True power monitoring in 1- or 3-phase loads

G4BM480V12ADTL20
24-240V AC/DC

Art.No. 2394706

Loadmonitors - GAMMA series
Digital setting
Multifunction
Temperature monitoring of the motor winding
Fault latch
Recognition of disconnected load
Suitable for VFI (10 to 100Hz)
Supply voltage selectable via power modules
2 change over contacts
Width 45mm
Industrial design

Technical data

1. Functions
True power monitoring for 1- or 3-phase loads with adjustable switching thresholds, adjustable start-up suppression time, separately adjustable tripping delay, selectable fault latch and temperature monitoring of the motor winding with max. 6 PTC.

OVER	Overload monitoring
OVER+I=0 ON	Overlaod monitoring and recognition of disconnected load (relay ON or OFF)
UNDER	Underload monitoring
UNDER+I=0 ON	Underlaod monitoring and recognition of disconnected load (relay ON or OFF)
2MIN	Minimum monitoring
2MIN+I=0 ON	Minimum monitoring and recognition of disconnected load (relay ON or OFF)
2MAX	Maximum monitoring
2MAX+I=0 ON	Maximum monitoring and recognition of disconnected load (relay ON or OFF)
WIN	Monitoring the window between MIN and MAX
WIN+I=0 ON	Monitoring the window between MIN and MAX and recognition of disconnected load (relay ON or OFF)
MAX/MIN	Maximum- and minimum monitoring
MAX/MIN+I=0 ON	Maximum- and minimum monitoring and recognition of disconnected load (relay ON or OFF)

2. Time ranges

	Adjustment range	
Start-up suppression time (t2):	0s	100s
Tripping delay (Del_A / Del_B):	0,1s	50s

3. Indicators
Display specifications - see supplementary sheet

4. Mechanical design
Self-extinguishing plastic housing, IP rating IP40
Mounted on DIN-Rail TS 35 according to EN 60715
Mounting position: any
Shockproof terminal connection according to VBG 4 (PZ1 required), IP rating IP20
Tightening torque: max. 1Nm
Terminal capacity:
1 x 0.5 to 2.5mm² with/without multicore cable end
1 x 4mm² without multicore cable end
2 x 0.5 to 1.5mm² with/without multicore cable end
2 x 2.5mm² flexible without multic re cable end

5. Input circuit
Supply voltage:
24 to 240V AC/DC terminals A1-A2 (galvanically seperated)
Tolerance:
24 to 240V DC -20% to +25%
24 to 240V AC -15% to +10%
Rated frequency:
48 to 400Hz 24 to 240V AC
16 to 48Hz 48 to 240V AC
Rated consumption: 2.8VA (1.6W)
Duration of operation: 100%
Reset time: 500ms
Ripple and noise: -
Drop-out voltage: >30% of the supply voltage
Overvoltage category: III (in accordance with IEC 60664-1)
Rated surge voltage: 4kV

6. Output circuit
2 potential free change over contacts
Rated voltage: 250V AC
Switching capacity: 750VA (3A / 250V AC)
If the distance between the devices is less than 5mm!
Rated voltage: 1250VA (5A / 250V AC)
If the distance between the devices is greater than 5mm!
Fusing: 5A fast acting
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
(in accordance with IEC 60947-5-1)
Overvoltage category: III (in accordance with IEC 60664-1)
Rated surge voltage: 4kV

7. Measuring circuit
Measuring range (Range): 2.5kW and 10kW
Wave form
AC Sinus: 10 to 400Hz
Sinus weighted PWM: 10 to 100Hz
Measuring input voltage: terminals L1-L2-L3
1-phase loads 48 to 480V AC
3-phase loads 3~ 48 to 480/277V
Overload capacity:
1-phase loads 550V AC
3-phase loads 3~ 550/318V
Input resistance: 1.25MΩ
Measuring input current: terminals i-k
Measuring range 2.5kW: 0.15 to 6A
Measuring range 10kW: 0.3 to 12A
(for I>8A distance >5mm)
Overload capacity: 12A permanent
Input resistance: <10mΩ
Current transformer factor (Factor): 1-100
Switching thresholds Th:
Measuring range 2.5kW: 120W to 2490W
Measuring range 10kW: 480W to 9960W
Hysteresis: fixed 5% or adjustabl
Temperature monitoring ϑ:
Terminals: T1-T2
Initial resistance: <1.5kΩ
Response value (Relais in on-position): ≥3.6kΩ
Release value (Relais in off-position): ≤1.8kΩ
Disconnection (short circuit thermistor): no
Measuring voltage T1-T2: ≤7.5V at R ≤4.0kΩ
(in accordance with EN 60947-8)

