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Operating manual



PME industrial measurement electronics linked to a field bus

MP55 module

A0563-5.6 en

HBM

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Contents **Page**

Safety instructions **4**
1 Introduction **7**
1.1 List of components and accessories supplied 7
1.2 Introduction 7
2 Choose amplifier settings with the aid of DIP switches **8**
3 Fitting/removing the MP55 . . . . . **12**
3.1 Linking several modules 13
4 Connections **14**
4.1 Functional overview of the MP55 14
4.2 Supply voltage and remote contact I/Os 15
4.2.1 External supply voltage for the control I/Os 16
4.3 Transducers 17
4.4 CAN-interface 19
4.5 Synchronisation 20
5 Setting up and operation (MP55) **21**
5.1 Operating principles 21
5.2 Commissioning 24
5.3 Overview of all groups and parameters 25
5.3.1 Set up all parameters 26
6 Declaring the significant parameters **30**
7 CAN interface description **38**
7.1 Introduction 38
7.2 Cyclical data transmission 38
7.3 Parameter assignment 39
7.4 Object directory: communications profile section as defined in CANopen (CiA-DS301) 41
7.5 Object directory: manufacturer-specific objects 44
7.6 Manufacturer-specific objects in FLOAT data format 53
7.7 Examples 55
8 Error messages/operating status (LED) **57**
9 Specifications **60**
10 Keyword index **63**

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Safety instructions

Use in accordance with the regulations

The MP55 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 maximum permissible supply voltage is 18...30 V.

General dangers of failing to follow the safety instructions

The MP55 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 MP55 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.

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Residual dangers

The scope of supply and list of components provided with the MP55 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 minimise residual dangers. Prevailing regulations must be complied with at all times. There must be reference to the residual dangers connected with measurement technology.
Any risk of residual dangers when working with the MP55 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: **Possible dangerous situation**

Warns of a possibly dangerous situation in which failure to comply with safety requirements can cause damage to property or lead to some form of **physical injury**.

Symbol:  **NOTE**

Means that important information about the product or its handling is being given.

Symbol: CE

Meaning: **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/support/dokumentation).

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Working safely

Error messages should only be acknowledged if the cause of the error is removed and no further danger exists.

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

To ensure adequate immunity from interference, use only *Greenline* shielded ducting (place the shield of the transducer cable onto the connector housing).

The MP55 module must be operated with an extra-low safe voltage (supply voltage 18 to 30 V DC).

Conversions and modifications

The MP55 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 damage resulting therefrom.

In particular, any repair or soldering work on motherboards is prohibited. When exchanging any modules, only original HBM parts must be used.

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 appropriate legal and safety regulations 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 dangers involved.

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1 Introduction

1.1 List of components and accessories supplied

List of components supplied:

- 1 MP55 module
- 3 x 6-pin terminal plugs, coded
  Order No.: 3.3312-0251 (terminal plug 3);
  3.3312-0252 (terminal plug 4); 3.3312-0250 (terminal plug 1)
- 10-pin ribbon cable jack-connector
- 1 User Manual for the MP55 module

Accessories:

- 15-pin Sub-D connector for transducer, Order No.: 3.3312-0182
- Standard ribbon cable, 10pin, 1.27 mm pitch

1.2 Introduction

The MP55 module from the PME product line is a carrier-frequency amplifier, and is ideal for connecting the widest possible technological varieties of force, pressure, torque and displacement transducers as well as load cells. The MP55 module is set up, and its parameters are assigned, using either the keyboard and display or the PME Assistent. The PME Assistent provides an easy operator interface under MS-Windows and this is used for assigning parameters to modules (as described in the ”PME Assistant” online help).

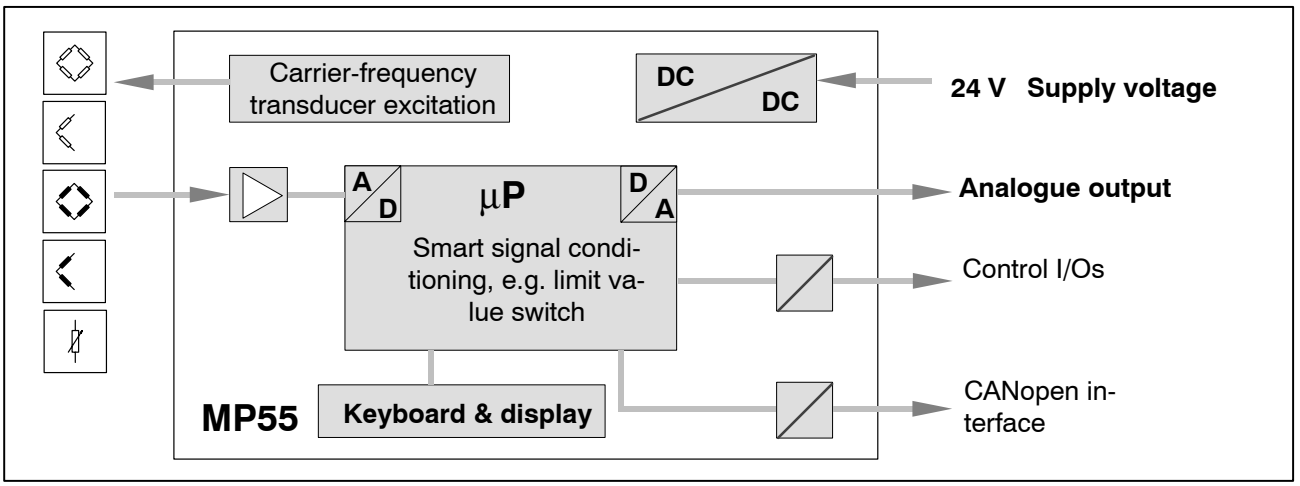


Fig. 1.1: Block diagram of the MP55 module

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2 Choose amplifier settings with the aid of DIP switches

NOTE

The DIP switches must be set up/changed before the PME is fitted.

Various settings are defined with DIP switches and can be read out via the display (see chapter 5.3). These are the settings for

bridge excitation voltage, effective range, bridge type, analogue output, master/slave, terminating bus impedance, edge steepness

To set up the DIP switches proceed as shown in Fig. 2.1.

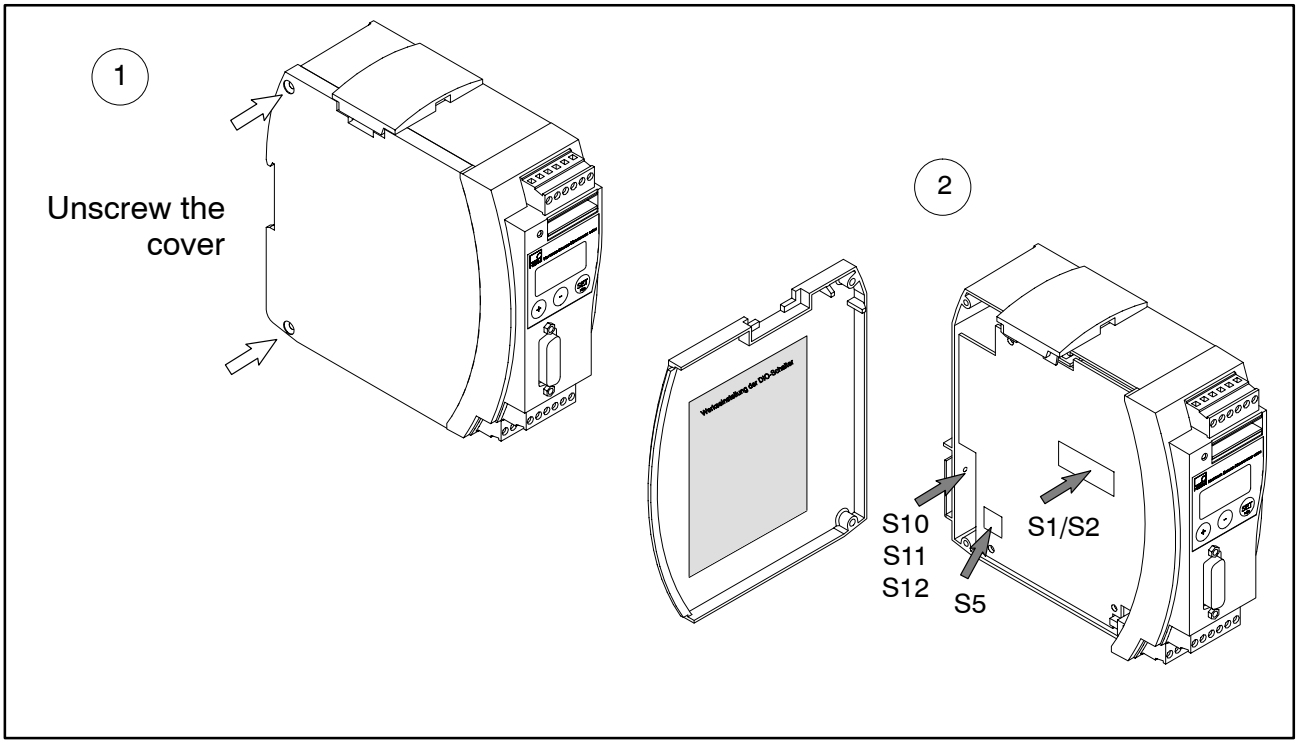
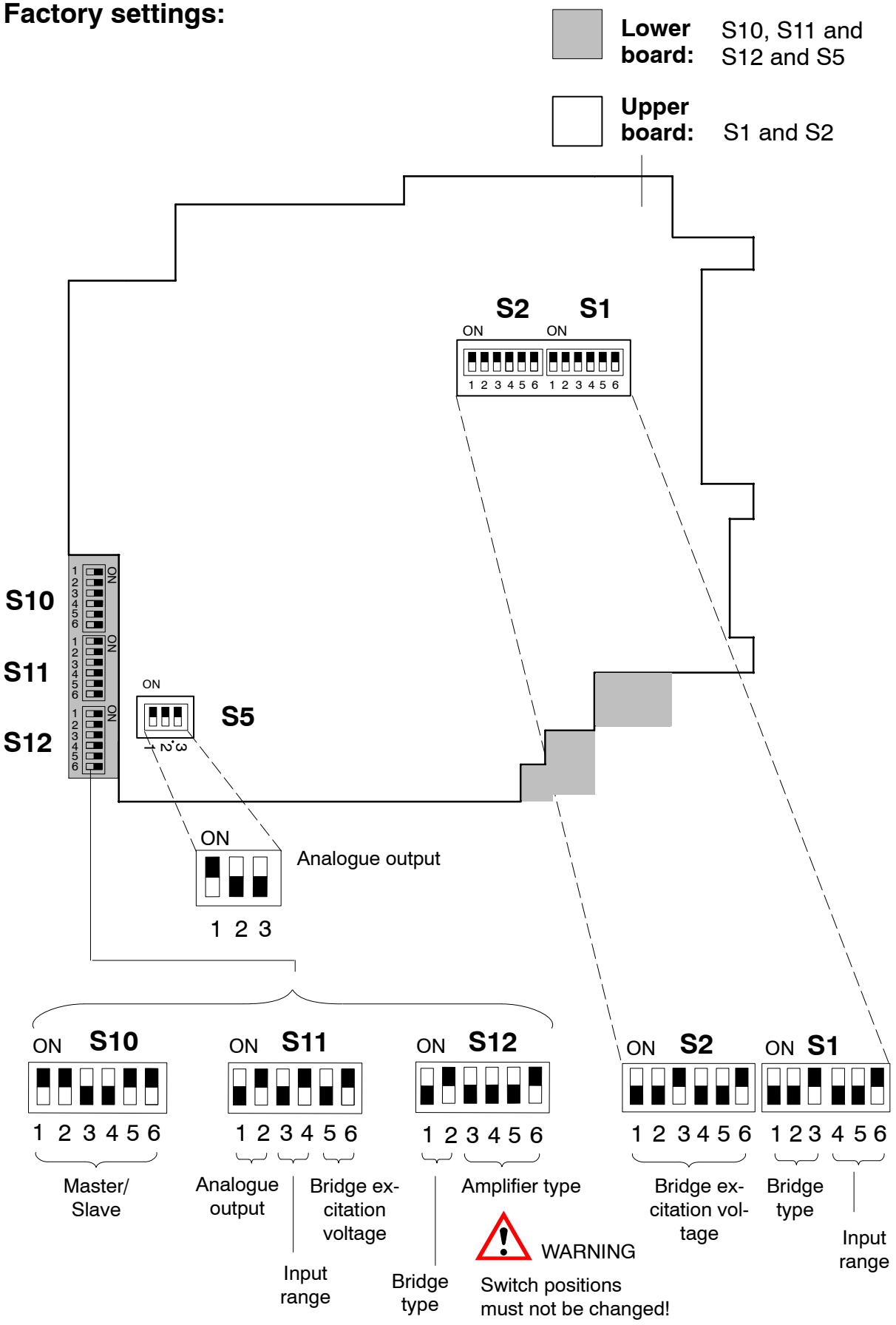


Fig. 2.1: Open the housing; position of the DIP switches

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Factory settings:



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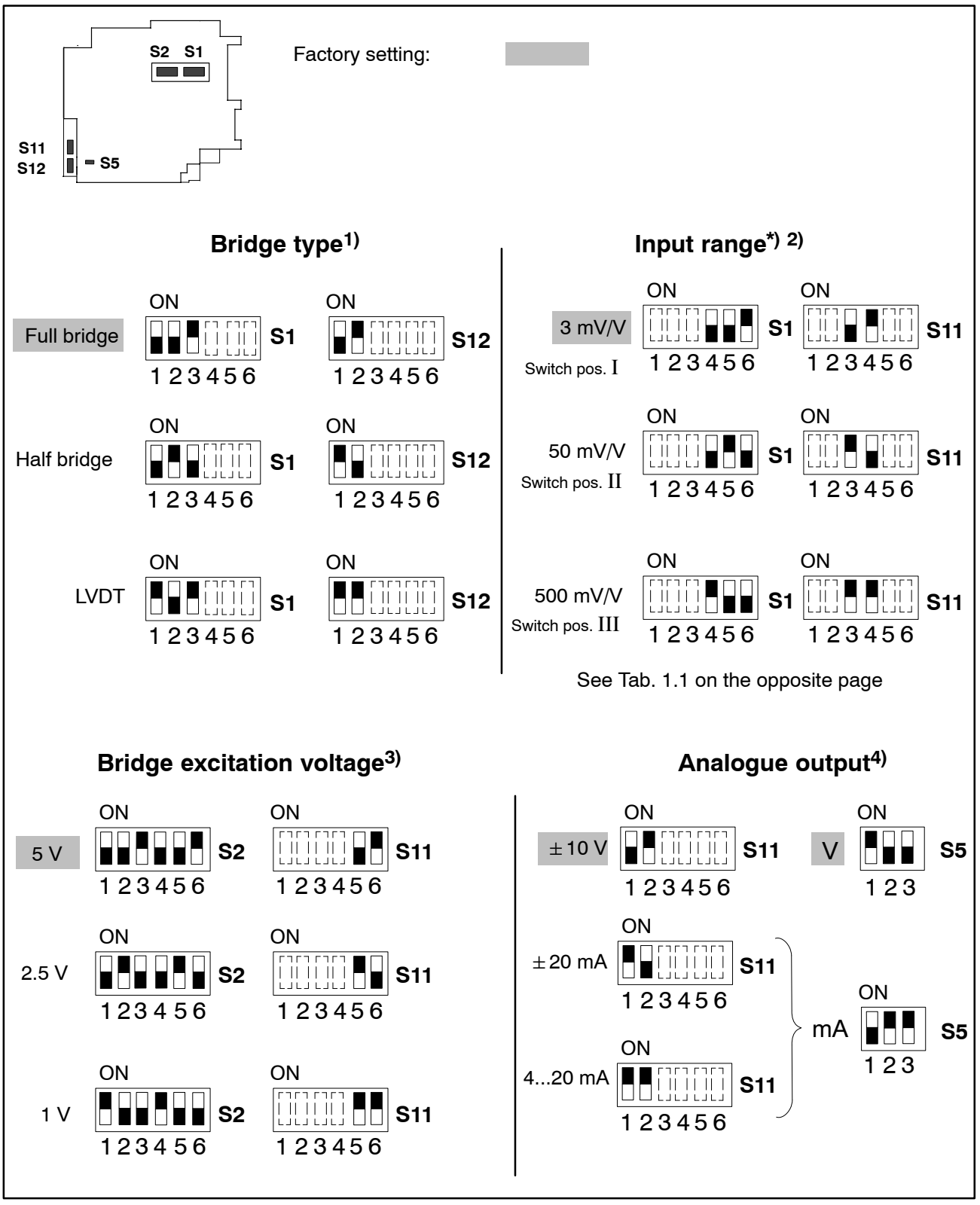


Fig. 2.2: Setting up an amplifier

1) Check this in the display under the TRANSDUCER group, parameter ”Trans.type”; see page 25

2) Check this in the display under the TRANSDUCER group, parameter ”Input”; see page 25

3) Check this in the display under the TRANSDUCER group, parameter ”Excitation”; see page 25

