



FCIR Series
Online IR Temperature Sensor
USER MANUAL

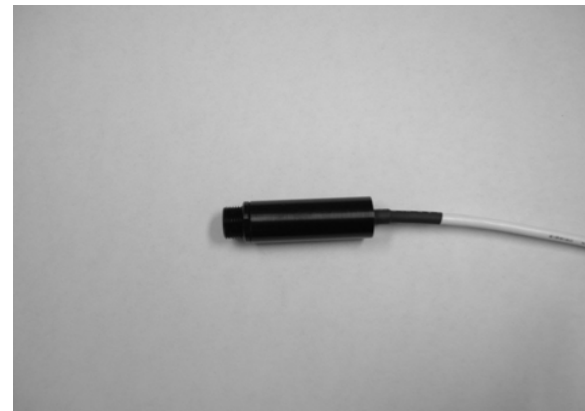
NEWTHERM®

Product Features

- Full Advanced Digitized design
- Customized Digital/Analog signal output
- Repeatability: $< \pm 1^{\circ}\text{C}$
- Advanced optical structure
- Spectrum response: 8-14 μm
- Accuracy: greater of $\pm 2^{\circ}\text{C}$ or 2% of reading
- Resolution: 0.1 $^{\circ}\text{C}$
- Response Time: $\leq 500\text{ms}$
- Measurable object distance: 0~15meters
- Wide operating temperature range
- Easy to install and maintain with low cost
- Factory calibrated with temperature compensation within full scale



FCIR 0810-xxx/xxx



FCIR 0812-xxx/xxx



FCIR 1816-xxx/xxx



FCIR 3816-xxx/xxx



FCIR 5816-xxx/xxx

Product Overview

Be composed of the aluminium/stainless steel metal shell, the optical parts, the *ASIC* and the *MCU* etc, the **FCIR** series products are industrial temperature measuring devices using in electric power, metallurgy, petrification and other related fields. Digitized circuit, factory calibration with black body, temperature compensation and linearization with *MCU* ensures the high accuracy and stable output of this IR sensor in the full operating & measuring range. Standard **FCIR** has 8 different temperature range which targets the object of $-50^{\circ}\text{C}\sim 1500^{\circ}\text{C}$. Upon those special requests of some consumers, we could provide other IR sensors with the measuring temperature range up to 3000°C . Operating temperature is $0\sim 75^{\circ}\text{C}$ for Standard **FCIR**.

Optical parts adopt imported high sensitive thermopile IR sensor, monocrystalline silicon lens, diaphragm for optimizing IR light path, and aluminum cavity as a better heat sink or *ABS* cavity with better performances. Its Spectrum Response is $8\sim 14\ \mu\text{m}$ which availably weaken the space attenuation by dust & vapor while IR radiated through atmosphere, effectively eliminate the signal noise due to miscellaneous light, and helpfully lower output shift as ambient temperature fluctuate rapidly. Consequently, **FCIR** series products have greatly powerful detectability to object IR, and that efficaciously resolve these difficult problem of short measurable object distance and inferior interference-free capability in fashionable IR temperature measuring devices at present. Further more, by using special light diaphragm and advanced optical cavity, these **FCIR** products enhance greatly the accuracy, measurable object distance, and avoid the output instability when the *D:S* is less or the distance is shorter. The distance :spot ratios of **FCIR** are *D:S=3:1, 5:1, 8:1, 10:1, 12:1, 15:1, 20:1, 30:1, 50:1* etc. According to customer requirements, the greater ratio ($\leq 200:1$) is also available as a special design.

Because of the full advanced digitized design and using the powerful *ASIC*, We are able to provide expediently both *Digital output* like *RS232, RS485, SPI, I²C, PWM* etc and *Analog output* such as industrial standard $0\sim 5\text{VDC}$, $4\sim 20\text{mA}$ or nonstandard $10\text{mV}/^{\circ}\text{C}$. In general, optional power supply is $+5\text{VDC}$, $+7.5\text{VDC}$, $+9\text{VDC}$, $+12\text{VDC}$, $+24\text{VDC}$ or $+18\sim 30\text{VDC}$, and the lower as $+2.7\text{VDC}$, $+3\text{VDC}$ or $+3.3\text{VDC}$ for *Digital output* like *SPI, I²C, PWM* etc, but then it is also adjustable according to different application or system integration.

