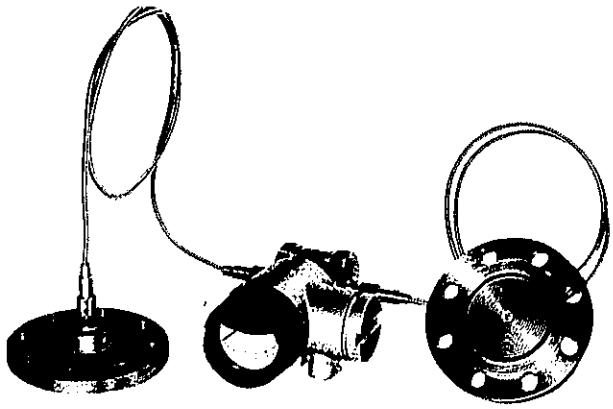
FUJI ELECTRIC

FC SERIES DIFFERENTIAL PRESSURE TRANSMITTER WITH REMOTE SEAL DIAPHRAGM

DATA SHEET FFD

FC SERIES capacitance type differential pressure transmitters provide precise measurement of flow rate and liquid level of corrosive, high temperature or high viscous liquids and slurries. Process high and low pressures act only on the seal diaphragms connected to the detecting main unit by capillary tubings to separate it from the process. Process pressures change capacitance by deflection of the flat diaphragm or a moving electrode. This change is measured and converted to a signal current in the electronics circuit. The detecting main unit has the same construction as type FFC differential pressure transmitter. Explosionproof, field indicator, corrosion resistant materials, built-in arrester and other specifications are fully filled up.



FEATURES

1. **High accuracy**
   The simple measuring principle to detect the capacitance change by a very small deflection of the flat diaphragm and the unique Floating Cell system assures high accuracy of 0.25%. The influence of static pressure, overload and temperature is smaller than any other transmitters on the market.
2. **High reliability and long-term stability**
   All welded, simple mechanism with few parts causes little failure and drift.
3. **Excellent environmental adaptability**
   Minimal influence of vibration, weather and radio frequency interference enables this transmitter to locate in almost all circumstances.
4. **Easy maintenance and handling**
   Compact and lightweight design ensures speedy installation. Zero, span and damping are easily and independently adjusted on the front panel. The detecting unit and the electronics unit are interchangeable and easily replaceable because of the three block structure.
5. **Full range specifications**
   To meet any process requirements, a wide choice of explosionproof, large indicator, arrester, corrosion resistant materials, various treatments, integral orifice etc. are available.
6. **Wide rangeability**
   Each transmitter is available with 10 to 1 turndown for application flexibility. FC SERIES transmitters are offered in three ranges; 0 to 130mmH_2O to 0 to 32000mmH_2O with the same structure and size.

SPECIFICATIONS

Measuring range:
FFD □3 0 to 130··· 1300mmH_2O
FFD □4 0 to 640··· 6400mmH_2O
FFD □5 0 to 3200··· 32000mmH_2O

Working pressure:
FFD1 -1 to 10 kg/cm^2
FFD3 -1 to 20 kg/cm^2
(Negative pressure service; below 60°C.)

Material:
Wetted parts

Material code	Seal diaphragm	Other wetted part
W	JIS SUS316L	JIS SUS316
H	Hastelloy C	Hastelloy C
M	Monel	Monel
T	Tantalum	Tantalum

Electronics casing
Aluminum alloy
Epoxy-polyurethane double coating, silver
Field indicator cover, black N3.

Zero shift: Adjustable from –32% to 100% of the maximum span.
(The sum of zero shift, calibrated span and *p*H should not exceed the maximum measuring range, where "H" is the height difference of the high/low mounting flanges, and "*p*" is the specific gravity of filled liquid.
At 25°C
Standard type: $p = 0.96$
Oxygen measurement: $p = 1.87$

Output signal: DC 4 to 20mA or DC 10 to 50mA

Power supply and allowable load resistance:
DC 4 to 20mA output
DC 12 to 45V
(Less than DC 26V; intrinsic safety)
(Less than DC 27V; with arrester)
0 to 600Ω (at DC 24V power supply)
DC 10 to 50mA output
DC 25 to 70V
0 to 450Ω (at DC 48V power supply)

Wiring system: 2-wire system

Ambient temperature:
–30 to 80°C
(–30 to 60°C; explosionproof or with arrester)
(–10 to 60°C; oxygen measurement)

Weather resistance:
DIN 40040 HQC

Fluid temperature:
–40 to 180°C (non-freezing condition)

Response time: Faster than 1.5 sec./capillary 1.5 m, time constant of the detecting unit at room temperature
(When capillary is longer, +0.6 sec/m should be added.)

