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# RECENT INNOVATIONS

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## DIFFERENTIAL PRESSURE TRANSMITTER - LOW RANGES SERIES 616KD-LR

- Wide selection of ranges down to 0.1 in w.c. and accuracies cover numerous applications minimizing components and standardizing on design
- Simple calibration push-buttons to set zero and span, saving time installing and maintaining over the service life
- Cost effective and compact device suitable for OEM applications where space, simplicity, and value are key

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## WET/WET DIFFERENTIAL PRESSURE TRANSMITTER - WITH REMOTE SENSORS SERIES 629C-RS

- Same benefits as the 629C Wet/Wet Differential Pressure Transmitter with the added convenience of using remote pressure sensors
- Available with standard cable and armored cable versions with 10 or 20 feet shielded cable
- Remote sensors option reduces installation cost
- Sensors convert pressure changes into a standard 4-20 mA output signal or field selectable voltage

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## DIFFERENTIAL PRESSURE TRANSMITTER SERIES 629HLP

- Measurement of small pressure differences of high-static line pressures
- $\pm 1\%$  accuracy through the entire operating temperature range from  $-10$  to  $60^\circ\text{C}$  ( $14$  to  $122^\circ\text{F}$ )
- For measuring over-pressure, under-pressure, and differential pressure
- 4 different ranges, up to 6 bars

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## WIRELESS HYDRONIC DIFFERENTIAL PRESSURE MANOMETER SERIES 490W

- Familiar ergonomic mobile device interface
- Full comprehensive kit for direct to job site capability on almost any application or hydronic valve
- Flow conversion capability built into the app minimizes steps in the balancing process
- Wide ranges and high resolution. Even at the 500 psid range, technicians can see readings

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## AVERAGING AIR FLOW GRID SERIES 160G

- New lightweight pole for longer periods of use with larger pole diameter for ergonomics
- Up to 48" (122 cm) of reach
- 16 sensing points provides an accurate average flow

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# RECENT INNOVATIONS

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## METAL AVERAGING FLOW SENSOR SERIES MAFS



- Blade design limits disruption of air stream
- Configurable in inch or millimeter lengths up to 78 inches or 2000 mm
- Lightweight aluminum construction with flange mounting for rectangular or square ducts

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## WALL MOUNT HUMIDITY/TEMPERATURE TRANSMITTER SERIES RHPLC



- 2 or 3% accuracy models available
- Humidity only or temperature and humidity combo
- Wide selection of passive thermistor or RTD temperature sensors

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## CARBON DIOXIDE TRANSMITTER SERIES CDWP



- Single beam dual wavelength NDIR CO2 sensor automatically corrects for aging effects
- Durable and rugged aluminum housing designed to withstand 168 hour salt spray test
- Ranges include 2,000, 5,000, and 10,000 ppm allowing for use in animal husbandry as well as mechanical rooms utilizing CO2 based refrigerants

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## CARBON MONOXIDE TRANSMITTERS SERIES CMT200/CMT200-R



- Field replaceable sensor scaled at 0-200 PPM
- Round or rectangular housing options
- Field selectable current or voltage output signal

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## CARBON MONOXIDE TRANSMITTER AND SWITCH SERIES CMS300



- Field selectable current or voltage analog outputs
- Integral SPDT relay contact for low or high alarm
- Jumper selectable alarm set points of 25, 60, or 150 ppm

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# RECENT INNOVATIONS

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## INSERTION THERMAL ENERGY METER

### SERIES IEFB

- Field configurable
- Integral or remote display for ultimate flexibility
- Complies with high accuracy requirements of EN 1434-1, ASTM E3137, CSA C900.1-13 for accurate heat measurement

PAGES 292-293

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## REMOTE DISPLAY FOR SERIES IEF AND IEFB

### SERIES A-IEF

- Use to set up the IEF/IEFB and adjust the settings or indicate remotely
- Varying cable lengths of up to 100 ft (30 m) allows for flexible installation on a wall or pipe mount
- Easy to install and wire in the field

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## INSERTION ELECTROMAGNETIC FLOW TRANSMITTER

### SERIES IEF

- Field configurable
- Integral or remote displays allow for ultimate flexibility
- Multiple display configurations with a single unit



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## INSERTION ELECTROMAGNETIC FLOW TRANSMITTER KIT

### A-IEF-KIT

- Accessory setup kit
- Ensures exact installation application for the Series IEF
- Includes set up display, thickness gage, measuring tape and universal power adapter

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## ULTRASONIC ENERGY METERS

### SERIES TUF

- Manufactured to comply with EN1434-1 requirements
- Compact energy monitoring
- BACnet or Modbus® communication outputs

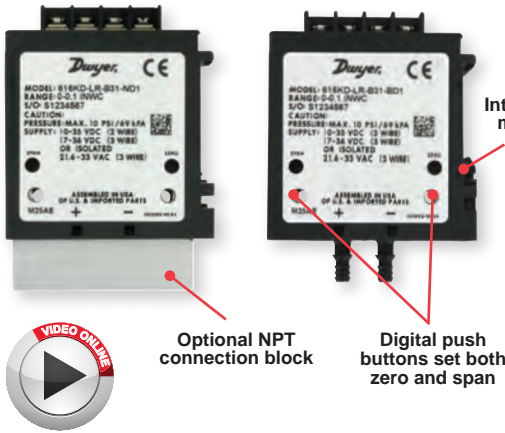
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Modbus® is a registered trademark of Schneider Automation, Inc.

# DIFFERENTIAL PRESSURE TRANSMITTERS - LOW RANGES

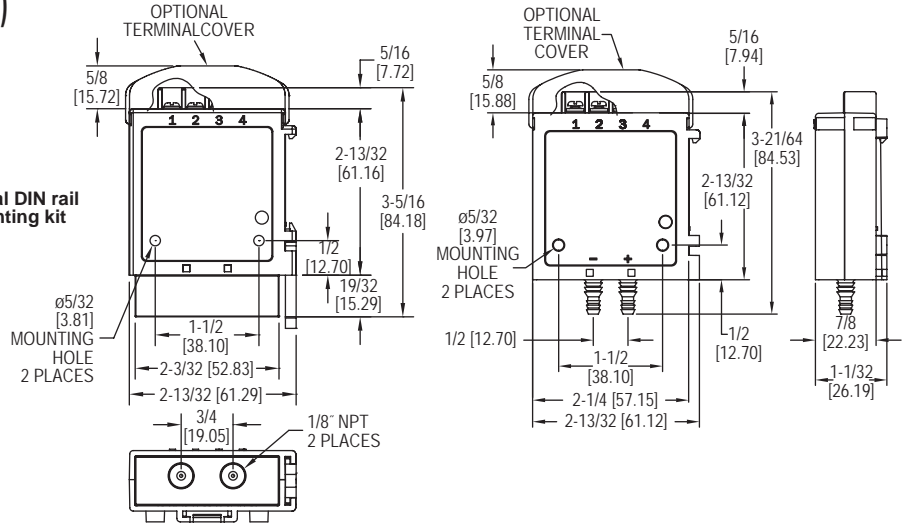
High Accuracy, Ranges Down to 0.1 in w.c. (25 Pa)



Optional NPT connection block

Digital push buttons set both zero and span

Integral DIN rail mounting kit



The Series 616KD-LR Differential Pressure Transmitters - Low Ranges are designed for simplicity, making it the ideal choice for installers and maintenance professionals. These low range instruments not only alleviate cumbersome turn pots typically found in most transmitters, but eliminate entirely the need to span the instruments during calibration. With single digital push-button, both ZERO AND SPAN are calibrated properly, nothing else is required. No additional reference pressure sources or separate calibration devices are necessary.

**FEATURES/BENEFITS**

- Wide selection of low ranges and accuracy cover numerous applications minimizing components and standardizing on design
- Simple calibration push-buttons to set zero and span, saving time installing and maintaining over the service life
- Cost effective and compact device suitable for OEM applications where space, simplicity, and value are key
- Simultaneous current and voltage outputs
- Optional 1/8" NPT process connection allows for use with metal barbed fittings or compression fittings for use with metal tubing
- Optional plenum rated units meeting UL Standard 2043 are available

**APPLICATIONS**

- Air handlers
- Variable air volume
- Duct pressure
- Filter monitoring

**SPECIFICATIONS**

**Service:** Air and non-combustible, compatible gases.  
**Wetted Materials:** Consult factory.  
**Accuracy:** ±0.25% FS for ±0.4" (100 Pa) and ±0.5" (125 Pa), ±0.5% FS for ±0.25" (60 Pa), and ±1% FS for ±0.1" (25 Pa).  
**Stability:** ±1% / year FSO.  
**Temperature Limits:** 0 to 140°F (-17.8 to 60°C).  
**Pressure Limits:** 1 psi max., operation; 10 psi burst.  
**Power Requirements:** 10-35 VDC (2 wire), 17-36 VDC or isolated 21.6-33 VAC (3 wire).  
**Output Signal:** 4-20 mA (2-wire), 0-5 VDC, 0-10 VDC (3-wire).  
**Response Time:** 2.5 Hz sample rate.

**Zero and Span Adjustments:** Push buttons.  
**Loop Resistance:** Current Output: 0 to 1250Ω max; Voltage Output: Min. load resistance 1kΩ.  
**Current Consumption:** 40 mA max.  
**Electrical Connections:** Screw-type terminal block.  
**Process Connections:** Barbed, dual size to fit 1/8" & 3/16" (3 mm & 5 mm) ID rubber or vinyl tubing, or 1/8" NPT.  
**Enclosure Rating:** NEMA1 (IP20).  
**Mounting Orientation:** Vertical with pressure connections pointing down.  
**Weight:** 1.8 oz (51 g).  
**Agency Approvals:** CE, optional plenum rated units meet UL Standard 2043.

