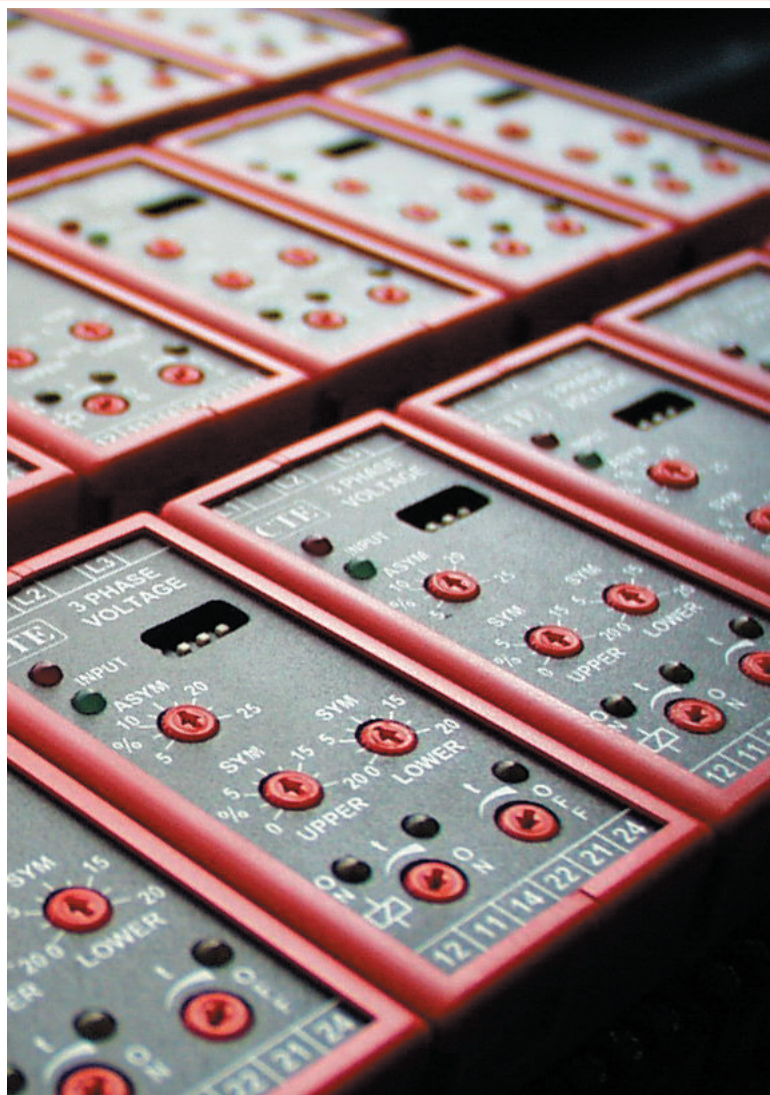


Datasheets 2006

Also available at
www.thiim.com



Electronic modules

- **Control relays**
- **Monitoring relays**
- **Phase failure relays**
- **Engine starter relays**
- **Motorbrake relays**
- **Synchronizers**
- **Isolation amplifiers, transmitters**
- **Transducers**

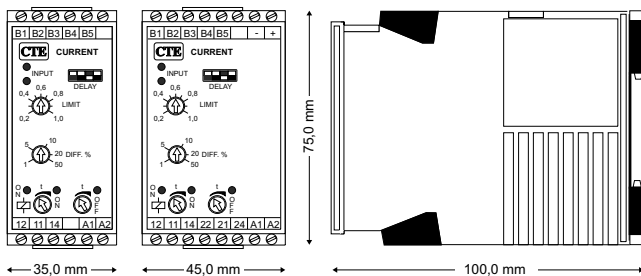
The standard products cover a wide selection of transducers and electronic control relays.

Additionally we produce for special applications, covering all stages from development to final production and testing.

The products are flexible in design and customization is possible.

www.thiim.com

	Type	Input	Function	Input or supply Range	Page
Control relays					
Current , Single phase	IMCA	AC-DC	Multifunction, 12 ranges for under or over current in one unit	0.5mA - 10A	1
	IDRA	DC	Low cost. 4 standard currents	3 - 16A	3
	ILUA	DC	Current loop relay	4 - 20mA	5
	ILUB	DC	Current loop relay w. precision adjustment	4 - 20mA	5
	IMAA		Current, Earth leakage and Differential current	5mA - 100A	7
With through hole for CT			Multifunction with 12 current ranges in one unit		9
	DDCA	DC	Current, Earth leakage and Differential current. 6 current settings	5 - 200mA	9
Voltage , Single Phase	UMCA	AC-DC	Multifunction, 11 ranges in one	50mV - 500V	11
	UAWA	AC	Window voltage relay. Individual Low & high voltage setting.	110 - 415V	13
Incl frequency control	UFWA	AC	Window voltage & frequency relay. Individual Low & high voltage setting	100 - 415V	15
Voltage , 3 phase 4 wire	PNDA	AC 4w	Phase under voltage & phase sequence	100 - 480V	17
	PNDI	AC 4w	Phase under voltage & phase sequence with true time delay	100 - 480V	17
Battery Control relays					
	BVCA	DC	Low voltage setting. 0 to -25%	12V	19
	BVCB	DC	Low voltage setting. 0 to -25%	24V	19
	BVCC	DC	Low voltage setting. 0 to -25%	48V	19
	BVCD	DC	Individual Low & High voltage setting. 0 to ±25%	12V	21
	BVCE	DC	Individual Low & High voltage setting. 0 to ±25%	24V	21
	BVCF	DC	Individual Low & High voltage setting. 0 to ±25%	48V	21
	BMWA	DC	Universal DC voltage relay. Individual Low & High voltage plus hysteresis setting	12.5 - 340V	23
	BVSA	DC	Battery symmetry monitoring relay	12, 24, 48V	25
	BMSA	DC	Battery symmetry monitoring relay with digital setting and display	24 - 256V	27
	BRIA	DC	Symmetry setting: 1 to 20% of cell voltage DC ripple relay. Setting: 0.4 - 6.4% ripple	18 - 340V	31
Phase failure relays, 3 or 4 wire Voltage and asymmetry	PADA	AC 3w	Unbalance & Balanced under & over voltage	100 - 480V	33
	PADI	AC 3w	PADA with true time delay	100 - 480V	33
	PANA	AC 4w	PADA with test for Neutral	100 - 480V	33
	PANI	AC 4w	PADA with test for Neutral and true time delay	100 - 480V	33
Incl phase rotation	PAHA	AC 3w	Phase rotation w. 2 relays, Unbalance & Balanced under & over voltage	100 - 480V	35
	PAHI	AC 3w	PAHA with true time delay	100 - 480V	35
	PAMA	AC 4w	PAHA with test for Neutral	100 - 480V	35
	PAMI	AC 4w	PAHA with test for Neutral and true time delay	100 - 480V	35
Frequency, voltage and asymmetry	PAFA	AC 3w	Frequency 50, 60 and 400Hz, Unbalance & Balanced under & over voltage	100 - 480V	37
	PAGA	AC 4w	PAFA with test for Neutral	100 - 480V	37
Incl phase rotation	PAFB	AC 3w	PAFA with test for Phase rotation	100 - 480V	37
	PAGB	AC 4w	PAFA with test for Phase rotation and Neutral	100 - 480V	37
Load monitoring relays					
Power factor Cos φ	LMCA	Ph. Angle	Over or Under load. 2, 3 and 4 wire	24 - 440V 0,5 - 10A	39
Active power	LMWA	AC Watt	Over & Under load or 2 x Overload. Analogue adjustment. 2, 3 and 4 wire	60 - 400V 1 - 10A	41
Active power	LMWD	AC Watt	Over & Under load or 2 x Overload. Digital adj., Analogue output. 2, 3 and 4 wire	70 - 500V 0,1 - 10A	43
Engine & generator relays					
Starter	ESPA	DC	Programmable start or pause firs. 1-15 trials	9 - 30V	45
Starter inhibit and over speed	FRAA	Freq.	Frequency range from 10 to 5120Hz. Transformer, Namur or optocoupler input	12V	47
	FRBA	Freq.	Frequency range from 10 to 5120Hz. Transformer, Namur or optocoupler input	24V	47
Synchronizer	SYND	AC 2w	Synchronization of grid and generators.	100 - 500V	49
	SYPD	Bus 3w.	Optional 96x96 Panel indicator to SYND	Bus 3 wire	51
Isolation amplifiers					
Multi function	AISA	DC	Programmable: 8 input and 8 output volt/mA ranges. Includes power supply	24 - 440V	53
Multifunction, mV input	AISB	DC	Programmable: 4 mV input and 8 volt/mA output ranges. Includes power supply	24 - 440V	55
Multifunction, Volt input.	UISA	DC	Programmable w.16 input volt ranges and, 8 output V/mA ranges. Incl. power supply	24 - 440V	57
	UISB	DC	Programmable w.16 input volt ranges and current loop output. Incl. power supply	24 - 440V	57
Volt in and current loop out	UIDA	DC	2 input ranges: 4.8 - 24V and 6 - 30V to current loop.	4 - 20mA	59
Current loop isolator	AITA	DC	Current loop. 3 loops 4 to 20mA. Loop powered	4 - 20mA	61
	AITB	DC	Current loop. 1 loop 4 to 20mA. Loop powered	4 - 20mA	63
Temperature transmitters	TAMA	Temp.	76 selectable input ranges from PT100 sensor to 6 standard selectable DC outputs	-100 to + 400°C	65
	TAMB	Temp.	TAMA with 1 C/O limit contact	-100 to + 400°C	65
Transducers					
Current	IAMA	AC	Dual range: 1 & 5Aac in to 6 standard V/mA output ranges.	24 - 440V	67
	IAMB	AC	Dual range: 1 & 5Aac in to 4 - 20mA current loop out	24 - 440V	67
Voltage	UAMA	AC	Dual range: 250 & 500Vac in to 6 standard V/mA output ranges	24 - 440V	67
	UAMB	AC	Dual range: 250 & 500Vac in to 4 - 20mA current loop out	24 - 440V	67
Frequency	FAMA	Freq.	Min. & Max. range specified from 1 to 5000Hz. 8 V/mA output ranges	24 - 440V	69
Power Active	WAAA	AC Watt	1 - Phase 2 wire. Select from 19 Volt or mA unipolar or bipolar outputs	24 - 440V	71
	WABA	AC Watt	3 - Phase 3 & 4 wire symmetrical load.	24 - 440V	71
	WACA	AC Watt	3 - Phase 3 wire asymmetrical load (Aron coupling)	24 - 440V	71
	WADA	AC Watt	3 - Phase 3 & 4 wire asymmetrical load	24 - 440V	71
Power Reactive	WRBA	AC Watt	3 - Phase 3 & 4 wire symmetrical load	24 - 440V	71
	WRCA	AC Watt	3 - Phase 3 wire asymmetrical load (Aron coupling)	24 - 440V	71
	WRDA	AC Watt	3 - Phase 3 & 4 wire asymmetrical load	24 - 440V	71
Design of housing for 35/45/55 and 22,5 mm housing					73



MULTIFUNCTION CURRENT RELAY

Type: IMCA

FEATURES

- For AC and DC current
- Balanced input for noise immunity
- Input current range from 0.5 mA to 10 A
- 12 programmable input ranges
- 4 programmable times for power up reset
- 4 programmable time ranges
- Separate adjustable ON and OFF delay
- Relay function can be inverted
- Adjustable upper or lower limit and differential
- Latch function available
- LEDs indicate the state of the input
- LEDs indicate the timing function
- LED indicates the state of the relay
- SMD technology
- 0-1 V DC control output for full scale (Only in 45 mm. housing)

Description:

The current relay is designed with a microcontroller. With programmable range, function and timing it can be programmed to cover all kinds of applications.

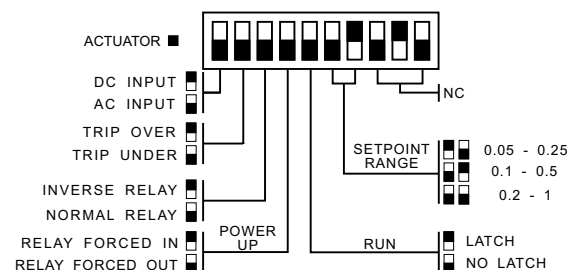
The monitored current is fed through an internal shunt with a voltage drop of 50 mV at full range. For extreme noise immunity the voltage is then amplified in a balanced amplifier, rectified, averaged and compared with a preset reference voltage. AC and DC current between 1 mA and 10 A can be measured directly. By means of a current transformer or a shunt resistor the range can be extended without limits.

Application:

Level comparator used with transducers and transmitters. Over- or undercurrent surveillance of loads, batteries, generators, mains etc.

PROGRAMMABLE FEATURES

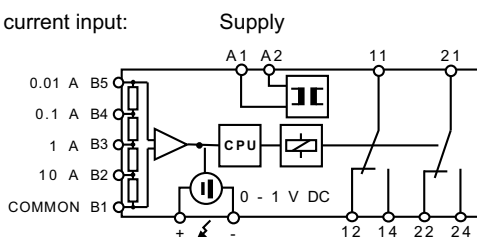
Range and relay function



CONNECTION DIAGRAM

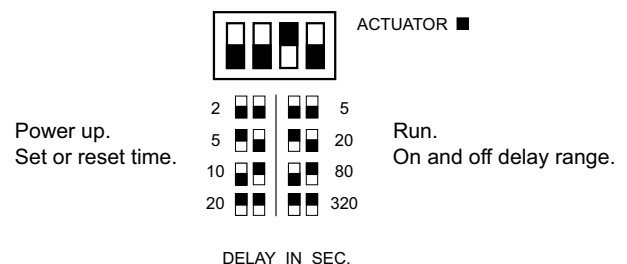
Rail mounting

Max. current input:



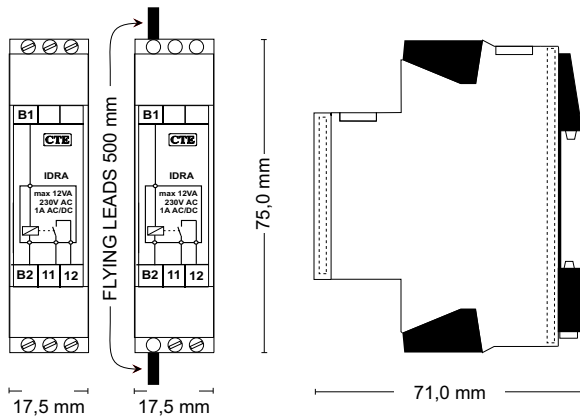
Control output and 2 relays, only in 45 mm. housing.

Time function





DC HIGH CURRENT RELAY Type: IDRA

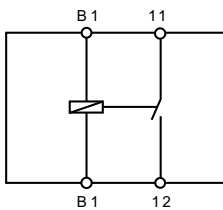


FEATURES

- **Cost effective solution**
- **4 current sensitivities: 3, 6, 10, 16 A**
- **Compact size**
- **3 models with flying leads for high continuous current**

CONNECTION DIAGRAM

Rail mounting



SPECIFICATIONS

INPUT

Input Range:	DC current	
Max. continuous current	Pull in	Drop out
10 A Terminal connection	3.0 A	1.5 A
16 A 2.5 mm ² Flying leads	6.0 A	3.0 A
20 A 4.0 mm ² Flying leads	10 A	5.0 A
32 A 6.0 mm ² Flying leads	16 A	8.0 A

PERFORMANCE PARAMETERS

Pull in	+20% -30%
Drop out	+30% -30%

OUTPUT

Switching capacity	Reed contact
Switching voltage	12 W/VA
Switching current	230 Vac/dc
Carrying current	Max. 1.0 A
Contact resistance	Max. 2.0 A
	100 mOhm

GENERAL

Temperature range	- 25 °C to + 55 °C ambient
Humidity	Up to 90 % RH non-condensing
Dielectric test voltage	Input to contact 4000 VAC

Weight	Version	
	3.0 A	40 g
	6.0 A	80 g
	10 A	100 g
	16 A	125 g



EMC directive 89/336:

International Standards

EN50081 - Emission

EN50082 - Immunity

Low voltage directive 73/23:

EN60255 - Electrical Relays

Description:

The IDRA DC current relay is a miniaturized and cost effective solution for monitoring the presence of a DC current. The units for currents above 10 A are, in order to allow for a high continuous current, supplied with 500 mm flying leads of 2.5, 4.0 or 6.0 mm².

The current is monitored by means of a Reed Relay, and the set point is fixed.

Application:

Used as input to PLC's for over or under current surveillance of DC loads or charging currents.

ORDERING INFORMATION

EXAMPLE:

TYPE
DC current relay

SENSITIVITY (Pull in)

3.0 A
6.0 A
10 A
16 A

CONNECTIONS

Terminal connection
2.5 mm² Flying leads
4.0 mm² Flying leads
6.0 mm² Flying leads

ADJUSTMENT

Fixed sensitivity

HOUSING

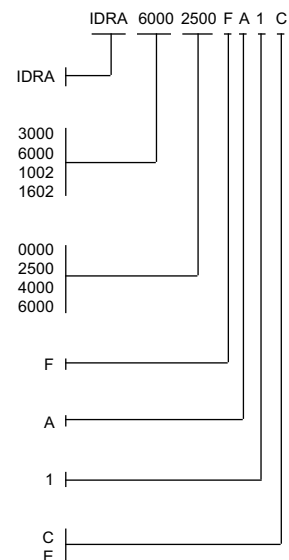
Rail mounting

SIZE

17.5 mm

CODE

Code end
Extended code







Type: ILUA & ILUB

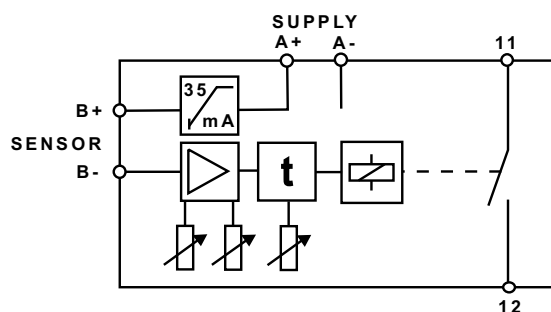
- Includes a 35 mA current limit for a loop powered external sensor in order to secure against shorted sensor wires
- Includes an alarm LED for a shorted or broken sensor wire
- Adjustable differential
- 0 to 2 sec. adjustable ON and OFF delay
- LEDs indicate the state of input, fault and relay
- Extremely compact solution

The current relay is designed to be used as a trip relay in a 4 to 20 mA current loop. The ILUA comes with single turn potentiometers for the set point and the differential, and the ILUB with multiturn potentiometers for precise setting. The differential is adjustable from 1 to 20% of the set tripping current. The relay is powered from an external 16 to 32 VDC source, and includes a 35 mA current limiter to the attached sensor, as well as an under current monitor for a broken sensor wire. If the sensor current goes higher or lower than the limits, a Red LED will be lit and in case of an over current the internal relay will be released. The relays are provided with a common 0 to 2 sec. adjustable timer for pull In and drop Out. The timer can as an option be specified up to 30 sec. and disabled for either pull In or drop Out delay.

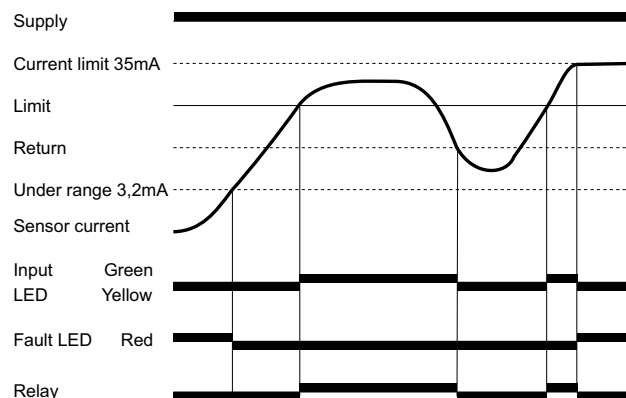
The level of the input current is shown by the Yellow LED for currents below the set point (-differential) and the Green LED for currents above the set point (-differential). Under normal conditions the relay is released at low current and will pull in at the set tripping point, indicated by a Yellow LED. When the relay is energized, the current has to drop below the set point minus the set differential for drop out. Precautions must be taken for low set point currents in order to secure that the set point minus the differential is above the minimum of the sensor range of 4 mA.

Application:
Used with sensors, transducers and transmitters as an alarm or control relay. Surveillance of all kinds of physical measures, which can be converted to a 4 to 20 mA signal.

Rail mounting



FUNCTION DIAGRAM



SPECIFICATIONS

INPUT		DC current
Range	4 - 20 mA	
Differential	Adjustable 1 to 20% of set point	
Input resistance	50 Ohm	
Max. continuous current	70 mA	
Sensor current		Limited by internal circuit to max. 40 mA
Sensor Voltage		Supply voltage minus 5V
PERFORMANCE PARAMETERS		
TIMING		
Response time	Approx. 100 msec.	
Delay	Adjustable On/Off 0 to 2 sec.	
ELECTRICAL		
Temp. dependence	Typ. $\pm 0.02\%$ / °C	
Supply dependence	Typ. $\pm 0.01\%$ / % ΔU	
OUTPUT		Relay, 1 N/O
Contact rating	5 A, 250 Vac, 1250 W	
Mechanical life	15 Million operations	
SUPPLY		DC voltage
DC supply range	24 V (from 16 to 32 V)	
Power consumption	1 W	
GENERAL		
Temperature range	- 25 °C to + 55 °C ambient	
Humidity	Up to 90 % RH non-condensing	
Dielectric test voltage	Coil to relay contacts	4000
VAC		
	Open contact	1000
VAC		
Weight	60 g	



EMC directive 89/336:

Low voltage directive 73/23:

International Standards
 EN50081 - Emission
 EN50082 - Immunity
 EN60255 - Electrical Relays

ORDERING INFORMATION

EXAMPLE:

TYPE

Relay with single turn potentiometer
 Relay with multi turn potentiometer

SUPPLY

SUPPLY VOLTAGE

From 16 to 32 VDC

ADJUSTMENT

Adjustable
 Fixed

HOUSING

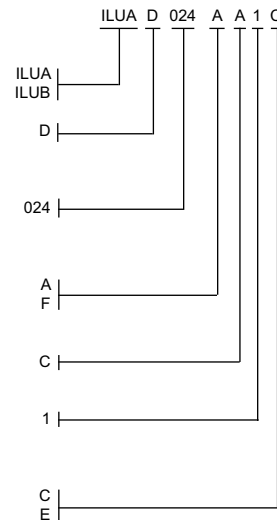
Rail mounting M36

SIZE

17.5 mm

CODE

Code end
 Extended code



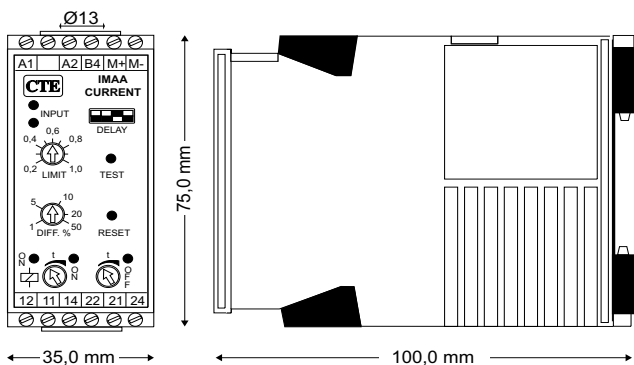
OPTIONAL EXTRAS

TIME MODULES - type TAI, TAO and TAB.

The modules cause delay on operate, delay on release and delay on both operate and release. The delay is adjustable and can be specified up to 30 sec. On applying the supply voltage, the delay on operate will follow the power up reset period.
 As standard the ILUA and ILUB are supplied with a TAB 02 timing module.

SPECIAL FACTORY ADJUST - type SFA.

The relay can be factory preadjusted according to customers specifications.



5mA to 100A MULTI-FUNCTION AC CURRENT RELAY WITH INTERNAL CT

Type: IMAA

FEATURES

- Applications includes differential current (earth leakage) measurement with manual 30mA fault test
- 12 programmable input ranges for over or under current
- Adjustable differential and upper or lower limit
- 20mA output signal at max. range for current monitoring
- Separate adjustable ON and OFF delay
- 4 programmable time ranges for ON and OFF delay
- 4 programmable Power Up delays
- Relay function can be inverted
- Relay can be set to latch IN or latch OUT.
- Electrical and manual reset of latch
- LEDs indicate the state of input, timing and relay

Description:

The current relay is designed to cover all possible AC current monitoring and control applications - including differential current measuring (earth leakage) - in the range from 5mA to 100A. Higher sensitivity can be achieved by pulling the current carrying wire multiple times through the relay. The wide range, 4 decades, are divided into 12 sub ranges for easy adjusting. For an external monitoring of the actual input, there is a 20mA output signal related to the max. of the set range.

The differential is adjustable from 1 to 50% of the set tripping current. By means of DIP switches, the actual relay function can be set to detect over or under current with fail safe relay function. The relay function can be inverted and set to latch in or out with manual or electrical reset. Furthermore several ranges of Power Up delay, as well as adjustable ON and OFF delay makes this relay the ultimate choice for AC current measuring.

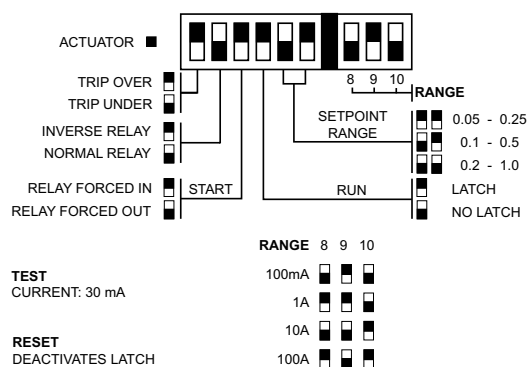
Used as an earth leakage relay - with up to 2 wires of 6mm² (63A) through the relay - the setting of a 30mA limit can simply be done by pressing the test button - for a 30mA fault current through the CT - and adjusting the trip point to drop out.

Application:

Differential (earth leakage) AC current monitoring. Level comparator used with transducers and transmitters. Over- or undercurrent surveillance of all kinds of loads, heaters, motors, generators, mains current etc.

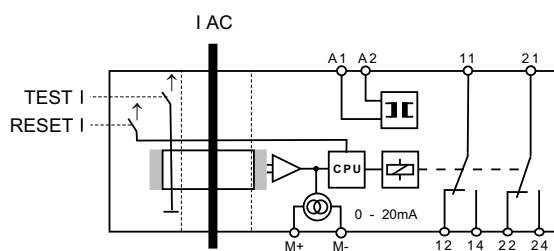
PROGRAMMABLE FEATURES

Range and relay function

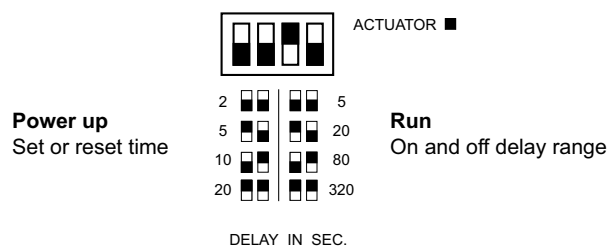


CONNECTION DIAGRAM

Rail mounting



Time function



SPECIFICATIONS

INPUT	AC current from 5mA to 100A	
Input Range: 5 to 100 mA	Setpoint Range	
	5 - 25 mA	
	10 - 50 mA	
	20 - 100 mA	
50 to 1000 mA	50 - 250 mA	
	100 - 500 mA	
	200 - 1000 mA	
0,5 to 10 A	0,5 - 2,5 A	
	1 - 5 A	
	2 - 10 A	
5,0 to 100 A	5,0 - 25 A	
	10 - 50 A	
	20 - 100 A	
AC frequency range	45 to 440 Hz	
Max. continuous input	Limited by square of current carrying wire.	
Input resistance	Resistance of wire through the unit	
Power up, set or reset	Dip switch settings. Fixed	
	2 sec.	
	5 sec.	
	10 sec.	
	20 sec.	
Time range during run	Dip switch settings. Adjustable	
	0 - 5 sec.	
	0 - 20 sec.	
	0 - 80 sec.	
	0 - 320 sec.	
Differential	Adjustable from 1 to 50 % of setting	
PERFORMANCE PARAMETERS		
TIMING		
Response time	Approx. 100 msec.	
ELECTRICAL		
Temp. dependence	Typ. $\pm 0.02\%$ / °C	
Supply dependence	Typ. $\pm 0.01\%$ / % ΔU	
OUTPUT		
Relay	2 C/O	
Contact rating	6 A, 250 VAC , 1500 W	
Mechanical life	30 Million operations	
DC output	0 to 20 mA at max. setpoint range	
SUPPLY		
AC or DC voltage		
DC supply range	24 V (From 20 to 32 V)	
AC supply range	24 V (From 20 to 28 V)	
with transformer	110 V (From 85 to 121 V)	
	230 V (From 187 to 264 V)	
	400 V (From 323 to 484 V)	
	460 V (From 374 to 506 V)	
AC frequency range	45 to 440 Hz	
Power consumption	4 VA, 2 W	
GENERAL		
Temperature range	- 25 °C to + 55 °C ambient	
Humidity	Up to 90 % RH non-condensing	
Dielectric test voltage	Input to supply	4000 VAC
	Coil to relay contacts	4000 VAC
	Pole to pole	2500 VAC
Weight	0.19 kg in 35 mm. housing	



EMC directive 89/336:

International Standards

EN50081 - Emission

EN50082 - Immunity

Low voltage directive 73/23:

EN60255 - Electrical Relays

ORDERING INFORMATION

EXAMPLE:

TYPE

Multifunction current relay

SUPPLY

AC with transformer

DC

SUPPLY VOLTAGE

From 20 to 32 VDC

From 20 to 28 VAC

From 85 to 127 VAC

From 187 to 264 VAC

From 323 to 457 VAC

From 374 to 506 VAC

ADJUSTMENT

Trimpot and dipswitch adj.

HOUSING

Rail mounting.(internal transformer)

SIZE

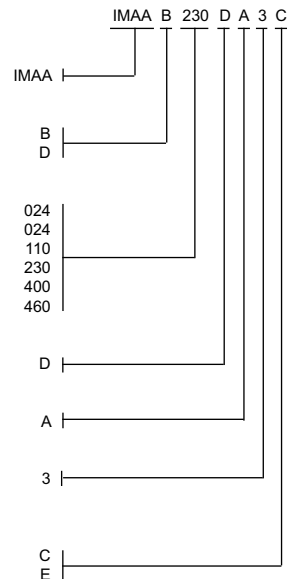
35 mm.

