

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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Please contact our service representatives for further information.

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

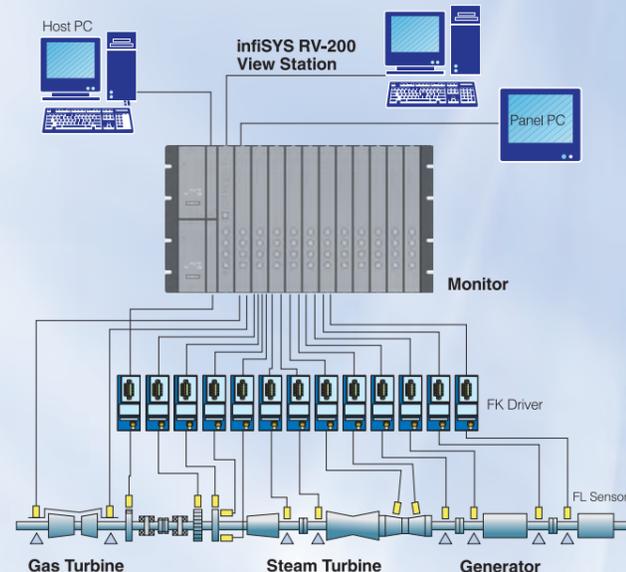
▼Case of Screw type terminal block(M4)



Example of screw mounting

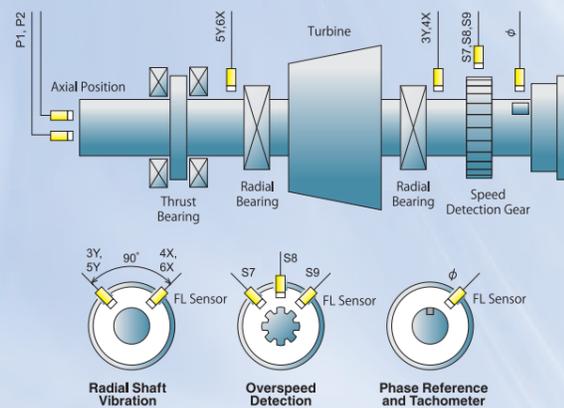
Example of Application

Typical System Configuration



Typical system arrangement for a turbine

(Quotation from API 670 (5th Edition) Annex H)



P1, P2 : Axial Position Sensors
 3Y, 4X, 5Y, 6X : Radial Shaft Vibration Sensors
 S7, S8, S9 : Overspeed Detection Sensors
 φ : Phase Reference and Tachometer

Features

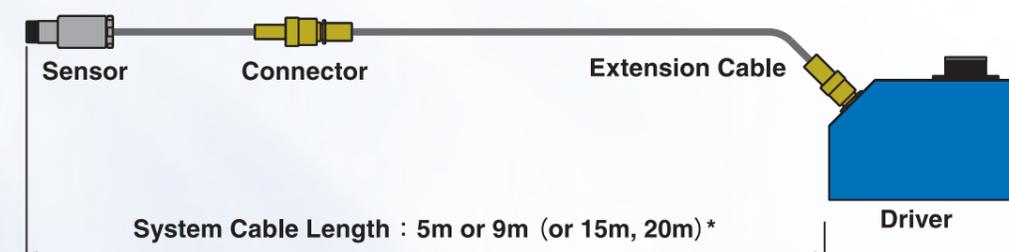
- **Environmental friendly design**
lead-free soldering, RoHS compliance and reduced footprint
- **Flexible mounting options**
DIN-rail adaptor, 4-screw-cramp plate adaptor (to replace VK series and others)
- **Quality sensor with excellent environmental resistance**
sensor without impact of oil droplets and oil mist can be installed in two machines in principle
- **API Standard 670(5th Edition)compliant**
- **Intrinsically safe*¹, and marine certified (NK, LR, DNV)**
*1 Japan, North America, Europe, China, Korea etc.
- **CE compliant**

