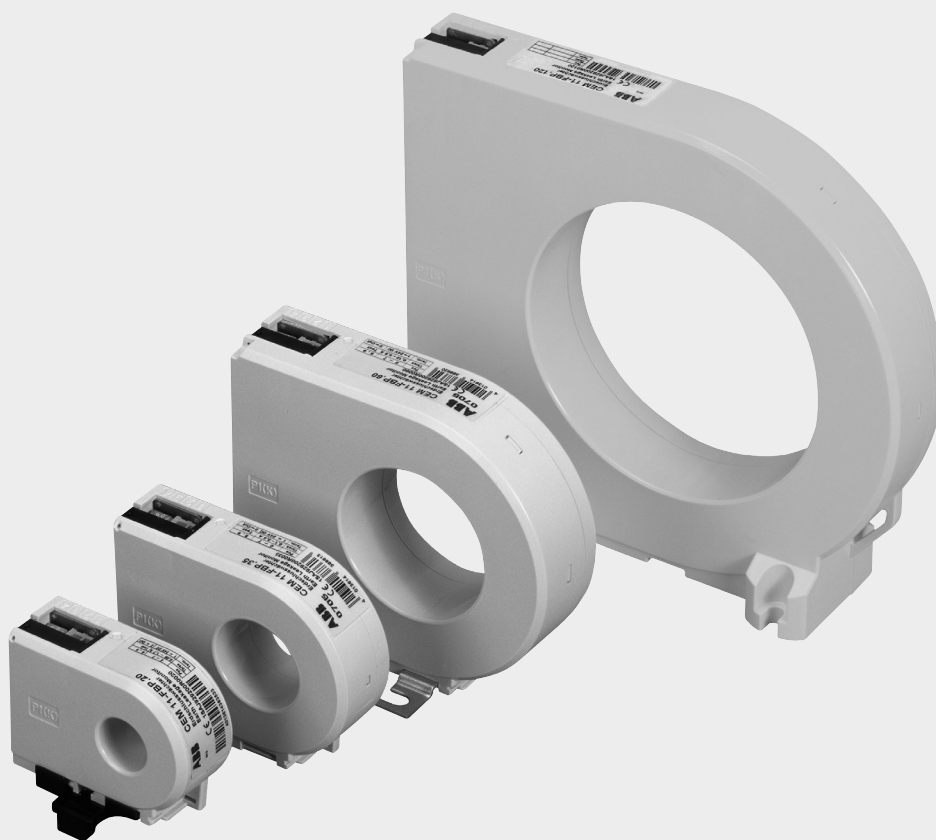

MANUAL

CEM11-FBP.xxx

Earth leakage monitor



Important notice

Target group

This description is intended for the use of trained specialists in electrical installation and control and automation engineering, who are familiar with the applicable national standards.

Safety requirements

The responsible staff must ensure that the application or use of the products described satisfy all the requirements for safety, including all the relevant laws, regulations, guidelines and standards.

Using this handbook

Symbols

This technical document contains sentinels to point the reader to important information, potential risks and precaution information. The following symbols are used:



Sign to indicate a potential dangerous situation that can cause damage of the connected devices or the environment.



Sign to indicate important information and conditions.



Sign to indicate a potentially dangerous situation that can cause human injuries.

Terms and abbreviations

TOL	Thermal Overload Relay
EOL	Electronic Overload Relay
UMC	Universal Motor Controller: High grade motor protection and control device from ABB STOTZ-KONTAKT GmbH
CEM	Common Accessory, Earth Leakage Monitor
PTC	Positive Temperature Coefficient thermistor sensors. PTC sensors are commonly embedded in motor stator windings to monitor the motor winding temperature

Related documents

Name	Document No.
UMC100.3-FBP manual	2CDC135032D0204
UMC100.3-FBP Atex manual	2CDC135033D0202

