

INSTRUCTION MANUAL
VIBRATION SWITCH MODEL EURO366
EXPLOSION PROOF
CESI 03 ATEX 186
and
IEC Ex CES 10.0018X
Ex d IIC T6 Gb
Ex t IIIC T85° Db IP66



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Vibration Switch Detector Inside
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SECTION I DESCRIPTION

1.1 DESCRIPTION

The Vibration switch, Model EURO366, is designed to protect rotating, reciprocating, or similar equipment against serious damage from malfunctions that can be detected as an increase in vibration. A reset and holding coil is provided, in the DC/AC voltage as specified so that accidental shutdowns on start can be prevented.

The Vibration switch, Model EURO366, may be used in conjunction with the Vibration switch Monitor, Model 563A. The Monitor is a solid-state electronic system designed to “sort-out” false signals received by the Vibration switch so that Alarm and/or Shutdown of the operating machine will not result from false, transient disturbances. Please note that the Model 563A does not have CE or IEC, ATEX certification at this time.

1.2 MODEL IDENTIFICATION

Specify and order instrument models in accordance with the description and variations listed in each table.

Key Model Number Example

	Euro 366	-	A	2	-	W	2	-	A	-	F	X	-	F
Table A – Key Model Number	_____		_____			_____			_____		_____			_____
Table 1 – Switch Contacts	_____		_____			_____			_____		_____			_____
Table 2 – Remote Reset	_____		_____			_____			_____		_____			_____
Table 3 – Enclosure Type	_____		_____			_____			_____		_____			_____
Table 4 – Enclosure Finish	_____		_____			_____			_____		_____			_____
Table 5 – Switch Type	_____		_____			_____			_____		_____			_____
Table 6 – Enclosure Inlet	_____		_____			_____			_____		_____			_____
Table 7 – Enclosure Outlet	_____		_____			_____			_____		_____			_____
Table 8 – Space Heater	_____		_____			_____			_____		_____			_____

Table A - Key Model Number

Model Number	Description
EURO366	Electric Vibration Detector inside ALUMINUM Enclosure mod. “CS-INV(R)366L” , Explosion Proof Ex d. Contacts actuate when Setpoint is exceeded. Range: from 0 to 4,5 g (Horizontal mounted)

Table 1 - Switch Contacts

Designation	Description
A	SPDT - Single Pole, Double Throw load contacts.
D	DPDT - Double Pole, Double Throw load switches.

Table 2 - Remote Option Reset

Designation	Description
0	No Reset Coil
2	24Volt DC reset coil voltage
4	48Volt DC reset coil voltage
7	120Volt DC reset coil voltage
8	120Volt AC 50/60Hz reset coil voltage
9	230/240Volt AC 50/60 Hz reset coil voltage

Table 3 - Enclosure Type

Designation	Description
J	CS-INV366LW/out external manual reset & Amb. Temp. –40 / +60°C
W	CS-INVR366L..... With external manual reset & Amb. Temp. –40 / +60°C
K	CS-INVR366L..... With external manual reset & SPECIAL Amb. Temp. –60 / +60°C NOTE <i>Vibration switch Working Ambient Temperature is limited to -40 / +60°C</i>

NOTE: CS-INV >**w/out** Manual reset push button CS-INVR > **with** Manual reset push button

Table 4 - Enclosure Finish

Designation	Description
1	Aluminum, Sandblasted Outside&Inside
2	Aluminum, Thermoset POLYESTER powder coated RAL6003 embossed Out&Inside
5	Aluminum, Epoxy polyamide paint coated RAL9006

Table 5 – Switch Type

Designation	Resistive Load Ratings	Protection
A (SPDT only)	7,0 Amp at 240 VAC. 0,5 Amp at 120 VDC 1,0 Amp at 48 VDC 2,0 Amp at 24 VDC	IP50
E ⁽¹⁾ (Oper. Temper. - 25°C only)	5,0 Amp at 250 VAC 3,0 Amp at 30VDC 0,4 Amp at 120VDC	IP40
G	2,0 Amp at 125 & 250 VAC 2,0 Amp at 30 VDC 0.4 Amp at 125 VDC	IP67 (Sealed)
H ⁽²⁾	0,1 Amp max. at 250 VAC 0,1 Amp max. at 125 VAC 0,1 Amp max. at 30 VDC 5,0 mA min. 6 VDC max. 2,0 mA min. 12 VDC max. 1,0 mA min. 24 VDC max.	IP67 (Sealed)

⁽¹⁾ Operating Ambient temperature with this type of switch is limited to -25°C / +60°C

⁽²⁾ Gold Plated Contacts, suitable for Intrinsic safety Applications (Ui 30Vdc max – li 100mA max)

Table 6 and 7 – Enclosure Entries Inlet and Outlet accessories

Designation	Description
A	¾" NPT - ½" NPT Adapter
B	¾" NPT - ½" UNI Adapter
C	¾" NPT - M20 ISO Adapter
D	¾" NPT – 1" NPT Adapter
E	¾" NPT – 1" UNI Adapter
F	¾" NPT Plug
G	E xd-IIC Cable Gland Inner ¾" NPT for armoured cable Inner Seal kit (2pcs) Ø 11÷17mm – Outer Seal kit (3pcs) Ø 17÷25mm
R	For special INLET adapter - Refer to job test certificate for dimensions
S	For special OUTLET adapter - Refer to job test certificate for dimensions
P	¾" NPT – M25x1,5 Adapter
X	Standard ¾" NPT entrances

NOTE: Adapter, Tap and Cable Gland are provided unmounted

Table 8 – Space Heater

(to prevent condensation in the enclosure where climate conditions require)

Designation	Description
F	24 VDC 2 Watt
G	48 VDC 2 Watt
H	120 VAC 2 Watt
L	120 VDC 2 Watt
M	230/240 VAC 2 Watt
X	No Space Heater

Accessory Items (To be ordered separately)

Part Number	Description
TP-SPHE024VDC-02	Space Heater 24 Volt DC
TP-SPHE048VDC-03	Space Heater 48 Volt DC
TP-SPHE120VDA-04	Space Heater 117 Volt AC or 120 Volt DC
TP-SPHE230VAC-05	Space Heater 230/240 Volt AC

SECTION II SPECIFICATIONS

2.1 ENVIRONMENTAL

Housing	Cast Aluminum G-AlSi12(Cu) EN AB47000 (Cu max 0,6%)
Weight Model CS-INV366L.....	2,2 Kg
Weight Model CS-INVR366L.....	2,5 Kg
Enclosure Classification	ATEX >>  II 2 GD Ex d IIC T6 Gb – Ex tb IIIC T6 T85°C Db IP66
	IEC-Ex >> Ex d IIC T6 Gb - Ex t IIIC T85° Db IP66
	Other certifications available on request >> INMETRO, EAC,
Certificates No.	IEC Ex CES 10.0018X and CESI 03ATEX186
Enclosure Protection	IP66
Enclosure Sealing	Silicon O-ring
Mounting Location:	Outdoors, Unprotected
External Bolts	Stainless Steel
Nameplate	Stainless Steel
Conduits	2 x 3/4" NPT (CLOSE with certified plug the second conduit if NOT used)
Enclosure Finish (Out&Inside)	See table 4
Explosion Proof Certified Ambient Temperatures Limits	⁽¹⁾ -40°C / +60°C (Standard)