MODEL CHART							
Example	616KD-LR	-A	34	-B	D1	-FC	616KD-LR-A34-BD1-FC
Series	616KD-LR						Differential pressure transmitter
Accuracy		A B D					0.25% FS accuracy 1.0% FS accuracy 0.5% FS accuracy
Range			31 32 34 35 41 42 44 45 61 62 64 65 71 72 74 75				0 to 0.1 in w.c. ① 0 to 0.25 in w.c. ② 0 to 0.4 in w.c. 0 to 0.5 in w.c. 0 to ±0.1 in w.c. ① 0 to ±0.25 in w.c. ② 0 to ±0.4 in w.c. 0 to ±0.5 in w.c. 25 Pa ① 60 Pa ② 100 Pa 125 Pa 0 to ±25 Pa ① 0 to ±60 Pa ② 0 to ±100 Pa 0 to ±125 Pa
Process Connection				B N			Plastic barb 1/8" female NPT with front push-button
Output					D1 D2 D3 D4		4-20 mA and 0-10 V 4-20 mA and 0-5 V 4-20 mA and 2-10 V 4-20 mA and 1-5 V
Options						AT COC FC NIST TC PR	Aluminum tag Certificate of Conformance Factory calibration certificate NIST traceable calibration certificate Terminal cover Plenum rated

ACCESSORIES	
Model	Description
A-360	Aluminum DIN rail 1 m
A-618	Protective terminal cap

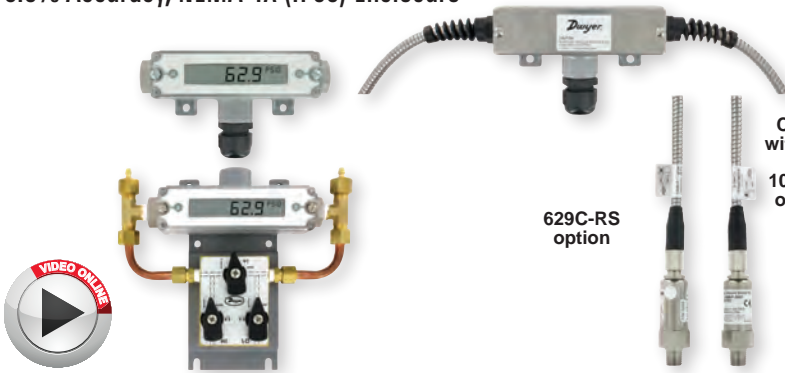


A-618 installed on unit

Differential Pressure Transmitters

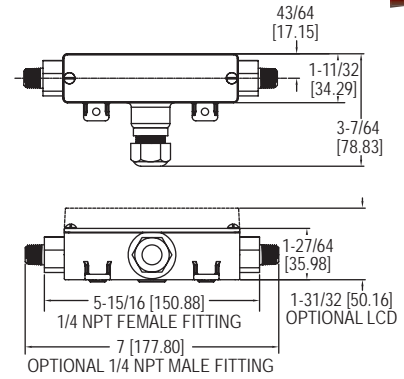
# WET/WET DIFFERENTIAL PRESSURE TRANSMITTERS

0.5% Accuracy, NEMA 4X (IP66) Enclosure



Conduit housing with remote sensor available in 10' or 20' shielded or armored cable

629C-RS option



The Series 629C Wet/Wet Differential Pressure Transmitters monitor differential pressure of air and compatible gases and liquids with 0.5% accuracy. The design employs dual pressure sensors converting pressure changes into a standard 4-20 mA output signal or field selectable voltage. Small internal volume and minimal moving parts result in exceptional response and reliability. The terminal block, as well as a zero adjustment button, are easily accessed under the top cover. The Series 629C Differential Pressure Transmitter is designed to meet NEMA 4X (IP66) construction.

**FEATURES/BENEFITS**

- Powered by either DC or AC - take advantage of most readily available power source reducing installation costs
- Optional LCD does not need a separate power supply - lowers installed cost
- Selectable voltage range - provides flexible choice for changing design or inputs for process/HVAC controllers being used to monitor and control
- Push-button zero (versus trim pot) - more simple zeroing provides easy install and calibration reducing installation time and possibility of operator error
- Optional LCD indicator provides local status to identify operational condition
- Remote sensor option reduces installation labor and material

**APPLICATIONS**

- Flow elements
- Heat exchangers
- Filters
- Coils
- Chiller
- Pumps

**SPECIFICATIONS**

**Service:** Compatible gases and liquids.  
**Wetted Materials:** Without valve: 316, 316L SS. Additional wetted parts with valve option: Buna-N, silicone grease, PTFE, brass 360, copper, and reinforced copolymer.  
**Accuracy:** ±0.5% FS (includes linearity, hysteresis & repeatability).  
**Stability:** ±1% FS/year.  
**Temperature Limits:** 0 to 200°F (-18 to 93°C).  
**Compensated Temperature Limits:** 0 to 175°F (-18 to 79°C).  
**Pressure Limits:** See Table 1.  
**Thermal Effects:** Avg 0.04%/°F (0.072%/°C) (includes zero and span).  
**Power Requirements:** 2-wire: 10-35 VDC; 3-wire: 13-35 VDC or isolated 16-33 VAC (reverse polarity protected).  
**Output Signal:** 2-wire: 4-20 mA; 3-wire: Field selectable 0-5, 1-5, 0-10, or 2-10 VDC.

**Zero and Units:** Push-buttons inside conduit enclosure.  
**Response Time:** 400 msec.  
**Loop Resistance:** Current output: 0 to 1250 Ω (max), Rmax = 50(Vps-10); Voltage output: Minimum load resistance = 5 kΩ.  
**Current Consumption:** 28 mA (max).  
**Electrical Connections:** Removeable terminal block; 1/2" female NPT conduit.  
**Process Connections:** 1/4" female or male NPT.  
**Display:** Optional 4-1/2 digit LCD field attachable display.  
**Enclosure Rating:** Designed to meet NEMA 4X.  
**Mounting Orientation:** Not position sensitive.  
**Weight:** 629C-XX-CH: 10.1 oz (286 g); 629C-XX-R2-P1-E5-XX: 2.3 lbs (1.04 kg); 629C-XX-R6-P1-E5-XX: 4.55 lbs (2.06 kg).  
**Agency Approvals:** CE.

MODEL CHART							
Example	629C	-01	-CH	-P1	-E1	-S1	-3V
Series	629C						
Range		01 02 03 04 05 06 07 08 09					0 to 5 psid 0 to 10 psid 0 to 25 psid 0 to 50 psid 0 to 100 psid 0 to 150 psid 0 to 200 psid 0 to 300 psid 0 to 500 psid
		11 12 13 14 15 16 17 18 19					0 to 0.5 bar differential 0 to 1 bar differential 0 to 2 bar differential 0 to 4 bar differential 0 to 6 bar differential 0 to 10 bar differential 0 to 15 bar differential 0 to 20 bar differential 0 to 30 bar differential
Housing			CH R1 R2 R5 R6				Conduit housing, NEMA 4X (IP66) Conduit housing, NEMA 4X (IP66) with Remote Sensor and 10' shielded cable Conduit housing, NEMA 4X (IP66) with Remote Sensor and 20' shielded cable Conduit housing, NEMA 4X (IP66) with Remote Sensor and 10' armored cable Conduit housing, NEMA 4X (IP66) with Remote Sensor and 20' armored cable
Process Connection				P1 P2 P3 P4			1/4" male NPT 1/4" female NPT 1/4" male BSPT 1/4" female BSPT
Electrical Connection					E1 E2 E3 E5 E9		Cable gland with 3' of prewired cable Cable gland with 6' of prewired cable Cable gland with 9' of prewired cable 1/2" female NPT conduit M-12 4 pin connector
Signal Output						S1 S3	4-20 mA Field selectable 0-5, 1-5, 0-10, 2-10 VDC
Options							3V 3-way valve AT Aluminum tag FC Factory calibration certificate LCD LCD indication NIST NIST traceable certificate

RANGE			
Range Number	Range	Working Pressure*	Over Pressure
01	0 to 5 psid	10 psi	50 psi
02	0 to 10 psid	20 psi	50 psi
03	0 to 25 psid	50 psi	120 psi
04	0 to 50 psid	100 psi	250 psi
05	0 to 100 psid	200 psi	500 psi
06	0 to 150 psid	300 psi	750 psi
07	0 to 200 psid	400 psi	1000 psi
08	0 to 300 psid	600 psi	1200 psi
09	0 to 500 psid	1000 psi	2000 psi
11	0 to 0.5 bar differential	1 bar	3 bar
12	0 to 1 bar differential	2 bar	8 bar
13	0 to 2 bar differential	4 bar	8 bar
14	0 to 4 bar differential	8 bar	18 bar
15	0 to 6 bar differential	12 bar	18 bar
16	0 to 10 bar differential	20 bar	50 bar
17	0 to 15 bar differential	30 bar	60 bar
18	0 to 20 bar differential	40 bar	80 bar
19	0 to 30 bar differential	60 bar	120 bar

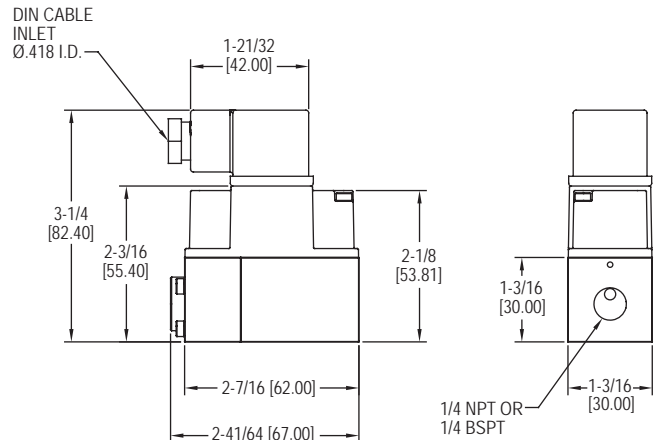
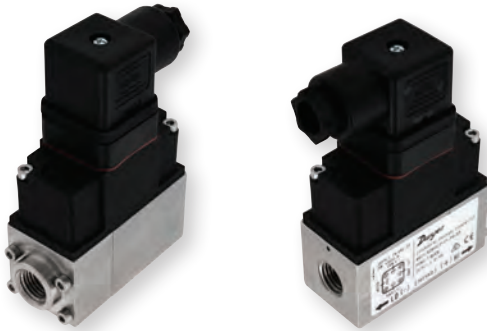
\*Pressures exceeding the working pressure limit may cause a calibration shift of up to ±3% of full-scale.  
**Note:** Over pressure of all models with 3-way valve is 100 psi.

ACCESSORIES	
Model	Description
A-155	Cable gland with 1/2" NPT male
A-228	12" SS flex hose
A-62X-LCD	Field-upgradeable LCD
BBV-1B	Mini SS 3-valve block manifold

USA: California Proposition 65  
 ⚠WARNING: Cancer and Reproductive Harm  
[www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

# DIFFERENTIAL PRESSURE TRANSMITTERS

## High Accuracy, IP65 Enclosure



The **Series 629HLP Differential Pressure Transmitters** are suitable for measuring over-pressure, under-pressure, and differential pressure in compatible gases and liquids with 1% accuracy. The 629HLP is suitable for all measuring tasks in commercial, industrial or sanitary applications. Its single sensor design, allows it to measure small increment pressure changes, and converts them to a linear analog output signal from 4-20 mA or 0-10 VDC.

### FEATURES/BENEFITS

- Rugged, versatile, high accuracy device
- For liquid or gas systems requiring precise measurements
- Provide excellent response and reliability
- Suitable for static and dynamic measurements
- Converts pressure changes into 4-20 mA or 0-10 VDC output
- Compact, lightweight, capable to be installed in any arrangement making installation very simple

### APPLICATIONS

- Heat exchangers
- Fan coils/air handlers
- Core testing applications
- Hydraulic systems
- High line pressures/low DP
- Pumps
- Commercial/industrial processes
- Sanitary process

### SPECIFICATIONS

**Service:** Compatible gases or liquids.  
**Wetted Material:** 304 SS.  
**Housing Material:** ABS.  
**Enclosure Rating:** IP65.  
**Accuracy:** ±1% from -5 to 60°C (23 to 140°F).  
**Stability:** ±1% FS/year.  
**Temperature Limits:** Ambient: -10 to 60°C (14 to 122°F); Process: -10 to 80°C (14 to 176°F).  
**Relative Humidity:** 10% to 90% non-condensing.  
**Installation Position:** Not position sensitive.  
**Pressure Limits:** See Pressure Range Limits chart.  
**Burst Pressure:** See Pressure Range Limits chart.  
**Static Pressure Limits:** See Pressure Range Limits chart.  
**Output Signal:** 4-20 mA, 0-10 VDC.  
**Response Time:** 50 ms.  
**Rated Supply Voltage:** 0-10 VDC Output: 12-36 VDC or 12-32 VAC (@ Max load of 2k Ω) 4-20 mA output: 8-36 VDC.  
**Max Loop resistance:** (Supply Voltage – 8 V) / 0.02 for 4-20mA output.  
**Power Consumption:**  $V_{out} = 13$  mA max,  $I_{out} = 24$  mA max.  
**Electrical Connections:** Form A DIN 43650.  
**Process Connections:** 1/4" female NPT, 1/4" female BSPT.  
**Weight:** 1 lb 4 oz (567 g).  
**Approvals:** CE, RCM.

