Please ensure that this publication is thoroughly read and understood

Publication number E770E
Date of issue 01/06
The Rotork Setting Tool allows actuator control, indication and protection functions to be configured to suit site requirements.

It is essential that all the actuator settings are checked for compatibility with the process and control system requirements before the actuator is put into service. Please read this publication before proceeding.

When Rotork Skilmatic personnel or nominated agents are contracted to carry out site commissioning and/or acceptance, documentation of commissioned actuator configuration can be made available for customer records.
This manual provides instruction on:

* Electrical (local and remote) and optional manual operation.

* Preparation and installation of the actuator onto the valve.

* Subsequent commissioning and adjustment of the Primary Settings for correct valve operation.

* Commissioning and adjustment of the Secondary Settings to suit site-specific control and indication requirements.

* Maintenance – Troubleshooting.

* Sales and Service.

THE ROTORK SKILMATIC SI RANGE – A RELIABLE SOLUTION FOR ELECTRIC FAILSAFE AND MODULATING VALVE CONTROL THAT YOU CAN COMMISSION AND INTERROGATE WITHOUT REMOVING ELECTRICAL COVERS.

Using the supplied infra-red Setting Tool to access the actuator set-up procedures, “point and shoot” setting of position limits, and all other control and indication functions can be made safely, quickly and conveniently, even in hazardous locations.

Standard diagnostics information about the control system, valve and actuator status in the form of display icons and help screens.

Instantaneous internal hydraulic pressure and valve position are displayed on the integral indication display.

The actuator containing the Setting Tool will be identified with a yellow label on the terminal cover.

Visit our web site at www.rotork.com for more information on the Rotork Skilmatic SI and other Rotork actuator ranges.
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health and Safety</td>
<td>2</td>
</tr>
<tr>
<td>Storage</td>
<td>3</td>
</tr>
<tr>
<td>Operating your Skilmatic SI Actuator</td>
<td>4</td>
</tr>
<tr>
<td>3.1 Electrical Operation</td>
<td>4</td>
</tr>
<tr>
<td>3.2 Display – Local Indication</td>
<td>4</td>
</tr>
<tr>
<td>3.3 Display – Alarm Indication</td>
<td>5</td>
</tr>
<tr>
<td>Optional Manual Operation</td>
<td>6</td>
</tr>
<tr>
<td>Mounting the Actuator</td>
<td>7</td>
</tr>
<tr>
<td>5.1 Lifting</td>
<td>7</td>
</tr>
<tr>
<td>5.2 Mounting Orientation – SI-L Actuators</td>
<td>8</td>
</tr>
<tr>
<td>5.3 Fitting SI-L Actuator to Valve</td>
<td>8</td>
</tr>
<tr>
<td>5.4 Mounting Orientation – SI-Q Actuators</td>
<td>9</td>
</tr>
<tr>
<td>5.5 Fitting SI-Q Actuator to Valve</td>
<td>9</td>
</tr>
<tr>
<td>Cable Connections</td>
<td>10</td>
</tr>
<tr>
<td>6.1 Earth/Ground Connections</td>
<td>10</td>
</tr>
<tr>
<td>6.2 Removing Terminal Cover</td>
<td>10</td>
</tr>
<tr>
<td>6.3 Cable Entry</td>
<td>10</td>
</tr>
<tr>
<td>6.4 Connecting to Terminals</td>
<td>11</td>
</tr>
<tr>
<td>6.5 Replacing Terminal Cover</td>
<td>11</td>
</tr>
<tr>
<td>Commissioning</td>
<td>12</td>
</tr>
<tr>
<td>7.1 The Setting Procedure</td>
<td>12</td>
</tr>
<tr>
<td>7.2 The Rotork Setting Tool</td>
<td>13</td>
</tr>
<tr>
<td>The Rotork Setting Tool Pro</td>
<td>14</td>
</tr>
<tr>
<td>7.3 Entering the Actuator Setting Procedure</td>
<td>15</td>
</tr>
<tr>
<td>7.4 Setting Mode – Password</td>
<td>15</td>
</tr>
<tr>
<td>7.5 Password Edit</td>
<td>15</td>
</tr>
<tr>
<td>7.6 Checking Mode</td>
<td>15</td>
</tr>
<tr>
<td>7.7 Procedure Branch – Crossroad</td>
<td>16</td>
</tr>
<tr>
<td>7.8 The Actuator Display – Setting/Checking Mode</td>
<td>16</td>
</tr>
<tr>
<td>7.9 Returning to Valve Position Display</td>
<td>16</td>
</tr>
<tr>
<td>Commissioning – Primary Functions</td>
<td>17</td>
</tr>
<tr>
<td>Primary Functions Contents</td>
<td>18</td>
</tr>
<tr>
<td>Commissioning – Secondary Functions</td>
<td>26</td>
</tr>
<tr>
<td>Secondary Functions Contents</td>
<td>28</td>
</tr>
<tr>
<td>9.1 Accessing Secondary Functions</td>
<td>28</td>
</tr>
<tr>
<td>9.2 Settings Menu</td>
<td>29</td>
</tr>
<tr>
<td>9.3 Controller Set-up Menu</td>
<td>32</td>
</tr>
<tr>
<td>9.4 Interrupter Timer</td>
<td>44</td>
</tr>
<tr>
<td>9.5 Help Screens</td>
<td>47</td>
</tr>
<tr>
<td>Maintenance, Monitoring and Troubleshooting</td>
<td>53</td>
</tr>
<tr>
<td>Environmental</td>
<td>54</td>
</tr>
<tr>
<td>Weights and Measures</td>
<td>55</td>
</tr>
<tr>
<td>Actuator Nameplate</td>
<td>56</td>
</tr>
<tr>
<td>Rotork Skilmatic SI Approvals</td>
<td>57</td>
</tr>
</tbody>
</table>
This manual is produced to enable a competent user to install, operate, adjust and inspect Rotork Skilmatic SI range of actuators.

