tekflo sensors

"Sensing the pulse of industry"

Technical Data Sheet & General Specifications

tekFab DP04 + TekProbe
First Nanotechnology Capacitive DP Cell with True Static Averaging Pitot Flow Sensor

The **tekflo tekFab DP04** Series brings uncompromised low cost, but with the most advanced nanotechnology capacitive reactance differential pressure (dp) sensing, to **tekflo's** insertion **tekProbe PR3** averaging Pitot flow sensors. This **low cost** version complements the TekFab Multivariable system. However, this system is used for simplified volumetric flow measurement of liquids, gases, saturated or superheated steam, with a fixed mean density, in pipes and ducts 100 to 3000mm (4" – 120").

The flow computation, displayed digitally on the **tekFab DP04**, is based on classical Bernoulli Theory, which defines a true static pressure input. Only the **tekflo PR3** averaging Pitot produces such a noise free true static pressure. Other industrial Pitot types measure either a suction pressure, or an attempt at static pressure measured on the side of a costly profiled tube in the pipe line. Both types result in a noisy, erroneous static pressure, emanating in erroneous flow sensing.

The **tekflo tekFab DP04 DP Cell** series uniquely accomplishes the most long-term accurate sensing by embodiment of two nano-molecular crystalline silicon filled chambers, which provide virtually solid state capacitive reactance sensor. The sensor contains two high natural frequency diaphragms, which sense the +ve and – ve differential pressure produced by the **tekProbe.** The high natural frequency and virtual solid state **tekFab** construction ensures virtual insensitivity to normal plant shock and vibration, even at low range dp..

The **tekProbe** produces a noise free **true static pressure** and impact pressure to provide unmatched total system mass flow accuracy, repeatability and resolution, with virtually zero hysteresis.

tekFab Features:

+ Unique dp sensing chamber provides 500% of upper range limit static pressure overload protection
+ Sensing chamber incorporates Czochralski nanotechnology mono-crystalline silicone. Nano molecules (down to 0.000000001m) provide the ultimate fluidic long term stability and strength, which is transferred to the tekFab measurement system
+ Virtual solid state sensing chamber provides high insensitivity to shock and vibration, even with low dp ranges
+ Ranges from 0 – 10mm water gauge (0.4" or 0.1 kPa) differential pressure
+ Suitable for liquids, gases, vapours
+ 2 –wire 4-20mA output with HART protocol, or 220/110 VAC 4-wire system with 0 – 10mA output
+ Auto zero with remote smart handheld configuration and interrogation
+ E^2PROM parameter storage
+ Wetted parts materials in AISI 316 stainless steel, Hastelloy C, Monel, titanium
+ Static pressures to 100 bar g (1450 psig)
+ DP Cell temperature to - 40º C to + 150º C (-40º F to + 300º F)
+ Certified intrinsically safe and Flameproof
+ tekProbe's Differential and true static pressure traceable to USA NIST and other international standards
+ Display linear to dp or with digital square root extraction linear to flow rate
+ Certified ISO 9001 Quality Assurance

Specification:

Differential pressure accuracy:	±0.25% of span traceable to USA NIST and other international standards
Optional dp accuracy:	±0.5% of span traceable to USA NIST and other international standards
Static pressure accuracy:	±0.1% of span
Static pressure effects:	500% over max dp range has no effect. < ±0.5% with full static pressure to 100 bar g (1450 psig), without damage. May be re-zeroed
Max static pressure:	Optional 10 bar g (145 psig), 40 bar g (590 psig), 100 bar g (1450 psig)
Stability:	±0.1% of URL over 6 months
Ambient temperature effects:	±0.2% of dp span per 56º C (133º F)
Differential pressure range:	Range 1: 0 – 10mm to 150mm water gauge (0 – 0.4" to 6" wg) Range 2: 0 – 40mm to 400mm wg (0 – 1.5" to 15" wg) Range 3: 0 – 60mm to 610mm wg (0 – 2.5" to 25" wg) May be adjusted for same negative pressures
External temperature range:	Normal temperature -30º C to +93º C (-22º F to +200º F) standard Optional - 40º c to + 104º C (-40º F to + 220º F)
Vibration effects:	0.05% of max range / g for frequencies < 200 Hz
Signal damping:	0.5 – 80 seconds adjustable (time constant 0.1 – 16 seconds)
2- wire signal output:	4 – 20mA, 12 – 45 Vdc, default with square root extraction for flow measurement
Protocol:	HART superimposed on 4-20mA output signal.
4-wire signal output:	110/ 220 V, 50/60 Hz with 0 – 10mA output
Power supply error:	0.005% of max range/Volt
Self diagnostics:	CPU failure, hardware failure, configuration error, process alarms for dp, static pressure
Digital display:	5-digit LED or LCD numerical display A bar graph is configurable to display up to 4 variables. Ambient temperature of **tekFab** is also displayed.
Display options:	Mass flow, volumetric flow provided in accordance with classical Bernoulli Theory and assumes **true static pressure sensing**, as provided by a TekProbe PR3 averaging Pitot. A constant mean process temperature and pressure Is taken for the basis of the computatation (max pressure and min temperature). **True static pressure** and dp is also configurable
HART supply:	12 – 42 Vdc for general and flameproof applications 12 – 30 Vdc for intrinsically safe, type n or non-incendive
Certified intrinsically safe:	Ex ia II C T3- T6
Certified Flameproof:	Ex d II C T4 – T6
Environmental protection:	IP 65 and NEMA 4X
Electro-magnetic conformity:	EMC conformity EN61326-1 Cl 1, Table 2 industrial locations, EN61326-2-3 From 20MHz to 1000MHz field intensity to 30V/m, output drift < 0.1% fs
European Pressure Equipment Directive:	Conforms to Sound Engineering Practice, Category III, Pressure Accessory Vessel, Fluid Groups 1 and 2
Electronics housing material:	Low copper aluminium alloy
Environmental humidity:	0 – 100%.

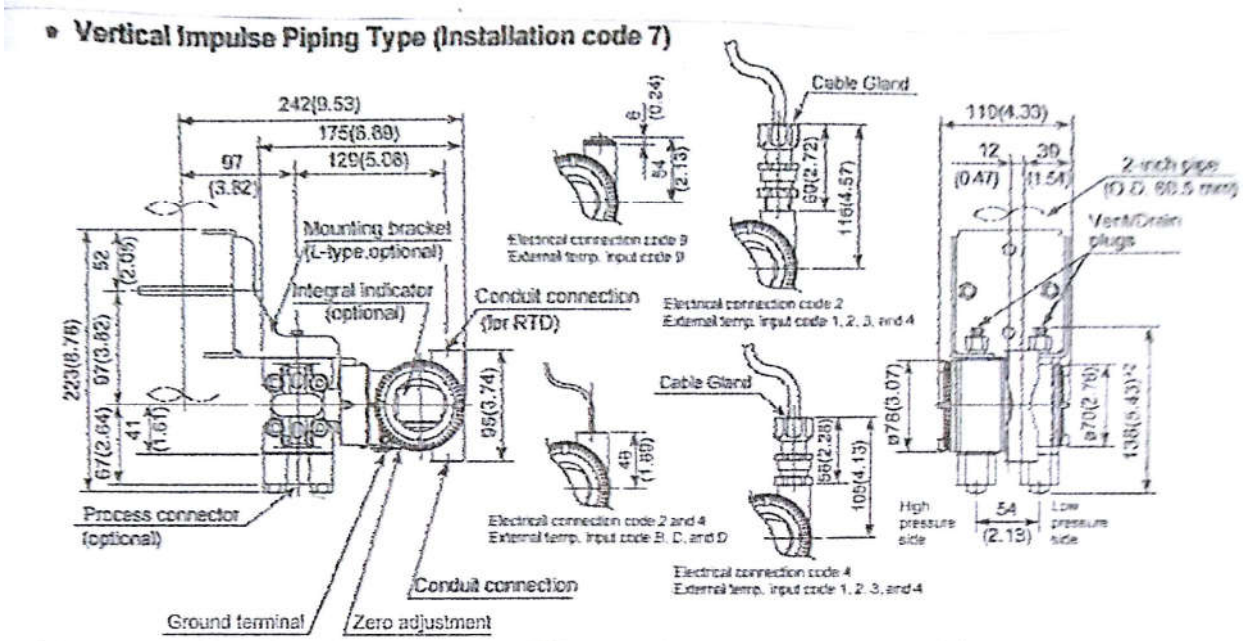
Wetted Part Options:	Process Connections	Drain/Fill Plug	Isolation Diaphragm
Option 1:	AISI 316 stainless steel	AISI 316 stainless steel	AISI 316 stainless steel
Option 2:	ditto	ditto	Hastelloy C
Option 3:	ditto	ditto	Monel
Option 4:	ditto	ditto	Tantalum
Option 5:	Hastelloy C	Hastelloy C	Hastelloy C
Option 6:	ditto	ditto	Tantalum
Option 7:	Monel	Monel	Monel

