Multitel

TMS (2/3/4)000
APPLICATION NOTE

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Purpose: This application note presents a step-by-step approach to integrate an intelligent Tank Management system to a FUSION.

Figure 1 TMS2000

Figure 2 TMS3000

Figure 3 TMS 4000

Target Equipment: TMS2000/3000/4000

Equipment Description: The TMS is Tank management system manufactured by Pneumercator. The controller provides a mean to communicate via standard 2-wire RS-485 using Modbus RTU protocol.

PRODUCT DESCRIPTION	
Name	TMS2000/TMS3000/TMS4000
Manufacturer	Pneumercator
System Type	Tank Management System
Modbus Version	
Manufacture Technical Support	**(800)209-7858**
Specificities	Modbus RTU Interface Card Required for Comm See Pneumercator Instruction Manual: Modbus RTU interface card for TMS series for more information

The connector to use is located on the Modbus RTU interface card. It's a six pins green terminal with a screw connection. The pins to use are indicated on the card. If the TMS system is not the last equipment of the Modbus network, the end of line resistor needs to be disabled (place TERM switch to OFF). The microprocessor is labelled with the Firmware version

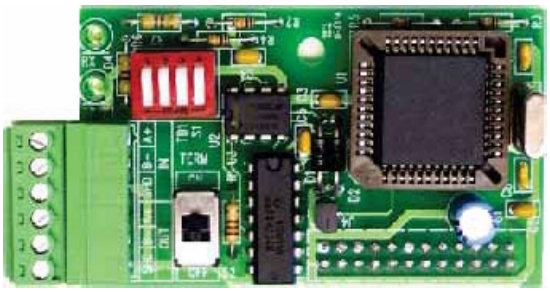


Figure 4 Rev. E Modbus RTU Interface Card

Figure 5 Rev. F Modbus Interface Card

EQUIPMENT CONNECTIONS

MODBUS RTU over RS-485 must be wired in a daisy chain pattern, star network is not allowed as it modifies drastically the electrical characteristics of the RS-485 driver and can ultimately cause communication failures. The use of a good quality cable such as a 22AWG stranded, twisted shielded wire to perform the termination at TMS communication card. Polarity must be respected throughout the RS-485 network, otherwise communication failures will prevail.

1. Locate the terminal connection on the Modbus interface card inside the TMS. The location of the card change depending on the system Model (2000/3000/4000), you will need to remove the TMS cover to access the connector. See page 5 in the Pneumecator Instruction Manual: Modbus RTU interface card for TMS series for the card location.
2. Wire the MODBUS cable as per the following instructions:
    a. Use IN A (+) for TX/RX+
    b. Use IN B (-) for TX/RX-
    c. Use the OUT section of the connector if you need to connect another Modbus device after the TMS.

EQUIPMENT COMMUNICATION SETTINGS

VERSION E AND EARLIER

Device Slave Address	SW#3	SW #2	SW #1
1 (Default)	Closed	Closed	Closed

2	Closed	Closed	Open
3	Closed	Open	Closed
4	Closed	Open	Open
5*	Open	Closed	Closed
6*	Open	Closed	Open
7*	Open	Open	Closed
8*	Open	Open	Open

*Firmware version PM008S

Baud Rate	SW #4
9600* (Default, do not changed)	Closed
38400	Open

REVISION F, FIRMWARE PM020S AND HIGHER

Device Slave Address	SW #6	SW #5	SW #4	SW #3	SW #2	SW #1
1 (Default)	Closed	Closed	Closed	Closed	Closed	Closed
2	Closed	Closed	Closed	Closed	Closed	Open
3	Closed	Closed	Closed	Closed	Open	Closed
4	Closed	Closed	Closed	Closed	Open	Open
5	Closed	Closed	Closed	Open	Closed	Closed
6	Closed	Closed	Closed	Open	Closed	Open
7	Closed	Closed	Closed	Open	Open	Closed
8	Closed	Closed	Closed	Open	Open	Open
9	Closed	Closed	Open	Closed	Closed	Closed
10	Closed	Closed	Open	Closed	Closed	Open
11 thru 62						
63	Open	Open	Open	Open	Open	Closed

64	Open	Open	Open	Open	Open	Open

FIRMWARE PM020S-PM030S

Baud Rate	SW #8	SW #7
9600 (Default, do not changed)	Closed	Closed
19200	Closed	Open
38400	Open	Closed
Not Used	Open	Open

