

Measuring and monitoring relays CM-ESS.M

Multifunctional voltage monitoring relays, single-phase AC/DC

Data sheet



CM-ESS.M

- ① Threshold value adjustment
- ② Hysteresis adjustment
- ③ Adjustment of the tripping delay T_V
- ④ Adjustment of the measuring range
- ⑤ DIP switches (see DIP switch functions)
- ⑥ U/T: green LED - control supply voltage, timing
- ⑦ R: yellow LED - relay status
- ⑧ U: red LED - over- / undervoltage

Characteristics

- Monitoring of DC and AC voltages from 3-600 V
- RMS measuring principle
- One device includes 4 measuring ranges: 3-30 V; 6-60 V; 30-300 V; 60-600 V
- Over- or undervoltage monitoring configurable
- Open- or closed-circuit principle configurable
- Latching function configurable
- Hysteresis adjustable from 3-30 %
- Tripping delay T_V adjustable 0; 0.1-30 s
- 2 c/o contacts
- 22.5 mm width
- 3 LEDs for status indication

Approvals

- UL 508, CAN/CSA C22.2 No. 14
- GL (pending)
- GOST
- CB Scheme
- CCC
- RMRS

Marks

- CE
- C-Tick

Order data

Type	Control supply voltage	Order code
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Measuring range: 3-30 V; 6-60 V; 30-300 V; 60-600 V

CM-ESS.M	24-240 V AC/DC	1SVR 430 830 R0500
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Order data (Accessories)

Type	Description	Order code
ADP.01	Adapter for screw mounting	1SVR 430 029 R0100
MAR.01	Marker label	1SVR 366 017 R0100
COV.01	Sealable transparent cover	1SVR 430 005 R0100

Application

Depending on the configuration, the voltage monitoring relay **CM-ESS.M** can be used for over- or undervoltage monitoring in single-phase AC and/or DC systems. Open- or closed-circuit principle are selectable.

Operating mode

The voltage monitoring relay **CM-ESS.M** has 2 c/o contacts. One device includes 4 measuring ranges: 3-30 V, 6-60 V, 30-300 V, and 60-600 V.

The unit is adjusted with potentiometers and switches on the top of the unit. The selection of: over- or undervoltage monitoring , open - or closed-circuit principle , and latching function ON or OFF is made with DIP switches. A potentiometer, with direct reading scale, allows the adjustment of the threshold value U. There are also adjustments for hysteresis %, and the tripping delay T_V . The hysteresis % is adjustable within a range of 3 to 30 % of the threshold value. The tripping delay T_V is adjustable over a range of instantaneous to a 30 s delay.

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
Data sheet

Function diagrams

Overvoltage monitoring without latching

Open-circuit principle


The voltage to be monitored (measured value) is applied to terminals **B-C**. The supply voltage applied to terminals **A1-A2** is displayed by the glowing green LED.

If the measured value exceeds the adjusted threshold value, the tripping delay T_v starts and the red LED glows (overvoltage). Timing of T_v is displayed by the flashing  green LED. When T_v is complete and the measured value still exceeds the threshold value minus the adjusted hysteresis, the output relays energize and the yellow LED (relay energized) glows.

