

## LINETRAXX® CMD420/CMD421

Current monitoring devices for monitoring 3AC currents for overcurrent and undercurrent using measuring current transformers or current monitoring with window discriminator function



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Current monitoring devices for monitoring 3AC currents  
for overcurrent or undercurrent using measuring current transformers  
or with window discriminator function



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## Device features

- Undercurrent and overcurrent monitoring in AC systems with prealarm and main alarm or current monitoring with window discriminator function
- Current monitoring using current transformers, suitable for standard transformers x/1 A, x/5 A (depending on the device type)
- Transformation ratio n allows adaptation to all standard current transformers x/1 A, x/5 A
- Start-up delay, response delay and delay on release
- Adjustable switching hysteresis
- r.m.s. value measurement AC
- Digital measured value display via multi-functional LC display
- LEDs: Power On, Alarm 1, Alarm 2
- Fault memory for the operating value
- Cyclical self monitoring
- Internal test/reset button
- Two separate alarm relays with one changeover contact each
- N/C or N/O operation and fault memory behaviour selectable
- Password protection for device setting
- Sealable transparent cover
- Two-module enclosure (36 mm)
- Push-wire terminal (two terminals per connection)
- RoHS compliant

## Approvals



## Product description

The CMD420/421 current monitoring devices monitor AC currents using three measuring inputs for overcurrent, undercurrent or undercurrent and overcurrent (window discriminator function). The currents are measured as r.m.s. values (AC). The currently measured values are continuously shown on the LC display. The respective measuring channel can be selected using the Arrow up or Arrow down button. The measured values causing the alarm relay to switch are stored. Due to adjustable delay times, installation-specific characteristics, such as device-specific making currents, short-time current changes etc. can be considered.

For the measurement three standard current transformers are to be connected to the respective CMD420/421. The transformation ratio "n" of the current transformers ( $n = x/1A$  resp.  $n = x/5A$ ) can be set up to a factor of  $n = 2000$ .

Then the actual current of the installation can be calculated by multiplying the measured current by factor "n" and indicated on the display. The currents can derive from a 3-phase system or from three different single-phase systems.

The CMD420/421 series requires external supply voltage.

## Typical applications

- Current consumption of motors, such as pumps, elevators, cranes
- Monitoring of lighting circuits, heating circuits, charging stations
- Monitoring of emergency lighting
- Monitoring of screw conveyors, e.g. in sewage plants
- Dust removal in wood working
- 70 % agreement in accordance with EEG 2012 for PV inverters

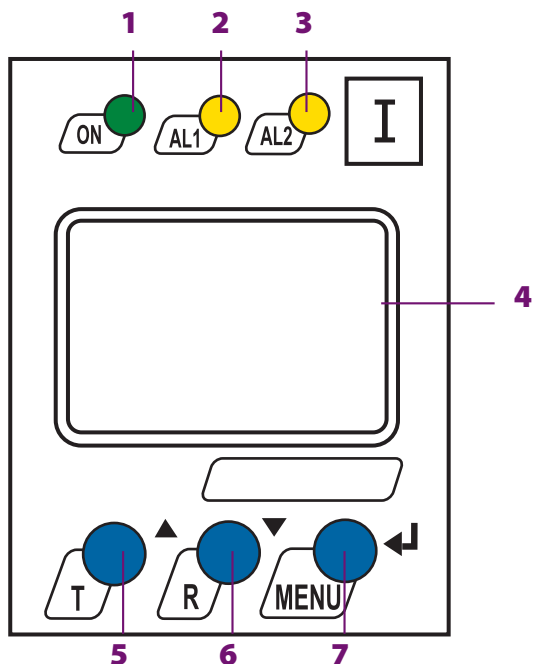
## Description of the function (window discriminator function)

Once the supply voltage is applied, the start-up delay begins. Measured values changing during this time do not influence the switching state of the alarm relays.

The devices provide two separately adjustable response values (overcurrent/undercurrent). When the measuring quantity exceeds the response value ("Alarm 1") or falls below the response value ("Alarm 2"), the time of the response delay " $t_{on1/2}$ " begins. Once the response delay has elapsed, the alarm relays switch and the alarm LEDs light up. When the measuring value exceeds or falls below the release value (response value plus hysteresis) after the alarm relays have switched, the selected release time " $t_{off}$ " begins. When " $t_{off}$ " has elapsed, the alarm relays switch back to their original state (fault memory inactive). When the fault memory is activated, the alarm relays remain in alarm position until the reset button is pressed.

