

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 μ m/0.3nm	10 μ m/0.6nm	25 μ m/1.5nm	z/600,000mm
Accuracy	as calibrated	as calibrated	as calibrated	as calibrated
Sensitivity	up to 200mV/ μ m	up to 100mV/ μ m	up to 50mV/ μ m	up to 200mV/ μ 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 _{ambient} = 25° C	12V	15V	15V
Supply Current	T _{ambient} = 25° C		70mA	
Frequency Response			10KHz	
LED	green-yellow-red			
Output impedance			100 Ohms	
Output Bandwidth			10kHz	
Output current				5mA
Temp sensor offset	T _{ambient} = 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	Channel 2 output¹ (+/- 5V nominal)	Black	#30 AWG
2	GND	White	#30 AWG
3	Channel 1 output (+/- 5V nominal)	Red	#30 AWG
4	GND	Green	#30 AWG
5	Temperature sensor output (°C x 10mV/°C)	Brown	#30 AWG
6	NC (Not Connected)	Blue	#30 AWG
7	GND	Orange	#30 AWG
8	1MHz reference ² (see note)	Yellow	#30 AWG
9	NC (Not Connected)	Violet	#30 AWG
10	NC (Not Connected)	Gray	#30 AWG
11	GND	Tan	#30 AWG
12	GND	Pink	#30 AWG
13	Vcc (+15V)	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

¹ ECS98D dual channel units only.

² 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