The mechanical design: metal housing advances the obdurability & serviceableness of **FCIR** while in field installation, facilitates the sensor to stand shock and vibration. With fine sealed cable, *IP65* enclosure enables the sensor to be waterproof, be dripping-proof and be dustproof in industrial applications, thereby protect it from erosion or damage. **FCIR** provides *screw thread* on the front or body of its shell easily to implement system integration and installation with *the Mounting Bracket accessorized* and *Bolt Hole* in the customer system, as well as other some optional accessories as *Digital Display & Control meter, Air Purgig, Air/Water-cooled Housing, Temperature Data Collection & Communication Software* etc.

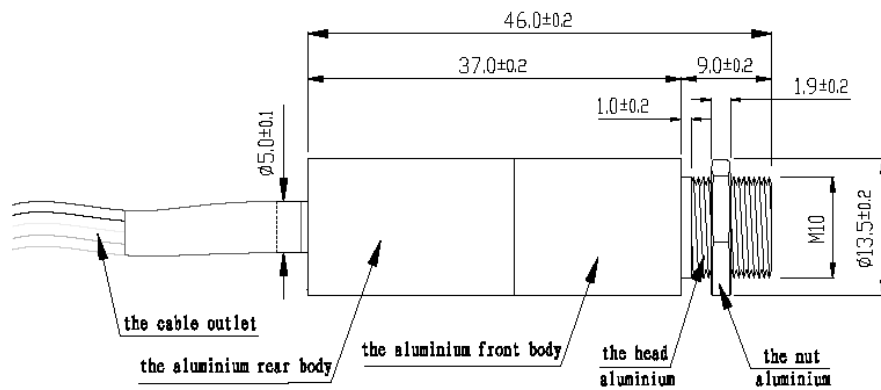
Profiting from the digitized design based on *ASIC*, **FCIR** is easy to satisfy the *OEM* diversified requests with some especial specifications as follows: *Object Temperature Range, Ambient Temperature Range, Precision, Object Distance, Distance :Spot Ratio, certain fixed or adjustable Emissivity, Power Supply, Type of Output signal*, and *special mechanical configuration*.

Specifications

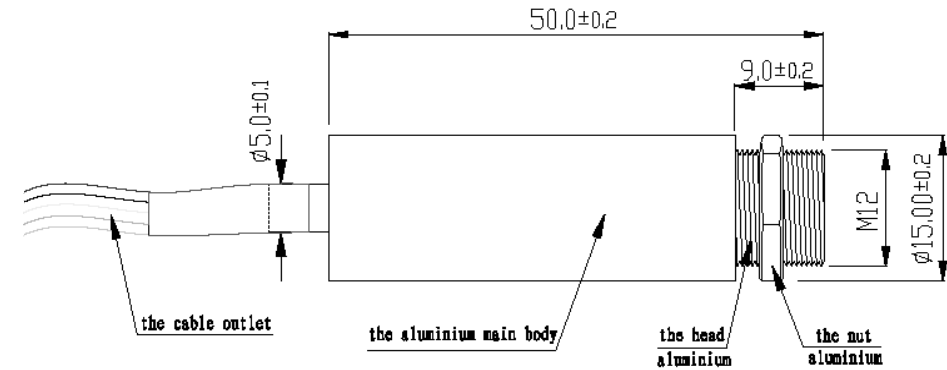
Model	FCIR-0810	FCIR-0812	FCIR-1816	FCIR-3816	FCIR-5816
Measurement range	0~300°C、20~300°C、0~500°C、-20~300°C、 -50~300°C、0~800°C、600~1500°C、0~1500°C etc.				
Resolution	Typical 0.1°C				
Precision	-50~-20°C: ±4.0°C -20~500°C: greater of ±2°C or 2% of reading 500~1500°C: ±3.0% of reading				
Repeatability	±1°C of full Temperature range				
Spectrum Response	8~14 μ m				
Distance: Spot Ratio	3:1, 5:1, 8:1, 10:1, 12:1, (15:1, 20:1, 30:1, 50:1 only be for HBIR-5816)				
Operating Temperature	0 ~ 75°C (wider range also available with <i>Air/Water-cooled Housing</i>)				
Storage Temperature	-20~85°C				
Relative Humidity	10~90%(without coagulated dew)				
Response Time	100~500ms				
Emissivity	Default 0.95 (0.01~1.00 adjustable as requested)				
Object Distance	0~15m				
Housing	IP65				
Power Supply	+2.7VDC +3VDC +3.3VDC +5 VDC	+2.7VDC +3VDC +3.3VDC +5 VDC Must be +5VDC for RS232 /RS485	+5VDC, +7.5VDC, +9VDC, +12VDC, +24VDC or +18~30VDC, and the lower as +2.7VDC, +3VDC or +3.3VDC (just while Output is SPI, or PWM, or I ² C)		
Analog Output	customized	customized	Standard:4~20mA; Optional: 0~5 V ,10mV/°C		
Digital Output	SPI	SPI, RS485 ,RS232	SPI, RS485, I ² C, RS232, PWM		