Technical data

Overvoltage category:	III (in accordance with IEC 60664-1)
Rated surge voltage:	4kV

Please note:
When the temperature monitoring isn‘t required the jumper must be set between the terminals T1-T2!

8. Control contact Y (equipotential with measuring circuit)

Function:	Latch
Terminals:	Jumper Y1-Y2
Loadable:	no
Line length Y1-Y2:	max. 10m (twisted pair)
Control pulse length:	-
Reset:	normally closed contact in the input circuit normally closed contact in jumper Y1-Y2

9. Accuracy

Base accuracy:	±2% of upper range value
Base accuracy Ieff:	±2% of upper range value
Frequency response:	±0,025% / Hz
Adjustment accuracy:	-
Repetition accuracy:	±2%
Voltage influence	-
Temperature influence	≤0,02% / °C

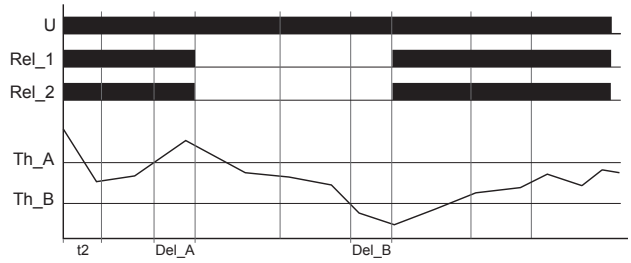
10. Ambient contitions

Ambient temperature:	-25 to +55°C (in accordance with IEC 60068-1) -25 to +40°C (in accordance with UL 508)
Storage temperature:	-25 to +70°C
Transport temperature:	-25 to +70°C
Relative humidity:	15% to 85% (in accordance with IEC 60721-3-3 class 3K3)
Pollution degree:	3 (in accordance with IEC 60664-1)
Vibration resistance:	10 to 55Hz 0.35mm (in accordance with IEC 60068-2-6)
Shock resistance:	15g 11ms (in accordance with IEC 60068-2-27)

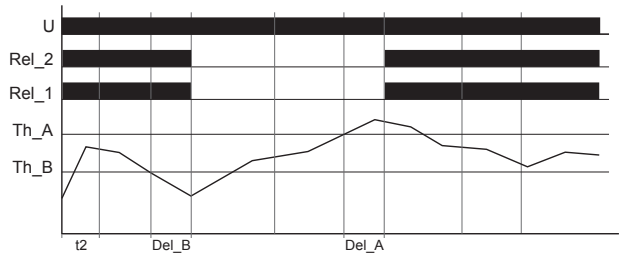
Functions

When the supply voltage U is applied, the output relays Rel_1 and Rel_2 switches into on-position (state of output relay 11) and the set interval of the start-up suppression time (t2) begins. During this period, changes of the measured true power don‘t affect the state of the output relays Rel_1 and Rel_2 (state of output relay 11).

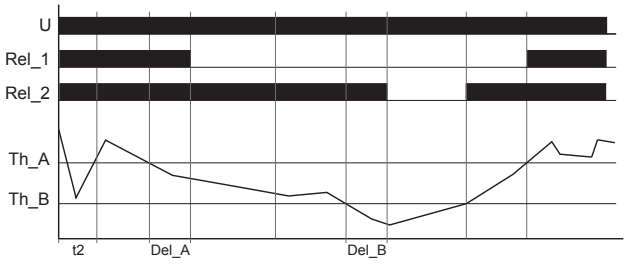
Overload monitoring (OVER)
The adjusted threshold Th_A must be greater than the adjusted threshold Th_B.
When the measured true power exceeds the adjusted threshold Th_A, the set interval of the tripping delay (Del_A) begins. After the interval has expired, the output relays Rel_1 and Rel_2 switches into off-position (state of output relay 00). As soon as the measured true power falls below the adjusted threshold Th_B, the set interval of on delay (Del_B) begins. After the interval has expired, the output relays Rel_1 and Rel_2 switches into on-position again (state of output relay 11).



