Operating Manual

Interface
description

T12
CAN bus/
PROFIBUS

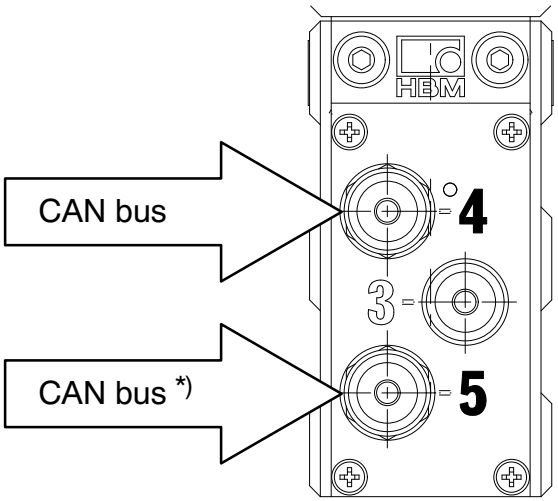
I2003-6.1 en

HBM

Contents **Page**

1 Connection

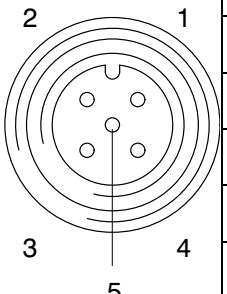
1.1 CAN bus connections



*) second device connector

Fig. 1.1: CAN bus connections at the T12 stator

Assignment for connector 4 (5):
CAN bus; A-coded, M12x1, black washer

Binder 713 (M12x1)	**Connector pin**	**Assignment**	**Color code**	**CAN bus (Sub D 9-pin)**
	1	Shielding	–	–
	2	no function	–	–
	3	CAN earth	–	–
	4	CAN HIGH-dominant high	wh	7
	5	CAN LOW-dominant low	bu	2
		Shielding connected to enclosure ground		

Top view

1.2 CANopen interface

The CAN bus is connected via male device connector 4 or 5. A maximum of 32 CAN nodes can be connected in one bus segment (in accordance with the CANopen specification).

The CAN bus requires a 120 Ω termination resistor in the first and last bus nodes.

The bus line may have a maximum of two termination resistors. There is no termination resistor integrated in the T12 torque transducer itself. If you connect only one torque transducer using the Setup-Toolkit (accessory: 1-T12-SETUP-USB), please activate the termination resistor in the Sub-D connector (”ON” position, see Fig. 1.2). In addition, connect a termination resistor to the T12 (device connector 5).

