Datasheets 2016

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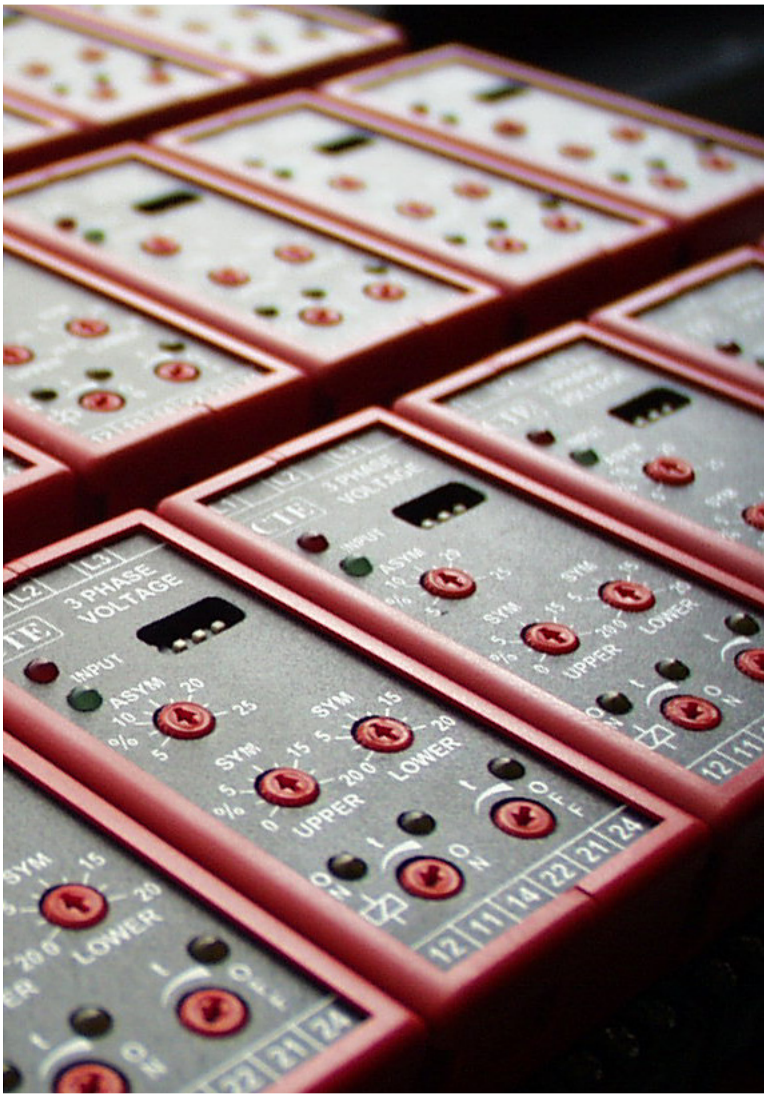

Electronic modules

- Control relays
- Monitoring relays
- Phase failure relays
- Engine starter 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.

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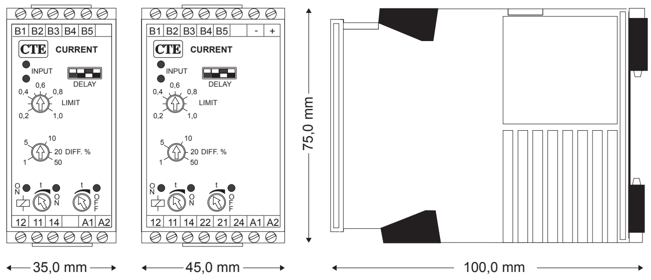
2860 Søborg
Denmark

	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
With through hole for CT	**IMAA**		Current, Earth leakage and Differential current	5mA - 100A	7
			Multifunction with 12 current ranges in one unit		
	IADA	AC	Current detecting relay with delayed drop out. 12VDC supply.	9-16VDC	9
	DDCA	DC	Current, Earth leakage and Differential current. 6 current settings	5-200mA	11
	DDCB	DC	Current, Earth leakage and Differential current. External coil	5-200mA	13
DC earth leakage monitor	**DDEA**	DC	Current, Earth leakage for DC unearthedit systems	0,2mA-30mA	15
	DDEB	DC	Current, Symmetric & asymmetric leakage for DC unearthed systems	0,2mA-30mA	17
Voltage, Single Phase	**UMCA**	AC-DC	Multifunction, 11 ranges in one	50mV - 500V	21
	UAWA	AC	Window voltage relay. Individual Low & high voltage setting.	100 - 415V	23
Incl frequency control	**UFWA**	AC	Window voltage & frequency relay. Individual Low & high voltage setting	100 – 415V	25
Voltage, 3 phase 4 wire	**PNDA**	AC 4w	Phase under voltage & phase sequence	100 - 480V	27
	PNDI	AC 4w	Phase under voltage & phase sequence with true time delay	100 - 480V	
Current and Voltage Single phase	**IUAB**	AC	Current relay with voltage compensated setpoint	0,2A-2,5A	29
Battery Control relays			Replacement for BVCA, BVCB, BVCC		
	BMCA	DC	Battery low voltage monitoring relay. For 12V, 24V, 48V & 110V batteries.	8 - 180 VDC	31
			Replacement for BVCD, BVCE, BVCF		
	BMCD	DC	Battery high/low voltage monitoring relay. For 12V, 24V, 48V & 110V batteries.	8 - 180 VDC	31
	BMWB	DC	Universal DC voltage relay. Individual Low & High voltage plus hysteresis setting	12.5 - 340V	33
	BVSA	DC	Battery symmetry monitoring relay	12, 24, 48V	35
	BMSA	DC	Battery symmetry monitoring relay with digital setting and display	24 - 256V	37
			Symmetry setting: 1 to 20% of cell voltage		
	BRIA	DC	DC ripple relay. Setting: 0.4 – 6.4% ripple	18 – 340V	41
Phase failure relays, 3 or 4 wire					
Voltage and asymmetry	**PADA**	AC 3w	Unbalance & Balanced under & over voltage	100 - 480V	43
	PADI	AC 3w	PADA with true time delay	100 - 480V	43
	PANA	AC 4w	PADA with test for Neutral	100 - 480V	43
	PANI	AC 4w	PADA with test for Neutral and true time delay	100 - 480V	43
Incl phase rotation	**PAHA**	AC 3w	Phase rotation w. 2 relays, Unbalance & Balanced under & over voltage	100 - 480V	45
	PAHI	AC 3w	PAHA with true time delay	100 - 480V	45
	PAMA	AC 4w	PAHA with test for Neutral	100 - 480V	45
	PAMI	AC 4w	PAHA with test for Neutral and true time delay	100 - 480V	45
Frequency, voltage and asymmetry	**PAFA**	AC 3w	Frequency 50, 60 and 400Hz, Unbalance & Balanced under & over voltage	100 - 480V	47
	PAGA	AC 4w	PAFA with test for Neutral	100 - 480V	47
Incl phase rotation	**PAFB**	AC 3w	PAFA with test for Phase rotation	100 - 480V	47
	PAGB	AC 4w	PAFA with test for Phase rotation and Neutral	100 - 480V	47
Phase, Neutral & Ground monitoring relays 3, 4 and 5 wire					
	PMSA	AC	RMS Neutral to Ground plus RMS Phase to Neutral or RMS Phase to Phase measure-ment	50 - 830V Sup. 18-288V	49
Load monitoring relays					
Power factor Cos φ	**LMCB**	Ph.Angle	Over or Under load. 2, 3 and 4 wire	24 - 440V	53
				0,5 - 10A	
Active power	**LMWB**	AC Watt	Real Watt. Min. & Max. load or 2 individuak Min. or Max. values. Analogue adjustment.	0 - 480V	55
			2, 3 and 4 wire. Terminals for PTC monitoring of motors.	0 - 12A	
Engine & generator relays					
Starter	**ESPA**	DC	Programmable start or pause firs. 1-15 trials	9 - 30V	57
Starter inhibit and over speed	**FRAA**	Freq.	Frequency range from 10 to 5120Hz. Transformer, Namur or optocoupler input	12V	61
	FRBA	Freq.	Frequency range from 10 to 5120Hz. Transformer, Namur or optocoupler input	24V	61
Starter inhibit	**FAAA**	Freq.	Frequency range from 10 to 5120Hz. Transformer, Namur or optocoupler input	24V	61
Over speed	**FABA**	Freq.	Frequency range from 10 to 5120Hz. Transformer, Namur or optocoupler input	24V	61
Synchronizer	**SYND**	AC 2w	Synchronization of grid and generators.	100 - 500V	63
	SYPD	Bus 3w.	Optional 96x96 Panel indicator to SYND	Bus 3 wire	65
Isolation amplifiers					
Multi function	**AISA**	DC	Programmable: 8 input and 8 output volt/mA ranges. Includes power supply	24 - 440V	67
Multifunction, mV input	**AISB**	DC	Programmable: 4 mV input and 8 volt/mA output ranges. Includes power supply	24 - 440V	69
Multifunction, Volt input.	**UISA**	DC	Programmable w.16 input volt ranges and, 8 output V/mA ranges. Incl. power supply	24 - 440V	71
	UISB	DC	Programmable w.16 input volt ranges and current loop output. Incl. power supply	24 - 440V	71
Volt in and current loop out	**UIDA**	DC	2 input ranges: 4.8 - 24V and 6 - 30V to current loop.	4 - 20mA	73
Current loop isolator	**AITA**	DC	Current loop. 3 loops 4 to 20mA. Loop powered	4 - 20mA	75
	AITB	DC	Current loop. 1 loop 4 to 20mA. Loop powered	4 -20mA	77
Transducers					
Current	**IAMA**	AC	Dual range: 1 & 5Aac in to 6 standard V/mA output ranges.	24 - 440V	79
	IAMB	AC	Dual range: 1 & 5Aac in to 4 - 20mA current loop out	24 - 440V	79
Voltage	**UAMA**	AC	Dual range: 250 & 500Vac in to 6 standard V/mA output ranges	24 - 440V	79
	UAMB	AC	Dual range: 250 & 500Vac in to 4 - 20mA current loop out	24 - 440V	79
Frequency	**FAMA**	Freq.	Min. & Max. range specified from 1 to 5000Hz. 8 V/mA output ranges	24 - 440V	81
Power Active	**WAAA**	AC Watt	1 - Phase 2 wire. Select from 19 Volt or mA unipolar or bipolar outputs	24 -440V	83
	WABA	AC Watt	3 - Phase 3 & 4 wire symmetrical load.	24 -440V	83
	WACA	AC Watt	3 - Phase 3 wire asymmetrical load (Aron coupling)	24 -440V	83
	WADA	AC Watt	3 - Phase 3 & 4 wire asymmetrical load	24 -440V	83
Power Reactive	**WRBA**	AC Var	3 - Phase 3 & 4 wire symmetrical load	24 -440V	87
	WRCA	AC Var	3 - Phase 3 wire asymmetrical load (Aron coupling)	24 -440V	87
	WRDA	AC Var	3 - Phase 3 & 4 wire asymmetrical load	24 -440V	87
			Continued ...		

	Type	Input	Function	Input or supply Range	Page
Transducers (Continued)					
Power Active	**WBAA**	AC Watt	1 - Phase 2 wire. Select from 19 different Volt or mA unipolar or bipolar outputs	24 - 440V	87
	WBBA	AC Watt	3 - Phase 3 & 4 wire symmetrical load	24 - 440V	87
	WBCA	AC Watt	3 - Phase 3 wire asymmetrcal load (Aron coupling)	24 - 440V	87
	WBDA	AC Watt	3 - Phase 3 & 4 wire symmetrical load.	24 - 440V	87
Power Reactive	**WSAA**	AC Var	1 - Phase 2 wire. Select from 19 different Volt or mA unipolar or bipolar outputs	24 - 440V	87
	WSBA	AC Var	3 - Phase 3 & 4 wire symmetrical load	24 - 440V	87
	WSCA	AC Var	3 - Phase 3 wire asymmetrical load (Aron coupling)	24 - 440V	87
	WSDA	AC Var	3 - Phase 3 & 4 wire asymmetrical load	24 - 440V	87
Design of housing for 35/45/55 and 22,5 mm housing					91



MULTIFUNCTION CURRENT RELAY

Type: IMCA

FEATURES

- **For AC and DC current**
- **Balanced input for noise immunity**
- **Input current range from 0.5mA to 10A**
- **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)

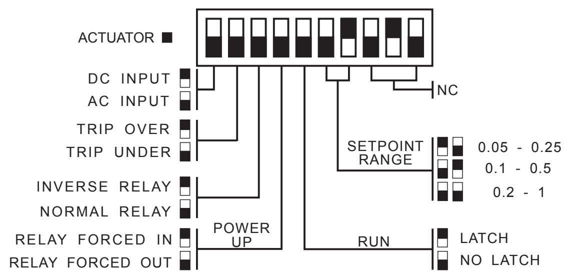
Description:
The current relay is designed with a microcontroller. With programmable range, function and timing it can be programmed to cover all kinds of applications.

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 0,5mA and 10A 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 monitoring of loads, batteries, generators, mains etc.

PROGRAMMABLE FEATURES

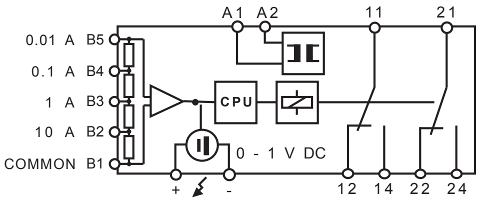
Range and relay function



CONNECTION DIAGRAM

Rail mounting

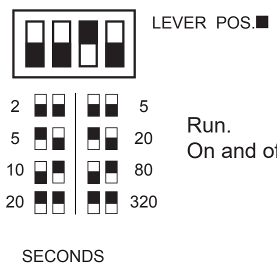
Max. current input: Supply



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

Time function

Power up.
Set or reset time.



Run.
On and off delay range.

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SPECIFICATIONS

INPUT	DC or AC current
Range	From 0.5 mA to 10 A
Input Range:	Setpoint Range
B1 and B5 0.01 A socket type 1008	0.5 - 2.5 mA 1 - 5 mA 2 - 10 mA
B1 and B4 0.1 A socket type 1009	5 - 25 mA 10 - 50 mA 20 - 100 mA
B1 and B3 1 A socket type 1000	50 -250 mA 0.1 - 0.5 A 0.2 - 1 A
B1 and B2 10 A socket type 1001	0.5 - 2.5 A 1 - 5 A 2 - 10 A
AC frequency range	45 to 440 Hz
Max. continuous input	1.42 x I_{NOM}
Input resistance	0.1 / I_R Ω (10 Ω, 1 Ω, 0.1 Ω, 0.01 Ω)
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. ± 0.02 % / °C
Supply dependence	Typ. ± 0.01 % / % DU
OUTPUT	Relay, 1 C/O 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 and DC with isolated switchmode	18-360 VDC and 20-264 VAC
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)
AC frequency range	45 to 440 Hz
Power consumption	4 VA, 3 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

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

ORDERING INFORMATION

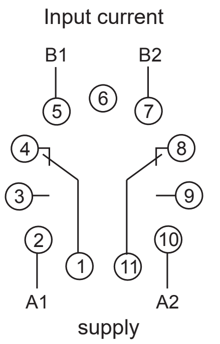
EXAMPLE, Rail mounting: IMCA B230 D A 3 C

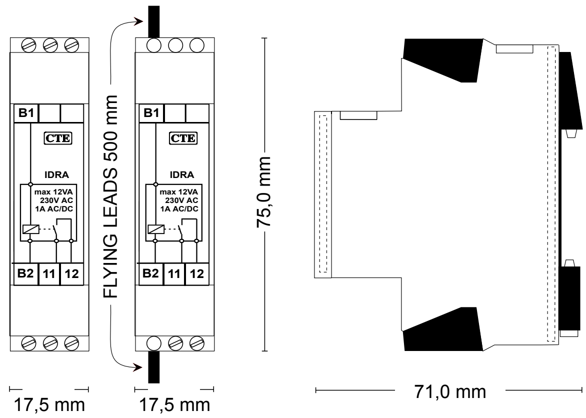
TYPE		
Multifunction current relay		IMCA
SUPPLY VOLTAGE		
18-360 VDC and 20-264VAC		E400
20-28 VAC		B024
99-140 VAC		B110
198-264 VAC		B230
342-484 VAC		B400
ADJUSTMENT		
Trimpot and dipswitch adj.		D
HOUSING		
Rail mounting.(internal transformer)		A
SIZE		
35 mm.	1 C/O	3
45 mm. (with 0 - 1 VDC output)	2 C/O	4
CODE END		C

EXAMPLE, Socket mounting 11-Pin.: IMCA 1001 B230 D E 3 C

TYPE		
Multifunction current relay		IMCA
INPUT CURRENT RANGE		
From 0,5 to 10 mA		1008
From 5 to 100 mA		1009
From 0,05 to 1 A		1000
From 0,5 to 10 A		1001
SUPPLY VOLTAGE		
18-360 VDC and 20-240VAC		E400
20-28 VAC		B024
99-140 VAC		B110
198-264 VAC		B230
342-484 VAC		B400
ADJUSTMENT		
Trimpot and dipswitch adj.		D
HOUSING		
Socket mounting 11-Pin.(internal transformer)		E
SIZE		
35 mm.	2 C/O	3
CODE END		C

Socket mounting





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**

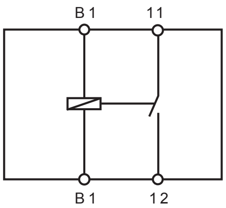
Description:
The IDRA DC current relay is a miniaturized and cost effective solution for monitoring the presence of a DC current. The units for currents above 10 A are, in order to allow for a high continuous current, supplied with 500 mm flying leads of 2.5, 4.0 or 6.0 mm^2.

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.

CONNECTION DIAGRAM

Rail mounting



SPECIFICATIONS

INPUT	DC current	
Input Range:		
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	Reed contact	
Switching capacity	12 W/VA	
Switching voltage	230 Vac/dc	
Switching current	Max. 1.0 A	
Carrying current	Max. 2.0 A	
Contact resistance	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

CE

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

ORDERING INFORMATION

EXAMPLE: IDRA 6000 2500 F A 1 C

TYPE	
DC current relay	IDRA
SENSITIVITY (Pull in)	
3.0 A	3000
6.0 A	6000
10 A	1002
16 A	1602
CONNECTIONS	
Terminal connection	0000
2.5 mm^2 Flying leads	2500
4.0 mm^2 Flying leads	4000
6.0 mm^2 Flying leads	6000
ADJUSTMENT	
Fixed sensitivity	F
HOUSING	
Rail mounting	A
SIZE	
17.5 mm	1
CODE	
Code end	C
Extended code	E

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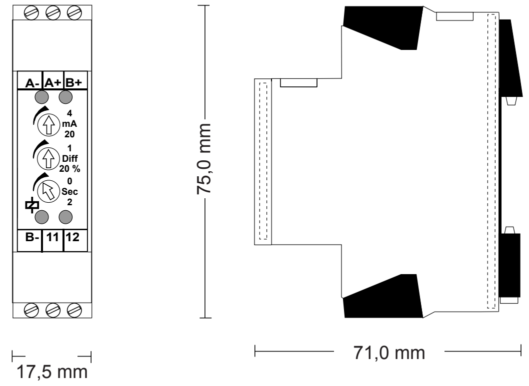


4 to 20 mA DC
CURRENT RELAY WITH
SENSOR SHORT PROTECTION
Type: ILUA & ILUB

FEATURES

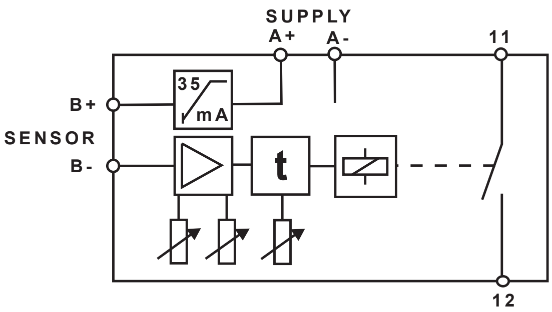
- **Includes a 35 mA current limit for a loop powered external sensor in order to secure against shorted sensor wires**
- **Includes an alarm LED for a shorted or broken sensor wire**
- **Adjustable differential**
- **0 to 2 sec. adjustable ON and OFF delay**
- **LEDs indicate the state of input, fault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

Description:
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.

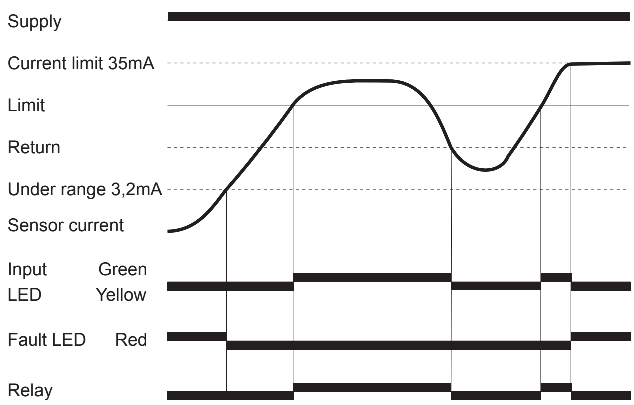
Operation:
The level of the input current is shown by the Yellow LED for currents below the set point (-differential) and the Green LED for currents above the set point (-differential). Under normal conditions the relay is released at low current and will pull in at the set tripping point, indicated 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.

CONNECTION DIAGRAM
Rail mounting



FUNCTION DIAGRAM



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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. ± 0.02 % / °C
Supply dependence	Typ. ± 0.01 % / % DU
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

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

ORDERING INFORMATION

EXAMPLE: ILUA D 024 A A 1 C

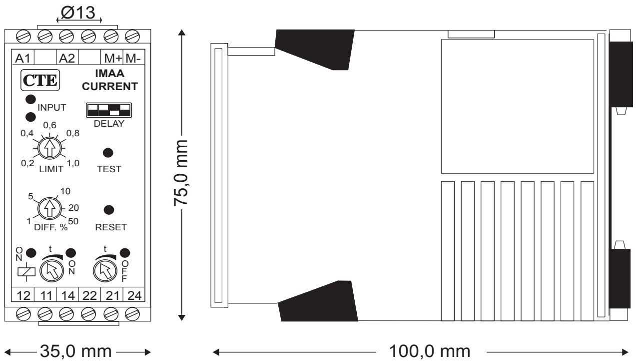
TYPE	
Relay with single turn potentiometer	ILUA
Relay with multi turn potentiometer	ILUB
SUPPLY	D
SUPPLY VOLTAGE	
From 16 to 32 VDC	024
ADJUSTMENT	
Adjustable	A
Fixed	F
HOUSING	
Rail mounting M36	C
SIZE	
17.5 mm	1
CODE	
Code end	C
Extended code	E

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.

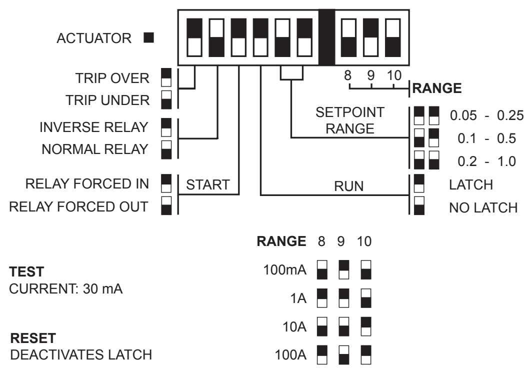
The differential is adjustable from 1 to 50% of the set tripping current. By means of DIP switches, the actual relay function can be set to detect over or under current with fail safe relay function. The relay function can be inversed and set to latch in or out with manual or electrical reset. Furthermore 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.

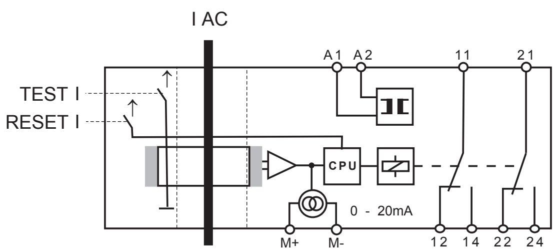
PROGRAMMABLE FEATURES

Range and relay function

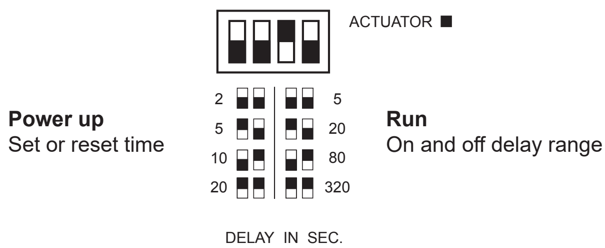


CONNECTION DIAGRAM

Rail mounting



Time function



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Transformervej 31
2860 Søborg - Denmark
Tel.: +45 4485 8000
Fax: +45 4485 8005
Web: www.thiim.com
Mail: thiim@thiim.com

SPECIFICATIONS

INPUT	AC current from 5mA to 100A
Input Range:	Setpoint Range
5 to 100 mA	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 carying 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. ± 0.02 % / °C
Supply dependence	Typ. ± 0.01 % / % DU
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 with transformer	24 V (From 20 to 28 V) 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

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

ORDERING INFORMATION

EXAMPLE: IMAA B 230 D A 3 C

TYPE
Multifunction current relay — IMAA

SUPPLY VOLTAGE

20 - 32 VDC	D024
20 - 28 VAC	B024
85 - 127 VAC	B110
187 - 264 VAC	B230
323 - 457 VAC	B400
374 - 506 VAC	B460

ADJUSTMENT
Trimpot and dipswitch adj. — D

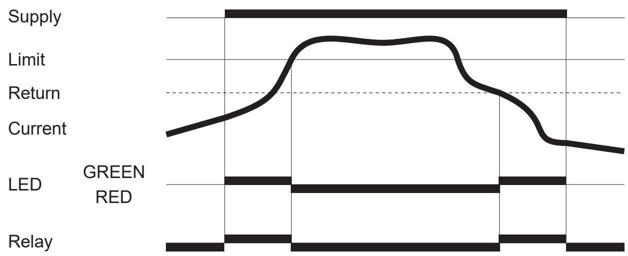
HOUSING
Rail mounting.(internal transformer) — A
Socket, 11 Pin — E

SIZE
35 mm. 2 C/O — 3

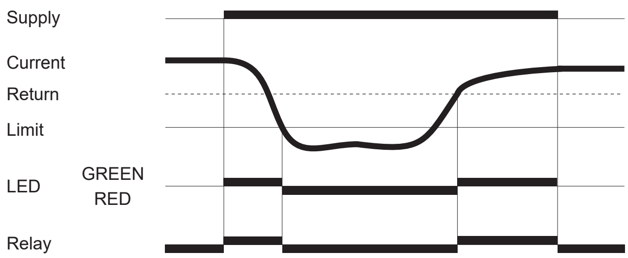
CODE
Code end — C
Extended code — E

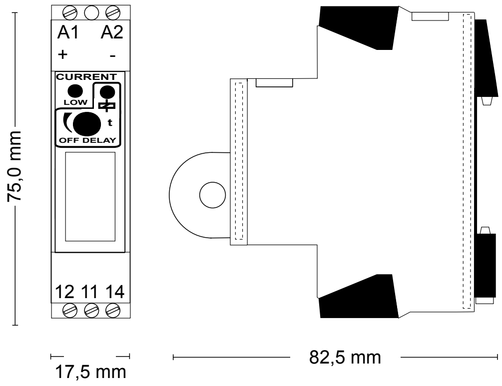
FUNCTION DIAGRAM

Overcurrent sensing



Undercurrent sensing





THiiM

AC CURRENT DETECTING RELAY WITH DELAYED DROP OUT

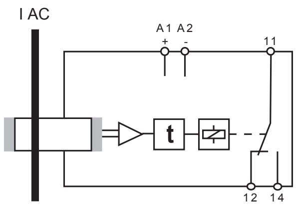
Type: IADA

FEATURES

- * Cost effective solution
- * Minimize energy consumption
- * Minimize environmental noise
- * Compact size
- * Direct powered from the starter battery

CONNECTION DIAGRAM

Rail mounting



Description:
The IADA AC current relay is a miniaturized and cost effective solution for monitoring the presence of an AC current. The unit detects current from 50 mA and above and accepts continuous currents only limited by the cable size through the CT in the front.

Operation:
When powered from either 12 or 24 V DC the relay will pull when the wire through the CT conducts an AC current of more than 50 mA. When the current drops down below 40 mA the relay will drop out after the set delay of up to 60 sec. has expired.

Application:
Automatic idle and run control of small petrol or diesel motor powered generator sets. When the motor is idling, the output voltage will only be a fraction of the nominal voltage and not able to feed the connected units. The generator set will run with a low power consumption and low noise. But as soon as a connected load is switched on, a small load current will be detected by the IADA and the motor will be switched from idling to run in order to supply the power for the load. In order to minimize the number of switches the IADA comes with an adjustable drop out delay. When the load is disconnected the build-in timer in the IADA starts to count down and after the set time the relay will drop out and the motor go back to the idle condition.