The electrical installation, maintenance and use of these actuators should be carried out in accordance with the National Legislation and Statutory Provisions relating to the safe use of this equipment, applicable to the site of installation.

For the UK: Electricity at Work Regulations 1989 and the guidance given in the applicable edition of the “IEE Wiring Regulations” should be applied. Also the user should be fully aware of his duties under the Health and Safety Act 1974.

For the USA: NFPA70, National Electrical Code ® is applicable.

The mechanical installation should be carried out as outlined in the manual and also in accordance with relevant standards such as British Standard Codes of Practice. If the actuator has nameplates indicating that it is suitable for installation in Hazardous Gas Areas then the actuator is suitable for use in Zone 1 and Zone 2 explosive atmospheres only. It should not be installed in atmospheres where gases are present with an ignition temperature less than 135°C (T4), unless suitability for lower ignition temperatures has been indicated on the actuator nameplate.

Any test instruments applied to the actuator should be of equivalent certification. The electrical installation, maintenance and the use of the actuator should be carried out in accordance with the code of practice relevant for that particular Hazardous Gas Area certification.

No inspection or repair should be undertaken unless it conforms to the specific Hazardous Gas Area certification requirements. Under no circumstances should any modification or alteration be carried out on the actuator as this could invalidate the conditions under which its certification was granted.

Access to live electrical conductors is forbidden in the hazardous area unless this is done under a special permit to work, otherwise all power should be isolated and the actuator moved to a non-hazardous area for repair or attention.

Only persons competent by virtue of their training or experience should be allowed to install, maintain and repair Rotork Skilmatic actuators. Work undertaken must be carried out in accordance with instructions in the manual. The user and those persons working on this equipment should be familiar with their responsibilities under any statutory provisions relating to the Health and Safety of their workplace.

WARNING: Compressed Springs

All springs within the SI range of actuators are pre-compressed. Springs must not be removed from the actuator.

Any service or maintenance must only be undertaken by a approved Rotork Skilmatic technician.

WARNING: Hydraulic Fluid

The SI range of actuators are filled with hydraulic fluid. See actuator data label for type of oil supplied.