4) Check this in the display under the ANALOG OUTPUT group, parameter ”ModeUa”, see page 25

*) **mV/V values by reference to 5 VU_B** (see table Tab. 1.1 on the following page)

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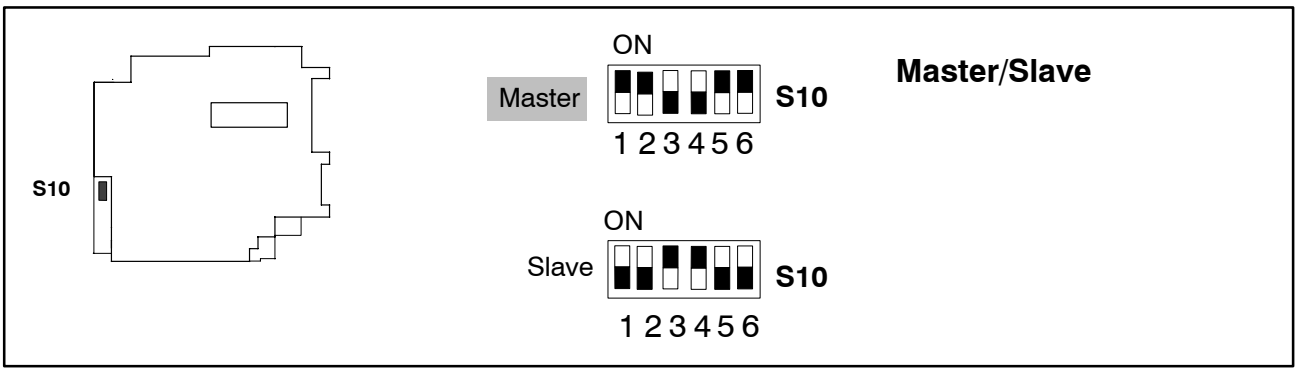


Fig. 2.3: Setting up an amplifier (Continued)

Terminating bus resistor

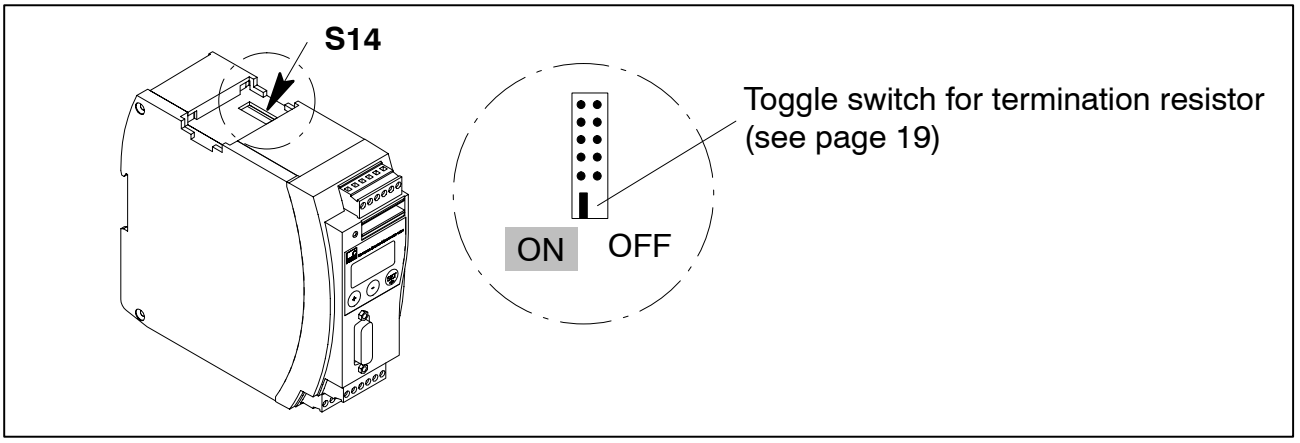


Fig. 2.4: Toggle switch for termination resistor

Bridge excitation voltage [V]	Input range [mV/V]		
	Switch position I	Switch position II	Switch position III
5	3	50	500
2.5	6	100	1000
1	15	250	2500

Tab. 1.1: Input ranges for different bridge excitation voltages

Transducer type and rated data	Bridge type	Bridge excitation voltage	Input range
Strain gauge force transducer 2 mV/V=20 kN	Full bridge	5 V	3 mV/V
Inductive displacement transducer 80 mV/V	Half bridge	2.5 V	100 mV/V
Inductive displacem. trans. 10 mV/V	Half bridge	1 V	15 mV/V
Piezoresistive transducer 400 mV/V	Half bridge	1 V	250 mV/V
Potentiometric transducer 1000 mV/V	Half bridge	2.5 V	1000 mV/V

Tab. 1.2: Useful options

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3 Fitting/removing the MP55

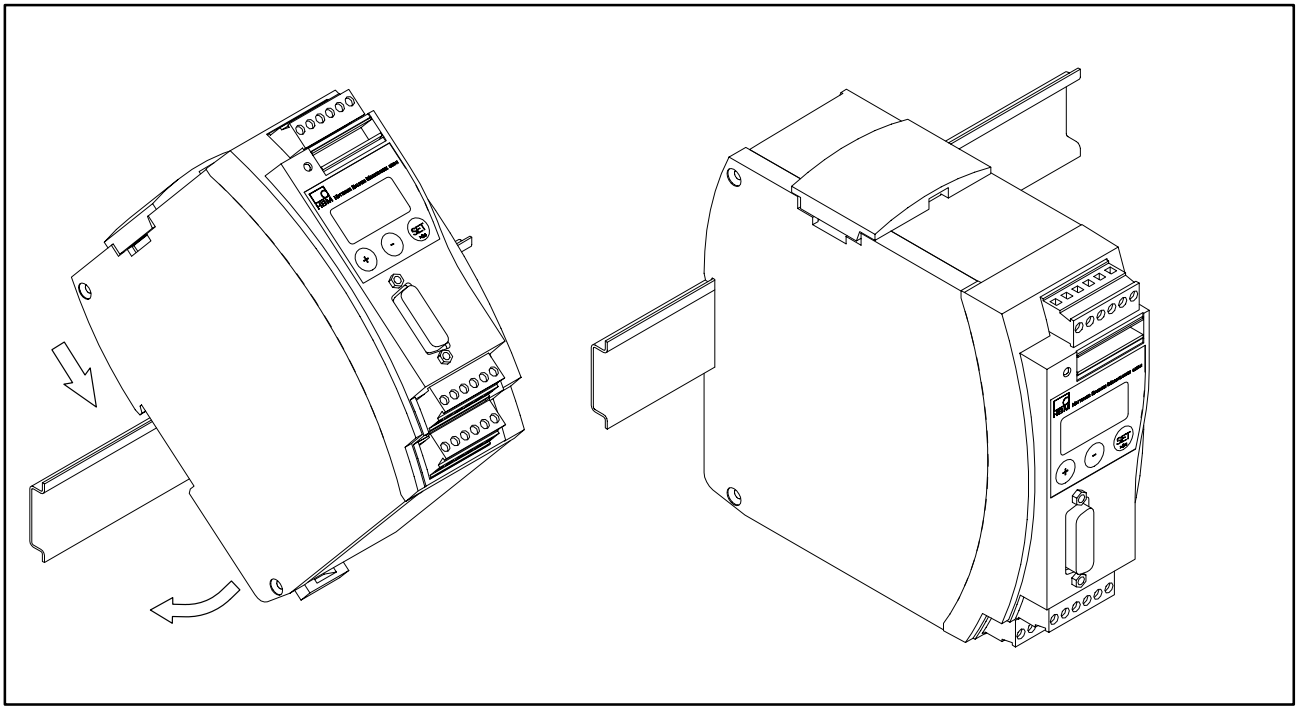


Fig. 3.1: Fitting to a support rail

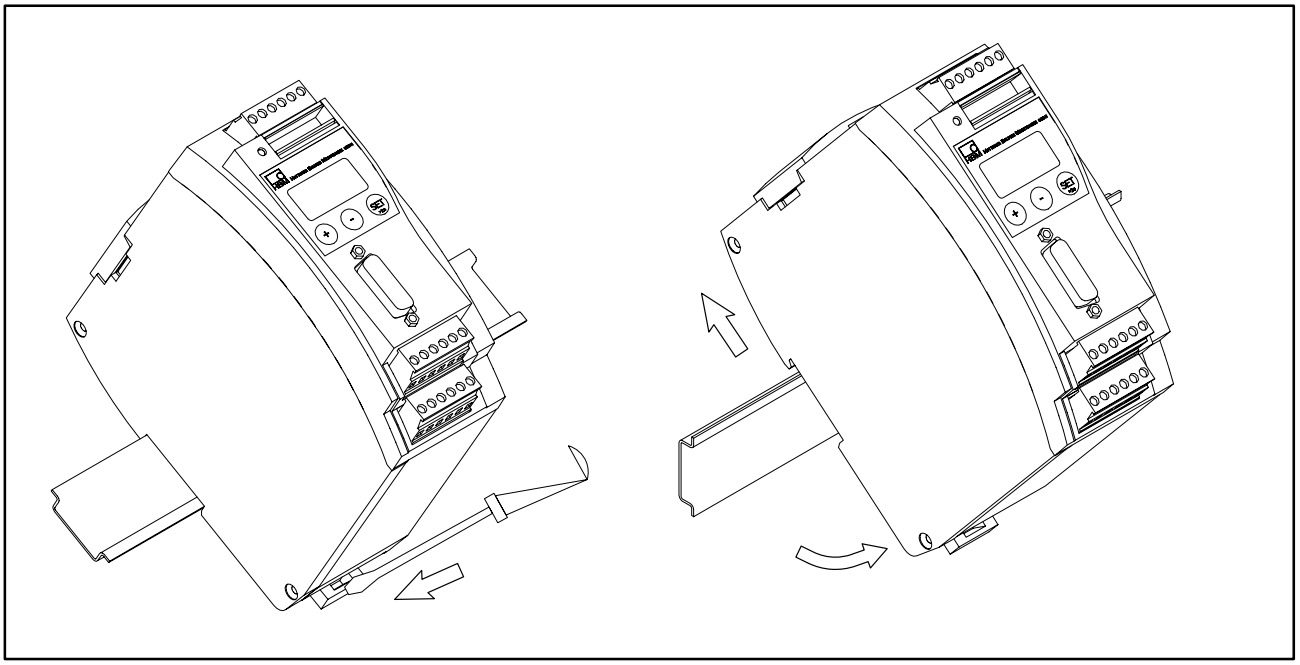


Fig. 3.2: Removal

CAUTION

The support rail must be on protection circuit potential ⏚ .

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3.1 Linking several modules

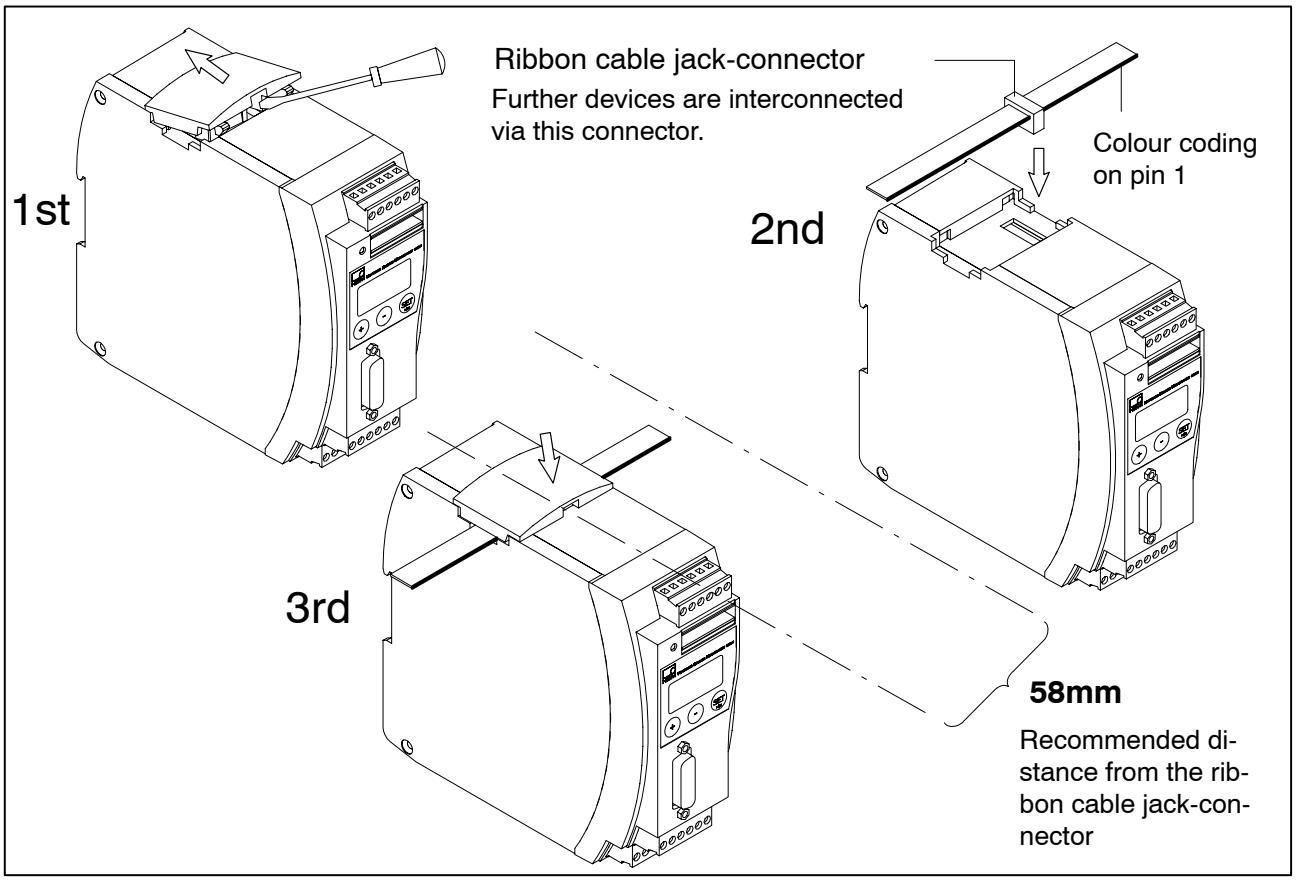


Fig. 4.1: Connecting ribbon cable

Several MP55 modules can be connected via one ribbon cable. This cable serves as the local link for supply voltage and synchronisation between modules. No more than eight modules should be interconnected over one ribbon cable.

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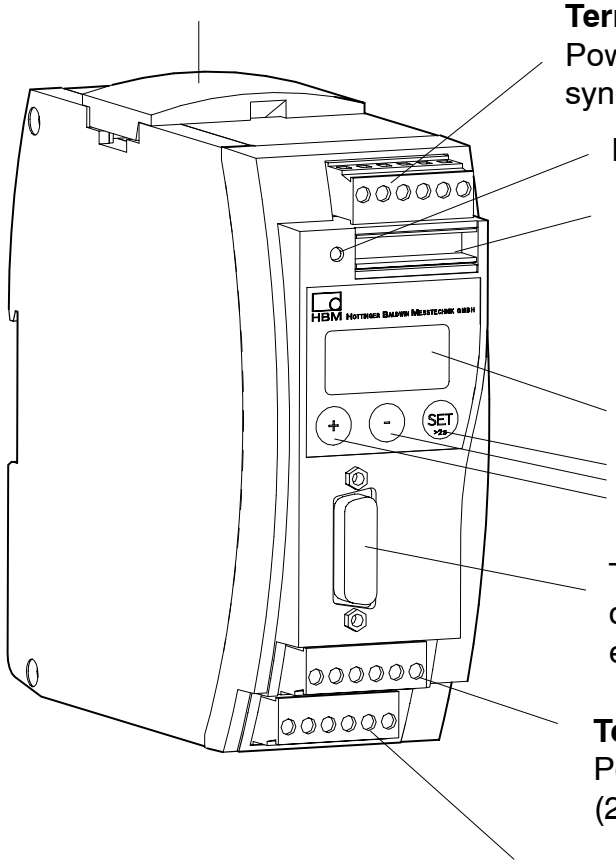
4 Connections

Warning

Comply with the safety instructions before putting the instrument into service.

