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SUPPORTED FEATURES

TFX-5000 meters have an optional Ethernet card that supports commands for commonly used parameters. For further information on the proper installation of the transmitter or communication card, see the TFX-5000 user manual.

WIRING

Ethernet

The card has an RJ-45 connector.

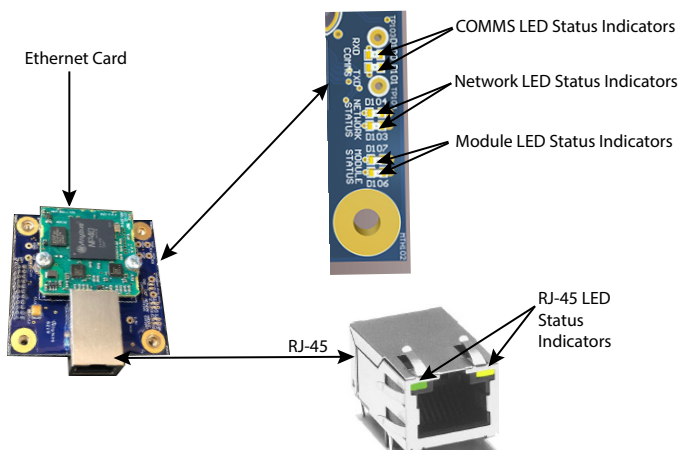


Figure 1: Ethernet port on the TFX-5000

Removing the Cover from the Communication Board

1. Turn off the power.
2. Open the enclosure.
3. Remove (2) M3 pan head Phillips screws that secure the cover over the communication board.
4. Remove the cover.

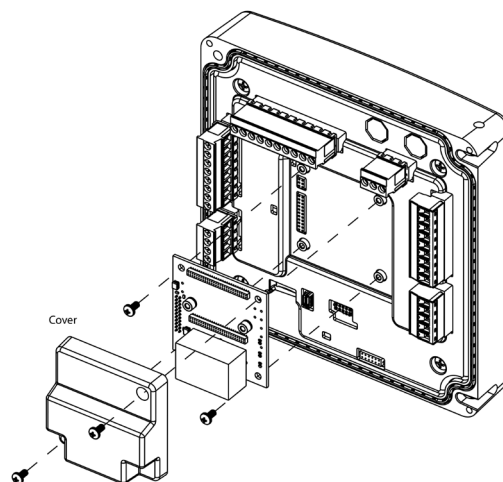


Figure 2: Removing the communication board cover

ETHERNET/IP SETUP

If the *EtherNet/IP* menu is not available, check *Main Menu > System Setup > Options > Card Type*. The *Card Type* should be set to **Autodetect** or **EtherNet/IP**.

ETHERNET/IP INSTANCES

EtherNet/IP Object

Identity Object (01HEX - 1 Instance)

Instance 1 is defined by the attributes as follows:

Attribute ID	Name	Description	Data Type	Default Value	Access Rule
1	DeviceDescrip	Vendor ID (ODVA)	UINT	1326	Static, Read-only
2	ProdType	Product Type (ODVA)	UINT	43HEX	Static, Read-only
3	ProductCode	TFX-5000 Product Code (ODVA)	UINT	5	Static, Read-only
4	Revision[0]	Major firmware revision (ODVA)	UINT	2	Static, Read-only
5	Revision[1]	Minor firmware revision (ODVA)	UINT	2	Static, Read-only
6	SerialNumber	Device Serial Number	UINT	1	Dynamic, Read-only
7	ProductName	Device product name or device model	Short String8	Flow Meter or Energy Meter	Dynamic, Read-only

Get Attribute Single (code 0x0E) for Read or Read/Write access

Set Attribute Single (code 0x10) for Read/Write access

TFX-5000 Flow Meter

Input Data - Instance 100, Size 12 Bytes

Instance ID	Parameter Description	Units	Data Type	Bytes
1	Flow Rate	User configured unit (Instance 136)	32-bit Float	4
2	Total Volume - Positive	User configured unit	32-bit Float	4
3	Total Volume - Negative	User configured unit	32-bit Float	4

