

# Current and voltage monitoring relays, single-phase

## Product group picture

2



# Current and voltage monitoring relays, single-phase

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# Current and voltage monitoring relays, single-phase

## Benefits and advantages

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### Characteristics current and voltage monitoring relays

- Monitoring of DC and AC currents: 3 mA to 15 A <sup>1)</sup>
- Monitoring of DC and AC voltages from 3-600 V
- TRMS measuring principle
- One device includes 3 measuring ranges
- One device includes 4 measuring ranges: 3-30 V; 6-60 V; 30-300 V; 60-600 V
- Over- and undercurrent monitoring<sup>1)</sup>
- Over- and undervoltage monitoring<sup>1)</sup>
- ON or OFF-delay configurable<sup>1)</sup>
- Open- or closed-circuit principle configurable<sup>1)</sup>
- Threshold values for >U and/or <U adjustable<sup>1)</sup>
- Latching function configurable<sup>1)</sup>
- Thresholds for >I and/or <I adjustable<sup>1)</sup>
- Fixed hysteresis of 5 %<sup>1)</sup>
- Start-up delay  $T_v$  adjustable 0; 0.1-30 s<sup>1)</sup>
- Tripping delay  $T_v$  adjustable 0; 0.1-30 s<sup>1)</sup>
- 1 x 2 c/o contacts (common signal) or 2 x 1 c/o contact (separate signals for >I and <I) configurable <sup>1)</sup>
- 1 x 2 c/o contacts (common signal) or 2 x 1 c/o contact (separate signals for >U and <U) configurable<sup>1)</sup>
- 22.5 mm width
- 3 LEDs for the indication of operational states
- Approvals / Marks  
A C R K E L  <sup>2)</sup> / a b

<sup>1)</sup> depending on device

<sup>2)</sup> Applicable in rail application following the latest standards for rail applications:  
NF F 16-101/102 (I2/F2 classified), EN 45545 (Hazard Level 3), DIN 5510, EN 50155, IEC 60571.  
Further information is available in our rail segment brochure 2CDC110084B0201.

### Current monitoring, single-phase

The ABB current monitoring relays CM-SRS.xx reliably monitor the occurrence of currents that exceed or fall below the selected threshold value. The functions overcurrent or undercurrent monitoring can be preselected. Single- and multifunction devices for the monitoring of direct or alternating currents from 3 mA to 15 A are available.

### Current window monitoring ( $I_{min}$ , $I_{max}$ )

The window monitoring relay CM-SFS.2x is available if the application requires the simultaneous monitoring of over- and undercurrents.

### Voltage monitoring, single-phase

The ABB voltage monitoring relays CM-SRS.xx are used to monitor direct and alternating voltages within a range of 3-600 V. Over- or undervoltage detection can be preselected.

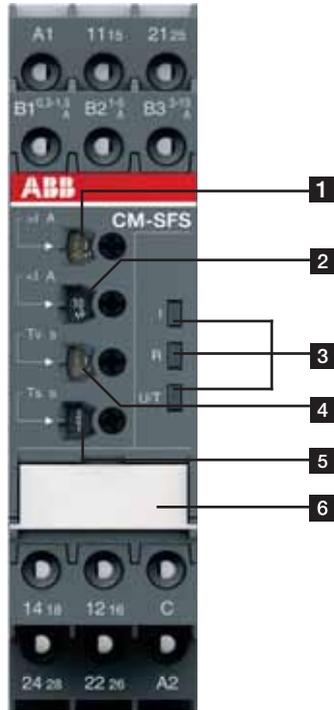
### Voltage window monitoring ( $U_{min}$ , $U_{max}$ )

For the simultaneous detection of over- and undervoltages, the window monitoring relay CM-EFS.2 can be used.

# Current and voltage monitoring relays, single-phase

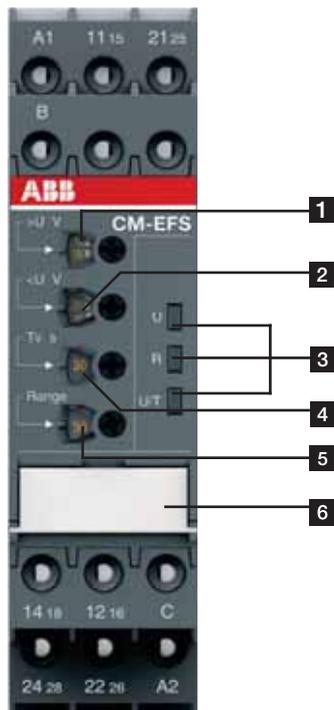
## Operating controls

### Current monitoring relays



- 1** Adjustment of the threshold value  $>I$  for overcurrent
- 2** Adjustment of the threshold value  $<I$  for undercurrent
- 3** Indication of operational states
  - U/T: green LED – control supply voltage/timing
  - R: yellow LED – relay status
  - I: red LED – over- / undercurrent
- 4** Adjustment of the tripping delay  $T_v$
- 5** Adjustment of the start-up delay  $T_s$
- 6** DIP switches (see DIP switch functions on page 2/20)
  - A ON-delay
  - B OFF-delay
  - g Closed-circuit principle
  - h Open-circuit principle
  - f Latching function activated
  - e Latching function not activated
  - i 2x1 c/o (SPDT) contact
  - j 1x2 c/o (SPDT) contacts

### Voltage monitoring relays



- 1** Adjustment of the threshold value  $>U$  for overvoltage
- 2** Adjustment of the threshold value  $<U$  for undervoltage
- 3** Indication of operational states
  - U/T: green LED – control supply voltage/timing
  - R: yellow LED – relay status
  - U: red LED – over- / undervoltage
- 4** Adjustment of the tripping delay  $T_v$
- 5** Adjustment of the measuring range
- 6** DIP switches (see DIP switch functions on page 2/20)
  - A ON-delay
  - B OFF-delay
  - g Closed-circuit principle
  - h Open-circuit principle
  - f Latching function activated
  - e Latching function not activated
  - i 2x1 c/o (SPDT) contact
  - j 1x2 c/o (SPDT) contacts

