

Model TFX Ultra®

Clamp-on ultrasonic flow and energy meters for liquids



Description

TFX Ultra® ultrasonic flow and energy meters clamp onto the outside of pipes and do not contact the internal liquid. The technology has inherent advantages over alternate devices including: low-cost installation, no pressure head loss, no moving parts to maintain or replace, no fluid compatibility issue, and a large, bi-directional measuring range that ensures reliable readings even at very low and high flow rates. TFX Ultra® is available in a variety of configurations that permit the user to select a meter with features suitable to meet particular application requirements.

The TFX Ultra® is available in two versions: a stand-alone flow meter, and an energy flow meter used in conjunction with dual clamp-on RTDs. The energy flow meter measures energy usage in BTU, MBTU, MMBTU, Tons, kJ, kW, MW and is ideal for retrofit, chilled water and other HVAC applications.

Features

- Reduced material cost: Clamp-on sensor eliminates the need for in-line flanges, pipe fittings, strainers and filters
- Reduced installation time: The TFX Ultra® may be installed and fully operational within minutes
- Reduced maintenance costs: With no moving parts, there is nothing on the TFX Ultra® to wear down – no repair kits or replacement parts are needed
- No need to shut down the process for installation or maintenance due to clamp-on-sensor design

Applications

- May be used to measure clean liquids as well as those with small amounts of suspended solids or aeration (e.g. surface water, sewage).
- Bi-directional flow measurement system. Totalizer options include forward, reverse and net total.
- ModBus® RTU and BACnet® MS/TP over RS485; Ethernet connection includes BACnet®/IP™, EtherNet/IP™ and ModBus® TCP/IP protocols.
- Large, easy-to-read digital display.
- Rugged, aluminium enclosure ensures a long service life in harsh environments.
- Certified for hazardous area installation in North America and Europe.



