HOTTINGER BRÜEL & KJÆR

English

Operating Manual

PanelX

HBM

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1 Support technique

If problems occur when working with the PanelX program, HBM technical support offers you:

E-mail support

support@hbkworld.com

Telephone support

Telephone support is available on all working days from 09:00 to 5:00 PM (CET):

+49 6151 803-0

Fax support

+49 6151 803-9100

You can get more assistance by signing up to a support or maintenance contract.

The following options are also available:

HBM on the Internet

https://www.hbkworld.com

Download software update from HBM

https://www.hbm.com/panelx

2 Introduction

We assume in this manual that

- You know how to use your Windows®operating system
- You know how to use Windows® online help
- You are familiar with the selected interface and its special features, for example the permitted line length at a given transmission speed or the minimum cable diameters to use.

In this section you will find

1. A list of system requirements.
2. A description of installation.
3. Instructions for uninstalling.
4. An explanation of the conventions and notations used in this help.

See also Quick start.

2.1 System requirements

To operate the PanelX program in the current version, you need a PC with the following minimum requirements:

- Intel Pentium processor or equivalent, with at least 1 GHz
- Windows® 7 or 8
- At least 1024 MBytes of main memory (RAM)
- Graphics or screen card with a resolution of at least 1024 x 768 pixels
- About 40 MBytes of free memory for the program installation
- One of the following interfaces to connect devices:
  - RS-232, RS-422 or RS-485 (connecting to standard commercial adapter via USB is also possible)
  - CANopen/DeviceNet: PCAN–USB adapter from PEAK-System Technik GmbH
  - PROFIBUS: Plug-in boards CP551x, CP561x or CP571x from Siemens. The Step7 programming environment must be installed to be able to use the functions.

2.2 Installation/upgrade

The installation requires Administrator rights. We recommend that you close all open programs.

Insert the USB flash drive in a USB interface on your PC. If you have deactivated the Windows Autostart function or have received the installation files via a download, find the “Setup.exe” file (root directory of the USB flash drive or download). Double-click on the associated icon to obtain the Start window.

Follow the instructions of the installation program. Define the directory where you want the software to be installed and specify the folder for the start menu in which the link to the program will be created. If necessary, setup.exe will create the directory you have specified and then copy all the files to it.

STEP7 from Siemens must be installed to be able to use the PROFIBUS interface.

The version of your program is displayed after the program starts in the window title and in menu **Help -> About**.

Upgrade

To upgrade from an existing version to a new version, you can install the new version without having to remove the old one previously. The installation program takes care of removing old components if necessary.

2.3 Uninstalling

To uninstall the PanelX program, open the list of installed Windows applications. Choose the PanelX entry and click on ***Uninstall***.

Opening the list of applications under Windows 10

In the taskbar search box type ***Change or remove a program*** and open the suggested Control Panel program.

Alternatively, you can also use **Settings -> System -> Apps & Features** in the **Start** menu.

Opening the list of apps under Windows 8/8.1

From the **Charms** menu on the Windows desktop (not in tile view) open **Settings -> Control Panel**. Double click on ***Programs and Features*** (**View by**: ***Small Icons***) or ***Uninstall***

program (**View by**: ***Category***).

Opening the list of programs under Windows 7

From the Windows **Start** menu select **Control panel -> Network and sharing center**. Double click on ***Programs and Features*** (**View by**: ***Small Icons***) or ***Uninstall program*** (**View by**: ***Category***).

Only the files created during installation are deleted. Files created during the use of the program are not removed.

2.4 Typographical conventions

For clear identification and improved legibility, the following conventions have been used in these instructions:

This symbol indicates an important detail or a special feature.

Paragraphs with this symbol offer a tip or explain an interesting feature.

► Lines with this symbol prompt you to do something, for example make an entry.

Individual terms within the text are highlighted in *italics*. Other special notations include the ***entries*** you need to make, all **buttons**, **checkboxes**, the names of **input fields**, etc. The **menus**, **commands**, **dialog boxes** and **windows used in the program,** as well as **tabs** and **groups** on the menu ribbon, are also identified.

We hope these notations will help you identify the relevant sections and menus more quickly, and guide you through the program in a user-friendly way.

3 Quick start

Digital sensor electronics, as an independent device or integrated into a transducer, allow for high-precision weight measurements as well as control of filling and batching processes and more. In Legal-For-Trade applications you can set up scales with resolution up to 6000 parts. You can also use linearization with intermediate points and various filters to optimize your measurements.

With independent devices you can connect up to 8 transducers. No distinction is made in this documentation between separate electronics (in a dedicated housing) and electronics integrated into a transducer. The term "sensor electronics" is used as a term to cover both.

The various versions offer you a series of different interfaces, from RS-232 to RS-422, RS-485 2-wire to RS-485 4-wire or PROFIBUS DP, CANopen or DeviceNet. Functionality does not depend on the interface. However, not all commands are available for every interface. This is indicated where appropriate in the list of commands.

The PanelX PC software is available to make it easy for you to set all parameters. You can download the software free of charge from the HBM web site in the "Digital weighing electronics" area: https://www.hbm.com/panelx.

3.1 Target groups for this documentation

This documentation is intended for two groups of users:

1. Users who would like to parameterize one of the sensor electronics units with the PanelX software or at least become familiar with the interface commands relevant for them in the software.
2. Users who have one of the applications listed in the *Applications* section and would like to become familiar with the settings and procedure required for it.

You should start with different sections in this documentation depending on which user group you belong to.

PanelX software

The best approach is to read the following sections:

- PanelX software
- The part of Interfaces about the one you are using
- The section in Starting up with an explanation of the basic settings you have to make

- Refer to the Functions as needed for explanations of working methods.
- Use the Command reference for details about individual commands and how they are used.

Applications

First read through the section about your Interface and consult details of your application in Applications to determine what procedure is suitable and which parameters should be set. Individual descriptions of the commands listed in the Applications section can be found in the Command reference.

This documentation also contains sections with sample applications for:

- Filling and dosing
- Checkweighers
- Sorting weighers

3.2 Sensor electronics units covered by this documentation

This documentation describes how to connect and operate via interfaces for the following sensor electronics units. The firmware version used is shown in brackets.
See also Overview: Which commands are in which firmware version?, Overview: Commands for P8x grouped by application category.

Transducer electronics

- AED9101B/C with AD103C (P7x)
- AED9101C-Z2/22 with AD103C (P7x)
- AED9101D with AD103C (P7x)
- AED9201B with AD103C (P7x)
- AED9301B with AD103C (P7x)
- AED9401A with AD103C (P7x)
- AED9501A with AD103C (P7x)
- PAD400xA (P8x)

Digital transducers of the FIT family

- FIT/0 (P7x)
- FIT/1 (P7x)
- FIT/5 (P7x)

- FIT5A (P8x)
- FIT7A (P8x)

Digital transducers of the PW15 family

- PW15AHi (P6x)
- PW15iA (P8x)
- C16i (P5x)

Measuring chains

- Measurement chain with AD104C (P5x)
- Measurement chain with AD105C (P5x)

Amplifier boards

- AD103C (P7x)
- AD104C (P5x)
- AD105C (P5x)
- AD105D (P8x)
- AD112D (P8x)

3.3 What other documentation is available?

Each of the individual sensor electronics units has its own installation location instructions, which you can download from the HBM website if necessary: https://www.hbm.com/support/downloads. You need Adobe Acrobat Reader to read this documentation. You can obtain Acrobat Reader at no cost if necessary from the Adobe website.

3.4 PanelX software

The PanelX software is available free of charge. You can download the current version from the HBM website if necessary: https://www.hbm.com/panelx.
The following sections will introduce you to working with the software.

3.4.1 The user interface

The menu ribbon contains various menu items for settings. For example, if you select **Checkweigher** for **Application**, an additional symbol appears so that you can configure that application. Some actions, for example saving the current settings for sensor electronics, are also accessible via an additional menu above the menu ribbon.

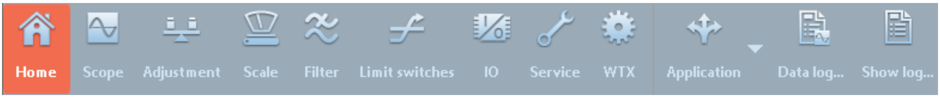


*Fig. 3.1 PanelX Ribbon in user level **Administrator**.*

User level

You can open different user levels from menu **Options -> User level**. To enhance clarity, different menu items are hidden depending on the level. All menu items are available on the **Administrator** user level.

The setting is not saved in the sensor electronics. It only applies to the current program (and the Windows user who is currently logged in). A password is not required.

Opening Help or a description of the command

Provided you have not clicked on any of the input fields that appear on the main page, open general Help for this page with F1. First click on the input field and then press F1 to open a description of the corresponding command. Once Help is displayed, it follows the selected content dynamically. The pages appear in an additional component window in the default setting to the right of the main screen.

Component window

In addition to the main window, there are two component windows in the default setting after the program starts: the **Measured values** window and the **Devices** window. You can also dock these windows at other places in the program window or position them anywhere on the screen. The windows appear again in their most recent position when the program starts.

Component window for measured values

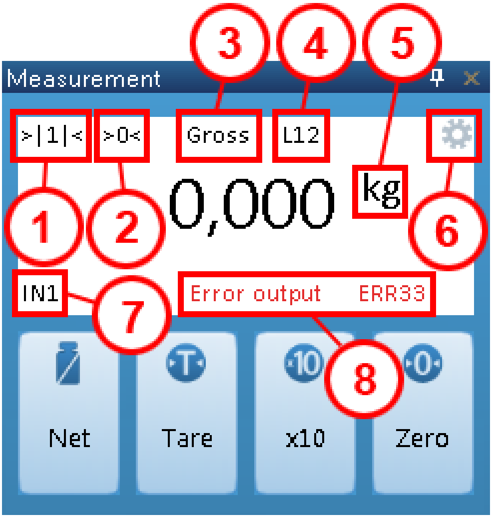


Fig. 3.2 Information displayed in component window Measurement.

1: Display of weighing range (in figure 1)
2: True zero
3: Displayed signal
4: If digital outputs are active, L and 1, 2, etc. are displayed for each active output. In the example shown here outputs 1 and 2 are active.
5: If the color of the unit in the display is black, this means standstill has been reached. Otherwise the color of the unit in the display is gray.
6: The rotating wheel indicates that the program is working and in contact with the sensor electronics.
7: If digital inputs are active, IN and 1 or 2 are displayed for each active output. Input 1 is active in the figure.
8: If errors occur the error message and an error number are displayed.

Clicking on one of the buttons, ***Tare*** or ***Zero*** (setting) starts the action. Clicking on ***x10*** increases the display resolution. Clicking on ***Gross***() or ***Net*** () switches the signal (3) that is displayed.

Devices component window

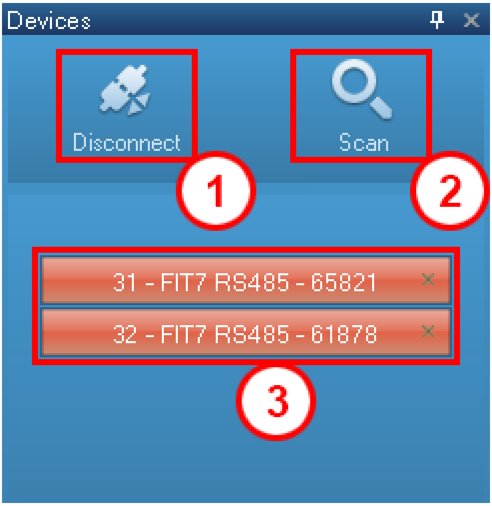


Fig. 3.3 Information displayed in component window Devices.

1: Terminates the connection to the currently displayed device
2: Opens the **Scan** dialog
3: Shows the connected sensor electronics with address, type, interface and serial number

If the connection to your sensor electronics has problems or is disconnected, click on the button with that sensor electronics unit (3) in the window. A connection is set up again.

3.4.2 The Home menu item in PanelX

The **Home** menu item leads to the home page, which shows the following areas after it has been connected with a sensor electronics unit:

- **Device Info**
- **Device State**
- The **Filler** or **Checkweigher** area if you have selected one of these applications. No checkweigher function is available with WTX110/120.

Device information

This area shows you detailed information about your sensor electronics:

- Type of sensor electronics
- Serial number or ID
- For electronics installed in a transducer, the maximum capacity of the transducer.
- The sensor electronics generation, for example the *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics or *4th generation* FIT5A, FIT7A, PAD400x, PW15iA.
- The version of the firmware and
- the date of the firmware version.

Device status

This area shows you:

- Status of digital inputs and outputs
- Peak values

You can also define which signal will be monitored by the peak values and you can manually ***reset*** the peak values.

Filler

If you have selected the “Filler” application, this area shows:

- The current measured value as a bar
- The status of the sensor electronics as a dosing process progresses, and which action is currently being performed
- Which values are currently being used for the values settings

You can use the two buttons to start or cancel the filling process

Checkweigher

If you have selected the “Checkweigher” application, this area shows:

- The trigger result (MAV)
- The number of triggerings since switching on or reset (TRN)
- The mean value of all triggerings since switching on or reset (TRN)
- The standard deviation of all triggerings since switching on or reset (TRN)

You can use ***Reset*** to delete old values (equivalent to reset, RES).

3.4.3 Working with the PanelX program

See also the The user interface.

Requirements

- Connect the transducer(s) to the electronics if you are not using any of the transducers with installed electronics.
- Connect the supply voltage.
- Connect the digital inputs and/or outputs if they are needed for your application.
- Connect the interface.

Connecting with the sensor electronics unit(s)

- Start the PanelX program.
  The first time the program starts, the **Scan** window opens automatically. When the program starts again, the most recently connected sensor electronics are connected again. However, you can open the dialog again by clicking on ***Scan*** in the **Devices** component window.

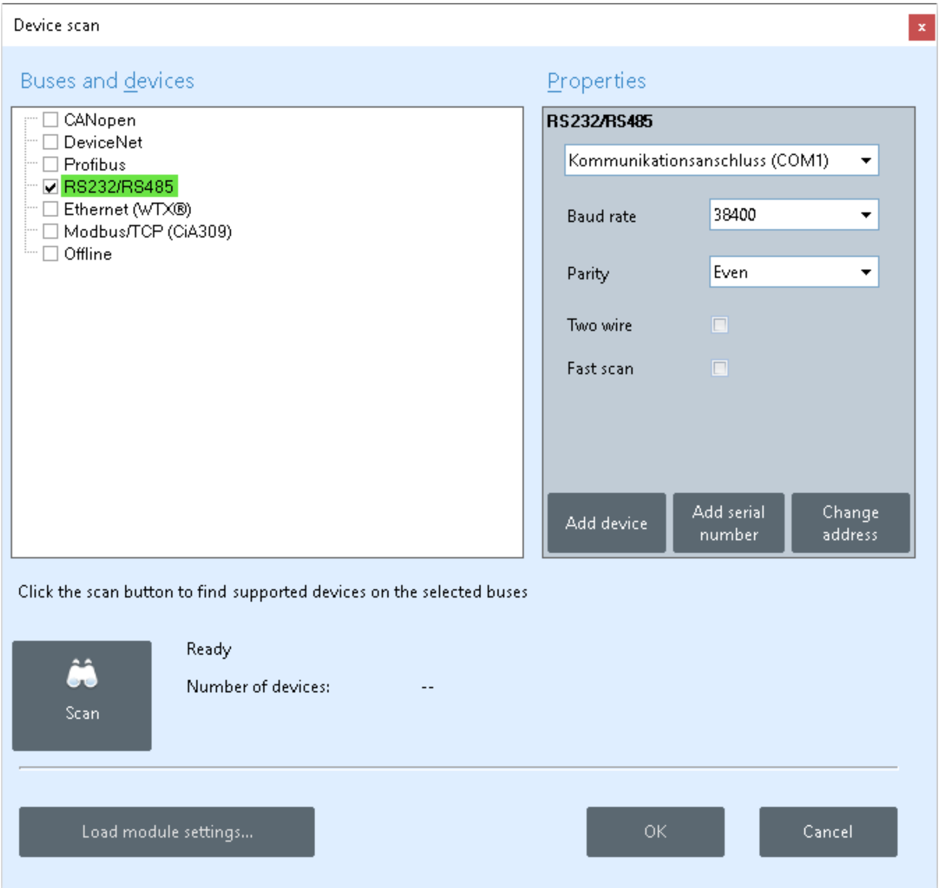


Fig. 3.4 The ***Scan*** *window.*

- In the **Buses and Devices** area mark the interface you use to connect the sensor electronics unit(s) with the PC.
- Enter the required data depending on the interface in the **Settings** area, for example the ***baud rate*** or the interface port to use if several are possible. You can use ***Add device*** and ***Add serial number*** with serial interfaces to search for a specific sensor electronics unit by its address or serial number and also to assign a new address to it with ***Change address***. With WTX110/120, you can set a new IP address in the dialog: Click on ***Change IP*** and set with ***Write***. In this case a new SSL certificate is automatically generated by PanelX; see also Ethernet (WTX110/120).

- Click on ***Find*** to search for the connected sensor electronics.
  Instead of "Read" you now see "Search running" and a progress bar appears next to the button. The number of sensor electronics units found is then displayed, with their address, type, serial number and firmware version shown under the marked interface.

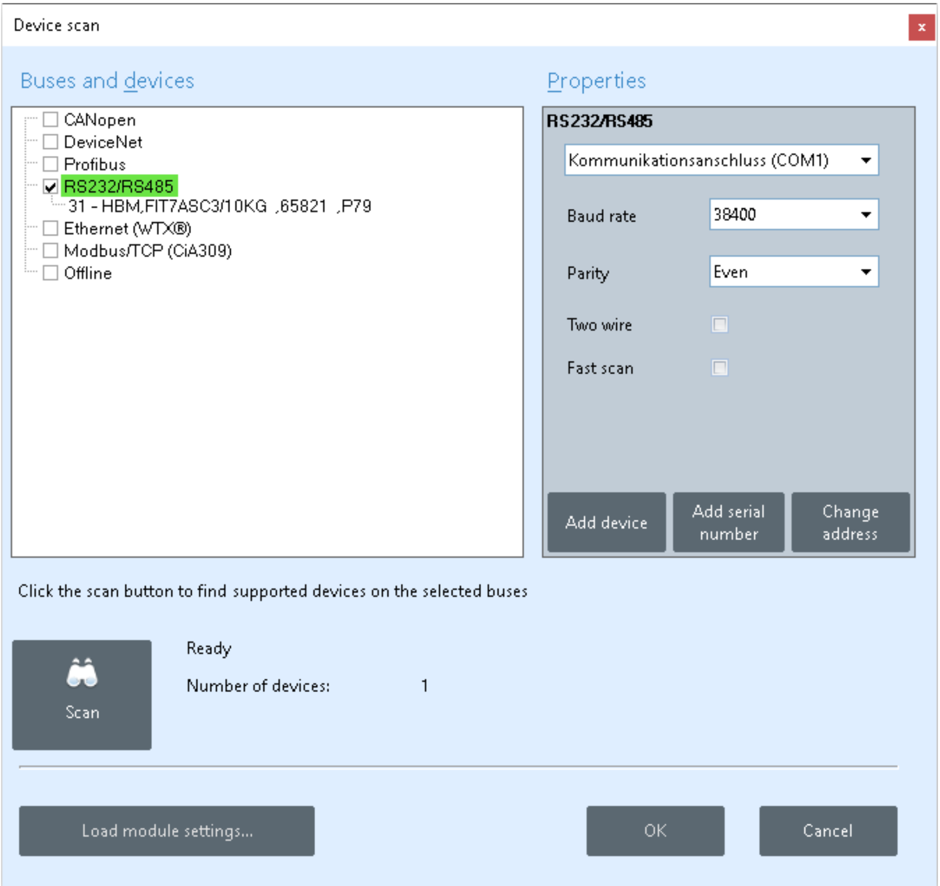


*Fig. 3.5 The **Scan** window with found sensor electronics.*

- Close the dialog with ***OK***.

Adjusting sensor electronics units

After the connection is made the Home menu appears. Go through the **Adjustment** and **Scale** menus and set the parameters required for your application. Either use **Application** to select your applications and directly view and make the settings needed for them, or go through the menus (**Filter**, **Limit values** etc.) to make the settings you need. For WTX110/120, first go to the **WTX** menu item and read in the data of your device.
See also Start-up, Starting up WTX110/120.

Use Scope to detect the effect of various settings or to find better settings with the current measured values.

Once you have connected to a device, the connection will be made automatically the next time you start PanelX. Click on ***Disconnect*** and then ***Scan*** to connect to a new device.

4 Communication via one of the interfaces

Communication behaves differently depending on the interface, even the same parameters are actually always set or read for the command. This section describes the general requirements for communication and setting up the commands you must send to the sensor electronics.

To set up the connection with a sensor electronics unit in the PanelX program, simply scan the interface on your PC that is connected to the sensor electronics: See Working with the PanelX program

4.1 CANopen®

The CANopen interface operates according to the CiA DS301 standard (**C**AN **i**n **A**utomation), see also ISO 11898. Communication is carried out over 2 lines with CAN H and CAN L. A bus termination resistor is required at the beginning and end of the bus, each with 120 Ω. You can only activate the resistors at the end of the bus system: If you activate more than 2 terminating resistors or they are not located at the ends, communication will only function to a limited extent (bus errors) or not at all.

To simplify wiring, the design of most sensor electronics features double connections for CAN H (CAN+) and CAN L (CAN-). This allows you to connect the lines on a node from the previous node and to the next node to separate connections. The connections are internally joined (bridged) to keep the stub lines as short as possible. The level of all lines is relative to GND. So the GND (0V) of the supply voltage must also be connected, but you must not connect GND with the shielding. Use a separate line to connect the digital ground of the nodes with the GND (0 V) of the power supply. Connect the cable shields with the housings of the sensor electronics or connector plugs so they *cover a wide area*.

Connection variants

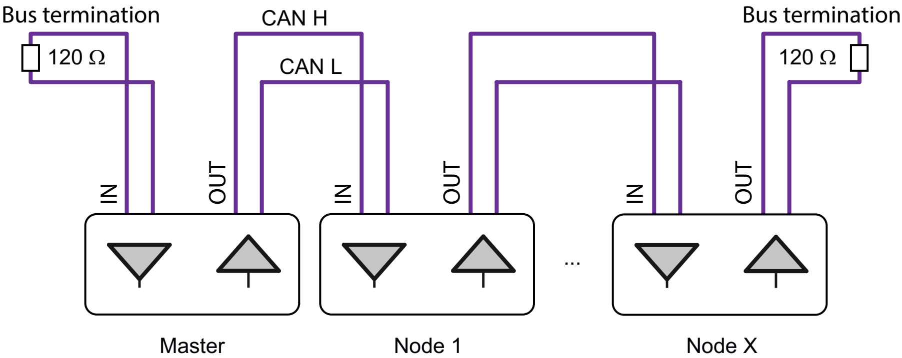


Fig. 4.1 Recommended connection variant

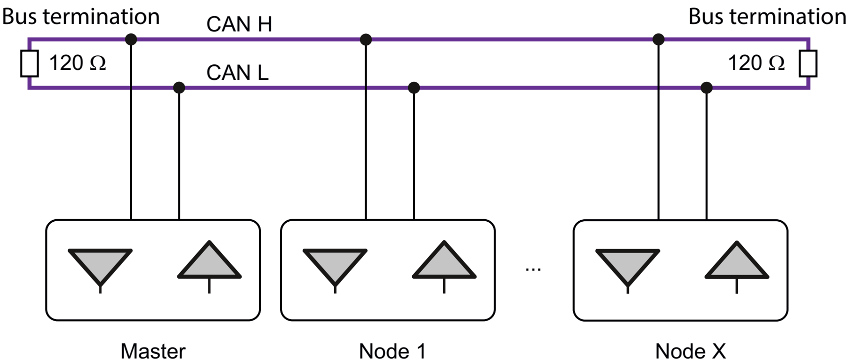


Fig. 4.2 Possible connection variant

Maximum cable length subject to bit rate

Bit rate in kBaud	10	20	50	125	250	500	800	1000
Max. cable length in m	5000	2500	1000	500	250	100	50	25

The maximum cable length is the total line length, calculated from the length of all the stub lines for each bus node and the line length between the nodes. The length of the stub lines per node is limited and depends on the bit rate being used. The stub lines in all sensor electronics with double connections are so short that they can be ignored.

Bit rate

The factory setting for bit rate is 125 kBaud. To change the bit rate use the PanelX program or a configuration tool for CANopen. The sensor electronics support the LSS protocol as defined by CiA DS305. So you can change the bit rate and address with the PanelX program or a CANopen configuration tool. Generally the change can only be made for one node. If necessary disconnect the node from the bus system or deactivate the other nodes.

Address range

An address is necessary to be able to identify the nodes in the bus system unambiguously. The address may be between 1 and 127. The factory setting is 63. To change the address use the PanelX program or a configuration tool for CANopen. The sensor electronics support the LSS protocol as defined by CiA DS305.

Estimating the bus load

The bus load depends on the number of nodes, the baud rate and the output rate, i.e. how many measured values will be generated. The following formula can be used for a system with the sensor electronics described in this documentation:

Bus load = (12000 * number of nodes * output rate) / baud rate

The bus load is expressed as a percentage if you indicate the baud rate in baud. If the bus load is more than 75% you should use a higher baud rate.

Project configuration of a bus system

The EDS file is included with delivery for project configuration. You can download the current version from the HBM website if necessary: https://www.hbm.com/support/downloads (Digital load cells and weighing electronics). You can also use LARcan from LARsys-Automation GmbH (http://www.larsys.com) or μCAN.open.ER from MicroControl GmbH & Co. KG (http://www.microcontrol.net) or similar programs as configuration tools.

Configure the address and baud rate and the cyclic PDOs for your bus system and if necessary modify the entries in the object directory. To complete the settings, save all parameters (and the object directory) to the non-volatile memory of the transducer electronics with the TDD1 command.

Note when parameterizing that some parameters can only be changed in a certain order, for example adjusting the characteristic curve.

CANopen communication

The sensor electronics in this documentation support the following functions:

- Cyclic process data (PDOs) for measurement output and to control functions (event-controlled by measured values or time-controlled). Re-mapping of PDOs is not supported. You can only change the COBIDs of PDOs by using the node number. The data format of the PDOs and the value ranges of parameters can be found in the Command reference.
- Service Data Objects (SDOs) for access to all parameters. The data format of the PDOs and the value ranges of parameters can be found in the Command reference.
- Output of an emergency object.
- Error messages and alarm states.

It is not practical to overwrite all parameters. Only change the parameters that are useful for your application.

Special features

- Some of the parameters have to be executed in a specific order, for example the characteristic curve settings.
- After password protection is activated, the commands identified in the **Password protection** line with **Yes** are not executed until after you have entered the password (SPW). Otherwise you will receive an error message.
- When Legal-For-Trade mode is activated (LFT, P1 > 0), the commands identified in the **Disabled in Legal-For-Trade mode** line with **Yes** are not executed until after you have deactivated Legal-For-Trade mode. Otherwise you will receive an error message.

4.1.1 Process Data Objects (PDOs)

Measured values and states that are collected are transferred as PDOs (**P**rocess **D**ata **O**bjects). Measured values and states are sent without further identification under a defined CAN identifier. You do not need a query command for this.

The send PDO1 (measured value/status) is sent cyclically. The sampling rate depends on the parameters that are set, for example the filters you are using. Then send PDOs 2 to 5 (trigger value, dosing result, peak values and alarm status) are always sent if a new value is present (acyclic transmission). You can also switch these send PDOs to cyclic mode. In this case, data is transferred via the SYNC object, regardless of whether there are any current measured values. You can also use SDOs to read out measured values and states.

Re-mapping of PDO COB-IDs is not supported. The only way to change COB-IDs is with the node number.

Input data (sent from the transducer electronics)

PDO No.	Command shortform	CAN-ID	Meaning
1	MSV	180*hex* (hexadecimal) + module address	Measured value (LSB–MSB, 4 bytes *SINT32* (Signed Integer 32 bit)) and Status (2 bytes *UINT16* (Unsigned Integer 16 bit))
2	MAV	280*hex* (hexadecimal) + module address	Trigger result (LSB–MSB, 4 bytes *SINT32* (Signed Integer 32 bit)), Status (2 bytes *UINT16* (Unsigned Integer 16 bit)) and Trigger counter (2 bytes *UINT16* (Unsigned Integer 16 bit))[1)]
3	FRS	380*hex* (hexadecimal) + module address	Dosing result (LSB–MSB, 4 bytes *SINT32* (Signed Integer 32 bit)), Status (2 bytes *UINT16* (Unsigned Integer 16 bit)) and Dosing counter (2 bytes *UINT16* (Unsigned Integer 16 bit))[1)]
4	PVA	480*hex* (hexadecimal) + module address	Peak value min (LSB–MSB, 4 bytes *SINT32* (Signed Integer 32 bit)) and max (LSB–MSB, 4 bytes)
5[2)]	–	300*hex* (hexadecimal) + module address	Alarm status (LSB–MSB, 4 bytes *UINT32* (Unsigned Integer 32 bit), defined by the event masks EMA/EMB)

[1)] There is no trigger counter or dosing counter with APD0 and APD1; see also APD (Alternative Poll Data).

[2)] PDO5 (alarm status) is marked in the object dictionary as invalid (index 1804*hex* (hexadecimal), subindex 1, bit 31), because the CiA DS301 defines only 4 transmit PDOs. So use a configuration tool to enable the transmit PDO5.

Output data (sent to the transducer electronics)

The control word is required for functions such as taring, zeroing, setting the target status of outputs or controlling dosing processes.

Starting/stopping output of cyclic PDOs

Cyclic PDOs are not sent until the nodes are in "Operational" state. To do this send the following message:

CAN-ID	0*hex* (hexadecimal)
Data byte 1	1*hex* (hexadecimal)
Data byte 2	Module address, 0 = all nodes

Sending is stopped if you send the following message (Enter_Pre_Operational_State):

CAN-ID	0*hex* (hexadecimal)
Data byte 1	80*hex* (hexadecimal)
Data byte 2	Module address, 0 = all nodes

4.1.2 Service Data Objects (SDOs)

Commands for parameterizing transducer electronics are transferred as SDOs (**S**ervice **D**ata **O**bjects). Various parameters can be addressed via index and subindex, see section Command reference. Data formats longer than one byte are always transmitted in LSB–MSB order.

Reading a parameter

Output data (sent to the transducer electronics)

CAN-ID	600*hex* (hexadecimal) + module address
Data byte 1	40*hex* (hexadecimal)
Data bytes 2 and 3	Index (LSB–MSB)
Data byte 4	Subindex
Data bytes 5 to 8	0

Depending on the parameter, 1 to 4 bytes are send as response. 8 bytes are sent for an error with information about the error.

Input data for 1-byte response

CAN-ID	580*hex* (hexadecimal) + module address
Data byte 1	4F*hex* (hexadecimal)
Data bytes 2 and 3	Index (LSB–MSB)
Data byte 4	Subindex
Data byte 5	Parameter value
Data bytes 6 to 8	Empty

Input data for 2-byte response

CAN-ID	580*hex* (hexadecimal) + module address
Data byte 1	4B*hex* (hexadecimal)
Data bytes 2 and 3	Index (LSB–MSB)
Data byte 4	Subindex
Data bytes 5 and 6	Value of the parameter (LSB–MSB)
Data bytes 7 and 8	Empty

Input data for 3-byte response

CAN-ID	580*hex* (hexadecimal) + module address
Data byte 1	47*hex* (hexadecimal)
Data bytes 2 and 3	Index (LSB–MSB)
Data byte 4	Subindex
Data bytes 5 to 7	Value of the parameter (LSB–MSB)
Data byte 8	Empty

Input data for 4-byte response

CAN-ID	580*hex* (hexadecimal) + module address
Data byte 1	43*hex* (hexadecimal)
Data bytes 2 and 3	Index (LSB–MSB)
Data byte 4	Subindex
Data bytes 5 to 8	Value of the parameter (LSB–MSB)

Writing a parameter

Output data (sent to the transducer electronics)

CAN-ID	600*hex* (hexadecimal) + module address
Data byte 1	2F*hex* (hexadecimal): Write 1 byte 2B*hex* (hexadecimal): Write 2 bytes 27*hex* (hexadecimal): Write 3 bytes 23*hex* (hexadecimal): Write 4 bytes
Data bytes 2 and 3	Index (LSB–MSB)
Data byte 4	Subindex
Data bytes 5 to 8	Value of the parameter (LSB–MSB)

Use 0x7FFFFF as the parameter to send a command that does not use a parameter via CANopen.

Depending on the parameter, 1 to 4 bytes are required for the parameter value. If the command can be executed, the following input data is returned by the transducer electronics (value = 0). 8 bytes are sent for an error with information about the error.

Input data (sent from the transducer electronics)

CAN-ID	580*hex* (hexadecimal) + module address
Data byte 1	60*hex* (hexadecimal)
Data bytes 2 and 3	Index (LSB–MSB)
Data byte 4	Subindex
Data bytes 5 to 8	0

Input data with error (sent from the transducer electronics)

CAN-ID	580*hex* (hexadecimal) + module address
Data byte 1	80*hex* (hexadecimal)
Data bytes 2 and 3	Index (LSB–MSB)
Data byte 4	Subindex
Data bytes 5 and 6	Error code: 10*hex* (hexadecimal): Parameter value invalid 11*hex* (hexadecimal): Sub-index does not exist 12*hex* (hexadecimal): Length too great 13*hex* (hexadecimal): Length too small 20*hex* (hexadecimal): Service cannot be executed at present 21*hex* (hexadecimal): - because of local checking 22*hex* (hexadecimal): - because of device status 30*hex* (hexadecimal): Parameter value range overflow 31*hex* (hexadecimal): Parameter value too big 32*hex* (hexadecimal): Parameter value too small 40*hex* (hexadecimal): Value incompatible with other settings 41*hex* (hexadecimal): Data cannot be mapped 42*hex* (hexadecimal): PDO length overflow 43*hex* (hexadecimal): General incompatibility
Data byte 7	Error code: 1: Object access not supported 2: Object does not exist 3: Parameter inconsistent 4: Illegal parameter 6: Hardware errors 7: Type conflict 9: Object attributes inconsistent (sub-index does not exist)
Data byte 8	Error class: 5: Service faulty 6: Access error 8: Other error

4.1.3 Measured value status

The measured value status is sent with PDOs 1 to 3. The status information depends on the operating mode (IMD command). Additional status information is available for example with the RIO command (firmware version P73 or higher) or process data object PDO5. The CSM command has no effect on CANopen.
See also MAV for trigger status, FRS for dosing status.

IMD with parameter P1 = 0, standard mode

Bit	Meaning when bit is set (= 1)
15	Error in ESR status
14	Control input 2 active (1)
13	Bridge excitation voltage error
12	Short circuit digital outputs OUT1 … 4
11	Tare value has been set manually (preset tare)[1)]
10	Weighing range 2 active (MRA)[2)]
9	Indicating range exceeded, see also LFT
8	True zero (0 ± 0.25 d)[2)]
7	Overflow/underflow (analog-to-digital converter/gross/net, see also ESR)
6	Weighing range 2 active (MRA)
5	Limit value 2 active (LIV2)
4	Limit value 1 active (LIV1)
3	Standstill (MTD)
2	Control input 1 active (1)
1	True zero (0 ± 0.25 d)
0	Gross (bit0 = 0 means the net signal will be transmitted), see also TAS

1) Starting with firmware version P81.
2) Starting with firmware version P73.

IMD with parameter P1 = 1, trigger mode

Bit	Meaning when bit is set (= 1)
15	Error in ESR status
14	Control input 2 active (taring)
13	Bridge excitation voltage error
12	Short circuit digital outputs OUT1 ... 4
11	Zero balance performed (CDL, CDT, DZM, DZT)[1)]
10	Weighing range 2 active (MRA)[2)]
9	Indicating range exceeded, see also LFT
8	True zero (0 ± 0.25 d)[2)]
7	Overflow/underflow (analog-to-digital converter/gross/net, see also ESR)
6	Trigger function active (TRC)
5	Limit value 2 active (LIV2) for LFT < 3 or tare value set (manually) for LFT = 3[3)]
4	Limit value 1 active (LIV1)
3	Standstill (MTD)
2	Trigger result available (MAV)
1	Control input 1 active (external trigger)
0	Gross (bit0 = 0 means the net signal will be transmitted), see also TAS

1) Starting with firmware version P77, the bit is reset after output.
2) Starting with firmware version P73.
3) Starting with firmware version P81.

IMD with parameter P1 = 2, dosing mode

Bit	Meaning when bit is set (= 1)
15	Error in ESR status
14	Control input 1 active (stop function)
13	Bridge excitation voltage error
12	Short circuit digital outputs OUT1 ... 4

Bit	Meaning when bit is set (= 1)
11	Lower tolerance limit exceeded during batching (LTL)
10	Upper tolerance limit exceeded during batching (UTL)
9	Indicating range exceeded, see also LFT
8	Dosing time overrun (MDT)
7	Overflow/underflow (analog-to-digital converter/gross/net, see also ESR)
6	Alarm output active (SDF)
5	Fill flow active, see also CBK, FBK
4	Emptying active, see also EWT
3	Redosing active, see also RDS
2	Batching ready signal (FRS can be read out)
1	Fine flow active
0	Coarse flow active

4.1.4 Alarm status (event mask)

Whether the alarm status is generated and sent depends on the settings for the EMA and EMB commands.
See also Process Data Objects (PDOs).

EMA	EMB	Meaning
0	0	PDO 5 (alarm status) is not generated.
1	0	PDO 5 (alarm status) is generated if an error state occurs.
0	1	PDO 5 (alarm status) is generated if an error state disappears.
1	1	PDO 5 (alarm status) is generated if an error state occurs or disappears.

Input data (sent from the transducer electronics)

CAN-ID	300*hex* (hexadecimal) + module address
Data bytes 1 to 4	Alarm status (LSB–MSB)

Meaning of the status bits

Bit	Meaning when bit is set (= 1)
31	ESR error
30	Residual flow active
29	Bridge excitation voltage error
28	Short circuit digital outputs OUT1 … 4
27	Lower tolerance limit exceeded during batching (LTL)
26	Upper tolerance limit exceeded during batching (UTL)
25	Indicating range exceeded, see also LFT
24	Dosing time exceeded (MDT)
23	A peak value is available (PVA). The bit will be deleted after a query.
22	Dosing error (ALARM)
21	A peak result is available (FRS). The bit will be deleted after a query.
20	Broken bag/damaged container
19	A measured value is available (MSV). The bit will be deleted after a query.
18	Zero balance was performed. The bit will be deleted after a query.
17	Overflow/underflow analog-to-digital converter, see also ESR
16	Overflow/underflow gross, see also ESR
15	Overflow/underflow net, see also ESR
14	Control input 2 active
13	Batching ready signal (FRS can be read out)
12	Emptying active, see also EWT
11	Fine flow active
10	A trigger result is available (MAV). The bit will be deleted after a query.
9	Coarse flow active
8	Redosing active, see also RDS
7	Trigger function active (TRC)

Bit	Meaning when bit is set (= 1)
6	Weighing range 2 active (MRA). Otherwise (bit = 0) weighing range 1 is active.
5	Limit value 2 active (LIV2)
4	Limit value 1 active (LIV1)
3	Standstill, see also MTD
2	Control input 1 active
1	True zero (0 ± 0.25 d)
0	The gross weight is transmitted. Otherwise (bit = 0) the net signal is transmitted. See also TAS.

4.1.5 Control word

You can trigger various functions with the control word without sending the individual commands. You can also write the control word in the acyclic data.

Output data (sent to the transducer electronics)

CAN-ID	200*hex* (hexadecimal) + module address
Data bytes 1 and 2	Control word (LSB–MSB), *UINT16* (Unsigned Integer 16 bit)
Data byte 4	Subindex
Data bytes 5 to 8	0

For bits 0 and 2 through 7, trigger the corresponding function by setting the bit (= 1). If you would like to read out the function, first delete the bit and then reset it. For bit 1: If the bit is set (= 1), gross values will be transmitted, otherwise net values (= 0). Bits 10 through 15 set the target status to the value of the bit.

Meaning of the bits in the control word

Bit	Meaning
15	Desired state Output 6[1)]
14	Desired state Output 5[1)]
13	Desired state Output 4[1)]

Bit	Meaning
12	Desired state Output 3[1)]
11	Desired state Output 2[1)]
10	Desired state Output 1[1)]
9	Reserved[2)]
8	Reserved[2)]
7	Clear peak values (CPV)
6	Zero balance (CDL)
5	Clear trigger results (CTR)
4	Cancel batching (BRK)
3	Start batching (RUN)
2	Delete batching results (CSN)
1	Gross/Net selection[3)] (TAS)
0	Taring (TAR)

1) The target status of outputs 1 through 6 is only activated if the “Batching” mode of operation is turned off (IMD with parameter P1 = 0) and the corresponding limit switches 1 through to 4 are deactivated (LIV1 to LIV4).
2) The reserved bits are assigned to internal functions and cannot be set.
3) Starting with firmware version P73.

4.1.6 Busy flag

Commands LDW, LFT, LWT, SFA, SZA and TDD require up to 4.5 seconds to run. The Busy flag (Bit 0) is set during this time. Watch the flag to see when processing ends.

Output data (sent to the transducer electronics)

CAN-ID	600*hex* (hexadecimal) + module address
Data byte 1	40*hex* (hexadecimal)
Data bytes 2 and 3	Index (LSB–MSB): 2000*hex* (hexadecimal)

Data byte 4	Subindex: 0C*hex* (hexadecimal)
Data bytes 5 to 8	0

Input data (sent from the transducer electronics)

CAN-ID	580*hex* (hexadecimal) + module address
Data byte 1	4F*hex* (hexadecimal)
Data bytes 2 and 3	Index (LSB–MSB)
Data byte 4	Subindex
Data byte 5	Busy flag (*UINT8* (Unsigned Integer 8 bit))
Data bytes 6 to 8	Empty

Meaning of the bits in the Busy flag

Bit	Meaning when bit is set (= 1)
7	Error while executing the command.
6	Reserved
5	Reserved
4	Reserved
3	Reserved
2	Reserved
1	Reserved
0	The command is still being executed.

4.1.7 Emergency object

The object is sent if one of the errors included in the error bits occurs.

You can activate the alarm status independently of the emergency object as send PDO 5 via EMA and EMB, see Alarm status.

Input data (sent from the transducer electronics)

CAN-ID	80*hex* (hexadecimal)+ module address
Data byte 1	FF*hex* (hexadecimal)
Data byte 2	Error status tab, see ESR (*UINT16* (Unsigned Integer 16 bit))
Data byte 3	Error bits
Data bytes 4 to 8	Reserved

Meaning of the error bits (data byte 3)

Bit	Meaning when bit is set (= 1)
7	Reserved
6	Reserved
5	Dosing alarm (SDF)
4	Maximum dosing time exceeded (MTD)
3	Fill flow too low (CBK, FBK)
2	Bridge excitation voltage error
1	Short circuit digital outputs OUT1 ... 4
0	Overflow or underflow (analog-to-digital converter/gross/net, see also ESR)

4.2 DeviceNet®

The DeviceNet interface is based on ISO 11898 and was standardized in EN 50325. As the hardware is based on CANopen, also read information about the CANopen interface. However, there are some restrictions compared to CANopen. Communication is also carried out over 2 lines. A bus termination resistor is required at the beginning and end of the bus, each with 120 Ω. You can only activate the resistors at the end of the bus system. If you activate more than 2 terminating resistors or they are not located at the ends, communication will only function to a limited extent (bus errors) or not at all.

To simplify wiring, the design of most sensor electronics features double connections for CAN H and CAN L. This allows you to connect the lines on a node from the previous node and to the next node to separate connections. The connections are internally joined (bridged) to keep the stub lines as short as possible. The level of all lines is relative to

GND. Therefore the GND (0V) of the supply voltage must also be connected, but you must not connect GND with the shielding. Use a separate line to connect the digital ground of the nodes with the GND (0 V) of the power supply. Connect the cable shields with the housings of the sensor electronics or connector plugs so they *cover a wide area*.

Only 8/8 attribute format is supported, in other words classes, entities and attributes are addressed as *UINT8* (Unsigned Integer 8 bit).

Connection variants

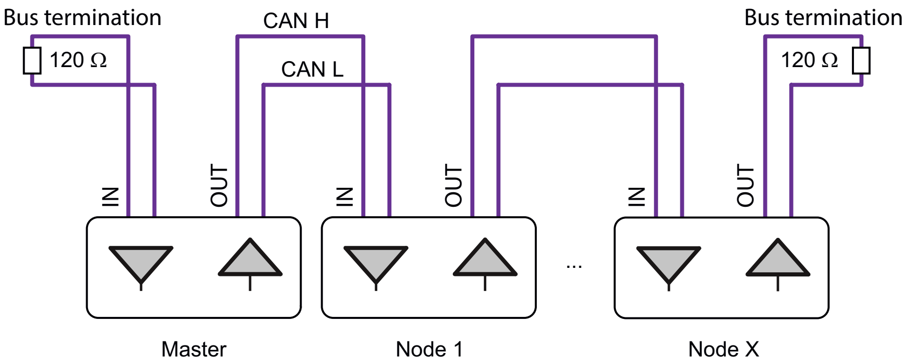


Fig. 4.3 Recommended connection variant

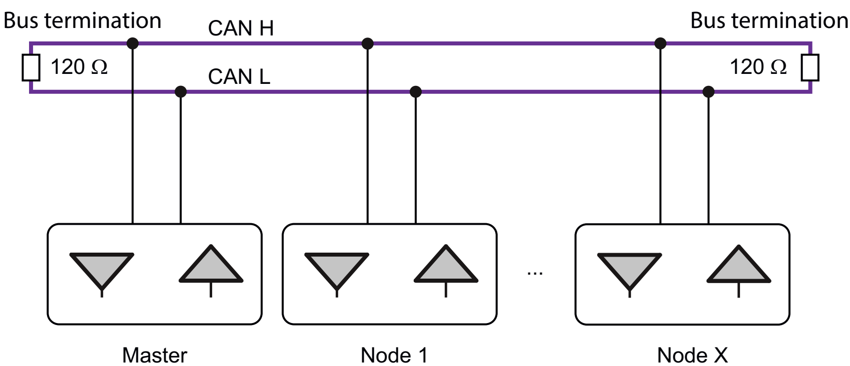


Fig. 4.4 Possible connection variant

Maximum cable length subject to baud rate

Baud rate in kBaud	125	250	500
Max. cable length in m	500	250	100

The maximum cable length is the total line length, calculated from the length of all the stub lines for each bus node and the line length between the nodes. The length of the stub lines per node is limited and depends on the baud rate being used.

Baud rate

The factory setting for baud rate is 125 kBaud. To change the baud rate use the PanelX program or a configuration tool for DeviceNet.

Address range

An address is necessary to be able to identify the nodes in the bus system unambiguously. The address may be between 1 and 63. The factory setting is 63. To change the address use the PanelX program or a configuration tool for DeviceNet.

Estimating the bus load

The bus load depends on the number of nodes, the baud rate and the sample rate, i.e. how many measured values will be generated. The following formula can be used for a system with the sensor electronics described in this documentation:

Bus load = (33900 * number of nodes * sample rate) / baud rate

The bus load is expressed as a percentage if you indicate the baud rate in baud. If the bus load is more than 75% you should use a higher baud rate.

Project configuration of a bus system

The EDS file is included with delivery for project configuration. You can download the current version from the HBM website if necessary: https://www.hbm.com/support/downloads (Digital load cells and weighing electronics). In addition to the PanelX program, you can also use LARcan from LARsys-Automation GmbH (http://www.larsys.com) for configuration tools.
Configure the address and baud rate and the cyclic data (polled connection) for your bus system. Finally save all parameters to the non-volatile memory of the device with the TDD1 command.

DeviceNet communication

The sensor electronics in this documentation support "Group2 only, predefined Connection Set" and therefore the following functions:

- Cyclic data exchange for measurement output: Cyclic messages/change-of-state messages, poll messages and bit-strobe messages
- Acyclic data exchange with explicit messages
- Output of an emergency object
- Error messages and event masking

The data format of the commands and the value ranges of parameters can be found in the Command reference.

It is not practical to overwrite all parameters. Only change the parameters that are useful for your application.

Special features

- Some of the parameters have to be executed in a specific order, for example the characteristic curve settings.
- The production number set by HBM must not be changed.
- Password protection is not taken into consideration for communication via DeviceNet.
- When Legal-For-Trade mode is activated (LFT, P1 > 0), the commands identified in the **Disabled in Legal-For-Trade mode** line with **Yes** are not executed until after you have deactivated Legal-For-Trade mode. Otherwise you will receive an error message.

4.2.1 Examples of DeviceNet communication

Use 0x7FFFFF as the parameter to send a command that does not use a parameter via DeviceNet.

Example 1: Send reset telegram

Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
05FF	00	89	03	87	D6	12	00	x
CAN-ID	Port number	Vendor ID, 0389*hex* (hexadecimal) = HBM		Serial number 1234567= 0012D687*hex* (hexadecimal)				

Example 2: Open explicit and poll connection to the device

The connection to the device is opened with MAC-ID 8.

Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0446	01	4B	03	01	03	01	-	-
CAN-ID	MAC ID master	Service code allocate	Class ID	Instance ID	Reason: Explicit and poll	MAC ID allocator		

Response from device:

Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0443	01	CB	00	-	-	-	-	-
CAN-ID	MAC ID master	Response code	Device sup-ports 8-bit message format					

Example 3: Cyclic data exchange after the poll connection is opened

The master (PLC) sends the control word indicating what data/actions are requested. The control word (or control byte) must be sent again for every response. In the example below a 16-bit control word is specified (APP command with parameter P1 = 0). You can also use the APP command with parameter P1 = 1 to define that only one 8-bit control word will be used.

See also Control word, APP, STB, STW, MSV, MAV, FRS.

Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0445 (CAN-ID)	Control word LSB	Control word MSB	–					

The following data is outputted depending on the P1 parameters for APD and IMD:

P1 of APD	P1 of IMD	Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte	9th byte	10th byte	11th byte	12th byte	13th byte	14th byte
0	0	0400 (CAN-ID)	00 (message header)	IMD value	MSV value (LSB–MSB, measured value in 32 bits)				MSV status[1] (LSB–MSB, 16 bit)		MAV value[2] (LSB–MSB, measured trigger in 32 bits)				MAV status[1] (LSB–MSB, 16 bits)	
0	1	0400	00	IMD value	MSV value (LSB–MSB)				MSV status[1] (LSB–MSB)		MAV value[2] (LSB–MSB)				MAV status[1] (LSB–MSB)	
0	2	0400	00	IMD value	MSV value (LSB–MSB)				MSV status[1] (LSB–MSB)		FRS value (LSB–MSB, dosing result in 32 bits)				FRS status[1] (LSB–MSB)	

<table>
<tr><th>P1 of APD</th><th>P1 of IMD</th><th>Iden-tifier</th><th>1st byte</th><th>2nd byte</th><th>3rd byte</th><th>4th byte</th><th>5th byte</th><th>6th byte</th><th>7th byte</th><th>8th byte</th><th>9th byte</th><th>10th byte</th><th>11th byte</th><th>12th byte</th><th>13th byte</th><th>14th byte</th></tr>
<tr><td>1</td><td>0</td><td>0400</td><td>00</td><td colspan="4">MSV value (LSB–MSB, meas-ured value in 32 bits)</td><td colspan="2">MSV status[1)] (LSB–MSB, 16 bit)</td><td colspan="4">MAV value[2)] (LSB–MSB, measured trigger in 32 bits)</td><td colspan="2">MAV status[1)] (LSB–MSB, 16 bits)</td><td>IMD value</td></tr>
<tr><td>1</td><td>1</td><td>0400</td><td>00</td><td colspan="4">MSV value (LSB–MSB)</td><td colspan="2">MSV status[1)] (LSB–MSB)</td><td colspan="4">MAV value[2)] (LSB–MSB)</td><td colspan="2">MAV status[1)] (LSB–MSB)</td><td>IMD value</td></tr>
<tr><td>1</td><td>2</td><td>0400</td><td>00</td><td colspan="4">MSV value (LSB–MSB)</td><td colspan="2">MSV status[1)] (LSB–MSB)</td><td colspan="4">FRS value (LSB–MSB, dos-ing result in 32 bits)</td><td colspan="2">FRS status[1)] (LSB–MSB)</td><td>IMD value</td></tr>
<tr><td>2</td><td>0</td><td>0400</td><td>00</td><td>IMD value</td><td colspan="4">MSV value (LSB–MSB, meas-ured value in 32 bits)</td><td colspan="2">MSV status[1)] (LSB–MSB, 16 bit)</td><td colspan="4">MAV value[3)] (LSB–MSB, measured trigger in 32 bits)</td><td colspan="2">MAV status[1)] (LSB–MSB, 16 bits)</td></tr>
<tr><td>2</td><td>1</td><td>0400</td><td>00</td><td>IMD value</td><td colspan="4">MSV value (LSB–MSB)</td><td colspan="2">MSV status[1)] (LSB–MSB)</td><td colspan="4">MAV value[3)] (LSB–MSB)</td><td colspan="2">MAV status[1)] (LSB–MSB)</td></tr>
<tr><td>2</td><td>2</td><td>0400</td><td>00</td><td>IMD value</td><td colspan="4">MSV value (LSB–MSB)</td><td colspan="2">MSV status[1)] (LSB–MSB)</td><td colspan="4">FRS value (LSB–MSB, dos-ing result in 32 bits)</td><td colspan="2">FRS status[1)] (LSB–MSB)</td></tr>
</table>

P1 of APD	P1 of IMD	Iden-tifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte	9th byte	10th byte	11th byte	12th byte	13th byte	14th byte
3	0	0400	00	MSV value (LSB–MSB, measured value in 32 bits)				MSV status[1] (LSB–MSB)		MAV value[3] (LSB–MSB, measured trigger in 32 bits)				MAV status[1] (LSB–MSB, 16 bits)		IMD value
3	1	0400	00	MSV value (LSB–MSB)				MSV status[1] (LSB–MSB)		MAV value[3] (LSB–MSB)				MAV status[1] (LSB–MSB)		IMD value
3	2	0400	00	MSV value (LSB–MSB)				MSV status[1] (LSB–MSB)		FRS value (LSB–MSB, dosing result in 32 bits)				FRS status[1] (LSB–MSB)		IMD value
4	x[4]	0400	00	MSV value (LSB–MSB, 24 bits)			–									
5	x[4]	0400	00	MAV value[3] (LSB–MSB, 24 bits)			–									
6	x[4]	0400	00	FRS value (LSB–MSB, 24 bits)			–									
7	x[4]	0400	00	MSV value (LSB–MSB, 32 bits)				–								
8	x[4]	0400	00	MAV value[3] (LSB–MSB, 32 bits)				–								

P1 of APD	P1 of IMD	Iden-tifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte	9th byte	10th byte	11th byte	12th byte	13th byte	14th byte
9	x[4]	0400	00	FRS value (LSB–MSB, 32 bits)				–								
10	x[4]	0400	00	MSV status[1] (8 bits)	–											
11	x[4]	0400	00	MAV status[1] (8 bits)	–											
12	x[4]	0400	00	FRS status[1] (8 bits)	–											
13	x[4]	0400	00	MSV status[1] (LSB–MSB, 16 bits)		–										

P1 of APD	P1 of IMD	Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte	9th byte	10th byte	11th byte	12th byte	13th byte	14th byte
14	x[4]	0400	00	MAV status[1] (LSB–MSB, 16 bits)		–										
15	x[4]	0400	00	FRS status[1] LSB–MSB, (16 bits)		–										
16	x[4]	0400	00	MSV value (LSB–MSB, 24 bits)			MSV status[1] (8 bits)	–								
17	x[4]	0400	00	MSV value (LSB–MSB, 24 bits)			MSV status[1] (LSB–MSB, 16 bits)		–							
18	x[4]	0400	00	MSV value (LSB–MSB, 32 bits)				MSV status[1] (8 bits)	–							

P1 of APD	P1 of IMD	Iden-tifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte	9th byte	10th byte	11th byte	12th byte	13th byte	14th byte
19	x[4)]	0400	00	MSV value (LSB–MSB, 32 bits)				MSV status[1)] (LSB–MSB, 16 bits)		–						
20	x[4)]	0400	00	MAV value[3)] (LSB–MSB, 24 bits)			MAV status[1)] (8 bits)	–								
21	x[4)]	0400	00	MAV value[3)] (LSB–MSB, 24 bits)			MAV status[1)] (LSB–MSB, 16 bits)		–							
22	x[4)]	0400	00	MAV value[3)] (LSB–MSB, 32 bits)				MAV status[1)] (8 bits)	–							
23	x[4)]	0400	00	MAV value[3)] (LSB–MSB, 32 bits)				MAV status[1)] (LSB–MSB, 16 bits)		–						

P1 of APD	P1 of IMD	Iden-tifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte	9th byte	10th byte	11th byte	12th byte	13th byte	14th byte
24	x[4)]	0400	00	FRS value (LSB–MSB, 24 bits)			FRS status[1)] (8 bits)	–								
25	x[4)]	0400	00	FRS value (LSB–MSB, 24 bits)			FRS status[1)] (LSB–MSB, 16 bits)		–							
26	x[4)]	0400	00	FRS value (LSB–MSB, 32 bits)				FRS status[1)] (8 bits)	–							
27	x[4)]	0400	00	FRS value (LSB–MSB, 32 bits)				FRS status[1)] (LSB–MSB, 16 bits)		–						
28	x[4)]	0400	00	MAV value[2)] (LSB–MSB, 24 bits)			–									
29	x[4)]	0400	00	MAV value[2)] (LSB–MSB, 32 bits)				–								

P1 of APD	P1 of IMD	Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte	9th byte	10th byte	11th byte	12th byte	13th byte	14th byte
30	x[4]	0400	00	MSV status[1] (8 bits)	–											
31	x[4]	0400	00	MAV status[1] (LSB–MSB, 16 bits)		–										
32	x[4]	0400	00	MAV value[2] (LSB–MSB, 24 bits)			MAV status[1] (8 bits)	–								
33	x[4]	0400	00	MAV value[2] (LSB–MSB, 32 bits)				MAV status[1] (LSB–MSB, 16 bits)		–						

P1 of APD	P1 of IMD	Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte	9th byte	10th byte	11th byte	12th byte	13th byte	14th byte
34	x[4]	0400	00	MAV value[2] (LSB–MSB, 32 bits)				MAV status[1] (8 bits)	–							
35	x[4]	0400	00	MAV value[2] (LSB–MSB, 32 bits)				MAV status[1] (LSB–MSB, 16 bits)		–						

[1] See Measured value status for MSV status, MAV for MAV status and FRS for FRS status.
[2] The MAV value is set to -8,388,608 after sending.
[3] The MAV value is not changed after sending.
[4] Any value.

Example 4: Read the output rate (ICR)

The output rate is read as *UINT8* (Unsigned Integer 8 bit) via the "Explicit connection" from the device with module address 8 (class 100, instance 2, attribute 6):

Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0444	00	0E	64	02	06	-	-	-
CAN-ID	Message header	Read Attribute	Class	Instance	Attribute			

Device sends result (ICR value):

Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0443	00	8E	m0	-	-	-	-	-
CAN-ID	Message header	Response code	m0 = ICR					

Example 5: Read emptying time (CBT)

The emptying time is read from the device as *UINT16* (Unsigned Integer 16 bit) with module address 8 (class 102, instance 3, attribute 1).

Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0444	00	0E	66	03	01	-	-	-
CAN-ID	Message header	Read attribute	Class	Instance	Attribute			

Device sends result (CBT value):

Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0443	00	8E	m0	m1	-	-	-	-
CAN-ID	Message header	Response code	CBT value m0 = LSB m1 = MSB					

Example 6: Read the NOV value

The NOV value is read from the device as *SINT32* (Signed Integer 32 bit) with module address 8 (class 101, instance 2, attribute 10):

Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0444	00	0E	65	02	0A	-	-	-
CAN-ID	Message header	Read attribute	Class	Instance	Attribute			

Device sends result (NOV value):

Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0443	00	8E	m0	m1	m2	m3	-	-
CAN-ID	Message header	Response code	NOV value m0 = LSB m3 = MSB					

Example 7: Write the output rate (ICR)

The output rate is read from the device as *UINT8* (Unsigned Integer 8 bit) via the “Explicit connection” with module address 8 (class 100, instance 2, attribute 6):

Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0444	00	10	64	02	06	m0	-	-
CAN-ID	Message header	Write attribute	Class	Instance	Attribute	ICR parameter		

Device sends result (90 = OK):

Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0443	00	90	-	-	-	-	-	-
CAN-ID	Message header	Response code						

Example 8: Write emptying time (CBT)

The emptying time is written to the device as *UINT16* (Unsigned Integer 16 bit) with module address 8 (class 102, instance 3, attribute 1):

Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0444	00	10	66	03	01	m0	m1	-
CAN-ID	Message header	Write attribute	Class	Instance	Attribute	CBT value m0 = LSB m1 = MSB		

Device sends result (90 = OK):

Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0443	00	90	-	-	-	-	-	-
CAN-ID	Message header	Response code						

Example 9: Write the NOV value

The NOV value is written to the device in two steps as *SINT32* (Signed Integer 32 bit) with module address 8 (class 101, instance 2, attribute 10):

Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0444	80	00	10	65	02	0A	m0	m1
CAN-ID	Message header	Frag header	Write attribute	Class	Instance	Attribute	NOV value m0 = LSB	

Device sends acknowledgment for the 1st fragment:

Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0443	80	C0	00	-	-	-	-	-
CAN-ID	Message header	Response code	Response code					

Master sends the 2nd fragment:

Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0444	80	81	m2	m3	-	-	-	-
CAN-ID	Message header	Frag header	NOV value m3 = MSB					

Device sends acknowledgment for the 2nd fragment:

Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0443	80	C1	00	-	-	-	-	-
CAN-ID	Message header	Response code	Response code					

Example 10: Close connection to the device

The connection to the device with MAC-ID 8 is closed.

Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0446	00	4C	03	01	03	-	-	-
CAN-ID	Message header	Close connection	Class	Instance	Reason			

Acknowledgment from device:

Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0443	00	CC	-	-	-	-	-	-
CAN-ID	Message header	Response code						

4.2.2 Measured value status

The measurement status is transmitted in different bytes, depending on the control word. The status information depends on the APP command (8- or 16-bit status), the operating mode (command IMD), and the type of measurement status (simple/extended) (command CSM).
See also Example 3 for DeviceNet communication.

16-bit status, IMD with parameter P1 = 0, standard mode

Bit	Meaning when bit is set (= 1)
15	Error in ESR status
14	Control input 2 active (1)
13	Bridge excitation voltage error
12	Short circuit digital outputs OUT1 … 4
11	Tare value has been set manually (preset tare)[1)]

Bit	Meaning when bit is set (= 1)
10	Weighing range 2 active (MRA)[2)]
9	Indicating range exceeded, see also LFT
8	True zero (0 ± 0.25 d)[2)]
7	Overflow/underflow (analog-to-digital converter/gross/net, see also ESR)
6	Weighing range 2 active (MRA)
5	Limit value 2 active (LIV2)
4	Limit value 1 active (LIV1)
3	Standstill (MTD)
2	Control input 1 active (1)
1	True zero (0 ± 0.25 d)
0	Gross (bit0 = 0 means the net signal will be transmitted), see also TAS

[1)] Starting with firmware version P81.
[2)] Starting with firmware version P73.

16-bit status, MD with parameter P1 = 1, trigger mode

Bit	Meaning when bit is set (= 1)
15	Error in ESR status
14	Control input 2 active (taring)
13	Bridge excitation voltage error
12	Short circuit digital outputs OUT1 ... 4
11	Zero balance performed (CDL, CDT, DZM, DZT)[1)]
10	Weighing range 2 active (MRA)[2)]
9	Indicating range exceeded, see also LFT
8	True zero (0 ± 0.25 d)[2)]
7	Overflow/underflow (analog-to-digital converter/gross/net, see also ESR)
6	Trigger function active (TRC)

Bit	Meaning when bit is set (= 1)
5	Limit value 2 active (LIV2) for LFT < 3 or tare value set (manually) for LFT = 3[3)]
4	Limit value 1 active (LIV1)
3	Standstill (MTD)
2	Trigger result available (MAV)
1	Control input 1 active (external trigger)
0	Gross (bit0 = 0 means the net signal will be transmitted), see also TAS

1) Starting with firmware version P77, the bit is reset after output.
2) Starting with firmware version P73.
3) Starting with firmware version P81.

16-bit status, IMD with parameter P1 = 2, dosing mode

Bit	Meaning when bit is set (= 1)
15	Error in ESR status
14	Control input 1 active (stop function)
13	Bridge excitation voltage error
12	Short circuit digital outputs OUT1 ... 4
11	Lower tolerance limit exceeded during batching (LTL)
10	Upper tolerance limit exceeded during batching (UTL)
9	Indicating range exceeded, see also LFT
8	Dosing time overrun (MDT)
7	Overflow/underflow (analog-to-digital converter/gross/net, see also ESR)
6	Alarm output active (SDF)
5	Fill flow active, see also CBK, FBK
4	Emptying active, see also EWT
3	Redosing active, see also RDS
2	Batching ready signal (FRS can be read out)

Bit	Meaning when bit is set (= 1)
1	Fine flow active
0	Coarse flow active

8-bit status, IMD with parameter P1 = 1 and CSM with parameter P1 = 0, trigger mode with simple trigger status

Bit	Meaning when bit is set (= 1)
7	Error, measured value output is no longer possible in the chosen configuration. The data rate and transmission speed are no longer compatible (baud rate too low)
6	Trigger function active (TRC) or error if bit 7 is also active (then the trigger status will be overwritten)
5	Limit value 2 active (LIV2)
4	Limit value 1 active (LIV1)
3	Standstill (MTD)
2	A/D converter (ADU) overflow/underflow
1	Gross overflow (e.g. scaling too sensitive)
0	Net overflow (e.g. tare value too high)

8-bit status, IMD with parameter P1 = 1 and CSM with parameter P1 = 2, trigger mode with extended trigger status

Bit	Meaning when bit is set (= 1)
7	Error, see ESR
6	Trigger function active (TRC)
5	Limit value 2 active (LIV2)
4	Limit value 1 active (LIV1)
3	Standstill (MTD)
2	Trigger result available (MAV)
1	True zero (0 ± 0.25 d)
0	Gross (bit0 = 0 means the net signal will be transmitted), see also TAS

8-bit status, IMD with parameter P1 = 2 and CSM with parameter P1 = 0, dosing mode with simple dosing status

Bit	Meaning when bit is set (= 1)
7	Alarm dependent on SDF function: If an alarm bit of the monitor functions is activated, this bit and output OUT4 will be activated (see also OMD). This bit and OUT4 are reset when – there is no more overflow, – the BRK command is sent, – the digital input for Stop filling is set, – the next RUN command is sent.
6	Ready signal for batching (FRS can be read out) or emptying active
5	Fine flow active
4	Coarse flow active
3	Standstill (MTD)
2	A/D converter (ADU) overflow/underflow
1	Gross overflow (e.g. scaling too sensitive)
0	Net overflow (e.g. tare value too high)

8-bit status, IMD with parameter P1 = 2 and CSM with parameter P1 = 2, dosing mode with extended dosing status

Bit	Meaning when bit is set (= 1)
7	Error, see ESR
6	Alarm output active (SDF)
5	Fill flow active, see also CBK, FBK
4	Emptying active, see also EWT
3	Redosing active, see also RDS
2	Batching ready signal (FRS can be read out)
1	Fine flow active
0	Coarse flow active

4.3 PROFIBUS®

The PROFIBUS interface works according to standards DIN EN 61158 and EN 61784. The sensor electronics units described in this documentation work with the PROFIBUS-DP variant (EN 50170). They allow for complete parameterization via the PROFIBUS-DPV1 protocol. Communication is carried out over 2 lines and the transmission process is based on an RS-485 interface. Bus terminating resistors are required at the beginning and end. You can only activate the resistors at the end of the bus system. If you activate more than 2 terminating resistors or they are not located at the ends, communication will only function to a limited extent (bus errors) or not at all.

To simplify the wiring, the design of most devices that support this interface features double connections. This allows you to connect the lines on a device from the previous node and to the next node to separate connections. The connections are internally joined (bridged). The PROFIBUS is electrically isolated from the measuring system and supply voltage. Use shielded and twisted-pair lines and connect the cable shields with the housings of the relevant sensor electronics or connector plugs so they *cover a wide area*.

Connection

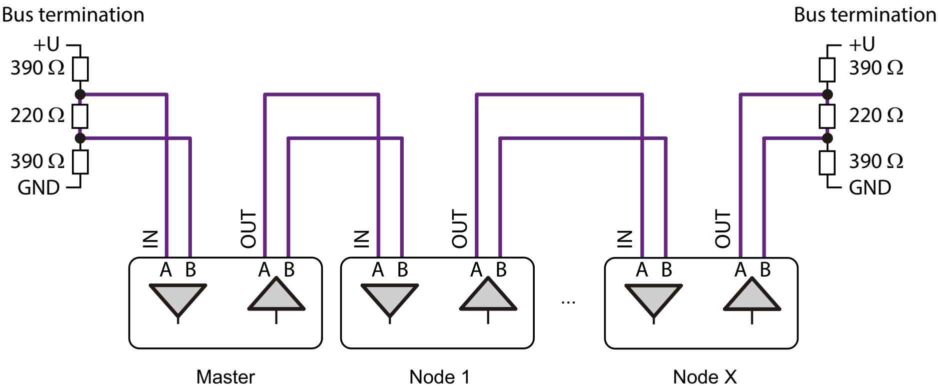


Fig. 4.5 Connect nodes to the PROFIBUS. The bus termination can often be activated in the connection plug as well.

Maximum cable length subject to baud rate

Baud rate in kBaud	9.6	19.2	93.75	187.5	500	1500	12000
Max. cable length in m	1200	1200	1200	1000	400	200	100

The maximum cable length is the sum of the length of all lines.

Display of PROFIBUS status with LEDs

LED	Function	Explanation
LED 1 (green)	Supply voltage (on the right next to the switch for the bus termination)	The supply voltage of the RS-485 driver is present if the LED is lit.
LED 2 (green)	PROFIBUS data exchange	Shows the status of data exchange for cyclic data exchange.
LED 3 (yellow)	PROFIBUS diagnostics	The LED is lit if there is an internal error. The measurement data may be invalid.
LED 4 (red)	PROFIBUS error	The LED is lit as long as there is a bus error. Possible causes: - Incorrect wiring (A and B reversed?) – PROFIBUS-Master not (yet) working

Baud rate

To set the baud rate use the PanelX program or a configuration tool for PROFIBUS, for example SIMATIC Step7.

Address range

An address is necessary to be able to identify the nodes in the bus system unambiguously. The address may be between 3 and 99. The factory setting is 3. Set the address while the device is turned off using the switch on the device.

Project configuration of a bus system

The GSD file is included with delivery for project configuration. You can download the current version from the HBM website if necessary: https://www.hbm.com/support/downloads (Digital load cells and weighing electronics).

Install the GSD file in your system. Then configure your system and set the transmission speed on the bus (baud rate) as well as the node addresses. After that configure the cyclic PDOs with the information in the GSD file and load the configuration into your PLC. Finally save all parameters to the non-volatile memory of the device with the TDD1 command.

With many PLCs, direct access from the PLC program to data content more than 2 bytes long is not possible. As the data content in cyclic data exchange of the devices described in this documentation often has data lengths greater than 2 bytes, the content must be read and written as consistent data blocks with other function blocks of the PLC. For SIMATIC Step7 modules, for example, use the function blocks SFC14 and SFC15 (cyclic mode) and SFB52/SFB53 (acyclic mode).
Note when parameterizing that some parameters can only be changed in a certain order, for example adjusting the characteristic curve.

PROFIBUS communication

The sensor electronics in this documentation support the following functions:

- Parameter container for reading parameters in cyclic mode.
- Parameter container for writing parameters in cyclic mode.
- Cyclic reading of measured value, status, dosing results, etc.
- Setting the control word, limit value levels, filling weights, etc.
- Acyclic data traffic.

The data format of the commands and the value ranges of parameters can be found in the Command reference.

Special features

- Some of the parameters have to be executed in a specific order, for example the characteristic curve settings.
- The production number set by HBM must not be changed.
- After password protection is activated, the commands identified in the **Password protection** line with **Yes** are not executed until after you have entered the password (SPW). Otherwise you will receive an error message.
- When Legal-For-Trade mode is activated (LFT, P1 > 0), the commands identified in the **Disabled in Legal-For-Trade mode** line with **Yes** are not executed until after you have deactivated Legal-For-Trade mode. Otherwise you will receive an error message.

4.3.1 Cyclic data exchange

Input data (sent from the transducer electronics)

- Measured value and status (gross or net measured value)
- Alternative measured value and status (trigger result)
- Dosing result and status
- Cumulative filling weight
- Piece counter
- Dosing status
- Parameter container for reading settings

Output data (sent to the transducer electronics)

- Control word (for autotaring, autocalibration, clearing the dosing counter, starting and stopping dosing)
- Activation and deactivation level for limit value switches
- Filling weight assignment
- Parameter container for setting the parameters of commands with one parameter

You can define what data content will be exchanged on the PROFIBUS master.

Measured values and data are transferred as integer values (integers). The number of bytes depends on the value range as described in the Command reference. Measured values are normally transferred signed (two's complement) with 4 bytes (*SINT32* (Signed Integer 32 bit)). The byte sequence corresponds to the PROFIBUS standard in that it always starts with the most significant byte (MSB - Motorola format).

4.3.2 Acyclic data exchange

DPV1 parameterization allows for asynchronous parameterization messages to be exchanged in parallel to normal PROFIBUS operation with cyclic data exchange. They can be sent from the master (for example the PLC, class 1 master), or even in parallel from a second, diagnostic master (for example the programming unit, class 2 master).

The PanelX program works as a class 2 master and can therefore be plugged into a running PROFIBUS as an additional master. The software determines all the modules described in this documentation on the bus and gives you the opportunity to set all the parameters and store them in non-volatile memory in the sensor electronics.

You can use a PLC to invoke the relevant service routines for DPV1 parameterization. A distinction is made between setting up and terminating a connection and between read and write access to parameters. The parameters are addressed by index numbers and slot numbers, see the Command reference.

4.4 Serial interfaces

The commands that are transferred with serial interfaces are identical. Only the interfaces themselves differ in the type of transfer. The information is transferred as data packets. A packet consists of a start bit, 8 bits of actual information, which are transferred as ASCII characters, maximum 1 parity bit (check bit for transfer) and 1 stop bit. You must specify in advance whether odd or no parity will be used, the speed of bits in the data packet and the baud rate. Since there is a pause between individual data packets, the baud rate is not identical with the data transmission rate.

The following variants of serial interfaces are possible:

1. RS-232
   Simple transmission via three lines (send line, receive line and GND) between two nodes. According to the standard, only distances of a few meters are possible. Therefore you should not use more than 15 m of cable. The interface is a point-to-point connection, which means that only one node can be connected for each interface on the PC or PLC. As only voltage levels are analyzed, the interface is sensitive to interference. If you do not have the interface on your PC you can work with standard commercial converters from USB to RS-232.
2. RS-422 (4-wire)
   Transmission via 5 lines (2 send lines, 2 receive lines and GND) between two nodes. According to the standard, distances of up to 1000 meters are possible. The interface is a point-to-point connection, which means that only one node can be connected for each interface on the PC or PLC. Transmission is differential and highly tolerant to interference. If you do not have the interface on your PC you can work with standard commercial converters from USB to RS-422/485.
3. RS-485 4-wire
   This form is the standard for RS-485. It allows for transmission via 5 lines (2 send lines, 2 receive lines and GND) between *multiple* nodes (bus-capable interface). According to the standard, distances of up to 1000 meters are possible. In contrast to the RS-422, the circuit for the inputs and outputs is short-circuit-proof. Transmission is differential and highly tolerant to interference. If you do not have the interface on your PC you can work with standard commercial converters from USB to RS-485.

4. RS-485 2-wire
   This form of the RS-485 interface is used in the sensor electronics described in this documentation, for example for the diagnostics bus. It requires only 3 lines (2 for data transfer and GND) for communication between *multiple* nodes (bus-capable interface). As 2 lines are required for sending and 2 for receiving, however, it is only possible *either* to send *or* to receive. Therefore continuous output of values is not possible, as it could never be interrupted. According to the standard, distances of up to 1000 meters are possible. If you do not have the interface on your PC you can work with standard commercial converters from USB to RS-485.

4.4.1 RS-232 interface

The RS-232 interface uses 2 lines for communication, one for sending and one for receiving. As the function of the lines is permanently defined, you must ensure when setting up the connection that the send line of one node is connected with the receive line of another and vice versa: RxD (receive line of the PC) goes to TxD (send line of the transducer electronics) and TxD (send line of the PC) goes to RxD (send line of the sensor electronics). The level of both lines is relative to GND. So the GND must also be connected, but you must not connect GND with the shielding. Use a separate line to connect the digital ground of a PC with the GND (0 V) of the power supply. Use shielded and twisted-pair lines. Connect the cable shields with the housings of the sensor electronics or connector plugs so they *cover a wide area*. The total length of the interface line should not exceed 15 m.

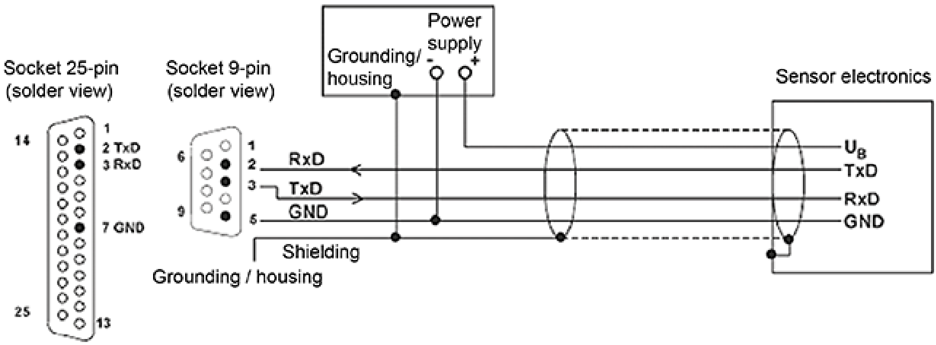


Fig. 4.6 Diagram for connecting a serial interface (with standard assignment of 9-pin and 25-pin socket) with voltage supply in the same cable.

Bit rate

You can set bit rates from 1200 to 115200 bit/s with the BDR command. The factory setting is 9600 bit/s.

Saving settings

To complete the settings, save all parameters to the non-volatile memory of the transducer electronics with the TDD1 command.

4.4.2 RS-422 interface

The connection of an RS-422 interface is identical to that of an RS-485 interface (4 wires), although only two notes can actually be connected with each other, as with RS-232. True bus mode is not possible. However, since the sensor electronics behave like an RS-485 node when sending data for this interface as well, you can connect multiple sensor electronics units with an RS-422 master, for example a PC. That means bus mode is possible with this interface.

In contrast to the RS-232 interface, distances of up to 1000 meters are possible, as 2 lines are used for sending and receiving each (from all nodes). Higher transmission rates (baud rates) can generally be implemented than for RS-232.

As the function of the lines is permanently defined, you must ensure when setting up the connection that the send lines of the master are connected with the receive lines of the node and vice versa: TA and TB of the master go to RA and RB of the node and RA and RB of the master go to TA and TB of the node. The level of all lines is relative to GND. So the GND (0V) of the supply voltage must also be connected, but you must not connect GND with the shielding. Use a separate line to connect the digital ground of a PC with the GND (0 V) of the power supply. Use shielded and twisted-pair lines. Connect the cable shields with the housings of the sensor electronics or connector plugs so they *cover a wide area*.

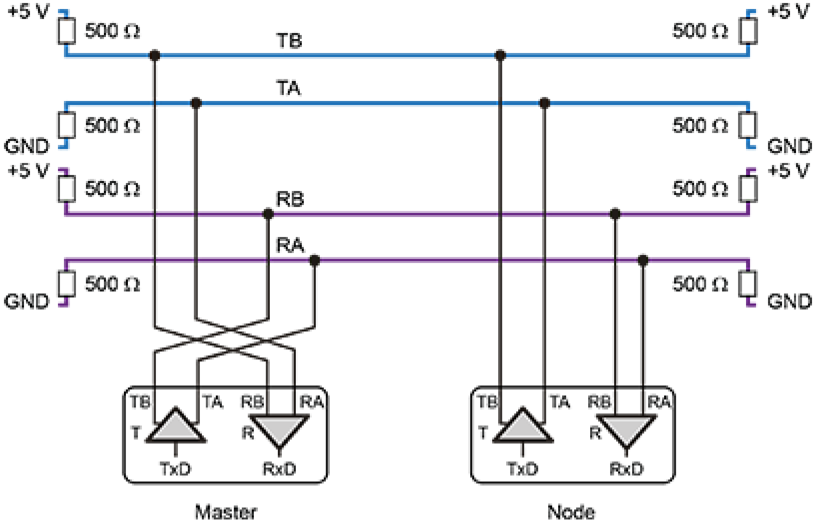


Fig. 4.7 Connection diagram for RS-422 interface

Don't forget to activate the termination resistors on the first and last nodes of the bus system. Often they are always active for the master or they can be activated by software. On the node side, only one sensor electronics unit (the last in the chain if there are multiple units) may have the resistors activated. Depending on the sensor electronics, use the built-in DIP switches or the STR command to do this.

Bit rate

You can set bit rates from 1200 to 115200 bit/s with the BDR command. The factory setting is 9600 bit/s.

Saving settings

To complete the settings, save all parameters to the non-volatile memory of the transducer electronics with the TDD1 command.

4.4.3 RS-485 interface

The RS-485 interface normally uses 4 lines for communication, 2 for sending and 2 for receiving. As the function of the lines is permanently defined, you must ensure when setting up the connection that the send lines of the master are connected with the receive lines of the node and vice versa TA and TB of the master go to RA and RB of the nodes and RA and RB of the master go to TA and TB of the receiver units. The level of all lines is relative to GND. Therefore the GND (0V) of the supply voltage must also be connected, but you must not connect GND with the shielding. Use a separate line to connect the digital ground of a PC with the GND (0 V) of the power supply. Use shielded and twisted-pair lines. Connect the cable shields with the housings of the sensor electronics or connector plugs so they *cover a wide area*.

Make a note of the serial number printed on the type plate. With this serial number and the ADR command you can still assign individual addresses to the sensor electronics units in an RS-485 bus system, even after several notes have been combined together.

Connection with RS-485 4-wire

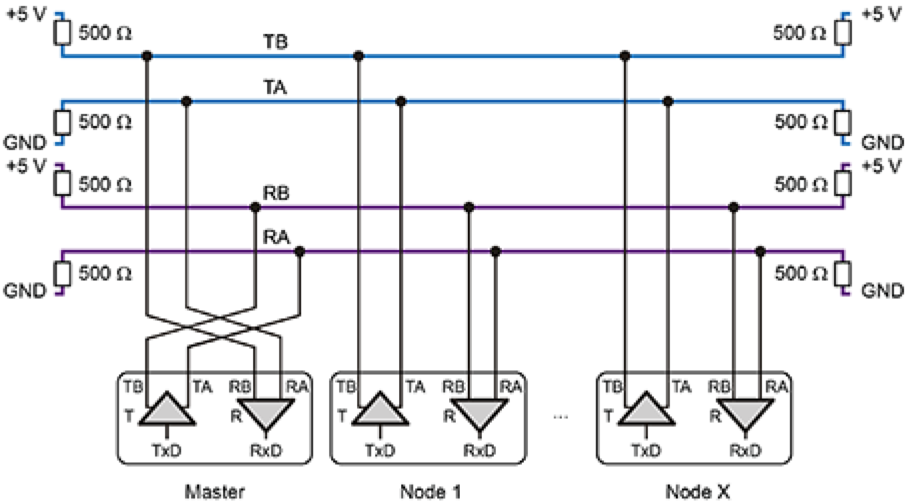


Fig. 4.8 Connection diagram for RS-485 interface

Don't forget to activate the termination resistors on the first and last nodes of the bus system. Often they are always active for the master or they can be activated by software. On the node side, only the last in the chain may have the resistors activated. Depending on the sensor electronics, use the built-in DIP switches or the STR command to do this.

The interface tolerates a maximum voltage offset compared to GND (common mode range) of ±7 V. You should therefore check whether potential equalization must be set up between the sensor electronics and the interface. If necessary lay a separate potential equalization line. The shield for the lines must not be used for potential equalization.

The quiescent level on the line pairs (TA/TB or RA/RB) must be below 0.35 V. The output signal of the transmitter is normally ±2 V. However, all levels higher than 0.35 V are still detected as a valid signal so that signals will not be lost with longer lines.

Connection with RS-485 2-wire

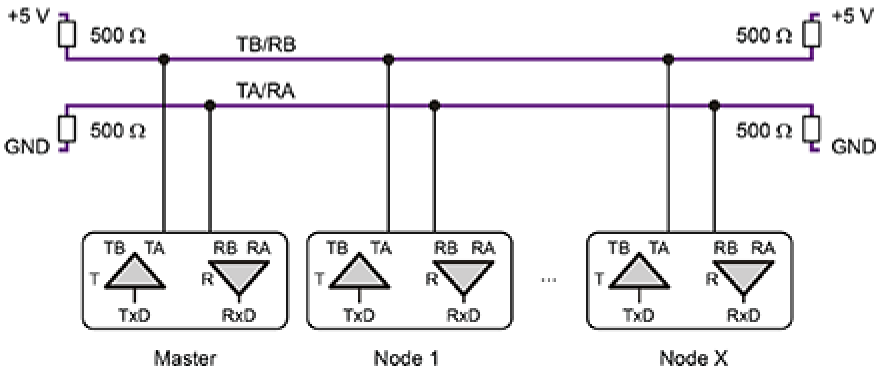


Fig. 4.9 Connection diagram for RS-485 interface in 2-wire configuration

If only one line pair is used for data communication (bidirectional) only one node can send data at a time. The other nodes are unable to respond until after the data is sent. An advantage of this bus system is that every node can communicate with every other one (multimaster)

Send one of the commands COF64 to COF79 to activate operation using the 2-wire connection.

Do not use the MSV?0 command in this operating mode. If you do, it will not be possible to stop the continuous output of measured values that will be generated.

Address range

An address is necessary to be able to identify the nodes in the bus system unambiguously. Depending on the sensor electronics, the address may be between 0 and 89 or up to 128. The factory setting for the address is 31. Set the address with the ADR command.

Baud rate

You can set baud rate from 1200 to 115200 baud with the BDR command. The factory setting is 9600 baud.

Saving settings

To complete the settings, save all parameters to the non-volatile memory of the transducer electronics with the TDD1 command.

4.4.4 Serial communication, commands and responses

As soon as the connection is set up via one of the serial interfaces, you can send commands to one of the sensor electronics units and receive data. This section explains how commands are structured and how to send and receive them.

See also Examples of serial communication.

Format of commands

Each command consists of the command shortform as described in the Command reference and none, one or more parameters separated from each other by comma and the end label. All ASCII characters ≤20 may stand between these three elements of a command except for ASCII 0A*hex* (hexadecimal) (the end label, lf or line feed), 11*hex* (hexadecimal) (ctrl-q) and 13*hex* (hexadecimal) (ctrl-s, cr or carriage return)*hex* (hexadecimal) (20*hex* (hexadecimal) = space).

Command shortform

You can enter command shortforms in uppercase or lowercase letters. Use the command shortform as described in the Command reference to set a parameter. To query the setting, use the command shortform and add ? at the end.

ExampleNOV: `NOV5000;` sets the nominal value to 5000 and `NOV?;` queries the nominal value.

Parameters

- Optional parameters can be omitted. You *must* specify all other parameters, otherwise the command will not be recognized and executed.
- If you would like to specify an additional parameter after an optional parameter, write only the parameter separator (comma), for example `LIV1,,,,2;` to set only parameter P4 to 2.
- Text parameters must be enclosed in double quotation marks (`"Text"`).
- Numbers are always entered as ASCII numbers, not binary. The data types specified in the command description apply only to the other interfaces or where so indicated to the output, for example with status bits. The decimal separator must

always be a point. Note however that you must specify a series of settings without decimal point (but with decimal places).

- You can enter numbers without leading zeros and any leading zeros will not be taken into account. You can enter numbers directly or in exponential notation, for example `+12000` or `+1.2e4`.

Delimiter

You can use either a semicolon (;) or a line feed (abbreviated as lf, 0A*hex* (hexadecimal) = 10*dec* (decimal)) as delimiter. If you send only an end label, the input buffer of the sensor electronics is cleared.

Format of responses

Other than a few exceptions there is always a response to a command. The response time is specified in the Command reference section, but without the time required to transfer the command and response. The time depends on the baud rate

Response to correct command

After entering a command you receive the response `0crlf`, i.e. the number 0 followed by carriage return (`cr`, 0D*hex* (hexadecimal) = 13*dec* (decimal)) and line feed (`lf`, 0A*hex* (hexadecimal) = 10*dec* (decimal)).

In response to a query you receive one or more parameters separated from each other by commas and followed by `crlf`. Except for commands FRS, MAV and MSV, numbers are always generated as an (ASCII) character sequence. The length corresponds to the maximum possible number of characters for the relevant parameters. For example, if the parameter can be ±1,599,999 (7 digits plus sign), `+0092467crlf` is generated.

Response to incorrect command

If an incorrect command or query is entered, you receive `?crlf` as the response (a question mark followed by `crlf`). Query the error status with commands ERR? and/or ESR?.

Exceptions

You do not receive any response to command RES (Reset), STP (Stop) and S00 to S99 (select command for selecting a node).

Special features

- The BDR command responds with two parameters, the current baud rate and the parity in the *new* baud rate.

- If you are using the RS-485 2-wire interface (commands COF64 to COF79), there is no response to input errors. In this case `0crlf` will *not* be generated. The same applies if you are connecting multiple nodes to *one* RS-422 interface.
- After password protection is activated, the commands identified in the **Password protection** line with **Yes** are not executed until after you have entered the password with the SPW command. Otherwise you will receive `?crlf` as response.
- When Legal-For-Trade mode is activated (LFT command with P1 > 0), the commands identified in the **Disabled in Legal-For-Trade mode** line with **Yes** are not executed until after you have deactivated Legal-For-Trade mode. Otherwise you will receive `?crlf` as response.

4.4.5 Examples of serial communication

Setting the address for bus mode

If all the nodes involved are using the standard baud rate and are connected to the bus, you can use the serial number to set the addresses.

- ▶ Read the production number (7 digits) from the type plate.
- ▶ Initialize the interface of the masters to 9600 baud, 8 data bits, even parity and 1 stop bit.
- ▶ Clear the input buffer for safety sake and select all the nodes: send `;S98;`
- ▶ Set the required addresses one after the other: send `ADR21,"12345";`
  In the example shown here, the required address for the device with serial number 12345 is 21.
- ▶ Save the addresses in the non-volatile memory of the sensor electronics so they will be retained through a power failure: send `TDD1;`

The sensor electronics do not respond to the input commands after the S98 command. If no communication is possible after the setting, the baud rate is not correct.

Determining the existing nodes on the bus

The principle of this query is simple: Query every possible address.

- ▶ Send the following commands: `;S00;ADR?;`
- ▶ Wait 100 ms.
- ▶ If no response comes, query the next address (S01, etc.). If you receive undefined or incorrect characters, an address could be assigned multiple times or there could be a bus fault.

- If `00crlf` or `01crlf`, etc. is received as the response, a sensor electronics unit is present at that address. Then send `IDN?;`, for example, to obtain the device type and serial number.

Querying measured values in bus mode

In the following example we assume you are using three sensor electronics units on the bus with addresses 21, 22 and 23.

- Set the output format for all three sensor electronics units: send `;S98;TEX172;COF11;`
  The measured values are separated by a semicolon and sent as a measured values with 8 places, text separator and status with 3 places. The end label remains `crlf`.
- Retrieve the first measured value: send `S21;MSV?;`
  The device with address 21 sends a measured value and the status separated by a semicolon.
- Retrieve the second measured value: send `S22;MSV?;`
  The device with address 22 sends a measured value and the status separated by a semicolon.
- Retrieve the third measured value: send `S23;MSV?;`
  The device with address 23 sends a measured value and the status separated by a semicolon.

You can also use the following process (processing is faster):

- Set the output format for all three sensor electronics units: send `;S98;TEX172;COF11;`
- Have all three sensor electronics units measure, but not respond yet: send `S98;MSV?;`
- Retrieve the first measured value: send `S21;`
  The device with address 21 sends a measured value and the status separated by a semicolon.
- Retrieve the second measured value: send `S22;`
  The device with address 22 sends a measured value and the status separated by a semicolon.
- Retrieve the third measured value: send `S23;`
  The device with address 23 sends a measured value and the status separated by a semicolon.

4.5 Ethernet (WTX110/120)

See also Working with the PanelX program, Starting up WTX110/120

You can only use the Ethernet interface for WTX110 and WTX120. The connection via port 443 is secured by HTTPS. Select this interface, run a scan, and connect to your device (highlight device and click ***OK***). The device will then be displayed in the **Home** menu.

Cannot connect/Device not found

If you cannot connect to the device, check the following points:

- Has the IP address been manually changed?
  In this case, you also need to generate the SSL certificate again manually. The certificate is only generated automatically when you change the IP address via the PanelX program.
- Is the update rate less than 450?
- Is access to the device allowed?

You can only make these settings on the device.

Generating a new SSL certificate

First make sure that the date and time of the WTX are current, or at least identical to the values of your PC. Then generate the new certificate. When connecting, you must then accept the certificate, otherwise the SSL connection cannot be established. Also connect a sensor to the device, otherwise the certificate cannot be generated.

Use and (holding for less than 3 seconds) to enter Supervisor Mode. You can then use to display the date and time, and change them using F2 and F3. The setting is important because otherwise the certificate might not be valid until some time in the future.

Use and (holding for less than 3 seconds) to enter Setup Service Mode), enter the password (324) and press . Press (**Service: Interface**) and wait for the display to appear. Then press repeatedly until you reach the **Service: Network** menu item. Press repeatedly until you reach the **Update SSL cert** menu item. Press **F2** to change the display from ***No*** to ***Yes***. Press to finish. Exit the mode with .

Setting the update rate

Use and (holding for less than 3 seconds) to enter Setup Service Mode), enter the password (324) and press . Press (**Service: Interface**) and wait for the display to appear. Then press repeatedly until you reach the **Service: Calibration** menu item. Press until **Select Group 1-9** appears. Then press until **5 Adaptation** appears. Then press until **Update rate** appears. If a value greater than 450 is shown here, delete it and enter ***200***, for example. Exit the mode with , but confirm the **Save parameters** prompt with ***Y***, otherwise the setting will not be applied.

Allowing device access

Use and (holding for less than 3 seconds) to enter Setup Service Mode), enter the password (324) and press . Press (**Service: Interface**) and wait for the display to appear. Then press repeatedly until you reach the **Service: Network** menu item. Press repeatedly to check the following menu items and change them as necessary: **PanelX access**: ***On***, **Ext. access**: ***Y*** and **Access No** > ***0***. If a password is set (**Set PanelX passwd = Y**), you must enter it to connect in PanelX. The default password is ***wtx***. Exit the mode with .

4.6 Modbus/TCP (CiA309)

The interface entry in the Scan dialog has been included for future customizations, and is currently not available.

5 Starting up

To obtain the values of a weighing in the desired unit, you must make the basic settings and adjustments both for transducers with integrated electronics and for sensor electronics with one or more load cells connected.

Working standard calibration

All sensor electronics are calibrated by HBM in the factory after manufacturing (factory calibration). This calibration is saved not only to (normal) non-volatile memory, but also to a protected area. Therefore you can restore the working standard calibration at any time with the TDD command and parameter P1 = 0. You should only change the working standard calibration in exceptional cases as doing so requires high-precision calibration machines. Resetting to the original working standard calibration is only possible if you cancel any password protection you have set.

> ℹ When the working standard calibration is reset, most other parameters are also reset to the factory settings. Only the address (ADR), baud rate (BDR) and legal-for-trade counter TCR) are not reset.

Without further adjustment, the working standard calibration yields a value of 1,000,000 digits in ASCII format at maximum capacity or with a nominal (rated) output signal.

Adjustment options

You have various possibilities for making the adjustment. However, not every one is allowed in all fields of application. For example, the adjustment in mV/V must not be used in legal-for-trade applications. You should therefore first define the field of application. Otherwise it could happen that the adjustment becomes invalid after a change in the field of application.

> ℹ The Legal-For-Trade counter (TCR) is incremented by one every time the LFT command is performed with a new parameter (switching to Legal-For-Trade or to industrial mode). No adjustment is possible in Legal-For-Trade mode. The adjustment must be performed in industrial mode. As the counter state is noted on the scale for legal-for-trade applications, changes to the adjustment or calibration can be discovered by comparing.
> See also Legal-For-Trade mode.

If you would like to set up several scales of the same type, you can first make an adjustment in mV/V with the default values (2 mV/V), save the settings on the PC and transfer them to other sensor electronics units. Then perform the adjustment with direct load if you are planning to use a legal-for-trade application.

Variants generally available for adjustment and calibration

1. Calibration and adjustment with a direct load (application calibration)
   This variant must be used in legal-for-trade applications.
2. Adjustment in mV/V
   This variant can only be used in non-Legal-For-Trade (industrial) mode.
3. Linearization
   You can use this variant in addition to calibration and adjustment with a direct load.

Differences between adjustment, calibration and legal verification

A calibration determines the correlation between what is displayed and the actual weight value. Therefore you need a calibration weight. Then the display is adjusted or set to the actual weight value. If you are entering the values from a data sheet or calibration protocol, it is simply an adjustment. The term calibration is only used if the correctness of the display has been “verified” with a calibration weight or, when performed by a weights and measures officer, by a legal verification.
See also Legal-For-Trade mode.

General definitions

Before you make an adjustment for scales, you must first make a few general definitions:

- Should the scale have only one weighing range or should it work as a dual-range scale?
- What unit should be displayed?
- Should a legal-for-trade scale be set up?

When is a second weighing range useful?

Two measuring ranges can be advantageous, especially for static scales in legal-for-trade applications. The number of verification intervals determines the resolution in the weighing range of the load cell. To achieve a better resolution in the partial load range, a second weighing range can be used, provided an appropriate load cell is available.

This makes it possible, for example, to measure a load up to 100 kg with a resolution of 20 g or up to a nominal load of 200 kg with a resolution of 50 g.

In dual-range mode, depending on the *gross weight*, the weighing range switches from range 1 (small load) to range 2 (full load). Switching back to weighing range 1 does not occur until the zero point has definitively been reached again (exactly zero; standstill condition required).

5.1 General settings and definitions

Procedure in the PanelX program

- If you would like to set up a second measuring range, click on the **Scale** menu item and create the changeover point for the second measuring range (***Range selection***). Click on ***Write*** to save the value in the sensor electronics.
- Click on the **Adjustment** menu item.
- Define the number of ***Decimal points*** (position of the decimal point).
- Specify the unit (***Measuring unit***) of the measured values.
- Specify the ***Resolution***, which in turn determines the minimum load cell verification interval.
- For ***Nominal value*** specify the measuring range for the scale. The measuring range does not need to be the same as the maximum capacity.
- Click on ***Write*** to save the values in the sensor electronics.

Procedure when using one of the interfaces

- Cancel any password protection (SPW) you have set if you are performing the adjustment via one of the serial interfaces or PROFIBUS. (Password protection does not apply to communication with CANopen or DeviceNet.)
- Set the sampling rate (HSM) and Filter to their lowest values so that the measured values will fluctuate as little as possible, thereby ensuring a good adjustment.
- Define whether you would like to set up a dual-range scale. Then specify the changeover point between the two ranges (MRA).
- Specify the nominal (rated) range of the scale (NOV).
- Specify the resolution RSN, which in turn determines the minimum load cell verification interval.
- Define the position of the decimal point (DPT) and thereby the number of places after the decimal in the display.
- Specify the unit of the measured value (ENU).

5.2 Calibration (and adjustment) with a direct load

This type of calibration is the only one allowed in applications subject to weights and measures approval. The General settings must already be in effect. The calibration weight you use must be at least 20% of the maximum capacity.
See also Legal-For-Trade mode.

Procedure in the PanelX program

- Click on the **Adjustment** menu item if it is not already displayed.
- Enter the value for the ***Calibration weight*** you are using.
- Click on ***Start calibration***.
  “Unload scale!” appears in the comment field.
- Make certain the scale is unloaded (empty).
- Click on ***Measure dead load***.
  First the message “Measuring” appears in the comment field, then “Place calibration weight!”.
- Place the specified calibration weight on the scale.
- Click on ***Measure weight***.

A measurement is performed. After a successful calibration, ✔ appears.

Click ***Reset*** to reset the sensor electronics to the factory settings.

Procedure when using interfaces

- If you do not perform the calibration with the nominal load (partial range calibration), enter the weight that is used as a percentage of the maximum capacity *10,000 (CWT).
- Measure the output signal of the load cells (the initial load) with the scale unloaded (LDW).
- Load the scale with calibration weight.
- Use this to measure the signal that is generated (LWT).

The new characteristic curve is not set and used until all parameters have been measured. Specifying the maximum capacity (NOV) assigns the digits to the weight value.

Measuring dead load (initial load)

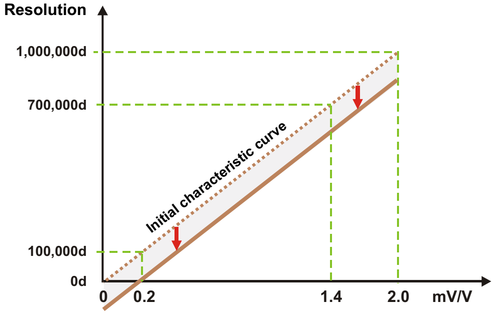


Fig. 5.1 Effect of the measurement on the characteristic curve.

The current input signal of the unloaded scale (initial load) is assigned an output value of 0 digits.

Measuring full scale

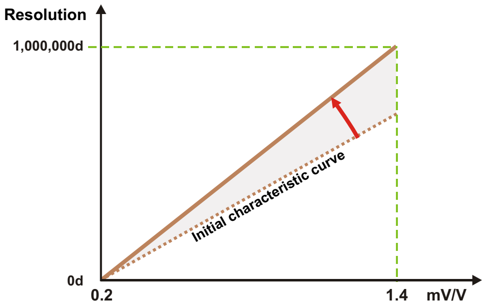


Fig. 5.2 Effect of the measurement on the characteristic curve.

The current input signal of the scale loaded with maximum capacity is assigned an output value of 1,000,000 digits. In a calibration with partial load, the measured value is extrapolated to the nominal load and that value is assigned.

5.3 Adjustment in mV/V

This type of calibration is not permitted in applications subject to weights and measures approval. The General settings must already be made.

Procedure in the PanelX program

- Click on the **Adjustment** menu item if it is not already displayed.
- Activate ***Calculate calibration*** and ***mV/V (optional)***.
- Either activate ***Measure dead load*** or enter the value for the ***Scale dead load***.
- For independent sensor electronics, specify how many load cells are connected (***Load cell count***).
- Specify the characteristic value of the connected transducer(s): ***Characteristic value***. You can take the value from the calibration protocol or the transducer.
- Click on ***Start calibration***.
- If you have activated ***Measure dead load***, the comment field shows “Unload scale” and ***Measure dead load*** appears on the button. Unload the scale and click the button.

After a successful calibration, appears.

If a calibration and adjustment has already been made, you can have other maximum capacities converted by specifying only ***Calculate calibration***. You can either measure the scale dead load again or enter it.

5.4 Changing the working standard calibration

You should only change the factory characteristic curve if you have high-precision calibration machines. There is *no* way provided to make the change in the PanelX program. Entering or measuring the factory characteristic curve sets the user characteristic curve (LDW/LWT) to 0/1,000,000 and resets the value for CWT to 1,000,000.
The `TDD0;` command restores the original working standard calibration.

Procedure when using interfaces

- Measure the output signal of the load cell without a load or use a calibration unit and set a misalignment of 0 mV/V (SZA).
- Load the load cell with the maximum capacity or use a calibration unit and set a misalignment of 2 mV/V.
- Use this to measure the signal that is generated (SFA).

The new characteristic curve is not set and used until both parameters have been measured.

Measuring the factory characteristic curve zero point

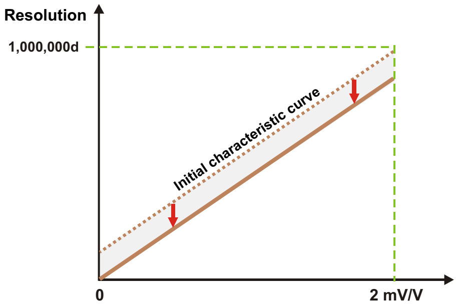


Fig. 5.3 Effect of the measurement on the characteristic curve.

The internal measured value corresponds to the input signal 0 mV/V of a calibration standard or to the unloaded load cell. An output value of 0 digits is assigned to this internal measured value.

Measuring the factory characteristic curve full scale

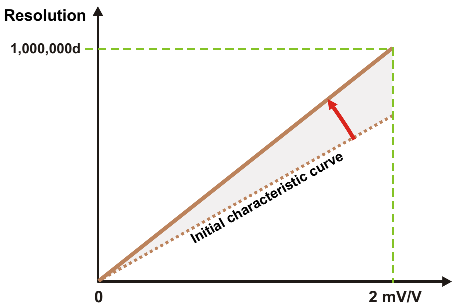


Fig. 5.4 Effect of the measurement on the characteristic curve.

The internal measured value corresponds to the input signal 2 mV/V of a calibration standard or to the maximum capacity of a loaded load cell. An output value of 1,000,000 digits is assigned to this internal measured value.

you can see the values of the working standard calibration in the **Adjustment** menu item on the **Extended** tab.

5.5 Using linearization

> You cannot perform linearization until the scale is adjusted (calibrated and adjusted) because linearization affects the user characteristic curve (LDW/LWT).
> The function is not available for WTX110/120.

The settings for linearization can be found on the **Extended** tab in the **Adjustment** menu item. The values of the working standard calibration are also displayed on this tab.

The user characteristic curve is defined by two points. With linearization you can use a 3rd order polynomial to compensate for a less than ideal linear characteristic curve.

Measured value = $K0 + K1 * x + K2 * x^2 + K3 * x^3$
where x = measured value of the A/D converter

Let PanelX calculate the coefficients based on measurements of the actual characteristic curve. The coefficients are not calculated by the sensor electronics.
See also LIC.

Procedure in the PanelX program

- Enter the measured values (**Actual value**) and the actual values (**Target value)**) under **User linearization** for 4 measuring points.
- Click on ***Calculate***.
  The coefficients are calculated and displayed in the coefficient fields.
- Click on ***Write***.

If you have already determined the coefficients, you can also enter them directly in the corresponding fields LIC0 to LIC3 (K0 to K3 from the above formula).

5.6 Starting up WTX110/120

For connecting to a WTX110/120, see Ethernet (WTX110/120).

Make the settings in the PanelX menus as detailed in the Starting up section. However, the only **Applications** available for WTX are **Standard** and **Filler**.

WTX has its own menu item, presenting various settings in a tree structure. Some of them are not accessible from the other menus.

> The view is saved in the background when you choose a different menu item. But after making changes you must update with ***Read***, as changed settings are not automatically read in again.

The information displayed is read directly from the WTX, and corresponds to the terminology also displayed on the WTX when entered manually. Not all settings can be changed here.

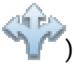
Switching between gross and net is restricted with WTX: You can switch back to gross after taring, but you will only see a new net value after taring again.

Click on ***Write*** to permanently save changed settings.

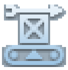
Backup/restore

Backup and ***Restore*** allows you to back up and restore the settings of a WTX on your PC. Settings displayed in gray, such as the network settings, are not saved. This means you can transfer the settings to another WTX of the same type.

6 Applications

Choose your application for the PanelX program in the menu ribbon with **Application** (). An additional symbol then appears for the relevant application. Click on symbol to be able to make additional settings.

 Filler

 Checkweigher

Sorting weigher

6.1  Filling and batching

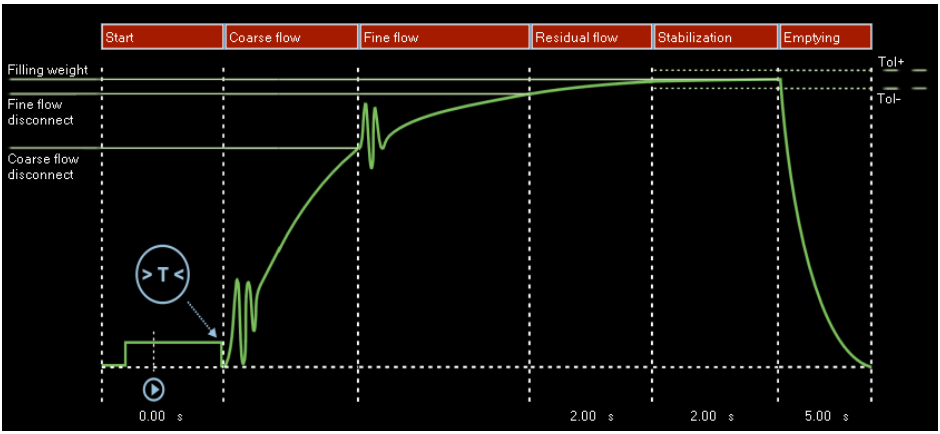


Fig. 6.1 Principle of a filling process

The illustration above shows the typical sequence of a filling process (upward batching) as it is also represented in PanelX:

1. Taring is performed after the check of start conditions.
2. Starts the filling process with coarse flow. (However, you can set a fine flow phase first.)
3. Fine flow starts.
4. The time for residual flow begins, i.e. the amount of material that will still flow into the container after fine flow is turned off.
5. The filling result is determined during the stabilization time, after standstill has been detected (constant measured value), or in any case no later than after the stabilization time.
6. The filling station is emptied or the container is removed.

When you click on the name of an area, the setting options for the relevant area appear under the screen. Click again to hide the settings and show the (possible) course of the digital outputs or signals for control.

The following sections explain which settings you need to make before adjusting the sensor electronics (see the Starting up section) to ensure optimum settings for the various segments of upward or downward dosing.

To complete the settings, return to the **Main** section above the graphic and save the current dosing parameters in one of the 32 parameter sets. The respective settings in the different sections are written to non-volatile memory as soon as you click on ***Write***.
The **Home** menu shows the current values and status of the filling process in the **Filler** window. You can also start or stop the filling process manually in this window.
See also Home in PanelX.

Relevant commands

- Dosing mode (DMD), Fill weight (FWT), Valve control (VCT), Save dosing parameter set (WDP)
- Select the dosing parameter set (RDP)
- Start batching (RUN or digital input) or redosing (RDS)
- Start weight monitoring (SDF, MSW)
- Taring (TMD, TAD)
- First fine flow phase before the coarse flow (FFL)
- Coarse flow control (CFD) with lockout time (LTC) and dosage monitoring (CBK, CBT)

- Fine flow control (FFD) with lockout time (LTF) and dosage monitoring (FBK, FBT), minimum fine flow amount (FFM)
- Time interval (FPT) for fine flow prediction
- Residual flow time (RFT)
- Stabilization time (STT)
- Dosing time monitoring (MDT)
- Actual value determination (FRS) with tolerance checking (UTL, LTL)
- Emptying (EPT)
- Read dosing counter (NDS), Dosing status (SDO), Summation function (SUM), Standard deviation (SDS), Mean value (SDM), Dosing time (DST), Coarse flow time (CFT), Fine flow time (FFT), Emptying time (EPT)
- Optimization (OSN), affects CFD and FFD, systematic deviation (SYD)
- Start batching process (RUN) or cancel it (BRK).

6.1.1 General settings

Generally speaking there are two types of filling:

1. The type already described, Upward dosing, in which a container is weighed during filling and then removed.
2. Downward dosing, in which the removal of the weight of a storage container is weighed while a (smaller) container is being filled.

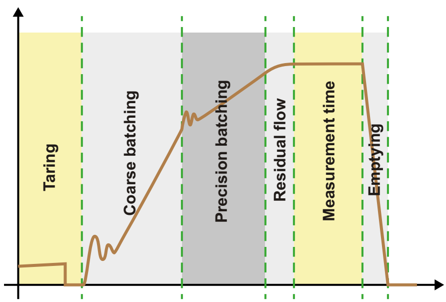


Fig. 6.2 Upward dosing

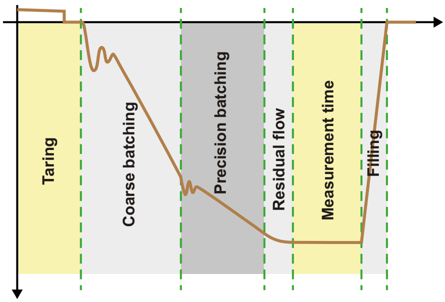


Fig. 6.3 Downward dosing

Main section in the PanelX program

- Specify the fill weight (FWT).
- Define the maximum dosing time (MDT).
  If the dosing time is exceeded, batching is aborted with an error and the outputs for coarse and fine flow are set to inactive again.
- Specify the dosing mode (DMD).
- Specify whether you would like to have optimization of coarse and fine flow defined by the sensor electronics (OSN) or would like to define the times yourself.
- Click on ***Write*** to save the settings in the sensor electronics.

In the **Dosing parameter set** area you can ***Store*** the current settings in the settings parameter set or read out one of the saved parameter sets and ***Activate*** it.

Alarms section in the PanelX program

In this section you can determine that an alarm will be triggered under certain conditions:

- Alarm on overflow or underflow of gross signal, net signal or analog-to-digital converter value.
- Output alarm when the maximum dosing time is exceeded (MDT).
- Total weight monitoring at the start of dosing. If the measured value is greater than the empty weight (EWT), the batching process will not be started. Filling to completion when the container is damaged (for example a burst sack) is pointless.

Configure the alarm states to be displayed with the SDF (Special Dosing Functions) command with bits 2, 3 and 0. The alarm is displayed in the measured value status (MSV) and in the dosing status (SDO). You can send it to a digital output (OMD).

6.1.2 Start

The settings are divided into two sections: To complete your settings, click on ***Write*** to save the settings in the sensor electronics.

Main section

Empty weight and minimum start weight

In the **Main** section, use these two values to define the range within which the measured value must lie for taring to be performed. The currently measured value must then lie above the minimum staring weight (MSW) and below the empty weight (EWT).
See also Tare limit (empty weight).

Alarm for empty weight (SDF)

If the empty weight is exceeded, you can have an alarm triggered. The alarm is displayed in the status bits of the SDF command (Special Dosing Functions) in bit 0.

Redosing (RDS)

You can define here that redosing will be performed before taring if the current measured value is above the fine flow cutoff point but still below the ***Lower tolerance limit***. Then the filling process will continue with the stabilization time.
See also Stabilization time.

Tare section

Tare mode (TMD)

Taring can be done in three ways:

1. Off: *No* taring is performed after the start (RUN command or digital input). There is *no* wait for a set delay time for taring.
2. On: If the measured value is less than the fine flow cutoff point after the start (RUN command or digital input), there is a wait for the delay time for taring. Then taring occurs followed by coarse and fine flow.
3. Extended: If the measured value is less than the overflow weight (150% of NOV) after the start (RUN command or digital input), there is a wait for the delay time for taring. Then taring occurs followed by coarse and fine flow. Use this option if the weight of the container (empty weight) is greater than the filling weight.

Tare delay (TAD)

You can use this time for example to blank out interference from putting up sacks or putting on containers. Then taring will occur after the delay time elapses.
See also Taring after delay.

Activate ***Auto*** to have the delay time for taring optimized by the sensor electronics (ASD). Then it is no longer possible to enter the values (directly). If this option is active, the lockout time (RFT) and zero value settling time (CD2) will also be optimized (the option is also marked as active in the relevant sections of the PanelX program).

6.1.3 Coarse flow

The settings for coarse flow are divided into two sections: To complete your settings, click on ***Write*** to save the settings in the sensor electronics.

Main section

Coarse flow cutoff (CFD)

After the filling weight is entered (General settings), the coarse flow cutoff point is automatically set to 50% of the filling weight. If optimization is activated (General settings), the coarse flow cutoff point is tracked automatically. Otherwise enter the required coarse flow cutoff point. The coarse flow cutoff point must not be greater than the fine flow cutoff point.

Valve control

The type of valve control depends on your system. There are four methods you can use to select the type; see the graphics under the selection field and the explanation and graphics for the VCT command. With upward dosing, the function also depends on the setting of the ***fine flow phase before coarse flow***. The first two methods differ only in behavior during redosing or when starting from stop status In the first case fine and coarse flow are always opened together, in the second case only fine flow. In the fourth method the coarse flow remains active for the entire filling time and the filling time is enabled as well.

Fine flow phase before coarse flow (FFL)

The fine flow signal is activated for the set time after the start or after taring and before the coarse flow for the set duration. You can also use this additional fine flow time before the coarse flow, for example to prevent the coarse flow causing excessive foaming in the liquid being filled.

Control section

Coarse flow lockout time (LTC)

Once coarse flow is activated, comparison of the actual weight for reaching the coarse flow cutoff point is disabled for the specified duration. The time does not delay the filling process.

Especially when the fill material has pieces, it may happen that the first pieces that fall in the container after coarse flow has started will generate peak loads that will already cause the coarse flow cutoff point to be exceeded. You can prevent that with this setting. Based on experience, the lockout time should be about 10 % of the coarse flow dosing time. If you are using monitoring of the fill flow limit value, the time must be long enough for material to reach the container within the lockout time.

Activate ***Auto*** to have the time optimized by the sensor electronics based on the material flow (ATP). Then it is no longer possible to enter the values (directly). If this option is active the lockout time for fine and residual flow is also optimized (the option is also marked as active in the relevant sections of the PanelX program).

Level monitoring, coarse flow (CBK)

This option is used for breakage monitoring during the coarse flow phase (sack breakage). Enter the increase in the weight you expect per time interval (CBT) for a normal filling process. After the lockout time for the coarse flow (LTC) elapses, the increase is checked after every time interval (CBT). If the weight increase is not exceeded, this is interpreted as breakage in the container that is being filled. Fill flow monitoring of the coarse flow is deactivated after the coarse flow cutoff point (CFD) is reached.
See also Breakage monitoring during the fine flow phase.

Monitoring time (interval) for coarse flow (CBT)

Specify the time interval here for checking the increase in weight during fill flow monitoring (container breakage). The time can only be set in increments of 10 ms. If you enter ***0***, the increase will be checked every 100 ms.

Fill flow check alarm (SDF)

Configure the alarm states to be displayed with the SDF (Special Dosing Functions) command with bit 1. The alarm is displayed in the measured value status (MSV) and in the dosing status (SDO). You can send it to a digital output (OMD).

6.1.4 Fine flow

The settings for fine flow are divided into two sections: To complete your settings, click on ***Write*** to save the settings in the sensor electronics.

Main section

Fine flow cutoff point (FFD)

The fine flow cutoff point is automatically set to 95% of the filling weight. If optimization is activated (General settings), the fine flow cutoff point is tracked automatically. Otherwise enter the required fine flow cutoff point. You cannot set the fine flow cutoff point to less than the coarse flow cutoff point. If you try to do this, the coarse flow cutoff point will automatically be set to the value of the fine flow cutoff point – the Minimum fine flow (FFM).

Valve control

The setting is the same as for coarse flow.

Minimum fine flow amount (FFM)

The minimum fine flow amount determines how close the coarse flow cutoff point can be taken to the fine flow cutoff point. This means that when the fill material has pieces, you can set the coarse flow to fine flow interval in such a way that fine flow will run in all cases. When the fill material has pieces, set the minimum fine flow amount setting to slightly more than the heaviest piece.

To obtain the most consistent dosing result possible, you should set the minimum fine flow amount in such a way that the batching process always ends with fine flow.

Control section

Fine flow lockout time (LTF)

The time starts when the coarse flow cutoff point is reached. Comparison of the actual weight for reaching the fine flow cutoff point is disabled for the specified duration. The time does not delay the filling process.