SPECIFICATIONS

INPUT	AC current	
Input Range	45 - 400 Hz	
PERFORMANCE PARAMETERS		
Pull in	< 50mA AC	
delay	0- 60 sec. -25% - +50%	
Temp. dependence	Typ. ± 0.02 % / °C	
Supply dependence	Typ. ± 0.01 % / % ∆U	
OUTPUT	Relay, 1 C/O or 2 C/O	
Contact rating	6 A, 250 VAC , 1500 W	
Mechanical life	30 Million operations	
SUPPLY	DC voltage	
DC supply range	12 V (From 9 to 16 V)	
Power consumption	1 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
Weight	0.06 kg in 35 mm. housing	

CE

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

ORDERING INFORMATION

EXAMPLE: IADA 1009 F C 1 C

TYPE AC current relay	IADA
SENSITIVITY (Pull in) max 100 mA	1009
ADJUSTMENT Fixed sensitivity	F
HOUSING Rail mounting with Current transformer	C
SIZE 17.5 mm	1
CODE Code end Extended code	 C E

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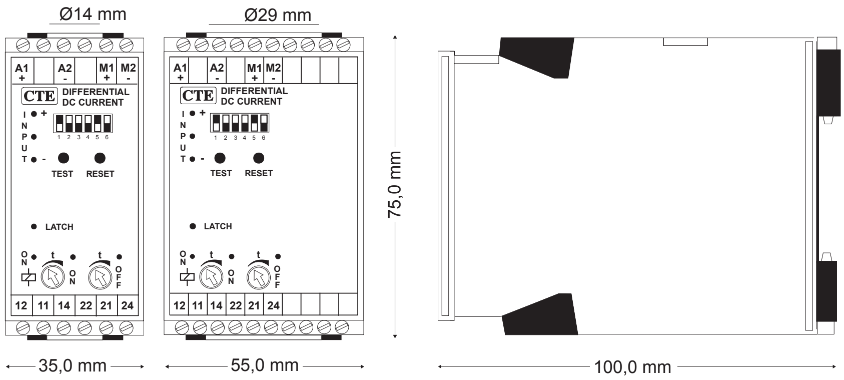


DIFFERENTIAL DC CURRENT RELAY

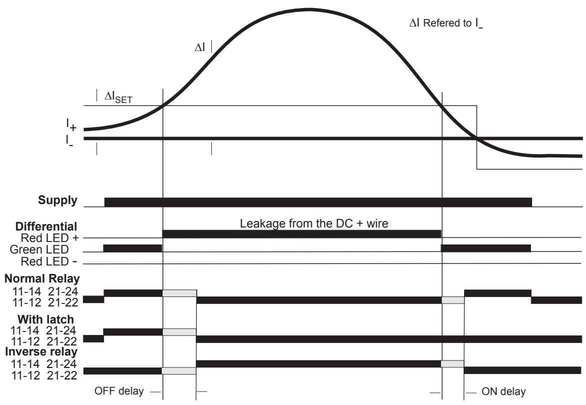
DC Earth Leakage Relay

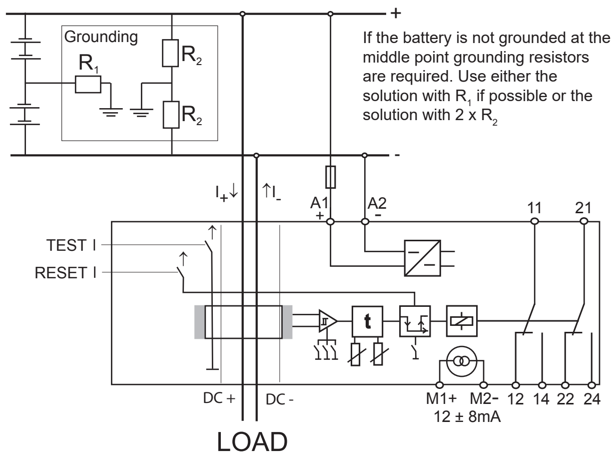
Type: DDCA

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 ± 8mA output and LED indication for supervision and easy trouble shooting**
- **External current transformer Ø50mm or Ø90mm**
- **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**
- **Test and Reset switch**

FUNCTION DIAGRAM





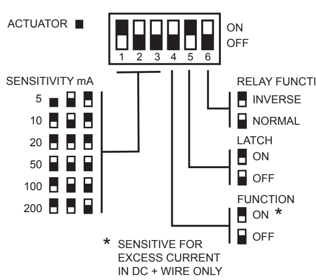
Description:
The differential DC current relay is designed to monitor IT systems for insulation deterioration. The DDCA is able to selectively indicate faults in branched systems. In addition to this it shows if the fault is related to the positive or the negative wire for easy maintenance. Used with 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 for measuring the DC component in AC installations including loads with rectifiers e.g. in variable speed drives, causing the AC monitors to malfunction.

PROGRAMMABLE FEATURES



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Mail: thiim@thiim.com

SPECIFICATIONS

INPUT	DC Current. No specified limitation
Set points selectable by dipswitch	5, 10, 20, 50, 100, 200mA
Differential	Typical 2%
Transformer Diameter	Ø 14mm Ø 29mm
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, AgNi/Au
Contact rating	6 A, 250 VAC, 1500 W See figure for DC rating
Mechanical life	30 million operations
ANALOG INDICATION	
Current	12mA @ Input (fault)= 0mA 12 ± 8mA @ input = ± set point current
SUPPLY	DC voltage
Supply range	18 - 340V
Power consumption	Max 3 W
GENERAL	
Precaution	The DDCA is screened with μ metal for high immunity. If the analog output in the highly sensitive ranges is used, precautions should be taken against permanent magnetic fields close to the DDCA as they can influence on the accuracy. In the sensitive ranges the wires should be kept close and in the center of the core.
Temperature range	- 25 °C to + 55 °C ambient
Humidity	Up to 90 % RH non-condensing
Dieletric test voltage	Coil to relay contacts 4000 VAC Pole to pole 2500 VAC
Weight	Size 3: 0.17 kg. Size 5: 0.23 kg

CE

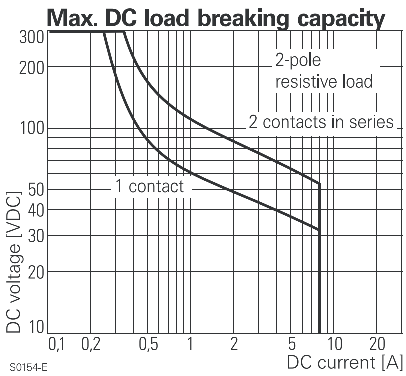
	International Standards
Directive 2002/95/EC of	RoHS
EMC directive 89/336:	EN50081 - Emission EN50082 - Immunity
Low voltage directive 73/23:	EN60255 - Electrical Relays

ORDERING INFORMATION

Main Unit DDCA — DDCA 1834 D A 5 C

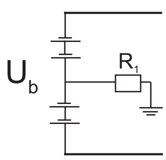
TYPE		
Differential DC current control relay	DDCA	
SUPPLY VOLTAGE		
18 V - 340 VDC	1834	
ADJUSTMENT		
Dipswitch adj.	D	
HOUSING		
Rail mounting	A	
SIZE		
35 mm, 14mm throughput	3	
55 mm, 29mm throughput	5	
CODE END	C	

RELAY CONTACTS



Calculations of grounding resistors for not grounded batteries

Examples for U_b = 48V, ΔI_{set} = 5mA

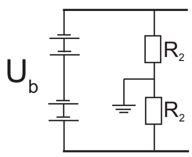


$R_1^* = \text{Max } \frac{U_b}{4\,\Delta\,I_{set}}\,\Omega$

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

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

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



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

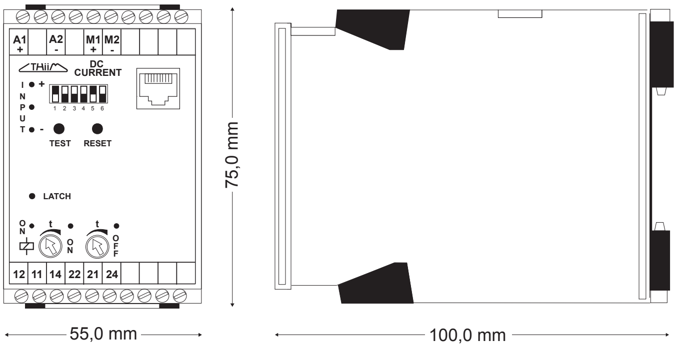
Size of resistor W** = Min. 1,6 $\frac{U_b^2}{R_2}$ Watt

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

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

* 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%.



DIFFERENTIAL DC CURRENT RELAY

DC Earth Leakage Relay

Type: DDCB
with external coil DDCC

Description:
The differential DC current relay is designed to monitor IT systems for insulation deterioration. The DDCB 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, the DDCB can monitor a circuit for connectivity and under current. If the DC current drops below the set value, the relay will trip. This is another key feature as the DDCB 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 DDCB 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.

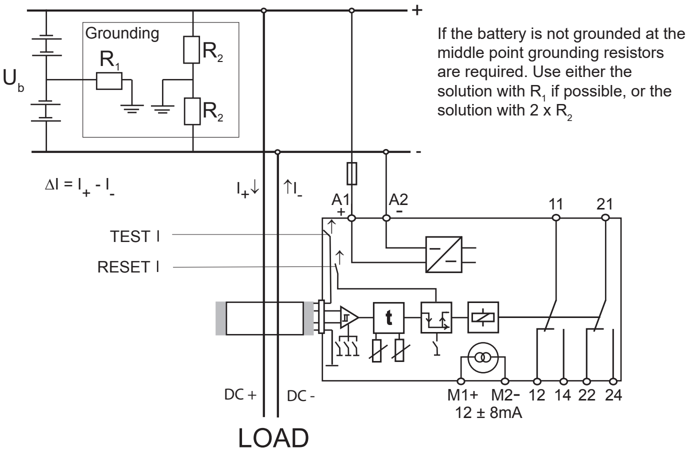
Test and Reset function:
The Test switch activates a real functional test as it conducts a DC current through a separate winding on the sensing core. The Reset switch will, when activated, release the latch function.

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

FEATURES

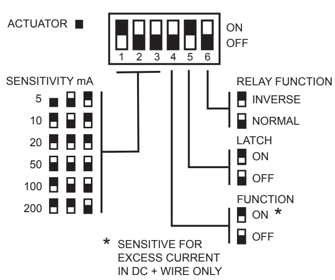
- **Early warning for Insulation deterioration and/or Earth leakage**
- **Minimum current detection**
- **6 Ranges from 5 - 200mA or 7.5 - 300mA selected by DIP switches**
- **Wide DC supply range from 18 to 340 V**
- **Directional 12 ± 8mA output and LED indication for supervision and easy trouble shooting**
- **External current transformer Ø50mm or Ø90mm**
- **Extremely compact and μ metal screened sensor 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**
- **Test and Reset switch**

CONNECTION DIAGRAM



If the battery is not grounded at the middle point grounding resistors are required. Use either the solution with R_1 if possible, or the solution with 2 x R_2

PROGRAMMABLE FEATURES



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Web: www.thiim.com
Mail: thiim@thiim.com

SPECIFICATIONS

INPUT	DC Current. No specified limitation
Set points selectable by dipswitch	5, 10, 20, 50, 100, 200mA, or 7.5, 15, 30, 75, 150, 300 mA (Special version max. range 2.0A)
Differential	Typical 2%
Transformer Diameter	Inner Ø50mm, Outer Ø85 mm Inner Ø90mm, Outer Ø130 mm
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, AgNi/Au
Contact rating	6 A, 250 VAC, 1500 W See figure for DC rating
Mechanical life	30 million operations
ANALOG INDICATION	
Current	12mA @ Input (fault)= 0mA 12 ± 8mA @ input = ± set point current
SUPPLY	DC voltage
Supply range	18 - 340V
Power consumption	Max 3 W
GENERAL	
Precaution	The DDCC is screened with μ metal for high immunity. If the analog output in the highly sensitive ranges is used, precautions should be taken against permanent magnetic fields close to the DDCC as they can influence the accuracy. In the sensitive ranges the wires should be kept close and in the center of the core.
Temperature range	- 25 °C to + 55 °C ambient
Humidity	Up to 90 % RH non-condensing
Dieletric test voltage	Coil to relay contacts 4000 VAC Pole to pole 2500 VAC
Weight	Size 3: 0.17 kg. Size 5: 0.23 kg
	International Standards
Directive 2002/95/EC of	RoHS
EMC directive 89/336:	EN50081 - Emission EN50082 - Immunity
Low voltage directive 73/23:	EN60255 - Electrical Relays

ORDERING INFORMATION

Main Unit DDCB DDCB 2009 1834 D A 5 C

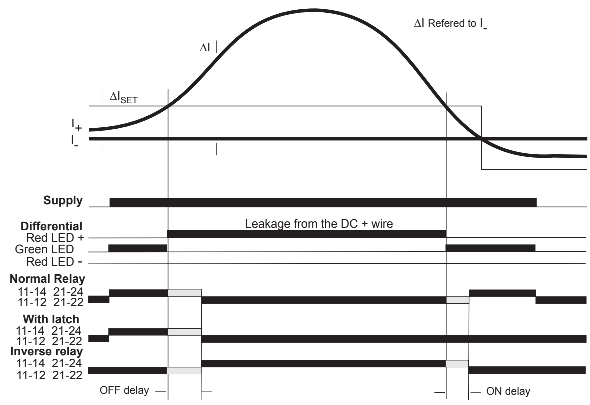
TYPE		
Differential DC current control relay	DDCB	
SETPOINTS		
5, 10, 20, 50, 100, 200mA	2009	
7.5, 15, 30, 75, 150, 300 mA	3009	
SUPPLY VOLTAGE		
18 V - 340 VDC	1834	
ADJUSTMENT		
Dipswitch adj.	D	
HOUSING		
Rail mounting	A	
SIZE		
55 mm	5	
CODE END	C	

EXTERNAL Coil DDCC

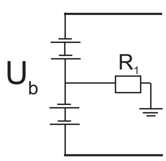
External Coil DDCC DDCC 5085 200

External Coil DDCC	DDCC
Coil Size, ID mm (Inner/outer diam.)	50/85 90/130
Length, connecting cable, cm	100 200 300 400 500

FUNCTION DIAGRAM



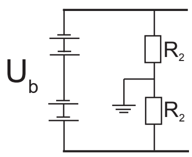
Calculations of grounding resistors for not grounded batteries



Examples for U_b = 48V, ΔI_{set} = 5mA

$R_1^* = \text{Max } \frac{U_b}{4\,\Delta I_{set}}\ \Omega$ $R_1 = \text{Max } \frac{48}{4 \times 0{,}005} = \text{Max. } 2400\Omega$

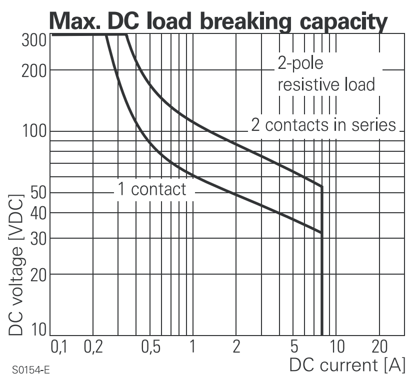
$W^{**} = \text{Min. } 0{,}4\ \frac{U_b^2}{R_1}\ \text{Watt}$ $W = \text{Min. } 0{,}4\ \frac{48^2}{2400} = \text{Min. } 0{,}384 \text{ Watt}$



$R_2^* = \text{Max } \frac{U_b}{2\,\Delta I_{set}}\ \Omega$ $R_2 = \text{Max } \frac{48}{2 \times 0{,}005} = \text{Max. } 4800\Omega$

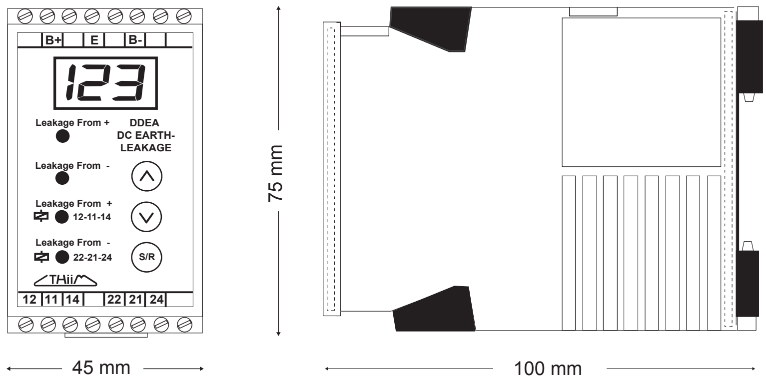
$W^{**} = \text{Min. } 1{,}6\ \frac{U_b^2}{R_2}\ \text{Watt}$ $W = \text{Min. } 1{,}6\ \frac{48^2}{4800} = \text{Min. } 0{,}768 \text{ Watt}$

Max. DC load breaking capacity



* 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%.



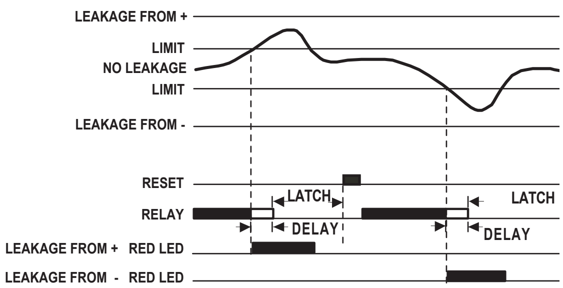
EARTH LEAKAGE MONITOR FOR DC UNEARTHED IT SYSTEMS

Type: DDEA

FEATURES

- **Monitors Insulation deterioration and faults and gives an early warning if a leak current exceeds a preset level**
- **Programmable leak current limit from 0.2 to 30 mA**
- **Universal unit for a wide range of distribution system voltages U_n from 20 to 500 V.**
- **Self-supplied from the distribution system**
- **Time delay - on and off - individually adjustable**
- **Relay function 2x1C/O (leak from + or -) or 1x2C/O**
- **The relays work in Fail Safe mode**
- **Latch function can be selected**
- **3-digit display shows actual current leak**
- **LEDs indicate the status of the relay, latch and timing function**

FUNCTION DIAGRAM

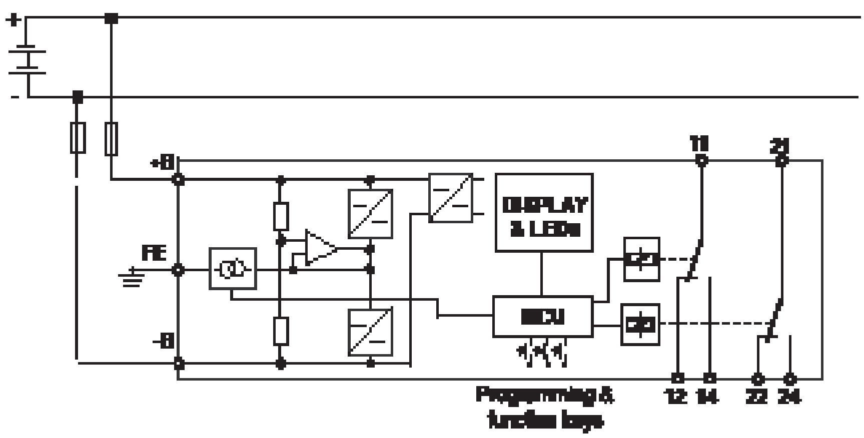


Description:
The DC earth leakage relay is designed to monitor unearthed DC IT systems for insulation deterioration or faults. The DDEA, that is power supplied from the system to be monitored, is connected to earth through an active current limited circuitry, trying to keep the earth voltage at half the system voltage. If there is a leak to ground from one of the supply lines the DDEA will compensate in order to keep the earth voltage at half the supply voltage. When the compensation current rises to a higher level than the set point the relay will switch, and the DDEA will let the earth float with the limited compensation current still running. This ensures that the special features of an unearthed system are still available while the fault can be found and repaired. The internal relays can be set to work in parallel for a fault or individually for faults in the positive or the negative line. In the unlikely case that there is a balanced leak from both the positive and the negative supply line it will not be detected by the DDEA.

Operation:
In order to minimize the size of the DDEA the unit is powered by 3 independent switch mode supplies. Two supplies are used to either source or drain current from the earth terminal and a third supply powers the electronics. The DDEA is with leak currents below 10mA either sourcing or draining with a DC current. At higher leak current, high supply voltage and high ambient temperature the DDEA automatically changes mode to a safe pulse pause mode where the pulses (leak and measuring current) are 600 msec and the pause up to 20 sec. or long enough to keep the temperature in the box below 65 °C.
If LATCH is selected the relays can be reengaged - if the leak current is under the set point - by pressing the S/R button on the front.

Application:
Unearthed systems can function even with a direct short from any point in the wiring to ground, but another short or leak from another point in the system can be fatal. Either direct with heavy currents, overheating or indirect through component malfunction. The DDEA solves the problem by monitoring the circuit and giving an early warning as soon as it senses a leak current greater than the set value. Securing the ground level at half system voltage reduces at the same time personal risks for electric shock.

CONNECTION DIAGRAM



Please note
If the two relay contacts are in "Fault" position and all LED's are red and the display shows "FFF", then the DDEA is defect and must be replaced.

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SPECIFICATIONS

INPUT

To Earth connector	DC Current up to set point then a floating DC Voltage
Set points	Programmable from 0,2 to 30 mA
Differential	Programmable from 0,1 to set point -0,1 mA
Voltage limit	Voltage on Earth connector FE must be limited to be within system voltage

PERFORMANCE PARAMETERS

TIMING	
Response time	Typical <200 msec. Below 10 mA and not pulsed earth leakage current. At higher current, voltage and ambient temperatures dependent on pause time . Max. 20 sec.
Time range during run	Programmable separate On and Off delay 0 - 99,9 sec. MCU controlled.
ELECTRICAL	
Accuracy	Set point ± 2 % within system voltage
Temp. dependence	Typ. ± 0.02 % / °C

OUTPUT

RELAY	2 relays x 1C/O, AgNi/Au
Contact rating	6 A, 250 VAC, 1500 W See figure for DC rating
Mechanical life	20 million operations
ANALOG INDICATION	
Display	3 digit LED Current resolution 0,1 mA Time resolution 0,1 sec.

SUPPLY

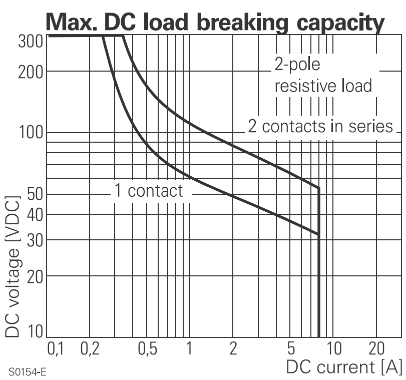
	DC voltage
Supply range	20 - 500 V ±10%
Power consumption	Max 3.5 W

GENERAL

Temperature range	- 25 °C to + 55 °C ambient
Humidity	Up to 90 % RH non-condensing
Dielectric test voltage	DC circuit to contact 4000 V_{rms} Contact to contact 2500 V_{rms}
Open contact circuit	1000 V_{rms}
Weight	0.17 kg.

CE

International Standards	
Product safety	EN 60255-27: 2006
EMC	EN 50263: 2000
	EN 60255-22 Immunity
	EN 61000-25 Emission



ORDERING INFORMATION

EXAMPLE: DDEA 2050 P A 4 C

TYPE Differential DC current control relay	DDEA
SUPPLY VOLTAGE 20 - 500 Vdc	2050
ADJUSTMENT Programmed	P
HOUSING Rail mounting	A
SIZE 45 mm.	4
CODE END	C

DDEA Set-up parameters

To enter Setup Menu pres S/R button for app. 5sec.
If no activity on the buttons for 50sec., then the setup will end without saving data. To return to factory default see below

Step 1: Set Trip to over current. Relay ON to OFF
LEDs: "Leakage to +" and "Leakage to –" are blinking Red
Set trip value from 0,1 to 30,0 mA
Press Up or Down keys to change trip value and press S/R for next Setup menu

Step 2: Set Return to acceptable current. Relay Off to ON
LEDs: "Leakage to +" and "Leakage to –" are blinking Green
Set return value 0,1 to "trip value" x,x mA
Press Up or Down keys to change trip value and press S/R for next Setup menu

Step 3: Set Delay time from ON to OFF
LEDs: "Relay Leakage to +" and Relay Leakage to –" are blinking Red
Set OFF time delay from 0,0 to 99,9 sec.
Press Up or Down keys to change trip value and press S/R for next Setup menu

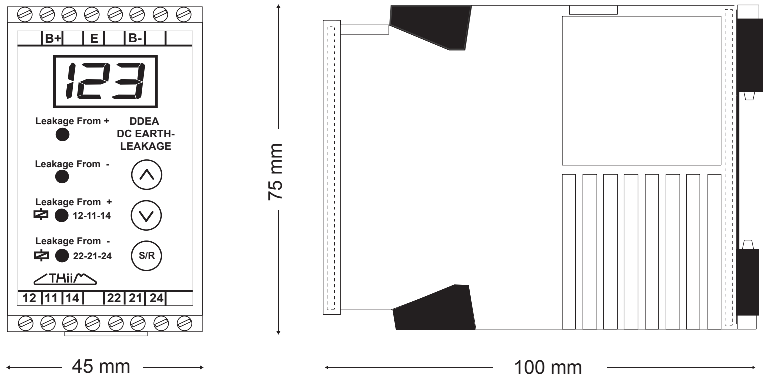
Step 4: Set Delay time from OFF to ON
LEDs: "Relay leakage to +" and "Relay leakage to –" are blinking Green
Set ON delay time from 0,0 to 99,9 sec.
Press Up or Down keys to change trip value and press S/R for next Setup menu

Step 5: Set Latch OFF (0) or ON (1)
If latch OFF all 4 LEDs are Green
If latch ON all 4 LEDs are Red
Press Up or Down keys to change latch setting and press S/R for next Setup menu

Step 6: Set Relay Function
Function 1: Individual functioning C/O contact for leakage to + and for leakage to -. Relay LEDs blinking Red and Green out of phase
Function 2: 2 parallel functioning C/O contacts for leakage to + or leakage to –. Relay LEDs are blinking Red and Green in phase
Press Up or Down keys to change the relay function and press S/R to Store Data and Exit setup

To return to factory default setup values press "S/R" and "UP" buttons simultaneously for app. 5 sec.

Over current trip:	10,0	mA
Return trip:	9,8	mA
Delay time ON to OFF:	2,0	sec.
Delay time OFF to ON:	2,0	sec.
Latch:	OFF	(0)
Relay function:	Function 1	(Individual)



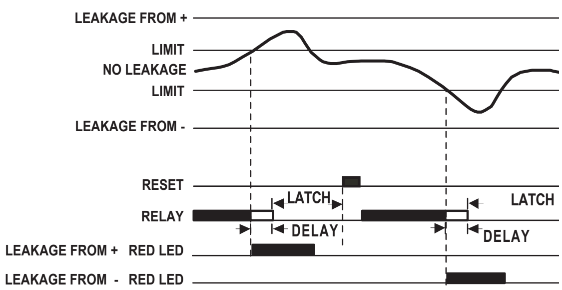
EARTH LEAKAGE MONITOR ASYM & SYM LEAKAGE FOR DC UNEARTHED IT SYSTEMS

Type: DDEB

FEATURES

- **Monitors Insulation deterioration and faults and gives an early warning if a leak current exceeds a preset level**
- **Reacts on both symmetric and asymmetric leakages**
- **Programmable leak current limit from 0.2 to 30 mA**
- **Universal unit for a wide range of distribution system voltages U_n from 20 to 500 V.**
- **Self-supplied from the distribution system**
- **Time delay - on and off - individually adjustable**
- **Relay function 2x1C/O (leak from + or -) or 1x2C/O**
- **The relays work in Fail Safe mode**
- **Latch function can be selected**
- **3-digit display shows actual current leak**
- **LEDs indicate the status of the relay, latch and timing function**

FUNCTION DIAGRAM

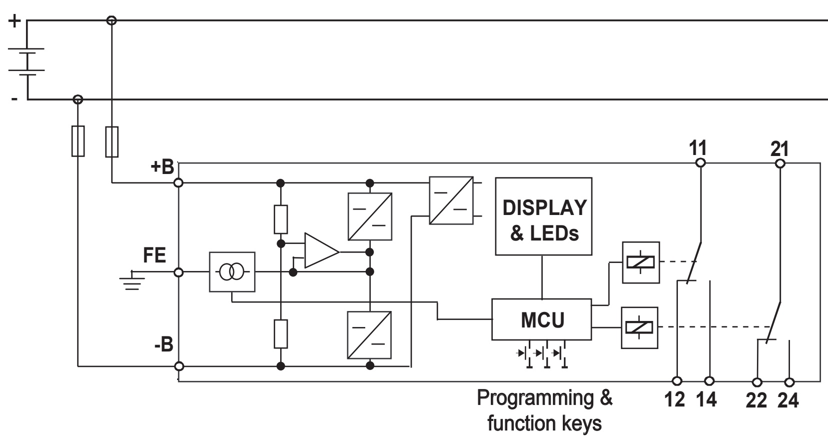


Description:
The DC earth leakage relay is designed to monitor unearthed DC IT systems for insulation deterioration or faults. The DDEB, that is power supplied from the system to be monitored, is connected to earth through an active current limited circuitry, trying to keep the earth voltage at half the system voltage. If there is a leak to ground from one or both of the supply lines the DDEB will compensate in order to keep the earth voltage at half the supply voltage. When the compensation current rises to a higher level than the set point the relay will switch, and the DDEB will let the earth float with the limited compensation current still running. This ensures that the special features of an unearthed system are still available while the fault can be found and repaired. The internal relays can be set to work in parallel for a fault or individually for faults in the positive or the negative line.

Operation:
In order to minimize the size of the DDEB the unit is powered by 3 independent switch mode supplies. Two supplies are used to either source or drain current from the earth terminal and a third supply powers the electronics. The DDEB is with leak currents below 10mA either sourcing or draining with a DC current. At higher leak current, high supply voltage and high ambient temperature the DDEB automatically changes mode to a safe pulse pause mode where the pulses (leak and measuring current) are 600 msec and the pause up to 20 sec. or long enough to keep the temperature in the box below 65 °C.
If LATCH is selected the relays can be reengaged - if the leak current is under the set point - by pressing the S/R button on the front.

Application:
Unearthed systems can function even with a direct short from any point in the wiring to ground, but another short or leak from another point in the system can be fatal. Either direct with heavy currents, overheating or indirect through component malfunction. The DDEB solves the problem by monitoring the circuit and giving an early warning as soon as it senses a leak current greater than the set value. Securing the ground level at half system voltage reduces at the same time personal risks for electric shock.

