

Rotork Modtest II Modbus Module Evaluation and Test Tool

Modbus Test Tool

This test tool software is designed to test and operate a Rotork IQ MK2, IQT or Q Modbus Module for an individual actuator at the actuator. It is not designed to be a network operating system. The Modbus Module communication protocol complies with the Modicon PI-MBUS-300 Rev C specification.

BEFORE YOU BEGIN, you will need the following:

Hardware

- A Personal Computer (preferably a notebook PC) Pentium 100Mhz or above processor, 32 MB Ram, 20 MB free hard drive space, CD ROM Disk Drive, a 9 Pin RS232 Serial Port, Mouse or pointing device and Windows 98/2000/XP, along with MS Office to utilize the Excel spreadsheets. (Note: Screen area for this software is set to 800 x 600 resolution)
- A Rotork Hand Held Setting Tool
- Actuator to test
- The Associated Wiring Diagram for the Customers Actuator (See Appendix A for samples)
- A suitable RS232/RS485 converter

Information

- Address for the actuator to be tested (1 to 247)
- Customers Communications Data Rate (110, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600 or 115200 baud)
- Customers Communications Parity (Odd, Even or None)
- Computer Serial Communications Port Number (typically 1)
- Customers 2 Wire RS485 Highway wire connection:

You will not be able to utilize the Test Software without all of the above. Please read the following instruction manual before proceeding to site.

Related Documents

- S175E Version 2.2 IQ Modbus Module Technical Manual
- E121E IQ Modbus Module
- E170E IQ Setting and Installation Instructions

WARNING: This test device is not Intrinsically safe or suitable for use in hazardous locations. If the actuator nameplates indicate that it is suitable for installation in Hazardous Locations., appropriate safety precautions in accordance with the prevailing local authority should be taken before attempting any work. Work permits that allow servicing of the electrical equipment must be obtained prior to work commencement. Isolate all power before attempting work on the field devices

Contents	Page
1. Introduction	4
2. Getting Started	4
2.1 Unpack Materials	
3. Software Installation	5
3.1 Modbus Test Tool	
3.2 Document Requirements	
4. Address, Baud Rate, Parity and Comm Port	6
5. Configuring the RS232/RS485 Converter	6
6. Making the RS485 Connection to the Actuator	7
7. Operating the Test Tool Software	9
8. Troubleshooting Tips	16
 Appendices	
A. Sample Actuator Wiring Diagrams	17
B. Modbus Module Set Up Records	23

1. Introduction

What This Is:

This manual is designed to direct the installation of the test tool software on a personal computer and to allow configuration and test of a Rotork MK 2 Modbus Communications Module installed in a Rotork IQ MK 2, IQT or Q Actuator.

The software is intended to be a test tool for an individual actuator. The program tests the operability of the Rotork Modbus Module and suitability for use with the customers system in regards to wiring connection, configuration and communications parameters.

Important Note: The MK 2 Modbus module can utilize two different database formats. The New MK 2 database format is detailed in section 7 of S175E V2.2. When the MFU is being used as a spare part to replace the earlier design, it is possible to select the MK 1 database format where data and performance are the same as that used with the MK1 protocol. *This software tool can only be used with the MK 2 database format.* More details will be presented later but it is important that this distinction be understood.

What This Is Not:

This is not designed to be an operating system for a RS485 data network. System integrity is not the responsibility nor within the scope of Rotork's supply hence the software cannot test operability of the customers network as it relates to the Rotork Modbus Module. This manual is not an installation and setting procedure for the Modbus Module. It is assumed that the Modbus Module is already installed properly. If not, refer to publication S175E Version 2.2 in the documents folder on the enclosed CD for set-up instructions.

There are some general troubleshooting tips found in Section 8 that may assist in determining system operation problems.

2. Getting Started

While it is possible to install the software without the required information and hardware shown on page 2, you will not be able to operate the system and test the actuator operation without all the required materials. If you haven't done so already, gather this material now.

In addition, ensure you have the accompanying CD titled "ModtestII Test Tool"

Installing the Software

3.1 Software Installation – Modbus Test Tool

- 3.1.1** Insert the “Modbus Test Tool Software” CD into the CD ROM drive of your computer. Select "run" in the windows Start Menu and type *D:\setup.exe* (*Assuming D is the CD ROM Drive or Use the appropriate letter for your CD-ROM Drive*). Click the OK button..

Set up error messages should be handled accordingly. Any messages regarding overwriting of older files should be answered as NO. Any message requiring a restart of the PC will require you to restart the installation process.

- 3.1.2 Setup Rotork ModtestII Window** after confirming no other applications are running, click Next>.
- 3.1.3 License Agreement Window** Read the agreement and click the “I accept...” button and press the Next> button
- 3.1.4 Information Window** Review the notes and then click the Next> button.
- 3.1.5 Select Destination Location Window** leave this folder as it appears as the default and click the Next> button
- 3.1.6 Select Start Menu Window** click the Next> button to use this default folder
- 3.1.7 Select Additional Tasks Window** decide if you want a Desktop Icon and then click the Next> button
- 3.1.8 Ready to install Window** if ready, click the Install button.
- 3.1.9 Completing the Rotork ModtestII Setup Wizard** decide if you want to start the program and click the Finish button.

3.2 Documentation Requirements

Most of the documents included with the CD are in Adobe .PDF format. To view the documents you must have Adobe Acrobat Reader installed on your PC. If you have this software installed on your PC you can skip this section. If you do not have it installed, it can be downloaded from <http://www.adobe.com/products/acrobat/readstep2.html>

Documents on the CD are to be viewed by running Adobe Acrobat Reader or the appropriate associated document program.

4. Address, Baud Rate, Parity and Comm Port

While this information can be obtained at most any time, do so before the power is shut off to the actuator.

For the IQ MK2 or IQT you can use the standard Infrared setting tool to obtain:

Address
Baud Rate
Parity
Stop Bits will be 1

You must also know the number of the comms port on your computer, typically it is #1.

See also publication S175E V2.2 page 50 for default settings for the above parameters.

