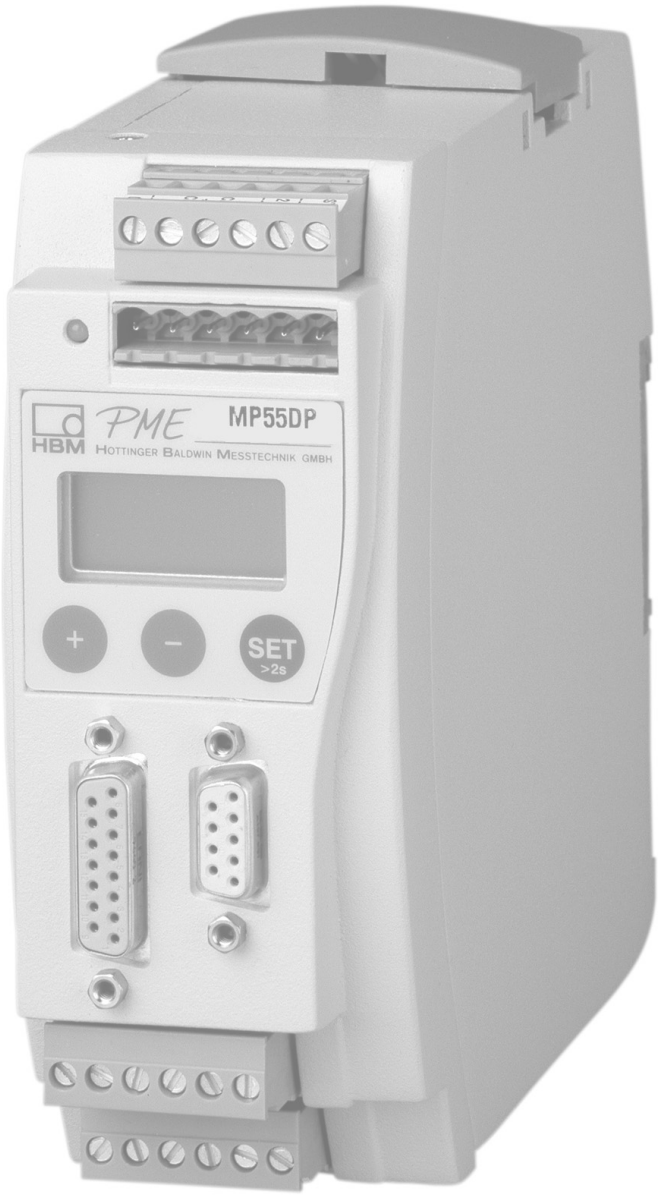
Operating manual

Profibus Interface

MP55DP



A0581-2.1 en

HBM

Content **Page**

Safety instructions

Use in accordance with the regulations

The MP55DP module and its connected transducers are to be used exclusively for measurement tasks and directly related control tasks. Use for any additional purpose 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 User Manual. It is also essential to observe the appropriate legal and safety regulations for the application concerned during use. The same applies to the use of accessories.

The device must not be connected directly to the mains supply.
The supply voltage may be a maximum of 18 – 30 V DC (extra-low safe voltage).

General dangers of failing to follow the safety instructions

The MP55DP module corresponds to the state of the art and is safe to operate. The instrument can give rise to further dangers if it is inappropriately installed and operated by untrained personnel.

Everyone involved with the installation, commissioning, maintenance or repair of the instrument must have read and understood the User Manual and in particular the technical safety instructions.

Conditions on site

Protect the device from direct contact with water (IP20).

Maintenance and cleaning

The MP55DP module is maintenance-free. Please note the following points when cleaning the housing:

- Before cleaning, disconnect the devices from the power supply.
- Clean the housing with a soft, slightly damp (not wet!) cloth. You should **never** use solvent, since this could damage the labelling on the front panel and the display.
- When cleaning, ensure that no liquid gets into the device or connections.

Remaining dangers

The scope of supply and list of components provided with the MP55DP cover only part of the scope 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. Prevailing regulations must be complied with at all times. There must be reference to the remaining dangers connected with measurement technology.
Any risk of residual dangers when working with the MP55DP is pointed out in this introduction by means of the following symbols:

Symbol:  **WARNING**

Meaning: **Dangerous situation**

Warns of a **potentially** dangerous situation in which failure to comply with safety requirements **can** lead to death or serious physical injury.

Symbol:  **CAUTION**

Meaning: **Possibly dangerous situation**

Warns of a potentially dangerous situation in which failure to comply with safety requirements **could** lead to property damage or slight to medium physical injury.

Symbol:  **NOTE**

Indicates that important information is given about the product or how to handle it.

Symbol: CE

Meaning: **CE mark**

With the CE mark, the manufacturer guarantees that his product complies with the requirements of the relevant EC guidelines (see Declaration of conformity at the end of this operating manual).

Working safely

Error messages must only be acknowledged when the cause of the error has been removed and no further danger exists.

The instrument complies with the safety requirements of DIN EN 61010, Part 1 (VDE 0411, Part 1).

You must ensure that even if there is an error in one of the connected devices, the MP55DP cannot carry any touch-sensitive voltages.

To ensure adequate immunity from interference, use only *Greenline* shielded ducting (see HBM offprint "*Greenline* shielding design, EMC-compliant measuring cable; G36.35.0).

The MP55DP module must be operated with a separated extra-low voltage (supply voltage 18 to 30V DC).

Conversions and modifications

The MP55DP module 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 resulting damage.

In particular, any repair or soldering work on motherboards is prohibited. When exchanging complete modules, use only original parts from HBM.

Qualified personnel

This instrument is only to be installed and used by qualified personnel strictly in accordance with the technical data and with the safety rules and regulations which follow. 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.

