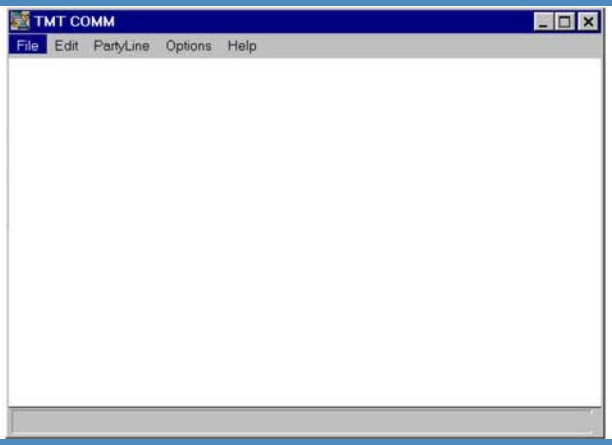
TMT Comm

Communication Software for Thermo Scientific Level and Density Gauges

User Guide

P/N 717820

Revision A



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Revision History

Revision Level	Date	Comments
1.0	08-2001	Initial release.
A	04-2011	Revised per ECO 7697.

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Contents

Chapter 1
Introduction

The Thermo Scientific TMT Comm communication software is designed to communicate with the Thermo Scientific series of density and level gauges via the RS485 serial port. The software allows the user to configure and monitor up to 32 gauges from one PC.

TMT Comm runs on PC-compatible computers with RS232 serial communications port (e.g., COM1). An RS485 / RS232 converter (p/n 670045) is required to connect the RS232 serial port on the PC to the RS485 serial port on the gauge.

This manual only describes the TMT Comm software. For specific information on configuring and using a specific gauge, refer to the documentation provided with it.

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Chapter 2
Installation

The software is shipped with the following items:

- Thermo Scientific TMT Comm communication software, p/n 595034
- RS485 / RS232 converter, p/n 670045 or RS485 converter with AC adapter, p/n 670046
- 6 ft. serial cable, p/n 810141
- TMT Comm user guide, p/n 717820

Hardware Connections

To use the TMT Comm software, the PC must be connected to the gauge. In addition to the steps below, refer to wiring diagram 868604.

1. Connect the RS485 converter to the serial communications port on the PC using the serial cable provided: Plug the RJ-11 (phone jack) connector on the serial cable into the RS485 converter and attach the DB9 connector on the serial cable to the serial port on the PC.

2. Connect the RS485 converter to the RS485 port on the gauge as shown in drawing 868604.

3. Connect the AC adapter to the RS485 to RS232 converter.

Software Installation

The installation disk and includes TMTCOMM.EXE (the main program) and TMTCOMM.HLP (the help file).

To install the software, create a directory (or folder) named "TMTCOMM" on the PC hard drive.

Insert the TMT Comm installation disk into the appropriate drive, and copy all the files from the disk to the directory.

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Chapter 3
Using the Software

Startup

After connecting the PC to the gauge and installing the software, you are ready to run TMT Comm.

Open the folder created for the software, and double-click on the TMTCOMM.exe file to start the program. The main screen will be displayed.

