

Keeping the World Flowing for Future Generations



IQT3 Pro Multiport and IQ3 Pro Multiset configuration manual



CE CK



Table of Contents

1.	Intro	oduction	3	
2.	Mul	tiport	4	
3.	Configuring Multiport			
	3.1	Accessing the Multiport menu	4	
	3.2	Configuring the Multiport parameters	5	
	3.3	Backlash	6	
	3.4	Configuring each Port	6	
	3.5	Close Settings	7	
	3.6	Open Settings	7	
	3.7	Configuring ESD	7	
	3.8	ESD Override	8	
	3.9	Configuring Indications for Multiport	9	
	3.10	Relays	9	
	3.11	Configuration of Local Display	9	
	3.12	LED	10	
4.	Mul	tiset	_ 11	
5.	Configuring Multiset			
	5.1	Accessing the Multiport menu	11	
	5.2	Configuring the Multiset parameters	12	
6.	How to set up a Multiport or Multiset actuator			
	6.1	How to set up a Multiport actuator	13	
	6.2	How to set up a Multiset or Multiport bi-directional no-wrap actuator	13	
7.	Status			
8.	Controlling the Multiport actuator			
	8.1	Local Control	15	
	8.2	Remote Control	15	
	0 0	Modbus Control	15	
	0.5			
	8.4	Hardwired control	15	

1. Introduction

This manual gives instruction on how to configure multiport on IQT3 Pro actuators and multiset on IQ3 Pro actuators.

Full and part-turn actuators (IQT3 Pro) have an optional feature where they can be configured to control multiport valves. Multiturn actuators (IQ3 Pro) have an optional feature where they can be configured to stop at multiple points in a stroke (multiset).

The home screen for multiport and multiset is different from the one used for non-multiport/set actuators and shows the current port (where the actuator is positioned) and the demand port (where the actuator has been commanded to move). There is a choice of home screens that can be configured using the user interface. See Section 3.11 for details.

The port positions are set up during commissioning. Multiport and multiset allow for the angular distances between each port to be either equi-spaced or different. Operation is possible in either direction (clockwise and anti-clockwise) and rotation through the first and last ports – in the case of multiport. However, it is possible to restrict movements, not supported by a valve, during the commissioning process.

This manual should be read in conjunction with the IQ3 Pro safe use manual PUB002-039 and IQT3 Pro safe use manual PUB002-065 for basic setup instructions. The IQ3 Pro range full configuration manual provides detailed configuration instructions for the other settings in the actuator and details on how to use the Rotork Actuator Setting Tool PRO, Model BTST v1.1.

Notes:

In the product name 'Rotork Actuator Setting Tool PRO, Model BTST v1.1', the 'BTST' stands for 'Bluetooth® Setting Tool'.

For simplicity, the Rotork Actuator Setting Tool PRO, Model BTST v1.1 is referenced within this document as 'Rotork setting tool'.

2. Multiport

A multiport actuator has a set of special screens that only appear when the feature is enabled.

The home screen shows the Demand port (the last port it was commanded to go to) and the Position (the last port the actuator passed through or has stopped at). Unless the actuator is moving between ports, these will usually be the same value.



Example of default multiport home screen

3. Configuring Multiport

3.1 Accessing the Multiport menu

The first step is to navigate to the Multiport menu. From the Settings menu, select Control and then Multiport.



Control Menu

3.2 Configuring the Multiport parameters

The Multiport parameters can be configured from the Multiport menu.





1/17. Number of Ports

Set this to the total number of ports required, including inactive ports. Range 3 to 16.

2/17. Direction



This sets the direction for the valve to move from one port to the next numbered port in sequence and can be:

- Bidirectional-no wrap
- Clockwise
- Anti-clockwise
- Bidirectional-wrap

Rotork recommends that when you change the direction parameter, that you reconfigure the ports.

In both bidirectional modes the actuator can travel in clockwise or anti-clockwise direction. It will generally take the quickest route to the demanded port regardless of direction.