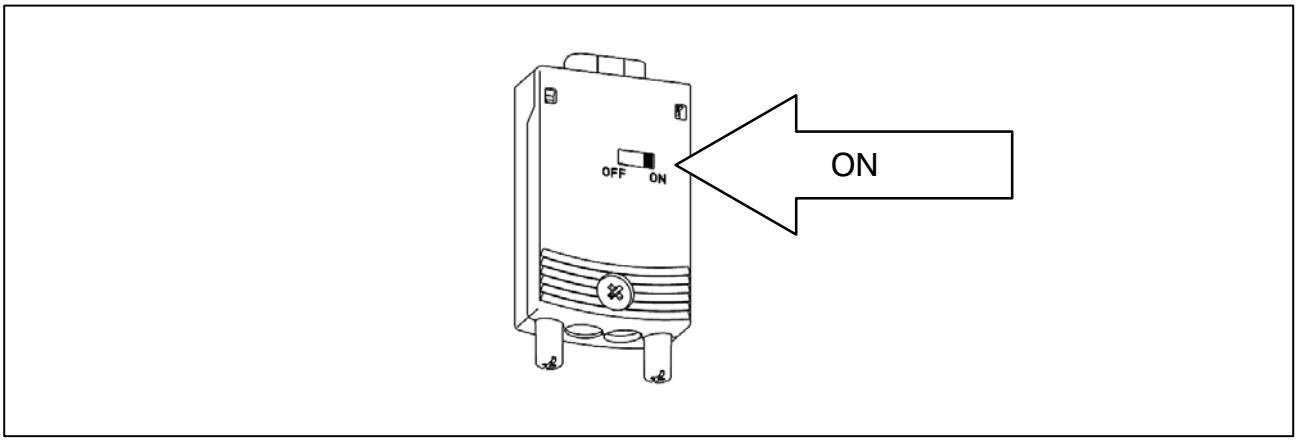


Fig. 1.2: Activate the termination resistor in the Sub-D connector

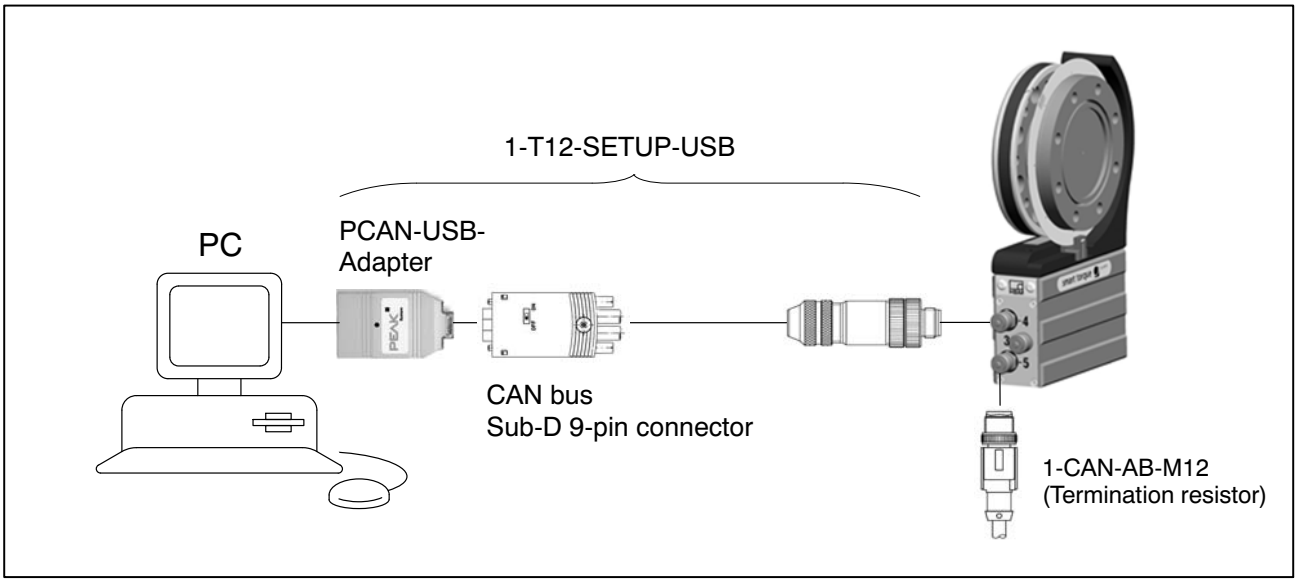


Fig. 1.3: Example for CAN bus operation with a single connection

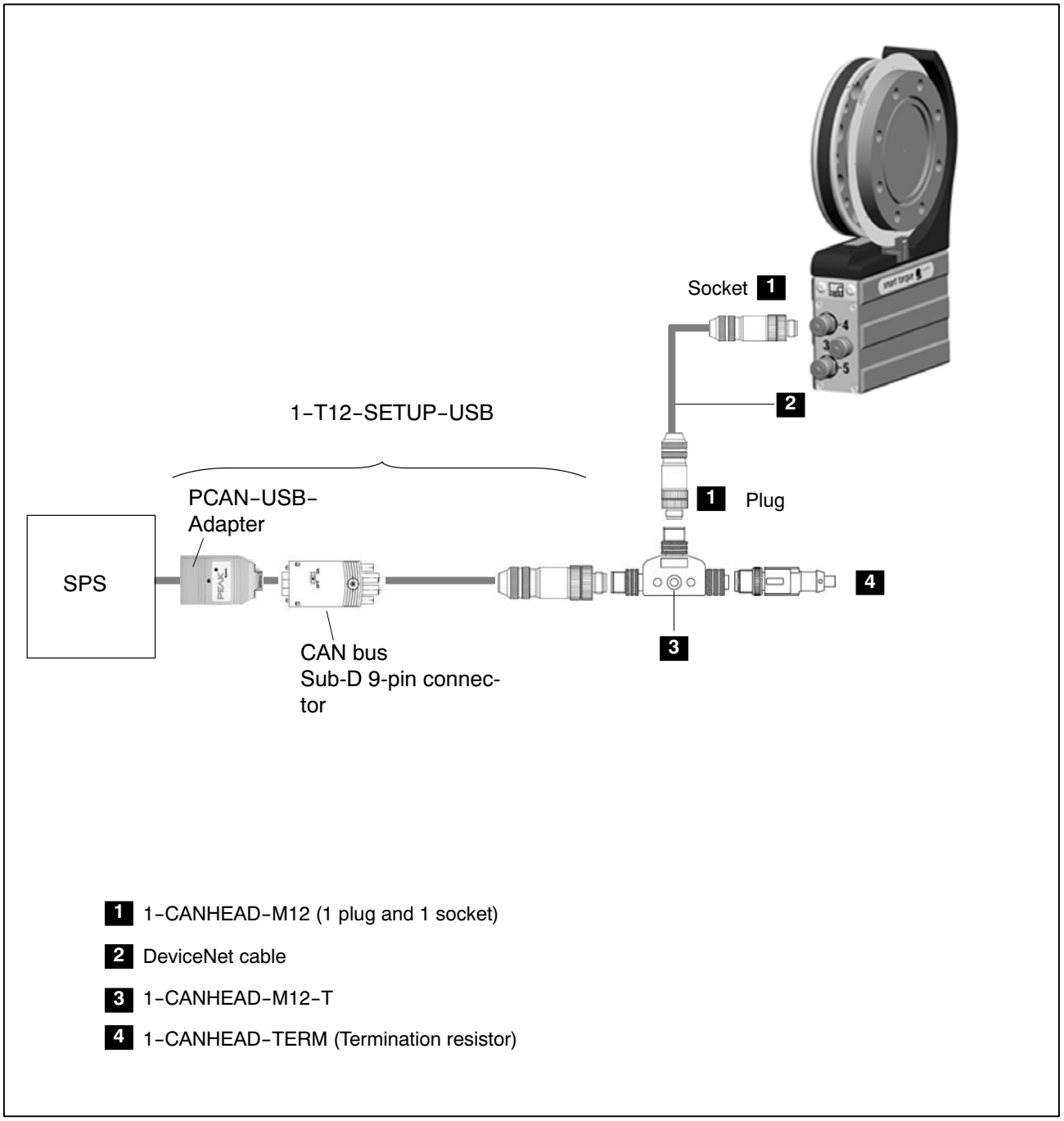


Fig. 1.4: Example for CAN bus operation with a single connection with Option 5, Code P