Dimensions

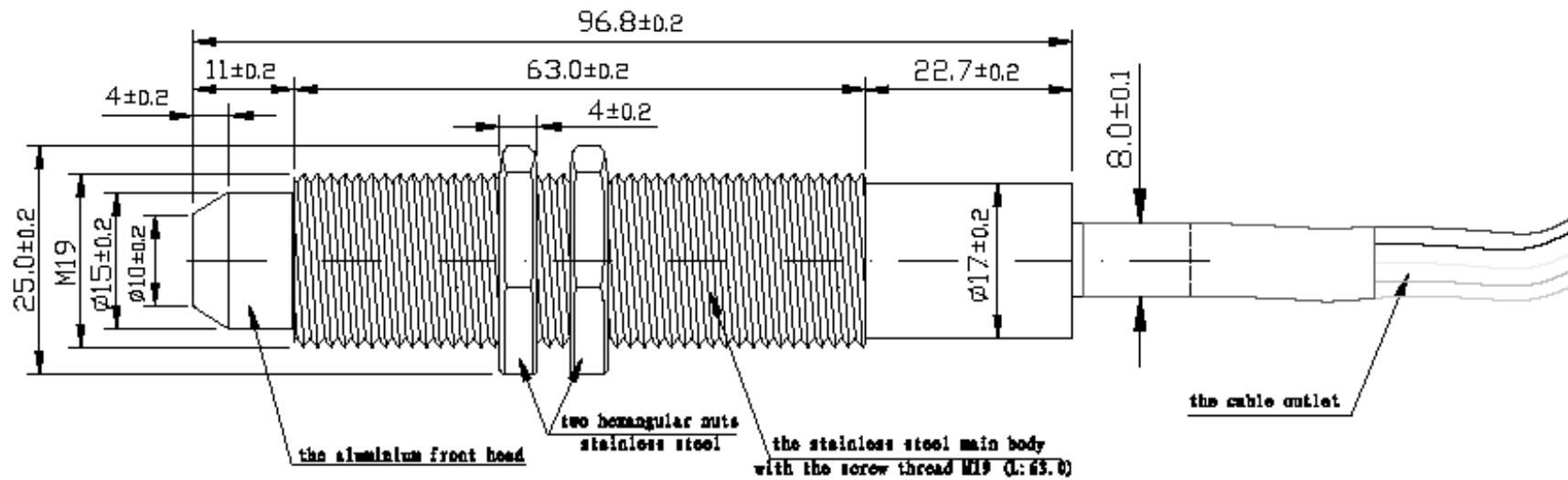
Units: mm



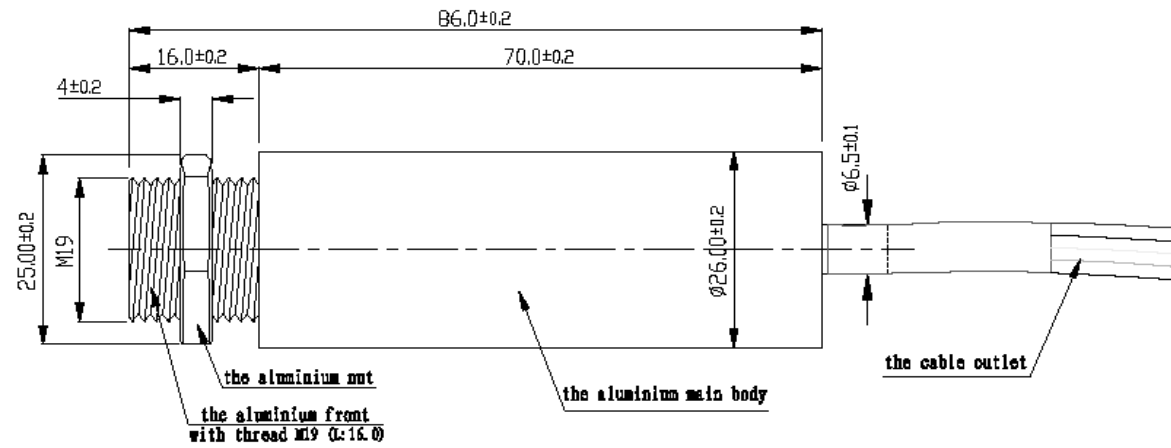
FCIR-0810



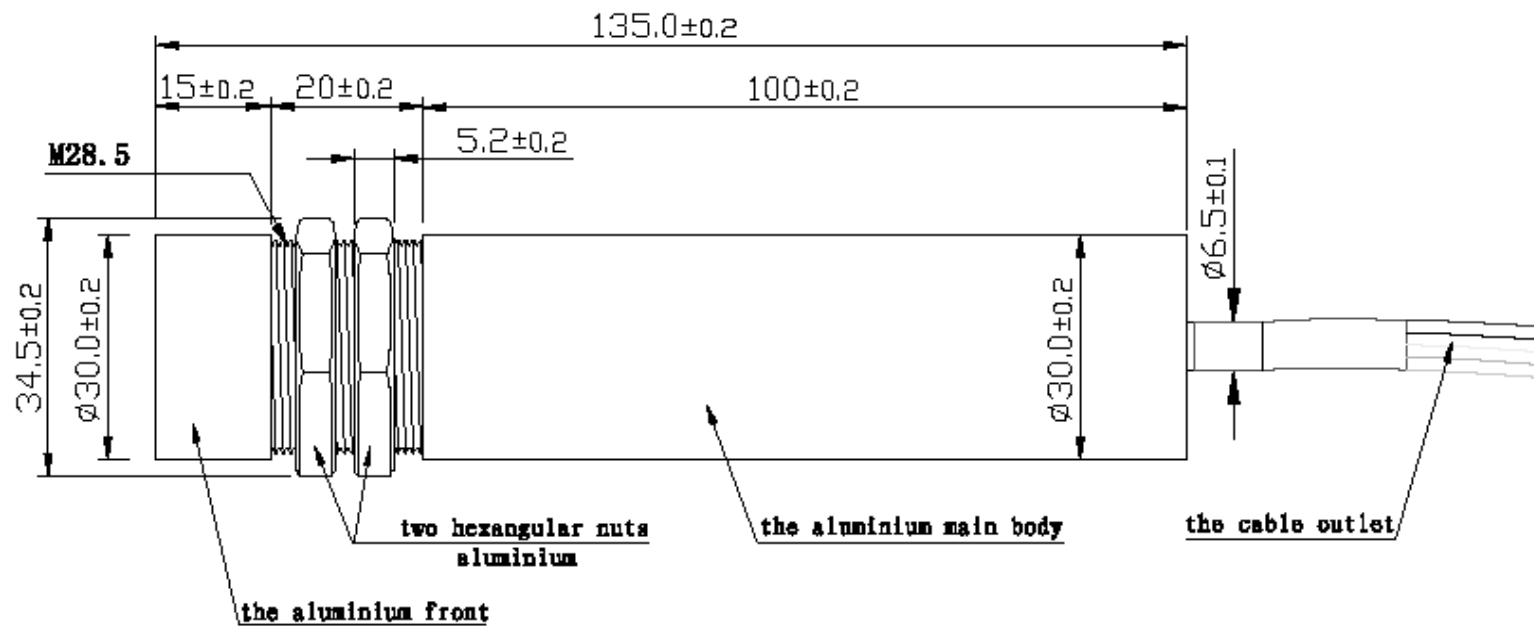
FCIR-0812



FCIR-1816



FCIR-3816



FCIR-5816

Standard Cable Wiring

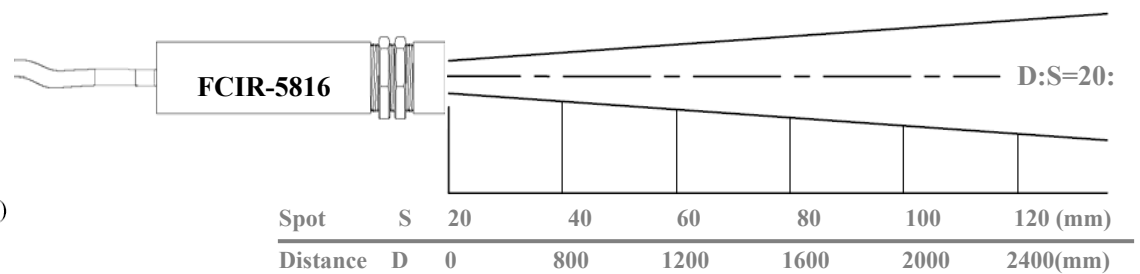
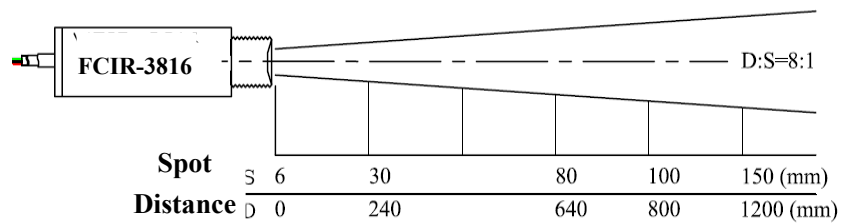
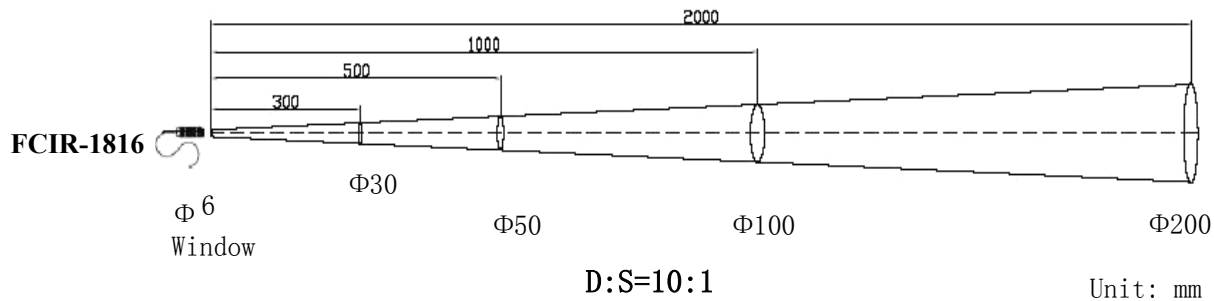
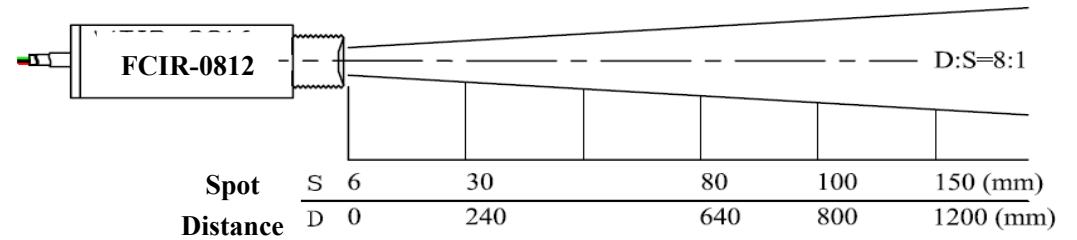