Technical data

Flow meter	
Liquid types	Most clean liquids or liquids containing small amounts of suspended solids or gas bubbles
Velocity range	Bi-directional to greater than 12 m/s (40 ft/s)
Flow accuracy	DTTN/DTTH/DTTL: $\pm 1\%$ of reading or ± 0.003 m/s (0.01 ft/s), whichever is greater DTTS/DTTC: DN 25 (1") and larger - $\pm 1\%$ of reading or ± 0.012 m/s (0.04 ft/s), whichever is greater DTTS/DTTC: DN 19 (¾") and smaller - 1% of full scale (refer to page dimensions)
Temperature accuracy (energy meters only)	Option A: 0 to +50 °C (+32 to +122 °F); absolute: 0,12 °C (0.22 °F) difference: 0,05 °C (0.09 °F) Option B: 0 to +100 °C (+32 to +212 °F); absolute: 0,25 °C (0.45 °F) difference: 0,1 °C (0.18 °F) Option C: -40 to +175 to (-40 °C +350 °F); absolute: 0,6 °C (1.1 °F) difference: 0,25 °C (0.45 °F) Option D: -20 to +30 °C (-4 to +85 °F); absolute: 0,12 °C (0.22 °F) difference: 0,05 °C (0.09 °F)
Sensitivity	Flow: 0,0003 m/s (0.001 ft/s) Temperature: option A: 0,012 °C (0.03 °F); option B: 0,025 °C (0.05 °F); option C: 0,06 °C (0.1 °F); option D: 0,012 °C (0.03 °F)
Repeatability	0,5 % of reading
Approvals	General safety (all models): UL® 61010-1, CSA® C22.2 No. 61010-1; (power options A and D only) EN 61010-1 Hazardous location (power supply options A and D only): class I division 2 groups C, D, T4; class II, division 2, groups F, G, T4; class III division 2 for US/CAN; ATEX II 2 G Ex nA II T4: UL® 1604, CSA® 22.2 No. 213, EN 60079-0 and EN 60079-15 CE: EN61326-1:2006on meter systems with integral flow sensors, sensors constructed with twin axial cable [all sensors with cables 30 m (100 ft) and shorter] or remote sensor with conduit.
Transmitter	
Power supply	AC: 95-264 VAC 47-63 Hz @ 17 VA max. or 20-28 VAC 47-63 Hz @ 0,35 A max. DC: 10-28 VDC @ 5 W max. Protection: Auto resettable fuse, reverse polarity and transient suppression
Display	Two line LCD, LED backlit; top row 18 mm (0.7") height, 7-segment; bottom row 9 mm (0.35") height, 14-segment Icons: RUN, PROGRAM, RELAY1, RELAY2 Flow rate indication: 8-digit positive, 7-digit negative max.; auto decimal, lead zero blanking Flow accumulator (totalizer): 8-digit positive, 7-digit negative max. (reset via keypad press, ULTRALINK™, network command or momentary contact closure)
Enclosure	Type 4 (IP65) construction: Powder-coated aluminum, polycarbonate, stainless steel, polyurethane, nickel-plated steel mounting brackets Size (electronic enclosure only): 152 mm W x 112 mm H x 56 mm D (6.0" W x 4.4" H x 2.2" D) Conduit holes: (2) ½" NPT female; (1) ¾" NPT female; optional cable gland kit
Temperature	-40 °C to +85 °C (-40 °F to +185 °F)
Configuration	Via optional keypad or PC running ULTRALINK™ software (Note: Not all configuration parameters are available from the keypad - i.e. flow and temperature calibration and advanced filter settings)
Engineering units	Flow meter: Feet, gallons, cubic feet, million gallons, barrels (liquid and oil), acre-feet, lbs., meters, cubic meters, liters, million liters, kg Energy meter: BTU, MBTU, MMBTU, tons, kJ, kW, MW and the flow meter list from above
Inputs/outputs	USB 2.0: for connection of a PC running ULTRALINK™ configuration utility RS485: ModBus® RTU command set; optional BACnet® MS/TP 10/100 Base-T: RJ45, communication via ModBus® TCP/IP, EtherNet/IP™ or BACnet®/IP 4-20mA: 12-bit, internal power, can span negative to positive flow/energy rates Energy meter model only: Total pulse option: Opto isolated open collector transistor Flow meter model only: 0-1000 Hz: open-collector, 12-bit, can span negative to positive rates; square-wave or turbine meter simulation outputs Two alarm outputs: Open-collector, configure as rate alarm, signal strength alarm or totalizer pulse
Sensors	
Sensor ratings	DTTN/DTTC/DTTL: NEMA 6* (IP67), CPVC, Ultem®, nylon cord grip, PVC cable jacket; -40 to +120 °C (-40 to +250 °F) DTTN/DTTL: NEMA 6P* (IP68) option, CPVC, Ultem®, nylon cord grip, polyethylene cable jacket; -40 to +120 °C (-40 to +250 °F) DTTH: NEMA 6* (IP67), PTFE, Vespel®, nickel-plated brass cord grip, PFA cable jacket; -40 to +175 °C (-40 to +350 °F) DTTS: NEMA 6* (IP67), PVC, Ultem®, nylon cord grip, PVC cable jacket; -40 to +85 °C (-40 to +185 °F) *NEMA 6 units: To a depth of 1 m (3 ft) for 30 days max. NEMA 6P units: To a depth of 30 m (100 ft) seawater equivalent density indefinitely.
Frequency	DTTS/DTTC: 2 MHz DTTN/DTTH: 1 MHz DTTL: 500 KHz
Cables	RG59 Coaxial, 75 ohms or twinaxial, 78 ohms (optional armored conduit)

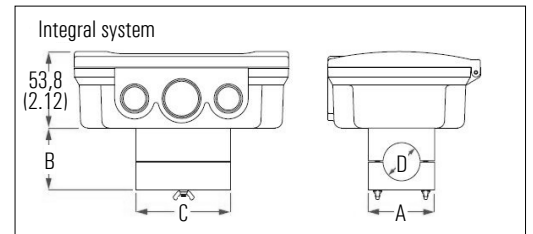
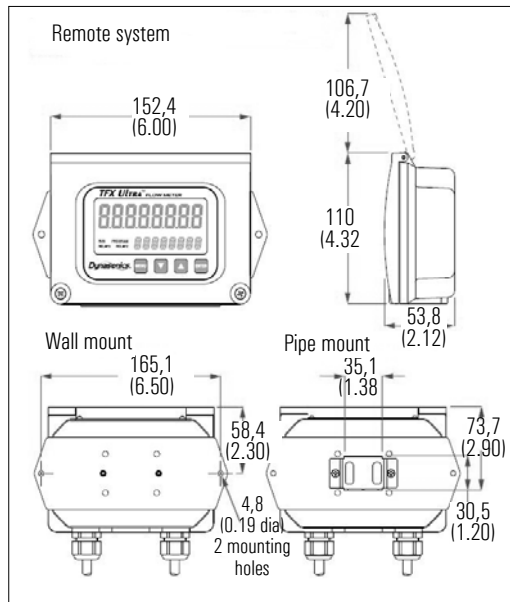


Technical data (cont.)

