Honeywell

TrendManager Pro User Manual V4.9

Teletrend
Multitrend
Circitrend

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TrendManager Pro V4.9 Site License Agreement

This License Agreement is your proof of license. Please treat it as valuable property.

This is a legal agreement between you (either an individual or entity), the end user, and **Honeywell**. If you do not agree to the terms of this Agreement, promptly return the disk package and the accompanying items (including written materials and binders or other containers) to the place you obtained them for a full refund.

Honeywell ***TrendManager Pro V4.9***

Grant of License

Honeywell grants to you the right to use the software program identified above on an individual computer.

For the purposes of this Agreement, "use" means loading the software into RAM as well as installation on a hard disk or other storage. You may access the software from a hard disk, over a network, or any other method you choose, so long as you comply with this Agreement.

Your registration number, which will be required in ***TrendManager Pro V4.9*** to enter for Trendbus use, is:

36 26 43 33

Chapter 1: Welcome to TrendManager Pro V4.9

Introduction

TrendManager Pro V4.9 is a Windows™-based PC package which accompanies the **Honeywell** range of recorders as a data acquisition and configuration tool. The mouse and keyboard operations are Windows™-orientated and this manual is written under the assumption that the user is familiar with Windows™.

TrendManager Pro V4.9 is designed and written for Windows™ 95, 98 and NT version 3.51 or later. ***TrendManager Pro V4.9*** will run with Windows™ 3.1 but requires the Win32s (version 1.3 or later) 32 bit API extensions.

Any technical terms peculiar to the **Honeywell** range of recorders should be referred to in the **Honeywell** User Manual or the ***TrendManager Pro V4.9*** Reference Manual.

System Requirements

TrendManager Pro V4.9 requires the following minimum specification:

- 80486 or Pentium processor
- 3.5" floppy disk drive
- Windows™ 95, 98, NT v3.51, 3.1/3.11 with Win32s (v1.3 or later)
- 4 Mbyte of RAM (8 Mbyte recommended)
- 4 Mbyte free hard disk space
- a Mouse

If you intend to run ***TrendManager Pro V4.9*** in conjuction with Trendbus the following minimum specifications apply:

- 166 MHz Pentium processor
- 2 Gbyte Hard-drive
- Windows™ 95, 98 or NT
- 32 Mbyte RAM

Optional 8-way RS485 card (Windows™ NT 4.0 only)

Installation

Windows™ 3.1 ***TrendManager Pro V4.9*** will only run under Windows™ 3.1 if Win 32s (version 1.3 or later) is installed. If you do not have a suitable version of Win 32s on your system, installation disks for Win 32s are supplied with ***TrendManager Pro V4.9***.

To install Win 32s on your system

1. Place disk 1 in the 'A' drive of your PC.
2. Select Run from the File options in Program Manager.
3. Type a:\setup then <Return>.
4. Follow the installation instructions on your screen.

When installation is complete you will be asked to restart your PC. ***TrendManager Pro V4.9*** can now be installed.

To install TrendManager Pro V4.9

1. From Windows™ 3.1 select Run from the File options in Program Manager. Type a:\setup and press <Return> to begin installation - follow the instructions displayed on your screen.
2. From Windows™ 95 or 98 click on the Start button and select Run. Type a:\setup then click OK.

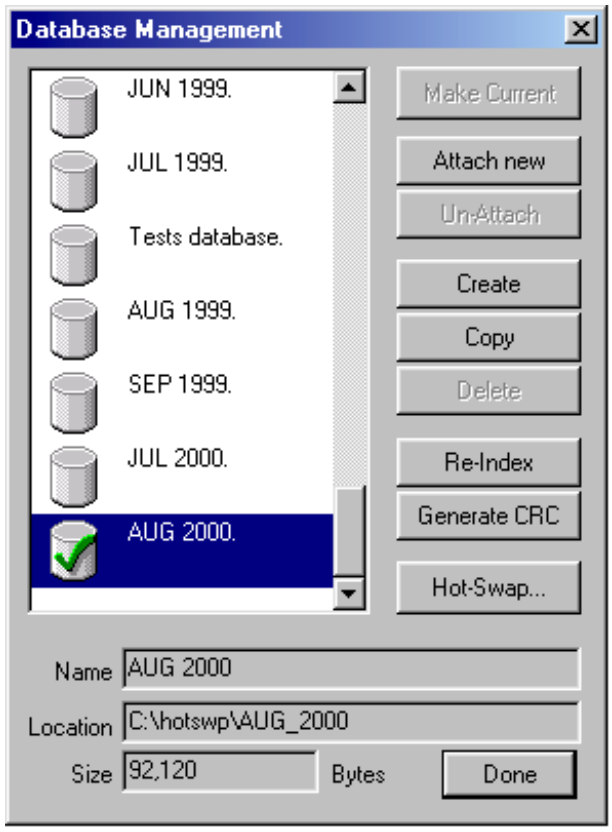
During installation you will be asked to confirm the drive and directory into which you would like ***TrendManager Pro V4.9*** installed. The default drive is C:\ and the directory is Trendpro - you can type in an alternative drive and/or directory of your choice. Click on OK to complete the installation.

Upgrading

If you are upgrading from version 3.3 or version 4.0 to this latest version please do the following:

1. Select Configure-Database from the main menu - the warning message shown below will appear. Click OK to enter the Database Management dialog box.

2. Note the name of the active database (the one with the green tick) - in this case "Original Database."
3. Select a non-active database (e.g. "test database") and click on Make Current, (if you only have a single database in the list, create a new empty database by clicking on Create, then select it).
4. Select the previously active database ("Original Database") and click Make Current.
5. Click Done.



This operation is required because in ***TrendManager Pro V4.9*** graphs are stored locally on the PC on which they were created - this enables multiple users to create graphs from the same data, for instance when the database is held on a network server.

On selecting a database and making it Current, any existing graphs are copied from the database to the new local graph store.