MODEL CHART						
Example	629HLP	-01	-P2	-S1	-FC	629HLP-01-P2-S1-FC
<b>Series</b>	629HLP					Differential pressure transmitter
<b>Range</b>		01				0 to 1 bar
		02				0 to 2.5 bar
		04				0 to 4 bar
		06				0 to 6 bar
		15				0 to 15 psi
		30				0 to 30 psi
		60				0 to 60 psi
		90				0 to 90 psi
<b>Process Connections</b>			P2			1/4" female NPT
			P4			1/4" female BSPT
<b>Output Signal</b>				S1		4-20 mA
				S5		0-10 VDC
<b>Options</b>					FC	Factory calibration
					NIST	NIST certificate

**Note:** Psi ranges available upon request. Contact factory for details.

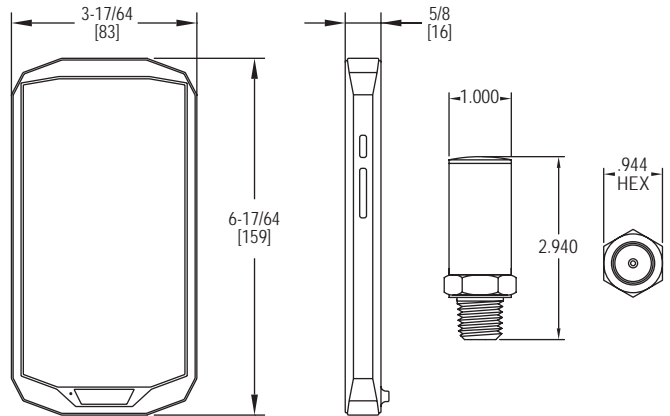
PRESSURE RANGE LIMITS			
Pressure Range	Maximum Static Pressure (bars)	*Maximum Differential Over Pressure	**Burst Differential Pressure
0 to 1 bar	25 bar	5 bar	8 bar
0 to 2.5 bar	25 bar	5 bar	8 bar
0 to 4 bar	25 bar	12 bar	18 bar
0 to 6 bar	25 bar	12 bar	18 bar
0 to 15 psi	360 psi	70 psi	115 psi
0 to 30 psi	360 psi	70 psi	115 psi
0 to 60 psi	360 psi	174 psi	260 psi
0 to 90 psi	360 psi	174 psi	260 psi

**Note:** \*The differential pressure limit, between high and low ports, that the transmitter can withstand without affecting transmitter performance  
**\*\***Differential pressures between high and low ports that exceed overpressure limits will result in permanent diaphragm deformation, and any pressure higher than the burst pressure limits will rupture the diaphragm.

ACCESSORIES	
Model	Description
A-629HLP-BKT	Mounting bracket kit
BBV-1B	3-Valve block manifold
A-228	12" SS flex hose

# WIRELESS HYDRONIC DIFFERENTIAL PRESSURE MANOMETER

Liquid and Gas Pressure Measurement,  $\pm 2\%$  of Reading Accuracy



**Series 490W Wireless Hydronic Differential Pressure Manometer** is the most accurate and easy to operate manometer on the market. By using wireless transducers and a versatile handheld, a single operator can monitor and balance a hydronic system in less time than traditional hydronic balancers. The Series 490W utilizes mobile technology to communicate via a Bluetooth connection with the transducers to monitor differential pressure and flow on up to three different valves. Being wireless means there are no hoses to carry, snag on equipment or needing to be drained. The 490W includes the Dwyer Hydronic Application Software that contains valve charts for numerous manufacturers, which converts differential pressure to flow directly on the screen.

## FEATURES/BENEFITS

- Rugged weatherproof handheld housing withstands 1.5 meter drop test.
- Wireless measurement of differential pressure, single pressure and air flow.
- Share logged data directly from handheld over Wi-Fi, GSM or CDMA networks.
- Bluetooth direct wireless communication provides range up to 65 ft (19.8 m).
- The ergonomic design is much lighter and easier to work with, providing greater maneuverability and quick install setup.

## APPLICATIONS

- Refrigerant pressure testing
- Hydronic valve balancing
- Measure pressure drop across pumps
- Measure pressure drop across chiller and coils for freeze protection

## SPECIFICATIONS

**Wireless Distance:** Up to 65' (19.8 m).  
**Service:** Compatible gases & liquids.  
**Wetted Materials:** 316 SS, PTFE, brass.  
**Accuracy:** 2% of reading,  $\pm 1$  psi.  
**Compensated Temperature Range:** 14 to 140°F (-10 to 60°C).  
**Pressure Hysteresis:**  $\pm 0.25\%$  FS.  
**Pressure Range:** See chart.  
**Process Temperature Limits:** -4 to 185°F (-20 to 85°C).  
**Display:** 5" Gorilla® glass 3, touch screen, 1280x720.  
**Resolution:** 0.01 psi.  
**Power Connections:** Two 1/4" male NPT.  
**Power Requirements:** CR2050 or CR2032 lithium battery, user replaceable.  
**Weight:** 2 lb (907 g).  
**Agency Approvals:** CE, FCC.

## MODEL CHART

Model	English Range	Metric Range	Maximum Pressure	Available Engineering Units
490W-6-HKIT	0 to 50 psi, 0 to 200 psi	0 to 344.7 kPa, 0 to 1379 kPa	100 psi (6.89 bar), 400 psi (27.58 bar)	psi, ft w.c., in w.c., Pa, kPa, hPa, cm w.c., mm w.c.
490W-6-HKIT-NIST	0 to 50 psi, 0 to 200 psi	0 to 344.7 kPa, 0 to 1379 kPa	100 psi (6.89 bar), 400 psi (27.58 bar)	psi, ft w.c., in w.c., Pa, kPa, hPa, cm w.c., mm w.c.

## REPLACEMENT TRANSDUCERS

A-490W-1	0 to 15 psi	1.034 bar	30 psig	psi, ft w.c., in w.c., Pa, kPa, hPa, cm w.c., mm w.c.
A-490W-2	0 to 30 psi	2.069 bar	60 psig	psi, ft w.c., in w.c., Pa, kPa, hPa, cm w.c., mm w.c.
A-490W-3	0 to 50 psi	3.447 bar	100 psig	psi, ft w.c., in w.c., Pa, kPa, hPa, cm w.c., mm w.c.
A-490W-4	0 to 100 psi	6.895 bar	200 psig	psi, ft w.c., in w.c., Pa, kPa, hPa, cm w.c., mm w.c.
A-490W-5	0 to 500 psi	34.47 bar	1000 psig	psi, ft w.c., in w.c., Pa, kPa, hPa, cm w.c., mm w.c.
A-490W-6	0 to 200 psi	13.79 bar	400 psig	psi, ft w.c., in w.c., Pa, kPa, hPa, cm w.c., mm w.c.

## ACCESSORIES

Model	Description
A-HKIT-500	Piercing gage adapter, 1/8" dia x 1-1/2" length (2 per kit)
A-HKIT-500XL	Piercing gage adapter, 1/8" dia x 3" length (2 per kit)
A-HKIT-510	Piercing gage adapter, 1/16" dia x 1-1/2" length (2 per kit)

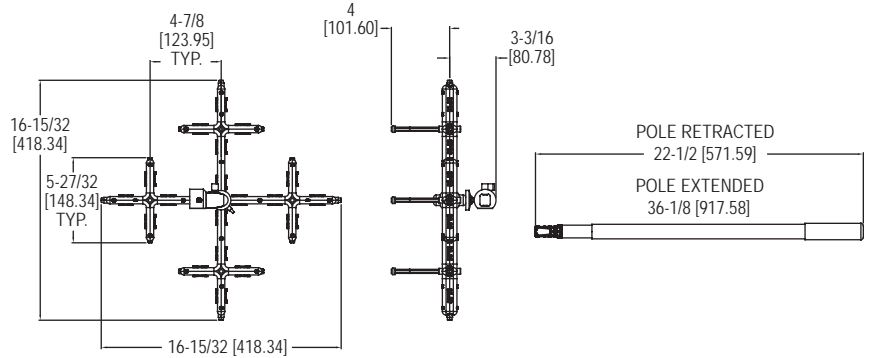
USA: California Proposition 65  
 ⚠ WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov

Gorilla® is a registered trademark of Corning, Incorporated



# AVERAGING AIR FLOW GRID

Extends Over 50" to Aid in Air Flow Output Checks



The **Model 160G Averaging Air Flow Grid** utilizes 16 sensing points to provide precision sensing across its 16.5" (41.9 cm) length and width. The ball pivot joint and tightening nut allows the user to position the sensing grid at any angle in any direction for ease of use in hard to reach locations. The included color coded tubing connects to the integral barbed fittings, providing a differential pressure signal to a gage or manometer where the readings can be converted into a velocity or flow reading.

**FEATURES/BENEFITS**

- Maximum reach of approximately 48" (122 cm)
- 16 sensing points provide an accurate average flow

**APPLICATIONS**

- Measure face air velocity on grills, diffusers, registers, exhaust hoods

**SPECIFICATIONS**

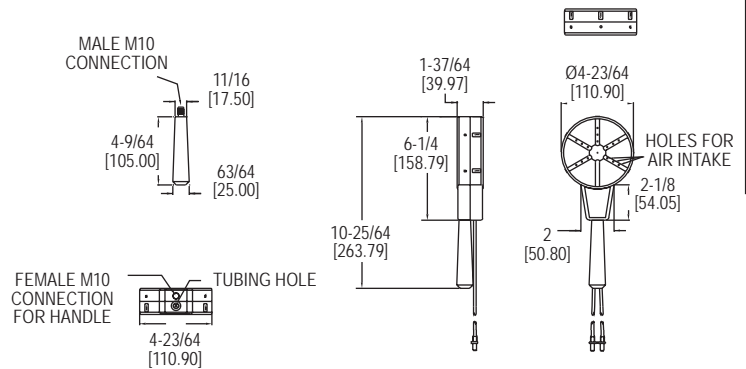
**Service:** Air or compatible gases.  
**Wetted Materials:** Grid: Black polycarbonate; Ball pivot joint: AL, plastic; Handle: Aluminum; Standoffs: Aluminum with rubber bumpers, two sets: 1.25" (31.7 mm) and 2" (50.8 mm), 1/8" ID / 1/4" OD; Tubing: Two 10' (3 m) lengths of silicone rubber.  
**Accuracy:** ±2% FS.  
**Temperature Limits:** -40 to 257°F (-40 to 125°C).  
**K Factor:** 0.84.  
**Range:** 1000 to 5000 FPM (5 to 25 m/s).  
**Process Connection:** 1/8 to 1/4" ID tubing.  
**Weight:** 1.75 lb (0.79 kg).  
**Agency Approvals:** RoHS.

