

Rexroth Fieldline Modular M8 Local Bus Device With Digital I/O

R911170496
Edition 03

RF-FLM DIO 8/4 M8

4 digital Inputs
4 digital Inputs and Outputs
DC 24V

09/2017



Description

The device is designed for use on the Fieldline modular M8 local bus, which is opened by a Fieldline or Inline bus coupler. It is used to acquire and output digital signals.

Features

- Connection to the Fieldline modular local bus using M8 connectors
- 4 fixed inputs
- 4 freely selectable inputs or outputs
- Connection of digital sensors using M8 connectors
- Connection of digital actuators using M8 connectors, each with a load capacity of 500 mA (nominal current)
- Flexible voltage supply concept
- Diagnostic and status indicators
- Short-circuit and overload protection of outputs and sensor supply
- IP 65/IP67 protection



This data sheet is only valid in association with the application description DOK-CONTRL-FLSYSINS***-AW..-EN-P or the Fieldline application description for your bus system (see "[Documentation](#)" on page 2).



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

Ordering Data

Product

Description	Type	MNR	Pcs./Pkt.
Fieldline modular M8 device with 4 digital inputs and 4 digital inputs or outputs	RF-FLM DIO 8/4 M8	R911170450	1

Documentation

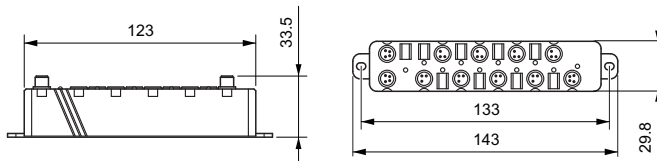
Description	Type	MNR	Pcs./Pkt.
"Installing the Rexroth Fieldline Product Range" application description	DOK-CONTRL-FLSYS-INS***-AW...-EN-P	R911317026	1
"Configuring an INTERBUS System Using Devices in the Rexroth Fieldline Product Range" application description	DOK-CONTRL-FLSIBSYS-PRO-AW...-EN-P	R911317947	1
"Configuring a PROFIBUS DP System Using Devices in the Rexroth Fieldline Product Range" application description	DOK-CONTRL-FLSPBSYS-PRO-AW...-EN-P	R911317945	1
"Configuring a DeviceNet System Using Devices in the Rexroth Fieldline Product Range" application description	DOK-CONTRL-FLSDNSYS-PRO-AW...-EN-P	R911317949	1



For further ordering data (accessories), please refer to our product catalog at www.boschrexroth.com.

Technical Data

Dimensions of the Device



7328:002

General Data

Dimensions (width x height (including fixing clips) x depth)	29.8 mm x 143 mm x 33.5 mm
Weight	144 g
Operating mode	Process data mode with 8 bits
Transmission speed	500 kbps
Connection method for sensors	2 and 3-wire technology
Connection method for actuators	2 and 3-wire technology
Permissible temperature (operation)	-25°C to +60°C
Permissible temperature (storage/transport)	-25°C to +85°C
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 above sea level)
Permissible air pressure (storage/transport)	70 kPa to 106 kPa (up to 3000 m above sea level)
Degree of protection	IP65/IP67 according to IEC 60529
Protection class	Class 3 according to VDE 0106, IEC 60536

Mechanical Requirements

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 Bosch Rexroth.

Voltage Supply

Nominal value	24 V DC
Tolerance	±25%
Current consumption at U_L at 24 V DC	40 mA, typical (55 mA, maximum)
Current consumption at U_A at 24 V DC	4 mA, typical + sensor current (600 mA, maximum) + actuator current (2 A, 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	$t_{ON} < 1 \text{ ms}$, typical $t_{OFF} = 1 \text{ ms}$, typical
Permissible cable length to the sensor	< 30 m

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	$U_A - 1 \text{ V}$
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 disconnects the sensor supply to all channels and sends an I/O error message to the master.