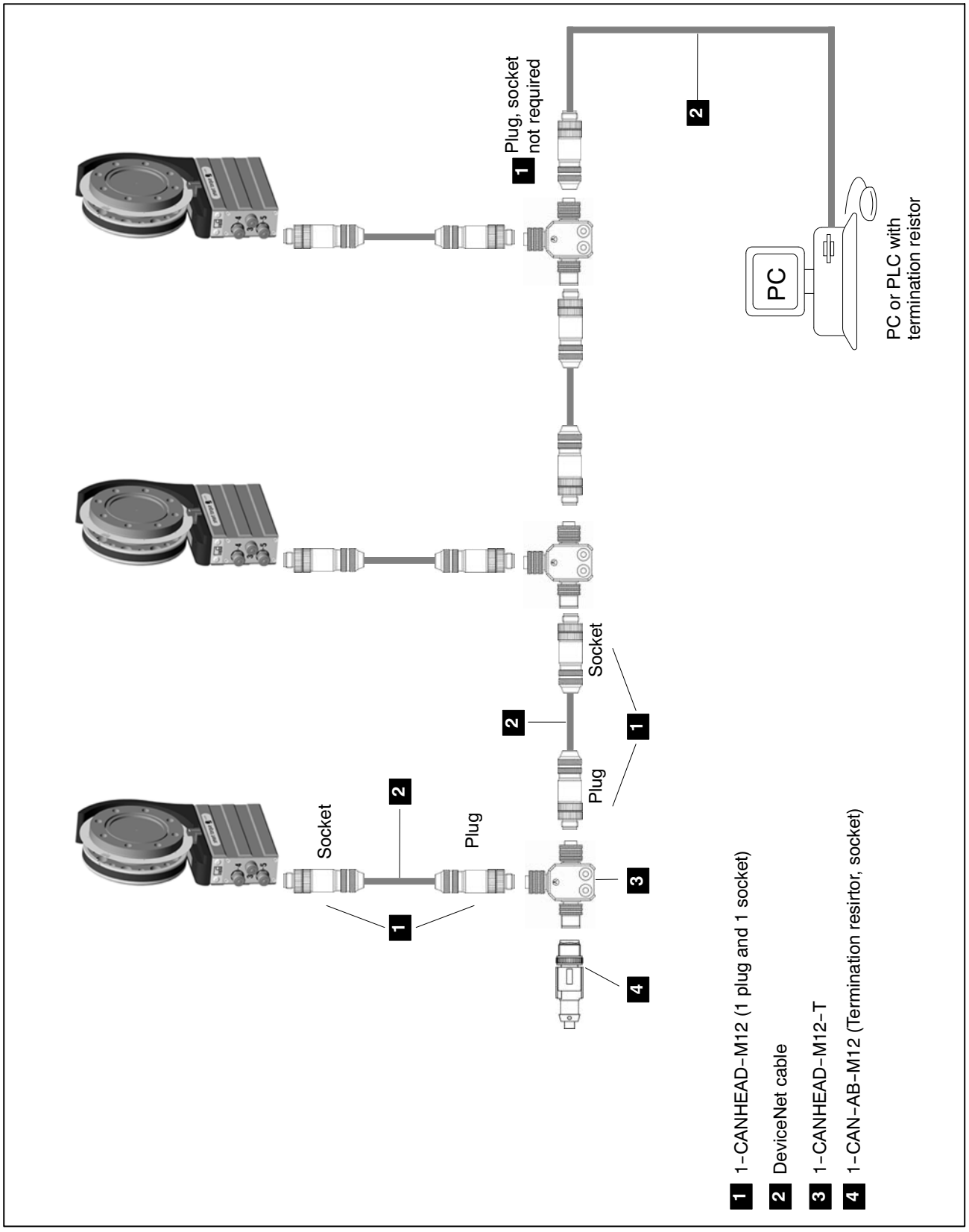


Fig. 1.5: Example for CAN bus operation with several transducers

1.3 PROFIBUS interface

At the T12 stator, male device connector 5 is used to connect to the PROFIBUS.

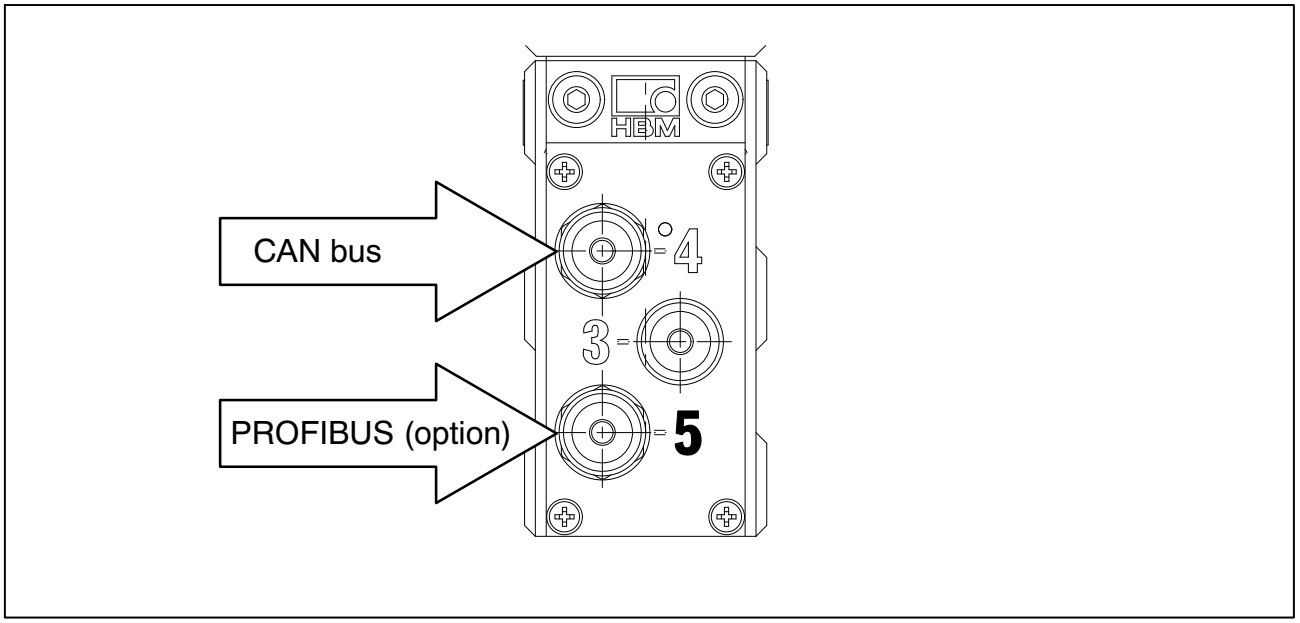
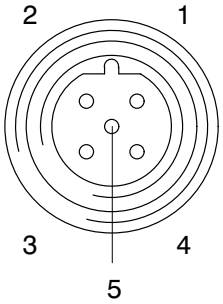


