

Effekt transducere



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Loadmonitors - GAMMA series

True power monitoring in 1- or 3-phase mains

Analog output 4...20mA

Suitable for VFI (10 to 100Hz)

Zoom voltage 24V to 240V DC and 48V to 240V AC

Width 22.5mm

Industrial design



Technical data

1. Functions

True power monitoring in 1- and 3-phase mains with analog output 4 ... 20mA and the following settings (selectable by means of rotary switch):

Zero	setting of zero point (0%, 25%, 50%, 75% of nominal value)
Zero Fine	fine setting of zero point (0% ... 25% of nominal value)
Span	span (100%, 75%, 50%, 25% of nominal value)
Range	measuring range reversible between 0.6kW, 1.2kW, 2.4kW, 4.8kW

2. Indicators

Green LED U ON: indication of supply voltage
Yellow LED's ON/OFF: indication analog output 4...20mA

3. Mechanical design

Self-extinguishing plastic housing, IP rating IP40
Mounted on DIN-Rail TS 35 according to EN 50022
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 multicore cable end

4. Input circuit

Supply voltage: 24V to 240V DC
48V to 240V AC
Terminals: A1-A2 (galvanically separated)
Tolerance:
48V to 240V AC -15% to +10%
24V to 240V DC -20% to +25%
Rated frequency:
48 to 400Hz 48V to 240V AC
Rated consumption: 2.5VA (1.3W)
Duration of operation: 100%
Reset time: 500ms
Ripple and noise: -
Drop-out voltage: >30% of supply voltage
Overvoltage category: III (in accordance with IEC 60664-1)
Rated surge voltage: 4kV

5. Output circuit

1 analog output 4...20mA
Terminals: X1(+) - X2(-)
Settling time: <300ms
Burden: max. 500Ω
Galvanic isolation: 3kV DC

6. Measuring circuit

Measuring range PN: reversible between
0.6kW, 1.2kW, 2.4kW, 4.8kW
Wave form
AC Sinus: 10 to 400Hz
Sinus weighted PWM: 10 to 100Hz
Measuring input voltage: terminals L1-L2-L3
1-phase mains 0 to 400V AC
3-phase mains 3~ 0 to 415/240V
Overload capacity:
1-phase mains 440V AC
3-phase mains 3~ 500/289V
Input resistance: 1MΩ
Measuring input current: terminal i-k
Measuring range 0.6kW, 1.2kW: 0 to 6A
Measuring range 2.4kW, 4.8kW: 0 to 12A (for I>8A distance >5mm)

Overload capacity: 12A permanent
Input resistance: <10mΩ
Overvoltage category: III (in accordance with IEC 60664-1)
Rated surge voltage: 4kV

7. Accuracy

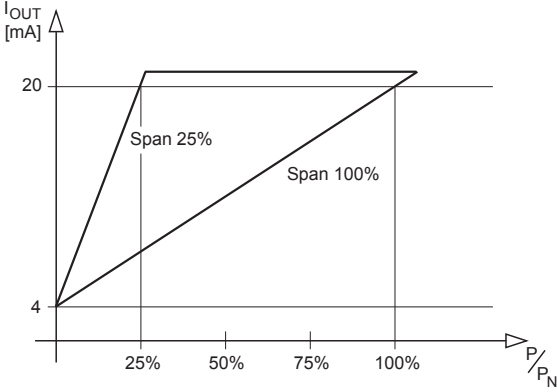
Base accuracy: ±2% (of maximum scale value)
Frequency influence: ±0.025% / Hz
Voltage influence: -
Temperature influence: ≤0.05% / °C

8. Ambient conditions

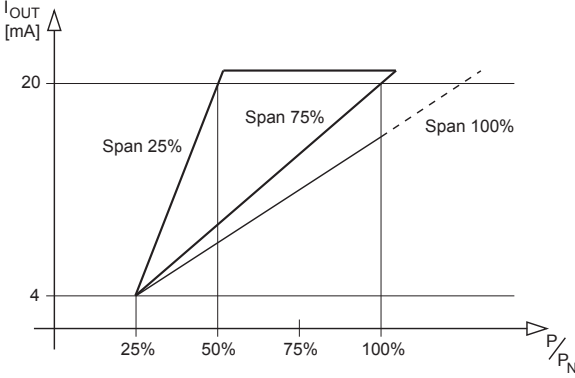
Ambient temperature: -25 to +55°C
(in accordance with IEC 60068-1)
-25 to +40°C (in accordance with UL 508)
Storage temperature: -25 to +70°C
Transport temperature: -25 to +70°C
Relative humidity: 15% to 85%
(in accordance with IEC 60721-3-3 Klasse 3K3)
Pollution degree: 3 (in accordance with IEC 60664-1)
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

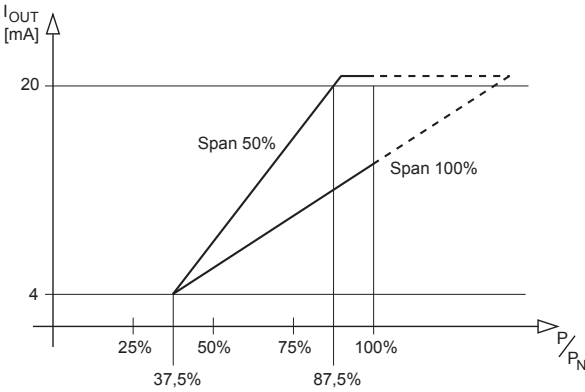
Zero = 0% / Span = 25% ; Zero = 0% / Span = 100%



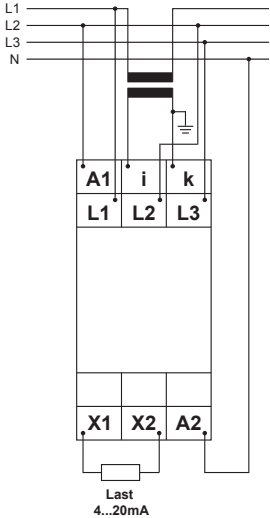
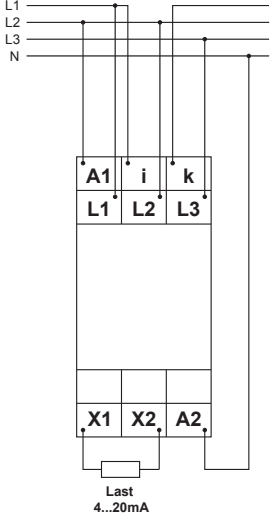
Zero = 25% / Span = 25% ; Zero = 25% / Span = 75%



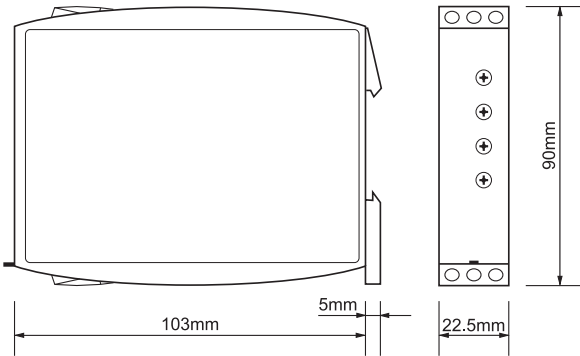
Zero = 37,5% / Span = 50% ; Zero = 37,5% / Span = 100%



Connections



Dimensions





Active power transducer

G2BA480V12A 4...20mA

Loadmonitors - GAMMA series

True power monitoring in 1- or 3-phase mains

Analog output 4...20mA

Suitable for VFI (10 to 100Hz)

Zoom voltage 24V to 240V DC and 48V to 240V AC

Width 22.5mm

Industrial design



Read and understand these instructions before installing, operating or maintaining the equipment.



Danger!

Never carry out work on live parts! Danger of fatal injury! The product must not be used in case of obvious damage. To be installed by an authorized person.

Technical data

1. Functions

True power monitoring in 1- and 3-phase mains with analog output 4 ... 20mA and the following settings which are selected by means of rotary switch:

Zero	setting of zero point (0%, 25%, 50%, 75% of nominal value)
Zero Fine	fine setting of zero point (0% ... 25% of nominal value)
Span	span (100%, 75%, 50%, 25% of nominal value)
Range	measuring range reversible between 0.75kW, 1.5kW, 3kW, 6kW

2. Indicators

Green LED U ON: indication of supply voltage
 Yellow LED's ON/OFF: indication analog output 4...20mA

3. 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 multicore cable end

4. Input circuit

Supply voltage: 24V to 240V d.c.
 48V to 240V a.c.
 Terminals: A1-A2 (galvanically separated)
 Tolerance:
 48V to 240V a.c. -15% to +10%
 24V to 240V d.c. -20% to +25%
 Rated frequency:
 48 to 400Hz 48V to 240V a.c.
 Rated consumption: 2.5VA (1.3W)
 Duration of operation: 100%
 Reset time: 500ms
 Ripple and noise: -
 Drop-out voltage: >30% of supply voltage
 Overvoltage category: III (in accordance with IEC 60664-1)
 Rated surge voltage: 4kV

5. Output circuit

1 analog output
 4...20mA
 Terminals: X1(+)-X2(-)
 Settling time: <450ms
 Burden: max. 500Ω
 Galvanic isolation: 3kV d.c.

6. Measuring circuit

Measuring range P_N : reversible between
 0.75kW, 1.5kW, 3kW, 6kW
 Wave form
 a.c. Sinus: 10 to 400Hz
 Sinus weighted PWM: 10 to 100Hz
 Measuring input voltage: terminals L1-L2-L3
 1-phase mains 0 to 480V a.c.
 3-phase mains 3~ 0 to 480/277V
 Overload capacity:
 1-phase mains 550V a.c.
 3-phase mains 3~ 550/318V
 Input resistance: 1.25MΩ
 Measuring input current: terminal i-k
 Measuring range 0.75kW, 1.5kW: 0 to 6A
 Measuring range 3kW, 6kW: 0 to 12A (for I>8A distance >5mm)
 Overload capacity: 12A permanent
 Input resistance: <10mΩ
 Overvoltage category: III (in accordance with IEC 60664-1)
 Rated surge voltage: 4kV

7. Accuracy

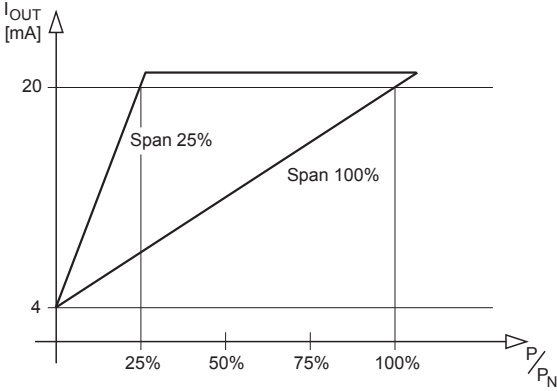
Base accuracy: ±2% (of maximum scale value)
 Frequency influence: ±0.025% / Hz
 Voltage influence: -
 Temperature influence: ≤0.05% / °C

8. Ambient conditions

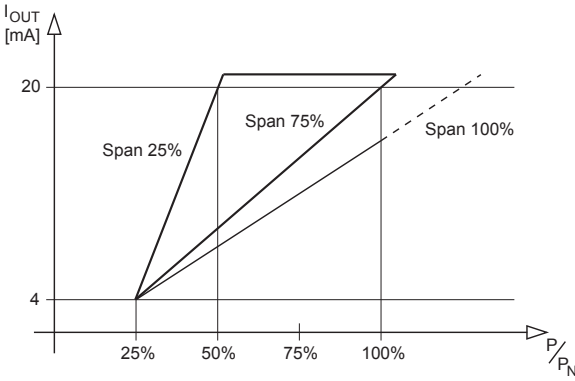
Ambient temperature: -25 to +55°C
 (in accordance with IEC 60068-1)
 -25 to +40°C
 (in accordance with UL 508)
 Storage temperature: -25 to +70°C
 Transport temperature: -25 to +70°C
 Relative humidity: 15% to 85%
 (in accordance with IEC 60721-3-3 class 3K3)
 Pollution degree: 3 (in accordance with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

Functions

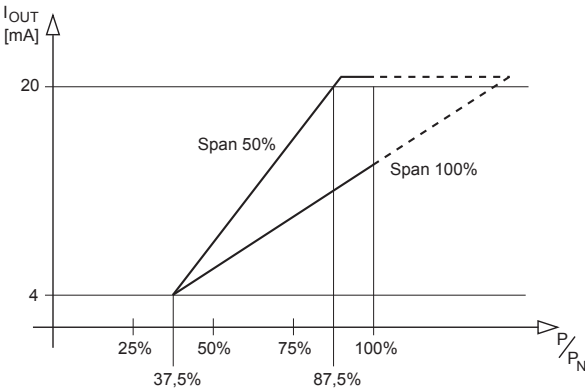
Zero = 0% / Span = 25% ; Zero = 0% / Span = 100%



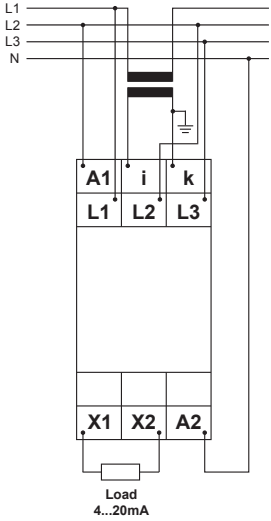
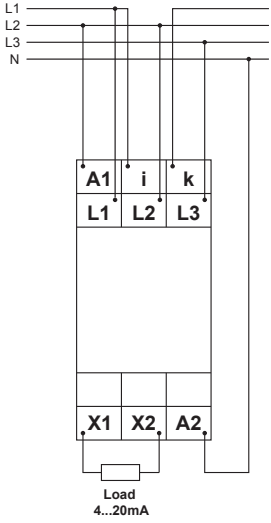
Zero = 25% / Span = 25% ; Zero = 25% / Span = 75%



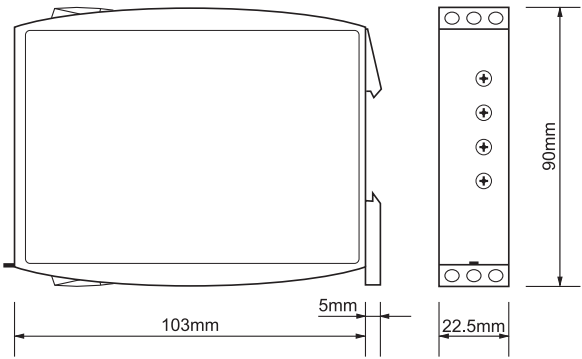
Zero = 37,5% / Span = 50% ; Zero = 37,5% / Span = 100%



Connections



Dimensions





Loadmonitors - GAMMA series

Multifunction

Fault latch

Recognition of disconnected consumers

Suitable for VFI (10 to 100Hz)

Supply voltage selectable via power modules

1 change-over contact

Width 22.5mm

Industrial design



Technical data

1. Functions

True power monitoring in 1- or 3-phase mains with adjustable threshold, fixed hysteresis, timing for start-up suppression and tripping delay separately adjustable, fault latch and the following functions (selectable by means of rotary switch)

OVER+I=0	Overload monitoring with recognition of disconnected consumers (Rel.ON if I=0)
OVER+I=0	Overload monitoring with recognition of disconnected consumers (Rel.OFF if I=0)
UNDER	Underload monitoring
UNDER+I=0	Underload monitoring with recognition of disconnected consumers (Rel.ON if I=0)

2. Time ranges

	Adjustment range	
Start-up suppression time:	0.1s	2s
Tripping delay:	0.1s	2s

3. Indicators

Green LED ON:	indication of supply voltage
Green LED flashes:	indication of start-up suppression time
Yellow LED R ON/OFF:	indication of relay output
Yellow LED I=0 ON/OFF:	indication of disconnected consumers
Red LED ON/OFF:	indication of failure of the corresponding threshold
Red LED flashes:	indication of tripping delay of the corresponding threshold

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 multicore cable end

5. Input circuit

Supply voltage:
 12 to 400V AC terminals A1-A2 (galvanically separated) selectable via power modules TR2 according to specification of power module

Tolerance:
 Rated frequency:
 Rated consumption:
 Duration of operation:
 Reset time:
 Residual ripple for DC:
 Drop-out voltage:
 Overvoltage category:
 Rated surge voltage:

according to specification of power module
 2VA (1.5W)
 100%
 500ms
 -
 >30% of the supply voltage
 III (in accordance with IEC 60664-1)
 4kV

