PT580 Digital Vibration Switch

User Manual

Installation, Operation, Maintenance

ProvibTech, Inc. 11011 Brooklet Drive, Suite 300, Houston, Texas 77099, USA

Phone: +1-713-830-7601, Fax: +1-281-754-4972, Email: pvt@provibtech.com , Web: www.provibtech.com

PT580-USR-E-C-5

Table of Content

PT580 Digital Vibration Switch-Introduction

The PT580 Digital Vibration Switch is designed to be the “one stop shop” for all vibration switch applications. The PT580 is fully programmable, suitable for harsh environments and hazardous areas. It has a universal mounting feature, wide operating temperature range, dual alarms, 4-20mA output, Modbus communication, and works with an internal or a remote sensor.

Specifications

Sensor: internal piezoelectric accelerometer or external accelerometer or velocity sensor.

Frequency Range:
Internal sensor: 2 - 1,000 Hz
External sensor: 2 - 2,000 Hz

4-20mA Source Output: Non-linearity ±1%. 600 ohms max. load resistance

Field Wiring: Wire clamp type screw terminal block. Max. wire gauge: 16-26 AWG/12-22AWG. 300 Vrms, circuit to case

Buffered Dynamic Signal:
Capable of driving 300 meters (1000 feet) of shielded cable (0.03uF max)

Alarms: Dual alarms
Dry-contact relay: 5A 230VAC/115VAC or 5A 30VDC
Triac: 5A 230VAC. Optically Isolated, Standard NC

Temperature Limit: -40 ℃ to +75℃ (-40℉ +167 ℉)

Power Supply:
95 - 250VAC@ 100mA, 50 - 60Hz, or
22 - 30VDC @ 200mA

Enclosure: Cast Aluminum (copper free)

Coating: Standard plastic coating for all cased aluminum parts outside. Mounting plate is LY12CZ aluminum alloy, mounting stud and local reset are 304 stainless steel.

Environmental Rating: NEMA 4X, IP65

Hazard Rating: See order information

Programming (Customer Selects The Option):
Fully programmable with software or
Pre-configured at factory

Physical

Temperature:
Operation: -40 ℃ to +75℃ (-40℉ +167℉)
Storage: -50℃ to +120℃ (-58℉ to +248℉)

Dimensions:
See attached drawing

Weight:
1.4kg (3 lbs)

System Default Setting

- ✓ Channel Type: default is Acceleration input, velocity output.
- ✓ Sensor type: TM0782A or any 100mv/g*
- ✓ Transducer location: internal or external. Default is internal
- ✓ Transducer sensitivity: default is 100mv/g
- ✓ ALERT time delay: default is 6S
- ✓ DANGER time delay: default is 6S
- ✓ System start up time delay: default is 30S**
- ✓ Full scale: default is 25mm/s
- ✓ Measurement type: default is RMS
- ✓ Measurement unit: default is mm/s
- ✓ Alarm type: (Alert; GAP). The default is Alert
- ✓ Alarm latching:default is alarm latching***
- ✓ Alarm: dual dry contact relays; single dry contract relays; dual TRIAC NO; dual TRIAC NC; single TRIAC NO; single TRIAC NC;. The default is dual dry contact relays
- ✓ ALERT high: default is 12.5mm/s
- ✓ DANGER high: default is 18.75mm/s
- ✓ GAP high: default is 17.5V
- ✓ GAP low: default is -2V

