SIEMENS

Motion Sensors

Milltronics MFA 4p

Operating Instructions

Edition 08/2017

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Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

DANGER
indicates that death or severe personal injury **will** result if proper precautions are not taken.

WARNING
indicates that death or severe personal injury **may** result if proper precautions are not taken.

CAUTION
indicates that minor personal injury can result if proper precautions are not taken.

NOTICE
indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

WARNING
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Table of contents

Introduction 1

This instruction manual covers the installation, operation, and maintenance of the Milltronics MFA 4p.

This instruction manual covers the installation, operation and maintenance of the Milltronics MFA 4p. It is essential that this manual be referred to for proper installation and operation of your unit. Adhering to the installation and operating procedures will insure a quick, trouble free installation and allow for the maximum accuracy and reliability of your motion sensing alarm unit and probes.

Note

The MFA 4p (Motion Failure Alarm) is to be used only in the manner outlined in this manual, otherwise protection provided by the equipment may be impaired.

1.1 Transportation and Storage

WARNING
Cardboard shipping package provides limited humidity and moisture protection. This product can only function properly and safely if it is correctly transported, stored, installed, set up, operated, and maintained.

1.2 Unit Repair and Excluded Liability

- The user is responsible for all changes and repairs made to the device by the user or the user’s agent.
- All new components are to be provided by Siemens Milltronics Process Instruments.
- Restrict repair to faulty components only.
- Do not reuse faulty components.

Note

This product is intended for use in industrial areas.

In a domestic environment this device may cause radio interference.

Milltronics MFA 4p Overview 2

Milltronics MFA 4p is a highly sensitive, single setpoint motion sensor alarm unit, used with MSP and XPP probes. The probe detects an increase or decrease in the speed of rotating, reciprocating, or conveying equipment and sends the information to the MFA 4p. The MFA 4p works with a pre-amplifier which can be internal to the motion sensing probe or remote from the motion sensing probe.

Pulses generated from the probe are continually compared to the adjustable setpoint. If the pulse rate is lower than the setpoint, the alarm relays operating in a fail-safe mode will de-energize, indicating failure. The relays will not energize until the pulse rate increases above the setpoint.

Installing/mounting

3

Note

Installation shall only be performed by qualified personnel and in accordance with local governing regulations.

3.1 Location Requirements

The MFA 4p (and RMA if applicable) must be mounted in a non-hazardous area that is clean, dry, vibration-free, within the ambient temperature range, and non-corrosive to the electronics or its enclosure. The door should be accessible for viewing and to allow calibration of the MFA 4p.

Consider the probe location carefully before installation. Avoid strong magnetic fields (50/60 Hz) from nearby power transformers, heater elements, or large industrial motors, because these can affect the probe’s performance.

Note

Do not mount MFA 4p in direct sunlight.

3.2 Proper Mounting

The probe should be mounted onto a vibration free structure using the mounting flange. The gap between probe and target should be large enough to prevent the target from damaging the probe. The probe environment must be within the probe's ambient temperature range and non-corrosive to the probe's body. Refer to Applications (Page 43).

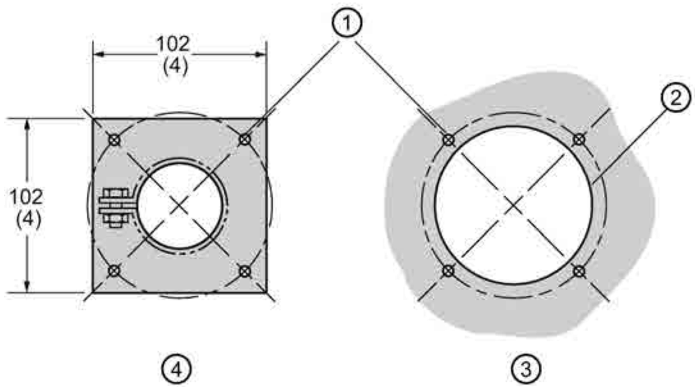
The probe design detects a changing magnetic field, typically caused by a ferromagnetic target disturbing the probe's magnetic field. Extremely strong magnetic fields (like those produced by the 30 A/m requirements of 1EC 60004-8, Power Frequency Magnetic Field Immunity test) will be detected and will result in loss of functionality.

Functionality loss indicators:

- Alarm conditions by relay trip
- False pulse readings in LED1

3.3 Mounting Details

MSP-9 Mounting Details



Dimensions in mm (inch)

① 6 (0.25) ∅ 4 holes equally spaced on a 114 (4.5) BCD

② 95 (3.75) ∅ probe clearance hole

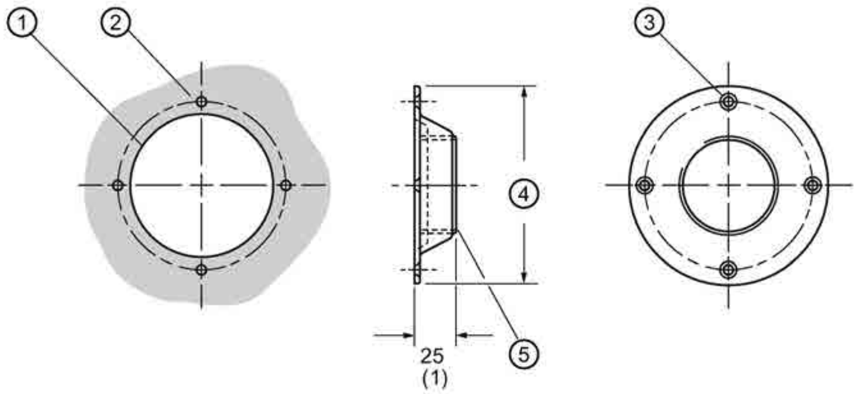
③ Panel cutout

④ Probe flange

- For high temperature and corrosion resistance applications
- 304 stainless steel body comes with stainless steel clamp and silicone gasket
- 1.5 m (5 ft) Belden 83321 Teflon[1)] cable potted in probe
- Pre-amp is mounted in an enamel painted steel Hammond 1414N4E enclosure

[1)] Teflon is a registered trademark of E.I. du Pont de Nemours and Company

MSP-3, MSP-12, XPP-5 Mounting Details



Dimensions in mm (inch)

① 95 (3.75) ∅ probe clearance hole

② 6 (0.25) ∅ hole for ¼ - 20 nut and bolt or drill and tap, four holes on 114 (4.5) BCD

③ 6 (0.25) ∅ hole for ¼ - 20 bolt on 114 (4.5) BCD, four places

④ 113 (5.25) O.D.

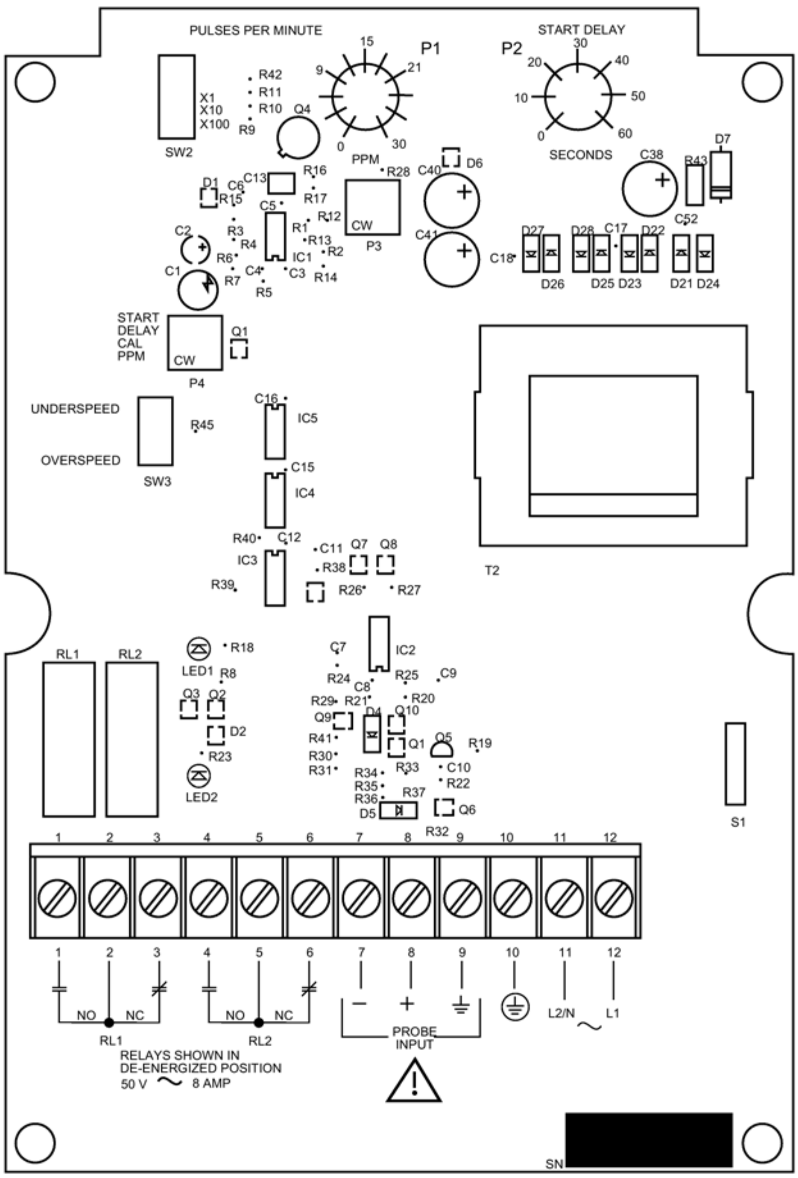
⑤ 2" NSPL

3.4 Wiring

Where possible, the probe components should be interconnected via flexible conduit. This allows for easier removal or adjustment of the probe and mounting flange assembly.