Applications

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



FK System Configuration



System Cable Length : 5m or 9m (or 15m, 20m)*

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

FK-Series

Specifications



	FK - 202F (Linear range : 2mm)	FK - 302F (Linear range : 3mm)	FK - 452F (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 ^{*1}	7.87V/mm	5.0V/mm	3.94V/mm																																													
Scale Factor Error ^{*1}	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 ^{*1}	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 ^{*1}	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 φ8mm, 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>—</td> <td>Threaded Portion</td> <td>M10x1.5, 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^{*2}, 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 φ10mm, 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>—</td> <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^{*2}, 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 φ11mm, 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>—</td> <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^{*2}, 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	M10x1.5, 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 ^{*2} , 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 ^{*2} , 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 ^{*2} , 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 - 602F (Linear range : 6mm)	FK - 143F (Linear range : 13.5mm)	FK - 263F (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 ^{*1}	2.5V/mm	0.8V/mm	0.4V/mm																																										
Sensitivity Error ^{*1}	Within ±4%																																												
Linearity ^{*1}	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 ^{*1}	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 φ18mm, 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>—</td> <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^{*2}, 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 φ27mm, 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>—</td> <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^{*2}, 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 φ50mm, 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>—</td> <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^{*2}, 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 ^{*2} , 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 ^{*2} , 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 ^{*2} , 9.0m ^{*2} : only for 5m system
Code	Length to be specified	FL-602F18T																																											
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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

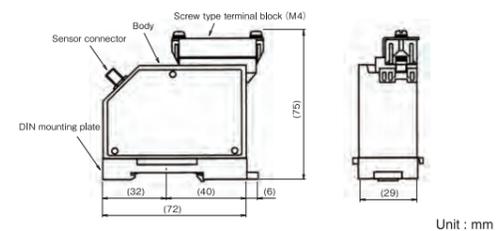
Specifications (Long cable type)

	FK-152R (Linear range : 1.5mm)	FK-302F3 (Linear range : 3mm)																														
System Cable Length	15m, 20m	15m																														
Calibration Material	JIS SCM440 flat surface																															
Measuring Range	0.25mm to 1.75mm from sensor tip	0.25mm to 3.25mm from sensor tip																														
Sensitivity ^{*1}	7.87V/mm	5.0V/mm																														
Scale Factor Error ^{*1}	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 ^{*1}	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 ^{*1}	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> <table border="1"> <thead> <tr> <th>Code</th> <th>Length to be specified</th> <th>FL-152R08T</th> </tr> </thead> <tbody> <tr> <td>—</td> <td>Threaded Portion</td> <td>M10×1, 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, 15.0m, 20.0m</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 φ10mm, 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>—</td> <td>Threaded Portion</td> <td>M12×1.25, 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</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-152R08T	—	Threaded Portion	M10×1, 3/8-24UNF-2A	L1	Unthreaded length	Maximum length : 230mm	L2	Case length	Maximum length : 250mm	L3	Cable length	0.5m, 1.0m, 15.0m, 20.0m	Code	Length to be specified	FL-302F10T	—	Threaded Portion	M12×1.25, 1/2-20UNF	L1	Unthreaded length	Maximum length : 100mm	L2	Case length	Maximum length : 120mm	L3	Cable length	0.5m, 1.0m
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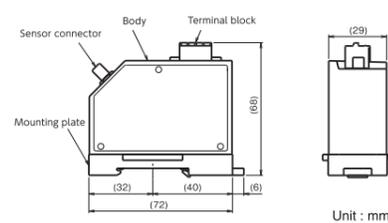
*1 The above specification apply at 25°C with -24VDC power supply and load resistance 10kΩ and JIS SCM440 target.

FK Driver Outline Drawing/FW Extension Cable Outline Drawing

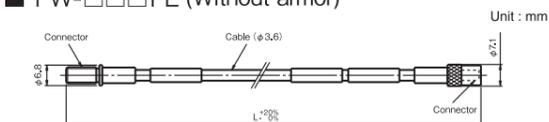
■ FK-□□□F□-1-1 (Screw type terminal block (M4))



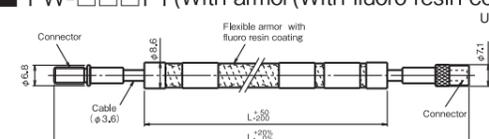
■ FK-□□□F□-1-2 (Spring lock terminal)