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

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

1 Introduction

This User Manual describes only those functions which differ from the MP55. The features of the MP55DP correspond to those of the MP55.

The MP55DP carrier-frequency amplifier has been expanded to include a Profibus interface. The features on the CAN-interface remain the same; the object directory is expanded to include some parameters for the Profibus connection.

The Profibus connection is made using a 9-pin sub-D connector (conforming to standard) on the front panel next to the transducer port.

DP protocol is used on the Profibus.

The following are communicated:

- the measured values (gross, net, peak values)
- the status of the limit switches
- control bits for taring, zeroing, peak value store control and changing the parameter set, and
- optionally, the limit value levels

2 How to connect to a PLC

The steps in successfully connecting to the Profibus:

1. Physically connect the device to the Profibus (see page 11 and page 12)
2. Configure the device parameters, see page 14 (can also be carried out using HBM‘s “PME–Setup“ software).
3. Configure the Profibus message and set up its parameters with the aid of a configuration tool (such as Step7) and GSE files, or manually as shown in chapter 6.2.

A GSE file describes the properties of a Profibus node in standardized form. The configuration tool uses it to define which data held on individual bus nodes will be exchanged on the Profibus.

A default GSE file for PME modules is supplied with the device (on diskette: hbmxxx.gsd = German version; hbmxxxgse = English version).

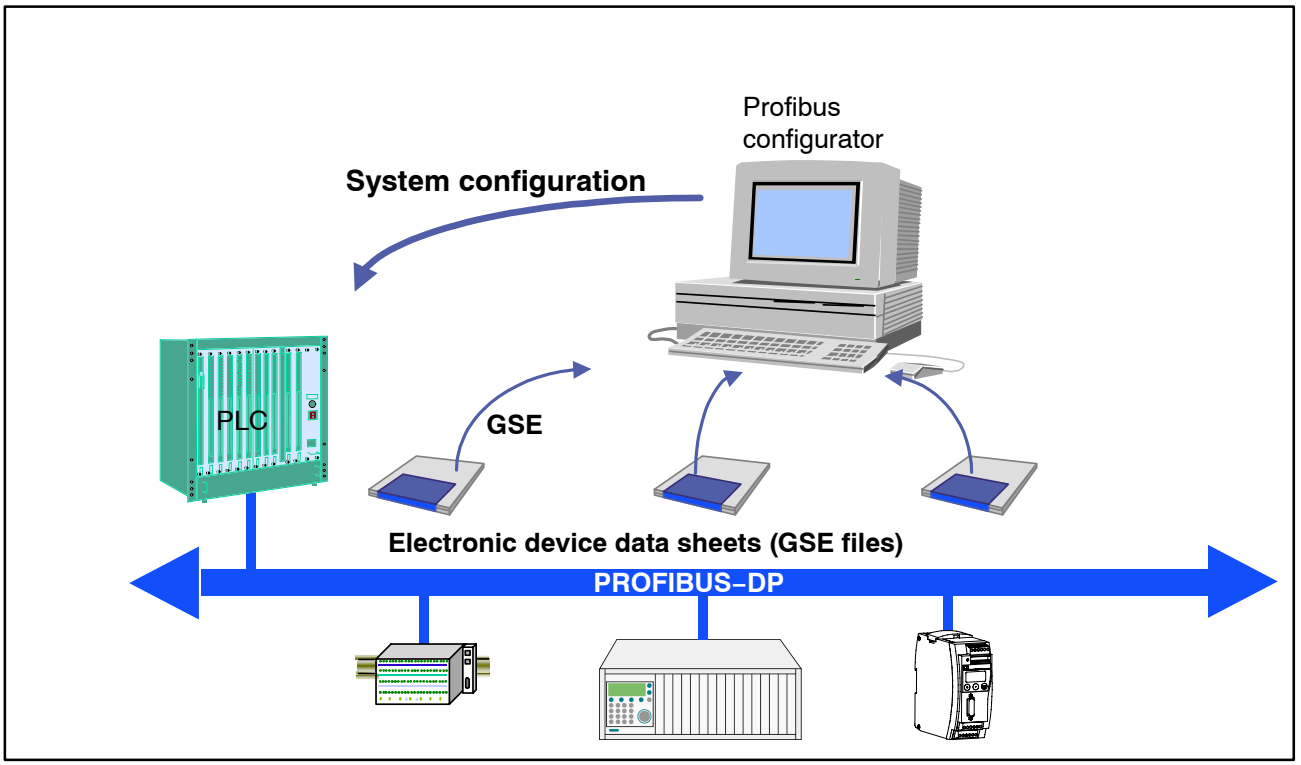


Fig. 2.1: Configuration with the aid of GSE files

2.1 Configuring and assigning parameters

- Start your configuration program (e.g. Step7; if you have no configuration program, proceed to chapter 6.2)
- Load the HBM GSD file (PME diskette incl. GSD/GSE files for PME)
- Add an HBM device (Hardware catalog)
- From the hardware catalog choose the configuration you want on the Profibus.

