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Датчик CVR600 BinMaster



CVR600

Level Control Instrument

Instruction Manual



IMPORTANT:

for safety reasons and for proper function of these instruments it is strongly recommended to carefully read this instruction manual before installation!

Application

The CVR600 is a vibration type level control instrument that detects the minimum and maximum level in bins, silos and hoppers, filled with grained materials. Typical product applications are plastic granules, all kinds of pellets, corn etc.

IMPORTANT:

the instrument cannot be used for detecting materials which are sticky and tend to build a deposit on the probe! The CVR600 is not recommended for detecting powdered materials.

General Notes:

- Installation and maintenance must be performed by qualified technical personnel only.
- The CVR600 must be used only in the manner outlined in this instruction manual.
- The CVR600 vibrating level switches are sensitive sensors which need to be handled with care. Never expose these instruments to mechanical loads and temperatures higher than indicated in the technical data. Do not make any changes on these instruments.

Function

The signal from the electronic circuit of the CVR600 excites the rod of the instrument to vibrate on its resonance frequency of approx. 460 Hz. When material covers the rod of the probe, the vibration stops. This is sensed by the electronic circuitry which forces its relay to switch. When the blade gets uncovered, the vibration will restart and the relay will switch back.

Technical Data

Enclosure: die cast aluminium (option: powder coated)
 protection IP 66 and IP 67
 1 cable gland M16 (option: 2 cable glands)
 suitable for cable diameters 0.177 to 0.394 inches

Probe: stainless steel 1.4301 / AISI 304
 resonance frequency approx. 460 Hz

Mounting: thread 1" NPT

Power Supply: wide range power supply 20...250V AC/DC

Power consumption: 3 VA

Relay: 1 SPDT
 max. switching voltage 250V-AC
 max. switching current 5A
 max. switching power 1250 VA
 $\cos \varphi = 1$; 150 Watt for DC

Time Delay: 1 second from stop of vibration
 2 to 5 seconds for start of vibration

Indication: relay: red LED on PCB
 power: yellow LED on PCB

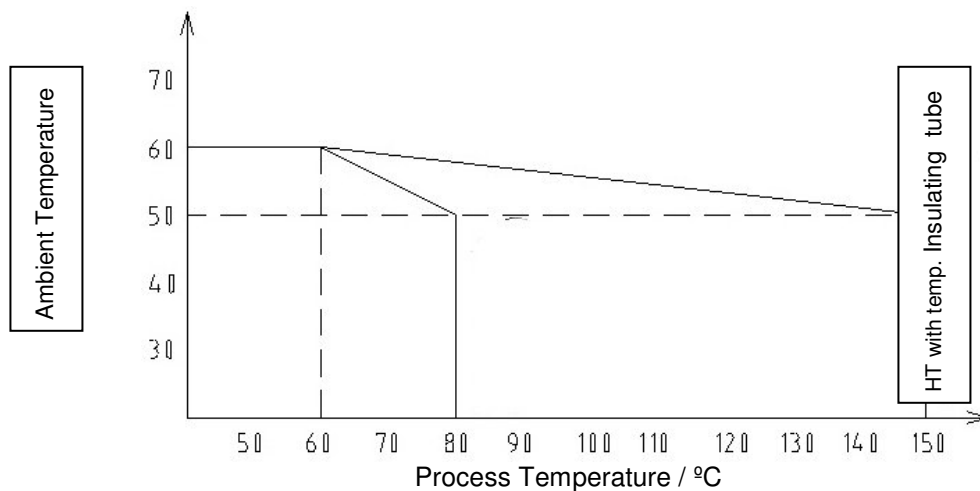
min. density of material to be monitored: 3.12 lbs / cu. ft. (50 g / liter)

max. vertical and horizontal load upon the end of the blade: 80 N

max. pressure inside bin: 10 bar

temperatures (see also following sketch):

