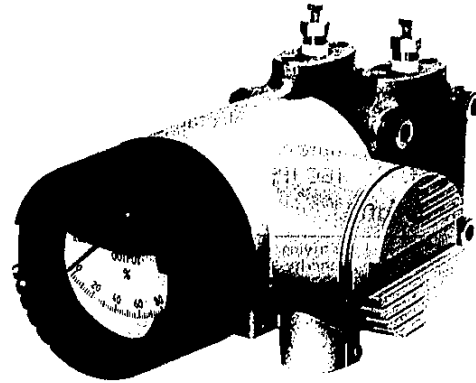


## FC SERIES LOW DIFFERENTIAL PRESSURE TRANSMITTER

DATA SHEET

FFB

FC SERIES capacitance type differential pressure transmitters provide precise measurement of flow rate, differential pressure, pressure and liquid level of various liquids, gases and steam. Process high and low pressures act on the flat diaphragm through metal seal diaphragms and 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 for transmission to receiving instruments. Explosionproof, field indicator, 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, various treatments, integral orifice, equalizing valve etc. are available.
6. **Wide rangeability**  
Each transmitter is available with 10 to 1 turndown for application flexibility. FC SERIES transmitters are offered in six ranges; 0~10mmH<sub>2</sub>O to 0~30 kg/cm<sup>2</sup> with the same structure and size.

### SPECIFICATIONS

#### Measuring range and working pressure:

Type	Working pressure (kg/cm <sup>2</sup> )	Measuring range (mmH <sub>2</sub> O)
FFB11	-1 to 10	0 to 10...100
FFB22	-1 to 30	0 to 25...250

#### Material:

Detecting unit;  
Measuring element  
Seal diaphragm/SUS 316L  
Other wetted part/SUS 316  
Process cover/SUS 316  
Electronics casing;  
Aluminium alloy  
Epoxy-polyurethane double coating, silver  
Field indicator cover, black N3  
O-Ring; Viton  
Fill; Silicone or daifloil (fluorinated fluid for oxygen measurement)

Zero shift: Adjustable from -32 to 100% of the maximum span.  
(The sum of zero shift and calibrated span should not exceed the upper range limit.)

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 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: with arrester)
- Weather resistance:
  - DIN 40040 HQC
- Fluid temperature:
  - 30 to 100°C
  - (Non-freezing condition)
- Response time: Faster than 0.8 sec. (time constant of the detecting unit at room temperature)
- Adjustable damping:
  - 4 steps selectable; no damping, and time constant of 0.2, 1 and 3 sec.
- Waterproof: IEC IP65 or 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

External dimensions (HxWxD) and weight:  
 143x164x237 (267)\* mm, 6.5 kg  
 \*: with field indicator

Mounting method:  
 On a horizontal or vertical 2" pipe by using a U-bolt

Process connection:  
 1/4-18NPT internal thread  
 1/2-14 NPT with oval flange)

Conduit connection:  
 1/2-14NPT internal thread

**OPTIONAL SPECIFICATIONS**

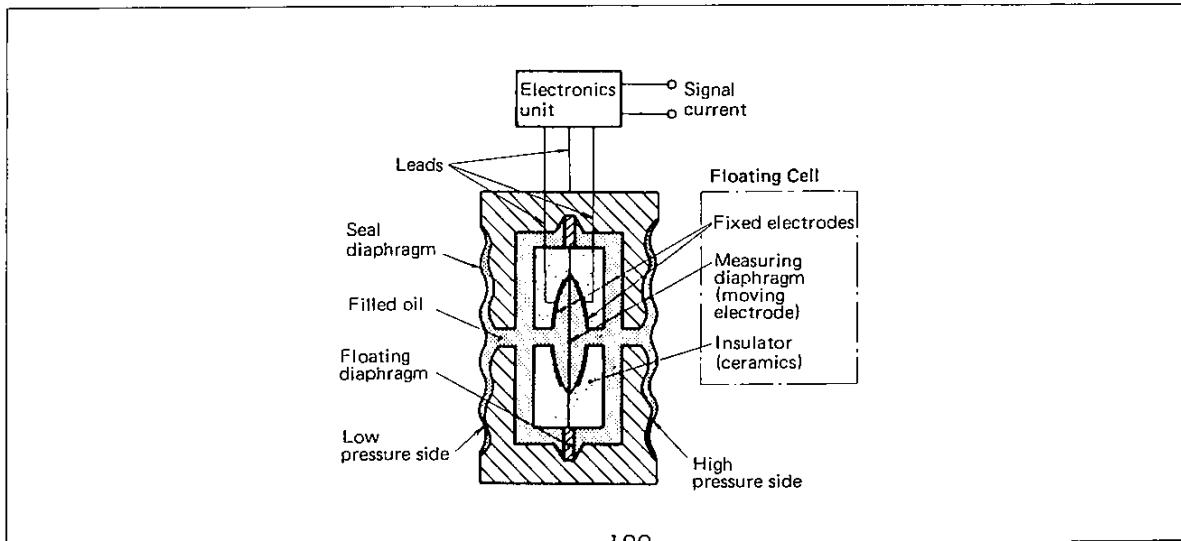
- Field indicator: Built in electronics casing, class 1.5  
0 to 100% linear, square root
- Arrester: Built in the electronics casing  
(DC 4 to 20mA output only)
- Oxygen measurement:
  - Daifloil (fluorinated fluid) filled and special cleaning
- Acid and alkali-proof treatment:
  - Detecting unit bolts: 17-4PH SS
  - U-bolt, nuts and washers: SUS 304
- Oval flange: Available for process connection flange.  
For details, refer to the oval flange data sheet EDS6-10.

