Commissioning DeviceNet

HBM

Content

1 Introduction

The 3rd generation AED / FIT® has a DeviceNet interface.

This CAN-based interface opens up new and powerful options for users and their technical weighing applications.

This document describes commissioning an AED / FIT® with a programmable controller (PLC). But there are so many different PLCs on the market, that it is only possible to give a general overview.

Thanks are due to Hilscher GmbH (www.hilscher.com), who have generously given us their permission to use screenshots from the SYCON Software.

2   General

DeviceNet is a CAN-based network, which has been standardized by ODVA (Open Device Vendor Association). Specifications can be obtained from ODVA (www.odva.org).

HBM products are usually "Class2 only" devices, so they only have a subset of the DeviceNet functionalities.

DeviceNet defines a series of connections for the transmission of data:

Explicit

This connection is provided for transmitting acyclic data and it is normally used to transmit configuration parameters.

Polled

This is used for the transmission of cyclic data, that is to say measured values and their associated statuses. The PLC transmits the output data (control word) and receives in response the input data (measured value, trigger or dosing result). The control word contains individual bits, with which the user can trigger functions such as zeroing and taring. The format of the poll data can be found in appendix 2.

Bitstrobe

With the bitstrobe connection, the PLC induces a single AED / FIT$^®$ or a group of them to transmit the current measured values with the associated status. The format of the bitstrobe data can be found in appendix 2.

3   Identification

Devices are identified by a vendor ID and a product code:

Device	Vendor ID	Product Code
AD103	389_{HEX}	501_{HEX}
FIT$^®$3	389_{HEX}	502_{HEX}

EDS file

An EDS file is included among the items supplied with the devices. This is required for com-missioning the AED / FIT$^®$ with a PLC. Import the EDS file associated with your firmware into your controller. Use your controller configuration tool to read out the firmware version of the AED / FIT$^®$. EDS files can also be obtained from the HBM Website(www.hbm.com).

File name nomenclature:

PRODUCT_FIRMWAREVERSION_MAJORREV_MINORREV_DNS.EDS

FIT3_P73_1_01_DNS.EDS

indicates a DeviceNet EDS file of Version 1.01 for firmware version P73 of an FIT$^®$3.

4   Planning the DeviceNet network

The structure of a DeviceNet network requires careful planning:

- Estimate the expected cables lengths; under no circumstances must you exceed the maximum values applicable to the selected bit rate. Avoid spur lines. This is why the AED / FIT® has separate pins or core pairs for CANin and CANout. Use multi-port taps, if necessary.

Maximum cable lengths for DeviceNet

Baud rate [kbit/s]	125	250	500
Maximum cable length [m]	500	250	100

- Use only standard-compliant cables with a characteristic impedance of 120 Ω.

- Estimate the expected bus load. The rule of thumb for estimating the bus load is:

  bus load[%] = 33900∗AED_FIT_count∗output rate[number per second] / bit rate.

  If the bus load exceeds 75 %, choose the next highest bit rate. If the bit rate cannot be increased any further, the network must be split into several segments, each with separate DeviceNet connections.

- Check the dimensioning of the power supply with regard to voltage drops on the power supply lines.

5 Commissioning the network

- Check the bus termination. The bus needs a differential resistance of 120 Ω at both ends.

  The CANBus does not work without termination resistors.

- Check the Mac Ids (node numbers) and the bit rates of the connected nodes.

- The factory settings for the AED / FIT® at the time of delivery are:

  - Bit rate: 125 kbit/s

  - Node ID: 63

  Mac IDs must not be duplicated. Nodes that detect a duplicated Mac ID during power-on, proceed to the "Communication Fault" state. The only way to exit this state is by a reset or a power-on.
 All the nodes used must have identical bit rates. If the bit rates are different, this can result in a "bus off" state for a node and possibly even the entire network. The only way to exit a "bus-off" state is by a reset or a power-on.

- A configuration tool is needed to change the Mac ID or the bit rate:

  - Sycon manufacturer Hilscher   http://www.hilscher.com

  - Larcan manufacturer LARSYS http://www.larsys.com

  - RSNetworks from Rockwell http://www.rockwell.com

  - AEDPanel32 from HBM http://www.hbm.com

  - or the configuration tool that came with your controller.

