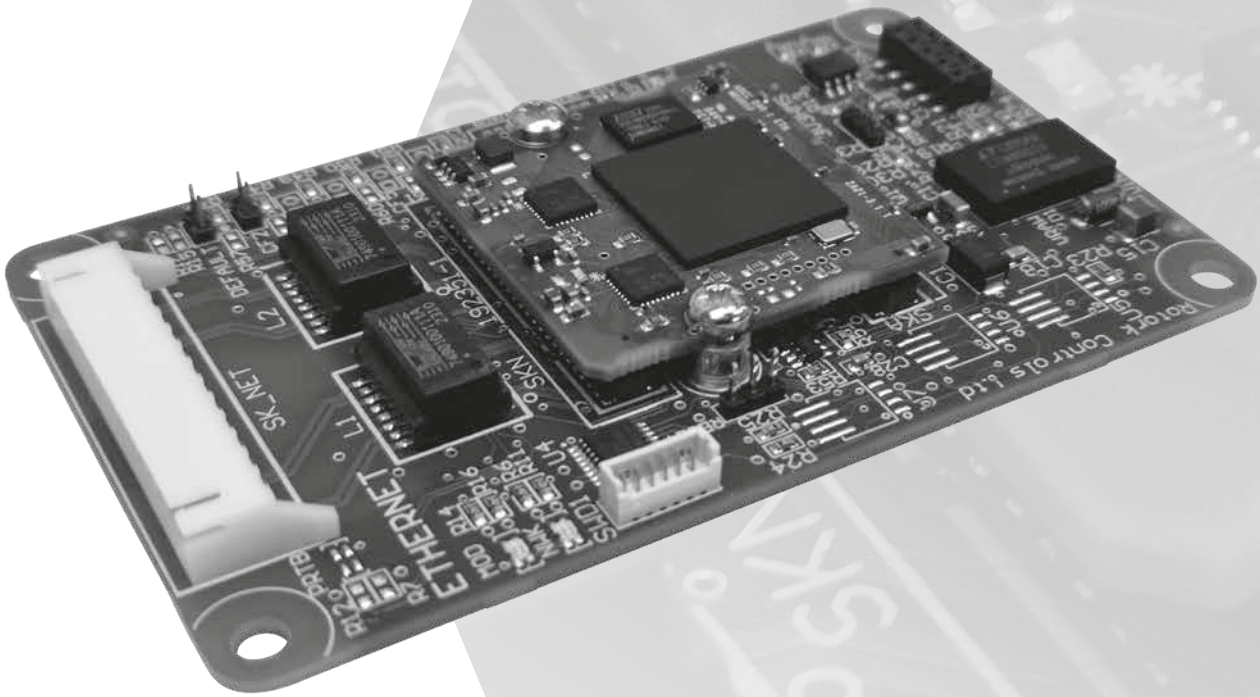
rotork®

Keeping the World Flowing
for Future Generations



Modbus TCP option card

Technical manual

Compatible with IQ3 Pro
and IQT3 Pro actuators

Modbus TCP/IP

CE

The Modbus TCP card described in this manual contains static-sensitive devices. Suitable precautions, such as wearing an earthed anti-static wrist strap, should be taken before handling the card. It should be kept in an anti-static bag or box while it is not fitted within an actuator.

Note 1:

Throughout this manual the Modbus TCP option module may be referred to as the module, the Modbus TCP option card, the option card, or the card.

Note 2:

The information in this manual relates to the following firmware releases:

- Modbus TCP option card v103 and v104

Differences between v103 and v104 firmware:

– NAMUR features not available in v103

– Parameter indices 28 to 31 are reserved in v103

– Parameter indices 324 onwards are not available in v103

– Enum values 99 onwards (for relay functions) not available in v103

Firmware versions:

This table shows the firmware required within the actuator, for the two versions of Ethernet option card:

Actuator firmware	Control board	User interface board
v103 version	v128 (or later)	v207 (or later)
v104 version	v133	v212

This table show the firmware within the Ethernet option card for the two versions of Ethernet:

Ethernet option card	Actuator interface firmware	Modbus TCP protocol firmware	Webpage
v103 version	v103	v1.16	v1.03
v104 version	v104	v1.17	v1.04

Note 3:

This manual assumes a pre-existing level of knowledge of using the actuator that the card is installed inside. It is recommended that the IQ3 Pro full configuration manual (PUB002-040) for the actuator is read prior to setting up Modbus TCP with the actuator. Manuals can be downloaded from the Rotork website. This manual also assumes intermediate knowledge of Modbus TCP protocol and networks.

Contents

Acronyms and abbreviations

Comms	Communications
DCS	Data Concentrator System
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
EMC	Electromagnetic Compatability
EMI	Electromagnetic Interference
ESD	Electrostatic Discharge
HTTP	HyperText Transfer Protocol
iAM	Intelligent Asset Management
IP	Internet Protocol
LED	Light Emitting Diode
MAC	Media Access Control
PCBA	Printed Circuit Board Assembly
PLC	Programmable Logic Controller
SCADA	Supervisory Control And Data Acquisition
TCP	Transport Control Protocol
UDP	User Datagram Protocol

1 Introduction

This document gives instructions for commissioning the Modbus TCP option card.

1.1 Modbus TCP

The option card has two physical connection options that must be selected at the time of order, either 2 x RJ45 or 2 x M12, with transmission speeds of up to 100 Mbps, full duplex. Communications are established using auto negotiation and auto crossover by default.

Due to the presence of two Ethernet ports, the option card is capable of being used in various network topologies, including:

- Star
- Line

The Modbus TCP option card circuits do not impinge on the actuator control electronics; the actuator itself remains fully self-protecting. The module performs the tasks of network interface, actuator data collection and the issuing of actuator commands to open, stop, close, perform an ESD operation, or move to a desired value (DV) position.

Fig 1: The option card is compatible with IQ3 Pro (left) and IQT3 Pro (right) actuators

1.2 Safety information

The control switch on the front panel must be in the 'STOP' position during commissioning of the option card, this will prevent all movement of the drive shaft.

The control switch is a 3-position switch, as described in PUB002-040. The actuator is powered by AC and DC voltages, as specified in PUB002-197. In normal circumstances this mains power is not exposed to the user but may be exposed if the terminal cover is removed during installation of the network cables to the RJ45 or M12 connectors. It is important that the actuator is isolated from mains power when removing the terminal cover when accessing the RJ45 or M12 connectors.

2 Modbus TCP option card properties

2.1 Mechanical properties

The option card is installed inside the actuator, mounting directly onto the main control board of the actuator using 4 Torx screws.

All the connectors are polarised to prevent incorrect insertion.

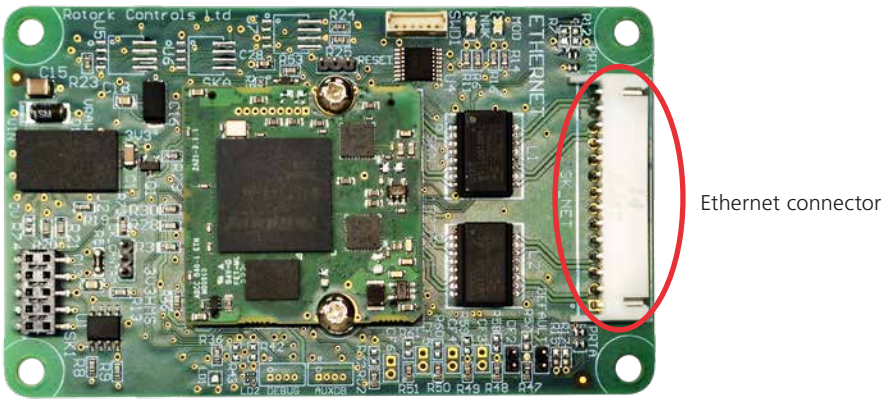


Fig 2: Modbus TCP option card

2.2 Electrical properties

The option card external network connections are fully isolated from the actuator electronics.

2.3 Operation and storage

The option card is designed to be stored in the actuator and operated within the same environment as the actuator.

The constraints are:

- Operating temperature: -40 to +70 °C (-40 to +158 °F)
- Storage temperature: -50 to +85 °C (-58 to +185 °F)
- Relative humidity: 5 to 95% (<50 °C (<122 °F)) non-condensing

2.4 Inside an IQ3 Pro or IQT3 Pro actuator

The Modbus TCP option card is suitable for fitting into IQ3 Pro actuators. The connections and fitting in an IQT3 Pro are similar to that for an IQ3 Pro and the following information effectively relates to both actuator types. The option card can be located into either of the two mounting locations available on the main PCB.

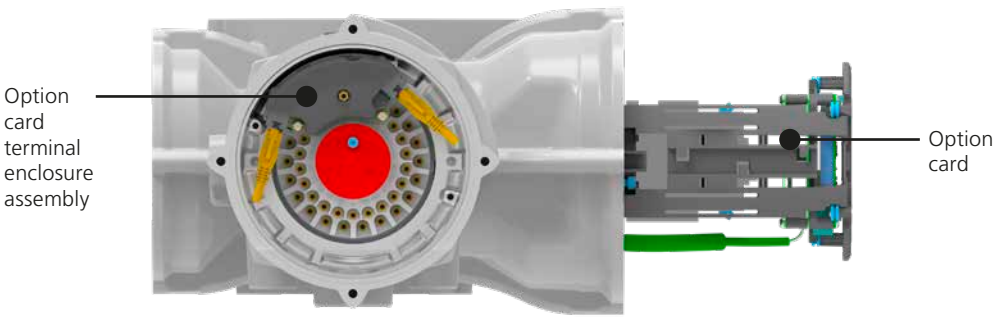


Fig 3: Option card and terminal enclosure locations

2.5 Option card LEDs

If the actuator cover is opened there are several LEDs on the circuit board that are used to indicate communication activity. These indicate the communication between the network and the card. Alternatively the presence of an Ethernet connection can be observed on the Modbus TCP menu on the actuator display or the availability of the webpages.

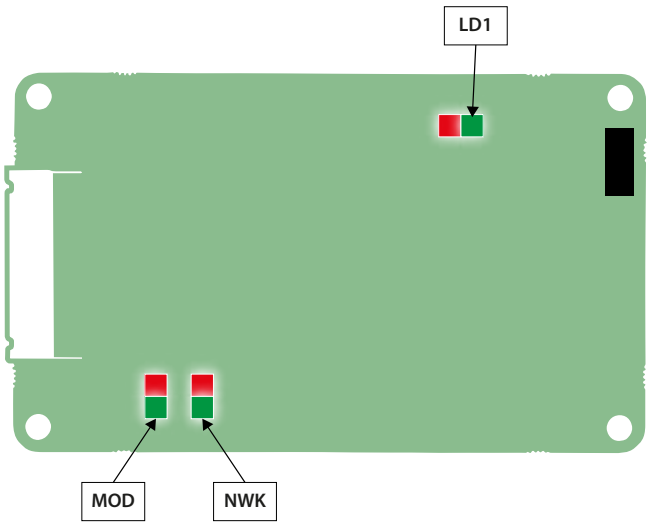


Fig 4: Modbus TCP card LED positions

LED	Appearance	Meaning
MOD	Off	No power
MOD	Green	Normal operation
MOD	Red	Major fault, or FATAL error if NWK LED is also red
MOD	Red flashing	Minor fault
NWK	Off	No IP address, or option card network module in EXCEPTION state
NWK	Green	At least one Modbus message received
NWK	Green flashing	Waiting for first Modbus message
NWK	Red	IP address conflict detected, or FATAL error if MOD LED is also red
NWK	Red flashing	Connection timeout. No Modbus message has been received within 250 ms
LD1	Alternating red and green	Normal operation
LD1	Alternating 2 red and 1 green	Option card communication issue with its network module
LD1	Alternating 4 red and 1 green	Option card FTP enabled
LD1	Alternating red and 2 green	Communication issue between option card and actuator control board

3 Industrial Ethernet

3.1 Overview

Ethernet is a family of computer networking technologies, invented in the early 1970's, commercially introduced in 1980 and first standardised in 1983 as IEEE 802.3. It is used extensively throughout the world.

In its most basic form, it is a means of carrying data between two points in a digital format. The data is packaged into message telegrams, which also include routing data, error checking and message type information.

The Ethernet specification is a transmission protocol which covers the bottom two layers in the OSI 7-layer comms model:

- It defines the specification for the Physical Layer interface, i.e. cabling and devices
- It also defines how data is routed through a network or series of networks, known as the Data Link Layer comprising of Logical Link Control (LLC) and Media Access Control (MAC)

The various Industrial Ethernet communications protocols 'sit' on top of the Ethernet Physical and Data Link layers, the figure below shows how the Industrial Ethernet protocols available on Rotork products fit into the OSI 7-layer model:

Application Process	EtherNet/IP	Modbus TCP	PROFINET	Webpages
7: Application Layer	CIP	Modbus	PROFINET	HTTP
6: Presentation Layer				
5: Session Layer				
4: Transport Layer	TCP/UDP	TCP	TCP/UDP	TCP
3: Network Layer	IP	IP	IP	IP
2: Datalink Layer	Ethernet	Ethernet	Ethernet	Ethernet
1: Physical Layer				

3.2 Network topology

Ethernet can be configured in several network topologies, the most common ones are illustrated below. Note that the Modbus TCP option card does not natively support Ring topology.

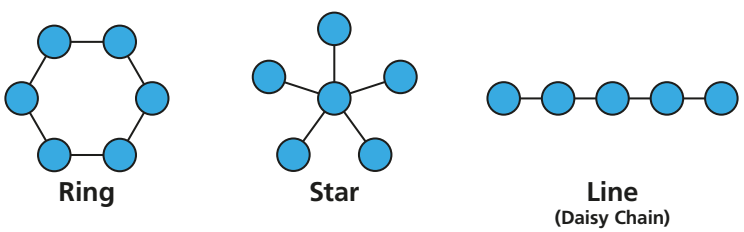


Fig 5: Common network topologies

3.3 Cable and screening

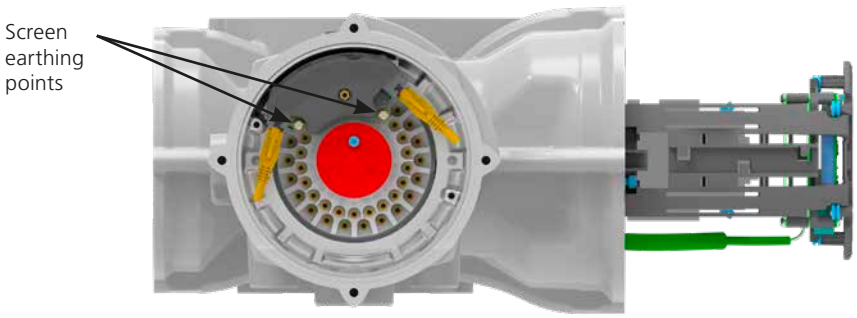


Fig 6: Screen earthing screw locations

Cable and screening

It is recommended that industrial grade dual pair screened CAT5 or CAT6 cables are used, due to their superior mechanical and electrical properties.

In the industrial environment, there are potential issues surrounding inadequate equipotential bonding, particularly on mature sites. For this reason, careful consideration needs to be given to the earthing of the screens of signal and communications cable. However, sites may have policies or rules regarding the connection of both ends of a cable to earth.

Screen connection options

It is the assumption that the screens of Ethernet cables should be earthed at both ends as a protection against EMI of all types. This is the optimum configuration and should be used if possible.

It is further assumed that the screens will be earthed by default at the 'central point,' e.g., PLC, DCS, etc.

To earth the Ethernet cable at the actuator, in order of preference, either:

- Use an 'EMC' gland to earth the screen at the point of entry into the enclosure
- Ensure the screw is fitted to the screen earthing point for the Ethernet port(s) used, as shown in the diagram above (Fig 6)

If earthing the Ethernet cable at the actuator is not required, in order of preference, either:

- On the Ethernet port that the earthing is not required, remove the earthing screw from the screen earthing point. This will allow the default termination of 1nF in parallel with 1MΩ to earth on that port
- Crop the cable screen so that the chosen connector does not have a screen connection

For situations that make use of both Ethernet ports (i.e. Ring or Line topology), the earthing arrangements may need to be different for each port. For instance, in a Ring connected system, each leg needs to be earthed at one or both ends. This must take place at the actuators since the cable only connects between actuators. In other topologies employing switches or routers, there are more options.

3.4 Ethernet network security

When installing an Ethernet control network an assessment of the level of security required should be made. Security policies may require modification appropriate for the control and business networks.

Coordination between IT (Information Technology) and OT (Operational Technology) network teams is required to ensure a suitable network infrastructure is implemented.

For example, IT departments may use remote access to periodically maintain and update devices on the business network; these routine updates could disrupt the operation of the control system network. Additionally, control system software updates and configuration must be strictly controlled as remote connections may introduce security risks.

The security guidance in this document is intended to help the user implement and maintain reasonable security of the Ethernet actuator. However, no security implementation can guarantee to protect against all existing, new or previously unknown threats. Rotork does not guarantee that adherence to these and any other security recommendations will protect the Ethernet actuator from security breaches and any subsequent impact on process in which the Ethernet actuator is involved with.

Many common industrial control protocols (e.g. Modbus/TCP, PROFINET, EtherNet/IP) do not encrypt data and so offer no protection against third parties monitoring data or injecting commands. Therefore we would recommend:

- Segregating networks where possible to control the flow and availability of data. The Purdue model is a good example of this
- Physical security of the network is reviewed and controlled to ensure that no third parties can access it
- Default passwords on devices be changed during installation/commissioning to ensure that access be limited to approved users

4 Configuration of the Modbus TCP option card

4.1 Factory default settings

A Rotork actuator fitted with a Modbus TCP option card leaves the factory with the following default settings:

Host Name:	""	**Port 1 Network Speed:**	Auto Negotiate
DHCP Enabled:	Enabled	**Port 2 Network Speed:**	Auto Negotiate
Domain Name:	""	**Command Filter Delay (ms):**	250
IP Address:	0.0.0.0	**FTP Enabled:**	Disabled
Subnet Mask:	0.0.0.0	**Webpage Admin Password:**	ROTACT
Gateway Address:	0.0.0.0	**Webpage Engineer Password:**	ROTORK
Primary DNS server:	0.0.0.0		
Secondary DNS server:	0.0.0.0		

Notes:

- Webpage passwords should be changed from default during commissioning
- Command Filter Delay is the fastest rate which repeat-value write operations to each parameter is sent to the actuator control board

  For example, the Modbus Client could be writing desired position to parameter 23, DesiredPosition, every 100 ms. Each write operation sends the same value of 3,000 (position 30.0%). The option card detects repeat-value write operations, and only forwards the desired position value to the actuator control board every 250 ms (which is the default delay)

  If the value being written to the parameter is different from the last, then the command is immediately forwarded to the actuator control board`

4.2 Using a DHCP server to set up the Modbus TCP card

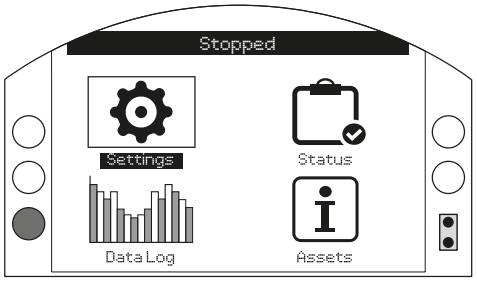
The Modbus TCP option card has a DHCP client service enabled by default. The network settings can be set using a DHCP server connected to the same network as the actuator.