# Current and voltage monitoring relays, single-phase

## Selection table - Current monitoring relays



Type	Order number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
CM-SRS.11S	1SVR730840R0200																				
CM-SRS.11P	1SVR740840R0200																				
CM-SRS.11S	1SVR730841R0200																				
CM-SRS.11P	1SVR740841R0200																				
CM-SRS.11S	1SVR730841R1200																				
CM-SRS.11P	1SVR740841R1200																				
CM-SRS.12S	1SVR730840R0300																				
CM-SRS.12S	1SVR730841R0300																				
CM-SRS.21S	1SVR730840R0400																				
CM-SRS.21P	1SVR740840R0400																				
CM-SRS.21S	1SVR730841R0400																				
CM-SRS.21P	1SVR740841R0400																				
CM-SRS.21S	1SVR730841R1400																				
CM-SRS.21P	1SVR740841R1400																				
CM-SRS.22S	1SVR730840R0500																				
CM-SRS.22S	1SVR730841R0500																				
CM-SRS.22S	1SVR730841R1500																				
CM-SRS.M1S	1SVR730840R0600																				
CM-SRS.M1P	1SVR740840R0600																				
CM-SRS.M2S	1SVR730840R0700																				
CM-SFS.21S	1SVR730760R0400																				
CM-SFS.21P	1SVR740760R0400																				
CM-SFS.22S	1SVR730760R0500																				
CM-SFS.22S	1SVR730760R0500																				
<b>Rated control supply voltage U<sub>s</sub></b>																					
24 - 240 V AC/DC		■	■						■										■		
110 - 130 V AC				■	■					■									■		
220 - 240 V AC																			■		
<b>Measuring ranges AC/DC</b>																					
3 - 30 mA		■	■	■	■	■	■												■	■	
10 - 100 mA		■	■	■	■	■	■												■	■	
0.1 - 1 A		■	■	■	■	■	■												■	■	
0.3 - 1.5 A								■	■	■									■	■	
1 - 5 A								■	■	■									■	■	
3 - 15 A								■	■	■									■	■	
<b>Monitoring function</b>																					
Over- or undercurrent		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Windows current monitoring																			■	■	■
Latching																			sel	sel	sel
Open circuit or closed circuit principle																			sel	sel	sel
<b>Timing functions for tripping delay</b>																					
ON delay, 0 or 0.1 - 30 s										adj											
ON or OFF delay																				sel	sel
<b>Output</b>																					
c/o contact		1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2
<b>Connection type</b>																					
Push-in terminals		■	■	■	■	■	■	■	■										■	■	■
Double-chamber cage connection terminals		■		■	■	■	■	■	■										■	■	■

adj: adjustable  
sel: selectable

# Current and voltage monitoring relays, single-phase

## Selection table - Voltage monitoring relays



Type	Order number	1SVR730830R0300	1SVR740830R0300	1SVR730831R0300	1SVR740831R0300	1SVR730831R1300	1SVR740831R1300	1SVR730830R0400	1SVR740830R0400	1SVR730831R0400	1SVR740831R0400	1SVR730831R1400	1SVR740831R1400	1SVR730830R0500	1SVR740830R0500	1SVR730750R0400	1SVR740750R0400
CM-ESS.1S		■						■	■					■	■	■	■
CM-ESS.1P			■							■	■						
CM-ESS.1S				■	■												
CM-ESS.1P						■	■										
CM-ESS.1S																	
CM-ESS.1P																	
CM-ESS.2S								■	■								
CM-ESS.2P										■	■						
CM-ESS.2S																	
CM-ESS.2P																	
CM-ESS.2S																	
CM-ESS.2P																	
CM-ESS.MS																	
CM-ESS.MP																	
CM-EFS.2S																	
CM-EFS.2P																	
<b>Rated control supply voltage <math>U_s</math></b>																	
24 - 240 V AC/DC		■	■					■	■					■	■	■	■
110 - 130 V AC				■	■					■	■						
220 - 240 V AC						■	■					■	■				
<b>Measuring ranges AC/DC</b>																	
3 - 30 V		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
6 - 60 V		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
30 - 300 V		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
60 - 600 V		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
<b>Monitoring function</b>																	
Over- or undervoltage		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Windows voltage monitoring																	
Latching														sel	sel	sel	sel
Open circuit or closed circuit principle														sel	sel	sel	sel
<b>Timing functions for tripping delay</b>																	
ON delay, 0 or 0.1 - 30 s								adj									
ON or OFF delay																sel	sel
<b>Output</b>																	
c/o contact		1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
<b>Connection type</b>																	
Push-in terminals			■		■		■		■		■		■		■		■
Double-chamber cage connection terminals		■		■		■		■		■		■		■		■	

adj: adjustable  
sel: selectable

# Current and voltage monitoring relays, single-phase

## Ordering details - Current monitoring relays

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### Description

The CM range current monitoring relays protect single-phase mains (DC or AC) from over- and undercurrent from 3 mA to 15 A. Two different terminal versions are available. You can choose between the proven screw connection technology (double-chamber cage connecting terminals) and the completely tool-free Easy Connect Technology (push-in terminals).

### Ordering details

Rated control supply voltage	Function	Tripping delay $T_V$	Measuring range	Type	Order code	Price 1 pce	Weight (1 pce) kg (lb)
24-240 V AC/DC	b a	without	3-30 mA, 10-100 mA, 0.1-1 A	CM-SRS.11S	1SVR730840R0200		0.145 (0.320)
110-130 V AC					1SVR730841R0200		0.161 (0.355)
220-240 V AC					1SVR730841R1200		0.161 (0.355)
24-240 V AC/DC				CM-SRS.11P	1SVR740840R0200		0.137 (0.302)
110-130 V AC					1SVR740841R0200		0.153 (0.337)
220-240 V AC					1SVR740841R1200		0.153 (0.337)
24-240 V AC/DC	b a	without	0.3-1.5 A, 1-5 A, 3-15 A	CM-SRS.12S	1SVR730840R0300		0.137 (0.302)
110-130 V AC					1SVR730841R0300		0.168 (0.370)
220-240 V AC					1SVR730841R1300		0.168 (0.370)
24-240 V AC/DC	b a	adjustable 0 or 0.1-30 s	3-30 mA, 10-100 mA, 0.1-1 A	CM-SRS.21S	1SVR730840R0400		0.152 (0.335)
110-130 V AC					1SVR730841R0400		0.179 (0.395)
220-240 V AC					1SVR730841R1400		0.179 (0.395)
24-240 V AC/DC				CM-SRS.21P	1SVR740840R0400		0.141 (0.311)
110-130 V AC					1SVR740841R0400		0.168 (0.370)
220-240 V AC					1SVR740841R1400		0.168 (0.370)
24-240 V AC/DC	b a	adjustable 0 or 0.1-30 s	0.3-1.5 A, 1-5 A, 3-15 A	CM-SRS.22S	1SVR730840R0500		0.144 (0.399)
110-130 V AC					1SVR730841R0500		0.181 (0.399)
220-240 V AC					1SVR730841R1500		0.181 (0.399)
24-240 V AC/DC	b e a f	adjustable 0 or 0.1-30 s	3-30 mA, 10-100 mA, 0.1-1 A	CM-SRS.M1S	1SVR730840R0600		0.153 (0.337)
24-240 V AC/DC				CM-SRS.M1P	1SVR740840R0600		0.142 (0.313)
24-240 V AC/DC	b e a f	adjustable 0 or 0.1-30 s	0.3-1.5 A, 1-5 A, 3-15 A	CM-SRS.M2S	1SVR730840R0700		0.155 (0.342)
24-240 V AC/DC				CM-SFS.21S	1SVR730760R0400		0.150 (0.331)
24-240 V AC/DC	b e a f j	adjustable 0 or 0.1-30 s	3-30 mA, 10-100 mA, 0.1-1 A	CM-SFS.21P	1SVR740760R0400		0.139 (0.306)
24-240 V AC/DC				CM-SFS.22S	1SVR730760R0500		0.158 (0.348)



CM-SRS.22S

2CDC251 054 V0011



CM-SFS.22P

2CDC 251 058 V0011

b Overcurrent monitoring  
a Undercurrent monitoring  
e Without latching  
f With latching  
j 1x2 c/o (SPDT) contacts  
i 2x1 c/o (SPDT) contact

S: screw connection  
P: push-in / easy connect

# Current and voltage monitoring relays, single-phase

## Ordering details - Voltage monitoring relays

### Description

The CM range voltage monitoring relays provide reliable monitoring of voltages as well as detection of phase loss in single-phase mains.

