

**milltronics**

MD-36 SPEED SENSOR

**SIEMENS**

## Safety Guidelines

Warning notices must be observed to ensure personal safety as well as that of others, and to protect the product and the connected equipment. These warning notices are accompanied by a clarification of the level of caution to be observed.

## Qualified Personnel

This device/system may only be set up and operated in conjunction with this manual. Qualified personnel are only authorized to install and operate this equipment in accordance with established safety practices and standards.

**Warning:** This product can only function properly and safely if it is correctly transported, stored, installed, set up, operated, and maintained.

**Note:** Always use product in accordance with specifications.

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While we have verified the contents of this manual for agreement with the instrumentation described, variations remain possible. Thus we cannot guarantee full agreement. The contents of this manual are regularly reviewed and corrections are included in subsequent editions. We welcome all suggestions for improvement.

Technical data subject to change.

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# Introduction

## Safety Notes

Special attention must be paid to warnings and notes highlighted from the rest of the text by grey boxes.







**WARNING:** means that failure to observe the necessary precautions can result in death, serious injury, and/or considerable material damage.

**CAUTION:** means that failure to observe the necessary precautions can result in considerable material damage.

**Note:** means important information about the product or that part of the operating manual.

## Safety marking symbols

	Alternating Current
	Direct Current
	Earth (ground) Terminal
	Protective Conductor Terminal

## Product Warnings



### WARNINGS:

- ◆ Repair of this equipment shall be carried out by suitably trained personnel in accordance with the applicable Codes of Practice.
- ◆ If the equipment is likely to come into contact with aggressive substances, then it is the responsibility of the user to use suitable precautions that prevent it from being adversely affected.
- ◆ The MD-36 Speed Sensors are to be used only in the manner outlined in this manual or protection provided to the equipment may be impaired.

# Milltronics MD-36 Speed Sensor

The Milltronics MD-36 is a general purpose and hazardous rated speed sensor. The sensor, coupled to the motor or pulley shaft, converts the rotation of its input shaft into an encoded speed signal. The speed signal is transmitted to the integrating electronics for use in calculating the rate of material flow.

Siemens Milltronics provides a full range of electronic integrators:

- Compuscale III
- Milltronics BW 100
- Milltronics BW 500

The MD-36 sensors can also be used with older model Siemens Milltronics integrators:

- Compuscale
- Compuscale IIA
- Compuscale II
- Compu-M

For further information about Siemens Milltronics products, go to [www.siemens-milltronics.com](http://www.siemens-milltronics.com).

## The Manual

### Notes

- Please follow the installation and operating procedures for a quick, trouble-free installation and to ensure the maximum accuracy and reliability of your Siemens Milltronics weighing system.
- This manual applies to the MD-36 Speed Sensors only. Please consult the separate integrator and belt scale manuals for operating instructions.

This manual will help you set up your MD-36 Speed Sensor for optimum performance. We always welcome suggestions and comments about manual content, design, and accessibility.

Please direct your comments to [techpubs@siemens-milltronics.com](mailto:techpubs@siemens-milltronics.com).

# Specifications

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## Power

- MD-36/MD-36A/MD-36SS: +15 V DC, 25 mA from integrator
- MD-36 IS: +5, – 25 V DC from IS Switch Isolator

## Temperature

- – 40 to 55 °C (–40 to 130 °F)

## Input

- shaft rotation 0 to 2,000 rpm, bi-directional

## Output

MD-36/MD-36A/MD-36SS:

- open collector sinking output, max. 25 mA at 15 V DC
- 36 pulses / revolution
- 0 to 2,000 rpm = 0 to 1200 Hz

MD-36 IS:

- load current: 0 – 15mA
- 36 pulses per revolution
- 0 to 2000 rpm = 0 to 1200 Hz

## Input: Output

- 1:1 (speed ratio)

## Enclosure

- MD-36 and MD-36 IS: aluminum rating – Type 4/NEMA 4/IP 65
- MD-36A: aluminum
- MD-36SS: 304 stainless steel

# Approvals

- MD-36: CSA, FM – Class II, Gr. E, F&G, Class III, CE
- MD-36 IS:
  - ATEX: II 2 G, EEx ia IIC T6 (with suitable IS Switch Isolator)
  - CSA/FM (with suitable IS Switch Isolator or Switch Amplifier): Class I, Div. 1, Groups A,B,C, and D. Also Class II, Div. 1, Groups E,F, and G system approval
  - CE
- MD-36A, MD-36SS: CE

## Switch and Isolator Approvals

**Note:** The Approval Ratings for the Proximity Switch and the IS Switch Isolator are the property of Pepperl+Fuchs. Copies of these Approval Certificates may be obtained at [www.siemens-milltronics.com](http://www.siemens-milltronics.com).