MODEL CHART	
Model	Description
160G	Averaging air flow grid

ACCESSORIES	
Model	Description
UHH-C2	Protective hard case



**MODEL ANE-1**  
**DIFFERENTIAL PRESSURE ANEMOMETER**  
Bi-Directional Anemometer, No Sensing Electronics



The **Model ANE-1 Differential Pressure Anemometer** is a robust and durable bi-directional anemometer with no moving parts or sensing electronics. Using the installed tubing, the ANE-1 connects easily to any manometer or applicable pressure sensing device and is capable of measuring a wide velocity range. The air velocity range and accuracy is dependent on the installed manometer, and the ANE-1 retains the accuracy as long as it is dust free.

**FEATURES/BENEFITS**

- Wide velocity range dependent on connected manometer
- Includes 5' of blue and 5' of red silicone tubing with a removable adapter sized 2 mm OD to 3/16" OD

**APPLICATIONS**

- Measure face air velocity on grills, diffusers, registers, exhaust hoods

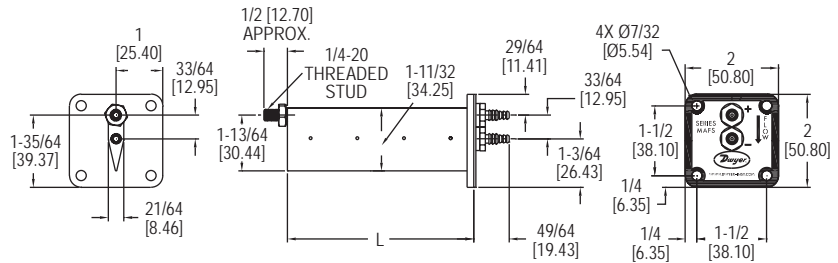
**SPECIFICATIONS**

**Service:** Clean air only.  
**Wetted Materials:** Anemometer: ABS; Tubing: Silicone; Handle: Phenolic.  
**Dimensions:** Tubing: 2 mm ID x 4.5 mm OD; Adapter: 2 mm OD to 3/16" OD connections.  
**Temperature Limits:** 23 to 122°F (-5 to 50°C).  
**K-Factor:** 0.843.  
**Process Connections:** 2 removable 5" (12.7 cm) tubing 3/16" ID.  
**Weight:** 7.7 oz (220 g).

MODEL CHART	
Model	Description
ANE-1	Differential pressure anemometer

# METAL AVERAGING FLOW SENSOR

Blade Profile Provides Enhanced Performance and Minimal Flow Disruption



The **Series MAFS Metal Averaging Flow Sensor** is ideal for use with Dwyer Instruments, Inc. precision air velocity gages, transmitters and switches. The Series MAFS uses evenly distributed total and static pressure measuring points to deliver an accurate measurement of velocity pressure in a duct.

**FEATURES/BENEFITS**

- Blade design limits disruption of air stream
- Lightweight aluminum construction
- Flange mount for rectangular or square ducts

**APPLICATIONS**

- VAV air flow measurement
- Fume hood exhaust flow verification
- HVAC retrofit air flow measurement

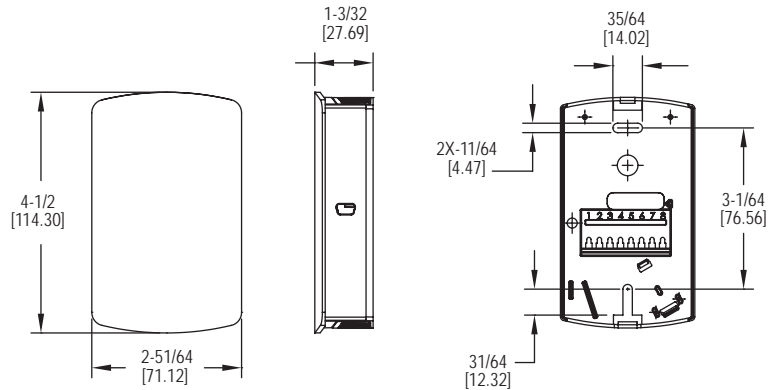
**SPECIFICATIONS**

**Service:** Clean air.  
**Wetted Materials:** Aluminum AA6063.  
**Accuracy:** 400 to 9000 FPM (45.7 m/s); ±2% FS, ±3% FS for 6" (160 mm) and 48" (1200 mm) length models.  
**K-Factor:** 0.81, 0.80 for 6" (160 mm) and 48" (1200 mm) lengths, 4" (100 mm) length=0.82.  
**Maximum Temperature:** 400°F (204°C); Gasket: -31 to 230°F (-35 to 110°C).  
**Minimum Design Flow:** 400 fpm (2 m/s).  
**Maximum Design Flow:** 12,000 fpm (60.91 m/s).  
**Process Connections:** Dual barb for 3/16" or 1/4" ID tubing.  
**Straight Run Requirements:** 5 diameters or longest side dimensions.  
**Agency Approvals:** Meets the technical requirements of EU Directive 2011/65/EU (RoHS II).

MODEL CHART							
Model	Probe Length (in)	Model	Probe Length (in)	Model	Probe Length (mm)	Model	Probe Length (mm)
MAFS-4	4	MAFS-24	24	MAFS-100MM	100	MAFS-550MM	550
MAFS-6	6	MAFS-26	26	MAFS-125MM	125	MAFS-600MM	600
MAFS-8	8	MAFS-28	28	MAFS-160MM	160	MAFS-630MM	630
MAFS-10	10	MAFS-30	30	MAFS-200MM	200	MAFS-650MM	650
MAFS-12	12	MAFS-32	32	MAFS-250MM	250	MAFS-750MM	750
MAFS-14	14	MAFS-34	34	MAFS-300MM	300	MAFS-800MM	800
MAFS-16	16	MAFS-36	36	MAFS-315MM	315	MAFS-1000MM	1000
MAFS-18	18	MAFS-40	40	MAFS-400MM	400	MAFS-1500MM	1500
MAFS-20	20	MAFS-48	48	MAFS-450MM	450	MAFS-2000MM	2000
MAFS-22	22			MAFS-500MM	500		

# WALL MOUNT HUMIDITY/TEMPERATURE TRANSMITTER

2% or 3% Humidity Sensor, Passive Temperature Outputs



The Series RHPLC Wall Mount Humidity/Temperature Transmitter is a compact economical sensor for the building automation marketplace. The stylish housing is well vented to provide air flow across the sensor to improve measurement accuracy. Each unit utilizes a capacitive polymer sensing element to deliver a proportional analog output. A combination humidity and temperature model can be configured with current, voltage, RTD, or thermistor output. A wide selection of passive RTD or thermistor temperature sensors are available in this series.

**FEATURES/BENEFITS**

- 2% or 3% accuracy models
- Humidity only or temperature and humidity combo
- Wide selection of passive thermistor or RTD temperature sensors

**APPLICATIONS**

- Air economizers
- Room comfort monitoring

**SPECIFICATIONS**

**Sensor:** Capacitive polymer.  
**Relative Humidity Range:** 0-100% RH.  
**RH Accuracy:** ±2% 10 to 90% RH @ 25°C for 2% accuracy units; ±3% 20 to 80% RH @ 25°C for 3% accuracy units.  
**RH Hysteresis:** ±0.8%.  
**RH Repeatability:** ±0.1% typical.  
**Temperature Output Range:** -40 to 140°F (-40 to 60°C).  
**Passive Thermistor Temperature Sensor Accuracy:** ±0.36°F @ 77°F (±0.2°C @ 25°C).  
**Accuracy RTD Temp Sensor:** DIN Class B; ±0.3°C @ 0°C (±0.54°F @ 77°F).  
**Accuracy Current/Voltage Temperature Output:** ±0.9°F @ 72°F (±0.3°C @ 25°C).  
**Temperature Limits:** Operating: -40 to 140°F (-40 to 60°C); Storage: -40 to 176°F (-40 to 80°C).  
**Power Requirements:** 10-35 VDC for 4-20 mA or 0-5 VDC output; 15-35 VDC for 0-10 VDC output; 10-29 VAC for 0-5 VDC output; 15-29 VAC for 0-10 VDC output.  
**Response Time:** 8 s (τ<sub>63</sub>).  
**Electrical Connections:** Screw terminal block.  
**Drift:** <0.25% RH/year.  
**Enclosure Material:** Polycarbonate.  
**Weight:** 4.4 oz (125 g).  
**Agency Approvals:** CE.

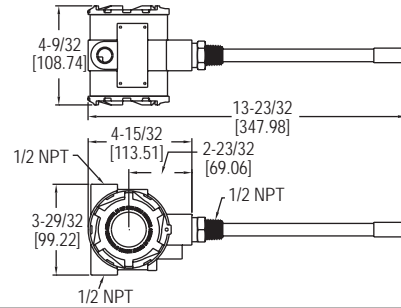
MODEL CHART							
Example	RHPLC	-3	N	2	A	-FC	RHPLC-3N2A-FC
Series	RHPLC						Humidity/temperature transmitter
Accuracy		2					2% accuracy
		3					3% accuracy
Housing			N				North American style wall mount
Humidity Output				1			Current 4-20 mA
				2			Voltage 0-10 VDC
				3			Voltage 0-5 VDC
Temperature Output					0		None
					1		Current 4-20 mA
					2		Voltage 0-10 VDC
					3		Voltage 0-5 VDC
					A		10K Ω @ 25°C thermistor type III
					B		10K Ω @ 25°C thermistor type II
					C		3K Ω @ 25°C thermistor
					D		100 Ω RTD DIN 385
					E		1K Ω RTD DIN 385
					F		20K Ω @ 25°C thermistor
Options						FC	Factory calibration certificate (3% accuracy units)

ACCESSORIES	
Model	Description
SCD-PS	100-240 VAC/VDC to 24 VDC power supply
APT-40-5DN	AC power transformer, 120/208/240/277/480 VAC input, 24 VAC isolated output, 40 VA, dual hub

Humidity/Temperature Transmitters

# HAZARDOUS AREA HUMIDITY/TEMPERATURE TRANSMITTER

Intrinsically Safe or Explosion-Proof Models



The Series HHT Hazardous Area Humidity/Temperature Transmitter takes accurate measurements in the harshest of environments. The explosion-proof model is offered with 4-20 mA output for humidity only. The intrinsically safe version is offered with 4-20 mA output for humidity and temperature, and do require an intrinsically safe barrier to meet hazardous area approvals.

