Operating Manual

ML77B

Profibus Interface

HBM

A00760_09_E00_00 HBM: public ML77B

1   Savety instructions

Approbiate use

The K3607 calibration instrument is to be used exclusively for measurement tasks and directly related control tasks. Use for any purpose other than the above shall be deemed to be not in accordance with the regulations.

In the interests of safety, the instrument should only be operated as described in the Operating Manual. It is also essential to comply with the legal and safety requirements for the application concerned during use. The same applies to the use of accessories.

Conditions on site

- Protect the device from direct contact with water.

- Protect the device from moisture and humidity or weather conditions such as rain, snow.

- Do not expose the device to direct sunlight.

- Please observe the permissible maximum ambient temperatures and humidity stated in the specifications.

- The device must not be modified from the design or safety engineering point of view except with our express agreement. Any modification shall exclude all liability on our part for any damage resulting therefrom.
  In particular, any repair or soldering work on motherboards is prohibited. When exchanging complete modules, use only original parts from HBM.

- Install the device so that it can be disconnected from the supply voltage at any time without difficulty.

- The device is maintenance-free.

- Before cleaning, disconnect all connections.

- Clean the housing with a soft, slightly damp (not wet!) cloth. You should *never* use solvents, since these could damage the labeling.

- When cleaning, ensure that no liquid gets into the module or connections.

- In accordance with national and local environmental protection and material recovery and recycling regulations, old equipment that can no longer be

used must be disposed of separately and not with normal household garbage.

Qualified personnel

Qualified personnel means persons entrusted with the installation, assembly, commissioning and operation of the product, who possess the appropriate qualifications for their function.

This includes people who meet at least one of the three following requirements:

- Knowledge of the safety concepts of automation technology is a requirement and, as project personnel, you must be familiar with these concepts.

- As automation plant operating personnel, you have been instructed how to handle the machinery. You are familiar with the operation of the equipment and technologies described in this documentation.

- As commissioning engineers or service engineers, you have successfully completed the training to qualify you to repair the automation systems. You are also authorized to activate, ground and label circuits and equipment in accordance with safety engineering standards.

It is also essential to comply with the legal and safety requirements for the application concerned during use. The same applies to the use of accessories.

The device must only be installed by qualified personnel, strictly in accordance with the specifications and with the safety requirements and regulations listed below.

Maintenance and repair work on an open device with the power on may only be carried out by trained personnel who are aware of the dangers involved.

Working safety

- Maintenance and repair work on an open device with the power on may only be carried out by trained personnel who are aware of the dangers involved.

- Automation equipment and devices must be installed in such a way that adequate protection or locking against unintentional actuation is provided (e.g. access checks, password protection, etc.).

Additional safety precautions

Additional safety precautions must be taken in plants where malfunctions could cause major damage, loss of data or even personal injury. In the event of a fault, these precautions establish safe operating conditions.

The scope of supply and performance of the device only covers a small area of measurement technology. In addition, equipment planners, installers and operators should plan, implement and respond to the safety engineering considerations of measurement technology in such a way as to minimize remaining dangers. On-site regulations must be complied with at all times. There must be reference to the remaining dangers connected with measurement technology.

General dangers of failing to follow the safety instructions

The device is a state of the art unit and as such is reliable. The module may give rise to dangers if it is inappropriately installed and operated by untrained personnel.

2   Markings used

2.1   The markings used in this document

Important instructions for your safety are specifically identified. It is essential to follow these instructions in order to prevent accidents and damage to property.

Symbol	Significance
⚠ **DANGER**	Warns of an *imminently* dangerous situation in which failure to comply with safety requirements *will* result in death or serious physical injury.
⚠ **WARNING**	This marking warns of a *potentially* dangerous situation in which failure to comply with safety requirements *can* result in death or serious physical injury.
⚠ **CAUTION**	This marking warns of a *potentially* dangerous situation in which failure to comply with safety requirements *can* result in slight or moderate physical injury.
Notice	This marking draws your attention to a situation in which failure to comply with safety requirements *can* lead to damage to property.
i **Important**	This marking draws your attention to *important* information about the product or about handling the product.
i **Tip**	This marking indicates application tips or other information that is useful to you.
i **Information**	This marking draws your attention to information about the product or about handling the product.
Emphasis *See….*	Italics are used to emphasize and highlight text and references to other chapters and external documents.

Symbol	Significance
Gerät -> Neu	Fette Schrift kennzeichnet Menüpunkte sowie Dialog- und Fenstertitel in Programmoberflächen. Pfeile zwischen Menüpunkten kennzeichnen die Reihenfolge, in der Menüs und Untermenüs aufgerufen werden
Messrate	Fett-kursive Schrift kennzeichnet Eingaben und Eingabefelder in Programmoberflächen.

2.2   Symbols on the product

CE mark

The CE mark enables the manufacturer to guarantee that the product complies with the requirements of the relevant EC directives (the declaration of conformity is available at http://www.hbm.com/HBMdoc).

Statutory marking requirements for waste disposal
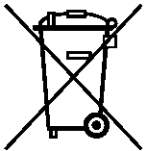
National and local regulations regarding the protection of the environment and recycling of raw materials require old equipment to be separated from regular domestic waste for disposal.

For more detailed information on disposal, please contact the local authorities or the dealer from whom you purchased the product.

3　Introduction

The ML77B module uses the internal bus (link) to access measured values from other system modules and "hand them over" to the Profibus. The Profibus output (e.g. taring, zeroing, clearing peak value stores, predefining limit value levels) is transmitted to the respective amplifiers via the internal serial interface in the form of single commands.

The data contents for the Profibus is selected via the Profibus communication telegram. The DP protocol is used on the Profibus.

The Profibus enables a maximum of 244 bytes of input and 244 bytes of output data to be transmitted.

Transmission of:

- measured values (gross, net, peak, sample time)
- limit switch status
- control bits for taring, zeroing, peak value control, parameter set switching, and
- optionally, the limit value levels
- press-fit results

In general, only instantaneous values are available on the Profibus.

The update rates on the Profibus vary according to the Profibus master and the Profibus baud rate (max. 12 Mbaud), data is read in at a rate of 2,400 Hz per second via the link. If with large numbers of channels the CPU capacity is not sufficient, it might prove necessary to reduce this rate. With 15 channels with one signal each, an update rate of 1,200 Hz is achieved.

Notice

Please note that MGCplus measurement cycles are asynchronous to the Profibus cycle. Hence, it is possible that not all values will reach the receiver at the same time.

4 Guideline

Steps for successfully connecting to Profibus:

1. Mechanical connection of the device to Profibus (see chapter 5).

2. Setting the parameters on the device, see chapter 8.1 (can also be done using the HBM software "MGCplus Assistant").

3. Configuring and parameterizing the Profibus message by means of a configuration tool (e.g. Step7) and device database files (GSD files) or manually in accordance with Chapter 11.

A GSD file describes the properties of a Profibus node in a standardized form. It is used by the configuration tool to specify which data content of the individual bus nodes is exchanged at the Profibus.

A standard GSD (hbmxxx.gsd=german; hbmxxx.gse=english) for MGCplus modules is included on the MGCplus system CD (GSD directory). Use the program "GSDEdit" to edit the standard GSD.
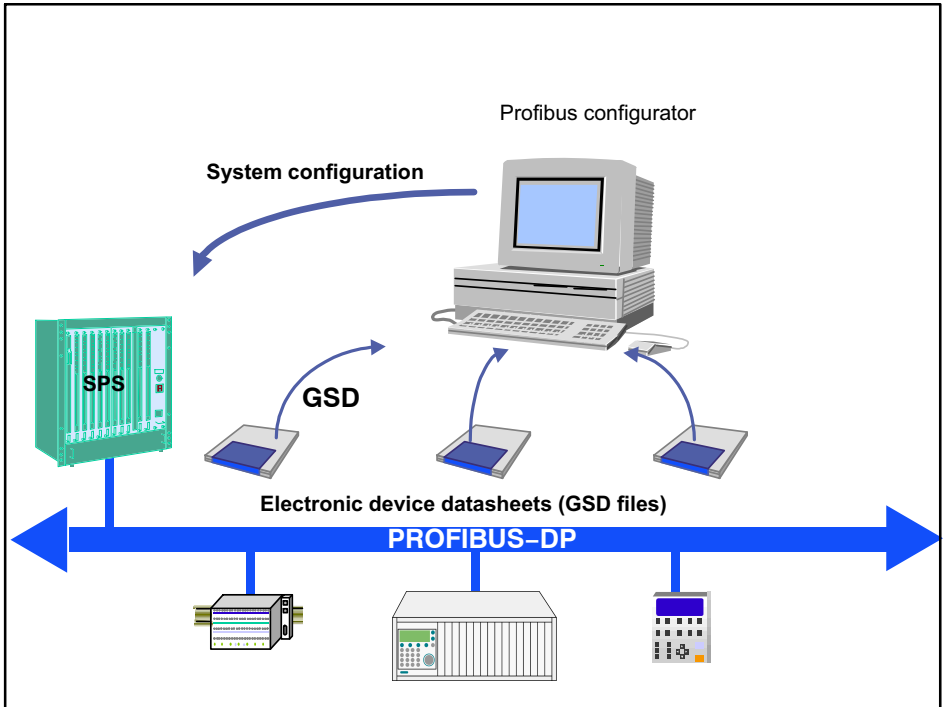
Fig. 4.1   Configuration with GSD files

5 Connection

> ### ⚠ WARNING
>
> Before starting the device, do in any case read the safety instructions.

