Process Protection

6

Process Protection

Product overview

Overview

	Application	Device description
Acoustic sensor for pump monitoring	Acoustic diagnostics unit for flow valve leakage monitoring in oscillating displacement pumps or for material flow monitoring of bulk solids in pipes, conveyors or raceways.	**SITRANS DA400** • 4 inputs for structure-born noise sensors • 4 universal inputs • 6 digital outputs • With PROFIBUS DP or PROFIBUS PA • Sensor degree of protection IP66/IP68
Acoustic sensors for material flow monitoring	Acoustic sensor for solids flow detection.	**SITRANS AS100** • Non-invasive • Screw in, bolt on, weld, or bond in place • Analog output • High and low sensitivity range of operation
	Alarm control unit for use with SITRANS AS100 acoustic sensor to provide reliable continuous protection for bulk solid flow. It processes signals from the sensor, providing relay and analog outputs for interface into a process.	**SITRANS CU02** • 3 digit LCD display • 4 ... 20 mA output • Two programmable relays • Adjustable independent time delay for each relay • DIN rail mounting provides easy installation

Overview (continued)

Motions sensors	Application	Device description
	Highly sensitive single set point motion sensor alarm unit, used with MSP probes.	**Milltronics MFA 4p** • Probe/target separation up to 100 mm (4 inch) • Minimum velocity of moving ferrous target: 1 cm/sec. (2 fpm)
	Highly sensitive dual setpoint motion sensor system, used with Milltronics MSP probes.	**SITRANS WM300 MFA** • Up to 100 mm (4 inch) gap between target and probe. • Setpoint adjustment range 2 to 5 000 Hz (120 to 300 000 ppm
	Heavy duty 3-wire motion sensor that provides an NPN open collector output to PLCs.	**Milltronics MSP-7** • Up to 100 mm (4 inch) gap between target and probe • Corrosion resistant construction
	Heavy-duty zero speed alarm switch.	**SITRANS WM100** • Detects the absence or presence of motion of rotating or reciprocating or conveying equipment

Process Protection

Acoustic and motion sensing

Introduction

Overview

Process protection devices act as early warning systems to avoid costly process interruptions and breakdowns of equipment. Non-contacting motion sensors detect changes in motion and speed of conveying, reciprocating and rotating machinery.

Non-invasive acoustic sensors detect inaudible, high frequency acoustic emissions generated by friction and impact, caused by materials in motion. They can detect conditions of flow/no flow or high/low flow, to warn of blockages, product absence or equipment failure. They are located outside of the process, accurately detecting conditions without wear on the sensor.

Motion sensors can warn in case of equipment malfunction and shut down machinery in case of a slowdown or failure. They are rugged and perform even in harsh industrial conditions. Most of the MFA 4p motion sensing probes, as well as the SITRANS WM100, can be mounted up to 100 mm (4 inch) from the ferrous target, reducing the chance of damage to the probe and the equipment. The probes are not affected by moisture or dust build-up.

Mode of operation

Acoustic Sensing

Acoustic sensors monitor high frequency emissions generated by friction and the impact of flowing material or mechanical parts. The sensors can also sense the turbulence of gases or liquids leaking through valves and flanges. When matter vibrates between 0 Hz and 200 kHz, it creates acoustic energy. Sound energy between 20 Hz and 20 kHz can be detected by humans. Acoustic sensors detect high-frequency acoustic energy between 75 kHz and 175 kHz. Acoustic energy travels quickly through dense materials (metal) and poorly through less dense materials (air). Because the acoustic sensors are mounted directly to the external wall of the chute work, other plant noises are well below 75 kHz and effectively ignored by the sensors.

The acoustic sensors contain a specialized piezocrystal and filter circuit that responds effectively to the high-frequency band between 75 kHz and 175 kHz. As the crystal is excited by the acoustic energy, it produces a continuous electrical signal in direct proportion to the level of acoustic energy received. The SITRANS AS100 sensor output of 0 to 10 V DC can be applied to a PLC or to an optional control unit for a programmable alarm relay or 4 to 20 mA signal output.

Motion sensing

Siemens 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 its coil windings to 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 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 robust motion sensors provide the contacts to shut down machinery whenever under-speed, over-speed or plant equipment failure occurs. On belt, drag and screw conveyors, or on bucket elevators, fans and pumps, the speed alarm option can warn instantly of equipment malfunction. Some probes may be linked to a programmable logic controller to monitor equipment.

Technical specifications

Process Protection Selection Guide

Criteria	SITRANS DA400	SITRANS AS100	Milltronics MFA 4p	SITRANS WM300 MFA	Milltronics MSP-7	SITRANS WM100
Typical industries	Mining, water/wastewater, chemicals/petrochemicals and oil & gas industry	Aggregates, grain, cement, food processing, power generation, steel processing	Aggregates, cement, mining, wastewater, grain	Mining aggregate, cement, and other primary and secondary industries.	General industrial applications	Aggregates, cement, mining
Typical Applications	Oscillating displacement pumps such as diaphragm piston pumps, piston pumps and hose-type diaphragm piston pumps. Monitoring of flowing materials in pipes, conveyors or channels.	Pipes, pneumatic conveyors, aerated gravity flow systems, burst filter bag detection	Tail pulleys, driven pulleys, motor shaft sensing, screw conveyor flights, bucket elevators	Tail pulleys, motor shaft sensing, screw conveyor flights, bucket elevators	Tail pulley shafts, driven pulleys, motor shaft sensing, belt or drag conveyors, screw conveyor flights, bucket elevators, fans and pumps	Tail pulleys, driven pulleys, motor shaft sensing, screw conveyor flights, bucket elevators
Operation	Acoustic detection of cavitation, optionally acoustic detection of impact noises of high frequency	Acoustic sensing	Motion sensing	Motion sensing	Motion sensing	Motion sensing
Enclosure	Electronics housing, Makrolon IP65, sensor, stainless steel material number 1.4571 (316Ti SST)	Compact 304 or 303 stainless steel, IP68	Type 4X/NEMA 4X/IP65 polycarbonate	Polycarbonate	Type 4X/NEMA 4X/IP67 aluminum	Type 4X/NEMA 4X/IP67 aluminum
Sensor mounting	Screw to outside of pump housing. For material flow monitoring on the outside of pipes, channels, chutes or raceways	Sensor non-invasive: glue or weld-on disc, bolt or weld-on tab, drill and tap	Non-contacting probes secured with supplied flange	Non-contacting probes secured with supplied flange	Non-contacting probe secured with supplied flange	Non-contacting, secured with supplied flange
Operating temperature	Electronics: -20 ... +60 °C (-4 ... +140 °F) Sensor: -20 ... +110 °C (-4 ... +230 °F)	-20 ... +80 °C (-4 ... +176 °F)[1]	-20 ... +50 °C (-4 ... +122 °F)[2]	-20 ... +50 °C (-4 ... +122 °F)	-40 ... +60 °C (-40 ... +140 °F)	-40 ... +60 °C (-40 ... +140 °F)
Power requirements	19 V ... 36 V DC, < 100 mA	20 ... 30 V DC, 18 mA	100/115/200/230 V AC ± 10 % 50/60 Hz, 15 VA	100 ... 240 V AC, 50/60 Hz, 0.7 ... 0.35 A per LOGO! power module	21 ... 28 V DC, 40 mA max.	115 or 230 V AC ± 10 % 50/60 Hz, 7 VA
Approvals	CE, PROFIBUS DP, and PROFIBUS PA conform, Ex protection to ATEX 1G or 1D	CE, RCM, CSA/FM Class II, Div. 1, Groups E, F, G optional, ATEX II, 2GD, 3D optional, EAC	$CSA_{US/C}$, CE, RCM	CE, $CSA/UL_{C/US}$, FM, EAC, RCM, KCC	CE, RCM	$CSA_{US/C}$, CE, RCM

[1] Extended temperature model -40 ... +125 °C (-40 ... +257 °F) available (CE version)
[2] Probes available for -40 ... +260 °C (-40 ... +500 °F)

Process Protection

Acoustic sensors

SITRANS DA400 Acoustic diagnostic unit

Overview

The SITRANS DA400 acoustic diagnostic unit acoustically measures the structure-borne noise

- In the version for pump monitoring; on oscillating displacement pumps

- In the version for material flow monitoring; on pipes, conveying equipment or channels.

It comprises an electric diagnostic unit and up to four acoustic sensors.

Benefits

Benefits when pump monitoring

- Increased availability of the system through:
  - Advanced maintenance planning thanks to early recognition of defective components
  - Reduced downtimes (no fault locating necessary)
  - Increased maintenance intervals
  - Greater pump reliability
- Prevention of expensive consequential damage
- Increased safety of critical applications
- Early recognition of a reduction in power
- Increased productivity

Benefits when material flow monitoring

- Detection of insufficient or excessive inflow of material in a liquid or gas flow
- Detection of blockages or clogging
- Reduction of down times
- Increased product quality
- Increased availability
- Guaranteed operational safety
- Increased productivity

Application

In the version for pump monitoring, the SITRANS DA400 allows continuous, simultaneous and independent monitoring of up to four flow control valves in a pump for leaks. In addition, another four inputs are available for monitoring standard signals (e.g. diaphragm and temperature monitoring). This means that the condition of an oscillating displacement pump is monitored in every phase of its operation.

The SITRANS DA400 is used in all industries where an oscillating displacement pump is used.

The version for material flow monitoring monitors the material flow in liquids or gases that is usually as a result of impact or friction, e.g. against the pipe or channel wall.

Function

Product features

Continuous and independent status monitoring:

• Of the flow control valves, for leaks

• Of the membranes, for material fatigue

• Of the temperature loading of the hydraulic oil

• Of flowing bulk solids in pipes, conveying equipment or channels

Communication of the status to superordinate control systems:

• Via digital outputs

• Digitally, via PROFIBUS DP

Simple to operate and parameterize:

• Locally, via digital display and keys

• PROFIBUS DP

Mode of operation

Principle of measurement

Leaks in the flow control valves of oscillating displacement pumps are flows in which cavitation occurs. This results in sound waves that are transmitted to the valve housing, where they are recorded by the structure-borne sound sensor in the SITRANS DA400 on the outside.

The SITRANS DA400 utilizes the fact that with both an open valve and a closed intact valve, no cavitation occurs and the measured sound level thus corresponds to the operating noise of the pump. By contrast, with a closed defective valve cavitation does occur, which can be identified by a period increase in the sound level (see figures). The measured value from the SITRANS DA400 corresponds exactly to this increase in the sound level.

In the version for material flow monitoring, SITRANS DA400 continuously detects high-frequency acoustic oscillations by means of structure-born noise sensors.

These oscillations are created by:

• Friction and impact of bulk solids in:

  - pipes, raceways or channels

  - chutes

  - conveyors

• Friction and impact of mechanical parts

• Bursting of bubbles

• Cavitation

• Turbulence in gas and liquid flows

The following shows an example of signal levels at an oscillating displacement pump
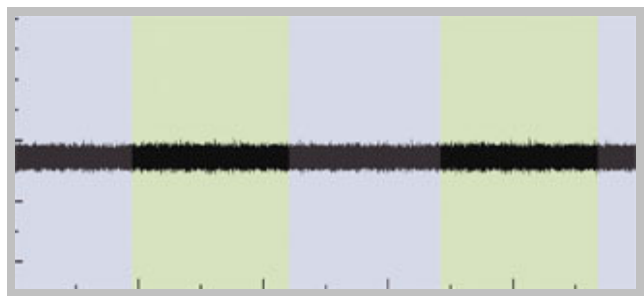
Signal from structure-borne sound sensor with intact valve

Function (continued)
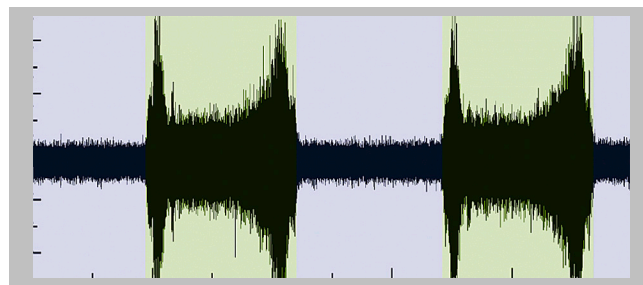
Signal from structure-borne sound sensor with defective valve

Sensor operation

The structure-borne sound sensor works on the piezoelectric principle. The structure-borne sound is injected into the sensor via the sensor base (mounting surface) and inside it is converted into an electrical voltage by a piezo-ceramic element. This is amplified in the sensor and transmitted via the cable.