When the coarse flow shuts off, settling processes may occur that will already cause the coarse flow cutoff point to be exceeded. You can prevent that with this setting. Based on experience, the lockout time should be about 10 % of the fine flow dosing time.

Activate ***Auto*** to have the time optimized by the sensor electronics based on the material flow (ATP). Then it is no longer possible to enter the values (directly). If this option is active the lockout time for coarse and residual flow is also optimized (the option is also marked as active in the relevant sections of the PanelX program).

Level monitoring for fine flow (FBK)

This option is used for breakage monitoring during the fine flow phase (sack breakage). Enter the increase in the weight you expect per time interval (FBT) for a normal filling process. After the lockout time for the fine flow (LTF) elapses, the increase is checked after every time interval (FBT). If the weight increase is not exceeded, this is interpreted as breakage in the container that is being filled. Fill flow monitoring of the fine flow is deactivated after the fine flow cutoff point (FFD) is reached.
See also Breakage monitoring during the coarse flow phase.

Monitoring time (interval) for fine flow (FBT)

Specify the time interval here for checking the increase in weight during fill flow monitoring (container breakage). The time can only be set in increments of 10 ms. If you enter ***0***, the increase will be checked every 100 ms.

Fill flow check alarm (SDF)

Configure the alarm states to be displayed with the SDF (Special Dosing Functions) command with bit 1. The alarm is displayed in the measured value status (MSV) and in the dosing status (SDO). You can send it to a digital output (OMD).

Prediction section

Time (interval) for fine flow prediction (FPT)

The fine flow prediction can change the fine flow cutoff point during the filling process based on previous filler results. This function is useful if the material is not all supplied at once, for example because there is more or less material in the storage container. The sensor electronics check after every time interval whether the increase in weight during the fine flow phase is behaving as it did in the most recent filling processes. If the increase is stronger or weaker, the fine flow cutoff point is moved to a lower or higher value so that not too much or too little material will be added in the residual flow phase.

When fine flow prediction is activated, automatic optimization (OSN) of the fine flow cutoff point is deactivated.

6.1.5 Residual flow

The time for the residual flow (RFT, in-flight time) starts after the fine flow cutoff point is reached. The amount of material that has still to flow into the container after fine flow is deactivated is recorded during this time. The amount of material should be small and should be the same for every batching process if possible. It is important to record the residual flow for proper optimization and for an accurate actual weight value. The time to be set depends on the proportioning device.

Activate ***Auto*** to have the time optimized by the sensor electronics based on the material flow (ATP). Then it is no longer possible to enter the values (directly). If this option is active the lockout time for coarse and residual flow is also optimized (the option is also marked as active in the relevant sections of the PanelX program).

DL1/DL2: This option is useful for example if material still remaining in the infeed is stuck when the valves close and will still reach the container due to the blow-out and shaking process. For DL1 specify how long to wait with the signal for blow-out and shaking and for DL2 how long the signal should be generated.
See also IO see also in PanelX.

To complete your settings, click on ***Write*** to save the settings in the sensor electronics.

6.1.6 Stabilization

The settings for stabilization are divided into two sections: To complete your settings, click on ***Write*** to save the settings in the sensor electronics.

Main section

Define here the maximum time to wait for the measured value to stabilize after the end of residual flow: ***Stabilization time*** (STT).
If you activate ***motion detection*** (MTD) in addition, checkweighing (determining the actual weight) will be performed after standstill is detected, but withing the stabilization time. Otherwise checkweighing starts immediately. If no standstill occurs within the stabilization time, the actual weight is measured in any case once the stabilization time elapses.
The actual weight acquired after the stabilization time is the basis for optimization of the filling process.

Results section

Redosing (RDS)

Define here whether redosing should be performed after checkweighing if the actual weight is less than the ***Lower tolerance limit*** (LTL).

Upper tolerance limit, Tol+ (UTL)

If the dosing result exceeds the tolerance limit, status "Tolerance limit exceeded" (bit 5) is set in the dosing status (SDO). The status is cleared with the next start. The upper tolerance limit is automatically set to 100.2% of the filling weight (not with WTX).

Lower tolerance limit, Tol- (LTL)

If the dosing result falls below the tolerance limit, status "Below tolerance limit" (bit 6) is set in the dosing status (SDO). The status is cleared with the next start. The lower tolerance limit is automatically set to 99.8% of the filling weight (not with WTX).

Systematic difference (SYD)

Filling processes may be subject depending on the system to a specific amount of filling material that is lost after every filling or additional material that is added. This loss or addition does not occur until after checkweighing and therefore cannot be acquired by optimization. You can use this function to take the loss or addition into consideration. See also Systematic difference.

6.1.7 Emptying/filling

With upward dosing the storage tank is filled again in the emptying time. The term emptying is nevertheless used below, although it actually only applies to upward dosing.

There are two ways to monitor emptying (EMD) or refilling:

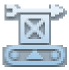
1. Timer-controlled emptying/filling
   The emptying time parameter alone determines the period of activation for digital output.
2. Weight-controlled emptying/filling
   The empty weight is used as the emptying limit. The emptying time is also used as the maximum duration.
   See also Start (Main section).

Emptying takes place immediately after checkweighing, or depending on the settings not until after the stabilization time has elapsed. Emptying is considered complete if the gross value is below the emptying limit in weight-controlled emptying mode or (in both modes) if the emptying time is exceeded. After emptying finishes, the ready signal is set in the dosing status (SDO).

Depending on the design of your system, there are two variants in upward dosing:

1. The filled container is removed.
   In this case set the emptying time to ***0*** and use ***weight controlled***: After the container has been removed, the filling process is complete.
2. The filled container is emptied so that the next amount of material can be added.
   Use one of the methods depending on the fill material and also define the emptying time as the maximum time for removal.

- Select the method to be used and define the emptying time (EPT).
- To complete your settings, click on ***Write*** to save the settings in the sensor electronics.

6.2  Checkweigher

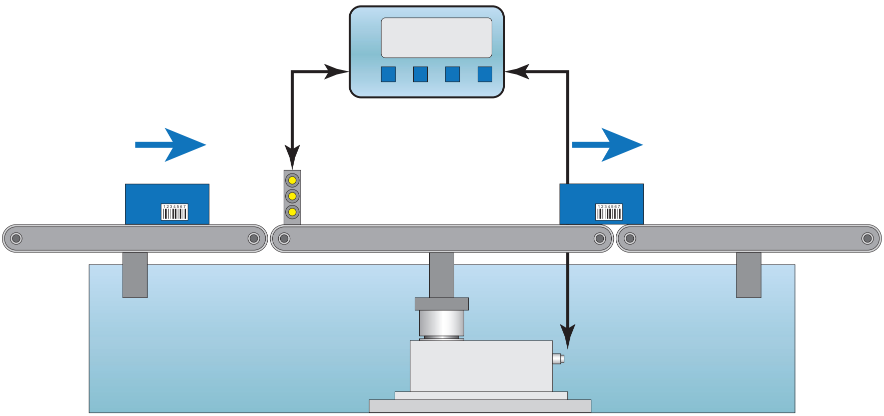


Fig. 6.4 Principle of a checkweigher

The illustration above shows the typical layout of a checkweigher:

- On the left is the conveyor belt for supplying the product to be weighed
- The actual scale is in the middle.
- Weighed product is taken away on the right.

Weighing is part of the movement in which the product to be weighed passes through the middle area. The three conveyor sections work at the same, constant speed.

The aim of these dynamic weighing is a high throughput rate (weighing operations per minute) without loss of accuracy (low standard deviation). The fast sampling rate, fast settling filters and the trigger functions make digital sensor electronics ideal for dynamic weighing.
The throughput rate is dependent on the weight to be weighed, the scale dead load, the length of the weighing platform (middle section in the illustration above), the speed of the conveyor belt, the vibration behavior of the scale structure and the required accuracy. The settling time depends on the total weight (product to be weighed plus scale dead load) acting on the load cell and the rigidity of the load cell.
You can use the trigger functions available in the sensor electronics to optimize the throughput rate and also to increase accuracy. Then it will also be necessary to transfer all measured values (up to 1200 measured values per second) via an interface to an analysis unit during the weighing process. Sensor electronics take over all control functions including reporting which weight was measured and whether it falls within the permitted tolerances. Depending on the version, digital inputs and outputs are available or you can use a control word (STW) or the status information (RIO) to have your control unit perform the appropriate actions.
See also Limit switches.

A precondition for a successful measurement is reproducibility of measurements under the same or similar dynamic conditions:

- An adequate settling time to account for the product to be weighed resting in different positions on the conveyor belt.
- A sufficiently long measuring time (for multiple variable) with a low range of fluctuation.

In case of doubt you will either have to reduce the transport speed or make concessions in terms of the accuracy that will be achieved.
The following sections describe the general sequence under various trigger conditions (charts in the PanelX program) and which settings you need to make after adjusting your sensor electronics (see the Starting up section) to adjust your checkweigher optimally.

Relevant commands

- Output rate (ICR)
- Trigger mode, Trigger level, Settling time, Measuring time, Tolerance (TRC)
- Use filter settling time for the settling time (AST)
- Zero balance delay (CDT)
- Correction factor for the trigger result (TRF)
- Post-trigger delay (PTD)
- Trigger result and status (MAV)
- Status of digital inputs and outputs(RIO)
- Control word (STW)

6.2.1 Level pre-trigger

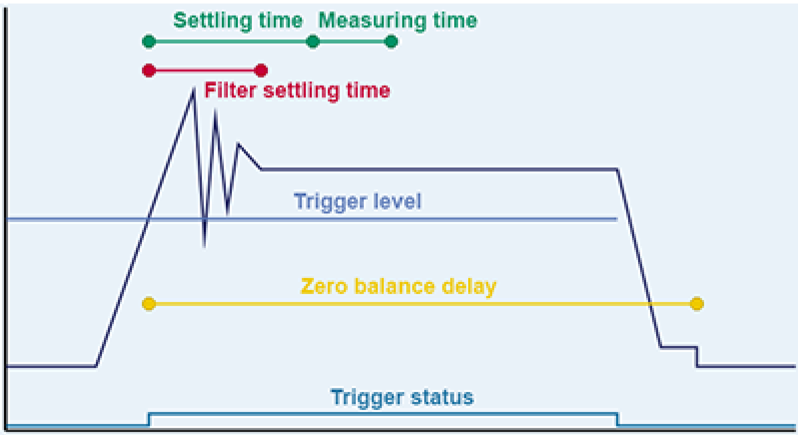


Fig. 6.5 Flowchart of a measurement (schematic).

The graphic shows the different times that occurred during the measurement in simplified format for which you must find suitable values. Enter the settling time and measuring time here as the number of measured values (MV). Then the values will be independent of the sampling rate.
See also Pre-triggering via level.
Retriggering is also possible starting with firmware P77.9, for example with multi-head combination weighers.
See also Retriggering.

Trigger level (TRC)

Starting at this level all times are taken into account, for example the settling time and zeroing delay, and the measurement sequence begins.

Settling time (TRC)

The setting should be long enough so that the measured values are already as stable as possible. In the ***Auto*** setting the filter settling time (AST) is applied as the settling time.

Measuring time (TRC)

Define how long the measurement should or can continue before the product to be weighed leaves the belt.

Zeroing delay (CDT)

This time, calculated from the point at which the trigger level is exceeded, is followed by the zeroing.
See also Zeroing after a time delay.

Correction factor (TRF)

You can use this function to make a correction between the static adjustment of the scale and the dynamic result. Each valid trigger result (MAV) is multiplied by this correction factor.

6.2.2 External pre-trigger

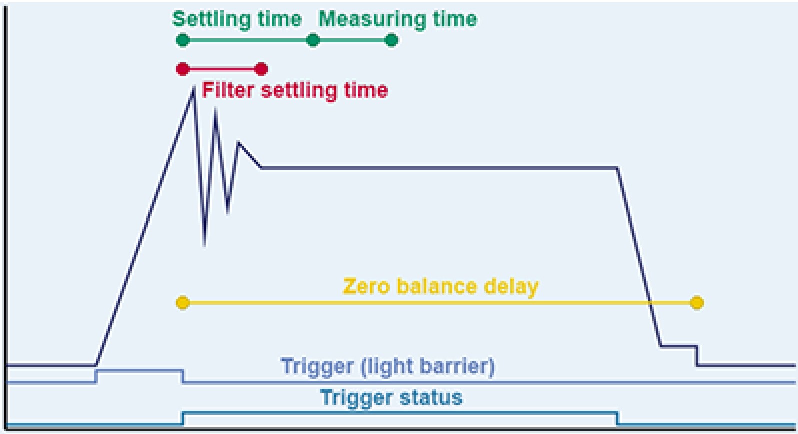


Fig. 6.6 Flowchart of a measurement (schematic).

The graphic shows the different times that occurred during the measurement in simplified format for which you must find suitable values. Enter the settling time and measuring time here as the number of measured values (MV). Then the values will be independent of the sampling rate.
See also External pre-triggering.
In the illustration, all times are taken into account starting with the falling edge of the trigger signal (for example from a light barrier), including the settling time and zeroing delay, and the measurement sequence begins. The falling or rising edge (AD103c) is used for the trigger depending on the sensor electronics unit. If necessary invert the logic level with the POL command.

Settling time (TRC)

The setting should be long enough so that the measured values are already as stable as possible. In the ***Auto*** setting the filter settling time (AST) is applied as the settling time.

Measuring time (TRC)

Define how long the measurement should or can continue before the product to be weighed leaves the belt.

Zeroing delay (CDT)

This time, calculated from the point at which the trigger level is exceeded, is followed by the zeroing.

See also Zeroing after a time delay.

Correction factor (TRF)

You can use this function to make a correction between the static adjustment of the scale and the dynamic result. Each valid trigger result (MAV) is multiplied by this correction factor.

6.2.3 Level post-trigger

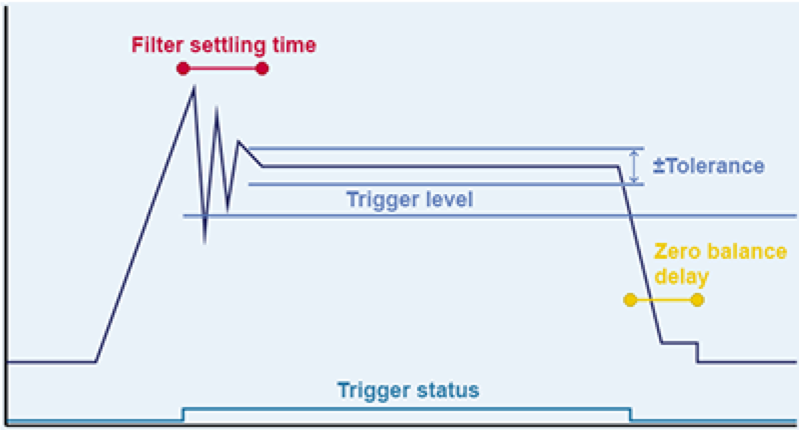


Fig. 6.7 Flowchart of a measurement (schematic).

The chart shows a simplified view of the different times occurring during measurement.

See also Post-triggering via level.

Trigger level (TRC)

After the trigger level is exceeded, all measured values are first written to a ring buffer. As soon as the level falls below the trigger level again, measured values present in the buffer are analyzed.

Tolerance (TRC)

The tolerance is used to determine how many measured values from the ring buffer will be used to calculate the measurement result. Only the measured values that lie within the tolerance before the level falls below the trigger level will be taken into consideration. Tolerance must be indicated in digits, and therefore relative to maximum capacity = 1,000,000 digits.

Zeroing delay (CDT)

The zeroing delay begins as soon as the trigger level is undershot. After this time, zeroing takes place.
See also Zeroing after a time delay.

Correction factor (TRF)

You can use this function to make a correction between the static adjustment of the scale and the dynamic result. Each valid trigger result (MAV) is multiplied by this correction factor.

6.2.4 External post-trigger

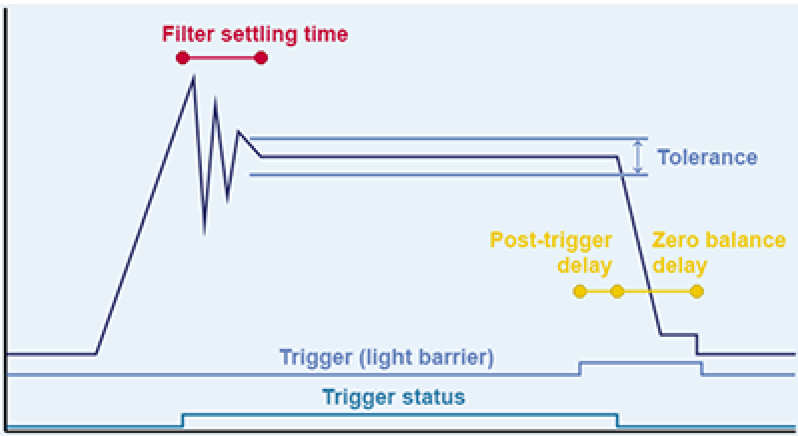


Fig. 6.8 Flowchart of a measurement (schematic).

The chart shows a simplified view of the different times occurring during measurement.
See also External post-triggering.

All measured values are first written to a ring buffer. The analysis does not begin until after the post-trigger delay.

Tolerance (TRC)

The tolerance is used to determine how many measured values from the ring buffer will be used to calculate the measurement result. Only the measured values that lie within the tolerance before the end of the post-trigger delay will be taken into consideration. Tolerance must be indicated in digits, and therefore relative to maximum capacity = 1,000,000 digits.

Post-trigger delay (PTD)

You can use the post-trigger delay to prevent recording of measured values in the ring buffer from being stopped too soon, for example because the object has already passed the light barrier but has not left the belt yet. This allows you to make use of the longest measuring time possible.

Zeroing delay (CDT)

This time, calculated from the end of the post-trigger delay, is followed by the zeroing. See also Zeroing after a time delay.

Correction factor (TRF)

You can use this function to make a correction between the static adjustment of the scale and the dynamic result. Each valid trigger result (MAV) is multiplied by this correction factor.

6.3 Sorting weigher

The sorting weigher belongs to a group of continuously operating, self-activated scales. It works similarly to a checkweigher. In addition, the product to be weighed is checked and evaluated for (exceeding / falling below) the assigned limits as the basis for controlling one output (good/bad) or multiple outputs (classifying).

Two factors are critical in determining the highest possible quality for sorting:

1. Sorting uncertainty due to low separation efficiency
   You can minimize this uncertainty with the appropriate filters and by optimizing the speed at which the weighing material is loaded.

2. Sorting uncertainty due to zero drift of the measured value
   You can minimize this uncertainty with a combination of various zero setting functions (CDT, DZT, ZTR).

Four limit switches and timing (delay time and activation time) of the outputs are available for the sorting application (**Limit switches** menu item). After the (trigger) measurement, the mean value and standard deviation are calculated using the trigger results from the sensor electronics. You can also have the minimum and maximum values of the trigger results determined using the Peak values (**Home** menu item).

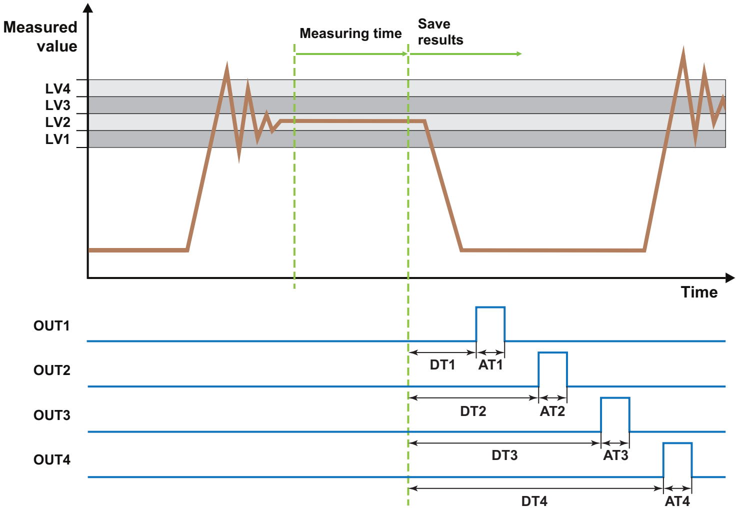


Fig. 6.9 Typical sorting example

The limit switches monitor the trigger result (MAV). Depending on which limit value mode is selected, the applicable condition relative to the measured value must be met for the corresponding limit value switch to be activated. The ***Delayed: Inside band*** function is used for all four limit switches in this screen, resulting in four (weight) classes for the analysis. By setting different delay times for the four outputs you can control the sorting unit so that as the product to be weighed arrives it is ejected into the appropriate container.

Requirement:

The Checkweigher application must be set up.

Activation

- Set the limit switches (LIV1 to LIV4) to the appropriate values (in the example above P1 = 3, P2 = 2).
- Set the delay times for outputs (DT1 to DT4).
- Set the active time indicating how long the relevant digital output will be active (AT1 to AT4).

7 Functions

This section describes functions that are needed for various applications such as weighing, filling and dosing systems. Not all functions are available for every sensor electronics unit. Some functions are only available in newer hardware or firmware versions.

Refer to the Applications section to find out which settings you need to make for applications such as dosing/filling, checkweighers or weight grading machines.
The following sections set out *all* the functions available in the sensor electronics units. The order of explanations is not based on any specific application, however, and depending on the application only some of the functions are necessary or useful.

7.1 General signal flow diagram

The following diagrams show the signal flow of the electronics units as from P80 onward. Other software versions may be missing some of the functions shown here. The commands for some of the functions are given as abbreviations.

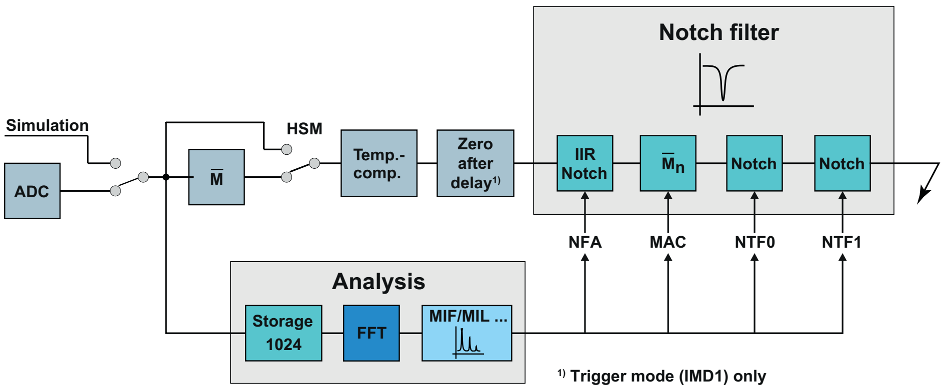


Fig. 7.1 Signal conditioning at input

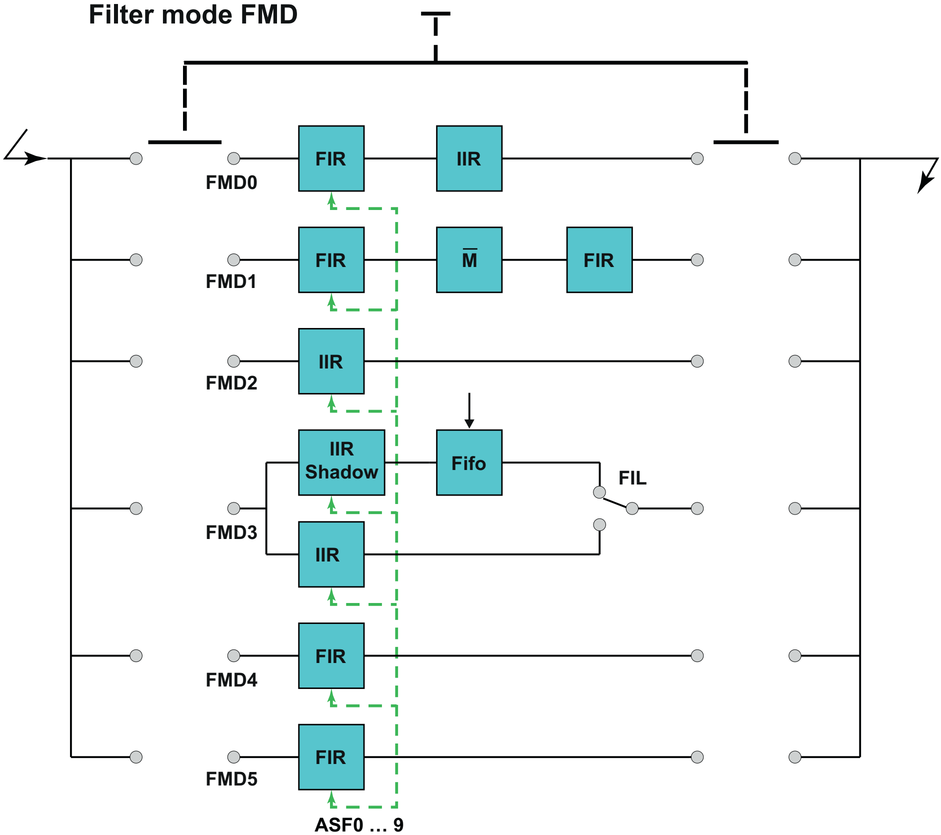


Fig. 7.2 Variants of filter mode ([FMD](#))

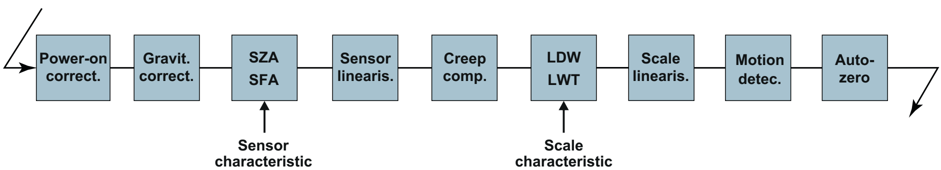


Fig. 7.3 Further processing — Part 1

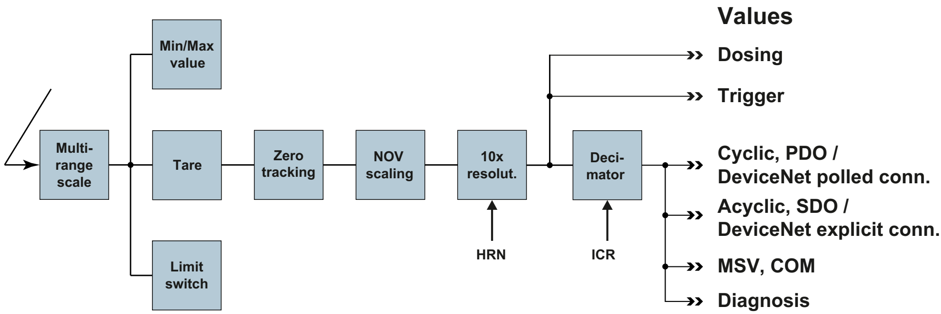


Fig. 7.4 Further processing — Part 2

7.2 Motion detection (standstill recognition)

The measured values of a scale are not reliable until the standstill condition has been met. An entry of ±1 d/s means that the measured value can vary by a maximum of 1 digit within one second. Standstill is indicated in PanelX by displaying the unit of measure, for example kg.

In Legal-For-Trade applications (LFT command with parameter P1 > 0), monitoring must *always* be performed at standstill.

Information about whether the measured values within one second fall within the selected standstill range is transferred in the measurement status information (see command MSV) in bit 3. If you turn off motion detection there is no check and the status is always “Standstill”.

Requirement for standstill

- The gross value and net value must be within the nominal (rated) value (NOV).

Activation

Activate motion detection in the **Scale** menu item or with the MTD command, specifying the range in which standstill must be detected. Motion detection is performed at 1 d/s if you turn off user-defined scaling (NOV with parameter P1 = 0) or set scaling to over 100,000.

Influence due to other settings

The following settings also affect motion detection: nominal (rated) value (NOV), resolution (RSN) and changeover between weighing ranges if the scale is operating as a dual-range scale (MRA).
See also Stabilization time STT.

7.3 Zeroing

Zeroing is performed with an unloaded scale to compensate for initial loads inherent in the installation. After zeroing, identified in the PanelX program by , the gross measured value is zero. The value measured during zeroing is written to zero memory and then subtracted from all following measured values. In addition to performing a command or clicking for zeroing, there are also various functions you can use for automatic zeroing under certain conditions.

Requirements

- The scale must be unloaded.
- The gross value must be within ±2% (legal-for-trade applications) to ±20% of the nominal (NOV). Define the range via ZSE.
- In legal-for-trade applications (LFT command with parameter P1 > 0) the standstill condition must additionally be met.
- As from firmware version P81, you can use ZMD to extend the zeroing range beyond that defined by ZSE (not for legal-for-trade applications).

Activation

To activate (one-time) zeroing, click on the button with the symbol or use the CDL command.

Reading zero memory

You can read the saved zero value with the CDL? command.

Clearing zero memory

Zero memory is overwritten by a subsequent zeroing operation. It is cleared when a new characteristic curve is entered, after the supply voltage is turned on again or with the RES command.

7.3.1 Zeroing on start-up

This function is helpful if your scale is subject to continuous soiling or the scale operates at widely differing temperatures, for example in truck scales: Zeroing is performed within the selected range if at least 2.5 seconds have passed since the device was turned on or the RES command and standstill has been detected. The zero value that is determined is written to zero memory.

A change to the area does not take effect until after switching on (again) or sending the RES command.

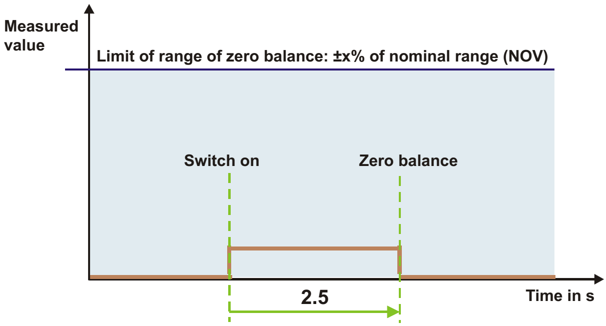


Fig. 7.5 Flowchart (schematic).

Requirements

- The scale must be unloaded.
- The gross value and net value must be within the nominal (rated) value (NOV).
- The standstill condition must be met.

Activation

Activate zeroing when switching on in the **Scale** menu or with the ZSE command, specifying the range of the nominal (rated) value in which the zero value can be readjusted.

7.3.2 Zero tracking

To hold the zero point stable for a longer time, you can use *zero tracking*. For example, an entry of 1 d/s means that the measured value can vary by a maximum of 1 digit within one second.

There are two variants:

1. Static zero tracking (ZTR)
   This variant is suitable for static scale applications.
   Static zero tracking corrected the zero value as long as the set zero tracking speed is not exceeded.
2. Dynamic zero tracking (DZT)
   Static zero tracking cannot be used in dynamic processes. The measured values must be analyzed dynamically. You can activate dynamic zero tracking in addition to static zero tracking.
   Dynamic zero tracking acquires all measured values that occur within a definable time (P1 of DZT) and within a specific percentage rate of the nominal (rated) value (P2 of DZT) relative to the zero value. This serves as the basis for calculating the mean value, which is added to the value for static zero tracking.

Since the operating principle of both processes is controlled by the standstill condition, there is always just one correction after one of the two processes (but with the two processes one after the other if necessary). The two processes are not applied simultaneously. Therefore if standstill is detected during dynamic zero tracking, the time is restarted and the measured values recorded so far during this interval are cleared. Zero memory does not change.

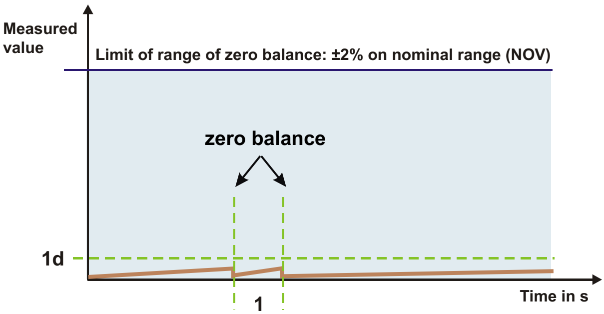


Fig. 7.6 Static zero tracking.

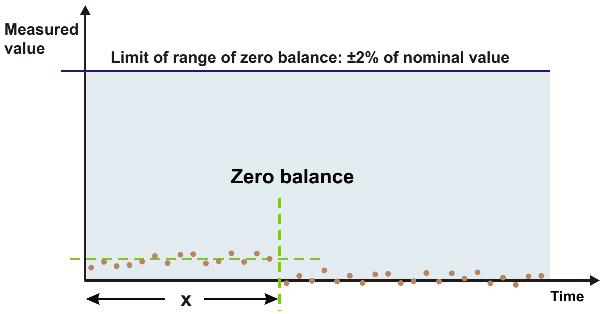


Fig. 7.7 Dynamic zero tracking.

Requirements for static zero tracking

- The scale must be unloaded.
- The gross value and net value must be within ±2% of the nominal (rated) value (NOV).
- The standstill condition must be met.

Requirements for dynamic zero tracking

- The scale must be unloaded.
- The gross value and net value must be within specified percentage rate of the nominal (rated) value (NOV).
- The standstill condition must *not* be met. Otherwise the time for mean value calculation will be started again.
- There must be more than nine measured values within the band for zero tracking (DZT, P2).

Activation

Activate static zero tracking in the **Scale** menu item or with the ZTR command, specifying how rapidly the measured value may change and still be readjusted.

Activate dynamic zero tracking (only possible in non-Legal-For-Trade mode) with the DZT command, specifying the time and range within which measured values will be determined.

Influence due to other settings

The following settings also affect motion detection: nominal (rated) value (NOV), resolution (RSN) and changeover between weighing ranges if the scale is operating as a dual-range scale (MRA).

Memory for zero tracking is cleared by the following actions

- If the scale is adjusted (commands SZA, SFA, LDW, LWT)
- During taring (TAR and TAV) commands
- If the scale is reset (RES command)
- After turning on the scale

7.3.3 Zero balance after delay

This function is intended for checkweighers when the unloaded scale has to be reset to zero between checkweighings. The zero value that is determined is written to zero memory.

The version differs depending on the settings for the trigger:

1. Triggering to a level or an external trigger
   The delay time starts at the moment of triggering: This also applies if you have specified a trigger delay time (TVT). That does not change when the delay time starts.
2. External post-trigger delay is activated
   The delay time does not start until the delay time defined for the post-trigger (PTD) has elapsed.

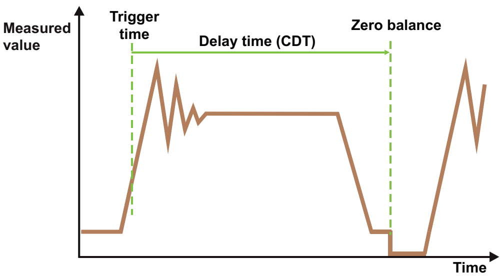


Fig. 7.8 Zero balance with pre-triggering.

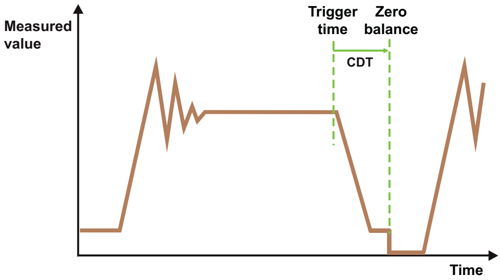


Fig. 7.9 Zero balance with post-triggering.

Requirements

- The trigger function must be active.
- The scale must be unloaded.
- In legal-for-trade applications (LFT command with parameter P1 > 0), the gross value must fall within ±2% of the nominal (rated) value (NOV). In non-Legal-For-Trade mode the gross value must fall within ±20% of the nominal (rated) value.

Activation

Activate zero balance after a delay with the CDT command, specifying the delay time to be used.

7.3.4 Automatic zeroing

Automatic zeroing is zero balancing for dynamic processes such as a checkweigher. It allows you to zero a scale without having to wait for the measurement signal to stop. In addition, measured values before and after signal peaks can be eliminated to obtain a better zero value.

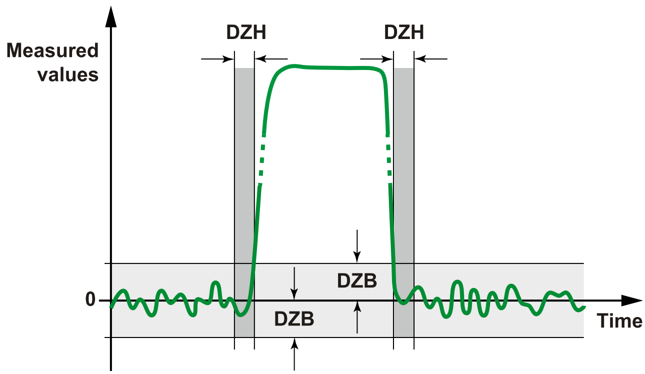


Fig. 7.10 Weighing process with plotted DZB and DZH ranges

Zeroing band for automatic zeroing (DZB, Automatic Zeroing Band)

The zeroing band defines a range (plus and minus) around the current zero signal. All weight values within this band (2 x DZB) are averaged during the calculation, producing the new zero value. Measured values outside the band are ignored in the calculation.

Hold-off time for automatic zeroing (DZH, Automatic Zeroing Hold-off Time)

The hold-off time defines intervals in which the measured values are not used to calculate the zero value, even if they are within DZB. The intervals are applied before the signal leaves the zeroing band and after it re-enters the zeroing band. Use the setting to also eliminate the signal edges that exceed the zeroing band.

Note that the setting of the digital filters has a great influence on the correct values for this hold-off time. So check the hold-off time after changing filters.

Mode for automatic zeroing (DZM, Automatic Zeroing Mode)

The mode for automatic zeroing determines the end condition for calculating the zero value. You can specify either the number of measured values to be included (P1 = 1) or the time period during which measurements are taken (P1 = 2). If P1 = 1 (count), only the values that are not filtered out by DZB or DZH are counted. If P1 = 2 (time), zeroing is performed at fixed intervals; DZB or DZH are not additionally taken into account.

Number of measured values to include (DZC, Automatic Zeroing Count)

Defines the number of measured values used for automatic zeroing if you have selected P1 = 1 for DZM. Values excluded by the DZH and DZB settings are also ignored here.

Time for automatic zeroing (DZT, Automatic Zeroing Time)

Defines the averaging time period used for automatic zeroing if you have selected P1 = 2 for DZM. The time runs as soon as the measured values enter the band defined by DZB. There is no further excluding of values by DZH or DZB settings here.

7.3.5 Zero balance options for filling

Zero balance is an essential element in ensuring filling accuracy, as this function is used to correct zero drift (over time and temperature). The available zero balance functions such as zero balance and (static) zero tracking have the disadvantage that the standstill condition must be met. This is difficult if the filters required for the process have long settling times and/or zero balance will be initiated by a command. Especially in batching applications, the zero balance must be performed in the time domain when there is no container on the scale or filling head. Most times required are under a second.

Therefore a special process is available for this case:

1. After the filling weight is determined, status bit 6 (READY) is set (see MSV) and the filter that is normally used is temporarily deactivated to allow for fast settling on the zero value. Only the notch or mean value filters (if any) present for interference suppression remain activated due to their short settling time.
2. As soon as the measured value falls below 50% of the filling weight (FWT), the unloading wait time (CD1) begins.
3. After that the original filter is reactivated, followed by a wait for settling, the zero value settling time (CD2).
4. After this time elapses a check determines whether you have specified a zero balance tolerance (CTO) and if so whether the measured value is within the tolerance limits. If the condition is met, zero balance is performed and the value is written to zero memory.

The READY status (after using the IMD command with parameter P1 = 2) is only generated if the CSM command (changing measured value status) is not used or was sent with parameter P1 = 0 (default setting).

If necessary read this value from the tare buffer with the TAV? command.

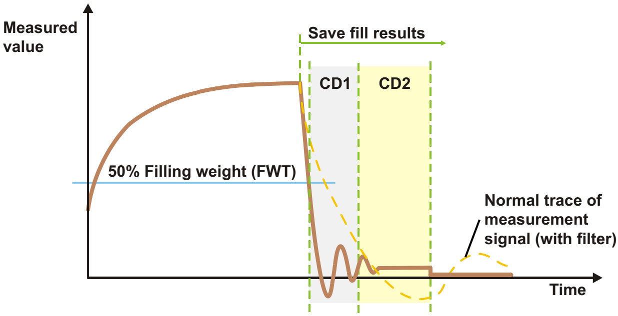


Fig. 7.11 Schematic diagram of a sequence.

Requirement

- Dosing must be active as the working mode (IMD command with parameter P1 = 2).

Activation

Activate zero balance with the CD1 command, specifying the unloading wait time to be used.

7.4 Taring

Taring is performed to be able to distinguish the weight of the container from the weight of the contents. The gross value is equivalent to the total weight. The net weight is the weight of the contents. After taring, identified in the PanelX program by , the net measured value is displayed (zero after taring). The value measured during taring is written to the tare buffer and then subtracted from all following gross values. In addition to performing a command or clicking to tare, there are also various functions you can use to optimize taring.

Requirements

- The tare value must fall within a specific range of the nominal (rated) value (NOV). In legal-for-trade applications the tare value must be between 0 and NOV, in other words the weighing range. Otherwise the tare value must be <±150% of NOV.
- In legal-for-trade applications (LFT command with parameter P1 > 0) the standstill condition must be met.

- Taring must be permitted in dosing mode (DMD with parameter P1 = 1) (TMD command with parameter P1 > 0).

Activation

To activate (one-time) taring, click on the button with the symbol or use the TAR command. If there is a digital input available, you can also trigger the taring process with a digital signal for some devices.

Use the TAS command to change between display of the net or gross signal.

> You can also write a tare value to the tare buffer with the TAV command (manual tare). In this case the display does not change to the net value as it usually does, however.

Reading out the tare buffer

You can read the saved tare value with the TAV? command.

Deleting the tare buffer

The tare buffer is cleared by subsequent taring, turning on the device or with the RES command.

7.4.1 Taring after delay

This process is available especially for the batching application to hide interference such as setting the container in place or placing the sack on the scale. Set the tare delay so that the interference associated with these events has died down after the beginning of the filling process before taring is performed.

The tare delay begins after the start of the filling process with the RUN command or via a digital input. Taring is performed after this time has elapsed.
See also Tare limit (empty weight).

If necessary read this value from the tare buffer with the TAV? command.

Requirements

- Dosing must be active as the working mode (IMD command with parameter P1 = 2).
- For upward dosing (DMD command with parameter P1 = 0), the empty weight or

- the coarse flow cutoff point must not be exceeded at the start.
- Taring must be activated (TMD command with parameter P1 > 0).

Activation

Activate taring after a delay with the TAD command, specifying the delay time to be used.

7.4.2 Tare limit (empty weight)

For dynamic processes such as batching you should limit the possible tare value to prevent overfilling. This could happen if there is already material in the container after the start. If you do not set this tare limit, the coarse flow cutoff point (CFD) will be used as a limit.

The start of the filling process with the RUN command or via a digital input is followed by a wait (if one is set) for the tare delay (TAD). Then a check determines whether the weight is below the value specified for the empty weight. If so, taring is performed. Otherwise no new taring is performed (the old tare value is retained).

If necessary read this value from the tare buffer with the TAV? command.

Requirements

- Dosing must be active as the working mode (IMD command with parameter P1 = 2).
- Taring must be activated (TMD command with parameter P1 = 1).

It makes no difference whether tare delay is activated.

Activation

Activate the tare limit with the EWT command, specifying the maximum permitted value for the empty weight.

7.5 Filter

Measured values must be filtered for almost all applications to obtain usable results. What type of filter is most suitable depends on the type and size of the transducer as well as the application itself. The sensor electronics described in this documentation provide different filter types and functions, not all of which are available in every version.

The choice of filter and filter cut-off frequency does not affect the internal *data rate*, i.e. the speed at which measured values are monitored (limit values, peak values, triggers and dosing control). Only filter mode 1 (FMD command with parameter P1 = 1) affects the internal data rate. You can use the ICR command to reduce the output rate of measured values.

Ultimately you will have to find the optimum setting by trial and error. The PanelX program offers you the option of recording measured values with Scope.

Static applications

For static applications the product to be weighed is placed on the scale (manually) and remains there until the measurement is performed. Then it is removed. You can therefore select relatively strong filtering to obtain a smooth display of measured value (standstill).

It works to your advantage that no interference vibrations are usually generated by the application itself in static applications. Only neighboring equipment could transfer mechanical vibrations to the scale, for example due to floor vibrations. These would have to be taken into consideration.

Dynamic applications

In dynamic applications the product to be weighed is automatically placed on the scale for a specific amount of time and then removed. You must therefore select the filter so that the measured value has settled to within sufficient accuracy within that time window and there is still enough time to acquire the measurement.

If filtering is too strong, it will take too long until full scale is reached, i.e. the number of weighings is too low or the measurement is performed before full scale is reached and is therefore incorrect. If filtering is too weak, the spread of values from the weighings will be too wide and measurement uncertainty will increase.

7.5.1 Filters in PanelX

The **Filter** menu item leads to the settings for the measuring rate and the filter available in the sensor electronics. As long as the menu item is selected, signal analysis is performed in the background and the result is displayed every 10 seconds.

Sampling and output rate

Choose the ***Output rate*** (ICR) to be used. The output rate is the rate at which measured values as generated with the MSV? command. The output rate does not depend on the

filter settings.
See also Output rate of measured values, Filter mode, Filter cut-off frequency.

You can use ***High speed*** mode (HSM) to double the sampling rate of the A/D converter. This affects the filter settings (settling times, cut-off frequency), the internal speed at which the trigger, limit values and peak values are analyzed, and the output rate.
See Increase analog-to-digital converter sampling rate.

Low-pass filters

The ***filter mode*** (FMD) determines which filter type will be used.
See also Filter mode.

You can select different cut-off frequencies (ASF) depending on the filter type. You can use **Background signal analysis** in the window at the maximum filter frequency to see which interference frequencies occur so you can select a suitable filter.
See also Filter cut-off frequency.

Notch filters

You can activate notch filters in addition to selectively suppress individual interference frequencies and their harmonics. You can define the maximum number of notch filters to be used here (ADF). The number may also be reduced by specifying the maximum settling time (TMA) to ensure that the signal runtime is not too long. Enter ***0*** if you do not want to have any restrictions.
The optimum filter frequencies are automatically calculated by the program and the values determined in this way are shown.
See also Notch filters.

7.5.2 Filter mode

The filter mode (FMD) command (together with the filter cut-off frequency) determines the essential characteristics of filtering. Different filter types are used depending on the filter mode to meet requirements in the best way possible.

Filter mode 0

A 2nd order IIR low-pass filter is used in this mode. Notch filters and mean value calculation are also available for you for selective interference suppression.

Filter mode 1

A fast-settling, 3-stage FIR low-pass filter is used in this mode. *The filter changes the internal data rate*. Notch filters and mean value calculation are also available for you for selective interference suppression.

This filter mode is suitable for dynamic measurements.

Filter mode 2

An 8th order IIR low-pass filter is used in this mode. Notch filters and mean value calculation are also available for you for selective interference suppression.

This filter mode is especially suitable for static measurements.

Filter mode 3

A 4th order IIR low-pass filter is used in this mode. Another possibility for adjusting the filter is the FTL command. Notch filters and mean value calculation are also available for you for selective interference suppression.

This filter mode is suitable for dynamic measurements, especially batching and filling processes.

Filter mode 4

A FIR low-pass filter with a settling time of less than 100 ms is used in this mode. Notch filters are also available for selective interference suppression, as is mean value calculation as from P80.

This filter mode is suitable for dynamic measurements.

Filter mode 5 (as from P77.9)

A FIR low-pass filter with a settling time of less than 250 ms is used in this mode. Notch filters and mean value calculation are also available for you for selective interference suppression.

This filter mode is suitable for dynamic measurements.

7.5.2.1 Notch filter

With all filter modes (FMD) you can also activate two notch filters that are independent of each other with the NTF command to selectively suppress individual interference frequencies and their *odd* harmonics. The first suppressed frequency (main frequency) is also called the notch frequency. The notch filters are deactivated in the default setting.

See also Increased analog-to-digital converter sampling rate.

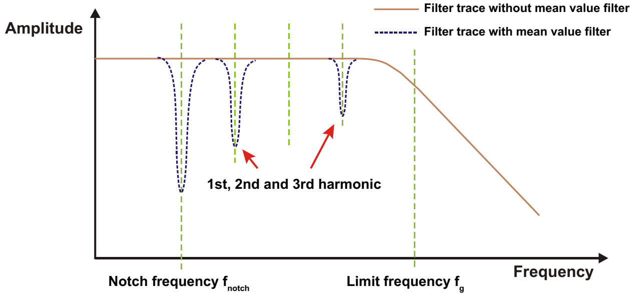


Fig. 7.12 Frequency response of a notch filter.

Calculation of parameter P with known interference frequency f_{notch}

Use the same equation to calculate the NTF parameter P with known interference frequency and standard analog-to-digital converter sample rate (HSM with parameter P1 = 0):

$$P = 1 + 610 / (2 * f_{notch})$$

For the increased analog-to-digital converter sample rate (HSM with parameter P1 = 1) use:

$$P = 1 + 1220 / (2 * f_{notch})$$

Please note: For electronics with P7x, put 613 instead of 610 and 1226 instead of 1220.

For electronics with P50 (electronics with P50 see Firmware overview) and AD105D applies differently:

$$P = 1 + 100 / (2 * f_{notch})$$

and with increased ADC sample rate

$$P = 1 + 200 / (2 * f_{notch})$$

Settling time calculation

Each filter increases the settling time. The settling time in milliseconds depending on parameter P at the standard analog-to-digital converter sample rate (HSM with parameter P1 = 0) is:

$$T_{delay} = P * 1000 / 610$$

For the increased analog-to-digital converter sample rate (HSM with parameter P1 = 1) use:

$$T_{delay} = P * 1000 / 1220$$

Please note: For electronics with P7x, put 613 instead of 610 and 1226 instead of 1220.

For electronics with P50 (electronics with P50 see Firmware overview) and AD105D applies differently:

T_{delay} = P * 1000 / 100

and with increased ADC sample rate

T_{delay} = P * 1000 / 200

Note that this time applies to each filter. If you activate multiple filters, the resulting times must be added.

Calculation of the notch frequency with parameter P known

For parameter P set with the NTF command, the notch frequency of the notch filter at the standard analog-to-digital converter sample rate (HSM with parameter P1 = 0) is:

f_{notch} = 610 / (2 * (P-1))

For the increased analog-to-digital converter sample rate (HSM with parameter P1 = 1) use:

f_{notch} = 1220 / (2 * (P-1))

Please note: For electronics with P7x, put 613 instead of 610 and 1226 instead of 1220.

For electronics with P50 (electronics with P50 see Firmware overview) and AD105D applies differently:

f_{notch} = 100 / (2 * (P-1))

and with increased ADC sample rate

f_{notch} = 200 / (2 * (P-1))

7.5.2.2 Mean value filter

The mean value filter (MAC command) works similarly to a notch filter. It selectively suppresses individual interference frequencies and their *even and odd* harmonics. The first suppressed frequency (main frequency) is also called the notch frequency.
See also Increased analog-to-digital converter sampling rate.

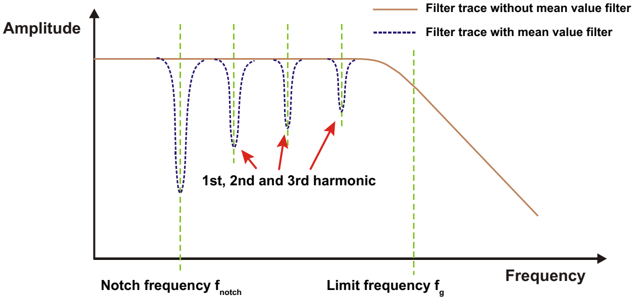


Fig. 7.13 Frequency response of a mean value filter.

Calculation of parameter P with known interference frequency f_{notch}

Use the same equation to calculate the NTF parameter P with known interference frequency and standard analog-to-digital converter sample rate (HSM with parameter P1 = 0):

$$P = 1 + 610 / (2 * f_{notch})$$

For the increased analog-to-digital converter sample rate (HSM with parameter P1 = 1) use:

$$P = 1 + 1220 / (2 * f_{notch})$$

Please note: For electronics with P7x, put 613 instead of 610 and 1226 instead of 1220.

For electronics with P50 (electronics with P50 see Firmware overview) and AD105D applies differently:

$$P = 1 + 100 / (2 * f_{notch})$$

and with increased ADC sample rate

$$P = 1 + 200 / (2 * f_{notch})$$

Settling time calculation

Each filter increases the settling time. The settling time in milliseconds depending on parameter P at the standard analog-to-digital converter sample rate (HSM with parameter P1 = 0) is:

$$T_{delay} = P * 1000 / 610$$

For the increased analog-to-digital converter sample rate (HSM with parameter P1 = 1) use:

$$T_{delay} = P * 1000 / 1220$$

Please note: For electronics with P7x, put 613 instead of 610 and 1226 instead of 1220.

For electronics with P50 (electronics with P50 see Firmware overview) and AD105D applies differently:

T_{delay} = P * 1000 / 100

and with increased ADC sample rate

T_{delay} = P * 1000 / 200

Note that this time applies to each filter. If you activate multiple filters, the resulting times must be added.

7.5.3 Filter cut-off frequency

Adjust the filter cut-off frequency with the ASF command. The filters are deactivated for ASF with parameter P1 = 0.

The resulting filter characteristics are determined not only by this command, but also by the selected Filter mode (FMD) and analog-to-digital converter sample rate (HSM). Only certain filters are available in each mode.
At the increased analog-to-digital converter sample rate (HSM with parameter P1 = 1) the frequencies specified in the tables are doubled and the settling times are halved.

Notch filters and Mean value calculation are also available for you in all filter modes for selective interference suppression.

The notation FMDx and HSMx is used in the paragraphs below for the FMD and HSM commands respectively with parameter P1 = x.

Filter characteristics for FMD0 and HSM0

A 2nd order IIR filter is used. The specified settling time is the time that elapses until settling on a value with less than 0.1% deviation from f.s.

ASF	Settling time in ms	−3 dB cut-off frequency in Hz	Max. attenuation in dB at 300 Hz
0	84	120	–
1	67	40	-20
2	93	18	-34

ASF	Settling time in ms	–3 dB cut-off frequency in Hz	Max. attenuation in dB at 300 Hz
3	147	8	-48
4	258	4	-60
5	488	3	-72
6	960	1	-82
7	1934	0.5	-90
8	3943	0.25	-96
9	8082	0.125	-100

For electronics with P50 (electronics with P50 see Firmware overview) and AD105D applies differently:

ASF	Settling time in ms	–3 dB cut-off frequency in Hz
1	60	8
2	120	3.5
3	240	1.5
4	480	0.7
5	1000	0.3
6	2000	0.2
7	4000	0.1
8	8000	0.05
9	16,000	0.025
10	32,000	0.0125

Filter characteristics for FMD1 and HSM0/HSM1

A 3-stage FIR filter is used. The specified settling time is the time that elapses until settling on a value with less than 0.01% deviation from f.s. The filters affect the maximum possible sample rate (ICR). With FMD1 and HSM1, the specified frequencies are doubled and the settling times halved.

ASF	Settling time in ms	−3 dB cut-off fre-quency in Hz	−20 dB with fre-quency in Hz	−40 dB with fre-quency in Hz	Damping in dB in the stop band	Stop band in Hz	Max. output rate
0	42	120	–	–	–	–	600
1	54	18	47	63	>90	>90	600
2	91	11	32	45	>90	>70	300
3	127	9	24	31	>90	>60	200
4	165	7	18	24	>90	>60	150
5	203	5	12	17	>90	>40	120
6	240	4	10.5	13	>90	>34	100
7	278	3.5	8	10	>90	>34	85
8	316	3	7	9	>90	>30	75
9	353	2.5	6.2	8	>90	>30	66

For electronics with P50 (electronics with P50 see Firmware overview) and AD105D applies differently:

ASF	Settling time in ms	−3 dB cut-off frequency in Hz
1	120	8
2	140	6
3	160	5.5
4	160	5
5	180	4.5
6	200	4
7	220	3.5
8	240	3
9	280	2.5
10	320	2

Filter characteristics for FMD2 and HSM0

An 8th order IIR filter is used. The specified settling time is the time that elapses until settling on a value with less than 0.01% deviation from f.s.

ASF	Settling time in ms	–3 dB cut-off frequency in Hz	–100 dB with frequency in Hz
0	–	120	–
1	185	26	61
2	239	22	51
3	309	17	41
4	401	15	36
5	519	13	31
6	673	11	26
7	871	8	21
8	1127	6	16
9	1459	4	10

For electronics with P50 (electronics with P50 see Firmware overview) and AD105D applies differently:

ASF	Settling time in ms	–3 dB cut-off frequency in Hz
0	–	(Filter OFF)
1	540	17
2	680	15
3	750	11
4	980	10
5	1130	9
6	1350	7
7	1500	6

ASF	Settling time in ms	−3 dB cut-off frequency in Hz
8	2100	4
9	2900	3
10	3600	2

Filter characteristics for FMD3 and HSM0

A 4th order IIR filter is used. The specified settling time is the time that elapses until settling on a value with less than 0.01% deviation from f.s.

ASF	Settling time in ms, fast-track filter option not active	Settling time in ms, fast-track filter option active	−3 dB cut-off frequency in Hz	Max. attenuation in dB
0	42	–	120	-
1	34	150	30	38
2	70	190	12	67
3	145	260	6	94
4	301	260	3	120
5	620	260	1.5	>120
6	1276	260	0.8	>120
7	2623	260	0.4	>120
8	5390	260	0.2	>120
9	11,075	260	0.1	>120

For electronics with P50 (electronics with P50 see Firmware overview) and AD105D applies differently:

ASF	Settling time in ms, fast-track filter option not active	Settling time in ms, fast-track filter option active	−3 dB cut-off frequency in Hz
0	–	–	(Filter OFF)
1	90	900	20
2	180	1140	9

ASF	Settling time in ms, fast-track filter option not active	Settling time in ms, fast-track filter option active	−3 dB cut-off frequency in Hz
3	365	1560	4
4	730	1560	2
5	1450	1560	1
6	2900	1560	0.5
7	5800	1560	0.25
8	11,600	1560	0.12
9	32,200	1560	0.06
10	46,400	1560	0.03

Filter characteristics for FMD4/FMD5 and HSM0

A fast-settling FIR low-pass filter is used. The specified settling time is the time that elapses until settling on a value with less than 0.01% deviation from f.s.

The filter characteristics for FMD5 are identical to those for FMD4. However, with FMD5 you can activate (an additional) mean value calculation with the MAC command, although this does lengthen the settling time. This mean value calculation is independent of the one set with the output rate (ICR).

ASF	Settling time in ms	−3 dB cut-off frequency in Hz	−80 dB with frequency in Hz
0	–	120	–
1	104	21	73
2	104	18	67
3	104	16	60
4	104	15	60
5	104	14	60
6	104	13	60
7	104	9	60

ASF	Settling time in ms	−3 dB cut-off frequency in Hz	−80 dB with frequency in Hz
8	104	8	60
9	104	7	60

For electronics with P50 (electronics with P50 see Firmware overview) and AD105D applies differently:

ASF	Settling time in ms	−3 dB cut-off frequency in Hz
0	–	(Filter OFF)
1	140	14
2	140	12
3	135	11
4	150	10
5	150	9
6	140	8
7	160	8
8	160	5
9	160	4
10	160	3

7.5.4 Output rate of measured values (mean value calculation)

You can use the ICR to calculate a mean value for the measured values. The output rate has no effect on the internal data transfer rate, i.e. the speed of monitoring for triggers, limit values and peak values.

The output rate is also determined by the following settings:

- The analog-to-digital converter sample rate (HSM command),
- Filter mode 1 (FMD command with parameter P1 = 1[1]),
- With filter mode 1, also filter cut-off frequency (ASF[1] command).

[1] Except for AD105D and electronics with P50 (electronics with P50 see Firmware overview)

Please note the data transmission rate of your application: Otherwise data may be lost if the output rate is too high if it cannot be transferred quickly enough. The speed required for transmission (bit rate) also depends on which transfer format (COF) is set.