  For further details, please see your documentation.

- The bit rate or the Mac ID can only ever be selected for a single AED / FIT®. All the other nodes must be disconnected from the bus. The AED9301 has a slide switch for bus disconnection.

6   Changing the bit rate and the Mac ID with AED_Panel3
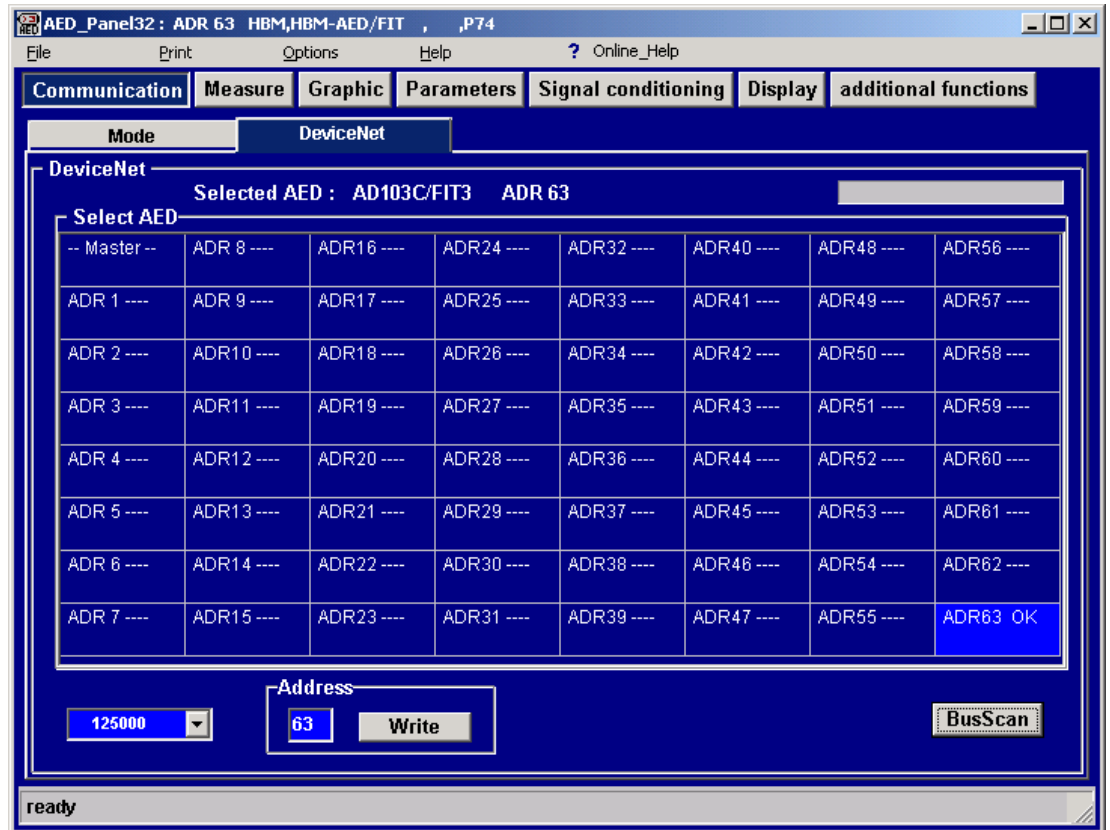
Changing the Mac ID

- Run a bus scan

- Change the Mac ID in the input field

- Press the Write button

  The panel program now changes the Mac ID and stores it safe from power failure in the EEPROM of the AED / FIT®.

Changing the bit rate

- Change the setting in the panel.

