ifm electronic

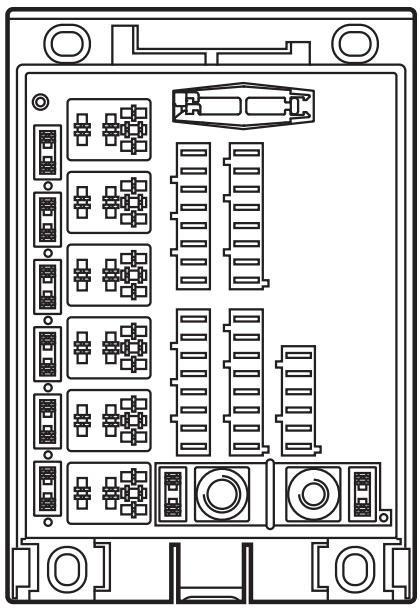
CE

Installation instructions
BasicController *relay*

UK

ecomat100®

CR0431



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Contents

This document is the original instructions.

1 Preliminary note

This document applies to devices of the type "BasicController relay" (art. no.: CR0431). These instructions are part of the device.

This document is intended for specialists. These specialists are people who are qualified by their appropriate training and their experience to see risks and to avoid possible hazards that may be caused during operation or maintenance of the device. The document contains information about the correct handling of the device.

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.

Adhere to the safety instructions.

1.1 Symbols used

► Instructions
> Reaction, result
[…] Designation of keys, buttons or indications
→ Cross-reference

Important note
Non-compliance may result in malfunction or interference.

Information
Supplementary note

1.2 Warnings used

⚠ WARNING
Warning of serious personal injury.
Death or serious irreversible injuries may result.

⚠ CAUTION
Warning of personal injury.
Slight reversible injuries may result.

NOTE
Warning of damage to property.

2 Safety instructions

2.1 General

These instructions contain texts and figures concerning the correct handling of the device and must be read before installation or use.

Observe the operating instructions. Non-observance of the instructions, operation which is not in accordance with use as prescribed below, wrong installation or incorrect handling can seriously affect the safety of operators and machinery.

2.2 Target group

These instructions are intended for authorised persons according to the EMC and low-voltage directives. The device must be installed, connected and put into operation by a qualified electrician.

2.3 Electrical connection

Disconnect the unit externally before handling it. If necessary, also disconnect any independently supplied output load circuits.

If the device is not supplied by the mobile on-board system (12/24 V battery operation), it must be ensured that the external voltage is generated and supplied according to the criteria for safety extra-low voltage (SELV) as this voltage is supplied without further measures to the connected controller, the sensors and the actuators.

The wiring of all signals in connection with the SELV circuit of the device must also comply with the SELV criteria (safety extra-low voltage, safe electrical isolation from other electric circuits).

If the supplied SELV voltage is externally grounded (SELV becomes PELV), the responsibility lies with the user and the respective national installation regulations must be complied with. All statements in this document refer to the device the SELV voltage of which is not grounded.

The connections may only be supplied with the signals indicated in the technical data and/or on the device label and only the approved accessories of ifm electronic may be connected.

2.4 Tampering with the device

In case of malfunctions or uncertainties 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 Functions and features

The freely programmable controllers of the "BasicController relay" series are rated for use under difficult conditions (e.g. extended temperature range, strong vibration, intensive EMC interference). They are suitable for direct installation in mobile vehicles.

By means of the application software the user can configure the inputs and outputs to adapt to the respective application. The controllers can be used as CAN controller, CANopen master or intelligent I/O module (→ 9 Technical data).

Application-specific extensions and adaptations are possible in conjunction with additional products of the modular Basic design.

⚠ WARNING

The device is not approved for safety-related tasks in the field of operator protection.

NOTE

The device is intended for installation in vehicle bodies, not in engines.

3.1 Features at a glance

- Freely programmable to IEC 61131-3
- 2 CAN interfaces (incl. interface for BasicDisplay CR0451 or CR0452)
- Locations for 6 automotive micro relays and 8 automotive mini fuses
- Configurable inputs and relay switching outputs
- Protection IP 54 (with cover and cable seal)
- Status LEDs for controller and fuse states F0...F6
- Integrated fuse puller

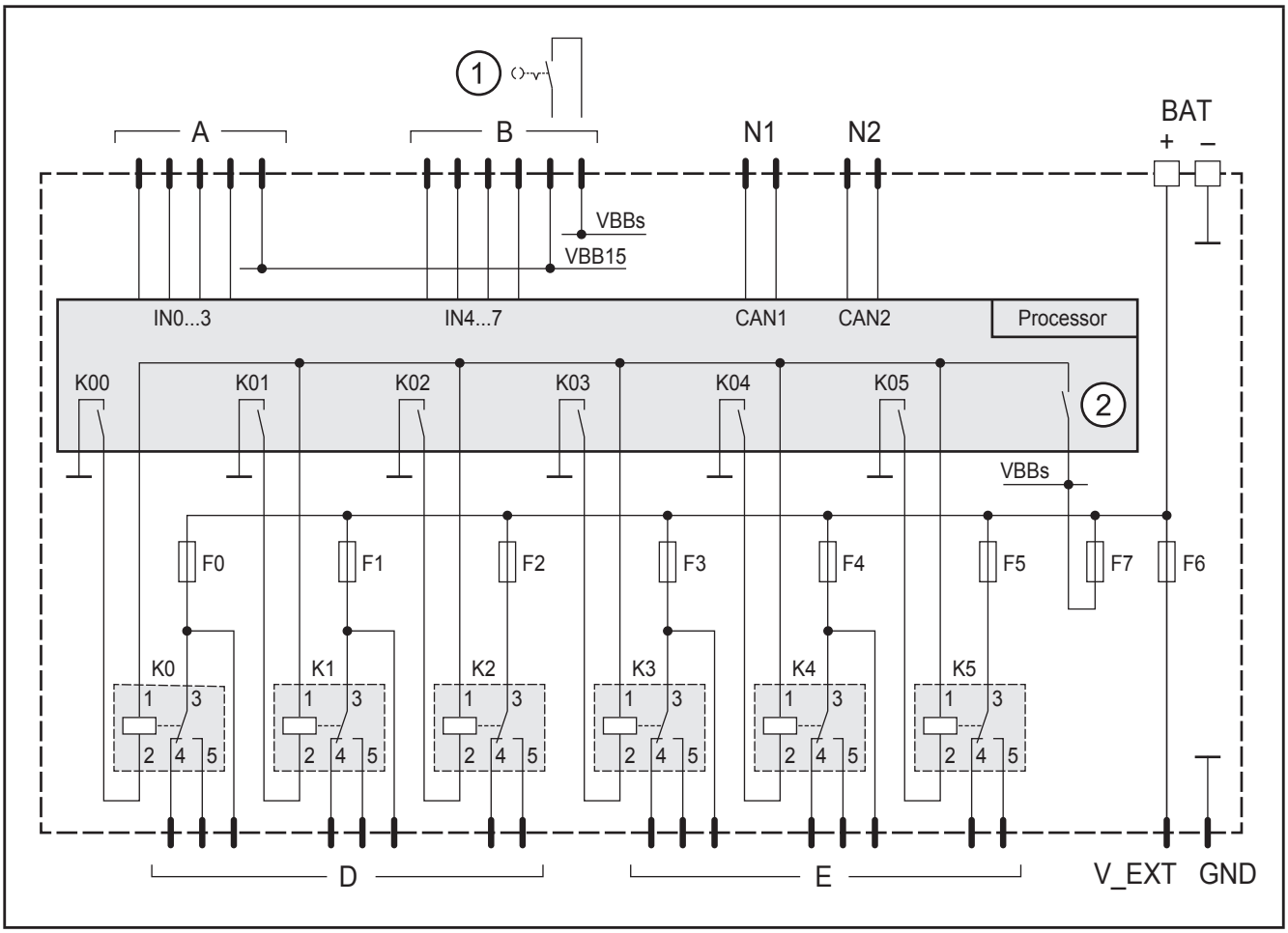
3.2 Items supplied

The device is supplied with a fuse puller.
Relays, fuses, crimps, connectors, hexagon nuts and washers are not supplied with the device.

3.3 Accessories

Information about available relays, fuses etc. at:www.ifm.com → Data sheet search → CR0431 → Accessories

3.4 Block diagram



1: Ignition switch
2: SUPPLY_SWITCH (CODESYS flag)

3.5 Devices of the Basic series (examples)

- BasicController (art. no.: CR040x) and BasicController plus (art. no.: CR0411)
  Mobile controller, freely programmable to IEC 61131-3
  2 CAN interfaces (incl. interface for BasicDisplay CR045x)
  Configurable inputs/outputs
- BasicDisplay (art. no.: CR0451) and BasicDisplay XL (art. no.: CR0452)
  Programmable display with graphics capabilities with 2.8" colour display
  5/6 freely programmable, backlit function keys
  1 navigation key for cursor function
- BasicRelay (art. no.: CR0421)
  Freely wirable relay and fuse carrier for 6 automotive relays and 10 automotive fuses
- Cover (art. no.: EC0401)
  incl. cable seal to obtain IP 54 protection

For information about the available Basic family see:
www.ifm.com → Product line → Systems for mobile machines

4 Installation

4.1 General installation instructions

4.1.1 Protection rating

The achievable protection rating of the device depends on the accessories used and the installation position.