The sensor frequency range lies in the ultrasonic range (> 20 kHz). The sensor is non-directional, i.e. the angle at which the sound wave impacts on the sensor base is not important.

Process Protection

Acoustic sensors

SITRANS DA400 Acoustic diagnostic unit

Selection and ordering data

SITRANS DA400 Acoustic diagnostic unit **Monitors material flow in pipes, leakage in valves or oscillating pumps with up to 4 independent acoustic sensors.**	Article No. 7MJ2400- ●	A	A	0	●
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.					
Communication					
• PROFIBUS DP	1				
Application software					
For continuous condition monitoring of positive displacement pumps					1
For material flow monitoring in pipes, raceways and conveyors					2

SITRANS DA400 Acoustic diagnostic unit **Monitors material flow in pipes, leakage in valves or oscillating pumps with up to 4 independent acoustic sensors.**	Article No. 7MJ2000- 1	A	●	0	0
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.					
Cable **(incl. pin and allen screw M6)**					
20 m			B		
40 m			C		
100 m			F		

Technical specifications

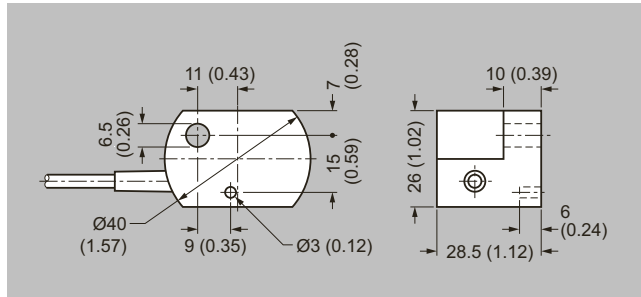| SITRANS DA400	
Input	
Acoustic channels	4
• Cycle time	10 ms
Universal inputs	4
• Cycle time	80 ms
• Low pass filter time	1 s
Universal analog current input	
• Load	< 105 Ω
• Resolution	0.1 %
• Accuracy	0.5 %
• Fault signal	> 21 mA or < 3.6 mA (at 4 ... 20 mA)
• Alarm monitoring hysteresis	0.5 %
• Static destruction limit	40 mA, 4 V
Universal input 24 V digital signal	
• Input resistance	> 19 kΩ
• Signal level Low	< 4.5 V or open
• Signal level High	> 7 V
• Hysteresis	> 1 V
• Static destruction limit	± 40 V
8.2 V source for NAMUR signal (DIN EN 60947-5-6)	
• Open circuit voltage	8.2 V ± 0.3 V, short-circuit proof
• Input resistance	< 950 Ω
• Static destruction limit for incorrect wiring	+20 V/-10 V
Output	
Digital outputs	6
• Semiconductor relay	Individually isolated, short circuit-proof
• Switching voltage	24 V AC/36 V DC, any polarity
• Destruction limit	35 V AC, 50 V DC
• Max. switching current	100 mA
Conditions of use	
Installation conditions	Vertical wall mounting, cables fed in from below
Climatic class	Class 4K4 according to EN 60721-3-4
Permissible ambient temperature	-20 ... +60 °C (-4 ... +140 °F)
Storage temperature	-20 ... +60 °C (-4 ... 140 °F)
Mechanical load	Class 4M3 according to EN 60721-3-4
Degree of protection to EN 60529	IP65
Electromagnetic Compatibility	
• Emitted interference and interference immunity	To EN 61326 and NAMUR NE 21
Usage limits for water	
• Delivery side	≥ 10 bar a
• Number of strokes	Min. 4 min^{-1}, max. 10 ... 500 min^{-1}
Design	
Weight (without options)	Approx. 2.5 kg
Dimensions (W x H x D) in mm (inch)	172 x 320 x 80 (6.8 x 12.6 x 3.2)
Enclosure material	Polycarbonate
Electrical connection via screw terminals	• Rigid 2.5 mm (0.984 inch)
	• Flexible 1.5 mm (0.59 inch)
	• Flexible with connector sleeves 1.5 mm (0.59 inch)
Cable inlet via plastic cable joints	• 2 x Pg 13.5
	• 5 x Pg 11

Technical specifications (continued)

SITRANS DA400	
Power supply	
Rated voltage	24 V DC
Operating range	19 ... 36 V DC
Current consumption	< 100 mA
Communication	
PROFIBUS DP	RS 485, switchable terminating resistor
Protocol	Cyclic with Master C1 and acyclic with Master C2
PC parameterization software	SIMATIC PDM (not included in the scope of delivery)

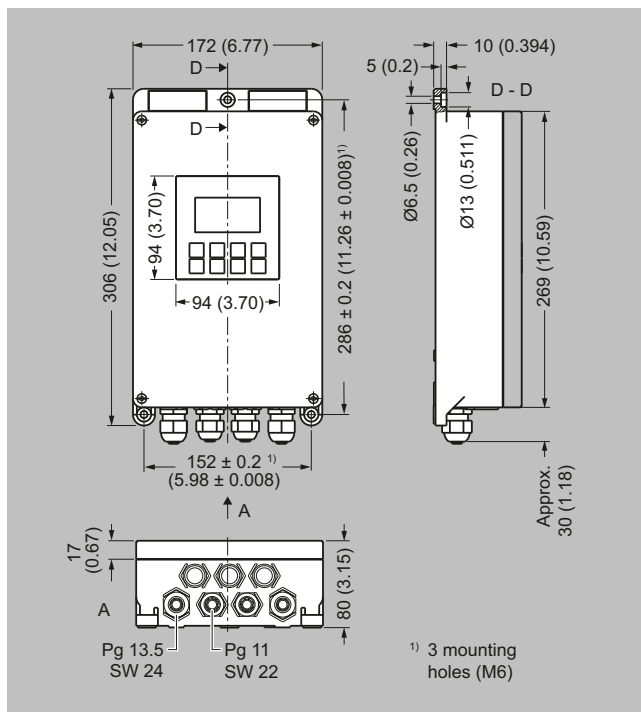| Sensor for SITRANS DA400	
Setup	• Piezoceramic sensor with pre-amplifier
	• Encapsulated electronics
	• 4-wire cable with anti-kink sleeve
Conditions of use	
Permissible ambient temperature	-40 ... +110 °C (-40 ... +230 °F)
Degree of protection to EN 60529	P66/IP68
Mechanical load	Class 4M7 according to EN 60721-3-4
Climatic class	Class 4K4 according to EN 60721-3-4
Design	
Housing material	Stainless steel 1.4571 (316Ti SST)
Cable	Ends with wire protectors and cable shoe for connection to the SITRANS DA400
Weight	125 g (0.276 lb)
Dimensions (W x H x D) in mm (inch)	26 x 29 x 40 (1.02 x 1.14 x 1.57)
Power Supply	Power fed from device

Process Protection

Acoustic sensors

SITRANS DA400 Acoustic diagnostic unit

Dimensional drawings
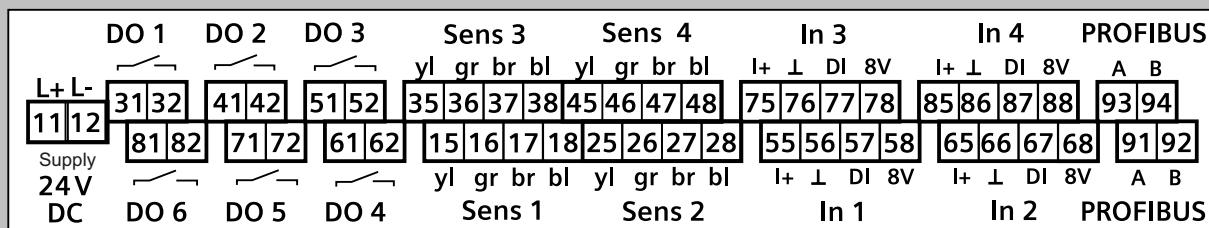

Sensor for SITRANS DA400, dimensions in mm (inch)

SITRANS DA400, dimensions in mm (inch)

Circuit diagrams

SITRANS DA400, terminal assignment

L+/L-	Power supply	In	Input	⊥	Ground
DO	Digital output	yl	Yellow	DI	Digital input
Sens	Sensor	gr	Green	A	Signal A (green) with PROFIBUS DP
		br	Brown	B	Signal B (red) with PROFIBUS DP
		bl	Black		
		I+	Analog current input +		

Process Protection

Acoustic sensors

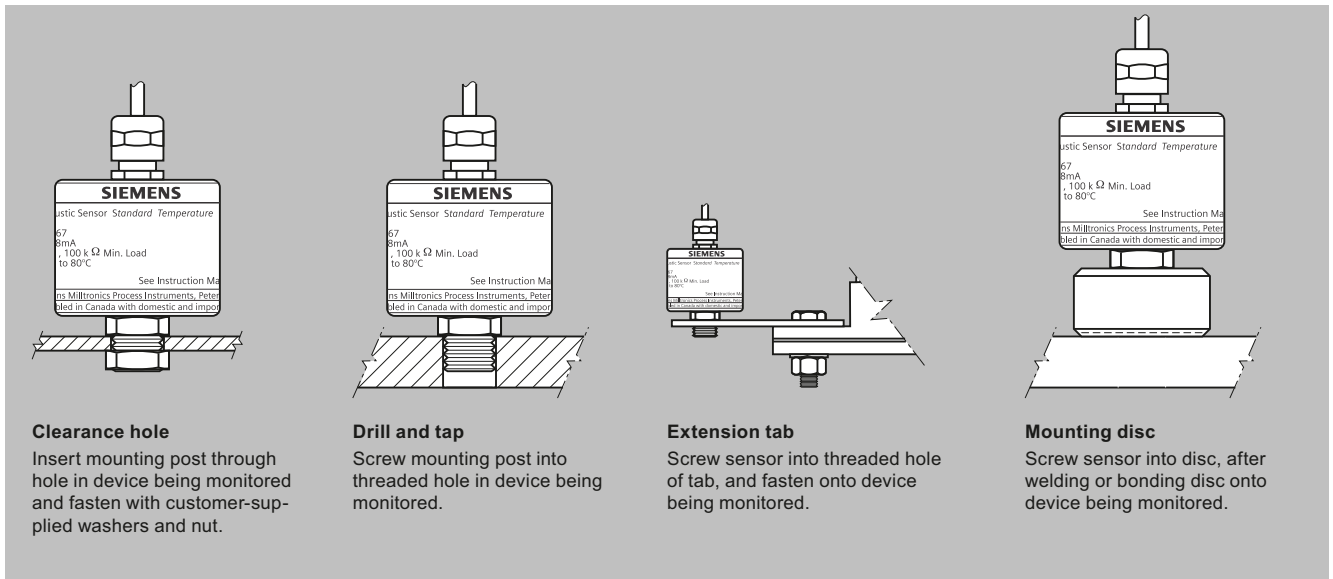### SITRANS AS100 Acoustic sensor

Overview

SITRANS AS100 is an acoustic sensor used for solids flow detection.

Benefits

- Non-invasive
- Screw in, bolt on, weld, or bond in place
- Analog output
- High and low sensitivity range of operation

Application

SITRANS AS100 detects changes in high frequency sound waves from equipment and materials in motion. It detects and reacts instantly to changes in solids flow to warn of blockages, product absence, or equipment failure such as burst filter bags. This allows an operator to take early preventative action and avoid costly damage.

Common applications include pellets, powders and most bulk solids in pipes, chutes, vibratory feeders, pneumatic conveyors or aerated gravity flow systems.

Operating with a SITRANS CU02 control unit, the system detects conditions of high flow, low flow or no flow. It can be added to a control loop via a 4 to 20 mA output. Two relays are fully programmable and independent of each other and can be used to operate an alarm or control device.

With no moving parts and a type 304 or 303 stainless steel enclosure sealed against dust and moisture, this non-invasive unit requires little or no maintenance. With a dual operating range, the sensor offers an exceptionally wide range of application capabilities.

- Key applications: pipes, chutes, vibratory feeders, aerated gravity flow systems, burst filter bag detection

Design

Clearance hole
Insert mounting post through hole in device being monitored and fasten with customer-supplied washers and nut.