2 C/O

CODE

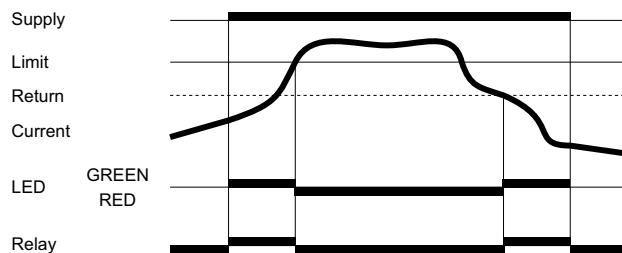
Code end

Extended code

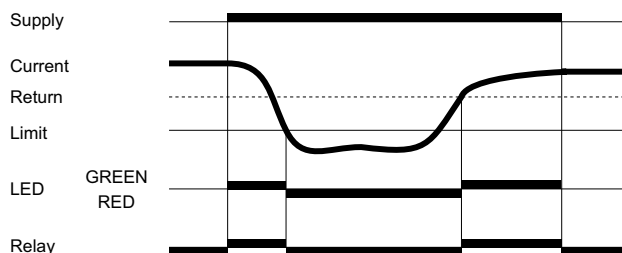


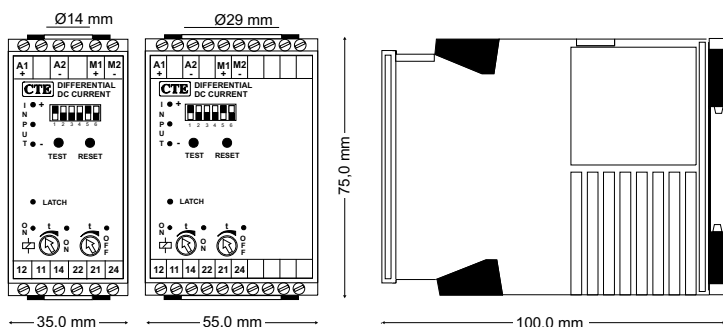
FUNCTION DIAGRAM

Overcurrent sensing



Undercurrent sensing





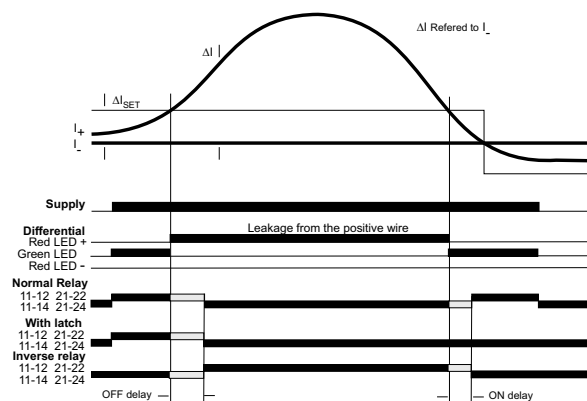
DIFFERENTIAL DC CURRENT RELAY

Type: DDCA

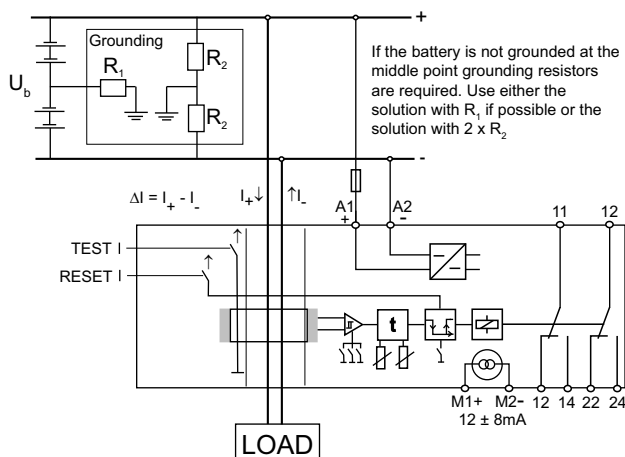
FEATURES

- Early warning for Insulation deterioration and Earth leakage
- Minimum current detection
- 6 Ranges from 5 to 200mA selected by DIP switches
- Wide DC supply range from 18 to 340 V
- Directional $12 \pm 8\text{mA}$ output and LED indication for supervision and easy trouble shooting
- Integrated current transformer Ø14mm or Ø29mm
- Extremely compact and μ metal screened transformer for high accuracy and noise immunity
- Time delay - on and off - individually adjustable
- Relay function can be inverted
- Latch function can be selected
- LEDs indicate the status of the relay, latch and timing function
- SMD technology
- Test and Reset switch

FUNCTION DIAGRAM



CONNECTION DIAGRAM



Description:

The differential DC current relay is designed to monitor IT systems for insulation deterioration. The DDCA is able to selectively indicate faults in branched systems. In addition to this it shows if the fault is related to the positive or the negative wire for easy maintenance. Used with only one wire through the sensing core, it can monitor a circuit for connectivity and function. If the DC current drops below the set value, the relay will trip. This is another key feature as the DDCA allows, up to the cable capacity, AC and DC Amps to flow under normal conditions without having the usual voltage drop and heat from a shunt resistor.

Operation:

Set the DIP switches (123) to the requested sensitivity, latching relay (5) to On or Off and the relay (6) to Normal (fail safe) or Inverse function. When the power is connected to A1 and A2, and with no differential current through the sensing coil, the green LEDs for Differential and Relay ON (normal function) will be on. When a differential current above the set limit is detected, one of the red Differential LED's will be switched on, showing the polarity of the cable leaking to ground. (For leak currents above 15A both red Differential LEDs will be switched on indicating that the DDCA is saturated and cannot detect which cable is leaking). When high current is detected, the OFF delay starts to elapse, indicated by a green LED, and the relay will drop out when the set time has expired. If the latch function is selected the relay will stay de-energized (normal function) and the red Latch LED will be on until the Reset button is activated. If the latch function is not active and the differential current drops below the set level, the green Differential LED will be switched on and the ON delay starts to elapse, indicated by a green LED. The relay will pull in (normal function) when the set time has expired.

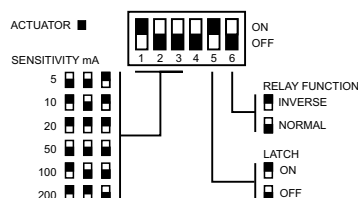
Test and Reset function:

The Test switch activates a real functional test as it conducts a DC current through a separate winding on the sensing core. The Reset switch will while activated release the latch function.

Application:

Selective DC earth leakage detection in single and branched systems. The DDCA is the solution for pure DC installations used in UPS and control systems for chemical, petrochemical, mining industry as well as seagoing vessels. The DDCA is also ideal in AC installations including loads with rectifiers e.g. in variable speed drives, causing the AC monitors to malfunction.

PROGRAMMABLE FEATURES



SPECIFICATIONS

INPUT

Set points selectable by dipswitch	AC/DC Current. No specified limitation
Differential	5, 10, 20, 50, 100, 200mA
Transformer Diameter	Typical 2%
	Ø 14mm (Housing size 3)
	Ø 29mm (Housing size 5)

PERFORMANCE PARAMETERS

TIMING	
Response time	Typical <200msec.
Time range during run	Separate On and Off delay
	0 - 10 sec. adjustable
ELECTRICAL	
Current direction indication	Up to 15 Amp
Precision	Set point ± 2%
	Analog output class 2
Temp. dependence	Typ. ± 0.02 % / °C

OUTPUT

RELAY	2 C/O
Contact rating	6 A, 250 VAC, 1500 W
Mechanical life	30 million operations
ANALOG INDICATION	
Current	12mA @ Input = 0mA
	12 ± 8mA @ input = ± set point current

SUPPLY

DC voltage	18 - 340V
Supply range	Max 4 W
Power consumption	

GENERAL

Precaution	The DDCA is screened with µ metal for high immunity. If the analog output is used in the highly sensitive ranges precautions should be taken against permanent magnetic fields close to the DDCA as they can influence on the accuracy.
Temperature range	- 25 °C to + 55 °C ambient
Humidity	Up to 90 % RH non-condensing
Dielectric test voltage	Coil to relay contacts 4000 VAC
	Pole to pole 2500 VAC
Weight	0.22 kg



EMC directive 89/336:	International Standards
	EN50081 - Emission
	EN50082 - Immunity

ORDERING INFORMATION

EXAMPLE:

TYPE
Differential DC current control relay

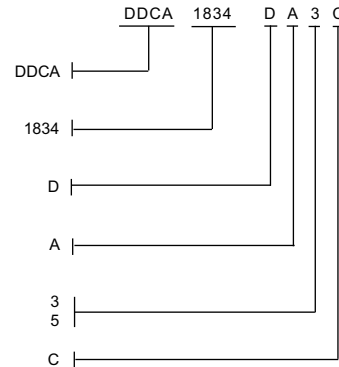
SUPPLY VOLTAGE
18 V - 340 VDC

ADJUSTMENT
Dipswitch adj.

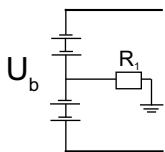
HOUSING
Rail mounting

SIZE
35 mm.
55 mm.

CODE END

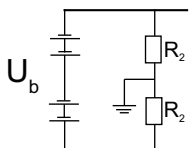


Calculations of grounding resistors for not grounded batteries



$$R_1^* = \text{Max} \frac{U_b}{4 \Delta I_{\text{set}}} \Omega$$

$$\text{Size of resistor } W^{**} = \text{Min. } 0,4 \frac{U_b^2}{R_1} \text{ Watt}$$



$$R_2^* = \text{Max} \frac{U_b}{2 \Delta I_{\text{set}}} \Omega$$

$$\text{Size of resistor } W^{**} = \text{Min. } 1,6 \frac{U_b^2}{R_2} \text{ Watt}$$

Examples for $U_b = 48V$, $\Delta I_{\text{set}} = 5mA$

$$R_1 = \text{Max} \frac{48}{4 \times 0,005} = \text{Max. } 2400 \Omega$$

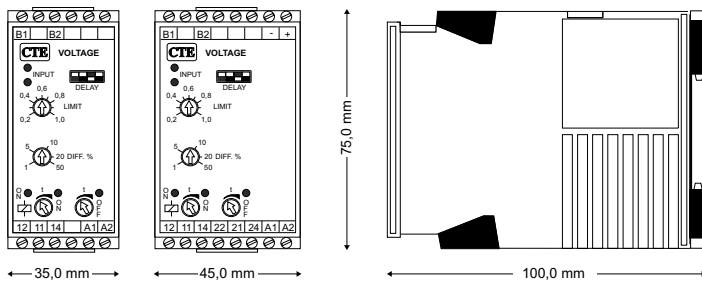
$$W = \text{Min. } 0,4 \frac{48^2}{2400} = \text{Min. } 0,384 \text{ Watt}$$

$$R_2 = \text{Max} \frac{48}{2 \times 0,005} = \text{Max. } 4800 \Omega$$

$$W = \text{Min. } 1,6 \frac{48^2}{4800} = \text{Min. } 0,768 \text{ Watt}$$

* The calculation of the resistor is based on a safety factor of 2 corresponding to a detection of a short from one pole to ground down to half battery voltage.
A resistor selected according to the maximum resistor value as calculated above will limit the leak current to 2 times ΔI_{set} in case of direct short to ground.
If it is a branched circuit with distributed "acceptable" leaks, it is recommended to use a lower value of the resistor.

** The calculation of the resistor size is based on a safety factor of 1,6 corresponding to an acceptable increase in battery voltage of up to 26%.



MULTIFUNCTION VOLTAGE RELAY

Type: UMCA

FEATURES

- For AC and DC voltage
- Balanced input for noise immunity
- Input voltage range from 50 mV to 500 V
- 11 programmable input ranges
- 4 programmable times for power up reset
- 4 programmable time ranges
- Separate adjustable ON and OFF delay
- Relay function can be inverted
- Adjustable upper or lower limit and differential
- Latch function available
- LEDs indicate the state of the input
- LEDs indicate the timing function
- LED indicates the state of the relay
- SMD - technic
- 0-1 V DC control output for full scale (Only in 45 mm. housing)

Description:

The voltage relay is designed with a microcontroller. With programmable range, function and timing it can be programmed to cover all kinds of applications.

The voltage under surveillance is fed into a resistive divider and, for extreme noise immunity, amplified in a balanced amplifier, rectified, averaged, and compared with a preset reference voltage.

AC and DC voltage between 50 mV and 500 V can be measured directly. By means of a voltage transformer or a resistive divider the range can be extended without limits.

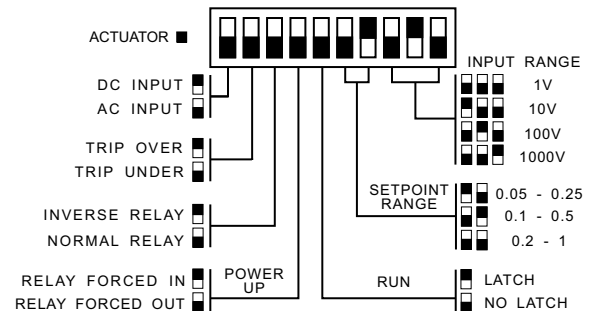
For applications in DC systems a special feature of the balanced amplifier admits voltages against the negative supply line to be measured directly without DC separation between input and supply.

Application:

Level comparator used with transducers and transmitters. Over- or undervoltage surveillance of, loads, batteries, generators, mains etc.

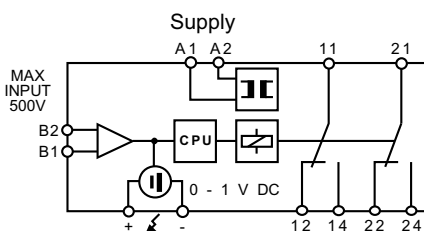
PROGRAMMABLE FEATURES

Range and relay function



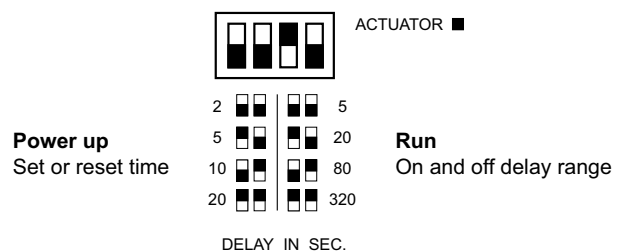
CONNECTION DIAGRAM

Rail mounting



Control output and 2 relays, only in 45 mm. housing.

Time function



SPECIFICATIONS

INPUT	DC or AC voltage
Range	From 50 mV to 500 V
Input Range	Setpoint Range
1V	0.05- 0.25 V 0.1 - 0.5 V 0.2 - 1 V
10V	0.5 - 2.5 V 1 - 5 V 2 - 10 V
100V	5 - 25 V 10 - 50 V 20 - 100 V
1000V	50 - 250 V 100 - 500 V
Max. continuous input	500 V r.m.s.
Input resistance	2 MΩ
AC frequency range	45 to 440 Hz
Power up, set or reset	Dip switch settings. Fixed 2 sec. 5 sec. 10 sec. 20 sec.
Time range during run	Dip switch settings. Adjustable 0 - 5 sec. 0 - 20 sec. 0 - 80 sec. 0 - 320 sec.
Differential	Adjustable from 1 to 50 % of setting

PERFORMANCE PARAMETERS

TIMING	
Response time	Approx. 100 msec.
ELECTRICAL	
Temp. dependence	Typ. $\pm 0.02\%$ / °C
Supply dependence	Typ. $\pm 0.01\%$ / % ΔU

OUTPUT	Relay, 1 or 2 C/O
Contact rating	6 A, 250 VAC , 1500 W
Mechanical life	30 Million operations
DC output	0 - 1 V DC (Only in 45 mm.)

SUPPLY	AC or DC voltage
DC supply range	24 V (From 20 to 32 V)
with isolated switchmode	
AC supply range	24 V (From 20 to 28 V)
with transformer	110 V (From 99 to 140 V)
	230 V (From 198 to 264 V)
	400 V (From 342 to 484 V)
AC frequency range	45 to 440 Hz
Power consumption	4 VA, 2 W

GENERAL	
Temperature range	- 25 °C to + 55 °C ambient
Humidity	Up to 90 % RH non-condensing
Dielectric test voltage	Input to supply 4000 VAC Coil to relay contacts 4000 VAC Pole to pole (45 mm.) 2500 VAC
Weight	0.19 kg in 35 mm. housing 0.26 kg in 45 mm. housing



International Standards	
EMC directive 89/336:	EN50081 - Emission EN50082 - Immunity
Low voltage directive 73/23:	EN60255 - Electrical Relays

ORDERING INFORMATION

EXAMPLE:

TYPE
Multifunction voltage relay

SUPPLY
AC with transformer
DC with switchmode

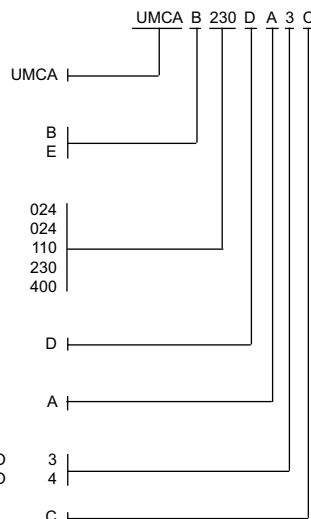
SUPPLY VOLTAGE
From 20 to 32 VDC
From 20 to 28 VAC
From 99 to 140 VAC
From 198 to 264 VAC
From 342 to 484 VAC

ADJUSTMENT
Trimpot and dipswitch adj.

HOUSING
Rail mounting (internal transformer)

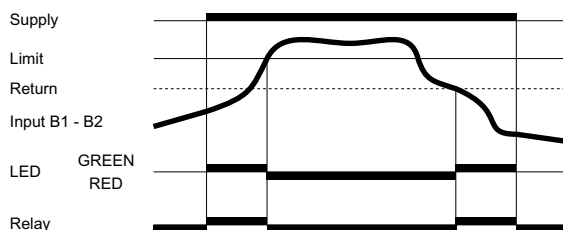
SIZE
35 mm. (without DC output) 1 C/O
45 mm. (with 0 - 1 VDC output) 2 C/O

CODE END

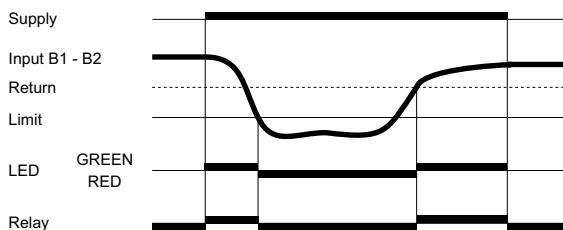


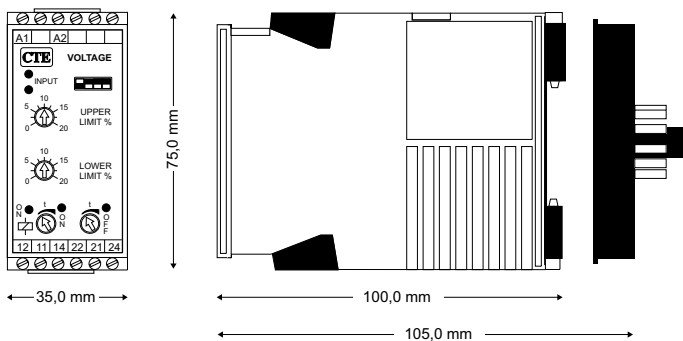
FUNCTION DIAGRAM

Trip over



Trip under





MAINS VOLTAGE MONITORING RELAY

Type: UAWA

FEATURES

- Separate adjustment for upper and lower limit
- Separate dipswitch setting for upper and lower limit function
- LED indicates the state of the input
- LED indicates the state of relay
- LEDs indicate the timing function
- Time delay separate adjustable

Description:

The voltage relays are designed for applications where a voltage needs to be monitored for deviations from a nominal value U_N . UAWA are combined over- and under voltage relays (window discriminator relays).

The relay can by means of a dipswitch be set to work as either an under voltage relay or as an over voltage relay only.

Operation:

When the supply voltage is applied, the - power up reset - period begins. If the nominal voltage is applied to the input, the internal relay pulls in the end of the reset period.

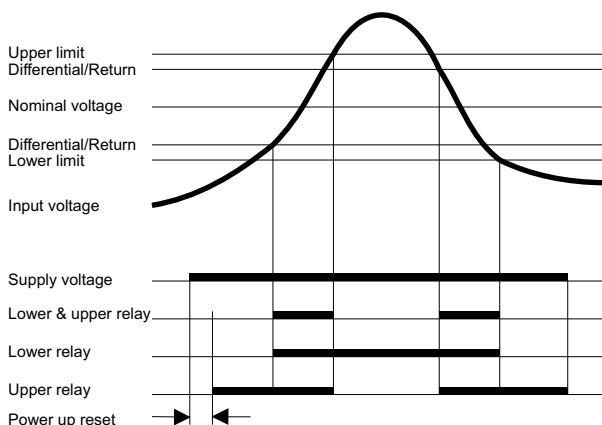
If the input voltage exceeds the adjusted upper or lower limit the relay drops out.

If the input voltage comes between the lower limit plus the differential and the upper limit minus the differential, the relay pulls in. The differential is fixed 2 % of the nominal input voltage (the center voltage of the window).

As under voltage relay only, the relay remains energized for input voltages exceeding the upper limit.

As over voltage relay only, the relay remains energized for input voltage under the lower range limit.

FUNCTION DIAGRAM



Application:

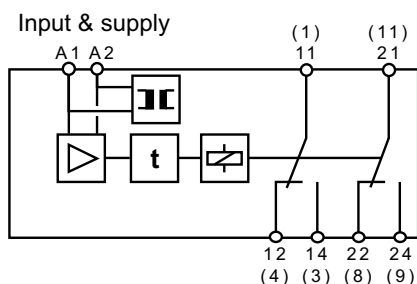
To monitor mains- and generator voltages in emergency power systems. To protect electrical and electronic equipment from damage because of over- or under voltage. On special request, the relay can be modified to monitor the value of any voltage, e.g. from sensors and transmitters.

PROGRAMMABLE FEATURES

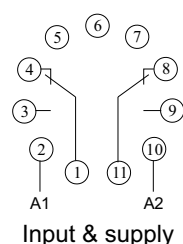
VOLTAGE SETTING				ACTUATOR ■	
TYPE	TYPE	TYPE		FUNCTION	
110 V	230 V	400 V		■	LOWER AND UPPER LIMIT
100 V	220 V	380 V	■	■	LOWER LIMIT
110 V	230 V	400 V	■	■	UPPER LIMIT
115 V	240 V	415 V	■	■	

CONNECTION DIAGRAM

Rail mounting



Socket mounting



SPECIFICATIONS

INPUT

Phase to phase voltage	Type B110: 100, 110 and 115
Selectable by dipswitch	Type B230: 220, 230 and 240 Type B400: 380, 400 and 415

Adjustable range	$0 \pm 20 \%$
Differential	$2 \% \text{ of } U_N$

PERFORMANCE PARAMETERS

TIMING

Time range during run	Separate On and Off delay
Response time	0 - 10 sec. adjustable
	Approx. 200 msec.

ELECTRICAL

Temp. dependency	Typ. $\pm 0.02 \% / ^\circ\text{C}$
Supply dependency	Typ. $\pm 0.01 \% / \% \Delta U$

OUTPUT

Contact rating	Relay, 2 C/O
Mechanical life	6 A, 250 VAC, 1250 W 30 million operations

SUPPLY

AC supply range	AC voltage direct from input
with transformer	110 V (From 99 to 140 V)
Standard voltage	230 V (From 198 to 264 V) 400 V (From 342 to 484 V)

AC frequency range	45 to 440 Hz
Power consumption	4 VA, 2 W

GENERAL

Temperature range	- 25 °C to + 55 °C ambient
Humidity	Up to 90 % RH non-condensing
Dielectric test voltage	Coil to relay contacts 4000 VAC Pole to pole (45 mm.) 2500 VAC
Weight	0.22 kg



EMC directive 89/336:	International Standards EN50081 - Emission EN50082 - Immunity
Low voltage directive 73/23:	EN60255 - Electrical Relays

ORDERING INFORMATION

EXAMPLE:

TYPE

Voltage monitoring control relay

SUPPLY

AC with transformer

INPUT AND SUPPLY VOLTAGE

100, 110 and 115
220, 230 and 240
380, 400 and 415

ADJUSTMENT

Trimpot and dipswitch adj.

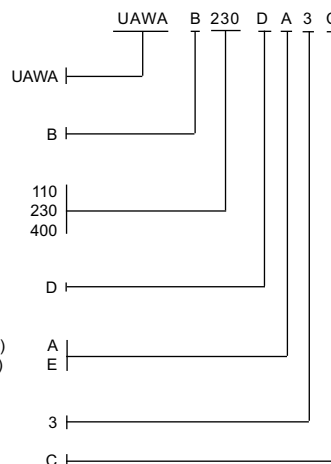
HOUSING

Rail mounting (internal transformer)
Socket 11 pin (internal transformer)

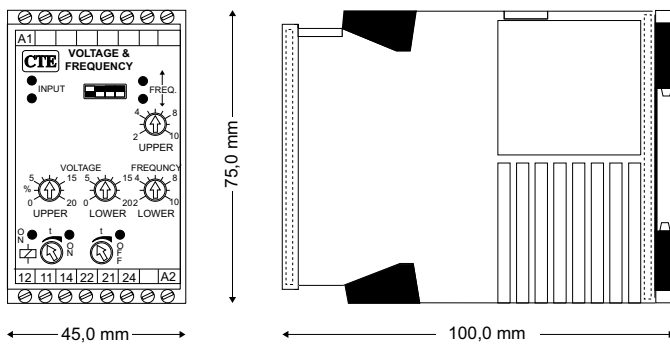
SIZE

35 mm.

CODE END



On special request, the relay can be modified to monitor the value of any voltage, e.g. from sensors and transmitters as well as it can be delivered with separate supply



MAINS FREQUENCY & VOLTAGE MONITORING RELAY

Type: UFWA

FEATURES

- Adjustable version with individual under- and overvoltage settings and under- and overfrequency settings
- Function setting with dipswitch
- Ceramic resonator controlled reference
- Time delay - on and off - individually adjustable
- One unit for three mains voltages
- LEDs indicate the state of the frequency
- LED indicates the state of input
- LED indicates the state of relay
- LEDs indicate the timing function

Description:

The combined voltage and frequency relays are designed for applications where a voltage and/or a frequency needs to be monitored. UFWA are combined over- and under voltage and frequency relays.

The relay can by means of dipswitches and trimmers be set to work as:

- 1) an under voltage and frequency relay
- 2) an over voltage and frequency relay
- 3) a frequency relay only
- 4) or as an under and over voltage and frequency relay

Operation:

When the supply voltage is applied, the - power up reset - period begins. If the nominal voltage and/or frequency is applied to the input, the internal relay pulls in the end of the reset period.

If the input voltage/frequency exceeds the adjusted upper or lower limits the relay drops out.

If the input voltage/frequency comes between the lower limit plus the differential and the upper limit minus the differential, the relay pulls in.

The voltage differential is fixed 2 % of the nominal input voltage.

The frequency differential is fixed 10 % of tripping deviation.

As under voltage relay only, the relay remains energized for input voltages exceeding the upper limit.

As over voltage relay only, the relay remains energized for input voltage under the lower limit.

As frequency relay only, the relay remains energized for input frequencies within the lower and upper limits.

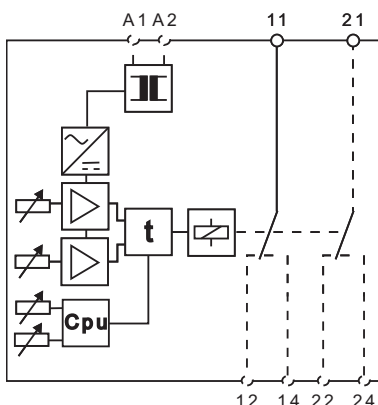
As under and over and frequency relay, the relay remains energized for voltage and frequency within the limits.

Application:

To monitor mains voltages and frequencies. To protect electrical and electronic equipment from damage because of over- or under voltage. On special request, the relay can be modified to monitor higher or lower frequencies.

CONNECTION DIAGRAM

Rail mounting



PROGRAMMABLE FEATURES

VOLTAGE SETTING

TYPE	TYPE	TYPE
110 V	230 V	400 V
100 V	220 V	380 V
110 V	230 V	400 V
115 V	240 V	415 V



ACTUATOR ■

FUNCTION

■	LOWER AND UPPER VOLTAGE LIMIT
■	LOWER VOLTAGE LIMIT
■	UPPER VOLTAGE LIMIT

SPECIFICATIONS

INPUT

Phase to phase voltage	Type B110: 100, 110 and 115
Selectable by dipswitch	Type B230: 220, 230 and 240
	Type B400: 380, 400 and 415

Adjustable range	$0 \pm 20\%$
Differential	2 % of U_N

Frequency unit

Differential	Fixed approx. 10 % of tripping deviation.
Ref. deviation	$\pm 0.5\%$
Ref. temp. dependence	$\pm 0.3\%$ (-20 to 80°C)
Response time	max 200 msec.

PERFORMANCE PARAMETERS

TIMING

Time range during run	Separate On and Off delay
	0 - 10 sec. adjustable
Response time	Approx. 200 msec.

ELECTRICAL

Temp. dependency	Typ. $\pm 0.02\%$ / °C
Supply dependency	Typ. $\pm 0.01\%$ / % ΔU

OUTPUT

Contact rating	Relay, 2 C/O
Mechanical life	6 A, 250 VAC, 1250 W
	30 million operations

SUPPLY

AC supply range	AC voltage direct from input
with transformer	110 V (From 99 to 140 V)
Standard voltage	230 V (From 198 to 264 V)
	400 V (From 342 to 484 V)

AC frequency range	45 to 440 Hz
Power consumption	4 VA, 2 W

GENERAL

Temperature range	- 25 °C to + 55 °C ambient
Humidity	Up to 90 % RH non-condensing
Dielectric test voltage	Coil to relay contacts 4000 VAC
	Pole to pole (45 mm.) 2500 VAC
Weight	0.22 kg



EMC directive 89/336:

International Standards

EN50081 - Emission

EN50082 - Immunity

Low voltage directive 73/23:

EN60255 - Electrical Relays

ORDERING INFORMATION

EXAMPLE:

TYPE

Mains frequency & voltage control relay

FREQUENCY

Center frequency 50Hz
Center frequency 60Hz

frequency range $\pm 2-10\%$
frequency range $\pm 4-20\%$

SUPPLY

AC with transformer

100, 110 and 115
220, 230 and 240
380, 400 and 415
440, 460 and 480

ADJUSTMENT

Trimpot and dipswitch adj.

HOUSING

Rail mounting

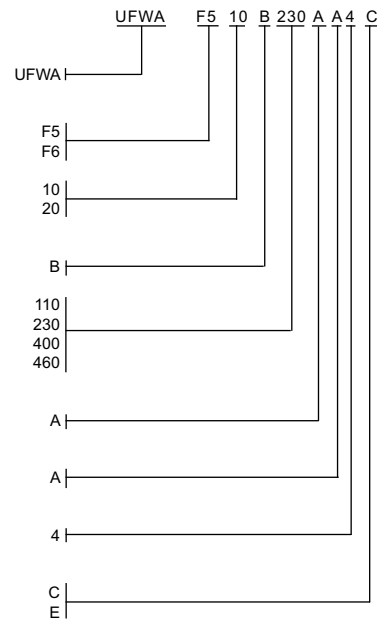
SIZE

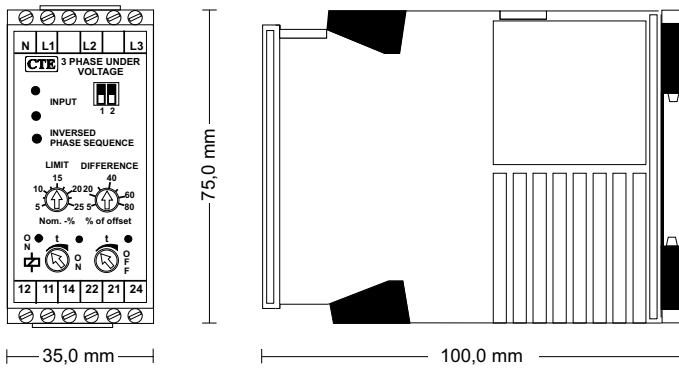
45 mm.

CODE

Code end

Extended Code





3 PHASE UNDER VOLTAGE CONTROL RELAY WITH PHASE SEQUENCE DETECTION

Type: PNDA & PNDI (4 wire system)

FEATURES

- **Accurate under voltage detection of each phase against neutral**
- **Phase sequence detection inhibit the relay with wrong sequence**
- **Adjustable Sensitivity from -5 to -25% of nominal voltage**
- **Adjustable differential from -5 to -80% of under voltage offset from nominal. Voltage range 0,25 to 20% of under voltage**
- **Time delay - on and off - individually adjustable**
- **One unit for three mains voltages**
- **6 LEDs indicate the state of input, phase sequence, timing function and relay**

Description:

The 3 phase 4 wire voltage relays are designed for applications where the three phases need to be individually monitored for under voltage against neutral and correct phase sequence. The PNDA and PNDI contain a standard timing function. In addition the PNDI offers a true time delay on drop out even at total power failure. The relay works in "fail safe" mode and need no external power supply.

Operation:

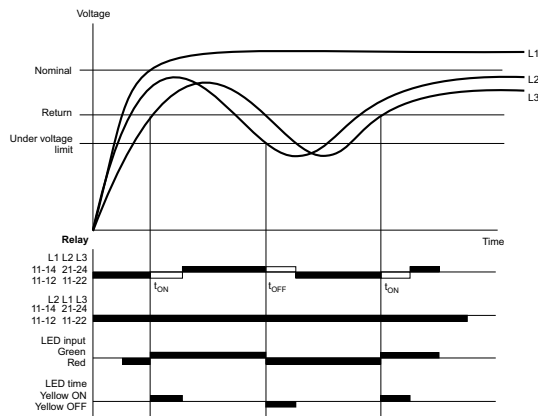
Under normal phase conditions the relay is energized - contacts 11-14 and 21-24 closed - and the green "input" LED and the yellow "relay" LED are switched on.

If one or more phase voltages are below the preset under voltage value, the red "input" LED will be switched on and stay on until all three phase voltages are above the set value plus the preset differential, given by a percentage of the under voltage offset from the nominal value.

If the state of the relay is not corresponding to the input signal, the yellow LED indicating delay "ON" or "OFF" will be on until the relay changes state and corresponds to the input.

