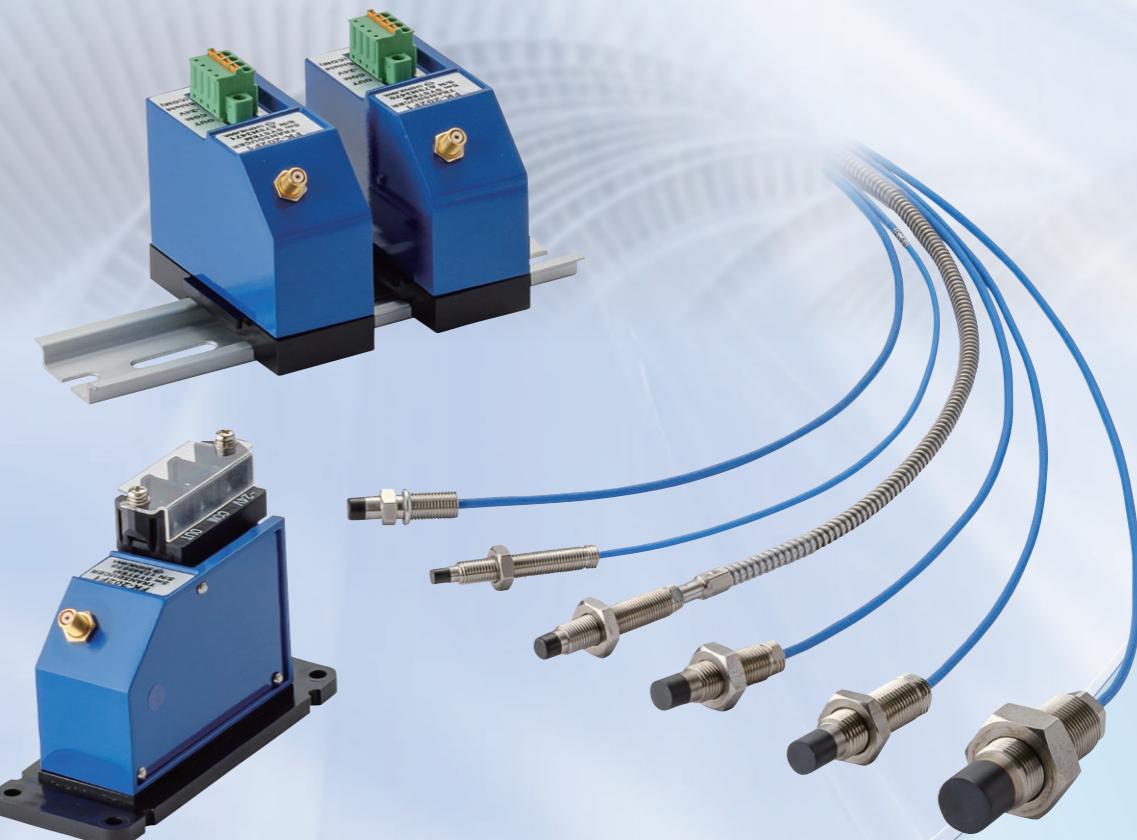


Best solution for the measurement of shaft vibration,  
shaft position, rotating speed, eccentricity and  
differential expansion of a Rotating Machine.

# FK series



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# Suitable for measurements of shaft vibration, axial position, rotational speed, phase mark, eccentricity and differential expansion on small high speed rotating machinery to large turbines and compressors

FK series transducer is an eddy current displacement sensor and it can be applied for condition monitoring of critical machines in a plant.