Document History

D0202	03.2009	Approvals cUL - Note was supplemented
D0203	03.2011	In the tables on page 5 and 6 the switch positions 1 ... 10 were adapted to 0 ... 9. The table now matches the device marking itself.
D0204	12.2011	The lowest earth fault current threshold of CEM11-FBP.120 was changed to 240 mA.
D0204 Rev. B	01.2019	Update to UMC100.3 and new design

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Overview

Nearly all motors in industrial applications are protected against overload using TOLs, EOLs or intelligent motor control units such as the UMC100.3. Additional surveillance with PTCs improves the protection against over temperature. Earth faults are another important reason for motor destructions (when above named protection measures are used). The CEM11 device monitors if the sum of the currents flowing through it is zero (factorial addition). If the sum is zero no residual current is present. If the residual current is above an adjusted threshold value the output signal of the CEM11 changes. It can be used in motor feeders to detect leakage currents respectively ground faults caused for example by insulation breakdowns. Detection of such ground faults can be used to interrupt the motor to prevent further damage or to alert the maintenance personnel to perform maintenance.



Instead of “earth fault current” monitor the term “residual current” monitor is often used as well.

Product features

With only four products a wide residual current range can be covered:

Type	Pass through-hole size	Current range
CEM11-FBP.20	20 mm	80 mA ... 1700 mA
CEM11-FBP.35	35 mm	100 mA ... 3400 mA
CEM11-FBP.60	60 mm	120 mA ... 6800 mA
CEM11-FBP.120	120 mm	240 mA ... 13600 mA

- Simple residual current adjustment with a rotary switch including test position.
- The output operates similar to a contact and can control an input that meets the IEC 61131-2 requirements for 24 V signals. The fault free status is “closed” and has max. 4 V voltage loss (closed circuit). If a high residual current appears the output “opens”.
- Preferably the CEM11 is used together with the UMC100.3 but it can also be used with PLCs.
- Only a two wire connection between UMC100.3 or PLC and the CEM11 is required.
- Flexible mounting options on a DIN rail (along side or cross side) or with screws/clips.

Product description

Setting the earth fault current

The current threshold when the CEM11 signals an earth fault can be adjusted with a rotary switch.



The test position can be used to test the CEM11 and connected devices like the UMC100.3. This allows simple verification if the earth fault related settings in the UMC100.3 are all done correctly and e.g. lead to a trip.

The following tables show the current thresholds for each device variant.

CEM11-FBP.20

Rotary switch set to	Earth fault current threshold [mA]	Comment
0	80	Tolerance $\pm 30\%$
1	300	Tolerance $\pm 10\%$
2	550	Tolerance $\pm 10\%$
3	750	Tolerance $\pm 10\%$
4	1000	Tolerance $\pm 10\%$
5	1300	Tolerance $\pm 10\%$
6	1500	Tolerance $\pm 10\%$
7	1700	Tolerance $\pm 10\%$
8	for functional test	
9	for functional test	

CEM11-FBP.35

Rotary switch set to	Earth fault current threshold [mA]	Comment
0	100	Tolerance $\pm 30\%$
1	500	Tolerance $\pm 10\%$
2	1000	Tolerance $\pm 10\%$
3	1400	Tolerance $\pm 10\%$
4	2000	Tolerance $\pm 10\%$
5	2400	Tolerance $\pm 10\%$
6	3000	Tolerance $\pm 10\%$
7	3400	Tolerance $\pm 10\%$
8	for functional test	
9	for functional test	

