KF10
Optical system
Melt Pressure & Temperature Sensor

The innovative resin pressure sensor that measures pressure optically.

CE UKCA RoHS

Durability is improved by the sapphire single crystal diaphragm!

Achieves high-pressure measurement of ±0.5% F.S. at 400°C!

High-precision pressure measurement at high temperatures with an optical system!

● Compatible with high temperatures (400°C)

This is an optical sensor that does not use semiconductor elements in the detection unit, so high temperature measurement (±0.5% F.S. at 400°C) is possible.

● By adopting a sapphire diaphragm, durability performance is improved compared to conventional products

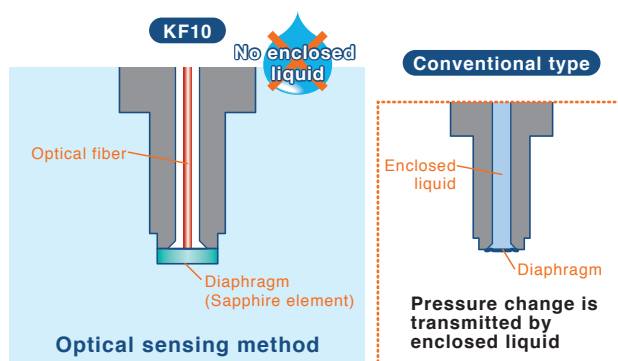Compared to metal diaphragms, it has 4.5 times the tensile strength and 10 times the wear resistance.

Industry's Highest Performance

● Simultaneous measurement of pressure and temperature

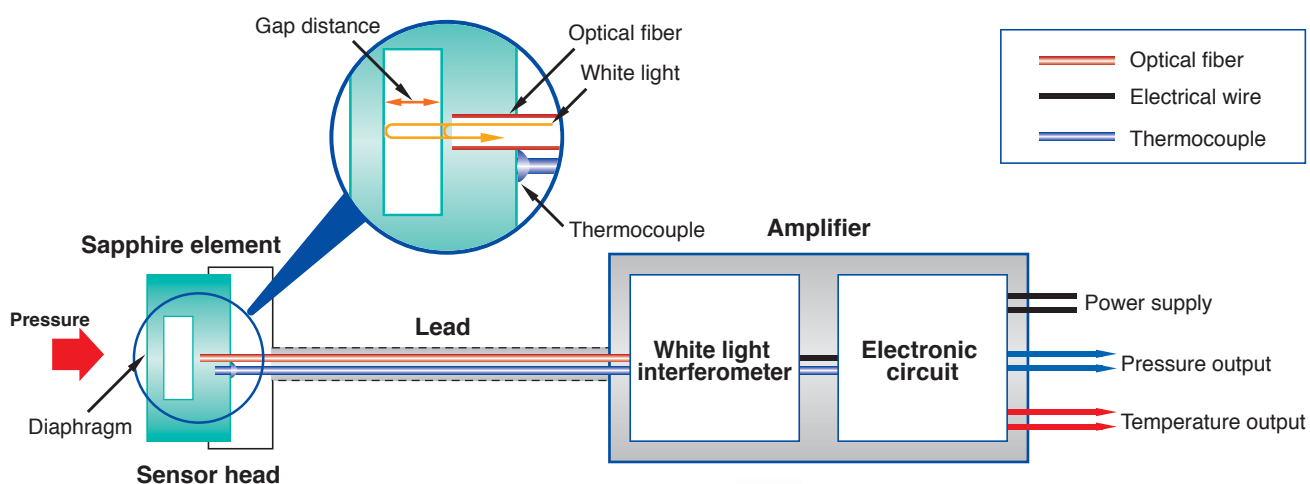Simultaneous measurement of pressure and temperature with an optical pressure sensor and a built-in thermocouple.

● No enclosed liquid structure

Achieves high accuracy ±0.25% F.S. (at 150 to 300°C) with a safe and secure structure that uses an optical system and does not use an "enclosed liquid" to transmit pressure change.