5.1 Pin assignment

A 9-pin Sub-D connector (complying with standard) on the AP77 connection board is used for connecting the Profibus.
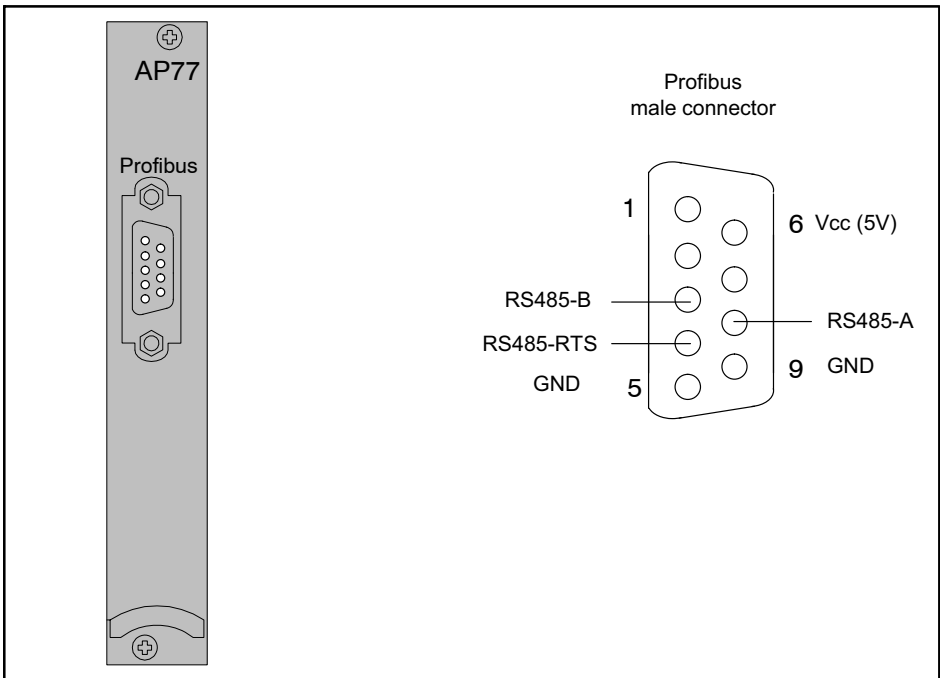
Fig. 5.1   Profibus connection complying with standard

5.2   Bus termination

Correct termination of the first and last device on a Profibus segment is essential to correct signal transmission. Bus termination involves three resistors (see Fig. 5.2), integrated in the Profibus connector.
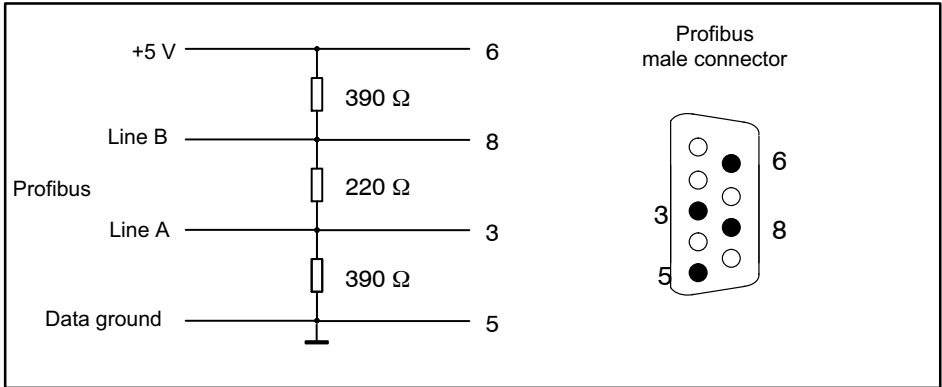
Fig. 5.2   Terminating resistors

• Connect the Profibus line to the AP77 connection board. Ensure that the Profibus connector slide switches of the first and last Profibus device are set to "ON" position.

Example:
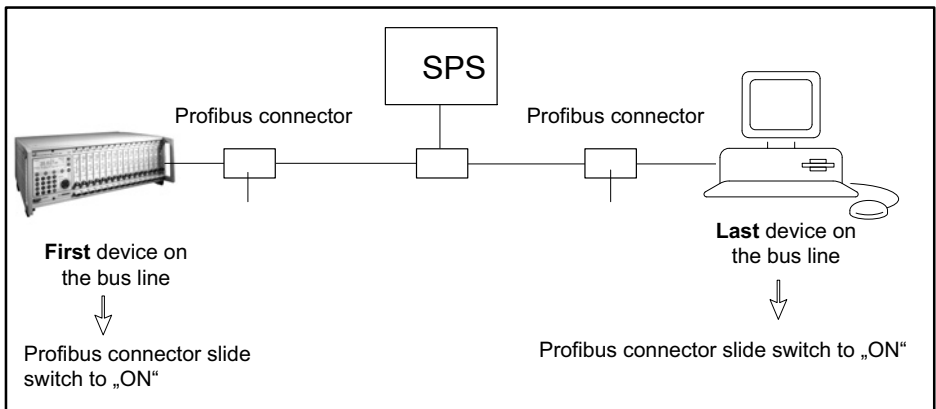
Fig. 5.3   Profibus mode

6 Configuration and parameterization

- Start your configuration program (e.g. Step7).

- Load the HBM GSD file (MGCplus CD).

- Add an HBM device (Profibus-DP/additional field devices/general).

- Simulate the layout of your device, with the device itself (MGCplus*)* being given as in slot 0. All the device modules must be mapped (counting from left to right), even if they do not send data ("empty slot").
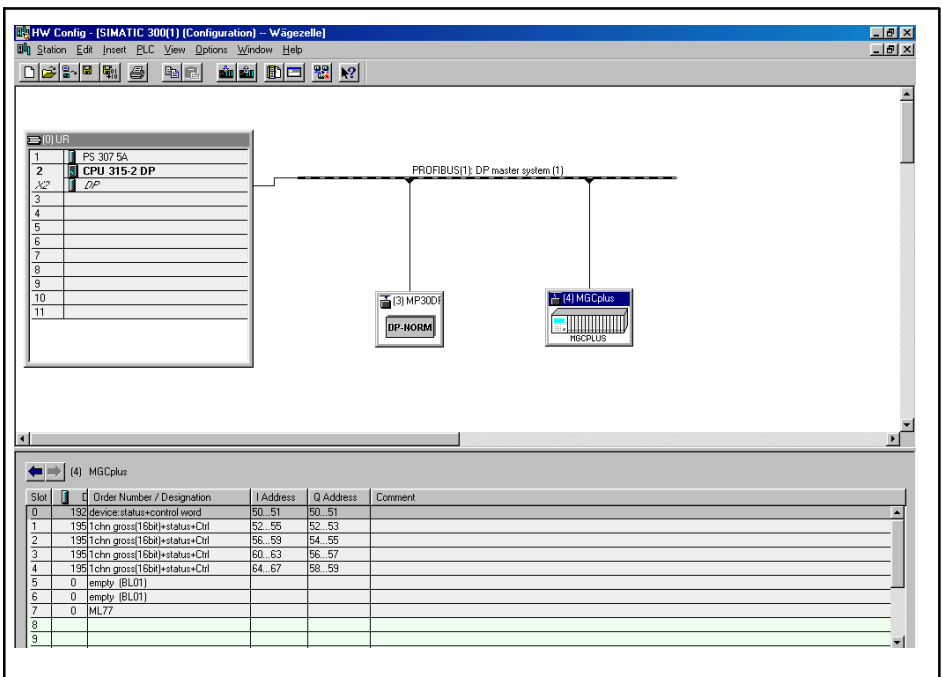
Fig. 6.1   Hardware configuration

- **Note:** The ML77B module must be configured.