Operation

To start TrendManager Pro V4.9

1. From Windows™ 3.1 open the ***TrendManager Pro V4.9*** Program Group in Program Manager, then double-click on the ***TrendManager Pro V4.9*** icon.
2. From Windows™ 95 or 98 click on the Start button, open the Programs list then select ***TrendManager Pro V4.9***.

TrendManager Pro V4.9 has a comprehensive on-line Help facility which includes detailed instructions on how to use ***TrendManager Pro V4.9***, as well as information on **Honeywell** recorders. A section on using Help in ***TrendManager Pro V4.9*** is also included and this is repeated later in this Chapter.

When ***TrendManager Pro V4.9*** is running a Menu bar and a Toolbar are displayed at the top of the display. A brief description of each of these facilities is given overleaf.

Menu bar

The Menu bar performs in the same way as any standard Windows menu bar. The ***TrendManager Pro V4.9*** Menu bar contains the following options:

- **Configure** - primarily for setting up a **Honeywell** recorder, but also allows certain ***TrendManager Pro V4.9*** configuration and Printer setups.
- **Graph** - from this menu you can open a graph. Once a graph is open, this menu also allows you to set up and print a graph.

- **Data** - from this menu you can either import data from a recorder or export data to other PC applications.
- **View** - from this menu you can enable or disable certain features such as the Toolbar or Status bar.
- **Help** - this menu offers all the Help-related functions.

One other item, Window, is added to the Menu bar when a Graph Window is open. This is a standard Windows application item.

Toolbar

The Toolbar allows quick operation of certain functions found in the Menu bar. Tool Tips are given for each icon in the Toolbar - point to an icon with your mouse pointer and a brief description of that icon will appear.

To operate a Toolbar function click on the corresponding icon.

Help in TrendManager Pro V4.9

Help in ***TrendManager Pro V4.9*** can be used in various ways.

1. Select Index from the Help drop-down menu and choose the topic on which help is required.
2. Click on the Help Icon, then point-and-click on the relevant topic.
3. Press F1 to call up information on the contents of the currently active window.

There are two types of Help topic:-

- A jump topic is in green text with a single underline - clicking on this piece of text will result in a jump to a new topic.
- A pop-up topic is in green text with a dashed underline - clicking on this piece of text, displays additional information which will appear, then disappear when clicked a second time.

Closing Help

Close the Help Window as you would for any Window within the Microsoft Windows system.

Help Maze

The Help Maze provides an overview of the entire ***TrendManager Pro V4.9*** Help system - click on a signpost in the Help maze to jump to a topic. The Help Maze will close down behind you.

Click on this button to enter the Help Maze

Click on this button to leave the Help Maze.

Remember you can press F1 at any time when ***TrendManager Pro V4.9*** Help is running for general instructions on using a Windows-based Help system.

Chapter 2: Getting the most from TrendManager Pro V4.9

TrendManager Pro V4.9 includes a range of features designed to make life easier but which are not always obvious to the first-time user. This document is intended to help you get straight to those features, improving the functionality of ***TrendManager Pro V4.9***.

Recorder Configuration

TrendManager Pro V4.9 allows you to set up a **Honeywell** recorder from the comfort of your PC. The heart of this facility is the Recorder Configuration Page, from where you have access to the set-up facilities available on a **Honeywell** recorder. The advantage of keyboard and mouse operations makes the entire process much faster. Once you have selected your set-ups save them to floppy disk so that you can transfer the set-ups to a **Honeywell** recorder.

Some of the main features of the Recorder Configuration Page are described below.

- Copy Pen set-ups to other pens using the right mouse button - click-and-drag a Pen button over to another pen you want set-up in the same way. This copies ALL pen set-ups, including Maths Expressions, which means that the copied pens will display the same data as the original.
- The amount of recording time with your chosen set-ups is calculated for you by the Disk Usage Calculator - click on the Disk Use button with the left mouse button to operate this feature.
- The simulated display provides you with an instant means of assessing how your current set-ups will look on a **Honeywell** display.
- To save set-ups to disk place the disk in the drive of your PC and click on the Export button.

See Recorder Configuration Page in the Help facilities.

Importing Data

Having used ***TrendManager Pro V4.9*** to set-up a **Honeywell** recorder, the next main function of ***TrendManager Pro V4.9*** is to store your recorded data. Take the disk from your recorder, place it in the drive of your PC and click on the Import icon.

NB. If you are ever unsure about what an icon does, place the mouse pointer over it and a "tool tip" will appear, giving a brief description of the icon.

Data is stored under individual "Recorders" on the ***TrendManager Pro V4.9*** database. It is worth investigating the on-line Help for this subject to fully understand the Import process.

The main features of the Import Data facility are:

- The Import Window which provides information on incoming data and shows the progress of the operation.
- Automatic creation of new "Recorders" on the database where the data can be stored according to the ID number and description of the source recorder.
- Choose whether to include the latest set-ups from the source recorder along with the imported data.

See Importing Data in the Help facilities.

Graphing

TrendManager Pro V4.9 allows you to prepare the data imported from **Honeywell** recorders as a graph. To open a graph click on the Graph icon which displays the Graph Settings Page. From here select various data sources for your graph. (Data is imported to each "Recorder" on the ***TrendManager Pro V4.9*** database under the Pen on which it was recorded - a data source is therefore a particular Pen from any one of the "Recorders" on the database.)

The main features of the Graph Settings Page are:-

- "Click-and-drag" a data source (or Pen) to a Graph Area using the left mouse button.
- Graphs can be split into up to four graph areas, each of which could contain 12 different data sources. A graph area is activated as soon as you "drag" a data source into it.
- Remove a data source from the Graph Settings Page by dragging the data source to the Remove Bin.
- Select the style in which a data source will be displayed on a graph by double-clicking on the data source in a Graph Area - this generates the Trace Settings Page.

Further selection of data for a graph is possible through the Data Locator (see below).