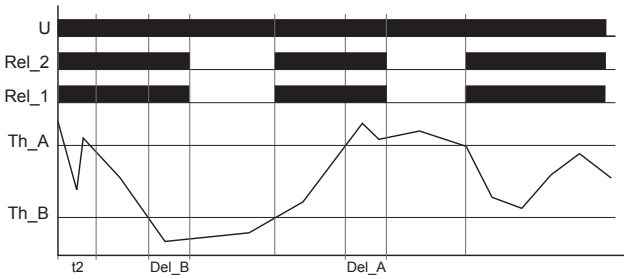
Underload monitoring (UNDER)
The adjusted threshold Th_A must be greater than the adjusted threshold Th_B.
When the measured true power falls below the adjusted threshold Th_B, the set interval of the tripping delay (Del_B) begins. After the interval has expired, the output relays Rel_1 and Rel_2 switches into off-position (state of output relay 00). As soon as the measured true power exceeds the adjusted threshold Th_A, the set interval of on delay (Del_A) begins. After the interval has expired, the output relays Rel_1 and Rel_2 switches into on-position again (state of output relay 11).



Minimum monitoring (2MIN)
The adjusted threshold Th_A must be greater than the adjusted threshold Th_B. When the measured true power falls below the adjusted threshold Th_A, the set interval of the tripping delay (Del_A) begins. After the interval has expired, the output relay Rel_1 switches into off-position (state of output relay 01). When the measured true power falls below the adjusted threshold Th_B, the set interval of the tripping delay (Del_B) begins. After the interval has expired, the output relay Rel_2 switches into off-position (state of output relay 00).
As soon as the measured true power exceeds the corresponding threshold (Th_A or Th_B), the output relays Rel_1 or Rel_2 switches into on-position again (state of output relay 11).

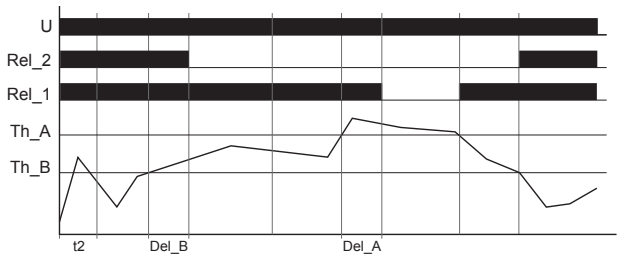


Window function (WIN)
The adjusted threshold Th_A must be greater than the adjusted threshold Th_B. When the measured true power falls below the adjusted threshold Th_B, the set interval of the tripping delay (Del_B) begins. After the interval has expired, the output relays Rel_1 and Rel_2 switches into off-position (state of output relay 00). As soon as the measured true power exceeds the adjusted threshold Th_B, the output relays Rel_1 and Rel_2 switches into on-position again (state of output relay 11). When the measured true power exceeds the adjusted threshold Th_A, the set interval of the tripping delay (Del_A) begins. After the interval has expired, the output relays Rel_1 and Rel_2 switches into off-position (state of output relay 00). As soon as the measured true power falls below the adjusted threshold Th_A, the output relays Rel_1 and Rel_2 switches into on-position again (state of output relay 11).

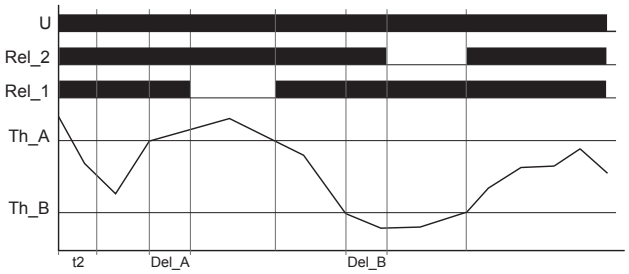


Functions

Maximum monitoring (2MAX)
The adjusted threshold Th_A must be greater than the adjusted threshold Th_B. When the measured true power exceeds the adjusted threshold Th_B, the set interval of the tripping delay (Del_B) begins. After the interval has expired, the output relay Rel_2 switches into off-position (state of output relay 10). When the measured true power exceeds the adjusted threshold Th_A, the set interval of the tripping delay (Del_A) begins. After the interval has expired, the output relay Rel_1 switches into off-position (state of output relay 00). As soon as the measured true power exceeds the corresponding threshold (Th_A or Th_B), the output relays Rel_1 or Rel_2 switches into on-position again (state of output relay 11).



