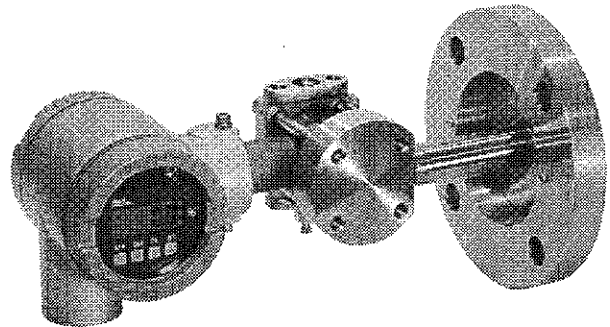


OPTICAL FLANGE TYPE LIQUID LEVEL TRANSMITTER

The model FPK 2 Optical Flange Type Liquid Level Transmitter is a precision, electrostatic capacitance type instrument used for measuring liquid level of various fluids. The transmission unit incorporates a micro-processor for digital signal processing to achieve highly accurate measurements.

A fiber optic cable used for the signal transmission line forms an optical field instrumentation system together with an optical star coupler and a master station.

An 6mm dia. optical fiber cable is connected to the instrument.



SPECIFICATIONS

Functional specifications

Fluids measured: Liquid, gas or steam

Measuring range:

Type	Span [kPa] (mH ₂ O)	Range limits [kPa] (mH ₂ O)	
		Lower range limit	Upper range limit
FPK□3	3.2...32 (or 0.32...3.2)	-32 (-3.2)	32 (3.2)
FPK□4	6.4...64 (or 0.64...6.4)	-64 (-6.4)	64 (6.4)
FPK□5	13...130 (or 1.3...13)	-130 (-13)	130 (13)
FPK□6	50...500 (or 5...50)	-500 (-50)	500 (50)

Operating pressure:

Flange rating

Process pressure limit:

Sealing liquid	Code	Process temperature	Operating pressure
Fluorolube oil	W, A, D	-20 to 80°C	0kPa (0kgf/cm ²) min.
Silicon oil	H	-15 to 250°C	
Silicon oil	J	85 to 300°C	2.7kPa abs (20.3mmHg abs) min.
Silicon oil	Y, G	-40 to 120°C	
Silicon oil	S	-15 to 250°C	See Fig.1 on page 3
Silicon oil	T	85 to 300°C	
Silicon oil	K	-15 to 150°C	0.13kPa abs (0.98mmHg abs) min. See Fig.2 on page 3

Notes: (1) When the code is H, J, S or T, the low pressure side process temperature and the transmitter temperature must be 120°C or less and, when the code is K, the low pressure side process temperature must be 80°C or less.

(2) Process temperature in intrinsic safety : -10 to +80°C.

Output: Linear (optical digital)

Power supply: Built-in lithium battery (expected life about 2 years)

Setting:

Item	Remote setting	Direct setting
Detail	1. Measuring range 2. Damping(*1) 3. Read from, write in transmitter inside memory	1. Measuring range 2. Damping(*1)
Setter	By HHC(*2), MS(*2)	By indication unit

Notes: * (1) Damping 0.2 to 51.2sec

(2) HHC: Hand held communicator

MS: Master station

(see System block diagram on page 3)

Zero elevation and suppression:

From -100 to +90% of maximum span

Self-diagnosis: Displayed on indication unit (option) and transmitted to host master station

Diagnosis item	HHC, MS	Indication unit
Measuring range abnormal	○	○
Detecting unit failure	○	○
Battery voltage low	○	○
Battery voltage	○	—
Amplifier ambient temperature	○	—

Explosion-proof: JIS i3aG4. Safety barriers are not necessary.

Ambient temperature:

-30 to +70°C

(For intrinsic safety: -10 to +60°C)

(When filled with fluorolube oil:

-10 to +60°C

Silicon oil H, S, K: -10 to +70°C

Silicon oil J, T: +20 to +70°C)

Storage temperature:

-30 to +70°C

Ambient humidity:

0 to 95%RH

Transmission: Half-duplex bi-directional transmission with one-fiber system (6mm dia. cable)
Transmission distance: 1.2km max.
(free from noise effects and surge)

Indication of measured value:

-100 to 100% or actual value scale, LCD
4-digit

Others: Optical/electric converter is available with transmission distance of 4km max.