TFX-5000 Energy Meter

Input Data - Instance 100, Size 32 Bytes

Instance ID	Parameter Description	Units	Data Type	Bytes
1	Flow Rate	User configured unit (Instance 136)	32-bit Float	4
2	Total Volume - Positive	User configured unit	32-bit Float	4
3	Total Volume - Negative	User configured unit	32-bit Float	4
4	RTD 1 Temperature Reading	User configured unit (Instance 484)	32-bit Float	4
5	RTD 2 Temperature Reading	User configured unit (Instance 484)	32-bit Float	4
6	Energy Rate	User configured unit (Instance 486)	32-bit Float	4
7	Energy Total - Positive	User configured unit	32-bit Float	4
8	Energy Total - Negative	User configured unit	32-bit Float	4

Explicit Messaging

Class: A2 (hex) Data Object

Attribute: 5 (Data)

Service Type: Get Attribute Single (code 0x0E) for Read access; Set Attribute Single (code 0x10) for Write access

Product Information Parameters

Instance ID	Parameter Description	Units	Data Type	Bytes	Access	Range for Output (Write) Data
2	Firmware Version	Not Applicable	String - 9 Characters	9	Read	ASCII Characters
6	Manufacture Date	Not Applicable	String - 16 Characters	16	Read	ASCII Characters
7	Last Factory Calibration Date	Not Applicable	String - 16 Characters	16	Read	ASCII Characters
8	Manufacture Name	Not Applicable	String - 20 Characters	20	Read	ASCII Characters
9	Vendor Name	Not Applicable	String - 20 Characters	20	Read	ASCII Characters
12	Device Tag	Not Applicable	String - 20 Characters	20	Read	ASCII Characters
13	BACNet Device Name	Not Applicable	String - 20 Characters	20	Read	ASCII Characters
14	Part Number	Not Applicable	String - 60 Characters	60	Read	ASCII Characters
15	Serial Number	Not Applicable	String - 20 Characters	20	Read	ASCII Characters

Reset and Action Parameters

Instance ID	Parameter Description	Units	Data Type	Bytes	Access	Range for Output (Write) Data
61	Reset Totals	Not Applicable	16-bit Unsigned Integer	2	Write	Write 1 to force reset
62	Reset Alarms	Not Applicable	16-bit Unsigned Integer	2	Write	Write 1 to force reset
63	Clear Alarm History	Not Applicable	16-bit Unsigned Integer	2	Write	Write 1 to force reset
64	Reboot Device	Not Applicable	16-bit Unsigned Integer	2	Write	Write 1 to force reset

Readings and Status Parameters

Instance ID	Parameter Description	Units	Data Type	Bytes	Access	Range for Output (Write) Data
126	Communication Status	Enumerations	16-bit Unsigned Integer	2	Read	0 or 1
129	Raw Delta Time	Nano Seconds (ns)	32-bit Float	4	Read	-10,000.0...10,000.0
130	Delta Time Average	Nano Seconds (ns)	32-bit Float	4	Read	-10,000.0...10,000.0
135	Velocity Units	Enumerations	16-bit Unsigned Integer	2	R/W	0...12
136	Flow Rate Units	Enumerations	16-bit Unsigned Integer	2	R/W	0...24
137	Volume Units	Enumerations	16-bit Unsigned Integer	2	R/W	0...17
138	Volume Decimals	Not Applicable	16-bit Unsigned Integer	2	R/W	0...7
139	Signal Quality	Not Applicable	16-bit Unsigned Integer	2	Read	0...99
140	Low Signal Cutoff	Not Applicable	16-bit Unsigned Integer	2	R/W	0...100
141	High Signal Cutoff	Not Applicable	16-bit Unsigned Integer	2	R/W	0...100
145	Velocity	User configured (Instance 135)	32-bit Float	4	Read	-10,000.0...10,000.0
146	Velocity	Feet/second (ft/s)	32-bit Float	4	Read	-10,000.0...10,000.0
147	Velocity	Meters/second (m/s)	32-bit Float	4	Read	-10,000.0...10,000.0
152	Low Flow Cutoff	User configured (Instance 136)	32-bit Float	4	R/W	-200,000.0...200,000.0
156	Flow Rate	Gallons per minute (gal/min)	32-bit Float	4	Read	-200,000.0...200,000.0