Damping: 4 steps selectable; no-damping, and time constants of 0.2, 1 and 3 sec

Waterproof: IEC IP65 and NEMA4

Explosionproof:

	Certifying authority	Area classification	Temperature classification
Flameproof (Explosionproof)	FM	Class I, Division 1 Group B, C, D	T6
	CSA	Class I, Division 1 Group C, D	T6
Intrinsically safe	FM	Class I, Division 1 Group A, B, C, D	T6
	CSA	Class I, Division 1 Group A, B, C, D	T6
	SAA	Exia II C	T6
	PTB	Exib II C	T5, T6

FM : Factory Mutual Research (USA)
CSA : Canadian Standards Association
SAA : Standards Association of Australia
PTB : Physikalisch-Technische Bundesanstalt

Weight: 14 ~ 20 kg

Dimensions (HxWxD):
Main unit 102x159x230 mm
(see outline)

Mounting method:
The main unit is mounted on a horizontal or vertical 2" pipe by using a U-bolt

Process connection:
Flange mounting;
Flush type 3" flange
Extension type 4" flange

Capillary length: 1.5, 3, 6m (material; SUS, vinyl chloride coated)

Diaphragm extension length:
100 mm (distance between flange surface and diaphram)
(50, 150 mm is also available)

Conduit connection:
1/2-14NPT internal thread

OPTIONAL SPECIFICATIONS

Field indicator: Built in electronics casing, class 1.5
0 to 100% linear, square root

Arrester: Built in the electronics casing
(DC 4 to 20mA output only)

Oxygen measurement:
Specify material JIS SUS316
(Code: "W")

Acid and alkaliproof treatment:
U-bolt, nuts and washers; JIS SUS304

CHARACTERISTICS

(indicated by % of span with stainless steel diaphragm and silicone fill.)

Allowance: Better than ±0.25% (under standard condition)

Linearity: Better than ±0.25%

Repeatability: Better than ±0.1%

Sensitivity: Better than 0.05%

Temperature effect: *1), *2)
At maximum span and between –30 ~ 80°C; (Typical)
Total error (zero and span) ±2%/55°C

Static pressure effect: *1), *2)
At maximum span;
Zero shift 0.2%/10 kg/cm²

Allowable differential overpressure:
Up to the rated pressure

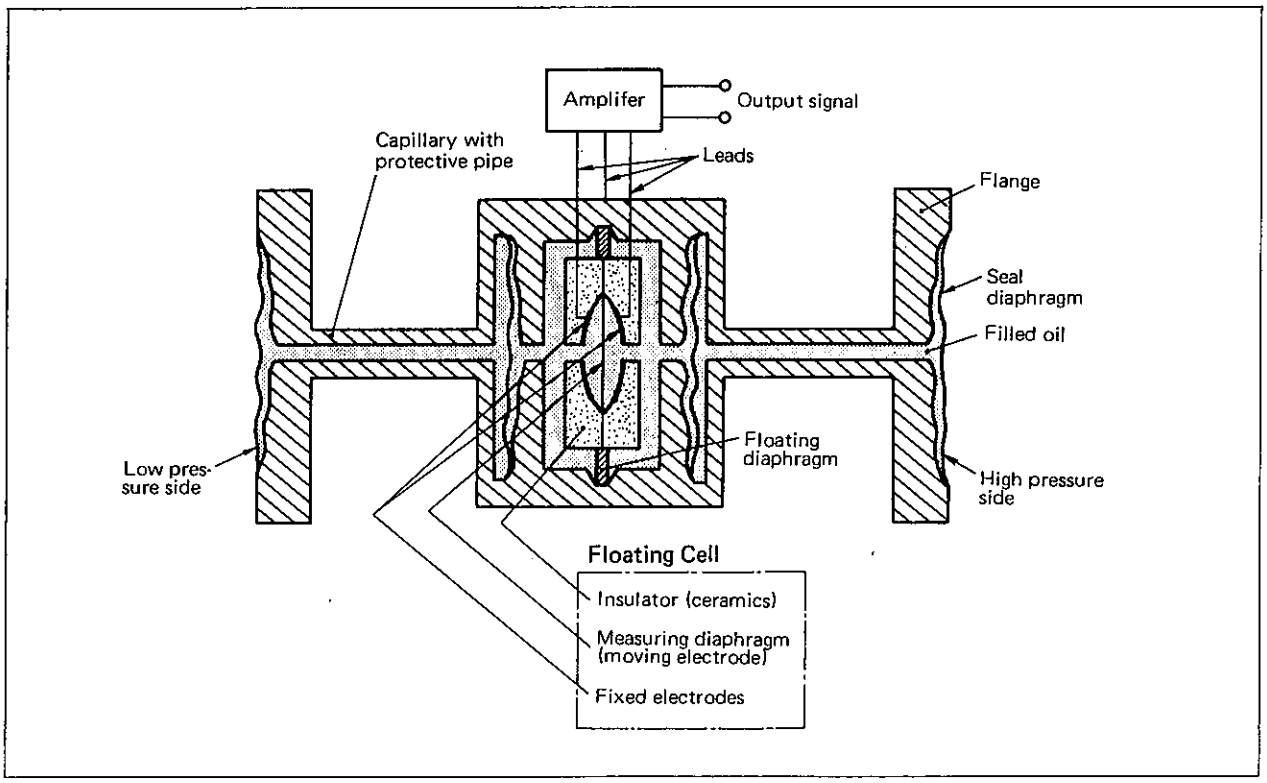
Effect of differential overpressure:
At maximum span 0.3%/±10 kg/cm²