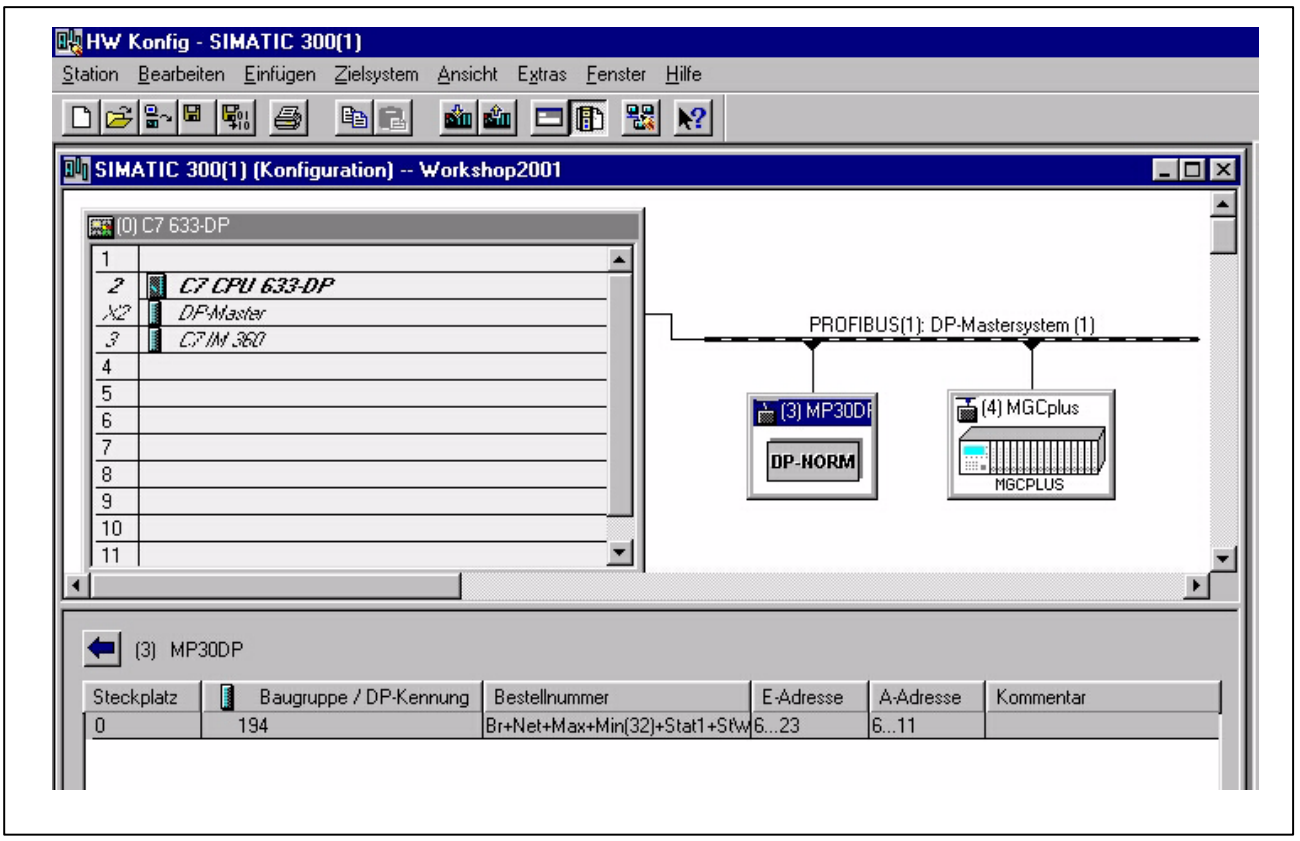


Fig. 2.2: Hardware configuration

- Double-click on the configured entries to open the properties window and select the required parameters.