FIRMWARE PM031S AND HIGHER

Baud Rate	SW #7
9600 (Default, do not changed)	Closed
38400	Open

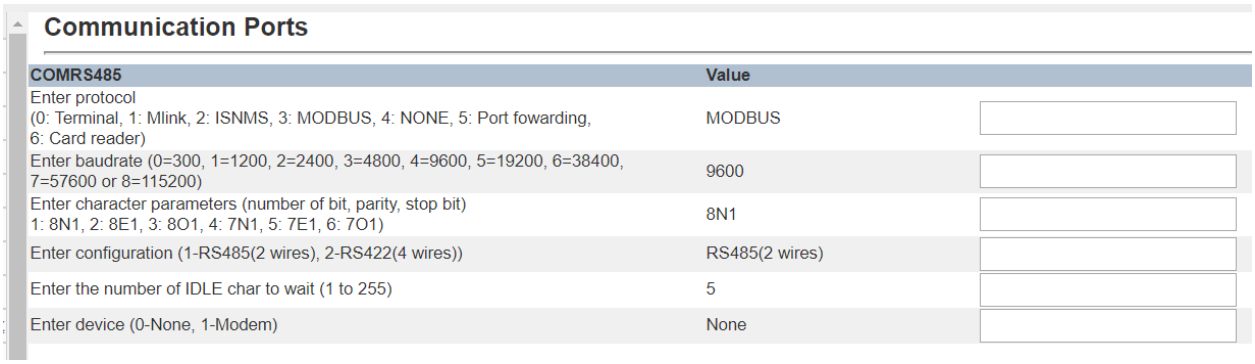
Data Mapping	SW #8
Standard (Default, do not changed)	Closed
Extended	Open

FUSION CONNECTIONS

Refer to you detailed engineering or the layout of your MODBUS network, respect the MODBUS best practises at all times by preventing star shape network, thus terminate to the last equipment of the current MODBUS daisy chain trunk or if this is you first equipment on the network device, then terminate directly at the FUSION back panel. The FUSION offers (2) RS-485 ports, one called MLINK and the other one RS-485. Use the connector available from Multitel to convert the RJ-12 connector to a screw type connector. (Part# is C-7000-MOD).

FUSION COMMUNICATION SETTINGS

Once you have logged into the FUSION using the "supervisor" username and no password, click on **CONFIG** menu and select "**Communication Ports**" from the left menu. Select the **MLINK** or **RS-485** port and config operating parameters as follows:



Communication Ports

COMRS485	Value	
Enter protocol (0: Terminal, 1: Mlink, 2: ISNMS, 3: MODBUS, 4: NONE, 5: Port fowarding, 6: Card reader)	MODBUS	
Enter baudrate (0=300, 1=1200, 2=2400, 3=4800, 4=9600, 5=19200, 6=38400, 7=57600 or 8=115200)	9600	
Enter character parameters (number of bit, parity, stop bit) 1: 8N1, 2: 8E1, 3: 8O1, 4: 7N1, 5: 7E1, 6: 7O1)	8N1	
Enter configuration (1-RS485(2 wires), 2-RS422(4 wires))	RS485(2 wires)	
Enter the number of IDLE char to wait (1 to 255)	5	
Enter device (0-None, 1-Modem)	None	

FUSION "MODULE" SETTINGS

Once the FUSION communication port is setup, associate the equipment to a specific Module number. Select "**Modules**" from the left menu and choose the pre-assigned module or click on a module available (State = None).

Modules Edit

M49	Value
The module state is	Enabled
The name is	TMS4000
The slave ID is	1
The port is	MLINK Port
The number of retry is	4
The module type is	GEN
The time out is	1
The register order is	Most significative register = higher address
The register base address is	subtract 1 from given address
The silent (in 0.01 sec) before sending request is	35

*Configure the name of the Module using the reference name of the Fuel System, such as "**TMS4000**"*

FUSION "TEST CHANNEL" SETTINGS

Once the Equipment is associated to a module, a list of channels will appear and be available for Multitel to configure. However, in order to test the MODBUS RTU wiring and TMS communication settings, it is highly recommended to configure a test channel as per the following to validate. Click on M1A1 and configure the operating parameters as follow for tank #1 Net Volume (Register address change according to the tank#):

Modules

M49A1	Value	
Enter channel state (0: Disabled, 1: Enabled or 2: None)	Enabled	
Enter channel name (up to 50 chars) ('C' to clear)	Net Volume	
Enter unit (up to 5 chars) ('C' to clear)	GL	
Enter number of decimal digits (0 to 4, 4 = auto)	0	
Enter bits for the mask used to extract value ((bit - bit), bit is a value between 0 to 15, 'C' to clear)	None	
Enter strings associated to each code ('C' to clear) Use comma "," to separate strings, first string links to code 0, second string to code 1, ... - Your entry will only be visible after using the "Apply" button.	Not Programmed	
Enter register address (1 - 65535)	9	
Enter the reading function code (3: Holding Register 4: Input Register)	3	
Enter sign (0:Normal, 1:Inverted)	Normal	
Enter data type 1:16-Bit Integer 2:32-Bit Integer 3:32-Bit Floating Point Number	32-Bit Integer	
Enter sign (1:Signed Integer, 2:Unsigned Integer)	Unsigned Integer	
Enter multiplication factor (-3.40282e+38 - 3.40282e+38)	1	
Enter channel offset (-3.40282e+38 - 3.40282e+38)	0	