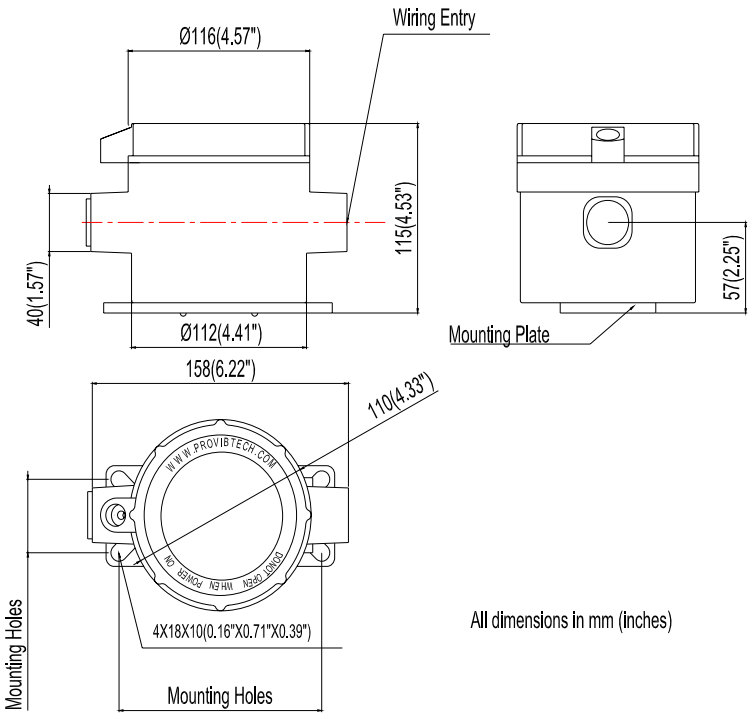
* TM0782A or any 100mv/g: Refer to relevant products from Provibtech.

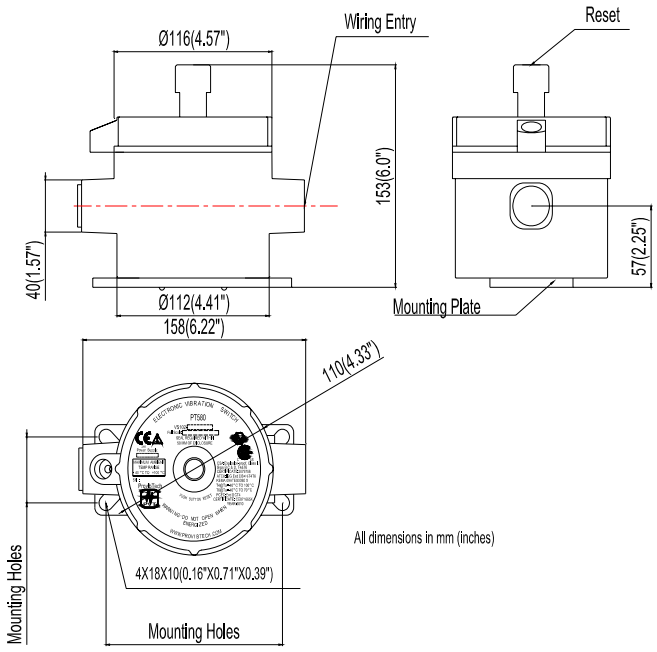
** Output current of 3mA during startup.

*** Latching: The alarm status of the Vibration Switch does not change while the measured variable goes below the alarm setpoint after it has alarmed.