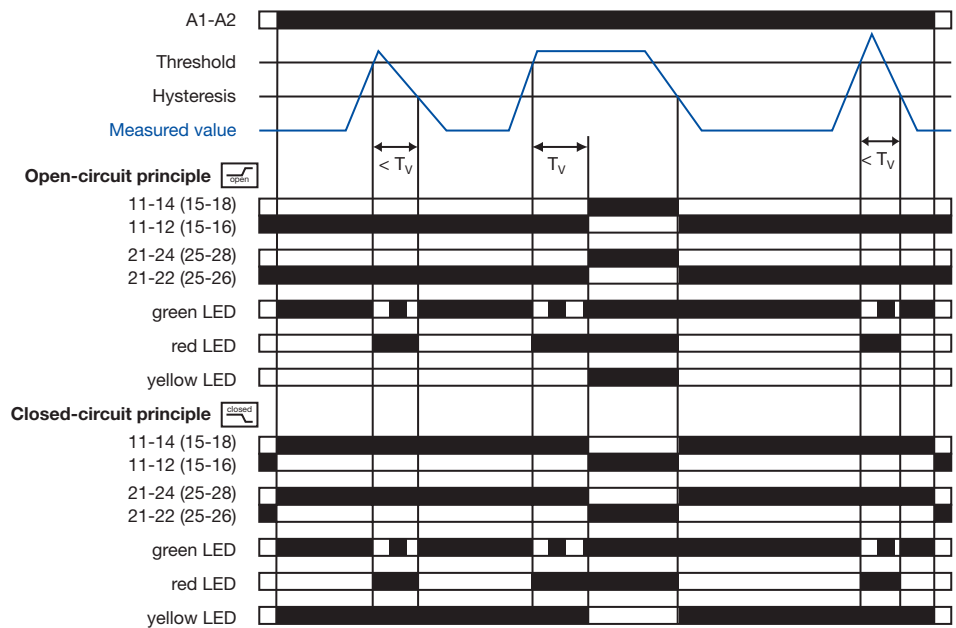
If the measured value decreases below the threshold value minus the hysteresis, the output relays de-energize and the red and yellow LEDs turn off. If supply voltage is interrupted, the green LED turns off.

Closed-circuit principle

The voltage to be monitored (measured value) is applied to terminals **B-C**. When supply voltage is applied to terminals **A1-A2**, the output relays energize and the green and yellow LED (relays energized) glow.

If the measured value exceeds the adjusted threshold value, the tripping delay T_v starts and the red LED glows (overvoltage). Timing of T_v is displayed by the flashing  green LED. When T_v is complete and the measured value still exceeds the threshold value minus the adjusted hysteresis, the output relays de-energize and the yellow LED turns off.

If the measured value decreases below the threshold value minus the hysteresis, the output relays re-energize, the yellow LEDs glows and the red LED turns off. If supply voltage is interrupted, the output relays de-energize and the green and yellow LEDs turn off.



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
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Undervoltage monitoring without latching

Open-circuit principle



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If the measured value decreases below the adjusted threshold value, the tripping delay T_v starts and the red LED flashes  (undervoltage). Timing of T_v is displayed by the flashing  green LED. When T_v is complete and the measured value is still below the threshold value plus the adjusted hysteresis, the output relays energize and the yellow LED (relay energized) glows.

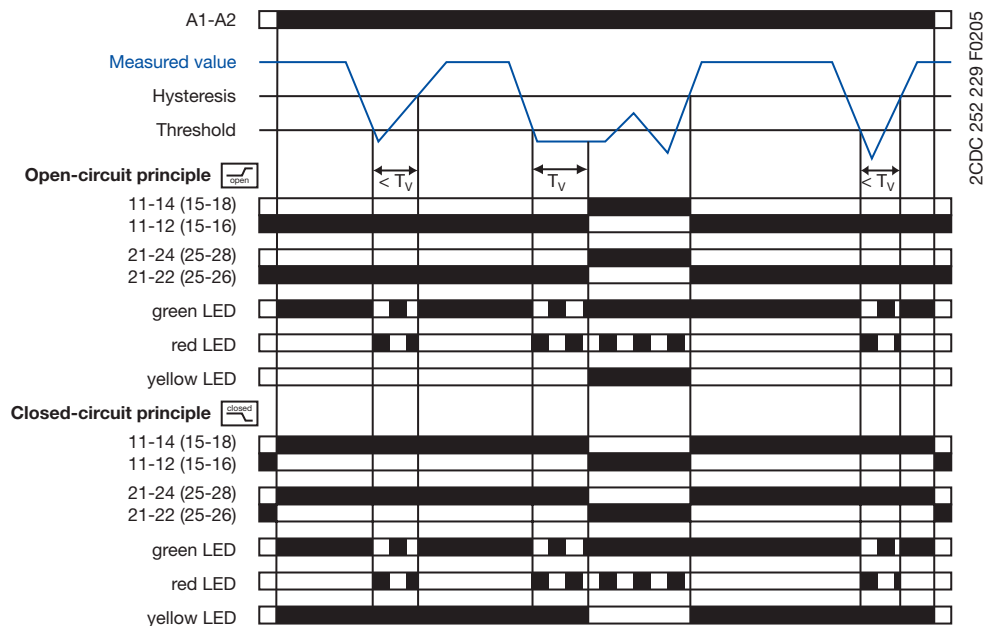
If the measured value exceeds the threshold value plus the hysteresis, the output relays de-energize and the red and yellow LEDs turn off. If supply voltage is interrupted, the green LED turns off.