- ambient temperature for electronics: -4 °F to +140 °F (-20 °C to +60 °C)
- process temperature for standard probe: -4 °F to +176 °F (-20 °C to +80 °C)
- process temperature for probe HT: -4 °F to +302 °F (-20 °C to +150 °C)
 (special model for high temperatures)



CE-Conformity

The vibration type level switch CVR600 meets the requirements of the following regulations:

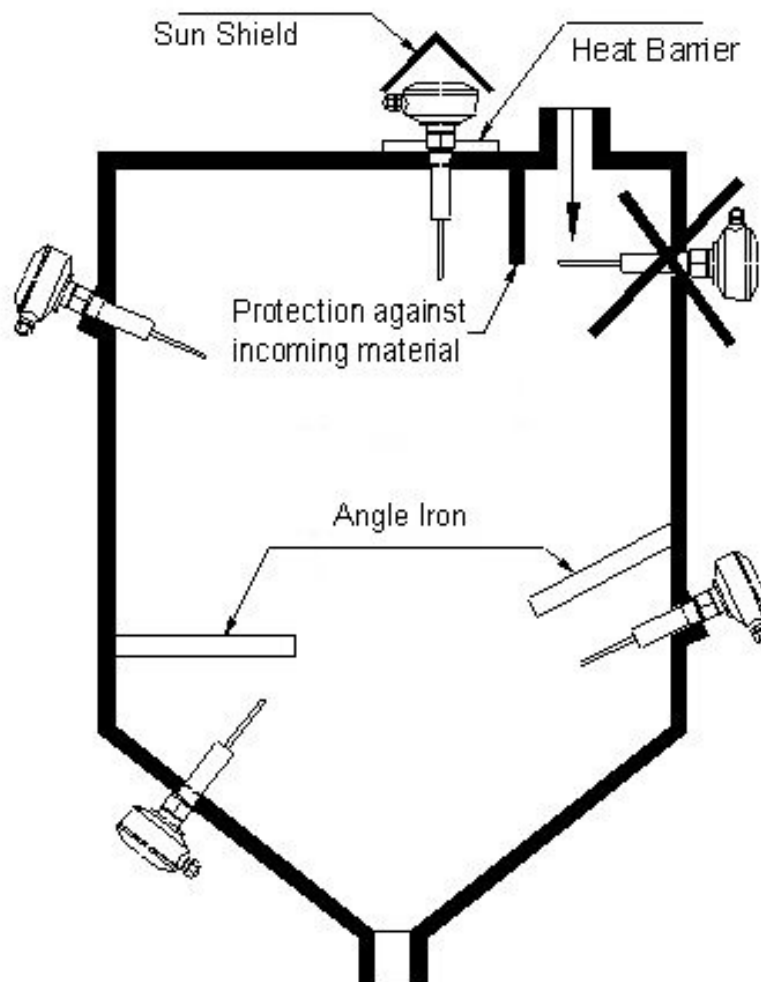
- EG-EMC-directive 89 / 336 / EWG
- EG-Low Voltage Directive 73 / 23 / EWG

Applied standards: EN 61326-1, EN 61326 / A1, EN 61010 T1

Mounting

The following has to be considered when mounting the CVR600:

- The switching point of the CVR600 depends on the density of the material: for heavy materials only a few millimeters of the vibrating rod have to be covered for damping the vibration. At light materials the material must cover the vibrating rod completely in order to damp its vibration.
- The CVR600 must not be mounted in or near the path of incoming material. The falling material could damage the probe.
- In order to keep the ambient temperature of the PCB within the allowed range of -4 to +140°F the housing should be protected from direct sunlight by installing a sun shield.
- A heat barrier has to be installed between the enclosure and the bin wall in cases the temperature of the material inside the bin exceeds 140°F (60°C). Instead it also is possible to use a temperature insulating tube which must be mounted between mounting socket and enclosure, (see chapter *Special Models*).