6. Output circuit

1 potential free change-over contact
 Rated voltage: 250V AC
 Switching capacity: 750VA (3A / 250V AC)
 If the distance between the devices is less than 5mm!
 Switching capacity: 1250VA (5A / 250V AC)
 If the distance between the devices is greater than 5mm!
 Fusing: 5A fast acting
 Mechanical life: 20 x 10⁶ operations
 Electrical life: 2 x 10⁸ operations
 at 1000VA resistive load
 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 P_N: 0.5, 1, 2 and 4kW selectable
 Wave form
 AC Sinus: 10 to 400Hz
 Sinus-weighted PWM: 10 to 100Hz
 Measuring-input voltage: terminals L1-L2-L3
 1-phase mains: 0 to 230V AC
 3-phase mains: 3~ 0 to 415/240V
 Overload capacity:
 1-phase mains: 300V AC
 3-phase mains: 3~ 500/289V
 Input resistance: 2MΩ
 Measuring-input current: terminals i-k
 Power range 0.5, 1kW: 0 to 6A
 Power range 2, 4kW: 0 to 12A (for I>8A distance >5mm)
 Overload capacity: 12A permanently
 Input resistance: <10mΩ
 Switching threshold: 5% to 120% of P_N
 Hysteresis: fixed, approx. 3% of P_N
 Overvoltage category: III (in accordance with IEC 60664-1)
 Rated surge voltage: 4kV

8. Control contact Y (equipotential with measuring circuit)

Function: fault latch (Y1-Y2 bridged)
 Loadable: No
 Line length Y1-Y2: max. 10m (twisted pair)
 Control pulse length: -
 Reset: normally closed contact in the input circuit

9. Accuracy

Base accuracy: ±2% (of maximum scale value)
 Frequency response: ±0.025% / Hz
 Adjustment accuracy: ≤5% (of maximum scale value)
 Repetition accuracy: ±2%
 Voltage influence: -
 Temperature influence: ≤0.2% / °C

Technical data

10. Ambient conditions

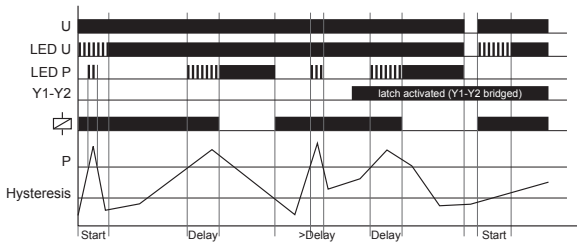
Ambient temperature: -25 to +55°C (in accordance with IEC 60068-1)
 -25 to +40°C (in accordance with UL 508)
 Storage temperature: -25 to +70°C
 Transport temperature: -25 to +70°C
 Relative humidity: 15% to 85%
 (in accordance with IEC 60721-3-3 class 3K3)
 Pollution degree: 3 (in accordance with IEC 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 switch into on-position (yellow LED R and LED I=0 illuminated) and the set interval of the start-up suppression (START) begins (green LED U flashes). Changes of the measured true power during this period do not affect the state of the output relay. After the interval has expired the green LED is illuminated steadily.

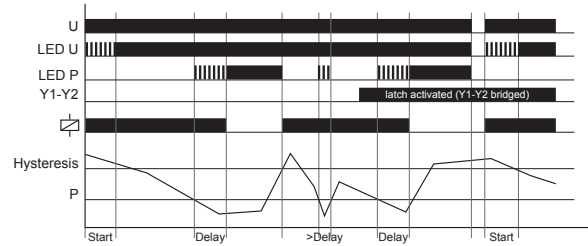
Overload monitoring (OVER)

When the measured true power exceeds the value adjusted at the PN-regulator, the set interval of the tripping delay (DELAY) begins (red LED P flashes). After the interval has expired (red LED P illuminated), the output relay switches into off-position (yellow LED R not illuminated). The output relay again switches into on-position (yellow LED R illuminated), when the measured true power falls below the value adjusted at the PN-regulator by more than the fixed hysteresis (red LED P not illuminated). If the fault latch is activated (bridge Y1-Y2) and the measured true power remains above the MAX-value longer than the set interval of the tripping delay, the output relay remains in the off-position even if the measured true power falls below the value adjusted at the PN-regulator by more than the fixed hysteresis. After resetting the failure (interrupting and re-applying the supply voltage), the output relay switches into on-position and a new measuring cycle begins with the set interval of the start-up suppression (START).



Underload monitoring (UNDER)

When the measured true power falls below the value adjusted at the PN-regulator, the set interval of the tripping delay (DELAY) begins (red LED P flashes). After the interval has expired (red LED P illuminated), the output relay switches into off-position (yellow LED R not illuminated). The output relay again switches into on-position (yellow LED R illuminated), when the measured true power exceeds the value adjusted at the PN-regulator by more than the fixed hysteresis. If the fault latch is activated (bridge Y1-Y2) and the measured true power remains below the PN-value longer than the set interval of the tripping delay, the output relay remains in the off-position even if the measured true power exceeds the value adjusted at the PN-regulator by more than the fixed hysteresis. After resetting the failure (interrupting and re-applying the supply voltage), the output relay switches into on-position and a new measuring cycle begins with the set interval of the start-up suppression (START).



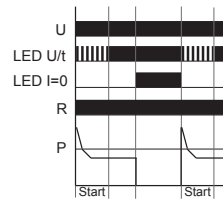
Recognition of disconnected consumers (I=0)

Overview:

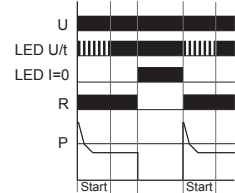
Function	OVER		UNDER	
	O+I $\bar{<$	O+I<	U+I<	U
Detection I=0	yes	yes	yes	no
Relais if I=0	on	off	on	off
LED I=0 if I=0	on	on	on	off

When the current flow between i and k is interrupted and no fault has been stored, the output acts as shown in the table. When the current flow is restored, the measuring cycle is restarted with the set interval of the start-up suppression (START).

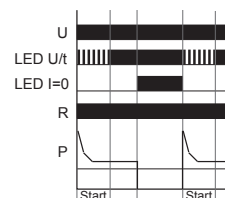
OVER + I $\bar{<$



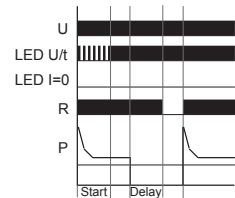
OVER + I<



UNDER + I<

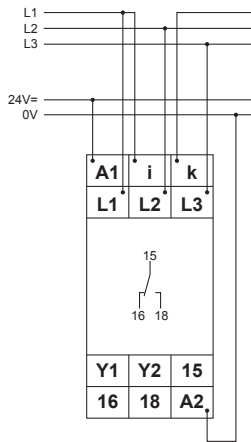


UNDER



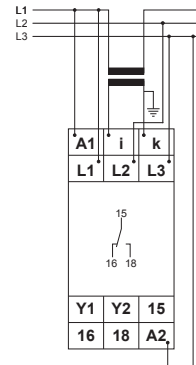
Functions

Connected to 3~ 400V mains with power module 24V AC without fault latch
 $I_N < 12A$

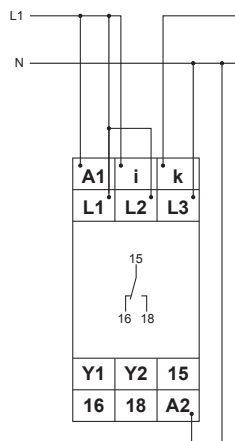


Connections

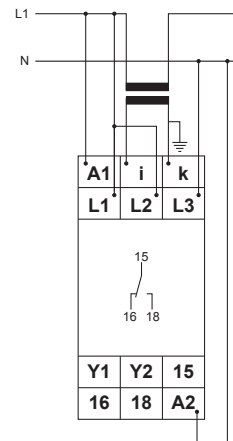
Connected to 1~ 230V mains with power module 230V AC without fault latch
 $I_N > 12A$



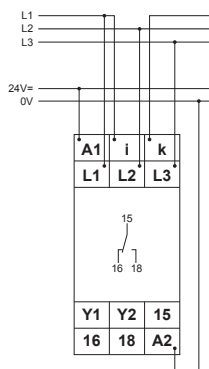
Connected to 1~ 230V mains with power module 230V AC without fault latch
 $I_N < 12A$



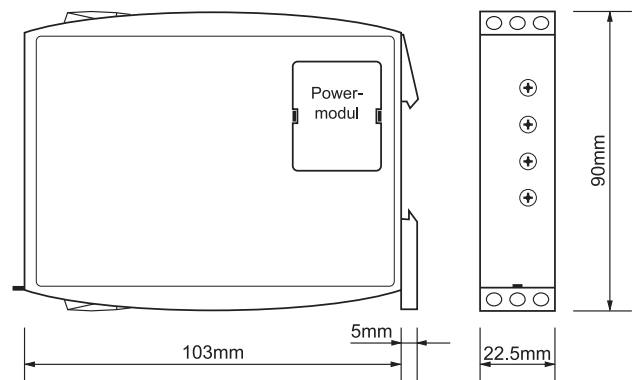
Connected to 1~ 230V mains with power module 230V AC without fault latch
 $I_N > 12A$



Connected to 3~ 400V mains with power module SNT2 24V DC without fault latch
 $I_N < 12A$



Dimensions





Loadmonitors - GAMMA series

Multifunction

Fault latch

Recognition of disconnected consumers

Suitable for VFI (10 to 100Hz)

Supply voltage selectable via power modules

1 change over contact

Width 22.5mm

Industrial design



Technical data

1. Functions

True power monitoring of 1- or 3-phase loads with adjustable threshold, fixed hysteresis, timing for start-up suppression and tripping delay separately adjustable, fault latch and the following functions which are selectable by means of rotary switch:

OVER+I=0	Overload monitoring with recognition of disconnected consumers (Rel.ON if I=0)
OVER+I=0	Overload monitoring with recognition of disconnected consumers (Rel.OFF if I=0)
UNDER	Underload monitoring
UNDER+I=0	Underload monitoring with recognition of disconnected consumers (Rel.ON if I=0)

2. Time ranges

	Adjustment range	
Start-up suppression time:	0.1s	2s
Tripping delay:	0.1s	2s

3. Indicators

Green LED ON:	indication of supply voltage
Green LED flashes:	indication of start-up suppression time
Yellow LED R ON/OFF:	indication of relay output
Yellow LED I=0 ON/OFF:	indication of disconnected consumers
Red LED ON/OFF:	indication of failure of the corresponding threshold
Red LED flashes:	indication of tripping delay of the corresponding threshold

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 multicore cable end

5. Input circuit

Supply voltage:	12 to 440V AC	terminals A1-A2 (galvanically separated)
	24V DC	selectable via power modules TR2 or switching power supply SNT2
Tolerance:		according to specification of power module or switching power supply
Rated frequency:		according to specification of power module or switching power supply
Rated consumption:		2VA (1.5W)
Duration of operation:		100%
Reset time:		500ms
Residual ripple for DC:		-
Drop-out voltage:		>30% of the supply voltage

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

6. Output circuit

1 potential free change-over contact
 Rated voltage: 250V AC
 Switching capacity: 750VA (3A / 250V AC)
 If the distance between the devices is less than 5mm!
 Switching capacity: 1250VA (5A / 250V AC)
 If the distance between the devices is greater than 5mm!
 Fusing: 5A fast acting
 Mechanical life: 20 x 10⁶ operations
 Electrical life: 2 x 10⁵ operations
 at 1000VA resistive load
 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 PN: 0.75, 1.5, 3 and 6kW selectable
 Wave form:
 AC Sinus: 10 to 400Hz
 Sinus-weighted PWM: 10 to 100Hz
 Measuring-input voltage: terminals L1-L2-L3
 1-phase mains: 0 to 480V AC
 3-phase mains: 3~ 0 to 480/277V
 Overload capacity:
 1-phase mains: 550V AC
 3-phase mains: 3~ 550/318V
 Input resistance: 2MΩ
 Measuring-input current: terminals i-k
 Power range 0.75, 1.5kW: 0 to 6A
 Power range 3, 6kW: 0 to 12A (for I>8A distance >5mm)
 Overload capacity: 12A permanently
 Input resistance: <10mΩ
 Switching threshold: 5% to 120% of P_N
 Hysteresis: fixed, approx. 3% of P_N
 Overvoltage category: III (in accordance with IEC 60664-1)
 Rated surge voltage: 4kV

8. Control contact Y (equipotential with measuring circuit)

Function: fault latch (Y1-Y2 bridged)
 Loadable: no
 Line length Y1-Y2: max. 10m (twisted pair)
 Control pulse length: -
 Reset: normally closed contact in the input circuit

9. Accuracy

Base accuracy: ±2% (of maximum scale value)
 Frequency response: ±0.025% / Hz
 Adjustment accuracy: ≤5% (of maximum scale value)
 Repetition accuracy: ±2%
 Voltage influence: -
 Temperature influence: ≤0.2% / °C

Technical data

10. Ambient conditions

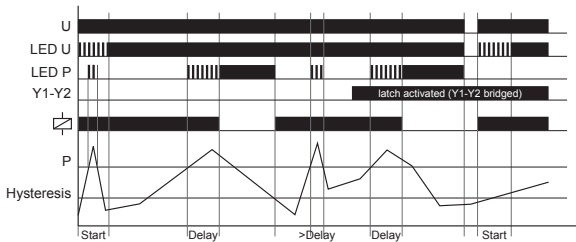
Ambient temperature: -25 to +55°C (in accordance with IEC 60068-1)
 -25 to +40°C (in accordance with UL 508)
 Storage temperature: -25 to +70°C
 Transport temperature: -25 to +70°C
 Relative humidity: 15% to 85%
 (in accordance with IEC 60721-3-3 class 3K3)
 Pollution degree: 3 (in accordance with IEC 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 switch into on-position (yellow LED R and LED I=0 illuminated) and the set interval of the start-up suppression (START) begins (green LED U flashes). Changes of the measured true power during this period do not affect the state of the output relay. After the interval has expired the green LED is illuminated steadily.

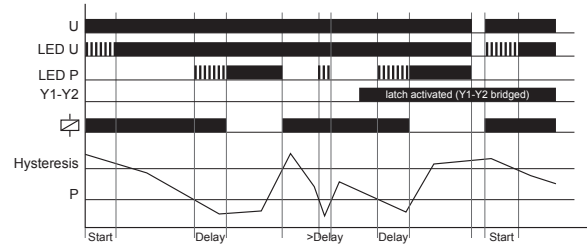
Overload monitoring (OVER)

When the measured true power exceeds the value adjusted at the PN-regulator, the set interval of the tripping delay (DELAY) begins (red LED P flashes). After the interval has expired (red LED P illuminated), the output relay switches into off-position (yellow LED R not illuminated). The output relay again switches into on-position (yellow LED R illuminated), when the measured true power falls below the value adjusted at the PN-regulator by more than the fixeded hysteresis (red LED P not illuminated). If the fault latch is activated (bridge Y1-Y2) and the measured true power remains above the MAX-value longer than the set interval of the tripping delay, the output relay remains in the off-position even if the measured true power falls below the value adjusted at the PN-regulator by more than the fixeded hysteresis. After resetting the failure (interrupting and re-applying the supply voltage), the output relay switches into on-position and a new measuring cycle begins with the set interval of the start-up suppression (START).



Underload monitoring (UNDER)

When the measured true power falls below the value adjusted at the PN-regulator, the set interval of the tripping delay (DELAY) begins (red LED P flashes). After the interval has expired (red LED P illuminated), the output relay switches into off-position (yellow LED R not illuminated). The output relay again switches into on-position (yellow LED R illuminated), when the measured true power exceeds the value adjusted at the PN-regulator by more than the fixeded hysteresis. If the fault latch is activated (bridge Y1-Y2) and the measured true power remains below the PN-value longer than the set interval of the tripping delay, the output relay remains in the off-position even if the measured true power exceeds the value adjusted at the PN-regulator by more than the fixeded hysteresis. After resetting the failure (interrupting and re-applying the supply voltage), the output relay switches into on-position and a new measuring cycle begins with the set interval of the start-up suppression (START).



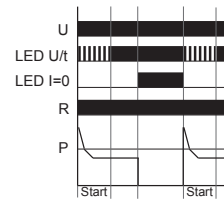
Recognition of disconnected consumers (I=0)

Overview:

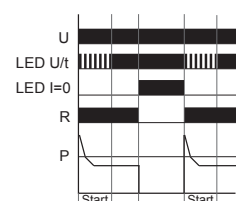
Function	OVER		UNDER	
	O+I<	O+I<	U+I<	U
Detection I=0	yes	yes	yes	no
Relais if I=0	on	off	on	off
LED I=0 if I=0	on	on	on	off

When the current flow between i and k is interrupted and no fault has been stored, the output acts as shown in the table. When the current flow is restored, the measuring cycle is restarted with the set interval of the start-up suppression (START).

