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Technical Information

Sensors

KS10201 Microsyn Level Sensor

Revision history

Table of revisions

Date	Changed	Rev
November 2015	Converted to Danfoss layout	0001
August 2010	Initial release (replaces BLN-95-8912)	0000

Contents

Overview

Description

The KS10201 Microsyn Level Sensor electromagnetically measures the deviation of the sensor from a gravity reference. The reference is a pendulous mass having freedom of movement in one plane about a fixed center point.

This is an AC input device with variable transformer interface and AC differential amplitude output.

In normal use the level sensor is connected to a remote R7232A proportional indicating controller or K04462 controller to provide excitation to the level sensor coils and a proportional output to a servovalve such as the V7059A to correct for off-level conditions. If an off-level surface is required, an adjustable setpoint referenced to the level sensor mechanism is plugged into the controller. The system can then be used for ±9 1/2% level requirements.

Features

- Modular design. Compact unit can be mounted on any vertical surface.
- Totally enclosed in a rugged cast aluminum housing.
- Easy to wire, connections between amplifier and level sensor are made through MS connectors.
- Excellent sensitivity, the shaft supporting the pendulous mass and the rotor of the microsyn is mounted on ball bearings for smooth, low-friction rotation.
- Easy to remove for service or replacement.

Ordering information

Specifications

Part number	Description	Viscosity (CS)
KS10201	Level sensor	1000 CS
KS10202	Level sensor	100 CS
KS10203	Level sensor	500 CS
KS10204	Level sensor	3000 CS

Coiled cord for wiring

Part number	Description
KW01009*	2 to 10 Foot Coiled Cable

* All connections are made through an MS receptacle mounted on the level sensor. The kit (part number KW01009) provides a two foot coiled cable that extends to ten feet and is completely assembled with mating MS connectors to provide all necessary wiring between the level sensor and R7232A amplifier.

Overview

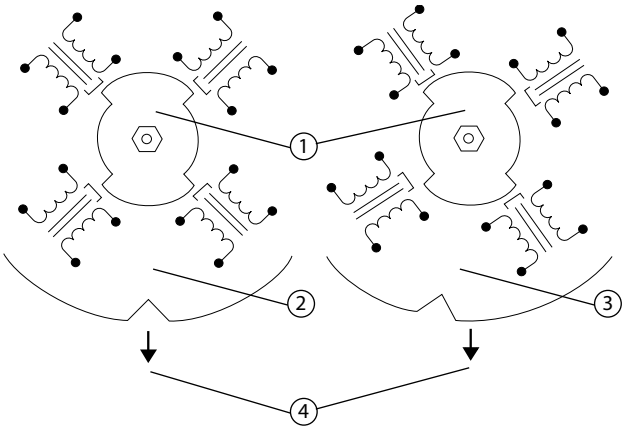
Theory of operation

The pendulum is suspended from a ball-bearing mounted shaft. The rotor of a microsyn is made of permeable material and is also attached to the shaft. The stator of the microsyn is mounted on the outer housing of the level sensor. The stator consists of four transformer coils mounted 90° apart on the four pole faces of a magnetically permeable frame. See following *Rotor-stator relationship*. Secondaries of the coils 180° apart are wired in series.

Rotor position with respect to the stator determines the number of flux linkages between primary and secondary of each coil. The voltages induced in the secondaries can be summed so that the output is proportional to the magnitude of the deviation from the gravity reference. Phase indicates the direction of rotation.

At null, an equal amount of the magnetically permeable material of the rotor is in the magnetic field of each coil. As the stator and housing rotates from null, more magnetically permeable material is introduced into the magnetic field of one set of two coils and some material is removed from the magnetic field of the other set of coils. The material displacement results in a higher voltage output from the secondaries of the two coil set with the greater amount of magnetically permeable material in its magnetic field. The displacement also results in a lower voltage output from the other two coil set.