CONNECTION DIAGRAM



Please note
If the two relay contacts are in "Fault" position and all LED's are red and the display shows "FFF", then the DDEB is defect and must be replaced.

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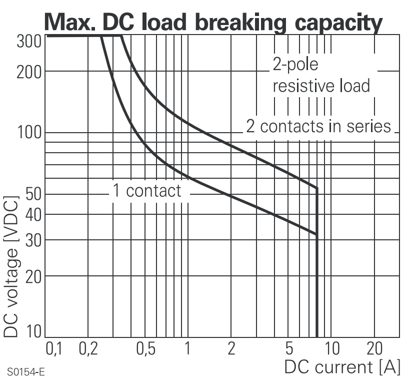
SPECIFICATIONS

INPUT	
To Earth connector	DC Current up to set point then a floating DC Voltage
Set points	Programmable from 0,2 to 30 mA
Differential	Programmable from 0,1 to set point -0,1 mA
Voltage limit	Voltage on Earth connector FE must be limited to be within system voltage
PERFORMANCE PARAMETERS	
TIMING	
Response time	Typical <200 msec. Below 10 mA and not pulsed earth leakage current. At higher current, voltage and ambient temperatures dependent on pause time . Max. 20 sec.
Time range during run	Programmable separate On and Off delay 0 - 99,9 sec. MCU controlled.
ELECTRICAL	
Accuracy	Set point ± 2 % within system voltage
Temp. dependence	Typ. ± 0.02 % / °C
OUTPUT	
RELAY	2 relays x 1C/O, AgNi/Au
Contact rating	6 A, 250 VAC, 1500 W See figure for DC rating
Mechanical life	20 million operations
ANALOG INDICATION	
Display	3 digit LED Current resolution 0,1 mA Time resolution 0,1 sec.
SUPPLY	DC voltage
Supply range	20 - 500 V ±10%
Power consumption	Max 3.5 W
GENERAL	
Temperature range	- 25 °C to + 55 °C ambient
Humidity	Up to 90 % RH non-condensing
Dielectric test voltage	DC circuit to contact 4000 V_{rms} Contact to contact 2500 V_{rms}
Open contact circuit	1000 V_{rms}
Weight	0.17 kg.

CE

International Standards	
Product safety	EN 60255-27: 2006
EMC	EN 50263: 2000 EN 60255-22 Immunity EN 61000-25 Emission



ORDERING INFORMATION

EXAMPLE: DDEB 2050 P A 4 C

TYPE Differential DC current control relay	DDEB
SUPPLY VOLTAGE 20 - 500 Vdc	2050
ADJUSTMENT Programmed	P
HOUSING Rail mounting	A
SIZE 45 mm.	4
CODE END	C

Setup procedure for the DDEB

To enter Setup Menu pres S/R button for app. 5sec.
If no activity on the buttons for 50sec., then the setup will end without saving data. To return to factory default see below

Choose function first :
Function 1.: Asym & Sym LEDs: “Leakage to +” and “Leakage to –“ are blinking Red & Green In phase
Function 2.: Asym + Sym LEDs: “Leakage to +” and “Leakage to –“ are blinking Red & Green out of phase

Fuction 1.: Different values for Asym and Sym

Step 1: Set Trip to Asym over current. Relay A ON to OFF
LEDs: “Asym +” and “Relay A” are blinking Red
Set trip value from 0,1 to 30,0 mA
Press Up or Down keys to change trip value and press S/R for next Setup menu

Step 2: Set Return to acceptable Asym current. A Relay Off to ON
LEDs: “Asym +” and “Relay A” are blinking Green
Set return value 0,1 to “trip value” x,x mA
Press Up or Down keys to change trip value and press S/R for next Setup menu

Step 3: Set Delay time from ON to OFF Relay A
LEDs: “Relay A” are blinking Red
Set OFF time delay from 0,0 to 99,9 sec.
Press Up or Down keys to change trip value and press S/R for next Setup menu

Step 4: Set Delay time from OFF to ON Relay A
LEDs: “Relay A” are blinking Green
Set ON delay time from 0,0 to 99,9 sec.
Press Up or Down keys to change trip value and press S/R for next Setup menu

Step 5: Set Latch OFF (0) or ON (1) Relay A
If latch OFF all 4 LEDs are Green
If latch ON all 4 LEDs are Red
Press Up or Down keys to change latch setting and press S/R for next Setup menu

Step 6: Set Trip to Sym over current. Relay B ON to OFF
LEDs: “Asym +” and “Asym –“ and “Relay B” are blinking Red
Set trip value from 0,1 to 30,0 mA
Press Up or Down keys to change trip value and press S/R for next Setup menu

Step 7: Set Return to acceptable Sym current. Relay B Off to ON
LEDs: “Asym +” and “Asym –“ and “Relay B are blinking Green
Set return value 0,1 to “trip value” x,x mA
Press Up or Down keys to change trip value and press S/R for next Setup menu

Step 8: Set Delay time from ON to OFF Relay B
LEDs: “Relay B” are blinking Red
Set OFF time delay from 0,0 to 99,9 sec.
Press Up or Down keys to change trip value and press S/R for next Setup menu

Step 9: Set Delay time from OFF to ON Relay B
LEDs: “Relay B” are blinking Green
Set ON delay time from 0,0 to 99,9 sec.
Press Up or Down keys to change trip value and press S/R for next Setup menu

Step 10: Set Latch OFF (0) or ON (1) Relay B
If latch OFF all 4 LEDs are Green
If latch ON all 4 LEDs are Red
Press Up or Down keys to change latch setting and press S/R for next Setup menu

Function 2.: Same value for Asym + Sym

Step 1: Set Trip to over current. Relay A&B ON to OFF
LEDs: “Asym +” and “Asym –“ are blinking Red out of phase
Set trip value from 0,1 to 30,0 mA
Press Up or Down keys to change trip value and press S/R for next Setup menu

Step 2: Set Return to acceptable current. Relay A&B Off to ON
LEDs: “Asym +” and “Asym –“ are blinking Green out of phase
Set return value 0,1 to “trip value” x,x mA
Press Up or Down keys to change trip value and press S/R for next Setup menu

Step 3: Set Delay time from ON to OFF Relay A&B
LEDs: “Relay A” and Relay B“ are blinking Red
Set OFF time delay from 0,0 to 99,9 sec.
Press Up or Down keys to change trip value and press S/R for next Setup menu

Step 4: Set Delay time from OFF to ON Relay A&B
LEDs: “Relay A” and “Relay B“ are blinking Green
Set ON delay time from 0,0 to 99,9 sec.
Press Up or Down keys to change trip value and press S/R for next Setup menu

Step 5: Set Latch OFF (0) or ON (1) Relay A&B
If latch OFF all 4 LEDs are Green
If latch ON all 4 LEDs are Red
Press Up or Down keys to change latch setting and press S/R for next Setup menu

To return to factory default setup values press "S/R" and "UP" buttons simultaneously for app. 5 sec.

Function 1:	Sym & Asym
Asym Over current trip:	10,0 mA
Asym Return trip:	9,8 mA
Relay A Delay time ON to OFF:	2,0 sec.
Relay A Delay time OFF to ON:	2,0 sec.
Relay A Latch:	...OFF (0)

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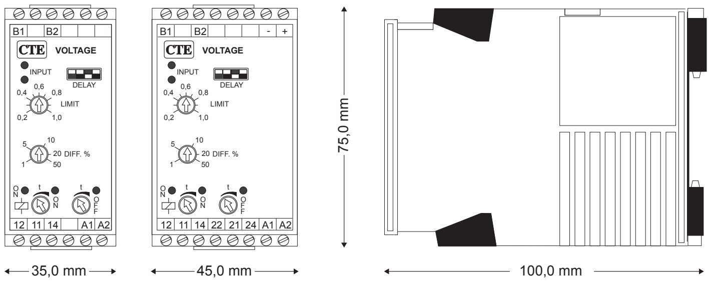


MULTIFUNCTION VOLTAGE RELAY

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 a wide range of applications.

The voltage to be monitored 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.

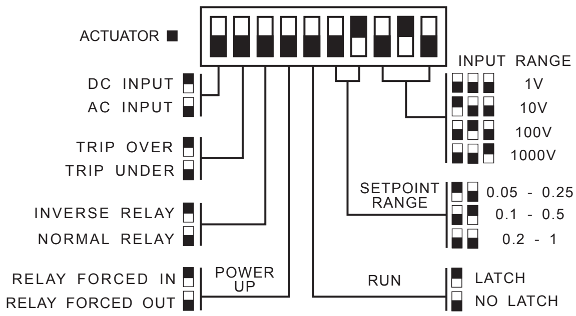
AC and DC voltages between 50 mV and 500 V can be measured directly. By means of a voltage transformer or a resistive divider the range can be extended without limits.

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

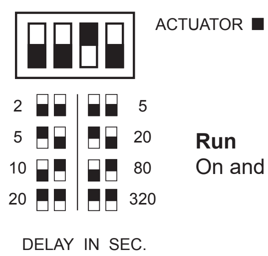
Application:
Level comparator used with transducers and transmitters. Over- or undervoltage monitoring of, loads, batteries, generators, mains etc.

PROGRAMMABLE FEATURES

Range and relay function



Time function



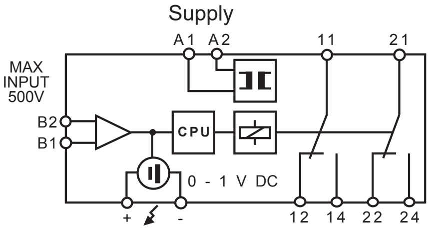
Power up
Set or reset time

Run
On and off delay range

CONNECTION DIAGRAM

Rail mounting

Supply



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

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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. ± 0.02 % / °C
Supply dependence	Typ. ± 0.01 % / % DU

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 and DC with isolated switchmode supply	18 to 360 VDC and 20 to 264 VAC
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)
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	

CE

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

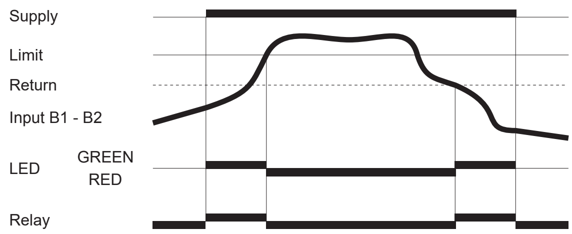
ORDERING INFORMATION

EXAMPLE: UMCA B230 D A 3 C

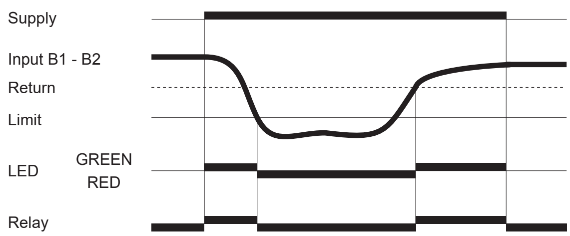
TYPE		
Multifunction voltage relay		UMCA
SUPPLY VOLTAGE		
18-360 VDC and 20-240 VAC		E400
20 - 28 VAC		B024
99-140 VAC		B110
198-264 VAC		B230
342-484 VAC		B400
374-506 VAC		B460
ADJUSTMENT		
Trimpot and dipswitch adj.		D
HOUSING		
Rail mounting (internal transformer)		A
Socket, 11 pin (Only 35mm version)		E
SIZE		
35 mm. (without DC output)	1 C/O	3
45 mm. (with 0 - 1 VDC output)	2 C/O	4
CODE END		C

FUNCTION DIAGRAM

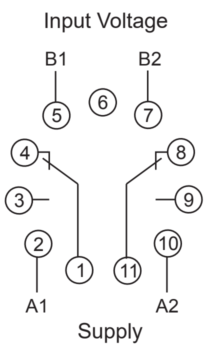
Trip over

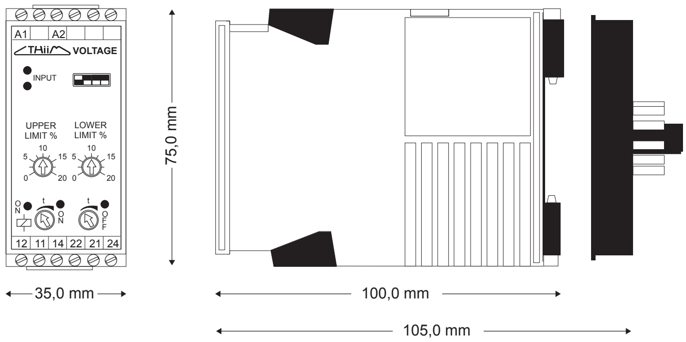


Trip under



Socket mounting





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.

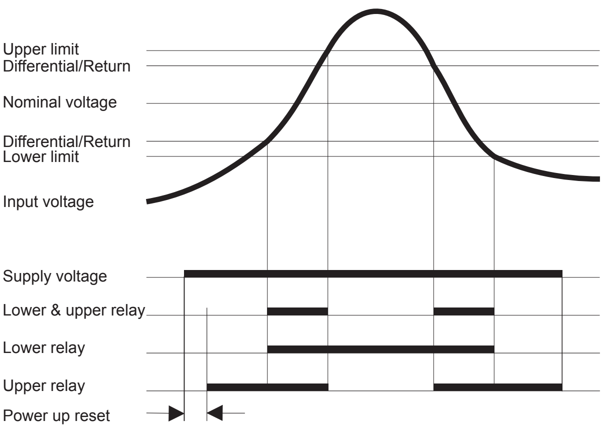
If the input voltage comes between the lower limit plus the differential and the upper limit minus the differential, the relay pulls in.
The differential is fixed 2 % of the nominal input voltage (the center voltage of the window).

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

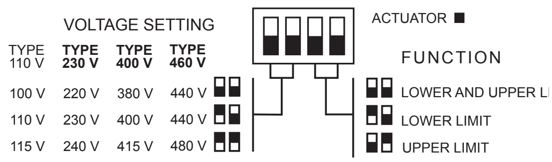
As over voltage relay only, the relay remains energized for input voltage under the lower range limit.

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.

FUNCTION DIAGRAM

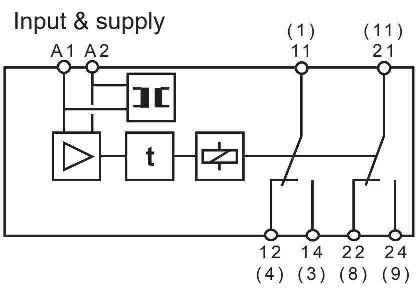


PROGRAMMABLE FEATURES

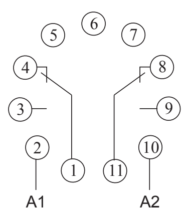


CONNECTION DIAGRAM

Rail mounting



Socket mounting



Input & supply

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Transformervej 31
2860 Søborg - Denmark
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Web: www.thiim.com
Mail: thiim@thiim.com

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
	Type B460: 440, 460 and 480
Adjustable range	0 ± 20 %
Differential	2 % of U_N

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. ± 0.02 % / °C
Supply dependency	Typ. ± 0.01 % / % ΔU

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

SUPPLY	AC voltage direct from input
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)
	460 V (From 393 to 557 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	

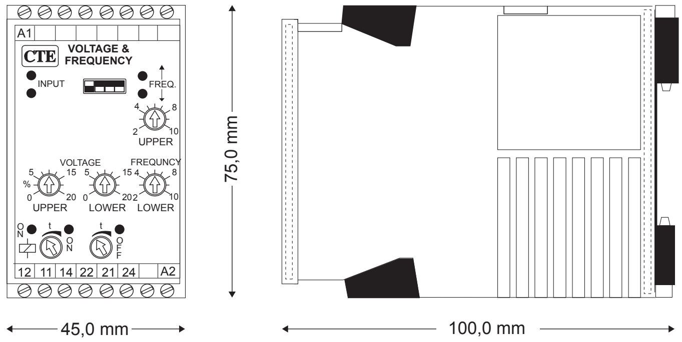
	International Standards
EMC directive 89/336:	EN50081 - Emission
	EN50082 - Immunity
Low voltage directive 73/23:	EN60255 - Electrical Relays

ORDERING INFORMATION

EXAMPLE: UAWA B 230 D A 3 C

TYPE	
Voltage monitoring control relay	UAWA
SUPPLY	
AC with transformer	B
INPUT AND SUPPLY VOLTAGE	
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.	D
HOUSING	
Rail mounting (internal transformer)	A
Socket 11 pin (internal transformer)	E
SIZE	
35 mm.	3
CODE END	C

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 terminals.



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 resenator 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**

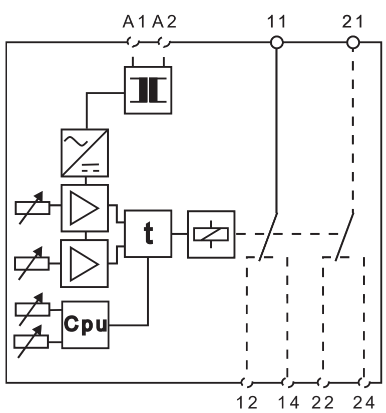
Description:
The combined voltage and frequency relays are designed for applications where a voltage and/or a frequency needs to be monitored. UFWA are combined over- and under voltage and frequency relays.
The relay can by means of dipswitches and trimmers be set to work as:
1) an under voltage and 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.

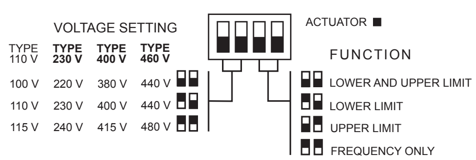
Application:
To monitor mains voltages and frequencies. To protect electrical and electronic equipment from damage because of over- or under voltage. On special request, the relay can be modified to monitor higher or lower frequencies.

CONNECTION DIAGRAM

Rail mounting



PROGRAMMABLE FEATURES



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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
	Type B460: 440, 460 and 480
Adjustable range	0 ± 20 %
Differential	2 % of U_N

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.

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. ± 0.02 % / °C
Supply dependency	Typ. ± 0.01 % / % ΔU

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

SUPPLY	AC voltage direct from input
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)
	460 V (From 393 to 557 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	

CE

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

ORDERING INFORMATION

EXAMPLE: UFWA F5 10 B 230 A A 4 C

TYPE
Mains frequency & voltage control relay — UFWA

FREQUENCY
Center frequency 50Hz — F5
Center frequency 60Hz — F6

frequency range ± 0,4-2% — 02
frequency range ± 1-5% — 05
frequency range ± 2-10% — 10
frequency range ± 4-20% — 20

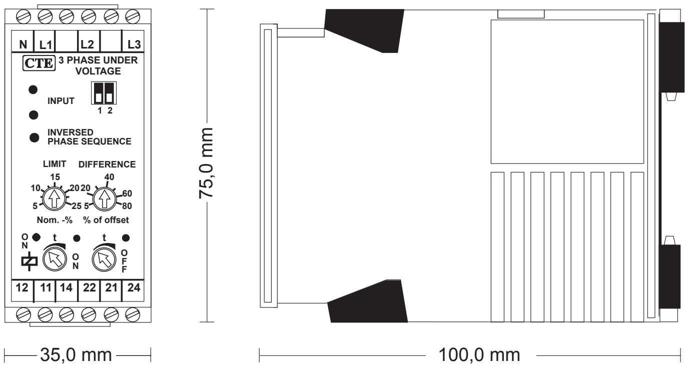
SUPPLY
100, 110 and 115 VAC — B110
220, 230 and 240 VAC — B230
380, 400 and 415 VAC — B400
440, 460 and 480 VAC — B460

ADJUSTMENT
Trimpot and dipswitch adj. — A

HOUSING
Rail mounting — A

SIZE
45 mm. — 4

CODE
Code end — C
Extended Code — E



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.

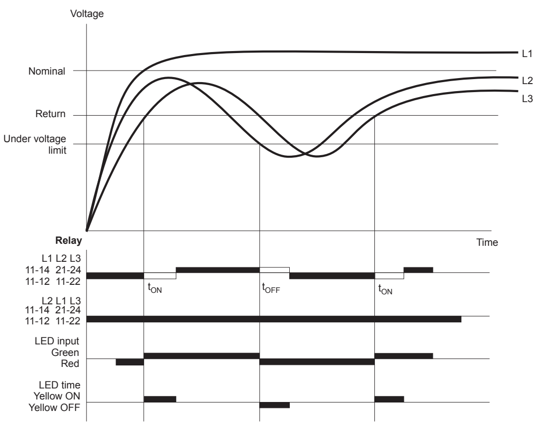
Operation:
Under normal phase conditions the relay is energized - contacts 11-14 and 21-24 closed - and the green "input" LED and the yellow "relay" LED are switched on.

If one or more phase voltages are below the preset under voltage value, the red "input" LED will be switched on and stay on untill 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 untill the relay changes state and corresponds to the input.

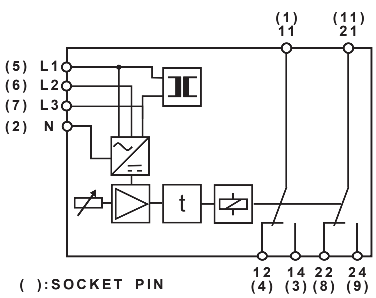
In case of wrong phase sequence the relay will not be energized and the red "inversed phase sequence" LED will be on indicating the fault.

FUNCTION DIAGRAM

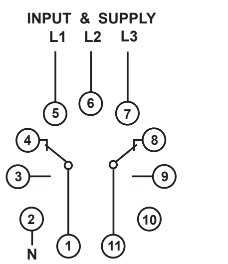


CONNECTION DIAGRAM

Rail mounting



Socket mounting*

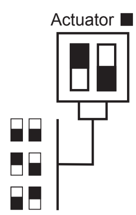


*CE up to 230V phase to phase voltage

PROGRAMMABLE FEATURES

Nominal Voltage Settings
Phase to phase

Type 110 V	Type 230 V	Type 400 V	Type 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



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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
	Type B460:	440, 460 and 480
Input resistance	B110 130 k	
	B230 280 k	
	B400 500 k	
	B460 580 k	
Frequency range	45 to 440 Hz	
Under voltage, Range	- 5 to - 25 %	
Differential, Range	5 to 80% of under voltage offset	
PERFORMANCE PARAMETERS		
TIMING		
Response time	Approx. 500 msec. with limited under voltage	
	Approx. 100 msec. with total phase loss	
Time range during run	Separate On and Off delay	
	0 - 10 sec. adjustable	
True time delay	PNDI > 6 sec. at total phase loss	
ELECTRICAL		
Nominal accuracy	all phases ± 2%	
Limit accuracy	all phases ± 2%	
Repeat accuracy	all phases ± 0,5%	
Temp. dependence	Typ. ± 0.02 % / °C	
Supply dependence	Typ. ± 0.01 % / % ΔU_N	
OUTPUT	Relay, 2 C/O	
Contact rating	6 A, 250 VAC, 1500 W	
Mechanical life	30 Million operations	
SUPPLY	AC voltage internal from L1 and L3	
AC supply range	110 V (From 75 to 127 V)	
with transformer	230 V (From 165 to 264 V)	
Standard voltage	400 V (From 285 to 457 V)	
	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	2500 VAC
	11-12-14 to 21-22-24	
Weight	0.22 kg	

CE

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

ORDERING INFORMATION

EXAMPLE: PNDA B 400 A A 3 C

TYPE
3 Phase voltage control relay — PNDA

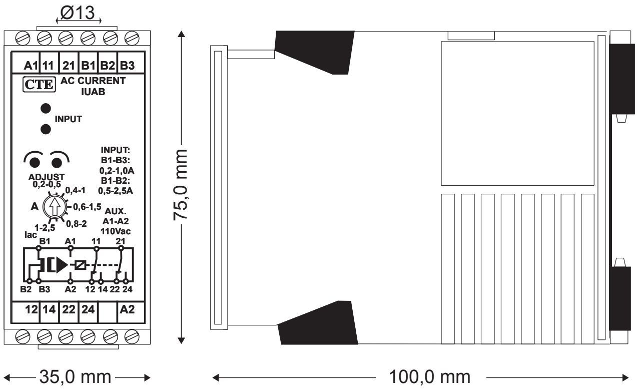
INPUT AND SUPPLY VOLTAGE
100, 110 and 115 VAC — B110
220, 230 and 240 VAC — B230
380, 400 and 415 VAC — B400
440, 460 and 480 VAC — B460

ADJUSTMENT
Trimpot and dipswitch adj. — A

HOUSING
Rail mounting — A
Socket mounting — E

SIZE
35 mm. — 3

CODE
Code End — C
Extended code — E



AC CURRENT RELAY WITH VOLTAGE COMPENSATED SETPOINT

Type: IUAB

FEATURES

- **LED guidance for easy installation**
- **Two ranges for precise setting**
- **Red and green LEDS indicate the state of the input and the relay**

Description:
The current relay IUAB is designed for monitoring up to 10 parallel connected equal loads. As soon as one of the loads is defective, and no longer draws current, the relay will give an alarm by dropping out.

If the load is resistive or in general dependent on the supply voltage, the load current will vary with the actual voltage. A supply voltage change of -10% will cause the load current to drop 10%, or the same as if one of the loads was lost at normal supply voltage. Commonly used current relays would send a false alarm as this is still an OK condition. With this relay the current set point is related to the actual supply voltage and the set point will vary with the same percentage as the supply voltage change. By using this set point compensation it is possible, without getting false alarms, to monitor load changes down to 10% or detect one defect load out of ten equal loads.

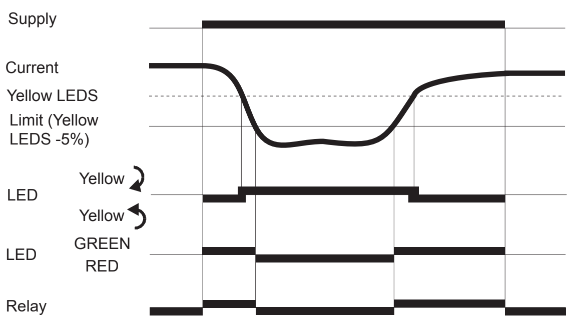
In order to simplify the installation the IUAB has two yellow LED's suggesting the direction of the adjustment on the current setting spindle. When the two yellow LED's are equally lit the current set point is precisely 5% under the actual current. This means that the unit is adjusted to give an alarm if the current drops by 5% from the current value.

The current setting on the front refers to a current set point at nominal voltage.

The standard unit is made with a 1:1 voltage current relation as for resistive loads. If the relation is different from this or even inverse as for switch mode supplies used in e.g. fluorescent tubes, the voltage current relation can be modified to the actual application.

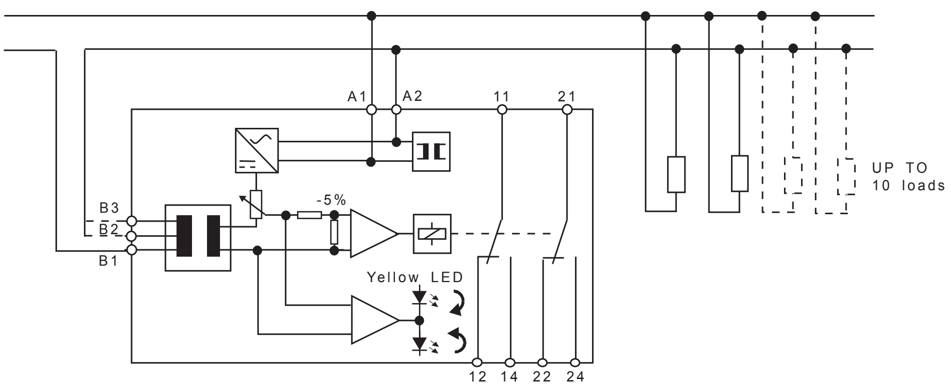
Application:
Monitoring e.g. heaters and lamps.

