rotork®

Keeping the World Flowing for Future Generations

IQ3 Perform Range

Full configuration, status and monitoring user manual

IQ3 Perform multi-turn and IQT3 Perform part-turn electric valve actuators

IQ³ Perform®

CE UKCA

Table of Contents

1. Introduction

⚠ This manual provides instruction on the setup and analysis of the actuator.

It is structured so that instruction on using the various setting options, navigation and password security is contained in Section 1. This must then be applied when changing settings and viewing information as set out in Sections 2 - 3.

The user must therefore be familiar with the operations contained in Section 1 before proceeding.

This manual should be read in conjunction with PUB002-403 IQ3 Perform or PUB002-404 IQT3 Perform Instructions for Safe Use, Installation, Basic Setup and Maintenance supplied with the actuator.

The Rotork Bluetooth® Setting Tool *Pro* v1.1 (BTST) combines the legacy IR and IrDA communication protocols with the latest Bluetooth wireless technology. IR / IrDA support for older Rotork products is retained for use as an IR communication tool. Refer to PUB002-003 and PUB002-004 for details.

The BTST is able to connect to Rotork Bluetooth wireless enabled actuators and related software to set up and complete missions. Missions are configurable sequences of instructions that are to be initiated and controlled by the BTST on an actuator and include (but are not limited to) downloading configuration and data logger files as well as uploading specific configurations to the actuator. Different missions can be programmed into the BTST via Insight 2.

Rotork Bluetooth® Setting Tool Pro v1.1

Specification

Enclosure: IP54

The BTST has been built in accordance with the following standards:

II 1G
Ex ia IIC T4 Ga
CML 19ATEX2194

CE 2776 IECEx CML 20.0054

UKCA 2503 CML 21UKEX2122

Ex ia
Class 1, Div 1,
Group A, B, C, D T4
CSA19CA80005457

Ex ia IIC T4 Ga
GB 3836.1-2021,
GB 3836.4-2021
GYJ20.1173X

Ex ia IIC T4 Ga
CSAUK 20JPN025
JNIOSH-TR-46-1(2015)
JNIOSH-TR-46-6(2015)

| 労 (令和 2.1) 検 |
| CSAUK 20JPN025 |
| Rotork Controls Ltd |

Ambient Temperature Range: Tamb = -30 to +50 °C

Operating Range: Infrared 0.25m, Bluetooth 10m

Enclosure Materials: Polycarbonate resin containing 10% Carbon Fibre, Silicone Rubber

Instructions for Safe Selection, Installation, Use, Maintenance and Repair

The following instructions relevant to safe use in a hazardous area apply to equipment covered by CSA certificate numbers 80005457, IECEx CML 20.0054, CML 19ATEX2194 and CML 21UKEX2122.

1. The BTST v1.1 may be used in Division 1, 2 and Zones 0, 1, 2 hazardous areas that require IIC, IIB or IIA protection and temperature class T1, T2, T3 or T4.

2. The following checks must be conducted on the BTST v1.1 prior to taking it into a hazardous area:

a. The BTST v1.1 function must be checked by ensuring a red or green LED illuminates on the front of the Setting Tool when any button is pressed. If an LED does not illuminate, the BTST v1.1 requires inspection and battery replacement.

b. The BTST v1.1 does not require assembly or dismantling, however suitable precautions must be taken if the BTST v1.1 may come into contact with damaging substances (e.g. solvents that degrade polymeric materials). Regular inspections must be performed to confirm enclosure damage is not apparent. Do not use the equipment if damage is present.

3. The BTST v1.1 is not intended to be repaired by the user. Repair of the equipment is only permitted by the manufacturer or an approved agent in accordance with applicable code of practice.

4. No user adjustment of the BTST v1.1 is required.

5. The BTST must be inspected every three months, in a safe (non-hazardous), dry area by suitably trained personnel, to ensure it has been maintained in accordance with the applicable code of practice.

6. Subject to the applicable code of practice, the batteries may be replaced in a non-hazardous area with one of the following types of Alkaline-Manganese or Zinc-Manganese 'AAA' size batteries:

- Duracell Procell type MN2400

- Energizer Ultimate

- Energizer HighTech

- Duracell Ultra

- VARTA Industrial

- VARTA High Energy

- Panasonic Pro Power

- Eveready Super

- Duracell Chinese

7. The BTST v1.1 contains no other user-replaceable parts and it cannot be repaired by the user. If the BTST v1.1 is faulty or needs repairing, it must not be used.

Refer to Publication PUB095-013 Rotork Actuator Setting Tool *Pro* v1.1 manual for full details and BTST user instructions.

The Rotork Bluetooth® Setting Tool *Pro* (BTST) is used to connect to the actuator, navigate through menus, change settings and view information presented on the actuator display.
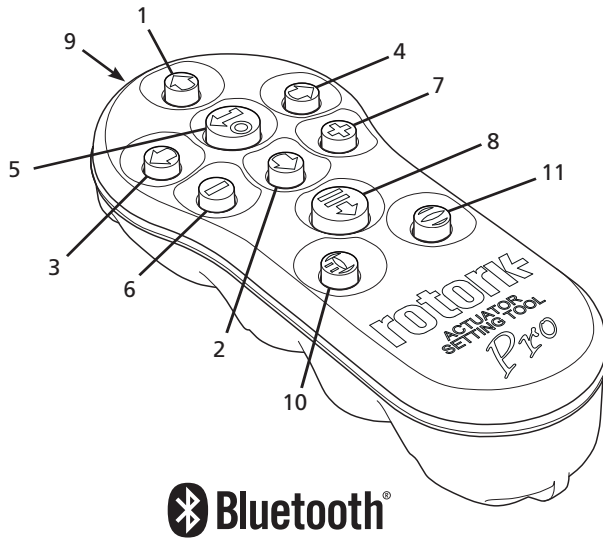
Name	General Operation
1. ⬆ Key	Scroll up.
2. ⬇ Key	Scroll down / Connect via *Bluetooth®*.
3. ◀ Key	Decrease value / Toggle setting / Scroll left.
4. ▶ Key	Increase value / Toggle setting / Scroll right.
5. Key	Select the highlighted item. Save the highlighted setting. Stop actuator running (when Setting Tool control is enabled, refer to Section 2.3.1).
6. ➖ Key	Return to previous menu.
7. ➕ Key	Cycle between standard and zoom view on data logger torque graphs.
8. Key	Actions the pre-configured mission stored on the Rotork Bluetooth® Setting Tool *Pro*.
9. ((•))	Infrared transmitter window.
10. Key	Send a close command to the connected actuator (when enabled refer to Section 2.3.1).
11. Key	Send an open command to the connected actuator (when enabled refer to Section 2.3.1).

Navigation

To navigate through screens, menus and pages, the ⬇ ⬆ ◀ ▶ ➖ and ➕ keys are used. A single key press results in one movement. Holding the key will result multiple movements in succession. Menus, pages and dropdowns wrap round. This means that an item at the bottom of a screen can be accessed by pressing ⬆ while at the top.

Shorthand Instructions

This manual uses shorthand instruction (example): ◀ ▶ (meaning select, edit setting, save) to prompt the user with the key operations required. The display will also indicate the relevant keys at the bottom left.

Pages, Functions and Index

The display indicates the number of each function as it is highlighted along with the total number of functions on that page. In the example below, Set Limit is function 4 out of a total of 16 functions on that page: 4/16

This manual uses the display function number as reference for instructions.
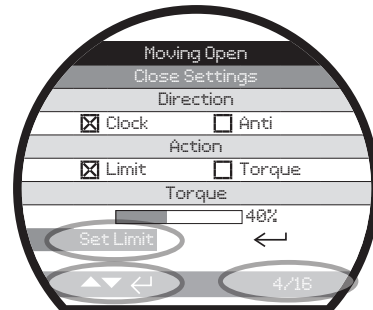
Set Limit (highlighted) is function 4 out of a total 16 on the LIMITS page.

Selection

The key is used to select a main menu item, menu items or instruction buttons. For a setting, is used to select when a change is required. The first time this occurs in a communication session, a password will be requested, refer to Section 1.4. Subsequent changes within the same session will not require the entry of a password. When selected, a menu item will be opened or a setting or function will be highlighted.

Information, instruction and password entry screens require an OK or Cancel button to be selected. Navigate to highlight the required button using ◀ or ▶ and press to select.

Setting controls

There are four types of setting control used. When a function is selected, the ability to change the function, setting or value is made available using drop down list boxes, check boxes, slider controls or numerical values.
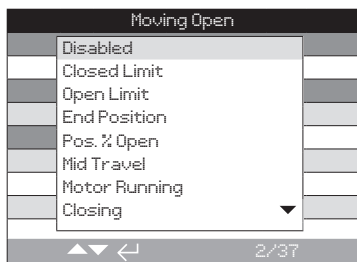
Drop down list boxes

Drop down list boxes are indicated by ▼.
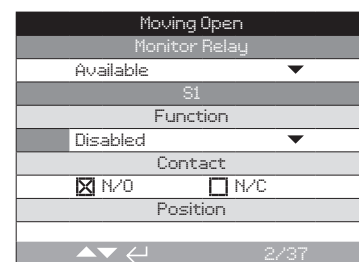
The example of the S1 indication contact Function (highlighted) dropdown list box is shown on the next page. When selected (password entered if applicable, refer to Section 1.4), the current set function will be highlighted within the drop down list.

```
            Moving Open
   ┌─────────────────────────┐
   │ Disabled                │
   │ Closed Limit            │
   │ Open Limit              │
   │ End Position            │
   │ Pos. % Open             │
   │ Mid Travel              │
   │ Motor Running           │
   │ Closing              ▼  │
   └─────────────────────────┘
   ▲▼ ↵              2/37
```

The symbol ▼ in the drop down box indicates more functions are available by scrolling ◯ or ◯.

Use ◯ or ◯ to scroll through the list until the required function is highlighted. Press ◉ to select. The drop down list box will close and the selected function will be saved and shown on the page.

To exit the drop down list without saving a new setting press ⊖ to return to the previous page.

Checkboxes

Check boxes are indicated by ☒ or ☐.

```
            Moving Open
         Monitor Relay
   Available              ▼
              S1
           Function
   Closed Limit           ▼
           Contact
   ☒ N/O            ☐ N/C
           Position

   ▲▼ ↵              3/37
```
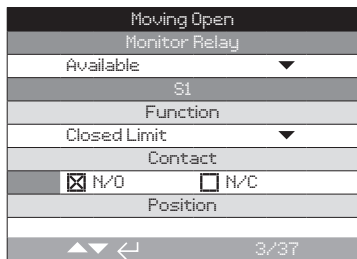
An example for the S1 indication contact type check box is shown above.

```
            Moving Open
         Monitor Relay
   Available              ▼
              S1
           Function
   Closed Limit           ▼
           Contact
   ☒ N/O            ☐ N/C
           Position

   ▲▼◀▶ ↵           3/37
```
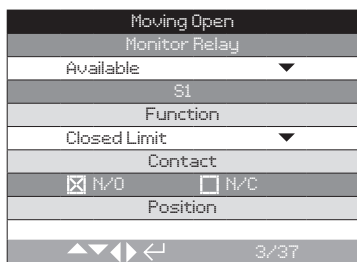
When selected (password entered if applicable, refer to 1.3), the current mode will be highlighted.

Use either the ◯ or ◯ to toggle between modes.

Once the required mode is checked, press ◉ to select. The selected mode will be saved and shown as checked on the page.
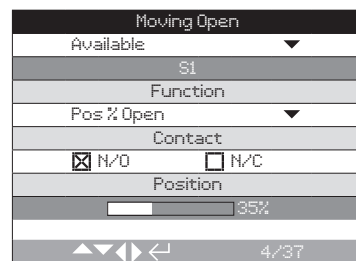
To exit the checkbox without saving a new setting, press ⊖ to return to the page.

Slider controls

Slider controls graphically indicate the set value followed by the exact numerical value, for example:

```
   ▭▭▭▭▭▭▭▭▭▭▭ 35%
```

The range covered by the slider is fixed and is determined by its function.

```
            Moving Open
   Available              ▼
              S1
           Function
   Pos % Open             ▼
           Contact
   ☒ N/O            ☐ N/C
           Position
   ▭▭▭▭▭▭▭▭▭ 35%
   ▲▼◀▶ ↵           4/37
```

An example of the S1 indication position value is shown above. The S1 contact function of Pos.% Open indication will show the valve position at which the contact will change state.

Press ◉ (enter password if applicable, refer to 1.3).
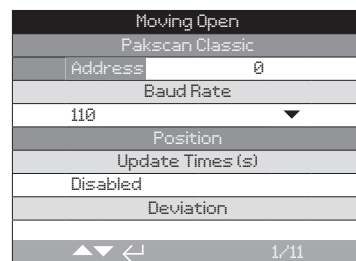Use ◯ or ◯ to decrease or increase the value.

Slider controls wrap round so a ◯ key press on a minimum value will wrap round and indicate the maximum value. The value step changes increase as ◯ or ◯ is held down.

Once the required value is set press ◉ to select. The selected value will be saved and shown on the page.

To exit the slider control without saving a new setting, press ⊖ to return to the page.

Numerical values

Numerical values relate to fields such as time or address - shown in the example below.

```
            Moving Open
         Pakscan Classic
   Address              0
           Baud Rate
   110                    ▼
           Position
       Update Times (s)
   Disabled
           Deviation

   ▲▼ ↵              1/11
```

Press ◉ (enter the password if applicable, refer to 1.3).

Use ◯ or ◯ to decrease/increase the numerical value.
Press ◉ to select.

To exit the numerical value control without saving a new value, press ⊖ to return to the previous page.

The Rotork Bluetooth® Setting Tool *Pro* (BTST) incorporating Bluetooth wireless technology is shown below. It is identified by the key symbols and a clear band between the top and bottom casings being transparent.

The Rotork Infrared Setting Tool *Pro* is identified by solid yellow keys and a yellow band between casings:

Yellow: Rotork Infrared Setting Tool Pro
Clear: Rotork Bluetooth® Setting Tool *Pro*

Note: Rotork has made two versions of the Rotork Bluetooth® Setting Tool *Pro* with blue and black casings. Both are compatible with IQ range actuators.

Connecting to the actuator using Bluetooth

The actuator must be powered up to connect using Bluetooth. The default security set in the actuator for Bluetooth connection is by initiation using an infrared command. This means that the user must be in close proximity and in direct line of sight of the actuator.

Point the BTST at the infrared sensor located at the lower right of the actuator display window within a range of 0.25 m (10 in) and press ⊙ until the 🔒 key flashes blue.

The screen will change to the Main Menu screen.
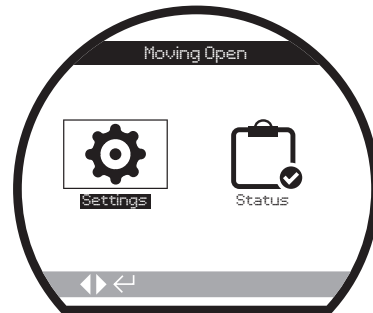
The BTST will automatically connect using Bluetooth which takes up to 5 seconds.

Connection is indicated by a blue light on the tool and in the actuator display window. Once connected, the tool can be used without pointing it at the actuator display window.

Bluetooth connection will be maintained while BTST key commands are made. After a period of 6 minutes with no key commands, Bluetooth connection will be turned off and the BTST and display blue lights will go out. To manually disconnect Bluetooth at any time, press ⊖ and ⊕ together.

Connecting to the actuator using Infrared

Infrared communication is used when:

- Bluetooth communication has been disabled (refer to Section 2.5)
- Configuration is required without power being applied to the actuator
- Legacy infrared only Rotork Setting Tool is used (yellow banded tool)

The Infrared only tool has solid yellow keys and a yellow band between casings.

Communication is by direct line of sight infrared commands within a range of 0.25 m (10 in). Keys have the same function as shown in this manual. Each key press sends a discreet infrared command and therefore the tool must be in range.

Menus, pages and settings may be viewed when the actuator is set to Remote, Stop or Local. To change a setting, the actuator must be selected to Local or Stop using the red knob and the correct password must be entered.

The password will be requested the first time a function is selected. Once correctly entered, other changes can be made without re-entering the password for the duration of the configuration session.
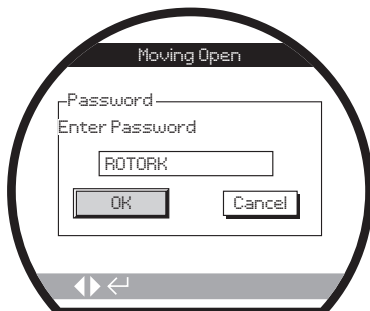
If the actuator is selected to Remote and a setting is selected, the following information screen will be displayed:
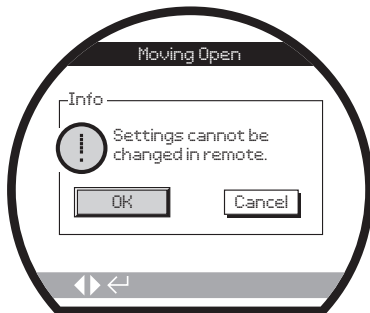
Press 🔘 to return to the page. Set the red knob to Local or Stop to proceed with setting.

Prior to being put into service

With the actuator selected to Local or Stop and when any setting function is selected, the Password screen will be displayed:

The factory set default password ROTORK is displayed and the OK button is highlighted.

Press 🔘. The setting page from which the function was selected will be displayed with the function highlighted.