Rotar-stator relationship



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1 Rotor

2 Slope sensor at null

3 Slope sensor 10° from null

4 Gravity reference

Technical data

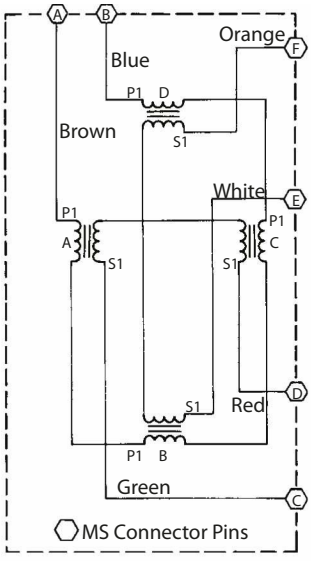
Electrical

Input voltage	5 V maximum at 60 Hz Input voltage may be increased at higher frequencies.
Power consumption	0.5 watts, maximum
Output voltage*	100 V peak, maximum Varies with input and has a flat frequency response with inputs from 400 to 2000 Hz.
Primary impedance	Approximately 10 ohms
Secondary impedance†	145 ohms 200 mh each coil Two coils in series for each pair of output terminals.
Range	The useful range is ± 9 1/2% slope

* If using a controller other than the R7232A or K04462, consult a Danfoss representative.

† Reference following *Block diagram*.

Block diagram



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Technical data

Environmental

Operation temperature rating	- 18° to 77° C (0° to 170° F)
Storage temperature rating	- 40° to 77° C (- 40° to 170° F)
Temperature stability	Null shift of ± 0.35% slope maximum; referred to 27° C (80° F)
Vibration (Two part vibration test designed for mobile equipment controls)	Withstands cycling test performed on each of the three major axes: Cycling from 5 to 2000 Hz for a period of one hour (if four resonant points) to three hours (if no resonant point). Withstands resonant dwell for one million cycles for each of the four most severe resonant points on each of the three major axes.
Shock (Three shocks in both directions of the three mutually perpendicular axes for a total of 18 shocks)	50 g per 11 ms

Weight

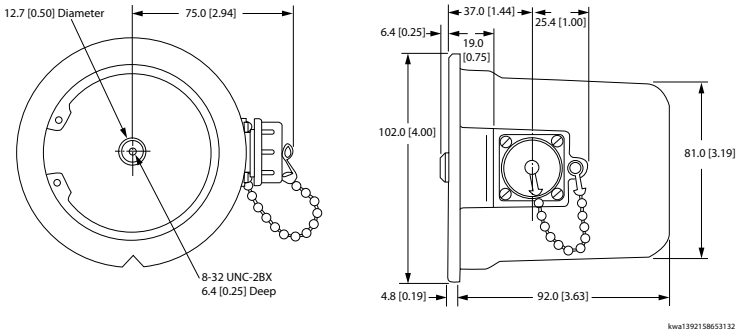
Weight	0.97 kg (2 lbs, 2 ozs)

Installation

Dimensions

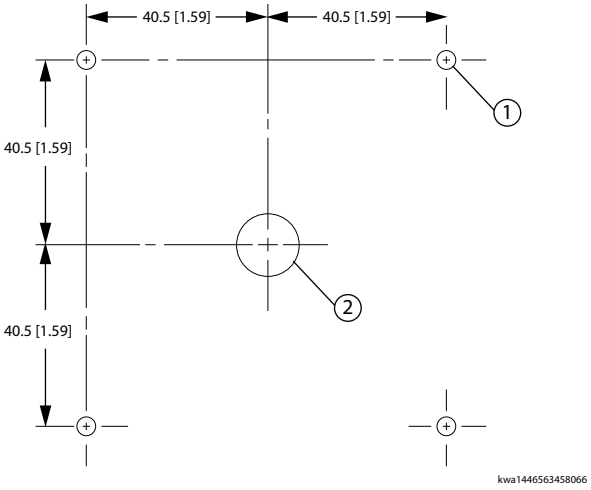
KS10201 mounting dimensions

millimeters [inches]