CEM11-FBP.60

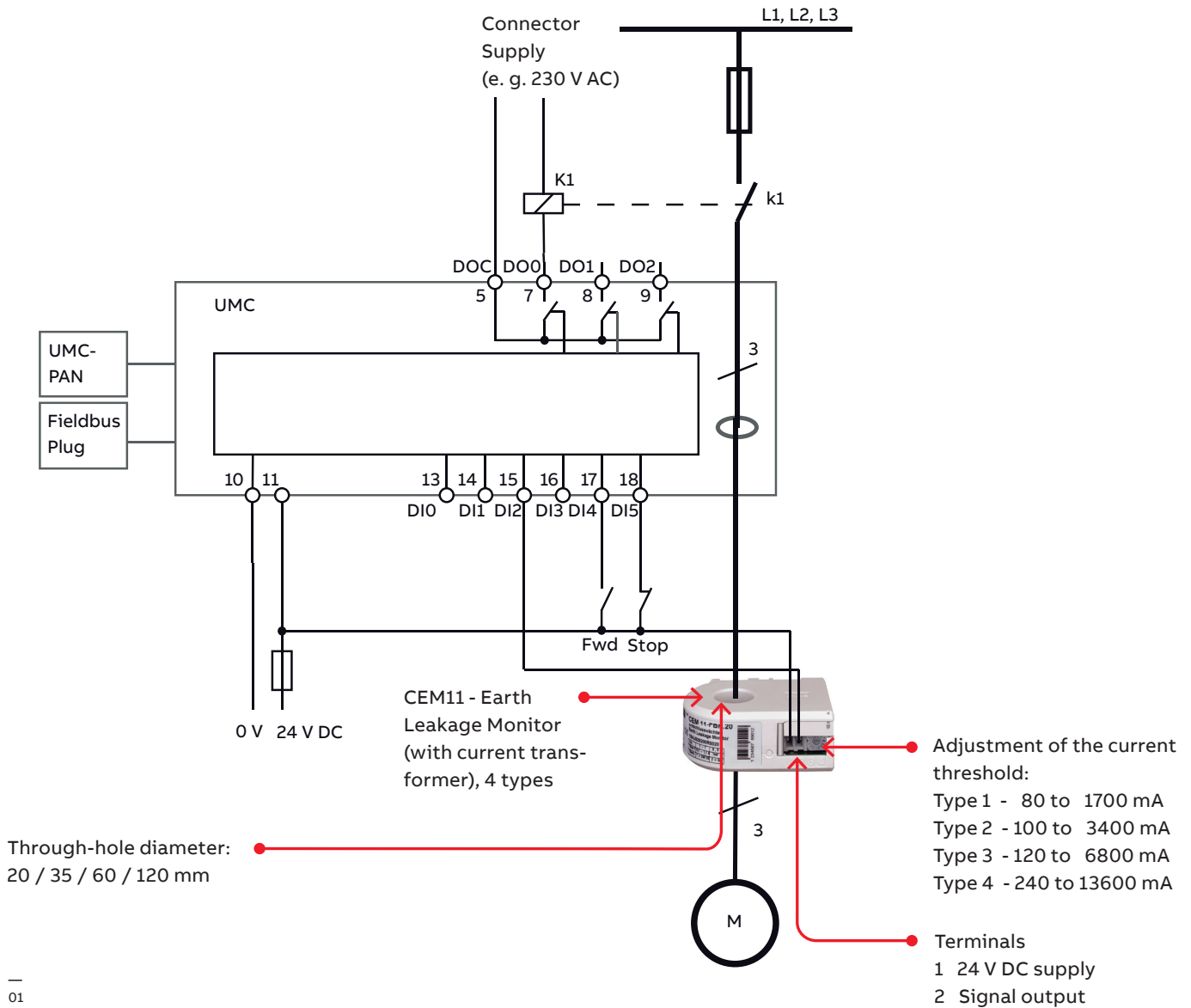
Rotary switch set to	Earth fault current threshold [mA]	Comment
0	120	Tolerance $\pm 30\%$
1	1000	Tolerance $\pm 10\%$
2	2000	Tolerance $\pm 10\%$
3	2800	Tolerance $\pm 10\%$
4	4000	Tolerance $\pm 10\%$
5	4800	Tolerance $\pm 10\%$
6	6000	Tolerance $\pm 10\%$
7	6800	Tolerance $\pm 10\%$
8	for functional test	
9	for functional test	