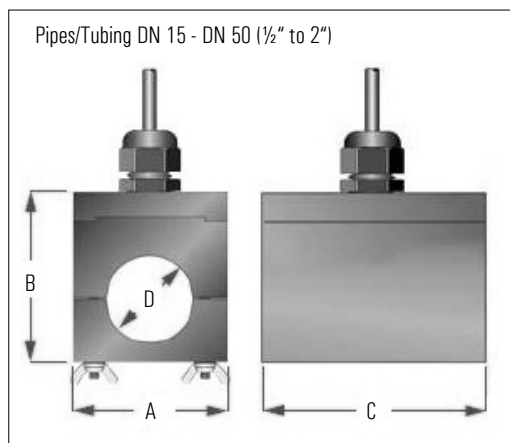
Sensors (cont.)	
Cable length	300 m (990 ft) max. in 3 m (10 ft) increments; submersible conduit limited to 30 m (100 ft)
RTDs	Energy meters only: Platinum 385, 1,000 ohms, 3-wire; PVC jacket cable
Installation	DTTN (-N option) /DTTS/DTTH/DTTC: General and hazardous location (see installation compliance above) DTTN sensor and IS barrier (-F option): Class I Div. 1, groups C&D T5 intrinsically safe Ex ia; CSA® C22.2 No.'s 142 & 157; UL® 913 & 916
Software utilities	
*ULTRALINK™	Utilized to configure, calibrate and troubleshoot flow and energy meters. Connection via USB A/B cable; software is compatible with Windows® 2000, Windows® XP, Windows Vista® and Windows® 7
*EnergyLink	Utilized to monitor a network of flow and energy meters. Connection via RS485. Operates within Microsoft Excel® 2003, Microsoft Excel® 2007, Microsoft Excel® 2010 (32-bit O.S. only).

*Software available at no additional cost.

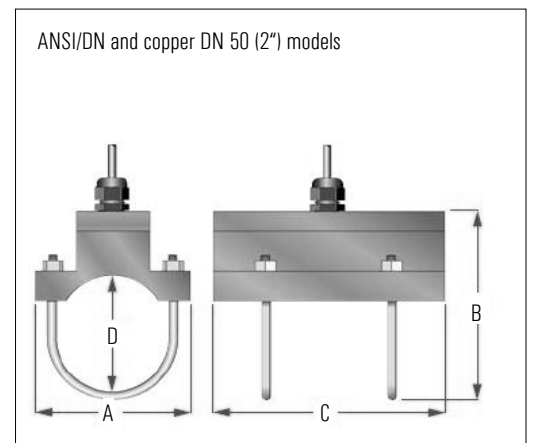
Dimensions in mm (inches)



DTTS/DTTC/ sensor



DTTS/DTTC U-bolt connection

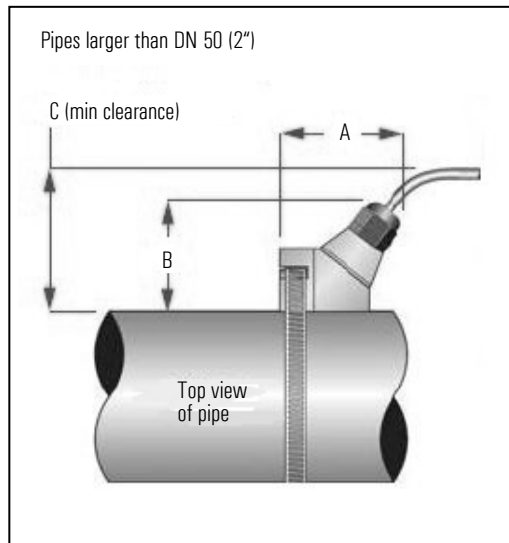


DTTS /DTTC sensor
Dimensions in mm (inches)