After the default password has been changed

If the user has set their own password the following screen will be displayed:
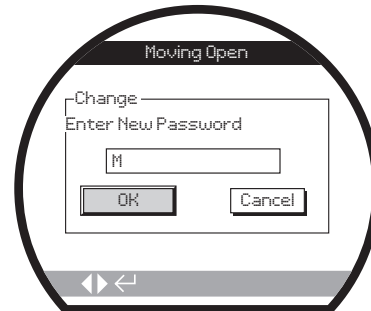
Enter user selected Password:

Use 🔘 to highlight new password entry box and press 🔘

Use 🔘 🔘 to scroll through alphanumeric values to display required character.

Use 🔘 to move to the next character.

Use 🔘 to delete the highlighted character.

Use 🔘 when selected password is complete.

Navigate to the OK button using 🔘 🔘. Press 🔘

⚙
Settings

```
         Settings
  Limits
  Indication
  Control
  ESD
  Security
  Defaults
  Power Save
  ▲▼ ↵
```

2. Settings menu   **Page**

```
         Settings
  Limits
  Indication
  Control
  ESD
  Security
  Defaults
  Power Save
  ▲▼ ↵
```

```
              Limits
          Close Settings
1/16       Direction
       ☒ Clock      ☐ Anti
2/16         Action
       ☒ Limit      ☐ Torque
3/16         Torque
       ▬▬▬▬▬       40%
4/16   Set Limit           ↵
5/16       Speed Close*
       ▬▬▬▬▬       40%
          Open Settings
6/16         Action
       ☒ Limit      ☐ Torque
7/16         Torque
       ▬▬▬▬▬       40%
8/16   Set Limit           ↵
9/16   Turns          0.0
10/16  Position       46.4
11/16      Speed Open*
       ▬▬▬▬▬       40%
          Breakout Torque
12/16        Opening
       ☐ On         ☒ Off
13/16        OP Position
       [          ]0%
14/16        Closing
       ☐ On         ☒ Off
15/16        CL Position
       [          ]0%
          Auto Limit Setting
16/16  Auto Set Limits*    ↵
       ▲▼ ↵          1/16
```

* IQT builds only
The Limits page is shown above with the default settings.

Close Settings

1/16	Direction

Sets the output rotation direction required to close the valve. Using the handwheel, manually operate the actuator to establish valve closing direction.

Clock (*default*) – clockwise rotation of the actuator closes the valve.

Anti – anti-clockwise (counter clockwise) rotation of the actuator closes the valve.

To change, 🔧 ◖ ◗ 🔧. The checkbox will indicate the set closing direction.

2/16	Action

The actuator can be configured to close on torque for seating valve types or limit for non-seating valve types.

Refer to Valve manufacturer for recommended setting. In the absence of valvemaker instruction refer to the following table:

Valve Type	Close Action	Open Action
Wedge gate	Torque	Limit
Globe	Torque	Limit
Butterfly	Limit	Limit
Through conduit	Limit	Limit
Ball	Limit	Limit
Plug	Limit	Limit
Sluice gate	Limit	Limit
Penstock	Limit	Limit
Parallel slide	Limit	Limit

Limit (*default*) – The actuator will move the valve to the set Closed Limit position and stop.

Torque – The actuator will move the valve to the set Closed Limit position and then apply the set torque (3/16) to seat the valve.

To change, 🔧 ◖ ◗ 🔧. The checkbox will indicate the set closing action.

3/16	Torque

The value of torque available to close the valve can be limited to between 40% and 100% of its nameplate rated torque. If the actuator experiences the set torque when closing between the limits, it will stop and must then be reversed before it will move closed again. Operational torque can be monitored using downloadable data log and using the torque-position home screen (refer to Section 2.2.2).

The default setting for closed torque limit is 40%. If a value of torque was specified at time of order, the % value equating to the specified torque will have been set by Rotork.

If the actuator was delivered complete with valve, the valvemaker may have set the closed torque limit based on testing and/or design requirements.

In the absence of valvemaker instruction, set the minimum value required to close the valve under process conditions.

To change, 🔧 ◖ ◗ 🔧. The slider will indicate the set closing torque value.

4/16	Set Limit

Limits must only be set when the actuator is coupled to the valve.

The minimum number of output turns between set Closed and Open Limits is 2.5 or 30° (IQT). A Closed Limit position cannot be set if the actuator is at its set Open Limit or within 2.5 (30°) turns of an Open Limit position. Should a condition arise where this occurs, for example where an actuator at its Closed Limit position is coupled to a valve at its open position, refer to Section 2.7 Defaults - Limits.

If the actuator was delivered complete with valve, the valvemaker should have set the Closed and Open limit position, refer to testing below.

The Closed Limit position must be set by moving the actuator to the valve Closed Limit position (using the handwheel) and pressing 🔧.

The actuator will display the following Instruction:

```
┌─Info─────────────────────────┐
│  ╭─╮    Move to close allow for │
│  │ ! │   overrun and press OK.   │
│  ╰─╯                            │
│  ┌─────────┐    ┌─────────┐     │
│  │   OK    │    │ Cancel  │     │
│  └─────────┘    └─────────┘     │
└──────────────────────────────┘
```
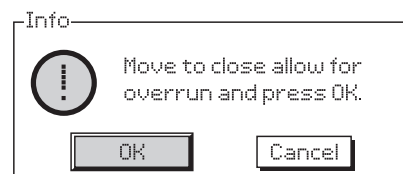
Move the actuator and valve to the close position. Allow for overrun by winding open by ½ to 1 output turn.

Press 🔧 to select OK.

The Closed Limit will be set at the current valve position. If not previously illuminated, the closed indication LED (default green, refer to Section 2.2.2) will be turned on.

Testing: The limit position can be confirmed by opening the actuator until the indication LED changes colour and then moving closed until the Closed Limit indication LED colour is turned on at the set Closed Limit position.

5/16	Speed Close (IQT only)

This shows the speed of the close action as a percentage of maximum speed.

The default speed for a standard IQT is 100% (rated) or 25% for IQTM, except for the 3000 size which is 50%. For IQTM actuators with the high speed option, the default speed is 20% of rated speed. Speed can be adjusted to suit operation/process needs.

To change, 🔧 ◖ ◗ 🔧. The slider will indicate the current set speed.
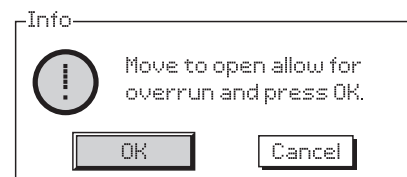
Open Settings

6/16   Action

The actuator can be configured to open on torque for back-seating valve types or limit for non back-seating valve types.

⚠ **Refer to valve manufacturer for recommended setting. In the absence of valvemaker instruction set open action to Limit.**

Limit (*default*) – The actuator will move the valve to the set Open Limit position and stop.

Torque – The actuator will move the valve to the set Open Limit position and then apply the set torque (7/16) to back-seat the valve.

To change, 🕹 ◐ ◑ 🕹. The checkbox will indicate the set opening action.

7/16   Torque

The value of torque available to open the valve can be limited to between 40% and 100% of its nameplate rated torque. If the actuator experiences the set torque when opening between the limits, it will stop and must then be reversed before it will move open again. Operational torque can be monitored using downloadable data log and using the torque-position home screen (refer to Section 2.2.2).

The default setting for open torque limit is 40%. If a value of torque was specified at time of order, the % value equating to the specified torque will have been set by Rotork.

If the actuator was delivered complete with valve, the valvemaker may have set the open torque limit based on testing and/or design requirements.

In the absence of valvemaker instruction, set the minimum value required to open the valve under process conditions but higher than that set for closed torque.

To change, 🕹 ◐ ◑ 🕹. The slider will indicate the set limit of opening torque value.

8/16   Set Limit

Limits must only be set when the actuator is coupled to the valve.

The minimum number of output turns between set Open and Closed Limits is 2.5. An Open Limit position cannot be set if the actuator is at a set Closed Limit position or within 2.5 turns of a Closed Limit position. This is 30 degrees for IQT. Should a condition arise where this occurs, for example where an actuator at its Open Limit position is coupled to a valve at its closed position, refer to Section 2.7 Defaults - Limits.

If the actuator was delivered complete with valve, the valvemaker should have set the Closed and Open limit positions, refer to Testing below.

The Open Limit position must be set by moving the actuator to the valve Open Limit position and pressing 🕹.

The actuator will display the following Instruction:

```
┌Info──────────────────────┐
│  ⬤   Move to open allow for │
│  ┃   overrun and press OK.  │
│                            │
│  ┌────────┐    ┌────────┐  │
│  │   OK   │    │ Cancel │  │
│  └────────┘    └────────┘  │
└────────────────────────────┘
```

Move the actuator and valve to the open position. Allow for overrun by winding closed by ½ to 1 output turn.

Press 🕹 to select OK.

The Open Limit will be set at the current valve position. If not previously illuminated, the open indication LED (default red, refer to Section 2.2.2) will be turned on.

Testing: The limit position can be confirmed by closing the actuator until the indication LED changes colour and then moving open until the Open Limit indication LED is turned on at the set Open Limit position.

9/16   Turns

Shows the actuator output turns between the set Closed and Open Limit positions.

10/16   Position (non-editable)

Shows the actuator current position on 0-100%.

11/16   Speed Open (IQT only)

This shows the speed of the open action as a percentage of maximum speed.

The default speed for a standard IQT is 100% (rated) or 25% for IQTM, except for the 3000 size which is 50%. For IQTM actuators with the high speed option, the default speed is 20% of rated speed. Speed can be adjusted to suit operation/process needs.

To change, 🕹 ◐ ◑ 🕹. The slider will indicate the current set speed.

Breakout Torque

The default setting for opening and closing breakout torque is Off (torque protection active at all times). Overriding the torque protection allows torque up to approximately 150% of rated to be available.

The valve maker or integrator should be consulted to confirm whether the valve structure and interface components can withstand the additional torque/thrust.

12/16   Opening

Opening torque limit protection can be overridden over a portion of the opening stroke, refer to 13/16. When set to On, torque of up to approximately 150% of rated is available for opening "sticky" valves.

To change, 🔘 🔘 🔘 🔘. The checkbox will indicate the set opening breakout torque status.

13/16   OP Position

When opening Breakout Torque is set to On (refer to 12/16), the position over the opening stroke where torque limit protection is overridden can be set. If breakout torque open is set to Off, the OP Position control will be greyed out.

The available position range over which torque limit protection is overridden is 0% (Closed Limit) to 95% open. Outside the set breakout torque position, torque switch protection will revert to that set for 7/16.

To change, 🔘 🔘 🔘 🔘. The slider will indicate the set position range over which opening torque limit is overridden.

14/16   Closing

Closing torque limit protection can be overridden over a portion of the closing stroke, refer to 15/16. When set to On, torque of up to approximately 150% of rated is available for closing the valve.

To change, 🔘 🔘 🔘 🔘. The checkbox will indicate the set closing breakout torque status.

15/16   CL Position

When closing breakout torque is set to On (refer to 14/16), the position over the closing stroke where torque limit protection is overridden can be set. If breakout torque closed is set to Off, the CL Position control will be greyed out.

The available position range over which torque limit protection is overridden is 100% (Open Limit) to 5% open. Outside the set breakout torque position, torque switch protection will revert to that set for 3/16.

To change, 🔘 🔘 🔘 🔘. The slider will indicate the set position range over which closing torque limit is overridden.

16/16   Auto Set Limit (IQT only)

Sets the open and close limits automatically. Then end of travel for the lower and upper limits is established when 40% torque has been reached in each direction. The actuator must be in Local to complete this function.
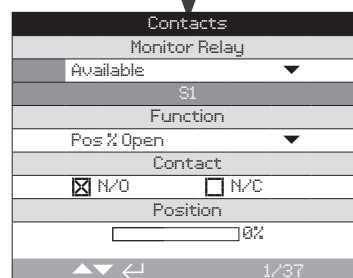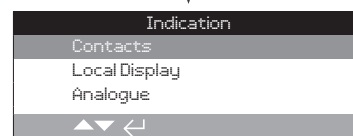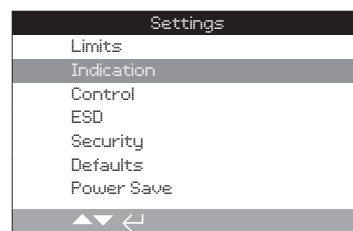
2.2 Settings – Indication

```
┌─────────────────────────────┐
│         Settings            │
├─────────────────────────────┤
│ Limits                      │
│ Indication                  │
│ Control                     │
│ ESD                         │
│ Security                    │
│ Defaults                    │
│ Power Save                  │
├─────────────────────────────┤
│ ▲▼  ↵                       │
└─────────────────────────────┘
```

Instruction is provided on:

2.2.1   Contacts

2.2.2   Local display

2.3.3   Analogue

2.2.1 Indication – Contacts

```
┌─────────────────────────────┐
│         Settings            │
├─────────────────────────────┤
│ Limits                      │
│ Indication                  │
│ Control                     │
│ ESD                         │
│ Security                    │
│ Defaults                    │
│ Power Save                  │
├─────────────────────────────┤
│ ▲▼  ↵                       │
└─────────────────────────────┘
```

```
┌─────────────────────────────┐
│        Indication           │
├─────────────────────────────┤
│ Contacts                    │
│ Local Display               │
│ Analogue                    │
├─────────────────────────────┤
│ ▲▼  ↵                       │
└─────────────────────────────┘
```

```
┌─────────────────────────────┐
│         Contacts            │
├─────────────────────────────┤
│      Monitor Relay          │
│ Available            ▼      │
│           S1                │
│        Function             │
│ Pos % Open           ▼      │
│         Contact             │
│ ☒ N/O        □ N/C          │
│        Position             │
│ [            ]0%            │
├─────────────────────────────┤
│ ▲▼  ↵          1/37         │
└─────────────────────────────┘
```

The Monitor Relay and S contact settings page is shown in their default setting.

Refer to the actuator wiring diagram for available contacts.

1/37	Mode (Monitor Relay)

The monitor relay provides remote indication of actuator status. It provides a volt free change over contact, refer to actuator circuit diagram. There are 2 modes that can be set:

Available (*default*) – Actuator available for remote control. Monitors power supplies, motor thermostat, detected internal fault and remote control selected. A loss in one or more will cause the monitor relay to de-energise indicating "not available" for remote control.

Fault – Actuator fault. Monitors power supplies, motor thermostat and detected internal fault. A loss in one or more will cause the monitor relay to de-energise indicating "actuator fault".

To change the mode, ⊖ ◯ ◯ ⊖. The drop down list box will close and the selected mode will be shown:

S Contact function, contact type and position

Each relay contact can be set to one of the functions shown in the table below and its contact type can be set as Normally Open (NO) or Normally Closed (NC). If Pos % Open function is selected, the position at which the relay operates can be set. For all other functions the position control slider will be greyed out.

Standard Contacts S1-S4, Option S5-S8 and S9-S12 Contacts when fitted

The method for setting all S contacts is the same. S1 to S4 are fitted as standard. A further 8 extra contacts are available as options grouped: S5 to S8 and S9 to S12, refer to actuator wiring diagram. If extra contacts are fitted their configuration screens are accessed by scrolling down. If not fitted their configuration settings will be greyed out.

2/37	Function

The available contact functions included in the drop down list box are shown below.

To change the contact function, 🔘 🔼 🔽 🔘. The drop down list box will close and the selected function will be shown:

Function	Indication:
Disabled	Contact disabled
Open Limit	Open limit position (exact)
Closed Limit	Closed limit position (exact)
Control Err	Communications have been lost with a control card
End Position	Both Closed and Open Limit positions
Pos % open	Set position mid-travel – opening and closing
Mid Travel	Not at Closed or Open Limits
Motor Running	Motor running
Closing	Travelling in the close direction - motor or handwheel
Opening	Travelling in the open direction - motor or handwheel
Moving	Travelling – motor or handwheel
Handwheel	During handwheel operation
Blinker	Travelling (make/break at 1 second intervals)
Valve Alarm	On torque trip mid-travel or motor stall condition
Torque Trip CL	Torque trip closing - any position
Torque Trip OP	Torque trip opening - any position
Torque Trip	Torque trip closing or opening - any position
Torque Trip Mid	Torque trip mid-travel, closing or opening
Motor Stall	At limit, motor energised – no output movement detected
Mid Travel Stall	Not at limit, motor energised – no output movement detected
Stop Selected	Red control knob set to STOP
Local Selected	Red control knob set to Local
Remote Selected	Red control knob set to Remote
Control Alarm	ESD signal and/or interlock active
Monitor	Monitor relay de-energised
ESD Active	ESD signal applied
OP Interlock Active	Open Interlock active
CL Interlock Active	Close interlock active
Interlock Active	Open and/or closed interlock active
Actuator Alarm	Internal fault detected
Motor Over Temp	Motor thermostat has tripped

Function	Indication:
Lost Phase	3-phase only: monitored phase 3 lost
24 V Supply Fail	Internal 24 VDC supply failed (Terminals 4 & 5)
P Stroke Active	Partial stroke underway
P Stroke Fail	Partial stroke not completed
P Stroke Pass	Partial stroke completed
Bluetooth	Bluetooth communication in progress
Battery Low	Battery low
Battery Discharged	Battery discharged or missing
Digital Output	Network option controlled
Maintenance	Scheduled maintenance due
Hi Torque Alarm	Set Hi torque value reached
Hi Hi Torque Alarm	Set Hi-Hi torque value reached
Src 1 Coms Loss	Communication failure with option 1 card
Src 2 Coms Loss	Communication failure with option 2 card
NAMUR Maint.	A NAMUR maintenance condition is active
NAMUR Out Of Spec.	A NAMUR out of specification condition is active
NAMUR Func. Check	A NAMUR function check condition is active
NAMUR Failure	A NAMUR failure condition is active
Over Modulation	Starts per hour has been exceeded
Motor Enable	Active when motor enable is inhibiting electrical operation
Maintain Enabled	Open/Close signals are maintained
HMI Loss	HMI will not be lit up
General alarm	Anything which constitutes an alarm from the 'function' list triggers this alarm
Control Err	A control has failed
Closetrq/Limit	The close position is at its torque limit
OpenTrq/Limit	The open position is at its torque limit
Local Ctrl Close	A local close control has been activated
Local Ctrl Open	A local open control has been activated

3/37	Contact

Each relay contact output can be configured as normally open (make on condition) or normally closed (break on condition).