■ FW-□□□FL (Without armor)

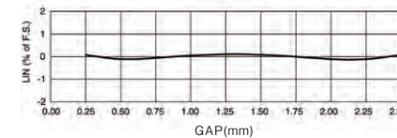
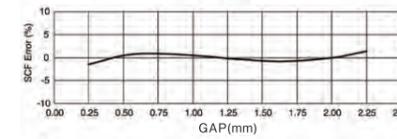
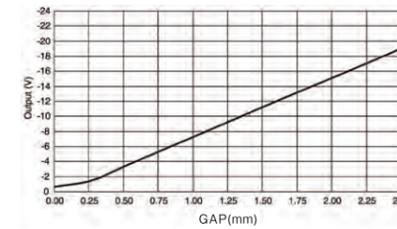


■ FW-□□□FT (With armor (With fluoro resin coating))

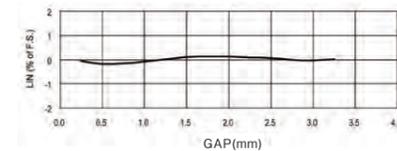
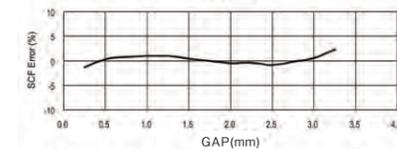
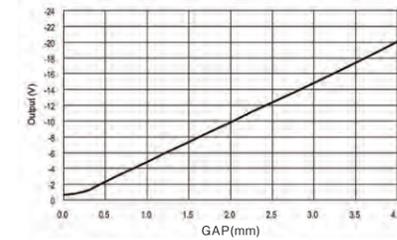


Characteristics Data (Target Material : SCM440 Flat Face Target Size: Triple Diameter or more of Sensor Tip)

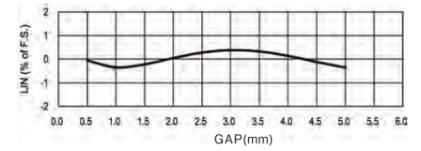
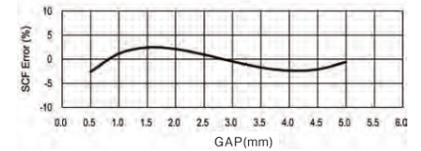
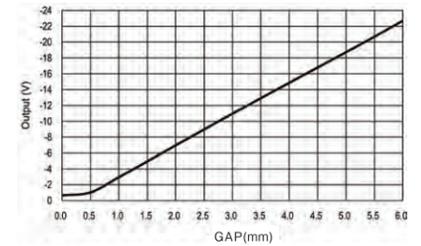
■ FK-202F



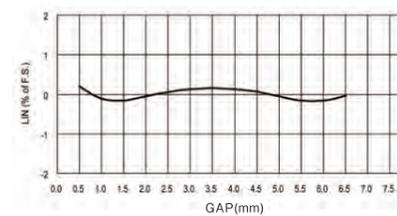
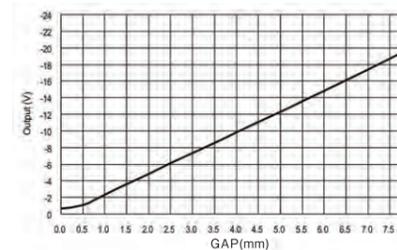
■ FK-302F



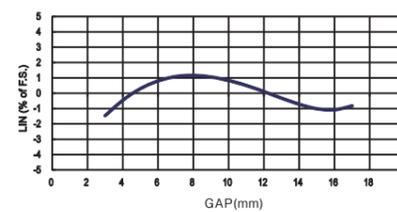
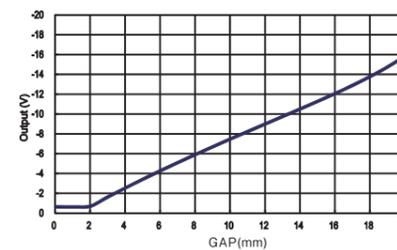
■ FK-452F



■ FK-602F



■ FK-143F



■ FK-263F