Fig. 1.6: PROFIBUS connection

Assignment for connector 5:
PROFIBUS (option); B-coded, M12x1, violet washer

Binder 715 (M12x1)	**Connector pin**	**Assignment**
 Top view	1	5 V (typ. 50 mA)
	2	PROFIBUS A
	3	PROFIBUS ground
	4	PROFIBUS B
	5	Shielding
		Shielding connected to enclosure ground

Installation:

- Connect the T12 torque transducer to supply voltage and use the Setup program to set the required PROFIBUS address.
- Connect the PROFIBUS line to the T12. Make sure that the termination resistors at the first and last PROFIBUS node of each segment are connected (if applicable, use 1-PROFIBUS-AB-M12).

NOTE

With band rates exceeding 1.5 Mbaud, it is essential to use short (≤ 0.3 m) stub lines!

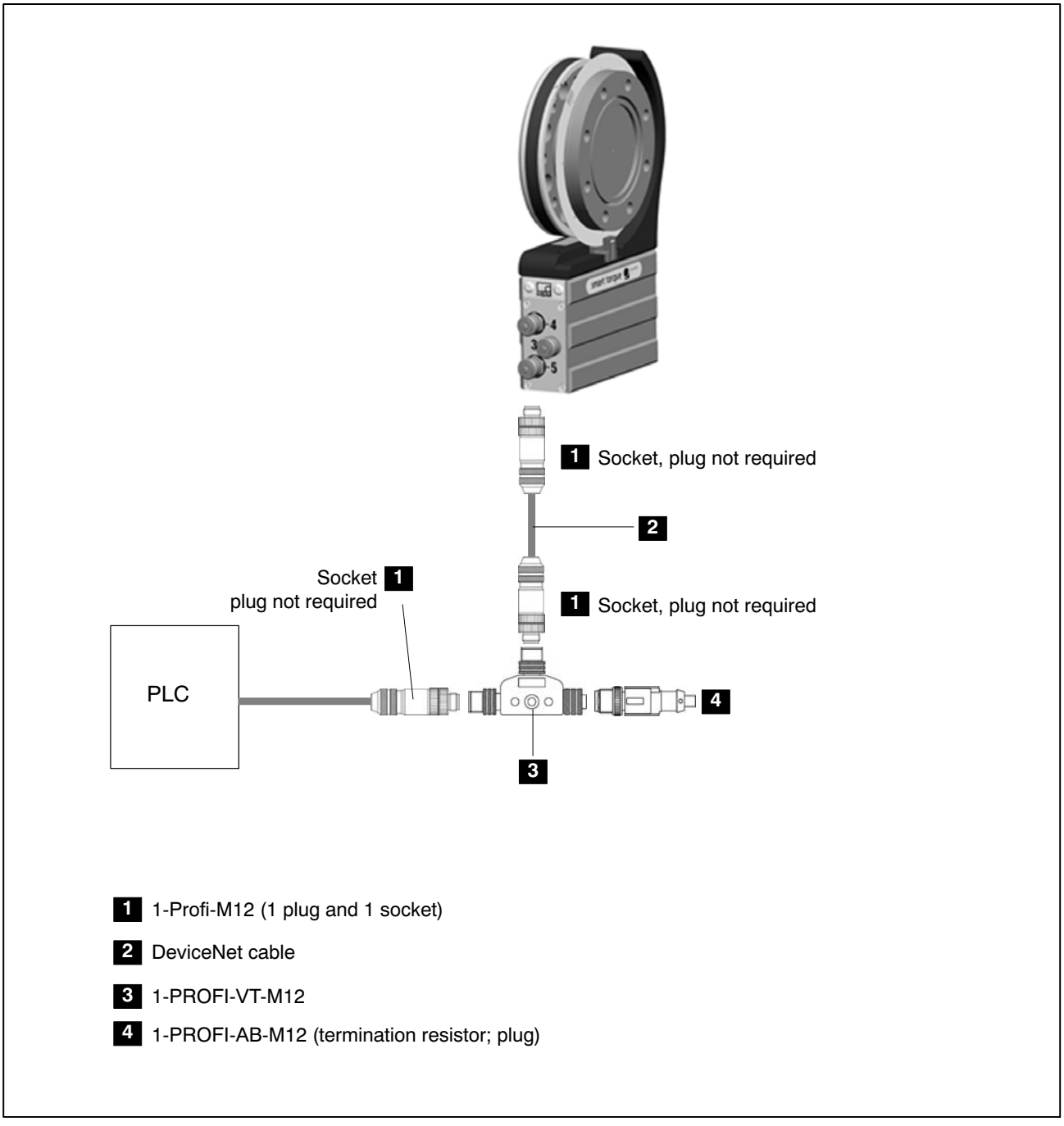


Fig. 1.7: Example for PROFIBUS operation with a single connection

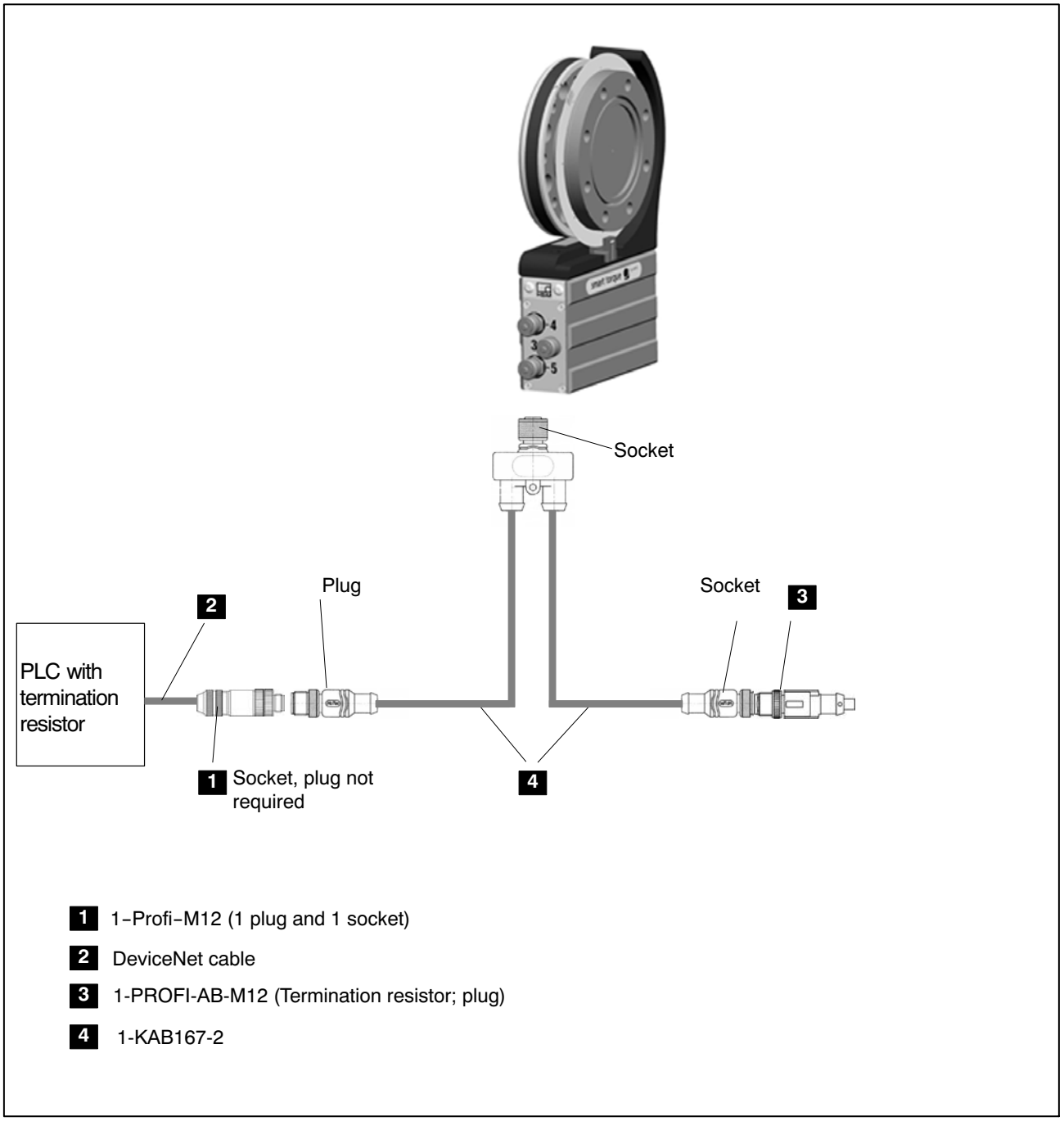


Fig. 1.8: Example for PROFIBUS operation with a single connection via 1–KAB167-2 cable

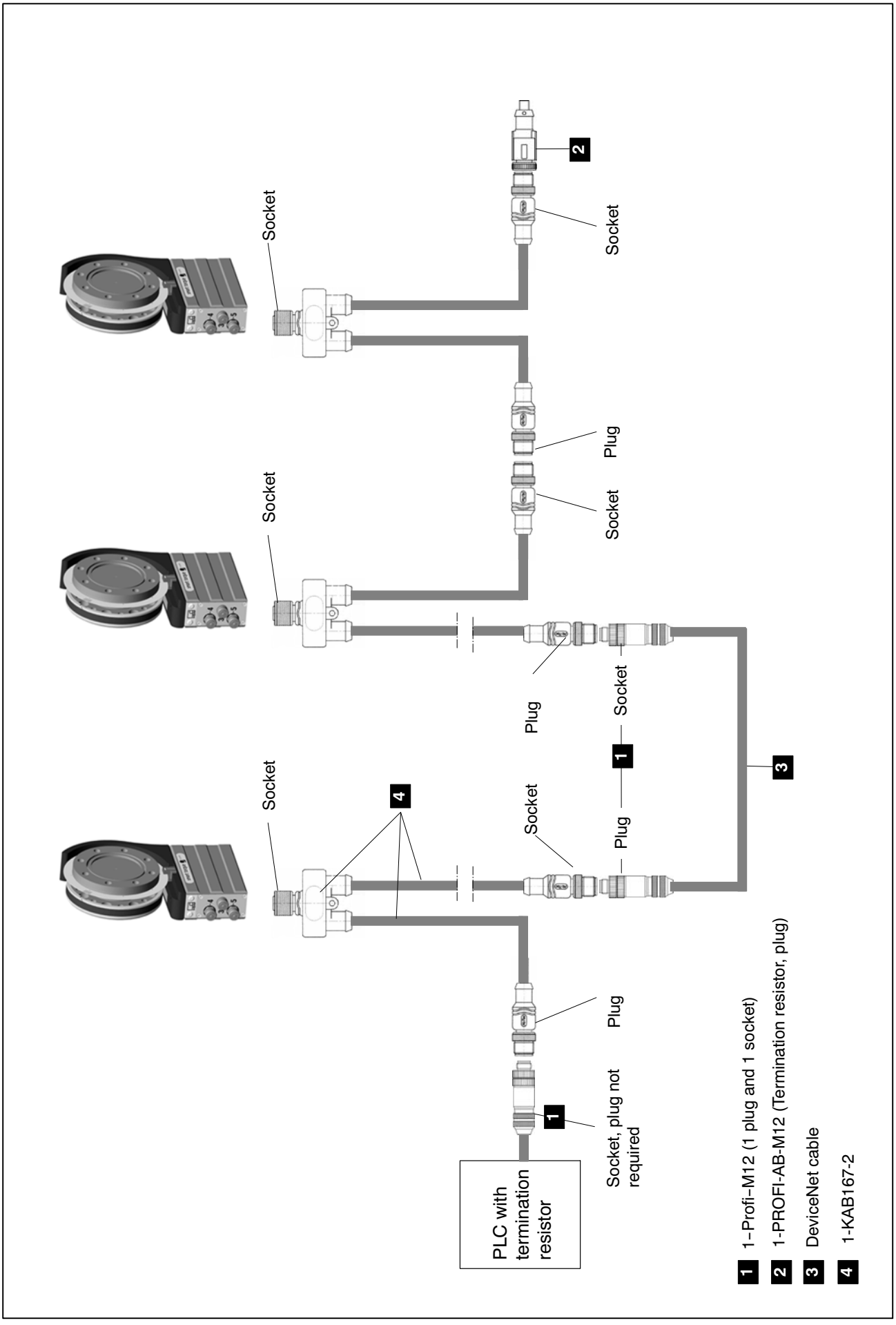


Fig. 1.9: Example for PROFIBUS operation with several transducers

NOTE

With band rates exceeding 1.5 Mbaud, it is essential to use short (≤0.3 m) stub lines!