**FEATURES/BENEFITS**

- FM approved explosion-proof and intrinsically safe models
- Integral LCD option
- Dual temperature and relative humidity output models

**APPLICATIONS**

- Process monitoring
- Offshore HVAC monitoring
- Dust and grain handling

MODEL CHART			
Model	Protection	Description	Display
HHT-EU	Explosion-proof	Humidity	No
HHT-IU	Intrinsically safe	Humidity	No
HHT-IT	Intrinsically safe	Humidity/temperature	No
HHT-EU-LCD	Explosion-proof	Humidity	Yes
HHT-IT-LCD	Intrinsically safe	Humidity/temperature	Yes

ACCESSORIES	
Model	Description
KFD0-SCS-EX1.55 A-287	Loop powered galvanic isolator Mounting bracket for pipe or surface mounting (Includes bracket and two 2" U-bolts)
A-450	Replacement sintered filter

**SPECIFICATIONS**

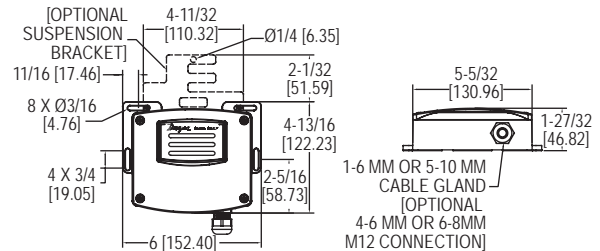
**Relative Humidity Range:** 0 to 100% RH.  
**Temperature Range:** -40 to 140°F (-40 to 60°C).  
**Accuracy:** ±2% 10 to 90% RH, ±0.9°F at 72°F (±0.3°C at 25°C).  
**Hysteresis:** ±1%.  
**Repeatability:** ±0.1% typical.  
**Temperature Limits:** -40 to 140°F (-40 to 60°C).  
**Storage Temperature:** -40 to 176°F (-40 to 80°C).  
**Compensated Temperature:** -40 to 140°F (-40 to 60°C).  
**Power Requirements:** For intrinsically safe models HHT-IX, 9.5-28 VDC. For explosion-proof models HHT-EX, 16.5-28 VDC.  
**Output Signal:** 4-20 mA, 2 channels for humidity/temperature models (loop power on RH).  
**Response Time:** 15 s.  
**Electrical Connections:** Screw terminal block.  
**Conduit Connection:** 1/2 female NPT.  
**Drift:** < 1% RH/year.  
**RH Sensor:** Capacitance polymer.  
**Temperature Sensor:** Solid state band gap.  
**Housing Material:** Aluminum.  
**Display:** Optional 2 line alpha numeric, 8 characters/line. Temperature display is °F/°C selectable.  
**Display Resolution:** RH: 0.1%; Temperature: 0.1°F (0.1°C).  
**Weight:** 2 lb 8 oz (1134 g).  
**Enclosure Rating:** NEMA 4X (IP66). Models HHT-EX: FM Explosion- Proof, Class I Div. 1 Group B, C, D, Class II Div. 1 Group E, F, G, Class III Div. 1; Models HHT-IX: FM Intrinsically Safe, Class I Div. 1 Group A, B, C, D, Class II Div. 1 Group E, F, G, Class III Div. 1 T4.  
**Agency Approvals:** CE, FM.

See page 366 (Model KFD0)

SERIES CDWP

# CARBON DIOXIDE TRANSMITTER

NDIR CO<sub>2</sub> Sensor with Universal Outputs in an Industrial Housing



The Series CDWP Carbon Dioxide Transmitter accurately monitors the CO<sub>2</sub> concentration in industrial and indoor environments to help achieve energy savings. For increased sensor life and accuracy, a single-beam dual-wavelength non-dispersive infrared (NDIR) sensor is used to eliminate light source aging effects. This sensing technology provides the highest level of accuracy compared to Automatic Baseline Correction methods, which can unintentionally shift the calibration based on CO<sub>2</sub> levels and barometric pressure conditions.

MODEL CHART						
Example	CDWP	-05	W	-M4	-FC	CDWP-05W-M4
<b>Series</b>	CDWP					Carbon dioxide transmitter
<b>Range</b>		02 05 10				2000 PPM 5000 PPM 10000 PPM
<b>Mounting</b>			W H			Wall mount Suspended mount
<b>Electrical Connection</b>				C1 C5 M4 M6		Cable gland 1 to 6 mm cable Cable gland 5 to 10 mm cable M12 connection 4 to 6 mm cable M12 connection 6 to 8 mm cable
<b>Option</b>					FC	Factory calibration certificate

ACCESSORIES	
Model	Description
A-CDWP-L	Replacement lid with filter material
A-CDWP-H	Suspended mount bracket

**SPECIFICATIONS**

**Sensor:** Single beam, dual-wavelength NDIR.  
**Range:** CO<sub>2</sub>: 0 to 2000, 0 to 5000, or 0 to 10000 ppm (depending on model).  
**Accuracy:** CO<sub>2</sub>: ± 40 ppm ±3% of reading.  
**Temperature Dependence:** ±8 ppm/°C at 1100 ppm.  
**Non-Linearity:** 16 ppm.  
**Pressure Dependence:** 0.13% of reading per mm of Hg.  
**Response Time:** 300 s (τ<sub>63</sub>).  
**Temperature Limits:** 32 to 122°F (0 to 50°C).  
**Humidity Limits:** 10 to 95% RH (non-condensing).  
**Power Requirements:** 16-35 VDC or 19-28 VAC.  
**Power Consumption:** Average: 2 w; Peak: 3.75 w.  
**Output:** Current: 4-20 mA (max. 500 Ω); Voltage: 0-5 VDC or 0-10 VDC (min. 500 Ω).  
**Enclosure Rating:** IP54.  
**Mounting Orientation:** Vertically, with electrical connections points downward.  
**Weight:** 26.24 oz (744 g).  
**Agency Approvals:** CE.

**FEATURES/BENEFITS**

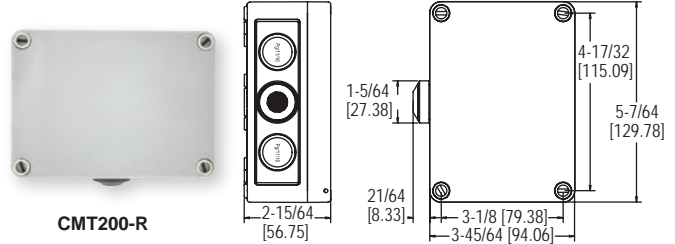
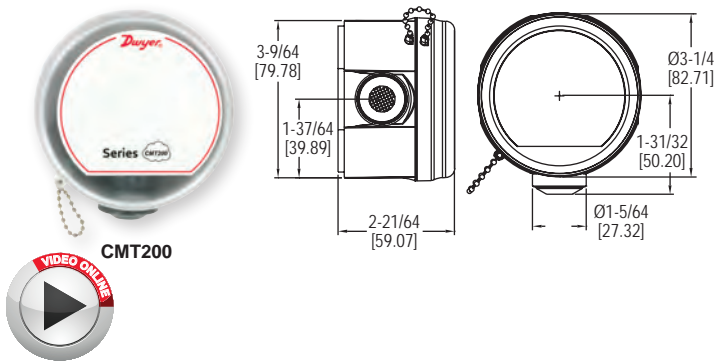
- IP54 aluminum housing
- Gray finish tested to withstand 168 hour salt spray test
- Single-beam dual-wavelength sensor automatically corrects for aging effects
- Measures unfiltered light intensity directly and eliminates error from incorrect assumptions of gas concentration in theoretical logic assumption methods
- Universal outputs to work with any building management system

**APPLICATIONS**

- Animal husbandry
- Mechanical room
- CO<sub>2</sub> refrigeration monitoring
- Greenhouses

# CARBON MONOXIDE TRANSMITTERS

Current/Voltage Selectable Output, 200 PPM Range



The Series CMT200 Carbon Monoxide Transmitters provides a field selectable current or voltage output that is proportional to the gas concentration in underground parking garages, vehicle maintenance facilities, or mechanical rooms.

**FEATURES/BENEFITS**

- Field selectable current or voltage outputs
- Replaceable sensor
- Field calibration kits

**APPLICATIONS**

- Garage ventilation
- Mechanical room monitoring

MODEL CHART	
Model	Description
CMT200	Carbon monoxide transmitter
CMT200-R	Carbon monoxide transmitter with rugged housing

ACCESSORIES	
Model	Description
GCK-200CO-2000CO2	Calibration gas
A-505	Replacement Carbon Monoxide Sensor
A-507A	Calibration adaptor

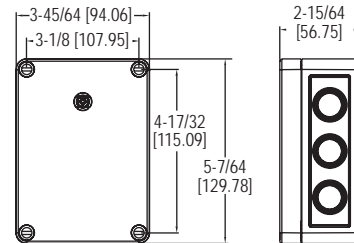
**SPECIFICATIONS**

**Sensor:** Field replaceable electrochemical, 4 year typical lifespan.  
**Range:** 0 to 200 ppm.  
**Coverage Area:** 5000 to 7000 sq. ft. typical.  
**Accuracy:** ±2% FS at the time of calibration.  
**Output Drift:** <5% per year in air.  
**Temperature Limits:** -4 to 122°F (-20 to 50°C).  
**Storage Temperature:** For best sensor life, 32 to 68°F (0 to 20°C).  
**Humidity Limits:** 15 to 90% RH constant; 0 to 99% RH intermittent.  
**Response Time:** <45 s to 90% of final value.  
**Calibration:** 15 turn span and zero adjustment potentiometers.  
**Housing:** UV resistant polycarbonate.  
**Output:** Jumper selectable 4-20 mA (loop powered) or 2-10 V (load must be >50 KΩ).  
**Power Requirements:** Current Output: 18-28 VDC; Voltage Output: 18-28 VDC/VAC, reverse polarity protected.  
**Electrical Connection:** Removable terminal block, includes two PG11 and one PG 16 knockouts for conduit fitting.  
**Weight:** 0.28 lb (0.11 kg).  
**Agency Approvals:** CE.

SERIES CMS300

# CARBON MONOXIDE TRANSMITTER AND SWITCH

Current/Voltage Selectable Output, Jumper Selectable SPDT Relay Contact



The Series CMS300 Carbon Monoxide Transmitter and Switch provides a field selectable current or voltage output that is proportional to the carbon monoxide concentration in underground parking garages, vehicle maintenance facilities, or mechanical rooms. An integral relay can be used for alarm conditions and is configured with preset jumper selectable ranges of 25, 60, or 150 PPM. Field calibration can be done by using Model GCK-200CO-2000CO2 calibration gas, Model A-507 calibration adapter, and the on board zero and span potentiometers.