PT580 System Installation

Installation - Mechanical Outline Drawing

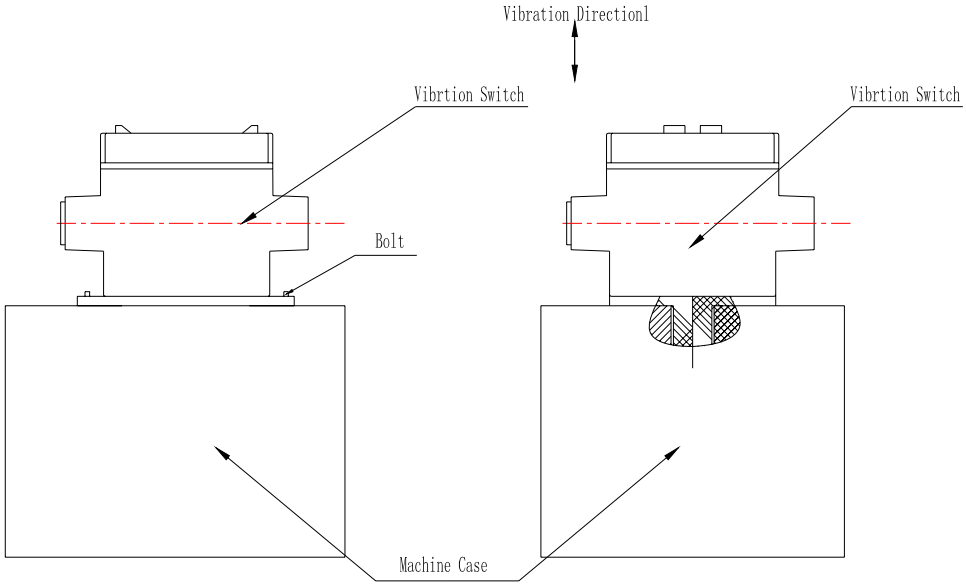




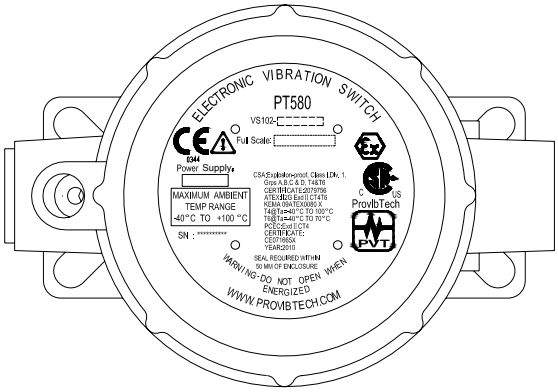
Note: The default case has no local Reset.

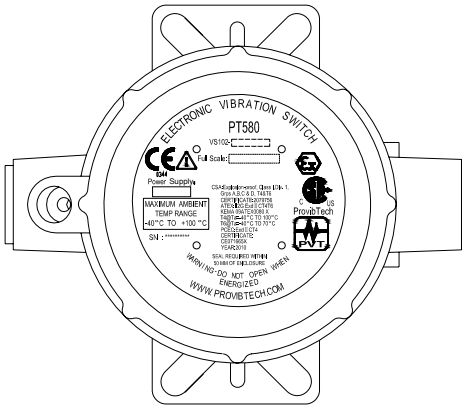
Installation – Hardware

PT580 has two different mounting plates and two different mounting studs. See figuration below. Be aware of that PT580 will sense the vibration in the vertical axis reference to the mounting plate.