  The panel program now changes the bit rate and stores it safe from power failure in the EEPROM of the AED / FIT$^®$.
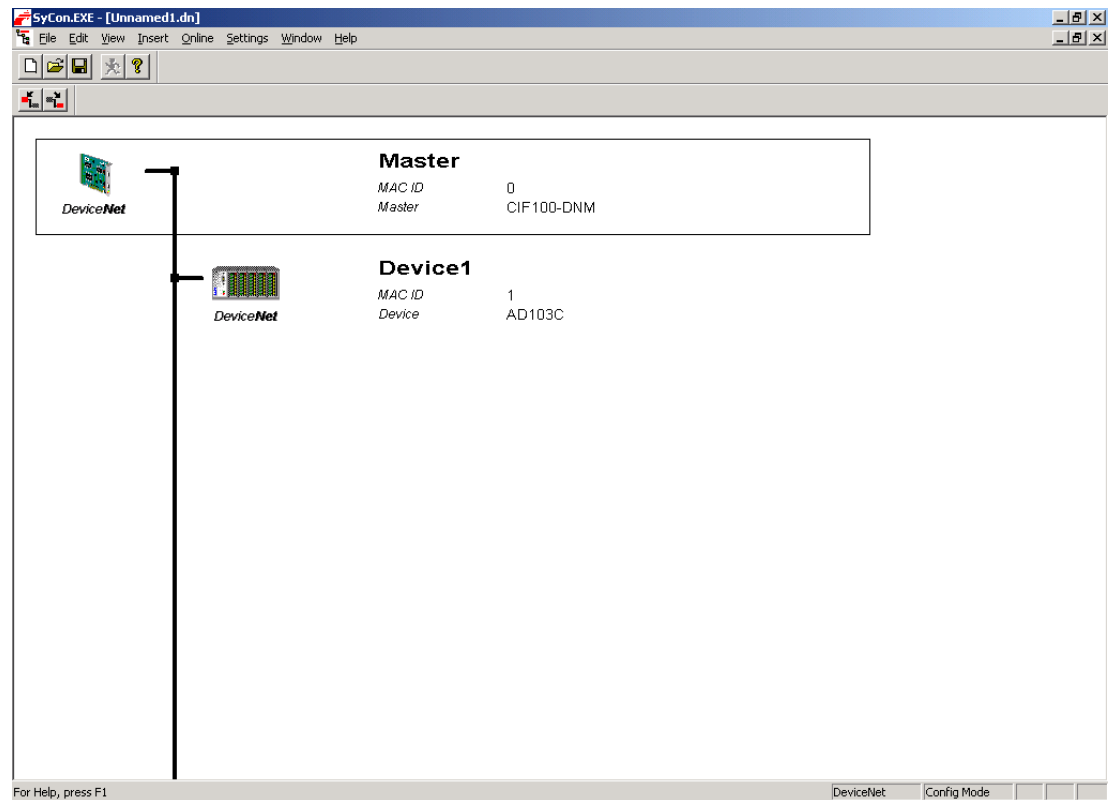
  As the *AED_Panel32* program does not have multi-master capability, the PLC may have to be brought to the stop state.

# 7   Commissioning the AED / FIT®

Use the configuration tool provided with your controller to do this.

The following screenyshots show a typical configuration with the Sycon tool from Hilscher.

- First import the EDS file of the AED / FIT® into your configuration tool.

- Create a new project

- Enter a master and the requisite slave devices.