Drill and tap
Screw mounting post into threaded hole in device being monitored.

Extension tab
Screw sensor into threaded hole of tab, and fasten onto device being monitored.

Mounting disc
Screw sensor into disc, after welding or bonding disc onto device being monitored.

SITRANS AS100 mounting

Selection and ordering data

SITRANS AS100 Acoustic sensor Non-invasive, for detection of solids flow.	Article No. 7MH7560- ●	●	●	0	●
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.					
Sensor					
Standard temperature range [-20 ... +80 °C (-4 ... +176 °F)][1]	1				
Extended temperature range [-40 ... +125 °C (-40 ... +257 °F)][2]	3				
Extended temperature range [-30 ... +120 °C (-22 ... +248 °F)][3]	4				
Cable Length					
4 m (13.12 ft)		A			
Sensor Mounting					
None			A		
Mounting disk			B		
Mounting tab			C		
Approvals					
Ordinary Locations/General Purpose (Non-Ex), CE, UKCA, RCM, EAC, KC					1
CSA/FM Class II, Div. 1, Group E, F, and G (includes ½" NPT female fitting)					3
CSA Class II, Div. 1, Group E, F, and G (includes ½" NPT female fitting)					4
FM/CSA Class II, Div. 1, Groups E, F, & G; ATEX II 3D, Ex tc IIIC T100°C Dc, Ta 0= -20°C to +80°C, IP68 (includes M20 female fitting); UKEX II 3D, Ex tc IIIC T100°C Dc, Ta = -20°C to +80°C, IP68 (includes M20 female fitting); EAC Ex tc IIIC T100°C Dc; CE, UKCA, RCM					5
ATEX II 2 G Ex d IIC T4 Gb, c/w cable gland; ATEX II 2 D Ex tb IIIC T100°C Db, c/w cable gland; EAC Ex 1Ex db IIC T4 Gb; EAC Ex Ex tb IIIC T100°C Db[4]					6

[1] Available with approval options 1, 3, 5, and 6 only.
[2] Available with approval option 1 only.
[3] Available with approval option 4 only.
[4] Available with sensor option 1 only and sensor mounting option A only.

Selection and Ordering data	Order code
Further designs	
Please add "**-Z**" to Article No. and specify Order code(s).	
Manufacturer's test certificate: According to EN 10204-2.2	**C11**
Acrylic coated, stainless steel tag [12 x 45 mm (0.5 x 1.75 inch)]: Measuring-point number/identification (max. 16 characters), specify in plain text	**Y17**

| Spare Parts	Article No.
Operating Instructions	
All literature is available to download for free, in a range of languages, at http://www.siemens.com/processinstrumentation/documentation	
Spare Parts	
Mounting tab	**7MH7723-1AA**
Mounting disk	**7MH7723-1AB**
½" NPT adapter kit for standard temperature range sensor, not Class II approved	**7MH7723-1BW**
M20 adapter kit for standard temperature range sensor, not Class II or ATEX and UKEX approved	**7MH7723-1BV**
½" NPT adapter kit for extended temperature range sensor, not Class II approved Note: Adapter kits are not CSA Class II approved	**7MH7723-1BX**

Process Protection
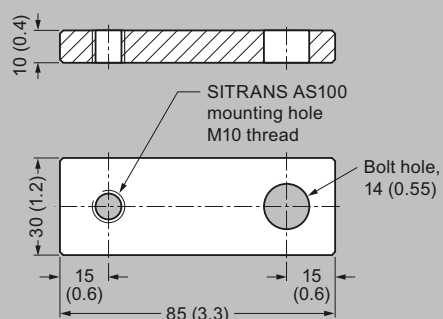
Acoustic sensors

SITRANS AS100 Acoustic sensor


Technical specifications

SITRANS AS100 Acoustic sensor	
Mode of Operation	
Operating principle	Acoustic sensing of high frequency emissions caused by impact or friction
Typical application	• Detects burst filter bags in dust collection systems
	• Detects material being conveyed in pneumatic conveyor lines
	• Route confirmation in chute work
Model	
Standard	Standard operating temperature range
Extended	Extended operating temperature range
Operation	
Relative sensitivity	0.5 %/°C of reading, average over the operating range
Outputs	Analog, 0.08 ... 10 V DC nominal, 100 kΩ minimum load impedance
Rated operating conditions	
Amb. temperature for enclosure	
• Standard	-20 ... +80 °C (-4 ... +176 °F)
• Extended	• -40 ... +125 °C (-40 ... +257 °F) (CE and UKCA only)
	• -30 ... +120 °C (-22 ... +248 °F) option
Storage temperature	
• Standard	-20 ... +80 °C (-4 ... +176 °F)
• Extended	• -40 ... +125 °C (-40 ... +257 °F) (CE and UKCA only)
	• -30 ... +120 °C (-22 ... +248 °F) option
Design	
Weight	0.4 kg (1 lb)
Enclosure	Enclosure: 304 (1.4301) stainless steel [303 stainless steel (1.4305) on Class II version, aluminum 231 on 2GD version]
Degree of protection	IP68 (waterproof)
Cable	
• Standard	4 m (13 ft) cable, PVC jacketed, 3 twisted pairs, 24 AWG (0.25 mm²), shielded
• Extended	4 m (13 ft) cable, thermoplastic elastomer jacketed, 6 conductor, 24 AWG (0.25 mm²) conductor, shielded
Power supply	20 ... 30 V DC, 18 mA (typical)
Certificates and approvals	CE, UKCA, RCM, EAC, KC, CSA/FM, Class II, Div. 1, Groups E, F, G (optional), ATEX II 2GD (optional), ATEX II 3D (optional), UKEX II 3D (optional), EAC Ex

◾ **Dimensional drawings**
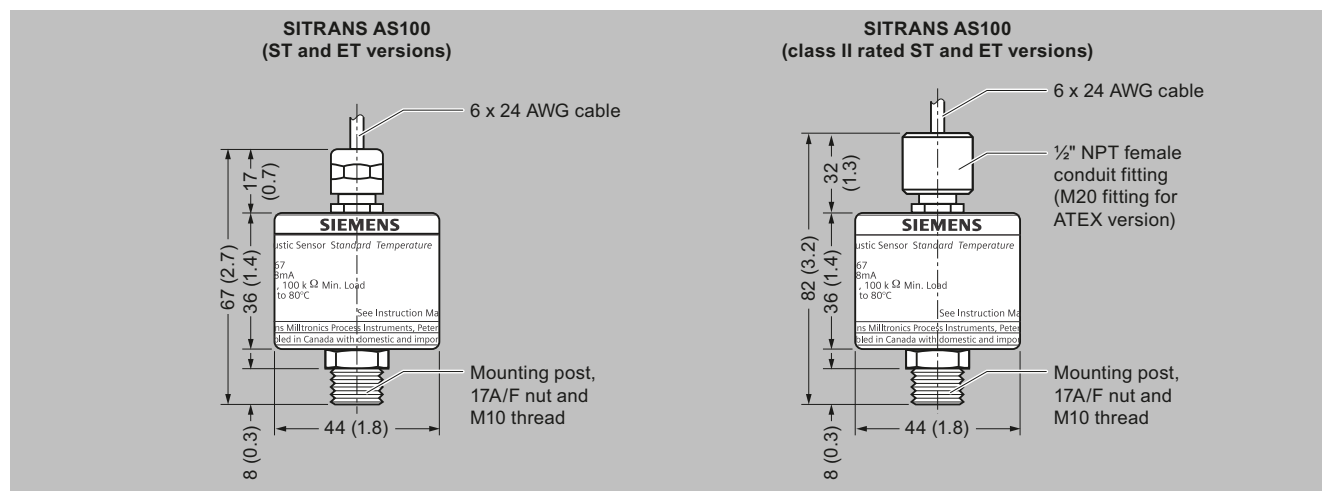
SITRANS AS100, dimensions in mm (inch)
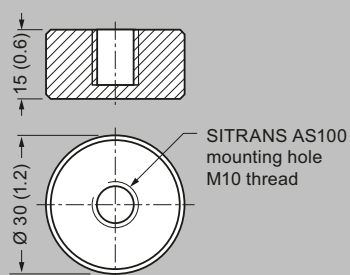
SITRANS AS100 accessories, dimensions in mm (inch)

Dimensional drawings (continued)
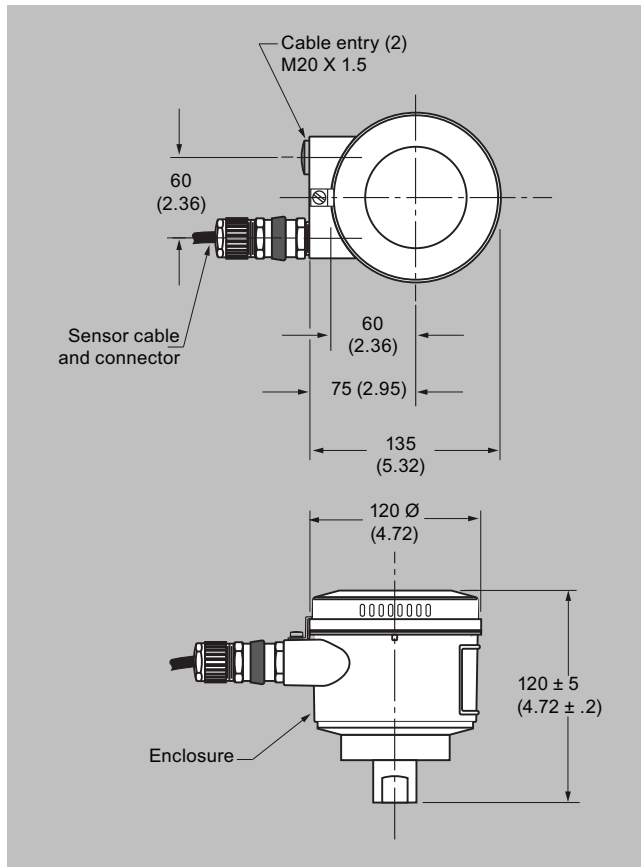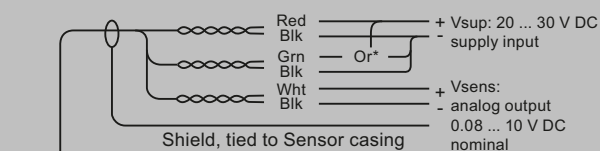

SITRANS AS100 (2D, 2G, XP version), dimensions in mm (inch)

Circuit diagrams

SITRANS AS100 connections

Standard temperature range

Red / Blk — + Vsup: 20 ... 30 V DC - supply input
Grn / Blk — Or*
Wht / Blk — +/- Vsens: analog output 0.08 ... 10 V DC nominal
Shield, tied to Sensor casing
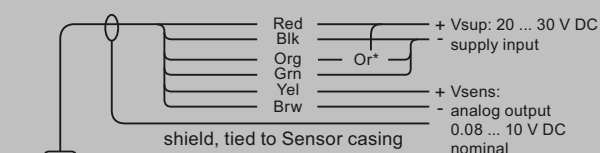
* Sensor range selection
High sensitivity range = red and green to Vsup+
Low sensitivity range = red to Vsup+, green to Vsup-

Extended temperature range

Red / Blk — + Vsup: 20 ... 30 V DC - supply input
Org / Grn — Or*
Yel / Brw — +/- Vsens: analog output 0.08 ... 10 V DC nominal
shield, tied to Sensor casing

* Sensor range selection
High sensitivity range = red and orange to Vsup+
Low sensitivity range = red to Vsup+, orange to Vsup-

Interconnection

The longer the cable, the more susceptible it is to noise and earth loops. It is therefore recommended to use cable with heavy gauge conductors and good RF/electrical shielding (copper braid rather than drain and foil). A proper junction box close to the sensor is an ideal location not only to extend the cable but also to configure the wiring for high or low sensitivity range operation.
The following table provides a guideline for suitable wire gauges where distances are considerable.

Max. distance between sensor and supply
(24 V or Control Unit).

| AWG | Wire size | | Distance | |
	mm	mm²	meters	feet
24	7 x 0.20	0.25	500	1 600
22	7 x 0.25	0.35	800	2 600
20	10 x 0.25	0.5	1 200	3 900

Process Protection

Acoustic sensors

SITRANS CU02 Control Unit

Overview

SITRANS CU02 is an alarm control unit, for use with SITRANS AS100 acoustic sensor, that provides reliable continuous protection for bulk solids flow.