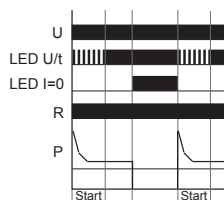
OVER + I<



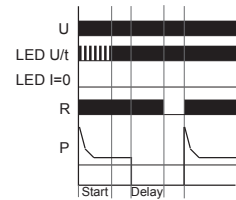
OVER + I<



UNDER + I<

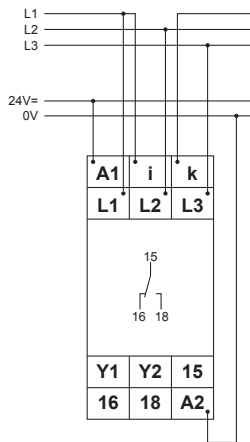


UNDER

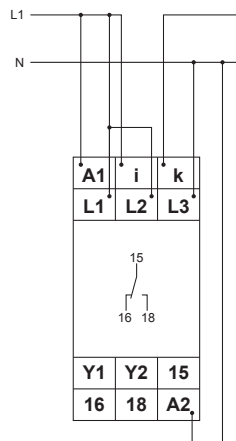


Functions

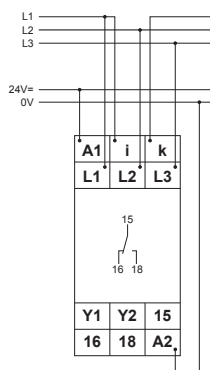
Connected to 3~ 400V mains with power module 24V AC without fault latch
 $I_N < 12A$



Connected to 1~ 230V mains with power module 230V AC without fault latch
 $I_N < 12A$

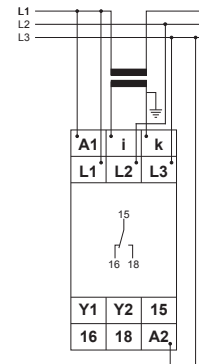


Connected to 3~ 400V mains with power module 400V AC without fault latch
 $I_N < 12A$

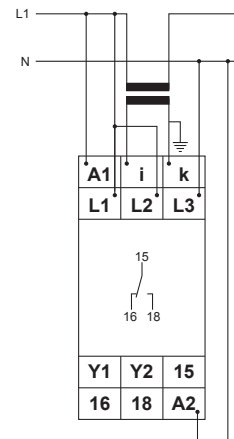


Connections

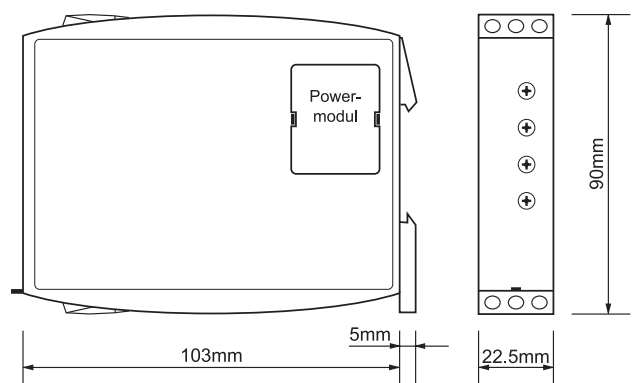
Connected to 1~ 230V mains with power module 230V AC without fault latch
 $I_N > 12A$



Connected to 1~ 230V mains with power module 230V AC without fault latch
 $I_N > 12A$



Dimensions





- Loadmonitors - GAMMA series
- Multifunction
- Temperature monitoring of the motor winding
- Reset-key
- 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



Read and understand these instructions before installing, operating or maintaining the equipment.



Danger!
Never carry out work on live parts! Danger of fatal injury! The product must not be used in case of obvious damage. To be installed by an authorized person.

Technical data

1. Functions

True power monitoring in 1- and 3-phase mains with adjustable thresholds (P1 and P2), timing for start-up suppression time and tripping delay separately adjustable, selectable fault latch, temperature monitoring of the motor winding with max. 6 PTC, reset-key and the following functions which are selected by means of rotary switch:

2MIN	Minimum monitoring
2MIN+I=0 ON	Minimum monitoring and recognition of disconnected consumers (relay ON if I=0)
2MIN+I=0 Inv.	Minimum monitoring and recognition of disconnected consumers (relay OFF if I=0 Inv.)
2MAX	Maximum monitoring
2MAX+I=0 ON	Maximum monitoring and recognition of disconnected consumers (relay OFF if I=0)
2MAX+I=0 Inv.	Maximum monitoring and recognition of disconnected consumers (relay OFF if I=0 Inv.)
WIN	Monitoring the window between MIN and MAX
WIN+I=0 ON	Monitoring the window between MIN and MAX and recognition of disconnected consumers (relay ON if I=0)
WIN+I=0 Inv.	Monitoring the window between MIN and MAX and recognition of disconnected consumers (relay OFF if I=0 Inv.)
MIN/MAX	Minimum- and maximum monitoring
MIN/MAX+I=0 ON	Minimum- and maximum monitoring and recognition of disconnected consumers (relay ON if I=0)
MIN/MAX+I=0 Inv.	Minimum- and maximum monitoring and recognition of disconnected consumers (relay OFF if I=0 Inv.)

2. Time ranges

	Adjustment range	
Start-up suppression time:	1s	10s
Tripping delay:	0s	10s

3. Indicators

Green LED U/t ON:	indication of supply voltage
Green LED U/t flashes:	indication of start-up suppression time
Yellow LED I=0 ON/OFF:	indication of disconnected consumers
Red LED Failure ON:	indication of failure of the corresponding threshold P1 or P2
Red LED Failure flashes:	indication of tripping delay of the corresponding threshold P1 or P2
Red LED Temp ON/OFF:	indication of overtemperature
Yellow LED Rel 1 ON/OFF:	indication of relay output Rel 1
Yellow LED Rel 2 ON/OFF:	indication of relay output Rel 2

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 multicore cable end

5. Input circuit

Supply voltage: 12 to 500V a.c. terminals A1-A2 (galvanically separated) selectable via power module type TR3 according to specification of power module according to specification of power module

Tolerance:
 Rated frequency:
 Rated consumption: 3.5VA (3W)
 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 a.c.
 Switching capacity: 750VA (3A / 250V a.c.)
 If the distance between the devices is less than 5mm!
 Rated voltage: 1250VA (5A / 250V a.c.)
 If the distance between the devices is greater than 5mm!
 Fusing: 5A fast acting
 Mechanical life: 20 x 10⁶ operations
 Electrical life: 2 x 10⁵ operations at 1000VA resistive load
 max. 60/min at 100VA resistive load
 max. 6/min at 1000VA resistive load (in accordance with IEC 60947-5-1)
 Switching capacity: max. 60/min at 100VA 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 P_N: reversible between 0.5kW, 1kW, 2kW and 4kW

Technical data

Wave form	
AC Sinus:	10 to 400Hz
Sinus weighted PWM:	10 to 100Hz
Measuring input voltage:	terminals L1-L2-L3
1-phase mains	0 to 480V a.c.
3-phase mains	3~ 0 to 480/277V
Overload capacity:	
1-phase mains	550V a.c.
3-phase mains	3~ 550/318V
Input resistance:	1.25M Ω
Measuring input current:	terminals i-k
Measuring range 0.75kW, 1.5kW:	0.15 to 6A
Measuring range 3kW, 6kW:	0.3 to 12A (for I>8A distance >5mm)
Overload capacity:	12A permanent
Input resistance:	<10m Ω
I< - recognition:	
Power interruption:	
Measuring range 0.75kW, 1.5kW:	150mA
Measuring range 3kW, 6kW:	180mA
Current flow recognition:	
Measuring range 0.75kW, 1.5kW:	300mA
Measuring range 3kW, 6kW:	360mA
Switching threshold P:	
Switching threshold P1:	10% to 120% of P _N
Switching threshold P2:	5% to 110% of P _N
Hysteresis:	1% of maximum value of the measuring range

Temperature monitoring:	
Terminals:	T1-T2
Initial resistance:	<1.5k Ω
Response value (Relais in on-position):	\geq 3.6k Ω
Release value (Relais in off-position):	\leq 1.8k Ω
Disconnection (short circuit thermistor):	no
Measuring voltage T1-T2:	\leq 7.5V at R \leq 4.0k Ω (in accordance with EN 60947-8)
Overvoltage category:	III (in accordance with IEC 60664-1)
Rated surge voltage:	4kV

8. Control contact Y (equipotential with measuring circuit)

Function:	latch (terminal Y1-Y2 bridged)
Loadable:	no
Line length Y1-Y2:	max. 10m (twisted pair)
Control pulse length:	-
Reset:	normally closed contact in the input circuit

9. Accuracy

Base accuracy:	\pm 2% (of maximum scale value)
Frequency response:	\pm 0.025% / Hz
Adjustment accuracy:	\leq 5% (of maximum scale value)
Repetition accuracy:	\pm 2%
Voltage influence:	-
Temperature influence:	\leq 0.02% / $^{\circ}$ C

10. Ambient conditions

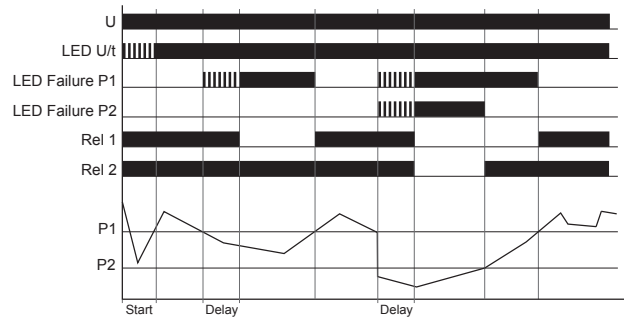
Ambient temperature:	-25 to +55 $^{\circ}$ C (in accordance with IEC 60068-1) -25 to +40 $^{\circ}$ C (in accordance with UL 508)
Storage temperature:	-25 to +70 $^{\circ}$ C
Transport temperature:	-25 to +70 $^{\circ}$ C
Relative humidity:	15% to 85% (in accordance with IEC 60721-3-3 class 3K3)
Pollution 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 60068-2-7)

Functions

When the supply voltage U is applied (green LED U/t illuminated) the output relays Rel 1 and Rel 2 switches into on-position (yellow LED Rel 1 and Rel 2 illuminated) and the set interval of the start-up suppression time (Start) begins (green LED U/t flashes). Changes of the measured true power during this period don't affect the state of the output relays Rel 1 and Rel 2. After the interval has expired the green LED U/t illuminates steadily.

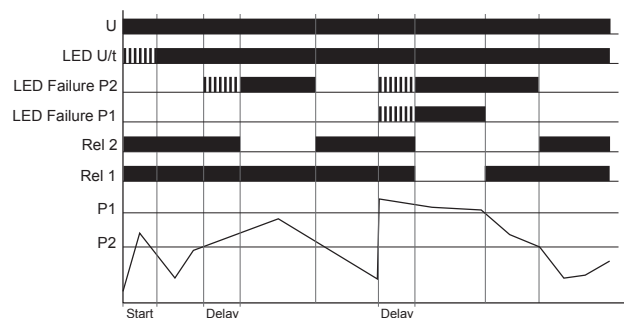
Minimum monitoring (2MIN)

The adjusted threshold for P1 must be greater than the adjusted threshold for P2. When the measured true power falls below the value adjusted at the P1-regulator, the set interval of the tripping delay (Delay) begins (red LED Failure of the corresponding threshold P1 flashes). After the interval has expired (red LED Failure of the corresponding threshold P1 illuminated), the output relay Rel 1 switches into off-position (yellow LED Rel 1 not illuminated). When the measured true power exceeds the value adjusted at the P2-regulator, the set interval of the tripping delay (Delay) begins (red LED Failure of the corresponding threshold P2 flashes). After the interval has expired (red LED Failure of the corresponding threshold P2 illuminated), the output relay Rel 2 switches into off-position (yellow LED Rel 2 not illuminated). As soon as the measured true power exceeds the adjusted value at the corresponding regulator P1 or P2 (red LED Failure of the corresponding threshold P1 or P2 not illuminated), the output relay Rel 1 or Rel 2 switches into on-position again (yellow LED Rel 1 or Rel 2 illuminated).



Maximum monitoring (2MAX)

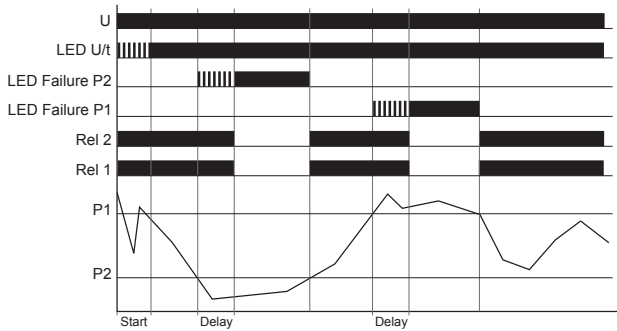
The adjusted threshold for P1 must be greater than the adjusted threshold for P2. When the measured true power exceeds the value adjusted at the P2-regulator, the set interval of the tripping delay (Delay) begins (red LED Failure of the corresponding threshold P2 flashes). After the interval has expired (red LED Failure of the corresponding threshold P2 illuminated), the output relay Rel 2 switches into off-position (yellow LED Rel 2 not illuminated). When the measured true power exceeds the value adjusted at the P1-regulator, the set interval of the tripping delay (Delay) begins (red LED Failure of the corresponding threshold P1 flashes). After the interval has expired (red LED Failure of the corresponding threshold P1 illuminated), the output relay Rel 1 switches into off-position (yellow LED Rel 1 not illuminated). As soon as the measured true power falls below the adjusted value at the corresponding regulator P1 or P2 (red LED Failure of the corresponding threshold P1 or P2 not illuminated), the output relay Rel 1 or Rel 2 switches into on-position again (yellow LED Rel 1 or Rel 2 illuminated).



Functions

Window function (WIN)

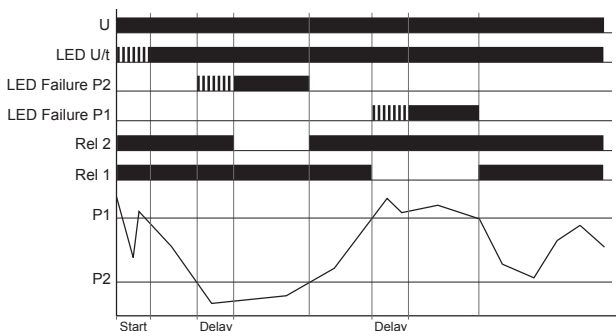
The adjusted threshold for P1 must be greater than the adjusted threshold for P2. When the measured true power falls below the value adjusted at the P2-regulator, the set interval of the tripping delay (Delay) begins (red LED Failure of the corresponding threshold P2 flashes). After the interval has expired (red LED Failure of the corresponding threshold P2 illuminated), the output relays Rel 1 and Rel 2 switches into off-position (yellow LED Rel 1 and Rel 2 not illuminated). The output relays Rel 1 and Rel 2 switches into on-position again (yellow LED Rel 1 and Rel 2 illuminated), as soon as the the measured true power exceeds the adjusted value at the P2-regulator (red LED Failure of the corresponding threshold P2 not illuminated). When the measured true power exceeds the value adjusted at the P1-regulator, the set interval of the tripping delay (Delay) begins (red LED Failure of the corresponding threshold P1 flashes). After the interval has expired (red LED Failure of the corresponding threshold P1 illuminated), the output relays Rel 1 and Rel 2 switches into off-position (yellow LED Rel 1 and Rel 2 not illuminated). As soon as the measured true power falls below the value adjusted at the P1-regulator (red LED Failure of the corresponding threshold P1 not illuminated) the output relays Rel 1 and Rel 2 switches into on-position again (yellow LED Rel 1 and Rel 2 illuminated).



Minimum- and maximum monitoring (MIN/MAX)

The adjusted threshold for P1 must be greater than the adjusted threshold for P2. When the measured true power falls below the value adjusted at the P2-regulator, the set interval of the tripping delay (Delay) begins (red LED Failure of the corresponding threshold P2 flashes). After the interval has expired (red LED Failure of the corresponding threshold P2 illuminated), the output relay Rel 2 switches into off-position (yellow LED Rel 2 not illuminated). The output relay Rel 2 switches into on-position again (yellow LED Rel 2 illuminated), as soon as the the measured true power exceeds the adjusted value at the P2-regulator (red LED Failure of the corresponding threshold P2 not illuminated).

When the measured true power exceeds the value adjusted at the P1-regulator, the set interval of the tripping delay (Delay) begins (red LED Failure of the corresponding threshold P1 flashes). After the interval has expired (red LED Failure of the corresponding threshold P1 illuminated), the output relay Rel 1 switches into off-position (yellow LED Rel 1 not illuminated). As soon as the measured true power falls below the value adjusted at the P1-regulator (red LED Failure of the corresponding threshold P1 not illuminated) the output relay Rel 1 switches into on-position again (yellow LED Rel 1 illuminated).