- Assign Mac IDs and meaningful names to the devices.
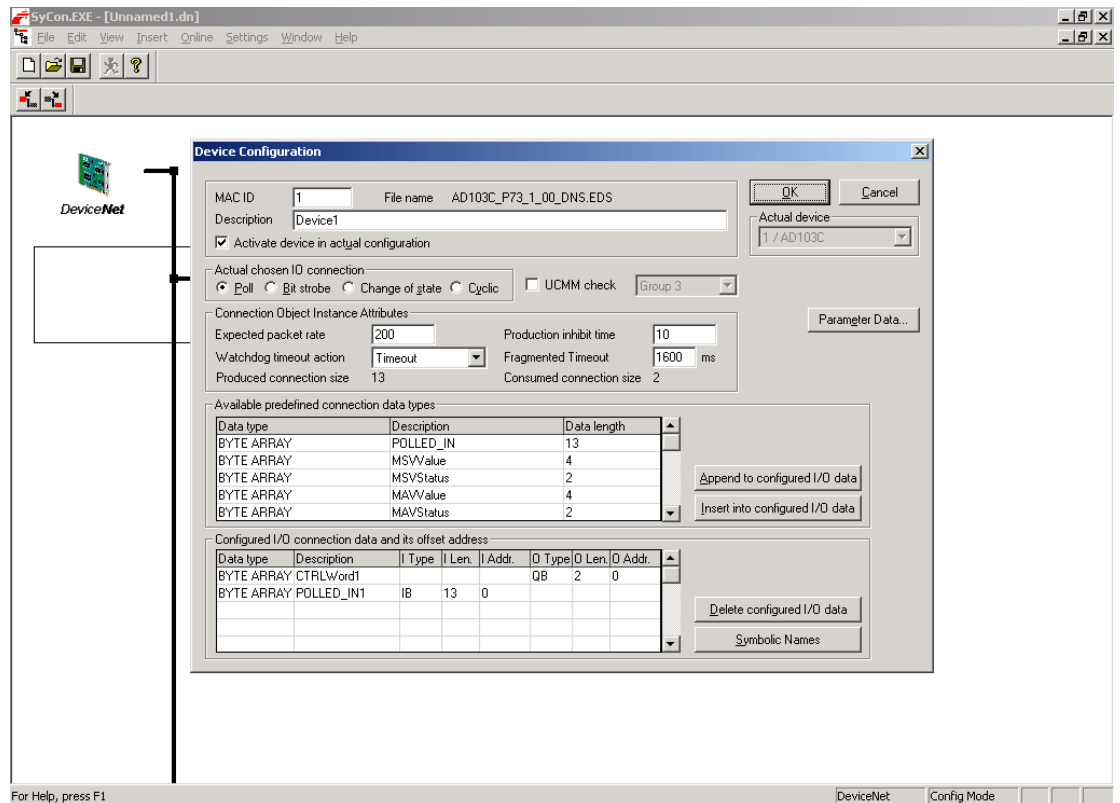
- Now edit the device function

- First choose the required connection, which in our example is the polled connection. The AED / FIT® supports up to 4 connections, that is to say explicit, polled, bitstrobe and COS/cyclic connections can be used simultaneously.