N/O - The contact will complete the circuit when the set function is present, normally open, refer to 2/37 Contact Function.
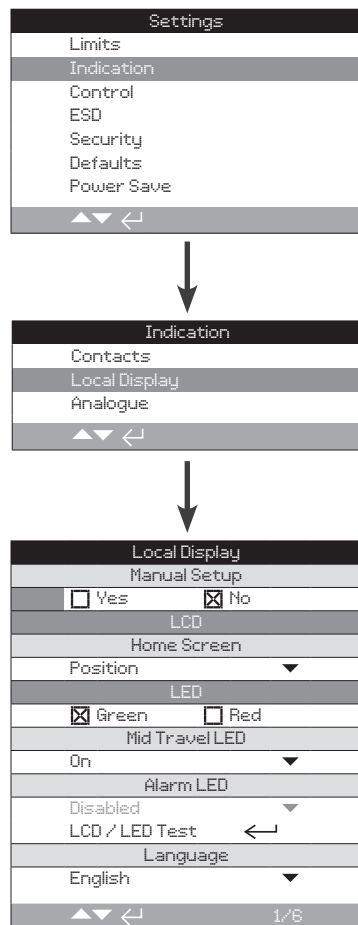
N/C - The contact will break the relay circuit when the set function is present, normally closed, refer to 2/37 Contact Function.

To change use 🔘 🔼 🔽 🔘. The checkbox will indicate the selected contact type.

4/37	Position

If the relay function relates to an actuator position, for example Pos % Open, this setting will become available to edit. Range 0% - 100%.

To change use 🔘 🔼 🔽 🔘. The slider control will indicate the set position value.

⚙

```
┌──────────────────────────┐
│        Settings          │
│  Limits                  │
│  Indication              │
│  Control                 │
│  ESD                     │
│  Security                │
│  Defaults                │
│  Power Save              │
│  ▲▼ ↵                    │
└──────────────────────────┘
              ↓
┌──────────────────────────┐
│       Indication         │
│  Contacts                │
│  Local Display           │
│  Analogue                │
│  ▲▼ ↵                    │
└──────────────────────────┘
              ↓
┌──────────────────────────┐
│      Local Display       │
│      Manual Setup        │
│  □ Yes        ☒ No       │
│          LCD             │
│      Home Screen         │
│  Position           ▼    │
│          LED             │
│  ☒ Green      □ Red      │
│      Mid Travel LED      │
│  On                 ▼    │
│       Alarm LED          │
│  Disabled           ▼    │
│  LCD ╱ LED Test     ↵    │
│       Language           │
│  English            ▼    │
│  ▲▼ ↵          1/6       │
└──────────────────────────┘
```

The Local Display settings page is shown in its default setting.

1/6	Manual Setup

This enables the Manual Setup feature, which allows you to perform configuration and monitoring functions using the local control knobs. See Section 2.6 for details.

LCD

The displayed home screen language can be selected and power save mode can be activated.

2/6	Home Screen

Refer also to PUB002-039 (IQ) or PUB002-065 (IQT).

Available Home screens included in the drop down list box:

Position (*default*) - Display indicates the current valve position to one decimal place. Icons are used for closed ⌶ and open ⋯ limit positions.

Torque (A) + Pos – Display indicates current valve position to one decimal place as Position (above) plus analogue torque indication scaled 0% to 100% of rated torque, shown at the top of the display.

Torque (D) + Pos – Display indicates current valve position to one decimal place as Position (above) plus digital torque indication scaled 0% to 99% of rated torque. If the actuator develops torque greater than 99% then "Hi" will be displayed.

Positioner – Used only with analogue or network position control. Display indicates current valve position (▼) to one decimal place plus the position equating to the applied demand signal (▽). In addition, an analogue indication of demand and position is provided scaled 0% to 100% of valve position.

To set the home screen, ⊖ ⊙ ⊙ ⊖. The drop down list box will close and the selected home screen will be indicated.

LED

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

3/6	Close LED

Green (*default*) – The green lights illuminate at the Closed Limit position, red at open.

Red – The red lights illuminate at the Closed Limit position, green at open.

To change the Closed Limit position indication light, ⊟ ◯ ◯ ⊟. The checkbox will indicate the selected closed colour.

4/6	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.

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 5/6 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 5/6 Alarm LED.

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

To change the mid-travel LED Mode, ⊟ ◯ ◯ ⊟. The drop down list box will close and the selected mode will be shown.

5/6	Alarm LED

Alarm LED Function will be greyed out unless 4/6 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.

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.

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

To change the Alarm LED Mode, ⊟ ◯ ◯ ⊟. The drop down list box will close and the selected mode will be shown.

6/6	Language

The language used on the display can be selected.

English (*default*) is available as standard. Chinese is available for download from the Rotork website, loaded into the BTST using Insight 2 and uploaded into the actuator.
Visit **www.rotork.com.**

```
            Settings
  Limits
  Indication
  Control
  ESD
  Security
  Defaults
  Power Save
  ▲▼ ↵
```

```
           Indication
  Contacts
  Local Display
  Analogue
  ▲▼ ↵
```

```
           Analogue
  ☐ On  Invert   ☒ Off



  ▲▼ ↵              1/1
```

Analogue position indication screen is shown above with its default setting.

Analogue position indication (4-20 mA) is an optional extra, refer to circuit diagram for inclusion. If the option is not fitted the Analogue menu item will not be present in the Indication menu.

The analogue output signal auto ranges to the set limits and cannot be calibrated.

1/1	Invert

Off (*default*) – 4 mA output at Closed Limit position / 20 mA output at Open Limit position.

On – 4 mA output at Open Limit position / 20 mA output at Closed Limit position.

To change the analogue output mode, �़ 🔄 🔄 🔄. The checkbox will indicate the selected mode.

2.3 Settings – Control
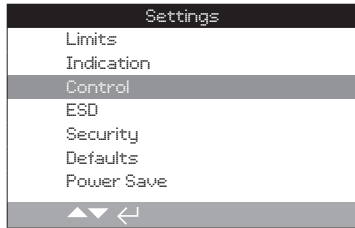
Instruction is provided on:

2.3.1 Local control

Settings for vandal resistant build, setting tools control, maintained local control, delay control and action on loss of actuator user interface.

2.3.2 Remote control

Settings for control source; hardwired, networks, analogue and partial stroke setup.

2.3.3 Interrupter Timer

The Interrupter Timer is an optional extra, check the circuit diagram for inclusion. If it is not enabled it will not be included in the display menu. It is used to control closing and/or opening operating time under both local and remote control.

2.3.1 Control – Local
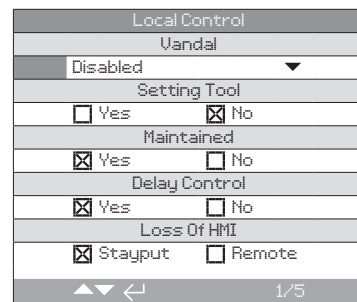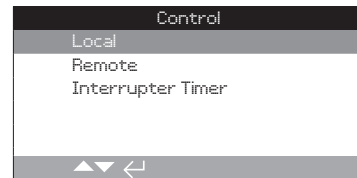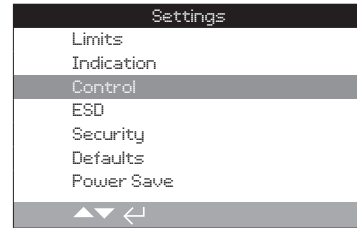
The local control configuration page is shown with the default settings.

1/5	Vandal

Actuators built as vandal resistant Type 1 do not have the black and red control knobs fitted. Selection of Local control and Remote control is made using the vandal resistant setting:

Disabled (*default***)** – Actuator is not vandal resistant build and control knobs are present.

Local – Actuator selected for Local control using a Rotork setting tool. Infrared local control has a range of approximately 0.25 m (10") and must be in direct line of sight. Bluetooth local control has a range up to approximately 10 m (30 ft) depending on environment.

Remote – Actuator selected for Remote control. Rotork setting tool control keys are inactive and the actuator responds only to remote control signals.

Switched – This option is available with an external PCB (i.e., DIO), the actuator uses the input to switch the vandal resistant setting between local and remote.

To change, 🔘 ⟳ ⟲ 🔘. The drop down list will close and the selected control mode will be indicated.

2/5	Setting Tool

With control knobs fitted to the actuator, the Close, Open and Stop control keys on Rotork setting tools can be used to operate the actuator:

Yes – Control keys are active. Control is possible only when the red control knob is set to Local. Infrared local control has a range of approximately 0.25 m (10") and must be in direct line of sight. Bluetooth local control has a range up to approximately 10 m (30 ft) depending on environment. The black close/open control knob remains active.

No (*default***)** – Control keys are disabled. Local control is by close/open/stop control knobs fitted to the actuator.

To change, 🔘 ⟳ ⟲ 🔘. The checkbox will indicate the selected Setting Tool control mode.

3/5	Maintained

Sets the action as a response to local open or close control signals:

Yes (*default***)** – The actuator will self-maintain as a response to a fleeting local open or close control signal. It will run until it receives a stop command, it reaches a travel limit or is reversed – Maintained control.

No – The actuator will run only while an open or close control signal is applied – Push to run local control.

To change, 🔘 ⟳ ⟲ 🔘. The checkbox will indicate the selected action.

4/5	Delay Control

If there is a risk of a local close or open control signal being applied due to the control knob moving inadvertently or by being hit momentarily, a delay can be set to help prevent an unintended operation:

Yes – A local close or open signal must be held for approximately 2 seconds before the actuator responds.

**No (***default***)** – The actuator responds immediately to a local close or open control signal.

To change, 🔘 ⟳ ⟲ 🔘. The checkbox will indicate the selected local control knob response.

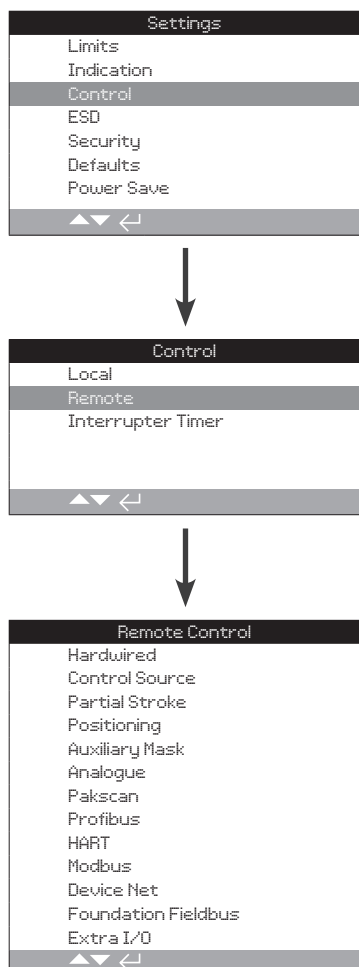| 5/5	Loss of HMI

The Human Machine Interface consists of the actuator display and red and black control knobs. If for any reason the HMI stops responding, the response of the actuator can be set.

Stayput (*default***)** – The actuator will stayput and raise an alarm using the monitor relay. It will not respond to remote control signals.

Remote – The actuator will raise an alarm using the monitor relay. It will continue to respond to remote control signals.

To change, 🔘 ⟳ ⟲ 🔘. The checkbox will indicate the selected HMI failure response.

```
         Settings
  Limits
  Indication
  Control
  ESD
  Security
  Defaults
  Power Save
     ▲▼ ↵
```

```
         Control
  Local
  Remote
  Interrupter Timer


     ▲▼ ↵
```

```
      Remote Control
  Hardwired
  Control Source
  Partial Stroke
  Positioning
  Auxiliary Mask
  Analogue
  Pakscan
  Profibus
  HART
  Modbus
  Device Net
  Foundation Fieldbus
  Extra I/O
     ▲▼ ↵
```

Instruction is provided on the setup of standard hardwired and remote control options.

The Remote Control menu is shown left, listing all possible entries. Some menu items shown are optional remote control forms requiring additional hardware to be fitted in the actuator (see table below). **The menu list displayed on the actuator will show only the option(s) fitted**. Options not fitted will not be included in the menu list, check wiring diagram for option inclusion.

The table below lists the available standard and option remote control forms, their type and the section of this manual where instruction is provided.

Remote Control Form	Included as:	Type	Section
Hardwired	Standard	Hardwired	2.3.2-1
Control Source	Standard	Software	2.3.2-2
Partial Stroke	Standard	Hardwired	2.3.2-3
Positioning	Option	See Note	2.3.2-4
Auxiliary Mask	Option	See Note	2.3.2-5
Analogue	Option	Analogue	2.3.2-6
Pakscan	Option	Network	2.3.2-7
Profibus	Option	Network	2.3.2-8
HART	Option	Analogue	2.3.2-9
Modbus	Option	Network	2.3.2-10
Device Net	Option	Network	2.3.2-11
Foundation Fieldbus*	Option	Network	N/A
Extra I/O	Option	Hardwired	2.3.2-12

* When Foundation Fieldbus is fitted it will be included in the remote control menu for information only. The Foundation Fieldbus option is configured remotely over the Fieldbus network and therefore does not have a setup page. Control Source, Positioning and Auxiliary Mask pages will be included to allow associated setting to be made when Foundation Fieldbus is fitted.
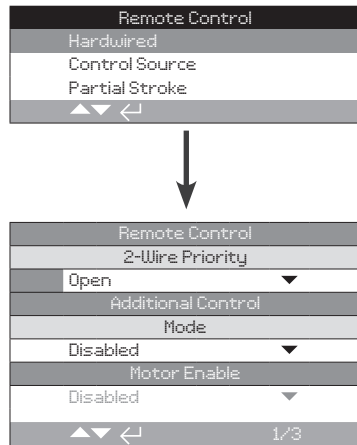
Note: When any of the analogue or network remote control options are fitted, Auxiliary Mask and Positioning are automatically included in the remote control menu. These items allow access to settings that are common to all fitted options. See Examples below.

Example 1: For a basic actuator with no control options fitted, the remote control menu is shown below.

```
      Remote Control
  Hardwired
  Control Source
  Partial Stroke
     ▲▼ ↵
```
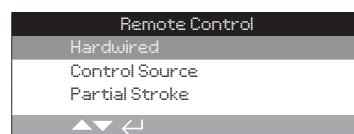
Example 2: For an actuator with a remote control option, the remote control menu will automatically display the appropriate items relating to that option. The example below shows the menu for an actuator including the Profibus option with the associated Positioning and Auxiliary Mask items.

```
      Remote Control
  Hardwired
  Control Source
  Partial Stroke
  Positioning
  Auxiliary Mask
  Profibus
     ▲▼ ↵
```

```
        Remote Control
Hardwired
Control Source
Partial Stroke
        ▲▼  ↵
```

↓

```
        Remote Control
        2-Wire Priority
Open                    ▼
      Additional Control
           Mode
Disabled                ▼
        Motor Enable
Disabled                ▼
        ▲▼  ↵        1/3
```

Hardwired Control is a standard feature. The default settings are shown above.

Hardwired Control is a standard remote control form available on all actuators. It allows settings for hardwired 2-wire priority control and interlocks.

| 1/3 | 2-Wire Priority |

Sets the action the actuator performs when a close and open signal are applied simultaneously. Hardwired remote control form C uses the priority action (open or closed) to set the actuator response when 2 signals are applied. Refer to the wiring diagram and its referenced RWS control diagram.

On applying hardwired close and open signals together, the actuator will:

Open – The actuator will move open.

Stop (*default*) – The actuator will not move, or will stop if running. This is sometimes known as "stayput".

Close – The actuator will move closed.

To change, ⊖ ⟳ ⟲ ⊖. The drop down list will close and the selected 2-wire control mode will be indicated.

| 2/3 | Mode (Additional Control) |

Set the operating mode for the terminals marked as interlocks, refer to wiring diagram. External interlocks can be used to prevent operation of the actuator until a certain process condition is met. An example is a main and bypass valve system. The main valve is interlocked with the bypass valve such that it cannot be opened until the bypass valve is fully open.

Disabled (*default*) – The interlock inputs are disabled, interlocking is not available.

Interlocks – Open and close interlock inputs become active and provide traditional interlocking functionality. The actuator will not run in local or remote control unless an interlock signal is applied for the required operating direction. If only one interlock is required by the site process, the other interlock must be linked out to always permit operation.

Conditional – Open and close interlock inputs become active and provide permissive control for remote command signals. Remote control is conditional on two signals being applied simultaneously (e.g., close command and close interlock) and therefore integrity of operation due to spurious control signals is increased. Local control remains available.

Partial Stroke – Partial stroke testing demonstrates the operational integrity of the valve and actuator by moving them for a set portion of stroke. A remote "partial stroke" hardwired signal applied to the open interlock input is used to initiate a partial stroke test. For setting the partial stroke test parameters, refer to Section 2.3.2-3. When set to partial stroke, the closed interlock input is disabled. Partial stroke initiated via a network command (with a network option fitted), does not require the interlocks to be configured for partial stroke.