KF10

No enclosed liquid

Optical fiber

Diaphragm (Sapphire element)

Optical sensing method

Conventional type

Enclosed liquid

Diaphragm

Pressure change is transmitted by enclosed liquid

● Optical pressure sensor configuration diagram

A gap is provided in the sapphire element, and the gap distance that changes depending on the pressure applied to the diaphragm is directly measured by using the white interference method. Simultaneous temperature measurement is also possible with a thermocouple.

Gap distance
Optical fiber
White light
Thermocouple

Sapphire element

Pressure

Diaphragm

Sensor head

Lead

Amplifier

White light interferometer

Electronic circuit

Power supply
Pressure output
Temperature output

— Optical fiber
— Electrical wire
— Thermocouple

MELT PRESSURE & TEMPERATUR SENSOR **KF10** CE

SW1   SW2

NAGANO KEIKI

Specifications

Items	Description
Wetted parts materials	Sapphire, SUS316, Nickel, Gold-copper alloy, Fe+Ni+Co alloy
Pressure range	0 to 1, 3.5, 10, 25, 35, 50, 70 MPa
Temperature range	0 to 400°C
Diaphragm diameter	φ8 mm (G1/4B, 1/2-20UNF), Φ10 mm (G3/8B)
Sensor length (B dimension)	80, 150, 200, 250, 300, 350 mm
Connection*1	G1/4B, G3/8B, 1/2-20UNF
Pressure output accuracy*2	0.25% at 150°C (Factory default*3 Connection: ±0.5% F.S. when G3/8B is selected and for 10MPa range or less)
	0.5% at 300°C (Factory default*3 Connection: ±1.0% F.S. when G3/8B is selected and for ranges below 10MPa)
Temperature coefficient	Detection end: ±0.05% FS/°C (between 150°C and 400°C)
	Circuit part*4: ±0.05% FS/°C
Temperature output accuracy	±2.5°C (150 to 333°C)
	333°C or higher ±0.75% X ITI°C * ITI: Temperature at measurement
Maximum allowable pressure	120%F.S.
Operating temperature	Sensor head: 0 to 400°C
	Lead: 0 to 150°C
	Amplifier section: 0 to 60°C
Storage temperature	-20 to 80°C
Lead length	2 m*5
Cable bend radius	80 mm (minimum)
Supply voltage	15 to 30V DC
Current consumption	Max. 250mA
Output	4 to 20mA DC (standard)
	0 to 5V DC
	0 to 10V DC
Response speed	50 ms
Zero adjustment	Non-contact adjustment with adjustment magnet * Adjustment magnet (1 piece) is included as standard.
Protection class	IP54

