# External level devices for conductive point level switch

## Application/Specified usage

- Point level detection of aqueous, conductive media in tanks with a min. conductivity of 1 µS/cm
- Simple level control for tanks

## Application examples

- Empty/full indication in tanks and pipes
- Level control in tanks
- Overfill protection in tanks
- Dry running protection in pipes (e.g. before pumps)

## Special features

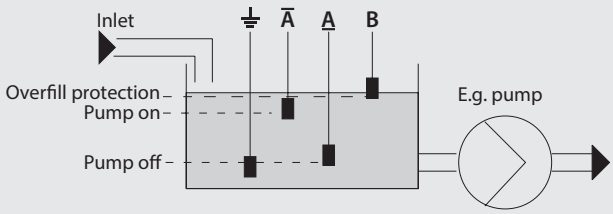
- Measurement signal is absolutely free of DC voltage
- Devices for up to 2 or up to 4 point levels
- Devices for up to 2 level controls and up to 2 point levels
- All devices feature an active output or change-over contact
- Devices with optional wire break monitoring

## ZNV-2, VNV-2

## Application examples

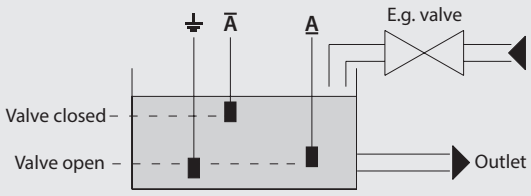
### Level control in vessel with additional overfill protection

Medium flows into the vessel through the inlet. When the maximum level Ā is reached, the pump is started and stops as soon as the medium level drops below the minimum level A. The overfill sensor B prevents overflowing of the tank in the event of a malfunction.




### Simple level control in vessel

Medium is continuously removed from the vessel at the outlet. When the medium level drops below the minimum level A, medium is added at the inlet until the maximum level Ā is reached. An after-run period can be set using the time setting.



| Technical data for devices with supply voltage 24 V DC | | |
|---|---|---|
| **Design** | DIN standard housing<br>Dimensions VNV-2<br>Dimensions ZNV-2 | Made of ABS for rail mounting as per EN50022<br>45 x 75 x 105 mm (W x H x D)<br>22.5 x 75 x 105 mm (W x H x D) |
| **Protection class** | | IP 20; terminals protected against contact |
| **Environment** | Operating temperature<br>Humidity | -10...+55 °C<br>0...65 % no condensation |
| **Electrical connection** | | Screw terminals 2.5 mm², pluggable |
| **Sensor measurement** | | Free of DC voltage |
| **Sensitivity** | Adjustable | 0.1...1000 kΩ (devices without wire break monitoring)<br>0.1...100 kΩ (devices with wire break monitoring) |
| **Time delay (on/off)** | 1CT(W), 2CT(W)<br>Sensors without time trimmer | 0.5...10 s, adjustable per trimmer<br>Fixed time delay selectable in order code |
| **Supply voltage** | | 24 V DC (±15 %)<br>75 mA device + max. 100 mA per active output in use |
| **Output** | PNP<br>Change-over contact | 24 V DC, max 100 mA (supply voltage -10 %)<br>250 V AC/3 A or 30 V DC/3A |
| **Noise immunity** | Electromagnetic compatibility | 2014/30/EU |
| **Line capacity** | From device to sensor | Max. 2000 pF |
| **Weight** | VNV-2<br>ZNV-2 | Approx. 150 g<br>Approx. 100 g |

| Technical data for devices with supply voltage 115 V AC, 230 V AC | | |
|---|---|---|
| **Design** | DIN standard housing<br>Dimensions | Made of ABS for rail mounting as per EN50022<br>45 x 75 x 105 mm (W x H x D) |
| **Protection class** | | IP 20; terminals protected against contact |
| **Environment** | Operating temperature<br>Humidity | -10...+55 °C<br>0...65 % no condensation |
| **Electrical connection** | | Screw terminals 2.5 mm², pluggable |
| **Sensor measurement** | | Free of DC voltage |
| **Sensitivity** | Adjustable | 0.1...1000 kΩ (devices without wire break monitoring)<br>0.1...100 kΩ (devices with wire break monitoring) |
| **Time delay (on/off)** | 1CT(W), 2CT<br>Sensors without time trimmer | 0.5...10 s, adjustable per trimmer<br>Fixed time delay selectable in order code |
| **Supply voltage** | | 115 V AC/230 V AC (±10 %), 50-60 Hz, max. 3 W |
| **Output** | Change-over contact | 250 V AC/3 A or 30 V DC/3A |
| **Noise immunity** | Electromagnetic compatibility | 2014/30/EU |
| **Low Voltage Directive** | | 2014/35/EU |
| **Line capacity** | From device to sensor | Max. 2000 pF |
| **Weight** | VNV-2 (relay output) | Approx. 200 g |

## Legend

**Advice:**
Non observance of this warning notice may cause troubles.

**Danger:**
Non observance of this warning notice may cause serious injury of persons and / or damages or destruct the unit.