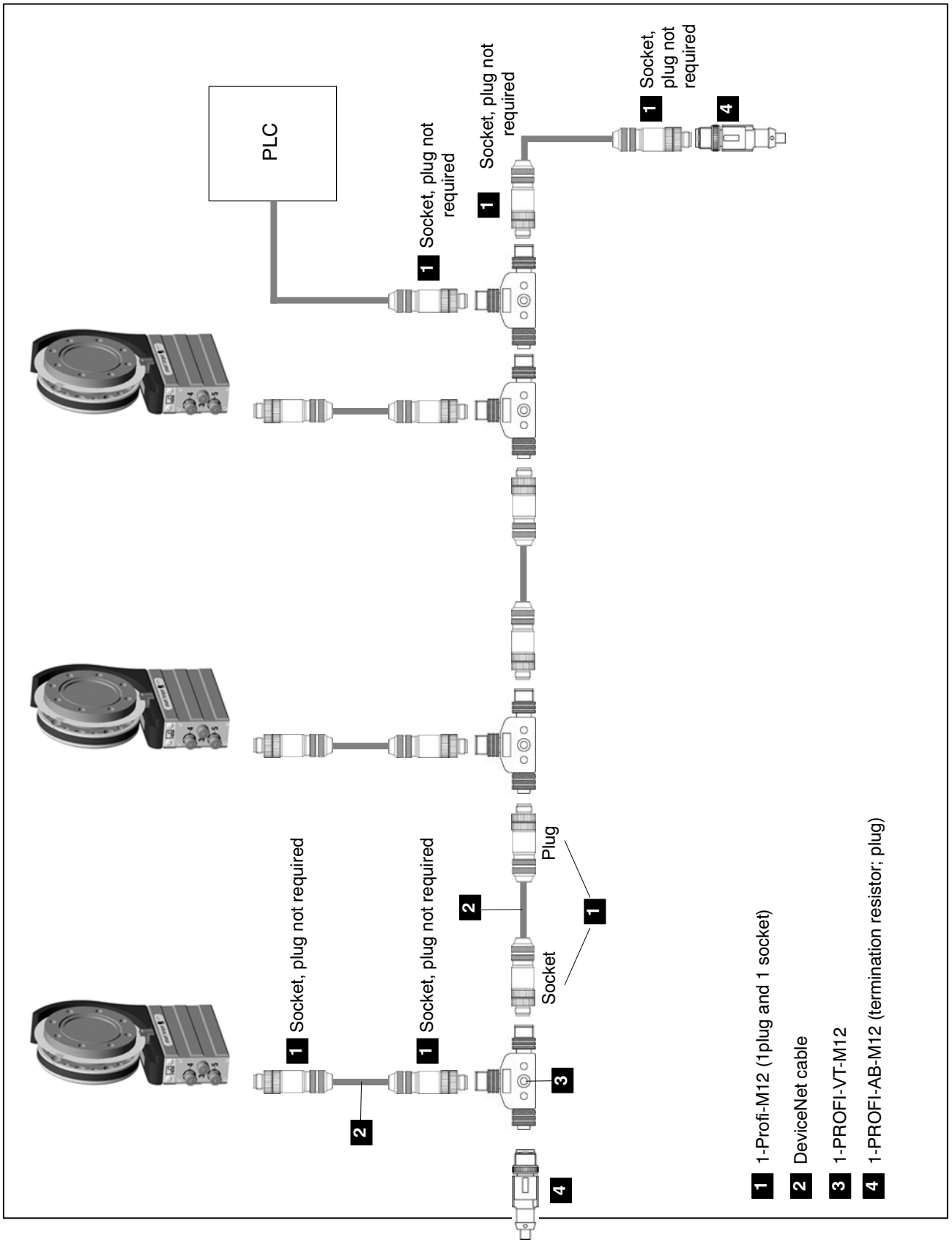


Fig. 1.10: Example for PROFIBUS operation with several transducers

2 CAN interface description

2.1 General

The T12 torque transducer has an inbuilt CAN interface which can be used both for transmitting measured values and for module parameterization. Different baud rates can be selected up to a maximum of 1 MBaud. The interface protocol is adapted from the CANopen Standard.

2.2 Cyclic transmission of measured values

The cyclic data are transmitted as so-called ”Process Data Objects” (PDOs, in accordance with CANopen definitions). Interesting measured values are transmitted cyclically from the measurement module under a previously defined CAN Identifier, without any further identification. A query message is not required. A parameter setting determines how often the PDOs are transmitted. Data formats longer than one byte are always transmitted in LSB-MSB order.

2.2.1 PDO contents:

PDO1 Torque Low pass 1

CAN Identifier	384(180Hex) + module address	Data
1st..4th data bytes	Measured value (LSB-MSB), integer 32	Torque TP1

PDO1 Torque + Speed Low pass 1

CAN Identifier	384(180Hex) + module address	Data
1st..4th data bytes	Measured value (LSB-MSB), integer 32	Torque TP1
5..8th data bytes	Measured value (LSB-MSB), integer 32	Speed TP1

PDO1 Torque + Angle of rotation Low pass 1

CAN Identifier	384(180Hex) + module address	Data
1st..4th data bytes	Measured value (LSB-MSB), integer 32	Torque TP1
5..8th data bytes	Measured value (LSB-MSB), integer 32	Speed TP1

PDO2 Torque Low pass 2

CAN Identifier	640(280Hex) + module address	Data
1st..4th data bytes	Measured value (LSB-MSB), integer 32	Torque TP2

PDO2 Torque + Speed Low pass 2

CAN Identifier	640(280Hex) + module address	Data
1st..4th data bytes	Measured value (LSB-MSB), integer 32	Torque TP2
5..8th data bytes	Measured value (LSB-MSB), integer 32	Speed TP2

PDO3 Power + Rotor temperature

CAN Identifier	896(380Hex) + module address	Data
1st..4th data bytes	Measured value (LSB-MSB), integer 32	Power
5..8th data bytes	Measured value (LSB-MSB), integer 32	Rotor temperature

PDO4 Statuses

CAN Identifier	1152(480Hex) + module address	Data
1st..4th data bytes	Measured value (LSB-MSB), integer 32	Torque status
5..8th data bytes	Measured value (LSB-MSB), integer 32	Speed status

2.2.2 Activating PDO output:

The exchange of cyclic PDOs only starts once the module has been brought to the ”Operational” state. This is done with the ”Start_Remote_Node” message.

Switching all configured PDO’s to operational:

CAN Identifier	0
1st data byte	1 (01hex)
2nd data byte	module address (0 = all, ID 110 = 6e hex)

The message ”Enter_Pre_Operational_State” can be used to exit the ”Operational” state.

Switching all configured PDO’s to pre-operational:

CAN Identifier	0
1st data byte	128 (80hex)
2nd data byte	module address (0 = all, ID 110 = 6e hex)

2.2.3 PDO exchange immediately upon switch-on:

Alternatevely, cyclic PDO exchange can also be starded using the following command:

SDO	**Sub Ix**	**Format**	**Value / Function**
0x2273	0	UINT16	1: PDOs operational 2: PDOs pre-operational

By subsequently saving the parameters to one of the parameter sets 1 to 4, PDO exchange becomes operational immediately upon switching on the transducer.

2.3 Parameterization

Messages for module parameterization are transmitted as so-called “Service Data Objects” (SDOs, in accordance with CANopen definitions). The various parameters are addressed by an index number and a sub-index number. For the assignment of these index numbers, please refer to the object dictionary. Data formats longer than one byte are always transmitted in LSB–MSB order.

Reading a parameter:

Query (PC or PLC to T12)

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

Response (T12 to PC or PLC)

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

Writing a parameter:

Transmit value (PC or PLC to T12)

CAN Identifier	1536 (600 Hex) + module address
1st data byte	47 (2F Hex) = write 1 byte 43 (2B Hex) = write 2 bytes 35 (23 Hex) = write 4 bytes)
2nd + 3rd data byte	Index (LSB-MSB)
4th data byte	Sub-index
5..8th data byte	Value (LSB-MSB)

Acknowledgement (T12 to PC or PLC)

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

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

Error acknowledgement (T12 to PC or PLC)

CAN Identifier	1408 (580 Hex) + module address
1st data byte	128 (80 Hex)
2nd + 3rd data byte	Index (LSB_MSB) or 0
4th data byte	Sub-index or 0
5..6th data byte	Additional error code: 10H: Parameter value invalid 11H: Sub-index does not exist 12H: Length too great 13H: Length too small 20H: Service cannot be executed at present 21H: – because of local checking 22H: – because of the device status 30H: Parameter value range overflow 31H: Parameter value too high 32H: Parameter value too low 40H: Value incompatible with other settings 41H: Data cannot be mapped 42H: PDO-Length overflow 43H: General incompatibility
7th data byte	Error code: 1: Object access not supported 2: Object does not exist 3: Parameter inconsistent 4: Illegal parameter 6: Hardware error: 7: Type conflict 9: Object attribute inconsistent (sub-index does not exist)
8th data byte	Error class: 5: Service faulty 6: Access error 8: Other errors

3 PROFIBUS

3.1 Cyclic data traffic

Before you can communicate with the T12 on PROFIBUS, you have to configure and parameterize the message contents.

To do this, start your configuration software (such as Step 7) and load the GSD file from the T12 system CD. You can then configure the information relevant to your application from the ”hardware catalog”.