Connecting 4

4.1 MFA 4p Circuit Board Layout

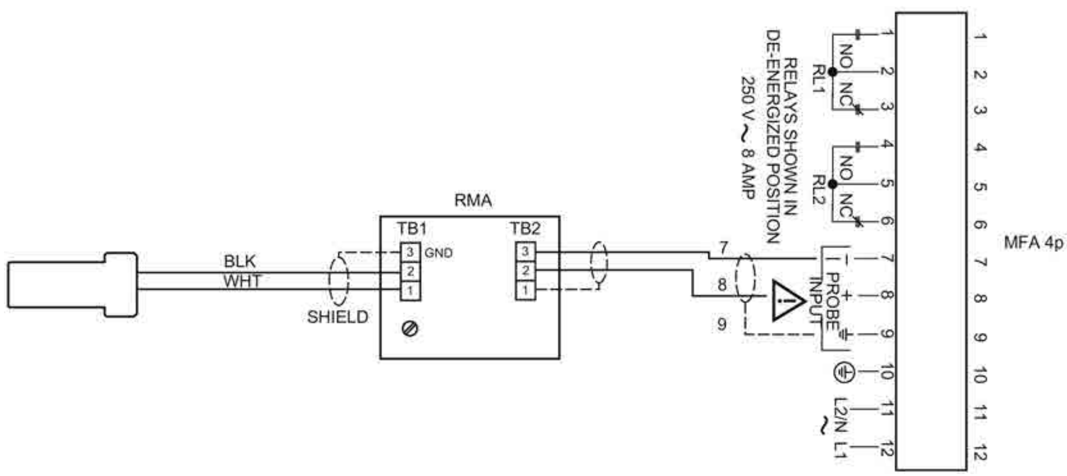


4.2 Interconnection

Note

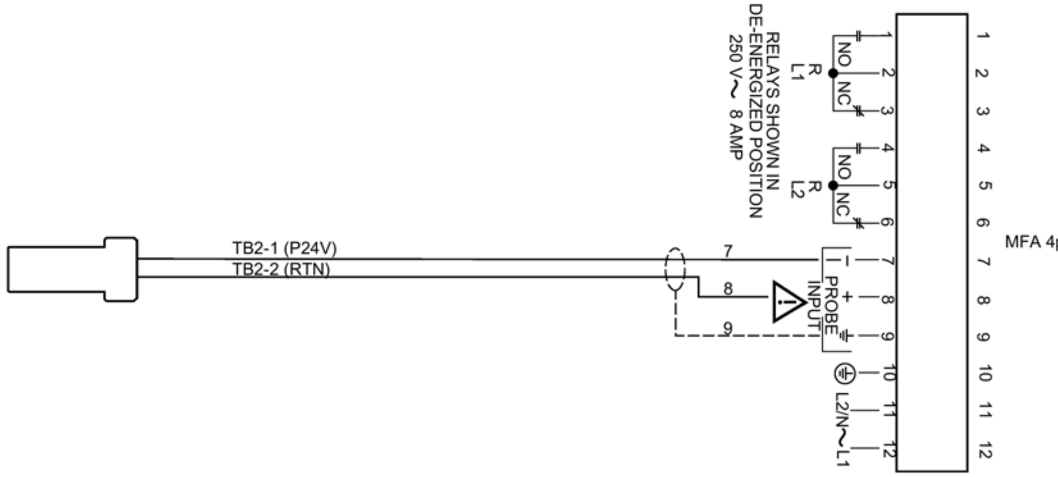
Use shielded cable and connect all cable shields to the MFA shield terminals to avoid differential ground loops.

4.2.1 MSP-3 or MSP-9 Probe with RMA (remote mounted amplifier)



Maximum cable length from probe to RMA is 30 m/100 ft of shielded cable, 18 ga. wire. See Cable length from RMA or IMA to MFA 4p (Page 16) for cable lengths from RMA to main group.

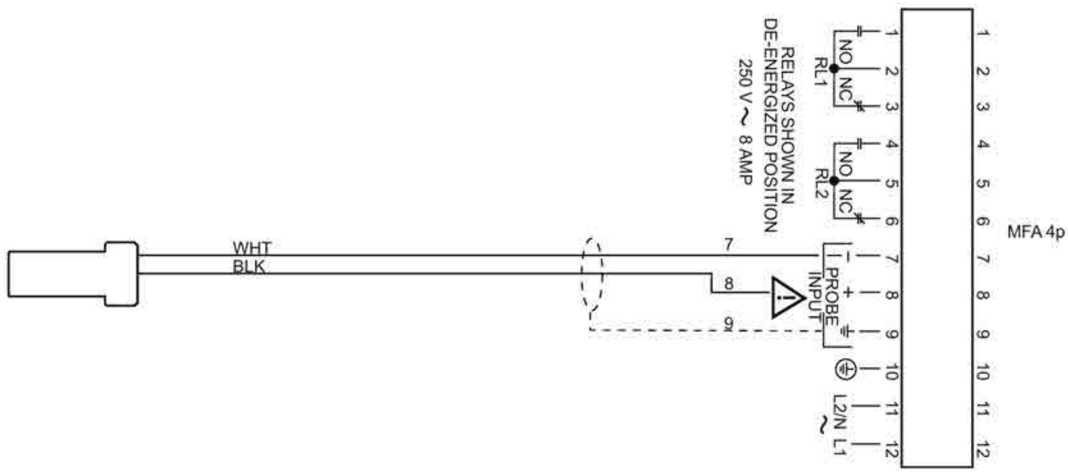
4.2.2 MSP-12 Probe with IMA (internally mounted pre-amplifier)



Wire can be run in conduit common to motor supply or control wiring. Connection to probe terminals can be made under probe cap.

See Cable length from RMA or IMA to MFA 4p (Page 16) for cable lengths from probe at MFA 4p.

4.2.3 XPP-5 with IMA (internally mounted pre-amplifier)



XPP-5 cable must be run in dedicated, approved metal conduit, boxes and fittings and to procedures in accordance with all governing regulations. See Cable length from RMA or IMA to MFA 4p (Page 16) for cable lengths from probe at MFA 4p.

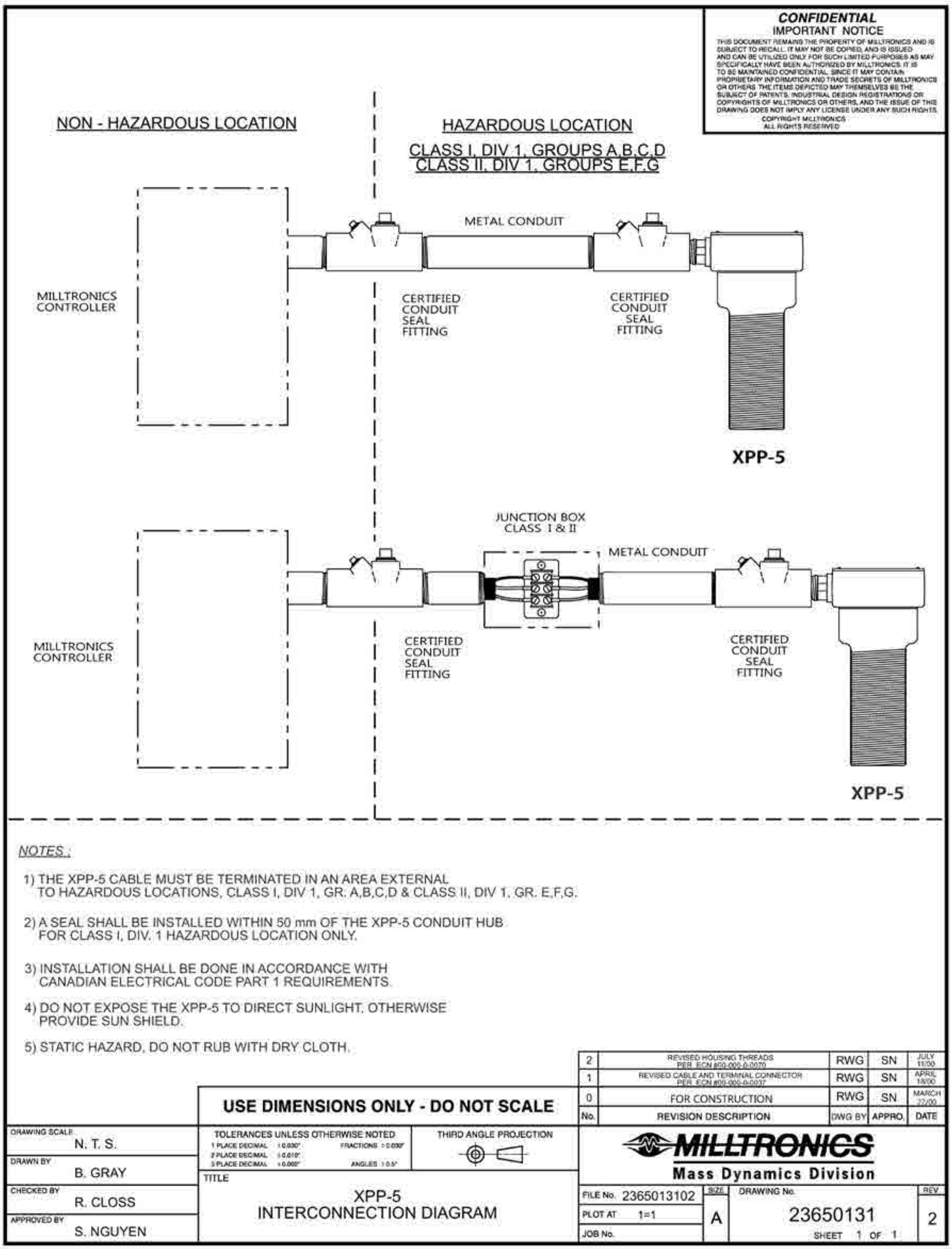
Note

Refer to Interconnection Diagram for XPP-5 (Page 17)

