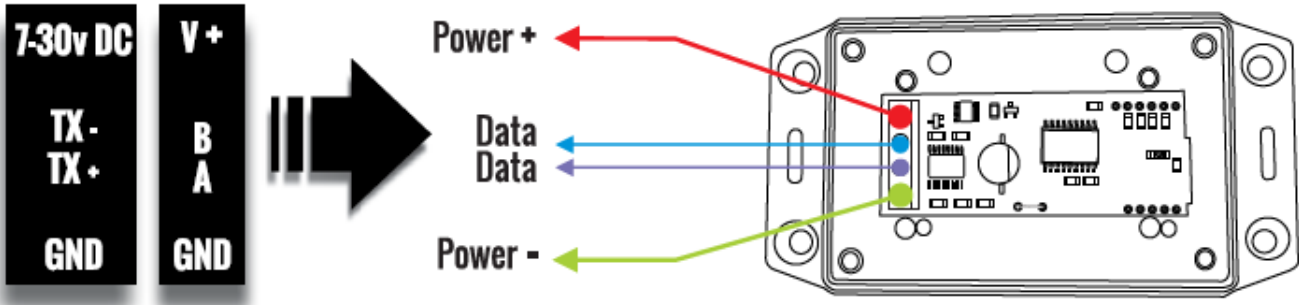


EF1 Modbus Converter



Current drawn 3 mAmps (requires an external 7-30vdc supply)



KEY FEATURES

- Converts any utility meter (Electricity | Gas | Heat | Oil | Steam | Water) into Modbus.

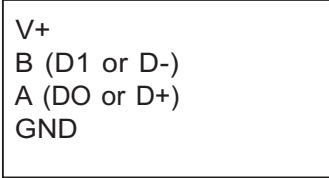
NB. Meter must have a pulsed output.

- Directly connects into the Modbus System
- Current drawn 3 mAmps (requires an external 7-30vdc supply)
- Manufactured to ISO En15745-2:2007

MODBUS Efi INTERFACE NOTES

The RS485 connections are as follows -

7-30v DC
TX-
TX +
GND



The data format is as follows -

Modbus RTU
9600 Baud
1 Start bit
8 Data bits
1 Even Parity bit
1 Stop bit

To read the registers use Function Code 4 (Read Input Registers) -
Register 1 & 2 contain the 32 bit pulse count value (1 = high, 2 = low)

To write the registers use Function Code 16 (Write Multiple Registers) -
Register 1 & 2 contain the 32 bit pulse count value (1 = high, 2 = low)

Function Code 17 returns the interface serial number -
Request - Address, 17, CRC low, CRC high
Response -Address, 17,4, SN 1, SN 2, SN 3, SN 4, CRC low, CRC high

Function Code 43 returns the interface manufacturer data -
Request-Address, 43, 14, 1, 0, CRC low, CRC high
Response -Address, 43, 14, 1, 1, 0, 0, 3, 0, Length 0, Company, 1, Length 1, Product, 2, Length 2, Version,
CRC low, CRC high

Function Code 70 sets the interface address -
Request -Address, 70, New Address, CRC low, CRC high
If Address is 0 then all connected units are set to the New Address but no response is sent, otherwise -
Response -Address, 70, New Address, CRC low, CRC high

MODBUS CABLE SPECIFICATION

Modbus over RS485 cable should have the following characteristics -

- 1 twisted pair of conductors for data
- 1 additional conductor for common
- An overall protective screen

If using EF1 interfaces an additional conductor is required to provide power.

This can be achieved using 2 twisted pairs with one pair for data and the other pair for common and power. This type of cable can also be used where power is not required in which case the additional conductor is not connected.

The twisted pair of conductors for data should have a characteristic impedance of 120Ω and a capacitance of less than 80pF per metre. All the conductors should be of at least 0.2mm² (24 AWG) cross section and preferably of stranded construction for greater durability.

The common conductor should be connected to the GND terminal on all the Modbus interfaces to provide a reference for data reception. The outer screen should not be connected to any of the interfaces, but should maintain continuity and be earthed near the master interface.

It is advised that the cable is daisy chained between interfaces to form one continuous run with 2 ends and no stubs. If it is necessary to use stubs then they should be kept as short as possible. For networks over 100m total cable length a 120Ω 0.5W resistor should be connected across the data pair at each end of the main cable run to provide termination.

Suitable cables are -

- Belden 3106A (not for EF1)
- Belden 3107A
- Belden 9842

The total length of all cable within a network is limited to 1km with this type of cable.

A cheaper alternative for smaller networks (up to 500m total cable length) is to use Cat 5/6 ethernet cable (STP or FTP) with similar characteristics.

04 (0x04) READ INPUT REGISTERS

This function code is used to read from 1 to 125 contiguous input registers in a remote device. The Request POU specifies the starting register address and the number of registers. In the POU Registers are addressed starting at zero. Therefore, input registers numbered 1-16 are addressed as 0-15.

The register data in the response message are packed as two bytes per register with the binary contents right justified within each byte. For each register, the first byte contains the high order bits and the second contains the low order bits.

REQUEST

Function Code	1 Byte	0x04
Starting Address	2 Bytes	0x0000
Quantity of Input Registers	2 Bytes	0x0002

RESPONSE

Function Code	1 Byte	0x04
Byte Count	1 Byte	0x04
Input Registers	4 Bytes	Count Value

ERROR

Error Code	1 Byte	0x84
Exception Code	1 Byte	01 or 02 or 03 or 04

16 (0x10) WRITE MULTIPLE REGISTERS

This function code is used to write a block of contiguous registers (1 to 123 registers) in a remote device. The requested written values are specified in the request data field. Data is packed as two bytes per register. The normal response returns the function code, starting address, and quantity of registers written.

REQUEST

Function Code	1 Byte	0x10
Starting Address	2 Bytes	0x0000
Quantity of Registers	2 Bytes	0x0002
Byte Count	1 Byte	0x04
Registers Value	4 Bytes	New Count Value

RESPONSE

Function Code	1 Byte	0x10
Starting Address	2 Bytes	0x0000 to 0xFFFF
Quantity of Input Registers	2 Bytes	0x0002

ERROR

Error Code	1 Byte	0x90
Exception Code	1 Byte	01 or 02 or 03 or 04

ERROR CODES

01	ILLEGAL FUNCTION	This is not an allowable function code for this device.
02	ILLEGAL DATA ADDRESS	Combination of starting address and quantity of registers is invalid.
03	ILLEGAL DATA VALUE	Value contained in the query data field is not an allowable value.
04	SLAVE DEVICE FAILURE	An unrecoverable error occurred whilst attempting to perform the request.

FAULT FINDING- FAQ's

Q: I need to reset the address from the one set in the EFI

A: The address can be reset by using function code 70

Q: How do I know the address has changed ?

A: The LED flashes to confirm the change has been made

Q: I have no software to reset the address

A: Free software is available at www.windmill.co.uk

Q: Does the unit need a power supply?

A: Yes! It will not work without one.

Q: What power supply is required?

A: 7vdc to 30vdc (must be DC supply)

Q: What is the best type of cable to use?

A: Screened Cable a definite. 2 pairs of screen twisted pairs or Screen Cat 5 {which has 4 twisted pairs *use 2}
Screen Cat is suitable for up to 600 meters

Q: Can I test for the pulse manually?

A: Yes! If the unit has power short out the pulse input terminals. Make a temporary contact between them.
The LED will flash.

Q: How do I match the registers on the Ef1 to mirror the meter display?

A: Use Function Code: 16