All devices are available with two different terminal versions. You can choose between the proven screw connection technology (double-chamber cage connecting terminals) and the completely tool-free Easy Connect Technology (push-in terminals).

### Ordering details



CM-ESS.MP

2CDC 251 060 V0011



CM-EFS.2

2CDC 251 069 V0011

- b Overcurrent monitoring
- a Undercurrent monitoring
- e Without latching
- f With latching
- j 1x2 c/o (SPDT) contacts
- i 2x1 c/o (SPDT) contact

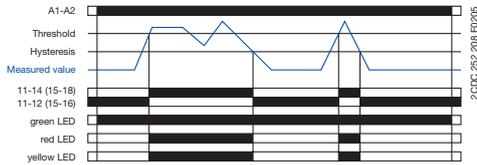
Rated control supply voltage	Function	Tripping delay T <sub>v</sub>	Measuring range AC/DC	Type	Order code	Price 1 pce	Weight (1 pce) kg (lb)
24-240 V AC/DC	d c	without	3-30 V, 6-60 V, 30-300 V, 60-600 V	CM-ESS.1S	1SVR730830R0300		0.135 (0.298)
110-130 V AC					1SVR730831R0300		0.164 (0.362)
220-240 V AC					1SVR730831R1300		0.164 (0.362)
24-240 V AC/DC				CM-ESS.1P	1SVR740830R0300		0.126 (0.278)
110-130 V AC					1SVR740831R0300		0.155 (0.342)
220-240 V AC					1SVR740831R1300		0.155 (0.342)
24-240 V AC/DC	d c	adjustable 0 or 0.1-30 s	3-30 V, 6-60 V, 30-300 V, 60-600 V	CM-ESS.2S	1SVR730830R0400		0.153 (0.337)
110-130 V AC					1SVR730831R0400		0.181 (0.399)
220-240 V AC					1SVR730831R1400		0.181 (0.399)
24-240 V AC/DC				CM-ESS.2P	1SVR740830R0400		0.142 (0.313)
110-130 V AC					1SVR740831R0400		0.170 (0.375)
220-240 V AC					1SVR740831R1400		0.170 (0.375)
24-240 V AC/DC	d e c d f c	adjustable 0 or 0.1-30 s	3-30 V, 6-60 V, 30-300 V, 60-600 V	CM-ESS.MS	1SVR730830R0500		0.154 (0.340)
				CM-ESS.MP	1SVR740830R0500		0.143 (0.320)
24-240 V AC/DC	b e a r j i	adjustable 0 or 0.1-30 s	3-30 V, 6-60 V, 30-300 V, 60-600 V	CM-EFS.2S	1SVR730750R0400		0.157 (0.346)
				CM-EFS.2P	1SVR740750R0400		0.146 (0.322)

**S:** screw connection  
**P:** push-in / easy connect

# Current and voltage monitoring relays, single-phase Function diagrams

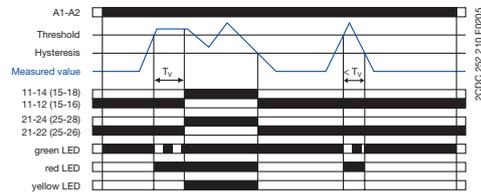
## Function diagrams - CM-SRS.1

### Overcurrent monitoring b

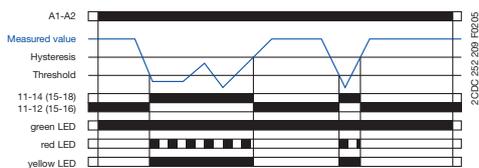


## Function diagrams - CM-SRS.2

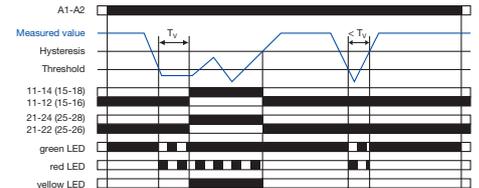
### Overcurrent monitoring b



### Undercurrent monitoring a



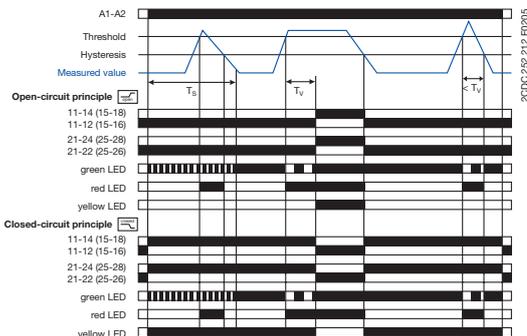
### Undercurrent monitoring a



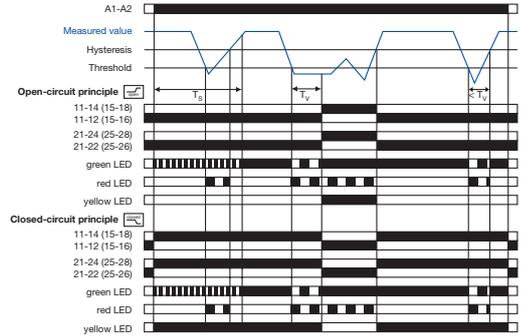
If the measured value exceeds resp. drops below the adjusted threshold value, the output relay(s) energize(s): on the CM-SRS.1 immediately, on the CM-SRS.2 after the set tripping delay  $T_V$ . If the measured value exceeds resp. drops below the threshold value plus resp. minus the adjusted hysteresis, the output relay(s) de-energize(s). The hysteresis is adjustable within a range of 3-30 % of the threshold value.