The Data Locator is a tool for selecting various data sources over a specified time span. Within the Data Locator each data source is represented as a coloured bar which stretches over the time span during which the data was recorded. Where the data was recorded over more than one recording session, the bar will be split into sections representing each session. The Data Locator is used as follows:-

1. Click on the Enable check box to select a data source.
2. Specify the overall time span by "dragging out" a box to the width you require. Alternatively, use the Zoom buttons to reduce the time span ("In" button), increase the time span ("Out" button) or return to full width ("All" button).
3. Move to a particular point in time by "dragging" the scroll bar using the left mouse button - the centre time of the Data Locator is shown as you move the scroll bar.
4. Click on a data source with the right mouse button to bring up information on that session such as Start time, Stop time, Logging method used, and Number of readings.

The Data Locator displays the time span and sources of data made available to a graph (or exported to another application - see Exporting Data overleaf).

Graphs are opened as Graph Windows, and can be moved, re-sized or minimised in the same way as any standard Windows™ application. Once you have selected the layout of your graph, it can then be printed or the data shown in the graph can be exported to another application.

Using the Mouse

- "Click-and-drag" a box around a section of the graph to “zoom in”, either on the x-axis, or the y-axis, or both.
- Cancel a "click-and-drag" operation by clicking the right mouse button while the left button is still held down.
- Switch between scales for each trace by double-clicking on the scale of a Graph Area.
- Double-click on a scale with the right mouse button to return the Graph Area to full y-axis.
- Various icons become available in the ***TrendManager Pro V4.9*** toolbar when a Graph Window is open.

Exporting Data

Data can be exported from ***TrendManager Pro V4.9*** in Comma Separated Variable (CSV) format to files which can then be imported to other applications on your PC, such as Microsoft Excel™, Lotus 1-2-3™, and Quattro Pro™.

Data can be exported in two ways:-

1. Click on the Export icon to export data selected in the Data Locator (as described in Graphing in the previous section).
2. Click on the Export View icon, which exports the data contained in the Graph Window activated at the time.

Both methods call up the Export Window - here select whether you want to export the data using the standard or Lotus 1-2-3™ time/date format.

Snap Shot Viewer

This facility allows you to look at Screen Dumps taken from a **Honeywell** recorder. (Screen Dumps are instantaneous images of the recorder display captured on disk when the SHIFT and MODE keys are pressed.)

To use the Snap Shot Viewer, place the disk containing the Screen Dumps in the drive of your PC and click on the Snap Shot icon. ***TrendManager Pro V4.9*** will automatically scan the disk and present any detected Screen Dumps as a list on the right side of the screen. Highlight the selection required by clicking on the relevant item in the list, then click on View Snapshot. The image will appear on the left side if the screen.

Chapter 3: Honeywell Communications

Introduction

There are two types of RS485 network communications that can be used with **Honeywell** recorders for the purposes of downloading data to a host in real time.

Trendbus is a **Honeywell** protocol that is used in conjunction with the Windows-based ***TrendManager Pro V4.9*** software. This allows real-time downloading of data to a host PC which ***TrendManager Pro V4.9*** uses to create real-time graphs and update records of the set-ups for each recorder in the network. This manual details the MultiPort Trendbus function where up to 8 communications ports may be used from one PC running ***TrendManager Pro V4.9***. For single port Trendbus operation please refer to the **Honeywell** Comms User Manual (Part number 43-TV-25-02).

Modbus™ is an industry standard protocol used in many SCADA packages for network control. This allows **Honeywell** recorders to be inserted into existing networks using Modbus™ or linked directly to a controller over an RS485 link. Please refer to the **Honeywell** Comms User Manual (Part number 43-TV-25-02) for information on Modbus™.

Chapter 4: Trendbus

Introduction

This section is intended for use with **Honeywell** recorders fitted with a Trendbus communications card.

Trendbus is an RS485 serial communications protocol developed by **Honeywell** enabling 32 recorders to be linked in a network configuration. Each recorder may download information to a PC. Using ***TrendManager Pro V4.9***, data from selected pens on any of the networked recorders can be saved in the ***TrendManager Pro V4.9*** database and displayed as graphs in real time.

This section expains how to install and operate recorders using the Trendbus communications network. Further instructions are found in the **Honeywell** User Manual and the ***TrendManager Pro V4.9*** on-line Help facility and references to these aids are made in this manual where necessary.

NOTICE

When using Trendbus communications, the recorder date/time is synchronized to the PC clock which bases all its calculations on the Time Zone currently in use.

To avoid problems, the user MUST ENSURE THAT AUTOMATIC DAYLIGHT ADJUSTMENT IS TURNED OFF. This will mean that manual time adjustment forwards or backwards an hour will be necessary in order that the time of the recorders be the same as the local time. Some users may not want to allow for daylight saving, and log all data to GMT or their local standard time at a fixed offset from GMT. There are no difficulties associated with this mode of operation.

Recorders which are not connected to Trendbus will have to be adjusted manually for daylight saving. The data imported into ***TrendManager Pro V4.9*** will always be graphed at the time of the data, with no allowances for daylight saving being made, e.g. data recorded at 10 a.m. will be graphed on ***TrendManager Pro V4.9*** at 10 a.m. whether or not the PC is an hour ahead. If users wish to combine their data from different processes on one graph, they must ensure that all recorders are synchronized.

Specifications

Recorders

Any model of **Honeywell** *V5* Recorder can be installed in a Trendbus network.

The recorder must also be fitted with an RS485 card.

PC requirements

An RS485 card or an RS232-485 converter is required. (For example, a Westermo MA-42 fitted directly to the RS232 serial comms port of your PC would be sufficient.) Any converter or card must be capable of half-duplex operation using RTS control.