4.1 Functional overview of the MP55

Local link for CAN-bus, supply voltage and synchronisation between modules, Terminating bus resistor



Terminal plug 1:
Power supply and CAN-bus, synchronisation

LED

Terminal plug 2: (same pin assignment as terminal plug 1)
CAN adapter for PC/laptop connection, assigning parameters via CAN-bus

2-line LCD display

Touch-sensitive control keys

Transducer connection (15-pin sub-D connector) including transducer excitation

Terminal plug 3:
Potential-separated control inputs (24 V-level), analogue output

Terminal plug 4:
Potential-separated control outputs (24 V-level), external power supply for control inputs

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4.2 Supply voltage and remote contact I/Os

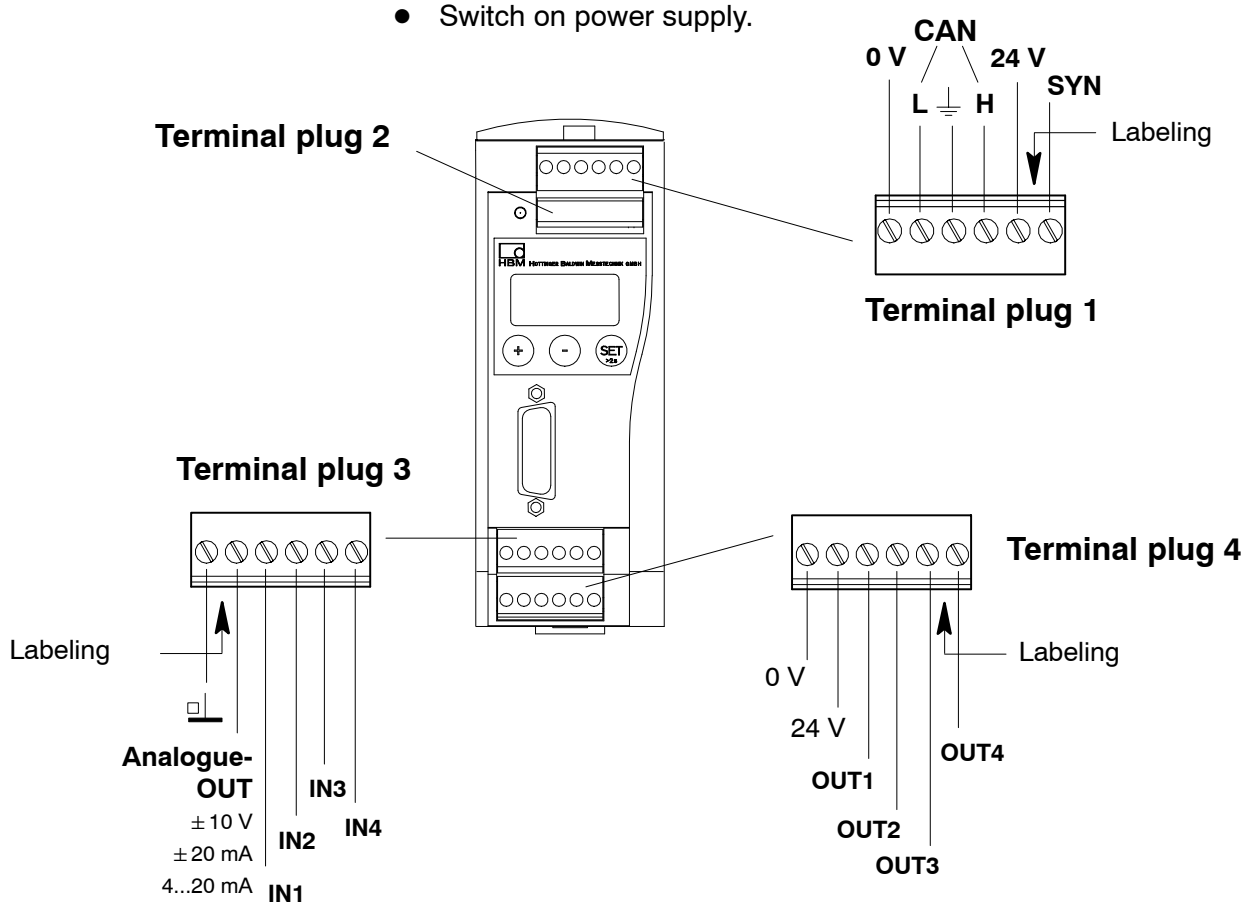
Four removable terminal plugs are available for connections.

Connecting the power supply:

Warning

The MP55 module must be connected to an external 18-30 V supply voltage (24 V $_{nominal}$).

- Twist the power supply conductors and fit them with sleeves.
- Screw the conductors to terminal plug 1.
- Insert the terminal plug into the uppermost jack.
- Switch on power supply.



IN = digital input **OUT = digital output**

More information on I/Os can be found in chapter 6, page 35.

CAUTION **In the event of a power failure to the MP55 module, all control outputs are set to 0 V.**

Fig. 4.2: Pin assignment for terminal plugs

The 4 terminal plugs are coded so that they can be inserted in the 4 jacks without any confusion. Jacks are fitted with coded lateral guides and terminal plugs are fitted with coded pins.

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4.2.1 External supply voltage for the control I/Os

Example: PLC connection

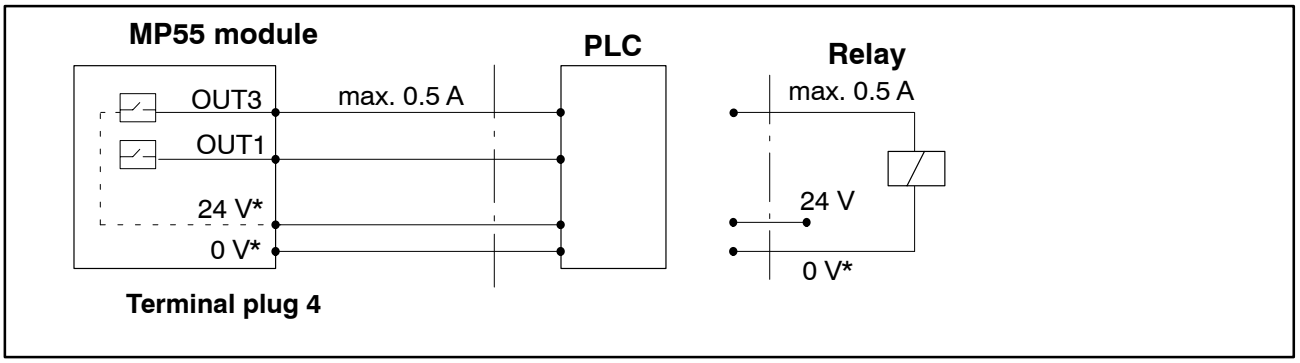


Fig. 4.3: Connection to a PLC

The control**inputs** are available on terminal plug 3, the control**outputs** are available on terminal plug 4, and they are all galvanically isolated from the internal supply voltage (see also chapter 6, ”Declaring the significant parameters” page 30).

*) The control-outputs must be supplied with an external voltage (ground **and** 24 V).

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4.3 Transducers

The following transducer types can be connected to the MP55 module:

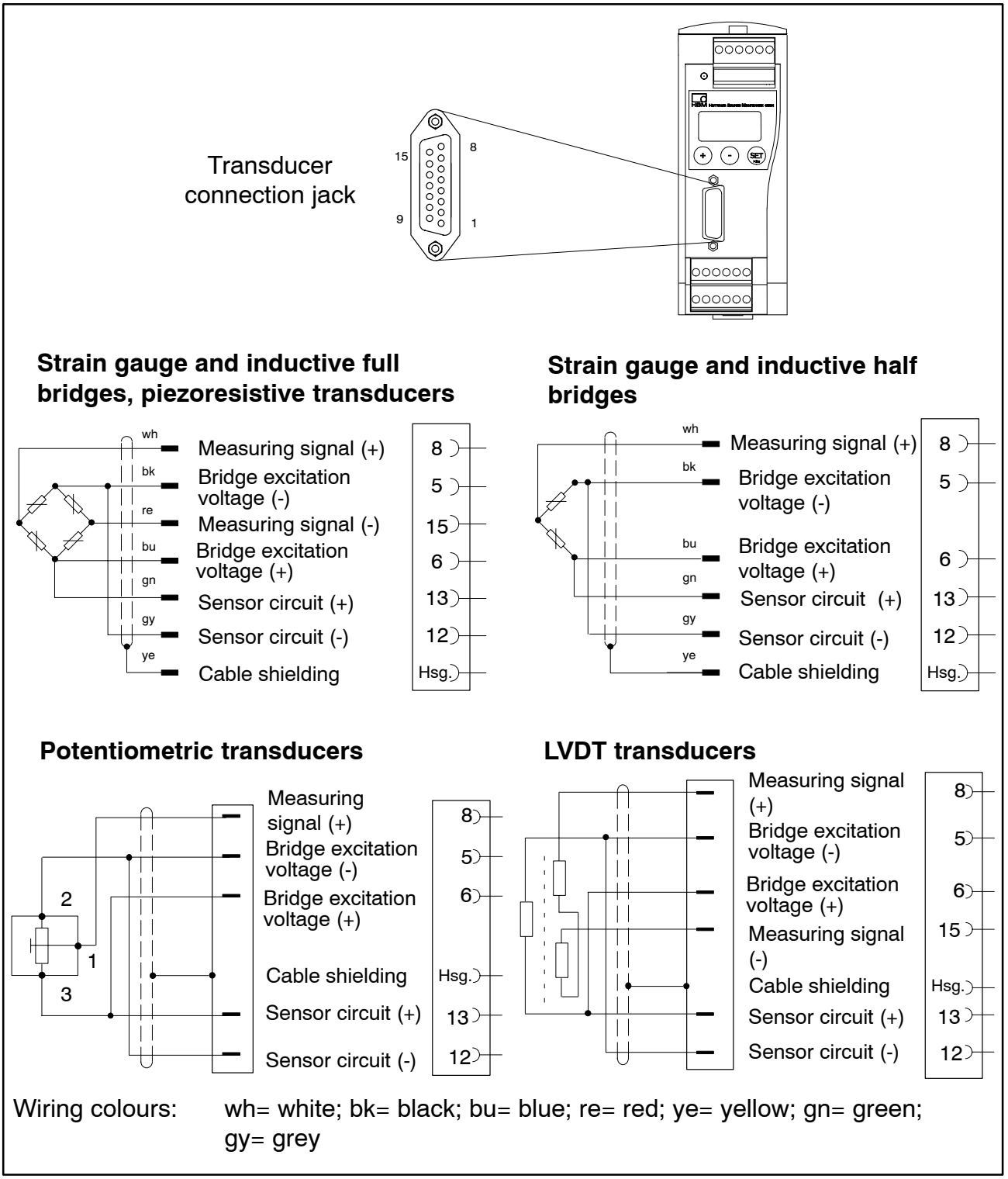


Fig. 4.4: Connecting various transducers

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When installing a transducer with a four-wire connection, you must connect the sensor lines with the corresponding bridge excitation line (Pin 5 with Pin 12, Pin 6 with Pin 13) [1].

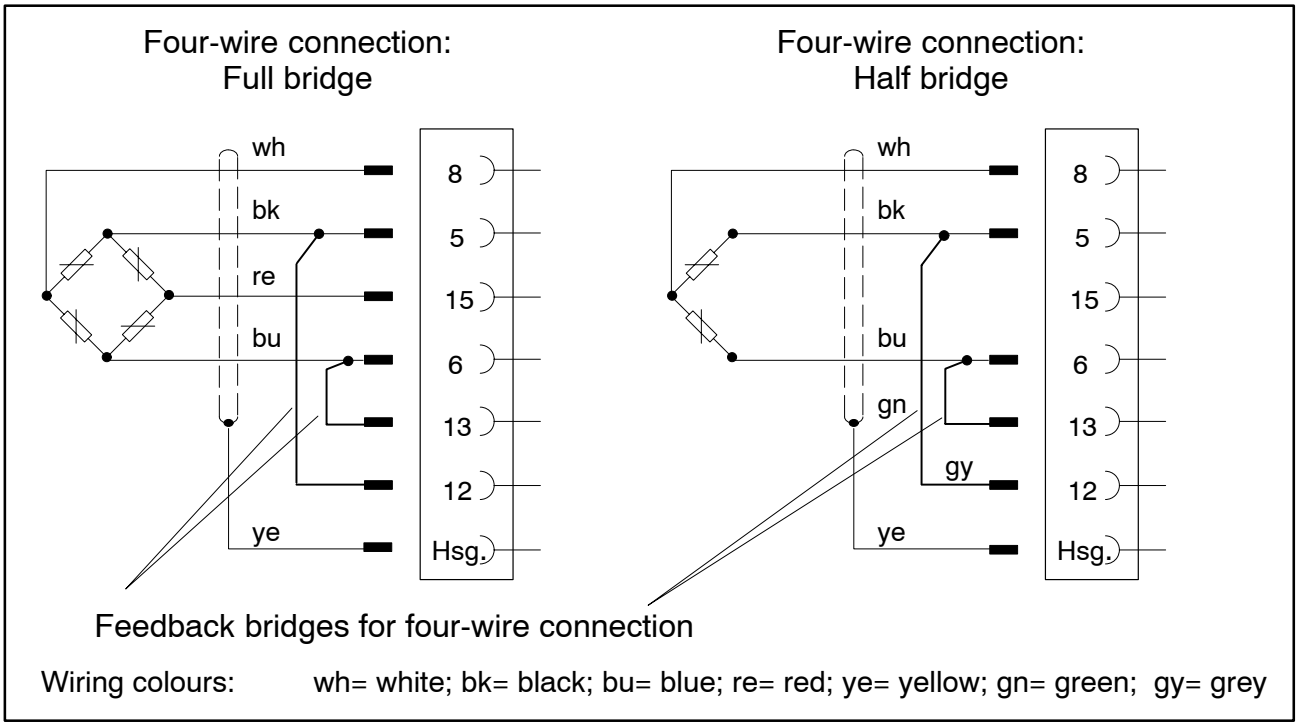


Fig. 4.5: Four-wire transducer connection

NOTE

Use standard HBM cable for the transducer connection. When using other shielded, low-capacitance measuring cable, connect the transducer cable shielding to the connector housing in accordance with the HBM Greenline concept (publication S1578). This ensures EMC protection.

[1] For cable lengths in excess of 50 m, one resistor with half the value of the bridge resistance ($R_B/2$) must be switched on at the transducer in place of each of the feedback bridges. If the transducers are calibrated in six-core circuit, the resistors must be switched on directly in the sensor circuit.

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4.4 CAN-interface

The CAN-bus is connected via terminal plug 1. A maximum of 32 CAN users can be connected to a bus segment (in accordance with the CANopen specification). The CAN-bus needs a terminating impedance of 120 Ω in the first and last bus users. The bus line can have a maximum of two terminating resistors. The MP55 module has a built-in terminating resistor which is enabled by toggle switch S14 (see page 11).

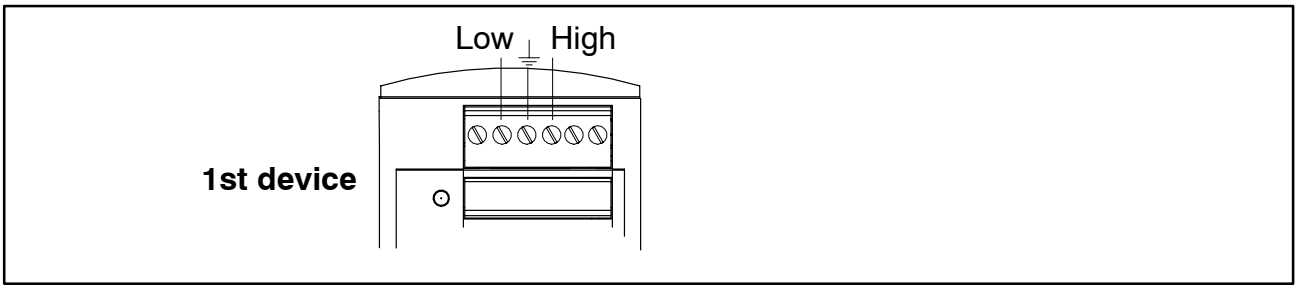


Fig. 4.6: Connecting the CAN interface

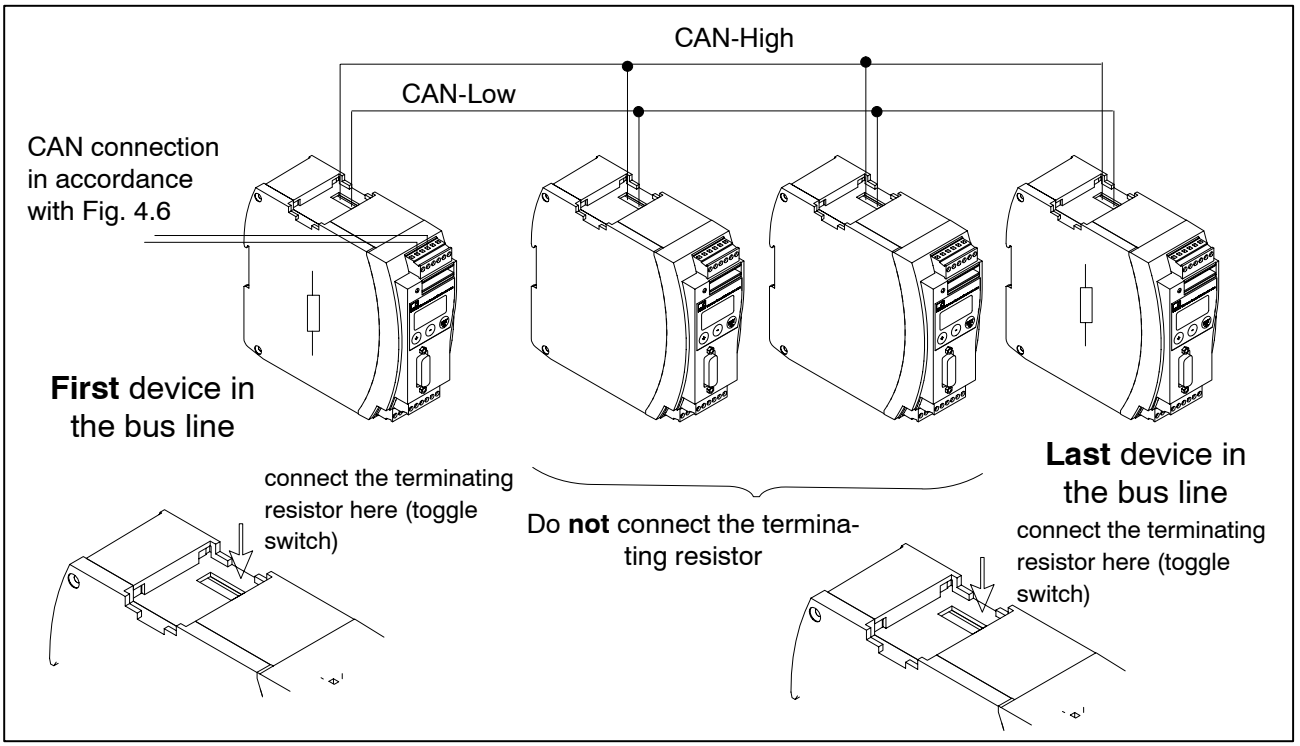


Fig. 4.7: CAN-bus operation with several modules (maximum 32 in accordance with standard)

NOTE

If the first or last device in the bus line is not a PME module, one 120 Ω resistor must be connected for each of these outside devices.