Always use the maximum output rate (ICR with parameter P1 = 0) for dynamic measurements so you will have short response times.

The notation FMDx and HSMx is used in the paragraphs below for the FMD and HSM commands respectively with parameter P1 = x. The following two tables do not apply to electronics with P50 (electronics with P50 see Firmware overview) and AD105D, for which the output rate is independent of FMD, and depends only on ICR and HSM - see third table.

Output rates (measured values per second) for filter modes FMD0, FMD2, FMD3, FMD4 and FMD5 depending on parameter P1 of ICR

P1	Output rate for HSM0	Output rate for HSM1
0	610	1221
1	305	610
2	153	305
3	76	153
4	38	76
5	19	38
6	10	19
7	5	10

Output rates for filter mode FMD1 depending on the filter limit frequency ASF

Always use ICR with parameter P1 = 0 with this filter mode, as the filter is intended for dynamic measurements. Depending on the set filter limit frequency (command ASF) there will still be different output rates:

ASF	Output rate for HSM0	Output rate for HSM1
0	610	1221
1	610	1221
2	305	610
3	204	407
4	153	305
5	122	244
6	102	203
7	87	174
8	77	153
9	68	136
10	61	122

For AD105D and electronics with P50 (electronics with P50 see Firmware overview) the following applies for all FMDx filter modes:

P1	Output rate for HSM0	Output rate for HSM1
0	100	200
1	50	100
2	25	50
3	12	25
4	6	12
5	3	6
6	2	3
7	1	2

7.5.5 Increased analog-to-digital converter sampling rate

The sensor electronics units described in this documentation work at a standard sampling rate. For highly dynamic applications it may be necessary to increase this sampling rate.

You can use the HSM command with parameter P1 = 1:

- to reduce settling times of filters (by half)
- to increase the speed at which triggers, limit values and peak values are analyzed (double).

Increasing the sampling rate with the HSM command with parameter P1 = 1 also has the following additional effects:

- The frequencies of the low-pass filters are doubled
- The data rate output rates are doubled

> Please note the data transmission rate of your application: Otherwise data may be lost if the output rate is too high if it cannot be transferred quickly enough. The speed required for transmission (baud rate) also depends on which transfer format (COF) is set.

The HSM command with parameter P1 = 0 resets the output rate to the standard sampling rate.

7.6 Triggers

The trigger function is useful for the following applications:

- Checkweighers
- Sorting weighers
- Multi-head combination weighers (MHCs)

The advantage of the trigger function (TRC) is that you can determine just one weight value as the result of a dynamic measurement and can save it in output memory (MAV). That means you do not have to query the measured values continuously (cyclically) at a high sampling rate.

The requirements for the trigger function are different depending on your application. The sensor electronics support different functions, which you can select with parameter P2 of the TRC command:

- Pre-triggering via an adjustable level (firmware P77.9 and higher), also re-triggerable for multi-head combination weighers.
- External pre-triggering via a digital input (trigger input).
- Post-triggering via an adjustable level.
- External post-triggering via a digital input (trigger input).

Other than pre-triggering via level, no trigger functions are re-triggerable. Once a trigger function has started, it has to be completed before the trigger start is enabled again.

Requirements

- Trigger mode must be active (IMD content with parameter P1 = 1).
  The setting also changes the content of the measured value status, which you can read out with each measured value.
- You should select the fastest output rate (ICR command with parameter P1 = 0), see Output rate of measured values.
- Choose appropriately fast filters, see Filter.

Additional functions

Additional functions are available for the individual trigger functions depending on the application:

- Automatic zero balance (CDT)
- Limit switches (LIV1 to LIV4) for monitoring the trigger result (MAV) for sorting functions with delayed switching function (AT1 to AT4, DT1 to DT4),
- Monitoring of trigger results for Min/Max (CPV),
- Correction of systematic differences (TRF) in the trigger results.

See also Checkweigher, Sorting weigher.

Measurement output and evaluation

After weighing is performed, the weighing result is evaluated statistically for further processing. The following information is available for you after the trigger result:

- Number of trigger results (TRN)
- Mean value (TRM) of the trigger results
- Standard deviation (TRS) of the trigger results

You can also monitor the trigger results for Min/Max (CPV).

The CTR command deletes all trigger results.

7.6.1 Pre-triggering via level

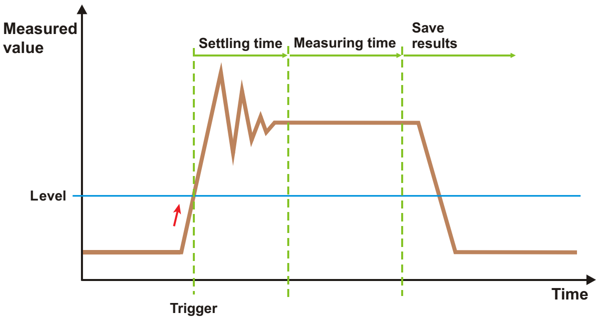


Fig. 7.14 Schematic diagram of a measurement sequence.

When weighing without an external sensor, use the measurement signal itself to detect when a new product to be weighed has arrived on the weighing cell or weighing platform. As soon as the trigger level is exceeded, the settling time starts in this mode. Then the weight is determined in the measuring time and the weight value is saved in output memory (MAV). As soon as this value is saved, bit 2 is set to 1 in the extended measured value status (CSM with parameter P1 = 2).

This type of triggering is only suitable for processes in which the scale is unloaded between weighings.

Requirements

- The first time the scale starts it must be unloaded so that the level will be exceeded.
- The current measured value must fall below the trigger level after every measurement. Otherwise a new trigger process cannot be started.

Activation

Parameter P1 = 1 of the TRC command activates triggering and parameter P2 = 0 activate this function. Use the other parameters to define the trigger level, settling time and measuring time.

Additional functions

- You can use the RTB command in this mode for retriggering. This is useful for example in applications for multi-head combination weighers.

- The DZT and CDT commands are available for you with additional zero balance functions to improve the accuracy of measured values in this dynamic process.

7.6.2 External pre-triggering

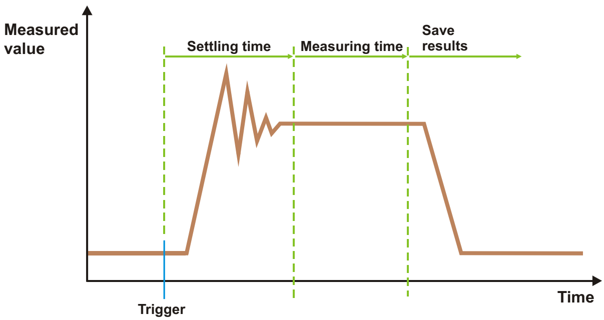


Fig. 7.15 Schematic diagram of a measurement sequence.

Use this function if you would like to use a sensor to determine when a new product to be weighed will arrive on the load cell or weighing platform. The trigger edge starts the settling time. Then the weight is determined in the measuring time and the weight value is saved in output memory (MAV). As soon as this value is saved, bit 2 is set to 1 in the extended measured value status (CSM with parameter P1 = 2).

During the measurement (settling time plus measuring time), an additional trigger signal has no effect (no retriggering). Then a new product to be weighed can be measured. It is not necessary to unload the scale.

Requirements

- Trigger mode must be active (IMD with parameter P1 = 1).
- The sensor, for example a light barrier, must be connected via a digital input (IN1 in sensor electronics up to and including *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics sensor electronics; in *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics you can select the input).
- The quiescent level of the trigger input is HIGH (1) and the trigger is initiated by a falling edge. You can take an inverted level into consideration with the POL command.

Activation

Parameter P1 = 1 of the TRC command activates triggering and parameter P2 = 1 activate this function. Use the other parameters to define the settling time and measuring time.

Additional function

- The DZT and CDT commands are available for you with additional zero balance functions to improve the accuracy of measured values in this dynamic process. See (Dynamic) Zero tracking, Zero balance options for filling.

7.6.3 Post-triggering via level

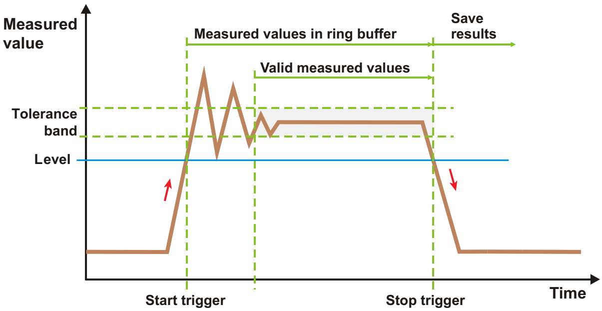


Fig. 7.16 Schematic diagram of a measurement sequence.

When weighing without an external sensor, use the measurement signal itself to detect when a new product to be weighed has arrived on the weighing cell or weighing platform. As soon as the trigger level is exceeded, the measured values are saved to a ring buffer. Up to 199 measured values are saved in *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics, in older sensor electronics up to 99. As soon as the stop trigger occurs below trigger level, the ring buffer is checked: A check is performed starting with the last measured value for valid measured values, meaning values withing the tolerance band. The mean value is calculated from the result. This weight value is then saved in output memory (MAV). As soon as this value is saved, bit 2 is set to 1 in the extended measured value status (CSM with parameter P1 = 2). The number of valid measured values is saved in parameter P5 of the TRC command.

This type of triggering is only suitable for processes in which the scale is unloaded between weighings.

Requirements

- The first time the scale starts it must be unloaded so that the level will be exceeded.
- The current measured value must fall below the trigger level after every measurement. Otherwise a new trigger process cannot be started.

Activation

Parameter P1 = 1 of the TRC command activates triggering and parameter P2 = 2 activate this function. Use the other parameters to define the trigger level and size of the tolerance band.

Additional function

- The DZT and CDT commands are available for you with additional zero balance functions to improve the accuracy of measured values in this dynamic process. See (Dynamic) Zero tracking, Zero balance options for filling.

7.6.4 External post-triggering

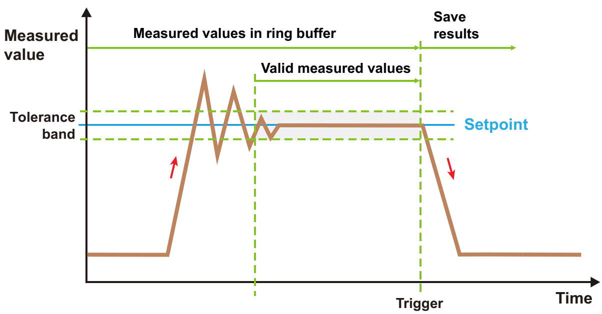


Fig. 7.17 Schematic diagram of a measurement sequence.

Use this function if you would like to use a sensor to determine when the product to be weighed will leave the load cell or weighing platform. The measured values are continuously saved to a ring buffer. Up to 199 measured values are saved in *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics, in older sensor electronics up to 99. If the stop trigger occurs shortly before leaving the weighing range, the ring buffer is checked: A check is performed starting with the last measured value for valid measured values, meaning values withing the tolerance band. The mean value is calculated from the result. This weight value is then saved in output memory (MAV). As soon as this value is saved, bit 2 is set to 1 in the extended measured value status (CSM with parameter P1 = 2). The number of valid measured values is saved in parameter P5 of the TRC command.

Then a new product to be weighed can be measured. It is not necessary to unload the scale.

Requirements

- Trigger mode must be active (IMD with parameter P1 = 1).
- The sensor, for example a light barrier, must be connected via a digital input (IN1 in sensor electronics up to and including *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics sensor electronics; in *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics you can select the input).
- The quiescent level of the trigger input is HIGH (1) and the trigger is initiated by a falling edge. You can take an inverted level into consideration with the POL command.

Activation

Parameter P1 = 1 of the TRC command activates triggering and parameter P2 = 3 activate this function. Use the other parameters to define the setpoint and tolerance band.

Additional functions

- The DZT and CDT commands are available for you with additional zero balance functions to improve the accuracy of measured values in this dynamic process. See (Dynamic) Zero tracking, Zero balance options for filling.
- You can use the post-trigger delay time function (PTD) to compensate for delay times of active digital filters and to make optimum use of the available measuring time (the product to be weighed has not quite left the weighing platform yet or leaving the platform has not affected the measured value yet with filter delay times). See Zero balance:after delay.
- You can reduce a constant difference between the static adjustment and the dynamic result with the correction factor for trigger results (TRF).

7.6.5 Trigger delay time

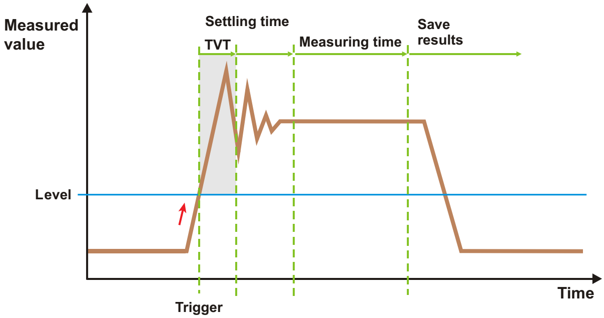


Fig. 7.18 Schematic diagram of a measurement sequence.

Use the trigger delay time with irregular or extended settling or if measured values over the trigger level may occur briefly between weighings (can only be used in combination with level pre-triggering). When the trigger level is exceeded, first the trigger delay time (TVT) starts. If the trigger level is not exceeded in this time, the settling time (TRC, parameter P4) starts as it normally does. However, if the trigger level is undershot again during the trigger delay time, there is no wait until the trigger level is exceeded again. The measurement is not continued. The trigger delay time starts again when the trigger level is exceeded again.

Requirements

- Trigger mode must be active (IMD command with parameter P1 = 1).
- The Level pre-triggering mode must be active (TRC command with parameter P1 = 1 and P2 = 0).
- The first time the scale starts it must be unloaded so that the level will be exceeded.
- The current measured value must fall below the trigger level after every measurement. Otherwise a new trigger process cannot be started.

Activation

Activate the function with the TVT command, specifying the number of measured values to wait or to be checked for being below the trigger level.

7.6.6 Retriggering

This function is especially useful for applications with multi-head combination weighers (MHCs): When the fill material has pieces and a part falls on the scale belatedly, the measurement begins again. This means the current weight is measured and no mean value of the old and new measured value is calculated.

The function divides the measurement into several sections (MVC command). The mean value is calculated for each section and a check determines whether it is within the tolerance band assigned by the RTB command. If it is not, the measurement time starts again with this section. That means the old sections are discarded and the counting starts again. The tolerance band is also applied to the new mean value.

The abbreviated notation TRC P3 is used in the graphics to mean the TRC command, parameter P3.

See also Pre-triggering via level, Trigger stop (TSL, TST), TVT, MAV.

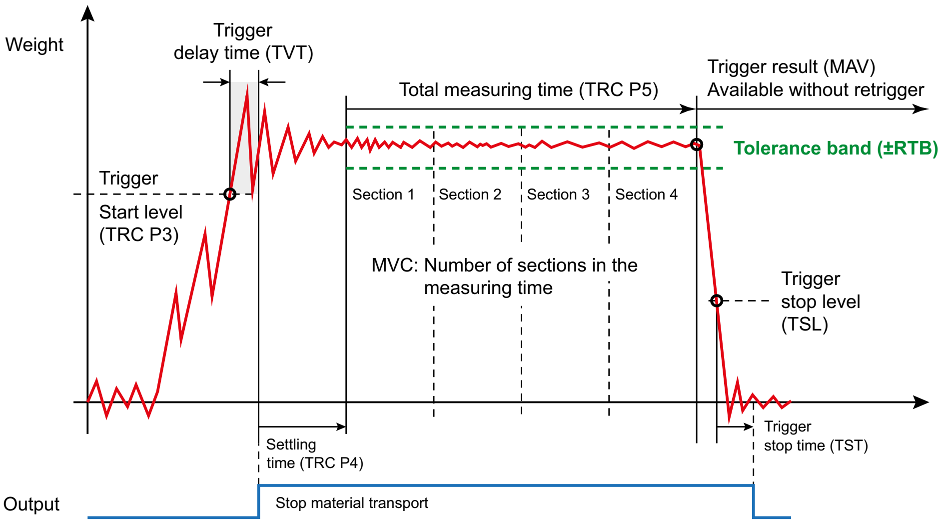


Fig. 7.19 Normal sequence of the trigger measurement, MVC with parameter P1 = 4

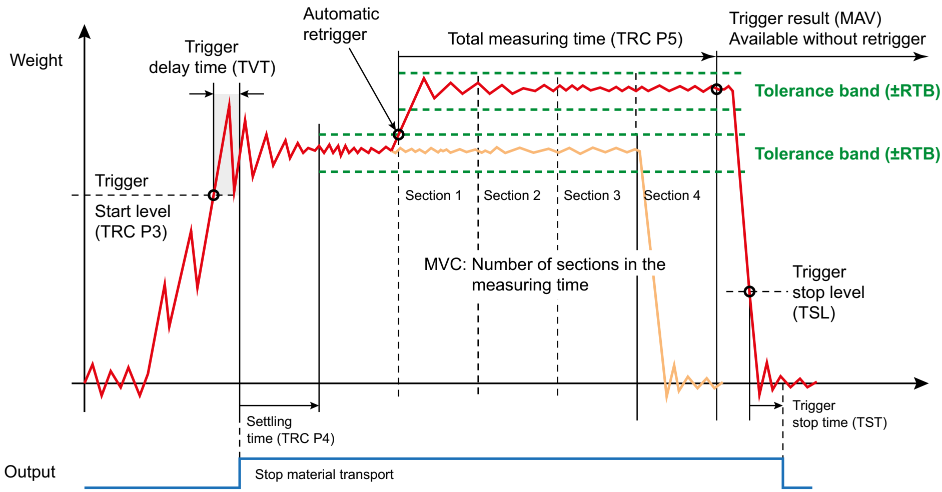


Fig. 7.20 Trigger measurement with re-trigger, MVC with parameter P1 = 4

Requirement

- Level triggering must be active (TRC command with parameter P2 = 0).

Activation

The RTB command with parameter P1 > 0 sets the tolerance band and activates pre-triggering. For the TRC command also specify parameter P5 (total measuring time) and with the MVC command specify the number of sections to be formed.

7.6.7 Trigger stop (level, time)

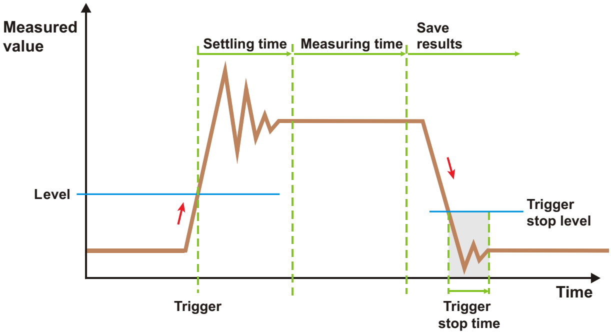


Fig. 7.21 Schematic diagram of a measurement sequence.

The trigger stop level function (TSL) and trigger stop time function (TST) are especially useful in applications for multi-head combination weighers (can only be used in combination with level post-triggering). After the measuring time has elapsed, and the weight value (MAV) is determined, the product to be weighed remains in the weighing container until the container is enabled for filling by the control unit. If the trigger stop level is undershot during emptying, the trigger stop time starts. A new start trigger (level trigger) is not possible until after this time elapses.

Requirements

- Trigger mode must be active (IMD command with parameter P1 = 1).
- The Level pre-triggering mode must be active (TRC command with parameter P1 = 1 and P2 = 0).
- The first time the scale starts it must be unloaded so that the level will be exceeded.

Activation

Activate the function with the TSL command and specify the wait time with the TST command.

Additional function

- You can reduce a constant difference between the static adjustment and the dynamic result with the correction factor for trigger results (TRF).

7.7 Limit switches

The digital outputs are used for control in dosing mode (IMD command with parameter P1 = 2) and no limit value functions are available. Limit values are only available if parameter P1 = 0 (standard) or 1 (trigger mode).

Most of the sensor electronics units described in this documentation have four limit value functions. You can adjust the limit values with the **Limit switches** menu item or commands LIV1 to LIV4. The following input signals are possible:

- Gross signal
- Net signal
- Trigger result (MAV)
- Peak values (Min/Max)

Limit value modes ***Delayed: Outside/Inside band*** and ***Delayed: Above/Below level*** are only available for the ***Trigger result*** input signal.
See also the Sorting weigher section for how these functions are applied.

Monitoring of limit values is always active, even without communication via one of the interfaces. The monitoring speed depends on the filter setting (FMD, ASF) and the set sampling rate (HSM).
You can read out the status of limit values with the MSV or RIO command.

Sensor electronics without digital outputs require an external control unit so that the digital I/Os can be made available. The information for controlling digital outputs is transferred in the measured value status (MSV), trigger status (MAV) or dosing status (SDO), etc.. Then the control input must simply monitor the relevant bits and forward the digital outputs.

7.8 Peak values

The sensor electronics units described in this documentation have one memory for the minimum (Min) and one for the maximum (Max) measured value. Activate acquisition with the **Home** menu item and the **Device State** area or with the PVS command. The following input signals are possible:

- Gross signal
- Net signal
- Trigger result (MAV)

Monitoring of peak values is always active, even without communication via one of the interfaces. The monitoring speed depends on the filter setting (FMD, ASF) and the set sampling rate (HSM).

Relevant commands

- Delete Min/Max memory (two peak values are always deleted simultaneously): CPV or ***Clear*** in the **Home** menu item in the **Device State** area.
- To read out peak values: PVA.

7.9 IO settings in PanelX

The **IO** menu item leads to the settings for digital inputs and outputs. It is also used for output of measured values via the serial interfaces after the program has closed, i.e. for output to other nodes. The settings are divided into two sections. To complete your settings, click on ***Write*** to save the settings in the sensor electronics.

IO section

With *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics, if possible use the ***User-defined*** setting (IOM) so you will be able to assign inputs and outputs freely. For all other sensor electronics up to *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics no free assignment is possible and the option cannot be activated.

PW15iA and PAD400x use shared connections for input and output. Therefore you should only activate the output function if the connection is also being used as an output and is connected accordingly.

In the ***User-defined*** setting and after selecting the ***Manually*** function, you can turn individual outputs on and off in the **State** column, in other words set HIGH or LOW level. For the DL1/DL2 setting see also Residual flow.

Output mode: With some sensor electronics units the assignment of outputs can be changed between different variants. In those cases you can chose the configuration you would like here.

Input signal level: With some sensor electronics units it is also possible to select the switching threshold on the inputs (SPL). Then you can define whether to switch from LOW to HIGH and back between 1 and 4 V or between 6 and 10 V. The first variant is suitable for TTL and CMOS signals, etc., the second for controlling PLC signals, etc.

Measurement output section

Output format: Sets the format used for output via the serial interfaces as it is written for the COF command.

You can use ***Status*** to select in formats where more than the measured value is transferred whether the normal status, the extended status or the checksum (CSM) instead of the status should be generated.

Text separator: Enter the text separator (TEX) here for ASCII output of measured values and for output of values to the log records.

Termination resistor: The bus termination resistors (STR) ensure the quiescent level on the interface lines when no node is sending. The bus termination may only be active for two nodes per bus system and must be located on the ends on the lines.

For some sensor electronics the bus termination resistors can or must be activated via a DIP switch. In this case the command will have no effect. Therefore check the behavior or read the relevant operating manual.

Sensor electronics without digital outputs require an external control unit so that the digital I/Os can be made available. The information for controlling digital outputs is transferred in the measured value status (MSV), trigger status (MAV) or dosing status (SDO), etc.. Then the control input must simply monitor the relevant bits and forward the digital outputs.

7.10 Systematic difference

Filling processes may be subject depending on the system to a specific amount of filling material that is lost after every filling or additional material that is added. This loss or addition does not occur until after checkweighing and therefore cannot be acquired by optimization. You can take this loss into consideration, however, with the “Systematic difference" function.

Example

To fill sacks with a filling weight of 50 kg, each bar is ejected after the checkweighing. During the process, the sack clamp takes about 200 g of material from the filled sack, so that the released sack only weighs 49.8 kg instead of 50 kg.

In this case you can enter the SYD20 as a correction, which will result in overfilling by 200 g (10 * P1 of SYD). Then the sack will initially be filled wit 50.2 kg. After it is ejected it will have the target weight of 50 kg.

Requirement:

- Dosing must be active as the working mode (IMD command with parameter P1 = 2).

Activation

Activate the function with the SYD command, specifying the overfilling (positive value) or underfilling (negative value). Maximum ±5% of the nominal (rated) value (NOV) is permitted as the value.

7.11 Legal-For-Trade mode

The Legal-For-Trade counter (TCR) is incremented by one every time the LFT command is performed with a new parameter (switching to Legal-For-Trade or to industrial mode). No adjustment is possible in Legal-For-Trade mode. The adjustment must be performed in industrial mode. As the counter state is noted on the scale for legal-for-trade applications, changes to the adjustment or calibration can be discovered by comparing.

The following commands are disabled for write access after changing to Legal-For-Trade mode in the **Scale** menu item or by using the LFT command with parameter P1 > 0:

CRC, CWT, DPT, ENU, IDN, LDW, LIC, LWT, MRA, MTD, NOV, RSN, SFA, SZA, TDD with parameter P1 = 0, TRF, ZSE, ZTR

If you send one of these commands with write functionality, the response will be `?crlf`.

As from P80 (electronics units with P80 see Firmware overview), the integrity of the flash memory is also monitored in legal-for-trade mode. A background process checks the program code each time the system starts, and every 15 minutes during operation. If the test is failed, no more measured values are outputted ("-----" or "Overflow").
See also ESR, ERR.

Switching by hardware switch is also possible for some sensor electronics units. In these cases the command LFT has no effect if the switch is set to Legal-For-Trade.

Special features

- LFT with parameter P1 > 0: The tare range is limited to 0 … NOV. If the value falls outside this range, the measurement status is designated “Measured value outside the measuring range" (for CSM = 2, see MSV command, measurement status description.
- LFT with parameter P1 = 0: The gross value is checked for the range ±150 % of NOV.
- LFT with parameter P1 = 1 (OIML): The gross value is checked for the display range –20 d … NOV + 9 d.
- LFT with parameter P1 = 2 (NTEP): The gross value is checked for the display range –2% ... NOV + 5%.

8 Scope in PanelX

The **Scope** allows you to display the current signal and also to analyze the signal in real time or make trigger-controlled recordings.

Select operating mode

You can select from three different operating modes with ***Mode***:

1. ***Standard***
   Shows you currently measured values over time. Depending on the transmission speed of the interface, it may not be possible to display all values here.
2. ***Real time***
   Shows you measured values over time and also an analysis of the frequencies that occur during the measurement. You can use ***Trigger*** (on the right side of the **Chart** tab) to set various conditions so you only receive specific measured values, for example beginning with the start of coarse flow or at a certain level.
3. ***Analysis***
   Turns off all filters and mean value calculation so that you receive essentially "raw values" from the A/D converter so you can identify the time and magnitude of interference.

In the last two modes you can limit the measurement to a single time window (***Single shot***) or record continuously.

Set time window

In ***Standard*** mode you can select a period of time to be displayed in the graphic. In the other modes you can choose between different fixed time windows: Generally values are recorded here via a trigger in the sensor electronics before being transfered to the PanelX program. That makes measurement in these modes independent of the interface transmission speed. The possible time windows depend on the sensor electronics units and the memory they have available (see also the DGN command).

Cursor

Activate ***Cursor*** in the **Chart** tab on the right side to show two cursors in the graphic. If one or both of the cursors are not visible, click on ***Find*** to place the cursor in the displayed range.

The red cursor shows the current position in a small field. The blue cursor also shows the mean value and standard deviation between the two cursor positions. If the two display fields are covering relevant parts of the graphic, you can move them to another position: Click in the field and drag while holding the mouse button.

Trigger

The trigger is only available in ***Real time*** and ***Analysis*** modes. Choose here whether a recording will take place in the sensor electronics and if so when the recording will begin or end.

In the ***Off*** setting the measured values are sent directly to the program. This means that depending on the transmission speed of the interface, it may not be possible to display all values.

If a trigger is active, the measured values are first stored in the device. The maximum memory for the devices is *4th generation* FIT5A, FIT7A, PAD400x, PW15iA 8192 measured values. This is equivalent to about 13 seconds at a sampling rate of 600 Hz. Older devices or devices with a firmware version lower than P80 can store a maximum 512 measured values internally.

Possible starting times are: ***Immediately with start*** (click on the ***Start*** button), when the trigger event occurs (***Trigger event***), at the beginning of ***Batching***, ***Coarse flow***, ***Fine flow*** ***Residual flow*** and ***Emptying*** and with ***Above level*** or ***Below level***.

Possible stopping times are: When the trigger event (***Trigger event***) occurs and with ***Above level*** or ***Below level***.

Signal

You can show the different status signals with the **Signals** tab on the right side: Click on the box in the right column of the table. Change the color in the curve that is displayed by clicking on the color field.

9 Service and diagnostic functions

Service functions in the PanelX program

The **Service** menu opens the service area. You can read all logs in the service area if you have activated the function in ***Log on/off***. Define the time in seconds between two log entries for the window with the output of temperature values (86,400 is equivalent to one entry per day).

The following protocol files are available:

- Calibration protocol: Log file with calibration data
- Data protocol: Log file with measurement results
- Environmental protocol: Log file with temperature values
- Error protocol: Log file with errors

You can also read out the analog-to-digital converter and sensor overflow counters as well as the current (relative) temperature values. As the temperature sensor is not calibrated, only temperature changes can be determined with the temperature values, not the absolute temperatures.

You can use a calibration signal (0 mV/V oder 2 mV/V) as the signal for the sensor electronics for test purposes with ***Input signal***.

General diagnostic functions

Various diagnostic functions are available in the sensor electronics for monitoring dynamic measuring processes. A memory for up to 8192 measured values (starting with P80) plus the corresponding status information is used for this purpose. Measured values can be saved in real time. Different recording modes are available so you can analyze the processes without interrupting the measurement. Since measured values are not read until after the measurement, an analysis is also possible at low interface transmission rates.

Activate the diagnostic function with the DGA command and parameter P1 = 1 or use the PanelX program. Diagnostics can be performed in two ways for some sensor electronics:

1. Using the (normal) interface
   This is possible with AED, PW20i, PW15AHi, PW15iA and PAD400x.
2. Using the diagnostic interface
   This is possible beginning with AED9101C, AED9201B, AED9301B, AED9401A, AED9501A in combination with amplifier board AD103C as well as FIT/0e to FIT7Ae (e: optional extended version). Communication in this case is via the 2-wire RS-485 interface.

As soon as you have activated the diagnostic function for an interface, it is disabled for anyone else.

Diagnostic interface

The address of this interface is identical with the main interface, as the transmission parameters are permanently set to 38,400 baud, 1 start bit, 8 data bits, even parity and 1 stop bit. You can change the address with the ADR command. The S command (for selecting the node) is always required.

The diagnostic interface also allows you to read all parameters of individual measured values and results from batching or triggering.

Relevant commands for diagnostics

- Activate diagnostic function: DGA.
- Define number of measured values to save: DGN.
- Read a measured value with status from diagnostic memory: DGR.
- Start diagnostics and query status: DGS.
- Define trigger level for diagnostics: DGL.

Notes

- The data rate (speed) of signal processing depends on the sample rate that is set (HSM, FMD, ASF, ICR).
- External bus termination resistors are not needed for the diagnostics bus.
- Note the ground (GND) to which the interface level of the relevant sensor electronics units are related.
- Use shielded lines only for the bus cable. Place the shielding on the housing on both ends with ample coverage.

10 Command reference

The command reference contains all available commands for the various sensor electronics systems. Not all commands are supported by every sensor electronics system. Some commands are only available beginning with a certain firmware version or are only available for a specific version. If you are not certain you should therefore check what type of sensor electronics you are using and whether your sensor electronics have the current firmware. Almost all commands are available for the serial interfaces. The explanatory notes indicate if a command is not available for one of the interfaces.

The general format and procedure for using the commands are described in sections Serial interfaces, CANopen, DeviceNet and PROFIBUS.

Notes

- Parameters identified by ***Disabled in Legal-For-Trade mode: Yes*** can no longer be changed after you have switched to one of the Legal-For-Trade modes (LFT command with parameter P1 greater than zero).
- Parameters that cannot be specified as a number or fixed text contain a description of the parameter value in angle brackets (<>).
- The specified range “0 … 160% of NOV” for a parameter means that the maximum value of the parameter is 1.6 times the value specified for parameter P1 for NOV. For example, if P1 of NOV has a value of 50,000, the maximum value of the parameter in question is 80,000.

10.1 Overview: Which commands are in which firmware version?

See also Overview: Commands for P8x grouped by application category, Sensor electronics units covered by this documentation.

The P50 firmware is available in the following electronics units:
AD104C, AD105C, C16i.

Commands in firmware P50

The following commands are available in this firmware:

- ADR (Device Address)
- AOV (ADC Overflow Counter)
- ASF (Amplifier Signal Filter)
- BDR (Baud Rate)
- BSY (Busy State)
- CDT (Zeroing Delay)
- COF (Configure Output Format)
- CPV (Clear Peak Values)
- CRC (Cyclic Redundancy Check)
- CSM (Checksum)
- CTR (Clear Trigger Results)
- CWT (Calibration Weight)
- DPT (Decimal Point)
- DPW (Define Password)
- DZT (Dynamic Zero Tracking/Automatic Zeroing Time)
- ENU (Engineering Unit)
- ESR (Error Status)
- FMD (Filter Mode)
- FTL (Fast Track Level (FMD3))
- GRU (Group Address)
- HRN (High Resolution)
- HSM (High Speed Mode ADC)
- ICR (Internal Conversion Rate)
- IDN (Identification)
- LDW (Load Cell Dead Weight)
- LFT (Legal-For-Trade)

- LIC (Linearization Coefficient)
- LIV1 (Limit Value 1 Monitoring)
- LIV2 (Limit Value 2 Monitoring)
- LWT (Load Cell Weight)
- MAV (Measured Alternative Data)
- MRA (Multirange Switch Point)
- MSV (Measured Signal Value)
- MTD (Motion Detection)
- NOV (Nominal Value)
- NTF (Notch Filter)
- POR (Port Set And Read)
- PVA (Read Peak Value)
- PVS (Peak Value Select)
- RES (Reset)
- RIO (Read Status Digital I/O)
- RSN (Resolution)
- S (Select)
- SFA (Sensor Fullscale Adjust)
- SOV (Sensor Overflow Counter)
- SPW (Set Password)
- STP (Stop)
- STR (Set Termination Resistor)
- SZA (Sensor Zero Adjust)
- TAR (Tare)
- TAS (Gross Signal)
- TAV (Tare Value)
- TCR (Trade Counter)
- TDD (Store Parameters)
- TEX (Text Separator)
- TMP (Temperature)
- TRC (Trigger Command)
- TRF (Trigger Correction Factor)
- TRM (Trigger Mean Value)
- TRN (Trigger Number)
- TRS (Trigger Standard Deviation)
- TYP (Amplifier Type)

- ZSE (Zero Setting)
- ZTR (Zero Tracking)

The P6x firmware is available in the following electronics units: PW15AHi.

Commands in firmware P6x

The following commands are available in this firmware:

- ADR (Device Address)
- AOV (ADC Overflow Counter)
- APD (Alternative Poll Data)
- ASF (Amplifier Signal Filter)
- AT1 (Active Time Output 1)[1)]
- AT2 (Active Time Output 2)[1)]
- AT3 (Active Time Output 3)[1)]
- AT4 (Active Time Output 4)[1)]
- BDR (Baud Rate)
- BOF (Bus-off Behavior)
- BRK (Abort Dosing)
- BSY (Busy State)
- CBK (Coarse Flow Monitoring)
- CBT (Coarse Flow Monitoring Time)
- CDT (Zeroing Delay)
- CFD (Coarse Flow Disconnect)
- CFT (Coarse Flow Time)
- COF (Configure Output Format)
- CPV (Clear Peak Values)
- CRC (Cyclic Redundancy Check)
- CSM (Checksum)
- CSN (Clear Dosing Results)
- CTR (Clear Trigger Results)
- CWT (Calibration Weight)
- DGA (Diagnostic Activation)
- DGL (Diagnostic Trigger Level)
- DGS (Diagnostic Start And Status)
- DL1 (Delay Time 1)[2)]

- DL2 (Delay Time 2)[2)]
- DMD (Dosing Mode)
- DPT (Decimal Point)
- DPW (Define Password)
- DST (Dosing Time)
- DT1 (Delay Time Output 1)[1)]
- DT2 (Delay Time Output 2)[1)]
- DT3 (Delay Time Output 3)[1)]
- DT4 (Delay Time Output 4)[1)]
- DZT (Dynamic Zero Tracking/Automatic Zeroing Time)
- EMA (Event Mask A)
- EMB (Event Mask B)
- EMD (Emptying Mode)
- ENU (Engineering Unit)
- EPT (Emptying Time)
- ESR (Error Status)
- EWT (Empty Weight)
- FBK (Fine Flow Monitoring)
- FBT (Fine Break Time)
- FFD (Fine Flow Disconnect)
- FFL (First Fine Flow Time)
- FFM (Fine Feed Minimum)
- FFT (Fine Flow Time)
- FMD (Filter Mode)
- FNB (Dosing Parameter Set)
- FRS (Filling Result)
- FTL (Fast Track Level (FMD3))
- FWT (Filling Weight)
- GRU (Group Address)
- HRN (High Resolution)
- HSM (High Speed Mode ADC)
- ICR (Internal Conversion Rate)
- IDN (Identification)
- IMD (Input Mode)
- LDW (Load Cell Dead Weight)
- LFT (Legal-For-Trade)

- LIC (Linearization Coefficient)
- LIV1 (Limit Value 1 Monitoring)
- LIV2 (Limit Value 2 Monitoring)
- LIV3 (Limit Value 3 Monitoring)
- LIV4 (Limit Value 4 Monitoring)
- LTC (Lockout Time Coarse Flow)
- LTF (Lockout Time Fine)
- LTL (Lower Tolerance Limit)
- LWT (Load Cell Weight)
- MAC (Moving Average Filter for FMD5)[1)]
- MAV (Measured Alternative Data)
- MDT (Maximum Dosing Time)
- MRA (Multirange Switch Point)
- MSV (Measured Signal Value)
- MSW (Minimum Start Weight)
- MTD (Motion Detection)
- MUX (Control of Digital Outputs OUT5 And OUT6)
- MVC (Retrigger Mean Value Count)[1)]
- NDS (Number of Dosings)
- NOV (Nominal Value)
- NTF (Notch Filter)
- OMD (Output Mode)[2)]
- OSN (Optimization)
- POR (Port Set And Read)
- PTD (Post-Trigger Delay)[1)]
- PVA (Read Peak Value)
- PVS (Peak Value Select)
- RDP (Select Dosing Parameter Set)
- RDS (Redosing)
- RES (Reset)
- RFT (Residual Flow Time)
- RIO (Read Status Digital I/O)
- RSN (Resolution)
- RTB (Re-Trigger Tolerance Band)[1)]
- RUN (Start Filling)
- S (Select)

- SDF (Special Dosing Functions)
- SDM (Mean Value Dosing Results)
- SDO (State of Dosing)
- SDS (Standard Deviation Dosing Results)
- SFA (Sensor Fullscale Adjust)
- SOV (Sensor Overflow Counter)
- SPW (Set Password)
- STP (Stop)
- STR (Set Termination Resistor)
- STT (Stabilization Time)
- STW (Control Word)
- SUM (Cumulative Weight)
- SYD (Systematic Difference)
- SZA (Sensor Zero Adjust)
- TAD (Tare Delay)
- TAR (Tare)
- TAS (Gross Signal)
- TAV (Tare Value)
- TCR (Trade Counter)
- TDD (Store Parameters)
- TEX (Text Separator)
- TMD (Tare Mode)
- TMP (Temperature)
- TRC (Trigger Command)
- TRF (Trigger Correction Factor)
- TRM (Trigger Mean Value)
- TRN (Trigger Number)
- TRS (Trigger Standard Deviation)
- TSL (Trigger Stop Level)[1)]
- TST (Trigger Stop Time)[1)]
- TVT (Trigger Delay Time)[1)]
- TYP (Amplifier Type)
- UTL (Upper Tolerance Limit)
- VCT (Valve Control)
- WDP (Write Dosing Parameter Set)
- ZSE (Zero Setting)

- ZTR (Zero Tracking)

1) From P64.4.
2) From P64.3.

The P7x firmware is available in the following electronics units:
AD103C, FIT/0, FIT/1, FIT/5, following AEDs with AD103C: AED9101B/C/D, AED9101C-Z2/22, AED9201B, AED9301B, AED9401A, AED9501A.

Commands in firmware P7x

The following commands are available in this firmware:

- ADR (Device Address)
- AOV (ADC Overflow Counter)
- APD (Alternative Poll Data)
- ASF (Amplifier Signal Filter)
- AT1 (Active Time Output 1)[1)]
- AT2 (Active Time Output 2)[1)]
- AT3 (Active Time Output 3)[1)]
- AT4 (Active Time Output 4)[1)]
- BDR (Baud Rate)
- BOF (Bus-off Behavior)
- BRK (Abort Dosing)
- BSY (Busy State)
- CBK (Coarse Flow Monitoring)
- CBT (Coarse Flow Monitoring Time)
- CDT (Zeroing Delay)
- CFD (Coarse Flow Disconnect)
- CFT (Coarse Flow Time)
- COF (Configure Output Format)
- CPV (Clear Peak Values)
- CRC (Cyclic Redundancy Check)
- CSM (Checksum)
- CSN (Clear Dosing Results)
- CTR (Clear Trigger Results)
- CWT (Calibration Weight)
- DGA (Diagnostic Activation)

- DGL (Diagnostic Trigger Level)
- DGS (Diagnostic Start And Status)
- DL1 (Delay Time 1)[2)]
- DL2 (Delay Time 2)[2)]
- DMD (Dosing Mode)
- DPT (Decimal Point)
- DPW (Define Password)
- DST (Dosing Time)
- DT1 (Delay Time Output 1)[1)]
- DT2 (Delay Time Output 2)[1)]
- DT3 (Delay Time Output 3)[1)]
- DT4 (Delay Time Output 4)[1)]
- DZT (Dynamic Zero Tracking/Automatic Zeroing Time)
- EMA (Event Mask A)
- EMB (Event Mask B)
- EMD (Emptying Mode)
- ENU (Engineering Unit)
- EPT (Emptying Time)
- ESR (Error Status)
- EWT (Empty Weight)
- FBK (Fine Flow Monitoring)
- FBT (Fine Break Time)
- FFD (Fine Flow Disconnect)
- FFL (First Fine Flow Time)
- FFM (Fine Feed Minimum)
- FFT (Fine Flow Time)
- FMD (Filter Mode)
- FNB (Dosing Parameter Set)
- FPT (Time Base Fine Flow Prediction)[3)]
- FRS (Filling Result)
- FTL (Fast Track Level (FMD3))
- FWT (Filling Weight)
- GRU (Group Address)
- HRN (High Resolution)
- HSM (High Speed Mode ADC)
- ICR (Internal Conversion Rate)

- IDN (Identification)
- IMD (Input Mode)
- LDW (Load Cell Dead Weight)
- LFT (Legal-For-Trade)
- LIC (Linearization Coefficient)
- LIV1 (Limit Value 1 Monitoring)
- LIV2 (Limit Value 2 Monitoring)
- LIV3 (Limit Value 3 Monitoring)
- LIV4 (Limit Value 4 Monitoring)
- LTC (Lockout Time Coarse Flow)
- LTF (Lockout Time Fine)
- LTL (Lower Tolerance Limit)
- LWT (Load Cell Weight)
- MAC (Moving Average Filter for FMD5)1)
- MAV (Measured Alternative Data)
- MDT (Maximum Dosing Time)
- MFO (Material Flow Last Dosing Cycle)3)
- MRA (Multirange Switch Point)
- MSV (Measured Signal Value)
- MSW (Minimum Start Weight)
- MTD (Motion Detection)
- MVC (Retrigger Mean Value Count)1)
- NDS (Number of Dosings)
- NOV (Nominal Value)
- NTF (Notch Filter)
- OMD (Output Mode)
- OSN (Optimization)
- POR (Port Set And Read)
- PTD (Post-Trigger Delay)1)
- PVA (Read Peak Value)
- PVS (Peak Value Select)
- RDP (Select Dosing Parameter Set)
- RDS (Redosing)
- RES (Reset)
- RFO (Residual Flow Last Dosing Cycle)3)
- RFT (Residual Flow Time)

- RIO (Read Status Digital I/O)
- RSN (Resolution)
- RTB (Re-Trigger Tolerance Band)[1)]
- RUN (Start Filling)
- S (Select)
- SDF (Special Dosing Functions)
- SDM (Mean Value Dosing Results)
- SDO (State of Dosing)
- SDS (Standard Deviation Dosing Results)
- SFA (Sensor Fullscale Adjust)
- SOV (Sensor Overflow Counter)
- SPW (Set Password)
- STP (Stop)
- STR (Set Termination Resistor)
- STT (Stabilization Time)
- STW (Control Word)
- SUM (Cumulative Weight)
- SYD (Systematic Difference)
- SZA (Sensor Zero Adjust)
- TAD (Tare Delay)
- TAR (Tare)
- TAS (Gross Signal)
- TAV (Tare Value)
- TCR (Trade Counter)
- TDD (Store Parameters)
- TEX (Text Separator)
- TMD (Tare Mode)
- TMP (Temperature)
- TRC (Trigger Command)
- TRF (Trigger Correction Factor)
- TRM (Trigger Mean Value)
- TRN (Trigger Number)
- TRS (Trigger Standard Deviation)
- TSL (Trigger Stop Level)[1)]
- TST (Trigger Stop Time)[1)]
- TVT (Trigger Delay Time)[1)]

- TYP (Amplifier Type)
- UTL (Upper Tolerance Limit)
- VCT (Valve Control)
- WDP (Write Dosing Parameter Set)
- ZSE (Zero Setting)
- ZTR (Zero Tracking)

1) From P77.9.

2) From P77.8.

3) From P78.3.

The P8x firmware is available in the following electronics units:
AD105D, AD112D, FIT5A, FIT7A, PW15iA, PAD400xA.

Commands in firmware P8x

The following commands are available in this firmware:

- ADF (Adaptive Noise Suppression)
- ADR (Device Address)
- ALS (Alarm Status)
- AOV (ADC Overflow Counter)
- APD (Alternative Poll Data)
- APP (Alternative Control Word)
- ASD (Adaptive Dosing Times)
- ASF (Amplifier Signal Filter)
- AST (Adaptive Trigger Settling)
- AT1 (Active Time Output 1)
- AT2 (Active Time Output 2)
- AT3 (Active Time Output 3)
- AT4 (Active Time Output 4)
- ATP (Adaptive Lockout Times)
- BDR (Baud Rate)
- BOF (Bus-off Behavior)
- BRK (Abort Dosing)
- BSY (Busy State)
- CBK (Coarse Flow Monitoring)
- CBT (Coarse Flow Monitoring Time)

- EMD (Emptying Mode)
- ENU (Engineering Unit)
- EPT (Emptying Time)
- ERR (Extended Error Status)
- ESR (Error Status)
- EWT (Empty Weight)
- FBK (Fine Flow Monitoring)
- FBT (Fine Break Time)
- FFD (Fine Flow Disconnect)
- FFL (First Fine Flow Time)
- FFM (Fine Feed Minimum)
- FFT (Fine Flow Time)
- FLO (Flow Rate)
- FMD (Filter Mode)
- FNB (Dosing Parameter Set)
- FPT (Time Base Fine Flow Prediction)
- FRS (Filling Result)
- FRT (Flow Rate Measurement Time)
- FST (Filter Settling Time)
- FTL (Fast Track Level (FMD3))
- FWT (Filling Weight)
- GRU (Group Address)
- HRN (High Resolution)
- HSM (High Speed Mode ADC)
- HWV (Hardware Version)
- ICR (Internal Conversion Rate)
- IDN (Identification)
- IM1 (Input Mode Input 1)
- IM2 (Input Mode Input 2)
- IMD (Input Mode)
- IOM (IO Mode)
- IS1 (Digital Input State Input 1)
- IS2 (Digital Input State Input 2)
- LDW (Load Cell Dead Weight)
- LFT (Legal-For-Trade)
- LIC (Linearization Coefficient)

- LIV1 (Limit Value 1 Monitoring)
- LIV2 (Limit Value 2 Monitoring)
- LIV3 (Limit Value 3 Monitoring)
- LIV4 (Limit Value 4 Monitoring)
- LTC (Lockout Time Coarse Flow)
- LTF (Lockout Time Fine)
- LTL (Lower Tolerance Limit)
- LWT (Load Cell Weight)
- MAC (Moving Average Filter for FMD5)
- MAV (Measured Alternative Data)
- MDT (Maximum Dosing Time)
- MFO (Material Flow Last Dosing Cycle)
- MRA (Multirange Switch Point)
- MRM (Multi-Range Mode)[1)]
- MSV (Measured Signal Value)
- MSW (Minimum Start Weight)
- MTD (Motion Detection)
- MUX (Control of Digital Outputs OUT5 And OUT6)
- MVC (Retrigger Mean Value Count)
- NAM (Manufacturer)
- NDS (Number of Dosings)
- NOV (Nominal Value)
- NTF (Notch Filter)
- OM1 (Output Mode Output 1)
- OM2 (Output Mode Output 2)
- OM3 (Output Mode Output 3)
- OM4 (Output Mode Output 4)
- OM5 (Output Mode Output 5)
- OM6 (Output Mode Output 6)
- OMD (Output Mode)
- OS1 (Digital Output 1)
- OS2 (Digital Output 2)
- OS3 (Digital Output 3)
- OS4 (Digital Output 4)
- OS5 (Digital Output 5)
- OS6 (Digital Output 6)

- OSN (Optimization)
- PDT (Firmware Date)
- POL (Light Sensor Polarity)
- POR (Port Set And Read)
- PTD (Post-Trigger Delay)
- PVA (Read Peak Value)
- PVS (Peak Value Select)
- PZN (Check Number)
- RDP (Select Dosing Parameter Set)
- RDS (Redosing)
- RES (Reset)
- RFO (Residual Flow Last Dosing Cycle)
- RFT (Residual Flow Time)
- RIO (Read Status Digital I/O)
- RSN (Resolution)
- RTB (Re-Trigger Tolerance Band)
- RUN (Start Filling)
- S (Select)
- SCR (Set Current Range)1)
- SDF (Special Dosing Functions)
- SDM (Mean Value Dosing Results)
- SDO (State of Dosing)
- SDS (Standard Deviation Dosing Results)
- SFA (Sensor Fullscale Adjust)
- SNR (Serial Number)2)
- SOV (Sensor Overflow Counter)
- SPL (Input Level)
- SPW (Set Password)
- SRV (Software Sub-Version)
- STB (Control Byte)
- STP (Stop)
- STR (Set Termination Resistor)
- STT (Stabilization Time)
- STW (Control Word)
- SUM (Cumulative Weight)
- SWI (Software Identification)

1) From P81.

2) From P80.1.7.

10.2 Overview: Commands for P8x grouped by application category

See also Sensor electronics units covered by this documentation, Overview: Which commands are in which firmware version?.

Adjustment

- CWT (Calibration Weight)
- DPT (Decimal Point)
- ENU (Engineering Unit)
- LDW (Load Cell Dead Weight)
- LIC (Linearization Coefficient)
- LWT (Load Cell Weight)
- NOV (Nominal Value)
- RSN (Resolution)
- SFA (Sensor Fullscale Adjust)
- SZA (Sensor Zero Adjust)

Diagnosis

- DGA (Diagnostic Activation)
- DGL (Diagnostic Trigger Level)
- DGN (Diagnostic Number)
- DGR (Diagnostic Read)
- DGS (Diagnostic Start And Status)
- UDC (Supply Voltage)
- UIT (Input Threshold)

Dosing

- ASD (Adaptive Dosing Times)
- ATP (Adaptive Lockout Times)
- BRK (Abort Dosing)
- CBK (Coarse Flow Monitoring)
- CBT (Coarse Flow Monitoring Time)
- CD1 (Zeroing Delay 1)
- CD2 (Zeroing Delay 2)
- CFD (Coarse Flow Disconnect)
- CFT (Coarse Flow Time)

- SDS (Standard Deviation Dosing Results)
- STT (Stabilization Time)
- SUM (Cumulative Weight)
- SYD (Systematic Difference)
- TAD (Tare Delay)
- TMD (Tare Mode)
- UTL (Upper Tolerance Limit)
- VCT (Valve Control)
- WDP (Write Dosing Parameter Set)

Filter

- ADF (Adaptive Noise Suppression)
- ASF (Amplifier Signal Filter)
- FMD (Filter Mode)
- FST (Filter Settling Time)
- FTL (Fast Track Level (FMD3))
- HSM (High Speed Mode ADC)
- ICR (Internal Conversion Rate)
- MAC (Moving Average Filter for FMD5)
- NTF (Notch Filter)
- TMA (Maximum Filter Settling Time)

Device ID

- HWV (Hardware Version)
- IDN (Identification)
- NAM (Manufacturer)
- PDT (Firmware Date)
- PZN (Check Number)
- SNR (Serial Number)
- SRV (Software Sub-Version)
- SWI (Software Identification)
- SWV (Software Version)

IO

- IM1 (Input Mode Input 1)
- IM2 (Input Mode Input 2)

- IOM (IO Mode)
- IS1 (Digital Input State Input 1)
- IS2 (Digital Input State Input 2)
- MUX (Control of Digital Outputs OUT5 And OUT6)
- OM1 (Output Mode Output 1)
- OM2 (Output Mode Output 2)
- OM3 (Output Mode Output 3)
- OM4 (Output Mode Output 4)
- OM5 (Output Mode Output 5)
- OM6 (Output Mode Output 6)
- OS1 (Digital Output 1)
- OS2 (Digital Output 2)
- OS3 (Digital Output 3)
- OS4 (Digital Output 4)
- OS5 (Digital Output 5)
- OS6 (Digital Output 6)
- POR (Port Set And Read)
- RIO (Read Status Digital I/O)
- SPL (Input Level)

Measuring

- ALS (Alarm Status)
- AOV (ADC Overflow Counter)
- APD (Alternative Poll Data)
- APP (Alternative Control Word)
- AT1 (Active Time Output 1)
- AT2 (Active Time Output 2)
- AT3 (Active Time Output 3)
- AT4 (Active Time Output 4)
- CDL (Zeroing)
- CPV (Clear Peak Values)
- DT1 (Delay Time Output 1)
- DT2 (Delay Time Output 2)
- DT3 (Delay Time Output 3)
- DT4 (Delay Time Output 4)
- ERR (Extended Error Status)

- ESR (Error Status)
- FLO (Flow Rate)
- FRT (Flow Rate Measurement Time)
- IMD (Input Mode)
- LIV1 (Limit Value 1 Monitoring)
- LIV2 (Limit Value 2 Monitoring)
- LIV3 (Limit Value 3 Monitoring)
- LIV4 (Limit Value 4 Monitoring)
- MSV (Measured Signal Value)
- PVA (Read Peak Value)
- PVS (Peak Value Select)
- SOV (Sensor Overflow Counter)
- STB (Control Byte)
- STP (Stop)
- STW (Control Word)
- TAR (Tare)
- TAS (Gross Signal)
- TAV (Tare Value)

Interface

- ADR (Device Address)
- BDR (Baud Rate)
- BOF (Bus-off Behavior)
- BSY (Busy State)
- COF (Configure Output Format)
- CSM (Checksum)
- DPW (Define Password)
- EMA (Event Mask A)
- EMB (Event Mask B)
- GRU (Group Address)
- S (Select)
- SPW (Set Password)
- STR (Set Termination Resistor)
- TEX (Text Separator)

Service

- RES (Reset)
- TDD (Store Parameters)
- TIM (Date/Time)
- TMO (Temperature Alarm Sensor)
- TMP (Temperature)

Trigger functions and parameters

- AST (Adaptive Trigger Settling)
- CDT (Zeroing Delay)
- CTR (Clear Trigger Results)
- MAV (Measured Alternative Data)
- MVC (Retrigger Mean Value Count)
- POL (Light Sensor Polarity)
- PTD (Post-Trigger Delay)
- RTB (Re-Trigger Tolerance Band)
- TRC (Trigger Command)
- TRF (Trigger Correction Factor)
- TRM (Trigger Mean Value)
- TRN (Trigger Number)
- TRS (Trigger Standard Deviation)
- TSL (Trigger Stop Level)
- TST (Trigger Stop Time)
- TSW (Software Trigger)
- TVT (Trigger Delay Time)

Scale functions and parameters

- CRC (Cyclic Redundancy Check)
- DZB (Automatic Zeroing Band)[1)]
- DZC (Automatic Zeroing Count)[1)]
- DZH (Automatic Zeroing Hold-off)[1)]
- DZM (Automatic Zeroing Mode)[1)]
- DZT (Dynamic Zero Tracking/Automatic Zeroing Time)
- HRN (High Resolution)
- LFT (Legal-For-Trade)
- MRA (Multirange Switch Point)
- MRM (Multi-Range Mode)[1)]

- MTD (Motion Detection)
- SCR (Set Current Range)[1)]
- TCR (Trade Counter)
- ZSE (Zero Setting)
- ZTR (Zero Tracking)

1)

10.3 ADF (Adaptive Noise Suppression)

Sets or reads the maximum number of adaptive filters that will be used.

When the notch filters are active the sensor electronics automatically search for interference frequencies during the measurement and suppress them with up to 3 filters.

The settling time of the entire filter chain changes depending on the number of filters and the interference frequency. You can therefore limit the maximum filter settling time with the TMA command.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Number of adaptive filters used
Range/data		0: Adaptive notch filters deactivated 1: Filtering via moving average (MAC) 2: Filtering via moving average (MAC) plus 1 comb filters (NTF) 3: Filtering via moving average (MAC) plus 2 comb filters (NTF)
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2050*hex* (hexadecimal)
	Subindex	01*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	6
	Attribute	1
PROFIBUS		Not available

10.4 ADR (Device Address)

This command only concerns serial interfaces.

Sets or reads the network address of the device for RS-485 interfaces. With the optional second parameter, if you are operating on bus-capable interfaces, you can access devices with the same address individually to be able to save the address. Newer electronics (available beginning with P80) also use 10-digit serial numbers. In this case 10 digits are used as soon as 9,999,999 is exceeded, otherwise 7.
See also SNR, IDN, S.

Use this command to prepare for bus operation to ensure that each connected device has a unique address.

No. of parameters	2
Factory setting	31
Response time	<10 ms
Password protection[1]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1] Only available if serial interfaces are used.

Parameter P1

Meaning	Network address for the serial interface, also with diagnostics bus
Range/data	0 … 89
Number of ASCII characters with serial interface	2
Data type	*UINT8* (Unsigned Integer 8 bit)

Access		*R/W* (Read/Write)
CANopen	Index	2600*hex* (hexadecimal)
	Subindex	01*hex* (hexadecimal)
DeviceNet	Class	130
	Instance	1
	Attribute	1
PROFIBUS		Not available

Parameter P2 (optional)

Meaning	Serial number
Range/data	Text (ASCII), 7 or 10 characters; see also SNR.
Data type	STRING
Access	*R* (Read only)
CANopen	Not available
DeviceNet	Not available
PROFIBUS	Not available

Example

Command	`S98;`	Broadcast, selects all bus nodes.
Command	`ADR25,"007";`	Changes the address of the device with serial number 007 to 25.

10.5 ALS (Alarm Status)

Reads the alarm status.

The alarm status is a 32-bit value, see the table below for the meaning of the individual bits.

