



Greyline TTFM 6.1

Instruction Manual – Serial Communications Manual

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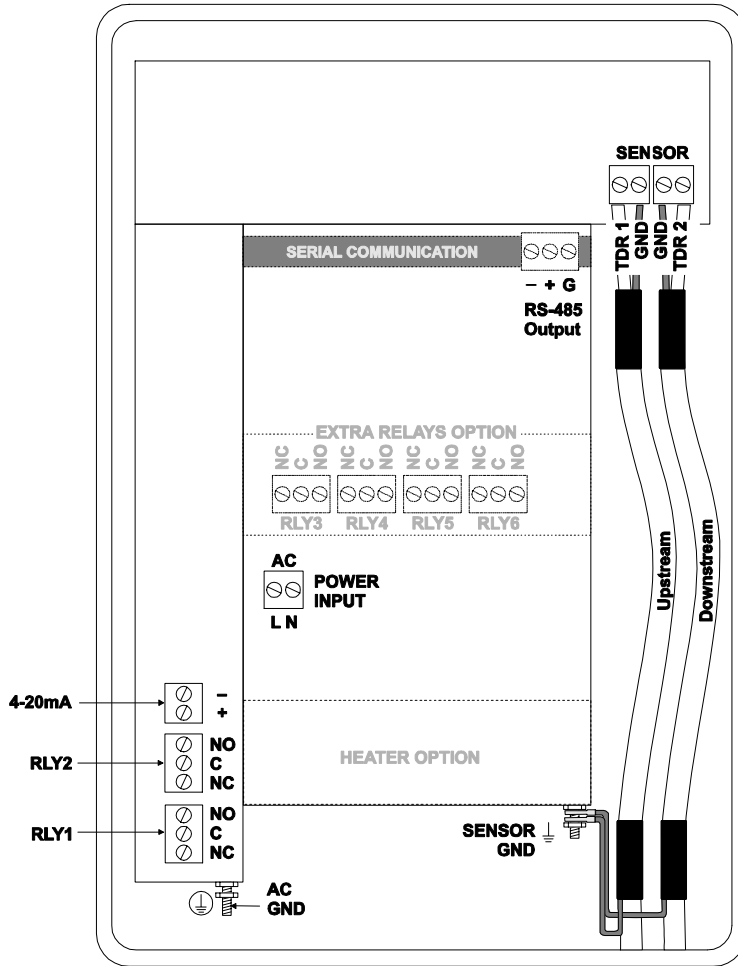
IMPORTANT NOTE: This instrument is manufactured and calibrated to meet product specifications. Please read this manual carefully before installation and operation. Any unauthorized repairs or modifications may result in a suspension of the warranty.

If this product is not used as specified by the manufacturer, protection may be impaired.

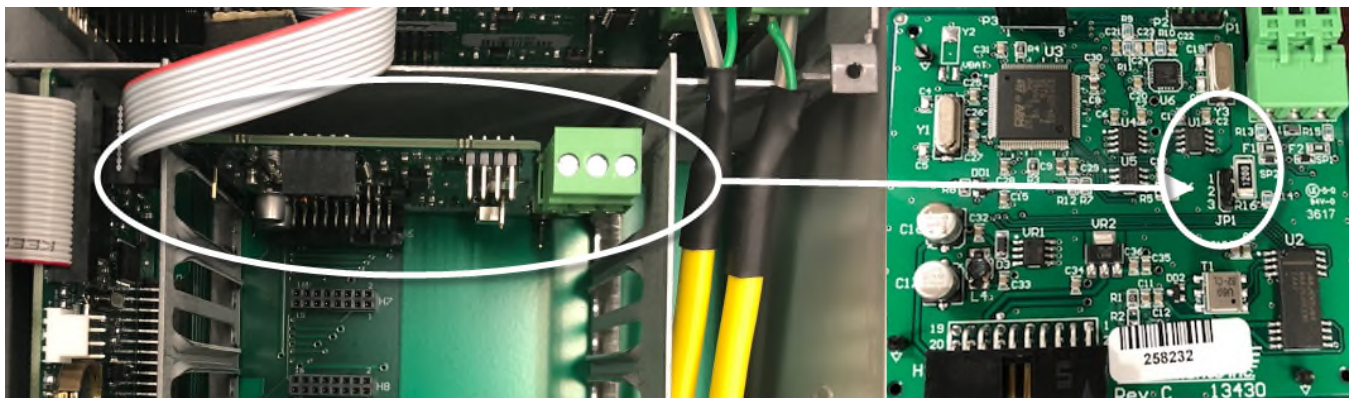
Available in Adobe Acrobat pdf format

MODBUS® RTU COMMUNICATION

MODBUS® RTU serial interface connections are made at the RS485 card's terminal block if your TTFM 6.1 was ordered with this card, or if one was added after installation. Card location:



Transceiver: 2-wire, half-duplex
 MODBUS Address (MAC address) range: 1-255 (Default: 001)
 BAUD rates: 4800, 9600, 19200, 38400, 57600, 76800 or 115200 (Default: 9600)
 Data Bits: 8
 Parity: None, Even, Odd (Default: Even)
 Stop Bits: 1, 2 (Default: 1)
 Termination: 120 Ohms or none (Default: None)
 Jumper JP1 position 1 & 2 = OFF (No term)
 Jumper JP1 position 2 & 3 = ON (Term)
 Biasing: None
 Flow Control: None



Termination Jumper Position

Function Codes Supported:
01 – Read Coil(s)
02 – Read Discreet Input(s)
04 – Read Input Register(s)
05 – Write Single Coil
06 – Write Single Register
15 – Write Multiple Coils
16 – Write Multiple Registers
17 – Report Slave ID

MODBUS® MEMORY MAP

Register Address	Description	Register Type	Data Range	Over Range	Read/ Write	Comments
1	Reset Volume Total	Coil	NA	NA	Read/ Write	Turn coil ON (1) to reset total on TTFM 6.1. Turn coil to OFF (0) once reset is complete.

Register Address	Description	Register Type	Data Range	Over Range	Read/ Write	Comments
10001	Pulse Output 1 Status	Discreet Input	NA	NA	Read	(0) indicates pulse output is OFF or inactive. (1) indicates pulse output is ON or active.
10002	Pulse Output 2 Status	Discreet Input	NA	NA	Read	(0) indicates pulse output is OFF or inactive. (1) indicates pulse output is ON or active.