FUNCTION DIAGRAM



CONNECTION DIAGRAM

Rail mounting



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SPECIFICATIONS

INPUT	AC current
Input Range:	Setpoint Range
B1-B2	0,2 - 1A
B1-B3	0,5 - 2,5A
AC frequency range	45 to 440 Hz
Max. continuous input	1,5 x I range
Input resistance	0,05W / I range
Power up time	Fixed 2 sec.
Differential	Fixed 1% of setting
PERFORMANCE PARAMETERS	
TIMING	
Response time	Approx. 100 msec.
ELECTRICAL	
Temp. dependence	Typ. ± 0.02 % / °C
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 voltage
AC supply range with transformer	24 V (From 20 to 28 V) 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

CE

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

ORDERING INFORMATION

EXAMPLE: IUAB B 230 D A 3 C

TYPE
Multifunction current relay — IUAB

SUPPLY
AC with transformer — B

SUPPLY VOLTAGE

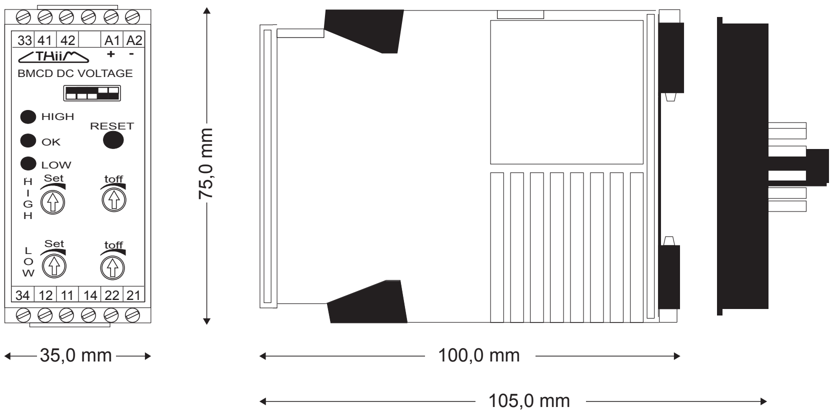
From 20 to 28 VAC	024
From 85 to 127 VAC	110
From 187 to 264 VAC	230
From 323 to 457 VAC	400
From 374 to 506 VAC	460

ADJUSTMENT
Trimpot and dipswitch adj. — D

HOUSING
Rail mounting.(internal transformer) — A

SIZE
35 mm. 2 C/O — 3

CODE
Code end — C
Extended code — E



BATTERY VOLTAGE MONITORING RELAY

Type:
BMCA low
BMCD high & low

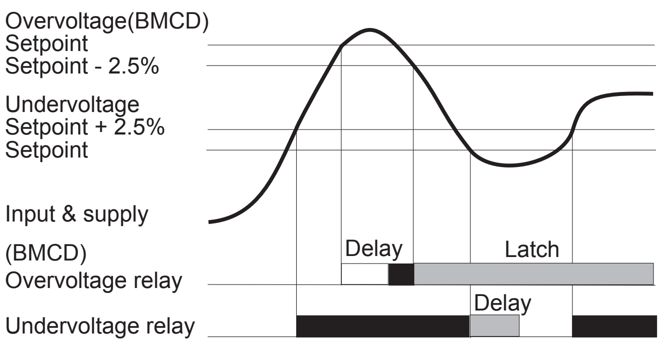
FEATURES

- **Supply from the battery**
- **Programmable voltage 12V, 24V, 48V & 110V**
- **LEDs indicate the state of the input**
- **Programmable OFF delay 0-10 sec or 0-100 sec**
- **Programmable Latch for over voltage**

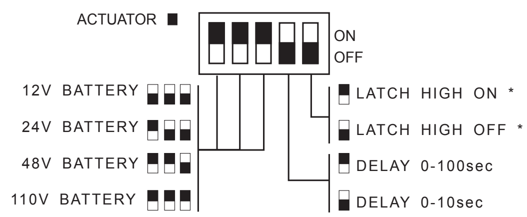
Description:
The BMCA battery voltage relay is designed to measure battery voltage for under voltage.The BMCD battery voltage relay is designed to measure battery voltage for under voltage and over voltage. The relays are Programmable for 12V, 24V, 48V or 110V battery systems, can be set by DIP switch.

Application:
Avoiding deep discharging, or overcharging in UPS, stationary battery equipment and mobile battery equipment. Alarm function in case of faulty batteries or charges.

FUNCTION DIAGRAM



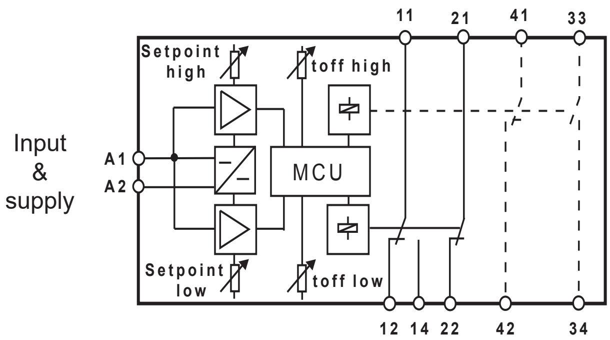
PROGRAMMABLE FEATURES



* LATCH ONLY ON TYPE BMCD

CONNECTION DIAGRAM

Rail mounting

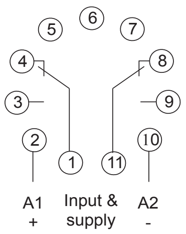


Relay contacts:
BMCA Low: 11,12,14 & 21,22

BMCD Low: 11,12,14 & 21,22
BMCD High: 41,42 & 33,34

Socket mounting

Relay contacts:
BMCA Low 1,4,3 & 11,8,9
BMCD Low 1,4,3 High 11,8,9



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SPECIFICATIONS

INPUT

BMCA & BMCD	12 V, range int. adjustable Under voltage from 9 to 12 V Over voltage from 12 to 15 V Precision 12V ± 0.1 V
	24 V, range int. adjustable Under voltage from 18 to 24 V Over voltage from 24 to 30 V Precision 24V ± 0.2 V
	48 V, range int. adjustable Under voltage from 36 to 48 V Over voltage from 48 to 60 V Precision 48V ± 0.4 V
	110 V, range int. adjustable Under voltage from 83 to 110 V Over voltage from 110 to 137 V Precision 110V ± 0.9 V
Differential	Under voltage Approx. setpoint + 2.5 %
	Over voltage Approx. setpoint - 2.5 %

PERFORMANCE PARAMETERS

TIMING	
Time range accuracy	±5 %
ELECTRICAL	
Repeat accuracy	< 0.5 %
Temp. dependence	Typ ±0.02 % / °C

OUTPUT

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

SUPPLY	DC voltage, supply and input internal connected From 8 to 180 V
Power consumption	2,5 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	0.14 kg	

CE

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

ORDERING INFORMATION

EXAMPLE: BMCD 0820 A A 3 C

TYPE
Battery multi control relay under volt. — BMCA
Battery multi control relay over & under volt. — BMCD

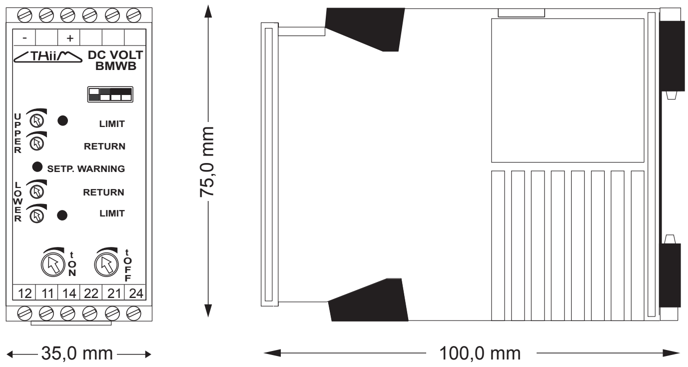
Supply range
form 8 to 180V — 0820

ADJUSTMENT
Trimpot adj. — A

HOUSING
Rail mounting — A
Socket 11 pin — E

SIZE
35 mm. — 3

CODE
Extend code — E
Code end — C



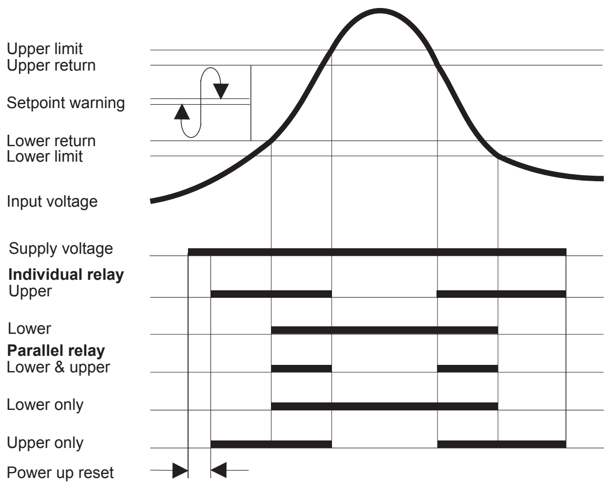
DC VOLTAGE MONITO-RING RELAY

Type:BMWB

FEATURES

- **Includes two relays for use in parallel or for individual under and over voltage signalisation**
- **Accurateadjustmentforupperlimit,upperreturn, lower limit and lower return by means of multiturn potentiometers**
- **Easy dipswitch setting selects function as under and over voltage relay, window relay or under 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**

FUNCTION DIAGRAM

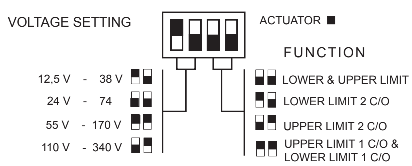


Description:
BMWB is a combined over and/or under voltage relay.
The voltage relay is designed for precise monitoring of a wide range of DC voltages from 14V to 340V.
With a build in high efficiency switch mode power supply, the BMWB is able to cover the whole measuring range without the need of an external supply.
The BMWB can by means of dipswitches be set to work as a relay for monitoring under voltage and over voltage with two individual C/O contacts, or the contacts can be paralleled and the BMWB be used as a window discriminator relay where both C/O contacts are in the powerless position outside the window.
With the paralleled relays the BMWB can be set to only register under or over voltage.

Operation:
When the supply voltage is applied, the - power up reset - period begins. If a voltage within the allowed voltage range is applied to the input, the internal relay pulls in at the end of the reset period.
If the input voltage exceeds the adjusted upper or lower limit, the corresponding relay or both relays 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 relays 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 14 V.

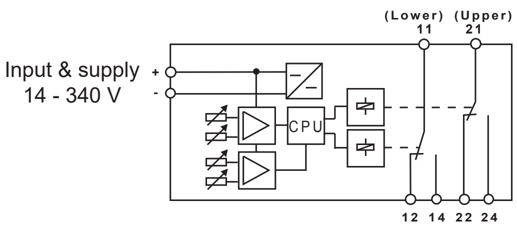
Application:
Voltage monitoring in UPS, stationary and mobile battery installations.

PROGRAMMABLE FEATURES

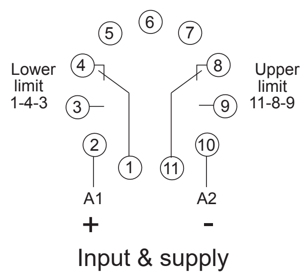


CONNECTION DIAGRAM

Rail mounting



Socket Mounting



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SPECIFICATIONS

INPUT	DC voltage 0 - 340 V
Ranges selectable by dipswitch	14 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. ± 0.02 % / °C
OUTPUT	Relay, 2 x 1 C/O, AgNi/Au
Contact rating	6 A, 250 VAC, 1500 W See figure
Mechanical life	30 million operations
SUPPLY	DC voltage direct from input
Voltage range	14 - 340 Volts (Max. 360V)
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 4000 VAC Pole to pole 2500 VAC
Weight Nett.	0.15 kg

CE

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

ORDERING INFORMATION

EXAMPLE: BMWB 1434 D A 3 C

TYPE
DC voltage monitoring control relay — BMWB

INPUT AND SUPPLY VOLTAGE
14 V - 340 V DC — 1434

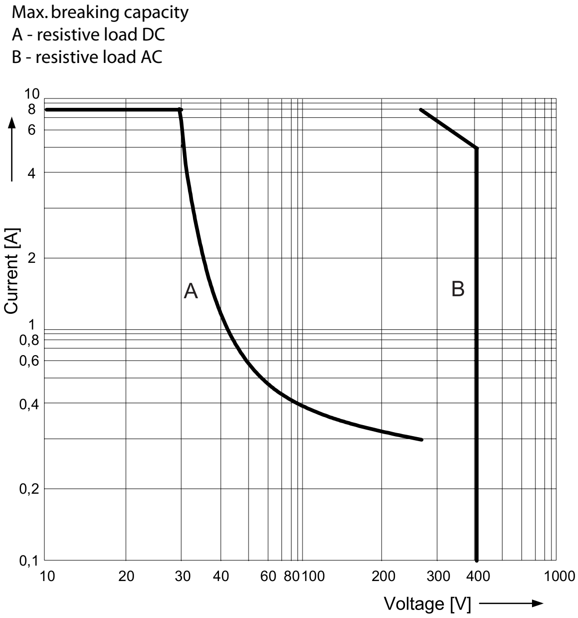
ADJUSTMENT
Trimpot and dipswitch adj. — D

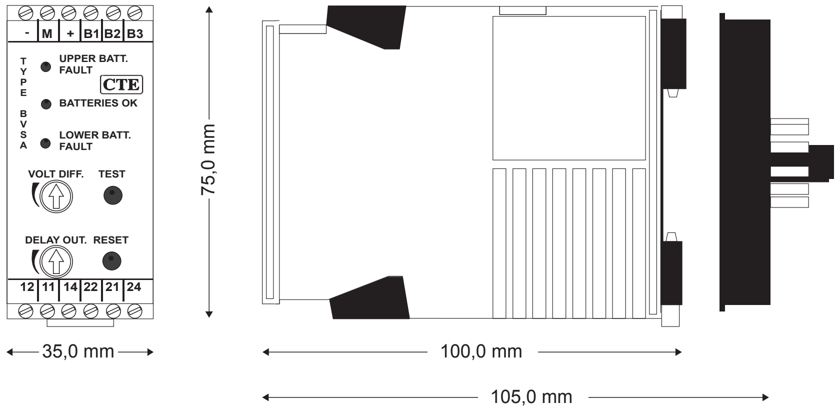
HOUSING
Rail mounting — A
Socket Mounting — E

SIZE
35 mm. — 3

CODE END — C

Relay Contacts:





BATTERY SYMMETRY MONITORING RELAY

Type: BVSA

FEATURES

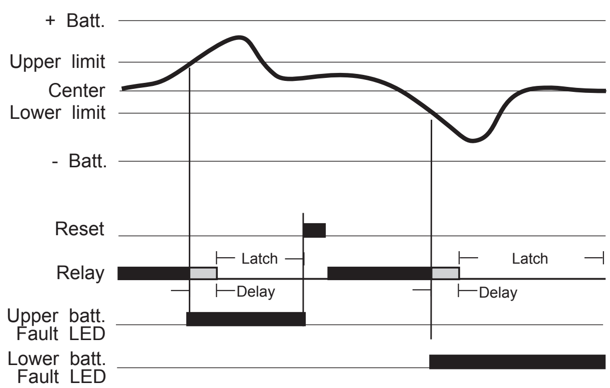
- **Supply from the battery**
- **LEDs indicate the status and the fault conditions**
- **Latch for symmetry failure**
- **Adjustable symmetry level**
- **Adjustable Timeoff delay to prevent false alarm**
- **Test and reset button on the relay**
- **Terminals for remote test and reset**

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.

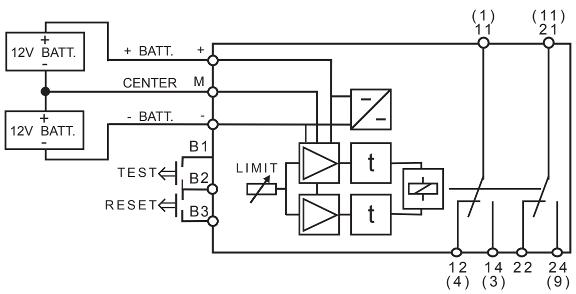
Application:
Detection of an early failure in battery cells within a battery system. For a complete monitoring system the BVSA can be used together with a standard battery voltage monitoring relay - type BMCD (HI/LOW)

FUNCTION DIAGRAM

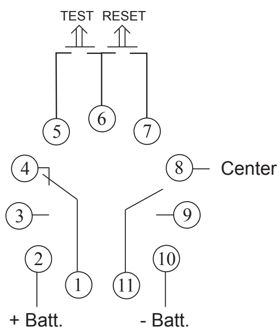


CONNECTION DIAGRAM

Rail mounting



Socket mounting



Input & supply

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SPECIFICATIONS

INPUT

PERFORMANCE PARAMETERS

Time range off delay	
standart	0 - 10 sec. adjustable
Time range accuracy	- 20 % to + 50 %
ELECTRICAL	
Repeat accuracy	< 1 %
Temp. dependence	Typ. ± 0.02 % / °C

INPUT

Type 12V: Adjustable from	0,05V - 0,5V
Type 24V: Adjustable from	0,1V - 1,0V
Type 48V: Adjustable from	0,2V - 2,0V

OUTPUT

Under voltage	Relay, 2 C/O, 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	

CE

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

ORDERING INFORMATION

EXAMPLE: BVSA D024 A A 3 C

TYPE
Battery voltage symmetry monitoring relay BVSA

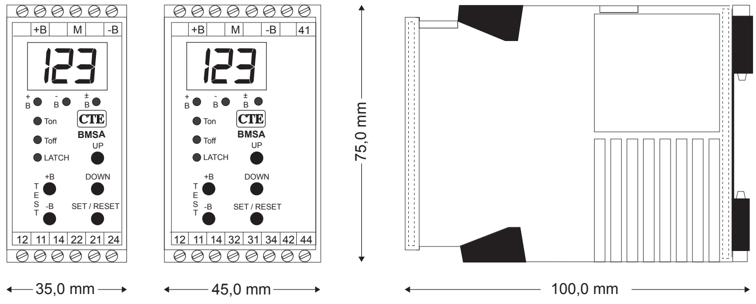
VOLTAGE RANGE
12 V D012
24 V D024
48 V D048

ADJUSTMENT
Trimpot adj. A

HOUSING
Rail mounting A
Socket 11 pin E

SIZE
35 mm. 3

CODE
Extend code E
Code end C



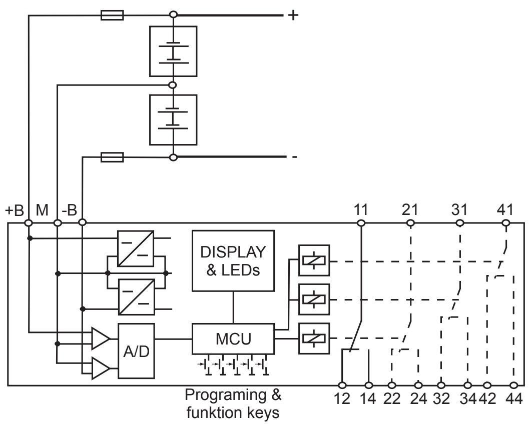
BATTERY SYMMETRY MONITORING RELAY

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.

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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	Self Supplied, DC voltage
Range	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	
Dieletric test voltage	Coil to relay contacts	4000 VAC
Pole to pole		2500 VAC
Weight	170 g standard 200 g with optional over and under voltage	

CE

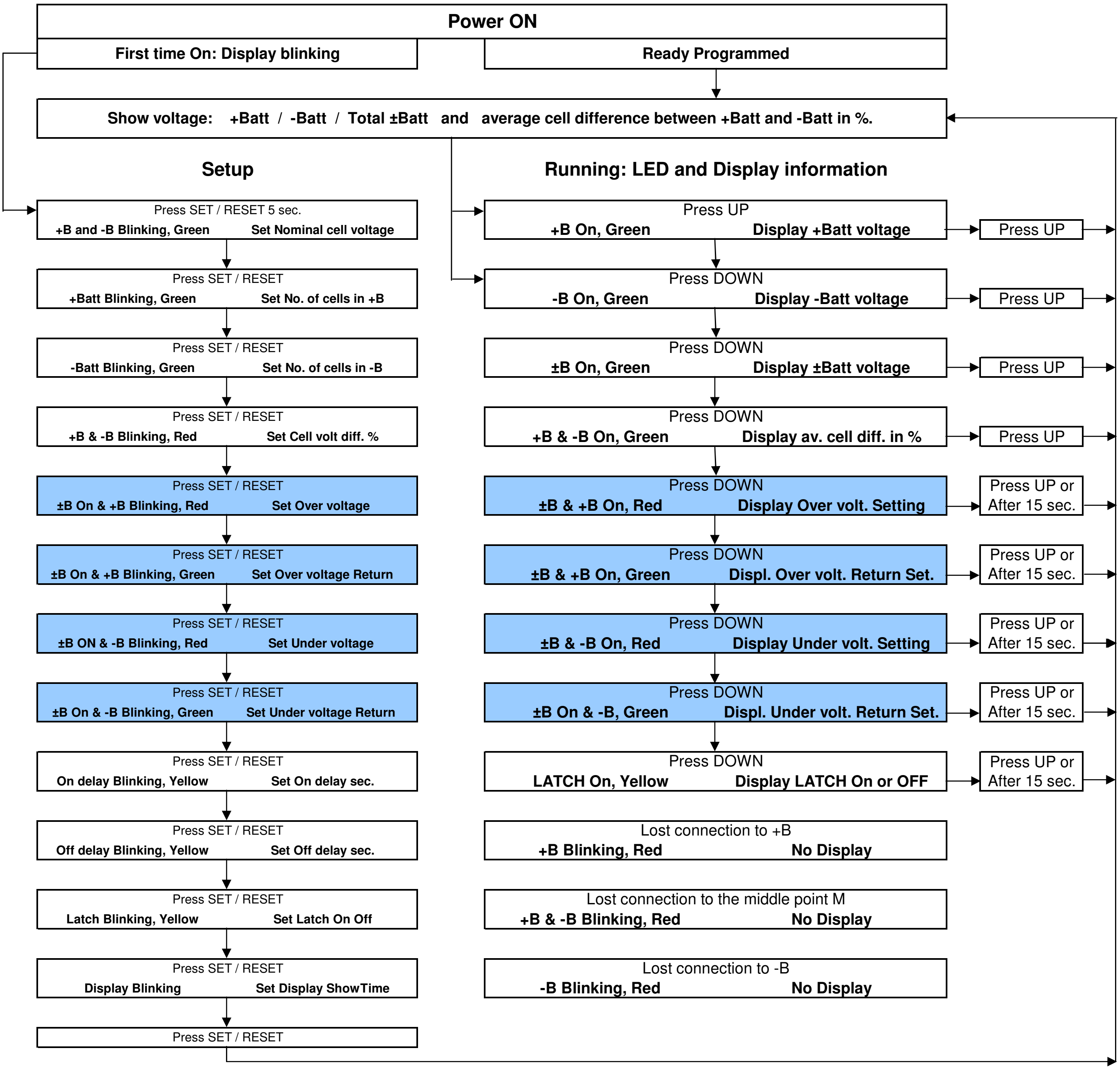
	International Standards	
Directive 2002/95/EC of 27. January 2003	RoHS	
EMC directive 89/336:	Emission and Immunity	EN50263:2000 EN61000-3-2 EN61000-3-3
Low voltage directive 73/23:	Electrical Relays	EN60255

ORDERING INFORMATION

EXAMPLE: BMSA 1830 P A 3 C

TYPE	
Battery Symmetry Relay	BMSA
SUPPLY VOLTAGE	
18 V to 300 Vdc	1830
ADJUSTMENT	
Programmed	P
HOUSING	
Rail mounting	A
SIZE	
35 mm. Symmetry Relay only	3
45 mm. With optional Under & Over voltage	4
CODE	
Code end	C
Extended code	E

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 = 17.1mV. 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.

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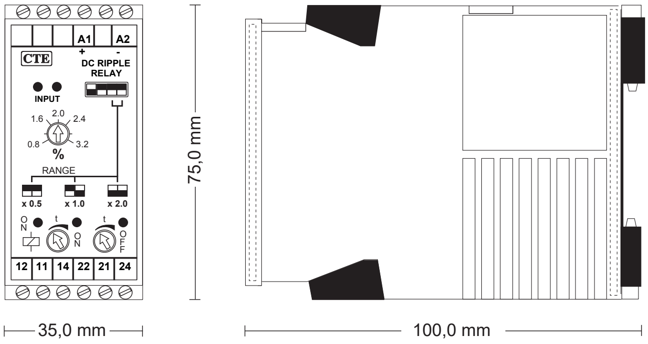


DC RIPPLE RELAY

Type: BRIA

FEATURES

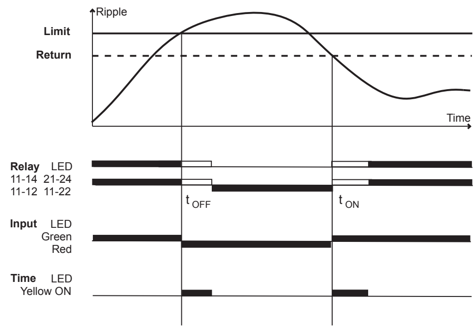
- **One unit for all voltages from 18 to 340Vdc**
- **4 voltage sub-ranges for high accuracy**
- **High sensitivity. Adjustable from 0.4 to 6.4%**
- **3 ripple sensitivity ranges for an easy adjustment**
- **Excellent accuracy and equal sensitivity for ripple frequencies from 30 to 3000Hz.**
- **No separate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

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.

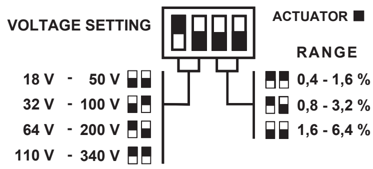
Operation:
The input voltage is divided into two signals. In order to measure the ripple in % of the varying system voltage, one part is averaged and used to set the internal reference voltage. The other signal, the AC signal related to the ripple, is amplified and conditioned through a bandpass filter 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.

FUNCTION DIAGRAM

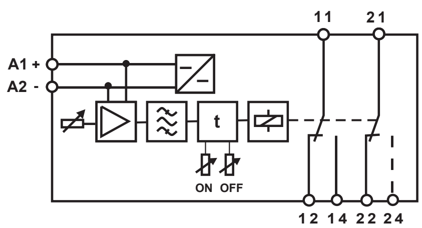


PROGRAMMABLE FEATURES

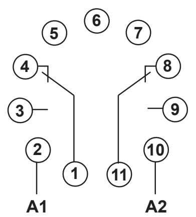


CONNECTION DIAGRAM

Rail mounting



Socket mounting



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SPECIFICATIONS

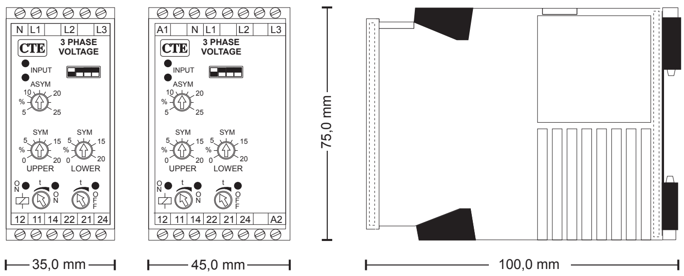
INPUT	DC voltage 0 - 340V, 374V$_{Peak}$	
Voltage Ranges selectable by dipswitch	18 - 50 V	
	32 - 100 V	
	64 - 200 V	
	110 - 340 V	
Ripple Ranges selectable by dipswitch	0.4 - 1.6 %	
	0.8 - 3.2 %	
	1.6 - 6.4 %	
Hysteresis	10 % of Ripple sensitivity	
PERFORMANCE PARAMETERS		
TIMING		
Response time	Approx. 200 msec.	
Time range during run	Separate On and Off delay	
	0.2 - 10 sec. adjustable	
ELECTRICAL		
Temp. dependence	Typ. ± 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	
Dieletric test voltage	Coil to relay contacts	4000 VAC
	Pole to pole	2500 VAC
Weight	0.22 kg	

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

ORDERING INFORMATION

EXAMPLE: BRIA 1834 D A 3 C

TYPE	
DC voltage monitoring control relay	BRIA
INPUT AND SUPPLY VOLTAGE	
18 - 340 Vdc	1834
ADJUSTMENT	
Trimpot and dipswitch adj.	D
HOUSING	
Rail mounting	A
Socket Mounting	E
SIZE	
35 mm.	3
CODE	
Code end	C
Extended code	E



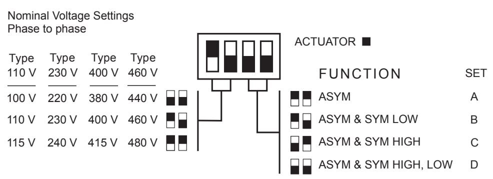
3 PHASE VOLTAGE CONTROL RELAY

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**

PROGRAMMABLE FEATURES



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 seperate 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.

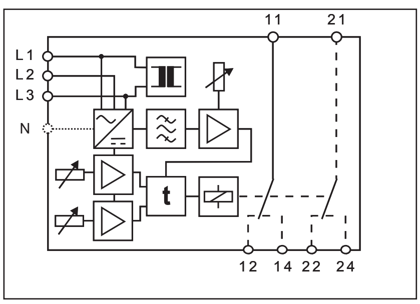
Balanced voltage is measured by rectifying and adding the three-phase voltages.

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.

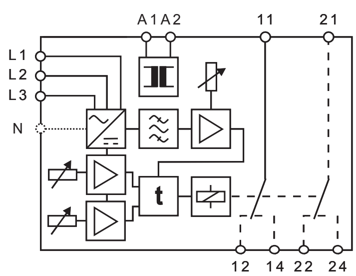
Application:
To switch off motors automatically before damage due to faulty supply, and to switch them on again as soon as the supply is re-established. E.g. pumps, oilburners, ventilators and refrigerators.
To monitor the three-phase main system and control the use of local emergency generators.
To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

CONNECTION DIAGRAM

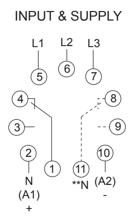
Rail mounting 35mm



Rail mounting 45mm



Socket mounting*



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

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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 kΩ	100 < U_N < 200 V
	500 kΩ	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 suply 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

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

SUPPLY

AC and DC	18-360 VDC and 20-240 VAC
Isolated switch mode 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, 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	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 PADA B400 A A 3 C

TYPE

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

INPUT
with transformer intern conected to L1-L3

100, 110 and 115 VAC	B110
220, 230 and 240 VAC	B230
380, 400 and 415 VAC	B400
440, 460 and 480 VAC	B460

ADJUSTMENT
Trimpot and dipswitch adj. A

HOUSING

Rail mounting	A
socket 11 pin	E

SIZE
35 mm. 3

CODE END C

EXTERNALY SUPPLY CONECTIONS
EXAMPLE: 45mm Housing PADA 400 2 B230 A A4 C

TYPE

3 Phase voltage control relay	PADA
3 Phase + N voltage control relay	PANA

NOMINAL INPUT
standart input

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

(other voltages on request)

10.0 to 99.9 V	1
100. to 999. V	2

SUPPLY VOLTAGE

18-360 VDC and 20-240 VAC	E400
From19.2 to 28.8 VAC	B024
From38.4 to 57.6 VAC	B048
From 80 to 138 VAC	B110
From 176 to 288 VAC	B230
From 304 to 498 VAC	B400
From 352 to 576 VAC	B460

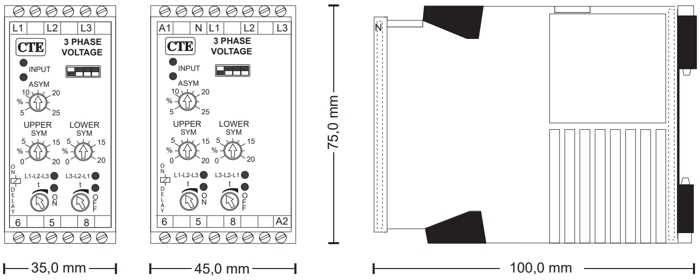
(other voltages on request)

ADJUSTMENT
Trimpot and dipswitch adj. A

HOUSING

Rail mounting 45 mm.	A4
Socket 11 pin 35mm.	E3

CODE END C



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

ACTUATOR ■

VOLTAGE SETTING

TYPE 110 V	TYPE 230 V	TYPE 400 V	TYPE 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

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

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.