You must have this data before you can communicate with the actuator.

Note: Fill out a Modbus Module Set Up Record for both the host controller and each individual actuator. This will prove very helpful for troubleshooting, should you need it. The forms can be found in Appendix C, in addition, the forms are stored electronically as an Excel Spreadsheet in the documents folder on the CD. These can be filled in electronically and e-mailed if needed.

5. Configuring the RS485 Converter

Communications to the Modbus module is via an RS485 communications highway, unless you have an RS485 port in your PC, you will need to utilize an RS232/RS485 converter to establish communications to the module from your PC.

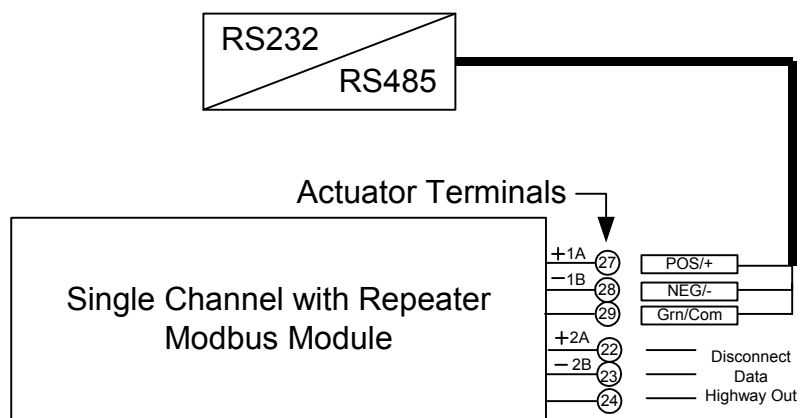
If you are using a Rotork PS412 RS232/RS485 make the settings as needed, note the RS485 Pins required are:

PIN 3 = -
PIN 8 = +
PIN 5 = Signal Ground

This modbus module is configured for RS485 Two Wire connections only.

Note: Other RS232/RS485 converters can be used, attention needs to be paid to any baud rate settings, automatic send control settings etc.. to ensure operability.

Typical 2 Wire RS485 Highway with or without Common Connection for Single Highway with Repeater



Remember to remove the clients Data Highway Out connections or you may transmit signals to the next devices on the network. This may not be desirable especially if the downstream devices have not been addressed or commissioned.

7 Operating the Test Tool Software – Modtest II

To run the program, from your Windows Start Button, select Programs > ModtestII > Rotork ModtestII.

7.1 Opening screen, figure 1

This screen will automatically direct you to establish the communications parameters such as address, baud rate, parity, stop bits and comms port. Clicking on the Yes button will open the Connection Window, see figure 2. Generally, you must establish communications before accessing any of the other utilities in this program.

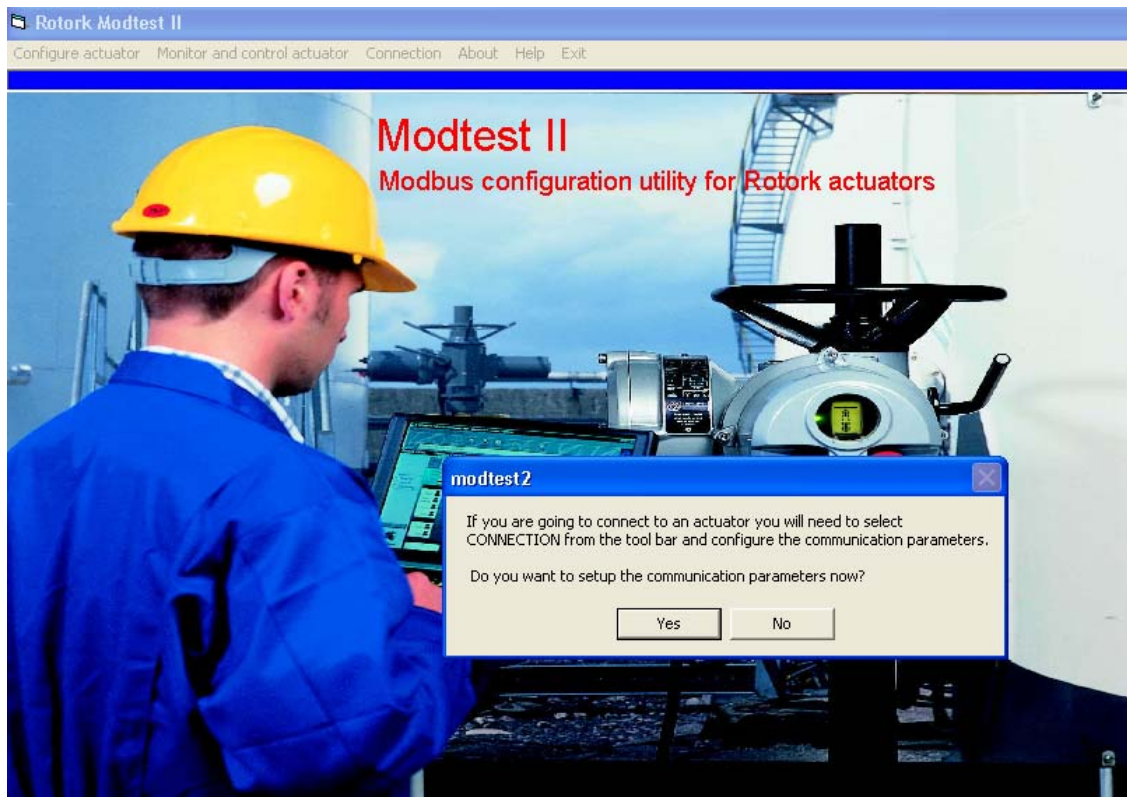


Fig. 1 Opening screen

7.1.1 Connection Window communications parameters are set in this window.

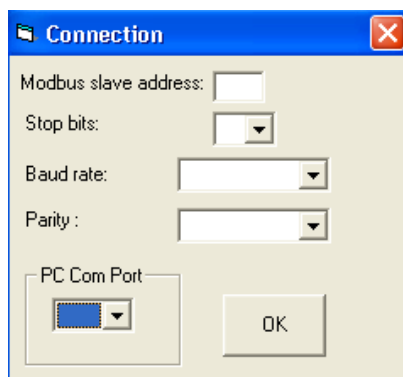


Fig. 2 Connection Window

Manually enter the *Modbus slave address* of the connected actuator. Typically the default address is 247

Select the *Stop bits* for the drop down box. Typically this is 1.