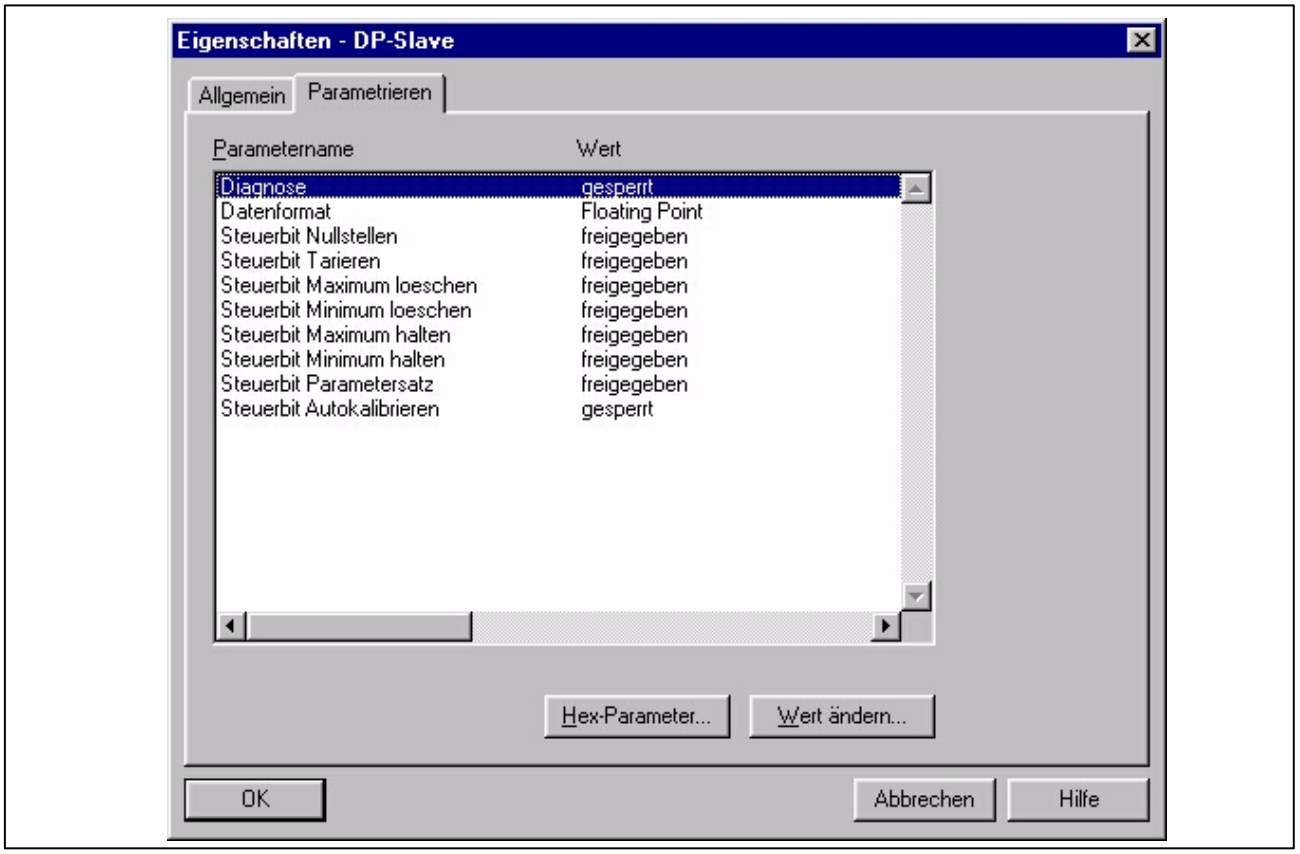


Fig. 2.3: Setting parameters

Notes for users of the Simatic S7 PLC:

- To download consistent data of 3 bytes or over 4 bytes, use special function modules SFC14 to read and SFC15 to write.
- In the case of the S7 3xx a maximum of 32 bytes of consistent data can be downloaded.

To find out the meaning of the status bits and control word bits please refer to the tables in chapter 6.3.

3 Installation

- Connect the MP55DP module to a 24V supply voltage.
- Connect the Profibus cable to the MP55DP module. Ensure that a terminating resistance is connected to the first and last Profibus unit (the housing of the Profibus connector usually contains a sliding switch for this purpose).

Example:

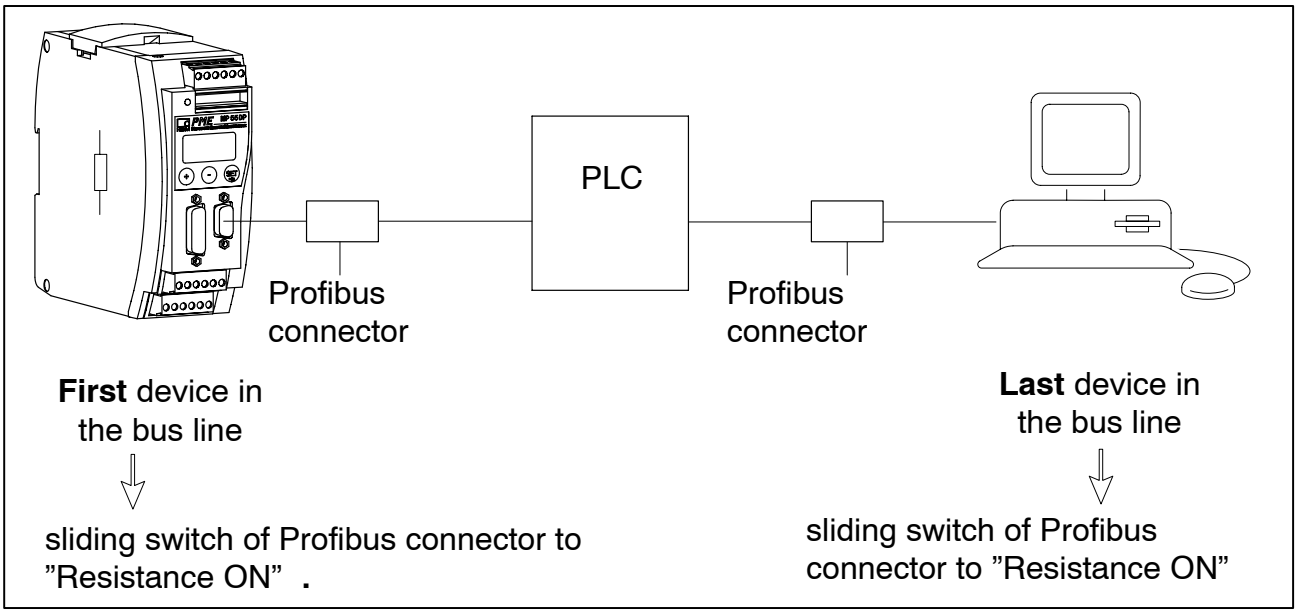


Fig. 3.1: Profibus operation

4 Connections

Warning

Please note the safety instructions before commissioning the device.

4.1 Pin assignment

For the pin assignment of the MP55DP module please refer to the User Manual “PME industrial measurement electronics with MP55 module field bus link”. On the front panel of the MP55DP is an additional 9-pin D-sub port for the Profibus connection.