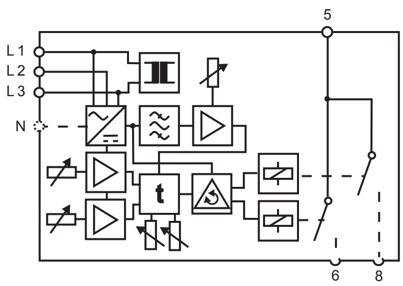
Unbalance, due to phase angle and phase voltage deviation, is very accurately measured by measuring the inverse phase system relatively to the main system. The method is independent of the actual balanced voltage and perfect for the protection of three-phase motors, generators and transformers. The measuring 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.

CONNECTION DIAGRAM

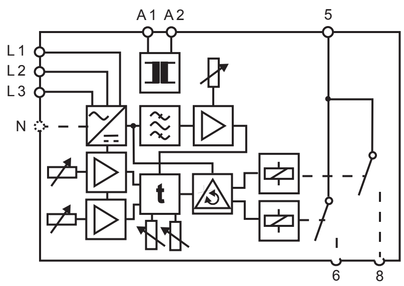
35mm Rail mounting



With correct Voltage

Phase Sequense	Relay Contact
L1-L2-L3 :	5-6 on
L3-L2-L1 :	5-8 on

45mm Rail Mounting



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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 kΩ	$100 < U_N < 200$ V
	500 kΩ	$200 < U_N < 480$ 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: ± 0.02 % / °C
Supply dependence	Typical: ± 0.01 % / ΔU

OUTPUT

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

SUPPLY

	AC voltage from L1 & L3
AC supply range	110 V (From 80 to 138 V)
with transformer	230 V (From 176 to 288 V)
Standard voltage	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

CE

	International Standards	
Directive 2002/95/EC of 27 January 2003	RoHS	
EMC directive 89/336:	Emission and Immunity	EN50283:2000
		EN61000-3-2
		EN61000-3-3
Low voltage directive 73/23:	Electrical Relays	EN60255

ORDERING INFORMATION

EXAMPLE: 35mm Housing PAHA B400 A A 3 C
Internal supply connection

TYPE

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

INPUT
Standard voltages
Transformer internal conected to L1-L3

100, 110 and 115 VAC	B110
220, 230 and 240 VAC	B230
380, 400 and 415 VAC	B400
440, 460 and 480 VAC	B460

ADJUSTMENT
Trimpot and dipswitch adj. A

HOUSING
Rail mounting A
Socket 11-pin E

SIZE
35 mm. 3

CODE END C

EXAMPLE: 45mm w/socket PAHA 400 2 B 230 A A4 C
External supply connections

TYPE

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

INPUT
standard voltages

100, 110 and 115VAC	110
220, 230 and 240VAC	230
380, 400 and 415VAC	400
440, 460 and 480VAC	460
(Other voltages on request)	
10.0 to 99.9 V	1
100. to 999. V	2

SUPPLY
AC with transformer
AC/DC with switch mode supply

SUPPLY VOLTAGE

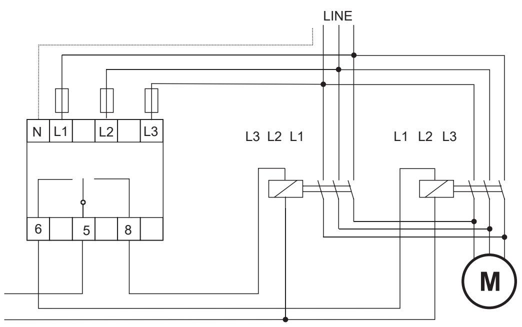
18-360VDC and 20-240VAC	E400
From 19.2 to 28.8 VAC	B024
From 38.4 to 57.6 VAC	B048
From 80 to 138 VAC	B110
From 176 to 288 VAC	B230
From 304 to 498 VAC	B400
From 352 to 576 VAC	B460
(Other voltages on request)	

ADJUSTMENT
Trimpot and dipswitch adj. A

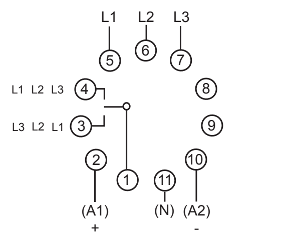
HOUSING
Rail mounting 45mm wide A4
Socket 11-pin 35mm wide E3

CODE END C

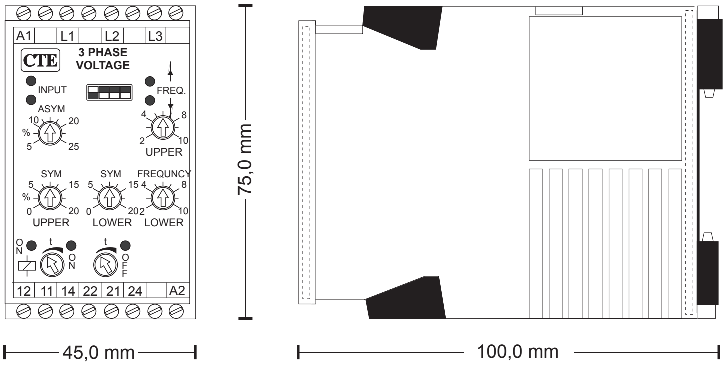
APPLICATION DIAGRAM



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 resenator 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 frquency. PADF includes a standard timing function. the PADF offers seperate 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.

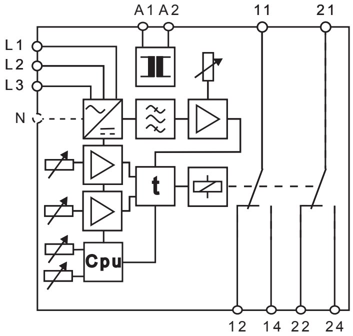
Balanced voltage is measured by rectifying and adding the three-phase voltages.

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.

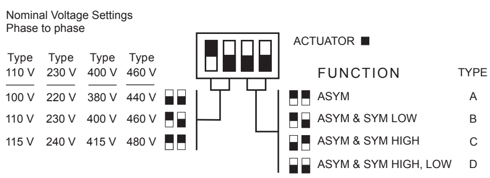
Application:
To switch off motors automatically before damage due to faulty supply, and to switch them on again as soon as the supply is re-established. E.g. pumps, oilburners, ventilators and refrigerators.
To monitor the three-phase main system and control the use of local emergency generators.
To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



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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 kΩ	$100 < U_N < 200$ V
	500 kΩ	$200 < U_N < 500$ 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 % / % ΔU_N

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

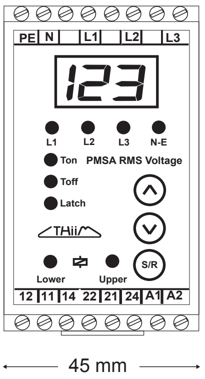
OUTPUT	Relay, 2 C/O	
Contact rating	6 A, 250 VAC, 1500 W	
Mechanical life	30 Million operations	
SUPPLY	AC/DC voltage from A1 & A2	
AC supply range	110 V (From 80 to 138 V)	
with transformer	230 V (From 176 to 288 V)	
Standard voltage	400 V (From 304 to 498 V)	
	460 V (From 352 to 576 V)	
	24 to 480V 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
	Pole to pole (45 mm.)	2500 VAC
	11-12-14 to 21-22-24	
Weight	0.22 kg	

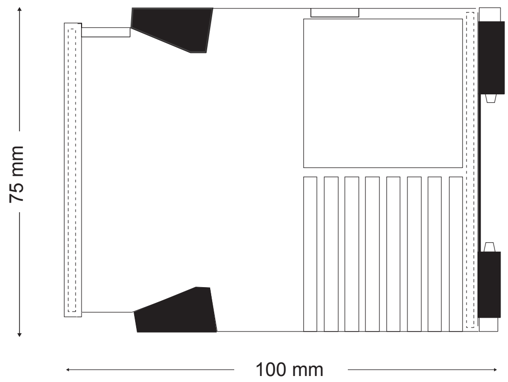
	International Standards
EMC directive 89/336:	EN50081 - Emission
	EN50082 - Immunity
Low voltage directive 73/23:	EN60255 - Electrical Relays

ORDERING INFORMATION

EXAMPLE: PAFA 4002 F5 10 B 400 A A 4 C

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 115VAC	1102
220, 230 and 240VAC	2302
380, 400 and 415VAC	4002
440, 460 and 480VAC	4602
FREQUENCY	
Center frequency 50Hz	F5
Center frequency 60Hz	F6
frequency range ± 2-10%	10
frequency range ± 4-20%	20
SUPPLY	
AC with transformer	
AC/DC with switch mode supply	
SUPPLY VOLTAGE	
18-360 VDC and 20-240 VAC	E400
From 19.2 to 28.8 V	B024
From 38.4 to 57.6 V	B048
From 80 to 138 V	B110
From 176 to 288 V	B230
From 304 to 498 V	B400
From 352 to 576 V	B460
(Other voltages on request)	
ADJUSTMENT	
Trimpot and dipswitch adj.	A
HOUSING	
Rail mounting	A
SIZE	
45 mm.	4
CODE	
Code end	C
Extended Code	E





RMS VOLTAGE MONITORING RELAY

Type: PMSA

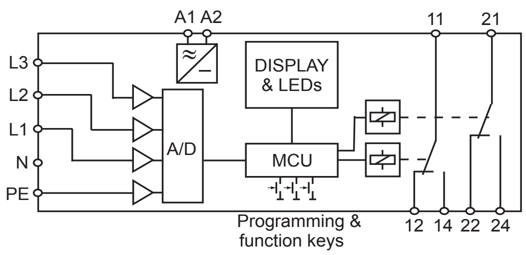
FEATURES

- **ALL IN ONE UNIT:**
  Multi Range from 50 to 830 Volt for use in Single-phase, Two-phase or Three-phase systems with or without Neutral and Ground
- **True RMS voltage measurement**

* **Measures Neutral to Ground voltage and 3 x Phase to Phase or 3 x Phase to Neutral**

- **Over and Under voltage monitoring with individual relays or window function with 2 C/O contacts**
- **One Relay can be dedicated to the Neutral to Ground monitoring**
- **Easy set-up by keying in actual parameters**
- **Time delay - On and Off - can be set individually**
- **Latched Relay function can be selected**
- **LEDs indicate the status of the relay, latch, timing and display information**
- **Extremely compact and low power consumption**

FUNCTION DIAGRAM



Contact information:

Relay programmed to Type 1: If enabled. Neutral to Ground plus
Under voltage: 1 C/O, terminal 11-12-14
Over voltage: 1 C/O, terminal 21-22-24

Relay programmed to Type 2: If enabled. Neutral to ground plus
Voltage Window 2 C/O, terminal 11-12-14 , 21-22-24

Relay programmed to Type 3:
Under- or Over voltage or Window func.: 1 C/O, term. 11-12-14
Neutral to Ground voltage: 1 C/O, terminal 21-22-24

Description:
The RMS voltage monitoring relay PMSA is a universal 2, 3, 4 and 5 wire Multi-voltage unit that measures under as well as over voltages in star or delta configuration. The PMSA is designed to fulfill the demand for one unit for all applications in order to reduce overall costs. The PMSA is build with a strong MCU that can handle 40000 13 bit voltage samples/sec for a precise and true RMS conversion.
The two internal relays can be used for Phase and Neutral to Ground voltage measurements, or one relay can be used for Phase measurements and the other relay dedicated for Neutral to Ground measurement.

Operation:
Star connection:
1, 2 or 3 phase with Neutral and an optional Ground. The PMSA is measuring the voltage of each phase against Neutral, or in a 3 phase system an "Internal Neutral" made by a resistor star coupling. Phase to Neutral voltages are individually monitored for under as well as over voltage. Both voltages and differential can be set indvidually. If the Ground "PE" is connected PMSA can monitor the voltage between Neutral and PE and activate an alarm signal if it exceeds a preset limit.
Delta connection:
2 or 3 phase with an optional Neutral and Ground. The PMSA is measuring the voltage of each phase against the other phase(s). The phase to phase voltages are individually monitored for under as well as over voltage. Both voltages and the differential can be set individually. If the Neutral and Ground "PE" is connected PMSA can monitor the voltage between Neutral and PE and activate an alarm signal if it exceeds a preset limit.
General:
The PMSA has two relays working in fail-safe mode. They can be used for an individual over and under voltage alarm or in parallel where they are both pulled in if the phase voltages are within the set limits. If the voltages are within the limits the relays will pull in after the power-up and the on-delay period has elapsed. If a voltage come outside the set limits the relays drop out after the off-delay period has elapsed.
Latch function:
If the relays are set to Latch they will pull in immediately at power-up and remain in until the PMSA after the power-up delay measures a fault and the off-delay has elapsed. After dropping out they will remain out until the PMSA have been reset manually by pressing the S/R button on the unit or by turning off the power supply.

Application:
Generally where humans and equipment have to be protected against unexpected voltages caused by broken wires - especially the Neutral - or voltages that are not within acceptable limits for the connected equipment.

SPECIFICATIONS

INPUT	AC voltage. 45 to 66 Hz
Range	
Connection type 1-3	50 to 480V N-Phase
Connection type 4-5	86 to 830V Phase-Phase
Input resistance	
N-L1, N-L2, N-L3, N-PE	1Mohm
PERFORMANCE PARAMETERS	
DISPLAY RESOLUTION	
Voltage	1 V
Time	1 sec
TIMING	
Measuring Response time	< 100msec. (50 to 90msec.)
Time range	Separate On and Off delay setting 0 - 99 sec.
ELECTRICAL	
Temp. dependence	A/D conversion Typ. ± 0.02 % / °C
OUTPUT	
RELAY	2 C/O or 2 x 1 C/O for separate Over & Under voltage monitoring or 1 C/O dedicated for Neutral to Ground monitoring
Contact rating	6 A, 250 VAC, 1500 W, AgNi
Mechanical life	30 million operations
SUPPLY	
Range	18 - 288 VAC, 20-400 VDC
Fuse	Internal 400 mA in A1 Breaking capacity 100 A / 250 Vdc/ac
Power consumption	Max 4 W
GENERAL	
Temperature range	- 25 °C to + 55 °C ambient
Humidity	Up to 90 % RH non-condensing
Dieletric test voltage	Coil to relay contacts 4000 VAC
Pole to pole	2500 VAC
Weight	0.17 kg
	International Standards
EMC	EN50263 Product standard for measuring relays and protection equipment
Safety	EN60255 Insulation coordination for measuring relays and protection equipment

ORDERING INFORMATION

EXAMPLE: PMSA P A 4 C

TYPE		
RMS Voltage Relay	PMSA	
ADJUSTMENT		
Programmed	P	
HOUSING		
Rail mounting	A	
SIZE		
45 mm. -	4	
CODE		
Code end	C	
Extended code	E	

Power ON: Auto show all Values
Press UP: Select value to show   Press DOWN: Auto show all Values
Press SET / RESET 5 sec.

Set-up connection type
Display Shows connection: Type 1 to 5   Press UP or DOWN to change
1: Neutral & L1   **2**: Neutral & L1-L2   **3**: Neutral & L1-L2-L3   **4**: L1-L2   **5**: L1-L2-L3
Press SET / RESET

Set-up trip voltage Neutral to Ground
Display Shows: Trip voltage 0-480, N blinking green, toff is ON   Press UP or DOWN to change
0 = Disable measurement Neutral to Ground.   Minimum recommended trip setting 20V
Press SET / RESET

Set-up return voltage Neutral to Ground
Display Shows: Return voltage 1-480, N blinking green, ton is ON   Press UP or DOWN to change
Return voltage must be lower than trip voltage
Press SET / RESET

Set-up Over voltage trip voltage
Display Shows: Trip voltage 0-830, L1 blinking green, toff is ON   Press UP or DOWN to change
0 = disable Over voltage measurement. Set range for connection: Type 1-3: 50-480V, Type 4-5: 86-830V
Press SET / RESET

Set-up Over voltage return voltage
Display Shows: return voltage 0-830, L1 blinking green, ton is ON   Press UP or DOWN to change
Return voltage must be lower than trip voltage. Set range for connection: Type 1-3: 50-480V, Type 4-5: 86-830V
Press SET / RESET

Set-up under voltage trip voltage
Display Shows: Trip voltage 0-830, L3 blinking green, toff is ON   Press UP or DOWN to change
0 = Disable Over voltage measurement. Set range for connection: Type 1-3: 50-480V, Type 4-5: 86-830V
Press SET / RESET

Set-up under voltage return voltage
Display Shows: Return voltage 0-830, L3 blinking green, ton is ON   Press UP or DOWN to change
Return voltage must be higher than trip voltage. Set range for connection: Type 1-3: 50-480V, Type 4-5: 86-830V
Press SET / RESET

Set Relay type
Display Shows: 1, 2 or 3 ton & toff blinking yellow   Press UP or DOWN to change
type1: Under voltage relay 11-12-14 Over voltage relay 21-22-24 **type 2**: Window relay function 2 C/O relay
type3: If Neutral to Ground measuring enabled then: 11-12-14 Over/Under/Window and 21-22-24 Neutral to Ground
Press SET / RESET

Set-up relay Latch
Display Shows: 0 or 1, Latch blinking red   Press UP or DOWN to change
0: Latch off   1: Latch on
Press SET / RESET

Set-up ton time
Display Shows: 0-99, ton blinking yellow   Press UP or DOWN to change
Time setting: 0-99 sec.
Press SET / RESET

Set-up $t_{power\text{-}up\ time}$
Display Shows: 125-975, ton, toff and Latch blinking yellow and red   Press UP or DOWN to change
Time setting: 100 to 975 msec. in 25 msec. steps
Press SET / RESET

Set-up toff time
Display Shows :0-99; toff blinking yellow   Press UP or DOWN to change
Time setting: 0-99 sec.
Press SET / RESET

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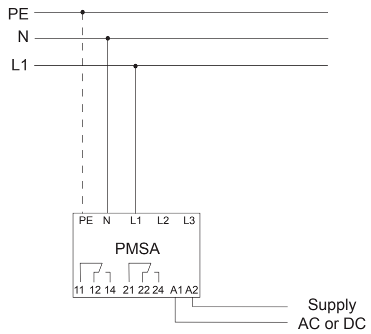
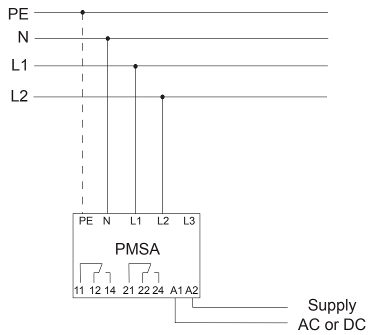
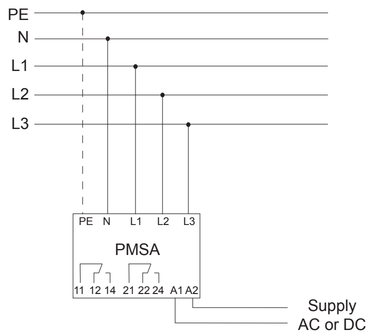
PMSA various connection types 1-5



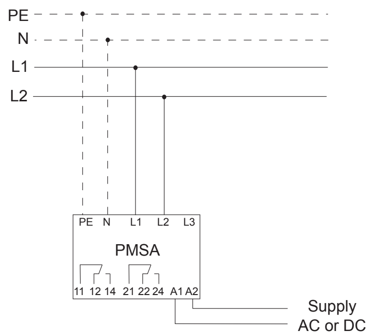
CONNECTION TYPE 1:
TRMS Voltage is measured from: L1 to N
and if enabled from N to PE



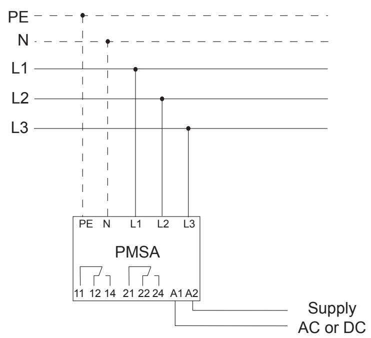
CONNECTION TYPE 2:
TRMS Voltage is measured from: L1 to N & from L2 to N
and if enabled from N to PE



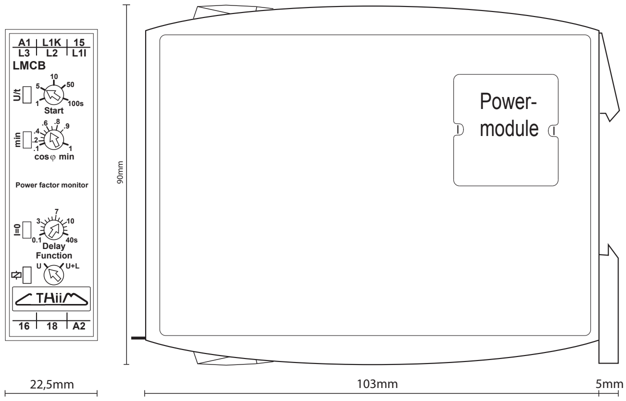
CONNECTION TYPE 3:
TRMS Voltage is measured from: L1 to N & from L2 to N & from L3 to N
and if enabled from N to PE



CONNECTION TYPE 4:
TRMS Voltage is measured from: L1 to L2
and if enabled from N to PE



CONNECTION TYPE 5:
TRMS Voltage is measured from: L1 to L2 & from L2 to L3 & from L3 to L1
and if enabled from N to PE. If the Neutral is not connected an internal artificial Neutral will be used for the measurement N to PE



LOAD MONITOR
Power Factor cos φ
Type: LMCB

Description:
The load monitor determines the phase angle cos φ, 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 the motor load, it represents a directly measurable variable for the motor load.

When the actual cos φ passes the set point cos φ, the unit will react by letting the (min) LED blink. After a set period of time, the relay R switches to failure position and the (min) LED is switched on.

If no current flows between L1i and L1k, the I=0 LED will blink until the set value od dealy is reached. Then the LED is switched on

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

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

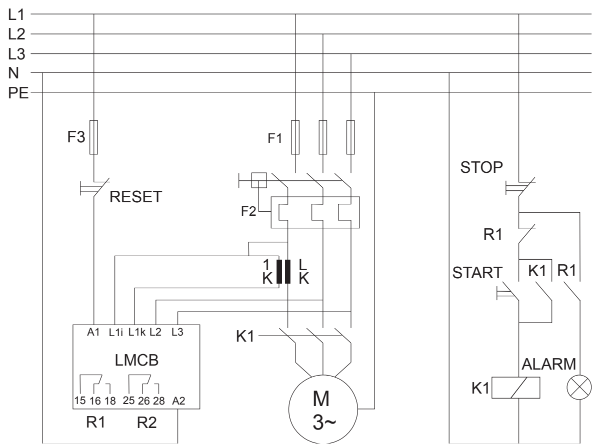
Under load monitoring can recognize power transmission faults (for example, when a V-belt breaks) or flow interruptions

FEATURES

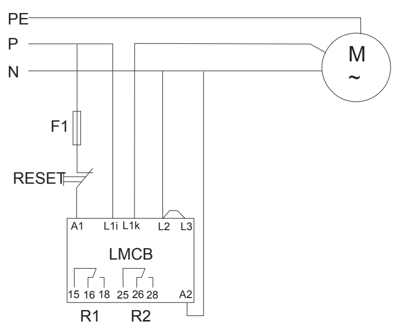
- **Fan monitoring (V-belt break)**
- **Filter monitoring (filter blockage)**
- **Protection for single and 3-phase lightly loaded motors.**
- **Current transformer may be connected for I_N > 10 A**
- **Suitable for frequency converters**
- **Voltage range: 1-phase 24-230 V, 3-phase 24 - 400 V**
- **Current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

CONNECTION DIAGRAM

Three-phase connection

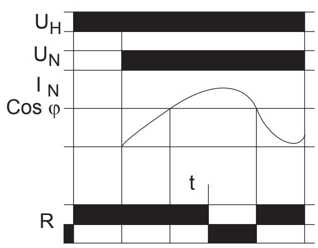


Single-phase connection

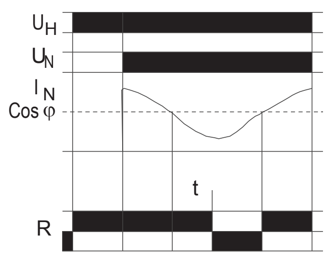


FUNCTION DIAGRAM

Overload monitoring



Underload monitoring



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SPECIFICATIONS

INPUT

Rated voltage	1-phase 24 - 230 V 3-phase 24 - 400 V
Rated current	0,5 to 10 A
Phase angle cos φ	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-)
Continous current	8 A
Switching capacity	1500 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 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

CE

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

ORDERING INFORMATION

EXAMPLE: LMCB M 230 A B 3 C

TYPE

Pump-Fan monitoring relay	LMCB

SUPPLY

AC with transformer	M

SUPPLY VOLTAGE

Excl. transformer module	xxx
From 20 to 28 VAC	024
From 36 to 46 VAC	042
From 41 to 52 VAC	048
From 99 to 140 VAC	110
From 108 to 139 VAC	127
From 198 to 264 VAC	230
From 323 to 418 VAC	380
From 342 to 440 VAC	400
From 374 to 484 VAC	440

ADJUSTMENT

Trimpot and dipswitch adj.	A

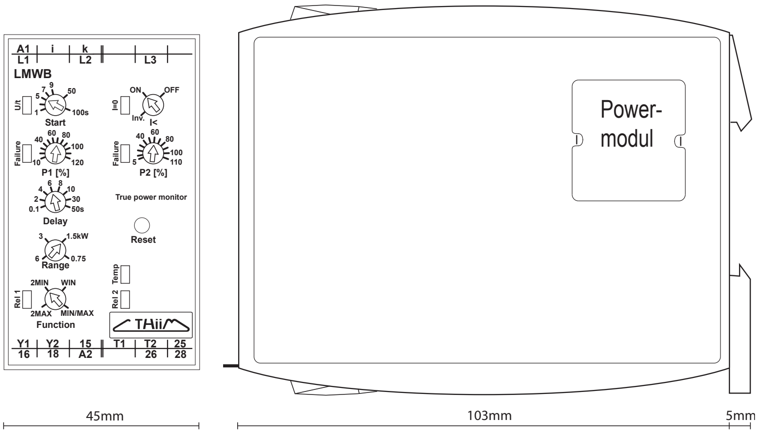
HOUSING

Rail mounting.(internal transformer)	B

SIZE

30 mm. 2 C/O	3

CODE END C

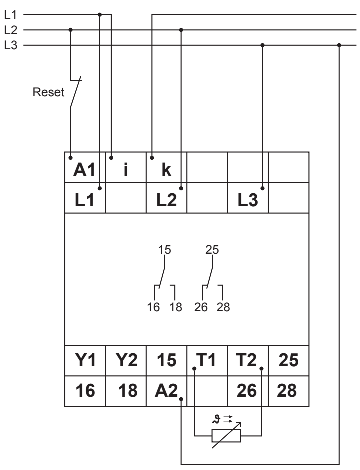


LOAD MONITOR
Real Power Watt
Type: LMWB

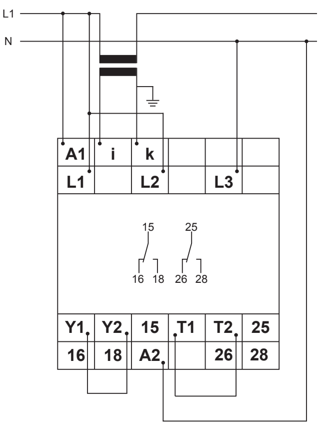
FEATURES

- **True power monitor for motors and other loads**
- **Temperature monitoring of motor windings**
- **Single and symmetric 3-Phase loads**
- **0,75kW, 1,5kW, 3kW and 6kW ranges w/o ext. CT**
- **Min. and max. monitoring with individual or parallel working relays or 2 max. or 2 min. thresholds with individual relays**
- **Adjustable start-up delay 1-100s**
- **Off delay 0,1-50s**
- **Recognition of disconnected load**
- **Reset Key**
- **Fault latch**
- **Supply voltages selectable via power modules**

CONNECTION DIAGRAM
Three-phase connection with temperature monitoring. I_N < 12A



Single-phase connection with current transformer and fault latch



DESCRIPTION:
The unit monitors the true power supplied to a single phase or a symmetrical 3-phase load up to 7,2 kW without using external current transformers. For a higher resolution the LMWB has 4 ranges. The overload current can be up to 6 or 12A continuously depending on range.

The LMWB has two adjustable set points that can be used for setting either one maximum and one minimum level or two individual min. or max. levels. The status of the load and each level is signalled by separate LED's and output relays.

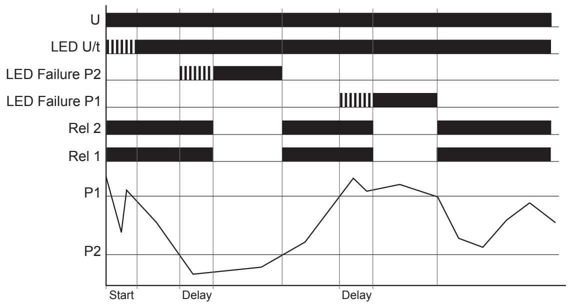
When the load exceeds the set points an adjustable time delay controls the time from the fault is recognised until the relay drops out. During the delay time the LED related to the set point will indicate the condition by flashing until the relay reacts and the LED being permanently on.