Pipe size	Pipe material	A	B	C	D	Measuring range
½"	ANSI/DN	62,5 (2.46)	59,9 (2.36)	67,6 (2.66)	21,3 (0.84)	8 - 144 l/min (2 - 38 gal/min)
	Copper	62,5 (2.46)	59,9 (2.36)	84,6 (3.33)	15,9 (0.63)	7 - 102 l/min (1.8 - 27 gal/min)
	Tubing	62,5 (2.46)	57,9 (2.28)	94,5 (3.72)	12,7 (0.50)	6 - 68 l/min (1.5 - 18 gal/min)
¾"	ANSI/DN	62,5 (2.46)	65,3 (2.57)	67,6 (2.66)	26,7 (1.05)	10 - 250 l/min (2.75 - 66 gal/min)
	Copper	62,5 (2.46)	63,5 (2.50)	90,4 (3.56)	22,2 (0.88)	10 - 204 l/min (2.5 - 54 gal/min)
	Tubing	62,5 (2.46)	63,5 (2.50)	90,4 (3.56)	19,0 (0.75)	10 - 170 l/min (2.5 - 45 gal/min)
1"	ANSI/DN	62,5 (2.46)	74,2 (2.92)	72,6 (2.86)	33,4 (1.32)	13 - 409 l/min (3.5 - 108 gal/min)
	Copper	62,5 (2.46)	72,9 (2.87)	96,5 (3.80)	28,6 (1.13)	13 - 320 l/min (3.5 - 95 gal/min)
	Tubing	62,5 (2.46)	69,9 (2.75)	96,5 (3.80)	25,4 (1.00)	13 - 320 l/min (3.5 - 85 gal/min)
1 ¼"	ANSI/DN	71,0 (2.80)	80,8 (3.18)	79,8 (3.14)	42,2 (1.66)	19 - 704 l/min (5 - 186 gal/min)
	Copper	62,5 (2.46)	76,2 (3.00)	102,6 (4.04)	34,9 (1.38)	17 - 575 l/min (4.5 - 152 gal/min)
	Tubing	62,5 (2.46)	76,2 (3.00)	102,6 (4.04)	31,8 (1.25)	15 - 514 l/min (4 - 136 gal/min)
1 ½"	ANSI/DN	76,7 (3.02)	86,9 (3.42)	84,6 (3.33)	48,3 (1.90)	23 - 946 l/min (6 - 250 gal/min)
	Copper	68,8 (2.71)	72,6 (2.86)	108,7 (4.28)	41,3 (1.63)	19 - 814 l/min (5 - 215 gal/min)
	Tubing	68,8 (2.71)	84,1 (3.31)	108,7 (4.28)	38,1 (1.50)	19 - 757 l/min (5 - 200 gal/min)
2"	ANSI/DN	94,0 (3.70)	86,9* (3.42)	139,7 (5.50)	60,3* (2.38)	30 - 1590 l/min (8 - 420 gal/min)
	Copper	94,0 (3.70)	85,9* (3.38)	139,7 (5.50)	54,0* (2.13)	30 - 1419 l/min (8 - 375 gal/min)
	Tubing	81,5 (3.21)	98,0 (3.85)	120,7 (4.75)	50.8 (2.00)	30 - 1381 l/min (8 - 365 gal/min)

* Varies due to U-bolt configuration

DTTN/DTTH/DTTL sensor*



	A	B	C
DTTN	74,9 (2.95)	69,8 (2.75)	76,2 (3.00)
DTTH	74,9 (2.95)	69,8 (2.75)	76,2 (3.00)
DTTL	86,4 (3.40)	74,7 (2.94)	81,3 (3.20)

*One pair of sensors are supplied and are required for measurements

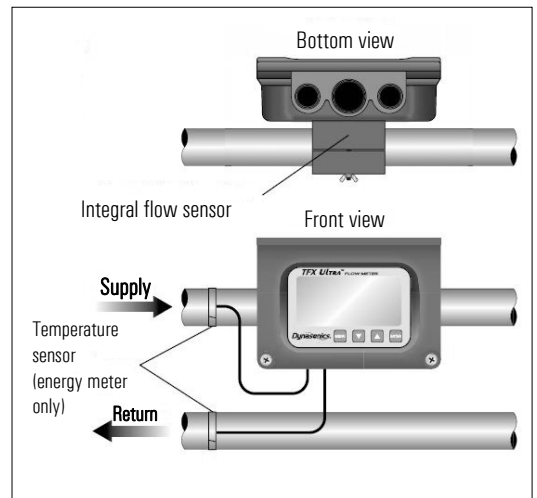


Meter with integral flow sensor

For pipe/tubing sizes of DN 50 (2") and lower, TFX Ultra® is available with a clamp-on sensor mounted and wired directly to the flow meter display/electronics enclosure. This design provides a convenient installation in areas where the user requires local indication. PVC constructed sensors are rated to 85 °C (185 °F) and CPVC are rated to 120 °C (250 °F).