Side mounting or vertical mounting

- The CVR600 can be mounted at the container either from the side or vertical from top or bottom.
- For side mounting it is recommended to screw the CVR600 into the bin wall with the vibrating rod pointing slightly downwards (approx. 20°) so that material can more easily flow and does not rest on the vibrating rod.
- The CVR600 must not be mounted in or near the path of incoming material. If this cannot be avoided a protection shield, for example an angle steel with side length of approx. 2 inches, must be installed approx. 6 inches over the probe. A protection shield is also necessary for low level detection in order to protect the probe against falling material.
- The CVR600 gets installed by screwing the mounting socket of the instrument into the bin wall by means of a 36 mm open end wrench.
- A suitable sealing, (like Teflon tape), must be applied onto the thread.

IMPORTANT: Do not screw by turning the housing!**Orientation of the cable glands:**

The cable glands must always point downwards to prevent moisture seeping inside the housing. If the housing is not in the correct position after the probe has been firmly screwed into the bin wall, proceed as follows:

- remove the cover of the housing, use a 4mm hexagon socket screw key, (Allen key)
- use a 10mm wrench to loosen the mounting nut in the center of the enclosure
- turn the housing into the correct position so that the cable glands are pointing downwards
- tighten the mounting nut, torque 3 to 4 Nm
- close the cover of the housing (torque 3Nm)

Cable ducts which are not used must get sealed!**Wiring*****Safety Guidelines:***

- Wiring of these instruments must only be performed by qualified technical personnel.
- Before opening the cover and start of wiring make sure that power supply on all wires has been switched off.
- According to DIN EN 61010-1 a main switch for this instrument has to be installed nearby the instrument with which power supply for this instrument **and** its relay output can be switched off. This switch must be marked as main switch of the instrument.
- For power supplies $\geq 50V$ protective earth has to be connected to the terminal on the enclosure.
- If power supply and relay signal do not have the same source the connecting wires of the power supply have to be separated from the connecting wires of the relay by means of wire fasteners in order to prevent the connecting wires of the power supply getting in touch with the relay terminals and vice versa, (which might be possible in case of an error, e.g. break of a wire).

The cables for power supply and relay must be connected to the terminals according to the following sketch:
(also printed on the PCB!)

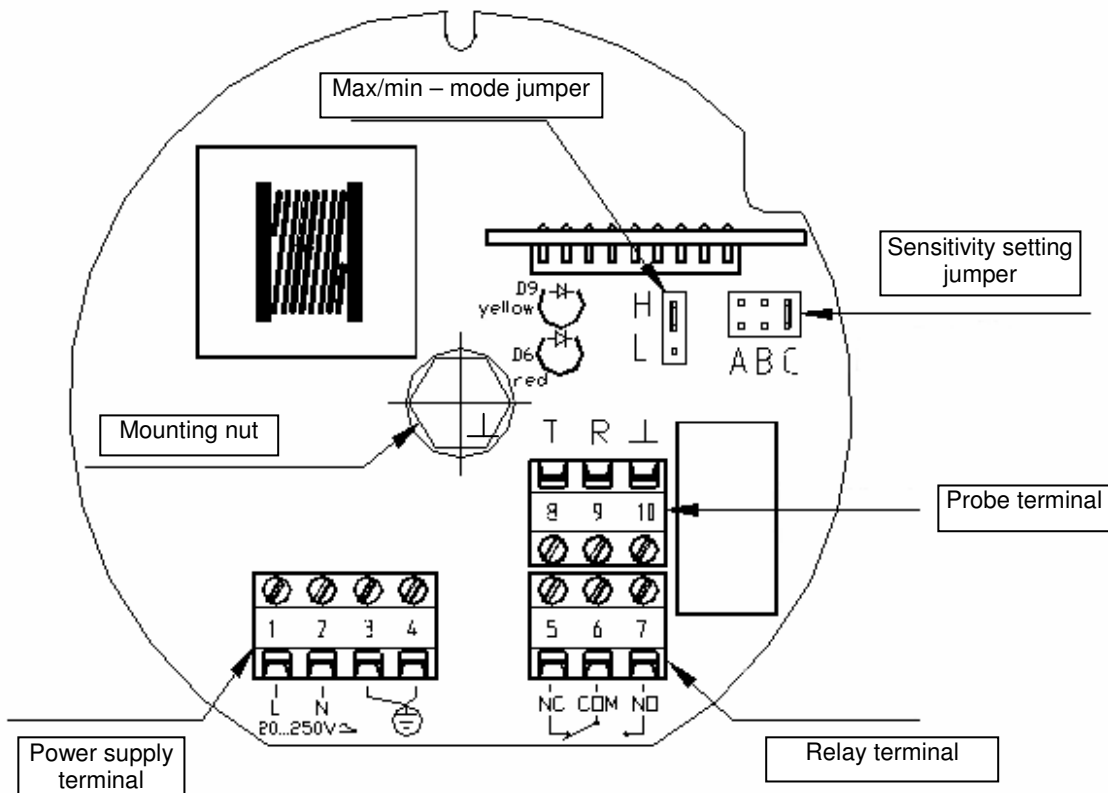
terminal for power supply: 1 = L } 20...250V AC/DC
 2 = N }
 3 = protective earth
 4 = protective earth