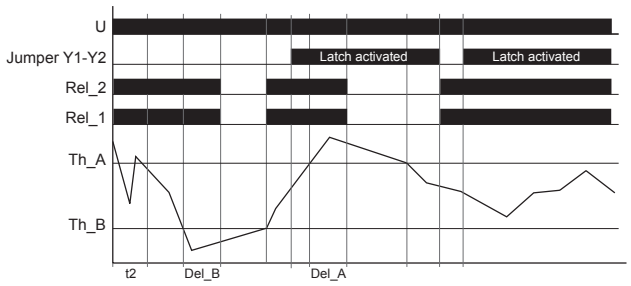
Maximum- and minimum monitoring (MIN/MAX)
The adjusted threshold Th_A must be greater than the adjusted threshold Th_B. When the measured true power exceeds the adjusted threshold Th_A, the set interval of the tripping delay (Del_A) begins. After the interval has expired, the output relay Rel_1 switches into off-position (state of output relay 01). As soon as the measured true power falls below the adjusted threshold Th_A, the output relay Rel_1 switches into on-position again (state of output relay 11). When the measured true power falls below the adjusted threshold Th_B, the set interval of the tripping delay (Del_B) begins. After the interval has expired, the output relay Rel_2 switches into off-position (state of output relay 10). As soon as the measured true power exceeds the adjusted threshold Th_B, the output relay Rel_2 switches into on-position again (state of output relay 11).



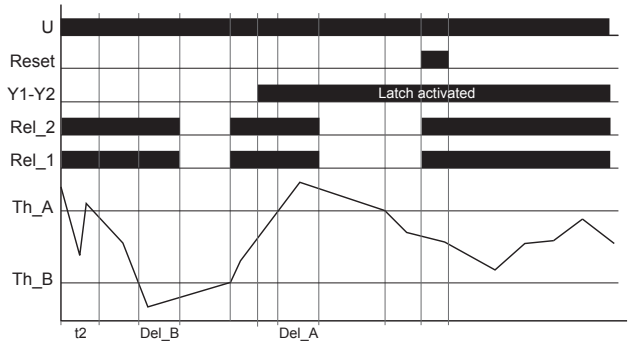
Fault latch
The fault latch can be activated via a jumper between the terminals Y1 and Y2 or via the display (Latch on).
If the fault latch is activated and a failure has occured, the failure can be reseted by activating the normal closed contact (Y1-Y2) or by pressing the plus- and minus-key (+ & -). After reseting the failure, the output relays Rel_1 and Rel_2 take their position according to the selected function and measured true power.
The device will be reset by interrupting the supply voltage. After reconnecting the supply voltage the output relays Rel_1 and Rel_2 switches into on-position and a new measuring cycle begins with the set interval of the start-up suppression time (t2).

Please note:
The fault latch remains activ inspite of a I=0 recognition!

Example: Window function (WIN) - Resetting the fault latch by activating the normal closed contact (Y1-Y2)



Example: Window function (WIN) - Resetting the fault latch by pressing the plus- and minus-key (+ & -)



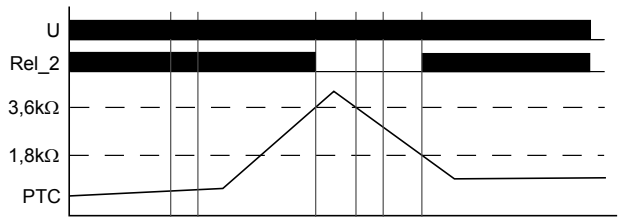
Temperature monitoring of the motor winding ϑ
If the supply voltage U is applied and the cumulative resistance of the PTC-circuit is less than 3.6kΩ (standard temperature of the motor), the output relay Rel_2 switches into on-position if no other failure is applied!
When the cumulative resistance of the PTC-circuit exceeds 3.6kΩ (at least one of the PTCs has reached the cut-off temperature), the output relay Rel_2 switches into off-position and a temperature failure ϑ will be indicated. The output relay Rel_2 switches into on-position again respectively the temperature failure ϑ will be cancelled, if the cumulative resistance drops below 1.8kΩ by cooling down of the PTC. If the fault latch is activated, the failure can be reseted by activating the normal closed contact (Y1-Y2) or by pressing the plus- and minus-key (+ & -).