Common features:

- Rate-total backlit display
- 4-20 mA output
- 0-1,000 Hz rate pulse and dual alarm outputs (flow meter model only)
- USB programming port
- RS485 ModBus® network connection
- Remote totalizer reset



Ordering matrix

DTFX		-			-					-			-	
Model														
B) Flow meter model														
E) Energy meter model														
Pipe size / measurement range														
A) ½" ANSI pipe (DN 15)														
B) ¾" ANSI pipe (DN 20)														
C) 1" ANSI pipe (DN 25)														
D) 1-¼" ANSI pipe (DN 32)														
E) 1-½" ANSI pipe (DN 40)														
F) 2" ANSI pipe (DN 50)														
G) ½" Copper tube														
H) ¾" Copper														
I) 1" Copper tube														
J) 1-¼" Copper tube														
K) 1-½" Copper tube														
L) 2" Copper tube														
M) ½" OD standard tube														
N) ¾" OD standard tube														
P) 1" OD standard tube														
Q) 1-¼" OD standard tube														
R) 1-½" OD standard tube														
S) 2" OD standard tube														
Power supply														
A) A/C (95-264 VAC)														
C) A/C (20-28 VAC)														
D) D/C (10-28 VDC)														
Keypad														
K) Keypad														
N) No keypad														
Sensor material / temperature														
P) PVC, -40 to +85 °C (-40 to +185 °F)														
C) CPVC, -40 to +120 °C (-40 to +250 °F)														
Advanced communications														
E) 10/100 Base-T (EtherNet/IP™, BACnet®/IP, ModBus® TCP/IP)														
B) BACnet® MS/TP														
C) BACnet® MS/TP; 10/100 Base-T (EtherNet/IP™, BACnet®/IP, ModBus® TCP/IP)														
N) None														
P) Total pulse output (energy meter only)														
H) BACnet® MS/TP 76800 Baud														
Language														
(leave blank for English)														
F) French														
S) Spanish														
Options														
N) None														
C) 4-pin (male) Brad Harrison® Micro-Change® (available for D/C power only)														
A) Cable gland kit														
Area approvals														
F) General safety, hazardous locations, and CE (see technical data)														
N) General safety (power supply C only)														
Energy temperature range														
N) None (select for flow meter model B)														
A) 0 to +50 °C (+32 to +122 °F)														
B) 0 to +100 °C (+32 to +212 °F)														
C) -40 to +175 °C (-40 to +350 °F)														
D) -20 to +30 °C (-4 to +85 °F)														

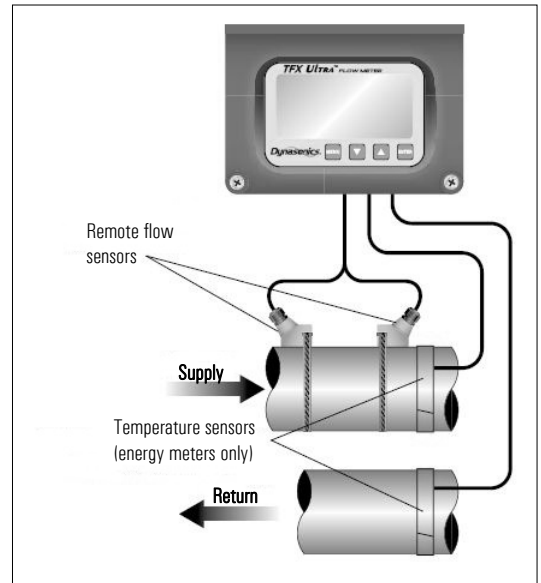


Meter with remote flow sensor

TFX Ultra® is available with remote mounted sensors that permit separation of up to 300 m (990 ft). This design is utilized when pipes are located in areas that are not convenient for viewing, or on piping systems with severe vibration. PVC constructed sensors are rated to 85 °C (185 °F), CPVC to 120 °C (250 °F) and PTFE to 175 °C (350 °F).