### Proximity Switch Approval Ratings (Pepperl+Fuchs #SJ3.5-N)

- ATEX: II 2 G, EEx ia IIC T6 (with suitable IS Switch Isolator)<sup>1</sup>
- CSA/FM (with suitable IS Switch Isolator or Switch Amplifier): Class I, Div. 1, Groups A,B,C, and D. Also Class II, Div. 1, Groups E,F, and G system approval

### IS Switch Isolator (Pepperl+Fuchs #KFA5-SOT2-Ex2 and #KFA6-SOT2-Ex2)

- ATEX: II (1) G, [EEx ia] IIC
- CSA/FM: Class I, Div. 1, Groups A,B,C, and D. Also Class II, Div. I, Groups E,F, and G.

## Cable (optional)

- Belden 8770, 3 wire shielded, 0.75 mm<sup>2</sup> (18 AWG) or equivalent
- max. run 305 m (1000 ft.)

<sup>1</sup> Based on the ATEX rating of the NAMUR slotted sensor and CSA/FM system approvals.



# Operation

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The speed sensor consists of a main shaft rotating in a bearing assembly fixed to the enclosure. The shaft turns a toothed disk divided into 36 teeth, each separated by a gap equal to the tooth width. In the MD-36/MD-36A/MD-36SS, the encoder card is mounted so that the two optocouplers straddle the disk's teeth.

## MD-36/MD-36A/MD-36SS Operation

Power from the integrating device energizes the two optocoupler LEDs and feeds the 5Vdc regulator. The 5Vdc bus powers the logic circuitry and the output driver transistors.

As the shaft rotates, the 36-tooth wheel modulates the light crossing within each optocoupler. The resulting outputs are two 50% duty cycle square waves that are phase shifted by 90 degrees electrical or 1/4 cycle (one cycle of 360 degrees electrical corresponds to the width of one tooth and one gap). This configuration provides directional discrimination.

The optocouplers' square wave outputs are converted into clockwise (CW) and counterclockwise (CCW) square wave output signals by the intermediate logic. When the shaft rotates in a CW direction, the logic produces pulses at the CW output and the CCW output is disabled. When the shaft rotates in a CCW direction, the logic produces pulses at the CCW output and the CW output is disabled.

The speed sensor is immune to any external vibration that would cause the toothed wheel to oscillate 1/4 cycle (1/2 tooth width or 5° of shaft rotation) or less.

## MD-36 IS Operation

The MD-36 IS Speed Sensor contains a Pepperl + Fuchs, NAMUR rated, inductive proximity sensor, model # SJ3.5-N, consisting of an oscillator and a coil. The oscillator creates a frequency which is emitted from the coil and out the face of the sensor.

When a metal target enters this radiated field, eddy currents are induced on this target. As the target moves closer to the sensor, the energy required from the oscillator increases. The IS switch isolator monitors the change in the oscillator load, triggering the output when a predetermined level is reached.

English

# Dimensions

## MD-36, MD-36A, MD-36 IS

### Front View

Technical drawing showing the front view of the MD-36 speed sensor. The drawing includes the following dimensions:

- Overall width: 142 mm (5.6")
- Distance from left edge to center: 71 mm (2.8")
- Overall height: 218 mm (8.6")
- Distance from top edge to center: 142 mm (5.2")
- Distance from center to right edge of mounting hole: 56 mm (2.2")
- Distance from center to right edge of sensor body: 112 mm (4.4")

Additional features shown include:

