

## General Description

The ECS98 family of single channel and differential eddy-current proximity sensors are instrument grade position sensors for precision measurement. Standard full-scale position ranges are 1, 2, and 4mm with 5, 10, and 20mm probes respectively. The full-scale position changes are converted to  $\pm 5V$  via low-noise electronics. Custom probes are also provided for OEM and research applications.

In most cases, a linear output is achieved by restricting the measurement, but the use of external software linearization is common. Factory provided linearization formulas are available upon request.

The sensor operates on a single 12-15 V supply, has high power supply rejection ratio, and has reduced sensitivity to probe cable flexure relative to competing designs.

Resolutions of 50 Angstroms are common in temperature stable environments.

## Features

- Low-noise electronics
- < 1 part in 200,000 resolution at 100Hz bandwidth
- High thermal stability when internal temperature sensor is used.
- Standard probes operate up to 100° Celsius
- 5mm, 10mm, 20mm standard probes
- Cable flex insensitivity
- Low-profile electronics package

---

## Applications

---

### Non-contact Measuring Systems

- Position
- Displacement
- Alignment
- Vibration
- Tilt

### Non-Destructive Evaluation

- Crack Detection
- Wear
- Strain

### Contact Measuring Systems

- Coating thickness films

**Table 1. Information**

Product Type	Description	Probe compatibility
ECS98S	Single channel	All probes in Table 2.
ECS98D	Dual channel for differential measurements	All probes in Table 2.

**Table 2. Probe Specifications**

Probe type (P/N)	(5P)	(10P)	(20P)	custom made
Probe diameter	5mm	10mm	20mm	customer specified = z mm
Probe Length standard	18mm	34mm	41mm	N/A
Max measuring range	1mm	2mm	4mm	z/4 mm
Max resolution (@100Hz)	5nm	10nm	20nm	z/600,000mm
Repeatability	5 $\mu$ m/0.3nm	10 $\mu$ m/0.6nm	25 $\mu$ m/1.5nm	z/600,000mm
Accuracy	as calibrated	as calibrated	as calibrated	as calibrated
Sensitivity	up to 200mV/ $\mu$ m	up to 100mV/ $\mu$ m	up to 50mV/ $\mu$ m	up to 200mV/ $\mu$ m
Linearity	$\leq$ 10%	$\leq$ 10%	$\leq$ 10%	$\leq$ 10%
Linearity (w/ software calibration)	$\leq$ 1%	$\leq$ 1%	$\leq$ 1%	$\leq$ 1%

**Table 3. Customer Specified Features**

Feature	Minimum	Maximum	Standard
body type	smooth	threaded	either
length of cable	as specified	3m	1m
temperature range for probe	-60°C	180°C	100°C

**Table 4. Electrical Characteristics**

	Conditions	Min	Nominal	Max
Supply Voltage	T <sub>ambient</sub> = 25° C	12V	15V	15V
Supply Current	T <sub>ambient</sub> = 25° C		70mA	
Frequency Response			10KHz	
LED	green-yellow-red			
Output impedance			100 Ohms	
Output Bandwidth			10kHz	
Output current				5mA
Temp sensor offset	T <sub>ambient</sub> = 0° C		500 mV	
Temp sensor gain			10mV/°C	
Connections	see Table 4.			
Carrier residual	@1MHz		6mV peak-peak	

**Table 5. ECS98 Connector Single Channel Pin Out**

Pin number	Function for pin (AMP P/N 557908-2)	Function for pigtail (AMP P/N 621371-1)	
Detention Clip	ECS98 chassis	Drain	#30 AWG (shield)
1	<b>Channel 2 output<sup>1</sup> (+/- 5V nominal)</b>	Black	#30 AWG
2	<b>GND</b>	White	#30 AWG
3	Channel 1 output (+/- 5V nominal)	Red	#30 AWG
4	<b>GND</b>	Green	#30 AWG
5	Temperature sensor output (°C x 10mV/°C)	Brown	#30 AWG
6	NC (Not Connected)	Blue	#30 AWG
7	<b>GND</b>	Orange	#30 AWG
8	1MHz reference <sup>2</sup> (see note)	Yellow	#30 AWG
9	NC (Not Connected)	Violet	#30 AWG
10	NC (Not Connected)	Gray	#30 AWG
11	<b>GND</b>	Tan	#30 AWG
12	<b>GND</b>	Pink	#30 AWG
13	<b>Vcc (+15V)</b>	White/Blue	#30 AWG
14	Vcc (+15V)	Blue/White	#30 AWG
15	Case	Green/Yellow	#30 AWG
Detention Clip	ECS98 chassis	Drain	#30 AWG (shield)

**Table 6. Other**

Weight of electronics box	88 g
Material of probe tip	polyamide-imide
Material of sleeve	stainless steel 303, or 316
Dimensions of electronics box	88.6mmX61.0mmX13.4mm
Chemical Compatibility	can be specified as per customer request

<sup>1</sup> ECS98D dual channel units only.

<sup>2</sup> For synchronizing multiple sensors. 4Volts peak to peak with 5Volt DC offset. Normally N.C.

---

Typical Performance Curves for ECS98S with Probe (ECS98S)

---

Calibration Data for ECS98S with Probe