Digital Outputs

Number	4
Nominal output voltage U_{OUT}	$U_A - 1 V$
Differential voltage for I_{nom}	$\leq 1 V$
Nominal current I_{nom} per channel	500 mA
Total current	2 A (observe derating)
Protection	Short circuit; overload

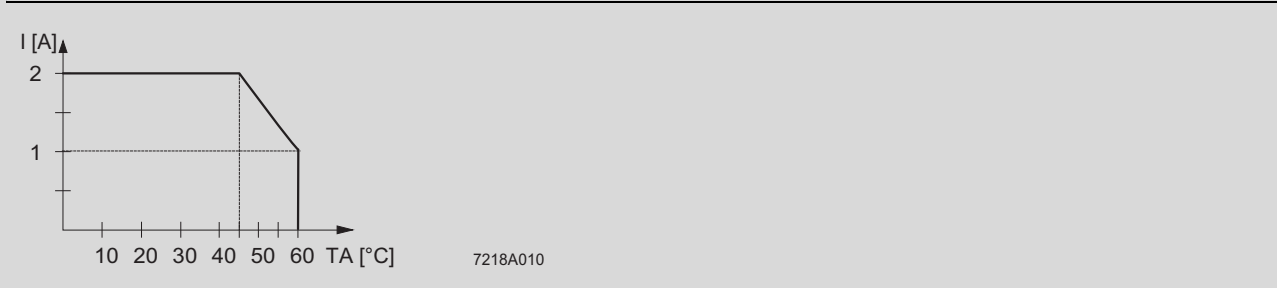


Single chip structure, i.e., all channels are thermally coupled. An error in one channel can affect the other channels. The outputs have separate overload protection.

Derating at 100% simultaneity



Derating must be observed when mounting the module on a non-metal surface. When mounting the module on a metal surface, no derating has to be observed.



Nominal load per channel	
Ohmic	12 W, 48 Ω
Inductive	12 VA (1.2 H, 48 Ω)
Lamp	12 W
Signal delay upon power up	Approximately 500 μs , typical (ohmic)
Signal delay upon power down	Approximately 1 μs , typical (ohmic)



The behavior of the output voltage depends on the switched load.

Switching frequency with:	
Nominal ohmic load	300 Hz, maximum



This switching frequency is limited by the number of bus devices, the bus configuration, the software used, and the control or computer system used.

Nominal inductive load	0.5 Hz (1.2 H, 48 Ω), maximum
Nominal lamp load	8 Hz, maximum
Overload response	Auto restart
Restart frequency with ohmic overload (2 Ω)	400 Hz, approximately
Response with inductive overload	Output may be damaged
Reverse voltage protection against short pulses	Protected against reverse voltages
Resistance to permanently applied reverse voltages	No
Response upon power down	The output follows the supply voltage without delay

Digital Outputs (Continued)

Validity of output data after connecting the voltage supply (power up)	5 ms, typical
Limitation of the voltage induced on circuit interruption	$-15 \text{ V} \leq U_{\text{demag}} \leq 45.8 \text{ V}$, approximately
Single maximum energy in free running	400 mJ
Protective circuit type	Integrated free-wheeling diode
Overcurrent shutdown	0.7 A, minimum
Output current when switched off	300 μA , maximum
Output current with ground connection interrupt when switched off	25 mA, maximum

Error Messages

Overload of outputs	Yes
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If an error is triggered at the outputs by an overload, the device switches off the corresponding output and sends an I/O error message to the master.

Permissible cable length to the actuator	< 30 m
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Output Characteristic Curve When Switched On (Typical)

Output Current (A)	Differential Output Voltage (V)
0	0
0.1	0.04
0.2	0.08
0.3	0.12
0.4	0.16
0.5	0.20

Interface

Bus system	Fieldline modular M8 local bus
Incoming bus	
Coupling of shield connection	Directly to FE
Transmission speed	500 kbps
Outgoing bus	
Coupling of shield connection	Directly to FE
Transmission speed	500 kbps

Electrical Isolation/Isolation of the Voltage Areas

For device connection, please note the instructions and regulations in the "Installing the Rexroth Fieldline Product Range" application description DOK-CONTRL-FLSYSINS***-AW..-EN-P.

Separate Potentials in the RF-FLM DIO 8/4 M8

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)/digital outputs (actuator supply)	500 V AC, 50 Hz, 1 min.
24 V supply (bus logic)/local 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)/digital outputs (actuator supply)	500 V AC, 50 Hz, 1 min.
Digital inputs (sensor supply/I/O)/local bus	500 V AC, 50 Hz, 1 min.
Digital outputs (actuator supply)/FE	500 V AC, 50 Hz, 1 min.
Digital outputs (actuator supply)/local bus	500 V AC, 50 Hz, 1 min.
Local bus/FE	500 V AC, 50 Hz, 1 min.