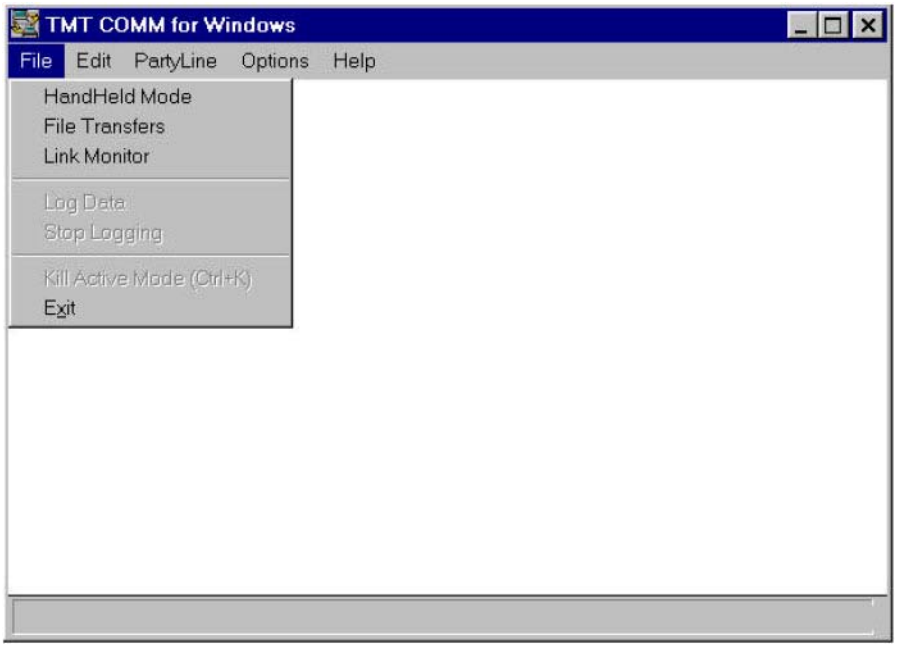

Figure 3–1. TMT Comm main screen

Establishing Communication

If running TMT Comm for the first time, you must first set up the serial communication port on the PC before you can communicate with the gauge(s). The communication parameters specified for the PC serial port must match the communication settings of each of the gauges. Refer to the user documentation supplied with the gauge for information on configuring gauge communication settings. The default communication settings for Thermo Scientific gauges are 9600 baud, Even parity, 7-bit word length, and 1 stop bit (7-E-1).

Go to **Options > Comm Ports** to open the Comm Ports screen to configure the port.

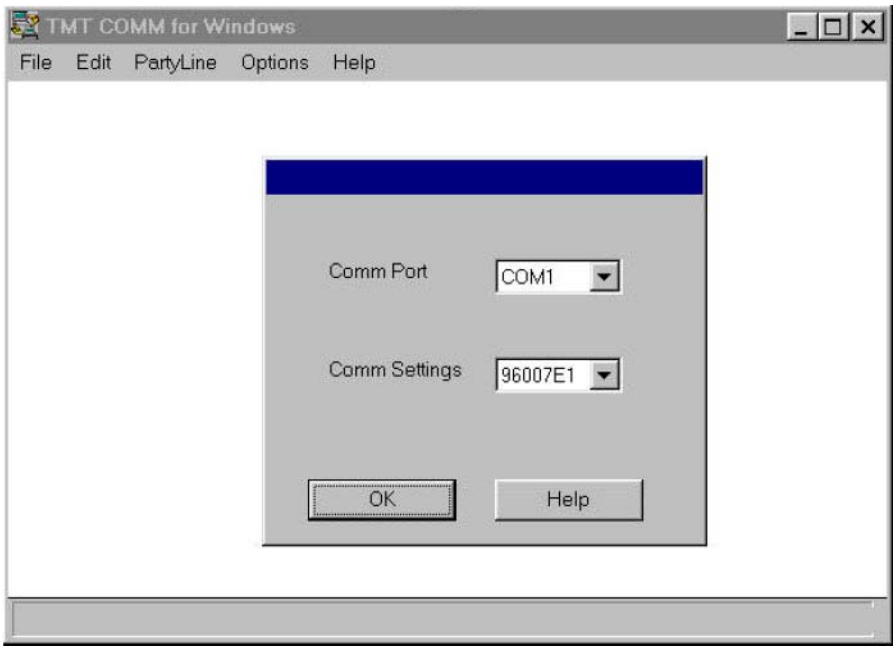

Figure 3–2. Comm Port screen

Party-Line Communication

To communicate with multiple gauges over an RS485 network (party-line), the RS485 ports of the gauges must have been wired correctly. Refer to the appropriate wiring diagram (showing the RS485 wiring) provided with the gauge.

Each unit on an RS485 party-line must be assigned a unique, non-zero ID number from 1 to 32 (maximum of 32 units can be connected via an RS485 party-line). Duplicate ID numbers will cause errors. The default value for the ID number in the gauge software is 0. A unit with ID number 0 (zero) will operate as if it is always in Connect Mode. Units with a non-zero ID number will only respond in Connect Mode or when issued a data update command in data streaming mode. Refer to the user documentation provided with the gauge for additional details regarding serial communications.