- Configure the modules from the hardware catalog using Drag and Drop.

- Open the Properties window by double-clicking the configured entries and select the required parameters.
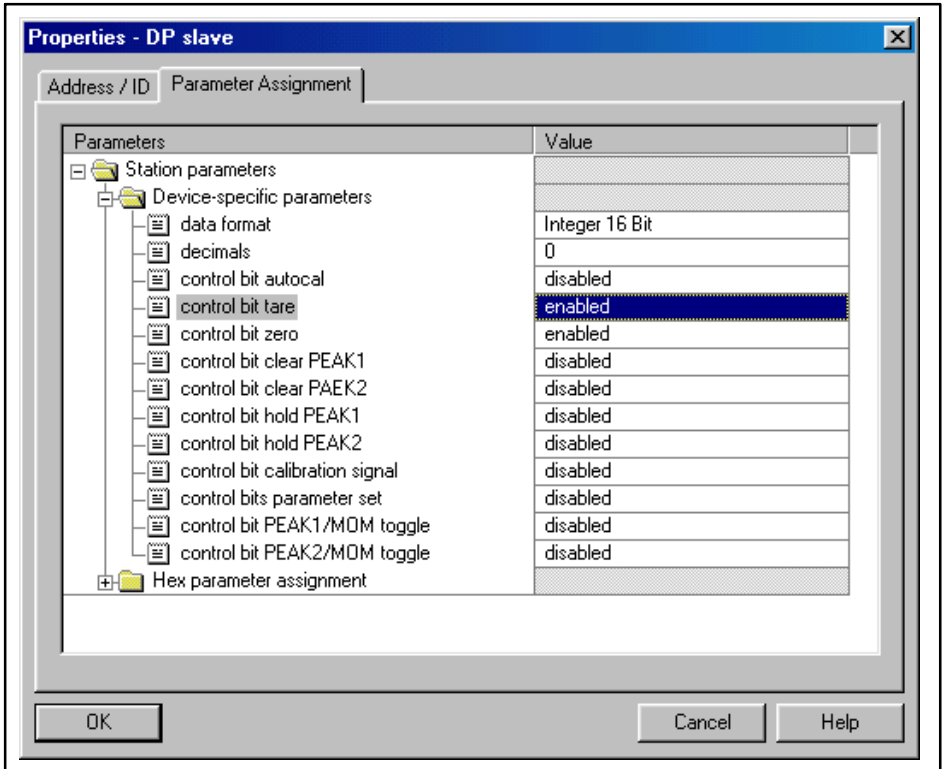
Fig. 6.2   Setting the parameters

Instructions for users of the Simatic S7 PLC:

- To ensure consistent transfer of data of 3 bytes or 4 bytes, you must use the SFC14 special function block for reading and the SFC15 for writing.

- The maximum amount of data that can be transferred consistently with the S7 3xx is 32 bytes.

7   Front panel
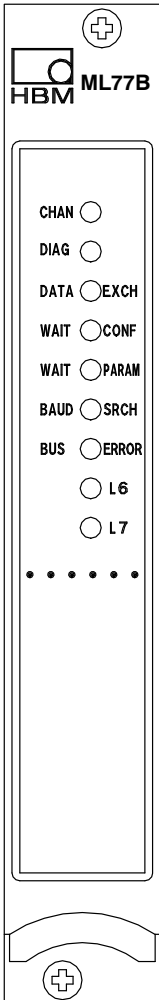
LED designation	Colour	Meaning
CHAN.	yellow	Channel selected
DIAG	red	Diagnostic message
DATA EXCH	yellow	Bus status: Data Exchange
WAIT CONF	red	Bus status: Wait Configuration
WAIT PARAM	red	Bus status:Wait Param
BAUD SRCH	red	Bus status: Baud Search
BUS ERROR	red	Bus error

(L6, L7 no function, at present)

8 Menu structure in Setup mode

The MGCplus device setup is structured in functional groups. Press the (SET) key to access the setup dialogue. The setup menu will be displayed.

Display in setup mode
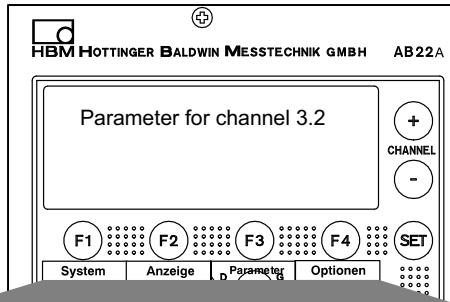
Setup menü

System	Display	Parameter	Optionen
System-specific setup which normally must only be made for the first putting into operation or for a new measurement task.	User-oriented display setup such as e.g. the desired representation of measured values, F-key assignment, assignment of channel names.	DP setup	Param. data Configuration data Input data Output data Diagnostic data Bus parameters

For more information on operation using the AB22A Display and control panel, refer to the operating manual MGCplus.

8.1 Parameters menu

8.1.1 Setup window *DP settings*

The Profibus address is set in this menu.

If there are system errors, you can choose between two modes of operation:

1. No data-exchange possible at the Profibus.

2. Data-exchange possible; diagnostics indicate faulty signals. (factory default)

DP-SETTINGS	CHANNEL 3	
Slave address		4 ...
Behaviour with system errors:		
	No data-exchange ↓	
System	Display	Parameters	Options

No data-exchange ↓
Data-ex with diagnostics
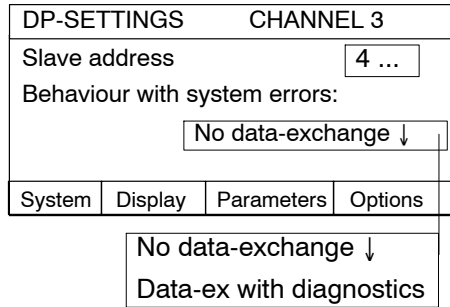
8.1.2 Setup window Scaling (P2.00 or later)

The scaling factor of each subchannel can be set for multichannel mode in this menu.

Scaling	CHANNEL 3.1
Phys. unit	kN
Zero offset	0
Full scale	1000
System	Display	Parameters	Options

8.1.3 Setting the Profibus address

1. To make your choice, use the channel selector buttons ⊕ CHANNEL ⊖ or enter the Profibus channel directly.

2. Use the shift key (SET) to change to setup mode.

3. Press the function key (F3) and confirm with (⬅).

4. This will bring you to the setup menu "DP settings".

5. Use the cursor keys ⟨↕⟩ to select the edit field "Slave address" and confirm with ⟨⟵⟩.

6. Enter the device address and confirm with ⟨⟵⟩.

7. Use the shift key ⟨SET⟩ to change to measuring mode and confirm when asked with ⟨⟵⟩.

8.2   Options menu

The displayed values will not be updated cyclically.

8.2.1   *Output data* dialogue window

Output data is displayed in hexadecimal format as received by the master. The relative address, i.e., the start address for displaying data for the MGCplus is entered into the "Start address" entry field.

OUTPUT DATA		CHANNEL3	
Start address		0 ...	
Data	00 11 22 33 44 55 66 88		
	00 22 33 44 55 66 FF AA		
	22 44 66 88 99 00 AA BB		
System	Display	Parameters	Options

8.2.2 *Input data* dialogue window

Input data is displayed as transmitted from the MGCplus to the master.

INPUT DATA	CHANNEL3
Start address	0 ...
Data	00 11 22 33 44 55 66 77
	00 22 33 44 55 66 77 FF
	22 44 66 88 99 00 AA FF

System	Display	Parameters	Options

8.2.3 *Diagnostic data* dialogue window

Diagnostic data is displayed as transmitted from the MGCplus to the master.

DIAGNOSTIC DATA	CHANNEL3
	00 11 22 33 44 55 66 77
	00 22 33 44 55 66 77 FF
	Update

System	Display	Parameters	Options

8.2.4 *Parameterisation data* dialogue window

Parameterisation data is displayed as transmitted from the master to the MGCplus.

PARAMETERISATION DATA	CHANNEL3
Start address	0 ...
Data	00 11 22 33 44 55 66 77
	00 22 33 44 55 66 77 FF
	22 44 66 88 99 00 AA BB

System	Display	Parameters	Options

8.2.5 *Configuration data* dialogue window

Configuration data is displayed as transmitted from the master to the MGCplus.