In bidirectional-wrap mode the actuator is able to travel directly between the last port and the first port and vice versa. In bidirectional-no wrap mode the actuator can not pass between this point. For example: in an 8 port valve with wrap mode the sequence of operation to go from port 7 to port 1 would be the shortest route, passing from 7 to 8 then to 1. In no wrap mode it is unable to take this shortest route as it can not pass between port 8 and 1 (and vice versa) therefore in no wrap mode the sequence will be from 7 to 6, 5, 4, 3, 2, 1 as shown in the diagram below:



Bidirectional-wrap

Bidirectional-no wrap

3/17. ESD Port

This sets the port to which the actuator will travel when an emergency shutdown (ESD) is active. Further ESD settings are required to be made. See Section 3.7.

4/17. Reset Ports

This will automatically configure the approximate port position, dependent on the number of ports. The port positions will be equidistant. It is the customer's responsibility to set each port manually for unequally spaced valves.

5/17. Set Min Port Pos

For bidirectional-no wrap mode only, the user must set the 'min port pos', as this is the limit of operation in the clockwise direction.

6/17. Set Max Port Pos

For bidirectional-no wrap mode only, the user must set the 'max port pos', as this is the limit of operation in the anti-clockwise direction.

3.3 Backlash

7/17. Count to Port

This is the Rotork absolute encoder count difference between the current position and the nearest port position.

8/17. Current Backlash

This value is used to ensure the accuracy of positioning in bidirectional mode where movement towards a port can be in the clockwise or anti-clockwise direction. It is an adjustment to remove the backlash in the system. Negative values denote anticlockwise rotation.

This is a property of the actuator/valve combination. It is caused by the inherent inertia of the coupling. This should be checked annually, as the inertia will be affected by wear.

9/17. Set Backlash

The Set Backlash configuration is applicable only in bidirectional mode and is used to correct system backlash. Before configuring backlash, ensure the port positions are set incrementally in the **anti-clockwise** direction.

After completing this setup, electrically operate the actuator in the **clockwise** direction to move to a different port position. Then, use the Handwheel to properly align the port and take up the backlash.

Next, record the value displayed in the Count to Port field (7/17). Using the Handwheel, operate the actuator until the display shows the opposite sign with the same value previously recorded in the Count to Port field (e.g. if -15 was initially recorded, adjust until +15 is displayed).

Finally, press Set Backlash to correct the backlash for all ports.

3.4 Configuring each Port

10/17. Select Port

This enables you to select a port to configure using the Port Active and Set Port Pos settings. When commissioning, you need to select each port in turn and configure its details.



11/17. Port Active

Select On or Off to indicate whether the port is active or not. If a port is inactive (dormant), it will be passed by during normal operation.

An inactive port may be set as the ESD port. In this case, the ESD action will still move to this port. This feature is useful if the user wishes to avoid movement to the ESD port during normal operation. Note that the ESD port will still be passed through if it is 'on the way' to the demanded port.

12/17. Set Port Pos

Select this to manually select the port position using the handwheel. Move the handwheel to align to the port position then select Set Port Pos.

Alternatively, you can use the local control knob to increment or decrement the port position to align it to the required position then select Set Port Pos. A popup will ask you to confirm whether you wish to set the current port to the current position. Ensure that before setting the port, the actuator has come to a complete stop. It is also important to ensure that the ports are set up in the anti-clockwise direction when operating in bidirectional mode.



13/17 Position

This is the encoder value for the current position.

3.5 Close Settings

14/17. Torque

The torque setting for the close direction.

15/17. Speed Close

The speed in percentage of the maximum speed for the close direction (IQT3 Pro only).

3.6 Open Settings

16/17. Torque

The torque setting for the open direction.

17/17. Open Speed

The speed in percentage of the maximum speed for the open direction (IQT3 Pro only).

Note: If the actuator trips due to high torque, the only way to clear the error is by moving the actuator in the reverse direction. However, in a unidirectional multiport actuator, moving the actuator in reverse is not possible and could damage the valve. Therefore, secondary methods have been implemented to clear torque trip errors in unidirectional valves:

- Change the control knob to Stop
- Stop command from the network option card in remote mode
- Stop command from the Rotork setting tool in local mode
- Stop/Maintain command from hardwired control

For bidirectional actuators, the above methods are not implemented. In a bidirectional multiport/set actuator, you must move in the reverse direction to clear the torque trip error. Care must be taken when applying multiple increment/decrement commands in bidirectional mode. Even in the event of a torque trip, increment/decrement commands can update the target port. If the increment/decrement command is continually pressed, the target port will update, wrap around, and eventually move the actuator in the reverse direction, thus clearing the torque trip.

