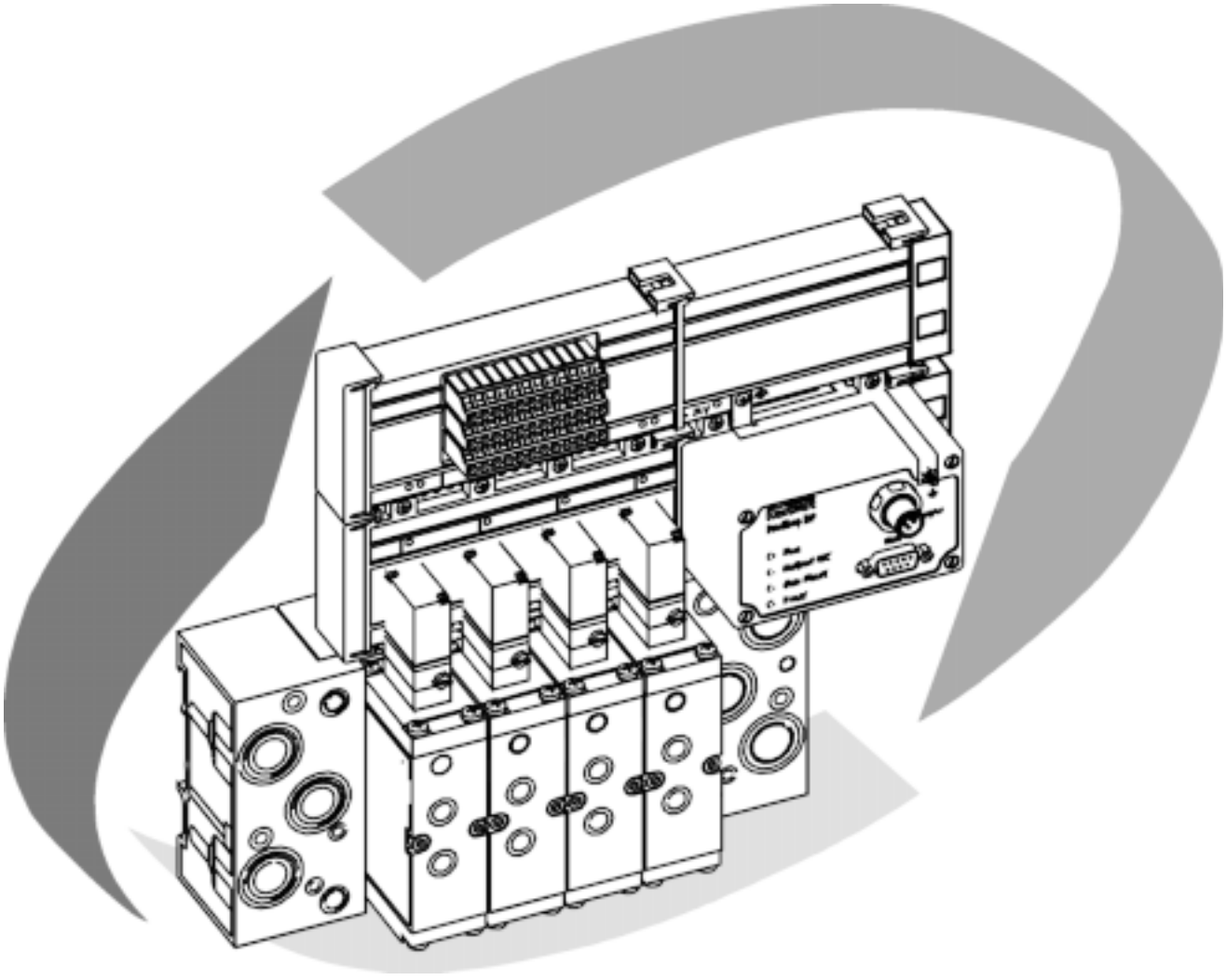
bürkert

Fluid Control Systems

☛ Operating Manual



Modular Electrical Valve Block

Type 8640

Modular Concept - System Assembly

The valve battery is specifically designed for the customer. For optimal adaptation to the tasks, a large selection of electrical and hydraulic components are available. Fig. 1 shows the structure of a valve battery. The individual components are described in the following chapters.

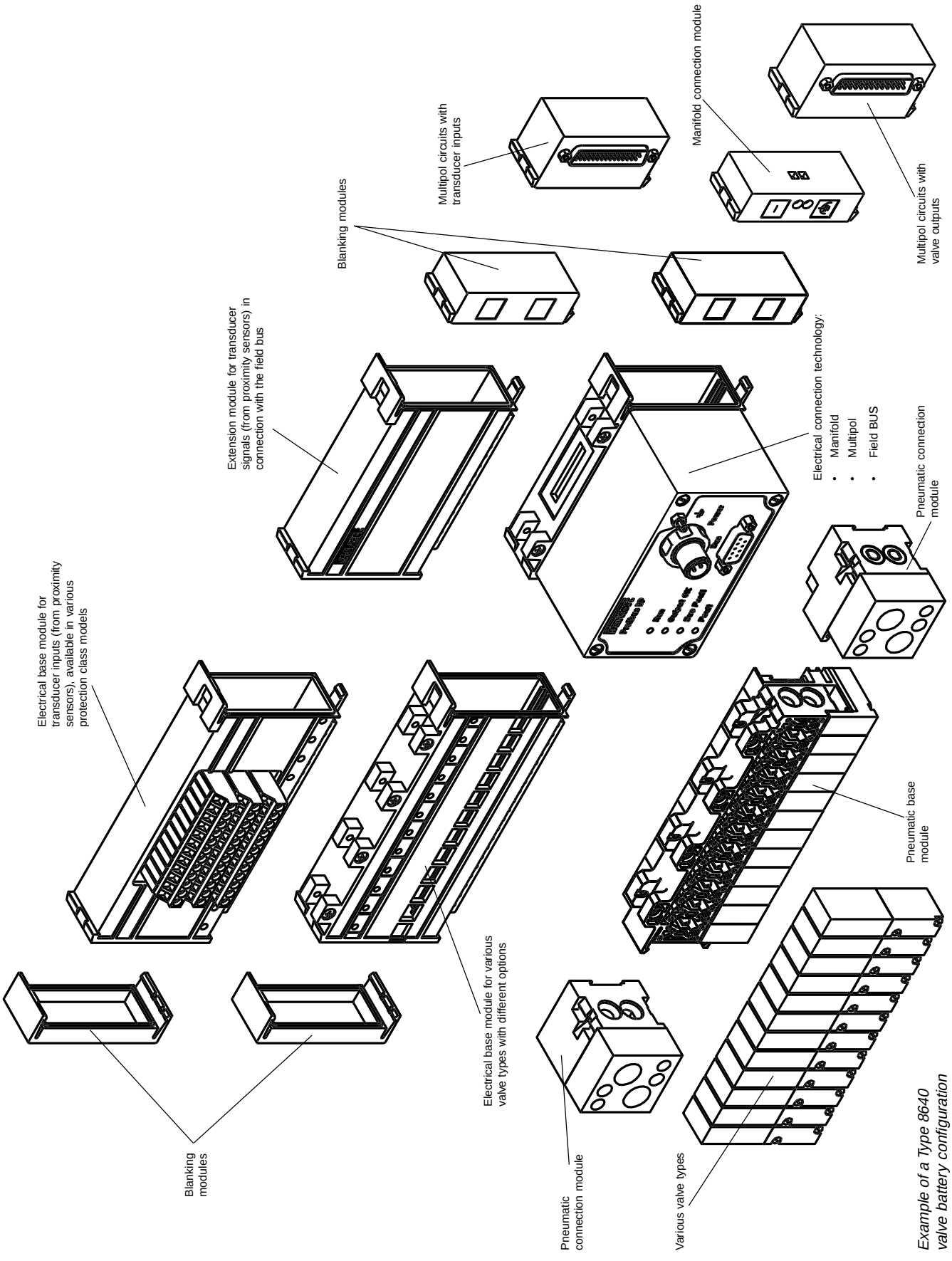


Fig. 1: Example of a Type 8640 valve battery configuration

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- have comments regarding these operating instructions

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CONTENTS

SYMBOLS USED

In these Operating Instructions, the following symbols are used:

→ Indicates a working step that you have to carry on.

ATTENTION! Indicates information which must be followed. Failure to do this could endanger your health or the functionality of the device.

NOTE Indicates important additional information, tips and recommen-dations.

1 GENERAL SAFETY INSTRUCTIONS

To ensure that the device functions correctly, and will have a long service life, please comply with the information in these Operating Instructions, as well as the application conditions and additional data given in the Type 8640 data sheet:

- When planning the application of the device, and during its operation, observe the general technical rules!
- Observe the relevant accident prevention and safety regulations applicable for electrical equipment throughout the operation, maintenance and repair of the device!
- Always switch off the voltage supply before working on the system!
- Take suitable measures to prevent unintentional operation or impermissible impairment.
- If these instructions are ignored, no liability will be accepted from our side, and the guarantee on the device and on accessories will become invalid!

2 ASSEMBLY, COMMISSIONING AND SERVICE OF THE VALVE BATTERY

- Work on the device should only be carried out by specialist staff using the correct tools!
- Always switch off the supply voltage before carrying out repair work!
- When carrying out overhaul work, ensure that safe separation and media blocking equipment are available.
- Faults can result from soiling, short-circuits and loss of electrical power.
- When faults occur, check line connections, voltages and the operational pressure.
- Following an interruption, ensure that a defined and controlled restart of the system takes place according to the instructions.

2.1 Assembly

- The valve battery is assembled in our factory.
- Extensions to the valve battery are possible, but must only be implemented by trained personnel.

2.2 Installation

- When installing the valve battery, take the protection class into consideration. Where necessary, the valve battery must be installed in a control cabinet.
- Never in any circumstances secure the valve battery to the electrical base module! The standard rails of the pneumatic base module or the fixation holes of the pneumatic connection module are provided for this fixation.
- To guarantee the electro-magnetic compatibility (EMC), the TE connection (technical earth) must be connected to the earth potential using a cable that is a short as possible (max. length 30 cm).

2.3 Extensions

- When carrying out extensions and when operating the valve battery, ensure that the maximum permissible power input of the inputs and outputs are not exceeded (see Chapter 3: General Technical Data)!

3 GENERAL TECHNICAL DATA

NOTE

The valve battery meets the requirements of the EMC Law:

Immunity to interference	EN 50082-2
Interference radiation	EN 50081-2

Mounting dimension	**11 mm**	**19 mm**	**33 mm**
Function	C (3/2-Way) Type 6510 H (5/2-Way) Type 6511	C (3/2-Way) Type 5470 G (4/2-Way) Type 5470	C (3/2-Way) Type 6516 H (5/2-Way) Type 6517
Flow	130 l/min	300 l/m	1300 l/min
Pressure range	2,5 - 7 bar	2 - 8 bar	2 - 8 bar
Power (current)	1 Watt (42 mA)	1 Watt (42 mA), 2 Watt (84 mA)	1 Watt (42 mA), 2 Watt (84 mA)
Valve positions	max. 24	max. 24	max. 24
Transducers	max. 32	max. 32	max. 32
Electrical modules	6,12	2,5	2,4
Pneumatic modules	2,3,12	2,3	2,3
Protection class	IP 20 (as terminal model) IP 40	IP 20 (as terminal model) IP 65	IP 20 (as terminal model) IP 65

Ambient temperature 0 to +50°C

Storage temperature -20 to +60°C

Nominal operation Continuous operation (100 % ED)

Operational voltage 24 V/DC ±10%; Residual ripple at field bus interface 1 V_{SS}

Protection classes 3 to VDE 0580

Power consumption The power consumption is dependent on the type of electrical connection technology
Connection technology:

1. For the manifold connection (parallel connection technique) and Multipol interface, the power consumption depends on the type of valve used, but is. however, limited to a total current of max. 3 A. With Multipol together with transducers, an additional summed current also occurs, which must also not exceed 3 A.
2. For the field bus interface, the total current is calculated according to the formula

$$I_{complete} = I_{basic} + (n * I_{valve}) + (m * I_{transducer})$$

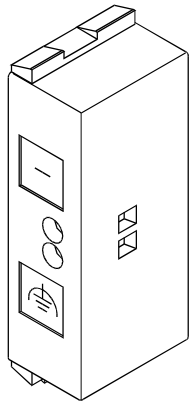
I_{basic}	basic current depending on the field bus	
	PROFIBUS-DP	200 mA
	INTERBUS-S	300 mA
	DeviceNet	200 mA
	Selecan	200 mA
	CANopen	200 mA
n:	number of valves	
m:	number of transducers	
I_{valve}	Rated current of the valve type	
$I_{transducer}$	Power consumption of transducer; ($m*I_{transducer}$) = max. 650 mA	

ATTENTION!

Always use low safety voltages according to protection class 3 VDE 0580!

4 MODULES FOR CONVENTIONAL CONNECTION TECHNIQUES

4.1 Manifold connection module



Allocation plan

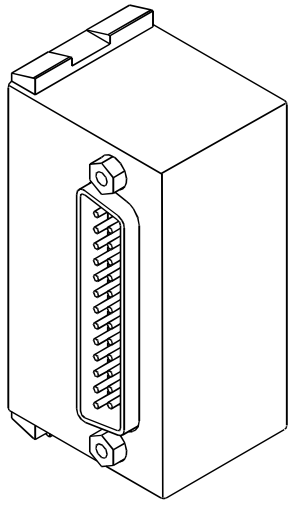
Ground

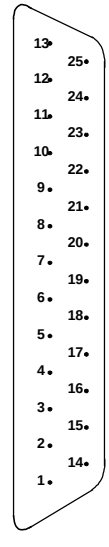
Technical earth

Fig. 2: Manifold connection module for valve outputs

The manifold connection is used as the central connection to ground and the technical earth.

4.2 Multipol circuit valve outputs





Pin 1	Valve 1
Pin 2	Valve 2
Pin 3	Valvel 3
Pin 4	Valve 4
Pin 5	Valve 5
Pin 6	Valve 6
Pin 7	Valve 7
Pin 8	Valve 8
Pin 9	Valve 9
Pin 10	Valve 10
Pin 11	Valve 11
Pin 12	Valve 12
Pin 13	Valve 13
Pin 14	Valve 14
Pin 15	Valve 15
Pin 16	Valve 16
Pin 17	Valve 17
Pin 18	Valve 18
Pin 19	Valve 19
Pin 20	Valve 20
Pin 21	Valve 21
Pin 22	Valve 22
Pin 23	Valve 23
Pin 24	Valve 24
Pin 25	Ground

Fig. 3: Multipol module for D-SUB IP 65 valve outputs and pin allocation of the plug

Accessories

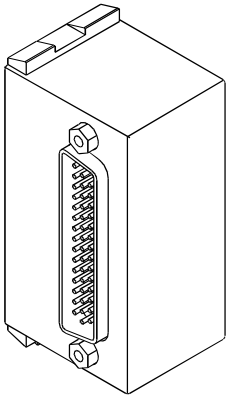
D-SUB connector	25pole	IP 65	5 m cable	Id. Nr. 917 494 H
D-SUB connector	25pole	IP 65	10 m cable	Id. Nr. 917 495 A

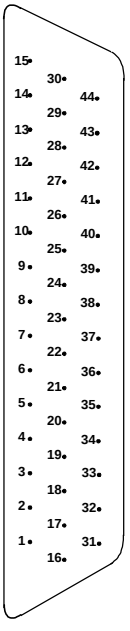
Colour codes for D-SUB cables

The wires are soldered 1:1 to the D-SUB connector, i.e., Wire 1 ws to Pin 1 D-SUB, and so on.

PIN/wire	Wirecolour	Code	PIN/wire	Wirecolour	Code
1	white	ws	14	blue/green	brgn
2	brown	br	15	white/yellow	wsge
3	green	gn	16	qellow/brown	gebr
4	yellow	ge	17	white/grey	wsgr
5	grey	gr	18	grey/brown	grbr
6	rose	rs	19	white/rose	wsrs
7	blue	bl	20	rose/brown	rsbr
8	red	rt	21	white/blue	wsbl
9	black	sw	22	brown/blue	brbl
10	violet	vi	23	white/red	wsrt
11	grey/rose	grrs	24	brown/red	brrt
12	red/blue	rtbl	25	white/black	wssw
13	white/green	wsgn			

4.3 Multipol circuit with transducer inputs (proximity sensors)





Pin 1	Input 1	Pin 20	Input 20
Pin 2	Input 2	Pin 21	Input 21
Pin 3	Input 3	Pin 22	Input 22
Pin 4	Input 4	Pin 23	Input 23
Pin 5	Input 5	Pin 24	Input 24
Pin 6	Input 6	Pin 25	Input 25
Pin 7	Input 7	Pin 26	Input 26
Pin 8	Input 8	Pin 27	Input 27
Pin 9	Input 9	Pin 28	Input 28
Pin 10	Input 10	Pin 29	Input 29
Pin 11	Input 11	Pin 30	Input 30
Pin 12	Input 12	Pin 31	Input 31
Pin 13	Input 13	Pin 32	Input 32
Pin 14	Input 14		:
Pin 15	Input 15	Pin 43	24V
Pin 16	Input 16	Pin 44	Ground
Pin 17	Input 17		
Pin 18	Input 18		
Pin 19	Input 19		

Fig. 4: Multipol module for D-SUB IP 65 transducer inputs and pin allocation of the plug

Asseccories

D-SUB connector	44polig	IP 65	5 m Kabel	Id. Nr. 917 496 B
D-SUB connector	44polig	IP 65	10 m Kabel	Id. Nr. 917 497 C

Colour codes for D-SUB cables

The wires are soldered 1:1 to the D-SUB connector, i.e., Wire 1 ws to Pin 1 D-SUB, and so on.