- Now configure the I/O connection data. You can assemble the connection data either as a "BYTE ARRAY" or as "discrete types". For a "BYTE ARRAY" input, the tags must be declared if necessary. For "discrete type" input, the offsets have to be entered. The format for the I/O data can be found in the appendix or in the AED / FIT® online Help.
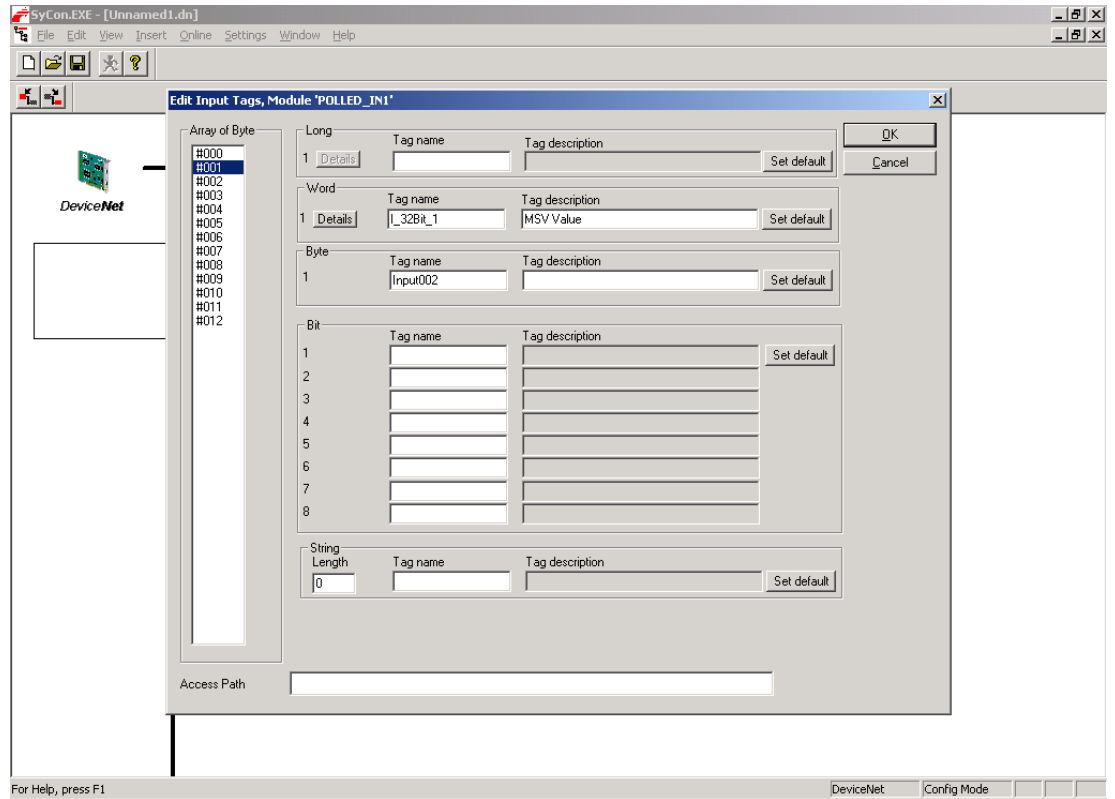
- If necessary, define the tags for the output data. The format for