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4.5 Synchronisation

Synchronisation is advisable when

- the transducer cables are connected in parallel to several devices
- unshielded channels lie close together

Synchronisation prevents carrier-frequency differences giving rise to beat interference.

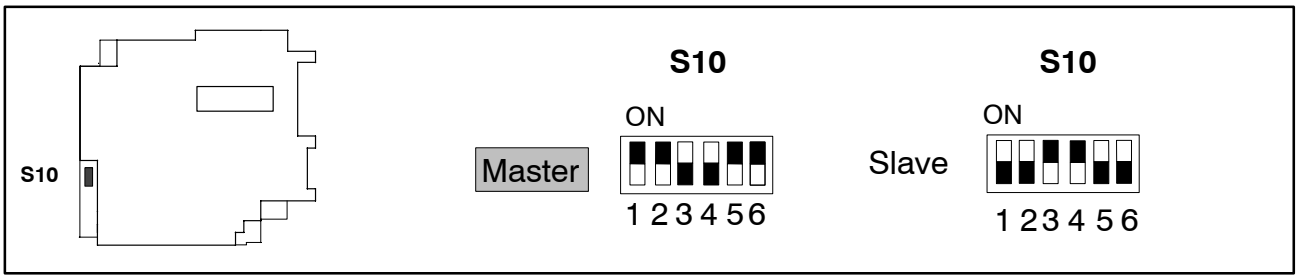


Fig. 4.8: Setting up master/slave

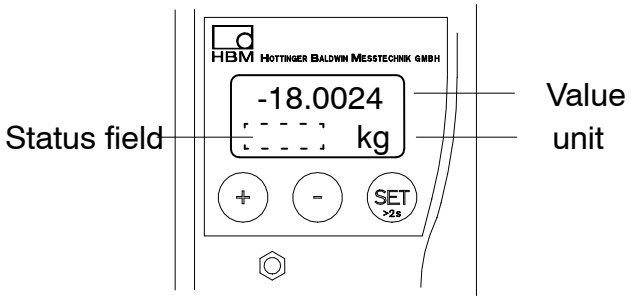
To synchronise several instruments, set up **one** of them as Master. Set up all the other instruments as Slaves.
Synchronisation between modules should always be carried out via the ribbon cable- even when you are not working with CAN-bus.

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5 Setting up and operation (MP55)

5.1 Operating principles

Display in measuring mode:



↕ The status field flashes if the parameter value can be edited

The keys ⊕ ⊖ are pressure-sensitive:

Hold key down - the values scroll (the harder you press, the faster they scroll)
Press key briefly - go to next value

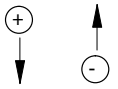
Function of the buttons:

SET

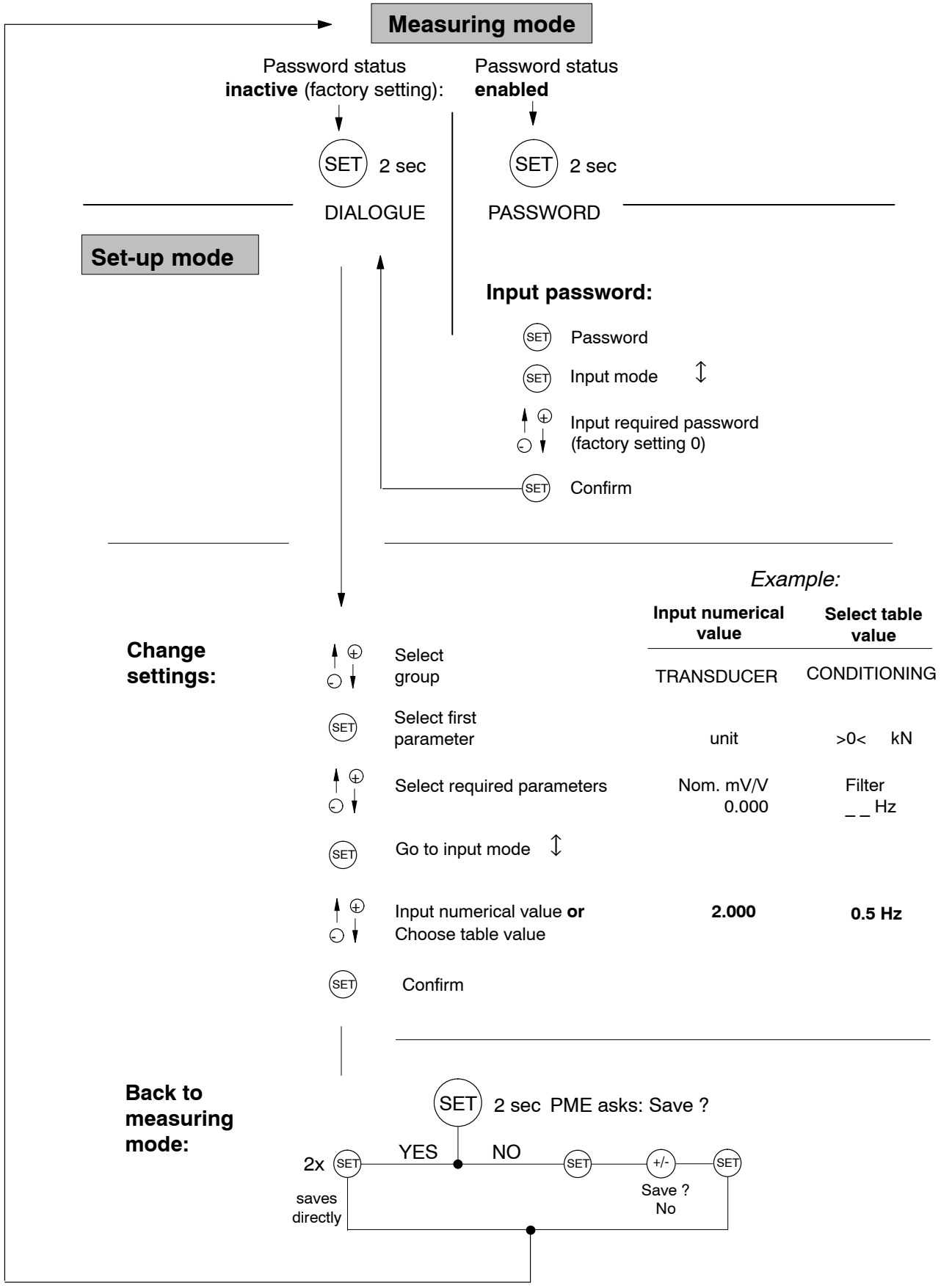
1. Switch from measuring mode to input mode
2. Choose the first parameter within the group.
3. Confirm input
4. Return to measurement range (press for 2 sec)

+ -

Select parameter/group



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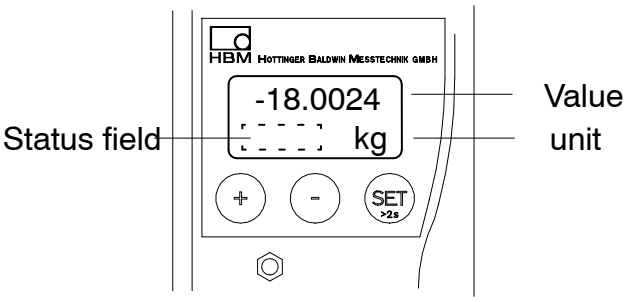


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During measurement you can press ⊕ ⊖ - to look at the following in the display:

1. Display mode
2. The status of input and output
3. Error types (ERROR)

The status field also displays the symbols ! , and .



	Symbol in status field	Display mode
	No character	Gross signal
	>T<	Net signal
		Maximum peak value signal
		Minimum peak value signal
		Peak/peak signal
	mV/V	Input signal
	V or mA	Analogue output signal
	Outp ■ □ □ □ Inpt □ □ □ □	■ set, □ not set Status of input and output
	e.g. StoreMax	**Error messages** During measurement the character **!** warns of an error in the module. Current errors are automatically displayed one after another in display mode ”ERROR” (accessible through ⊕).*)

Status field	!	Error occurred
		Standstill status occurred
		Shunt resistor on

*) see chapter 8 ”Error messages”, page 57

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5.2 Commissioning

- Set up the DIP switches in accordance with chapter 2 (pages 10 and 11).

Example:

Transducer type and rated data	Bridge type	Bridge excitation voltage	Input range
Strain gauge force transducer 2 mV/V=20 kN	Full bridge	5 V	3 mV/V
Inductive displacement transducer 80 mV/V	Half bridge	2.5 V	100 mV/V
Inductive displacement transducer 10 mV/V	Half bridge	1 V	15 mV/V
Piezoresistive transducer 400 mV/V	Half bridge	1 V	250 mV/V
Potentiometric transducer 1000 mV/V	Half bridge	2.5 V	1000 mV/V

- Connect the power supply cable and the transducer to the module, as described in chapters 4.2 and 4.3.



CAUTION

Be sure to follow the safety instructions!

- Switch on the power supply.

  The instrument carries out a function test (approx. 15 sec) and if functioning correctly, switches to measuring mode. **During the function test, the remote contacts stay at 0 V.**



NOTE

If the error message HardwOvf is displayed at this point, please refer to chapter 8 ”Error messages” for more details.

A green LED also tells you whether the MP55 is ready to begin measuring.

If the LED shows yellow or red, please refer to chapter 8 ”Error messages” for more details.



NOTE

When connecting transducers in parallel, please take into account the resulting total resistance. If required, reduce the excitation voltage.

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5.3 Overview of all groups and parameters

SET ↓ ⊕ ⊖ → **Groups**

SET ↓ **Overview of parameters**

⊕ Up

⊖ Down

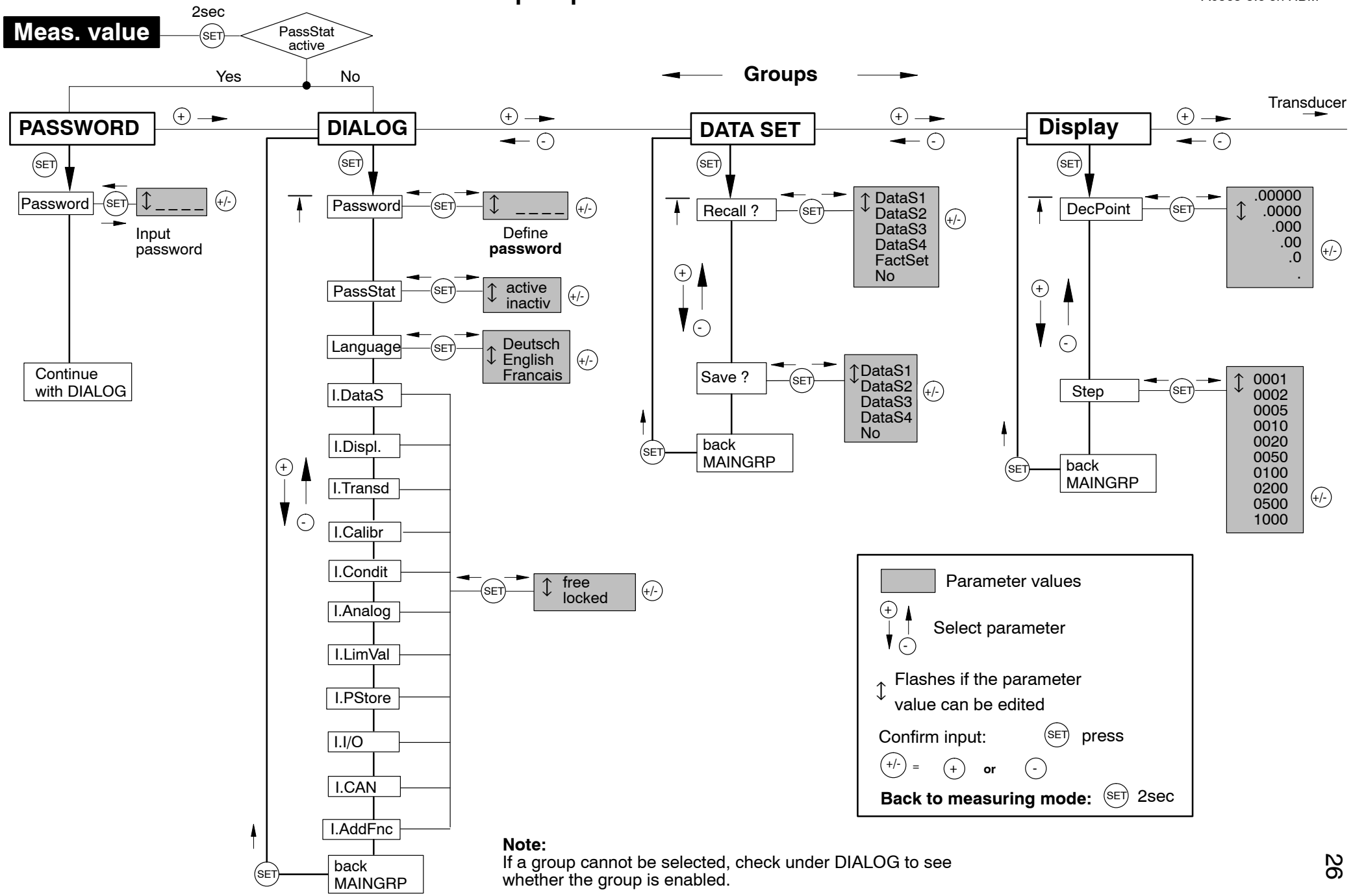
DIALOG	DATA SET	DISPLAY	TRANS-DUCER	TRANSD.-CALIBRAT	CONDITIONING	ANALOG-OUTPUT	LIMIT VAL. 1...4	PEAK STORE	IN/OUT	CAN-BUS	ADDITION FUNC-TION
Password	Recall ?	DecPoint	Unit	P1Meas.?	>0< kN[1)]	SourceUa	Operatn.	Operatn.	Output1	Baudrate	AmplType
PassStat	Save ?	Step	Transd.Type	P1 mV/V	>0<set ?	Mode UA	Source	InputMin	ModeOut1	Address	PrgVers
Language	**MAINGR**	**MAINGR**	Excitatn	P1 kN[1)]	>0<save	Zero kN[1)]	SwtchDir	InputMax	Output2	Profil	>0<Rf kN[1)]
I.DataS			InputRng	P2Meas.?	>T< kN[1)]	Zero V	Value kN[1)]	ClearPkV	ModeOut2	Output	MotionDsp
I.Displ.			ZeromV/V	P2 mV/V	>T<set?	EndV kN[1)]	Hyst kN[1)]	⦜ kN/s[1)]	Output3	OutR. ms	MTime ms
I.Transd			Zero kN[1)]	P2 kN[1)]	>T<save	EndV V	On Del ms	**MAINGR**	ModeOut3	PDO-Frmt	MAmp kN[1)]
I.Calibr			Nom.mV/V	**MAINGR**	filtre	**MAINGR**	Off Del ms		Output4	**MAINGR**	HW Synchr
I.Condit			NVal kN[1)]		FiltChar		**MAINGR**		ModeOut4		Keyboard
I.Analog			Zero.Adj		**MAINGR**				Zeroing		SNo prior version
I.LimVal			NomV.Adj						Tare		HW-Vers.
I.PStore			Shunt						PkMomMax		**MAINGR**
I.I/O			ShuntPol						PkHldMax		
I.CAN			**MAINGR**						PkMomMin		
I.AddFnc									PkHldMin		
MAINGR									ParaCo1		
									ParaCo2		
									InpFunc		
									MAINGR		