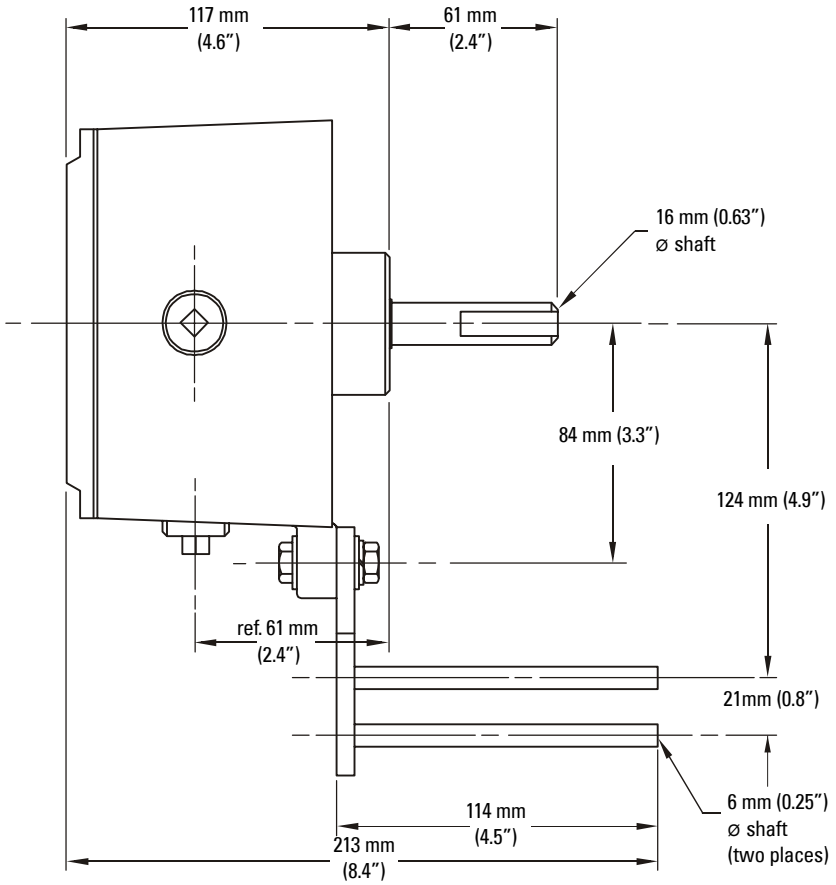
- Four mounting holes (two on the top and two on the bottom).
- Two 1/2" NPT plugs (two places) on the right side.
- A central mounting hole at the bottom.

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Milltronics MD-36 Speed Sensor – INSTRUCTION MANUAL