3.7 Configuring ESD

The next step (optional) is to set the emergency shutdown (ESD) parameters.

Navigation to the ESD configuration is the same as a standard IQ3 and IQT3 actuator without multiport, although the configuration is somewhat different. IQT3 range actuators with the battery backup option allow the actuator to move to the emergency port if there is a loss of the primary power source to the actuator.

Return to the main menu and select Settings.









1/7. ESD Action

This can be set to move to the emergency port, stayput (do not move) or Off. If the user sets ESD action as Off, the actuator will ignore the ESD command.

2/7. ESD when signal

This can be set to Removed or Applied. On Removed, the actuator performs the ESD action when a signal is removed. On Applied, the actuator performs the ESD action when the signal is applied.

3/7. ESD Net Disable

This can be on or off and determines whether the network inputs are disabled on emergency shutdown.



3.8 ESD Override

These data fields, when set to YES, determine whether the Stop Selector, Interlocks, Interrupter Timer and/or Thermostat conditions are overridden when an emergency shutdown occurs.

4/7. Stop

ESD override Local Stop selection.

No (default) – ESD action is not available when the actuator is selected to stop using the local/stop/remote control knob.

Yes – ESD action is available when the actuator is selected to stop on the local/stop/remote control knob.

A WARNING: In this mode, when under ESD control, setting Stop on the red control knob will not prevent operation under ESD control. The valve and actuator can operate. Consideration should be given to providing warning signs and control system information. In all circumstances, Stop selection cannot be considered as a safety lockout – always isolate the electrical supply to the actuator during valve or actuator maintenance.

5/7. Interlocks

There are two interlock signals available: Clockwise and Anticlockwise interlock. If the interlock feature is enabled and the interlock is not energised, it will lock the actuator from moving in that particular direction. Care must be taken when applying multiple increment/decrement commands in bidirectional mode. Even if interlocked in one direction, the increment/decrement commands can still update the target port. If the increment/ decrement commands are continually pressed, the target port will update, wrap around, and eventually move the actuator in the reverse direction in bidirectional mode.

External interlocks can be used to prevent operation of the actuator until a certain process condition is met. If interlocks are being used, ESD can be set to override them.

No (default) - ESD action cannot override active interlocks.

Yes - ESD action will override active interlocks.

▲ WARNING: In this mode, when under ESD control, the process or safety interlocks may be overridden. Consideration should be given to providing warning signs and control system information. In all circumstances, active interlocks on cannot be considered as a safety lockout – always isolate the electrical supply to the actuator during valve or actuator maintenance.

6/7. Interrupter Timer

ESD will override the Interrupter Timer (if enabled).

The Interrupter Timer option allows the valve operating time to be increased. This is used, for example, to prevent hydraulic shock (water hammer) when closing or to prevent surges when opening a valve. The Interrupter Timer is active in both local and remote control.

No (default) – ESD action cannot override the Interrupter Timer. Under ESD control, the timer will remain active and the valve operating time, as controlled by the Interrupter Timer, is set.

Yes – ESD overrides the Interrupter Timer. Under ESD control, the timer will be overridden and the actuator will run continuously to the set ESD position at normal speed.

A WARNING: In this mode when under ESD control, process conditions requiring slow operation may be compromised. Consideration should be given to providing warning signs and control system information.

7/7. Thermostat

The IQ motor includes two embedded thermostats. Should the duty cycle of the actuator be exceeded and the motor temperature rises to that of the thermostat trip temperature, the motor will be de-energised and the actuator will stop. On cooling, the thermostats will automatically reset and the actuator can be returned to operation.

Areas. If the thermostats are bypassed during ESD, hazardous area certification is invalid. Users must carry out their own risk assessment. Due to this requirement, an internal physical link must also be set to bypass thermostats. Setting 7/7 alone to Yes will not bypass the thermostats. Contact Rotork.

ESD action can be set to override tripped thermostats providing an internal physical link is also set:

No (default) - ESD action cannot override the thermostats.