the output data can be found in the appendix or in the AED / FIT® online Help.
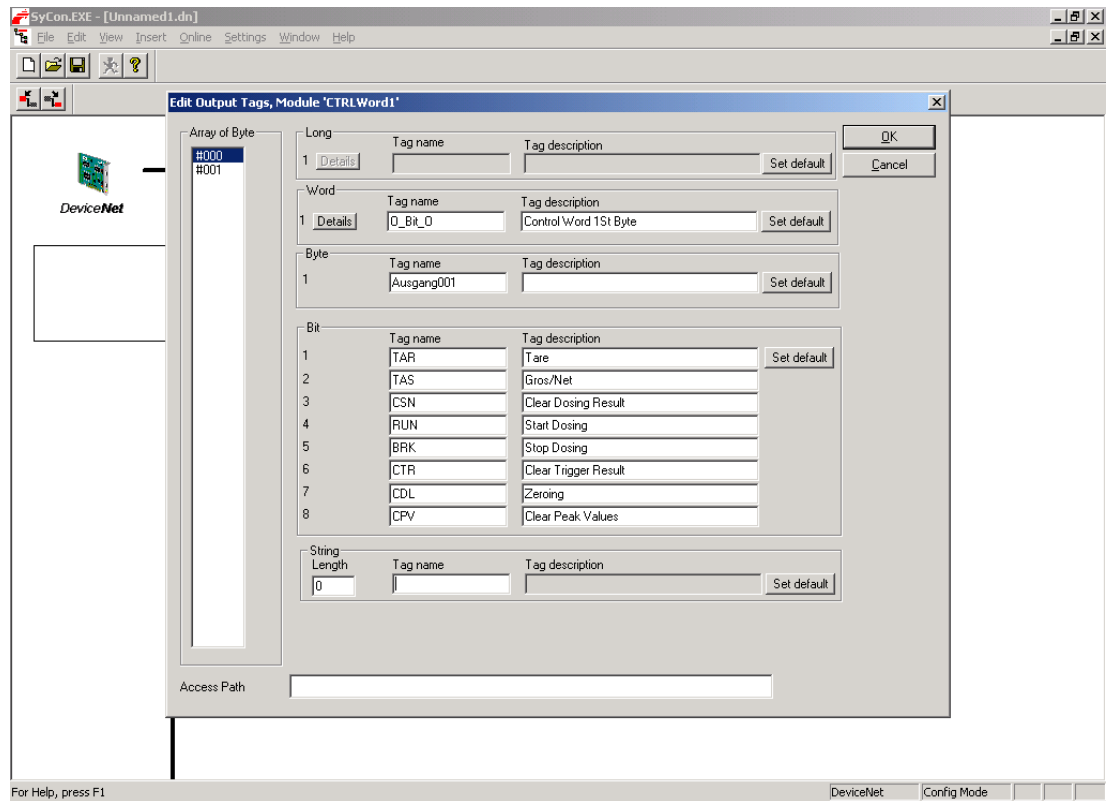
- Define the bit tags for the input data. The format for the input data can be found in the appendix or in the AED / FIT® online Help.
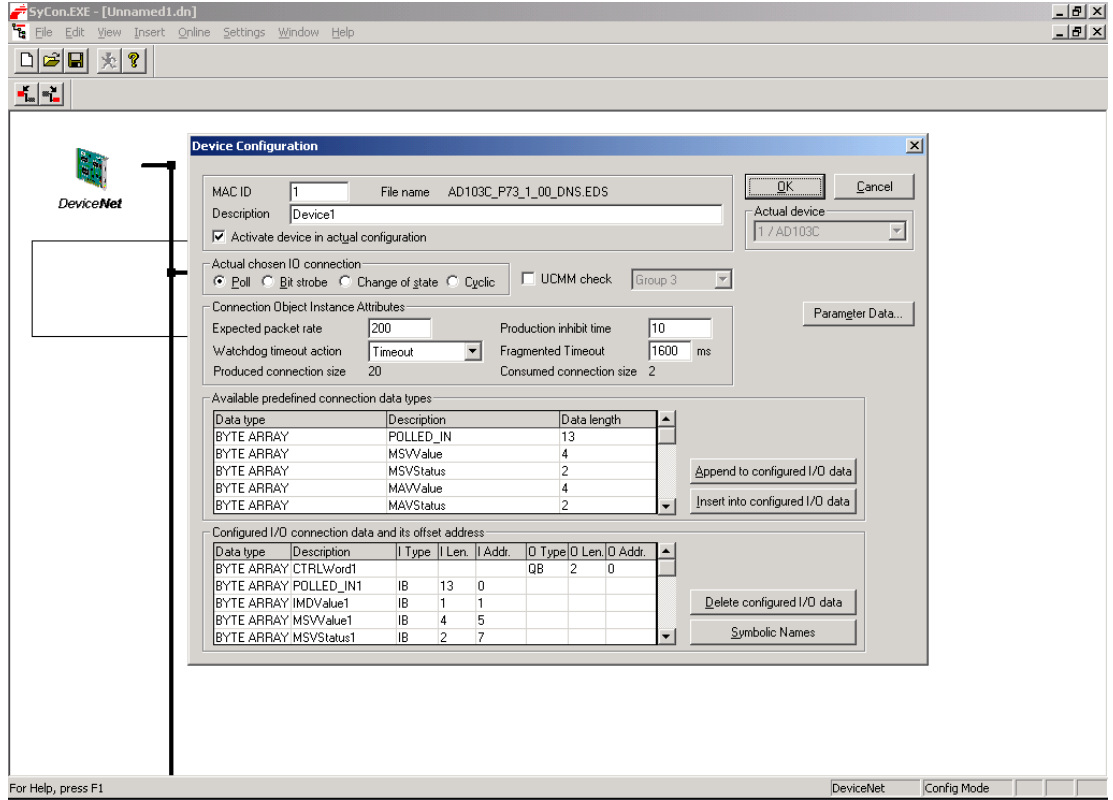
- IO connection data as discrete types. The offset values (I. Adr) must be entered. The values can be found in the appendix or in the AED / FIT® online Help.