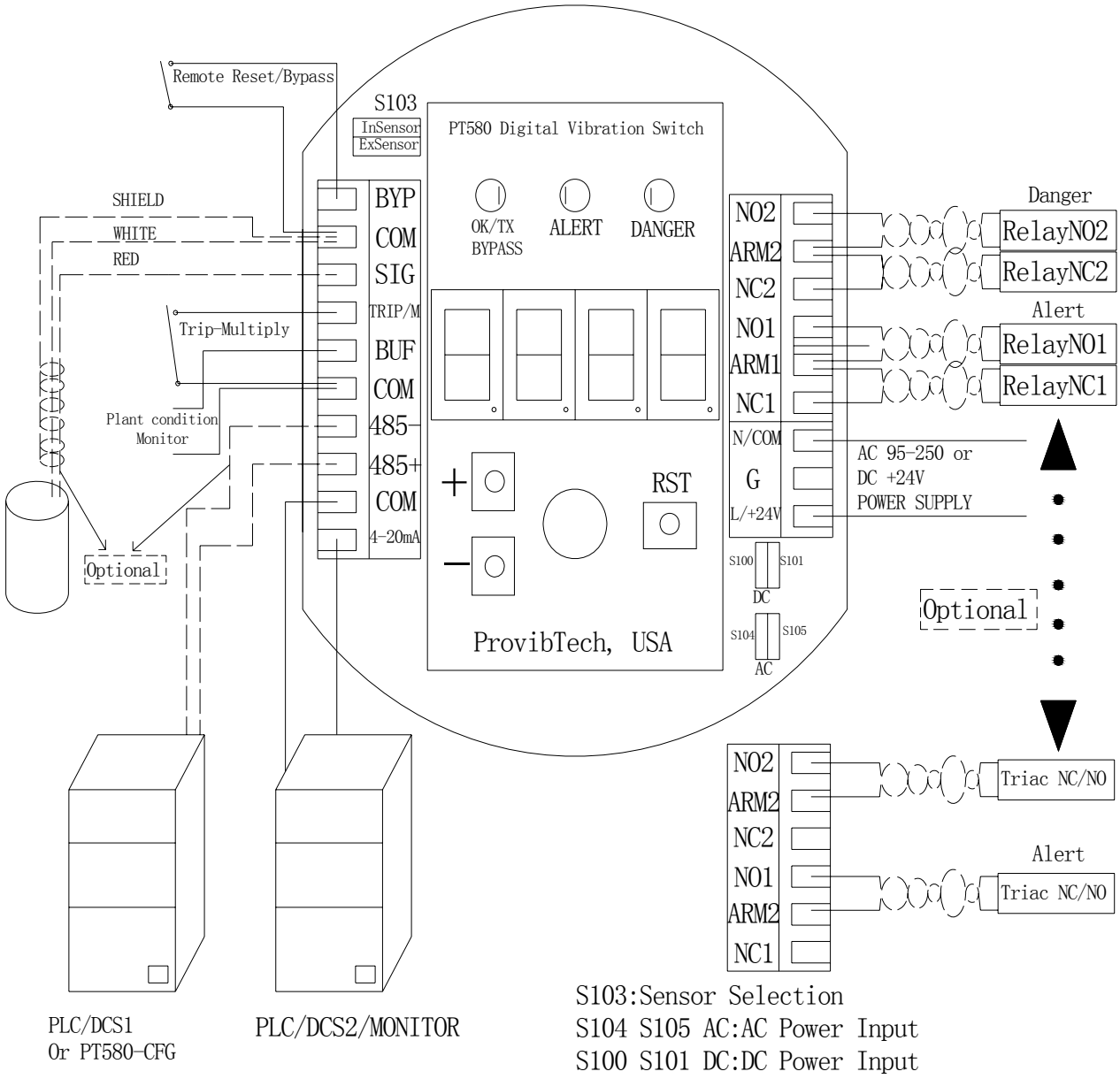


Mounting plate has two different fixed modes. See figuration below. Default fixed mode is as shown in left figuration.





Installation – Field-Wiring Diagram



Caution:

Power Supply： Wrong setting will destroy the switch!

Function Description:

BYP: Alarms reset / Bypass(When short circuit with COM, OK/TX/BYPASS LED turns red, alarm status draws back). There are two types of bypass, hardware bypass and software bypass. When hardware or software bypass is active, the Bypass LED comes on. Both types of bypass do not take effect on monitoring except the alarm. They are valid for both Alert alarm and GAP alarm. The default status is inactive. Bypass has a higher privilege than alarm latch does.

COM: System ground

SIG: External sensor input

TRIP: The value selected to temporarily increase the alarm (Alert and Danger) set-point values. The function of TRIP is fulfilled through software under the hardware control i.e. the software TRIP function takes effect only after a TRIP terminal has been short circuit with COM. When alarm type is Alert, this function is valid for both alarm levels alert and danger. When alarm type is GAP voltage, this function is valid for danger. When double multiply is set, alarm occurs after real-time value reaches two times higher than alarm set-point value; When triple multiply is set, alarm occurs after real-time value reaches three times higher than alarm set-point value. The default status is inactive.