Performance specifications

Accuracy rating: ±0.2% at 0 to 100% output signal under reference conditions (inclusive of linearity, hysteresis and repeatability)

Temperature effect:

Zero shift at maximum span
±0.8%/55°C between -30 and +70 °C
(±0.5%/55°C optional).

Remarks:

- (1) Output changes when entire transmitter is at same temperature if process pressure receiving unit and transmitter proper are at the same level.
- (2) Error increases if there is difference in temperature between process pressure receiving unit, capillary and transmitter proper.

Overrange effect:

Zero shift at maximum span
±0.3%/nominal pressure of flange.
Double above value for other than material code W or V.

Static pressure effect:

Zero shift at maximum span
±0.2%/1MPa {10.2kgf/cm²}
Doble above value for other than material code W or V.
Span change at maximum span
-0.2^{+0.2}_{-0.1} %/nominal flange pressure

Inclination effect:

0.3kPa {30.6mmH₂O}/10° (without extension). Double above value when 13th digit (tratment, filled-fluid) is W, D or A.

External dimensions (H x W x D) and mass(weight):

132 x 124 x 367mm, approx. 10 to 19kg

Mounting method:

Mounted with flange

Diaphragm extension length:

0, 50, 100, 150, 200mm
(as specified)

Cable and connection:

Optical fiber cable per our specification (separately available).

Used with optical connector

Process connection (low pressure side):

Rc1/4 (PT1/4)

Optional specifications

Indication unit: 4-digit LCD unit

Setting unit (4 pushbutton switches).
Operating temperature range -20 to +70°C)

Material:

Stainless steel bolts, nuts
Stainless steel fixture

Oxygen oil-proof processing:

Fluorolube filled. Wetted parts degreased and cleaned. Available for material code "W" or "V".

Fill-fluid: Fluorolube oil

Chlorine service: Fluorolube oil filled (for material code H, T, B or U)

Acid/alkali-proof treatment:

Depends on Code symbol of stainless steel bolt/nut

Physical specifications

Flange material: Carbon steel or SUS304

Process-wetted part material:

Material code	High pressure side (mounting flange side)		Low pressure side	
	Seal diaphragm	Other wetted parts	Seal diaphragm	Cover
W	SUS316L	SUS316	Hastelloy-C	SUS14
V	SUS316L	SUS316	SUS316L	SUS14
H	Hastelloy-C	Hastelloy-C	Hastelloy-C	SUS14
M	Monel	Monel	Monel	SUS14
T	Tantalum	Tantalum	Tantalum	SUS14
B	Hastelloy-C	Hastelloy-C	Hastelloy-C	Hastelloy-C lining
L	Monel	Monel	Monel	Monel lining
U	Tantalum	Tantalum	Tantalum	Tantalum lining
P	Titanium	Titanium	Titanium	SUS14
R	Zirconium	Zirconium	Zirconium	SUS14

- Fill-fluid Silicon oil
- Casing bolt Chrome molybdenum steel
- O-ring Viton
- Amplifier case Aluminum alloy

Finish: Epoxy-polyurethane double coat, silver (blue for amplifier case cover)

Environment protection:

Meets JIS C0920 immersion-proof (equivalent to IEC IP65 and NEMA4)

