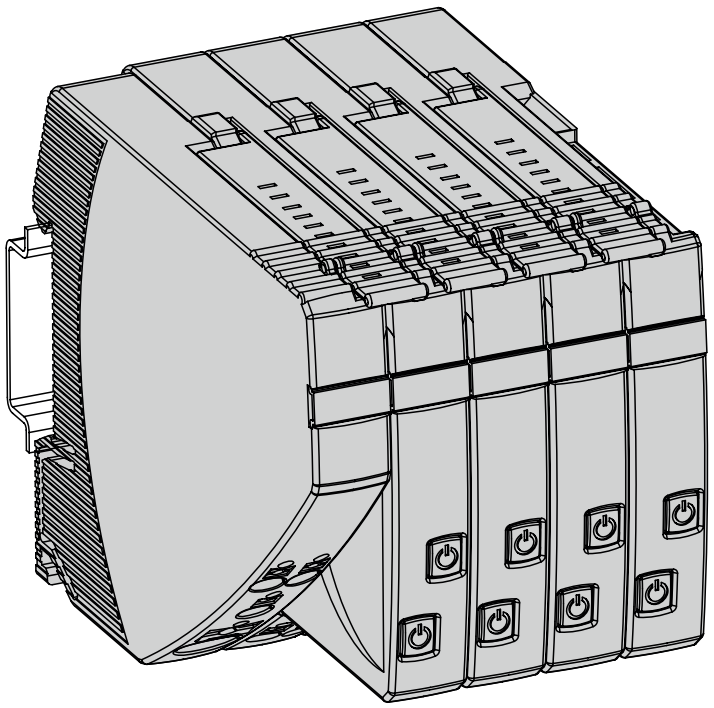
Installation instructions

Electronic circuit breakers
for the 24 V DC secondary circuit

UK

DF11xx
DF12xx
DF21xx
DF22xx



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1 Preliminary note

This document applies to the supply modules DF11xx/DF21xx and the circuit protection modules DF12xx/DF22xx.

Read this document before use to familiarise yourself with operating conditions, installation and operation. Keep this document during the entire duration of use of the device.

⚠ WARNING

Adhere to the warning notes and safety instructions (→ 2 Safety instructions).

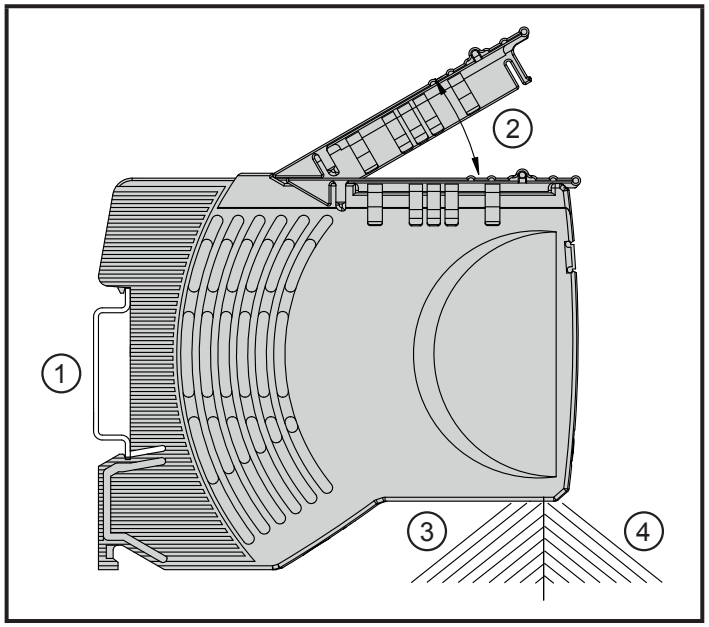
The devices are not suitable for battery-backed applications.

2 Safety instructions

- The devices are intended for use with a 24 V DC safety extra-low voltage.
- A wrong connection to voltage which is higher and/or not safely isolated may lead to damage or conditions which are dangerous to life.
- Use the supply module only with the matching circuit protection modules.
- Observe the technical data of the circuit protection modules used.
- The devices must be installed, connected and put into operation by a qualified electrician.
- Adhere to the national regulations regarding the installation and selection of cables.
- Do not mount the devices and do not actuate the contact levers while live.
- Supply the devices with energy only after they have been properly installed.
- After triggering a circuit protection module and before power on again, remove the cause of triggering (short circuit or overload).
- Check the devices for damage prior to installation. Faulty devices must not be used.
- In case of malfunction of the unit or queries please contact the manufacturer. Any tampering with the device can seriously affect the safety of operators and machinery. This is not permitted and leads to the exclusion of any liability and warranty claims.

3 Installation

▶ Mount the devices on a 35 mm rail.



