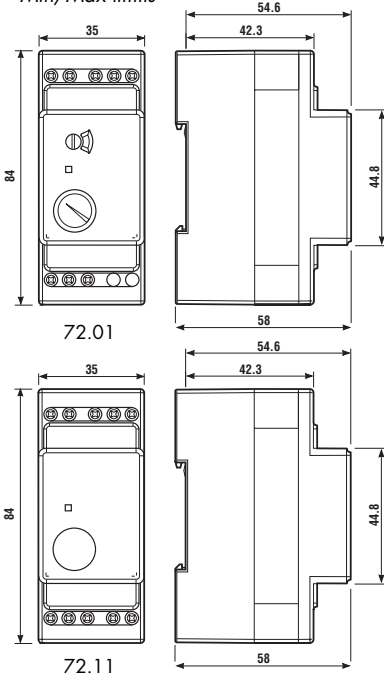


- Level control relays for conductive liquids
- Emptying or filling functions
- Sensitivity: adjustable (72.01) or fixed (72.11)
- LED indicator
- Double insulation (6 kV - 1.2/50 μs) between:
 - supply and contacts
 - electrodes and supply
 - contacts and electrodes
- 35 mm rail mount
- Control about a single level or between Min/Max limits



	72.01	72.11
	- Sensitivity range (5...150) kΩ adjustable - Delay time (0.5s or 7s) switch selectable - Emptying or filling functions switch selectable	- Sensitivity fixed 150 kΩ - Delay time fixed: 1 s - Emptying or filling functions link selectable
	<p>U = 24 V DC/AC 50/60 Hz or (110...125)V AC 50/60 Hz or (230...240)V AC 50/60 Hz</p> <p>R = (5...150) kΩ</p> <p>FL = Filling - 7s delay FS = Filling - 0.5s delay ES = Emptying - 0.5s delay EL = Emptying - 7s delay</p>	<p>U = 24 V DC/AC 50/60 Hz or (110...125)V AC 50/60 Hz or (230...240)V AC 50/60 Hz</p> <p>T = 1 s R = 150 kΩ</p>
Contact specifications		
Contact configuration	1 CO (SPDT)	1 CO (SPDT)
Rated current/Maximum peak current A	16/30	16/30
Rated voltage/Maximum switching voltage V AC	250/400	250/400
Rated load in AC1 VA	4,000	4,000
Rated load in AC15 (230 V) VA	750	750
Single phase motor rating (230 V) kW	0.55	0.55
Breaking capacity in DC1: 30/110/220 V A	16/0.3/0.12	16/0.3/0.12
Minimum switching load mW(V/mA)	500 (10/5)	500 (10/5)
Standard contact material	AgCdO	AgCdO
Supply specifications		
Nominal voltage (U _N) V AC (50/60 Hz)/DC V AC	24 110...125 - 230...240	
Rated power AC/DC VA (50 Hz)/W	2.5/1.5	2.5/1.5
Operating range AC	(0.8...1.1)U _N	(0.8...1.1)U _N
DC	(0.8...1.1)U _N	(0.8...1.1)U _N
Technical data		
Electrical life at rated load AC1 cycles	100 · 10 ³	100 · 10 ³
Electrode voltage V AC	4	4
Electrode current mA	0.2	0.2
Run-on time s	0.5 - 7 (selectable)	1
Max sensitivity range kΩ	5...150 (adjustable)	150 (fixed)
Insulation between supply/contacts/electrode (1.2/50 μs) kV	6	6
Ambient temperature °C	-20...+60	-20...+60
Protection category	IP20	IP20
Approvals (according to type):		

ORDERING INFORMATION

Example: 72 series level control relay, with adjustable sensitivity range, (230...240)V AC supply voltage.

7 2 . 0 1 . 8 . 2 4 0 . 0 0 0 0

Series

Type

0 = Sensitivity range adjustable (1...150) kΩ
35 mm rail mount
1 = Sensitivity fixed 150 kΩ
35 mm rail mount

No. of poles

1 = 1 CO (SPDT)

Supply voltage

024 = 24 V AC/DC
125 = (110...125)V AC
240 = (230...240)V AC

Supply version

0 = AC (50/60 Hz)/DC
8 = AC (50/60 Hz)