KS10201 mounting holes

Mounting holes locations



1 Four 8-32 UNC-2B screw holes

2 19/32 inch drill bit size pilot hole

Mounting

1. Determine the location on any convenient vertical surface.
2. Reference mounting hole locations, *Dimensions* on page 8.
   a) Drill and tap four #8/32 UNC-2B holes.
   b) Drill a 15.1 mm [0.59 in] pilot hole at the center of the four holes.
3. When the notch in the flange of the sensor is at the bottom, the sensor is approximately at null. If enough clearance exists above the sensor, install the two bottom cleats, leaving the screws loose enough to get the flange beneath the cleat. The cleats and screws are provided with the sensor.
   a) Slide the flange of the sensor beneath these two cleats and install the other two.
   b) Tighten the four cleats so the sensor is snug but can still be turned by hand for final leveling or sloping.

Installation

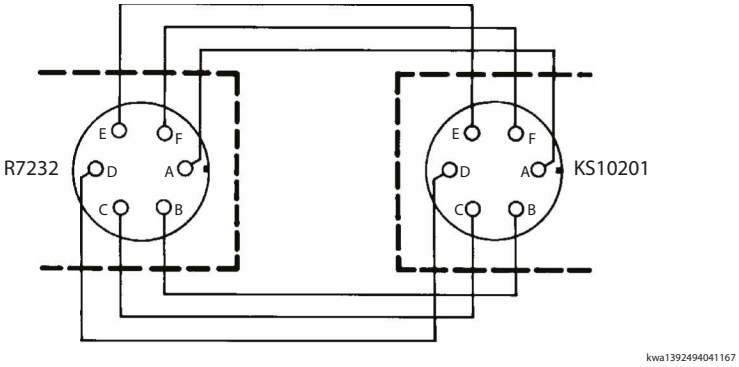
Wiring

All connections are made through an MS receptacle mounted on the level sensor.

The Danfoss kit (part number KW01009) provides a two foot coiled cable that extends to ten feet and is completely assembled with mating MS connectors to provide all necessary wiring between the level sensor and R7232A amplifier.

If the coiled cable is not used, Bendix MS3106A14S-6S (straight) or MS3108A14S-6S (elbow) can be ordered. Order two connectors and wire A to A, B to B, etc., as shown in following *Connection diagram*, and then plug directly into the R7232A.

Connection diagram



Adjustment

After all wiring has been completed, only minor adjustment is needed to bring the sensor to null:

1. If a Q625A remote set unit is used, disconnect it temporarily at the R7232A amplifier, switch to STANDBY, and observe the meter.
2. Using the JOG switch, raise or lower the machine to a level position.

   A four foot level or better can be used to determine when the machine is level.
3. Gently turn the level sensor until the meter centers (nulls), and tighten the cleats so the sensor cannot move.
4. Reconnect the Q625A and complete installation of the rest of the system.

Troubleshooting

The level sensor will provide extended, trouble free operation and should not need servicing under normal operating conditions. Be sure the level sensor is malfunctioning before replacing it.

1. Check if one of the two MS connectors at either the amplifier or sensor are loose.
2. Check wiring. Inspect the coil cord along its entire length for a cut or evidence of pinching.
3. Check if mounting cleats have loosened from excessive vibration.
4. If a VOM or some other type of resistance indicator is available, check for closed circuit between Pins A and B, between Pins C and D, between Pins E and F. Reference *Electrical* on page 6, *Block diagram*.
5. If a replacement level sensor is available, unplug the MS connector from the existing sensor and attach the connector to the replacement sensor. With the notch in the flange down, rotate the replacement sensor a few degrees side-to-side and observe operation.

   If operation appears to be normal where a malfunction occurred before, replace the level sensor.

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