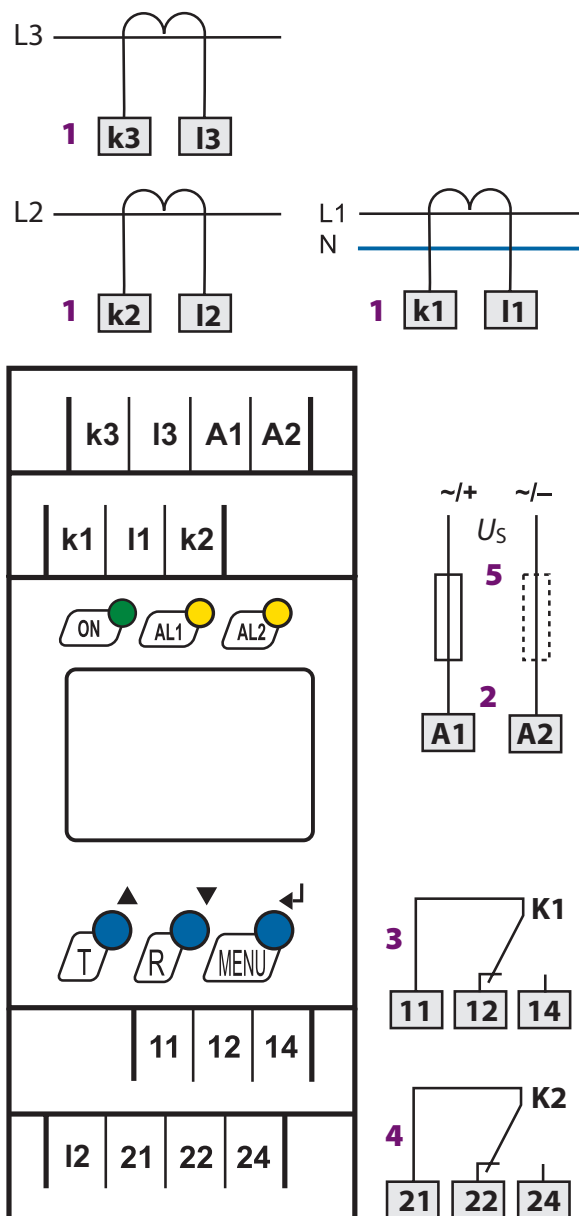


Operating elements



- 1 - Power On LED "ON" (green); lights when supply voltage is applied and flashes in the event of system fault alarm
- 2 - Alarm LED "AL1" (yellow): lights when the value exceeds or falls below the set response values and flashes in the event of system fault alarm
- 3 - Alarm LED "AL2" (yellow): lights when the value exceeds or falls below the set response values and flashes in the event of system fault alarm
- 4 - Multi-functional LC display
- 5 - Test button "T":  
 Arrow up button: To change the measured value display, move upwards in the menu or to change parameters.  
 To call up the self test: press the button "T" > 1.5 s
- 6 - Reset button "R":  
 Arrow down button: to change the measured value indication, move downwards in the menu or to change parameters  
 To delete stored alarms: press the button "T" > 1.5 s
- 7 - "MENU" button:  
 Enter button: to confirm the measured value indication or to confirm changed parameters  
 To call up the menu system, press the button "T" > 1.5 s  
 Press the ESC button > 1.5 s to abort an action or to return to the previous menu level

Wiring diagram



- 1 - Connection to the conductors to be monitored; using current transformers
- 2 - Supply voltage  $U_s$  (see ordering information)
- 3 - Alarm relay "K1": configurable for <math>\lt;I, >I</math> or <math>\lt;I/>I</math>/ERROR/TEST
- 4 - Alarm relay "K2": configurable for alarm <math>\lt;I, >I</math> or <math>\lt;I/>I</math>/ERROR/TEST
- 5 - Line protection according to IEC 60364-4-43: 6 A fuse recommended. If being supplied from an IT system, both lines have to be protected by a fuse.