CONFIGURATION DATA		CHANNEL3	
Start address		0 ...	
Data	00 11 22 33 44 55 66 77		
	00 22 33 44 55 66 77 FF		
	22 44 66 88 99 00 AA BB		
System	Display	Parameters	Options

8.2.6 *Bus parameters* dialogue window

This menu enables some important ML77B bus parameters to be monitored.

BUS PARAMETERS		CHANNEL3	
	Update		
	Clear Max		
Meas. update rate		2400Hz	
Output-data cycle times:			
typical		56 ms	
System	Display	Parameters	Options

Displayed parameters:

Update:

There is no cyclic update of the displayed values. Use this button to update all displayed values.

Clear Max.:

Use this button to clear the cycle-time maximum values displayed below.

Meas. update rate:

Displays the frequency at which measured values of the 1-channel and 8-channel devices are read, scaled and updated in the input data by the HS link. Data is not necessarily requested at this rate by the DP master. This frequency can be requested from the master (cycle time).

Output-data cycle times:

Displays the time elapsing between the changing of a bit in the control word (or LIV or tare level) and the execution of the command in the amplifier.

9 Profibus

Three different types of telegram are available:

1. Configuration telegram: This telegram enables data contents and telegram length for cyclic data exchange to be specified.

2. Parameterisation telegram: This telegram enables the data contents to be parameterised (enable bits, decimal places, etc.)

3. Cyclic data exchange: Cyclic exchange of input data (direction: slave→master) and output data (direction: master→slave) between master and slave. The meaning of each individual byte has been predefined in the configuration and parameterisation made before.

9.1 Input data

Below you will find a description of the input data which the Profibus master can read off the MGCplus. Refer to chapters 9.1.1 to 9.1.6 for a description on the bit-level of the individual control words that are permissible. Chapters 9.1.7 to 9.1.9 deal with the permissible combinations of the individual control words for the different channel types.

9.1.1 Device status

Bit	Name	Meaning
0	DiagChn1	Error condition of channel 1
1	DiagChn2	Error condition of channel 2
2	DiagChn3	Error condition of channel 3
3	DiagChn4	Error condition of channel 4
4	DiagChn5	Error condition of channel 5
5	DiagChn6	Error condition of channel 6
6	DiagChn7	Error condition of channel 7
7	DiagChn8	Error condition of channel 8
8	DiagChn9	Error condition of channel 9
9	DiagChn10	Error condition of channel 10
10	DiagChn11	Error condition of channel 11

11	DiagChn12	Error condition of channel 12
12	DiagChn13	Error condition of channel 13
13	DiagChn14	Error condition of channel 14
14	DiagChn15	Error condition of channel 15
15	DiagChn16	Error condition of channel 16

9.1.2 Measured values

Measured values can be transmitted in different formats such as IEEE float, Siemens float (4 bytes), 16-bit fixed point number (16-bit integer as two's complement, decimal point position must be signalled to reading device) or 32-bit fixed point number (32-bit integer as two's complement, decimal point position must be signalled to reading device) (also see chapter **Parameterisation**). For converting the values into fixed point format, the number of decimal places must be specified in the parameterisation telegram.

9.1.3 Channel status for 1-channel device

Mode0		
Bit	**Name**	**Meaning**
0	GW1	Status of limit switch 1
1	GW2	Status of limit switch 2
2	GW3	Status of limit switch 3
3	GW4	Status of limit switch 4
4	BRT OVLD	Gross value overload
5	NET OVLD	Net value overload
6	CAL_ERR	Calibration error or other error in channel
7	CHANGE	Changed scaling of measured values
8	PAR1	Active parameter set bit 1
9	PAR2	Active parameter set bit 2
10	PAR3	Active parameter set bit 3
11	PAR4	Active parameter set bit 4
12..14	Res	Reserved
15	MODE	0

Mode1		
Bit	**Name**	**Meaning**
0	GW1	Status of limit switch 1
1	GW2	Status of limit switch 2
2	GW3	Status of limit switch 3
3	GW4	Status of limit switch 4
4	Res	Reserved
5	Res	Reserved
6	CHN_ERR	Error in channel
7	CHANGE	Changed scaling of measured values
8	PAR1	Active parameter set bit 1
9	PAR2	Active parameter set bit 2
10	PAR3	Active parameter set bit 3
11	PAR4	Active parameter set bit 4
12..14	Res	Reserved
15	MODE	1

The parameter set number is binary coded in 3 bits:

Bit 8	**Bit 9**	**Bit 10**	**Parameter set no.**
0	0	0	1
1	0	0	2
0	1	0	3
1	1	0	4
0	0	1	5
1	0	1	6
0	1	1	7
1	1	1	8

9.1.4 Channel status for 8-channel device

Mode0		
Bit	**Name**	**Meaning**
0	GW1	Status of limit switch 1
1	GW2	Status of limit switch 2
2	GW3	Status of limit switch 3

3	GW4	Status of limit switch 4
4	NET OVLD	Net value overload
5	OVLD	Gross value overload
6	CAL_ERR	Calibration error or other error in channel
7	CHANGE	Changed scaling of measured values
8..14	Res	Reserved
15	MODE	0

Mode1		
Bit	**Name**	**Meaning**
0	GW1	Status of limit switch 1
1	GW2	Status of limit switch 2
2	GW3	Status of limit switch 3
3	GW4	Status of limit switch 4
4	Res	Reserved
5	Res	Reserved
6	CHN_ERR	Error in channel
7	CHANGE	Changed scaling of measured values
8..14	Res	Reserved
15	MODE	1

9.1.5   Control word status

Configuring a control-word status word enables handshaking between Profibus master and MGCplus. If the control word transmitted in the output data by the master is reflected in the control word status, all commands requested by the master have been executed.

To make sure that all commands have been executed, the master - after having set or cleared a bit in the control word - has to wait until the control word transmitted is reflected in the control word status.

9.1.6 Time stamp

The time stamp is a 32-bit integer value specifying the time when samples have been taken from the respective module. The internal counter starts upon restart (power-on or RES command) with the value 0.

The counter counts up at a frequency of 76.8 kHz (in intervals of 13.0208 μs). Thus, every 15.5 hours approximately there is an overflow.

9.1.7 Input data of 1-channel device

The below data is available as input data for the 1-channel devices (ML01B, ML10B, ML30B, ML55B,...):

Time stamp (see chapter 9.1.6)
Gross value
Net value
Peak value 1
Peak value 2
Channel status (see chapter 9.1.3)
Control word status (see chapter 9.1.5)
Softw. peak
Remote contacts

The desired data is entered into the configuration telegram and appears on the input data in the sequence shown in the above table (also see chapter 11.2.2). Depending on the data format, measured values are 1 or 2 data words long.

9.1.8 Input data of 8-channel device

The below data is available as input data per subchannel for the 8-channel device (ML801B):

The data of the individual subchannels are directly appended to each other starting with subchannel 1.

Time stamp (see chapter 9.1.6) (only once per module)
Gross value
Net value
Peak value 1
Peak value 2
Channel status (see chapter 9.1.3)
Control word status (see chapter 9.1.5)

The desired data is entered into the configuration telegram and appears on the input data in the sequence shown in the above table (also see chapter 11.2.3). From the values on the gray background, one value only is available at a time. Depending on the data format, measured values are 1 or 2 data words long.

9.1.9   Input data of 32-channel device

Due to Profibus protocol format restrictions, MGCplus multi-channel moduls with up to 128 subchannels enable only the first 32 subchannels to be displaced.

The below data is available as input data per subchannel for the 32-channel device (ML71B, ML70B):

The data of the individual subchannels are directly appended to each other starting with subchannel 1.

Time stamp (see chapter 9.1.6) (only once per module)
Control word status (see chapter 9.1.5)
Measuring value of subchannel 1
Status of subchannel 1 (see chapter 9.1.3)
Measuring value of subchannel 2
Status of subchannel 2 (see chapter 9.1.3)
Measuring value of subchannel 3
Status of subchannel 3 (see chapter 9.1.3)
:
:
:
Measuring value of subchannel 32

Status of subchannel 32 (see chapter 9.1.3)
Channel status

9.2   Output data

Below you will find a description of the output data enabling the Profibus master to control the MGCplus. Refer to chapters 9.2.1 to 9.2.5 for a description on the bit-level of the individual control words that are permissible. Chapters 9.2.8 to 9.2.10 deal with the permissible combinations of the individual control words for the different channel types.

The functions that can be triggered in the control words are partly edge triggered (the status changing from 0 to 1 triggers the function) or they are statically linked to the control word bits.