In order to assign each unit a unique ID number, you must be able to disconnect each unit from the RS485 party-line and communicate with it directly. Alternately, you must be able to power up each unit individually or add on one gauge at a time as described below. Follow the steps below for each gauge to be added to the RS485 party-line. Refer to "Party-Line Support" later in this chapter for information on how to access the various commands discussed below.

1. Before adding a new unit to the group, issue the Sleep command. From the main screen, select **File > HandHeld Mode**. Power up all of the units in the group except the new gauge. With all units on the party-line in the Disconnect Mode, send the Sleep command. The units will continue to operate normally but will not respond to any commands other than the Wakeup command.

2. Power up the new unit to be added to the party-line and determine its ID by issuing a Request ID command. If the unit has not previously been assigned a unit number, it will have a default ID of 0 (zero).

3. Connect to the new unit and issue the Connect command for the new unit.

4. You can change the unit number for the gauge using the serial port menus, or you can enter the value using a direct entry code. To do this:

   a. Press **X**.

   b. Enter **034002** and press the down arrow.

   c. Enter the new ID number for the unit.

   d. Press **X** to store the new ID number and exit the direct entry mode.

Monitor Mode

This mode allows for an "at-a-glance" monitor of all units on the RS485 party-line. At user-specified intervals, the software will poll each selected unit for its Measurement 1 value and display the accompanying dialog. Then, the monitor will also flag any unit in system fault by turning the unit's display to red. The monitor dialog is shown below.

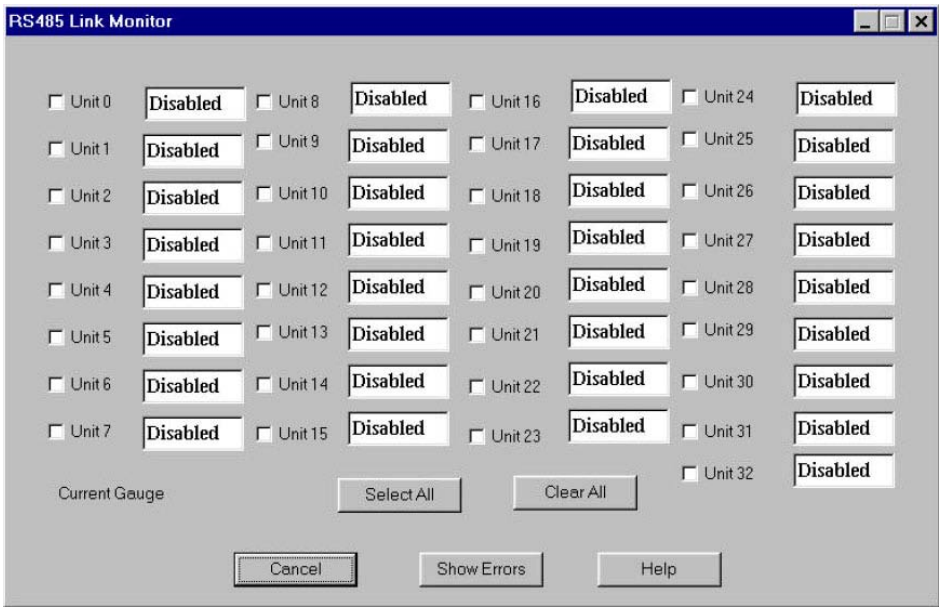

Figure 3–3. TMT Comm in Monitor mode

General Operation

The Monitor uses the "Super Blind" protocol to interrogate the units for measurement and alarms. This protocol employs a packet of the form:

```
[Start Character][Address][Direct Entry Code][Checksum]
```

where

`Start Character` is the pipe '|' (ASCII code 124).

`Address` is 32 + the unit's RS485 node address given by direct entry code 220C.

`Direct Entry Code` is any legal direct entry code.

`Checksum` is the 16 bit sum of the ASCII codes of all characters from the start to the end of the payload. This checksum is sent in Hexadecimal ASCII.

Then, the instrument response packet is in the same format. This packet protocol offers both address and checksum validation of response packets. In particular, the Monitor gets Measurement 1 via direct entry 741F and the System Fault Alarm via 0A2B.

Link Update Time

Specify the interval time between Monitor updates from the Options menu.