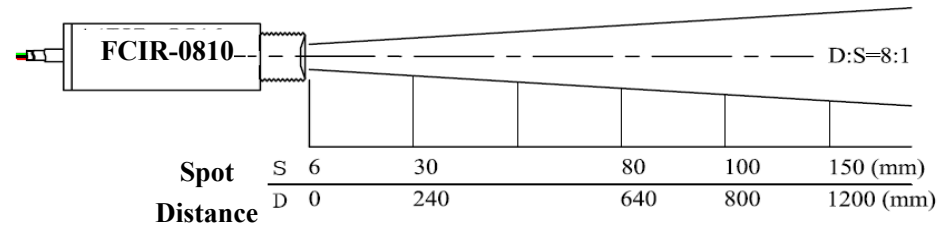
Cable Wire Color	Digital Output	Analog Output	Remarks
Red	Power Supply +	Power Supply +	The Color is always red
Black	Power Supply –	Power Supply –	or SPI "CLOCK", this Color is always black, refer to the relevant <i>Compact SPEC</i> .
Yellow	Signal Input	Signal +	or SPI "DATA", this Color is occasionally other one due to each batch of Cable, refer to the relevant <i>Compact SPEC</i> .
Green	Signal Output	Signal –	or SPI "SELECT/CS of master slave relation", this Color is occasionally other one due to each batch of Cable, refer to the relevant <i>Compact SPEC</i> .
Bare	Shield Ground	Shield Ground	or SPI "Power Supply –", it is optional Ground according to the additional request of some customers, refer to the relevant <i>Compact SPEC</i> .