Preset with DIP switches , **MAINGRP** with SET back to group

[1)] Depending on the unit chosen

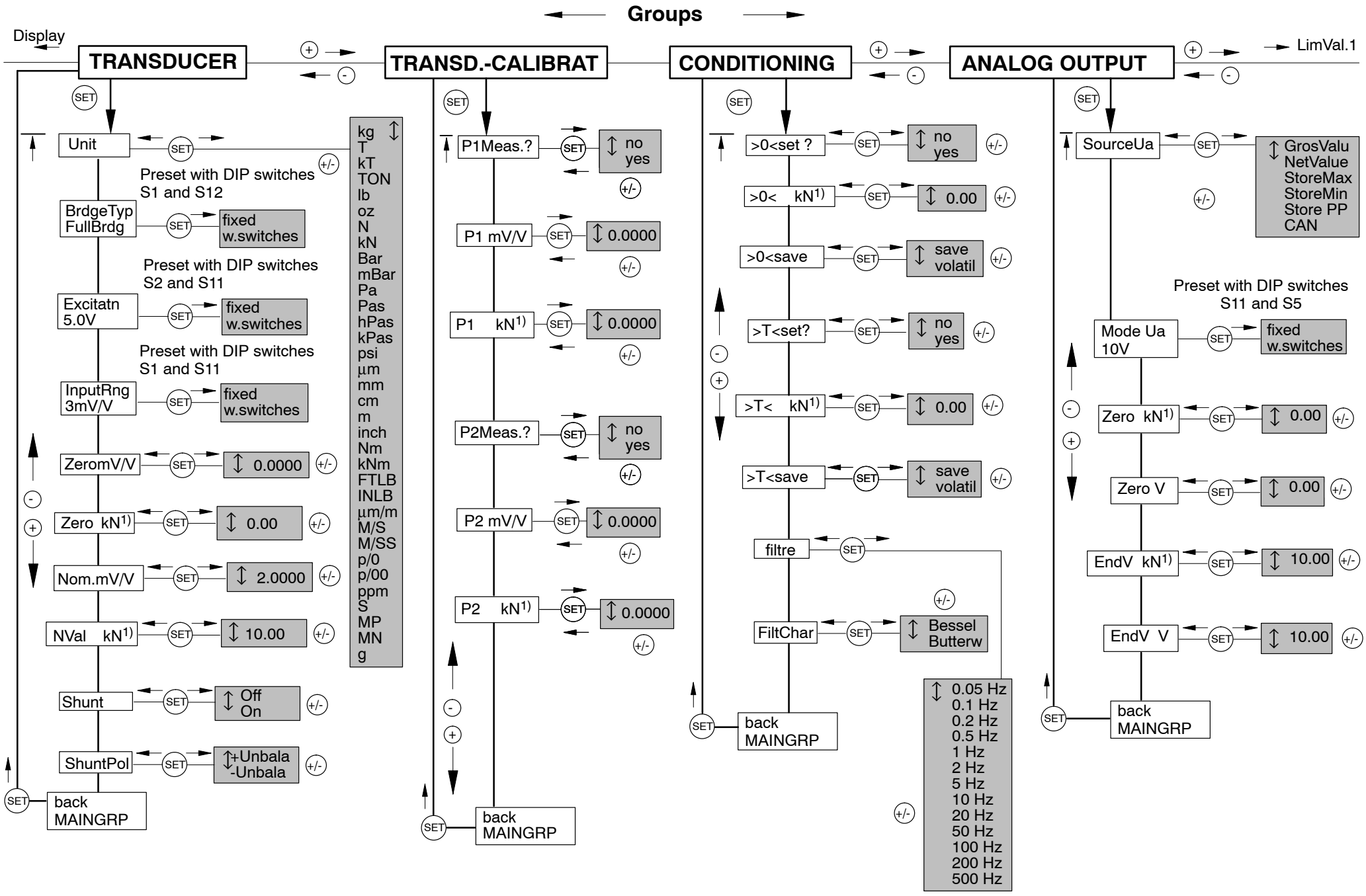
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5.3.1 Set up all parameters



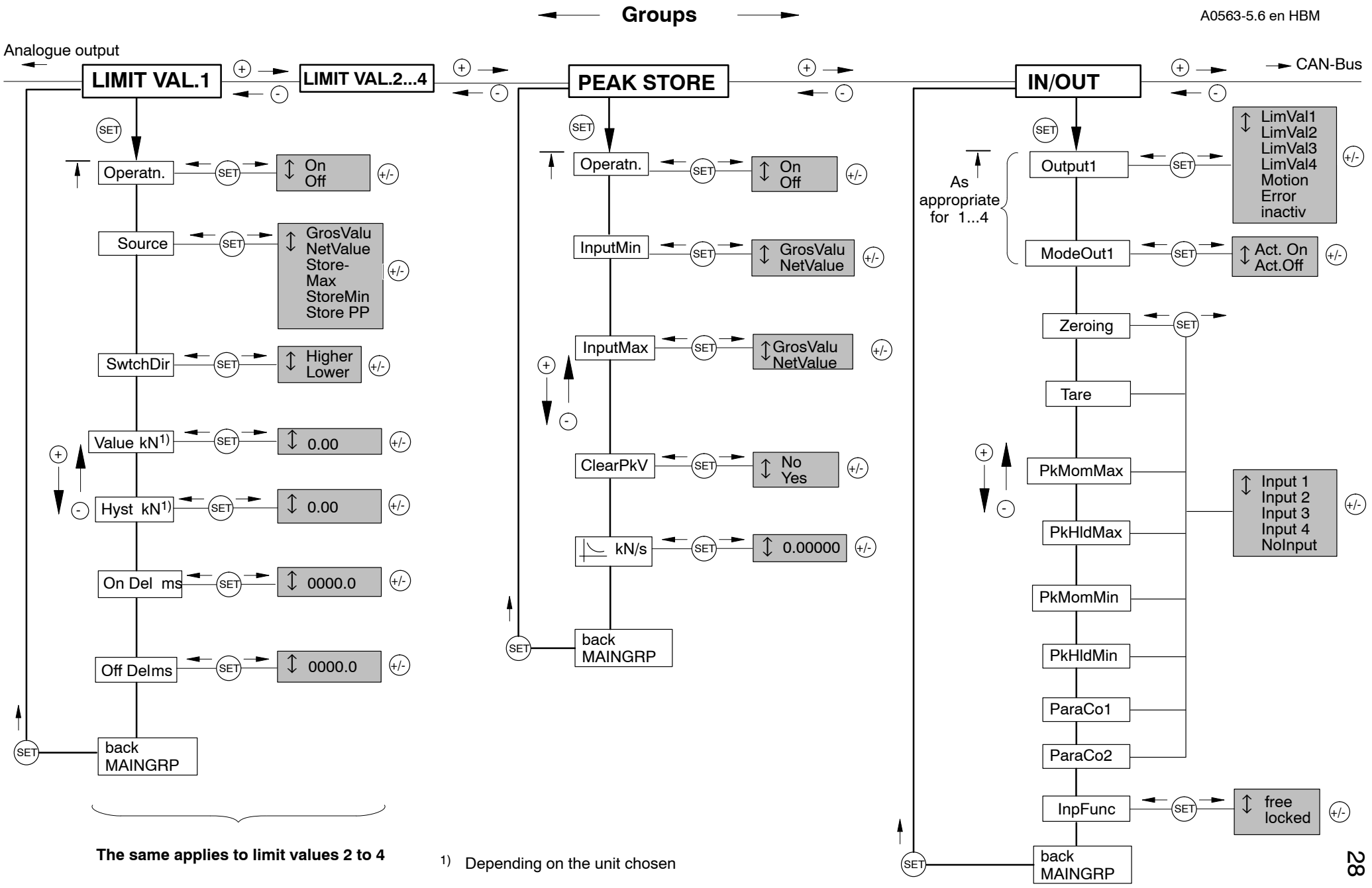
Note:
If a group cannot be selected, check under DIALOG to see whether the group is enabled.

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1) Depending on the unit chosen

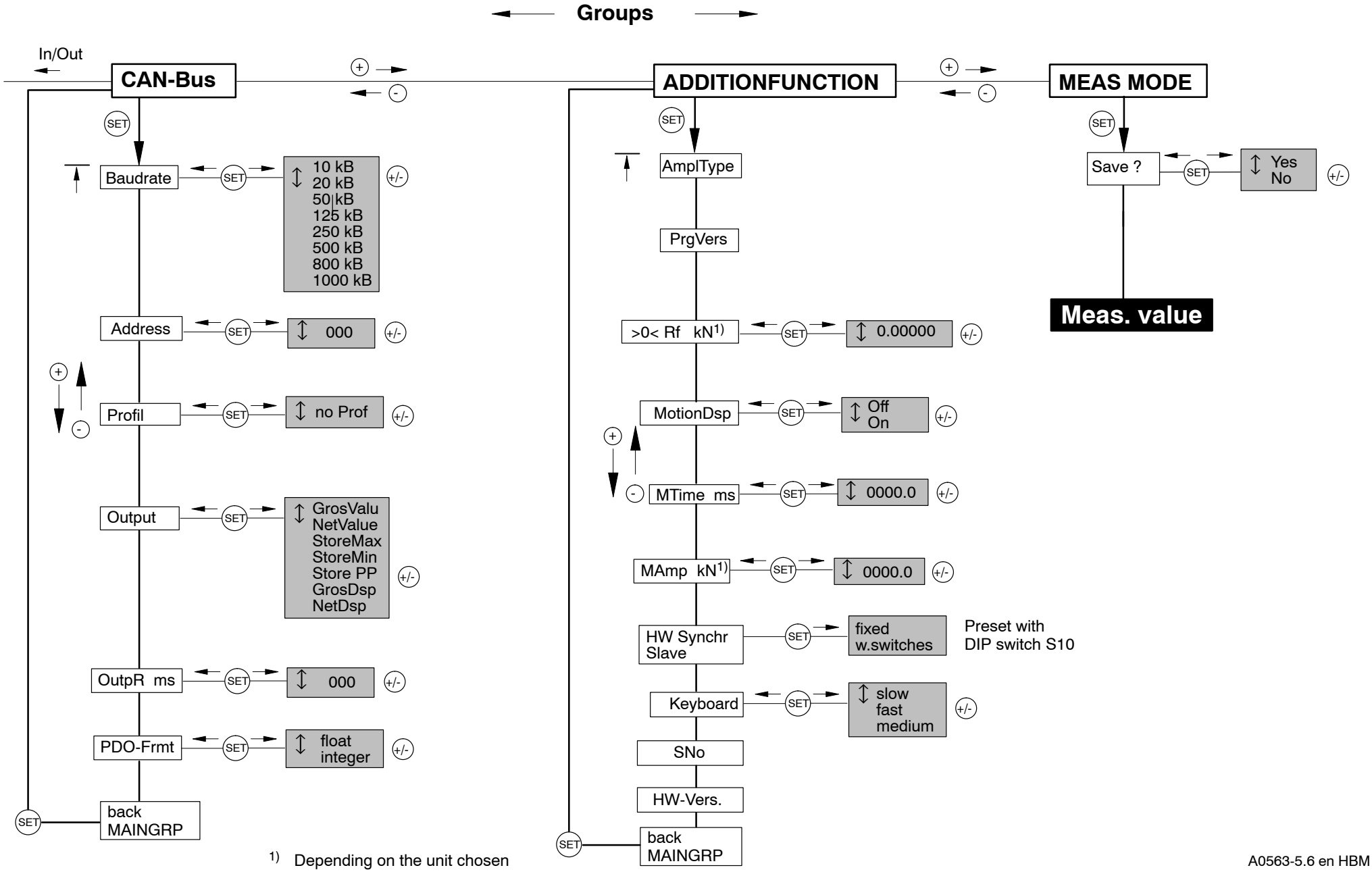
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The same applies to limit values 2 to 4

1) Depending on the unit chosen

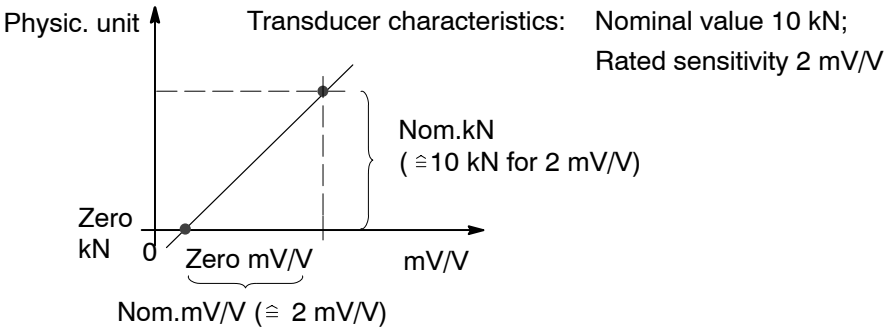
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1) Depending on the unit chosen

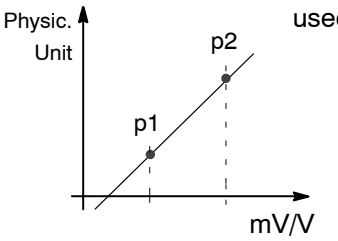
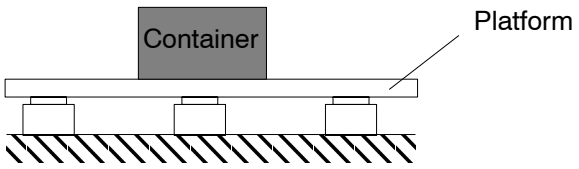
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6 Declaring the significant parameters

Group	Parameter	Meaning
DIALOG	Password	Define password (modify), 0000...9999 (Factory preset password: 0000)
	PassStat	Define password status: active=password must be input; inactive=PME can be operated without entering a password
	I.DataS to I.AddFnc	Access to group via keyboard enabled or disabled.
DATA SET	Recall ?	You can load either the factory settings or one of the four parameter sets that have been stored.
	Save ?	To protect all the instrument set-ups from power failure, they can be stored in four parameter sets. Whenever you change from set-up mode to measuring mode you are asked whether you want the changes to be stored or not. The data will be permanently saved if you confirm the security prompt with "Yes" when you exit from set-up mode.
TRANS-DUCER	ZeromV/V Zero kN[1)] Nom.mV/V NVal kN[1)]	**Setting up in accordance with transducer characteristics** 

[1)] Depending on the unit chosen

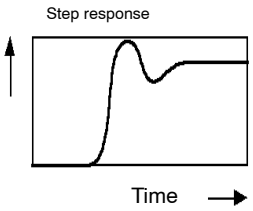
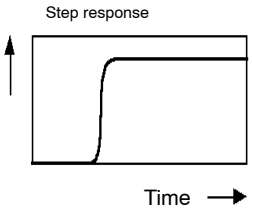
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Group	Parameter	Meaning
TRANS-DUCER		**Information on scaling** Input characteristics: The range of values for scale factors is limited. Scaling is dependent on the chosen resolution. In the case of set-ups that lead to overshooting the respective limits, ”Scaling error” is reported (see page 58). Maximum display resolution: 999 999 digits at 6.67 % of the input range Minimum display resolution: 10 Digits at 100 % of the input range
	Shunt ShuntPol	Defines the polarity of the shunt resistor (positive or negative effect). The mismatch amounts to approx. 1 mV/V at a transducer sensitivity of 2 mV/V and a bridge resistance of 350 Ω. Accuracy approx. 4 %.
TRANSD.-CALIBRAT	P1Meas.? P1 mV/V P1 kN[1)]	Assigning the signals issued by the transducer at a defined load  Example: A calibration weight of 10 kg is used to calibrate a 4 kg-load cell. 1. Relieve transducer P1Meas.? Yes 0,0457 mV/V P1 Enter 0 kg (physic. Unit is assigned) 2. Load transducer with 4kg P2Meas.? Yes 7,873 mV/V P2 Enter 4 kg Note: If the zero point is modified, P1 and P2 will be discarded.
CONDI-TIONING		Difference between taring and zeroing: zero balance (>0 kN<) affects both gross and net values. Taring (>T<) affects only the net value. Here is an example to illustrate the difference between zero balancing and taring: 

Steps in the weighing procedure	Action	Display	
		Gross	Net
Attach platform (35 kg)	> 0< Input 35 kg	before 35 kg after 0 kg	before 35 kg after 0 kg
Attach container (8 kg)	> T< Input 8 kg	before 8 kg after 8 kg	before 8 kg after 0 kg

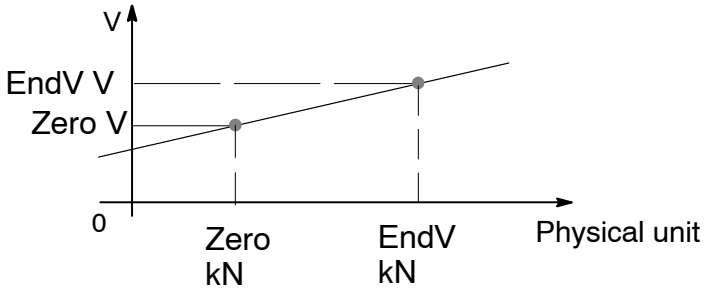
[1)] Depending on the unit chosen

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Group	Parameter	Meaning
CONDI-TIONING	>0<kN[1)]	Enter zero value. Zeroing effects both, the gross value and the net value.
	>0< set ?	Trigger zero balance; set current measured value (physical unit) to zero
	>0< save	Each time there is a zeroing procedure the zero value is adopted into the EEPROM (service life 100.000 cycles)
	>T< kN[1)]	Input tare value. Taring affects the net value.
	>T< set ?	Trigger taring; net value becomes 0
	>T<save	Save tare value immediately after taring
	Filter	0.05 Hz 1 Hz 20 Hz 500 Hz 0.1 Hz 2 Hz 50 Hz 0.2 Hz 5 Hz 100 Hz 0.5 Hz 10 Hz 200 Hz
	FiltChar	 The diagram shows a linear amplitude response which falls away steeply above the cut-off frequency. There is an overshoot of approx. 10 %. Best frequency response (Butterworth)  The diagram shows a step response with very little (<1 %) or no overshoot. The amplitude response falls away less steeply. Best course over time (Bessel)