9.2.1   Device control word

Commands (Bits 1..10) are transmitted to all channels. This procedure includes only those channels for which the respective function has been enabled in the parameterisation telegram (enable word) and which understand these commands.

Bit	Name	Triggering	Meaning
0	PRINT	Pos. edge	0-1= Printing is triggered
1	ACAL	Static	1 = Autocal ON 0 = Autocal OFF
2	TAR	Pos. edge	0-1 Triggers taring
3	NULL	Pos. edge	0-1 Triggers automatic zeroing
4	CLRPEAK1	Pos. edge	0-1 Clears peak value store 1
5	CLRPEAK2	Pos. edge	0-1 Clears peak value store 2
6	HOLD-PEAK1	Static	1: Hold peak value store 1
7	HOLD-PEAK2	Static	1: Hold peak value store 2
8	PAR1	Pos. edge	Parameter set selection Bit 1
9	PAR2	Pos. edge	Parameter set selection Bit 2
10	PAR3	Pos. edge	Parameter set selection Bit 3
11	PAR4	Pos. edge	Parameter set selection Bit 4
12	CAL_SIG	Static	1 = Calibration signal ON, 0 = OFF
13	res.	res.	Reserved, set to 0
14	MOM-PEAK1	Static	1: Peak value store 1 shows instantaneous value
15	MOM-PEAK2	Static	1: Peak value store 2 shows instantaneous value

9.2.2 Limit values, tare value for 1-channel device

For the representation of limit value level and tare value the same format is used as for the representation of measured values (16-bit integer, 32-bit integer or Float format), see chapter 11. The switching direction and hysteresis can be modified via the Profibus and are set via the display and control panel or the configuration software.

9.2.3 Channel control word for 1-channel device

Bit	Name	Triggering	Meaning
0	ACAL	Static	1 = Autocal ON 0 = Autocal OFF
1	TAR	Pos. edge	0-1 Triggers taring
2	NULL	Pos. edge	0-1 Triggers automatic zeroing
3	CLRPEAK1	Pos. edge	0-1 Clears peak value store 1
4	CLRPEAK2	Pos. edge	0-1 Clears peak value store 2
5	HOLD-PEAK1	Static	1: Hold peak value store 1
6	HOLD-PEAK2	Static	1: Hold peak value store 2
7	CAL_SIG	Static	1 = Calibration signal ON, 0 = OFF
8	PAR1	Pos. edge	Parameter set selection Bit 1
9	PAR2	Pos. edge	Parameter set selection Bit 2
10	PAR3	Pos. edge	Parameter set selection Bit 3
11	PAR4	Pos. edge	Parameter set selection Bit 4 (from version P1.10 on)
12..13	res	res	Reserved
14	MOM-PEAK1	Static	1: Peak value store 1 shows instantaneous value
15	MOM-PEAK2	Static	1: Peak value store 2 shows instantaneous value

9.2.4 Channel control word for 8-channel device

Bit	Name	Triggering	Meaning
0	ACAL	Static	1 = Autocal ON, 0 = Autocal OFF
1	TAR	Pos. edge	0-1 Triggers taring
2	NULL	Pos. edge	0-1 Triggers automatic zeroing
3	CLRPEAK1	Pos. edge	0-1 Clears peak value store 1
4	CLRPEAK2	Pos. edge	0-1 Clears peak value store 2
5..6	Res	Res	Reserved
7	CAL_SIG	Static	1 = Calibration signal ON, 0 = OFF
5..6	Res	Res	Reserved

9.2.5 Channel control word for 32-channel device

Bit	Name	Triggering	Meaning
0	Bit 0	Static	Specific to user
1	Bit 1	Static	Specific to user
2	Bit 2	Static	Specific to user
:	:	Static	
:	:	Static	
15	Bit 15	Static	Specific to user

9.2.6 Output data for 1-channel device

The below data is available as output data for the 1-channel devices (ML01B, ML10B, ML30B, ML55B,...):

Channel control word (see chapter 11.2.2)
Limit value level 1 (see chapter 9.2.2)
Limit value level 2 (see chapter 9.2.2)
Limit value level 3 (see chapter 9.2.2)
Limit value level 4 (see chapter 9.2.2)
Tare value (see chapter 9.2.2)

The desired data is entered into the configuration telegram and appears on the output data in the sequence shown in the above table (also see chapter 11.2.2). Depending on the data format, limit value level and tare value are 1 or 2 data words long.

9.2.7 Output data for 8-channel device

The below data is available as output data per subchannel for the 8-channel devices (ML801B):

The data of the individual subchannels are directly appended to each other starting with subchannel 1.

Channel control word (see chapter 9.2.4)
Tare value (see chapter 9.2.2)

The desired data is entered into the configuration telegram and appears on the output data in the sequence shown in the above table (also see chapter 11.2.3). Depending on the data format, measured values are 1 or 2 data words long.

9.2.8   Output data for 32-channel device

The below data is available as output data per subchannel for the 32-channel devices (ML71B, ML70B):

Channel control word (see chapter 9.2.5)

The desired data is entered into the configuration telegram and appears on the output data in the sequence shown in the above table (also see chapter 11.2.3).

9.2.9   ML77B output data (if ML77B has one subchannel)

The output data for the ML77B sets the ML77B measurement data that can be read by the CPxx or by catman.

When the measurement data is read in 32-bit format, configuration bits 0 ... 2 of configuration byte 1 must be used. The output data is then mapped at the Profibus as follows.

Signal gross bytes 0 and 1 (see sub-section 11.2.5)
Signal gross byte 2, signal net byte 0 (see sub-section 11.2.5)
Signal net bytes 1 and 2 (see sub-section 11.2.5)
Signal PV1 bytes 0 and 1 (see sub-section 11.2.5)
Signal PV1 byte 2, signal PV2 byte 0 (see sub-section 11.2.5)
Signal PV2 bytes 1 and 2 (see sub-section 11.2.5)
Signal S5 bytes 0 and 1 (see sub-section 11.2.5)
Signal S5 byte 2, "Bit mask remote contacts" byte 0 (see sub-section v)
Signal "Bit mask remote contacts" bytes 1 and 2 (see sub-section 11.2.5)

When the measurement data is read in 16-bit format, configuration bits 0 ... 5 of configuration byte 2 must be used. The output data is then mapped at the Profibus as follows.

Signal gross bytes 0 and 1 (see sub-section 11.2.5)
Signal net bytes 0 and 1 (see sub-section 11.2.5)
Signal PV1 bytes 0 and 1 (see sub-section 11.2.5)
Signal PV2 bytes 0 and 1 (see sub-section 11.2.5)
Signal S5 bytes 0 and 1 (see sub-section 11.2.5)
Signal "Bit mask remote contacts" bytes 0 and 1 (see sub-section 11.2.5)

The measured values are read into catman as floating values. After conversion into 32-bit integer values, the data is available in the following sequence:

don't care	Byte 2	Byte 1	Byte 0
MSB			LSB

⚠ **CAUTION**

When ML77B output data is used, at least one other channel must also be available in the configuration!
When the sampling rate of the CPxx is set to less than 60 Hz, the averaging function is activated automatically. This causes the lowest 2 bits of byte 0 to be lost!

9.2.10 ML77B output data (if ML77B has several subchannels, available as from firmware-version P2.00)

The output data for the ML77B sets the ML77B measurement data that can be read by the CPxx or by catman. When the ML77B is operated with several sub-channels, the output data set in the control is distributed among the individual subchannels (signals are gross).

The number of subchannels can be adjusted with the command PAR9990,<number of subchannels>. To adopt the set number of subchannels, please turn the MGCplus off and then on again. In the Profibus configuration, the number of subchannels is calculated from the length of the output data (see subsections 11.2.1 and 11.2.5).

Output data must be set in the control without scaling. There is a choice between 16-bit mode (configuration byte 2, bit 7 set) or 24-bit mode (configuration byte 1, bit 7 set).