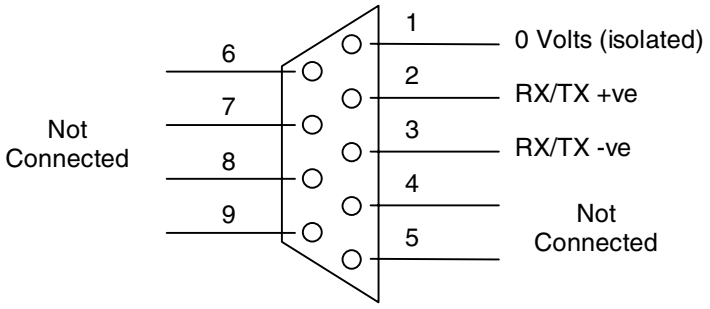
Your PC must be running Windows™ 95, 98 or NT - Windows™ 3.1 cannot support Trendbus.

The Trendbus communications configuration is included in ***TrendManager Pro V4.9***, and as such your PC must be of the standard specified in the ***TrendManager Pro V4.9*** Installation Instructions.

Installation and Connection

Trendbus networks are subject to standard RS485 specifications.

Connection to the network is made via the 9-way D-type connector on the rear panel of the recorder. The pin-outs are as shown below:



Operation

Ensure that the Comms facility is enabled on each recorder in the network and that all recorders are set to the same baud rate. To do this select the Comms option in the Special Setups menu as described in the **Honeywell** User Manual.

The remainder of the set-up procedure is performed in ***TrendManager Pro V4.9***. Full information is contained in the ***TrendManager Pro V4.9*** on-line Help facility, but a brief sequence of actions is given below for ease of reference.

1. From the Configure menu in ***TrendManager Pro V4.9,*** select the Communications option.

2. From the Trendbus dialog box, check the Enable Trendbus box and select the Comms port on your PC to which the network is connected. Select the same baud rate as selected on each of your recorders in the network.
3. Click on OK and the Communications Status window will appear. (You can remove this window by clicking on the Close button, open it again by selecting Communications Status from the View menu.)
4. Each recorder on the network should have a corresponding recorder on the ***TrendManager Pro V4.9*** database. To check this select Recorders from the Configure menu - a list will appear with all the recorders on the database. The ID numbers of each of these recorders should be unique and should correspond to the ID numbers of the recorders in the network. (If you cannot find a networked recorder on the database, you may need to create one as described in the ***TrendManager Pro V4.9*** Help section on Creating a New Recorder.)
5. For each networked recorder on the database you must go to the Recorder Configuration page and select System. In the Comms section of the System settings ensure that the Enable Trendbus for this Recorder check box is ticked.
6. For each individual pen required for the network, go into the Comms section of the Pen Setups page. From there tick the Comms Pen Enable check box and select the logging method and speed for data from that Pen to be downloaded onto the network.
7. When the set-ups are complete, click on OK in the Recorder Configuration page and that recorder will be added to the Communications Status window. Data will immediately be downloaded from the selected pens on that recorder to the ***TrendManager Pro V4.9*** database.

With the recorders on the network being successfully linked to ***TrendManager Pro V4.9***, saved information may be displayed in a graph. Create a graph in the normal way and select the relevant pen either from the Data Locator or by adding a data source in the Graph Settings page. All the graphing functions are available and data transferred via both Trendbus and floppy disk can be presented on a graph. When selecting a pen as a data source for a graph, the means by which the data for that pen was acquired is shown by the following symbols:-

Data acquired from a Pen via Trendbus 

Data transferred to ***TrendManager Pro V4.9*** via floppy disk 

As data is transferred to a graph from networked recorders, the traces will eventually reach the edge of the graph. If you select the Auto Scrolling option from the ***TrendManager Pro V4.9*** toolbar, the graph will be redrawn with the latest data when the edge of the graph is reached.

Important points about Trendbus

Purpose

Trendbus is designed to allow the user to receive data from remote recorders, without having to retrieve the disk from the unit. It is not a substitute for recording data onto floppy disk, which can be done at faster logging rates and with less risk of interruption.

Functions

TrendManager Pro V4.9 uses Trendbus to perform the following functions:-

- Retrieval of the current recorder set-up.
- Retrieval of real-time data from individual channels on networked recorders at independent sampling rates and methods.
- Time synchronisation of networked recorders.

Setups can not be transferred to a recorder using Trendbus.

Data acquisition

Data acquired using Trendbus is stored in a different location on the ***TrendManager Pro V4.9*** database from data transferred via floppy disk. The fastest logging rate is 1 second/log and data retrieval can be interrupted during ***TrendManager Pro V4.9*** operations. For this reason Max-Min logging method is recommended, as the recorder will store the maximum and minimum readings obtained during the interruption and pass those readings to ***TrendManager Pro V4.9*** when communications are resumed.

The Communications Status window lists all the networked recorders and reports if there is an error or interruption in data transfer between recorder and ***TrendManager Pro V4.9***.

For further information consult the on-line Help facility in ***TrendManager Pro V4.9***, which gives comprehensive details on Communications set-ups, operations and features.

Chapter 5: Trendbus Troubleshooter

Please refer to Appendix A for Westermo MA-42 configuration.

Follow these instructions to eliminate any Trendbus problems:

RS485 to RS232 converter

1. Ensure that the PC is connected to the bus via the specified RS485 to RS232 converter, and that the converter is configured as follows:
   - RX-Line Terminator IN.
   - Receive Echo OFF.
   - Transmit Enable RTS.
   - Links to connect the converter for Half-Duplex operation, [i.e. TX(A) to RX(A) and TX(B) to RX(B)].
2. Check that the power supply is connected and turned on!
3. Ensure that the recorders are correctly connected to the bus.

Recorder Configuration

1. Ensure that each recorder is configured for Trendbus as follows:
   - In the Factory Hardware options, ensure RS485 TMP Comms is selected.
   - In the Comms settings (Special Set-up menu) check that the baud rate is set correctly.
2. Ensure that the recorder has the correct Unit ID Number, and that it is different on each recorder.