▼Case of Spring lock terminal



Example of DIN rail mounting

▼Case of Screw type terminal block(M4)



Example of screw mounting

## Features

### ● Environmental friendly design

lead-free soldering, RoHS compliance and reduced footprint

### ● Flexible mounting options

DIN-rail adaptor, 4-screw-cramp plate adaptor  
(to replace VK series and others)

### ● Quality sensor with excellent environmental resistance

sensor without impact of oil droplets and oil mist can be installed in two machines in principle

### ● API Standard 670(5th Edition) compliant

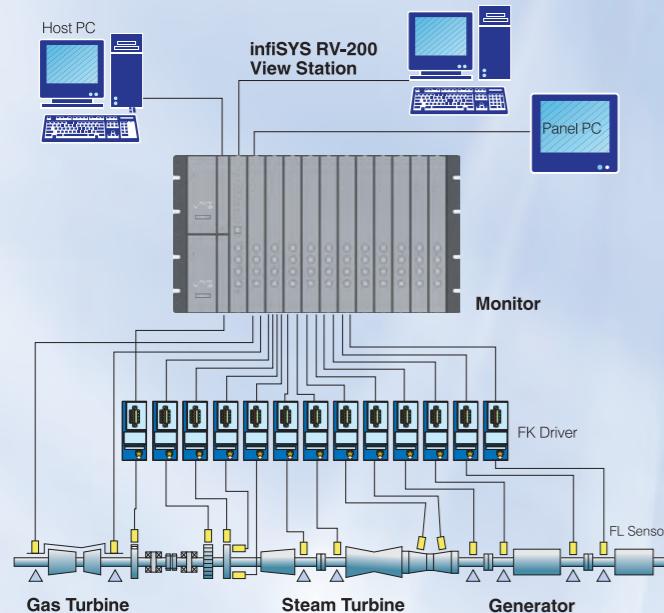
### ● Intrinsically safe<sup>1</sup>, and marine certified (NK, LR, DNV)

<sup>1</sup> Japan, North America, Europe, China, Korea etc.

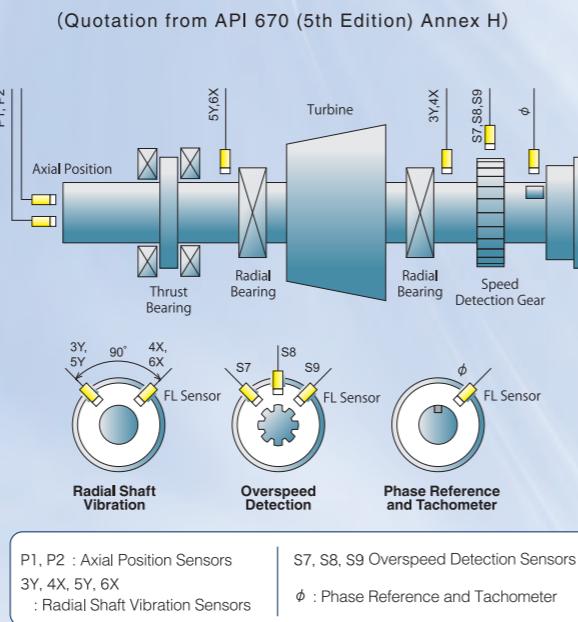
### ● CE compliant

## Example of Application

### Typical System Configuration



### Typical system arrangement for a turbine

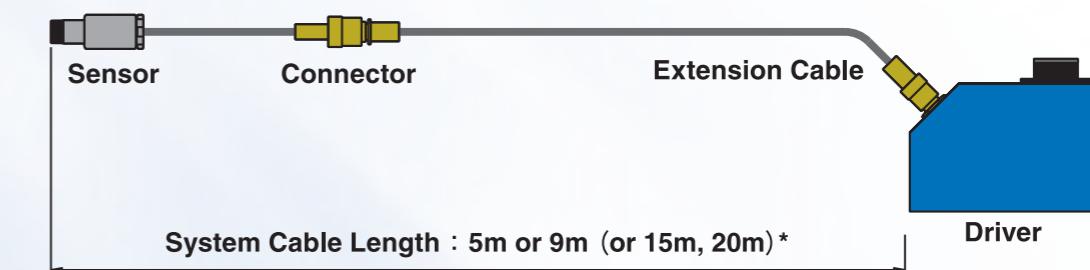


## Applications

Condition monitoring of critical machines supported by journal bearings. Such as steam/gas turbines, generators, compressors and so on.