terminal for relay: 5 = NC
 6 = COM
 7 = NO

The max. wire size for power supply and relay is 14 AWG.

The probe is connected to the PCB by the three leads of the probe:

terminal probe: 8 = T (red lead)
 9 = R (yellow lead)
 10 = I (black lead)



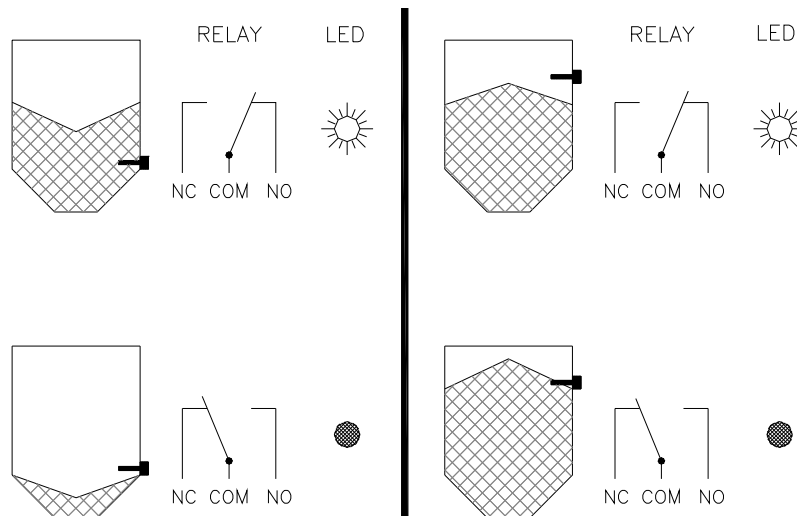
Adjustment

Failsafe high (H) / Failsafe low (L):

Switching Logic: see following sketch.

Failsafe high: jumper in position H: for high level alarm:
the relay is de-energized (position NC, red LED off), when the blade is covered by material or power has failed.

Failsafe low: jumper in position L: low level alarm:
the relay is de-energized (position NC, red LED off), when the blade is free, (not covered by material), or power has failed.



Sensitivity:

selectable by jumper:

- Pos. A: use this setting only for light material with densities down to 3 lbs/cu.ft. or 50g/l. The sensitivity is high at this setting.
- Pos. B: standard setting, sufficient for most materials.
- Pos. C: for heavy materials with high densities which may form a deposit on the vibrating rod. As the sensitivity of the instrument is low at position C, light materials can not be detected at this setting!

Options

The following options are available:

- Enclosure powder coated
- Second cable gland

Special Models

- **Special model for high temperatures:**

can be used for process temperatures up to 302°F (150°C).