PIN/wire	Wirecolour	Code	PIN/wire	wirecolour	Code
1	white	ws	23	white/red	wsrt
2	brown	br	24	brown/red	brrt
3	green	gn	25	white/black	wssw
4	yellow	ge	26	brown/black	brsw
5	grey	gr	27	grey/green	grgn
6	rose	rs	28	yellow/grey	gegr
7	blue	bl	29	rose/green	rsgn
8	red	rt	30	yellow/rose	gers
9	black	sw	31	green/blue	gnbl
10	violet	vi	32	yellow/blue	gebl
11	grey/rose	grrs	33	green/red	gnrt
12	red/blue	rtbl	34	yellow/red	gert
13	white/green	wsgn	35	green/black	gnsw
14	brown/green	brgn	36	yellow/black	gesw
15	white/yellow	wsge	37	grey/blue	grbl
16	yellow/brown	gebr	38	rose/blue	rsbl
17	white/grey	wsgr	39	grey/red	grrt
18	grey/brown	grbr	40	rose/red	rsrt
19	white/rose	wsrs	41	grey/black	grsw
20	rose/brown	rsbr	42	rose/black	rssw
21	white/blue	wsbl	43	blue/black	blsw
22	brown/blue	brbl	44	red/black	rtsw

4.4 Multipol circuit with industrial connector

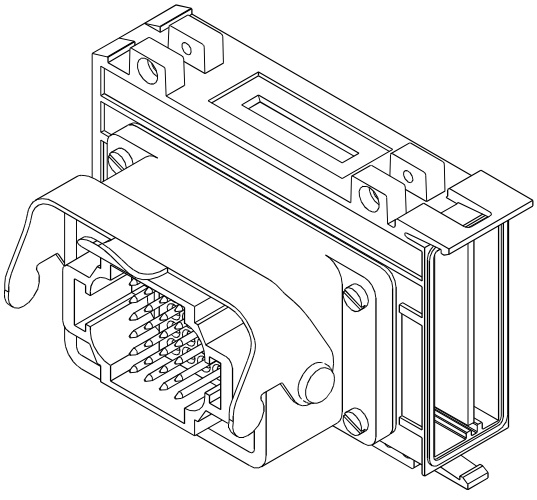
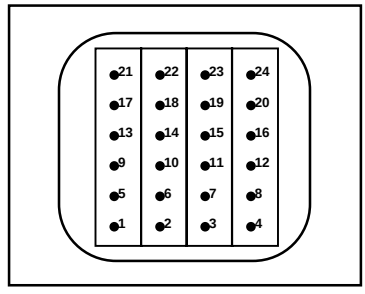


Fig. 5: Multipol module for valve inputs (max. 22) and pin allocation of the industrial connector for the valve outputs



Pin 1	Valve 1	Pin 13	Valve 13
Pin 2	Valve 2	Pin 14	Valve 14
Pin 3	Valve 3	Pin 15	Valve 15
Pin 4	Valve 4	Pin 16	Valve 16
Pin 5	Valve 5	Pin 17	Valve 17
Pin 6	Valve 6	Pin 18	Valve 18
Pin 7	Valve 7	Pin 19	Valve 19
Pin 8	Valve 8	Pin 20	Valve 20
Pin 9	Valve 9	Pin 21	Valve 21
Pin 10	Valve 10	Pin 22	Valve 22
Pin 11	Valve 11	Pin 23	Ground
Pin 12	Valve 12	Pin 24	TE

5 FIELD BUS TECHNOLOGY

5.1 PROFIBUS-DP field bus module

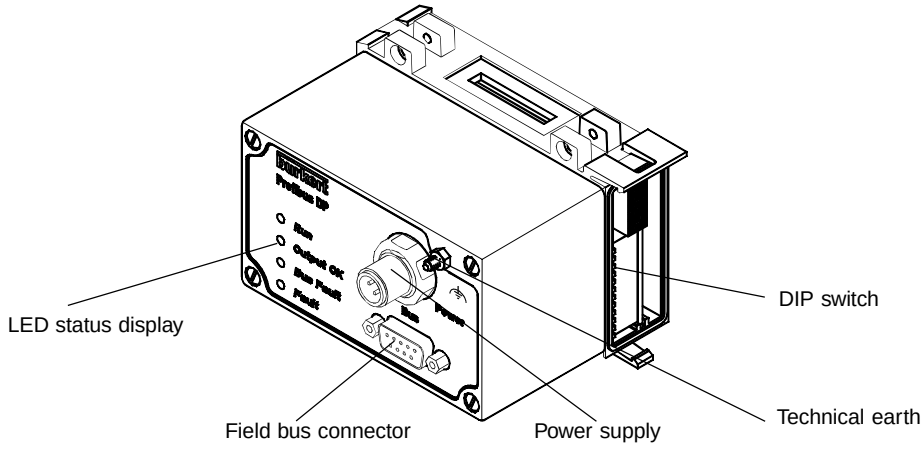
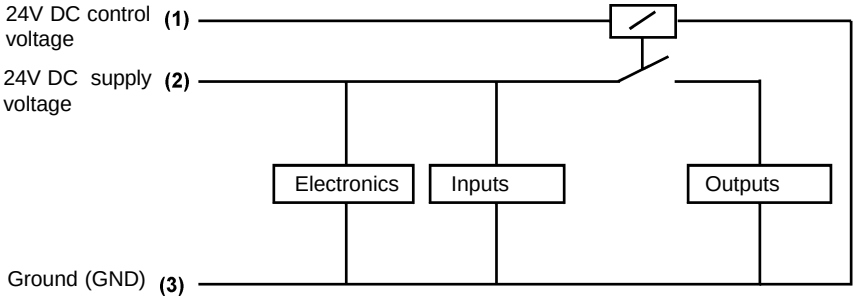


Fig. 6: General view of PROFIBUS-DP field bus module

5.1.1 Power supply

The 4-pole round plug for the power supply has the following pin allocations



Pin 1	24V DC control voltage
Pin 2	24V DC supply voltage
Pin 3	Ground (GND)
Pin 4	not used

NOTE Pin 2 of the power supply must be fused with 4A (semi-time lag).

ATTENTION! To ensure the electro-magnetic compatibility (EMC), connect the screw terminal TE (Technical earth) to the ground potential with a cable that is a short as possible.

Accessories

Plug connector M12+1 (socket) for the power supply Order number 917116 D

5.1.2 Field bus connection

A 9-pole D-SUB connector is used for the field bus connection. The pin allocation laid down by the 19245 Standard, Part 1 is described below.

Pin No.	Signal name (socket in unit, plug on cable)	Description
1	free	-
2	free	-
3	RxD/TxD-P	Receive / Send Data-P
4	CNTR-P (RTS)	Request to Send (repeater control signal)
5	DGND	Data reference potential
6	+5V	Supply voltage-plus
7	free	-
8	RxD/TxD-N	Receive/Send Data-N
9	free	-

5.1.3 LED Status Display

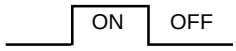
Normal status

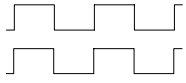
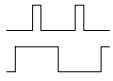
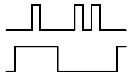
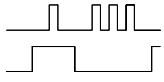
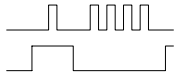
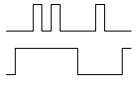
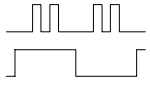
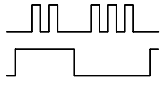
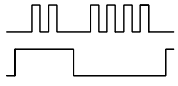
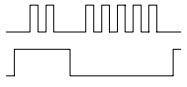
LED	Status	Description
RUN Output OK Bus Fault Fault	ON ON OFF OFF	Error-free operation of the valve battery

Power supply fault

LED	Status	Description	Cause of fault / Rectification
RUN	OFF	No voltage supplied by 24 V power supply	Check the power supply (Power supply connector Pin 2)
Output OK	OFF	No voltage supplied by the 24 V control voltage for the outputs	Check the control voltage (Power supply connector Pin 1)

Faults and warnings will be displayed by the Bus Fault and Fault LEDs

LED status 

LED	Status	Description	Cause of fault / Rectification
BusFault **Fault**	ON OFF	Response monitoring time for the valve battery has elapsed without the Master responding	**In operation:** Check Master (controller) and bus cable **During commissioning:** Check network configuration to master and station address at the valve battery
BusFault **Fault**	ON or OFF 	Fault on an extension battery, complete failure or output voltages not present	Check expansion battery Power supply, RIO-BUS
BusFault **Fault**	OFF ON	RIO interface set by DIP switch (SW8), but not inserted or RIO interface faulty	Check RIO interface *
BusFault **Fault**		BusFault and Fault LEDs blinking at same rate. Station address set is outside the permitted range (0 ... 125)	Check the address at the valve battery *
BusFault **Fault**		Parameter Fault Number 1 Too many inputs for one valve battery	Check user parameters and DIP switch *
BusFault **Fault**		Parameter Fault Number 2 Too many outputs for one valve battery	Check user parameters and DIP switch *
BusFault **Fault**		Parameter Fault Number 3 Parameter telegram too small	Check user parameters and DIP switch *
BusFault **Fault**		Parameter Fault Number 4 Parameter telegram too big	Check user parameters and DIP switch *
BusFault **Fault**		Configuration Fault Number 1 Too many inputs for one valve battery	Check identifier bytes and DIP switch *
BusFault **Fault**		Configuration Fault Number 2 Too many outputs for one valve battery	Check identifier bytes and DIP switch *
BusFault **Fault**		Configuration Fault Number 3 Too few inputs for all valve batteries (default from parameter telegram)	Check identifier byte, DIP switch and user parameters *
BusFault **Fault**		Configuration Fault Number 4 Too few outputs for all valve batteries (default from parameter telegram)	Check identifier byte, DIP switch and user parameters *
BusFault **Fault**		Configuration Fault Number 5 A identifier has the wrong code	Check identifier bytes *

* After rectifying the fault, it is necessary to carry out a new start of the valve battery by temporarily disconnecting the power supply.

5.1.4 Setting the DIP switches

Using the DIP switches, you can carry out settings for the field bus module. It is located on the right-hand side, in the lower part of the bus module (see also Fig. 6). In order to access the DIP switch, remove the plugged-in termination module.

NOTE A change of the switch position only becomes active after the field bus module has been restarted.

1	2	3	4	5	6	7	8	9	10	11	12
Address of the PROFIBUS-DP-subscriber 0-125							RIO-Interface ON: aktive	Inputs Mode		Input filter ON: aktive	Reserve

5.1.4.1 Address of the PROFIBUS-DP subscribers: DIP switches 1 to 7

Each subscriber on the Profibus has a unique address. This address is set at the valve battery using DIP switches 1 to 7.

DIP-1	DIP-2	DIP-3	DIP-4	DIP-5	DIP-6	DIP-7	Address
OFF	OFF	OFF	OFF	OFF	OFF	OFF	0
ON	OFF	OFF	OFF	OFF	OFF	OFF	1
OFF	ON	OFF	OFF	OFF	OFF	OFF	2
ON	ON	OFF	OFF	OFF	OFF	OFF	3
				:			
ON	ON	ON	ON	ON	OFF	OFF	124
ON	ON	ON	ON	ON	OFF	ON	125

5.1.4.2 RIO interface: DIP Switch 8

You can connect extension batteries using the internal bus (RIO). If the internal bus is used, DIP switch 8 must be set to ON. The RIO interface module is inserted onto the PROFIBUS-DP field bus module (see Chapter 7).

5.1.4.3 „Inputs“ mode: DIP switches 9 and 10

NOTE Using the input mode, the inputs (transducers) can be allocated in different ways in the process layout of the inputs (PAE).

	DIP 9	DIP 10
No inputs present	OFF	OFF
Normal mode	ON	OFF
Mode: shifted inputs	OFF	ON
Mode: halved inputs	ON	ON

ATTENTION! If no inputs are present, both switches must be set to OFF.

Normal Mode

In the Normal mode, all inputs are read in from right to left.

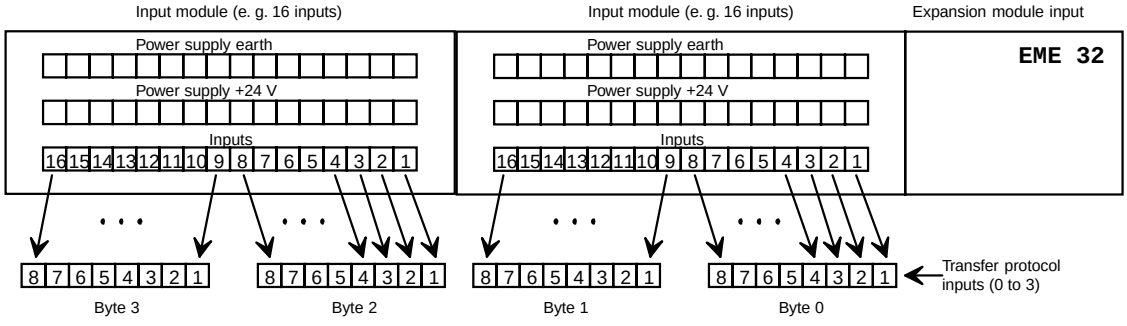


Fig. 7: Normal mode

„Shifted Inputs“ mode

In the „Shifted Inputs“ mode, the first 16 inputs are alternately set in the transfer protocol in Byte 0 and Byte 1. With the next 16 inputs, the same takes place for Byte 2 and Byte 3.

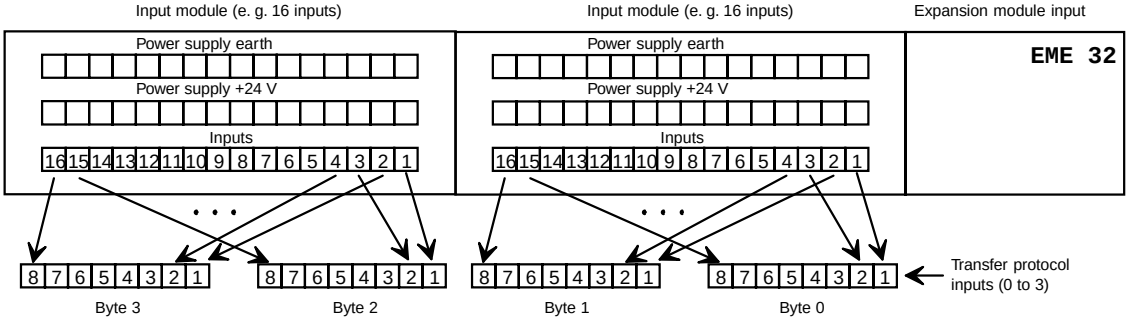


Fig. 8: „Shifted Inputs“ mode

„Halved Inputs“ mode

In the „Halved Inputs“ mode, every second input is missed out. Only inputs 1, 3, 5, ... are transferred; as a result, only 2 Bytes are needed for 32 physically-present inputs.

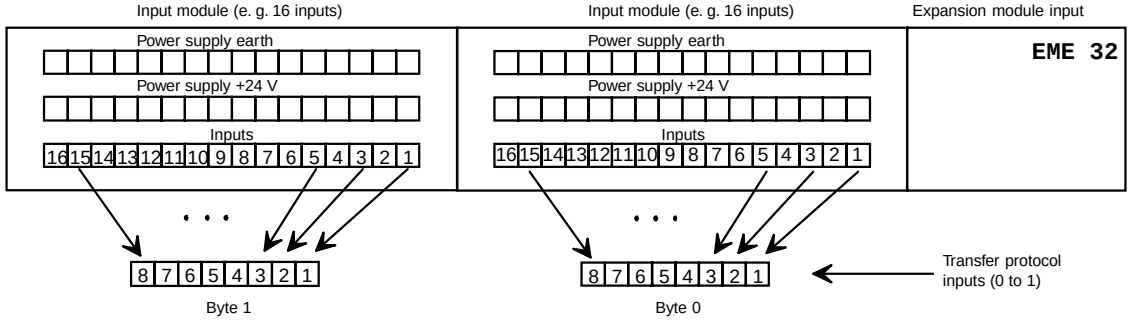


Fig. 9: „Halved Inputs“ mode

5.1.4.4 Input filter: DIP switch 11

With the input filter, interference which could affect the input modules is suppressed.

	DIP 11
Input filter inactive	OFF
Input filter active	ON

ATTENTION!

With the filter active, only signals with a duration of ≥ 2 ms will be recognised.

5.1.5 Terminal resistance

In the PROFIBUS-DP, the two-wire lines of the field bus must be terminated at both ends with resistances. If the last subscriber is a valve battery, the terminal resistance can be activated through the DIP switch. The DIP switch is located on the underside of the Bus module, underneath a protective cap.

NOTE

With the high data transfer rates used in the field bus technology, there can be signal reflections at the end of the field bus branches which cause interference. This can lead to data errors. By adding terminal resistors, these reflections are suppressed.

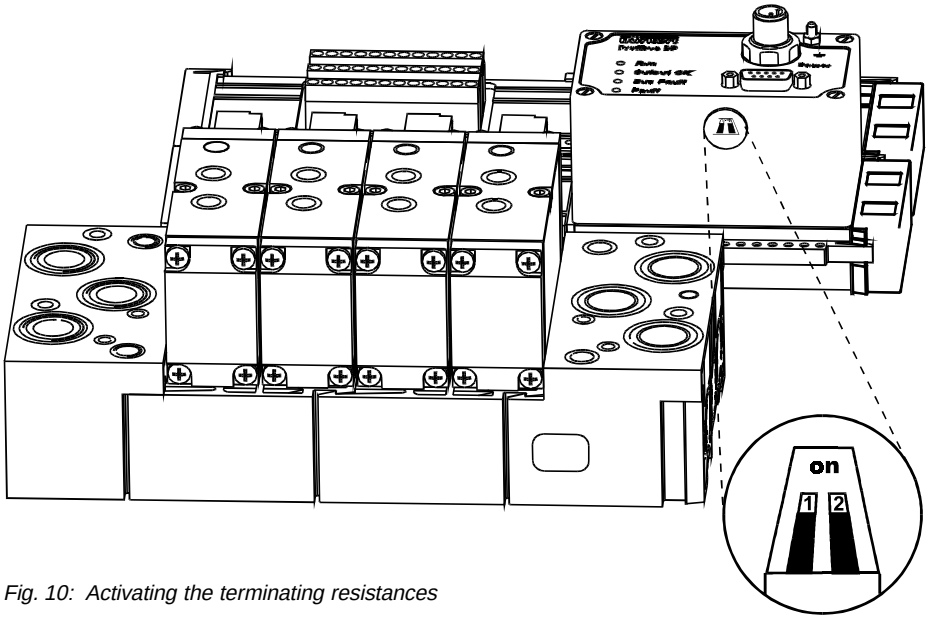


Fig. 10: Activating the terminating resistances

Activating the terminal resistors on the underside of the module

➔ Carefully remove the protective cap!

➔ Slide both switches to the rear, into the ON position!

➔ Replace the protective cap!

5.1.6 PROFIBUS-DP

The purpose of the bus system is the fast serial linkage of de-central peripherals (valve batteries) with the central Master (controller). In addition to the Input/Output data, parameter data, configuration data and diagnosis data is also transferred.
The PROFIBUS-DP is defined in the DIN 19245 T3 standard.

Many Profibus masters (controllers) need a configuration program with which the network structure is described. e.g., SIEMENS COM ET200 for the S5 controller. These programs require the unit master file (GSD file) or, as in the case of the above-mentioned Siemens controller, the Type file. Both files are stored on diskettes, and contain bus-specific data.

5.1.6.1 Extract of important data for the PROFIBUS-DP

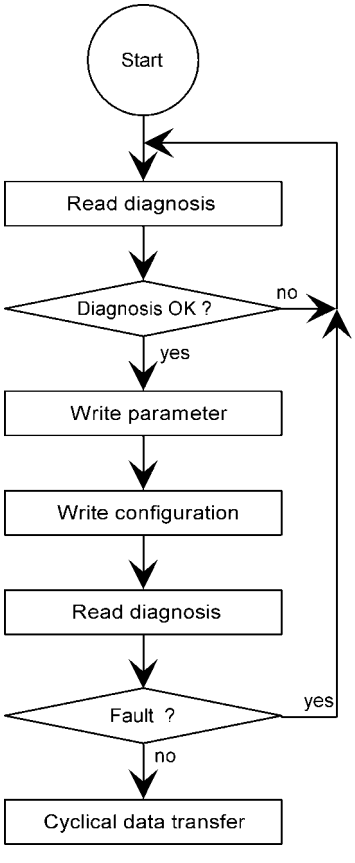
Available Baud rates: 9,6; 19,2; 93,75; 187,5; 500; 1500 kBaud

Manufacture's Number: 0081 Hex

Data quantity without RIO extension:
- 4 input and 3 output bytes
- several identifiers possible (e.g., 10H, 10H, 10H, 10H, 20H, 20H, 20H)
- no user-specific parameters

Data quantity with RIO extension:
- 4 input and 3 output bytes for each battery
- Byte or bit limits between the individual batteries
- with bit limits, user-specific parameters necessary

5.1.6.2 Simplified illustration of the PROFIBUS-DP communication procedure



Read diagnosis The diagnosis is requested until the subscriber logs on, and is not seized by another master

Master sends parametrising
- bus-specific data (e.g., response monitoring)
- user-specific parameter data (only with RIO)
  => Fault indicated in diagnosis

Master sends desired configuration
Desired configuration is compared to the actual configuration in the Slave => Fault indicated in diagnosis

Read diagnosis Master reads diagnosis

If there is a parametrising / configuration fault, the communication restarts from the beginning.

If the Slave is in the data transfer mode, a cyclical data transfer takes place.

5.1.6.3 Parametrising the Slave (valve battery)

When the system is running up, each slave receives parameters from the master. The first 7 bytes are defined by the DIN 19245 T3 standard (bus parameters). The following bytes are user parameters (User_Prm_Data). The input of the parameter data takes place in different ways in the various configuration programs (e.g., COM ET200). In many cases, the bytes defined by the standard are read from the GSD file.

Some configuration programs read the user-specific parameters separately. The count for the user parameters often begins with 0 or 1.

The configuration program COM ET 200 from the Siemens company has one parameter string for each Slave. The input masks is activated in the configuration mask using the keys SHIFT + F6. The count begins with 0 for the user parameters.

NOTE The valve battery only requires user parameters if the RIO expansion is used with bit limits.

The user parameter data is closely linked with the configuration. For this reason, you will find the examples in the „Configuration“ chapter 5.1.6.4.