CEM11-FBP.120

Rotary switch set to	Earth fault current threshold [mA]	Comment
0	240	Tolerance $\pm 30\%$
1	2000	Tolerance $\pm 10\%$
2	4000	Tolerance $\pm 10\%$
3	5600	Tolerance $\pm 10\%$
4	8000	Tolerance $\pm 10\%$
5	9600	Tolerance $\pm 10\%$
6	12000	Tolerance $\pm 10\%$
7	13600	Tolerance $\pm 10\%$
8	for functional test	
9	for functional test	

Connection to UMC100.3 / PLC

The following figure shows the application of CEM11 together with UMC100.3. The CEM11 is supplied with 24 V. The output from CEM11 is connected to digital input DI2 of UMC100.3. The UMC100.3 can be configured to generate a warning or optionally a trip in case of an earth fault. See the technical description of UMC100.3 for further description on how to set the parameters accordingly.



01
CEM11 Connection to a UMC

By nature, earth fault sensors encounter all kind of disturbances inserted through the motor feeding lines. Therefore the evaluating unit should foresee some kind of filtering to suppress erroneous activations of the output due to disturbances.



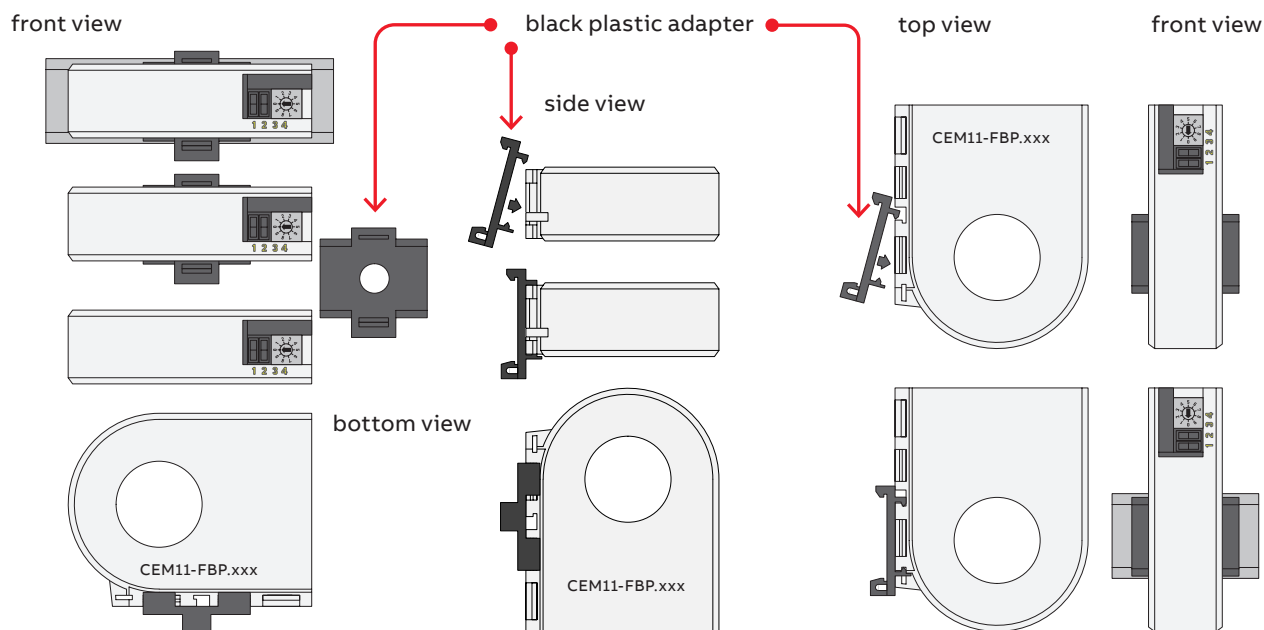
When using the CEM11 with a PLC a filter should be used in the PLC program. The PLC is responsible to switch off the motor in case of an earth fault.

CEM11-FBP.xxx is connected to a multifunction input (DI0, DI1, DI2) of UMC100.3. This input can be configured then for fault or warning, working always or after the motor startup time. It is recommended to select after startup time to avoid a tripping during the motor start phase. Additionally a filter time can be configured for this input to ignore short disturbances.