To change the settings use ⊖ ⟳ ⟲ ⊖. The drop down list will close and the selected interlock mode will be indicated.

| 3/3 | Motor Enable |

Sets the remote control maintain function when the motor enable feature is used. When using motor enable, the maintain line on Terminal 34 becomes the permissive input.

Disabled (*default*) – Maintain function is controlled by applying a signal to Terminal 34.

Push to Run – Remote controls are push to run. On removal of the remote open or close command, movement will stop.

Maintained – Remote controls are self maintained so only a pulse is required. Removal of the remote open or close signal will not stop operations. To stop movement, you must remove the motor enabled signal.

```
┌─────────────────────────────┐
│      Remote Control         │
│  Hardwired                  │
│  Control Source             │
│  Partial Stroke             │
│  Positioning                │
│  Auxiliary Mask             │
│  Analogue                   │
│  ▲▼  ↵                      │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│      Option Control         │
│      Ctrl Source 1          │
│  Analogue              ▼    │
│      Ctrl Source 2          │
│  Disabled              ▼    │
│      Ctrl Selection         │
│  Disabled              ▼    │
│      Options Fitted         │
│      Option 1               │
│  Analogue              ▼    │
│      Option 2               │
│  Disabled              ▼    │
│      Option 3               │
│  Disabled              ▼    │
│      Option 4               │
│  Disabled              ▼    │
│      Analogue               │
│  Lost Sig Time (s)   0      │
│      Lost Signal Act.       │
│  Off                   ▼    │
│      Signal Loss Pos.       │
│  [            ]0%           │
│      Disabled               │
│  Lost Sig Time (s)   0      │
│      Lost Signal Act.       │
│  Off                   ▼    │
│      Signal Loss Pos.       │
│  [            ]0%           │
│  ▲▼  ↵            1/20      │
└─────────────────────────────┘
```

Introduction

In addition to standard hardwired control, the actuator can have up to two remote control options fitted. For most remote control systems employed by end-users, only one control option is used.

For control systems using Analogue control only or where Analogue and Network (such as Modbus) control is used, control (Hardwired/Analogue or Analogue/ Network) can be switched by the user using the Manual/Auto input available with the analogue option and the settings made in Control Source. When Analogue and Network options are fitted and Analogue is switched to control, the Network option cannot control the actuator but will continue to report actuator status.

The control source will be set by Rotork to the defaults required for the option(s) fitted. Refer to Table: Control Source Settings.

For analogue control, if both Manual (hardwired control inputs) and Auto (analogue control) is to be used, the control selection will require re-setting. If only analogue control is required, the default settings for Control Source will be correct. Refer also to Section 2.3.2-6.

The control source is used to:

- Control Source 1/Source 2 - Associate fitted control option(s) to a source of control (Source 1 or Source 2).

- Control Selection - Set which Control Source (1 or 2) has priority when Manual/Auto input is used to switch between Analogue and Network option sources.

- Lost Signal - Determines the actuator response to a lost analogue signal or network communication.

The Control Source setting page shown above is an example of an actuator with the Analogue remote control option.

The actuator display will indicate fitted options.

Refer to wiring diagram for options fitted.

Table: Control Source Settings

Options Control					
Settings	**Hardwired (no options)**	**Analogue Only**	**Analogue and Hardwired**	**Network Only**	**Analogue and Network**
Ctrl Source 1	Disabled	Analogue	Analogue	Network	Analogue
Ctrl Source 2	Disabled	Disabled	Disabled	Disabled	Network
Ctrl Selection	Hardwired	Source 1	Hardwired / Source 1	Source 1	Source 1 / Source 2
Options Fitted					
	Disabled	Analogue	Analogue	Network	Network
	Disabled	Disabled	Disabled	Disabled	Analogue
	Disabled	Disabled	Disabled	Disabled	Disabled
	Disabled	Disabled	Disabled	Disabled	Disabled

KEY: For "Network", display will indicate the fitted option(s): Pakscan/Profibus/Modbus/Foundation Fieldbus (FF)/HART/DeviceNet.

1/20	Ctrl Source 1

Control Source 1 will be set by Rotork for the fitted remote Analogue or Network control option(s). Refer to Table: Control Source Settings.

2/20	Ctrl Source 2

Control Source 2 will be set by Rotork for the fitted remote Analogue or Network control option(s). Refer to Table: Control Source Settings.

3/20	Ctrl Selection

Control Selection is used to select the control source and if required, for Analogue option or Analogue with Network options, allow hardwired switching between sources using the Manual/Auto input.

Disabled – All remote control disabled. The actuator can only be operated using the local controls.

Hardwired – Remote control by hardwired inputs only. This setting is the default for actuators with no option cards fitted.

If a Network option is fitted but is not required for control, ⊟ ◐ ◑ ⊟ to select Hardwired.

Source1 – Control by the option listed for Control Source 1. If Control Source 1 is a Network option, control will be via its auxiliary mask inputs, refer to Section 2.3.2-5.

Hardwired / Source1 – Control available only when Analogue option is fitted. This mode enables the user to select between control by hardwired inputs or Source 1 (Analogue) control by applying or removing a signal to the Manual/Auto input, refer to the wiring diagram. Manual will enable hardwired control and Auto will enable Source 1 control.

If an Analogue option is fitted and Manual/Auto switching is required, ⊟ ◐ ◑ ⊟ to select Hardwired/Source 1.

Source 1 / Source 2 – Control by Analogue and a Network option only. This mode enables the user to select between Source 1 (Analogue) and Source 2 (Network) control, by applying or removing a signal to the Manual/Auto input available with the Analogue option, refer to wiring diagram. Manual will enable Source 2 and Auto will enable Source 1, refer to Section 2.3.2-6. When setting up closed-loop control, there are two further options:

When a setpoint value is read from a network, Source1 is the setpoint and Source2 is the feedback value.

Where a setpoint has a fixed value, Source1 is set to "FIX" and Source2 is the feedback value.

4/20 to 7/20	Options Fitted

Not editable. Factory set for the control options fitted. Up to 4 options can be fitted and will be indicated in the list. Unused allocations will be set to Disabled.

If a control option is fitted after manufacture, the allocation will be set to the fitted option type by Rotork Site Services. Where the user upgrades an actuator to include a new control option using a kit supplied by Rotork, this must be set before the control mode settings can be made. Contact Rotork for access.

8/20 to 19/20	Lost Signal

Sets the actuator response for when the analogue signal or Network communications of the control source are lost.

There are 3 settings for determining the actuator response on loss of signal and these are common for all option types fitted. Each group of 3 will be headed with the applicable option type - example Analogue. For actuators including one control option, settings 8/20 to 10/20 will be available and settings 11/20 to 20/20 will be greyed out. For 2 options fitted, 8/20 to 13/20 will be available and so on up to 4 options. This instruction is therefore common for as many options as are fitted.

8/20	Lost Sig Time (s)

Sets the amount of time in seconds that a signal must be lost before the set lost signal action is performed. Range 0 to 65 seconds:

For the analogue option, time must be set to 0 seconds.

To change, ⊟ ◐ ◑ ⊟. The time set after which the lost signal action will be implemented and indicated.

9/20	Lost Signal Act.

Sets the action performed when the signal is lost:

Off (*default*) – The lost signal feature is disabled. An actuator with Analogue control will run to the set low signal position. An actuator with Network Control will stay at its current position when communication is lost.

Stayput – If the actuator is not moving it will Stayput, if it is moving it will Stop.

Close – The actuator will run to the Close Limit.

Open – The actuator will run to the Open Limit.

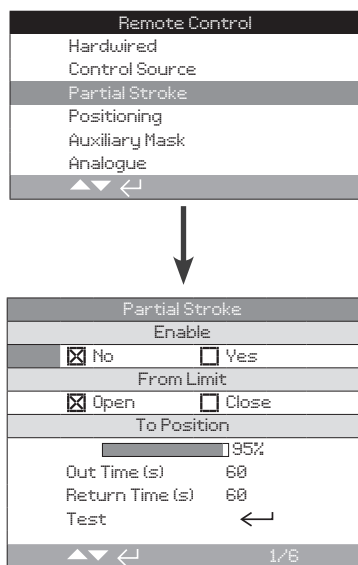**Position** – The actuator will run to the mid-travel position set for Signal Loss Position, refer to 10/20.

To change, ⊟ ◐ ◑ ⊟. The drop down list will close and the selected action will be indicated.

10/20	Signal Loss Pos.

When the lost signal action is set to Position the actuator will run to the mid-travel position set. Range is 0% (Closed Limit) to 100% (Open Limit). This control should be used if a lost signal position in mid-travel is required.

Whenever the actuator is running under positioning mode, the parameters in the Positioning menu will apply. Refer to Section 2.3.2-4.

To change, ⊟ ◐ ◑ ⊟. The slider control will indicate the mid-travel position the actuator will move to when the control/network signal is lost.

```
        Remote Control
     Hardwired
     Control Source
     Partial Stroke
     Positioning
     Auxiliary Mask
     Analogue
        ▲▼  ↵
```

```
        Partial Stroke
            Enable
    ☒ No          ☐ Yes
         From Limit
    ☒ Open        ☐ Close
         To Position
    ▭▭▭▭     95%
    Out Time (s)      60
    Return Time (s)   60
    Test              ↵
        ▲▼  ↵        1/6
```

Partial Stroke is a standard feature. The default settings are shown above.

Partial stroke testing is used to demonstrate the operational integrity of the valve and actuator by moving over a set portion of valve stroke. In addition, partial stroking may be used to exercise infrequently operated valves to help keep them mechanically free. Partial stroke test can only be initiated when the actuator is at the From Limit position.

A partial stroke test may be initiated by a remote partial stroke signal applied to the open interlock*, a network command (network option fitted) or using the test control on the partial stroke page.

*Interlocks must be set to partial stroke, refer to Section 2.3.2-1.

Partial stroke test results (torque and pass/ failure status) are recorded in the data log.

Partial stroke operation, pass and failure can be indicated by the S contacts, refer to Section 2.2.1.

1/6	Enable

No (*default*) – Partial stroking testing is disabled

Yes – Partial stroke testing is enabled.

To change, 🕹 🔄 🔄 🕹. The checkbox will indicate partial stroke test status.

2/6	From Limit

Selects the start/finish limit position for the partial stroke test.

Open (*default*) – The partial stroke test will start from the Open Limit position, move close to the position set for 3/6 To Position and then return to the Open Limit position.

Close – The partial stroke test will start from the Closed limit position, move open to the position set for 3/6 To Position and then return to the Close Limit position.

To change, 🕹 🔄 🔄 🕹. The checkbox will indicate partial stroke start/finish position.

3/6	To Position

Range 0% (closed) to 97% Open

Selects the intermediate position for the partial stroke test.

Sets the position in valve stroke to where the actuator will move when a partial stroke test is initiated. For example a test starting at Open Limit with a To Position of 70% set, will move from Open Limit to 70% open and then return to the Open Limit. A minimum of 3% travel is required to adequately perform the partial stroke test.

To change, 🕹 🔄 🔄 🕹. The slider control will indicate the position the actuator will move to for the partial stroke test.

4/6 - 5/6	Out Time - Return Time

Range 0 to 3600 seconds.

For IQ actuators, out time and return time must be set to the same value. They are used to ensure that the partial stroke test is completed in a quantified period of time. Alarms can be set to indicate a failure in meeting the set time, indicating a valve problem.
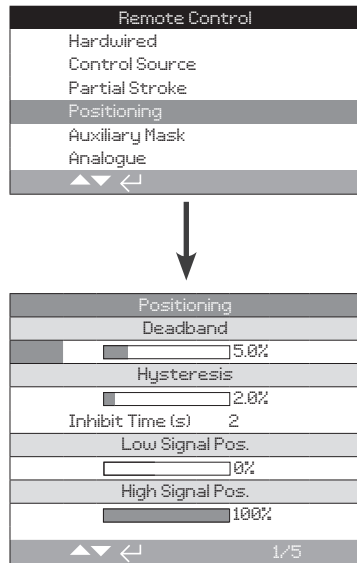
Measure or calculate the time to complete the set partial stroke test. Add 10% to this value then half it. The resulting time should be entered into both Out Time and Return Time.

To change, 🕹 🔄 🔄 🕹. The set partial stroke out/return time will be indicated.

6/6	Test

To initiate a partial stroke test using a Rotork setting tool, the actuator must be set to Local control using the red control knob and at the limit position set for 2/6 From Limit.

To initiate a partial stroke test, 🕹. The partial stroke test will be initiated as set.

⚙
Settings

```
┌─────────────────────────────────┐
│         Remote Control          │
│  Hardwired                      │
│  Control Source                 │
│  Partial Stroke                 │
│  Positioning                    │
│  Auxiliary Mask                 │
│  Analogue                       │
│         ▲▼ ↵                     │
└─────────────────────────────────┘
```

```
┌─────────────────────────────────┐
│          Positioning            │
│          Deadband               │
│ ▐▐▐▐[        ]5.0%              │
│          Hysteresis             │
│ ▐[          ]2.0%              │
│  Inhibit Time (s)    2          │
│         Low Signal Pos.         │
│ [           ]0%                │
│         High Signal Pos.        │
│ ▐▐▐▐▐[      ]100%              │
│     ▲▼ ↵            1/5          │
└─────────────────────────────────┘
```

The Positioning option settings page with its default settings is shown above.

Applicable for Analogue and HART control options and for all Network control options where positioning control is required. Settings are used to tune the actuator positioning response.

- Deadband and Hysteresis are combined to set positioning accuracy.

- Inhibit Time is used to set a delay in the actuator's response.

- Low/High Signal Position sets the range of the valve stroke where positioning is required.

1/5	Deadband

Range 0% - 25.5%. Default setting: 5%.

Affects positioning accuracy as a response to the process control system desired value (DV) signal position. A smaller deadband increases accuracy, however the widest deadband should be set while maintaining good control in order to protect the mechanical valve from excessive wear and/or to keep the actuator within its electrical rating.

Setting a suitable deadband also stops the actuator from moving rapidly around the DV, without reaching it. This is known as "hunting" and is another cause of excessive wear of the valve and actuator.

Deadband setting should be combined with 2/5 Hysteresis setting. The actuator will run towards the DV position until the actual position is within the set deadband minus the hysteresis setting. This has the effect of the actuator stopping nearer to the DV position. The actuator will not restart unless it overshoots and runs outside the deadband or a new command places the new desired position outside the deadband. Refer to Figure 2.3-1.

To change, 🔄 ⭕ ⭕ 🔄. The slider control will indicate the deadband setting.

2/5	Hysteresis

Range 0% - 25.5%. Default setting: 2%.

Affects positioning accuracy as a response to the process control system's desired value (DV) signal position. A larger Hysteresis setting will increase accuracy but the value set must not be greater than that set for Deadband.

Hysteresis setting should be combined with 1/5 Deadband setting. The actuator will run towards the DV position until the actual position is within the set deadband minus the hysteresis setting. This has the effect of the actuator stopping nearer to the DV position. The actuator will not restart unless it overshoots and runs outside the deadband or a new command places the new desired position outside the deadband. Refer to Figure 2.3-1.

To change, 🔄 ⭕ ⭕ 🔄. The slider control will indicate the hysteresis setting.

3/5	Inhibit Time

**Range 0 – 255 seconds. Default setting: 5 seconds.**

Sets a delay after the actuator stops as a result of reaching a position consistent with a new DV position. For the period set, the actuator will not respond to a change in DV. Inhibit time is used to prevent unwanted operation as a result of a rapidly oscillating or fluctuating DV signal or to slow actuator response in order to protect the mechanical valve from excessive wear and/or maintain actuator within its electrical rating.

To change, 🔄 ⭕ ⭕ 🔄. The time set will be indicated.

4/5	Low Signal Pos.

Range 0% to 100% open positions.

Used to set the position the actuator will move to when the low analogue signal is applied, for Analogue control, or for a 0% position command for Network options. Normally this will be set at Closed Limit position (0%), unless positioning is required over a reduced portion of full valve travel, for example, to prevent full closure where valve throttling is required.

To change, 🔄 ⭕ ⭕ 🔄. The slider control will indicate the position the actuator will move to when the low signal is applied.

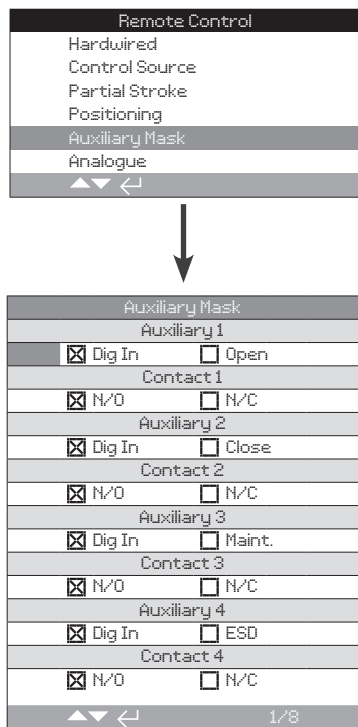| 5/5	High Signal Pos.

Range 0% to 100% open positions.

Used to set the position the actuator will move to when the High analogue signal is applied for Analogue control or for a 100% position command for Network options. Normally this will be set at Open Limit position (100%), unless positioning is required over a reduced portion of full valve travel, for example, to increase positioning resolution for a butterfly valve where positioning is required from Closed Limit position to 60% open position.