Parametrising the valve battery

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte	**Bus parameters (System parameters)** 7 Bytes							
1	**Lock_Rep** 00 min TSDR and Slave spez. data 01 for other Master enabled 10 for other Master blocked 01 for other Master enabled	**Unlock_Re**	**Sync_Req** Slave will be operated in Sync-Mode	**Freeze_Req** Slave will be operated in Freeze-Mode	**WD_On** Response monitor 0: de-activate 1: activated	**reserved**	**reserved**	**reserved**
2	**WD_Fact_1**		(Range 1 - 255 response monitoring in [s] = 10ms * WD_Fact_1 * WD_Fact_2)					
3	**WD_Fact_2**		(Range 1 - 255 response monitoring in [s] = 10ms * WD_Fact_1 * WD_Fact_2)					
4	**TSDR**		(Time in Tbit if slave can answer. At least 11 Tbit, 0 all value remains)					
5	**Ident_Number high Byte**		(Manufacturer identifier 00 Hex)					
6	**Ident_Number low Byte**		(Manufacturer identifier 81 Hex)					
7	**Group_Ident**		(for group-formation, each bit represents a group)					
	User_Prm_Data (User Parameter)							
8	**Diagnosis length** 0:16 Byte 20 Byte	**reserved**	**reserved**	**reserved**	**Parameter type** 0:EI data is assembled in bytes 1:EI data is assembled in bits (No. of bits per EI is defined in the following Byte)			
	No. of bits per expansion battery (only if parameter type = bit)							
9	**No. of input bits, Master battery** (0-32)							
10	**No. of output bits, Master battery** (0-24)							
11	**No. of input bits, Extension battery 0** (0-32)			(DIP switch on the EI		S1=OFF, S2=OFF, S3=OFF)		
12	**No. of output bits, Extension battery 0** (0-24)			(DIP switch on the EI		S1=OFF, S2=OFF, S3=OFF)		
13	**No. of input bits, Extension battery 1** (0-32)			(DIP switch on the EI		S1=ON, S2=OFF, S3=OFF)		
14	**No. of output bits, Extension battery 1** (0-24)			(DIP switch on the EI		S1=ON, S2=OFF, S3=OFF)		
15	**No. of input bits, Extension battery 2** (0-32)			(DIP switch on the EI		S1=OFF, S2=ON, S3=OFF)		
16	**No. of output bits, Extension battery 2** (0-24)			(DIP switch on the EI		S1=OFF, S2=ON, S3=OFF)		
17	**No. of input bits, Extension battery 3** (0-32)			(DIP switch on the EI		S1=ON, S2=ON, S3=OFF)		
18	**No. of output bits, Extension battery 3** (0-24)			(DIP switch on the EI		S1=ON, S2=ON, S3=OFF)		
19	**No. of input bits, Extension battery 4** (0-32)			(DIP switch on the EI		S1=OFF, S2=OFF, S3=ON)		
20	**No. of output bits, Extension battery 4** (0-24)			(DIP switch on the EI		S1=OFF, S2=OFF, S3=ON)		
21	**No. of input bits, Extension battery 5** (0-32)			(DIP switch on the EI		S1=ON, S2=OFF, S3=ON)		
22	**No. of output bits, Extension battery 5** (0-24)			(DIP switch on the EI		S1=ON, S2=OFF, S3=ON)		
23	**No. of input bits, Extension battery 6** (0-32)			(DIP switch on the EI		S1=OFF, S2=ON, S3=ON)		
24	**No. of output bits, Extension battery 6** (0-24)			(DIP switch on the EI		S1=OFF, S2=ON, S3=ON)		
25	**No. of input bits, Extension battery 7** (0-32)			(DIP switch on the EI		S1=ON, S2=ON, S3=ON)		
26	**No. of output bits, Extension battery 7** (0-24)			(DIP switch on the EI		S1=ON, S2=ON, S3=ON)		

EI: Expansion battery

5.1.6.4 Configuring the Slaves (Valve batteries)

With the configuration telegram, the number of input and output bytes is compared. The entry takes place via identifier bytes. A configuration telegram can contain one or more identifiers.

Structure of a identifier byte

Bit 7	Bit 6	Bit 5-4	Bit 3-0
Consistency	**Bytes/Words**	**Input/Output**	**Length (no.) of the data**
0=Byte/Word	0 = Bytes	00 = spec. charact. format	0000 = 1 Byte/Word
1=complete length	1 = Words (2Byte)	01 = Input	:
		10 = Output	0010 = 3 Bytes/Words
		11 = In/Output	:
			1111 = 16 Bytes/Words

Examples:

Hex	Decimal	Significance
10	016	1 byte input consistent via Byte
11	017	2 bytes input consistent via Byte
12	018	3 bytes input consistent via Byte
14	019	4 bytes input consistent via Byte
20	032	1 byte output consistent via Byte
21	033	2 bytes output consistent via Byte
22	034	3 bytes output consistent via Byte
00	000	Bookmark

5.1.6.4.1 Configuration of the valve batteries without expansion batteries

A valve battery has a maximum of 24 valves (outputs) and a maximum of 32 transducers (inputs). This results in 3 output bytes and 4 input bytes. In order to be able to flexibly store the data in the process image, up to 7 identifier bytes can be given.

Example 1: Valve battery with 16 valves (outputs) and 32 transducers (inputs)

- PROFIBUS-DP addresses 4
- Valves 1 - 16 occupy „Outputs“ (PAA) Byte 11-12 in the process image
- Transducers 1 - 32 occupy „Inputs“ (PAE) Byte 20-23 in the process image
- Mode: Normal input mode
- Input filter active

DIP Switch:

1	2	3	4	5	6	7	8	9	10	11	12
OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	ON	OFF	ON	OFF

User parameters are unnecessary!

Configuration:

Byte number (Slot)	1 (0)	2 (1)
Identification in Hex (Dez)	13 (019)	21 (033)
Process image output (PAA)		11-12
Process image input (PAE)	20-23	

Allocation of Inputs and Outputs to the Controller Process Image

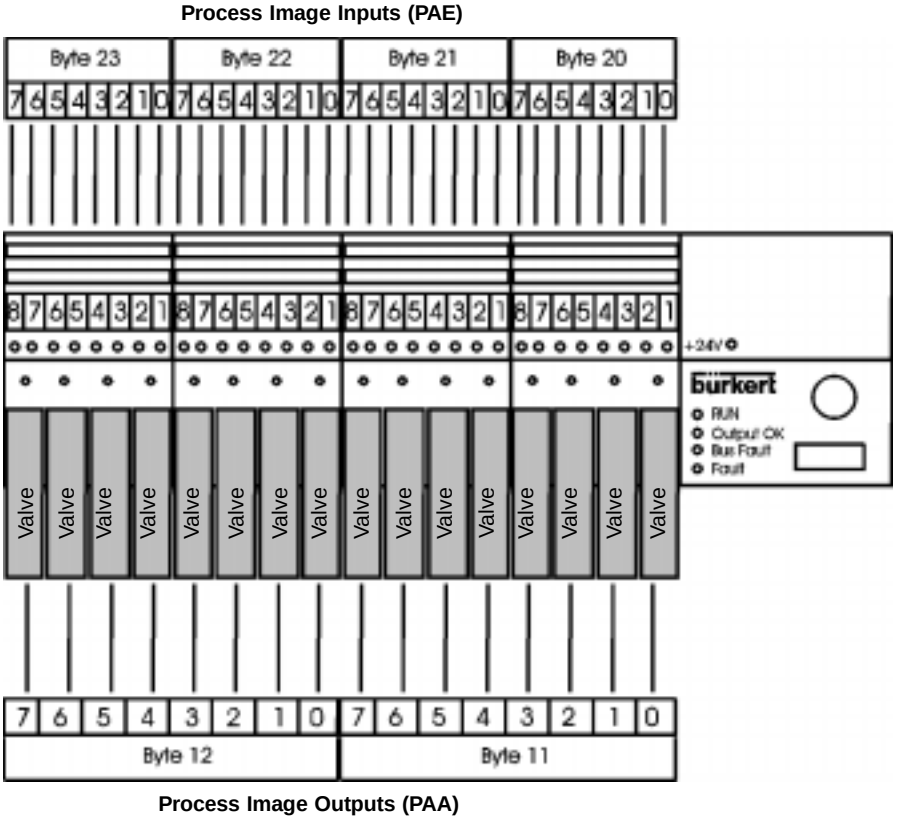


Fig. 11: Allocation of Inputs and Outputs to the Controller Process Image

Example 2: Valve battery with 16 valves (outputs) and 32 transducers (inputs)

- PROFIBUS-DP address 5
- Valves 1 - 8 occupy „Outputs“ (PAA) Byte 11 in the process image
- Valves 9 - 16 occupy „Outputs“ (PAA) Byte 20 in the process image
- Transducers 1 - 8 occupy „Inputs“ (PAE) Byte 10 in the process image
- Transducers 9 - 16 occupy „Inputs“ (PAE) Byte 15 in the process image
- Transducers 17 - 32 occupy „Inputs“ (PAE) Byte 20-21 in the process image
- Mode: Normal input mode
- Input filter active

DIP-Switch:

1	2	3	4	5	6	7	8	9	10	11	12
ON	OFF	ON	OFF	OFF	OFF	OFF	OFF	ON	OFF	ON	OFF

User parameters are unnecessary!

Configuration:

Byte number (Slot)	1 (0)	2 (1)	3 (2)	4 (3)	5 (4)
Identification in Hex (Dez)	10 (016)	10 (016)	11 (017)	20 (032)	20 (032)
Process image output (PAA)				11	20
Process image input (PAE)	10	15	20-21		

Allocation of Inputs and Outputs to the Controller Process Image

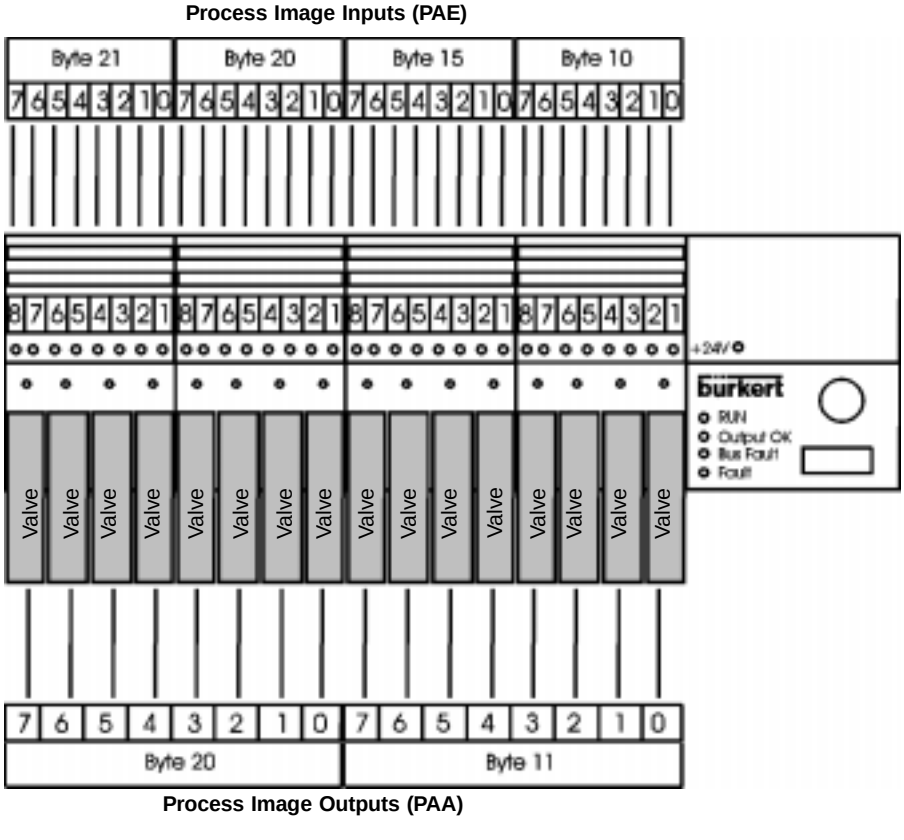


Fig. 12: Allocation of Inputs and Outputs to the Controller Process Image

Example 3: Valve battery with 16 valves (outputs) and 32 transducers (inputs)

- PROFIBUS-DP address 6
- Valves 1 - 16 occupy „Outputs“ (PAA) Byte 11 + 12 in the process image
- Transducers 1, 3, 5...15 occupy „Inputs“ (PAE) Byte 10 in the process image
- Transducers 2, 4, 6, ..16 occupy „Inputs“ (PAE) Byte 16 in the process image
- Transducers 17, 19, .. 31 occupy „Inputs“ (PAE) Byte 11 in the process image
- Transducers 18, 20, .. 32 occupy „Inputs“ (PAE) Byte 17 in the process image
- Mode: „Shifted Inputs“
- Input filter active

DIP Switch:

1	2	3	4	5	6	7	8	9	10	11	12
OFF	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF

User parameters are unnecessary!

Configuration:

Byte number (Slot)	1 (0)	2 (1)	3 (2)	4 (3)	5 (4)
Identification in Hex (Dez)	10 (016)	10 (016)	10 (016)	10 (016)	21 (032)
Process image output (PAA)					11-12
Process image input (PAE)	10	16	11	17	

Allocation of Inputs and Outputs to the Controller Process Image

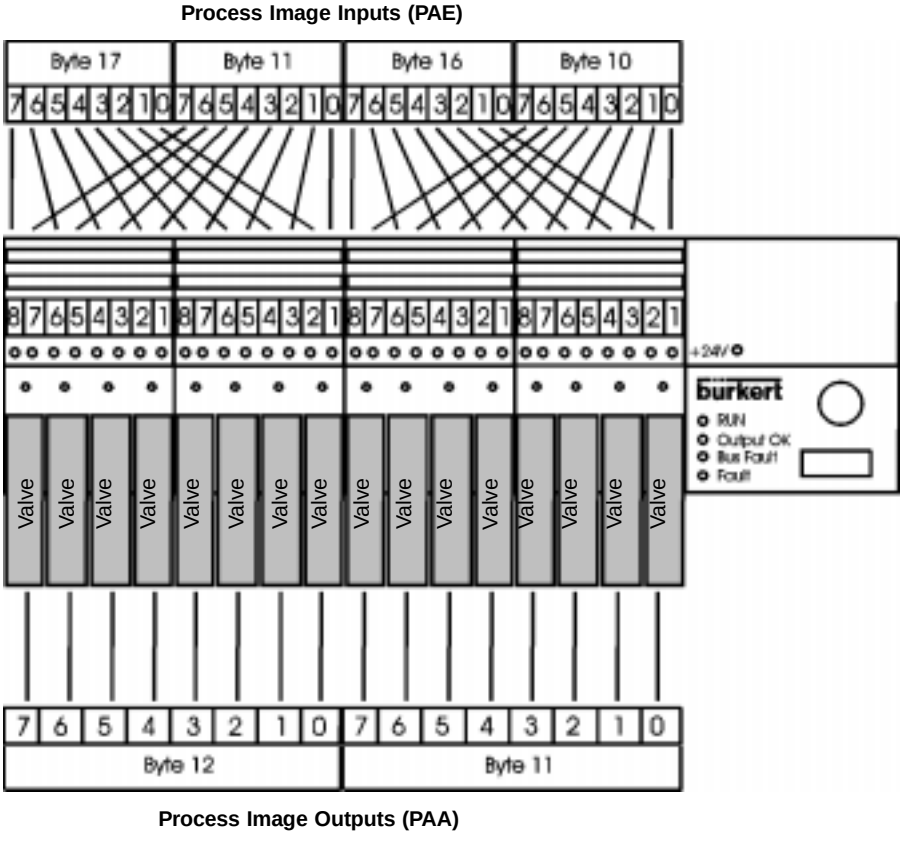


Fig. 13: Allocation of Inputs and Outputs to the Controller Process Image

Example 4: Valve battery with 16 valves (outputs) and 32 transducers (inputs) Every second transducer will not be considered

- PROFIBUS-DP address 7
- Valves 1 - 8 occupy Outputs (PAA) Byte 17 in the process image
- Valves 9 - 16 occupy Outputs (PAA) Byte 10 in the process image
- Transducers 1, 3, 5,..15 occupy „Inputs“ (PAE) Byte 18 in the process image
- Transducers 17, 19, .. 31 occupy „Inputs“ (PAE) Byte 21 in the process image
- Mode: „Halved Inputs“
- Input filter active

DIP Switch:

1	2	3	4	5	6	7	8	9	10	11	12
ON	ON	ON	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	OFF

User parameters are unnecessary!

Configuration:

Byte number (Slot)	1 (0)	2 (1)	3 (2)	4 (3)
Identification in Hex (Dez)	10 (016)	10 (016)	20 (032)	20 (032)
Process image output (PAA)			17	10
Process image input (PAE)	18	21		

Allocation of Inputs and Outputs to the Controller Process Image

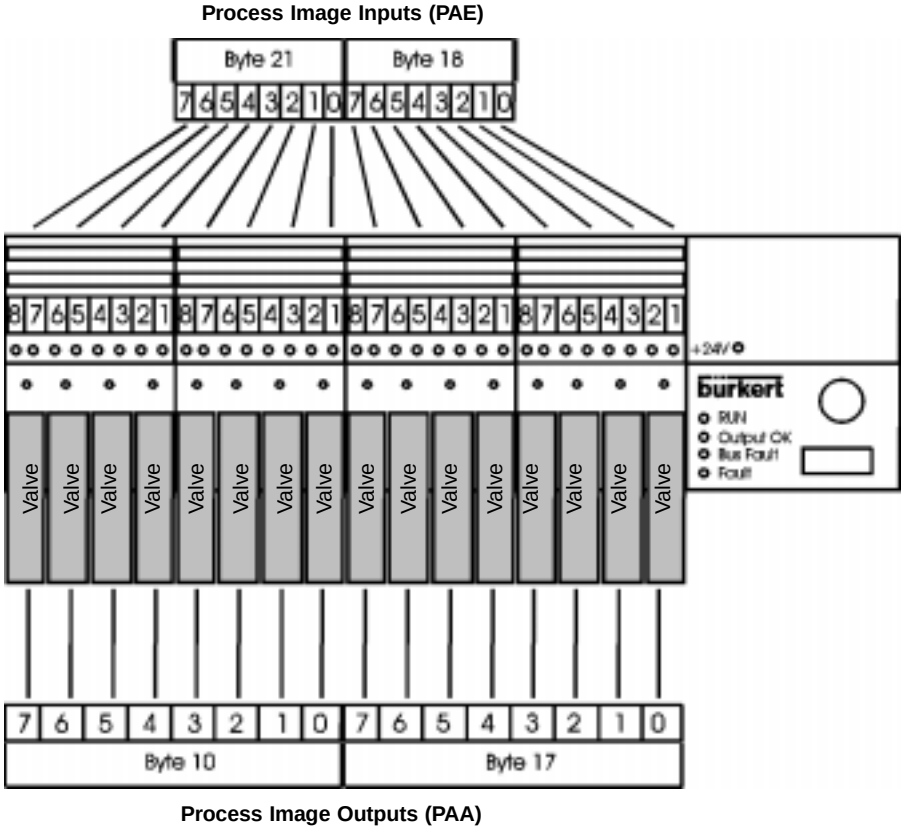


Fig. 14: Allocation of Inputs and Outputs to the Controller Process Image

5.1.6.4.2 Configuring the valve battery with an expansion battery

Expansion batteries begin with a new byte

Each expansion valve battery begins with a new byte in the process image.
For the main battery and each expansion battery, 2 identifiers are used. Each battery can be configured with 4 input bytes and 3 output bytes. For „no input“ or „no output“, the identifier „0“ is used.
Sequence of the input and output bytes:

Main battery,
Expansion battery 0,
Expansion battery 1,
Expansion battery 2, ...

For each battery, the mode of the inputs can be separately set using DIP switches. Corresponding to the setting of the DIP switch on the expansion battery, the data is sent to the main battery and passed on from there to the Master.

ATTENTION!

If 1 byte is configured for the expansion battery (identifier in configuration telegram), then only 1 byte will be passed on to the Master, even if several inputs have been given in the expansion battery. The same applies to outputs.

