

# Monitoring Relays

## 1-Phase True RMS AC/DC Over and Under Current

### Types DIC01, PIC01

CARLO GAVAZZI



DIC01



PIC01

- TRMS AC/DC over + under, over+over, under+under current and voltage monitoring relays
- DC process signal plus/minus monitoring relay (DIC01)
- Selection of measuring range by DIP-switches
- Adjustable current and voltage on relative scale
- Adjustable hysteresis on relative scale
- Separately adjustable delay functions (0.1 to 30 s)
- Programmable latching or inhibit at set level
- Output: 1 or 2 x 8 A SPDT relay N.D. or N.E. selectable
- For mounting on DIN-rail in accordance with DIN/EN 50 022 (DIC01) or plug-in module (PIC01)
- 45 mm Euronorm housing (DIC01)
- 36 mm plug-in module (PIC01)
- LED indication for relay(s), alarm and power supply ON
- Galvanically separated power supply

## Product Description

DIC01 and PIC01 are precise TRMS AC/DC over+under, over+over or under+under current and voltage (selectable by DIP-switch) monitoring relays. DIC01 can perform also DC plus/minus measurement by short circuiting pins Z3 and Y1. The devices can be connected to the MI or MP and A82 or E82 current transformers. Both relays have two individual set levels with their own

time delay. Only for DIC01 each set level can work with a single SPDT relay. Owing to the built-in latch function, the ON-position of the relay output can be maintained. Inhibit function can be used to avoid relay operation when not desired (maintenance, transitions). The LED's indicate the state of the alarm and the output relays.

## Ordering Key

**DIC 01 D B23 AV0**

Housing \_\_\_\_\_  
 Function \_\_\_\_\_  
 Type \_\_\_\_\_  
 Item number \_\_\_\_\_  
 Output \_\_\_\_\_  
 Power supply \_\_\_\_\_  
 Range \_\_\_\_\_

## Type Selection

Mounting	Output	Supply: 24 VDC	Supply: 48 VDC	Supply: 24/48 VAC	Supply: 115/230 VAC
DIN-rail	2xSPDT	DIC 01 D 724 AV0	DIC 01 D 748 AV0	DIC 01 D B48 AV0	DIC 01 D B23 AV0
Plug-in	SPDT	PIC 01 C 724 AV0	PIC 01 C 748 AV0	PIC 01 C B48 AV0	PIC 01 C B23 AV0

## Input Specifications

Input	CT ranges		AAC rms	Max. curr.
Current level	DIC01: Terminals Y1, Y2 PIC01: Terminals 6, 7			
Voltage level	DIC01: Terminals Y1, Y3 PIC01: Terminals 5, 7			
DC levels (DIC01 only)	Connecting terminals Z3, Y1			
<b>Current ranges</b>	<b>Internal resis.</b>	<b>Max. curr.</b>		
0.5 to 5 mA AC/DC	50 Ω	35 mA		
2 to 20 mA AC/DC	50 Ω	55 mA		
-5 to 5 mA DC	50 Ω	35 mA		
-20 to 20 mA DC	50 Ω	55 mA		
Max. current for 1 s		100 mA		
<b>Voltage ranges</b>	<b>Internal resis.</b>	<b>Max. volt.</b>		
0.1 to 1 V AC/DC	> 10 kΩ	7 V		
1 to 10 V AC/DC	> 10 kΩ	20 V		
0.4 to 4 V <sub>p</sub> AC	> 10 kΩ	100 V		
-1 to 1 VDC	> 10 kΩ	7 V		
-10 to 10 VDC	> 10 kΩ	20 V		
Max. voltage for 1 s		100 V		
<b>Note:</b> The input voltage cannot raise over 300 VAC/DC with respect to ground (PIC01 only)				



## Input Specifications (cont.)

<b>Note:</b> MP 3... current transformers not suitable for under current measurements due to the output signal of the device (see data sheet)	
<b>Contact input</b> DIC01 PIC01 Disabled Enabled Latch disable	Terminals Z1, Y1 Terminals 8, 9 > 10 kΩ < 500 Ω > 500 ms

## Output Specifications

<b>Output</b> Rated insulation voltage	1 or 2 x SPDT relays 250 VAC
<b>Contact ratings</b> (AgSnO <sub>2</sub> ) Resistive loads AC 1 DC 12 Small inductive loads AC 15 DC 13	μ 8 A @ 250 VAC 5 A @ 24 VDC 2.5 A @ 250 VAC 2.5 A @ 24 VDC
<b>Mechanical life</b>	≥ 30 x 10 <sup>6</sup> operations
<b>Electrical life</b>	≥ 10 <sup>5</sup> operations (at 8 A, 250 V, cos φ = 1)
<b>Operating frequency</b>	≤ 7200 operations/h
<b>Dielectric strength</b> Dielectric voltage Rated impulse withstand volt.	≥ 2 kVAC (rms) 4 kV (1.2/50 μs)