**FEATURES/BENEFITS**

- Field selectable current or voltage analog outputs
- Integral SPDT relay contact for low or high alarm
- Jumper selectable alarm set points of 25, 60, or 150 PPM
- UL recognized carbon monoxide sensing element
- Field calibration kits

**APPLICATIONS**

- Garage or loading dock ventilation
- Vehicle maintenance facilities
- Mechanical room monitoring

**SPECIFICATIONS**

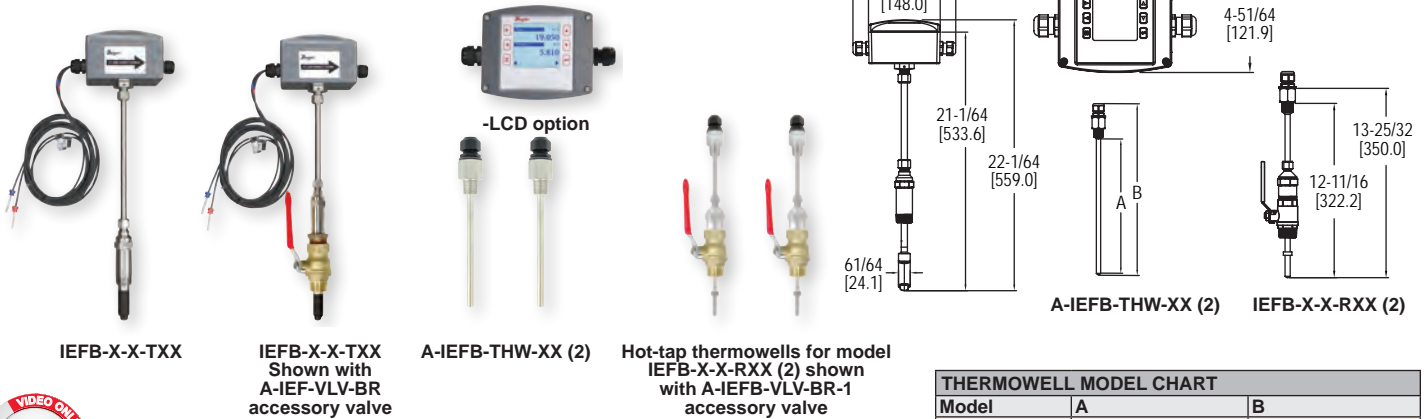
**Sensor:** Electrochemical, 5 years typical lifespan.  
**Range:** 0-300 PPM.  
**Output Drift:** <5% per year in air.  
**Temperature Effect:** ±2% over range.  
**Coverage Area:** 7,500 ft<sup>2</sup> (700 m<sup>2</sup>) or 50 ft (15 m) radius.  
**Accuracy:** ±5 PPM or 5% of reading for 0-300 PPM (whichever is greater).  
**Resolution:** 1 PPM.  
**Temperature Range:** -4 to 122°F (-20 to 50°C).  
**Storage Temperature:** For best sensor life, 32°F to 68°F (0 to 20°C).  
**Humidity Range:** 15-90% RH constant; 0-99% RH intermittent.  
**Response Time:** <45 seconds to 90% of final value.  
**Calibration:** 15 turn span and zero adjustment potentiometers.  
**Housing:** UV resistant glass filled polycarbonate.  
**Analog Output:** Jumper selectable 4-20 mA (loop powered) or 2-10 V (max. load 2K Ω).  
**Enclosure Rating:** IP64.  
**Weight:** 1 lb (0.45 kg).  
**Switch Type:** Single-pole double-throw (SPDT).  
**Electrical Rating:** 30 VAC/VDC. N/O = 5 A. N/C = 3 A.  
**Set Point:** Jumper selectable 25, 60, or 150 PPM.  
**Set Point Differential/Hysteresis:** 3% of scale.  
**Relay Action:** Factory set for direct acting.  
**Agency Approvals:** Sensor is UL recognized component for ANSI/UL-2034, UL-2075, E340403, CE.

MODEL CHART	
Model	Description
CMS300	Carbon monoxide transmitter and switch

ACCESSORIES	
Model	Description
GCK-200CO-2000CO2	Calibration gas
A-507	Calibration adapter

# INSERTION THERMAL ENERGY METER

Field Adjustable, BACnet/Modbus® Outputs



IEFB-X-X-TXX

IEFB-X-X-TXX  
Shown with  
A-IEFB-VLV-BR  
accessory valve

A-IEFB-THW-XX (2)

Hot-tap thermowells for model  
IEFB-X-X-RXX (2) shown  
with A-IEFB-VLV-BR-1  
accessory valve

THERMOWELL MODEL CHART		
Model	A	B
A-IEFB-THW-4	4-11/16" (119.0 mm)	5-25/32 (146.8 mm)
A-IEFB-THW-6	6-11/16" (169.8 mm)	7-25/32 (197.6 mm)

The **Series IEFB** is a field-adjustable insertion thermal energy meter that uses electromagnetic technology to accurately and reliably measure fluid velocity and energy consumption. The high accuracy IEFB is adjustable to fit pipe sizes from 4 to 10" (100 to 250 mm), while the standard accuracy IEFB fits pipe sizes 4 to 36" (100 to 900 mm). The energy meter is simple to install and incorporates a temperature meter and calculator into a single unit. The IEFB incorporates a temperature meter and a calculator into a single unit. The LCD display provides clear readings of the meter's values, including temperature and energy consumption, making it ideal for installation on chillers, boilers, and other heating and cooling applications. The high measuring accuracy and long lifetime keeps annual operating costs at a minimum. In addition, it offers several output options, including selectable BACnet MS/TP or Modbus® RTU communications protocol over 2-wire RS-485 and standard analog, frequency, and alarm outputs.

**FEATURES/BENEFITS**

- Flexible, field configurable setup displays (-LCD integral option or remote accessory A-IEF-DSP) accommodate a variety of application configurations. Application information is display selectable and includes pipe size, pipe material, liquid type, analog output, pulse/frequency output, alarm outputs, communication, outputs, damping, and calibration factor
- High performance accuracy is maintained through changes in temperature, density and/or viscosity
- The Setup Wizard and installation tool are simple to use, providing quick and precise installation
- Accessory setup kit A-IEF-KIT comes with a thickness gage and measuring tape to ensure exact installation depth
- The meter has no moving parts and electrodes that discourage fouling, which gives the meter a long lifecycle and minimizes the need for maintenance
- Hot-tap isolation valve accessories allow for easy installation and removal in operational systems without system downtime

**APPLICATIONS**

- Monitoring chiller cooling output performance
- Industrial boiler heating performance
- Energy efficiency monitoring
- Optimization of heat energy performance
- Commercial and residential heat energy consumption and metering
- District heating and cooling monitoring
- Energy cost allocation monitoring

**SPECIFICATIONS**

**Service:** Compatible clean or dirty non coating, conductive liquids.  
**Range:** 0 to 20 ft/s (0 to 6 m/s).\*  
**Wetted Materials:** Body shaft/fitting: 316 SS; Electrodes: 316 SS; Electrode cap: Polymer/polystyrene; O-ring: Silicone; Thermowells: 304 SS.  
**BTU Accuracy per EN1434/ASTM E3137/CSA C900.1-13:** High Accuracy Units: Class 2 for 2 to 20 ft/s (0.6 to 6 m/s)\*\*; Standard Accuracy Units: Class 3 for 6.5 to 20 ft/s (2 to 6 m/s)\*\*.  
**Flow Sensor Accuracy:** High Accuracy Units: ±0.5% of reading at calibrated velocity, ±1% of reading from 2 to 20 ft/s (0.6 to 6 m/s) ±0.02 ft/s (±0.006 m/s) at < 2 ft/s (0.6 m/s); Standard Accuracy Units: ±1% FS.  
**Temperature Accuracy:** Class B ±(0.30 + 0.005\*t)°C per EN60751.  
**Differential Temperature Accuracy:** Et = ±(0.5 + 3\*ΔΘmin/ΔΘ) % per EN1434.  
**Calculator Accuracy:** Ec = ±(0.5 + ΔΘmin/ΔΘ) % per EN1434.  
**Temperature Compensation:** 140 to 220°F (60 to 104.4°C) < 2% error over ±30°F (-1.1 °C) change, 40 to 70°F (4.4 to 21.1°C) < 2% error over ±10°F (-12.2°C) change.  
**Temperature Limits:** Ambient: -20 to 160°F (-29 to 71°C)\*\*; LCD -4 to 158°F (-20 to 70°C); Process: 15 to 250°F (-9 to 121°C); Storage: -40 to 185°F (-40 to 85°C).  
**Process Connection:** Flowmeter: 1" NPT or BSPT with accessory full port ball valve options; Thermowell: (2) 1/2" NPT or BSPT thermowell with 1" full port ball valve options.  
**Pressure Limit:** 400 psi (27.6 bar) @ 100°F (37.8°C).  
**Pressure Drop:** < 0.1 psi at 12 ft/s in 4" (<0.01 bar at 3.7 m/s in 100 mm) and larger pipe.  
**Outputs:** (1) Analog: 4-20 mA, 0-5 V, 0-10 V or 2-10 V (display selectable); (1) Pulse/Frequency: 0-15 V peak pulse, 0 to 500 Hz or scalable pulse output (display selectable); (2) Alarm: Empty pipe detection or minimum/maximum velocity, (display selectable) & Reverse flow output indication.  
**Power Requirements:** 12-42 VDC, .25 A @ 24 VDC; 12-36 VAC.  
**Electrical Connection:** Removable terminal blocks, (2) model selectable 1/2" female NPT conduit connection, (2) PG 16 gland or (2) PG 16 gland with 10 ft (3 m) 9 conductor 22 AWG plenum rated cables, accessory cable lengths up to 200 ft (61 m) optional.  
**Display (-LCD option):** 2 x 2" (50 x 50 mm) graphic LCD with backlight.  
**Conductivity:** >20 microsiemens.  
**Enclosure Material:** Powder coated die cast aluminum.  
**Enclosure Ratings:** NEMA 6P (IP68) (Non display models); NEMA 4X (IP66) (-LCD option).  
**Agency Approvals:** BTL.

**COMMUNICATIONS (-COM OPTION)**

**Type:** BACnet MS/TP or Modbus® RTU communication protocol (default disabled, display selectable).  
**Supported Baud Rates:** 9600, 19200, 38400, 57600, 76800, or 115200 bps (display selectable).  
**Device Load:** 1/8 unit load.

**ADDITIONAL SPECIFICATIONS**

**Applicable Pipe Material:** Most popular plastic and metal pipes; i.e. Carbon steel, SS, copper, UPVC/PVDF, galvanized steel, mild steel, and brass.  
**Applicable Pipe Size:** 4 to 36" (100 to 900 mm), model dependent. See model chart.  
**Diameter Length Requirements:** >10 upstream, >5 downstream.  
**Temperature Resistance:** Matched 4 wire platinum RTD's.  
**Relative Humidity:** 10 to 90% non-condensing.  
**Output Impedance:** 4 to 20 mA: 536 Ω; 5V: 500 Ω; 10V: 1.27k Ω.

\*For max flowrates >10 ft/s (3 m/s) order option -CC.  
 \*\*Verified at standard temperature 73.4°F (23°C) refer to listed standards for detailed accuracy formulations.

# INSERTION THERMAL ENERGY METER

Field Adjustable, BACnet/Modbus® Outputs

MODEL CHART							
Example	IEFB	-L	N	-CND	-R10	-LCD	IEFB-LN-CND-R10-LCD
Series	IEFB						Insertion thermal energy meter
Accuracy		L G S F I E T H					Standard accuracy <10" (250 mm) pipe; 1% FS Standard accuracy >10" (250 mm) pipe; 1% FS Standard accuracy 4 to 36" (100 to 900 mm) pipe; 1% FS High accuracy 4" (100 mm) pipe; 1% of reading High accuracy 6" (150 mm) pipe; 1% of reading High accuracy 8" (200 mm) pipe; 1% of reading High accuracy 10" (250 mm) pipe; 1% of reading High accuracy 4 to 10" (100 to 250 mm) pipe; 1% of reading
Process Connection			N B				1" Male NPT 1" Male BSPT
Housing Electrical Connection				CND PG 10			1/2" female NPT PG 16 gland without cable PG 16 gland with (2) 10' (3 m) cables
Temperature Sensors					T10 T20 T50 R10 R20 R50		(2) 10' (3 m) PT temperature sensors* (2) 20' (6 m) PT temperature sensors* (2) 50' (15 m) PT temperature sensors* (2) 10' (3 m) PT temperature sensors with hot-tap thermowells (2) 20' (6 m) PT temperature sensors with hot-tap thermowells (2) 50' (15 m) PT temperature sensors with hot-tap thermowells
Options						LCD COM NIST FC CC	Integral LCD display BACnet or Modbus® communications protocol (display selectable) NIST traceable calibration certification for flow and temperature Factory calibration certification for 0.5% of reading at single point Custom configuration (required input)

\*Thermowells not included. Refer to accessories model chart to purchase permanent thermowells.

