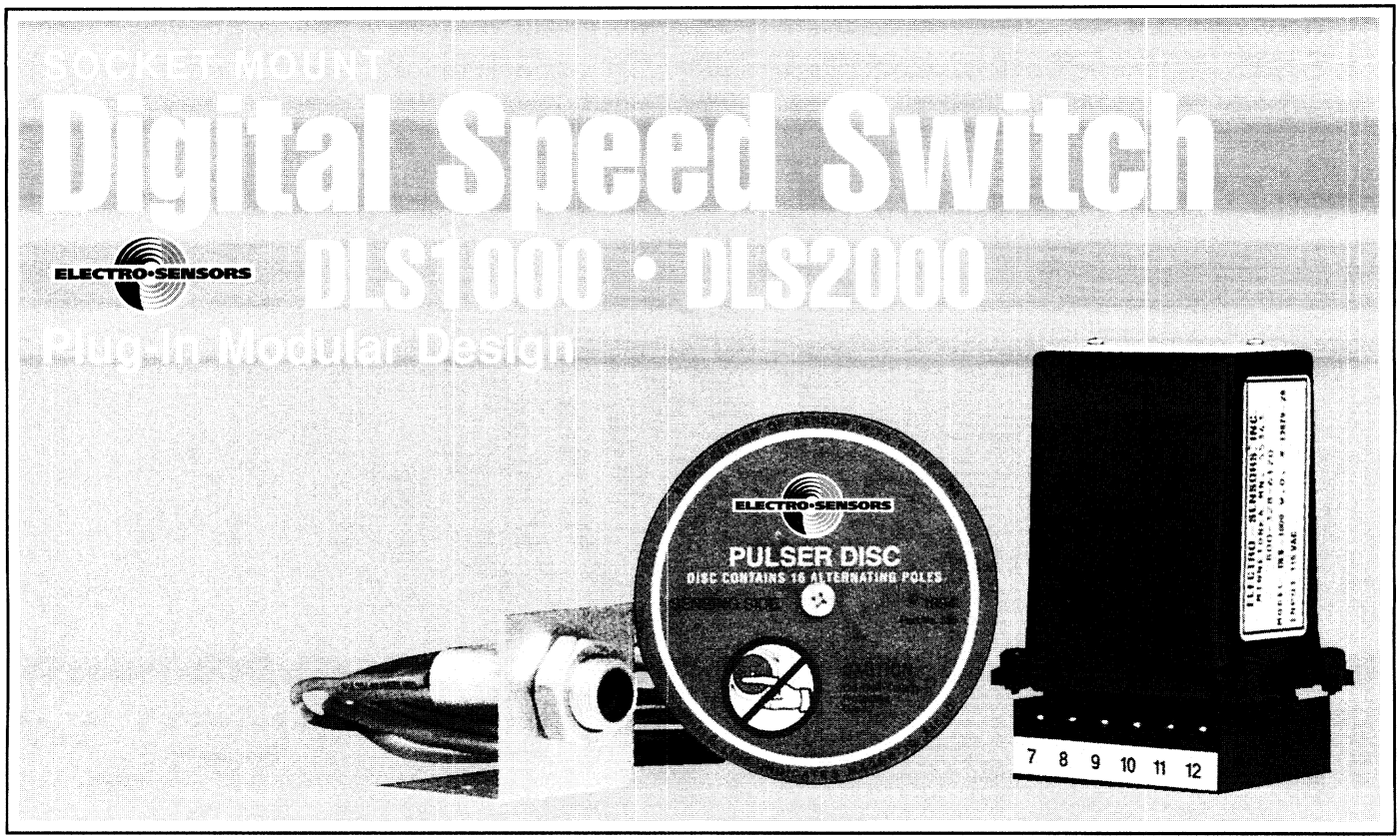


Features:

- **Simple Installation**
- **Set Point Range of .5 to 5000 RPM**
- **Digital Accuracy**
- **Over or Under Speed Detection**
- **One or Two Independent Set Points**
- **Electronics Plug-In to Socket Terminal**
- **Non-Critical Sensor Alignment**