No. of parameters	–
Factory setting	–
Response time	<10 ms
Password protection [1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Information about the command

Meaning		Alarm status
Range/data		0 … 4,294,967,296
Number of ASCII characters with serial interface		10
Data type		*UINT32* (Unsigned Integer 32 bit)
Access		*R* (Read only)
CANopen	**Index**	2000*hex* (hexadecimal)
	Subindex	0D*hex* (hexadecimal)

DeviceNet	**Class**	100
	Instance	1
	Attribute	13
PROFIBUS		Not available

Meaning of the status bits

Bit	Meaning when bit is set (= 1)
31	ESR error
30	Residual flow active
29	Bridge excitation voltage error
28	Short circuit digital outputs OUT1 … 4
27	Lower tolerance limit exceeded during batching (LTL)
26	Upper tolerance limit exceeded during batching (UTL)
25	Indicating range exceeded, see also LFT
24	Dosing time exceeded (MDT)
23	A peak value is available (PVA). The bit will be deleted after a query.
22	Dosing error (ALARM)
21	A peak result is available (FRS). The bit will be deleted after a query.
20	Broken bag/damaged container
19	A measured value is available (MSV). The bit will be deleted after a query.
18	Zero balance was performed. The bit will be deleted after a query.
17	Overflow/underflow analog-to-digital converter, see also ESR
16	Overflow/underflow gross, see also ESR
15	Overflow/underflow net, see also ESR
14	Control input 2 active
13	Batching ready signal (FRS can be read out)
12	Emptying active, see also EWT

Bit	Meaning when bit is set (= 1)
11	Fine flow active
10	A trigger result is available (MAV). The bit will be deleted after a query.
9	Coarse flow active
8	Redosing active, see also RDS
7	Trigger function active (TRC)
6	Weighing range 2 active (MRA). Otherwise (bit = 0) weighing range 1 is active.
5	Limit value 2 active (LIV2)
4	Limit value 1 active (LIV1)
3	Standstill, see also MTD
2	Control input 1 active
1	True zero (0 ± 0.25 d)
0	The gross weight is transmitted. Otherwise (bit = 0) the net signal is transmitted. See also TAS.

10.6 AOV (ADC Overflow Counter)

Reads the counter for the A/D converter overflow (ADU Overflow).

AED9101C-Z2/22, AED9101D, AED9201B, AED9301B, AED9401A, AED9501A: If the A/D converter is overloaded, this counter is incremented by one every 10 seconds. The maximum extent of the count is 8,388,607.

FIT/0, FIT/1, FIT/4, FIT/5, FIT5A, FIT/7, PW15AHi, PW15iA, PW20i, C16i: If the load cell is overloaded at more than 160% of maximum capacity, this counter is incremented by one every 10 seconds. The maximum extent of the count is 8,388,607.

No. of parameters	1
Factory setting	–
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Counter for A/D converter overflow
Range/data		0 … 8,388,607
Number of ASCII characters with serial interface		7
Data type		*UINT32* (Unsigned Integer 32 bit)
Access		*R* (Read only)
CANopen	**Index**	2500*hex* (hexadecimal)
	Subindex	01*hex* (hexadecimal)
DeviceNet	**Class**	120
	Instance	1
	Attribute	1
PROFIBUS	**Slot**	0
	Index	115

10.7 APD (Alternative Poll Data)

Reads or sets the content of a DeviceNet poll request and displays the trigger results included in the content.

This function is useful if your PLC has problems with the content of the poll request.

No. of parameters	1
Factory setting	2
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Alternative poll data
Range/data		0 … 47
Number of ASCII characters with serial interface		2
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2600*hex* (hexadecimal)
	Subindex	0F*hex* (hexadecimal)

DeviceNet	Class	130
	Instance	1
	Attribute	15
PROFIBUS		Not available

Meaning of values for P1

See also Example 3: Cyclic data traffic after the poll connection is opened with DeviceNet for additional parameter values.

P1	Poll data byte 1	Poll data byte 2	Poll data byte 3	Poll data byte 4	Poll data byte 5	Trigger result mode
0	IMD	MSV	MSV status	MAV/FRS	MAV/FRS status	Standard
1	MSV value	MSV status	MAV/FRS value	MAV/FRS status	IMD value	Standard
2	IMD value	MSV value	MSV status	MAV/FRS value	MAV/FRS status	Advanced
3	MSV value	MSV status	MAV/FRS value	MAV/FRS status	IMD value	Advanced

Trigger result mode:

1. Standard
   The status bit is set with each new trigger event. After the trigger result in the poll request is transferred, the trigger result is set to the assigned value (-8.388.607) and the “Trigger available” status bit is deleted.
2. Advanced
   After the trigger result in the poll request is transferred, the trigger result and the “Trigger available” status bit are continuously transferred. The trigger result and status bit are only reset by reading out the trigger result via the explicit connection

10.8 APP (Alternative Control Word)

Sets or reads use of the alternative control word for poll data with DeviceNet.
Changing the size of the control word (STW) to 8 bits (control byte STB) shortens the poll sequence.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Control word or control byte
Range/data		0: Use control word (16 bits) 1: Use control byte (8 bits)
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2600*hex* (hexadecimal)
	Subindex	1B*hex* (hexadecimal)
DeviceNet	**Class**	130
	Instance	1
	Attribute	27
PROFIBUS		Not available

10.9 ARP (Adaptive Residual Flow Time)

Sets or reads activation of the adaptive setting for the residual flow time RFT.

When this function is active, the residual flow time is set automatically based on the material flow (optimized). Then it is no longer possible to enter the value (directly).

See also ATP.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in Legal-For-Trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Adaptive residual flow time active/not active
Range/data		0: Deactivate setting 1: Activate adaptive setting
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2200*hex* (hexadecimal)
	Subindex	11*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	1
	Attribute	17
PROFIBUS		Not available

10.10 ASD (Adaptive Dosing Times)

Sets or reads the activation of the adaptive setting for the delay time for taring (TAD), the residual flow time (RFT), and the zero value settling time (CD2).

When this function is active, the times are set automatically based on the filter that is used (optimized). Then it is no longer possible to enter the values (directly).

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Adaptive setting for delay time during taring, residual flow time and zero value settling time active/inactive
Range/data		0: Deactivate adaptive setting 1: Activate adaptive setting
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2200*hex* (hexadecimal)
	Subindex	13*hex* (hexadecimal)

DeviceNet	**Class**	102
	Instance	1
	Attribute	19
PROFIBUS		Not available

10.11 ASF (Amplifier Signal Filter)

Sets or reads the filter limit frequency. The filter effect is also influenced by the FMD, HSM and ICR commands.
See also Filter mode, Filter frequency.

No. of parameters	1
Factory setting	5
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Filter selection
Range/data		0: Deactivated 1 … 9; see Filter limit frequency
Number of ASCII characters with serial interface		2
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2010*hex* (hexadecimal)
	Subindex	01*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	2
	Attribute	1

PROFIBUS	Slot	0
	Index	43

10.12 ASS (Amplifier Signal Selection)

Sets or reads the amplifier input signal. This command is only present for compatibility reasons and is used by HBM for tests.

No. of parameters	1
Factory setting	2
Response time	<10 ms for queries <220 ms for setting
Password protection[1)]	No
Disabled in Legal-For-Trade mode	No
Save parameters	TDD1
Available starting with firmware version	P50

[1)] Only available if serial interfaces or PROFIBUS are used.

Parameter P1

Meaning		Amplifier input signal
Range/data		0: Internal zero signal (0 mV/V) 1: Internal calibration signal (2 mV/V) 2: Measurement signal (transducer) 3: Internal calibration signal (for compatibility with AD101)
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	Index	2010*hex* (hexadecimal)
	Subindex	02*hex* (hexadecimal)

DeviceNet	Class	100
	Instance	2
	Attribute	2
PROFIBUS	Slot	0
	Index	103

10.13 AST (Adaptive Trigger Settling)

Sets or reads activation of the adaptive setting for the settling time (TRC).

When this function is active, the times are set automatically based on the filter that is used (optimized). Then it is no longer possible to enter the values (directly).

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Adaptive setting of trigger settling time active/not active
Range/data		0: Deactivate adaptive setting 1: Activate adaptive setting
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2200*hex* (hexadecimal)
	Subindex	14*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	1
	Attribute	19
PROFIBUS		Not available

10.14 AT1 (Active Time Output 1)

The description below referring to the functions of digital outputs applies only to sensor electronics up to *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics and for *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics in compatibility mode (IOM command with parameter P1 = 0). For sensor electronics in *4th generation* FIT5A, FIT7A, PAD400x, PW15iA you can define the function of the digital outputs yourself with commands OM1 to OM6 (IOM command with parameter P1 = 1).

Amount of time digital output OUT1 is active when the trigger function is used.

The functionality is activated with the LIV1 command with parameter 1 > 2 and parameter 2 = 2. The calculation of the trigger result (MAV) starts delay time DT1. When the delay time has elapsed, time AT1 starts (parameter P1 * 10 ms). Output OUT1 is active during this time. Set parameter P1 = 0 to turn off the function.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P64.4 (electronics units with P64.4 see Firmware overview), P77.9 (electronics units with P77.9 see Firmware overview)

[1] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning	Activation time 1
Range/data	0 ... 32,767; the activation time is parameter P1 * 10 ms

Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2030*hex* (hexadecimal)
	Subindex	11*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	4
	Attribute	17
PROFIBUS	**Slot**	0
	Index	172

10.15 AT2 (Active Time Output 2)

The description below referring to the functions of digital outputs applies only to sensor electronics up to *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics and for *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics in compatibility mode (IOM command with parameter P1 = 0). For sensor electronics in *4th generation* FIT5A, FIT7A, PAD400x, PW15iA you can define the function of the digital outputs yourself with commands OM1 to OM6 (IOM command with parameter P1 = 1).

Amount of time digital output OUT2 is active when the trigger function is used.

The functionality is activated with the LIV2 command with parameter 2 > 2 and parameter 3 = 2. The calculation of the trigger result (MAV) starts delay time DT2. When the delay time has elapsed, time AT2 starts (parameter P1 * 10 ms). Output OUT2 is active during this time. Set parameter P1 = 0 to turn off the function.

No. of parameters	1
Factory setting	–
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P64.4 (electronics units with P64.4 see Firmware overview), P77.9 (electronics units with P77.9 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning	Activation time 2
Range/data	0 ... 32,767; the activation time is parameter P1 * 10 ms

Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2030*hex* (hexadecimal)
	Subindex	12*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	4
	Attribute	18
PROFIBUS	**Slot**	0
	Index	173

10.16 AT3 (Active Time Output 3)

The description below referring to the functions of digital outputs applies only to sensor electronics up to *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics and for *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics in compatibility mode (IOM command with parameter P1 = 0). For sensor electronics in *4th generation* FIT5A, FIT7A, PAD400x, PW15iA you can define the function of the digital outputs yourself with commands OM1 to OM6 (IOM command with parameter P1 = 1).

Amount of time digital output OUT3 is active when the trigger function is used.

The functionality is activated with the LIV3 command with parameter 2 > 2 and parameter 3 = 2. The calculation of the trigger result (MAV) starts delay time DT3. When the delay time has elapsed, time AT3 starts (parameter P1 * 10 ms). Output OUT3 is active during this time. Set parameter P1 = 0 to turn off the function.

No. of parameters	1
Factory setting	–
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P64.4 (electronics units with P64.4 see Firmware overview), P77.9 (electronics units with P77.9 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning	Activation time 3
Range/data	0 ... 32,767; the activation time is parameter P1 * 10 ms

Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2030*hex* (hexadecimal)
	Subindex	13*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	4
	Attribute	19
PROFIBUS	**Slot**	0
	Index	174

10.17 AT4 (Active Time Output 4)

The description below referring to the functions of digital outputs applies only to sensor electronics up to *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics and for *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics in compatibility mode (IOM command with parameter P1 = 0). For sensor electronics in *4th generation* FIT5A, FIT7A, PAD400x, PW15iA you can define the function of the digital outputs yourself with commands OM1 to OM6 (IOM command with parameter P1 = 1).

Amount of time digital output OUT4 is active when the trigger function is used.

The functionality is activated with the LIV4 command with parameter 2 > 2 and parameter 3 = 2. The calculation of the trigger result (MAV) starts delay time DT4. When the delay time has elapsed, time AT4 starts (parameter P1 * 10 ms). Output OUT4 is active during this time. Set parameter P1 = 0 to turn off the function.

No. of parameters	1
Factory setting	–
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P64.4 (electronics units with P64.4 see Firmware overview), P77.9 (electronics units with P77.9 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning	Activation time 4
Range/data	0 … 32,767; the activation time is parameter P1 * 10 ms

Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2030*hex* (hexadecimal)
	Subindex	14*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	4
	Attribute	20
PROFIBUS	**Slot**	0
	Index	175

10.18 ATP (Adaptive Lockout Times)

Sets or reads activation of the adaptive setting for the lockout times with for coarse/fine flow (LTC/LTF).

When this function is active, times are set automatically based on the material flow (optimized). Then it is no longer possible to enter the values (directly).

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection [1]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1] Only available if serial interfaces are used.

Parameter P1

Meaning		Adaptive setting of lockout times with coarse and fine flow active/not active
Range/data		0: Deactivate adaptive setting 1: Activate adaptive setting
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2200*hex* (hexadecimal)
	Subindex	F*hex* (hexadecimal)

DeviceNet	**Class**	102
	Instance	1
	Attribute	15
PROFIBUS		Not available

10.19 BDR (Baud Rate)

Sets or reads the baud rate and setting of the parity bit of the serial interface.

The response indicates the new setting (baud rate, parity). Because of this, communication is no longer possible initially after a change. First change the PC to the new setting (baud rate).

Use the TDD command with parameter P1 = 1 to save the new setting. Otherwise the parameter that was valid previously will be used after a reset (RES) command or the next time after the supply voltage is turned on.

No. of parameters	2
Factory setting	9600
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Baud rate
Range/data		1200, 2400, 4800, 9600, 19,200, 38,400, 57,600, 115,200
Number of ASCII characters with serial interface		6
Data type		*UINT32* (Unsigned Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2600*hex* (hexadecimal)
	Subindex	03*hex* (hexadecimal)
DeviceNet	**Class**	130
	Instance	1
	Attribute	3
PROFIBUS		Not available

Parameter P2

Meaning		Parity bit
Range/data		0: No parity 1: Even parity
Number of ASCII characters with serial interface		1
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2600*hex* (hexadecimal)
	Subindex	04*hex* (hexadecimal)

DeviceNet	**Class**	130
	Instance	1
	Attribute	4
PROFIBUS		Not available

BOF (Bus-off Behavior)

Sets or reads the bus-off behavior for CANopen and DeviceNet.

You can use this command to define whether and how long the sensor electronics will wait to restart after a bus-off (hardware reset).

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Bus-off behavior
Range/data		0: The sensor electronics remain in bus-off status 1 … 255: The sensor electronics wait for parameter P1 * 100 ms after the bus-off status has occurred and then restart (hardware reset)
Number of ASCII characters with serial interface		3
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2600*hex* (hexadecimal)
	Subindex	0E*hex* (hexadecimal)

DeviceNet	**Class**	130
	Instance	1
	Attribute	14
PROFIBUS		Not available

10.20 BRK (Abort Dosing)

Aborts the automatic batching process if the sensor electronics are in dosing mode (IMD with parameter P1 = 2). Otherwise the response to the command is ?.

All outputs are deactivated and the dosing status is cleared. The command has the same effect as a signal on input IN1 for all sensor electronics systems up to *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics and for *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics in compatibility mode (IOM command with parameter P1 = 0). For sensor electronics in *4th generation* FIT5A, FIT7A, PAD400x, PW15iA you can define the function of the digital inputs yourself with commands IM1 to IM2 (IOM command with parameter P1 = 1).

See also Filler.

Use 0x7FFFFFFF as the parameter to send a command that does not use parameters via CANopen or DeviceNet.

Notes

- If emptying is interrupted, it will not be continued the next time batching starts. Instead a batching start will be performed.
- If emptying is interrupted, it will be continued the next time batching starts.

No. of parameters	–
Factory setting	–
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

1) Only available if serial interfaces or PROFIBUS used.

Information about the command

Meaning		Batching break
Range/data		–
Data type		–
Access		*W* (Write only)
CANopen	Index	2240*hex* (hexadecimal)
	Subindex	01*hex* (hexadecimal)
DeviceNet	Class	102
	Instance	5
	Attribute	1
PROFIBUS	Slot	0
	Index	28

10.21 BSY (Busy State)

Reads the busy status.

The bit (bit 0) is set while commands LDW, LFT, LWT, SFA, SZA and TDD are being performed, as these commands last longer. This makes it possible for you to check whether these commands have reached the end of processing. If an error occurs while one of the commands is being performed, bit 7 is set in addition.

No. of parameters	–
Factory setting	–
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces are used.

Information about the command

Meaning		Busy status
Range/data		Bit 0 = 1: Busy Bit 7 = 1: Error
Number of ASCII characters with serial interface		3
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R* (Read only)
CANopen	**Index**	2000*hex* (hexadecimal)
	Subindex	0C*hex* (hexadecimal)

DeviceNet	**Class**	100
	Instance	1
	Attribute	12
PROFIBUS		Not available

10.22 CBK (Coarse Flow Monitoring)

Sets or reads the value for increase in weight during the coarse flow phase.

This command is used for breakage monitoring during the coarse flow phase (sack breakage). Enter the increase in the weight you expect per time interval (CBT) for a normal filling process . After the lockout time for the coarse flow (LTC) elapses, the increase is checked after every time interval. If the increase in weight is *not* exceeded, this is interpreted as breakage in the container that is being filled and batching is canceled no later than 1.6 ms after the check. Fill flow monitoring of the coarse flow is deactivated after the coarse flow cut-off point (CFD) is reached.

For NOV (maximum capacity) with parameter P1 greater than zero, the value is indicated as a percentage rate. This means that with a maximum capacity of 50,000 and an interval (differential weight) of 6%, the value is 3000.

See also Filler, FBK.

When the filling weight (FWT) is entered, monitoring is automatically deactivated (parameter P1 = 0).

The description below referring to the functions of digital outputs applies only to sensor electronics up to *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics and for *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics in compatibility mode (IOM command with parameter P1 = 0). For sensor electronics in *4th generation* FIT5A, FIT7A, PAD400x, PW15iA you can define the function of the digital outputs yourself with commands OM1 to OM6 (IOM command with parameter P1 = 1).

When a break is detected:

- Coarse flow and fine flow are deactivated.
- In dosing status (SDO) bit 7 (Alarm) is set to 1.
- If bit 1 is set for special monitoring functions (SDF), an alarm is generated.
- Output OUT6 is activated for OMD with parameter P1 = 0.
- Dosing control goes to stop status.

Then you can use Start to continue the batching process (this leaves out the optimization calculation) or end batching with Break.

Reasons for breakage during coarse flow:

- The actual buildup of material is less than the given limit value.
- No material is received because the filling stud is clogged.
- The lockout time for the coarse flow assessment setting (LTC) is too short and therefore material does not arrive until fill flow monitoring is already active
- The container is no good or not available.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Value for the increase in weight during the coarse flow phase
Range/data		0: Deactivated 1 … 1,599,999 for NOV with parameter P1 = 0, otherwise 0 … 160% of NOV
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2210*hex* (hexadecimal)
	Subindex	01*hex* (hexadecimal)

DeviceNet	**Class**	102
	Instance	2
	Attribute	1
PROFIBUS	**Slot**	0
	Index	75

10.23 CBT (Coarse Flow Monitoring Time)

Sets or reads the time interval for the increase in weight during coarse flow monitoring.

If you set parameter P1 = 0, a time interval of 100 ms is used. Monitoring starts after the lockout time for coarse flow (LTC). It is deactivated after the coarse flow cut-off point (CFD) is reached. The differential weight (CBK) must be greater than zero, otherwise there will be no check.

See also Filler, Coarse flow.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Time interval for coarse flow monitoring
Range/data		0: The time interval is 100 ms (independently of HSM) 1 ... 32,767: The time interval is parameter P1 * 10 ms
Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2220*hex* (hexadecimal)
	Subindex	01*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	3
	Attribute	1
PROFIBUS	**Slot**	0
	Index	92

10.24 CD1 (Zeroing Delay 1)

Sets or reads the relief wait time for zero balance during filling.

A digital filter with a fast settling time is used during this time to allow for a faster zero balance.

See also Zero balance options for filling.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Relief wait time
Range/data		0 … 32,767; the time interval is in ms (milliseconds)
Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2220*hex* (hexadecimal)
	Subindex	0E*hex* (hexadecimal)

DeviceNet	**Class**	102
	Instance	3
	Attribute	14
PROFIBUS		Not available

10.25 CD2 (Zeroing Delay 2)

Sets or reads the zero value settling time for zero balance during filling.

The original filter is reactivated followed by a wait for settling. This is followed by the zero balance.

See also Zero balance options for filling.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Zero value settling time
Range/data		0 … 32,767; the time interval is in ms (milliseconds)
Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2220*hex* (hexadecimal)
	Subindex	0F*hex* (hexadecimal)

DeviceNet	**Class**	102
	Instance	3
	Attribute	15
PROFIBUS		Not available

10.26 CDL (Zeroing)

Transfers the current gross measured value to zero memory if the gross value lies within the permitted zeroing range. Standstill must be reached in addition in legal-for-trade mode. The value of zero memory is then subtracted from every measured value. By default, the setting range is limited to ±2%. With ZSE you can increase the range to ±20%; from firmware P81 with ZMD to ±100%. As from firmware P80, read out the stored zero value with `CDL?;` (also includes the zero value resulting from Zero tracking).
See also Zeroing, ZSE, ZMD.
When a new characteristic curve is entered, zero memory is deleted after the supply voltage is turned on or with the RES command.

Use 0x7FFFFFFF as the parameter to send a command that does not use parameters via CANopen or DeviceNet.

No. of parameters	1
Factory setting	0
Response time	Depends on the filter mode (FMD), filter (ASF) and index (P1) of the output rate (ICR) FMD0/2/3/4/5: <2^{ICR} * 1.6 ms + 1.6 ms FMD1 and ASF0: <2^{ICR} * 1.6 ms + 1.6 ms FMD1: <2^{ICR} * ASF parameter * 1.6 ms + 1.6 ms
Password protection	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)/P80 (electronics units with P80 see Firmware overview)

Parameter P1 (optional)

Meaning	Zeroing
Range/data	-20,000 … +20,000

Number of ASCII characters with serial interface		9 (8 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		From P50 (electronics with P50 see Firmware overview): *W* (Write only) From P80: *R/W* (Read/Write)
CANopen	**Index**	2010*hex* (hexadecimal)
	Subindex	03*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	2
	Attribute	3
PROFIBUS		Not available

Examples

Command	`S05;`	Select the device with address 5.
Command	`CDL;`	Zero.
Response	`0crlf`	Zeroing successful.

Starting with firmware version P80 you can also read out the zero value.

Command	`S05;`	Select the device with address 5.
Command	`CDL?;`	Read out zero value.
Response	`127crlf`	The zero value is 127, taking into consideration the number of places after the decimal and the unit. With two places after the decimal and kg as the unit, the resulting zero value is 1.27 kg.

10.27 CDT (Zeroing Delay)

Sets or reads the delay time for the zero balance if the trigger function is active (IMD with parameter P1 = 1 and TRC with parameter P1 = 1).

This function is suitable for weighing processes when the scale is unloaded between weighing operations. Note that the zero setting range is restricted in legal-for-trade mode.

See also Zero balance after a time delay.

Make certain the scaleis unloaded after the delay time elapses.

Working method:

- After initiating a trigger result (level or external triggering) the preset delay time begins.
- Once this delay time has expired, zero balance is performed if the gross measured value lies within the range of zero setting. There is no wait for a standstill!

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning	Zero balance after a time delay
Range/data	0: Off 1 … 32,767: The delay time is parameter P1 * 10 ms

Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2010*hex* (hexadecimal)
	Subindex	0B*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	2
	Attribute	11
PROFIBUS	**Slot**	0
	Index	170

10.28 CFD (Coarse Flow Disconnect)

Sets or reads the coarse flow cut-off point. The coarse flow cut-off point must not be higher than the fine flow cut-off point (FFD).
See also Filler.

When the filling weight is entered (FWT), the coarse flow cut-off point is automatically set to 50% of the filling weight. If optimization is activated (OSN command with parameter P1 > 0), the coarse flow cut-off point is tracked automatically.

Coarse flow cut-off point$_{max.}$ = Fine flow cut-off point – Minimum fine flow (FFM)

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Coarse flow cut-off point
Range/data		0 … 1,200,000
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2210*hex* (hexadecimal)
	Subindex	02*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	2
	Attribute	2
PROFIBUS	**Slot**	0
	Index	71

10.29 CFT (Coarse Flow Time)

Reads out the coarse flow duration.

The duration of the coarse flow is recorded for each batching process (query with `CFT?;`). Recording of time starts when coarse flow is turned on and ends when it is turned off. Therefore it also includes the lockout time for the coarse flow (LTC). With each new ready signal the current duration is set as the duration for the next process. See also Filler.

Notes

- The coarse flow duration is not updated if batching has been interrupted with a break (BRK) or an error.
- Commands CSN (clear dosing result) and RES (reset) clear the coarse flow duration.

No. of parameters	1
Factory setting	–
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Coarse flow duration
Range/data		0 ... 32,767: The coarse flow duration is parameter P1 * 10 ms
Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R* (Read only)
CANopen	**Index**	2230*hex* (hexadecimal)
	Subindex	01*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	4
	Attribute	1
PROFIBUS	**Slot**	0
	Index	58

10.30 COF (Configure Output Format)

Sets or reads the output format for measurement output for commands MSV?, MAV? and FRS?.

No. of parameters	1
Factory setting	9
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Output format
Range/data		0 … 143, see tables for formats
Number of ASCII characters with serial interface		3
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2600*hex* (hexadecimal)
	Subindex	07*hex* (hexadecimal)
DeviceNet	**Class**	130
	Instance	1
	Attribute	7
PROFIBUS		Not available

Different groups of formats are available for you for output:

- COF0 … 15: Standard formats
- COF16 … 31: Formats for bus mode
- COF32 … 47: Formats without crlf end detection
- COF64 … 79: Formats for 2-wire bus mode
- COF128 … 143: Formats for continuous output

The same identifiers apply in every group. To distinguish the group you will need add 16, 32, 64 or 128 respectively to the standard formats.

Output speed of measured values

The maximum output rate of the sensor electronics is 1200 measured values per second. The data transfer rate (BDR), depends on the baud rate (BDR), the measurement data output format (COF), the set output rate (HSM, ICR) and the filter mode (FMD, ASF).

You can use the tables below to estimate the achievable speed at a given baud rate for different formats.

Table for FMD with parameter P1 = 0, HSM with parameter P1 = 0 and for command MSV?0 (continuous output):

Measured values/s	ICR With P1 =	COF0, COF4	COF2, COF6	COF1	COF3	COF9, COF13	COF15
600	0	38400	19200	–	115000	–	–
300	1	19200	9600	115000	38400	115000	–
150	2	9600	4800	38400	19200	38400	115000
75	3	4800	2400	19200	9600	19200	38400
37	4	2400	1200	9600	4800	9600	19200
18	5	1200	1200	4800	2400	4800	9600
9	6	1200	1200	2400	1200	2400	4800
4	7	1200	1200	1200	1200	1200	2400

COF0/COF4: 4 characters, binary format

COF2/COF6: 2 characters, binary format

COF1: 13 characters, ASCII format, measured value + address

COF3: 10 characters, ASCII format, measured value

COF9: 17 characters, ASCII format, measured value + address + status

COF13: 29/30 characters, ASCII format, measured value with additional information

COF15: 40/41 characters, ASCII format, measured value with additional information

Table for FMD with parameter P1 = 0, HSM with parameter P1 = 0 and for command MSV?1 (output individual measured values):

Measured values/s	ICR With P1 =	COF0, COF4
600	0	115000
300	1	38400
150	2	19200
75	3	9600
37	4	4800
18	5	2400
9	6	1200
4	7	1200

COF0/COF4: 6 characters, binary format

10.30.1 Standard formats COF0 ... COF15

Standard formats are divided into three groups.

1. Binary formats

P1	Length of the output	Sequence	Output
000	4 bytes	MSB ... LSB	Measured value, no status (LSB = 0)
002	2 bytes	MSB ... LSB	Measured value
004	4 bytes	LSB ... MSB	Measured value, no status (LSB = 0)
006	2 bytes	LSB ... MSB	Measured value
008	4 bytes	MSB ... LSB	Measured value and status/checksum (CSM) in LSB
012	4 bytes	LSB ... MSB	Measured value and status/checksum in LSB

MSB = most significant bit, LSB = least significant bit

With measurement output in binary format, the binary codes for cr and lf may occur within the bytes for the measured value. Therefore you should not test the content for these characters to find the end of the transmission. Be guided exclusively by the number of characters received.
The end identifier crlf is only appended to the measured value in binary output if you retrieve a single measured value with MSV?;. For MSV? with parameter P1 > 1, the end identifier is only appended to the *last* measured value.
`MSV?0;` (continuous output) never has an end identifier.

2. ASCII formats

In ASCII output, a separator is placed between the individual items of information. You can define the separator yourself with the TEX command. Depending on parameter P1 in TEX, the last item of information is followed by either crlf (2 characters) or the selected separator (1 character).

In single measured value output with MSV?, crlf is always the end identifier. In multiple output, e.g. with MSV?10, crlf is also appended as the end identifier after the *last* measured value, and either crlf or the separator specified with TEX is outputted between the values.

P1	Length of the output	Output sequence[1)]
001	12/13 characters	Measured value (8), separator (1), address (2), end identifier (1/2)
003	9/10 characters	Measured value (8), end identifier (1/2)
005	12/13 characters	Measured value (8), separator (1), address (2), end identifier (1/2)
007	9/10 characters	Measured value (8), end identifier (1/2)
009	16/17 characters	Measured value (8) separator (1) address (2) separator (1) status (3) (1/2)
011	13/14 characters	Measured value (8), separator (1), status (3), end identifier (1/2)

[1)] The numbers in brackets represent the number of characters transferred.

3. Special formats

These formats are suitable for legal-for-trade applications.

Output of the trigger result (MAV?) or dosing result (FRS?) is *always* in the unit (ENU) .

P1 = 13 (COF13)

Character	Output	Explanation
1	G/N/E	G = gross (TAS1), N = net (TAS0), E = error status
2	_/1/2	Space character for single-range balance (MRA0); 1 = range 1, 2 = range 2 for dual-range balance (MRA with parameter P1 > 0)
3	_/o	Space character or true zero for gross or net
4	Separator	Separator as set with the TEX command

Character	Output	Explanation
5 ... 13	xxxx.xxxx/ _________/ ---------	Measured value in 9 characters including the decimal point (DPT), 9 x _ in case of underflow (gross or net value too small), 9 x - in case of overflow (gross or net value too large),
14	Separator	Separator as set with the TEX command
15 ... 18	yyyy	No standstill: 4 spaces At standstill: 4 characters with the unit defined by the ENU command
19	T	Separator as set with the TEX command
20 ... 28	zzzz.zzzz	Tara value (TAV) in 9 characters including decimal point (DPT)
29, 30	Separator/crlf	Separator or crlf

P1 = 15 (COF15)

Character	Output	Explanation
1	G/N/E	G = gross (TAS1), N = net (TAS0), E = error status
2	_/1/2	Space character for single-range balance (MRA0); 1 = range 1, 2 = range 2 for dual-range balance (MRA with parameter P1 > 0)
3	_/o	Space character or true zero for gross or net
4	Separator	Separator as set with the TEX command
5 ... 13	xxxx.xxxx/ _________/ ---------	Measured value in 9 characters including the decimal point (DPT), 9 x _ in case of underflow (gross or net value too small), 9 x - in case of overflow (gross or net value too large),
14	Separator	Separator as set with the TEX command
15 ... 18	yyyy	No standstill: 4 spaces At standstill: 4 characters with the unit defined by the ENU command
19	T	Separator as set with the TEX command

Character	Output	Explanation
20 … 28	zzzz.zzzz	Tara value (TAV) in 9 characters including decimal point (DPT)
29	Separator	Separator as set with the TEX command
30 … 36	bbbbbbb	Serial number of the sensor electronics (see also IDN, SNR), 7 characters
37	Separator	Separator as set with the TEX command
38 … 39	aa	Address of the sensor electronics (ADR) in 2 characters
40, 41	Separator/crlf	Separator or crlf

10.30.2 Formats COF16 ... COF31 for bus mode

Add 16 to the standard formats to obtain the relevant parameter for bus mode.

Then the sensor electronics switch to bus output mode: Each measured value is initially saved only in the output buffer. Output does not occur until you select the relevant sensor electronics with the S command.

Example

Command	`S98;`	Broadcast, selects all bus nodes.
Command	`COF18;`	Output as 2-byte binary value.
Command	`ICR0;`	Set highest sampling rate.
Command	`MSV?0;`	Start continuous measurement.
Command	`S01;`	Start output of the sensor electronics value with address 1.
Response	2-byte measured value	Load value (no crlf is set with MSV?0).
Command	`S02;`	Start output of the sensor electronics value with address 2.
Response	2-byte measured value	Load value.
...	...	...
Command	`STP;`	Terminate output.

10.30.3 Formats COF32 … COF47 without end label crlf

Add 32 to the standard formats to obtain the relevant parameter for output without end label crlf.

> The end label crlf is omitted in the binary output formats.

The sensor electronics switch to bus output mode with these parameters: Each measured value is initially saved only in the output buffer. Output does not occur until you select the relevant sensor electronics with the S command.
See also Formats COF16 … COF31 for bus mode.

10.30.4 Formats COF64 … COF79 for 2-wire bus mode

Add 32 to the standard formats to obtain the relevant parameter for output in 2-wire bus mode.

> Do not use the MSV?0 (continuous measurement) in this mode, otherwise it will no longer be possible to stop the measurement.

In this mode the sensor electronics do not respond to commands with `0 crlf` or `? crlf`. A response with the corresponding, for example `ASF03 crlf`, is given only for queries, such as ASF?.

10.30.5 Formats COF128 … COF143 for continuous output

Add 128 to the standard formats to obtain the relevant parameter for continuous output after a reset (RES command) or turning on the supply voltage again.

In this mode the sensor electronics send their measured values without requiring the MSV? command. Terminate sending with the STP command.

If a trigger is active (TRC command with parameter P1 = 1) the trigger result is sent *after triggering*.

Example

Command	`FMD2;ICR7;`	Sets the sensor electronics to an IIR low-pass filter and 4 measured values per second.
Command	`COF130;`	Sets the sensor electronics to output of 2-byte binary values and continuous output.
Command	`TDD1;`	Save settings.
Command	`RES;`	Reset sensor electronics. Output starts after reset. The measured values are spaced in time about every 250 ms.

10.31 CPV (Clear Peak Values)

Clears the peak value memories (minimum and maximum).
See also Peak values, PVS, PVA.

Use 0x7FFFFF as the parameter to send a command that does not use a parameter via CANopen or DeviceNet.
After the supply voltage is turned on again, peak values can also be cleared with the RES command.

No. of parameters	–
Factory setting	–
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

1) Only available if serial interfaces or PROFIBUS used.

Information about the command

Meaning		Clear peak value memory
Range/data		–
Data type		–
Access		*W* (Write only)
CANopen		Not available
DeviceNet	**Class**	100
	Instance	3
	Attribute	1

PROFIBUS	Slot	0
	Index	52

10.32 CRC (Cyclic Redundancy Check)

Sets or reads a value, for example a checksum for all parameters. This makes it possible for you to have the controller or PLC calculate a checksum for the relevant parameters and save them with CRC. Then you can detect any change in these parameters. To prevent changes by third parties, define both the method of calculation as well as the parameters involved so they cannot be guessed.

No. of parameters	1
Factory setting	–
Response time	<10 ms
Password protection[1)]	Yes
Disabled in legal-for-trade mode	Yes
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Save/read checksum
Range/data		-8,388,607 … 8,388,607
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2300*hex* (hexadecimal)
	Subindex	01*hex* (hexadecimal)

DeviceNet	**Class**	103
	Instance	1
	Attribute	1
PROFIBUS	**Slot**	0
	Index	122

10.33 CSM (Checksum)

Activates or deactivates generating of a checksum in the measured value status for the MSV command. The measured value status is only sent if you use the COF command with parameter P1 = 8, 9, 11 or 12 or these values plus 16, 32, 64 or 128. You can use the checksum to detect transmission errors with 4-byte output.

The command has no effect on the type of measured value status (simple/extended) when using CANopen. The output is always16-bit.
See also Measured value status, MAV, FRS.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Activates/deactivates checksum for measured value
Range/data		0 ... 2
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2600*hex* (hexadecimal)
	Subindex	08*hex* (hexadecimal)
DeviceNet	**Class**	130
	Instance	1
	Attribute	8
PROFIBUS	**Slot**	0
	Index	15

Meaning of values for P1

P1	Explanation
0	Checksum calculation is turned off and the measured value status is sent as is (sensor electronics up to and including *2nd generation* PW18i, AD101B, AD103B, AD104, AD105, some FIT electronics and C16i).
1	A checksum is calculated for each measured value and is sent instead of the measured value status.
2	Checksum calculation is turned off and the extended measured value status is sent (*3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics and newer sensor electronics). This setting also affects the ESR command.

10.34 CSN (Clear Dosing Results)

Clears dosing results. This sets the dosing counter NDS, cumulative weight memory SUM, mean value (SDM) and standard deviation (SDS) of the dosing results as well as the measured times (DST, CFT and FFT) to 0.
See also Filler.

Use 0x7FFFFFFF as the parameter to send a command that does not use parameters via CANopen or DeviceNet.

No. of parameters	–
Factory setting	–
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Information about the command

Meaning		Clear dosing results
Range/data		–
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*W* (Write only)
CANopen	**Index**	2230*hex* (hexadecimal)
	Subindex	02*hex* (hexadecimal)

DeviceNet	Class	102
	Instance	4
	Attribute	2
PROFIBUS	Slot	0
	Index	21

10.35 CTO (Zeroing Tolerance)

Sets or reads the limit for automatic zero balance during filling (zero balance tolerance). Zero balance is only performed if the current measured value is below this limit or if you set parameter P1 = 0.

See also Zero balance options for filling.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Limit for automatic zero balance
Range/data		0: Always zero 1: 10 digits in the unit of the selected weight 2: 20 digits in the unit of the selected weight 3: 50 digits in the unit of the selected weight 4: 100 digits in the unit of the selected weight 5: 250 digits in the unit of the selected weight
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2210*hex* (hexadecimal)
	Subindex	0C*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	2
	Attribute	12
PROFIBUS		Not available

10.36 CTR (Clear Trigger Results)

Clears the trigger results. This causes the counter for the number of trigger results (TRN), the trigger value (MAV) and memory for the mean value (TRM) and the standard deviation (TRS) of the trigger results to 0.
See also Trigger.

Use 0x7FFFFFFF as the parameter to send a command that does not use parameters via CANopen or DeviceNet.

No. of parameters	–
Factory setting	–
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Information about the command

Meaning		Clearing trigger results
Range/data		–
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*W* (Write only)
CANopen	**Index**	2020*hex* (hexadecimal)
	Subindex	02*hex* (hexadecimal)

DeviceNet	**Class**	100
	Instance	3
	Attribute	2
PROFIBUS	**Slot**	0
	Index	119

10.37 CWT (Calibration Weight)

Sets or reads the calibration weight for a partial range calibration. The value is given as a percentage of the nominal load (maximum capacity), where 100% corresponds to the value 1,000,000. So for a nominal load of 50 kg and a calibration weight of 30 kg (60%) enter 600,000. Set the nominal load with NOV.
See also Partial range calibration when calibrating with direct load, COF, DPT, LDW.

No. of parameters	2
Factory setting	1,000,000
Response time	<10 ms
Password protection[1)]	Yes
Disabled in Legal-For-Trade mode	Yes
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS are used.

Parameter P1

Meaning		Calibration weight for calibration in a partial load range
Range/data		Percentage of partial load * 10,000
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2110*hex* (hexadecimal)
	Subindex	01*hex* (hexadecimal)

DeviceNet	Class	101
	Instance	2
	Attribute	1
PROFIBUS	Slot	0
	Index	34

Parameter P2

Meaning		Calibration weight of the partial range calibration most recently performed
Range/data		Percentage of partial load * 10,000
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R* (Read only)
CANopen	Index	2110*hex* (hexadecimal)
	Subindex	02*hex* (hexadecimal)
DeviceNet	Class	101
	Instance	2
	Attribute	2
PROFIBUS		Not available

10.38 DGA (Diagnostic Activation)

Sets or reads activation of the diagnostic function. All entries for diagnostic functions are disabled as long as you have not activated diagnostics with this command.
See also DGL, DGN, DGR, DGS.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in Legal-For-Trade mode	No
Save parameters	–
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS are used.

Parameter P1

Meaning		Diagnostic function activated/deactivated
Range/data		0: Diagnostic function deactivated 1: Diagnostic function activated
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2700*hex* (hexadecimal)
	Subindex	01*hex* (hexadecimal)
DeviceNet	**Class**	140
	Instance	1
	Attribute	1

PROFIBUS	**Slot**	0
	Index	130

10.39 DGL (Diagnostic Trigger Level)

Sets or reads the trigger level for diagnostics. You must use the parameter P1 with values between 9 and 12 for the DGS command for the function to be active. The trigger level will not be considered for any other values.
See also DGA.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Diagnostic Trigger Level
Range/data		-8,388,607 ... 8,388,607
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2700*hex* (hexadecimal)
	Subindex	04*hex* (hexadecimal)

DeviceNet	Class	140
	Instance	1
	Attribute	4
PROFIBUS	Slot	0
	Index	132

10.40 DGN (Diagnostic Number)

Sets or reads the number of (filtered) measured values to be stored in diagnostic memory.

The currently gross or net measured value and the status (8 bits) in COF format with parameter P1 = 8 are recorded (measured value and status/checksum (CSM) in LSB).

See also DGA.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)/P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Number of measured values in diagnostic memory
Range/data		0: 64 values 1: 128 values 2: 256 values 3: 512 values From firmware P80: 4: 1024 values 5: 2048 values 6: 4096 values 7: 8192 values
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2700*hex* (hexadecimal)
	Subindex	02*hex* (hexadecimal)
DeviceNet	**Class**	140
	Instance	1
	Attribute	2
PROFIBUS	**Slot**	0
	Index	131

10.41 DGP (Diagnostic Buffer Pointer)

Sets or reads the pointer (index) to the data in the diagnostic memory. A subsequent command DGR reads the values as from this index; the command DWR writes starting from it.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in Legal-For-Trade mode	No
Save parameters	–
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Pointer/index to data in diagnostic memory
Range/data		0 ... 8191
Number of ASCII characters with serial interface		4
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2700*hex* (hexadecimal)
	Subindex	06*hex* (hexadecimal)
DeviceNet	**Class**	140
	Instance	1

	Attribute	6
PROFIBUS		Not available

10.42 DGR (Diagnostic Read)

Reads the specified value from diagnostic memory. The diagnostic status must be zero (query with DGS?), otherwise you will not be able to read any values.

The measured value and the status are sent in binary format as for COF8 (MSB … LSB). Including the end identifier (crlf), a total of 6 bytes are therefore sent for each measured value. The status contains the same information as for the MSV? command.

Default values are written to diagnostic memory before the start (-8,388,608 = 800000*hex* (hexadecimal)). You should therefore check the values when reading them in and discard measured values with this value. This can occur for example with a post-trigger if a trigger event has already ended immediately after the start of the save process before the selected number of measured values has been read.

Recording begins with address 0 and ends (except in the case of a post-trigger) with the address for the number of values - 1 (see DGN). The time interval at which the measured values are spaced depends on the settings for HSM, ICR and ASF.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning	Position of the diagnostic value to be read out
Range/data	0 … 8191

Number of ASCII characters with serial interface		4 (format COF8)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R* (Read only)
CANopen	Index	2700*hex* (hexadecimal)
	Subindex	07*hex* (hexadecimal)
DeviceNet	Class	140
	Instance	1
	Attribute	7
PROFIBUS	Slot	0
	Index	134

Intervals for measured values in ms in relation to ASF and HSM

ASF	HSM with P1 = 0	HSM with P1 = 1
0, 1	1000 * 2 * ICR / 600	1000 * ICR / 600
2	2000 * 2 * ICR / 600	2000 * ICR / 600
3	3000 * 2 * ICR / 600	3000 * ICR / 600
4	4000 * 2 * ICR / 600	4000 * ICR / 600
5	5000 * 2 * ICR / 600	5000 * ICR / 600
6	6000 * 2 * ICR / 600	6000 * ICR / 600
7	7000 * 2 * ICR / 600	7000 * ICR / 600
8	8000 * 2 * ICR / 600	8000 * ICR / 600
9	9000 * 2 * ICR / 600	9000 * ICR / 600

Use the set output rate as the number for this calculation in this command instead of ICR.

10.43 DGS (Diagnostic Start And Status)

This command sets conditions for the start of recording to diagnostic memory. Depending on the parameter, recording is also started. When you read the parameter, the status of recording or the selected recording condition is returned.

First turn on the diagnostic function (DGA) and specify the parameter for recording before the start: DGL, DGN.
The data rate depends on the selected filter setting and output rate, see HSM, FMD, ASF, ICR.

Read out the acquired values with DGR.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

1) Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning	Set the start of recording or recording parameters or read the status or recording parameters
Range/data	0 … 13
Number of ASCII characters with serial interface	2
Data type	*UINT8* (Unsigned Integer 8 bit)
Access	*R/W* (Read/Write)

CANopen	**Index**	2700*hex* (hexadecimal)
	Subindex	03*hex* (hexadecimal)
DeviceNet	**Class**	140
	Instance	1
	Attribute	3
PROFIBUS	**Slot**	0
	Index	133

Meaning of values for P1

P1	Function	Working method	Explanation
0	None	–	Function deactivated
1	Pre-trigger	Start recording immediately	Starting with the next measured value, all the values will be stored in the diagnostic memory until the selected number (DGN) has been reached
2	Pre-trigger	Start recording at the next trigger function trigger event	If you have activated the trigger function (TRC), then starting with the next trigger event, all the measured values will be stored in the diagnostic memory until the selected number (DGN) has been reached.
3	Post-trigger	Start immediately and stop at the next trigger event in the trigger function	If you have activated the trigger function (TRC), then starting with the next measured value, all the values will be stored in the diagnostic memory until a trigger event stops the recording.
4	Pre-trigger	Start recording from the start of batching (RUN) or on activation via IN2	After you have activated this batching function (IMD with parameter P1 = 2), starting with the next batch, all values will be saved to diagnostic memory until the selected number (DGN) has been reached.
5	Pre-trigger	Start recording from the beginning of coarse flow (batching)	After you have activated this batching function (IMD with parameter P1 = 2), starting with the next trigger event, all measured values will be saved to diagnostic memory until the selected number (DGN) has been reached.
6	Pre-trigger	Start recording from the end of coarse flow = fine flow (= start fine flow (batching))	After you have activated this batching function (IMD with parameter P1 = 2), starting with the next trigger event, all measured values will be saved to diagnostic memory until the selected number (DGN) has been reached.

P1	Function	Working method	Explanation
7	Pre-trigger	Start recording from the end of fine flow = residual flow (= start residual flow (batching))	After you have activated this batching function (IMD with parameter P1 = 2), starting with the next trigger event, all measured values will be saved to diagnostic memory until the selected number (DGN) has been reached.
8	Pre-trigger	Start recording from the beginning of emptying (batching)	After you have activated this batching function (IMD with parameter P1 = 2), starting with the next trigger event, all measured values will be saved to diagnostic memory until the selected number (DGN) has been reached.
9	Pre-trigger	Start recording when trigger level DGL has been exceeded	If you have activated the trigger function (TRC), then starting with the next trigger event, all the measured values will be stored in the diagnostic memory until the selected number (DGN) has been reached.
10	Pre-trigger	Start recording when the level has fallen below trigger level DGL	If you have activated the trigger function (TRC), then starting with the next trigger event, all the measured values will be stored in the diagnostic memory until the selected number (DGN) has been reached.
11	Post-trigger	Start recording immediately and stop when trigger level DGL has been exceeded	If you have activated the trigger function (TRC), then starting with the next measured value, all the values will be stored in the diagnostic memory until the trigger event occurs.

P1	Function	Working method	Explanation
12	Post-trig-ger	Start recording immediately and stop when the level has fallen below trigger level DGL	If you have activated the trigger function (TRC), then starting with the next measured value, all the values will be stored in the diagnostic memory until the trig-ger event occurs.
13	FastFilter trigger	Start recording when the filter is switched	Only possible in filter mode 3 (FMD with parameter P1 = 3): Two different filters are actually used in this mode, an “exact” filter and a “fast” one. As soon as the difference between two measured values exceeds a certain threshold, the fast filter is applied and record-ing starts.

10.44 DL1 (Delay Time 1)

Sets or reads delay time 1 for dosing when using OMD3. It is started after the fine flow (FFD) is turned off. After DL1 elapses, DL2 starts.
See also Filler.

In the output modes of OMD with parameter P1 <> 3, times DL1 and DL2 are simply wait times.

The residual flow status bit is already set during delay time 1, see also RFT.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P64.3 (electronics units with P64.3 see Firmware overview), P77.8 (electronics units with P77.8 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Delay time 1 for dosing
Range/data		0: Delay time 1 is deactivated 1 … 32,767: Delay time 1 is parameter P1 * 10 ms
Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2220*hex* (hexadecimal)
	Subindex	0B*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	3
	Attribute	11
PROFIBUS	**Slot**	0
	Index	127

10.45 DL2 (Delay Time 2)

Sets or reads delay time 2 for dosing when using OMD3. It is started after DL1 expires. At the end of delay time 2 the residual flow time (RFT) starts.
See also Filler.

In the output modes of OMD with parameter P1 <> 3, times DL1 and DL2 are simply wait times.

> The description below referring to the functions of digital outputs applies only to sensor electronics up to *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics and for *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics in compatibility mode (IOM command with parameter P1 = 0). For sensor electronics in *4th generation* FIT5A, FIT7A, PAD400x, PW15iA you can define the function of the digital outputs yourself with commands OM1 to OM6 (IOM command with parameter P1 = 1).

If you have selected the output mode of OMD with parameter P1 = 3, output mode OUT4 is activated while DL2 runs down. Activation is only useful if you set delay time 2 to greater than zero. Therefore output OUT4 is not activated for DL2 with parameter P1 = 0, independently of OMD.

> The residual flow status bit is already set during delay time 1, see also RFT.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P64.3 (electronics units with P64.3 see Firmware overview), P77.8 (electronics units with P77.8 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Delay time 2 for dosing
Range/data		0: Delay time 2 is deactivated 1 … 32,767: Delay time 2 is parameter P1 * 10 ms
Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2220*hex* (hexadecimal)
	Subindex	0C*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	3
	Attribute	12
PROFIBUS	**Slot**	0
	Index	128

10.46 DMD (Dosing Mode)

Sets or reads the type of batching: Upward batching, i.e. a container is filled or deduction batching, i.e. material is removed from a filled container (silo, tank). This command is only useful in dosing mode (IMD command with P1 = 2).

The descriptions below referring to the functions of digital inputs apply only to sensor electronics up to *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics and for *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics in compatibility mode (IOM command with parameter P1 = 0). For sensor electronics in *4th generation* FIT5A, FIT7A, PAD400x, PW15iA you can define the function of the digital inputs yourself with commands IM1 to IM2 (IOM command with parameter P1 = 1).

Deduction weighing involves the following special considerations

The parameter for the empty weight (EWT) has a new function: it determines the minimum weight that must be present in the container to start. If the empty weight is zero (deactivated, EWT with parameter P1 = 0), a start is only executed if the gross value is greater that the filling weight (FWT).

The general rule is:

gross value – FWT > EWT or gross value – FWT > 0

If this condition is not met, the dosing process does not start as there is insufficient material available to complete the deduction weighing process. The alarm output is activated if you have set bit 4 in the SDF in parameter P1.

If the condition is met, the batching process is started with taring. Taring is performed without additional conditions (taring range: 0 … NOV).

The ready signal is sent after checkweighing.

You can use the emptying function as a delay or wait time: EPT with parameter P1 = 1, EMD with parameter P1 = 0. In this case you should not connect an emptying valve to the “Emptying” output.

You can use fill flow monitoring (CBK, FBK) to detect clogging during the coarse and fine flow times.

Redosing (RDS with parameter P1 = 1)

If batching is interrupted before checkweighing (BRK command or via input IN1) and then restarted (RUN command or via input IN2), taring does not take place at the start. The batching process continues from the point at which it was interrupted (coarse flow or fine flow). The dosing process continues with checkweighing if the net weight at restart is above the lower tolerance limit (LTL).

If redosing is deactivated (RDS with parameter P1 = 0), each start is judged to be a new batching process process (starting with taring), regardless of whether the previous batching process was completed or interrupted.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Batching type
Range/data		0: Upward batching (filling a container) 1: Deduction weighing (removal from a container)
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2200*hex* (hexadecimal)
	Subindex	04*hex* (hexadecimal)

DeviceNet	**Class**	102
	Instance	1
	Attribute	4
PROFIBUS	**Slot**	0
	Index	98

10.47 DPT (Decimal Point)

Sets or reads the number of places after the decimal (position of the decimal point).

This command is only taken into consideration if you are using ASCII measurement output and you have set parameter P1 to 13 or 15 or to those values plus 32, 64 or 128 for the COF command.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection [1)]	Yes
Disabled in legal-for-trade mode	Yes
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

1) Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Number of places after the decimal
Range/data		0 … 6
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2110*hex* (hexadecimal)
	Subindex	03*hex* (hexadecimal)
DeviceNet	**Class**	101
	Instance	2
	Attribute	3

PROFIBUS	**Slot**	0
	Index	62

10.48 DPW (Define Password)

Sets the password for all password-protected settings (password protection = Yes).
See also SPW.
All visible characters are permitted except for quotation marks. The maximum length of the password is 7 characters.

Password entry is case-sensitive. Password protection is only in effect when the serial interfaces and PROFIBUS are used.

No. of parameters	–
Factory setting	AED
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

1) Only available if serial interfaces or PROFIBUS used.

Information about the command

Meaning		Define password
Range/data		–
Data type		ASCII characters, maximum 7 characters
Access		*W* (Write only)
CANopen	**Index**	2FFF*hex* (hexadecimal)
	Subindex	04*hex* (hexadecimal)
DeviceNet		Not available
PROFIBUS	**Slot**	0
	Index	100

10.49 DST (Dosing Time)

Reads the time required for the last batching.

The time required for each batching process is saved. Time recording starts with RUN or when it is started via a digital input and ends with the ready signal. The previous dosing time is overwritten.

Dosing time is not updated if batching has been interrupted with a break or an error, etc.

The CSN command or a reset (RES) both clear the dosing time.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Time required for the last batching
Range/data		0 … 32,767; the dosing time is parameter P1 * 100 ms
Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R* (Read only)
CANopen	**Index**	2230*hex* (hexadecimal)
	Subindex	03*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	4
	Attribute	3
PROFIBUS	**Slot**	0
	Index	105

10.50 DT1 (Delay Time Output 1)

The description below referring to the functions of digital outputs applies only to sensor electronics up to *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics and for *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics in compatibility mode (IOM command with parameter P1 = 0). For sensor electronics in *4th generation* FIT5A, FIT7A, PAD400x, PW15iA you can define the function of the digital outputs yourself with commands OM1 to OM6 (IOM command with parameter P1 = 1).

Sets or reads the delay time of digital output OUT1.

The functionality is activated with the LIV1 command with parameter 2 > 2 and parameter 3 = 2. After calculation of the trigger result (MAV) delay time DT1 (parameter P1 * 10 ms) starts. When the delay time has elapsed, time AT1 starts. Output OUT1 is active during this time. If you use parameter P1 = 0 for the AT1 command, the function is deactivated.

The delay can be used for example to drive a sorting unit in order to sort out parts that do not fall within the required tolerance range.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P64.4 (electronics units with P64.4 see Firmware overview), P77.9 (electronics units with P77.9 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Delay time 1
Range/data		0 … 32,767; the delay time is parameter P1 * 10 ms
Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2030*hex* (hexadecimal)
	Subindex	15*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	4
	Attribute	21
PROFIBUS	**Slot**	0
	Index	176

10.51 DT2 (Delay Time Output 2)

The description below referring to the functions of digital outputs applies only to sensor electronics up to *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics and for *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics in compatibility mode (IOM command with parameter P1 = 0). For sensor electronics in *4th generation* FIT5A, FIT7A, PAD400x, PW15iA you can define the function of the digital outputs yourself with commands OM1 to OM6 (IOM command with parameter P1 = 1).

Sets or reads the delay time of digital output OUT2.

The functionality is activated with the LIV2 command with parameter 2 > 2 and parameter 3 = 2. After calculation of the trigger result (MAV) delay time DT2 (parameter P1 * 10 ms) starts. When the delay time has elapsed, time AT2 starts. Output OUT2 is active during this time. If you use parameter P1 = 0 for the AT2 command, the function is deactivated.

The delay can be used for example to drive a sorting unit in order to sort out parts that do not fall within the required tolerance range.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P64.4 (electronics units with P64.4 see Firmware overview), P77.9 (electronics units with P77.9 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Delay time 2
Range/data		0 … 32,767; the delay time is parameter P1 * 10 ms
Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2030*hex* (hexadecimal)
	Subindex	16*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	4
	Attribute	22
PROFIBUS	**Slot**	0
	Index	177

10.52 DT3 (Delay Time Output 3)

The description below referring to the functions of digital outputs applies only to sensor electronics up to *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics and for *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics in compatibility mode (IOM command with parameter P1 = 0). For sensor electronics in *4th generation* FIT5A, FIT7A, PAD400x, PW15iA you can define the function of the digital outputs yourself with commands OM1 to OM6 (IOM command with parameter P1 = 1).

Sets or reads the delay time of digital output OUT3.

The functionality is activated with the LIV3 command with parameter 2 > 2 and parameter 3 = 2. After calculation of the trigger result (MAV) delay time DT3 (parameter P1 * 10 ms) starts. When the delay time has elapsed, time AT3 starts. Output OUT3 is active during this time. If you use parameter P1 = 0 for the AT3 command, the function is deactivated.

The delay can be used for example to drive a sorting unit in order to sort out parts that do not fall within the required tolerance range.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P64.4 (electronics units with P64.4 see Firmware overview), P77.9 (electronics units with P77.9 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Delay time 3
Range/data		0 … 32,767; the delay time is parameter P1 * 10 ms
Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2030*hex* (hexadecimal)
	Subindex	17*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	4
	Attribute	23
PROFIBUS	**Slot**	0
	Index	178

10.53 DT4 (Delay Time Output 4)

The description below referring to the functions of digital outputs applies only to sensor electronics up to *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics and for *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics in compatibility mode (IOM command with parameter P1 = 0). For sensor electronics in *4th generation* FIT5A, FIT7A, PAD400x, PW15iA you can define the function of the digital outputs yourself with commands OM1 to OM6 (IOM command with parameter P1 = 1).

Sets or reads the delay time of digital output OUT4.

The functionality is activated with the LIV4 command with parameter 2 > 2 and parameter 3 = 2. After calculation of the trigger result (MAV) delay time DT4 (parameter P1 * 10 ms) starts. When the delay time has elapsed, time AT4 starts Output OUT4 is active during this time. If you use parameter P1 = 0 for the AT4 command, the function is deactivated.

The delay can be used for example to drive a sorting unit in order to sort out parts that do not fall within the required tolerance range.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P64.4 (electronics units with P64.4 see Firmware overview), P77.9 (electronics units with P77.9 see Firmware overview)

[1] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Delay time 4
Range/data		0 … 32,767; the delay time is parameter P1 * 10 ms
Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2030*hex* (hexadecimal)
	Subindex	18*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	4
	Attribute	24
PROFIBUS	**Slot**	0
	Index	179

10.54 DWE (Diagnosis Buffer Enable)

Sets or reads whether measured values are simulated.
See also DWR.

No. of parameters	1
Factory setting	2
Response time	<10 ms
Password protection[1)]	No
Disabled in Legal-For-Trade mode	No
Save parameters	–
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Controls the simulation of measured values
Range/data		0: Simulation deactivated 1: Enables the diagnostic memory for writing via the interface (DWR) 2: Starts a simulation cycle. At the end of the cycle, DWE is reset to 0.
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2450*hex* (hexadecimal)
	Subindex	11*hex* (hexadecimal)

DeviceNet	**Class**	110
	Instance	6
	Attribute	17
PROFIBUS		Not available

10.55 DWR (Write Diagnostic Byte)

Writes a value to the diagnostic memory as soon as writing is enabled with the command DWE1. The write pointer is automatically increased after writing.
See also DWE.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1] Only available if serial interfaces are used.