## Technical data

### Insulation coordination acc. to IEC 60664-1/IEC 60664-3

Rated insulation voltage	AC 250 V
Rated impulse voltage/pollution degree	6 kV/3
Protective separation (reinforced insulation) between	(A1, A2) - (k, l) - (11, 12, 14) - (21, 22, 24)
Protective separation (reinforced insulation) between	(k1, l1, k2, l2, k3, l3) - (11, 12, 14)
Voltage test acc. to IEC 61010-1	3.536 kV
Rated insulation voltage	AC 250 V
Rated impulse voltage/pollution degree	4 kV/3
Basic insulation between:	(k1, l1, k2, l2, k3, l3) - (A1, A2), (21, 22, 24)
Basic insulation between:	(11, 12, 14) - (21, 22, 24)
Voltage test acc. to IEC 61010-1	2.21 kV

### Supply voltage

#### CMD420-D-1, CMD421-D-1:

Supply voltage $U_S$	AC 16...72 V/DC 9.6...94 V
Frequency range $f_n$	15...460 Hz

#### CMD420-D-2, CMD421-D-2:

Supply voltage $U_S$	AC/DC 70...300 V
Frequency range $f_n$	15...460 Hz
Power consumption	≤ 4 VA

### Measuring circuit CMD420

Nominal measuring range (r.m.s. value) $n = 1$	AC 0...1 A
Overload capability, continuous	2 A
Overload capability < 5 s	5 A
Load per measuring input	50 mΩ
Rated frequency $f_n$	42...460 Hz

### Response values CMD420

Undercurrent $I_o < I$ (Alarm 2) $n = 1$	AC 0.1...1 A (0.3 A)*
Undercurrent $I_o < I$ (Alarm 1) $n = 1$	100...200 % (150 %)*
Take a maximum nominal current of 1 A into consideration!	
Overcurrent $I_n > I$ (Alarm 2) $n = 1$	AC 0.1...1 A (0.3 A)* (Hi)*
Overcurrent $I_n > I$ (Alarm 1) $n = 1$	50...100 % (50 %)* (Hi)*
Window $I_n > I$ (Alarm 2) $n = 1$	AC 0.1...1 A (0.3 A)*
Window $I_n < I$ (Alarm 1) $n = 1$	50...100 % (50 %)*
External current transformer	x/1 A
Transformation ratio $n$	1...2000 (1)*
Relative uncertainty in the range of 42...460 Hz	± 5 %, ± 2 digits
Hysteresis	3...40% (15 %)*

### Measuring circuit CMD421

Nominal measuring range (r.m.s. value)	AC 0...5 A
Overload capability, continuous	7.5 A
Overload capability < 5 s	with screw-type terminal connection: 20 A with push-wire terminals: 12 A
Load per measuring input	3 mΩ
Rated frequency $f_n$	42...460 Hz

### Response values CMD421

Undercurrent $I_o < I$ (Alarm 2) $n = 1$	AC 0.5...5 A (1.5 A)*
Undercurrent $I_o < I$ (Alarm 1) $n = 1$	100...200 % (150 %)*
Take a maximum nominal current of 5 A into consideration!	
Overcurrent $I_n > I$ (Alarm 2) $n = 1$	AC 0.5...5 A (1.5 A)* (Hi)*
Overcurrent $I_n > I$ (Alarm 1) $n = 1$	50...100 % (50 %)* (Hi)*
Window $I_n > I$ (Alarm 2) $n = 1$	AC 0.5...5 A (1.5 A)*
Window $I_n < I$ (Alarm 1) $n = 1$	50...100 % (50 %)*
External current transformer	x/5 A
Transformation ratio $n$	1...2000 (1)*
Relative uncertainty in the range of 42...460 Hz	± 5 %, ± 2 digits
Hysteresis	3...40% (15 %)*

### Time response

Start-up delay $t$	0...300 s (0.5 s)*
Response delay $t_{on1}$	0...300 s (1 s)*
Response delay $t_{on2}$	0...300 s (0 s)*
Delay on release $t_{off}$	0...300 s (1 s)*
Resolution of setting $t, t_{on1/2}, t_{off}$ (0...10 s)	0.1 s
Resolution of setting $t, t_{on1/2}, t_{off}$ (10...99 s)	1 s
Resolution of setting $t, t_{on1/2}, t_{off}$ (100...300 s)	10 s
Operating time $t_{ae}$	≤ 130 ms
Response time $t_{an}$	$t_{an} = t_{ae} + t_{on1/2}$
Device release time $t_{re}$	≤ 135 ms
Release time $t_{off}$	$t_{off} = t_{re} + t_{off}$
Recovery time $t_b$	≤ 300 ms