⁽²⁾ -60°C / +60°C (Optional)

NOTE: ⁽¹⁾ if selected switch "E" Tambient is limited at -25°C / +60°C

⁽²⁾ Vibration switch (detector inside) working ambient temperature -40°C / +60°C

Humidity	To 95% Relative Humidity @ +37,7°C
Shock	40 g @ 11 ms. maximum

2.2 PERFORMANCE

Vibration Measurement Range	0 ÷ 4,5 g from 0 to 300 Hz
Setpoint Range	from 0 to 4,5 g when mounted Horizontal
	0 to 3,5 g when mounted Vertical
Setpoint Adjustment	1 turn per g
Accuracy	±5% of full range (0 to 300 Hz)
Ambient Temperature Effect	±10%/100°F (55,5°C) maximum
Reset Coil	
Standard Voltages	24 VDC / 0,5 Amp
	48 VDC / 0,2 Amp
	120 VDC / 0,14 Amp
	120 VAC / 0,3 Amp, 50/60 Hz
	240 VAC / 0,3 Amp, 50/60 Hz

Duty Cycle (24 VDC, 48 VDC, 120 VDC, 120 VCA)..... 4 minutes **max. ON** - 10 minutes **min. OFF**

Duty Cycle (230/240 VCA)..... 1 minute **max. ON** - 10 minutes **min. OFF**

SECTION III INSTALLATION

3.1 GENERAL

Examine the instrument for possible shipping damages. **IMPORTANT:** If for any reason it is determined that the equipment should be returned to the factory, please notify to us prior to shipment. Each unit must be properly packaged to prevent damage. We assume no responsibility for equipment damaged in shipment due to improper packing.

Choose the location in accordance with good instrument practice, avoiding extremes temperature, humidity and vibration. (See SPECIFICATIONS, Section II.)

The Vibration switch, Model EURO366, malfunction detector may be located in any outdoor or indoor area according to IEC or Atex Classification and housing Protection information contained in Section II, Specifications.

In locations where moisture condensation within junction boxes is a problem, for Vibration switches with a SPDT switch (Table 1, Designation A) a two watt resistor may be placed across terminals 6 and 8 inside the Vibration switch enclosure and wired to a source of continuous voltage to provide heat within the enclosure to reduce condensation effects. See Table 3-1 for Space heater value. Space heater resistors cannot be readily installed in the field in Vibration switches with a DPDT switch (Table 1, Designation D).

3.2 MOUNTING

Figure 3-1 illustrates the methods of mounting on various pieces of equipment. Figure 3-2 and 3-3 shows the external wiring and mounting dimensions for the Vibration switch Model EURO366.

The vibration sensitive axis of the Vibration switch is perpendicular to its mounting base. Therefore, the Vibration switch must be mounted in a plane that will detect the vibratory motion for which protection is desired. The Vibration switch may be mounted at any location along the length of machines containing rotating shafts that are horizontal and parallel to the base of machine: the preferable location being in line with the rotating shaft. Do not mount the Vibration switch perpendicular to the ends of the rotating shafts unless the end-play or end-thrust measurement is desired. Normally, bent shafts, unbalances on the rotating mass of the shaft, worn bearings, and other anomalies are detected near the bearing housing and at the right angles to the shaft.

The Vibration switch may be mounted in any position between the side (vertical) or the top (horizontal) of bearings or machine housing. It should be noted that when mounting Vibration switches on top (horizontal position) of equipment the vibration measurement range is stated in the Specification Section. However, when the Vibration switch is mounted on a side position (90° from horizontal), 1 g is subtracted from the measurement range of the instrument.

If mounting bracket assembly is used to mount the Vibration switch due to an irregular mounting surface, it must be constructed of steel having sufficient thickness and properly reinforced so that mechanical resonance are not introduced; usually ½" steel plate is satisfactory if the dimensions of the bracket are not large. It is extremely important that all the corners of the Vibration switch, as well as the mounting assembly, be rigidly secured to the machine. Exact location is not critical as the adjustment procedure of the Vibration switch automatically accounts for the normal vibration at the location.

The Vibration switch, when properly adjusted, trips on a relative increase in vibration.

When installing the Vibration switch on existing equipment where several convenient mounting positions are available, it is advisable to check the existing vibration level at each possible position before permanently mounting the unit. The Vibration switch can be used to measure existing vibration by holding or clamping it against the running machine and determining the trip point as described under "ADJUSTMENT" in this manual. Should normal vibration exceed the range of the Vibration switch, it is recommended that consideration be given to Vibra-Tel, model 566, Continuous Monitor Unit which is capable of monitoring higher g-levels. Please note that the Model 566 does not have CE or IEC, ATEX certification at this time.