Instance ID	Parameter Description	Units	Data Type	Bytes	Access	Range for Output (Write) Data
157	Flow Rate	Liters per minute (l/min)	32-bit Float	4	Read	-200,000.0...200,000.0
158	Flow Rate	User configured unit (Instance 136)	32-bit Float	4	Read	-200,000.0...200,000.0
168	Total Volume - Positive	User configured unit (Instance 137)	32-bit Float	4	Read	-1,000,000,000,000...1,000,000,000,000
169	Total Volume - Negative	User configured unit (Instance 137)	32-bit Float	4	Read	-1,000,000,000,000...1,000,000,000,000
170	Total Volume - Net	User configured unit (Instance 137)	32-bit Float	4	Read	-1,000,000,000,000...1,000,000,000,000
171	Total Volume - Gross	User configured unit (Instance 137)	32-bit Float	4	Read	-1,000,000,000,000...1,000,000,000,000
182	Total Volume - Positive	Gallons (gal)	32-bit Float	4	Read	-1,000,000,000,000...1,000,000,000,000
183	Total Volume - Negative	Gallons (gal)	32-bit Float	4	Read	-1,000,000,000,000...1,000,000,000,000
184	Total Volume - Net	Gallons (gal)	32-bit Float	4	Read	-1,000,000,000,000...1,000,000,000,000
185	Total Volume - Gross	Gallons (gal)	32-bit Float	4	Read	-1,000,000,000,000...1,000,000,000,000
194	Total Volume - Positive	Liters (l)	32-bit Float	4	Read	-1,000,000,000,000...1,000,000,000,000
195	Total Volume - Negative	Liters (l)	32-bit Float	4	Read	-1,000,000,000,000...1,000,000,000,000
196	Total Volume - Net	Liters (l)	32-bit Float	4	Read	-1,000,000,000,000...1,000,000,000,000
197	Total Volume - Gross	Liters (l)	32-bit Float	4	Read	-1,000,000,000,000...1,000,000,000,000
440	Overflow Count - Positive User Units	User configured unit (Instance 137)	32-bit Unsigned Integer	4	Read	0...4,294,967,295
441	Overflow Count - Negative User Units	User configured unit (Instance 137)	32-bit Unsigned Integer	4	Read	0...4,294,967,295
442	Overflow Count - Net User Units	User configured unit (Instance 137)	32-bit Unsigned Integer	4	Read	0...4,294,967,295
443	Overflow Count - Gross User Units	User configured unit (Instance 137)	32-bit Unsigned Integer	4	Read	0...4,294,967,295
444	Overflow Count - Positive User Units	Gallons (gal)	32-bit Unsigned Integer	4	Read	0...4,294,967,295
445	Overflow Count - Negative User Units	Gallons (gal)	32-bit Unsigned Integer	4	Read	0...4,294,967,295
446	Overflow Count - Net User Units	Gallons (gal)	32-bit Unsigned Integer	4	Read	0...4,294,967,295
447	Overflow Count - Gross User Units	Gallons (gal)	32-bit Unsigned Integer	4	Read	0...4,294,967,295
448	Overflow Count - Positive User Units	Liters (l)	32-bit Unsigned Integer	4	Read	0...4,294,967,295
449	Overflow Count - Negative User Units	Liters (l)	32-bit Unsigned Integer	4	Read	0...4,294,967,295
450	Overflow Count - Net User Units	Liters (l)	32-bit Unsigned Integer	4	Read	0...4,294,967,295
451	Overflow Count - Gross User Units	Liters (l)	32-bit Unsigned Integer	4	Read	0...4,294,967,295