Common features

- Rate-total backlit display
- 4-20 mA output
- 0-1,000 Hz rate pulse and dual alarm outputs (flow meter model only)
- USB programming port
- RS485 ModBus® network connection
- Remote totalizer reset



Ordering matrix

DTFX	<input type="checkbox"/>	-	ZN	-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-	<input type="checkbox"/>	<input type="checkbox"/>	-	<input type="checkbox"/>
Model													
B) Flow meter model													
E) Energy meter model													
Remote sensor													
Use with DTTN/DTTH/DTTL large pipe sensors (pipes larger than 2") or DTTS/DTTC small pipe sensors (pipes ½" - 2")													
Power supply													
A) A/C (95-264 VAC)													
C) A/C (20-28 VAC)													
D) D/C (10-28 VDC)													
Keypad													
K) Keypad													
N) No keypad													
Advanced communications													
E) 10/100 Base-T (EtherNet/IP™, BACnet®/IP, ModBus® TCP/IP)													
B) BACnet® MS/TP													
C) BACnet® MS/TP; 10/100 Base-T (EtherNet/IP™, BACnet®/IP, ModBus® TCP/IP)													
N) None													
P) Total pulse output (energy meter only)													
H) BACnet® MS/TP 76800 Baud													
Approvals													
F) General safety, hazardous locations, and CE (see technical data)													
N) General safety (power supply C only)													
Energy temperature range													
N) None (select for flow meter model B)													
A) 0 to +50 °C (+32 to +122 °F)													
B) 0 to +100 °C (+32 to +212 °F)													
C) -40 to +175 °C (-40 to +350 °F)													
D) -20 to +30 °C (-4 to +85 °F)													
Language													
(Leave blank for English)													
F) French													
S) Spain													
Options													
N) None													
C) 4-pin (male) Brad Harrison® Micro-Change® (available for D/C power only)													
A) Cable gland kit													



Ordering matrix for flow sensor –

Pipes larger than DN 50 (2")

DTT	<input type="checkbox"/>	-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-	<input type="checkbox"/>
Construction	N) Standard + 120 °C (+250 °F) (CPVC, Ultem®)			H) High temperature + 175 °C (+350 °F) (PTFE, Vespel®)			L) Large pipe – 500 KHz + 120 °C (+250 °F) (CPVC, Ultem®)*					
Cable length	020) 6 m (20 ft)			050) 15 m (50ft)			100) 30 m (100 ft)					
Conduit type	N) None			A) Flexible armored			S) Submersible (DTTN and DTTL only) limited to 30 m (100 ft)					
Conduit length	(Standard construction; conduit length = cable length)			000) None			020) 6 m (20 ft)			050) 15 m (50 ft)		
							100) 30 m (100 ft)					
										Installation		
										N) General purpose		
										F) Class I, Div. 1, Groups C & D (DTTN only)		
* Recommended for pipe sizes larger than DN 600 (24")												

Ordering Matrix for flow sensor

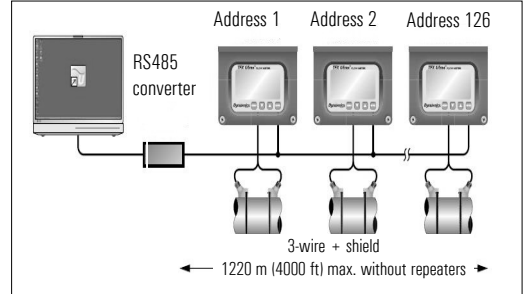
Small pipes DN 12 to DN 50 (½" to 2")

DTT	<input type="checkbox"/>	-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Model	S) Standard +85 °C (+185 °F) (PVC, Ultem®)			C) High temperature + 120 °C (+250 °F) (CPVC, Ultem®)								
Nominal pipe size	D) ½"		H) 1-¼"		F) ¾"		J) 1-½"		G) 1"		L) 2"	
Pipe type	P) ANSI pipe			C) Copper pipe			T) Rigid tubing					
Cable length	020) 6 m (20 ft)			050) 15 m (50 ft)			100) 30 m (100 ft)*					
Conduit length	000) None			020) 6 m (20 ft)			050) 15 m (50 ft)			100) 30 m (100 ft)*		
Conduit type	N) None			A) Flexible armored								
* Maximum length: 300 m (990 ft) in 3 m (10 ft) increments.												