**Information:**
This symbol indicates useful additional informations.

## Global safety instructions

- Mounting, electrical connection, set up and maintenance of the unit must be done by trained and skilled personnel. They must have read and understood these installation and operating instructions. They must follow them carefully.
- Do not use the product where flammable or combustion gases are present.
- Only use the product properly built-in condition. (See assembly instructions)
- This product is not a safety device (SIL). Malfunction of the device may lead to failures of the outputs. Take safety measures, such as installing a separate monitoring system, to ensure safety and to prevent serious accidents caused by such failures, thus ensuring safety.
- Do not open the housing, there are no serviceable parts inside. Inside are high voltage circuits.

## Note on CE

- Applicable directives:
  - Electromagnetic Compatibility Directive 2014/30/EU
  - Low Voltage Directive 2014/35/EU
- Compliance with the applicable EU directives is identified by the CE label on the product.
- The operating company is responsible for complying with the guidelines applicable to the entire installation.

## Assembly instructions

The devices are designed for integration in switch cabinets and housings.

1: The device is only suitable for installation in permanent and weather-protected switch cabinets and housings with a maximum operating altitude of 2000 m.
During installation, all lines and connections must be de-energized.
2: The building equipment must feature a disconnecting device such as a switch or circuit breaker in an accessible location and that is labeled as a disconnect for this device. This disconnecting device must be able to disconnect all cables conducting line power.
3: In devices with 115 V AC and 230 V AC supply voltage, the transformer must be protected with a nominal fuse rating of 1 A (slow) on the primary side. A fuse must be provided by the operator for each device.
4: The relay outputs are protected with a normal fuse rating of 3.15 A (slow). The fuse must be provided by the operator for each relay.
5: The devices are suitable for a pollution degree of 2.
6: The rated voltage is 250 V AC and the insulation voltage is 3000 V AC CAT II.

## Transport/Storage

- Use suitable transport packaging only to avoid damage of the equipment!
- No outdoor storage
- Store dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration
- Storage temperature -40...+70 °C
- Relative humidity maximum 95 % no condensation

## Cleaning

- The device may only be cleaned with a dry cloth.

### Installation

- If multiple devices are installed next to each other (series), they must be separated by at least 5 mm.
- Ensure that the terminals are secure before switching the device on. This is especially important for the connecting terminals of devices with a relay output.
- Only one VNV-2/ZNV-2 device may be connected to a tank. Multiple devices in one tank may lead to detection faults.

### Setting the level detection

1: Connect the device according to the drawings.
2: Set the trimmer of the associated sensor to the middle setting (0).
3: Wet the sensor with the medium with the lowest conductivity.
4: Turn the trimmer to the full indicator setting (left half) or to the empty indicator setting (right half) until the output or the relay switches and the status LED for the output lights up.
5: The sensitivity setting is now complete.
6: If there is a trimmer for the time delay (hour glass), an additional on (left half) or off (right half) delay of up to 10 seconds can be set. There is no additional delay in the middle position.
7: If there is no time delay trimmer for a sensor, a fixed time delay applies to the on and off delay that is specified in the order code.

### Note

To simulate the sensors, a wire bridge can be connected between the corresponding terminals. This does not damage the evaluation electronics (short-circuit-proof).

### Control of the wire break monitoring (only in devices with the option "W")

1: The connection to the sensor is interrupted in a device with wire break detection.
2: All LEDs flash to indicate the break and the „Error" output indicates the error. The output becomes inactive or the relay is switched off.
3: All further outputs are set to inactive or the relays are switched off.