Benefits

- 4 to 20 mA output
- Two programmable relays
- Adjustable independent time delay for each relay
- Adjustable start-up time delay
- DIN rail mounting provides easy installation
- Built-in password protection to parameters

Application

SITRANS CU02 receives a 0 to 10 V DC input signal from the SITRANS AS100 sensor, providing relay and analog outputs for interface into a process.

- Key applications: with SITRANS AS100 for bulk solids flow

Function

The system can be readily configured for set points indicating such conditions as high flow, low flow or no flow. Alternatively, it can be added to a control loop via a 4 to 20 mA isolated output for trend monitoring proportional to the signal from the sensor.

Two relays are fully programmable and independent of each other and can be used to operate an alarm or control device. Alarming may be provided above or below a setpoint or within a band. Readings are also displayed locally by the SITRANS CU02 on its LCD.

The SITRANS CU02 may be mounted up to 500 m (1 500 ft) from the sensor.

Selection and ordering data

SITRANS CU02 Control unit **Set-point alarm controller, for use with AS100 acoustic sensor.**	Article No. 7MH7562- ●		●	●
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.				
Power Supply				
100 V AC		1		
115 V AC		2		
200 V AC		3		
230 V AC		4		
Enclosure				
Standard DIN Rail			A	
Approvals				
Ordinary Locations/General Purpose (Non-Ex), $_C$CSA$_{US}$, CE, UKCA, RCM, EAC, KC				A

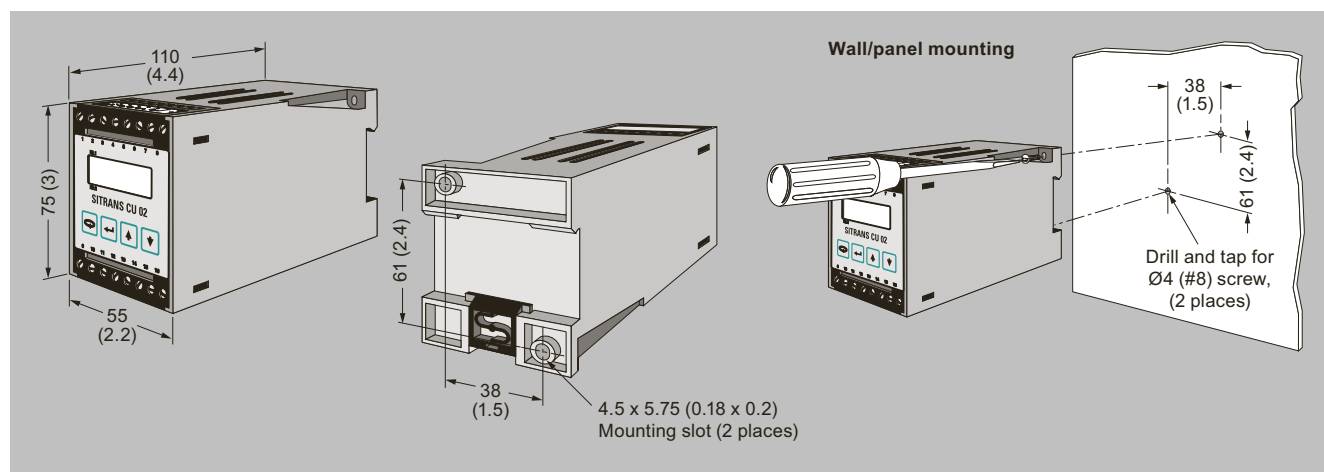| Selection and Ordering data	Order code
Further designs	
Please add "**-Z**" to Article No. and specify Order code(s).	
Manufacturer's test certificate: According to EN 10204-2.2	**C11**
Acrylic coated, stainless steel tag [38 x 51 mm (1.5 x 2 inch)]: Measuring-point number/identification (max. 16 characters), specify in plain text	**Y18**
Operating Instructions	
All literature is available to download for free, in a range of languages, at http://www.siemens.com/processinstrumentation/documentation	

Process Protection

Acoustic sensors

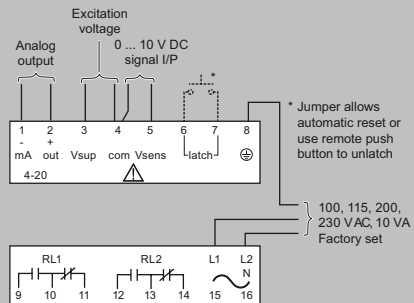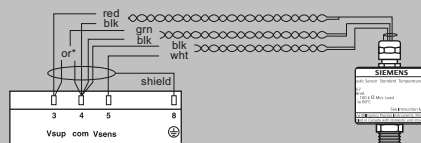## SITRANS CU02 Control Unit

Technical specifications

SITRANS CU02 Control unit	
Mode of operation	
Measuring principle	Controller for acoustic sensing (SITRANS AS100)
Typical application	Connects to SITRANS AS100 to detect burst filter bag
Input	0 ... 10 V DC, from sensor
Output	
Output signal	4 ... 20 mA isolated output, 2 Form C relays - latching or non-latching - 5 amp at 250 V AC non-inductive
Sensor excitation	26 V DC
Max. load	750 Ω
Rated operating conditions	
Installation conditions	
• Location	Indoor
Ambient conditions	
• Ambient temperature for enclosure	-20 ... +50 °C (-4 ... +122 °F)
• Storage temperature	-20 ... +50 °C (-4 ... +122 °F)
• Relative humidity	80 % for temperatures up to 50 °C (122 °F)
• Degree of protection	IP20
• Installation category	II
• Pollution degree	2
Design	
Weight	550 g (18 oz)
Dimensions (W x H x D)	55 x 75 x 110 mm (2.2 x 3 x 4.4 inch)
Material enclosure	Polycarbonate
Mounting	DIN Rail (DIN 46277 or DIN EN 50022), or wall mount, up to 500 m (1 500 ft) from sensor
Cable	2 twisted pair, 24 AWG (22 mm²), shielded. Mount up to 500 m (1 500 ft) from sensor
Display	Liquid crystal, three digits, 9 mm (0.35 inch), high and multi-segment graphic symbols for operation status
Power supply	
Supply voltage	100, 115, 200, 230 V AC ± 15 %, 50/60 Hz, factory set
Power consumption	Max. 10 VA
Approvals	$_c$CSA$_{US}$, CE, UKCA, RCM, EAC, KC

Dimensional drawings

SITRANS CU02, dimensions in mm (inch)

Circuit diagrams

SITRANS CU02 connections

Process Protection

Motion sensors

Milltronics MFA 4p Motion failure alarm controller

Overview

MFA 4p motion failure alarm controller is a highly sensitive single setpoint motion sensor system, used with Milltronics MSP probes.

Benefits

- Up to 100 mm (4 inch) gap between target and probe

- Switch selectable overspeed or underspeed detection

- Setpoint adjustment 0.15 to 3 000 PPM (pulses/minute)

- Adjustable start-up time delay

- Visual indication of probe operation and relay status

- General purpose, suitable for majority of industrial applications; rugged probe designs provide unmatched reliability

Application

The MFA 4p detects changes in the motion and speed of rotating, reciprocating or conveying equipment. It warns of equipment malfunction and signals through contacts to shut down machinery in case of a slowdown or failure. Its reliability makes it a cost-effective way to protect valuable process equipment.

The single setpoint system suits most industrial applications. This versatile unit can be used on tail pulley shafts, driven pulleys, motor shaft sensing, belt or drag conveyors, screw conveyor flights, bucket elevators, fans and pumps.

A special feature is the adjustable 0 to 60 second time delay, allowing the monitored device to accelerate to normal running speed before monitoring begins. A wide range of probes are available to suit specific needs, including high temperatures and corrosive installations. The CE and UKCA approval allows the MFA 4p to consistently meet the needs of the mining aggregate, cement and other primary and secondary industries.

- Key Applications: tail pulleys, motor shaft sensing, screw conveyor flights, bucket elevators

Design

Mounting for Milltronics MSP-12, MSP-3, XPP-5
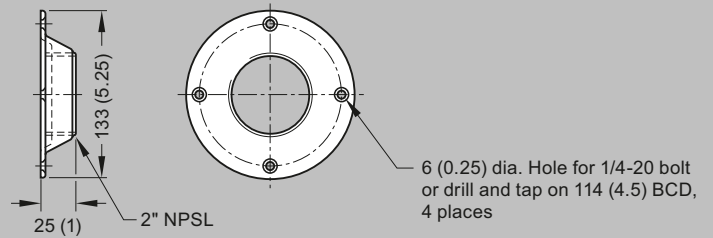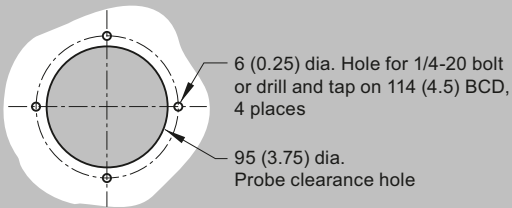
6 (0.25) dia. Hole for 1/4-20 bolt or drill and tap on 114 (4.5) BCD, 4 places

95 (3.75) dia. Probe clearance hole

133 (5.25)

25 (1)   2" NPSL

6 (0.25) dia. Hole for 1/4-20 bolt or drill and tap on 114 (4.5) BCD, 4 places

Note: Mounting flange supplied with probe.

Mounting for Milltronics MSP-9

6 (0.25) dia. Hole for 1/4-20 bolt or drill and tap on 114 (4.5) BCD, 4 places

95 (3.75) dia. Probe clearance hole

Panel

102 (4)

102 (4)

6 (0.25) dia. Hole for 1/4-20 bolt or drill and tap on 114 (4.5) BCD, 4 places

Probe flange
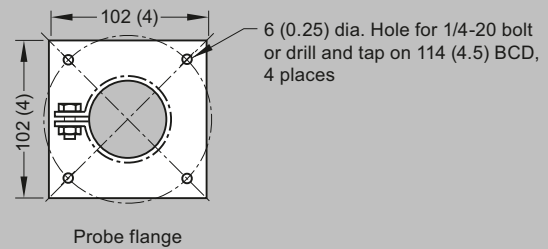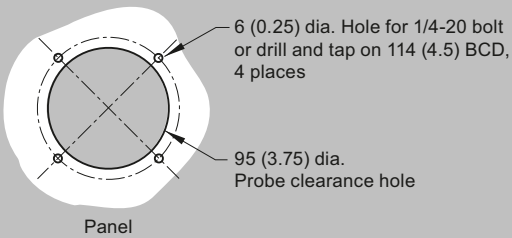
Milltronics MSP-12, MSP-3, MSP-9, XPP-5 mounting, dimensions in mm (inch)

Process Protection

Motion sensors

Milltronics MFA 4p Motion failure alarm controller

Design (continued)

Standard Milltronics MSP-12
- Heavy-duty general purpose motion probe
- Long lasting aluminum body with internal amplifier
- Convenient mounting flange and locknut for fast installation and setup
- Temperature rating: -40 ... +60 °C (-40 ... +140 °F)
- Enclosure rating: Type/NEMA 4X, 6, IP67

Milltronics XPP-5
- CSA hazardous approval (Class I, Div. 1, Groups A, B, C, D; Class II Div. 1, Groups E, F, G; Class III)
- Aluminum body that is fully potted
- Convenient mounting flange and locknut
- 3/4" NPT male hub connection
- Operating temperature from -40 ... 60 °C (-40 ... 140 °F)
- Enclosure rating: Type/NEMA 4X,6, IP67

High temperature Milltronics MSP-3
- Heavy-duty, high temperature aluminum probe designed to withstand operating temperatures from -50 ... 260 °C (500 °F)
- Cast aluminum probe with convenient mounting flange and locknut
- 1.5 m (5 ft) of high temperature PTFE cable provided. Up to 30 m (100 ft) may be used.
- Amplifier remote mounted in enclosure 140 x 140 x 100 mm (5.5 x 5.5 x 4 inch), available in cast aluminum (½" NPT conduit entry), painted steel (Type/NEMA 4, IP65 rating), or stainless steel (Type/NEMA 4X, IP65 rating)
- Amplifier temperature rating -40 ... +60 °C (-40 ... +140 °F)
- Enclosure rating: Type/NEMA 4X, 6, IP67