BUF: Buffered output

NC1: Alarm 1. Normally closed

ARM1: Alarm 1. Arm

NO1: Alarm1. Normally open

NC2: Alarm2. Normally closed

ARM2: Alarm 2. Arm

NO2: Alarm 2. Normally open

POW+: power input. For DC input, connect to positive.

POW-: power input. For DC input, connect to negative.

4-20mA:transmitting of overall to up-level PLC or DCS

485+、485-:Modbus/Config digital communication ports

PT580 Operation

PT580 Display and Status

PT580 will have the following display and status indication:

- ✓ Up to four digits LED display for overall vibration that conform to the selected engineering unit and measurement method (peak or RMS).
- ✓ BUF: Buffered output.
- ✓ OK/TX/BYPASS: green/red LED. Normally green, For digital communication, the LED will blink. With not OK or no power supply, the LED is off. in bypass mode, the LED is red.
- ✓ ALERT: yellow LED
- ✓ DANGER: red LED

PT580 Field Controls

- ✓ Reset: There are three reset mode: 1. by pressing RESET/SET button. 2. by pressing Local button. There is a lever on the instrument cover. After it alarmed, press this lever can reset it. Note, it works only when the current measured variable is less than the alarm set-point. 3. by software CFG operating. Refer to PT580-CFG-USR for details.
- ✓ Remote reset / Bypass: Brief short the RST/BYP pin to COM will reset the system. Continue short the RST/BYP pin to COM will disable the alarms to realize bypass.
- ✓ Buffered output: a raw signal can be accessed by the BUF pin. There is 100 ohms output impedance. The output can drive up to 300 meters (1000 ft) in distance between a condition monitoring system and PT580.
- ✓ Alarms: Dual SPDT/SPST alarms with customer selectable of dry contact relays or Triacs.
- ✓ Power input: PT580 can be configured to work with either high voltage (95 to 250 VAC) or low voltage (22 to 30 VDC). No power adaptor change is required.
- ✓ Reset communication parameters: Simultaneously press the key + and - when power up. 10s later, the leds OK, Alert, Danger flash and the communication parameters will be reset to default setting: baud rate: 9600, stop bit:2 bits, parity bit: none, ID:63.
- ✓ There are many more controls that can be operated by PT580-CFG software. Check with the PT580-CFG-USR for more details.

PT580 Alarm Set-Point Configuration Without Software

PT580 can be field configured with alarms set-points without software.

- ✓ Power on
- ✓ Connect a ampere meter to the 4-20mA terminal
- ✓ Adjust Zero: hold down RESET/SET button for 10s, OK, Alert LED wink and change to 4mA calibration mode, at the moment, the digital LED shows 4.00. Press +, - button to let the instrument output a current of 4mA, which can be read out from the ampere meter. Hit RESET/SET button again, and the ALERT LED winks and digital LED shows ALT. Three seconds later, hit RESET/SET button again, and DANGER LED winks, and digital LED shows DNG. Wait three seconds and then press RESET/SET button again, OK, ALERT, DANGER LED wink. At last, press RESET/SET button to withdraw from the calibration mode.
- ✓ Adjust Alert: hold down RESET/SET button for 10s, OK LED and Alert LED wink. Press RESET/SET button again, ALERT LED winks and change into calibrating Alert mode. At the moment, the digital LED displays ALT. 3s later, it displays the last set ALERT set-point (factory setting: 50% of full scale), Press + and/or – button to adjust the current to desired value. Press RESET/SET button again, DANGER LED winks, and the digital LED displays DNG. 3s later, press RESET/SET button again, OK LED, ALERT LED and DANGERLED wink. At last, press RESET/SET button to withdraw from calibrating Alert mode.
- ✓ Adjust Danger: hold down RESET/SET button for 10s, OK LED and Alert LED wink. Press RESET/SET button again, ALERT LED winks and the digital LED displays ALT. 3s later, press RESET/SET button again, DANGER LED winks, and change into Danger calibrating mode. At the moment the digital LED displays DNG. 3s later, it displays the last set DAGER set-point (factory setting: 75% of full scale). Press + and/or – button to adjust the current to desired value. Press RESET/SET button again, OK LED, ALERT LED and DANGER LED wink. At last, press RESET/SET button to withdraw from calibrating Danger mode.