Each individual channel is then shown in MGCplus and catman with the scaling set in the ML77B (see subsection 8.1.2). Each measured value is represented by a 24-bit or 16-bit integer value. The value range for the 24-bit values is -7,680,000 ... 7,680,000 and for the 16-bit values -30,000 .. 30.000. The physical measured value is calculated in accordance with the following formula:

$$phys.\ value\ =\ \frac{integer\ value}{range}\ \cdot\ full\ scale\ -\ zero\ offset$$

Range: 7,680,000 for 24-bit values, 30,000 for 16-bit values
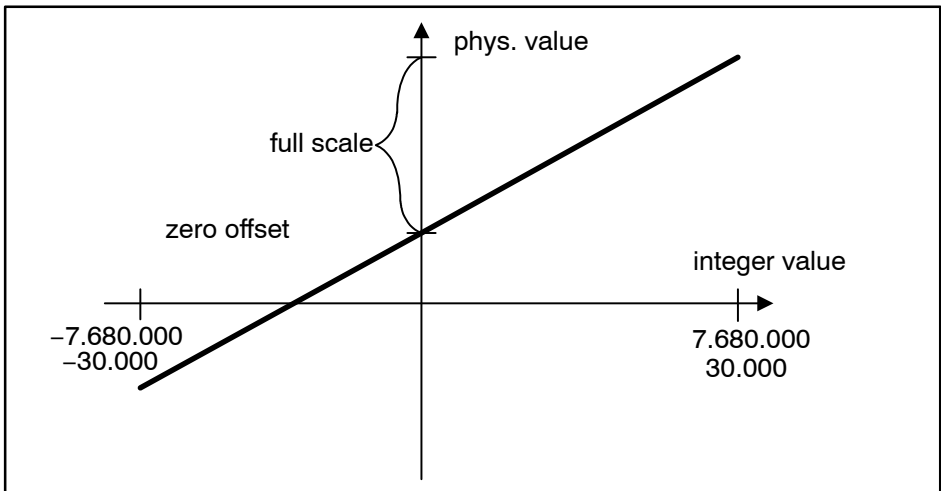
In 24 bit mode the measuring values of the individual sub channels are represented in the output data range of the PLC as follows:

The 24 bit measuring value is located in the upper 3 bytes of the double word. The LSB represents the status of the measuring value which may also be set through the PLC (should be set always to zero).

Byte address		MSB			LSB
0	Meas. value sub channel 1	Byte 2	Byte 1	Byte 0	Status
4	Meas. value sub channel 2	Byte 2	Byte 1	Byte 0	Status
8	Meas. value sub channel 3	Byte 2	Byte 1	Byte 0	Status
	: :				
	Meas. value sub channel n	Byte 2	Byte 1	Byte 0	Status

In 16 bit mode the measuring values of the individual sub channels are represented in the output data range of the PLC as follows:

Byte address		MSB	LSB
0	Meas. value sub channel 1	Byte 1	Byte 0
2	Meas. value sub channel 2	Byte 1	Byte 0
4	Meas. value sub channel 3	Byte 1	Byte 0
	:		
	Meas. value sub channel n	Byte 1	Byte 0

The measuring status is always set to zero in 16 bit mode.

⚠ CAUTION

If the ML77B uses output data, there always has to be at least one measuring channel in the configuration!

9.3   Diagnosis

As a sort of external diagnosis the ML77B provides a device diagnosis which can be enabled via the parameterisation telegram.

The external diagnosis is 5 bytes long. The first byte includes the identification for the device diagnosis; in the second and third byte one bit related to input errors is reserved for each channel; in the forth and fifth byte one bit related to output errors is reserved for each channel.

Octet	Bit	Value	Meaning
0	0..7	5	Total length of device diagnosis is 5 bytes
1	0	0	No error with inputs channel 9
		1	Error with inputs channel 9
1	1	0	No error with inputs channel 10
		1	Error with inputs channel 10
...			
1	7	0	No error with inputs channel 16
		1	Error with inputs channel 16
2	0	0	No error with inputs channel 1
		1	Error with inputs channel 1
2	1	0	No error with inputs channel 2
		1	Error with inputs channel 2
...			
2	7	0	No error with inputs channel 8
		1	Error with inputs channel 8
3	0	0	No error with outputs channel 9
		1	Error with outputs channel 9
3	1	0	No error with outputs channel 10
		1	Error with outputs channel 10
...			
3	7	0	No error with outputs channel 16
		1	Error with outputs channel 16
4	0	0	No error with outputs channel 1
		1	Error with outputs channel 1

4	1	0	No error with outputs channel 2
		1	Error with outputs channel 2
...			
4	7	0	No error with outputs channel 8
		1	Error with outputs channel 8

Error causes for input:

Error cause	Remedies
Channel not found	Only request data from channels that are actually available in the system
Measured value overload	Check transducer and amplifier settings
No communication with channel	Switch off and on the MGCplus

Error causes for output:

Error cause	Remedies
Channel not found	Only request data from channels that are actually available in the system
Measured value overload	Check transducer and amplifier settings
No communication with channel	Switch off and on the MGCplus

10 Output of measured values

The ML77B outputs an error status to the link and to the internal serial interface to enable detailed indications on potential errors to be given during the start-up phase.

Use the EST? and IDS? commands to request detailed error descriptions.

See below for the list of potential error messages:

Value	Meaning
0	"OK"
1	"Overload chan <n.m>"
1	"Amplifier ignored instruction, chan <n.m >"
1	"Link error, chan <n.m > "
1	"Signal not available, chan <n.m >"
1	"Chan <n> missing"
1	"Wrong configuration, chan <n> "
1	"Wait for link master"
1	"The configuration of chan <n> doesn`t match the parameterisation"
1	"The configuration of slot 0 is missing"

10.1 Measured values as output data for the ML77B

Representation of measured values as output data for the ML77B

In 24-bit mode the measured values of the subchannels are represented in the memory as follows:

The 24-bit measured value is located in the upper 3 bytes of the double word in Motorola format.

The LSB represents the status of the measured value (should always be set to zero).

Memory map in the PLC:

Byte address in PLC memory	MSB			LSB	
0	Byte 2	Byte 1	Byte 0	Status	meas. val. subchannel 1

4	Byte 2	Byte 1	Byte 0	Status	meas. val. subchannel 2
8	Byte 2	Byte 1	Byte 0	Status	meas. val. subchannel 3
				: :	
	Byte 2	Byte 1	Byte 0	Status	meas. val. subchannel n

Notice

If the measuring rate of the communication processor is set to a value below 60 Hz, an average filter will be activated automatically.
Thereby the lowest 2 bits of the measured value will always be set to 0 (only 24-bit mode)!

In 16-bit mode the measured values of the subchannels are represented in the memory as follows:

Byte address in PLC memory	MSB	LSB	
0	Byte 1	Byte 0	meas. val. subchannel 1
2	Byte 1	Byte 0	meas. val. subchannel 2
4	Byte 1	Byte 0	meas. val. subchannel 3
			: :
	Byte 1	Byte 0	meas. val. subchannel n

The measuring status is always set to zero in 16-bit mode.

Notice

If the ML77B uses output data, there always has to be at least one measuring channel in the configuration!

Example 1 (24-bit format):

A measured value –100% … 100% represented in a 3-decimal fixed-point format (-100,000 … 100,000) in the PLC is to be displayed as an output value of the ML77B.

The value 100,000 (for 100%) is represented as HEX 01 86 A0 in the PLC memory. Consider that the measured value is represented in Motorola byte order and that the LSB contains status information. Therefore the measured value has to be left shifted by 8 bit.

Byte address in PLC memory	MSB			LSB	
0	01	86	A0	00	meas. val. 100% (subchan 1)

To set the correct scaling factor, use the following formula:

$$PhysValue = \frac{IntegerValue}{7,680,000} \cdot Fullscale - ZeroOffset$$

or

$$FullScale = (PhysValue + ZeroOffset) \cdot \frac{7,680,000}{IntegerValue}$$

In our example the integer value 100,000 is to be displayed in the MGCplus as 100.000.

$$FullScale = (100 + 0) \cdot \frac{7,680,000}{100,000} = 7,680$$

→ Set the zero offset for the corresponding subchannel of the ML77B to **0** and set the range to **7,680.**

Example 2 (16-bit format):

A measured value –100 % … 100 % represented in a 2-decimal fixed-point format (-10,000 … 10,000) in the PLC is to be displayed as an output value of the ML77B.

The value 10,000 (for 100 %) is represented as HEX 27 10 in the PLC memory. Consider that the measured value is represented in Motorola byte order.