The network settings can be checked using Insight 2 and the Bluetooth Setting Tool.

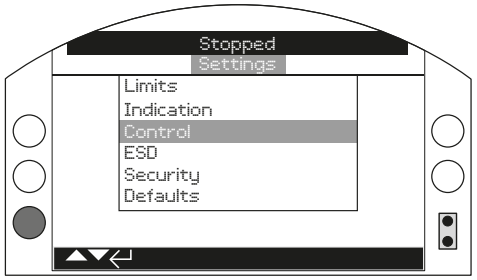
4.3 Configuring the option card using the actuator menus

Before you begin, read the appropriate safe use manual: PUB002-039 for multi-turn IQ3 Pro actuators or PUB002-065 for part-turn IQT3 Pro actuators and the full configuration manual, PUB002-040. Check for any errors that may affect the configuration and resolve them.
An example is the text “Hardware Error” appearing at the top of the display. Check the Remote Control menu, as described in PUB002-040.

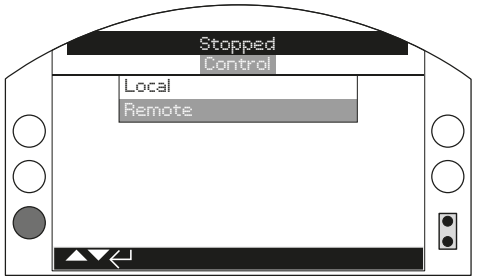
From the home screen select **Settings**.



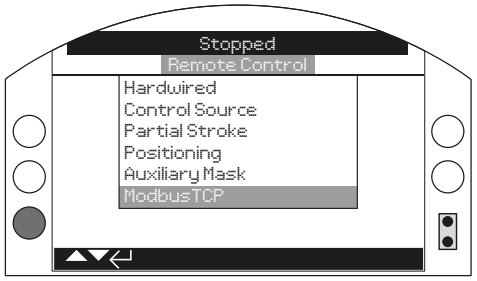
From the **Settings** menu, select **Control**.



From the **Control** menu, select **Remote**.



From the **Remote** menu, select **ModbusTCP**. Note that this option appears only when the option card is fitted.

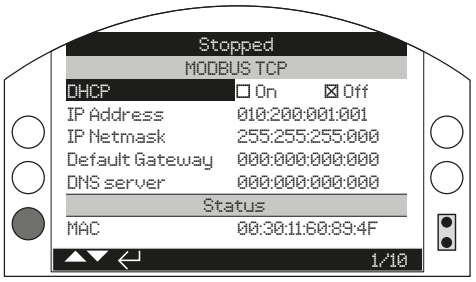


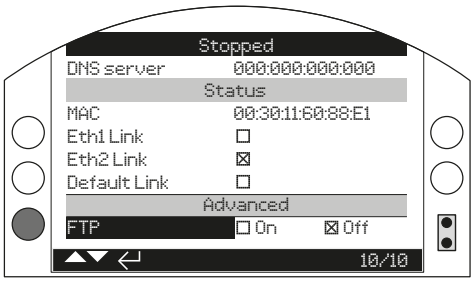
4 Configuration of the Modbus TCP option card

You have now reached the **Modbus TCP** menu. The screen below is an example where the IP Address is static.

Note that there must be an Ethernet link established with the option card for IP settings to appear, otherwise zeros will be shown. It can take up to 15 seconds for IP settings to appear or disappear when Ethernet link is made or lost respectively.

Also note that when configuring the IP settings, changes take up to 15 seconds to appear. If the IP changes are not successful, the settings will revert to previous values or default values stated in Section 4.1 Factory default settings.

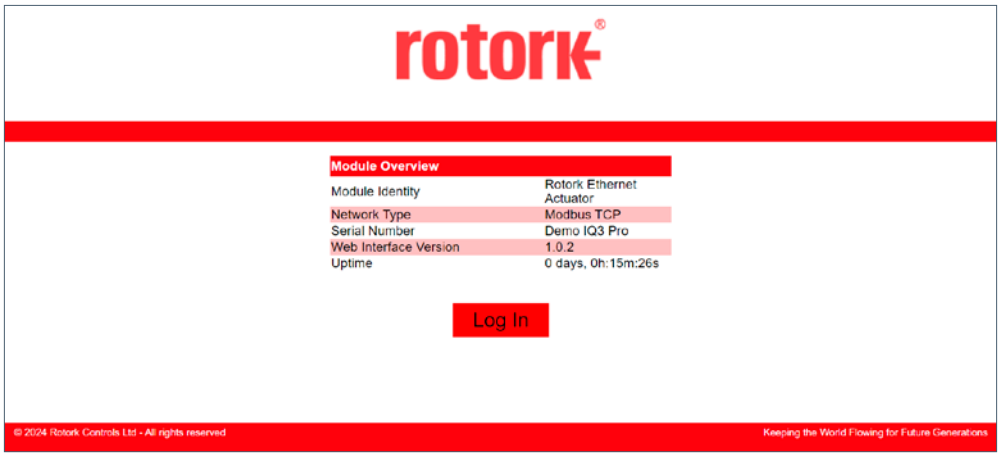




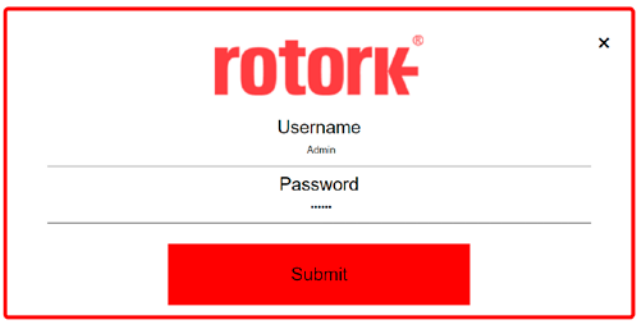
1/10	**DHCP**	Set this to Off unless you are using a DHCP server.
2/10	**IP Address**	This is the IP address of the actuator and should follow your normal address sequence for your network. Use the ▲ and ▼ keys to edit the values, as you would for changing tags and passwords on other actuator screens and ◀ and ▶ keys to move between characters. This does not need to be set if DHCP is on.
3/10	**IP Netmask**	This is usually set to 255.255.255.0, unless required otherwise by your Ethernet network.
4/10	**Default Gateway**	This should be set to 0.0.0.0, unless you are using a gateway.
5/10	**DNS server**	The primary DNS server used by the option card. It is common practice to use numerical IP addresses but there is an option to use a DNS server. If you are not using one, this should be set to 0.0.0.0.
6/10	**MAC**	MAC address of the option card.
7/10	**Eth1 Link**	Indicates whether Ethernet link is present on Port 1.
8/10	**Eth2 Link**	Indicates whether Ethernet link is present on Port 2.
9/10	**Default Link**	Indicates whether the default hard wire link is inserted in the option card during power-up or firmware reset. If the default link is inserted, option card configurations are set to default values.
10/10	**FTP**	Indicates whether FTP is enabled and remote control of the actuator is disabled.

4.4 Configuring the option card using the web interface

Enter the IP address of your actuator in your browser and press return. The home page shows the serial number of the actuator and network type to determine whether you have connected to the correct device. The home page and banner are shown below. Note that the banner on the bottom line appears on every page.



Click on the Log In button. You will be prompted to enter the username and password.



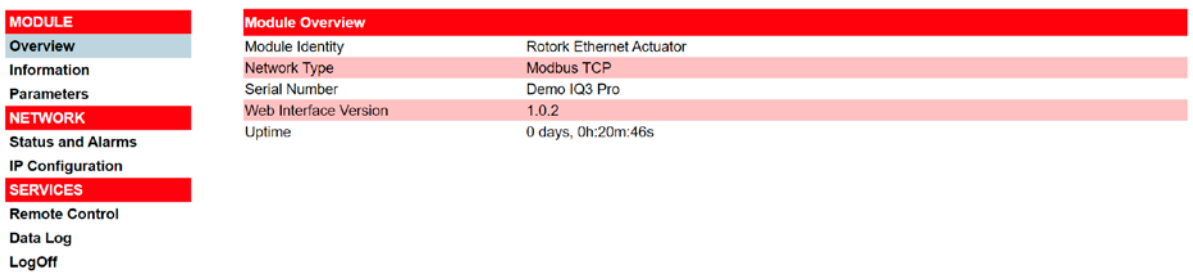
To Log on, enter the username ("Admin" or "Engineer") and password that has been assigned to the actuator using Insight 2. Refer to Section 4.1 Factory Default Settings for default webpage passwords. Passwords can be changed by connecting to the actuator using Insight 2. The two possible usernames are:

Engineer: Permission to read and write data from the option card.

Admin: Permission to read only.

Once logged in, the **Overview page** appears.

4.4.1 Overview

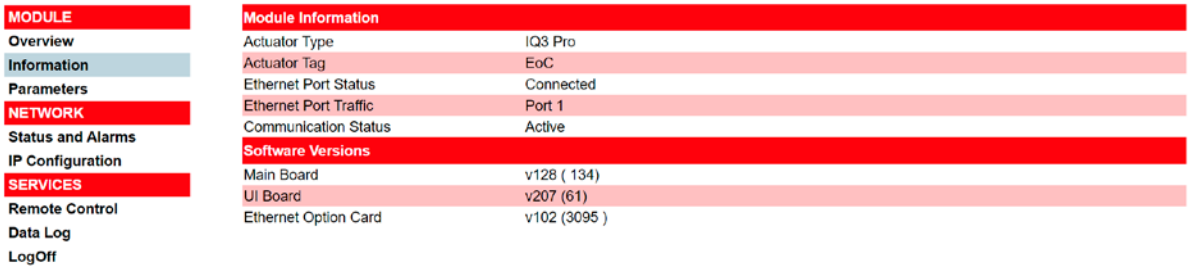


The **module overview** gives basic information about the actuator. Note that the serial number is free-form text, used to identify each actuator.

The **menu** is located at the left hand side of the page. It remains visible on all other pages.

You can select further pages, as follows:

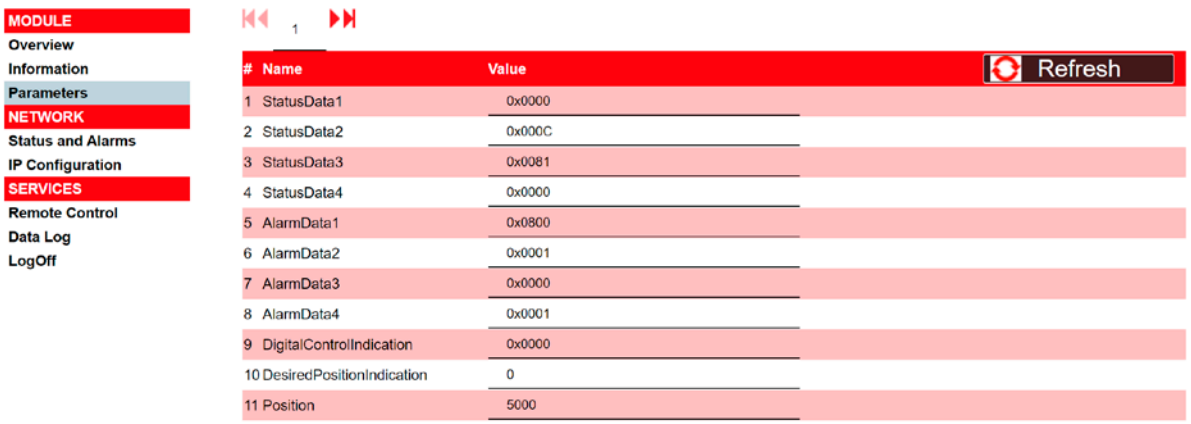
4.4.2 Information



This gives further details about the option card and actuator, and lists the software versions.

4.4.3 Parameters

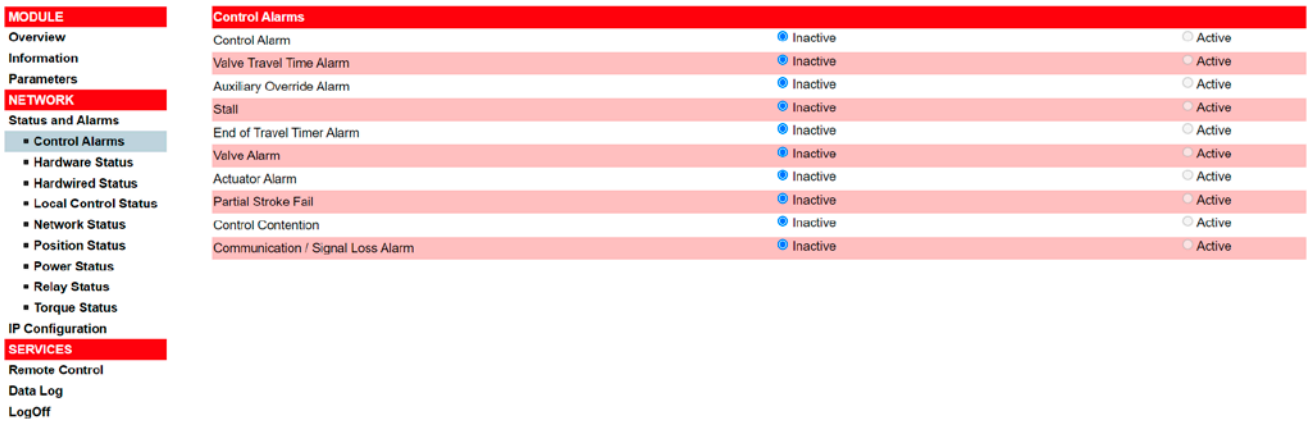
This page shows the parameters listed in Section 6, Modbus Database. This page does not automatically refresh, so there is a Refresh button on the top right corner. The parameters are split into multiple pages. The parameter pages can be navigated using the arrow keys located at the top of the parameters table.



4.4.4 Status and Alarms

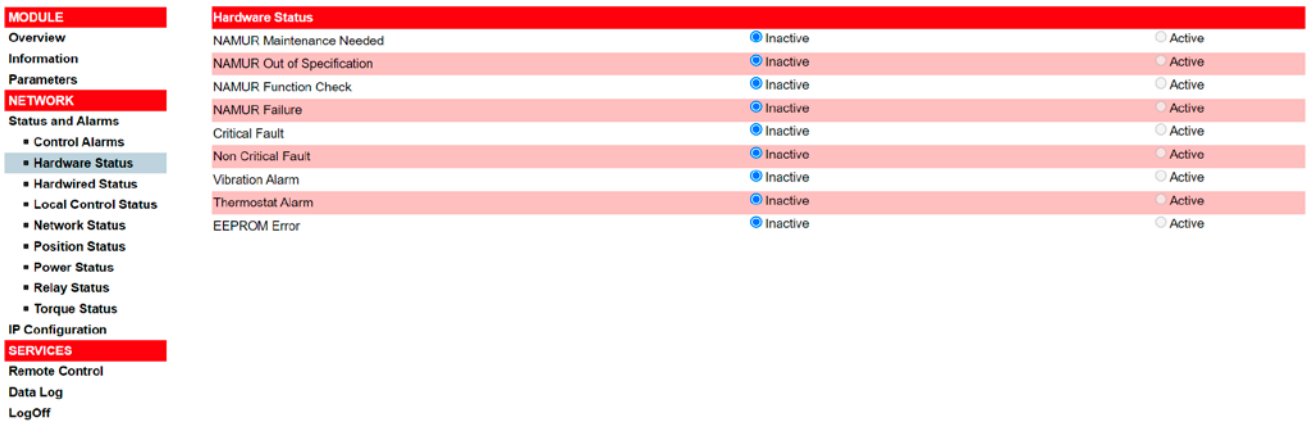
Clicking on Status and Alarms reveals more pages which can be accessed.

4.4.5 Control Alarms



This page shows the control alarms, as detailed in PUB002-040.

4.4.6 Hardware Status

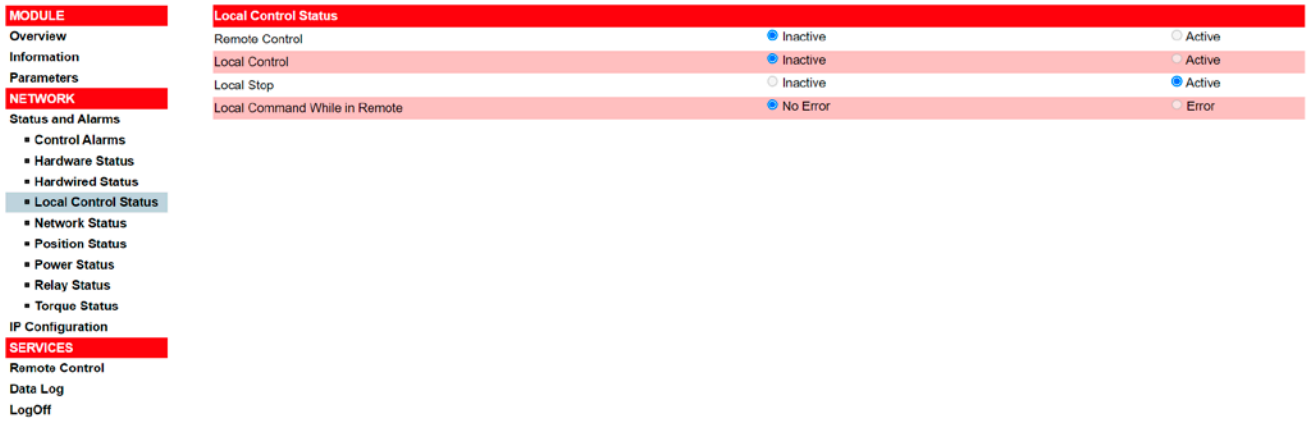


This page shows the hardware status, as detailed in PUB002-040.

4.4.7 Hardwired Status

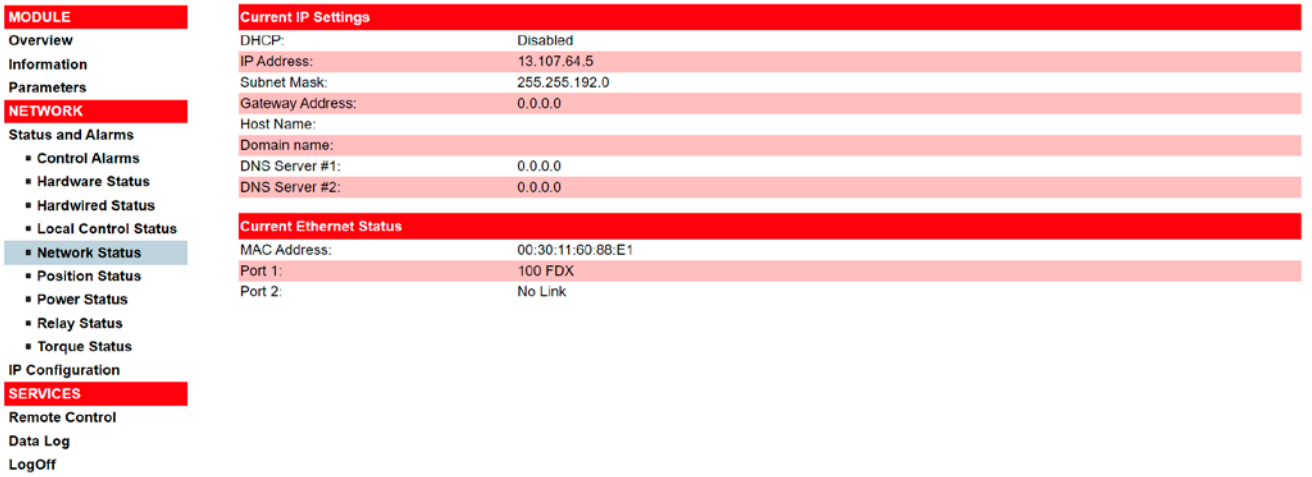
This shows the status of the digital inputs and input function status, as detailed in PUB002-040.