Select the *Baud rate* from the drop down box. Typically, the default is 9600.

Select the *Parity* from the drop down box. Typically the default is None.

Select the *PC Comm Port* that is connected to the RS232/RS485 converter. Typically this is Comm 1.

Press the OK Button and the Testing Communications Window, figure 3, will appear

Testing Communications Window



Fig 3 Testing Communications Window

This step is normal and is in place to check that that communications parameters entered are correct for the connected device. Click the OK button to proceed. After successfully checking the communications parameters a window confirming a connection will appear.

Communications Confirmation Window confirms that the actuator is in the MK II format for use with this software utility. See figures 4 and 4a, click OK to continue. If this does not confirm, the module is in the MK 1 format and you will be asked if you want switch the module to the new database format. See Switching Database Format Window and figure 5.

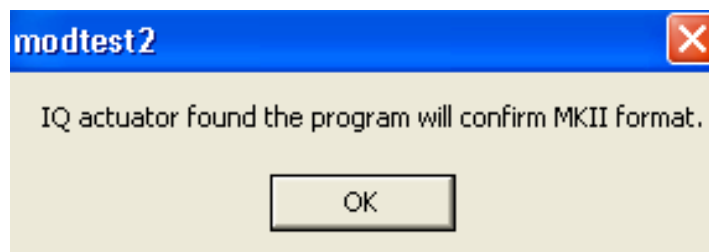


Fig 4 Communications Confirmation Window



Fig 4a MK II Format Confirmation Window

Click the OK button to use the rest of the program facilities.

Switching Database Format Window this will set the database format to the new MK 2 format. Clicking the Yes button will change the format, and then follow the on-screen instructions. You'll need to cycle power to the actuator for this setting to take. Note: This tool provides a means to change the database format to the MK 1 design. (See Fig 6 - Data Base Arrangement) If this is done in error, restarting the program provides the means to change the database back to MK 2 format.

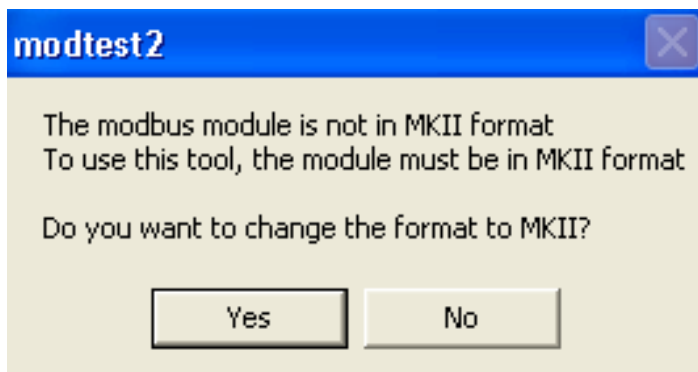


Fig 5 Switching Database Format Window

In addition to access to the connection window the toolbar presents other options:

The *Configure actuator* toolbar item accesses the on-line configuration window for the connected actuator.

The *Monitor and control* toolbar item accesses the screen that allows the actuator to be operated and feedback to be viewed.

The *Connection* toolbar item accesses the same window shown in figure 2 and is used to set the communications parameters for the connected actuator

The *About* toolbar item provides a window that displays information about this version of ModtestII software.

The *Exit* toolbar item exits the program and shuts down communication to the connected actuator.

7.1.2 Configuration Screen clicking on the Configure actuator toolbar item will open the *Configure actuator* screen. See figure 6. This screen can be used to do on-line configuration of the modbus module.

Fig 6 Configure Actuator Screen

In addition to access to the configuration of the actuator, the toolbar presents other options:

The *File* toolbar item allows you to open a saved configuration, save a configuration and print out a report of the current on-screen configuration. Note, your PC must have Microsoft's Access to print reports.

The *Upload configuration* toolbar item uploads the configuration of the connected actuator.

The *Download configuration* toolbar item downloads the current on-screen configuration of the connected actuator. This will be followed by on-screen prompts.

The *Main* screen toolbar item returns to the Opening screen.

The *Monitor and control* toolbar item accesses the screen that allows the actuator to be operated and feedback to be viewed.

The *Service notes* toolbar item opens the standard Windows Notebook program and allows notes to be typed and saved on the computer.

Typically the first step is to upload the current configuration and view it on-screen. This configuration screen allows changes to be made to parameters for the modbus module and those changes can then be downloaded to the actuator. For some changes to take place, like a new address, you'll be prompted to cycle power to the actuator.

7.1.3 Monitor and control clicking on the Monitor and control toolbar item will open the *Monitor and control* screen. See figure 7. This screen can be used to control the actuator and view feedback from the actuator.