**CHARACTERISTICS**

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

- Accuracy: Better than  $\pm 0.25\%$   
(under reference operating conditions, includes linearity, hysteresis and repeatability)
  - Repeatability: Better than  $\pm 0.1\%$
  - Sensitivity: Better than 0.05%
  - Temperature effect: 1)
    - At maximum span and between -30 to 80°C
    - Total effect (zero and span);  $\pm 2\%/55^\circ\text{C}$
  - Static pressure effect: 1)
    - At maximum span:
    - Zero shift 0.2%/rated pressure
  - Allowable differential overpressure:
    - Up to the max. working pressure
  - Effect of differential overpressure:
    - At maximum span;
    - Zero shift 0.3%/rated pressure
  - Power fluctuation:
    - Zero shift 0.005%/V
  - Effect of position:
    - Zero shift 10mmH<sub>2</sub>O/10°
- 1) This is doubled for oxygen measurement.

**STRUCTURAL PRINCIPLE**



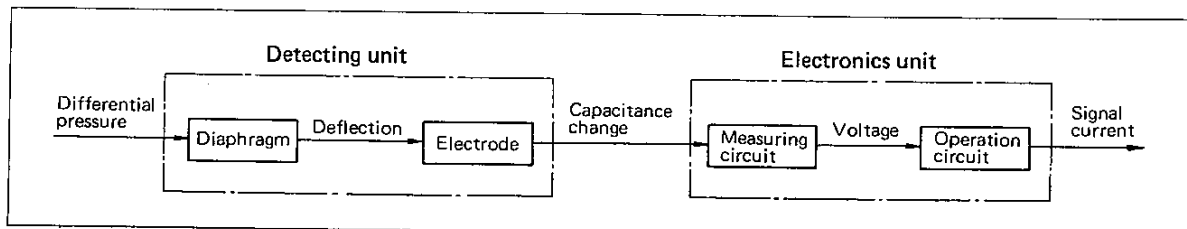
# CODE SYMBOLS

1 2 3 4 5 6 7 8 9 10 11 12																	
F	F	B										Description					
												Pressure rating (kg/cm <sup>2</sup> )					
												10					
												2	30				
												Measuring range (mmH <sub>2</sub> O)					
												1	0 to 10...100				
												2	0 to 25...250				
												Materials of detecting unit					
												Measuring element					
												Seal diaphragm SUS316L					
												Other wetted part SUS316					
												Process cover SUS316					
												Electronics unit, field indicator and arrester					
												Field indicator					
												Yes/No	Scale	Arrester	Output signal	Note	
												A	—	—	—	Not available for intrinsic safety (9th digit, "2")	
												B	○	0 to 100% linear	—		DC 4 to 20mA
												D	○	0 to 100% square root	—		
												G	—	—	○		
												H	○	0 to 100% linear	○		
												K	○	0 to 100% square root	○		
												P	—	—	—	DC 10 to 50mA	
												O	○	0 to 100% linear	—		
												R	○	0 to 100% square root	—		
												Hazardous location					
												9	Non-explosionproof				
												5	FM approved explosionproof				
												6	CSA " "				
												A	FM approved intrinsically safe with STAHL barrier				
												B	FM " " " " " TAYLOR barrier				
												C	FM " " " " " WESTING HOUSE barrier				
												D	FM " " " " " M.T.L barrier				
												F	FM " " " " " FOXBORO barrier				
												G	FM " " " " " HONEY WELL barrier				
												K	SAA " " " " " M.T.L barrier				
												L	PTB " " " " "				
												P	CSA " " " " " STAHL barrier				
												Q	CSA " " " " " TAYLOR barrier				
												S	CSA " " " " " M.T.L barrier				
												U	CSA " " " " " FOXBORO barrier				
												V	CSA " " " " " HONEY WELL barrier				
												Input/output					
												0	Normal operation				
												1	Reverse operation				
												Special specifications					
												0	Standard				
												2	Low temperature service (-40 to +60°C)				
												Treatment					
												Y	Standard				
												A	Oxygen measurement (O <sub>2</sub> no oil treatment)				
												B	Acid and alkali-proof treatment				
												C	A + B				