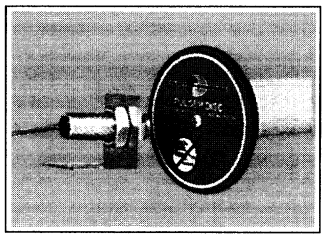
Description:

The DLS1000 and DLS2000 are complete digital speed switch systems for detecting shaft speeds that are out of tolerance. The DLS System has two modes. In the underspeed mode the DLS will provide a relay output when the shaft speed drops below a preset RPM. In the overspeed mode the relay switches when the shaft speed is over a preset RPM. The overspeed or underspeed mode selection is switch selectable. The relay operation is fail-safe in underspeed mode, meaning that the relay deenergizes in a fault condition, power failure condition, or loss of signal. The DLS2000 should be used to assure fail-safe operation in overspeed mode. The DLS is typically applied to conveyor or elevator tail shafts, screw conveyors, drive trains, or exhaust fans – any shaft whose rotation indicates proper machine operation.

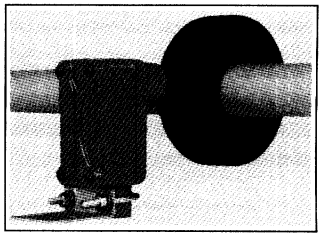
The DLS is available with one or two set points. The DLS1000 has one set point; the DLS2000 has two set points. The set point range (.5 – 5 rpm, 5 – 50 rpm, 50 – 500 rpm, or 500 – 5000 rpm) is set using Range Selector switches. A potentiometer is used to fine tune the set point to a precise speed. Each set point triggers a 5amp SPDT relay output. The standard transducer system for the DLS unit consists of an end-of-shaft mount Pulser Disc, or a pulser wrap that fits around the shaft, and a non-contacting Hall Effect sensor. This sensing system provides a 1/4-inch gap between the sensor and disc, which makes the sensor easy to align, and tolerant of vibration, dust, grease, water, and other conditions common to the industrial environment.

Principle of Operation:

A Pulser Disc or Pulser Wrap is attached to the monitored shaft. A Hall Effect sensor, gapped to approximately 1/4-inch, is mounted in line with the magnets on the Disc or Wrap. The Hall Effect sensor provides a digital signal to the DLS circuitry as the magnets on the Disc or Wrap rotate past the sensing surface. The frequency of the signal is compared to the set point speed. In underspeed mode, when the frequency of the signal drops below the set point setting, the relay deenergizes. In overspeed mode, the relay deenergizes when the frequency of the signal is above the set point setting.



Sensing Head and Pulser Disc



Optional Explosionproof Sensor and Pulser Wrap

Pulser Disc:

The end of the shaft to be monitored must be center drilled to a depth of 1/2-inch with a No. 21 drill and tapped for 10-32UNF. After applying Loctite® or a similar adhesive on the threads to keep the pulser disc tight, the pulser disc should be attached, decal side out, with the supplied 10-32UNF machine screw and lock washer.

Pulser Wrap (optional):

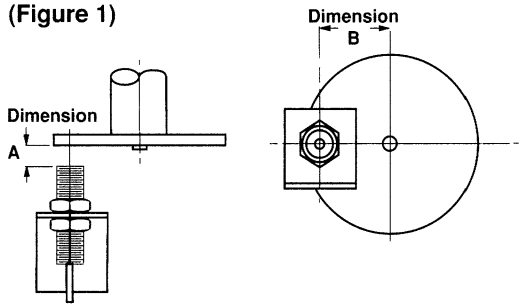
Pulser Wraps are custom manufactured to fit the shaft they will be mounted on. When the wrap is shipped, four allen-head cap screws hold the two halves of the wrap together. These screws must be removed so that the wrap is in two halves. Place the halves around the shaft, reinsert the screws and torque them to 8 foot pounds.

Sensor Installation:

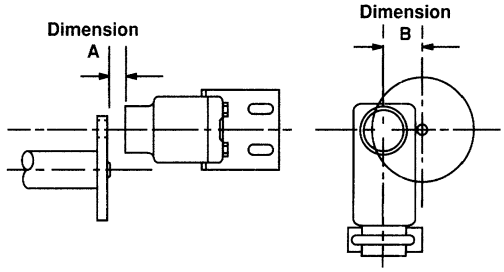
The standard sensor is supplied with a mounting bracket and two jam nuts. The explosionproof sensor is supplied with a slotted mounting bracket. Sensors should be installed so the center line of the magnets pass in front of the center of the sensor as the disc, or wrap rotates. When using the pulser disc, the center of the magnetized area of the disc, shown as Dimension B in figures 1 and 3, is 1-3/4 inches from the center hole of the disc.