## FK System Configuration



\* FK-152R : 15m or 20m  
FK-302F3 : 15m

# FK-Series

## Specifications

	<b>F K - 2 0 2 F</b> (Linear range : 2mm)	<b>F K - 3 0 2 F</b> (Linear range : 3mm)	<b>F K - 4 5 2 F</b> (Linear range : 4.5mm)																																								
System Cable Length	5m, 9m																																										
Calibration Material	JIS SCM440 flat surface																																										
Measuring Range	0.25mm to 2.25mm from sensor tip	0.25mm to 3.25mm from sensor tip	0.5mm to 5.0mm from sensor tip																																								
Sensitivity <sup>1</sup>	7.87V/mm	5.0V/mm	3.94V/mm																																								
Scale Factor Error <sup>1</sup>	Within ±5% of 7.87V/mm (for 5m system) Within ±6.5% of 7.87V/mm (for 9m system) (including interchangeability errors) Step : 0.25mm, Linear range : 2mm	Within ±4% of 5.0V/mm (if calibrated as a system) Within ±10% of 5.0V/mm (including interchangeability errors) Step : 0.25mm, Linear range : 3mm	Within ±6% of 3.94V/mm (if calibrated as a system) Within ±10% of 3.94V/mm (including interchangeability errors) Step : 0.5mm, Linear range : 4mm																																								
Linearity <sup>1</sup>	Within ±25μm of 7.87V/mm Straight line: (for 5m system) Within ±38μm of 7.87V/mm Straight line: (for 9m system) (including interchangeability errors) Linear range : 2mm	Within ±30μm of 5.0V/mm Straight line: (if calibrated as a system) Within ±45μm of 5.0V/mm Straight line: (including interchangeability errors) Linear range : 3mm	Within ±50μm of 3.94V/mm Straight line: (if calibrated as a system) Within ±100μm of 3.94V/mm Straight line: (including interchangeability errors) Linear range : 4.5mm																																								
Frequency Response <sup>1</sup>	DC to 10kHz(-3dB)	DC to 10kHz or more(-3dB)	DC to 10kHz(-3dB)																																								
Sensor Tip Diameter	Approx. 5mm or 8mm dia.	Approx. 10mm dia.	Approx. 11mm dia.																																								
Operating Temperature Range	Sensor : -40 to +177°C Extension Cable : -40 to +177°C Driver : -40 to +80°C																																										
Operating Humidity Range	30 to 95%RH (non-condensing, non-submerged)(Sensor body : 100%RH)																																										
Power Supply	-24VDC±10%																																										
Terminal Block	Screw type terminal block (M4) or Spring lock terminal																																										
