

S3 Pressure Transducers for Hydrogen Applications

Features

- Compact and highly configurable; wide selection of pressure connections, electrical terminations and outputs
- Certified to UL 61010-1, including Annex DVF (Hydrogen service)
- Designed for mid-high volume OEM applications
- 316L Stainless steel or A286 diaphragm
- Field proven polysilicon thin film pressure sensor
- Ranges Vac to 20,000 psi

Typical Uses

- Fuel cells
- Compressed hydrogen gas
- Commercial vehicles
- Hydrogen storage
- Refrigerant and ammonia production

Specifications

Reference Temperature 72 °F ±2 °F (21 °C ±1 °C)

Accuracy Class: ±1.0% Span (±0.50% Optional): Includes non-linearity, hysteresis, non-repeatability, zero offset and span setting errors at reference temperature.

Total Error Band Accuracy (TEB):
Ranges Vac to 10,000 psi:
 ±1.0% of Span: From 0 °C to 85 °C (32 °F to 185 °F)
 ±2.0% of Span: From 85 °C to 125 °C (185 °F to 257 °F)
 ±2.0% of Span: From -40 °C to 0 °C (-40 °F to 32 °F)
Exception: Ranges greater than 10,000 psi:
 ±2.0% of Span: From -20 °C to 0 °C (-4 °F to 32 °F)
 Includes the combined effects of non-linearity (Terminal Point Method), hysteresis, non-repeatability, temperature and zero offset and span setting errors

Stability: ≤ ±0.25% of span/year

Durability: 50 million cycles

Approvals: CE, ROHS UL Recognized component per UL 61010-1, Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use
 UL 61010-1 with evaluation to Annex DVF for hydrogen applications

Environmental Specifications

Temperature Limits: (Excl. Shielded Cable)
 Storage: -50 °C to +125 °C (-58 °F to 257 °F)
 Media: -40 °C to +125 °C (-40 °F to 257 °F)
 Ambient: -40 °C to +125 °C (-40 °F to 257 °F)

Temperature Limits: (Shielded Cable)
 Storage: -40 °C to +105 °C (-40 °F to 221 °F)
 Media: -40 °C to +125 °C (-40 °F to 257 °F)
 Ambient: -40 °C to +105 °C (-40 °F to 221 °F)

Humidity Effects: 0 to 100% R.H., ± .05% typical



S3 Pressure Transducer
for Hydrogen Applications



Key Benefits

- Compact & rugged design
- Wetted materials to limit hydrogen permeation and stress
- High EMI/RFI immunity ratings

Functional Specifications

Vibration Effects: Random vibration (20 g) RMS; 20-2000 Hz per IEC 60068-2-64

Shock Effects: 100 gs, 6 ms

Drop Test: Withstands 1 meter on concrete

Response Time: < 5 msec

Warm-up Time: < 20 msec

Position Effect: < ±0.015% span typical

Electrical Specifications

Insulation Withstand Voltage: 500 Vac

Insulation Resistance: >100 MOhms @ 100 Vdc

Circuit Protection: Reverse polarity and miswire protection (excludes ratiometric output)

Continued on page 2

Contact Us

1.800.328.8258

ashcroft.com

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S3 Pressure Transducers for Hydrogen Applications

Output Signals Available

Voltage Output	Excitation	Supply Current
0-5 Vdc, 3 wire	9-32 Vdc	11 mA
0-10 Vdc, 3 wire	14-32 Vdc	11 mA
1-5 Vdc, 3 wire	9-32 Vdc	5 mA
1-6 Vdc, 3 wire	9-32 Vdc	5 mA
0.5-4.5 Vdc, 3 wire	9-32 Vdc	5 mA
Ratiometric Output		
0.5-4.5 Vdc, 3 wire	5 Vdc ±0.5 Vdc	5 mA
Current Output		
4-20 mA, 2 wire	9-32 Vdc	

Environmental Rating

Rating:	Electrical Connections
IP67, NEMA 6X	Metri-Pack [®] shielded cable, Deutsch [®] DT/DTM, AMP [®] Econoseal [®] /Superseal [®] , and M12
IP65, NEMA 4X	EN 175301-803 Form A & C (DIN 43650 A & C)