Please note:
If the output relay Rel_2 should switch into on-position again, no other failure should be applied!

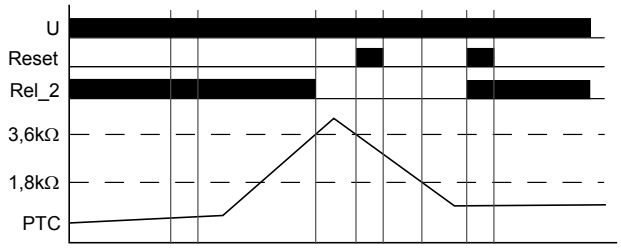
When the temperature monitoring isn't required then the jumper must be set between the terminals T1-T2!

Functions

Temperature monitoring without fault latch



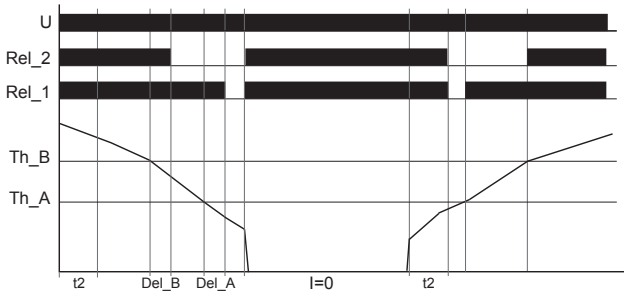
Temperature monitoring with fault latch



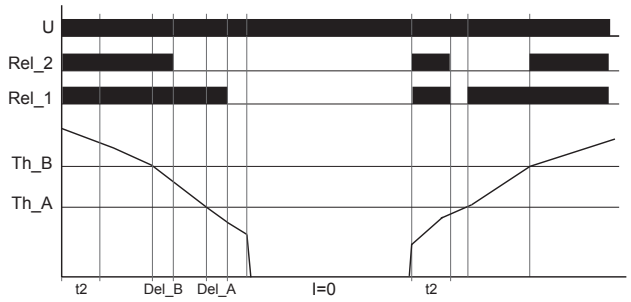
Recognition of disconnected load (I=0)
When the recognition of disconnected load (I=0) is activated, the relay state can be freely selected depending on the function.

When the current flow between i and k is interrupted, the output relays Rel_1 and Rel_2 remains into user-defined state.
When the current flow restores, the measuring cycle is restarted with the adjusted set interval of the start-up suppression time (t2).

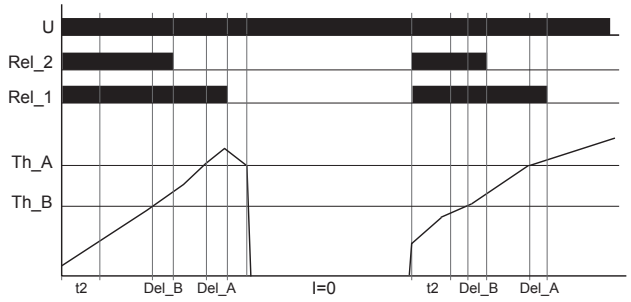
Example: I=0 with minimum monitoring (2MIN+I=0 ON)
relay state normal: Rel_1 and Rel_2 on



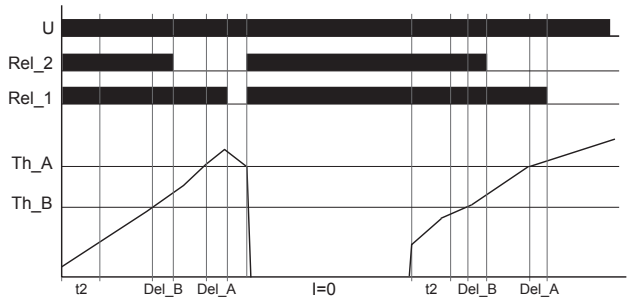
Example: I=0 Inv. with minimum monitoring (2MIN+I=0 ON)
relay state invers: Rel_1 and Rel_2 off