Register Address	Description	Register Type	Format Type	Comments
30001	Flow Velocity - ft/s	Input Register	Floating Point Register (1 of 2)	
30002	Flow Velocity - ft/s	Input Register	Floating Point Register (2 of 2)	
30003	Flow Velocity - m/s	Input Register	Floating Point Register (1 of 2)	
30004	Flow Velocity - m/s	Input Register	Floating Point Register (2 of 2)	
30101	Flow Rate - GPM (USG/min)	Input Register	Floating Point Register (1 of 2)	
30102	Flow Rate - GPM (USG/min)	Input Register	Floating Point Register (2 of 2)	
30103	Flow Rate - L/sec	Input Register	Floating Point Register (1 of 2)	
30104	Flow Rate - L/ssec	Input Register	Floating Point Register (2 of 2)	
30105	Flow Rate - ft ³ /min	Input Register	Floating Point Register (1 of 2)	
30106	Flow Rate - ft ³ /min	Input Register	Floating Point Register (2 of 2)	
30107	Flow Rate - m ³ /hr	Input Register	Floating Point Register (1 of 2)	
30108	Flow Rate - m ³ /hr	Input Register	Floating Point Register (2 of 2)	
30109	Flow Rate - USG/sec	Input Register	Floating Point Register (1 of 2)	
30110	Flow Rate - USG/sec	Input Register	Floating Point Register (2 of 2)	
30111	Flow Rate - USG/hr	Input Register	Floating Point Register (1 of 2)	
30112	Flow Rate - USG/hr	Input Register	Floating Point Register (2 of 2)	
30113	Flow Rate - USG/day	Input Register	Floating Point Register (1 of 2)	
30114	Flow Rate - USG/day	Input Register	Floating Point Register (2 of 2)	

Register Address	Description	Register Type	Format Type	Comments
30115	Flow Rate - ft ³ /s	Input Register	Floating Point Register (1 of 2)	
30116	Flow Rate - ft ³ /s	Input Register	Floating Point Register (2 of 2)	
30117	Flow Rate - ft ³ /hr	Input Register	Floating Point Register (1 of 2)	
30118	Flow Rate - ft ³ /hr	Input Register	Floating Point Register (2 of 2)	
30119	Flow Rate - ft ³ /day	Input Register	Floating Point Register (1 of 2)	
30120	Flow Rate - ft ³ /day	Input Register	Floating Point Register (2 of 2)	
30121	Flow Rate - USMG/sec	Input Register	Floating Point Register (1 of 2)	USMG = US Million Gallons
30122	Flow Rate - USMG/sec	Input Register	Floating Point Register (2 of 2)	USMG = US Million Gallons
30123	Flow Rate - USMG/min	Input Register	Floating Point Register (1 of 2)	USMG = US Million Gallons
30124	Flow Rate - USMG/min	Input Register	Floating Point Register (2 of 2)	USMG = US Million Gallons
30125	Flow Rate - USMG/hr	Input Register	Floating Point Register (1 of 2)	USMG = US Million Gallons
30126	Flow Rate - USMG/hr	Input Register	Floating Point Register (2 of 2)	USMG = US Million Gallons
30127	Flow Rate - USMG/day	Input Register	Floating Point Register (1 of 2)	USMG = US Million Gallons
30128	Flow Rate - USMG/day	Input Register	Floating Point Register (2 of 2)	USMG = US Million Gallons
30129	Flow Rate - L/min	Input Register	Floating Point Register (1 of 2)	
30130	Flow Rate - L/min	Input Register	Floating Point Register (2 of 2)	
30131	Flow Rate - L/hr	Input Register	Floating Point Register (1 of 2)	
30132	Flow Rate - L/hr	Input Register	Floating Point Register (2 of 2)	
30133	Flow Rate - L/day	Input Register	Floating Point Register (1 of 2)	
30134	Flow Rate - L/day	Input Register	Floating Point Register (2 of 2)	
30135	Flow Rate - m ³ /sec	Input Register	Floating Point Register (1 of 2)	
30136	Flow Rate - m ³ /sec	Input Register	Floating Point Register (2 of 2)	
30137	Flow Rate - m ³ /min	Input Register	Floating Point Register (1 of 2)	
30138	Flow Rate - m ³ /min	Input Register	Floating Point Register (2 of 2)	
30139	Flow Rate - m ³ /day	Input Register	Floating Point Register (1 of 2)	
30140	Flow Rate - m ³ /day	Input Register	Floating Point Register (2 of 2)	

Register Address	Description	Register Type	Format Type	Comments
30141	Flow Rate - IG/sec	Input Register	Floating Point Register (1 of 2)	IG = Imperial Gallons
30142	Flow Rate - IG/sec	Input Register	Floating Point Register (2 of 2)	IG = Imperial Gallons
30143	Flow Rate - IG/min	Input Register	Floating Point Register (1 of 2)	IG = Imperial Gallons
30144	Flow Rate - IG/min	Input Register	Floating Point Register (2 of 2)	IG = Imperial Gallons
30145	Flow Rate - IG/hr	Input Register	Floating Point Register (1 of 2)	IG = Imperial Gallons
30146	Flow Rate - IG/hr	Input Register	Floating Point Register (2 of 2)	IG = Imperial Gallons
30147	Flow Rate - IG/day	Input Register	Floating Point Register (1 of 2)	IG = Imperial Gallons
30148	Flow Rate - IG/day	Input Register	Floating Point Register (2 of 2)	IG = Imperial Gallons
30149	Flow Rate - IMG/sec	Input Register	Floating Point Register (1 of 2)	IMG = Imperial Million Gallons
30150	Flow Rate - IMG/sec	Input Register	Floating Point Register (2 of 2)	IMG = Imperial Million Gallons
30151	Flow Rate - IMG/min	Input Register	Floating Point Register (1 of 2)	IMG = Imperial Million Gallons
30152	Flow Rate - IMG/min	Input Register	Floating Point Register (2 of 2)	IMG = Imperial Million Gallons
30153	Flow Rate - IMG/hr	Input Register	Floating Point Register (1 of 2)	IMG = Imperial Million Gallons
30154	Flow Rate - IMG/hr	Input Register	Floating Point Register (2 of 2)	IMG = Imperial Million Gallons
30155	Flow Rate - IMG/day	Input Register	Floating Point Register (1 of 2)	IMG = Imperial Million Gallons
30156	Flow Rate - IMG/day	Input Register	Floating Point Register (2 of 2)	IMG = Imperial Million Gallons
30157	Flow Rate - bbl/sec	Input Register	Floating Point Register (1 of 2)	bbl = US Oil Barrel = 42 Gallons
30158	Flow Rate - bbl/sec	Input Register	Floating Point Register (2 of 2)	bbl = US Oil Barrel = 42 Gallons
30159	Flow Rate - bbl/min	Input Register	Floating Point Register (1 of 2)	bbl = US Oil Barrel = 42 Gallons
30160	Flow Rate - bbl/min	Input Register	Floating Point Register (2 of 2)	bbl = US Oil Barrel = 42 Gallons
30161	Flow Rate - bbl/hr	Input Register	Floating Point Register (1 of 2)	bbl = US Oil Barrel = 42 Gallons
30162	Flow Rate - bbl/hr	Input Register	Floating Point Register (2 of 2)	bbl = US Oil Barrel = 42 Gallons