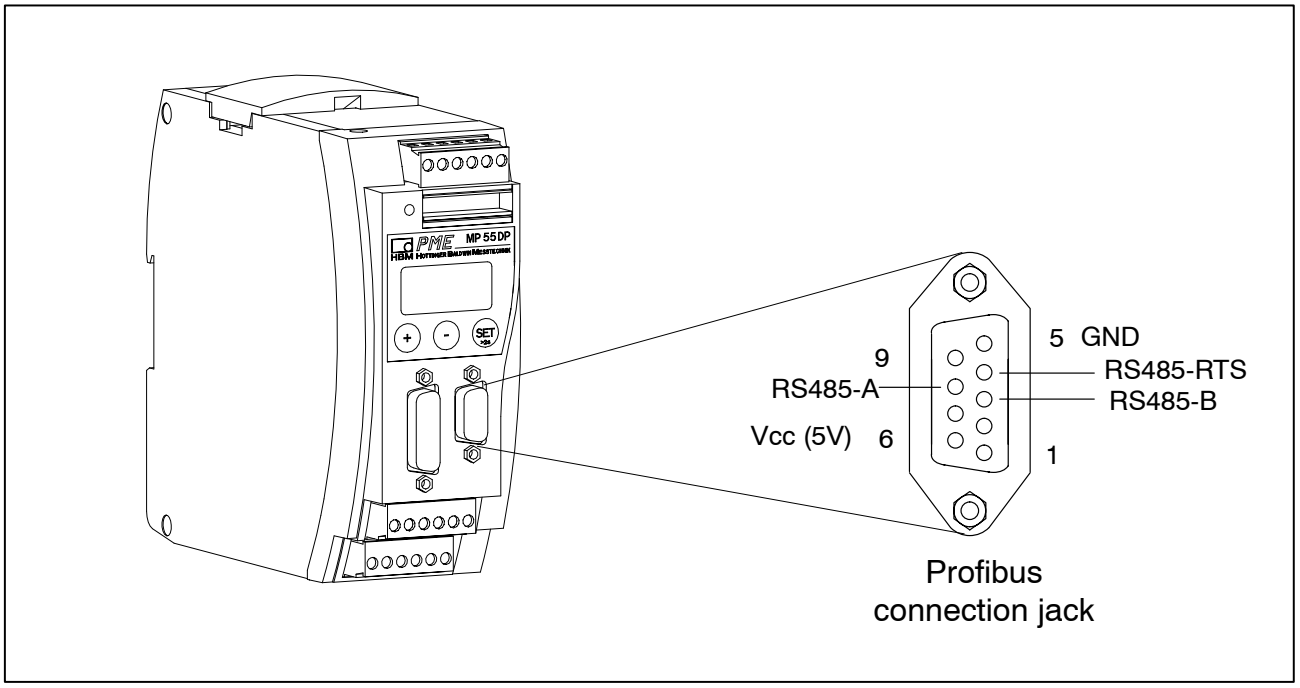


Fig. 4.1: Profibus connection in accordance with standard

5 Operation via the keyboard

During measurement you can press ⊕ ⊖ – to view the status messages in the display (e.g. mV; V; Out, In; error messages).

Next to the status message “ERROR” the display shows the status of the Profibus DP connection. **One** of the following status messages is displayed in each case:

BD_SEAR (baud rate search)

WT_PARM (waiting for parameter)

WT_CONF (waiting for configuration)

DATA_EX (cyclical data communication)

ERROR (bus error)

The LED shows the operating status (ready to take measurements, overflow etc.) of the MP55DP. Instead of the CAN status (as with the MP55), however, the Profibus status is displayed.

Operating status:

LED colour	**Status**	**Meaning**
		Profibus status
Green	Steady light	DATA_EX status
Yellow	Steady light	BD_SEAR, WT_PARM, WT_CONF status
Red	Steady light	ERROR status

The representation of the other operating statuses is the same as that of the MP55.

5.1 Expanded menus

New “Profibus” group in set-up mode:

SET ↓	SET ↓	⊕ ⊖ → Groups					
	DIALOGUE	**...**	**PEAK STORE**	**IN/OUT**	**CAN-BUS**	**PROFIBUS**	**ADDITION FUNCTION**
	Password		Operatn.	Output1	Baud rate	Address	AmplType
	PassStat		InputMin	ModeOut1	Address	MAINGRP	PrgVers
⊕	Language			Output2	Protocol		>0<Rf kN[1)]
Up	I.DataS		ClearPkV	ModeOut2	Output		MotionDsp
⊖	I.Displ.		∟ kN/s[1)]	Output3	OutR. ms		MTime ms
Down	I.Transd		MAINGRP	ModeOut3	PDO-Frmt		MAmp kN[1)]
↓	I.Calibr			Output4	MAINGRP		HW synchr
Overview of parameters	I.Condit			ModeOut4			Keyboard
	I.Analog			Zeroing			SNo prior version
	I.LimVal			Tare			HW vers.
	I.PStore			PkMomMax			MAINGRP
	I.I/O			PkHldMax			
	I.CAN			PkMomMin			
	I.AddFnc			PkHldMin			
	MAINGRP			ParaCo1			
				ParaCo2			
				InpFunc			
				MAINGRP			

