Operating instructions
Evaluation system for flow sensors

 VS3000

UK

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The operating instructions apply to all control monitors of type VS3000 for 35mm DIN rail mounting. The only difference between the individual units is the type of supply voltage which is indicated on the type label of the unit. 2 versions are available: 24 V DC and 85 to 265 V AC.

The operating instructions are part of the unit. They contain information about the correct handling of the product. Read them before use to get familiar with operating conditions, mounting and operation. Adhere to the safety instructions. The operating instructions are made for authorised persons according to the EMC and low voltage guidelines.
1 Safety instructions

• Follow the operating instructions, as failure to do so may result in damage to both the unit and persons using the equipment.

• Ensure that the unit is isolated from any supply voltages before installing or changing the equipment. Installation should only be carried out by qualified personnel (due to the IP 20 rating). When altering the settings of the units please ensure that the unit is not connected to the monitored plant.

• The design of the units corresponds to protection class II (EN61010) except for the terminal blocks where protection against accidental contact (safety from finger-touch to IP 20) for operation by qualified staff is only guaranteed if the terminals are completely inserted. This is why the unit always has to be mounted in a control cabinet of at least IP 54 which can only be opened by means of keys.

• If the unit has an external 24 V DC supply, this voltage has to be generated and supplied externally according to the requirements for safe extra-low voltage (SELV) since without further measures this voltage is supplied near the operating elements and at the terminals for the supply of connected pulse pick-ups.

• In case of malfunctioning of the unit or uncertainties please contact the manufacturer. An unauthorised access of the unit can lead to considerable risks for the safety of persons and plant. It is not permitted and leads to an exclusion of liability and warranty.

For units with cULus approval and the scope of validity cULus:

The device shall be supplied from an isolating transformer having a secondary Listed fuse rated as noted in the following table.

<table>
<thead>
<tr>
<th>Control-circuit wire size</th>
<th>Maximum protective device rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWG</td>
<td>(mm²)</td>
</tr>
<tr>
<td>26</td>
<td>(0.13)</td>
</tr>
<tr>
<td>24</td>
<td>(0.20)</td>
</tr>
<tr>
<td>22</td>
<td>(0.32)</td>
</tr>
<tr>
<td>20</td>
<td>(0.52)</td>
</tr>
<tr>
<td>18</td>
<td>(0.82)</td>
</tr>
<tr>
<td>16</td>
<td>(1.3)</td>
</tr>
</tbody>
</table>
2 Function and features
The evaluation system VS3000 is designed to work with flow sensors of the type SFxxxx. It evaluates the signals from the sensors and signals whether there is a preset flow rate or not:
• Flow above the preset value / output relay is energised
• Flow below the preset value / output relay is de-energised
• Flows of either liquids or gases can be monitored.
• Wire break monitoring: in the case of an open-circuit or short-circuit the monitoring relay is de-energised, the red LED (WIRE BREAK/RELAY) signals a fault.
• Temperature monitoring: relay is energised when temperature is exceeded, the red LED (TEMP/RELAY) signals a fault.

⚠️ The unit is not approved for safety tasks in the field of safety of persons.

3 Mounting
• Mount the unit in a control cabinet with a protection rating of at least IP 54 to guarantee protection against accidental contact with voltages and against atmospheric influence. The control cabinet should be installed in accordance with local and national rules and regulations.
• Mount the unit on a DIN rail Once mounted leave enough space between the unit and the top and bottom of the control cabinet (to enable clear space for convection cooling).

⚠️ When several units are mounted side by side the internal heating of all units has to be considered. The ambient temperature for the individual unit must not exceed the permissible value of +60°C.
   In this case adhere to the distances between the units. The following applies to identical VS3000 units: distance = at least 5 mm.
   For units from other companies the permissible distance is to be determined by measurements.
• Prevent the penetration of conductive or other dirt into the housing or wiring.

3.1 Mounting of the sensors
Adhere to the mounting instructions of the manufacturer.
4 Electrical connection

The unit must only be connected by an electrician. The national and international regulations for the installation of electrical equipment must be observed. Avoid contact with voltages. Disconnect the plant from power before wiring. Check if the relays are connected to voltages of external power supplies.

- In order to avoid malfunction caused by interference, lay the sensor cable separately from the load cable. Max. length of the sensor cable: 100m.
- Connection by means of Combicon connectors (fitted). Combicon connectors are also available as accessories:
  - connector with cage clamps (order no. E40171),
  - connector with screw terminals (order no. E40173).