FLASH LED	4mA	Set Alert	Set Danger	Set End
OK	✓			✓
ALERT	✓	✓		✓
DANGER			✓	✓

PT580 Configuration with PT580-CFG Software

PT580-CFG supply much more functions to be controlled by customer. Consult with the PT580-CFG user manual for more details about how to configure the system with software.

PT580 Modbus Communication

PT580 supplies Modbus RTU. Please consult with ProvibTech for communication protocols.

- ✓ When user set Outputs/Communication item to None, uploading real time value and module status are prohibited. At the moment, the output current is 3mA and digital LED displays normally.
- ✓ When Output/Communication item is set to 4-20mA, uploading real time value and module status are prohibited.. The current outputs normally and the digital LED displays normally.
- ✓ When Output/Communication item is set to Modbus, at the moment, the output current is 3mA and digital LED displays normally.
- ✓ When Output/Communication item is set to 4-20mA and Modbus, the current outputs normally and the digital LED displays normally.

PT580 Maintenance

Order Information

PT580-ABC-DEF-GGHI

A: Alarms***

A = 0*: Dual SPDT Relays

A = 1: Single SPDT Relay

A = 2: Single SPST Triac, NO

A = 3: Dual SPST Triacs, NO

A = 4: Single SPST Triac, NC

A = 5: Dual SPST Triacs, NC

A = 6: None

B: Conduit Entries

B = 0*: 3/4” NPT

B = 1: M20×1.5

C: Mounting Plate or Mounting Stud

C = 0*: Mounting Plate PT500-13

C = 1: Mounting Plate PT500-14

C = 2: Mounting Stud 3/4” NPT

C = 3: Mounting Stud M20×1.5

D: Local Display

D = 0*: With display (No Local Reset)

D = 1: No display (No Local Reset)

D = 2: No display (With Local Reset)

E: Hazardous Area Approval

E = 0*: CE Mark

E = 1: Multiple approvals:

CSA: Class I, Div 1, Groups B, C, D, T4 & T6

CERTIFICATE: 2079756

ATEX: II 2 G Ex d ⅡB+H_2T4 T6

KAMA 09ATEX0080 X

T4@Ta= -40℃ to +100℃

T6@Ta= -40℃ to +70℃

PCEC: Ex d ⅡB+H_2T4/T6 Gb

CE Mark

E = 2: Multiple approvals (D=1 only) :

CSA: Class I, Div 1, Groups A, B, C, D, T4 &T6

CERTIFICATE: 2079756

ATEX: II 2 G Ex d ⅡB+H_2T4 T6

KAMA 09ATEX0080 X

T4@Ta= -40℃ to +100℃

T6@Ta= -40℃ to +70℃

CERTIFICATE: 2079756

PCEC: Ex d ⅡC T4/T6 Gb

CE Mark

E = 3: Multiple approvals:

TR CU: 1Ex d IIB+H2T4,T6 X

№ TC RU C-US.ГБ05.B.00476

NANIO CCVE

CE Mark

E = 4: Multiple approvals(D=1 only):

TR CU: 1Ex d IIC T4 ,T6 X

№ TC RU C-US.ГБ05.B.00476

NANIO CCVE

CE Mark

F: Outputs/Communication

F = 0: None

F = 1*: 4-20mA

F = 2: Modbus

F = 3: 4-20mA and Modbus

GG: Full Scale

GG = 09: 0 - 5.0g pk

GG = 10: 0 - 10.0g pk

GG = 11: 0 - 20.0g pk

GG = 13: 0 - 200 um pk-pk (with H=2)

GG = 14: 0 - 250 um pk-pk (with H=2)