Additional Energy Parameters for TFX-5000 Energy Meters

Instance ID	Parameter Description	Units	Data Type	Bytes	Access	Range for Output (Write) Data
472	RTD 1 Temperature Reading	User configured unit (Instance 479)	32-bit Float	4	Read	-40.0...473.15
473	RTD 2 Temperature Reading	User configured unit (Instance 479)	32-bit Float	4	Read	-40.0...473.15
474	Delta Temperature 1 - Temperature 2	User configured unit (Instance 479)	32-bit Float	4	Read	-40.0...473.15
477	RTD 1 Temperature Reading	User configured unit (Instance 484)	32-bit Float	4	Read	-40.0...473.15
478	RTD 2 Temperature Reading	User configured unit (Instance 484)	32-bit Float	4	Read	-40.0...473.15
479	Temperature User Defined Unit	Enumeration	16-bit Unsigned Integer	4	R/W	-40.0...473.15
480	Energy Rate User Defined Unit	Enumeration	16-bit Unsigned Integer	4	R/W	0...11
481	Energy Total User Defined Unit	Enumeration	16-bit Unsigned Integer	4	R/W	0...11
482	Energy Total Decimals	Not Applicable	16-bit Unsigned Integer	4	R/W	0...12
508	Energy Rate	User configured unit (Instance 480)	32-bit Float	4	Read	0...7
509	Energy Rate	Kilo British Thermal Unit/Hour (kBtu/hr)	32-bit Float	4	Read	-200,000.0...200,000.0
510	Energy Rate	Kilo Watt (kW)	32-bit Float	4	Read	-200,000.0...200,000.0
528	Energy Total - Positive	User configured units (Instance 481)	32-bit Float	4	Read	-200,000.0...200,000.0
529	Energy Total - Negative	User configured units (Instance 481)	32-bit Float	4	Read	-1,000,000,000,000...1,000,000,000,000
530	Energy Total - Net	User configured units (Instance 481)	32-bit Float	4	Read	-1,000,000,000,000...1,000,000,000,000
531	Energy Total - Gross	User configured units (Instance 481)	32-bit Float	4	Read	-1,000,000,000,000...1,000,000,000,000
542	Energy Total - Positive	Kilo British Thermal Unit (kBtu)	32-bit Float	4	Read	-1,000,000,000,000...1,000,000,000,000
543	Energy Total - Negative	Kilo British Thermal Unit (kBtu)	32-bit Float	4	Read	-1,000,000,000,000...1,000,000,000,000
544	Energy Total - Net	Kilo British Thermal Unit (kBtu)	32-bit Float	4	Read	-1,000,000,000,000...1,000,000,000,000
545	Energy Total - Gross	Kilo British Thermal Unit (kBtu)	32-bit Float	4	Read	-1,000,000,000,000...1,000,000,000,000
554	Energy Total - Positive	Kilo Watt-Hour (kWh)	32-bit Float	4	Read	-1,000,000,000,000...1,000,000,000,000
555	Energy Total - Negative	Kilo Watt-Hour (kWh)	32-bit Float	4	Read	-1,000,000,000,000...1,000,000,000,000
556	Energy Total - Net	Kilo Watt-Hour (kWh)	32-bit Float	4	Read	-1,000,000,000,000...1,000,000,000,000
557	Energy Total - Gross	Kilo Watt-Hour (kWh)	32-bit Float	4	Read	-1,000,000,000,000...1,000,000,000,000
563	Overflow Count - Positive	User configured units (Instance 481)	32-bit Unsigned Integer	4	Read	-1,000,000,000,000...1,000,000,000,000
564	Overflow Count - Negative	User configured units (Instance 481)	32-bit Unsigned Integer	4	Read	0...4,294,967,295
565	Overflow Count - Net	User configured units (Instance 481)	32-bit Unsigned Integer	4	Read	0...4,294,967,295
566	Overflow Count - Gross	User configured units (Instance 481)	32-bit Unsigned Integer	4	Read	0...4,294,967,295
567	Overflow Count - Positive	Kilo British Thermal Unit (kBtu)	32-bit Unsigned Integer	4	Read	0...4,294,967,295

Instance ID	Parameter Description	Units	Data Type	Bytes	Access	Range for Output (Write) Data
568	Overflow Count - Negative	Kilo British Thermal Unit (kBtu)	32-bit Unsigned Integer	4	Read	0...4,294,967,295
569	Overflow Count - Net	Kilo British Thermal Unit (kBtu)	32-bit Unsigned Integer	4	Read	0...4,294,967,295
570	Overflow Count - Gross	Kilo British Thermal Unit (kBtu)	32-bit Unsigned Integer	4	Read	0...4,294,967,295
571	Overflow Count - Positive	Kilo Watt-Hour (kWh)	32-bit Unsigned Integer	4	Read	0...4,294,967,295
572	Overflow Count - Negative	Kilo Watt-Hour (kWh)	32-bit Unsigned Integer	4	Read	0...4,294,967,295
573	Overflow Count - Net	Kilo Watt-Hour (kWh)	32-bit Unsigned Integer	4	Read	0...4,294,967,295
574	Overflow Count - Gross	Kilo Watt-Hour (kWh)	32-bit Unsigned Integer	4	Read	0...4,294,967,295
579	Overflow Count - Gross	Kilo Watt-Hour (kWh)	32-bit Unsigned Long Integer	4	Read	0...4,294,967,295

Please refer to the EDS file, available on our website, www.badgermeter.com, for additional information.