Approvals

For the latest approvals, please visit www.boschrexroth.com.

Connection Assignment

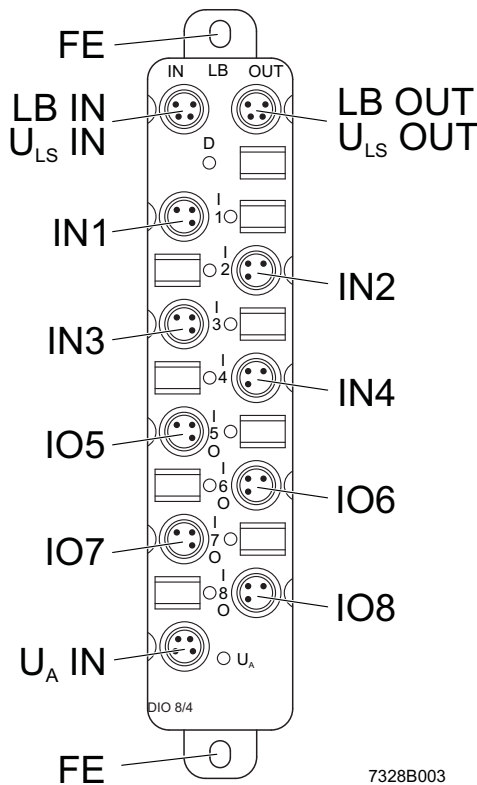


Fig. 1 Connections of the RF-FLM DIO 8/4 M8

Des.	Meaning
FE	Functional earth ground
LB IN	Local bus IN
LB OUT	Local bus OUT
U _L IN	Voltage supply IN (logic)
U _L OUT	Voltage supply OUT (logic and sensors for additional devices)
IN1 to IN4	Inputs 1 to 4
IO5 to IO8	Inputs/outputs 5 to 8
U _A	Voltage supply for the actuators and sensors



CAUTION

In general, the maximum current load of 3 A per contact must not be exceeded.



The voltage U_A supplies all inputs and outputs.

Pin Assignment of LB IN/LB OUT

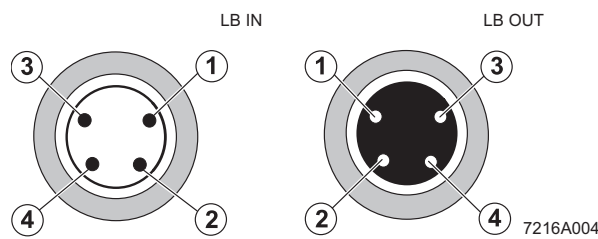


Fig. 2 Pin assignment of LB IN/LB OUT

Pin	IN	OUT
1	Supply voltage U _L	Supply voltage U _L
2	DI (LB IN)	DO (LB OUT)
3	GND U _L	GND U _L
4	/DI (LB IN)	/DO (LB OUT)



The thread is used for shielding.

Pin Assignment of the Voltage Supply U_A for the Inputs and Outputs

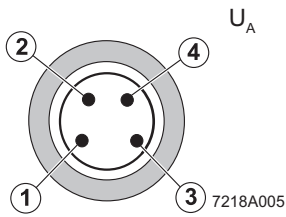


Fig. 3 Pin assignment of the voltage supply U_A for the input and outputs

Pin	Assignment	Note
1	24 V U_A	Voltage supply for actuators and sensors
2	GND U_A	Reference ground for actuators and sensors
3	GND U_A	Reference ground for actuators and sensors
4	24 V U_A	Voltage supply for actuators and sensors