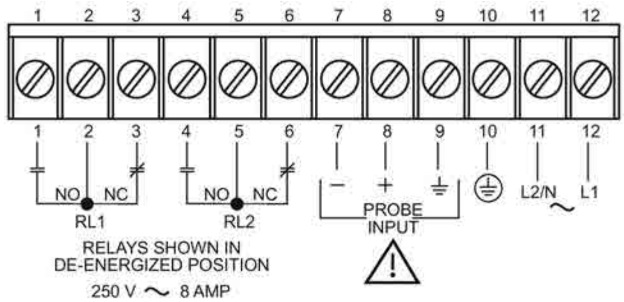
4.2.4 Cable length from RMA or IMA to MFA 4p

Wire gauge	Length in feet	Length in meters
22 AWG (0.34 mm²)	2 500	760
18 AWG (0.75 mm²)	5 000	1 520
12 AWG (4 mm²)	25 000	7 600

4.2.5 Interconnection Diagram for XPP-5

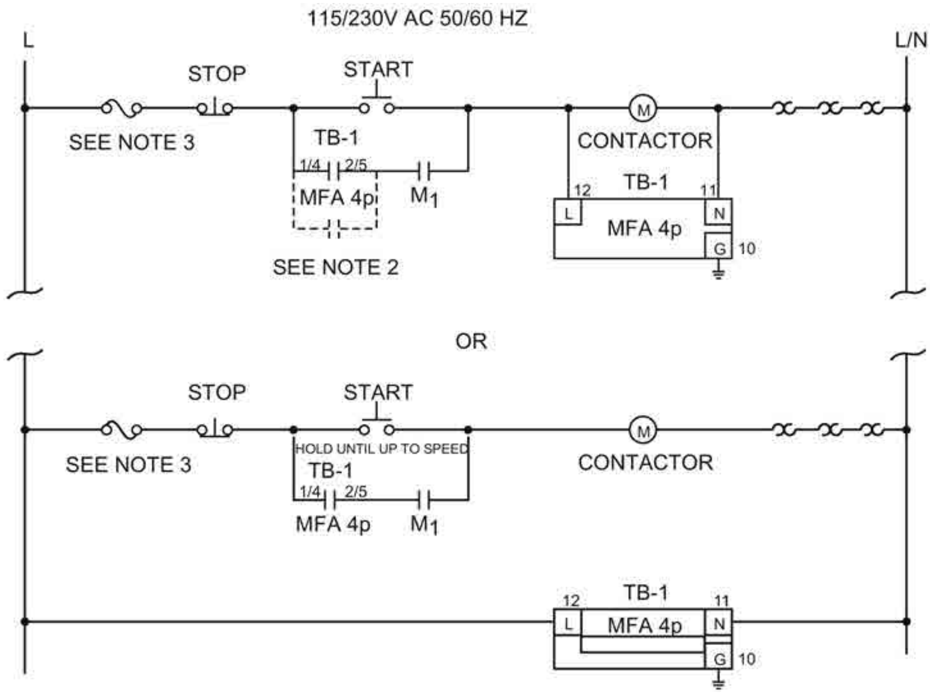


4.3 Connection to Power



- Terminal 10 must be connected to reliable ground.
- All current-carrying conductors must be protected by a fuse or circuit breaker in the building installation, having a breaking capacity of up to 15 A.
- A circuit breaker or switch in the building installation, marked as the disconnect switch, must be in close proximity to the equipment and within easy reach of the operator, and must disconnect all current-carrying conductors.
- AC input circuit, relay circuits, min. 14 AWG copper wire.
- Recommended torque on terminal clamping screws, 7 inch/lb max.
- All field wiring shall have insulation suitable for the highest applied input or relay voltage (whichever is greater).
- Relay contact terminals are for use with equipment that has no accessible live parts and wiring that has insulation suitable for at least 250 V. The maximum allowable working voltage between adjacent relay contacts shall be 250 V.

4.4 MFA 4p Wiring for Automatic Start Delay



Note

1. Interlocks and Safety Pull Switches are not shown.
2. If **START** is initiated by programmable logic controller, closure time may be too brief to allow MFA 4p contact to latch. In this case, program a timer contact into the circuit.
3. CSA requires an 8 A or less fuse to protect contacts. For 240 V AC, protect the contacts with a 1 500 VA transformer as well.

Should the **Time Delay** feature on start-up not be required, power should be applied continuously from a separate source and the potentiometer turned to zero. This is usually necessary for automatic up-stream startup of conveying devices after the down-stream drive has reached its operation speed.

Service and maintenance 5

5.1 Calibration

The probe and pre-amplifier require no calibration.

Connect the probe, pre-amp, and MFA 4p as shown in the Interconnection (Page 14) chapter. Connect the MFA 4p to power as shown in the Connection to Power (Page 18) diagram, and if applicable, as shown for MFA 4p Wiring for Automatic Start Delay (Page 19).

Note

To help the calibration procedure, short N.O. contacts of relays to prevent motor shutdown (terminals 1 to 2 and/or 4 to 5). This allows the system to run uninterrupted until an operating setpoint is established.

MFA 4p

Refer to MFA 4p Circuit Board Layout (Page 13)

1. Operate monitored equipment at its normal operating speed.
2. Confirm that Probe LED 1 is pulsing at a regular frequency.
3. Set **Start Delay** fully counter-clockwise (**CCW**) to **0** seconds.

Underspeed

1. Set switch **SW3** to **Underspeed**.
2. Set **pulses per minute (ppm)** switch **SW2** to **X 100** position.
3. Turn **ppm** potentiometer fully clockwise **(CW)** to **30**.
4. Determine incoming pulse rate by slowly turning **ppm** potentiometer **CCW** until relay LED 2 goes on. As the MFA 4p requires 2 pulses within range before energizing relays, low **ppm** applications (e.g. **2 ppm**) may require stepping of potentiometer at appropriate time intervals.
5. If no response is obtained when you set the **ppm** potentiometer to **3** (below this stability suffers), reset potentiometer fully **CW**, set switch **SW2** to **X 10** and then **X 1** if required, and repeat step 4.
6. When Relay LED 2 goes on, indicating the incoming pulse rate, turn potentiometer **CCW** slightly past this point to obtain an operating setpoint that allows for normal fluctuations due to load and voltage variations. For 50 % of full speed, set potentiometer (and **SW2** if required) to halfway between incoming pulse rate of normal speed and **0** ppm.
7. Set **Start Delay** by adjusting potentiometer so that equipment being monitored can attain normal operating speed before LED 2 can turn off.

Overspeed

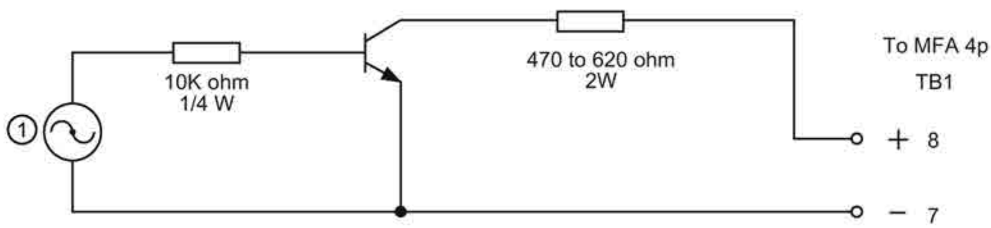
1. Set switch **SW3** to **Overspeed**.
2. Set **ppm** switch **SW2** to **X 1** position.
3. Set **ppm** potentiometer fully **CCW** to **0**.
4. Determine incoming pulse rate by slowly turning **ppm** potentiometer **CW** until Relay LED 2 goes on. Because the MFA 4p requires 2 pulses within range before energizing relays, low **ppm** applications (e.g. **2 ppm**) may require stepping of potentiometer at appropriate time intervals.
5. If no response is obtained when you set the **ppm** potentiometer to **3**, (below this stability suffers), reset potentiometer fully **CCW** and set switch **SW2** to **X 10**, and then **X 1** if required, and repeat step 4.
6. When Relay LED 2 goes on, indicating the incoming pulse rate, turn potentiometer **CW** slightly past this point to obtain an operating setpoint that allows for normal fluctuations due to load and voltage variations.

Note

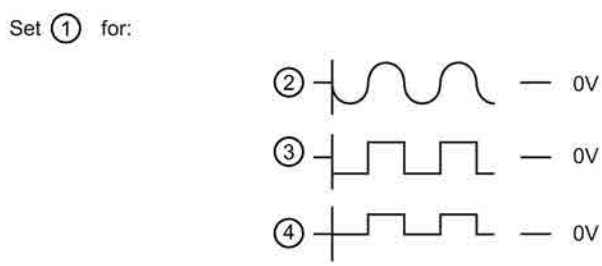
If N.O. contacts were shorted as described in final note of calibration preamble, remove them now as calibration is complete.