Should there be a requirement to change the fluid, then the appropriate protective clothing including gloves and safety glasses must be worn. Used hydraulic fluid must be disposed of safely (see environmental section).
Enclosure Materials

SI-1-Q31 to SI-1-Q80
Power unit: Aluminium
Actuator body: Aluminium
Drive shaft: Plated steel
Switchbox: Aluminium
Piping: Stainless steel (hard piped)
External fasteners: Stainless steel
Paint finish: Standard 2 pack epoxy silver grey (150microns thick)

SI-2-Q100 to SI-2-Q130
Power unit: Aluminium
Actuator body: Carbon steel
Drive shaft: Carbon steel
Switchbox: Aluminium
Piping: Stainless steel (hard piped)
External fasteners: Stainless steel
Paint finish: Standard 2 pack epoxy silver grey (150microns thick)

SI-1-L and SI-2-L All sizes
Power unit: Aluminium
Actuator body: Steel
Drive shaft: Plated steel
Switchbox: Aluminium
Piping: Stainless steel (hard piped)
External fasteners: Stainless steel
Paint finish: Standard 2 pack epoxy silver grey (150microns thick)

The user must ensure that the operating environment and any materials surrounding the actuator cannot lead to a reduction in the safe use of, or the protection afforded by, the actuator. Where appropriate the user must ensure the actuator is suitably protected against it’s operating environment.

Should further information and guidance relating to the safe use of the Rotork Skilmatic SI range of actuators be required, it will be provided on request.

Products manufactured by Rotork Skilmatic do not present a hazard to health under normal conditions of storage, distribution and use, provided that good industrial and hygiene procedures are followed.

Note the PRODUCT SAFETY DATA SHEETS covering the type of hydraulic oil supplied by Rotork Skilmatic for use within the supplied power units are available on request.

WARNING: Operating by Hand
With respect to optional handwheel operation of Rotork Skilmatic actuators, see warning on page 6.

If your actuator cannot be installed immediately then store it in a dry place until you are ready to connect incoming cables.

If the actuator has to be installed but cannot be cabled it is recommended that any plastic transit cable entry plugs are replaced with a suitable metal plug.

The Rotork Skilmatic double-sealed construction will preserve internal electrical components perfectly if left undisturbed.

It is not necessary to remove the electrical compartment covers in order to commission the SI actuator.

Rotork Skilmatic cannot accept responsibility for deterioration caused on site once the covers are removed.

Every Rotork Skilmatic actuator has been fully tested before leaving the factory to give years of trouble free operation, providing it is correctly commissioned, installed and sealed.

Do not store in temperatures outside of the normal operating temperatures. As stated on data label.
3.1 Electrical Operation
Check that power supply voltage agrees with that stamped on the actuator nameplate. Switch on power supply. It is not necessary to check phase rotation (on 3-phase units).

Selecting Local/Stop/Remote Operation
The red selector enables either Local or Remote control, lockable in each position using a padlock with a 6.5mm hasp.
When the selector is locked in the Local or Remote positions the Stop facility is still available. The selector can also be locked in the Stop position to prevent electrical operation by Local or Remote control.

Local Control
With the red selector positioned at Local (anti-clockwise) the adjacent black knob can be turned to select Open or Close. For Stop, turn red knob clockwise.

Remote Control
Rotate the red selector to the Remote position (clockwise), this gives Remote control only for Open and Close but local Stop can still be used by turning the red knob anti-clockwise.

3.2 Display–Local Indication

As standard, red lamp signifies valve open, yellow intermediate, and green lamp signifies valve closed. Open and closed colour functions can be reversed.

Closed
Green indicator, internal hydraulic pressure and valve closed symbol displayed.

Fig. 3.1

Fig. 3.2 The Actuator Display

The display consists of:
1. Red – position indication lamp
2. Yellow – position indication lamp
3. Green – position indication lamp
4. Liquid crystal display screen (LCD)
5. Infra-red sensors

On power up the actuator’s liquid crystal display screen is back-lit with a “soft amber” light and one of the indicator lamps will be on, dependent on position. The display screen will show internal hydraulic pressure and percentage open or an end of travel symbol. (See Figs 3.3, 3.4 and 3.5)
3 Operating your Skilmatic SI Actuator continued

Mid Travel
Yellow indicator, internal hydraulic pressure and percentage valve open value displayed.

