

## 5.2 Operator controls and connection terminals

### Front view / terminal labeling

Front view	Description
	<b>Position digits</b>
	① Terminal block (removable): Connection is possible using screw terminals or spring-loaded terminals.
	② Rotary button for setting the monitoring mode.
	③ Display field: drainage control (OV) or inflow control (UN)
	④ Rotary button for setting the sensor sensitivity (R sens)
	⑤ Rotary button for setting the tripping delay (Delay)
	⑥ Device article number
	⑦ Label
	⑧ Status display: LED contact symbol (yellow)
	⑨ Status display: LED coil symbol (green)
	<b>Terminal labels</b>
	A1+ Rated control supply voltage ~ / +
	A2- Rated control supply voltage ~ / -
	M (GND) Reference point
	Min Minimum level
	Max Maximum level
	12 Output relay K1 CO contact NC contact
	11 Output relay K1 CO contact root
	14 Output relay K1 CO contact NO contact

You can find additional information on the connection terminals and the permissible conductor cross-sections in the Chapter "Connection methods (Page 25)".

You can find information on connecting in the Chapter "Circuit diagrams (Page 97)".

## 5.3 Functions

### General functionality

The 3UG4501 filling level monitoring relays and the connectable 2-pole or 3-pole 3UG3207-.. probes are used to monitor the filling levels of electrically conductive liquids.

### Monitoring

The working principle of the 3UG4501 filling level monitoring relay is based on measurement of the electrical resistance of the liquid between the probes (minimum and maximum level) or the reference potential (conductive measurement principle). The output relay changes its switching state if the measured value is below the sensitivity set on the front. The probes (e.g. 3UG3207-..) are powered with alternating current (AC measured current) to exclude electrolysis phenomena in the liquid.

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#### Note

The filling level monitoring relays do not have active monitoring of probe defects or probe conductor defects. Therefore when selecting the probes and routing the cable, make sure that this source of error is precluded. For example, use stable bow probes if wire electrodes are in danger of being broken.

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Depending on their design, the 3UG4501 filling level monitoring relays are powered with a 24 V AC/DC or 24 to 240 V AC/DC rated control supply voltage through terminals A1+ / A2-. When the rated control supply voltage is applied, the green LED next to the coil symbol on the device cover lights up.

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#### Note

On the 3UG4501-..AA30 devices with 24 V AC / DC versions, as a common reference for the AC probe voltage at terminals Min and Max, terminal M must not be connected to terminals A1 / A2 of the device or grounded!

On the 3UG4501-..AW30 24 to 240 V AC / DC versions, terminals M, Min, and Max are electrically isolated from terminals A1 and A2 of the rated control supply voltage!

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#### Note

The specified voltages represent the absolute thresholds.

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### Tripping delay

Tripping can be delayed by 0.5 to 10 s to avoid tripping the switching function too early when the level has not quite been reached (e.g. wave motion or foaming of the liquid).

The switching states of the output relay are given below in the section entitled "Function diagrams."

### Probes for filling level monitoring

To monitor filling levels of electrically conductive liquids, the following probes can be mounted on the 3UG4501 filling level relays.

- Three-pole wire electrode
- Two-pole wire electrode
- Two-pole bow electrode
- Single-pole bow electrode for side mounting
- Single-pole rod electrode for side mounting

These necessary accessories are described in Chapter "Probes for the 3UG4501 monitoring relay (Page 329)."

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#### Note

At the terminals, other resistance sensors in the range 2 to 200 k $\Omega$  (e.g. photoresistor, temperature sensors, resistor-based position encoders, etc.) can also be connected. The monitoring relays are therefore also suitable as resistance triggers.

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### Two-point monitoring

If the liquid level reaches the maximum probe while the minimum probe and reference probe are immersed, the output relay changes its switching state. The output relay reverts to its original switching state as soon as the minimum probe is no longer in contact with the liquid.