## Function diagrams - CM-SRS.M

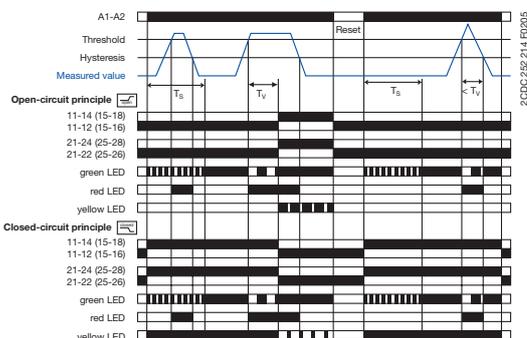
### Overcurrent monitoring b without latching e



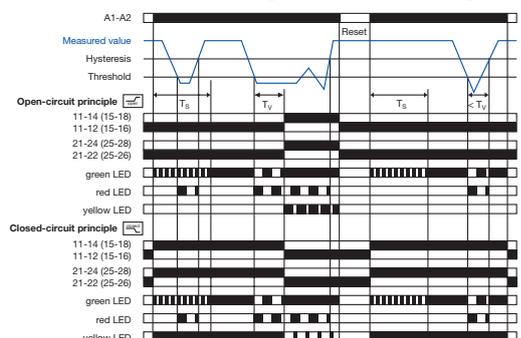
### Undercurrent monitoring a without latching e



### Overcurrent monitoring b with latching f



### Undercurrent monitoring b with latching f



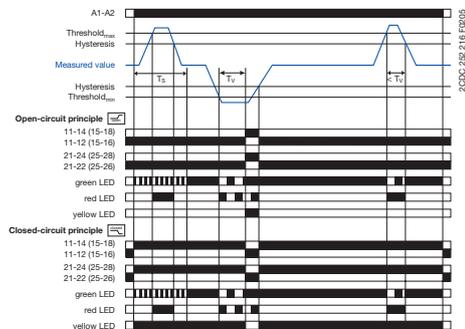
If the measured value exceeds resp. drops below the adjusted threshold value before the set start-up delay  $T_S$  is complete, the output relays do not change their actual state. If the measured value exceeds resp. drops below the adjusted threshold value when  $T_S$  is complete, the tripping delay  $T_V$  starts. If  $T_V$  is complete and the measured value is still exceeding resp. below the threshold value plus resp. minus the set hysteresis, the output relays energize h / de-energize g .  
If the measured value exceeds resp. drops below the threshold value minus resp. plus the set hysteresis and the latching function is not activated e , the output relays de-energize h / energize g . With activated latching function f the output relays remain energized h and de-energize only, when the supply voltage is interrupted / the output relays remain de-energized g and energize only, when the supply voltage is switched off and then again switched on = Reset.  
The hysteresis is adjustable within a range of 3-30 % of the threshold value.

# Current and voltage monitoring relays, single-phase

## Function diagrams

### Function diagrams - CM-SFS.2

Current window monitoring 1x2 c/o contact j  
ON-delayed A without latching f



Further function diagrams see data sheet.

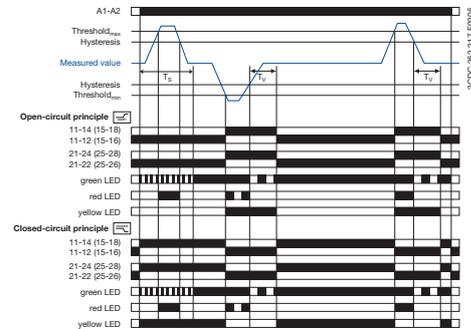
**ON-delayed A current window monitoring with parallel switching c/o contacts j :**

If the measured value exceeds resp. drops below the adjusted threshold value before the set start-up delay  $T_s$  is complete, the output relays do not change their actual state.

If the measured value exceeds resp. drops below the adjusted threshold value when  $T_s$  is complete, the tripping delay  $T_v$  starts, when A is configured. If  $T_v$  is complete and the measured value is still exceeding resp. below the threshold value minus resp. plus the fixed hysteresis (5%), the output relays energize h /de-energize g .

If the measured value exceeds resp. drops below the threshold value plus resp. minus the hysteresis and the latching function is not activated f , the output relays de-energize h / energize g . With activated latching function e the output relays remain energized h and de-energize only, when the supply voltage is interrupted / the output relays remain de-energized g and energize only, when the supply voltage is switched off and then again switched on = Reset.

Current window monitoring 1x2 c/o contact j  
OFF-delayed B without latching e



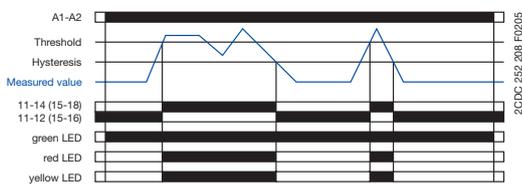
**OFF-delayed B current window monitoring with parallel switching c/o contacts j :**

If the measured value exceeds resp. drops below the adjusted threshold value when the set start-up delay  $T_s$  is complete, the output relays energize h / de-energize g , when B is configured, and remain in this position during the set tripping delay  $T_v$ . If the measured value exceeds resp. drops below the threshold value plus resp. minus the fixed hysteresis (5%) and the latching function is not activated e , the tripping delay  $T_v$  starts. After completion of  $T_v$ , the output relays de-energize h / energize g , provided that the latching function is not activated e . With activated latching function f the output relays remain energized h and de-energize only, when the supply voltage is interrupted / the output relays remain de-energized g and energize only, when the supply voltage is switched off and then again switched on = Reset. When i is adjusted on the device, the functionality is equivalent to the one described above. There is only to consider that in this case, instead of both output relays, only one output relay each will be switched.

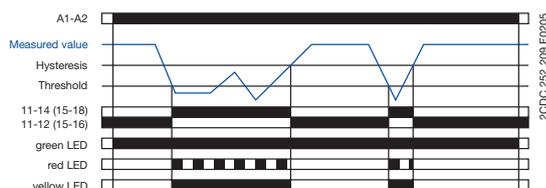
">I" = 11<sub>15</sub>-12<sub>16</sub>/14<sub>18</sub> ; "<I" = 21<sub>25</sub>-22<sub>26</sub>/24<sub>28</sub>

### Function diagrams - CM-ESS.1

Overvoltage monitoring d

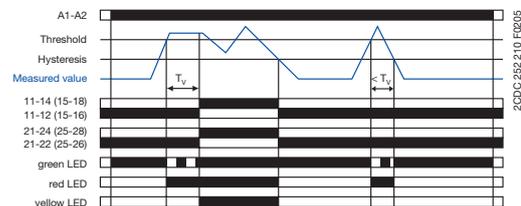


Undervoltage monitoring c

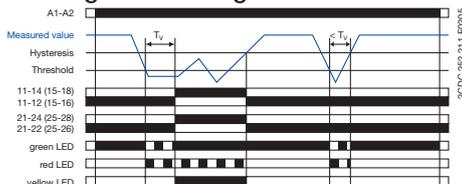


### Function diagrams - CM-ESS.2

Overvoltage monitoring d



Undervoltage monitoring c



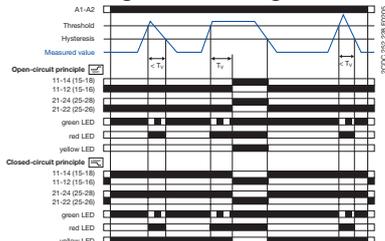
Depending on the configuration, the voltage monitoring relays CM-ESS.1 and CM-ESS.2 can be used for over- d or undervoltage monitoring c in single-phase AC and/or DC systems. The voltage to be monitored (measured value) is applied to terminals B-C. The devices work according the open-circuit principle. If the measured value exceeds resp. drops below the adjusted threshold value, the output relay(s) energize(s): on the CM-ESS.1 immediately, on the CM-ESS.2 after the set tripping delay  $T_v$ . If the measured value exceeds resp. drops below the threshold value plus resp. minus the adjusted hysteresis, the output relay(s) de-energize(s). The hysteresis is adjustable within a range of 3-30 % of the threshold value.