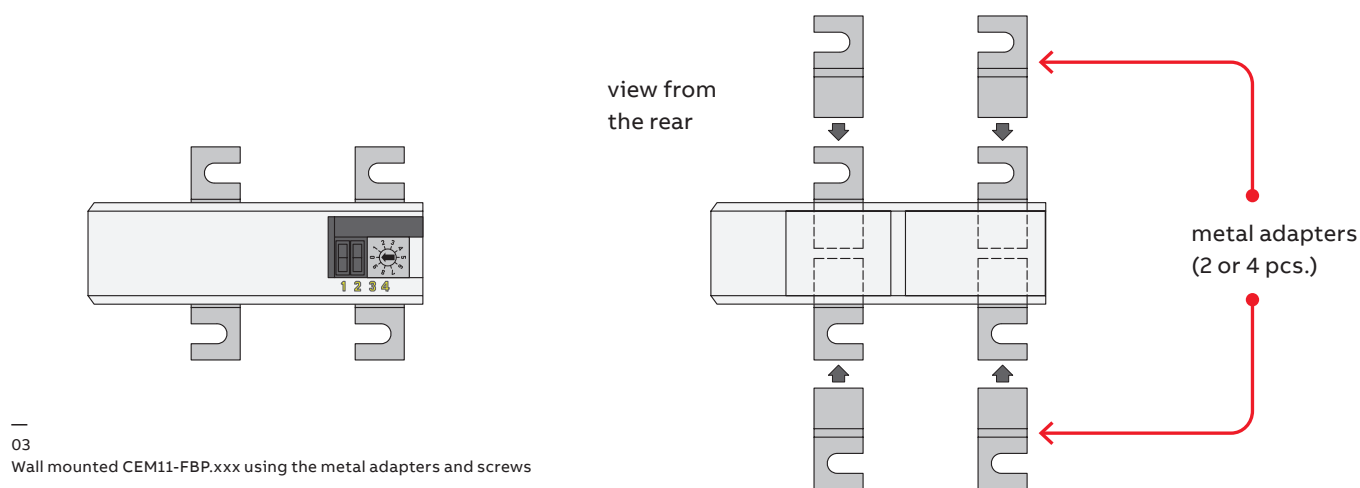
Mounting instructions

The CEM11-FBP.xxx can be DIN rail or alternatively wall mounted, using the provided accessories. See the figures below how to snap on the parts. With the CEM11-FBP120 only the assembly with screws is possible.

CEM11-FBP.xxx



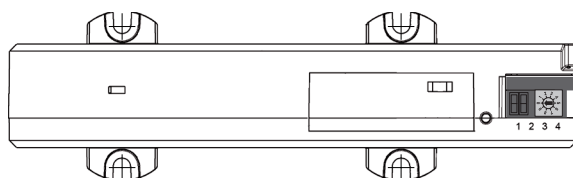
02
CEM11-FBP.xxx, DIN rail mounted using the black plastic adapter (several possibilities available)