*1 Except these sizes, optional adapter , model FJ95 is available (as the size of sensing part is 1/2-20UNF) .
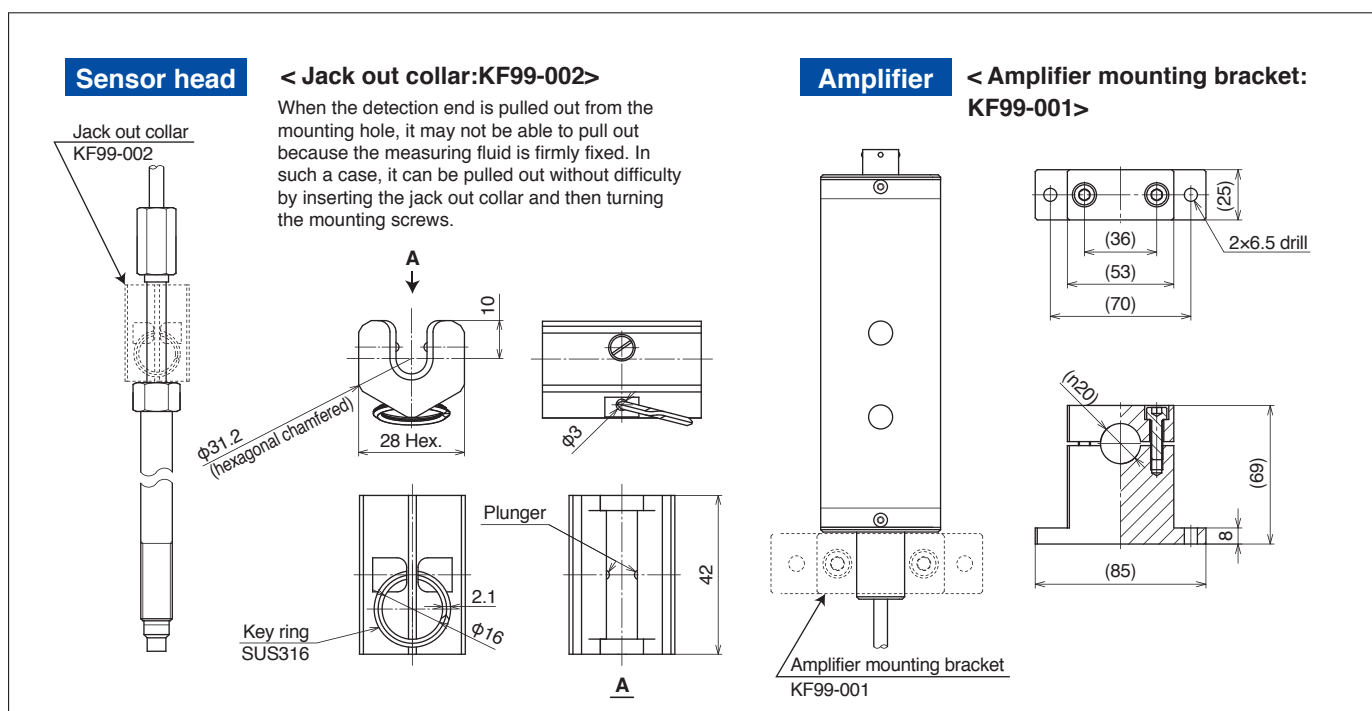*2 If the temperature is below 150°C, the accuracy is not guaranteed.
*2,4 The temperature at the time of shipping inspection of the circuit part is 30°C.
*3 The reference temperature can be changed by adjusting the zero point at the temperature for use.
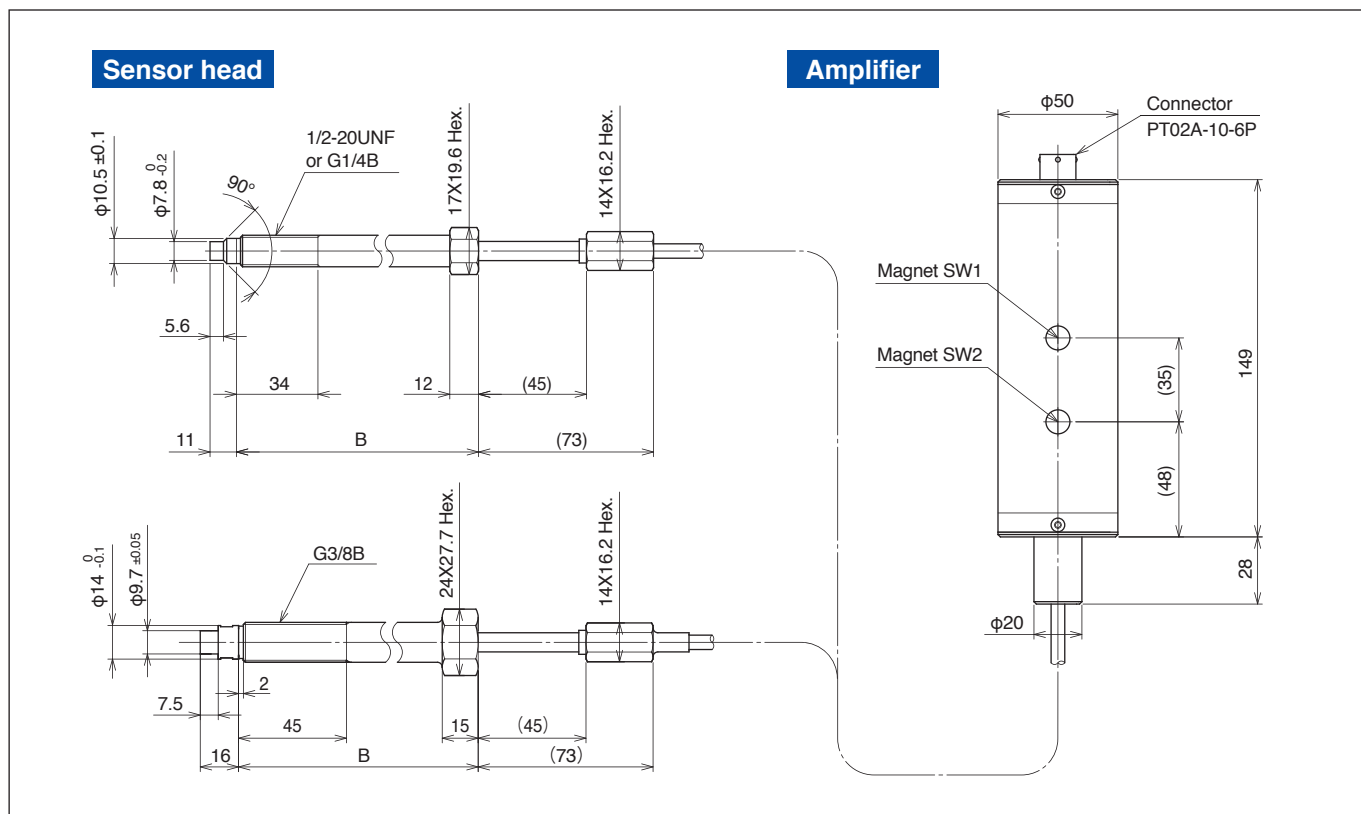*5 The standard lead length is 2 m. The length of the connector cable can be specified separately.