Network options

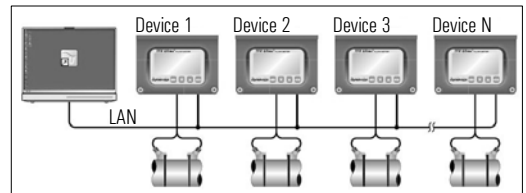
TFX RS 485 Network

All TFX Ultra® meters come equipped with RS485 drivers and utilize a ModBus® RTU command set (data can be returned in single-precision, double-precision, integer or floating point values). Up to 126 TFX Ultra® products can be run on a single daisy-chain network and be individually queried for flow rate, positive flow accumulator, negative flow accumulator, supply temperature, return temperature and signal strength. Flow accumulators can be cleared at discrete addresses or globally. The RS485 network is also compatible with the EnergyLink, direct to Excel®, application detailed below.



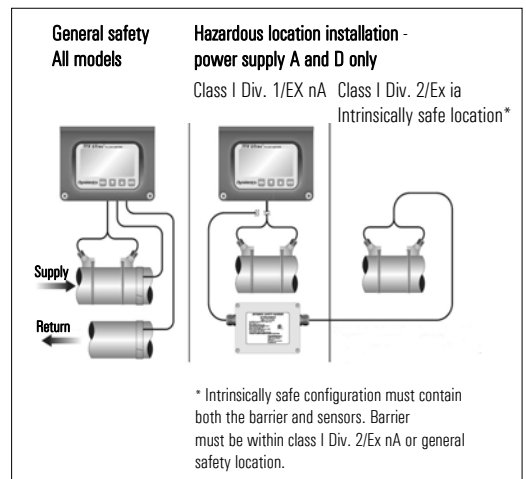
TFX 10/100 Base-T network

If equipped with the optional Ethernet communications module, the TFX Ultra® can be plugged into a LAN and queried for flow rate, positive flow accumulator, negative flow accumulator, supply temperature, return temperature and signal strength. The module contains ModBus® TCP/IP, EtherNet/IP™ and BACnet®/IP network compatibility.



EnergyLink software

Operating from a standard, low-cost PC, EnergyLink software operates within Microsoft® Excel® and provides an efficient method of monitoring and archiving data from a network of TFX Ultra® energy meters. EnergyLink automatically backs up accumulated energy data every hour, day, month, quarter and year into convenient spreadsheet formats suitable for input into invoicing systems. The “Current Readings” screen provides real time measurements from all TFX Ultra® meters on the network (up to 126 meters can be connected on a single RS485 network). Data displayed includes: Location name, room number, TFX Ultra® address, a good/bad communication indicator, the time and date of the last reading, flow signal level, energy flow rate, energy accumulation, supply temperature and return temperature. The software can be configured to “auto run” should PC power be interrupted or the PC be turned off. The software can also be configured to reset the energy accumulators on all network meters at the beginning of every month or quarter.





Parts

RTD kits for integral and remote energy measurement meters

Part number	U.S. part number	Description
280003	D010-3000-120	RTD Kit ¹ , clamp on, 130 °C, 1,000 ohms, 6 m (20 ft)
280032	D010-3000-121	RTD Kit ¹ , clamp on, 130 °C, 1,000 ohms, 15 m (50 ft)
280033	D010-3000-122	RTD Kit ¹ , clamp on, 130 °C, 1,000 ohms, 30 m (100 ft)
280034	D010-3000-123	RTD Kit ¹ , clamp on, 200 °C, 1,000 ohms, 7,5 m (25 ft)
280035	D010-3000-124	RTD Kit ¹ , clamp on, 200 °C, 1,000 ohms, 15 m (50 ft)
280036	D010-3000-125	RTD Kit ¹ , clamp on, 200 °C, 1,000 ohms, 30 m (100 ft)
280037	D010-3000-200	Insertion RTD Kit ² , 3", ¼" O.D., 260 °C, 1,000 ohms, 6 m (20 ft)
280038	D010-3000-201	Insertion RTD Kit ² , 3", ¼" O.D., 260 °C, 1,000 ohms, 15 m (50 ft)
280039	D010-3000-202	Insertion RTD Kit ² , 3", ¼" O.D., 260 °C, 1,000 ohms, 30 m (100 ft)

¹RTD kits include: 2 RTDs, heat sink compound and installation tape

²Insertion RTD kits include a set of 2 RTDs