The gap distance between the sensor and the disc or wrap, Dimension A in the diagrams, can be from 1/16 inch to 1/4 inch. To achieve the proper gap distance, adjust the jam nuts holding the standard sensor in the mounting bracket, or adjust the position of the explosionproof sensor using the slots on its mounting bracket.

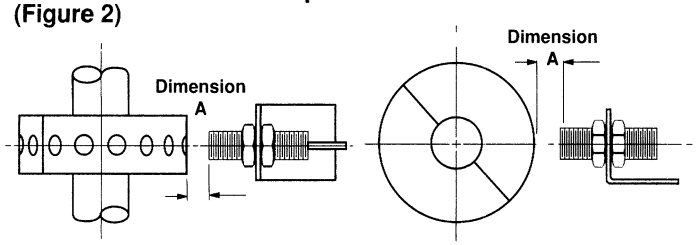
Standard Sensor and Disc (Figure 1)



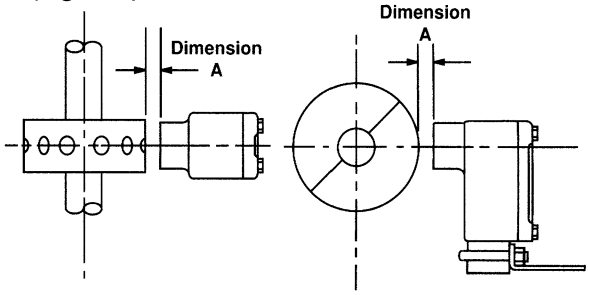
Explosionproof Sensor and Disc (Figure 3)



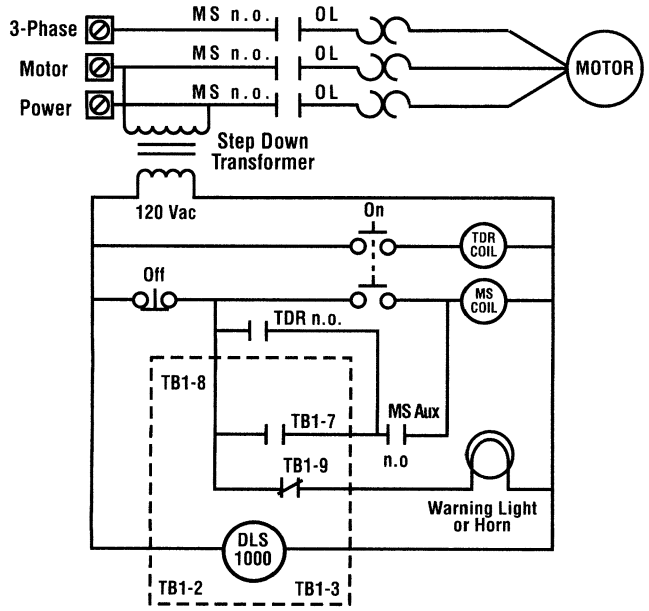
Standard Sensor and Wrap (Figure 2)



Explosionproof Sensor and Wrap (Figure 4)



Motor Shutdown with Alarm • DLS1000/2000



Troubleshooting Guide:

Symptom: Relay will not Energize, LED does not "Light Up"

Probable Causes:	Possible Solutions:
1. AC power is not applied to the DLS terminal block correctly.	See page 3, Dia. 2
2. Sensing head is not aligned, or gapped properly.	See page 2
3. The set point is not in the proper range.	See page 3, Table 1
4. The set point potentiometer is not turned fully counterclockwise.	See page 3, Calibration
5. Shaft is not turning faster than the set point.	Check actual RPM
6. Sensing head is not wired correctly to the DLS Speed Switch.	See page 3 Dia. 2
7. Sensor supply voltage is not present.	Check for approx.15Vdc between TB5 & TB6
8. DLS speed switch is not receiving signal.	Check for approx. 7.5Vdc between TB4 and TB6 with shaft running

Wiring Diagram Key:

MS Motor Starter (not supplied)
OL Overload contacts
n.o. Normally open (relay is in a deenergized state).
TDR Time Delay "OFF" Relay not supplied)
If the shaft being monitored comes up to speed slowly, a TDR can be used so the operator will not have to hold the START button in.