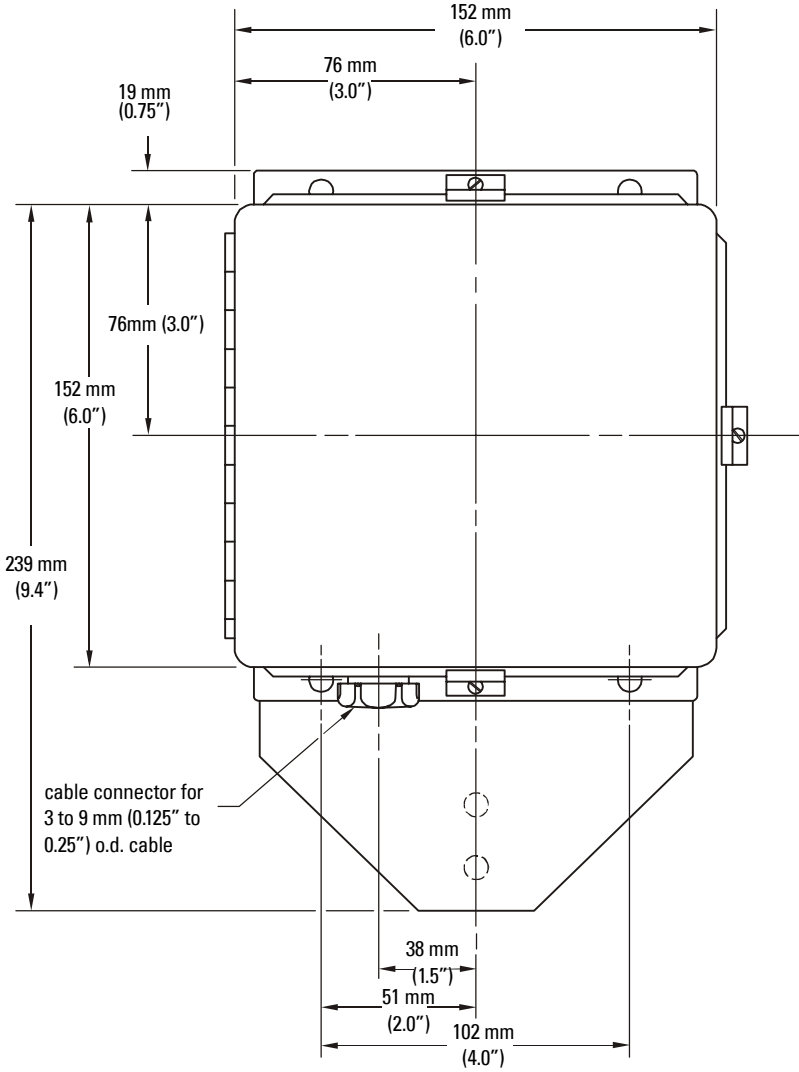
7ML19985DB01

## Side View

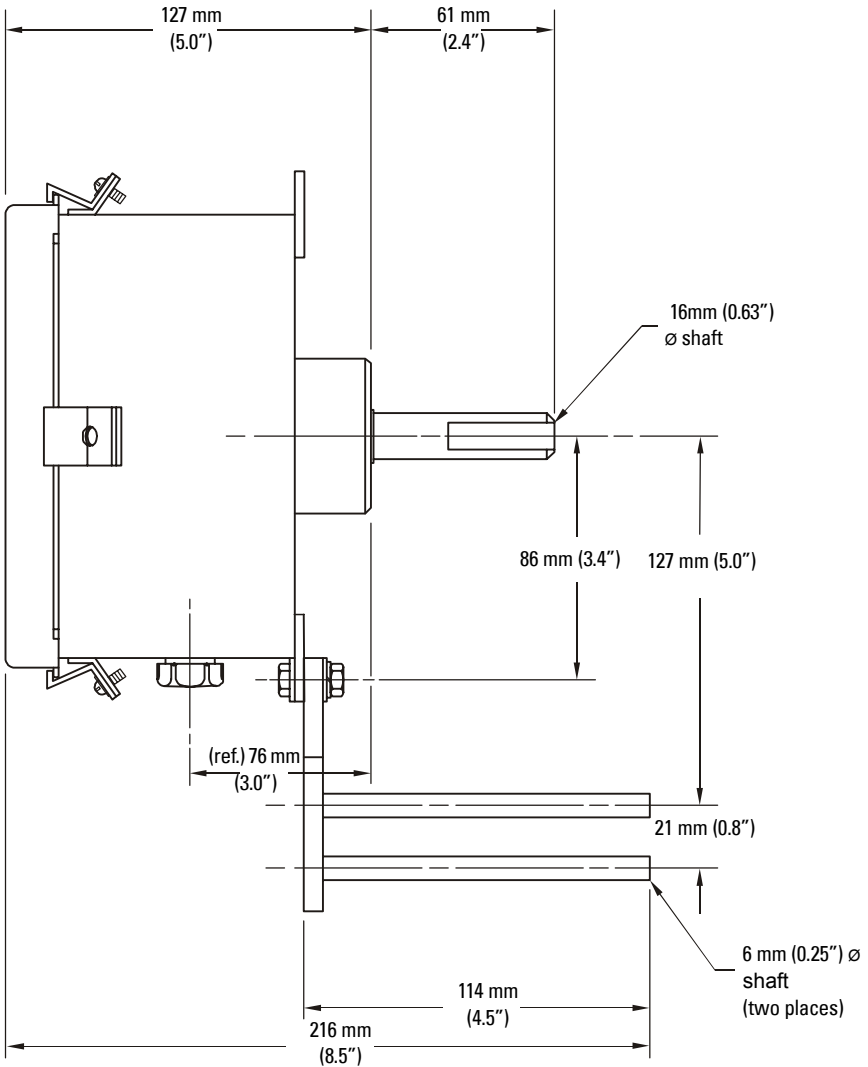


# MD-36SS

## Front View



## Side View



# Mounting

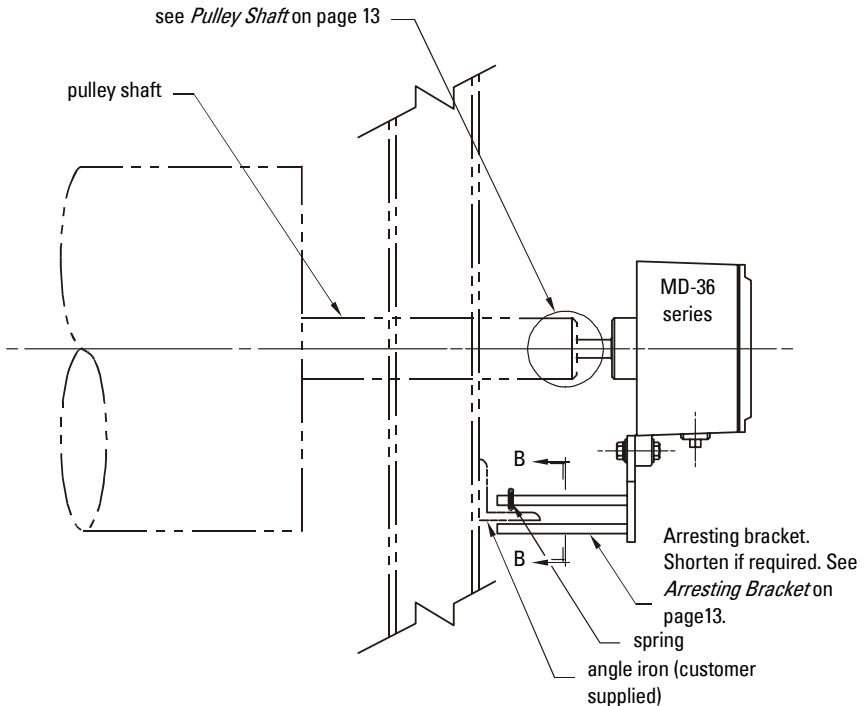
The MD-36 speed sensor models can be coupled to a tail pulley, bend pulley, or motor shaft.

