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FLM DI 8 M12

Fieldline Modular Device With Eight Digital Inputs

Data Sheet 697000

02/2004



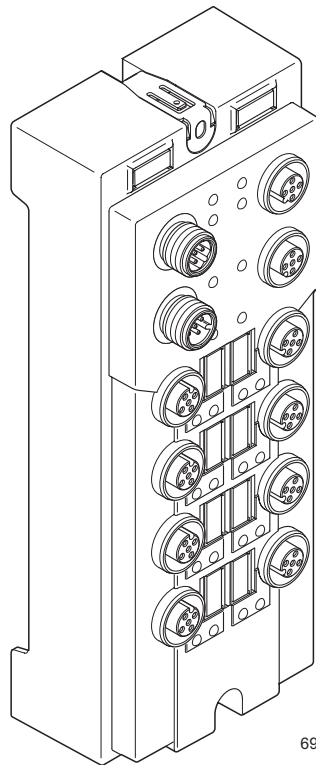
This data sheet is only valid in association with the FLS FLM SYS INST UM E user manual or the user manual for your bus system (see "Ordering Data" on page 12).

Function

The device is designed for use in the Fieldline modular local bus, which is opened by a Fieldline modular bus coupler. It is used to acquire digital signals.

Features

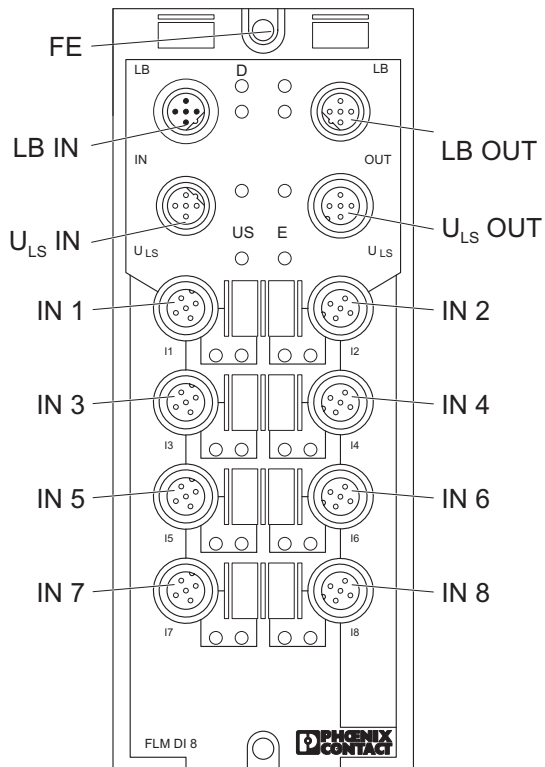
- Connection to the Fieldline modular local bus using M12 connectors (B-encoded)
- Connection of digital sensors using M12 connectors
- Flexible voltage supply concept
- LED diagnostic and status indicators
- Short-circuit and overload protection of the sensor supply
- IP65/IP67 protection



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Figure 1 The FLM DI 8 M12 Fieldline device

Connections



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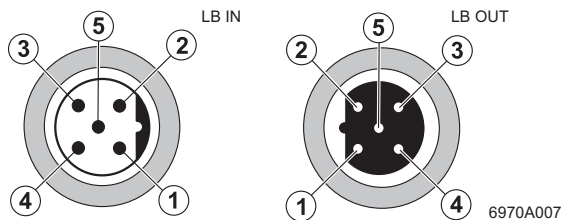
Figure 2 Connections of the FLM DI 8 M12

Des.	Meaning
FE	Functional earth ground
LB IN	Local bus IN
LB OUT	Local bus OUT
U_{LS} IN	Voltage supply IN (logic and sensor supply)
U_{LS} OUT	Voltage supply OUT (logic and sensor supply) for additional devices
IN1 to IN8	Inputs 1 to 8



In general, the maximum current load of 4 A per contact must not be exceeded.

Pin Assignment of LB IN/LB OUT



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Figure 3 Pin assignment of LB IN/ LB OUT (M12 B-encoded)

Pin	IN	OUT
1	DO	DO
2	$\overline{\text{DO}}$	$\overline{\text{DO}}$
3	DI	DI
4	$\overline{\text{DI}}$	$\overline{\text{DI}}$
5	GND	GND



The thread is used for shielding.