Protection rating	Accessories	Installation position	Art. no.
IP 54	Cover with cable seal	Cable connection from the bottom	EC0401
IP 00	–	Any	–

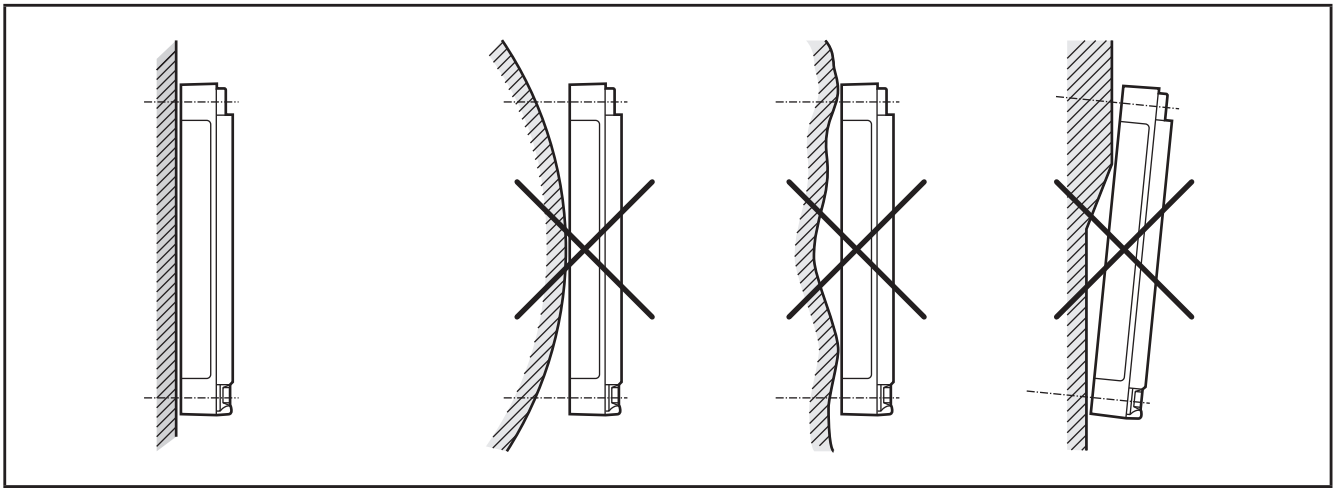
– = not required

4.1.2 Mounting surface

NOTE

The housing must not be exposed to any torsional forces or mechanical stress.

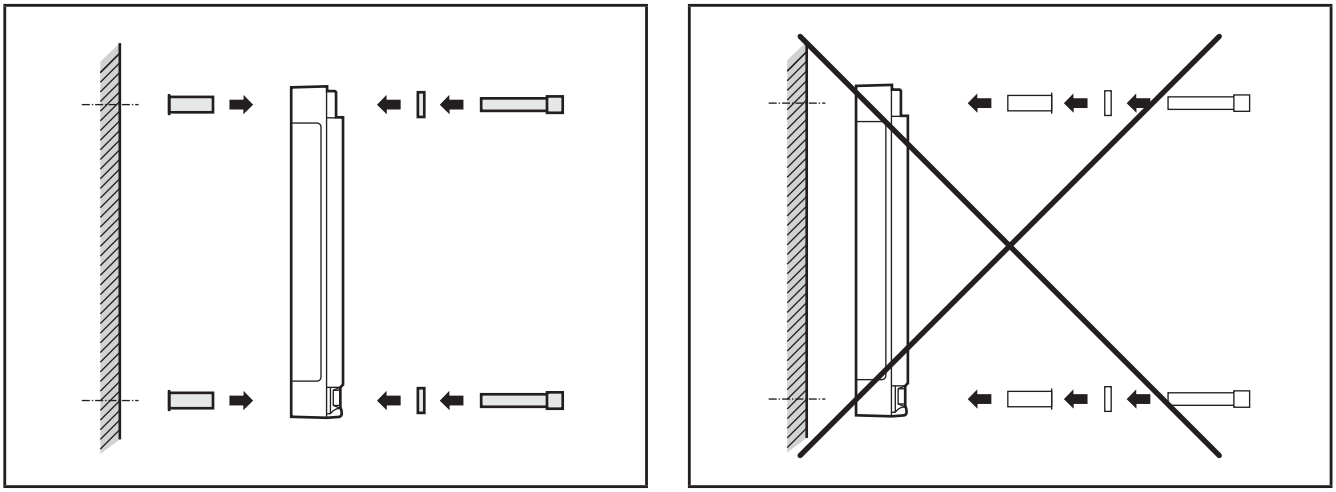
► Mount the device on a flat surface.
► Use compensating elements if there is no flat mounting surface available.



Mounting surface

4.2 Fixing

► Insert the enclosed tubular rivets from the back of the module in the 4 fixing holes.
► Fix the module using 4 washers and M4 screws.
Tighten the screws alternately crosswise.



Use of the tubular rivets

Tightening torque: 1.5 Nm
Hole dimensions (→ 9 Technical data)

Screws to be used (examples):	Standard
Cylinder screws with hexagon socket (M4 x L)	ISO 4762
Cylinder screws with hexagon socket and low head (M4 x L)	DIN 7984

4.3 Cover and cable seal

NOTE

Protection IP 54 can only be guaranteed if the cover is used together with the cable seal.

NOTE

The cover reduces the amount of heat to be dissipated and can increase the device temperature. With the cover the max. possible operating temperature decreases (→ 9 Technical data).

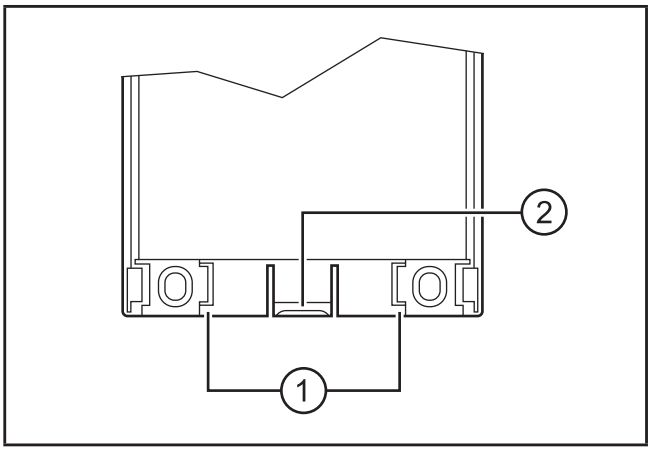
4.3.1 Max. overall height of the relay

As a principle use automotive micro relays without mounting brackets. The mounting brackets cannot be used in conjunction with the device and would unnecessarily increase the height of the relay.

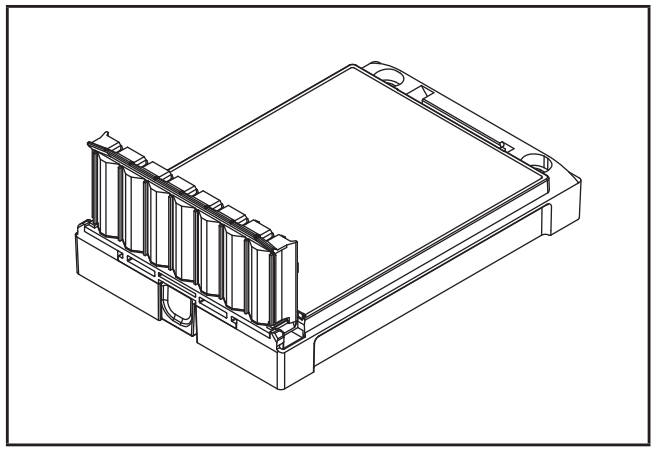
Base dimensions of the relays used (→ 5.4 Relay)

4.3.2 Installation of the cable seal

► Insert the cable seal into the locator from below.
> The locking of the cable seal audibly clips into place.



1. Locator for cable seal
2. Locking

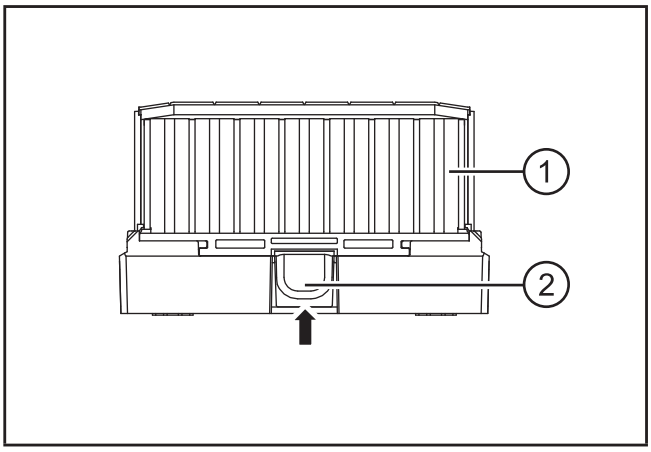


Mounted cable seal

The cable seal cannot be used as strain relief of the cables. (→ 5.1 General electrical connection)

4.3.3 Remove the cable seal

► Press the locking at the bottom of the device and remove the cable seal from the device by pulling downwards.