Register Address	Description	Register Type	Format Type	Comments
30163	Flow Rate - bbl/day	Input Register	Floating Point Register (1 of 2)	bbl = US Oil Barrel = 42 Gallons
30164	Flow Rate - bbl/day	Input Register	Floating Point Register (2 of 2)	bbl = US Oil Barrel = 42 Gallons
30165	Previous day Average Flow Rate - GPM (USG/min)	Input Register	Floating Point Register (1 of 2)	
30166	Previous day Average Flow Rate - GPM (USG/min)	Input Register	Floating Point Register (2 of 2)	
30167	Previous day Average Flow Rate - L/sec	Input Register	Floating Point Register (1 of 2)	
30168	Previous day Average Flow Rate - L/ssec	Input Register	Floating Point Register (2 of 2)	
30169	Previous day Average Flow Rate - ft3/min	Input Register	Floating Point Register (1 of 2)	
30170	Previous day Average Flow Rate - ft3/min	Input Register	Floating Point Register (2 of 2)	
30171	Previous day Average Flow Rate - m3/hr	Input Register	Floating Point Register (1 of 2)	
30172	Previous day Average Flow Rate - m3/hr	Input Register	Floating Point Register (2 of 2)	
30173	Previous day Average Flow Rate - USG/sec	Input Register	Floating Point Register (1 of 2)	
30174	Previous day Average Flow Rate - USG/sec	Input Register	Floating Point Register (2 of 2)	
30175	Previous day Average Flow Rate - USG/hr	Input Register	Floating Point Register (1 of 2)	
30176	Previous day Average Flow Rate - USG/hr	Input Register	Floating Point Register (2 of 2)	
30177	Previous day Average Flow Rate - USG/day	Input Register	Floating Point Register (1 of 2)	
30178	Previous day Average Flow Rate - USG/day	Input Register	Floating Point Register (2 of 2)	
30179	Previous day Average Flow Rate - ft3/s	Input Register	Floating Point Register (1 of 2)	
30180	Previous day Average Flow Rate - ft3/s	Input Register	Floating Point Register (2 of 2)	
30181	Previous day Average Flow Rate - ft3/hr	Input Register	Floating Point Register (1 of 2)	
30182	Previous day Average Flow Rate - ft3/hr	Input Register	Floating Point Register (2 of 2)	

Register Address	Description	Register Type	Format Type	Comments
30183	Previous day Average Flow Rate - ft ³ /day	Input Register	Floating Point Register (1 of 2)	
30184	Previous day Average Flow Rate - ft ³ /day	Input Register	Floating Point Register (2 of 2)	
30185	Previous day Average Flow Rate - USMG/sec	Input Register	Floating Point Register (1 of 2)	USMG = US Million Gallons
30186	Previous day Average Flow Rate - USMG/sec	Input Register	Floating Point Register (2 of 2)	USMG = US Million Gallons
30187	Previous day Average Flow Rate - USMG/min	Input Register	Floating Point Register (1 of 2)	USMG = US Million Gallons
30188	Previous day Average Flow Rate - USMG/min	Input Register	Floating Point Register (2 of 2)	USMG = US Million Gallons
30189	Previous day Average Flow Rate - USMG/hr	Input Register	Floating Point Register (1 of 2)	USMG = US Million Gallons
30190	Previous day Average Flow Rate - USMG/hr	Input Register	Floating Point Register (2 of 2)	USMG = US Million Gallons
30191	Previous day Average Flow Rate - USMG/day	Input Register	Floating Point Register (1 of 2)	USMG = US Million Gallons
30192	Previous day Average Flow Rate - USMG/day	Input Register	Floating Point Register (2 of 2)	USMG = US Million Gallons
30193	Previous day Average Flow Rate - L/min	Input Register	Floating Point Register (1 of 2)	
30194	Previous day Average Flow Rate - L/min	Input Register	Floating Point Register (2 of 2)	
30195	Previous day Average Flow Rate - L/hr	Input Register	Floating Point Register (1 of 2)	
30196	Previous day Average Flow Rate - L/hr	Input Register	Floating Point Register (2 of 2)	
30197	Previous day Average Flow Rate - L/day	Input Register	Floating Point Register (1 of 2)	
30198	Previous day Average Flow Rate - L/day	Input Register	Floating Point Register (2 of 2)	
30199	Previous day Average Flow Rate - m ³ /sec	Input Register	Floating Point Register (1 of 2)	
30200	Previous day Average Flow Rate - m ³ /sec	Input Register	Floating Point Register (2 of 2)	
30201	Previous day Average Flow Rate - m ³ /min	Input Register	Floating Point Register (1 of 2)	
30202	Previous day Average Flow Rate - m ³ /min	Input Register	Floating Point Register (2 of 2)	
30203	Previous day Average Flow Rate - m ³ /day	Input Register	Floating Point Register (1 of 2)	
30204	Previous day Average Flow Rate - m ³ /day	Input Register	Floating Point Register (2 of 2)	

Register Address	Description	Register Type	Format Type	Comments
30205	Previous day Average Flow Rate - IG/sec	Input Register	Floating Point Register (1 of 2)	IG = Imperial Gallons
30206	Previous day Average Flow Rate - IG/sec	Input Register	Floating Point Register (2 of 2)	IG = Imperial Gallons
30207	Previous day Average Flow Rate - IG/min	Input Register	Floating Point Register (1 of 2)	IG = Imperial Gallons
30208	Previous day Average Flow Rate - IG/min	Input Register	Floating Point Register (2 of 2)	IG = Imperial Gallons
30209	Previous day Average Flow Rate - IG/hr	Input Register	Floating Point Register (1 of 2)	IG = Imperial Gallons
30210	Previous day Average Flow Rate - IG/hr	Input Register	Floating Point Register (2 of 2)	IG = Imperial Gallons
30211	Previous day Average Flow Rate - IG/day	Input Register	Floating Point Register (1 of 2)	IG = Imperial Gallons
30212	Previous day Average Flow Rate - IG/day	Input Register	Floating Point Register (2 of 2)	IG = Imperial Gallons
30213	Previous day Average Flow Rate - IMG/sec	Input Register	Floating Point Register (1 of 2)	IMG = Imperial Million Gallons
30214	Previous day Average Flow Rate - IMG/sec	Input Register	Floating Point Register (2 of 2)	IMG = Imperial Million Gallons
30215	Previous day Average Flow Rate - IMG/min	Input Register	Floating Point Register (1 of 2)	IMG = Imperial Million Gallons
30216	Previous day Average Flow Rate - IMG/min	Input Register	Floating Point Register (2 of 2)	IMG = Imperial Million Gallons
30217	Previous day Average Flow Rate - IMG/hr	Input Register	Floating Point Register (1 of 2)	IMG = Imperial Million Gallons
30218	Previous day Average Flow Rate - IMG/hr	Input Register	Floating Point Register (2 of 2)	IMG = Imperial Million Gallons
30219	Previous day Average Flow Rate - IMG/day	Input Register	Floating Point Register (1 of 2)	IMG = Imperial Million Gallons
30220	Previous day Average Flow Rate - IMG/day	Input Register	Floating Point Register (2 of 2)	IMG = Imperial Million Gallons
30221	Previous day Average Flow Rate - bbl/sec	Input Register	Floating Point Register (1 of 2)	bbl = US Oil Barrel = 42 Gallons
30222	Previous day Average Flow Rate - bbl/sec	Input Register	Floating Point Register (2 of 2)	bbl = US Oil Barrel = 42 Gallons
30223	Previous day Average Flow Rate - bbl/min	Input Register	Floating Point Register (1 of 2)	bbl = US Oil Barrel = 42 Gallons
30224	Previous day Average Flow Rate - bbl/min	Input Register	Floating Point Register (2 of 2)	bbl = US Oil Barrel = 42 Gallons