Closed-circuit principle

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Overvoltage monitoring with latching

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If the measured value exceeds the adjusted threshold value, the tripping delay T_v starts and the red LED glows (overvoltage). Timing of T_v is displayed by the flashing $\square\square\square$ green LED. When T_v is complete and the measured value still exceeds the threshold value minus the adjusted hysteresis, the output relays energize and the yellow LED (relay energized) flashes $\square\square\square$.

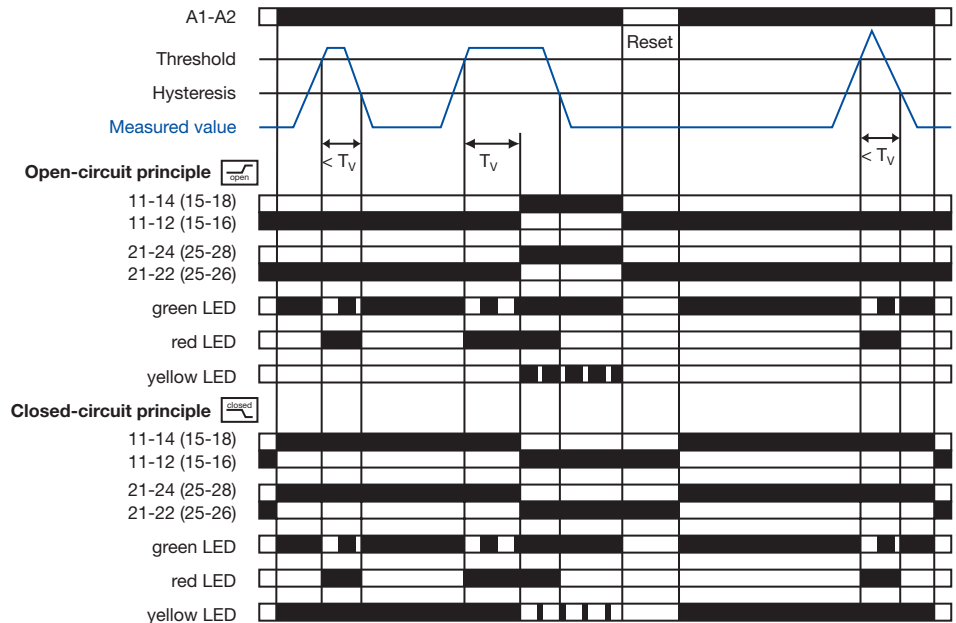
If the measured value decreases below the threshold value minus the hysteresis, the red LED turns off. The output relays remain energized (latching function). If supply voltage is interrupted (reset), the output relays de-energize and the green and yellow LEDs turn off.

Closed-circuit principle

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If the measured value decreases below the threshold value minus the hysteresis, the red LED turns off. The output relays remain de-energized (latching function). If supply voltage is interrupted (reset), the green and yellow LEDs turn off. The output relays energize again when supply voltage is re-applied.