Entering Link Monitor Mode

Enter Link Monitor mode by selecting **File > Link Monitor**. The software will invoke the Monitor dialog and change the screen title to "TMT COMM for Windows – Monitor Mode" to indicate that it is running in Link Monitor mode.

Link Monitor Errors

The Link Monitor maintains a record of all communication and instrument errors that it encounters. Click the **Show Errors** button to view the error log.

Choosing Units for Monitoring

A unit is selected for monitoring by checking the appropriate box in the Monitor dialog.

Select All for Monitoring

This option selects all 33 units for monitoring

Clear All from Monitoring

This option clears all unit selections.

Exiting Link Monitor Mode

This mode is exited by closing the Monitor dialog.

Handheld Mode

The handheld mode models the behavior of the Thermo Scientific Model 9734 handheld terminal and provides the following:

- A simple ANSI terminal for accessing gauge menus.
- Support for Thermo Scientific RS485 party-line protocol.
- Data logging feature to write all data from the gauge to hard disk.
- Clipboard support, which allows you to copy and paste data in other Microsoft® Windows® applications.

Entering Handheld Mode

Enter Handheld mode by selecting **File > HandHeld Mode**. The screen title will change to "TMT COMM for Windows – HHT Mode" to indicate that it is running in handheld mode.

Party-Line Support

The software supports the various RS485 party-line functions with a dialog invoked from its main menu bar. These functions are described below.

- **Connect** to Gauge: Allows a user access to a particular instrument's setup menus. If successful, the target gauge should report "Connected to Unit N". Once entered, all other units should cease data streaming to prevent data collisions on the link.
- **Disconnect** from Gauge: Returns the connected gauge back to the normal "disconnected" state. All units should resume normal data streaming.
- **Request ID**: Issues a global request to all units to report their individual RS485 unit numbers. Each unit should report its ID in succession.
- All Units to **Sleep** Mode: Issues a global request for all units to enter sleep mode, in which they suspend data streaming and ignore any connect requests. This mode is useful when adding another unit to the party-line.
- All Units to **Shutup** Mode: Issues a global request for all units to enter Shutup mode, in which they suspend normal data streaming but still acknowledge connect requests.
- All Units to **Wakeup** Mode: Issues a global request to all units to return to normal data streaming mode. This command cancels both the Sleep and Shutup modes.

Data Logging

The software support a data logging function, logging all received RS485 transmissions to hard disk. This mode is useful for capturing the data stream for diagnostic purposes. Open the log by selecting **File > Log Data**. You will be prompted for the log file's name. If successful, "Log File Open" will be displayed in the status bar. Close the log file by selecting **File > Stop Logging**.

Clipboard Support

The software supports copy / paste operations to the Microsoft Windows clipboard. The text to be copied may be selected by highlighting it with the mouse or by selecting **Edit > Select All** from the main screen. Copy the selected text to the clipboard by pressing **Ctrl-C** on the keyboard or selecting **Edit > Copy**. The software also supports the Pause key, which will suspend screen updates until pressed again. This function is useful when copying scrolling data stream updates.

Exiting Handheld Mode

Handheld mode is exited by selecting **File > Kill Active Mod**e or pressing **Ctrl-K** on the keyboard.

File Transfers

This mode supports the gauge's ability to transmit / receive NV setup images over the RS485 link. All non-zero setup variables will be included in this dump. The NV setup data is transmitted in packets with the format of:

`[Start Character][Address]`[Start Data]`[Item Count][Data Payload][Checksum]`

where

`Start Character` is '~' (ASCII code 126).

`Address` is 32 + the unit's RS485 node address given by direct entry code 220C.

`Start Data Character` '{' marks the beginning of the payload.

`Item Count` is the number of setup variables in the data payload section.

`Data Payload` consists of `[Item Count]` Hex direct entry codes followed by their values. Each entry is delimited with a backslash '\'.

`Checksum` is the 16 bit sum of the ASCII codes of all characters from the start to the end of the payload. This checksum is sent in Hexadecimal ASCII.

As an example, the packet below is addressed to Unit 0 and contains five data entries. In the payload, the variable 5820 is set to 3, 600C to 1, 640C to 2, 871C to 70. Then, the packet checksum is given by 099B.

```
~ {054A0C01\582C03\600C01\640C02\871C70\099B
```

Entering File Transfer Mode

Enter File Transfer mode by selecting **File > File Transfer**. The software will invoke the File Transfer dialog and change the screen title "TMT COMM for Windows – File Transfer" to indicate that it is running in file transfer mode.