There are two methods of attaching the sensor: floating and fixed.

## Floating Pulley Mount

The input shaft and bearing assembly bear the weight of the speed sensor. The unit's arresting bracket stops the speed sensor from rotating with the shaft.

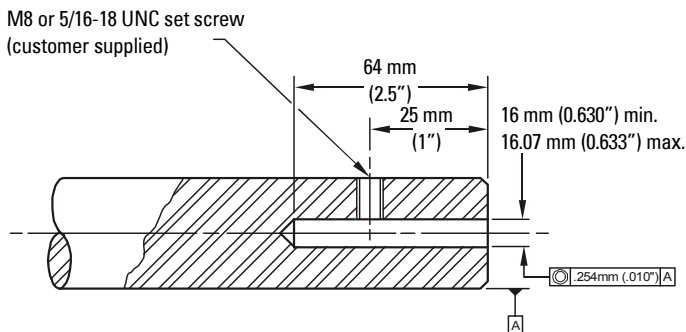
The arresting bracket straddles a section of angle iron installed by the customer. Make sure to fasten the anti-rotation spring.



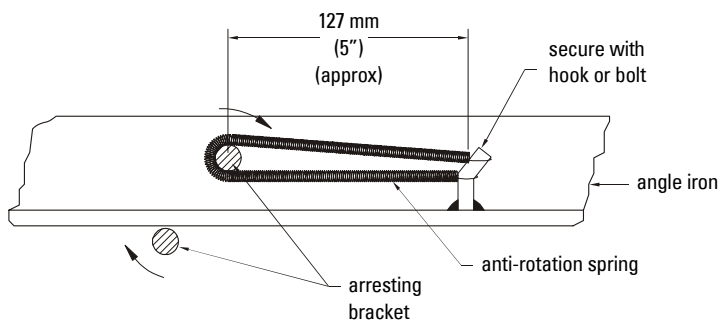
### Notes:

- When mounting the speed sensor, ensure that the shaft alignment is true to avoid stresses on the shaft bearing.
- For preferred mounting locations, refer to the associated belt scale or weigh feeder application drawings.