4.4.8 Local Control Status



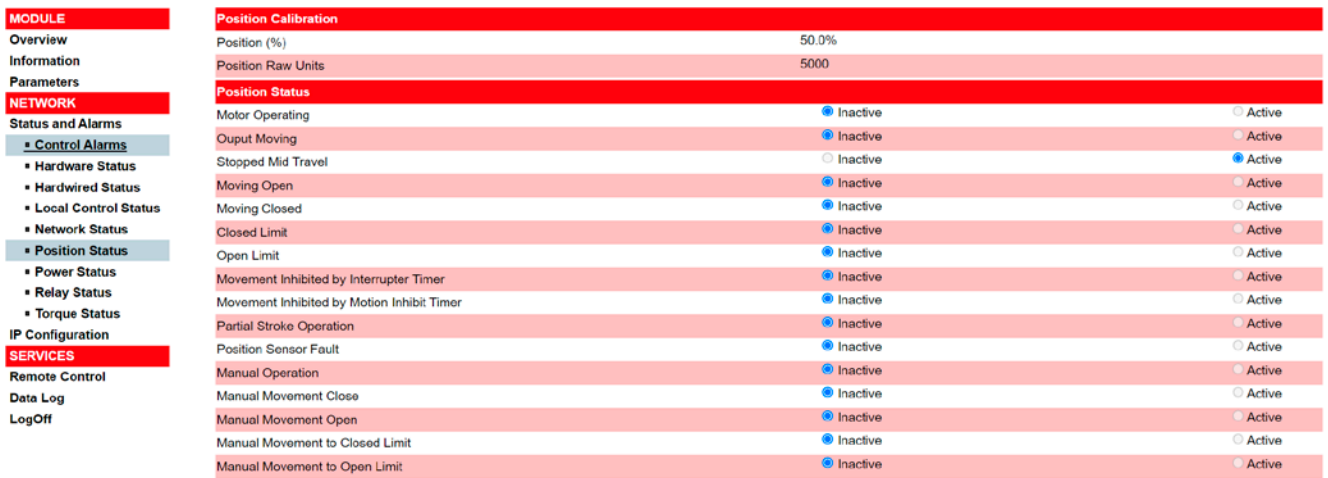
This shows the status of the local control switch, as detailed in PUB002-040.

4.4.9 Network Status



The Network Status page shows similar items to that of the Modbus TCP menu on the actuator display.

4.4.10 Position Status

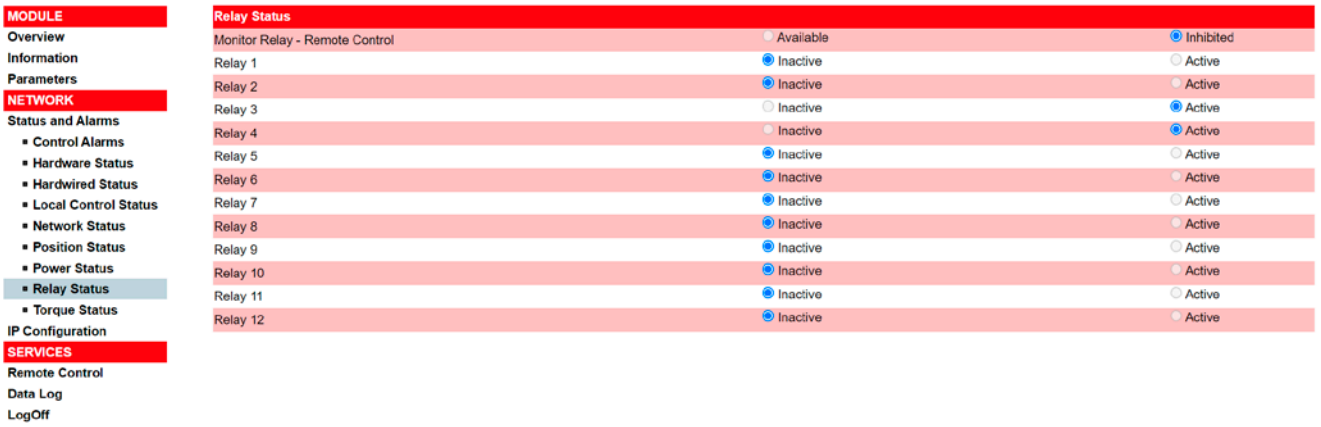


This shows the position calibration and status, as detailed in PUB002-040.

4.4.11 Power Status

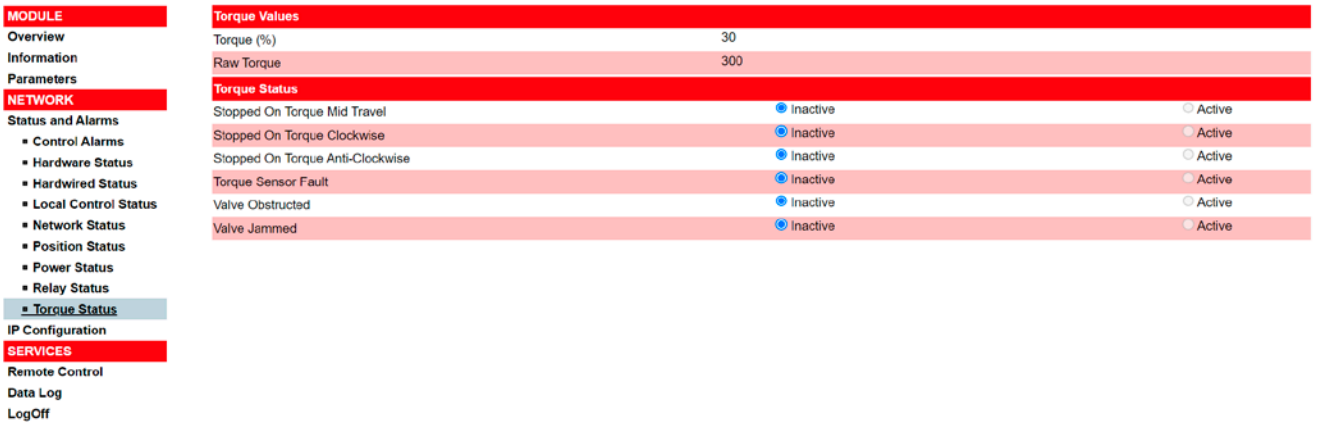
This shows the status of the power supply, as detailed in PUB002-040.

4.4.12 Relay Status



This shows the status of the relays, as detailed in PUB002-040. Not all relays are fitted on all actuators. Relays which are not fitted will show as inactive.

4.4.13 Torque Status

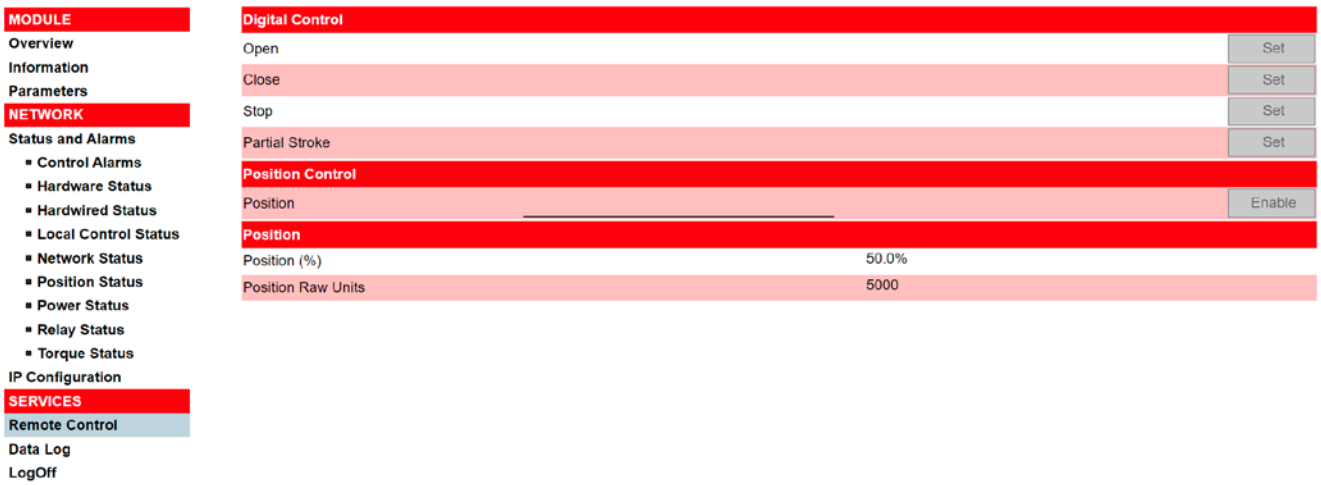


This shows the torque measurements, as detailed in PUB002-040.

4.4.14 IP Configuration

This displays the same data as the Network Status page but also allows you to edit the settings. Note that if the IP address of the option card is changed, the new IP address must be used to access the webpages.

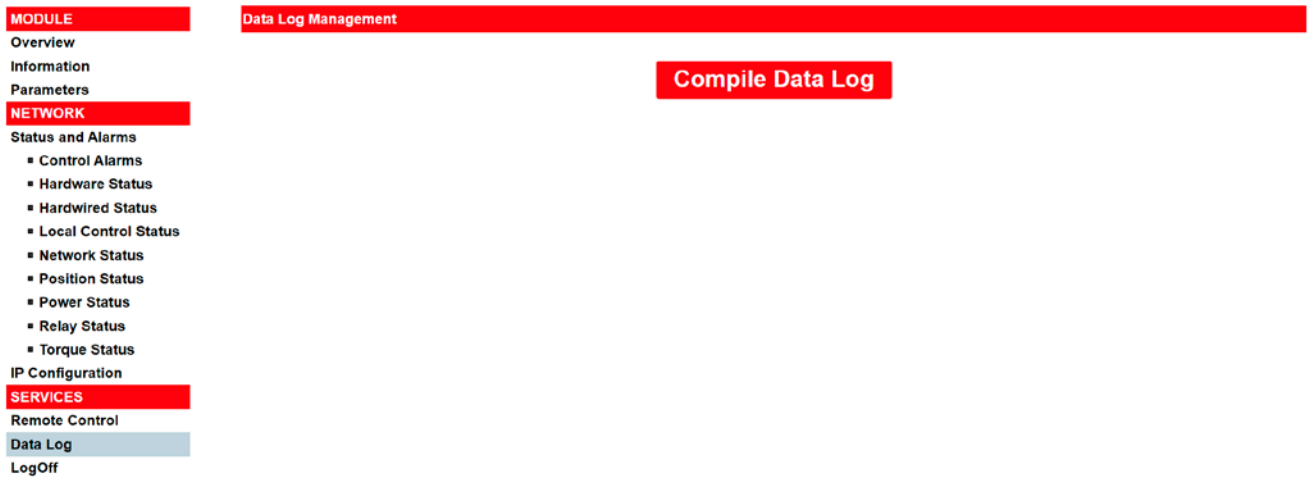
4.4.15 Remote Control



This allows you to control the actuator remotely.

⚠ Prior to controlling the actuator remotely using this method, check parameter #39 ActionOnLossOfComms. Following a remote control operation using the option card web interface; the actuator will execute the action specified in parameter #39 ActionOnLossOfComms if another command is not received within the time specified in parameter #38 LossOfCommsTimeout. To prevent an action being taken, ensure the ActionOnLossOfComms is set to None (no action).

4.4.16 Data Log

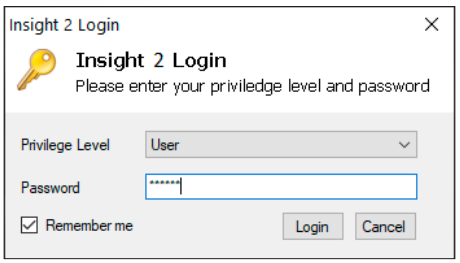


This allows you to retrieve the data log and configuration from the actuator. Note that the data log file is a binary file, and can only be processed by being sent to a remote system for analysis. An example of a suitable remote system is the Rotork iAM product.

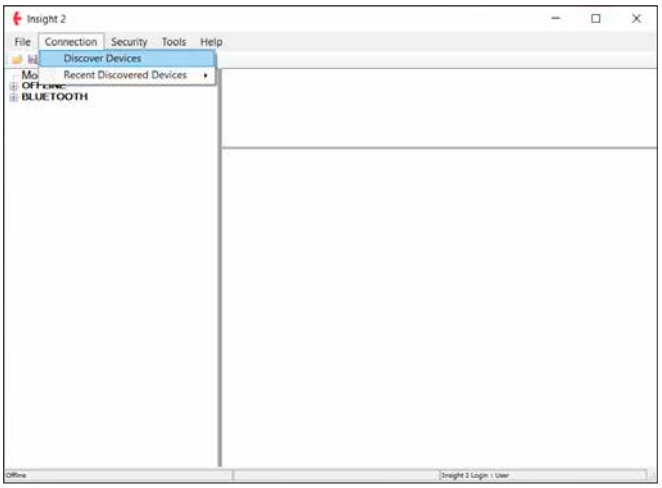
4.5 Using Insight 2 to set up the Modbus TCP option card

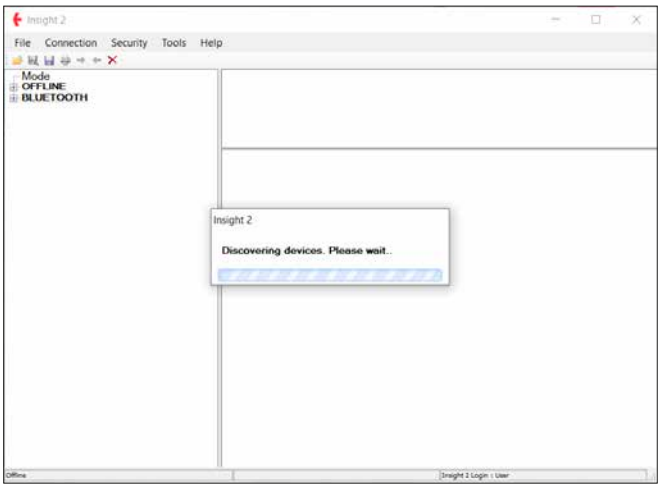
See PUB095-004 for guidance on how to use Insight 2, a PC-based tool to view and configure actuator settings.

1. Launch Insight 2 and select the username assigned to you for the Privilege Level. In the Password field, enter the appropriate password. Then click on the Login button.

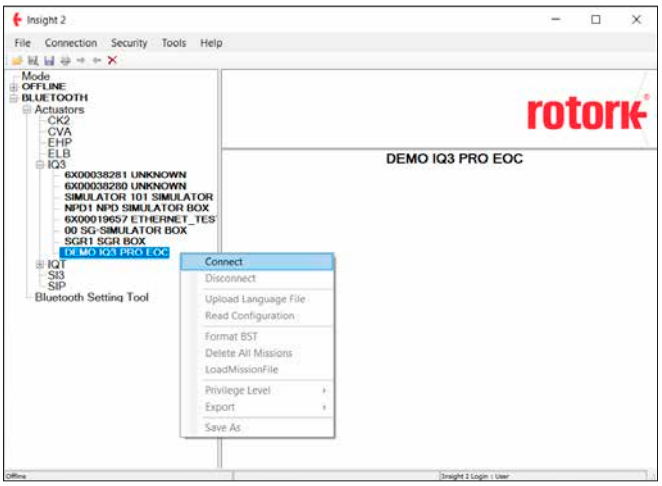


2. Insight 2 communicates with the actuator using Bluetooth. To enable discovery mode on the actuator, refer to the IQ3/IQT3 full configuration manual PUB002-040.
3. With the actuator now set to Bluetooth discoverable, in Insight 2 go to Connection -> Discover Device.

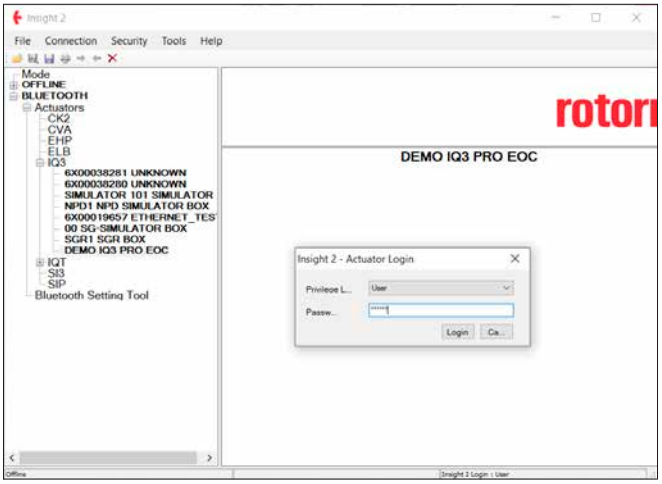




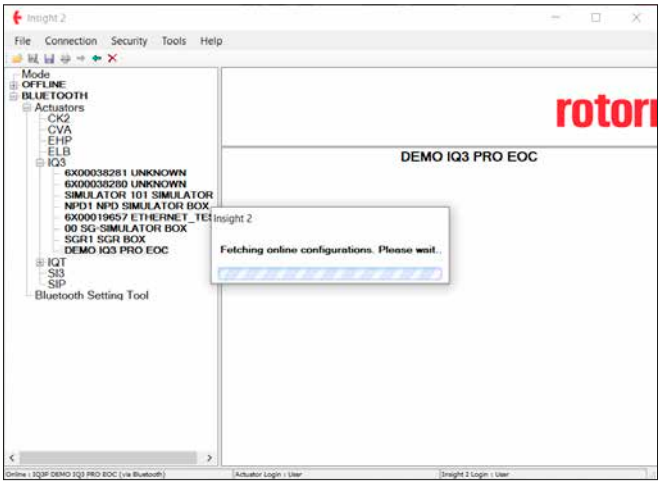
4. In the left panel a list of discovered actuators appears. Right click on an actuator and click Connect. In this example, an IQ3 actuator fitted with a Modbus TCP option card is used.



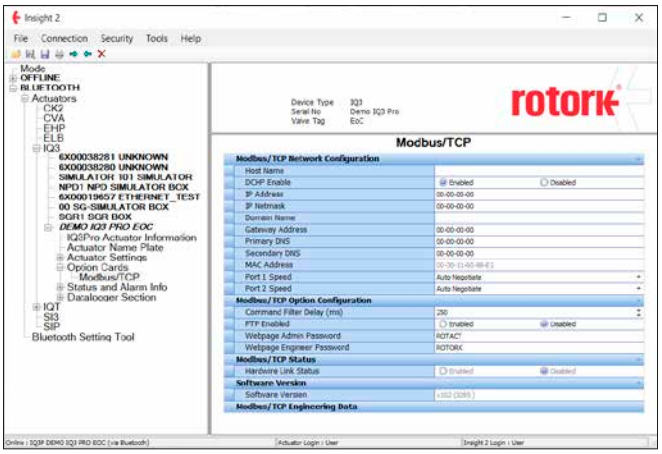
5. If connection to the actuator is successful, an actuator login prompt will appear. Set the appropriate privilege level and enter the corresponding password. Then click on the Login button.