### One-point monitoring

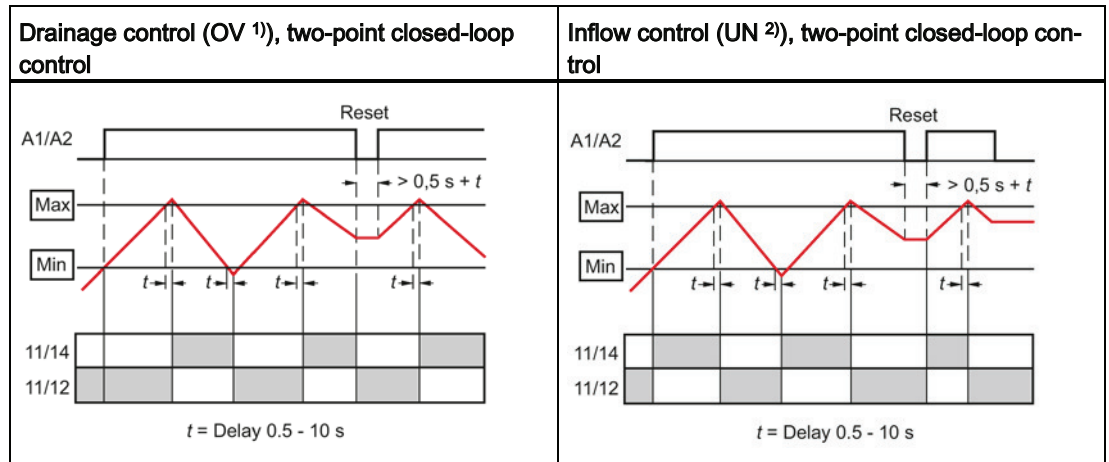
For closed loop control of only one level, the terminals for Min and Max are bridged on the filling level monitoring relay. The output relay changes its switching state as soon as the liquid level has been reached. The output relay reverts to its original switching state as soon as the probe is no longer in contact with the liquid.

### Reset response

For reliable resetting, the rated control supply voltage must be interrupted at least for the set delay time of +0.5 s.

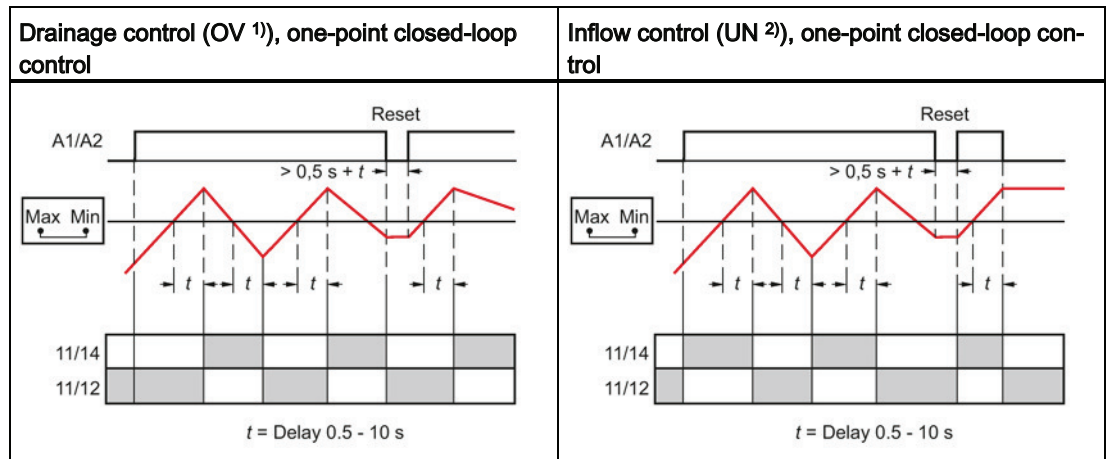
When the rated control supply voltage is interrupted, the output relay returns to the quiescent state when the power failure backup time has expired (contact 11-12 is closed, contact 11-14 is open). If the rated control supply voltage is switched on again after  $> 0.5 \text{ s} + \text{Delay (t)}$  (device reset), the output relay switches depending on the set relay switching behavior.

## Function diagrams 3UG4501



1) OV = overshoot

2) UN = undershoot



1) OV = overshoot

2) UN = undershoot