### Setting the level detection switching function

The full or empty indicator function is set by positioning the sensitivity trimmer in the left or right half of the rotation range.

| | |
|---|---|
| **Full indicator switching function** | |
| **Sensor is wet** | Output is active or the relay is switched (LED is illuminated) |
| **Empty indicator switching function** | |
| **Sensor is wet** | Output is inactive or the relay is not switched (LED is off) |

### Functional principle of the level control

| | |
|---|---|
| **Full indicator switching function** | |
| **Both sensors Immersed** | Active output (relay is switched) LED is illuminated |
| **Upper sensor Not immersed Lower sensor Immersed** | Previous state is maintained |
| **Both sensors Not immersed** | Inactive output (relay is not switched) LED is not illuminated |
| **Switching function of empty indicator** | |
| **Both sensors Not immersed** | Active output (relay is switched) LED is illuminated |
| **Upper sensor Not immersed Lower sensor Immersed** | Previous state is maintained |
| **Both sensors Immersed** | Inactive output (relay is not switched) LED is not illuminated |

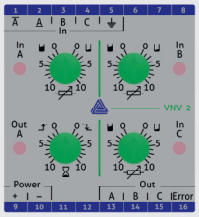
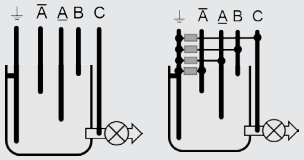
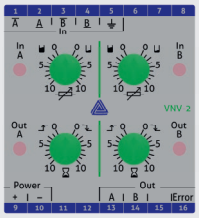
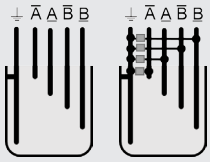
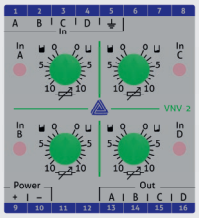
### Information

For all devices with level control, the upper sensor can be connected alone instead of the control function. In this case, the upper sensor is used solely for level detection.

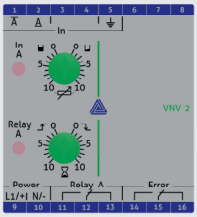
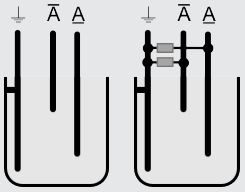
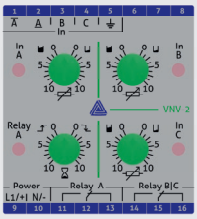
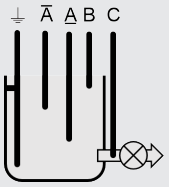
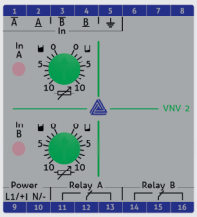
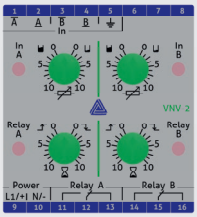
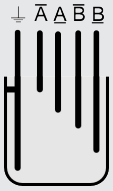
| Wiring diagram key | |
|---|---|
| **Label** | **Explanation/translation** |
| ⏚ | Ground |
| **Ā** | Top sensor |
| **A** | Bottom sensor |
| **A, B, C, D** | Sensor |
| **Power L1 / +** | L1 (AC devices) or<br>+ supply voltage (DC devices) |
| **Power N / -** | N (AC devices) or<br>- supply voltage (DC devices) |
| **Relay A, B** | Potential-free change-over contact as output |

| Wiring diagram key | |
|---|---|
| **Out A, B, C, D** | Active output (PNP) |
| **ERROR** | Signaling for wire break |
| **LED In A, B, C, D** | For level detection: LED indicator of sensor. For level control: LED indicator of top sensor |
| **LED Relay A, B** | LED indicator for relay |
| | Full indicator setting |
| | Empty indicator setting |
| | Sensitivity trimmer |
| | On delay |
| | Off delay |
| | Time delay trimmer |

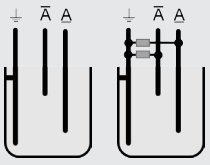
**Application examples for devices with active output | VNV-2, supply voltage: 24 V DC**

| Model | Function | Application | |
|---|---|---|---|
| **4A / 1CT2D(W) / t**  | · 1 x level/time (A)<br>· 2 x detection (B, C)<br>· t: Time delay in [ms], selectable<br>· Option W: Wire break | · 1 x level control with adjustable time delay for A<br>· Time delay for B and C selectable in order code<br>· Sensor B for overflow protection and sensor C for dry running protection<br>· Optional with wire break monitoring |  |
| **4A / 2CT(W) / 0050**  | · 2 x level/time (A, B)<br>· Min. time delay 50 ms<br>· Option W: Wire break | · 2 x level control switch adjustable time delay for A and B<br>· Optional with wire break monitoring |  |
| **4A / 4D / t**  | · 4 x detection (A, B, C, D)<br>· t: Time delay in [ms], selectable | · 4 x level detection<br>· Selectable time delay for A, B, C and D in order code |  |

