

# CMSS 68 / CMSS 668 series

## 8 mm eddy probe system, Ryton-based eddy current transducers

Option now available with either the standard removable/reversible connector or the optional permanent fixed connector.



### Introduction

The eddy probe is used to measure radial or axial shaft motion. It is mounted through or to the side of a bearing cap and observes the shaft's movement relative to its mounting position. An eddy probe system comprises a probe, a driver (oscillator demodulator) and an optional extension cable.

Eddy probe systems have excellent frequency response. They have no lower frequency limit and are used to measure shaft axial position as well as vibration.



### Specifications

#### CMSS 68 eddy current probe system

Unless otherwise noted, the following specifications apply to a complete CMSS 68 eddy current probe system, at 23 °C (73 °F), with a -24 V DC supply and target of AISI 4140 steel, comprising of:

- CMSS 68: Eddy current probe
- CMSS 958: Extension cable
- CMSS 668 or CMSS 668P: Driver

**Note:** These specifications may vary with different options and systems.

#### Electrical

- Usable range: 2,3 mm (0,2 to 2,5 mm); 90 mils (10 to 100 mils)
- Sensitivity: 7,87 mV/μm (200 mV/mil)
- Linearity: ±25,4 μm (1 mil) of best straight line over 2,3 mm (90 mil) range
- Frequency range: DC to 10 kHz (600 000 CPM), down maximum of 3 dB at 10 kHz
- Driver signal output:
  - Impedance: Minimum calibrated load resistance of 3 kΩ; output is protected against miswiring
  - Voltage: Nominal 7,87 mV/μm (200 mV/mil) corresponding to -18 V DC at 2,3mm (90 mils) with -24 V DC supply
- Power supply requirements: 15 mA from -24 to -30 V DC

- Interchangeability:
  - Probes, extension cables and drivers are compliant to API 670 requirement and may be interchanged with 5% or less performance change without recalibration
  - All units factory calibrated at 23 °C (73 °F)
  - Trim calibration adjustment on driver provides duplication of characteristics after replacement of any component

#### Environmental and mechanical

##### CMSS 68 probe

- Operating temperature range: -35 to +175 °C (-30 to +350 °F) (**Note:** Ex i regulations restrict upper limit to 100 °C (210 °F))
- Differential pressure: To 4 bar (60 PSI)
- Materials:
  - Case: Grade 300 stainless steel
  - Tip material: Ryton
  - Connectors: Nickel plated stainless steel; weatherproof, sealable
  - Cable: Coaxial with fluorine based polymer insulation; high tensile and flexible strength
- Mounting: Recommend minimum clearance of 1/2 probe tip diameter around the probe tip to maintain factory calibration

##### CMSS 958 extension cable

The temperature ranges, connectors and cable are the same as the CMSS 68 eddy current probe.

## CMSS 668 and CMSS 668P drivers

- Operating temperature range: 0 to 65 °C (30 to 150 °F)
- Connections (Power, Signal, GND):
  - Five terminal removable and reversible compression terminal block accepting up to 2 mm<sup>2</sup> (14 AWG) wire
  - Three connections necessary per block (–24 V DC, GND, Signal)
  - The CMSS 668P has a permanent fixed connector with the same connection characteristics
- Mounting: C-DIN rail mount that bolts onto the driver enclosure or the standard four 4,8 mm (0.19 in. or #10) clearance holes in a square on 63,5 mm (2.5 in.) centers

## System performance

The following performance characteristics apply for the CMSS 68 eddy current probe system in addition to quoted nominal specifications:

- Extended temperatures: With 1 m (3.3 ft.) probe and 4 m (13.1 ft.) extension cable operating in a range of –35 to +120 °C (–30 to +250 °F), and driver in the range of 0 to 65 °C (30 to 150 °F)
- Sensitivity: ±10% of 7,87 mV/μm (200 mV/mil)
- Linearity: ±25,4 μm (1 mil) of best straight line over 2,3 mm (90 mil) range
- Minimum target size:
  - Flat surface: 16 mm (0.63 in.)
  - Shaft diameter: 24 mm (0.93 in.)