Notes for Installation

FCIR absorb infrared radiation energy emitted from the target and convert it to electric signal or digital signal output, and the installation of the sensor will greatly affect the accuracy, sensitivity and response. Here are some extreme situations to be avoided:

- Ambient temperature changes greatly
- Collision or vibration
- Object emitted infrared ray will go through glass or mist
- Environment with liquid, causticity gas or on the sea shore
- Constant use under high temperature and Humidity
- Environment with static noise or strong electromagnetic wave
- Environment with heated airflow or air-conditioning
- Other object is close to the target object if their temperatures are very difference each other

Optical Chart

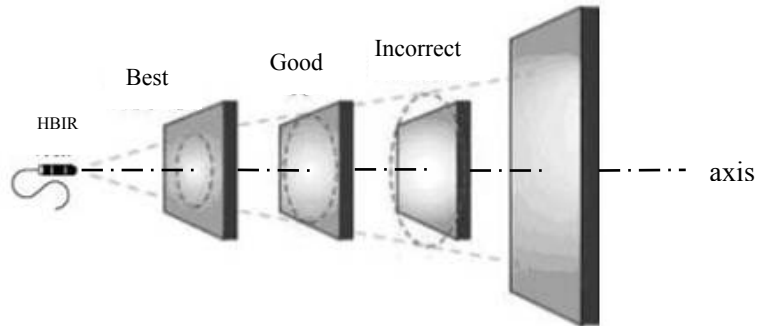


D-Distance : direct distance between the sensor and the object

S-Spot : diameter of the area on the object that the sensor could measure according to the reversibility of light path

Sensor Installation

Please paying attention to the size of the target object. If the target is smaller than the spot size, the output data is the average value of the target and background covered by the sensor. Therefore, before installing FCIR, the user should make sure that the target is greater than or at least equal to the spot size so as to adjust the position of the sensor along the central axis.



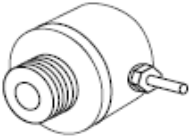
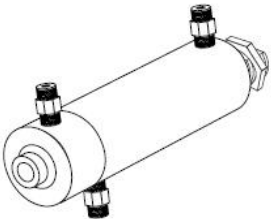


Mounting Bracket



This **Mounting Bracket** is applicable when frequent change of angle between the sensor and the object is applied. Usually, only using the **Nut** and the **Screw Thread** on the front or body of the sensor, **Bolt Hole** in the customer system, System Integration and Installation are easily implemented by customers.

ACCESSORIES

	<p>Digital Display & Control meter</p> <ul style="list-style-type: none"> ➤ Power supply: AC220V / DC24V ➤ Dimension: 160(Width) × 80 (Height) × 140 (Depth)mm , 80(Width) × 160(Height) × 140 (Depth)mm . ➤ Relay output or 4~20mA or RS232/RS458 output ➤ Single or double or more channels ➤ Zero shift and gain adjustment to implement secondary calibration and building for temperature measurement, cold-junction compensation, and transition output. ➤ LED OR LCD display , PID control, recorder etc. ➤ Support customized multi-network communication protocol.
	<p>Data Collection & communication Software</p> <ul style="list-style-type: none"> ➤ Provide long-distance control ➤ Data storing and restoring for future analysis ➤ Set emissivity (ξ) with software ➤ Multi-sensor & Long-distance data transmission and control (Be capable of connecting 247 FCIR in one RS485 network,) ➤ Auto adjustment range of sensor, easy use.
	<p>Air Purging</p> <p>When vapor or moisture around the object covers the lens, the measuring result will be greatly affected due to their IR spectrum response(or absorption coefficient, or transmission coefficient) different from the one of actual target object. To avoid this problem, an <i>air purging</i> equipment is available to blow away vapor /moisture within the measuring area to guarantee the measuring accuracy at the temperature of object surface</p> <p>Purging types: laminar flow and upright flow.</p>
	<p>Air/Water-cooled Housing</p> <p>When Ambient Temperature is above 50°C, an air/water-cooled housing is recommended to ensure FCIR to work properly with accurate output.</p>