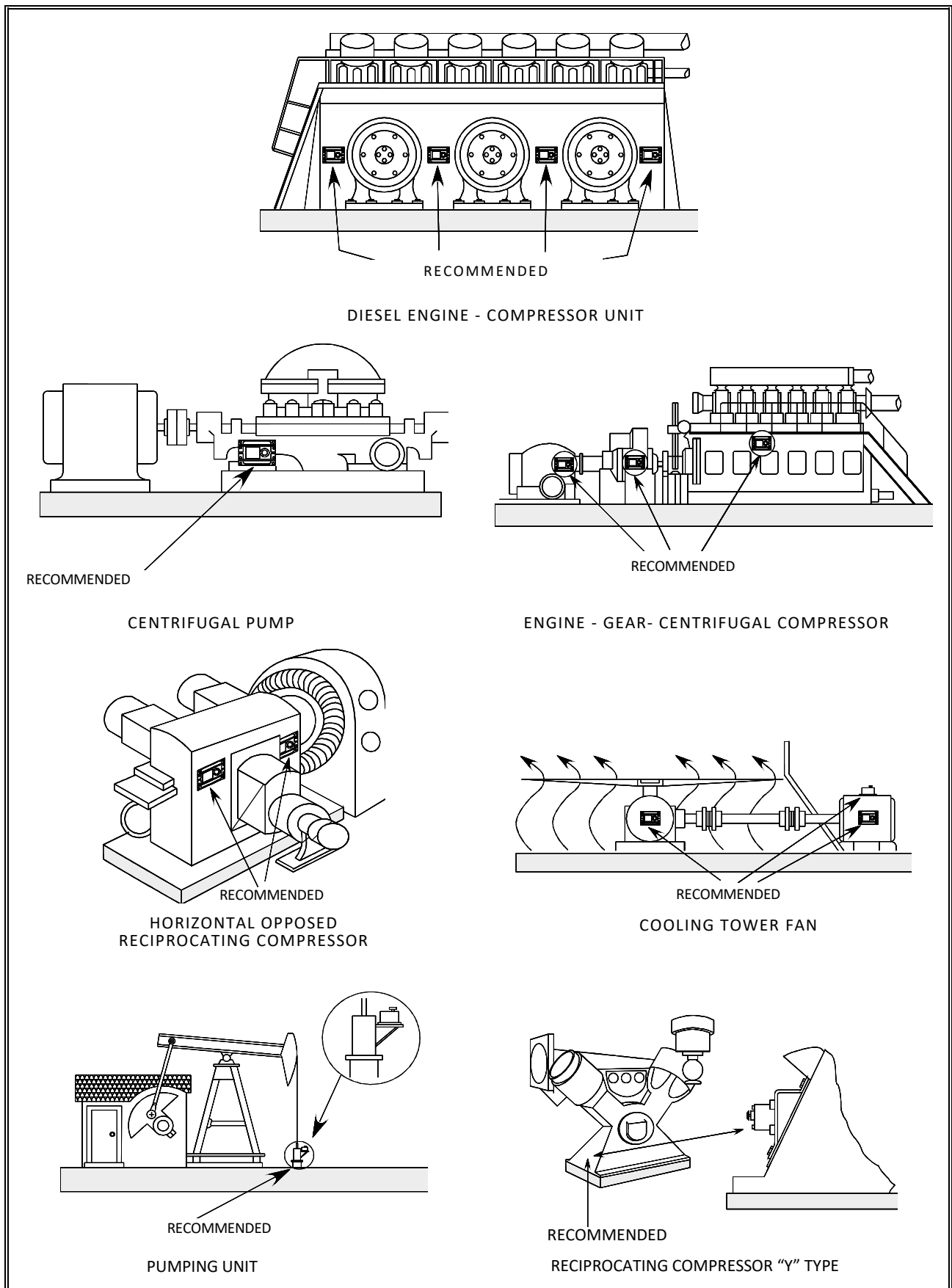


Figure 3-1. Methods of Mounting the Vibration switch, Model EURO366

3.3 SPACE HEATER

In some outdoor installations, it may be necessary to install a space heater to prevent moisture condensation. For Vibration switches with a SPDT switch (Table 1, Designation A) a small conventional carbon 2 watt resistor should be installed across terminals 6 and 8 in the detector. Proper values are shown in Table 3-1. Space heaters cannot be readily installed in the field in Vibration switches with a DPDT switch (Table 1, Designation D).

Table 3-1. Space Heater Resistor Values

VOLTAGE (DC or AC)	SPACE HEATER RESISTOR (OHMS)
460	220.000
230/240	56.000
120	12.000
48	2.000
24	560

3.4 WIRING

The Vibration switch Model EURO366, is equipped with two threaded hubs for ¾" NPT conduit. When the vibration amplitude is large (i.e., greater than 5 mils) it is good practice to use a short length of flexible conduit to serve as an insulator between the rigid conduit and the Vibration switch. Wiring into the unit should be done with #18 stranded wire although #14 can be used where necessary. The Vibration switch was not designed for wiring with heavy solid wire. However, where necessary to use an heavier wire, as in low voltage DC units, a junction box near the Vibration switch should be used.

NOTE

The instrument housing must be sealed at the conduit outlets with a suitable compound or "trap" to prevent infiltration of moisture-laden air or corrosive gases into the housing.

In case the second cable enclosure's entry is not used MUST BE CLOSED and sealed by certified Ex plug (must NOT be kept open)

NOTE

All instrument installation wiring must be done in accordance with local codes and commonly accepted practices.

NOTE

The products installed in places with environment temperature of 60°C, must use Tcable 105°C inside enclosure. This means that the Buyer and/or the User must use a connection cable having maximum service temperature not lower than 105°C.

To avoid unnecessary difficulty in wiring the unit, the following procedure should be followed in detail:

- When installing conduit and mounting the Model EURO366, it is recommended that the cover be left on the unit.
- If the Model EURO366 is to be mounted in unprotected or dusty areas, a dust-tight or water-tight seal should be made at the conduit entrance.
- With all mounting complete, remove cover and insert wires through conduit entrance with sufficient length to reach the terminal block.
- Strip wires back approximately 6,4mm (¼") and install solderless insulated terminals.
- Connect wires to terminals as shown in Figure 3-2.
- Ground enclosure connecting by inside and outside apposite signed terminals

3.5 TERMINAL BLOCK

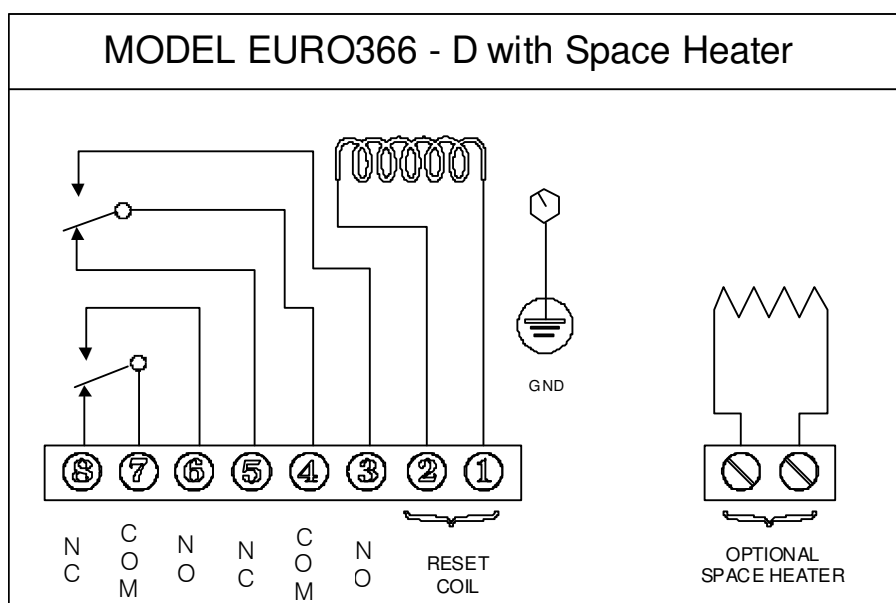
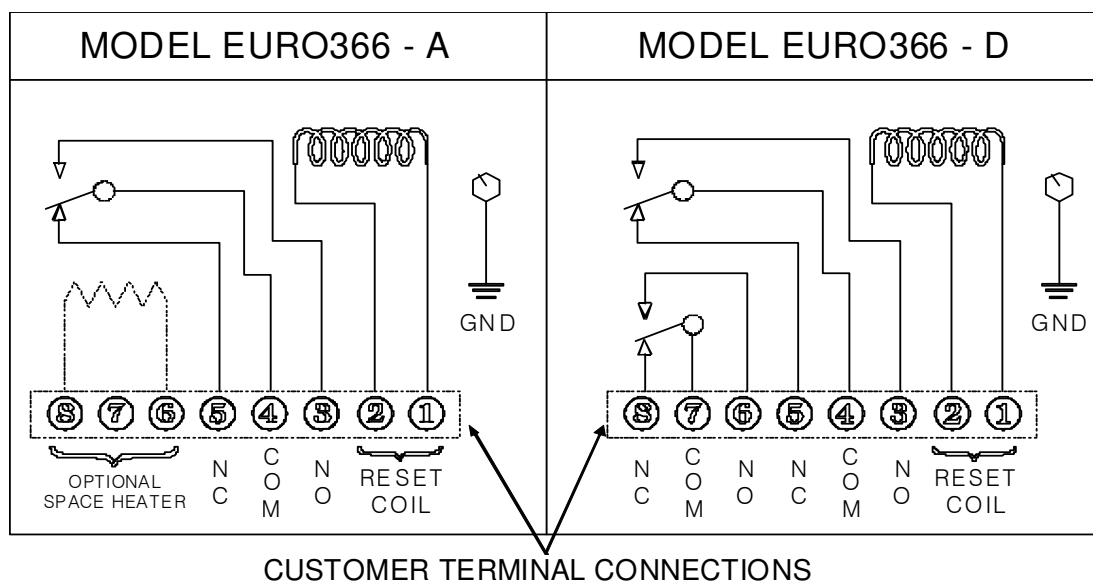


Figure 3-2. External Wiring for the Vibration switch, Model EURO 366.