Power fluctuation:
Zero shift; 0.005%/V

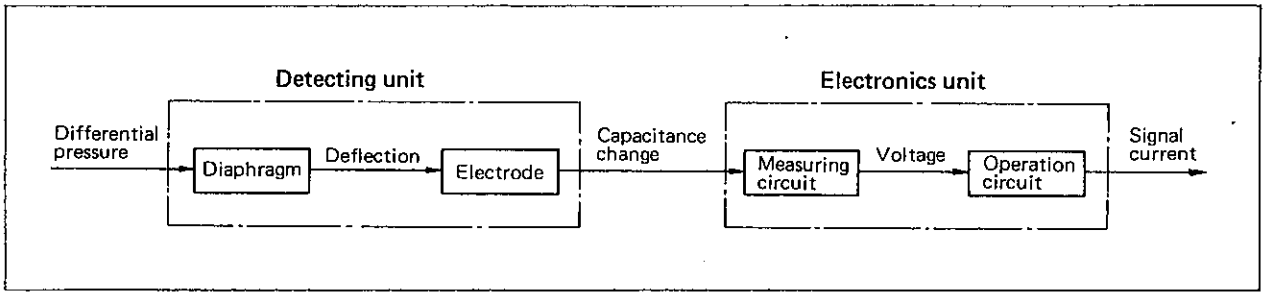
Effect of position:
Zero shift;
20mmH_2O/10°
(detecting main unit) *2)

Note *1) This is doubled for corrosion resistance materials (Code: H, M and T) measurement.
*2) This is doubled for oxygen measurement.