Example: I=0 with maximum monitoring (2MAX+I=0 ON)
relay state normal: Rel_1 and Rel_2 off

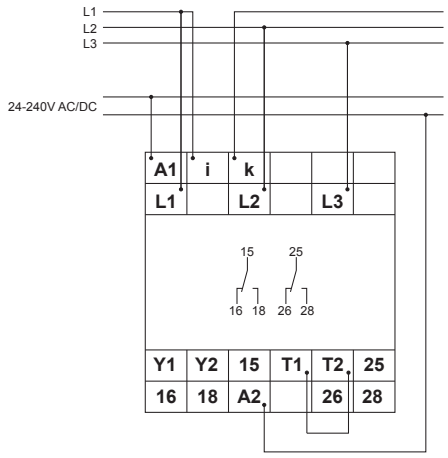


Example: I=0 Inv. with maximum monitoring (2MAX+I=0 ON)
relay state invers: Rel_1 and Rel_2 on

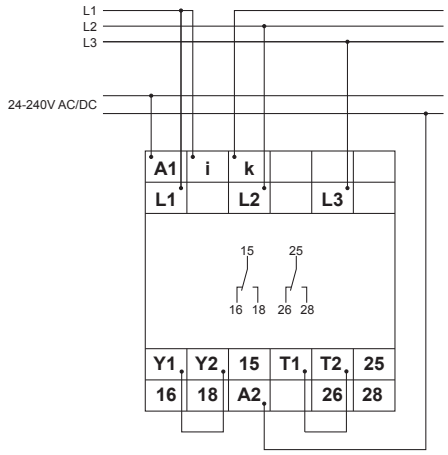


Connections

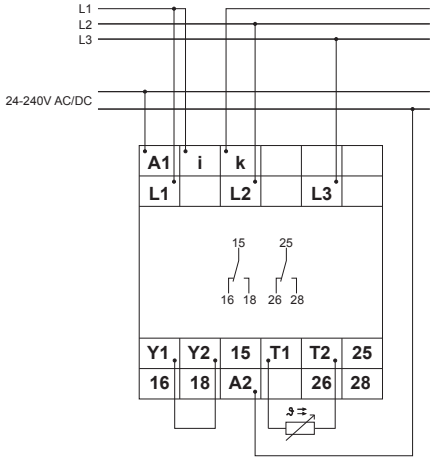
Connected 3~ without fault latch I_N<12A



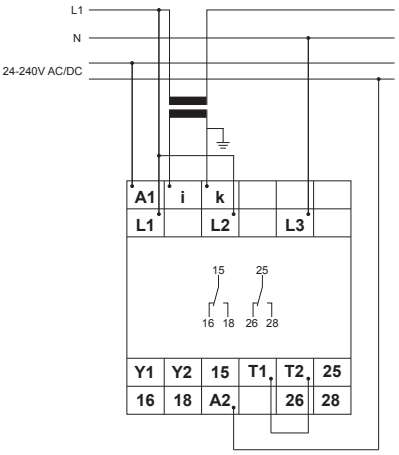
Connected 3~ with fault latch I_N<12A



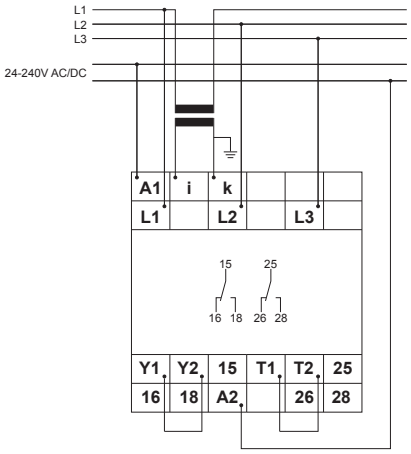
Connected 3~ with fault latch and temperature monitoring sensor I_N<12A