Dimensions for typical sensor	<p>■ FL-202F08T : Sensor for 2mm range (Sensor tip diameter <math>\phi</math>8mm, with armor, with fluoro resin coating)</p> <table border="1"> <thead> <tr> <th>Code</th> <th>Length to be specified</th> <th>FL-202F08T</th> </tr> </thead> <tbody> <tr> <td>— Threaded Portion</td> <td>M10x1, 3/8-24UNF-2A</td> </tr> <tr> <td>L1</td> <td>Unthreaded length</td> <td>Maximum length : 230mm</td> </tr> <tr> <td>L2</td> <td>Case length</td> <td>Maximum length : 250mm</td> </tr> <tr> <td>L3</td> <td>Cable length</td> <td>0.5m, 1.0m, 5.0m<sup>2</sup>, 9.0m *2 : only for 5m system</td> </tr> </tbody> </table> <p>L1 and L2 are to be specified by order steps of 10mm. Also order steps of 0.1 inches are available.</p> <p>■ FL-302F10T : Sensor for 3mm range (Sensor tip diameter <math>\phi</math>10mm, with armor, with fluoro resin coating)</p> <table border="1"> <thead> <tr> <th>Code</th> <th>Length to be specified</th> <th>FL-302F10T</th> </tr> </thead> <tbody> <tr> <td>— Threaded Portion</td> <td>M12x1.25, 1/2-20UNF</td> </tr> <tr> <td>L1</td> <td>Unthreaded length</td> <td>Maximum length : 100mm</td> </tr> <tr> <td>L2</td> <td>Case length</td> <td>Maximum length : 120mm</td> </tr> <tr> <td>L3</td> <td>Cable length</td> <td>0.5m, 1.0m, 5.0m<sup>2</sup>, 9.0m *2 : only for 5m system</td> </tr> </tbody> </table> <p>L1 and L2 are to be specified by order steps of 10mm. Also order steps of 0.1 inches are available.</p> <p>■ FL-452F11T : Sensor for 4.5mm range (Sensor tip diameter <math>\phi</math>11mm, with armor, with fluoro resin coating)</p> <table border="1"> <thead> <tr> <th>Code</th> <th>Length to be specified</th> <th>FL-452F11T</th> </tr> </thead> <tbody> <tr> <td>— Threaded Portion</td> <td>M14x1.5, 1/2-20UNF</td> </tr> <tr> <td>L1</td> <td>Unthreaded length</td> <td>Maximum length : 100mm</td> </tr> <tr> <td>L2</td> <td>Case length</td> <td>Maximum length : 120mm</td> </tr> <tr> <td>L3</td> <td>Cable length</td> <td>0.5m, 1.0m, 5.0m<sup>2</sup>, 9.0m *2 : only for 5m system</td> </tr> </tbody> </table> <p>L1 and L2 are to be specified by order steps of 10mm. Also order steps of 0.1 inches are available.</p>	Code	Length to be specified	FL-202F08T	— Threaded Portion	M10x1, 3/8-24UNF-2A	L1	Unthreaded length	Maximum length : 230mm	L2	Case length	Maximum length : 250mm	L3	Cable length	0.5m, 1.0m, 5.0m <sup>2</sup> , 9.0m *2 : only for 5m system	Code	Length to be specified	FL-302F10T	— Threaded Portion	M12x1.25, 1/2-20UNF	L1	Unthreaded length	Maximum length : 100mm	L2	Case length	Maximum length : 120mm	L3	Cable length	0.5m, 1.0m, 5.0m <sup>2</sup> , 9.0m *2 : only for 5m system	Code	Length to be specified	FL-452F11T	— Threaded Portion	M14x1.5, 1/2-20UNF	L1	Unthreaded length	Maximum length : 100mm	L2	Case length	Maximum length : 120mm	L3	Cable length	0.5m, 1.0m, 5.0m <sup>2</sup> , 9.0m *2 : only for 5m system
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\*1 The above specification apply at 25°C with -24VDC power supply and load resistance 10kΩ and JIS SCM440 target.