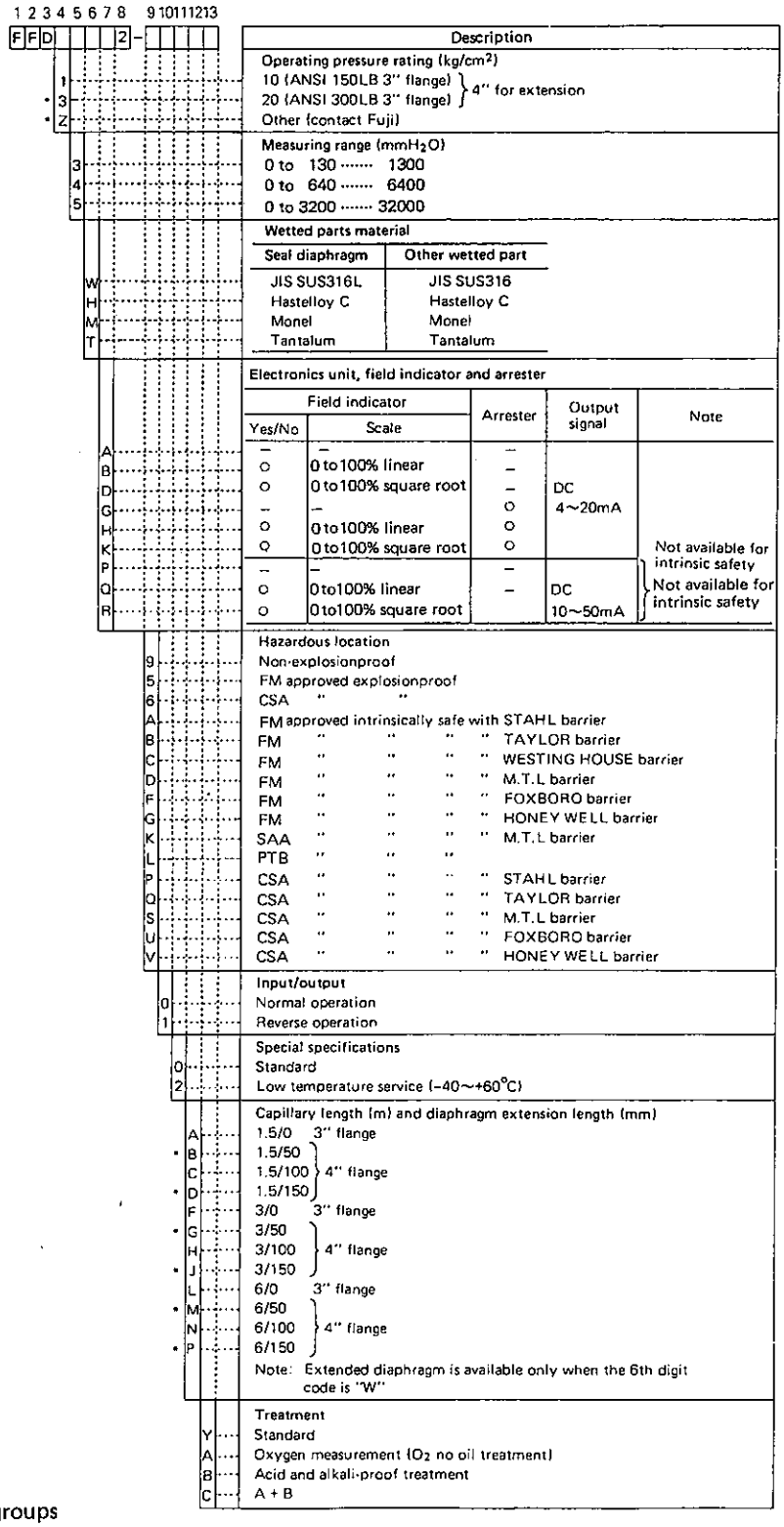
STRUCTURAL PRINCIPLE



FUNDAMENTAL BLOCK DIAGRAM



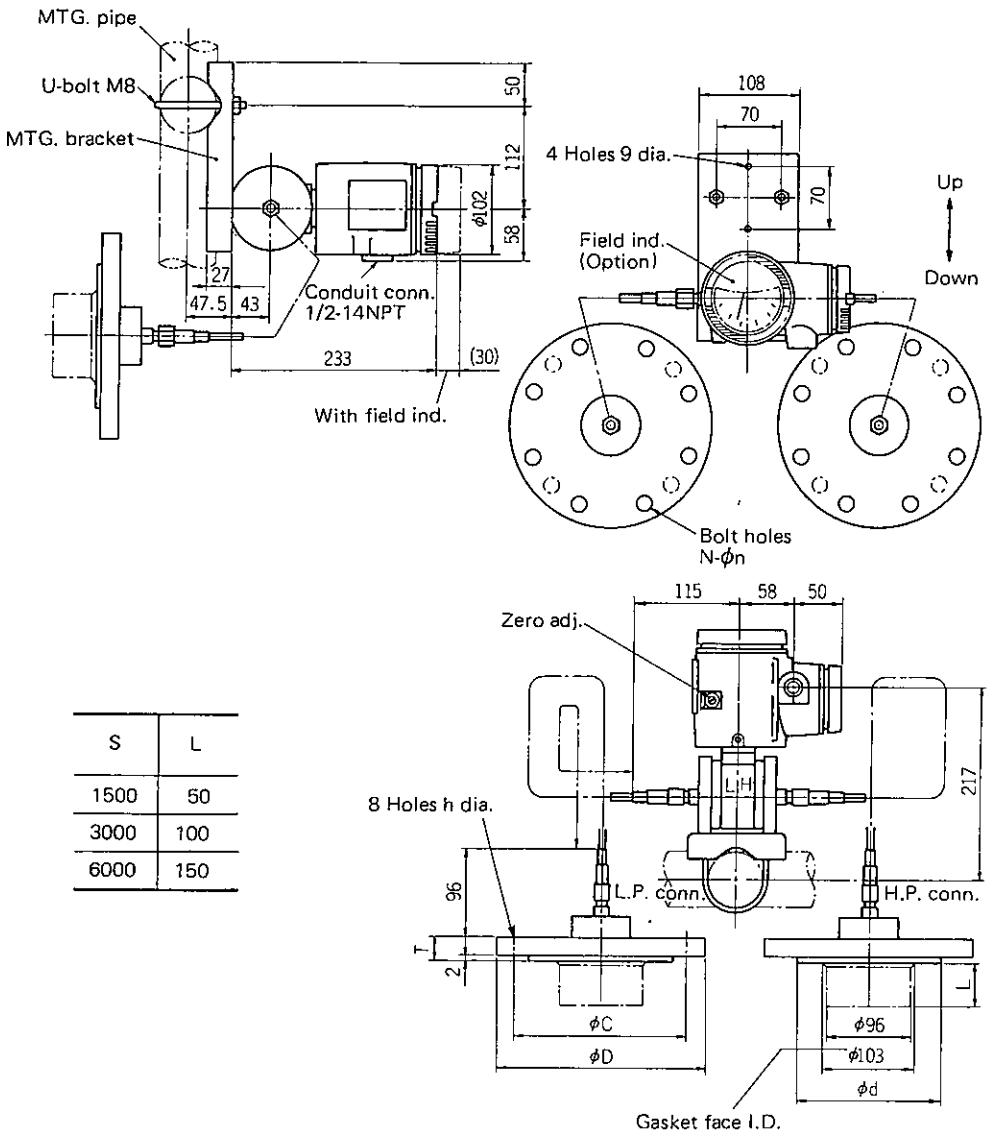
CODE SYMBOLS



Barriers and Gas groups

Codes	Certified by	Barrier	Installation drawing	Applicable gas groups
A	FM	STAHL, 8901, 8903	TC 408292	A, B, C, D
B	FM	Taylor, 1130, 1135	TC 408293	C, D
C	FM	Westinghouse, 75SB02	TC 408294	A, B, C, D
D	FM	MTL, 128, 188, 322	TC 408660	A, B, C, D
F	FM	Foxboro,	TC 409102	B, C, D
G	FM	Honeywell, 38545	TC 408625	A, B, C, D
K	SAA	MTL, 128, 188, 322	TD 407370	II C
L	PTB	Ik ≤ 100mA, U≤ 30V	————	II C
P	CSA	STAHL, 8901, 8903	TC 408628	A, B, C, D
Q	CSA	Taylor, 1130, 1135	TC 408629	C, D
S	CSA	MTL, 128, 188, 322	TC 408661	A, B, C, D