Units of Measure Enumerations

Parameter	Enumeration
Flow Rate Units	1. Liters per second
	2. Liters per minute
	3. Liters per hour
	4. Cubic meters per second
	5. Cubic meters per minute
	6. Cubic meters per hour
	7. Cubic feet per second
	8. Cubic feet per minute
	9. Cubic feet per hour
	10. Gallons per second
	11. Gallons per minute
	12. Gallons per hour
	13. Mega gallons per day
	14. Imperial gallons per second
	15. Imperial gallons per minute
	16. Imperial gallons per hour
	19. Oil Barrels per minute
	20. Mega Imperial gallons per day
	21. Oil Barrels per day
	22. Acre feet per day
	23. Fluid barrels per day
	24. Imperial barrels per day
	25. Custom flow rate
Velocity Units	1. Meters per second
	10. Feet per second
Flow Total Units	1. Liters
	2. Hectoliters
	3. Cubic meters
	4. Cubic feet
	5. Gallons
	6. Mega gallons
	7. Imperial gallons
	10. Acre Feet
	11. Oil Barrels (BBL)
	12. Imperial MegaGallons (MIGAL)
	13. Liquid Barrels (FBBL)
	17. Custom

Parameter	Enumeration
Energy Rate Units	1. Custom
	2. Watts
	3. Kilowatts
	4. Mega Watts
	5. British thermal units per hour
	6. Thousand British thermal units per hour
	7. Million British thermal units per hour
	8. KiloJoule per hour
	9. Mega Joule per hour
	10. Kilocalorie per hour
	11. Megacalorie per hour
	12. Ton of refrigeration
Temperature Units	1. Degrees Celsius
	2. Degrees Fahrenheit
	3. Degrees Kelvin
Energy Total Units	1. Custom
	2. Watt-Hour
	3. KiloWatt-Hour
	4. MegaWatt-Hour
	5. BTU
	6. kBTU
	7. MMBTU
	8. KiloJoule
	9. MegaJoule
	10. KiloCalorie
	11. MegaCalorie
	12. Ton-Hours

TROUBLESHOOTING

TFX-5000 Messages

Code	Description	Recommended Action
S64 MODULE FAILED	Unable to initialize module.	Reseat module and reboot transmitter. If error repeats, replace module.
S65 MODULE MISMATCH	Module installed does not match settings.	Replace module with correct module. Check card type settings.

LED Indicators

RJ-45 (J100)

	LED Color	Description
RJ-45 LED Status Indicators	Yellow	Link/Act for Network
	Green	10 Mbit Link/Act

PCB LED Status Indicators (Remove Cover For Viewing)

	LED Color	Signal Name	Description
COMMS (UART) Status Indicators (D100=Yellow, D101=Green)	Yellow	RXD	UART, from Brick to DSP
	Green	TXD	UART, from DSP to Brick

	LED State	Description
Network Status Indicators (D103=Green, D104=Red)	Off	No power or no IP address.
	Green	Online, one or more connections established.
	Green, flashing	Online, no connections established.
	Red	Duplicate IP address, Fatal error.
	Red, flashing	A timeout has occurred. Cycle power to return status to its normal state (flashing green).
Module Status Indicators (D106=Green, D107=Red)	Off	No power.
	Green	Controlled by a scanner in Run State.
	Green, flashing	Not configured, or scanner in Idle state.
	Red	Major fault (for example, Exception state or Fatal error).
	Red, flashing	Recoverable fault(s). Module is configured, but stored parameters differ from currently used parameters.

Symptoms	Possible Causes	Recommended Action
Intermittent communication	Cable is not properly shielded.	Communication cables must have shielding to protect the quality of the communication signals from electromagnetic interference (EMI). Check that the cable has a shield. Typically, one end of the shield drain is connected to a clean ground to dissipate EMI and prevent ground loops. However, depending on the ground quality, cable length and type of interference, other methods can be employed.
	Cable routed near power cables such a variable frequency drives.	Cables carrying high currents cause a high degree of electromagnetic interference that can interfere with the quality of the communication signals. Route signal cables away from power cable.

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