Pin Assignment of the Voltage Supply U_{LS}

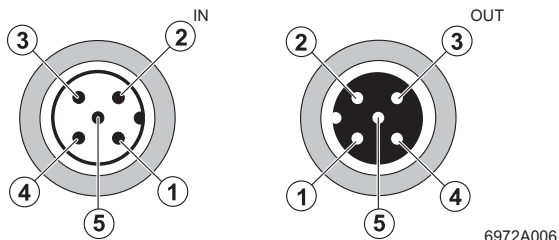


Figure 4 Pin assignment of the voltage supply U_{LS}

Pin	IN	OUT
1	$U_L +24\text{ V}$	$U_L +24\text{ V}$
2	$U_S\text{ GND}$	$U_S\text{ GND}$
3	$U_L\text{ GND}$	$U_L\text{ GND}$
4	$U_S +24\text{ V}$	$U_S +24\text{ V}$
5	500 kbaud/ 2 Mbaud	500 kbaud/ 2 Mbaud



The transmission speed is switched at the bus coupler.

Pin Assignment of the Inputs

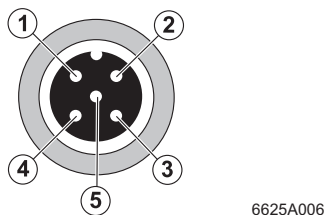
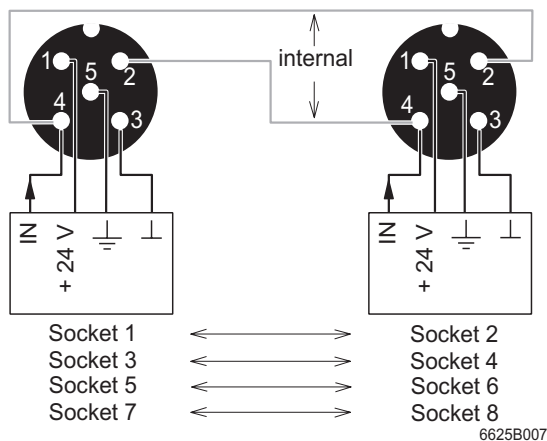


Figure 5 Pin assignment of the inputs

Pin	Input Socket
1	$U_S +24\text{ V}$
2	See Figure 6
3	GND
4	Input
5	FE

Assignment of the Input Sockets



Two input signals can be connected to each input socket. If both inputs of the same socket are used, the other socket must not be used (1 or 2, 3 or 4, 5 or 6, and 7 or 8) (see Figure 6).

Figure 6 Assignment of the input sockets

Local LED Diagnostic and Status Indicators

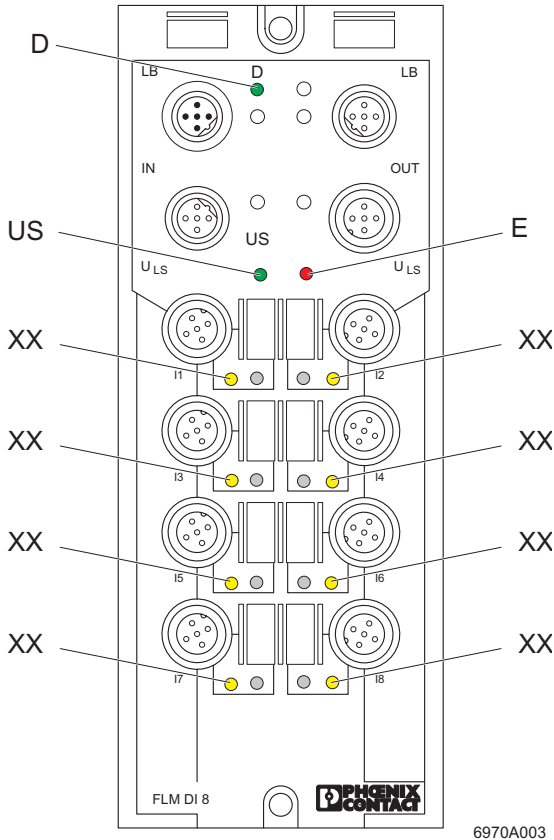


Figure 7 LED diagnostic and status indicators of the FLM DI 8 M12

Des.	Color	Meaning
D	Green LED	Diagnostics
	ON:	Bus active
	Flashing, 0.5 Hz:	Communications power present, bus not active
	Flashing, 2 Hz:	Communications power present, bus active, I/O error
	Flashing, 4 Hz:	Communications power present, transmission path to the left of the flashing device failed, device to the left of the flashing device failed, devices to the right of the flashing device are not part of the configuration frame
OFF:	Communications power not present, bus not active	
US	Green LED	Voltage supply for inputs IN1 to IN8
	ON:	Voltage supply present
	OFF:	Voltage supply too low
E	Red LED	Overload of voltage supply U_S
	ON:	Voltage supply overloaded
	OFF:	Voltage supply not overloaded
XX	Yellow LED	Status indicators of the inputs
	ON:	Input active
	OFF:	Input not active