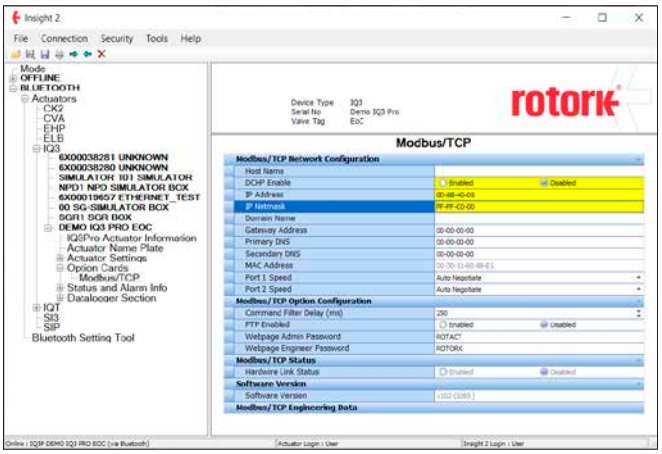
6. Insight 2 fetches the online configuration.



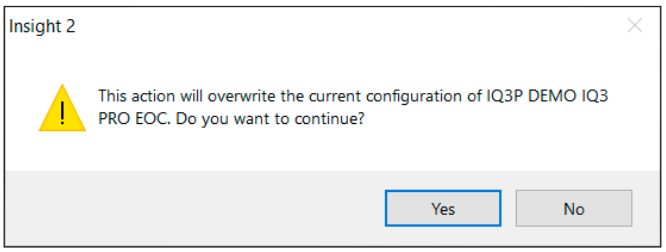
7. Once the configuation is retrieved from the actuator, expand Option Cards and select Modbus TCP.

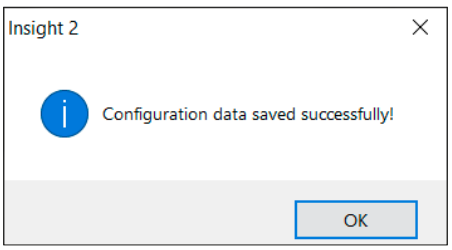


8. To modify the network settings, type in the new settings, then click on the Send Configuration icon (blue arrow pointing right). The IP settings must be entered in hexadecimal format, separated by hyphens. For example, 13.107.64.5 is 0D-6B-40-05 in hexadecimal format.



9. When sending configurations to the actuator, a warning dialog appears that current configurations of the actuator will be overwritten. Click on the Yes button to continue. If the community strings have successfully been modified, another dialog appears to confirm that configuration data has been sent to the actuator successfully.





5 Diagnostics

5.1 Diagnostic input registers

The option card issues diagnostic event(s) when one or more of the following is true:

- Parameter #17 NAMURFailureAlarmData has non-zero value (Major Event)
- Parameter #18 NAMUROutOfSpecAlarmData has non-zero value (Minor Event)
- Parameter #19 NAMURFunctionCheckAlarmData has non-zero value (Major Event)
- Parameter #20 NAMURMaintenanceAlarmData has non-zero value (Minor Event)
- Byte0_CANFault bit (0x0080) in Parameter #24 NetworkStatus1 is set, which indicates that there is a communication fault between the option card and actuator control board (Major Event)

Diagnostic events are stored in the input registers described in the table below. The registers are not specific to the type of diagnostic event, and are used when available. Inactive registers return the value 0x0000 when read.

Input Register	Content	Description
2048	Diagnostic Event Count	Number of pending diagnostic events. There may be "gaps" between active diagnostic events. Inactive diagnostic events return 0x0000 when read.
2049	Diagnostic Event #1	High byte = Severity: • Minor = 0x00 • Major = 0x30 Low byte fixed at 0x50.
2050	Diagnostic Event #2	
2051	Diagnostic Event #3	
2052	Diagnostic Event #4	
2053	Diagnostic Event #5	

6 Modbus Database

6.1 Holding registers, input registers and discrete inputs

The table below describes the parameters which are mapped to each register. See Section 6.4 Parameters overview table for a description of the parameters.

Index	Data Name	Holding Registers	Alternative Data Holding Registers	Input Registers	Discrete Inputs
1	StatusData1	4112	2048	0	0 - 15
2	StatusData2	4128	2049	1	16 - 31
3	StatusData3	4144	2050	2	32 - 47
4	StatusData4	4160	2051	3	48 - 63
5	AlarmData1	4176	2052	4	64 - 79
6	AlarmData2	4192	2053	5	80 - 95
7	AlarmData3	4208	2054	6	96 - 111
8	AlarmData4	4224	2055	7	112 - 127
9	DigitalControlIndication	4240	2056	8	128 - 143
10	DesiredPositionIndication	4256	2057	9	144 - 159
11	Position	4272	2058	10	160 - 175
12	TorqueOrThrust	4288	2059	11	176 - 191
13	Temperature	4304	2060	12	192 - 207
14	Analogueinput1	4320	2061	13	208 - 223
15	Analogueinput2	4336	2062	14	224 - 239
16	NAMURAlarmDataAllMasked	4352 - 4353	2063 - 2064	15 - 16	240 - 271
17	NAMURFailureAlarmData	4368 - 4369	2065 - 2066	17 - 18	272 - 303
18	NAMUROutofSpecAlarmData	4384 - 4385	2067 - 2068	19 - 20	304 - 335
19	NAMURFunctionCheckAlarmData	4400 - 4401	2069 - 2070	21 - 22	336 - 367
20	NAMURMaintenanceAlarmData	4416 - 4417	2071 - 2072	23 - 24	368 - 399
21	NAMURStatusAlarmData	4432 - 4433	2073 - 2074	25 - 26	400 - 431
22	DigitalControl	4448			
23	DesiredPosition	4464			
24	NetworkStatus1	4480	2075	27	432 - 447
25	NetworkStatus2	4496	2076	28	448 - 463
26	NetworkStatus3	4512	2077	29	464 - 479
27	NetworkStatus4	4528	2078	30	480 - 495
28	MultiportStatus1	4544	2079	31	496 - 511
29	MultiportStatus2	4560	2080	32	512 - 527
30	MultiportStatus3	4576	2081	33	528 - 543
31	MultiportStatus4	4592	2082	34	544 - 559
32	MultiportNearestPort	4608	2083	35	560 - 575
353	MultiportTargetPort	9744	2084	36	576 - 591
354	MultiportPositionDegrees	9760	2085	37	592 - 607
355	MultiportNumPorts	9776			
356	MultiportActivePorts	9792			
357	MultiportCurrentBacklash	9808			
358	MultiportEsdPort	9824			
359	MultiportDirection	9840			

Note: Indices 28 to 31 are reserved and 324 onwards are not available on v103 firmware

Index	Data Name	Holding Registers
33	SetResetRelays	4624 - 4625
34	NAMURFailureDataMask	4640 - 4641
35	NAMUROutOfSpecDataMask	4656 - 4657
36	NAMURFunctionCheckDataMask	4672 - 4673
37	NAMURMaintenanceDataMask	4688 - 4689
38	LossOfCommsTimeout	4704
39	ActionOnLossOfComms	4720
40	CommsLostPosition	4736
41	FunctionOfS1	4752
42	FunctionOfS2	4768
43	FunctionOfS3	4784
44	FunctionOfS4	4800
45	FunctionOfS5	4816
46	FunctionOfS6	4832
47	FunctionOfS7	4848
48	FunctionOfS8	4864
49	FunctionOfS9	4880
50	FunctionOfS10	4896
51	FunctionOfS11	4912
52	FunctionOfS12	4928
53	ContactTypeS1	4944
54	ContactTypeS2	4960
55	ContactTypeS3	4976
56	ContactTypeS4	4992
57	ContactTypeS5	5008
58	ContactTypeS6	5024
59	ContactTypeS7	5040
60	ContactTypeS8	5056
61	ContactTypeS9	5072
62	ContactTypeS10	5088
63	ContactTypeS11	5104
64	ContactTypeS12	5120
65	PositionTripS1	5136
66	PositionTripS2	5152
67	PositionTripS3	5168
68	PositionTripS4	5184

Index	Data Name	Holding Registers
69	PositionTripS5	5200
70	PositionTripS6	5216
71	PositionTripS7	5232
72	PositionTripS8	5248
73	PositionTripS9	5264
74	PositionTripS10	5280
75	PositionTripS11	5296
76	PositionTripS12	5312
77	FTPEnabled	5328
78	DefaultHardWireLinkEnabled	5344
79	NetworkUptime	5360 - 5361
80	FieldIntefaceType	5376
81	OptionNumber	5392
82	CloseContactorCount	5408 - 5409
83	OpenContactorCount	5424 - 5425
84	NumberOfContactorSwitches	5440 - 5441
85	ClosingTorqueAt0Pct	5456
86	ClosingTorqueAt1Pct	5472
87	ClosingTorqueAt2Pct	5488
88	ClosingTorqueAt3Pct	5504
89	ClosingTorqueAt4Pct	5520
90	ClosingTorqueAt5Pct	5536
91	ClosingTorqueAt6Pct	5552
92	ClosingTorqueAt7Pct	5568
93	ClosingTorqueAt8Pct	5584
94	ClosingTorqueAt9Pct	5600
95	ClosingTorqueAt10Pct	5616
96	ClosingTorqueAt11Pct	5632
97	ClosingTorqueAt12Pct	5648
98	ClosingTorqueAt13Pct	5664
99	ClosingTorqueAt14Pct	5680
100	ClosingTorqueAt15Pct	5696
101	ClosingTorqueAt16Pct	5712
102	ClosingTorqueAt17Pct	5728
103	ClosingTorqueAt18Pct	5744
104	ClosingTorqueAt19Pct	5760

Index	Data Name	Holding Registers
105	ClosingTorqueAt20Pct	5776
106	ClosingTorqueAt21Pct	5792
107	ClosingTorqueAt22Pct	5808
108	ClosingTorqueAt23Pct	5824
109	ClosingTorqueAt24Pct	5840
110	ClosingTorqueAt25Pct	5856
111	ClosingTorqueAt26Pct	5872
112	ClosingTorqueAt27Pct	5888
113	ClosingTorqueAt28Pct	5904
114	ClosingTorqueAt29Pct	5920
115	ClosingTorqueAt30Pct	5936
116	ClosingTorqueAt31Pct	5952
117	ClosingTorqueAt32Pct	5968
118	ClosingTorqueAt33Pct	5984
119	ClosingTorqueAt34Pct	6000
120	ClosingTorqueAt35Pct	6016
121	ClosingTorqueAt36Pct	6032
122	ClosingTorqueAt37Pct	6048
123	ClosingTorqueAt38Pct	6064
124	ClosingTorqueAt39Pct	6080
125	ClosingTorqueAt40Pct	6096
126	ClosingTorqueAt41Pct	6112
127	ClosingTorqueAt42Pct	6128
128	ClosingTorqueAt43Pct	6144
129	ClosingTorqueAt44Pct	6160
130	ClosingTorqueAt45Pct	6176
131	ClosingTorqueAt46Pct	6192
132	ClosingTorqueAt47Pct	6208
133	ClosingTorqueAt48Pct	6224
134	ClosingTorqueAt49Pct	6240
135	ClosingTorqueAt50Pct	6256
136	ClosingTorqueAt51Pct	6272
137	ClosingTorqueAt52Pct	6288
138	ClosingTorqueAt53Pct	6304
139	ClosingTorqueAt54Pct	6320
140	ClosingTorqueAt55Pct	6336
141	ClosingTorqueAt56Pct	6352
142	ClosingTorqueAt57Pct	6368
143	ClosingTorqueAt58Pct	6384
144	ClosingTorqueAt59Pct	6400
145	ClosingTorqueAt60Pct	6416
146	ClosingTorqueAt61Pct	6432
147	ClosingTorqueAt62Pct	6448
148	ClosingTorqueAt63Pct	6464
149	ClosingTorqueAt64Pct	6480
150	ClosingTorqueAt65Pct	6496
151	ClosingTorqueAt66Pct	6512
152	ClosingTorqueAt67Pct	6528
153	ClosingTorqueAt68Pct	6544
154	ClosingTorqueAt69Pct	6560
155	ClosingTorqueAt70Pct	6576
156	ClosingTorqueAt71Pct	6592
157	ClosingTorqueAt72Pct	6608
158	ClosingTorqueAt73Pct	6624
159	ClosingTorqueAt74Pct	6640
160	ClosingTorqueAt75Pct	6656
161	ClosingTorqueAt76Pct	6672
162	ClosingTorqueAt77Pct	6688
163	ClosingTorqueAt78Pct	6704
164	ClosingTorqueAt79Pct	6720
165	ClosingTorqueAt80Pct	6736
166	ClosingTorqueAt81Pct	6752
167	ClosingTorqueAt82Pct	6768
168	ClosingTorqueAt83Pct	6784
169	ClosingTorqueAt84Pct	6800
170	ClosingTorqueAt85Pct	6816
171	ClosingTorqueAt86Pct	6832
172	ClosingTorqueAt87Pct	6848
173	ClosingTorqueAt88Pct	6864
174	ClosingTorqueAt89Pct	6880
175	ClosingTorqueAt90Pct	6896
176	ClosingTorqueAt91Pct	6912
177	ClosingTorqueAt92Pct	6928
178	ClosingTorqueAt93Pct	6944
179	ClosingTorqueAt94Pct	6960
180	ClosingTorqueAt95Pct	6976
181	ClosingTorqueAt96Pct	6992
182	ClosingTorqueAt97Pct	7008
183	ClosingTorqueAt98Pct	7024
184	ClosingTorqueAt99Pct	7040
185	ClosingTorqueAt100Pct	7056
186	OpeningTorqueAt0Pct	7072
187	OpeningTorqueAt1Pct	7088
188	OpeningTorqueAt2Pct	7104

Index	Data Name	Holding Registers
189	OpeningTorqueAt3Pct	7120
190	OpeningTorqueAt4Pct	7136
191	OpeningTorqueAt5Pct	7152
192	OpeningTorqueAt6Pct	7168
193	OpeningTorqueAt7Pct	7184
194	OpeningTorqueAt8Pct	7200
195	OpeningTorqueAt9Pct	7216
196	OpeningTorqueAt10Pct	7232
197	OpeningTorqueAt11Pct	7248
198	OpeningTorqueAt12Pct	7264
199	OpeningTorqueAt13Pct	7280
200	OpeningTorqueAt14Pct	7296
201	OpeningTorqueAt15Pct	7312
202	OpeningTorqueAt16Pct	7328
203	OpeningTorqueAt17Pct	7344
204	OpeningTorqueAt18Pct	7360
205	OpeningTorqueAt19Pct	7376
206	OpeningTorqueAt20Pct	7392
207	OpeningTorqueAt21Pct	7408
208	OpeningTorqueAt22Pct	7424
209	OpeningTorqueAt23Pct	7440
210	OpeningTorqueAt24Pct	7456
211	OpeningTorqueAt25Pct	7472
212	OpeningTorqueAt26Pct	7488
213	OpeningTorqueAt27Pct	7504
214	OpeningTorqueAt28Pct	7520
215	OpeningTorqueAt29Pct	7536
216	OpeningTorqueAt30Pct	7552
217	OpeningTorqueAt31Pct	7568
218	OpeningTorqueAt32Pct	7584
219	OpeningTorqueAt33Pct	7600
220	OpeningTorqueAt34Pct	7616
221	OpeningTorqueAt35Pct	7632
222	OpeningTorqueAt36Pct	7648
223	OpeningTorqueAt37Pct	7664
224	OpeningTorqueAt38Pct	7680
225	OpeningTorqueAt39Pct	7696
226	OpeningTorqueAt40Pct	7712
227	OpeningTorqueAt41Pct	7728
228	OpeningTorqueAt42Pct	7744
229	OpeningTorqueAt43Pct	7760
230	OpeningTorqueAt44Pct	7776
231	OpeningTorqueAt45Pct	7792
232	OpeningTorqueAt46Pct	7808
233	OpeningTorqueAt47Pct	7824
234	OpeningTorqueAt48Pct	7840
235	OpeningTorqueAt49Pct	7856
236	OpeningTorqueAt50Pct	7872
237	OpeningTorqueAt51Pct	7888
238	OpeningTorqueAt52Pct	7904
239	OpeningTorqueAt53Pct	7920
240	OpeningTorqueAt54Pct	7936
241	OpeningTorqueAt55Pct	7952
242	OpeningTorqueAt56Pct	7968
243	OpeningTorqueAt57Pct	7984
244	OpeningTorqueAt58Pct	8000
245	OpeningTorqueAt59Pct	8016
246	OpeningTorqueAt60Pct	8032
247	OpeningTorqueAt61Pct	8048
248	OpeningTorqueAt62Pct	8064
249	OpeningTorqueAt63Pct	8080
250	OpeningTorqueAt64Pct	8096
251	OpeningTorqueAt65Pct	8112
252	OpeningTorqueAt66Pct	8128
253	OpeningTorqueAt67Pct	8144
254	OpeningTorqueAt68Pct	8160
255	OpeningTorqueAt69Pct	8176
256	OpeningTorqueAt70Pct	8192
257	OpeningTorqueAt71Pct	8208
258	OpeningTorqueAt72Pct	8224
259	OpeningTorqueAt73Pct	8240
260	OpeningTorqueAt74Pct	8256
261	OpeningTorqueAt75Pct	8272
262	OpeningTorqueAt76Pct	8288
263	OpeningTorqueAt77Pct	8304
264	OpeningTorqueAt78Pct	8320
265	OpeningTorqueAt79Pct	8336
266	OpeningTorqueAt80Pct	8352
267	OpeningTorqueAt81Pct	8368
268	OpeningTorqueAt82Pct	8384
269	OpeningTorqueAt83Pct	8400
270	OpeningTorqueAt84Pct	8416
271	OpeningTorqueAt85Pct	8432
272	OpeningTorqueAt86Pct	8448

Index	Data Name	Holding Registers
273	OpeningTorqueAt87Pct	8464
274	OpeningTorqueAt88Pct	8480
275	OpeningTorqueAt89Pct	8496
276	OpeningTorqueAt90Pct	8512
277	OpeningTorqueAt91Pct	8528
278	OpeningTorqueAt92Pct	8544
279	OpeningTorqueAt93Pct	8560
280	OpeningTorqueAt94Pct	8576
281	OpeningTorqueAt95Pct	8592
282	OpeningTorqueAt96Pct	8608
283	OpeningTorqueAt97Pct	8624
284	OpeningTorqueAt98Pct	8640
285	OpeningTorqueAt99Pct	8656
286	OpeningTorqueAt100Pct	8672
287	ActuatorTag	8688 - 8703
288	ActuatorType	8704
289	ActuatorSerialNumber	8720 - 8727
290	ControllerSerialNumber	8736 - 8747
291	UISerialNumber	8752 - 8763
292	PositionSensorSerialNumber	8768 - 8779
293	DCPowerModuleSerialNumber	8784 - 8795
294	PowerModuleSerialNumber	8800 - 8811
295	SolidStateStarterModuleSerialNumber	8816 - 8827
296	Option1SerialNumber	8832 - 8843
297	Option2SerialNumber	8848 - 8859
298	Option3SerialNumber	8864 - 8875
299	Option4SerialNumber	8880 - 8891
300	AssetIDList1	8896
301	AssetIDList2	8912
302	AssetIDList3	8928
303	AssetIDList4	8944
304	AssetIDList5	8960
305	AssetIDList6	8976
306	AssetIDList7	8992
307	AssetIDList8	9008
308	AssetIDList9	9024
309	AssetIDList10	9040
310	Asset1SoftwareVersion	9056 - 9061
311	Asset2SoftwareVersion	9072 - 9077
312	Asset3SoftwareVersion	9088 - 9093

Index	Data Name	Holding Registers
313	Asset4SoftwareVersion	9104 - 9109
314	Asset5SoftwareVersion	9120 - 9125
315	Asset6SoftwareVersion	9136 - 9141
316	Asset7SoftwareVersion	9152 - 9157
317	Asset8SoftwareVersion	9168 - 9173
318	Asset9SoftwareVersion	9184 - 9189
319	Asset10SoftwareVersion	9200 - 9205
320	FirmwareUpgradeoverNetworkEnable	9216
321	FileLoadStatus	9232
322	FileLoadProgress	9248
323	DataLogTimestamp	9264 - 9271
324	LimitedRangePositionMin	9280
325	LimitedRangePositionMax	9296
326	Deadband	9312
327	Hysteresis	9328
328	IQT3SlowModeSpeed	9344
329	MotionInhibitTimeMs	9360 - 9361
330	ManualMovementTravel	9376
331	AuxInputTypeMask	9392
332	AuxInputContactStateMask	9408
333	PartialStrokePosition	9424
334	PartialStrokeStartingLimit	9440
335	PartialStrokeOutTimeMs	9456 - 9457
336	PartialStrokeReturnTimeMs	9472 - 9473
337	CloseTorqueSet	9488
338	OpenTorqueSet	9504
339	EsdNetDisable	9520
340	EsdAction	9536
341	EsdContact	9552
342	EsdOverrideInterlock	9568
343	EsdOverrideThermostatTrip	9584
344	EsdOverrideLocalStop	9600
345	EsdOverrideInterruptTimer	9616
346	InterlocksInputMode	9632
347	InterruptTimerStartingLimit	9648
348	InterruptTimerOnTime100Ms	9664 - 9665
349	InterruptTimerOffTime100Ms	9680 - 9681
350	InterruptTimerPositionOpenDirection	9696
351	InterruptTimerPositionCloseDirection	9712
352	AnalogueInputMinMax	9728

Note: Indices 28 to 31 are reserved and 324 onwards are not available on v103 firmware

6.2 Supported function codes

Function Code	Description
01	Read Coil
02	Read Discrete Inputs
03	Read Holding Registers
04	Read Input Registers
05	Write Single Coil
06	Write Single Register
15	Write Multiple Coils
16	Write Multiple Registers
23	Read/Write Multiple Registers
43/14	Read Device Identification

6.3 Supported exception codes

Exception Code	Name	Description
0x01	Invalid Function	The function code in the request is not supported.
0x02	Invalid Data Address	The data address received in the request is outside the initialised memory area.
0x03	Invalid Data Value	The data in the request is invalid.