Option

Sensor head

Jack out collar
KF99-002

< Jack out collar:KF99-002>

When the detection end is pulled out from the mounting hole, it may not be able to pull out because the measuring fluid is firmly fixed. In such a case, it can be pulled out without difficulty by inserting the jack out collar and then turning the mounting screws.

A

10

Φ31.2 (hexagonal chamfered)

28 Hex.

φ3

Plunger

2.1

φ16

42

Key ring
SUS316

A

Amplifier

< Amplifier mounting bracket: KF99-001>

(25)

(36)

(53)

(70)

2×6.5 drill

(n20)

(69)

8

(85)

Amplifier mounting bracket
KF99-001

Dimensions 【KF10】

Sensor head

φ10.5 ±0.1
φ7.8 0/-0.2
90°
1/2-20UNF or G1/4B
17X19.6 Hex.
14X16.2 Hex.
5.6
34
12
(45)
11
B
(73)

φ14 0/-0.1
φ9.7 ±0.05
G3/8B
24X27.7 Hex.
14X16.2 Hex.
7.5
2
45
15
(45)
16
B
(73)

Amplifier

φ50
Connector PT02A-10-6P
Magnet SW1
Magnet SW2
149
(35)
(48)
28
φ20

Recommended sensor port dimensions

· Tapered seal

C3 (in the case of fled processing)
91° ±1°
F
φD6
φD5
φD7
A1
C2
C1
B-5 or less
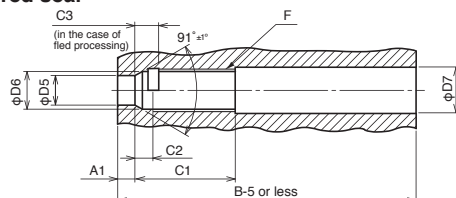
Diaphragm diameter	F	D5	D6	D7	A1	C1	C2	C3
8	G1/4B	7.93 +0.05/0	11.5 +0.3/0	13.6 or higher	6.4 or higher	35 +0/0	6 or less	9 or less
8	1/2-20UNF	7.93 +0.05/0	11.5 +0.3/0	13.1 or higher	6.4 or higher	35 +0/0	6 or less	9 or less