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Undervoltage monitoring with latching

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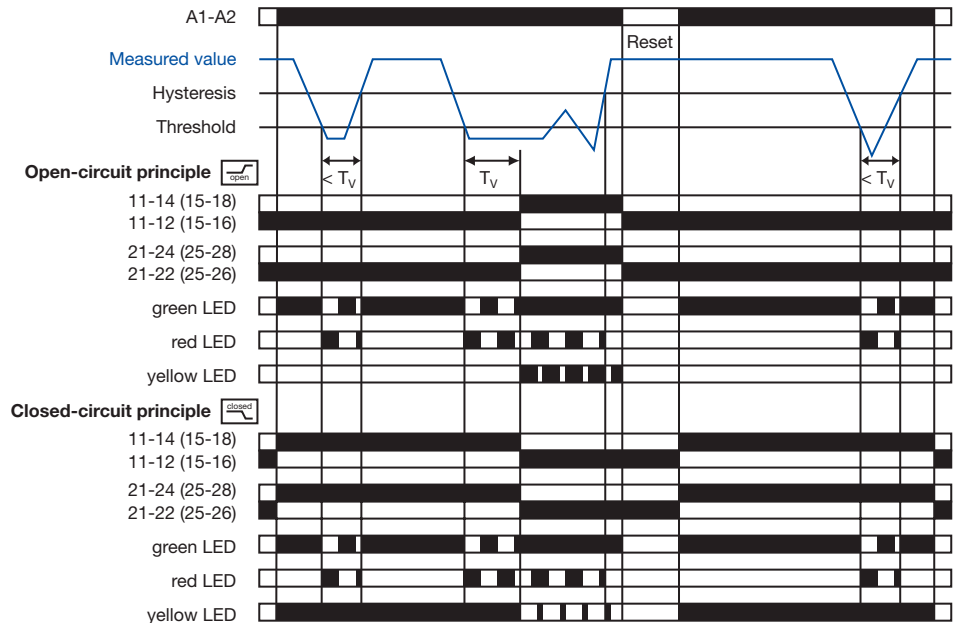
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If the measured value exceeds the threshold value plus the hysteresis, the red LED turns off. The output relays remain de-energized (latching function). If supply voltage is interrupted (reset), the green and yellow LEDs turn off. The output relays energize again when supply voltage is re-applied.

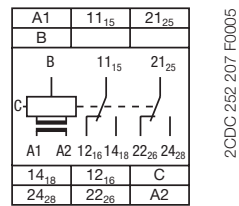


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Connection diagram



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A1-A2 Control supply voltage

B-C Measuring range: 3-30 V; 6-60 V; 30-300 V; 60-600 V

11₁₅-12₁₆/14₁₈ Output contacts - Open- or closed-circuit principle

21₂₅-22₂₆/24₂₈

DIP switch functions

Position	4	3	2	1
ON ↑				
OFF				

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1 ON Undervoltage monitoring