6.4 Modbus TCP parameter overview table

This table gives an overview of the parameters. See Section 6.5 for bitfield descriptions, 6.6 for enumeration descriptions, and refer to PUB002-040 for detailed parameter descriptions, where required.

Index	Data Name	Data Type	Data Size (octets)	Data Access	Description
1	StatusData1	Bitfield	2	Read	**StatusData1 to StatusData4:** Actuator general status signals.
2	StatusData2	Bitfield	2	Read	
3	StatusData3	Bitfield	2	Read	
4	StatusData4	Bitfield	2	Read	
5	AlarmData1	Bitfield	2	Read	**AlarmData1 to AlarmData4:** Actuator general Alarm signals.
6	AlarmData2	Bitfield	2	Read	
7	AlarmData3	Bitfield	2	Read	
8	AlarmData4	Bitfield	2	Read	
9	DigitalControlIndication	Bitfield	2	Read	**Digital control:** This is a read only version of the digital control parameter (index 22).
10	DesiredPositionIndication	Unsigned int	2	Read	**Position control:** This is a read only version of the position control parameter (index 23). Value in 100ths of %, range 0 (0.00%) to 10000 (100.00%). Multiport/Multiset actuator: Value in 10s of port number. Range 10 (port 1) to 160 (port 16).
11	Position	Unsigned int	2	Read	**Position feedback** in 100ths of a %. Range 0 (0.00%) to 10000 (100.00%). Will calibrate to limited range position if configured.
12	TorqueOrThrust	Signed int	2	Read	**Instantaneous torque** in 10ths of a %. Range 0 (0.0%) to 1200 (120.0%).
13	Temperature	Signed int	2	Read	**Internal temperature of the actuator:** Signed value with units of 0.1 degrees Celsius.
14	Analogueinput1	Unsigned int	2	Read	**Analogue input 1:** Only applicable to actuators capable of additional analogue input cards. Range 0 (0.00%) to 10000 (100.00%).
15	Analogueinput2	Unsigned int	2	Read	**Analogue input 2:** only applicable to actuators capable of additional analogue input cards. Range 0 (0.00%) to 10000 (100.00%).
16	NAMURAlarmDataAllMasked	Bitfield	4	Read	**NAMUR 107 status and alarm data for all four failure levels** (as masked in parameters 34 to 37). Data bits are defined in the Bitfields table, and more details can be found in publication PUB002-040.
17	NAMURFailureAlarmData	Bitfield	4	Read	**NAMUR 107 status and alarm data for Failure only** (as masked in parameter NAMURFailureDataMask, no. 34). Data bits are defined in the Bitfields table, and more details can be found in publication PUB002-040.
18	NAMUROutofSpecAlarmData	Bitfield	4	Read	**NAMUR 107 status and alarm data for out of specification only** (as masked in parameter NAMUROutOfSpecDataMask, no. 35). Data bits are defined in the Bitfields table, and more details can be found in publication PUB002-040.
19	NAMURFunctionCheckAlarmData	Bitfield	4	Read	**NAMUR 107 status and alarm data for function check only** (as masked in parameter NAMURFunctionCheckDataMask, no. 36). Data bits are defined in the Bitfields table, and more details can be found in publication PUB002-040.
20	NAMURMaintenanceAlarmData	Bitfield	4	Read	**NAMUR 107 status and alarm data for Maintenance only** (as masked in parameter NAMURMaintenanceDataMask, no.37). Data bits are defined in the Bitfields table, and more details can be found in publication PUB002-040.
21	NAMURStatusAlarmData	Bitfield	4	Read	**NAMUR 107 all status and alarm data** (regardless of the masks in parameters 34 to 37). Data bits are defined in the Bitfields table, and more details can be found in publication PUB002-040.
22	DigitalControl	Bitfield	2	Read / Write	**Digital control:** Digital movement command register for the actuator. Writing here will cause movement if the actuator is available for remote control.
23	DesiredPosition	Unsigned int	2	Read / Write	**Position control:** Positional command register for the actuator. Value in 100ths of %. Range 0 (0.00%) to 10000 (100.00%). Writing here will cause movement if the actuator is available for remote control and the PositionEnable bit is set in DigitalControl (index 22). **Multiport/Multiset actuator:** Value in 10s of port number. Range 10 (port 1) to 160 (port 16).
24	NetworkStatus1	Bitfield	2	Read	**NetworkStatus1 to NetworkStatus4:** Option card status. Requires the actuator to be a Multiport build, refer to PUB002-221 for more information about Multiport.
25	NetworkStatus2	Bitfield	2	Read	
26	NetworkStatus3	Bitfield	2	Read	
27	NetworkStatus4	Bitfield	2	Read	
28	MultiportStatus1	Bitfield	2	Read	**Multiport status.** See Bitfields table for detailed description. Requires the actuator to be a Multiport build, refer to PUB002-221 for more information about Multiport
29	MultiportStatus2	Bitfield	2	Read	
30	MultiportStatus3	Bitfield	2	Read	
31	MultiportStatus4	Bitfield	2	Read	
32	MultiportNearestPort	Unsigned int	2	Read	**Multiport Nearest Port:** indicates the port nearest to the current position. Requires the actuator to be a Multiport build, refer to PUB002-221 for more information about Multiport.
33	SetResetRelays	Bitfield	4	Read / Write	**Relay control:** 32-bit register for controlling the output of the relays. Bits 0 to 8, sets relays 1 to 9 respectively (value 1 sets relay, value 0 does nothing). Bits 9 to 17, resets relays 1 to 9 respectively (value 1 resets relay, value 0 does nothing).
34	NAMURFailureDataMask	Bitfield	4	Read / Write	**NAMUR 107 Mask Configuration for Failure Level:** Data bits are defined in the Bitfields table and more details can be found in publication PUB002-040.
35	NAMUROutOfSpecDataMask	Bitfield	4	Read / Write	**NAMUR 107 Mask Configuration for Out Of Specification Level:** Data bits are defined in the Bitfields table and more details can be found in publication PUB002-040.
36	NAMURFunctionCheckDataMask	Bitfield	4	Read / Write	**NAMUR 107 Mask Configuration for Function Check Level:** Data bits are defined in the Bitfields table and more details can be found in publication PUB002-040.
37	NAMURMaintenanceDataMask	Bitfield	4	Read / Write	**NAMUR 107 Mask Configuration for Maintenance Level:** Data bits are defined in the Bitfields table and more details can be found in publication PUB002-040.
38	LossOfCommsTimeout	Unsigned int	2	Read / Write	**LossOfCommsTimeoutConfiguration:** Configuration for action on loss of signal timeout. Time, in milliseconds, after communications with the option card have been lost, that the configured action on loss of signal will take place.
39	ActionOnLossOfComms	Enumeration	1	Read / Write	**ActionOnLossOfComms:** Configuration for action on loss of signal. Action to be performed when communication loss occurs and the time set in LossOfCommsTimeout (paramter 38) has elapsed. Values: 0 – No action 1 – Open 3 – Close 5 – Stop 7 – Go to position
40	CommsLostPosition	Unsigned int	2	Read / Write	**CommsLostPosition:** Configuration for the position that the actuator should move to when comms loss occurs, and the action (parameter ActionOnLossOfComms, no. 39) is set to Go To position. Range 0 (0.00%) to 10000 (100.00%).

Note: Indices 28 to 31 are reserved and 324 onwards are not available on v103 firmware

Index	Data Name	Data Type	Data Size (octets)	Data Access	Description
41	FunctionOfS1	Enumeration	1	Read / Write	**FunctionOfS1 to FunctionOfS12:** If fitted, configuration for relays 1 to 12 action. See Enumerations table for values (FunctionOfS1 to S12). Relays S1 to S4 are supplied with an actuator by default. Relays S5 to S12 are optional. They can be configured to provide communication to external devices. For example, they can signal that a partial stroke is active or 24V power supply is lost. Please refer to PUB002-040 for details.
42	FunctionOfS2	Enumeration	1	Read / Write	
43	FunctionOfS3	Enumeration	1	Read / Write	
44	FunctionOfS4	Enumeration	1	Read / Write	
45	FunctionOfS5	Enumeration	1	Read / Write	
46	FunctionOfS6	Enumeration	1	Read / Write	
47	FunctionOfS7	Enumeration	1	Read / Write	
48	FunctionOfS8	Enumeration	1	Read / Write	
49	FunctionOfS9	Enumeration	1	Read / Write	
50	FunctionOfS10	Enumeration	1	Read / Write	
51	FunctionOfS11	Enumeration	1	Read / Write	
52	FunctionOfS12	Enumeration	1	Read / Write	
53	ContactTypeS1	Enumeration	1	Read / Write	**ContactTypeS1 to ContactTypeS12:** If fitted, configuration for relays 1 to 12 contact type. Values: 0 – Normally Closed contact 1 – Normally Open contact
54	ContactTypeS2	Enumeration	1	Read / Write	
55	ContactTypeS3	Enumeration	1	Read / Write	
56	ContactTypeS4	Enumeration	1	Read / Write	
57	ContactTypeS5	Enumeration	1	Read / Write	
58	ContactTypeS6	Enumeration	1	Read / Write	
59	ContactTypeS7	Enumeration	1	Read / Write	
60	ContactTypeS8	Enumeration	1	Read / Write	
61	ContactTypeS9	Enumeration	1	Read / Write	
62	ContactTypeS10	Enumeration	1	Read / Write	
63	ContactTypeS11	Enumeration	1	Read / Write	
64	ContactTypeS12	Enumeration	1	Read / Write	
65	PositionTripS1	Unsigned int	2	Read / Write	**PositionTripS1 to PositionTripS12:** If fitted, configuration for relays 1 to 12 when function type 'intermediate position' is selected. Range 0 (0.0%) to 1000 (100.0%).
66	PositionTripS2	Unsigned int	2	Read / Write	
67	PositionTripS3	Unsigned int	2	Read / Write	
68	PositionTripS4	Unsigned int	2	Read / Write	
69	PositionTripS5	Unsigned int	2	Read / Write	
70	PositionTripS6	Unsigned int	2	Read / Write	
62	ContactTypeS10	Enumeration	1	Read / Write	
63	ContactTypeS11	Enumeration	1	Read / Write	
64	ContactTypeS12	Enumeration	1	Read / Write	
65	PositionTripS1	Unsigned int	2	Read / Write	
66	PositionTripS2	Unsigned int	2	Read / Write	
67	PositionTripS3	Unsigned int	2	Read / Write	
68	PositionTripS4	Unsigned int	2	Read / Write	
69	PositionTripS5	Unsigned int	2	Read / Write	
70	PositionTripS6	Unsigned int	2	Read / Write	
71	PositionTripS7	Unsigned int	2	Read / Write	
72	PositionTripS8	Unsigned int	2	Read / Write	
73	PositionTripS9	Unsigned int	2	Read / Write	
74	PositionTripS10	Unsigned int	2	Read / Write	
75	PositionTripS11	Unsigned int	2	Read / Write	
76	PositionTripS12	Unsigned int	2	Read / Write	
77	FTPEnabled	Enumeration	1	Read	**FTPEnabled:** Indicates whether File Transfer Protocol is enabled on the option card.
78	DefaultHardWireLinkEnabled	Enumeration	1	Read	**DefaultHardWireLinkEnabled:** Indicates whether the default hard wire link is inserted in the option card during power-up or firmware reset. Value 0 indicates default link not present, Value 1 indicates default link in place. If the default link is inserted, option card configurations are set to default values.
79	NetworkUptime	Unsigned int	4	Read	**NetworkUptime:** The time, in units of 0.25s, since the last reset of the option card.
80	FieldIntefaceType	Enumeration	1	Read	**FieldIntefaceType:** Indicates which Ethernet industrial protocol is in use. Value is fixed to 50 for Modbus-TCP.
81	OptionNumber	Unsigned int	2	Read	**OptionNumber:** Internal inter-board communications reference (CAN slot number).
82	CloseContactorCount	Unsigned int	4	Read	**CloseContactorCount:** Indicates the number of times the actuator has been operated in the Close direction.
83	OpenContactorCount	Unsigned int	4	Read	**OpenContactorCount:** Indicates the number of times the actuator has been operated in the Open direction.
84	NumberOfContactorSwitches	Unsigned int	4	Read	**NumberOfContactorSwitches:** Indicates the number of times the actuator has been operated in either direction.
85	ClosingTorqueAt0Pct	Unsigned int	2	Read	**ClosingTorqueAt0Pct to ClosingTorqueAt100Pct:** Instantaneous Torque log - closing. Indicates the average value of the closing torque at each percentage position. Range 0 (0%) to 120 (120%).
86	ClosingTorqueAt1Pct	Unsigned int	2	Read	
87	ClosingTorqueAt2Pct	Unsigned int	2	Read	
88	ClosingTorqueAt3Pct	Unsigned int	2	Read	
89	ClosingTorqueAt4Pct	Unsigned int	2	Read	
90	ClosingTorqueAt5Pct	Unsigned int	2	Read	
91	ClosingTorqueAt6Pct	Unsigned int	2	Read	
92	ClosingTorqueAt7Pct	Unsigned int	2	Read	
93	ClosingTorqueAt8Pct	Unsigned int	2	Read	
94	ClosingTorqueAt9Pct	Unsigned int	2	Read	
95	ClosingTorqueAt10Pct	Unsigned int	2	Read	
96	ClosingTorqueAt11Pct	Unsigned int	2	Read	
97	ClosingTorqueAt12Pct	Unsigned int	2	Read	
98	ClosingTorqueAt13Pct	Unsigned int	2	Read	
99	ClosingTorqueAt14Pct	Unsigned int	2	Read	
100	ClosingTorqueAt15Pct	Unsigned int	2	Read	
101	ClosingTorqueAt16Pct	Unsigned int	2	Read	
102	ClosingTorqueAt17Pct	Unsigned int	2	Read	
103	ClosingTorqueAt18Pct	Unsigned int	2	Read	
104	ClosingTorqueAt19Pct	Unsigned int	2	Read	
105	ClosingTorqueAt20Pct	Unsigned int	2	Read	
106	ClosingTorqueAt21Pct	Unsigned int	2	Read	
107	ClosingTorqueAt22Pct	Unsigned int	2	Read	
108	ClosingTorqueAt23Pct	Unsigned int	2	Read	