5.2 Signal Generator Interface

The following circuit may be used for calibrating or for troubleshooting the MFA 4p



Circuit substitutes operating probe and pre-amp



① Signal generator

② 6 V p-p sine

③ 6 V p-p square

④ 3 V p square

5.3 Cleaning

If it is necessary to clean the enclosure and circuit boards:

1. First, make sure the power is disconnected at the main breaker.
2. Use a vacuum cleaner and a clean, dry paint brush.
3. Check all electrical contacts for corrosion and arcing.

It is a good idea to periodically check the face of the probe: it should be free of material buildup, corrosion or deformation.

5.4 Maintenance

The Motion Failure Alarm MFA 4p requires no maintenance: however, we recommend a program of periodic checks.

Troubleshooting 6

6.1 Troubleshooting

	LED 1	LED 2	Term 7/8 (note 1)	C8	Term 1/2 relay 1 out	Term 4/5 relay 2 out
Normal	pulsing	on	24 V	27 V	closed	closed
Alarm	pulsing	off	24 V	27 V	open	open
Probe reversed polarity	on	off	20 V	27 V	open	open
Probe wiring open circuit	off	off	27 V	27 V	open	open
Probe wiring short circuit	off	off	0 V	27 V	open	open
Relay defective	pulsing	on	24 V	27 V	open	open

Notes:

- Voltage levels are DC, nominal values, and may appear to be pulsing, coincidental with LED 1.
- If diagnosis does not solve the malfunction, the probe, pre-amp or MFA 4p may be defective.
- If no spare circuit boards or probes are available for interchanging, the MFA 4p may be tested as follows in order to determine which section is defective:
  - To find out if the MFA 4p is defective:

    i. Disconnect the pre-amp.

    ii. Set ppm switch **SW2** to **X 1** position and turn potentiometer to 15.

    iii. Connect one lead of a 530 ohm, 1 watt resistor to terminal 7 and then momentarily contact terminal 8 at a rate of once per second. If the MFA 4p is functional, the relays will energize after two pulses and de-energize approximately 8 seconds after last pulse.

  - To find out if the RMA is defective:

    i. Disconnect pre-amp from the MFA 4p. Attach probe across terminals TB1 1/2 and a 24 V DC (floating) power supply across terminals TB2 3/2, according to the MSP-3 or MSP-9 Probe with RMA (remote mounted amplifier) (Page 14) connection diagram.

    ii. Run equipment to be monitored at normal operating speed or pass a ferrous object in front of and as close to probe as possible at a continuous rate.

    iii. With an oscilloscope, look for approximately 6 V peak to peak pulses or alternating hi/lo levels across ground and link 3. Or with an amp meter connected in series between the RMA and the 24 V DC power supply, look for hi/lo levels of approximately 12 mA/40 mA alternating at the rate of the passing ferrous objects.

  - To find out if the probe is defective (non-IMA type only; i.e. MSP-3 and MSP-9):

    i. Disconnect probe from pre-amp.

    ii. Connect an ohm meter across the black and white leads.

    iii. Nominal probe impedances are as follows:

MSP-3 and MSP-9	750 ohms

    If impedance deviates substantially from these values, an open or short circuit condition is indicated.

Technical data 7

Note

Always use product in accordance with specifications.

7.1 Power

- 100 ... 240 V AC ± 10 %, 50/60 Hz, 15 VA
  Fuse: 5 x 20 mm, Slow Blow, 1A, 250 V

7.2 Performance

Repeatability

- ± 1 %

Temperature coefficient (setpoint variance)

- 0.018 %/°C (0.01 %/°F)

Setpoint adjustment range

- 2 ... 3 000 ppm (pulses per minute): standard model
- 0.15 ... 15 ppm: slow speed version

Dynamic range

- 0 ... 7 200 ppm

7.3 Outputs

- 2 relays with Form C (S.P.D.T.) fail-safe contacts (relays operate in unison)

Resistive rating

- 8 A @ 250 V AC

7.4 Construction

Weight

- Polycarbonate enclosure: 1.5 kg (3.3 lb)
- Mild steel or stainless steel enclosure: 4.3 kg (9.5 lb)

7.5 Approvals

- CE, $CSA_{(C/US)}$, FM
- EMC performance available on request

7.6 Operating Conditions

Location	Indoor/outdoor
Altitude	2 000 m max.
Ambient temperature	-20 ... 50 °C (-4 ... 122 °F)
Relative humidity	Suitable for outdoor (Type 4X / NEMA 4X / IP65)*
Installation category	II
Pollution degree	4

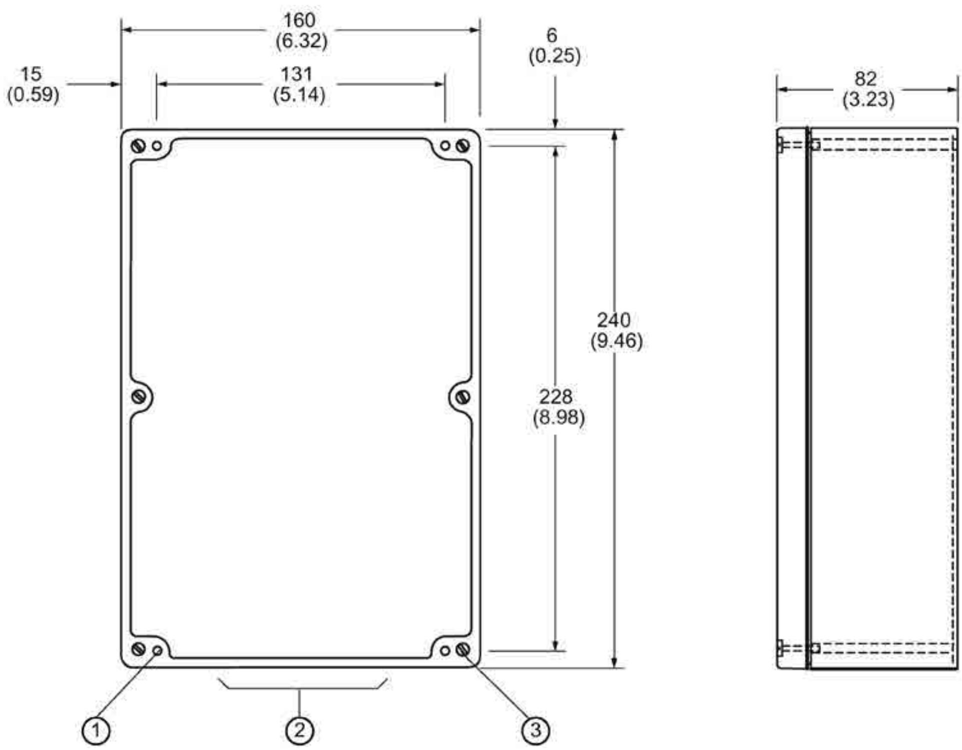
*Type 4/ NEMA 4 /IP65 with mild steel enclosure

Related Equipment	**Ambient Temperature Range**	**Approx wt.**
RMA	-40 ... 60 °C (-40 ... 140 °F)	2.3 kg (5 lb)
MSP-12	-40 ... 60 °C (-40 ... 140 °F)	1.4 kg (3 lb)
XPP-5	-40 ... 60 °C (-40 ... 140 °F)	1.8 kg (4 lb)
MSP-3	-50 ... 260 °C (-58 ... 500 °F)	1.4 kg (3 lb)
MSP-9	-50 ... 260 °C (-58 ... 500 °F)	1.8 kg (4 lb)

8 Dimension drawings

8.1 MFA 4p

8.1.1 Type 4X/NEMA 4X/IP65 Polycarbonate Enclosure



Dimensions in mm (inch)

① 4.3 (0.17) ∅ mounting holes, 4 places

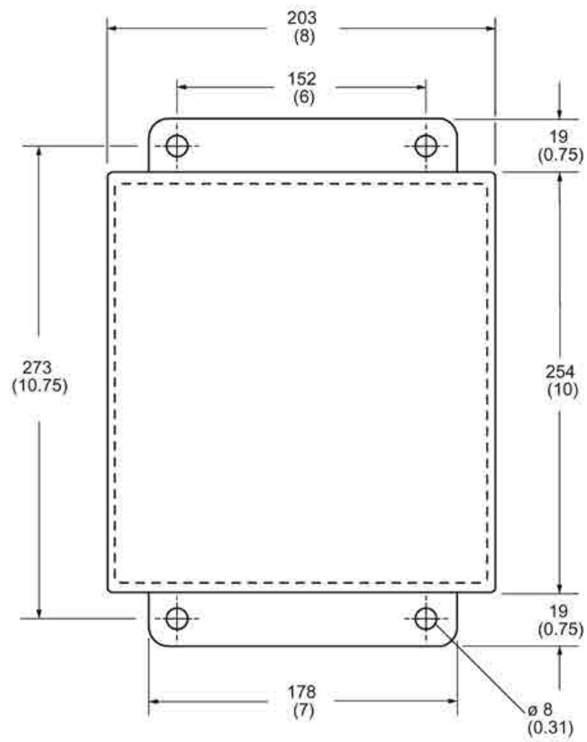
② Suitable location for conduit entrance

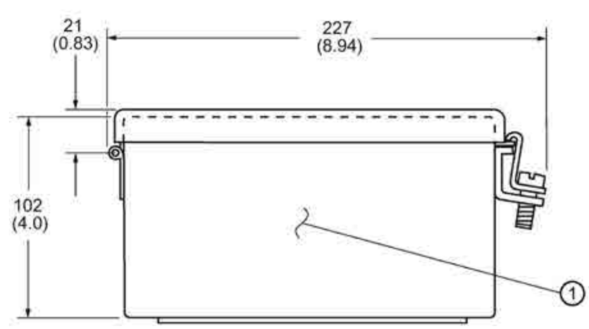
③ Lid screws

Note

- Non-metallic enclosure does not provide grounding between conduit connections: use grounding type bushings and jumpers.
- Use only approved, suitable size hubs for watertight application.