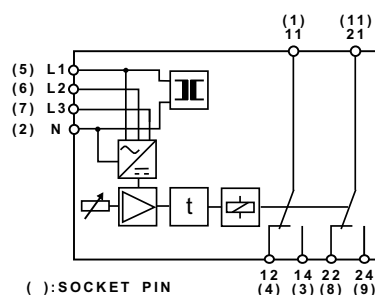
In case of wrong phase sequence the relay will not be energized and the red "inversed phase sequence" LED will be on indicating the fault.

FUNCTION DIAGRAM

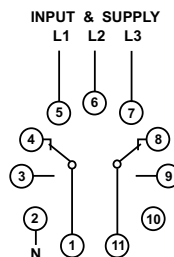


CONNECTION DIAGRAM

Rail mounting



Socket mounting*

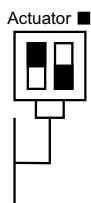


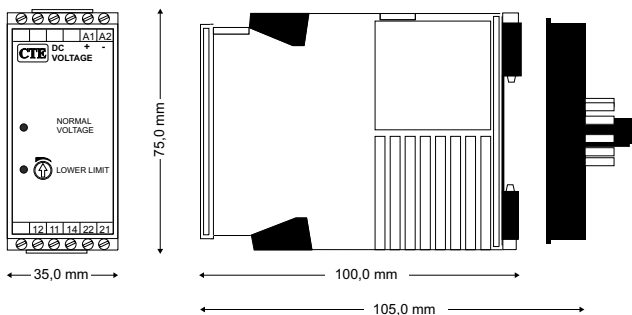
*CE up to 230V phase to phase voltage

PROGRAMMABLE FEATURES

Nominal Voltage Settings
Phase to phase

Type	Type	Type	Type
110 V	230 V	400 V	460 V
100 V	220 V	380 V	440 V
110 V	230 V	400 V	460 V
115 V	240 V	415 V	480 V





BATTERY VOLTAGE MONITORING RELAYS

Type: BVCA, BVCB & BVCC

FEATURES

- Supply from the battery
- LEDs indicate the state of the input
- Time delay (optional)

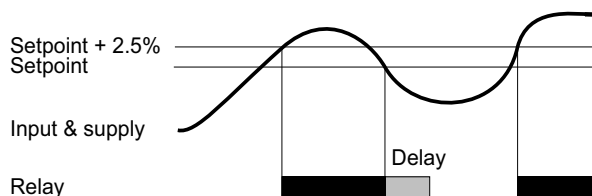
Description:

The battery voltage relays are designed to measure battery voltage for under voltage. Type BVCA for 12 V battery system. Type BVCB for 24 V battery system. Type BVCC for 48 V battery system. The supply and input, is taken from the battery.

Application:

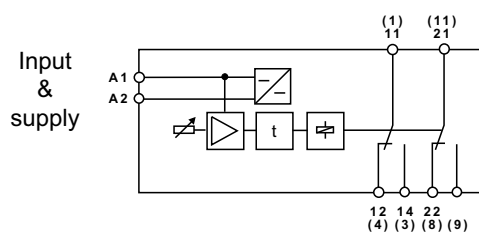
In UPS, stationary battery equipment, mobile battery equipment.

FUNCTION DIAGRAM

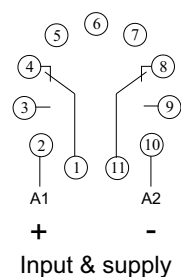


CONNECTION DIAGRAM

Rail mounting



Socket mounting



SPECIFICATIONS

INPUT

BVCA	12 V, range int. adjustable from 9 to 12 V Precision in factory adjust ± 0.1 V
BVCB	24 V, range int. adjustable from 18 to 24 V Precision in factory adjust ± 0.2 V
BVCC	48 V, range int. adjustable from 36 to 48 V Precision in factory adjust ± 0.4 V
Differential	Approx. setpoint + 2.5 %

PERFORMANCE PARAMETERS

TIMING	
Time range accuracy	- 20 % to + 50 %
ELECTRICAL	
Temp. dependence	Typ. ± 0.02 % / °C
Repeat accuracy	< 1 %

OUTPUT

Relay, 1 C/O and 1 N/C	
Contact rating	6 A, 250 VAC, 1500 W
Mechanical life	30 Million operations

SUPPLY

	DC voltage, supply and input internal connected
BVCA	12 V (From 8 to 16 V)
BVCB	24 V (From 16 to 32 V)
BVCC	48 V (From 32 to 64 V)
Power consumption	2 W

GENERAL

Temperature range	- 25 °C to + 55 °C
Humidity	Up to 90 % RH non-condensing
Dielectric test voltage	Coil to relay contacts 4000 VAC Pole to pole (45 mm.) 2500 VAC
Weight	0.12 kg



EMC directive 89/336:

International Standards

EN50081 - Emission

EN50082 - Immunity

Low voltage directive 73/23:

EN60255 - Electrical Relays

ORDERING INFORMATION

EXAMPLE:

TYPE
Battery voltage control relay

UNDERVOLTAGE RANGE

12 V
24 V
48 V

ADJUSTMENT

Trimpot adj.

HOUSING

Rail mounting
Socket 11 pin

SIZE

35 mm.

CODE

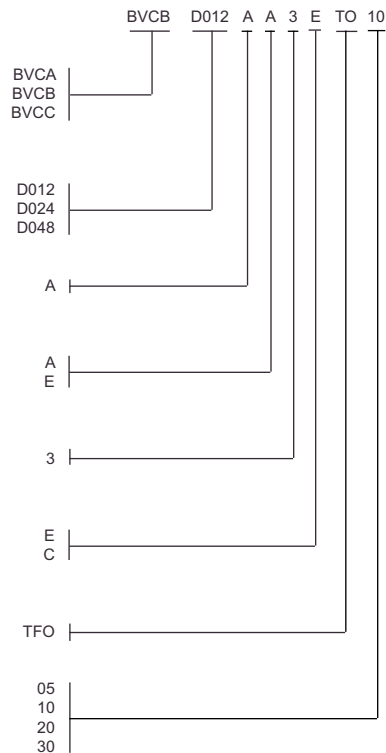
Extend code
Code end

DELAY

(e.g. time off delay fixed 10 sec.)

In seconds

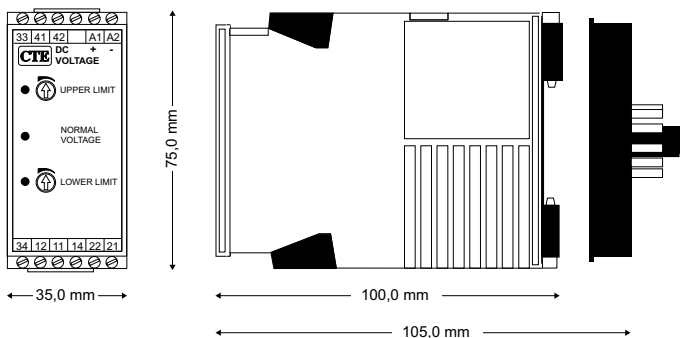
5sec.
10sec.
20sec.
30sec.



OPTIONAL EXTRAS

TIME MODULE UNDERVOLTAGE - type time delay fixed out

The module cause delay on release of undervoltage relay, while the delay is running the LED's normal voltage and undervoltage is lit, after the delay is run out only the undervoltage LED will be lit. The undervoltage relay starts de-energized in power up and until undervoltage setpoint plus differential voltage is reached.



BATTERY VOLTAGE MONITORING RELAYS

Type: BVCD, BVCE & BVCF

FEATURES

- Supply from the battery
- LEDs indicate the state of the input
- Time delay under voltage (optional)
- Latch for over voltage (optional)

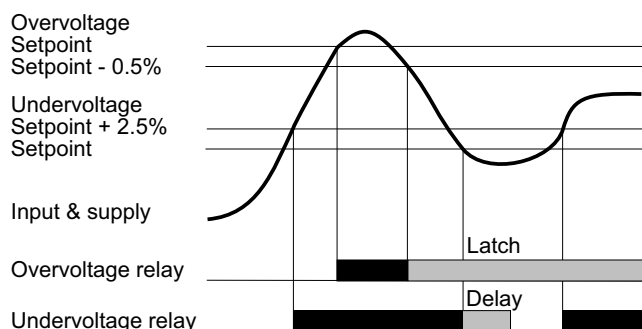
Description:

The battery voltage relays are designed to measure battery voltage for under voltage and over voltage. Type BVCD for 12 V battery system. Type BVCE for 24 V battery system. Type BVCF for 48 V battery system. The supply and input, is taken from the battery.

Application:

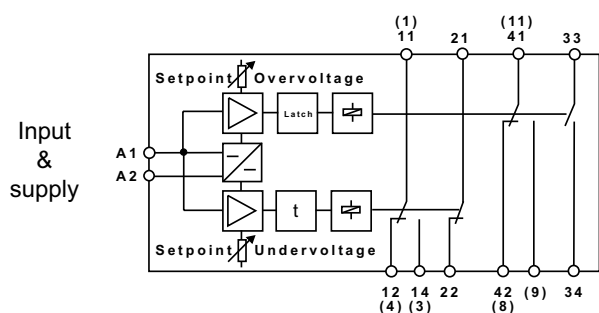
Avoiding deep discharging, and overcharging in UPS, stationary battery equipment and mobile battery equipment.

FUNCTION DIAGRAM

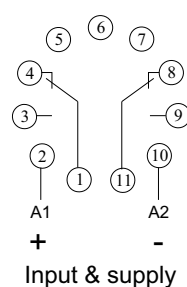


CONNECTION DIAGRAM

Rail mounting



Socket mounting



SPECIFICATIONS

INPUT

BVCD	12 V, range int. adjustable Under voltage from 9 to 12 V Over voltage from 12 to 15 V Precision in factory adjust ± 0.1 V
BVCE	24 V, range int. adjustable Under voltage from 18 to 24 V Over voltage from 24 to 30 V Precision in factory adjust ± 0.2 V
BVCF	48 V, range int. adjustable Under voltage from 36 to 48 V Over voltage from 48 to 60 V Precision in factory adjust ± 0.4 V
Differential	Under voltage Approx. setpoint + 2.5 % Over voltage Approx. setpoint -0.5%

PERFORMANCE PARAMETERS

TIMING	
Time range accuracy	- 20 % to + 50 %
ELECTRICAL	
Repeat accuracy	< 1 %
Temp. dependence	Typ. ± 0.02 % / °C

OUTPUT

Under voltage	Relay, 1 C/O and 1 N/C, AgCdO
Over voltage	Relay, 1 N/O and 1 N/C, AgCdO
Contact rating	6 A, 250 VAC, 1500 W
Mechanical life	30 Million operations

SUPPLY

	DC voltage, supply and input internal connected
BVCD	12 V (From 8 to 16 V)
BVCE	24 V (From 16 to 32 V)
BVCF	48 V (From 32 to 64 V)
Power consumption	3 W

GENERAL

Temperature range	- 25 °C to + 55 °C
Humidity	Up to 90 % RH non-condensing
Dielectric test voltage	Coil to relay contacts 4000 VAC Pole to pole 2500 VAC
Weight	0.13 kg



	International Standards
EMC directive 89/336:	EN50081 - Emission EN50082 - Immunity
Low voltage directive 73/23:	EN60255 - Electrical Relays

OPTIONAL EXTRAS

TIME MODULE UNDERVOLTAGE - type time delay fixed out

The module cause delay on release of undervoltage relay, while the delay is running the LED's normal voltage and undervoltage is lit, after the delay only the undervoltage LED will be lit. The undervoltage relay starts de-energized during power up and remains so until the undervoltage setpoint plus the differential voltage is reached.

LATCH MODULE OVERVOLTAGE - type HO01

The latch module cause latch on overvoltage relay, if the input voltage has been over overvoltage setpoint, the relay stays on until the supply is interrupted. While the latch is in function the normal voltage LED is unlit and the overvoltage LED is lit. The overvoltage relay starts de-energized during power up.

ORDERING INFORMATION

EXAMPLE:

TYPE

Battery voltage control relay

UNDER- AND OVER VOLTAGE RANGE

12 V
24 V
48 V

ADJUSTMENT

Trimpot adj.

HOUSING

Rail mounting
Socket 11 pin

SIZE

35 mm.

CODE

Extend code
Code end

DELAY

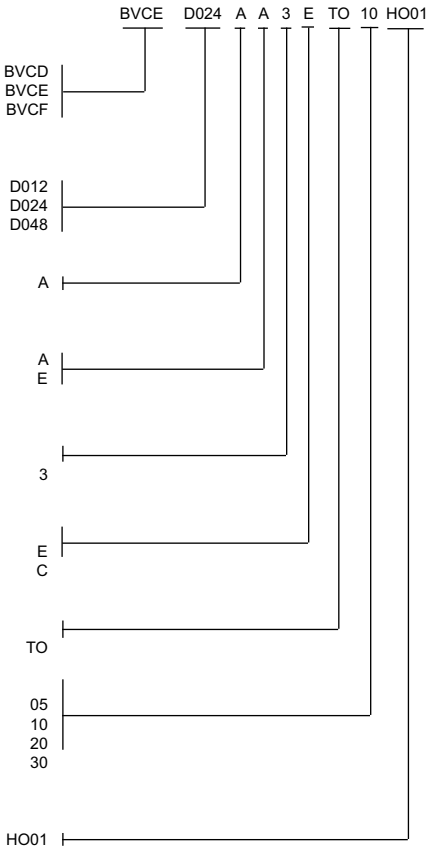
(e.g. time off delay fixed 10 sec.)

In seconds

5sec.
10sec.
20sec.
30sec.

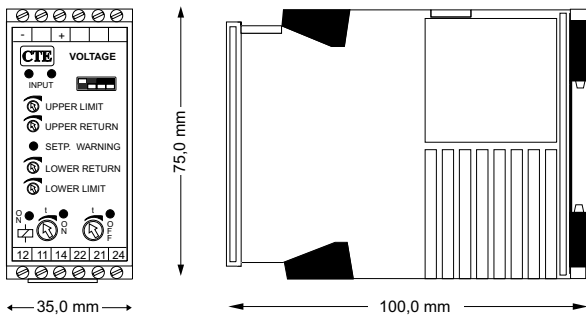
LATCH OVERVOLTAGE

e.g. start up time 1 sec.
latch on over voltage





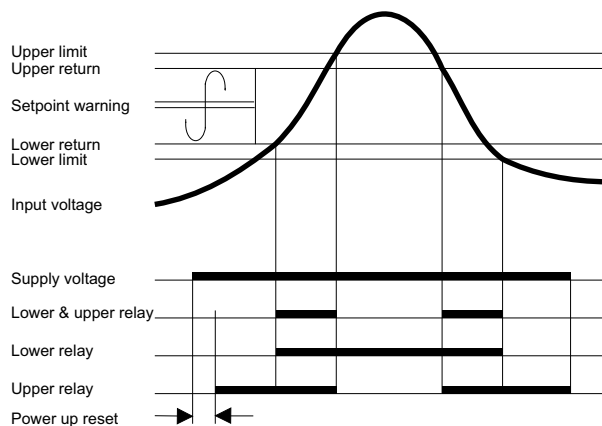
DC VOLTAGE MONITORING RELAY Type:BMWA



FEATURES

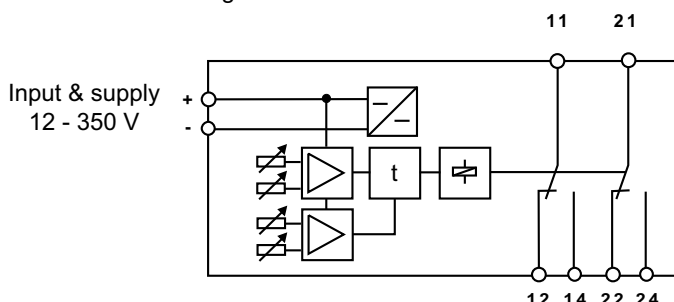
- **Accurate adjustment for upper limit, upper return, lower limit and lower return by means of multiturn potentiometers**
- **Easy dipswitch setting for function as a window, under voltage or over voltage relay only**
- **LEDs indicate the state of the input**
- **LED indicates the state of the relay**
- **LEDs indicate when the timing function is active**
- **Pull in and drop out delay are separate adjustable**
- **The differential can be adjusted over the full range**

FUNCTION DIAGRAM



CONNECTION DIAGRAM

Rail mounting



Description:

BMWA is a combined over and under voltage relay (window discriminator relay).

The voltage relay is designed for precise monitoring of a wide range of DC voltages from 12,5 V to 340 V.

With a built-in high efficiency switch mode power supply, the relay is able to cover the whole range without the need of an external supply.

The relay can by means of a dipswitch be set to work as either an under voltage relay or as an over voltage relay only.

Operation:

When the supply voltage is applied, the - power up reset - period begins. If a voltage within the "window" is applied to the input, the internal relay pulls at the end of the reset period.

If the input voltage exceeds the adjusted upper or lower limit the relay drops out.

If the input voltage comes between the upper return and the lower return, the relay pulls in.

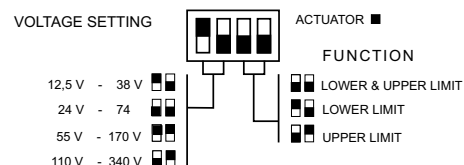
As under voltage relay only, the relay remains energized for input voltages exceeding the upper limit.

As over voltage relay only, the relay remains energized for input voltage under the lower range limit, until it drops out due to power loss at inputs below 12 V.

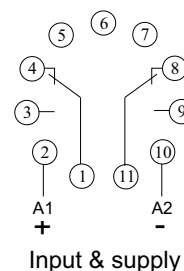
Application:

Voltage monitoring in UPS, stationary and mobile battery installations.

PROGRAMMABLE FEATURES



Socket Mounting



SPECIFICATIONS

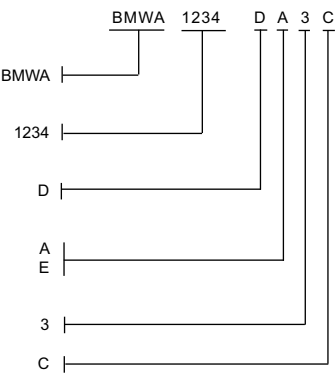
INPUT		DC voltage 0 - 350 V
Ranges selectable by dipswitch	12,5 V -	38 V
	24 V -	74 V
	55 V -	170 V
	110 V -	340 V
Differential	Adjustable within upper and lower limit	
PERFORMANCE PARAMETERS		
TIMING		
Response time	Approx. 200 msec.	
Time range during run	Separate On and Off delay	
	0 - 10 sec. adjustable	
ELECTRICAL		
Temp. dependence	Typ. $\pm 0.02\%$ / °C	
OUTPUT		
Contact rating	Relay, 2 C/O, AgCdO	
Mechanical life	6 A, 250 VAC, 1250 W	
	30 million operations	
SUPPLY		
	DC voltage direct from input	
Power consumption	Max 4 W	
GENERAL		
Temperature range	- 25 °C to + 55 °C ambient	
Humidity	Up to 90 % RH non-condensing	
Dielectric test voltage	Coil to relay contacts	4000 V
	Pole to pole	2500 V
Weight	0.22 kg	

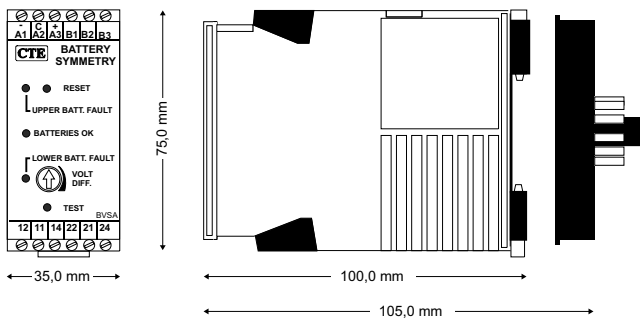


International Standards	
EMC directive 89/336:	EN50081 - Emission
	EN50082 - Immunity
Low voltage directive 73/23:	EN60255 - Electrical Relays

ORDERING INFORMATION

EXAMPLE:
TYPE
DC voltage monitoring control relay
INPUT AND SUPPLY VOLTAGE
12,5 V - 340 V DC
ADJUSTMENT
Trimpot and dipswitch adj.
HOUSING
Rail mounting
Socket Mounting
SIZE
35 mm.
CODE END





BATTERY SYMMETRY MONITORING RELAY

Type: BVSA

FEATURES

- Supply from the battery
- LEDs indicate the status and the fault conditions
- Latch for symmetry failure
- Adjustable symmetry level
- Time delay to prevent false alarm
- Test and reset button on the relay
- Terminals for remote test and reset

Description:

The BVSA is designed to give an early warning for cells, in a battery system, that are performing different from the other cells. The battery system being monitored must consist of two equal blocks coupled in series with an accessible centerpoint.

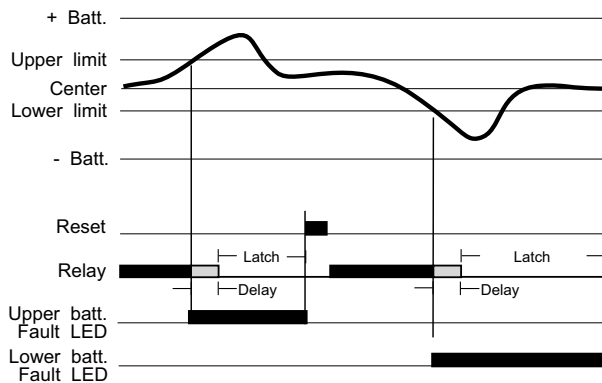
Operation:

The measuring system is based on a comparison of the voltage from the two blocks. Over the lifetime they are charged and discharged equally and the voltage will, within close limits, be the same as long as all cells in both blocks are healthy. At the end of the lifetime, or if a cell is shorted, the two blocks will perform different. The BVSA will sense the difference in performance and the internal relay will give an early warning by dropping out. Information about which battery block that is defect is indicated by the LEDs on the front. In order to prevent false alarm the BVSA includes a timing function.

Application:

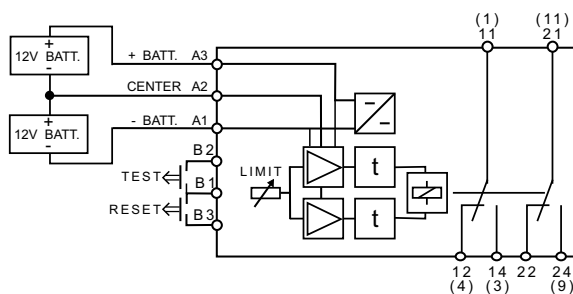
Detection of an early failure in battery cells within a battery system. For a complete monitoring system the BVSA can be used together with a standard battery voltage monitoring relay - type BVCE (HI/LOW)

FUNCTION DIAGRAM

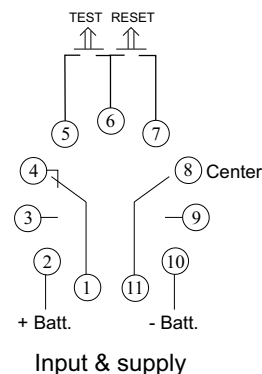


CONNECTION DIAGRAM

Rail mounting



Socket mounting



SPECIFICATIONS

INPUT

PERFORMANCE PARAMETERS

TIMING	
Time range accuracy	- 20 % to + 50 %
ELECTRICAL	
Repeat accuracy	< 1 %
Temp. dependence	Typ. ± 0.02 % / °C

OUTPUT

Under voltage	Relay, 1 C/O and 1 N/C, AgCdO
Over voltage	Relay, 1 N/O and 1 N/C, AgCdO
Contact rating	6 A, 250 VAC, 1500 W
Mechanical life	30 Million operations

SUPPLY

DC voltage, supply and input internal connected	
12 V (From 8 to 16 V)	
24 V (From 16 to 32 V)	
48 V (From 32 to 64 V)	
Power consumption	3 W

GENERAL

Temperature range	- 25 °C to + 55 °C
Humidity	Up to 90 % RH non-condensing
Dielectric test voltage	Coil to relay contacts 4000 VAC
	Pole to pole 2500 VAC
Weight	0.13 kg



International Standards	
EMC directive 89/336:	EN50081 - Emission
	EN50082 - Immunity
Low voltage directive 73/23:	EN60255 - Electrical Relays

ORDERING INFORMATION

EXAMPLE:

TYPE
Battery voltage symmetry monitoring relay

UNDER- AND OVER VOLTAGE RANGE
12 V
24 V
48 V

ADJUSTMENT
Trimpot adj.

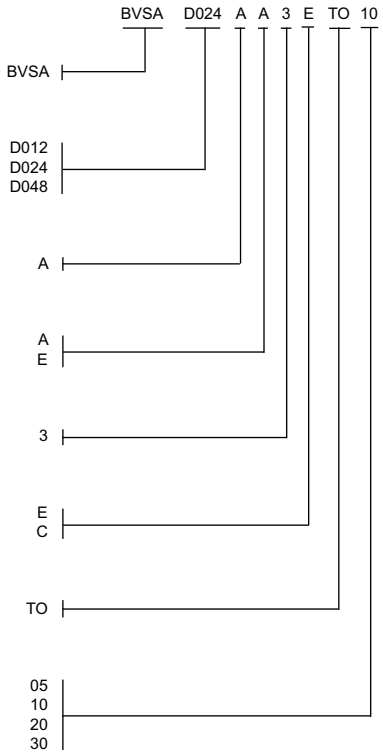
HOUSING
Rail mounting
Socket 11 pin

SIZE
35 mm.

CODE
Extend code
Code end

DELAY
(e.g. time off delay fixed 10 sec.)

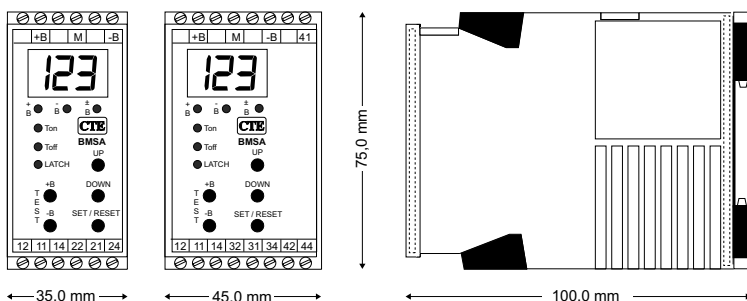
In seconds
5sec.
10sec.
20sec.
30sec.



OPTIONAL EXTRAS

TIME MODULE UNDERVOLTAGE - type time delay fixed out

The module cause delay on release of undervoltage relay, while the delay is running the LED's normal voltage and undervoltage is lit, after the delay only the undervoltage LED will be lit. The undervoltage relay starts de-energized during power up and remains so until the undervoltage setpoint plus the differential voltage is reached.



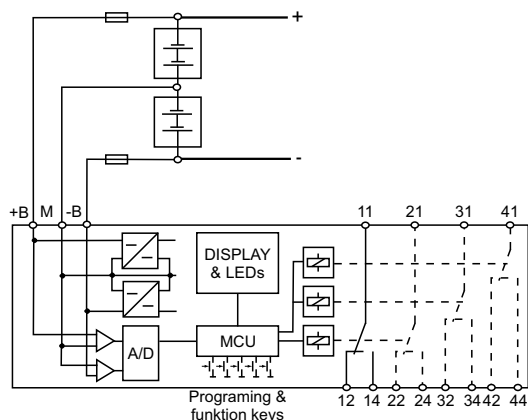
BATTERY SYMMETRY MONITORING RELAY

Type: BMSA

FEATURES

- **Early warning for Cell deterioration like Sulphating or internal Short Circuit**
- **All in one unit by Multi Range from 24 to 512 Volt**
- **No current leak through the middle point connection**
- **Optional Over and Under voltage monitoring**
- **Easy set-up by keying in actual parameters or loading in through a RS 232 connection**
- **Time delay - On and Off - can be set individually**
- **Latched Relay function can be selected**
- **LEDs indicate the status of the relay, latch and timing function**
- **Reset and individual Test keys for +B and -B**
- **RoHS technology**
- **Extremely compact and low power consumption**

CONNECTION DIAGRAM



Contact information:

Symmetry relay: 11, 12, 14 and 21, 22, 24

Optional: Under voltage relay: 31, 32, 34. Excludes 21, 22, 24

Optional: Over voltage relay: 41, 42, 44. Excludes 21, 22, 24

For a healthy battery the following contacts will be closed:
11-14, 31-34 and 41-42

Description:

The multipurpose Battery Symmetry Relay BMSA is designed to monitor and give an early warning if one or more cells are performing different from an average cell in the battery. The battery must consist of two blocks of cells coupled in series with an accessible middle point used as a reference potential. No current will be drawn from the middle point. The Symmetry Relay monitors that the positive and the negative battery blocks perform equally independent of the actual charge and load level. The two battery blocks do not need to be of equal voltage (same number of cells), but the individual cells must be equal and have the same history. The BMSA accepts up to twice as many cells in one block as in the other. The nominal voltage range of each block can be set from 12V to 256V and the actual voltage must be within the range of 9 to 300V allowing a battery voltage ranging from 18V to 600V. For high battery voltages exceeding 300V the middle point connection is critical. If it can (even accidentally) be disconnected, the maximum battery voltage must be kept below 300V.

As an option, the BMSA can be extended to monitor the actual battery voltage for under and over voltage. The option will include individual relays for under and over voltage.

Operation:

When the BMSA is powered up for the first time it will need to be configured to the application. The configuration can be done either by using the keys on the front, or through a RS232 port in the side of the unit. When it is programmed it is ready to monitor the battery. For detailed information of the function of the Display and the LED's, please see the block diagram. The display will show the two battery block voltages, the total battery voltage and the average cell voltage difference between the two battery blocks in %. For each readout, the LED's on the front will indicate what the display is showing. The display can be set to show one particular measured value, or continuously cycle through the different measurements, one after the other in a specified time sequence. When the BMSA is connected to the battery, and the battery is OK, then the internal relay will pull in. When the cell difference exceeds the set maximum, the OFF delay will start to expire and the yellow LED "Toff" will be lit. After the set time delay the relay will drop out. Depending on the latch setting, the relay will remain out or may go in again if the battery returns to a healthy condition. The BMSA is constantly checking the battery connections and blinks with the LED: +B, -B or both LED's if the connection to battery plus, minus or the middle point is disconnected.

Test and Reset function:

The two test keys offset the measured voltage from either battery block by 10%. The display and the function of the BMSA will respond to the change with a new voltage and cell difference information and the relay will operate. The reset key is used for releasing the Latch function and for programming.

Application:

The BMSA is used on batteries in back up supplies where, by matching two batteries against each other, a warning can be given as soon as a cell in one of the battery blocks starts to deteriorate. As the BMSA is not depending on the actual charge and load status, it is a powerful supervision of only occasionally used batteries in emergency systems.

SPECIFICATIONS

INPUT	DC voltage
Set Range	2 x 12 Vdc to 2 x 256 Vdc. (Numbers of cells times cell voltage)
Functional Range	2 x 9 Vdc to 2 x 300 Vdc with the middle point "M" connected. Maximum short time voltage 2 x 350 Vdc or 1 x 350 Vdc (+B -B) if the middle point "M" is disconnected
Current	120 mA @ 2 x 9 Vdc 6 mA @ 2 x 300 Vdc
RS 232	Isolated. Used with special adapter and mini USB female connector.

PERFORMANCE PARAMETERS

RESOLUTION

For Set Range < or = 2 x 48 V	< ± 50 mV. Display voltage ± 0,1 V
For Set Range 48 V to 256 V	< ± 200 mV. Display voltage ± 1 V
Average cell diff. in %	< ± 0.5% @ 12V/70V and 48V/300V range < ± 0.1% @ 48V/70V and 256V/300V range Display average cell diff. ± 0.1%

TIMING

Response time	Typical < 200msec.
Time range	Separate On and Off delay setting 0.1 - 99.9 sec.

