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) or 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: 24/48 VAC	Supply: 115/230 VAC
DIN-rail	2 x SPDT	**DIC 01 D 724 AV0**	**DIC 01 D B48 AV0**	**DIC 01 D B23 AV0**
Plug-in	SPDT	**PIC 01 C 724 AV0**	**PIC 01 C B48 AV0**	**PIC 01 C B23 AV0**

Input Specifications

Input		
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	
Current ranges	**Internal resis.**	**Max. curr.**
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 (DIC01 only)	50 Ω	35 mA
-20 to 20 mA DC (DIC01 only)	50 Ω	55 mA
Max. current for 1 s		100 mA
Voltage ranges	**Internal resis.**	**Max. volt.**
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_p AC	> 10 kΩ	100 V
-1 to 1 VDC (DIC01 only)	> 10 kΩ	7 V
-10 to 10 VDC (DIC01 only)	> 10 kΩ	20 V
Max. voltage for 1 s		100 V

CT ranges		**AAC rms**	**Max. curr.**
MI and MP ranges (0.4 to 4 V_p input)			
1-ph.:	3-ph.:		
MI 5	MP 3005	0.5 to 5 A	20 AAC
MI 20	MP 3020	2 to 20 A	50 AAC
MI 100	MP 3100	10 to 100 A	250 AAC
MI 500	MP 3500	50 to 500 A	750 AAC
A82 ranges (2 to 20 mA input)			
A82-10/20 25		2.5 to 25 A	30 AAC
A82-10/20 50		5 to 50 A	60 AAC
A82-10/20 100		10 to 100 A	120 AAC
A82-10/20 250		25 to 250 A	300 AAC
A82-10/20 500		50 to 500 A	600 AAC
E82-20 ranges (2 to 20 mA input)			
E82-20 25		2.5 to 25 A	50 AAC
E82-20 50		5 to 50 A	100 AAC

Note:
The input voltage cannot raise over 300 VAC/DC with respect to ground (PIC01 only)

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Input Specifications (cont.)

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

Output Specifications

Output	1 or 2 x SPDT relays
Rated insulation voltage	250 VAC
Contact ratings ($AgSnO_2$)	μ
Resistive loads AC 1	8 A @ 250 VAC
DC 12	5 A @ 24 VDC
Small inductive loads AC 15	2.5 A @ 250 VAC
DC 13	2.5 A @ 24 VDC
Mechanical life	≥ 30 x 10^6 operations
Electrical life	≥ 10^5 operations (at 8 A, 250 V, cos φ = 1)
Operating frequency	≤ 7200 operations/h
Dielectric strength	
Dielectric voltage	≥ 2 kVAC (rms)
Rated impulse withstand volt.	4 kV (1.2/50 μs)

Supply Specifications

Power supply	Overvoltage cat. III (IEC 60664, IEC 60038)
Rated operational voltage through terminals:	
A1, A2 or A3, A2 (DIC01)	
2, 10 or 11, 10 (PIC01)	
724:	24 VDC ± 20%, insulated
B48:	24/48 VAC ± 15% 45 to 65 Hz, insulated
B23:	115/230 VAC ± 15% 45 to 65 Hz, insulated

Dielectric voltage	**DC supply**	**AC supply**
Supply to input	2 kV	4 kV
Supply to output	4 kV	4 kV
Input to output	4 kV	4 kV
Rated operational power		
AC	5 VA	
DC	3 W	

General Specifications

Power ON delay	1 s ± 0.5 s or 6 s ± 0.5 s
Reaction time	(input signal variation from -20% to +20% or from +20% to -20% of set value)
Alarm ON delay	< 100 ms
Alarm OFF delay	< 100 ms
Accuracy	(15 min warm-up time)
Temperature drift	± 1000 ppm/°C
Delay ON alarm	± 10% on set value ± 50 ms
Repeatability	± 0.5% on full-scale
Indication for	
Power supply ON	LED, green
Alarm ON	LED, red (flashing 2 Hz during delay time)
Output relay ON	1 or 2 x LED(s), yellow

Environment	(EN 60529)
Degree of protection	IP 20
Pollution degree	3 (DIC01), 2 (PIC01)
Operating temperature	-20 to 60°C, R.H. < 95%
Storage temperature	-30 to 80°C, R.H. < 95%
Housing dimensions	
Din-rail version	45 x 80 x 99.5 mm
Plug-in version	36 x 80 x 87 mm
Weight	Approx. 250 g
Screw terminals	
Tightening torque	Max. 0.5 Nm acc. to IEC 60947
CE-Marking	Yes

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

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Mode of Operation (cont.)

it drops below the over voltage set level minus hysteresis (the hysteresis is the same for both set levels).