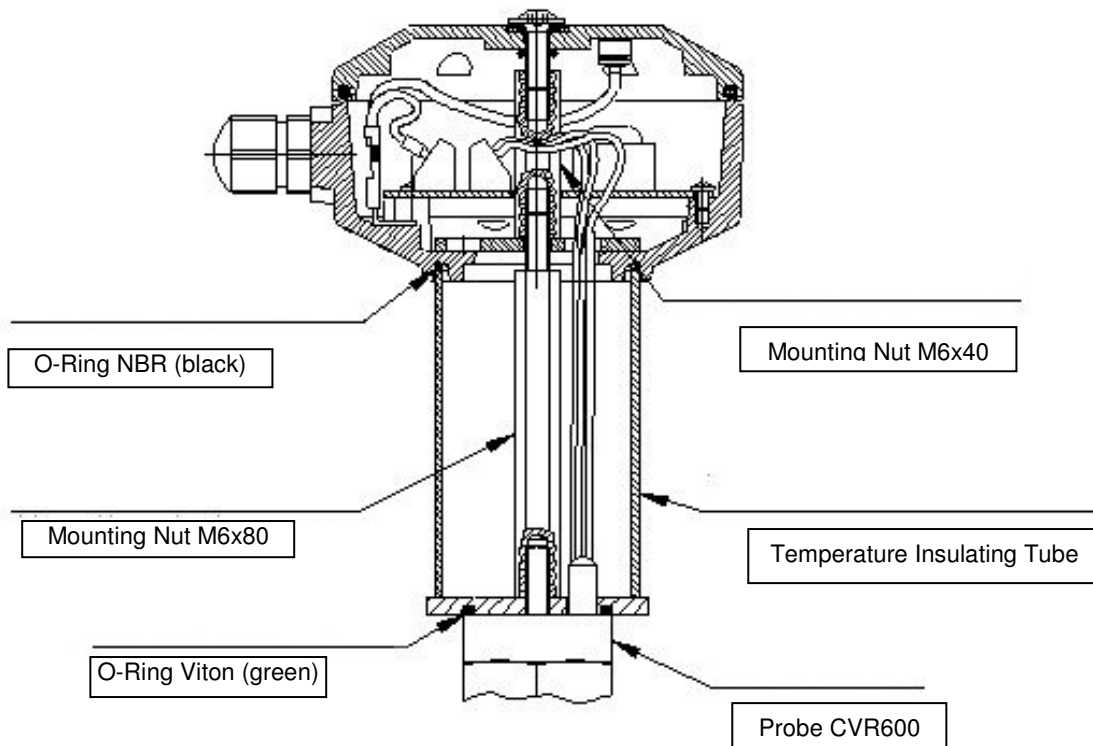
Important: the instruments have got the same outlook as the standard instruments, therefore they are marked with labels „*Special Model HT*“ and the serial numbers of probes and electronics do have the indices „-HT“.

Special model probes must only be used together with the according special model electronics and vice versa!

In order to ensure that the ambient temperature of the electronics, 140°F (60°C), will not be exceeded due to thermal conduction via the probe a temperature insulating tube has to be mounted between probe and enclosure or the electronics has to be installed at a remote place, (see following chapters).