Standard wetted seal:	Fluororubber. Others on request (see Ordering Code
Sensor chamber filler: (non wetted part)	**Czochralski nanotechnology mono-crystalline silicone**
Process connections:	1/2" NPT female
Electrical connections:	M20 female threaded
Pipe Mounting Bracket:	AISI 304 mounting bracket suitable for 60mm OD (2" Sch 40) pipe

Optional Manifold:

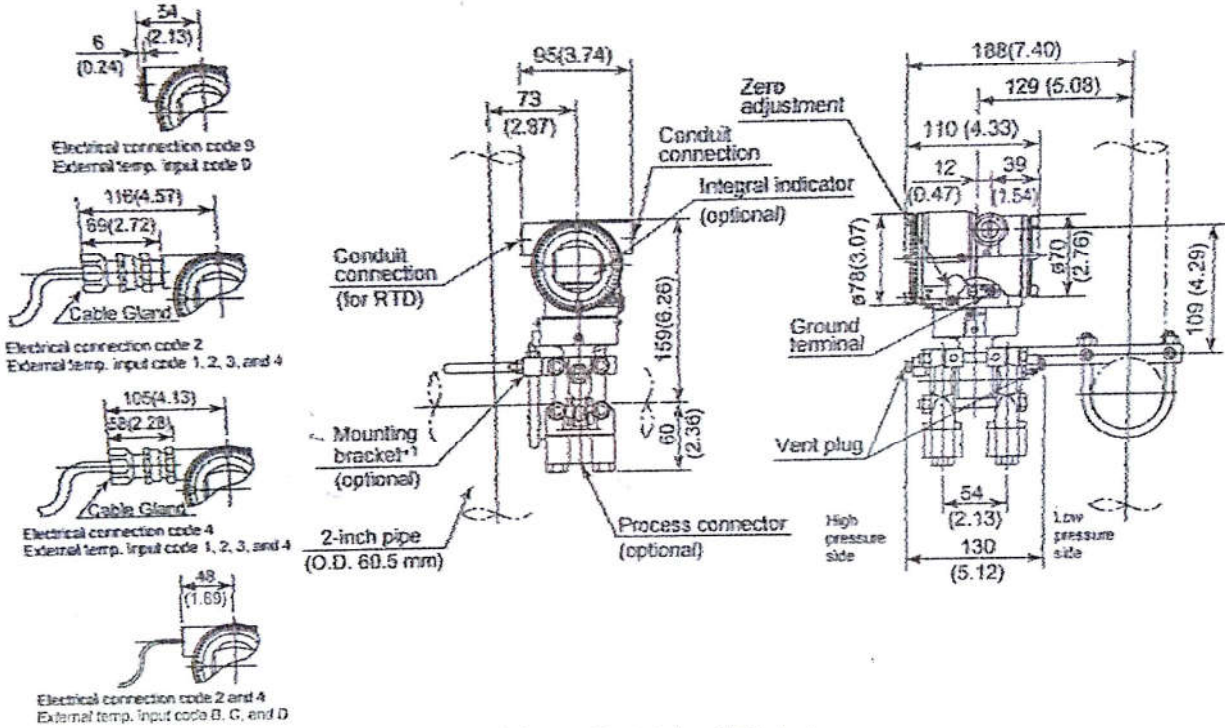
Optional **TekFab** 3-way valve manifold with ½" NPT female connections is available in AISI 304 or 316 stainless steel (see Ordering Code)

Dimensional Drawings:



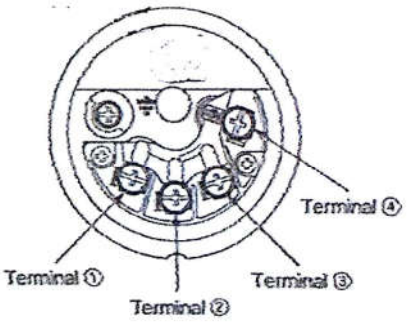
Unit: mm (approx.inch)

• Bottom Process Connection Type (Installation code B)



*1: A transmitter with SST housing is not applicable for mounting to horizontal 2-inch pipe.