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

Selection of measuring range:
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).
DIP-switch selector (1 to 2)

1 2
ON 0.5 to 5 mA AC/DC
-5 to 5 mA DC
0.1 to 1 V AC/DC
-1 to 1 VDC

2 to 20 mA AC/DC
-20 to 20 mA DC
0.4 to 4 V_p AC

1 to 10 V AC/DC
-10 to 10 V DC

Selection of function:
DIP-switch selector (3 to 6 and 1 A, 2 A)

3
Relay(s) de-energized in normal condition.
Relay(s) energized in normal condition.

4
Power ON delay 1 ± 0.5 s
Power ON delay 6 ± 0.5 s

5
Contact input as latch function enable. When the contact is closed the latch function is activated. The reset of the latch condition occurs when the contact is open or by power down.

Contact input as inhibit of alarm enable. When the contact is closed the relay remains in normal position even if the alarm condition occurs.

6
Set point 1 over voltage/-current monitoring relay. The alarm condition occurs when voltage/current input is over the set point value.

Set point 1 under voltage/-current monitoring relay. The alarm condition occurs when voltage/current input is under the set point value.

1A
ON Set point 2 over voltage/-current monitoring relay. The alarm condition occurs when voltage/current input is over the set point value.

Set point 2 under voltage/-current monitoring relay. The alarm condition occurs when voltage/current input is under the set point value.

2A
ON 2 x SPDT relays (DIC01)
1 x DPDT relay (PIC01)

Selection of level, time delay and hysteresis:

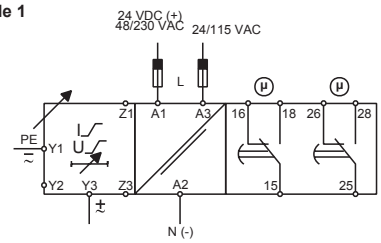
Upper knob:
Setting of hysteresis on relative scale: 0 to 30% on set value.

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

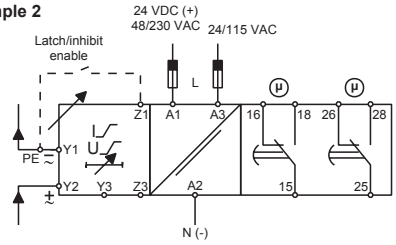
Lower knobs:
Setting of delay on alarm time on absolute scale (0.1 to 30 s).