1. Switch shown in normal or reset position - reverses on actuation from increased vibration.
2. Standard Coil Voltages: 24 VDC, 48 VDC, 120 VDC and 120VAC (230/240 VAC Optional).
3. Heater resistor installed, when required, to prevent condensation in housing where climate conditions require. (Supplied only when specified)
4. If Manual Reset Only is desired, do not apply power to the reset coil.
5. Ground enclosure connecting by inside and outside apposite signed terminals

3.6 MOUNTING DIMENSIONS

(Dimensions are in millimeters)

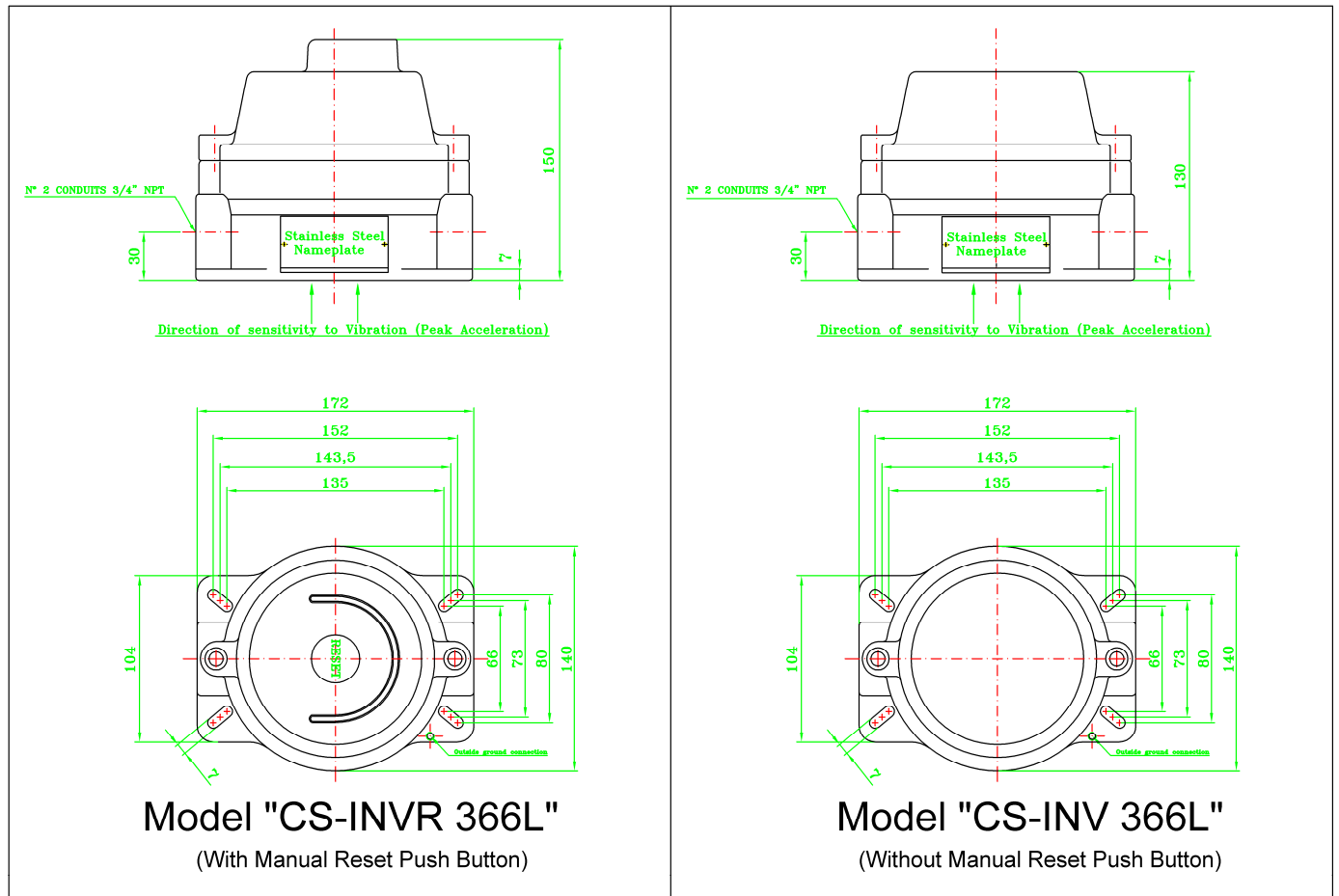


Figure 3-3.

Mounting Dimensions for the Vibration switch

Model EURO366 .

SECTION IV OPERATION

4.1 OPERATION

The Vibration switch Model EURO366 (Refer to Figure 4-1), is sensitive to vibration in a direction (the sensitive axis) perpendicular to its mounting base. It contains a vibration detecting mechanism, which also functions as a “mechanical amplifier”, to activate a snap-action switch when the selected level of vibration is exceeded and the detecting mechanism “trips”.

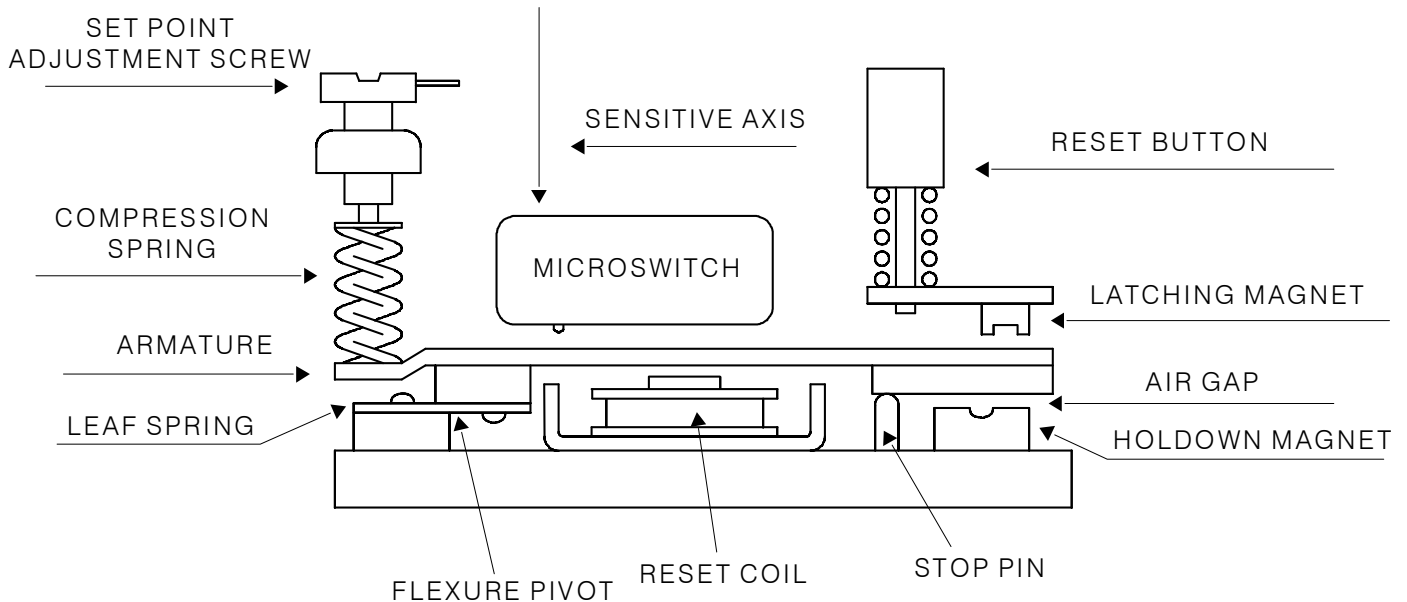


Figure 4-1. Operating Principle for the Vibration switch, Model EURO366.