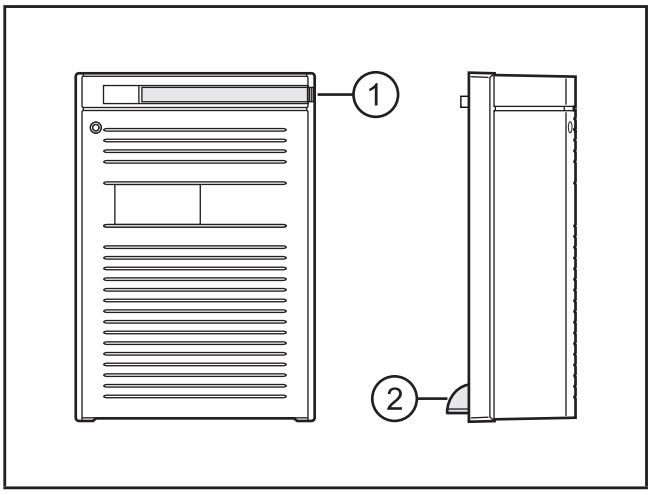


1. Cable seal
2. Locking

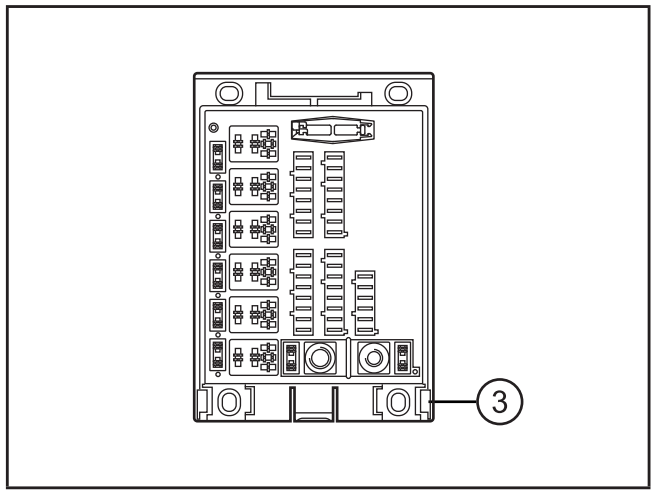
Bottom of the device

4.3.4 Installation of the cover

The covers of the Basic series feature a single-lever locking. Installation is done without tools.

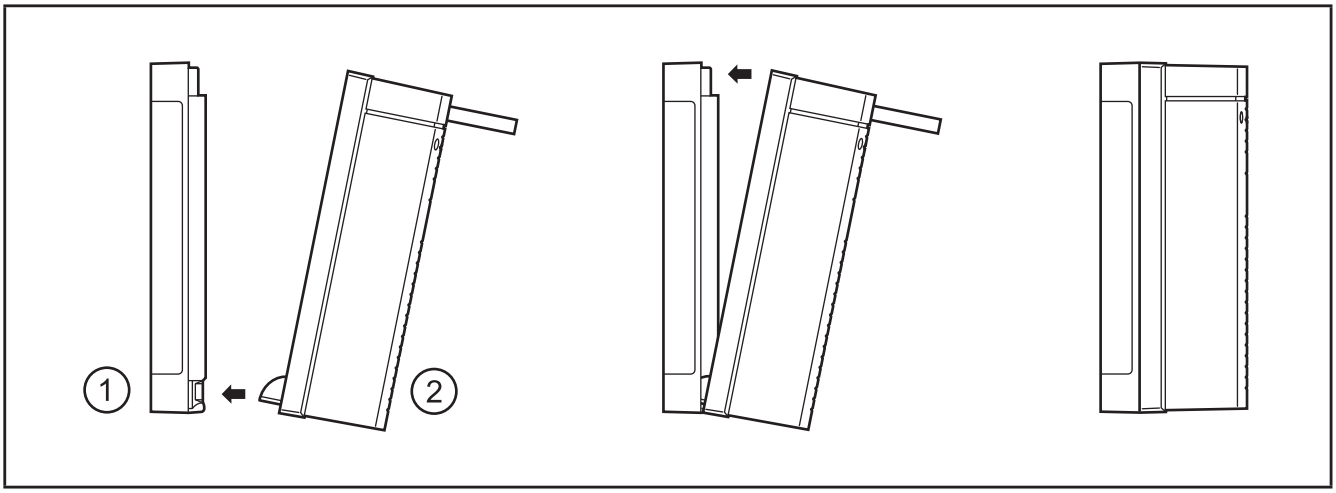


1: Locking lever
2: Cover guides



3: Insertion slots for cover guides

► Pull out the locking lever and rotate it towards you.
► Place the cover diagonally onto the device.
Insert the 2 cover guides, found at the bottom of the cover, into the slots.
► Close the cover onto the lower part.
The 2 guides and slots provide a pivot point.
► Move the locking lever back into its initial position.
> The cover is locked.



1: BasicController relay
2: Cover

4.3.5 Removing the cover

► Pull out the locking lever and rotate it towards you.
> The cover is unlocked and can be removed.

5 Electrical connection

5.1 General electrical connection

⚠ WARNING

The user is responsible for the safe function of the circuits which he created himself. If necessary, he must additionally carry out an approval test by corresponding supervisory and test organisations according to the national regulations.

⚠ WARNING

The user must ensure that malfunction due to bent cable connections or loose spade terminals does not impair the safety of people and equipment.

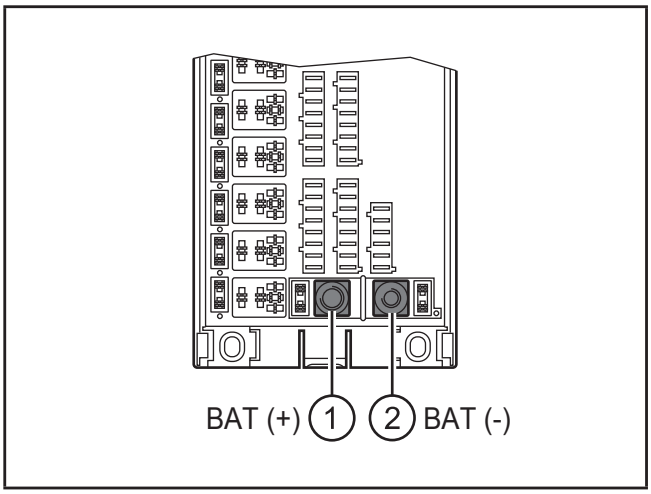
NOTE

Wrong connection may cause damage to the device.
► Observe the safety instructions (→ 2.3 Electrical connection).

► Basically all supply and signal cables must be laid separately.
► Lay supply and signal cables away from the device using the shortest possible route.
► All connected cables must be provided with a strain relief at least 100 mm behind the cable entry.
► Protect unused terminals with unpopulated sockets if no cover is used.

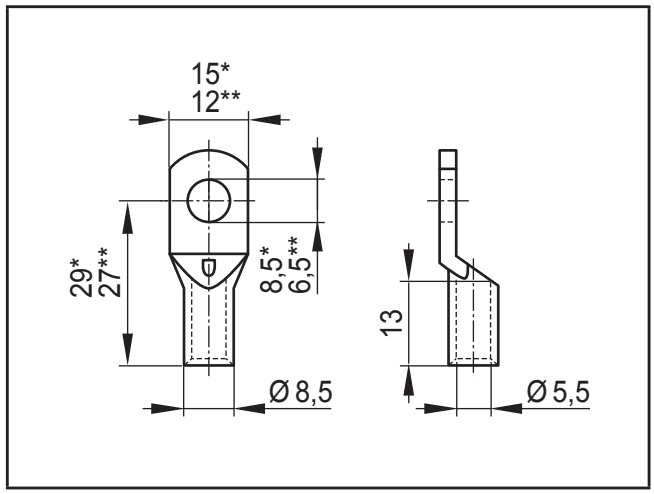
5.2 Supply voltage

► Establish voltage and GND connections via crimps and the M8/M6 threaded suspension rods.
► Observe max. tightening torques.
  – M8: ≤ 9.0 Nm
  – M6: ≤ 3.9 Nm



Connection supply voltage from battery

1: M8 threaded suspension rod
   Supply voltage BAT (+)
2: M6 threaded suspension rod
   GND BAT (-)



Crimps (e.g. for 16 mm² nominal cross section)