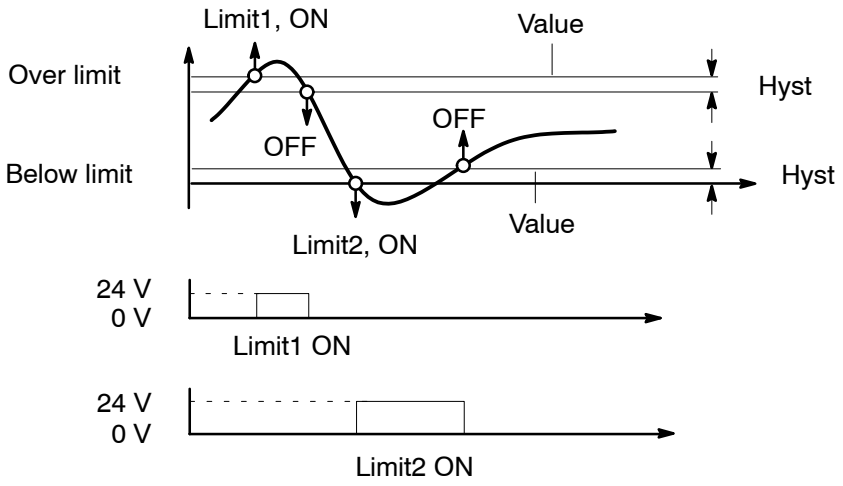
[1)] Depending on the unit chosen

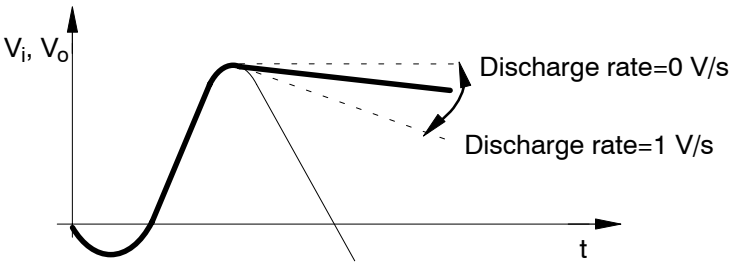
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Group	Parameter	Meaning
ANALOG-OUTPUT	SourceUa	The gross or net value and the peak value can be chosen as the source for the analogue signal.
	Mode Ua	Use DIP switches S11 and S5 to define the analogue output signal mode. The following options are possible: ±10 V, ±20 mA, 4...20 mA
	Zero kN[1)] Zero V EndV kN[1)] EndV V	 **Information on scaling** Output characteristics: The scale factor for the analogue output is derived from the input and output characteristics. If the span that has been set up corresponds to the measurement range in mV/V, the minimum output voltage that can be set up is 0.17 V. If the settings cause the respective limits to be exceeded, ”Analogue scaling error” is reported (see page 58). Scale range min. for analogue output: 0.17 V at 100 % of amplifier input range Scale range max. for analogue output: 10 V at 3.67 % of amplifier input range

1) Depending on the unit chosen

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Group	Parameter	Meaning
LIMIT VAL. 1...4	Source	You can choose from the following as the source for the limit value signal: Gross, Net, Peak value Max/Min / Peak-to-peak
	SwtchDir Value Hyst	Functions and parameters of limit values 
	On Del ms	Starting delay; in the event of exceeding a limit value level, the change only takes effect after the delay time (On Del) at the output.
	Off Del ms	Cut-off delay, as for On Del

PEAK STORE*)	InputMin/Max	The following can be chosen as the source for the peak value: Gross, Net,
	ClearPkV	The peak value can be cleared.
	kG/s	Discharge rate of envelope function (in physical units/sec) for both peak value stores. Peak value stores can also be used to display the envelope function. The envelope function is suitable for measuring amplitude-modulated vibration. The discharge rate of the envelope function (i.e. the decay time of the discharge function) defines how quickly the current value is discharged from the peak store. 

*) See also following page (Remotes)

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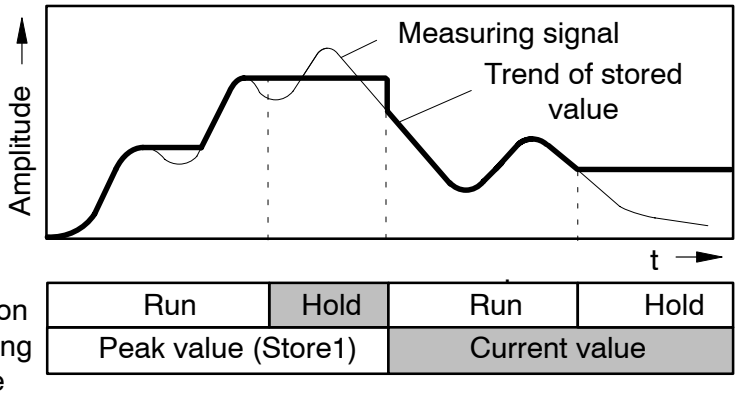
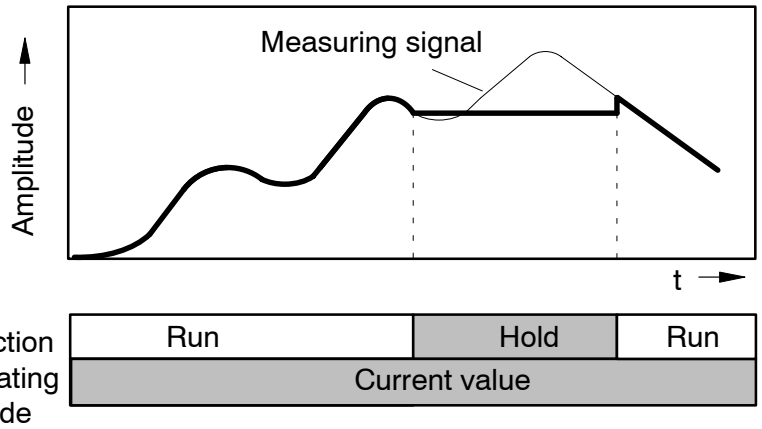
Inputs/Outputs (I/Os)

Terminal plug 3: This is equipped with **4 inputs** which you can use to control the functions of the PME.

Terminal plug 4: This has **4 outputs** available.

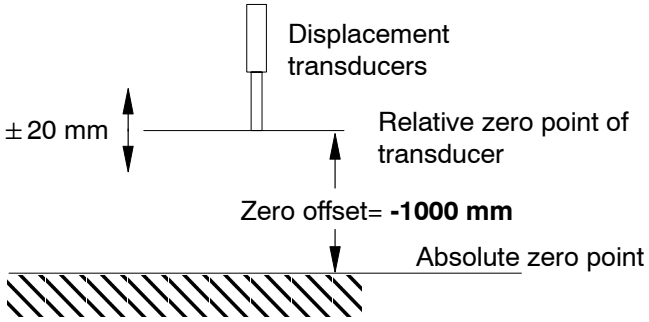
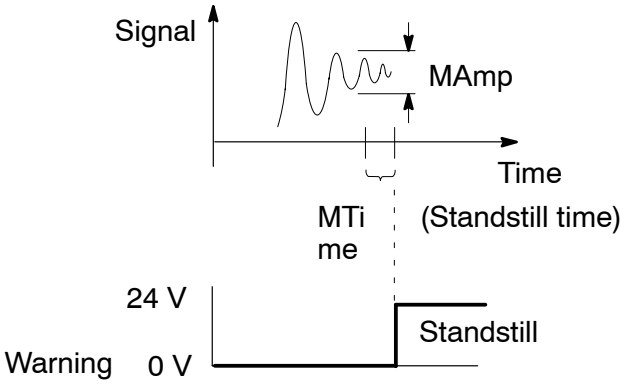
<table>
<tr><th>Group</th><th>Parameter</th><th colspan="3">Meaning</th></tr>
<tr><td rowspan="2">IN/OUT</td><td>Output1...4</td><td colspan="3">Outputs1..4 can be assigned the following functions:
Limit switches 1 to 4, standstill, errors, inactive</td></tr>
<tr><td>Mode Out1...4</td><td colspan="3">The output signal is inverted (pos.log) or not inverted (neg.log).</td></tr>
<tr><td rowspan="11"></td><td></td><td colspan="3">Functions can be freely assigned to remotes (I/Os).</td></tr>
<tr><td>Function</td><td>Input value 0 V</td><td colspan="2">Input value 24 V</td></tr>
<tr><td>Taring</td><td colspan="3">Taring is started upon alternation from 0 V to 24 V</td></tr>
<tr><td>Zero balance</td><td colspan="3">Current measuring signal is set to zero upon alternation from 0 V to 24 V</td></tr>
<tr><td>PkMomMax</td><td>Peak value operating mode for PkMax</td><td colspan="2">Current value operating mode for PkMax</td></tr>
<tr><td>PkMomMin</td><td>Peak value operating mode for PkMin</td><td colspan="2">Current value operating mode for PkMin</td></tr>
<tr><td>PkHldMax</td><td>Memory contents PkMax are updated</td><td colspan="2">Memory contents PkMax are frozen</td></tr>
<tr><td>PkHldMin</td><td>Memory contents PkMin updated</td><td colspan="2">Memory contents PkMin frozen</td></tr>
<tr><td>ParaCo1
ParaCo2</td><td colspan="3">Selecting parameter sets and binary coded inputs</td></tr>
<tr><td></td><td colspan="3"><table>
<tr><td>Parameter set</td><td>ParaCo2</td><td>ParaCo1</td></tr>
<tr><td>1</td><td>0</td><td>0</td></tr>
<tr><td>2</td><td>0</td><td>1</td></tr>
<tr><td>3</td><td>1</td><td>0</td></tr>
<tr><td>4</td><td>1</td><td>1</td></tr>
</table></td></tr>
</table>

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Group	Parameter	Meaning
IN/OUT	PkMom Max PkMomMin PkHldMax PkHldMax PkHldMin	Peak value operating mode  Current value operating mode 

CAN-Bus	Baudrate	10 kB, 20 kB, 50 kB, 125 kB, 250 kB, 500 kB, 800 kB, 1000 kB
	Address	From 0 to 127 (8-bit)
	Profile	DS401 (Device Profile for I/O-Modules) or DS404 (Device Profile for Measuring Devices and Closed Loop Controller)
	Output	You may choose which signal is output over the CAN bus: Gross, Net or Peak value Max/Min.
	OutR. ms	Output rate. Specifies the interval (in ms) at which a value is sent over the CAN-interface.

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Group	Parameter	Meaning
Additional function	>0< Rf	Example: Zero reference A displacement transducer ⟨ ± 20 mm nominal displacement) is fastened at a height of 1m measured from the engine seating. When setting zero, the *analogue output* is balanced to 0V. The *display value* is adjusted to >0<Ref (+1000 mm).The display is to show a movement in absolute terms, i.e. a display range of 980 mm to 1020 mm is available. 
	MotionDsp	Motion count indication. If standstill occurs with ON selected, the character is displayed ◺◿
	MTime ms MAmp kg	Standstill time; Standstill is reported if Amplitude MAmp is not exceeded in standstill time ”t”. 

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7 CAN interface description

7.1 Introduction

The MP55 module has a built-in CAN-interface which may be used not only for data transmission but also for assigning parameters to the module. The baud rate is selectable; the maximum possible is 1 MBaud. The interface protocol is based on the CANopen standard.

7.2 Cyclical data transmission

Cyclical data is transmitted in the form of “Process Data Objects” (PDOs, as defined in CANopen). The measurement module sends the measured values concerned cyclically without additional flags, under a previously defined CAN identifier. No prompt message is needed. A parameter defines how often the PDOs are sent (see object directory). Data formats with a length of more than one byte are always sent in the sequence LSB-MSB.

Send PDO:

CAN identifier	384 (180 Hex) + module address
1st-4th data byte	Value (LSB-MSB), integer 32
5th data bytes	Status (object 2010)

Receive PDO:

CAN identifier	512 (200 Hex) + module address
1st data byte	Control word (object 2630)

In addition to these predefined PDOs, it is possible to set up more PDOs as defined in CANopen (CiA-DS 301) using a technique known as mapping. Appropriate tools for this purpose are commercially available.

The exchange of cyclical PDOs only starts after the module has been placed in ”Operational” status. This happens when the message ”Start_Remote_Node” is sent

CAN identifier	0
1st data byte	1
2nd data byte	Module address (0 = all)

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To exit from ”Operational” status use the message ”Enter_Pre_Operational_State”:

CAN identifier	0
1st data byte	128
2nd data byte	Module address (0 = all)

7.3 Parameter assignment

Parameter assignment messages affecting the module are transmitted in the form of “Service Data Objects” (SDOs, as defined in CANopen). These address the various parameters by an index and subindex number. For information on these index numbers please refer to the object directory. Data formats with a length of more than one byte are always sent in the sequence LSB-MSB.

Reading a parameter:

Request (PC or PLC to MP55)

CAN identifier	1536 (600 Hex) + module address
1st data byte	64 (40 Hex)
2nd + 3rd data byte	Index (LSB_MSB)
4th data byte	Subindex
5th-8th data byte	0

Response (MP55 to PC or PLC)

CAN identifier	1408 (580 Hex) + module address
1st data byte	66 (42Hex)
2nd + 3rd data byte	Index (LSB-MSB)
4th data byte	Subindex
5th-8th data byte	Value (LSB-MSB)

Reading a parameter:

Send value (PC or PLC to MP55)

CAN identifier	1536 (600 Hex) + module address
1st data byte	47 (2FHex) = write 1 byte 43 (2BHex) = write 2 bytes 35 (23Hex) = write 4 bytes)
2nd + 3rd data byte	Index (LSB-MSB)
4th data byte	Subindex
5th-8th data byte	Value (LSB-MSB)

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Acknowledge (MP55 to PC or PLC)

CAN identifier	1408 (580 Hex) + module address
1st data byte	96 (60Hex)
2nd + 3rd data byte	Index (LSB_MSB)
4th data byte	Subindex
5th-8th data byte	0

Response in the event of an error when reading or writing parameters:

Error acknowledge (MP55 to PC or PLC)

CAN identifier	1408 (580 Hex) + module address
1st data byte	128 (80Hex)
2nd + 3rd data byte	Index (LSB_MSB) or 0
4th data byte	Subindex or 0
5th-6th data byte	Additional error code: 10H: Parameter value invalid 11H: Subindex does not exist 12H: Too long 13H: Too short 20H: Service not available at present 21H: - due to local control 22H: - due to device status 30H: Range of values of parameter exceeded 31H: Parameter value too high 32H: Parameter value too low 40H: Value incompatible with other settings 41H: Data cannot be mapped 42H: Exceeds PDO length 43H: General incompatibility
7th data byte	Error code: 1: Object access not supported 2: Object does not exist 3: Parameter inconsistent 4: Prohibited parameter 6: Hardware error 7: Type conflict 9: Object attributes inconsistent (subindex does not exist)
8th data byte	Error class: 5: Service defective 6: Access error 8: Other error

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7.4 Object directory: communications profile section as defined in CANopen (CiA-DS301)

Index (hex)	Sub-index	Name	Data type	Attr.	Values
1000	0	Device type	Unsigned32	ro	
1001	0	Error register	Unsigned8	ro	Bit 0: Fatal error Bit 4: Communications error Bit 7: Manufacturer-specific
1003	0	Predefined error array	Unsigned8	rw	Number of errors
1003	1..7	Predefined error array	Unsigned32	ro	Bytes 1-2: error code Bytes 3-4: Additional information
1005	0	Identifier SYNC message	Unsigned32	rw	
1008	0	Manufacturer's device designation	Vis-String	ro	
1009	0	Manufacturer's hardware version	Vis-String	ro	
100A	0	Manufacturer's software version	Vis-String	ro	
100B	0	Device address	Unsigned32	ro	
100C	0	Guard time	Unsigned16	rw	
100D	0	Life time factor	Unsigned8	rw	
100E	0	Node guarding identifier	Unsigned32	rw	
100F	0	Number of supported SDOs	Unsigned32	ro	
1010	0..2	Save communications parameters	Unsigned32	rw	65766173Hex
1011	0..2	Load communications parameters as per factory setup	Unsigned32	rw	64616F6CHex
1012	0..2	Time stamp identifier	Unsigned32	rw	
1014	0	Identifier EMERGENCY message	Unsigned32	rw	
1200	0..2	Server SDO parameter	SDOParameter	ro	
1400	0..2	1st Receive PDO parameter	PDOCommPar	rw	
1401	0..2	2nd Receive PDO parameter	PDOCommPar	rw	