1) acc. to desired unit

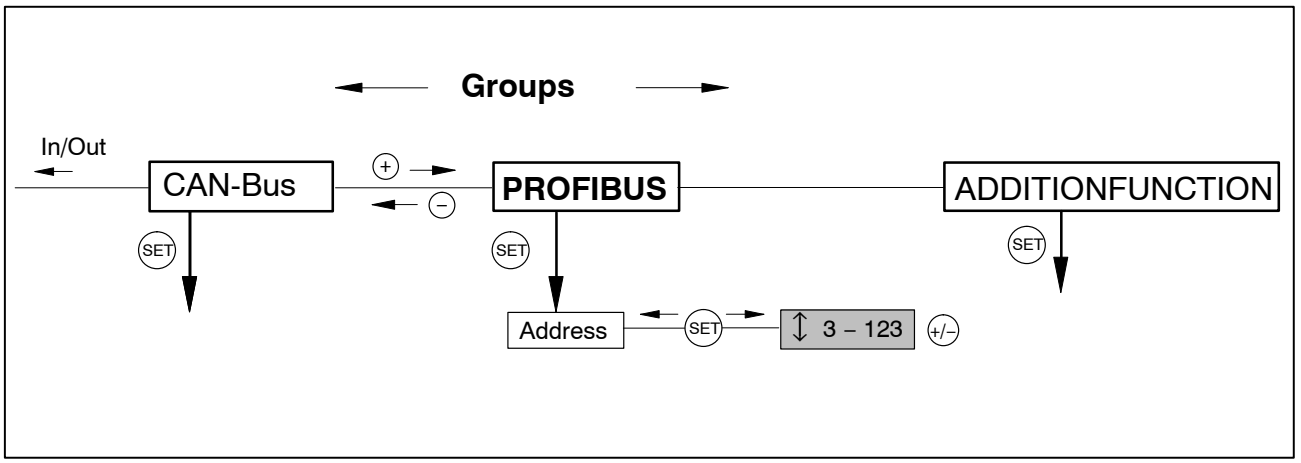


Fig. 5.1: Setting up the Profibus address

6 Setup for Profibus

6.1 Parameter assignment

The amplifier parameters are set via the keyboard or CAN-interface, as on the MP55DP. The Profibus DP parameter assignment telegram defines some parameters for the DP communication. If you use Profibus parameter assignment tools which are able to evaluate the GSD files of GSD revision 1, the following parameters are available for selection:

Parameter name	Available values	Default	Meaning
Diagnosis	locked released	released	operation of external diagnosis
Data format	integer 16 bits integer 32 bits floating point	integer 16 bits	defines the coding format for measured values
Zeroing control bit	locked released	locked	operates function for control of output control word
Taring control bit	locked released	locked	operates function for control of output control word
Clear maximum control bit	locked released	locked	operates function for control of output control word
Clear minimum control bit	locked released	locked	operates function for control of output control word
Hold maximum control bit	locked released	locked	operates function for control of output control word
Hold minimum control bit	locked released	locked	operates function for control of output control word
Parameter set control bit	locked released	locked	operates function for control of output control word

Tab 6.1: Meaning of the parameters

The data format set applies to all the measured values exchanged in the cyclical data communication. The definition of the decimal places for the formats integer 16 bits and integer 32 bits is adopted from the module setup (display, CAN bus) (e.g. when 3 decimal places is specified, 2.0 mm is communicated as integer value 2000). The choice of data format also affects the length of the input data (integer 16 bits = 1 word per analogue value, integer 32 bits and floating = 2 words per analogue value).

The targeted operation of the required control bits in the control word allows you to secure all the functions not required against accidental operation in the event of an error; otherwise, for example, the zero point set could be lost.

If you are using older parameter assignment tools the parameter values will have to be converted to decimal or hexadecimal values:

Octet	Bits	Parameter name	Available values	Default	Meaning
0	0–7	reserved	0	0	do not change[1)]
1–2	all	Diagnosis	0 = locked 0xffff = released	released	operation of external diagnosis
3	all	Data format	0 = integer 16 bits 1 = integer 32 bits 2 = floating point	integer 16 bits	defines the coding format for measured values
4	0–1	Parameter set control bits	0 = locked 3 = released	locked	operates function for control of output control word
5	0	Zeroing control bit	0 = locked 1 = released	locked	operates function for control of output control word
5	1	Taring control bit	0 = locked 1 = released	locked	operates function for control of output control word
5	4	Control bit Clear maximum	0 = locked 1 = released	locked	operates function for control of output control word
5	5	Control bit Clear minimum	0 = locked 1 = released	locked	operates function for control of output control word
5	6	Control bit Hold maximum	0 = locked 1 = released	locked	operates function for control of output control word
5	7	Control bit Hold minimum	0 = locked 1 = released	locked	operates function for control of output control word

Tab 6.2: Contents of the parameter assignment telegram

1) changed by your parameter assignment tool in certain circumstances

6.2 Configuration

The configuration defines which data content is exchanged in the cyclical data communication. The following data is available for selection:

Input values:

Name	Meaning	Length
Gross	gross measured value	1 or 2 words
Net	net measured value (gross minus tare value)	1 or 2 words
Max	contents of the maximum store	1 or 2 words
Min	contents of the minimum store	1 or 2 words
Pk–Pk	peak-to-peak, difference between max and min	1 or 2 words
Status1	status word with status of the limit switches and gen. error bits	1 word
Status2	double status word with differentiated error flagging	2 words

Output values:

Name	Meaning	Length
Control word	control word for triggering taring, zeroing, clearing the peak value store, parameter set selection, etc.	1 word
GW1	level at which limit switch 1 responds	1 or 2 words
GW2	level at which limit switch 2 responds	1 or 2 words
GW3	level at which limit switch 3 responds	1 or 2 words
GW4	level at which limit switch 4 responds	1 or 2 words

The formats of the cyclically communicated data content are specified in detail in chapter 6.3. The measured values care offered optionally as a 16-bit integer, 32-bit integer or 32 bit float. The values are always scaled to physical size with the number of decimal places of your choice. Information on whether the 16 bit format or a 32 bit format is used and on the number of decimal places is defined in the parameter assignment telegram.

Typical combinations are predefined in the GSD file. If you require other combinations you can expand the GSD file accordingly using the following specifications.

6.2.1 Defining your own configuration combinations

Only one configuration entry is available. The special identification format (special format) must be used for this. The manufacturer-specific data specifies the contents and thus also the length of the input data and is 2 bytes in length.

CFG entry no.	Meaning	Contents
0	channel 1	special format with inputs and outputs, maximum 9 words output, maximum 13 words input, 2 bytes comment length (data)

The following input and output data can be configured for the cyclical data communication. The choice of which data is actually transferred is communicated via the manufacturer-specific data of the special identification format.