03
Wall mounted CEM11-FBP.xxx using the metal adapters and screws

CEM11-FBP.120

front view



04
Wall mounted CEM11-FBP.120 using screws

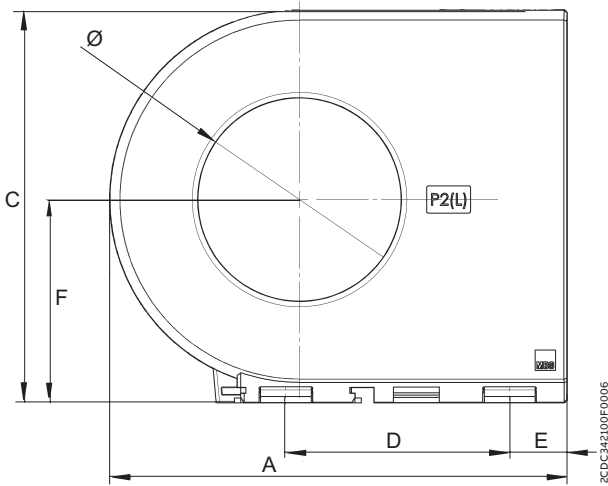
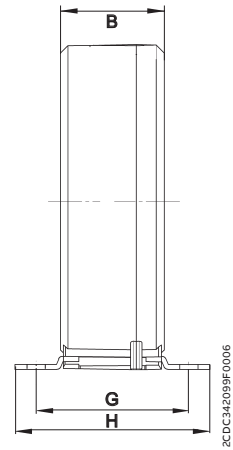
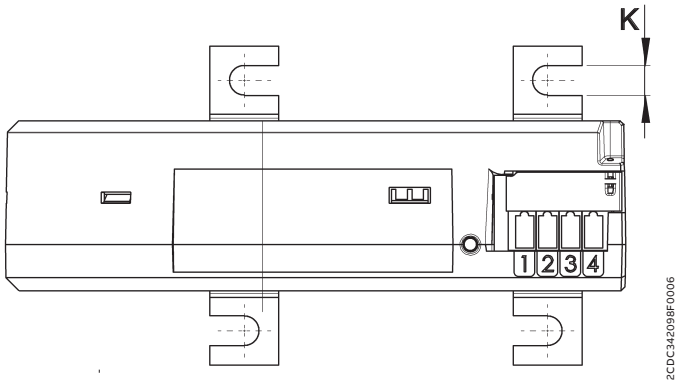
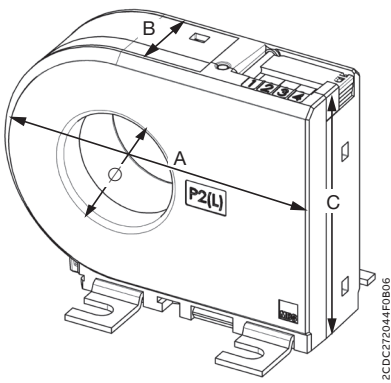
Technical data

Supply voltage		24 V DC (+30 % ... -20 %) (19.2 ... 31.2 V DC) including ripple
Supply current		Max. 0.5 mA
Total device dissipation		Max. 125 mW
Motor voltage		Max. 1000 V AC, isolated wires have to be used
Selectable earth fault current thresholds	CEM11-FBP.20	80 ¹⁾ , 300, 550, 750, 1000, 1200, 1500, 1700 mA
	CEM11-FBP.35	100 ¹⁾ , 500, 1000, 1400, 2000, 2400, 3000, 3400 mA
	CEM11-FBP.60	120 ¹⁾ , 1000, 2000, 2800, 4000, 4800, 6000, 6800 mA
	CEM11-FBP.120	240 ¹⁾ , 2000, 4000, 5600, 8000, 9600, 12000, 13600 mA
Tripping and tripping time		If the earth fault current is above the adjusted threshold the control device (e.g. UMC100.3 or PLC) is responsible to switch off the motor within the specified tripping time (e.g. 1 s).
		Earth fault detection time of CEM11-FBP.xxx is about 25 ms. UMC100.3 or PLC should use an additional delay time to ignore short disturbances.
Max. inaccuracy of the threshold level		+/- 10 %
		+/- 30 % for the currents marked with ¹⁾
Output signal	Earth fault current lower than threshold value	Signal: output switches to + 24 V DC ("closed contact") Max. voltage drop: 4.1 V DC Max. load: 30 mA
	Earth fault current higher than threshold value	Signal: output opens ("open contact") Max. output current: 0.5 mA Max. output low voltage 1.9 V DC
Connecting capacity	Solid or stranded	0.75 - 1.5 mm ² / 18 - 16 AWG
	Stripping length	5 ... 6 mm / 0.2 ... 0.24 inch
	Cable length	10 m shielded or unshielded
Mounting	CEM11-FBP.xxx	On DIN rail (IEC/EN 60715, 35 mm) or with screws, in each case with the provided accessories.
	CEM11-FBP.120	Only with screws
Mounting position		No restrictions
Dimensions		See "Dimensional drawings"
Net weight	CEM11-FBP.20	130 g
	CEM11-FBP.35	200 g
	CEM11-FBP.60	330 g
	CEM11-FBP.120	940 g
Pollution degree	Terminals	3
Degree of protection		IP20
Temperature range	Storage	- 40 ... + 75 °C
	Operation	0 ... + 60 °C
Operation altitude above sea level		Up to 5000 m
Approvals		CE, cUL ²⁾