Wetted Components

Sensor Diaphragm:	316L with 316LSS adapter from Vac to 6000 psi A286 with 316LSS adapter from 7500 to 20,000 psi
Process Connection	316 Stainless steel

Non-Wetted Components

Housing:	316 Stainless steel
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EMC Testing

EMC:	Directive 2014/30/EU, and EN61326-1, EN61326-2-3 (Industrial Env.)	
Immunity:	61000-4-2 (ESD)	±4 kV/±8 kV (Contact/Air)
	61000-4-3 (Radiated RF)	10 V/m to 1 GHz, 3 V/m to 2 GHz, 1 V/m to 2.7 GHz
	61000-4-4 (EFT/Burst)	±1 kV (5/50 ns, 5 kHz)
	61000-4-5 (Surge)	±1 kV, Earth to Shield over all I/O lines
	61000-4-6 (Conducted RF)	3 V/ (0.15 to 80 MHz)
	61000-4-8 (Line Freq. Magnetic)	30 A/m
Emissions:	EN 55011 (CISPR 11) Class A, Group 1 & FCC (47 CFR 15)	

TruAccuracy

What Does It Mean?

Ashcroft's TruAccuracy™ specification is exclusively based on terminal point methodology instead of statistically derived schemes like 'best fit straight line'.

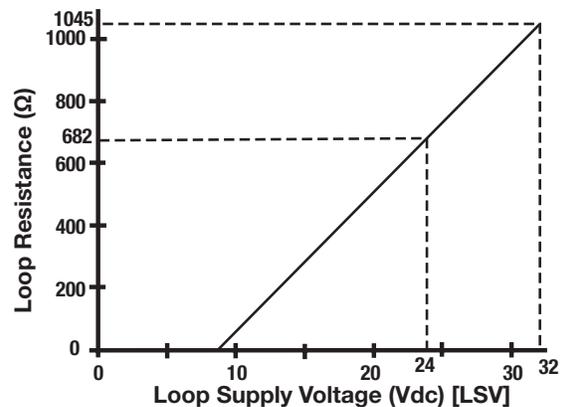
TruAccuracy™ means the Ashcroft S3 has standard span accuracy of ±1.00% with option to purchase as ±0.50% out of the box. Zero and span setting errors are already included in the standard ±1.00% or optional ±0.50% of span accuracy spec

The S3 is ready to be installed with no additional calibration adjustments required.

A unit from another manufacturer advertised as ±0.25% best fit straight line may actually be a ±1.25% to ±2.25% device. Using best fit straight line method, the accuracy spec does not include zero and span setting errors, which can be as much as ±1.00% each.

Power Supply & Load Resistance

Power Supply Voltage vs. Loop Resistance (4-20 mA ONLY)



$$V_{MIN} = 9V + [0.022A \times (R_L)]$$

(*includes a 10% safety factor)

$$R_L = R_S + R_W$$

R_L = Loop Resistance (Ohms)

R_S = Sense Resistance (Ohms)

R_w = Wire Resistance (Ohms)

S3 Pressure Transducers for Hydrogen Applications

Ordering Code	Example:	S3	7	L	0	MEK	42	GN	60#	XTU
Model										
S3 - Pressure Transducer		S3								
Accuracy										
5 - ± 0.50% span										
7 - ± 1.00% span			7							
Fitting Material										
L - 316 Stainless steel (max pressure range 20,000 psi)				L						
Fitting Finish										
0 - No Plating					0					
Pressure Connection Size										
FGA - G ¼ A - Female										
FS7 - 7/16-20 UNF-2B Female (¼ in. SAE) Flare Internal Thread w/Schrader Depressor										
F01 - 1/8 NPT - Female										
F02 - ¼ NPT - Female										
F09 - 9/16-18 - Female (¼ HiP)										
MB1 - M10x1.25 Banjo - Single										
MFH - 5/16-24 UNF-2A SAE #2 - Male										
MEK - 7/16-20 UNF-2A SAE #4 - Male						MEK				
MEH - 9/16-18 UNF-2A SAE J1926-2 "Heavy Duty" - Male										
MEV - 9/16-18 SAE #6 Male w/Buna-N O-ring										
MGA - G ¼ A - Male										
MG1 - G 1/8 B - Male										
MG2 - G ¼ B - Male										
MG4 - G ½ B - Male										
MM4 - M14x1.5 ISO 6149-2 "Heavy Duty" - Male										
M01 - 1/8 NPT - Male										
M02 - ¼ NPT - Male										
M04 - ½ NPT - Male										
M15 - M14 x 1.5 [Form E]										
M45 - 7/16-20 Flare 45°										
M76 - 7/16-20 Flare 37°										
Output Signal										
05 - 0-5 Vdc										
10 - 0-10 Vdc										
15 - 1-5 Vdc										
16 - 1-6 Vdc										
42 - 4-20 mA							42			
RM - 0.5 - 4.5 Vdc ratio metric to 5 Vdc supply										
45 - 0.5 - 4.5 Vdc non-ratio metric to 9-32 Vdc supply										