Yes – ESD overrides tripped thermostats. Under ESD control, should the motor temperature rise and trip the thermostats, ESD operation will continue.

3.9 Configuring Indications for Multiport

Access the Indication menu from the Settings screen. You are presented with the options for Contacts and Local Display.



Setting the contacts is identical to that of an IQT3 Pro actuator without multiport. See PUB002-040 for details.

3.10 Relays

The four relays (S1, S2, S3 and S4 – supplied as default) can be mapped to indicate each of the 16 ports in the multiport/set actuators as shown in the table below:

Closest Port	Relay 1 (Bit4)	Relay 2 (Bit3)	Relay 3 (Bit2)	Relay 4 (Bit1)
1	Off	Off	Off	Off
2	Off	Off	Off	On
3	Off	Off	On	Off
4	Off	Off	On	On
5	Off	On	Off	Off
6	Off	On	Off	On
7	Off	On	On	Off
8	Off	On	On	On
9	On	Off	Off	Off
10	On	Off	Off	On
11	On	Off	On	Off
12	On	Off	On	On
13	On	On	Off	Off
14	On	On	Off	On
15	On	On	On	Off
16	On	On	On	On

Optionally, Rotork supports a maximum of 12 relays, which can be configured as the individual ports.



3.11 Configuration of Local Display

From the Indication menu, select Local Display.





The data items on the Local Display screen are as follows:

1/8. Manual Setup

This determines whether manual setup using the control knobs is allowed or not. See PUB002-040 for details.

2/8. Home Screen



This selects one of four possible home screens. The options are:

• Angle in degrees (the display below shows an angle of 179 degrees)



rotork

3. Configuring Multiport

• Port Number



• Torque Multiport



Default Multiport



3/8. Power Save

The LCD has a white backlight to maximise contrast of the segment display and matrix characters. It may be switched off when not required if a bright display is disruptive within its environment.

Off (*default*) - The display backlight is permanently illuminated when the actuator is powered up.

On - The display backlight automatically switches off when the actuator is not operating. The segments/matrix remain on. The display backlight will switch on when the local control knobs are moved, electrical or handwheel operation takes place or when a Rotork setting tool or Rotork App are communicating with the actuator. The backlight will switch off again approximately 30 seconds after the above events have taken place.

3.12 LED

The function of the display green, red and yellow LED lights can be set.

4/8. Close LED

Green (default) – The green lights illuminate at the last port.

Red - The red lights illuminate at the first port.

5/8. Mid Travel LED

On (*default*) – The yellow lights are on when mid-travel. Off – The yellow lights are off when mid-travel.

Blinker – The yellow lights flash at approximately 0.5 second intervals when travelling in mid-travel (electric or handwheel operation). When stationary, the lights will remain on. It is recommended that this LED is set to Blinker mode to indicate to the user that the actuator is moving.

On/Alarm – The yellow lights are on when mid-travel. If an alarm is active the yellow lights flash alternately at approximately 0.5 second intervals. Refer to 5/7 Alarm LED.

Off/Alarm – The yellow lights are off when mid-travel. If an alarm is active the yellow lights flash alternately at approximately 0.5 second intervals. Refer to 5/7 Alarm LED.

Information regarding the nature of the alarm(s) will be shown at the top of the display.

6/8. Alarm LED

Alarm LED Function will be greyed out unless 4/7 Mid Travel LED is set to On/Alarm or Off/Alarm.

Disabled (*default*) – The yellow lights do not indicate an active alarm.

Alarms - The yellow lights indicate active alarms.

Service – The yellow lights indicate active service alarms only.

A service alarm indicates the actuator requires service due to set duty parameters being met. Refer to PUB002-040.

Service/Alarms – The yellow lights indicate active alarms and active service alarms. A service alarm indicates the actuator requires service due to set duty parameters being met. Refer to PUB002-040.

Information regarding the nature of the alarm(s) will be shown at the top of the display.

7/8. LCD / LED Test

The LCD/LED test function operates a test procedure to check all of the local display functions. It will cycle periodically between screen and LED functions to provide visual indication that the display is in fully working order.

8/8. Language

The language used on the display can be selected.

English is available as standard. Other available languages may be downloaded from the Rotork website, loaded into the Rotork setting tool using Insight 2 and uploaded into the actuator. Visit www.rotork.com.