Index	Data Name	Data Type	Data Size (octets)	Data Access	Description
109	ClosingTorqueAt24Pct	Unsigned int	2	Read	**ClosingTorqueAt0Pct to ClosingTorqueAt100Pct:** Instantaneous Torque log – closing. Indicates the average value of the closing torque at each percentage position. Range 0 (0%) to 120 (120%).
110	ClosingTorqueAt25Pct	Unsigned int	2	Read	
111	ClosingTorqueAt26Pct	Unsigned int	2	Read	
112	ClosingTorqueAt27Pct	Unsigned int	2	Read	
113	ClosingTorqueAt28Pct	Unsigned int	2	Read	
114	ClosingTorqueAt29Pct	Unsigned int	2	Read	
115	ClosingTorqueAt30Pct	Unsigned int	2	Read	
116	ClosingTorqueAt31Pct	Unsigned int	2	Read	
117	ClosingTorqueAt32Pct	Unsigned int	2	Read	
118	ClosingTorqueAt33Pct	Unsigned int	2	Read	
119	ClosingTorqueAt34Pct	Unsigned int	2	Read	
120	ClosingTorqueAt35Pct	Unsigned int	2	Read	
121	ClosingTorqueAt36Pct	Unsigned int	2	Read	
122	ClosingTorqueAt37Pct	Unsigned int	2	Read	
123	ClosingTorqueAt38Pct	Unsigned int	2	Read	
124	ClosingTorqueAt39Pct	Unsigned int	2	Read	
125	ClosingTorqueAt40Pct	Unsigned int	2	Read	
126	ClosingTorqueAt41Pct	Unsigned int	2	Read	
127	ClosingTorqueAt42Pct	Unsigned int	2	Read	
128	ClosingTorqueAt43Pct	Unsigned int	2	Read	
129	ClosingTorqueAt44Pct	Unsigned int	2	Read	
130	ClosingTorqueAt45Pct	Unsigned int	2	Read	
131	ClosingTorqueAt46Pct	Unsigned int	2	Read	
132	ClosingTorqueAt47Pct	Unsigned int	2	Read	
133	ClosingTorqueAt48Pct	Unsigned int	2	Read	
134	ClosingTorqueAt49Pct	Unsigned int	2	Read	
135	ClosingTorqueAt50Pct	Unsigned int	2	Read	
136	ClosingTorqueAt51Pct	Unsigned int	2	Read	
137	ClosingTorqueAt52Pct	Unsigned int	2	Read	
138	ClosingTorqueAt53Pct	Unsigned int	2	Read	
139	ClosingTorqueAt54Pct	Unsigned int	2	Read	
140	ClosingTorqueAt55Pct	Unsigned int	2	Read	
141	ClosingTorqueAt56Pct	Unsigned int	2	Read	
142	ClosingTorqueAt57Pct	Unsigned int	2	Read	
143	ClosingTorqueAt58Pct	Unsigned int	2	Read	
144	ClosingTorqueAt59Pct	Unsigned int	2	Read	
145	ClosingTorqueAt60Pct	Unsigned int	2	Read	
146	ClosingTorqueAt61Pct	Unsigned int	2	Read	
147	ClosingTorqueAt62Pct	Unsigned int	2	Read	
148	ClosingTorqueAt63Pct	Unsigned int	2	Read	
149	ClosingTorqueAt64Pct	Unsigned int	2	Read	
150	ClosingTorqueAt65Pct	Unsigned int	2	Read	
151	ClosingTorqueAt66Pct	Unsigned int	2	Read	
152	ClosingTorqueAt67Pct	Unsigned int	2	Read	
153	ClosingTorqueAt68Pct	Unsigned int	2	Read	
154	ClosingTorqueAt69Pct	Unsigned int	2	Read	
155	ClosingTorqueAt70Pct	Unsigned int	2	Read	
156	ClosingTorqueAt71Pct	Unsigned int	2	Read	
157	ClosingTorqueAt72Pct	Unsigned int	2	Read	
158	ClosingTorqueAt73Pct	Unsigned int	2	Read	
159	ClosingTorqueAt74Pct	Unsigned int	2	Read	
160	ClosingTorqueAt75Pct	Unsigned int	2	Read	
161	ClosingTorqueAt76Pct	Unsigned int	2	Read	
162	ClosingTorqueAt77Pct	Unsigned int	2	Read	
163	ClosingTorqueAt78Pct	Unsigned int	2	Read	
164	ClosingTorqueAt79Pct	Unsigned int	2	Read	
165	ClosingTorqueAt80Pct	Unsigned int	2	Read	
166	ClosingTorqueAt81Pct	Unsigned int	2	Read	
167	ClosingTorqueAt82Pct	Unsigned int	2	Read	
168	ClosingTorqueAt83Pct	Unsigned int	2	Read	
169	ClosingTorqueAt84Pct	Unsigned int	2	Read	
170	ClosingTorqueAt85Pct	Unsigned int	2	Read	
171	ClosingTorqueAt86Pct	Unsigned int	2	Read	
172	ClosingTorqueAt87Pct	Unsigned int	2	Read	
173	ClosingTorqueAt88Pct	Unsigned int	2	Read	
174	ClosingTorqueAt89Pct	Unsigned int	2	Read	
175	ClosingTorqueAt90Pct	Unsigned int	2	Read	
176	ClosingTorqueAt91Pct	Unsigned int	2	Read	
177	ClosingTorqueAt92Pct	Unsigned int	2	Read	
178	ClosingTorqueAt93Pct	Unsigned int	2	Read	
179	ClosingTorqueAt94Pct	Unsigned int	2	Read	
180	ClosingTorqueAt95Pct	Unsigned int	2	Read	
181	ClosingTorqueAt96Pct	Unsigned int	2	Read	
182	ClosingTorqueAt97Pct	Unsigned int	2	Read	
183	ClosingTorqueAt98Pct	Unsigned int	2	Read	
184	ClosingTorqueAt99Pct	Unsigned int	2	Read	
185	ClosingTorqueAt100Pct	Unsigned int	2	Read	

Index	Data Name	Data Type	Data Size (octets)	Data Access	Description
186	OpeningTorqueAt0Pct	Unsigned int	2	Read	**OpeningTorqueAt0Pct to OpeningTorqueAt100Pct:** Instantaneous Torque log – opening. Indicates the average value of the opening torque at each percentage position. Range 0 (0%) to 120 (120%).
187	OpeningTorqueAt1Pct	Unsigned int	2	Read	
188	OpeningTorqueAt2Pct	Unsigned int	2	Read	
189	OpeningTorqueAt3Pct	Unsigned int	2	Read	
190	OpeningTorqueAt4Pct	Unsigned int	2	Read	
191	OpeningTorqueAt5Pct	Unsigned int	2	Read	
192	OpeningTorqueAt6Pct	Unsigned int	2	Read	
193	OpeningTorqueAt7Pct	Unsigned int	2	Read	
194	OpeningTorqueAt8Pct	Unsigned int	2	Read	
195	OpeningTorqueAt9Pct	Unsigned int	2	Read	
196	OpeningTorqueAt10Pct	Unsigned int	2	Read	
197	OpeningTorqueAt11Pct	Unsigned int	2	Read	
198	OpeningTorqueAt12Pct	Unsigned int	2	Read	
199	OpeningTorqueAt13Pct	Unsigned int	2	Read	
200	OpeningTorqueAt14Pct	Unsigned int	2	Read	
201	OpeningTorqueAt15Pct	Unsigned int	2	Read	
202	OpeningTorqueAt16Pct	Unsigned int	2	Read	
203	OpeningTorqueAt17Pct	Unsigned int	2	Read	
204	OpeningTorqueAt18Pct	Unsigned int	2	Read	
205	OpeningTorqueAt19Pct	Unsigned int	2	Read	
206	OpeningTorqueAt20Pct	Unsigned int	2	Read	
207	OpeningTorqueAt21Pct	Unsigned int	2	Read	
208	OpeningTorqueAt22Pct	Unsigned int	2	Read	
209	OpeningTorqueAt23Pct	Unsigned int	2	Read	
210	OpeningTorqueAt24Pct	Unsigned int	2	Read	
211	OpeningTorqueAt25Pct	Unsigned int	2	Read	
212	OpeningTorqueAt26Pct	Unsigned int	2	Read	
213	OpeningTorqueAt27Pct	Unsigned int	2	Read	
214	OpeningTorqueAt28Pct	Unsigned int	2	Read	
215	OpeningTorqueAt29Pct	Unsigned int	2	Read	
216	OpeningTorqueAt30Pct	Unsigned int	2	Read	
217	OpeningTorqueAt31Pct	Unsigned int	2	Read	
218	OpeningTorqueAt32Pct	Unsigned int	2	Read	
219	OpeningTorqueAt33Pct	Unsigned int	2	Read	
220	OpeningTorqueAt34Pct	Unsigned int	2	Read	
221	OpeningTorqueAt35Pct	Unsigned int	2	Read	
222	OpeningTorqueAt36Pct	Unsigned int	2	Read	
223	OpeningTorqueAt37Pct	Unsigned int	2	Read	
224	OpeningTorqueAt38Pct	Unsigned int	2	Read	
225	OpeningTorqueAt39Pct	Unsigned int	2	Read	
226	OpeningTorqueAt40Pct	Unsigned int	2	Read	
227	OpeningTorqueAt41Pct	Unsigned int	2	Read	
228	OpeningTorqueAt42Pct	Unsigned int	2	Read	
229	OpeningTorqueAt43Pct	Unsigned int	2	Read	
230	OpeningTorqueAt44Pct	Unsigned int	2	Read	
231	OpeningTorqueAt45Pct	Unsigned int	2	Read	
232	OpeningTorqueAt46Pct	Unsigned int	2	Read	
233	OpeningTorqueAt47Pct	Unsigned int	2	Read	
234	OpeningTorqueAt48Pct	Unsigned int	2	Read	
235	OpeningTorqueAt49Pct	Unsigned int	2	Read	
236	OpeningTorqueAt50Pct	Unsigned int	2	Read	
237	OpeningTorqueAt51Pct	Unsigned int	2	Read	
238	OpeningTorqueAt52Pct	Unsigned int	2	Read	
239	OpeningTorqueAt53Pct	Unsigned int	2	Read	
240	OpeningTorqueAt54Pct	Unsigned int	2	Read	
241	OpeningTorqueAt55Pct	Unsigned int	2	Read	
242	OpeningTorqueAt56Pct	Unsigned int	2	Read	
243	OpeningTorqueAt57Pct	Unsigned int	2	Read	
244	OpeningTorqueAt58Pct	Unsigned int	2	Read	
245	OpeningTorqueAt59Pct	Unsigned int	2	Read	
246	OpeningTorqueAt60Pct	Unsigned int	2	Read	
247	OpeningTorqueAt61Pct	Unsigned int	2	Read	
248	OpeningTorqueAt62Pct	Unsigned int	2	Read	
249	OpeningTorqueAt63Pct	Unsigned int	2	Read	
250	OpeningTorqueAt64Pct	Unsigned int	2	Read	
251	OpeningTorqueAt65Pct	Unsigned int	2	Read	
252	OpeningTorqueAt66Pct	Unsigned int	2	Read	
253	OpeningTorqueAt67Pct	Unsigned int	2	Read	
254	OpeningTorqueAt68Pct	Unsigned int	2	Read	
255	OpeningTorqueAt69Pct	Unsigned int	2	Read	
256	OpeningTorqueAt70Pct	Unsigned int	2	Read	
257	OpeningTorqueAt71Pct	Unsigned int	2	Read	
258	OpeningTorqueAt72Pct	Unsigned int	2	Read	
259	OpeningTorqueAt73Pct	Unsigned int	2	Read	
260	OpeningTorqueAt74Pct	Unsigned int	2	Read	
261	OpeningTorqueAt75Pct	Unsigned int	2	Read	
262	OpeningTorqueAt76Pct	Unsigned int	2	Read	
263	OpeningTorqueAt77Pct	Unsigned int	2	Read	
264	OpeningTorqueAt78Pct	Unsigned int	2	Read	
265	OpeningTorqueAt79Pct	Unsigned int	2	Read	
266	OpeningTorqueAt80Pct	Unsigned int	2	Read	
267	OpeningTorqueAt81Pct	Unsigned int	2	Read	
268	OpeningTorqueAt82Pct	Unsigned int	2	Read	

Index	Data Name	Data Type	Data Size (octets)	Data Access	Description
269	OpeningTorqueAt83Pct	Unsigned int	2	Read	**OpeningTorqueAt0Pct to OpeningTorqueAt100Pct:** Instantaneous Torque log – opening. Indicates the average value of the opening torque at each percentage position. Range 0 (0%) to 120 (120%).
270	OpeningTorqueAt84Pct	Unsigned int	2	Read	
271	OpeningTorqueAt85Pct	Unsigned int	2	Read	
272	OpeningTorqueAt86Pct	Unsigned int	2	Read	
273	OpeningTorqueAt87Pct	Unsigned int	2	Read	
274	OpeningTorqueAt88Pct	Unsigned int	2	Read	
275	OpeningTorqueAt89Pct	Unsigned int	2	Read	
276	OpeningTorqueAt90Pct	Unsigned int	2	Read	
277	OpeningTorqueAt91Pct	Unsigned int	2	Read	
278	OpeningTorqueAt92Pct	Unsigned int	2	Read	
279	OpeningTorqueAt93Pct	Unsigned int	2	Read	
280	OpeningTorqueAt94Pct	Unsigned int	2	Read	
281	OpeningTorqueAt95Pct	Unsigned int	2	Read	
282	OpeningTorqueAt96Pct	Unsigned int	2	Read	
283	OpeningTorqueAt97Pct	Unsigned int	2	Read	
284	OpeningTorqueAt98Pct	Unsigned int	2	Read	
285	OpeningTorqueAt99Pct	Unsigned int	2	Read	
286	OpeningTorqueAt100Pct	Unsigned int	2	Read	
287	ActuatorTag	Char	32	Read / Write	**ActuatorTag:** The customers Valve Tag can be entered in here for reference.
288	ActuatorType	Enumeration	1	Read	**Actuator Type:** Value 26 – IQ3Pro, value 27 – IQ3TPro.
289	ActuatorSerialNumber	Char	16	Read	**ActuatorSerialNumber:** Manufacturer data. Actuator serial number.
290	ControllerSerialNumber	Char	24	Read	**ControllerSerialNumber:** Manufacturer data. Serial number for actuator main controller board.
291	UISerialNumber	Char	24	Read	**UISerialNumber:** Manufacturer data. Serial Number for user interface board/local controls.
292	PositionSensorSerialNumber	Char	24	Read	**PositionSensorSerialNumber:** Manufacturer data. Serial number for the position sensor.
293	DCPowerModuleSerialNumber	Char	24	Read	**DCPowerModuleSerialNumber:** Manufacturer data. Serial number for the DC power board.
294	PowerModuleSerialNumber	Char	24	Read	**PowerModuleSerialNumber:** Manufacturer data. Serial number for the power module board.
295	SolidStateStarterModule SerialNumber	Char	24	Read	**SolidStateStarterModuleSerialNumber:** Manufacturer data. Serial Number for the solid-state starter module board.
296	Option1SerialNumber	Char	24	Read	**Option1SerialNumber to Option4SerialNumber:** Manufacturer data. Serial Number for options 1 to 4 - if fitted.
297	Option2SerialNumber	Char	24	Read	
298	Option3SerialNumber	Char	24	Read	
299	Option4SerialNumber	Char	24	Read	
300	AssetIDList1	Unsigned int	2	Read	**AssetIDList1to AssetIDList10:** Lists the asset IDs in the system. This data is used internally.
301	AssetIDList2	Unsigned int	2	Read	
302	AssetIDList3	Unsigned int	2	Read	
303	AssetIDList4	Unsigned int	2	Read	
304	AssetIDList5	Unsigned int	2	Read	
305	AssetIDList6	Unsigned int	2	Read	
306	AssetIDList7	Unsigned int	2	Read	
307	AssetIDList8	Unsigned int	2	Read	
308	AssetIDList9	Unsigned int	2	Read	
309	AssetIDList10	Unsigned int	2	Read	
310	Asset1SoftwareVersion	Char	12	Read	**Asset1SoftwareVersion to Asset10SoftwareVersion:** Software versions for the assets (main actuator board, user interface board, option card, etc) in the actuator. Each software version is max 12 characters long, which is the version number followed by build number. For example, "v102(3145)".
311	Asset2SoftwareVersion	Char	12	Read	
312	Asset3SoftwareVersion	Char	12	Read	
313	Asset4SoftwareVersion	Char	12	Read	
314	Asset5SoftwareVersion	Char	12	Read	
315	Asset6SoftwareVersion	Char	12	Read	
316	Asset7SoftwareVersion	Char	12	Read	
317	Asset8SoftwareVersion	Char	12	Read	
318	Asset9SoftwareVersion	Char	12	Read	
319	Asset10SoftwareVersion	Char	12	Read	
320	FirmwareUpgradeover NetworkEnable	Enumeration	1	Read / Write	**FirmwareUpgradeoverNetworkEnable:** Used to initiate the firmware upgrade of the network module. Firmware file is required to be loaded first via FTP. Writing 1 initiates upgrade.
321	FileLoadStatus	Enumeration	1	Read / Write	**FileLoadStatus:** Status parameter for data log and config file compilation. 0 - Idle, or Done (ready for download from the option card webpages). 1 - Set to 1 to start data log/config file compilation. Or if reading, 1 indicates compilation in progress. 2 - Error during compilation. The option card must first get the data log from the actuator user interface board, initiated by setting this parameter to 1, once compiled and 'Done' is indicated, then it's ready for download from the webpages. Used by option card webpages ONLY.
322	FileLoadProgress	Unsigned int	2	Read	**FileLoadProgress:** Progress parameter for data log and config file compilation. Range 0 to 100, indicating % complete. Used by option card webpages ONLY.
323	DataLogTimestamp	Char	16	Read / Write	**DataLogTimestamp:** Data log and configuration date and time. Used by option card webpages ONLY.
324	LimitedRangePositionMin	Unsigned int	2	Read / Write	**Minimum Range:** Minimum span for positioning in 100ths %.
325	LimitedRangePositionMax	Unsigned int	2	Read / Write	**Maximum Range:** Maximum span for positioning in 100ths %.
326	Deadband	Unsigned int	2	Read / Write	**Deadband:** Deadband range in both directions whilst positioning in 100ths %.
327	Hysteresis	Unsigned int	2	Read / Write	**Hysteresis:** Hysteresis range in both directions whilst positioning in 100ths %.
328	IQT3SlowModeSpeed	Unsigned int	2	Read / Write	**Slow Mode:** Speed setting for operation near limits, percentage of rated speed.
329	MotionInhibitTimeMs	Unsigned int	4	Read / Write	**MIT:** Motion Inhibit Timer in ms.
330	ManualMovementTravel	Unsigned int	2	Read / Write	**Manual Movement:** Movement required to generate manual movement indication in 100ths %.
331	AuxInputTypeMask	Bitfield	2	Read / Write	**Aux Mask:** Auxiliary function type, value (1) command action (0) Digital Input (DI). Bits 0-3 representing the actions DI1/Open, DI2/Close, DI3/STOP or Maintain, DI4/ESD see bit fields.
332	AuxInputContactStateMask	Bitfield	2	Read / Write	**Aux Input:** Auxiliary input type, value (1) Normally open (0) Normally closed. Bits 0-3 representing the actions DI1/Open, DI2/Close, DI3/STOP or Maintain, DI4/ESD see bit fields.
333	PartialStrokePosition	Unsigned int	2	Read / Write	**Partial Stroke Position:** Specifies the position to move to when the partial stroke action is invoked.