Ordering Code (continued on next page)

S3 Pressure Transducers for Hydrogen Applications

Ordering Code (continued)	Example:	S3	7	L	0	MEK	42	GN	60#	XTU
Electrical Termination (See PINOUTS and DIMENSIONS sections for specific part code pinout descriptions)										
EN 175301-803 Form C (DIN 43650, Form C) elec conn add conn part code:										
DC - No mating connector										
N1 - With matting connector (PG 7 cable gland outlet)										
EN 175301-803 Form A (DIN 43650, Form A) elec conn add part codes:										
DA - No mating connector										
D0 - With mating connector (PG 9 cable gland outlet)										
CD - With mating connector (½ NPT female conduit cable outlet)										
M12 - 4 Pin with molded thread										
EW - M12 (no mating connector)										
GW - M12 (no mating connector)										
LW - M12 (no mating connector)										
RW - M12 (no mating connector)										
M12 - 4 Pin with metal thread										
EX - M12 with Pin 3 as Common (no mating connector)										
GX - M12 (no mating connector)										
LX - M12 (no mating connector)										
RX - M12 with Pin 4 as Common (no mating connector)										
Shielded cable with PVC jacket and 24 AWG leads										
FA - 1 foot										
FB - 1 meter										
FC - 10 feet										
FD - 5 Meters										
FE - 20 feet										
Metri-Pack®										
GN - No mating connection										
AMP® Econoseal®										
JN - No mating connection										
Deutsch® DT Series DT04-3P										
DT - Without mating connector										
DR - Without mating connector										
AMP® Superseal®										
AP - No mating connector										
Deutsch® DT Series DT04-4P										
DU - Without mating connector										
Deutsch® DTM Series DTM04-3P										
DS - Without mating connector										
Pressure Ranges (see range table on page 5)										
60# - 60 psi										
Option (if including an option(s) must include an "X")										
TU - Throttle plug										
P9 - Individual packing										
6B - Clean for oxygen service										

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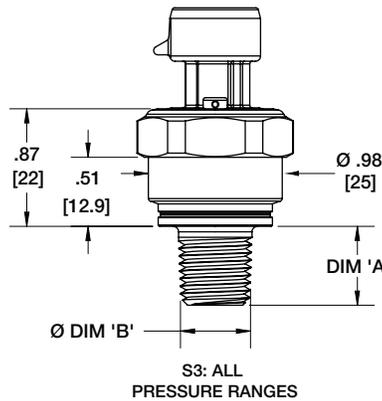
S3 Pressure Range Table