8.1.2 Type 4/NEMA 4/IP65 Painted Steel Enclosure & Type 4X/NEMA 4X/IP65 Stainless Steel Enclosure





Dimensions in mm (inch)

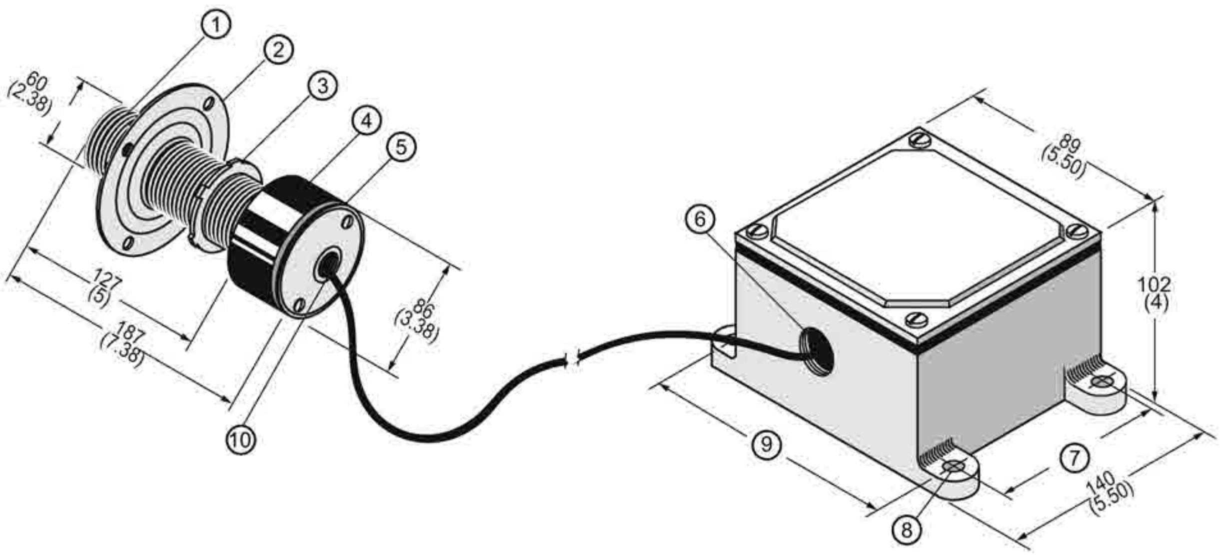
① Suitable location for conduit entrance (customer specified)

Note

- Painted steel enclosure does not provide grounding between conduit connections: use grounding type bushings and jumpers.
- Use only approved, suitable size hubs for watertight application.

8.2 Probes

8.2.1 High Temperature Probe MSP-3



Dimensions in mm (inch)

① 2" NPSL

② Mounting flange

③ Locknut

④ Probe body

⑤ Gasket

⑥ ½" NPT, tapped both sides

⑦ Mounting centers 111 (4.375)

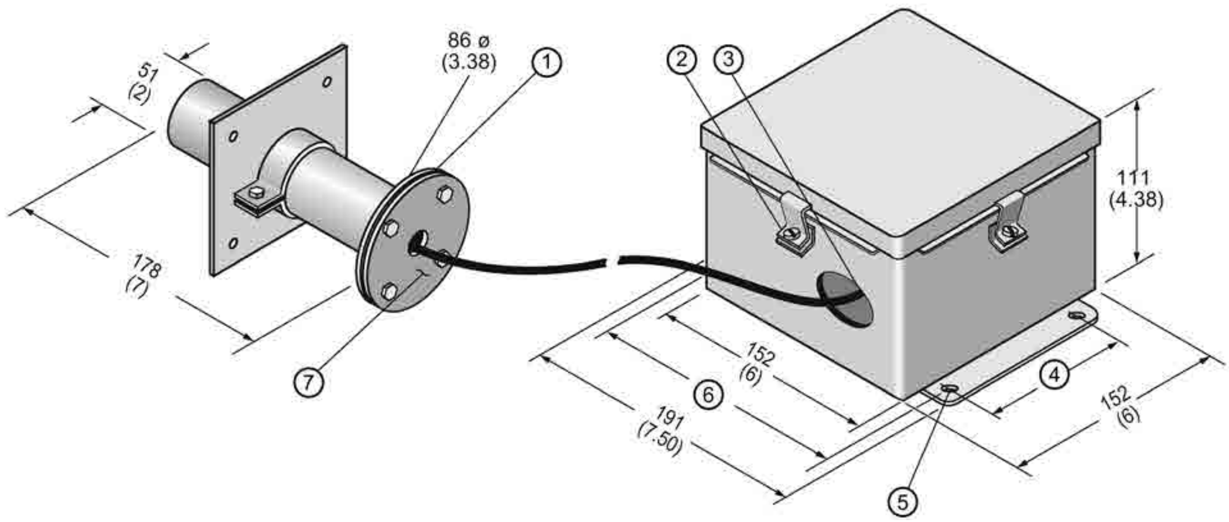
⑧ 8 (0.312) ∅, 4 holes

⑨ Mounting centers 165 (6.50)

⑩ CAP c/w ½" NPT conduit entrance

- Cast aluminum body comes with cast aluminum cap and zinc flange, zinc plated locknut, and silicone rubber gasket.
- See Mounting Details (Page 10)
- Pre-amp is mounted in a NEMA 4 cast aluminum enclosure.

8.2.2 Stainless Steel Probe MSP-9



Dimensions in mm (inch)

① Gasket

② Clamps, 4 places

③ 22 (0.875) ∅, 2 places

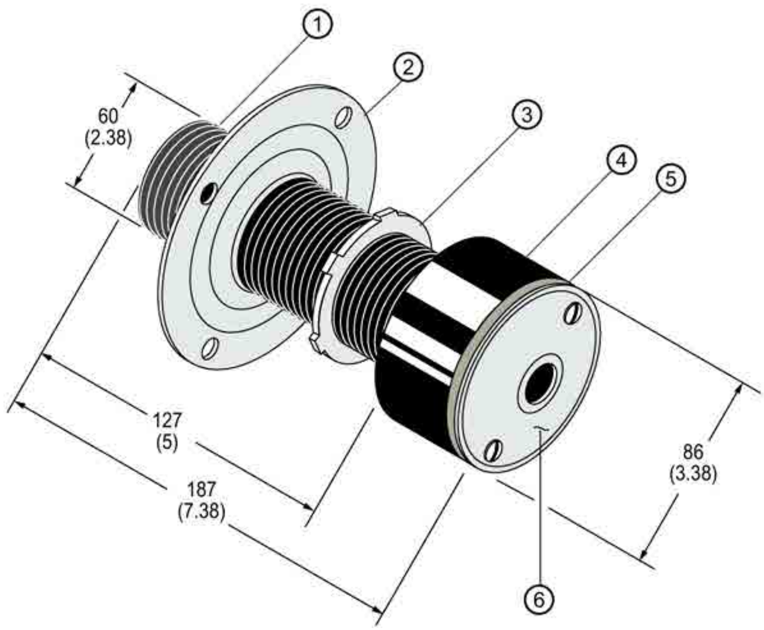
④ 102 (4) mounting centers

⑤ 8 (0.312), 4 places

⑥ 171 (6.75) mounting centers

⑦ Cap c/w 22 (0.8758) ∅ hole

8.2.3 Standard Probe MSP-12



Dimensions in mm (inch)

① 2" NPSL

② Mounting flange

③ Locknut

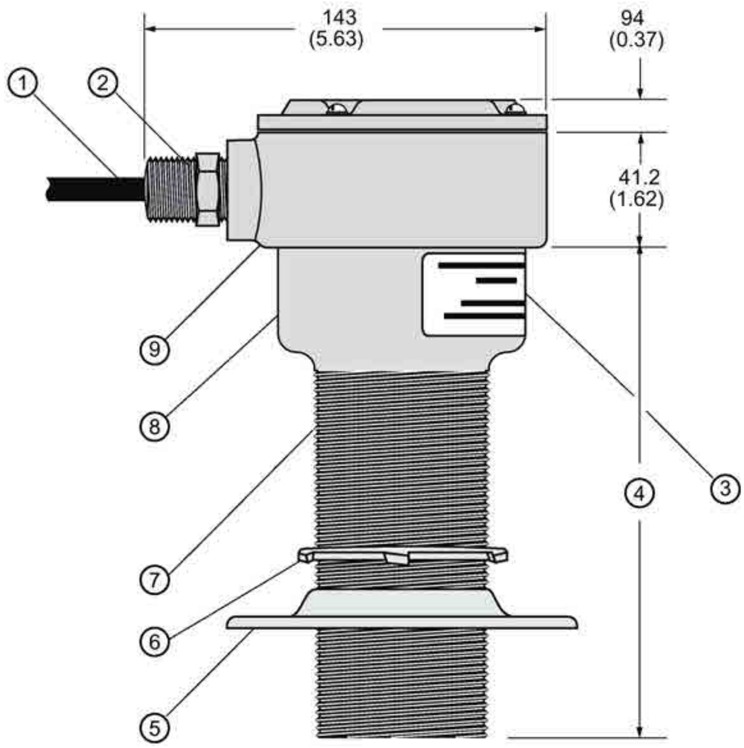
④ Probe body

⑤ Gasket

⑥ Cap c/w ½" NPT conduit entrance

- Aluminum body comes with die-cast aluminum cap and zinc flange, zinc plated locknut, and neoprene gasket.
- See Mounting Details (Page 10)
- Pre-amp is potted in the probe body and comes with two 127 mm (5 inch) long hook-up wires.