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Index (hex)	Sub-index	Name	Data type	Attr.	Values
1600	0..2	1st Receive PDO mapping	PDOMapping	rw	
1601	0..2	2nd Receive PDO mapping	PDOMapping	rw	
1800	0..2	1st Send PDO parameter	PDOCommPar	rw	
1801	0..2	2nd Send PDO parameter	PDOCommPar	rw	
1A00	0..2	1st Send PDO mapping	PDOMapping	rw	
1A01	0..2	2nd Send PDO mapping	PDOMapping	rw	

Data structures:

PDO CommPar:

Index	Subindex	Name	Data type
0020	0	Number of entries	unsigned 8
	1	CAN identifier for PDO	unsigned32
	2	Transmission type	unsigned8
	3	Off-time	unsigned16
	4	Priority group	unsigned8

CAN identifier for PDO (subindex 1):

Bits	Value	Meaning
31 (MSB)	0 1	PDO valid PDO invalid
30	0 1	RTR allowed RTR not allowed
29	0 1	11 bit ID 29 bit ID
28..0	X	CAN-ID

PDO mapping:

Index	Subindex	Name	Data type
0021	0	Number of mapped objects	unsigned8
	1	1st mapped object	unsigned32
	2	2nd mapped object	unsigned32
	...	...	unsigned32

Structure of a PDO mapping entry:

Index (16 bits)	Subindex (8 bits)	Object length in bits (8bit)

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SDO parameter:

Index	Subindex	Name	Data type
0022	0	Number of entries	unsigned8
	1	COB-ID client->server	unsigned32
	2	COB-ID server->client	unsigned32
	3	Node ID (optional)	unsigned8

Error code (object 1003HEx):

Value	Meaning
0	No error
1000	Fatal error
8100	Communication
FF00	Device-specific

Error code - additional information (object 1003Hex):

Value	Meaning
0	No error
1	Transmission error
2	System error
3	Unknown command
4	Wrong number of parameters
5	Wrong parameter value
6	Filter frequency error
7	Amplifier overflow
8	Command cannot be executed
10	Wrong channel selection
11	Measuring error
12	Triggering error
13	Range error
14	Taring error
21	Filter frequency warning
22	Tare status warning

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7.5 Object directory: manufacturer-specific objects

Parameters that refer to measured values are scaled as long-coded (32-bit integer) with figures in the appropriate range. The position of the decimal point is defined in object 2120Hex. Alternatively these quantities are also available as floating values (IEEE754-1985 32-bit format) (see page 53).

Index (hex)	Sub-index	Name	Format	Attr.	Values
		Measured values:			
2000	1	Gross measured value	integer32	ro	
2001	1	Net measured value	integer32	ro	
2002	1	maximum	integer32	ro	
2003	1	minimum	integer32	ro	
2004	1	Peak-to-peak	integer32	ro	
2005	1	Measured value in mV/V	integer32	ro	5 Decimal places
2006	1	Analogue output value V	integer32	ro	3 Decimal places
2010	1	Measured value status	unsigned8	ro	Bit 0: Meas.val. overflow Bit 1: Analogue out. overfl. Bit 2: Scaling defective Bit 3: EEPROM error Bit 4..7: Limit switch 1...4
2011	1	Measured value status_2	unsigned32	ro	Bit 0: Overfl. hardware Bit 1: Overfl. ADC Bit 2: Overfl. gross Bit 3: Overfl. net Bit 4: Overfl. anal. outp. Bit 5: Overfl. maximum Bit 6: Overfl. minimum Bit 7: Negative overfl. Bit 8: Limit value 1 Bit 9: Limit value 2 Bit 10: Limit value 3 Bit 11: Limit value 4 Bit 12: Input scaling Bit 13: Output scaling Bit 14: Span exceeded Bit 15: Urcal.Error Bit 16: Transducer error
2020*	1	I/O status	unsigned8	ro	Bits 0..3: Inputs 1...4 Bits 4...7: Outputs 1...4

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Index (hex)	Sub-index	Name	Format	Attr.	Values
2080	0	Edit mode	unsigned8	ro	1: Edit mode on 0: Edit mode off
2081	0	Restart executed	unsigned8	rw	1: Restart executed 0: Write = Delete
2082	0	Serial number	vis.string	ro	12 char.
2083	0	Exit from edit mode	unsigned8	wo	Value display after writing with alloc. value

		Dialog:			
2101	0	Dialog language	unsigned16	rw	1500 German 1501 English
2103	0	Password	integer16	rw	
2104	1	Enable keyboard and menu	unsigned16	rw	0: Input enabled 1: Input disabled Bit 0: Password input Bit 1: Dialog Bit 2: Parameter set Bit 3: Display Bit 4: Transducer Bit 5: Conditioning Bit 6: Analogue output Bit 7: Limit values Bit 8: Peak values Bit 9: I/Os Bit 10: CAN Bit 11: Additional functions Bit 15: Keyboard lock
		Parameter sets			
2110	1	Activate parameter set	unsigned16	rw	6600: Factory set-up 6601: Parameter set 1 6602: Parameter set 2 6603: Parameter set 3 6604: Parameter set 4
2111	1	Save parameter set	unsigned16	rw	See above
2112	1	Number of the active parameter set	unsigned16	ro	See above

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Index (hex)	Sub-index	Name	Format	Attr.	Values
		Display adaptation			
2120	1	Decimal point position	unsigned16	rw	0..5
2121	1	Step	unsigned16	rw	110: 1 111: 2 112: 5 113: 10 114: 20 115: 50 116: 100 117: 200 118: 500 119: 1000
		Transducers			
2122	1	Physical unit	unsigned16	rw	1603: g 1604: kg 1605: T 1606: kT 1607: TON 1608: lb 1609: oz 1610: N 1611: kN 1612: bar 1613: mbar 1614: Pa 1615: Pas 1616: hPas 1617: kPas 1618: psi 1619: µm 1620: mm 1621: cm 1622: m 1623: inch 1624: Nm 1625: kNm 1626: FTLB 1627: INLB 1628: µm/m 1629: m/s 1630: m/s^2 1631: percent 1632: perthou 1633: ppm 1634: S 1635: MPas 1636: MN 1637: Blank

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Index (hex)	Sub-index	Name	Format	Attr.	Values
2130	1	Transducer type	unsigned16	ro	350: Full bridge 351: Half bridge 380: LVDT
2131	1	Excitation	unsigned16	ro	11: 1 V 13: 2.5 V 14: 5 V
2132	1	Range	unsigned16	ro	for U_B = 5 V 700: 3 mV/V 773: 50 mV/V 703: 500 mV/V for U_B = 2,5 V 771: 6 mV/V 774: 100 mV/V 776: 1000 mV/V for U_B = 1 V 772: 15 mV/V 775: 250 mV/V 777: 2500 mV/V
2133	1	Shunt	unsigned16	rw	1: On 0: Off
2134	1	Shunt mismatch direction	unsigned16	rw	44: positive 45: negative
2140	1	Transducer null mV/V	integer32	rw	Value in mV/V
2141	1	Transducer null phys. unit	integer32	rw	Value e.g. in kN
2142	1	Transducer sensitivity mV/V	integer32	rw	Value in mV/V
2143	1	Transducer nominal value phys. unit	integer32	rw	Value e.g. in kN
2150	1	Input characteristics at 1st point mVV	integer32	rw	Value in mV/V
2151	1	Input characteristics at 2nd point mVV	integer32	rw	Value in mV/V
2160	1	Input characteristics at 1st point in phys. unit	integer32	rw	Value e.g. in kN
2161	1	Input characteristics at 2nd point in phys. unit	integer32	rw	Value e.g. in kN

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Index (hex)	Sub-index	Name	Format	Attr.	Values
		Conditioning			
2180	1	Tare value	integer32	rw	
2181	1	Zero balance value	integer32	rw	
2182	1	Memory mode for taring	unsigned16	rw	6611: volatile 6610: permanent
2183	1	Memory mode for zeroing	unsigned16	rw	6611: volatile 6610: permanent
2185	1	Zero reference	integer32	rw	
2190	1	Filter frequency	unsigned16	rw	908: 0.05 Hz 914: 0.1 Hz 917: 0.2 Hz 921: 0.5 Hz 927: 1 Hz 931: 2 Hz 935: 5 Hz 941: 10 Hz 945: 20 Hz 949: 50 Hz 955: 100 Hz 958: 200 Hz 962: 500 Hz
2191	1	Filter characteristics	unsigned16	rw	141: Butterworth 142: Bessel
21A0	1	Standstill monitoring by time window	unsigned32	rw	ms
21A1	1	Standstill monitoring by amplitude	integer32	rw	
21A2	1	Activate motion count indication	unsigned16	rw	1: on 0: off
		Analogue output			
21C0	1	Mode of analogue output (voltage/current)	unsigned16	ro	290: ± 10 V 291: ± 20 mA 292: 4..20 mA
21C1	1	Signal at analogue output	unsigned16	rw	214: Gross 215: Net 204: Max 205: Min 218: Peak-to-peak
21D0	1	Zero point of analogue output phys. unit	integer32	rw	Value e.g. in kN
21D1	1	Final value of analogue output phys. unit	integer32	rw	Value e.g. in kN
21D2	1	Zero point of analogue output V	integer32	rw	Value in V
21D3	1	Final value of analogue output V	integer32	rw	Value in V

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Index (hex)	Sub-index	Name	Format	Attr.	Values
		Limit switches			
2210	1	Enable limit value 1	unsigned16	rw	1: yes 0: no
2211	1	Input signal for limit value 1	unsigned16	rw	214: Gross 215: Net 204: Min 205: Max 218: Peak-to-peak
2212	1	Direction of limit value 1	unsigned16	rw	130: Above limit 131: Below limit
2214	1	Starting delay LV 1	integer32	rw	ms
2215	1	Cut-off delay LV 1	integer32	rw	ms
2216	1	Switching level for limit value 1	integer32	rw	
2217	1	Hysteresis for limit value 1	integer32	rw	
2218	1	Status of limit value 1	unsigned8	ro	
2220	1	Enable limit value 2	unsigned16	rw	1: yes 0: no
2221	1	Input signal for limit value 2	unsigned16	rw	214: Gross 215: Net 204: Min 205: Max 218: Peak-to-peak
2222	1	Direction of limit value 2	unsigned16	rw	130: Above limit 131: Below limit
2224	1	Starting delay LV 2	integer32	rw	ms
2225	1	Cut-off delay LV 2	integer32	rw	ms
2226	1	Switching level for limit value 2	integer32	rw	
2227	1	Hysteresis for limit value 2	integer32	rw	
2228	1	Status of limit value 2	unsigned8	ro	
2230	1	Enable limit value 3	unsigned16	rw	1: yes 0: no
2231	1	Input signal for limit value 3	unsigned16	rw	214: Gross 215: Net 204: Min 205: Max 218: Peak-to-peak
2232	1	Direction of limit value 3	unsigned16	rw	130: Above limit 131: Below limit

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Index (hex)	Sub-index	Name	Format	Attr.	Values
2234	1	Starting delay LV 3	integer32	rw	ms
2235	1	Cut-off delay LV 3	integer32	rw	ms
2236	1	Switching level for limit value 3	integer32	rw	
2237	1	Hysteresis for limit value 3	integer32	rw	
2238	1	Status of limit value 3	unsigned8	ro	
2240	1	Enable limit value 4	unsigned16	rw	1: yes 0: no
2241	1	Input signal for limit value 4	unsigned16	rw	214: Gross 215: Net 204: Min 205: Max 218: Peak-to-peak
2242	1	Direction of limit value 4	unsigned16	rw	130: Above limit 131: Below limit
2244	1	Starting delay LV 4	integer32	rw	ms
2245	1	Cut-off delay LV 4	integer32	rw	ms
2246	1	Switching level for limit value 4	integer32	rw	
2247	1	Hysteresis for limit value 4	integer32	rw	
2248	1	Status of limit value 4	unsigned8	ro	

		Peak values			
2260	1	Input signal Min store	unsigned16	rw	214: Gross 215: Net
2261	1	Input signal Max store	unsigned16	rw	214: Gross 215: Net
2262	1	Envelope curve function discharge	integer32	rw	Display / s
2263	1	Enable peak-value store	unsigned16	rw	1: enabled 2: disabled

		Additional functions			
2271	0	Hardware synchronisation	unsigned16	ro	6700: Master 6701: Slave
2272	0	Sensitivity of keyboard	unsigned16	rw	7601: low 7602: medium 7603: high

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Index (hex)	Sub-index	Name	Format	Attr.	Values
		Digital I/Os			
2310	1	Function of output 1	unsigned16	rw	200: No function 221: Limit value 1 222: Limit value 2 223: Limit value 3 224: Limit value 4 230: Error / Warning 231: Standstill
2311	1	Mode Outp. 1	unsigned16	rw	135: normal 136: inverse
2312	1	Function of output 2	unsigned16	rw	See above
2313	1	Mode Outp. 2	unsigned16	rw	See above
2314	1	Function of output 3	unsigned16	rw	See above
2315	1	Mode Outp. 3	unsigned16	rw	See above
2316	1	Function of output 4	unsigned16	rw	See above
2317	1	Mode Outp. 4	unsigned16	rw	See above
2320	1	Remote function Taring	unsigned16	rw	100: no input 101: Input 1 102: Input 2 103: Input 3 104: Input 4
2322	1	Remote function Max/Current value	unsigned16	rw	See above
2323	1	Remote function Min/Current value	unsigned16	rw	see above
2324	1	Remote function Hold Max value	unsigned16	rw	See above
2325	1	Remote function Hold Min value	unsigned16	rw	See above
2326	1	Remote function Zeroing	unsigned16	rw	See above
=2327	1	Remote function Select parameter set 1	unsigned16	rw	See above
2328	1	Remote function Select parameter set 2	unsigned16	rw	See above
2330	1	Enable remote contacts	unsigned16	rw	5: free 4: locked

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Index (hex)	Sub-index	Name	Format	Attr.	Values
		CAN-interface			
2400	0	CAN baudrate	unsigned16	rw	1409: 10 kBaud 1411: 20 kBaud 1413: 50 kBaud 1427: 100 kBaud 1417: 125 kBaud 1419: 250 kBaud 1421: 500 kBaud 1423: 800 kBaud 1424: 1000 kBaud
2410	1	PDO contents	unsigned16	rw	214: Gross 215: Net 204: Max 205: Min 218: Peak-to-peak
2411	1	Data transmission rate	integer32	rw	0.1 ms
2412	1	Data format	unsigned16	rw	1253: Integer32 1257: Floating

		Functions			
2600	1	SetZero	unsigned8	wo	1: Zeroing
2610	1	Tare	unsigned8	wo	1: Taring
2620	1	Clear Max store	unsigned8	wo	1: Constant delete 2: 1x delete
2621	1	Clear Min store	unsigned8	wo	1: Constant delete 2: 1x delete
2622	1	Hold Max store	unsigned8	rw	1: Hold
2623	1	Hold Min store	unsigned8	rw	1: Hold
2630	1	Control word	unsigned8	rw	Bit 0: Zeroing Bit 1: Taring Bit 4: Clear Max. Bit 5: Clear Min. Bit 6: Hold Max. Bit 7: Hold Min.

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7.6 Manufacturer-specific objects in FLOAT data format

Index (hex)	Sub-index	Name	Format	Attr.	Values
		Measured values:			
3000	1	Gross value	float	ro	
3001	1	Net value	float	ro	
3002	1	Maximum	float	ro	
3003	1	Minimum	float	ro	
3004	1	Peak-to-peak	float	ro	
3005	1	Value in mV/V	float	ro	
3006	1	Analogue output value	float	ro	
		Transducers			
3140	1	Transducer null mV/V	float	rw	Value in mV/V
3141	1	Transducer null physical unit	float	rw	Value e.g. in kN
3142	1	Transducer sensitivity mV/V	float	rw	Value in mV/V
3143	1	Transducer nominal value physical unit	float	rw	Value e.g. in kN
3150	1	Input characteristics at 1st point mVV	float	rw	
3151	1	Input characteristics at 2nd point mVV	float	rw	
3160	1	Input characteristics at 1st point in phys. unit	float	rw	
3161	1	Input characteristics at 2nd point in phys. unit	float	rw	
		Conditioning			
3180	1	Tare value	float	rw	
3181	1	Zero balance value	float	rw	
3185	1	Zero reference	float	rw	
31A1	1	Standstill monitoring by amplitude	float	rw	
		Analogue output			
31D0	1	Zero point of analogue output phys. unit	float	rw	
31D1	1	Final value of analogue output phys. unit	float	rw	
31D2	1	Zero point of analogue output V	float	rw	
31D3	1	Final value of analogue output V	float	rw	

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Index (hex)	Sub-index	Name	Format	Attr.	Values
		Limit switches			
3216	1	Switching level for limit value 1	float	rw	
3217	1	Hysteresis for limit value 1	float	rw	
3226	1	Switching level for limit value 2	float	rw	
3227	1	Hysteresis for limit value 2	float	rw	
3236	1	Switching level for limit value 3	float	rw	
3237	1	Hysteresis for limit value 3	float	rw	
3246	1	Switching level for limit value 4	float	rw	
3247	1	Hysteresis for limit value 4	float	rw	
		Peak values			
3262	1	Envelope curve function discharge	float	rw	Display value/s

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7.7 Examples

Example 1:

Read a net measured value as a float value via SDO transfer from an amplifier with module address 3.