- **Temperature Insulating Tube (see sketch below):**

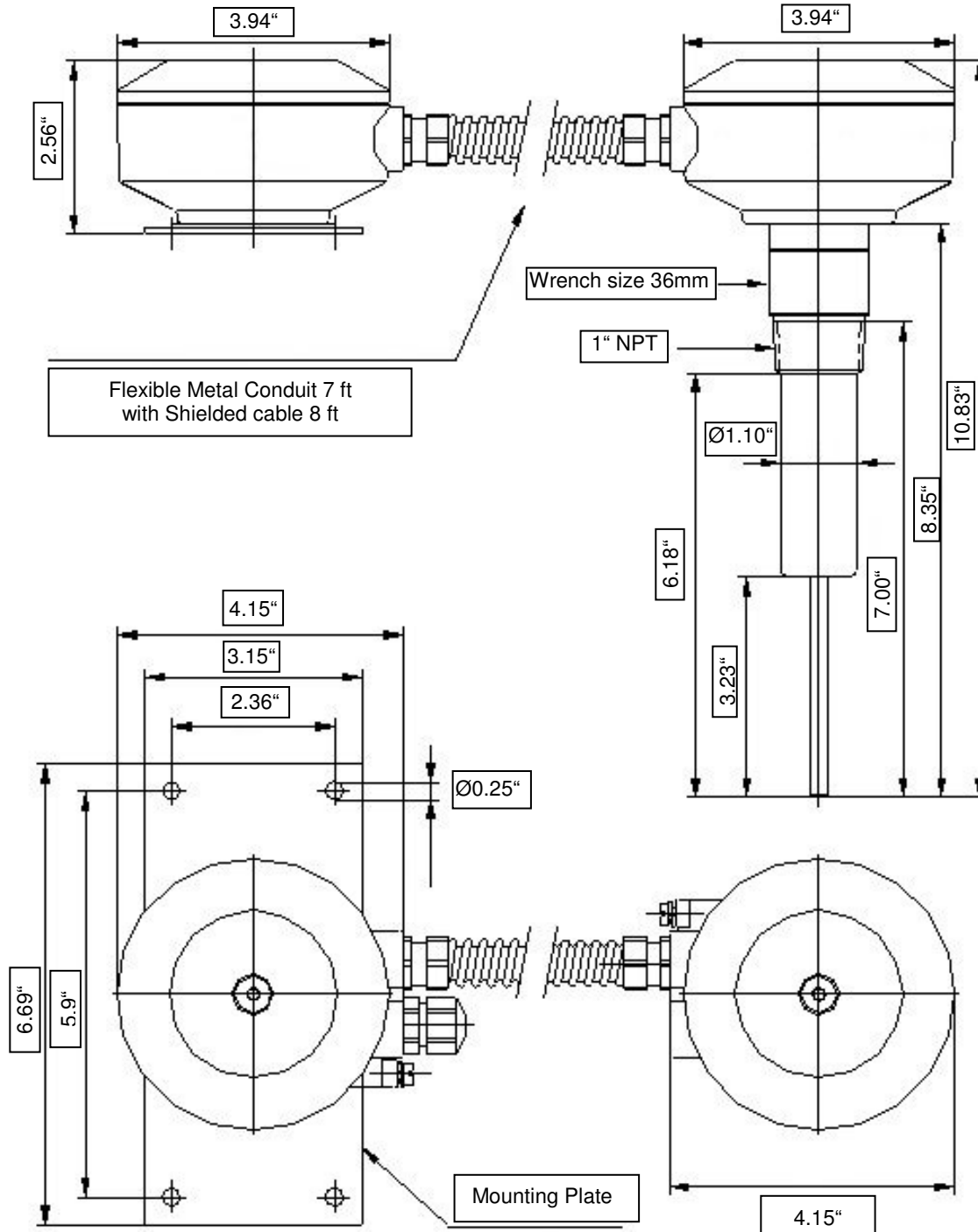
The temperature insulating tube consists of a stainless steel tube Ø50mm which is welded onto a stainless steel plate. The tube gets fixed onto the mounting socket of the probe by means of a 80mm long mounting nut M6. The enclosure gets fixed onto the tube by means of a washer Ø50x3 and the mounting nut M6x40. The green O-ring sealing, (special material Viton), must be located between mounting socket and tube and the black standard O-Ring must be located between tube and enclosure. Use torque 3 to 4 Nm for the screwing of the mounting nuts.



- Remote Electronics Installation (not available for dust-ex)

If the temperature outside the bin near the bin wall exceeds the maximum ambient temperature of the PCB, 140°F (60°C), it is necessary to install the PCB in a remote enclosure apart from the bin where the temperature is in the allowed range. Remote electronics installation is also necessary in case of heavy vibrations of the bin. In this case the remote enclosure has to be installed at a place apart from the vibrations.

PCB and probe get connected by a shielded cable via the terminal PCB which is located inside the enclosure fixed on top of the mounting socket of the probe. A metal hose which is screwed between the remote enclosure and the enclosure that contains the terminal PCB is protecting the cable. The remote enclosure can be installed by means of the mounting plate. Cable and metal hose can withstand temperatures up to 176°F (80°C). Protection of the remote electronics installation is IP65.