SyCon.EXE - [Unnamed1.dn]

File   Edit   View   Insert   Online   Settings   Window   Help
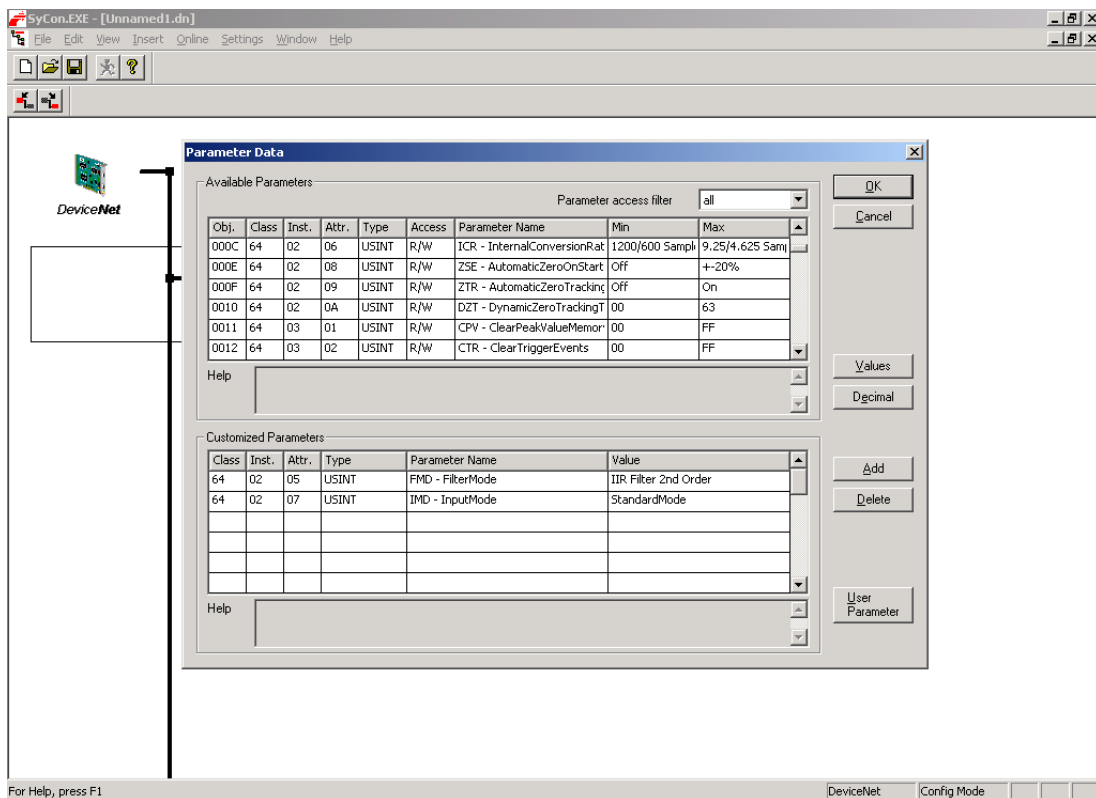
Parameter Data

DeviceNet

Available Parameters

Parameter access filter   all

Obj.	Class	Inst.	Attr.	Type	Access	Parameter Name	Min	Max
000C	64	02	06	USINT	R/W	ICR - InternalConversionRat	1200/600 Sampl	9.25/4.625 Sam
000E	64	02	08	USINT	R/W	ZSE - AutomaticZeroOnStart	Off	+-20%
000F	64	02	09	USINT	R/W	ZTR - AutomaticZeroTracking	Off	On
0010	64	02	0A	USINT	R/W	DZT - DynamicZeroTrackingT	00	63
0011	64	03	01	USINT	R/W	CPV - ClearPeakValueMemor	00	FF
0012	64	03	02	USINT	R/W	CTR - ClearTriggerEvents	00	FF

Help

Customized Parameters

Class	Inst.	Attr.	Type	Parameter Name	Value
64	02	05	USINT	FMD - FilterMode	IIR Filter 2nd Order
64	02	07	USINT	IMD - InputMode	StandardMode

Help

OK   Cancel   Values   Decimal   Add   Delete   User Parameter

For Help, press F1   DeviceNet   Config Mode

- Run parameterization. The parameters selected here are written to the AED / FIT® each time the network is started up. This process is not suitable for all parameters; see Note. The alternative option is to run parameterization via the *AED_Panel32*. The parameter set can be stored with the attribute 110 / 6 / 2 or the panel in the EEPROM of the AED / FIT®, where it is safe from power failure.

- There is no point in writing all the parameters of the AED / FIT®; only modify those parameters that are useful in your application

- Some of the parameters must only be written in a specific sequence. If the rules are violated, error messages can result.

- Some of the parameters have minimum and maximum values and if these are exceeded, error messages result.