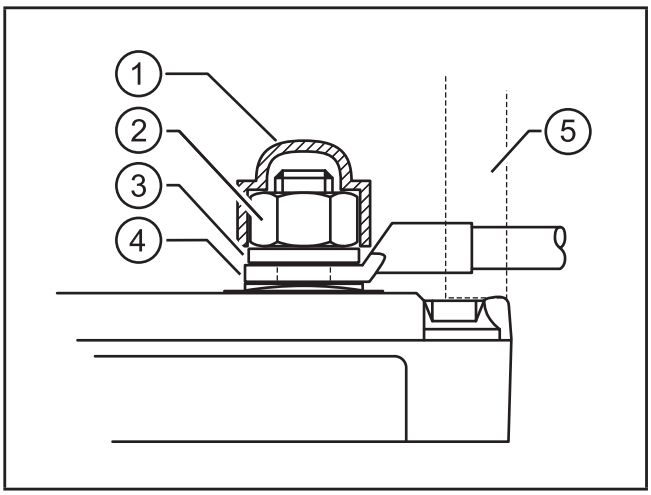
*) M8 design
**) M6 design

Connection material to be used (examples):		Standard
Crimps	M8/M6 connection diameter up to 16 mm² nominal cross-section Material Cu-ETP	-
Hexagon nuts	M8/M6, tin-plated	ISO 4032
Washers	Without phase	ISO 7089
	With phase	ISO 7090

5.2.1 Short-circuit protection

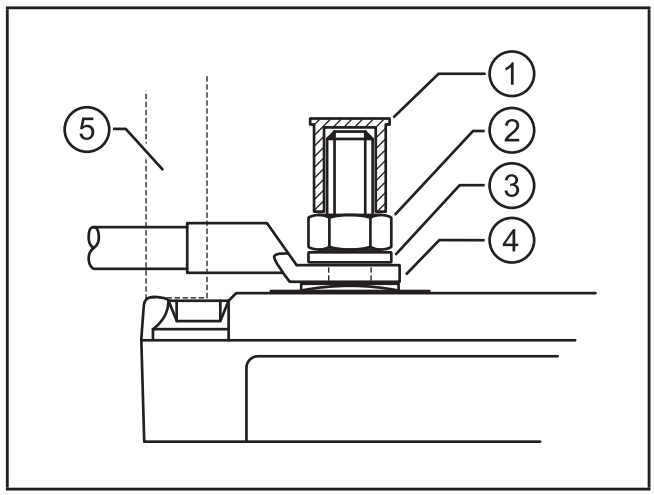
NOTE

Plastic caps/sleeves are recommended for short-circuit protection between the M8/M6 threaded suspension rods and cables with damaged insulation.This applies especially if cables are guided via the threaded suspension rods when the cable seal is used.



M8 threaded suspension rod BAT (+)

1: Protective cover or M8 hexagon nut
2: M8 hexagon nut
3: Washer
4: M8 crimp
5: Cable seal



M6 threaded suspension rod BAT (-)

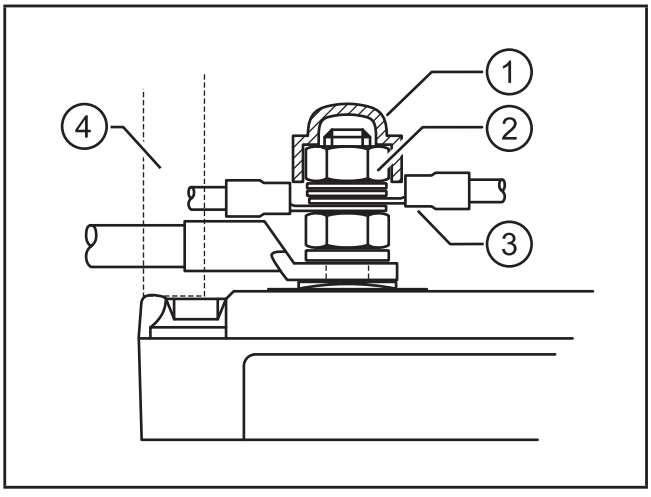
1: M6 x 10 mm protective sleeve
2: M6 hexagon nut
3: Washer
4: M6 crimp
5: Cable seal

UK

5.2.2 Multiple assignment of the M6 threaded suspension rod BAT (-)

Only one wire is allowed on the M8 threaded suspension rod BAT (+). Several wires are allowed on the M6 threaded suspension rod BAT (-) (e.g. for GND return of the actuators).

- ► Place additional ring terminals on the screwed nut.
- ► Secure ring terminals with additional M6 hexagon nuts.
- ► Depending on the remaining thread length, place a protective cap on the M6 hexagon nut or a protective sleeve on the M6 thread.



Multiple assignment M6 threaded suspension rod BAT (-)

1: Protective cap for M6 hexagon nut or M6 x 10 mm protective sleeve
2: Additional M6 hexagon nut
3: Additional M6 ring terminals
4: Cable seal

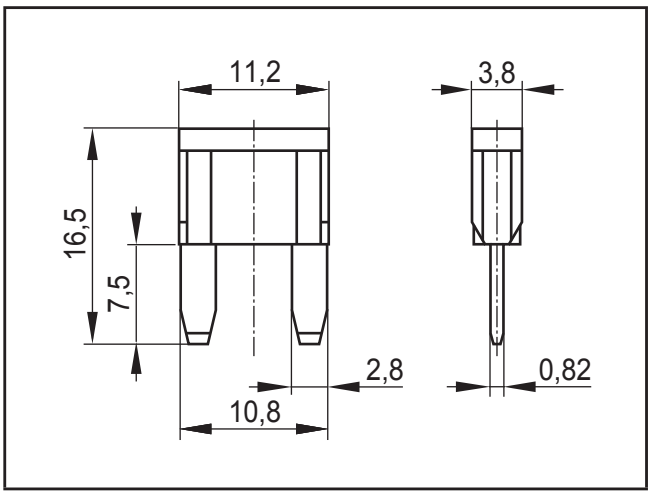
NOTE

Max. total current via BAT (-) ≤ total current via BAT (+).

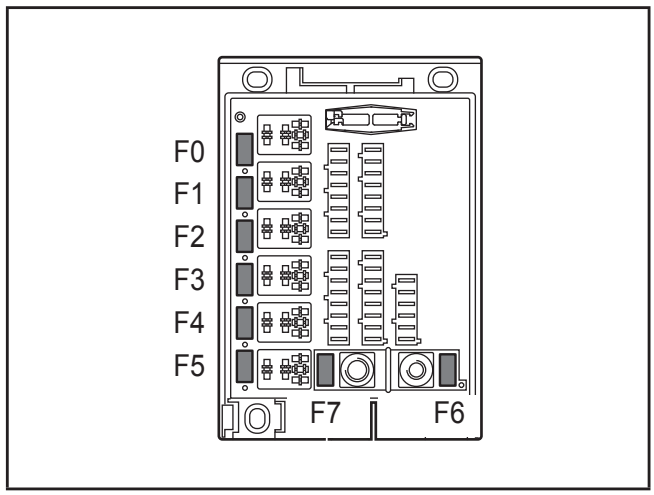
5.3 Fuses

5.3.1 Automotive mini fuses

The device is suited for automotive mini fuses to ISO 8820-3, type F.



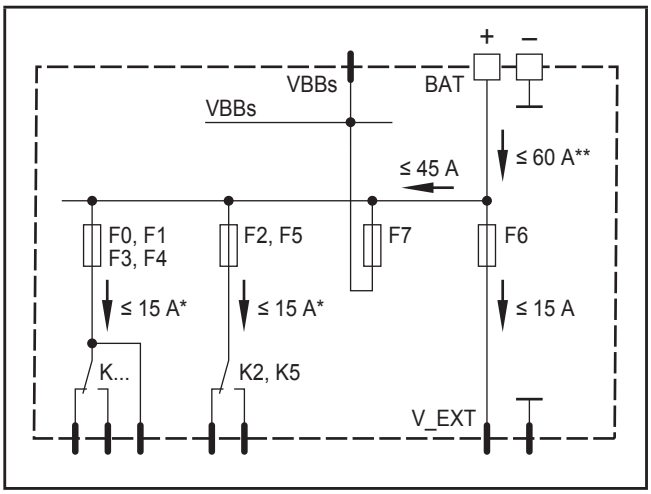
Dimensions [mm]



Locations for fuses

Colour coding to ISO 8820-3 (rated current [A])										
1	2	3	4	5	7.5	10	15	20	25	30
black	grey	violet	pink	beige	brown	red	blue	yellow	clear	green

► The individual electric circuits must be protected in order to protect the whole system.
► Observe the maximum total currents.



Fuses and total currents

*) For each relay switching output
**) Observe derating (→ 9 Technical data)

Fuse			**Nominal current**	**Value**
F0...5	Supply relay switching outputs K0...5		≤ 15 A (each)	≤ 30 A (each)
F6	Supply external devices	V_EXT	≤ 15 A	≤ 30 A
F7	Supply sensors/module/trip coils	VBBs	≤ 2 A	≤ 4 A T

NOTE

For fuse dimensioning observe the manufacturer's indications, the nominal current derating and the cable cross-section.