WARNING

During a stopped condition, even a slight movement of the shaft or magnetic disc could energize the control relay and start the motor if the Motor Auxiliary Normally Open Contact (MS Aux n.o.) is not wired in series as shown in these typical wiring diagrams. This situation could cause equipment damage or PERSONAL INJURY! To prevent starting the motor accidentally, ALWAYS USE PROPER LOCK-OUT – TAG-OUT PROCEDURES.

Calibration Procedure:

Remove the 2 screws holding the acrylic cover on the socket mount housing. Remove the protective adhesive paper covering the acrylic. Place the over/underspeed mode switch in the desired position (see diagram 1 for switch location). Position A is underspeed, position B is overspeed.

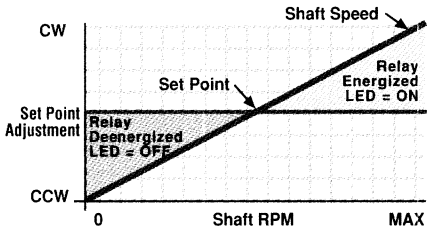
Note: in underspeed mode the relay energizes (LED Status Indicator ON) when the monitored shaft is running above the set point RPM. The relay will de-energize (LED Status Indicator OFF) when an underspeed fault condition occurs.

Decide what speed range the set point will be in. Example: if an underspeed set point will be set at 25 rpm, select the 5 – 50 rpm set point range. Adjust the three Range Selector switches to the positions corresponding to the selected range. See Table 1 for Range Selector switch location.

Setting Underspeed Set Point:

With A.C. power turned off, turn the set point potentiometer fully counterclockwise. Apply AC power and run the monitored shaft at a known RPM, near the desired set point speed. Turn the potentiometer clockwise until the LED relay indicator light goes out (indicating that the current shaft speed is under the set point and deenergizing the relay). Slowly turn the set point potentiometer counterclockwise until the LED illuminates (indicating that the relay has energized because the current shaft speed is above the underspeed set point). The DLS will provide a set point 4% to 5% under the known RPM using this method of calibration.

Underspeed Mode Shaft Running



Overspeed Set Point:

If an overspeed set point is desired, Electro-Sensors, Inc. recommends using the DLS2000 unit. The DLS1000 cannot provide fail safe operation in the overspeed mode, if there is a loss of feedback (i.e. sensor failure). To use a DLS2000 in overspeed mode, calibrate the first set point to provide an underspeed output upon loss of feedback and calibrate the second set point to provide the overspeed output at the desired speed. Wire the two relays in series with the control circuit.

Setting an Overspeed Set Point:

Select the set point range. Turn the potentiometer fully clockwise. Run the monitored shaft at a known RPM. Turn the potentiometer counterclockwise until the LED indicator light extinguishes (indicating that the relay is deenergized, because the known shaft speed is above the overspeed set point). Slowly turn the potentiometer clockwise until the LED illuminates (indicating that the relay is energized because the known shaft speed is now below the overspeed set point). This will provide an overspeed set point 4% to 5% over the known shaft speed.

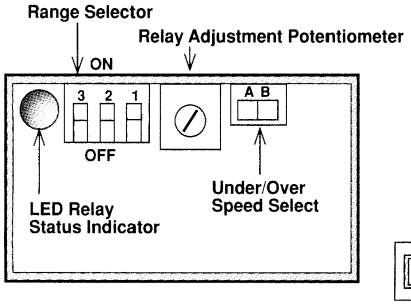
Note: If the desired set point speed is provided at the time of purchase, Electro-Sensors, Inc. can factory calibrate the DLS to the desired setting.

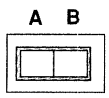
Table 1.
Set Point RPM Ranges: (based on 8 Pulses per Revolution

S1	S2	S3	Set Point Range
OFF	ON	ON	.5 to 5 RPM
OFF	OFF	ON	5 to 50 RPM
OFF	ON	OFF	50 to 500 RPM
OFF	OFF	OFF	500 to 5000 RPM

Diagram 1.