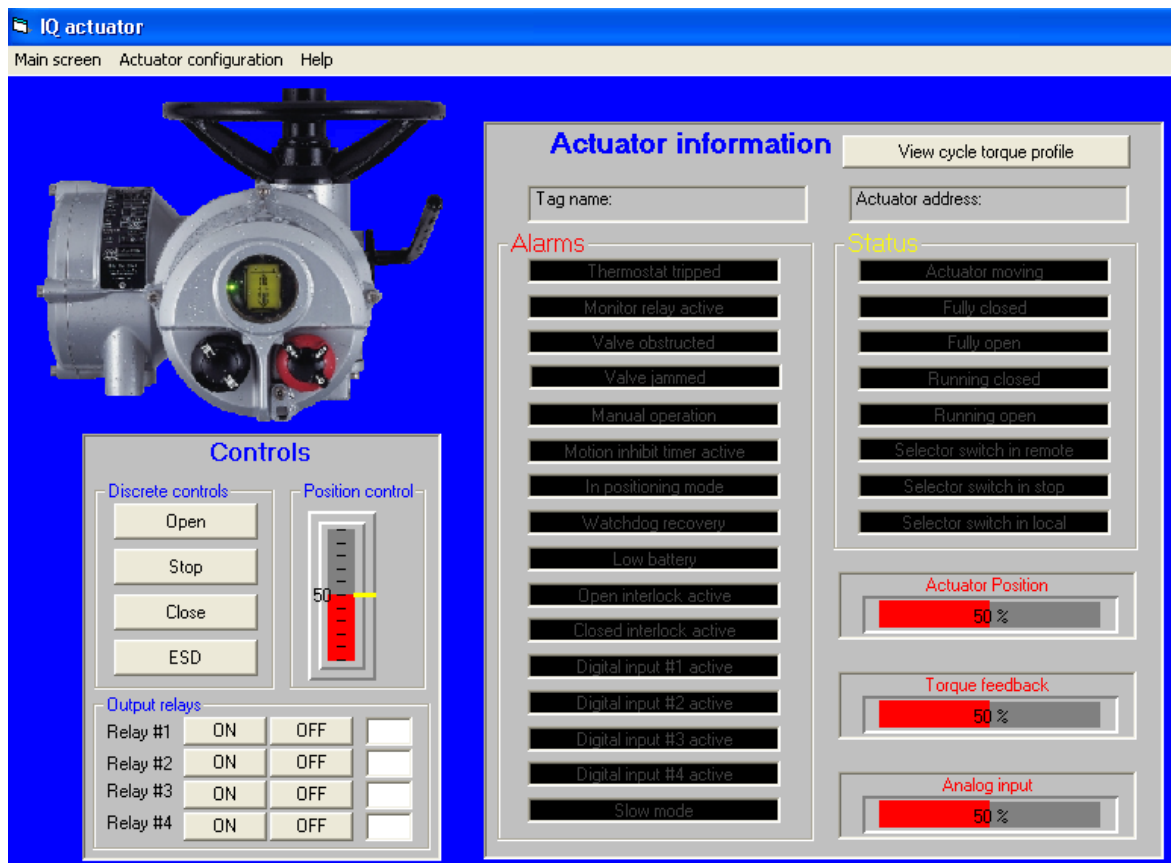
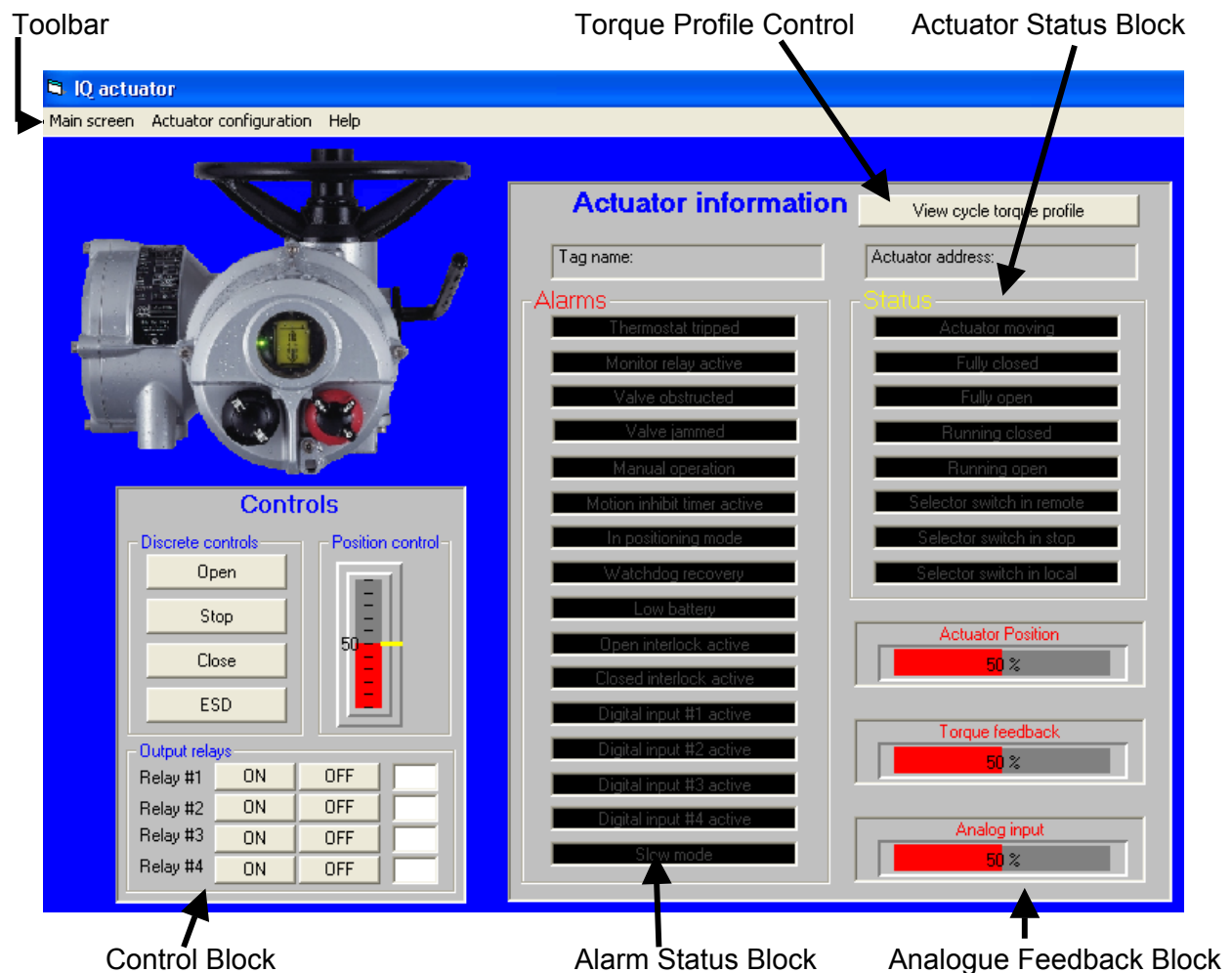


Fig 7 Monitor and Control Screen

This is the main evaluation and test window. The main elements are the toolbar, the controls block, the actuator status block, the alarms block, analogue feedback block and torque profile control. See below.