Pin Assignment of the Inputs and Outputs

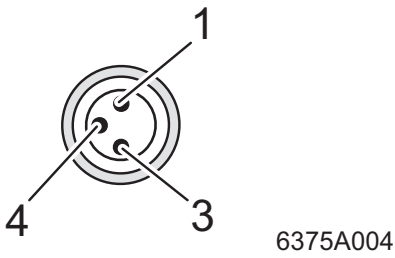


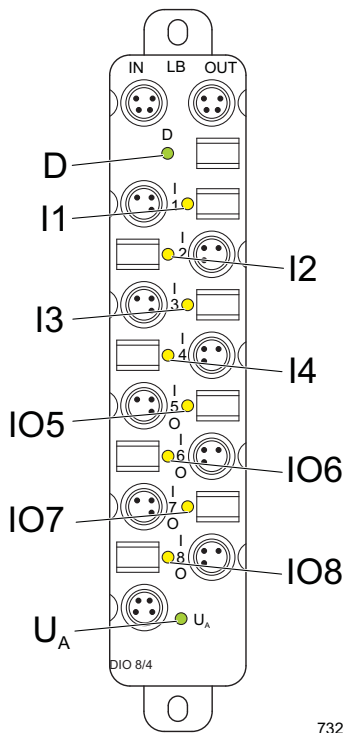
Fig. 4 Pin assignment of the inputs and outputs

Pin	Female Input Connectors IN1 to IN4	Female Output Connectors IO5 to IO8
1	24 V U_A supply voltage for sensors	24 V U_A supply voltage for actuators and sensors
3	GND U_A (sensors)	GND $_A$ for actuators and sensors
4	Input signal	Input or output signal



No parameters are required to specify the function of the inputs or outputs.

Local Diagnostic and Status Indicators



7328B006

Fig. 5 Diagnostic and status indicators of the RF-FLM DIO 8/4 M8

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, I/O error present, e.g., fuse has blown, voltage not present
	Flashing, 4 Hz:	Communications power present, transmission path before the flashing device failed, device before the flashing device failed, devices after the flashing device are not part of the configuration frame.
	OFF:	Communications power not present, bus not active
I1 to I8	Yellow LED	Status indicators of the inputs
	ON:	Input active
	OFF:	Input not active
O5 to O8	Yellow LED	Status indicators of the outputs
	ON:	Output active
	OFF:	Output not active
U_A	Green LED	Sensor/actuator voltage
	ON:	Sensor/actuator voltage present
	OFF:	Sensor/actuator voltage not present