# Current and voltage monitoring relays, single-phase

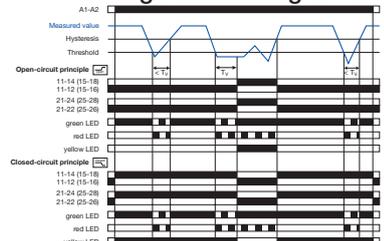
## Function diagrams

### Function diagrams - CM-ESS.M

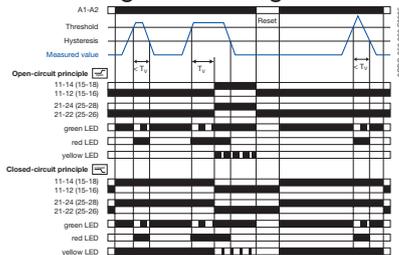
#### Overvoltage monitoring $d$ without latching $e$



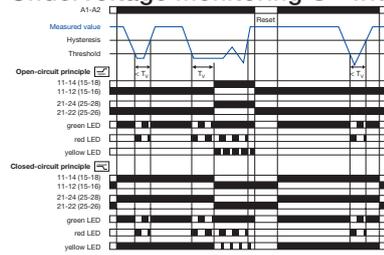
#### Undervoltage monitoring $c$ without latching $e$



#### Overvoltage monitoring $d$ with latching $f$



#### Undervoltage monitoring $c$ without latching $f$



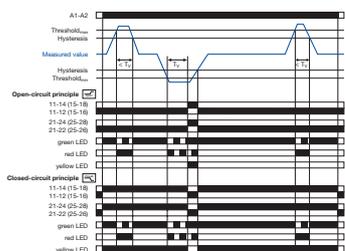
If the measured value exceeds resp. drops below the adjusted threshold value, the tripping delay  $T_V$  starts. If  $T_V$  is complete and the measured value is still exceeding resp. below the threshold value plus resp. minus the set hysteresis, the output relays energize  $h$  / de-energize  $g$ .

If the measured value exceeds resp. drops below the threshold value plus resp. minus the set hysteresis and the latching function is not activated  $e$ , the output relays de-energize  $h$  / energize  $g$ . With activated latching function  $f$  the output relays remain energized  $h$  and de-energize only, when the supply voltage is interrupted / the output relays remain de-energized  $g$  and energize only, when the supply voltage is switched off and then again switched on = Reset. The hysteresis is adjustable within a range of 3-30 % of the threshold value.

Further function diagrams see data sheet.

#### Voltage window monitoring 1x2 c/o contact $j$

##### ON-delayed $A$ without latching $e$



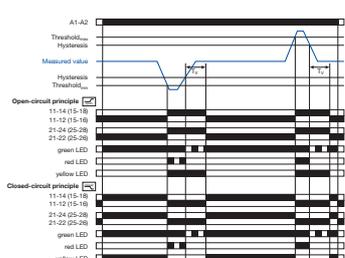
##### ON-delayed $A$ voltage window monitoring with parallel switching c/o contacts $j$ :

If the measured value exceeds resp. drops below the adjusted threshold value, the tripping delay  $T_V$  starts, when  $A$  is configured. If  $T_V$  is complete and the measured value is still exceeding resp. below the threshold value minus resp. plus the fixed hysteresis (5%), the output relays energize  $h$  / de-energize  $g$ .

If the measured value exceeds resp. drops below the threshold value plus resp. minus the hysteresis and the latching function is not activated  $e$ , the output relays de-energize  $h$  / energize  $g$ . With activated latching function  $e$  the output relays remain energized  $h$  and de-energize only, when the supply voltage is interrupted / the output relays remain de-energized  $g$  and energize only, when the supply voltage is switched off and then again switched on = Reset.

#### Voltage window monitoring 1x2 c/o contact $j$

##### OFF-delayed $B$ without latching $e$



##### OFF-delayed $B$ voltage window monitoring with parallel switching c/o contacts $j$ :

If the measured value exceeds resp. drops below the adjusted threshold value, the output relays energize  $h$  / de-energize  $g$ , when  $B$  is configured, and remain in this position during the set tripping delay  $T_V$ .

If the measured value exceeds resp. drops below the threshold value plus resp. minus the fixed hysteresis (5%) and the latching function is not activated  $e$ , the tripping delay  $T_V$  starts. After completion of  $T_V$ , the output relays de-energize  $h$  / energize  $g$ , provided that the latching function is not activated  $e$ . With activated latching function  $e$  the output relays remain energized  $h$  and de-energize only, when the supply voltage is interrupted / the output relays remain de-energized  $g$  and energize only, when the supply voltage is switched off and then again switched on = Reset.

When  $i$  is adjusted on the device, the functionality is equivalent to the one described above. There is only to consider that in this case, instead of both output relays, only one output relay each will be switched.

$$">U" = 11_{15}-12_{16}/14_{18}; "<U" = 21_{25}-22_{26}/24_{28}$$

# Current and voltage monitoring relays, single-phase

## Connection diagrams, DIP switches

### Connection diagram CM-SRS.1, CM-SRS.2

A1	11 <sub>15</sub>	C
B1	B2	B3

A1	11 <sub>15</sub>	21 <sub>25</sub>
B1	B2	B3

2CDC 252 204 F0005      2CDC 252 205 F0005

A1-A2      Control supply voltage  
 B1-C      Measuring range 1: 3-30 mA or 0.3-1.5 A  
 B2-C      Measuring range 2: 10-100 mA or 1-5 A  
 B3-C      Measuring range 3: 0.1-1 A or 3-15 A  
 11<sub>15</sub>-12<sub>16</sub>/14<sub>18</sub>      Output contacts - open-circuit principle  
 21<sub>25</sub>-22<sub>26</sub>/24<sub>28</sub>