4. Multiset

Multiset has a set of screens that appear only on IQ3 Pro actuators on which multiset has been enabled. They are similar to multiport but there are some differences, due to different parameters.

The home screen shows the port number that is demanded (the port that has been selected as the one to move to) and the position (the port that the actuator is at). In the absence of a port selection operation, these will usually be the same. There are alternative home screens that can be selected for use.



5. Configuring Multiset

Configuring a multiset actuator uses the same menus as used when configuring the multiport, refer to the multiport section. Configuration is the same as a multiport actuator with the exception of the following settings.

5.1 Accessing the Multiport menu

The first step is to navigate to the Multiport menu. From the Settings menu, select Control and then Multiport.



Control Menu

5.2 Configuring the Multiset parameters

The next step is to configure the Multiset parameters, using the Multiport screen.



2/17. Direction

This sets the direction for the valve to move from one port to the next numbered port in sequence and can be:

 Bidirectional-no wrap – This is the only option for multiset (IQ3)

7/17. Count to Port

This is the difference between the current position and the nearest port position in percentage. Range 0 - 10000 equals 0% to 100%.

For other menu options, see Section 3.2

A WARNING: Under normal electrical operation, movement will be restricted between the first and last ports. Using the handwheel it is possible to move past these limits. Do not move the unit more than 30 turns past the limit as position measurement will be corrupted.

6.1 How to set up a Multiport actuator

Customer information required before setup:

- Number of ports in the valve
- Directional mode (unidirectional or bidirectional)
- For bidirectional mode, specify if it can pass through 360° to 0° (wrapping allowed)
- For unidirectional mode, specify which direction (clockwise or anti-clockwise)

Set up process:

- Move the actuator using the handwheel and align it to port 1 (home port)
- For bidirectional modes ensure this operation is in the anticlockwise direction
- In Control > Multiport menu, select Reset Ports. This will set approximate port position based on the number of ports The ports will be equi-spaced

Fine-tune each port using the handwheel:

For example, to fine-tune port 2, move the actuator using the handwheel until port 2 is perfectly aligned:

- In Control > Multiport menu, select Port 2
- In Control > Multiport menu, select Set Port Pos. This sets the current actuator position as Port 2
- Repeat the same process for all other ports

While setting ports in bidirectional mode, ensure the actuator is stopped in the anti-clockwise direction. The port position set in this direction is only applicable in the anti-clockwise direction. There may be backlash in the clockwise direction, which needs to be corrected later.

Refer to Section 3.3 for backlash configuration instructions.

6.2 How to set up a Multiset or Multiport bi-directional no-wrap actuator

For Multiset the set up is the same as a Multiport bidirectional no-wrap mode as this is the only direction option for Multiset.

Customer information required before setup:

• Number of ports in the valve

Set up process:

- Move the actuator using the handwheel and align it to port 1 (home port)
- Ensure operation is in the clockwise direction
- Set the first port position and last port position:

In Control > Multiport menu, select Set Min Port Pos

Move the actuator using the handwheel and align it to the last port (end port) – in the anti-clockwise direction.

In Control > Multiport menu, select Set Max Port Pos

 In Control > Multiport menu, select Reset Ports. This will set approximate port position based on the number of ports. The ports will be equi-spaced

Fine-tune each port using the handwheel:

To fine tune the first and last ports you MUST use the **Set Min Port Pos** and **Set Max Port Pos** respectively.

For the other ports use the following process, for example, to finetune port 2, move the actuator using the handwheel until port 2 is perfectly aligned:

- In Control > Multiport menu, select Port 2
- In Control > Multiport menu, select Set Port Pos. This sets the current actuator position as Port 2
- Repeat the same process for all other ports

While setting ports in bidirectional mode, ensure the actuator is stopped in the anti-clockwise direction. The port position set in this direction is only applicable in the anti-clockwise direction. There may be backlash in the clockwise direction, which needs to be corrected later.

Refer to Section 3.3 for backlash configuration instructions.

rotork

13

7. Status

There are four additional status messages in the multiset/port actuators.