To change, 🔄 ⭕ ⭕ 🔄. The slider control will indicate the position the actuator will move to when the high signal is applied.

```
┌─────────────────────────────┐
│      Remote Control         │
│  Hardwired                  │
│  Control Source             │
│  Partial Stroke             │
│  Positioning                │
│  Auxiliary Mask             │
│  Analogue                   │
│  ▲▼  ↵                      │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│      Auxiliary Mask         │
│       Auxiliary 1           │
│  ☒ Dig In      ☐ Open       │
│        Contact 1            │
│  ☒ N/O         ☐ N/C        │
│       Auxiliary 2           │
│  ☒ Dig In      ☐ Close      │
│        Contact 2            │
│  ☒ N/O         ☐ N/C        │
│       Auxiliary 3           │
│  ☒ Dig In      ☐ Maint.     │
│        Contact 3            │
│  ☒ N/O         ☐ N/C        │
│       Auxiliary 4           │
│  ☒ Dig In      ☐ ESD        │
│        Contact 4            │
│  ☒ N/O         ☐ N/C        │
│  ▲▼  ↵              1/8     │
└─────────────────────────────┘
```

The Auxiliary Mask settings page is shown above with default settings visible.

Introduction

When a Network option card is fitted (Pakscan/Profibus/Modbus/Foundation Fieldbus or HART) a facility to accept 4 Auxiliary inputs is available. Auxiliary inputs can be set as supplementary control for the actuator (open, close, stop/maintain or ESD) or as digital indication inputs whose status is reported over the option network. It is also possible to have a combination of both supplementary remote control and digital inputs to provide, for example, open and close control as well as a high and low tank level alarm indication from external level transducers.

Auxiliary inputs are in addition to the standard control and feedback features incorporated into a Network option. Auxiliary inputs are connected to the standard Open, Close, Stop/maintain and ESD inputs. Refer to the wiring diagram.

NOTE: If an Analogue option and a Network option are fitted and hardwired ESD control is required (Auxiliary 4 set to ESD), ensure Auxiliary contact 4 setup is matched to the ESD configuration when signal setting. Refer to Section 2.4.

The Auxiliary Mask page allows the user to setup the 4 Auxiliary inputs as supplementary control, indication or a combination of both. Each Auxiliary input can be set for the type of contact connected. Refer to Auxiliary input setup.

Auxiliary Input Setup

Input	Auxiliary 1	Auxiliary 2	Auxiliary 3	Auxiliary 4
Control	Open	Close	Stop/Maintain	ESD
Indication	Digital Input	Digital Input	Digital Input	Digital Input
Contact type	**Contact 1**	**Contact 2**	**Contact 3**	**Contact 4**
Normally Open	N/O	N/O	N/O	N/O
Normally Closed	N/C	N/C	N/C	N/C

A normally open contact is considered to be in the active state when the contact is closed. A normally closed contact is considered to be in the active state when the contact is open.

Using Auxiliary 1 and Contact 1 as an example:

1/8   Auxiliary 1

Refer to Auxiliary input setup.

Dig in (*default*) – Network option will report digital input status: 1 or 0

Open – Hardwired open command signal is required. Use Auxiliary 2 to 4 for close, stop/maintain and ESD.

To change the settings use, ⊖ ◐ ◑ ⊖. The checkbox will indicate the set Auxiliary 1 input function.
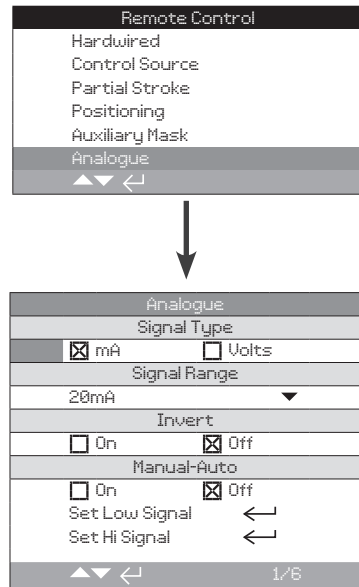
2/8   Contact 1

Refer to Auxiliary input setup.

N/O (*default*) – A normally open contact is used to derive input.

N/C – A normally closed contact is used to derive input.

To change the settings use, ⊖ ◐ ◑ ⊖. The checkbox will indicate the set Contact 1 input type.

```
        Remote Control
     Hardwired
     Control Source
     Partial Stroke
     Positioning
     Auxiliary Mask
     Analogue
        ▲▼ ↵
```

```
        Analogue
        Signal Type
     ☒ mA        ☐ Volts
        Signal Range
     20mA                 ▼
        Invert
     ☐ On        ☒ Off
        Manual-Auto
     ☐ On        ☒ Off
     Set Low Signal    ↵
     Set Hi Signal     ↵
        ▲▼ ↵          1/6
```

The Analogue option settings page is shown above with its default settings. Analogue is a control option.

The Analogue menu item and its associated settings page will only be shown when the Analogue option is fitted. Refer to wiring diagram. The Analogue option setting page allows the option to be set for the applied signal type and range. Signal low and high values can also be calibrated.

For Analogue option; deadband, hysteresis and positioning settings, refer to Section 2.3.2-4.

| 1/6 | Signal Type |

mA (*default*) – Set for current (mA) Analogue control signal.

Volts – Set for voltage Analogue control signal.

To change, 🔘 ◁ ▷ 🔘. The checkbox will indicate the set Analogue signal type.

| 2/6 | Signal Range |

Available ranges: 5 mA, 10 mA or 20 mA (default) or 5 V, 10 V or 20 V range for voltage control. For Analogue signal using a 4 mA to 20 mA range, set 20 mA.

To change, 🔘 ◁ ▷ 🔘. The drop down list will close and the selected range will be indicated.

| 3/6 | Invert |

Off (*default*) – Low Analogue signal will move the actuator in the close direction.

On - High Analogue signal will move the actuator in the close direction.

To change, 🔘 ◁ ▷ 🔘. The checkbox will indicate the set Analogue signal action.

| 4/6 | Manual-Auto |

With the Analogue control option it is possible to have Manual/Auto control by a user-supplied remote switch selection:

	Analogue Option Fitted	Analogue and Network Options fitted
Manual	Hardwired	Network
Auto	Analogue	Analogue

When Analogue and Network options are fitted and Auto is selected, the Network option fitted will continue to report actuator status.

Hardwired ESD is available in both Manual and Auto. When applied, ESD will override all other control signals. Refer to Section 2.4 ESD.

For Manual Auto control, refer to wiring diagram and referenced RWS diagram.

OFF (*default*) – Manual/Auto control is not used. Actuator will be controlled by the Analogue signal. Where a Network option card is also fitted, the Network option will report actuator status only.

On – Actuator can be controlled by hardwired contacts or the Network (as applicable) or by the Analogue signal.

To change the settings use, 🔘 ◁ ▷ 🔘. The checkbox will indicate the set Manual/Auto mode.
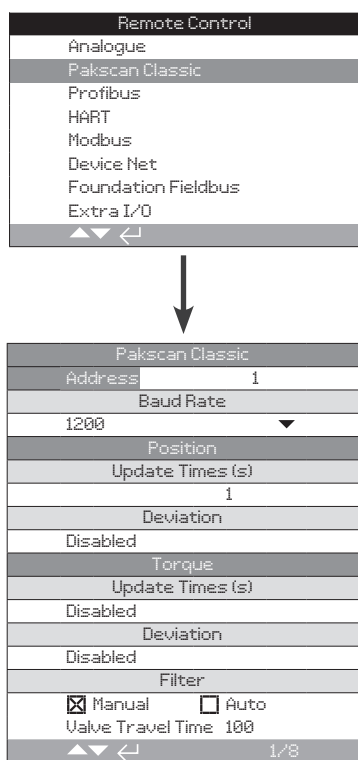
| 5/6 | Set Low Signal |

The actuator must be calibrated to the Low Analogue signal value. By measuring this signal it will then be able to control the actuator by moving it to the Set Low Signal position, refer to Section 2.3.2-4.

APPLY THE LOW ANALOGUE SIGNAL and select 🔘. The signal will be measured and set as the Low signal position value.

| 6/6 | Set High Signal |

The actuator must be calibrated to the High Analogue signal value. By measuring this signal it will then be able to control the actuator by moving it to the Set High Signal position, refer to Section 2.3.2-4.

APPLY THE HIGH ANALOGUE SIGNAL and select 🔘. The signal will be measured and set as the High signal position value.

```
┌─────────────────────────────┐
│      Remote Control         │
│ Analogue                    │
│ Pakscan Classic             │
│ Profibus                    │
│ HART                        │
│ Modbus                      │
│ Device Net                  │
│ Foundation Fieldbus         │
│ Extra I/O                   │
│ ▲▼        ↵                 │
└─────────────────────────────┘
```

```
┌─────────────────────────────┐
│      Pakscan Classic        │
│ Address          1          │
│      Baud Rate              │
│ 1200                 ▼      │
│      Position               │
│ Update Times (s)            │
│           1                 │
│      Deviation              │
│ Disabled                    │
│      Torque                 │
│ Update Times (s)            │
│ Disabled                    │
│      Deviation              │
│ Disabled                    │
│      Filter                 │
│ ☒ Manual    ☐ Auto          │
│ Valve Travel Time  100      │
│ ▲▼       ↵           1/8    │
└─────────────────────────────┘
```

The Pakscan Control option settings page is shown above with its default settings. Pakscan is a control option, refer to the wiring diagram.

Depending on the Pakscan control scheme, other related settings may be required, refer also to:

Section 2.3.2-4 Positioning

Section 2.3.2-5 Auxiliary Mask

1/8	Address

The Pakscan Field Control Unit option must be allocated a unique loop node address. Changes made to the address will take effect immediately. The range of address is 1 – 240.

To change, � 🔄 🔄 🔑. The set address will be indicated.

2/8	Baud rate

The actuator Pakscan Field Control Unit option must be set to the loop baud rate. For a Pakscan 2-wire control loop the selected baud rate must be common in the master station and all the field units included in the loop. Changes made to baud rate will take effect immediately. The baud rate is selectable using the drop down list box and the possible values are 110, 300, 600, 1200 and 2400.

To change, 🔑 🔄 🔄 🔑. The drop down list will close and the selected baud rate will be indicated.

Position

3/8	Update Time (s)

Range 0 (Disabled) to 255 seconds.

Set when mid-travel positioning control is required. Update Time in seconds is the set period for updating the master station with position data. Refer also to 4/8 Deviation. The valve position will be reported at time intervals equating to the set Update Time. If the FCU updates on deviation whilst the valve is moving then the update time should be set to approximately 10 times the loop scan time. If the actuator is not used for mid-travel positioning (i.e. isolating duty), then the Update Time should be turned off by setting it to zero (Disabled).

To change, 🔑 🔄 🔄 🔑. The set Position Update time in seconds will be indicated.

4/8	Deviation

Range 1% to 99%. Setting below 1% will indicate Disabled.

Set when mid-travel positioning control is required. Deviation is the set amount of change that has to occur before the position data is reported to the master station. Whilst the valve is in motion, reports about its position will be made each time the position changes by more than the Deviation setting. The recommended value is 5% where positioning data is required. If the actuator is not used for mid-travel positioning (i.e. isolating duty), then the Deviation should be turned off by setting it to zero (Disabled).

To change, 🔑 🔄 🔄 🔑. The set Position Deviation % will be indicated.

Torque

5/8	Update Time (s)

Range 5 to 255 seconds. Setting below 5 will indicate Disabled.

Torque update time (seconds) value is refreshed from a stationary actuator. If torque data is not required then its update time should be disabled.

To change, ⊟ ◖ ◗ ⊟. The set Torque Update time in minutes will be indicated.

6/8	Deviation

Range 1% to 99%. Setting below 1% will indicate Disabled.

Set for the amount of change in actuator measured torque that has to occur before torque data is reported to the master station. During valve travel, torque reporting will be made each time the torque changes by more than the Deviation setting. Where continuous torque data is required the recommended value is 5%. If torque data is not being used then the deviation should be set to Disabled.

To change, ⊟ ◖ ◗ ⊟. The set Torque Deviation % will be indicated.

7/8	Filter

Set to enable or disable auto reporting of the historical torque logs.

Auto - The Pakscan option will automatically report the 6 historical torque logs for each direction once the actuator has stopped at a limit. The historical log will contain the instantaneous value of torque for both closing and opening torque logs.

Manual – The historical torque logs are not automatically updated. Historical logs are read on demand using a master station command. In Manual, the historical logs will contain the averaged (or filtered) torque logs i.e., the data from the actuator average torque logs.
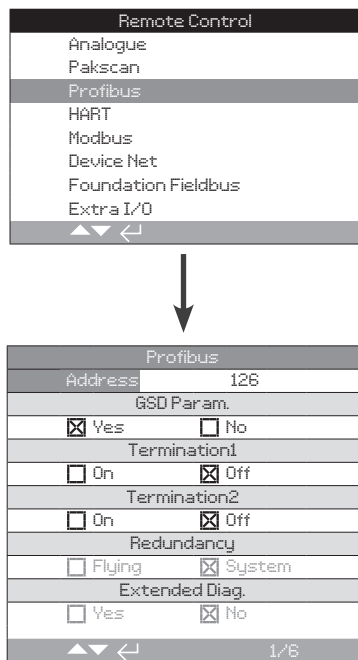
To change, ⊟ ◖ ◗ ⊟. The checkbox will indicate the set Torque Log Filter mode.

8/8	Valve Travel Time

Range 0 to 18000 seconds.

Valve Travel Time should be set to a value 10% greater than the actual valve travel stroke time (i.e., open to closed). If the valve travel time is exceeded, an alarm will be raised via the Pakscan Network.

To change, ⊟ ◖ ◗ ⊟. The set Valve Travel Time will be indicated.

```
         Remote Control
     Analogue
     Pakscan
     Profibus
     HART
     Modbus
     Device Net
     Foundation Fieldbus
     Extra I/O
         ▲▼  ↵
```

```
            Profibus
     Address        126
         GSD Param.
     ☒ Yes        ☐ No
         Termination1
     ☐ On        ☒ Off
         Termination2
     ☐ On        ☒ Off
         Redundancy
     ☐ Flying    ☒ System
         Extended Diag.
     ☐ Yes       ☒ No
         ▲▼  ↵        1/6
```

The Profibus Control option settings page is shown above with its default settings. Profibus is a control option and is available in single or dual versions, refer to wiring diagram.

Depending on the Profibus control scheme, other related settings may be required, refer also to:

Section 2.3.2-4 Positioning

Section 2.3.2-5 Auxiliary Mask

1/6   Address

The actuator Profibus module must be allocated a unique address in the Profibus system. Changes made to the address will take effect immediately. The range of address is 1 – 126 (default 126). Refer also to 5/6 Redundancy.

To change, 🔾 🔾 🔾 🔾. The set address will be indicated.

2/6   GSD Param.

If the user parameterisation data is to be setup using FDT, EDDL or the actuator's menu, setting this menu item to No will ensure that the user parameterisation data sent to the Profibus card during the parameterisation of the Profibus network with the GSD file will be ignored. The settings previously made will not be overwritten. As default this is Yes to ensure that the Profibus card will be parameterised by the GSD user parameterisation data.

Yes (*default*) – Parameterisation by GSD file is enabled.

No – Parameterisation by GSD file is disabled.

3/6 - 4/6   Termination 1 - Termination 2

Profibus networks require active termination at each end of the highway. Profibus option has active termination (2 sets for dual) built in, which can be switched in or out of the circuit.

Off (*default*) - Termination resistors switched out.

On – Termination resistors switched in.

To change, 🔾 🔾 🔾 🔾. The checkbox will indicate the set termination mode.

5/6   Redundancy

Used for dual Profibus option (redundant) only. Refer to the wiring diagram.

System (*default*) - System redundancy means that there are 2 completely separate Profibus highways in the network system and that each highway is connected to one of the Profibus channels. In this mode the address of both Profibus channels are identical.

Flying - Flying redundancy means that there is 1 highway that is connected to both channels, in this mode the addresses of the channels must be different to avoid both channels responding to the same message. In flying redundancy, the channel 2 address will be channel 1 address plus 64.

If flying redundancy is used, the address for 1/6 must not be set higher than 62.

To change, 🔾 🔾 🔾 🔾. The checkbox will indicate the set redundancy.

6/6   Extended Diag.

Used for dual Profibus option (redundant) only. Refer to wiring diagram.

The slave redundancy specification from the PNO describes extended diagnostics that are available in the redundant card. These messages describe, for example, the state of the backup channel. Diagnostics messages can be turned on and off depending on the capabilities of the PLC to which the module is connected.

No (*default*) - Diagnostic messages turned off.

Yes - Diagnostic messaging turned on.

To change, 🔾 🔾 🔾 🔾. The checkbox will indicate the set extended diagnostic mode.

⚙
Settings

```
        Remote Control
     Analogue
     Pakscan
     Profibus
     HART
     Modbus
     Device Net
     Foundation Fieldbus
     Extra I/O
     ▲▼ ←
```

↓

```
            HART
     Address          0
     Set Low Signal   ←
     Set Hi Signal    ←
     Lower Range      0
     Upper Range      10000


     ▲▼ ←            1/5
```
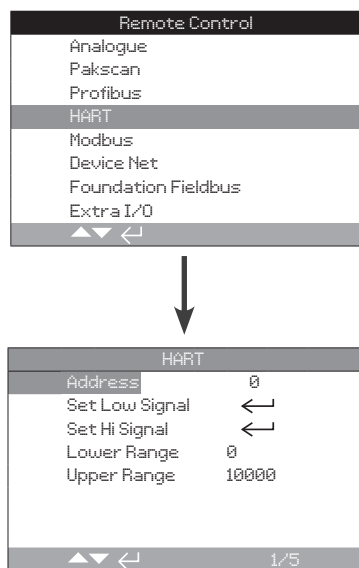
The HART Control option settings page is shown above with its default settings. HART is a control option, refer to the wiring diagram.