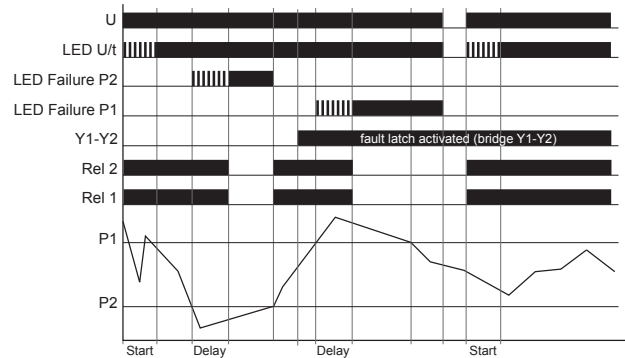
Fault latch

The fault latch can be activated via bridge between the terminals Y1 and Y2. If the fault latch is activated and a failure has occurred (red LED of the corresponding threshold or red LED Temp illuminated), the failure can only be reset by interrupting the supply voltage or pressing the reset-key. After resetting the failure and re-applying of the supply voltage, the output relays Rel 1 and Rel 2 switches into on-position again and the measuring cycle begins with the set interval of the start-up suppression time (Start).

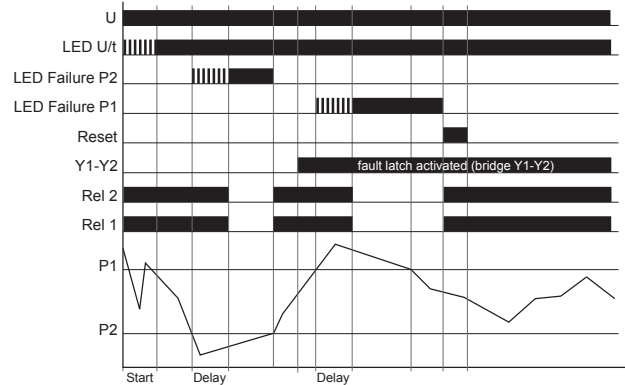
Note:

The fault latch remains active inspite of a I=0 recognition!

Example: Window function (WIN) - Resetting the fault latch by interrupting the supply voltage



Example: Window function (WIN) - Resetting the fault latch by pressing the reset-key



Functions

Recognition of disconnected consumers

The following applies for functions, where the I=0 recognition is activated:

When the current flow between i and k is interrupted (yellow LED I=0 illuminated) and the minimum-, window- or minimum- and maximum function is activated (2MIN+I=0, WIN+I=0, MIN/MAX+I=0), the output relays Rel 1 and Rel 2 remains into on-position (yellow LED Rel 1 and LED Rel 2 illuminated).

When the maximum function is activated (2MAX+I=0), the output relays Rel 1 and Rel 2 switches into off-position (yellow LED Rel 1 and LED Rel 2 not illuminated).

When the current flow restores, the measuring cycle is restarted with the set interval of the start-up suppression time (Start) (green LED U/t flashes).

The following applies for functions, where the inverted I=0 recognition is activated:

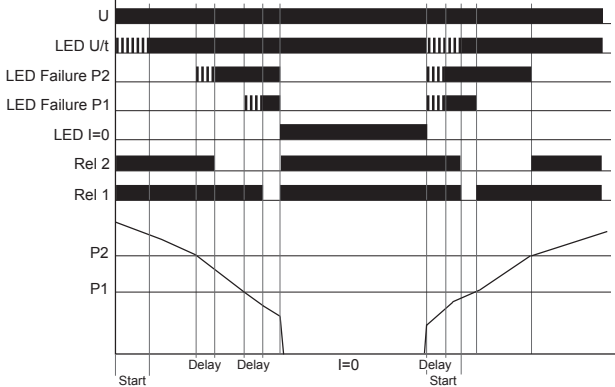
When the current flow between i and k is interrupted (yellow LED I=0 illuminated), the output relays behaves inverse to the above mentioned function.

If the minimum-, window- or minimum- and maximum function (2MIN+I=0 Inv., WIN+I=0 Inv., MIN/MAX+I=0 Inv.) is activated, the output relays Rel 1 and Rel 2 switches into off-position (yellow LED Rel 1 and LED Rel 2 not illuminated).

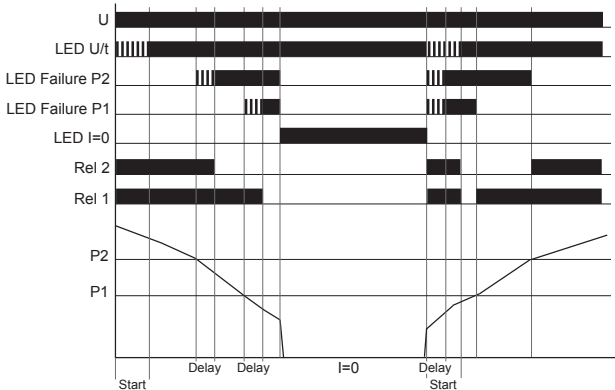
When the maximum function is activated (2MAX+I=0 Inv.), the output relays Rel 1 and Rel 2 remains in on-position (yellow LED Rel 1 and LED Rel 2 illuminated).

When the current flow restores, the measuring cycle is restarted with the set interval of the start-up suppression time (Start) (green LED U/t flashes).

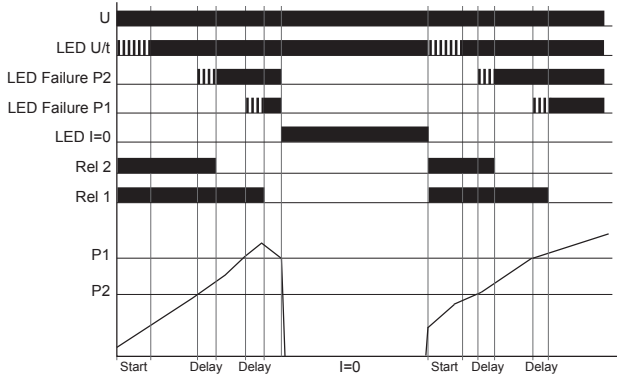
I=0 with minimum monitoring (2MIN+I=0)



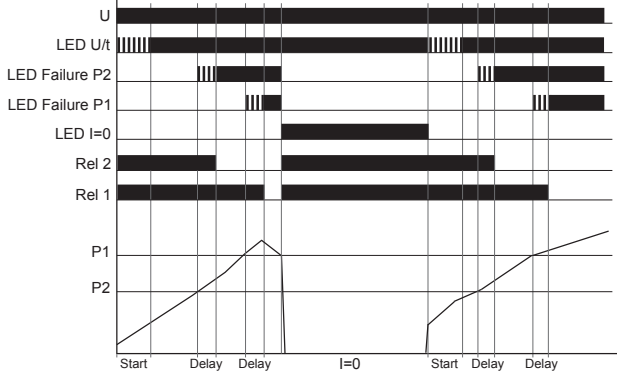
I=0 Inv. with minimum monitoring (2MIN+I=0 Inv.)



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



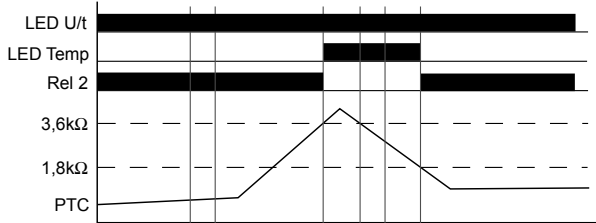
I=0 Inv. with maximum monitoring (2MAX+I=0 Inv.)



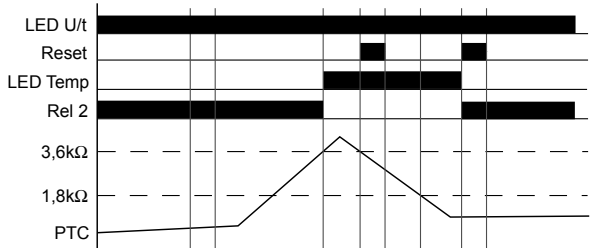
Temperature monitoring of the motor winding

If the supply voltage U is applied (green LED U/t illuminated) 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 (yellow LED Rel 2 not illuminated) and a failure will be indicated (red LED Temp illuminated). The output relay Rel 2 switches into on-position again (yellow LED Rel 2 illuminated) respectively the failure will be cancelled (red LED Temp not illuminated), if the cumulative resistance drops below 1.8kΩ by cooling down of the PTC. If the fault latch is activated, a press of the reset-key is required to cancel the temperature failure.

Temperature monitoring without fault latch



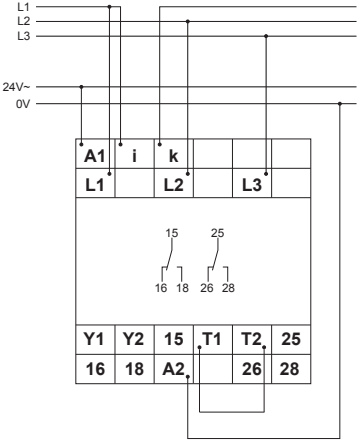
Temperature monitoring with fault latch



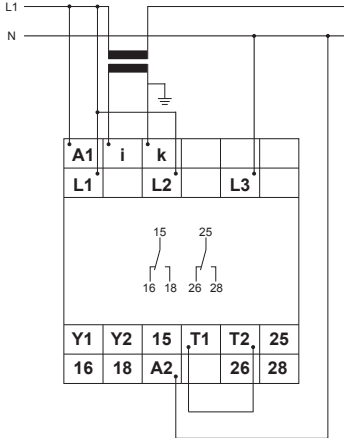
Note: If the output relay Rel 2 should switch into on-position again, no other failure should be applied!

Connections

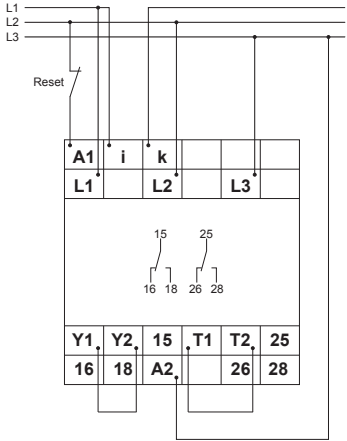
Connected 3~ 400V with power module 24V a.c. without fault latch $I_N < 12A$



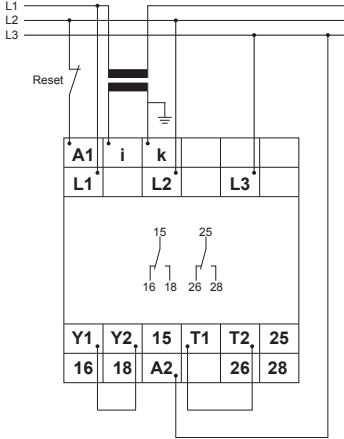
Connected 1~ 230V with power module 230V a.c. without fault latch but with current transformer $I_N > 12A$



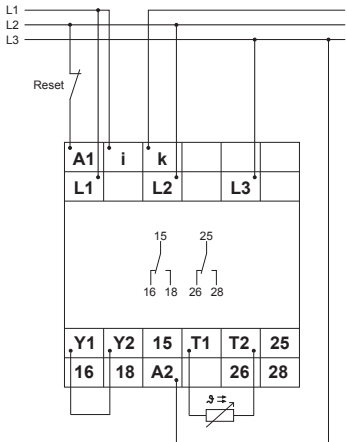
Connected 3~ 400V with power module 400V a.c. with fault latch $I_N < 12A$



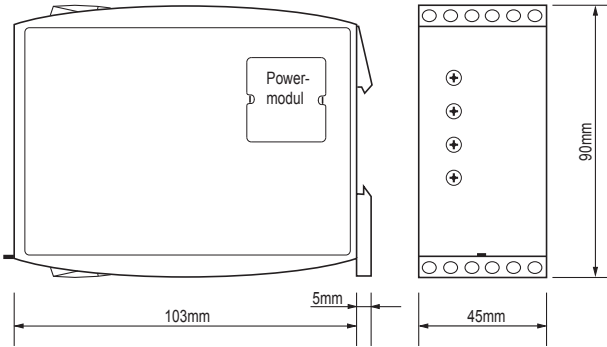
Connected 3~ 400V with power module 400V a.c. with fault latch and current transformer $I_N > 12A$



Connected 3~ 400V with power module 400V a.c. with fault latch and temperature monitoring sensor $I_N < 12A$



Dimensions





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	Overload monitoring and recognition of disconnected load (relay ON or OFF)
UNDER	Underload monitoring
UNDER+I=0 ON	Underload 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 multicore cable end

5. Input circuit

Supply voltage:
 12 to 500V AC terminals A1-A2 (galvanically separated)
 selectable via power module type TR3
 according to specification of power module
 Tolerance:
 Rated frequency:
 Rated consumption: 3.5VA (3W)
 according to specification of power module
 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 10⁶ operations
 Electrical life: 2 x 10⁵ 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
 fixed 5% or adjustable
 Hysteresis:
 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)
 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!

Technical data

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: $\pm 2\%$ of upper range value
 Base accuracy leff: $\pm 2\%$ of upper range value
 Frequency response: $\pm 0,025\%$ / Hz
 Adjustment accuracy: -
 Repetition accuracy: $\pm 2\%$
 Voltage influence: -
 Temperature influence: $\leq 0,02\%$ / °C

10. Ambient conditions

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)

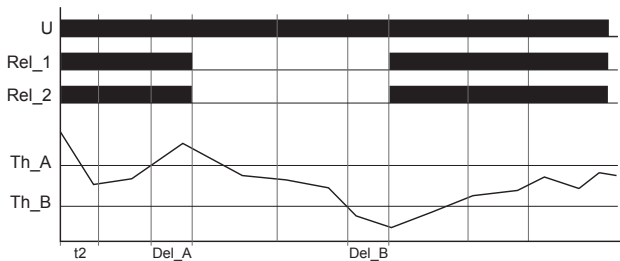
Functions

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.

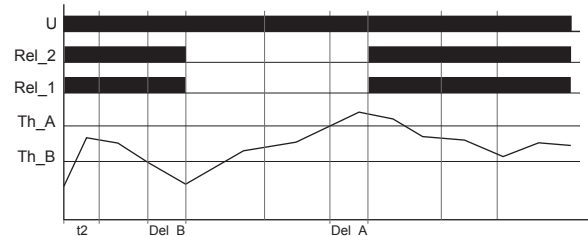
When the measured true power exceeds the adjusted threshold Th_A, the set interval of the tripping delay (Del_A) begins. After the interval has expired, the output relays Rel_1 and Rel_2 switches into off-position (state of output relay 00). As soon as the measured true power falls below the adjusted 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)

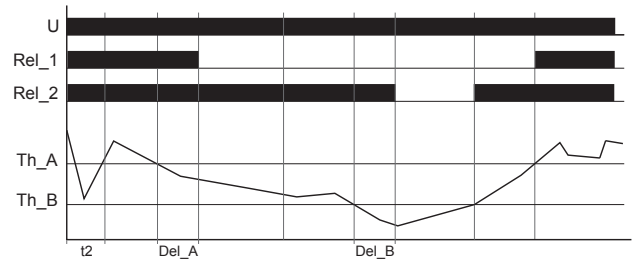
The adjusted threshold Th_A must be greater than the adjusted threshold Th_B.

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).



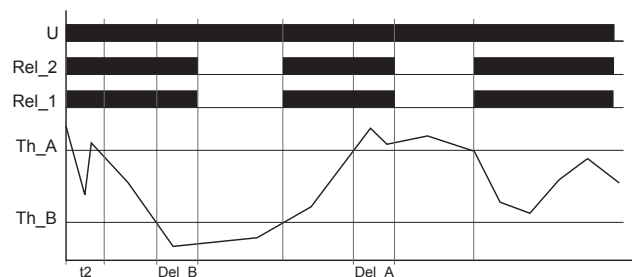
Minimum monitoring (2MIN)

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)

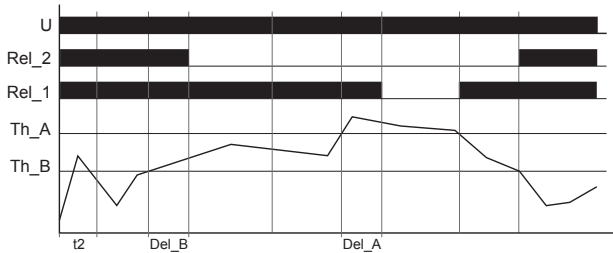
The adjusted threshold Th_A must be greater than the adjusted threshold Th_B. When the measured true power falls below the adjusted threshold Th_B, the set interval of the tripping delay (Del_B) begins. After the interval has expired, the output relays Rel_1 and Rel_2 switches into off-position (state 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

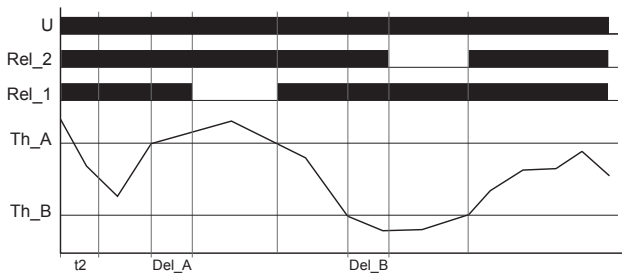
Maximum monitoring (2MAX)

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).