¹⁾ Lowest values have higher inaccuracy

²⁾ Device is not suitable to be used as a substitute for a GFCI (Ground-Fault Circuit-Interrupters) or a Listed Ground Fault Sensing and Relaying Equipment (UL)

Dimensional drawings

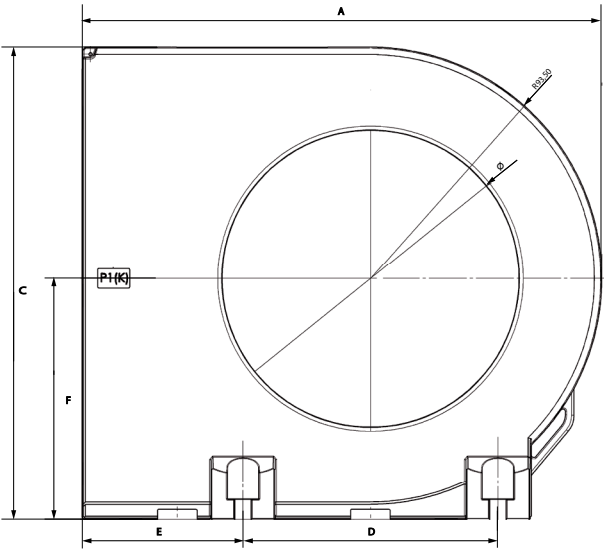
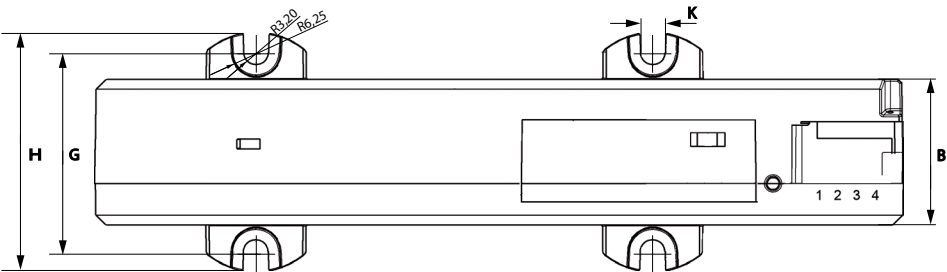


05
Dimensions CEM11-FBP.xxx

Dimensions

Type	Ø	A	B	C	D	E	F	G	H	K
CEM11-FBP.20	20	76.40	30	56	29	20.35	29.50	48	63	6.50
CEM11-FBP.35	35	99.50	30	79	48.50	12.85	41.50	48	63	6.50
CEM11-FBP.60	60	135	37	116	66	17	60	54.50	69.50	6.50

All dimensions in mm



06
Dimensions CEM11-FBP.120

Dimensions

Type	Ø	A	B	C	D	E	F	G	H	K
CEM11-FBP.120	120	210	37	190	103	65,25	97,50	51,50	61	6,50

All dimensions in mm

Ordering details

Order No.	Type	Description
1SAJ929200R0020	CEM11-FBP.20	Earth Leakage Monitor, pass through-hole size 20 mm
1SAJ929200R0035	CEM11-FBP.35	Earth Leakage Monitor, pass through-hole size 35 mm
1SAJ929200R0060	CEM11-FBP.60	Earth Leakage Monitor, pass through-hole size 60 mm
1SAJ929200R0120	CEM11-FBP.120	Earth Leakage Monitor, pass through-hole size 120 mm

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