How to Order

Please writing each requirements severally into the below relevant block :

FCIR0810— /

D:S	Range(°C)	Output	Cable type	Cable length (m)	Power supply
1=3:1	1= 0~300	1= SPI	1=non-shielded	1=1.0	1=+2.7VDC
2=5:1	2=-20~300		2= shielded	2=2.0	2=+3VDC
3=8:1	3= 0~500		3=high temp.	3=3.0	3=+3.3VDC
4=10:1	4=-20~500			.....	4=+5VDC
5=12:1	5=-50~300			n=n.0	
(No. n = length) the longer or other is available, and customized.					

note: In principles, to be incapable of providing other **FCIR-0810** whose any parameters is out of the optional range in the above table.

If and when some clients insist on the **FCIR-0810** with other requirements, it will be regarded as specific order production individually that is agreed by both purchase and sale according to circumstances about customized.

For example

FCIR0810— 4 2 1 / 2 5 3

Viz. **FCIR0810- 421/253**

Meaning: to order the **FCIR-0810** sensor with D:S=10:1, measuring range=-20 ~ 300°C, SPI output, +3.3VDC Power supply, 5.0m shielded cable.

FCIR0812— /

D:S	Range(°C)	Output	Cable type	Cable length (m)	Power supply
1=3:1	1= 0~300	1= SPI	1=non-shielded	1=1.0	1=+2.7VDC
2=5:1	2=-20~300	2= RS485	2= shielded	2=2.0	2=+3VDC
3=8:1	3= 0~500	3= RS232	3=high temp.	3=3.0	3=+3.3VDC
4=10:1	4=-20~500			.....	4=+5VDC
5=12:1	5=-50~300			n=n.0	
(No. n = length) the longer or other is available, and customized.					must be +5VDC for the output of RS232 or RS485

note: In principles, to be incapable of providing other **FCIR-0812** whose any parameters is out of the optional range in the above table.

If and when some clients insist on the **FCIR-0812** with other requirements, it will be regarded as specific order production individually that is agreed by both purchase and sale according to circumstances about customized.

For example

FCIR0812— 3 1 2 / 2 1 4

viz. **FCIR0812 -312/214**

Meaning: to order the **FCIR-0812** sensor with D:S=8:1, measuring range=0 ~ 300°C, RS485 output, +5VDC Power supply, 1.0m shielded cable.

FCIR1816— /

D:S	Range(°C)	Output	Cable type	Cable length (m)	Power supply
1=3:1	1= 0~300	1= RS232	1=non-shielded	1=1.0	1=+2.7VDC
2=5:1	2=-20~300	2=4~20mA	2= shielded	2=2.0	2=+3VDC
3=8:1	3= 0~500	3= 0~5 V	3=high temp.	3=3.0	3=+3.3VDC
4=10:1	4=-20~500	4= SPI		.....	4=+5VDC
5=12:1	5=-50~300	5= RS485		n=n.0	5=+7.5VDC
	6= 0~800	6= PWM			6=+9VDC
	7=600~1500	7=10mV/°C			7=+12VDC
	8= 0~1500	8= I ² C			8=+24VDC
					9=+18~30VDC
				(No. n = length) the longer or other is available, and customized.	the lower as+2.7VDC, +3VDC or +3.3VDC only for output like SPI, I ² C, and PWM.

note: In principles, to be incapable of providing other **FCIR-1816** whose any parameters is out of the optional range in the above table.

If and when some clients insist on the **FCIR-1816** with other requirements, it will be regarded as specific order production individually that is agreed by both purchase and sale according to circumstances about customized.