Open
Red indicator, internal hydraulic pressure and valve open symbol displayed.

3.3 Display–Alarm Indication
The SI display incorporates an actuator alarm indication in the form of a display icon located in the top portion of the actuator display.

- When an active actuator alarm is present the alarm icon will be displayed and at the same time the display will cycle between Pressure/Valve Position indication and an indication of the fault type. For example fig 3.6 indicates Fault – Over pressure in mid travel, valve 30% open. The various fault displays are shown on page 37.

Standard Help Screens are also available to assist in determining the actuator operational and alarm status. (refer to Help Screens page 47)
Optional manual operation may have been specified for your SI actuator.

For all SI-1-L and SI-2-L actuators, optional manual operation is provided by an hydraulic hand pump.

For all SI-1-Q actuators and SI-2-Q70 & Q80 actuators, optional manual operation is provided with either a handwheel operated gearbox or a hydraulic hand pump.

For SI-2-Q100 to Q130 actuators, optional manual operation is provided using a hydraulic hand pump.

See specific manual override sheet, as supplied with actuator, for manual override procedure.

For units fitted with an external solenoid valve, an extra isolating valve is fitted inline with the valve, this must be isolated to operate the manual override. An isolation valve is also fitted for fail in position units.

**WARNING**

With respect to optional handwheel operation of SI actuators, under no circumstances should any additional lever device such as a wheel key or wrench be applied to the handwheel in order to develop additional force when operating the valve as this may cause damage to the valve and/or actuator or may cause the valve to become stuck in the end of travel position or against an obstruction.

A manual override operation should only be carried out when there is no power supplied to the actuator.
5 Mounting the Actuator

5.1 Lifting
(Refer to Weights and Measures page 55 for actuator weight.)

Ensure the valve is secure before fitting the actuator as the combination may be top heavy and therefore unstable.

SI-L actuators should be lifted using the base plate beneath the cylinder and the power unit.

SI-1-Q31 to SI-2-Q80 quarter turn actuators should be lifted between the power unit and the box section mounting bracket (see fig 5.1).

SI-2-Q100 to SI-2-Q130 actuators should be lifted using the two lifting eyes, located on the spring can and cylinder end flange.

In no circumstances should hydraulic piping or electrical cabling be used for lifting purposes.

If it is necessary to lift the actuator using mechanical lifting equipment certified slings should be attached as indicated in Fig 5.1 for SI-Q actuators and Fig 5.2 for SI-L actuators.

At all times trained and experienced personnel should ensure safe lifting, particularly when mounting actuators.

WARNING:
The actuator should be fully supported until full valve shaft engagement is achieved and the actuator is secured to the valve flange.

Actuator to valve fixing must conform to Material Specification ISO Class 8.8, yield strength 628 N/sq mm.

WARNING:
Do not lift the actuator and valve combination via the actuator. Always lift the valve/actuator assembly via the valve.

Each assembly must be assessed on an individual basis for safe lifting.

See SI-L and SI-Q data sheets for actuator base and mounting dimensions.

Fig. 5.1
Fig. 5.2
5 Mounting the Actuator continued

5.2 Mounting Orientation
SI-1-L Actuators

SI-1-L actuators can be mounted in the positions shown below:

RECOMMENDED - The actuator can be mounted and serviced in this position.

PERMITTED - The actuator can be mounted in these orientations. The unit will have to be removed for servicing.

PERMITTED - Consult Rotork Skilmatic. Modifications need to be made if mounting in this orientation.

NOT PERMITTED - The actuator must NOT be mounted in these orientations.

SI-2-L Mounting Orientation

The SI-2-L actuators must always be mounted in the vertical position as shown. Please note the mounting bracket can be altered for different mounting orientations.

5.3 Fitting SI-L Actuator to Valve

The standard actuator is supplied with the cylinder mounted on a base plate that is machined to accept four pillars concentric with the output shaft. In order to fit the actuator to the valve four pillars and a valve mounting plate should be provided together with a split coupling adaptor to fit the end of the piston rod to the valve spindle. Details of the actuator base and output shaft dimensions can be found in the appropriate actuator data sheet.