Parameter telegram: User parameters are not necessary, or parameter type (Byte 8) = 0

Byte No. (Slot)	Function	Valve battery	
1 (0)	Inputs	Main battery	
2 (1)	Outputs	Main battery	
3 (2)	Inputs	Expansion battery 0	(DIP switch on EI 0 S1=OFF, S2=OFF,S3=OFF)
4 (3)	Outputs	Expansion battery 0	(DIP switch on EI 0 S1=OFF, S2=OFF,S3=OFF)
5 (4)	Inputs	Expansion battery 1	(DIP switch on EI 1 S1=ON, S2=OFF,S3=OFF)
6 (5)	Outputs	Expansion battery 1	(DIP switch on EI 1 S1=ON, S2=OFF,S3=OFF)
7 (6)	Inputs	Expansion battery 2	(DIP switch on EI 2 S1=OFF, S2=ON,S3=OFF)
8 (7)	Outputs	Expansion battery 2	(DIP switch on EI 2 S1=OFF, S2=ON,S3=OFF)
9 (8)	Inputs	Expansion battery 3	(DIP switch on EI 2 S1=ON, S2=ON,S3=OFF)
10 (9)	Outputs	Expansion battery 3	(DIP switch on EI 2 S1=ON, S2=ON,S3=OFF)
11 (10)	Inputs	Expansion battery 4	(DIP switch on EI 4 S1=OFF, S2=OFF,S3=ON)
12 (11)	Outputs	Expansion battery 4	(DIP switch on EI 4 S1=OFF, S2=OFF,S3=ON)
13 (12)	Inputs	Expansion battery 5	(DIP switch on EI 5 S1=ON, S2=OFF,S3=ON)
14 (13)	Outputs	Expansion battery 5	(DIP switch on EI 5 S1=ON, S2=OFF,S3=ON)
15 (14)	Inputs	Expansion battery 6	(DIP switch on EI 6 S1=OFF, S2=ON,S3=ON)
16 (15)	Outputs	Expansion battery 6	(DIP switch on EI 6 S1=OFF, S2=ON,S3=ON)
17 (16)	Inputs	Expansion battery 7	(DIP switch on EI 6 S1=ON, S2=ON,S3=ON)
18 (17)	Outputs	Expansion battery 7	(DIP switch on EI 6 S1=ON, S2=ON,S3=ON)

EI expansion battery

Example 5: Main valve battery and 3 expansion batteries
Main battery with 8 valves (outputs) and 16 transducers (inputs)

- PROFIBUS-DP address 8
- Valves 1 - 8 occupy Outputs (PAA) Byte 30 in the process image
- Transducers 1 - 16 occupy „Inputs“ (PAE) Byte 15+16 in the process image
- Mode: normal input mode
- Input filter active
- RIO interface

DIP Switch on Main Battery:

1	2	3	4	5	6	7	8	9	10	11	12
OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	ON	OFF	ON	OFF

Expansion battery 0 with 8 valves (outputs) and 16 transducers (inputs)

- Address 0 (Expansion battery 0 always has the Address 0)
- Valves 1 - 8 occupy Outputs (PAA) Byte 12 in the process image
- Transducers 1 - 16 occupy „Inputs“ (PAE) Byte 20+21 in the process image
- Mode: normal input mode
- Input filter active

DIP Switch on Expansion Battery 0:

1	2	3	4	5	6	7	8	9	10	11	12
OFF	OFF	OFF	ON	OFF	OFF	ON	OFF	ON	OFF	ON	OFF

Expansion battery 1 with 8 valves (outputs) and 16 transducers (inputs)

- Address 1 (Expansion battery 1 always has the Address 1)
- Valves 1 - 8 occupy Outputs (PAA) Byte 15 in the process image
- Transducers 1 - 16 occupy „Inputs“ (PAE) Byte 17+18 in the process image
- Mode: normal input mode
- Input filter active

DIP Switch on Expansion Battery 1:

1	2	3	4	5	6	7	8	9	10	11	12
ON	OFF	OFF	ON	OFF	OFF	ON	OFF	ON	OFF	ON	OFF

Expansion battery 2 with 8 valves (outputs) and 16 transducers (inputs)

- Address 2 (Expansion battery 2 always has the Address 2)
- Valves 1 - 8 occupy Outputs (PAA) Byte 16 in the process image
- Transducers 1 - 16 occupy „Inputs“ (PAE) Byte 22+23 in the process image
- Mode: normal input mode
- Input filter active

DIP Switch on Expansion Battery 2:

1	2	3	4	5	6	7	8	9	10	11	12
OFF	ON	OFF	ON	OFF	OFF	ON	OFF	ON	OFF	ON	OFF

User parameters are unnecessary!

Configuration

Byte number (Slot)	1 (0)	2 (1)	3 (2)	4 (3)	5 (4)	6 (5)	7 (6)	8 (7)
Identification in Hex (Dec)	11(017)	20(032)	11(017)	20(032)	11(017)	20(032)	11(017)	20(032)
Process image output (PAA)		30		12		15		16
Process image input (PAE)	15+16		20+21		17+18		22+23	
	Main battery		Expansion battery 0		Expansion battery 1		Expansion battery 2	

Allocation of Inputs and Outputs to the Controller Process Image

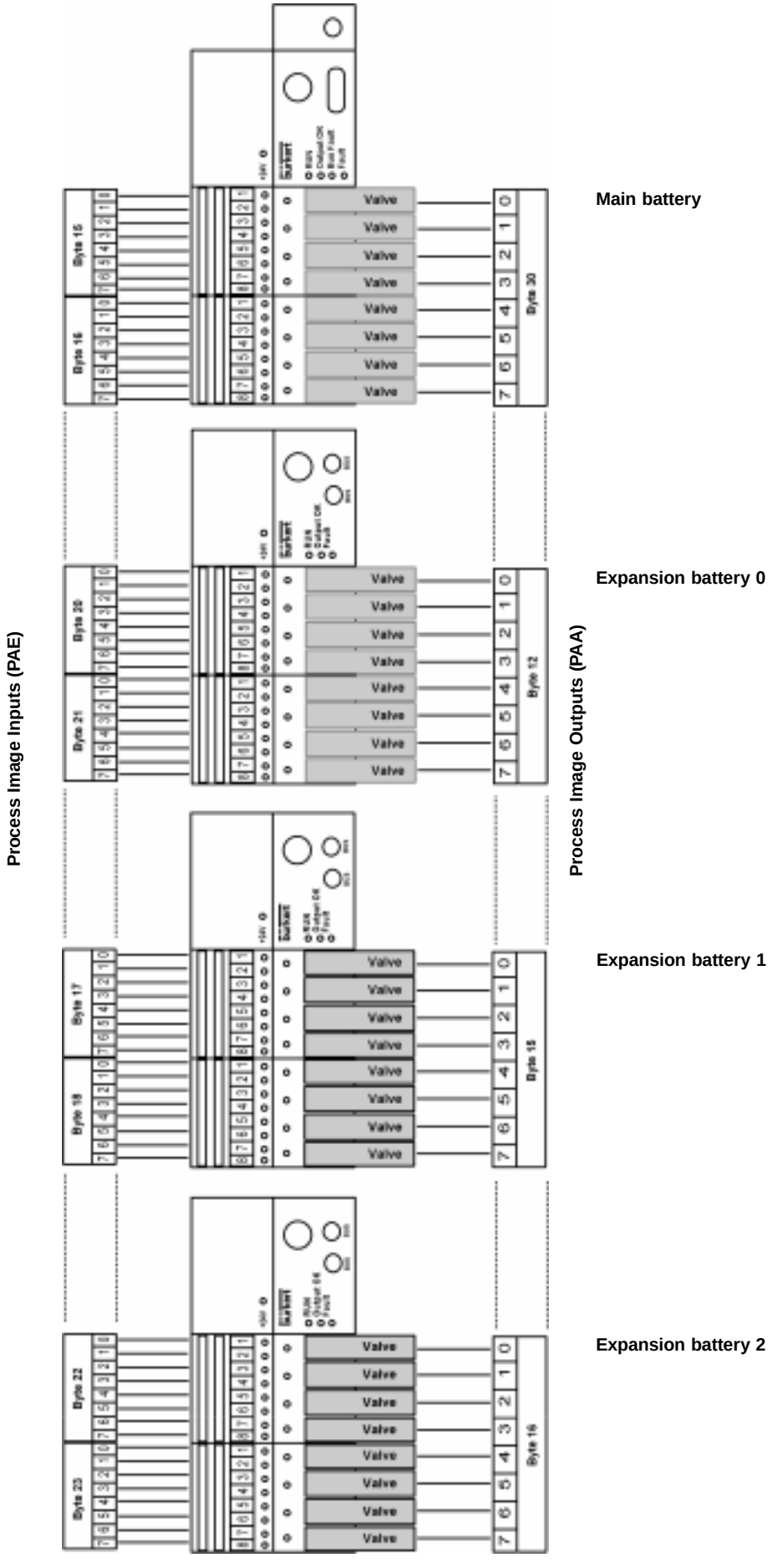


Fig. 15: Allocation of Inputs and Outputs to the Controller Process Image

Joining the data of the expansion batteries together in bits

This configuration is used if the inputs and outputs on the expansion battery do not correspond to the byte matrix, e.g., 4 valves. In this case, the 4th bit would be lost in a configuration with byte limits.

The separation into individual bits takes place with the parameter telegram. The number of input bits and output bits used is given for each battery.

NOTE | In the input mode „Shifted inputs“ (DIP-9 OFF DIP-10 ON), Input 0 is stored in Byte 0 and Input 1 in Byte 1, and so on.

Parametertelegram:
Here, only the user parameters are shown (User_Prm_Data). The count in brackets starts from 0 (many configuration programs only display user parameters).

Byte-No.	Description
8 (0)	01 Hex short diagnosis or 81 Hex long diagnosis
9 (1)	Number of bits Input Main battery
10 (2)	Number of bits Output Main battery
11 (3)	Number of bits Input Main battery Expansion battery 0 (DIP switch on EI 0 S1=OFF, S2=OFF, S3=OFF)
12 (4)	Number of bits Output Expansion battery 0 (DIP switch on EI 0 S1=OFF, S2=OFF, S3=OFF)
:	:
25 (17)	Number of bits Input Main battery Expansion battery 7 (DIP switch on EI 7 S1=ON, S2=ON, S3=ON)
26 (18)	Number of bits Output Expansion battery 7 (DIP switch on EI 7 S1=ON, S2=ON, S3=ON)

EI Expansion battery

See also Chapter 5.1.6.3 Parametrisation

The COM ET 200 configuration program from the Siemens company provides on parameter string per Slave. The Input mask is activated in the Configuration mask using the keys SHIFT + F6. The count begins for the user parameters with „0“ (User_Prm_Data).

Configuration telegram:
The identifiers are independent of the individual valves, although the complete sum of the inputs and outputs must be greater then or equal to the number of identifiers in the Parameter telegram. The identifiers can be selected corresponding to the desired allocation in the process image.

Sequence of the Input and Output bits:

- Main battery,
- Expansion battery 0,
- Expansion battery 1,
- Expansion battery 2, ...

Example 6: Main valve battery with 3 expansion batteries
Main battery with 3 valves (outputs) and 3 transducers (inputs);
every second transducer signal will not be considered

- PROFIBUS-DP address 9
- Mode: „Halved Inputs“
- Input filter active
- RIO interface

DIP Switch on Main Battery:

1	2	3	4	5	6	7	8	9	10	11	12
ON	OFF	OFF	ON	OFF	OFF	OFF	ON	ON	ON	ON	OFF

Expansion battery 0 with 4 valves (outputs) and no transducers (inputs)

- Address 0 (Expansion battery 0 always has the Address 0)

DIP Switch on Expansion Battery 0:

1	2	3	4	5	6	7	8	9	10	11	12
OFF	OFF	OFF	ON	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF

Expansion battery 1 with 2 valves (outputs) and 4 transducers (inputs)

- Address 1 (Expansion battery 1 always has the Address 1)
- Mode: normal input mode
- Input filter active

DIP Switch on Expansion Battery 1:

1	2	3	4	5	6	7	8	9	10	11	12
ON	OFF	OFF	ON	OFF	OFF	ON	OFF	ON	OFF	ON	OFF

Expansion battery 2 with 3 valves (outputs) and 6 transducers (inputs);

every second transducer signal will not be considered

- Address 2 (Expansion battery 2 always has the Address 2)
- Mode: „Halved Inputs“
- Input filter active

DIP Switch on Expansion Battery 2:

1	2	3	4	5	6	7	8	9	10	11	12
OFF	ON	OFF	ON	OFF	OFF	ON	OFF	ON	ON	ON	OFF

Parameterdiagram:
Only the user parameters are shown here (User_Prm_Data). Counts in brackets start from 0 (most configuration programs only display user parameters). Values in Hex format.

Byte No.	8 (0)	9 (1)	10 (2)	11(3)	12 (4)	13(5)	14(6)	15(7)	16(8)
Value	01	03	03	00	04	04	02	03	03
Meaning	Parameter type	Inputs	Outputs	Inputs	Outputs	Inputs	Outputs	Inputs	Outputs
		Main battery		Expansion battery 0		Expansion battery 1		Expansion battery 2	

Configuration

Byte number (Slot)	1 (0)	2 (1)	3 (2)	4 (3)
Identification in Hex (Dec)	10(016)	10(016)	21(033)	21(033)
Process image output (PAA)			11	14
Process image input (PAE)	15	20		

Allocation of Inputs and Outputs to the Controller Process Image

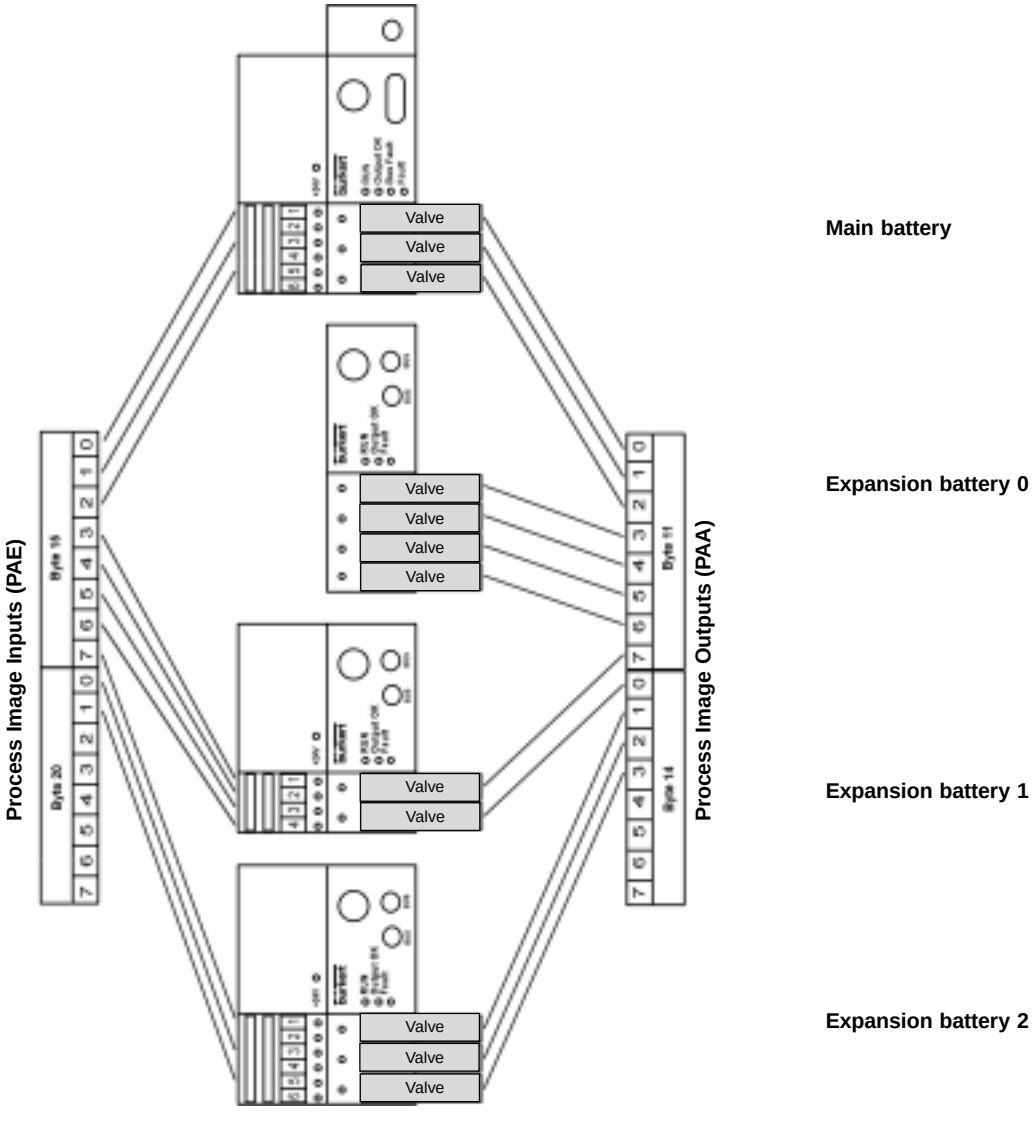


Fig. 16: Allocation of Inputs and Outputs to the Controller Process Image

5.1.6.5 Diagnosis

When the system is running up, or in case of faults, the diagnosis will be read from the Slave by the Master. Most of the controllers make a part of this data available.

In the unit-related diagnosis file (Ext_Diag_Data), the following data is stored:

- Indispensable DIP switch settings
- Fault numbers of the parameter and configuration faults
- Output voltage faults
- Information about the failure of an expansion battery
- Data about the configuration of an expansion battery

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte	**Standard Diagnosis 6 bytes**							
1	**Master_look** parametrised by other Master	**Prm_ Fault** Parameter faulty	**Invalid_Slave _ Response** Battery sets 0	**Not_ Supported** Function not supported	**Ext_Diag** Diagnosis entry present	**Cfg_ Fault** Diagnosis faulty	**Station_Not_ Ready** Not ready for data exchange	**Station_Non _ Existent** Battery sets 0
2	**Deactivated** Battery sets 0	**Not_ Present** Battery sets 0	**Sync_Mode** Sync command received (Outputs are output and frozen)	**Freeze_Mode** Freeze command received (Inputs are input and frozen)	**WD_On** Watchdog on	**immer =1**	**Stat_Diag** Static diagnosis	**Prm_Req** Slave must be re-parametrised and configures
3	**Ext_Diag_**, Overflow more diagnoses present than can be sent	**reserved**	**reserved**	**reserved**	**reserved**	**reserved**	**reserved**	**reserved**
4	**Master_ADD**		(Address of the Master which parametrised the battery [No Master: FF Hex])					
5	**Ident_Number high Byte**		(Manufacturer identifier 00 Hex)					
6	**Ident_Number low Byte**		(Manufacturer identifier 81 Hex)					
			Ext_Diag_Data (Unit-related diagnosis 10 or 14 bytes)					
7	**Headerbyte**		(length of the unit-related diagnosis 10 or 14 bytes)					
			Diagnosis and Switch Position of the Main Battery (HI)					
8	HI: DIP-12	HI: DIP-11	HI: DIP-10	HI: DIP-9	HI: DIP-8	0	0	HI: 24VOut
			Parametrisation and Configuration faults (see next page)					
9	Configuration fault number				Parametrisation fault number			
			Diagnosis Expansion battery (EI)					
10	EI7: 24VOut	EI6: 24VOut	EI5: 24VOut	EI4: 24VOut	EI3: 24VOut	EI2: 24VOut	EI1: 24VOut	EI0: 24VOut
11	EI7: NOK	EI6: NOK	EI5: NOK	EI4: NOK	EI3: NOK	EI2: NOK	EI1: NOK	EI0: NOK
12	EI7: Config	EI6: Config	EI5: Config	EI4: Config	EI3: Config	EI2: Config	EI1: Config	EI0: Config
			Switch positions of the Expansion batteries (EI)					
13	EI0: DIP-8	EI0: DIP-7	EI0: DIP-6	EI0: DIP-5	EI0: DIP-4	EI0: DIP-11	EI0: DIP-10	EI0: DIP-9
14	EI1: DIP-8	EI1: DIP-7	EI1: DIP-6	EI1: DIP-5	EI1: DIP-4	EI1: DIP-11	EI1: DIP-10	EI1: DIP-9
15	EI2: DIP-8	EI2: DIP-7	EI2: DIP-6	EI2: DIP-5	EI2: DIP-4	EI2: DIP-11	EI2: DIP-10	EI2: DIP-9
16	EI3: DIP-8	EI3: DIP-7	EI3: DIP-6	EI3: DIP-5	EI3: DIP-4	EI3: DIP-11	EI3: DIP-10	EI3: DIP-9
			Only for the 14 byte User Diagnosis					
17	EI4: DIP-8	EI4: DIP-7	EI4: DIP-6	EI4: DIP-5	EI4: DIP-4	EI4: DIP-11	EI4: DIP-10	EI4: DIP-9
18	EI5: DIP-8	EI5: DIP-7	EI5: DIP-6	EI5: DIP-5	EI5: DIP-4	EI5: DIP-11	EI5: DIP-10	EI5: DIP-9
19	EI6: DIP-8	EI6: DIP-7	EI6: DIP-6	EI6: DIP-5	EI6: DIP-4	EI6: DIP-11	EI6: DIP-10	EI6: DIP-9
20	EI7: DIP-8	EI7: DIP-7	EI7: DIP-6	EI7: DIP-5	EI7: DIP-4	EI7: DIP-11	EI7: DIP-10	EI7: DIP-9

HI	Main battery on the PROFIBUS-DP	Example: Hl: DIP-6 main battery DIP switch 6
EIn	Expansion battery n on the RIO bus (n = 0 bis 7)	Example: El0: DIP-4 expansion battery with Address = Switch 4
DIP-n	DIP switch number of the corresponding valve battery (at the right on the field bus module)	0:= OFF; 1:=ON
24 V Out	The 24V output control voltage is missing on the corresponding valve battery	0:=No fault; 1:=fault
NOK	The corresponding expansion battery does not log on at the RIO bus	0:=No fault; 1:=fault
Config	The corresponding expansion battery was configured by the Master	0:=Not configured; 1:=configured