Range Code	Operating Pressure Range (PSI)	Fitting Material		Overpressure	
		316L SS	A286	Proof	Burst
VAC#	-14.7 psi/0 psi	X		2X	50X
V&15#	-14.7 psi/15 psi	X		2X	50X
V&30#	-14.7 psi/30 psi	X		2X	50X
V&45#	-14.7 psi/45 psi	X		2X	50X
V&60#	-14.7 psi/60 psi	X		2X	50X
V&75#	-14.7 psi/75 psi	X		2X	50X
V&100#	-14.7 psi/100 psi	X		2X	5X
V&150#	-14.7 psi/150 psi	X		2X	5X
V&200#	-14.7 psi/200 psi	X		2X	5X
V&300#	-14.7 psi/300 psi	X		2X	5X
15#	15 psi	X		2X	50X
30#	30 psi	X		2X	50X
45#	45 psi	X		2X	50X
50#	50 psi	X		2X	50X
60#	60 psi	X		2X	50X
75#	75 psi	X		2X	50X
100#	100 psi	X		2X	5X
150#	150 psi	X		2X	5X
200#	200 psi	X		2X	5X
250#	250 psi	X		2X	5X
300#	300 psi	X		2X	5X
400#	400 psi	X		2X	5X
500#	500 psi	X		2X	5X
650#	650 psi	X		2X	5X
750#	750 psi	X		2X	5X
1000#	1,000 psi	X		2X	5X
1500#	1,500 psi	X		2X	5X
2000#	2,000 psi	X		2X	5X
2500#	2,500 psi	X		2X	5X
3000#	3,000 psi	X		2X	5X
4000#	4,000 psi	X		1.5X	4X
5000#	5,000 psi	X		1.5X	4X
6000#	6,000 psi	X		1.5X	3X
7500#	7,500 psi		X	1.2X	5X
10000#	10,000 psi		X	1.2X	5X
15000#	15,000 psi		X	1.2X	3X
20000#	20,000 psi		X	1.2X	3X

ksc, bar, kPa, and mPa ranges also available.
Enhanced proof and burst overpressure may be available upon request.

Dimensions are identified in inches and [millimeters]

For reference only, consult Ashcroft for specific dimensional drawings.



Pressure Connection General Dimensions

Pressure Conn. Code	Thread	Dimension A in [mm]	Dimension B in [mm]	Max Pressure (material not considered)
FGA	G ¼ A - Female	.78 [19.7]	.87 [22.1]	10,000 psi
FS7	7/16-20 UNF-2B Schrader - Female	.75 [19.2]	.75 [19.1]	2,000 psi
F01	1/8-27 NPT - Female	.71 [18.0]	.75 [19.1]	10,000 psi
F02	1/4-18 NPT - Female	.68 [17.3]	.75 [19.1]	10,000 psi
F09	9/16-18 UNF-2B - Female	.69 [17.5]	.81 [20.6]	20,000 psi
MB1	M10x1.25 Banjo - Single	.79 [20.0]	.39 [9.9]	6,000 psi
MEH	9/16-18 UNF-2A SAE J1926-2 "Heavy Duty" - Male	.47 [12.0]	.48 [12.2]	10,000 psi
MEK	7/16-20 UNF-2A SAE #4 - Male	.43 [11.0]	.44 [11.2]	10,000 psi
MEV	9/16-18 UNF-2A SAE #6 - Male	.47 [12.0]	.56 [14.2]	10,000 psi
MFH	5/16-24 UNF-2A SAE #2 - Male	.43 [10.9]	.31 [7.9]	10,000 psi
MGA	G ¼ A - Male	.58 [14.7]	.52 [13.2]	10,000 psi
MG1	G ½ B - Male	.39 [10.0]	.38 [9.7]	5,800 psi
MG2	G ¼ B - Male	.59 [15.0]	.52 [13.2]	20,000 psi
MG4	G ½ B - Male	.90 [22.9]	.71 [18.0]	20,000 psi
MM4	M14x1.5 ISO 6149-2 "Heavy Duty" - Male	.43 [11.0]	.46 [11.7]	10,000 psi
M01	1/8-27 NPT - Male	.47 [12.0]	.42 [10.7]	20,000 psi
M02	1/4-18 NPT - Male	.58 [14.7]	.53 [13.5]	20,000 psi
M04	1/2-14 NPT - Male	.78 [19.7]	.84 [21.3]	10,000 psi
M15	M14 x 1.5 [Form E] (DIN 3852-11/ISO 9974-2)	.47 [12.0]	.46 [11.7]	10,000 psi
M45	7/16-20 Flare 45°	.55 [14.0]	.44 [11.2]	10,000 psi
M76	7/16-20 Flare 37°	.55 [14.0]	.55 [14.0]	10,000 psi

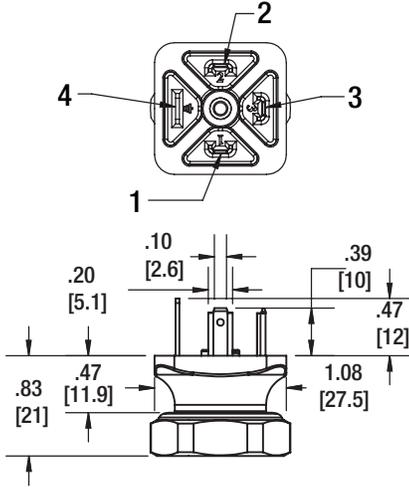
Note 1: Dim 'B' Measured to thread OD
Note 2: Dimensions in [] are millimeters