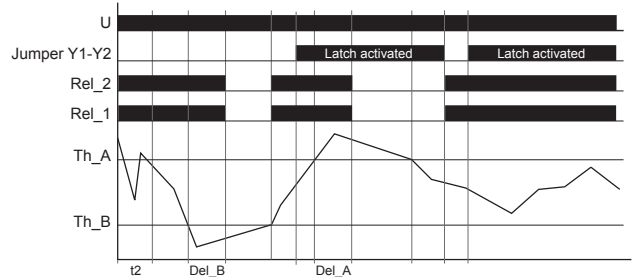
If the fault latch is activated and a failure has occurred, the failure can be reseted by activating the normal closed contact (Y1-Y2) or by pressing the plus- and minus-key (+ & -). After resetting the failure, the output relays Rel_1 and Rel_2 take their position according to the selected function 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 (t_2).

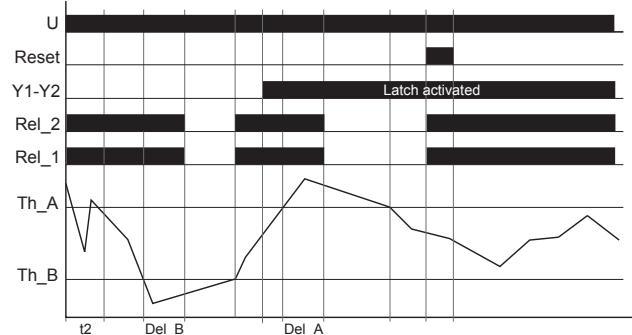
Please note:

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 9

If the supply voltage U is applied and the cumulative resistance of the PTC-circuit is less than $3.6k\Omega$ (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 $3.6k\Omega$ (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 9 will be indicated. The output relay Rel_2 switches into on-position again respectively the temperature failure 9 will be cancelled, if the cumulative resistance drops below $1.8k\Omega$ 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 (+ & -).

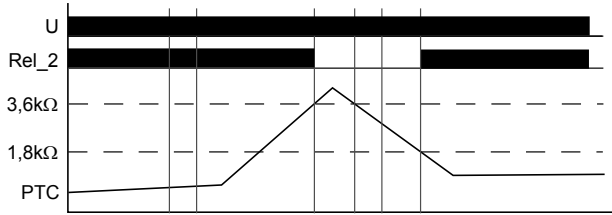
Please note:

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

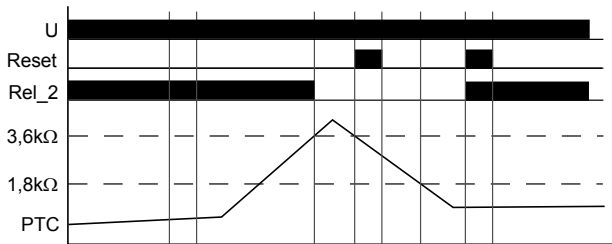
When the temperature monitoring isn't required then the jumper must be set between the terminals T1-T2!

Functions

Temperature monitoring without fault latch



Temperature monitoring with fault latch

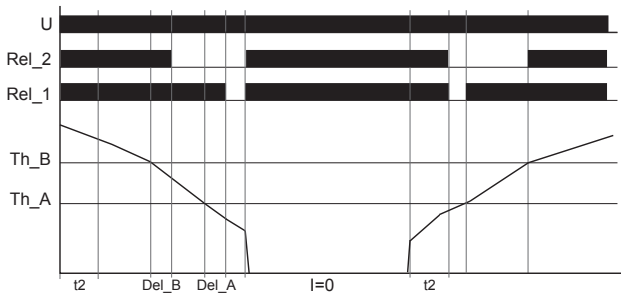


Recognition of disconnected load (I=0)

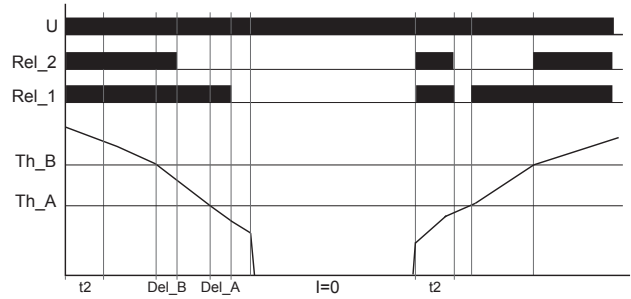
When the recognition of disconnected load (I=0) is activated, the relay state can be freely selected depending on the function.

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).

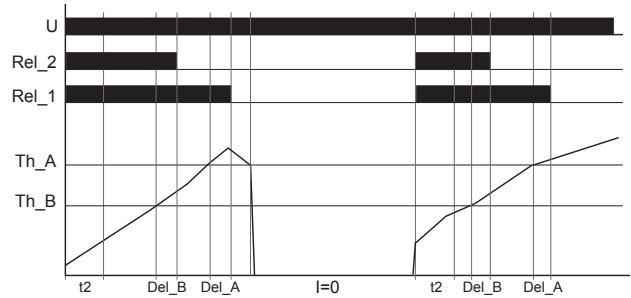
Example: I=0 with minimum monitoring (2MIN+I=0 ON)
relay state normal: Rel_1 and Rel_2 on



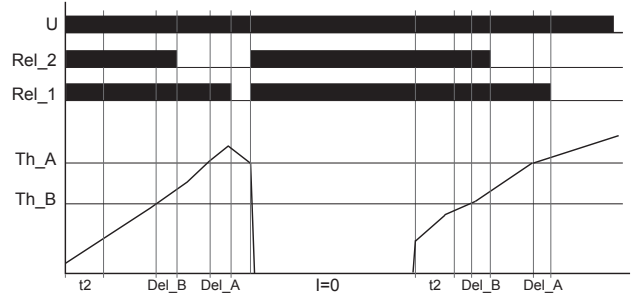
Example: I=0 Inv. with minimum monitoring (2MIN+I=0 ON)
relay state invers: Rel_1 and Rel_2 off



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

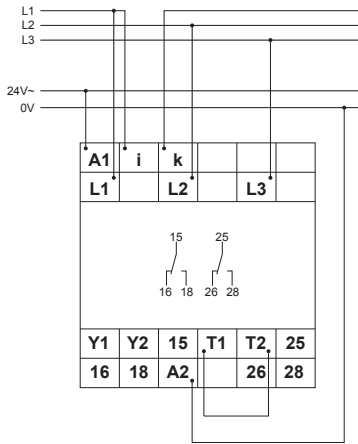


Example: I=0 Inv. with maximum monitoring (2MAX+I=0 ON)
relay state invers: Rel_1 and Rel_2 on

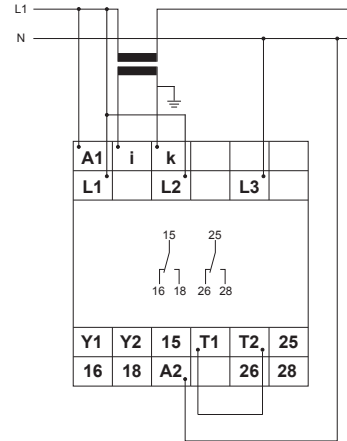


Connections

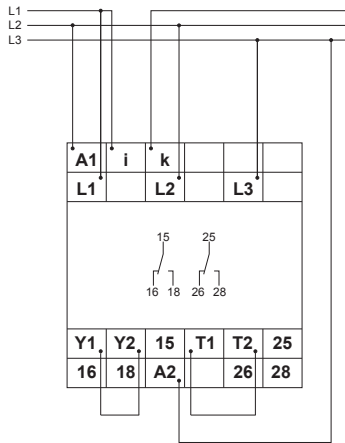
Connected 3~ 400V with power module 24V AC without fault latch $I_N < 12A$



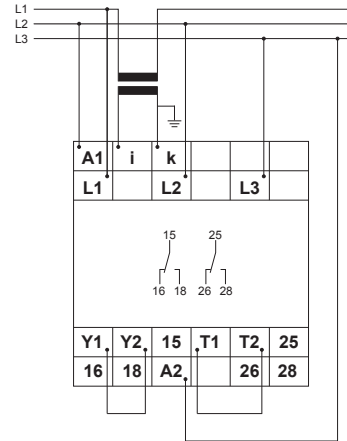
Connected 1~ 230V with power module 230V AC without fault latch but with current transformer $I_N > 12A$



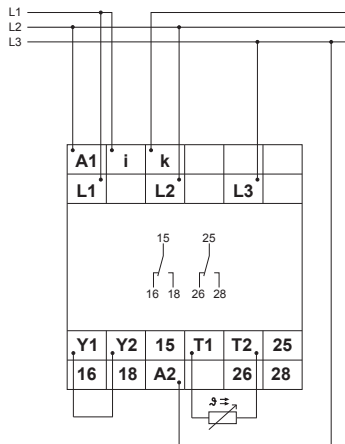
Connected 3~ 400V with power module 400V AC with fault latch $I_N < 12A$



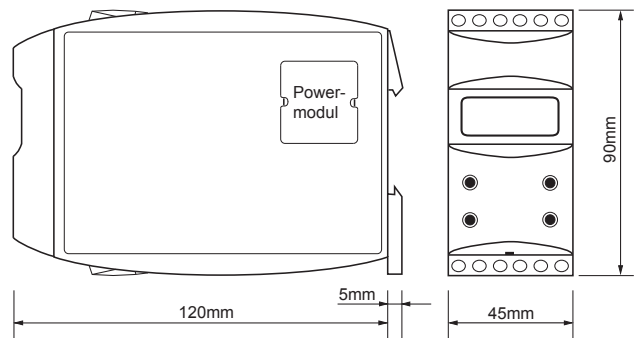
Connected 3~ 400V with power module 400V AC with fault latch and current transformer $I_N > 12A$



Connected 3~ 400V with power module 400V AC with fault latch and temperature monitoring sensor $I_N < 12A$



Dimensions



True power monitoring relay – G4BM480V12ADTL20

GAMMA Display Module

Content

1	General	2
1.1	Measured value display	2
1.2	Parameters	3
1.3	Menu configuration	5

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			∅	I	1	0
3	8	7	,	5	W	

P ... power

∅ ... 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			∅	I	1	0
		8	,	0	A	

I ... current

∅ ... 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	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	

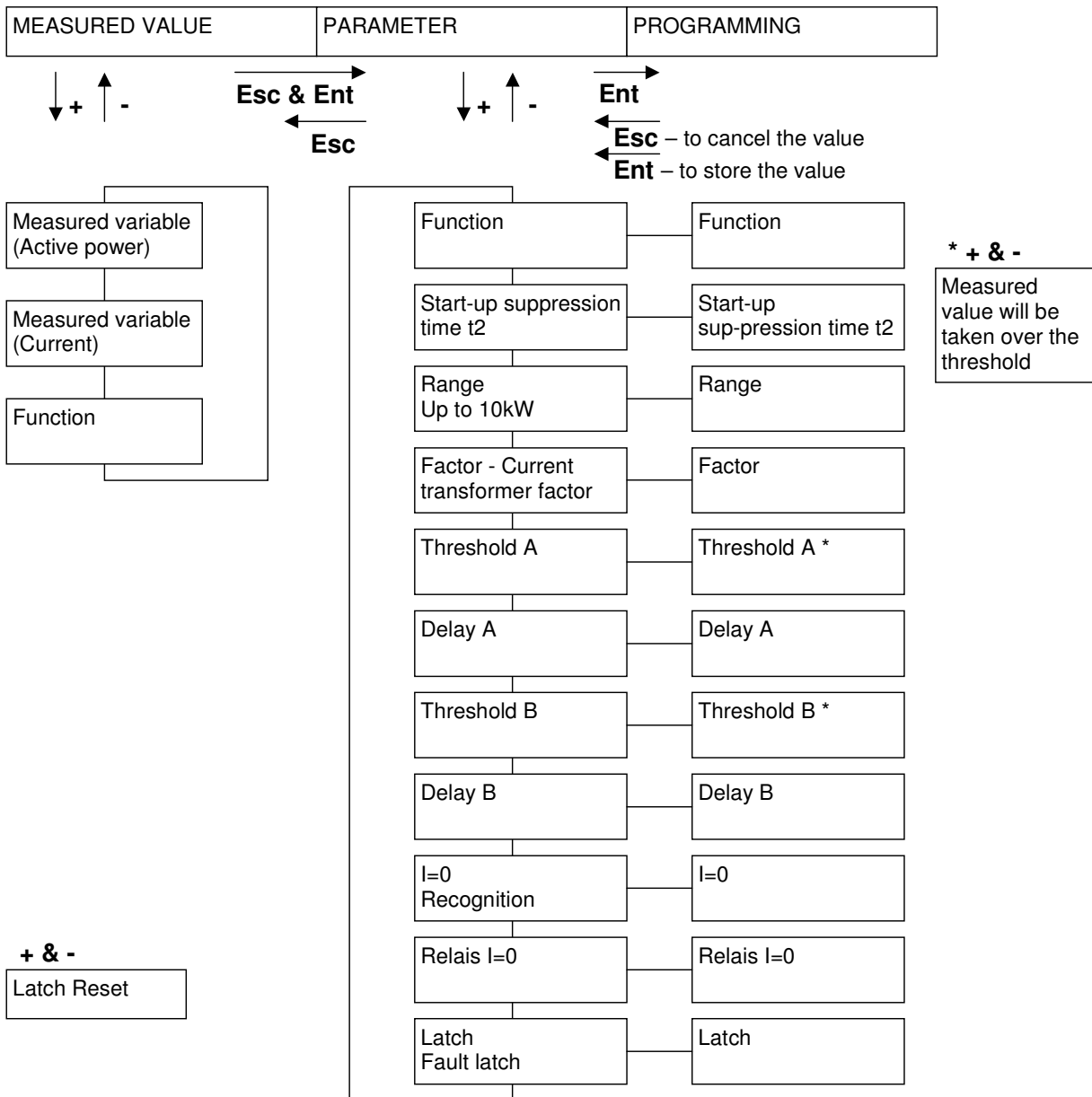
Indication of relay outputs - normal or inverse if I=0 activated
 (Recognition of disconnected load – relay on (1) or off (0))

Parameter fault latch (Latch):

L	a	t	c	h		P
o	f	f				

Fault latch (Latch): on or off

1.3 Menu configuration





True power monitoring in 1- or 3-phase loads

G4BM690V16AL20

Loadmonitors - GAMMA series

Multifunction

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



Read and understand these instructions before installing, operating or maintaining the equipment.



Danger!

Never carry out work on live parts! Danger of fatal injury! The product must not be used in case of obvious damage. To be installed by an authorized person.

Technical data

1. Functions

True power monitoring in 1- and 3-phase loads with adjustable thresholds (P1 and P2), timing for start-up suppression time and tripping delay separately adjustable, selectable fault latch and the following functions which are selected by means of rotary switch:

2MIN	Minimum monitoring
2MIN+I< ON	Minimum monitoring and recognition of disconnected consumers (relay ON if I<)
2MIN+I< Inv.	Minimum monitoring and recognition of disconnected consumers (relay OFF if I< Inv.)
2MAX	Maximum monitoring
2MAX+I< ON	Maximum monitoring and recognition of disconnected consumers (relay OFF if I<)
2MAX+I< Inv.	Maximum monitoring and recognition of disconnected consumers (relay OFF if I< Inv.)
WIN	Monitoring the window between MIN and MAX
WIN+I< ON	Monitoring the window between MIN and MAX and recognition of disconnected consumers (relay ON if I<)
WIN+I< Inv.	Monitoring the window between MIN and MAX and recognition of disconnected consumers (relay OFF if I< Inv.)
MIN/MAX	Minimum- and maximum monitoring
MIN/MAX+I< ON	Minimum- and maximum monitoring and recognition of disconnected consumers (relay ON if I<)
MIN/MAX+I< Inv.	Minimum- and maximum monitoring and recognition of disconnected consumers (relay OFF if I< Inv.)