· Gasket sheet

C3
F
φD6
φD5
φD7
A1
C2
C1
B-9 or less
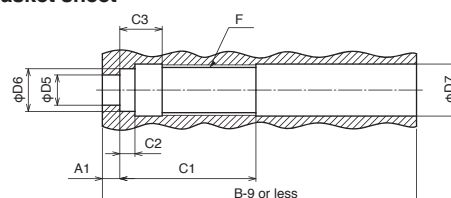
Diaphragm diameter	F	D5	D6	D7	A1	C1	C2	C3
10	G3/8B	10 +0.1/0	14.1 +0.3/0	17.2 or higher	5.8 or higher	45 +0/0	5 or higher	14 or less

* Please note that the above dimensions change depending on the gasket dimensions used. The above dimensions are the values when the recommended gasket is used.

· Recommended gasket dimensions

φdi
φdo
t
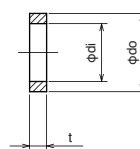
Diaphragm diameter	di	do	t
10	10.2 ±0.2	13.8 ±0.1	3.0 ±0.1

Standard material: Aluminum

● Electrical connections

Connector terminal array	Terminal number	Power supply /output
	A	Power supply +
	B	Power supply -
	C	Pressure output +
	D	Pressure output -
	E	Temperature output +
PT02A-10-6P(manufacturer: Amphenol)	F	Temperature output -

Dimensions 〔FJ95 dedicated adapter/port plug〕

Unit: mm

φ18 Gasket seal

25 to 30
(Depends on A dimension)
φ17 G3/4B
φ24 ⁺⁰·¹₋₀.₂ φ18 ⁺⁰·¹₋₀.₂
≥14 3
45 20
A* 6 B*

FJ95-263

φ18 Taper seal

30
φ17 G3/4B
φ24 ⁺⁰·¹₋₀.₂ φ18 ⁺⁰·¹₋₀.₂
≥14 3
45 20
10 10 B*

FJ95-563

Sensor head

φ23.6 Gasket seal

25 to 30
(Depends on A dimension)
φ17 G1B
φ30 ⁺⁰·¹₋₀.₂ φ23.6 ⁺⁰·¹₋₀.₂
≥14 3
45 20
A* 6 B*

FJ95-383

φ23.6 Taper seal

30
φ17 G1B
φ30 ⁺⁰·¹₋₀.₂ φ23.6 ⁺⁰·¹₋₀.₂
≥14 3
45 20
10 10 B*
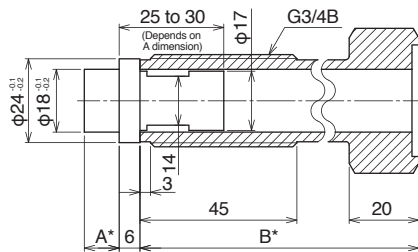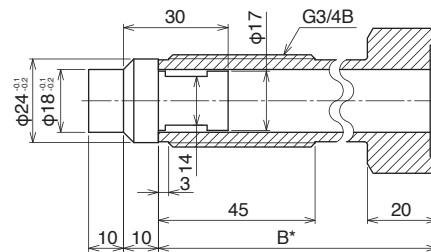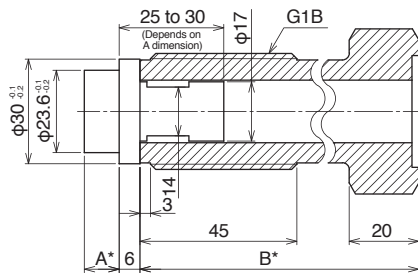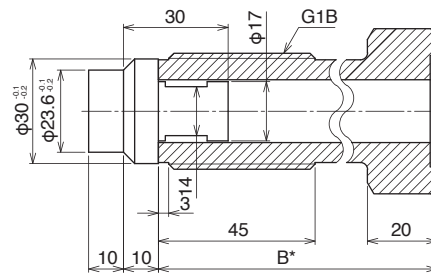
FJ95-683

* Dimension A Please specify from 10mm to 30mm by 5mm step.
  Dimension B Please specify 55mm or from 80mm to 300mm by 10mm step.