ELECTRICAL

Temp. dependence	A/D converting Typ. ± 0.02 % / °C
------------------	-----------------------------------

OUTPUT

RELAY	2 C/O or 3 x 1 C/O with Optional Over & Under Voltage monitoring
Contact rating	6 A, 250 VAC, 1500 W
Mechanical life	30 million operations

SUPPLY

Range	Self Supplied, DC voltage 18 - 600V (300V if the middle point is not connected)
Fuse	Internal 2 x 250 mA in +B and -B Breaking capacity 100 A / 250 Vdc
Power consumption	Max 4 W

GENERAL

Temperature range	- 25 °C to + 55 °C ambient
Humidity	Up to 90 % RH non-condensing
Dielectric test voltage	Coil to relay contacts 4000 VAC 2500 VAC
Pole to pole	
Weight	170 g standard 200 g with optional over and under voltage



Directive 2002/95/EC of
27. January 2003

EMC directive 89/336:

International Standards

RoHS

Emission and Immunity
EN50263:2000
EN61000-3-2
EN61000-3-3

Low voltage directive 73/23:

Electrical Relays

EN60255

ORDERING INFORMATION

EXAMPLE:

TYPE

Battery Symmetry Relay

SUPPLY VOLTAGE

18 V to 300 Vdc

ADJUSTMENT

Programmed

HOUSING

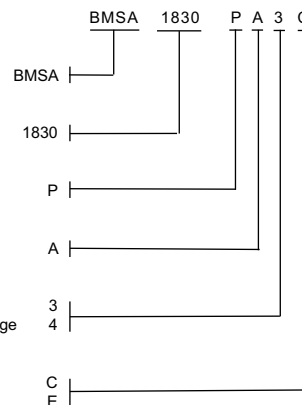
Rail mounting

SIZE

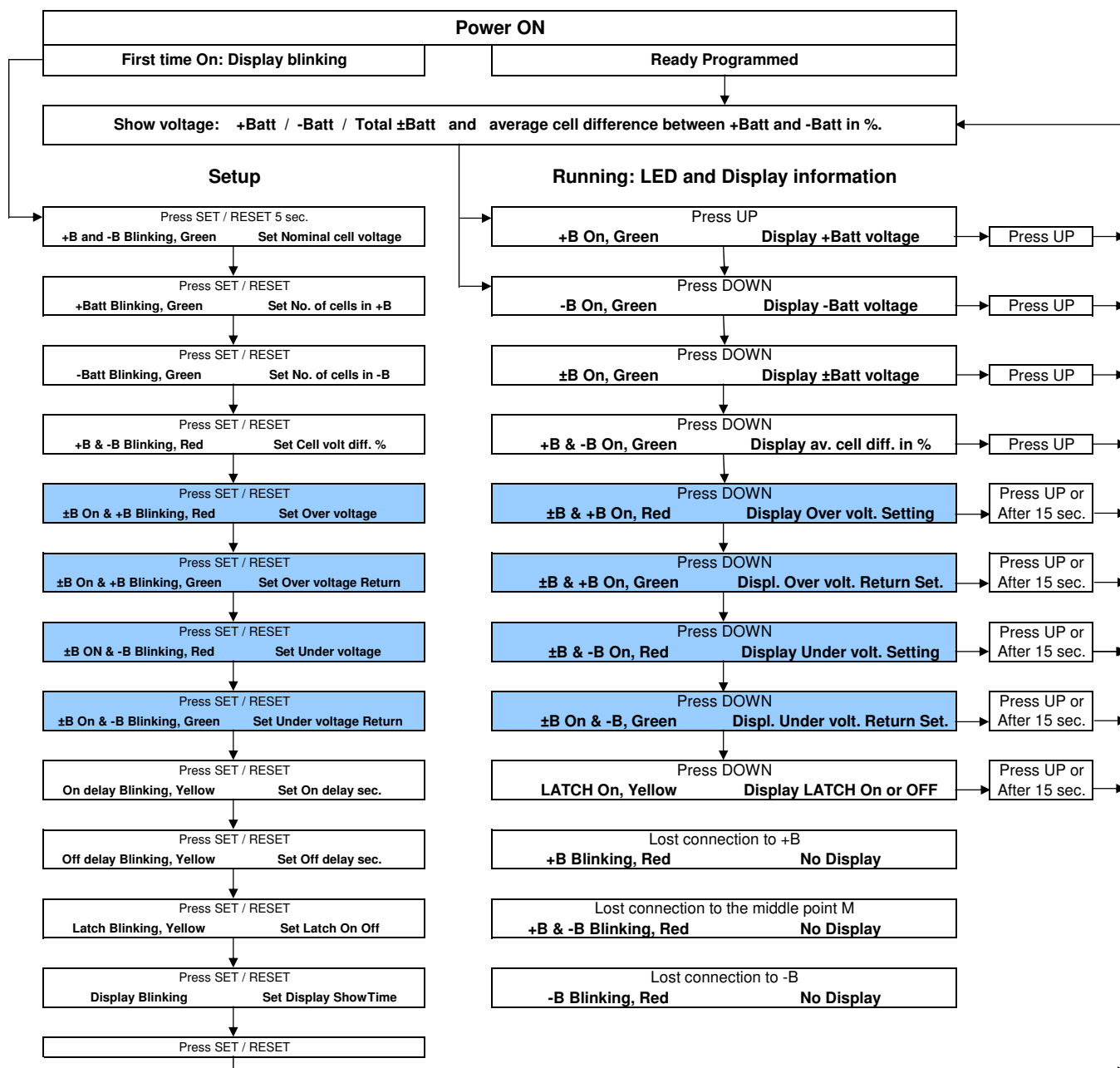
35 mm. Symmetry Relay only
45 mm. With optional Under & Over voltage

CODE

Code end
Extended code



Functional diagram for battery symmetry relay type: BMSA



Definitions and limitations

Nominal cell voltage x.xx is used to calculate the voltage range to be used. The range is set according to the battery with the highest No. of cells.
If the battery has a total nominal voltage up to 48V, it will be measured in the 70V range.
If the battery has a total nominal voltage higher than 48V, it will be measured in the 300V range.

Number of cells times nominal voltage of the cells, must be within the range from 12V to 256V for each of the two Batteries.

The actual voltage of each of the two batteries must be within the range of 9 to 300 volts.

NOTE: If the middle point M is not connected or disconnected, the maximum voltage of ±B must be below 340V.

Cell voltage difference in % is the percentual difference between the average voltage of the cells in the + Battery compared to the cells in the - Battery.
The calculation is $(100 * ((Av. Cell + Batt) - (Av. Cell - Batt))) / (0.5 * ((Av. Cell + Batt) + (Av. Cell - Batt))) \%$.

Cell voltage difference in % can be set from 1% to 20%.

1% is equal to a cell voltage difference of 20mV for two cells of 2.0V and 120mV between two 12V batteries at 12V.
20% is equal to a cell voltage difference of 400mV for two cells of 2.0V and 2.4V between two 12V batteries at 12V.

The resolution of the voltage measurement is calculated up to 70V to be $70/4096 = 17.1\text{mV}$. In the range up to 300V it is 73.2mV.
The practical resolution over the temperature range is 2 to 3 times the calculated values.

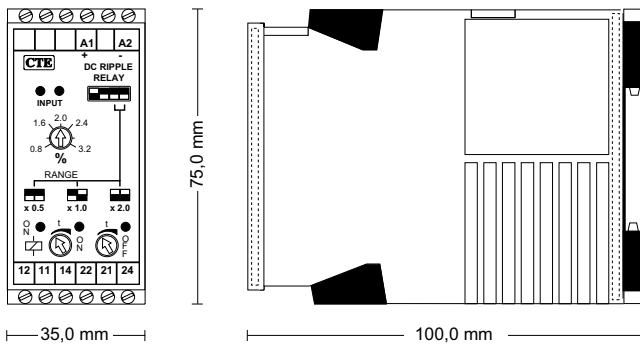
Time delay ON or OFF can be set from 0.1 to 99.9 sec.

Less than 0,1mA will be drawn from the middle point. Total supply will be taken from the +B and -B.

Optional

Over and under voltage measuring with one separate relay for each function.





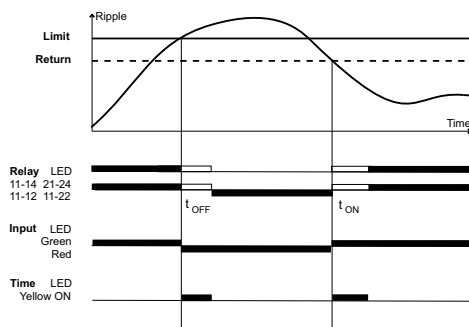
DC RIPPLE RELAY

Type: BRIA

FEATURES

- One unit for all voltages from 18 to 340Vdc
- 4 voltage sub-ranges for high accuracy
- High sensitivity. Adjustable from 0.4 to 6.4%
- 3 ripple sensitivity ranges for an easy adjustment
- Excellent accuracy and equal sensitivity for ripple frequencies from 30 to 3000Hz.
- No separate supply power needed
- Time delay - ON and OFF - individually adjustable
- Compact. 35mm box with 2 C/O contacts

FUNCTION DIAGRAM



Description:

The ripple relay BRIA is developed to supervise thyristor rectifiers for faulty thyristors. The relay is extremely sensitive, stable and detects with high accuracy ripple levels exceeding the set sensitivity in the frequency range from 30 to 3000 Hz. Supply power is taken from the input, and by using a wide range switchmode supply, the same relay can be used in systems with voltages from 18 to 340Vdc. In order to have the same precision for all system voltages, the range 18 to 340Vdc is divided into 4 overlapping subranges, selected by two DIP-switches. By use of another DIP-switch, the sensitivity range can be set from 0.4 to 1.6%, 0.8 to 3.2% or 1.6 to 6.4% of the system voltage.

Operation:

The input voltage is divided into two signals. In order to measure the ripple in % of the varying system voltage, one part is averaged and used to set the internal reference voltage. The other signal, the AC signal related to the ripple, is amplified and conditioned through a bandpass filter in order to avoid false triggering due to frequencies outside the measuring range from 30 to 3000 Hz. The rectified mean value is then compared to a set part of the reference voltage. When the relay is powered up, and the ripple on the input is below the set limit, then the internal relay will pull in and the contacts 11-14 and 21-24 will close. The indication will be a green LED for the input and a yellow for the relay. If the ripple content of the input voltage increases and exceeds the set sensitivity, then the OFF delay starts to elapse, indicated by the red input LED and a yellow timing LED. The relay will drop out when the set OFF delay has expired and the yellow relay LED will extinguish. If the ripple content decreases by 10% of the set limit, the ON delay starts to elapse, indicated by the green input LED and a yellow timing LED. The relay will pull in when the set ON delay has expired and the yellow relay LED will be lit.

Application:

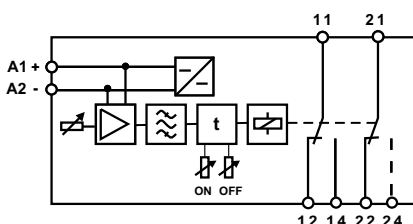
Supervision of DC Power supplies in general or battery chargers in UPS systems.

PROGRAMMABLE FEATURES

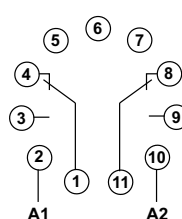
VOLTAGE SETTING	ACTUATOR	RANGE
18 V - 50 V	1	0,4 - 1,6 %
32 V - 100 V	2	0,8 - 3,2 %
64 V - 200 V	3	1,6 - 6,4 %
110 V - 340 V	4	

CONNECTION DIAGRAM

Rail mounting



Socket mounting



SPECIFICATIONS

INPUT		DC voltage 0 - 340V, 374V _{Peak}
Voltage Ranges selectable by dipswitch	18	- 50 V
	32	- 100 V
	64	- 200 V
	110	- 340 V
Ripple Ranges selectable by dipswitch	0.4	- 1.6 %
	0.8	- 3.2 %
	1.6	- 6.4 %
Hysteresis	10 % of Ripple sensitivity	
PERFORMANCE PARAMETERS		
TIMING		
Response time	Approx. 200 msec.	
Time range during run	Separate On and Off delay 0.2 - 10 sec. adjustable	
ELECTRICAL		
Temp. dependence	Typ. $\pm 0.02\%$ / °C	
OUTPUT		Relay, 2 C/O, AgNi
Contact rating	6 A, 250 VAC, 1500 W	
Mechanical life	30 million operations	
SUPPLY		DC voltage from input
Power consumption	Max. 3 W	
GENERAL		
Temperature range	- 25 °C to + 55 °C ambient	
Humidity	Up to 90 % RH non-condensing	
Dielectric test voltage	Coil to relay contacts Pole to pole	
Weight	0.22 kg	



EMC directive 89/336:			International Standards	
			Emission and	EN50263:2000
			Immunity	EN61000-3-2
				EN61000-3-3
Low voltage directive 73/23:			Electrical Relays	EN60255

ORDERING INFORMATION

EXAMPLE:
DC voltage monitoring control relay

TYPE
DC voltage monitoring control relay

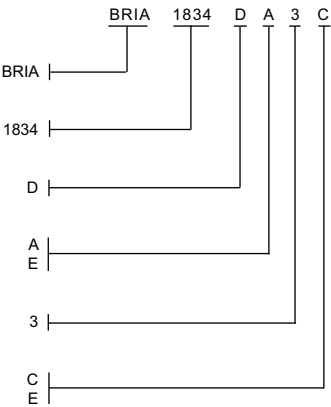
INPUT AND SUPPLY VOLTAGE
18 - 340 Vdc

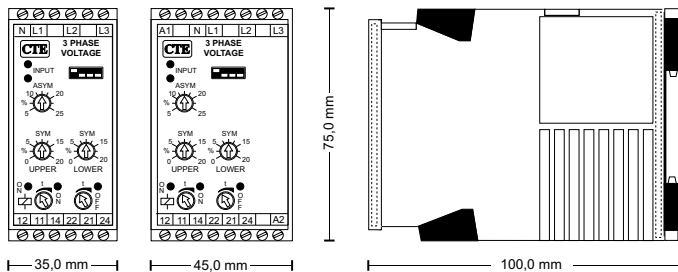
ADJUSTMENT
Trimpot and dipswitch adj.

HOUSING
Rail mounting
Socket Mounting

SIZE
35 mm.

CODE
Code end
Extended code





3 PHASE VOLTAGE CONTROL RELAY

PADA, PADI
PANA, PANI

FEATURES

- **Detect phase-loss and phase-regeneration in three phase systems**
- **High sensitivity for the protection of motors and power transformers**
- **Insensitive to harmonics and spikes as the detection system includes a narrow band pass filter**
- **Adjustable version with individual adjustments for unbalanced and balanced under- and overvoltage settings**
- **Function setting with dipswitch**
- **Time delay - on and off - individually adjustable**
- **One unit for three mains voltages**
- **LED indicates the state of input, relay and timing function**

Description:

The phase failure relays are designed for applications where a three-phase system needs to be monitored for unbalance or deviation in balanced voltage. The relays includes a standard timing function. In addition the PADI and PANI offers a true time delay on drop out even at total power failure. The relay works in "fail safe" mode and need no external power supply. If an external stable power supply is available the 45mm housing offers separate terminals for internal power.

A - function monitors the three-phase system for unbalance due to phase angle and phase voltage deviations e.g. a blown fuse or a bad connection.

B - function monitors the three-phase system for both unbalance (as the A - function) and balanced under voltage.

C - function monitors the three-phase system for both unbalance (as the A - function) and balanced over voltage.

D - function Monitors the three-phase system for all possible deviations by monitoring unbalance and balanced under-and over voltage.

Unbalance due to phase angle and phase voltage deviations is very accurately measured by measuring the inverse phase system relatively to the main system. The method is independent of the actual balanced voltage and very insensitive to electrical noise.

Balanced voltage is measured by rectifying and adding the three-phase voltages.

Operation:

Under normal phase conditions the relay is energized and the green LEDs are switched on. If a phase failure is detected, or the supply voltage for the electronic system is lost, the relay drops out and the LED, related to the type of failure, is switched off.

Application:

To switch off motors automatically before damage due to faulty supply, and to switch them on again as soon as the supply is re-established. E.g. pumps, oilburners, ventilators and refrigerators.

To monitor the three-phase main system and control the use of local emergency generators.

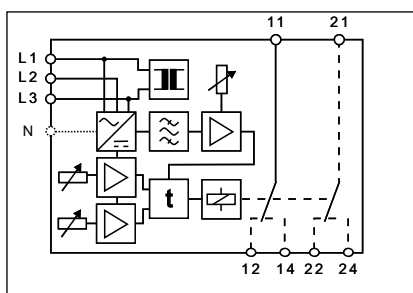
To prevent motors from being switched on to a faulty supply e.g. cranes and elevators.

PROGRAMMABLE FEATURES

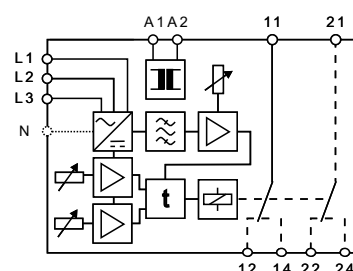
Nominal Voltage Settings Phase to phase				ACTUATOR ■	FUNCTION	SET
Type	Type	Type	Type			
110 V	230 V	400 V	460 V		ASYM	A
100 V	220 V	380 V	440 V		ASYM & SYM LOW	B
110 V	230 V	400 V	460 V		ASYM & SYM HIGH	C
115 V	240 V	415 V	480 V		ASYM & SYM HIGH, LOW	D

CONNECTION DIAGRAM

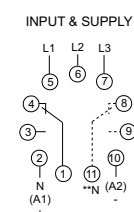
Rail mounting 35mm



Rail mounting 45mm



Socket mounting*



*CE up to 230V phase to phase voltage
**PANA with external supply only 1C/O

SPECIFICATIONS

INPUT

Phase to phase voltage	Type B110:	100, 110 and 115
Selectable by dipswitch	Type B230:	220, 230 and 240
	Type B400:	380, 400 and 415
Input resistance	300 k Ω	100 < U _N < 200 V
	500 k Ω	200 < U _N < 500 V
Frequency range	45 to 66 Hz	
Balanced under voltage	Approx. - 40 %	A & C Function
	0 to - 20 %	B & D Function
Balanced over voltage	0 to + 20 %	C & D Function
Differential		
Unbalance	2 % of U _N	
Balanced	2 % of U _N	

PERFORMANCE PARAMETERS

TIMING

Response time	Approx. 500 msec. with small variation
	Approx. 100 msec. with drop out
Time range during run	Separate On and Off delay
	0 - 10 sec. adjustable
True time delay	PADI & PANI > 6 sec. at total supply loss

ELECTRICAL

Unbalance sensitivity	5 to 25 %
Temp. dependence	Typ. ± 0.02 % / °C
Supply dependence	Typ. ± 0.01 % / % ΔU_N

* Unbalance is tested by varying one phase against neutral keeping the two other phases on nominal value against neutral.

OUTPUT

Relay, 2 C/O	
Contact rating	6 A, 250 VAC, 1500 W
Mechanical life	30 Million operations

SUPPLY

AC voltage direct from L1 & L3	
AC supply range	110 V (From 99 to 140 V)
with transformer	230 V (From 198 to 264 V)
Standard voltage	400 V (From 342 to 484 V)
AC frequency range	45 to 440 Hz
Power consumption	4 VA, 2 W

GENERAL

Temperature range	- 25 °C to + 55 °C ambient
Humidity	Up to 90 % RH non-condensing
Dielectric test voltage	Coil to relay contacts 4000 VAC
	Pole to pole (45 mm.) 2500 VAC
	11-12-14 to 21-22-24
Weight	0.22 kg



International Standards	
EMC directive 89/336:	EN50081 - Emission
	EN50082 - Immunity
Low voltage directive 73/23:	EN60255 - Electrical Relays

ORDERING INFORMATION

EXAMPLE: 35mm Housing

TYPE

3 Phase voltage control relay
3 Phase + N voltage control relay
As PADA + True time delay
As PANA + True time delay

INPUT

with transformer intern connected to L1-L3

100, 110 and 115
220, 230 and 240
380, 400 and 415
440, 460 and 480

ADJUSTMENT

Trimpot and dipswitch adj.

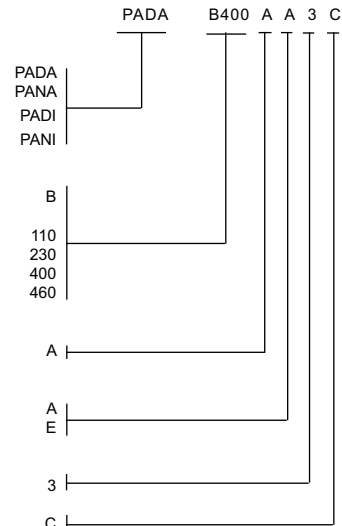
HOUSING

Rail mounting
socket 11 pin

SIZE

35 mm.

CODE END



EXTERNALLY SUPPLY CONECTIONS

EXAMPLE: 45mm Housing

TYPE

3 Phase voltage control relay
3 Phase + N voltage control relay

NOMINAL INPUT

standart input

100, 110 and 115V
220, 230 and 240V
380, 400 and 415V
440, 460 and 480V
(other voltages on request)

10.0 to 99.9 V
100. to 999. V

SUPPLY

AC with transformer

SUPPLY VOLTAGE

From 80 to 138 V
From 176 to 288 V
From 304 to 498 V
From 352 to 576 V

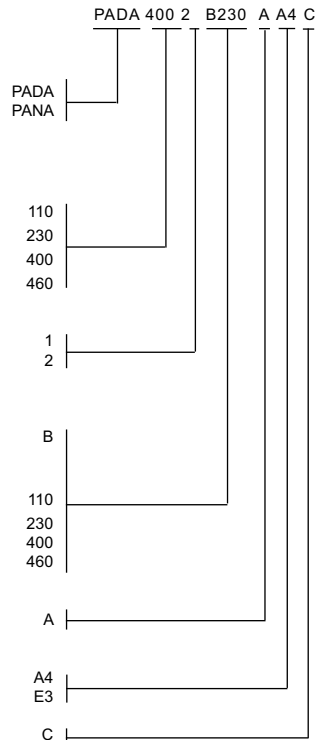
ADJUSTMENT

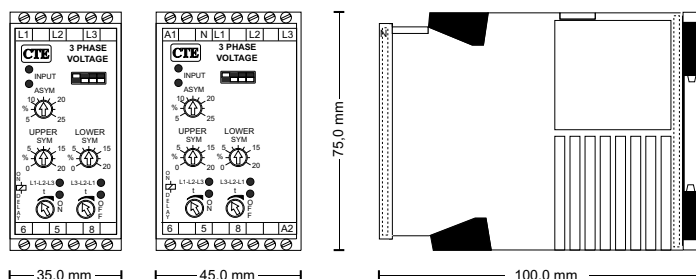
Trimpot and dipswitch adj.

HOUSING

Rail mounting 45 mm.
Socket 11 pin 35mm.

CODE END





3-PHASE SEQUENCE CONTROL & PHASE MONITORING RELAY

3 wire: PAHA & PAHI
4 wire: PAMA & PAMI

FEATURES

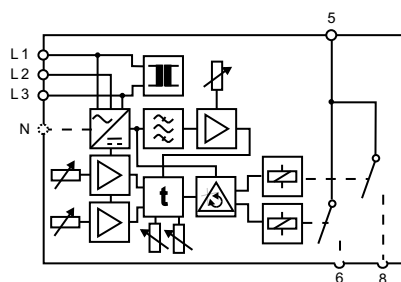
- Active contact function for both phase sequences with two relays
- Detects phase sequence, phase failure, phase regeneration and phase loss in three-phase mains
- High sensitivity for the protection of installations, control gear, motors and power transformers
- Time delay - on and off - individually adjustable. PAHI and PAMI includes a true time delay independent of the power supply
- Insensitive to harmonics and spikes as the detection system includes a narrow band pass filter
- Adjustable set points with individual adjustments for unbalanced and balanced under and over voltage settings
- Function setting with DIP-switch
- 12 standard mains voltages covered by just 4 units
- LED indication of the state of input, relay and timing function

PROGRAMMABLE FEATURES

VOLTAGE SETTING				ACTUATOR ■	FUNCTION	SET
TYPE	TYPE	TYPE	TYPE			
110 V	230 V	400 V	460 V		ASYM	A
100 V	220 V	380 V	440 V		ASYM & SYM LOW	B
110 V	230 V	400 V	460 V		ASYM & SYM HIGH	C
115 V	240 V	415 V	480 V		ASYM & SYM HIGH, LOW	D

CONNECTION DIAGRAM

35mm Rail mounting



With correct Voltage
Phase Sequence Relay Contact
L1-L2-L3 : 5-6 on
L3-L2-L1 : 5-8 on

Description:

The PAHA & PAHI are 3 wire relays for sequence control and phase monitoring. The PAHI includes a true time delay. The PAMA & PAMI are 4 wire relays for sequence control and phase and neutral monitoring. The PAMI includes a true time delay.

The phase sequence and phase and neutral monitoring relays are designed for applications where the sequence of a three-phase system needs to be controlled. In addition to the sequence control the relays monitors the three-phase system for phase unbalance, and according to the selected setting, they can further monitor balanced under or over voltage, as well as both under and over voltage. The relays work in "fail-safe" mode and the 35mm modules need no external power supply. If an external stable power supply is available, the 45mm modules offer separate terminals for the internal power.

Unbalance, due to phase angle and phase voltage deviation, is very accurately measured by measuring the inverse phase system relatively to the main system. The method is independent of the actual balanced voltage and perfect for the protection of three-phase motors, generators and transformers. The measuring system is insensitive to higher harmonics and secures the relays from false triggering due to "noisy" power lines. As the measuring system includes the phase angles in the measurement, it provides full protection against regenerated phases. Balanced voltage is measured by adding the three individual rectified phase voltages.

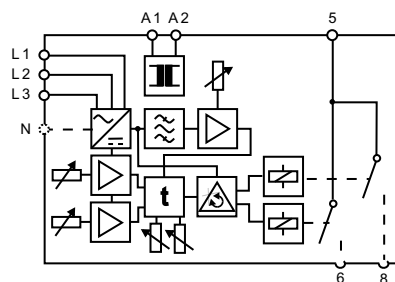
Operation:

Under normal phase conditions the green input LED is on and one of the sequence sensitive relays will be energized, indicated by a yellow LED. The yellow LED, next to the description, shows the sequence of the three-phase system. If there is a phase deviation beyond one of the set levels, the failure will be detected, and the red input LED will go on. During the set delay period the yellow timing LED for off delay will be on. At the end of the timing period the relay will drop out and only the red input LED will stay on. If the common phase voltage drops below -40%, the relay will drop out, even if the under voltage detection is disabled. If the phase or the separate supply voltage is lost, the relay and all LED's will de-energize with out delay for PAHA and PAMA. The PAHI and PAMI will be able to hold the relays for more than 6 sec.

Application:

To prevent motors from rotating in the wrong direction and being switched on to a faulty supply. Motor protection by controlling the direction of rotation and on-off switching depending on supply conditions. E.g. pumps, compressors, ventilators and refrigerators. Automatic control of phase sequence and monitoring of phase and neutral voltages in mobile equipment like refrigerated containers, control and distribution panels and machines used on building sites and on service jobs.

45mm Rail Mounting



SPECIFICATIONS

MEASURING CIRCUIT

Phase to phase voltage	Type B110: 100, 110 and 115
Selectable by DIP switch	Type B230: 220, 230 and 240
	Type B400: 380, 400 and 415
	Type B460: 440, 460 and 480
Input resistance	300 k Ω 100 < U _N < 200 V
	500 k Ω 200 < U _N < 480 V
Frequency range	45 to 66 Hz
Unbalance sensitivity *	Adj. 5 to 25 %
Balanced under voltage	Approx. - 40 % A - Function
	Adj. 0 to - 20 % B - & D - Function
Balanced over voltage	Adj. 0 to + 20 % C - & D - Function
Differential	
Unbalance	2 % of U _N
Balanced	2 % of U _N

* Unbalance is defined and tested by varying one phase against neutral keeping the two other phases on nominal value against neutral.
The 4-wire units PAMA & PAMI are further tested for the same sensitivity by varying neutral, keeping the three phase to phase voltages on nominal values.

PERFORMANCE PARAMETERS

TIMING

Response time	100 to 500 msec. depending on fault
	Approx. 100 msec. with drop out
Time range during run	Separate On and Off delay
	0 - 10 sec. adjustable
True time delay	PAHI & PAMI > 6 sec. at total supply loss
ELECTRICAL	
Temp. dependence	Typical: $\pm$ 0.02 % / °C
Supply dependence	Typical: $\pm$ 0.01 % / Δ U

OUTPUT

Contact rating	Relay, 2 NO (moving contact connected)
Mechanical life	6 A, 250 VAC, 1500 W
	30 Million operations

SUPPLY

AC supply range	AC voltage from L1 & L3
with transformer	110 V (From 80 to 138 V)
Standard voltage	230 V (From 176 to 288 V)
	400 V (From 304 to 498 V)
	460 V (From 352 to 576 V)
	AC/DC voltage from A1 & A2
	24 to 480V can be specified
AC frequency range	45 to 440 Hz
Power consumption	4 VA, 2 W

GENERAL

Temperature range	- 25 °C to + 55 °C ambient
Humidity	Up to 90 % RH non-condensing
Dielectric test voltage	Coil to relay contacts 4000 VAC
Weight	0.22 kg



Directive 2002/95/EC of
27 January 2003

EMC directive 89/336: Emission and EN50283:2000
Immunity EN61000-3-2
EN61000-3-3

Low voltage directive 73/23: Electrical Relays EN60255

International Standards

RoHS

Emission and
Immunity

Electrical Relays

ORDERING INFORMATION

EXAMPLE: 35mm Housing Internal supply connection

TYPE

3 Phase sequence & voltage relay
3 Phase + N sequence & voltage relay
PAHA + True time delay
PAMA + True time delay

INPUT

Standard voltages
Transformer internal connected to L1-L3

100, 110 and 115
220, 230 and 240
380, 400 and 415
440, 460 and 480

ADJUSTMENT

Trimpot and dipswitch adj.

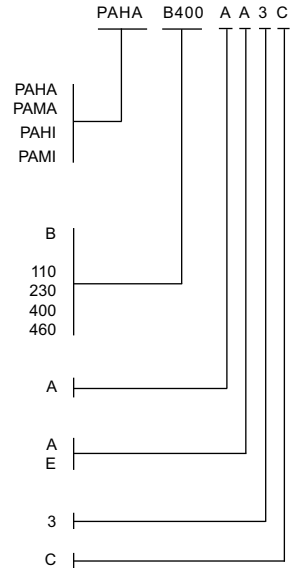
HOUSING

Rail mounting
Socket 11-pin

SIZE

35 mm.

CODE END



EXAMPLE: 45mm w/socket External supply connections

TYPE

3-Phase sequence & voltage relay
3-Phase + N sequence & voltage relay
PAHA + True time delay
PAMA + True time delay

INPUT

standard voltages
100, 110 and 115V
220, 230 and 240V
380, 400 and 415V
440, 460 and 480V
(other voltages on request)
10.0 to 99.9 V
100. to 999. V

SUPPLY

AC with transformer
AC/DC with switch mode supply

SUPPLY VOLTAGE

From 19.2 to 28.8 V
From 38.4 to 57.6 V
From 80 to 138 V
From 176 to 288 V
From 304 to 498 V
From 352 to 576 V
(other voltages on request)

ADJUSTMENT

Trimpot and dipswitch adj.

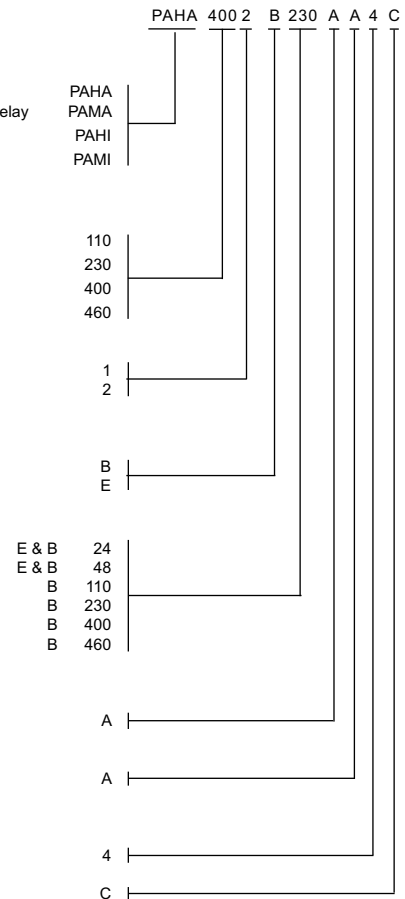
HOUSING

Rail mounting
Socket 11-pin

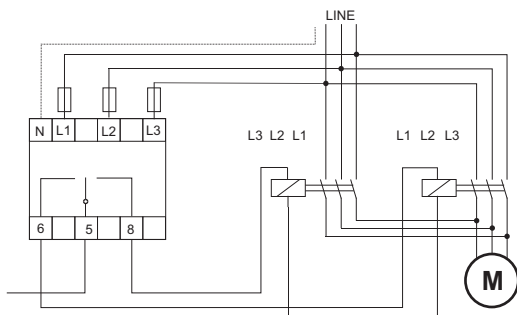
SIZE

45 mm.