Note: Not all functions are available with the Q Range actuator. Examples are:
Torque Feedback
Optional Relays

Slow Mode, The IQ and Q Range actuators report this bit but these actuators do not have the slow mode capability.



7.1.3.1 Toolbar Items

The Main Screen toolbar item returns back to the opening screen

The Actuator configuration toolbar item returns to the screen outlined in 7.1.2 above

7.1.3.2 Actuator Status Block

This area displays the current status of the valve such as valve position and operational readiness.

7.1.3.3 Control Block

The actuator can be controlled via the controls shown in this area. If fitted, the optional output relays can be also be controlled.

7.1.3.4 Alarm Block

This area displays the current status of any valve alarms or control alarms such as thermostat trip, valve jammed etc..

7.1.3.5 Analogue Feedback Block

This area displays the three analogue feedbacks relative to the actuator, they are position feedback, torque produced and the value of the auxiliary analogue feedback, if it is calibrated and used by the customer.

7.1.3.6 Torque Profile Control

This is a new feature for the modbus module. Torque output for the last valve stroke as well as torque switch settings and operational counts can be viewed in this window. See figure 8 below. Settings cannot be changed via this window. Note that this facility is not available for the Q Range actuator.

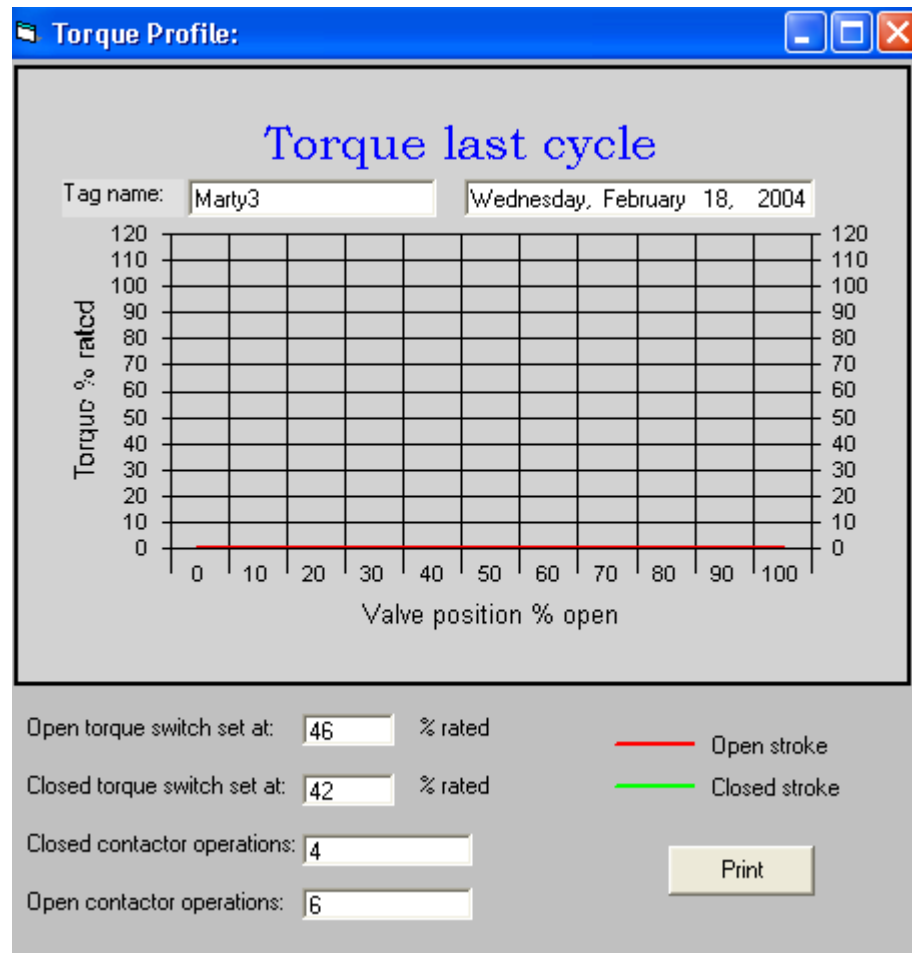


Fig 8 Torque Profile Window

To exit the program, return to the main screen and click on Exit.

8. Troubleshooting Tips

Q: I can read indication properly from the actuator with the software but I cannot control the actuator.

A: 1) The most common scenario is that the control source setting found on the setting screen Od, for the IQ2/IQT actuator, has not been set for the Modbus Module to control the actuator. Check this setting, it should be set to Op.

2) We have found that many times, values are being inadvertently written to configuration registers, via the host controller, that prevent normal operation. One such scenario is a 0 written to register 16 – the Valve Jammed Time. If set to 0, anytime the actuator is commanded to operate, it immediately times out and displays a Valve Obstructed alarm. To correct this, a default value of 5 seconds or greater, should be written to that register.

Similar scenarios can exist for the Auxiliary Input Masking. Inadvertent writes to that register may set the actuator auxiliary input masking incorrectly so that an ESD control is active. The typical default is 15 Decimal or 00001111 Binary.

A similar scenario can exist for the Analogue control facility. If analogue control does not appear to work, it is possible that the values for Limited Range Positions registers have been overwritten by the controller and both set to 0. Typically the maximum position value is 100 and the minimum position value is 0.

Use the configuration utility in this software to check values and correct them if needed. Zeros written to other Timeout registers may cause similar reactions.

Q: I'm not getting any communication to the actuator with the software.

A: Check the baud rate settings, parity setting, the address or computer comms port. Most often, one of these is not set properly. They all have to match. Check the wiring connections between the RS232/RS485 converter and the actuator.