	<b>F K - 6 0 2 F</b> (Linear range : 6mm)	<b>F K - 1 4 3 F</b> (Linear range : 13.5mm)	<b>F K - 2 6 3 F</b> (Linear range : 26mm)																																					
System Cable Length	5m, 9m																																							
Calibration Material	JIS SCM440 flat surface																																							
Measuring Range	0.5mm to 6.5mm from sensor tip	3mm to 16.5mm from sensor tip	3mm to 29mm from sensor tip																																					
Sensitivity <sup>1</sup>	2.5V/mm	0.8V/mm	0.4V/mm																																					
Sensitivity Error <sup>1</sup>	Within ±4%																																							
Linearity <sup>1</sup>	Within ±70μm of 2.5V/mm Straight line: (if calibrated as a system) Within ±90μm of 2.5V/mm Straight line: (including interchangeability errors) Linear range : 6mm	Within ±200μm of 0.8V/mm Straight line: (if calibrated as a system) Within ±270μm of 0.8V/mm Straight line: (including interchangeability errors) Linear range : 13.5mm	Within ±250μm of 0.4V/mm Straight line: (if calibrated as a system) Within ±400μm of 0.4V/mm Straight line: (including interchangeability errors) Linear range : 26mm																																					
Frequency Response <sup>1</sup>	DC to 10kHz or more(-3dB)	DC to 200Hz or more(-3dB)																																						
Sensor Tip Diameter	Approx. 18mm dia.	Approx. 27mm dia.	Approx. 50mm dia.																																					
Operating Temperature Range	Sensor : -40 to +125°C Extension Cable : -40 to +125°C Driver : -40 to +80°C																																							
Operating Humidity Range	30 to 95%RH (non-condensing, non-submerged)(Sensor body : 100%RH)																																							
Power Supply	-24VDC±10%																																							
Terminal Block	Screw type terminal block (M4) or Spring lock terminal																																							
Dimensions for typical sensor	<p>■ FL-602F18T : Sensor for 6mm range (Sensor tip diameter <math>\phi</math>18mm, with armor, with fluoro resin coating)</p> <table border="1"> <thead> <tr> <th>Code</th> <th>Length to be specified</th> <th>FL-602F18T</th> </tr> </thead> <tbody> <tr> <td>— Threaded Portion</td> <td>M20x1.5, 7/8-14UNF</td> </tr> <tr> <td>L1</td> <td>Unthreaded length</td> <td>Maximum length : 80mm</td> </tr> <tr> <td>L2</td> <td>Case length</td> <td>Maximum length : 120mm</td> </tr> <tr> <td>L3</td> <td>Cable length</td> <td>0.5m, 1.0m, 5.0m<sup>2</sup>, 9.0m *2 : only for 5m system</td> </tr> </tbody> </table> <p>L1 and L2 are to be specified by order steps of 10mm. Also order steps of 0.1 inches are available.</p> <p>■ FL-143F27T : Sensor for 13.5mm range (Sensor tip diameter <math>\phi</math>27mm, with armor, with fluoro resin coating)</p> <table border="1"> <thead> <tr> <th>Code</th> <th>Length to be specified</th> <th>FL-143F27T</th> </tr> </thead> <tbody> <tr> <td>— Threaded Portion</td> <td>M30x1.5, 1 1/4-12UNF</td> </tr> <tr> <td>L1</td> <td>Unthreaded length</td> <td>Maximum length : 60mm</td> </tr> <tr> <td>L2</td> <td>Case length</td> <td>Maximum length : 100mm</td> </tr> <tr> <td>L3</td> <td>Cable length</td> <td>0.5m, 1.0m, 5.0m<sup>2</sup>, 9.0m *2 : only for 5m system</td> </tr> </tbody> </table> <p>L1 and L2 are to be specified by order steps of 10mm. Also order steps of 0.1 inches are available.</p> <p>■ FL-263F50T : Sensor for 26mm range (Sensor tip diameter <math>\phi</math>50mm, with armor, with fluoro resin coating)</p> <table border="1"> <thead> <tr> <th>Code</th> <th>Length to be specified</th> <th>FL-263F50T</th> </tr> </thead> <tbody> <tr> <td>— Threaded Portion</td> <td>M24x1.5, 1 -12UNF</td> </tr> <tr> <td>L2</td> <td>Threaded length</td> <td>Maximum length : 100mm</td> </tr> <tr> <td>L3</td> <td>Cable length</td> <td>0.5m, 1.0m, 5.0m<sup>2</sup>, 9.0m *2 : only for 5m system</td> </tr> </tbody> </table> <p>L2 is to be specified by order steps of 10mm. Also order steps of 0.1 inches are available.</p>	Code	Length to be specified	FL-602F18T	— Threaded Portion	M20x1.5, 7/8-14UNF	L1	Unthreaded length	Maximum length : 80mm	L2	Case length	Maximum length : 120mm	L3	Cable length	0.5m, 1.0m, 5.0m <sup>2</sup> , 9.0m *2 : only for 5m system	Code	Length to be specified	FL-143F27T	— Threaded Portion	M30x1.5, 1 1/4-12UNF	L1	Unthreaded length	Maximum length : 60mm	L2	Case length	Maximum length : 100mm	L3	Cable length	0.5m, 1.0m, 5.0m <sup>2</sup> , 9.0m *2 : only for 5m system	Code	Length to be specified	FL-263F50T	— Threaded Portion	M24x1.5, 1 -12UNF	L2	Threaded length	Maximum length : 100mm	L3	Cable length	0.5m, 1.0m, 5.0m <sup>2</sup> , 9.0m *2 : only for 5m system
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\*1 The above specification apply at 25°C with -24VDC power supply and load resistance 10kΩ and JIS SCM440 target.