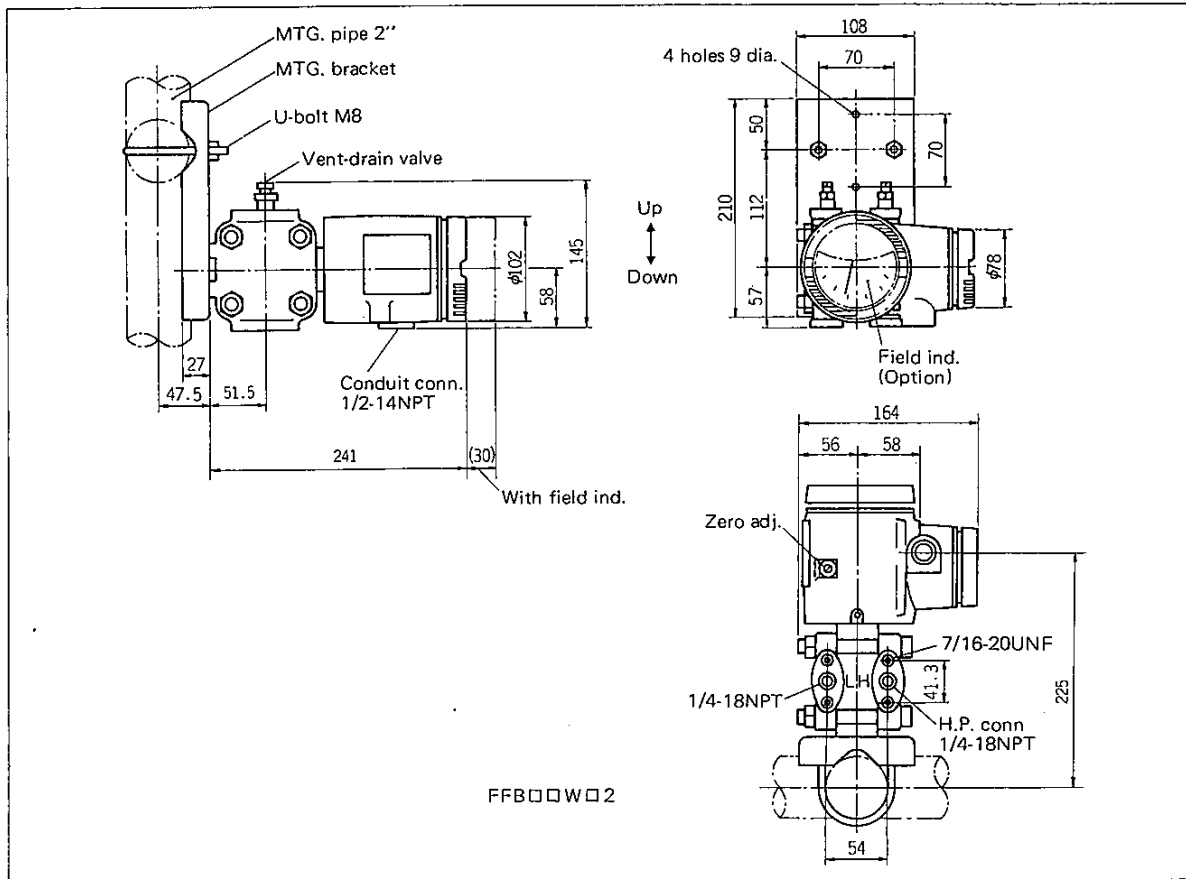
## Barriers and Gas groups

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, 75S802	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

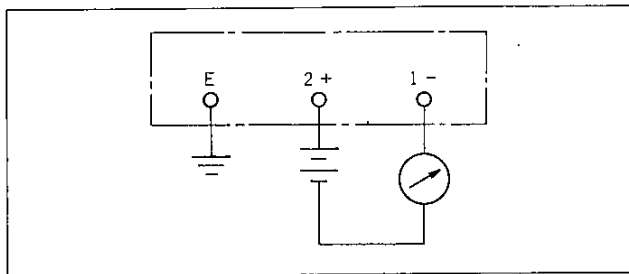
## FUNDAMENTAL BLOCK DIAGRAM



**OUTLINE DIAGRAM (Unit:mm)**



**CONNECTION DIAGRAM**



**ORDERING INFORMATION**

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

**RELATED DEVICES**

- Equalizing valve
- Distributor
- Oval flange
- Square root extractor
- Integral orifice
- (with distributor)
- Opener
- Zener barrier