## Pulley Shaft



## Arresting Bracket (B-B Cross Section)

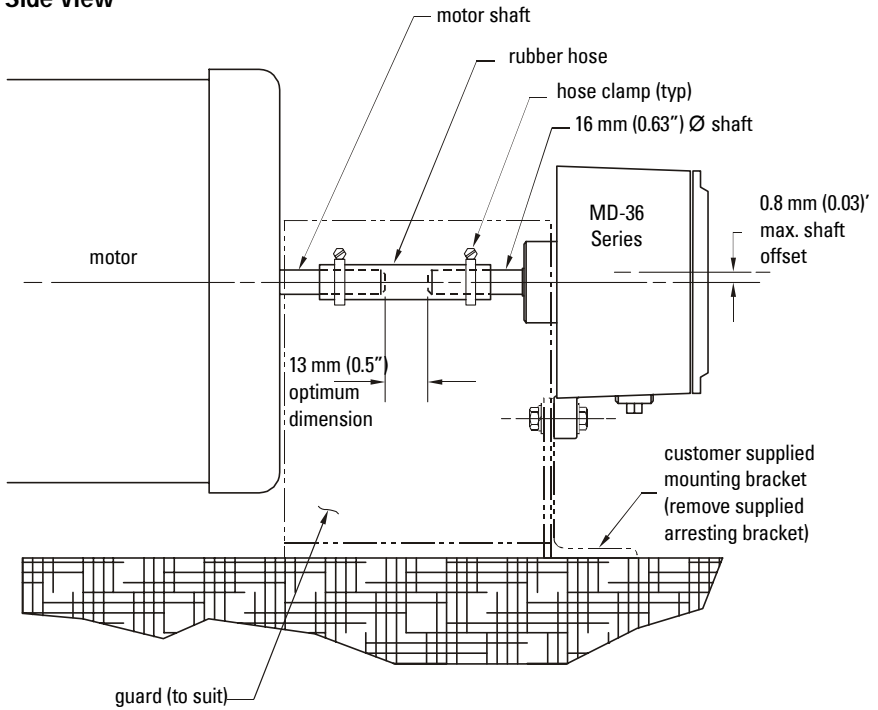


### Notes:

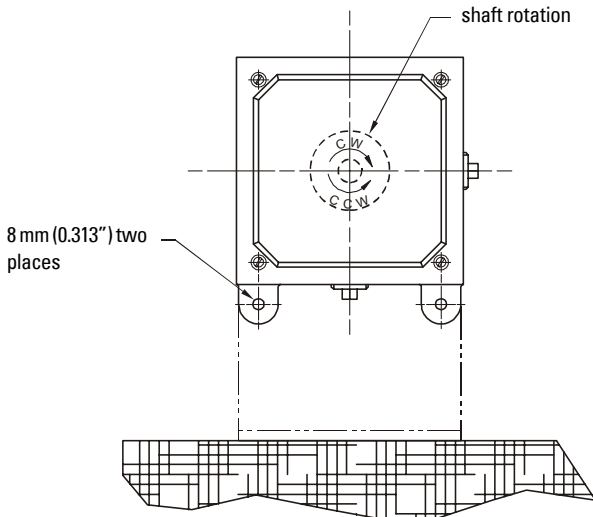
- When tail or bend pulley is not supplied by Siemens Milltronics, machining on tail/bend pulley shaft (see *Pulley Shaft* above) to accommodate Milltronics speed sensor is done by customer.
- Arresting bracket is an anti-rotation device only and must not secure or support the speed sensor. Bearing life is greatly reduced if speed sensor is not free to "float." Use anti-rotation spring to prevent mechanical oscillation of speed sensor.
- Grease mating surfaces to prevent seizing.

# Fixed Shaft Mount

## Side View



## Front View





# Interconnection

## CAUTION:

- All wiring must be done in accordance with approved conduit, boxes, and fittings, and to procedures in accordance with all governing regulations.
- Flexible conduit is recommended so excess stress is not applied to the shaft bearings
- Interconnection between the speed sensor and the integrator should be made with 3-wire shielded, 18 AWG cable (Belden 8770 or equivalent).
- Ground the shield at the integrator ONLY!

## MD-36 Speed Sensor/Integrator Connection

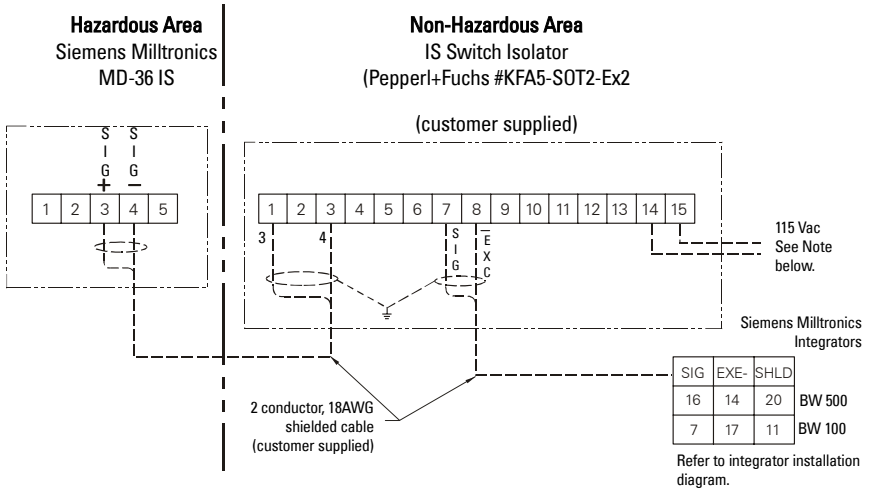
MD-36		Compu III	BW 100	BW 500
Description	Terminal	TB1	TB1	TB1
+ 15 V DC	1	30	8	19
Speed Out (CW) <sup>1</sup>	2	(31) <sup>2</sup>	(7)	(16)
Speed Out (CCW)	3	(31)	(7)	(16)
Common	4	32	6	17
Ground	G	N/C <sup>3</sup>	N/C	N/C

1. To determine direction of rotation, see *Front View* mounting on page 14.
2. Terminal positions in brackets denote that only one signal may be connected at one time.
3. N/C = No Connection

## MD-36 IS Speed Sensor/Isolator/Integrator Connection

MD-36 IS	IS Switch Isolator (P&F #KFA5-S0T2-Ex2)	BW 100	BW 500
Terminal	Terminal	TB1	TB1
3	1		
4	3		
	7	7	16
	8	17	14