### DIP switch functions CM-SRS.1, CM-SRS.2

Position	2	1
ON ↑		
OFF		

2CDC 252 272 F0005

1 ON      Undercurrent monitoring  
 OFF      Overcurrent monitoring

OFF = Default

### Connection diagram CM-SRS.M

A1	11 <sub>15</sub>	21 <sub>25</sub>
B1	B2	B3

A1-A2	Control supply voltage
B1-C	Measuring range 1: 3-30 mA or 0.3-1.5 A
B2-C	Measuring range 2: 10-100 mA or 1-5 A
B3-C	Measuring range 3: 0.1-1 A or 3-15 A
11 <sub>15</sub> -12 <sub>16</sub> /14 <sub>18</sub>	Output contacts - open- or closed circuit principle
21 <sub>25</sub> -22 <sub>26</sub> /24 <sub>28</sub>	

2CDC 252 205 F0005

### DIP switch functions CM-SRS.M

Position	4	3	2	1
ON ↑				
OFF				

2CDC 252 273 F0005

1 ON      Undercurrent monitoring  
 OFF      Overcurrent monitoring  
 2 ON      Closed-circuit principle  
 OFF      Open-circuit principle  
 3 ON      Latching function activated  
 OFF      Latching function not activated  
 OFF = Default

### Connection diagram CM-SFS.2

A1	11 <sub>15</sub>	21 <sub>25</sub>
B1	B2	B3

A1-A2	Control supply voltage
B1-C	Measuring range 1: 3-30 mA or 0.3-1.5 A
B2-C	Measuring range 2: 10-100 mA or 1-5 A
B3-C	Measuring range 3: 0.1-1 A or 3-15 A
11 <sub>15</sub> -12 <sub>16</sub> /14 <sub>18</sub>	Output contacts - open- or closed circuit principle
21 <sub>25</sub> -22 <sub>26</sub> /24 <sub>28</sub>	

2CDC 252 205 F0005

### DIP switch function CM-SFS.2

Position	4	3	2	1
ON ↑				
OFF				

2CDC 252 274 F0005

1 ON      OFF-delay  
 OFF      ON-delay  
 2 ON      Closed-circuit principle  
 OFF      Open-circuit principle  
 3 ON      Latching function activated  
 OFF      Latching function not activated  
 4 ON      2x1 c/o contact  
 OFF      1x2 c/o contacts  
 OFF = Default

### Connection diagram CM-ESS.M

A1	11 <sub>15</sub>	21 <sub>25</sub>
B		

A1-A2	Control supply voltage
B-C	Measuring ranges AC/DC: 3-30 V; 6-60 V 30-300 V; 60-600 V
11 <sub>15</sub> -12 <sub>16</sub> /14 <sub>18</sub>	Output contacts - open- or closed circuit principle
21 <sub>25</sub> -22 <sub>26</sub> /24 <sub>28</sub>	

2CDC 252 207 F0005

### DIP switch functions CM-ESS.M

Position	4	3	2	1
ON ↑				
OFF				

2CDC 252 276 F0005

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

# Current and voltage monitoring relays, single-phase

## Connection diagrams, DIP switches

2

### Connection diagram CM-ESS.1, CM-ESS.2

A1	11 <sub>15</sub>	C
B		

2CDC 252 206 F0005

A1	11 <sub>15</sub>	21 <sub>25</sub>
B		

2CDC 252 207 F0005

A1-A2 Control supply voltage  
 B-C Measuring ranges AC/DC:  
 3-30 V; 6-60 V; 30-300 V; 60-600 V  
 11<sub>15</sub>-12<sub>16</sub>/<sub>14</sub><sub>18</sub> Output contacts - open-circuit principle  
 21<sub>25</sub>-22<sub>26</sub>/<sub>24</sub><sub>28</sub>

### DIP switch functions CM-ESS.1, CM-ESS.2

Position	2	1
ON ↑		
OFF		

2CDC 252 276 F0005

1 ON Undervoltage monitoring  
 OFF Overvoltage monitoring  
 OFF = Default

### Connection diagram CM-EFS.2

A1	11 <sub>15</sub>	21 <sub>25</sub>
B		

2CDC 252 207 F0005

A1-A2 Control supply voltage  
 B-C Measuring ranges AC/DC:  
 3-30 V; 6-60 V; 30-300 V;  
 60-600 V  
 11<sub>15</sub>-12<sub>16</sub>/<sub>14</sub><sub>18</sub> Output contacts - open-  
 21<sub>25</sub>-22<sub>26</sub>/<sub>24</sub><sub>28</sub> or closed circuit principle

### DIP switch functions CM-EFS.2

Position	4	3	2	1
ON ↑				
OFF				

2CDC 252 274 F0005

1 ON ON-delay  
 OFF OFF-delay  
 2 ON Closed-circuit principle  
 OFF Open-circuit principle  
 3 ON Latching function activated  
 OFF Latching function not activated  
 4 ON 2x1 c/o contact  
 OFF 1x2 c/o contacts  
 OFF = Default