8.2.4 Hazardous Locations XPP-5



Dimensions in mm (inch)

① 2 conductor shielded cable

② ¾" NPT

③ Nameplate

④ 171.5 (6.75) nominal

⑤ Mounting flange

⑥ Locknut

⑦ 2" NSPL

⑧ Probe body (potted aluminum housing)

⑨ Probe body (potted aluminum junction box)

- C.S.A Approved for:
  - Class **I**, Div. 1, Groups A, B, C, and D
  - Class **II**, Div. 1, Groups E, F, and G
  - Class **III**
- Aluminum body with die-cast flange and zinc-plated locknut.
- Pre-amp and cable potted in the probe's body.

See also

Interconnection Diagram for XPP-5 (Page 17)
XPP-5 with IMA (internally mounted pre-amplifier) (Page 16)
Mounting Details (Page 10)

Technical Reference A

A.1 Principles of Operation

MFA 4p

Milltronics MFA 4p is a highly sensitive, single setpoint motion sensor alarm unit, used with MSP and XPP probes. The probe detects an increase or decrease in the speed of rotating, reciprocating, or conveying equipment and sends the information to the MFA 4p. The MFA 4p works with a pre-amplifier which can be internal to the motion sensing probe, or remote from the motion sensing probe. Pulses generated from the probe are continually compared to the adjustable setpoint. If the pulse rate is lower than the setpoint, the alarm relays operating in a fail-safe mode will de-energize, indicating failure. The relays will not energize until the pulse rate increases above the setpoint.

Probe

The Milltronics probes work on the principle of Faraday’s Laws of Electromagnetic Induction. When a ferromagnetic object enters the probe’s permanent magnetic field, it distorts the flux causing it to cut the coil windings and generate a voltage. This voltage is proportional to the strength of the magnet and the number of wire turns in the coil (constant in the Milltronics probes) and the speed at which the ferrous target passes through the flux. The generated voltage is also inversely proportional to the square of the distance between the target and the probe.

The relationship between speed and gap of a standard probe

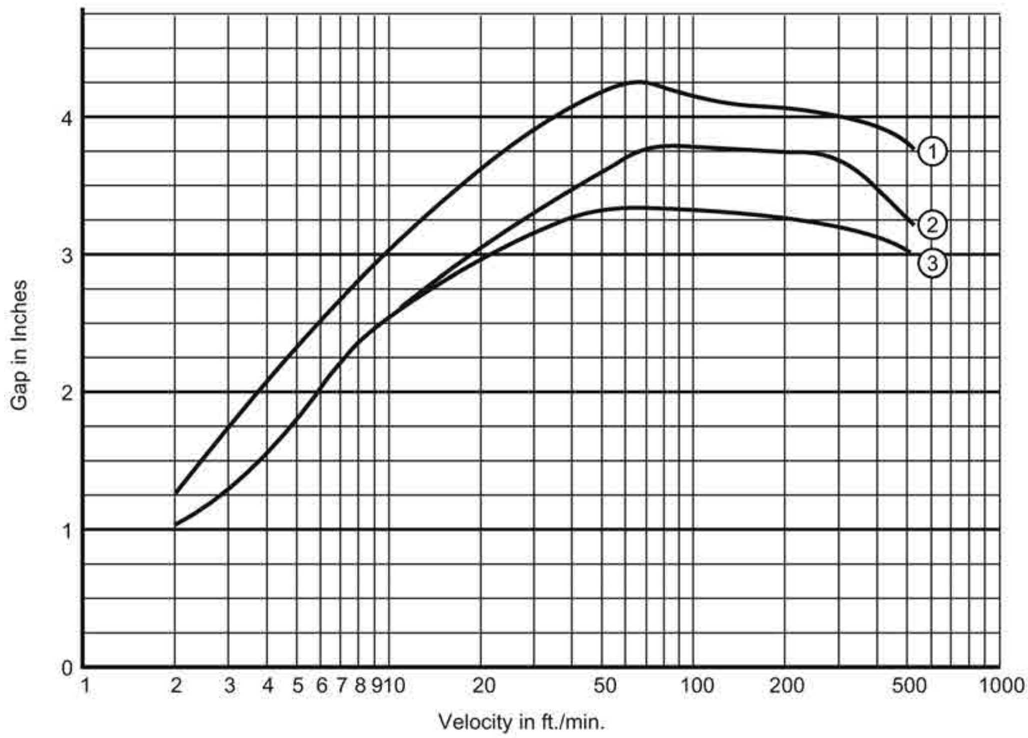


Fig. a
50 x 25 x 50 mm
(2 x 1 x 2 inch)
ferrous block

Fig. b
50 x 50 x 25 mm
(2 x 2 x 1 inch)
ferrous block

Fig. c
50 x 25 x 25 mm
(2 x 1 x 1 inch)
ferrous block

① Fig. a

② Fig. b

③ Fig. c

The resultant line indicates the threshold tolerance of the accompanying MFA 4p electronics. For example, in **Fig. a**, a 100 mm (4 inch) gap requires a minimum velocity of about 10 m/minute (35 ft/minute): with a velocity of 0.61 m/minute (2 ft/minute), a maximum gap of 31 mm (1.25 inch) is possible.

Note

25.4 mm = 1 inch and 0.305 m = 1 ft

The graph was plotted from tests using four ferrous blocks set equidistantly on a 406 mm (16 inch) diameter circle on a non-ferrous disc.

The physical shape of the ferrous target generally becomes important at low velocities or large gaps. At these points, tests indicate that a cubic shape gives the best results due to the sudden change it causes in the magnetic field.

An increase in block size beyond 50 x 50 x 25 mm (2 x 2 x 1 inch) is generally not as effective as minimizing the gap, except at very low velocities.

Milltronics manufactures probes to suit a wide variety of environments: low temperature, high temperature, corrosive, and Class I, II, and III applications.

Pre-Amplifier (IMA and RMA)

The pre-amplifier accepts the voltage pulses generated by the probe and converts them into noise-immune current pulses. Current levels are 12 mA low and 45 mA high. The preamplifier comes internally mounted in the probe, or in an enclosure for remote mounting.

Internally mounted pre-amplifiers are called IMAs. Remote mounted pre-amplifiers are called RMAs.

MFA 4p Operation

The MFA 4p provides a short circuit protected, +24 V DC unregulated supply to the preamp. In the event that the interconnecting wiring is shorted, output current from the MFA 4p is automatically limited and the on-board alarm relays are de-energized to indicate failure.

The output current pulses from the pre-amp are super-imposed onto the DC current supply. These are monitored by Probe LED 1, which is illuminated at the rate of the incoming pulses and is useful for positioning the probe.

The rate at which the pulses are received by the MFA 4p is compared to a setpoint reference signal from the time base generator.

Although two pulses within range are required to energize the relays, as long as the frequency of the incoming pulses exceeds the setpoint frequency (or is less than that of the setpoint in the case of overspeed detection), the MFA 4p keeps the alarm relays energized. The reference generator is frequency adjustable by the pulses per minute (ppm) switch and potentiometer.

The alarm relays will de-energize after two time constants of the setpoint when the frequency of the incoming pulses falls below that of the setpoint (or exceeds that of the setpoint in the case of overspeed detection). The relay status is indicated by Relay LED 2, which is illuminated when the relays are energized (normal).

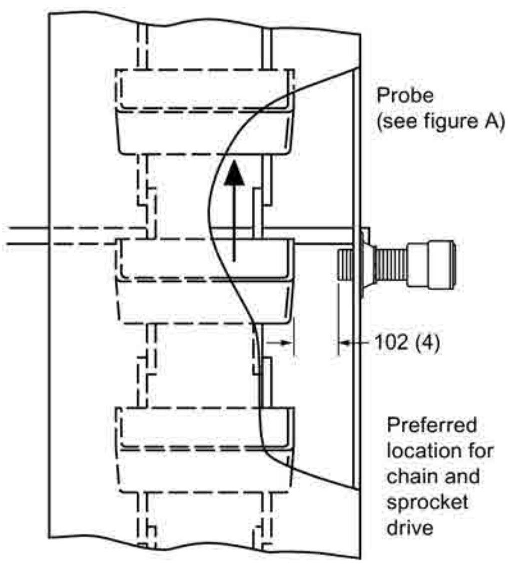
The MFA 4p has a 0 to 60 second time delay feature, allowing the monitored device to accelerate to normal running speed before monitoring begins.

This feature is activated when power is applied to the MFA 4p in parallel with the motor starter contact coil. The time delay circuit simulates normal operating conditions for the amount of time as set by the **Start Delay** potentiometer, keeping the alarm relays energized. If the monitored device does not reach normal speed before the set time period, the relays will de-energize giving an alarm condition. This feature is not applicable in the overspeed detection mode.