TrendManager Pro V4.9 Configuration

1. Ensure that each recorder required to communicate using Trendbus is enabled to do so in the System settings for that recorder.
2. Ensure that one or more pens are configured to receive Comms data in the Pen settings for that pen.
3. From the Configure Communications option, enable Trendbus and check that the baud rate is set to match the recorders on the bus, and that the Comms port is correct.

The Communications Status window will give the status for each recorder. The values displayed and their meanings are as shown below.

Mode	Description
Initialising	Trendbus is being configured.
Downloading	***TrendManager Pro V4.9*** is attempting to download set-up information from the recorder.
Real-Time	***TrendManager Pro V4.9*** will request real-time data when required.
In Set-Up	The user has entered Set-Up on the recorder. During this time, no data is logged for the recorder, and once the user exits Set-Up the mode will change to “Downloading”.
Configuration error	The pens selected for Comms do not correspond with the pens enabled on the recorder.
Disabled	A recorder has been removed from Comms operations.
Waiting	Occurs briefly at Start-Up and if the user enters Set-Up on the recorder.
(blank)	***TrendManager Pro V4.9*** is retrying the operation.
No Reply	***TrendManager Pro V4.9*** received nothing from the recorder. Work through the above checklist to ensure configuration is correct. If all is OK, then your PC is unsuitable for Trendbus operations. (See minimum PC specification)
RX Error	***TrendManager Pro V4.9*** received a reply from the recorder, but it was corrupt. If the error persists you may have a faulty connection on two recorders with the same ID Number (see note below.)
TX Error	***TrendManager Pro V4.9*** tried unsuccessfully to communicate with the recorder via Trendbus. If this persists check that you have selected a valid comms port on your PC. If this is OK then your PC is unsuitable for Trendbus operations. (See minimum PC specification)
Error	A general comms error has occurred. Your PC is unsuitable for Trendbus operations. (See minimum PC specification)
Talking	Trendbus has received real-time data from the recorder. Trendbus is working correctly - Congratulations!
Talking *	Trendbus has received real-time data but it arrived later than expected. If this is a common occurrence then the system is too heavily loaded. The user should reduce the log rate for the pens of the recorder(s) in question.

Continuous RX Errors

If you are frequently getting an RX Error message in the Communications Status window, and you have checked that

- There is no faulty connection in the RS485 wiring.
- There are no recorders in the network with the same ID number. You should try amending the RX timeout in the TMP.INI file. To do this use a text editing package, such as Windows™ Notepad, to open the file. In the [comms] section of the file you will find a line Timeout = 100. Change the value from 100 to 200, then save and close the file.

If you are still getting frequent RX Error messages, try changing the Baud rate of the network, first to 19200, then, to 9600. (Change the baud rate on the recorders also.)

Chapter 6: Modbus™

Introduction

Controllers using Modbus™ communicate using a master-slave technique, in which only one device (the master) can initiate transactions (called "queries"). The other devices (the slaves) respond by supplying the requested data to the master. **Honeywell** recorders play the role of a slave in a Modbus™ network, and when addressed by a master will return a message (called a "response") to the query. The Modbus™ protocol establishes the format for the master's query by placing into it the device address, a function code defining the requested action, any data to be sent, and an error-checking field. The slave's response message is also constructed using Modbus™ protocol. If an error occurs in receipt of the message, the slave will construct an error message and send it as its response. Modbus™ is a well-documented industry standard and it is not the purpose of this manual to go into detail on how Modbus™ operates. Documents such as the Modicon Modbus™ Protocol Reference Guide provide in-depth information on Modbus. Certain aspects of using Modbus communications with a **Honeywell** recorder are peculiar to the product, and this section of the manual will deal with these aspects.

Specifications and Protocols

Recorder

To connect a **Honeywell** recorder to a Modbus™ network the recorder must be fitted with a **Honeywell** Modbus™ card. This card is terminated in a 9-way D-type socket which provides connection for serial RS485 Modbus™ communications.

Master

Honeywell recorders incorporated in serial Modbus™ networks require the RTU mode of message framing. The following function codes are supported by **Honeywell** recorders (refer to Modicon Modbus Protocol Reference Guide for further information).

01	Read output coil status	Reads the ON/OFF status of discrete outputs (0X registers) in the slave.
02	Read input status	Reads the ON/OFF status of discrete inputs (1X registers) in the slave
03	Read holding registers	Reads the binary contents of holding registers (4X registers) in the slave.
04	Read input registers	Reads the binary contents of input registers (3X registers) in the slave.
05	Force single output coil	Forces a single coil (0X register) to either ON or OFF.
06	Pre-set single holding register	Pre-sets a value into a single holding register (4X register)
07	Read exception status	Reads the contents of eight Exception Status coils within the slave controller. Certain coils have pre-defined assignments in the slave, others can be programmed by the user to hold information about the slave's status.
08	Diagnostics	Provides a series of tests for checking the communications system between master and slave, or for checking for various internal error conditions within the slave.
15	Force multiple coils	Forces each coil (0X register) in a sequence of coils to either ON or OFF.
16	Pre-set multiple registers	re-sets values into a sequence of holding registers (4X registers).

The function codes above are applicable to particular registers. The individual Modbus™ registers used on **Honeywell** recorders are described below. For ease of reference, a concise version of the information below is included in Appendix B.

Modbus™Start Reg	Class	Number of Points	Input/Output	Comments
0:0001	Digital	16 bits to 0:0016	Output	Set relay outputs

Relay output override. The state of relay outputs on a recorder can be set from the Modbus™ master. Relay override must be enabled in registers 0:0009 to 0:0016 for Relays O1 to O8 respectively, where 0 = disabled and 1 = enabled. The relays are then set in registers 0:0001 to 0:0008 for Relays O1 to O8 respectively, where 0 = open and 1 = closed.