TECHNICAL DATA

EMC SPECIFICATIONS

TYPE OF TEST	REFERENCE STANDARD
Electrostatic discharge	- contact discharge - air discharge
	EN 61000-4-2
	4 kV
	8 kV
Radio-frequency electromagnetic field (80 ÷ 1000 MHz)	EN 61000-4-3
	10 V/m
Fast transients (burst) (5-50 ns, 5 kHz) on Supply terminals	EN 61000-4-4
	4 kV
Surges (1.2/50 µs) on Supply terminals	EN 61000-4-5
	4 kV
Radio-frequency common mode (0.15 ÷ 80 MHz) on Supply terminals	EN 61000-4-6
	10 V
Radiated and conducted emission	EN 55022
	class B

INSULATION

Insulation	Dielectric strength	Impulse (1.2/50 µs)
- between supply and contacts	4,000 V AC	6 kV
- between electrodes, Z1-Z2 and supply*	4,000 V AC	6 kV
- between contacts and electrodes	4,000 V AC	6 kV
- between contacts and electrodes	1,000 V AC	1.5 kV

*There is no insulation between electrode and supply for the type 72.x1.0.024.0000 at 24V AC/DC.

OTHER DATA

Current absorption on Z1 and Z2	mA	< 1
Power lost to the environment		
- without contact current	W	1.5
- with rated current	W	3.2
Max wire size		
	solid cable	stranded cable
	mm ²	1x6 / 2x4
	AWG	1x10 / 2x12
		1x4 / 2x2.5
		1x12 / 2x14
Screw torque	Nm	0.8
Max cable length between electrode and relay	m	200 (max. capacitance of 100 nF/km)

EMPTYING FUNCTIONS

Wiring diagram

Examples with 3 electrodes

<p>Type 72.01</p> <p>U = 24 V DC/AC 50/60 Hz or (110...125)V AC 50/60 Hz or (230...240)V AC 50/60 Hz</p> <p>R = (5...150) kΩ</p> <p>Type 72.11</p> <p>T = 1 s R = 150 kΩ</p>		<p>Emptying Control – between Max. and Min. levels. Under normal operation the liquid level can be expected to cycle between the Maximum and the Minimum electrodes, B1 and B2 (plus a degree of over and under-shoot).</p> <p>Switch On:</p> <ul style="list-style-type: none"> • On “power-up”, if the liquid level is above B2 the output relay will operate after time T has expired. • On the liquid level rising to B1, the output relay will operate after time T has expired. <p>Switch Off:</p> <ul style="list-style-type: none"> • On the liquid level falling below electrode B2, the output relay will de-energise after time T has expired. • On “power-off”, the output relay will immediately de-energise.
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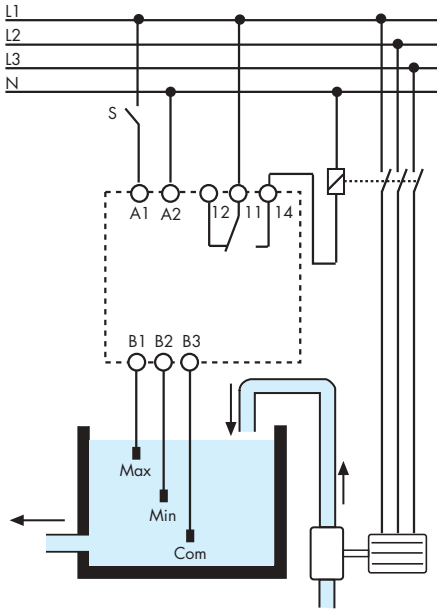
Examples with 2 electrodes

<p>Type 72.01</p> <p>U = 24 V DC/AC 50/60 Hz or (110...125)V AC 50/60 Hz or (230...240)V AC 50/60 Hz</p> <p>R = (5...150) kΩ</p> <p>Type 72.11</p> <p>T = 1 s R = 150 kΩ</p>		<p>Emptying Control about a single level, B1. Under normal operation the liquid level can be expected to cycle about the level set by electrode B1 with a degree of over and under-shoot.</p> <p>Switch On:</p> <ul style="list-style-type: none"> • On “power-up”, if the liquid level is above B1 the output relay will operate after time T has expired. • On the liquid level rising to B1, the output relay will operate after time T has expired. <p>Switch Off:</p> <ul style="list-style-type: none"> • On the liquid level falling below electrode B1, the output relay will de-energise after time T has expired. • On “power-off”, the output relay will immediately de-energise.
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APPLICATIONS