Register Address	Description	Register Type	Format Type	Comments
30225	Previous day Average Flow Rate - bbl/hr	Input Register	Floating Point Register (1 of 2)	bbl = US Oil Barrel = 42 Gallons
30226	Previous day Average Flow Rate - bbl/hr	Input Register	Floating Point Register (2 of 2)	bbl = US Oil Barrel = 42 Gallons
30227	Previous day Average Flow Rate - bbl/day	Input Register	Floating Point Register (1 of 2)	bbl = US Oil Barrel = 42 Gallons
30228	Previous day Average Flow Rate - bbl/day	Input Register	Floating Point Register (2 of 2)	bbl = US Oil Barrel = 42 Gallons
30301	Volume Total - Gallons	Input Register	Floating Point Register (1 of 2)	
30302	Volume Total - Gallons	Input Register	Floating Point Register (2 of 2)	
30303	Volume Total - Liters	Input Register	Floating Point Register (1 of 2)	
30304	Volume Total - Liters	Input Register	Floating Point Register (2 of 2)	
30305	Volume Total - ft ³	Input Register	Floating Point Register (1 of 2)	
30306	Volume Total - ft ³	Input Register	Floating Point Register (2 of 2)	
30307	Volume Total - m ³	Input Register	Floating Point Register (1 of 2)	
30308	Volume Total - m ³	Input Register	Floating Point Register (2 of 2)	
30309	Volume Total - USMG	Input Register	Floating Point Register (1 of 2)	USMG = US Million Gallons
30310	Volume Total - USMG	Input Register	Floating Point Register (2 of 2)	USMG = US Million Gallons
30311	Volume Total - IG	Input Register	Floating Point Register (1 of 2)	IG = Imperial Gallons
30312	Volume Total - IG	Input Register	Floating Point Register (2 of 2)	IG = Imperial Gallons
30313	Volume Total - IMG	Input Register	Floating Point Register (1 of 2)	IMG = Imperial Million Gallons
30314	Volume Total - IMG	Input Register	Floating Point Register (2 of 2)	IMG = Imperial Million Gallons
30315	Volume Total - bbl	Input Register	Floating Point Register (1 of 2)	bbl = US Oil Barrel = 42 Gallons
30316	Volume Total - bbl	Input Register	Floating Point Register (2 of 2)	bbl = US Oil Barrel = 42 Gallons
30317	Previous day Volume Total - Gallons	Input Register	Floating Point Register (1 of 2)	
30318	Previous day Volume Total - Gallons	Input Register	Floating Point Register (2 of 2)	
30319	Previous day Volume Total - Liters	Input Register	Floating Point Register (1 of 2)	
30320	Previous day Volume Total - Liters	Input Register	Floating Point Register (2 of 2)	

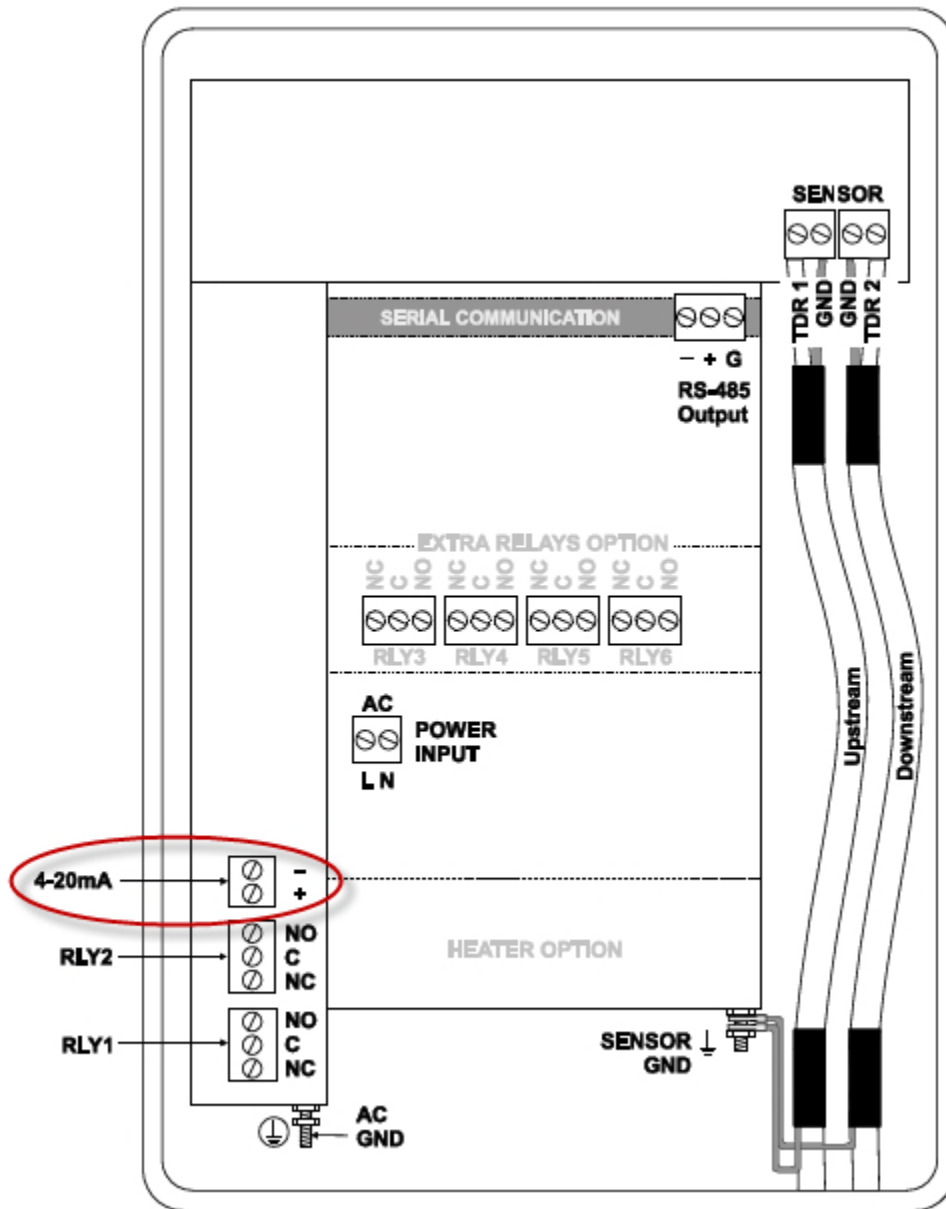
Register Address	Description	Register Type	Format Type	Comments
30321	Previous day Volume Total - ft3	Input Register	Floating Point Register (1 of 2)	
30322	Previous day Volume Total - ft3	Input Register	Floating Point Register (2 of 2)	
30323	Previous day Volume Total - m3	Input Register	Floating Point Register (1 of 2)	
30324	Previous day Volume Total - m3	Input Register	Floating Point Register (2 of 2)	
30325	Previous day Volume Total - USMG	Input Register	Floating Point Register (1 of 2)	USMG = US Million Gallons
30326	Previous day Volume Total - USMG	Input Register	Floating Point Register (2 of 2)	USMG = US Million Gallons
30327	Previous day Volume Total - IG	Input Register	Floating Point Register (1 of 2)	IG = Imperial Gallons
30328	Previous day Volume Total - IG	Input Register	Floating Point Register (2 of 2)	IG = Imperial Gallons
30329	Previous day Volume Total - IMG	Input Register	Floating Point Register (1 of 2)	IMG = Imperial Million Gallons
30330	Previous day Volume Total - IMG	Input Register	Floating Point Register (2 of 2)	IMG = Imperial Million Gallons
30331	Previous day Volume Total - bbl	Input Register	Floating Point Register (1 of 2)	bbl = US Oil Barrel = 42 Gallons
30332	Previous day Volume Total - bbl	Input Register	Floating Point Register (2 of 2)	bbl = US Oil Barrel = 42 Gallons
30901	Signal Strength - %	Input Register	Integer	0-100
30902	Run Hours	Input Register	Floating Point Register (1 of 2)	
30903	Run Hours	Input Register	Floating Point Register (2 of 2)	
30919	Measured Speed of Sound - ft/sec	Input Register	Floating Point Register (1 of 2)	
30920	Measured Speed of Sound - ft/sec	Input Register	Floating Point Register (2 of 2)	
30921	Measured Speed of Sound - m/sec	Input Register	Floating Point Register (1 of 2)	
30922	Measured Speed of Sound - m/sec	Input Register	Floating Point Register (2 of 2)	
30923	Sensor Status	Input Register	Index (0-10)	0 = Sensor Good 4 = Sensor Open 5 = Sensor Short 7 = Low Signal