Modbus™Start Reg	Class	Number of Points	Input/Output	Comments
1:0001	Digital	24 bits to 1:0024	Input	Read digitals

Digitals. (Bits 1:0001 to 1:0016 can be addressed as a 16 bit word at 3:0001, and bits 1:0017 to 1:0032 as a 16 bit word at 3:0002.)

The state of the contact between the NO and C terminals of a digital are read from registers 1:0001 to 1:0008 for channels O1/I8 to O8/I1 respectively, where 1 = closed contact.

Registers 1:0009 to 1:0016 are reserved.

Registers 1:0017 to 1:0024 are used specifically for the state of Digital Inputs 8 to 1 respectively where 1=externally applied closed contact. (Typically DI3 - DI8 are not used and should never be 1.)

Registers 1:0025 to 1:0032 are used specifically for the state of Relay Outputs 1 to 8, where 1 = contact closed internally or by the Modbus™ master override.

.

Modbus™Start Reg	Class	Number of Points	Input/Output	Comments
3:0033	Analogue	9 Floats	Input	Pen 1 to 9 (Array)
The analogue value of each Pen is stored in two register locations, (where each register is two bytes), as a float-type value, which is therefore four bytes, (so Pen 1 starts at register 3:0033, Pen 2 at 3:0035, Pen 3 at 3:0037, and so on).				
3:0257	String	20 Char	Input	Pen1, Units, Scale Factor, Name
3:0267	String	20 Char	Input	Pen2, Units, Scale Factor, Name
3:0277	String	20 Char	Input	Pen3, Units, Scale Factor, Name
3:0287	String	20 Char	Input	Pen4, Units, Scale Factor, Name
3:0297	String	20 Char	Input	Pen5, Units, Scale Factor, Name
3:0307	String	20 Char	Input	Pen6, Units, Scale Factor, Name
3:0317	String	20 Char	Input	Pen7, Units, Scale Factor, Name
3:0327	String	20 Char	Input	Pen8, Units, Scale Factor, Name
3:0337	String	20 Char	Input	Pen9, Units, Scale Factor, Name
The associated information with each Pen value (i.e. the Pen units, scale factor and name) are held as strings of 20 char-type values, with two characters occupying a single register location.				
3:0347	Analogue	9 unsigned integers	Input	Scale top value pens 1 to 9 (array)
3:0356	Analogue	9 unsigned integers	Input	Scale bottom value pens 1 to 9 (array)
These registers hold the scale information for each Pen. The top values are held as 9 unsigned integers (one in each location) starting at 3:0347 for Pen 1 to 3:0355 for pen 9. Similarly, the bottom values are held in 9 registers starting at 3:0356 for Pen 1 to 3:0364 for Pen 9.				
3:1281	Analogue	1 unsigned long	Input	Serial number (value 0..999999)
3:1283	Analogue	1 unsigned integer	Input	ID number (value 0..9999)
The recorder serial and ID number are held in the above locations. The serial number is a long-type integer and therefore needs to be stored in two registers.				
3:1284	String	6 Char	Input	Unit Name
3:1287	String	20 Char	Input	Unit Description
The recorder name and description are held in these registers. The unit name consists of a string of 6 char values which occupy three registers from 3:1284 to 3:1286, and the unit description consists of a string of 20 char values occupying ten registers starting at register 3:1287.				
4:0033	Analogue	8 Floats	Output	C1 to c8 (array)
4:0257	String	18 Char	Output	Time. “hh:mm:ss mm/dd/yy”

These registers can be set from the master. Starting at register 4:0033, float values can be entered for C1 to C8, with two registers required for each float value. These values can be read into maths expressions for particular Pens, for example P1 = A1 + C1, where the value entered for C1 will be added to the reading from Analogue Input 1 and the result displayed on Pen 1.

The master can also synchronise the time and date setting on a recorder by sending an 18 char string starting at 4:0257. The time and date setting is sent as a null-terminated string in the format shown in the table above, including the colons, forward slashes and a space between the last char for the seconds value and the first char for the month value.

NB. C1 - C8 are taken in engineering units of the specified pen.

Installation and Connection

Fitting the Modbus™ card to a recorder

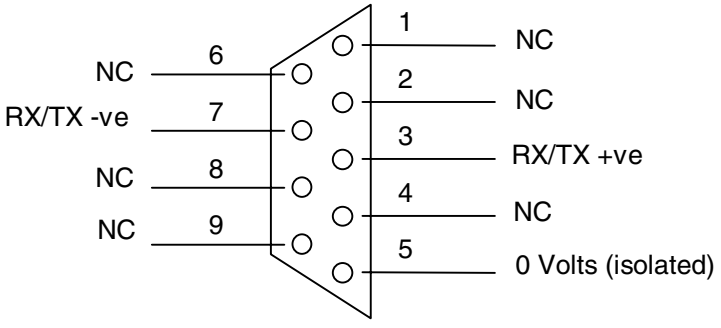
- Ensure hex switches are as described below.

Switch	Position	Value	Comment
SW1	0 - F	High hex digit	Modbus slave address from 00 to FF
SW2	0 - F	Low hex digit	
SW3	0 1 2 3 4 5 6 - F	1200 2400 4800 9600 19200 38400 Reserved	Default baud rate

- Remove the rear panel and and slide out the PCB assembly as described in the **Honeywell** Service Manual.
- Insert Modbus™ card into sockets J9 and J18 on the motherboard of the recorder.
- Re-assemble as shown in the **Honeywell** Service Manual.

Connecting the recorder to a Modbus™ network

This is made via the 9-way D-type connector on the Modbus™ card at the rear of the recorder. The pin-outs for this connector are shown below:



NC - not connected

Chapter 7: Modbus™ Troubleshooter

The following is a list of checks that should be performed in the event of the Modbus™ communications not working correctly.

Installation

1. If you have fitted the Modbus™ card to the recorder, check that it is inserted in the correct sockets on the motherboard of the recorder.
2. Check that the pin-outs of the Modbus™ card 9-Way D type connector match your network connectors.
3. Check that the recorder is configured for Modbus™ communications.
4. Check that the baud rate selection switch and slave address switches on the Modbus™ card are set to match the requirements of your Modbus™ network.
5. Check that no other Modbus™ device on the network has the same hexadecimal address.