Q: The control software works properly when I connect directly to the actuator but if I try to connect it to the clients network, I cannot communicate with any actuator.

A: This is likely to be a wiring problem on the network. Remember that the network is not Rotork's responsibility. Nearly 90% of the systems we have started up have a wiring problem. One wire landed on the wrong terminal or not connected can cause a problem for the entire network.

Q: If I connect to the entire network and send a command, the network locks up.

A: Remember that the network is not Rotork's responsibility. It is possible that two devices on the network are set for the same address. Hopefully you have recorded this information as shown above and would have discovered any duplicates. One unique address per device on the network is the rule.

Q: If I connect to the entire network I can communicate with some of the units but not others.

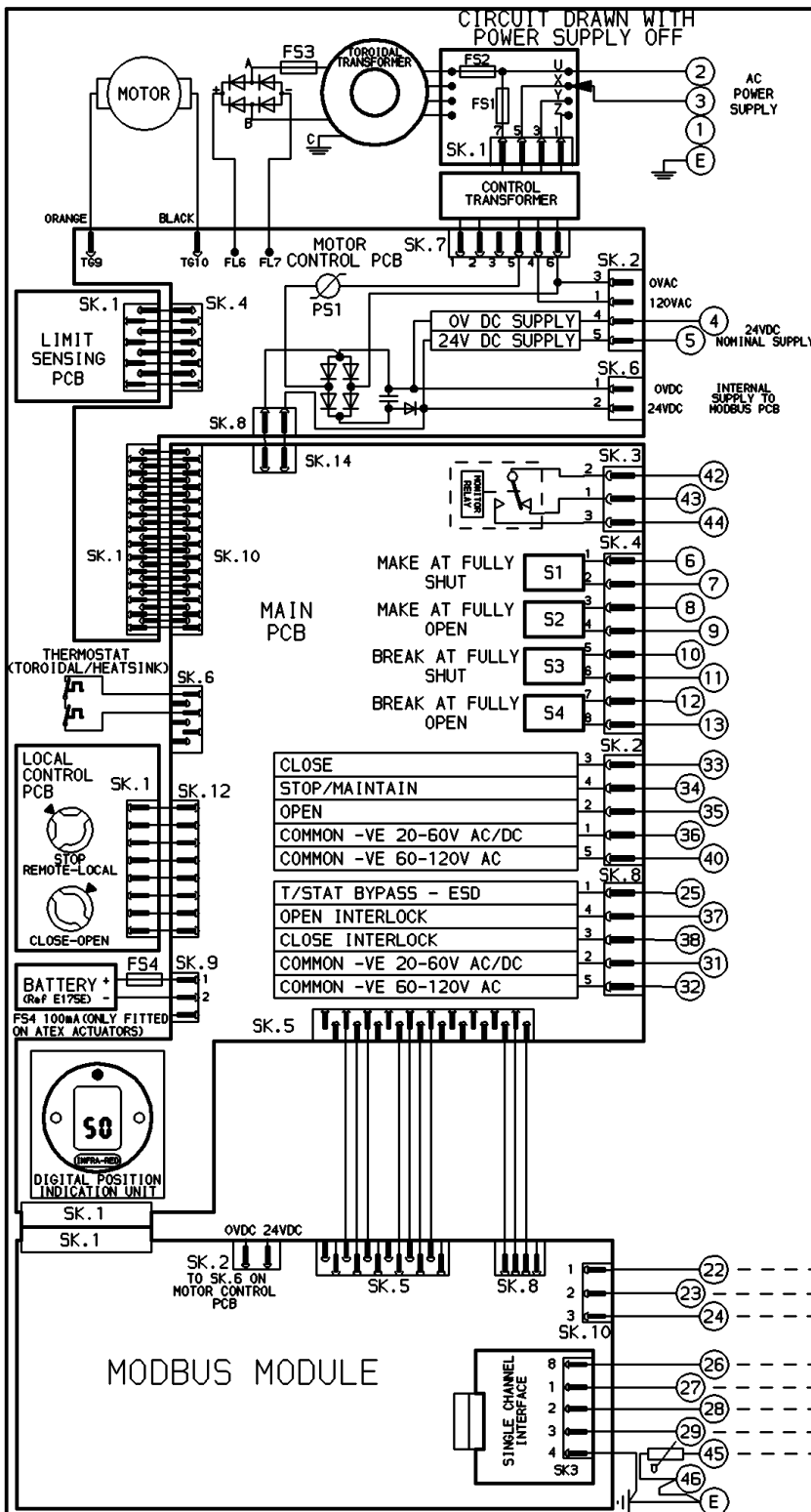
A: Check the baud rate settings, parity setting and the address of the problem device. Most often, one of these is not set properly. They all have to match. Also, there could be a wiring connection problem at the particular actuator in question.

Appendix A: Sample Actuator Wiring Diagrams

Standard Rotork Wiring diagrams, shown for connection purposes, are as follows:

IQ MK2 with Modbus Module	3000-400
IQ MK2 with Dual Highway Modbus	3000-500
IQT with Modbus Module	6000-400
IQT with Dual Highway Modbus	6000-500
Q with Modbus Module	WD08070-01





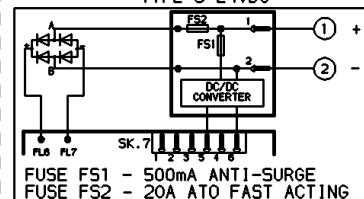
FOR TYPICAL REMOTE CONTROL
DETAILS SEE DOCUMENT
No RWS

TRANSFORMER TAPPING OPTIONS

TYPE 1			TYPE 2		
TAP	NOM	RANGE	TAP	NOM	RANGE
X	100	80-120	X	200	160-240
Y	110	88-132	Y	230	184-276
Z	120	96-144	Z	270	216-324
FS1-250mA A/S FS2-5A A/S			FS1-150mA A/S FS2-2.5A A/S		

TYPE 3			TYPE 4		
TAP	NOM	RANGE	TAP	NOM	RANGE
X	380	304-456	X	480	384-576
Y	400	320-480	Y	575	460-690
Z	415	332-498	Z	690	552-828
FS1-100mA A/S FS2-1.5A A/S			FS1-50mA A/S FS2-1.6A F/A		

TRANSFORMER TYPES 1, 2, 3 & 4 -
FUSE FS3 - 20A ATO FAST ACTING



ALL TRANSFORMER TYPES -
PS1 SELF RESETTING FUSE

NOTE

REFER TO PUBLICATION E175E FOR
APPROVED FUSES FS1, FS2 AND FS3.