4.1 Terminal connection

1: flow monitoring
2: wire break monitoring
3: temperature monitoring
4: power-on delay time
5: selection liquid / gas

Core colours for flow sensors of the type SFxxxx:
BN = brown, BU = blue, BK = black, WH = white, GY = grey
4.2 Power supply (Power)
Terminal 1: L (AC unit) / L+ (DC unit).
Terminal 2: N (AC unit) / L- (DC unit).
- For DC units the supply voltage must be protected externally (max. 2A).
- The terminals of the DC supply are directly linked with the terminals of the sensor supply. This is why the SELV criteria must be adhered to for DC supply (protective low voltage, circuit galvanically separated from other circuits, not earthed).
- If the DC circuit is to be earthed (e.g. because of national regulations), the PELV criteria have to be adhered to (protective low voltage, circuit galvanically separated from other circuits).
- If the unit is supplied with AC voltage, the low voltage supply for the sensors meets the SELV criteria.

4.3 Connection of sensors
Please also adhere to the SELV criteria for the sensor connection so that there is no dangerous contact voltage at the sensor which can enter the unit!

4.4 Relay outputs
The voltage between the different output circuits (terminals 4, 5, 6 – terminals 7, 8, 9 – terminals 10, 11, 12) must not exceed the permissible maximum value of 300 V AC.
Insert a miniature fuse according to IEC60127-2 Sheet 1 (≤ 5 A fast acting).
5 Adjustment

1. Selection of the monitored medium:

2. Setting of the power-on delay time $t_1$:
   Factory setting: $t_1 = 10 \text{ s}$. To define other times: Connect an external resistor ($R$) between the terminals 22 and 23.

<table>
<thead>
<tr>
<th>$t_1$ [s]</th>
<th>15</th>
<th>20</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
<th>55</th>
<th>60</th>
<th>65</th>
<th>70</th>
<th>75</th>
<th>80</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R$ [kΩ]</td>
<td>10</td>
<td>18</td>
<td>27</td>
<td>39</td>
<td>47</td>
<td>56</td>
<td>68</td>
<td>82</td>
<td>100</td>
<td>120</td>
<td>150</td>
<td>180</td>
<td>220</td>
<td>270</td>
</tr>
</tbody>
</table>

3. Apply the operating voltage. After the power-on delay time has elapsed, the unit is ready for operation, (during this time the output relay for flow monitoring is energised).

4. Set the preset flow and keep it constant. Turn the setting potentiometer (2) until a green LED lights. The farther the green LED lit is away from the yellow LED, the safer is the adjustment (excess gain for flow or temperature fluctuations).

5. Set the setting potentiometer for the temperature monitoring (3) to the requested limit temperature.
6 Operation

After mounting, wiring and setting check whether the unit operates correctly.

For units with monitoring of the sensor cable: In the case of wire break or short circuit the relay „wire monitoring“ is de-energised and the red LED lights. After rectification of the fault the control monitor is again ready for operation.

**Function diagram flow monitoring**

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**A =** preset flow; **B =** switch point; **C =** output relay

**t1 =** power-on delay time

7 Maintenance, repair, disposal

In case of correct use no maintenance measures are necessary.

Depending on the switching rate to be expected and the load to be switched, we recommend testing the relay contacts.

Only the manufacturer is allowed to repair the unit.

After use dispose of the unit in an environmentally friendly way according to the valid national regulations.
8 Scale drawing

1: Potentiometer (switch point flow)
2: Potentiometer (switch point temperature)
## 9 Technical data

### AC
- **Nominal voltage [V]**: 90...240 AC (47...63 Hz)
- **Voltage tolerance [%]**: -5 / +10
- **Power consumption max. [VA]**: 4

### DC
- **Operating voltage [V]**: 24 DC
- **Voltage tolerance [%]**: +/-10
- **Current consumption [mA]**: 90

### Relais:
- **Contact rating**: 4 A (250 VAC / 30 VDC)

### Flow monitoring
- **Switching function**: relay energised when flow is present and during the power-on delay time
- **Function display**: 11 LED
- **Adjustment of the switch point**: with pot.
- **Selection liquids / gases**: link terminals 23-24

### Temperature monitoring
- **Switching function**: relay energised when temperature is exceeded
- **Output status indication**: LED red
- **Temperature range [°C]**
<table>
<thead>
<tr>
<th>SN0150; SN0500; SR0150; SR0503</th>
<th>SR0151</th>
</tr>
</thead>
<tbody>
<tr>
<td>0...80</td>
<td>40...120</td>
</tr>
</tbody>
</table>
- **Repeatability switch point / measured value [°C]**: ± 4

### Wire break monitoring
- **Switching function**: relay de-energised in case of wire break or short circuit
- **Output status indication**: LED red
- **Response time [s]**: max. 3

### Power-on delay time [s]
- Adjustable (fixed-value resistors terminals 22-23)
- 10...80

### Operating temperature [°C]
- -20...60 (in case of sufficient free space for convection cooling)

### Protection
- **Protection class - AC**: II
- **Protection class - DC**: III
- **Housing material**: PBT

More information at www.ifm.com