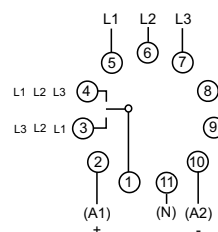
CODE END



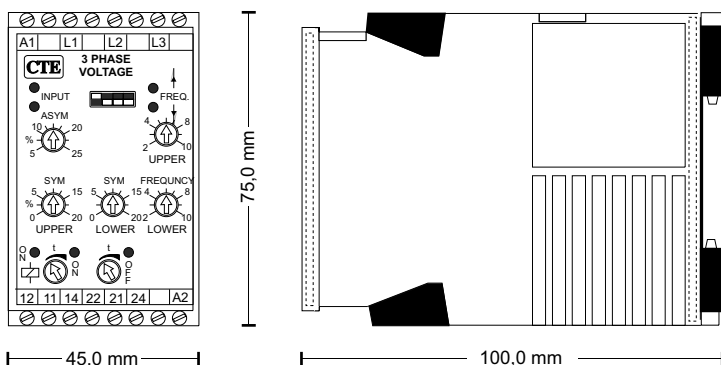
APPLICATION DIAGRAM



SOCKET MOUNTING*



*CE up to 230V phase to phase voltage



3 PHASE & 3 PHASE + N VOLTAGE & FREQUENCY CONTROL RELAY

PAFA, PAGA
PAFB, PAGB

FEATURES

- Detect phase-loss and phase-regeneration in three phase systems
- High sensitivity for protection of motors and power transformers
- Insensitive to harmonics and spikes as the detection system includes a narrow band pass filter
- Adjustable version with individual adjustments for unbalanced and balanced under- and overvoltage settings and under- and overfrequency settings
- Function setting with dipswitch
- Ceramic resonator controlled reference
- Time delay - on and off - individually adjustable
- One unit for three mains voltages
- LEDs indicate the state of the frequency
- LED indicates the state of input
- LED indicates the state of relay
- LEDs indicate the timing function

Description:

The phase failure relays are designed for applications where a three-phase system needs to be monitored for unbalance or deviation in balanced voltage or deviation in frequency. PAFB includes a standard timing function. the PAFB offers separate terminals for internal power.

A - function monitors the three-phase system for unbalance due to phase angle and phase voltage deviations e.g. a blown fuse or a bad connection.

B - function monitors the three-phase system for both unbalance (as the A - function) and balanced under voltage.

C - function monitors the three-phase system for both unbalance (as the A - function) and balanced over voltage.

D - function Monitors the three-phase system for all possible deviations by monitoring unbalance and balanced under-and over voltage.

Unbalance due to phase angle and phase voltage deviations is very accurately measured by measuring the inverse phase system relatively to the main system. The method is independent of the actual balanced voltage and very insensitive to electrical noise.

Balanced voltage is measured by rectifying and adding the three-phase voltages.

Operation:

Under normal phase conditions the relay is energized and the green LEDs are switched on. If a phase failure is detected, or the supply voltage for the electronic system is lost, the relay drops out and the LED, related to the type of failure, is switched off.

Application:

To switch off motors automatically before damage due to faulty supply, and to switch them on again as soon as the supply is re-established. E.g. pumps, oilburners, ventilators and refrigerators. To monitor the three-phase main system and control the use of local emergency generators.

To prevent motors from being switched on to a faulty supply e.g. cranes and elevators.

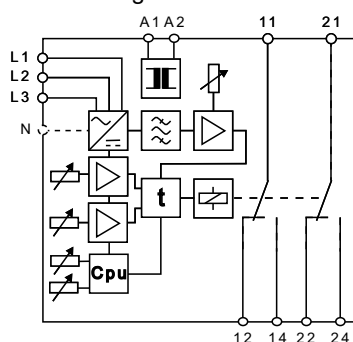
To monitor the mains frequency and control the use of local generators or stand-by supplies.

To protect dieselgenerator plants against over and under speed.

To protect electrical and electronic equipment from damage due to over and under frequency

CONNECTION DIAGRAM

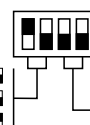
Rail mounting



PROGRAMMABLE FEATURES

Nominal Voltage Settings
Phase to phase

Type	Type	Type	Type
110 V	230 V	400 V	460 V
100 V	220 V	380 V	440 V
110 V	230 V	400 V	460 V
115 V	240 V	415 V	480 V



ACTUATOR ■

FUNCTION

FUNCTION	TYPE
ASYM	A
ASYM & SYM LOW	B
ASYM & SYM HIGH	C
ASYM & SYM HIGH, LOW	D

SPECIFICATIONS

INPUT

Phase to phase voltage	Type B110:	100, 110 and 115
Selectable by dipswitch	Type B230:	220, 230 and 240
	Type B400:	380, 400 and 415
Input resistance	300 k Ω	100 < U _N < 200 V
	500 k Ω	200 < U _N < 500 V
Frequency range	45 to 66 Hz	Unbalance
Balanced under voltage	Approx. - 40 %	A & C Function
	0 to - 20 %	B & D Function
Balanced over voltage	0 to + 20 %	C & D Function
Differential		
Unbalance	2 % of U _N	
Balanced	2 % of U _N	

PERFORMANCE PARAMETERS

TIMING

Response time	Approx. 500 msec. with small variation
	Approx. 100 msec. with drop out
Time range during run	Separate On and Off delay
	0 - 10 sec. adjustable
Frequency unit	
Differential	Fixed approx. 10 % of tripping deviation.
Ref. deviation	± 0.5 %
Ref. temp. dependence	± 0.3 % (-20 to 80°C)
Response time	max 200 msec.

ELECTRICAL

Unbalance sensitivity	5 to 25 %
Temp. dependence	Typ. ± 0.02 % / °C
Supply dependence	Typ. ± 0.01 % / % Δ U _N

* Unbalance is tested by varying one phase against neutral keeping the two other phases on nominal value against neutral.

OUTPUT

Relay, 2 C/O	
Contact rating	6 A, 250 VAC, 1500 W
Mechanical life	30 Million operations

SUPPLY

AC voltage	110 V (From 75 to 127 V)
AC supply range	230 V (From 165 to 264 V)
with transformer	400 V (From 285 to 457 V)
Standard voltage	460 V (From 330 to 528 V)

AC frequency range	45 to 440 Hz
Power consumption	4 VA, 2 W

GENERAL

Temperature range	- 25 °C to + 55 °C ambient
Humidity	Up to 90 % RH non-condensing
Dielectric test voltage	Coil to relay contacts 4000 VAC
	Pole to pole (45 mm.) 2500 VAC
	11-12-14 to 21-22-24
Weight	0.22 kg



EMC directive 89/336:

International Standards

EN50081 - Emission

EN50082 - Immunity

Low voltage directive 73/23:

EN60255 - Electrical Relays

ORDERING INFORMATION

EXAMPLE: TYPE

3 Phase voltage & frequency control relay with separatet supply terminals	PAFA
3 Phase + N voltage & frequency control relay with separatet supply terminals	PAGA
3 Phase voltage & frequency & Rotation control relay with separatet supply terminals	PAFB
3 Phase + N voltage & frequency & Rotation control relay with separatet supply terminals	PAGB

INPUT

100, 110 and 115	1102
220, 230 and 240	2302
380, 400 and 415	4002
440, 460 and 480	4602

FREQUENCY

Center frequency 50Hz	F5
Center frequency 60Hz	F6
frequency range ± 2-10%	10
frequency range ± 4-20%	20

SUPPLY

AC with transformer

100, 110 and 115	110
220, 230 and 240	230
380, 400 and 415	400
440, 460 and 480	460

ADJUSTMENT

Trimpot and dipswitch adj.

HOUSING

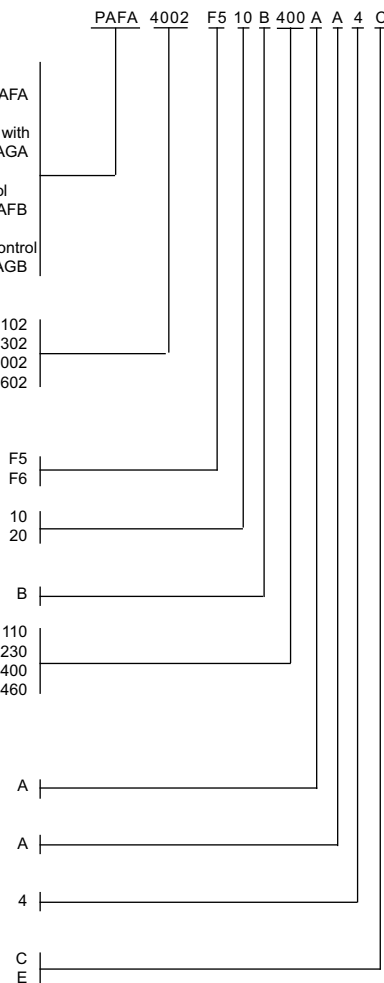
Rail mounting

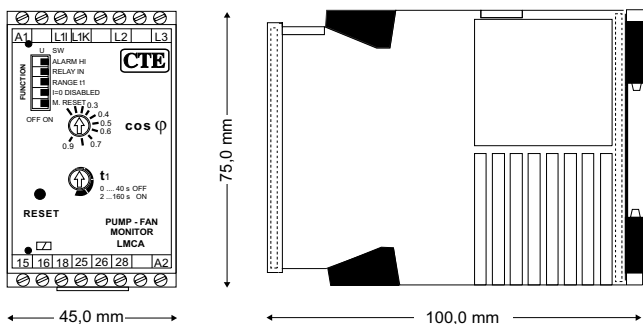
SIZE

45 mm.

CODE

Code end
Extended Code





LOAD MONITOR

Power Factor $\cos \varphi$

Type: LMCA

FEATURES

- Fan monitoring (V-belt break)
- Filter monitoring (filter blockage)
- Protection for single and 3-phase lightly loaded motors.
- Current transformer may be connected for $I_N > 10 \text{ A}$
- Suitable for frequency converter
- Voltage range: 1-phase 24-230 V, 3-phase 24 - 400 V
- Current range 0,5 - 10 A

Description:

The load monitor determines the phase angle $\cos \varphi$, which is the phase shift between current and voltage of asynchronous motors. The load monitor is directly connected to the motor and no additional sensors are required.

Because the phase angle depends on motor loading, it represents a directly measurable variable for the motor loading.

The set point $\cos \varphi$ reacts either to an excessive or insufficient freely selectable phase angle. After a set period of time, the relay R switches to failure position and the LED is switched on.

Application:

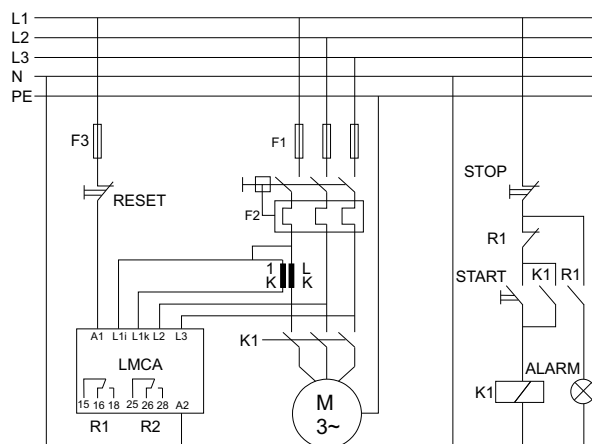
Load monitoring of pumps and fans and other lightly loaded motors.

Controlling the input flow rate at which new material is fed into, for instance, a grinding gear based on the current load status.

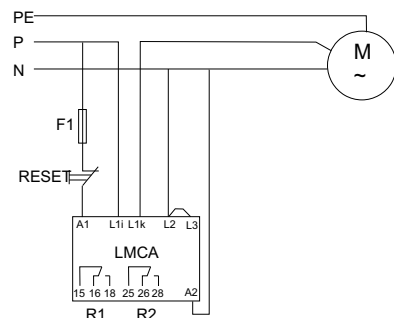
Under load monitoring can recognize power transmission faults (for example, when a V-belt breaks) or flow interruptions to centrifugal pumps and radial fans.

CONNECTION DIAGRAM

Three-phase connection

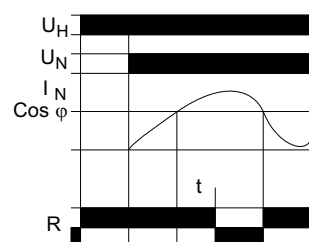


Single-phase connection

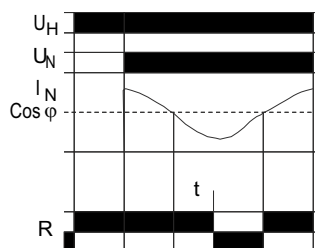


FUNCTION DIAGRAM

Overload monitoring



Underload monitoring



SPECIFICATIONS

INPUT

Rated voltage	1-phase 24 - 230 V 3-phase 24 - 400 V
Rated current	0,5 to 10 A
Phase angle $\cos \varphi$	0.....0.9 adjustable
Hysteresis	Constant at approx. 3-5%
Operating delay	0.5...160 sec. adjustable

PERFORMANCE PARAMETERS

TIMING	
Reset after failure of supply voltage	>20ms
Recovery time	<1sec (measuring circuit)

OUTPUT

2 changeover contacts for power	
Contact voltage	250V~(max.: 440V~250V-)
Continuous current	8 A
Switching capacity	1500 VA (220V-, $\cos \varphi = 1$)
Mechanical life	> 3 x 10 ⁷ operations
Electrical life	> 3 x 10 ⁵ operations (230V~, 5A, $\cos \varphi = 1$)
Contact material	silver-nickel gold plated

SUPPLY

AC supply range with transformer	24, 42, 48, 110, 127, 230, 380, 400, 440 V AC +10%...15% UN
AC frequency range	48 to 63 Hz
Power consumption	2 VA
Duty cycle	100%, class 1c

GENERAL

Temperature range	- 25 °C to + 55 °C ambient
Humidity	Up to 90 % RH non-condensing
VDE 0435	Test voltage 2000V~
VDE 0110	Group B 250V~

DIN rail installation in accordance with DIN 46277/3
(European std.EN 50022)

Protection class IP 40 in accordance with VDE 0106 and VBG4
Screw terminals up to 4mm², protection rating IP 20
Terminal designation and arrangement in accordance with
DIN 46199

Weight 0.14 kg in 45 mm. housing



EMC directive 89/336:	International Standards EN50081 - Emission EN50082 - Immunity
Low voltage directive 73/23:	EN60255 - Electrical Relays

ORDERING INFORMATION

EXAMPLE:

TYPE
Pump-Fan monitoring relay

SUPPLY
AC with transformer

SUPPLY VOLTAGE

Excl. transformer module	
From 20 to 28 VAC	
From 36 to 46 VAC	
From 41 to 52 VAC	
From 99 to 140 VAC	
From 108 to 139 VAC	
From 198 to 264 VAC	
From 323 to 418 VAC	
From 342 to 440 VAC	
From 374 to 484 VAC	

ADJUSTMENT

Trimpot and dipswitch adj.

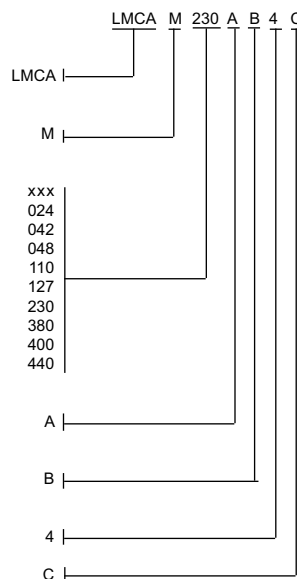
HOUSING

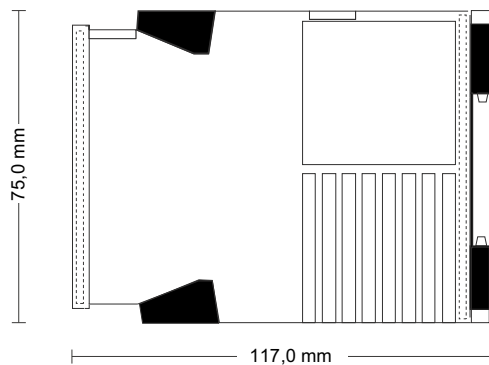
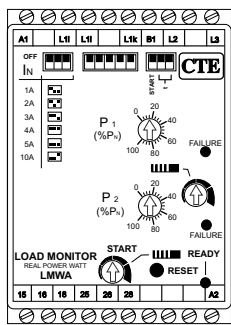
Rail mounting.(internal transformer)

SIZE

45 mm. 2 C/O

CODE END





LOAD MONITOR Real Power Watt Type: LMWA

FEATURES

- Load monitoring for motors
- 3~ 100 to 400 V or 1~ 60 to 230 V
- 23 to 6930 W without current transformer
- Minimum and maximum monitoring or 2 switchable maximum thresholds
- Start-surge delay
- Switching delay

Description:

The unit monitors the load (active power) of 1 - and 3-phase motors or any 1 phase or symmetrical 3-phase load. No additional sensors are required. 6 ranges up to 10 A are available for the load-current. Monitors motor-loads up to 6930 W without external current transformer.

Two setpoints can be adjusted for either one maximum and one minimum level or two distinct maximum levels. The status of each level is signaled by a separated output relay.

The setpoints are equipped with an adjustable time delay for the output of an error message. During timing between error and error-message the associated status LED is flashing (in case of 2-maximum monitoring P1 works undelayed with latch function). Relay-position of output-relays is selectable by DIP-switch.

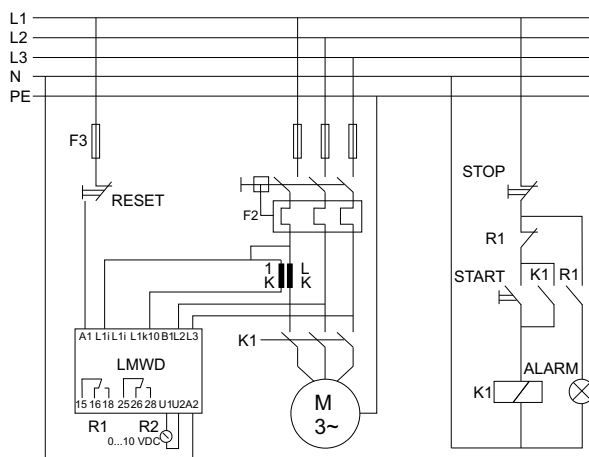
Individual latch (memory) for minimum and maximum selectable. The unit is equipped with a start up-delay (signalized by flashing of a green Power-LED) past connection of auxiliary voltage to suppress error message during machine start.

Application:

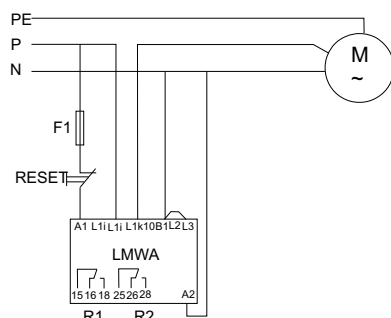
Load monitoring for motors.

CONNECTION DIAGRAM

Three-phase connection

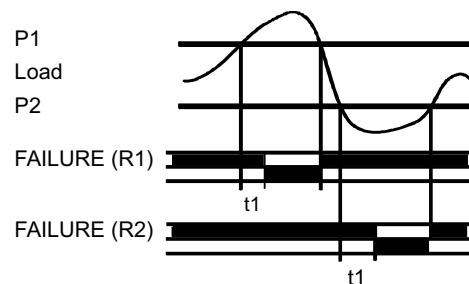


Single-phase connection

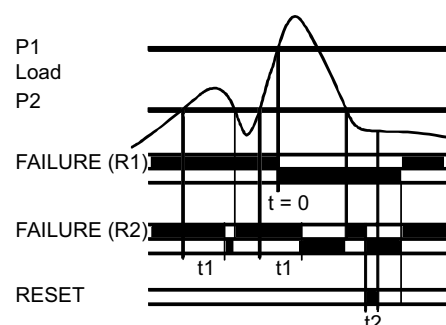


FUNCTION DIAGRAM

Minimum and maximum monitoring



2-level maximum monitoring



SPECIFICATIONS

INPUT

Rated voltage	1-phase 60 to 230 V 3-phase 100 to 400 V
Rated current	1 to 10 A
Load	0 to 100% of nominal load
Impedance	<20 mΩ
Nominal current	1, 2, 3, 4, 5, 10 A
I=0 detection	active below approx 5% of nominal range

PERFORMANCE PARAMETERS

TIMING	
Reset after failure	>20ms
of supply voltage	
Recovery time	<1 sec.
Start up delays	1...100 sec.
Error message	0.1...50 sec.

OUTPUT

2 separate changeover (1 for each limit)	
Contact voltage	250V~(max.: 440V~250V~)
Continuous current	5 A
Switching capacity	1200 VA (220V~, cos φ = 1)
Mechanical life	> 3 x 10 ⁷ operations
Electrical life	> 3 x 10 ⁵ operations (230V~, 5A, cos φ =1)
Contact material	silver-nickel thin film gold plated

SUPPLY

AC supply range	
with transformer	12, 24, 42, 48, 110, 127, 230, 400, 440, 500 V AC +10%...15% UN
AC frequency range	48 to 63 Hz
Power consumption	4 VA
Duty cycle	100%, class 1c

GENERAL

Temperature range	- 25 °C to + 55 °C ambient
Humidity	Up to 90 % RH non-condensing
VDE 0435	Test voltage 2000V~
VDE 0110	Group B 250V~

DIN rail installation in accordance with DIN 46277/3 (European std. EN 50022)

Protection class IP 40 in accordance with VDE 0106 and VBG4

Screw terminals up to 4mm², protection rating IP 20

Terminal designation and arrangement in accordance with DIN 46199

Weight	0.19 kg in 55 mm. housing
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EMC directive 89/336:

International Standards

EN50081 - Emission

EN50082 - Immunity

Low voltage directive 73/23:

EN60255 - Electrical Relays

ORDERING INFORMATION

EXAMPLE:

TYPE

Load monitoring relay

SUPPLY

AC with transformer

SUPPLY VOLTAGE

Excl. transformer module	
From 10 to 13 VAC	
From 20 to 28 VAC	
From 35 to 46 VAC	
From 41 to 52 VAC	
From 99 to 140 VAC	
From 108 to 139 VAC	
From 198 to 264 VAC	
From 341 to 440 VAC	
From 374 to 484 VAC	
From 425 to 550 VAC	

ADJUSTMENT

Trimpot and dipswitch adj.

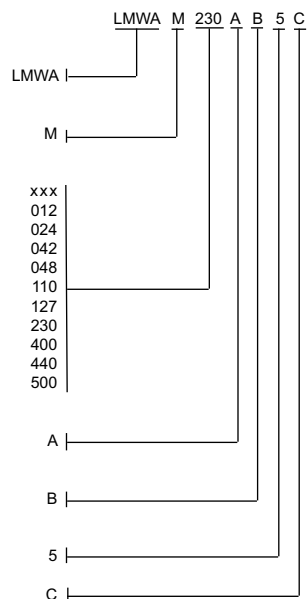
HOUSING

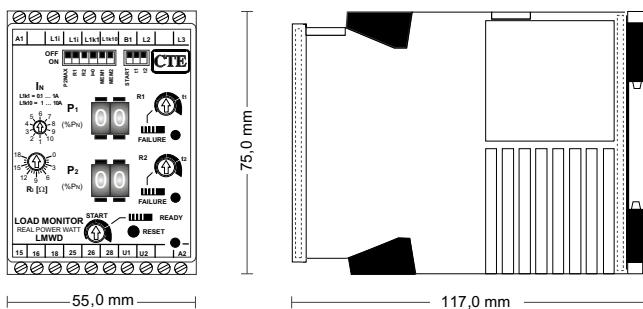
Rail mounting.(internal transformer)

SIZE

55 mm. 2 C/O

CODE END





LOAD MONITOR

Real Power Watt

Type: LMWD

FEATURES

- Real power monitoring
- 23 to 6930 W without current transformer
- Voltage range: 3-phase 120 - 500 V, 1-phase 70 - 290 V
- Minimum and maximum monitoring or 2 switchable maximum thresholds
- Start-surge delay
- Switching delay
- Digital adjustment
- Analog output

Description:

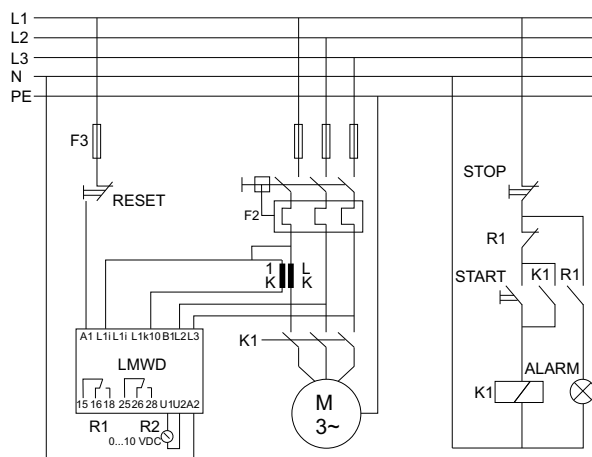
The unit monitors the load (active power) 1- and 3-phase motors or any 1 -phase or symmetric at 3-phase load. No additional sensors are required. 20 ranges for the load's-current up to 10 A are available. The motors impedance is corrected by CTE's unique compensation method to improve accuracy of measurement. Two setpoints can be adjusted for either one maximum and one minimum level or two distinct maximum levels. The status of each level is signalized by a separated output relay. Each setpoint is equipped with an individual adjustable time delay for the output of an error message. During timing between error and error message the associated status LED is flashing. Relay position and latch function of output relays is selectable by DIP-switch. The unit is equipped with a start-up-delay (signalized by flashing of a green LED) post connection of auxiliary voltage to suppress error message during machine start.

Application:

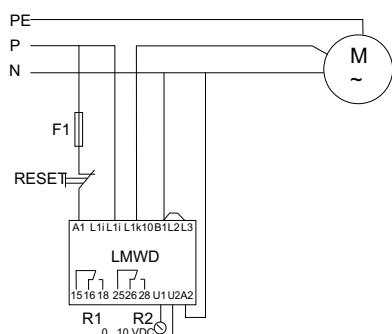
Load monitoring for motors.

CONNECTION DIAGRAM

Three-phase connection

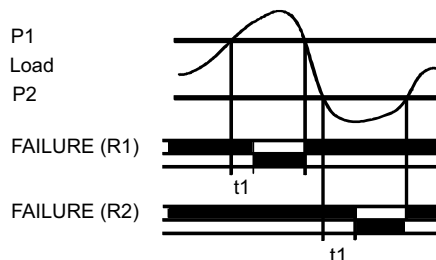


Single-phase connection

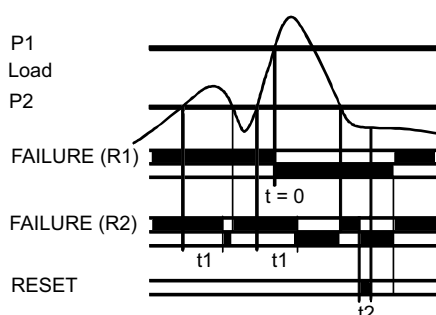


FUNCTION DIAGRAM

Minimum and maximum monitoring



2-level maximum monitoring



SPECIFICATIONS

INPUT

Rated voltage	1-phase 70 to 290 V 3-phase 120 to 500 V
Rated current	0.1 to 10 A
Load	0 to 100% of nominal load
Impedance	<20 mΩ
I=0 detection	active below approx 5% of nominal range
Nominal current	1, 2, 3, 4, 5, 10 A

PERFORMANCE PARAMETERS

TIMING	
Reset after failure of supply voltage	>20ms
Recovery time	<1 sec.
Start up delays	1...100 sec.
Error message	0.1...50 sec.

OUTPUT

2 separate changeover (1 for each limit)	
Contact voltage	250V~(max.: 440V~250V-)
Continuous current	5 A
Switching capacity	1200 VA (220V~, cos φ = 1)
Mechanical life	> 3 x 10 ⁷ operations
Electrical life	> 3 x 10 ⁵ operations (230V~, 5A, cos φ = 1)
Contact material	silver-nickel thin film gold plated

SUPPLY

AC supply range with transformer	12, 24, 42, 48, 110, 127, 230, 400, 440, 500 V AC +10%...15% UN
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AC frequency range	48 to 63 Hz
Power consumption	4 VA

Duty cycle	100%, class 1c
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GENERAL

Temperature range	- 25 °C to + 55 °C ambient
Humidity	Up to 90 % RH non-condensing
VDE 0435	Test voltage 2000V~
VDE 0110	Group B 250V~

DIN rail installation in accordance with DIN 46277/3 (European std. EN 50022)

Protection class IP 40 in accordance with VDE 0106 and VBG4
Screw terminals up to 4mm², protection rating IP 20
Terminal designation and arrangement in accordance with DIN 46199

Weight	0.22 kg in 55 mm. housing
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EMC directive 89/336:	International Standards EN50081 - Emission EN50082 - Immunity
Low voltage directive 73/23:	EN60255 - Electrical Relays

ORDERING INFORMATION

EXAMPLE:

TYPE
Load monitoring relay

SUPPLY
AC with transformer

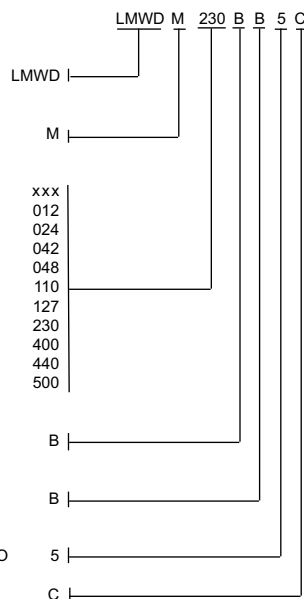
SUPPLY VOLTAGE
Excl. transformer module
From 10 to 13 VAC
From 20 to 28 VAC
From 35 to 46 VAC
From 41 to 52 VAC
From 99 to 140 VAC
From 108 to 139 VAC
From 198 to 264 VAC
From 341 to 440 VAC
From 374 to 484 VAC
From 425 to 550 VAC

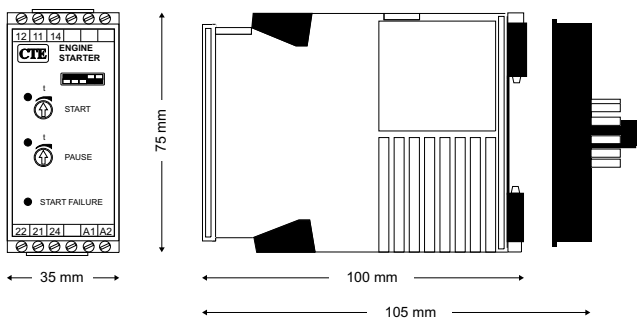
ADJUSTMENT
Trimpot and thumbwheel adj.

HOUSING
Rail mounting.(internal transformer)

SIZE
55 mm. (with 0 - 10 VDC output) 2 C/O

CODE END





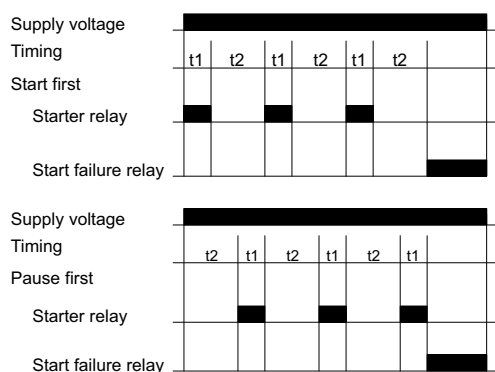
ENGINE STARTER RELAY

Type: ESPA

FEATURES

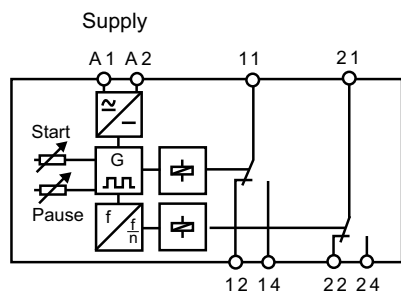
- **Extremely resistant to supply voltage drops**
- **Up to 15 programmable start attempts**
- **First timing period either start or pause**
- **Start and pause time are separately adjustable**
- **Free contact for start failure**
- **LEDs indicate start, pause or start failure**
- **Small outlines**

FUNCTION DIAGRAM



CONNECTION DIAGRAM

Rail mounting



Starter relay	11, 12, 14
Start failure relay	21, 22, 24

Description:

The engine starter relay is designed for automatic start of petrol, gas or diesel engines. The relays are provided with a separate alarm contact for start failure.