2. Time ranges

	Adjustment range
Start-up suppression time:	1s 100s
Tripping delay:	0.1s 50s

3. Indicators

Green LED U/t ON:	indication of supply voltage
Green LED U/t flashes:	indication of start-up suppression time
Yellow LED I=0 ON/OFF:	indication of disconnected consumers
Red LED Failure ON:	indication of failure of the corresponding threshold P1 or P2
Red LED Failure flashes:	indication of tripping delay of the corresponding threshold P1 or P2
Yellow LED Rel 1 ON/OFF:	indication of relay output Rel 1
Yellow LED Rel 2 ON/OFF:	indication of relay output Rel 2

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 multicore cable end

5. Input circuit

Supply voltage: 12 to 500V a.c. terminals A1-A2 (galvanically separated) selectable via power module type TR3 according to specification of power module according to specification of power module

Tolerance:
 Rated frequency:
 Rated consumption: 3.5VA (3W)
 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: 6kV

6. Output circuit

2 potential free change over contacts
 Rated voltage: 250V a.c.
 Switching capacity: 750VA (3A / 250V a.c.)
 If the distance between the devices is less than 5mm!
 Rated voltage: 1250VA (5A / 250V a.c.)
 If the distance between the devices is greater than 5mm!
 Fusing: 5A fast acting
 Mechanical life: 20 x 10⁶ operations
 Electrical life: 2 x 10⁵ 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)

Withstand voltage across open contacts: 1000Veff a.c.
 Overvoltage category: III (in accordance with IEC 60664-1)
 Rated surge voltage: 6kV

Technical data

7. Measuring circuit

Measuring range P_N :	reversible between 2kW, 4kW, 8kW and 16kW
Wave form:	
AC Sinus:	10 to 400Hz
Sinus weighted PWM:	10 to 100Hz
Measuring input voltage:	terminals L1-L2-L3
1-phase load:	42 to 690V a.c.
3-phase load:	3~ 42 to 690/400V
Overload capacity:	
1-phase load:	796V a.c.
3-phase load:	3~ 796/460V
Input resistance:	1.25M Ω
Measuring input current:	terminals i-k
Measuring range 2kW, 4kW:	0.2 to 8A
Measuring range 8kW, 16kW:	0.4 to 16A (for $I > 16A$ distance $> 5mm$)
Overload capacity:	18A permanent
Input resistance:	$< 10m\Omega$

I_c - recognition:

Power interruption:

Measuring range 2kW, 4kW:	200mA
Measuring range 8kW, 16kW:	400mA

Current flow recognition:

Measuring range 2kW, 4kW:	240mA
Measuring range 8kW, 16kW:	480mA

Switching threshold P:

Switching threshold P1:	10% to 120% of P_N
Switching threshold P2:	5% to 110% of P_N

Hysteresis:

1% of maximum value of the measuring range

Overvoltage category:

III (in accordance with IEC 60664-1)

Rated surge voltage:

6kV

8. Control contact Y (equipotential with measuring circuit)

Function:	latch (terminal Y1-Y2 bridged)
Loadable:	no
Control pulse length:	-
Reset:	normally closed contact in the input circuit

9. Accuracy

Base accuracy:	$\pm 2\%$ (of maximum scale value)
Frequency response:	$\pm 0.025\%$ / Hz
Adjustment accuracy:	$\leq 5\%$ (of maximum scale value)
Repetition accuracy:	$\pm 2\%$
Voltage influence:	-
Temperature influence:	$\leq 0.02\%$ / °C

10. Ambient conditions

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:	2 (in accordance with EN 60255-27)
Vibration resistance:	class 1 (in accordance with EN 60255-22-1)
Shock resistance:	class 1 (in accordance with EN 60255-22-2)

Functions

When the supply voltage U is applied (green LED U/t illuminated) the output relays Rel 1 and Rel 2 switch into on-position (yellow LED Rel 1 and Rel 2 illuminated) and the set interval of the start-up suppression time (Start) begins (green LED U/t flashes). Changes of the measured true power during this period don't affect the state of the output relays Rel 1 and Rel 2. After the interval has expired the green LED U/t illuminates steadily.

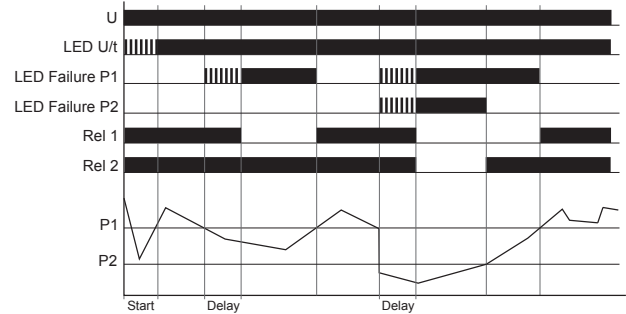
Minimum monitoring (2MIN)

The adjusted threshold for P1 must be greater than the adjusted threshold for P2. When the measured true power falls below the value adjusted at the P1-regulator, the set interval of the tripping delay (Delay) begins (red LED Failure of the corresponding threshold P1 flashes). After the

Failure of the corresponding threshold P2 flashes).

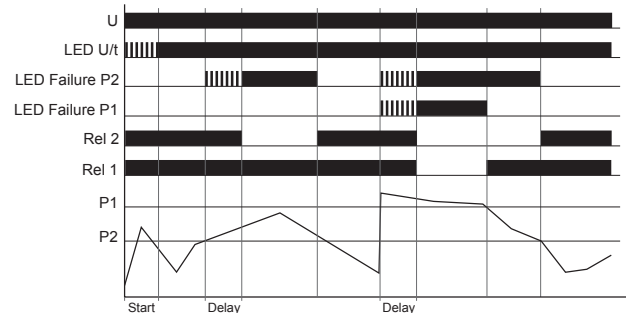
After the interval has expired (red LED Failure of the corresponding threshold P2 illuminated), the output relay Rel 2 switches into off-position (yellow LED Rel 2 not illuminated).

As soon as the measured true power exceeds the adjusted value at the corresponding regulator P1 or P2 (red LED Failure of the corresponding threshold P1 or P2 not illuminated), the output relay Rel 1 or Rel 2 switches into on-position again (yellow LED Rel 1 or Rel 2 illuminated).



Maximum monitoring (2MAX)

The adjusted threshold for P1 must be greater than the adjusted threshold for P2. When the measured true power exceeds the value adjusted at the P2-regulator, the set interval of the tripping delay (Delay) begins (red LED Failure of the corresponding threshold P2 flashes). After the interval has expired (red LED Failure of the corresponding threshold P2 illuminated), the output relay Rel 2 switches into off-position (yellow LED Rel 2 not illuminated). When the measured true power exceeds the value adjusted at the P1-regulator, the set interval of the tripping delay (Delay) begins (red LED Failure of the corresponding threshold P1 flashes). After the interval has expired (red LED Failure of the corresponding threshold P1 illuminated), the output relay Rel 1 switches into off-position (yellow LED Rel 1 not illuminated). As soon as the measured true power falls below the adjusted value at the corresponding regulator P1 or P2 (red LED Failure of the corresponding threshold P1 or P2 not illuminated), the output relay Rel 1 or Rel 2 switches into on-position again (yellow LED Rel 1 or Rel 2 illuminated).

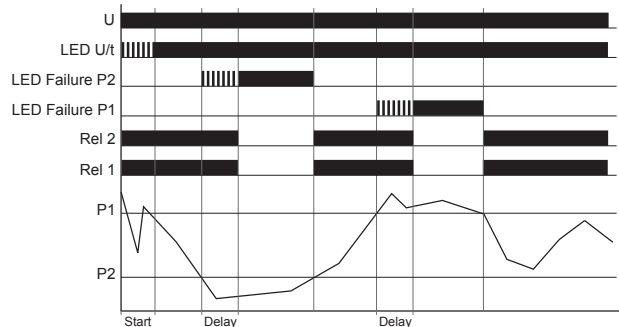


Functions

Window function (WIN)

The adjusted threshold for P1 must be greater than the adjusted threshold for P2. When the measured true power falls below the value adjusted at the P2-regulator, the set interval of the tripping delay (Delay) begins (red LED Failure of the corresponding threshold P2 flashes). After the interval has expired (red LED Failure of the corresponding threshold P2 illuminated), the output relays Rel 1 and Rel 2 switch into off-position (yellow LED Rel 1 and Rel 2 not illuminated). The output relays Rel 1 and Rel 2 switch into on-position again (yellow LED Rel 1 and Rel 2 illuminated), as soon as the the measured true power exceeds the adjusted value at the P2-regulator (red LED Failure of the corresponding threshold P2 not illuminated).

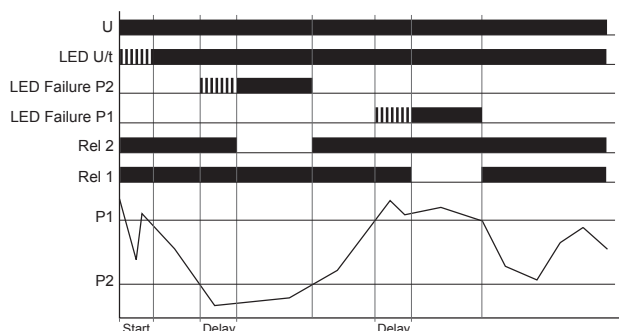
When the measured true power exceeds the value adjusted at the P1-regulator, the set interval of the tripping delay (Delay) begins (red LED Failure of the corresponding threshold P1 flashes). After the interval has expired (red LED Failure of the corresponding threshold P1 illuminated), the output relays Rel 1 and Rel 2 switch into off-position (yellow LED Rel 1 and Rel 2 not illuminated). As soon as the measured true power falls below the value adjusted at the P1-regulator (red LED Failure of the corresponding threshold P1 not illuminated) the output relays Rel 1 and Rel 2 switch into on-position again (yellow LED Rel 1 and Rel 2 illuminated).



Minimum- and maximum monitoring (MIN/MAX)

The adjusted threshold for P1 must be greater than the adjusted threshold for P2. When the measured true power falls below the value adjusted at the P2-regulator, the set interval of the tripping delay (Delay) begins (red LED Failure of the corresponding threshold P2 flashes). After the interval has expired (red LED Failure of the corresponding threshold P2 illuminated), the output relay Rel 2 switches into off-position (yellow LED Rel 2 not illuminated). The output relay Rel 2 switches into on-position again (yellow LED Rel 2 illuminated), as soon as the the measured true power exceeds the adjusted value at the P2-regulator (red LED Failure of the corresponding threshold P2 not illuminated).

When the measured true power exceeds the value adjusted at the P1-regulator, the set interval of the tripping delay (Delay) begins (red LED Failure of the corresponding threshold P1 flashes). After the interval has expired (red LED Failure of the corresponding threshold P1 illuminated), the output relay Rel 1 switches into off-position (yellow LED Rel 1 not illuminated). As soon as the measured true power falls below the value adjusted at the P1-regulator (red LED Failure of the corresponding threshold P1 not illuminated) the output relay Rel 1 switches into on-position again (yellow LED Rel 1 illuminated).



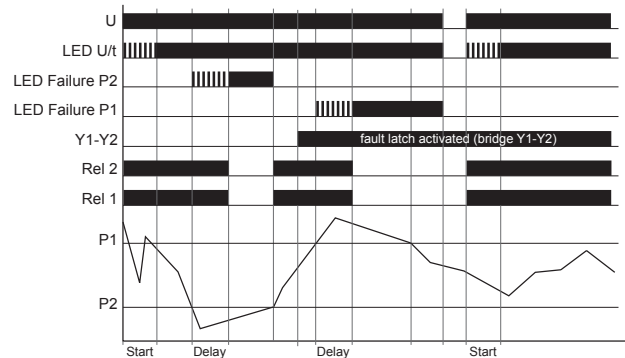
Fault latch

The fault latch can be activated via bridge between the terminals Y1 and Y2. If the fault latch is activated and a failure has occurred (red LED of the corresponding threshold illuminated), the failure can only be reset by interrupting the supply voltage or pressing the reset-key. After resetting the failure and re-applying of the supply voltage, the output relays Rel 1 and Rel 2 switch into on-position again and the measuring cycle begins with the set interval of the start-up suppression time (Start).

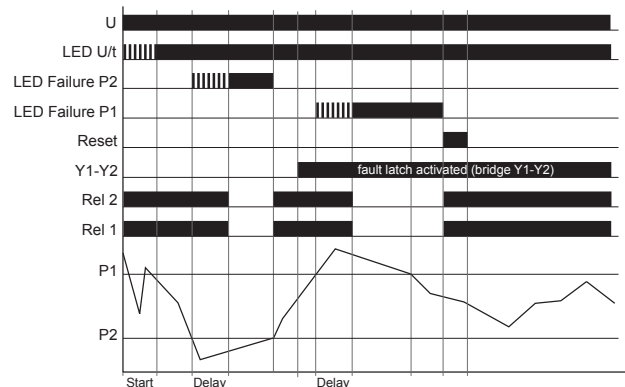
Note:

The fault latch remains active inspite of a I=0 recognition!

Example: Window function (WIN) - Resetting the fault latch by interrupting the supply voltage



Example: Window function (WIN) - Resetting the fault latch by pressing the reset-key



Functions

Recognition of disconnected consumers

The following applies for functions, where the I=0 recognition is activated:

When the current flow between i and k is interrupted (yellow LED I=0 illuminated) and the minimum-, window- or minimum- and maximum function is activated (2MIN+I=0, WIN+I=0, MIN/MAX+I=0), the output relays Rel 1 and Rel 2 remain in on-position (yellow LED Rel 1 and LED Rel 2 illuminated).

When the maximum function is activated (2MAX+I=0), the output relays Rel 1 and Rel 2 switch into off-position (yellow LED Rel 1 and LED Rel 2 not illuminated).

When the current flow restores, the measuring cycle is restarted with the set interval of the start-up suppression time (Start) (green LED U/t flashes).

The following applies for functions, where the inverted I=0 recognition is activated:

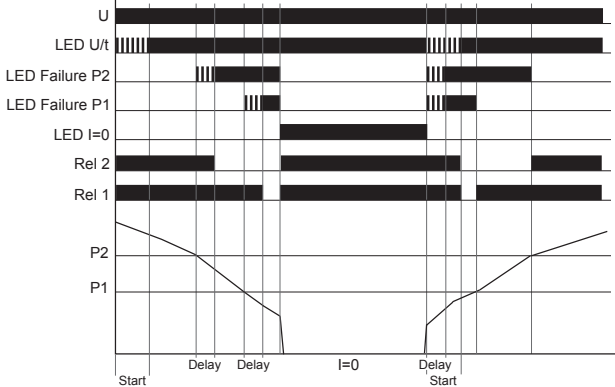
When the current flow between i and k is interrupted (yellow LED I=0 illuminated), the output relays behaves inverse to the above mentioned function.

If the minimum-, window- or minimum- and maximum function (2MIN+I=0 Inv., WIN+I=0 Inv., MIN/MAX+I=0 Inv.) is activated, the output relays Rel 1 and Rel 2 switch into off-position (yellow LED Rel 1 and LED Rel 2 not illuminated).

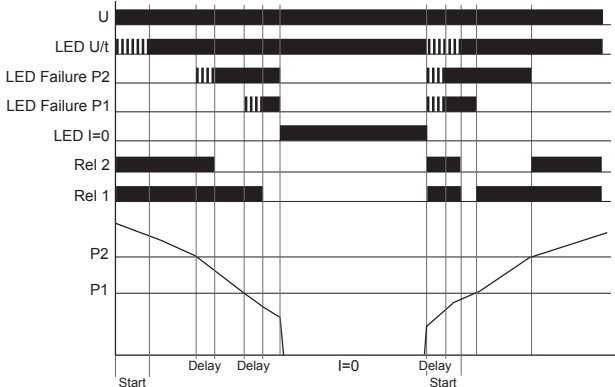
When the maximum function is activated (2MAX+I=0 Inv.), the output relays Rel 1 and Rel 2 remain in on-position (yellow LED Rel 1 and LED Rel 2 illuminated).

When the current flow restores, the measuring cycle is restarted with the set interval of the start-up suppression time (Start) (green LED U/t flashes).

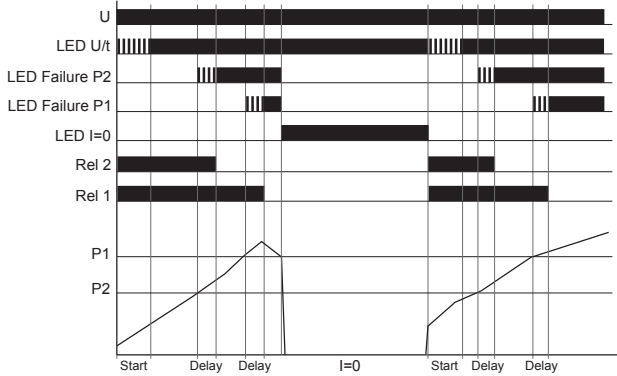
I=0 with minimum monitoring (2MIN+I=0)



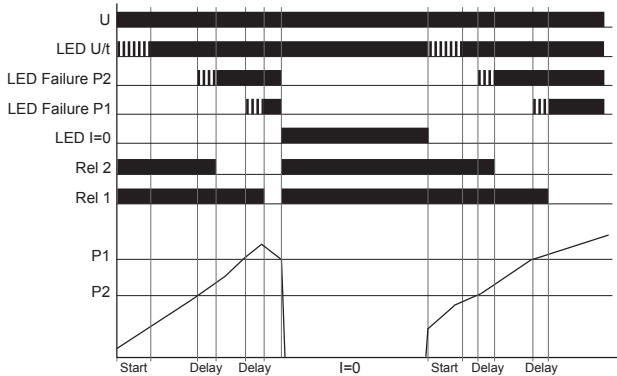
I=0 Inv. with minimum monitoring (2MIN+I=0 Inv.)