Note: Indices 28 to 31 are reserved and 324 onwards are not available on v103 firmware

Index	Data Name	Data Type	Data Size (octets)	Data Access	Description
334	PartialStrokeStartingLimit	Enumeration	1	Read / Write	**Partial Stroke Limit:** Sets the initial position from where the partial stroke test is to run. 0 – Test from open limit 1 – Test from closed limit
335	PartialStrokeOutTimeMs	Unsigned int	4	Read / Write	**Partial Stroke Out Time:** Time taken to reach the specified partial stroke position as set by parameter index 333 (multiples of 1ms).
336	PartialStrokeReturnTimeMs	Unsigned int	4	Read / Write	**Partial Stroke Return Time:** Time taken to return to the starting position of a partial stroke (multiples of 1ms).
337	CloseTorqueSet	Unsigned int	2	Read	**Close Torque Set:** The torque percentage of rated in the close direction in 0-100%.
338	OpenTorqueSet	Unsigned int	2	Read	**Open Torque Set:** The torque percentage of rated in the Open direction in 0-100%.
339	EsdNetDisable	Enumeration	1	Read / Write	**ESD Netdisable:** When set the ESD input will act as a 'net disable input' and not ESD. Meaning that commands via the network can be disabled if the input is activated. 0 – ESD input 1 – Net disable input
340	EsdAction	Enumeration	1	Read / Write	**ESD Action:** Sets the programmed action to be performed when the ESD is active. 0 – Close 1 – Stop 2 – Open 3 – Off 4 – Reserved 5 – Position
341	EsdContact	Enumeration	1	Read / Write	**ESD Contact:** Sets the contact type for the ESD 0 – Normally closed 1 – Normally open
342	EsdOverrideInterlock	Enumeration	1	Read / Write	**ESD Override Interlock:** Sets whether the ESD can override an interlock signal. 0 – No 1 – Yes
343	EsdOverrideThermostatTrip	Enumeration	1	Read / Write	**ESD Override Thermostat:** Sets whether the ESD can over ride an interlock signal. 0 – No 1 – Yes
344	EsdOverrideLocalStop	Enumeration	1	Read / Write	**ESD Override Local Stop:** Sets whether the ESD can over ride a Local Stop signal. 0 – No 1 – Yes
345	EsdOverrideInterruptTimer	Enumeration	1	Read / Write	**ESD Override Interrupter Timer:** Sets whether the ESD can over ride the Interrupter Timer. 0 – No 1 – Yes
346	InterlocksInputMode	Enumeration	1	Read	**Interlocks Mode:** Indicates which mode the interlocks will operate in. 0 – Interlocks disabled 1 – Interlocks enabled 2 – Conditional control enabled 3 – Partial stroke on open interlock
347	InterruptTimerStartingLimit	Enumeration	1	Read / Write	**Interrupter Timer Start Point:** Sets the limit (open/closed) that the interrupter timer is to operate at. 0 – Closed limit 1 – Open limit
348	InterruptTimerOnTime100Ms	Unsigned int	4	Read / Write	**Interrupter Timer On:** Sets the On time for the Interrupter Time - the time that the motor is energised, in 100ms steps.
349	InterruptTimerOffTime100Ms	Unsigned int	4	Read / Write	**Interrupter Timer Off:** Sets the Off time for the Interrupter Time - the time that the motor is de-energised, in 100ms steps.
350	InterruptTimerPosition OpenDirection	Unsigned int	2	Read / Write	**Interrupter Timer Position Open:** Sets the position in the Open direction which the function will operate in 100ths percent.
351	InterruptTimerPosition CloseDirection	Unsigned int	2	Read / Write	**Interrupter Timer Position Close:** Sets the position in the close direction which the function will operate in 100ths percent.
352	AnalogueInputMinMax	Enumeration	1	Read / Write	**Analogue Input Span:** Writing to this parameter will set up the span for the analogue input. A value of 1 will calibrate the maximum input and a value of 2 will calibrate the minimum. The relevant signals will need to be applied to the input prior to sending the command.
353	MultiportTargetPort	Unsigned int	2	Read	**Multiport Target Port:** The port number which the actuator is currently attempting to position to or has been instructed to move to. Requires the actuator to be a Multiport build, refer to PUB002-221 for more information about Multiport.
354	MultiportPositionDegrees	Unsigned int	2	Read	**Multiport Position Degrees:** The position of the actuator in degrees where 0º is the first port. Intermediate positions are divided equally by the number of ports. For example, for 3 ports: – Port 1 = 0º – Port 2 = 120º – Port 3 = 240º Requires the actuator to be a Multiport build, refer to PUB002-221 for more information about Multiport.
355	MultiportNumPorts	Unsigned int	2	Read	**Mulitiport Number of Ports:** Indicates the number of ports set up in a Multiport actuator. Requires the actuator to be a Multiport build, refer to PUB002-221 for more information about Multiport.
356	MultiportActivePorts	Bitfield	2	Read / Write	**Mulitiport Active Ports:** Allows the set ports to the deactivated. 16 Bit field representing 16 ports (see bit fields). Bit value 1 means port active, a 0 means port inactive. Requires the actuator to be a Multiport build, refer to PUB002-221 for more information about Multiport.
357	MultiportCurrentBacklash	Signed int	2	Read	**Mulitiport Current Backlash:** This value is used to remove backlash in the system when operating in bidirectional mode. Requires the actuator to be a Multiport build, refer to PUB002-221 for more information about Multiport.
358	MultiportEsdPort	Unsigned int	2	Read / Write	**Multiport ESD Port:** Sets the target port the unit is to go to in the event of an ESD. Requires the actuator to be a Multiport build, refer to PUB002-221 for more information about Multiport.
359	MultiportDirection	Enumeration	1	Read	**Multiport Direction Mode:** Indicates the direction mode set in the Multiport unit. Value 0 - Bidirectional-no wrap, 1 - Clockwise only, 2 - Anti-clockwise only, 3 - Bidirectional-wrap. Requires the actuator to be a Multiport build, refer to PUB002-221 for more information about Multiport.

Note: Indices 28 to 31 are reserved and 324 onwards are not available on v103 firmware

6.5 Bitfields

Index	Data Name	Bit Name	Bit Mask	Description
1	StatusData1	Byte0_DI1	0x0001	**Digital Input 1:** Reports the status of the contact connected to the actuator hard-wired Open terminal. The input can be used to control the actuator or simply to report the status of a plant feedback signal. The function is set in the Auxiliary Input Mask parameter which determines whether the bit is reported as true (1) for a closed contact or an open contact and whether the input controls the actuator or not. Note that the input is always reported even when it is also controlling the actuator. For details on the Auxiliary Input mask, please refer to the description in PUB002-040.
		Byte0_DI2	0x0002	**Digital Input 2:** Reports the status of the contact connected to the actuator hard-wired Close terminal. The input can be used to control the actuator or simply to report the status of a plant feedback signal. The function is set in the Auxiliary Input Mask parameter which determines whether the bit is reported as true (1) for a closed contact or an open contact and whether the input controls the actuator or not. Note that the input is always reported even when it is also controlling the actuator. For details on the Auxiliary Input mask, please refer to the description in PUB002-040.
		Byte0_DI3	0x0004	**Digital Input 3:** Reports the status of the contact connected to the actuator hard-wired Stop / Maintain terminal. The input can be used to control the actuator or simply to report the status of a plant feedback signal. The function is set in the Auxiliary Input Mask parameter which determines whether the bit is reported as true (1) for a closed contact or an open contact and whether the input controls the actuator or not. Note that the input is always reported even when it is also controlling the actuator. For details on the Auxiliary Input mask, please refer to the description in PUB002-040.
		Byte0_DI4	0x0008	**Digital Input 4:** Reports the status of the contact connected to the actuator hard-wired ESD terminal. The input can be used to control the actuator or simply to report the status of a plant feedback signal. The function is set in the Auxiliary Input Mask parameter which determines whether the bit is reported as true (1) for a closed contact or an open contact and whether the input controls the actuator or not. Note that the input is always reported even when it is also controlling the actuator. For details on the Auxiliary Input mask, please refer to the description in PUB002-040.
		Byte0_DI5	0x0010	**Digital Input 5 to Digital Input 8:** These bits report the status of the contact connected to the optional actuator hard-wired Digital Inputs 5 to 8. These are ignored if the optional digital input card for contacts S5 to S8 is not fitted.
		Byte0_DI6	0x0020	
		Byte0_DI7	0x0040	
		Byte0_DI8	0x0080	
		Byte1_R9	0x0100	**Relay 9 Status to Relay 12 Status:** These bits report the status of relays 9 to 12 (S contacts 9 to 12). These are ignored if the optional digital input card for relays S9 to 12 is not fitted.
		Byte1_R10	0x0200	
		Byte1_R11	0x0400	
		Byte1_R12	0x0800	
		Byte1_DI9	0x1000	**Digital Input 9 to Digital Input 12:** These bits report the status of the signal connected to the optional actuator hard-wired Digital Inputs 9 to 12 (if fitted).
		Byte1_DI10	0x2000	
		Byte1_DI11	0x4000	
		Byte1_DI12	0x8000	
2	StatusData2	Byte2_S1	0x0001	**Relay 1 Status to Relay 8 Status:** These bits report the status of relays 1 to 8 (S contacts 1 to 8).
		Byte2_S2	0x0002	
		Byte2_S3	0x0004	
		Byte2_S4	0x0008	
		Byte2_S5	0x0010	
		Byte2_S6	0x0020	
		Byte2_S7	0x0040	
		Byte2_S8	0x0080	
		Byte3_MRUN	0x0100	**Motor Running:** True (1) when the actuator is attempting to run the motor.
		Byte3_MOP	0x0200	**Moving Open:** True (1) when the actuator is moving to the open position.
		Byte3_MCL	0x0400	**Moving Close:** True (1) when the actuator is moving to the closed position.
		Byte3_CLT	0x0800	**Close Limit Reached:** True (1) when the actuator is at the closed limit.
		Byte3_OLT	0x1000	**Open Limit Reached:** True (1) when the actuator is at the open limit.
		Byte3_COLMOV	0x2000	**Column Moving:** True (1) when actuator the centre column is rotating.
		Byte3_RSEL	0x4000	**Remote Selected:** True (1) when the actuator three position remote / local stop / local selector is in the Remote position. The selector must be in this position for control using the option card to be permitted.
		Byte3_LOCAL	0x8000	**Local Selected:** True (1) when the actuator three position remote / local stop / local selector is in the Local position. Remote control of the actuator is not possible when the selector is in this position.
3	StatusData3	Byte4_LSTOP	0x0001	**Local Stop Selected:** The actuator three position selector passes from Local to Remote or Remote to Local through the Local Stop position. The switch can also be placed in Local Stop. When the switch is in the Local Stop position this bit will be true (1). Remote control of the actuator is not possible when the selector is in this position.
		Byte4_LTEST	0x0002	Reserved.
		Byte4_TTC	0x0004	T**orque Trip Open Active:** True (1) when the actuator has torqued off in the open direction.
		Byte4_TTA	0x0008	**Torque Trip Close Active:** True (1) when the actuator has torqued off in the close direction.
		Byte4_SM	0x0010	Reserved.
		Byte4_ITA	0x0020	**Interrupter Timer Active:** True (1) when the interrupter timer is active. The Interrupter Timer in the can be used over part or the entire actuator stroke to slow down the effective speed of valve travel.
		Byte4_MIT	0x0040	**Motion Inhibit timer Active:** True (1) when the Motion Inhibit timer is active. The Motion Inhibit Timer is used in position control to prevent the actuator from exceeding its prescribed number of starts per hour, or to reduce the effects of hunting during closed loop control.
		Byte4_SMT	0x0080	**Stopped Mid Travel:** True (1) when the actuator has stopped in mid travel (i.e. not at the closed or open limit).
		Byte5_ESD	0x0100	**ESD Active:** True (1) when an ESD is active.
		Byte5_PSA	0x0200	**Partial Stroke in Progress:** True (1) when a partial stroke test is active.
		Byte5_PHSEQ	0x0400	Phase Sequence is True (1) when the phase sequence is positive.
		Byte5_LocalRun	0x0800	Reserved.
		Byte5_SpareStatus4	0x1000	Reserved.
		Byte5_PSP	0x2000	**Partial Stroke Passed:** True (1) when a partial stroke test completed successfully.
		Byte5_PowerMode	0x4000	Reserved.
		Byte5_PositionerActive	0x8000	**Positioner Active:** True (1) when the actuator moving due to a position command.

Index	Data Name	Bit Name	Bit Mask	Description
4	StatusData4	Byte6_SlowModeActive	0x0001	**Slow Mode Active:** True (1) when slow mode is active. Applicable to IQT actuators only. In positioning mode, when the IQT actuator approaches its setpoint the motor automatically switches to 'slow mode' and the actuator runs at a lower speed. This allows any developed inertia to be dissipated and a better positional accuracy to be achieved without overshoot. Please refer to PUB002-040 for further details.
		Byte6_SpareStatus1	0x0002	Reserved.
		Byte6_SpareStatus2	0x0004	
		Byte6_SpareStatus3	0x0008	
		Byte6_SpareStatus4	0x0010	
		Byte6_SpareStatus5	0x0020	
		Byte6_SpareStatus6	0x0040	
		Byte6_SpareStatus7	0x0080	
5	AlarmData1	Byte0_EEPROM	0x0001	**EEPROM checksum error:** True (1) when there is a configuration error.
		Byte0_THERM	0x0002	**Thermostat Tripped:** If the temperature of the motor windings rises above the thermostat trip value, the thermostat contact will open, and this signal will be present (1). There are no adjustments for the temperature at which the thermostat trip operates. The motor will be stopped if the thermostat trips. Only once the motor has cooled down and the thermostat has reset itself can a new Remote, Network Host or Local command to move the actuator be carried out.
		Byte0_VOBS	0x0004	**Valve Obstructed:** True (1) if the actuator stops in mid travel when not expected to do so after receiving a command to move. The bit will remain true (1) until the actuator position changes by 2% or more.
		Byte0_VJAM	0x0008	**Valve Jammed:** True (1) if the actuator is stationary at the end of travel and fails to move away from the seat of the valve when expected to do so. The bit will remain true (1) until the actuator position changes by 2% or more.
		Byte0_MAN	0x0010	**Manual Movement:** True (1) when the actuator is moved by the handwheel away from the last position.
		Byte0_MCLG	0x0020	**Manual Movement in close direction:** True (1) when the actuator is moved by the handwheel away from the last position in the close direction.
		Byte0_MOPG	0x0040	**Manual Movement in open direction:** True (1) when the actuator is moved by the handwheel away from the last position in the open direction.
		Byte0_MCL	0x0080	**Manual movement moved valve to close position:** True (1) when the actuator is moved by the handwheel to the closed limit.
		Byte1_MOP	0x0100	**Manual movement moved valve to open position:** True (1) when the actuator is moved by the handwheel to the open limit.
		Byte1_EOT	0x0200	**End of travel movement:** True (1) when movement after the actuator has reached its limit occurs.
		Byte1_STALL	0x0400	**Actuator has stalled:** True (1) when the actuator is trying to operate, but there is no centre column motion.
		Byte1_MR	0x0800	**Monitor Relay:** True (1) when actuator remote control is not available. The actuator Monitor Relay status is a composite signal for several alarms. See PUB002-040 for details.
		Byte1_WD	0x1000	Reserved.
		Byte1_BL	0x2000	**Battery Low:** The status of the internal battery is monitored, and should it fall below a critical level this signal will become true (1). The battery is used to power the circuits used to keep track of the valve position when the actuator mains power is switched off. This battery is used only when the actuator has no power feed, and the valve is moved.
		Byte1_BF	0x4000	**Battery flat:** The status of the internal battery is monitored, and should it fall below a critical level this signal will become true (1). The battery is used to power the circuits used to keep track of the valve position when the actuator mains power is switched off. This battery is used only when the actuator has no power feed, and the valve is moved.
		Byte1_EEU	0x8000	**EEPROM Updated:** True (1) when the configuration of the actuator has been updated.
6	AlarmData2	Byte2_DU	0x0001	**Datalogger Updated:** True (1) when the datalogger in the actuator has been updated.
		Byte2_GA	0x0002	**General Alarm:** True (1) when any alarm is detected, including battery low or flat, valve alarm, actuator alarm, control alarm, valve obstructed or jammed (torque tripped) or monitor relay (not available for remote control).
		Byte2_VA	0x0004	**Valve Alarm:** True (1) when the actuator has tripped on torque in any direction in mid travel or on the limit (when not set to torque off on limit) or when the actuator has stalled.
		Byte2_AA	0x0008	**Actuator Alarm:** True (1) when any of the actuator alarm are set, these include: Phase loss, thermostat tripped, local controls fail, position sensor fail, torque sensor fail, power loss inhibit enabled and active, EEPROM Error, local signal in remote, position loss fail.
		Byte2_NWKF	0x0010	**Network Card Fault:** True (1) when a fault is being indicated by the option card. It is caused by one or more of the following conditions: • Network card configuration error • Remote Hand Station error • Battery charger communications error
		Byte2_PSE	0x0020	**Partial Stroke Error:** True (1) when an error occurs when requesting or operating a partial stroke test. For example, the partial stroke cannot complete as the unit is at the wrong limit.
		Byte2_COCT	0x0040	**Control Contention:** True (1) when there is contention in control, if more than one actuator control bit is active.
		Byte2_MF	0x0080	**Mains Fail:** True (1) when there is a power supply failure.
		Byte3_COMMS	0x0100	**Comms Loss:** True (1) if communication is lost between the option card and actuator, or if one or more CIP Class 1 or Class 3 connections have been lost.
		Byte3_LOP	0x0200	**Loss of Phase:** True (1) if a phase is lost in a three-phase actuator.
		Byte3_24VDC	0x0400	**24VDC Customer fault:** True (1) if the 24V supply from the actuator (customer supply) has a fault.
		Byte3_CA	0x0800	**Control Alarm:** True (1) if an ESD is active or an Interlock active and inhibiting the actuator.
		Byte3_PSF	0x1000	**Position Sensor Fault:** True (1) if the position sensor (encoder) is in alarm.
		Byte3_TSF	0x2000	**Torque Sensor Fault:** True (1) if the torque sensor is in alarm.
		Byte3_TTM	0x4000	**Torque Tripped Mid-Travel:** True (1) if the actuator has tripped on torque when it is mid travel and not at a limit position.
		Byte3_LSH	0x8000	**Local control signal held active when in remote:** True (1) if the local control knob is held in the open of close position for an extended period, when in remote.
7	AlarmData3	Byte4_FS	0x0001	Reserved.
		Byte4_TPL	0x0002	Reserved.
		Byte4_TPH	0x0004	Reserved.
		Byte4_MA	0x0008	**Maintenance Alert:** True (1) when maintenance action is required.

Index	Data Name	Bit Name	Bit Mask	Description
7	AlarmData3	Byte4_CriticalFault	0x0010	**Critical Fault:** True (1) if a product-specific critical fault has been detected. Conditions include: • Thermostat active • Phase lost • RHS Local selected • Position sensor fault • Position loss inhibit active • UIB comms error
		Byte4_NonCriticalFault	0x0020	**Non-critical fault:** True (1) if a product specific non-critical fault has been detected. Conditions include: • Valve obstructed • Valve jammed • Motor stalled • Option detection error • ESD active • Close or open interlock active • Battery flat • Battery low • Partial stroke fail • Customer supply fail
		Byte4_TestFailed	0x0040	Reserved.
		Byte4_OpenIntlkActive	0x0080	**Open Interlock Active:** True (1) if an Open Interlock is active and is inhibiting the actuator.
		Byte5_CloseIntlkActive	0x0100	**Close Interlock Active:** True (1) if a Close Interlock is active and is inhibiting the actuator
		Byte5_Vibration	0x0200	**Vibration service alarm:** True (1) if the configurable vibration service alarm is active.
		Byte5_VVT	0x0400	**Valve Travel Time Exceeded:** True (1) if the configurable Valve Travel Time alarm is active.
		Byte5_AUXOR	0x0800	**Auxiliary Override Alarm:** True (1) if the configurable auxiliary inputs mask value results in an auxiliary input overriding control.
		Byte5_NamurMaintenance	0x1000	**Namur Maintenance:** True (1) if the Maintenance level Namur alarm has tripped. More details can be found in publication PUB002-040.
		Byte5_NamurOutOfSpec	0x2000	**Namur Out of Specification:** True (1) if the Out of Specification level Namur alarm has tripped. More details can be found in publication PUB002-040.
		Byte5_NamurFunctionCheck	0x4000	**Namur Function Check:** True (1) if the Function Check level Namur alarm has tripped. More details can be found in publication PUB002-040.
		Byte5_NamurFailure	0x8000	**Namur Failure:** True (1) if the Failure level Namur alarm has tripped. More details can be found in publication PUB002-040.
8	AlarmData4	Byte6_NetDisableActive	0x0001	**Network Disable Active:** True (1) if control via the option card is being disabled by the Network disable feature.
		Byte6_CLCFaultAlarm	0x0002	**Closed Loop Control fault:** True (1) if there is a fault in the Closed Loop Control function.
		Byte6_SpareAlarm2	0x0004	Reserved.
		Byte6_SpareAlarm3	0x0008	
		Byte6_SpareAlarm4	0x0010	
		Byte6_SpareAlarm5	0x0020	
		Byte6_SpareAlarm6	0x0040	
		Byte6_SpareAlarm7	0x0080	
9	DigitalControlIndication	Open	0x0001	**Open:** True (1) when the actuator is being commanded into the open direction. (indication ONLY). Multiport/Multiset: increments port number.
		Close	0x0002	**Close:** True (1) when the actuator is being commanded into the close direction. (indication ONLY). Multiport/Multiset: Decrements port number.
		Stop	0x0004	**Stop:** True (1) when the actuator is being commanded to Stop. (indication ONLY).
		ESD	0x0008	**ESD:** True (1) when the actuator is being commanded to perform an ESD. (indication ONLY).
		PartialStroke	0x0010	**PartialStroke:** True (1) when the actuator is being commanded to perform a Partial Stroke. (indication ONLY).
		NoLongerUsed	0x0020	Reserved.
		HandAuto	0x0040	**HandAuto:** True (1) when the actuator is being controlled via a secondary control source (e.g. in folomatic case, to allow remote operation).
		PositionEnable	0x8000	**PositionEnable:** True (1) when the actuator is enabled to be commanded to an intermediate position using Position control Parameter. (indication ONLY).
16 17 18 19 20 21	NamurAllMaskedAlarmData NamurFailureAlarmData NamurOutofSpecAlarmData NamurFuncCheckAlarmData NamurMaintenanceAlarmData NamurStatusAlarmData	Byte0_BatteryLowFlat	0x00000001	Battery low.
		Byte0_LocalControlFault	0x00000002	Local control fault.
		Byte0_PowerFault	0x00000004	Mains failure.
		Byte0_Thermostat	0x00000008	Thermostat.
		Byte0_ServiceContactor	0x00000010	Service contactor.
		Byte0_ServiceDue	0x00000020	Service due.
		Byte0_ServiceHiHiTrip	0x00000040	Hi Hi torque alarm.
		Byte0_ServiceHiTrip	0x00000080	Hi torque alarm.
		Byte1_ServiceMotorStarts	0x00000100	Motor starts
		Byte1_ServiceOutputTurns	0x00000200	Total turns.
		Byte1_MonitorRelay	0x00000400	Monitor relay.
		Byte1_ControlFail	0x00000800	Control failure.
		Byte1_ActuatorFail	0x00001000	Actuator failure.
		Byte1_CommsFail	0x00002000	Comms loss.
		Byte1_HardwareOptionFail	0x00004000	Option not detected.
		Byte1_PartialStrokeError	0x00008000	Partial stroke failure.
		Byte2_ValveError	0x00010000	Valve obstructed.
		Byte2_ActuatorStalled	0x00020000	Motor stalled.
		Byte2_PosLimpHome	0x00040000	Position limp home.
		Byte2_EOT	0x00080000	End travel move.
		Byte2_NWRKFault	0x00100000	Network card fault.
		Byte2_24VDCCustSupplyFail	0x00200000	Customer power supply failure.
		Byte2_VVT	0x00400000	Valve travel time.
		Byte2_WrongDirectionFail	0x00800000	Wrong direction detected.