DLS1000 Switch Locations:





A = Under Speed
B = Over Speed

DLS2000 Switch Locations:

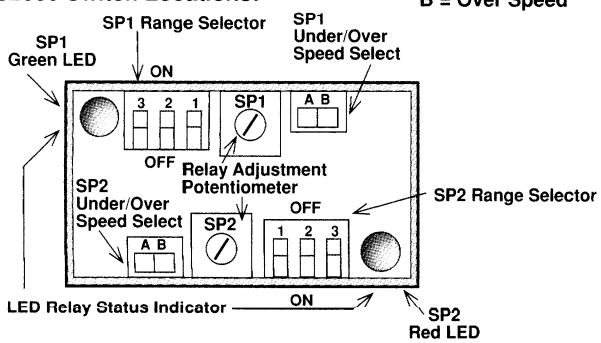
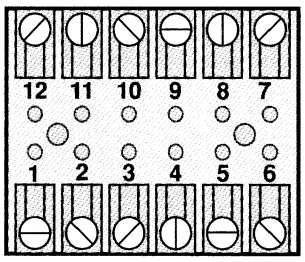


Diagram 2.

Terminal Connections:



1. **Earth Ground**
2. **115Vac Hot**
3. **115Vac Neutral**
4. **Transducer Signal**
5. **Transducer Supply**
6. **Transducer Ground**
7. **N.O. (Set Point 1)**
8. **Common (Set Point 1)**
9. **N.C. (Set Point 1)**
10. **N.O. (Set Point 2)**
11. **Common (Set Point 2)**
12. **N.C. (Set Point 2)**

Power Wire Connections:

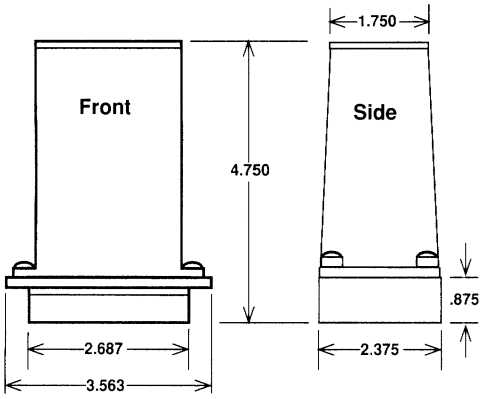
115Vac Earth Ground Term. 1	230Vac Earth Ground Term. 1
115Vac Hot Term. 2	230Vac Hot Term. 2
115Vac Neutral Term. 3	230Vac Hot Term. 3

12/24Vdc Earth Ground Term. 1
12/24Vdc Positive (+) Term. 2
12/24Vdc Negative (-) Term. 3

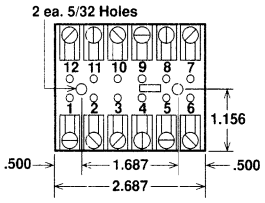
Sensor Wire Connections:

Terminal	Description	Sensor Model 906-907	Sensor Model 930-931-932-933-1101-1102
4	Signal	Black	Clear
5	Supply	Red	Red
6	Ground	Clear/Shield	Black/Shield