Spring to extend actuator piston rod (Valve stem down to close – Fail Closed)
- Ensure that the valve is fully closed.
- Remove the lock nuts or clamp from the valve bonnet and stem.
- Lower the actuator on to the valve.
- Replace the lock nuts or clamp on to the valve bonnet and tighten to the manufacturers recommended torque.
- Retract the actuator piston rod by 3 to 5mm so that the actuator preloads the valve seat. This can be accomplished by applying a temporary power supply to the actuator.
- Ensuring that the valve is still fully closed, fit the split coupling to clamp the actuator piston rod to the valve stem.

Spring to retract actuator piston rod (Valve stem down to close – Fail Open)
- Ensure that the valve is fully open.
- Remove the lock nuts or clamp from the valve bonnet and stem.
- With the actuator output shaft fully retracted, lower the actuator on to the valve.
- Make sure that the actuator piston rod is clear of the valve stem.
5 Mounting the Actuator continued

- Replace the lock nuts or clamp on to the valve bonnet and tighten to the manufacturers recommended torque.
- Ensure that the valve is still in the fully open position and fit the split coupling to clamp the actuator piston rod to the valve stem.

5.4 Mounting Orientation

SI-1-Q Actuators

SI-1-Q actuators can be mounted in the positions shown below:

RECOMMENDED - The actuator can be mounted and serviced in this position.

PERMITTED - The actuator can only be mounted in these orientations. The unit will have to be removed for servicing.

NOT PERMITTED - The actuator must NOT be mounted in these orientations.

PERMITTED - Consult Rotork Skilmatic. It may be possible to mount the actuator in this position but it may need to be removed for servicing.

SI-2-Q Mounting Orientation

The SI-2-Q actuators must always be mounted in the vertical position as shown. Please note the mounting bracket can be altered for different mounting orientations.

5.5 Fitting SI-Q Actuator to Valve

The standard SI-1-Q31 to SI-2-Q80 actuator is supplied machined to suit a close coupled ISO 5211 mounting having a square female drive and a selection of two mounting PCD’s as in the appropriate actuator data sheet.

The SI-2-Q100 to SI-2-Q130 actuator is supplied with 8 mounting holes and a bore & key drive. See SI-2-Q data sheet for more information.

If the actuator cannot be mounted directly on to the valve, a separate box bracket and coupling will be required for mounting the actuator.

Before fitting the actuator, ensure that the valve is in the Fail or Start position and fit the coupling on the valve, ensuring that the drive is in the correct orientation.

Lower the actuator on to the valve, making sure that the drive is properly located.

Fit securing bolts, but before tightening ensure that the actuator and valve are properly aligned.
6 Cable Connections

WARNING:
Ensure all power supplies are isolated before removing actuator covers.

Check that the supply voltage agrees with that stamped on actuator nameplate.

A switch or circuit breaker must be included in the wiring installation of the actuator. The switch or circuit breaker shall be mounted as close to the actuator as possible and shall be marked to indicate that it is the disconnecting device for that particular actuator. The actuator must be protected with a suitably rated overcurrent protection device as defined on the relative wiring diagram.

6.1 Earth/Ground Connections
An M6 earth stud is located adjacent to the conduit entries for attachment of an external protective earthing strap. An internal earth terminal is also provided on the terminal bung, however it must not be used alone as the protective Earth Connection.

6.2 Removing Terminal Cover
Using a 6mm Allen key loosen the four captive screws evenly. Do not attempt to lever off the cover with a screwdriver as this will damage the “O” ring seal and may damage the flamepath on a certified unit.

Actuators containing a Setting Tool fitted to the inside of the terminal compartment cover are identified with a self-adhesive yellow label on the outside of the terminal compartment cover.

A plastic bag in the terminal compartment contains:
- Terminal screws and washers.
- Spare cover “O” ring seal.
- Wiring diagram.
- Instruction book.

6.3 Cable Entry
Only appropriate certified Explosion-Proof entry reducers, glands or conduit may be used in hazardous locations.