Stainless high temperature Milltronics MSP-9
- Heavy-duty, high temperature 304 stainless steel probe
- Special construction allows operation of probe in environment from -50 ... 260 °C (500 °F)
- 1.5 m (5 ft) special high temperature PTFE cable provided. Up to 30 m (100 ft) may be used.
- Amplifier remote mounted in enclosure 140 x 140 x 100 mm (5.5 x 5.5 x 4 inch), available in cast aluminum (½" NPT conduit entry), painted steel (Type/NEMA 4, IP65 rating), or stainless steel (Type/NEMA 4X, IP65 rating)
- Enclosure rating: Type/NEMA 4X, 6, IP67
- Amplifier temperature rating -40 ... +60 °C (-40 ... +140 °F)

Milltronics RMA (Remote Mounted Amplifier)
- Available for internal mounting within Probe, or in enclosure for remote mounting
- Enclosures available in cast aluminum (½" NPT entry), painted steel (Type/NEMA 4 rating) or stainless steel (Type/NEMA 4X, IP65 rating)
- Operating temp. from -40 ... +60 °C (-40 ... +140 °F)
- Enclosure rating: Type/NEMA 4X, 6, IP67

Milltronics motion probes

Selection and ordering data

Milltronics MFA 4p Motion failure alarm controller Set-point alarm controller, for use with MSP motion probes.	Article No. 7MH7144- ●	●	●	●
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.				
Enclosure				
NEMA 4X, polycarbonate enclosure	1			
NEMA 4, painted mild steel enclosure	2			
NEMA 4X, 304 (1.4301) stainless steel enclosure	3			
Input Voltage				
100 ... 240 V AC, ± 10 %, 50/60 Hz, 15 VA		A		
Speed detection version				
Standard, underspeed (U/S) or overspeed (O/S), switch selectable			A	
Slow speed (S/S), U/S or O/S detection, switch selectable (limit of 15 ppm)			B	
Approvals				
Ordinary Locations/General Purpose (Non-Ex), CE, UKCA, RCM, EAC, KC, cCSAUS, FM				2

Selection and Ordering data	Order code
Further designs	
Please add "**-Z**" to Article No. and specify Order code(s).	
Manufacturer's test certificate: According to EN 10204-2.2	**C11**
Acrylic coated, stainless steel tag [69 x 50 mm (2.7 x 1.97 inch)]: Measuring-point number/id-entification (max. 27 characters), specify in plain text	**Y15**
Painted mild steel, heated enclosure with viewing window for use down to -50 °C (-58 °F) (finished unit is mounted inside enclosure) [483 x 584 x 203 mm (19 x 23 x 8 inch)]	**A35**
Stainless steel, sun/weather shield (finished unit is field mounted inside enclosure) [357 x 305 x 203 mm (14 x 12 x 8 inch)]	**S50**

Spare parts	Article No.
Operating Instructions	
All literature is available to download for free, in a range of languages, at http://www.siemens.com/processinstrumentation/documentation	
Spare Parts	
Circuit Card, standard	7MH7723-1DU
Circuit Card, Slow speed	7MH7723-1DV
Lid with overlay for MFA 4p	7MH7723-1GY

Milltronics RMA Remote mounted amplifier Remote mounted amplifier for Milltronics MSP-3 and MSP-9 motion sensing probes.	Article No. 7MH7145- 0	●
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Enclosure		
Aluminum enclosure, IP65, Type/NEMA 4X, ½" NPT entry		A
Painted steel, Type/NEMA 4, IP65 rating		C
304 (1.4301) stainless steel enclosure, Type/NEMA 4X, IP65 rating		D

Process Protection

Motion sensors

Milltronics MFA 4p Motion failure alarm controller

■ **Selection and ordering data** (continued)

Selection and Ordering data	Order code
Further designs	
Please add "**-Z**" to Article No. and specify Order code(s).	
Manufacturer's test certificate: According to EN 10204-2.20	**C11**
Acrylic coated, stainless steel tag [38 x 51 mm (1.5 x 2 inch)]: Measuring-point number/id-entification (max. 16 characters), specify in plain text	**Y18**

Spare parts	Article No.
Operating Instructions	
All literature is available to download for free, in a range of languages, at http://www.siemens.com/processinstrumentation/documentation	
Spare Parts	
Card, RMA	**7MH7723-1DT**

Milltronics Motion sensing probes Heavy duty, 100 mm measuring range, for use with RMA, MFA 4p, WM300 MFA, or other control. Note: Milltronics MSP-3 and MSP-9 probes require the use of Milltronics RMA (amplifier)	Article No. 7MH7146- ●	●	●
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.			
Cable Length			
Standard length (as described in Model options)[1]	0		
Add Order code Y01 and plain text: "Total cable length ... m"			
Extended cable length 2 000 ... 30 000 mm (79.2 ... 1 181 inch)[2]	1		
Extended cable length 30 001 ... 50 000 mm (1 181 ... 1 969 inch)[4]	2		
Extended cable length 50 001 ... 100 000 mm (1 969 ... 3 937 inch)[4]	3		
Model [standard cable length/type]			
MSP-3, ½" NPT cable inlet[3] [1.5 m (5 ft) high temperature cable]		B	
MSP-9 [1.5 m (5 ft) high temperature cable][3]		D	
MSP-12, ½" NPT cable inlet, no cable		E	
XPP-5 [1.5 m (5 ft) cable, (CSA Class I, Groups A, B, C and D; Class II Groups E, F, and G)]		G	
XPP-5 [10 m (32.8 ft) cable, (CSA Class I, Groups A, B, C, and D; Class II Groups E, F, and G)]		H	
XPP-5 [15 m (49.2 ft) cable, (CSA Class I, Groups A, B, C, and D; Class II Groups E, F, and G)]		J	
Approvals			
Ordinary Locations/General Purpose (Non-Ex), CE, UKCA, RCM, EAC, KC			A

[1] No Y01 needed in Order code for standard length.
[2] Only available with model options B, D, G, H, J.
[3] MSP-3 and MSP-9 probes required the use of RMA (amplifier).
[4] Available with Model options G, H, and J only.

Selection and ordering data (continued)

Selection and Ordering data	Order code
Further designs	
Please add "**-Z**" to Article No. and specify Order code(s).	
Total cable length: enter the total cable length in plain text description	**Y01**
Acrylic coated, stainless steel tag [13 x 45 mm (0.5 x 1.75 inch)]: Measuring-point number/identification (max. 16 characters), specify in plain text	**Y17**
Cable gland kit	**A57**
Manufacturer's test certificate: According to EN 10204-2.2	**C11**

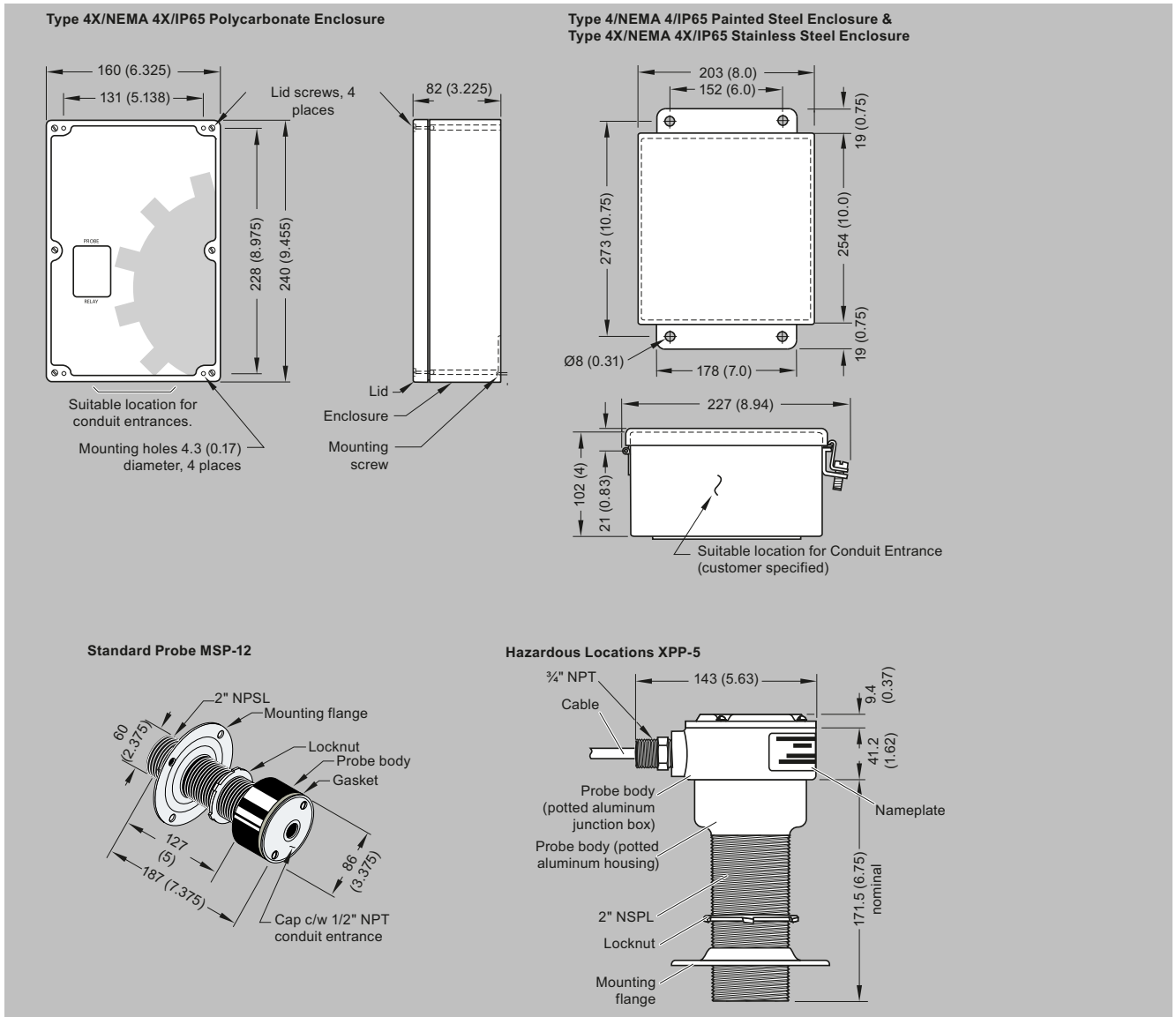| Spare parts	Article No.
Operating Instructions	
All literature is available to download for free, in a range of languages, at http://www.siemens.com/processinstrumentation/documentation	
Spare Parts	
Locknut, for MSP-3, MSP-7, MSP-12, XPP-5	**7MH7723-1CR**
Mounting flange, for MSP-3, MSP-7, MSP-12, XPP-5	**7MH7723-1CS**
Mounting bracket for MSP-9	**7MH7723-1CT**
Lid, 1/2" NPT cable inlet for MSP-3, MSP-7, MSP-12	**7MH7723-1CU**
Lid for MSP-9	**7MH7723-1CV**
Lid gasket, for MSP-3, MSP-9	**7MH7723-1CW**
Lid gasket, for MSP-7, MSP-12	**7MH7723-1CX**
Motion cable gland adaptor kit	**7MH7723-1JU**

Process Protection

Motion sensors

Milltronics MFA 4p Motion failure alarm controller

Technical specifications

Milltronics MFA 4p Motion failure alarm controller	
Mode of operation	
Measuring principle	Motion monitor and alarm
Typical application	Monitoring loss of motion in tail pulley, screw flights, bucket elevators
Features	• Switch selectable overspeed or under-speed detection
	• Setpoint adjustment: 0.15 ... 3 000 PPM
	• Adjustable start-up time delay: 0 ... 60 seconds
	• Visual indication of probe operation and relay status
Output	2 relays working in unison, each providing 1 SPDT Form C relay contact, rated 8 A at 250 V AC resistive
Performance	
Repeatability	± 1 %
Dead band	± 0.25 %
Dynamic Range	0 ... 7 200 PPM
Ambient Temperature Range	-20 ... +50 °C (-5 ... +122 °F)
Storage temperature	-20 ... +50 °C (-5 ... +122 °F)
Design	
Enclosure rating	Type 4X/NEMA 4X/IP65 (standard and optional stainless steel) Type 4/NEMA 4/IP65 (optional mild steel)
Enclosure dimensions	160 x 240 x 82 mm (6.3 x 9.5 x 3.2 inch) Optional: mild steel or 304 (1.4301) stainless steel 203 x 254 x 102 mm (8 x 10 x 4 inch)
Enclosure material	Polycarbonate Optional: mild steel or stainless steel
Power Supply	100 ... 240 V AC, 50/60 Hz, 15 VA, ± 10 % of rated voltage
Certificates and approvals	CE, UKCA, RCM, EAC, KC, $_c$CSA$_{US}$, FM