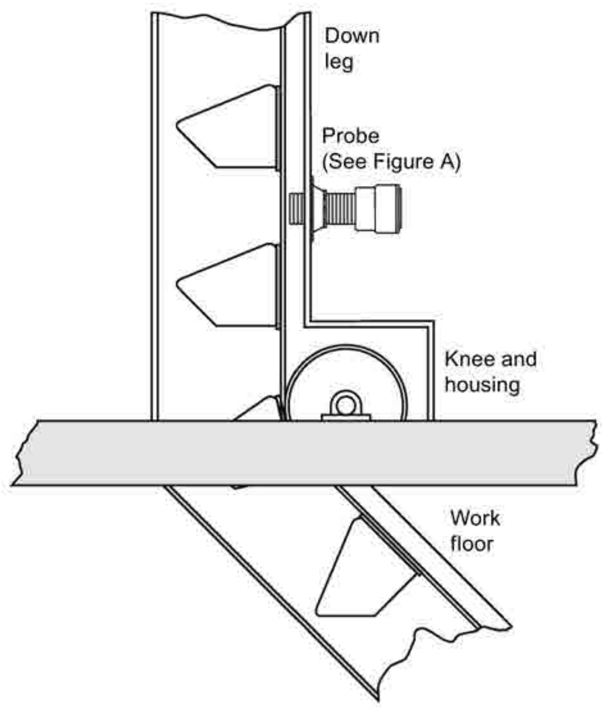
Applications

B

B.1 Bucket Elevators



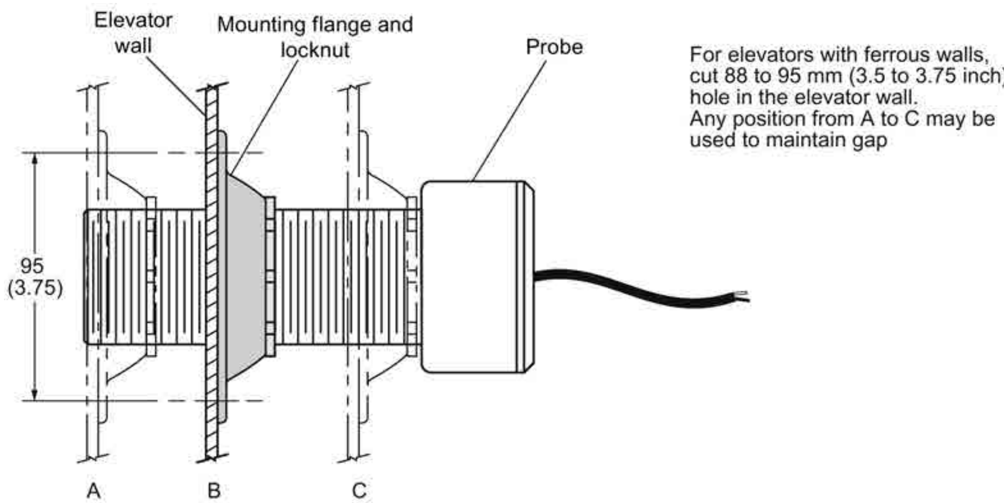
For chain and sprocket drive elevators, place the probe so that the gap between the bucket and the probe does not exceed 102 mm (4 inch). To prevent damage to the probe from eccentric bucket motion, ensure that the gap is not less than 12.5 mm (0.5 inch) in the worst condition



Preferred location for belt-driven elevators with ferrous bucket spacing greater than 76 mm (3 inch), and non-ferrous buckets with ferrous bolts.
For ferrous buckets with spacings less than 76 mm (3 inch) locate probe on the front of the leg.

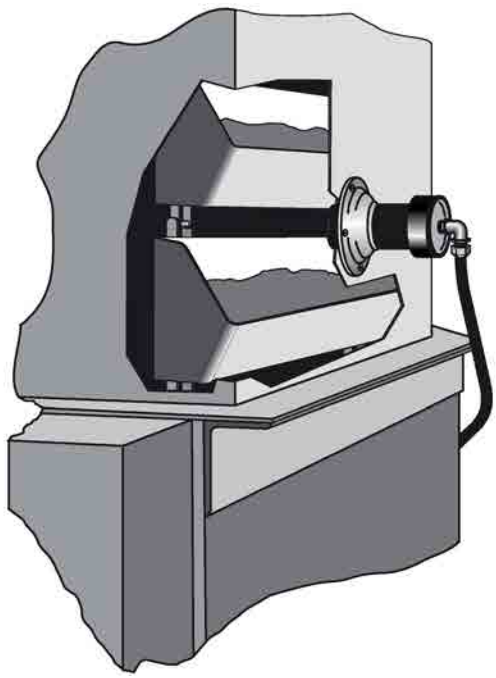
Dimensions in mm (inch)

Figure A

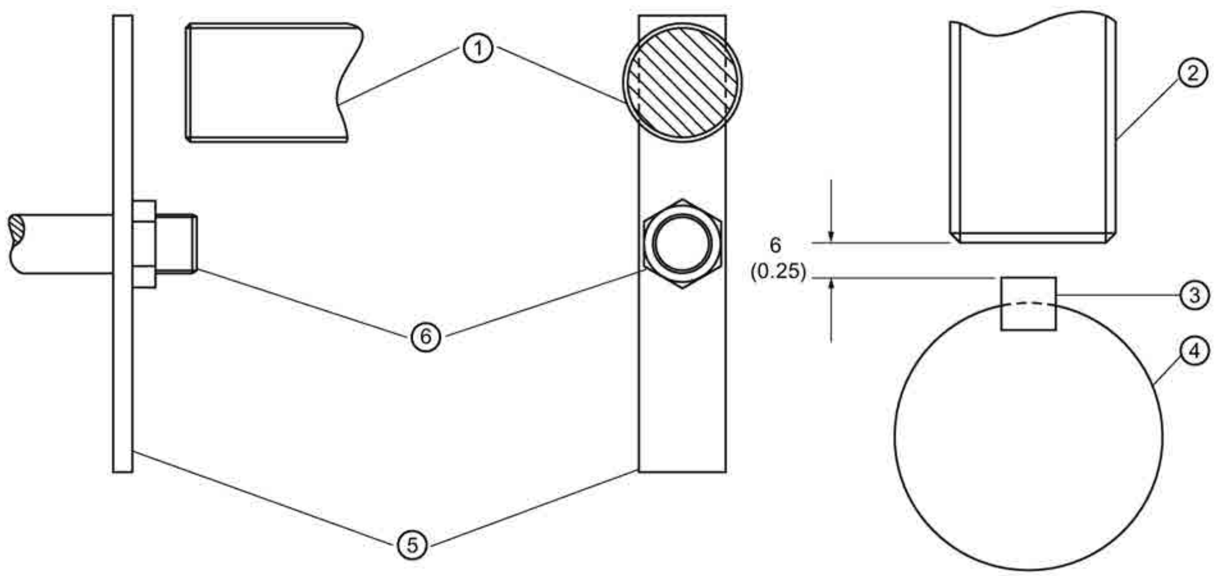


Dimensions in mm (inch)

B.2 Bucket Elevator



B.3 Shafts



Safety shield not shown

Dimensions in mm (inch)

① Probe

② Probe

③ Key and keyway

④ Shaft 102 (4) ∅ min.

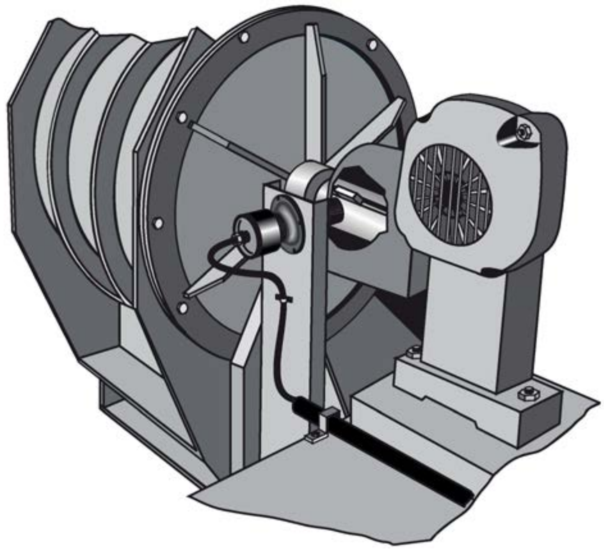
⑤ Added paddle

⑥ Shaft

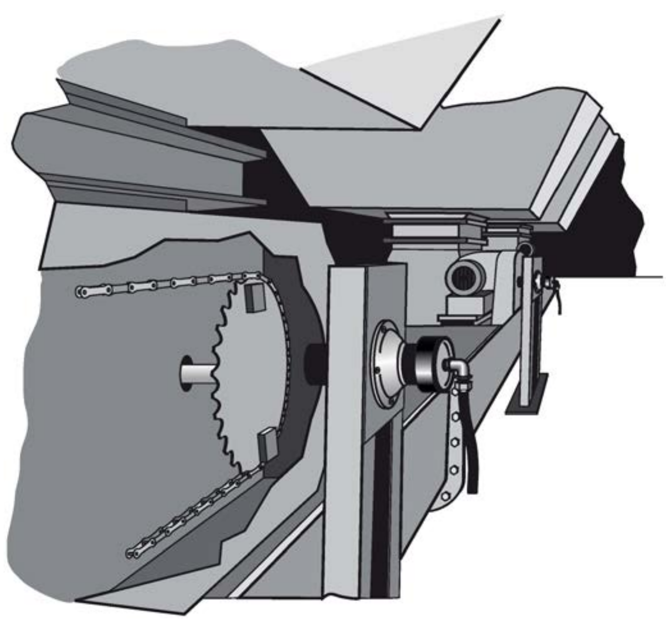
These methods are viable if the speed is such that the blades or key will provide the number of pulses required at a minimum velocity of 1.5 m/minute (5 ft/minute). In applications where exposed moving parts are required, safety shields and precautions should be applied.