Parameter P1

Meaning		Write specified value (bytes) to diagnostic memory
Range/data		-9,999,999 ... 9,999,999
Number of ASCII characters with serial interface		10
Data type		*SINT32* (Signed Integer 32 bit)
Access		*W* (Write only)
CANopen	**Index**	2450*hex* (hexadecimal)
	Subindex	12*hex* (hexadecimal)
DeviceNet	**Class**	110
	Instance	6

	Attribute	18
PROFIBUS		Not available

10.56 DZB (Automatic Zeroing Band)

Sets or reads the size of the range in plus and minus direction around the zero value within which the values are used for automatic zeroing. The total bandwidth is twice the range.

See also Automatic zeroing, DZC, DZH, DZM, DZT, ZMD

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	Yes
Disabled in legal-for-trade mode	Yes
Save parameters	TDD1
Available starting with firmware version	P81 (electronics units with P81 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS are used.

Parameter P1

Meaning		Range in plus and minus direction for automatic zeroing
Range/data		0 … 20,000
Number of ASCII characters with serial interface		5
Data type		*UINT32* (Unsigned Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2010*hex* (hexadecimal)
	Subindex	18*hex* (hexadecimal)

DeviceNet	Class	100
	Instance	2
	Attribute	24
PROFIBUS		Not available

10.57 DZC (Automatic Zeroing Count)

Sets or reads the number of values used for automatic zeroing.

See also Automatic zeroing, DZB, DZH, DZM, DZT, ZMD

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection [1)]	Yes
Disabled in legal-for-trade mode	Yes
Save parameters	TDD1
Available starting with firmware version	P81 (electronics units with P81 see Firmware overview)

1) Only available if serial interfaces or PROFIBUS are used.

Parameter P1

Meaning		Number of values for automatic zeroing
Range/data		0 … 100,000
Number of ASCII characters with serial interface		6
Data type		*UINT32* (Unsigned Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2010*hex* (hexadecimal)
	Subindex	19*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	2
	Attribute	25
PROFIBUS		Not available

10.58 DZH (Automatic Zeroing Hold-off)

Sets or reads the hold-off time for automatic zeroing. Measured values acquired during this time before exiting the bandwidth (DZB) or after entering the bandwidth are not taken into account when calculating the zero value.
See also Automatic zeroing, DZB, DZC, DZM, DZT, ZMD

No. of parameters	1
Factory setting	10
Response time	<10 ms
Password protection[1)]	Yes
Disabled in legal-for-trade mode	Yes
Save parameters	TDD1
Available starting with firmware version	P81 (electronics units with P81 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS are used.

Parameter P1

Meaning		Hold-off time for inclusion of values for automatic zeroing
Range/data		0 … 1000; Time in ms
Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2010*hex* (hexadecimal)
	Subindex	17*hex* (hexadecimal)

DeviceNet	**Class**	100
	Instance	2
	Attribute	23
PROFIBUS		Not available

10.59 DZM (Automatic Zeroing Mode)

Sets or reads the setting for stopping automatic zeroing.
See also Automatic zeroing, DZB, DZC, DZH, DZT, ZMD

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	Yes
Disabled in legal-for-trade mode	Yes
Save parameters	TDD1
Available starting with firmware version	P81 (electronics units with P81 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS are used.

Parameter P1

Meaning		Method of stopping automatic zeroing
Range/data		0: Compatibility mode 1: Counter control 2: Time control; the time specified by DZT is used
Number of ASCII characters with serial interface		1
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2010*hex* (hexadecimal)
	Subindex	16*hex* (hexadecimal)

DeviceNet	**Class**	100
	Instance	2
	Attribute	22
PROFIBUS		Not available

10.60 DZT (Dynamic Zero Tracking/Automatic Zeroing Time)

Sets or reads the settings for Zero tracking or the Automatic zeroing function (available from firmware P81). Only one of the two functions can be used.

See also CDL, DZB, DZC, DZH, DZM, ZMD, ZSE

The unit d (digit) for parameter P2 relates to the nominal value (NOV).

For NOV with parameter P1 = 0 or P1 > 100,000, the correction is always made with a setting of 0.5 d/s relative to 100,000 d. For example, if P1 = 1,000,000 the correction is made with 5 d/s.

No. of parameters	2
Factory setting	0
Response time	<10 ms
Password protection[1)]	Yes
Disabled in legal-for-trade mode	Yes
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS are used.

Parameter P1

Meaning	Time for mean-value calculation during dynamic zero tracking or automatic zeroing
Range/data	0 … 100; time in seconds
Number of ASCII characters with serial interface	3
Data type	*UINT8* (Unsigned Integer 8 bit)
Access	*R/W* (Read/Write)

CANopen	Index	2010*hex* (hexadecimal)
	Subindex	0A*hex* (hexadecimal)
DeviceNet	Class	100
	Instance	2
	Attribute	10
PROFIBUS	Slot	0
	Index	160

Parameter P2

Meaning		Range for dynamic zero tracking
Range/data		0: ±1 d 1: ±2 d 2: ±5 d 3: ±10 d 4: ±20 d
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	Index	2010*hex* (hexadecimal)
	Subindex	04*hex* (hexadecimal)
DeviceNet	Class	100
	Instance	2
	Attribute	4
PROFIBUS	Slot	0
	Index	161

10.61 EMA (Event Mask A)

You can use the EMA and EMB to define event masks to generate an alarm status for the CANopen and DeviceNet interfaces (send PDO 5) if the defined status or error occurs.
See also Alarm status (event mask)

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Event mask A
Range/data		0 … 4,294,967,296
Number of ASCII characters with serial interface		10
Data type		*UINT32* (Unsigned Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2500*hex* (hexadecimal)
	Subindex	04*hex* (hexadecimal)
DeviceNet	**Class**	120
	Instance	1

	Attribute	5
PROFIBUS		Not available

10.62 EMB (Event Mask B)

You can use the EMA and EMB to define event masks to generate an alarm status for the CANopen and DeviceNet interfaces (send PDO 5) if the defined status or error occurs. See also Alarm status (event mask)

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Event mask B
Range/data		0 … 4,294,967,296
Number of ASCII characters with serial interface		10
Data type		*UINT32* (Unsigned Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2500*hex* (hexadecimal)
	Subindex	05*hex* (hexadecimal)
DeviceNet	**Class**	120
	Instance	1

	Attribute	6
PROFIBUS		Not available

10.63 EMD (Emptying Mode)

Sets or reads the emptying mode.

The description below referring to the functions of digital outputs applies only to sensor electronics up to *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics and for *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics in compatibility mode (IOM command with parameter P1 = 0). For sensor electronics in *4th generation* FIT5A, FIT7A, PAD400x, PW15iA you can define the function of the digital outputs yourself with commands OM1 to OM6 (IOM command with parameter P1 = 1).

You can use the emptying time command (EPT with parameter P1 > 0) to activate emptying. Emptying occurs immediately after checkweighing. Then output OUT3 is activated to control emptying and automatically switches to the gross measurement value. Emptying is considered complete (OUT3 is deactivated) if the gross value is below the emptying limit EWT in weight-controlled emptying mode or (in both modes) if the emptying time (EPT) is exceeded. Time monitoring starts when output OUT3 is activated. If this emptying time is exceeded, output OUT3 is deactivated, regardless of whether or not the scaleis empty. After emptying finishes, the ready signal is set in the dosing status (SDO).

1. Time-controlled emptying (EMD with parameter P1 = 0)
   The emptying time parameter alone determines the period of activation for output OUT3.
2. Weight-controlled emptying (EMD with parameter P1 = 1)
   The parameter EWT is used as the emptying limit. The emptying time EPT is also used as a maximum duration.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No

Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Emptying mode
Range/data		0: Timer-controlled emptying 1: Weight-controlled emptying
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2200*hex* (hexadecimal)
	Subindex	05*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	1
	Attribute	5
PROFIBUS	**Slot**	0
	Index	97

10.64 ENU (Engineering Unit)

Sets or reads the physical unit.

If you enter fewer than four characters, blanks are added to the input. The unit that is entered is only appended to the measured value in certain types of output or output formats (COF command).

No. of parameters	1
Factory setting	""
Response time	<10 ms
Password protection[1)]	Yes
Disabled in legal-for-trade mode	Yes
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Unit
Range/data		–
Data type		Text (ASCII), 4 characters
Access		*R/W* (Read/Write)
CANopen	**Index**	2520*hex* (hexadecimal)
	Subindex	04*hex* (hexadecimal)
DeviceNet	**Class**	120
	Instance	1
	Attribute	4
PROFIBUS	**Slot**	0
	Index	102

10.65 EPT (Emptying Time)

Sets or reads the emptying time
See also DMD.

The description below referring to the functions of digital outputs applies only to sensor electronics up to *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics and for *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics in compatibility mode (IOM command with parameter P1 = 0). For sensor electronics in *4th generation* FIT5A, FIT7A, PAD400x, PW15iA you can define the function of the digital outputs yourself with commands OM1 to OM6 (IOM command with parameter P1 = 1).

You can activate an emptying time with parameter P1 > 0. Emptying occurs immediately after checkweighing. Then output OUT3 is activated to control emptying and automatically switches to the gross measurement value. Emptying is considered complete (OUT3 is deactivated) if the gross value is below the emptying limit EWT in *weight-controlled* emptying mode (EMD with parameter P1 = 1) or (in both modes) if the emptying time (EPT) is exceeded. Time monitoring starts when output OUT3 is activated. If this emptying time is exceeded, output OUT3 is deactivated, regardless of whether or not the scaleis empty. After emptying finishes, the ready signal is set in the dosing status (SDO).
If emptying is deactivated, output OUT3 works as a ready signal: It is active after checkweighing and is not reset until the next start.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Emptying time
Range/data		0: Emptying deactivated 1 ... 32,767: The emptying time is parameter P1 * 10 ms
Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2220*hex* (hexadecimal)
	Subindex	02*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	3
	Attribute	2
PROFIBUS	**Slot**	0
	Index	85

10.66 ERR (Extended Error Status)

Reads the extended error status.
See also ESR.

No. of parameters	–
Factory setting	–
Response time	<10 ms
Password protection[1]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1] Only available if serial interfaces are used.

Information about the command

Meaning		Extended error status
Range/data		See table
Number of ASCII characters with serial interface		10
Data type		*UINT32* (Unsigned Integer 32 bit)
Access		*R* (Read only)
CANopen	**Index**	2000*hex* (hexadecimal)
	Subindex	12*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	1
	Attribute	18
PROFIBUS		Not available

Meaning of the status bits

Bit	Description
21	System error: Parameter memory faulty
20	Reserved
19	Reserved
18	Fewer than 5 values present for MAV
17	Taring error (TAR)
16	Error during zero tracking, deviation > 2% (ZTR, DZT)
15	Error during zero balance (CDL)
14	Error during zero on start-up (ZSE)
13	Calibration counter overflow (TCR)
12	Calibration time exceeded
11	Reserved
10	Drift tolerance for zero point of factory characteristic curve exceeded
09	Temperature too high
08	Reserved
07	Drift error compared to the last measurement with the LWT command
06	Drift error compared to the last measurement with the LDW command
05	Drift error compared to the last measurement with the SFA command
04	Drift error compared to the last measurement with command SZA
03	There is a new peak value (maximum)
02	There is a new peak value (minimum)
01	A sensor overflow occurred (SOV value changed)
00	An A/D converter overflow (ADU-Overflow) occurred (AOV value changed)

10.67 ESR (Error Status)

Reads the error status.
See also ERR.

The status corresponds to the error messages defined in the IEC status and is sent as a 3-digit decimal number. Errors that occurred are linked by logical OR (add the individual value from the tables). The content is influenced by the CSM command.

The status is cleared after the supply voltage is turned on, after a read process or by the RES command.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning	Status query
Range/data	0 … 255
Number of ASCII characters with serial interface	3
Data type	*UINT8* (Unsigned Integer 8 bit)
Access	*R* (Read only)

CANopen	**Index**	2000*hex* (hexadecimal)
	Subindex	07*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	1
	Attribute	7
PROFIBUS	**Slot**	0
	Index	18

Meaning of the values for P1 with simple error status (CSM with parameter P1 = 0 or P1 = 1)

Bit no.	Value	Explanation
5	32	0: No error 1: Command error (command not available)
4	16	0: No error 1: Execution error (error on parameter input)
3	8	0: No error 1: Device-dependent error (hardware error, e.g. memory error)
2	4	Not in use
1	2	Not in use
0	1	Not in use

Meaning of the values for P1 with extended error status (CSM with parameter P1 = 2)

Bit no.	Value	Explanation
7	128	0: No error 1: Error in the measurement output via UART error (baud rate too slow for the set sampling rate)
6	64	0: No error 1: Communication error (Break, Parity, CRC)
5	32	0: No error 1: Error in digital outputs (overtemperature, output current too high, etc.)
4	16	0: No error 1: Parameter input error: Parameter outside of the permitted range or unknown command
3	8	0: No error 1: Error, bridge excitation voltage too low
2	4	0: No error 1: Error in parameter memory
1	2	0: No error 1: A/D converter (ADU) overflow/underflow
0	1	0: No error 1: Gross or net overflow/underflow

10.68 EWT (Empty Weight)

Sets or reads the empty weight.

The empty weight indicates the weight up to which the scale is defined as being empty, in other words, the weight up to which taring can occur. If a container has a weight above this empty weight after the start (RUN container or IN2) empty weight, the container cannot be tared. Instead it is only filled according to weight with coarse or fine flow.

If the empty weight is zero and taring is set at the start (TMD with parameter P1 > 1), each weight smaller than the coarse flow cut-off point is tared after the start (CFD).

For NOV (maximum capacity) with parameter P1 greater than zero, the maximum capacity is indicated as a percentage rate. This means that with a maximum capacity of 50,000 and an empty weight of 60%, the value is 30,000.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

1) Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning	Emptying tolerance
Range/data	0 … 1,599,999 for NOV with parameter P1 = 0, otherwise 0 … 160% of NOV
Number of ASCII characters with serial interface	8 (7 digits with sign)
Data type	*SINT32* (Signed Integer 32 bit)

Access		*R/W* (Read/Write)
CANopen	**Index**	2210*hex* (hexadecimal)
	Subindex	03*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	2
	Attribute	3
PROFIBUS	**Slot**	0
	Index	79

10.69 FBK (Fine Flow Monitoring)

Sets or reads the value for increase in weight during the fine flow phase.

This command is used for breakage monitoring during the fine flow phase (sack breakage). Enter the increase in the weight you expect per time interval (FBT) for a normal filling process. After the lockout time for the fine flow (LTF), elapses, the increase is checked after every time interval (FBT). If the increase in weight is *not* exceeded, this is interpreted as breakage in the container that is being filled and batching is canceled no later than 1.6 ms after the check. Fill flow monitoring of the fine flow is deactivated after the fine flow cut-off point (FFD) is reached.

For NOV (maximum capacity) with parameter P1 greater than zero, the value is indicated as a percentage rate. This means that with a maximum capacity of 50,000 and an interval (differential weight) of 6%, the value is 3000.

See also Filler, CBK.

When the filling weight (FWT) is entered, monitoring is automatically deactivated (parameter P1 = 0).

Choose an increase in weight that is greater than the fluctuations caused by the material escaping during the filling process.

The description below referring to the functions of digital outputs applies only to sensor electronics up to *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics and for *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics in compatibility mode (IOM command with parameter P1 = 0). For sensor electronics in *4th generation* FIT5A, FIT7A, PAD400x, PW15iA you can define the function of the digital outputs yourself with commands OM1 to OM6 (IOM command with parameter P1 = 1).

When a break is detected:

- Coarse flow and fine flow are deactivated.
- Bit 7 (Alarm) is set to 1 in dosing status (SDO).
- If bit 1 is set for special monitoring functions (SDF), an alarm is generated.
- Output OUT6 is activated for OMD with parameter P1 = 0
- Dosing control goes to stop status.

Then you can use Start to continue the batching process (this leaves out the optimization calculation) or end batching with Break.

Reasons for breakage during fine flow:

- The actual buildup of material is less than the given limit value.
- No material is received because the filling stud is clogged.
- The lockout time for the fine flow assessment setting (LTF) is too short and therefore material does not arrive until fill flow monitoring is already active
- The container is no good or not available.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning	Differential weight for breakage monitoring with fine flow
Range/data	0: Deactivated 1 … 1,599,999 for NOV with parameter P1 = 0, otherwise 0 … 160% of NOV
Number of ASCII characters with serial interface	8 (7 digits with sign)
Data type	*SINT32* (Signed Integer 32 bit)
Access	*R/W* (Read/Write)

CANopen	**Index**	2210_{hex} (hexadecimal)
	Subindex	04_{hex} (hexadecimal)
DeviceNet	**Class**	102
	Instance	2
	Attribute	4
PROFIBUS	**Slot**	0
	Index	76

10.70 FBT (Fine Break Time)

Sets or reads the time interval for the increase in weight during fine flow monitoring.

If you set parameter P1 = 0, a time interval of 100 ms is used. Monitoring starts after the lockout time for fine flow (LTF). It is deactivated after the fine flow cut-off point (FFD) is reached. The differential weight (FBK) must be greater than zero, otherwise there will be no check.

See also Filler, Fine flow.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

1) Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Time interval for fine flow monitoring
Range/data		0: The time interval is 100 ms (independently of HSM) 1 ... 32,767: The monitoring time is parameter P1 * 10 ms
Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2220*hex* (hexadecimal)
	Subindex	03*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	3
	Attribute	3
PROFIBUS	**Slot**	0
	Index	93

10.71 FFD (Fine Flow Disconnect)

Sets or reads the fine flow cut-off point. When you enter a filling weight (FWT), the fine flow cut-off point is automatically set to 95% of the filling weight. For NOV (maximum capacity) with parameter P1 greater than zero, the maximum capacity is indicated as a percentage rate. This means that with a maximum capacity of 50,000 and a fine flow cut-off point 60%, the value is 30,000.

> **i** You cannot set the fine flow cut-off point to less than the coarse flow cut-off point. If you try to do this, the coarse flow cut-off point will automatically be set to the value of the fine flow cut-off point – minimum fine flow (FFM).

If optimization is activated (OSN with parameter P1 > 0), the fine flow cut-off point is tracked automatically. When the filling weight is entered (FWT), the fine flow cut-off point is automatically set to 95% of the filling weight.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning	Fine flow cut-off point
Range/data	0 ... 1,200,000 for NOV with parameter P1 = 0, otherwise 0 ... 120% of NOV
Number of ASCII characters with serial interface	8 (7 digits with sign)

Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2210_{hex} (hexadecimal)
	Subindex	05_{hex} (hexadecimal)
DeviceNet	**Class**	102
	Instance	2
	Attribute	5
PROFIBUS	**Slot**	0
	Index	72

10.72 FFL (First Fine Flow Time)

Sets or reads the duration for an initial fine flow phase before the coarse flow.

The function is not active with deduction weighing (DMD with parameter P1 = 1).

The fine flow signal is activated for the set time after the start or after taring and before the coarse flow for the set duration. You can also use this additional fine flow time before the coarse flow to prevent the coarse flow causing excessive foaming in the liquid being filled.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Duration of fine flow phase before coarse flow
Range/data		0: The fine flow phase is deactivated 1 … 32,767: The fine flow phase continues parameter P1 * 10 ms
Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2220*hex* (hexadecimal)
	Subindex	0A*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	3
	Attribute	10
PROFIBUS	**Slot**	0
	Index	95

10.73 FFM (Fine Feed Minimum)

Sets or reads the minimum fine flow amount.

The minimum fine flow amount determines how close the coarse flow cut-off point can be taken to the fine flow cut-off point. This means that when the fill material has pieces, you can set the coarse flow to fine flow interval in such a way that fine flow will run in all cases. When the fill material has pieces, set the minimum fine flow amount setting to slightly more than the heaviest piece. For NOV (maximum capacity) with parameter P1 greater than zero, the maximum capacity is indicated as a percentage rate. This means that with a maximum capacity of 50,000 and a minimum fine flow amount of 6%, the value is 3000.

i To obtain the most consistent dosing result possible, you should set the minimum fine flow amount in such a way that the batching process always ends with fine flow.

The coarse flow cut-off point cannot be set to less than 0, even if you set the minimum fine flow amount to greater than the fine flow cut-off point (FFD). When the filling weight is entered (FWT), the minimum fine flow amount is automatically set to 1% of the filling weight.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Minimum fine flow component
Range/data		0 ... 1,200,000 for NOV with parameter P1 = 0, otherwise 0 ... 120% of NOV
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	Index	2210*hex* (hexadecimal)
	Subindex	06*hex* (hexadecimal)
DeviceNet	Class	102
	Instance	2
	Attribute	6
PROFIBUS	Slot	0
	Index	78

10.74 FFT (Fine Flow Time)

Reads out the fine flow duration.

The duration of the fine flow is recorded for each batching process (query with `FFT?;`). Recording of time starts when fine flow is turned on and ends when it is turned off. Therefore it also includes the lockout time for fine flow (LTF). With each new ready signal the current duration is set as the duration for the next process.
See also Filler.

Notes

- The fine flow duration is not updated if batching has been interrupted with a break (BRK) or an error.
- Commands CSN (clear dosing result) and RES (reset) clear the fine flow duration.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning	Fine flow duration
Range/data	0 … 32,767: The fine flow duration is parameter P1 * 10 ms
Number of ASCII characters with serial interface	5

<table>
<tr><td colspan="2">Data type</td><td>UINT16 (Unsigned Integer 16 bit)</td></tr>
<tr><td colspan="2">Access</td><td>R (Read only)</td></tr>
<tr><td rowspan="2">CANopen</td><td>Index</td><td>2230hex (hexadecimal)</td></tr>
<tr><td>Subindex</td><td>04hex (hexadecimal)</td></tr>
<tr><td rowspan="3">DeviceNet</td><td>Class</td><td>102</td></tr>
<tr><td>Instance</td><td>4</td></tr>
<tr><td>Attribute</td><td>4</td></tr>
<tr><td rowspan="2">PROFIBUS</td><td>Slot</td><td>0</td></tr>
<tr><td>Index</td><td>59</td></tr>
</table>

10.75 FLO (Flow Rate)

Reads the current flow rate.

You can set the time base for determining the flow rate with the FRT command.

No. of parameters	–
Factory setting	–
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Information about the command

Meaning		Flow rate
Range/data		0 … 1,599,999,999
Number of ASCII characters with serial interface		10
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R* (Read only)
CANopen	**Index**	2000_{hex} (hexadecimal)
	Subindex	14_{hex} (hexadecimal)
DeviceNet	**Class**	100
	Instance	1
	Attribute	20
PROFIBUS		Not available

10.76 FMD (Filter Mode)

Sets or reads the filter mode (digital filter).
See also Filter mode.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in Legal-For-Trade mode	No
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

1) Only available if serial interfaces or PROFIBUS are used.

Parameter P1

Meaning		Filter mode
Range/data		0: Standard filter (IIR 2nd order low-pass filter) 1: 3-stage fast-settling digital filter (FIR low-pass filter) 2: IIR 8th order low-pass filters 3: Fast-settling digital filter (IIR 4th order low-pass filter) 4: Fast-settling digital filter (FIR low-pass filter, settling time <100 ms); as from P80 plus mean value calculation (MAC) as with P1 = 5 5 (from P77.9): Fast-settling digital filter (FIR low-pass filter, settling time <250 ms, as with P1 = 4) plus mean value calculation (MAC); the parameter is no longer necessary as from P80, and has been retained for compatibility reasons.
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2010*hex* (hexadecimal)
	Subindex	05*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	2
	Attribute	5
PROFIBUS	**Slot**	0
	Index	42

10.77 FNB (Dosing Parameter Set)

Reads the parameter set number of the last batching performed.
See also RDP.

No. of parameters	–
Factory setting	–
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Information about the command

Meaning		Parameter set number of the batching most recently performed
Range/data		0 … 31
Number of ASCII characters with serial interface		2
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R* (Read only)
CANopen	**Index**	2200*hex* (hexadecimal)
	Subindex	0D*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	1
	Attribute	13

PROFIBUS	Slot	0
	Index	106

10.78 FPT (Time Base Fine Flow Prediction)

Sets or reads the time interval for fill flow prediction. Monitoring detects a change in the material flow rate based on the most recent filling processes. If the fine flow is stronger or weaker, the fine flow cut-off point is moved to a lower or higher value so that not too much or too little material will be added in the residual flow phase.
See also Fine flow.
Specify a longer time interval for the fine flow prediction if brief interference peak may occur during the filling process.

When fine flow prediction is activated, automatic optimization (OSN) of the fine flow cut-off point is deactivated.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P78.3 (electronics units with P78.3 see Firmware overview)

1) Only available if serial interfaces are used.

Parameter P1

Meaning		Time interval for fine flow prediction
Range/data		0: Fine flow prediction deactivated 1 … 32,767: The time interval is parameter P1 * 10 ms
Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	Index	2220*hex* (hexadecimal)
	Subindex	0D*hex* (hexadecimal)
DeviceNet	Class	102
	Instance	3
	Attribute	13
PROFIBUS		Not available

10.79 FRS (Filling Result)

Reads the measured value and status of the last batching process.
See also SDO.

No. of parameters	2
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Measured value of the last batching process
Range/data		-1,638,399 … 1,638,399
Number and type of characters for the serial interface		Depends on COF
Data type otherwise		*SINT32* (Signed Integer 32 bit)
Access		*R* (Read only)
CANopen	**Index**	2000*hex* (hexadecimal)
	Subindex	05*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	1
	Attribute	5

PROFIBUS	Slot	0
	Index	22

Parameter P2

Meaning		Status of the last batching process
Range/data		0 … 65,535
Number and type of characters for the serial interface		Depends on COF
Data type otherwise		*UINT16* (Unsigned Integer 16 bit)
Access		*R* (Read only)
CANopen	Index	2000*hex* (hexadecimal)
	Subindex	06*hex* (hexadecimal)
DeviceNet	Class	100
	Instance	1
	Attribute	6
PROFIBUS	Slot	0
	Index	22

Meaning of the values for P1 with simple dosing status (CSM with parameter P1 = 0)

Bit	Meaning when bit is set (= 1)
7	Alarm dependent on SDF function: If an alarm bit of the monitor functions is activated, this bit and output OUT4 will be activated (see also OMD). This bit and OUT4 are reset when – there is no more overflow, – the BRK command is sent, – the digital input for Stop filling is set, – the next RUN command is sent.
6	Ready signal for batching (FRS can be read out) or emptying active
5	Fine flow active

Bit	Meaning when bit is set (= 1)
4	Coarse flow active
3	Standstill (MTD)
2	A/D converter (ADU) overflow/underflow
1	Gross overflow (e.g. scaling too sensitive)
0	Net overflow (e.g. tare value too high)

Meaning of the values for P1 with extended dosing status (CSM with parameter P1 = 2)

Bit	Meaning when bit is set (= 1)
7	Error, see ESR
6	Alarm output active (SDF)
5	Fill flow active, see also CBK, FBK
4	Emptying active, see also EWT
3	Redosing active, see also RDS
2	Batching ready signal (FRS can be read out)
1	Fine flow active
0	Coarse flow active

10.80 FRT (Flow Rate Measurement Time)

Sets or reads the time base used to determine the current flow rate.

Reads out the current flow rate via the FLO command.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Time base for determining the current flow rates
Range/data		0 … 65,535; the time base is in ms (milliseconds)
Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2000*hex* (hexadecimal)
	Subindex	13*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	1
	Attribute	19
PROFIBUS		Not available

10.81 FST (Filter Settling Time)

Reads the settling time of the entire filter chain as currently set.
See also TMA.

The low-pass filters FMD and ASF, notch filters NTF and NFA as well as the average filter MAC are taken into consideration. As the time is indicated in cycles, the value also depends on the setting for HSM.

No. of parameters	–
Factory setting	–
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Information about the command

Meaning		Settling time of the filter chain in milliseconds
Range/data		–
Number of ASCII characters with serial interface		8
Data type		*UINT32* (Unsigned Integer 32 bit)
Access		*R* (Read only)
CANopen	**Index**	2010*hex* (hexadecimal)
	Subindex	10*hex* (hexadecimal)

DeviceNet	Class	100
	Instance	2
	Attribute	16
PROFIBUS		Not available

10.82 FTL (Fast Track Level (FMD3))

Sets or reads the threshold for the Fast Track Filter option in filter mode 3. The setting is made in the user-defined scaling set with NOV. The settling time is also influenced by the ASF command.
See also Filter cut-off frequency for settling times, Filter mode, FMD.

No. of parameters	1
Factory setting	20
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Level for Fast Track filter option using FMD with parameter P1 = 3
Range/data		0: Fast Track filter option deactivated 1 … 99,999: Level value
Number of ASCII characters with serial interface		5
Data type		*UINT32* (Unsigned Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	24C0*hex* (hexadecimal)
	Subindex	05*hex* (hexadecimal)

DeviceNet	**Class**	110
	Instance	13
	Attribute	5
PROFIBUS	**Slot**	0
	Index	139

10.83 FWT (Filling Weight)

Sets or reads the filling weight.

See also Filler.

The filling weight is on the characteristic curve defined with the LDW and LWT commands. It is the target weight for a batching process. The weight is indicated in the unit defined with ENU if you are using NOV (maximum capacity) with parameter P1 greater than zero. The value is then indicated as a percentage rate. This means that with a maximum capacity of 50,000 and a filling weight of 60%, the value is 30,000.

Entering the filling weight automatically makes the following settings:

Command	Meaning	Setting
CFD	Coarse flow cutoff point	50.0% of the filling weight
CBK	Coarse flow fill flow monitoring	0 (= switched off)
FFD	Fine flow cutoff point	95.0% of the filling weight
FBK	Fine flow fill flow monitoring	0 (= switched off)
FFM	Minimum fine flow	1.0% of the filling weight
LTL	Lower tolerance limit	99.8% of the filling weight (not with WTX)
UTL	Upper tolerance limit	100.2% of the filling weight (not with WTX)
SYD	Systematic difference	0 (= switched off)

Therefore do not set these parameters until after the filling weight has been entered.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in Legal-For-Trade mode	No
Save parameters	TDD1
Available starting with firmware version	P50

1) Only available if serial interfaces or PROFIBUS are used.

Parameter P1

Meaning		Filling weight (batching setpoint)
Range/data		Industrial mode: 0 … 1,000,000 for NOV with parameter P1 = 0, otherwise 0 … 100% of NOV Legal-for-trade mode: 50,000 … 1,000,000 for NOV with parameter P1 = 0, otherwise 5 … 100% of NOV
Number of ASCII characters with serial interface		8
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2210*hex* (hexadecimal)
	Subindex	07*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	2
	Attribute	7
PROFIBUS	**Slot**	0
	Index	70

Example

Containers will be filled on a scale to a maximum weight of 50 kg.

Action		Unload the scale.
Command	`LDW;`	The initial load is set to 0 kg.
Action		Load the scale with 50 kg.
Command	`LWT;`	The current measured value is applied. The measured value (MSV?) for a load of 50 kg and COF with parameter P1 = 3 is 1,000,000 d.
Command	`NOV5000`	This command causes 5000 d to be displayed for a load of 50 kg.
Action		Enter the filling weight of your container with `FWT`. In the Legal-For-Trade range the entry is limited to values between 250 and 5000 (5 … 100% of NOV). Otherwise all values between 0 and 5000 are allowed

10.84 GRU (Group Address)

This command only concerns serial interfaces.

Sets or reads a group address. This makes it possible for you to assign multiple sensor electronics units to a group: Give the same group address to each sensor electronics unit that will belong to the group. Subsequent selection commands (S) with this (group) address will initially be received by all sensor electronics units. Only the sensor electronics units with this group address will perform the command and place the response in output memory. The sensor electronics unit with the same address and the group address will respond immediately. The other sensor electronics units in the group will not transfer the data until requested.

No. of parameters	1
Factory setting	90
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning	Group selection
Range/data	0 … 89: Group address 90: Cancel grouping
Number of ASCII characters with serial interface	2
Data type	*UINT8* (Unsigned Integer 8 bit)

Access		*R/W* (Read/Write)
CANopen	**Index**	2600*hex* (hexadecimal)
	Subindex	9*hex* (hexadecimal)
DeviceNet	**Class**	130
	Instance	1
	Attribute	9
PROFIBUS		Not available

Example (output of a 2-byte measured values is set with COF2)

Command	`S01;`	Select the sensor electronics with address 1.
Command	`GRU01;`	Set group address 1.
Command	`S02;`	Select the sensor electronics with address 2.
Command	`GRU01;`	Set group address 1.
Command	`S03;`	Select the sensor electronics with address 3.
Command	`GRU01;`	Set group address 1.
Command	`S01;`	Select the sensor electronics with address 1; the rest of *Group 1* is partially active.
Command	`MSV?`	All sensor electronics units in *group* 1 save the current measured value in output memory.
Response	2-byte measured value	The sensor electronics with address 1 also sends the value immediately as the sensor electronics are active.
Command	`S02;`	Select the device with address 2.
Response	2-byte measured value	The sensor electronics with address 2 also sends the (saved) value as there is no group 2.
Command	`S03;`	Select the device with address 3.
Response	2-byte measured value	The sensor electronics with address 3 also sends the (saved) value as there is no group 3.
Command	`S01;`	Select the device with address 1 (restore initial status).

10.85 HRN (High Resolution)

Sets or reads the status of 10x resolution.

When 10x resolution is activated the MSV? command causes all measured values to be sent with the resolution 10 times higher. Entering NOV or LFT with parameter P1 > 0 deactivates 10x resolution.

10x resolution is deactivated after the sensor electronics are turned on or after the RES command.

You cannot turn on 10x resolution if LFT is set with parameter P1 > 0 (legal-for-trade mode) or if you are using NOV with parameter P1 = 0 or with parameter P1 > 100,000. In this case you receive `?crlf` as the response to the `HRN1` command.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	Yes
Disabled in legal-for-trade mode	Yes
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		10x resolution
Range/data		0: 10x resolution is deactivated 1: 10x resolution is active
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2110*hex* (hexadecimal)
	Subindex	04*hex* (hexadecimal)
DeviceNet	**Class**	101
	Instance	2
	Attribute	4
PROFIBUS	**Slot**	0
	Index	169

10.86 HSM (High Speed Mode ADC)

Sets or reads the sample rate of the A/D converter.

This command influences a number of other settings, especially filter behavior (ASF) and the output rate (ICR).

See also Filters, Filter cut-off frequency, Increased analog-to-digital converter sample rate.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in Legal-For-Trade mode	No
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Sample rate
Range/data		0: 600 measured values/s 1: 1200 measured values/s
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2110*hex* (hexadecimal)
	Subindex	05*hex* (hexadecimal)
DeviceNet	**Class**	101
	Instance	2
	Attribute	5

PROFIBUS	**Slot**	0
	Index	55

10.87 HWV (Hardware Version)

Reads the hardware version.

See also IDN, NAM, PDT, PZN, SNR, SRV, SWI, SWV.

No. of parameters	–
Factory setting	Device-dependent
Response time	<10 ms
Password protection[1)]	No
Disabled in Legal-For-Trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Information about the command

Meaning		Hardware version
Range/data		–
Number of ASCII characters with serial interface		10
Data type		Text (ASCII), 10 characters
Access		*R* (Read only)
CANopen	**Index**	2520*hex* (hexadecimal)
	Subindex	0A*hex* (hexadecimal)
DeviceNet	**Class**	120
	Instance	1
	Attribute	15
PROFIBUS		Not available

Examples

Command	`HWV?;`	Read hardware version.
Response	`PAD4000` `crlf` or `FIT5AE` `crlf` or `FIT7AS` `crlf` depending on device	A total of 10 characters plus end marker (2 characters) are sent.

10.88 ICR (Internal Conversion Rate)

Sets or reads the output rate of the measured values. The output rate is the rate at which measured values are outputted with the MSV? command. The output rate also depends on the filter settings FMD, ASF, and on HSM.
See also Filters, Filter cut-off frequency, Output rate of measured values, Increased analog-to-digital converter sample rate.

No. of parameters	1
Factory setting	2
Response time	<10 ms
Password protection[1)]	No
Disabled in Legal-For-Trade mode	No
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Output rate
Range/data		0 … 7
Number of ASCII characters with serial interface		2
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2010*hex* (hexadecimal)
	Subindex	06*hex* (hexadecimal)

DeviceNet	**Class**	100
	Instance	2
	Attribute	6
PROFIBUS	**Slot**	0
	Index	44

The following two tables do not apply to electronics with P50 (electronics with P50 see Firmware overview) and AD105D, for which the output rate is independent of FMD, and depends only on ICR and HSM - see third table.

Output rates (measured values per second) for filter modes FMD0[1)], FMD2, FMD3, FMD4 and FMD5 depending on parameter P1 of ICR

P1	Output rate for HSM0	Output rate for HSM1
0	610	1221
1	305	610
2	153	305
3	76	153
4	38	76
5	19	38
6	10	19
7	5	10

[1)] Notation for the FMD and HSM commands with parameter P1 = x.

Output rates for filter mode FMD1 depending on the filter limit frequency ASF

Always use ICR with parameter P1 = 0 with filter mode FMD1, as the filter is intended for dynamic measurements. Depending on the set filter limit frequency (command ASF) there will still be different output rates:

ASF	Output rate for HSM0	Output rate for HSM1
0	610	1221
1	610	1221
2	305	610
3	204	407
4	153	305
5	122	244
6	102	203
7	87	174
8	77	153
9	68	136
10	61	122

For AD105D and electronics with P50 (electronics with P50 see Firmware overview) the following applies for all FMDx filter modes:

P1	Output rate for HSM0	Output rate for HSM1
0	100	200
1	50	100
2	25	50
3	12	25
4	6	12
5	3	6
6	2	3
7	1	2

10.89 IDN (Identification)

Reads the identification of the sensor electronics or sets a new type name. The serial interface returns more information: the manufacturer, type name, serial number, and firmware version. The additional data can only be read however. Newer electronics units (possible as from P80) also use 10-digit serial numbers. In this case, 10 digits are outputted on the serial interface as soon as 9,999,999 is exceeded; otherwise 7.
See also HWV, NAM, PDT, PZN, SNR, SRV, SWI, SWV.

Parameter P1

Meaning		Identification of sensor electronics
Range/data		–
Data type		Write: Text (ASCII), 15 characters Read: Text (ASCII), 15 characters; serial interface 31 or 34 characters respectively
Access		*R/W* (Read/Write)
CANopen	**Index**	2520*hex* (hexadecimal)
	Subindex	01*hex* (hexadecimal)
DeviceNet	**Class**	120
	Instance	1
	Attribute	7
PROFIBUS	**Slot**	0
	Index	111

Example

Command	`IDN?;`	Read identification.
Response	`HBM,AD103C ,1234567,P80crlf` 1)	Over the serial interface, the manufacturer (HBM), the type name (AD103C plus 9 spaces), the serial number (1234567, here 7 digits; see also SNR) and the firmware version (P80, always 3 characters) are sent. A total of 31 characters plus end marker (2 characters) are sent.
Command	`IDN" scale 1";`	Set new type name. The entry is padded to 15 characters with space characters.

1) With CANopen, DeviceNet and PROFIBUS only "`AD103C         `" is sent, meaning the type name is AD103C (plus 9 spaces). A total of 15 characters are sent.

10.90 IM1 (Input Mode Input 1)

Sets or reads the function of digital input 1. To be able to set this function, you must enable it with the IOM command with parameter P1 = 1.

You can also read out the current status of digital input 1 with the IS1? command.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in Legal-For-Trade mode	No
Save parameters	–
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Function of digital input 1
Range/data		0: No function 1: Tare 2: Trigger 1 (only in trigger mode, see IMD with parameter P1 = 1) 3: Trigger 2 (only in trigger mode, see IMD with parameter P1 = 1) 4: Stop batching (only in dosing mode, see IMD with parameter P1 = 2) 5: Start batching (only in dosing mode, see IMD with parameter P1 = 2) 6: Reserved 7: Reserved
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2022*hex* (hexadecimal)
	Subindex	01*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	10
	Attribute	1
PROFIBUS		Not available

10.91 IM2 (Input Mode Input 2)

Sets or reads the function of digital input 2. To be able to set this function, you must enable it with the IOM command with parameter P1 = 1.

You can also read out the current status of digital input 1 with the IS2? command.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in Legal-For-Trade mode	No
Save parameters	–
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Function of digital input 2
Range/data		0: No function 1: Tare 2: Trigger 1 (only in trigger mode, see IMD with parameter P1 = 1) 3: Trigger 2 (only in trigger mode, see IMD with parameter P1 = 1) 4: Stop batching (only in dosing mode, see IMD with parameter P1 = 2) 5: Start batching (only in dosing mode, see IMD with parameter P1 = 2) 6: Reserved 7: Reserved
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2022*hex* (hexadecimal)
	Subindex	02*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	10
	Attribute	2
PROFIBUS		Not available

10.92 IMD (Input Mode)

Sets or reads the function of the sensor electronics and therefore also the function of the inputs and outputs.

> Command IMD affects the content of the measurement status, see MSV
> The descriptions below referring to the functions of digital inputs and outputs apply only to sensor electronics up to *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics and for *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics in compatibility mode (IOM command with parameter P1 = 0). For sensor electronics of *4th generation* FIT5A, FIT7A, PAD400x, PW15iA, you can define the function of the digital inputs yourself with the IM1 and IM2 commands, and the function of the digital outputs with commands OM1 to OM6 (IOM commands with parameter P1 = 1).

Standard mode (scale)

You can also query the states of inputs IN1 and IN2 with the POR command. A change in the level does not affect the sensor electronics.

Digital outputs OUT1 to OUT4 can be general control outputs or limit value outputs (LIV1 to LIV4, POR).

Trigger mode (checkweigher)

The function of the inputs is set to checkweigher. Input IN1 is the external trigger input for the trigger function (TRC). Input IN2 is the input for an external tare command (TAR). The wait time until the tare command is performed depends on which sampling rate is selected and the filter, see also ASF, FMD, ICR, TAR. A tare command via input IN2 has the same effect in this mode as the TAR command.

Digital outputs OUT1 to OUT4 can be general control outputs or limit value outputs (LIV1 to LIV4, POR).

Dosing mode

The inputs are set for the filling/batching function, see Filler (Filling). Input IN1 is the Stop input and input IN2 the Start input for the filling process.

The digital outputs have different output functions depending on the OMD command. The limit values (LIV1 to LIV4) must be deactivated.
See also DMD (Upward/Downward batching).

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

1) Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Function of digital inputs and outputs
Range/data		0: Standard mode 1: Trigger mode 2: Dosing mode
Number of ASCII characters with serial interface		2
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2010*hex* (hexadecimal)
	Subindex	07*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	2
	Attribute	7
PROFIBUS	**Slot**	0
	Index	69

10.93 IOM (IO Mode)

Sets or reads whether the function of the digital inputs and outputs is freely assignable.

Use the IOM command with parameter P1 = 1 for the *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics if possible. Use P1 = 0 only if the relevant sensor electronics unit will be operated in compatibility mode. For all other sensor electronics up to *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics, no free assignment is possible.

PW15iA and PAD400x use shared connections for input and output. Therefore you should only activate the output function using OM1 to OM6 if the connection is also being used as an output and is connected accordingly.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

1) Only available if serial interfaces are used.

Parameter P1

Meaning		IO mode
Range/data		0: The inputs and outputs are permanently assigned according to the settings for IMD/OMD 1: You can adjust the function of the digital inputs individually using commands IM1 and IM2, and the function of the digital outputs using commands OM1 to OM6
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	Index	2021*hex* (hexadecimal)
	Subindex	07*hex* (hexadecimal)
DeviceNet	Class	100
	Instance	9
	Attribute	7
PROFIBUS		Not available

10.94 IS1 (Digital Input State Input 1)

Reads the current state of digital input 1.

No. of parameters	1
Factory setting	–
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Status of digital input 1
Range/data		0: LOW level 1: HIGH level
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R* (Read only)
CANopen	**Index**	2020*hex* (hexadecimal)
	Subindex	18*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	3
	Attribute	24
PROFIBUS		Not available

10.95 IS2 (Digital Input State Input 2)

Reads the current state of digital input 2.

No. of parameters	1
Factory setting	–
Response time	<10 ms
Password protection[1]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1] Only available if serial interfaces are used.

Parameter P1

Meaning		Status of digital input 2
Range/data		0: LOW level 1: HIGH level
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R* (Read only)
CANopen	**Index**	2020*hex* (hexadecimal)
	Subindex	19*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	3
	Attribute	25
PROFIBUS		Not available

10.96 LDW (Load Cell Dead Weight)

Sets or reads the zero point of the user characteristic curve.

You can have the zero point measured or enter it as a value. During the measurement, the current input signal (scale not loaded = initial load) is assigned an output value of 0. The LDW value is not converted via NOV. The value is not activated until you actually measure or enter LWT.

See also Balancing a scale.

1. Measure zero point

- Unload the scale.
- Measure the zero point with the `LDW;` command.

  The sensor electronics measure the input signal (zero load) of the scale and save the measured value. Activation does not occur until the parameter for LWT is entered.

  Use 0x7FFFFFFF as the parameter to send a command that does not use parameters via CANopen or DeviceNet.

2. Manual input of the zero point

- Enter the zero point of the scale with the `LDW<zero point>;` command.

  The value entered is stored, but only activated after the parameter for LWT is entered.

  Use CWT if you are not balancing via LDW/LWT with 100% of the nominal maximum capacity. Entering or measuring a factory characteristic curve with SZA/SFA resets the LDW/LWT user characteristic curve to 0/1,000,000.

No. of parameters	1
Factory setting	0
Response time	<15 ms for reading or input <4.2 s for measurement
Password protection [1)]	Yes
Disabled in legal-for-trade mode	Yes

Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		User characteristic curve zero point
Range/data		±1,599,999 for NOV with parameter P1 = 0, otherwise ±NOV
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2110*hex* (hexadecimal)
	Subindex	06*hex* (hexadecimal)
DeviceNet	**Class**	101
	Instance	2
	Attribute	6
PROFIBUS	**Slot**	0
	Index	35/36

10.97 LFT (Legal-For-Trade)

Sets or reads the operating mode: legal-for-trade or industrial.

Every change to the status increases the legal-for-trade counter (TCR) by 1.

After switching to legal-for-trade mode, the following commands are disabled for write access:

CRC, CWT, DPT, ENU, IDN, LDW, LIC, LWT, MRA, MTD, NOV, RSN, SFA, SZA, TDD
with parameter P1 = 0, TRF, ZSE, ZTR

If you send one of these commands with write functionality, the response will be `?crlf`.

Switching by hardware switch is also possible for some sensor electronics units. In these cases the command has no effect if the switch is set to legal-for-trade.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	Yes
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS are used.

Parameter P1

Meaning		Operating mode: legal-for-trade or industrial
Range/data		0: Industrial mode 1: Legal-for-trade mode for OIML 2: Legal-for-trade mode for NTEP 3: Legal-for-trade mode for OIML with manual tare (entered tare value)[1)]
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2300*hex* (hexadecimal)
	Subindex	02*hex* (hexadecimal)
DeviceNet	**Class**	103
	Instance	1
	Attribute	2
PROFIBUS	**Slot**	0
	Index	120

1) Starting with firmware version P81.

10.98 LIC (Linearization Coefficient)

Sets or reads the coefficients of a 3rd order polynomial for linearization of the scale's characteristic curve.
See also Using linearization.

The user characteristic curve defined with the command pair LDW/LWT is defined by two points. With this command you can use a 3rd order polynomial to compensate for a less than ideal linear characteristic curve.

$$\text{Measured value} = K0 + K1 * x + K2 * x^2 + K3 * x^3$$

where x = measured value of the A/D converter

Parameters P1 to P4 are multiplied by 10^{-6} and inserted into the formula: $Kx = Px * 10^{-6}$.

You must calculate the coefficients yourself with a suitable program based on measurements of the actual characteristic curve. The coefficients are not calculated by the sensor electronics.

In contrast to the normal notation for commands, you must also enter the coefficients individually (one after the other) for serial interfaces (see the example).

No. of parameters	4
Factory setting	0
Response time	<10 ms
Password protection[1)]	Yes
Disabled in Legal-For-Trade mode	Yes
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS are used.

Parameter P1 = 0

Meaning	0.000001 * linearization coefficient K0 (absolute term)
Range/data	±1,599,999

Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	Index	2120*hex* (hexadecimal)
	Subindex	01*hex* (hexadecimal)
DeviceNet	Class	101
	Instance	3
	Attribute	1
PROFIBUS	Slot	0
	Index	156

Parameter P1 = 1

Meaning		0.000001 * linearization coefficient K1 (linear term)
Range/data		±1,599,999
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	Index	2120*hex* (hexadecimal)
	Subindex	02*hex* (hexadecimal)
DeviceNet	Class	101
	Instance	3
	Attribute	2
PROFIBUS	Slot	0
	Index	157

Parameter P1 = 2

Meaning		0.000001 * linearization coefficient K2 (quadratic term)
Range/data		±1,599,999
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	Index	2120*hex* (hexadecimal)
	Subindex	03*hex* (hexadecimal)
DeviceNet	Class	101
	Instance	3
	Attribute	3
PROFIBUS	Slot	0
	Index	158

Parameter P1 = 3

Meaning		0.000001 * linearization coefficient K3 (cubic term)
Range/data		±1,599,999
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	Index	2120*hex* (hexadecimal)
	Subindex	04*hex* (hexadecimal)

DeviceNet	**Class**	101
	Instance	3
	Attribute	4
PROFIBUS	**Slot**	0
	Index	159

Example

Command	`LIC0,+10;`	Set linearization coefficient K0 to +0.000010.
Response	`0crlf`	Entry OK.
Command	`LIC1,+1000345;`	Set linearization coefficient K1 to +1.000345.
Response	`0crlf`	Entry OK.
Command	`LIC2,-345;`	Set linearization coefficient K2 to -0.000345.
Response	`0crlf`	Entry OK.
Command	`LIC3,+45;`	Set linearization coefficient K3 to 0.000045.
Response	`0crlf`	Entry OK.

10.99 LIV1 (Limit Value 1 Monitoring)

Sets or reads the settings for limit value switch 1.

For compatibility reasons, you must send the `LIV?1;` command with a query, not `LIV1?;` as is otherwise usual.

The limit switch switch can monitor gross or net measured values. The monitoring speed depends on the filter settings (ASF, FMD) and the set sample rate (HSM). Monitoring is always implemented, even when there is no communication via one of the interfaces.

The descriptions below referring to the functions of digital outputs apply only to sensor electronics up to *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics and for *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics in compatibility mode (IOM command with parameter P1 = 0). For sensor electronics in *4th generation* FIT5A, FIT7A, PAD400x, PW15iA you can define the function of the digital outputs yourself with commands OM1 to OM6 (IOM command with parameter P1 = 1).
The settings for P1 > 2 are only executed if you set P2 = 2 and for AT1 (switch-on period of OUT1) parameter P1 has a value greater than zero. In this case you can also delay switching on of the output with the DT1 command.

No. of parameters	4
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

1) Only available if serial interfaces or PROFIBUS used.

Parameter P1 (optional)

Meaning		Limit value monitoring
Range/data		0: Monitoring deactivated 1: Limit value in measured value status only; the digital outputs are not changed 2: Limit value in measured value status and GW1 = OUT1 3: OUT1 active if P3 < measured value < P4 (only if P2 = 2) 4: OUT1 not active if P3 < measured value < P4 (only if P2 = 2) 5: OUT1 active if measured value > P3 (only if P2 = 2) 6: OUT1 active if measured value < P4 (only if P2 = 2)
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2030*hex* (hexadecimal)
	Subindex	01*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	4
	Attribute	1
PROFIBUS	**Slot**	0
	Index	50

Parameter P2 (optional)

Meaning	Signal source
Range/data	0: Net measured value 1: Gross measured value 2: Trigger result (MAV) 3: Minimum measured value 4: Maximum measured value
Data type	*UINT8* (Unsigned Integer 8 bit)

Access		*R/W* (Read/Write)
CANopen	**Index**	2030*hex* (hexadecimal)
	Subindex	02*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	4
	Attribute	2
PROFIBUS	**Slot**	0
	Index	50

Parameter P3 (optional)

Meaning		Activation level P2 = 2: Activates OUT1 or the status bit if measured value > P3 Otherwise: Activation level
Range/data		±1,599,999 for NOV with parameter P1 = 0, otherwise ±NOV
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2030*hex* (hexadecimal)
	Subindex	03*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	4
	Attribute	3
PROFIBUS	**Slot**	0
	Index	50

Parameter P4 (optional)

Meaning		Deactivation level P2 = 2: Activates OUT1 or the status bit if measured value < P4 Otherwise: Deactivation level
Range/data		±1,599,999 for NOV with parameter P1 = 0, otherwise ±NOV
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	Index	2030*hex* (hexadecimal)
	Subindex	04*hex* (hexadecimal)
DeviceNet	Class	100
	Instance	4
	Attribute	4
PROFIBUS	Slot	0
	Index	50

10.100 LIV2 (Limit Value 2 Monitoring)

Sets or reads the settings for limit value switch 2.

For compatibility reasons, you must send the `LIV?2;` command with a query, not `LIV2?;` as is otherwise usual.

The limit switch switch can monitor gross or net measured values. The monitoring speed depends on the filter settings (ASF, FMD) and the set sample rate (HSM). Monitoring is always implemented, even when there is no communication via one of the interfaces.

The descriptions below referring to the functions of digital outputs apply only to sensor electronics up to *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics and for *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics in compatibility mode (IOM command with parameter P1 = 0). For sensor electronics in *4th generation* FIT5A, FIT7A, PAD400x, PW15iA you can define the function of the digital outputs yourself with commands OM1 to OM6 (IOM command with parameter P1 = 1).
The settings for P1 > 2 are only executed if you set P2 = 2 and for AT2 (switch-on period of OUT2) parameter P1 has a value greater than zero. In this case you can also delay switching on of the output with the DT2 command.

No. of parameters	4
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1 (optional)

Meaning		Limit value monitoring
Range/data		0: Monitoring deactivated 1: Limit value in measured value status only; the digital outputs are not changed 2: Limit value in measured value status and W2 = OUT2 3: OUT2 active if P3 < measured value < P4 (only if P2 = 2) 4: OUT2 not active if P3 < measured value < P4 (only if P2 = 2) 5: OUT2 active if measured value > P3 (only if P2 = 2) 6: OUT2 active if measured value < P4 (only if P2 = 2)
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	Index	2030*hex* (hexadecimal)
	Subindex	05*hex* (hexadecimal)
DeviceNet	Class	100
	Instance	4
	Attribute	5
PROFIBUS	Slot	0
	Index	51

Parameter P2 (optional)

Meaning	Signal source
Range/data	0: Net measured value 1: Gross measured value 2: Trigger result (MAV) 3: Minimum measured value 4: Maximum measured value
Data type	*UINT8* (Unsigned Integer 8 bit)

Access		*R/W* (Read/Write)
CANopen	**Index**	2030*hex* (hexadecimal)
	Subindex	06*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	4
	Attribute	6
PROFIBUS	**Slot**	0
	Index	51

Parameter P3 (optional)

Meaning		Activation level P2 = 2: Activates OUT2 or the status bit if measured value > P3 Otherwise: Activation level
Range/data		±1,599,999 for NOV with parameter P1 = 0, otherwise ±NOV
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2030*hex* (hexadecimal)
	Subindex	07*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	4
	Attribute	7
PROFIBUS	**Slot**	0
	Index	51

Parameter P4 (optional)

Meaning		Deactivation level P2 = 2: Activates OUT2 or the status bit if measured value < P4 Otherwise: Deactivation level
Number of ASCII characters with serial interface		8 (7 digits with sign)
Range/data		±1,599,999 for NOV with parameter P1 = 0, otherwise ±NOV
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2030*hex* (hexadecimal)
	Subindex	08*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	4
	Attribute	8
PROFIBUS	**Slot**	0
	Index	51

10.101 LIV3 (Limit Value 3 Monitoring)

Sets or reads the settings for limit value switch 3.

For compatibility reasons, you must send the `LIV?3;` command with a query, not `LIV3?;` as is otherwise usual.

The limit switch switch can monitor gross or net measured values. The monitoring speed depends on the filter settings (ASF, FMD) and the set sample rate (HSM). Monitoring is always implemented, even when there is no communication via one of the interfaces.

The descriptions below referring to the functions of digital outputs apply only to sensor electronics up to *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics and for *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics in compatibility mode (IOM command with parameter P1 = 0). For sensor electronics in *4th generation* FIT5A, FIT7A, PAD400x, PW15iA you can define the function of the digital outputs yourself with commands OM1 to OM6 (IOM command with parameter P1 = 1).
The settings for P1 > 2 are only executed if you set P2 = 2 and for AT3 (switch-on period of OUT3) parameter P1 has a value greater than zero. In this case you can also delay switching on of the output with the DT3 command.

No. of parameters	4
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1 (optional)

Meaning		Limit value monitoring
Range/data		0: Monitoring deactivated 1: Limit value in measured value status only; the digital outputs are not changed 2: Limit value in measured value status and GW3 = OUT3 3: OUT3 active if P3 < measured value < P4 (only if P2 = 2) 4: OUT3 not active if P3 < measured value < P4 (only if P2 = 2) 5: OUT3 active if measured value > P3 (only if P2 = 2) 6: OUT3 active if measured value < P4 (only if P2 = 2)
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2030*hex* (hexadecimal)
	Subindex	09*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	4
	Attribute	9
PROFIBUS	**Slot**	0
	Index	48

Parameter P2 (optional)

Meaning	Signal source
Range/data	0: Net measured value 1: Gross measured value 2: Trigger result (MAV) 3: Minimum measured value 4: Maximum measured value
Data type	*UINT8* (Unsigned Integer 8 bit)

Access		*R/W* (Read/Write)
CANopen	**Index**	2030*hex* (hexadecimal)
	Subindex	0A*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	4
	Attribute	10
PROFIBUS	**Slot**	0
	Index	48

Parameter P3 (optional)

Meaning		Activation level P2 = 2: Activates OUT3 or the status bit if measured value > P3 Otherwise: Activation level
Range/data		±1,599,999 for NOV with parameter P1 = 0, otherwise ±NOV
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2030*hex* (hexadecimal)
	Subindex	0B*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	4
	Attribute	11
PROFIBUS	**Slot**	0
	Index	48

Parameter P4 (optional)

Meaning		Deactivation level P2 = 2: Activates OUT3 or the status bit if measured value < P4 Otherwise: Deactivation level
Range/data		±1,599,999 for NOV with parameter P1 = 0, otherwise ±NOV
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2030*hex* (hexadecimal)
	Subindex	0C*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	4
	Attribute	12
PROFIBUS	**Slot**	0
	Index	48

10.102 LIV4 (Limit Value 4 Monitoring)

Sets or reads the settings for limit value switch 4.

For compatibility reasons, you must send the `LIV?4;` command with a query, not `LIV4?;` as is otherwise usual.

The limit switch switch can monitor gross or net measured values. The monitoring speed depends on the filter settings (ASF, FMD) and the set sample rate (HSM). Monitoring is always implemented, even when there is no communication via one of the interfaces.

The descriptions below referring to the functions of digital outputs apply only to sensor electronics up to *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics and for *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics in compatibility mode (IOM command with parameter P1 = 0). For sensor electronics in *4th generation* FIT5A, FIT7A, PAD400x, PW15iA you can define the function of the digital outputs yourself with commands OM1 to OM6 (IOM command with parameter P1 = 1).
The settings for P1 > 2 are only executed if you set P2 = 2 and for AT4 (switch-on period of OUT4) parameter P1 has a value greater than zero. In this case you can also delay switching on of the output with the DT4 command.

No. of parameters	4
Factory setting	0
Response time	<10 ms
Password protection1)	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

1) Only available if serial interfaces or PROFIBUS used.