# Wiring Diagram (MD-36 IS only)



**Note:** The 115V version is shown. If 230V is required, use isolation barrier Pepperl + Fuchs #KFA6-SOT2-Ex2.

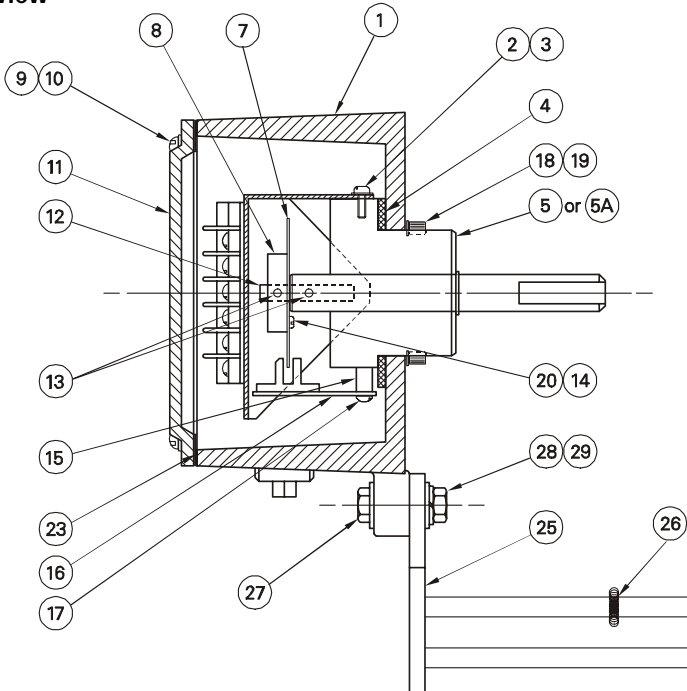
# Parts Lists

## MD-36/MD-36A/MD-36 IS Parts List

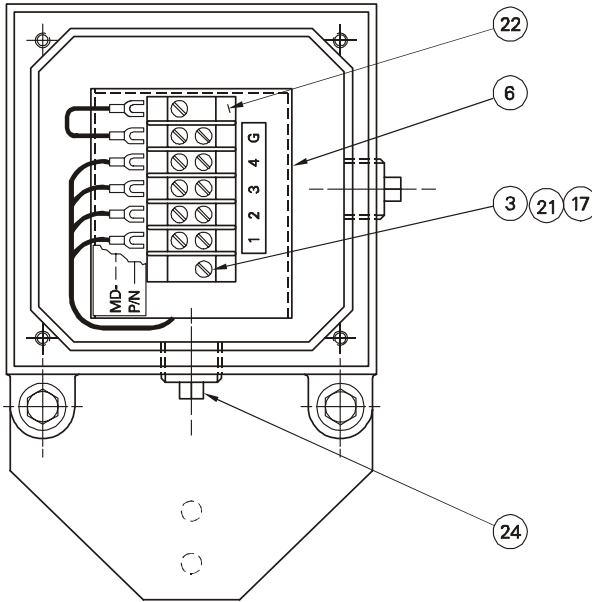
1	Enclosure	1
2	Screw, 6-32 x 5/16	3
3	External Lockwasher #6	5
4	Gasket, Bearing Assembly	1
5	MD-36 Bearing Assembly	1
5a	MD-36A Bearing Assembly	1
6	MD-36 Shroud	1
7	Disc 36 Tooth	1
8	Disc Hub	1
9	Slot Round Head Screw 1/4"	4
10	Lockwasher Split 1/4"	4
11	Enclosure Cover	1
12	Extension Shaft	1
13	Set Screw Socket, 8-32 x 3/16	2
14	External Lockwasher #4	3
15	Bushing	2

16	MD-36/36A: Speed Pickup Card Ver.3	1
	MD-36 IS: Mounting Plate	1
17	Binding Screw, Slot, 6 - 32 x 5/8	4
18	Cap Screw, Socket, 10 - 32	4
19	Lockwasher, Split #10	4
20	Binding Screw, Slot, 4 - 40	3
21	Hex Nut, 6 - 32	2
22	Terminal Block CSA	1
23	Gasket, Cover	1
24	Threaded Plug, 1/2 NPT	2
25	Enclosure Arresting Bracket	1
26	Spring Spnr. B-604	1
27	Bolt, Hex 5/16 - 18 x 1 1/4	2
28	Nut, Hex 5/16 - 18	2
29	Washer, Flat 5/16	2
30	Lockwasher Split 5/16	2