Scope of delivery

Instrument body

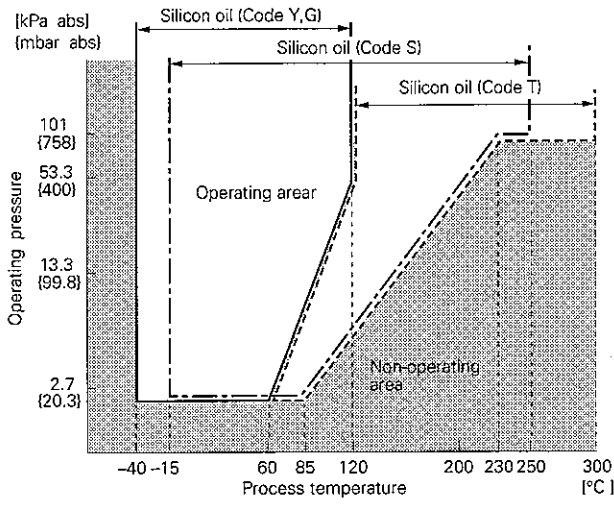


Fig. 1 Relation between process temperature and operating pressure

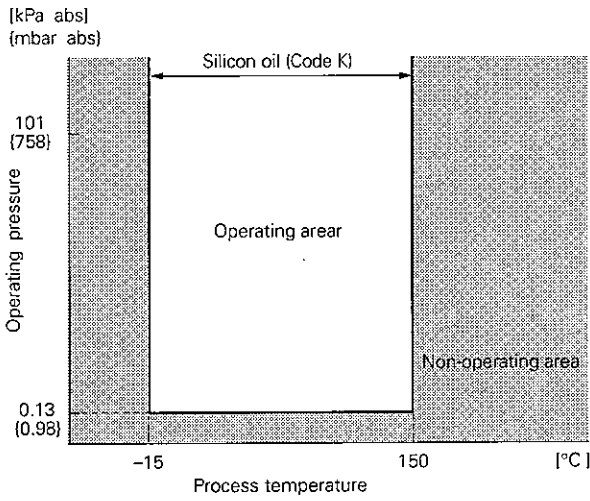
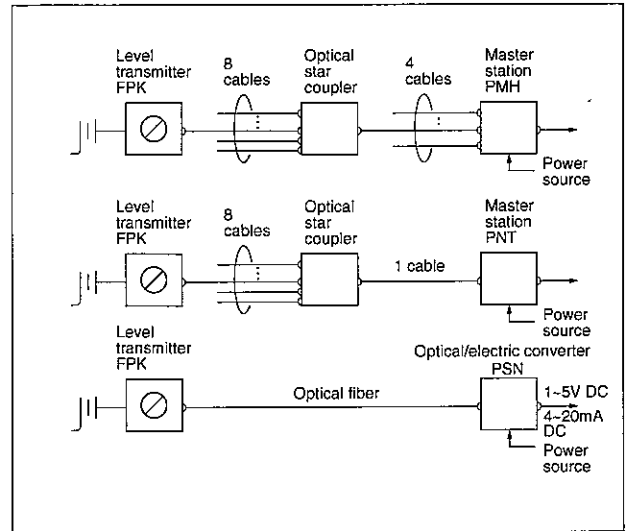


Fig. 2 Relation between process temperature and operating pressure

SYSTEM BLOCK DIAGRAM



CODE SYMBOLS

Description												
Process cover												
Process connection										Oval flange thread		
Rc1/4										7/16-20UNF		
Flange material						Flange standard						
SUS304						JIS 10K 80A JIS 10K 100A JIS 30K 80A JIS 30K 100A ANSI/JP1 150LB 3B ANSI/JP1 150LB 4B ANSI/JP1 300LB 3B ANSI/JP1 300LB 4B						
Carbon steel						JIS 10K 80A JIS 10K 100A JIS 30K 80A JIS 30K 100A ANSI/JP1 150LB 3B ANSI/JP1 150LB 4B ANSI/JP1 300LB 3B ANSI/JP1 300LB 4B						
Measuring span (kPa) (mHzO)												
3.2...32 (or 0.32...3.2)												
6.4...64 (or 0.64...6.4)												
13...130 (or 1.3...13)												
50...500 (or 5...50)												
Material												
High pressure side (mounting flange side)				Low pressure side				Remark				
Seal dia-phragm		Other wetted parts		Seal dia-phragm		Cover						
W		SUS316L		Hastelloy-C		SCS14						
V		SUS316L		SUS316L		SCS14		(*)				
H		Hastelloy-C		Hastelloy-C		SCS14						
M		Monel		Monel		SCS14						
T		Tantalum		Tantalum		Hastelloy-C lining						
B		Hastelloy-C		Hastelloy-C		Monel lining						
L		Monel		Monel		Tantalum lining						
U		Tantalum		Tantalum		SCS14						
P		Titanium		Titanium		SCS14						
R		Zirconium		Zirconium		SCS14						
Note: Unavailable when measuring span code (6th digit) is "6" for material code R												