NOTE

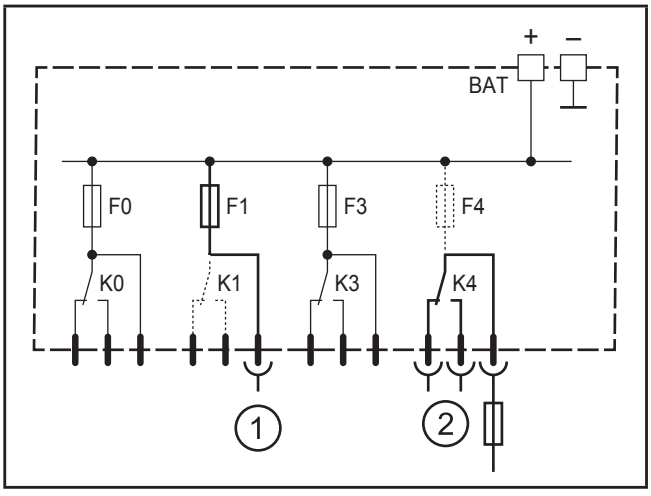
If the cable seal is used, the use of circuit breakers for the fuses F6 and F7 is not recommended.
Cables fed close to the circuit breakers can cause false triggering or damage.

5.3.2 Fuse circuits F0, F1, F3 and F4

Fuses F0, F1, F3, and F4 are additionally led to connectors D and E. This enables use as fuse circuit without relay or use of the relay switching outputs K0, K1, K3 and K4 as volt-free changeover contacts.

NOTE

If a relay switching output is used as a volt-free change-over contact, the circuit has to be externally protected.



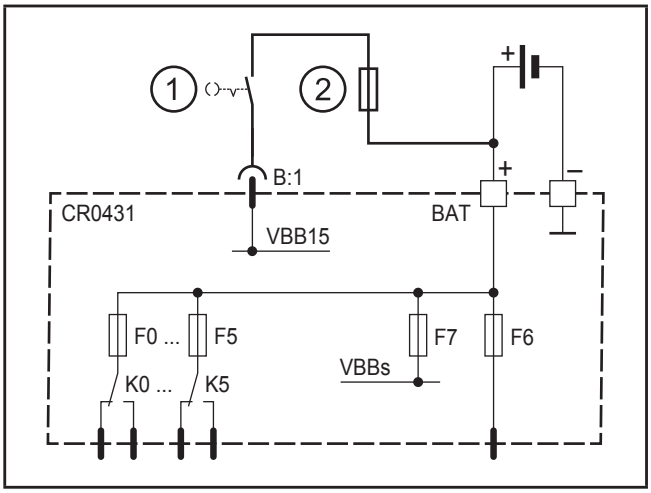
Example: Fuse circuits F1 and F4

1: Fuse circuit without relay
2: Volt-free change-over contact with external fuse

5.3.3 External protection VBB15 (clamp 15)

Usually the ignition switch is connected to the voltage VBBs protected via F7 (→ 3.4 Block diagram) and (→ 7.1.1 Start conditions).

► If an external voltage is used to start the device, protect this cable externally.

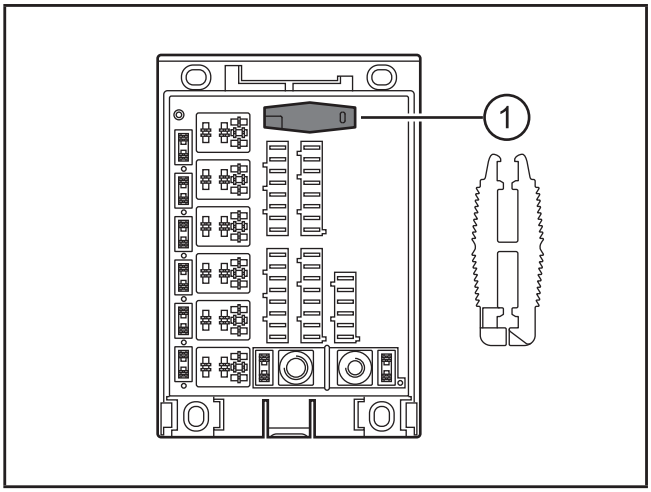


1: Ignition switch
2: External fuse

Ignition switch at external voltage

5.3.4 Replace fuses

► Use the fuse puller to remove defective fuses.



1: Locator for fuse puller

Fuse puller

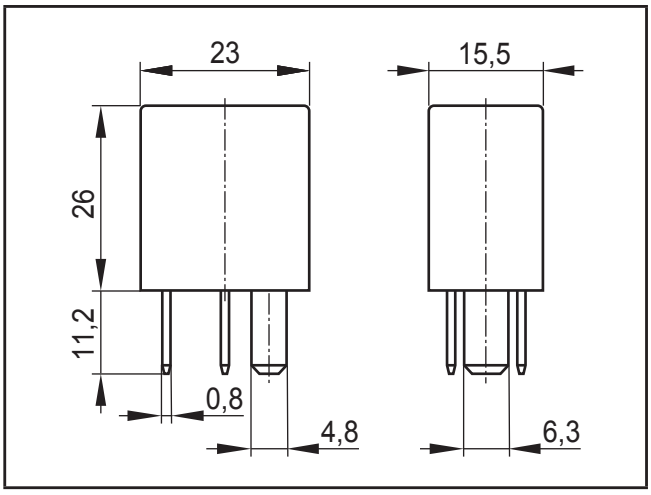
5.3.5 Central main fuse

A central main fuse in the supply to the device is recommended. For example directly on the battery via a battery terminal fuse of type CF8 (manufacturer: Littelfuse).

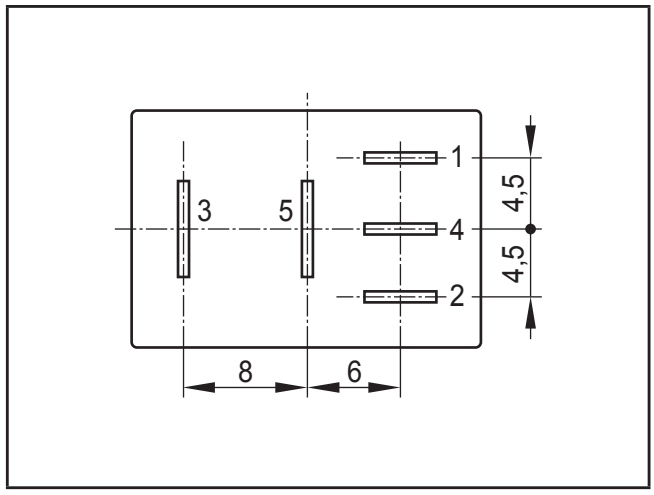
► Dimension fuse rate on the basis of the wire cross section.

5.4 Relay

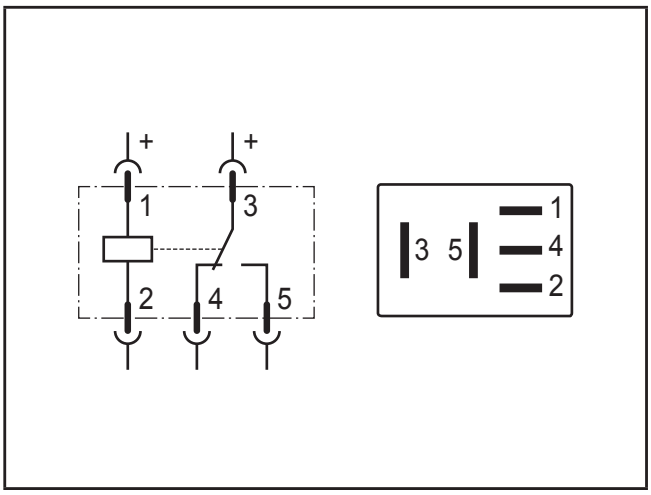
The device is suited for automotive micro relays with a contact arrangement to ISO 7588-3.



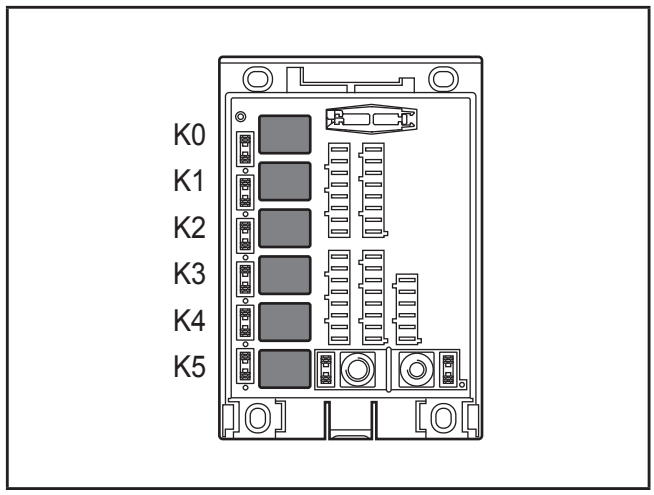
Dimensions [mm]



Contact arrangement (view relay bottom)



Connection to ISO 7588-3



Locations for relays

NOTE

Adhere to the manufacturer's information for selecting the relay:

- Operating voltage limits
- Coil voltage for safe switching at high ambient temperature
- Impermissible power loss due to high coil voltage
- Maximum nominal current of the NO contacts

NOTE

Protective circuitry to avoid peak inductance on the NO contacts of the relay are not integrated (→ 9 Technical data).