The relays can be latched in their fault position by bridging the terminals Y1 and Y2. The LED's will be on during the time where the relays are latched independently of the actual load status. Releasing the latch can be done by interrupting the power supply or pressing the reset key.

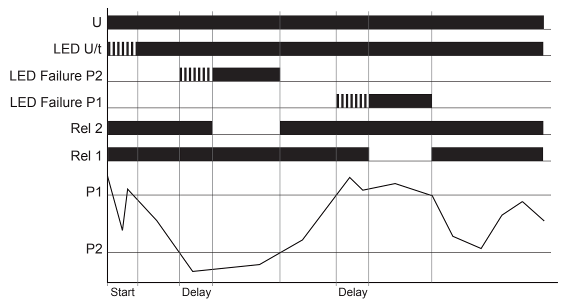
The unit is equipped with a start-up delay in order to suppress error messages during machine start. The delay period starts when supply voltage is applied.

For a complete load protection the LMWB include a temperature monitor that can be used with the standard PTC resistors used in motor windings. The temperature monitor is overriding the load function on relay 2.

FUNCTION DIAGRAM (Further examples in the manual)
Window function (WIN)



Minimum and maximum monitoring



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SPECIFICATIONS

INPUT	
Waveform Sinus	10 to 400 Hz / 10 to 100 Hz weighted PWM
Measuring voltage	1-phase 0 to 480VAC 3-phase 0 to 480/277VAC
Input resistance, voltage	1,25MΩ
Measuring Input current	0-12A (cont. w. >5mm airspace between units)
Range 0,75kW, 1,5kW	0,15 - 6A
Range 3kW, 6kW	0,3 - 12A
Input resistance, current	<10mΩ
Detection of disconnected load	I<
Interruption 0,75kW, 1,5kW	<150mA
Recognition 0,75kW, 1,5kW	>300mA
Interruption 3kW, 6kW	<180mA
Recognition 3kW, 6kW	>360mA
Temperature monitoring	Terminals T1-T2
Release value (Relay off)	≥3,6kΩ
Response value (Relay on)	≤1,8kΩ
Measuring voltage	<7,5V @ R ≤ 4,0 (IEC 60947-5-1)
Overvoltage category	III (IEC 60664-1)
Rated surge voltage	4kV
Fault latch	Y1-Y2 bridged. Potential equal to measuring cirquit
PERFORMANCE PARAMETERS	
Switching threshold P1	Adjustable 10% to 120% of P_N
Switching threshold P2	Adjustable 5% to 110% of P_N
Hysteresis	1% of max. measuring range
Basic accuracy	±2% of max. scale value
Adjustment accuracy	≤5% of max. scale value
Repetition accuracy	±2%
Frequency dependance	≤0,025% / Hz
Temperature dependence	≤0,02% / °C
TIMING	
Start up supression time	1...100 s
Tripping delay	0,1s...50s
Reset time	500ms
OUTPUT	
Relay	2 x potential free change over contacts
Switching capacity	5A/250VAC (w. >5mm airspace betw. units)
Fusing	5 A, Fast
Mechanical life	> 20 x 10^6 operations
Electrical life	> 2 x 10^5 operations at 1000VA resistive load
Switching capacity	max. 60/min at 100VA resistive load max. 6/min at 1000VA resistive load IEC 60947-5-1
Rated surge voltage	4kV
SUPPLY	
AC supply range	12-500VAC (specification on power module) Selectable via power module TR3 Terminals A1-A2 are galvanically separated
AC frequency range	50 to 60Hz (specification on power module)
Reset time	>500ms
Power consumption	3,5 VA (3W)
Duty cycle	100%
Overvoltage category	III (IEC 60664-1)
Rated surge voltage	4kV
AMBIENT CONDITIONS	
Temperature range	- 25°C to + 55°C ambient (IEC 60068-1) - 25°C to + 40°C ambient (UL 508)
Humidity	15% - 85% RH (IEC 60721-3-3 class 3k3)
Pollution degree	3 (IEC 60664-1)
Vibration resistance	10 to 55Hz 0,35 (IEC 60069-2-6)
Shock resistance	15g 11ms (IEC 60068-2-27)
MECHANICAL	
Housing	Self-extinguising plastic. IP40
Terminals	Tightening torque max. 1Nm (PZ1) IP20. 1 x 4 or 1 x 0,5 to 2,5mm² with end sleeve 2 x 2,5 or 2 x 0,5 to 1,5mm² with end sleeve
Mounting	DIN rail TS 35 (EN 60715). Any position
Weight	0.230 kg in 45 mm. housing

EN 60715
EN 60947-8
IEC 60068-1
IEC 60068-2-27
IEC 60068-2-6
IEC 60664-1
IEC 60721-3-3 Class 3k3
IEC 60947-5-1

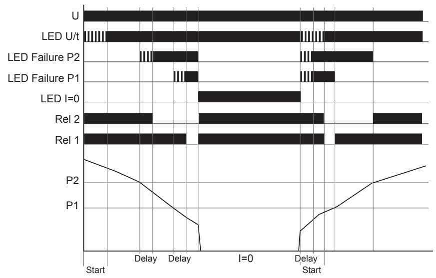
ORDERING INFORMATION

EXAMPLE: LMWB M 230 A B 4 C

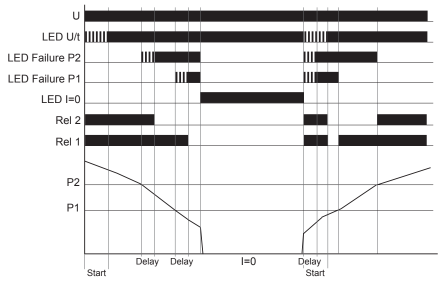
TYPE	
Load monitoring relay	LMWB
SUPPLY	
AC with transformer	M
SUPPLY VOLTAGE	
From 99 to 140 VAC	110
From 198 to 264 VAC	230
From 341 to 440 VAC	400
Other Voltages on request	
ADJUSTMENT	
Switch and trimpot adjustable	A
HOUSING	
Rail mounting.(internal transformer)	B
SIZE	
45 mm. 2 C/O	4
CODE END	C

Further examples

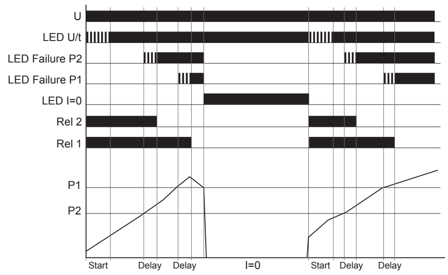
I=0 ON with minimum monitoring (2MIN + I=0 ON)



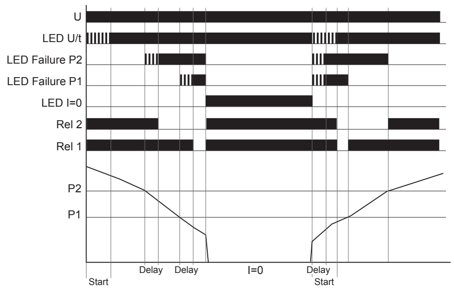
I=0 Inv. with minimum monitoring (2MIN + I Inv.)

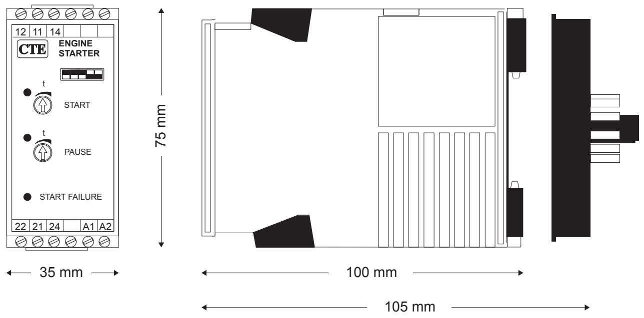


I=0 ON with maximum monitoring (2MAX + I=0 ON)



I=0 with maximum monitoring (2MAX + I=0 Inv.)





THiiM

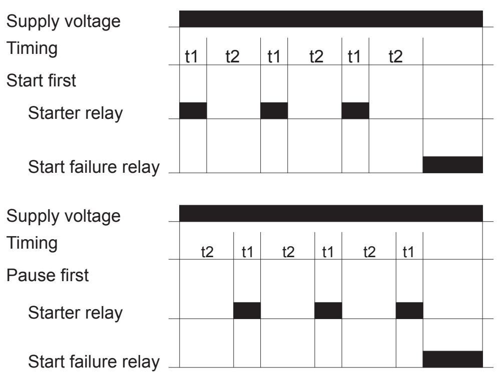
ENGINE STARTER RELAY

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 separatly adjustable**
- **Free contact for start failure**
- **LEDs indicate start, pause or start failure**
- **Small outlines**

FUNCTION DIAGRAM

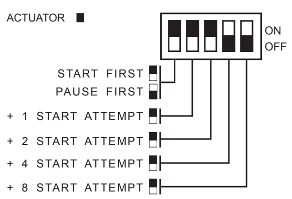


Description:
The engine starter relay is designed for automatic start of petrol, gas or diesel engines. The relays are provided with a separate alarm contact for start failure.

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.

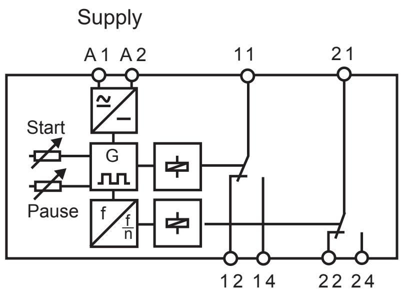
Application:
Automatic starting of engines driving generators, refrigerators and pumps.

PROGRAMMABLE FEATURES



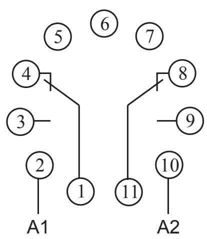
CONNECTION DIAGRAM

Rail mounting



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

Socket mounting



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

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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 % / % DU

OUTPUT	Relay, 2 x 1 C/O
Contact rating	6 A, 250 VAC, 1250 W
Mechanical life	30 million operations

SUPPLY	DC Voltage
DC supply range	12 - 24VDC (9 - 30 VDC)
Power consumption	4 VA, 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 (45 mm.)	2500 VAC
Weight	0.13 kg	

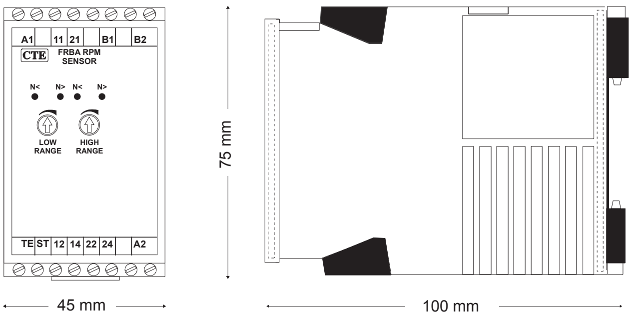
CE

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

ORDERING INFORMATION

EXAMPLE: ESPA E024 D A 3 C

TYPE	
Engine starter	ESPA
SUPPLY VOLTAGE	
24 VDC	E024
ADJUSTMENT	
Dipswitch adjustable.	D
HOUSING	
Housing, rail mounting	A
Housing, socket 11 pin	E
SIZE	
35 mm.	3
CODE END	C



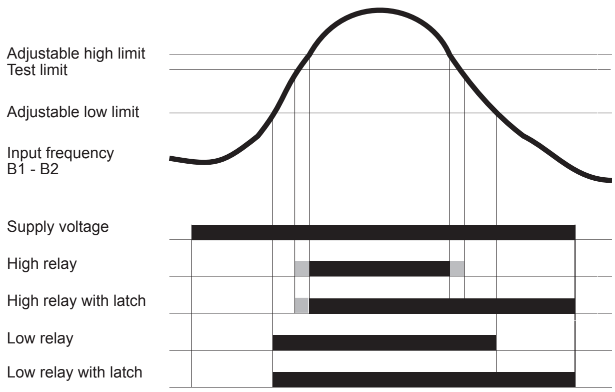
COMBINED STARTER INHIBIT & OVER-SPEED RELAYS

Type: FRAA for 12 V
Type: FRBA for 24 V

FEATURES

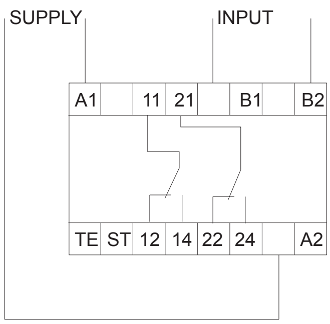
- **Extremely resistant to supply voltage drops**
- **Measurement of r.p.m. is based on frequency**
- **Both relays detect high frequency in less than 300 msec.**
- **The high range setting can be adjusted and tested at normal speed**
- **LEDs indicate the state of the input**

FUNCTION DIAGRAM



CONNECTION DIAGRAM

Rail mounting



Low range	11, 12, 14
High range	21, 22, 24

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 tacho generator 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.

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.

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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 % / °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 vlotage
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 °C to + 55 °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

CE

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

ORDERING INFORMATION

EXAMPLE: FRBA 2001 5123 4 010 A A4 C

TYPE

FRAA 12 V supply	FRAA
FRBA 24 V supply	FRBA

LOW RANGE
INPUT FREQUENCY RANGE

10 - 20 Hz	2001
20 - 40 Hz	4001
40 - 80 Hz	8001
80 - 160 Hz	1602
160 - 320 Hz	3202
320 - 640 Hz	6402
640 - 1280 Hz	1283
1280 - 2560 Hz	2563
2560 - 5120 Hz	5123

HIGH RANGE
INPUT FREQUENCY RANGE

10 - 20 Hz	2001
20 - 40 Hz	4001
40 - 80 Hz	8001
80 - 160 Hz	1602
160 - 320 Hz	3202
320 - 640 Hz	6402
640 - 1280 Hz	1283
1280 - 2560 Hz	2563
2560 - 5120 Hz	5123

INPUT

Namur	DIN 19 234	0
Optocoupler	NPN - PNP	1
Transformer	0.5 to 20 V	3
	10 to 100 V	4
	30 to 500 V	5

LATCHING

Relay not latching	0
Relay latching only LOW RANGE	1
Relay latching only HIGH RANGE	2
Relay latching LOW and HIGH RANGE	3
no test	00
test HIGH RANGE set point - 10 %	10

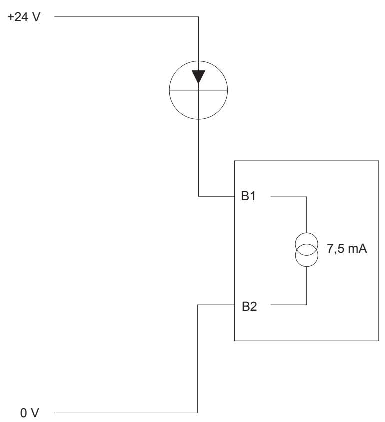
ADJUSTMENT

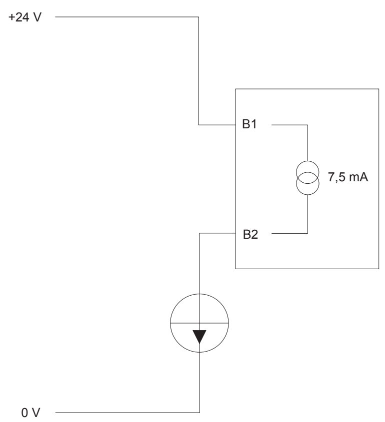
Fixed sensitivity	F
Trimpot. adj.	A
45 mm. 2 x 1 C/O - contact DIN RAIL	A4

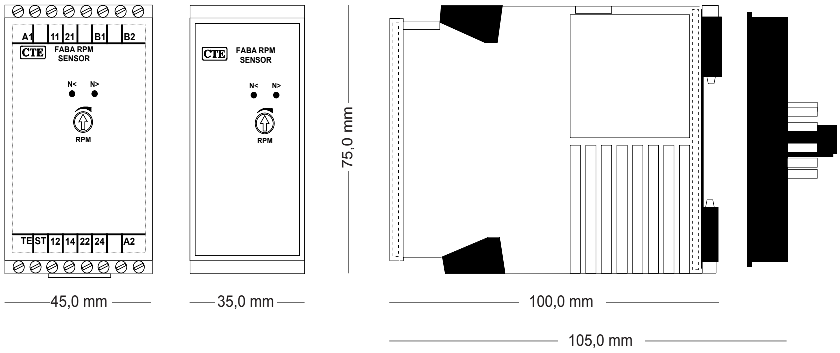
CODE

Code end	C
Extended code	E

OPTOCOUPLER INPUT:







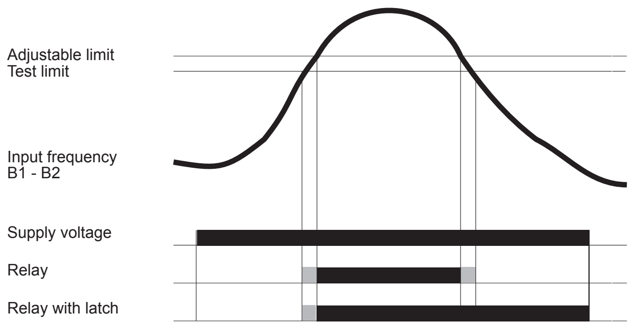
STARTER INHIBIT RELAY
Type: FAAA & FXAA

OVER-SPEED RELAY
Type: FABA & FXBA

FEATURES

- **Extremely resistant to supply voltage drops**
- **Insensitive to noise on input line**
- **Measurement of r.p.m. is based on frequency**
- **Detects over-speed in less than 300 msec.**
- **The over-speed setting can be adjusted and tested at normal speed**
- **Latch function can be specified**
- **LEDs indicate the state of the input**

FUNCTION DIAGRAM



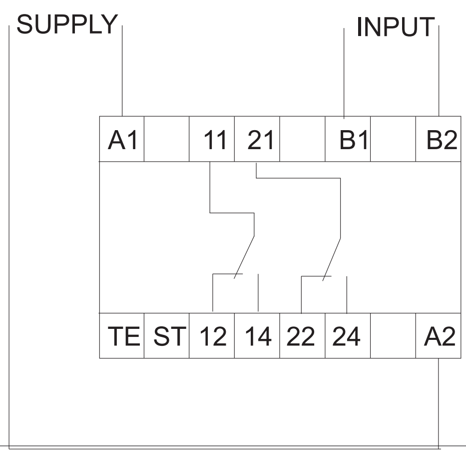
Description:
The starter inhibit relays and the over-speed relays are designed to be used with petrol, gas or diesel engines. FAAA and FXAA are used to inhibit the starter as soon as the engine runs by itself. FABA and FXBA are used to prevent engine damage due to failure in the automatic speed control system.
The relays accurately monitor the frequency from either a magnetic pick-up, a tacho generator 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 setpoint, the relay pulls in with a time delay of max. 300 msec. At lowest frequency setting.
When the frequency comes below the set point, the relay is de-energized with a delay of approximately 1.5 sec. However if the latch function is specified, the relay remains energized. The latch function is released by disconnecting the power supply.
o

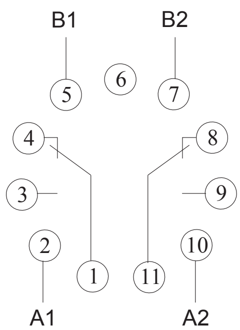
Test function:
If the test function is included then the over-speed limit can be adjusted by connecting the terminals TE and ST and setting the limit to normal speed. When the connection TE - ST is removed the r.p.m. setting will be increased by e.g. 10 % again.
Standard test limits over normal speed are 10%, 15%, 20% or 25%.

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

CONNECTION DIAGRAM
Rail and panel mounting



Socket mounting



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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	< 300 msec.
ELECTRICAL	
Temp. dependence	Typ. ± 0.04 % / °C
Supply dependence	Typ. ± 0.01 % / % ΔU
OUTPUT	Relay, 2 x 1 C/O
Contact rating	6 A, 250 VAC, 1500 W
Mechanical life	30 Million operations
Optocoupler	
Transistor rating	10 mA, 50 VDC
SUPPLY	AC / DC vlotage
Housing 45mm VOX:	
FRAA	12V AC/DC
FRBA	24V AC/DC
Voltage range	AC: - 20 % to + 15 % DC: - 25 % to + 33 %
Power consumption	2 W
GENERAL	
Temperature range	- 25 °C to + 55 °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

CE

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

ORDERING INFORMATION

EXAMPLE: FAAA 2001 4 0 10 A A4 C

TYPE

FXAA 12 V supply	FXAA
FAAA 24 V supply	FAAA
FXBA 12 V supply	FXBA
FABA 24 V supply	FABA

INPUT FREQUENCY RANGE

10 - 20 Hz	2001
20 - 40 Hz	4001
40 - 80 Hz	8001
80 - 160 Hz	1602
160 - 320 Hz	3202
320 - 640 Hz	6402
640 - 1280 Hz	1283
1280 - 2560 Hz	2563
2560 - 5120 Hz	5123

INPUT

Namur	DIN 19 234	0
Optocoupler	NPN - PNP	1
Transformer	0.5 to 20 V	3
	10 to 100 V	4
	30 to 500 V	5

LATCHING

Relay not latching	0
Relay latching	1

No test	00
TEST ONLY TYPE FXBA & FABA DIN RAIL	
Test set point - 10 %	10

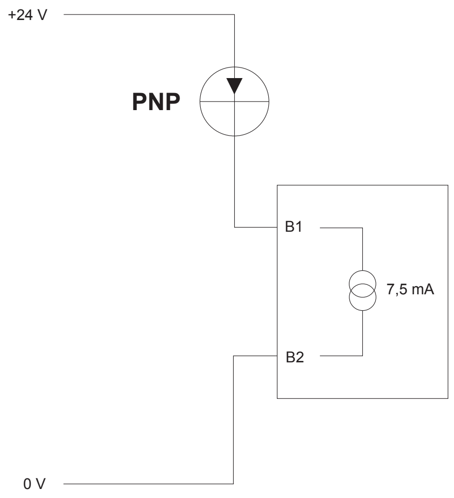
ADJUSTMENT

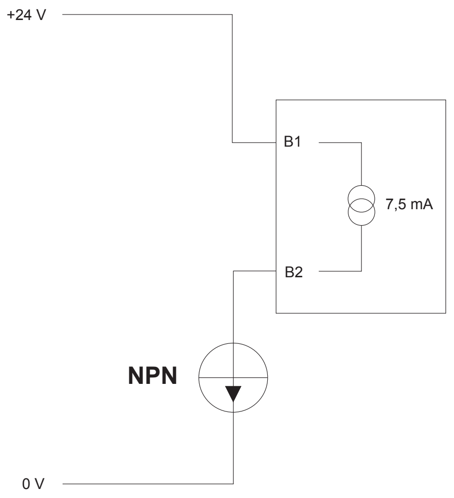
Fixed sensitivity	F
Trimpot. adj.	A
45 mm. 2 x 1 C/O DIN RAIL mounting	A4
35 mm. 2 x 1 C/O 11pin.Socket mounting	E3

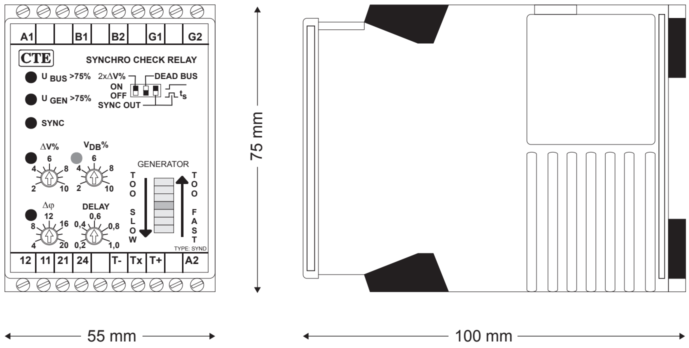
CODE

Code end	C
Extended code	E

OPTOCOUPLER INPUT:







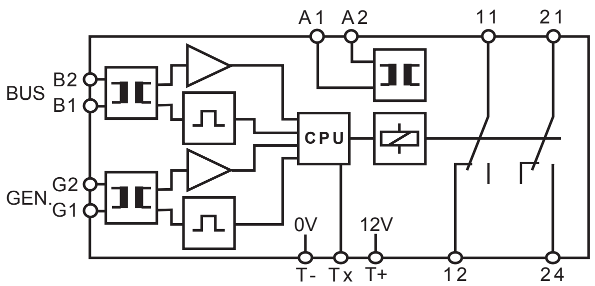
SYNCHRO CHECK RELAY

Type: SYND

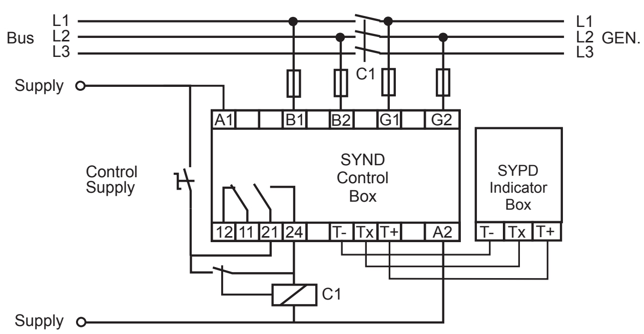
FEATURES

- **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 $\Delta V\%$. As soon as ΔV is below the set limit, the SYND will start monitoring the phase difference $\Delta\varphi$. If the phase difference $\Delta\varphi$ is continuously below the set limit during the elapse of the set delay time t_d and the voltages still within the limits, 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 Dead Bus $V_{DB}\%$ set limit V the Mains Bus is defined to be dead and the internal relay will pull in if 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.

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SPECIFICATIONS

INPUT

Nominal voltage	Specify from 110 to 500 V
Max. input	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 % / % ∆U 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 voltage, Nominal ± 20 %
AC supply with transformer	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	

CE

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

TYPICAL SETTING

∆V% setting — Set for max. differantial (U_{BUS} - U_{GEN}) voltage in % of U_{GEN}

C1 closing delay	25 mS	50 mS	100 mS	200 mS	400 mS
∆φ 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.

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

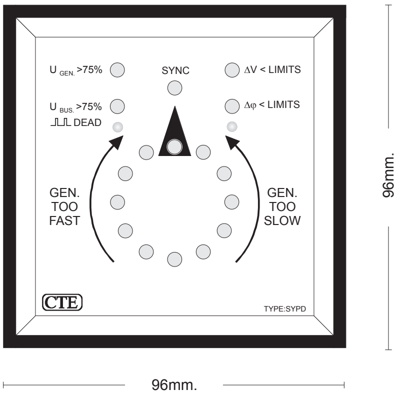
Frequency diff. in Hz $= \dfrac{1}{\text{time for 1 rotation 0-360 deg.}}$

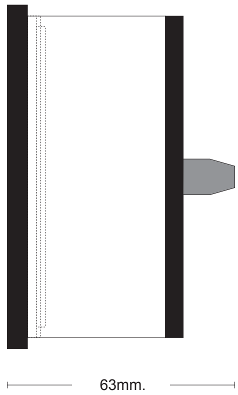
Max. sync error in deg. $= \Delta\varphi \text{ setting} + \left(\dfrac{\Delta\varphi \text{ setting} \times 2}{\text{DELAY setting}} \times \text{ C1 closing delay} \right)$

ORDERING INFORMATION

EXAMPLE: SYND 400 2 B230 A A 5 C

TYPE	
Syncho Check Relay	SYND
VOLTAGE BETWEEN PHASES	
The first three figures of the voltage in Volt e.g. 400 V	400
Followed by:	
1 for V = 10.0 to 99.9	1
2 for V = 100 to 999	2
SUPPLY VOLTAGE	
18-360 VDC and 20-240 VAC	E400
99-140 VAC	B110
198-264 VAC	B230
342-484 VAC	B400
374-506 VAC	B460
ADJUSTMENT	
Trimpot A adjutable	A
HOUSING	
Rail mounting.(internal transformer)	A
SIZE	
55 mm.	5
CODE END	C





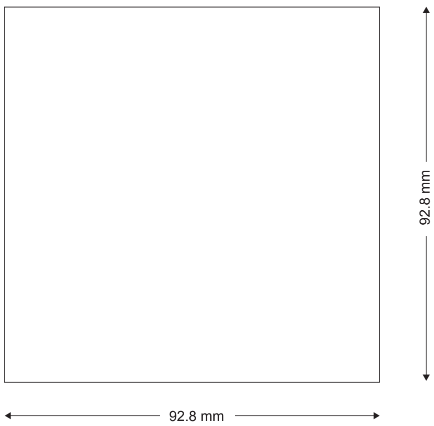
PANEL INDICATOR FOR SYNCHRO CHECK RELAY

Type: SYPD

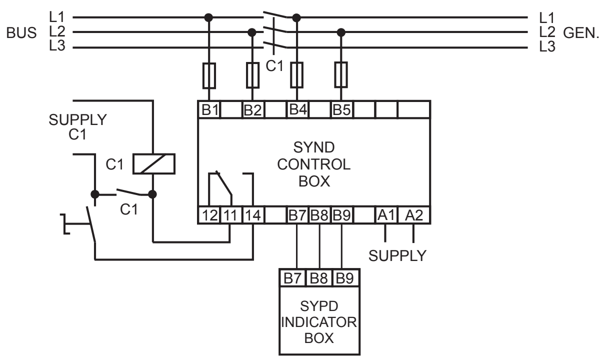
FEATURES

- **Remote indication**
- **Easy three wire connection**
- **No connection to high voltage**

PANEL HOLE



CONNECTION DIAGRAM



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%, ΔV<limit and $\Delta\varphi$<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
CE	International Standards
EMC directive 89/336:	EN50081 - Emission EN50082 - Immunity
Low voltage directive 73/23:	EN60255 - Electrical Relays

ORDERING INFORMATION

EXAMPLE: SYPD GL

TYPE
Panel indicator — SYPD

FRONT
Glass — GL
Macrolon — ML

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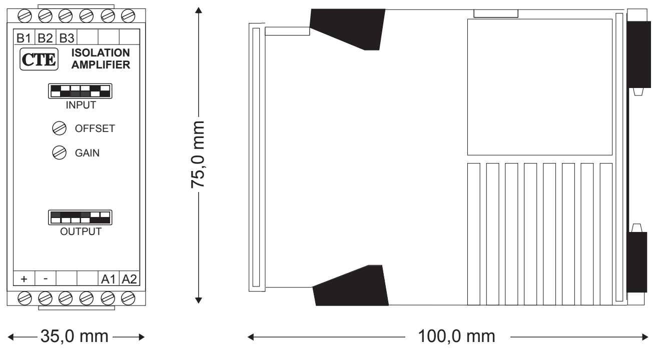


ISOLATION AMPLIFIER

Type: AISA

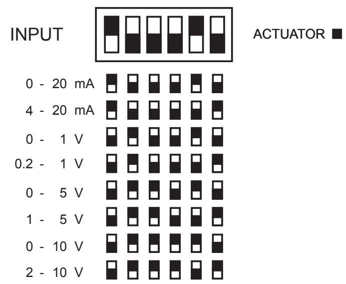
FEATURES

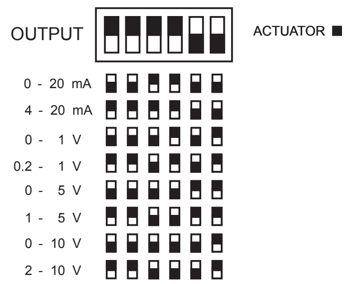
- **Galvanic separation > 4kV**
- **8 programmable input ranges**
- **8 programmable output ranges**
- **Excellent linearity**
- **Small outlines**

Description:
The isolation amplifier is buildt 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.