# Current monitoring relays, single-phase

## Technical data - Current monitoring relays

2

Type		CM-SRS.1	CM-SRS.2	CM-SRS.M	CM-SFS.2	
<b>Input circuit - Supply circuit</b>		<b>A1-A2</b>				
Rated control supply voltage $U_s$	A1-A2	110-130 V AC				
	A1-A2	220-240 V AC				
	A1-A2	24-240 V AC/DC				
Rated control supply voltage $U_s$ tolerance		-15...+10 %				
Rated frequency	AC versions	50/60 Hz				
	AC/DC versions	50/60 Hz or DC				
Current / power consumption		see data sheets				
Power failure buffering time		20 ms				
Transient overvoltage protection		Varistors				
<b>Input circuit - Measuring circuit</b>		<b>B1/B2/B3-C</b>				
Monitoring function		over- or undercurrent monitoring configurable			over- and under-current monitoring	
Measuring method		True RMS measuring principle				
Measuring inputs		<b>CM-SxS.x1</b>			<b>CM-SxS.x2</b>	
	Terminal connection	<b>B1-C</b>	<b>B2-C</b>	<b>B3-C</b>	<b>B1-C</b>	<b>B2-C</b>
	Measuring ranges AC/DC	3-30 mA	10-100 mA	0.1-1 A	0.3-1.5 A	1-5 A
	Input resistance	3.3 $\Omega$	1 $\Omega$	0.1 $\Omega$	0.05 $\Omega$	0.01 $\Omega$
	Pulse overload capacity $t < 1$ s	500 mA	1 A	10 A	15 A	50 A
	Continuous capacity	50 mA	150 mA	1.5 A	2 A	17 A
Threshold value(s)		adjustable within the indicated measuring range				
Setting accuracy of threshold value		10 %				
Hysteresis related to the threshold value		3-30 % adjustable				
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				
Accuracy within the control supply voltage tolerance		$\Delta U \leq 0.5$ %				
Accuracy within the temperature range		$\Delta U \leq 0.06$ % / $^{\circ}\text{C}$				
<b>Timing circuit</b>						
Start-up delay $T_s$		none	0 or 0.1-30 s adjustable			
Tripping delay $T_v$		none	0 or 0.1-30 s adjustable			
Repeat accuracy (constant parameters)		$\pm 0.07$ % of full scale				
Accuracy within the control supply voltage tolerance		-	$\Delta t \leq 0.5$ %			
Accuracy within the temperature range		-	$\Delta t \leq 0.06$ % / $^{\circ}\text{C}$			
<b>Indication of operational states</b>						
Control supply voltage	U/T: green LED	V	: control supply voltage applied,			
		X	: start-up delay $T_s$ active,			
		W	: tripping delay $T_v$ active			
Measured value	I: red LED	V	: overcurrent,			
		W	: undercurrent			
Relay status	R: yellow LED	V	: relay energized, no latching function			
		Z	: relay energized, active latching function			
		Y	: relay de-energized, active latching function			
<b>Output circuits</b>		<b>11(15)-12(16)/14(18), 21(25)-22(26)/24(28) - Relays</b>				
Kind of output		1 c/o contact	2 c/o contacts	1x2 c/o contacts or 2x1 c/o contact configurable		
Operating principle		open-circuit principle <sup>1)</sup>			open- or closed-circuit principle configurable <sup>1)</sup>	
Contact material		AgNi				
Rated operational voltage $U_o$	IEC/EN 60947-1	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 $I_o$	AC-12 (resistive) at 230 V	4 A				
(IEC/EN 60947-5-1)	AC-15 (inductive) at 230 V	3 A				
	DC-12 (resistive) at 24 V	4 A				
	DC-13 (inductive) at 24 V	2 A				
AC rating (UL 508)	Utilization category (Control Circuit Rating Code)	B 300				
	max. rated operational voltage	300 V AC				
	max. continuous thermal current at B 300	5 A				
	max. making/breaking apparent power (Make/Break) at B 300	3600/360 VA				
Mechanical lifetime		30x10 <sup>6</sup> switching cycles				
Electrical lifetime (AC-12, 230 V, 4 A)		0.1x10 <sup>6</sup> switching cycles				
Max. fuse rating to achieve short-circuit protection	n/c contact	6 A fast-acting	10 A fast-acting	6 A fast-acting		
	n/o contact	10 A fast-acting				

<sup>1)</sup> Open-circuit principle: output relay energizes if the measured value exceeds **b** / falls below **a** the adjusted threshold value  
 Closed-circuit principle: output relay de-energizes if measured value exceeds **b** / falls below **a** the adjusted threshold value

<sup>2)</sup> In case of measured currents > 10 A, lateral spacing has to be min. 10 mm

# Current monitoring relays, single-phase

## Technical data - Current monitoring relays

2

Type	CM-SRS.1	CM-SRS.2	CM-SRS.M	CM-SFS.2
<b>General data</b>				
MTBF	on request			
Duty time	100%			
Dimensions (W x H x D)	product dimensions	22.5 x 85.6 x 103.7 mm (0.89 x 3.37 x 4.08 in)		
	packaging dimensions	97 x 109 x 30 mm (3.82 x 4.29 x 1.18 in)		
Weight	net weight	depending on device, see ordering details		
	gross weight	depending on device, see ordering details		
Mounting	DIN rail (IEC/EN 60715), snap-on mounting without any tool			
Mounting position	any			
Minimum distance to other units	10 mm (0.39 in) at measured current > 10 A <sup>2)</sup>			
Material of housing	UL 94 V-0			
Degree of protection	housing / terminals	IP50 / IP20		
<b>Electrical connection</b>				
Wire size		<b>Screw connection technology</b>	<b>Easy Connect Technology (Push-in)</b>	
	fine-strand with(out) wire end ferrule	1 x 0.5-2.5 mm <sup>2</sup> (1 x 20-14 AWG) 2 x 0.5-1.5 mm <sup>2</sup> (2 x 20-16 AWG)	2 x 0.5-1.5 mm <sup>2</sup> (2 x 20-16 AWG)	
	rigid	1 x 0.5-4 mm <sup>2</sup> (1 x 20-12 AWG) 2 x 0.5-2.5 mm <sup>2</sup> (2 x 20-14 AWG)	2 x 0.5-1.5 mm <sup>2</sup> (2 x 20-16 AWG)	
Stripping length	8 mm (0.32 in)			
Tightening torque	0.6-0.8 Nm (5.31-7.08 lb.in)		-	
<b>Environmental data</b>				
Ambient temperature range	operation / storage	-20...+60 °C / -40...+85 °C		
Damp heat (IEC 60068-2-30)	55 °C, 6 cycles			
Vibration (sinusoidal) (IEC/EN 60255-21-1)	Class 2			
Shock (IEC/EN 60255-21-2)	Class 2			
<b>Isolation data</b>				
Rated insulation voltage (VDE 0110, IEC 60947-1, IEC/EN 60255-5)	supply / measuring circuit / output	600 V		
	supply / output 1/2	250 V		
Rated impulse withstand voltage U <sub>imp</sub> (IEC/EN 60947-1, IEC/EN 60255-5)	supply / measuring circuit / output	6 kV 1.2/50 µs		
	supply / output 1/2	4 kV 1.2/50 µs		
Pollution degree (VDE 0110, IEC 664, IEC/EN 60255-5)	3			
Overvoltage category (VDE 0110, IEC 664, IEC/EN 60255-5)	III			
<b>Standards</b>				
Product standard	IEC/EN 60255-1, IEC/EN 60255-27, EN 50178			
Low Voltage Directive	2006/95/EC			
EMC Directive	2004/108/EC			
<b>Electromagnetic compatibility</b>				
Interference immunity to	IEC/EN 61000-6-2			
electrostatic discharge	IEC/EN 61000-4-2	Level 3		
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3		
electrical fast transient / burst	IEC/EN 61000-4-4	Level 3		
surge	IEC/EN 61000-4-5	Level 3		
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3		
Interference emission	IEC/EN 61000-6-3			
high-frequency radiated	IEC/CISPR 22; EN 55022	Class B		
high-frequency conducted	IEC/CISPR 22; EN 55022	Class B		