ESPA is basically for 12 and 24 V DC supply.

Operation:

The starter relay is a cyclic timer with independently adjustable time periods t1 and t2 making one cycle. The output relay is energized through t1 and de-energized through t2.

If the relay is coded for start first the period t1 begins when the supply voltage is applied. This is followed by the periods t2, t1, t2 etc. The number of cycles is counted.

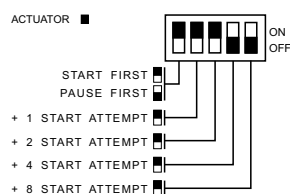
If the relay is coded for pause first the period t2 begins when the supply voltage is applied. This is followed by the periods t1, t2, t1 etc. The number of cycles is counted.

When the counter has counted to the precoded amount of cycles and the time for the last cycle is expired the relay drops out and the start failure relay pulls in. The start failure relay can be released and the counter reset by removing the power supply.

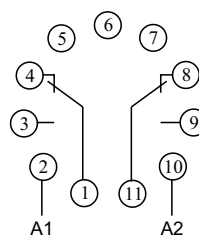
Application:

Automatic starting of engines driving generators, refrigerators and pumps.

PROGRAMMABLE FEATURES



Socket mounting



Starter relay	1, 3, 4
Start failure relay	11, 8, 9

SPECIFICATIONS

PERFORMANCE PARAMETERS

TIMING	
Time range adjustable	0.5 to 10 sec. start time 1.0 to 20 sec. pause time
ELECTRICAL	
Repetition accuracy	± 1 %
Range tolerance	± 20 %
Temp. dependence	Typ. ± 0.03 % / °C
Supply dependence	Typ. ± 0.01 % / % ΔU
OUTPUT	
Relay, 2 x 1 C/O	
Contact rating	6 A, 250 VAC, 1250 W
Mechanical life	30 million operations
SUPPLY	
DC voltage	12 - 24 VDC (9 - 30 VDC)
DC supply range	
Power consumption	4 VA, 2 W
GENERAL	
Temperature range	- 25 °C to + 55 °C
Humidity	Up to 90 % RH non-condensing
Dielectric test voltage	Coil to relay contacts 4000 VAC Pole to pole (45 mm.) 2500 VAC
Weight	0.13 kg



EMC directive 89/336:	International Standards EN50081 - Emission EN50082 - Immunity
Low voltage directive 73/23:	EN60255 - Electrical Relays

ORDERING INFORMATION

EXAMPLE:

TYPE
Engine starter

SUPPLY
DC

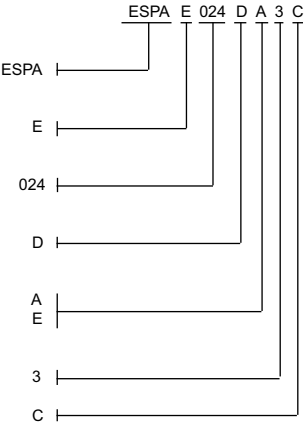
SUPPLY VOLTAGE
From 9 - 30 VDC

ADJUSTMENT
Dipswitch adjustable.

HOUSING
Housing, rail mounting
Housing, socket 11 pin

SIZE
35 mm.

CODE END

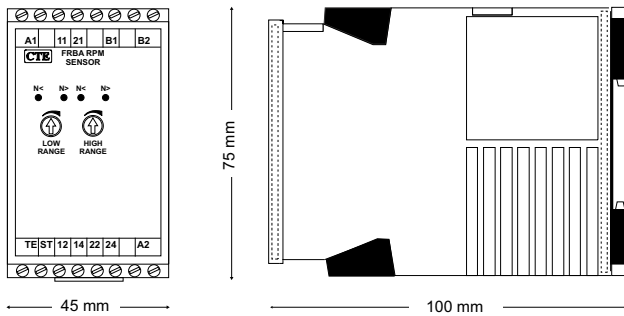




COMBINED STARTER INHIBIT & OVER-SPEED RELAYS

Type: FRAA for 12 V

Type: FRBA for 24 V



FEATURES

- **Extremely resistant to supply voltage drops**
- **Measurement of r.p.m. is based on frequency**
- **Both relays detect high frequency in less than 300 msec.**
- **The high range setting can be adjusted and tested at normal speed**
- **LEDs indicate the state of the input**

Description:

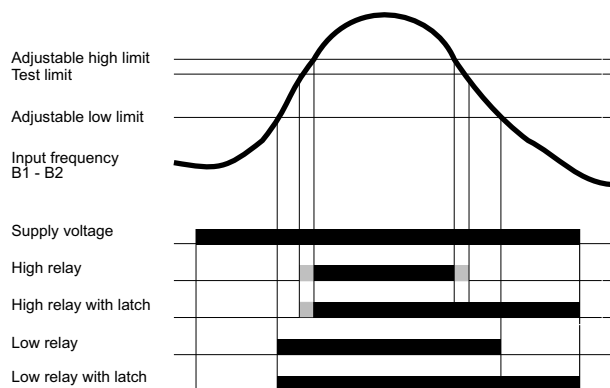
The starter inhibit & over-speed relay are designed for automatic start of petrol, gas or diesel engines and to prevent engine damage due to failure in the automatic speed control system.

The relays are very accurate monitoring the frequency from either a magnetic pick-up, a tachogenerator or the main generator.

Operation:

When the supply voltage is applied, the LED corresponding to the input frequency (r.p.m.) is switched on. If the frequency (r.p.m.) exceeds the setting the relay pulls in with a time delay of max. 300 msec. When the frequency comes below the setpoint, the relay is de-energized with a delay of approximately 1.5 sec. If the latch function is specified, though, the relay remains energized. The latch function is released by removing the power supply.

FUNCTION DIAGRAM



Test function:

If the testfunction is included, the over-speed limit can be adjusted by connecting the terminals TE and ST and adjust the limit to normal speed. When the connection TE - ST is removed the r.p.m. setting will be increased with e.g. 10% again.

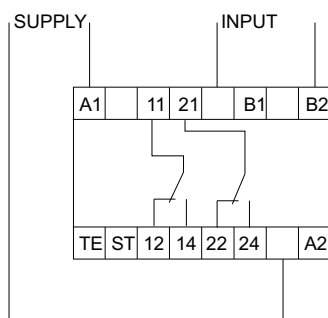
Standard test limits over normal speed are 10%, 15%, 20% or 25% of setting.

Application:

Automatic starters for engines in generator sets, refrigerators and pump units.

CONNECTION DIAGRAM

Rail mounting



Low range 11, 12, 14

High range 21, 22, 24

SPECIFICATIONS

INPUT

Frequency
For Namur sensor DIN 19 234
Optocoupler for external 24 VDC supply
NPN - PNP
Transformer, 30 - 500 VAC

Sensitivity

Adjustable A version 10 - 5120 Hz
50 -100 % of specified range in order code

Max frequency input

approx. 2 x high range

Input resistance

2.0 k Ω for 20 V input range

20 k Ω for 100 V input range

360 k Ω for 500 V input range

Min. voltage req.

0.5 V for 20 V input range

10 V for 100 V input range

30 V for 500 V input range

PERFORMANCE PARAMETERS

TIMING

Response time Max. 300 msec.

ELECTRICAL

Temp. dependence Typ. ± 0.04 % / $^{\circ}\text{C}$

Supply dependence Typ. ± 0.01 % / % ΔU

OUTPUT

Relay, 2 x 1 C/O

Contact rating

6 A, 250 VAC, 1250 W

Mechanical life

30 Million operations

Optocoupler

Transistor rating

10 mA, 50 VDC

SUPPLY

AC / DC voltage

Housing 45mm VOX:

Whitout supply module

FRAA

12V AC/DC

FRBA

24V AC/DC

Voltage range

AC: - 20 % to + 15 %

DC: - 25 % to + 33 %

Power consumption

8 VA, 4 W

GENERAL

Temperature range

- 25 $^{\circ}\text{C}$ to + 55 $^{\circ}\text{C}$

Humidity

Up to 90 % RH non-condensing

Dielectric test voltage

Input to supply 3000 VAC

Coil to relay contacts 4000 VAC

Relay contact to relay contact 2500 VAC

Weight

0.23 kg



EMC directive 89/336:

International Standards

EN50081 - Emission

EN50082 - Immunity

Low voltage directive 73/23:

EN60255 - Electrical Relays

ORDERING INFORMATION

EXAMPLE:

TYPE

FRAA 12 V supply

FRBA 24 V supply

LOW RANGE

INPUT FREQUENCY RANGE

10 - 20 Hz

20 - 40 Hz

40 - 80 Hz

80 - 160 Hz

160 - 320 Hz

320 - 640 Hz

640 - 1280 Hz

1280 - 2560 Hz

2560 - 5120 Hz

HIGH RANGE

INPUT FREQUENCY RANGE

10 - 20 Hz

20 - 40 Hz

40 - 80 Hz

80 - 160 Hz

160 - 320 Hz

320 - 640 Hz

640 - 1280 Hz

1280 - 2560 Hz

2560 - 5120 Hz

INPUT

Namur DIN 19 234

Optocoupler NPN - PNP

Transformer 0.5 to 20 V

10 to 100 V

30 to 500 V

LATCHING

Relay not latching

Relay latching only LOW RANGE

Relay latching only HIGH RANGE

Relay latching LOW and HIGH RANGE

no test

test HIGH RANGE set point - 10 %

ADJUSTMENT

Fixed sensitivity

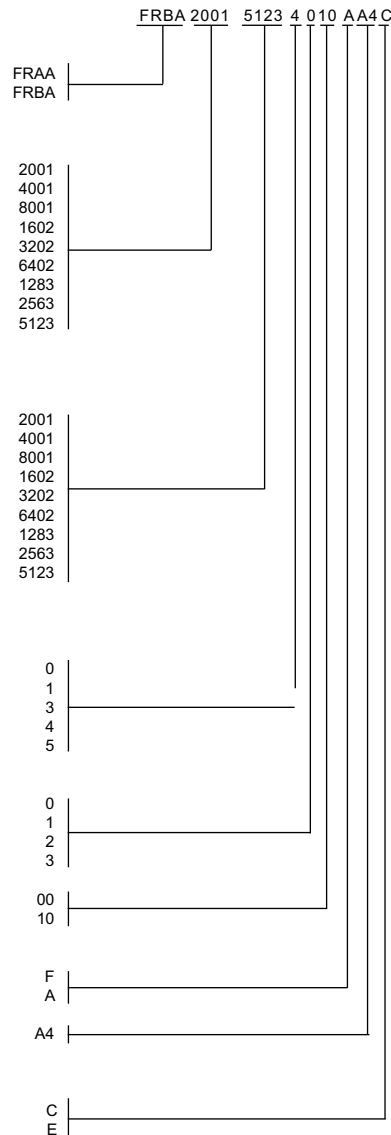
Trimpt. adj.

45 mm. 2 x 1 C/O - contact DIN RAIL

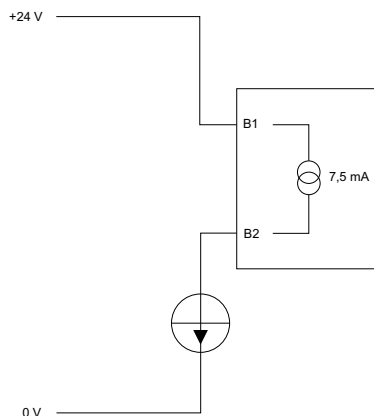
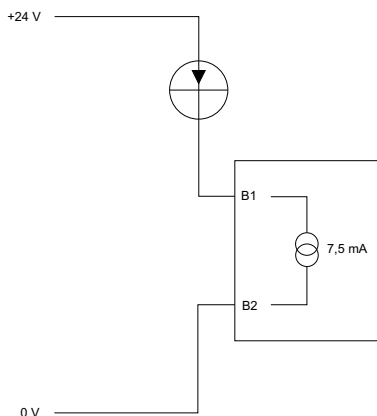
CODE

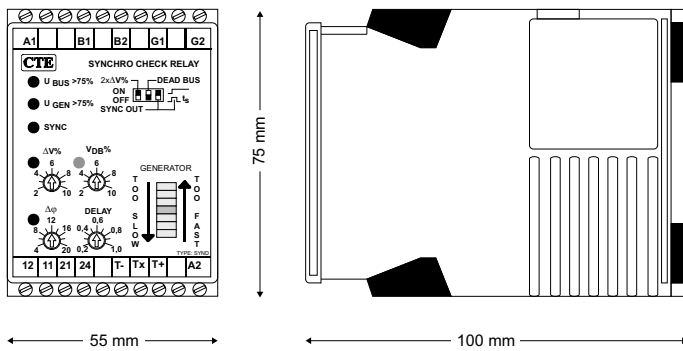
Code end

Extended code



OPTOCOUPLER INPUT:





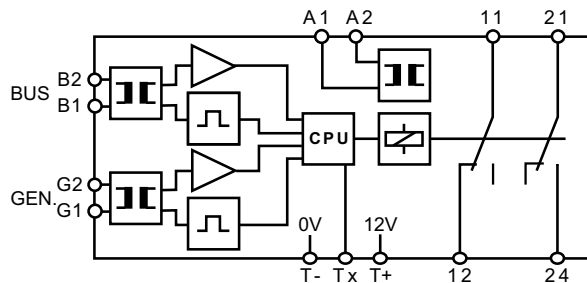
SYNCHRO CHECK RELAY

Type: SYND

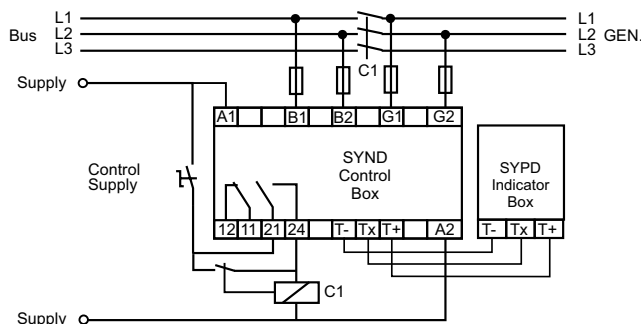
FEATURES

- **Multi function check relay**
- **Extremely compact**
- **Rail mounting for easy cabling on the baseplate**
- **Three wire interface to an optional panel indicator**
- **Microcontroller and SMD - technic for accurate and reliable function.**
- **LED indication of bus and generator status**

FUNCTION DIAGRAM



CONNECTION DIAGRAM



Description:

The synchro check relay type SYND is a multifunction unit that can be set to both constant or pulse output as well as to enable or disable synchronization to a "dead bus". The unit is designed with a micro controller to monitor the bus and the generator voltage, as well as the phase differential between two grids.

The SYND ensure the right conditions before the connection of the generator to the bus, in order to avoid damage to the generator and malfunction or damage to the connected equipment.

The unit is specially designed for DIN rail mounting on the base of the control box for an easy connection to the two bus systems.

For a front panel indication of the function, the SYND can be connected through a simple three wire digital interface to the optional panel indicator type SYPD.

Operation:

Dead Bus OFF: When the voltage on the Mains Bus, L1 - L2, and the Generator Bus, L1 - L2, both are above 75% of the nominal value, the SYND will monitor the voltage difference ΔV . As soon as ΔV is below the set limit, the SYND will start monitoring the phase difference $\Delta \phi$. If the phase difference $\Delta \phi$ is continuously below the set limit during the elapse of the set delay time t_d and the voltages still within the limits, then the internal relay will pull in for 100 m sec. if pulse output is selected, or stay in as long as the conditions are within the limits for synchronisation.

Dead Bus ON: *Be careful when this function is selected. Personal injury can occur if the bus is disconnected for maintenance. Too the load of the generator can be excessive.* When the Mains Bus voltage is detected to be under the set limit, then the Mains Bus is defined to be dead and the internal relay will pull in as soon as the Generator voltage is above 75% of nominal value. The relay will drop out or stay in according to the function setting on the SYPD as described above.

SPECIFICATIONS

INPUT

Nominal voltage Max. input	Specify from 110 to 500 V Unom. x 1.5
Input resistance	2 kΩ x Unom.
Voltage range	50 % to 130 %
Frequency range	35 to 70 Hz
U _{BUS} low level	75 % fixed
U _{GEN} low level	75 % fixed
U _{BUS} U _{GEN} voltage differential	2 to 10 % / 4 to 20 % adjustable
U _{BUS} U _{GEN} phase angle differential	4 to 20 degrees adjustable
Delay	0,2 to 1 sec. adjustable

PERFORMANCE PARAMETERS

ELECTRICAL	
Supply dependence	< 0.01 % / % ΔU supply
Temp. dependence	< 0.02 % / °C

OUTPUT

Sync pulse delay	200 ms. to 1sec. adjustable
Sync pulse relay	1 x C/O
Contact rating	6 A, 250 VAC, 1500 W
Mechanical life	30 Million cycles
Sync pulse	100 ms. or constant
Output for SYPD indicator	B7 0 VDC B8 Digital output B9 12 VDC

SUPPLY

AC supply with transformer	AC voltage, Nominal ± 20 % 24 V (19,2 to 28,8 V) 110 V (88 to 132 V) 230 V (184 to 276 V) 400 V (320 to 480 V) 440 V (352 to 528 V)
DC supply	DC Voltage, Nominal -20 % to +33 % 12V (From 9,6 to 16V) 24V (From 16 to 32V)
Frequency range	45 to 440 Hz (transformer)
Power consumption	4 VA, 3 W

GENERAL

Temperature range	- 25 °C to + 55 °C
Humidity	Up to 90 % RH non-condensing
Dielectric test voltage	Input to AC supply 3750 VAC Coil to relay contacts 3750 VAC
Weight	0.28 kg



EMC directive 89/336:

International Standards

EN50081 - Emission

EN50082 - Immunity

Low voltage directive 73/23:

EN60255 - Electrical Relays

TYPICAL SETTING

ΔV% setting	Set for max. differential (U _{BUS} - U _{GEN}) voltage in % of U _{GEN}				
C1 closing delay	25 mS	50 mS	100 mS	200 mS	400 mS
Δφ setting	± 15 deg.	± 15 deg.	± 10 deg.	± 7 deg.	± 5 deg.
DELAY setting	0.5 sec.	0.5 sec.	0.5 sec.	0.5 sec.	0.5 sec.
Min. time for 1 rotation 0-360 deg.	6 sec.	6 sec.	9 sec.	12.86 sec.	18 sec.
Max. frequency diff.	0.17 Hz	0.17 Hz	0.11 Hz	0.08 Hz	0.06 Hz
Max. sync error	16.5 deg.	18 deg.	14 deg.	12.6 deg.	13 deg.

$$\text{Min. time for 1 rotation 0-360 deg. in sec.} = \frac{180}{\Delta\phi \text{ setting}} \times \text{delay setting}$$

$$\text{Frequency diff. in Hz} = \frac{1}{\text{time for 1 rotation 0-360 deg.}}$$

$$\text{Max. sync error in deg.} = \Delta\phi \text{ setting} + \left(\frac{\Delta\phi \text{ setting} \times 2}{\text{DELAY setting}} \times \text{C1 closing delay} \right)$$

ORDERING INFORMATION

EXAMPLE:

TYPE
Syncho Check Relay

VOLTAGE BETWEEN PHASES

The first three figures of the voltage in Volt e.g. 400 V

Followed by:
1 for V = 10.0 to 99.9
2 for V = 100 to 999

SUPPLY

DC
AC

012	9,6	to	16	VDC
024	16	to	32	VDC
024	19,2	to	28,8	VAC
110	88	to	132	VAC
230	184	to	276	VAC
400	320	to	480	VAC
440	352	to	528	VAC

ADJUSTMENT

Trimpot A adjustable

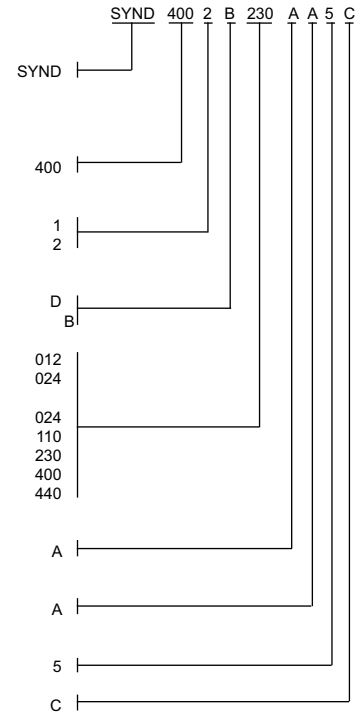
HOUSING

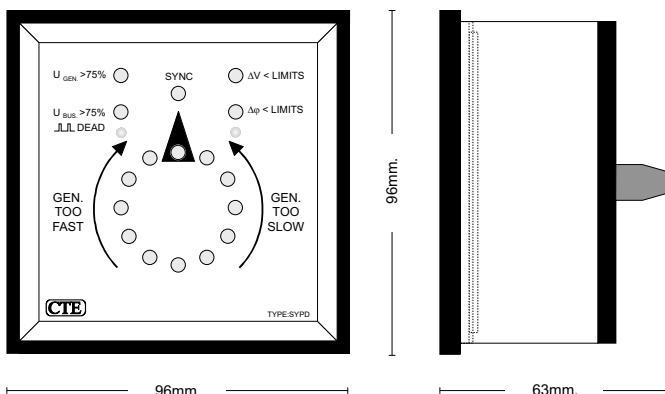
Rail mounting.(internal transformer)

SIZE

55 mm.

CODE END



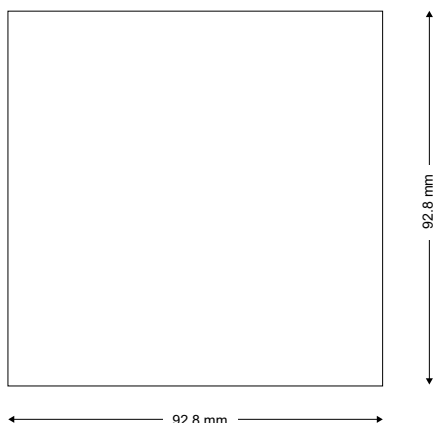


PANEL INDICATOR FOR SYNCHRO CHECK RELAY Type: SYPD

FEATURES

- Remote indication
- Easy three wire connection
- No connection to high voltage
- Optional IP65 cover

PANEL HOLE



Description:

The indicator type SYPD, is designed to give a remote visual indication of the status of two generators or a generator and the mains as registered by the Synchro Check Relay type SYND. For an easy installation, the SYPD is using a three wire serial interface to the SYND. Mechanically, the SYPD is delivered in a standard DIN case 96 x 96 mm. IP65 can be achieved by use of a silicon rubber cover.

Operation:

The SYPD displays $U_{bus} > 75\%$ or a Dead Bus, $U_{gen} > 75\%$, $\Delta V < \text{limit}$ and $\Delta \phi < \text{limit}$. The green LEDs are ON when the corresponding values are within the tolerances. When the synchronisation is achieved, the Sync LED, displaying the status of the relay in the SYND, gives a short blink or stays ON, depending on the selected function of the SYND. The difference in frequencies, between the two bus systems, is indicated by a running light on the circular LEDs at the scale centre. The larger the difference in frequency - the higher the velocity of the running light. One revolution per sec. corresponds to one Hz difference. The direction of the running light depends on whether the generator is too fast or too slow to cut in.

Application:

Front panel indication of the status of the two bus systems and the function of the Synchro Check Relay SYND.

Specification:

Box and frame	Dimensions as per DIN43700 and DIN 43718 IP52 (IP65) according to IEC 144 and DIN 40050 Heat resistant ABS Self extinguishing as per UL 94 Glass or Macrolon front
Base	Terminals IP20 max. 2mm Heat resistant PP0 Self extinguishing as per UL94
Temperature range	- 25 °C to + 55 °C
Humidity	Up to 90 % RH non-condensing
Weight	0.24 kg

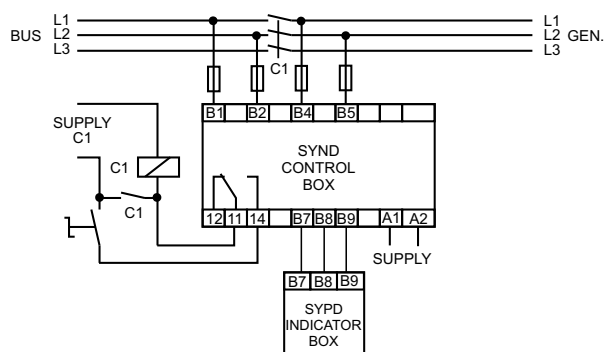


EMC directive 89/336:

Low voltage directive 73/23:

International Standards
EN50081 - Emission
EN50082 - Immunity
EN60255 - Electrical Relays

CONNECTION DIAGRAM



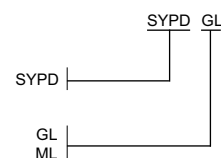
ORDERING INFORMATION

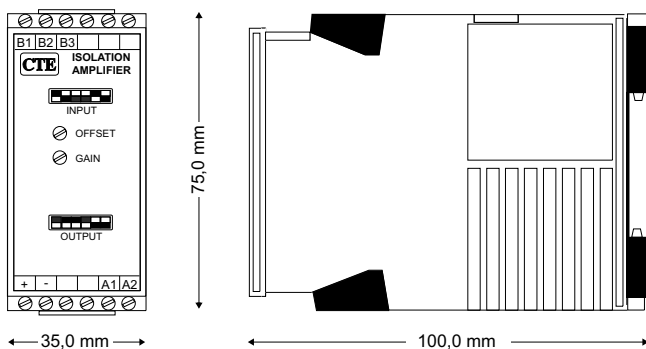
EXAMPLE:

TYPE
Panel indicator

FRONT
Glass
Macrolon

Options
Silicon Rubber Cover Type: XCON 9696





ISOLATION AMPLIFIER

Type: AISA

FEATURES

- **Galvanic separation > 4kV**
- **8 programmable input ranges**
- **8 programmable output ranges**
- **Excellent linearity**
- **Small outlines**

Description:

The isolation amplifier is build with a linear optocoupler. It is designed for galvanic separation and conversion between different standards of analog input and output signals. Linearized optic transmission is used to achieve high accuracy.

Application:

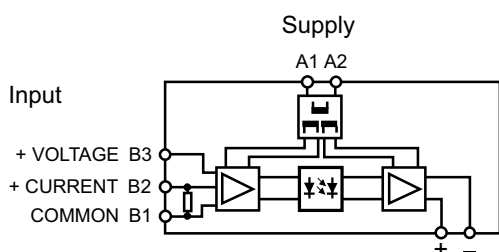
To interface between different kinds of analog sensors and receiving instruments, such as indicators, recorders, alarm units and PLCs.

PROGRAMMABLE FEATURES

INPUT	ACTUATOR
0 - 20 mA	☐
4 - 20 mA	☐
0 - 1 V	☐
0.2 - 1 V	☐
0 - 5 V	☐
1 - 5 V	☐
0 - 10 V	☐
2 - 10 V	☐

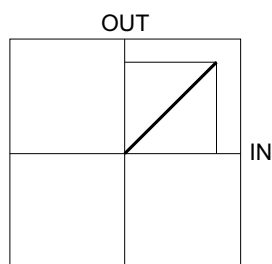
CONNECTION DIAGRAM

Rail mounting



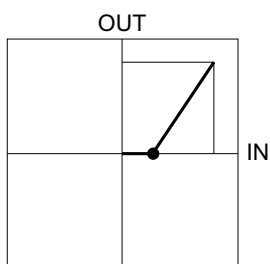
OUTPUT	ACTUATOR
0 - 20 mA	☐
4 - 20 mA	☐
0 - 1 V	☐
0.2 - 1 V	☐
0 - 5 V	☐
1 - 5 V	☐
0 - 10 V	☐
2 - 10 V	☐

OUTPUT CHARACTERISTICS



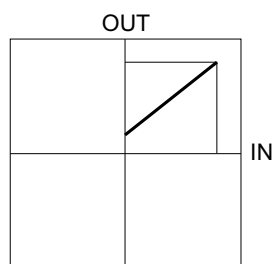
Input: 0 - 20 mA, 0 - 1 V,
0 - 5 V, 0 - 10 V

Output: 0 - 20 mA, 0 - 1 V,
0 - 5 V, 0 - 10 V



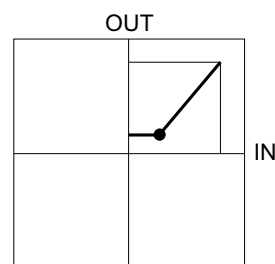
Input: 4 - 20 mA, 0.2 - 1 V,
1 - 5 V, 2 - 10 V

Output: 0 - 20 mA, 0 - 1 V,
0 - 5 V, 0 - 10 V



Input: 0 - 20 mA, 0 - 1 V,
0 - 5 V, 0 - 10 V

Output: 4 - 20 mA, 0.2 - 1 V,
1 - 5 V, 2 - 10 V



Input: 4 - 20 mA, 0.2 - 1 V,
1 - 5 V, 2 - 10 V

Output: 4 - 20 mA, 0.2 - 1 V,
1 - 5 V, 2 - 10 V

SPECIFICATIONS

INPUT

Programmable with
dipswitch



Adjustable type "A"
Offset potmeter.
Gain potmeter.

Input resistance
Voltage
Current

Range

0 - 20 mA	Max. input	100 mA
4 - 20 mA	Max. input	100 mA
0 - 1 V	Max. input	50 V
0.2 - 1 V	Max. input	50 V
0 - 5 V	Max. input	50 V
1 - 5 V	Max. input	50 V
0 - 10 V	Max. input	50 V
2 - 10 V	Max. input	50 V

± 100 % off full scale.
10 - 110 % off full scale.

Approx. 28 kΩ
10 Ω

PERFORMANCE PARAMETERS

TIMING

Response time < 100 msec.

ELECTRICAL

Precision

Class 0.5 according to DIN / EN60688

Linearity

< 0.2 %

Ripple

< 0.5 % pp

Temp. dependence

± 0.05 % / % °C

Supply dependence

± 0.01 % / % ΔU

OUTPUT

Programmable with
dipswitch



Range

0 - 20 mA	Max. Ω	500
4 - 20 mA	Max. Ω	500
0 - 1 V	Min. Ω	100
0.2 - 1 V	Min. Ω	100
0 - 5 V	Min. Ω	250
1 - 5 V	Min. Ω	250
0 - 10 V	Min. Ω	1000
2 - 10 V	Min. Ω	1000

Load

The output amplifier is protected against open and short circuit.

SUPPLY

DC supply range
with isolated switchmode

AC or DC voltage
24 V (From 20 to 32 V)

AC supply range
with transformer

24 V (From 20 to 28 V)
110 V (From 99 to 140 V)
230 V (From 198 to 264 V)
400 V (From 342 to 484 V)

Frequency range
Power consumption

45 to 440 Hz (transformer)
2.5 VA, 1.1 W

GENERAL

Temperature range

- 25 °C to + 55 °C

Humidity

Up to 90 % RH non-condensing

Dielectric test voltage

Between input and output 3000 VAC
Between input and supply 4000 VAC
Between supply and output 4000 VAC

Weight

0.12 kg



EMC directive 89/336:

International Standards

EN50081 - Emission

EN50082 - Immunity

Low voltage directive 73/23:

EN60255 - Electrical Relays

EN60688 - Measuring transducers

ORDERING INFORMATION

EXAMPLE:

TYPE

Analog isolation amplifier

SUPPLY

AC with transformer
DC with switchmode

SUPPLY VOLTAGE

From 20 to 32 VDC
From 20 to 28 VAC
From 99 to 140 VAC
From 198 to 264 VAC
From 342 to 484 VAC

ADJUSTMENT

Input offset & gain adjustable

Input offset & gain fixed

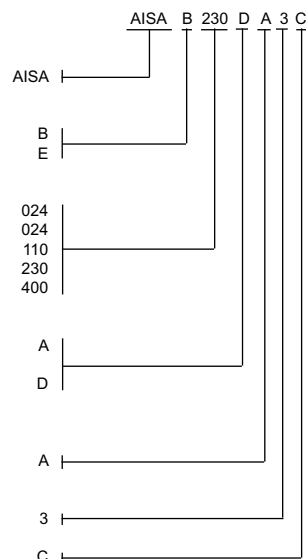
HOUSING

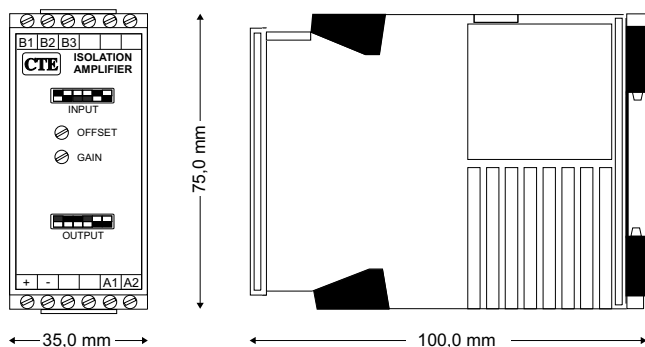
Rail mounting (without transformer)

SIZE

35 mm.