Protocol on the amplifier:

Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0603	**40**	**01**	**30**	**01**	**X**	**X**	**X**	**X**
CAN identifier	Read	Index low byte	Index high byte	Subindex	don't care			

Response from amplifier:

Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0583	**43**	**01**	**30**	**01**	**m0**	**m1**	**m2**	**m3**
CAN identifier	Read acknowledge	Index low byte	Index high byte	Subindex	Low byte	Measured value as a float		High byte

Example 2:

Setting up the filter frequency as 200 Hz.

Protocol on the amplifier:

Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0603	**2B**	**90**	**21**	**01**	**BB**	**03**	**X**	**X**
CAN identifier	Write 2 bytes	Index low byte	Index high byte	Subindex	Low byte High byte 958 = (03BB Hex)		don't care	

Response from amplifier:

Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0583	**60**	**90**	**21**	**01**	**X**	**X**	**X**	**X**
CAN identifier	Write acknowledge	Index low byte	Index high byte	Subindex	don't care			

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Example 3:

The intention is to set up the tare value as 23.250 kg (transfer as a long value, i.e. 23.250 =23250).

Assumed settings: unit ”kg”; decimal places: 3

Protocol on the amplifier:

Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0603	**23**	**80**	**21**	**01**	**D2**	**5A**	**00**	**00**
CAN identifier	Write 4 bytes	Index low byte	Index high byte	Subin dex	Low byte 23.250 kg=23500(=5AD2Hex)			High byte

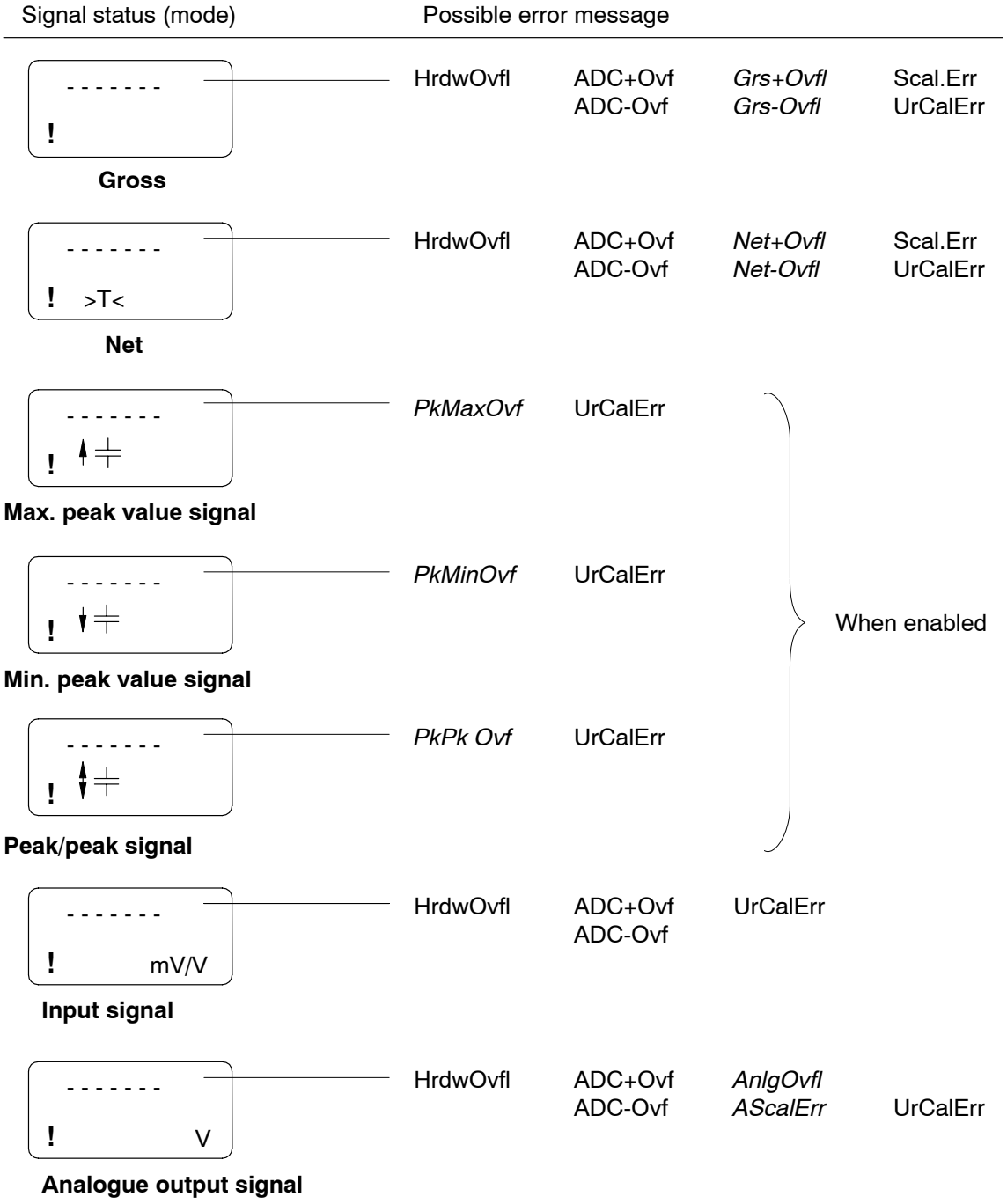
Response from amplifier:

Identifier	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0583	**60**	**80**	**21**	**01**	**X**	**X**	**X**	**X**
CAN identifier	Write acknowle dge	Index low byte	Index high byte	Subindex	don’t care			

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8 Error messages/operating status (LED)

Depending on the display mode, different error messages may be displayed in place of the measured value:



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The current errors are displayed consecutively (see also page 23). Press ⊕, until you come to the ”ERROR” display mode.

Error message	Cause	Remedy
Hrdware[1)] (HrdwOvfl)[2)]	Input signal overflow Transducer not connected Transducer wrongly connected Amplifier not matched to the transducer type No sensor circuits connected	 Connecting transducers See pin assignment on page17 Adapt amplifier under TRANSDUCER group Connect sensor circuits
AD Conv (ADC+Ovfl, ADC-Ovfl)	Input signal from AD converter too large	Adapt hardware measuring range
AnlgOutp (AnlgOvfl)	Analogue output overflow	Check allocation of display value to analogue output
StoreMin (PkMinOvf)	Minimum peak value overflow	1. Clear peak value via external remote or 2. In PEAK STORE group, ”ClearPkV” Yes
StoreMax (PkMaxOvf)	Maximum peak value overflow	1. Clear peak value via external remote or 2. In PEAK STORE group, ”ClearPkV” Yes
Net (Net+Ovf; Net-Ovf)	Net value overflow[3)]	Reduce display by one decimal place
Gross (Grs+Ovf; Grs-Ovf)	Gross value overflow[3)]	Reduce display by one decimal place
NomVal over	Nominal value exceeded	Adapt range
Transducer	Transducer not connected No sensor circuits connected	Connecting transducers Connect sensor circuits
Scaling[4)] (Scal.Err)	Input characteristic too steep	Change input characteristic
AnlgScal (AScalErr)	Input or output characteristic too steep	Change input or output characteristic
ISyncErr	No internal synchronisation	Restart, connect transducer
(UrCalErr)	Invalid original calibration values	Restart, send PME to the manufacturer (HBM)
CAN Tx	No PDO request on bus	Check CAN bus configuration

1) Error messages without brackets: errors that are displayed consecutively in the ’ERROR’ display mode.

2) Error messages in brackets: errors that are displayed in the appropriate display mode (e.g. Gross, Net, Analogue output signal).

3) On CAN bus ±1 000 000 is output

4) See page 31

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Operating status:

LED colour	Status	Meaning	
		Measuring mode	Bus mode
Green	Steady light	Ready to take measurements	CAN Operational (PDO transfer possible)
Green	Flashing	Data being transmitted over the interface	-
Yellow	Steady light	Ready to take measurements	CAN bus Pre-Operational (PDO transfer not possible)

LED colour	Status	Meaning		Remedy
		Measuring mode	Bus mode	
Red	Flashing	Measured value overflow LCD error Transducer resistance too low	-	Adapt range Restart Reduce excitation voltage
Red	Steady light	Startup phase: not yet ready to take measurements, calibration error No internal synchronisation Original calibration error	CAN bus not ready for communication	Wait Connect transducer, poss. restart Send PME to the manufacturer (HBM)

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9 Specifications

Type		MP55		
Accuracy class		0.1[2]		
Supply voltage	V_{DC}	24; Potential separation from measuring system, test voltage 350 V_{eff}[3])		
Permitted supply voltage range	V_{DC}	18...30		
Power consumption	W	9 maximum		
Amplifier				
Carrier frequency	kHz	4.8 ± 1 %		
Bridge excitation voltage U_B (± 5 %)	V_{rms}	5 / 2.5 / 1		
Transducers that can be connected				
SG half and full bridge	Ω	220...5000 / 110...5000 / 60...5000		
Inductive half and full bridge, LVDTs	mH	8...160 / 4...160 / 2...160		
Permitted cable length between transducer and amplifier	m	max. 500		
Maximum permitted common mode voltage	V	±5		
Common mode rejection				
0...500 Hz	dB	120		
0...4800 Hz	dB	72		
Maximum differential voltage	mV	± 30		
Linearity deviation (typical)	%	0.025		
Noise voltage[1]		Measuring range [mV/V]		
		3	50	500
0...10 Hz	$\mu V/V_{PP}$	0.2	3	30
0...500 Hz	$\mu V/V_{PP}$	1.5	25	250
Measurement frequency range, adjustable (-1 dB)	Hz	0.05...500		
Max. display resolution		999 999 digits at 6.67 % of amplifier input range		
Min. display resolution		10 digits at 100 % of amplifier input range		
Input sensitivities (measuring ranges can be adjustet by DIP switch)		Low	Medium	High
at U_B=5 V	mV/V	0.15...3	2.5...50	25...500
at U_B=2.5 V	mV/V	0.3...6	5...100	50...1000
at U_B =1 V	mV/V	0.75...15	12.5...250	125...2500
Low pass filter		Adjustable in steps of 0.05 to 500 Hz (Bessel and Butterworth filter characteristics)		
Effect of operating voltage when specified range is changed (in relation to final value)				
on zero point	%	< 0.01 f.s		
on sensitivity	%	< 0.01 f.s		

1) When U_B=5 V, by reference to the input

2) 0.25 with irradiation per EN61326 in the range of 700 MHz up to 1 GHz

3) Type-tested per EN61010-1:2001

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Effect of 10 K change in ambient temperature[4]		3 mV/V	50 mV/V	500 mV/V
on zero point full bridge	µV/V	1	10	100
on zero point half bridge	µV/V	10	20	100
on sensitivity	%	0.05	0.05	0.05
Long-term drift over 48 hours, range 3 mV/V (30 minutes after switching on)	µV/V	1		
Analogue output				
Impressed voltage	V	±10		
Permitted load resistance, min.	kOhm	10		
Internal resistance, max.	Ohm	10		
Impressed current	mA	±20; 4...20		
Permitted load resistance, max.	Ohm	500		
Internal resistance, min.	kOhm	100		
The analogue output can represent gross, net, positive and negative peaks, and peak-to-peak values.				
Analogue output scale range min.		0.17 V at 100 % of amplifier input range		
Analogue output scale range max		10 V at 3.67 % of amplifier input range		
Noise voltage at output, typically	mV_{SS}	10		
Long-term drift over 48 hours (30 minutes after switching on)	mV	<< 3		
Effect of 10 K change in ambient temperature (additional to the digital value effect)				
on zero point				
Voltage	mV	3		
Current	µA	6		
on sensitivity	%	0.05		
Limit switches				
Number		4		
Reference value		Gross, net, peak values		
hysteresis	%	0...100		
Adjustment accuracy	%	0.0033		
Response time	ms	1		
Peak-value store				
Number		2		
Function		Positive, negative, peak-to-peak		
Updating time	ms	1		
Clearing peak store	ms	2		
Recording current value/peak value	ms	2		
Envelope curve function discharge rate	Unit/sec	0 to 999999		

4) By reference to U_B=5 V

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Control outputs		
Number		4
Rated voltage, external power supply	V	24
Permitted supply voltage range	V	18...30
Output current, max.	A	0.5
Short-circuit current, typically	A	0.8
Short-circuit period		unlimited
Test voltage, typical	V_{DC}	500
Control inputs		4
Input voltage range, LOW	V	0...5
Input voltage range, HIGH	V	10...30
Input current, typically, HIGH value = 24 V	mA	12
Test voltage typical	V_{DC}	500
Interface		
Sampling rate, approx.		Maximum 1000 samples/sec.
Protocol		CAN 2.0B, CAL/CANopen compatible
Hardware bus link		in accordance with ISO11898
baud rate	kBit/s	1000 800 500 250 125 50 20 10
Maximum length of cable	m	25 50 100 250 500 1000 1000 1000
Parameter memory (EEPROM)		4 (plus factory setting)
Display		
Type		2-line, 8-digit alphanumeric, LCD
Keyboard		Touch-sensitive keyboard with 3 control buttons
Rated temperature range	°C [°F]	0...50 (32...122)
Service temperature range	°C [°F]	-20...+50 (-4...122)
Storage temperature range	°C [°F]	-20...+70 (-4...158)
Protection class		IP20
Dimensions, overall (W x H x D)	mm	55 x 146 x 162
Weight, approx.	g	470

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10 Keyword index

A

Additional functions, 50

Address, 36

Amplifier settings, 8

Analogue output, 9 , 10 , 14 , 15 , 33 , 48 , 53

B

Baudrate, 36

Bessel, 32

Bridge excitation voltage, 9 , 10

Bridge type, 9 , 10

Butterworth, 32

C

CAN bus, 14 , 19
  connection, 14

CAN interface, connection, 19

CAN interface description, 38

CAN-interface, 38 , 52

CAN¿Bus, 36 , 59

CAN-interface, 19

CANopen, 19

Coded lateral guide, 15

Coded pin, 15

Commissioning, 24

Conditioning, 48 , 53

Configuring, 24

Connections
  CAN interface, 19
  Supply voltage, 15
  Transducers, 17

Control I/Os, 7 , 14

Control inputs, 14 , 16 , 35

Control outputs, 14 , 16

Current value, 36

Cyclical data transmission, 38

D

Dialog, 45

Digital I/Os, 51

Digital input, 15

Digital output, 15

DIP switches, 8

Discharge rate, 34

Display adaptation, 46

Display mode, 23

Display resolution, 31

E

Error acknowledge, 40

Error message, 24 , 58

Error messages, 23

F

Factory setting, 10

Factory settings, 9

Feedback bridges, 18

filter, 32

Fitting, 12

Four-wire connection, 18

Function, 52

Function test, 24

G

Grenzwert, 34

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H

hysteresis, 34

I

Input range, 9 , 10
Input remotes, 35
Inputs, 35
Interface, connection, 19

L

LED, 59
Level, 34
Limit switches, 49 , 54
Limit value level, 34

M

Master/Slave, 9 , 11 , 20
Measured value, 44
Measured values, 53
Measuring mode, 22
Motion count indication, 37

O

Object directory, 41 , 44
Operating direction, 34
Output characteristics, 33
Output ports, 35
Output rate, 36
Output remotes, 35

P

Parameters, 25
  Description, 30
  Read, Writen, 39
  Recall, Save, 30
  set up, 26
Password, 22 , 30
Peak value, 34 , 35 , 36 , 58
Peak values, 50 , 54
Peak-value store, 34
Pin assignment for terminal plugs, 15
PLC, 39
PLC connection, 16
Power failure, 15
Power supply, 14 , 15
Profile, 36

R

Recall ?, 30
Remotes, 35
Removal, 12
Ribbon cable, 20

S

Save ?, 30
Scale factor, 31 , 33
Scale range, 33
Scaling, 31 , 33
Set up of parameters, 26
Set-up mode, 22
Setting up, 24
Setting up , 21
Setting up an amplifier, 10
Setting zero, 32
Standstill, 23
Standstill time, 37
Starting delay, 34
Supply voltage, 15
Synchronisation, 14 , 20 , 59

T

Tare, 31 , 32
Terminal plug, 14 , 15

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Power supply, CAN bus, Synchronisation, Remote contacts, Control outputs, 14

Terminating bus impedanz, 11

Terminating resistor, 19

Transducer connection, 14
Strain gauge full and half bridges, Inductive full and half bridges, Potentiometric, Piezoelectric, LVDT, 17

Transducer excitation, 14

Transducers, 46 , 53

Z

Zero balance, 31 , 32

Zero offset, 31

Zero reference, 37

Zero value, 32

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