For HART control option, other related settings are required, refer also to:

Section 2.3.2-4 Positioning

Section 2.3.2-5 Auxiliary Mask

1/5   Address

The HART option must be allocated a unique address in the HART system. Changes made to this parameter will take effect immediately. The range of address is 0 – 63 (default 0).

To change, 🔧 ◀ ▶ 🔧. The set address will be indicated.

2/5   Set Low Signal

The actuator must be calibrated to the Low analogue signal value. By measuring this signal it will then be able to control the actuator by moving it to the Set Low Signal position, refer to Section 2.3.2-4 Positioning.

APPLY THE LOW ANALOGUE SIGNAL and select 🔧 the signal will be measured and used to send the actuator to the set Low signal position.

3/5   Set Hi Signal

The actuator must be calibrated to the High analogue signal value. By measuring this signal it will then be able to control the actuator by moving it to the Set High Signal position, refer to Section 2.3.2-4 Positioning.

APPLY THE HIGH ANALOGUE SIGNAL and select 🔧 the signal will be measured and used to send the actuator to the set High signal position.

4/5   Lower range

Range 0% to 100% open positions.

Used to set the position the actuator will move to when the low analogue signal is applied for HART control. Normally this will be set at Closed Limit position (0%), unless positioning is required over a reduced portion of full valve travel, for example, to prevent full closure where valve throttling is required.

To change, 🔧 ◀ ▶ 🔧. The slider control will indicate the position the actuator will move to when the HART low signal is applied.

5/5   Upper Range

Range 0% to 100% open positions.

Used to set the position the actuator will move to when the High analogue signal is applied for HART control. Normally this will be set at Open Limit position (100%), unless positioning is required over a reduced portion of full valve travel, for example, to increase positioning resolution for a butterfly valve where positioning is required from Closed Limit position to 60% open position.

To change, 🔧 ◀ ▶ 🔧. The slider control will indicate the position the actuator will move to when the HART high signal is applied.

```
         Remote Control
    Analogue
    Pakscan
    Profibus
    HART
    Modbus
    Device Net
    Foundation Fieldbus
    Extra I/O
         ▲▼  ↵
```

```
            Modbus
    Address         247
         Termination
    ☐ On        ☒ Off
          Baud Rate
    9600                ▼
        Parity / Stop
    None / 1 Stop       ▼
    Second Address   247
           Control
    CH1 Ctrl Ch2 Ctrl   ▼
         ▲▼  ↵      1/6
```

**The Modbus Control option settings page is shown above
with its default settings. Modbus is a control option and is
available in single or dual channel versions, refer to wiring
diagram.**

Depending on the Modbus control scheme, other related settings
may be required, refer also to:

Section 2.3.2-4 Positioning

Section 2.3.2-5 Auxiliary Mask

| 1/6 | Address |

The Modbus option must be allocated a unique address in the
system to which it is attached. Changes made to this parameter
will take effect immediately. The address range is 1 – 247
(default 247).

To change, 🔘 🔄 🔄 🔘. The set address will be indicated.

| 2/6 | Termination |

Modbus networks require termination resistors at each end
of the highway. The Modbus option has a passive (120 Ohm)
termination resistor (2 for dual) built in, which can be switched in
or out of the circuit.

Off (*default***)** - Termination resistor(s) switched out.

On – Termination resistor(s) switched in. In a dual channel
Modbus option, when On is selected the termination resistors
will be switched in for both channels.

**To change, 🔘 🔄 🔄 🔘. The checkbox will indicate the set
termination mode.**

| 3/6 | Baud Rate |

The Modbus option must be set to the RS485 highway
baud rate. Changes made to this parameter will take effect
immediately. The baud rates selectable using the drop down box
are 110, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400,
57600, 115200.

**To change, 🔘 🔄 🔄 🔘. The drop down list will close and
the selected baud rate will be indicated.**

| 4/6 | Parity/Stop |

Where Modbus parity bit detection is used, the module must
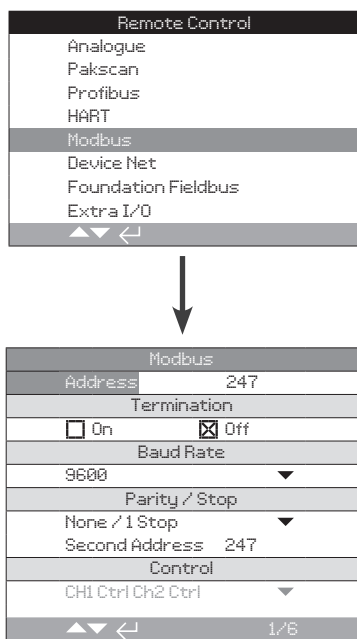be set with the same parity settings as the host. The choices of
parity are None, Even, Odd. This item also allows selection for
the number of stop bits as 1 or 2. The drop down box requires
selection of the parity and stop bits together.

**To change, 🔘 🔄 🔄 🔘. The drop down list will close and
the selected parity and stop bit will be indicated.**

| 5/6 | Second Address |

Used for dual Modbus option (redundant) only. Refer to the
wiring diagram.

A dual Modbus card has 2 channels available for connection to
separate or the same highway(s). The second channel address
is set up with this setting. It may be identical or different to the
first channel depending on the requirement of the system.

**To change, 🔘 🔄 🔄 🔘. The set second address will be
indicated.**

| 6/6 | Control |

Configure the Modbus channels for control, monitoring or off.

Ch1 Ctrl Ch2 Ctrl – Channel 1 and Channel 2 are controlling
the actuator.

Ch1 Ctrl Ch2 On – Channel 1 is controlling the actuator and
Channel 2 is monitoring only.

Ch2 Ctrl Ch1 On – Channel 2 is controlling the actuator and
Channel 1 is monitoring only.

Ch1 On – Channel 1 is controlling the actuator and Channel 2
is off.

Ch2 On – Channel 2 is controlling the actuator and Channel 1
is off.

⚙
Settings

```
         Remote Control
     Analogue
     Pakscan
     Profibus
     HART
     Modbus
     Device Net
     Foundation Fieldbus
     Extra I/O
     ▲▼ ↵
```

↓

```
          Device Net
          Baud Rate
     125                    ▼
     MAC              0



     ▲▼ ↵              1/2
```
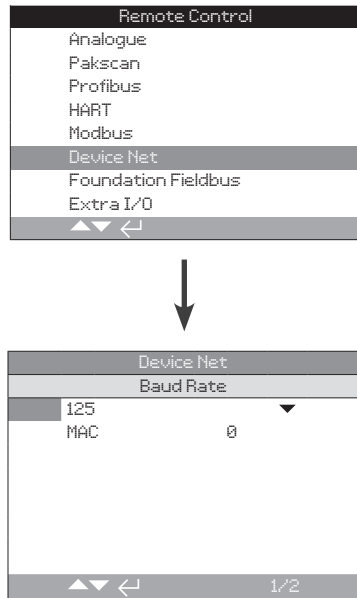
The Device Net settings screen is shown above. Device Net is a control and feedback option, refer to the wiring diagram.

1/2	Baud Rate

Configure the Device Net communication baud rate to 125, 250 or 500. This setting must match the connected network speed.

To change, 🔘 🔼 🔽 🔘. The drop down list will close and indicate the set baud rate.

2/2	MAC (Address)

Configure the actuator MAC for communication on the network. The MAC setting can be 0 – 63 and must be a unique address for the connected network.

To change, 🔘 🔼 🔽 🔘. The set MAC address will be shown.

Settings

```
      Remote Control
   Analogue
   Pakscan
   Profibus
   HART
   Modbus
   Device Net
   Foundation Fieldbus
   Extra I/O
   ▲▼ ↵
```

```
        Extra I/O
   Disabledt Remotes    ▼
           D17
   Disabledction        ▼
   ☒ N/OContact ☐ N/C
           D18
   Disabledction        ▼
   ☒ N/OContact ☐ N/C
   ▲▼ ↵           1/9
```

The DIO adds additional digital inputs and outputs to the actuator.

Fast Remotes

Fast remotes are for modulating applications (24 VDC signals only):

Disabled

Enabled

Functions

Below is a list of functions available for each I/O:

Disabled

Remote Open

Remote Closed

Remote Maintain

Remote ESD

Open Interlock

Close Interlock

Net Disable

Partial Stroke

HandAuto

VelanReset

ConditionalOpen

ConditionalClose

Contacts

These are the default positions for the contacts which the user can set:

N/O – Normally Open Contact

N/C – Normally Closed Contact

```
┌─────────────────────────────┐
│          Settings           │
│  Limits                     │
│  Indication                 │
│  Control                    │
│  ESD                        │
│  Security                   │
│  Defaults                   │
│  Power Save                 │
│  ▲▼ ↵                       │
└─────────────────────────────┘
            │
            ▼
┌─────────────────────────────┐
│          Control            │
│  Local                      │
│  Remote                     │
│  Interrupter Timer          │
│                             │
│  ▲▼ ↵                       │
└─────────────────────────────┘
            │
            ▼
┌─────────────────────────────┐
│      Interrupter Timer      │
│           Start             │
│  ☒ Open        ☐ Close      │
│          Closing            │
│  [====]30%                  │
│          Opening            │
│  [=====]70%                 │
│  On Time (s)        2       │
│  Off Time (s)       2       │
│        Stage2 Closing       │
│  [   ]0%                     │
│        Stage2 Opening       │
│  [   ]0%                     │
│  S2 On Time (s)     0       │
│  S2 Off Time (s)    0       │
│  Effct. Speed%      0       │
│  ▲▼ ↵           1/10        │
└─────────────────────────────┘
```

The Interrupter Timer is an optional extra. When enabled, it will be included in the control menu.

To enable the Interrupter Timer contact Rotork.

Introduction

The Interrupter Timer 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. It may be overridden during an ESD operation, refer to Section 2.4.

The IQ is a single speed machine so to increase the valve operating time, the timer stops and starts the actuator automatically – timed operation. The timer can be set to operate over all, or a portion of the closing and/or opening strokes and across two stages for increased control.

1/10   Start

Timed operation start position. Applies to Stage 1 and Stage 2 timers.

Close (*Default*) – Timed operation to and from the Closed Limit. The Interrupter Timer will start timed operation, in the close direction, at the position set for Closing (2/10, 6/10). It will stop timed operation, in the open direction, at the position set for Opening (3/10, 7/10).

Open – Timed operation to and from the Open Limit. The Interrupter Timer will start timed operation, in the open direction, at the position set for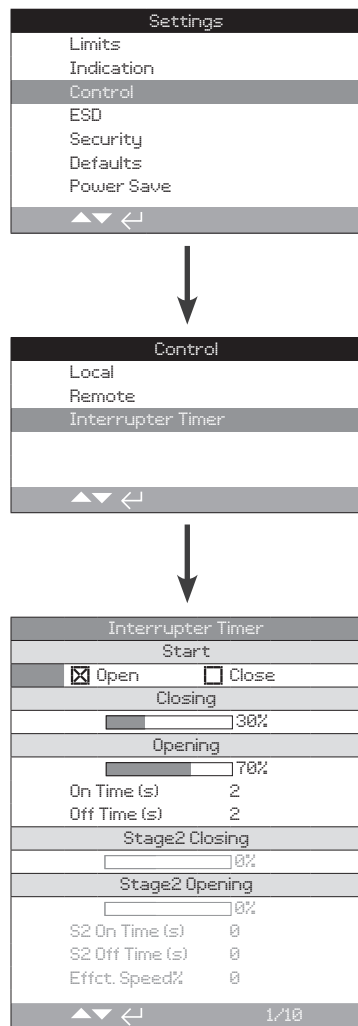 Opening (3/10, 7/10). It will stop timed operation, in the close direction, at the position set for Closing (2/10, 6/10).

To change, 🔒 ◔ ◑ 🔒. The checkbox will indicate the selected Interrupter Timer start limit.

PLEASE NOTE the shaded area of the slider control for Closing and Opening will be the timed section. If timed operation is no longer required, Closing (2/10, 6/10) and Opening (3/10, 7/10) positions should both be set to 0% or 100% depending on the Start (1/10) setting value.

2/10   Closing

The position where the Interrupter Timer will start/stop Stage 1 timed operation in the close direction. If timed operation is not required in the close direction (actuator runs at normal speed), set to 0% (1/10 = Close) or 100% (1/10 = Open).

To change, 🔒 ◔ ◑ 🔒. The slider will indicate the configured start/stop position.

3/10   Opening

The position where the Interrupter Timer will start/stop Stage 1 timed operation in the open direction. If timed operation is not required in the open direction (actuator runs at normal speed), set to 0% (1/10 = Close) or 100% (1/10 = Open).

To change, 🔒 ◔ ◑ 🔒. The slider will indicate the configured start/stop position.

4/10   On Time (s)

Set the actuator run time during Stage 1 timed operation. Stage 1 timed operation is active in the closing direction from 2/10 to 6/10 and in the opening direction from 3/10 to 7/10. Range 2 to 100 seconds.

To change, 🔒 ◔ ◑ 🔒. The set On time will be indicated.

5/10	**Off Time (s)**

Set the actuator pause time during Stage 1 timed operation. Stage 1 timed operation is active in the closing direction from 2/10 to 6/10 and in the opening direction from 3/10 to 7/10. Range 2 to 3,600 seconds.

To change, 🔒 🔾 🔾 🔒. The set Off time will be indicated.

⚠ **WARNING: To minimise actuator wear, it is advisable to limit the number of start/stops set with the Interrupter Timer function. Using longer durations for On and Off times can achieve the specified valve operating time while reducing the number of starts required to achieve it.**

6/10	**Stage2 Closing**

The position where the Interrupter Timer will start/stop Stage 2 timed operation in the close direction. If Stage 2 timed operation is not required in the close direction (actuator runs at Stage 1 speed), set to 0% (1/10 = Close) or 100% (1/10 = Open).

To change, 🔒 🔾 🔾 🔒. The slider will indicate the configured start/stop position.

7/10	**Stage2 Opening**

The position where the Interrupter Timer will start/stop Stage 2 timed operation in the open direction. If Stage 2 timed operation is not required in the open direction (actuator runs at Stage 1 speed), set to 0% (1/10 = Close) or 100% (1/10 = Open).

To change, 🔒 🔾 🔾 🔒. The slider will indicate the configured start/stop position.

8/10	**S2 On Time (s)**

Set the actuator run time during Stage 2 timed operation. Stage 2 timed operation is active in the closing direction from 6/10 to 1/10 limit position and in the opening direction from 7/10 to 1/10 limit position.

To change, 🔒 🔾 🔾 🔒. The S2 On time will be indicated.

9/10	**S2 Off Time (s)**

Set the actuator pause time during Stage 2 timed operation. Stage 2 timed operation is active in the closing direction from 6/10 to 1/10 limit position and in the opening direction from 7/10 to 1/10 limit position.

To change, 🔒 🔾 🔾 🔒. The S2 Off time will be indicated.

⚠ **WARNING: To minimise actuator wear, it is advisable to limit the number of start/stops set with the Interrupter Timer function. Using longer durations for On and Off times can achieve the specified valve operating time while reducing the number of starts required to achieve it.**

10/10	**Effective speed**

Non-editable. Automatically indicates the effective speed of the actuator over the timed portion(s) for the set on and off times.
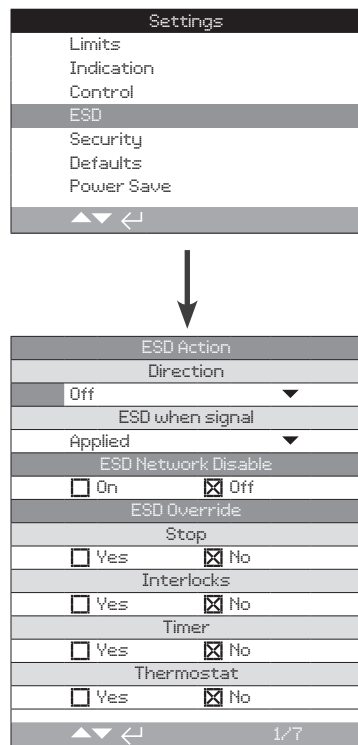
Example: To prevent hydraulic shock, the valve must be closed at a moderate speed from 50% open to 25% open, then a slower speed from 25% open to the Closed Limit. Timed operation is not required at all when opening, the actuator will run at normal speed for the complete opening valve stroke.

Correct settings are as follows:

1/10 Start = Close

Stage 1	Stage 2
2/10 Closing = 50%	6/10 Closing = 25%
3/10 Opening = 0%	7/10 Opening = 0%
4/10 On Time = 5 seconds	8/10 On Time = 2 seconds
5/10 Off Time = 5 seconds	9/10 Off Time = 8 seconds

Stage 1 operation has an effective speed of 50%.
Stage 2 operation has an effective speed of 20%.
Overall effective speed of the timed portions is 35%.

```
┌─────────────────────────────────┐
│           Settings              │
│  Limits                         │
│  Indication                     │
│  Control                        │
│  ESD                            │
│  Security                       │
│  Defaults                       │
│  Power Save                     │
│  ▲▼ ↵                          │
└─────────────────────────────────┘
              │
              ▼
┌─────────────────────────────────┐
│           ESD Action            │
│           Direction             │
│  Off                        ▼   │
│         ESD when signal         │
│  Applied                    ▼   │
│       ESD Network Disable       │
│  ☐ On          ☒ Off           │
│          ESD Override           │
│             Stop                │
│  ☐ Yes         ☒ No            │
│           Interlocks            │
│  ☐ Yes         ☒ No            │
│             Timer               │
│  ☐ Yes         ☒ No            │
│           Thermostat            │
│  ☐ Yes         ☒ No            │
│  ▲▼ ↵                   1/7    │
└─────────────────────────────────┘
```

Emergency Shut Down (ESD) is a standard feature.