## Supply Specifications

<b>Power supply</b> Rated operational voltage through terminals: A1, A2 or A3, A2 (DIC01) 2, 10 or 11, 10 (PIC01) 724: 748: B48: B23:	Overvoltage cat. III (IEC 60664, IEC 60038)  24 VDC ± 20%, insulated 48 VDC ± 20%, insulated 24/48 VAC ± 15% 45 to 65 Hz, insulated 115/230 VAC ± 15% 45 to 65 Hz, insulated	<b>Dielectric voltage</b> Supply to input Supply to output Input to output	<b>DC supply</b> 2 kV 4 kV 4 kV	<b>AC supply</b> 4 kV 4 kV 4 kV
		<b>Rated operational power</b> AC DC	5 VA 3 W	

## General Specifications

<b>Power ON delay</b>	1 s ± 0.5 s or 6 s ± 0.5 s	<b>Environment</b> Degree of protection Pollution degree Operating temperature Storage temperature	(EN 60529) IP 20 3 (DIC01), 2 (PIC01) -20 to 60°C, R.H. < 95% -30 to 80°C, R.H. < 95%
<b>Reaction time</b>  Alarm ON delay Alarm OFF delay	(input signal variation from -20% to +20% or from +20% to -20% of set value) < 100 ms < 100 ms	<b>Housing dimensions</b> Din-rail version Plug-in version	45 x 80 x 99.5 mm 36 x 80 x 87 mm
<b>Accuracy</b> Temperature drift Delay ON alarm Repeatability	(15 min warm-up time) ± 1000 ppm/°C ± 10% on set value ± 50 ms ± 0.5% on full-scale	<b>Weight</b>	Approx. 250 g
<b>Indication for</b> Power supply ON Alarm ON  Output relay ON	LED, green LED, red (flashing 2 Hz during delay time) 1 or 2 x LED(s), yellow	<b>Screw terminals</b> Tightening torque	Max. 0.5 Nm acc. to IEC 60947
		<b>Approvals</b>	UL, CSA (except 748)
		<b>CE Marking</b>	Yes
		<b>EMC</b> Immunity Emission	Electromagnetic Compatibility According to EN 61000-6-2 According to EN 50081-1

## Mode of Operation

DIC01 and PIC01 monitor both AC and DC current and voltage. DIC01 can also monitor positive and negative DC voltage connecting terminals Y1 and Z3.

### Example 1

(no contact input - under+over voltage - 2 x SPDT N.D. relays

(1 x SPDT for PIC01) - TRMS)  
DIC01: One relay operates when the voltage drops below the under voltage set point for more than the respective delay time. It releases when the voltage exceeds the set level plus the set hysteresis. The other relay operates when the voltage exceeds

the over voltage set point for more than the respective delay time. It releases when the voltage drops below the set level minus hysteresis.  
PIC01: The relay operates when the voltage drops below the under voltage set level for more than the respective set delay time or when it

exceeds the over voltage set level for more than the relative set delay time. The relay releases when the voltage exceeds the under voltage set level plus hysteresis and it drops below the over voltage set level minus hysteresis (the hysteresis is the same for both set levels).

## Mode of Operation (cont.)

### Example 2

(latch enable active - under+under current - 2 x SPDT relays (1 x SPDT for PIC01) - TRMS)

DIC01: Each relay operates and latches when the current drops below the respective set level for more than the respective delay time. Provided that the current has exceeded the respective set level plus hysteresis, each relay releases when the contact input's connection is interrupted.

PIC01: The relay operates when the current drops below the higher set level for more than the respective delay time. Provided that the

current has exceeded the higher set level plus hysteresis the relay releases when the contact input's connections is interrupted.

### Note

Different delay times can be used for appropriate reaction according to the set points.

### Example 3

(inhibit enable active - over+over current with MI CT - DPDT relay (SPDT for PIC01) - TRMS)

Provided that the contact input's connection is interrupted, the relay operates when the current flowing in the MI CT exceeds the lower set level for more than the respective delay time. It releases when the current drops below the lower set level minus hysteresis or

when the contact input's pins are connected.

### Example 4

(inhibit enable active - over+over current with A82-10 CT -

DPDT relay (1 x SPDT for PIC01) - TRMS

Provided that the contact input's connection is interrupted, the relay operates when the current flowing in the A82-10 CT exceeds the lower set level for more than its delay time. It releases when the current drops below the lower set level minus hysteresis or when the contact input's pins are connected.