Description												
Transmission unit / field indicator												
Field indicator										Remarks		
Yes/ No										Scale		
A										—		
L										Yes		
P										Yes		
										0 to 100% digital indication		
										Actual digital scale indication		
Explosion-proof												
A Non-explosion proof												
G Intrinsic safety, JIS												
Diaphragm extension length [mm] (*2)												
0 (specify 0 for other than W, H, or B at 7th digit)												
Y												
A 50												
B 100												
C 150												
D 200												
E 50												
F 100												
G 150												
H 200												
Special specification												
Stainless steel bolt(*3)						Optical fiber cable protective adapter (standard for 6mm dia. cable)						
Y						×						
A						○						
B						×						
C						○						
Note: 9mm dia. optical fiber cable connecting type is also available as an option.												
Treatment						Fill-fluid						
Y						No						
W						No						
G						Degreasing						
A						Oxygen oil-proof processing						
D						Chlorine service						
H						No						
J						No						
S						No						
T						No						
K						No						
						Silicon oil (for general purpose)						
						Fluorolube oil						
						Silicon oil						
						Fluorolube oil (W or V at 7th digit)						
						Fluorolube oil (H, T, B or U at 7th digit)						
						Silicon oil (for high temperature)						
						Silicon oil (for high temperature)						
						Silicon oil (for high temperature, vacuum)						
						Silicon oil (for high temperature, vacuum)						
						Silicon oil (for high temperature, vacuum)						
						Silicon oil (for high temperature, vacuum)						
						W or V at 7th digit						

- Notes: *1 (1) When measuring span code (6th digit) is "6", the low pressure side seal diaphragm is made of Hastelloy-C.
 (2) Extension may or may not be present for 80A or 3B
 For 100A or 4B, flange size extension length of 0mm is unavailable.
 (3) Low pressure side cover set bolt.

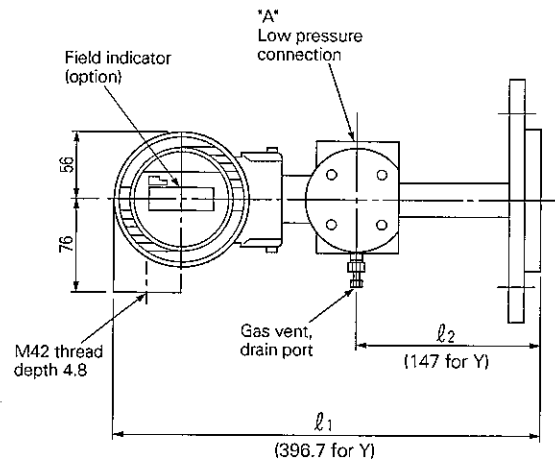
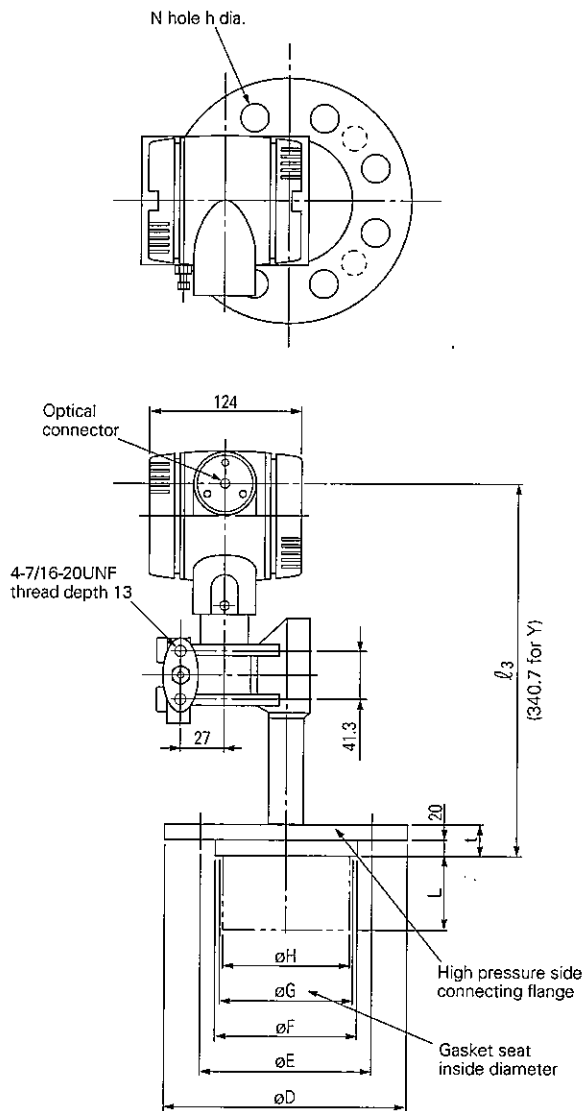
RELATED DEVICES