Refer to the actuator wiring diagram.

Control under an ESD control signal has higher priority than local or remote open/closed signals. For ESD, the control signal must be maintained for the duration of the ESD action required.

ESD control will operate under both the Local and Remote control selection. ESD can also be set to operate an actuator selected to Local Stop, refer to ESD Override - 4/7.

ESD Action

1/7	Direction

Close – Under ESD control the actuator will close. It will not respond to local or remote open or closed signals.

Stayput (*default*) – Under ESD control the actuator will Stop if running or Stayput in its current position. It will not respond to local or remote open or closed signals.

Open – Under ESD control the actuator will open. It will not respond to local or remote open or closed signals.

Off – ESD input is disabled. ESD is not available.

To change, 🔄 🔄 🔄 🔄. The drop down list will close and the selected ESD action will be indicated.

2/7	ESD when signal

Applied (*default*) – ESD will be active when the control signal is applied to the ESD input – Normally Open (N/O) contact making.

Removed – ESD will be active when the signal is removed from the ESD input - Normally Closed (N/C) contact breaking.

Note: If the analogue option and a Network option are fitted and hardwired ESD control is required, ensure the ESD when signal set matches that set for Auxiliary Contact 4. Refer to Section 2.3.2-5.

ESD Network Disable

3/7	Net Disable

When a Network option is fitted, refer to Section 2.3.2, the ESD input can be set to disable Network control. The Network option fitted will report status only.

Off (*default*) – The ESD input is set for ESD control.

On – The ESD input is set for Network disable.

To change, 🔄 🔄 🔄 🔄. The checkbox will indicate ESD/ Network Disable status.

ESD Override

ESD can be set to override Local Stop selection, Active Interlocks, Interrupter Timer and Motor Thermostats.

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.

⚠️ **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.**

To change, 🔄 🔄 🔄 🔄. The checkbox will indicate ESD override Local Stop status.

5/7	Interlocks

External interlocks can be used to prevent operation of the actuator until a certain process condition is met. Refer to Section 2.3.2-1. 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.**

To change, 🔄 ⭕ ⭕ 🔄. The checkbox will indicate ESD override interlock status.

6/7	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, refer to Section 2.3.3.

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.

⚠ **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.**

To change, 🔄 ⭕ ⭕ 🔄. The checkbox will indicate ESD override Interrupter Timer status.

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.

⚠ **WARNING: Actuators certified for use in Hazardous 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.
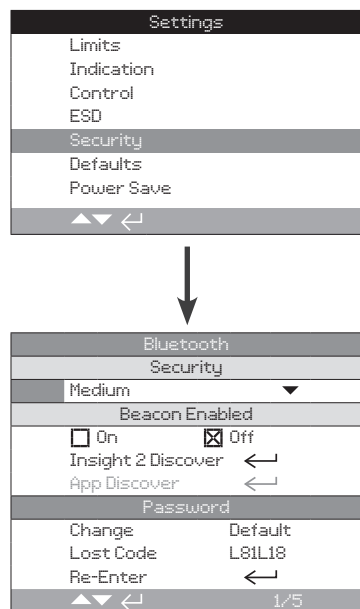
To change, 🔄 ⭕ ⭕ 🔄. The checkbox will indicate ESD override thermostats status.

In order to maintain the security of the actuator and any connected systems, it is recommended that operators / end users take appropriate measures to prevent access by unauthorised persons. This may include both measures to control or restrict physical access to the actuator, the selection of an appropriate security level within the actuator's settings and adopting a suitable actuator password prior to it being put into service.

```
Settings
Limits
Indication
Control
ESD
Security
Defaults
Power Save
▲▼ ↵
```

```
Bluetooth
Security
Medium                    ▼
Beacon Enabled
☐ On          ☒ Off
Insight 2 Discover    ↵
App Discover          ↵
Password
Change        Default
Lost Code     L81L18
Re-Enter              ↵
▲▼ ↵              1/5
```

Sets Bluetooth communication and Password security levels. The default settings are shown above.

| 1/5 | Security |

Medium: Discover in Local and Stop – The actuator is available for Bluetooth communication using a PC running Insight 2 or the BTST when it is selected to Local or Stop using the red control knob. Connection is unavailable in Remote.

High: Infrared Initiation only (*default*) – The actuator is not available for Bluetooth communication using a PC running Insight 2. Communication with the Bluetooth® Setting Tool *Pro* can be initiated using infra-red connection. Refer to Section 1.1.

For Medium and High, Bluetooth communication may be initiated and remains discoverable for a two minute period. If no connection is made within this period, it is no longer discoverable. If a connection is made, it is maintained until specifically disconnected or the device moves out of communication range. Bluetooth connection with the setting tool is terminated if no commands are issued within a 5 minute period.

Very High: Disabled. Infrared only – Communication is by infrared commands from a Rotork setting tool only. Refer to Section 1.1. Bluetooth connection to Insight 2 is available by specific command. This is maintained until specifically disconnected or the device moves out of communication range.

If requested, the user-required Bluetooth security level can be set and made non-editable by Rotork prior to delivery or by Rotork Site Services if this is required post-delivery. Contact Rotork.

To change, 🔘 🔘 🔘 🔘. The drop down list will close and indicate the set Bluetooth security level.

| 2/5 | Insight 2 Discover |

This enables Bluetooth connection to Insight 2 when Bluetooth connection is enabled. This times out after two minutes of inactivity. This is not available when the Bluetooth Security Level is High.

| 3/5 | Change |

The default password is **ROTORK** (User). Change (3/5) will indicate: Default.

This can be changed to a new password selected by the user.

To set a user selected Password press 🔘. The Change password display will be shown:
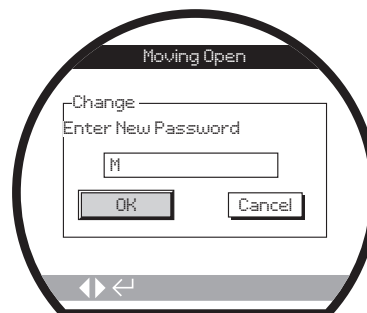
```
Moving Open
┌Change──────────────
Enter New Password
┌──────────────────┐
│ M                │
└──────────────────┘
┌────────┐   ┌────────┐
│   OK   │   │ Cancel │
└────────┘   └────────┘
◀▶ ↵
```

Enter user selected Password:

Use 🔘 to highlight new password entry box and press 🔘.

Use 🔘 🔘 to scroll through alphanumerical values to display the required character.

Use 🔘 to move to next character.

Use 🔘 to delete the previous character.

Use 🔘 when selected password is complete.

Navigate to the OK button using 🔘. Press 🔘.

The user selected password is now active. Refer to Section 1.4.

Change (3/5) will indicate User Defined.

The lost code (4/5) characters will change to reflect the new password.

2.5   Settings – Security *continued*

4/5	Lost Code

Non editable. Lost Code is used if a user password has been set and then lost or forgotten.

Contact Rotork quoting the code as read from the display. After caller verification, Rotork can then provide the user-set password.

5/5	Re-Enter

The Re-Enter password setting allows an operator to change permission level during the same communication session (such as entering a high level password).

Enter the different password, refer to Section 1.4.

Once correctly entered, access to high level settings as indicated in this manual will be made available.

Some settings are only available using a high level password. Contact Rotork for the user high level password.

2.6   Settings – Enabling Manual Setup

⚠ **NOTE: Manual setup is disabled by default. To enable this feature, follow the instructions below.**

Place the LOCAL/STOP/REMOTE control knob into STOP position before proceeding.

Step 1 – Activation

Using the BTST, navigate to **Settings > Indication > Local Display**
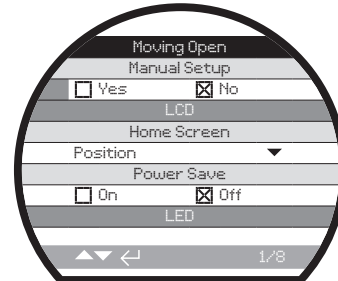
Select **Manual Setup** and press the 🔘 key.
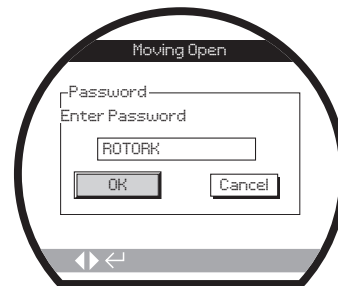
Enter the actuator password and select **OK**.
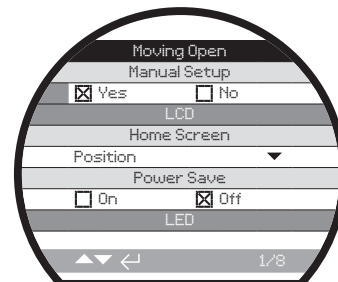
Press the ◐ or ◑ key on the setting tool and select **Yes**. Press 🔘 to confirm.

Once you have enabled the manual setup, initiation of app connection is no longer available through the method in Section 1.2. Please refer to Section 1.3 for other methods available for connection.

The Rotork app and manual setup can also be enabled/disabled separately.

Step 2 – Initiation

To initiate manual setup turn the OPEN/CLOSE control knob, as described in Section 1.2.1, in the following sequence:

clockwise > anti-clockwise > clockwise > anti-clockwise

Step 3 – Exit Settings Menu

To exit the Settings menu:

1. Repeatedly turn control knob **anti-clockwise**, until the Home Screen is reached.

2. Set the LOCAL/REMOTE/STOP control knob to LOCAL.

Alternatively, the system automatically exits from manual setup if no commands are issued for 5 minutes

```
            Settings
    Limits
    Indication
    Control
    ESD
    Security
    Defaults
    Power Save
    ▲▼ ↵
```

⬇

```
            Settings
    Restore        Default Setting
    Copy           Current to Def
            Limits
    Restore        Factory Limits



    ▲▼ ↵              1/3
```
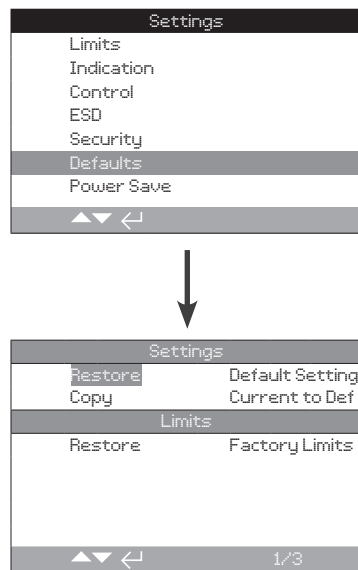
Allows default settings and factory set limits to be restored.

Settings

1/3	Restore

All IQ functions are configured to Rotork default settings before despatch. If requested at time of order, alternative user-specified settings will be set.

When valve maker and site commissioning takes place, any settings entered will overwrite the factory default settings and will be the current settings used in operation along with the remaining unadjusted defaults.

Should difficulty be encountered during commissioning the default settings can be restored, returning the actuator configuration to its default settings.

Standard default settings are indicated in this manual.

To restore the default settings, press ⊜.
A warning will appear, press ⊜ to continue.

⚠ **All settings must then be checked/set as required for valve operation and process control/indication.**

2/3	Copy

High level access only. Refer to Section 2.5 Security.

Once satisfactorily commissioned and tested, the current settings can be saved as the new defaults.

If Rotork commissions the actuator, on completion and agreement, current settings will be saved as defaults.

After entering the high level password, press ⊜.
A warning will appear, press ⊜ to continue.

All current settings will be saved as the default settings.

Limits

3/3	Restore

This setting will restore the factory set limit positions and position the actuator at 50% open. Factory limits: 25 output turns (or quarter-turn for IQT) between Closed and Open Limit positions.

To restore the default limits, press ⊜.
A warning will appear, press ⊜ to continue.

⚠ **Closed and Open Limits must be reset to the valve. Refer to Section 2.1.**

```
          Settings
    Limits
    Indication
    Control
    ESD
    Security
    Defaults
    Power Save
    ▲▼ ↵
```

```
       Power Save Menu
      Backlight Timeout
    1 min                  ▼
       LED Luminosity
    Medium                 ▼
         LED Duty
    4s On / 20s Off        ▼
    ▲▼ ↵              1/3
```
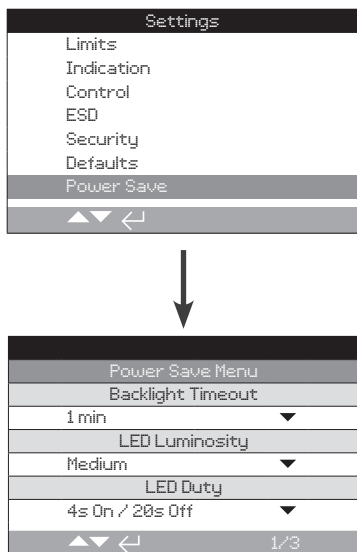
Power Save Mode

The IQ3 Perform implements a Power Save mode by default –
allowing the user to benefit from energy saving immediately.

There are three configurable parameters:

| 1/3 | Backlight Timeout |

The LCD backlight aids visibility of the LCD screen in very low
and extreme (direct) light conditions. Since the LCD screen is
intended for use during user interaction, the backlight is turned
off when idle. Any local user interaction will turn the backlight
on. A configurable timer will then turn the backlight off:

- Off – the backlight will turn off immediately after user
  interaction

- **1 minute** – the backlight will turn off 1 minute after user
  interaction

- On – the backlight will remain on with mains power

**Note that an active Bluetooth connection or navigation of
the local display is regarded as user interaction.**

Option in bold represents factory setting.

| 2/3 | LED Luminosity |

This setting allows the user to alter the brightness of LEDs.
The selectable options are:

- Low

- **Medium**

- High (maximum brightness)

Option in bold represents factory setting.

| 3/3 | LED Duty |

The function of the dual position LEDs is unchanged.
They are however cycled ON/OFF at a configured ratio.

- 1s ON / 20s OFF

- **4s ON / 20s OFF**

- 10s ON / 20s OFF

Option in bold represents factory setting.

Alternatively, the mode can be disabled through the same menu.

Benefits

The power savings through these modes have been calculated
as a measure against the power required for an actuator's full
stroke. The table below summarises this:

Size (IQT)	Power saving represented as the number of quarter-turn strokes
125	2216
250	1134
500	567
1000	271
2000	122
3000	203

Data based on:
Power savings over a period of 1 year
Actuator powered constantly
Factory power-saving settings
100 VAC to 270 VAC actuator supply
Max time for quarter turn
Actuator delivering 100% rated torque
(See PUB002-212 for electrical data)

Status screens on the IQ range display are provided to assist diagnostics. The displayed information is live data taken from the main data log processor and can be used to view control signals, alarms, movement and internal diagnostic data.

Refer to Section 1.1 for connecting to the actuator. Once connected, navigate to the main icon menu and select the Status Icon:
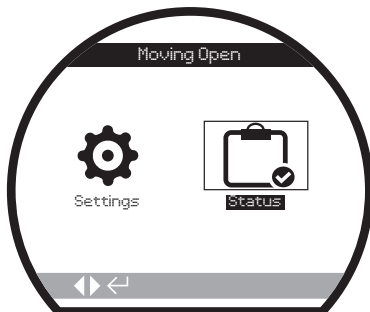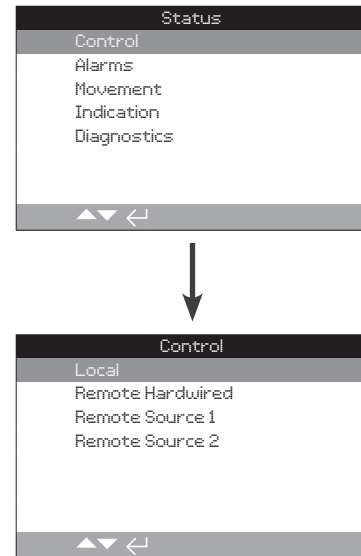
```
        Control
Local
  Remote Hardwired
  Remote Source 1
  Remote Source 2


  ▲▼  ↵
```

```
         Local
Open                    ☐
  Close                 ☐
  Mid Open              ☒
  Mid Close             ☒
  Stop                  ☐
  Local                 ☐
  Remote                ☐
  Field Sense           ☐
  ▲▼              1/8
```
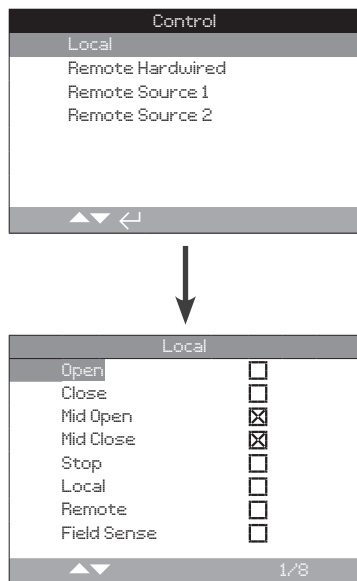
Local Control Status

View the signal status for each of the local control knob inputs. As the local controls are operated, the corresponding checkbox will show an active signal. Confirming healthy local control knob operation is useful when diagnosing fault conditions.

Movement may occur during testing of the local control knobs. To prevent movement, set the operating mode to STOP.

1/8	Open

Displays the current Local Open signal status. A check indicates the local Open/Close control knob is in the Open position and the command is recognised.

2/8	Close

Displays the current Local Close signal status. A check indicates the local Open/Close control knob is in the Close position and the command is recognised.