The detecting mechanism consists of an armature suspended on a flexure pivot which is restrained from motion by a permanent magnet (the holddown magnet). In the “armed” condition, the armature is held against the stop pin by the holddown magnet. The stop pin maintains a precise air gap between the armature and the holddown magnet. On the opposite end of the armature, the compression spring provides an adjustable force to oppose the force of the holddown magnet. Whenever the peak vibration inertial force (mass x acceleration) plus the adjustable compression spring force exceeds the force of the holding magnet, the armature is released and is pulled into the latching magnet (“tripped” position). Simultaneously, it activates the snap-action switch. This detecting mechanism has a uniform response from 0 to 300 Hz over a range of 0 to 4.5 g’s.

The mechanism may be reset to the “armed” position manually (locally) or electrically (remotely). Manually, depress the reset button to move the armature away from the latching magnet (“tripped” position) until it is held against the stop pin (“armed” position). Electrically, the reset coil may be activated to pull the armature into the “armed” position against the stop pin.

A reset and holding coil is provided, in the DC/AC voltage as specified, so that accidental shutdowns on starts can be prevented. External time-delay circuits are required to maintain voltage at the holding coil during the startup period and then release this voltage when operation is normal. At full voltage, the reset coil should not be energized for more than four minutes (1 minute for 230/240VAC reset coil) to prevent overheating. Then, the reset coil must be de-energized for a period of 10 minutes before re-energizing. For longer hold-in requirements the reset coil should be energized at a full voltage and then held-in at one-half the rated voltage.

The Vibration switch Model EURO366, may be used in conjunction with the Vibration switch Monitor, Model 563A. The monitor is a solid-state electronic system designed to “sort-out” false signals received by the Vibration switch so that Alarm and/or Shutdown of the operating machine will not result from false, transient disturbances, but any continuous vibration level which exceeds the Set point of the Vibration switch will cause Alarm or/and Shutdown. Example of transient disturbances are the closing of pipeline check valves on pumping applications, the start-up of additional pumps on a line, and the initial start-up of various operating machines. These disturbances may cause the Vibration switch to “trip-out” if the vibratory shock level is in excess of its set point. Please note that the Model 563A does not have CE or IEC, ATEX certification at this time.

4.2 ADJUSTMENT OF OPERATING SETPOINT

The operating setpoint for the Vibration switch varies with the type of machine and its location (measurement point) on the machine. The setpoint adjustments suggested in this instruction manual are for machines which are functioning in a “good” or “normal” condition. This method follows the concept of vibration tolerance for the machine and in this case is dependent upon an individual who is experienced in the operation of the machine to define the vibration as “normal”, “fair”, “slightly rough”, etc. These various degrees of machine vibration are, therefore, based on individual’s physical perception between normal and abnormal roughness while the machine is operating.

It is agreed that this method can lead to differences in the classification of degree of vibration between individual observers. It is our contention, and experience bears out this conclusion, that if the machine is operating satisfactorily as previously defined and the acceleration as measured by the Vibration switch is within certain limits, the settings as outlined in the instructions will offer protection to the machine and prevent catastrophic failure.

For example, assume that a relatively new machine which, in the experience of the operator, is operating as “smooth” or “good” regarding Vibration and the Vibration switch measures this acceleration level to be 0.25 g above its static condition (zero). Experience suggests that a reasonable level for alarm conditions would be a minimum of twice this value or 0.5 g. It must be acknowledged that such a definition of upper vibration limits (alarm condition) on the machine may not have adequately defined the upper tolerance limit of the machine before major repairs or excessive machine damages occurs. It does, however, define a limit which, in our experience, has proven to be safe. As the user becomes more adept in using the Vibration switch as a monitoring device, his experience may dictate an higher set point more in keeping with the experience he has gained on the particular machine.

The Model EURO366 Vibration switch is adjusted by a simple three-step procedure.

In making these measurements the cover must be removed to gain access to the Setpoint adjusting screw. (Ref. Figures 4-1 & 4-2.)

a. Zero Vibration Level Measurement

With the equipment on which the Vibration switch is mounted not operating, back off the Setpoint adjusting screw counterclockwise (CCW) two turns and press the reset button. Then turn the Setpoint adjusting screw slowly clockwise until actuation occurs (the armature assembly is against the latch magnet, Figure 4-1). This is the zero vibration point, or actuating point, with the machine not operating. A mark should be made with a lead pencil or other convenient means to permanently record this “zero vibration point”. Subsequent measurements are made relative to this point.

b. **Normal G-Level Measurement**

With the machine (equipment) operating, back off the Setpoint adjusting screw one turn CCW and reset. If it will not reset, back off the Setpoint adjusting screw two turn CCW, etc. Again turn the Setpoint adjusting screw slowly clockwise until actuation occurs. Mark this position with a lead pencil or other convenient means. The difference between the two actuating points in Steps a and b is the normal g-level of the operating machine, in scale divisions. One scale division is 0.1 g; one full revolution is 1.0 g.