Configuration and Parametrisation faults

Configuration fault number		**Parametrisation fault number**	
1	Too many inputs (>32) for one battery	**1**	Too many inputs (>32) entered for one battery
2	Too many outputs (>24) for one battery	**2**	Too many outputs (>24) entered for one battery
3	Too few inputs for all batteries (default from parameter telegram)	**3**	Parametrising telegram too small
4	Too few outputs for all batteries (default from parameter telegram)	**4**	Parametrising telegram too large
5	An incorrect code has been stored in a configuration byte		

5.2 INTERBUS-S field bus module

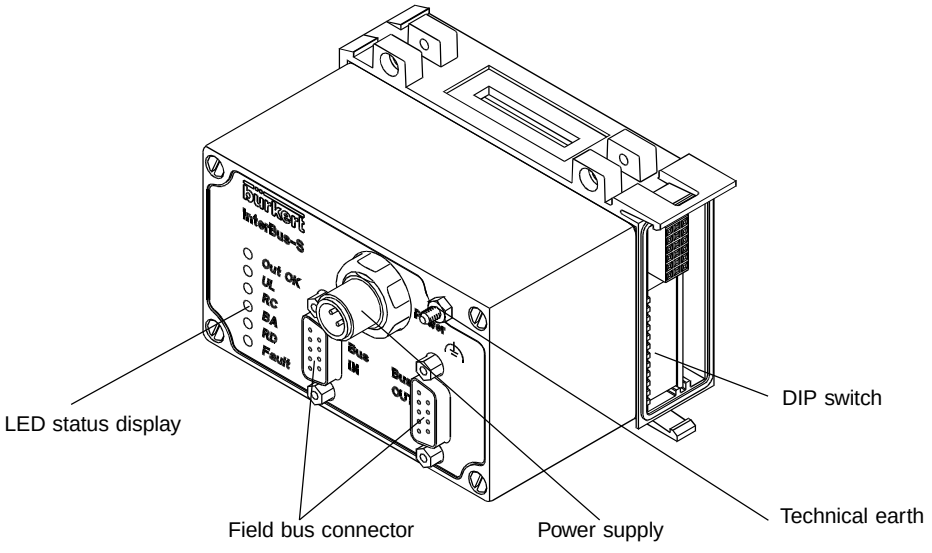
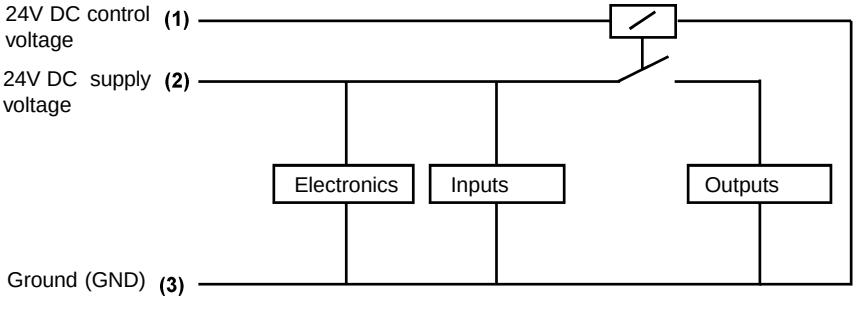


Fig. 17: General view of INTERBUS-S field bus module

5.2.1 Power supply

The 4-pole round plug for the power supply has the following pin allocations:



Pin 1	24V DC control voltage
Pin 2	24 VDC supply voltage
Pin 3	Ground (GND)
Pin 4	not used

NOTE Pin 2 of the power supply must be fused with 4A (semi-time lag)

ATTENTION!

To ensure the electro-magnetic compatibility (EMC), connect the screw terminal TE (Technical earth) to the ground potential with a cable that is a short as possible (30 cm).

Accessories

Plug connector M12+1 (socket) for the power supply Order number 917116D

5.2.2 Field bus connection

A 9-pole D-SUB connector is used for the field bus connection. The pin allocation laid down by the INTERBUS-S for the input and output interfaces is described below:

Pin No.	Signal name Incoming interface (BUS IN) (Plug on unit, socket on cable)	Signal name Ongoing interface (BUS OUT) (Socket on unit, plug on cable)
1	DO 1	DO 2
2	DI 1	DI 2
3	GND	GND
4	not used	not used
5	not used	+ 5V
6	/DO 1	/DO 2
7	/DI 1	/DI 2
8	not used	not used
9	not used	RBST

5.2.3 LED Status Display

LED name	LED Status	Description	Cause of fault / Rectification
Out OK **UL** **RC** **BA** **RD** **Fault**	ON (green) ON (green) ON (green) ON (green) OFF OFF	24 V power supply for outputs OK Internal voltage OK Remote bus cable OK Data transfer is active Remote bus status OK For future expansion	
Out OK	OFF	No 24 V voltage supply available for the outputs	Check the power supply
UL	OFF	Internal voltage for electronics missing	If Out OK = ON, replace field bus module
RC	OFF	Incoming remote bus connection damaged	Check field bus cable, connection and controller
BA	OFF	No data transfer is taking place	IF RC lights up, check the controller, otherwise see RC
RD	On (red)	Ongoing bus has been switched off	Check field bus cable, connection and following field bus module.

5.2.4 Setting the DIP switches

Using the DIP switches, you can carry out settings for the field bus module. They are located on the right-hand side, in the lower part of the bus module (see also Fig. 6). In order to access the DIP switches, remove the plugged-in termination module.

NOTE || A change of the switch position only becomes active after the field bus module has been restarted.

1	2	3	4	5	6	7	8	9	10	11	12
No. of output bytes		No. of input bytes			Reserve			Inputs Mode		Input filter	Reserve

5.2.4.1 Number of Input and Output Bytes: DIP switches 1 to 5

Here, the number of bytes necessary for the transmission of the status information of the inputs and outputs is given. From the larger of the two, the number of process data words reserved in the transfer protocol is determined. The INTERBUS-S thereby has a process data word of 2 bytes (16 bits). The number of process data words needed is described as the Length Code (LC).

	DIP 1	DIP 2	Length Code (LC)
0 Bytes (no outputs)	OFF	OFF	0
1 Byte (max. 8 outputs)	ON	OFF	1
2 Bytes (max. 16 outputs)	OFF	ON	1
3 Bytes (max. 24 outputs)	ON	ON	2

One byte corresponds to 8 outputs. For example, if 12 outputs are present, 2 bytes will have to be set. This corresponds to a length code of 1.

	DIP 3	DIP 4	DIP 5	Length Code (LC)
0 Bytes (keine Eingänge)	OFF	OFF	OFF	0
1 Byte (max. 8 inputs)	ON	OFF	OFF	1
2 Bytes (max. 16 inputs)	OFF	ON	OFF	1
3 Bytes (max. 24 inputs)	ON	ON	OFF	2
4 Bytes (max. 32 inputs)	OFF	OFF	ON	2

One byte corresponds to 8 inputs. For example, if 20 inputs are present, 3 bytes will have to be set. This corresponds to a length code of 2.

Altogether, the two above examples result in a length code of 2. This means that 2 INTERBUS-S process data words will be reserved for the transfer.

5.2.4.2 Identification Code (ID-Code)

The ID code describes the function of the module, and will be automatically determined from the settings for the number of inputs and outputs.

	ID-Code
Digital Output module (no input data)	01
Digital Input module (no output data)	02
Digital Input and Output module (input and output data)	03

5.2.4.3 “Inputs” mode: DIP switches 9 and 10

NOTE Using the input mode, the inputs (transducers) can be allocated in different ways in the process layout of the inputs (PAE).

	DIP 9	DIP 10
No inputs present	OFF	OFF
Normal mode	ON	OFF
Mode: shifted inputs	OFF	ON
Mode: halved inputs	ON	ON

ATTENTION! If no inputs are present, both switches must be set to OFF

Normal Mode

In the Normal mode, all inputs are read in from right to left.

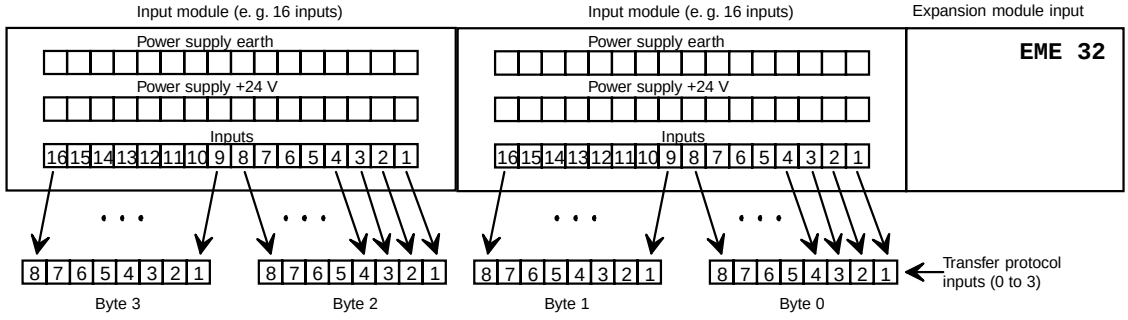


Fig. 18: Normal mode

“Shifted Inputs” mode

In the “Shifted Inputs” mode, the first 16 inputs are alternately set in the transfer protocol in Byte 0 and Byte 1. With the next 16 inputs, the same takes place for Byte 2 and Byte 3.

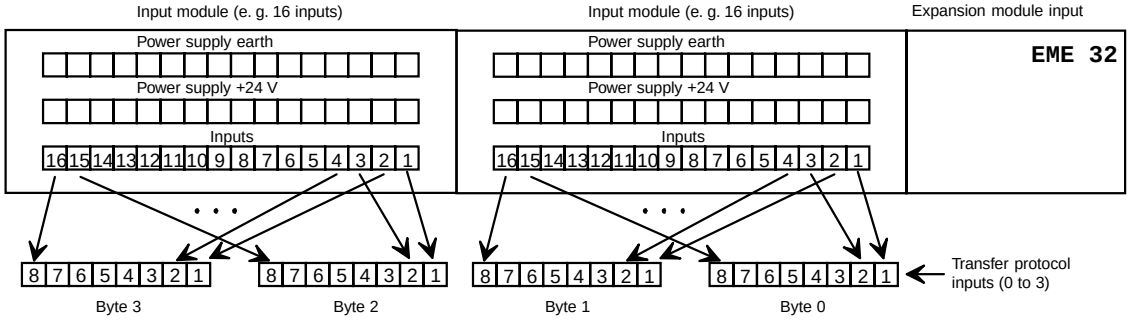


Fig. 19: “Shifted Inputs” mode

“Halved Inputs” mode

In the “Halved Inputs” mode, every second input is missed out. Only inputs 1, 3, 5, ... are transferred; as a result, only 2 Bytes are needed for 32 physically-present inputs.

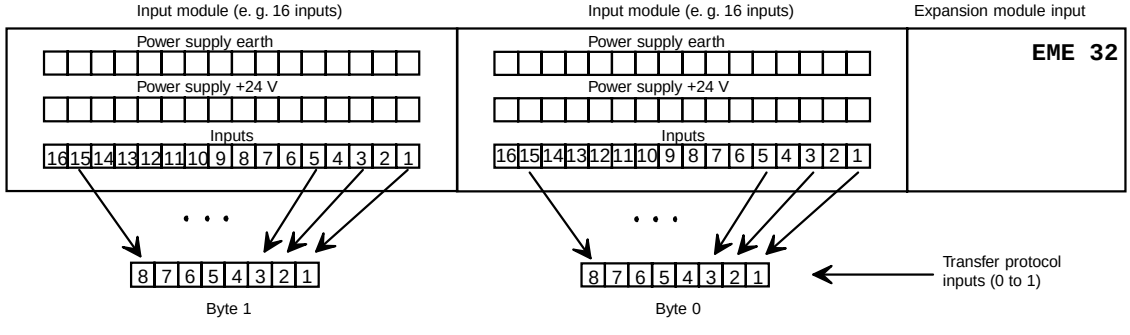


Fig. 20: “Halved Inputs” mode

5.2.4.4 Input filter: DIP switch 11

With the input filter, interference which could affect the input modules is suppressed.

	DIP 11
Input filter inactive	OFF
Input filter active	ON

ATTENTION!

With the filter active, only signals with a duration of ≥ 2 ms will be recognised.

5.3 DeviceNet field bus module

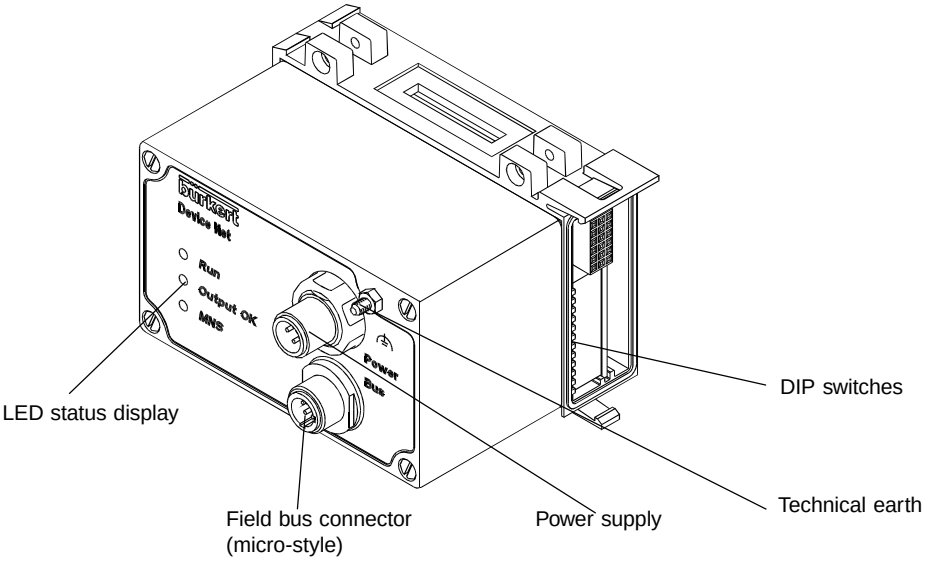
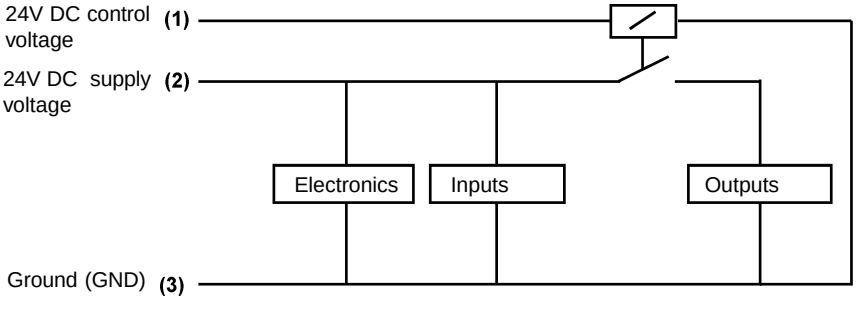


Fig. 21: General view of DeviceNet field bus module

5.3.1 Power supply

The 4-pole round plug for the power supply has the following pin allocations:



Pin 1	24 VDC control voltage
Pin 2	24 VDC supply voltage
Pin 3	Ground (GND)
Pin 4	not used

NOTE Pin 2 of the power supply must be fused with 4A (semi-time lag)

ATTENTION!

To ensure the electro-magnetic compatibility (EMC), connect the screw terminal TE (Technical earth) to the ground potential with a cable that is a short as possible (30 cm).

Accessory

Plug connector M12+1 (socket) for the power supply Order number 917116D

5.3.2 Field bus connection

A 5-pole Micro-style plug-in connector M12 is specified by DeviceNet for the field bus connection, with the following pin allocation:

Pin No.	Signal name
1	Drain (screen)
2	not used
3	GND
4	CAN HIGH
5	CAN LOW

The bus driver is supplied internally by a voltage which is galvanically isolated from the supply voltage. For this reason, no separate voltages must be provided by the bus on Pins 2 and 3.

5.3.3 LED Status Display

LED name	LED Status	Description	Cause of fault / Rectification
RUN **Out OK** **MNS**	ON (green) ON (green) ON (green)	24 V voltage supply OK 24 V voltage supply for outputs OK Module / network status OK	
RUN	OFF	No voltage present	Check the voltage
Out OK	OFF	No voltage supply available for the outputs	If RUN = ON, replace field bus module
MNS	OFF	Field bus module is not on the bus	If RUN = ON, replace field bus module
	ON (red)	The field bus module indicates an irreparable fault	Replace field bus module
	Blinking (green)	Duplicated MAC ID test OK. No connection to other field bus modules however	Check cables, connectors, baud rate, addresses and controller
	Blinking (red)	Connection time-out. A connection was separated after a specific time	New connection attempt by the controller.
	Blinking (red/green)	Another field bus module with the same MAC ID has been found on the bus	Set another address (see “Setting the DIP switches”)

5.3.4 Setting the DIP switches

Using the DIP switches, you can carry out settings for the field bus module. They are located on the right-hand side, in the lower part of the bus module (see also General View). In order to access the DIP switches, remove the plugged-in termination module.

NOTE A change of the switch position only becomes active after the field bus module has been restarted.

1	2	3	4	5	6	7	8	9	10	11	12
Adress of the field bus modules						Baud rate		Reserve			

5.3.4.1 Address of the Field Bus Module: DIP Switches 1 to 6

The address of the field bus module can be set on the DIP switches 1 ...6, within the range 0...63. The following table should demonstrate the address setting by example:

DIP 1	DIP 2	DIP 3	DIP 4	DIP 5	DIP 6	Address
OFF	OFF	OFF	OFF	OFF	OFF	0
ON	OFF	OFF	OFF	OFF	OFF	1
OFF	ON	OFF	OFF	OFF	OFF	2
ON	ON	OFF	OFF	OFF	OFF	3
						:
ON	ON	ON	ON	ON	ON	63

5.3.4.2 Baud rate: DIP switches 7 and 8

The baud rate can be set on DIP switches 7 and 8

DIP 7	DIP 8	Baud rate
OFF	OFF	125 KBaud
ON	OFF	250 KBaud
OFF	ON	500 KBaud

5.3.5 Terminal resistance

In the DeviceNet bus, the two-wire lines of the field bus must be terminated at both ends with resistances. If the last subscriber is a valve battery, the terminal resistance can be activated through the DIP switch. The DIP switch is located on the underside of the Bus module, underneath a protective cap.

NOTE

With the high data transfer rates used in the field bus technology, there can be signal reflections at the end of the field bus branches which cause interference. This can lead to data errors. By adding terminal resistors, these reflections are suppressed.

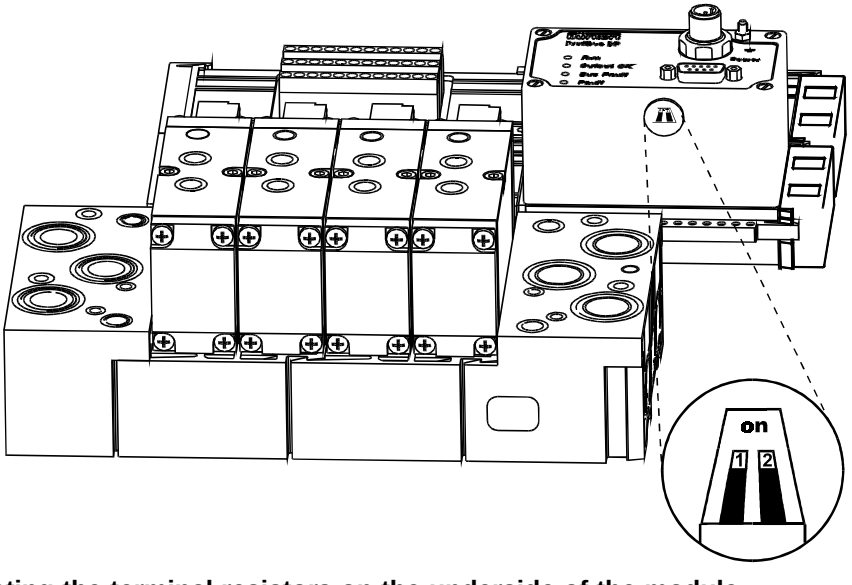


Fig. 22: Activating the terminating resistances

Activating the terminal resistors on the underside of the module

➔ Carefully remove the protective cap!

➔ Slide both switches to the rear, into the ON position!

➔ Replace the protective cap!