• Terminal Configuration



• Terminal Wiring

SUPPLY	+ −	① ② Power supply and output terminals
CHECK	+ −	③ ② External indicator (ammeter) terminals *1*2
PULSE	+ −	④ ② Pulse or status contact output terminals *2
⏚		Ground terminal

When using an external indicator or check meter, the internal resistance must be 10Ω or less.

Ordering Code tekFab DP04 Nanotechnology Capacitive DP Cell:

Basic Type Example: tekFab DP04 – A – 1 – A – 2 – A – 1 – A – 1 – C – 1 - C - 0 – A

Output:
A = 4 - 20mA + HART, flow linear
B = 4 – 20mA, 2-wire, flow linear
C = 0 – 10mA, 110/220 Vac, 4 –wire, flow linear
D = 4 -- 20mA + HART, dp linear
E = 4 – 20mA, 2-wire, dp linear
F = 0 – 10mA, 110/220 Vac, 4 –wire, dp linear

DP Span:
1 = 0 – 10mm to 150mm wg (0 – 0.4" to 6" wg)
2 = 0 – 40mm to 400mm wg (0 – 1.5" to 15" wg)
3 = 0 – 60mm to 610mm wg (0 – 2.5" to 25" wg)

Accuracy:
A = ±0.25% of span
B = ±0.5% of span

DP Cell Process Temperature:
1 = -30º C to +93º C (-22º F to +200º F)
2 = - 40º c to + 104º C (-40º F to + 220º F)

Wetted Seals:
A = fluororubber seal
B = special….consult factory

Wetted Metal Parts(see specification for details):
Option 1 = 1, Option 2 = 2, Option 3 = 3, Option 4 = 4,
Option 5 = 5, Option 6 = 6, Option 7 = 7

Process Connections:
A = 1/2" NPT female standard
B = special……consult factory

Bolts and Nuts Material:
1 = AISI 316L stainless steel
2 = special…..consult factory

AISI 304 Stainless Steel Mounting Bracket –
Suitable for 60mm OD (2" Sch 40) pipe
7 = Vertical pipe, left hand +ve pressure, process downside
8 = Horizontal pipe, right hand +ve pressure
9 = Horizontal pipe, left hand +ve pressure
B = Bottom process connection, left hand + pressure
N = No mounting bracket
Note: tekProbe PR3 +ve pressure is downstream of flow direction

3-Way Manifold:
1 = 3-way valve manifold in AISI 304 stainless steel
2 = 3-way valve manifold in AISI 316 stainless steel
N = no 3-way manifold

Static Pressure Rating:
A = 10 bar g (145 psig)
B = 40 bar g (580 psig)
C = 100 bar g (1459 psig)

Explosive Atmospheres:
1 = Intrinsically Safe, 2 = Flameproof, 0 = Non explosive atmosphere

Display Function:
A = Linear volumetric flow (state units)
B = Linear mass Flow (state units)
C = Linear DP (state units)
Note: for gases or steam the minimum temperature and maximum pressure will be used for max flow rate

tekFab Nanotechnology Capacitive DM04 DP Cell and PR3 tekprobe Enquiry Form

Customer's Name, Project Name, & Location:						
Detail	**Sensor 1**	**Sensor 2**	**Sensor 3**	**Sensor 4**	**Sensor 5**	**Sensor 6**
Quantity						
Media Type ADD any special notes, such as dirty, clean, deionised water, solutions of eg. ethylene glycol, propylene glycol, glycol substitutes, brine, or special flow conditions. Please provide % solution by weight……						
Typical flow rate with units required						
Min & max flow rate with units						
tekProbe style required: A = fixed flange, B = locking gland version, C = locking gland and under pressure version (see tekProbe specification						
Bi-directional (B)/ uni-directional (U) Flow						
Pressure range and units						
Temperature range and units						
Liquid viscosity and units						
Explosive atmosphere : Intrinsically safe (IS) or Flameproof (FL)						
Nominal pipe size (N) or ID (I) Specify mm or inches						
OR Pipe schedule or wall thickness Specify mm or inches						
Straight pipe runs available						
Pipe material						
Is the flow sensor to be used in an area of magnetic fields ? Yes or No						
Is HART communication network required?						
Mass flow (M) or corrected volumetric Flow (CV)						

tekflo sensors®

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Specifications are subject to change without notice