### Example 5 (DIC01 only)

(no contact input - under+over voltage - 2 x SPDT N.D. relays - plus/minus DC

One relay operates when the

voltage drops below the under voltage set point for

more than the respective delay time. It releases when the voltage exceeds the set

level plus the set hysteresis. The other relay operates when the voltage exceeds the over voltage set point for more than the respective delay time. It releases when the voltage drops below the set level minus hysteresis.

In this case the spare front label has to be placed on the device for proper level adjustment.

### Note

When the inhibit contact is opened, if the input signal is already in alarm position, the delay time needs to elapse before relay(s) activation.

## Function/Range/Level and Time Delay Setting

Adjust the input range setting the DIP switches 1 and 2 of the main black selector as shown below.

Select the desired function setting the DIP switches 3 to 6 of the black selector and 1, 2 of the small red selector as shown below.

To access the DIP switches

open the grey plastic cover as shown below

The selection between current and voltage is automatically selected through the input connectors.

TRMS or positive/negative DC monitoring selectable by short-circuiting terminals Y1 and Z3 (DIC01 only).

**Selection of level, time delay and hysteresis:**

**Upper knob:**

Setting of hysteresis on relative scale: 0 to 30% on set value.

**Centre knobs:**

Current level setting on relative scale: 10 to 110% on full scale.

**Lower knobs:**

Setting of delay on alarm time on absolute scale (0.1 to 30 s).

**Set Point 2 (SP2) monitoring function**  
ON: Over current or voltage  
OFF: Under current or voltage

**Relay(s) coupling**  
ON: 2 x SPDT (DIC01 only)  
OFF: 1 x DPDT (DIC01, PIC01)

Measuring range (depending on connections)					
		SW1	ON	ON	OFF
Connect	Input term.	SW2	OFF	ON	ON
None	DIC01: Y1,Y2 PIC01: 5,7		0.5 to 5 mA AC/DC	2 to 20 mA AC/DC	None
Y1 to Z3	DIC01: Y1,Y2		-5 to +5 mA DC	-20 to +20 mA DC	None
None	DIC01: Y1,Y3 PIC01: 6,7		0.1 to 1V AC/DC	4 V <sub>p</sub>	1 to 10 V AC/DC
Y1 to Z3	DIC01: Y1,Y3		-1 to +1 V DC	None	-10 to +10 V DC

**Relay(s) working mode**  
ON: Normally De-energized (ND)  
OFF: Normally Energized (NE)

**Power ON delay**  
ON: 6 s ± 0.5 s  
OFF: 1 s ± 0.5 s

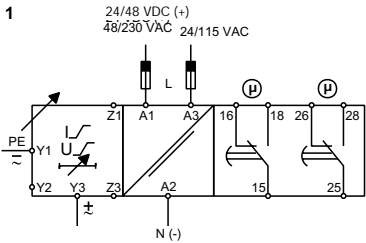
**Contact input**  
ON: Latch function enable  
OFF: Inhibit function enable