Dimensional drawings

Type 4X/NEMA 4X/IP65 Polycarbonate Enclosure

**Type 4/NEMA 4/IP65 Painted Steel Enclosure &
Type 4X/NEMA 4X/IP65 Stainless Steel Enclosure**
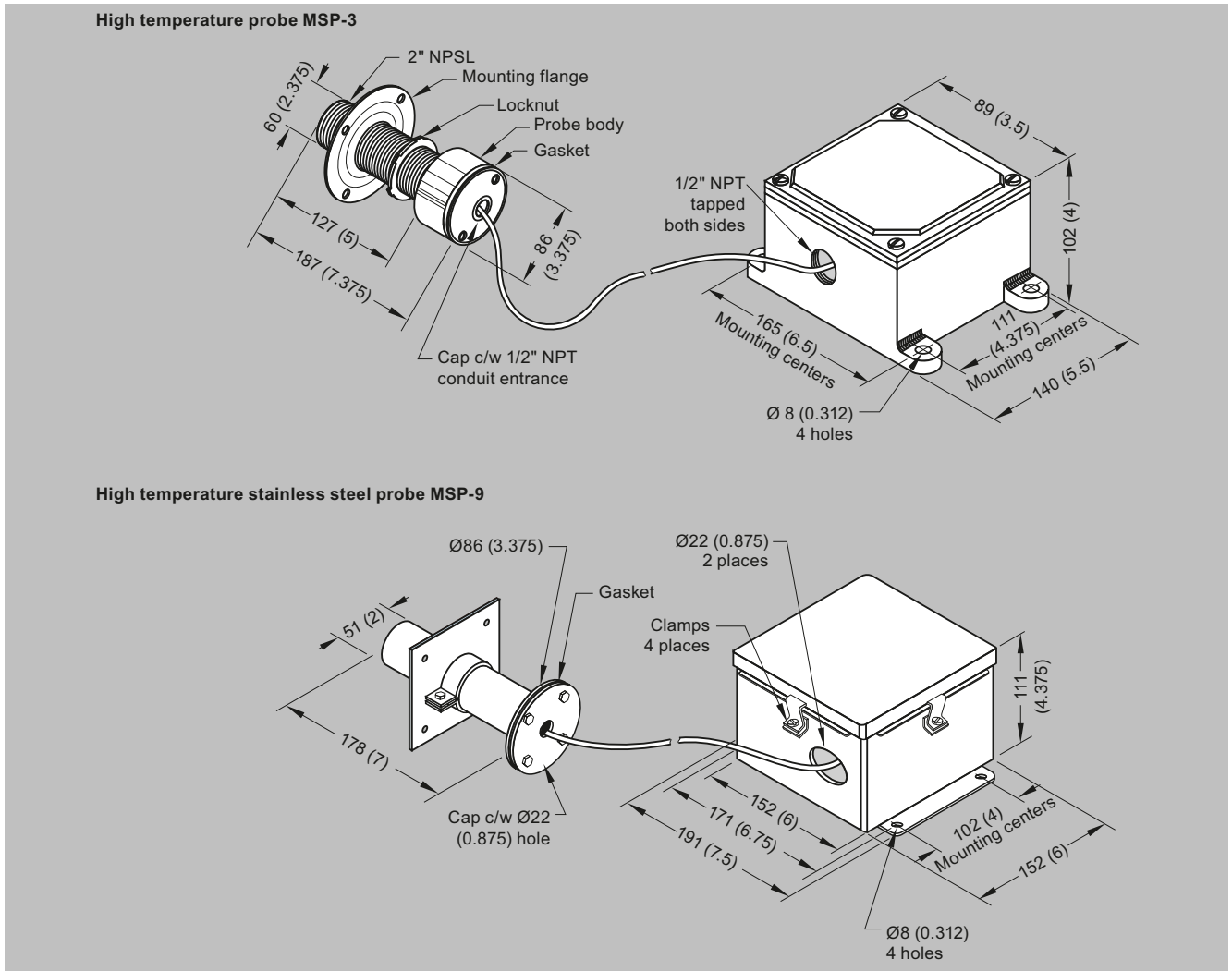
Standard Probe MSP-12

Hazardous Locations XPP-5

Milltronics MFA 4p and probe, dimensions in mm (inch)

Process Protection

Motion sensors

Milltronics MFA 4p Motion failure alarm controller

◼ Dimensional drawings (continued)

High temperature probe MSP-3

High temperature stainless steel probe MSP-9

Milltronics probes, dimensions in mm (inch)

Overview

Milltronics MSP-7 is a heavy-duty 3-wire motion sensor that provides an NPN open collector output to PLCs.

Benefits

- Up to 100 mm (4 inch) gap between target and probe

- Corrosion resistant construction

- General purpose, suitable for majority of industrial applications; rugged probe designs provide unmatched reliability

Application

The MSP-7 motion sensing probe can detect changes in the rotation and movement of ferrous equipment. When connected to a PLC it can warn of malfunction and signals to stop or slow down equipment, preventing costly failure or downtime. Its reliability makes it a very cost effective sensor.
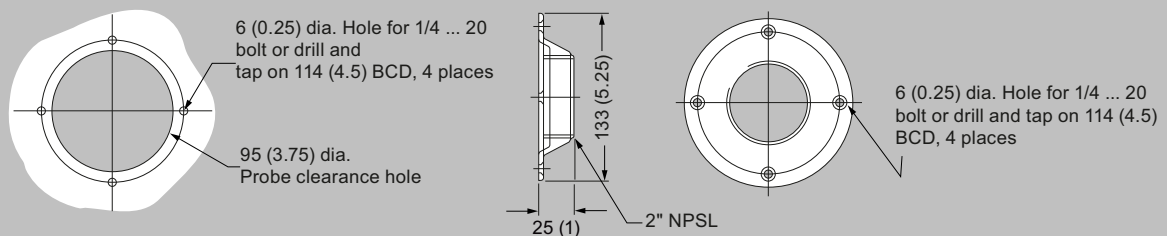
The single setpoint system suits most industrial applications. This versatile unit can be used on tail pulley shafts, driven pulleys, motor shaft sensing, belt or drag conveyors, screw conveyor flights, bucket elevators, fans and pumps.

An NPN open collector 3-wire output allows for versatile connection to most PLC models and a large dynamic range ensures that the MSP-7 can detect changes in target speed for a variety of applications.

- Key Applications: tail pulleys, motor shaft sensing, screw conveyor flights, bucket elevators

Design

Mounting for Milltronics MSP-7

6 (0.25) dia. Hole for 1/4 ... 20 bolt or drill and tap on 114 (4.5) BCD, 4 places

95 (3.75) dia. Probe clearance hole

133 (5.25)

25 (1)

2" NPSL

6 (0.25) dia. Hole for 1/4 ... 20 bolt or drill and tap on 114 (4.5) BCD, 4 places

Note: Mounting flange supplied with probe.

Mounting for Milltronics MSP-7, dimensions in mm (inch)

Process Protection

Motion sensors

Milltronics MSP-7 Motion sensor

Selection and ordering data

| Milltronics Motion sensing probes Heavy duty, 100 mm measuring range, for use with WM300 MFA, or other control.	Article No. 7MH7146- ●	●	●	●
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.				
Cable Length				
Standard length (as described in Model options)[1]		0		
Add Order code Y01 and plain text: "Total cable length ... m"				
Extended cable length 2 ... 30 m (6.6 ... 98.4 ft)		1		
Model [standard cable length/type]				
MSP-7, ½" NPT cable inlet [1.5 m (5 ft) cable]			K	
Approvals				
Ordinary Locations/General Purpose (Non-Ex), CE, UKCA, RCM, EAC, KC				A

[1] No Y01 needed in Order code for standard length.

Selection and Ordering data	Order code
Further designs	
Please add "**-Z**" to Article No. and specify Order code(s).	
Total cable length: enter the total cable length in plain text description	**Y01**
Acrylic coated, stainless steel tag [13 x 45 mm (0.5 x 1.75 inch)]: Measuring-point number/identification (max. 16 characters), specify in plain text	**Y17**
Cable gland kit	**A57**
Manufacturer's test certificate: According to EN 10204-2.2	**C11**

Spare parts	Article No.
Operating Instructions	
All literature is available to download for free, in a range of languages, at http://www.siemens.com/processinstrumentation/docu-mentation	
Spare Parts	
Locknut, for MSP-3, MSP-7, MSP-12, XPP-5	**7MH7723-1CR**
Mounting flange, for MSP-3, MSP-7, MSP-12, XPP-5	**7MH7723-1CS**
Lid, 1/2" NPT cable inlet for MSP-3, MSP-7, MSP-12	**7MH7723-1CU**
Lid gasket, for MSP-7, MSP-12	**7MH7723-1CX**
Motion cable gland adaptor kit	**7MH7723-1JU**

Technical specifications

Milltronics MSP-7 Motion sensor	
Measuring principle	Magnetic
Typical application	Monitoring loss of motion in tail pulley, screw flights, bucket elevators
Features	• Rugged corrosion resistant aluminum body • Low voltage operation • Large dynamic range • Threaded body for finite adjustment
Output	NPN open collector, 2 kΩ pull up to input voltage, 330 Ω impedance, 40 mA max.
Performance	
Repeatability	± 1 %
Dead band	± 0.25 %
Dynamic Range	0 ... 7 200 PPM
Ambient Temperature Range	-40 ... +60 °C (-40 ... +140 °F)
Storage temperature	-40 ... +60 °C (-40 ... +140 °F)
Design	
Enclosure rating	Type 4X/NEMA 4X/IP67
Power Supply	21 ... 28 V DC, 40 mA max.
Certificates and approvals	CE, UKCA, RCM, EAC, KC
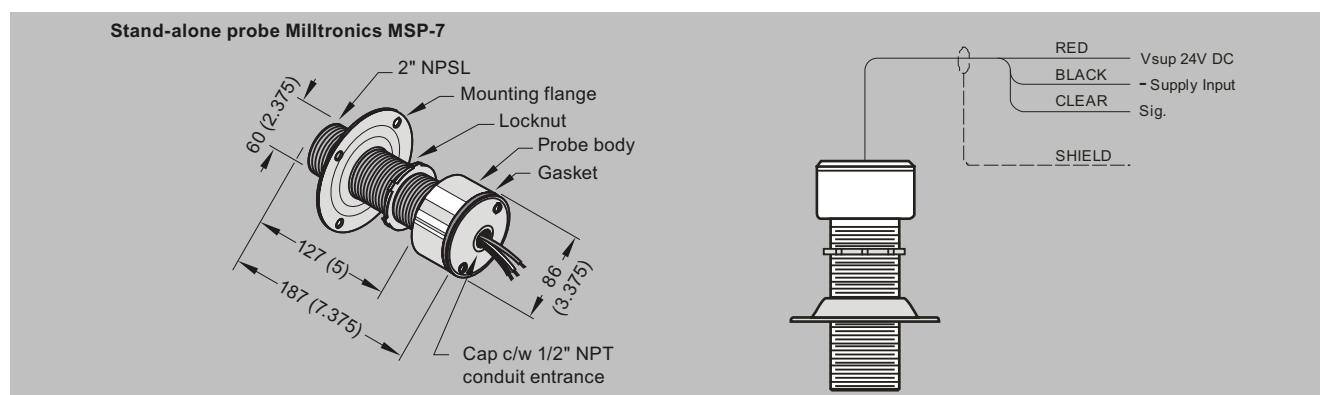
Dimensional drawings

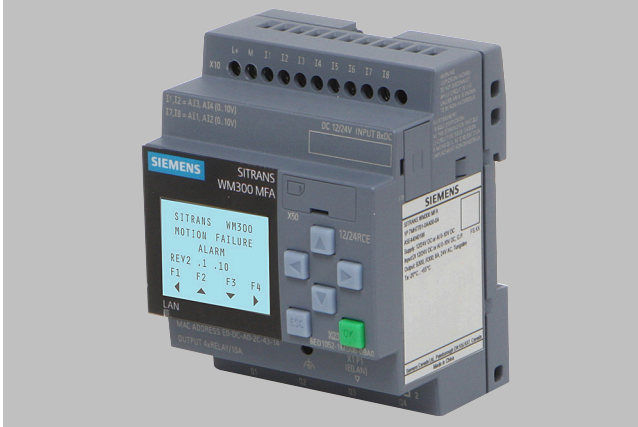Stand-alone probe Milltronics MSP-7, dimensions in mm (inch)

Process Protection

Motion sensors

SITRANS WM300 Motion failure alarm controller

Overview

SITRANS WM300 MFA motion failure alarm controller is a highly sensitive dual setpoint motion sensor system, used with Milltronics MSP probes.