OFF Overvoltage monitoring

2 ON Closed-circuit principle

OFF Open-circuit principle

3 ON Latching function activated

OFF Latching function not activated








OFF = Default

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Technical data

Type		CM-ESS.M			
Input circuit - Supply circuit		A1-A2			
Rated control supply voltage U_s		24-240 V AC/DC			
Rated control supply voltage tolerance		-15...+10 %			
Rated frequency AC/DC versions		50/60 Hz or DC			
Current / power consumption 24-240 V AC/DC		24 V DC	115 V AC	230 V AC	
		30 mA / 0.75 W	17 mA / 1.9 VA	11 mA / 2.6 VA	
On-period		100 %			
Power failure buffering		20 ms			
Transient overvoltage protection		Varistors			
Input circuit - Measuring circuit		B-C			
Monitoring function		over- or undervoltage monitoring configurable			
Measuring method		RMS measuring principle			
Measuring inputs Terminal connection Measuring range Input resistance Pulse overload capacity $t < 1$ s Continuous capacity		CM-ESS.M			
		B-C	B-C	B-C	B-C
		3-30 V	6-60 V	30-300 V	60-600 V
		600 k Ω	600 k Ω	600 k Ω	600 k Ω
		800 V	800 V	800 V	800 V
		660 V	660 V	660 V	
Threshold value		adjustable within the indicated measuring range			
Tolerance of the adjusted threshold value		10 % of the range end value			
Hysteresis related to the threshold value		3-30 % adjustable			
Maximum voltage within measuring circuit		factor 1.5 of full-scale			
Measuring signal frequency range		DC / 15 Hz - 2 kHz			
Rated measuring signal frequency range		DC / 50-60 Hz			
Maximum response time		AC: 80 ms, DC: 120 ms			
Measuring error within the control supply voltage tolerance		≤ 0.5 %			
Measuring error within the temperature range		≤ 0.06 % / $^{\circ}\text{C}$			
Transient overvoltage protection		Varistors			
Timing circuit					
Delay time T_v		0 or 0.1-30 s adjustable			
Repeat accuracy (constant parameters)		± 0.07 % of full scale			
Tolerance of the adjusted delay time					
Timing error within control supply voltage tolerance		≤ 0.5 %			
Timing error within temperature range		≤ 0.06 % / $^{\circ}\text{C}$			
Indication of operational states					
Control supply voltage	U/T: green LED	 : control supply voltage applied  : tripping delay T_v active			
Measured value	U: red LED	 : overvoltage  : undervoltage			
Relay status	R: yellow LED	 : relay energized, no latching function  : relay energized, active latching function  : relay de-energized, active latching function			
Output circuits		11-12/14, 21-22/24			
Kind of output		relays, 2 c/o contacts			
Operating principle ¹⁾		open- or closed-circuit principle configurable			
Contact material		AgNi			
Rated voltage (VDE 0110, IEC 947-1)		250 V			
Minimum switching voltage / minimum switching current		24 V / 10 mA			
Maximum switching voltage / maximum switching current		250 V AC / 4 A AC			
Rated operational current (IEC 60947-5-1)	AC12 (resistive) at 230 V	4 A			
	AC15 (inductive) at 230 V	3 A			
	DC12 (resistive) at 24 V	4 A			
	DC13 (inductive) at 24 V	2 A			
Mechanical lifetime		30x10 ⁶ switching cycles			
Electrical lifetime (AC12, 230 V, 4 A)		0.1x10 ⁶ switching cycles			

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Type		CM-ESS.M
Short-circuit capacity / maximum fuse rating	n/c contact	10 A fast-acting
	n/o contact	10 A fast-acting
General data		
MTBF		
Dimensions (W x H x D)		22.5 x 78 x 100 mm (0.89 x 3.07 x 3.94 in)
Mounting		DIN rail (EN 50022)
Mounting position		any
Material of enclosure		PA 6
Degree of protection	enclosure / terminals	IP50 / IP20
Electrical connection		
Wire size	fine-strand with wire end ferrule	2x0.75 mm ² / 2x2.5 mm ² (2x18 AWG / 2x14 AWG)
	fine-strand without wire end ferrule	2x0.75 mm ² / 2x2.5 mm ² (2x18 AWG / 2x14 AWG)
	rigid	2x0.5 mm ² / 2x4 mm ² (2x20 AWG / 2x12 AWG)
Stripping length		8 mm (0.31 in)
Tightening torque		0.8 Nm
Environmental data		
Ambient temperature range	operation	-20...+60 °C
	storage	-40...+85 °C
Damp heat (IEC 60068-2-30)		55 °C, 6 cycle
Vibration (sinusoidal) (IEC/EN 60255-21-1)		Class 2
Shock (IEC/EN 60255-21-2)		Class 2
Isolation data		
Insulation voltage (VDE 0110, IEC 947-1, IEC/EN 60255-5)	supply circuit / measuring circuit	600 V
	supply circuit / output circuit	250 V
	measuring circuit / output circuit	600 V
	output circuit 1 / output circuit 2	250 V
Pollution degree (VDE 0110, IEC 664, IEC/EN 60255-5)		2
Overvoltage category (VDE 0110, IEC 664, IEC/EN 60255-5)		III
Test voltage between all isolated circuits (type test)	Rated insulation voltage 250 V	2.0 kV, 50 Hz
	Rated insulation voltage 600 V	2.5 kV, 50 Hz
Standards		
Product standard		IEC 255-6, EN 60255-6
Low Voltage Directive		2006/95/EC
EMC Directive		2004/108/EC
Electromagnetic compatibility		
Interference immunity	IEC/EN 61000-6-2	
	electrostatic discharge (ESD)	IEC/EN 61000-4-2- Level 3
	electromagnetic field	IEC/EN 61000-4-3- Level 3
	fast transients (Burst)	IEC/EN 61000-4-4- Level 3
	powerful impulses (Surge)	IEC/EN 61000-4-9- Level 3
	HF line emission	IEC/EN 61000-4-6- Level 3
Interference emission	IEC/EN 61000-6-3	
	electromagnetic field	IEC/CISPR 22; EN 55022 - Class B
	HF line emission	IEC/CISPR 22; EN 55022 - Class B