Example circuit protection module DF12xx

1: Rail
2: Contact lever
3: Installation area
4: Operating area

UK

4 Electrical connection

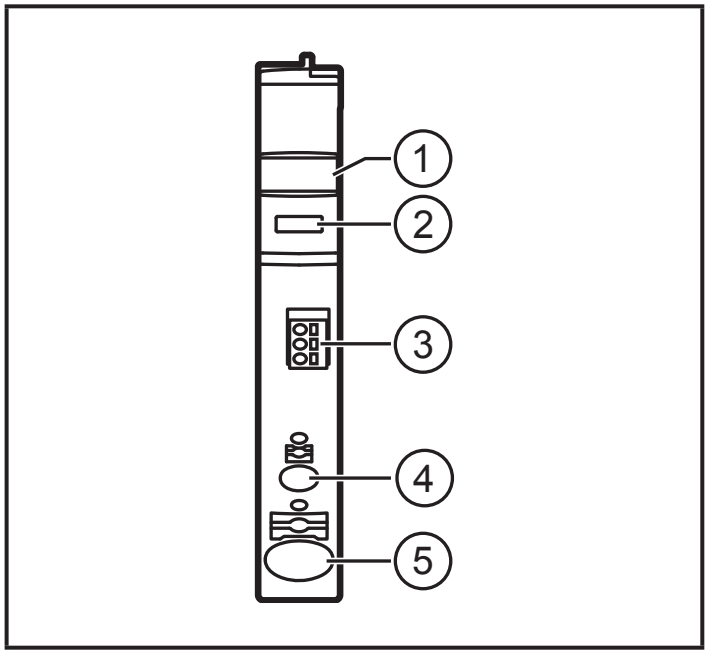
▶ Dimension cables according to input and output current.
▶ Insert wires directly into the terminals as shown on the device label.

Art. no.	Terminals	Potential	Cross-section [mm²]	Stripping length [mm]
DF11xx / DF21xx	24 V DC	Supply	0.5...10	18
	0 V		0.14...2.5	8...10
DF21xx	L+, C/Q, L-	IO-Link	0.25...0.5	6
DF11xx	13-14	NO contacts	0.14...2.5	8...10
DF12xx / DF22xx	O1 or O1/O2	Current outputs	0.14...2.5	8...10

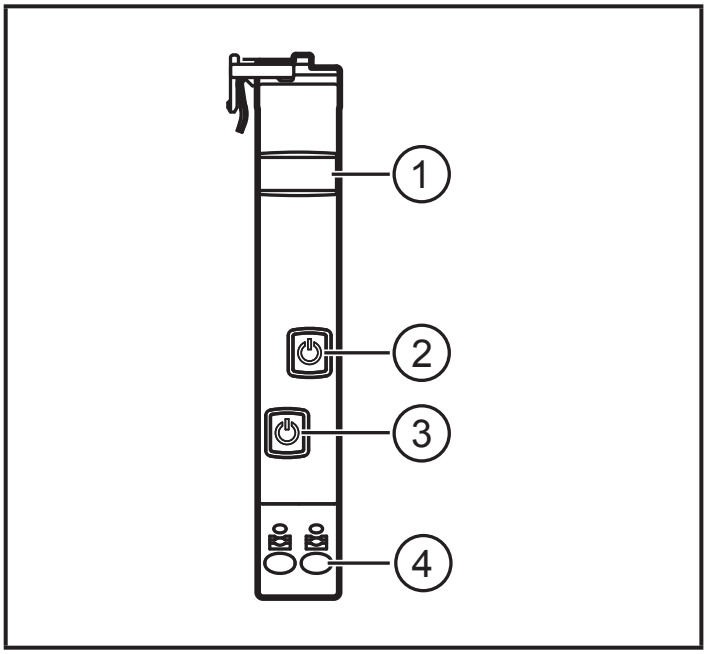
To disconnect press the orange pusher using a suitable tool.
To open the push-in terminals IO-Link use a 2 mm wide micro screwdriver.

As soon as the supply module is supplied with voltage, the device closes the contacts connected to terminals 13 and 14. If a fault occurs at min. one of the connected channels, the device opens the contacts again.

5 Operating and display elements



Example supply module DF21xx
1: Panel for labelling
2: Status LED
3: Push-in terminals IO-Link
4: Push-in terminal 0 V
5: Push-in terminal 24 V DC



Example DF22xx circuit protection module
1: Panel for labelling
2: ON/OFF/reset button and status LED (channel 2)
3: ON/OFF/reset button and status LED (channel 1)
4: Push-in terminals outputs 1/2

5.1 Supply module DF11xx/DF21xx

Status LED		Operating mode	IO-Link communication
—	Off	Missing operating voltage	No
Green	On	Correct operation (→ 5.1.1)	Yes
	Flashing	Independent operation (→ 5.1.2)	No
Orange	On	Uncritical error (→ 5.1.3)	Yes
	Flashing		No
Red	On	Critical error (→ 5.1.4)	No
	Flashing	System start (→ 5.1.5)	

5.1.1 Correct operation

No fault occurred and there is connection to the IO-Link master.