**Set Point 1 (SP1) monitoring function**  
ON: Over current or voltage  
OFF: Under current or voltage

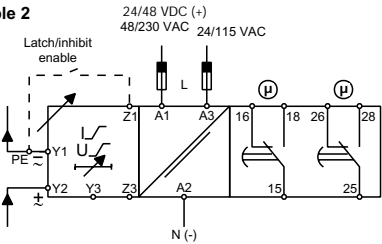


Wiring Diagrams

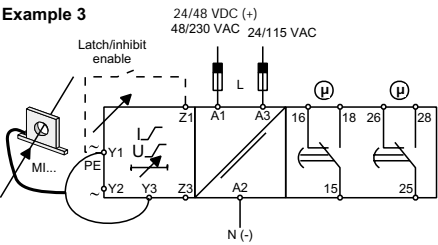
Example 1



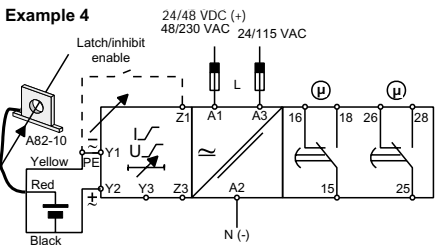
Example 2



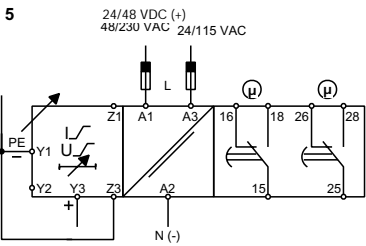
Example 3



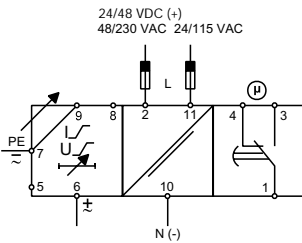
Example 4



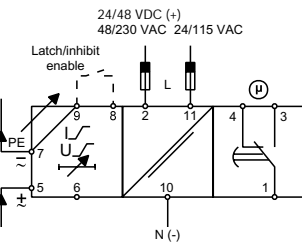
Example 5



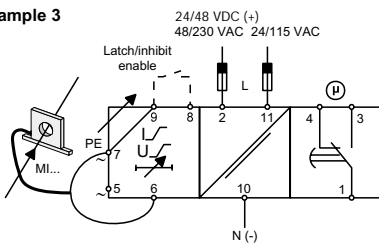
Example 1



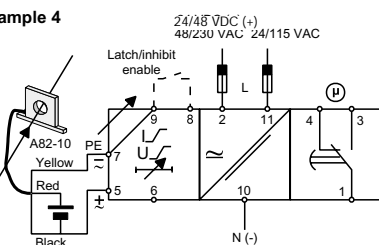
Example 2



Example 3



Example 4

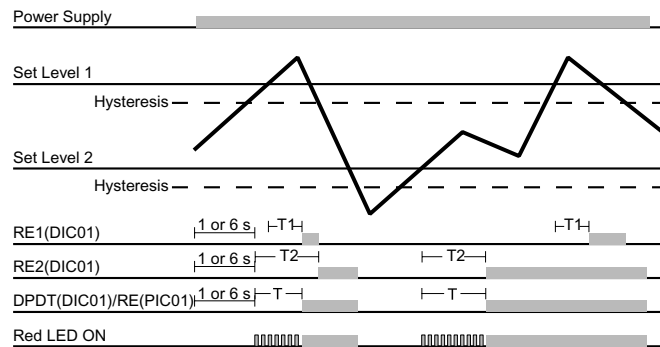


DIC01

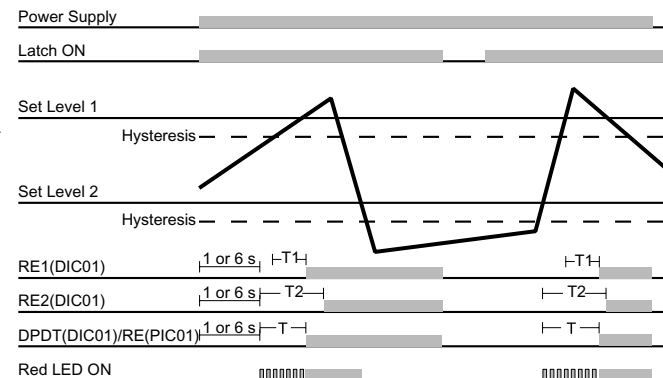
PIC01

## Operation Diagrams

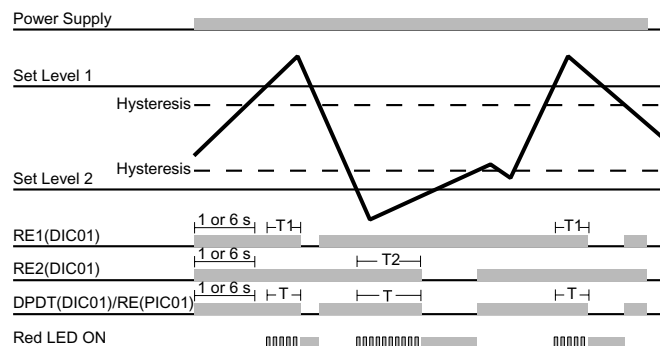
Over+over voltage/current - N.D. relay(s)



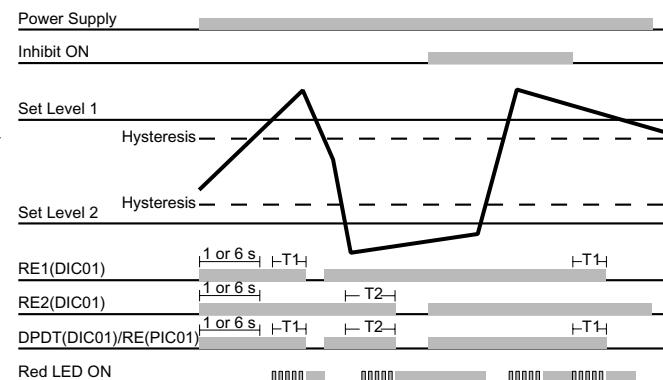
Over+over voltage/current - Latch - N.D. relay(s)



Over+under voltage/current - N.E. relay(s)



Over+under voltage/current - Inhibit - N.E. relay(s)



Under+under voltage/current - N.D. relay(s)