S3 Pressure Transducers for Hydrogen Applications

Dimensions are identified in inches and [millimeters]

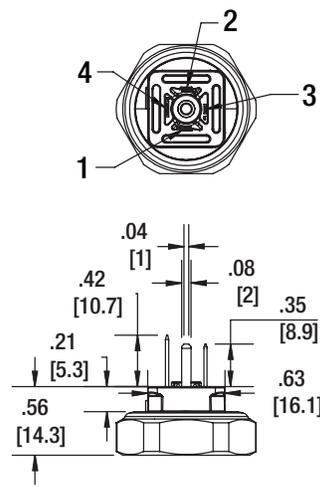
For reference only, consult Ashcroft for specific dimensional drawings.

DA - EN17530-803 Form A
(DIN 43650 Form A)



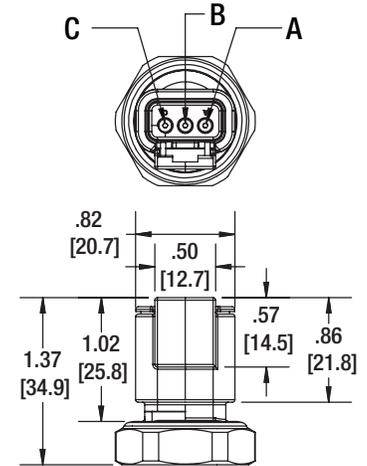
Din Form A		
Pin #	Voltage Function	Current Function
1	V+	V+
2	V- (Common)	V-
3	Output	V-
4	Ground	Ground

DC - EN17530-803 Form C
(DIN 43650 Form C)



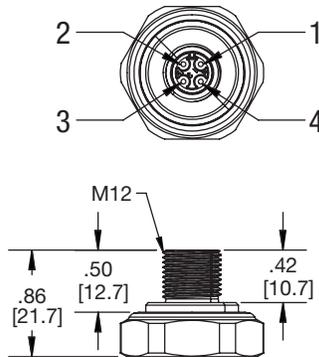
Din Form C		
Pin #	Voltage Function	Current Function
1	V+	V+
2	V- (Common)	V-
3	Output	V-
4	Ground	Ground

DS - Deutsch® DTM04-3P

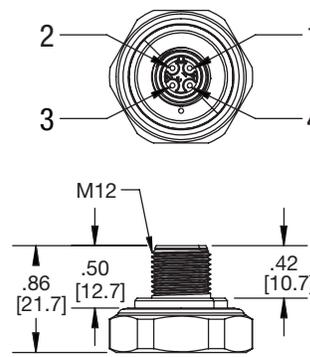


Deutsch® DTM04-3P		
Pin #	Voltage Function	Current Function
A	V+	V+
B	V- (Common)	V-
C	Output	V-

EW/RW/GW/LW (Plastic Threads)



EX/RX/GX/LX (Metal Threads)



M12-4P Pin-out Type 1 (EW/EX)		
Pin #	Voltage Function	Current Function
1	V+	V+
2	Ground	Ground
3	V-	V-
4	Output	V-

M12-4P Pin-out Type 2 (RW/RX)		
Pin #	Voltage Function	Current Function
1	V+	V+
2	Output	V-
3	Ground	Ground
4	V-	V-

M12-4P Pin-out Type 3 (GW/GX)		
Pin #	Voltage Function	Current Function
1	V+	V+
2	V-	V-
3	Ground	Ground
4	Output	V-

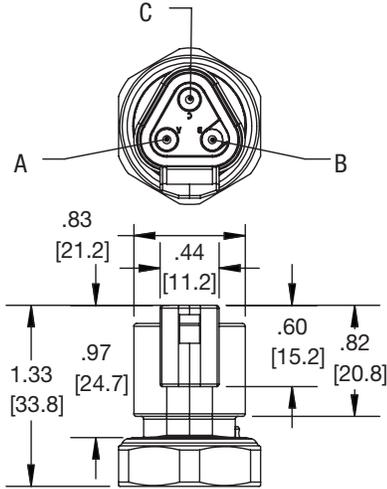
M12-4P Pin-out Type 4 (LW/LX)		
Pin #	Voltage Function	Current Function
1	V+	V+
2	Output	V-
3	V-	V-
4	V-	V-