Remove any red plastic transit plugs. Make cable entries appropriate to the cable type and size. Ensure that threaded adaptors, cable glands or conduit are tight and fully waterproof. Seal unused cable entries with a steel or brass threaded plug. In hazardous areas an appropriately certified threaded blanking plug must be used.
6 Cable Connections continued

6.4 Connecting to Terminals
Refer to the wiring diagram inside the terminal cover to identify functions of terminals. Check that supply voltage is the same as that marked on the actuator nameplate.

Remove red terminal cover.

Begin by connecting these cables and replace red terminal cover.

When all connections are made ensure wiring diagram is replaced in the terminal compartment.

6.5 Replacing Terminal Cover
Ensure cover “O” ring seal and spigot joint are in good condition and lightly greased before re-fitting cover.
7 Commissioning

7.1 The Setting Procedure
The Rotork Skilmatic SI-L and SI-Q ranges of actuators are designed so that commissioning may be carried out without removing any electrical covers.

Setting limits of travel and other functions are achieved by using the Infra-Red Setting Tool. The Setting Tool is certified Intrinsically Safe to allow commissioning in hazardous areas.

All the commissioning functions are stored in non-volatile memory in the actuator. The Setting Tool enables the user to view all the functions in turn via the actuator display window. As each function is viewed its setting can be checked and, if required, changed within the bounds of that function.

The power supply must be connected and energised for commissioning purposes.

The setting procedure is divided into two stages:

1. Primary Functions
   Setting the end of travel limit positions and remote control functions.

2. Secondary Functions
   Settings covering the control, indication and optional equipment functions.

All SI actuator functions are configured before despatch to Rotork Skilmatic standard default settings unless alternatives have been specified with the order. Should difficulty be encountered during commissioning the default settings can be reinstated, returning the actuator configuration to its original manufactured state. Site commissioning can then begin again (refer to Section 9.3 page 35).

The default function should be used with caution as settings selected after manufacture may be essential for the safe operation of the valve and/or plant. Throughout the text in this manual the top line of the actuator display will be represented in curved brackets "( )" and the bottom line of the actuator display will be represented in square brackets "[ ]".

Note: The Primary Functions must be commissioned first.
7.2 The Setting Tool (old version)

**Specification**

- **Enclosure**: IP67
- **Certification**: EEx ia IIC T4 (intrinsically safe)
  - FM, INT SAFE, Class I & II Div 1 Groups A B C D E F G, T4A
  - CSA, Exia, Class I, II Div 1 Groups A B C D
- **Power supply**: 9V Battery (supplied and fitted)
- **Operating range**: 0.75m (from actuator display window)

**Name**

1. ↓ Key* Display next function down
2. ➩ Key* Display next function across
3. ← Key Decrease/change displayed function's value or option setting
4. + Key Increase/change displayed function's value or option setting
5. ← Key Enter displayed value or option setting
6. Infra-red Transmitter Window

* Pressing the two arrow keys together returns the actuator display to the position indication mode

---

**Setting Tool Battery Replacement**

Battery status can be checked by looking at the Infra-red transmitter window while depressing any Setting Tool button. A flashing red indicator should be seen.

Battery replacement must be carried out in a safe area. To replace the battery remove the six caphead screws in the back of the Setting Tool. Remove the back cover to expose the battery.

In order to maintain hazardous area certification fit only Duracell MN1604 or Rayovac Alkaline Maximum NoAL-9V battery types. Refit cover ensuring red indicator LED faces the transmitter window in the back cover.

When a button is depressed the Setting Tool transmits the relevant instruction to the actuator by infra-red pulses and must therefore be directly in front of the actuator indicator window and at a distance no greater than 0.75m.
7 Commissioning continued

7.2 The Setting Tool Pro (new version)

Specification

Enclosure  IP54

This Setting Tool Pro has been built in accordance with the following standards:

- USA - Hazardous Area.
- Factory Mutual - Explosion Proof to NEC Article 500.
- Intrinsically Safe, Class 1, Div 1, Groups A, B, C & D, T4.
- Canada - Hazardous Area.
- CSA - Exia Intrinsically Safe, Class 1, Div 1, Groups A, B, C & D, T4.