# Voltage monitoring relays, single-phase

## Technical data - Voltage monitoring relays

Type		CM-ESS.1	CM-ESS.2	CM-ESS.M	CM-EFS.2
<b>Input circuit - Supply circuit</b>		<b>A1-A2</b>			
Rated control supply voltage $U_s$	A1-A2	110-130 V AC			
	A1-A2	220-240 V AC			
	A1-A2	24-240 V AC/DC			
Rated control supply voltage $U_s$ tolerance		-15...+10 %			
Rated frequency	AC versions	50/60 Hz			
	AC/DC versions	50/60 Hz or DC			
Current / power consumption		see data sheet			
Power failure buffering time		20 ms			
Transient overvoltage protection		Varistors			
<b>Input circuit - Measuring circuit</b>		<b>B-C</b>			
Monitoring function		over- or undervoltage monitoring configurable		over- and undervoltage monitoring configurable	
Measuring method		True RMS measuring principle			
Measuring inputs		<b>CM-ExS</b>			
	Terminal connection	<b>B-C</b>	<b>B-C</b>	<b>B-C</b>	<b>B-C</b>
	Measuring range AC/DC	3-30 V	6-60 V	30-300 V	60-600 V
	Input resistance	600 k $\Omega$	600 k $\Omega$	600 k $\Omega$	600 k $\Omega$
	Pulse overload capacity $t < 1$ s	800 V	800 V	800 V	800 V
	Continuous capacity	660 V	660 V	660 V	660 V
Threshold value(s)		adjustable within the indicated measuring range			
Setting accuracy of threshold value		10 %			
Hysteresis related to the threshold value		3-30 % adjustable			5 % fixed
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			
Accuracy within the control supply voltage tolerance		$\Delta U \leq 0.5$ %			
Accuracy within the temperature range		$\Delta U \leq 0.06$ % / °C			
Transient overvoltage protection		Varistors			
<b>Timing circuit</b>					
Delay time $T_v$		none	0 or 0.1-30 s adjustable		
Repeat accuracy (constant parameters)		$\pm 0.07$ % of full scale			
Accuracy within the control supply voltage tolerance		-	$\Delta t \leq 0.5$ %		
Accuracy within the temperature range		-	$\Delta t \leq 0.06$ % / °C		
<b>Indication of operational states</b>					
Control supply voltage	U/T: green LED	V	: control supply voltage applied		
		W	: tripping delay $T_v$ active		
Measured value	U: red LED	V	: overvoltage,		
		W	: undervoltage		
Relay status	R: yellow LED	V	: relay energized, no latching function		
		Z	: relay energized, active latching function		
		Y	: relay de-energized, active latching function		
<b>Output circuits</b>					
Kind of output		1 c/o contact	2 c/o contacts	1x2 c/o contacts or 2x1 c/o contact configurable	
Operating principle		open-circuit principle <sup>1)</sup>		open- or closed-circuit principle configurable <sup>1)</sup>	
Contact material		AgNi			
Rated operational voltage $U_o$	IEC/EN 60947-1	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	AC-12 (resistive) at 230 V	4 A			
$I_o$ (IEC/EN 60947-5-1)	AC-15 (inductive) at 230 V	3 A			
	DC-12 (resistive) at 24 V	4 A			
	DC-13 (inductive) at 24 V	2 A			
AC rating	Utilization category (Control Circuit Rating Code)	B 300			
(UL 508)	max. rated operational voltage	300 V AC			
	max. continuous thermal current at B 300	5 A			
	max. making/breaking apparent power (Make/Break) at B 300	3600/360 VA			
Mechanical lifetime		30x10 <sup>6</sup> switching cycles			
Electrical lifetime	AC-12, 230 V, 4 A	0.1x10 <sup>6</sup> switching cycles			
Max. fuse rating to achieve short-circuit protection	n/c contact	6 A fast-acting	10 A fast-acting		6 A fast-acting
	n/o contact	10 A fast-acting			

# Voltage monitoring relays, single-phase

## Technical data - Voltage monitoring relays

Type	CM-ESS.1	CM-ESS.2	CM-ESS.M	CM-EFS.2
<b>General data</b>				
MTBF	on request			
Duty time	100%			
Dimensions (W x H x D)	product dimensions	22.5 x 85.6 x 103.7 mm (0.89 x 3.37 x 4.08 in)		
	packaging dimensions	97 x 109 x 30 mm (3.82 x 4.29 x 1.18 in)		
Weight	net weight	depending on device, see ordering details		
	gross weight	depending on device, see ordering details		
		DIN rail (IEC/EN 60715), snap-on mounting without any tool		
Mounting position	any			
Minimum distance to other units	vertical / horizontal	not necessary / not necessary		
Material of housing	UL 94 V-0			
Degree of protection	housing / terminals	IP50 / IP20		
<b>Environmental data</b>				
Ambient temperature ranges	operation	-20...+60 °C		
	storage	-40...+85 °C		
Damp heat, cyclic (IEC/EN 60068-2-30)	55 °C, 6 cycle			
Vibration, sinusoidal (IEC/EN 60255-21-1)	Class 2			
Shock (IEC/EN 60255-21-2)	Class 2			
<b>Electrical connection</b>				
Wire size		<b>Screw connection technology</b>	<b>Easy Connect Technology (Push-in)</b>	
	fine-strand with(out) wire end ferrule	1 x 0.5-2.5 mm <sup>2</sup> (1 x 20-14 AWG)	2 x 0.5-1.5 mm <sup>2</sup> (2 x 20-16 AWG)	
	rigid	1 x 0.5-4 mm <sup>2</sup> (1 x 20-12 AWG) 2 x 0.5-2.5 mm <sup>2</sup> (2 x 20-14 AWG)	2 x 0.5-1.5 mm <sup>2</sup> (2 x 20-16 AWG)	
Stripping length	8 mm (0.32 in)			
Tightening torque	0.6-0.8 Nm (5.31-7.08 lb.in)			-
<b>Isolation data</b>				
Rated insulation voltage (VDE 0110, IEC 60947-1, IEC/EN 60255-5)	supply / measuring circuit / output	600 V		
	supply / output 1/2	250 V		
Rated impulse withstand voltage U <sub>imp</sub> (IEC/EN 60947-1, IEC/EN 60255-5)	supply / measuring circuit / output	6 kV 1.2/50 μs		
	supply / output 1/2	4 kV 1.2/50 μs		
Pollution degree (VDE 0110, IEC 664, IEC/EN 60255-5)	3			
Overvoltage category (VDE 0110, IEC 664, IEC/EN 60255-5)	III			
<b>Standards</b>				
Product standard	IEC/EN 60255-1, IEC/EN 60255-27, EN 50178			
Low Voltage Directive	2006/95/EC			
EMC Directive	2004/108/EC			
<b>Electromagnetic compatibility</b>				
Interference immunity to electrostatic discharge	IEC/EN 61000-4-2	IEC/EN 61000-6-2 Level 3		
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3		
electrical fast transient / burst surge	IEC/EN 61000-4-4	Level 3		
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-5	Level 3		
Interference emission	IEC/EN 61000-4-6	Level 3		
high-frequency radiated	IEC/CISPR 22; EN 55022	IEC/EN 61000-6-3 Class B		
high-frequency conducted	IEC/CISPR 22; EN 55022	Class B		

1) Open-circuit principle: output relay energizes if the measured value exceeds **d** / falls below **C** the adjusted threshold value  
 Closed-circuit principle: output relay de-energizes if measured value exceeds **d** / falls below **C** the adjusted threshold value