Port plug

* Used to check the shape of the sensor port and to block the sensor port.
  To prevent damage to the sensor head, it is recommended to check in advance using a port plug before installation.

φ10.5 ±0.1 φ7.8 ⁰₋₀.₁ C0.5 90° 1/2-20UNF or G1/4B
φ10.5 φ12.5 17X19.6 Hex.
5.6
13 20 12
60
310

φ14 ⁰₋₀.₁ φ9.7 ±0.05 G3/8B
φ14 φ16.5 24x27.7 Hex.
7.5
18 30 15
70
315
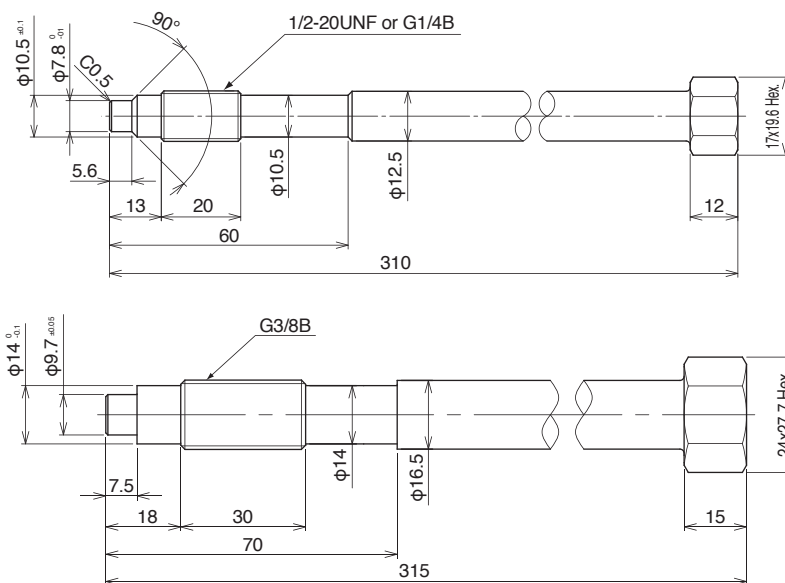
FJ95-8□3

Model number configuration Please specify the model number and each specs for ordering.

Model name

K F 1 0	–	1		3	–			1		0			×	×	3	
		①		②		③			④	⑤	⑥	⑦	⑧	⑨	⑩	⑪ ⑫ ⑬ ⑭ ⑮

Melt Pressure & Temperature Sensor

Model number			Selective spec.	Additional spec.

KF10	[Standard specifications] Indoor use Case material: Aluminum alloy Wetted parts material: Sapphire, SUS316, Nickel, Gold-copper alloy, Fe+Ni+Co alloy Diaphragm diameter: φ8 mm (G1/4B, 1/2-20UNF), Φ10 mm (G3/8B) Seal method: Tapered seal (G1/4B, 1/2-20UNF), Gasket seal (G3/8B) Detection unit temperature: 0 to 400°C

①Model	1	Thread connection

②Connection *1	2	G1/4B
	3	G3/8B
	Y	1/2-20UNF

③Wetted parts material	3	Sapphire, SUS316, Nickel, Gold-copper alloy, Fe+Ni+Co alloy

④Pressure range (MPa) ⑤Accuracy	④	⑤	④Pressure range（MPa）	⑤Accuracy
	G		0 to 1	±0.5%FS（150℃)/±1.0%FS（300℃)
	K	5	0 to 3.5	
	N		0 to 10	
	Q		0 to 25	±0.25%FS（150℃)/±0.5%FS（300℃) (Connection: ±0.5% F.S. (150 C) / ±1.0% F.S. (300 C)) when G3/8B is selected.)
	R	4	0 to 35	
	S		0 to 50	
	T		0 to 70	