Benefits

- Up to 100 mm (4 inch) gap between target and probe.

- Over and under speed setpoint detection.

- Setpoint adjustment range 2 to 5 000 Hz (120 to 300 000 ppm).

- Adjustable start-up time delay.

- Visual indication of probe operation and relay status.

- General purpose, suitable for majority of industrial applications; rugged probe designs provide unmatched reliability.

Application

The SITRANS WM300 MFA detects changes in the motion and speed of rotating, reciprocating or conveying equipment. It warns of equipment malfunction and signals through contacts to shut down machinery in case of a slowdown or failure. Its reliability makes it a cost-effective way to protect valuable process equipment.

The dual setpoint system suits most industrial applications. This versatile unit can be used on tail pulley shafts, driven pulleys, motor shaft sensing, belt or drag conveyors, screw conveyor flights, bucket elevators, fans and pumps.
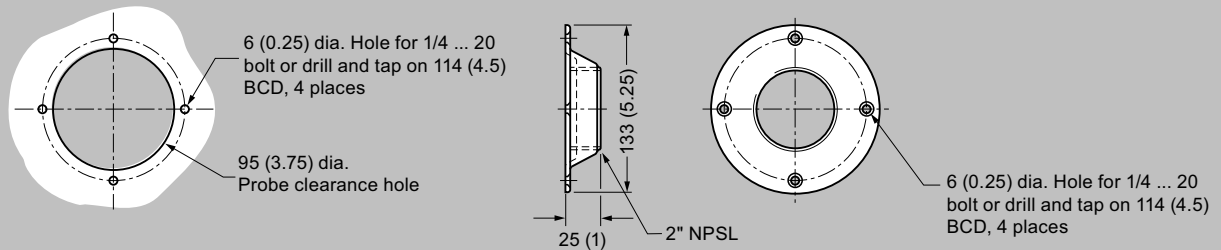
Multiple machines can be monitored with twin, independent probe inputs as well as an additional 2 inputs for differential speed detection (DSD) within a machine monitoring solution such as a belt conveyor comparing the head to tail pulley speeds. An optional analog output module can convert the WM300 into a non-contacting tachometer (NCT) with 2 mA outputs.

A special feature is the adjustable 0 to 60 second time delay, allowing the monitored device to accelerate to normal running speed before monitoring begins. A wide range of probes are available to suit specific needs, including high temperatures and corrosive installations. SITRANS WM300 MFA consistently meets the needs of mining aggregate, cement and other primary and secondary industries.

- Key Applications: tail pulleys, motor shaft sensing, screw conveyor flights, bucket elevators
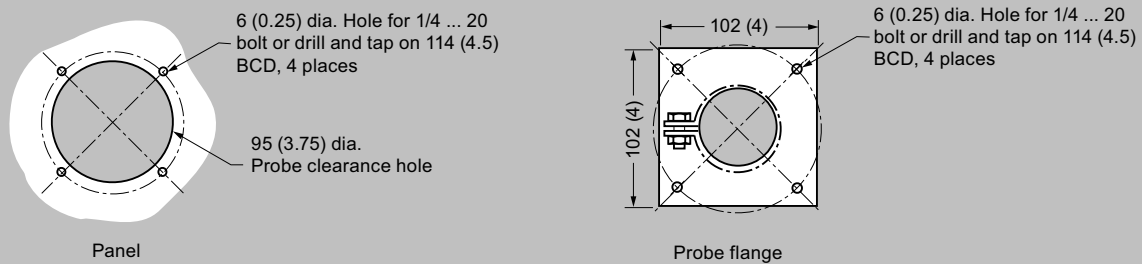
Design

Mounting for Milltronics MSP-3, MSP-7, MSP-12, XPP-5

6 (0.25) dia. Hole for 1/4 ... 20 bolt or drill and tap on 114 (4.5) BCD, 4 places

95 (3.75) dia. Probe clearance hole

133 (5.25)

25 (1)   2" NPSL

6 (0.25) dia. Hole for 1/4 ... 20 bolt or drill and tap on 114 (4.5) BCD, 4 places

Note: Mounting flange supplied with probe.

Mounting for Milltronics MSP-9

6 (0.25) dia. Hole for 1/4 ... 20 bolt or drill and tap on 114 (4.5) BCD, 4 places

95 (3.75) dia. Probe clearance hole

102 (4)

102 (4)

6 (0.25) dia. Hole for 1/4 ... 20 bolt or drill and tap on 114 (4.5) BCD, 4 places

Panel

Probe flange

Milltronics MSP-12, MSP-3, MSP-7, MSP-9, XPP-5 mounting, dimensions in mm (inch)

Standard Milltronics MSP-12
- Heavy-duty general purpose motion probe
- Long lasting aluminum body with internal amplifier
- Convenient mounting flange and locknut for fast installation and setup
- Temperature rating: -40 ... +60 °C (-40 ... +140 °F)
- Enclosure rating: Type/NEMA 4X, 6, IP67

Standard Milltronics MSP-7
- Heavy-duty general purpose motion probe for direct connection to WM300 MFA
- Long lasting aluminum body
- Convenient mounting flange and locknut for fast installation and setup
- Temperature rating: -40 ... +60 °C (-40 ... +140 °F)
- Enclosure rating: Type/NEMA 4X, 6, IP67
- NPN, open collector output
- 24 V DC power supply

Milltronics XPP-5
- CSA hazardous approval (Class I, Div. 1, Groups A, B, C, D; Class II Div. 1, Groups E, F, G; Class III)
- Aluminum body that is fully potted
- Convenient mounting flange and locknut
- 3/4" NPT male hub connection
- Operating temperature from -40 ... 60 °C (-40 ... 140 °F)
- Enclosure rating: Type/NEMA 4X,6, IP67

High temperature Milltronics MSP-3
- Heavy-duty, high temperature aluminum probe designed to withstand operating temperatures from -50 ... 260 °C (500 °F)
- Cast aluminum probe with convenient mounting flange and locknut
- 1.5 m (5 ft) of high temperature PTFE cable provided. Up to 30 m (100 ft) may be used.
- Enclosure rating: Type/NEMA 4X, 6, IP67

Stainless high temperature Milltronics MSP-9
- Heavy-duty, high temperature 304 stainless steel probe
- Special construction allows operation of probe in environment from -50 ... 260 °C (500 °F)
- 1.5 m (5 ft) special high temperature PTFE cable provided. Up to 30 m (100 ft) may be used.
- Enclosure rating: Type/NEMA 4X, 6, IP67

Milltronics RMA (Remote Mounted Amplifier)
- Available for internal mounted IMA in probe, or without and converting older existing applications into 3-wire NPN signals for use with WM300 MFA
- DIN rail mount
- Operating temp. from -40 ... +60 °C (-40 ... +140 °F)

Milltronics motion probes

Process Protection

Motion sensors

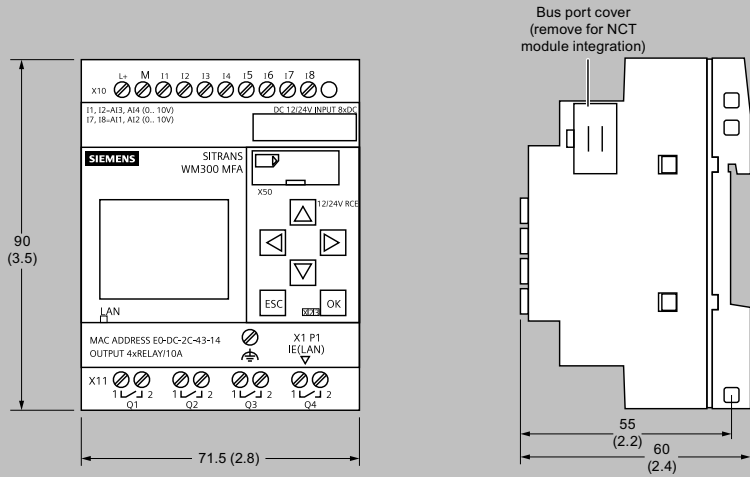### SITRANS WM300 Motion failure alarm controller

Selection and ordering data

| Selection and ordering data	Article No.
Motion Failure Alarm MFA, DSD, NCT A highly sensitive dual setpoint motion sensor system, used with up to 2 MSP or XPP probes. Capable of hi/lo setpoint as well as differential monitoring with 2 additional probes.	7MH7701-0AA00-0A
Remote Mounted Amplifier RMA A remote mounted amplifier for 2 Milltronics MSP-1, MSP-3, MSP-9, MSP-12 and XPP-5 motion sensing probes.	7MH7702-0B
Analog output module NCT Additional module required for NCT applications featuring 2, 4 ... 20 mA outputs, used with WM300.	6ED10551MM000BA2
Power conversion module Convert 100 ... 240 V AC ... 24 V DC power, for use with WM300	6EP33316SB000AY0
Remote display and configuration panel Larger text display panel mount HMI for use with enclosure mounted WM300 for easy user access and monitoring.	6ED10554MH080BA0
Operating Instructions All literature is available to download for free, in a range of languages, at http://www.siemens.com/processinstrumentation/documentation.	

Technical specifications

|	
Mode of operation	
Measuring principle	Motion monitor and alarm
Typical application	Monitoring loss of motion in tail pulley, screw flights, bucket elevators

Features	• Switch user configurable overspeed and underspeed detection
	• Setpoint adjustment range:
	  - Standard model: 2 ... 5 000 Hz (120 ... 300 000 ppm)
	  - Slow speed version: 2 ... 400 seconds (30 ... 0.15 ppm)
	• Adjustable start-up time delay: 0 ... 60 seconds
	• Visual indication of probe operation and relay status

Output	4 relays
Resistive rating	• 10 A at 24 V DC • 10 A at 240 V AC
Performance	
Repeatability	± 1 %
Dead band	± 0.25 %
MSP and XPP dynamic range	0 ... 7 200 PPM
Ambient temperature range	-20 ... +50 °C (-5 ... +122 °F)
Storage temperature	-20 ... +50 °C (-5 ... +122 °F)
Design	
Enclosure dimensions	71.5 x 90 x 60 mm (2.8 x 3.5 x 2.4 inch)
Enclosure material	Polycarbonate
Power	• 10.8 ... 28.8 V DC, 25 ... 165 mA • Power supply: 100 ... 240 V AC, 50/60 Hz, 0.7 ... 0.35 A per LOGO! power module
Certificates and approvals	CE, UKCA, $_C$CSA/UL$_{US}$, FM, EAC, RCM, KC