Where conditions prevent the sensing of buckets, a belt pulley or paddle mounted on an exposed shaft end, preferably the tail pulley, may be used.

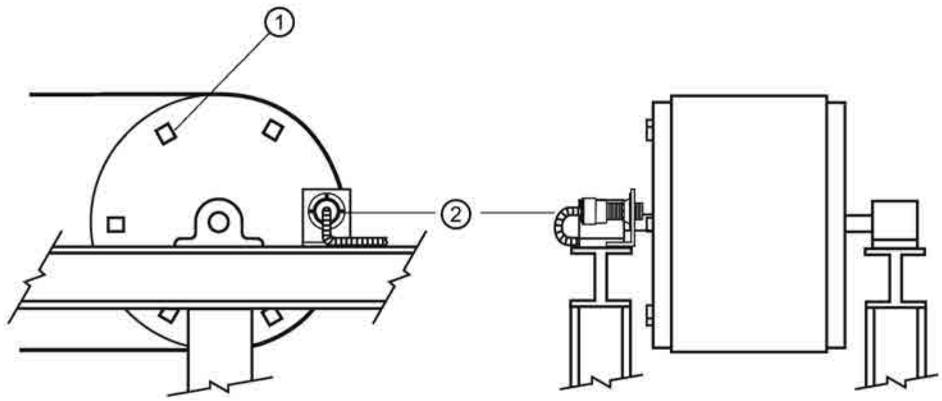
B.4 Rotating Shaft of Rotary Feeder



B.5 Drive Sprocket on Rotary Feeder



B.6 Belt Conveyors



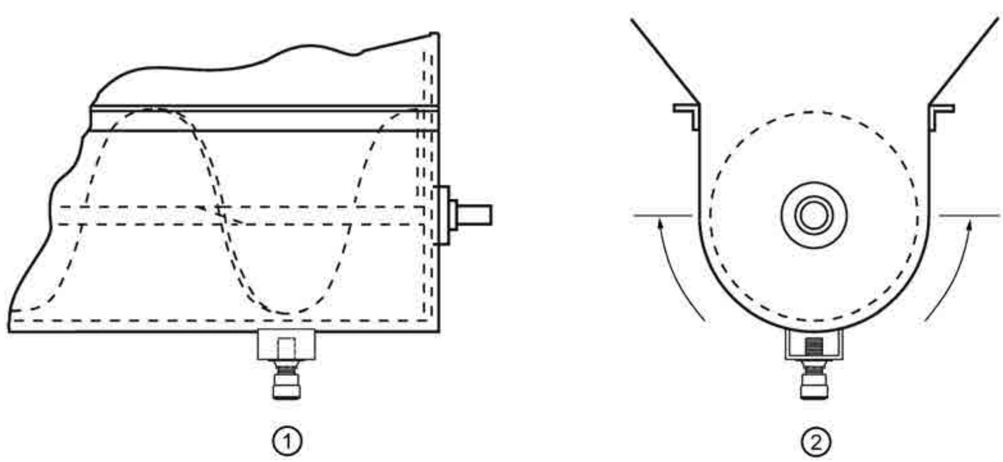
Dimensions in mm (inch)

① 50 x 50 x 25 (2 x 2 x 1) ferrous blocks or spoked wheel

② Probe

Potential for damage in each application governs the minimum gap allowable. Maximum gap for operation is 102 mm (4 inch), optimum 25 to 50 mm (1 to 2 inch).

B.7 Screw Conveyors

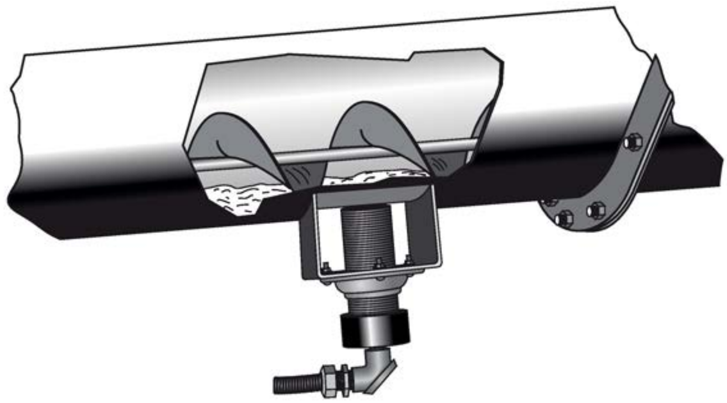


① The probe should be located at the idler end (usually feed end)

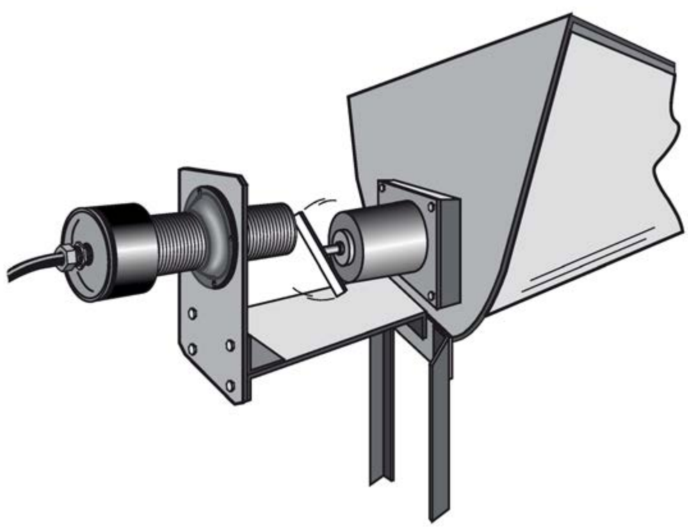
② Arrows indicate permissible placement range of the probe

A ferrous mass added behind the flight of a screw conveyor, where it passes the probe aids Borderline Operation. This mass must be added for all non-ferrous screws.

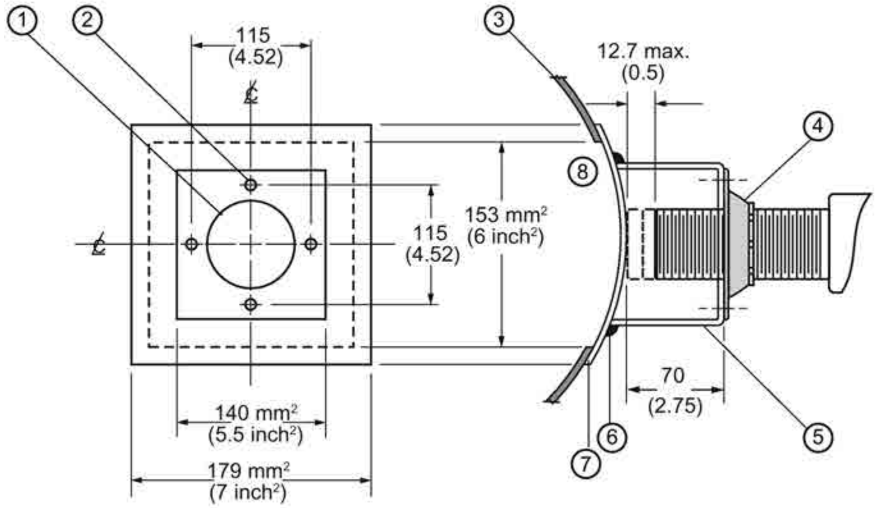
B.8 Screw Conveyor Flights



B.9 End Bearing on Screw Conveyor



B.10 Non-ferrous Window



Minimum recommended dimensions shown

Dimensions in mm (inch)

① 64 (3.5) ∅ clearance hole

② 6 (0.25) ∅ clearance, 4 holes

③ Conveyor housing

④ Probe and mounting flange

⑤ Bracket

⑥ Weld

⑦ Base plate

⑧ Window

For screw conveyor with trough over 3.1 mm (0.125 inch) thick or for high temperature applications. The dimensions shown for the base, window, and bracket are the minimum recommended with tolerances of ± 0.8 mm (0.031 inch). Use 305, 310, or 316 stainless steel, brass, or aluminum.

The probe may not touch the window if temperatures are in excess of 60 °C (140 °F) when using the low temperature probes or 260 °C (500 °F) when using the high temperature probes.

Support

C

Technical Support

If this documentation does not provide complete answers to any technical questions you may have, contact Technical Support at:

- Support request (http://www.siemens.com/automation/support-request)
- More information about our Technical Support is available at Technical Support (http://www.siemens.com/automation/csi/service)

Internet Service & Support

In addition to our documentation, Siemens provides a comprehensive support solution at:

- Services & Support (http://www.siemens.com/automation/service&support)

Personal contact

If you have additional questions about the device, please contact your Siemens personal contact at:

- Partner (http://www.automation.siemens.com/partner)

In order to find the contact for your product, select under 'All Products and Branches' the path 'Automation Technology > Sensor Systems'.

Documentation

You can find documentation on various products and systems at:

- Instructions and manuals Instructions and manuals (http://www.siemens.com/processinstrumentation/documentation)

C.1 Certificates

You can find certificates on the Internet at Milltronics MFA 4p (http://w3.siemens.com/mcms/sensor-systems/en/process-instrumentation/process-protection/motion-sensors/Pages/milltronics-mfa-4p.aspx) or on an included DVD.

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