Internal Circuit Diagram

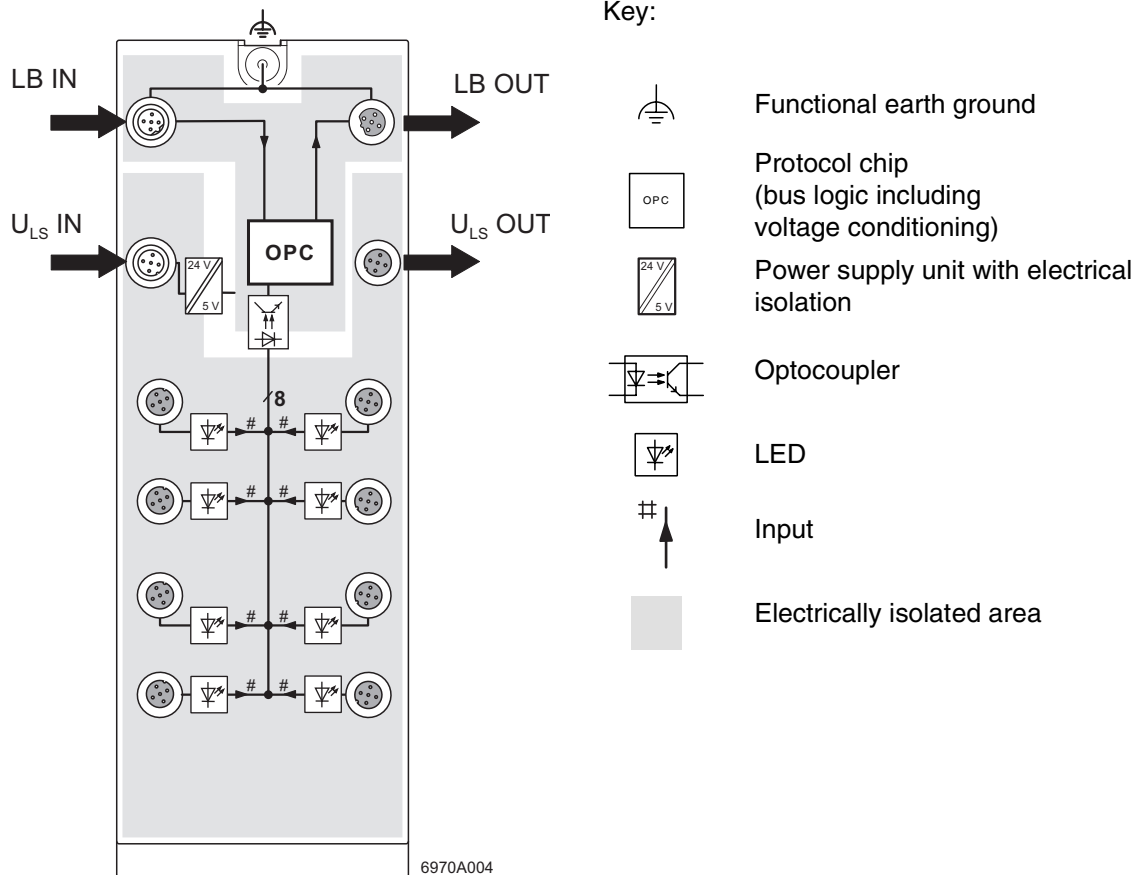
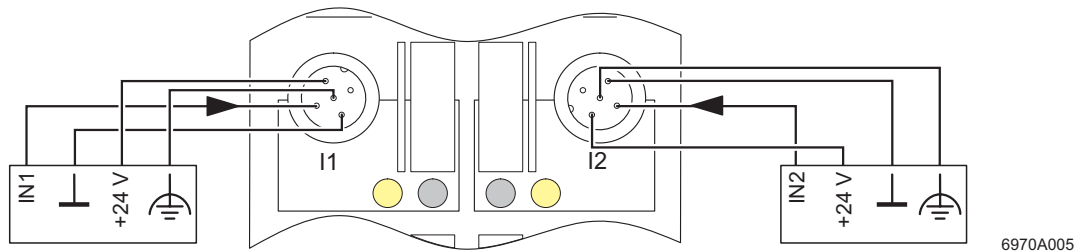


Figure 8 Internal wiring of the connection points



For information on electrically isolated areas, please refer to page 11.