Diagnostics

The Modbus™ card is fitted with RX and TX LEDs that indicate whether queries are being received from the master and whether responses are being sent back by the recorder. The following is a list of checks that should be performed in the event of various states of these LEDs.

1. RX flashing, TX off. This suggests that the master is sending queries to the recorder but the recorder is not responding. This may be due to:
   - The recorder not being configured for Modbus™ comms.
   - The Modbus™ card not being correctly installed.
   - Incorrect baud rate and address settings on the Modbus™ card.
2. RX off, TX off. This suggests no messages are reaching the recorder from the master. This may be due to:
   - The RS232-485 converter (if used) not powered up or connected to the master/network incorrectly (e.g. wrong COM port). Check LED diagnostics (where available) on the converter.
   - Incompatible pin-outs between Modbus™ card and network cable.
3. RX and TX flashing, incorrect data being returned. This may be due to incorrect register settings specified in the queries from the master (refer to Modbus™ memory map in Appendix B).

Appendix A - Comms Interface

For connecting of an RS485 Trendbus network to the RS232 serial comms port on your PC, you will require a suitable RS232-to-485 converter. The Westermo MA-42 is recommended for such an application and this appendix provides information on using this particular device.

The Westermo MA-42 provides a reliable link between your computer and the plant. The MA-42 is an external device which is separately mains powered - this avoids the need to open your PC. The MA-42 also provides full opto-isolation between the remote field bus and your PC thereby offering full protection from unwanted voltage spikes and surges.

Installation

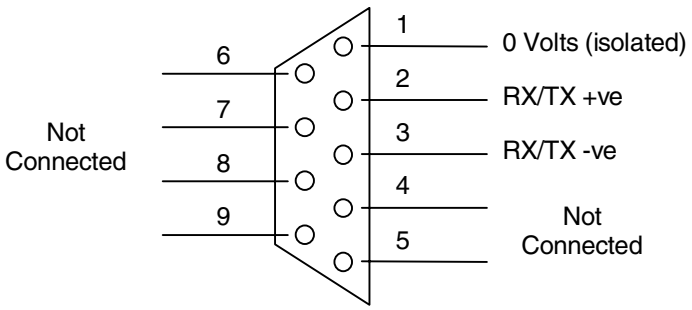
Connection to the serial port of your PC is made using a standard RS232 extension lead to the V.24/RS-232-C connection on the MA-42. The following pins are used in this connection:-

- 2TD (Transmitted Data)
- 3RD (Received Data)
- 4-RTS (Request To Send)
- 5-CTS (Clear To Send)
- 6-DSR (Data Set Ready)
- 7-SG (Signal Ground)
- 8-DCD (Data Carrier Detect)
- 20-DTR (Data Terminal Ready)

Connection to the RS485 network is made from the 5-pin Line Connection terminal on the MA-42. The pins used are as follows:-

Trendbus

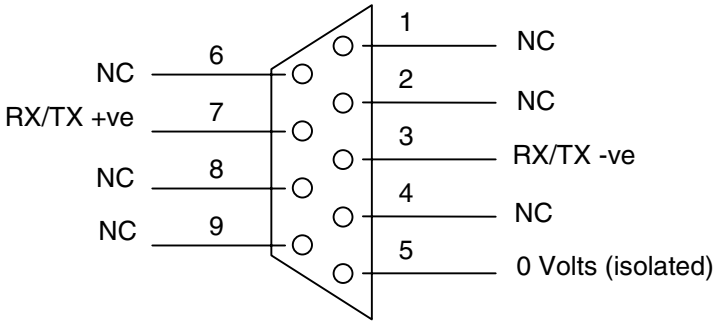
- Terminal 3 (A/A') connects to 9-Way D type connector pin 3 (RX /TX -ve)
- Terminal 4 (B/B') connects to 9-way D type connector pin 2 (RX /TX +ve)



Modbus™

- Terminal 3 (A/A') connects to 9-Way D type connector pin 7 (RX/TX +ve)
- Terminal 4 (B/B') connects to 9-Way D type connector pin 3 (RX/TX -ve)

Pins on this connector are numbered from 1 nearest the Mains connector to 5 nearest the 25-way D-type connector. The screw-terminal mating-half of the connector is supplied with the unit.



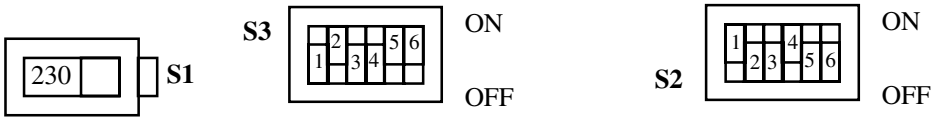
NC - not connected

Configuration

The Westermo MA-42 requires configuration using the DIP switches on the circuit board. To access the switches ensure all leads to the unit are disconnected, then open the case by placing and twisting a flat screwdriver between the top and bottom of the case at the rear of the unit on one corner. Repeat this operation on the other rear corner, then on the front two corners until the top of the case falls free.

The switches are set as follows:-

- S1-set to 230 V or 115 V depending on your Mains supply
- S2-switches 1 and 4 ON
- S3-switches 2, 5 and 6 ON



Operation

With the connections and configuration made as described above, the unit will convert all signals on the RS485 Trendbus network into the RS232 format required by the serial port of your PC. Ensure that the unit is powered correctly, ***TrendManager Pro V4.9*** will control the transfer of data over the network. Any problems can be diagnosed by the LEDs on the MA-42 as described below.