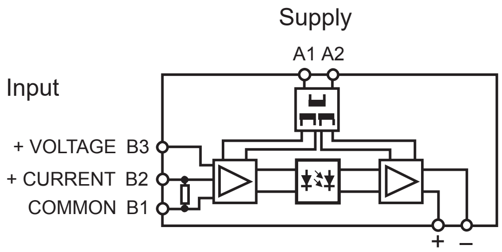
PROGRAMMABLE FEATURES



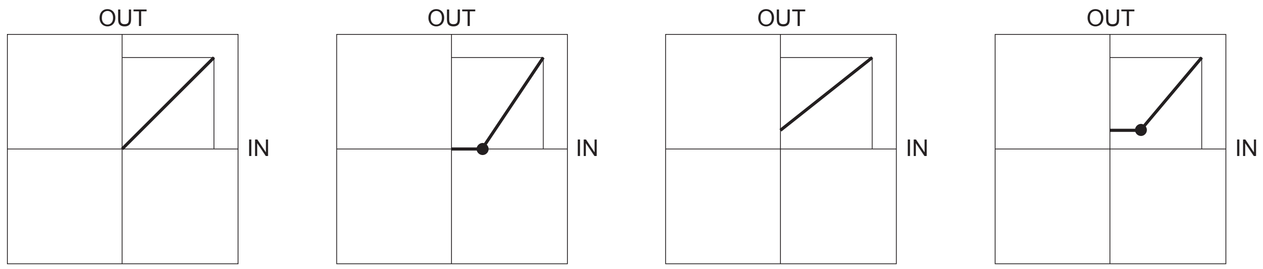


CONNECTION DIAGRAM

Rail mounting



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

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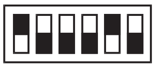
SPECIFICATIONS

INPUT

Programmable with dipswitch — 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

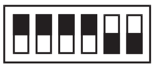
Adjustable type "A"	
Offset potmeter.	± 100 % off full scale.
Gain potmeter.	10 - 110 % off full scale.
Input resistance	
Voltage	Approx. 28 kΩ
Current	10 Ω

PERFORMAMCE 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 % / % ∆U

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

AC and DC with isolated switchmode supply	18-360 VDC and 20-264 VAC
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	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	3000 VAC
	Between input and supply	4000 VAC
	Between supply and output	4000 VAC
Weight	0.12 kg	

CE

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

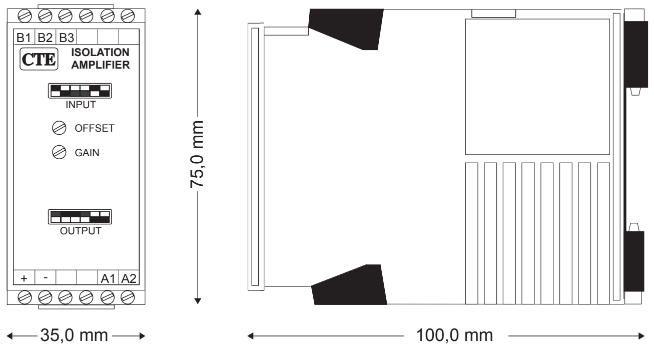
ORDERING INFORMATION

EXAMPLE: AISA B230 D A 3 C

TYPE	
Analog isolation amplifier	AISA
SUPPLY VOLTAGE	
18-360 VDC and 20-264VAC	E400
20-28 VAC	B024
99-140 VAC	B110
198-264 VAC	B230
342-484 VAC	B400
ADJUSTMENT	
Input offset & gain adjustable	A
Input offset & gain fixed	D
HOUSING	
Rail mounting (without transformer)	A
SIZE	
35 mm.	3
CODE END	C

mV TRANSMITTER

Type: AISB



FEATURES

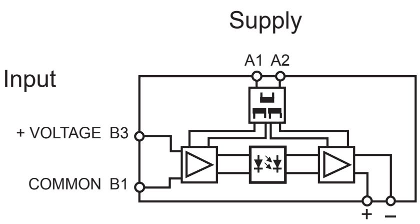
- **mV to standard Current/Voltage conversion**
- **Galvanic separation > 4 kV**
- **4 programmable input ranges**
- **8 programmable output ranges**
- **Excellent linearity**
- **Small outline**

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.

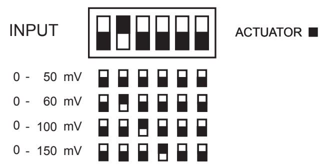
Application:
The mV transmitter is designed for the transmission of signals from distant sensors to the control room or for interface between sensor and PC or PLC. Sensors can be of any kind like: Shunt, measuring bridges or used in weight cells or in temperature units.

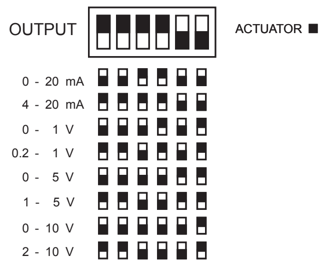
CONNECTION DIAGRAM

Rail mounting

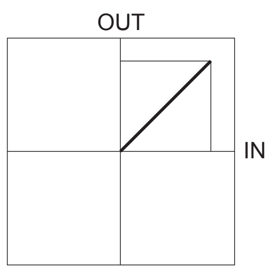


PROGRAMMABLE FEATURES



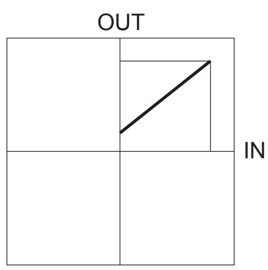


OUTPUT CHARACTERISTICS



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

Thiim A/S
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2860 Søborg - Denmark
Tel.: +45 4485 8000
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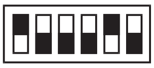
SPECIFICATIONS

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



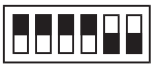
Adjustable type "A"	
Offset potmeter.	± 100 % off full scale.
Gain potmeter.	10 - 110 % off full scale.
Input resistance	
Voltage	Approx. 28 kΩ
Current	10 Ω

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

AC and DC with isolated switchmode supply	18-360 VDC and 20-264 VAC
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	45 to 440 Hz (transformer)
Power consumption	2.5 VA, 1.1 W

GENERAL

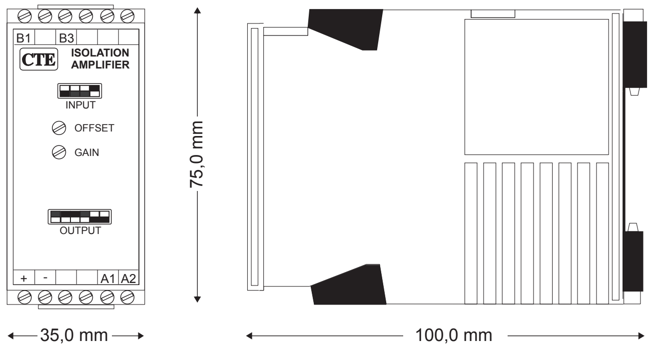
Temperature range	- 25 °C to + 55 °C	
Humidity	Up to 90 % RH non-condensing	
Dielectric test voltage	Between input and output	3000 VAC
	Between input and supply	4000 VAC
	Between supply and output	4000 VAC
Weight	0.12 kg	

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

ORDERING INFORMATION

EXAMPLE: AISB B230 D A 3 C

TYPE	
mV Transmitter	AISB
SUPPLY VOLTAGE	
18-360 VDC and 20-264VAC	E400
20-28 VAC	B024
99-140 VAC	B110
198-264 VAC	B230
342-484 VAC	B400
ADJUSTMENT	
Input offset & gain adjustable	A
Input offset & gain fixed	D
HOUSING	
Rail mounting (without transformer)	A
SIZE	
35 mm.	3
CODE END	C



ISOLATION AMPLIFIER

Type: UISA and UISB

FEATURES

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

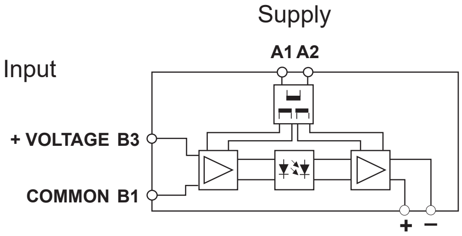
Description:
The isolation amplifier UISA is developed to meet high demands for accuracy, quality and flexibility. With 16 selectable DC voltage inputs and 8 selectable standard outputs, it covers a broad range of applications. As an option, the units can be supplied with adjustable gain and offset. 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 ± 100%. By using the full offset an increasing signal on the input, can be converted to a decreasing signal on the output. UISB 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 UISB 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.

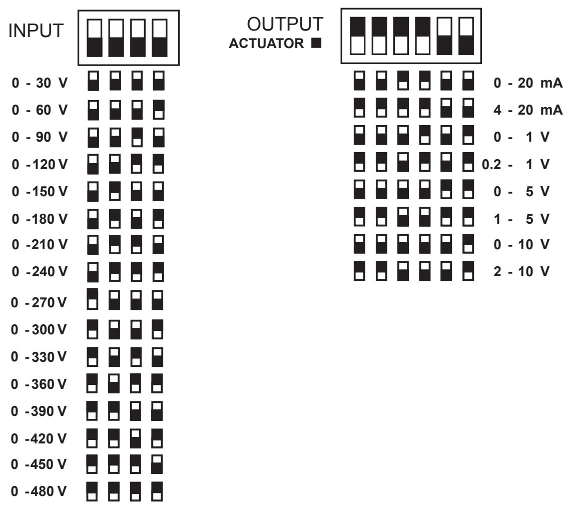
Application:
To interface and monitor DC voltages and convert the actual voltage to a standard signal being used as an input to a PC, a PLC or any other electronic device for control or alarm purpose.

CONNECTION DIAGRAM

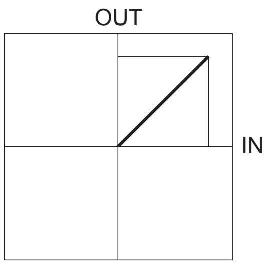
Rail mounting



PROGRAMMABLE FEATURES

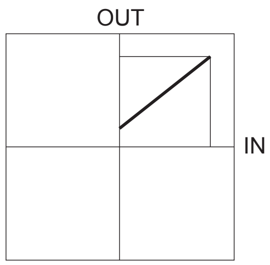


OUTPUT CHARACTERISTICS



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

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SPECIFICATIONS

INPUT

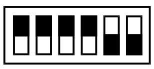
Programmable with dipswitch	
Version 3048	0 to 30, 60, 90, 120, 150, 180, 210, 240, 270, 300, 330, 360, 390, 420,450, and 480Vdc Max. Input 630Vdc
Adjustable type "A"	
Offset potmeter.	± 100 % off full scale.
Gain potmeter.	10 - 110 % off full scale.
Input resistance	B1 to B3 Approx. 3.0 MΩ

PERFORMAMCE 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

AC and DC with isolated switchmode supply	18-360 VDC and 20-264 VAC
AC supply range with transformer	24 V (From 20 to 28 V) 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	

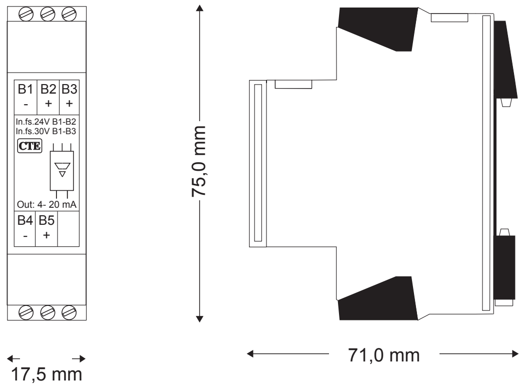
CE

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

ORDERING INFORMATION

EXAMPLE: UISA 3048 B230 D A 3 C

TYPE	
8 selectable outputs	UISA
Fixed output: 4-20mA	UISB
INPUT	
Set range from 30V to 480V	3048
SUPPLY VOLTAGE	
18-360 VDC and 20-264VAC	E400
20-28 VAC	B024
99-140 VAC	B110
198-264 VAC	B230
342-484 VAC	B400
ADJUSTMENT	
Input offset & gain adjustable	A
Input offset & gain fixed	D
HOUSING	
Rail mounting (without transformer)	A
SIZE	
35 mm.	3
CODE END	C



THiiM

VOLTAGE CONVERTER AND LOOP ISOLATOR

Type: UIDA

FEATURES

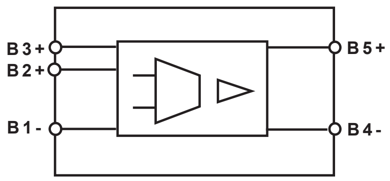
- **Loop powered isolator**
- **Input 4,8 - 24V and 6 - 30V**
- **Prevents interference from electrostatic fields and ground loops**
- **Working voltage up to 1000 V_{RMS}**
- **Transient overvoltage up to 8000 V_{peak}**
- **Excellent linearity**
- **Small outlines, 17,5 mm. wide**

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.

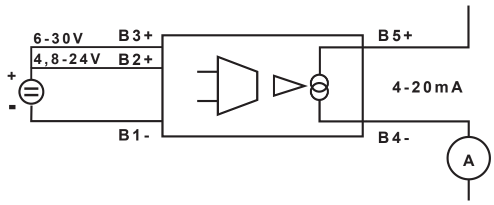
Application:
For use in instrumentation with current loop I/O as used by PLCs, sensors, recorders, indicators, alarm units etc.

CONNECTION DIAGRAM

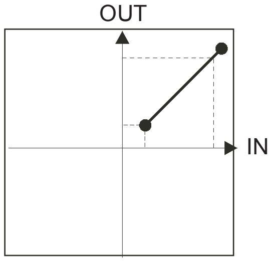
Rail mounting



FUNCTION DIAGRAM



INPUT/OUTPUT CHARACTERISTICS



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

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2860 Søborg - Denmark
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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

IS0LATION 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

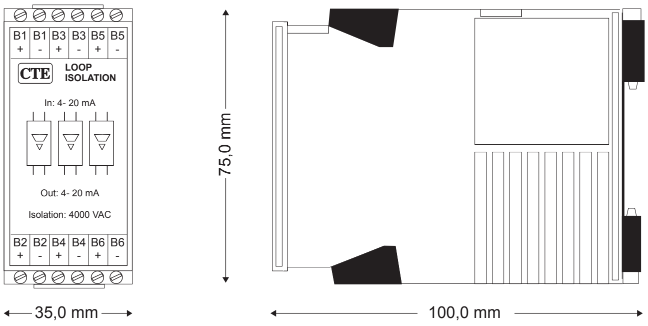
Temperature range	- 25 °C to + 55 °C
Humidity	Up to 90 % RH non-condensing
Weight	0.044 kg

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

ORDERING INFORMATION

UIDA 24 30 2008 A 1 C

TYPE		
Voltage converter and loop isolator	UIDA	UIDA
INPUT		
Max. range A		
24V	24	24
Max. range B		
30V	30	30
OUTPUT		
4 - 20mA	2008	2008
HOUSING		
Rail mounting	A	A
SIZE		
17,5 mm.	1	1
CODE END	C	C



TRIPLE LOOP ISOLATOR

Type: AITA

FEATURES

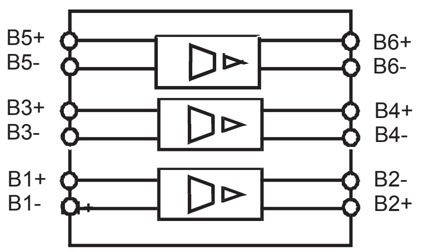
- **3 Loop isolators 4 - 20 mA in one unit**
- **Prevent lightning from spreading over the system**
- **Working voltage max.: 1000 V$_{RMS}$**
- **Transient overvoltage max.: 8000 V$_{peak}$**
- **Excellent linearity**
- **Small outlines, 35 mm. wide**

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.

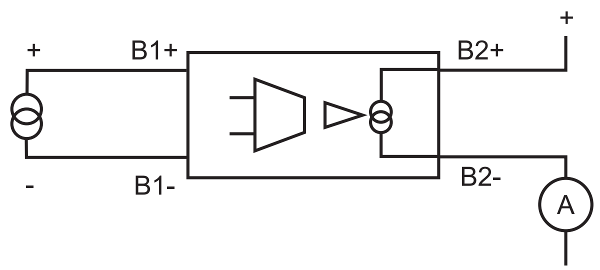
Application:
For use in instrumentation with current loop I/O as used by PLCs, sensors, recorders, indicators, alarm units etc.

CONNECTION DIAGRAM

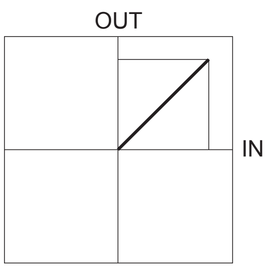
Rail mounting



FUNCTION DIAGRAM



INPUT/OUTPUT CHARACTERISTICS



Input: 4 - 20 mA

Output: 4 - 20 mA

Thiim A/S Transformervej 31 2860 Søborg - Denmark Tel.: +45 4485 8000 Fax: +45 4485 8005 Web: www.thiim.com Mail: thiim@thiim.com

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
Safty 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	0.12 kg

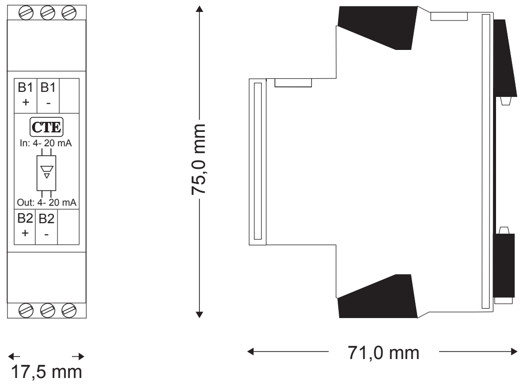
CE

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

ORDERING INFORMATION

AITA A 3 C

TYPE Triple loop isolator	AITA
HOUSING Rail mounting	A
SIZE 35 mm.	3
CODE END	C



LOOP ISOLATOR

Type: AITB

FEATURES

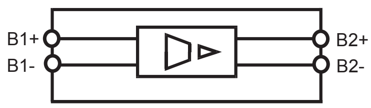
- **4 - 20 mA Loop powered isolator**
- **Prevent lightning from spreading over the system**
- **Working voltage up to 1000 V$_{RMS}$**
- **Transient overvoltage up to 8000 V$_{peak}$**
- **Excellent linearity**
- **Small outlines, 17,5 mm. wide**

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.

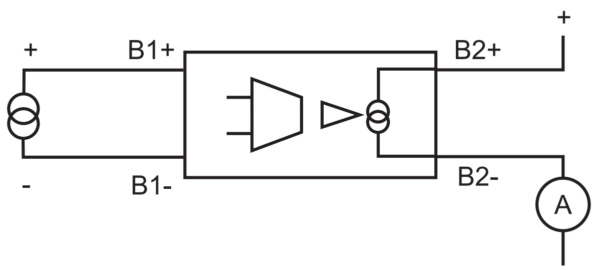
Application:
For use in instrumentation with current loop I/O as used by PLCs, sensors, recorders, indicators, alarm units etc.

CONNECTION DIAGRAM

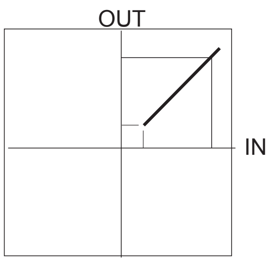
Rail mounting



FUNCTION DIAGRAM



INPUT/OUTPUT CHARACTERISTICS



Input: 4 - 20 mA

Output: 4 - 20 mA

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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 % / % DU

OUTPUT

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

IS0LATION 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

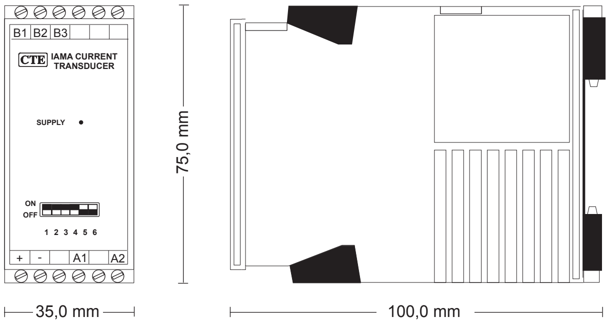
Temperature range	- 25 °C to + 55 °C
Humidity	Up to 90 % RH non-condensing
Weight	0.044 kg

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

ORDERING INFORMATION

AITB A 1 C

TYPE Loop isolator	AITB
HOUSING Rail mounting	A
SIZE 17,5 mm.	1
CODE END	C



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. Combined AC and DC supply as option**
- **Version with plug-in supply modules for easy stocking**

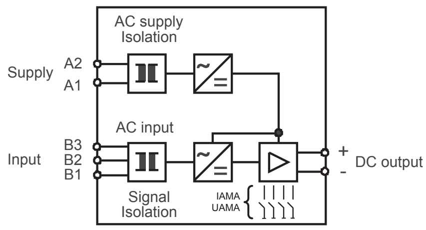
Description:
The transducers type IAMA for current and UAMA for voltage are developed to meet high demands for quality and by offering 8 selectable outputs it covers a broad range of applications. IAMB and UAMB are reduced versions with 4 to 20mA output only.

Operation:
The input current or voltage is, by means of a high-grade transformer (class. 0.2) with an isolation voltage of more than 4kV, galvanic isolated from the transducer circuitry and the output. After the transformer the measured signal is rectified, averaged and corresponding to the DIP-switch settings, converted to the required current or voltage output signal.

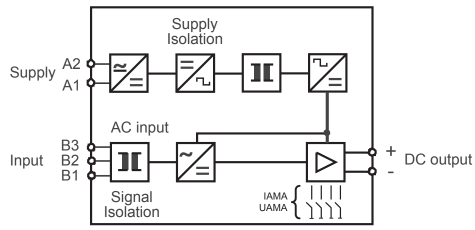
Application:
PLC, PC and microprocessor controlled Instrumentation.

FUNCTION DIAGRAM

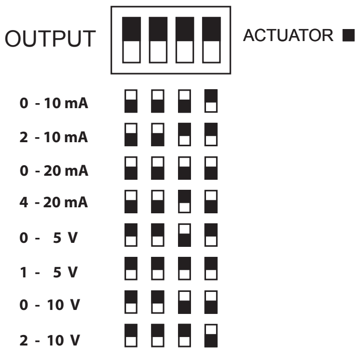
AC Supply



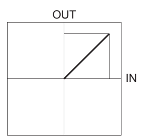
AC/DC Supply



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

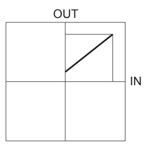


OUTPUT CHARACTERISTICS



Input: 0 - xxx A
0 - xxx V

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

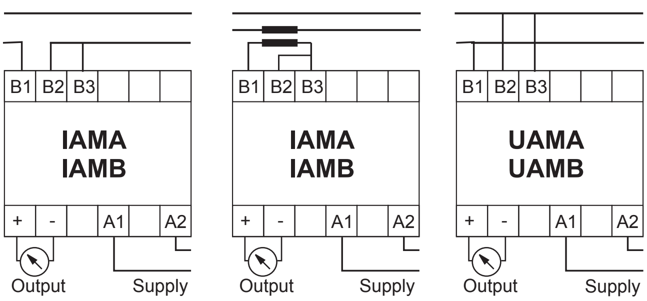


Input: 0 - xxx A
0 - xxx V

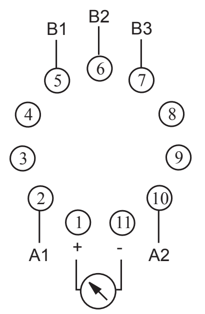
Output: 2 - 10 mA, 4 - 20 mA,
1 - 5 V, 2 - 10 V

CONNECTION DIAGRAM

Rail mounting



Socket mounting



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SPECIFICATIONS

INPUT IAMA, IAMB	AC current
Nominal input I_N	Specify from 0,5 to 10 A
Max. continuous input	1,5 x I_N or max. 10 A
	20 x I_N in 1 sec.
Input resistance approx.	0.05 W / I_R
AC frequency range	45 to 65 Hz

INPUT UAMA, UAMB	AC voltage
Nominal input V_N	Specify from 10 to 600 V
Max. continuous input	$40\sqrt{U_N}$ V rms. 10 V < U_N < 300 V
	720 V rms. U_N > 300 V
Input resistance approx.	2 K W / 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	< ± 0.01 % / % ΔU supply
Temp. dependence	< ± 0.01 % / °C
Ripple	< 1 % pp

OUTPUT

The output amplifier is protected against open and short circuit.

SUPPLY	
AC and DC	18-360 VDC and 20-264 VAC
With isolated switchmode supply	
AC Supply	
Transformer supply	24, 48, 110, 230, 400, 460 V
Voltage range	- 20 % to + 20 %
Frequency range	45 to 440 Hz
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 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	

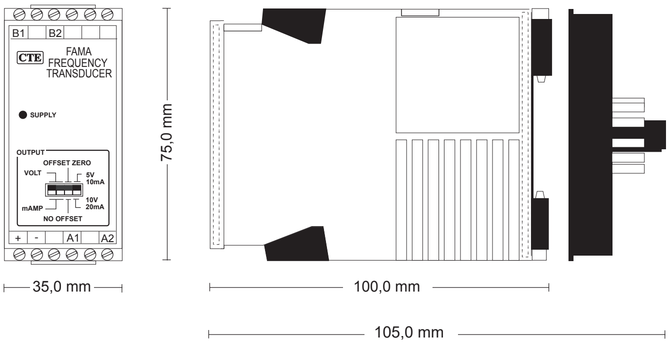
CE

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

ORDERING INFORMATION

EXAMPLE: IAMA 5000 E400 F A 3 C

TYPE	
Current measuring transducer	IAMA
	IAMB
Voltage measuring transducer	UAMA
	UAMB
CURRENT RANGE - IAMA & IAMB	
Standard 0 - 1A & 0 - 5 A	5000
Specified current xxxY	
Y = Multiplier 0 = x 1.0	
9 = x 0.1	
e.g. 0 - 1.5 A	1500
e.g. 0 - 500mA	5009
VOLTAGE RANGE - UAMA & UAMB	
Standard 0 - 250 V & 0 - 500 V	5002
Specified Voltage xxxY	
Y = Multiplier2= x 100	
1= x 10	
e.g. 0 - 150 V	1502
e.g. 0 - 60V	6001
SUPPLY VOLTAGE	
18-360 VDC and 20-264 VAC	E400
19,2-28,8 VAC	B024
38,4-57,6 VAC	B048
88-132 VAC	B110
184-276 VAC	B230
342-484 VAC	B400
368-552 VAC	B460
ADJUSTMENT	
Input offset & gain fixed	F
HOUSING	
Rail mounting with internal supply	A
Socket 11 pin with internal supply	E
SIZE	
35 mm.	3
CODE	
Code end	C
Extended code	E



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 combined AC and DC supply.**

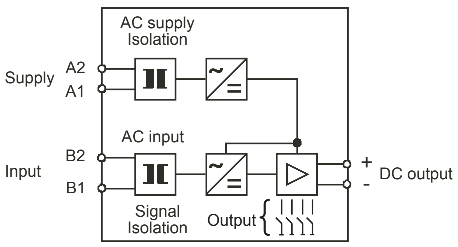
Description:
The transducer type FAMA is used to measure the frequency of an input voltage. The output is a load independent DC voltage or current signal. The input can be connected directly or via transformers.

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.

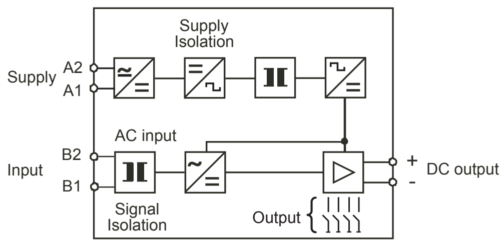
Applications:
Instrumentation, PLCs, PC and microprocessor control systems .