## Hazardous area approvals

### North America

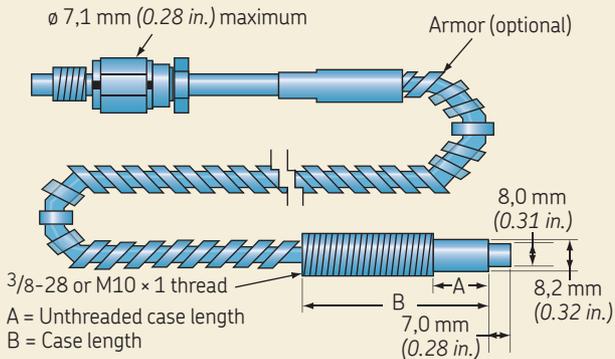
- Approvals granted by Factory Mutual (FM) and Canadian Standards Association (CSA)
- **Class I, Division 1 Groups A, B, C, D** when used with intrinsically safe Zener barriers or galvanic isolators; contact your local SKF sales representative for details
- **Class I, Division 2 Groups A, B, C, D** when connected with National Electric Code (NEC) without Zener barriers or galvanic isolator; contact your local SKF sales representative for details

### Europe

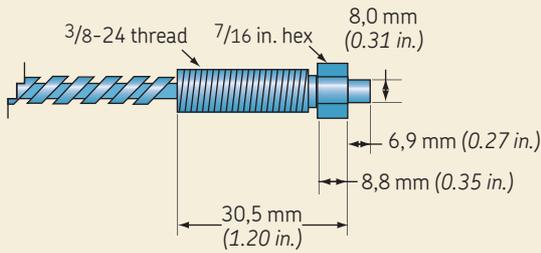
- Certification to ATEX Directive
  - Drivers: Ex II 1 G EEx ia IIC T4 (–20 ≤ T<sub>a</sub> ≤ +75 °C) (–5 ≤ T<sub>a</sub> ≤ +165 °F); certificate number BAS02ATEX1168X
  - Probes: Ex II 1 G EEx ia IIC T4 or T2; certificate number BAS02ATEX1169
  - System: EEx ia IIC T4 or T2 (as per schedule); certificate number Ex 02E2170
- Intrinsic Safety requires use of Zener barriers; contact your local SKF sales representative for details

**Note:** See ordering details for probe and driver designations for hazardous area approved models.

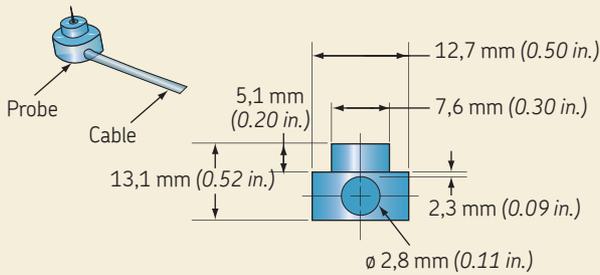
### Standard mount case



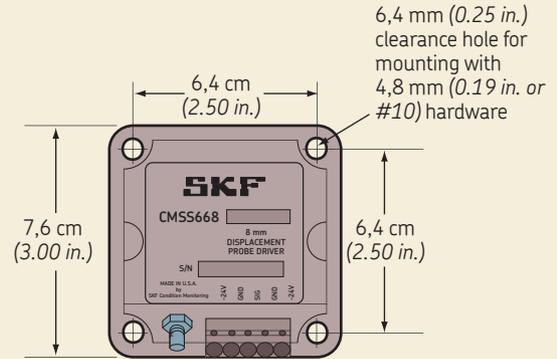
### Reverse mount case



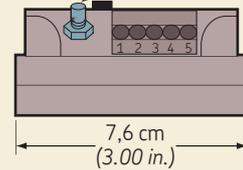
### Button (disk) probe



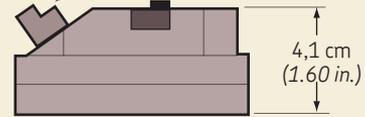
### CMSS 668 dimensions



**Connector:** Stainless steel jack-type mates with CMSS 958 extension cable



**Removable or permanent fixed connector:** Terminal strip type rated for 250 V, 10 A, 14 AWG maximum wire size



## Ordering information – Part 1: Eddy current probe

### Ordering information

CMSS 68 eddy current probe.  
(SKF standard: CMSS 68-000-00-12-10)