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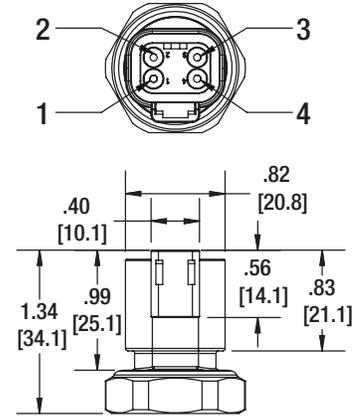
Dimensions are identified in inches and [millimeters]

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DT/DR - Deutsch® DT04-3P



DU - Deutsch® DT04-4P

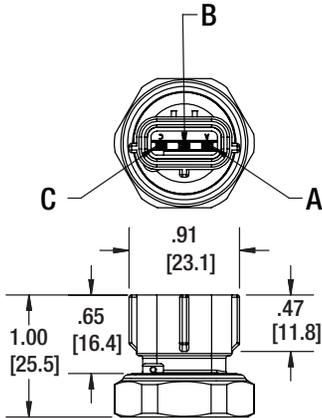


Pin-out Type 1 (DT)		
Pin #	Voltage Function	Current Function
A	V+	V+
B	V-	V-
C	Output	V-

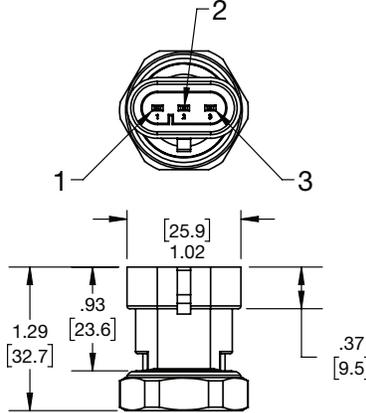
Pin-out Type 2 (DR)		
Pin #	Voltage Function	Current Function
A	V+	V+
B	Output	V-
C	V-	V-

Deutsch® DT04-4P		
Pin #	Voltage Function	Current Function
1	V- (Common)	V-
2	V+	V+
3	Ground	Ground
4	Output	V-

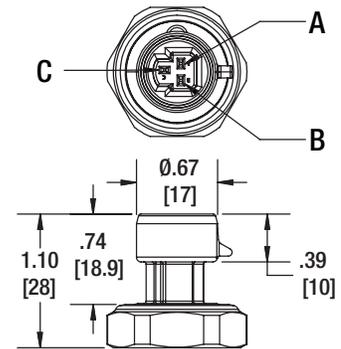
JN - AMP® Econoseal®



AP - AMP® Superseal®



GN - Metri-Pack®



AMP® Econoseal®		
Pin #	Voltage Function	Current Function
A	V+	V+
B	V- (Common)	V-
C	Output	V-

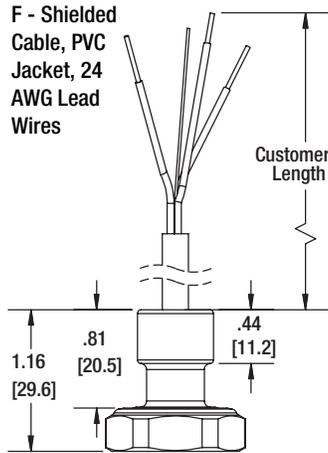
AMP® Superseal®		
Pin #	Voltage Function	Current Function
1	V-	V-
2	Output	V-
3	V+	V+

Metri-Pack®		
Pin #	Voltage Function	Current Function
A	V- (Common)	V-
B	V+	V+
C	Output	V-

For Pinouts, use either V- termination on S1 with 4-20mA output

S3 Pressure Transducers for Hydrogen Applications

Dimensions are identified in inches and [millimeters]



Shielded Cable		
Pin #	Voltage Function	Current Function
Red	V+	V+
Black	Common	V-
White	Output	n/a
Drain	n/a	n/a