### Side View



## Front View



**Note:** Shown with cover removed.

### Bearing Assembly Replacement

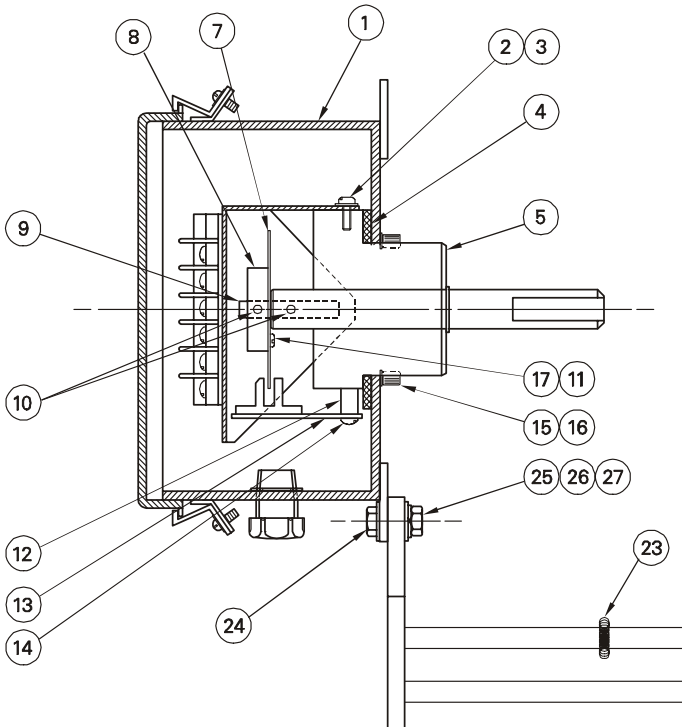
1. Turn off supply power from integrator and then remove speed sensor from mounting.
2. Remove cover (#11) and the four bearing assembly mounting screws (#18) located externally around shaft.
3. Pull out bearing assembly (#5) c/w card, disc hub, disc, and mounting brackets.
4. Remove screws (#17), bushing (#15), and card (#16).
5. Remove speed sensor shroud screws (#2).
6. Loosen hex screw in shaft and remove extension shaft, disc hub, and disc to free bearing assembly.

# MD-36SS Parts List

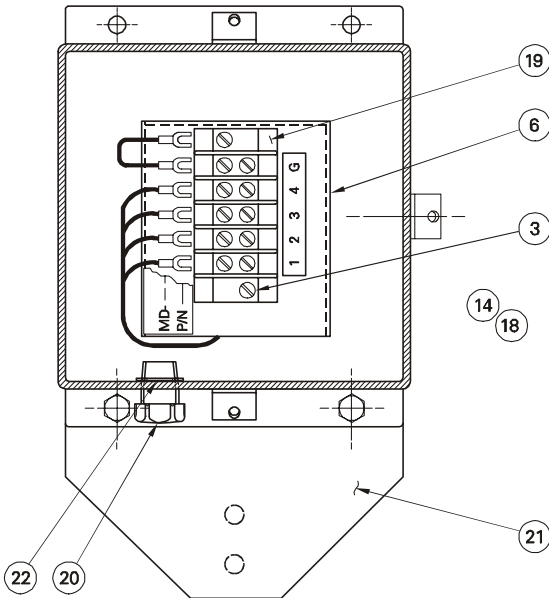
1	Enclosure	1
2	Screw, 6-32 x 5/16	3
3	External Lockwasher #6	5
4	Gasket, Bearing Assembly	1
5	Bearing Assembly	1
6	MD-36 Shroud	1
7	Disc 36 Tooth	1
8	Disc Hub	1
9	Extension Shaft	1
10	Set Screw Socket, 8-32 x 3/16	2
11	External Lockwasher #4	3
12	Bushing	3
13	Speed Pickup Card Ver.3	1
14	Binding Screw, Slot, 6 - 32 x 5/8	4

15	SS Screw, Socket, 10 - 32	4
16	Lockwasher, Split #10 SS	4
17	Binding Screw, Slot, 4 - 40 x3/8	3
18	Hex Nut, 6 - 32	2
19	Terminal Block	1
20	Cable Connector	1
21	Enclosure Arresting Bracket	1
22	Locknut T&B 1/2 in # 141	1
23	Spring Spnr. B-604	1
24	Bolt, Hex 5/16 - 18 x 1 1/4 SS	2
25	Lockwasher Split 5/16 SS	2
26	Nut, Hex 5/16 - 18 NC SS	2
27	SS Screw, Socket, 10 - 32	2

## Side View



## Front View



**Note:** Shown with cover removed.

### Bearing Assembly Replacement

1. Turn off supply power from integrator and then remove speed sensor from mounting.
2. Open cover and remove the four bearing assembly mounting screws (#15) located externally around shaft.
3. Pull out bearing assembly (#5) c/w card, disc assembly, and MD-36 shroud
4. Remove screws (#14), bushing (#12), and card (#13).
5. Remove MD-36 shroud screws (#2) and MD-36 shroud c/w terminal block (#19) and card (#13).
6. Loosen hex screw in shaft and remove extension shaft, disc hub, and disc to free bearing assembly.

# Maintenance

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The speed sensor electronics normally requires no maintenance; however, a program of periodic checks would be beneficial. The enclosure and circuit board, or NAMUR sensor should be cleaned if necessary, but only when the power is disconnected using a vacuum cleaner and a clean, dry paint brush. Check all electrical contacts for corrosion and arcing.

The speed sensor bearing should be periodically checked for corrosion, wear and seizing. The bearing's life is dependent upon the mounting, the severity of the application, and surrounding environment.





# Notes

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# Notes

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