Wiring Diagrams

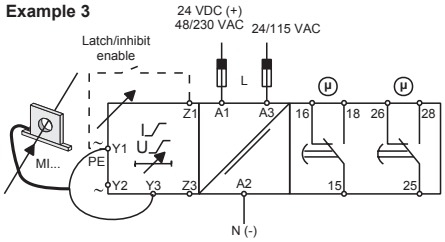
Example 1



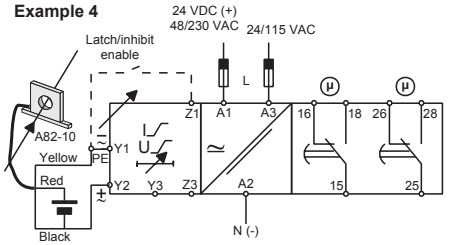
Example 2



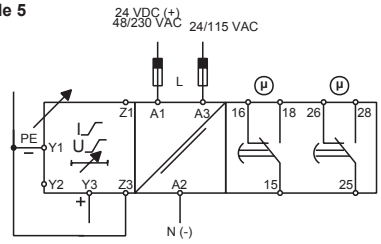
Example 3



Example 4

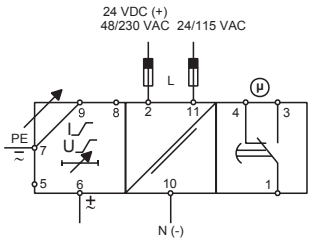


Example 5

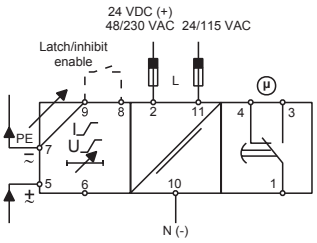


DIC01

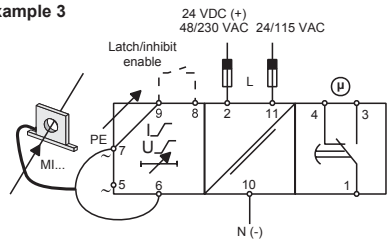
Example 1



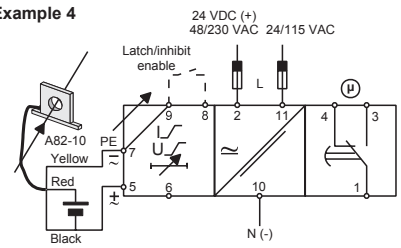
Example 2



Example 3



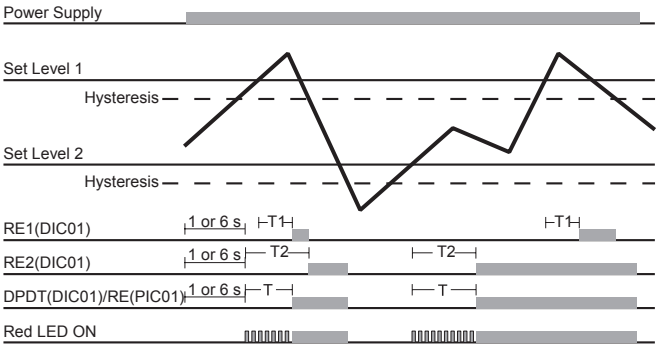
Example 4



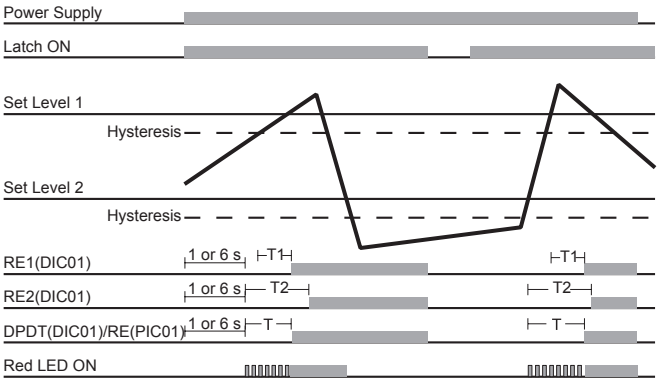
PIC01

Operation Diagrams

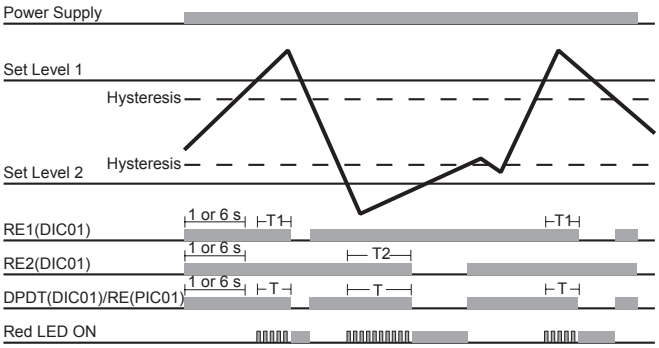
Over+over voltage/current



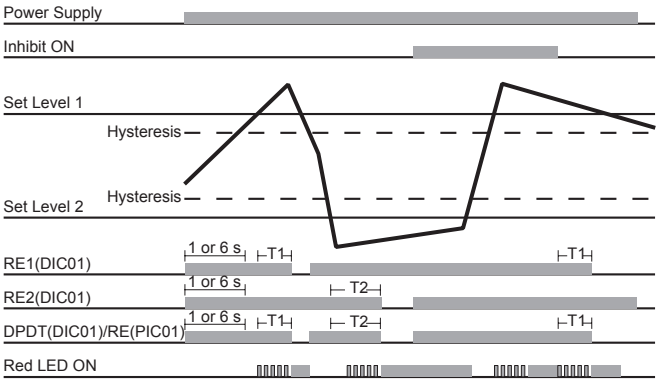
Over+over voltage/current - Latch



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



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



Under+under voltage/current