Parameter P1 (optional)

<table>
<tr><td colspan="2">Meaning</td><td>Limit value monitoring</td></tr>
<tr><td colspan="2">Range/data</td><td>0: Monitoring deactivated
1: Limit value in measured value status only; the digital outputs are not changed
2: Limit value in measured value status and GW4 = OUT4
3: OUT4 active if P3 < measured value < P4 (only if P2 = 2)
4: OUT4 not active if P3 < measured value < P4 (only if P2 = 2)
5: OUT4 active if measured value > P3 (only if P2 = 2)
6: OUT4 active if measured value < P4 (only if P2 = 2)</td></tr>
<tr><td colspan="2">Data type</td><td>UINT8 (Unsigned Integer 8 bit)</td></tr>
<tr><td colspan="2">Access</td><td>R/W (Read/Write)</td></tr>
<tr><td rowspan="2">CANopen</td><td>Index</td><td>2030hex (hexadecimal)</td></tr>
<tr><td>Subindex</td><td>0Dhex (hexadecimal)</td></tr>
<tr><td rowspan="3">DeviceNet</td><td>Class</td><td>100</td></tr>
<tr><td>Instance</td><td>4</td></tr>
<tr><td>Attribute</td><td>13</td></tr>
<tr><td rowspan="2">PROFIBUS</td><td>Slot</td><td>0</td></tr>
<tr><td>Index</td><td>49</td></tr>
</table>

Parameter P2 (optional)

<table>
<tr><td>Meaning</td><td>Signal source</td></tr>
<tr><td>Range/data</td><td>0: Net measured value
1: Gross measured value
2: Trigger result (MAV)
3: Minimum measured value
4: Maximum measured value</td></tr>
<tr><td>Data type</td><td>UINT8 (Unsigned Integer 8 bit)</td></tr>
</table>

Access		*R/W* (Read/Write)
CANopen	**Index**	2030*hex* (hexadecimal)
	Subindex	0E*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	4
	Attribute	14
PROFIBUS	**Slot**	0
	Index	49

Parameter P3 (optional)

Meaning		Activation level P2 = 2: Activates OUT4 or the status bit if measured value > P3 Otherwise: Activation level
Range/data		±1,599,999 for NOV with parameter P1 = 0, otherwise ±NOV
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	Index	2030*hex* (hexadecimal)
	Subindex	0F*hex* (hexadecimal)
DeviceNet	Class	100
	Instance	4
	Attribute	15
PROFIBUS	Slot	0
	Index	49

Parameter P4 (optional)

Meaning		Deactivation level P2 = 2: Activates OUT4 or the status bit if measured value < P4 Otherwise: Deactivation level
Range/data		±1,599,999 for NOV with parameter P1 = 0, otherwise ±NOV
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2030*hex* (hexadecimal)
	Subindex	10*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	4
	Attribute	16
PROFIBUS	**Slot**	0
	Index	49

10.103 LTC (Lockout Time Coarse Flow)

Sets or reads the lockout time for coarse flow. Once coarse flow is activated, comparison of the actual weight for reaching the coarse flow cut-off point is disabled for the specified duration. The time does not delay the filling process.

Especially when the fill material has pieces, it may happen that the first pieces that fall in the container after coarse flow has started will generate peak loads that will already cause the coarse flow cut-off point to be exceeded. You can prevent that with this setting. Based on experience, the lockout time should be about 10 % of the coarse flow dosing time. If you are using monitoring of the fill flow limit value (CBK), the time must be long enough for material to reach the container within the lockout time.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

1) Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Lockout time for coarse flow
Range/data		0 ... 32,767. The lockout time is parameter P1 * 10 ms
Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2220*hex* (hexadecimal)
	Subindex	04*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	3
	Attribute	4
PROFIBUS	**Slot**	0
	Index	81

10.104 LTF (Lockout Time Fine)

Sets or reads the lockout time for fine flow. The time starts when the coarse flow cut-off point is reached. Comparison of the actual weight for reaching the fine flow cut-off point is disabled for the specified duration. The time does not delay the filling process.

When the coarse flow shuts off, settling processes may occur that will already cause the coarse flow cut-off point to be exceeded. You can prevent that with this setting. Based on experience, the lockout time should be about 10 % of the fine flow dosing time.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Lockout time for fine flow
Range/data		0 … 32,767; the activation time is parameter P1 * 10 ms
Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	Index	2220*hex* (hexadecimal)
	Subindex	05*hex* (hexadecimal)
DeviceNet	Class	102
	Instance	3
	Attribute	5
PROFIBUS	Slot	0
	Index	82

10.105 LTL (Lower Tolerance Limit)

Sets or reads the lower tolerance limit for the dosing result.

The description below referring to the functions of digital outputs applies only to sensor electronics up to *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics and for *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics in compatibility mode (IOM command with parameter P1 = 0). For sensor electronics in *4th generation* FIT5A, FIT7A, PAD400x, PW15iA you can define the function of the digital outputs yourself with commands OM1 to OM6 (IOM command with parameter P1 = 1).

If the dosing result (FRS) falls below the tolerance limit, the status "Tolerance limit undershot" (bit 6) is set in the dosing status (SDO). The status is cleared with the next start. If you have set parameter P1 = 0 for OMD, output OUT5 is also active.

When the filling weight is entered (FWT), the lower tolerance limit is automatically set to 99.8% of the filling weight (not with WTX).

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning	Lower tolerance limit for dosing result
Range/data	0 … 1,599,999 for NOV with parameter P1 = 0, otherwise 0 … 160% of NOV

Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2210*hex* (hexadecimal)
	Subindex	08*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	2
	Attribute	8
PROFIBUS	**Slot**	0
	Index	73

10.106 LWT (Load Cell Weight)

Sets or reads the nominal weight of the user characteristic curve.

You can have the nominal weight measured or enter it as a value. During the measurement, the current input signal (scale loaded = maximum capacity) is assigned an output value of 1,000,000. The LWT value is not converted via NOV. The value is not activated until you actually measure or enter LDW.

See also Balancing a scale.

1. Measuring a nominal weight

- Load the scale with the maximum capacity.
- Measure the nominal weight with the `LWT;` command.

  The sensor electronics measure the input signal (maximum capacity) of the scale and save the measured value. However, activation does not occur until you have actually entered or measured LDW.

> **i** Use 0x7FFFFFFF as the parameter to send a command that does not use parameters via CANopen or DeviceNet.

2. Manual input of the nominal weight

- Enter the nominal weight of the scale with the `LDW<nominal weight>;` command.

  The value entered is stored, but only activated after the parameter for LDW is entered.

> **i** Use CWT if you are not balancing via LDW/LWT with 100% of the nominal maximum capacity. Entering or measuring a factory characteristic curve with SZA/SFA resets the LDW/LWT user characteristic curve to 0/1,000,000.

No. of parameters	1
Factory setting	1000000
Response time	<10 ms
Password protection[1)]	Yes

Disabled in legal-for-trade mode	Yes
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

1) Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Nominal weight balancing
Range/data		±1,599,999 for NOV with parameter P1 = 0, otherwise ±NOV
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2110*hex* (hexadecimal)
	Subindex	07*hex* (hexadecimal)
DeviceNet	**Class**	101
	Instance	2
	Attribute	7
PROFIBUS	**Slot**	0
	Index	37/38

10.107 MAC (Moving Average Filter for FMD5)

Sets or reads the number of values used by the average filter when filter mode FMD is active with parameter P1 = 5. The function is available as from P64.4 (electronics units with P64.4 see Firmware overview).

As from P80 (electronics units with P80 see Firmware overview), the function is available in all FMD filter modes.

See Average filter for filter mode 5, ADF, NTF.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in Legal-For-Trade mode	No
Save parameters	TDD1
Available starting with firmware version	P64.4 (electronics units with P64.4 see Firmware overview), P77.9 (electronics units with P77.9 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Number of values for the moving average
Range/data		0 ... 99 From P64.4/P77.9: 0 ... 199
Number of ASCII characters with serial interface		2 characters for 0 ... 99; from P64.4/P77.9: 3
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2010*hex* (hexadecimal)
	Subindex	0C*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	2
	Attribute	12
PROFIBUS	**Slot**	0
	Index	129

10.108 MAV (Measured Alternative Data)

Reads the measured value (trigger result) and status of the trigger function.

The measured value is only sent once. It is set after the query for the overflow value (ASCII = -1,638,400).

No. of parameters	–
Factory setting	–
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Trigger result
Range/data		±1,599,999 for NOV with parameter P1 = 0, otherwise ±NOV
Number and type of characters for the serial interface		Depends on COF
Data type otherwise		*SINT32* (Signed Integer 32 bit)
Access		*R* (Read only)
CANopen	**Index**	2000*hex* (hexadecimal)
	Subindex	03*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	1
	Attribute	3

PROFIBUS	**Slot**	0
	Index	16

Parameter P2

Meaning		Status of the trigger function
Range/data		0 … 65,536
Number and type of characters for the serial interface		Depends on COF
Data type otherwise		*UINT16* (Unsigned Integer 16 bit)
Access		*R* (Read only)
CANopen	**Index**	2000*hex* (hexadecimal)
	Subindex	04*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	1
	Attribute	4
PROFIBUS	**Slot**	0
	Index	16

Meaning of the values for P1 with simple trigger status (CSM with parameter P1 = 0)

Bit	Meaning when bit is set (= 1)
7	Error, measured value output is no longer possible in the chosen configuration. The data rate and transmission speed are no longer compatible (baud rate too low)
6	Trigger function active (TRC) or error if bit 7 is also active (then the trigger status will be overwritten)
5	Limit value 2 active (LIV2)
4	Limit value 1 active (LIV1)
3	Standstill (MTD)
2	A/D converter (ADU) overflow/underflow

Bit	Meaning when bit is set (= 1)
1	Gross overflow (e.g. scaling too sensitive)
0	Net overflow (e.g. tare value too high)

Meaning of the values for P1 with extended trigger status (CSM with parameter P1 = 2)

Bit	Meaning when bit is set (= 1)
7	Error, see ESR
6	Trigger function active (TRC)
5	Limit value 2 active (LIV2)
4	Limit value 1 active (LIV1)
3	Standstill (MTD)
2	Trigger result available (MAV)
1	True zero (0 ± 0.25 d)
0	Gross (bit0 = 0 means the net signal will be transmitted), see also TAS

10.109 MDT (Maximum Dosing Time)

Sets or reads the maximum dosing time.
See also Filler.

The description below referring to the functions of digital outputs applies only to sensor electronics up to *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics and for *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics in compatibility mode (IOM command with parameter P1 = 0). For sensor electronics in *4th generation* FIT5A, FIT7A, PAD400x, PW15iA you can define the function of the digital outputs yourself with commands OM1 to OM6 (IOM command with parameter P1 = 1).

The dosing time starts when dosing/batching begins (RUN control input or activation by control input) and ends with checkweighing (ready signal). If the dosing time is exceeded, batching is aborted with an error and the outputs for coarse and fine flow are set to inactive again (for output OUT4 see command SDF).

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning	Maximum dosing time
Range/data	0: The maximum dosing time is deactivated 1 … 32,767: The activation is parameter P1 * 100 ms

Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2220*hex* (hexadecimal)
	Subindex	06*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	3
	Attribute	6
PROFIBUS	**Slot**	0
	Index	94

10.110 MFO (Material Flow Last Dosing Cycle)

Reads out the material flow during the fine flow phase of the last batching process. The value of the last complete measuring interval is sent. The duration of the measurement is determined by the time specified for the FPT command (fine flow prediction).

If you have set the time interval for the fine flow prediction to 0, no measurement of the material flow will be performed.

No. of parameters	–
Factory setting	–
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P78.3 (electronics units with P78.3 see Firmware overview)

[1)] Only available if serial interfaces are used.

Information about the command

Meaning		Material flow during the fine flow phase of the last batching process
Range/data		0 ... 1,638,399
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R* (Read only)
CANopen	**Index**	2000*hex* (hexadecimal)
	Subindex	0E*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	1
	Attribute	14
PROFIBUS		Not available

10.111 MRA (Multirange Switch Point)

Sets or reads the switch point for the measuring range with dual-range balance or switches to single-range balance.

Dual-range balance

In legal-for-trade mode (LFT with parameter P1 > 0) you must always activate the motion detection function (MTD with parameter P1 > 0). If motion detection is turned off for industrial applications (MTD with parameter P1 = 0), zero will not automatically be set if the scale is switched from range 2 back to range 1.

In measuring range the digit set with the RSN command is used, in measuring range 2 the next digit following. For example, 2 as the digit in measuring range 1 results in 5 as the digit in measuring range 2.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	Yes
Disabled in legal-for-trade mode	Yes
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

1) Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning	Define the switch point for the second measuring range or single-range balance
Range/data	0: Single-range balance 1 ... 1,599,999 for NOV with parameter P1 = 0, otherwise 0 ... ±160% of NOV: Switch point for dual-range scale
Number of ASCII characters with serial interface	8 (7 digits with sign)

Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2110*hex* (hexadecimal)
	Subindex	08*hex* (hexadecimal)
DeviceNet	**Class**	101
	Instance	2
	Attribute	8
PROFIBUS	**Slot**	0
	Index	63

10.112 MRM (Multi-Range Mode)

Sets or reads the method of switching to weighing range 1 for a multi-range scale.
See also second weighing range, Multi-range scale, SCR.

No. of parameters	1
Factory setting	10
Response time	<10 ms
Password protection[1)]	Yes
Disabled in legal-for-trade mode	Yes
Save parameters	TDD1
Available starting with firmware version	P81 (electronics units with P81 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS are used.

Parameter P1

Meaning		Method of switching to weighing range 1
Range/data		0: Automatic (gross or net) 1: Gross only 2: Manual, see SCR
Number of ASCII characters with serial interface		1
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2110*hex* (hexadecimal)
	Subindex	0F*hex* (hexadecimal)

DeviceNet	**Class**	101
	Instance	2
	Attribute	15
PROFIBUS		Not available

10.113 MSV (Measured Signal Value)

Reads out the current measured value and depending on the setting the status as well. See also Measured value status (CANopen) and Measured value status (DeviceNet)

The output format for serial interfaces depends on COF. The measured value can be the gross or net value.

Special forms of the command

`MSV?;` generates the current measured value (and status).

`MSV?0;` starts continuous data output. You cannot use this command in two-wire mode.

`MSV?x;` starts output of x data sets. A maximum of 65,535 data sets are possible. The end identifier crlf is not generated until after the last measured value (or status) unless you use the TEX command with parameter P1 > 127.

No. of parameters	Writing: 1 (optional) Reading: 2 (P2 is optional)
Factory setting	–
Response time	Depends on the filter mode (FMD), filter (ASF) and index (P1) of the output rate (ICR) FMD0/2/3/4: $<2^{ICR} * 1.6$ ms + 1.6 ms FMD1 and ASF0: $<2^{ICR} * 1.6$ ms + 1.6 ms FMD1: $<2^{ICR}$ * ASF-Parameter * 1.6 ms + 1.6 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Measured value
Range/data		Input: 0 ... 65,535 Output: ±1,599,999 for NOV with parameter P1 = 0, otherwise ±NOV
Number and type of characters for the serial interface		Depends on COF
Data type otherwise		*SINT32* (Signed Integer 32 bit)
Access		*R* (Read only)
CANopen	Index	2000*hex* (hexadecimal)
	Subindex	01*hex* (hexadecimal)
DeviceNet	Class	100
	Instance	1
	Attribute	1
PROFIBUS	Slot	0
	Index	10

Parameter P2 (only possible for output)

Meaning		Status
Range/data		0 ... 65,536
Number and type of characters for the serial interface		Depends on COF
Data type otherwise		*UINT16* (Unsigned Integer 16 bit)
Access		*R* (Read only)
CANopen	Index	2000*hex* (hexadecimal)
	Subindex	02*hex* (hexadecimal)

DeviceNet	**Class**	100
	Instance	1
	Attribute	2
PROFIBUS	**Slot**	0
	Index	14

Meaning of the bits in the measured value status

The status information depends on the operating mode (IMD command) and the CSM command (normal or extended measured value status).

See also ERR, ESR.

Only 8 bits are sent to the serial interfaces. For CANopen and DeviceNet up to 16 bits are available in the measured value status.

IMD with parameter P1 = 0 and CSM with parameter P1 = 0, standard mode

Bit	Meaning when bit is set (= 1)
7 6	Error, measured value output is no longer possible in the chosen configuration. The data rate and transmission speed are no longer compatible (baud rate too low)
5	Limit value 2 active (LIV2)
4	Limit value 1 active (LIV1)
3	Standstill (MTD)
2	A/D converter (ADU) overflow/underflow
1	Gross overflow (e.g. scaling too sensitive)
0	Net overflow (e.g. tare value too high)

IMD with parameter P1 = 1 and CSM with parameter P1 = 0, trigger mode

Bit	Meaning when bit is set (= 1)
7	Error, measured value output is no longer possible in the chosen configuration. The data rate and transmission speed are no longer compatible (baud rate too low)
6	Trigger function active (TRC) or error if bit 7 is also active (then the trigger status will be overwritten)
5	Limit value 2 active (LIV2)
4	Limit value 1 active (LIV1)
3	Standstill (MTD)
2	A/D converter (ADU) overflow/underflow
1	Gross overflow (e.g. scaling too sensitive)
0	Net overflow (e.g. tare value too high)

IMD with parameter P1 = 2 and CSM with parameter P1 = 0, dosing mode

Bit	Meaning when bit is set (= 1)
7	Alarm dependent on SDF function: If an alarm bit of the monitor functions is activated, this bit and output OUT4 will be activated (see also OMD). This bit and OUT4 are reset when – there is no more overflow, – the BRK command is sent, – the digital input for Stop filling is set, – the next RUN command is sent.
6	Ready signal for batching (FRS can be read out) or emptying active
5	Fine flow active
4	Coarse flow active
3	Standstill (MTD)
2	A/D converter (ADU) overflow/underflow
1	Gross overflow (e.g. scaling too sensitive)
0	Net overflow (e.g. tare value too high)

IMD with parameter P1 = 0 and CSM with parameter P1 = 2, standard mode with extended measured value status

Bit	Meaning when bit is set (= 1)
7	Error, see also ESR
6	Measuring range 2 active (bit 6 = 0 means measuring range 1 is active), see also MRA
5	Limit value 2 active (LIV2)
4	Limit value 1 active (LIV1)
3	Standstill (MTD)
2	–
1	True zero (0 ± 0.25 d)
0	Gross (bit0 = 0 means the net signal will be transmitted), see also TAS

IMD with parameter P1 = 1 and CSM with parameter P1 = 2, trigger mode with extended measured value status

Bit	Meaning when bit is set (= 1)
7	Error, see ESR
6	Trigger function active (TRC)
5	Limit value 2 active (LIV2)
4	Limit value 1 active (LIV1)
3	Standstill (MTD)
2	Trigger result available (MAV)
1	True zero (0 ± 0.25 d)
0	Gross (bit0 = 0 means the net signal will be transmitted), see also TAS

IMD with parameter P1 = 2 and CSM with parameter P1 = 2, dosing mode with extended measured value status

Bit	Meaning when bit is set (= 1)
7	Error, see ESR
6	Alarm output active (SDF)
5	Fill flow active, see also CBK, FBK
4	Emptying active, see also EWT
3	Redosing active, see also RDS
2	Batching ready signal (FRS can be read out)
1	Fine flow active
0	Coarse flow active

10.114 MSW (Minimum Start Weight)

Sets or reads the minimum start weight for batching.

The batching process is not started if the current gross value is less than the minimum start weight. Use this command and the empty weight (EWT) to define the range in which the batching start will be performed. However, the two functions are independent of each other.

This setting is ignored for deduction weighing (DMD command with parameter P1 = 1).

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

<table>
<tr><td colspan="2">Meaning</td><td>Minimum start weight</td></tr>
<tr><td colspan="2">Range/data</td><td>0 … 1,599,999 for NOV with parameter P1 = 0, otherwise
0 … 160% of NOV</td></tr>
<tr><td colspan="2">Number of ASCII characters with serial interface</td><td>8 (7 digits with sign)</td></tr>
<tr><td colspan="2">Data type</td><td>SINT32 (Signed Integer 32 bit)</td></tr>
<tr><td colspan="2">Access</td><td>R/W (Read/Write)</td></tr>
<tr><td rowspan="2">CANopen</td><td>Index</td><td>2210hex (hexadecimal)</td></tr>
<tr><td>Subindex</td><td>0Bhex (hexadecimal)</td></tr>
<tr><td rowspan="3">DeviceNet</td><td>Class</td><td>102</td></tr>
<tr><td>Instance</td><td>2</td></tr>
<tr><td>Attribute</td><td>11</td></tr>
<tr><td rowspan="2">PROFIBUS</td><td>Slot</td><td>0</td></tr>
<tr><td>Index</td><td>198</td></tr>
</table>

10.115 MTD (Motion Detection)

Sets or reads the range for motion detection.

The range refers to the nominal value set with the NOV command. Motion detection is performed at 1 d/s if you turn off user-defined scaling (NOV with parameter P1 = 0) or set scaling to over 100,000.

Information about whether the measured values within one second fall within the selected standstill range is transferred in measurement status information (see command MSV) in bit 3. If motion detection is deactivated, the bit is still 1.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	Yes
Disabled in legal-for-trade mode	Yes
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

1) Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Range for motion detection
Range/data		0: Standstill recognition deactivated 1: ±0.25 d/s of NOV 2: ±0.5 d/s of NOV 3: ±1 d/s of NOV 4: ±2 d/s of NOV 5: ±3 d/s of NOV
Number of ASCII characters with serial interface		2
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	Index	2110*hex* (hexadecimal)
	Subindex	09*hex* (hexadecimal)
DeviceNet	Class	101
	Instance	2
	Attribute	9
PROFIBUS	Slot	0
	Index	65

10.116 MUX (Control of Digital Outputs OUT5 And OUT6)

Sets the digital outputs 5 and 6, if present and IMD with parameter P1 = 2 (dosing mode) and OMD with parameter P1 > 0 is used.

This command was retained for compatibility reasons. On the *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics units use commands OM5, OM6 and OS5, OS6 instead.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in Legal-For-Trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

1) Only available if serial interfaces or PROFIBUS are used.

Parameter P1

Meaning		Set digital outputs 5 and 6
Range/data		0: OUT5 and OUT6 = Low 4: OUT5 = High, OUT6 = Low 8: OUT5 = Low, OUT6 = High 12: OUT5 and OUT6 = High All other values do not result in an error, and are not answered with `?CrLf` !
Number of ASCII characters with serial interface		2
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2450*hex* (hexadecimal)
	Subindex	01*hex* (hexadecimal)
DeviceNet	**Class**	110
	Instance	6
	Attribute	1
PROFIBUS	**Slot**	0
	Index	64

10.117 MVC (Retrigger Mean Value Count)

Sets or reads the number of segments of measuring time (see TRC command, parameter P5) over which the mean value will be calculated if you are using pre-triggering operating mode via level (TRC command with parameter P2 = 0).

As soon as the mean value is outside of the tolerance band (plus and minus) assigned with the RTB command, re-triggering occurs, which restarts the measuring time. P1 of RTB must be greater than 0, otherwise there will be no retriggering.

See also Pre-triggering via level, Re-triggering.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P64.4 (electronics units with P64.4 see Firmware overview), P77.9 (electronics units with P77.9 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Number of segments of measuring time over which the mean value will be formed for retriggering
Range/data		0 … 99
Number of ASCII characters with serial interface		2
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	Index	2030*hex* (hexadecimal)
	Subindex	1A*hex* (hexadecimal)
DeviceNet	Class	100
	Instance	4
	Attribute	26
PROFIBUS	Slot	0
	Index	181

10.118 NAM (Manufacturer)

Sets or reads the manufacturer code.
See also HWV, IDN, PDT, PZN, SNR, SRV, SWI, SWV.

No. of parameters	1
Factory setting	"HBM"
Response time	<10 ms
Password protection [1)]	Yes
Disabled in Legal-For-Trade mode	No
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

1) Only available if serial interfaces or PROFIBUS are used.

Parameter P1

Meaning		Manufacturer code
Range/data		–
Number of ASCII characters with serial interface		3
Data type		Text (ASCII), 3 characters
Access		*R* (Read only)
CANopen	**Index**	2520*hex* (hexadecimal)
	Subindex	02*hex* (hexadecimal)
DeviceNet	**Class**	120
	Instance	1
	Attribute	8
PROFIBUS	**Slot**	0
	Index	110

10.119 NDS (Number of Dosings)

Reads out the dosing counter (number of dosing results).

Each time there is a dosing result, the counter is increased by 1. Use the CSN command to clear the counter. Turning on the supply voltage again and the RES command also clear the counter. The counter does not overflow. It stops when it reaches 65,535 if it is not cleared.

Cumulative weight memory SUM, the mean value (SDM) and the standard deviation (SDS) of the dosing results as well as the dosing counter are updated simultaneously. This means that the cumulative weight memory represents the sum of dosing results for the number of batching processes specified in the dosing counter.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Dosing counter
Range/data		0 … 65,535
Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R* (Read only)
CANopen	Index	2230*hex* (hexadecimal)
	Subindex	05*hex* (hexadecimal)
DeviceNet	Class	102
	Instance	4
	Attribute	5
PROFIBUS	Slot	0
	Index	20

10.120 NOV (Nominal Value)

Sets or reads the user-defined scaling.

ASCII measurement output is scaled at the factory to 1,000,000. Enter the number that will be generated for maximum capacity with this command. For a measurement output of 2000 digits at maximum capacity, use `NOV2000;` as the command.

If user-defined scaling is active, the parameters for the limit values (LIV1 to LIV4), the level value of the trigger function (TRC), the peak values (PVA), trigger result (MAV) and tare value (TAV) are scaled with NOV.

After balancing with LDW/LWT, first set the user-defined scaling and then the other parameters.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	Yes
Disabled in legal-for-trade mode	Yes
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning	User scaling
Range/data	0: User-defined scaling deactivated 1 … 1,599,999: Value at maximum capacity
Number of ASCII characters with serial interface	8 (7 digits with sign)
Data type	*SINT32* (Signed Integer 32 bit)

Access		*R/W* (Read/Write)
CANopen	Index	2110*hex* (hexadecimal)
	Subindex	0A*hex* (hexadecimal)
DeviceNet	Class	101
	Instance	2
	Attribute	10
PROFIBUS	Slot	0
	Index	39

Output format and output value for maximum capacity depending on P1

Output format	Value with P1 = 0	Value with P1 > 0
2 byte binary	20000	NOV value
4 byte binary	5120000	NOV value
ASCII	1000000	NOV value

10.121 NTF (Notch Filter)

Sets or reads the preset notch filters when the filter mode is FMD with parameter P1 = 2, 3 or 4.
As from P80 (electronics units with P80 see Firmware overview), the function is available in all FMD filter modes.
See also ADF, HSM.

The notch filters are connected on line side of the respective low-pass filter (ASF command).

See Filter mode, Notch filter.

No. of parameters	2
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in Legal-For-Trade mode	No
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning	Notch filter 1
Range/data	0: Filter deactivated 1 … 63: Filter active
Number of ASCII characters with serial interface	2
Data type	*UINT8* (Unsigned Integer 8 bit)
Access	*R/W* (Read/Write)

CANopen	Index	24C0*hex* (hexadecimal)
	Subindex	06*hex* (hexadecimal)
DeviceNet	Class	110
	Instance	13
	Attribute	6
PROFIBUS	Slot	0
	Index	60

Parameter P2

Meaning		Notch filter 2
Range/data		0: Filter deactivated 1 … 63: Filter active
Number of ASCII characters with serial interface		2
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	Index	24C0*hex* (hexadecimal)
	Subindex	07*hex* (hexadecimal)
DeviceNet	Class	110
	Instance	13
	Attribute	7
PROFIBUS	Slot	0
	Index	61

Calculation of the notch frequency with parameter P known

For parameter P set with the NTF command, the notch frequency of the notch filter at the standard analog-to-digital converter sample rate (HSM with parameter P1 = 0) is:

$$f_{notch} = 610 / (2 * (P-1))$$

For the increased analog-to-digital converter sample rate (HSM with parameter P1 = 1) use:

$$f_{notch} = 1220 / (2 * (P-1))$$

Please note: For electronics with P7x, put 613 instead of 610 and 1226 instead of 1220.

For electronics with P50 (electronics with P50 see Firmware overview) and AD105D applies differently:

$$f_{notch} = 100 / (2 * (P-1))$$

and with increased ADC sample rate

$$f_{notch} = 200 / (2 * (P-1))$$

Calculation of parameter P with known interference frequency f_{notch}

Use the same equation to calculate the NTF parameter P with known interference frequency and standard analog-to-digital converter sample rate (HSM with parameter P1 = 0):

$$P = 1 + 610 / (2 * f_{notch})$$

For the increased analog-to-digital converter sample rate (HSM with parameter P1 = 1) use:

$$P = 1 + 1220 / (2 * f_{notch})$$

Please note: For electronics with P7x, put 613 instead of 610 and 1226 instead of 1220.

For electronics with P50 (electronics with P50 see Firmware overview) and AD105D applies differently:

$$P = 1 + 100 / (2 * f_{notch})$$

and with increased ADC sample rate

$$P = 1 + 200 / (2 * f_{notch})$$

Settling time calculation

Each filter increases the settling time. The settling time in milliseconds depending on parameter P at the standard analog-to-digital converter sample rate (HSM with parameter P1 = 0) is:

$$T_{delay} = P * 1000 / 610$$

For the increased analog-to-digital converter sample rate (HSM with parameter P1 = 1) use:

$$T_{delay} = P * 1000 / 1220$$

Please note: For electronics with P7x, put 613 instead of 610 and 1226 instead of 1220.

For electronics with P50 (electronics with P50 see Firmware overview) and AD105D applies differently:

T_{delay} = P * 1000 / 100

and with increased ADC sample rate

T_{delay} = P * 1000 / 200

Note that this time applies to each filter. If you activate multiple filters, the resulting times must be added.

Example:

The interference frequency is 5.1 Hz and is used as the standard analog-to-digital converter sample rate (HSM0).

P = 1+ 610 / (2 * 5.1)

This results in a value of 60 (rounded) for P. The additional settling time is:

T_{delay} = 60 * 1000 / 610 ≈ 100 ms

So send the `NTF60;` command for the first notch filter or `NTF,60;` for the second.

10.122 OM1 (Output Mode Output 1)

Sets or reads the function of digital output 1.

It must be possible to assign the function of the outputs freely (IOM command with parameter P1 = 1). Otherwise the command will not have any effect.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in Legal-For-Trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning	Function of digital output 1
Range/data	0: No function 1: Manual with command OS1 2: Limit switch 1 3: Limit switch 2 4: Limit switch 3 5: Limit switch 4 6: Stop material flow (only for MultiHead application with IMD and parameter P1 = 1) 7: Coarse flow (only for batching with IMD and parameter P1 = 2) 8: Fine flow (only for batching with IMD and parameter P1 = 2) 9: Ready signal (only for batching with IMD and parameter P1 = 2) 10: Upper tolerance limit exceeded (only for batching with IMD and parameter P1 = 2) 11: Lower tolerance limit undershot (only for batching with IMD and parameter P1 = 2) 12: Tolerance limits exceeded or undershot (only for batching with IMD and parameter P1 = 2) 13: Alarm exceeded (only for batching with IMD and parameter P1 = 2) 14: The output is controlled by commands DL1/DL2 15: Limit value 1 (flashing) 16: Limit value 2 (flashing) 17: Limit value 3 (flashing) 18: Limit value 4 (flashing) 19: PAD/AD105D: Sync master or slave, otherwise not used
Number of ASCII characters with serial interface	2
Data type	*UINT8* (Unsigned Integer 8 bit)
Access	*R/W* (Read/Write)

CANopen	**Index**	2021*hex* (hexadecimal)
	Subindex	01*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	9
	Attribute	1
PROFIBUS		Not available

10.123 OM2 (Output Mode Output 2)

Sets or reads the function of digital output 2.

It must be possible to assign the function of the outputs freely (IOM command with parameter P1 = 1). Otherwise the command will not have any effect.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in Legal-For-Trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning	Function of digital output 2
Range/data	0: No function 1: Manual with command OS2 2: Limit switch 1 3: Limit switch 2 4: Limit switch 3 5: Limit switch 4 6: Stop material flow (only for MultiHead application with IMD and parameter P1 = 1) 7: Coarse flow (only for batching with IMD and parameter P1 = 2) 8: Fine flow (only for batching with IMD and parameter P1 = 2) 9: Ready signal (only for batching with IMD and parameter P1 = 2) 10: Upper tolerance limit exceeded (only for batching with IMD and parameter P1 = 2) 11: Lower tolerance limit undershot (only for batching with IMD and parameter P1 = 2) 12: Tolerance limits exceeded or undershot (only for batching with IMD and parameter P1 = 2) 13: Alarm exceeded (only for batching with IMD and parameter P1 = 2) 14: The output is controlled by commands DL1/DL2 15: Limit value 1 (flashing) 16: Limit value 2 (flashing) 17: Limit value 3 (flashing) 18: Limit value 4 (flashing) 19: PAD/AD105D: Sync master or slave, otherwise not used
Number of ASCII characters with serial interface	2
Data type	*UINT8* (Unsigned Integer 8 bit)
Access	*R/W* (Read/Write)

CANopen	**Index**	2021*hex* (hexadecimal)
	Subindex	02*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	9
	Attribute	2
PROFIBUS		Not available

10.124 OM3 (Output Mode Output 3)

Sets or reads the function of digital output 3.

It must be possible to assign the function of the outputs freely (IOM command with parameter P1 = 1). Otherwise the command will not have any effect.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in Legal-For-Trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning	Function of digital output 3
Range/data	0: No function 1: Manual with command OS3 2: Limit switch 1 3: Limit switch 2 4: Limit switch 3 5: Limit switch 4 6: Stop material flow (only for MultiHead application with IMD and parameter P1 = 1) 7: Coarse flow (only for batching with IMD and parameter P1 = 2) 8: Fine flow (only for batching with IMD and parameter P1 = 2) 9: Ready signal (only for batching with IMD and parameter P1 = 2) 10: Upper tolerance limit exceeded (only for batching with IMD and parameter P1 = 2) 11: Lower tolerance limit undershot (only for batching with IMD and parameter P1 = 2) 12: Tolerance limits exceeded or undershot (only for batching with IMD and parameter P1 = 2) 13: Alarm exceeded (only for batching with IMD and parameter P1 = 2) 14: The output is controlled by commands DL1/DL2 15: Limit value 1 (flashing) 16: Limit value 2 (flashing) 17: Limit value 3 (flashing) 18: Limit value 4 (flashing) 19: PAD/AD105D: Sync master or slave, otherwise not used
Number of ASCII characters with serial interface	2
Data type	*UINT8* (Unsigned Integer 8 bit)
Access	*R/W* (Read/Write)

CANopen	**Index**	2021*hex* (hexadecimal)
	Subindex	03*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	9
	Attribute	3
PROFIBUS		Not available

10.125 OM4 (Output Mode Output 4)

Sets or reads the function of digital output 4.

It must be possible to assign the function of the outputs freely (IOM command with parameter P1 = 1). Otherwise the command will not have any effect.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in Legal-For-Trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

1) Only available if serial interfaces are used.

Parameter P1

Meaning	Function of digital output 4
Range/data	0: No function 1: Manual with command OS4 2: Limit switch 1 3: Limit switch 2 4: Limit switch 3 5: Limit switch 4 6: Stop material flow (only for MultiHead application with IMD and parameter P1 = 1) 7: Coarse flow (only for batching with IMD and parameter P1 = 2) 8: Fine flow (only for batching with IMD and parameter P1 = 2) 9: Ready signal (only for batching with IMD and parameter P1 = 2) 10: Upper tolerance limit exceeded (only for batching with IMD and parameter P1 = 2) 11: Lower tolerance limit undershot (only for batching with IMD and parameter P1 = 2) 12: Tolerance limits exceeded or undershot (only for batching with IMD and parameter P1 = 2) 13: Alarm exceeded (only for batching with IMD and parameter P1 = 2) 14: The output is controlled by commands DL1/DL2 15: Limit value 1 (flashing) 16: Limit value 2 (flashing) 17: Limit value 3 (flashing) 18: Limit value 4 (flashing) 19: PAD/AD105D: Sync master or slave, otherwise not used
Number of ASCII characters with serial interface	2
Data type	*UINT8* (Unsigned Integer 8 bit)
Access	*R/W* (Read/Write)

CANopen	Index	2021*hex* (hexadecimal)
	Subindex	04*hex* (hexadecimal)
DeviceNet	Class	100
	Instance	9
	Attribute	4
PROFIBUS		Not available

10.126 OM5 (Output Mode Output 5)

Sets or reads the function of digital output 5.

It must be possible to assign the function of the outputs freely (IOM command with parameter P1 = 1). Otherwise the command will not have any effect.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in Legal-For-Trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

1) Only available if serial interfaces are used.

Parameter P1

Meaning	Function of digital output 5
Range/data	0: No function 1: Manual with command OS5 2: Limit switch 1 3: Limit switch 2 4: Limit switch 3 5: Limit switch 4 6: Stop material flow (only for MultiHead application with IMD and parameter P1 = 1) 7: Coarse flow (only for batching with IMD and parameter P1 = 2) 8: Fine flow (only for batching with IMD and parameter P1 = 2) 9: Ready signal (only for batching with IMD and parameter P1 = 2) 10: Upper tolerance limit exceeded (only for batching with IMD and parameter P1 = 2) 11: Lower tolerance limit undershot (only for batching with IMD and parameter P1 = 2) 12: Tolerance limits exceeded or undershot (only for batching with IMD and parameter P1 = 2) 13: Alarm exceeded (only for batching with IMD and parameter P1 = 2) 14: The output is controlled by commands DL1/DL2 15: Limit value 1 (flashing) 16: Limit value 2 (flashing) 17: Limit value 3 (flashing) 18: Limit value 4 (flashing) 19: PAD/AD105D: Sync master or slave, otherwise not used
Number of ASCII characters with serial interface	2
Data type	*UINT8* (Unsigned Integer 8 bit)
Access	*R/W* (Read/Write)

CANopen	**Index**	2021*hex* (hexadecimal)
	Subindex	05*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	9
	Attribute	5
PROFIBUS		Not available

10.127 OM6 (Output Mode Output 6)

Sets or reads the function of digital output 6.

It must be possible to assign the function of the outputs freely (IOM command with parameter P1 = 1). Otherwise the command will not have any effect.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1]	No
Disabled in Legal-For-Trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1] Only available if serial interfaces are used.

Parameter P1

Meaning	Function of digital output 6
Range/data	0: No function 1: Manual with command OS6 2: Limit switch 1 3: Limit switch 2 4: Limit switch 3 5: Limit switch 4 6: Stop material flow (only for MultiHead application with IMD and parameter P1 = 1) 7: Coarse flow (only for batching with IMD and parameter P1 = 2) 8: Fine flow (only for batching with IMD and parameter P1 = 2) 9: Ready signal (only for batching with IMD and parameter P1 = 2) 10: Upper tolerance limit exceeded (only for batching with IMD and parameter P1 = 2) 11: Lower tolerance limit undershot (only for batching with IMD and parameter P1 = 2) 12: Tolerance limits exceeded or undershot (only for batching with IMD and parameter P1 = 2) 13: Alarm exceeded (only for batching with IMD and parameter P1 = 2) 14: The output is controlled by commands DL1/DL2 15: Limit value 1 (flashing) 16: Limit value 2 (flashing) 17: Limit value 3 (flashing) 18: Limit value 4 (flashing) 19: PAD/AD105D: Sync master or slave, otherwise not used
Number of ASCII characters with serial interface	2
Data type	*UINT8* (Unsigned Integer 8 bit)
Access	*R/W* (Read/Write)

CANopen	**Index**	2021*hex* (hexadecimal)
	Subindex	06*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	9
	Attribute	6
PROFIBUS		Not available

10.128 OMD (Output Mode)

Sets or reads the function of digital outputs 4 to 6 if present. The function of digital outputs 1 to 3 is always identical.

This command was retained for compatibility reasons. On the *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics units use commands OM1 to OM6 instead.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P64.3 (electronics units with P64.3 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS are used.

Parameter P1

Meaning		Function of outputs
Range/data		0 … 3[1)]
Number of ASCII characters with serial interface		2
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2200*hex* (hexadecimal)
	Subindex	06*hex* (hexadecimal)

DeviceNet	**Class**	102
	Instance	1
	Attribute	6
PROFIBUS	**Slot**	0
	Index	88

[1)] P1 = 3 is only available as from P64.3 or P77.8 respectively.

Meaning of values for P1 depending on the output

P1	OUT1	OUT2	OUT3[1)]	OUT4	OUT5	OUT6
0	Coarse flow	Fine flow	Ready signal/Emptying	Upper tolerance limit exceeded	Lower tolerance limit undershot	Alarm
1	Coarse flow	Fine flow	Ready signal/Emptying	Error with tolerance limits	Depends on MUX command	
2	Coarse flow	Fine flow	Ready signal/Emptying	Alarm	Depends on MUX command	
3	Coarse flow	Fine flow	Ready signal/Emptying	Depends on commands DL1/DL2	Depends on MUX command	

[1)] The specified emptying time (EPT) determines whether the ready signal function or the emptying function will be used for OUT3.

10.129 OS1 (Digital Output 1)

Reads the state of digital output 1.

If you have used the OM1 command with parameter P1 = 1 (manual mode), you can also set the output.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1] Only available if serial interfaces are used.

Parameter P1

Meaning		Digital output 1
Range/data		0 ... 1
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		Standard: *R* (Read only) For OM1 with P1 = 1: *R/W* (Read/Write)
CANopen	**Index**	2020*hex* (hexadecimal)
	Subindex	1E*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	3
	Attribute	30
PROFIBUS		Not available

10.130 OS2 (Digital Output 2)

Reads the state of digital output 2.

If you have used the OM2 command with parameter P1 = 1 (manual mode), you can also set the output.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Digital output 2
Range/data		0 ... 1
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		Standard: *R* (Read only) For OM2 with P1 = 1: *R/W* (Read/Write)
CANopen	**Index**	2020*hex* (hexadecimal)
	Subindex	1F*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	3
	Attribute	31
PROFIBUS		Not available

10.131 OS3 (Digital Output 3)

Reads the state of digital output 3.

If you have used the OM3 command with parameter P1 = 1 (manual mode), you can also set the output.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1] Only available if serial interfaces are used.

Parameter P1

Meaning		Digital output 3
Range/data		0 ... 1
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		Standard: *R* (Read only) For OM3 with P1 = 1: *R/W* (Read/Write)
CANopen	**Index**	2020*hex* (hexadecimal)
	Subindex	20*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	3
	Attribute	32
PROFIBUS		Not available

10.132 OS4 (Digital Output 4)

Reads the state of digital output 4.

If you have used the OM4 command with parameter P1 = 1 (manual mode), you can also set the output.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Digital output 4
Range/data		0 ... 1
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		Standard: *R* (Read only) For OM4 with P1 = 1: *R/W* (Read/Write)
CANopen	**Index**	2020*hex* (hexadecimal)
	Subindex	21*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	3
	Attribute	33
PROFIBUS		Not available

10.133 OS5 (Digital Output 5)

Reads the state of digital output 5.

If you have used the OM5 command with parameter P1 = 1 (manual mode), you can also set the output.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Digital output 5
Range/data		0 ... 1
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		Standard: *R* (Read only) For OM5 with P1 = 1: *R/W* (Read/Write)
CANopen	**Index**	2020*hex* (hexadecimal)
	Subindex	22*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	3
	Attribute	34
PROFIBUS		Not available

10.134 OS6 (Digital Output 6)

Reads the state of digital output 6.

If you have used the OM6 command with parameter P1 = 1 (manual mode), you can also set the output.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection [1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Digital output 6
Range/data		0 ... 1
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		Standard: *R* (Read only) For OM6 with P1 = 1: *R/W* (Read/Write)
CANopen	**Index**	2020*hex* (hexadecimal)
	Subindex	23*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	3
	Attribute	35
PROFIBUS		Not available

10.135 OSN (Optimization)

Sets or reads the degree of optimization.

When optimization is active, the coarse flow (CFD) and fine flow (FFD) are optimized by the sensor electronics. The minimum fine flow weight (FFM) ensures that the tolerances will be observed. This limit prevents the fine flow component being minimized still further by increasing the coarse flow component.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning	Optimization
Range/data	0: Optimization deactivated 1: Highest degree of optimization 2: Medium degree of optimization 3: Lowest degree of optimization
Number of ASCII characters with serial interface	2
Data type	*UINT8* (Unsigned Integer 8 bit)
Access	*R/W* (Read/Write)

CANopen	**Index**	2200_{hex} (hexadecimal)
	Subindex	07_{hex} (hexadecimal)
DeviceNet	**Class**	102
	Instance	1
	Attribute	7
PROFIBUS	**Slot**	0
	Index	86

Effect of the degree of optimization

A portion of the material oversupply or undersupply is taken into account at the next fine flow cut-off point. The quantity depends on the degree of optimization and the difference between the actual weight and the target weight. The factor used to calculate the quantity is the correction factor, and ranges from 0.25 to 1.

Degree of optimization	Difference between current weight and target weight in %		
1	<0.2	0.2 … 0.4	>0.4
2	<0.6	0.6 … 1.2	>1.2
3	<2.0	2 … 4	>4
Resulting correction factor	**0.25**	**0.5**	**1**

A correction factor of 1 means that the difference between the actual weight and target weight (either too much or not enough material added) will be included in the next cut-off point at a rate of 100%. A correction factor of 0.5 means the difference will only be included at a rate of 50%.

Example

Fine flow cut-off point 480 g, target weight 500 g. An actual weight of 505 g (1% too much) and a degree of optimization of 2 results in a correction factor of 0.5. So the fine flow cut-off point for the next process is set to 477.5 g (480 g minus 0.5 times 5 g).

10.136 PDT (Firmware Date)

Reads the date of the firmware in the format "hh:mm:ss, month day year", e.g. "08:54:23, Nov 15 2015".

See also HWV, IDN, NAM, PZN, SNR, SRV, SWI, SWV.

No. of parameters	–
Factory setting	–
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

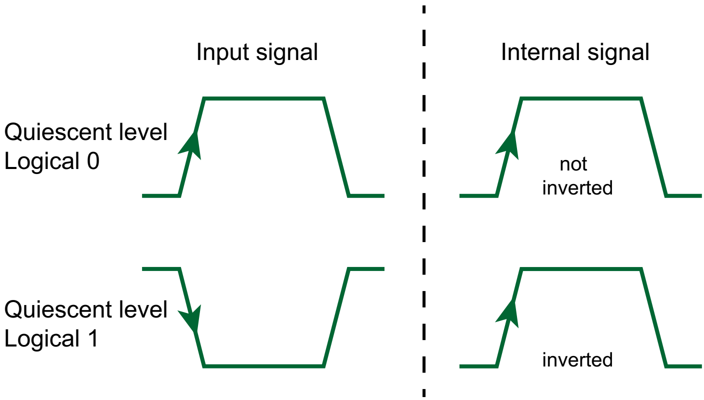
Information about the command

Meaning		Firmware date
Range/data		–
Data type		Text (ASCII)
Access		*R* (Read only)
CANopen	**Index**	2520*hex* (hexadecimal)
	Subindex	05*hex* (hexadecimal)
DeviceNet	**Class**	120
	Instance	1
	Attribute	10
PROFIBUS		Not available

10.137 POL (Light Sensor Polarity)

Sets or reads the polarity of the input signal range of the light sensor(s). Logical 0 is expected as the quiescent level in the default setting. You can invert the logic level if necessary with this command.

The command affects both inputs (IN1 *and* IN2).



No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

1) Only available if serial interfaces are used.

Parameter P1

Meaning		Polarity of the input signal range of the light sensor(s)
Range/data		0: Input signal not inverted 1: Input signal inverted
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2030*hex* (hexadecimal)
	Subindex	21*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	4
	Attribute	33
PROFIBUS		Not available

10.138 POR (Port Set And Read)

Sets or reads the status of the digital inputs and outputs.

This command was retained for compatibility reasons. On the *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics units instead use commands OS1 to OS6 for the outputs and IS1/IS2 for the inputs.

No. of parameters	2 for input 4 for output
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

1) Only available if serial interfaces or PROFIBUS are used.

Parameters P1 ... P4 with serial interface

Meaning	Status of digital inputs and outputs, P1 = OUT1, P2 = OUT2, P3 = IN1, P4 = IN2
Range/data	0: LOW 1: HIGH
Data type	*UINT8* (Unsigned Integer 8 bit)
Access	*R/W* (Read/Write)

Example

Command	`POR P1,P2;`	Input: Parameters P1 and P2 can be 0 or 1. Note that 0 = LOW and 1 = HIGH for digital outputs (P1 for OUT1, P2 for OUT2).
Command	`POR?;`	Query
Response	`0,1,1,0crlf`	The switching states of outputs OUT1 and OUT2 and the signal levels on the two inputs IN1 and IN2 are returned. If the limit values are activated (commands LIV1, etc.), the limit values states will be generated.

Parameters for CANopen

Meaning	Status of digital inputs and outputs
Read data	Bit 7: Short circuit on digital outputs Bit 6: Reserved Bit 5: Status OUT4 Bit 4: Status OUT3 Bit 3: Status OUT2 Bit 2: Status OUT1 Bit 1: Status IN2 Bit 0: Status IN1

Write data		Bit 7: Reserved Bit 6: Reserved Bit 5: Reserved Bit 4: Reserved Bit 3: Nominal status OUT4 Bit 2: Nominal status OUT3 Bit 1: Nominal status OUT2 Bit 0: Nominal status OUT1
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2020*hex* (hexadecimal)
	Subindex	03*hex* (hexadecimal)

Parameters for DeviceNet

Meaning	Status of digital inputs and outputs
Read data	Bit 7: Short circuit on digital outputs Bit 6: Reserved Bit 5: Status OUT4 Bit 4: Status OUT3 Bit 3: Status OUT2 Bit 2: Status OUT1 Bit 1: Status IN2 Bit 0: Status IN1
Write data	Bit 7: Reserved Bit 6: Reserved Bit 5: Reserved Bit 4: Reserved Bit 3: Nominal status OUT4 Bit 2: Nominal status OUT3 Bit 1: Nominal status OUT2 Bit 0: Nominal status OUT1
Data type	*UINT8* (Unsigned Integer 8 bit)
Access	*R/W* (Read/Write)

DeviceNet	Class	100
	Instance	3
	Attribute	3

Parameter PROFIBUS

Meaning		Status of digital inputs and outputs
Read data		Bit 3: Status IN2 Bit 2: Status IN1 Bit 1: Status OUT2 Bit 0: Status OUT1
Write data		Bit 1: Nominal status OUT2 Bit 0: Nominal status OUT1
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
PROFIBUS	Slot	0
	Index	17

10.139 PTD (Post-Trigger Delay)

Sets or reads the number of values by which the post-trigger will be delayed if you use the external post-triggering operating mode (command TRC with parameter P2 = 3).

The settling times (delays) of the signal differ depending on the filters that are used (ASF, FMD, NTF). You can compensate for this delay with PTD by increasing the number of measured values used for the trigger result. The following formula will return a rough approximation of parameter P1:

P1 = 0.2 * settling time of the filters in ms / time between two measured values in ms

Use the scope function of the PanelX program to determine the delay time between the trigger event and the drop in measured values, i.e. when the weight being measured leaves the weighing platform, and to determine the parameter more precisely.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P64.4 (electronics units with P64.4 see Firmware overview), P77.9 (electronics units with P77.9 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning	Delay of the post-trigger
Range/data	0 ... 99; the delay time is the time between measured values multiplied by the parameter value[1)]

Number of ASCII characters with serial interface		2
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2030*hex* (hexadecimal)
	Subindex	1E*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	4
	Attribute	30
PROFIBUS	**Slot**	0
	Index	171

1) Depending on parameter P1 of the HSM command, the time between two measured values is 1.66 ms (P1 = 0, 600 measured values/s) or 0.83 ms (P1 = 1, 1200 measured values/s).

10.140 PVA (Read Peak Value)

Reads the peak values (minimum and maximum).
See also Peak values, PVS, CPV.

You must activate peak value acquisition with the PVS command, otherwise no peak values will be available.
After the supply voltage is turned on again, peak values can be cleared with the RES command.

The output is scaled depending on NOV and without a decimal point.

No. of parameters	2
Factory setting	–
Response time	<10 ms
Password protection [1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning	Output peak value minimum
Range/data	±1,599,999 for NOV with parameter P1 = 0, otherwise ±NOV
Number of ASCII characters with serial interface	8 (7 digits with sign)
Data type	*SINT32* (Signed Integer 32 bit)
Access	*R* (Read only)

CANopen	Index	2020*hex* (hexadecimal)
	Subindex	04*hex* (hexadecimal)
DeviceNet	Class	100
	Instance	3
	Attribute	4
PROFIBUS	Slot	0
	Index	12

Parameter P2

Meaning		Output peak value minimum
Range/data		±1,599,999 for NOV with parameter P1 = 0, otherwise ±NOV
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R* (Read only)
CANopen	Index	2020*hex* (hexadecimal)
	Subindex	05*hex* (hexadecimal)
DeviceNet	Class	100
	Instance	3
	Attribute	5
PROFIBUS	Slot	0
	Index	13

Example

Command	`S05;`	Select the device with address 5.
Command	`PVA?;`	Read out peak values.

Response	`-0000355, 1000723crlf`	This results in a minimum of -355 digits and a maximum of +1,000,723 digits.

10.141 PVS (Peak Value Select)

Sets or reads the activation and monitored signal source of the peak value function (minimum and maximum).
See also Peak values, CPV, PVA.

No. of parameters	2
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Activation of peak values
Range/data		0: Peak value acquisition deactivated 1: Peak value acquisition activated
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2020*hex* (hexadecimal)
	Subindex	06*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	3
	Attribute	6
PROFIBUS	**Slot**	0
	Index	54

Parameter P2

Meaning		Signal source of the peak value function
Range/data		0: Net signal 1: Gross signal 2: trigger results
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2020*hex* (hexadecimal)
	Subindex	07*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	3
	Attribute	7
PROFIBUS	**Slot**	0
	Index	54

10.142 PZN (Check Number)

Reads the check number used to identify the version in legal-for-trade applications. For SWI = 80 the check number is 240413; for SWI = 81 it is 244554 (as stated in the OIML approval).

See also HWV, IDN, NAM, PDT, SNR, SRV, SWI, SWV.

The check number is formed from the version numbers of the software modules. The parameterization of the sensor electronics has no effect on the check number.

No. of parameters	–
Factory setting	–
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Information about the command

Meaning		Check number
Range/data		–
Number of ASCII characters with serial interface		7
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R* (Read only)
CANopen	**Index**	2300*hex* (hexadecimal)
	Subindex	04*hex* (hexadecimal)

DeviceNet	**Class**	130
	Instance	1
	Attribute	4
PROFIBUS		Not available

10.143 RDP (Select Dosing Parameter Set)

Sets or reads the parameter set for the next batching start.

A maximum of 32 parameter sets are available. They are saved in memory and retained through a power failure. The parameter set that was current during the last TDD command with parameter P1 = 1 is activated when the supply voltage is turned on again or with the RES command.

See also FNB, WDP, Filler.

The parameter set contains:

- The number of the parameter set
- The dosing parameters (weight values, time values, etc.)
- The dosing results

Explanation of the function

Working memory (RAM) of the sensor electronics contains two parameter sets: one for dosing control and one for parameter changes during batching. When batching starts (RUN command or via digital input) the parameters from the area for parameter changes are copied to the area for dosing control and the batching process starts. During the batching process you can change the parameters of the active parameter set (in the area for parameter changes). These changes have no effect on the batching process that is running. They do not take effect until the next batching process. After the batching process the dosing results from the dosing control area are written to the parameter changes area. Then they can be read out. If optimization is activated, the cut-off points for coarse flow and fine flow (CFD and FFD) are also updated.

If you send the RDP command during a batching process, the new parameters will not be applied from non-volatile memory until the start of the next batching process. The results of the last process can therefore be read until the next process starts.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No

Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Selection of parameter set for the next dosing start
Range/data		0 ... 31
Number of ASCII characters with serial interface		2
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2200*hex* (hexadecimal)
	Subindex	02*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	1
	Attribute	2
PROFIBUS	**Slot**	0
	Index	56

10.144 RDS (Redosing)

Sets or reads whether a redosing process is activated.
See also Filler.

The result of redosing does not change the cut-off points when optimization is set (OSN command with parameter P1 > 0). The previously measured actual value must be below the tolerance limit. Otherwise no redosing will be performed.

Redosing occurs with fine flow.

You can also turn on coarse flow briefly at the beginning of redosing with the VCT command and parameter P1 = 0 until a rise in the weight value is detected so that the fine flow valve opens. This function is intended for valves that only open if coarse and fine flow are triggered.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

1) Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning	Redosing
Range/data	0: Redosing deactivated 1 … 3: Redosing occurs if the corresponding condition is fulfilled
Number of ASCII characters with serial interface	2

Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2200*hex* (hexadecimal)
	Subindex	08*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	1
	Attribute	8
PROFIBUS	**Slot**	0
	Index	90

Meaning of values for P1

P1	Redosing if	Redose when?
1	Fine flow cut-off point (FFD) < current measured value < lower tolerance limit (LTL)	At the start of the batch-ing process
2	the previously determined actual weight is less than the lower tolerance limit (LTL)	After checkweighing
3	Fine flow cut-off point (FFD) < current measured value < lower tolerance limit (LTL)	At the start of the batch-ing process
	or	or
	if the previously determined actual weight is less than the lower tolerance limit	After checkweighing

10.145 RES (Reset)

Starts a reset (warm start). This command does *not* generate a response.

All parameters are restored as they were saved during the last TDD command with parameter P1 = 1.

Use 0x7FFFFFFF as the parameter to send a command that does not use parameters via CANopen or DeviceNet.

No. of parameters	–
Factory setting	–
Response time	<3 s
Password protection [1]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1] Only available if serial interfaces are used.

Information about the command

Meaning		Starts a reset
Range/data		–
Data type		–
Access		*W* (Write only)
CANopen	**Index**	2D00*hex* (hexadecimal)
	Subindex	04*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	5
	Attribute	3
PROFIBUS		Not available

10.146 RFO (Residual Flow Last Dosing Cycle)

Reads out the material flow during the residual flow phase of the last batching process. Use a residual flow time (RFT) that is long enough so that the residual flow has ended when the filler result is determined.

No. of parameters	–
Factory setting	–
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P78.3 (electronics units with P78.3 see Firmware overview)

[1)] Only available if serial interfaces are used.

Information about the command

Meaning		Material flow during the residual flow phase of the last batching process
Range/data		0 … 1,638,399
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R* (Read only)
CANopen	**Index**	2000*hex* (hexadecimal)
	Subindex	0F*hex* (hexadecimal)

DeviceNet	**Class**	100
	Instance	1
	Attribute	15
PROFIBUS		Not available

10.147 RFT (Residual Flow Time)

Sets or reads the time interval for the residual flow.

The time for the residual flow starts after the fine flow cut-off point is reached. During this time, amount of material that has still to flow into the canister after fine flow is deactivated is acquired. The amount of material should be small and should be the same for every batching process if possible. It is important to record the residual flow for proper optimization and for an accurate actual weight value. The time to be set depends exclusively on the proportioning device.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Time interval for residual flow
Range/data		0: Residual flow deactivated 1 … 32,767: The activation time is parameter P1 * 10 ms
Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	Index	2220*hex* (hexadecimal)
	Subindex	07*hex* (hexadecimal)
DeviceNet	Class	102
	Instance	3
	Attribute	7
PROFIBUS	Slot	0
	Index	83

10.148 RIO (Read Status Digital I/O)

Reads the status of digital inputs and outputs (if present).

The descriptions below referring to the functions of digital inputs and outputs apply only to sensor electronics up to *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics and for *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics in compatibility mode (IOM command with parameter P1 = 0). For sensor electronics of *4th generation* FIT5A, FIT7A, PAD400x, PW15iA, you can define the function of the digital inputs yourself with the IM1 and IM2 commands, and the function of the digital outputs with commands OM1 to OM6 (IOM commands with parameter P1 = 1).

The function of the outputs depends on the setting of the digital inputs and outputs with the IMD command and activation of limit values (LIV1 to LIV4):

1. IMD with parameter P1 = 2 (dosing mode): Control outputs OUT1 … 6 are sent.
2. IMD with parameter P1 < 2 and active limit values: The states of the limit values are sent.
3. IMD with parameter P1 < 2 and deactivated limit values: Control outputs OUT1 … 6 are sent. OUT1 and OUT2 can also be set and read by the POR command.