5.4.1 Contact designations

to ISO 7588-3	**Contact**	to DIN 72552 / 2 *	Contact
Coil plus	1	Positive connection trip coil	86
Coil minus	2	Ground connection trip coil	85
Switching contact input (moving contact)	3	Continuous positive of the battery	30
Switching contact output (break contact)	4	NC contact to the load	87 a
Switching contact output (make contact)	5	NO contact to the load	87

*) Information only for comparison

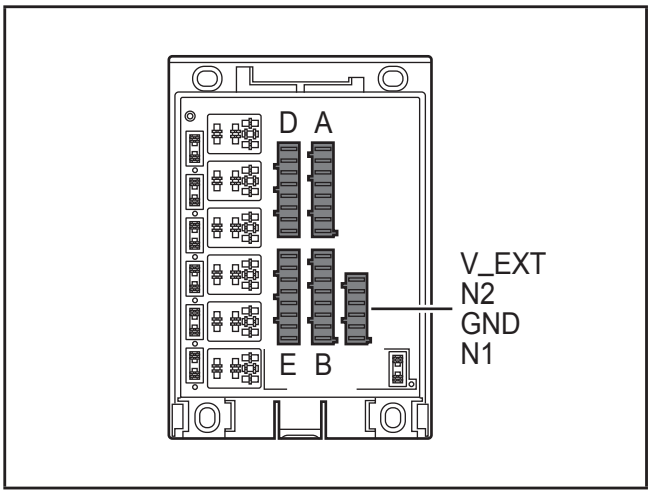
Observe the wiring and the documentation of the relays used. The contact designations can vary.

In CODESYS and in the programming manual BasicController relay the following designations are used for the contacts:
Contact 4 (87a) = normally closed (NC)
Contact 5 (87) = normally open (NO)

5.5 Connectors

The connections of the CAN interfaces, the inputs/outputs and the supply cables for external devices are made via connectors on the front of the device.

Test standards and characteristic values (→ 9 Technical data)



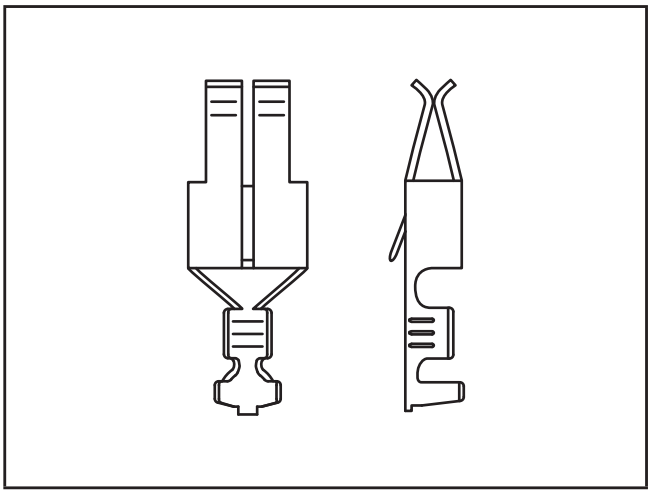
Connector

Connector	Connection		Number of poles
A	Inputs	IN0...3	8
B		IN4...7	
D	Relay switching outputs	K0...2	8
E		K3...5	
V_EXT N2 GND N1	Supply external devices CAN interface 2 GND CAN interface 1		6

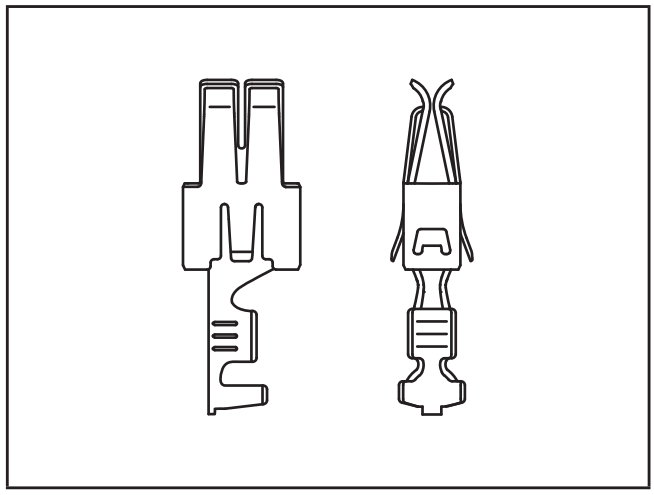
The mechanical coding of the connectors (A, B etc.) corresponds to the BasicController series.

5.5.1 Standard timer contacts

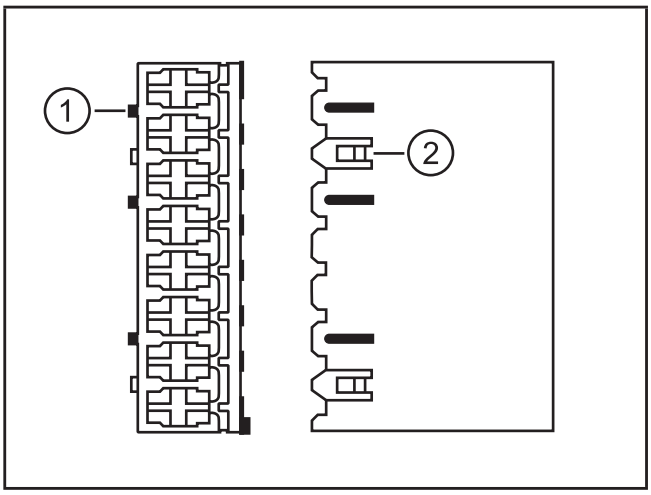
The device is suited for contacts of the standard timer and standard power timer AMP series and the respective standard timer housings.



Standard timer contact



Standard power timer contact



Standard timer housing (e.g. 8 poles, A-coded)

Figure shows standard timer housing with closed cover, view on the contact plug-in side

1: Coding
2: Snap spring

NOTE

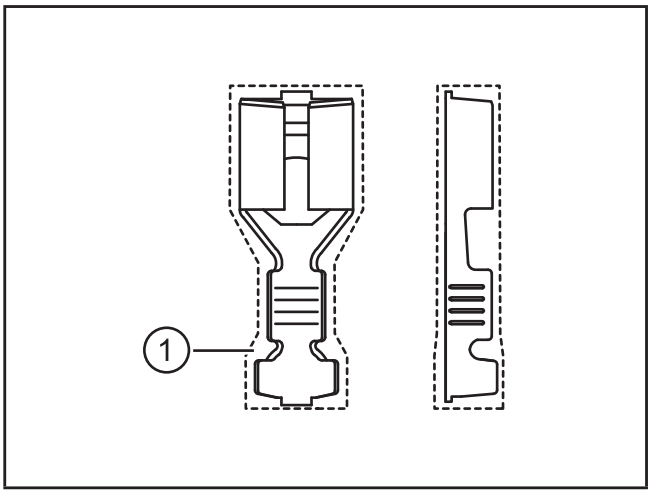
Individual non-insulated contacts are not permitted.

NOTE

For current intensities exceeding 10 A use standard timer contacts.

5.5.2 Spade sockets

The device is suited for 6.3 x 0.8 mm spade sockets with full insulation to DIN 46245-3.



1: Full insulation

Spade socket

Permissible current intensities for 6.3 mm spade sockets	
Core cross-section [mm²]	Max. current intensity [A] *
0.5	7
0.75	8.5
1	10.5
1.5	12
2.5	15

*) at maximum ambient temperature, to pre-standard DIN 46249-1

NOTE

Only use fully insulated single contacts (loose pieces).

NOTE

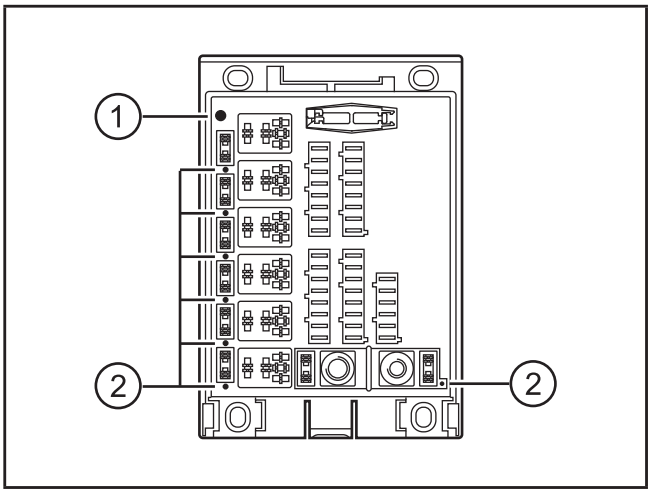
For current intensities exceeding 10 A use suitable spade sockets.