Register Address	Description	Register Type	Format Type	Comments
30925	Logging Status	Input Register	Index (0-2)	0 = Stopped 1 = Active 2 = Full
30926	Logging Used - %	Input Register	Floating Point Register (1 of 2)	
30927	Logging Used - %	Input Register	Floating Point Register (2 of 2)	
30967	Expected Speed of Sound - ft/sec	Input Register	Floating Point Register (1 of 2)	
30968	Expected Speed of Sound - ft/sec	Input Register	Floating Point Register (2 of 2)	
30969	Expected Speed of Sound - m/sec	Input Register	Floating Point Register (1 of 2)	
30970	Expected Speed of Sound - m/sec	Input Register	Floating Point Register (2 of 2)	
30971	Expected TT uS	Input Register	Floating Point Register (1 of 2)	
30972	Expected TT uS	Input Register	Floating Point Register (2 of 2)	
30973	Measured TT uS	Input Register	Floating Point Register (1 of 2)	
30974	Measured TT uS	Input Register	Floating Point Register (2 of 2)	
30975	Gain (Transit Time)	Input Register	Int16 Register	
30976	Signal Size mV (Transit Time)	Input Register	Int16 Register	
30947	Velocity Units	Input Register	Index (0 to 1)	0 = Feet per Second 1 = Meter per Second

Register Address	Description	Register Type	Format Type	Comments
30948	Flow Units	Input Register	Index (0 to 31)	0 = US Gallons per Minute 1 = Litres per Second 2 = Cubic Feet per Minute 3 = Cubic Meters per Hour 4 = US Gallons per Second 5 = US Gallons per Hour 6 = US Gallons per Day 7 = Cubic Feet per Second 8 = Cubic Feet per Hour 9 = Cubic Feet per Day 10 = US Million Gallons per Second 11 = US Million Gallons per Minute 12 = US Million Gallons per Hour 13 = US Million Gallons per Day 14 = Litres per Minute 15 = Litres per Hour 16 = Litres per Day 17 = Cubic Meters per Second 18 = Cubic Meters per Minute 19 = Cubic Meters per Day 20 = Imperial Gallons per Second 21 = Imperial Gallons per Minute 22 = Imperial Gallons per Hour 23 = Imperial Gallons per Day 24 = Imperial Million Gallons per Second 25 = Imperial Million Gallons per Minute 26 = Imperial Million Gallons per Hour 27 = Imperial Million Gallons per Day 28 = Barrels per Second 29 = Barrels per Minute 30 = Barrels per Hour 31 = Barrels per Day
30949	Linear Units	Input Register	Index (0 to 3)	0 = Feet 1 = Inches 2 = Millimeters 3 = Meters
30950	Volume Units	Input Register	Index (0 to 7)	0 = Cubic Feet 1 = US Gallons 2 = US Million Gallons 3 = Imperial Gallons 4 = Imperial Million Gallons 5 = Cubic Meters 6 = Litre 7 = Barrel
30951	Time Units	Input Register	Index (0 to 3)	0 = Second 1 = Minute 2 = Hour 3 = Day

HART® COMMUNICATION

HART® (Highway Addressable Remote Transducer) connections are made on the 4-20mA output of the TTFM 6.1. The TTFM 6.1 must be equipped with the optional serial communication card for the Communication menu to appear, and for the HART option to be able to be selected in the Communication menu. 4-20mA output location:



HART® (Highway Addressable Remote Transducer) Protocol Information:

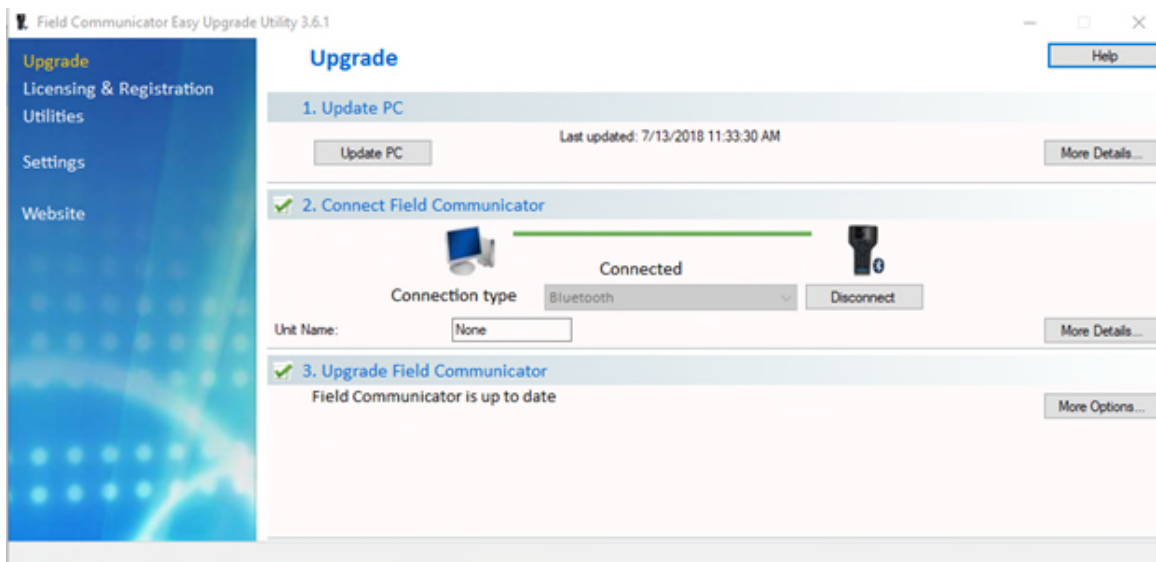
HART Version: 7.0

Device Description Files: DD files allow the user's handheld HART communicator to fully configure the TTFM 6.1. Greyline provides DD files for the Emerson 475 Communicator. The files are included in the USB drive provided with your TTFM 6.1 meter. You may also request the files from Greyline by calling or emailing us at info@greyline.com. **Warning:** The TTFM 6.1 and associated DDs are pending certification from the Fieldcomm Group.