Configuration manufacturer-specific data		Length of cyclical data inputs	Length of cyclical data outputs	Contents of cyclical data
Byte no.	Bit no.	(words)	(words)	
				Input values:
0	0	1(2)		Gross
0	1	1(2)		Net
0	2	1(2)		Max
0	3	1(2)		Min
0	4	1(2)		Peak-to-peak
0	5	1		Status1
0	6	2		Status2
				Output values:
1	0		1	Control word
1	1		1(2)	Limit value level 1
1	2		1(2)	Limit value level 2
1	3		1(2)	Limit value level 3
1	4		1(2)	Limit value level 4

Tab 6.3: Selecting the data content via the manufacturer-specific data

The length of the input data is the sum of all the data lengths selected for the communication in words. When selecting the 32 bit format and the float format for measured values, the length values must be used in brackets.

The configuration telegram thus has the following format:

CFG byte	Meaning	Permitted values for CFG (hex.)	
1	header	0xC2 (inputs and outputs, 2 bytes manufacturer-specific data)	
2	length of outputs	0x40 – 0x48 (1 to 9 words of outputs) or 0xC0 – 0xC8 (1 to 9 words of outputs with consistency)	
3	length of inputs	0xC0 – 0xCC or 0x40 – 0x7C (1 to 13 words of inputs with/without consistency)	
4	user-specific data	input data	selection of the data content (see Tab 6.3)
5		output data	

Tab 6.4: Contents of the configuration telegram

When using the 32 bit formats data consistency must always be set.

6.3 Cyclical data exchange

Depending on the configuration, the following data content is exchanged:

6.3.1 Inputs

Measured values

Measured values can be communicated in various forms of representation. The forms of representation available for selection are floating (2 words, 32 bit), 16 bit fixed point number (1 word, 16 bit integer in two's complement, decimal place must be known to the reader) or 32 bit fixed point number (2 words, 32 bit integer in two's complement, decimal place must be known to the reader). For conversion of the values to fixed point representation the number of decimal places in the module parameter assignment (display, CAN bus) is used as a basis.

Status 1

Bits	Name	Meaning
0	MesswOvfl	measured values overflow
1	AOutOvfl	analogue output overflow
2	SkalErr	scaling defective
3	EEPROMErr	EEPROM (parameter set) defective
4	GW1	status of limit switch 1
5	GW2	status of limit switch 2
6	GW3	status of limit switch 3
7	GW4	status of limit switch 4
8	PAR1	active parameter set bit 1
9	PAR2	active parameter set bit 1
10..14	res	reserved
15	MViO	Measured value in order [1] (if bit 0,2,3=0)

Tab 6.5: Contents of status 1

[1] Meaning of MViO:
NOR operation of: MesswOvfl, SkalErr, EEPROMErr.
MesswOvfl is the OR operation of ADCOvfl, HardwOvfl, GrossOvfl, NetOvfl

The parameter set number is coded in 2 bit binary:

Bit 8	Bit 9	Parameter set no.
0	0	1
1	0	2
0	1	3
1	1	4

Status 2

Double status word 2 returns detailed error flagging.

Bits	Name	Meaning
0	HardwOvfl	hardware overflow
1	ADCOvfl	ADC overflow
2	GrossOvfl	gross signal overflow
3	NetOvfl	net signal overflow
4	AOutOvfl	analogue output overflow
5	MaxOvfl	maximum overflow
6	MinOvfl	minimum overflow
7	NegOvfl	overflow in negative direction
8	GW1	status of limit switch 1
9	GW2	status of limit switch 2
10	GW3	status of limit switch 3
11	GW4	status of limit switch 4
12	SkalInError	scaling input invalid
13	SkalOutError	scaling output invalid
14	GainError	nominal value exceeded
15	UrcalError	works calibration defective
16	TransducerError	transducer error
17–31	res	reserved

Tab 6.6: Contents of status 2

6.3.2 Outputs

Limit values

Limit value levels are displayed in the same format as the measured values (16 bit integer, 32 bit integer or floating format). The operating direction and hysteresis remain unchanged and are set via the operating panel or the CAN bus.

Control word

Bits	Name	Meaning
0	ZERO	0–1 autom. triggers zeroing
1	TAR	0–1 triggers taring
2	res	
3	res	
4	CLRMAX	0–1 clears the MAX peak value store
5	CLRMIN	0–1 clears the MIN peak value store
6	HOLDMAX	1: freeze MAX peak value store
7	HOLDMIN	1: freeze MIN peak value store
8	PAR1	parameter set selection bit 1
9	PAR2	parameter set selection bit 2
10–15	res	reserved

Tab 6.7: Contents of control word

6.4 Diagnosis

The MP55DP module makes a device diagnosis available as an external diagnosis which can be released via the parameter assignment diagram.

The external diagnosis is 4 bytes long. The first byte contains the identification character for the version number. The second byte contains the identification character for device diagnosis. In the third and fourth bytes one bit each is reserved for various fault causes.

Octet	Bits	Value	Meaning
0	0–7	c1	version 1
1	0–7	4	length of device diagnosis is 4 bytes in total
2	0	0 1	hardware overflow
2	1		ADC overflow
2	2	0 1	gross overflow
2	3	0 1	net overflow
2	4	0 1	analogue output overflow
2	5	0 1	maximum overflow
2	6	0 1	minimum overflow
2	7		res
3	0–3		res
3	4	0 1	scaling of input characteristics defective
3	5	0 1	scaling of output characteristics defective
3	6	0 1	nominal value exceeded
3	7	0 1	works calibration defective
4	0	0 1	transducer error
4	1–7		res