Using all connections of a connector or the device with individual wires in spade sockets is not possible.

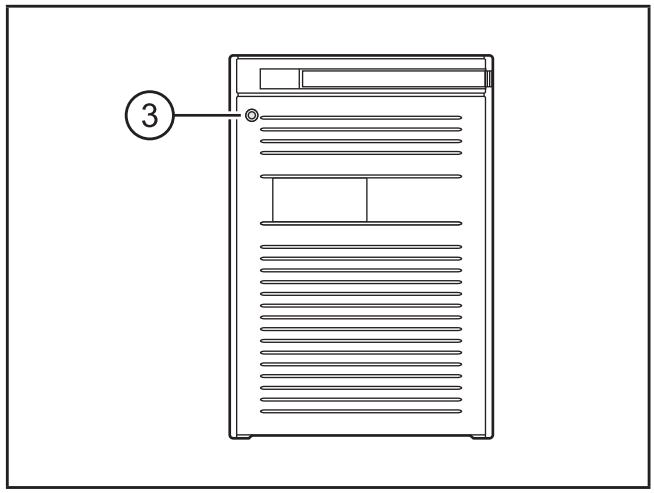
5.5.3 Frequency inputs

► Operate frequency inputs with screened cables so that useful signals are not affected by external interference.

6 Indicators



1: Status LED controller
2: Status LED fuses F0...F6



3: LED lighting in the cover (e.g. EC0401)

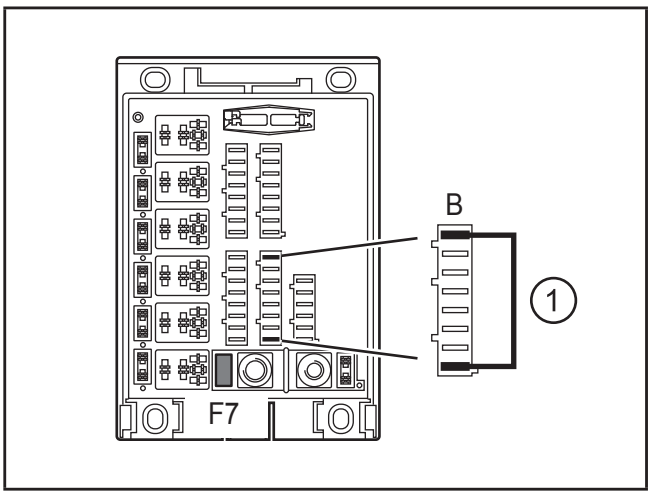
The status LEDs of the fuses are not visible when the cover is installed.

Operating states (→ 9 Technical data)

7 Set-up

7.1 Important notes on programming

► For the time of programming interconnect the connections B:1 (VBB15) and B:8 (VBBs).
► At least F7 must be fused



1: Bridge B:1 / B:8

7.1.1 Start conditions

The device does not start before sufficient voltage is applied to the supply connection VBB15. In vehicles VBB15 is the plus cable switched by the ignition switch.
A voltage >8 V DC is deemed sufficient.

The relay trip coil can only be switched when the protected voltage VBBs is applied and the CODESYS flag "SUPPLY_SWITCH" is closed (→ 3.4 Block diagram).

7.2 Programming

The user can easily create the application software by means of the IEC 61131-3 compliant programming system CODESYS 2.3.

⚠ WARNING

The user is responsible for the safe function of the application programs which he created himself. If necessary, he must additionally carry out an approval by corresponding supervisory and test organisations according to the national regulations.

⚠ WARNING

After completing component assembly and wiring, check the function of the device at max. operating conditions in normal operation and in fault condition.

7.3 Required documentation

In addition to the CODESYS programming system, the following documents are required for programming and set-up of the device:

- Programming manual CODESYS V2.3
  (alternatively as online help)
- System manual BasicController relay
  (alternatively as online help)

The manuals can be downloaded from the internet:
www.ifm.com → Data sheet search → CR0431 → More information

Online help CODESYS and BasicController relay:
www.ifm.com → Service → Download → Systems for mobile machines*

*) Download area with registration

7.4 Required hardware

A CAN interface for the connection to a PC or a notebook is required to load the application program to the device.

Example:

- CAN/RS232 USB interface CANfox (art. no.: EC2112)
- Adapter cable for CANfox (art. no.: EC2113)

You can find more information about the available accessories at:
www.ifm.com → Data sheet search → CR0431 → Accessories
or directly
www.ifm.com → Data sheet search → EC2112

8 Operation

NOTE

The max. temperatures at the metal or plastic parts of the device must not exceed 110°C.

9 Technical data

CR0431

Mobile controller
BasicController relay

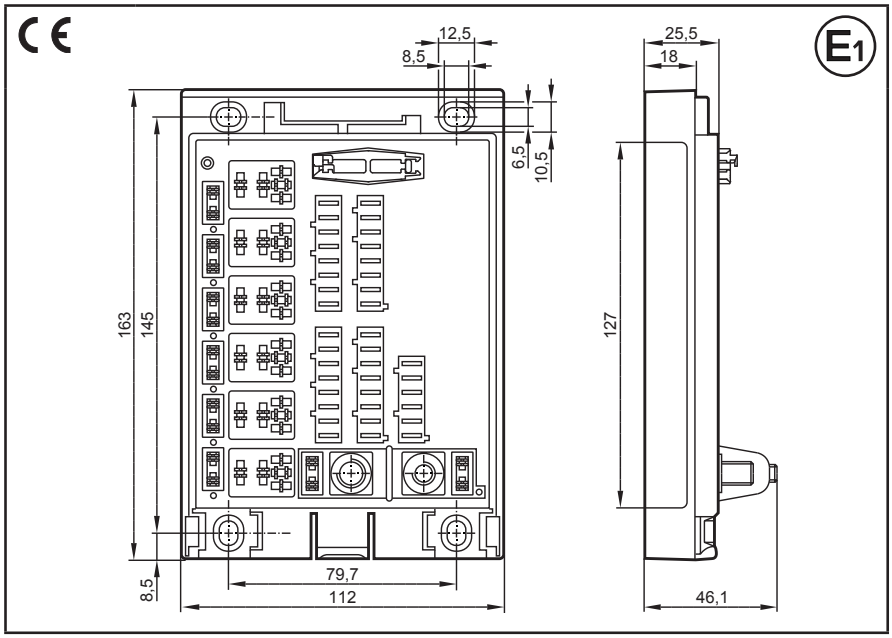
8 inputs

Locations
for 6 automotive micro relays
and 8 automotive mini fuses

2 CAN interfaces

Programming
according to IEC 61131-3

8...32 V DC



UK

Technical data	Modular control system Usable as CANopen master or intelligent I/O module
Mechanical data	
Housing	plastic housing (black)
Dimensions (H x W x D) unpopulated with EC0401 cover	 163 x 112 x 46.1 mm 163 x 112 x 68 mm
Installation	fixing by means of 4 M4 screws to DIN 4762 or DIN 7984 and 4 tubular rivets to DIN 7340 (tubular rivets are supplied)
Connections	
Relay	6 locations for automotive micro relay (23 x 15.5 x26 mm (H x W x D), without contacts, with cover installed)
Fuses	8 locations for automotive fuses up to 30 A
Operating voltage	M8 threaded suspension rod for supply voltage to the fuses M6 threaded suspension rod for ground connection (GND) core cross-section 0.5...16 mm²
Connectors	AMP blade male terminals 6.3 mm, contacts AMP standard timer or AMP standard power timer, CuZn pre-tin-plated with timer contact housing, protected against reverse polarity to be clipped into place and thus vibration-resistant core cross-section 0.5...2.5 mm²
Inputs Relay switching outputs External supply, CAN-Bus	2 x 8 poles 2 x 8-poles 1 x 6-poles
Protection rating	IP 00 (PCB without housing to DIN EN 60529) IP 54 (with cover and cable seal)
Operating temperature	-40...75° C (without cover) -40...65° C (with cover and cable seal)
Storage temperature	-40...85° C
Weight	0.50 kg (unpopulated)
Electrical data	
Operating voltage	8...32 V DC
Current consumption	45 mA (at 24 V DC, relay not switched)

CR0431	Technical data
Overvoltage Undervoltage detection Undervoltage shutdown	36 V for t ≤ 10 s if U_B ≤ 7.8 V if U_B < 7.0 V
Processor	Freescale PowerPC, 50 MHz
Memory (total)	208 Kbytes RAM / 1536 Kbytes Flash / 1 Kbyte FRAM
Memory allocation	see BasicController Relay system manual www.ifm.com → Data sheet search → e.g. CR0431 → More information
Device monitoring	Undervoltage monitoring Watchdog function Checksum test for program and system Excess temperature monitoring
CAN interfaces 1/2 Baud rate Communication protocol	CAN interface 2.0 A/B, ISO 11898 20 Kbits/s…1 Mbits/s (default CAN1: 250 Kbits/s, CAN2: 250 Kbit/s) CANopen, CiA DS 301 version 4, CiA DS 401 version 1.4 or SAE J 1939 or free protocol
Software/programming	
Programming system	CODESYS version 2.3 (IEC 61131-3)
Inputs	8 (configurable)
Configurations	