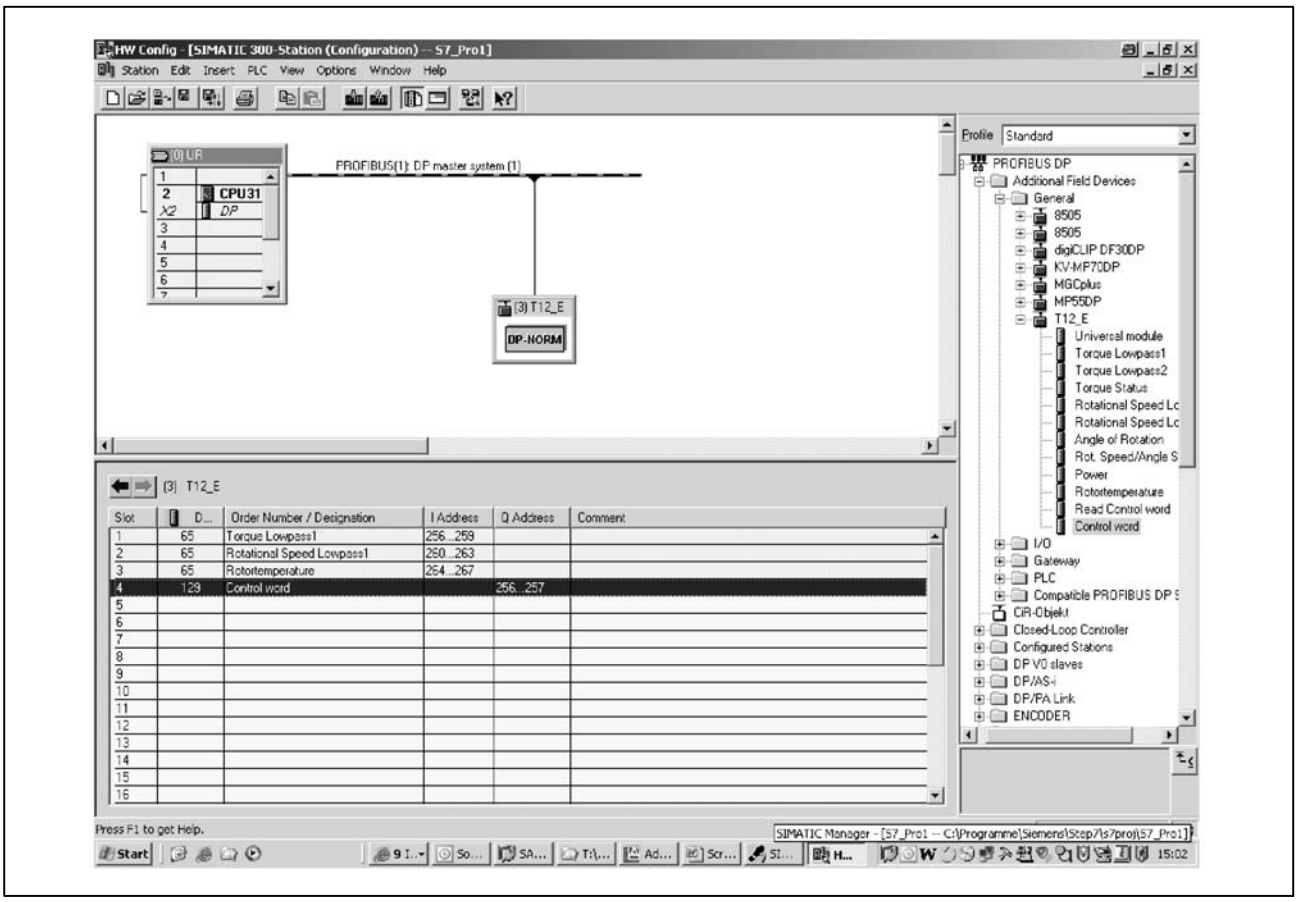


Fig. 3.1: T12 configuration

The T12 control bits must be enabled explicitly in the PROFIBUS Parameter Assignment (see figure below).

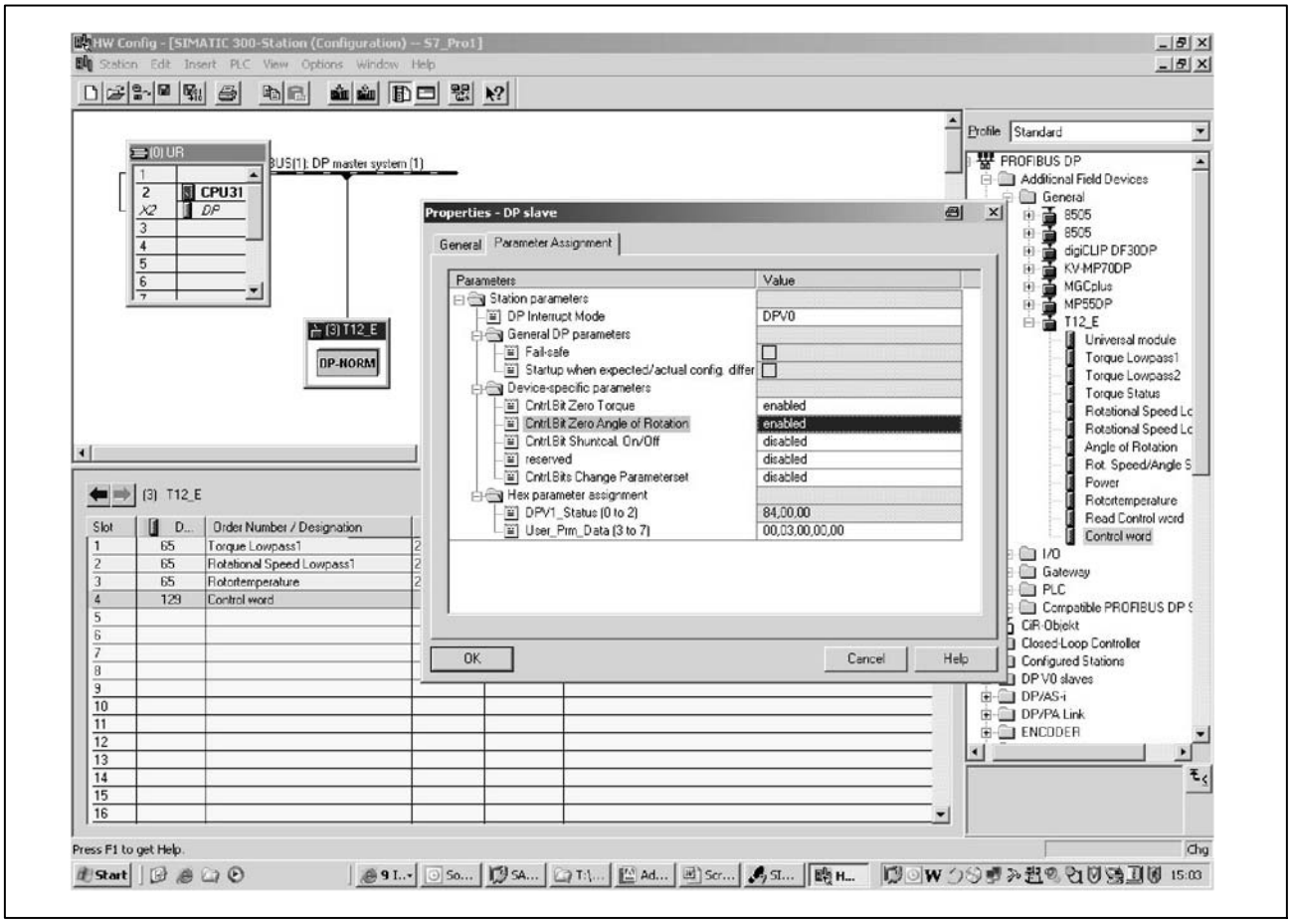


Fig. 3.2: Device-specific parameters

Notes for Simatic S7 PLC users:

- To transmit consistent data, you must use special function block SFC14 to read and SFC15 to write.
- With S7 3xx, a maximum of 32 bytes of consistent data can be transmitted.

The T12 allows the following cyclic data to be transferred via PROFIBUS DP:

Input data (sent from the T12 to the PLC):

- Measured values (torque, speed, angle of rotation, power, temperature)
- Status information

Output data (from the PLC to the T12):

- Control word with control bits (zeroing, changing the parameter set, shunt calibration)

The measured values and data of the T12 are transferred as integer values (integers).

The number of bytes complies with the value range, measured values are always transmitted as signed (two's complement) 32-bit quantities (4 bytes). To obtain the measured value in the physical quantity for displaying n decimal places, divide by 10^n.

The byte sequence corresponds to the PROFIBUS standard in that it always starts with the high byte (the so-called Motorola format).

Non-documented bits are reserved and sometimes assigned with internal functions.

Signal inputs and outputs

Input modules

Torque low pass 1
Torque low pass 2
Torque status
Speed low pass 1
Speed low pass 2
Angle of rotation
Speed/angle of rotation status
Power
Rotor temperature
Read control word

Output modules

Control word

T12 control word functions

Bit	Function
0	Torque zeroing
1	Angle of rotation zeroing
2	Activate shunt calibration
3	No function
4	No function
5	No function
6	Load parameter set
7	Load parameter set

Bit 7	Bit 6	
0	0	Parameter set 1
0	1	Parameter set 2
1	0	Parameter set 3
1	1	Parameter set 4

The ”Load parameter set” function is only executed if the new parameter set number differs from the current parameter set number.

4 DPV1 parameterization / connection to an S7 PLC

So-called DPV1 parameterization allows asynchronous parameterization messages to be exchanged parallel to PROFIBUS DP mode with cyclic data exchange between the Master module and the T12.

Alternatively, they can be sent from the DP Master (for example the PLC, the so-called Class 1 Master), or even in parallel from a second, so-called diagnostic Master (for example the programming unit, the Class 2 Master).