⑥Power source	1	15 to 30V DC

⑦Analog output	1	4 to 20mA DC (standard)
	6	0 to 5V DC
	7	0 to 10V DC

⑧Treatment	0	Nil
	1	Use no oil
	2	Use no water
	3	Use no oil & water

⑨Digital output	0	Nil

⑩Connector cable length	0	Nil (standard)
	1	2 m
	2	4 m
	3	6 m
	4	8 m
	5	10 m

⑪B dimension	1	80 mm
	2	150 mm
	3	200 mm
	4	250 mm
	5	300 mm
	6	350 mm

⑭Construction	3	Remote type (Lead length 2 m) *2

⑮Document	0	Nil
	1	Required

Option (sold separately): Amplifier mounting bracket (KF99-001)
Jack out collar (KF99-002)

*1 For non-standard connection sizes, use the separately sold adapter (FJ95).
Select 1/2-20UNF when combined with FJ95.

*2 The standard lead length is 2 m.
For the length of the connector cable, specify in ⑩.

Model number configuration Please specify the model number and each specs for ordering.

Dedicated adapter / port plug

Model name

F J 9 5	–			3	–	×			×		×	×	×	×	×	×	
Dedicated adapter/port plug		①	②	③		④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮

Model number		Selective spec.	Additional spec. (option)

FJ95	[Standard specifications] KF10-1Y3 Dedicated adapter/port plug		

①Detection end	2	φ18 Gasket seal
	3	φ23.6 Gasket seal
	5	φ18 Tapered seal
	6	φ23.6 Tapered seal
	8	Port plug

②Thread size	2	G1/4B ① For 8
	3	G3/8B ① For 8
	6	G3/4B ① For 2 and 5
	8	G1B ① For 3 and 6
	Y	1/2-20UNF ① For 8

③Detection end material	3	SUS316

⑤A dimension	0	Nil (for port plug)
	1	10mm (for taper seal)
	2	15mm
	3	20mm
	4	25mm
	5	30mm

⑥B dimension	0	Nil (When selecting a port plug)				
	1	55mm	(C dimension = 25 mm)	G	190mm	
	2	80mm		H	200mm	
	3	90mm		J	210mm	
	4	100mm		K	220mm	
	5	110mm		L	230mm	
	6	120mm	(C dimension = 45 mm)	M	240mm	(C dimension = 45 mm)
	7	130mm		N	250mm	
	8	140mm		P	260mm	
	C	150mm		Q	270mm	
	D	160mm		R	280mm	
	E	170mm		S	290mm	
	F	180mm		T	300mm	

⑧Treatment	0	Nil
	1	Use no oil
	2	Use no water
	3	Use no oil & water

⑮Documents	0	Nil
	1	Required

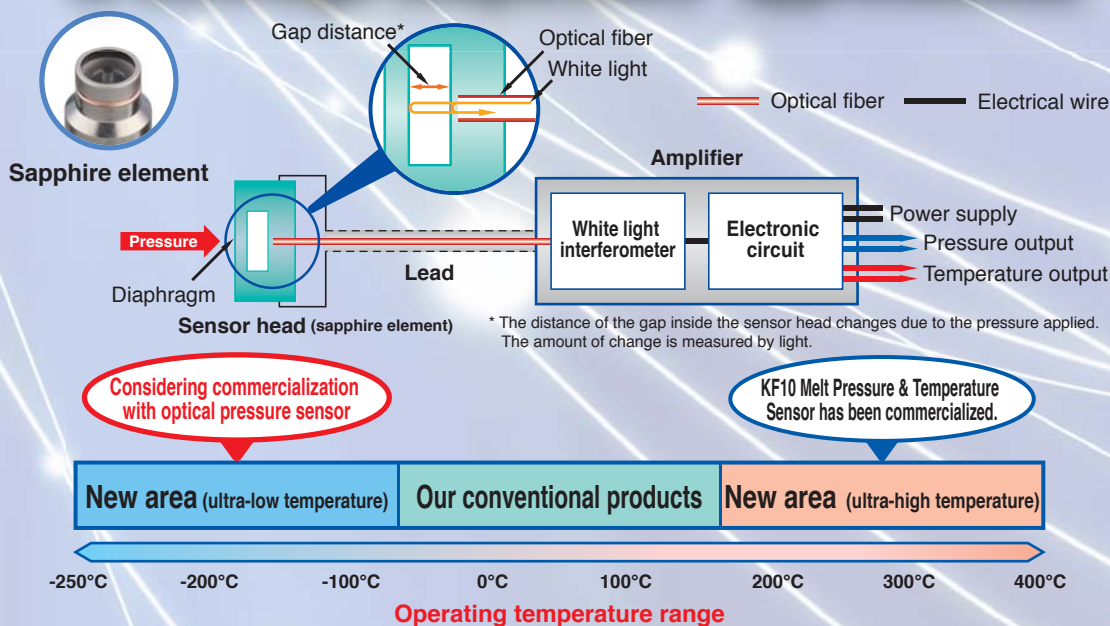*For φ18 or φ23.6: Two parts, a detection end and a mounting screw (made of SUS420J2), are used.