GG = 15: 0 - 500 um pk-pk (with H=2)

GG = 16: 0 - 10 mil pk-pk (with H=2)

GG = 17: 0 - 20 mil pk-pk (with H=2)
GG = 20: 0 - 12.5 mm/s pk
GG = 21: 0 - 20mm/s pk
GG = 22: 0 - 25mm/s pk
GG = 23: 0 - 50mm/s pk
GG = 24: 0 - 100mm/s pk
GG = 30: 0 - 12.5 mm/s rms
GG = 31: 0 - 20mm/s rms
GG = 32*: 0 - 25mm/s rms
GG = 33: 0 - 50mm/s rms
GG = 34: 0 - 100mm/s rms
GG = 40: 0 - 0.5ips pk
GG = 41: 0 - 1.0ips pk
GG = 42: 0 - 2.0ips pk
GG = 43: 0 - 4.0ips pk
GG = 50: 0 - 0.5ips rms
GG = 51: 0 - 1.0ips rms
GG = 52: 0 - 2.0ips rms
GG = 53: 0 - 4.0ips rms

H: Sensors

H = 0*: Internal accelerometer
H = 1: TM0782A or accelerometer with 100mV/g(purchase separately)
H = 2: TM0793V or velocity sensors with 4.0 mV/mm/s (purchase separately)

I: Power Supply

I = 0*: 115VAC or 230VAC
I = 1: 24VDC

Note:

* Factory default

***Alert delays 6s and relay works in non-energized mode.

CAUTION： Due to different regulation and requirement, Unit sale in East Asia countries will be factory configured as non-latching with no local reset option selected.

PT580 ZERO (4mA) Calibration without Software

PT580 can be field calibrated with ZERO (4mA)

- ✓ Power on
- ✓ Connect a ampere meter to the 4-20mA terminal.
- ✓ Zero adjust: Hold down RESET/SET button for 10s, OK LED and Alert LED wink. The instrument changes into 4mA calibrating mode. At the moment, digital LED displays 4.00. Press + and/or – button to let it output a current of 4mA which can be read from the connected ampere meter. Press RESET/SET button again, ALERT LED winks. Wait 3s and press RESET/SET button again, DANGER LED winks. 3s later, press RESET/SET button again, OK LED, ALERT LED and DANGER LED wink. At last, press RESET/SET button to withdraw from zero calibrating mode.

FLASH LED	4mA	Set Alert	Set Danger	Set End
OK	✓			✓
ALERT	✓	✓		✓
DANGER			✓	✓

PT580 Calibration with PT580-CFG Software

PT580-CFG supply additional calibrations to customer. Please see the PT580-CFG-USR for more details.

Accessories

PT580-CFG

Configuration and calibration software

RS485-USB

Converter from RS485 to USB for configuration with laptop computer

DTM-96

System interface module. Convert the digital output from PT580 to isolated RS232, RS422 or RS485 protocol for communication with PLC or DCS. Each DTM-96 can connect up to six PT580 switches.