If the customer wishes to make use of DPV1 parameterization, the relevant service routines must be called in the PLC. A basic distinction is made between setting up and releasing a connection and between read and write access to parameters. The various parameters are addressed by so-called index numbers and slot numbers.

The T12 maps these index numbers to the commands described in the Operating Manual (see Tables below).

This is why the following tables describe the parameters with their name, index and slot numbers and the underlying T12 command.

More detailed information on DPV1 mode can be obtained from the manufacturer of the Master module.

From Siemens, for example:

www.ad.siemens.de/support

Document number: 10259221

S7 integration of DPV1 slaves

5 Object dictionary: manufacturer-specific objects (CAN and DPV1 parameterization)

Parameters that make reference to measured values are scaled true to number, coded as Long (32-bit integer). The position of the decimal point is defined in object 2120 Hex. Alternatively, these quantities are also available as Float values (IEEE754-1985 32-bit format).

HBM T12 Object Dictionary							
Index hex	**Sub Ix**	**Attr**	**Format**	**Name**	**Data**	**DPV1-C1-Slot**	**DPV1 - Index hex**
1008	0	RO	VISIBLE STRING	Manufacturer Device Name		–	–
1009	0	RO	VISIBLE STRING	Manufacturer Hardware Version		–	–
100A	0	RO	VISIBLE STRING	Manufacturer Software Version		–	–
100B	0	RO	UINT32	Device Address		–	–
100E	0	RW	UINT32	Identifier Node Guard		–	–
1014	0	RW	UINT32	Identifier Emergency		–	–
User-specific Objects							
2000	1	ROP	INT32	Torque LP1	0x80000000: invalid MV 0x80000001: pos. Ovfl. 0x80000002: neg. Ovfl.	Torque	1
2000	2	ROP	INT32	Torque LP2	0x80000000: invalid measured value 0x80000001: pos. Ovfl. 0x80000002: neg. Ovfl.	Torque	2
2001	1	ROP	INT32	Speed LP1	0x80000000: invalid measured value 0x80000001: pos. Ovfl. 0x80000002: neg. Ovfl.	Speed	1
2001	2	ROP	INT32	Speed LP2	0x80000000: invalid measured value 0x80000001: pos. Ovfl. 0x80000002: neg. Ovfl.	Speed	2
2002	1	ROP	INT32	Angle of rotation	0x80000000: invalid measured value 0x80000001: pos. Ovfl. 0x80000002: neg. Ovfl.	Angle of rotation	1
2003	1	ROP	INT32	Power	0x80000000: invalid measured value 0x80000003: Ovfl.	Power	1
200B	0	ROP	INT32	Rotor temperature	1/10°	Torque	0

Index hex	Sub Ix	Attr	Format	Name	Data	DPV1-C1-Slot	DPV1 - Index hex
2010	1	ROP	UINT32	Torque status	Bit 0: Measured value valid Bit 1: Measured value overflow >120% Bit 2: Measured value overflow <–120% Bit 3: Amplifier error, rotor Bit 4: Compensation data error, rotor Bit 5: Calibration data error, rotor Bit 6: Initialization error, rotor (Shutdown) Bit 7: Supply voltage error, rotor Bit 8: CRC error, rotor transmission Bit 9: PLL synchronization error, rotor transmission Bit 10: Signal transmission error (rotor protocol not detected) Bit 11: Antenna circuit supply ok Bit 12: Frequency output overflow Bit 13: Torque scaling error Bit 14: Frequency output scaling error Bit 15: Analog output scaling error Bit 16: EEPROM error Bit 17: Initial calibration error Bit 18: PDO Transmit error Bit 19: Rotor overtemperature Bit 21: Indication overflow Bit 24: Limit value 1 Bit 25: Limit value 2 Bit 26: Limit value 3 Bit 27: Limit value 4	Torque	4

Index hex	Sub Ix	Attr	Format	Name	Data	DPV1-C1-Slot	DPV1 - Index hex
2010	2	ROP	UINT32	Speed/angle of rotation status	Bit 0: Speed measured value valid Bit 1: Angle of rotation measured value valid Bit 2: Power measured value valid Bit 4: Speed overflow pos. Bit 5: Speed overflow neg. Bit 6: Power overflow pos. Bit 8: Event counter overflow pos. Bit 9: Event counter overflow neg. Bit 10: Increment error Bit 11: F1/F2 event counter error Bit 12: Speed scaling error Bit 13: Angle of rotation scaling error Bit 14: Analog output scaling error Bit 15: Power scaling error Bit 16: EEPROM error Bit 17: Initial calibration error Bit 24: Limit value 1 Bit 25: Limit value 2 Bit 26: Limit value 3 Bit 27: Limit value 4	Speed	3
2081	0	RW	UINT8	Restart	1	0	1
2084	0	RO	UINT16	Amplifier type	5060 (T12)	0	2
2101	0	RW	UINT16	Language	1500: German 1501: English	0	5
2201	0	RO	VISIBLE STRING	Stator firmware-version		0	A
2202	0	RO	UINT16	FPGA logic version		0	B
2203	0	RO	UINT32	FPGA program version		0	C
2210	0	RO	VISIBLE STRING	Rotor ID number		0	10

Index hex	Sub Ix	Attr	Format	Name	Data	DPV1-C1-Slot	DPV1 - Index hex
2273	0	RW	UINT16	–	0: PDOs operational 1: PDOs pre-operational	–	–
2274	0	RW	UINT16	PDO output rate divisor	Value: Output rate (samples/s) PDO1 PDO2 PDO3/4 1: 4800 1200 600 2: 2400 600 300 4: 1200 300 150 8: 600 150 75 16: 300 75 37.5 32: 150 37.5 18.25 64: 75 18.25 9.375	–	–
2275	0	RW	UINT16	PDO1 Source	200: OFF 386: Torque LP1 394: Torque + rot. Speed LP1 396: Torque LP1 + angle of rotation	–	–
2276	0	RW	UINT16	PDO2 Source	200: OFF 390: Torque LP2 395: Torque + rot. Speed LP2	–	–
2277	0	RW	UINT16	PDO3 Source	200: OFF 397: Rotor temperature 398: Power + rotor temperature	–	–
2278	0	RW	UINT16	PDO4 Source	200: OFF 392: Status torque 399: Status torque, Rot. speed/Angle of rot.	–	–
2331	0	RW	VISIBLE STRING	Torque measuring point		Torque	20
2332	0	RW	UINT16	Torque physical unit	1624: Nm, 1625:kNm 1662: ozfin, 1663: ozfft 1664: lbfin, 1665: lbfft	Torque	21
2333	0	RW	UINT16	Torque decimal places	0...5	Torque	22
2334	0	RW	UINT16	Torque sign	135: positive, 136: negative	Torque	23
2341	0	RW	VISIBLE STRING	Speed measuring point		Speed	10
2342	0	RW	UINT16	Speed physical unit	1643: 1/s, 1644: rpm, 1650: rad/s, 1666: 1/min	Speed	11
2343	0	RW	UINT16	Speed decimal places	0...5	Speed	12

Index hex	Sub Ix	Attr	Format	Name	Data	DPV1-C1-Slot	DPV1 - Index hex
2351	0	RW	UINT16	Frequency output source	252: Torque LP1 253: Torque LP2	Frequency output	1
2352	0	RW	UINT16	Frequency output mode	232: 5...15 kHz 233: 30...90 kHz	Frequency output	2
2353	0	RW	FLOAT	Characteristic curve 1st point phys. quantity		Frequency output	3
2354	0	RW	FLOAT	Characteristic curve 2nd point phys. quantity		Frequency output	4
2355	0	RW	FLOAT	Characteristic curve 1st point frequency		Frequency output	5
2356	0	RW	FLOAT	Characteristic curve 2nd point frequency		Frequency output	6
2371	0	RW	UINT16	Analog output source	252: Torque LP1 253: Torque LP2 256: Speed LP1 257: Speed LP2	Analog output	1
2373	0	RW	FLOAT	Characteristic curve 1st point phys. quantity		Analog output	3
2374	0	RW	FLOAT	Characteristic curve 2nd point phys. quantity		Analog output	4
2375	0	RW	FLOAT	Characteristic curve 1st point voltage		Analog output	5
2376	0	RW	FLOAT	Characteristic curve 2nd point voltage		Analog output	6
2410	0	RW	UINT16	LV1 enable	1: ON 0: OFF	Limit value torque	1
2410	0	RW	UINT16	LV1 enable	s. Channel x	Limit value speed	1
2411	1	RW	UINT16	LV1 source	214: Gross	Limit value torque	2
2411	2	RW	UINT16	LV1 source	s. Channel x	Limit value speed	2