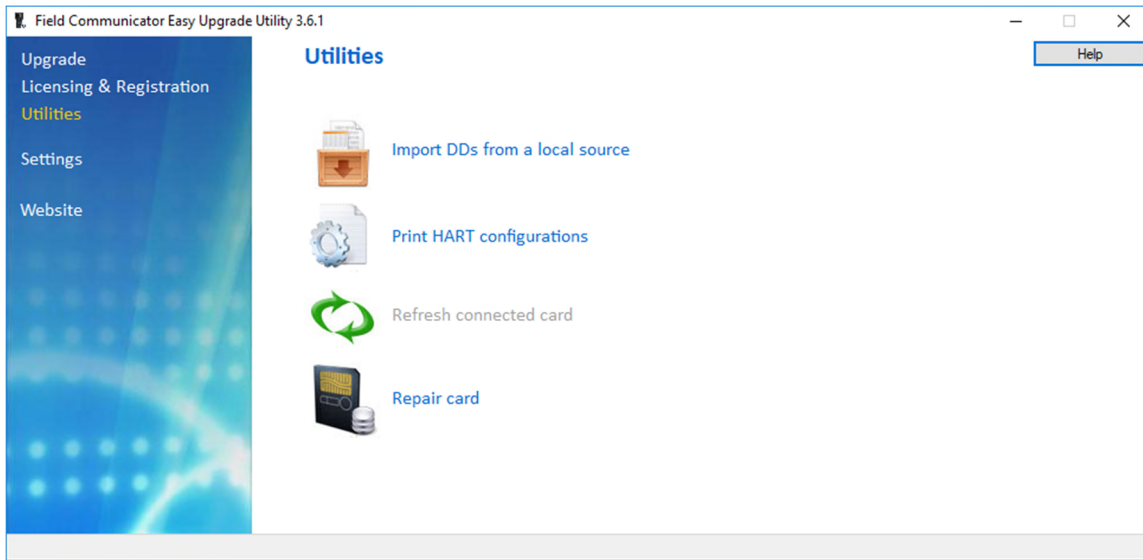
Connections: HART Protocol uses a digital signal superimposed on the 4-20mA output. When the 4-20mA output of the TTFM 6.1 is connected with a load resistor (230Ω to 600Ω), the HART communicator can be connected on the loop in order to communicate.

Loading the DD Files to the 475 Field Communicator

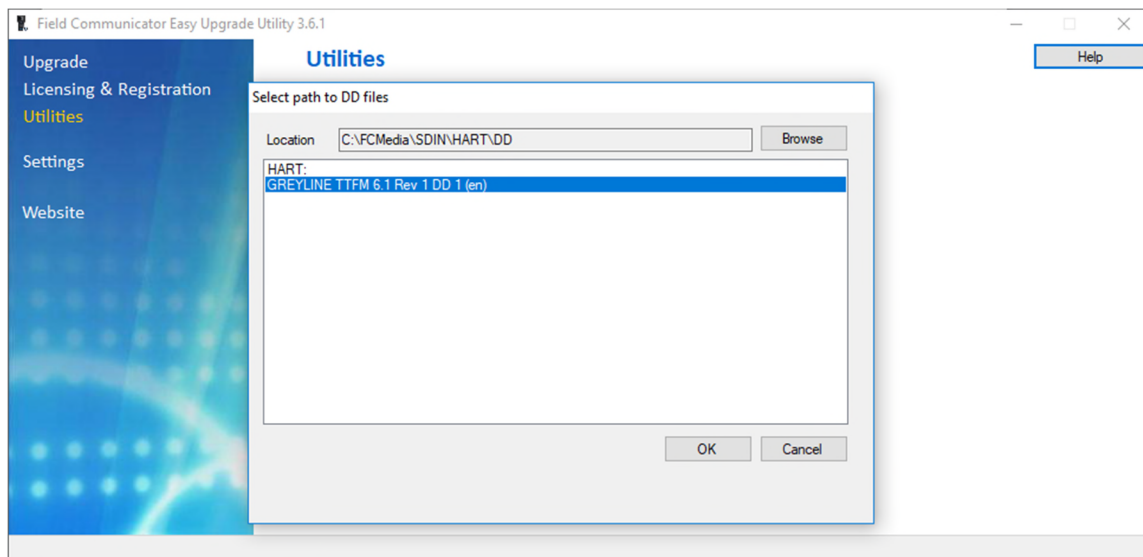
1. Install Emerson Field Communicator Easy Upgrade Utility from Emerson website
 - a. <http://www3.emersonprocess.com/ams/fieldcommunicatorsupport/>
2. Run Field Communicator Easy Upgrade utility.
3. Locate the DD Files from the Greyline USB drive included with the TTFM 6.1.
 - a. *6109E3FD0101.hdd*
4. Make sure your PC software is up to date by clicking *Update PC*.



5. Click on *Utilities* from the left menu pane.
6. Click on *Import DDs from a local source*.

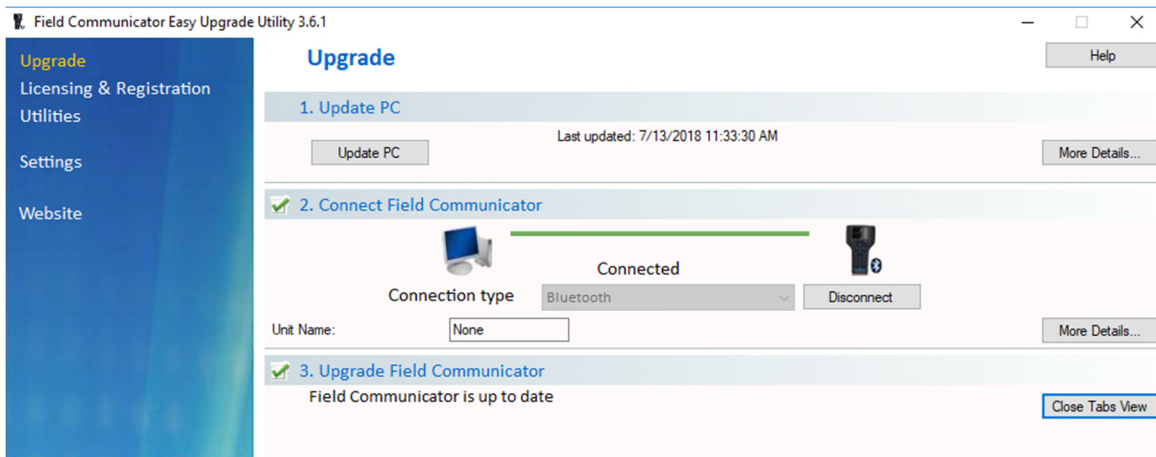


7. A popup window is displayed as shown below. Navigate to the directory containing the DD files using the *Browse* button. Select the desired DD files that shows up for your HART device. Click *OK*.