5.4 Selecan field bus module

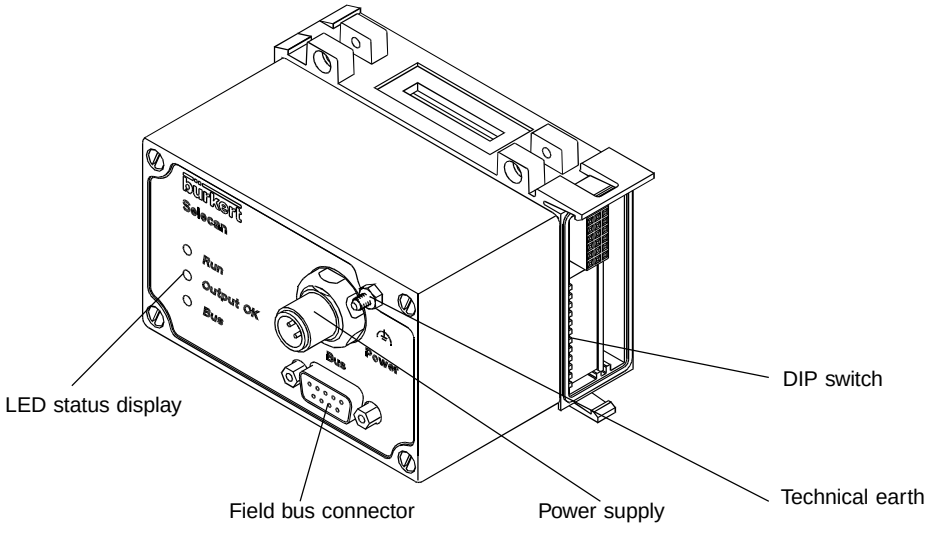
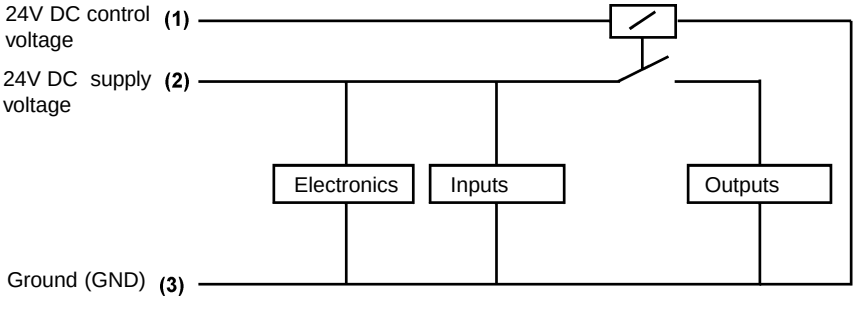


Fig. 17: General view of the Selecan field bus module

5.4.1 Power supply

The 4-pole round plug for the power supply has the following pin allocations:



Pin 1	24 VDC control voltage
Pin 2	24 VDC supply voltage
Pin 3	Ground (GND)
Pin 4	not used

NOTE Pin 2 of the power supply must be fused with 4A (semi-time lag)

ATTENTION!

To ensure the electro-magnetic compatibility (EMC), connect the screw terminal TE (Technical earth) to the ground potential with a cable that is a short as possible (30 cm).

Accessories

Plug connector M12+1 (socket) for the power supply Order number 917116D

5.4.2 Field bus connection

A 9-pole D-SUB connector is used for the field bus connection, with the following pin allocation:

Pin No.	Signal name
1	not used
2	CAN LOW
3	GND
4	not used
5	not used
6	not used
7	CAN HIGH
8	not used
9	not used

5.4.3 LED Status Display

LED name	LED Status	Description	Cause of fault / Rectification
RUN **Out OK** **BUS**	ON (green) ON (green) ON (green)	24 V voltage supply OK 24 V voltage supply for outputs OK Field bus module is active on the bus	
RUN	OFF	No voltage present	Check the voltage
Out OK	OFF	No voltage supply available for the outputs	If RUN = ON, replace field bus module
BUS	OFF	Field bus module is not on the bus	If RUN = ON, replace field bus module
	ON (red)	The field bus module has switched off from the bus due to large numbers of recognised transfer faults (“Bus OFF”)	Check cables, connectors, baud rate, addresses and controller. Restart the field bus module
	Blinking (green)	The field bus module is in the “STANDBY” mode	From the controller, switch the field bus module into the active mode
	Blinking (red)	The field bus module is in the “STANDBY” mode and has recognised a certain number of transfer faults (Warning limit)	Check cables, connectors, baud rate, addresses and controller
	Blinking (red/green)	The field bus module is in the active state and has recognised a certain number of transfer faults (Warning limit)	Check the cable connections and terminating resistors. Possibly lower the baud rate or reduce the bus cable length

5.4.4 Setting the DIP switches

Using the DIP switches, you can carry out settings for the field bus module. They are located on the right-hand side, in the lower part of the bus module (see also General View). In order to access the DIP switches, remove the plugged-in termination module.

NOTE A change of the switch position only becomes active after the field bus module has been restarted.

1	2	3	4	5	6	7	8	9	10	11	12
Address of the field bus module 0 ...31					Baud rate		I/O class	Inputs Mode		Input filter	Reserve

5.4.4.1 Adress of the field bus module: DIP-Switch 1 to 5

The address of the field bus module can be set on the DIP switches 1 ...5, within the range 0...31. The following table should demonstrate the address setting by example:

DIP 1	DIP 2	DIP 3	DIP 4	DIP 5	Adress
OFF	OFF	OFF	OFF	OFF	0
ON	OFF	OFF	OFF	OFF	1
OFF	ON	OFF	OFF	OFF	2
ON	ON	OFF	OFF	OFF	3
					:
ON	ON	ON	ON	ON	31

5.4.4.2 Baud rate: DIP switches 6 and 7

The baud rate can be set on DIP switches 6 and 7

DIP 6	DIP 7	Baud rate
OFF	OFF	20 KBaud
ON	OFF	100 KBaud
OFF	ON	500 KBaud
ON	ON	1 MBaud

5.4.4.3 I/O Class : DIP Switch 8

With DIP switch 8, the I/O class is set

DIP 8	I/O Class
OFF	I/O Class 1
ON	I/O Class 2

5.4.4.4 “Inputs” mode: DIP switches 9 and 10

NOTE Using the input mode, the inputs (transducers) can be allocated in different ways in the process layout of the inputs (PAE).

	DIP 9	DIP 10
No inputs present	OFF	OFF
Normal mode	ON	OFF
Mode: shifted inputs	OFF	ON
Mode: halved inputs	ON	ON

ATTENTION! If no inputs are present, both switches must be set to OFF

Normal Mode

In the Normal mode, all inputs are read in from right to left.

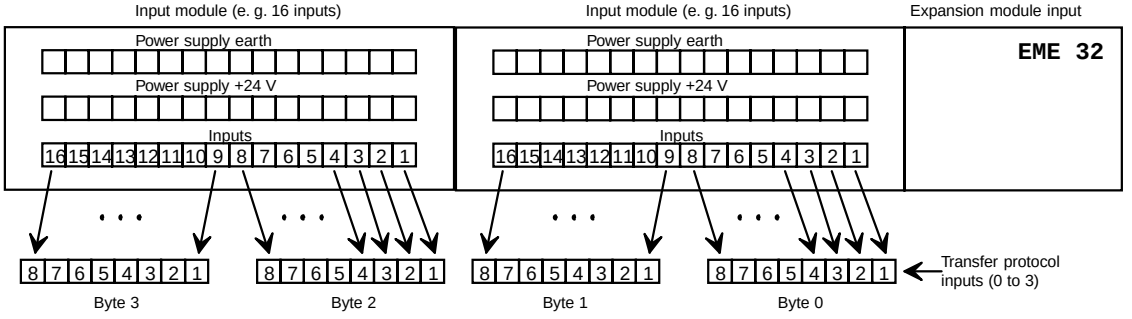


Fig. 24: Normal mode

“Shifted Inputs” mode

In the “Shifted Inputs” mode, the first 16 inputs are alternately set in the transfer protocol in Byte 0 and Byte 1. With the next 16 inputs, the same takes place for Byte 2 and Byte 3.

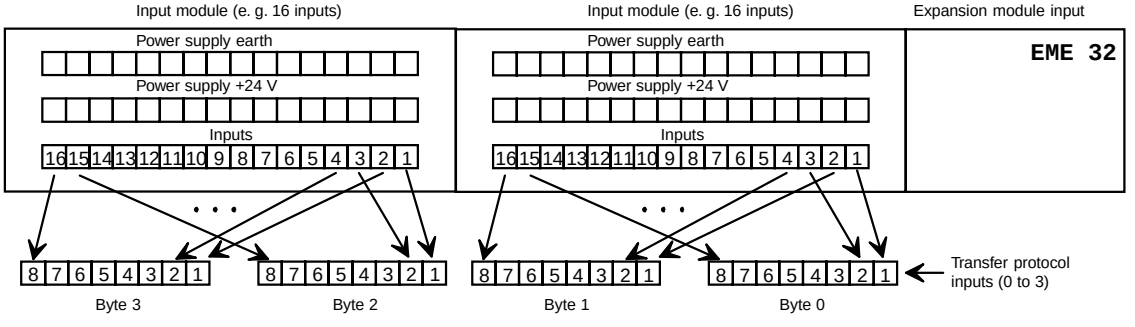


Fig. 25: “Shifted Inputs” mode

“Halved Inputs” mode

In the “Halved Inputs” mode, every second input is missed out. Only inputs 1, 3, 5, ... are transferred; as a result, only 2 Bytes are needed for 32 physically-present inputs.

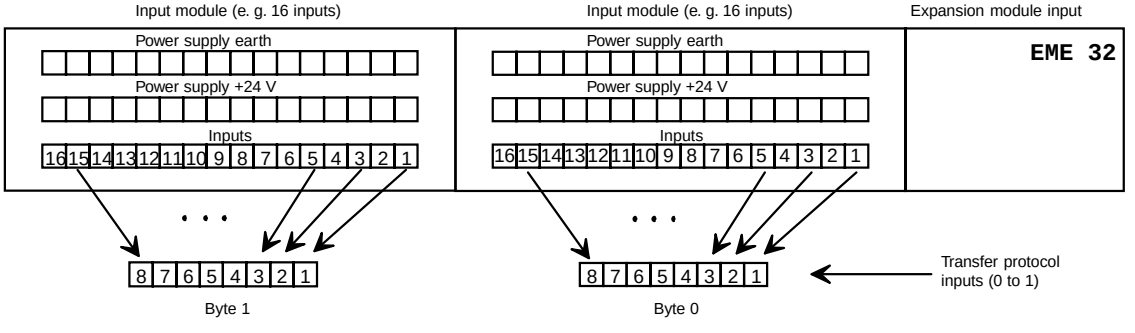


Fig. 26: “Halved Inputs” mode

5.4.4.5 Input filter: DIP switch 11

With the input filter, interference which could affect the input modules is suppressed.

	DIP 11
Input filter inactive	OFF
Input filter active	ON

ATTENTION!

With the filter active, only signals with a duration of ≥ 2 ms will be recognised.

5.4.5 Terminal resistance

In the Selecan bus, the two-wire lines of the field bus must be terminated at both ends with resistances. If the last subscriber is a valve battery, the terminal resistance can be activated through the DIP switch. The DIP switch is located on the underside of the Bus module, underneath a protective cap.

NOTE

With the high data transfer rates used in the field bus technology, there can be signal reflections at the end of the field bus branches which cause interference. This can lead to data errors. By adding terminal resistors, these reflections are suppressed.

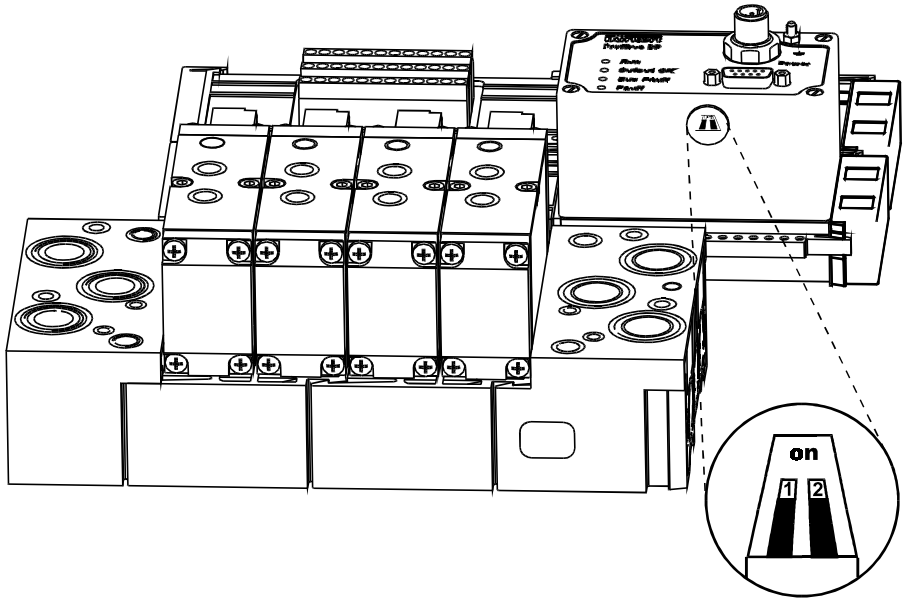


Fig. 27: Activating the terminating resistances

Activating the terminal resistors on the underside of the module

➔ Carefully remove the protective cap!

➔ Slide both switches to the rear, into the ON position!

➔ Replace the protective cap!

5.5 CANopen field bus module

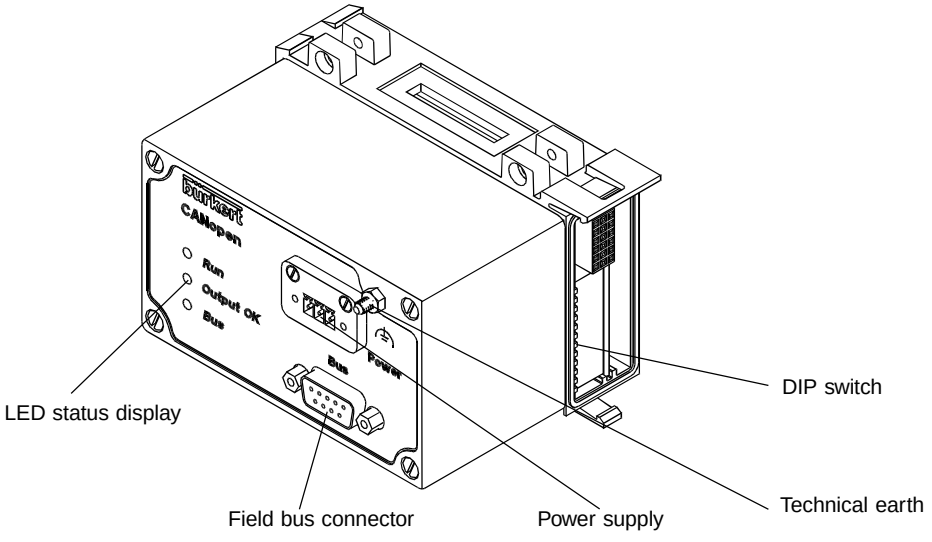
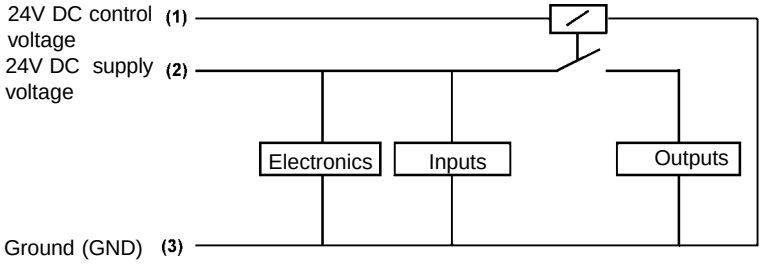


Fig. 28: General view of CANopen field bus module

5.5.1 Power supply

The plug-in connector for the power supply of the CANopen field bus module is included in the delivery!
The plug for the power supply has the following pin allocations:



Pin 1	24 VDC control voltage
Pin 2	24 VDC supply voltage
Pin 3	Ground (GND)

NOTE Pin 2 of the power supply must be fused with 4A (semi-time lag)

ATTENTION!

To ensure the electro-magnetic compatibility (EMC), connect the screw terminal TE (Technical earth) to the ground potential with a cable that is a short as possible (30 cm).

5.5.2 Field bus connection

A 9-pole D-SUB connector is used for the field bus connection, with the following pin allocation:

Pin Nr.	Signal name
1	not used
2	CAN LOW
3	GND
4	not used
5	not used
6	not used
7	CAN HIGH
8	not used
9	not used

5.5.3 LED Status Display

LED name	LED Status	Description	Cause of fault / Rectification
RUN **Out OK** **BUS**	ON (green) ON (green) ON (green)	24 V voltage supply OK 24 V voltage supply for outputs OK Field bus module is active on the bus (“Operational”)	
RUN	OFF	No voltage present	Check the voltage
Out OK	OFF	No voltage supply available for the outputs	If RUN = ON, replace field bus module
BUS	OFF	Field bus module is not on the bus	If RUN = ON, replace field bus module
	ON (red)	The field bus module has switched off from the bus due to large numbers of recognised transfer faults (“Bus Off”)	Check cables, connectors, baud rate, addresses and controller. Restart the field bus module
	Blinking (green)	The field bus module is in the “Pre-Operational” mode	From the controller, activate the field bus module (bring it into the “Operational” status)
	Blinking (red)	The field bus module is in the “ Pre-Operational” mode and has recognised a certain number of transfer faults (Warning limit)	Check cables, connectors, baud rate, addresses and controller
	Blinking	The field bus module is in the “Operational” mode and has recognised a certain number of transfer faults (Warning limit)	Check the cable connections and terminating resistors. Possibly lower the baud rate or reduce the bus cable length

5.5.4 Setting the DIP switches

Using the DIP switches, you can carry out settings for the field bus module. They are located on the right-hand side, in the lower part of the bus module (see also General View). In order to access the DIP switches, remove the plugged-in termination module.

NOTE A change of the switch position only becomes active after the field bus module has been restarted.

1	2	3	4	5	6	7	8	9	10	11	12
Address of the field bus module 1 ... 127							Baud rate		Inputs Mode		Input filter

5.5.4.1 Address of the Field Bus Module: DIP Switches 1 to 7

The address of the field bus module can be set on the DIP switches 1 ...7, within the range 1...127. The following table should demonstrate the address setting by example:

DIP 1	DIP 2	DIP 3	DIP 4	DIP 5	DIP 6	DIP 7	Adress
ON	OFF	OFF	OFF	OFF	OFF	OFF	1
OFF	ON	OFF	OFF	OFF	OFF	OFF	2
ON	ON	OFF	OFF	OFF	OFF	OFF	3
OFF	OFF	ON	OFF	OFF	OFF	OFF	4
							:
ON	ON	ON	ON	ON	ON	ON	127

5.5.4.2 Baud rate: DIP switches 8 and 9

The baud rate can be set on DIP switches 8 and 9

DIP 8	DIP 9	Baud rate
OFF	OFF	20 KBaud
ON	OFF	125 KBaud
OFF	ON	250 KBaud
ON	ON	500 KBaud

5.5.4.3 “Inputs” mode: DIP switches 10 and 11

NOTE Using the input mode, the inputs (transducers) can be allocated in different ways in the process layout of the inputs (PAE).

	DIP 10	DIP 11
No inputs present	OFF	OFF
Normal mode	ON	OFF
Mode: shifted inputs	OFF	ON
Mode: halved inputs	ON	ON

ATTENTION! If no inputs are present, both switches must be set to OFF

Normal Mode

In the Normal mode, all inputs are read in from right to left.

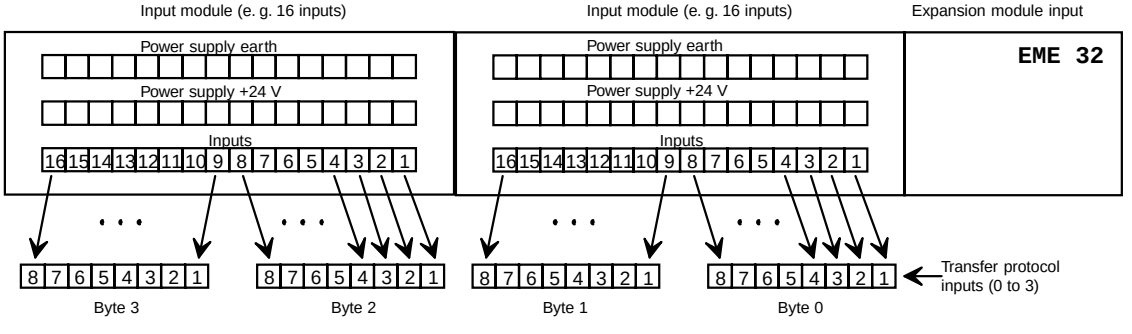


Fig. 29: Normal mode

“Shifted Inputs” mode

In the “Shifted Inputs” mode, the first 16 inputs are alternately set in the transfer protocol in Byte 0 and Byte 1. With the next 16 inputs, the same takes place for Byte 2 and Byte 3.