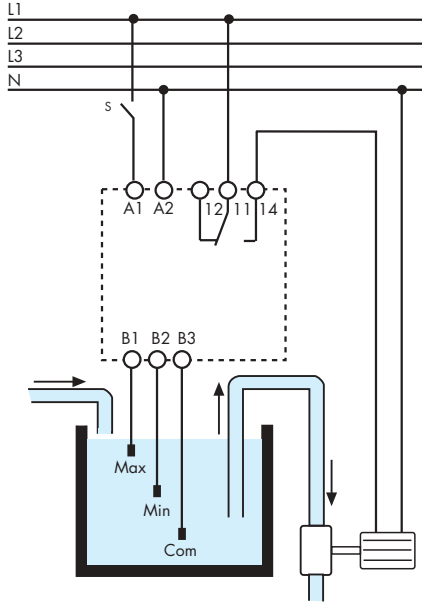
FILLING function:

Examples with 3 electrodes and with a contactor connected to the contact.



EMPTYING function:

Examples with 3 electrodes and with a motor pump connected directly to the contact.



The 72 series level control relays work by measuring the resistance through the liquid, between the common (B3) electrode and Min. and Max. electrodes (B2 and B1).

If the tank is metallic, then this can be substituted as the B3 electrode.

Take care to ensure that the liquid has a suitable resistivity – see below:

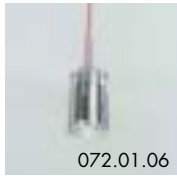
SUITABLE LIQUIDS

- City water
- Well water
- Rainwater
- Sea water
- Liquids with low-percentage alcohol
- Wine
- Milk, Beer, Coffee
- Sewage
- Liquids fertilizer

UN-SUITABLE LIQUIDS

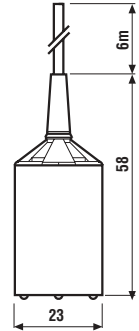
- Demineralised water
- Fuels
- Oil
- Liquids with high-percentage alcohol
- Liquid gas
- Paraffins
- Ethylene glycol
- Paint

ACCESSORIES



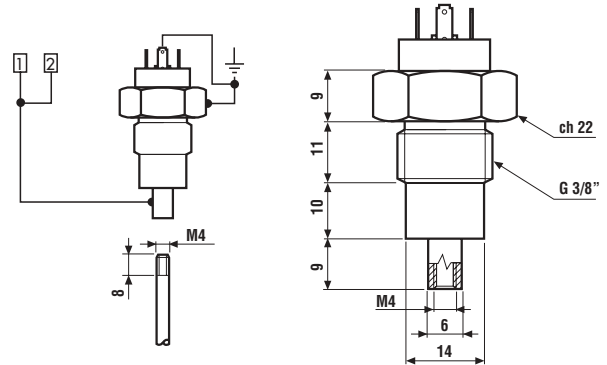
<p>Suspended electrode for conductive liquids, complete with cable. Suitable for level monitoring in wells and reservoirs not under pressure. All materials used are compatible with food processing applications (according to European Directive 2002/72 and cod. FDA title 21 part 177). Order appropriate number of electrodes - additional to the relay.</p>	
Cable length: 6 m (1.5 mm ²)	072.01.06
Cable length: 15 m (1.5 mm ²)	072.01.15

- Max. liquid temperature: + 100 °C



<p>Electrode holder with two pole connector, one connected directly to the electrode and the second connected to the grounded installation thread. Suitable for metal tank with G3/8" linkage. Electrode not included. Order appropriate number of electrodes holders - additional to the relay.</p>	072.51
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- Max liquid temperature: + 100 °C
- Max tank pressure: 12 bar
- Cable grip: $\varnothing \geq 6$ mm

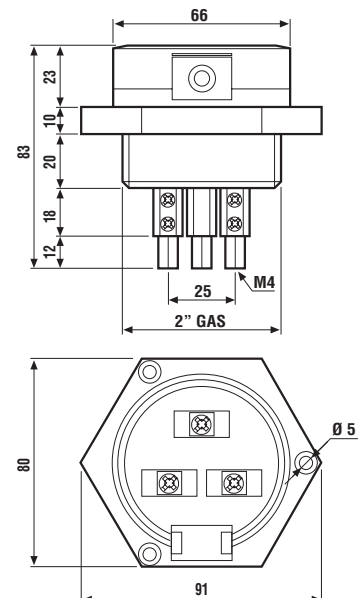


72



<p>Electrode holder with three poles. Electrode not included. Order appropriate number of electrodes holders - additional to the relay.</p>	072.53
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- Max liquid temperature: + 130 °C



APPLICATION NOTES

Applications

The main application for these relays is for the sensing and control of the level of conductive liquids.