FUNCTION DIAGRAM

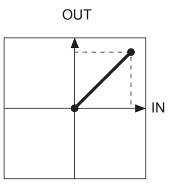
AC Supply



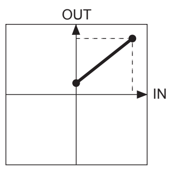
AC/DC Supply



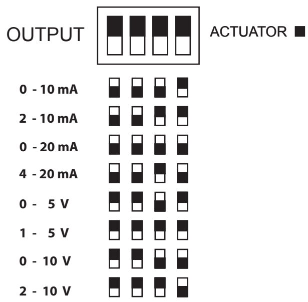
OUTPUT CHARACTERISTICS



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

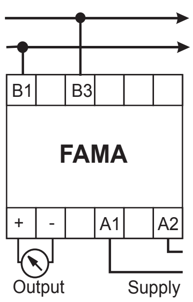


Output: 2 - 10 mA, 4 - 20 mA
1 - 5 V, 2 - 10 V

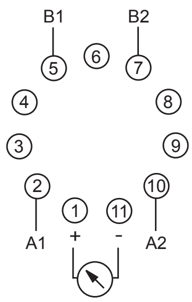


CONNECTION DIAGRAM

Rail mounting



Socket mounting



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SPECIFICATIONS

INPUT FAMA — AC voltage
- Nominal input V_N — Specify from 10 to 600 V
- Max. continuous input — $40\sqrt{U_N}$ V rms. 10 V < U_N < 300 V; 720 V rms. U_N > 300 V
- Input resistance — approx. 2 KΩ / 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 — < ± 0.01 % / % DU supply
- Temp. dependence — < ± 0.01 % / °C
- Ripple — < 1 % pp

OUTPUT

The output amplifier is protected against open and short circuit.

SUPPLY
- AC and DC with isolated switchmode supply — 18-360 VDC and 20-264 VAC
- 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 — 45 to 440 Hz (transformer)
- Power consumption — 2.5 VA, 1.1 W
- 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

CE

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

ORDERING INFORMATION

EXAMPLE: FAMA 450 1 550 1 400 2 B 230 D A 3 C

TYPE

Frequency measuring transducer — FAMA

FREQUENCY RANGE

Lower level
The first three figures of the frequency in Hz, e.g. 45.0 Hz — xxx

Followed by:
- 0 for Hz = 1.00 to 9.99 — 0
- 1 for Hz = 10.0 to 99.9 — 1
- 2 for Hz = 100 to 999 — 2

High level
The first three figures of the frequency in Hz, e.g. 55.0 Hz — xxx

Followed by:
- 0 for Hz = 1.00 to 9.99 — 0
- 1 for Hz = 10.0 to 99.9 — 1
- 2 for Hz = 100 to 999 — 2

VOLTAGE RANGE

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

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

SUPPLY VOLTAGE
- 18-360 VDC and 20-264VAC — E400
- 20-28VAC — B024
- 99-140VAC — B110
- 198-264VAC — B230
- 342-484VAC — B400
- 352-576VAC — B460

OUTPUT

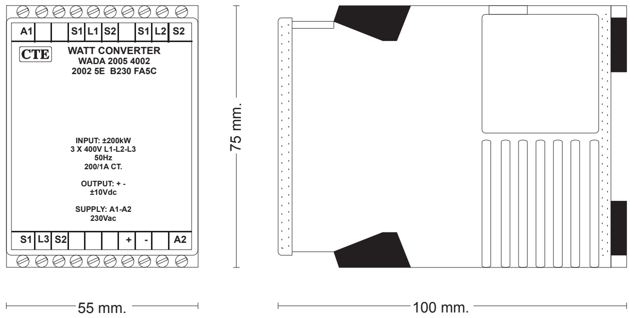
Programmable with dipswitch — D
0 - 10 mA, 2 - 10 mA,
0 - 20 mA, 4 - 20 mA,
0 - 5 V, 1 - 5V
0 - 10 V, 2 - 10 V

HOUSING
- Rail mounting with internal supply — A
- Socket 11 pin with internal supply — E

SIZE

35 mm. — 3

CODE
- Code end — C
- Extended code — E



MEASURING TRANSDUCER MODULE

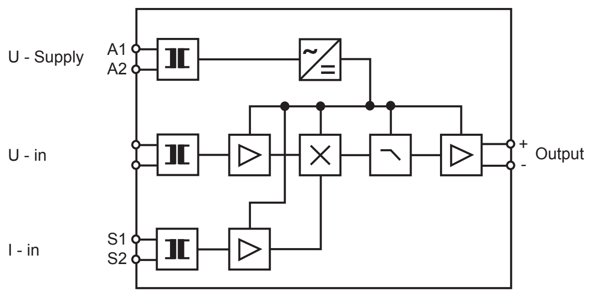
Type: WAxA (Watt) - Active power
Type: WRxA (VAr) - Reactive power

FEATURES

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

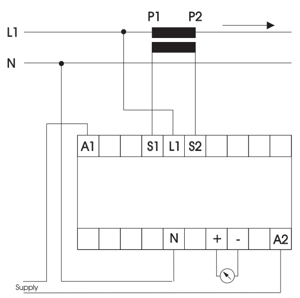
Description:
The input transformers for voltage and current separate the inputs galvanically from the converter. The signals are amplified to suitable levels and led to the multiplier. The multiplication is made by changing the voltage signal to a pulse-width modulated square wave, and the current to 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

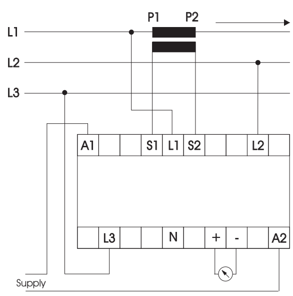


CONNECTION DIAGRAM

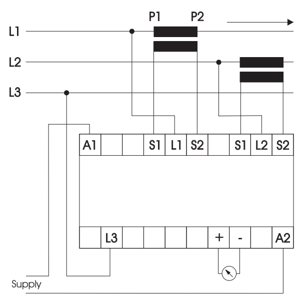
Rail mounting



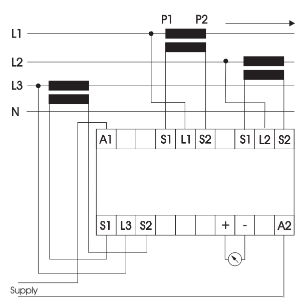
WAAA



WABA & WRBA



WACA & WRCA



WADA & WRDA

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SPECIFICATIONS

INPUT

Nominal voltage	Specify from 100 to 700 V
Max. input	1.2 x U_N
Input resistance	300 kΩ Uin < 200 V
	500 kΩ Uin > 200 V
Current	
Nominal current	1 A (from .../1 A current transformer)
Or	5 A (from .../5 A current transformer)
Max. input	1.2 x 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 mΩ
Type .../5 A	5 mΩ

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 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)
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	

CE

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

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

Chose your current transformer to the next standard above.

Standard tranducer:
Full output Unom. x 1 (nom. current) x 1 (cos φ = 1)
Calculation of full output in Watt:
1 - phase: Unom. x 1 (nom. current) x 1 (cos φ = 1)
3 - phase: Unom. x 1 (nom. current) x 1 (cos φ = 1) x √3

ORDERING INFORMATION

EXAMPLE: W A DA 250 5 400 2 200 2 5 E B230 FA5C

TYPE
Power measuring transducer — W

Active power — A
Reactive power — R

1 - phase (only active power) — A
3 - phase 3 & 4 wire symmetrical load — B
3 - phase 3 wire asymmetrical load ("Aron" coupling) — C
3 - phase 3 & 4 wire asymmetrical load — D

LOAD (Watt - VAr)
The first three figures of the load in Watt or VAr, e.g. 250 kW — 250

Followed by:
2 for W / VAr = 100 to 999 — 2
3 for W / VAr = 1k to 9.9 — 3
4 for W / VAr = 10k to 99.9 — 4
5 for W / VAr = 100k to 999 — 5
6 for W / VAr = 1M00 to 9.99 — 6

VOLTAGE BETWEEN PHASES
SINGLE PHASE - PHASE VOLTAGE
The first three figures of the voltage in Volt, e.g. 400 V — 400

Followed by:
2 for V = 100 to 999 — 2

CURRENT TRANSFORMER PRIMARY NOMINAL
The first three figures of the current in Ampere, e.g. 200 A — 200

Followed by:
CURRENT WITH .../1 A.
0 for A = 1.00 to 9.99 — 0
1 for A = 10.0 to 99.9 — 1
2 for A = 100 to 999 — 2
3 for A = 1k to 9.99k — 3
CURRENT WITH .../5 A.
4 for A = 1.00 to 9.99 — 4
5 for A = 10.0 to 99.9 — 5
6 for A = 100 to 999 — 6
7 for A = 1k to 9.99k — 7

FREQUENCY e.g. 50Hz
50Hz — **5**
60Hz — **6**

OUTPUT SPECIFICATION

Output	Min. k Ω	Max. k Ω	Code
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

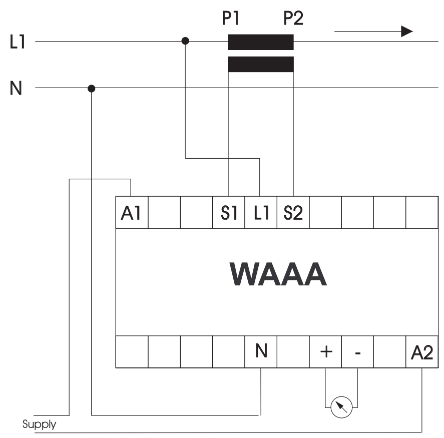
SUPPLY VOLTAGE

From 20 to 28 VAC — B024
From 99 to 140 VAC — B110
From 198 to 264 VAC — B230
From 342 to 484 VAC — B400
From 352 to 576 VAC — B460

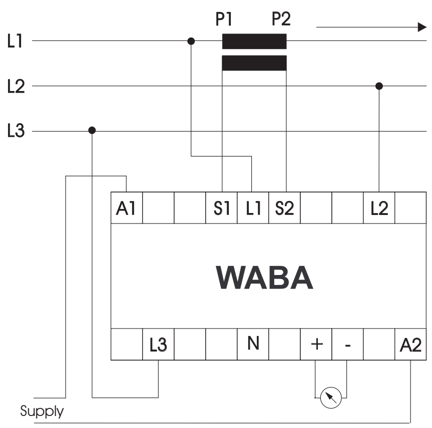
HOUSING
Rail mounting VOX 55mm — FA5C

COUPLINGS FOR MEASURING ACTIVE POWER

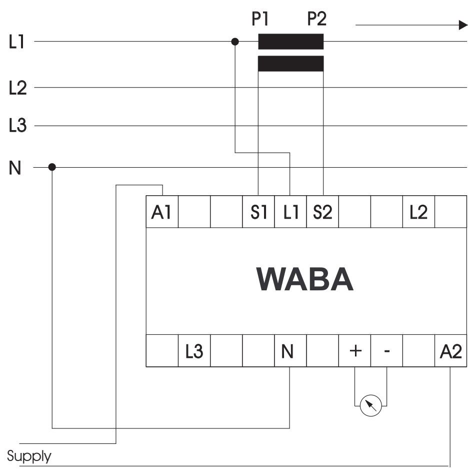
1 PHASE



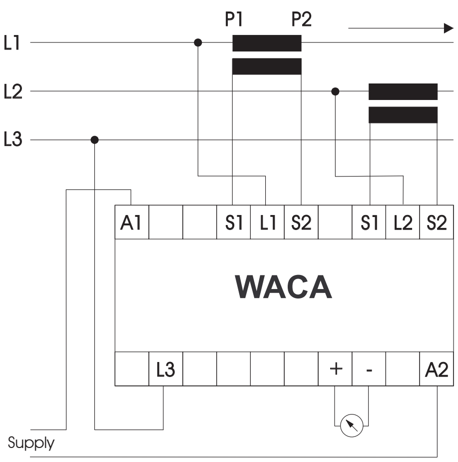
3 PHASE, 3 WIRE SYMMETRICAL LOAD



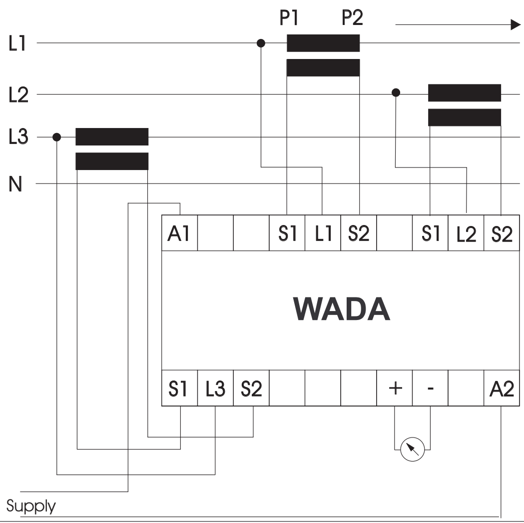
3 PHASE, 4 WIRE SYMMETRICAL LOAD



3 PHASE, 3 WIRE ASYMMETRICAL LOAD

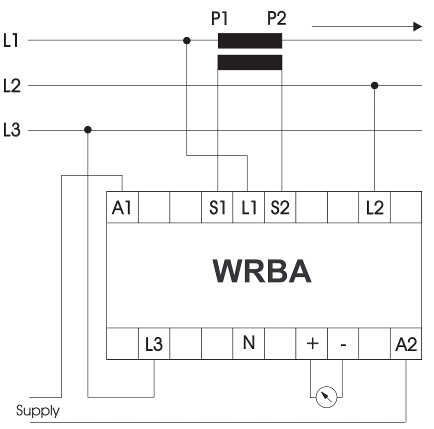


3 PHASE, 3 or 4 WIRE ASYMMETRICAL LOAD

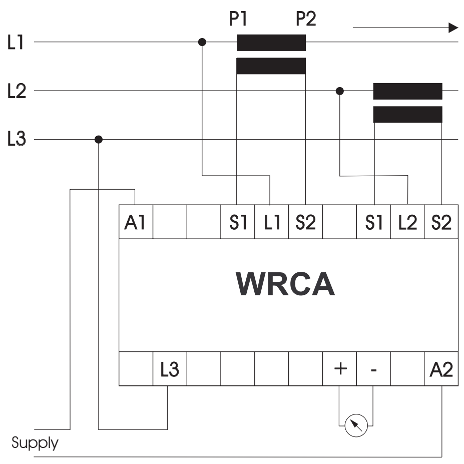


COUPLINGS FOR MEASURING REACTIVE POWER

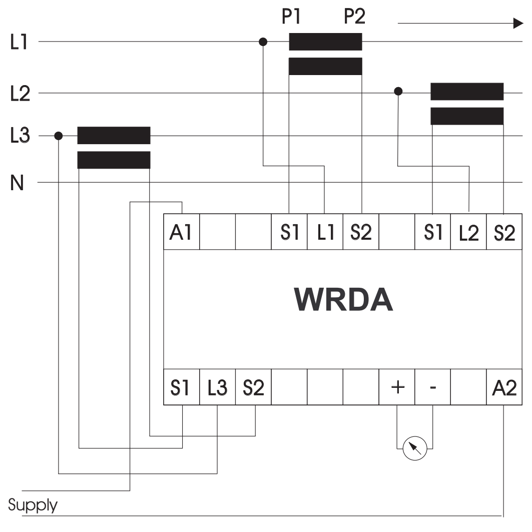
3 PHASE, 3 or 4 WIRE
SYMMETRICAL LOAD

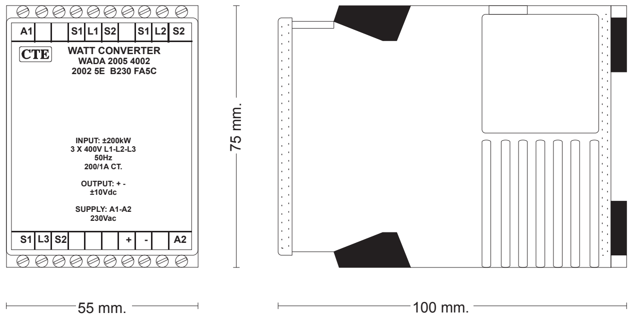


3 PHASE, 3 WIRE
ASYMMETRICAL LOAD



3 PHASE, 4 WIRE
ASYMMETRICAL LOAD





MEASURING TRANSDUCER MODULE fixed for: ../1A or ../5A C.T.

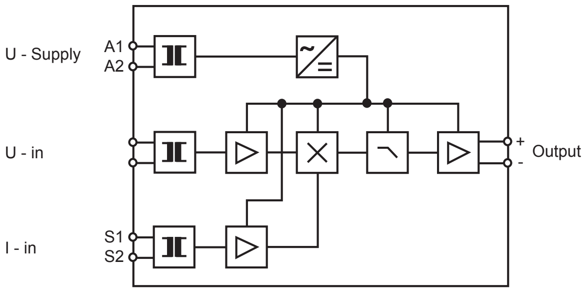
Type: WBxA (Watt) - Active power
Type: WSxA (VAr) - Reactive power

FEATURES

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

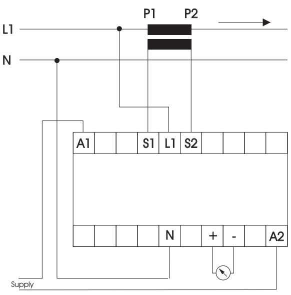
Description:
The input transformers for voltage and current separate the inputs galvanically from the converter. The signals are amplified to suitable levels and led to the multiplier. The multiplication is made by changing the voltage signal to a pulse-width modulated square wave, and the current to 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

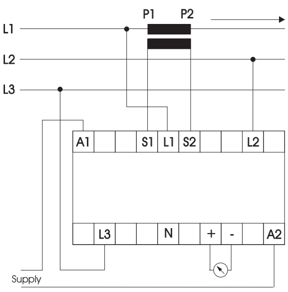


CONNECTION DIAGRAM

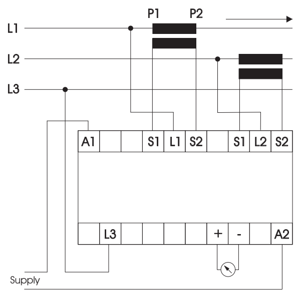
Rail mounting



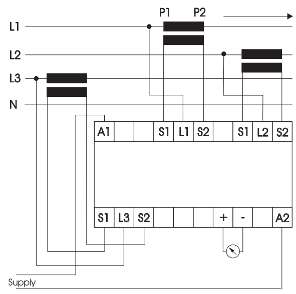
WBAA



WBBA & WSBA



WBCA & WSCA



WBDA & WSDA

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SPECIFICATIONS

INPUT

Nominal voltage	Specify from 100 to 700 V
Max. input	1.2 x U_N
Input resistance	300 kΩ Uin < 200 V
	500 kΩ Uin > 200 V
Current	
Nominal current	1 A (from .../1 A current transformer)
Or	5 A (from .../5 A current transformer)
Max. input	1.2 x 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 mΩ
Type .../5 A	5 mΩ

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 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)
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	

CE

	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 - phase: $\dfrac{\text{Watt (or VAr)}}{\text{U (nom. voltage) x } \cos\varphi}$ = current

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

Chose your current transformer to the next standard above.

Standard tranducer:
Full output Unom. x 1 (nom. current) x 1 (cos φ = 1)
Calculation of full output in Watt:
1 - phase: Unom. x 1 (nom. current) x 1 (cos φ = 1)
3 - phase: Unom. x 1 (nom. current) x 1 (cos φ = 1) x √3

ORDERING INFORMATION

EXAMPLE: W B D A 400 2 5000 5 E B230 FA5C

TYPE

Power measuring transducer	W
Active power	B
Reactive power	S
1 - phase (only active power)	A
3 - phase 3 & 4 wire symmetrical load	B
3 - phase 3 wire asymmetrical load ("Aron" coupling)	C
3 - phase 3 & 4 wire asymmetrical load	D

VOLTAGE BETWEEN PHASES
SINGLE PHASE - PHASE VOLTAGE

The first three figures of the voltage in Volt, e.g. 400 V	400
Followed by: 2 for V = 100 to 999	2

CURRENT TRANSFORMER PRIMARY NOMINAL

CURRENT WITH .../1 A.	1000
CURRENT WITH .../5 A.	5000

FREQUENCY e.g. 50Hz

50Hz	5
60Hz	6

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

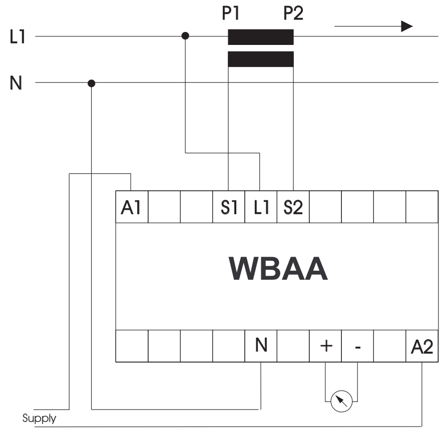
From 20 to 28 VAC	B024
From 99 to 140 VAC	B110
From 198 to 264 VAC	B230
From 342 to 484 VAC	B400
From 368 to 552 VAC	B460

HOUSING

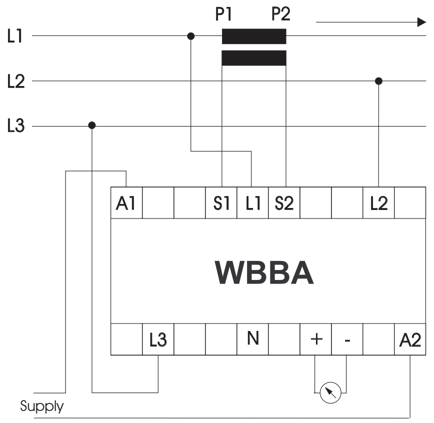
Rail mounting VOX 55mm	FA5C

COUPLINGS FOR MEASURING ACTIVE POWER

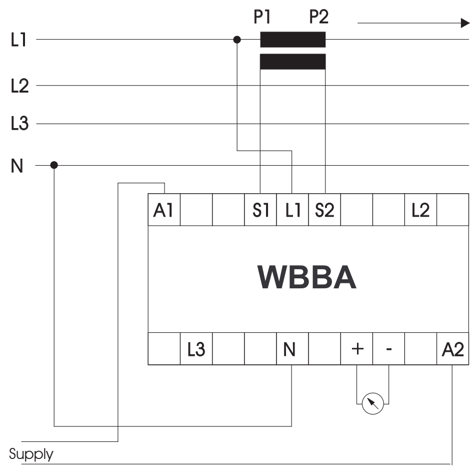
1 PHASE



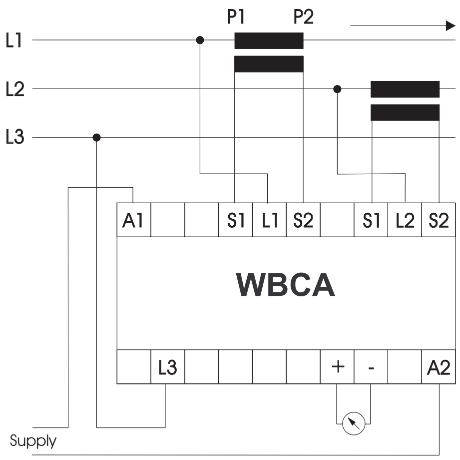
3 PHASE, 3 WIRE SYMMETRICAL LOAD



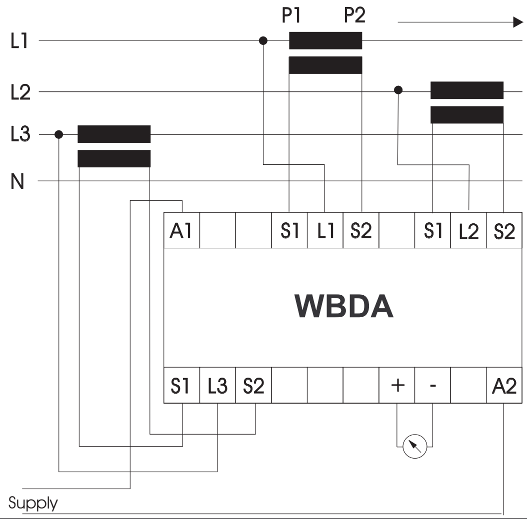
3 PHASE, 4 WIRE SYMMETRICAL LOAD



3 PHASE, 3 WIRE ASYMMETRICAL LOAD



3 PHASE, 3 or 4 WIRE ASYMMETRICAL LOAD



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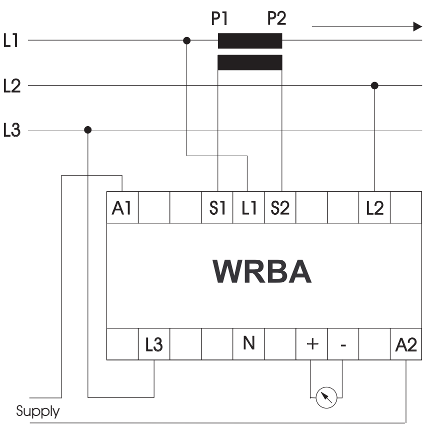
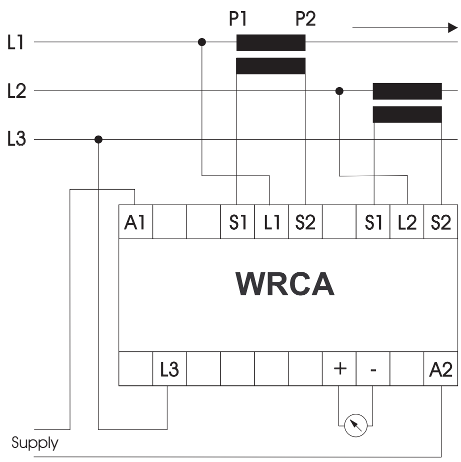
Web: www.thiim.com
Mail: thiim@thiim.com

COUPLINGS FOR MEASURING REACTIVE POWER

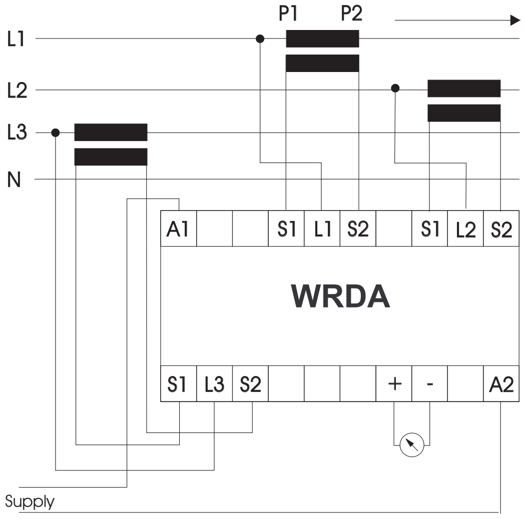
3 PHASE, 3 or 4 WIRE
SYMMETRICAL LOAD



3 PHASE, 3 WIRE
ASYMMETRICAL LOAD



3 PHASE, 4 WIRE
ASYMMETRICAL LOAD

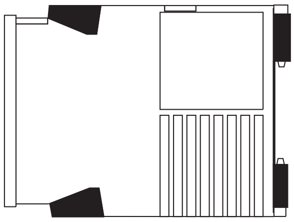


Rail mounting, 35/45/55 mm

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.

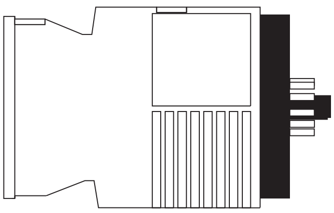


11-pin socket mounting, 35/45/55 mm

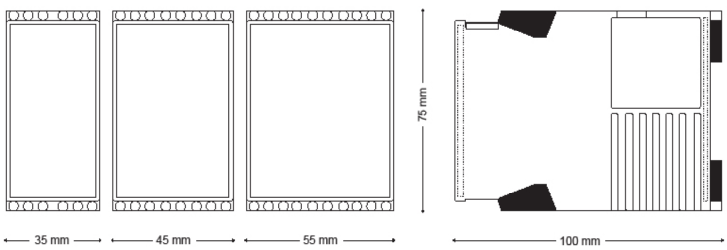
Mounting and connection by 11-pin socket with either screw terminals or soldering connections.

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.

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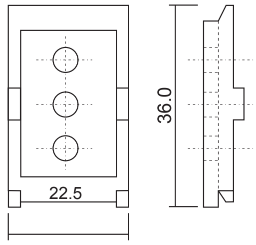
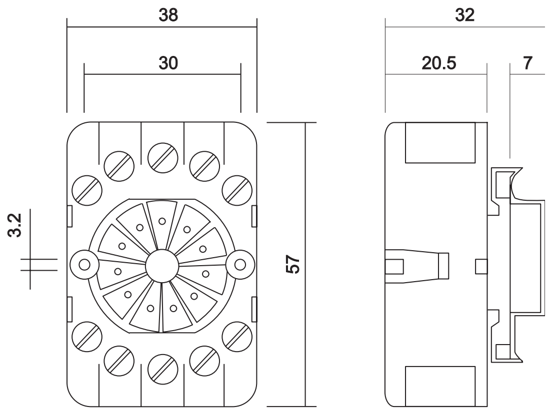
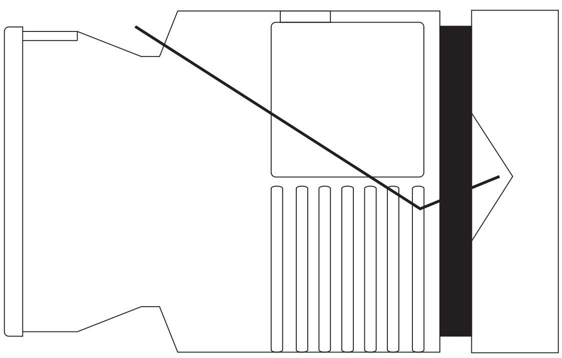
Mounting plate MP 225.
(only 35 mm. housing)



Socket ZKR 118 (11-pin)



Holding device BU 351



05.2016

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