- Some parameters cannot be written in "legal for trade mode" (LFT $\geq$ 1).

- Some of the parameters are Set Only, a Get access returns a 0 value.

Further details can be found in the online Help for the AED / FIT® or the EDS file.

8   PLC-Programming

The network can now be started up. The PLC parameterizes the AED / FIT® with the stored values and then starts cyclic operation. If the AED / FIT® has to be controlled or parameterized while cyclic operation is ongoing, there must be user programming in the PLC. There are so many different PLCs available on the market, that it is only possible to give a general overview.

DeviceNet provides several options for control and parameterization in cyclic operation:

- Input data of the poll connection

  The bits defined in the input data (control word) of the poll connection are used to control functions such as zeroing, taring, starting the dosing process, etc. The stored functions are triggered when the relevant bit is set. If the function is to be triggered again, the bit must first be cleared and then reset. It is preferable to use the poll connection for control, as this has a higher priority and so you can count on the defined response times.

- Attribute access via the explicit connection

  With the explicit connection, a control or re-parameterization can be performed during ongoing operation by writing individual attributes. As the explicit connection has a low priority, response times can vary considerably. For the classes and instances of the individual attributes, please see the EDS file or the AED / FIT® online Help.

  Some of the functions (such as LDW/LWT) have execution times of up to 4.5 seconds. Once these functions start, there is an immediate and positive acknowledgement. The user can query the function end and result with a busy flag (attribute **100/1/12**).

- Reading out attributes in cyclic operation

  The attributes transmitted via the cyclic connections are permanently stored in the firmware of the AED / FIT® and cannot be re-mapped.

  If required, the user can read out other interesting values, such as the actual dosing time, via the explicit connection. To do this, it is usually necessary to have user-programming in the PLC. PLC manufacturers make function blocks available for this.

9   Poll input data

Poll input data for IMD = 0, 1

Offset	Byte	Content
0		**IMD** value, 0 or 1
1	LSB	**MSV** value (measured value)
2		**MSV** value (measured value)
3		**MSV** value (measured value)
4	MSB	**MSV** value (measured value)
5	LSB	**MSV** status (measurement status)
6	MSB	**MSV** status (measurement status)
7	LSB	**MAV** value (trigger value)
8		**MAV** value (trigger value)
9		**MAV** value (trigger value)
10	MSB	**MAV** value (trigger value)
11	LSB	**MAV** status (trigger status)
12	MSB	**MAV** status (trigger status)

Poll input data for IMD = 2

Offset	Byte	Content
0		**IMD** value, 2
1	LSB	**MSV** value (measured value)
2		**MSV** value (measured value)
3		**MSV** value (measured value)
4	MSB	**MSV** value (measured value)
5	LSB	**MSV** status (measurement status)
6	MSB	**MSV** status (measurement status)
7	LSB	**FRS** value (dosing result)
8		**FRS** value (dosing result)
9		**FRS** value (dosing result)
10	MSB	**FRS** value (dosing result)
11	LSB	**FRS** status (dosing status)
12	MSB	**FRS** status (dosing status)

10   Poll output data

Byte Offset	Bit no.	Content
0	0	**TAR** – Tare
	1	**TAS** – Gross/net selection
	2	**CSN** – Clear dosing result
	3	**RUN** – Start dosing process
	4	**BRK** – End dosing process
	5	**CTR** – Clear trigger result
	6	**CDL** – Zeroing
	7	**CPV** – Clear peak value
1	0	Reserved
	1	Reserved
	2	Output 1 desired state
	3	Output 2 desired state
	4	Output 3 desired state
	5	Output 4 desired state
	6	Output 5 desired state
	7	Output 6 desired state

11 Bitstrobe / COS / cyclic input data

Offset	Byte	Content
0	LSB	**MSV** value (measured value)
1		**MSV** value (measured value)
2		**MSV** value (measured value)
3	MSB	**MSV** value (measured value)
4	LSB	**MSV** status (measurement status)
5	MSB	**MSV** status (measurement status)

For further details, please see the AED / FIT[®] online Help.

12 References

- The DeviceNet Specification, January 2005

  Open Device Vendor Association

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