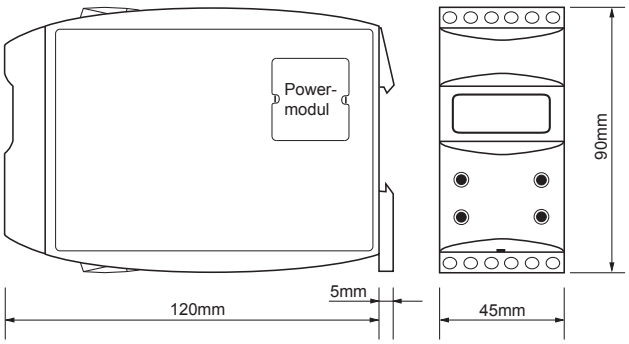
Connected 1~ without fault latch but with current transformer I_N>12A



Connected 3~ with fault latch and current transformer I_N>12A



Dimensions



True power monitoring relay – G4BM480V12ADTL20

GAMMA Display Module

Content

1 General

The G4BM480V12ADTL20 is a digital module with a display. The digital module can be programmed via the keys (Esc / Ent / + / -). The measured values will be indicated on the alphanumerical display.

1.1 Measured value display

Indication measured variable:

P			ϑ		I	1	0
3	8	7	,	5		W	

P ... power
ϑ ... thermistor failure

Please note:
When the temperature monitoring isn't required the jumper must be set between the terminals T1-T2!

Indication measured variable:

I			ϑ		I	1	0
		8	,	0		A	

I ... current
ϑ ... thermistor failure

Please note:
When the temperature monitoring isn't required the jumper must be set between the terminals T1-T2!

Indication function:

F	u	n	c				
w	i	n	d	o	w		

Indication of current function (Func):

- Over — Overload monitoring
- Under — Underload monitoring
- Window — Monitoring the window between MIN and MAX
- 2MIN — Minimum monitoring
- 2MAX — Maximum monitoring
- MAX/MIN — Maximum- and minimum monitoring

1.2 Parameters

Normally, the display only indicates the programmed parameters. When the device switches into the programming mode the letter “P” appears on the last position in the first line.

Parameter Function:

F	u	n	c				P
w	i	n	d	o	w		

Selected functions (Func):

- Over — Overload monitoring
- Under — Underload monitoring
- Window — Monitoring the window between MIN and MAX
- 2MIN — Minimum monitoring
- 2MAX — Maximum monitoring
- MAX/MIN — Maximum- and minimum monitoring

Parameter start-up suppression time:

t	2						P
		9	,	0		s	

Indication start-up suppression time (t2): adjustable between 0s to 100s

---

Parameter current transformer factor:

F	a	c	t	o	r		P
			1				

Indication current transformer factor (Factor): adjustable between 1 to 100

Parameter measured variable:

R	a	n	g	e			P
1	0	,	0	0	k	W	

Indication measuring range (Range): reversible between 2.5kW and 10kW

Parameter threshold A:

T	h	_	A				P
4	5	0	,	0		W	

Indication threshold Th_A: adjustable between 120W to 9960W of measuring range (Range)

Parameter tripping delay for threshold A:

D	e	l	_	A			P
		5	,	0		s	

Indication of tripping delay (Del_A) for threshold A: adjustable between 0.1s to 50s

---

Parameter threshold B:

T	h	_	B				P
3	2	0	,	0		W	

Indication threshold Th_B: adjustable between 120W to 9960W of measuring range (Range)

Parameter tripping delay for threshold B:

D	e	l	_	B			P
		6	,	0		s	

Indication of tripping delay (Del_B) for threshold B: adjustable between 0.1s to 50s

---

Parameter recognition of disconnected load (I=0):

I	=	0					P
o	f	f					

Activation (on) / Deactivation (off) recognition of disconnected load (I=0)

Parameter recognition of disconnected load (I=0) – arrangement of output relays

I	=	0	r	e	l		P
n	o	r	m	a	l		

Indication of relay outputs - normal or inverse if I=0 activated
(Recognition of disconnected load – relay on (1) or off (0))

Parameter fault latch (Latch):

L	a	t	c	h			P
o	f	f					

Fault latch (Latch): on or off

1.3 Menu configuration