Connection Example



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Figure 9 Typical connection of sensors

Connection Notes



Meet noise immunity requirements

Connect FE using a mounting screw or a cable connection to the FE connection latch (when mounting on a non-conductive surface).



Ensure degree of protection

To ensure IP65/IP67 protection, cover unused sockets with protective caps.



Avoid damage to the electronics

Make sure you only supply the sensors with the voltage U_S provided at the connection points.



Avoid polarity reversal

Avoid polarity reversal of the supply voltages U_L and U_S in order to prevent damage to the device.



Observe connection point assignment

When connecting the sensors, observe the assignment of the connection points to the IN process data (see "Process Data" on page 7).

Programming Data/Configuration Data

INTERBUS

ID code	BE _{hex} (190 _{dec})
Length code	81 _{hex}
Process data channel	8 bits
Input address area	8 bits
Parameter channel (PCP)	0 bits
Register length (bus)	8 bits

Other Bus Systems



For the programming data of other bus systems, please refer to the appropriate electronic device data sheet (GSD, EDS). For additional information, please refer to the user manuals, see "Ordering Data" on page 12.

Process Data

Assignment of the Connection Points to the IN Process Data

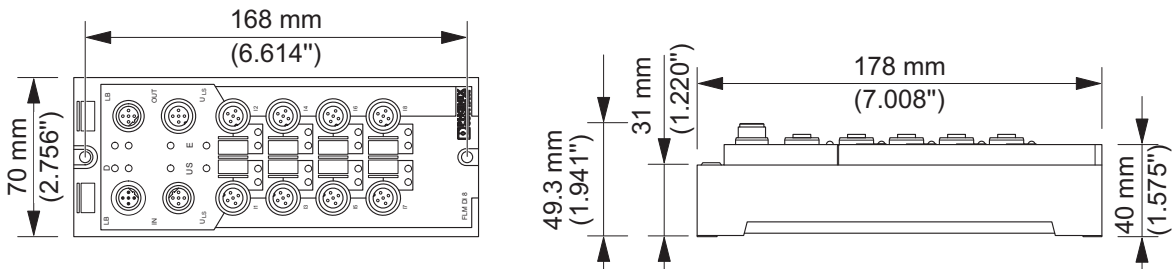
(Byte.bit) view	Byte	Byte 0							
	Bit	7	6	5	4	3	2	1	0
Device	Input	8	7	6	5	4	3	2	1





For the assignment of the illustrated (byte.bit) view for your INTERBUS control or computer system, please refer to data sheet DB GB IBS SYS ADDRESS, Part No. 90 00 99 0.

Technical Data

Device Dimensions



General Data	
Order designation	FLM DI 8 M12
Order no.	27 36 28 8
Housing dimensions (width x height x depth)	70 mm x 178 mm x 49.3 mm (2.756 x 7.008 x 1.941 in.)
Weight	290 g, approximately
Operating mode	Process data mode with 8 bits
Type of sensor connection	2, 3 or 4-wire technology
Permissible temperature (operation)	-25°C to +60°C (-13°F to +140°F)
Permissible temperature (storage/transport)	-25°C to +85°C (-13°F to +185°F)
Permissible humidity (storage/transport)	95%
 For a short period, slight condensation may appear on the housing.	
Permissible air pressure (operation)	80 kPa to 106 kPa (up to 2000 m [6562 ft.] above sea level)
Permissible air pressure (storage/transport)	70 kPa to 106 kPa (up to 3000 m [9843 ft.] above sea level)
Degree of protection	IP65/IP67 according to IEC 60529
Class of protection	Class 3 according to VDE 0106, IEC 60536

Mechanical Requirements	
Vibration test Sinusoidal vibrations according to EN 60068-2-6	5g load in each space direction
Shock test according to EN 60068-2-27	30g load, half sinusoidal wave positive and negative in each space direction
	For additional information on mechanical requirements and ambient conditions, please contact Phoenix Contact.