Choosing RS232 or RS485

Transfers on the RS485 or RS232 are supported. When RS232 is chosen, the Gauge Unit list box is disabled because unit numbers are meaningless.

Entering File Name

Although the software will accept any legal file name, NV setup files use the extension "*.TMT" by default.

Selecting Gauge Number

Select the target gauge's RS485 unit number with the drop-down list box.

Upload/Download

The Upload button will transfer the selected image file from the PC to the specified gauge. The Download button will transfer and store the gauge's NV setup data to the specified file.

Cancel Op

This button may be used to abort any transfers which may have "hung".

Transfer Statistics

This dialog reports the error counts from the last transfer.

Exiting File Transfer Mode

This mode is exited by closing the File Transfer dialog.

TMT COMM Shortcut Keys

General

- Ctrl-K: Kills the active mode.

HHT Mode

- **Alt-C**: Clears the terminal screen
- **Ctrl-C**: Copies selected text to clipboard
- **ESC**: Clears selected text.
- **PAUSE**: Suspends screen updates for copy / paste operations.

Chapter 4
Troubleshooting & Support

General

Table 4–1. General troubleshooting

Problem	Possible Cause / Corrective Action
Cannot establish communication with the party-line.	1. Verify COMM settings, wiring, etc. 2. The software works only with the "blue" RS485 module, which automatically controls communication direction.
After closing HHT, File Transfer, or Link Monitor the software reports "COMM Open Error" when trying to start a new mode.	The COMM port may have been left open when the previous mode was exited. Type **Ctrl-K** to see if that closes the port.

HHT Mode

Table 4–2. HHT mode troubleshooting

Problem	Possible Cause / Corrective Action
Cannot connect to unit N.	The unit may be in Sleep mode and will not accept Connect requests. Issue a Wakeup command, which will cancel Sleep mode.

File Transfer Mode

Table 4–3. File Transfer mode troubleshooting

Problem	Possible Cause / Corrective Action
Cannot upload / download to / from unit N.	1. The unit may be in Network Connect mode and cannot service transfer requests. Issue a Disconnect command (while in HHT mode). 2. The file transfer feature only works with later Thermo Scientific products, such as the Thermo Scientific DensityPRO and LevelPRO gauges. 3. The unit may be in Sleep mode and will not accept Connect requests. Issue a Wakeup command, which will cancel Sleep mode. 4. The wrong port may be selected. Verify COMM settings.

Link Monitor Mode

Table 4–4. Link Monitor mode troubleshooting

Problem	Possible Cause / Corrective Action
Unit N gives continuous TIMEOUT errors.	1. The unit may be in Network Connect mode. The Link Monitor automatically issues several Disconnect commands to take units out of this mode; however, these commands can be missed due to collisions on the link. Exit Link Monitor mode and then enter it again. 2. The unit may be password protected, which blocks all Super Blind requests. Remove the password.
All units give continuous TIMEOUT errors.	1. The party-line may be in Sleep mode. Issue a Wakeup command from the HHT. 2. The Monitor uses Super Blind protocol to interrogate the units. This protocol is only supported by the DensityPRO, LevelPRO, and Accu-Wave (obsolete).
The party-line does not resume data streaming after closing Link Monitor mode.	The Monitor automatically puts the party-line in Shutup mode when invoked to suspend data streaming. When exiting, the Monitor issues a Wakeup command to restore the link. Issue a Wakeup command while in HHT mode.
The Monitor displays sporadic errors.	The software uses the built-in Windows support for serial communications, which can unfortunately get confused during periods of heavy PC usage. Close all unessential applications.
During extended periods, all units show sporadic TIMEOUT and BAD CHKSUM errors.	Thermo Scientific gauges perform periodic self-checks every 10 minutes and may miss Monitor requests during this time. This error can occur even more frequently with fast monitor update times. Try increasing the update time.

Contact Information

The local representative is your first contact for support and is well equipped to answer questions and provide application assistance. You can also contact Thermo Fisher directly.

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