Selectable options allow for this control to be achieved either through a filling operation or through an emptying operation, and in either case "positive logic" is used.

Level control can be achieved around a single level – using 2 electrodes, or between Minimum and Maximum levels - using 3 electrodes.

Additionally, the 72.01, with its adjustable sensitivity setting, can be ideal for monitoring the conductivity of liquids.

Positive safety logic

These relays work according to the principle that it is the closure of a normally open output contact that will be used to control the pump, both in filling and emptying applications. Consequently, in the event of a failure of the supply local to the relay, the filling or emptying will cease. This is generally considered to be the safest option.

Overrunning of tank on filling

Care must be exercised to ensure that the tank cannot overrun. Factors that have to be considered are the pump performance, the rate of discharge from the tank, the position of the single level electrode (or maximum electrode), and the run-on time delay. Keeping the time delay to a minimum will minimise the possibility of tank overrun, but will increase the installed switching rate.

Prevent dry running of pump on emptying

Care must be exercised to ensure that the pump cannot run dry. Similar considerations must be given as outlined above. In particular, keeping the run-on time delay to a minimum will minimise the risk, but again, it will increase the installed switching rate.

Run-on time

In commercial and light industrial applications the use of a short Run-on time delay is more appropriate, due to the relatively small size of tanks and the consequential need to react quickly to the change in level. Larger scale industrial applications involving larger tanks and powerful pumps must avoid a frequent switching cycle, and the use of the 72.01 set for the longer Run-on time of 7 seconds is suggested.

Note that the short run-on time will always achieve closer control to the desired level(s), but at the cost of more frequent switching.

Electrical life of the output contact

The electrical life of the output contact will be enhanced where a larger distance between the Max. and Min. electrodes (3-electrode control) can be realised. A smaller distance, or level control to a single level (2-electrode control), will result in more frequent switching and therefore a shorter electrical life for the contacts. Similarly, the long run-on time will enhance, and the short time will reduce, electrical life.

Pump control

Small single-phase pumps within the kW (0.55 kW - 230 V AC) rating stated may be driven directly by the level relay output contact. However, where very frequent switching is envisaged, it is better to "slave" a higher power relay or contactor to drive the pump motor. Large pumps (single-phase and three-phase) will of course require an interposing contactor.

Electrodes and cable lengths

Normally 2 electrodes or 3 electrodes will be required for control about a single level, or control between Min. and Max. levels, respectively. However, if the tank is made of conductive material it is possible to use this as the common electrode, B3, if electrical connection can be made to it. The maximum permitted length of cable between the electrode and the relays is 200m, for a cable not exceeding 100nF/km.

A maximum of 2 relays and associated electrodes can be employed in the same tank – if two different levels need monitoring.

Note: It is possible to make direct connection (using a contact) between B1-B3 and B2-B3 without using electrodes, but in this case it is not possible set up the sensitivity.

Electrode choice

The choice of electrodes may depend on the liquid being monitored. Standard electrodes 072.01.06 and 072.51 are suitable for many applications but some liquids may be corrosive for example, and may therefore require custom made electrodes - but these can usually be used with the 72.01 and 72.11 relays.

On site commissioning

To confirm the suitability of the relay sensitivity to the resistance between electrodes it is suggested that the following checks are made.

For convenience it is suggested that the fill function and the shortest run-on time are selected.

Commissioning

Follow these setting-up instructions to achieve correct operation:

72.01

Select the function "FS" (Filling and Short delay of 0.5s), and set the sensitivity control to 5 kΩ. Ensure that all electrodes are immersed in the liquid - expect the output relay to be ON. Then, slowly rotate the sensitivity control in the 150 kΩ direction until the level relay switches OFF (internal output relay will switch OFF and red LED will switch slowly flash). (If the level relay does not switch OFF then, either the electrodes are not immersed, or the liquid has too high impedance or the distance between electrodes is too long).

Finally, select the filling or emptying function as required, run in real time and confirm that the level relay works as required.

72.11

Select the Filling function "F", (Z1 – Z2 open). Ensure that all electrodes are immersed in the liquid, but leave electrode B3 disconnected – output relay should be ON. Connect electrode B3, and the level relay should switch OFF (internal output relay will switch OFF and red LED will switch slowly flash). (If the level relay does not switch OFF then, either the electrodes are not immersed, or the liquid has too high impedance or the distance between electrodes is too long.)

Finally, select the filling or emptying function as required, run in real time and confirm that the level relay works as required.