Zero adjustment and output confirmation function (magnet type)

Various operations can be performed without contact by using a magnet.

Point 1
SW1
⟩⟩⟩ **Zero adjustment can be done easily.**

SW1: Zero adjustment switch

Magnet (neodymium magnet)

SW2: Output confirmation switch

Point 2
SW2
⟩⟩⟩ **Outputs the value of 80% F.S. of the analog output.**
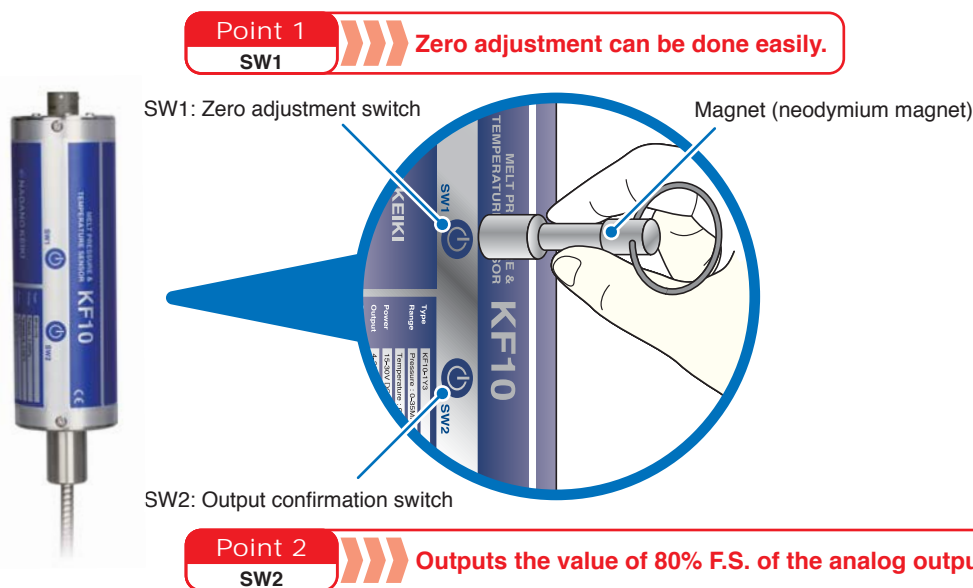
Optical Pressure Sensors

New measurement technology for "ultra-low to ultra-high temperature" apprecations!

Sapphire element

Gap distance*

Optical fiber
White light

Optical fiber — Electrical wire

Amplifier

Pressure

Diaphragm

Sensor head (sapphire element)

Lead

White light interferometer

Electronic circuit

Power supply
Pressure output
Temperature output

* The distance of the gap inside the sensor head changes due to the pressure applied.
The amount of change is measured by light.

Considering commercialization with optical pressure sensor

KF10 Melt Pressure & Temperature Sensor has been commercialized.

New area (ultra-low temperature)	Our conventional products	New area (ultra-high temperature)

-250°C   -200°C   -100°C   0°C   100°C   200°C   300°C   400°C

Operating temperature range

The operating temperature range has been greatly expanded compared to conventional products, making it possible to measure pressure in extreme environments.

The contents in the catalogue are subject to change without notice.