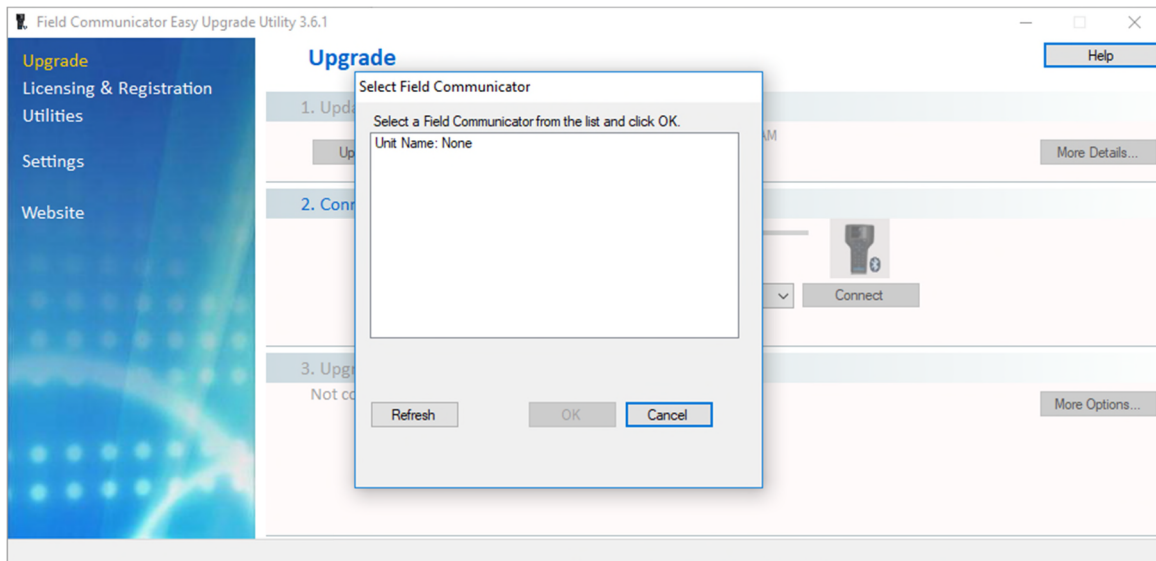


8. Navigate back to the previous screen by clicking on *Upgrade* from the left menu pane.

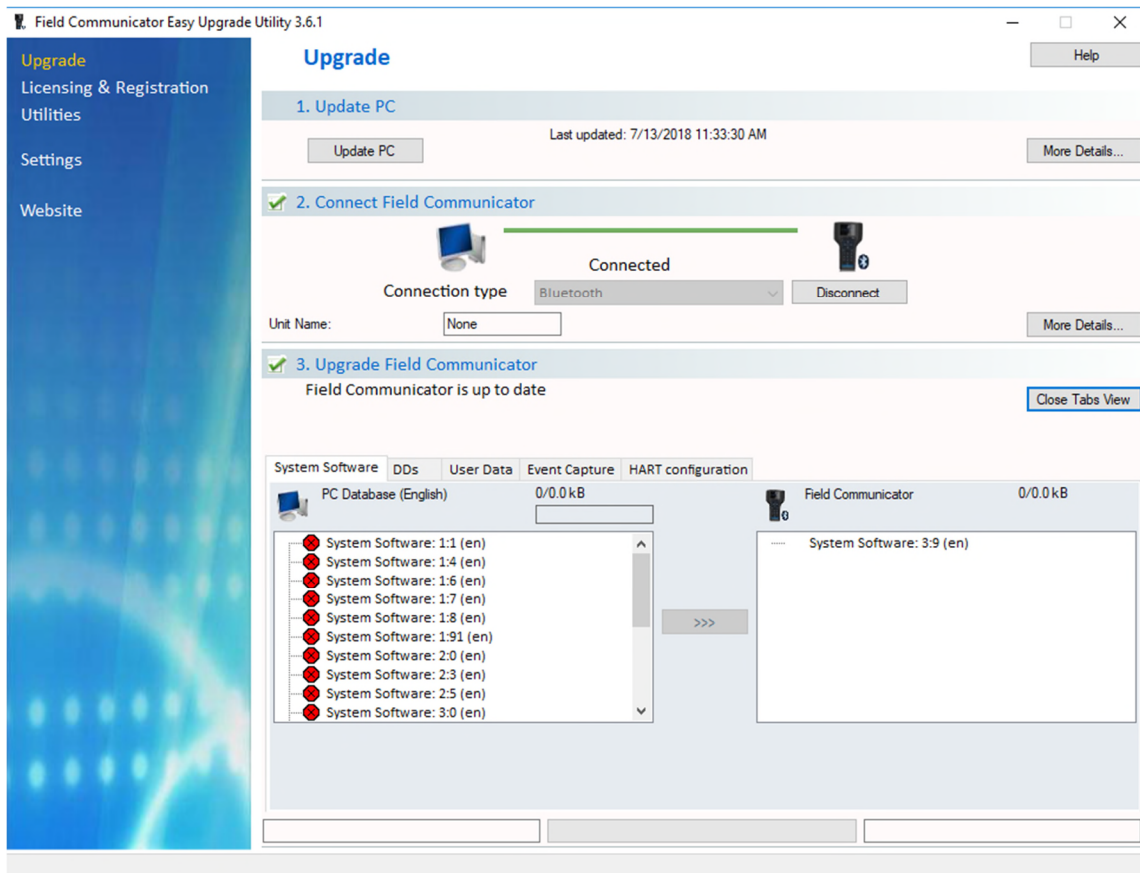
- Under Connect Field Communicator, select the type of the connection your device utilizes. Then click *Connect*.



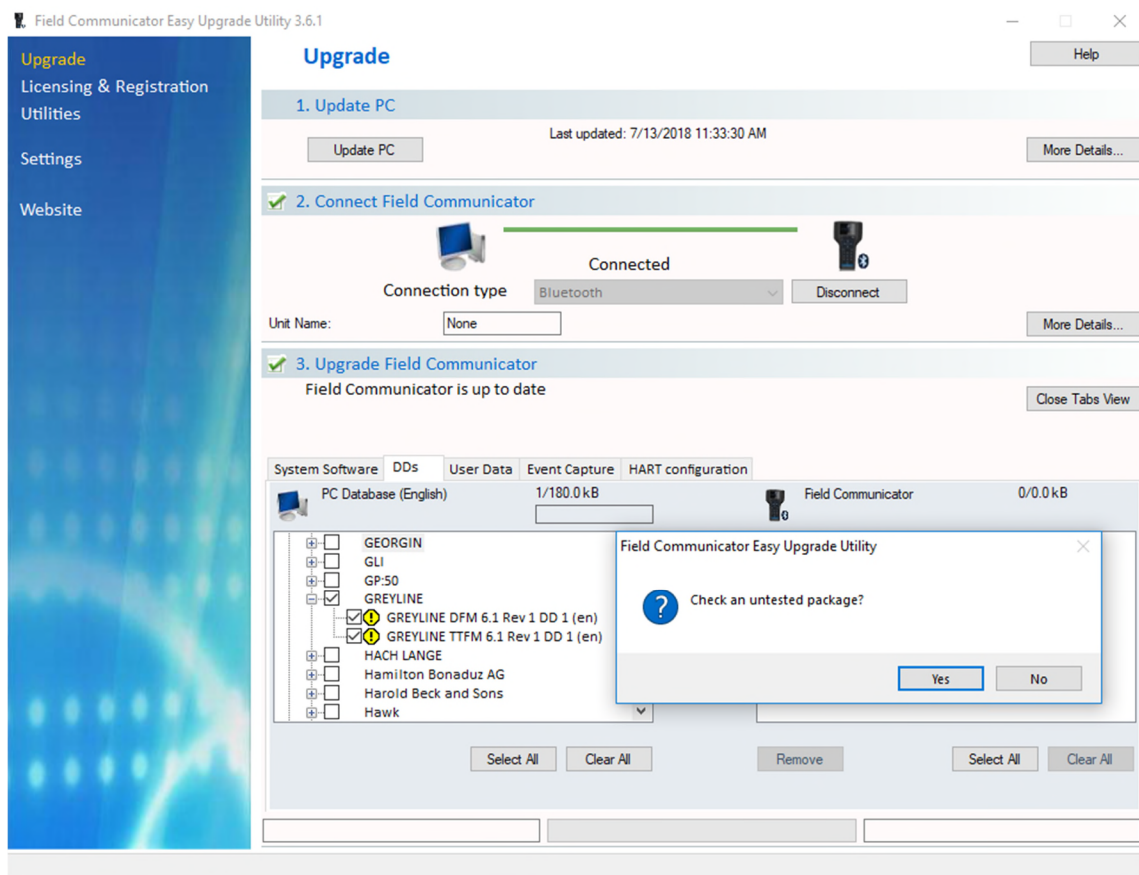
- Select Field Communicator from list shown below.