5.1.2 Independent operation

No connection to the IO-Link master. If there is no connection to the IO-Link master when the operating voltage has been applied, the supply module transfers the parameter data to the connected circuit protection modules. The behaviour of the connected circuit protection modules is controlled via the configuration of the supply module. Either the status of the circuit protection modules is kept (FREEZE) or the circuit protection modules are switched off (UNFREEZE). If there is again connection to the IO-Link master and no fault occurred, the device goes to the mode "correct operation".

5.1.3 Uncritical error

No valid configuration data is available. The connected circuit protection modules remain switched off. Cyclic data exchange is not possible, acyclic data exchange is conditionally possible. After the device has received the valid configuration and parameter data it quits this operating mode.

5.1.4 Critical error

During initialisation an error is found or a critical error occurs. Communication with the IO-Link master is not possible. The connected circuit protection modules are and remain switched off.

► Reboot the device.

5.1.5 System start

The supply module is initialised when the operating voltage is applied. During this time communication with the IO-Link master is not possible.

5.2 DF12xx/DF22xx circuit protection modules

The different operating states of the circuit protection modules are indicated by LEDs.

Status LED		Operating status	Status of load output
—	Off	Missing operating voltage, error in initialisation or channel switched off via button	Off
Green	On	Channel switched on via button or IO-Link, no error	On
Green + orange	Flashing	Load current limit reached	On
Orange	On	Overload or short circuit until disconnection	On
		Channel switched on via button and switched off via IO-Link	Off
Red	On	Triggering via short circuit or overload	Off
		Undervoltage in ON status with automatic switching on again	

6 Technical data

Art. no.		DF1100	DF1208	DF1210	DF1212	DF1214	DF1216	DF210x	DF2208	DF2210	DF2212	DF2214	DF2216
Supply module		●	-					●	-				
Circuit protection module		-	●					-	●				
Interface		-						IO-Link					
Number of circuit protection modules per supply module		-	≤ 10					-	≤ 8				
Electrical data													
Input voltage	[V]	18...30 DC (SELV/PELV)											
Nominal voltage	[V]	24 DC											
Input current (= max. total current)	[A]	40	-					40	-				
Number of channels		-	1		2			-	1		2		
Nominal current IN Fail-safe IN	[A]	-	8 (8)	10 (10)	2 (2)	4 (4)	6 (6.3)	-	8 (8)	10 (10)	2 (2)	4 (4)	6 (6.3)
Mechanical data													
Installation		rail TH35 (to EN 60715)											
Device width	[mm]	12.5											
Ambient temperature	[°C]	-25...60											
Storage temperature	[°C]	-40...70											
Protection rating (→ 3 Installation)		IP 30 (installation area) IP 20 (operating area)											
Electrical connection													
Type		push-in terminals, contact lever/strip											

● = applicable

Data sheets are available at:
www.ifm.com
When read with a smartphone the printed QR codes directly lead to the data sheet and more information.

6.1 Temperature factor / continuous current rating

The time-current characteristic curve depends on the ambient temperature. To determine the max. permitted load current multiply the nominal device current by the temperature factor taking into consideration the series connection.

Ambient temperature [°C]	0	10	23	40	50	60
Temperature factor	1	1	1	0.95	0.90	0.85

With series installation the nominal device current can be max. 80% or has to be overdimensioned accordingly. With increased temperature the load current warning limit "warning limit typ. 0.8 x I_N" is reduced by the temperature factor.

6.2 Fail-safe element

The load circuits are additionally protected by the circuit protection modules that are equipped with a fail-safe element (integrated fuse). The fail-safe element is adapted to the nominal current I_N of the respective circuit protection module and the respective wire cross-sections.

7 IO-Link

The load current warning threshold can be configured via the IO-Link interface

The IO-Link devices can also be used as stand-alone devices without IO-Link master.

Extended functions of the DF2101 head module via IO-Link:

- Min. / max. value generation of the measured current and voltage values for each channel over any period of time
- Averaging of the measured current and voltage values for each channel over any period of time
- Permanent switching on of individual channels in order to ignore the cyclic data exchange (e.g. to guarantee the voltage supply of important devices). The safety function remains active.

You will find the IODDs necessary for the configuration of an IO-Link device and detailed information about parameter setting tools, process data structure, diagnostic information and parameter addresses at www.ifm.com/gb/io-link.