6 Modbus Database

Index	Data Name	Bit Name	Bit Mask	Description
22	DigitalControl	Open	0x0001	**Open:** Set this bit true (1) to command the actuator into the open direction.
		Close	0x0002	**Close:** Set this bit true (1) to command the actuator into the close direction.
		Stop	0x0004	**Stop:** Set this bit true (1) to command the actuator to Stop.
		ESD	0x0008	**ESD:** Set this bit true (1) to command the actuator to perform an ESD.
		PartialStroke	0x0010	**PartialStroke:** Set this bit true (1) to command the actuator to perform a Partial Stroke.
		NoLongerUsed	0x0020	Reserved.
		HandAuto	0x0040	**HandAuto:** Set this bit true (1) to allow the actuator to be controlled by a secondary control source (e.g. in folomatic case, to allow remote operation).
		PositionEnable	0x8000	**PositionEnable:** Set this bit true (1) to enable the actuator to be commanded into an intermediate position using Position control Parameter.
24	NetworkStatus1	Byte0_AbccCommsFault	0x0001	**Byte0_AbccCommsFault:** True (1) if the option card is failing to communicate with its internal network module.
		Byte0_EEPROMFault	0x0002	**Byte0_EEPROMFault:** True (1) when a fault is detected in the EEPROM of the option card.
		Byte0_AbccCfgGetErr	0x0004	**Byte0_AbccCfgGetErr:** True (1) when a network related configuration shown on the user interface board or Insight2 is incorrect, for example IP address, subnet mask, hostname, etc.
		Byte0_FtpEnabled	0x0008	**Byte0_FtpEnabled:** Set if FTP is enabled on the option card.
		Byte0_AbccCfgSetErr	0x0010	**Byte0_AbccCfgSetErr:** True (1) if a network config item set via the user interface board or Insight2 is not successfully set.
		Byte0_EthLink10MbpsPort1	0x0020	**Byte0_EthLink10MbpsPort1:** True (1) when there is a 10 Mbps Ethernet link on port 1.
		Byte0_ControlContention	0x0040	**Byte0_ControlContention:** True (1) if the option card detects control contention in the parameter DigitalControl (instance 22). If control contention is detected, the option card will not execute the received digital control command.
		Byte0_CANFault	0x0080	**Byte0_CANFault:** True (1) if there is a communication fault between the actuator and option card.
		Byte1_CommsPresent	0x0100	**Byte1_CommsPresent:** True (1) if a Modbus TCP request has been received within 250ms.
		Byte1_WriteError	0x0200	**Byte1_WriteError:** True (1) if the last write command to the DesiredPosition parameter is rejected because the value is out of range.
		Byte1_HWConfigLinkActive	0x0400	**Byte1_HWConfigLinkActive:** True (1) if the default HW configuration link (CF1) on the PCB assembly is inserted when the option card is booted.
		Byte1_DatalogDownloadFail	0x0800	**Byte1_DatalogDownloadFail:** True (1) if the last data log download failed.
		Byte1_EthLink100MbpsPort1	0x1000	**Byte0_EthLink100MbpsPort1:** True (1) when there is a 100 Mbps Ethernet link on port 1.
		Byte1_Reserved5	0x2000	Reserved.
		Byte1_Reserved6	0x4000	Reserved.
		Byte1_AbccCfgOutOfSync	0x8000	**Byte1_AbccCfgOutOfSync:** True (1) when a network related configuration shown on the user interface board or Insight2 is potentially incorrect, for example IP address, subnet mask, hostname, etc. This occurs when option card is booting, or a new configuration value is being set.
25	NetworkStatus2	Byte2_EthLink10MbpsPort2	0x0001	**Byte2_EthLink10MbpsPort2:** True (1) when there is a 10 Mbps Ethernet link on port 2.
		Byte2_EthLink100MbpsPort2	0x0002	**Byte2_EthLink100MbpsPort2:** True (1) when there is a 100 Mbps Ethernet link on port 2.
		Byte2_Reserved2	0x0004	Reserved.
		Byte2_Reserved3	0x0008	
		Byte2_Reserved4	0x0010	
		Byte2_Reserved5	0x0020	
		Byte2_Reserved6	0x0040	
		Byte2_Reserved7	0x0080	
		Byte3_Reserved	0xFF00	
26	NetworkStatus3	Byte4_Reserved	0x00FF	
		Byte5_Reserved	0xFF00	
27	NetworkStatus4	Byte6_Reserved	0x00FF	
		Byte7_Reserved	0xFF00	
28	MultiportStatus1	Byte0_Nibble0_TargetPort	0x000F	**Mulitiport Target Port:** 4 bit value representing the target port that the unit is commanded to. A '1' needs to be added to the value returned to get the correct port. Requires the actuator to be a Multiport build, refer to PUB002-221 for more information about Multiport.
		Byte0_Nibble1_StartPort	0x00F0	**Mulitiport Start Port:** 4 bit value representing the port that the unit started from. A '1' needs to be added to the value returned to get the correct port. Requires the actuator to be a Multiport build, refer to PUB002-221 for more information about Multiport.
		Byte1_Nibble0_LastGoodPort	0x0F00	**Mulitiport Last Good Port:** 4 bit value representing the last port the unit passed through. A '1' needs to be added to the value returned to get the correct port. Requires the actuator to be a Multiport build, refer to PUB002-221 for more information about Multiport.
		Byte1_Bit4_ StuckBetweenPorts	0x1000	**Mulitiport Stuck between Ports:** Indicates if the actuator is not moving and the current position does not match any port position i.e. the actuator is between ports. Requires the actuator to be a Multiport build, refer to PUB002-221 for more information about Multiport.
		Byte1_Bit5_MovingClockwise	0x2000	**Mulitiport Moving Clockwise:** Indicates if the unit is moving in the clockwise direction. Requires the actuator to be a Multiport build, refer to PUB002-221 for more information about Multiport.
		Byte1_Bit6_ MovingAntiClockwise	0x4000	**Mulitiport Moving Anti-Clockwise:** Indicates if the unit is moving in the anti-clockwise direction. Requires the actuator to be a Multiport build, refer to PUB002-221 for more information about Multiport.
		Byte1_Bit7_Reserved	0x8000	Reserved.
29	MultiportStatus2	Byte2_Bit0To6_ TargetPortPosition	0x007F	**Mulitiport Target Port:** Percent value representing the target port that the unit is commanded to. Range 0-100% reflecting 0-360 degrees. 7 bits of byte utilised. Requires the actuator to be a Multiport build, refer to PUB002-221 for more information about Multiport.
		Byte2_Bit7_ DegreeOfRotationMSB	0x0080	**Mulitiport Degree Of Rotation:** 9 bit value representing the degrees of rotation (0-360). Requires the actuator to be a Multiport build, refer to PUB002-221 for more information about Multiport.
		Byte3_DegreeOfRotationLSB	0xFF00	

Note: Indices 28 to 31 are reserved and 324 onwards are not available on v103 firmware

Index	Data Name	Bit Name	Bit Mask	Description
30	MultiportStatus3	Byte4_CurrentPosition	0x00FF	**Mulitiport Current Position:** Percent value representing the units current position (0-100%). Requires the actuator to be a Multiport build, refer to PUB002-221 for more information about Multiport.
		Byte5_ CountToNearestPortMSB	0xFF00	**Mulitiport Count to Nearest Port:** 16 bit value representing the encoder count to the nearest port (0-360). Requires the actuator to be a Multiport build, refer to PUB002-221 for more information about Multiport.
31	MultiportStatus4	Byte6_ CountToNearestPortLSB	0x00FF	
33	SetResetRelays	Byte0_Set_Relays	0x000000FF	**SetResetRelays:** Bit map to control the Relays. Bits 0-7 set relays 1-8 respectively Bits 8-15 set relays 9-16 respectively Bits 16-23 reset relays 1-8 respectively Bits 24-31 reset relays 9-16 respectively
		Byte1_Set_Relays	0x0000FF00	
		Byte2_Reset_Relays	0x00FF0000	
		Byte3_Reset_Relays	0xFF000000	
34 35 36 37	NAMURFailureDataMask NAMUROutOfSpecDataMask NAMURFunctionCheckDataMask NAMURMaintenanceDataMask	Byte0_BatteryLowFlat	0x00000001	See description for instances 16 to 21 in Bitfields Table.
		Byte0_LocalControlFault	0x00000002	
		Byte0_PowerFault	0x00000004	
		Byte0_Thermostat	0x00000008	
		Byte0_ServiceContactor	0x00000010	
		Byte0_ServiceDue	0x00000020	
		Byte0_ServiceHiHiTrip	0x00000040	
		Byte0_ServiceHiTrip	0x00000080	
		Byte2_ServiceMotorStarts	0x00000100	
		Byte1_ServiceOutputTurns	0x00000200	
		Byte1_MonitorRelay	0x00000400	
		Byte1_ControlFail	0x00000800	
		Byte1_ActuatorFail	0x00001000	
		Byte1_CommsFail	0x00002000	
		Byte1_HardwareOptionFail	0x00004000	
		Byte1_PartialStrokeError	0x00008000	
		Byte1_ValveError	0x00010000	
		Byte2_ActuatorStalled	0x00020000	
		Byte2_PosLimpHome	0x00040000	
		Byte2_EOT	0x00080000	
		Byte2_NWRKFault	0x00100000	
		Byte2_24VDCCustSupplyFail	0x00200000	
		Byte2_VVT	0x00400000	
		Byte2_WrongDirectionFail	0x00800000	
331	AuxInputTypeMask	Byte0_AuxMaskCmd	0x00FF	Reserved.
		Byte1_DigInput1RmtOpen	0x0100	**DI1 Remote Open:** Command type, 0 - Digital input, 1 - Remote Open.
		Byte1_DigInput2RmtClose	0x0200	**DI2 Remote Close:** Command type, 0 - Digital input, 1 - Remote close.
		Byte1_DigInput3RmtMaint	0x0400	**DI3 Remote Maintain:** Command type, 0 - Digital input, 1 - Remote maintain.
		Byte1_DigInput4RmtEsd	0x0800	**DI4 Remote ESD:** Command type, 0 - Digital input, 1 - Remote ESD.
		Byte1_Nib1_AuxMaxCmd	0xF000	Reserved.
332	AuxInputContactStateMask	Byte0_AuxMaskNormOpen	0x00FF	Reserved.
		Byte1_DigInput1NormOpen	0x0100	**DI1 Remote Open:** Contact type, 0 - Normally closed, 1 - Normally open.
		Byte1_DigInput2NormOpen	0x0200	**DI2 Remote Close:** Contact type, 0 - Normally closed, 1 - Normally open.
		Byte1_DigInput3NormOpen	0x0400	**DI3 Remote Maintain:** Contact type, 0 - Normally closed, 1 - Normally open.
		Byte1_DigInput4NormOpen	0x0800	**DI1 Remote ESD:** Contact type, 0 - Normally closed, 1 - Normally open.
		Byte1_Nib1_ AuxMaxNormOpen	0xF000	Reserved.
356	MultiportActivePorts	Byte0_Port9	0x0001	Set if port 9 is active.
		Byte0_Port10	0x0002	Set if port 10 is active.
		Byte0_Port11	0x0004	Set if port 11 is active.
		Byte0_Port12	0x0008	Set if port 12 is active.
		Byte0_Port13	0x0010	Set if port 13 is active.
		Byte0_Port14	0x0020	Set if port 14 is active.
		Byte0_Port15	0x0040	Set if port 15 is active.
		Byte0_Port16	0x0080	Set if port 16 is active.
		Byte1_Port1	0x0100	Set if port 1 is active.
		Byte1_Port2	0x0200	Set if port 2 is active.
		Byte1_Port3	0x0400	Set if port 3 is active.
		Byte1_Port4	0x0800	Set if port 4 is active.
		Byte1_Port5	0x1000	Set if port 5 is active.
		Byte1_Port6	0x2000	Set if port 6 is active.
		Byte1_Port7	0x4000	Set if port 7 is active.
		Byte1_Port8	0x8000	Set if port 8 is active.

Note: Indices 28 to 31 are reserved and 324 onwards are not available on v103 firmware

6.6 Enumerations

Instance	Data Name	Enum Name	Enum Value	Description
		None	0	
		ClosedLimit	1	Closed limit position (exact).
		OpenLimit	2	Open limit position (exact).
		MotorRunning	4	Motor running.
		Closing	5	Travelling in the close direction – motor or handwheel.
		Opening	6	Travelling in the open direction – motor or handwheel.
		Moving	7	Travelling – motor or handwheel.
		MidTravelStall	8	Not a limit, motor energised – no output movement detected.
		Stall	10	Motor has stalled.
		LocalStop	14	Red Control knob set to STOP.
		LocalControlEn	15	Red Control knob set to Local.
		RemoteControlEn	16	Red Control knob set to Remote.
		ControlAlarm	17	ESD signal and/or interlock active.
		ESDActive	18	ESD signal applied.
		OpenInterlock	19	Open Interlock active.
		ClosedInterlock	20	Open Interlock active.
		Interlock	21	Open and/or closed interlock active.
		ManOverride	24	Handwheel operation.
		MotThermostat	30	Motor Thermostat has tripped.
		PStrokePass	31	Partial stroke completed.
		PStrokeFail	32	Partial stroke not completed.
		Monitor	33	Monitor relay de-energised.
		MidTravel	34	Not at Closed or Open limits.
		BluetoothConnected	35	Bluetooth is connected.
		EndPosition	36	Either at Closed or Open limit positions.
		IntermediatePosition	37	Not at Closed or Open limits.
		TorqueTripClosing	38	Torque trip closing – any position.
		TorqueTripOpening	39	Torque trip opening – any position.
		TorqueTrip	40	Torque trip closing or opening – any position.
		TorqueTripMidTravel	41	Torque trip mid-travel, closing or opening.
		PhaseLoss	42	3-phase only – monitored phase 3 lost.
		Cust24VFail	43	Internal 24VDC supply failed (Terminals 4 & 5).
		ActuatorAlarm	44	Internal fault detected.
		ValveAlarm	45	On torque trip mid-travel or motor stall condition.
		BatteryLow	46	Battery low.
		BatteryFlat	47	Battery discharged or missing.
41	FunctionOfS1	Blinker	48	Travelling (make/break at 1 second intervals).
42	FunctionOfS2	DigitalOutput	49	Network option controlled.
43	FunctionOfS3	PStrokeActive	50	Partial stroke underway.
44	FunctionOfS4	Maintenance	51	Scheduled maintenance due.
45	FunctionOfS5	HiTorqueAlarm	52	Set Hi torque value reached.
46	FunctionOfS6	HiHiTorqueAlarm	53	Set Hi-Hi torque value reached.
47	FunctionOfS7	OddParity	54	Set when count of relays set is and odd value.
48	FunctionOfS8	Source1NetworkCommsLoss	55	Communication failure with option 1 card.
49	FunctionOfS9	Source2NetworkCommsLoss	56	Communication failure with option 2 card.
50	FunctionOfS10	NamurMaintenance	57	A NAMUR maintenance condition is active.
51	FunctionOfS11	NamurOutOfSpec	58	A NAMUR out of specification condition is active.
52	FunctionOfS12	NamurFunctionCheck	59	A NAMUR function check condition is active.
		NamurFailure	60	A NAMUR failure condition is active.
		OverModulation	66	Starts per hour has been exceeded.
		MotorInhibit	67	Motor is inhibited.
		LossOfHMI	74	HMI will not be lit up.
		MaintainFeedback	75	Open/Close signals are maintained.
		GeneralAlarm	80	Anything which constitutes an alarm from the 'function' list triggers this alarm.
		BatBackupAvailable	81	For battery backup only: Checks availability of battery, checks if battery is charged.
		BatBackupControlling	82	For battery backup only: battery is in control.
		BatBackupCharging	93	For battery backup only: battery is charging.
		ClosedLoopControlFail	94	Closed Loop Control failure - due to loss of Setpoint or Feedback signal.
		TorqueOrLimitClose	95	The close position is at its torque limit.
		TorqueOrLimitOpen	96	The open position is at its torque limit.
		LocalClose	97	A local close control has been activated.
		LocalOpen	98	A local open control has been activated.
		Reserved	99	
		Reserved	100	
		Reserved	101	
		Reserved	102	
		Multiportport1	103	Port Position 1 reached.
		Multiportport2	104	Port Position 2 reached.
		Multiportport3	105	Port Position 3 reached.
		Multiportport4	106	Port Position 4 reached.
		Multiportport5	107	Port Position 5 reached.
		Multiportport6	108	Port Position 6 reached.
		Multiportport7	109	Port Position 7 reached.
		Multiportport8	110	Port Position 8 reached.
		Multiportport9	111	Port Position 9 reached.
		Multiportport10	112	Port Position 10 reached.
		Multiportport11	113	Port Position 11 reached.
		Multiportport12	114	Port Position 12 reached.
		Multiportport13	115	Port Position 13 reached.
		Multiportport14	116	Port Position 14 reached.
		Multiportport15	117	Port Position 15 reached.
		Multiportport16	118	Port Position 16 reached.

Note: Enum values 99 onwards not available for v103 EOC firmware

rotork®

Contact us now

mail@rotork.com
www.rotork.com

PUB190-004-00
Issue 05/25