These are listed below:

- 1. Moving clockwise this indicates that the actuator is moving in the clockwise direction.
- 2. Moving anti-clockwise this indicates that the actuator is moving in the anti-clockwise direction.
- Current port >>> Demand port (For example: P2 >>> P4)

 this indicates that the actuator is moving from port 2 to port 4.
- 4. Non-aligned port this indicates that the actuator has stopped but the demand port and current port are not matching i.e. the actuator has stopped between two ports. Along with this error message a warning triangle will also be visible on the home screen.

If the actuator has stopped more than 12 encoder counts (1°) in multiport or more than 'Deadband' in multiset, then the nonaligned status and warning triangle will be visible on the screen.







8.1 Local Control

When the actuator is selected for local control operation and the local controls are operated, the open and close knob will index the actuator to the next port. Open will increment and Close will decrement to the next port. Holding the open or close position will only increment or decrement once, to repeat the command, release the control knob and re-apply. Local Stop will immediately stop the actuator.

In local mode it is possible to control the actuator via Rotork setting tool. Open/Close command from the Rotork setting tool will increment/decrement the demand port, the stop command from the Rotork setting tool will instantly stop the actuator.

8.2 Remote Control

When the actuator is selected for remote control operation it is possible to control via hardwired inputs or a network option card, for example Modbus.

8.3 Modbus Control

There are five commands applicable to the multiport actuator – Increment (Open), Decrement (Close), ESD, STOP and Port command.

Based on a direction command from the option card, the port position should only increment or decrement by one. Care must be taken not to send continuous control commands that increment or decrement the port unnecessarily. Logic in the multiport actuator prevents continuous updates whilst the actuator is moving, however there is no lock out when the unit is stationary.

Modbus register for controlling the multiport actuator

Function Code 05 - Force Single Coil

Location (Bit)	Data
0	Stop
1	Decrement
2	Increment
3	ESD

Port demand register for controlling the multiport actuator

Function Code 06 - Preset Single Register

Location (Reg/Bit)	Data (2 Bytes)
6	0x0001 to 0x0010 (Port Position 1 to 16)

A port demand register allows the user to enter a port command (range 1 - 16) to move the actuator to that specific port.

The STOP command instantly stops the actuator. Note this position could be between ports.

Status register for reading the current port

Function Code 03 – Read Holding Register

Location (Reg)	Data (2 bytes)	
3	0x0001 to 0x0010 (Port Position 1 to 16)	

Comms Loss action in multiport/set

The comms loss action for multiport is "none" irrespective of the settings. The user should set the comm loss action as none.

8.4 Hardwired control

When the actuator is selected for Remote control operation and the remote controls are operated, the Open and Close digital hardwired signals will index the actuator to the next port. Open will increment and Close will decrement to the next port. Continually applying the Open or Close signals will only increment or decrement once, to repeat the command, remove the signal and re-apply.

The user can choose to operate the hardwired remotes with or without the STOP command. As default the STOP is disabled and only increment, decrement and ESD commands are available. To enable STOP the user must set the Hardwired configuration setting, **Control > Remote > Hardwired > Motor Enable** to **Maintained**. Once enabled the STOP command line operates in Normally Closed mode i.e. it must be energised at all times for normal operation and de-energising the STOP line will cause the actuator to immediately stop. Note this position could be between ports.



8.5 IQT3 Pro Shutdown Battery

A WARNING: In the case of an IQT3 Pro Shutdown Battery actuator, on mains failure the shutdown action will be performed. If mains power is restored before the shutdown action has completed, the actuator will stop and not complete the shutdown action. Therefore the multiport actuator could be left in a position between ports.



www.rotork.com

A full listing of our worldwide sales and service network is available on our website.

UK Rotork plc *tel* +44 (0)1225 733200 *email* mail@rotork.com USA Rotork Controls Inc. *tel* +1 (585) 247 2304 *email* info@rotork.com

Original instructions: English language version only. As part of a process of on-going product development, Rotork reserves the right to amend and change specifications without prior notice. Published data may be subject to change. For the very latest version release, visit our website at www.rotork.com The name Rotork is a registered trademark. Rotork recognises all registered trademarks. The *Bluetooth*[®] word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by Rotork is under license. Published and produced in the UK by Rotork. POLTG0125

PUB002-221-00 Issue 01/25