CODE END





mV TRANSMITTER

Type: AISB

FEATURES

- **mV to standard Current/Voltage conversion**
- **Galvanic separation > 4 kV**
- **4 programmable input ranges**
- **8 programmable output ranges**
- **Excellent linearity**
- **Small outline**

Description:

The mV transmitter is designed to convert low level noise sensitive signals into high level signals and improve the noise immunity by adding a galvanic separation.

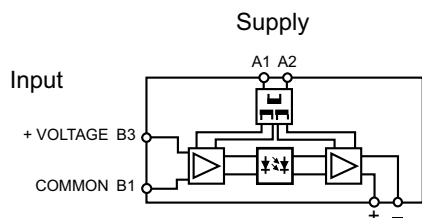
AISB is build with a linearized optic transmission for high accuracy. The mV transmitter is a version of the isolation amplifier.

Application:

The mV transmitter is designed for the transmission of signals from distant sensors to the control room or for interface between sensor and PC or PLC. Sensors can be of any kind like: Shunt, measuring bridges or used in weight cells or in temperature units.

CONNECTION DIAGRAM

Rail mounting

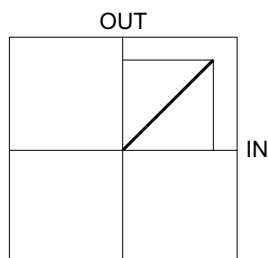


PROGRAMMABLE FEATURES

INPUT	ACTUATOR
0 - 50 mV	☐
0 - 60 mV	☐
0 - 100 mV	☐
0 - 150 mV	☐

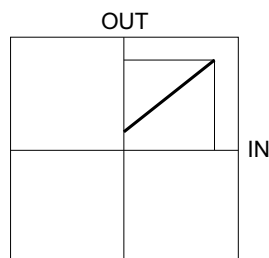
OUTPUT	ACTUATOR
0 - 20 mA	☐
4 - 20 mA	☐
0 - 1 V	☐
0.2 - 1 V	☐
0 - 5 V	☐
1 - 5 V	☐
0 - 10 V	☐
2 - 10 V	☐

OUTPUT CHARACTERISTICS



Input: 0 - 50 mV, 0 - 60 mV,
0 - 100 mV, 0 - 150 mV

Output: 0 - 20 mA, 0 - 1 V,
0 - 5 V, 0 - 10 V



Input: 0 - 50 mV, 0 - 60 mV,
0 - 100 mV, 0 - 150 mV

Output: 4 - 20 mA, 0.2 - 1 V,
1 - 5 V, 2 - 10 V

SPECIFICATIONS

INPUT

Programmable with
dipswitch



Range

0 - 50 mV	Max. input ± 20 V
0 - 60 mV	Max. input ± 20 V
0 - 100 mV	Max. input ± 20 V
0 - 150 mV	Max. input ± 20 V

Adjustable type "A"
Offset potmeter.
Gain potmeter.

± 100 % off full scale.
10 - 110 % off full scale.

Input resistance
Voltage
Current

Approx. 28 k Ω
10 Ω

PERFORMANCE PARAMETERS

TIMING

Response time < 100 msec.

ELECTRICAL

Precision

Class 0.5 according to DIN / EN60688

Linearity

< 0.2 %

Ripple

< 0.5 % pp

Temp. dependence

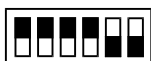
± 0.05 % / % °C

Supply dependence

± 0.01 % / % ΔU

OUTPUT

Programmable with
dipswitch



Range

Load

0 - 20 mA	Max. Ω	500
4 - 20 mA	Max. Ω	500
0 - 1 V	Min. Ω	100
0.2 - 1 V	Min. Ω	100
0 - 5 V	Min. Ω	250
1 - 5 V	Min. Ω	250
0 - 10 V	Min. Ω	1000
2 - 10 V	Min. Ω	1000

The output amplifier is protected against open and short-circuit.

SUPPLY

DC supply range
with isolated switchmode

AC or DC voltage
24 V (From 20 to 32 V)

AC supply range
with transformer

24 V (From 20 to 28 V)
110 V (From 99 to 140 V)
230 V (From 198 to 264 V)
400 V (From 342 to 484 V)

Frequency range
Power consumption

45 to 440 Hz (transformer)
2.5 VA, 1.1 W

GENERAL

Temperature range

- 25 °C to + 55 °C

Humidity

Up to 90 % RH non-condensing

Dielectric test voltage

Between input and output 3000 VAC

Between input and supply 4000 VAC

Between supply and output 4000 VAC

Weight

0.12 kg



EMC directive 89/336:

International Standards

EN50081 - Emission

EN50082 - Immunity

Low voltage directive 73/23:

EN60255 - Electrical Relays

EN60688 - Measuring transducers

ORDERING INFORMATION

EXAMPLE:

TYPE

mV Transmitter

SUPPLY

AC with transformer

DC with switchmode

SUPPLY VOLTAGE

From 20 to 32 VDC

From 20 to 28 VAC

From 99 to 140 VAC

From 198 to 264 VAC

From 342 to 484 VAC

ADJUSTMENT

Input offset & gain adjustable

Input offset & gain fixed

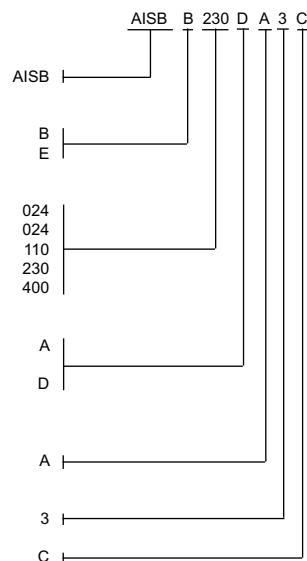
HOUSING

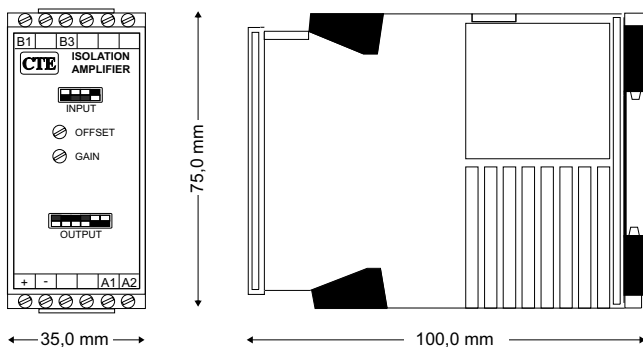
Rail mounting (without transformer)

SIZE

35 mm.

CODE END





ISOLATION AMPLIFIER

Type: UISA and USB

FEATURES

- Galvanic separation > 4kV
- 16 programmable input ranges
- 8 programmable output ranges
- Excellent accuracy and linearity

Description:

The isolation amplifier UISA is developed to meet high demands for accuracy, quality and flexibility. With 16 selectable DC voltage inputs and 8 selectable standard outputs, it covers a broad range of applications. As an option, the units can be supplied with adjustable gain and offset. The gain adjustment can be set to expand 10% of the input range to the full output range, and the offset can offset the range up to $\pm 100\%$. By using the full offset an increasing signal on the input, can be converted to a decreasing signal on the output. USB is a reduced version with 4 to 20 mA output only.

Operation:

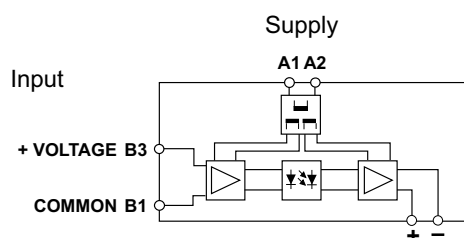
By means of a high performance linearized optic transmission (class. 0.2), the input and the output is galvanic separated with an isolation voltage of more than 4kVac. The UISA and USB is designed to be used with a range of dc and ac supply voltages, that all include galvanic isolation of more than 4kVac from the supply to both the Input and the output circuitry.

Application:

To interface and monitor DC voltages and convert the actual voltage to a standard signal being used as an input to a PC, a PLC or any other electronic device for control or alarm purpose.

CONNECTION DIAGRAM

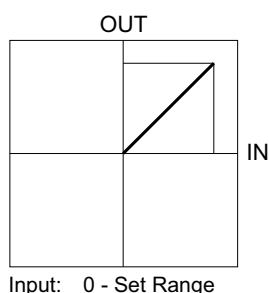
Rail mounting



PROGRAMMABLE FEATURES

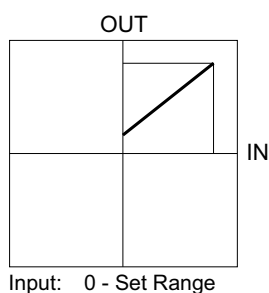
INPUT	OUTPUT ACTUATOR
0 - 30 V	0 - 20 mA
0 - 60 V	4 - 20 mA
0 - 90 V	0 - 1 V
0 - 120 V	0.2 - 1 V
0 - 150 V	0 - 5 V
0 - 180 V	1 - 5 V
0 - 210 V	0 - 10 V
0 - 240 V	2 - 10 V
0 - 270 V	
0 - 300 V	
0 - 330 V	
0 - 360 V	
0 - 390 V	
0 - 420 V	
0 - 450 V	
0 - 480 V	

OUTPUT CHARACTERISTICS



Input: 0 - Set Range

Output: 0 - 20 mA, 0 - 1 V,
0 - 5 V, 0 - 10 V



Input: 0 - Set Range

Output: 4 - 20 mA, 0.2 - 1 V,
1 - 5 V, 2 - 10 V

SPECIFICATIONS

INPUT

Programmable with dipswitch
Version 3048 0 to 30, 60, 90, 120, 150, 180, 210, 240, 270,
300, 330, 360, 390, 420, 450, and 480Vdc
Max. Input 630Vdc

Adjustable type "A"

Offset potmeter. $\pm 100\%$ off full scale.
Gain potmeter. 10 - 110 % off full scale.

Input resistance B1 to B3 Approx. 3.0 M Ω

PERFORMANCE PARAMETERS

TIMING

Response time < 100 msec.

ELECTRICAL

Precision Class 0.5 according to DIN / EN60688

Linearity < 0.2 %

Ripple < 0.5 % pp

Temp. dependence $\pm 0.05\%$ / % °C

Supply dependence $\pm 0.01\%$ / % ΔU

OUTPUT

Programmable with
dipswitch

Range	Load
0 - 20 mA	Max. Ω 500
4 - 20 mA	Max. Ω 500
0 - 1 V	Min. Ω 100
0.2 - 1 V	Min. Ω 100
0 - 5 V	Min. Ω 250
1 - 5 V	Min. Ω 250
0 - 10 V	Min. Ω 1000
2 - 10 V	Min. Ω 1000



The output amplifier is protected against open and short circuit.

SUPPLY

DC supply range AC or DC voltage
24 V (From 20 to 32 V)
with isolated switchmode supply

AC supply range 24 V (From 20 to 28 V)
with transformer 110 V (From 85 to 127 V)
230 V (From 187 to 264 V)
400 V (From 323 to 457 V)

Frequency range 45 to 440 Hz (transformer)
Power consumption 2.5 VA, 1.1 W

GENERAL

Temperature range - 25 °C to + 55 °C
Humidity Up to 90 % RH non-condensing
Dielectric test voltage Between input and output 4000 VAC
Between input and supply 4000 VAC
Between supply and output 4000 VAC
Weight 0.12 kg

EMC directive 89/336: International Standards
EN50081 - Emission
EN50082 - Immunity
Low voltage directive 73/23: EN60255 - Electrical Relays
EN60688 - Measuring transducers



ORDERING INFORMATION

EXAMPLE:

TYPE
8 selectable outputs
Fixed output: 4-20mA

INPUT

Set range from 30V to 480V

SUPPLY

AC with transformer
DC with switchmode

SUPPLY VOLTAGE

From 20 to 32 VDC switchmode 024
From 20 to 28 VAC transformer 024
From 85 to 140 VAC 110
From 187 to 264 VAC 230
From 323 to 457 VAC 400

ADJUSTMENT

Input offset & gain adjustable

Input offset & gain fixed

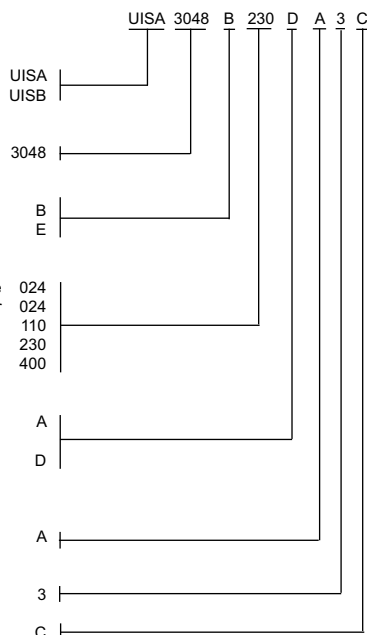
HOUSING

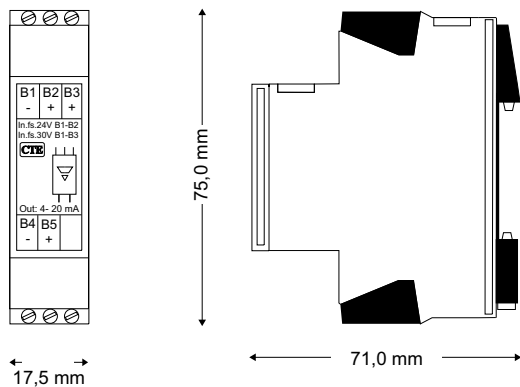
Rail mounting (without transformer)

SIZE

35 mm.

CODE END





VOLTAGE CONVERTER AND LOOP ISOLATOR

Type: UIDA

FEATURES

- **Loop powered isolator**
- **Input 4,8 - 24V and 6 - 30V**
- **Prevents interference from electrostatic fields and ground loops**
- **Working voltage up to 1000 V_{RMS}**
- **Transient overvoltage up to 8000 V_{peak}**
- **Excellent linearity**
- **Small outlines, 17,5 mm. wide**

Description:

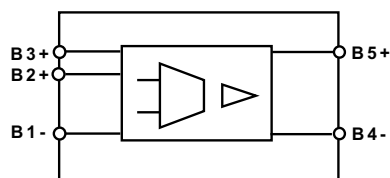
The loop isolator is designed to convert a voltage signal on the input into a 4 - 20mA current output. The use of a galvanic separation between the input and the output prevents signal distortion and instrumentation damages due to electrical noise, voltage spikes and ground loop currents. The UIDA does not need an external supply, as the input is powered from the voltage source and the output is powered from the loop. The insulation is based on a high performance linear optocoupler with an excellent linearity and a low coupling capacitance.

Application:

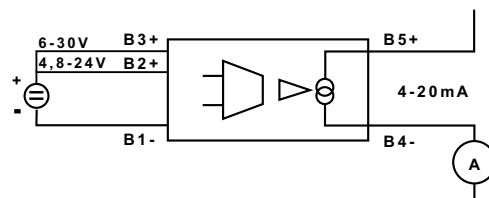
For use in instrumentation with current loop I/O as used by PLCs, sensors, recorders, indicators, alarm units etc.

CONNECTION DIAGRAM

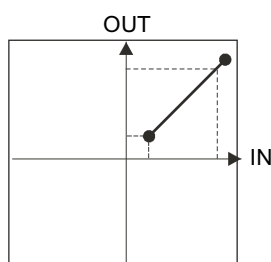
Rail mounting



FUNCTION DIAGRAM



INPUT/OUTPUT CHARACTERISTICS



Input: 4,8 - 24V or 6 - 30V
Output: 4 - 20mA

SPECIFICATIONS

INPUT

4,8 - 24V	Min. func. input 4,8 / 6,0V
6 - 30V	Max. cont. input 36V

PERFORMANCE PARAMETERS

TIMING	
Response time	< 10 msec.
ELECTRICAL	
Precision	Class 0.5 according to DIN / EN60688
Linearity	< 0.02 %
Temp. dependence	< 0.02 % / °C

OUTPUT

Loop supplied	Loop voltage, 8 - 32 V
4 - 20 mA	Max. voltage, 36 V
Max. load	600 Ω. @ 20 V Loop voltage

ISOLATION CHARACTERISTICS

Capacitance	< 1 pF, input/output
Safety approval	According to: UL 1577 (5 kVRMS/1 min. rating) VDE 0884/06.92 (V _{ORM} = 1 kVRMS) BSI: BS415; 1990 BS7002; 1992 BS EN60950; 1992 EN41003; 1991

GENERAL

Temperature range	- 25 °C to + 55 °C
Humidity	Up to 90 % RH non-condensing
Weight	0.044 kg



EMC directive 89/336:

International Standards
EN50081 - Emission
EN50082 - Immunity

Low voltage directive 73/23:

EN60255 - Electrical Relays

ORDERING INFORMATION

TYPE

Voltage converter and loop isolator

INPUT

Max. range A
24V

Max. range B
30V

OUTPUT

4 - 20mA

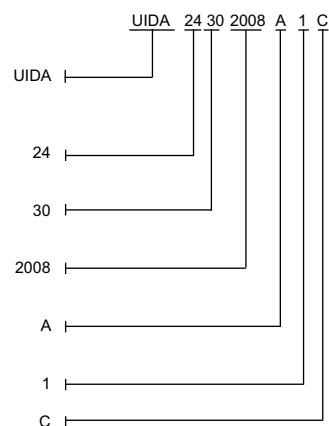
HOUSING

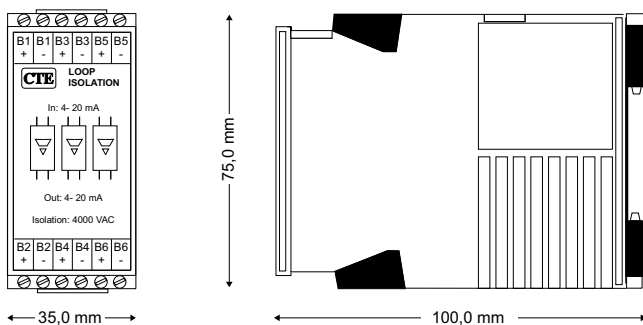
Rail mounting

SIZE

17,5 mm.

CODE END





TRIPLE LOOP ISOLATOR

Type: AITA

FEATURES

- **3 Loop isolators 4 - 20 mA in one unit**
- **Prevent lightning from spreading over the system**
- **Working voltage max.: 1000 V_{RMS}**
- **Transient overvoltage max.: 8000 V_{peak}**
- **Excellent linearity**
- **Small outlines, 35 mm. wide**

Description:

The loop isolator is designed to separate a 4 - 20 mA loop into two galvanically separated 4-20 mA loops in order to prevent signal distortion and instrumentation damages due to electrical noise or voltage spikes and ground loop currents.

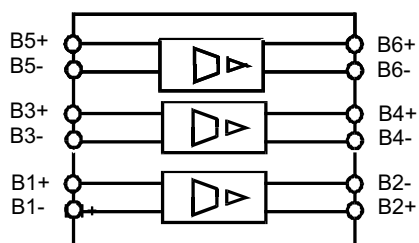
The insulation is based on a high performance linear optocoupler with an excellent linearity and a low coupling capacitance.

Application:

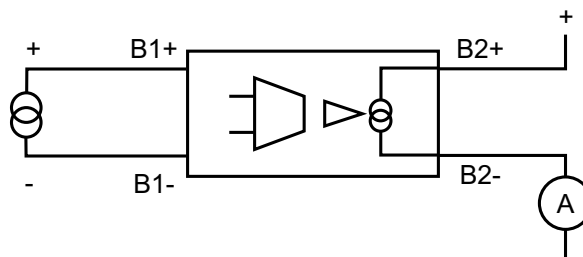
For use in instrumentation with current loop I/O as used by PLCs, sensors, recorders, indicators, alarm units etc.

CONNECTION DIAGRAM

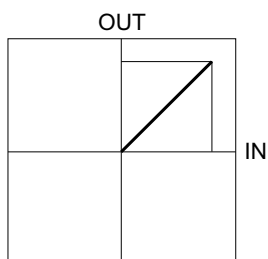
Rail mounting



FUNCTION DIAGRAM



INPUT/OUTPUT CHARACTERISTICS



Input: 4 - 20 mA

Output: 4 - 20 mA

SPECIFICATIONS

INPUT

4 - 20 mA
Loop supplied
Max. input 100 mA
Voltage drop, Max. 7 V

PERFORMANCE PARAMETERS

TIMING
Response time < 10 msec.
ELECTRICAL
Precision Class 0.5 according to DIN / EN60688
Linearity < 0.02 %
Temp. dependence $\pm 0.02\%$ / °C
Supply dependence $\pm 0.01\%$ / % ΔU

OUTPUT

Loop supplied
4 - 20 mA
Loop voltage, 8 - 32 V
Max. voltage, 36 V

Max. load 600 Ω . @ 20 V Loop voltage

ISOLATION CHARACTERISTICS

Capacitance < 1 pF, input/output
Safety approval According to:
UL1577 (5 kVRMS/1 min. rating)
VDE 0884/06.92 ($V_{IORM} = 1$ kVRMS)
BSI: BS415; 1990
BS7002; 1992
BS EN60950; 1992
EN41003; 1991

GENERAL

Temperature range - 25 °C to + 55 °C
Humidity Up to 90 % RH non-condensing
Weight 0.12 kg



EMC directive 89/336:

International Standards
EN50081 - Emission
EN50082 - Immunity

Low voltage directive 73/23:

EN60255 - Electrical Relays
EN60688 - Measuring transducers

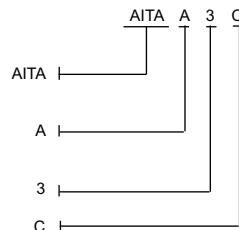
ORDERING INFORMATION

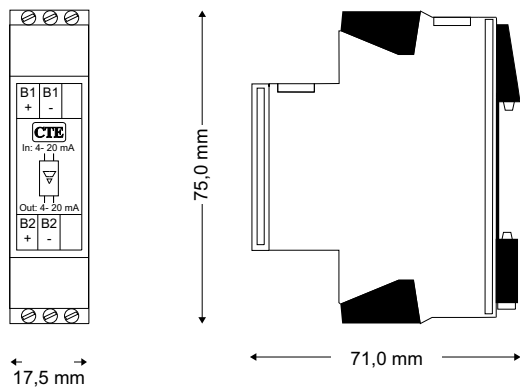
TYPE
Triple loop isolator

HOUSING
Rail mounting

SIZE
35 mm.

CODE END





LOOP ISOLATOR

Type: AITB

FEATURES

- **4 - 20 mA Loop powered isolator**
- **Prevent lightning from spreading over the system**
- **Working voltage up to 1000 V_{RMS}**
- **Transient overvoltage up to 8000 V_{peak}**
- **Excellent linearity**
- **Small outlines, 17,5 mm. wide**

Description:

The loop isolator is designed to separate one 4 - 20 mA loop into two galvanically separated 4-20 mA loops in order to prevent signal distortion and instrumentation damages due to electrical noise, voltage spikes and ground loop currents.

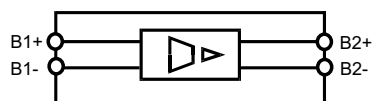
The insulation is based on a high performance linear optocoupler with an excellent linearity and a low coupling capacitance.

Application:

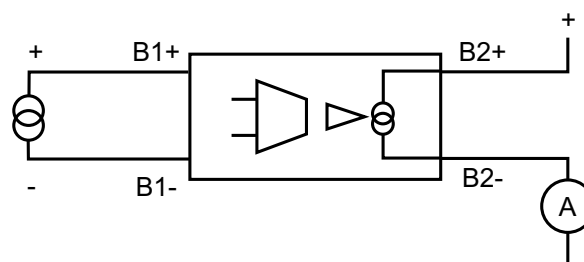
For use in instrumentation with current loop I/O as used by PLCs, sensors, recorders, indicators, alarm units etc.

CONNECTION DIAGRAM

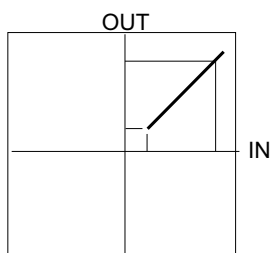
Rail mounting



FUNCTION DIAGRAM



INPUT/OUTPUT CHARACTERISTICS



Input: 4 - 20 mA

Output: 4 - 20 mA

SPECIFICATIONS

INPUT

4 - 20 mA	Max. input 100 mA
Loop supplied	Voltage drop, Max. 7 V

PERFORMANCE PARAMETERS

TIMING	
Response time	< 10 msec.
ELECTRICAL	
Precision	Class 0.5 according to DIN / EN60688
Linearity	< 0.02 %
Temp. dependence	± 0.02 % / °C
Supply dependence	± 0.01 % / % ΔU

OUTPUT

Loop supplied	Loop voltage, 8 - 32 V
4 - 20 mA	Max. voltage, 36 V
Max. load	600 Ω. @ 20 V Loop voltage

ISOLATION CHARACTERISTICS

Capacitance	< 1 pF, input/output
Safety approval	According to: UL1577 (5 kVRMS/1 min. rating) VDE 0884/06.92 (VIORM = 1 kVRMS) BSI: BS415; 1990 BS7002; 1992 BS EN60950; 1992 EN41003; 1991

GENERAL

Temperature range	- 25 °C to + 55 °C
Humidity	Up to 90 % RH non-condensing
Weight	0.044 kg



EMC directive 89/336:	International Standards EN50081 - Emission EN50082 - Immunity
Low voltage directive 73/23:	EN60255 - Electrical Relays EN60688 - Measuring transducers

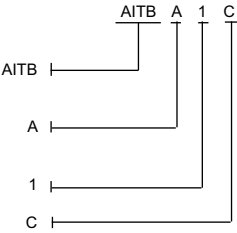
ORDERING INFORMATION

TYPE
Loop isolator

HOUSING
Rail mounting

SIZE
17,5 mm.

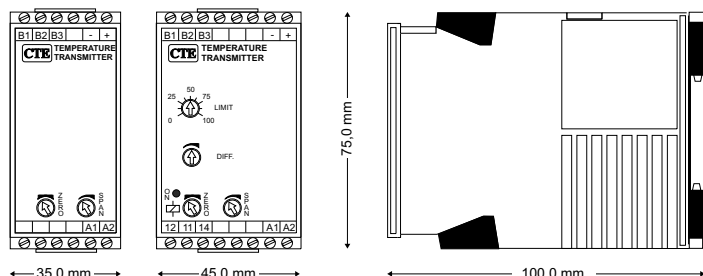
CODE END





PT100 TEMPERATURE TRANSMITTER

Type: TAMA & TAMB



FEATURES:

- 74 programmable input ranges
- 6 programmable output ranges
- Excellent linearity < 0.2%
- Build-in relay with adjustable limit (only in type TAMB)
- LED indicates the state of the relay (only in type TAMB)
- Small outlines

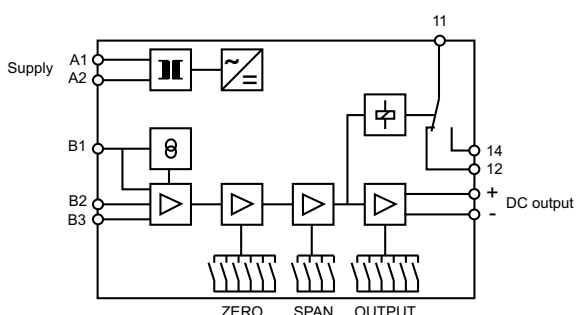
Description:

The measuring transducers type TAMA and TAMB are used for measuring the temperature with a PT100 sensor according to DIN IEC 751.

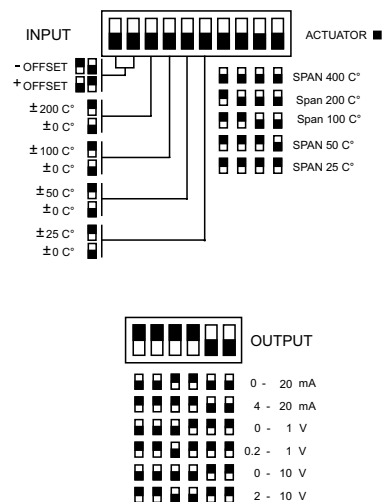
Application:

Monitoring temperatures in: motors, generators, heaters, air-condition systems, chemical processes and machine parts. The transducer is especially well suited for pre-amplification and range setting in front of instrumentation, PLCs, PC and microprocessor control systems.