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

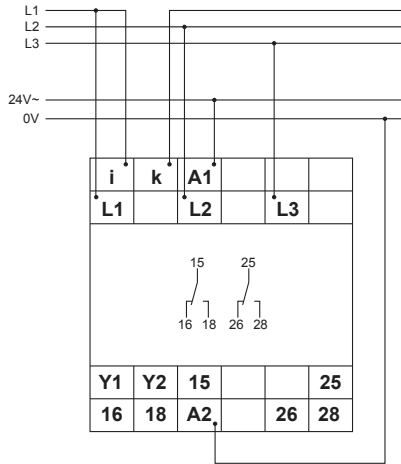


I=0 Inv. with maximum monitoring (2MAX+I=0 Inv.)

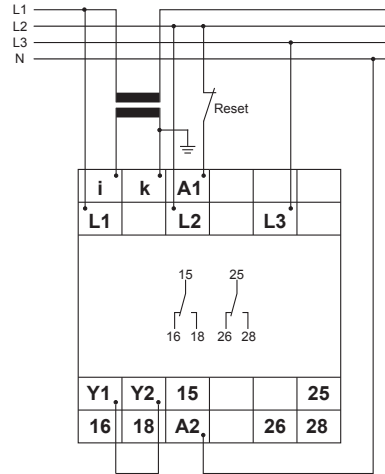


Connections

Connected 3~ 400/690V with power module 24V a.c. without fault latch $I_N < 16A$



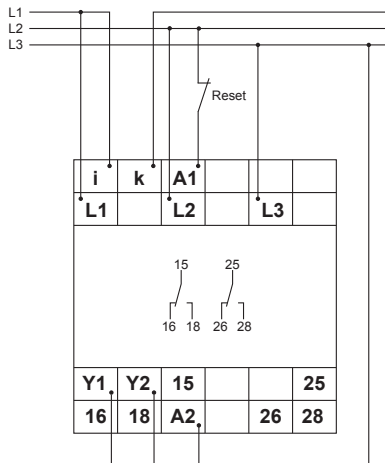
Connected 3~ 400/690V with power module 400V a.c. with fault latch and current transformer $I_N > 16A$



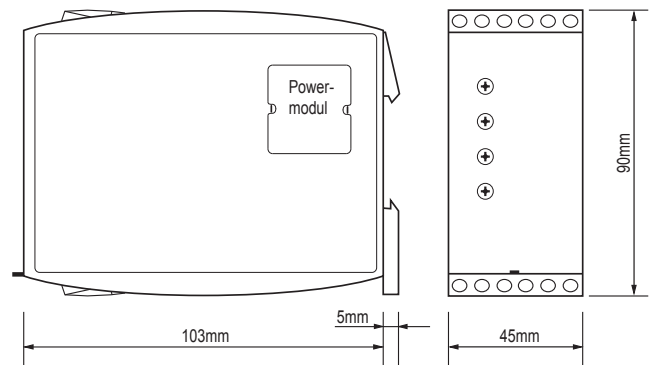
Note:

Before working on current transformer circuits, these shall be short-circuited.

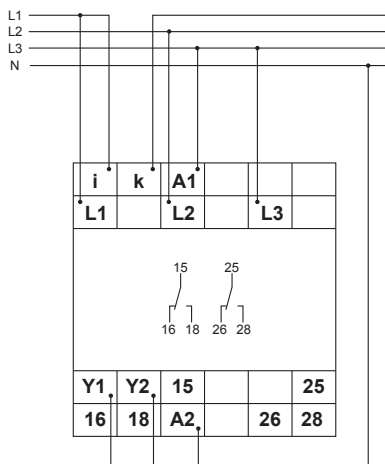
Connected 3~ 500V with power module 500V a.c. with fault latch $I_N < 16A$



Dimensions



Connected 3~ 230/400V with power module 230V a.c. with fault latch $I_N < 16A$





Loadmonitors - GAMMA series

Multifunction

Temperature monitoring of the motor winding

Reset-key

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



Read and understand these instructions before installing, operating or maintaining the equipment.



Danger!

Never carry out work on live parts! Danger of fatal injury! The product must not be used in case of obvious damage. To be installed by an authorized person.

Technical data

1. Functions

True power monitoring in 1- and 3-phase loads with adjustable thresholds (P1 and P2), timing for start-up suppression time and tripping delay separately adjustable, selectable fault latch, temperature monitoring of the motor winding with max. 6 PTC, reset-key and the following functions which are selectable by means of rotary switch:

2MIN	Minimum monitoring
2MIN+I< ON	Minimum monitoring and recognition of disconnected consumers (relay ON if I<)
2MIN+I< Inv.	Minimum monitoring and recognition of disconnected consumers (relay OFF if I< Inv.)
2MAX	Maximum monitoring
2MAX+I< ON	Maximum monitoring and recognition of disconnected consumers (relay OFF if I<)
2MAX+I< Inv.	Maximum monitoring and recognition of disconnected consumers (relay OFF if I< Inv.)
WIN	Monitoring the window between MIN and MAX
WIN+I< ON	Monitoring the window between MIN and MAX and recognition of disconnected consumers (relay ON if I<)
WIN+I< Inv.	Monitoring the window between MIN and MAX and recognition of disconnected consumers (relay OFF if I< Inv.)
MIN/MAX	Minimum- and maximum monitoring
MIN/MAX+I< ON	Minimum- and maximum monitoring and recognition of disconnected consumers (relay ON if I<)
MIN/MAX+I< Inv.	Minimum- and maximum monitoring and recognition of disconnected consumers (relay OFF if I< Inv.)

2. Time ranges

	Adjustment range
Start-up suppression time:	1s 100s
Tripping delay:	0.1s 50s

3. Indicators

Green LED U/t ON:	indication of supply voltage
Green LED U/t flashes:	indication of start-up suppression time
Yellow LED I=0 ON/OFF:	indication of disconnected consumers
Red LED Failure ON:	indication of failure of the corresponding threshold P1 or P2
Red LED Failure flashes:	indication of tripping delay of the corresponding threshold P1 or P2
Red LED Temp ON/OFF:	indication of overtemperature
Yellow LED Rel 1 ON/OFF:	indication of relay output Rel 1
Yellow LED Rel 2 ON/OFF:	indication of relay output Rel 2

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 multicore cable end

5. Input circuit

Supply voltage: 12 to 500V a.c. terminals A1-A2 (galvanically separated) selectable via power module type TR3 according to specification of power module according to specification of power module
 Tolerance:
 Rated frequency:
 Rated consumption: 3.5VA (3W)
 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: 6kV

6. Output circuit

2 potential free change over contacts
 Rated voltage: 250V a.c.
 Switching capacity: 750VA (3A / 250V a.c.)
 If the distance between the devices is less than 5mm!
 Rated voltage: 1250VA (5A / 250V a.c.)
 If the distance between the devices is greater than 5mm!
 Fusing: 5A fast acting
 Mechanical life: 20 x 10⁶ operations
 Electrical life: 2 x 10⁵ 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)
 Withstand voltage across open contacts: 1000Veff a.c.
 Overvoltage category: III (in accordance with IEC 60664-1)
 Rated surge voltage: 4kV

7. Measuring circuit

Measuring range P_N: reversible between 2kW, 4kW, 8kW and 16kW

Technical data

Wave form:	
AC Sinus:	10 to 400Hz
Sinus weighted PWM:	10 to 100Hz
Measuring input voltage:	terminals L1-L2-L3
1-phase load:	42 to 690V a.c.
3-phase load:	3~ 42 to 690/400V
Overload capacity:	
1-phase load:	796V a.c.
3-phase load:	3~ 796/460V
Input resistance:	1.25MΩ
Measuring input current:	
Measuring range 2kW, 4kW:	0.2 to 8A
Measuring range 8kW, 16kW:	0.4 to 16A (for I>16A distance >5mm)
Overload capacity:	18A permanent
Input resistance:	<10mΩ

I< - recognition:	
Power interruption:	
Measuring range 2kW, 4kW:	200mA
Measuring range 8kW, 16kW:	400mA
Current flow recognition:	
Measuring range 2kW, 4kW:	240mA
Measuring range 8kW, 16kW:	480mA
Switching threshold P:	
Switching threshold P1:	10% to 120% of P_N
Switching threshold P2:	5% to 110% of P_N
Hysteresis:	
	1% of maximum value of the measuring range

Temperature monitoring:	
Terminals:	T1-T2
Initial resistance:	<1.5kW
Response value (Relais in on-position):	≥3.6kW
Release value (Relais in off-position):	≤1.8kW
Disconnection (short circuit thermistor): no	
Measuring voltage T1-T2:	≤7.5V at R ≤4.0kW (in accordance with EN 60947-8)
Overvoltage category:	III (in accordance with IEC 60664-1)
Rated surge voltage:	6kV

8. Control contact Y (equipotential with measuring circuit)

Function:	latch (terminal Y1-Y2 bridged)
Loadable:	no
Control pulse length:	-
Reset:	normally closed contact in the input circuit

9. Accuracy

Base accuracy:	±2% (of maximum scale value)
Frequency response:	±0.025% / Hz
Adjustment accuracy:	≤5% (of maximum scale value)
Repetition accuracy:	±2%
Voltage influence:	-
Temperature influence:	≤0.02% / °C

10. Ambient conditions

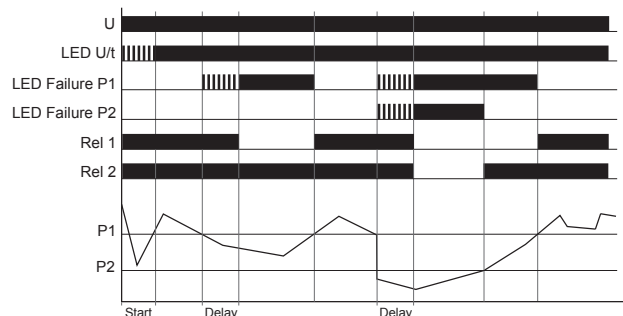
Ambient temperature:	
	-25 to +55°C
	(in accordance with IEC 60068-1)
	-25 to +40°C (in accordance with UL 508)
Storage temperature:	
	-25 to +70°C
Transport temperature:	
	-25 to +70°C
Relative humidity:	
	15% to 85%
	(in accordance with IEC 60721-3-3 class 3K3)
Pollution degree:	
	2 (in accordance with EN 60255-27)
Vibration resistance:	
	class 1 (in accordance with EN 60255-22-1)
Shock resistance:	
	class 1 (in accordance with EN 60255-22-2)

Functions

When the supply voltage U is applied (green LED U/t illuminated) the output relays Rel 1 and Rel 2 switches into on-position (yellow LED Rel 1 and Rel 2 illuminated) and the set interval of the start-up suppression time (Start) begins (green LED U/t flashes). Changes of the measured true power during this period don't affect the state of the output relays Rel 1 and Rel 2. After the interval has expired the green LED U/t illuminates steadily.

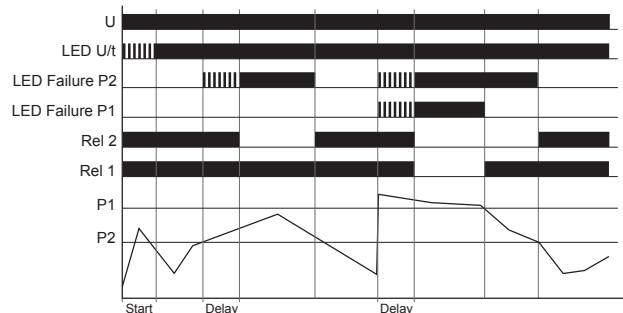
Minimum monitoring (2MIN)

The adjusted threshold for P1 must be greater than the adjusted threshold for P2. When the measured true power falls below the value adjusted at the P1-regulator, the set interval of the tripping delay (Delay) begins (red LED Failure of the corresponding threshold P1 flashes). After the interval has expired (red LED Failure of the corresponding threshold P1 illuminated), the output relay Rel 1 switches into off-position (yellow LED Rel 1 not illuminated). When the measured true power exceeds the value adjusted at the P2-regulator, the set interval of the tripping delay (Delay) begins (red LED Failure of the corresponding threshold P2 flashes). After the interval has expired (red LED Failure of the corresponding threshold P2 illuminated), the output relay Rel 2 switches into off-position (yellow LED Rel 2 not illuminated). As soon as the measured true power exceeds the adjusted value at the corresponding regulator P1 or P2 (red LED Failure of the corresponding threshold P1 or P2 not illuminated), the output relay Rel 1 or Rel 2 switches into on-position again (yellow LED Rel 1 or Rel 2 illuminated).



Maximum monitoring (2MAX)

The adjusted threshold for P1 must be greater than the adjusted threshold for P2. When the measured true power exceeds the value adjusted at the P2-regulator, the set interval of the tripping delay (Delay) begins (red LED Failure of the corresponding threshold P2 flashes). After the interval has expired (red LED Failure of the corresponding threshold P2 illuminated), the output relay Rel 2 switches into off-position (yellow LED Rel 2 not illuminated). When the measured true power exceeds the value adjusted at the P1-regulator, the set interval of the tripping delay (Delay) begins (red LED Failure of the corresponding threshold P1 flashes). After the interval has expired (red LED Failure of the corresponding threshold P1 illuminated), the output relay Rel 1 switches into off-position (yellow LED Rel 1 not illuminated). As soon as the measured true power falls below the adjusted value at the corresponding regulator P1 or P2 (red LED Failure of the corresponding threshold P1 or P2 not illuminated), the output relay Rel 1 or Rel 2 switches into on-position again (yellow LED Rel 1 or Rel 2 illuminated).

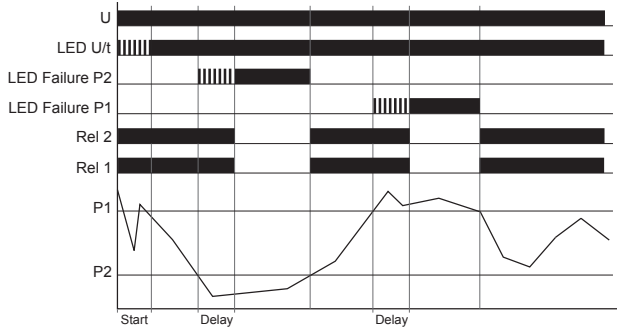


Functions

Window function (WIN)

The adjusted threshold for P1 must be greater than the adjusted threshold for P2. When the measured true power falls below the value adjusted at the P2-regulator, the set interval of the tripping delay (Delay) begins (red LED Failure of the corresponding threshold P2 flashes). After the interval has expired (red LED Failure of the corresponding threshold P2 illuminated), the output relays Rel 1 and Rel 2 switches into off-position (yellow LED Rel 1 and Rel 2 not illuminated). The output relays Rel 1 and Rel 2 switches into on-position again (yellow LED Rel 1 and Rel 2 illuminated), as soon as the the measured true power exceeds the adjusted value at the P2-regulator (red LED Failure of the corresponding threshold P2 not illuminated).

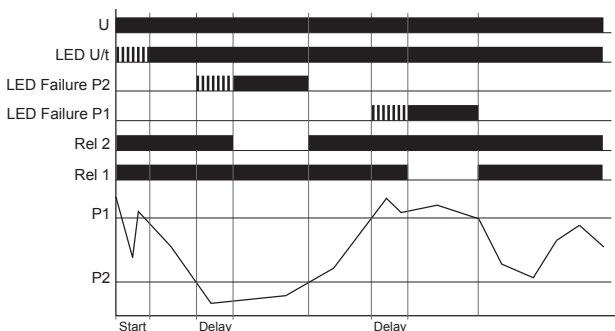
When the measured true power exceeds the value adjusted at the P1-regulator, the set interval of the tripping delay (Delay) begins (red LED Failure of the corresponding threshold P1 flashes). After the interval has expired (red LED Failure of the corresponding threshold P1 illuminated), the output relays Rel 1 and Rel 2 switches into off-position (yellow LED Rel 1 and Rel 2 not illuminated). As soon as the measured true power falls below the value adjusted at the P1-regulator (red LED Failure of the corresponding threshold P1 not illuminated) the output relays Rel 1 and Rel 2 switches into on-position again (yellow LED Rel 1 and Rel 2 illuminated).



Minimum- and maximum monitoring (MIN/MAX)

The adjusted threshold for P1 must be greater than the adjusted threshold for P2. When the measured true power falls below the value adjusted at the P2-regulator, the set interval of the tripping delay (Delay) begins (red LED Failure of the corresponding threshold P2 flashes). After the interval has expired (red LED Failure of the corresponding threshold P2 illuminated), the output relay Rel 2 switches into off-position (yellow LED Rel 2 not illuminated). The output relay Rel 2 switches into on-position again (yellow LED Rel 2 illuminated), as soon as the the measured true power exceeds the adjusted value at the P2-regulator (red LED Failure of the corresponding threshold P2 not illuminated).