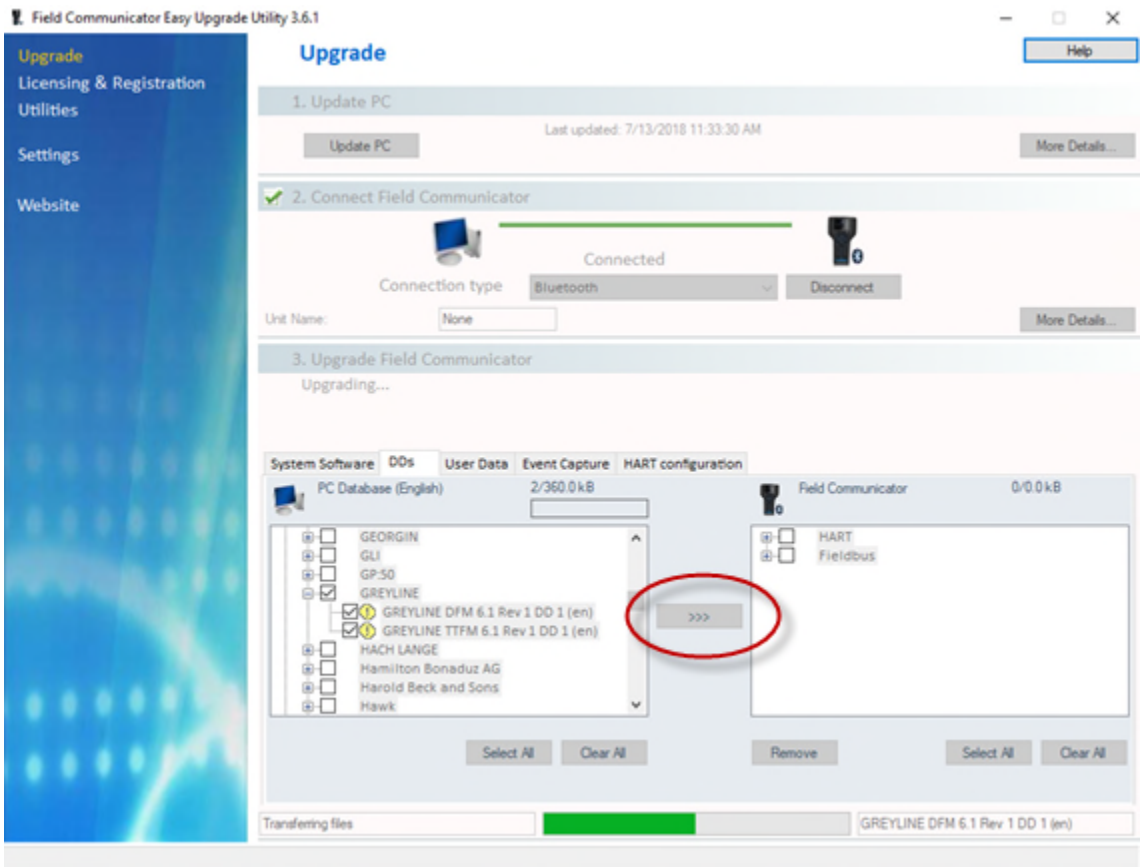
11. Once connected, click *More Options*. The *System Software* Tab Is now opened. Click the *DDs* tab.



12. The newly uploaded DD from the Utilities: Import DDs from Local source. Select the DD file you wish to send to the Field communicator. If package is untested, select **Yes** in the *Check an untested package dialog box*.



13. Click on the *Transfer Button* (Button with 3 arrows/Chevrons facing right). Wait until download complete dialog appears, then close out or continue with program as needed.



Device Descriptor Menu Structure

Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
Device Setup	Process Variables	PV			
		PV% Range			
		PV Loop Current			
		Dynamic Variables			
	Basic Setup	PV Unit			
		PV Xfer fnctn			
		PV Damp			
		Device Information	Distributor		
			Model		
			Dev id		
			Serial Number		
			Relay Count		
			Cfg chng count		
			Tag		
			Long Tag		
			Date		
			Write Protect		
			Descriptor		
			Message		
			Final asmbly num		
			Revision #'s		
			Device Image		
	Detailed Setup	Sensors	Flow Rate Sensor	Flow Rate	
				Flow Rate Unit	
				Sensor Information	Flow Rate Class
					Flow Rate PDQ
					Flow Rate LS

Device Descriptor Menu Structure (Cont.)

Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
					Flow Rate LSL
					Flow Rate USL
					Flow Rate Damp
			Velocity Sensor	Velocity	
				Velocity Unit	
				Sensor Information	Velocity Class
					Velocity PDQ
					Velocity LS
					Velocity LSL
					Velocity USL
					Velocity Damp
			Volume Sensor	Volume	
				Volume Unit	
				Sensor Information	Volume Class
					Volume PDQ
			Max dev vars		
		PV is			
		Signal condition	PV LRV		
			PV URV		
			PV % Range		
			PV Xfer fnctn		
			PV Damp		
		Output Condition	Analog Output	PV Loop Current	
				PV Alm typ	
				PV Channel flags	
				Loop current mode	
			HART Output	Poll addr	

Device Descriptor Menu Structure (Cont.)

Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
				Num req preams	
				Num resp preams	
		Device Information	Distributor		
			Model		
			Dev id		
			Serial Number		
			Relay Count		
			Cfg chng count		
			Tag		
			Long Tag		
			Date		
			Write Protect		
			Descriptor		
			Message		
			Final asmbly num		
			Revision #'s		
			Device Image		
	Review	Model			
		Distributor			
		Write protect			
		Dev id			
		Serial Number			
		Relay Count			
		Cfg chng count			
		Max dev vars			
		Tag			
		Long tag			

Device Descriptor Menu Structure (Cont.)

Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
		Descriptor			
		Message			
		Date			
		Final asmbly num			
		Universal rev			
		Fld dev rev			
		Software rev			
		Hardware rev			
		Poll addr			
		Loop current mode			
		Num req preams			
		Num resp preams			
Status	Relay Count				
	Relay 1				
	Relay 2				
	Pri Sen Stat				
	Prim Read Quality				
	Device Status	Device Status			
		Cfg chng count			
		Reset Configuration			
	Dev Spec Stat 0	Status group 0			
	Dev Spec Stat 1	Status group 1			
	Dev Spec Stat 2	Status group 2			
	Dev Spec Stat 3	Status group 3			
	Dev Spec Stat 4	Status group 4			
	Dev Spec Stat 5	Status group 5			
	Ext Dev Stat	Ext dev status			

Device Descriptor Menu Structure (Cont.)

Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
Logging	Logger Options	Log Status			
		Log Mode			
		Percent Log Used			
PV					
PV Loop Current					
PV LVR					
PV URV					



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