Internal Circuit Diagram

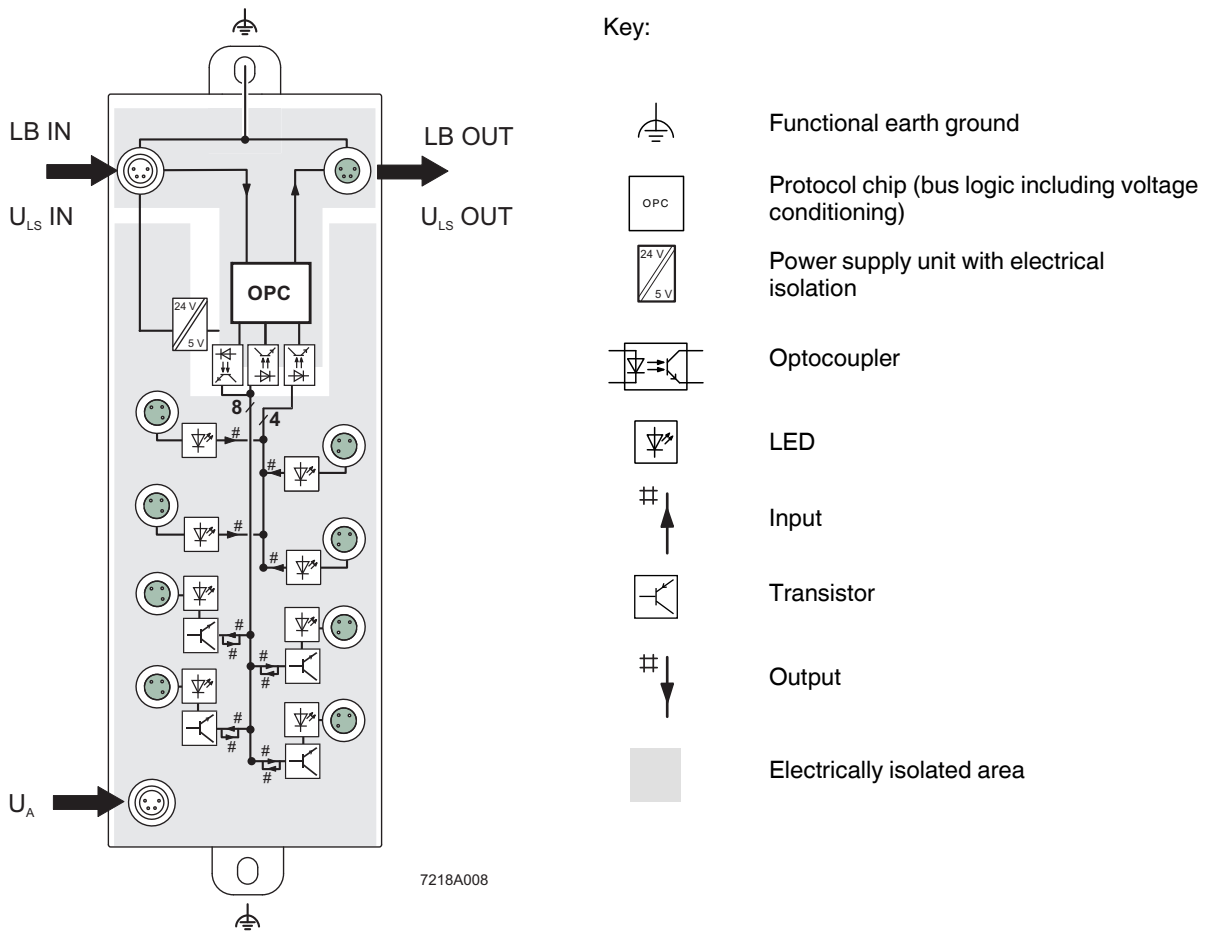

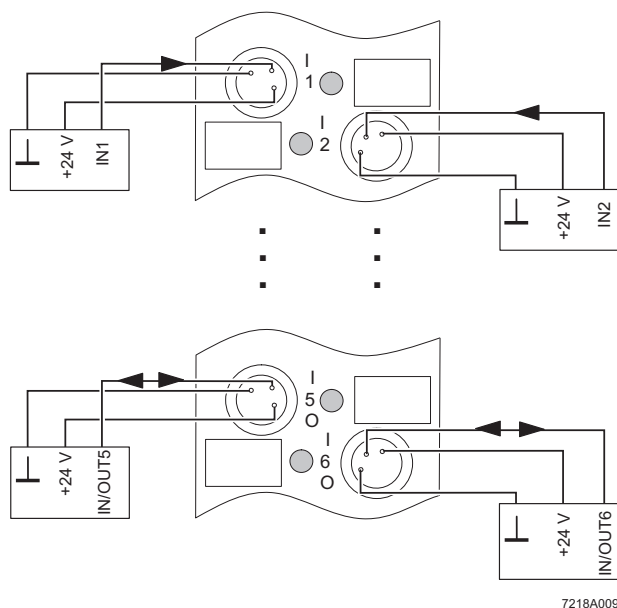


Fig. 6 Internal wiring of the connection points

 For information on electrically isolated areas, please refer to [page 6](#).

Connection Example



7218A009

Fig. 7 Typical connection of sensors and actuators

Connection Notes



CAUTION

Meet noise immunity requirements

Connect FE using a mounting screw when mounting on a conductive surface.

When mounting the sensor on a non-conductive surface, FE is connected using the mounting screw via a cable lug.



CAUTION

Ensure degree of protection

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



CAUTION

Avoid damage to the electronics

Only supply the sensors with the voltage U_A provided at the terminal points.



CAUTION

Avoid polarity reversal

Avoid polarity reversal of the supply voltages U_L and U_A to prevent damage to the device.

Do not mix up connections U_A IN and LB IN (U_L IN).



CAUTION

Observe connection point assignment

When connecting the sensors and actuators, observe the assignment of the connection points for the IN and OUT process data (see "Process Data" on page 12).



Secure the device to a level surface or to a profile. Do not bridge gaps with the device, this will ensure no forces are transferred to the device.



Tighten the mounting screws on the support plate with a maximum of 2.8 Nm.



In addition, insert as much of the filler litz wire as possible in the connector for the local bus cables with braided shield.

Programming Data/Configuration Data

Local Bus

ID code	B3 _{hex} (179 _{dec})
Length code	81 _{hex}
Process data channel	8 bits
Input address area	8 bits
Output 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 corresponding electronic device data sheet (e.g. GSD, EDS). For additional information, please refer to the application description, see "[Documentation](#)" on page 2.

Process Data

Assignment of the Terminal 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

Assignment of the Terminal Points to the OUT Process Data

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