¹⁾ Open-circuit principle: output relays energize if the measured value exceeds $\overline{\square}$ / falls below $\underline{\square}$ the adjusted threshold value
 Closed-circuit principle: output relays de-energize if measured value exceeds $\overline{\square}$ / falls below $\underline{\square}$ the adjusted threshold value

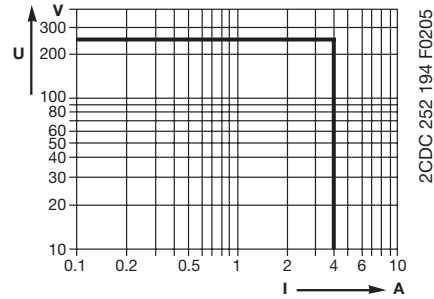
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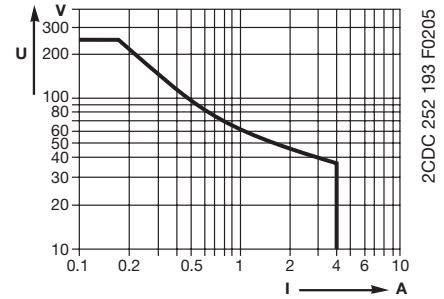
Data sheet

Technical diagrams

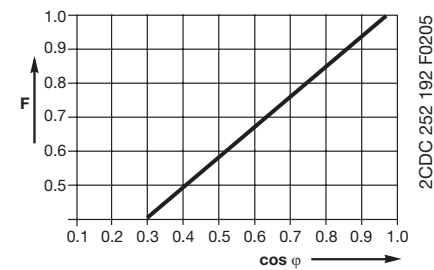
Load limit curves



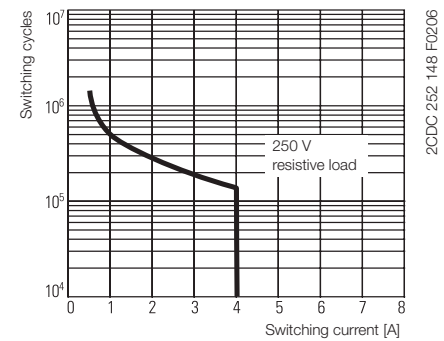
AC load (resistive)



DC load (resistive)



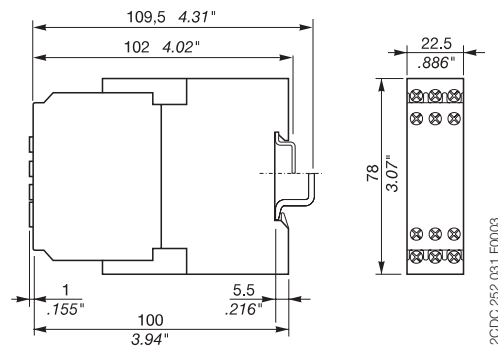
Derating factor F for inductive AC load



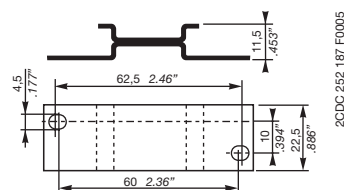
Contact lifetime

Dimensional drawing

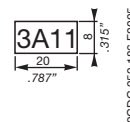
Dimensions in mm



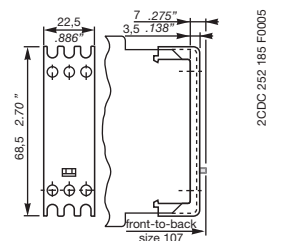
Dimensional drawings (Accessories)



ADP.01 - Adapter for screw mounting



MAR.01 - Marker label



COV.01 - Sealable transparent cover



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