Part number	CMSS 68-aab-cc-dd-ee
<b>aa</b>	<b>Cable</b>
00	Standard
01	Armored
02	Fiberglass sleeved
07	CSA/FM/SIRA (ATEX) (IS) certified
08	CSA/FM/SIRA (ATEX) (IS) certified and armored
09	FM (non-incendive)
0B	FM (non-incendive) armored
14	Standard for CMSS 668H-5 use
15	Armored for CMSS 668H-5 use
16	Fiberglass sleeved for CMSS 668H-5 use
<b>b</b>	<b>Case</b>
0	$\frac{3}{8}$ -24 threads (standard)
1	M10 x 1 threads
4	No case
E	Button probe (Fiberglass)
<b>cc</b>	<b>Unthreaded case length</b>
00	Fully threaded
01 to 50	2,5 to 127,0 mm (0.1 to 5.0 in.) (unthreaded)
51 to 99	129,5 to 251,5 mm (5.1 to 9.9 in.)
RM	Reverse mount, $\frac{3}{8}$ -24 threads
<b>dd</b>	<b>Case length</b>
00	Standard: No case
08	Standard: 2,0 cm (0.8 in.)
12	Standard: 3,0 cm (1.2 in.)
15	Standard: 3,8 cm (1.5 in.)
20	Standard: 5,1 cm (2.0 in.)
25	Standard: 6,4 cm (2.5 in.)
30	Standard: 7,6 cm (3.0 in.)
40	Standard: 10,2 cm (4.0 in.)
47	Standard: 11,9 cm (4.7 in.)
60	Standard: 15,2 cm (6.0 in.)
90	Standard: 22,9 cm (9.0 in.)
09 to 59	Special: 2,3 to 15,0 cm (0.9 to 5.9 in.)
91 to 99	Special: 23,1 to 25,1 cm (9.1 to 9.9 in.)
<b>ee</b>	<b>Overall length*</b>
05	0,5 m (1.6 ft.)
10	1,0 m (3.3 ft.) (standard)
5A	5,0 m (16.4 ft.)
AA	10,0 m (32.8 ft.)
FA	15,0 m (49.2 ft.)

\* Length is nominal electrical; physical length may vary.

#### Compatible systems:

- 0,5 m probe / 5,0 m system: CMSS 958-xx-045 / CMSS 668
- 1,0 m probe / 5,0 m system: CMSS 958-xx-040 / CMSS 668
- 5,0 m probe / 5,0 m system: CMSS 668
- 10,0 m probe / 10,0 m system: CMSS 668
- 15,0 m probe / 15,0 m system: CMSS 668

The 5A, AA and FA units have an integral cable and mate directly to the driver.

#### Reverse mount case and button (disk) probe:

- Reverse mount case: **CMSS 68-aa0-RM-12-ee**
- Button (disk) probe: **CMSS 68-aaE-00-00-ee**

## Ordering information – Part 2: Extension cable

### Ordering information

CMSS 958 Extension cable.  
(SKF standard CMSS 958-00-040)

Part number	CMSS 958-aa-bbb
<b>aa</b>	<b>Cable</b>
00	Standard
01	Armored
02	Fiberglass sleeved
09	CSA/FM/SIRA (ATEX) (Intrinsically Safe) certified
0A	CSA/FM/SIRA (ATEX) (Intrinsically Safe) certified and armored
0H	FM (non-incendive)
0J	FM (non-incendive) armored
50	Standard for CMSS 668H-5 use
51	Armored for CMSS 668H-5 use
52	Fiberglass sleeved for CMSS 668H-5 use
<b>bbb</b>	<b>Length (compatible system listed)</b>
040	4,0 m (13.1 ft.) (CMSS 668, 1,0 m (3.28 ft.) CMSS 68)
045	4,5 m (14.8 ft.) (CMSS 668, 0,5 m (1.64 ft.) CMSS 68)
090	9,0 m (29.5 ft.) (CMSS 668-1, 1,0 m (3.28 ft.) CMSS 68)
095	9,5 m (31.2 ft.) (CMSS 668-1, 0,5 m (1.64 ft.) CMSS 68)
140	14,0 m (45.9 ft.) (CMSS 668-2, 1,0 m (3.28 ft.) CMSS 68)

## Ordering information – Part 3: Driver (SKF standard: CMSS 668)

Drivers containing “P” in the model number denote those models with a permanent fixed connector.

### Driver (5 m system) – CMSS 668 / CMSS 668P

7,87 mV/μm (200 mV/mil). Use with:

- 1,0 m probe and 4,0 m extension cable
- 0,5 m probe and 4,5 m extension cable
- 5,0 m probe

### Driver (10 m system) – CMSS 668-1 / CMSS 668P-1

Use with a 1 m probe and 9 m extension cable or a 10 m probe.