Diagnostics

The LEDs on the front panel of the MA-42 provide the following:

LED	Indication when lit
PWR	Power to the unit is correctly supplied
RD	Data is being received on the RS485 interface
DCD	Simulated carrier controlled by RTS
CTS	Follows RTS
RTS	RS485 transmitter is activated
TD	Data is being received on the RS232 interface

Appendix B - Modbus™ Memory Map

Valid function codes:

01 - Read output coil status
02 - Read input status
03 - Read holding registers
04 - Read input registers
05 - Force single output coil
06 - Pre-set single holding register
07 - Read exception status
08 - Diagnostics
15 - Force multiple coils
16 - Pre-set multiple registers

Modbus™ Start Reg	Class	Number of Points	Input/Output	Comment
3:0033	Analogue	9 Floats	Input	Pen 1 to Pen 9 (array)
3:0257	String	20 Char	Input	Pen1, Units, Scale Factor, Name
3:0267	String	20 Char	Input	Pen2, Units, Scale Factor, Name
3:02757	String	20 Char	Input	Pen3, Units, Scale Factor, Name
3:0287	String	20 Char	Input	Pen4, Units, Scale Factor, Name
3:0297	String	20 Char	Input	Pen5, Units, Scale Factor, Name
3:0307	String	20 Char	Input	Pen6, Units, Scale Factor, Name
3:0317	String	20 Char	Input	Pen7, Units, Scale Factor, Name
3:0327	String	20 Char	Input	Pen8, Units, Scale Factor, Name
3:0337	String	20 Char	Input	Pen9, Units, Scale Factor, Name
3:03407	Analogue	9 signed integer	Input	Scale hi for Pen 1 to Pen 9 (array)
3:0356	Analogue	9 signed integer	Input	Scale low for Pen 1 to Pen 9 (array)
3:1281	Analogue	1 unsigned long	Input	Serial number value 0..999999
3:1283	Analogue	1 unsigned integer	Input	ID number value 0..9999
3:1284	String	6 Char String	Input	Unit Name
3:1287	String	20 Char String	Input	Unit Description
4:0033	Analogue	8 Floats	Output	C1 to C8 (array)
4:0257	String	18 Char String	Output	Time “hh:mm:ss mm/dd//yy”
1:0001	Digital	24 bits > 1:0024	Input	**See “Note 1. Digital Inputs.” on page 28.**
0:0001	Digital	16 bits > 0:0016	Output	**See “Note 2. Relay Output Overrides.” on page 28.**

Note 1. Digital Inputs.

(Bits 1:0001 to 1:0016 can be addressed as a 16 bit word at 3:0001, and 1:0017 to 1:0032 as a 16 bit word at 3:0002)

1:0001 to 1:0008Contact O1/I8 to Contact O8/I1 1 if contact closed internally (Ox) or externally (Ix).

1:0009 to 1:0016Reserved.

1:0017 to 1:0024Digital Input I8 to Digital Input I1 1 only if contact closed externally. (Unused inputs typically I3..I8 never 1)

1:0025 to 1:0032Relay O1 to Relay O8 1 only if contact closed by internal relay, or Modbus™ override. (Non existent relays never 1.)

Note 2. Relay Output Overrides.

0:0001 to 0:0008Relay O1 to Relay O8 Override 0 = Open, 1 = Closed. State of relays O1..O8 only takes effect if corresponding relay override enable bit set too. Gives remote override of relays from Modbus™ master.

0:0009 to 0:0016Relay O1 to Relay O8 Override enable 0 = Disabled, 1 = Enabled. Override enable (normally 0).

NB. Both relay override and override enable can be addressed as a 16 bit value at address 4:0001.

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VWXYZ

Please take a moment to complete this questionnaire

1 Reputation

How would you rate the reputation of **Honeywell**?
Tick as appropriate

- ☐ A very reputable, successful company
- ☐ A reputable company
- ☐ A disreputable company
- ☐ No views either way

2 Service

How do you rate or perceive the following service levels provided by our sales staff?

Tick as appropriate	Excellent	Good	Fair
Response speed	☐	☐	☐
Quality of response	☐	☐	☐
Follow up response	☐	☐	☐
Overall level of service	☐	☐	☐

How do you rate or perceive the following service levels provided by our Technical Support Service?

Tick as appropriate	Excellent	Good	Fair
Response speed	☐	☐	☐
Quality of response	☐	☐	☐
Follow up response	☐	☐	☐
Overall level of service	☐	☐	☐

How could our service be improved upon?

.....

.....

How many times do you receive a visit from one of our Sales representatives? Visits every:

1-3 months ☐ 3-6 months ☐ 6-12 months ☐

How does that compare to our competitors?

More ☐ Less ☐ The same ☐

Score on a level of 1-10, with 10 being the best

Quality of manuals / sales literature	☐
Administration / documentation and letters	☐
Technical expertise of our sales staff	☐
Sales staff ability to give informed advice	☐
The quality of the **Honeywell** sales team.	☐
Pricing	☐
Honeywell understanding of your industry.	☐

3 Products

How do you perceive our range of products?

Tick as appropriate

- ☐ Products offered are **better** than those of competitors
- ☐ Products offered are **worse** than those of competitors
- ☐ Products offered are the **same** as those of competitors

Any other comments

.....

.....

.....

Are there any products that we do not provide that you would like us to provide - or any we could improve on?

.....

.....

.....

Improvements to existing products.....

.....

.....

.....

4 General

If you are an existing or new customer, what made you choose **Honeywell**?

- ☐ Only on price
- ☐ Price plus a combination of factors
- ☐ Prefer to deal with a reputable company
- ☐ **Honeywell** offers more than the competition in terms of 'added value' over and above the product itself

Thank you for completing this questionnaire.

Please fill out your name and address below. Photo copy this form and Fax to us on

+44 (0)1202 476501

Name .....

Company name .....

Address .....

.....

.....

County..... Postcode.....

Tel:..... Fax.....

Company business .....

.....

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Honeywell warrants goods of its manufacture as being free of defective material and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during that period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and **is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

While we provide application assistance, personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change at any time without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

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