### Displays, memory

Display	LC display, multifunctional, not illuminated
Display range, measured value (r.m.s. value) x transformation ratio $n$	CMD420: AC 0...1 A x $n$ CMD421: AC 0...5 A x $n$
Operating uncertainty in the range of 42...460 Hz	± 5 %, ± 2 digit
Measured-value memory (HiS) for the first alarm value	data record measured values
Password	on/off/0...999 (OFF)*
Fault memory (M) alarm relay	on/off/con (on)*

### Switching elements

Number	2 x 1 changeover contacts (K1, K2)
Operating principle	N/C operation/N/O operation K1: Err, I1, I2, tES (device error Err, overcurrent prewarning > I1, test button tES)* K2: Err, I1, I2, tES (device error Err, overcurrent alarm > I2, test button tES)*
Electrical endurance, number of cycles	10000
Contact data acc. to IEC 60947-5-1:	
Utilisation category	AC 13 AC 14 DC-12 DC-12 DC-12
Rated operational voltage	230 V 230 V 24 V 110 V 220 V
Rated operational current	5 A 3 A 1 A 0.2 A 0.1 A
Minimum contact rating	1 mA at AC/DC ≥ 10 V

### Environment/EMC

EMC	IEC 61326-1
Operating temperature	-25...+55 °C
Classification of climatic conditions acc. to IEC 60721:	
Stationary use (IEC 60721-3-3)	3K5 (except condensation and formation of ice)
Transport (IEC 60721-3-2)	2K3 (except condensation and formation of ice)
Storage (IEC 60721-3-1)	1K4 (except condensation and formation of ice)
Classification of mechanical conditions acc. to IEC 60721:	
Stationary use (IEC 60721-3-3)	3M4
Transport (IEC 60721-3-2)	2M2
Storage (IEC 60721-3-1)	1M3

### Connection

Connection type	push-wire terminals
Connection properties	
rigid	0.2...2.5 mm <sup>2</sup> (AWG 24...14)
flexible without ferrule	0.2...2.5 mm <sup>2</sup> (AWG 24...14)
flexible with ferrule	0.2...1.5 mm <sup>2</sup> (AWG 24...16)
Stripping length	10 mm
Opening force	50 N
Test opening, diameter	2.1 mm

**Other**

Operating mode	continuous operation
Mounting	any position
Degree of protection, internal components (IEC 60529)	IP30
Degree of protection, terminals (IEC 60529)	IP20
Enclosure material	polycarbonate
Flammability class	UL94 V-0
DIN rail mounting acc. to	IEC 60715
Screw mounting	2 x M4 with mounting clip
Software version CMD420	D287 V1.1x
Software version CMD421	D294 V1.1x
Weight	≤ 150 g

( )\* = factory setting

**Ordering information**

Suitable for current transformer types	Response value	Supply voltage <sup>1)</sup> U <sub>S</sub>			Type	Art. No.
		AC	DC	AC/DC		
x/1A	0.1...1 A x n	16...72 V, 15...460 Hz	9,6 V...94 V	70...300 V, 15...460 Hz	CMD420-D-1	B 7306 0006
		-	-		CMD420-D-2	B 7306 0007
x/5A	0.5...5 A x n	16...72 V, 15...460 Hz	9,6 V...94 V	70...300 V, 15...460 Hz	CMD421-D-1	B 7306 0008
		-	-		CMD421-D-2	B 7306 0009

Device version with screw terminals on request.

<sup>1)</sup> Absolut values

**Accessories**

Type designation	Art. No.
Mounting clip for screw mounting (1 piece per device)	B 9806 0008

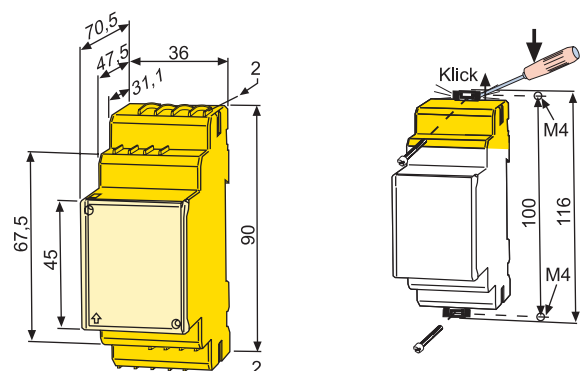
**Dimension diagram XM420**

Dimensions in mm

Open the front plate cover in direction of arrow!

**Screw mounting**

Note: The upper mounting clip must be ordered separately (see ordering information).





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