U	CSA	Foxboro,	TC 409101	B, C, D
V	CSA	Honeywell, 38545	TC 408630	A, B, C, D

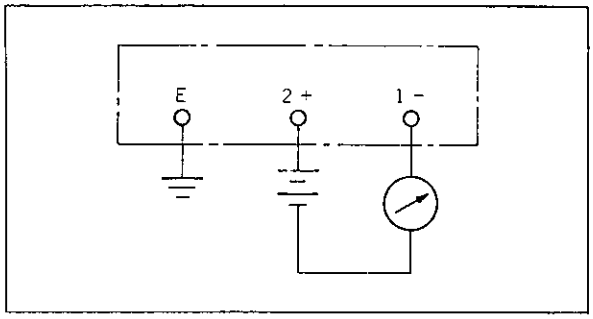
OUTLINE DIAGRAM (Unit: mm)



S	L
1500	50
3000	100
6000	150

φD	φC	φd	T	φh	N	Flange		L
						Size	Rating	
190.5	152.4	127	24	19	4	3"	150 LB	0
209.6	168.3	127	29	22	8	3"	300 LB	
228.6	190.5	157.2	24	19	8	4"	150 LB	50, 100 or 150
254	200	157.2	32	22	8	4"	300 LB	

CONNECTION DIAGRAM



RELATED DEVICES

- Distributor
- Square-root extractor (with distributor)
- Opener

ORDERING INFORMATION

1. Measuring object or application
2. Product name
3. Code symbols
4. Operating pressure and measuring range
5. Material of wetted parts
6. Explosionproof or special specifications
7. Other requirements