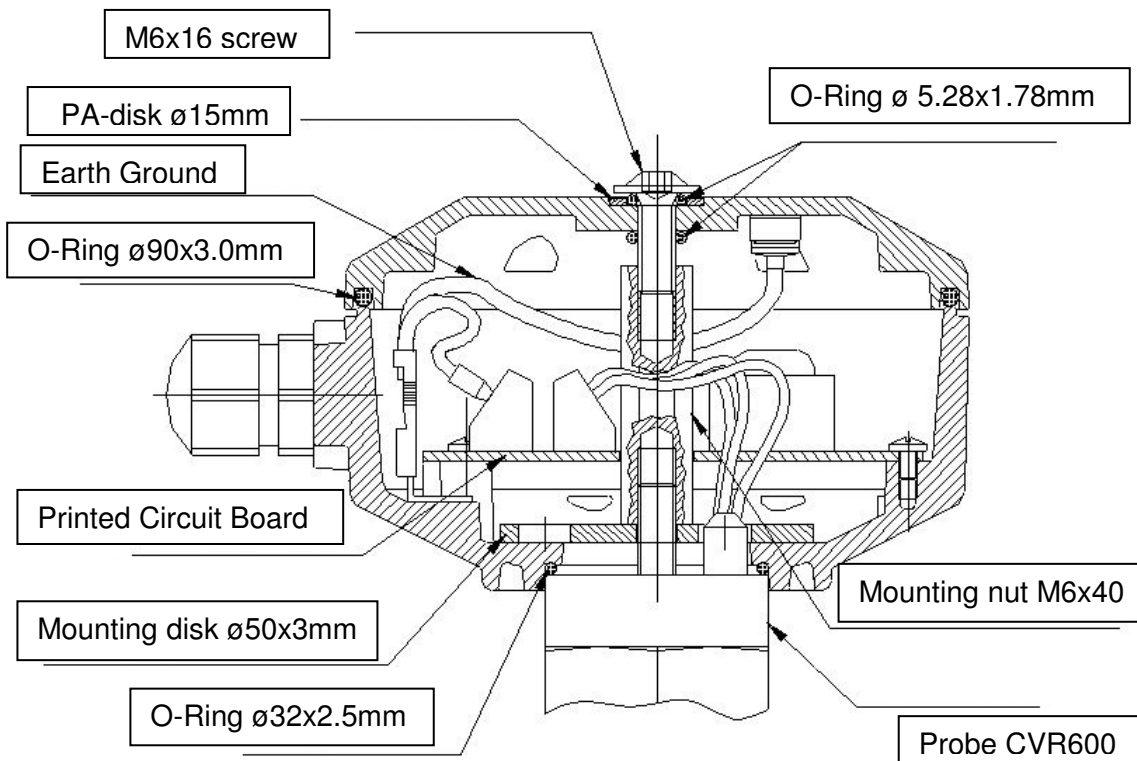
Spare Parts

The following spare parts are available:

- vibrating probe
- electronics
- enclosure

Contact the distributor who has supplied you with this instrument for spare parts or contact BinMaster directly.

Assembling of probe, enclosure and electronics must be done according the following sketch.