Voltage Supply	
Nominal value	24 V DC
Tolerance	±25%
Current consumption at U_L at 24 V DC	
At 500 kbaud	35 mA, typical (50 mA, maximum)
At 2 Mbaud	40 mA, typical (50 mA, maximum)
Current consumption at U_S at 24 V DC	5 mA, typical, + sensor current (600 mA, maximum)

Digital Inputs	
Number	8
Input design	According to IEC 61131-2 Type 1
Definition of switching thresholds	
Maximum low level voltage	$U_{Lmax} < 5 \text{ V}$
Minimum high level voltage	$U_{Hmin} > 11 \text{ V}$
Nominal input voltage	24 V DC
Range	$-30 \text{ V DC} < U_{IN} < +30 \text{ V DC}$
Nominal input current	5 mA
Current flow	Linear in the range $2 \text{ V} < U_{IN} < 30 \text{ V}$
Delay time	$t_{ON} = 3.1 \text{ ms}$, typical $t_{OFF} = 4.1 \text{ ms}$, typical
Permissible cable length to the sensor	< 30 m (98.43 ft.)

Input Characteristic Curve	
Input Voltage (V)	Typical Input Current (mA)
$-30 < U_{IN} < 0.7$	0
3	0.5
6	1.0
9	1.6
12	2.3
15	3.0
18	3.8
21	4.5
24	5.2
27	6.0
30	6.7

Sensor Supply	
Minimum sensor voltage	$U_S - 1 \text{ V}$
Nominal current per channel	600 mA
Nominal current per device	600 mA
Overload protection	Electronic per device
Short-circuit protection	Electronic per device


Error Messages to the Higher-Level Control or Computer System	
Sensor supply short-circuit	Yes
Sensor supply overload	Yes



If an error is triggered by an overload or short circuit of the sensor supply, the device switches off the sensor supply of the channels and reports an I/O error message to the master.

If the sensor supply U_S is not sufficiently high, the device reports an I/O error message to the master.

Interface	
Bus system	Fieldline modular local bus
Incoming Bus	
Coupling of shield connection	Directly to FE
Transmission speed	500 kbaud/2 Mbaud
Outgoing Bus	
Coupling of shield connection	Directly to FE
Transmission speed	500 kbaud/2 Mbaud

Electrical Isolation/Isolation of the Voltage Areas	
	For device connection, please note the instructions and regulations in the "Installing the Fieldline Product Range" user manual FLS FLM SYS INST UM E (Order No. 26 98 97 3).

Separate Potentials in the FLM DI 8 M12	
- Test Distance	- Test Voltage
24 V supply (bus logic) / FE	500 V AC, 50 Hz, 1 min
24 V supply (bus logic) / digital inputs (sensor supply / I/O)	500 V AC, 50 Hz, 1 min
24 V supply (bus logic) / incoming remote bus	500 V AC, 50 Hz, 1 min
24 V supply (bus logic) / outgoing remote bus	500 V AC, 50 Hz, 1 min
Digital inputs (sensor supply / I/O) / FE	500 V AC, 50 Hz, 1 min
Digital inputs (sensor supply / I/O) / incoming remote bus	500 V AC, 50 Hz, 1 min
Digital inputs (sensor supply / I/O) / outgoing remote bus	500 V AC, 50 Hz, 1 min
Incoming remote bus / FE	500 V AC, 50 Hz, 1 min
Outgoing remote bus / FE	500 V AC, 50 Hz, 1 min

Ordering Data

Description	Order Designation	Order No.
Fieldline modular device with eight digital inputs	FLM DI 8 M12	27 36 28 8
Protective caps (for unused sockets) pack of 5	IBS IP PROT-IO	27 59 91 9
Protective caps (for unused connectors) pack of 5	PROT-M12-M	27 36 19 4
Shielded connector, 5-pos. female connector, B-encoded, for the incoming local bus	SACC-M12FSB-5SC SH	15 13 59 6
Shielded connector, 5-pos. male connector, B-encoded, for the outgoing local bus	SACC-M12MSB-5SC SH	15 13 57 0
Markers pack of 10	ZBF 12:UNBEDRUCKT	08 09 73 5
"Installing the Fieldline Product Range" user manual	FLS FLM SYS INST UM E	26 98 97 3
"Configuring an INTERBUS System Using Devices in the Fieldline Product Range" user manual	FLS FLM IB SYS PRO UM E	26 99 06 6
"Configuring a PROFIBUS DP System Using Devices in the Fieldline Product Range" user manual	FLS FLM PB SYS PRO UM E	26 99 07 9
"Configuring a DeviceNet™ System Using Devices in the Fieldline Product Range" user manual	FLS FLM DN SYS PRO UM E	26 99 08 2
"Configuring a CANopen System Using Devices in the Fieldline Product Range" user manual	FLS FLM CO SYS PRO UM E	26 99 09 5
Additional accessories for connecting the sensors can be found in the Phoenix Contact PLUSCON catalog.		



Make sure you always use the latest documentation.
It can be downloaded at www.phoenixcontact.com.

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