- Master station: (Data sheet No. EDS11-86, EDS11-121)
- Optical/electric converter: (Data sheet No. EDS9-45)
- Optical star coupler: (Data sheet No. EDS8-48)
- Hand held communicator: (Data sheet No. EDS8-44)
- Connector assembly tool
- Optical connector
- Cable

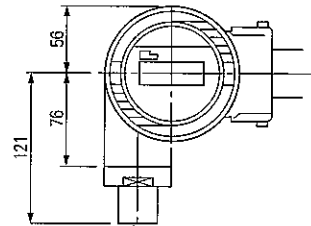
ORDERING INFORMATION

- Process variable or use
- Instrument name
- Model type
- Operating pressure and measuring range
- Measuring unit material
- Options
- Others

OUTLINE DIAGRAM (Unit:mm)

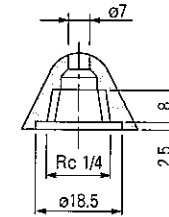


When provided with optical fiber cable protective adapter



Adapter 1/2-14NPT (option)

Details of "A"

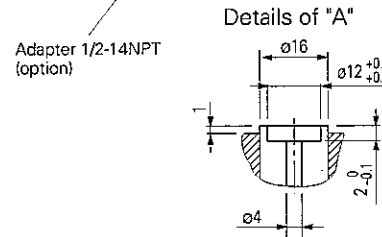
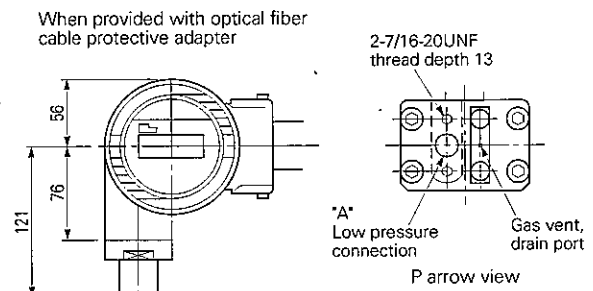
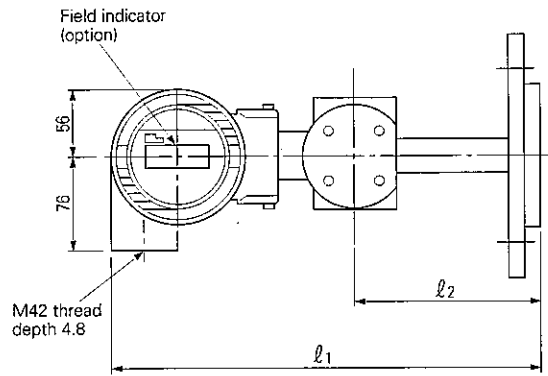
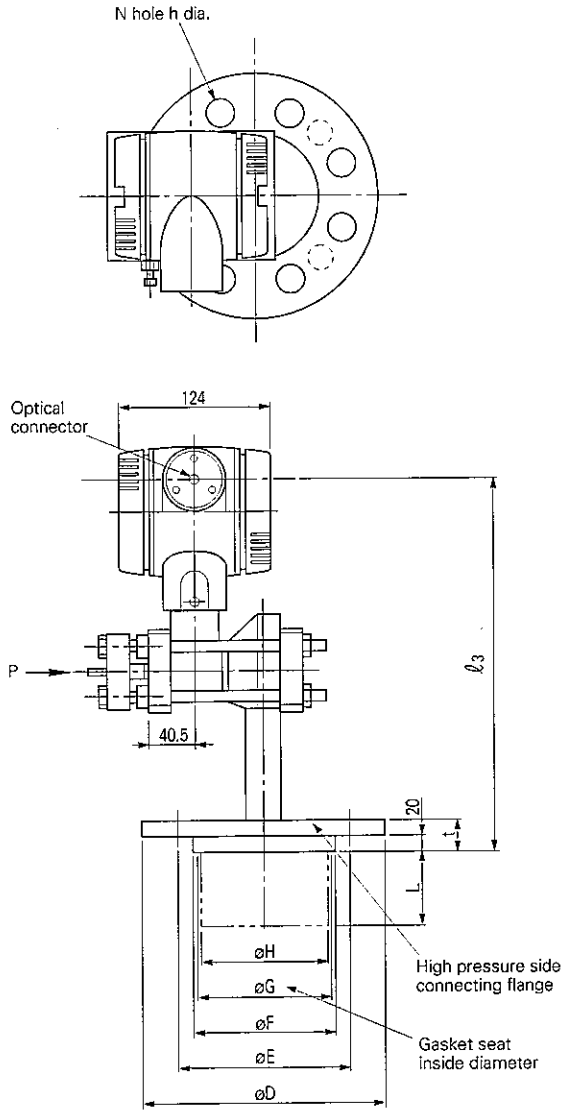


F P K S
 W
 V
 H
 M
 R
 P
 T

								ø:dia
øD	øE	øF	øG	øH	øt	N-øh	Flange standard	
185	150	126	100	73	38	8-19	JIS-10K-80A	