Index hex	Sub Ix	Attr	Format	Name	Data	DPV1-C1-Slot	DPV1 - Index hex
2412	1	RW	UINT16	LV1 switch direction	130: Overflow 131: Underflow	Limit value torque	3
2412	2	RW	UINT16	LV1 switch direction	s. Channel x	Limit value speed	3
2416	1	RWP	INT 32	LV1 level		Limit value torque	4
2416	2	RWP	INT 32	LV1 level		Limit value speed	4
2417	1	RW	INT 32	LV1 hysteresis		Limit value torque	5
2417	2	RW	INT 32	LV1 hysteresis		Limit value speed	5
2420	1	RW	UINT16	LV2 enable	1: ON 0: OFF	Limit value torque	11
2420	2	RW	UINT16	LV2 enable	s. Channel x	Limit value torque	11
2421	1	RW	UINT16	LV2 source	214: Gross	Limit value torque	12
2421	2	RW	UINT16	LV2 source	s. Channel x	Limit value speed	12
2422	1	RW	UINT16	LV2 switch direction	130: Overflow 131: Underflow	Limit value torque	13
2422	2	RW	UINT16	LV2 switch direction	s. Channel x	Limit value speed	13
2426	1	RWP	INT 32	LV2 level		Limit value torque	14
2426	2	RWP	INT 32	LV2 level		Limit value speed	14
2427	1	RW	INT 32	LV2 hysteresis		Limit value torque	15
2427	2	RW	INT 32	LV2 hysteresis		Limit value speed	15
2430	1	RW	UINT16	LV3 enable	1: ON 0: OFF	Limit value torque	21

Index hex	Sub Ix	Attr	Format	Name	Data	DPV1-C1-Slot	DPV1 - Index hex
2430	2	RW	UINT16	LV3 enable	s. Channel x	Limit value speed	21
2431	1	RW	UINT16	LV3 source	214: Gross	Limit value torque	22
2431	2	RW	UINT16	LV3 source	s. Channel x	Limit value speed	22
2432	1	RW	UINT16	LV3 switch direction	130: Overflow 131: Underflow	Limit value torque	23
2432	2	RW	UINT16	LV3 switch direction	s. Channel x	Limit value speed	23
2436	1	RWP	INT 32	LV3 level		Limit value torque	24
2436	2	RWP	INT 32	LV3 level		Limit value speed	24
2437	1	RW	INT 32	LV3 hysteresis		Limit value torque	25
2437	2	RW	INT 32	LV3 hysteresis		Limit value speed	25
2440	1	RW	UINT16	LV4 enable	1: ON 0: OFF	Limit value torque	31
2440	2	RW	UINT16	LV4 enable	s. Channel x	Limit value speed	31
2441	1	RW	UINT16	LV4 source	214: Gross	Limit value torque	32
2441	2	RW	UINT16	LV4 source	s. Channel x	Limit value speed	32
2442	1	RW	UINT16	LV4 switch direction	130: Overflow 131: Underflow	Limit value torque	33
2442	2	RW	UINT16	LV4 switch direction	s. Channel x	Limit value speed	33
2446	1	RWP	INT 32	LV4 level		Limit value torque	34
2446	2	RWP	INT 32	LV4 level		Limit value speed	34

Index hex	Sub Ix	Attr	Format	Name	Data	DPV1-C1-Slot	DPV1 - Index hex
2447	1	RW	INT 32	LV4 hysteresis		Limit value torque	35
2447	2	RW	INT 32	LV4 hysteresis		Limit value speed	35
2511	0	RWP	UINT8	Torque zeroing	1	Torque	30
2512	1	RW	FLOAT	Torque zeroing value		Torque	31
2513	0	RW	UINT16	Torque LP filter 1	908: 0.05 Hz, 914: 0.1 Hz 917: 0.2 Hz, 921: 0.5 Hz 927: 1.0 Hz, 931: 2.0 Hz 935: 5.0 Hz, 941: 10 Hz 945: 20 Hz, 949: 50 Hz 955: 100 Hz, 958: 200 Hz 962: 500 Hz, 969: 1000 Hz 1199: Filter OFF	Torque	32
2514	0	RW	UINT16	Torque LP filter 2	908: 0.05 Hz, 914: 0.1 Hz 917: 0.2 Hz, 921: 0.5 Hz 927: 1.0 Hz, 931: 2.0 Hz 935: 5.0 Hz, 941: 10 Hz 945: 20 Hz, 949: 50 Hz 955: 100 Hz	Torque	33
2515	0	RW	UINT16	Shunt calibration	1: ON 0: OFF	Torque	34
2521	0	RW	UINT16	Speed decimal places	0…3	Speed	20
2522	0	RW	UINT16	Speed sign	135: positive 136: negative	Speed	21
2523	0	RW	UINT16	Speed LP filter 1	908: 0.05 Hz, 914: 0.1 Hz 917: 0.2 Hz, 921: 0.5 Hz 927: 1.0 Hz, 931: 2.0 Hz 935: 5.0 Hz, 941: 10 Hz 945: 20 Hz, 949: 50 Hz 955: 100 Hz, 958: 200 Hz 962: 500 Hz, 969: 1000 Hz 1199: Filter OFF	Speed	22
2524	0	RW	UINT16	Speed LP filter 2	908: 0.05 Hz, 914: 0.1 Hz 917: 0.2 Hz, 921: 0.5 Hz 927: 1.0 Hz, 931: 2.0 Hz 935: 5.0 Hz, 941: 10 Hz 945: 20 Hz, 949: 50 Hz 955: 100 Hz	Speed	23
2527	0	RW	UINT16	Pulse output	2140: Frequency F1/F2 2141: Pulse pos. edge/direction of rot. 2142: Pulse pos./neg. edge/direction of rot. 2143: Pulse 4 edges/direction of rotation	Speed	26

Index hex	Sub Ix	Attr	Format	Name	Data	DPV1-C1-Slot	DPV1 - Index hex
2532	0	RW	UITN16	Direction of rotation unit	1648: degrees 1649: rad	Angle of rotation	10
2533	0	RW	UINT16	Angle of rotation decimal places	0…2	Angle of rotation	11
2534	0	RW	UINT8	Angle of rotation zeroing		Angle of rotation	12
2535	0	RW	UINT16	Angle of rotation zeroing mode	2122: Speed sensor 2123: Command	Angle of rotation	13
2536	0	RW	UINT16	Angle of rotation, number of revolutions	1…4	Angle of rotation	14
2537	0	RW	UINT16	Angle of rotation measuring range	2150: 0…360° pos. 2151: 0…360° neg. 2152: 0…–360° pos. 2153: 0…–360° neg. 2154: –360…360° pos. 2155: –360…360° neg.	Angle of rotation	15
2542	0	RW	UINT16	Power unit	1658: W, 1659: kW 1667: MW, 1669: hp	Power	2
2543	0	RW	UINT16	Power decimal places	0…3	Power	3
2544	0	RW	UINT16	Power LP filters	914: 0.1 Hz, 927: 1 Hz 941: 10 Hz, 955: 100 Hz	Power	4

Index hex	Sub Ix	Attr	Format	Name	Data	DPV1-C1-Slot	DPV1 - Index hex
2616	0	RW	UINT16	Load parameter set	1…4	0	30
2617	0	RW	UINT16	Write parameter set	1…4	0	31
3000	1	ROP	FLOAT	Torque LP1		–	–
3000	2	ROP	FLOAT	Torque LP2		–	–
3001	1	ROP	FLOAT	Speed LP1		–	–
3001	2	ROP	FLOAT	Speed LP2		–	–
3002	1	ROP	FLOAT	Angle of rotation		–	–
3003	1	ROP	FLOAT	Power		–	–
300A	0	RO	FLOAT	Rotor temperature		–	–

Name	Slot number
Torque	1
Speed	2
Angle of rotation	3
Power	4
Frequency output	5
Analog output	6
Control word	9
Limit value torque	10
Limit value speed	11

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