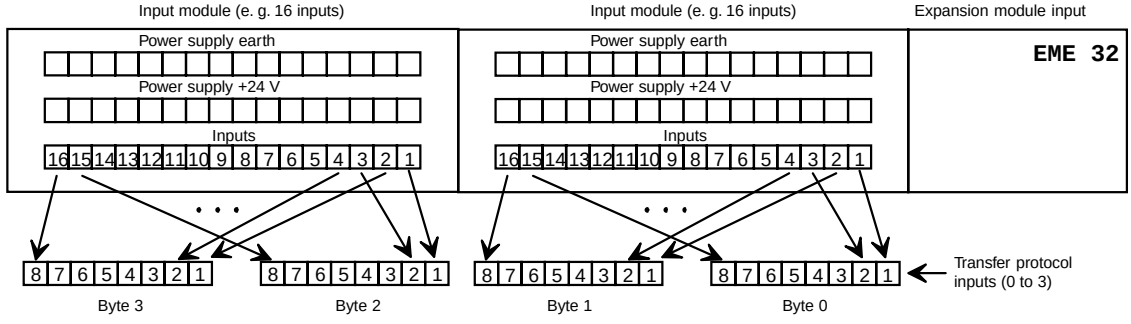


Fig. 30: “Shifted Inputs” mode

“Halved Inputs” mode

In the “Halved Inputs” mode, every second input is missed out. Only inputs 1, 3, 5, ... are transferred; as a result, only 2 Bytes are needed for 32 physically-present inputs.

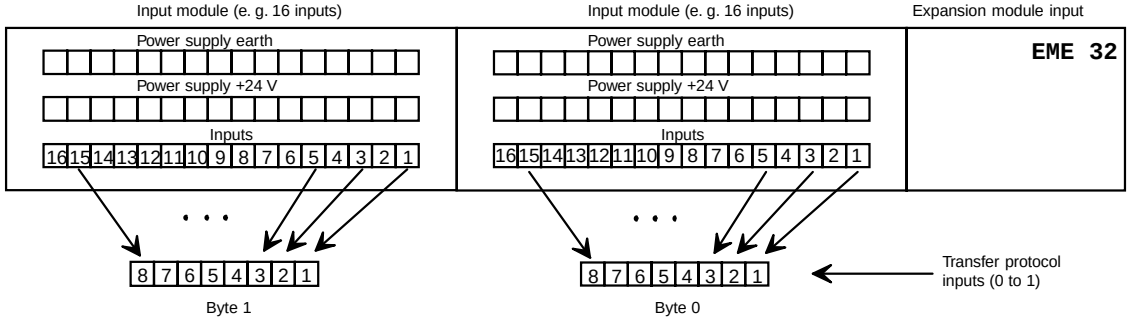


Fig. 31: “Halved Inputs” mode

5.5.4.4 Input filter: DIP switch 12

With the input filter, interference which could affect the input modules is suppressed.

	DIP 12
Input filter inactive	OFF
Input filter active	ON

ATTENTION!

With the filter active, only signals with a duration of ≥ 2 ms will be recognised.

5.5.5 Terminal resistance

In the CANopen bus, the two-wire lines of the field bus must be terminated at both ends with resistances. If the last subscriber is a valve battery, the terminal resistance can be activated through the DIP switch. The DIP switch is located on the underside of the Bus module, underneath a protective cap.

NOTE

With the high data transfer rates used in the field bus technology, there can be signal reflections at the end of the field bus branches which cause interference. This can lead to data errors. By adding terminal resistors, these reflections are suppressed.

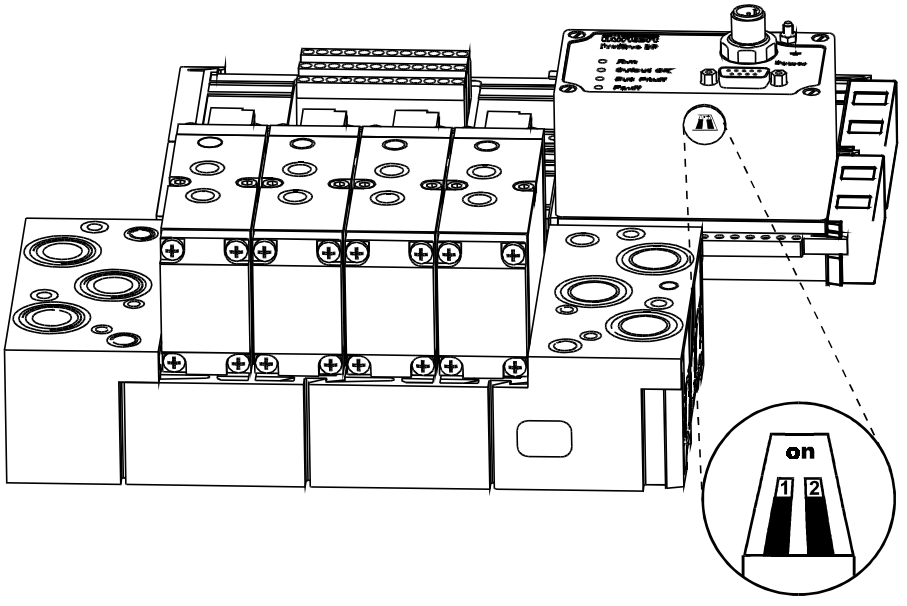


Fig. 32: Activating the terminating resistances

Activating the terminal resistors on the underside of the module

➔ Carefully remove the protective cap!

➔ Slide both switches to the rear, into the ON position!

➔ Replace the protective cap!

5.6 AS Interface field bus module

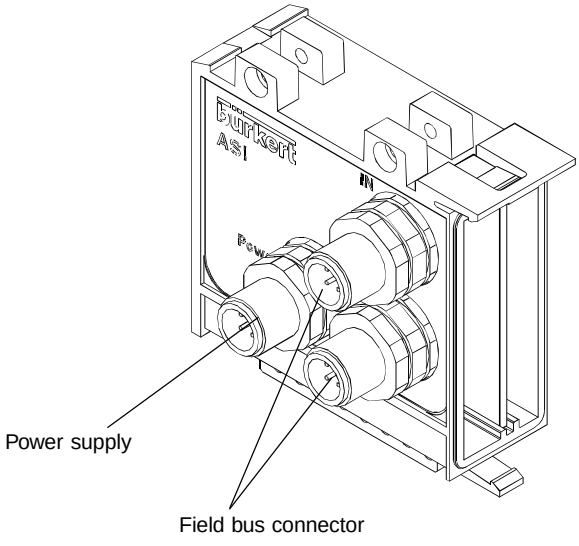


Fig. 33: General view of AS Interface field bus module

5.6.1 Power supply

The 4-pole round plug for the power supply has the following pin allocations:

Pin 1	not used
Pin 2	24 VDC supply for outputs
Pin 3	not used
Pin 4	Ground (GND)

NOTE Only the power supply for the outputs (valves) is fed via the power supply connection. The voltage for the electronics is taken from the bus. In this way, the outputs can be switched of without having to disconnect the field bus module from the bus.

Accessory

Plug connector M12+1 (socket) for the power supply Order number 917116D

5.6.2 Field bus connection

A 4-pole round plug is used for the field bus connection, with the following pin allocation:

Pin No.	Signal
1	ASI +
2	not used
3	ASI -
4	not used

NOTE The two bus connectors marked with “IN” and “OUT” are connected together internally. The two connectors therefore have the same pin allocation.

5.6.3 Programming instructions

The module has the following settings:

Adress: 00 (preset)

I/O-Code: 8

ID-Code: 0

Significance of the data and parameter bits

Bit	Function
D0	Output (valve) 1
D1	Output (valve) 2
D2	Output (valve) 3
D3	Output (valve) 4

Bit	Function
P0	no function
P1	no function
P2	no function
P3	no function

5.7 Input Expansion Module for Transducers (proximity sensors)

The expansion module is used for the connection of electrical transducer inputs (proximity sensors) to the field bus module.

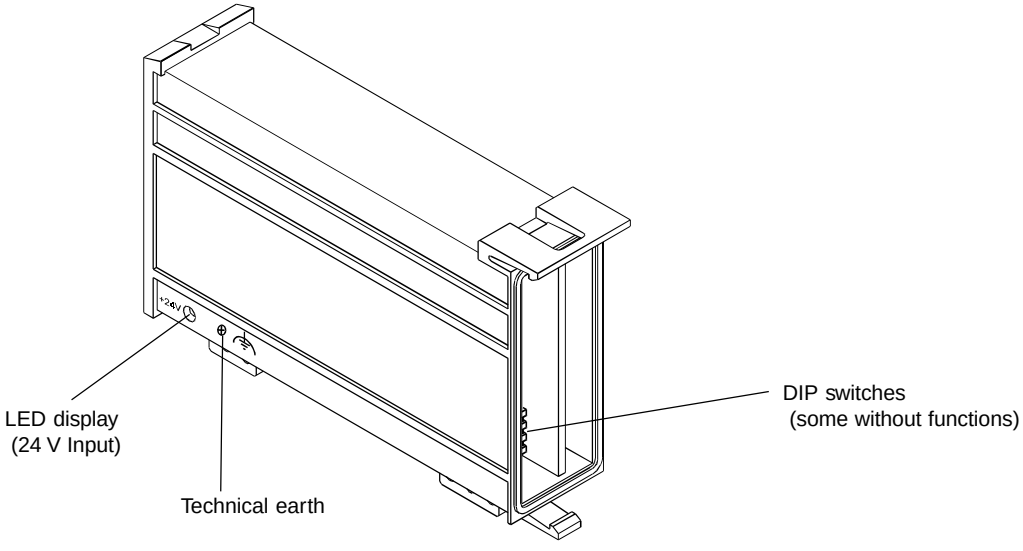
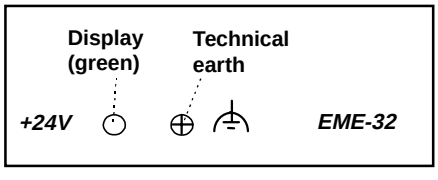


Fig. 34: Input Expansion Module EME-32

NOTE The power supply for the transducers is protected against short-circuit by a self-resetting fuse (700 mA).

Display of the EME-32 Module



Display of the +24 V LED:

LED	OFF	No supply voltage
LED	ON	Supply voltage present

Fig. 35: Display of the EME-32 module

NOTE The DIP switches on the side of the module have no function at the moment!

6 INTERNAL BUS EXTENSION

6.1 Remote I/O Interface Connection Module (RIO Interface)

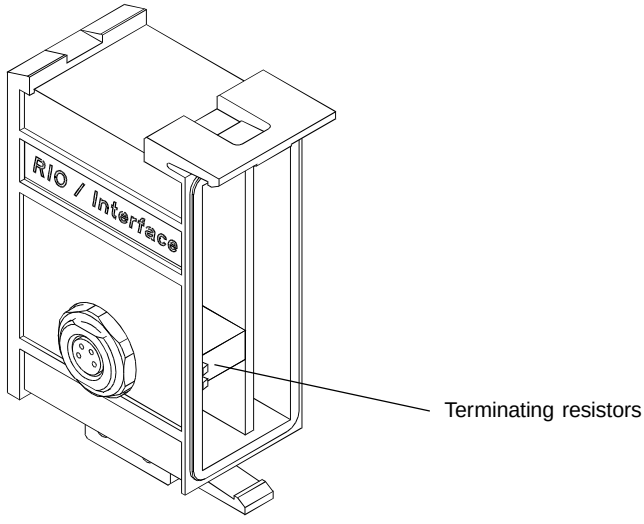


Fig 36: Remote I/O Interface Connection Module

Terminating resistors:

DIP 1	**DIP 2**	
OFF	OFF	Terminating resistors non-active
ON	ON	Terminating resistors active

6.2 Expansion module connection (RIO-VA)

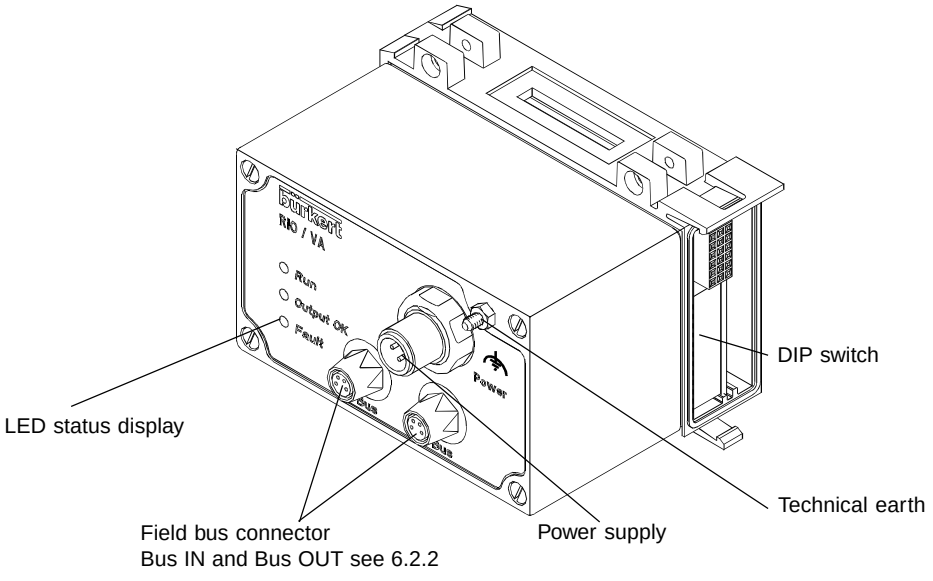


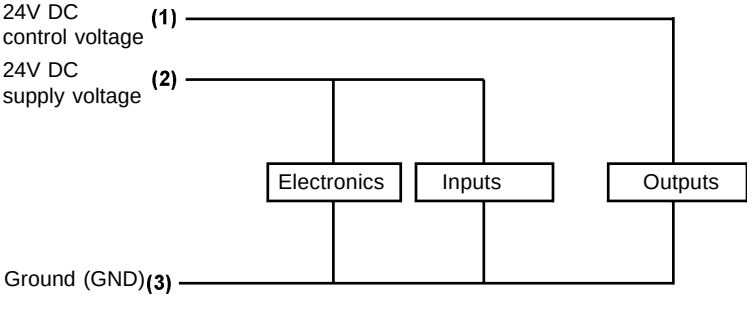
Fig. 37: General view of the Expansion Module Connection

Accessories

Connection line Remote I/O Interface to RIO-VA	1 m	Id. No. 917 498 M
Connection line Remote I/O Interface to RIO-VA	2 m	Id. No. 917 499 N

6.2.1 Power supply

The 4-pole round plug for the power supply has the following pin allocations:



Pin 1	24 VDC outputs
Pin 2	24 VDC Inputs and electronics
Pin 3	Ground (GND)
Pin 4	not used

NOTE Pin 1 of the power supply must be fused with 3A (semi-time lag), and Pin 2 with 1 A (semi-time lag)

ATTENTION!

To ensure the electro-magnetic compatibility (EMC), connect the screw terminal TE (Technical earth) to the ground potential with a cable that is a short as possible (30 cm).

Accessories

Plug connector M12+1 (socket) for the power supply Order number 917116D

6.2.2 Field bus connection

A 4-pole connector is used for the internal field bus connection.

NOTE The pin configuration of the two bus connectors are identical.

 Pin No.	**Signal name Incoming interface (BUS IN) (Socket on unit, plug on cable)**	**Signal name Ongoing interface (BUS OUT) (Plug on unit, socket on cable)**
1	CAN-HIGH	CAN-HIGH
2	CAN-LOW	CAN-LOW
3	Ground	Ground
4	Ground	Ground

6.2.3 LED Status Display

LED	Status	Description
RUN	ON	Error-free operation of the expansion battery
Output OK	ON	
Fault	OFF	

Fault

LED	Status	Description	Cause of fault / Rectification
RUN	OFF	24 V power supply No voltage present	Check the power supply (Power supply connector Pin 2)
Output OK	OFF	24 V control voltage for the outputs No voltage present	Check the control voltage (Power supply connector Pin 1)
Fault	BLINKING	Response monitoring time on the valve battery has expired without a response to the Main battery	**In operation:** Check the Main battery and the bus cable. **During commissioning:** Check the network configuration on the Master and the station address on the battery.

6.2.4 Setting the DIP switches

Using the DIP switches, you can carry out settings for the field bus module. They are located on the right-hand side, in the lower part of the bus module (see also Chapter 6.2: General View). In order to access the DIP switches, remove the plugged-in termination module.

NOTE A change of the switch position only becomes active after the field bus module has been restarted.

1	2	3	4	5	6	7	8	9	10	11	12
Address on internal RIO-Bus			No. of output bytes		No. of input bytes			Inputs Mode		Input filter	Reserve

6.2.4.1 Addresses on the internal RIO Bus: DIP Switches 1 to 3

Each expansion battery has a unique address. This address is set up on the expansion battery using the DIP switches 1 to 3.

DIP-1	DIP-2	DIP-3	Adress	Expansion battery
OFF	OFF	OFF	0	0
ON	OFF	OFF	1	1
OFF	ON	OFF	2	2
ON	ON	OFF	3	3
OFF	OFF	ON	4	4
ON	OFF	ON	5	5
OFF	ON	ON	6	6
ON	ON	ON	7	7

6.2.4.2 Number of Output bytes: DIP switches 4 and 5

Here, the number of bytes necessary for the transmission of the additional data of the outputs from the Main battery can be entered

	DIP-4	DIP-5
0 Bytes (no outputs)	OFF	OFF
1 Byte (max. 8 outputs)	ON	OFF
2 Bytes (max. 16 outputs)	OFF	ON
3 Bytes (max. 24 outputs)	ON	ON

6.2.4.3 Number of Input bytes: DIP switches 6 to 8

Here, the number of bytes necessary for the transmission of the additional data of the inputs to the Main battery can be entered

	DIP- 6	DIP- 7	DIP- 8
0 Bytes (no outputs)	OFF	OFF	OFF
1 Byte (max. 8 outputs)	ON	OFF	OFF
2 Bytes (max. 16 outputs)	OFF	ON	OFF
3 Bytes (max. 24 outputs)	ON	ON	OFF
4 Bytes (max. 32 outputs)	OFF	OFF	ON

6.2.4.4 “Inputs” mode: DIP switches 9 and 10

NOTE Using the input mode, the inputs (transducers) can be allocated in different ways in the process layout of the inputs (PAE).

	DIP 9	DIP 10
No inputs present	OFF	OFF
Normal mode	ON	OFF
Mode: shifted inputs	OFF	ON
Mode: halved inputs	ON	ON

ATTENTION! If no inputs are present, both switches must be set to OFF

Normal Mode

In the Normal mode, all inputs are read in from right to left.

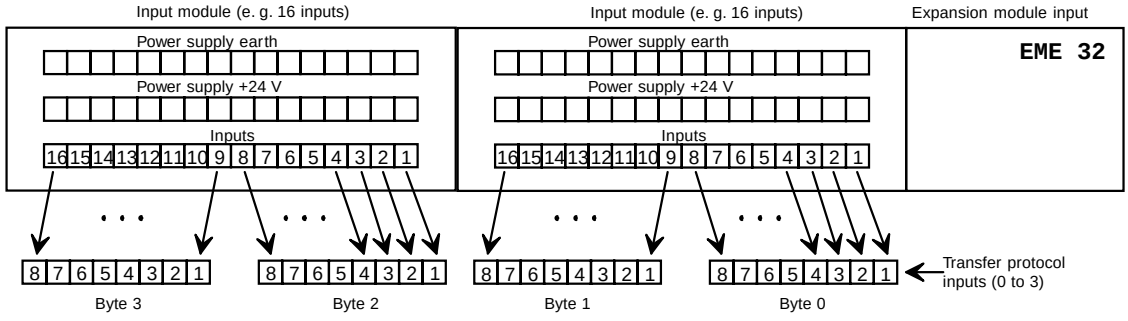


Fig. 38: Normal mode

“Shifted Inputs” mode

In the “Shifted Inputs” mode, the first 16 inputs are alternately set in the transfer protocol in Byte 0 and Byte 1. With the next 16 inputs, the same takes place for Byte 2 and Byte 3.