Dimensional drawings

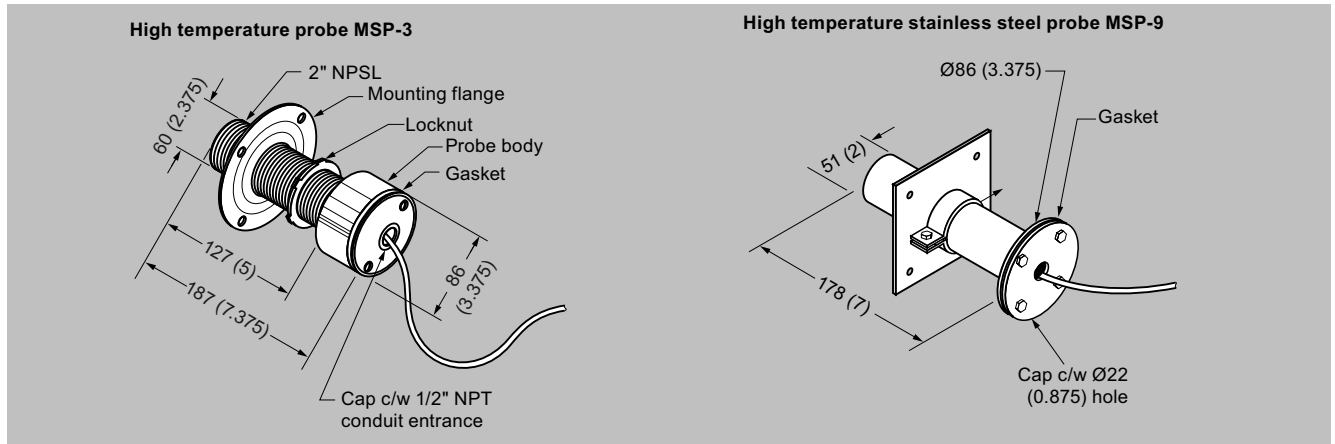**Standard Probe MSP-7, MSP-12**
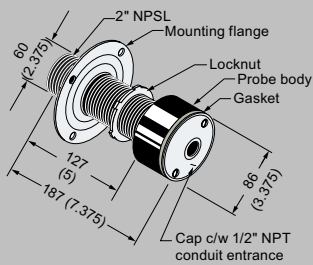
Hazardous Locations XPP-5
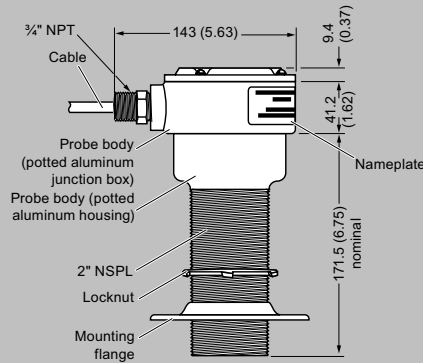
SITRANS WM300 MFA and probe, dimensions in mm (inch)

Process Protection

Motion sensors

Dimensional drawings (continued)

Milltronics probes, dimensions in mm (inch)

Overview

SITRANS WM100 is a heavy-duty zero-speed alarm switch. This non-contacting unit provides cost-effective equipment protection even in the harshest conditions.

Benefits

• Up to 100 mm (4 inch) gap between SITRANS WM100 and targets

• Rugged, low maintenance suitable for tough environments

• 1 SPDT Form C relay contact

• Provides cost-effective protection

• Visual indication of target triggered pulse

Application

This rugged unit is impervious to dust, dirt, build-up and moisture and is ideal for such primary industries as mining, aggregate, and cement. Operating where other systems are prone to failure, the non-contacting design eliminates the need for lubricating, cleaning and part replacement. Downtime and clean-up expenses associated with conveying equipment failure are reduced by the SITRANS WM100. It alarms to minimize spillage, prevent extensive damage or even fire caused by belt slippage at the head pulley, and warns against conveyor malfunction.

The SITRANS WM100 has built-in selectable start delays and 1 Form C relay contact. With an aluminum body, it operates from -40 to +60 °C (-40 to +140 °F).

• Key Applications: tail pulleys, driven pulleys, motor shaft sensing, screw conveyor flights, bucket elevators

Design

Mounting

The WM100 probe should be mounted, using the supplied mounting flange, onto a vibration-free structure. The gap between the probe and the target should be sufficient such that there is no danger of the target damaging the probe. The maximum allowable gap is 100 mm (4 inch) from the face of the target to the face of the probe for 4.5 x 4.5 mm (3/16 x 3/16 inch) keyway. The WM100 is sensitive to lateral disturbances to its magnetic field. If the WM100 is responding to motion from an interfering target, move the WM100 or install a ferrous plate (steel) as a shield between the WM100 and the interfering target. Where possible, the probe should be mounted such that the cable inlet is pointing downward to avoid accumulation of condensation in the casing. Connection of the probe should be made via flexible conduit for easier removal or adjustment of the probe.
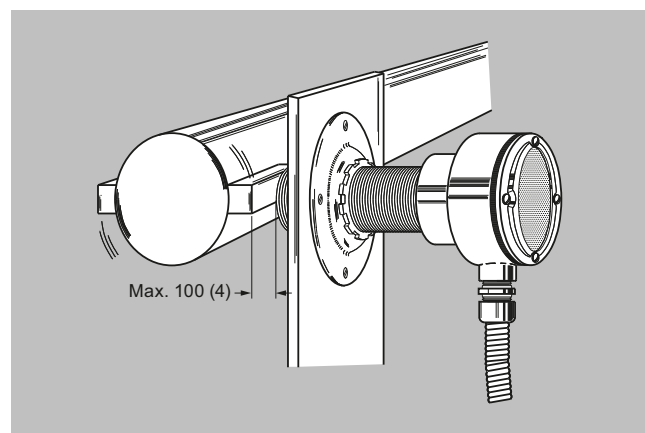
SITRANS WM100 mounting, dimensions in mm (inch)

Process Protection

Motion sensors

SITRANS WM100 Motion sensor

■ **Selection and ordering data**

SITRANS WM100 Motion sensor Heavy duty speed alarm switch with 100 mm measuring range.	Article No. 7MH71- 0 58 -		●	A	0	0
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.						
Model						
115 V AC			A			
230 V AC			B			

Selection and Ordering data	Order code
Further designs	
Please add "**-Z**" to Article No. and specify Order code(s).	
Manufacturer's Test Certificate: According to EN 10204-2.2	**C11**
Acrylic coated, stainless steel tag [13 x 45 mm (0.5 x 1.75 inch)]: Measuring-point number/i-dentification (max. 16 charac- ters), specify in plain text	**Y17**

Accessories	Article No.
Operating Instructions	
All literature is available to download for free, in a range of languages, at http://www.siemens.com/processinstrumentation/docu- mentation	
Accessories	
Locknut	7MH7723-1CR
Mounting flange	7MH7723-1CS
Motion cable gland adaptor kit	7MH7723-1JU

Technical specifications

Mode of operation	
Measuring principle	Disruption of magnetic field by ferrous target
Typical application	Monitors absence or presence of motion in harsh conditions
Output	
Contact	1 SPDT Form C dry relay contact, rated 5 A at 250 V AC, fail-safe operation
Time delay	Start up: 10 ... 14 seconds (5 ... 7 seconds with 12 ppm jumper installed)
Zero Speed (selected via a common jumper)	5 seconds ± 1 (minimum speed 10 ... 15 ppm) or 10 seconds ± 2 (minimum speed 5 ... 7.5 ppm)
Rated operating conditions	
Operating temperature	-40 ... +60 °C (-40 ... +140 °F)
Storage temperature	-40 ... +60 °C (-40 ... +140 °F)
Design	
Probe body	Aluminum
Process mounting	2" NPSL
Connection box	Aluminum, ¾" NPT conduit entrance, 5 screw terminals plus grounding terminal for electrical connection, max. 12 AWG (3.30 mm^2) wire size
Gasketing	Neoprene
Display	Red LED for verification of pulses
Enclosure rating	Type NEMA 4x, 6, IP67
Dynamic range	Minimum 6 or 12 pulses per minute Maximum 3 000 pulses per minute
Shipping weight	2 kg (4.4 lb)
Power supply	• 115 V AC/50 ... 60 Hz, 7 VA
	• 230 V AC/50 ... 60 Hz, 7 VA
	• ± 10 % of rated voltage
Certificates and approvals	$_c$CSA$_{US}$, CE, UKCA RCM, EAC, KC
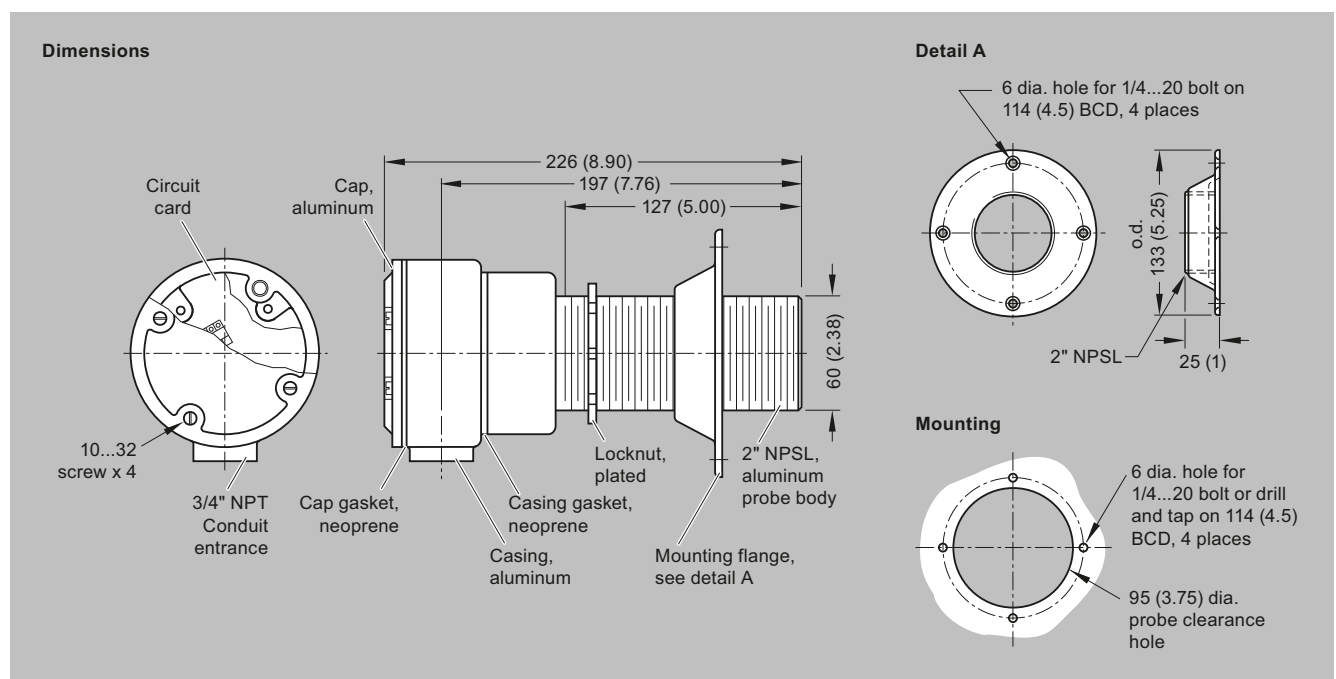
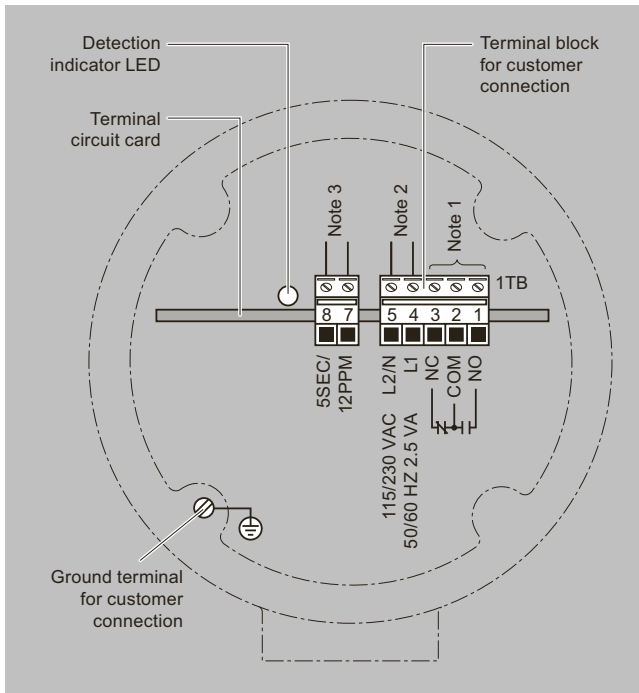## Dimensional drawings

SITRANS WM100 mounting, dimensions in mm (inch)

Process Protection

Motion sensors

SITRANS WM100 Motion sensor

Circuit diagrams

SITRANS WM100 wiring

Notes:

1. Dry contacts shown in de-energized (alarm or shelf) state.

2. SITRANS WM100 is manufactured for either 115 or 230 V AC operation. Check WM100 nameplate for applicable voltage. Correct voltage must be supplied. Voltages lower than specified will result in an inoperative condition. Voltages higher than specified will severely damage unit.

3. For 5 second time delay and a minimum 12 ppm range, connect jumper across terminals 7 and 8. Without a jumper, the default is a 10 second time delay and a minimum 6 ppm range.