210	175	151	103	96	38	8-19	JIS-10K-100A	
210	170	126	100	73	48	8-23	JIS-30K-80A	
240	195	151	103	96	52	8-25	JIS-30K-100A	
191	152.5	126	100	73	44	4-20	ANSI/JPI-150LB-3B	
229	190.5	151	103	96	44	8-20	ANSI/JPI-150LB-4B	
210	168	126	100	73	49	8-23	ANSI/JPI-300LB-3B	
254	200	151	103	96	52	8-23	ANSI/JPI-300LB-4B	

Extension length L	l ₁	l ₂	l ₃
0	366.7	147	340.7
50	360.7	141	334.7
100			
150			
200			

<For material code B, L or U>



							ø:dia
øD	øE	øF	øG	øH	øt	N-øh	Flange standard
185	150	126	100	73	38	8-19	JIS-10K-80A
210	175	151	103	96	38	8-19	JIS-10K-100A
210	170	126	100	73	48	8-23	JIS-30K-80A
240	195	151	103	96	52	8-25	JIS-30K-100A
191	152.5	126	100	73	44	4-20	ANSI/JPI-150LB-3B
229	190.5	151	103	96	44	8-20	ANSI/JPI-300LB-4B
210	168	126	100	73	49	8-23	ANSI/JPI-300LB-3B
254	200	151	103	96	52	8-23	ANSI/JPI-300LB-4B

FPKS □ □ **B**
L
U

L [mm]	l ₁	l ₂	l ₃
0	351	147	303
50	345	141	297
100			
150			
200			

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