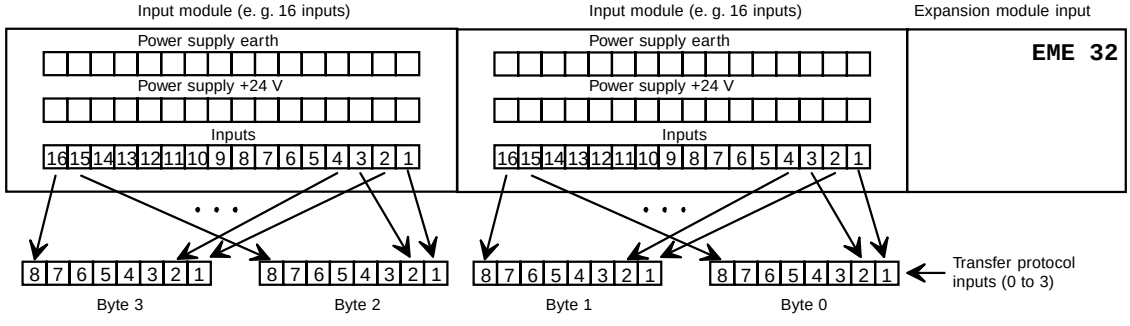


Fig. 39: “Shifted Inputs” mode

Modus “Halved Inputs” mode

In the “Halved Inputs” mode, every second input is missed out. Only inputs 1, 3, 5, ... are transferred; as a result, only 2 Bytes are needed for 32 physically-present inputs.

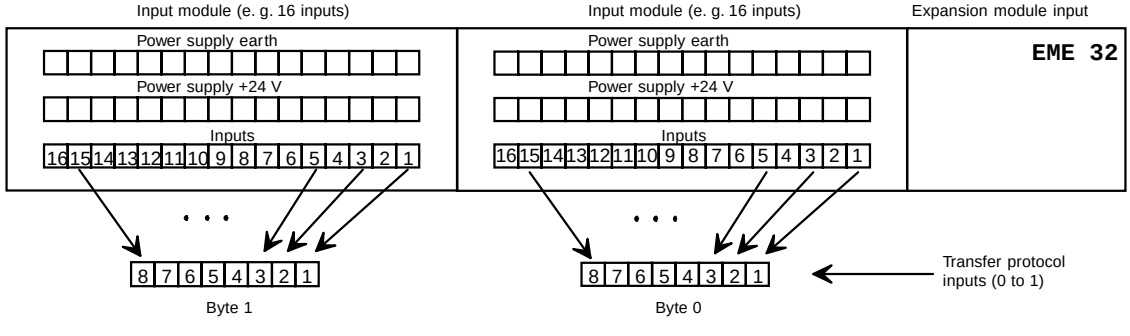


Fig. 40: “Halved Inputs” mode

6.2.4.5 Input filter: DIP switch 11

With the input filter, interference which could affect the input modules is suppressed.

	DIP 11
Input filter inactive	OFF
Input filter active	ON

ATTENTION!

With the filter active, only signals with a duration of ≥ 2 ms will be recognised.

6.2.5 Terminal resistance

In the Remote I/O, the two-wire lines of the field bus must be terminated at both ends with resistances. If the last subscriber is a valve battery, the terminal resistance can be activated through the DIP switch. The DIP switch is located on the underside of the Bus module, underneath a protective cap.

NOTE

With the high data transfer rates used in the field bus technology, there can be signal reflections at the end of the field bus branches which cause interference. This can lead to data errors. By adding terminal resistors, these reflections are suppressed.

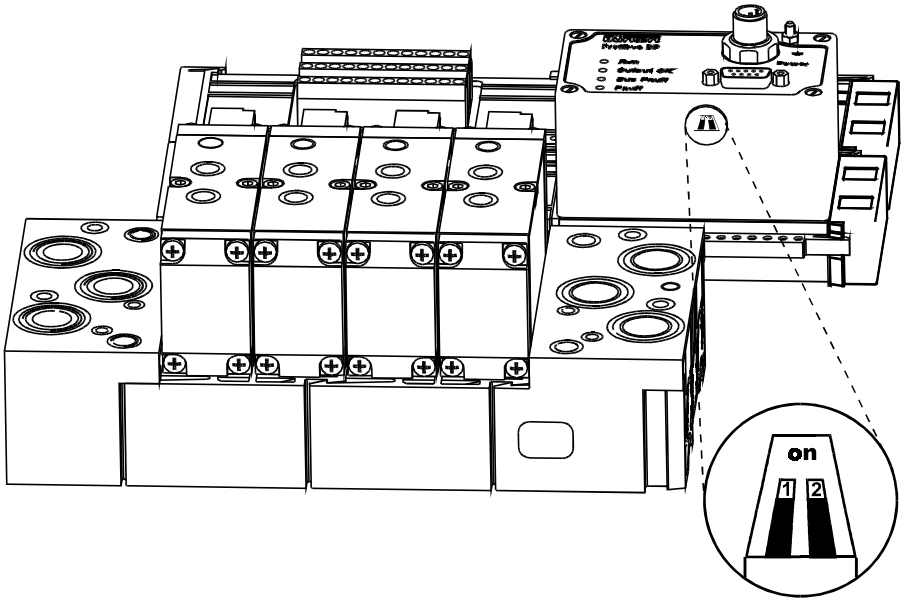


Fig. 41: Activating the terminating resistances

Activating the terminal resistors on the underside of the module

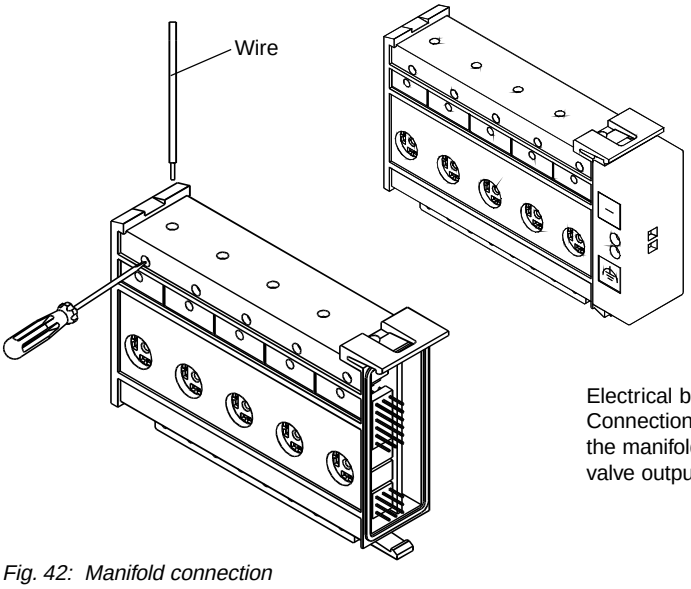
➔ Carefully remove the protective cap!

➔ Slide both switches to the rear, into the ON position!

➔ Replace the protective cap!

7 ELECTRICAL BASE MODULE OUTPUT

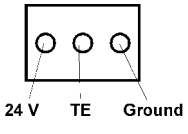
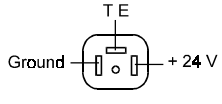
7.1 Manifold connection



Electrical base module “Manifold Connection”, only in connection with the manifold connection module for valve outputs (see 4.1)

Fig. 42: Manifold connection

Allocation plan

Valve types: 6510 6511	Valve types: 5470 6512 6513 6516 6517
	

NOTE The outputs are positive-switching: 24 V is switched
GND is connected.

7.2 Valve outputs

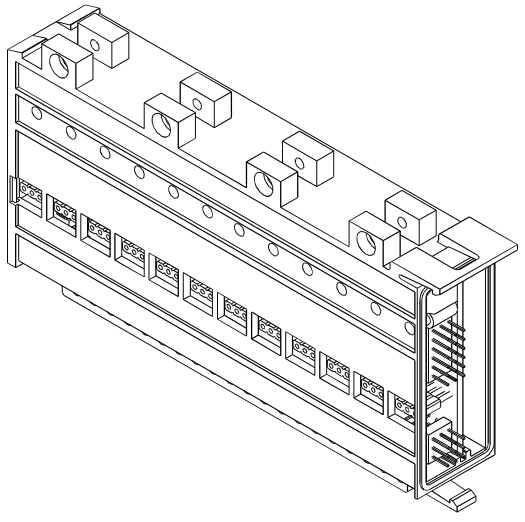
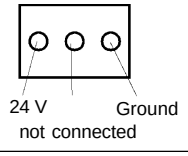
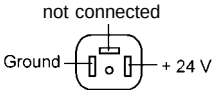


Fig. 43: Electrical base module for valve outputs (12-way)

NOTE The electrical base module contains the connections for the valve control.

Pin allocations for the valve outputs

Valve types: **6510** **6511**	Valve types: **5470** **6512** **6513** **6516** **6517**
	

NOTE The outputs are positive-switching: 24 V is switched
GND is connected.

7.3 Valve outputs with Manual / Automatic change-over

With this module, the connected valves can be switched manually or automatically, as wished.

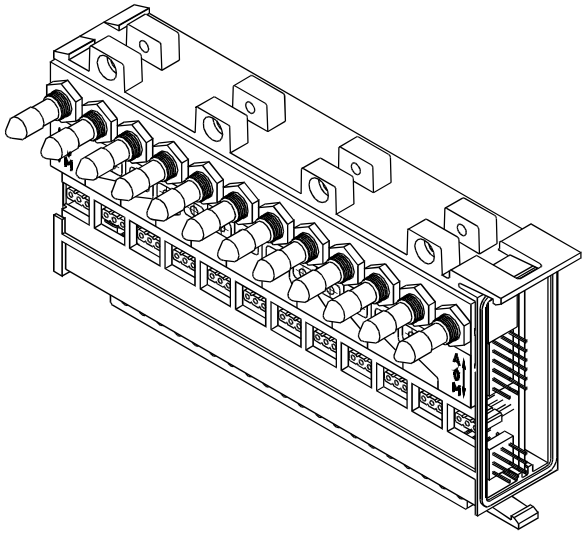
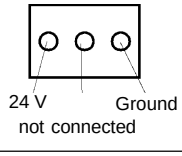
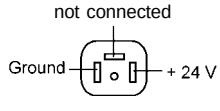


Fig. 44: Electrical base module for valve outputs with manual/automatic change-over (12-way)

NOTE Interlocked switch! The manual / automatic switch is mechanically interlocked. The lever must be pulled before tipping out of the interlock! .

Pin allocations for the valve outputs

Valve types: 6510 6511	Valve types: 5470 6512 6513 6516 6517
	

NOTE The outputs are positive-switching: 24 V is switched
GND is connected.

7.3.1 Switch Function of the Electrical Base Module with Manual / Automatic changeover

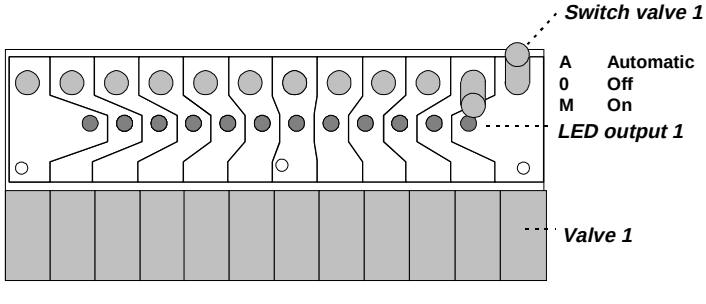


Fig. 45: Module description for the electrical Base Module manual / Automatic switching using the example: Module EGM/HA-10-12

Switch Functions

Switch position		Function	Description
Switch	up:	Automatic	Bus operation: incoming control signal switches the valve
	middle:	Valve “OFF”	Valve is always closed
	down:	Valve “ON”	Valve is always open

7.4 Valve outputs with external control

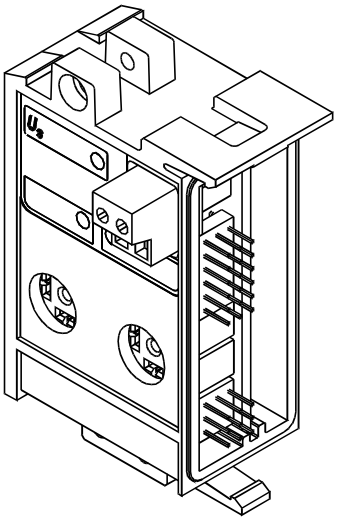


Fig. 46: Valve output with external control

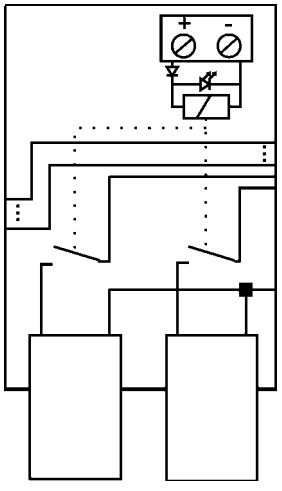
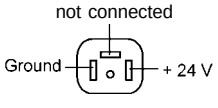


Fig. 47: Switching diagram of the valve outputs.

Nominal voltage U_n	24 V
Pick-up voltage U_{on}	16.8V
Drop-out voltage U_{off}	2.4 V
Input current I_{in}	12 mA

Pin allocations for the valve outputs

Valve types:
5470
6512
6513
6516
6517



NOTE The outputs are positive-switching: 24 V is switched
GND is connected.

8 ELECTRICAL BASE MODULE INPUT

8.1 Terminal inputs for transducers (proximity switches)

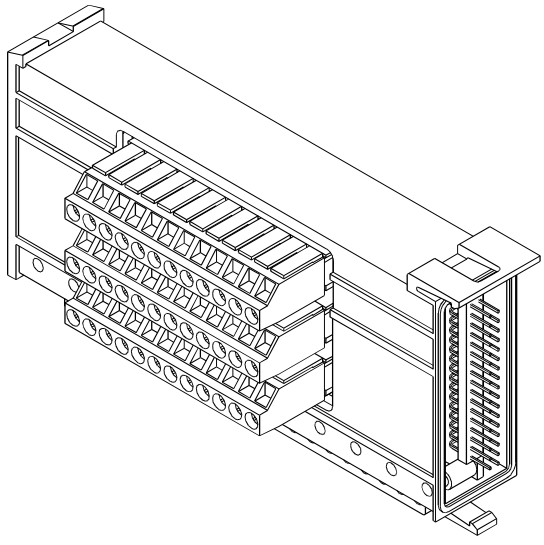


Fig. 48: Electrical base module for transducer inputs (proximity switches) for terminals (IP20)

Terminal allocation

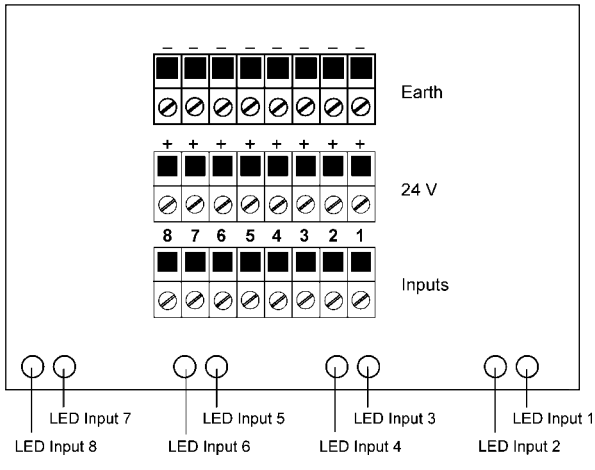


Fig. 4: Terminal allocation

Input voltage:	+ 24 V
Signal:	
0 (logical):	0 to 5 V
1 (logical):	13 to 30 V
Eingangsstrom bei 1-Signal:	typically 3 mA

8.2 Plug inputs (MS round plug) for transducers (proximity switches)

Electrical base module for transducer inputs (proximity switches) for terminals (IP20)

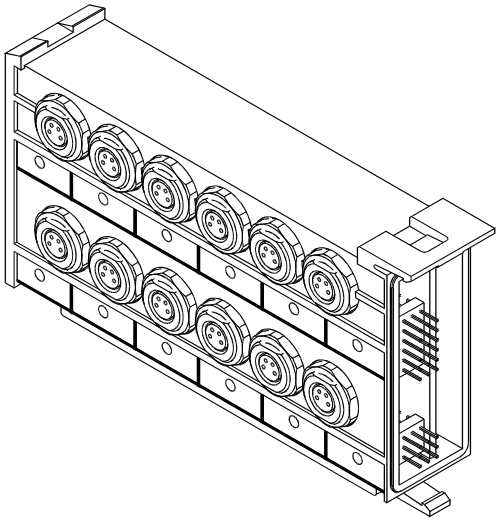
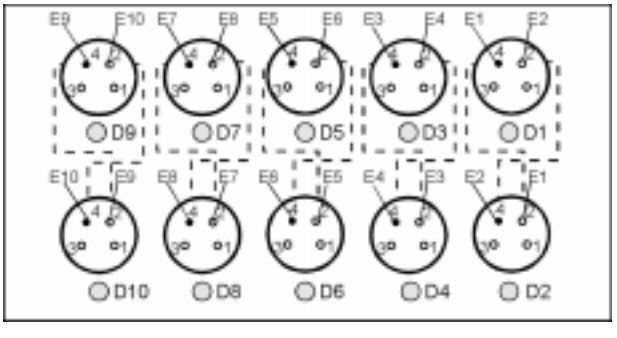


Fig. 50: Electrical base module for transducer inputs

Input voltage:	+ 24 V
Signal:	
0 (logical):	0 to 5 V
1 (logical):	13 to 30 V
Input current for 1 signal:	typically 8 mA

Inputs of the EGM-SE-19-10 module

10 inputs (round plug) for transducer signals, one LED per input



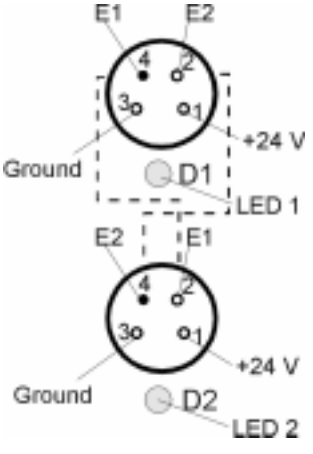


Fig. 51: Pin allocation of the EGM-SE modules, excepting the EGM-SE-19-4

NOTE The internal connection between two plugs lying one above the other is used to direct two transducer signals via one plug.

Inputs of the EGM-SE-19-4 module

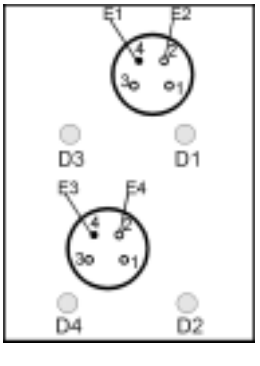


Fig. 52: Pin allocation of the EGM-SE-19-4 module

NOTES

GENERAL TECHNICAL DATA

NOTE

The valve battery meets the requirements of the EMC Law:

Immunity to interference	EN 50082-2
Interference radiation	EN 50081-2

Mounting dimension	**11 mm**	**19 mm**	**33 mm**
Function	C (3/2-Way) Type 6510 H (5/2-Way) Type 6511	C (3/2-Way) Type 5470 G (4/2-Way) Type 5470	C (3/2-Way) Type 6516 H (5/2-Way) Type 6517
Flow	130 l/min	300 l/m	1300 l/min
Pressure range	2,5 - 7 bar	2 - 8 bar	2 - 8 bar
Power (current)	1 Watt (42 mA)	1 Watt (42 mA), 2 Watt (84 mA)	1 Watt (42 mA), 2 Watt (84 mA)
Valve positions	max. 24	max. 24	max. 24
Transducers	max. 32	max. 32	max. 32
Electrical modules	6,12	2,5	2,4
Pneumatic modules	2,3,12	2,3	2,3
Protection class	IP 20 (as terminal model) IP 40	IP 20 (as terminal model) IP 65	IP 20 (as terminal model) IP 65

Ambient temperature 0 to +50°C

Storage temperature -20 to +60°C

Nominal operation Continuous operation (100 % ED)

Operational voltage 24 V/DC ±10%; Residual ripple at field bus interface 1 V_{SS}

Protection classes 3 to VDE 0580

Power consumption The power consumption is dependent on the type of electrical connection technology
Connection technology:

1. For the manifold connection (parallel connection technique) and Multipol interface, the power consumption depends on the type of valve used, but is. however, limited to a total current of max. 3 A. With Multipol together with transducers, an additional summed current also occurs, which must also not exceed 3 A.
2. For the field bus interface, the total current is calculated according to the formula

$$I_{complete} = I_{basic} + (n * I_{valve}) + (m * I_{transducer})$$

I_{basic}	basic current depending on the field bus	
	PROFIBUS-DP	200 mA
	INTERBUS-S	300 mA
	DeviceNet	200 mA
	Selecan	200 mA
	CANopen	200 mA
n:	number of valves	
m:	number of transducers	
I_{valve}	Rated current of the valve type	
$I_{transducer}$	Power consumption of transducer; $(m*I_{transducer})$ = max. 650 mA	

ATTENTION!

Always use low safety voltages according to protection class 3 VDE 0580!

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