No. of parameters	–
Factory setting	–
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

1) Only available if serial interfaces or PROFIBUS used.

Information about the command

Meaning		Status of digital inputs and outputs
Range/data		0 … 65,535
Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R* (Read only)
CANopen	**Index**	2020*hex* (hexadecimal)
	Subindex	12*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	3
	Attribute	18
PROFIBUS	**Slot**	0
	Index	126

Meaning of the status bits

Bit	Meaning
0	Status of input IN1 (1: active, 0: inactive)
1	Status of input IN2
2	Status of input OUT1 (1: active, 0: inactive)
3	Status of output OUT2
4	Status of output OUT3
5	Status of output OUT4
6	Status of output OUT5
7	Status of output OUT6
8	1: Thermal overload of outputs OUT1 … 4
9	1: true zero (±0.25 d)
10	1: Standstill (MTD)
11	1: Range 2, 0: Range 1 (multi-range scale, MRA)
12	1: Gross signal is sent, 0: Net signal is sent (TAS)
13	1: Overflow or underflow (gross or net measured value)
14	1: Indicating range exceeded (LFT)
15	1: Zero balance (CDT) performed; the bit is cleared after RIO is read.

10.149 RSN (Resolution)

Sets or reads the set resolution.

The increment limits the resolution of the measured value. The digit is automatically changed to the next larger value after switching to second measuring range with a dual-range balance (MRA command with parameter P1 > 0).

No. of parameters	1
Factory setting	1
Response time	<10 ms
Password protection[1)]	Yes
Disabled in legal-for-trade mode	Yes
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Digit
Range/data		1, 2, 5, 10, 20, 50, 100, 500
Number of ASCII characters with serial interface		3
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2110*hex* (hexadecimal)
	Subindex	0B*hex* (hexadecimal)

DeviceNet	**Class**	101
	Instance	2
	Attribute	11
PROFIBUS	**Slot**	0
	Index	89

Example

You are using the NOV command with parameter P1 = 10,000 and RSN with parameter P1 = 5. Then the measured values are sent in increments of 5: 0, 5, 10, 15, ..., 9990, 9995, 10,000.

10.150 RTB (Re-Trigger Tolerance Band)

Sets or reads the tolerance band for the number of segments of measuring time (see TRC command, parameter P5) over which the mean value will be calculated (MVC) if you are using pre-triggering operating mode via level (TRC command with parameter P2 = 0).

As soon as the mean value is outside of the tolerance band (plus and minus) assigned here, re-triggering occurs, which restarts the measuring time. P1 must be greater than 0, otherwise there will be no retriggering.

See also Pre-triggering via level, Re-triggering.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P64.4 (electronics units with P64.4 see Firmware overview), P77.9 (electronics units with P77.9 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Tolerance band for retriggerung
Range/data		0: Tolerance band deactivated 1,599,999 for NOV with parameter P1 = 0, otherwise 1 ... NOV
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2030*hex* (hexadecimal)
	Subindex	19*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	4
	Attribute	25
PROFIBUS	**Slot**	0
	Index	180

10.151 RUN (Start Filling)

Starts a batching process if the sensor electronics are in dosing mode (IMD command with parameter P1 = 2).
See also Filler.

The description below referring to the functions of digital inputs applies only to sensor electronics up to *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics and for *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics in compatibility mode (IOM command with parameter P1 = 0). For sensor electronics in *4th generation* FIT5A, FIT7A, PAD400x, PW15iA you can define the function of the digital inputs yourself with commands IM1 to IM2 (IOM command with parameter P1 = 1).

The result outputs and the status (SDO) of a previous batching are cleared. Any internal calibration process that is still running is aborted. You can also start batching via a digital input (IN1).

Use 0x7FFFFFFF as the parameter to send a command that does not use parameters via CANopen or DeviceNet.

If necessary, choose the parameter set to be used with the RDP command before you start batching. Read out the parameter set to be used for the current batching process with the FNB command.

No. of parameters	–
Factory setting	–
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Information about the command

Meaning		Start batching
Range/data		–
Data type		–
Access		*W* (Write only)
CANopen	**Index**	2240*hex* (hexadecimal)
	Subindex	02*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	5
	Attribute	2
PROFIBUS	**Slot**	0
	Index	27

10.152 S (Select)

This command only concerns serial interfaces.

Selects one or more nodes for subsequent communication. This command does not generate *any* response unless the command is faulty.
See also ADR.

The sensor electronics are always active after the RES command or after the supply voltage has been turned on unless you have previously used the COF command with parameter P1 > 127. Therefore you must use the S command in bus mode so that the other bus nodes will *not* respond. If there is only one sensor electronics unit, you do not need this command.

Send a semicolon (;) before the command to clear the input buffer of any commands that are still there and have not been processed yet.

No. of parameters	1
Factory setting	31
Response time	<10 ms
Password protection[1]	No
Disabled in Legal-For-Trade mode	No
Save parameters	–
Available starting with firmware version	P50

[1] Only available if serial interfaces are used.

Parameter P1

Meaning	Selection of nodes for serial interfaces
Range/data	0 … 89: Only the sensor electronics with the selected will be selected 96: All sensor electronics units respond to the S command 97, 98: All sensor electronics units perform the following commands, but do not respond 99: All sensor electronics units execute all commands and respond
Number of ASCII characters with serial interface	2
Data type	*UINT8* (Unsigned Integer 8 bit)
Access	*W* (Write only)
CANopen	Not available
DeviceNet	Not available
PROFIBUS	Not available

10.153 SCR (Set Current Range)

Sets or reads the weighing range for a multi-range scale.

The switch to weighing range 1 is only made if the gross value is 0 (no stop required). Switching to weighing range 2 is always possible.

See also second weighing range, Multi-range scale, MRM.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1]	Yes
Disabled in legal-for-trade mode	Yes
Save parameters	TDD1
Available starting with firmware version	P81 (electronics units with P81 see Firmware overview)

[1] Only available if serial interfaces or PROFIBUS are used.

Parameter P1

Meaning		Weighing range
Range/data		0: Weighing range 1 (only if gross value = 0) 1: Weighing range 2
Number of ASCII characters with serial interface		1
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2110*hex* (hexadecimal)
	Subindex	10*hex* (hexadecimal)

DeviceNet	**Class**	101
	Instance	2
	Attribute	16
PROFIBUS		Not available

10.154 SDF (Special Dosing Functions)

Sets or reads the activation status of specific monitoring functions, and expands some functions if the sensor electronics are in dosing mode (IMD with parameter P1 = 2).
See also Filler.

The activation status is an 8-bit value, see the table below for the meaning of the individual bits.

No. of parameters	1
Factory setting	2
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Special functions for batching
Range/data		0 … 255
Number of ASCII characters with serial interface		3
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2200*hex* (hexadecimal)
	Subindex	0A*hex* (hexadecimal)

DeviceNet	**Class**	102
	Instance	1
	Attribute	10
PROFIBUS	**Slot**	0
	Index	96

Meaning of the status bits

Bit	Function
6 ... 7	Reserved
5	Alarm in case of falling below the minimum start weight MSW or exceeding the empty weight EWT.
4	Alarm during deduction weighing (DMD command with parameter P1 = 1) and gross weight value < empty weight (EWT) or gross weight value < filling weight (FWT).
3	Output alarm, maximum dosing time exceeded (MDT).
2	Output alarm in case of overflow or underflow of gross signal, net signal or A/D converter value.
1	Output alarm, fill flow error (level monitoring, see also CBK and FBK).
0	Empty weight monitoring at the start of dosing If the measured value is greater than the empty weight (EWT), the batching process will not be started. Filling to completion when the container is damaged (for example a burst sack) is pointless.

10.155 SDM (Mean Value Dosing Results)

Reads the mean value of dosing results (FRS) calculated since the last time the system was turned on, the last CSN command (clear dosing results) or the last RES command (reset).

There is no correction of the mean value during redosing (RDS).

Cumulative weight memory SUM, the mean value (SDM) and the standard deviation (SDS) of the dosing results as well as the dosing counter (NDS) are updated simultaneously. This means that the dosing counter contains the number of dosing results offset in the mean value.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Mean value of the dosing results
Range/data		-1,638,399 … 1,638,399
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R* (Read only)
CANopen	**Index**	2230*hex* (hexadecimal)
	Subindex	06*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	4
	Attribute	6
PROFIBUS	**Slot**	0
	Index	29

10.156 SDO (State of Dosing)

Reads the current batching status if the sensor electronics are in dosing mode (IMD with parameter P1 = 2).
The dosing status is an 8-bit value, see the table below for the meaning of the individual bits.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Dosing status
Range/data		0 ... 255
Number of ASCII characters with serial interface		3
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R* (Read only)
CANopen	**Index**	2D00*hex* (hexadecimal)
	Subindex	02*hex* (hexadecimal)

DeviceNet	**Class**	100
	Instance	1
	Attribute	11
PROFIBUS	**Slot**	0
	Index	23

Meaning of the status bits

Bit	Meaning when bit is set (= 1)
0	Coarse flow active
1	Fine flow active
2	Residual flow active
3	Ready signal indicating the filler result (FRS) has been saved. The bit is reset the next time batching starts.
4	Ready signal indicating the filler result (FRS) has been saved. The bit is reset the next time batching starts. or Emptying, if this dosing type (EPT with parameter P1> 0) is active. The bit is only active during emptying.
5	Upper tolerance limit exceeded
6	Lower tolerance limit undershot
7	Alarm, for example if level monitoring (SDF) is turned on and an error occurs

10.157 SDS (Standard Deviation Dosing Results)

Reads the standard deviation of dosing results (FRS) calculated since the last time the system was turned on, the last CSN command (clear dosing results) or the last RES command (reset).

There is no correction of the standard deviation during redosing (RDS).

Cumulative weight memory SUM, the mean value (SDM) and the standard deviation (SDS) of the dosing results as well as the dosing counter (NDS) are updated simultaneously. This means that the dosing counter contains the number of dosing results offset in the standard deviation.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

1) Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Standard deviation
Range/data		-1,638,399 ... 1,638,399
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R* (Read only)
CANopen	Index	2230*hex* (hexadecimal)
	Subindex	07*hex* (hexadecimal)
DeviceNet	Class	102
	Instance	4
	Attribute	7
PROFIBUS	Slot	0
	Index	123

10.158 SFA (Sensor Fullscale Adjust)

Sets or reads the nominal value of the factory characteristic curve for an input signal of 2 mV/V.
See also SZA (zero value of factory characteristic curve).

> You must measure or enter the value for SZA before using the SFA command. The values are not activated until both values are present.
> Entering or measuring the factory characteristic curve sets the user characteristic curve (LDW/LWT) to 0/1,000,000 and resets the value for CWT to 1,000,000.

You can have the nominal value measured or enter it as a value. During the measurement, the current input signal is assigned an output value of 1,000,000.
See also Balancing a scale.

1. Measure nominal value

- Connect a calibration standard.
- Measure the zero value with the SZA command.
- Set the calibration standard to misalignment of 2 mV/V
- Measure the nominal value with the `SFA;` command (response time < 4.2 s).

  The sensor electronics measure the input signal and offset it with the value measured by the SZA command.

> Use 0x7FFFFFFF as the parameter to send a command that does not use parameters via CANopen or DeviceNet.

2. Manual input of the nominal value

- Enter the value for SZA.
- Enter the nominal value with the `SFA<nominal value>;` command (response time < 1.5 s).

  The value that is entered is offset with the value entered for the SZA command and both are activated.

No. of parameters	1
Factory setting	1000000
Response time	<10 ms
Password protection [1)]	Yes
Disabled in legal-for-trade mode	Yes
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Nominal value of factory characteristic curve
Range/data		±1,599,999 for NOV with parameter P1 = 0, otherwise ±NOV
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2100*hex* (hexadecimal)
	Subindex	01*hex* (hexadecimal)

DeviceNet	**Class**	101
	Instance	1
	Attribute	1
PROFIBUS	**Slot**	0
	Index	32/33

10.159 SNR (Serial Number)

Reads the serial number. Newer electronics units use up to 10-digit serial numbers. In this case, 10 digits are used as soon as 9,999,999 is exceeded, otherwise 7.
See also HWV, IDN, NAM, PDT, PZN, SRV, SWI, SWV.

No. of parameters	–
Factory setting	Serial number
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P80.1.7 (electronics units with P80.1.7 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS are used.

Information about the command

Meaning		Serial number
Range/data		–
Number of ASCII characters with serial interface		7 or 10
Data type		*UINT32* (Unsigned Integer 32 bit)
Access		*R* (Read only)
CANopen	**Index**	2600*hex* (hexadecimal)
	Subindex	15*hex* (hexadecimal)
DeviceNet	**Class**	130
	Instance	1
	Attribute	21

PROFIBUS[1)]	**Slot**	0
	Index	112

[1)] The command is already available for PROFIBUS as from P70 (electronics units with P70 see Firmware overview).

10.160 SOV (Sensor Overflow Counter)

Reads the counter for sensor overflow (number of overflows).

The counter is incremented by one each time 150% of the measuring range (NOV) is exceeded for longer than specified for SOZ.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Counter for sensor overflow
Range/data		0 ... 8,388,607
Number of ASCII characters with serial interface		7
Data type		*UINT32* (Unsigned Integer 32 bit)
Access		*R* (Read only)
CANopen	**Index**	2500*hex* (hexadecimal)
	Subindex	02*hex* (hexadecimal)
DeviceNet	**Class**	120
	Instance	1
	Attribute	2

PROFIBUS	**Slot**	0
	Index	116

10.161 SPL (Input Level)

Sets or reads the switching threshold for the digital inputs of AD105D, AD112D and PAD400xA.
See also UIT.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80, but not for FIT5A, FIT7A and PW15iA; see also Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Switching threshold for digital inputs
Range/data		0: LOW = 0 … 1 V; HIGH = 4 … 12 V 1: LOW = 0 … 6 V; HIGH = 10 … 24 V (PLC)
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2600*hex* (hexadecimal)
	Subindex	23*hex* (hexadecimal)
DeviceNet	**Class**	130
	Instance	1
	Attribute	35
PROFIBUS		Not available

10.162 SPW (Set Password)

Cancels password protection if the correct password is entered as a parameter.
See also DPW.

Password entry is case-sensitive. Password protection is only in effect when the serial interfaces or PROFIBUS are used.

After the RES command or after the supply voltage is turned on again, protected commands are disabled again.

No. of parameters	1
Factory setting	AED
Response time	<70 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Information about the command

Meaning		Cancel password protection
Range/data		–
Data type		ASCII, maximum 7 characters
Access		*W* (Write only)
CANopen		Not available
DeviceNet		Not available
PROFIBUS	**Slot**	0
	Index	101

10.163 SRV (Software Sub-Version)

Reads the number of the firmware patch version, e.g. `115359290` is returned in case of version 1.17.115359290. The patch version is also displayed together with the firmware version in the PanelX.

See also HWV, IDN, NAM, PDT, PZN, SNR, SWI, SWV.

No. of parameters	–
Factory setting	–
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Information about the command

Meaning		Patch version number
Range/data		–
Number of ASCII characters with serial interface		9
Data type		*UINT32* (Unsigned Integer 32 bit)
Access		*R* (Read only)
CANopen	**Index**	2600*hex* (hexadecimal)
	Subindex	21*hex* (hexadecimal)

DeviceNet	**Class**	130
	Instance	1
	Attribute	33
PROFIBUS		Not available

10.164 STB (Control Byte)

Control byte for triggering various actions if you are using APP with parameter P1 = 1.
During a read process you receive the last control byte that was sent.
See also Control word, STW.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1] Only available if serial interfaces are used.

Parameter P1

Meaning		Control byte
Range/data		0 ... 255
Number of ASCII characters with serial interface		3
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2000*hex* (hexadecimal)
	Subindex	16*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	1

	Attribute	22
PROFIBUS		Not available

Meaning of the status bits

Bit	Description
7	Deletes peak value (CPV)
6	Zero balance (CDL)
5	Deletes trigger results (CTR)
4	Abort batching (BRK)
3	Start batching (RUN)
2	Delete batching results (CSN)
1	Gross/Net selection[3)] (TAS)
0	Taring (TAR)

10.165 STP (Stop)

Terminates output of measured values if you have activated continuous output with the MSV?0; command.
Output that has started will be completed, but no additional measured values will be sent.

Use 0x7FFFFFFF as the parameter to send a command that does not use parameters via CANopen or DeviceNet.

No. of parameters	–
Factory setting	–
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

1) Only available if serial interfaces are used.

Information about the command

Meaning	Stop
Range/data	–
Data type	–
Access	*W* (Write only)
CANopen	Not available
DeviceNet	Not available
PROFIBUS	Not available

10.166 STR (Set Termination Resistor)

Sets or reads activation of the bus termination resistor.

The bus termination resistors ensure the quiescent level on the interface lines when no node is sending. The bus termination may only be active for two nodes per bus system and must be located on the ends on the lines.

For some sensor electronics the bus termination resistors can or must be activated via a DIP switch. In this case the command will have no effect. Therefore check the behavior or read the relevant operating manual.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Bus termination resistors
Range/data		0: Bus termination resistors deactivated 1: Bus termination resistors activated
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2600*hex* (hexadecimal)
	Subindex	0A*hex* (hexadecimal)
DeviceNet	**Class**	130
	Instance	1
	Attribute	10
PROFIBUS		Not available

10.167 STT (Stabilization Time)

Sets or reads the stabilization time

If standstill recognition (MTD) is activated, checkweighing - i.e. determining the actual weight - is performed after standstill but within the stabilization time. Otherwise check-weighing starts immediately.

If no standstill occurs within the stabilization time, the actual weight is measured in any case once the stabilization time expires. The actual weight acquired after the stabilization time is the basis for optimization of the filling process.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Stabilization time
Range/data		0 … 32,767; the stabilization time is parameter P1 * 10 ms
Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2220*hex* (hexadecimal)
	Subindex	08*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	3
	Attribute	8
PROFIBUS	**Slot**	0
	Index	84

10.168 STW (Control Word)

Control word for triggering various actions. When reading you get the last control word sent.
See also Control word, APP, STB.

This function is only available for serial interfaces starting with P79.0.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection [1]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1] Only available if serial interfaces are used.

Parameter P1

Meaning		Control word
Range/data		0 ... 65,535
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2000*hex* (hexadecimal)
	Subindex	0A*hex* (hexadecimal)

DeviceNet	Class	100
	Instance	1
	Attribute	10
PROFIBUS		Not available

For bits 0 and 2 through 7, trigger the corresponding function by setting the bit (= 1). If you would like to read out the function, first delete the bit and then reset it. For bit 1: If the bit is set (= 1), gross values will be transmitted, otherwise net values (= 0). Bits 10 through 15 set the target status to the value of the bit.

Meaning of the bits in the control word

Bit	Meaning
15	Desired state Output 6[1)]
14	Desired state Output 5[1)]
13	Desired state Output 4[1)]
12	Desired state Output 3[1)]
11	Desired state Output 2[1)]
10	Desired state Output 1[1)]
9	Reserved[2)]
8	Reserved[2)]
7	Clear peak values (CPV)
6	Zero balance (CDL)
5	Clear trigger results (CTR)
4	Cancel batching (BRK)
3	Start batching (RUN)
2	Delete batching results (CSN)
1	Gross/Net selection[3)] (TAS)
0	Taring (TAR)

[1] The target status of outputs 1 through 6 is only activated if the “Batching” mode of operation is turned off (IMD with parameter P1 = 0) and the corresponding limit switches 1 through to 4 are deactivated (LIV1 to LIV4).

[2] The reserved bits are assigned to internal functions and cannot be set.

[3] Starting with firmware version P73.

10.169 SUM (Cumulative Weight)

Reads the cumulative weight memory of dosing results (FRS) calculated since the last time the system was turned on, the last CSN command (clear dosing results) or the last RES command (reset).

There is no correction of the cumulative weight memory during redosing (RDS).

Cumulative weight memory SUM, the mean value (SDM) and the standard deviation (SDS) of the dosing results as well as the dosing counter (NDS) are updated simultaneously. This means that the cumulative weight memory represents the sum of dosing results for the number of batching processes specified in the dosing counter.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

1) Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Cumulative value
Range/data		0 … 2,147,483,647
Number of ASCII characters with serial interface		10
Data type		*UINT32* (Unsigned Integer 32 bit)
Access		*R* (Read only)
CANopen	**Index**	2230*hex* (hexadecimal)
	Subindex	08*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	4
	Attribute	8
PROFIBUS	**Slot**	0
	Index	19

10.170 SWI (Software Identification)

Reads the software identifier for the part of the firmware relevant to legal validation, i.e. the main version, e.g. `80` for P80.1.7.

See also HWV, IDN, NAM, PDT, PZN, SNR, SRV, SWV.

No. of parameters	–
Factory setting	–
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Information about the command

Meaning		Software identifier for the part of the firmware relevant to legal validation
Range/data		–
Number of ASCII characters with serial interface		3
Data type		*UINT32* (Unsigned Integer 32 bit)
Access		*R* (Read only)
CANopen	**Index**	2600*hex* (hexadecimal)
	Subindex	22*hex* (hexadecimal)

DeviceNet	**Class**	130
	Instance	1
	Attribute	34
PROFIBUS[1)]	**Slot**	0
	Index	113

1) PROFIBUS returns not only the number but also the letter P. So for the software version P80.1.7 the text (ASCII) `P80` is returned (no *UINT32* (Unsigned Integer 32 bit)).

10.171 SWV (Software Version)

Reads the software version of the sensor electronics unit, e.g. 100020 for version 1.20. See also HWV, IDN, NAM, PDT, PZN, SNR, SRV, SWI.

No. of parameters	–
Factory setting	–
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Information about the command

Meaning		Firmware version of sensor electronics
Range/data		100,001 … 9,999,999,999
Number of ASCII characters with serial interface		10
Data type		*UINT32* (Unsigned Integer 32 bit)[1)]
Access		*R* (Read only)
CANopen	**Index**	2600*hex* (hexadecimal)
	Subindex	16*hex* (hexadecimal)
DeviceNet	**Class**	130
	Instance	1
	Attribute	22
PROFIBUS		Not available

[1)] The first five (possible) decimal places indicate the primary version number, the last five the sub-version. A value of 100012 corresponds to version 1.12.

Example

Command	`S05;`	Select the device with address 5.
Command	`SWV?;`	Query firmware version.
Response	`0000100013crlf`	The firmware version is 1.13: 00001 and 00013, together 1.13

10.172 SYD (Systematic Difference)

Sets or reads the systematic difference.

When the filling weight (FWT) is entered, the systematic difference is automatically deactivated (parameter P1 = 0).

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Systematic difference
Range/data		-50,000 ... +50,000 for NOV with parameter P1 = 0, otherwise 0 ... ±5% of NOV
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2210*hex* (hexadecimal)
	Subindex	09*hex* (hexadecimal)

DeviceNet	Class	102
	Instance	2
	Attribute	9
PROFIBUS	Slot	0
	Index	77

10.173 SZA (Sensor Zero Adjust)

Sets or reads the zero value of the factory characteristic curve.
See also SFA (nominal value of factory characteristic curve).

You must measure or enter the value for SZA before using the SFA command. The values are not activated until both values are present.
Entering or measuring the factory characteristic curve sets the user characteristic curve (LDW/LWT) to 0/1,000,000 and resets the value for CWT to 1,000,000.

You can have the zero value measured or enter it as a value. During the measurement, the current input signal is assigned an output value of 0.
See also Balancing a scale.

1. Measure zero value

- Connect a calibration standard.
- Measure the zero value with the `SZA;` command (response time < 4.2 s).

Use 0x7FFFFFFF as the parameter to send a command that does not use parameters via CANopen or DeviceNet.

2. Manual input of the zero value

- Enter the value for SZA.
- Enter the zero value with the `SZA<zero value>;` command (response time < 15 ms).

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	Yes
Disabled in legal-for-trade mode	Yes
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Factory characteristic curve zero point
Range/data		±1,599,999
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	Index	2100*hex* (hexadecimal)
	Subindex	02*hex* (hexadecimal)
DeviceNet	Class	101
	Instance	1
	Attribute	2
PROFIBUS	Slot	0
	Index	30/31

10.174 TAD (Tare Delay)

Sets or reads the delay time for taring.
See also Tare balance after a time delay, TAR, TMD.

For DMD with parameter P1 = 1 (deduction weighing) or if the empty weight or coarse flow cut-off point is exceeded during start, there is no delay and no taring.

You can use this time for example to blank out interference from putting up sacks or putting on containers. Then taring occurs after the delay time elapses.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

<table>
<tr><td colspan="2">Meaning</td><td>Delay time for taring</td></tr>
<tr><td colspan="2">Range/data</td><td>0 … 32,767; the delay time is parameter P1 * 10 ms</td></tr>
<tr><td colspan="2">Number of ASCII characters with serial interface</td><td>5</td></tr>
<tr><td colspan="2">Data type</td><td>UINT16 (Unsigned Integer 16 bit)</td></tr>
<tr><td colspan="2">Access</td><td>R/W (Read/Write)</td></tr>
<tr><td rowspan="2">CANopen</td><td>Index</td><td>2220hex (hexadecimal)</td></tr>
<tr><td>Subindex</td><td>09hex (hexadecimal)</td></tr>
<tr><td rowspan="3">DeviceNet</td><td>Class</td><td>102</td></tr>
<tr><td>Instance</td><td>3</td></tr>
<tr><td>Attribute</td><td>9</td></tr>
<tr><td rowspan="2">PROFIBUS</td><td>Slot</td><td>0</td></tr>
<tr><td>Index</td><td>80</td></tr>
</table>

10.175 TAR (Tare)

Performs a tare and switches to display of the net measured value (TAS). Standstill must be reached in addition in legal-for-trade mode. The current value is stored in the tare buffer (TAV) and subtracted from all the subsequent gross measurements.
See also Tare balance, TAD.

Use 0x7FFFFFFF as the parameter to send a command that does not use parameters via CANopen or DeviceNet.

No. of parameters	–
Factory setting	–
Response time	Depends on the filter mode (FMD), filter (ASF) and index (P1) of the output rate (ICR) FMD0/2/3/4/5: $<2^{ICR} * 1.6$ ms + 1.6 ms FMD1 and ASF0: $<2^{ICR} * 1.6$ ms + 1.6 ms FMD1: $<2^{ICR} *$ ASF parameter $* 1.6$ ms + 1.6 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Information about the command

Meaning		Tare
Range/data		–
Data type		–
Access		*W* (Write only)
CANopen	Index	2040*hex* (hexadecimal)
	Subindex	01*hex* (hexadecimal)
DeviceNet	Class	100
	Instance	5
	Attribute	1
PROFIBUS	Slot	0
	Index	45

10.176 TAS (Gross Signal)

Sets or reads whether the gross or net measured value should be sent.
See also Tare balance, TAR, TAV.
For the gross measured value the value in tare memory is subtracted from the current measured value.

No. of parameters	1
Factory setting	1
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Gross / net selection
Range/data		0: Output net measured value 1: Output gross measured value
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2040*hex* (hexadecimal)
	Subindex	02*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	5
	Attribute	2

PROFIBUS	**Slot**	0
	Index	11

10.177 TAV (Tare Value)

Sets or reads the value in the tare buffer. As from firmware P81, it is also possible to enter a tare value (directly) in legal-for-trade mode. The tare value is converted with the value entered with the NOV command.

The tare value must fall on the LDW/LWT characteristic curve scaled with the NOV command. Entering a characteristic curve with the SZA/SFA commands or LDW/LWT clears the tare buffer.

Entering a value does not switch to output of the net measured value. Use the TAS command to do this.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	Input disabled, output allowed
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

1) Only available if serial interfaces or PROFIBUS are used.

Parameter P1

Meaning		Tare value
Range/data		-8,388,608 … 8,388,607
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2040*hex* (hexadecimal)
	Subindex	03*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	5
	Attribute	3
PROFIBUS	**Slot**	0
	Index	46

10.178 TCR (Trade Counter)

Reads out the legal-for-trade counter.

This counter that cannot be reset is incremented by one every time the LFT command is performed with a new parameter (switching to legal-for-trade or to industrial mode). No adjustment is possible in legal-for-trade mode. The adjustment must be performed in industrial mode. As the counter state is noted on the scale for legal-for-trade applications, changes to the adjustment or calibration can be discovered by comparing.

The maximum counter state is 8,388,607. If this counter value is reached, the counter stops and only overflow values are included in measured value output. The counter can only be reset in the HBM factory.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Legal-for-trade counter
Range/data		0 … 8,388,607
Number of ASCII characters with serial interface		7
Data type		*UINT32* (Unsigned Integer 32 bit)
Access		*R* (Read only)
CANopen	**Index**	2300*hex* (hexadecimal)
	Subindex	03*hex* (hexadecimal)
DeviceNet	**Class**	103
	Instance	1
	Attribute	3
PROFIBUS	**Slot**	0
	Index	121

10.179 TDD (Store Parameters)

Saves the sensor electronics parameters (scale parameters) or restores the setting. A query (`TDD?;`) is not permitted.

The sensor electronics contain non-volatile memory divided into two areas. Your (customized) parameters are stored in the first area and are retained through a power failure. The second area contains the write-protected factory setting.

See also RDP.

The communication settings, including the address (ADR) and baud rate (BDR), as well as the commands marked with [1)] in the table below, such as the factory-set characteristic curve (SZA/SFA), are not reset.

The PanelX performs the TDD1 command after every write process (click the ***Write*** button).

No. of parameters	1
Factory setting	–
Response time	TDD0: <2.2 s, from P80 <0.5 s TDD1: <0.1 s, from P80 <0.7 s TDD2: <1.3 s, from P80 <0.3 s
Password protection[1)]	TDD0: Yes TDD1: No TDD2: No
Disabled in legal-for-trade mode	TDD0: Yes TDD1: No TDD2: No
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS are used.

Parameter P1

Meaning		Save parameters
Range/data		0: Restore factory setting 1: Save current parameters in non-volatile memory 2: Read out the saved parameters of the current parameter set from non-volatile memory and activate them
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*W* (Write only)
CANopen	**Index**	2450*hex* (hexadecimal)
	Subindex	02*hex* (hexadecimal)
DeviceNet	**Class**	110
	Instance	6
	Attribute	2
PROFIBUS	**Slot**	0
	Index	104

Sensor electronics settings based on TDD with parameter P1 = 0

Command	Factory setting	Comment
ASF	5	Filter 3 Hz
CDT	0	No delay time for zero balance after triggering
COF	9	Measured value output in ASCII format
CRC[1)]	0	External checksum
CSM	0	Standard measured value status
CWT	1,000,000	Partial load value
DPT	0	Decimal point off
DPW[1)]	AED	Password

Command	Factory setting	Comment
DZT	0.0	Dynamic zero tracking deactivated
ENU[1)]	–	Physical unit
FMD	0	Filter mode: Standard filter
HSM	0	Analog-to-digital converter sampling rate: 600 measurements/s
ICR	2	Sample rate: 150 measurements/s
IDN[1)]	HBM...	Identification of sensor electronics
IMD	0	IN1 and IN2 are inputs only
LDW[1)]	0	User characteristic curve zero point
LFT[1)]	0	Operating mode industrial (not legal-for-trade)
LIC[1)]	0,1,000,000,0,0	Linearization deactivated
LIV1 ... LIV4	0,0,0,0	Limit values 1 ... 4 deactivated
LWT[1)]	1,000,000	User characteristic curve full scale
MRA	0	Single-range balance
MTD	0	Standstill recognition deactivated
NOV	0	User-defined scaling deactivated
NTF	0.0	Notch filter deactivated
POR	0.0	Outputs set to logical 0 (Low)
PVS	0.1	Peak value function deactivated
RSN	1	Resolution 1 d
SFA[1)]	Factory setting	Full scale (for 2 mV/V characteristic curve)
STR	0	Termination resistors deactivated
SZA[1)]	Factory setting	Zero value (for 2 mV/V characteristic curve)
TAS	1	Output gross measured value
TAV	0	Tare buffer cleared

Command	Factory setting	Comment
TCR	Unchanged	Legal-for-trade counter
TEX	172	Separator
TRC	0,0,0,0,0	Trigger function off, all parameters = 0
TRF	1,000,000	Correction value for trigger function
ZSE	0	Zero balance deactivated for switching on
ZTR	0	Zero tracking deactivated

[1] These parameters are saved in non-volatile memory as soon as they are entered. The commands `TDD1;` and `TDD2;` have no effect.

10.180 TEX (Text Separator)

Sets or reads the separator for ASCII output of measured values and for output of values to the log records.

The separator is placed between the individual values. If you add 128 to the value for the desired ASCII character, for *multiple output of measured values* (MSV? command with parameter P1 ≥ 0), the output will be terminated with crlf. The individual parts of the output (e.g. measured value and status) are separated by the preset separator however.

See also MSV, COF.

No. of parameters	1
Factory setting	172
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Separator
Range/data		0 … 127, 128 … 255
Number of ASCII characters with serial interface		3
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2600*hex* (hexadecimal)
	Subindex	0B*hex* (hexadecimal)

DeviceNet	**Class**	130
	Instance	1
	Attribute	11
PROFIBUS		Not available

Example

Command	`TEX44;`	Select comma as separator.
Response	`0crlf`	Command OK.
Command	`MSV?3;`	Send 3 measured values.
Measurement output for `COF9;`		0000021, 31, 001, 0000025, 31, 001, 0000023, 31, 001crlf
Command	`TEX172;`	Select comma as separator and crlf as end identifier.
Response	`0crlf`	Command OK.
Command	`MSV?3;`	Send 3 measured values.
Measurement output for `COF9;`		-0000004, 31, 001crlf 0000000, 31, 003crlf 0000006, 31, 001crlf

10.181 TIM (Date/Time)

Sets or reads the date and time present in the sensor electronics in Unix time format (POSIX standard). The Unix time is the time in seconds that has elapsed since Thursday January 1, 1970 at 00:00 UTC (Universal Time, Coordinated). Leap seconds are not taken into account

The sensor electronics have a clock, but the date and time are lost when there is no supply voltage. After switching on, the date and time when the TDD command was last executed with parameter P1 = 1 is applied.
When a sensor electronics unit is connected with the PanelX program, the current date and time of the PCs are transferred to the sensor electronics. To ensure that the sensor electronics also contain the correct data when they are connected via PLC or other programs, you should set the date and time after switching on (to be able to assign log entries correctly, for example).

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning	Date/time
Range/data	0 ... 4,294,967,296
Number of ASCII characters with serial interface	10

Data type		*UINT32* (Unsigned Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2E00*hex* (hexadecimal)
	Subindex	2*hex* (hexadecimal)
DeviceNet	**Class**	190
	Instance	1
	Attribute	2
PROFIBUS		Not available

10.182 TMA (Maximum Filter Settling Time)

Sets or reads the set maximum filter settling time of the filter chain.

If no limit is set, the maximum additional settling time of the notch filter (MAC and two filters for NTF) is 530 ms (MAC with parameter P1 = 199, NTF with parameter P1 and P2 = 63). You can shorten the maximum filter settling time with this command. This will reduce the number of filters used.

See also ADF, FST.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Maximum filter settling time of the filter chain
Range/data		0: No limit 1 ... 9999: Maximum settling time of the filter chain in ms
Number of ASCII characters with serial interface		6
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	Index	2010*hex* (hexadecimal)
	Subindex	13*hex* (hexadecimal)
DeviceNet	Class	100
	Instance	2
	Attribute	19
PROFIBUS		Not available

10.183 TMD (Tare Mode)

Sets or reads the tare mode. The function is especially useful for batching processes. See also Tare balance, Tare balance after a time delay.

You can choose from three methods:

1. Off: *No* taring is performed after the start (RUN command or digital input). There is *no wait* for a set delay time for taring (TAD).
2. On: If the measured value is less than the fine flow cut-off point after starting (RUN command or digital input), the delay time elapses before taring occurs. After taring the coarse and fine flow are activated.
3. Extended: If the measured value is less than the overflow weight (150% of NOV) after the start (RUN command or digital input), there is a wait for the delay time for taring. Then taring occurs followed by coarse and fine flow.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning	Tare mode
Range/data	0: Off 1: On 2: Advanced
Data type	*UINT8* (Unsigned Integer 8 bit)

Access		*R/W* (Read/Write)
CANopen	**Index**	2200*hex* (hexadecimal)
	Subindex	0B*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	1
	Attribute	11
PROFIBUS	**Slot**	0
	Index	87

10.184 TMO (Temperature Alarm Sensor)

Sets or reads which sensor is used for temperature monitoring .

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Sensor for temperature monitoring
Range/data		0: Monitoring with internal sensor 1: Monitoring with external sensor
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2700*hex* (hexadecimal)
	Subindex	0C*hex* (hexadecimal)
DeviceNet	**Class**	140
	Instance	1
	Attribute	12
PROFIBUS		Not available

10.185 TMP (Temperature)

Reads the temperature of the internal temperature sensor, if present. A value of 250,000 corresponds to +25°C.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS are used.

Parameter P1

Meaning		Temperature of the internal temperature sensor
Range/data		-50,000 ... +125,000
Number of ASCII characters with serial interface		9
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R* (Read only)
CANopen	**Index**	2460*hex* (hexadecimal)
	Subindex	03*hex* (hexadecimal)
DeviceNet	**Class**	110
	Instance	7
	Attribute	3
PROFIBUS	**Slot**	0
	Index	24

10.186 TRC (Trigger Command)

Sets or reads the parameters for the trigger function.
See also Trigger, MSV, MAV, COF128.

No. of parameters	5
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Trigger function
Range/data		0: Trigger function deactivated 1: Trigger function activated
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2020*hex* (hexadecimal)
	Subindex	08*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	3
	Attribute	8
PROFIBUS	**Slot**	0
	Index	68

Parameter P2

Meaning		Trigger mode
Range/data		0: Pre-trigger level 1: External pre-trigger (only for IMD with parameter P1 = 1) 2: Post-trigger level 3: External post-trigger (only for IMD with parameter P1 = 1)
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2020*hex* (hexadecimal)
	Subindex	09*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	3
	Attribute	9
PROFIBUS	**Slot**	0
	Index	68

Parameter P3 (only for P2 = 0, 2, 3)

Meaning		Trigger level (P2 = 0, 2) or setpoint (P2 = 3)
Range/data		±1,599,999 for NOV with parameter P1 = 0, otherwise ±NOV
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2020*hex* (hexadecimal)
	Subindex	0A*hex* (hexadecimal)

DeviceNet	Class	100
	Instance	3
	Attribute	10
PROFIBUS	Slot	0
	Index	68

Parameter P4

Meaning		Number of measured values for the settling time (P2 < 2, pre-trigger mode) or tolerance in digits (P2 > 1, post-trigger mode)
Range/data		0 … 99 From P80: 0 … 255
Settling time for P2 < 2		Depends on the filter mode (FMD), filter (ASF) and index (P1) of the output rate (ICR) FMD0/2/3/4/5 and ASF0: P4 * 2^{ICR} * 1.6 ms FMD1 and ASF with P1 > 0: P4 * 2^{ICR} * ASF parameter * 1.6 ms
Number of ASCII characters with serial interface		2/3 (the leading zero is omitted for values less than 100 for compatibility reasons)
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	Index	2020*hex* (hexadecimal)
	Subindex	0B*hex* (hexadecimal)
DeviceNet	Class	100
	Instance	3
	Attribute	11
PROFIBUS	Slot	0
	Index	68

Parameter P5

Meaning		Number of segments of the measuring time (P2 < 2, pre-trigger mode) or number of valid values for the trigger result (P2 > 1, post-trigger mode)
Range/data		0 … 99 From P80: 0 … 255
Measuring time for P2 < 2		Depends on the filter mode (FMD), filter (ASF) and index (P1) of the output rate (ICR) FMD0/2/3/4/5 and ASF0: P5 * 2^{ICR} * 1.6 ms FMD1 and ASF with P1 > 0: P5 * 2^{ICR} * ASF parameter * 1.6 ms
Number of ASCII characters with serial interface		2/3 (the leading zero is omitted for values less than 100 for compatibility reasons)
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		Number of measured values for the measurement time: *R/W* (Read/Write) Number of valid values for the trigger result: *R* (Read only)
CANopen	Index	2020*hex* (hexadecimal)
	Subindex	0C*hex* (hexadecimal)
DeviceNet	Class	100
	Instance	3
	Attribute	12
PROFIBUS	Slot	0
	Index	68

10.187 TRF (Trigger Correction Factor)

Sets or reads the correction factor for the trigger result in post-trigger mode (TRC with P2 > 1).
See also Trigger.
You can use this function to make a correction between the static adjustment of the scale and the dynamic result. Each valid trigger result (MAV) is multiplied by this correction factor. The general rule is:

Correction factor = P1/1,000,000

No. of parameters	1
Factory setting	1000000
Response time	<10 ms
Password protection[1)]	Yes
Disabled in legal-for-trade mode	Yes
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Correction factor for the trigger result
Range/data		900,000 ... 1,100,000
Number of ASCII characters with serial interface		7
Data type		*UINT32* (Unsigned Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2020*hex* (hexadecimal)
	Subindex	0D*hex* (hexadecimal)

DeviceNet	**Class**	100
	Instance	3
	Attribute	13
PROFIBUS	**Slot**	0
	Index	107

10.188 TRM (Trigger Mean Value)

Reads the mean value memory of trigger results (MAV) calculated since the last time the system was turned on, the last CTR command (clear trigger results) or the last RES command (reset).

See also Trigger.

The counter for the number of trigger results TRN, the mean value (TRM) and standard deviation (TRS) of trigger results as well as the trigger result itself (MAV) are updated at the same time.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Mean value of the trigger results
Range/data		±1,599,999 for NOV with parameter P1 = 0, otherwise ±NOV
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R* (Read only)
CANopen	Index	2020*hex* (hexadecimal)
	Subindex	0E*hex* (hexadecimal)
DeviceNet	Class	100
	Instance	3
	Attribute	14
PROFIBUS	Slot	0
	Index	108

10.189 TRN (Trigger Number)

Reads the trigger counter (number of trigger results).

See also Trigger.

Each time there is a trigger result, the counter is incremented by 1. Use the CTR command to clear the counter. The counter does not overflow. It stops when it reaches 65,535 if you do not clear it.

The counter for the number of trigger results TRN, the mean value (TRM) and standard deviation (TRS) of trigger results as well as the trigger result itself (MAV) are updated at the same time.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

1) Only available if serial interfaces or PROFIBUS are used.

Parameter P1

<table>
<tr><td colspan="2">Meaning</td><td>Number of trigger results</td></tr>
<tr><td colspan="2">Range/data</td><td>0 ... 65,535</td></tr>
<tr><td colspan="2">Number of ASCII characters with serial interface</td><td>5</td></tr>
<tr><td colspan="2">Data type</td><td>UINT16 (Unsigned Integer 16 bit)</td></tr>
<tr><td colspan="2">Access</td><td>R (Read only)</td></tr>
<tr><td rowspan="2">CANopen</td><td>Index</td><td>2020hex (hexadecimal)</td></tr>
<tr><td>Subindex</td><td>0Fhex (hexadecimal)</td></tr>
<tr><td rowspan="3">DeviceNet</td><td>Class</td><td>100</td></tr>
<tr><td>Instance</td><td>3</td></tr>
<tr><td>Attribute</td><td>15</td></tr>
<tr><td rowspan="2">PROFIBUS</td><td>Slot</td><td>0</td></tr>
<tr><td>Index</td><td>99</td></tr>
</table>

10.190 TRS (Trigger Standard Deviation)

Reads the standard deviation of trigger results (MAV) calculated since the last time the system was turned on, the last CTR (Clear trigger results) command, or the last RES (Reset) command.

See also Trigger.

The counter for the number of trigger results TRN, the mean value (TRM) and standard deviation (TRS) of trigger results as well as the trigger result itself (MAV) are updated at the same time.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Standard deviation of the trigger results
Range/data		±1,599,999 for NOV with parameter P1 = 0, otherwise ±NOV
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R* (Read only)
CANopen	**Index**	2020*hex* (hexadecimal)
	Subindex	10*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	3
	Attribute	16
PROFIBUS	**Slot**	0
	Index	109

10.191 TSL (Trigger Stop Level)

Sets or reads the stop level for the trigger if you are using the pre-triggering via level operating mode (TRC command with parameter P2 = 0).
See also Trigger.
You cannot start the weighing process again after determining a trigger result until the weight value is below the stop level (TSL) and then the wait time TST has elapsed.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P64.4 (electronics units with P64.4 see Firmware overview), P77.9 (electronics units with P77.9 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Stop level for trigger
Range/data		0: Stop level deactivated Otherwise: ±1,599,999 for NOV with parameter P1 = 0, otherwise ±NOV
Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	Index	2030*hex* (hexadecimal)
	Subindex	1C*hex* (hexadecimal)
DeviceNet	Class	100
	Instance	4
	Attribute	28
PROFIBUS	Slot	0
	Index	183

10.192 TST (Trigger Stop Time)

Sets or reads the number of measured values for the trigger wait time if you are using the pre-triggering via level operating mode (TRC command with parameter P2 = 0).
See also Trigger.
You cannot start the weighing process again after determining a trigger result until the weight value is below the stop level (TSL) and then the wait time TST has elapsed.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P64.4 (electronics units with P64.4 see Firmware overview), P77.9 (electronics units with P77.9 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Number of measured values for the trigger wait time
Range/data		0 ... 99
Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2030*hex* (hexadecimal)
	Subindex	1D*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	4
	Attribute	29
PROFIBUS	**Slot**	0
	Index	184

10.193 TSW (Software Trigger)

Initiates a software trigger if the electronics unit is configured as a checkweigher (trigger mode) (IMD with parameter P1 = 1) and the external trigger is active (TRC with parameter P1 = 1 and P2 = 1).

The command has the same effect as a signal at IN1 on the electronics units of the *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics and of the *4th generation* FIT5A, FIT7A, PAD400x, PW15iA when it is in compatibility mode (command IOM with parameter P1 = 0). Otherwise (IOM with parameter P1 = 1) the input on 4th generation electronics units may be IN1 or IN2, because you can freely assign IM1 and IM2 to the digital inputs.

See also Checkweigher.

Use 0x7FFFFFFF as the parameter to send a command that does not use parameters via CANopen or DeviceNet.

No. of parameters	–
Factory setting	–
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Information about the command

Meaning	Software trigger
Range/data	–
Data type	–

Access		*W* (Write only)
CANopen	**Index**	2020*hex* (hexadecimal)
	Subindex	24*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	3
	Attribute	36
PROFIBUS		Not available

10.194 TVT (Trigger Delay Time)

Sets or reads the number of measured values for the delay time for the trigger if you are using the pre-triggering via level operating mode TRC command with parameter P2 = 0). See also Trigger.

The delay time starts when the trigger level (parameter 3 of TRC) is exceeded. If the level does not all below the trigger level again , the settling time starts (parameter 4 of TRC). Otherwise the system waits for a new trigger event and then the delay time TVT starts again.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P64.4 (electronics units with P64.4 see Firmware overview), P77.9 (electronics units with P77.9 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Number of measured values for the delay time for the trigger
Range/data		0 ... 99
Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2030*hex* (hexadecimal)
	Subindex	1B*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	4
	Attribute	27
PROFIBUS	**Slot**	0
	Index	182

10.195 TYP (Amplifier Type)

Reads the amplifier (electronics unit) type. This is not identical to the module or load cell type. The AD112D is present in both the PAD400x and the PW15iA for example.

Up to and including P7x, the software subversion is outputted in the high nibble and the electronics unit type in the low nibble. If type 81 (= 51*hex* (hexadecimal)) is outputted, a FIT is installed as the electronics unit (1) and the software subversion is 5, e.g. P7x.5.

No. of parameters	–
Factory setting	–
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Information about the command

Meaning		Amplifier (electronics unit) type
Range/data		For P5x/P6x/P7x: Low nibble: Electronics; High nibble: Software sub-version 0: AD103C 1: FIT 4: AD112C 5: AD104C 6: AD105C 7: AD116C P8x 4: AD112D CAN 5: AD112D RS485 6: FIT7 CAN 7: FIT7 RS485 114: AD105D CAN 115: AD105D RS485
Number of ASCII characters with serial interface		3
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R* (Read only)
CANopen	**Index**	24B0*hex* (hexadecimal)
	Subindex	03*hex* (hexadecimal)
DeviceNet	**Class**	110
	Instance	12
	Attribute	3
PROFIBUS	**Slot**	0
	Index	217

10.196 UDC (Supply Voltage)

Reads the supply voltage of the amplifier in mV.

No. of parameters	–
Factory setting	–
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Information about the command

Meaning		Supply voltage in mV
Range/data		–
Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R* (Read only)
CANopen	**Index**	2021*hex* (hexadecimal)
	Subindex	08*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	9
	Attribute	8
PROFIBUS		Not available

10.197 UIT (Input Threshold)

Sets or reads the switching threshold for digital inputs.
See also SPL.

No. of parameters	1
Factory setting	2047
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P80 (electronics units with P80 see Firmware overview)

[1)] Only available if serial interfaces are used.

Parameter P1

Meaning		Switching threshold for digital inputs in mV
Range/data		0 ... 32,000
Number of ASCII characters with serial interface		5
Data type		*UINT16* (Unsigned Integer 16 bit)
Access		*R/W* (Read/Write)
CANopen	Index	2021*hex* (hexadecimal)
	Subindex	09*hex* (hexadecimal)
DeviceNet	Class	100
	Instance	9
	Attribute	9
PROFIBUS		Not available

10.198 UTL (Upper Tolerance Limit)

Sets or reads the upper tolerance limit for the dosing result.

The description below referring to the functions of digital outputs applies only to sensor electronics up to *3rd generation* AD103C, AD104C, AD105C, AD116C, PW15AHi, PW20i, some FIT and C16i electronics and for *4th generation* FIT5A, FIT7A, PAD400x, PW15iA sensor electronics in compatibility mode (IOM command with parameter P1 = 0). For sensor electronics in *4th generation* FIT5A, FIT7A, PAD400x, PW15iA you can define the function of the digital outputs yourself with commands OM1 to OM6 (IOM command with parameter P1 = 1).

If the dosing result (FRS) exceeds the tolerance limit, the status “Tolerance limit exceeded” (bit 5) is set in the dosing status (SDO). The status is cleared with the next start. If you have set parameter P1 = 0 for OMD, output OUT4 is also active.

When the filling weight is entered (FWT), the upper tolerance limit is automatically set to 100.2% of the filling weight (not with WTX).

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

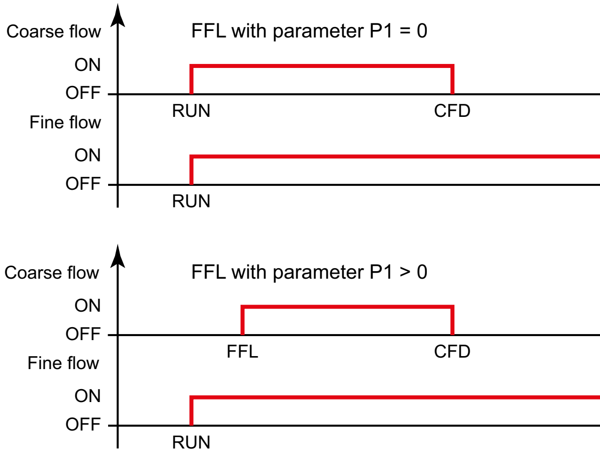
Meaning	Upper tolerance limit
Range/data	0 ... 1,599,999 for NOV with parameter P1 = 0, otherwise 0 ... 160% of NOV

Number of ASCII characters with serial interface		8 (7 digits with sign)
Data type		*SINT32* (Signed Integer 32 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2210*hex* (hexadecimal)
	Subindex	0A*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	2
	Attribute	10
PROFIBUS	**Slot**	0
	Index	74

10.199 VCT (Valve Control)

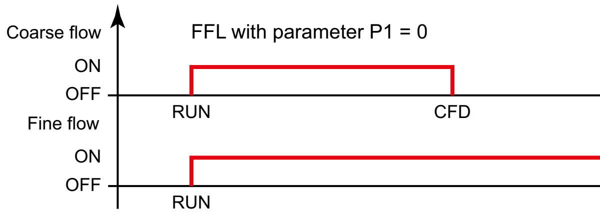
Sets or reads the operating mode for valve control.
See also Filler.
You can choose from four methods:

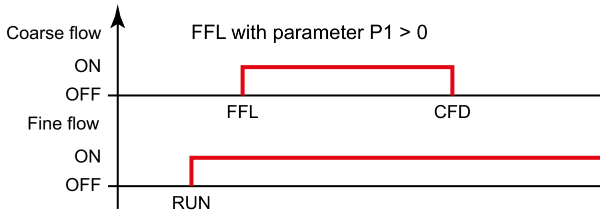
1. P1 = 0: Coarse and fine flow are always activated during opening. When the fill flow limit value (CBK) is reached, coarse flow is deactivated. If opening occurs in the fine flow phase, e.g. during redosing RDS or when starting from a stopped state, coarse and fine flow are activated together, though the coarse flow is then deactivated again as soon as the weight increases.
   The method was introduced because in practice there are often valves that open only when controlled by coarse *and* fine flow.



2. P1 = 1: Coarse and fine flow are always activated at the start of coarse flow. When the fill flow limit value (CBK) is reached, coarse flow is deactivated. If opening

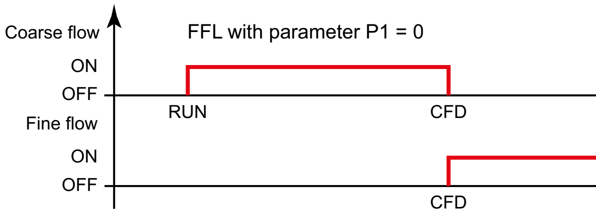
occurs during the fine flow phase, for example after redosing (RDS), or when starting from stop status, only fine flow is activated.

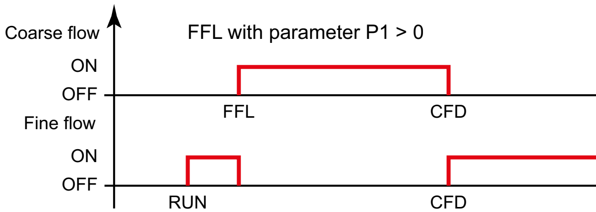




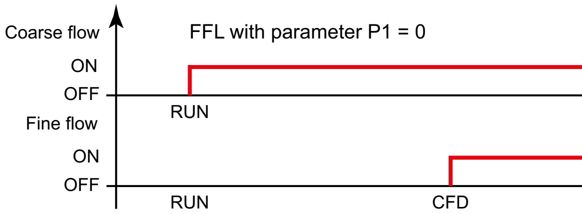
3. P1 = 2: Coarse flow and fine flow are always activated separately (never simultaneously). Only the coarse flow is active in the coarse flow phase. Only the fine

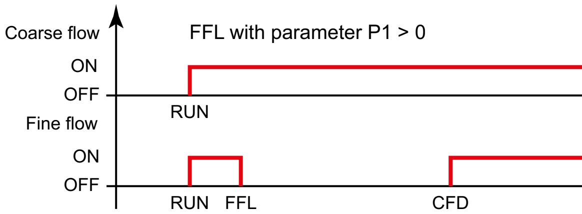
flow is active in the fine flow phase.





4. P1 = 3: Coarse flow is always activated during opening. It is active from the start of the batching process to the end. Fine flow is activated in addition.


FFL with parameter P1 = 0
Coarse flow
ON
OFF
RUN
Fine flow
ON
OFF
RUN
CFD


FFL with parameter P1 > 0
Coarse flow
ON
OFF
RUN
Fine flow
ON
OFF
RUN
FFL
CFD

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	TDD1
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

1) Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Valve control
Range/data		0 … 3
Number of ASCII characters with serial interface		2
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2200*hex* (hexadecimal)
	Subindex	0C*hex* (hexadecimal)
DeviceNet	**Class**	102
	Instance	1
	Attribute	12
PROFIBUS	**Slot**	0
	Index	91

10.200 WDP (Write Dosing Parameter Set)

Saves the current parameter set with dosing parameters under the specified parameter set number.

Save the current parameter set with TDD and parameter set P1 = 1 under the current parameter set number.

You can still save the parameter set before saving. However, you should then reload the parameter set you will be using with RDP before the start of batching.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	No
Disabled in legal-for-trade mode	No
Save parameters	–
Available starting with firmware version	P60 (electronics units with P60 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning		Save the dosing parameter set under the specified number
Range/data		0 … 31
Number of ASCII characters with serial interface		2
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*W* (Write only)
CANopen	Index	2200*hex* (hexadecimal)
	Subindex	01*hex* (hexadecimal)
DeviceNet	Class	102
	Instance	1
	Attribute	1
PROFIBUS	Slot	0
	Index	57

10.201 ZMD (Zeroing Mode)

Sets or reads the setting for the zeroing range allowed when zeroing with CDL.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	Yes
Disabled in legal-for-trade mode	Yes
Save parameters	TDD1
Available starting with firmware version	P81 (electronics units with P81 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS are used.

Parameter P1

Meaning		Zeroing range
Range/data		0: Zeroing range as before; see CDL, ZSE 1: Zeroing range ±100% of NOV, where LFT = 0 (Industrial mode)
Number of ASCII characters with serial interface		1
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	Index	2010*hex* (hexadecimal)
	Subindex	1A*hex* (hexadecimal)
DeviceNet	Class	100
	Instance	2

	Attribute	26
PROFIBUS		Not available

10.202 ZSE (Zero Setting)

Sets or reads the setting for *zeroing when switching on*.

If a standstill occurs within about 2.5 seconds after switching on the supply voltage or after the RES command and the gross value is within the selected range, the current gross value will be transferred to zero memory. If there is no standstill, there is no zeroing.

See also Zeroing on start-up, MTD, Standstill recognition, CDL.

Zero memory is cleared after the supply voltage is turned on or by the RES command. Reads out the current value of zero memory with `CDL?;`.

A change in the setting for zeroing on start-up does not take effect until after a reset (RES) command or the next time the supply voltage is turned on.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection [1)]	Yes
Disabled in legal-for-trade mode	Yes
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS are used.

Parameter P1

Meaning	Zeroing on start-up
Range/data	0: Zeroing on start-up disabled 1: Zeroing range ±2% of NOV 2: Zeroing range ±5% of NOV 3: Zeroing range ±10% of NOV 4: Zeroing range ±20% of NOV

Number of ASCII characters with serial interface		2
Data type		*UINT8* (Unsigned Integer 8 bit)
Access		*R/W* (Read/Write)
CANopen	**Index**	2010*hex* (hexadecimal)
	Subindex	08*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	2
	Attribute	8
PROFIBUS	**Slot**	0
	Index	67

10.203 ZTR (Zero Tracking)

Sets or reads the setting for (static) zero tracking.

See also Zero tracking.

Automatic zero tracking is executed when all gross or net measured values within one second are less than the zero value plus/minus the specified value for zero tracking. Then the mean value is transferred to zero memory. The unit d (digit) relates to the nominal value (NOV). If one of the measured values drops out of the range within that second, a new period begins.

For NOV with parameter P1 = 0 or P1 > 100,000, the correction is always made with a setting of 0.5 d/s relative to 100,000 d. For example, if P1 = 1,000,000 the correction is made with 5 d/s.

No. of parameters	1
Factory setting	0
Response time	<10 ms
Password protection[1)]	Yes
Disabled in legal-for-trade mode	Yes
Save parameters	TDD1
Available starting with firmware version	P50 (electronics with P50 see Firmware overview)

[1)] Only available if serial interfaces or PROFIBUS used.

Parameter P1

Meaning	Zero tracking
Range/data	0: Zero tracking deactivated 1: Zero tracking 0.5 d/s 2: Zero tracking 1 d/s 3: Zero tracking 2 d/s 4: Zero tracking 3 d/s
Data type	*UINT8* (Unsigned Integer 8 bit)

Access		*R/W* (Read/Write)
CANopen	**Index**	2010*hex* (hexadecimal)
	Subindex	09*hex* (hexadecimal)
DeviceNet	**Class**	100
	Instance	2
	Attribute	9
PROFIBUS	**Slot**	0
	Index	66

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