When the measured true power exceeds the value adjusted at the P1-regulator, the set interval of the tripping delay (Delay) begins (red LED Failure of the corresponding threshold P1 flashes). After the interval has expired (red LED Failure of the corresponding threshold P1 illuminated), the output relay Rel 1 switches into off-position (yellow LED Rel 1 not illuminated). As soon as the measured true power falls below the value adjusted at the P1-regulator (red LED Failure of the corresponding threshold P1 not illuminated) the output relay Rel 1 switches into on-position again (yellow LED Rel 1 illuminated).



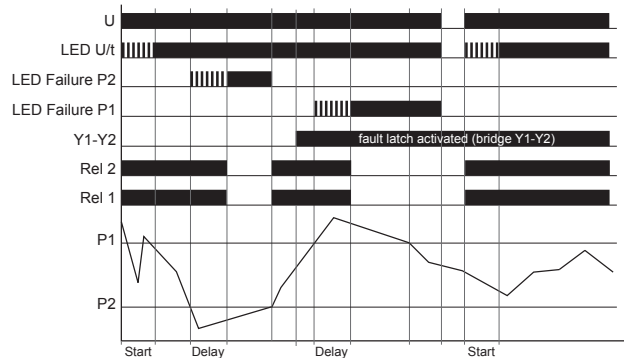
Fault latch

The fault latch can be activated via bridge between the terminals Y1 and Y2. If the fault latch is activated and a failure has occurred (red LED of the corresponding threshold or red LED Temp illuminated), the failure can only be reset by interrupting the supply voltage or pressing the reset-key. After resetting the failure and re-applying of the supply voltage, the output relays Rel 1 and Rel 2 switches into on-position again and the measuring cycle begins with the set interval of the start-up suppression time (Start).

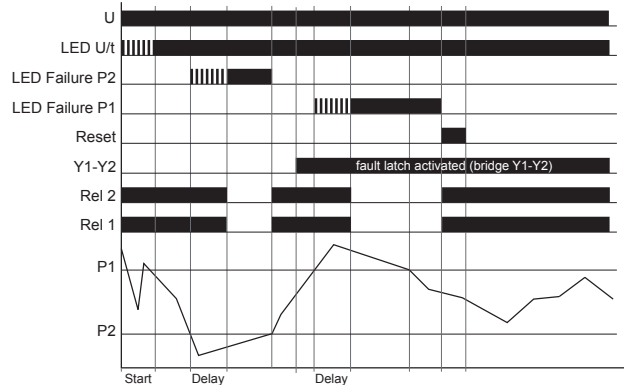
Note:

The fault latch remains active inspite of a I=0 recognition!

Example: Window function (WIN) - Resetting the fault latch by interrupting the supply voltage



Example: Window function (WIN) - Resetting the fault latch by pressing the reset-key



Functions

Recognition of disconnected consumers

The following applies for functions, where the I=0 recognition is activated:

When the current flow between i and k is interrupted (yellow LED I=0 illuminated) and the minimum-, window- or minimum- and maximum function is activated (2MIN+I=0, WIN+I=0, MIN/MAX+I=0), the output relays Rel 1 and Rel 2 remains into on-position (yellow LED Rel 1 and LED Rel 2 illuminated).

When the maximum function is activated (2MAX+I=0), the output relays Rel 1 and Rel 2 switches into off-position (yellow LED Rel 1 and LED Rel 2 not illuminated).

When the current flow restores, the measuring cycle is restarted with the set interval of the start-up suppression time (Start) (green LED U/t flashes).

The following applies for functions, where the inverted I=0 recognition is activated:

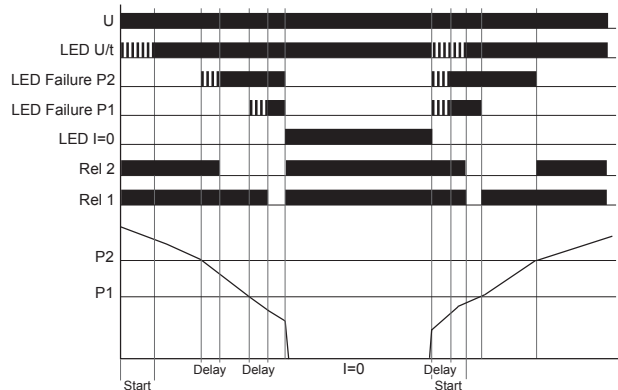
When the current flow between i and k is interrupted (yellow LED I=0 illuminated), the output relays behaves inverse to the above mentioned function.

If the minimum-, window- or minimum- and maximum function (2MIN+I=0 Inv., WIN+I=0 Inv., MIN/MAX+I=0 Inv.) is activated, the output relays Rel 1 and Rel 2 switches into off-position (yellow LED Rel 1 and LED Rel 2 not illuminated).

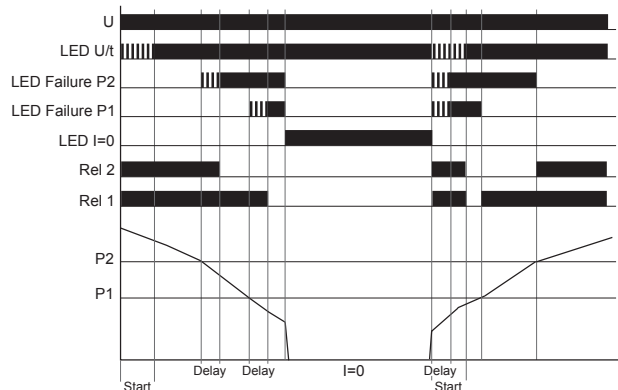
When the maximum function is activated (2MAX+I=0 Inv.), the output relays Rel 1 and Rel 2 remains in on-position (yellow LED Rel 1 and LED Rel 2 illuminated).

When the current flow restores, the measuring cycle is restarted with the set interval of the start-up suppression time (Start) (green LED U/t flashes).

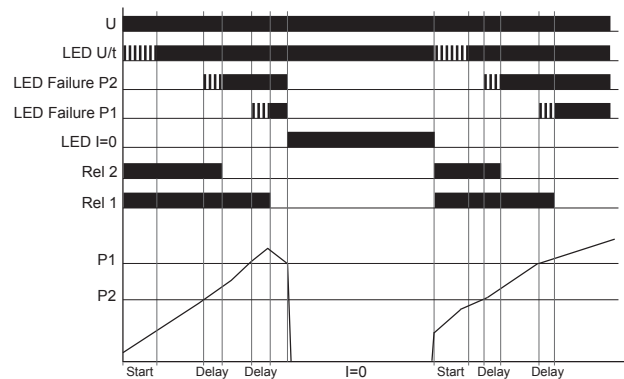
I=0 with minimum monitoring (2MIN+I=0)



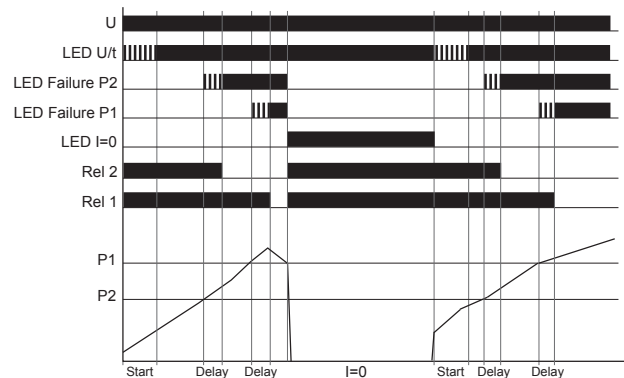
I=0 Inv. with minimum monitoring (2MIN+I=0 Inv.)



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



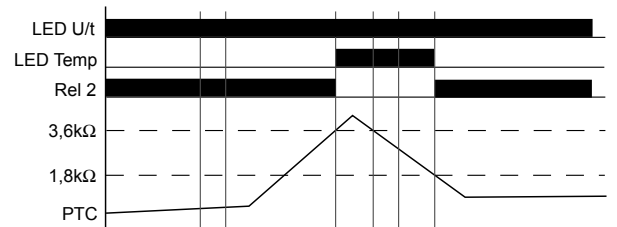
I=0 Inv. with maximum monitoring (2MAX+I=0 Inv.)



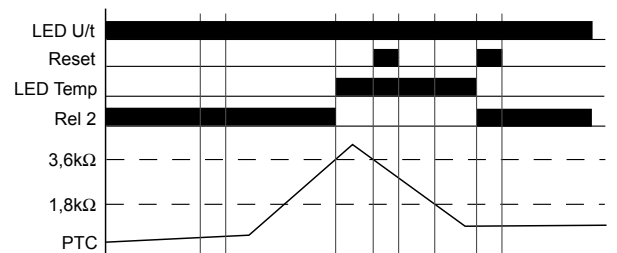
Temperature monitoring of the motor winding

If the supply voltage U is applied (green LED U/t illuminated) 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 (yellow LED Rel 2 not illuminated) and a failure will be indicated (red LED Temp illuminated). The output relay Rel 2 switches into on-position again (yellow LED Rel 2 illuminated) respectively the failure will be cancelled (red LED Temp not illuminated), if the cumulative resistance drops below 1.8kΩ by cooling down of the PTC. If the fault latch is activated, a press of the reset-key is required to cancel the temperature failure.

Temperature monitoring without fault latch



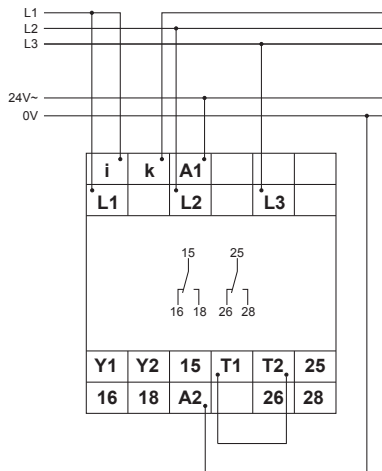
Temperature monitoring with fault latch



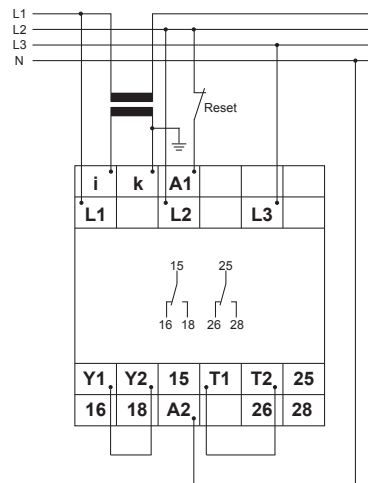
Note: If the output relay Rel 2 should switch into on-position again, no other failure should be applied!

Connections

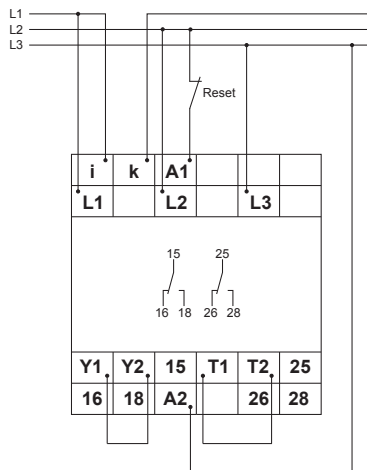
Connected 3~ 400/690V with power module 24V a.c. without fault latch $I_N < 16A$



Connected 3~ 400/690V with power module 400V a.c. with fault latch and current transformer $I_N > 16A$



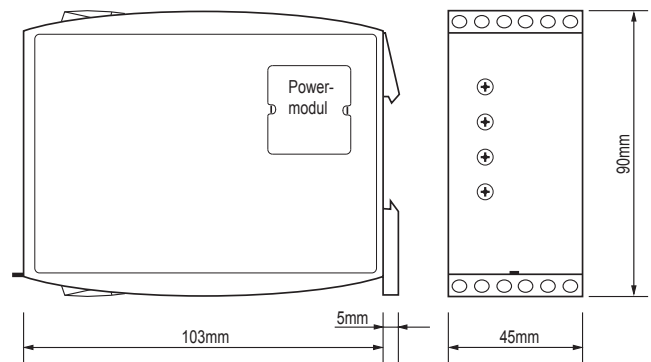
Connected 3~ 500V with power module 500V a.c. with fault latch $I_N < 16A$



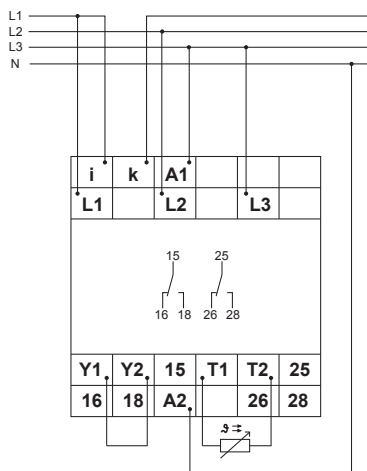
Note:

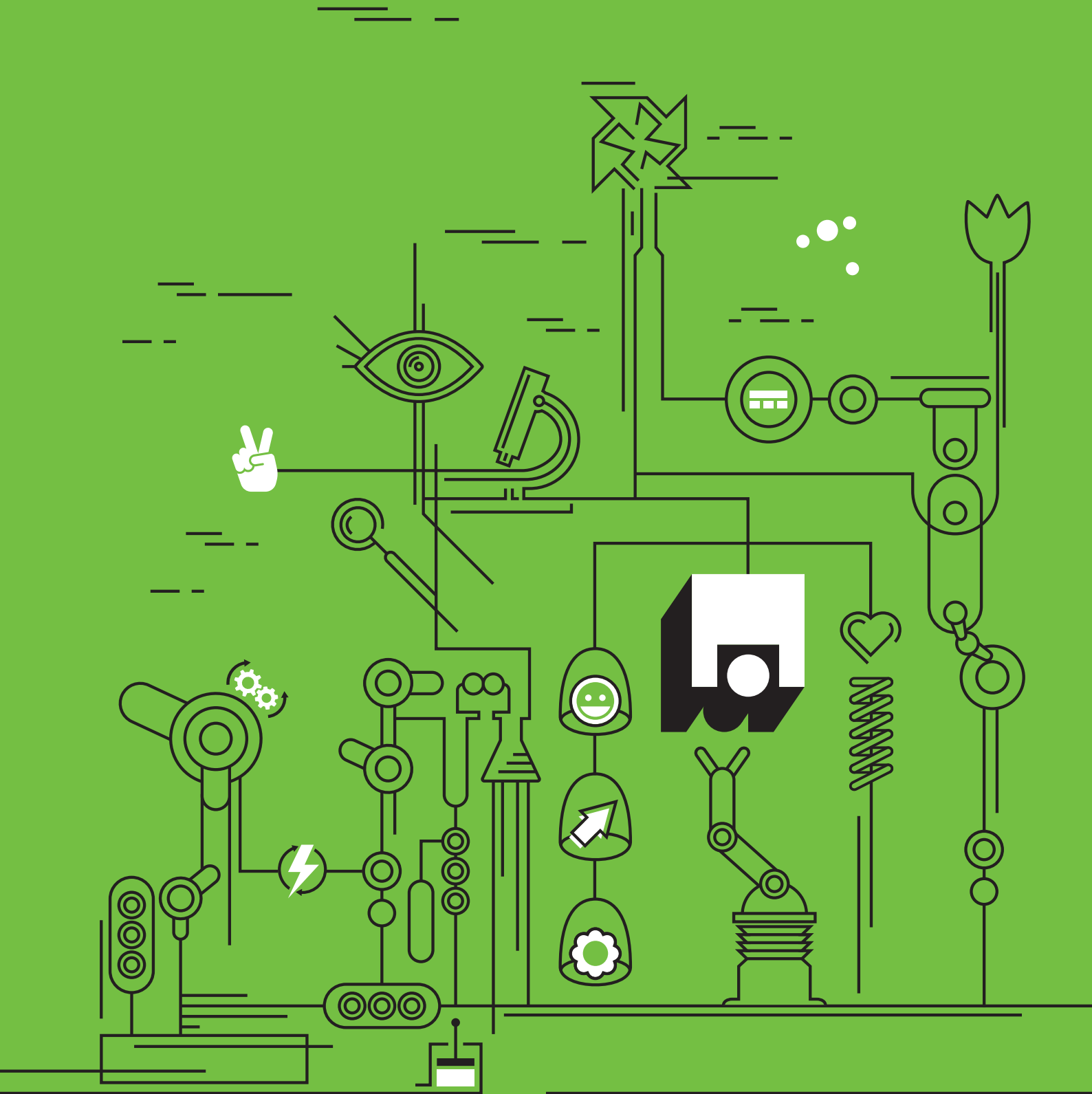
Before working on current transformer circuits, these shall be short-circuited.

Dimensions



Connected 3~ 230/400V with power module 230V a.c. with fault latch and temperature monitoring sensor $I_N < 16A$





For contact data of your local distributor please visit
<http://www.tele-online.com/en/organization/distribution/>

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