DLS1000/2000 Dimensional Drawings: Dimensions in Inches

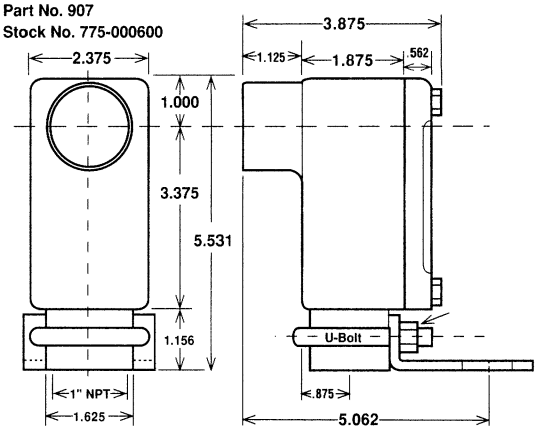


Terminal Block



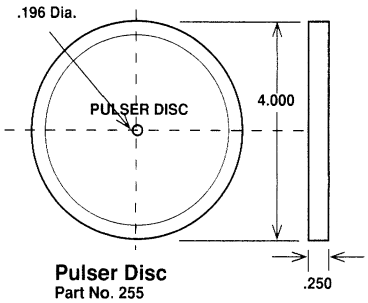
Explosionproof Sensor

Part No. 907
Stock No. 775-000600



*Sensing Head Dimensions are ±.062

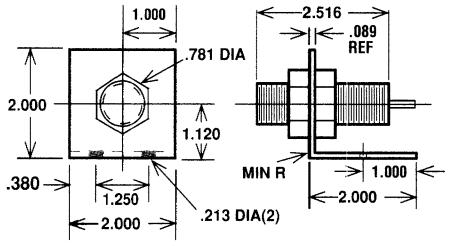
End of Shaft Pulser Disc



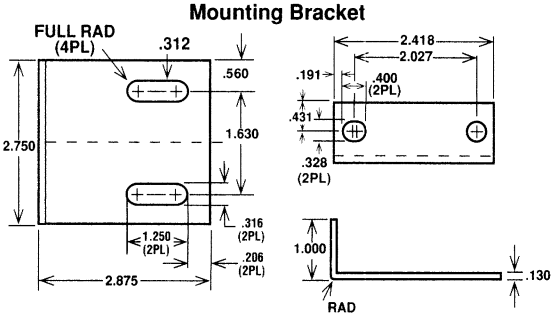
Pulser Disc
Part No. 255
Stock No. 700-000200

Digital Sensing Head

Part No.906
Stock No. 775-000500



Mounting Bracket



DLS1000/2000 General Specifications:

Input Power:

Voltage	115 Vac, ±10% Standard 230 Vac, 12 Vdc, 24 Vdc Optional
Frequency	50 – 60Hz
Wattage	6 VA

Transducer Input Signal:

Type	Open Collector NPN
Input Impedance	2200Ohms
Amplitude	15 Volts Nom., 10 Volts Min.
Frequency	.0666 Hz Min. 666.67 Hz Max.
Transducer Supply	+15 Vdc, 50 mA

Set Point Data:

Number Available	1 (DLS1000) or 2 (DLS2000)
Speed Range	.5 to 5000 rpm (.0666 Hz to 666.67 Hz)
Adjustment	Single Turn (270°) Potentiometer
Repeatability	0.5%
Contact Configuration	Form C (SPDT)
Indicator	Green LED (Set Point 1) Red LED (Set Point 2)

Physical/Environmental:

Housing Material	ABS Plastic
Operating Temperature	0°C to 70°C*
Shipping Weight (System)	2 lb.

Pulser Disc:

Material	Nylon 12 (with ferrite material)
Operating Temperature	-40°C to 60°C*
Maximum Speed	Consult Factory

Pulser Wrap (optional):

Material	PVC (standard) Aluminum (optional)
Operating Temperature	-40° to 60°C*
Maximum Speed	Consult Factory

Standard Sensor (906):

Material – Transducer Body	Aluminum
Material Mounting Bracket	Steel
Thread Size	3/4 – 16 UNF
Output Type	Open Collector, Current Sinking 20mA Max.
Signal Cable	3-Conductor, Shielded, 10 feet supplied
Signal Transmission Distance	Up to 1500 Feet
Operating Temperature	-40°C to 60°C*
Sensing Distance (Gap)	1/16 to 1/4 inch
Explosionproof Sensor (optional)	Cast Aluminum, C.S.A. Approved, U.L. Rated Class I Group D; Class II Group E, F, G; Class III

**Higher Temperature Ranges Available • Consult Factory.*

Spare Parts List	Stock No.	Part No.
Standard Digital Sensor	775-000500	906
Explosionproof Digital Sensor	775-000600	907
4-Inch Diameter Pulser Disc	700-000200	255
Aluminum 4-Inch Diameter Disc	700-001500	255-A
DLS1000 (Switch Only)	800-005001	
DLS2000 (Switch Only)	800-005101	
Terminal Block	569-005000	
Pulser Wraps	Consult Factory	

Specifications Subject to Change Without Notice.

CALL TOLL FREE FOR MORE INFORMATION

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