- Usable range: 2,3 mm (0,25 to 2,5 mm); 90 mils (10 to 100 mils)
- Sensitivity: 7,87 mV/μm (200 mV/mil) ±10%
- Linearity: ±38 μm (1.5 mil) from best straight line

### Driver (15 m system) – CMSS 668-2 / CMSS 668P-2

Use with a 1 m probe and 14 m extension cable or a 15 m probe.

- Usable range: 2,3 mm (0,25 to 2,5 mm); 90 mils (10 to 100 mils)
- Sensitivity: 7,87 mV/μm (200 mV/mil) ±10% at 23 °C (73 °F)
- Linearity: ±38 μm (1.5 mil) from best straight line over 2,3 mm at 23 °C (73 °F)

### Driver (extended range) – CMSS 668H-5 / CMSS 668HP-5

Use with a 1 m probe and 9 m extension cable or a 10 m probe.

- Usable range: 3,6 mm (0,4 to 4,0 mm); 145 mils (15 to 160 mils)
- Sensitivity: 3,94 mV/μm (100 mV/mil) ±10% at +23 °C (73 °F)
- Linearity: ±25,4 μm (1 mil) from best straight line over 3,6 mm at 23 °C (73 °F)

### Enhanced environmental protection – CMSS 668-8 / CMSS 668P-8

Specifications for an enhanced environmental protection driver are the same as for the standard driver; however, the enhanced environmental protection driver is also filled with potting material to provide an additional measure of protection when operated in adverse environmental conditions

- Sensitivity: 7,87 mV/μm (200 mV/mil)

### Hazardous area approval (Intrinsic Safety) with 4140 stainless steel target – CMSS 668-16-9 / CMSS 668P-16-9

This driver is CSA/FM/SIRA (Intrinsically Safe) certified for a 5 m system. Use it with CSA/FM/SIRA (Intrinsically Safe) certified 1 m CMSS 68 probe and 4 m CMSS 958 extension cable. For intrinsic safety installations, drivers must be installed with intrinsic safety (I-S) barriers.

### Barriers

- For FM approval:
  - Power: Stahl 8901/30-280/085/00
  - Signal: Stahl 8901/30-199/038/00
- For CSA and SIRA approval:
  - Power/Signal: MTL 7096 Dual (neg)

Contact your local SKF sales representative for details.

- Usable range: 1,6 mm (0,25 to 1,9 mm); 65 mils (10 to 75 mils)
- Sensitivity: 7,87 mV/μm (200 mV/mil)
- Linearity: ±25,4 μm (1 mil) from best straight line over 1,15 mm (45 mil) range

### CMSS 668-16-xx / CMSS 668P-16-xx\*

These are CSA/FM/SIRA (Intrinsically Safe) certified drivers for a 5 m system calibrated for shaft materials other than standard 4140 stainless steel. Use this driver with CSA/FM/SIRA (Intrinsically Safe) certified 1 m CMSS 68 probe and 4 m CMSS 958 extension cable. For intrinsic safety installations, drivers must be installed with intrinsic safety (I-S) barriers (see CMSS 668-16-9).

- Usable range:
  - Best attainable for specific shaft material provided
  - Customer to provide identification of shaft material and sample (approximately 5,1 cm (2.0 in.) diameter disk, 1,3 cm (0.5 in.) thick)
  - Range not expected to exceed the 1,651 mm (65 mils) of standard unit
- Sensitivity: 7,87 mV/μm (200 mV/mil), ± to be determined percentage of 7,87 mV/μm (200 mV/mil) dependent on the shaft sample material (–24 V DC supply)
- Linearity: ± the minimum deviation (in μm or mils) from the best straight line attainable for the sample shaft material provided

\* xx = System calibrated for shaft materials other than standard 4140 stainless steel. For custom configurations, please contact an SKF sales representative.

### Hazardous area approval (non-incendive) with 4140 stainless steel target – CMSS 668-20-00 / CMSS 668P-20-00

This FM (non-incendive) certified driver for the 5 m system is used with the FM (non-incendive) certified 1 m CMSS 68 probe and CMSS 958 extension cable.

- Usable range: 2,3 mm (0,25 to 2,5 mm); 90 mils (10 to 100 mils)
- Sensitivity: 7,87 mV/μm (200 mV/mil)
- Linearity: ±25,4 μm (1 mil) of best straight line over 2,3 mm (90 mil) range

**Note:** All circuit boards used in SKF CMSS 668 series drivers are conformal coated as standard procedure.