Tab 6.8: Contents of diagnosis

7 Technical data

Description		MP55DP
Protocol		Profibus DP slave, in accordance with DIN 19245-3
Baud rate	Mbaud	max. 12
Participant address		3 – 123, can be set via keyboard
Profibus ID number		00B2 (hex)
Configuration data	bytes	5
Parameter data	bytes	max. 6 (+7 bytes DP standard)
Input data	bytes	max. 26
Output data	bytes	max. 18
Updating time of inputs	ms	1 ms for 1 value, < 3.4 ms otherwise
Updating time for outputs	ms	< 10 ms (taring, zeroing, limit value level); < 1s (parameter sets)
Diagnosis data	bytes	1 byte version and 4 bytes module diagnosis
Profibus connection		9-pin sub-D (DIN19245-3), potential-separated from power supply and measuring mass
Supply voltage	V	24 (18–30)
Supply voltage	mA	approx. 320

8 Certificate of Conformance

HOTTINGER BALDWIN MESSTECHNIK

HBM MESS- UND SYSTEMTECHNIK GMBH
Im Tiefen See 45 - D-64293 Darmstadt
Tel. ++49/6151/803-0, Fax. ++49/6151/894896

Konformitätserklärung ***Declaration of Conformity*** ***Déclaration de Conformité***

Document: *105/05.1998*

Wir,	We,	Nous,
	HBM Mess- und Systemtechnik GmbH, Darmstadt	
erklären in alleiniger Verantwortung, daß das Produkt	declare under our sole responsibility that the product	déclarons sous notre seule responsabilité que le produit
	Trägerfrequenzmodul MP55DP	
auf das sich diese Erklärung bezieht, mit der/den folgenden Norm(en) oder normativen Dokument(en) übereinstimmt (siehe Seite 2) gemäß den Bestimmungen der Richtlinie(n)	to which this declaration relates is in conformity with the following standard(s) or other normative document(s) (see page 2) following the provisions of Directive(s)	auquel se réfère cette déclaration est conforme à la (aux) norme(s) ou autre(s) document(s) normatif(s) (voir page 2) conformément aux dispositions de(s) Directive(s)

89/336/EWG - Richtlinie des Rates vom 3. Mai 1989 zur Angleichung der Rechtsvorschriften der Mitgliedsstaaten über die elektromagnetische Verträglichkeit, geändert durch 91/263/EWG, 92/31/EWG und 93/68/EWG

Die Absicherung aller produktspezifischen Qualitätsmerkmale erfolgt auf Basis eines von der DQS (Deutsche Gesellschaft zur Zertifizierung von Qualitätsmanagementsystemen) seit 1986 zertifizierten Qualitätsmanagementsystems nach DIN ISO 9001 (Reg.Nr. DQS-10001). Die Überprüfung der sicherheitsrelevanten Merkmale (Elektromagnetische Verträglichkeit, Sicherheit elektrischer Betriebsmittel) führt ein von der DATech erstmals 1991 akkreditiertes Prüflaboratorium (Reg.Nr. DAT-P-006 und DAT-P-012) unabhängig im Hause HBM durch.	All product-related features are secured by a quality system in accordance with DIN ISO 9001, certified by DQS (Deutsche Gesellschaft zur Zertifizierung von Qualitätsmanagementsystemen) since 1986 (Reg. No. DQS-10001). The safety-relevant features (electromagnetic compatibility, safety of electrical apparatus) are verified at HBM by an independent testing laboratory which has been accredited by DATech in 1991 for the first time (Reg. Nos. DAT-P-006 and DAT-P-012).	Chez HBM, la détermination de tous les critères de qualité relatifs à un produit spécifique est faite sur la base d´un protocole DQS (Deutsche Gesellschaft zur Zertifizierung von Qualitätsmanagementsystemen) certifiant, depuis 1986, notre système d´assurance qualité selon DIN ISO 9001 (Reg.Nr. DQS-10001). De même, tous les critères de protection électrique et de compatibilité électromagnétique sont certifiés par un laboratoire d´essais indépendant et accrédité depuis 1991 (Reg.Nr. DAT-P-006 et DAT-P-012).

Darmstadt, 14.05.1998

Seite 2 zu	Page 2 of	Page 2 du
	Document: ***105/05.1998***	

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, beinhaltet jedoch keine Zusicherung von Eigenschaften. Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.	This declaration certifies conformity with the Directives listed above, but is no asseveration of characteristics. Safety directions of the delivered product documentation have to be followed.	Cette déclaration atteste la conformité avec les directives citées mais n´assure pas un certain charactère. S.v.p. observez les indications de sécurité de la documentation du produit ajoutée.
Folgende Normen werden zum Nachweis der Übereinstimmung mit den Vorschriften der Richtlinie(n) eingehalten:	The following standards are fulfilled as proof of conformity with the provisions of the Directive(s):	Pour la démonstration de la conformité aux disposition de(s) Directive(s) le produit satisfait les normes:

EN 50082-2 : 1995 ***Elektromagnetische Verträglichkeit (EMV); Fachgrundnorm Störfestigkeit;*** Teil 2: Industriebereich; Deutsche Fassung

EN 55011 : 1991 ***Funk-Entstörung von Elektrischen Betriebsmitteln und Anlagen;*** *Grenzwerte und Meßverfahren für Funkstörungen von industriellen, wissenschaftlichen und medizinischen Hochfrequenzgeräten (ISM-Geräten) (CISPR 11 : 1990, modifiziert); Deutsche Fassung; Klasse B*

Hottinger Baldwin Messtechnik GmbH

Postfach 10 01 51, D-64201 Darmstadt
Im Tiefen See 45, D-64293 Darmstadt
Tel.: +49/61 51/ 8 03-0; Fax: +49/61 51/ 8039100
E-mail: support@hbm.com www.hbm.com

measurement with confidence

A0581-2.1 en