RS485-RS232

Converter from RS485 to RS232 for configuration with laptop computer

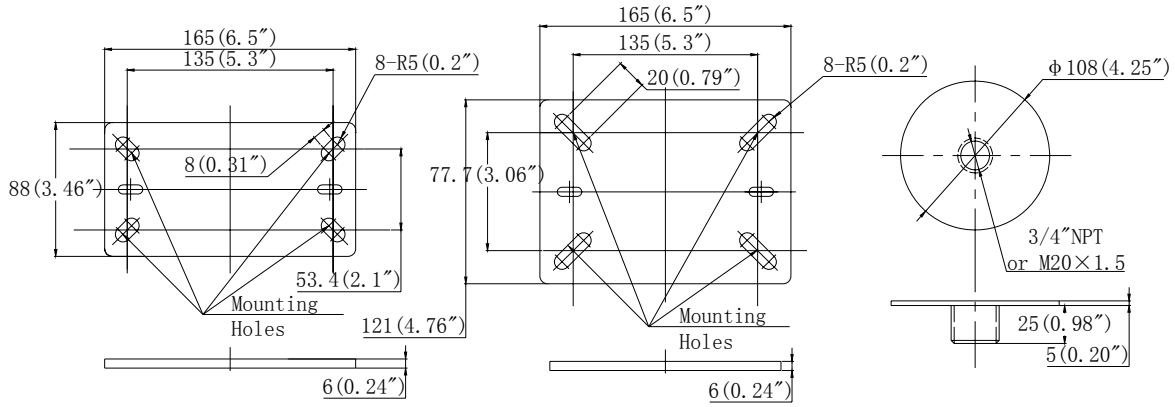
PCM370

PCM370 condition monitoring software is ideal for plant wide condition monitoring. PCM370 does not require any further hardware to communication with PT580.

PT2060/98-PC

Touch panel PC with IP65 rating. Ideal to work with PCM370 and PT580-CFG

Mounting Plate , Mounting Studs and Accessories:



All dimensions in mm (inches)

PT500-13 PT500-14 PT500-15(3/4” NPT)

PT500-17(M20 x 1.5)


Cover1*
（D=2）
PT500-2


Cover2*
(D=1)
PT500-3


Cover3*
(D=0)
PT500-1


magnetic ring**
PT500-10

Note：

*Cover1/Coer2/Cover3:Relates to the D option; if D=1, the factory default option is Cover2; if D=2 ,the factory default option is Cover1; if D=0, the factory default option is Cover3.

** Magnetic ring: One at the factory default setting. When in extremely environment or both ends of the vibration switch have wires, user should order additional accessories to acquire good effects. Please refer to figure Trouble Shooting 6 for installation method.

Trouble Shooting

1. NOT OK after power on

   Inspect the power supply, whether it is right, referring to the field wiring diagram; inspect whether the transducers are correctly connected (if it is external); inspect whether the delay expired.

2. The instrument has no 4-20mA output

   Inspect whether the power supply is right comparing with the filed wiring diagram. Check to see whether 4-20mA terminals are connected correctly; whether the instrument is connected correctly. If the power supply is okay and LED is okay, the output current should be within 4-20mA.

3. Hardware zero and alarm can not be adjust

   Inspect whether the power supply is right comparing with the field wiring diagram; Check to see whether 4-20mA terminals are connected correctly; whether the instrument is connected correctly. According to the relevant part of user manual, adjust it while corresponding LED winks. Note that when adjust ALERT and DANGER, the corresponding LED winks. It is needed to wait 3s before pressing + and/or – button to adjust alarm setpoint.

4. Instrument outputs with great error

   Ensure that the instrument is installed correctly and reliably. Its terminals are connected correctly and reliably.

5. Alarm status is abnormal

   Inspect whether the instrument is powered correctly referring to the field wiring diagram; the cables and the terminals are connected tightly. Make sure that the connected instrument's rated power suffices the relays and triacs' requirement (RELAY: 5A 230VAC/115VAC TRIAC: 5A 230VAC). According to the Alarm option in the category, connect terminals correctly, referring to the field wiring diagram. If the instrument behaves normally, when the alarm set point has been broken and retained for a time of alarm delay, corresponding LED lights up and relay and triac activates.

6. Measurement value increases abruptly or causes false alarm when using high frequency devices(e.g. interphone)

   It is caused by the installation method of vibration switch. The ideal method that all the wires of connecting vibration switch go through the metal conduit. Provibtech recommends to use this method; if there is no this installation condition in the field, it needs to use magnetic ring as the appendix shows. If it doesn't work well, please increase the quantity of magnetic ring according to the field condition. The installation method is as follows:

Note: if the effect is not apparent, wind the wire around the magnetic ring in a circle as the following figure shows or install another magnetic ring adjacent to the first one as the above figures.