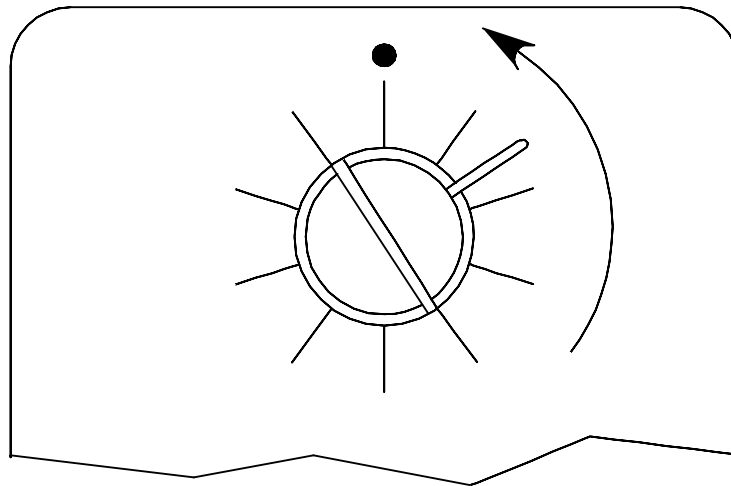


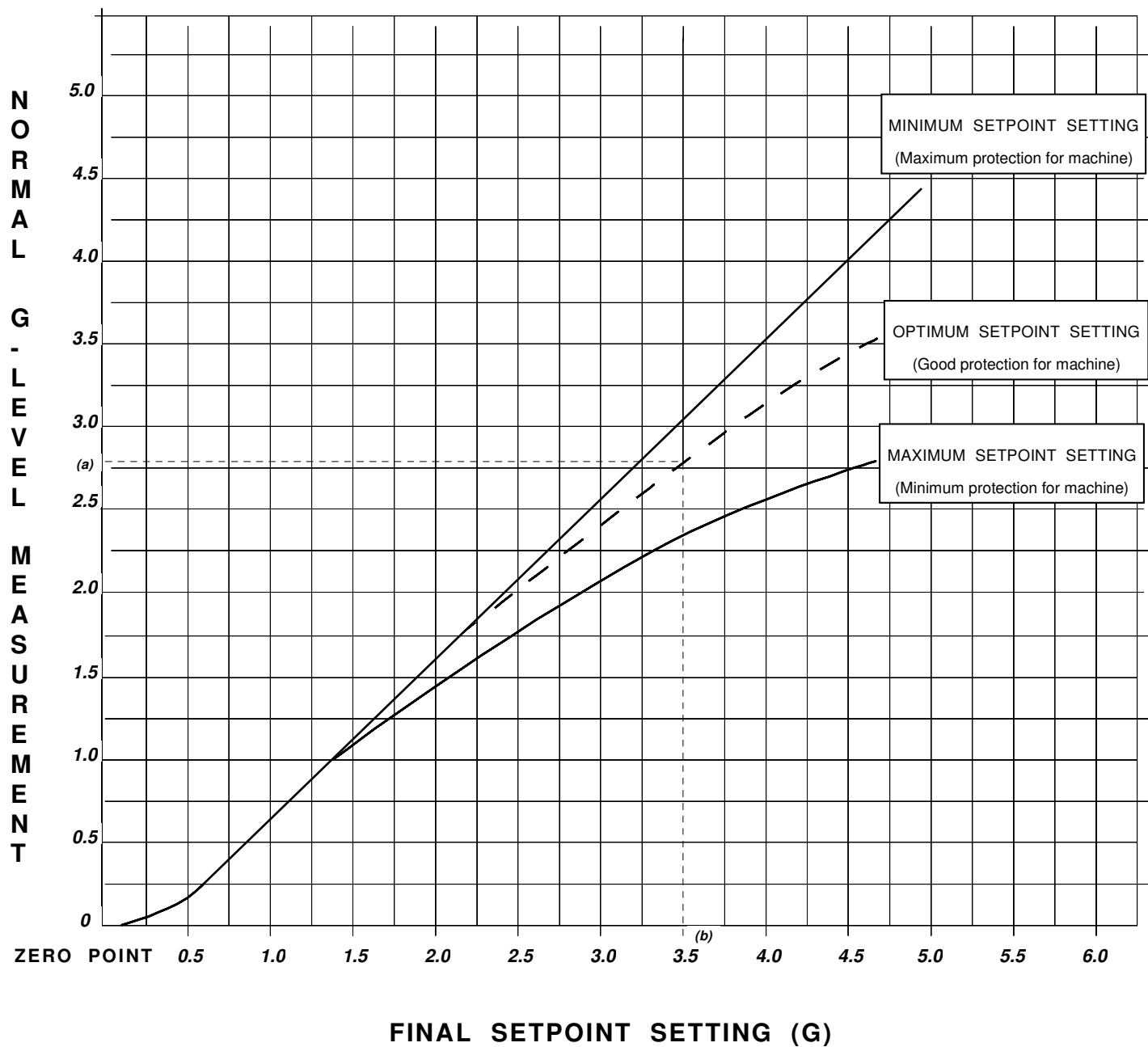
Figure 4-2. Setpoint Adjustment

c. **Final Setpoint Adjustment**

If the “normal” g-level is less than 1.0 g above the zero level, rotate the Setpoint adjusting screw CCW 0.5 g (five graduations) from the point where actuation occurs in Step b above. If the “normal” g-level is greater than 1.0 g refer to Figure 4-3 for the proper Final Setpoint setting with respect to the “normal g-level vibration point” obtained in Step b. See example on Figure 4-3.

NOTE

In the preceding adjustments, actuation can be heard as an audible “click”. In very noisy surroundings, it may be necessary to use an ohmmeter or wire the Vibraswitch to the control circuit to tell when actuation occurs or observe visually that the armature is in the up (latched) position.



Example: If the Normal G-Level (a) is 2.8 g above the Zero Vibration Level, the Final Setpoint Setting (b) should be set at 3.5 g above the Zero Vibration Level. Therefore, advance the Setpoint Pointer CCW 0.7 g ($3.5 \text{ g} - 2.8 \text{ g} = 0.7 \text{ g}$) or 7 divisions (one scale division is 0.1 g) from the Normal G-Level.

Figure 4-3. Setpoint Alarm settings.

SECTION V MAINTENANCE

5.1 TROUBLESHOOTING

Vibration switches do not normally require any maintenance or repair, however, listed below are some of the possible malfunctions that may occur and their recommended solutions (Ref. Figure 4-1). Perform all tests with field wiring disconnected.

a. Functional Test - (Ref. Figure 4-1)

1. With the Vibration switch cover removed, place Vibration switch on a table with its mounting surface down.
2. Press reset button. If switch does not reset (armature latched on stop pin), turn set point adjustment screw CCW until switch can be manually reset.
3. Slowly turn set point adjustment screw CW until switch trips. This is the zero trip point which is the amount of spring tension required to overcome the 1 g force exerted by the earth's gravitational pull.
4. Note set point setting. One complete turn equals approximately 1 g. Set point scale is marked in 0.1 g increments. Turn set point adjustment screw 1 complete turn CCW. This is a 1 g setting above the earth's gravitational pull.
5. Manually reset the switch (press reset button).
6. With the reset button to your right and the set point adjustment screw to your left, slowly rotate the Vibration switch toward you 90°. The switch will trip when the mounting surface is in a vertical plane and the earth's gravitational pull is not aiding the lower magnet to hold the armature against the stop pin.

b. Vibration switch Will Not Reset

7. Dirt and/or iron metal chips on magnets
Clean magnets.
8. Broken leaf spring - (Ref. Figure 4-1).
Return the Vibration switch to the factory for repair.
9. Open reset coil.
Check for continuity and proper coil resistance (Ref. Table 5-1).

TABLE 5-1. Coil Resistance

Nominal Voltage	Resistance (Ohms $\pm$ 10 %)
24 VDC	50
48 VDC	230
120 VDC	840
120 VAC	Check for continuity*
230/240 VAC	Check for continuity*

* (Diode prevents actual resistance reading)

c. Unable to Adjust Setpoint Setting to Obtain Tripping

Improper air gap between Holddown (lower) Magnet and Armature.
Return the Vibration switch to the factory for repair.

c. Switch Does Not Actuate

Defective or improperly adjusted switch - (Ref. Figure 4-1).
Manually move the Armature between the hold down magnet (armed position) and latching magnet (latched position) and listen for an audible click of the switch. An audible click occurs when contacts change state. Verify by performing a continuity check. Return the Vibration switch to the factory for repair.