Byte address in PLC memory	MSB		
0	27	10	meas. val. 100% (subchan 1)

To set the correct scaling factor, use the following formula:

$$\text{PhysValue} = \frac{\text{IntegerValue}}{30,000} \cdot \text{FullScale} - \text{ZeroOffset}$$

 or

$$\text{FullScale} = (\text{PhysValue} + \text{ZeroOffset}) \cdot \frac{30,000}{\text{IntegerValue}}$$

In our example the integer value 10,000 is to be displayed in the MGCplus as 100.00.

$$\text{Fullscale} = (100 + 0) \cdot \frac{30,000}{10,000} = 300$$

→ Set the zero offset for the corresponding subchannel of the ML77B to **0** and set the range to **300.**

11 Manual parameterization and configuration

11.1 Parameterisation

The parameterisation telegram has the following entries:

Parameterisation entry no.	Meaning	Contents
0	Device parameterisation	see 11.1
1	Channel 1	1-channel, see 11.1.2 8, 32-channel, see 11.1.3
2	Channel 2	1-channel, see 11.1.2 8, 32-channel, see 11.1.3
3	Channel 3	1-channel, see 11.1.2 8, 32-channel, see 11.1.3
4	Channel 4	
...	...	...
16	Channel 16	

The data format that has been set applies for all measured values exchanged in the cyclic data traffic. The definition of decimal places is only relevant for the Signed16 and Signed32 formats (Example: With 3 decimal places defined, 2.0 mm will be transmitted as integer value 2000). The data format selected also affects the length of the input data (Signed16 = 1 word per analogue value, Signed32 and Float = 2 words per analogue value).

The targeted enabling of the required control bits in the control word enables all functions that are not required to be protected against an accidental activation in the event of an error; otherwise, for example, the zero point that has once been adjusted could be lost. To enable, set bit to 1.

11.1.1 Device parameterisation entry

Byte no.	Bit no.	Meaning	Default
0	Byte	Reserved	0
1..2	16-bit	Enable diagnosis for channels 1..16	0xFFFF (enabled)

11.1.2 Parameterisation entry for 1-channel device

Byte no.	Bit no.	Meaning	Default
0	Bit 0..3	Type: 1-channel	1 (const)
0	Bit 4..7	Data format 0 = Signed16 2 bytes 1 = Signed32 4 bytes 2 = Float (IEEE format) 4 bytes 3 = Float (Siemens format) 4 bytes 4 = Raw data (0..7680000) 4 bytes 5 = Raw data (0..30000) 2 bytes	0
1	Byte	Number of decimal places	acc. to display
2	Bit 0..2	Enable PAR1..3 control bits in control word	0 (disabled)
2	Bit 3..5	Reserved	
2	Bit 6	Enable MOMPEAK1 control bit in control word	0 (disabled)
2	Bit 7	Enable MOMPEAK2 control bit in control word	0 (disabled)
3	Bit 0	Enable BusOff control bit in control bit	0 (disabled)
3	Bit 1	Enable ACAL control bit in control word	0 (disabled)
3	Bit 2	Enable TAR control bit in control word	0 (disabled)
3	Bit 3	Enable NULL control bit in control word	0 (disabled)
3	Bit 4	Enable CLRPEAK1 control bit in control word	0 (disabled)
3	Bit 5	Enable CLRPEAK2 control bit in control word	0 (disabled)
3	Bit 6	Enable HLDPEAK1 control bit in control word	0 (disabled)
3	Bit 7	Enable HLDPEAK2 control bit in control word	0 (disabled)

11.1.3 Parameterisation entry for 8-channel device

Byte no.	Bit no.	Meaning	Default
0	Bit 0..3	Type: 8-channel	2 (const)
0	Bit 4..7	Data format 0 = Signed16 2 bytes 1 = Signed32 4 bytes 2 = Float (IEEE format) 4 bytes 3 = Float (Siemens format) 4 bytes 4 = Raw data (0..7680000) 4 bytes 5 = Raw data (0..30000) 2 bytes	0
1	Bit0..5	Reserved	
1	Bit6	Enable MOMPEAK1 control bit in control word	0 (disabled)
1	Bit7	Enable MOMPEAK2 control bit in control word	0 (disabled)
2	Bit 0	Enable ACAL control bit in control word	0 (disabled)
2	Bit 1	Enable TAR control bit in control word	0 (disabled)
2	Bit 2	Enable NULL control bit in control word	0 (disabled)
2	Bit 3	Enable CLRPEAK1 control bit in control word	0 (disabled)
2	Bit 4	Enable CLRPEAK2 control bit in control word	0 (disabled)
2	Bit 5	Enable HOLDPEAK1 control bit in control word	0 (disabled)
2	Bit 6	Enable HOLDPEAK2 control bit in control word	0 (disabled)
3	Bit0..3	Decimal places for subchannel 1	
3	Bit4..7	Decimal places for subchannel 2	
4	Bit0..3	Decimal places for subchannel 3	
4	Bit4..7	Decimal places for subchannel 4	
5	Bit0..3	Decimal places for subchannel 5	
5	Bit4..7	Decimal places for subchannel 6	

| 6 | Bit0..3 | Decimal places for subchannel 7 | |
| 6 | Bit4..7 | Decimal places for subchannel 8 | |

11.1.4 Parametrisation entry for 32-channel device

Byte no.	Bit no.	Meaning	Default
0	Bit 0..3	Type: 32-channel	3 (const)
0	Bit 4..7	Data format 0 = Signed16 2 Byte 1 = Signed32 4 Byte 2 = Float (IEEE-format) 4 Byte 3 = Float (Siemens-format) 4 Byte 4 = Raw data (0..7680000) 4 Byte 5 = Raw data (0..30000) 2 Byte	0
1	Bit0..3	decimal places for subchannel 1	
1	Bit4..7	decimal places for subchannel 2	
2	Bit0..3	decimal places for subchannel 3	
2	Bit4..7	decimal places for subchannel 4	
3		decimal places for subchannel 5, 6	
4		decimal places for subchannel 7,8	
5		decimal places for subchannel 9,10	
6		decimal places for subchannel 11,12	
7		decimal places for subchannel 13,14	
8		decimal places for subchannel 15,16	
9		decimal places for subchannel 17,18	
10		decimal places for subchannel 19,20	
11		decimal places for subchannel 21,22	
12		decimal places for subchannel 23,24	
13		decimal places for subchannel 25,26	
14		decimal places for subchannel 27,28	
15		decimal places for subchannel 29,30	
16		decimal places for subchannel 31,32	
17	Bit7... 0	Enable Bit 8... 15 control bit in control word	
18	Bit7... 0	Enable Bit 0... 7 control bit in control word	

11.1.5 Parameterization entry ML77B

Byte no.	Bit no.	Meaning	Default
0	Bits 0..3	Type information ML77B	7 (const)

11.2 Configuration

In the configuration telegram the first entry is usually reserved for the device status. Then follow the configuration data for a maximum of 16 amplifier modules. Here, the special identification format (special format) must be used. The manufacturer-specific data specifies the contents and thus also the length of the input data. With less than 16 amplifier channels available in the system, the configuration telegram may be abridged accordingly before transmission.

CFG-Byte	Meaning	Permissible values for CFG (Hex)	
1	Device status	0x00 (blank space, no device status / control word	
		0x40 ,0x40 (1 input word for device status)	
		0x80, 0x40 (1 output word for device control word)	
		0xC0, 0x40, 0x40:(1 input and output word, status and control word)	
		0xC0, 0x40, 0x41: (1 output word: device control word, 2 input words: status, control word status)	
	Channel 1	Length of manufacturer-specific data	
		0xC3: 3 bytes (for 1-channel)	
		0xC2 .. 0xC9: 2..9 bytes (for 8-channel)	
		0xCD: 13 bytes (for 32-channel)	
	Output length	0x40...0x4F (1 to 16 output words) or	
		0xC0...0xCF (1 to 16 output words with consistency)	
	Input length	0xC0 ... 0xFF or	
		0x40..0x7F (1 to 64 input words with / without consistency)	
	User-specific data		

	Channel 2	Length of manufacturer-specific data	
		0xC3: 3 bytes (for 1-channel)	
		0xC2 .. 0xC9: 2..9 bytes (for 8-channel)	
		0xC4 .. 0xCD: 4..13 bytes (for 32-channel)	
	Output length	0x40...0x48 (1 to 9 output words) or	
		0xC0...0xC8 (1 to 9 output words with consistency)	
	Input length	0xC0 ... 0xFF or	
		0x40..0x7F (1 to 64 input words with / without consistency)	
	User-specific data		
	etc.		

Measured values are offered either as 16-bit integer, 32-bit integer or 32 bit float. Values are always scaled to physical quantity with selectable amount of decimal places. The parameterisation telegram is used for specifying whether the 16-bit format or the 32-bit format is to be used and for defining the number of decimal places.

11.2.1 Configuring amplifier channels

The following input and output data can be configured per amplifier channel for cyclic data traffic. The choice of which data is actually transmitted is communicated via the manufacturer-specific data of the special identification format. For a detailed specification of the data contents transmitted cyclically, please refer to the chapter on **Cyclic data exchange** .