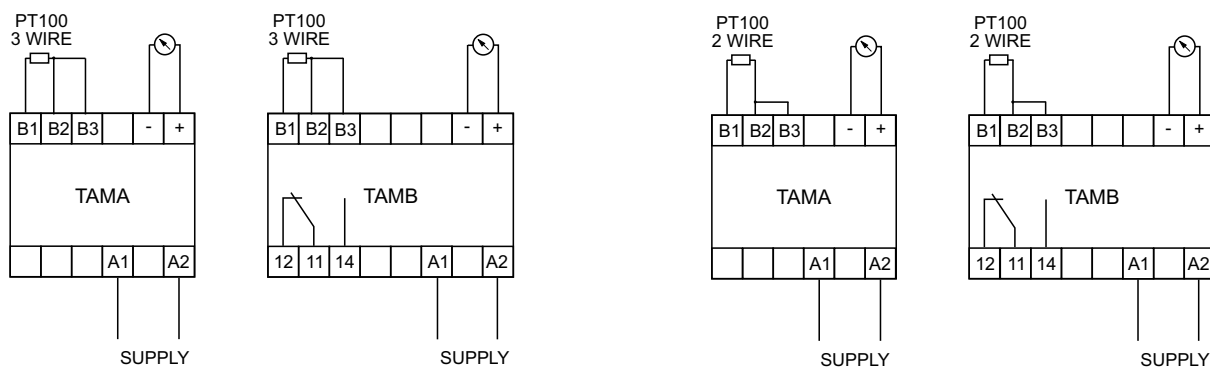
FUNCTION DIAGRAM



PROGRAMMABLE FEATURES



CONNECTION DIAGRAM



SPECIFICATIONS

INPUT	PT100 sensor
Sensor current	0.75 mA
Input range	- 100 to + 400 °C
Zero offset	dipswitch programmable from - 100 to + 375 °C in steps of 25 °C
Zero offset adjustment	offset $\pm 5\%$ (no function at 0 °C offset)
Span	5 dipswitch programmable ranges 400 °C, 200 °C, 100 °C, 50 °C, 25 °C
Span adjustment	span range adjustable $\pm 5\%$

PERFORMANCE PARAMETERS

TIMING	
Response time	< 200 msec.
ELECTRICAL	
Precision	$\leq \pm (\text{Span } ^\circ\text{C} \times 0,003) + 0.5 \text{ } ^\circ\text{C}$
Linearity	< 0.2 %
Ripple	< 1 % pp
Supply dependence	< fs. $\pm 0.01 \text{ } \%$ / $\%$ ΔU supply
Temp. dependence	< fs. $\pm 0.02 \text{ } \%$ / $^\circ\text{C}$

Type TAMB	
Limit	Adjustable from zero to span setting
Differential	Adjustable from limit to zero

OUTPUT

The output amplifier is protected against open- and short - circuit

Range	Programmable with dipswitch
	0 -20 mA Max. 0.5 k Ω
	4 -20 mA Max. 0.5 k Ω
	0 - 1 V Min. 0.1 k Ω
	0.2 - 1 V Min. 0.1 k Ω
	0 -10 V Min. 0.5 k Ω
	2 -10 V Min. 0.5 k Ω

Relay	1C/O, AgCdO
Contact rating	6 A, 250 VAC, 1250 W
Mechanical life	30 million operations

SUPPLY

DC supply range with internal switchmode supply	24V (From 20 to 32V)
AC supply range	24V (From 20 to 28V)
Transformer supply	110V (From 99 to 140V) 230V (From 198 to 264V) 400V (From 342 to 484V)
AC frequency	45 to 440 Hz
Power consumption	4 VA, 2W

GENERAL

Temperature range	- 25 °C to + 55 °C
Humidity	Up to 90 % RH non-condensing
Dielectric test voltage	Input to AC supply 4000 VAC Coil to relay contacts (TAMB) 4000 VAC
Weight	0.16 kg



EMC directive 89/336:

International Standards

EN50081 - Emission

EN50082 - Immunity

Low voltage directive 73/23:

EN60255 - Electrical Relays

EN60688 - Measuring transducers

ORDERING INFORMATION

EXAMPLE:

TYPE

Temp. transmitter
Temp. transmitter with 1 C/O limit contact

SUPPLY

AC with transformer
DC with switchmode

SUPPLY VOLTAGE

From	20 to 32 VDC
From	20 to 28 VAC
From	99 to 140 VAC
From	198 to 264 VAC
From	342 to 484 VAC

ADJUSTMENT

Input zero & span adjustable +
dipswitch programmable
Output dipswitch programmable

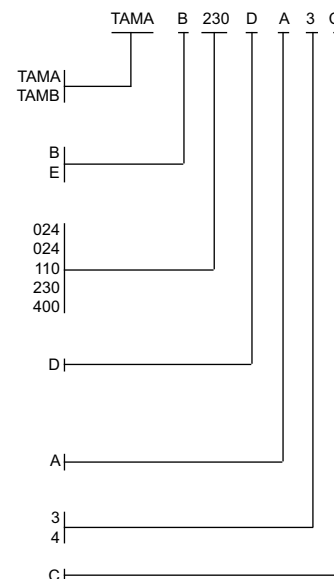
HOUSING

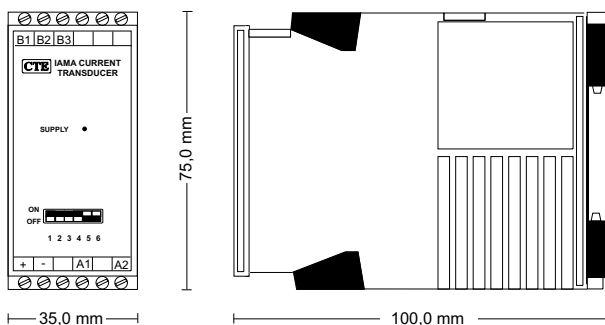
rail mounting

SIZE

Type TAMA	35mm
Type TAMB	45mm

CODE END





CURRENT AND VOLTAGE TRANSDUCERS

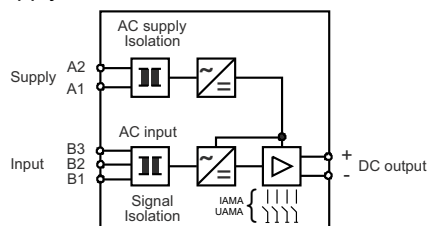
Type: IAMA, UAMA
IAMB, UAMB

FEATURES

- **Standard dual range. Current: 1A and 5A or Voltage: 250V and 500V**
- **All ranges class 0.5 according to EN60688. Class 0.2 on request**
- **8 outputs available on IAMA and UAMA**
- **Isolation > 4kV. Input, output and supply.**
- **All standard AC voltages for power supply. Optional DC supply.**
- **Version with plug-in supply modules for easy stocking**

FUNCTION DIAGRAM

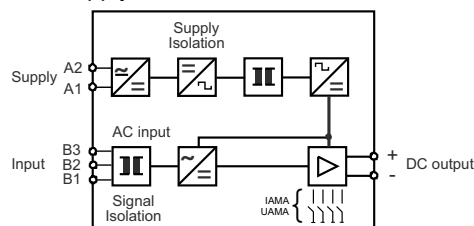
AC Supply



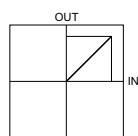
Standard range B1-B2/B3 IAmx 0-1A/5A
B1-B2/B3 UAmx 0-250V/500V

Other ranges B1-B3 IAmx 0-0.5 to 10A
B1-B3 UAmx 0-10V/500V

AC/DC Supply

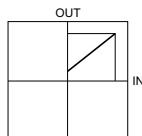


OUTPUT CHARACTERISTICS



Input: 0 - xxx A
0 - xxx V

Output: 0 - 10 mA, 0 - 20 mA
0 - 5 V, 0 - 10 V

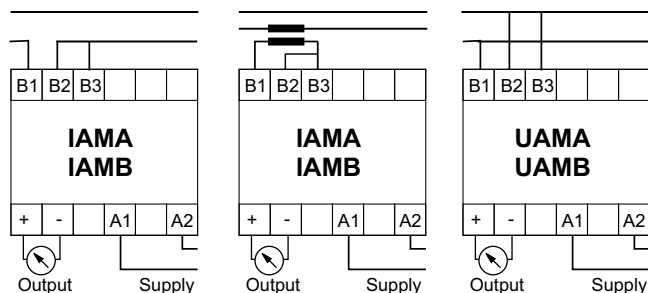


Input: 0 - xxx A
0 - xxx V

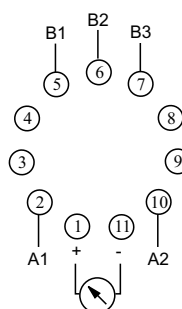
Output: 2 - 10 mA, 4 - 20 mA,
1 - 5 V, 2 - 10 V

CONNECTION DIAGRAM

Rail mounting



Socket mounting



SPECIFICATIONS

INPUT IAMA, IAMB

Nominal input I_N	AC current
Max. continuous input	Specify from 0,5 to 10 A $1,5 \times I_N$ or max. 10 A $20 \times I_N$ in 1 sec.
Input resistance approx.	$0,05 \Omega / I_R$
AC frequency range	45 to 65 Hz

INPUT UAMA, UAMB

Nominal input V_N	AC voltage
Max. continuous input	Specify from 10 to 600 V $40 \sqrt{U_N}$ V rms. $10 \text{ V} < U_N < 300 \text{ V}$ $720 \text{ V rms. } U_N > 300 \text{ V}$
Input resistance approx.	$2 \text{ K } \Omega / V$
AC frequency range	45 to 65 Hz

PERFORMANCE PARAMETERS

TIMING	
Response time	< 200 msec. 0-90% or 100-10%
ELECTRICAL	
Precision	Class 0.5
Linearity	< 0.2 %
Supply dependence	< $\pm 0.01 \%$ / % ΔU supply
Temp. dependence	< $\pm 0.01 \%$ / °C
Ripple	< 1 % pp

OUTPUT

The output amplifier is protected against open and short circuit.

SUPPLY

DC supply	
Switched power supply	24V
Range	-15 % to 33 %
AC Supply	
Transformer supply	24, 48, 110, 230, 400, 460 V
Voltage range	- 20 % to + 20 %
Frequency range	45 to 440 Hz
Power consumption	2.5 VA, 1.5 W
PLUG-IN supply module	According to specifications

GENERAL

Temperature range	- 25 °C to + 55 °C
Humidity	Up to 90 % RH non-condensing
Dielectric test voltage	Input to output 4000 VAC Input to supply (internal) 4000 VAC Output to supply (internal) 4000 VAC
Weight	0.20 kg with internal supply 0.10 kg with plug-in supply module



EMC directive 89/336:

International Standards

EN50081 - Emission

EN50082 - Immunity

Low voltage directive 73/23:

EN60255 - Electrical Relays

EN60688 - Measuring transducers

PLUG-IN SUPPLY MODULES:

Transformer TR3: 12, 24, 42, 48, 110, 127, 230, 400, 440 V AC

ORDERING INFORMATION

EXAMPLE:

TYPE

Current measuring transducer

Voltage measuring transducer

CURRENT RANGE - IAMA & IAMB

Standard 0 - 1A & 0 - 5A

Specified current xxxY

Y = Multiplier 0 = x 1.0

9 = x 0.1

e.g. 0 - 1.5 A

e.g. 0 - 500mA

VOLTAGE RANGE - UAMA & UAMB

Standard 0 - 250 V & 0 - 500 V

Specified Voltage xxxY

Y = Multiplier 2 = x 100

1 = x 10

e.g. 0 - 150 V

e.g. 0 - 60V

SUPPLY

DC with internal switched power supply

AC with internal transformer

AC or DC with plug-in supply module

SUPPLY VOLTAGE

Switch mode	20 to 32 VDC
Transformer	19.2 to 28.8 VAC
Transformer	38.4 to 57.6 VAC
Transformer	88 to 132 VAC
Transformer	184 to 276 VAC
Transformer	342 to 484 VAC
Transformer	368 to 552 VAC
Plug-in supply module	

ADJUSTMENT

Input offset & gain fixed

HOUSING

Rail mounting with internal supply
Rail mounting with Plug-in supply module
Socket 11 pin with internal supply
Socket 11 pin with Plug-in supply module

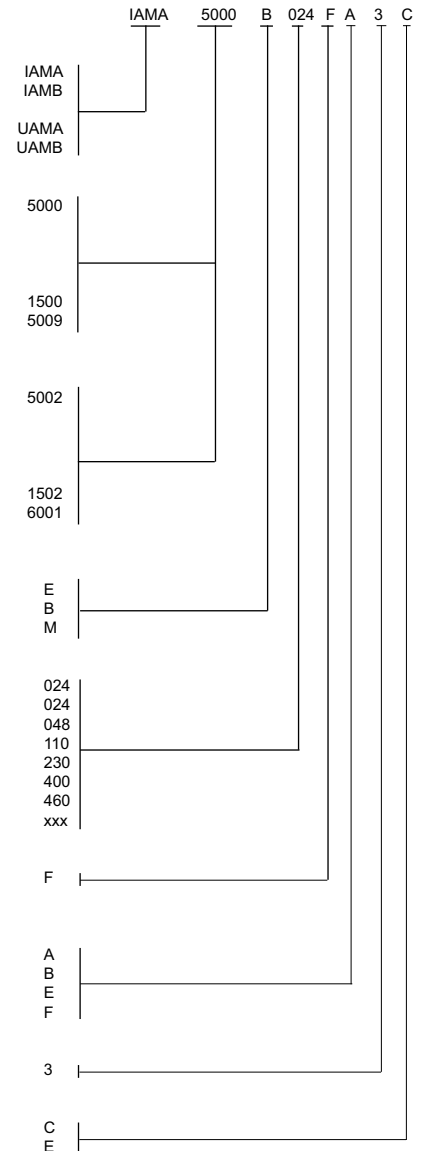
SIZE

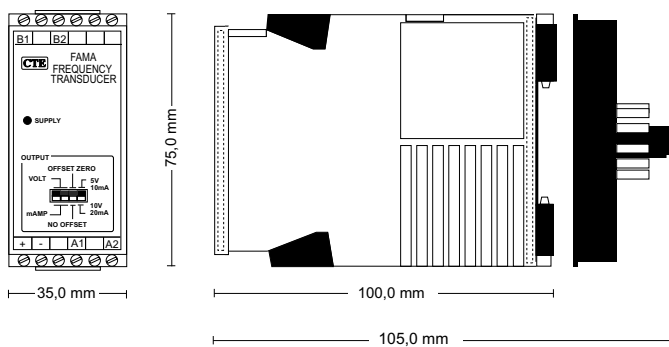
35 mm.

CODE

Code end

Extended code





FREQUENCY MEASURING TRANSDUCER

Type: FAMA

FEATURES

- High input resistance
- Low response time
- Excellent linearity
- All ranges class 0.5 according to EN60688.
- 8 outputs available
- Isolation > 4kV. Input, output and supply.
- All standard AC voltages for power supply. Optional DC supply.
- Version with plug-in supply modules for easy stocking

Description:

The transducer type FAMA is used to measure the frequency of an input voltage. The output is a load independent DC voltage or current signal. The input can be connected directly or via transformers.

Operation:

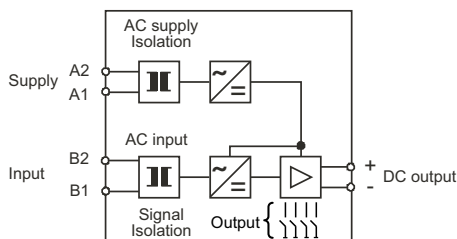
The input voltage is transformed to a suitable signal level. At each zero-crossing the input creates a rectangular pulse with a constant height and width. The pulse train, with a frequency proportional to that of the input voltage, is filtered and in amplifier converted to a load independent DC output. The input voltage can also be used as supply voltage. The supply voltage is galvanically separated by the plug-in transformer.

Applications:

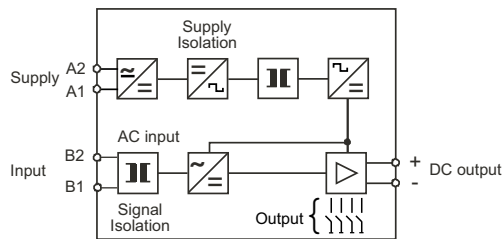
Instrumentation, PLCs, PC and microprocessor control systems .

FUNCTION DIAGRAM

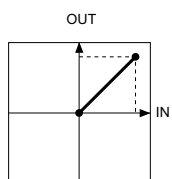
AC Supply



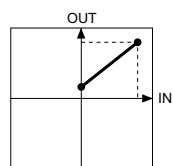
AC/DC Supply



OUTPUT CHARACTERISTICS



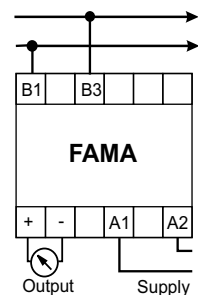
Output: 0 - 10 mA, 0 - 20 mA
0 - 5 V, 0 - 10 V



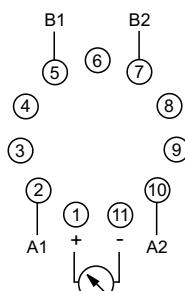
Output: 2 - 10 mA, 4 - 20 mA
1 - 5 V, 2 - 10 V

CONNECTION DIAGRAM

Rail mounting



Socket mounting



SPECIFICATIONS

INPUT FAMA

Nominal input V_N	AC voltage
Max. continuous input	Specify from 10 to 600 V $40\sqrt{U_N}$ V rms. $10\text{ V} < U_N < 300\text{ V}$ 720 V rms. $U_N > 300\text{ V}$
Input resistance	approx. 2 K Ω / V
AC frequency range	0 to 5000 Hz

PERFORMANCE PARAMETERS

TIMING	
Response time	< 200 msec. 0-90% or 100-10%
ELECTRICAL	
Precision	Class 0.5
Linearity	< 0.2 %
Supply dependence	< $\pm 0.01\%$ / % DU supply
Temp. dependence	< $\pm 0.01\%$ / °C
Ripple	< 1 % pp

OUTPUT

The output amplifier is protected against open and short circuit.

SUPPLY

DC supply	
Switched power supply	24V
	Range -15 % to 33 %
AC Supply	
Transformer supply	24, 48, 110, 230, 400, 460 V
Voltage range	- 20 % to + 20 %
Frequency range	45 to 440 Hz
Power consumption	2.5 VA, 1.5 W
PLUG-IN supply module	According to specifications

GENERAL

Temperature range	- 25 °C to + 55 °C
Humidity	Up to 90 % RH non-condensing
Dielectric test voltage	Input to output 4000 VAC
	Input to supply (internal) 4000 VAC
	Output to supply (internal) 4000 VAC
Weight	0.20 kg with internal supply
	0.10 kg with plug-in supply module



EMC directive 89/336:	International Standards
	EN50081 - Emission
	EN50082 - Immunity
Low voltage directive 73/23:	EN60255 - Electrical Relays
	EN60688 - Measuring transducers

PLUG-IN SUPPLY MODULES:

Transformer TR3: 12, 24, 42, 48, 110, 127, 230, 400, 440 V AC

ORDERING INFORMATION

EXAMPLE:

TYPE

Frequency measuring transducer

FREQUENCY RANGE

Lower level

The first three figures of the frequency in Hz, e.g. 45.0 Hz

Followed by:

0 for Hz = 1.00 to 9.99
1 for Hz = 10.0 to 99.9
2 for Hz = 100 to 999

High level

The first three figures of the frequency in Hz, e.g. 55.0 Hz

Followed by:

0 for Hz = 1.00 to 9.99
1 for Hz = 10.0 to 99.9
2 for Hz = 100 to 999

VOLTAGE RANGE

The first three figures of the voltage in Volt, e.g. 400 V

Followed by:

1 for V = 10.0 to 99.9
2 for V = 100 to 999

SUPPLY

AC with transformer
DC with switchmode
AC or DC with plug-in supply module

SUPPLY VOLTAGE

Switch mode 20 to 32 VDC
Transformer 19.2 to 28.8 VAC
Transformer 38.4 to 57.6 VAC
Transformer 88 to 132 VAC
Transformer 184 to 276 VAC
Transformer 342 to 484 VAC
Transformer 368 to 552 VAC
Plug-in supply module

OUTPUT

Programmable with dipswitch
0 - 10 mA, 2 - 10 mA,
0 - 20 mA, 4 - 20 mA,
0 - 5 V, 1 - 5V
0 - 10 V, 2 - 10 V

HOUSING

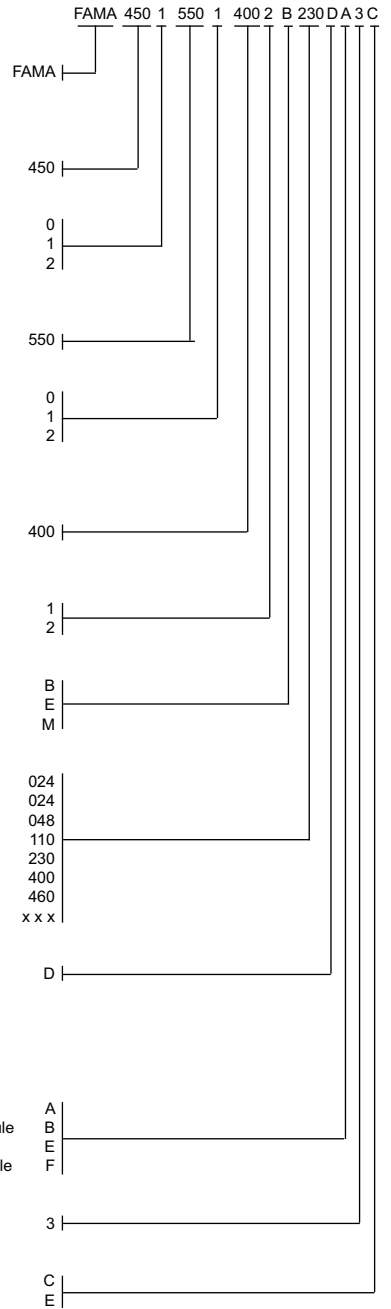
Rail mounting with internal supply
Rail mounting with Plug-in supply module
Socket 11 pin with internal supply
Socket 11 pin with Plug-in supply module

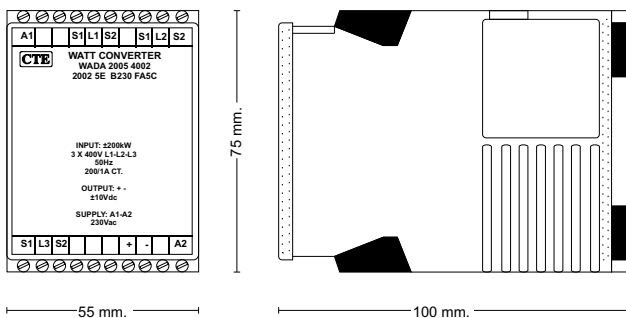
SIZE

35 mm.

CODE

Code end
Extended code





MEASURING TRANSDUCER MODULE

Type: WAXA (Watt) - Active power
Type: WRxA (VAr) - Reactive power

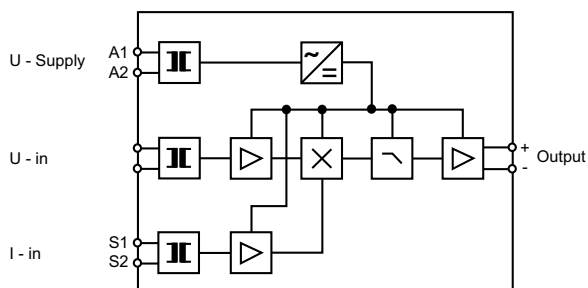
FEATURES

- Small outlines
- High input sensitivity
- Low response time
- Excellent linearity
- 19 outputs available
- According to EN60688

Description:

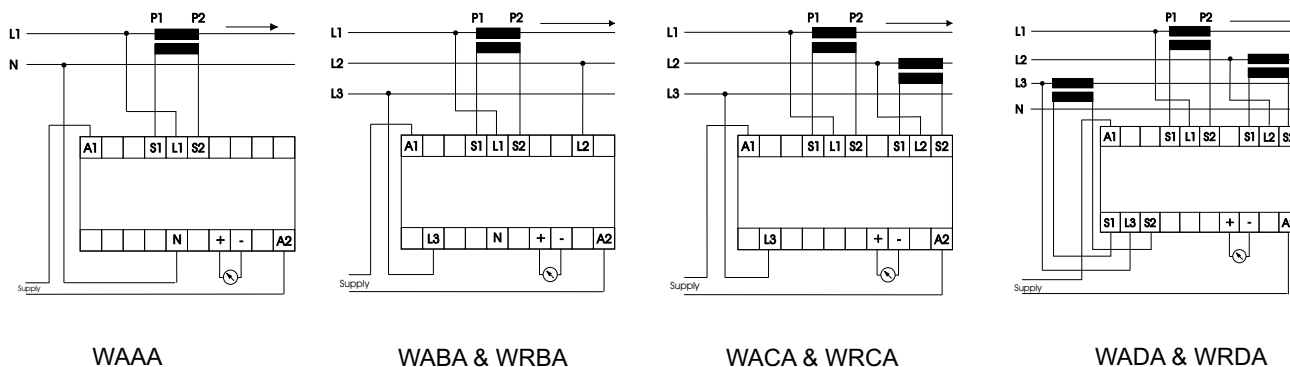
The input transformers for voltage and current separate the inputs galvanically from the converter. The signals are amplified to suitable levels and led to the multiplier. The multiplication is made by changing the voltage signal to a pulse-width modulated square wave, and the current to a voltage signal representing the amplitude of the current, thus giving a pulse area equal to the actual momentary power. Using a high frequency for the square pulses ensures an accurate measurement even with a high level of signal distortion (higher harmonics). The signal from the multiplier passes an active filter and an output circuit to ensure a low ripple and stable output signal. Output signals are short-circuit and open-circuit protected.

FUNCTION DIAGRAM



CONNECTION DIAGRAM

Rail mounting



SPECIFICATIONS

INPUT

Nominal voltage	Specify from 100 to 700 V
Max. input	$1.2 \times U_N$
Input resistance	300 k Ω $U_{in} < 200$ V 500 k Ω $U_{in} > 200$ V

Current	
Nominal current	1 A (from .../1 A current transformer)
Or	5 A (from .../5 A current transformer)
Max. input	$1.2 \times I_N$ constant
Type .../1 A	5 x I_N for 10 sec.
Type .../5 A	50 x I_N for 1 sec.
Input resistance	
Type .../1 A	50 m Ω
Type .../5 A	5 m Ω

PERFORMANCE PARAMETERS

TIMING	
Response time	< 200 msec.

ELECTRICAL	
Precision	Class 0.5
Linearity	< 0.1 %
Supply dependence	< ± 0.01 % / % ΔU supply
Temp. dependence	< ± 0.02 % / °C
Ripple	< 1 % pp

OUTPUT

All output types are protected against short-circuit and open-circuit. Max. loads for accurate operation are shown in ordering information.

SUPPLY

AC supply range	24 V (From 20 to 28 V)
with transformer	110 V (From 99 to 140 V) 230 V (From 198 to 264 V) 400 V (From 342 to 484 V)
AC frequency range	45 to 440 Hz
Power consumption	4 VA, 2 W

GENERAL

Temperature range	- 25 °C to + 55 °C
Humidity	Up to 90 % RH non-condensing
Dielectric test voltage	Input to AC supply 4000 VAC Output to AC supply 4000 VAC Input to output 3000 VAC
Weight	0.25 kg



International Standards	
EMC directive 89/336:	EN50081 - Emission EN50082 - Immunity
Low voltage directive 73/23:	EN60255 - Electrical Relays EN60688 - Measuring transducer

CHOISE OF CURRENT TRANSFORMER

$$1 - \text{phase: } \frac{\text{Watt (or VAR)}}{U (\text{nom. voltage}) \times \cos \varphi} = \text{current}$$

$$3 - \text{phase: } \frac{\text{Watt (or VAR)}}{U (\text{nom. voltage}) \times \cos \varphi} \times 0.577 = \text{current in one phase}$$

Chose your current transformer to the next standard above.

Standard tranducer:

Full output $U_{nom.} \times 1 (\text{nom. current}) \times 1 (\cos \varphi = 1)$

Calculation of full output in Watt:

1 - phase: $U_{nom.} \times 1 (\text{nom. current}) \times 1 (\cos \varphi = 1)$

3 - phase: $U_{nom.} \times 1 (\text{nom. current}) \times 1 (\cos \varphi = 1) \times \sqrt{3}$

ORDERING INFORMATION

EXAMPLE:

TYPE

Power measuring transducer

Active power
Reactive power

1 - phase (only active power)
3 - phase 3 & 4 wire symmetrical load
3 - phase 3 wire asymmetrical load ("Aron" coupling)
3 - phase 3 & 4 wire asymmetrical load

LOAD (Watt - VAR)

The first three figures of the load in Watt or VAR, e.g. 250 kW

Followed by:

2 for W / VAR = 100 to 999
3 for W / VAR = 1k to 9.9
4 for W / VAR = 10k to 99.9
5 for W / VAR = 100k to 999
6 for W / VAR = 1M00 to 9.99

VOLTAGE BETWEEN PHASES SINGLE PHASE - PHASE VOLTAGE

The first three figures of the voltage in Volt, e.g. 400 V

Followed by:

2 for V = 100 to 999

CURRENT TRANSFORMER PRIMARY NOMINAL

The first three figures of the current in Ampere, e.g. 200 A

Followed by:

CURRENT WITH .../1 A.

0 for A = 1.00 to 9.99
1 for A = 10.0 to 99.9
2 for A = 100 to 999
3 for A = 1k to 9.99k

CURRENT WITH .../5 A.

4 for A = 1.00 to 9.99
5 for A = 10.0 to 99.9
6 for A = 100 to 999
7 for A = 1k to 9.99k

FREQUENCY e.g. 50Hz

50Hz

60Hz

OUTPUT SPECIFICATION

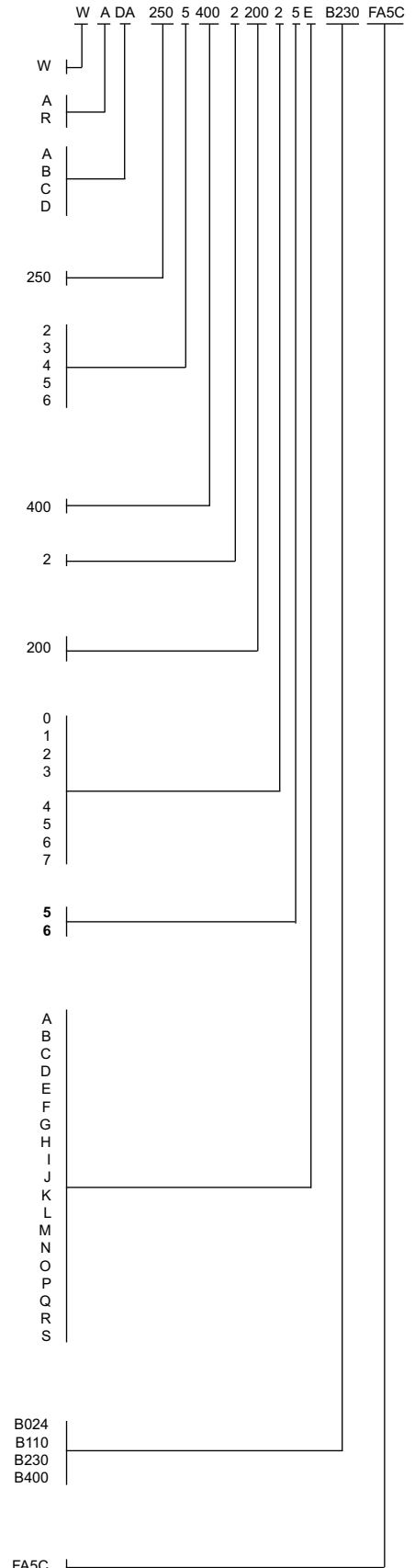
	Min. k Ω	Max. k Ω	
0 to ± 1 V	0.1		A
0 to ± 2.5 V		0.25	B
0 to ± 5 V	0.5		C
0 to ± 7.5 V		0.75	D
0 to ± 10 V	1		E
0.2 to 1 V	0.1		F
0.5 to 2.5 V	0.25		G
1 to 5 V	0.5		H
2 to 10 V	1		I
0 to ± 1 mA		10	J
0 to ± 2.5 mA		2.5	K
0 to ± 5 mA		2	L
0 to ± 10 mA		1	M
0 to ± 20 mA		0.5	N
0.2 to 1 mA		10	O
0.5 to 2.5 mA		2.5	P
1 to 5 mA		2	Q
2 to 10 mA		1	R
4 to 20 mA		0.5	S

SUPPLY VOLTAGE

From 20 to 28 VAC	B024
From 99 to 140 VAC	B110
From 198 to 264 VAC	B230
From 342 to 484 VAC	B400

HOUSING

Rail mounting VOX 55mm

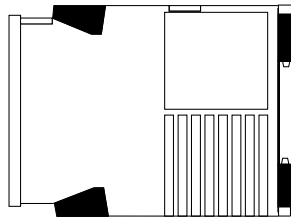


Rail mounting, 35/45/55 mm

Quick mounting on DIN rail according to DIN 46277/3
(European Norm EN 50022).

Connection terminals shielded to prevent human
contact, max. cable 4 mm², protection class IP 20.

Designation and arrangement according to
DIN 46 199.

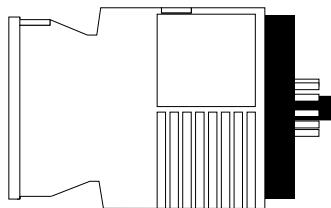


11-pin socket mounting, 35/45/55 mm

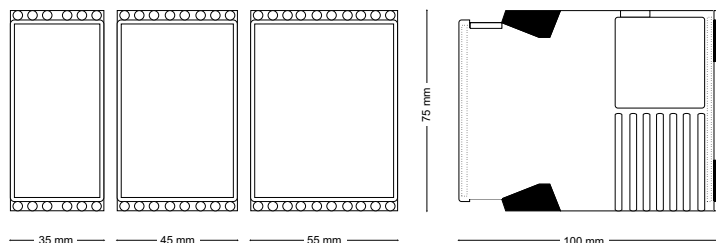
Mounting and connection by 11-pin socket with either screw terminals or soldering
connections.

Fixation by Retaining Clip BU 351 for 35/45/55 mm

Plug connection according to IEC 67 - 1 - 18a.



Dimensions:



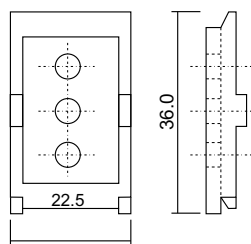
Classification:

VDE 0435
VDE 0110

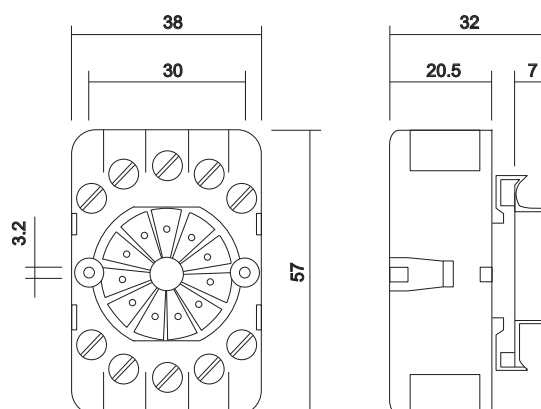
EN60255

Self - quenching plastic case,
protection class IP 40.

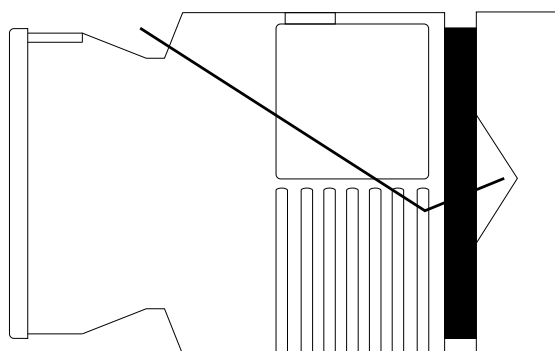
Mounting plate MP 225. (only 35 mm. housing)



Socket ZKR 118 (11-pin)



Holding device BU 351



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