MAX EXTERNAL LOAD ON TERMINALS
4 & 5 TO BE 5W.

CONTROL SIGNAL THRESHOLD VOLTAGES
TO BE MINIMUM 'ON' 20V AC/DC
MAXIMUM 'OFF' = 3V
MINIMUM CONTROL SIGNAL DURATION
TO BE 300ms.

CURRENT DRAWN FROM EACH REMOTE
CONTROL SIGNAL IS 5mA ON 24V DC
OR 12mA ON 120V AC

WIRES ARE IDENTIFIED AT EACH END
BY TERMINAL No. OR TAG No.

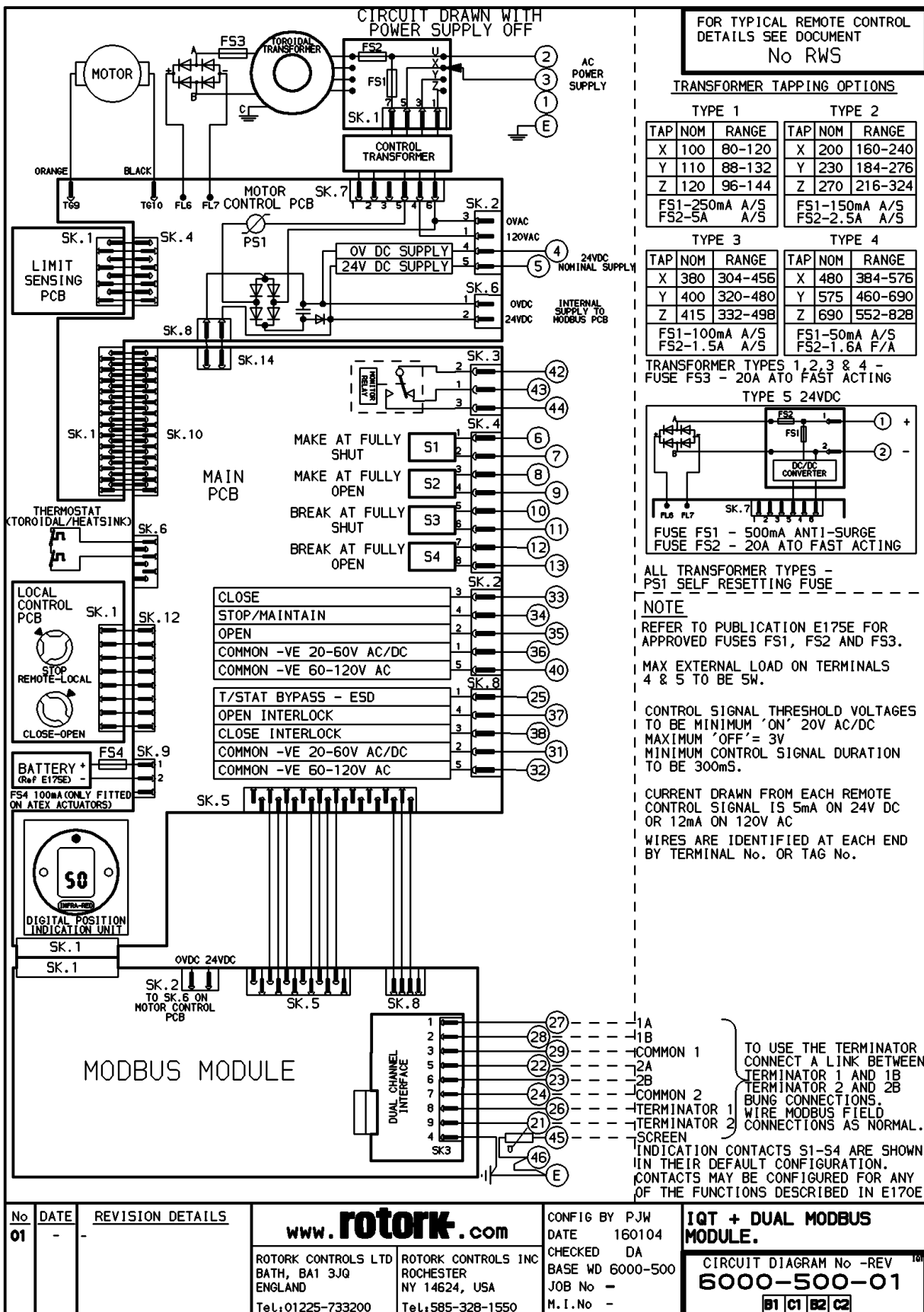
VOLTAGE INPUT (0-5 VOLTS)
+Ve TO 'A', 0 VOLTS TO COMMON
CURRENT INPUT (0-20mA)
LINK A TO B, CURRENT SOURCE
BETWEEN A/B AND COMMON.