NOTE

If the switch does not pass either of the tests above, return the
Vibration Switch to the factory for repair

	INSTALLATION USE AND MAINTENANCE INSTRUCTIONS		IM.C-168/10.01
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SECTION VI - SPECIAL IEC Ex and ATEX INSTRUCTIONS**Vibration Switches series CS(.)-INV. ...**

Execution : **Ex d IIC T6 Gb**
Ex t IIIC T85°C Db IP66
Ex d I Mb

Accordinging standards: **IEC 60079-0:2007, IEC 60079-1:2007, IEC 60079-31:2008**

Certificate of Conformity IEC-Ex: **CES 10.0018X**

Execution: **CE**  **II 2GD** **Ex d IIC T6 Gb**
CE  **I M2** **Ex t IIIC T6 T85°C Db IP66**
Ex d I Mb

Accordinging standards: **EN 60079-0:2009, IEC 60079-1:2007, IEC 60079-31:2009**

EC Type Certificate: **CESI 03ATEX186**

1.Safety instructions

This safety instructions refer to the installation, use and maintenance of the vibration switches series **CS(.)-INV. ...** for use on surface areas and underground in an explosive atmosphere due to dusts, gas and vapours.

The appliances included in the present instruction sheet are protected against risk of explosion as described hereafter:

Type of protection	Standard Amb. Temp.	Special Amb. Temp.
Ex d IIC T6 Gb - Ex t IIIC T85°C IP66 Db	-20°C÷+40°C	-60°C÷+60°C
Ex d I Mb		Not applicable

The above type of protections can be combined whenever required by different hazardous circumstances.

2.Installation and electrical connection**2.1 Compatibility between the appliances and the hazardous areas**

According to the technical and legislative regulations the housing can be installed in explosive areas. The appliances must be fitted in a compatible area under the user's responsibility. Criteria for classification of areas with presence of explosive atmosphere are set in standard IEC 60079-10 for gas presence and IEC 61241-10 for flammable dust presence.

Technical standards for electrical installations in classified areas are set in standard IEC 60079-14 for gas presence and

IEC 61241-14 in case of flammable dust presence. In the label, with functional data, there is reference to Competent Body responsible for IEC-Ex certification.

WARNING: the appliance can not be installed in "“ZONE 0” and in "“ZONE 20”".

2.2 Label data

Label data that identify safety characteristics of equipment and compliance to relevant standards are the following:

Ex d	Explosion proof protection
Ex t	Dust ignition protection by enclosure "t"
IIC	Equipment suitable for gas group IIC.
T6	Equipment temperature class (max. surface temperature).
IP66	Mechanical protection degree according to EN60529.
IIIC	Equipment suitable for dust group IIIC.
T85°C	Max surface temperature in presence of dust.
I M2	Equipment suitable for installation in mines susceptible to firedamp
II 2G	Gas explosion protected equipment suitable for Zone 1
II 2D	Dust explosion protected equipment suitable for Zone 21
II 2GD	Gas and dust explosion protected equipment suitable for Zone 1 and Zone 21
Mb	Equipment with "high" protection level, for installation in mines susceptible to firedamp

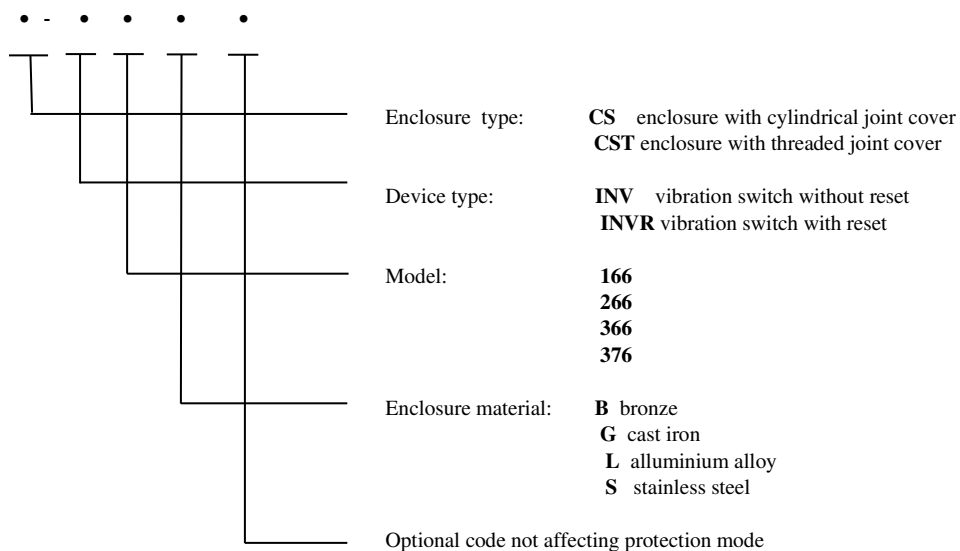
Gb	Equipment with “high” protection level, for explosive gas atmospheres
Db	Equipment with “high” protection level, for explosive dust atmospheres
CESI - Italy	Competent Body for certification
CES 10.nnnnX	IEC-Ex Certificate of Conformity; CES = Competent Body; 10.nnnnX = year and number of certificate of conformity.
CE nnnn	Conformity mark according to relevant European Directives and number of Notified Body for production surveillance
	Conformity mark according to European Directive 94/9/EC
CESI 03ATEX186	EC Type Certificate; 03 = year of certificate; 186 = number of the certificate

Notes:

- a) The appliances of IIC group are also suitable for IIA, IIB areas; appliances of group IIB are also suitable for IIA areas
- b) The appliances with temperature class T6 are also suitable for all the substances with higher temperature class (T5, T4, T3, T2, T1).
- c) The appliances with temperature class 85°C (dust presence) are also suitable for all the substances with higher temperature class.

2.3 Marking

The manufacturer and product identification initial together with the functional and certification details must be printed on a plate or directly on the housing. The initial printed on the plate identify the following code:



2.4 Installation

The appliance can be installed only by skilled personnel.

The threaded joints [X] and [I] and cylindrical joints [V], which meet the safety requirements, must not come into contact with tools, dusts or other types of material which could damage them. When closing the equipment please make sure that the joints are clean and protected with silicon grease.

For version with threaded cover, make sure that the cover is properly locked with the locking screw (**1a**).

The cover version with cylindrical joints must be locked through two allen screws (**1b**) with the appropriate wrench.

If an o-ring (2), is fitted in order to ensure the mechanical protection degree IP66, check that it has not been damaged during the assembly and is duly protected by silicon grease. The integrity of the o-ring (2) is essential to meet the safety requirements of the equipment.

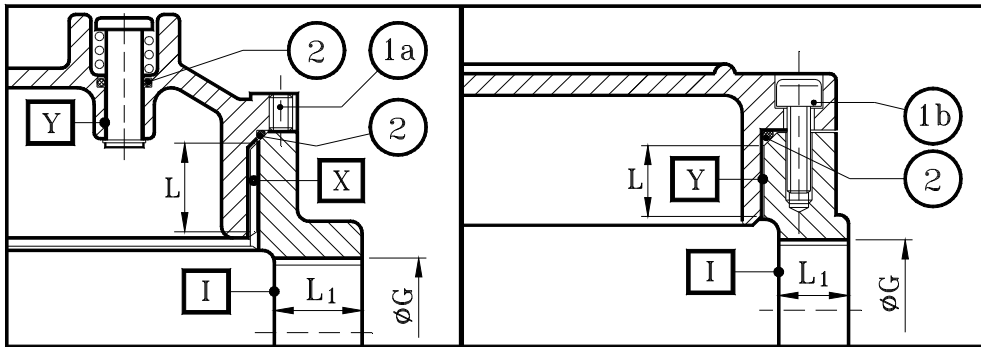


Fig. 1

Fig. 2

2.5 Cable entries

The connections must be realized through the cable inlets in accordance with IEC 60079-14 standard by means of certified cable entries and/or components in accordance with IEC 60079-0, IEC 60079-1, IEC 61241-0 and IEC 61241-1 standards.