ACCESSORIES	
Model	Description
A-IEF-KIT	Setup kit (includes setup display, thickness gage, and measuring tape) and universal power adapter
A-IEF-DSP	Setup display
A-IEF-VLV-BR†	1-1/4" full port isolation valve brass**
A-IEF-VLV-SS†	1-1/4" full port isolation valve 316 SS
Thermowells	
A-IEFB-THW-4	(2) 1/2" NPT, 4" thermowell for 4 to 7" pipe
A-IEFB-THW-6	(2) 1/2" NPT, 6" thermowell for ≥ 8" pipe
A-IEFB-THW-4-BSPT	(2) 1/2" BSPT, 4" thermowell for 4 to 7" pipe
A-IEFB-THW-6-BSPT	(2) 1/2" BSPT, 6" thermowell for ≥ 8" pipe
Hot-Tap Valves	
A-IEFB-VLV-BR-1†	(2) 1" NPT full port isolation valve brass for temperature sensor with 1" branch outlet and 1" nipple**
A-IEFB-VLV-SS-1†	(2) 1" NPT full port isolation valve 316 SS for temperature sensor with 1" branch outlet and 1" nipple

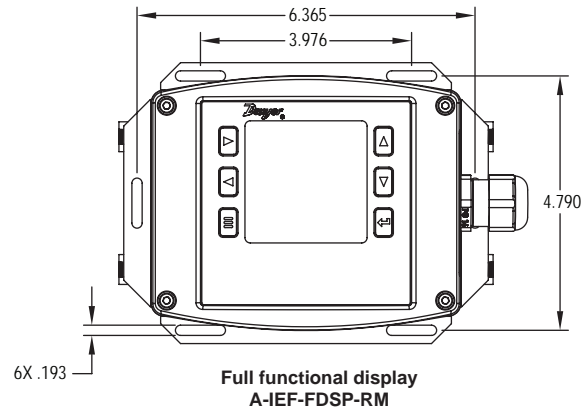
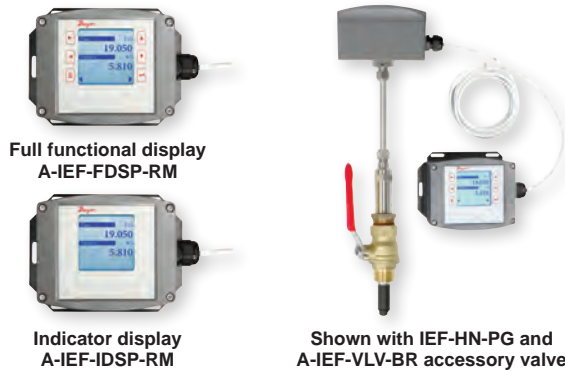
\*\*Brass fittings and pipe are not to be used with NSF Certified models. Brass valves are non-RoHS compliant.  
†BSPT valves also available

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## SERIES A-IEF

# REMOTE DISPLAY FOR SERIES IEF AND IEFB

Convenient Access to IEF & IEFB Meter Readings



The **Series A-IEF Remote Display** can be installed almost anywhere near a Series IEF flow transmitter or IEFB thermal energy meter. Both the indicator display (A-IEF-IDSP-RM) and the full functional display (A-IEF-FDSP-RM) have a maximum display cable length of 100 ft (30 m) to permit easy viewing of flow readings. The full functional display allows for convenient adjustment of configuration settings and allows the user to save the IEF or IEFB configuration settings to a computer for printing.

### FEATURES/BENEFITS

- Full functional display can be used to set up the IEF/IEFB and adjust the settings if it is installed in a hard-to-reach location.
- Indicator display makes it convenient to read process values if the meter is inaccessible.
- Varying cable lengths of up to 100 ft (30 m) allows for flexible installation on a wall or pipe mount.
- Easy to install and wire in the field.

### APPLICATIONS

- Mechanical rooms with a small footprint
- Hard-to-reach piping
- Boilers and chillers
- Chilled water
- Condenser water
- Make-up water
- Heating water
- Boiler feed water
- Steam condensate

### SPECIFICATIONS

**Temperature Limits:** Ambient: -4 to 158°F (-20 to 70°C); Storage: -40 to 185°F (-40 to 85°C).  
**Display:** 3.3" diagonal graphic LCD. Backlight (full functional display only).  
**Enclosure Material Housing:** Powder coated die cast aluminum.  
**Enclosure Rating:** NEMA 4X (IP66).  
**Electrical Connection:** Removable terminal blocks, #22 AWG (100 ft (30 m) max).  
**Mounting:** Wall or pipe mount.  
**Mounting Orientation:** Any orientation.  
**Weight:** 2.46 lbs (1.12kg).

### MODEL CHART

Model	Description
A-IEF-IDSP-RM	A-IEF-DSP-RM indicator remote display
A-IEF-FDSP-RM	A-IEF-DSP-RM full functional remote display

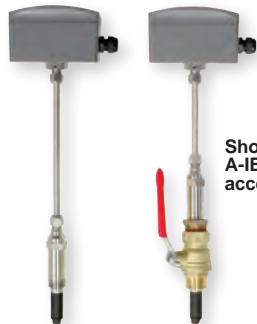
### ACCESSORIES

Model	Description
A-IEF-CBL-50	Plenum rated cable 50 ft (15.2 m)

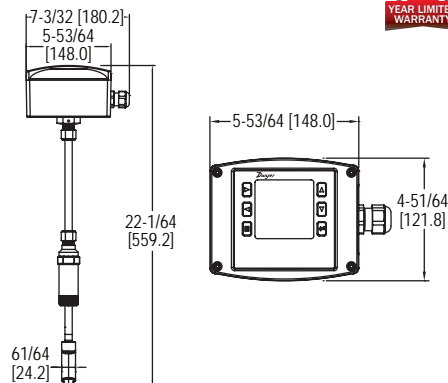
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# INSERTION ELECTROMAGNETIC FLOW TRANSMITTER

Field Configurable, High Accuracy, BACnet or Modbus® Protocol



Shown with A-IEF-VLV-BR\*\* accessory valve



The Series IEF Insertion Electromagnetic Flow Transmitter is an adjustable insertion flowmeter featuring electromagnetic technology that accurately and reliably measures fluid velocity in addition to providing several continuous signal outputs. This series is specifically designed to offer superior performance paired with simple installation and use. One unit is adjustable to fit pipe sizes from 4 to 36" (102 to 914 mm), and offers several output options including selectable BACnet MS/TP or Modbus® RTU communications protocol over 2-wire RS-485 in addition to the standard analog, frequency and alarm outputs.

**FEATURES/BENEFITS**

- Field configurable setup displays (-LCD integral option or remote accessory A-IEF-DSP) allow for ultimate flexibility by accommodating a variety of application configurations with one model through multiple display configurations i.e. pipe size, pipe material, liquid type, analog output, pulse/frequency output, alarm outputs, communication outputs, damping, and calibration factor.
- High performance accuracy is maintained through changes in temperature, density or viscosity.
- Setup Wizard and installation tool are simple to use allowing for quick and precise installation.
- Accessory setup kit A-IEF-KIT ensures exact installation application depth with included thickness gage and measuring tape.
- Long Life Cycle and minimal maintenance requirements with no moving parts to wear or break and electrodes that discourage fouling.
- Isolation valve accessory options allow for installation in operational systems via hot-tap kit or easy removal without system downtime.
- NIST traceable pass/fail verification certificate included standard for Carbon Steel Schedule 40 pipes sized 4" (102 mm), 6" (150 mm), 8" (200 mm), and 10" (250 mm) with high accuracy option; 10" (250 mm) with standard option.

**APPLICATIONS**

- Boiler feed water
- Chilled water
- Open and closed loop condenser water
- Irrigation system
- Municipal water distribution
- Process and coolant flow
- Ground water remediation
- Chemical processing
- Pump protection
- Wastewater
- Mining

**SPECIFICATIONS**

**Service:** Compatible clean or dirty non coating, conductive liquids.  
**Range:** 0 to 20 ft/s (0 to 6 m/s).\*  
**Wetted Materials:** Body shaft/fitting: 316 SS; Electrodes: 316 SS; Electrode cap: Polymer/Polystyrene; O-ring: Silicon.  
**Accuracy:** High accuracy units: ±0.5% of reading at calibrated velocity; ±1% of reading from 2 to 20 ft/s (0.6 to 6 m/s); ±0.02 ft/s (±0.006 m/s) at < 2 ft/s (0.6 m/s); Standard accuracy units: ±1% FS.  
**Temperature Limits:** Ambient: -20 to 160°F (-29 to 71°C); Process: 15 to 250°F (-9 to 121°C); Storage: -40 to 185°F (-40 to 85°C).  
**Process Connection:** 1" NPT or BSPT with accessory full port ball valve options.  
**Pressure Limits:** 400 psi (27.6 bar) @ 100° F (37.8°C).  
**Pressure Drop:** < 0.1 psi at 12 ft/s in 4" (101.6 mm) and larger pipe.  
**Outputs:** (1) Analog: 4-20 mA, 0-5 V, 0-10 V or 2-10 V (display selectable); (1) Pulse/Frequency: 0 to 15 V peak pulse, 0 to 500 Hz or scalable pulse output (display selectable); (2) Alarm: (1) Empty pipe detection or minimum/maximum velocity, (display selectable); (1) Reverse flow output indication.  
**Power Requirements:** 12-42.4 VDC, .25 A @ 24 VDC; 12-36 VAC.  
**Electrical Connection:** Removable terminal blocks, model selectable 1/2" female NPT conduit connection, PG 16 gland or PG 16 gland with (2) 10 ft (3 m) 9 conductor 22 AWG plenum rated cables, accessory cable lengths up to 200 ft (61 m) optional.  
**Display (-LCD option):** 2" (5.08 cm) x 2" (5.08 cm) graphic LCD with backlight.  
**Conductivity:** >20 microsiemens.  
**Enclosure Material:** Powder coated die cast aluminum.  
**Enclosure Ratings:** NEMA 6P (IP68) (Non display models); NEMA 4X (IP66) (-LCD option).  
**Agency Approvals:** BTL, CE, NSF/ANSI 61 and 372.  
**COMMUNICATIONS (-COM OPTION)**  
**Type:** BACnet MS/TP or Modbus® RTU communication protocol (default disabled, display selectable).  
**Supported Baud Rates:** 9600, 19200, 38400, 57600, 76800, or 115200 bps (display selectable).  
**Device Load:** 1/8 unit load.  
**ADDITIONAL SPECIFICATIONS**  
**Applicable Pipe Material:** Most popular plastic and metal pipes; i.e. Carbon steel, SS, copper, UPVC/PVDF, galvanized steel, mild steel, and brass.  
**Applicable Pipe Size:** 4-36" (101 to 914 mm), model dependent. See model chart.  
**Diameter Length Requirements:** >10 upstream; >5 downstream.  
**Glycol:** 0 to 100% display selectable.

\*For max flowrates >10 ft/s (3 m/s) order option -CC.  
 \*\*Brass fittings and pipe are not to be used with NSF Certified models.