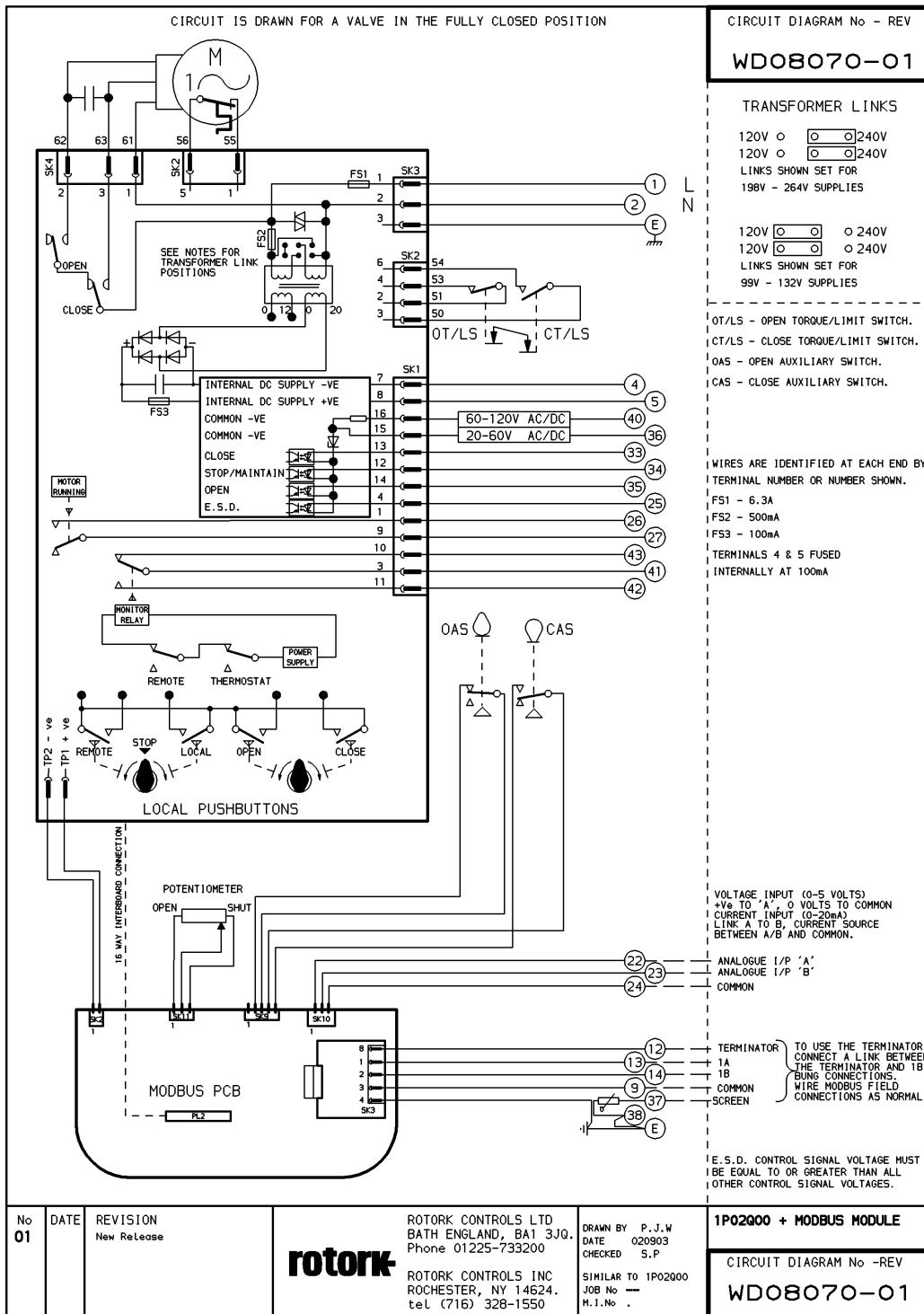
ANALOGUE I/P 'A'
ANALOGUE I/P 'B'
COMMON

TERMINATOR TO USE THE TERMINATOR
CONNECT A LINK BETWEEN
THE TERMINATOR AND 1B
BUNG CONNECTIONS.
WIRE MODBUS FIELD
CONNECTIONS AS NORMAL.

INDICATION CONTACTS S1-S4 ARE SHOWN
IN THEIR DEFAULT CONFIGURATION.
CONTACTS MAY BE CONFIGURED FOR ANY
OF THE FUNCTIONS DESCRIBED IN E175E

No	DATE	REVISION DETAILS	www.rotork.com		CONFIG BY PJW	IQT + MODBUS MODULE	
03	151003 P.J.W	MODBUS PWR DETAIL CORRECTED CHECKED D.A	ROTORK CONTROLS LTD BATH, BA1 3JQ ENGLAND Tel: 01225-733200	ROTORK CONTROLS INC ROCHESTER NY 14624, USA Tel: 585-328-1550	DATE 020903 CHECKED TH BASE WD 6000-400 JOB No - M.I.No -	CIRCUIT DIAGRAM No -REV 10 6000-400-03 B1 C1 B2 C2	





Appendix B: Modbus Module Set Up Records

There are two types of records that follow. The first is the Modbus Module Set Up Record for the Host Controller and the second is Modbus Module Set Up Record for the Individual Actuator. Note, this data is also stored on the CD as an Excel spreadsheet called “Modbus Module Set Up Records”. Information can be stored on the spreadsheet and e-mailed to a help center if needed.

Modbus Module Set Up Record Host Controller

Date / /

[illegible]

Modbus Module Setup Record Individual Actuator

Date ____/____/____

Param No.	Description	Setting	Notes
7	Action on Loss of Comms		
8	Limited Range Position Minimum		
9	Limited Range Position Maximum		
10	Deadband		
11	Motion Inhibit Time		
12	Aux Input Mask		
13	Comms Loss Position		
14	Hysteresis		
15	Slow Mode Range IQT Only		
16	Jammed Valve Time		
17	Manual Movement Travel		
18	Watchdog Timeout		
19	ESD DI-4/Net Disable		
20	Analogue Input Mask		
21	Comms Fault Timer		
22	Address		
23	Baud Rate (baud)		
24	Parity and Stop Bits		
25	Database Format		
26-31	Actuator Tag Name		



<http://www.rotork.com>

UK Head Office

Rotork Controls Ltd
Bath
England.
BA1 3JQ

Tel: (01225) 733200
Fax: (01225) 333467
e-mail mail@rotork.co.uk

USA Head Office

Rotork Controls Inc
675 Mile Crossing Blvd.
Rochester
New York 14624
USA

Tel: (585) 328 1550
Fax: (585) 328 5848
e-mail info@rotork.com