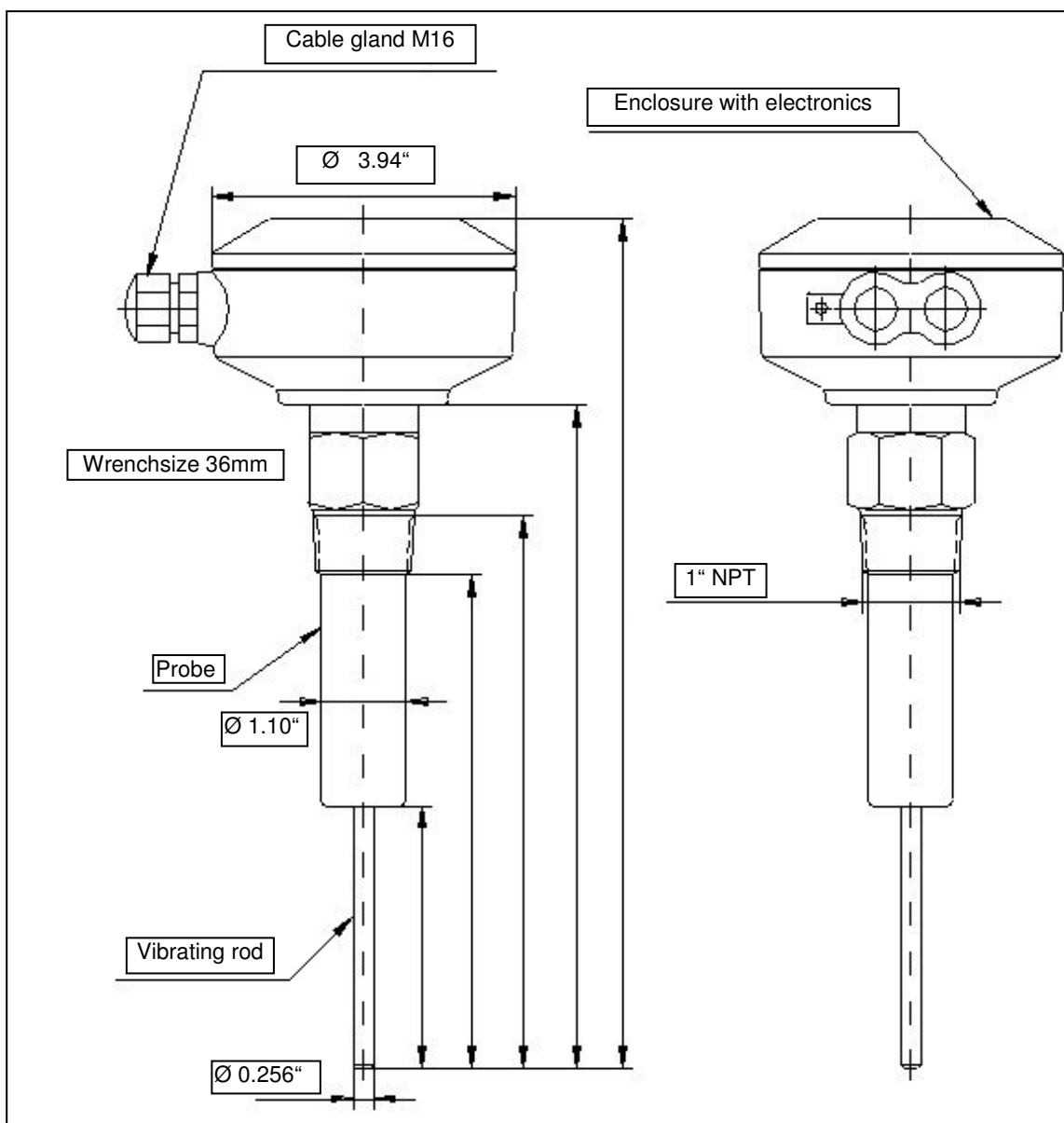
The following has to be considered:

- assembling must be done by qualified personnel only
- all O-ring seals must sit in its appropriate position according to the sketch aside
- apply torque 3 to 4Nm for the mounting nut M6x40
- apply torque 3Nm for the screw M6x16
- apply torque 3Nm for the cable gland
- care must be taken that special model probes will only be used together with the appropriate special model electronics

Maintenance

The CVR600 vibrating type level switches require no maintenance.

For applications with materials that are a little bit sticky we recommend to clean the vibrating blade of the instrument in certain periods of time. If the instruments are exposed to corrosive atmosphere they must be inspected in certain periods of time regarding corrosion of probe and enclosure in order to ensure the protection of the instruments.

Dimensions

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