# FK-Series

## Specifications (Long cable type)

	FK-152R (Linear range : 1.5mm)	FK-302F3 (Linear range : 3mm)
System Cable Length	15m, 20m	15m
Calibration Material		
Measuring Range	0.25mm to 1.75mm from sensor tip	0.25mm to 3.25mm from sensor tip
Sensitivity <sup>1)</sup>	7.87V/mm	5.0V/mm
Scale Factor Error <sup>1)</sup>	Within ±5% of 7.87V/mm (if calibrated as a system) Within ±10% of 7.87V/mm (including interchangeability errors) Step : 0.25mm, Linear range : 1.5mm	Within ±5% of 5.0V/mm (if calibrated as a system) Step : 0.25mm, Linear range : 3mm
Linearity <sup>1)</sup>	Within ±25 μm of 7.87V/mm Straight line : (if calibrated as a system) Within ±45 μm of 7.87V/mm Straight line : (including interchangeability errors) Linear range : 1.5mm	Within ±30 μm of 5.0V/mm Straight line : (if calibrated as a system) Linear range : 3mm
Frequency Response <sup>1)</sup>	DC to 7kHz or more(-3dB)	DC to 8kHz(-3dB)
Sensor Tip Diameter	Approx. 8mm dia.	Approx. 10mm dia.
Operating Temperature Range	Sensor : -40 to +177°C Extension Cable : -40 to +177°C Driver : -40 to +80°C	
Operating Humidity Range	30 to 95%RH (non-condensing, non-submerged) (Sensor body : 100%RH)	
Power Supply	-24VDC±10%	
Terminal Block	Screw type terminal block (M4) or Spring lock terminal	
Dimensions for typical sensor	<p>■ FL-152R08T : Sensor for 1.5mm range (Sensor tip diameter φ8mm, with armor, with fluoro resin coating)</p> <img alt="Diagram of FL-152R08T sensor showing dimensions: Sensor tip (φ8), Jam nut, Threaded portion, Flexible armor with fluoro resin coating, Model No. and TAG No. Serial No., Cable (φ3.6), Collar, Connector. Unit: mm. Dimensions: L1=5, L2=20, L3=50, L4=4.5, L5=3, L6=20, L7=1.5, L8=1.5, L9=1.5, L10=1.5, L11=1.5, L12=1.5, L13=1.5, L14=1.5, L15=1.5, L16=1.5, L17=1.5, L18=1.5, L19=1.5, L20=1.5, L21=1.5, L22=1.5, L23=1.5, L24=1.5, L25=1.5, L26=1.5, L27=1.5, L28=1.5, L29=1.5, L30=1.5, L31=1.5, L32=1.5, L33=1.5, L34=1.5, L35=1.5, L36=1.5, L37=1.5, L38=1.5, L39=1.5, L40=1.5, L41=1.5, L42=1.5, L43=1.5, L44=1.5, L45=1.5, L46=1.5, L47=1.5, L48=1.5, L49=1.5, L50=1.5, L51=1.5, L52=1.5, L53=1.5, L54=1.5, L55=1.5, L56=1.5, L57=1.5, L58=1.5, L59=1.5, L60=1.5, L61=1.5, L62=1.5, L63=1.5, L64=1.5, L65=1.5, L66=1.5, L67=1.5, L68=1.5, L69=1.5, L70=1.5, L71=1.5, L72=1.5, L73=1.5, L74=1.5, L75=1.5, L76=1.5, L77=1.5, L78=1.5, L79=1.5, L80=1.5, L81=1.5, L82=1.5, L83=1.5, L84=1.5, L85=1.5, L86=1.5, L87=1.5, L88=1.5, L89=1.5, L90=1.5, L91=1.5, L92=1.5, L93=1.5, L94=1.5, L95=1.5, L96=1.5, L97=1.5, L98=1.5, L99=1.5, L100=1.5, L101=1.5, L102=1.5, L103=1.5, L104=1.5, L105=1.5, L106=1.5, L107=1.5, L108=1.5, L109=1.5, L110=1.5, 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