**MODEL CHART**

Example	IEF	-H	N	-CND	-LCD	IEF-HN-CND-LCD
<b>Series</b>	IEF					Insertion electromagnetic flow transmitter
<b>Accuracy</b>		L G S T I E T H				Standard accuracy <10" (250 mm) pipe; 1% FS Standard accuracy >10" (250 mm) pipe; 1% FS Standard accuracy 4 to 36" (100 to 900 mm) pipe; 1% FS High accuracy 4" (100 mm) pipe; 1% of reading High accuracy 6" (150 mm) pipe; 1% of reading High accuracy 8" (200 mm) pipe; 1% of reading High accuracy 10" (250 mm) pipe; 1% of reading High accuracy 4 to 10" (100 to 250 mm) pipe; 1% of reading
<b>Process Connection</b>			N B			1" male NPT 1" male BSPT
<b>Housing Electrical Connection</b>				CND PG 10		1/2" female NPT conduit connection without cable PG gland without cable PG gland with 10' (3 m) cable
<b>Options</b>					LCD COM NIST FC CC NW	Integral LCD display BACnet or Modbus® communication protocol (display selectable) Six point NIST traceable calibration certificate Factory calibration certificate for 0.5% of reading at single point Custom configured for specific installation NSF certified

Note: For CC option, must provide completed configuration paperwork.

**ACCESSORIES**

Model	Description
A-IEF-KIT	Setup kit (includes setup display, thickness gage and measuring tape), and universal power adapter
A-IEF-DSP	Setup display
A-IEF-CBL-50	Plenum rated cable 50 ft (15.2 m)
A-IEF-VLV-BR	1-1/4" full port isolation valve brass**
A-IEF-VLV-SS	1-1/4" full port isolation valve 316 SS
A-IEF-PA	AC wall adapter

\*\*Brass fittings and pipe are not to be used with NSF Certified models. Brass valves are non-RoHS compliant.

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A-IEF Remote Display now available: See page 294

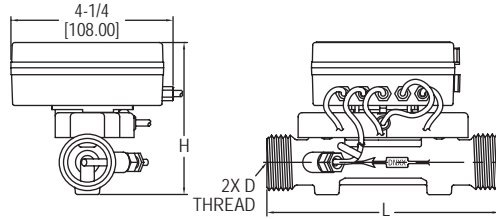


# ULTRASONIC ENERGY METERS

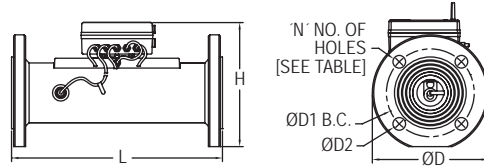
Flow & Temperature Monitoring Capability, Modbus® or BACnet Communication



TUF-150/400



TUF-500



DIMENSIONS in [mm]			
Model	L	D	H
TUF-150-XX	4-21/64 [110.00]	G3/4B	3-31/32 [101.00]
TUF-200-XX	5-1/8 [130.00]	G1B	3-31/32 [101.00]
TUF-250-XX	6-19/64 [160.00]	G11/4B	4-11/64 [106.00]
TUF-320-XX	7-3/32 [180.00]	G11/2B	4-29/64 [113.00]
TUF-400-XX	7-7/8 [200.00]	G2B	4-49/64 [121.00]

DIMENSIONS in [mm]						
Model	L	ØD	H	ØD1	ØD2	N
TUF-500-XX	7-7/8 [200]	6-1/2 [165.00]	9-27/32 [250]	4-59/64 [125.00]	45/64 [18.00]	4
TUF-650-XX	7-7/8 [200]	7-9/32 [185.00]	10-7/16 [265]	5-45/64 [145.00]	45/64 [18.00]	4
TUF-800-XX	8-55/64 [225]	7-7/8 [200.00]	11-1/32 [280]	6-19/64 [160.00]	45/64 [18.00]	8
TUF-1000-XX	9-27/32 [250]	8-21/32 [220.00]	12-13/64 [310]	7-3/32 [180.00]	45/64 [18.00]	8
TUF-1250-XX	9-27/32 [250]	9-27/32 [250.00]	12-63/64 [330]	8-17/64 [180.00]	45/64 [18.00]	8

The Series TUF Ultrasonic Energy Meters are highly accurate and stable energy meter that utilizes ultrasonic technology to measure heating and cooling energy consumption. The Series TUF is a compact meter with a flowmeter and energy calculator in one, making it great for installation on chillers and boilers.

### FEATURES/BENEFITS

- Lower maintenance costs with local parameter display and no moving parts
- Serial communication output allows for easy transfer of data
- Flow and temperature monitor in one unit eliminates the need for multiple units

### APPLICATIONS

- Heat metering
- Tenant billing
- Utilities billing
- Monitoring of water heating or cooling: radiators, fan coils

### INSTRUCTIONS FOR ORDERING

- Choose 1 ultrasonic energy meter model (includes 2 BSPP pipe fittings, 2 tightening nuts, 2 O-rings, and 1 thermowell with welding collar)
- Choose 1 pipe fitting model given the appropriate fitting size if NPT or BSPT connections are required (for DN15 to DN40 only)\*

**Example:** TUF-150-MD, Fitting Size: A, select pipe fitting Model WM-ACC-C01 or WM-ACC-C11.

### SPECIFICATIONS

**Service:** Clean, compatible liquids.  
**Wetted Materials:** Brass and 316L SS.  
**Range:** See chart.  
**Display:** 8-digit LED.  
**Accuracy:** BTU: EN1434/CJ128 Class 2; Flow:  $\pm(2+(0.02 Q_p / Q))\%$ ; Temperature:  $\pm 0.1^\circ\text{C}$ .  
**Power Requirements:** 24 VDC/VAC (model dependent) or 3.6 V ER26500 lithium metal battery, user supplied and installed, battery acts as back-up if power is lost.  
**Power Consumption:** 1 W.  
**Temperature Limits:** Ambient: 41 to 131°F (5 to 55°C); Process: 36 to 203°F (2 to 95°C).  
**Humidity Limit:** < 93%.

**Pressure Limits:** 232 psi (16 bar) for DN15 to DN40; 362 psi (25 bar) for >DN50.  
**Pressure Drop:** < 1.5 psi (10 kPa).  
**Process Connection:** See chart.  
**Serial Communications:** Modbus® RTU or BACnet MSTP (selectable)\*\*.  
**Enclosure Rating:** IP65.  
**Enclosure Material:** Plastic.  
**Repeatability:** Flowmeter: 1%.  
**Electrical Connections:** 3' (0.91 m) 4x0.2 mm2 cable with terminal block.  
**Flow Direction:** Unidirectional.  
**Mounting Orientation:** Horizontal or vertical.  
**Weight:** See chart.  
**Agency Approvals:** CE.

\*\*M-BUS available upon request.

MODEL CHART										
Ultrasonic Energy Meter Model	Body Size†	Pipe Size		Fitting Size	Communication	Meter Connection	GPM (LPM)			Weight lb (kg)
		in	mm				Min Flow (Qi)	Nominal Flow Range (Qp)	Max Flow (Qs)	
TUF-150-MD	DN15	1/2	15	A	Modbus®	G-3/4	0.1 (0.5)	6.6 (25)	13 (50)	3.1 (1.4)
TUF-200-MD	DN20	3/4	20	B	Modbus®	G1	0.2 (0.8)	11 (42)	22 (83)	3.1 (1.4)
TUF-250-MD	DN25	1	25	C	Modbus®	G1-1/4	0.3 (1.2)	15 (58)	31 (117)	4.1 (1.8)
TUF-320-MD	DN32	1-1/4	32	D	Modbus®	G1-1/2	0.5 (2)	26 (100)	53 (200)	5.2 (2.3)
TUF-400-MD	DN40	1-1/2	40	E	Modbus®	G2	0.9 (3)	44 (167)	88 (333)	6.6 (3)
TUF-500-MD*	DN50	2	50	-	Modbus®	Flange	1.3 (5)	66 (250)	132 (500)	33 (15)
TUF-650-MD	DN65	2-1/2	65	-	Modbus®	Flange	2.2 (8.3)	110 (417)	220 (833)	10.1 (4.6)
TUF-800-MD	DN80	3	80	-	Modbus®	Flange	3.5 (13.3)	176 (667)	352 (1333)	13.5 (6.1)
TUF-1000-MD	DN100	4	100	-	Modbus®	Flange	5.3 (20)	264 (1000)	528 (2000)	16.5 (7.5)
TUF-1250-MD	DN125	5	125	-	Modbus®	Flange	8.8 (33)	440 (1667)	881 (3333)	21.1 (9.6)
TUF-150-BN	DN15	1/2	15	A	BACnet	G-3/4	0.1 (0.5)	6.6 (25)	13 (50)	3.1 (1.4)
TUF-200-BN	DN20	3/4	20	B	BACnet	G2	0.2 (0.8)	11 (42)	22 (83)	3.1 (1.4)
TUF-250-BN	DN25	1	25	C	BACnet	G1-1/4	0.3 (1.2)	15 (58)	31 (117)	4.1 (1.8)
TUF-320-BN	DN32	1-1/4	32	D	BACnet	G1-1/2	0.5 (2)	26 (100)	53 (200)	5.2 (2.3)
TUF-400-BN	DN40	1-1/2	40	E	BACnet	G2	0.9 (3)	44 (167)	88 (333)	6.6 (3)
TUF-500-BN*	DN50	2	50	-	BACnet	Flange	1.3 (5)	66 (250)	132 (500)	33 (15)
TUF-650-BN	DN65	2-1/2	65	-	BACnet	Flange	2.2 (8.3)	110 (417)	220 (833)	10.1 (4.6)
TUF-800-BN	DN80	3	80	-	BACnet	Flange	3.5 (13.3)	176 (667)	352 (1333)	13.5 (6.1)
TUF-1000-BN	DN100	4	100	-	BACnet	Flange	5.3 (20)	264 (1000)	528 (2000)	16.5 (7.5)
TUF-1250-BN	DN125	5	125	-	BACnet	Flange	8.8 (33)	440 (1667)	881 (3333)	21.1 (9.6)
<b>Model</b>	<b>Power Requirements</b>									
TUF-XXX-XX	24 VAC/VDC									
TUF-XXX-XX-DC	24 VDC									

\*A pipe fitting is required to use the DN15 to DN40 energy meters. The DN50 has a flange connection and does not require a pipe fitting.  
 †For additional sizes up to 8" (203.2 mm) contact factory.

MODEL CHART							
Fitting Size	Pipe Fitting Model*	Process Connection Size	Weight lb (kg)	Fitting Size	Pipe Fitting Model*	Process Connection Size	Weight lb (kg)
A	WM-ACC-C01	1/2" NPT	0.6 (0.3)	C	WM-ACC-C13	1" BSPT	1.8 (0.8)
A	WM-ACC-C11	1/2" BSPT	0.6 (0.3)	D	WM-ACC-C04	1-1/4" NPT	2.3 (1.1)
B	WM-ACC-C02	3/4" NPT	1.2 (0.5)	D	WM-ACC-C14	1-1/4" BSPT	2.3 (1.1)
B	WM-ACC-C12	3/4" BSPT	1.2 (0.5)	E	WM-ACC-C05	1-1/2" NPT	4.4 (2)
C	WM-ACC-C03	1" NPT	1.8 (0.8)	E	WM-ACC-C15	1-1/2" BSPT	4.4 (2)

\*Each model includes 1 fitting.

USA: California Proposition 65  
 ⚠ WARNING: Cancer and Reproductive Harm  
[www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

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