Do not add any gasket unless provided by the manufacturer.

N.B. In case the second cable enclosure's entry is not used **MUST BE CLOSED** and sealed by ATEX and IEC Ex certified Ex d plug (must NOT be kept open).

2.6 Electrical connections

Remove the cover by unscrewing the locking screws before carrying out the electrical connection.

The connection to the electrical circuit must be carried out by connecting the suitable terminals with an electric wire according to the IEC 60079-14 standards, with a type of section not exceeding the max section of the connecting terminal.

The connection scheme is shown in the specific technical manual of each vibration switch, attached time by time to the present instructions.

Once connected close the cover and lock the screws.

The housing must be connected to the equipotential ground system through the appropriate earth connection.

3. Usage and maintenance

3.1 Use

The appliance must be fed with the voltage not exceeding the one indicated on the plate positioned outside the housing.

3.2 Maintenance and repair

The appliance must be periodically maintained by skilled personnel only.

Check the o-ring if assembled. In case of deterioration, ask the manufacturer the spare part to replace it.

Protect the joint with silicon grease after each check-up and maintenance.

Any modification to the joint both for oxidation and accidental damage must contemplate the housing removal for a proper check-up, preferably at the manufacturer's premises, by skilled technician.

The internal device can be replaced only with original spare parts, any modification of the internal electrical circuit is forbidden and void manufacturer's responsibility.

Any repair to the housing is forbidden. In case of need please contact the Customer Service.



4. Technical Characteristics

4.1 Electrical circuit

The vibration switch mentioned in the "Series" column, has the following electrical characteristics:

V.S. Series	Supply Voltage	Reset Coil Voltage	Max contacts ratings	Freq. [V _{ac}]
CS(.)-INV166	90÷250 V _{ac}	---	5 A @ 125 V _{ac} 5 A @ 28 V _{dc}	50÷60 Hz
CS(.)-INV.266	---	120÷240 V _{ac} 12÷120 V _{dc}	7A @ 460 V _{ac} 5A @ 250 V _{ac} 0,5A @ 120 V _{dc} 3A @ 30 V _{dc} 5A @ 12 V _{dc}	
CS(.)-INV.366	---	120÷240 V _{ac} 12÷120 V _{dc}	7A @ 460 V _{ac} 5A @ 250 V _{ac} 0,5A @ 120 V _{dc} 3A @ 30 V _{dc} 5A @ 12 V _{dc}	
CS(.)-INV.376	120 V _{ac}	---	2,5A @ 440 V _{ac} 5A @ 240 V _{ac} 0,5A @ 120 V _{dc} 2A @ 48 V _{dc} 5A @ 12 V _{dc}	

Reset coil voltages and contact ratings of any selected model are shown in the specific technical manual of each vibration switch, attached time by time to the present instructions.

4.2 Entries threads

Equipment has n. 2 cable entries (ØH) with 3/4" NPT ANSI B 1.20.1 as standard taper thread or M25x1,5 ISO 261 as standard cylindrical thread.

On request, following threads can be realized:

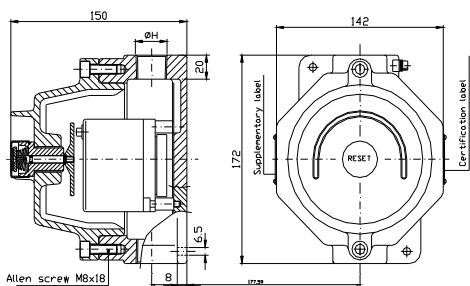
☐ 1" NPT ANSI B1.20.1

☐ 32x1,5 ISO 261

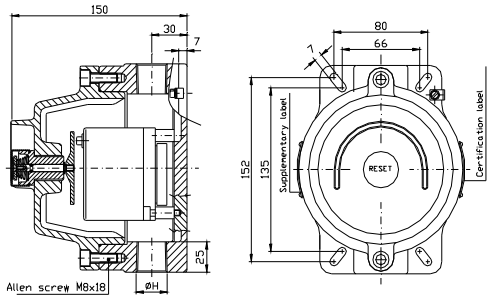
Thread identification is obtained by an additional tag fixed to the earth screw.

4.3 Dimensions

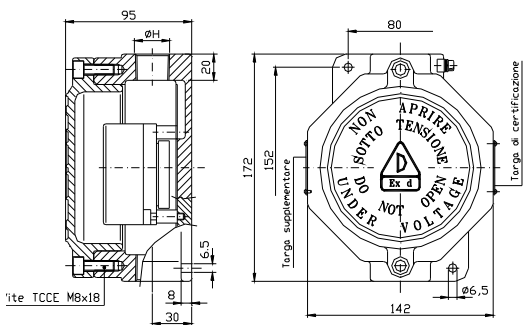
In the following pictures, main dimensions of equipment are indicated.



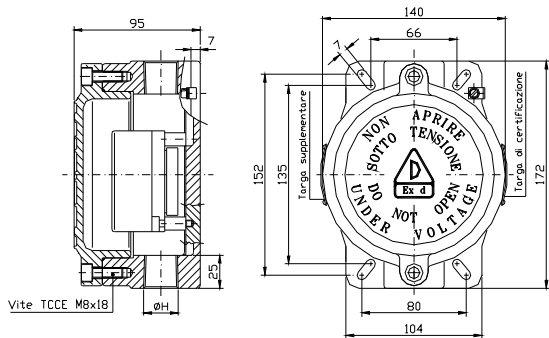
MOD. CS-INVR 266G
MOD. CS-INVR 366G
MOD. CS-INVR 376G



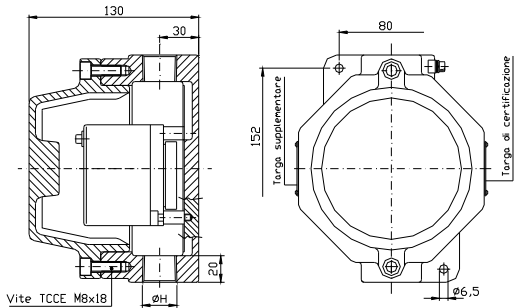
MOD. CS-INVR 266S / CS-INVR 266L
MOD. CS-INVR 366S / CS-INVR 366L
MOD. CS-INVR 376S / CS-INVR 376L



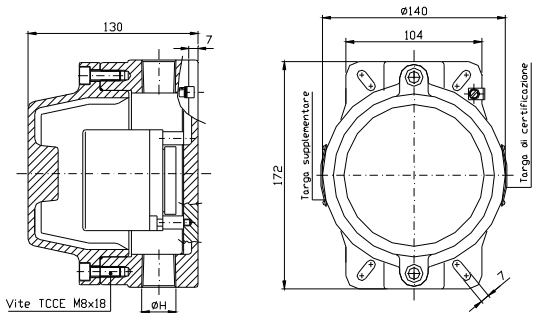
MOD. CS-INV166G



MOD. CS-INV166S / CS-INV166L



MOD. CS-INV 266G
MOD. CS-INV 366G
MOD. CS-INV 376G



MOD. CS-INV 266S / CS-INV 266L
MOD. CS-INV 366S / CS-INV 366L
MOD. CS-INV 376S / CS-INV 376L

For any further details please contact the Customer Service.