3/8	Mid Open

Displays the current local Mid Open signal status. A check indicates that a signal is applied to the Mid Open hardwired input and the command is recognised.

4/8	Mid Close

Displays the current local Mid Close signal status. A check indicates that a signal is applied to the Mid Close hardwired input and the command is recognised.

5/8	Stop

Displays the current Local Stop signal status. A check indicates the Local/Stop/Remote mode control knob is in the Stop position and the command is recognised.

In Stop mode, the actuator will not move. All local and remote control signals will be ignored except for ESD if configured to override Stop, refer to Section 2.4.

6/8	Local

Displays the current Local signal status. A check indicates the Local/Stop/Remote mode control knob is in the Local position and the command is recognised.

In Local mode, the Open/Close control knob will operate the actuator in the selected direction. Remote control signals will be ignored except for ESD.

ESD will still operate the actuator in Local mode.

7/8	Remote

Displays the current Remote signal status. A check indicates the Local/Stop/Remote mode control knob is in the Remote position and the command is recognised.

In Remote mode, the actuator will respond to signals from the hardwired inputs, Control Source 1 or Control Source 2. Local control signals will be ignored.

8/8	Field Sense

Field Sense is activated whenever an excessive magnetic field is detected in addition to the control knob magnets. This could indicate a high magnetic field in the near vicinity, which may affect local control operation.
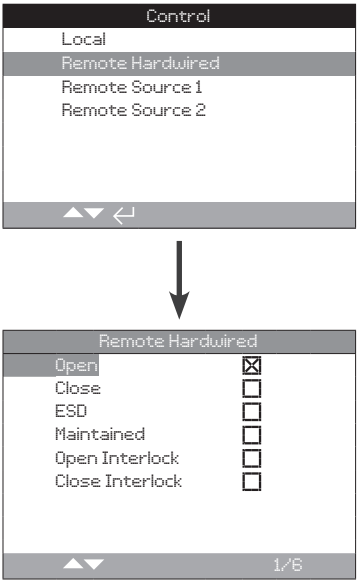
Remote Hardwired Status

View the signal status for each of the remote hardwired inputs. As remote signals are applied, the corresponding checkbox will show an active signal.

Movement may occur during testing of the remote hardwired inputs. To prevent movement, set the operating mode to STOP.

1/6	Open

Displays the current remote hardwired Open signal status.
A check indicates a signal is applied to the Open hardwired input and the command is recognised.

2/6	Close

Displays the current remote hardwired Close signal status.
A check indicates a signal is applied to the Close hardwired input and the command is recognised.

3/6	ESD

Displays the current remote hardwired ESD signal status. A check indicates a signal is applied to the ESD hardwired input and the command is recognised.

4/6	Maintained

Displays the current remote hardwired Maintained signal status. A check indicates a signal is applied to the Maintain hardwired input and the command is recognised.

When a Maintain signal is present, the actuator will self-maintain a fleeting Open or Close control signal. Operation will continue until the Maintain signal is removed, a limit position is reached or a command is issued to reverse direction.

75/6	Open Interlock

Displays the current remote hardwired Open Interlock signal status. A check indicates a signal is applied to the Open Interlock hardwired input and the command is recognised.

When Interlocks are enabled, the actuator will prevent operation in the Open direction unless there is a signal applied to the Open Interlock hardwired input. Refer to Section 2.3.2-1.

6/6	Close Interlock

Displays the current Remote Hardwired Close Interlock signal status. A check indicates a signal is applied to the Close Interlock hardwired input and the command is recognised.

When Interlocks are enabled, the actuator will prevent operation in the Close direction unless there is a signal applied to the Close Interlock hardwired input. Refer to Section 2.3.2-1.

3.1.3 Control – Remote Source 1

```
         Control
   Local
   Remote Hardwired
   Remote Source 1
   Remote Source 2


   ▲▼ ↵
```

↓

```
       Remote Source 1
   Open              ☒
   Close             ☐
   Stopped           ☐
   ESD               ☐


   ▲▼
```

Remote Source 1 Status

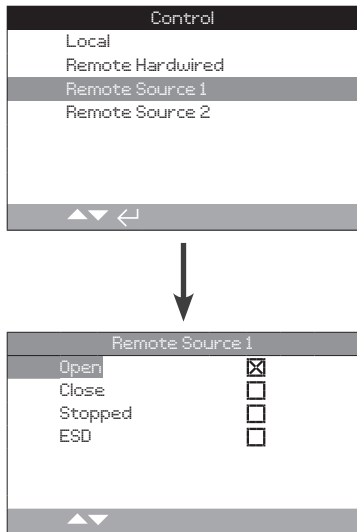View the signal status for Remote Source 1 inputs, refer to Section 2.3.2-2. As remote signals are applied, the corresponding checkbox will show an active signal.

Only digital remote control options will report a control status. Analogue control must be checked using the Positioner home screen, refer to Section 2.2.2.

Movement may occur during testing of the remote hardwired inputs. To prevent movement, set the operating mode to STOP.

1/4	Open

Displays the Remote Source 1 Open signal status. A check indicates an Open Source 1 signal is present and the command is recognised.

2/4	Close

Displays the Remote Source 1 Close signal status. A check indicates a Close Source 1 signal is present and the command is recognised.

3/4	Stopped

Displays the Remote Source 1 Stopped signal status. A check indicates a Stop Source 1 signal is present and the command is recognised.

4/4	ESD

Displays the Remote Source 1 ESD signal status. A check indicates an ESD Source 1 signal is present and the command is recognised.

3.1.4 Control – Remote Source 2

```
         Control
   Local
   Remote Hardwired
   Remote Source 1
   Remote Source 2


   ▲▼ ↵
```

↓

```
       Remote Source 2
   Open              ☒
   Close             ☐
   Stopped           ☐
   ESD               ☐


   ▲▼
```

Remote Source 2 Status

View the signal status for Remote Source 2 inputs, refer to Section 2.3.2-2. As remote signals are applied, the corresponding checkbox will show an active signal.

Only digital remote control options will report a control status. Analogue control must be checked using the Positioner home screen, refer to Section 2.2.2.

Movement may occur during testing of the remote hardwired inputs. To prevent movement, set the operating mode to STOP.

1/4	Open

Displays the Remote Source 2 Open signal status. A check indicates an Open Source 2 signal is present and the command is recognised.

2/4	Close

Displays the Remote Source 2 Close signal status. A check indicates a Close Source 2 signal is present and the command is recognised.
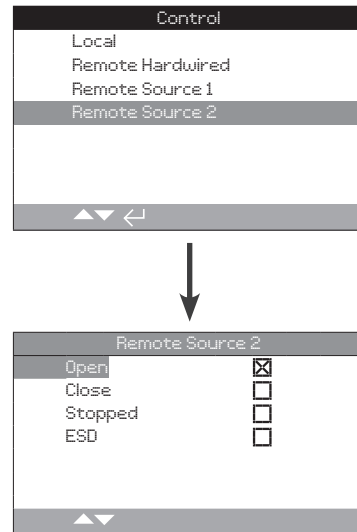
3/4	Stopped

Displays the Remote Source 2 Stopped signal status. A check indicates a Stop Source 2 signal is present and the command is recognised.

4/4	ESD

Displays the Remote Source 2 ESD signal status. A check indicates an ESD Source 2 signal is present and the command is recognised.

Actuator Alarms
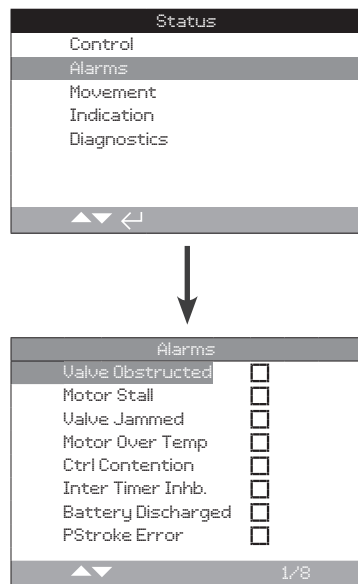
This screen displays the current status of the actuator alarms; the checkbox indicates that the alarm is currently active.

To scroll through this information use 🔼🔽 .

1/8	Valve Obstructed

Displays the Valve Obstructed alarm status. When active, this alarm indicates that the valve is obstructed or has reached the torque limit set. Check that the valve is free of any obstruction and is operating correctly.

2/8	Motor Stall

Displays the Motor Stall alarm status. When active, this alarm indicates that the actuator has received a valid command, but has not detected any movement within 5 seconds.

3/8	Valve Jammed

Displays the Valve Jammed alarm status. When active, this alarm indicates that the valve has jammed in either the open or closed position. Check valve operation by hand.

4/8	Motor Over Temp.

Displays the Motor Over Temperature alarm status. When active, this alarm indicates that the motor is over temperature and the thermostat has tripped. Check that operating conditions are within specification.

5/8	Control Contention

Displays the Control Contention alarm status. When active, this alarm indicates that more than one control signal is being received. In this event the actuator will remain in position or stop if already travelling.

6/8	Inter Timer Inhb.

Displays the Interrupter Timer Inhibit alarm status. When active, this alarm indicates that the Interrupter Timer is actively inhibiting actuator movement.

The Interrupter Timer is used to increase the valve operating time, the timer stops and starts the actuator automatically. The timer can be set to operate over all, or a portion of the closing and/or opening strokes.

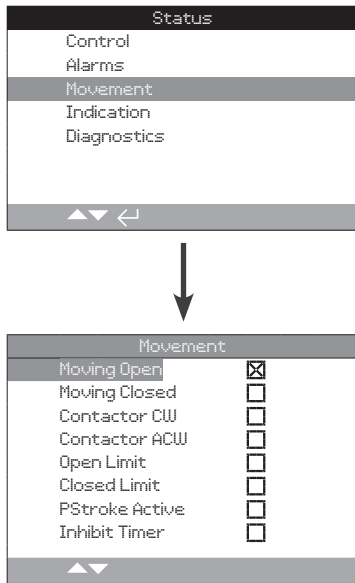| 7/8	Battery Discharged

Displays the Battery Discharged alarm status. When active, this alarm indicates that the battery is fully discharged and needs to be replaced.

8/8	PStroke Error

Displays the Partial Stroke Error alarm status. When active, this alarm indicates that the partial stroke was unable to be completed in the specified time.

```
            Status
  Control
  Alarms
  Movement
  Indication
  Diagnostics


  ▲▼ ↵
```

↓

```
          Movement
  Moving Open        ☒
  Moving Closed      ☐
  Contactor CW       ☐
  Contactor ACW      ☐
  Open Limit         ☐
  Closed Limit       ☐
  PStroke Active     ☐
  Inhibit Timer      ☐

  ▲▼
```

Movement Status

This screen displays the current movement status of the actuator. The checkbox indicates that the status is active.

To scroll through this information use ⬤ ⬤ .

1/8	Moving Open

Displays the actuator Moving Open status. When active, this status indicates that the actuator is moving open.

2/8	Moving Closed

Displays the actuator Moving Closed status. When active, this status indicates that the actuator is moving closed.

3/8	Contactor CW

Displays the Clockwise Contactor energised status. When active, this status indicates that the clockwise contactor is energised.

4/8	Contactor ACW

Displays the Anticlockwise Contactor energised status. When active, this status indicates that the anticlockwise contactor is energised.

5/8	Open Limit

Displays the Open Limit status. When active, this status indicates that the actuator is at the open limit.

6/8	Closed Limit

Displays the Closed Limit status. When active, this status indicates that the actuator is at the closed limit.

7/8	PStroke Active

Displays the Partial Stroke status. When active, this status indicates that the actuator is carrying out partial stroke movements.

Partial Stroking is used to demonstrate the operational integrity of the valve and actuator by moving over a set portion of valve stroke. In addition, partial stroking may be used to exercise infrequently operated valves to help keep them mechanically free.

8/8	Inhibit Timer

Displays the Inhibit Timer status. When active, this status indicates that the inhibit timer is counting to the set time. Range 0-255 seconds, default 5 seconds.

The Inhibit Timer sets a delay after the actuator stops as a result of reaching a position consistent with a new desired value position. For the period set, the actuator will not respond to a change in the desired value. The inhibit timer is used to prevent unwanted operation as a result of rapidly oscillating or fluctuating desired position signal, or to slow actuator response in order to protect the mechanical valve from excessive wear and/or maintain the actuator within its electrical rating. Refer to Section 2.3.2-4.

```
        Status
Control
Alarms
Movement
Indication
Diagnostics

▲▼ ↵
```

```
       Indication
Monitor Relay      ☒
  S1               ☐
  S2               ☐
  S3               ☐
  S4               ☐
  S5               ☐
  S6               ☐
▲▼              1/13
```
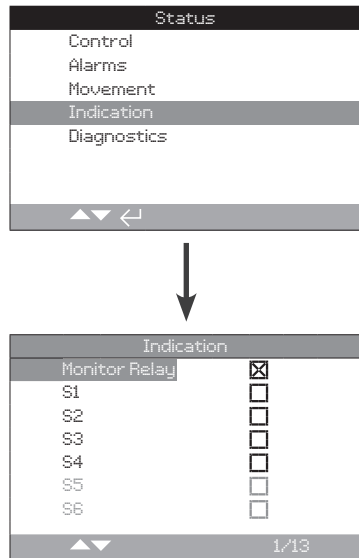
Indication Status

This screen displays the indication relays statuses. The checkbox indicates that the relay is energised.

The Monitor Relay and Relays S1-S4 are provided as standard, Relays S5-S8 and Relays S9-S12 are available options that are greyed out if the options are not present.

To scroll through this information use ⬤ ⬤ .

1/13	Monitor Relay

Displays the Monitor Relay status. A checked checkbox shows the relay is active, whilst an unchecked checkbox represents inactive.

When the monitor relay is used in availability mode; an inactive relay status indicates that the actuator is set to remote control, there are no detected internal failures and the actuator is powered. An active relay status indicates the actuator is not available for remote control.

When the monitor relay is used in fault mode; an inactive relay status indicates that there are no detected internal failures and the actuator is powered. An active relay status indicates the actuator has a fault present and the actuator is not available for remote control.

For each relay function, please refer to Section 2.2.1.

2/13	S1

Displays the S1 relay status. When active, this indicates that Relay S1 is energised.

3/13	S2

Displays the S2 relay status. When active, this indicates that Relay S2 is energised.

4/13	S3

Displays the S3 relay status. When active, this indicates that Relay S3 is energised.

5/13	S4

Displays the S4 relay status. When active, this indicates that Relay S4 is energised.

6/13	S5

Displays the S5 relay status. When active, this indicates that Relay S5 is energised.

7/13	S6

Displays the S6 relay status. When active, this indicates that Relay S6 is energised.

8/13	S7

Displays the S7 relay status. When active, this indicates that Relay S7 is energised.

9/13	S8

Displays the S8 relay status. When active, this indicates that Relay S8 is energised.

10/13	S9

Displays the S9 relay status. When active, this indicates that Relay S9 is energised.

11/13	S10

Displays the S10 relay status. When active, this indicates that Relay S10 is energised.
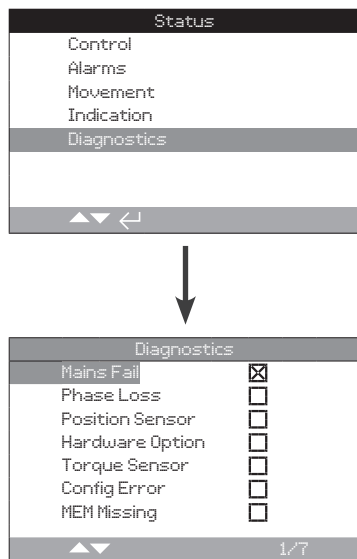
12/13	S11

Displays the S11 relay status. When active, this indicates that Relay S11 is energised.

13/13	S12

Displays the S12 relay status. When active, this indicates that Relay S12 is energised.

```
          Status
  Control
  Alarms
  Movement
  Indication
  Diagnostics


  ▲▼  ↵
```

```
        Diagnostics
  Mains Fail         ☒
  Phase Loss         ☐
  Position Sensor    ☐
  Hardware Option    ☐
  Torque Sensor      ☐
  Config Error       ☐
  MEM Missing        ☐
  ▲▼              1/7
```

Diagnostics Status

This screen displays the actuator's diagnostics status. The checkbox indicates that the fault is present.

To scroll through this information use ⬤ ⬤.

1/7	Mains Fail

Displays the power supply failure status. When active, this status indicates a power supply failure has occurred. If the backlight is still present it is likely that the third phase has been lost. Check all incoming phases.

2/7	Phase Loss

Displays the Phase Loss status. When active, this status indicates that one or more phases have been lost. Only the third phase is monitored so if the backlight is present then check the third phase is present. If the backlight is not present, check all phases.

3/7	Position Sensor

Displays the absolute encoder fault status. When active, this status indicates that a fault with the absolute encoder has occurred. Check the encoder operation and loom.

4/7	Hardware Option

Displays the communication fault status between the main control board and the option board. When active, this status indicates that a communication error has occurred. Check all connections between the option PCB and the main controller PCB.

5/7	Torque Sensor

Displays the fault status of the Torque Sensor. When active, this status indicates that a fault has occurred with the torque sensor. Check the torque sensor and loom.

6/7	Config Error

Displays the EEPROM fault status. When active, this status indicates that a fault with the EEPROM has occurred. Check all configuration settings.

7/7	MEM Missing

Displays the EEPROM missing status. When active, this status indicates that the EEPROM is missing. The EEEPROM stores all the actuator's settings and calibration. If the EEEPROM is physically missing, please contact Rotork for further advice.

rotork®

Contact us now

mail@rotork.com
www.rotork.com