## Application examples for devices with relay output | VNV-2, supply voltage: 24 V DC, 115 V AC or 230 V AC

| Model | Function | Application | |
|---|---|---|---|
| **2R / 1CT(W) / 0050**<br>  | · 1 x level/time (A)<br>· Min. time delay 50 ms<br><br>· Option W: Wire break | · 1 x level control with adjustable time delay for A<br>· Optional with wire break monitoring |  |
| **2R / 1CT2D / t**<br>  | · 1 x level/time (A)<br>· 2 x detection (B, C)<br>· t: Time delay in [ms], selectable | · 1 x level control with adjustable time delay for A<br>· Time delay for B and C selectable in order code<br>· The B\|C relay indicates in combination either sensor B for overflow protection or sensor C for dry run protection |  |
| **2R / 2C / t**<br>  | · 2 x levels (A, B)<br>· t: Time delay in [ms], selectable | · 2 x level control<br>· Time delay for A and B selectable in order code |  |
| **2R / 2CT / 0050**<br>  | · 2 x level/time (A, B)<br>· Min. time delay 50 ms | · 2 x level control with adjustable time delay for A and B |  |

## Application examples for devices with active output | ZNV-2, supply voltage: 24 V DC

| Model | Function | Application | |
|---|---|---|---|
| **2A / 1CT(W) / 0050**<br>  | · 1 x level/time (A)<br>· Min. time delay 50 ms<br><br>· Option W: Wire break | · 1 x level control with adjustable time delay for A<br>· Optional with wire break monitoring |  |
| **2A / 1C1D / t**<br>  | · 1 x level (A)<br>· 1 x detection (B)<br>· t: Time delay in [ms], selectable | · 1 x level control for A<br>· Time delay for B selectable in order code<br>· Sensor B for overflow protection |  |

## Order code for devices with relay output (housing width 45 mm)

**VNV-2**

**Supply voltage**

**24VDC** (Supply voltage 24 V DC)
**115VAC** (Supply voltage 115 V AC)
**230VAC** (Supply voltage 230 V AC)

**Output**

**2R** (2 x relay)

**Function scope**

**1CT** (1 x level control with adjustable time delay)
**1CTW** (1 x level control with adjustable time delay, wire break monitoring)
**1CT2D*** (1 x level control with adjustable time delay, 2 x level detection)
**2C*** (2 x level control)
**2CT** (2 x level control with adjustable time delay)

**Time delay (only selectable for devices with label*)**

**0050** (Delay 50 ms, standard)
**0150** (Delay 150 ms)
**0750** (Delay 750 ms)
**1000** (Delay 1 s)
**5000** (Delay 5 s)
**9999** (Delay 10 s)

**Configuration**

**00** Fixed value

| | | | | | |
|---|---|---|---|---|---|
| **VNV-2** | **24VDC /** | **2R /** | **2C /** | **0750 /** | **00** |

## Order code for devices with 24 V DC active output (housing width 45 mm)

**VNV-2**

**Supply voltage**

**24VDC** (Supply voltage 24 V DC)

**Output**

**4A** (4 x active output)

**Function scope**

**1CT2D*** (1 x level control with adjustable time delay, 2 x level detection)
**1CT2DW*** (1 x level control with adjustable time delay, 2 x level detection, wire break monitoring)
**2CT** (2 x level control with adjustable time delay)
**2CTW** (2 x level control with adjustable time delay, wire break monitoring)
**4D*** (4 x level detection)

**Time delay (only selectable for devices with label*)**

**0050** (Delay 50 ms, standard)
**0150** (Delay 150 ms)
**0750** (Delay 750 ms)
**1000** (Delay 1 s)
**5000** (Delay 5 s)
**9999** (Delay 10 s)

**Configuration**

**00** Fixed value

| | | | | | |
|---|---|---|---|---|---|
| **VNV-2** | **24VDC /** | **4A /** | **4D /** | **0750 /** | **00** |

## Order designation for devices with 24 V DC (housing width 22.5 mm)

**ZNV-2**

**Supply voltage**

**24VDC** (Supply voltage 24 V DC)

**Output**

**2A** (2 x active output)

**Function scope**

**1CT** (1 x level control with adjustable time delay)
**1CTW** (1 x level control with adjustable time delay, wire break monitoring)
**1C1D*** (1 x level control, 1 x level detection)

**Time delay (only selectable for devices with label*)**

**0050** (Delay 50 ms, standard)
**0150** (Delay 150 ms)
**0750** (Delay 750 ms)
**1000** (Delay 1 s)
**5000** (Delay 5 s)
**9999** (Delay 10 s)

**Configuration**

**00** Fixed value

| | | | | | |
|---|---|---|---|---|---|
| **ZNV-2** | **24VDC /** | **2A /** | **1C1D /** | **0750 /** | **00** |

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