Three types of devices are distinguished for configuration: 1-channel (ML01B, ML10B, ML30B, ML35B, ML38, ML50B, ML55B, ML60), 8-channel (ML801B) and 32-channel (ML71B).

Configuring manufacturer-specific data		Length of cyclic data inputs	Length of cyclic data outputs	Contents of cyclic data
Byte no.	Bit no.	(words)	(words)	
0	0..4			Channel type: 1: 1-channel (2 bytes follow) 2: 8-channel (8 bytes follow) 3: 32-channel (16 bytes follow) 7: ML77B
0	5			Reserved
0	6			Reserved
0	7	2		Time stamp

11.2.2 Subsequent configuration bytes for 1-channel device

Configuring manufacturer-specific data		Length of cyclic data inputs	Length of cyclic data outputs	Contents of cyclic data
Byte no.	**Bit no.**	**(words)**	**(words)**	
				Input values:
1	0	1(2)		Gross
1	1	1(2)		Net
1	2	1(2)		Peak value 1
1	3	1(2)		Peak value 2
1	4	1		Channel status
1	5	2		Time stamp
1	6	1(2)		Softw. peak
1	7	1(2)		Remote contacts
2	0		1	Output values: channel control word
2	1		1(2)	Limit value level 1
2	2		1(2)	Limit value level 2
2	3		1(2)	Limit value level 3
2	4		1(2)	Limit value level 4
2	5		1(2)	Tare value
2	6			Reserved
2	7			Reserved

11.2.3 Subsequent configuration bytes for 8-channel device

Configuring manufacturer-specific datas		Length of cyclic data input	Length of cyclic data outputs	Contents of cyclic data
Byte no.	**Bit no.**	**(words)**	**(words)**	
Subchannel 1				
1	0 .. 3	1 (2)		Signal selection: 0: No value 1: Gross 2: Net

				3: PV1 4: PV2
1	3			
1	4	1		Channel status
1	5	2		Time stamp
1	6		1	Channel control word
1	7		1(2)	Tare value
Subchannel 2				
2	0 .. 3	1 (2)		Signal selection:
				0: No value
				1: Gross 2: Net
				3: PV1 4: PV2
2	3			
2	4	1		Channel status
2	5	2		Time stamp
2	6		1	Channel control word
2	7		1(2)	Tare value
. .				
Subchannel 8				
8	0 .. 3	1 (2)		Signal selection:
				0: No value
8				1: Gross 2: Net
8				3: PV1 4: PV2
8	3			
8	4	1		Channel status
8	5	2		Time stamp
8	6		1	Channel control word
8	7		1(2)	Tare value

11.2.4 Subsequent configuration bytes for 32-channel device

Configuring manufacturer-specific data	Length of cyclic data inputs	Length of cyclic data outputs	Contents of cyclic data

Byte no.	Bit no.	(Words)	(Words)	
1	0		1	Control word
1	1...3			Reserved
1	4	1		Control word status
1	5...8			Reserved
2	0	1 (2)		Measured value for subchannel 1
2	1	1		Channel status for subchannel 1
2	2	1 (2)		Measured value for subchannel 2
2	3	1		Channel status for subchannel 2
2	4	1 (2)		Measured value for subchannel 3
2	5	1		Channel status for subchannel 3
2	6	1 (2)		Measured value for subchannel 4
2	7	1		Channel status for subchannel 4
3	0	1 (2)		Measured value for subchannel 5
3	1	1		Channel status for subchannel 5
3	2	1 (2)		Measured value for subchannel 6
3	3	1		Channel status for subchannel 6
3	4	1 (2)		Measured value for subchannel 7
3	5	1		Channel status for subchannel 7
3	6	1 (2)		Measured value for subchannel 8
3	7	1		Channel status for subchannel 8
4				Measured value and channel status for subchannels 9-12 (like byte 1)
5				Measured value and channel status for subchannels 13-16 (like byte 2)
6				Measured value and channel status for subchannels 17-20 (like byte 1)
7				Measured value and channel status for subchannels 21-24 (like byte 2)
8				Measured value and channel status for subchannels 25-28 (like byte 1)

9				Measured value and channel status for subchannels 29-32 (like byte 2)

11.2.5 Subsequent configuration bytes for the ML77B

The output data can only be configured for the individual module. If several ML77B modules are available in the MGCplus, the output data of the individual ML77Bs must be configured in the particular configuration applicable in each case.

If the measurement data is read out in 32-bit format, configuration bits 0..7 are used. For 16-bit format, configuration bits 8..15 are used. It is not possible to mix the two formats within one ML77B configuration.

As from firmware version P2.00, the option will be available to supply up to 128 measured values as output data from the Profibus to the MGCplus. The "24-bit multichannel mode" or "16-bit multichannel mode" bits are set for this. When operating in "24-bit multichannel mode", 2 words must be reserved for each subchannel of the ML77B; in "16-bit multichannel mode", 1 word for each subchannel. The number of subchannels in the ML77B must match the setting chosen in the configurator (there must be sufficient subchannels!), otherwise the configuration will be rejected. Firmware versions < P2.00 generally reject the configurations for this mode of operation.

Multichannel mode byte 1, bit 7 or byte 2, bit 7 can only be selected as an alternative to single-channel mode. That is to say, if bit 7 is set, all the other bits 0 must be zero and vice versa.

Configuration manufacturer-specific data		Length of cyclical data inputs	Length of cyclical data outputs	Content of cyclical data
Byte no.	Bit no.	(Words)	(Words)	
				Output data
1	0		3	3 bytes in gross, 3 bytes in net signal of ML77B
1	1		3	3 bytes in PV1, 3 bytes in PV2 signal of ML77B

1	2		3	3 bytes in S5 signal, 3 bytes in bit mask remote contacts of ML77B
1	3 ... 6			reserved
1	7		see length information, CFG-entry	24-bit multichannel mode + status (2 words/subchannel)
2	0		1	2 bytes in gross signal of ML77B
2	1		1	2 bytes in net signal of ML77B
2	2		1	2 bytes in PV1 signal of ML77B
2	3		1	2 bytes in PV2 signal of ML77B
2	4		1	2 bytes in S5 signal of ML77B
2	5		1	2 bytes in bit mask remote contacts of ML77B
2	6			reserved
2	7		see length information, CFG-entry	16-bit multichannel mode (1 word/subchannel)

12 Setup parameters in the AB22A Setup mode

All parameters are set up or read out via the PAR or PAR? command (see "Operation with computer or terminal").

12.1 Parameter list

No.	Type	Range of values	Comment
1	NODE	0..1	ML77B mother node
2	NODE	0..1	DP setup menu
11	NODE	0..1	Output data menu
12	NODE	0..1	Input data menu
13	NODE	0..1	Diagnostic data menu
14	NODE	0..1	Configuration data menu
15	NODE	0..1	Parameterisation menu
16	NODE	0..1	Bus parameters menu
21	EDIT	3..123	DP address
22	TEXT		"Behaviour with system errors"
23	MENUE	1730, 1731	1730 = No data exchange 1731 = Data exchange with diagnosis
111	EDIT	0..220	Output-data start address
112	TEXT		8-byte output data
113	TEXT		Subsequent 8-byte output data
114	TEXT		Subsequent 8-byte output data
121	EDIT	0..220	Start address for input data
122	TEXT		8-byte input data
123	TEXT		Subsequent 8-byte input data
124	TEXT		Subsequent 8-byte input data
131	TEXT		Byte 1..8 of diagnostic data
132	TEXT		Byte 9..12 of diagnostic data
133	KEY		Update diagnostic data
141	EDIT	0..220	Start address for configuration data
142	TEXT		8-byte configuration data

No.	Type	Range of values	Comment
143	TEXT		Subsequent 8-byte configuration data
144	TEXT		Subsequent 8-byte configuration data
151	EDIT	0..220	Start address for parameterisation data
152	TEXT		8-byte parameterisation data
153	TEXT		Subsequent 8-byte param. data
154	TEXT		Subsequent 8-byte param. data
161	IS_KEY | IS_MOD_VAL		Update display
162	IS_KEY | IS_MOD_VAL		Clear maximum values
163	IS_EDIT| IS_NOFOCUS		Update rate for measured values
164	IS_TEXT | IS_NOFO-CUS		Text
165	IS_EDIT | IS_NOFO-CUS		Typical output-data cycle time
166	IS_EDIT | IS_NOFO-CUS		Maximum output-data cycle time
167	IS_TEXT | IS_NOFO-CUS		Text
9990	IS_EDIT	1..128	As from P2.00: Number of Subchannels

measure and predict with confidence

HBM