Number	Version	
4	digital for positive / negative sensor signals analogue (0…10/32 V DC, 0..20 mA, ratiometric) frequency (≤ 30 kHz)	B_L/B_H A FRQ
4	digital for positive sensor signals resistance measurement (0.016...30 kΩ)	B_L R

positive sensor signals have diagnostic capabilities

Outputs	6 (configurable)
Relay connection	

Number	Version	
6	binary switching	B

CR0431	Technical data

Relay switching outputs

Number	Version	
6	normally open function with voltage readback	NO
	normally closed function with voltage readback	NC

Status LEDs

Controller: two-colour LED (red/green)

Operating states
freely programmable by the user
(table shows presetting)

Colour	Status	Description
–	permanently off	no operating voltage
Orange	1 x on	initialisation or reset checks
Green	5 Hz	no operating system loaded
	2 Hz	application is running (RUN)
	permanently on	application stopped (STOP)
Red	10 Hz	application stopped (STOP with error)
	5 Hz	application stopped due to undervoltage
	permanently on	system fault (fatal error)

Fuses F0...6: one-colour LEDs (orange)

Operating states
freely programmable by the user
(table shows example)

Colour	Status	Description
Orange	permanently out	fuse faulty or not populated
	permanently on	fuse OK

Fuse characteristics

Version	automotive mini fuses
Fuse rate	≤ 30 A
Nominal current	≤ 15 A
Total current	≤ 60 A
Voltage readback range	0...32 V DC
Accuracy	10 %

UK

CR0431

Technical data

Input characteristics

Analogue inputs (A, B_L/B_H, FRQ)
Connection A: 02, 03, 06, 07
IN0...IN3
configurable as...

● Voltage inputs	
Input voltage	0...10 V or 0...32 V
Resolution	12 bits
Accuracy	± 1% FS
Input resistance	65.6 kΩ (0...10 V), 50.7 kΩ (0...32 V)
Input frequency	≤ 500 Hz

● Current inputs, with diagnostic capability	
Input current	0...20 mA
Resolution	12 bits
Accuracy	± 1% FS
Input resistance	400 Ω
Input frequency	≤ 500 Hz
At a current of > 23 mA the input is switched to the voltage input!	

● Voltage inputs, 0...32 V, ratiometric	
Function	$(U_{IN} \div U_B) \times 1000$ ‰
Value range	0...1000 ‰
Input resistance	50.7 kΩ

● Binary voltage inputs for positive sensor signals	
Switch-on level	> 0.7 U_B
Switch-off level	< 0.3 U_B
Input resistance	3.2 kΩ
Input frequency	50 Hz
Diagnostics wire break	> 0.95 U_B
Diagnostics short circuit	< 1 V

● Binary voltage inputs for negative sensor signals	
Switch-on level	> 0.7 U_B
Switch-off level	< 0.3 U_B
Input resistance	3.2 kΩ
Input frequency	50 Hz

● Frequency inputs	
Input resistance	3.2 kΩ
Input frequency	≤ 30 kHz
Switch-on level	> 0.35...0.48 U_B
Switch-off level	< 0.29 U_B

CR0431	Technical data
Digital/resistor inputs (B_L, R) Connection B: 02, 03, 06, 07 IN4...IN7 configurable as…	

● Binary voltage inputs for positive sensor signals	
Switch-on level	> 0.7 U_B
Switch-off level	< 0.3 U_B
Input resistance	3.2 kΩ
Input frequency	50 Hz
Diagnostics wire break	> 0.95 U_B
Diagnostics short circuit	< 1 V

● Resistor input	
Measuring current	< 2.0 mA
Input frequency	50 Hz
Measuring range	0.016…30 kΩ
Accuracy	± 2% FS: 16 Ω...3 kΩ ± 5 % FS: 3...15 kΩ ± 10 % FS: 15...30 kΩ

Output characteristics	
Relay connection	
Relay K0...5 Contact 2: positive connection trip coil Contact 1: ground connection trip coil	

● Semiconductor outputs, short-circuit proof and overload protected	
Switching voltage	5.5...32 V DC (configurable)
Switching current	≤ 0.5 A

Relay switching outputs	
Relay K0...5 Contact 4: normally closed function Contact 5: normally open function	

Switching voltage	≤ 32 V DC
Switching current	≤ 15 A
Total current	≤ 45 A
Voltage readback range	0...32 V DC
Accuracy	10 %

Protective circuits	
for trip coils	integrated free wheel diodes
for switching outputs	not integrated
Overload protection (valid for all outputs)	≤ 5 minutes (at 100% overload)
Short-circuit protection (valid for all inputs and outputs)	≤ 5 minutes (contacts +VBB/GND)

UK

CR0431	Technical data	
Test standards and regulations		
CE marking	EN 61000-6-2	Electromagnetic compatibility (EMC) Noise immunity
	EN 61000-6-4	Electromagnetic compatibility (EMC) Radiation of interference
E1 marking	UN/ECE-R10	Radiation of interference Immunity with 100 V/m
Electrical testing	ISO 7637-2	Pulse 1, severity level: IV; function state C Pulse 2a, severity level: IV; function state A Pulse 2b, severity level: IV; function state C Pulse 3a, severity level: IV; function state A Pulse 3b, severity level: IV; function state A Pulse 4, severity level: IV; function state A Pulse 5, severity level: III; function state C (data valid for the 24V system) Pulse 4, severity level: III; function state C (data valid for the 12 V system)
Climatic tests	EN 60068-2-30	Damp heat, cyclic Upper temperature 55°C, number of cycles: 6
	EN 60068-2-78	Damp heat, steady state Test temperature 40°C / 93% RH, Test duration: 21 days
	EN 60068-2-52	Salt spray test Severity level 3 (vehicle) Only with installed EC0401 or EC0402 cover
Mechanical tests	ISO 16750-3	Test VII; Vibration, random Mounting location: vehicle body
	EN 60068-2-6	Vibration, sinusoidal 10...500 Hz; 0.72 mm/10 g; 10 cycles/axis
	ISO 16750-3	Bumps 30 g/6 ms; 24,000 shocks
Tests for railway applications	EN 50121-3-2	Electromagnetic compatibility (EMC)
	EN 50155 clause 12.2	Electronic equipment used on rolling stock
Note	The EC declaration of conformity and approvals can be found at: www.ifm.com → Data sheet search → CR0431 → More information	

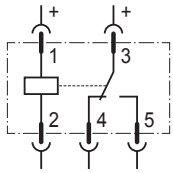
CR0431 | **Technical data**

Wiring

Connectors

A/B: Inputs
D/E: Relay switching outputs
V_EXT: Supply external devices
N2: CAN interface 2:
N1: CAN interface 1

	A	B	D	E	
	8 poles				6 poles
1	VBB15	VBB15	F0 (K0:3)	F3 (K3:3)	V_EXT
2	IN0	IN4	K0:5	K3:5	CAN2_H
3	IN1	IN5	K0:4	K3:4	CAN2_L
4	GND	GND	F1 (K1:3)	F4 (K4:3)	GND
5	GND	GND	K1:5	K4:5	CAN1_H
6	IN2	IN6	K1:4	K4:4	CAN1_L
7	IN3	IN7	K2:5	K5:5	
8	VBB15	VBBs	K2:4	K5:4	



Operating voltage
via battery

BAT (+)	BAT (-)
M8 8...32 V DC	M6 GND

Abbreviations

A	Analogue
B	Binary
BAT	Battery
B_H	Binary high side
B_L	Binary low side
F	Fuse
FRQ	Frequency/pulse inputs
K	Relay
NC	Normally closed function
NO	Normally open function
PWM	Pulse width modulation
R	Resistor input
VBBs	Supply sensors/module/trip coils
VBB15	Supply via ignition lock (clamp 15)
V_EXT	Supply external devices

UK

10 Maintenance, repair and disposal

10.1 Servicing

The device does not contain any components that need to be maintained by the user.

10.2 Cleaning of the housing surface

► Disconnect the device.
► Clean the device from dirt using a soft, chemically untreated and dry cloth.
► In case of heavy dirt, use a damp cloth.

The following agents are not suited for cleaning the device:
Chemicals dissolving plastics such as methylated spirit, benzine, thinner, alcohol, acetone or ammonia.

Micro-fibre cloths without chemical additives are recommended.

10.3 Repair

► The device must only be repaired by the manufacturer.
Observe the safety instructions (→ 2.4 Tampering with the device)

10.4 Disposal

► Dispose of the camera in accordance with the national environmental regulations.

11 Approvals/standards

Test standards and regulations (→ 9 Technical data)

The EC declaration of conformity and approvals can be found at:
www.ifm.com → Data sheet search → CR0431 → Approvals