For example

FCIR1816— 5 1 5 / 2 1 4

Viz. **FCIR1816 - 515/214**

Meaning: to order the **FCIR-1816** sensor with D:S=12:1, measuring range=0 ~ 300°C, RS485 output, +5VDC Power supply, 1.0m shielded cable.

FCIR3816— /

D:S	Range(°C)	Output	Cable type	Cable length (m)	Power supply
1=3:1	1= 0~300	1= RS232	1=non-shielded	1=1.0	1=+2.7VDC
2=5:1	2=-20~300	2=4~20mA	2= shielded	2=2.0	2=+3VDC
3=8:1	3= 0~500	3= 0~5 V	3=high temp.	3=3.0	3=+3.3VDC
4=10:1	4=-20~500	4= SPI		.....	4=+5VDC
5=12:1	5=-50~300	5= RS485		n=n.0	5=+7.5VDC
	6= 0~800	6= PWM			6=+9VDC
	7=600~1500	7=10mV/°C			7=+12VDC
	8= 0~1500	8= I ² C			8=+24VDC
					9=+18~30VDC
				(No. n = length) the longer or other is available, and customized.	the lower as+2.7VDC, +3VDC or +3.3VDC only for output like SPI, I ² C, and PWM.

note: In principles, to be incapable of providing other **FCIR-3816** whose any parameters is out of the optional range in the above table.

If and when some clients insist on the **FCIR-3816** with other requirements, it will be regarded as specific order production individually that is agreed by both purchase and sale according to circumstances about customized.

For example

FCIR3816— 4 2 2 / 2 3 7

Viz. **FCIR3816 - 422/237**

Meaning: to order the **FCIR-3816** sensor with D:S=10:1, measuring range=-20 ~ 300°C, 4~20mA output, +12VDC Power supply, 3.0m shielded cable.

FCIR5816—□ □ □ / □ □ □

D:S	Range(°C)	Output	Cable type	Cable length (m)	Power supply
1=3:1	1= 0~300	1= RS232	1=non-shielded	1=1.0	1=+2.7VDC
2=5:1	2=-20~300	2=4~20mA	2= shielded	2=2.0	2=+3VDC
3=8:1	3= 0~500	3= 0~5 V	3=high temp.	3=3.0	3=+3.3VDC
4=10:1	4=-20~500	4= SPI		.....	4=+5VDC
5=12:1	5=-50~300	5= RS485		n=n.0	5=+7.5VDC
6=15:1	6= 0~800	6= PWM			6=+9VDC
7=20:1	7=600~1500	7=10mV/°C			7=+12VDC
8=30:1	8= 0~1500	8= I ² C			8=+24VDC
9=50:1					9=+18~30VDC
				(No. n = length) the longer or other is available, and customized.	the lower as+2.7VDC, +3VDC or +3.3VDC only for output like SPI, I ² C, and PWM.

note: In principles, to be incapable of providing other **FCIR-5816** whose any parameters is out of the optional range in the above table.

If and when some clients insist on the **FCIR-5816** with other requirements, it will be regarded as specific order production individually that is agreed by both purchase and sale according to circumstances about customized.

For example

FCIR5816—□6 □6 □3 / □2 □12 □8

Viz.**FCIR5816 - 663/2128**

Meaning: to order the **FCIR-5816** sensor with D:S=15:1, measuring range=0 ~ 800°C, 0 ~ 5V output, +24VDC Power supply, 12.0m shielded cable.

Communications Protocol & Software

For online communication, display or monitoring etc., the relevant communications protocol & software would be specially offered with shipment to those Customers , who have ordered **FCIR** sensors with digital output like RS232, RS485, SPI, I²C, PWM etc.

Documents Accompanied With Shipment

- For preventing users from Incorrect wiring or overvoltage power supply to cause severe and permanent damage to the **FCIR** sensors, the corresponding *Compact SPEC* of the ordered concrete type **FCIR** would be accompanied with shipment, in accordance with familiar degree or special request of the customers toward the **FCIR** sensors (see also page 6).
- If certain optional accessories (refer to page 9) be selected, the relevant specification, or user's guide, or direction for use ,or instruction book etc, would be accompanied with shipment, too.

For OEM Only

Temperature Range	
Precision	
Distance: Spot Ratio	
Installation Conditions	
Ambient Temperature	
Response Time	
Emissivity	
Power Supply	
Type of Output	