Temperature  $\text{Tamb} = -30^\circ\text{C to } 50^\circ\text{C}$

Power supply  2x 1.5V Batteries (supplied and fitted)

Operating range  0.75m (from actuator display window)

Name  Instruction

1. $\downarrow$ Key*  Display next function down
2. $\uparrow$ Key  Display previous function up
3. $\rightarrow$ Key*  Display next function across
4. $\leftarrow$ Key  Display previous function across
5. $-$ Key  Decrease/change displayed function’s value or option setting
6. $+$ Key  Increase/change displayed function’s value or option setting
7. $\downarrow$ Key  Initiate download/upload mode
8. $\text{Infra-red Transmitter Window}$
9. $\text{Infra-red Transmitter Window}$

* Pressing these two arrow keys together returns the actuator display to the position indication mode
7 Commissioning continued

7.3 Entering the Actuator Setting Procedure
With the actuator securely mounted on the valve, the main power supply on and Local control or Stop selected.

PRESS THE ↓ KEY.
The actuator display will change and the password protection display will be seen.

7.4 Setting Mode – Password
To enable setting and adjustment of the actuator functions the correct password must be entered. The factory set (default) password is [ID]. If the actuator has previously been set with a site password this must be displayed.

Use the + or – keys to scroll through the available passwords [00]–[FF] (hexadecimal). With the correct password displayed.

PRESS THE ← KEY.
Two “setting” bars will appear and will remain visible on every function display screen.

7.5 Password Edit (PE)
To change to a new password refer to section 9.3, page 34.

7.6 Checking Mode
The actuator function settings can be checked without entering the correct password. The settings can only be viewed and not altered. The setting bars will not be seen.

Password display, checking mode
Once the password has been entered in the required mode

PRESS THE ↓ KEY.
The procedure branch (Cr) (crossroad) display can now be seen (refer to Section 7.7 page 16).
7 Commissioning continued

7.7 Crossroads [Cr]

This branch provides access to all configuration menus. All crossroad menus display (Cr) at the top of the screen.

The first menus [Cn] and [Re] give access to Limit of Travel and Remote Control settings and as such are the Primary setting menus which must be set before further configuration. Refer to section 8 Commissioning Primary Functions page 16.

Operation of the ➪ key gives access to the Secondary setting menus such as Settings, [Fn]. Refer to section 9 Commissioning Secondary Functions page 26.

7.8 The Actuator Display – Setting/Checking Mode

Actuator functions as laid out in the Primary and Secondary commissioning stages, can be individually displayed by using the Setting Tool arrow keys.

The ➪ arrow key will always display the heading on the next menu across.

The ➩ arrow key will always display the NEXT function on the SAME menu.

The actuator display indicator lamps will continue to indicate valve position.

Actuator functions are displayed in code form in the top portion of the liquid crystal display screen.

The setting for the displayed function is shown in the lower portion of the screen. Depending on the actuator function displayed, its setting may be an option or a value. In setting mode the Setting Tool + or – keys will cause the setting to be changed. In checking mode the settings cannot be altered. Options can be viewed but not reset.

In setting mode, once displayed, a new setting can be entered into the actuator memory by pressing the ➩ key. The setting will flash off and back on, confirming its selection.

In checking mode, press the ➩ key to return to password screen.

7.9 Returning to Valve Position Display

There are four ways of returning to valve position display:

1. Approximately 5 minutes after the last Setting Tool operation the display will automatically return to position display.

2. Press the ➩ and ➪ arrow keys together.

3. Press the ➩ arrow key until the display returns to position.

The actuator’s Primary Function settings affect the correct operation of the valve by the actuator. If the actuator has been supplied with the valve, the valve maker or supplier may have already made these settings.

This instruction assumes Setting Mode has been entered (refer to section 7.4 page 15).

Viewing the Primary Function Settings
With the actuator mounted on the valve, the power supply on and Local or Stop control selected, point the Setting Tool at the actuator indicator window from a distance of no more than 0.75m. By pressing the down key and, when appropriate, the right key, it is possible to move through the procedure, displaying the various functions and their settings as shown in Fig. 8.1 (refer to page 18).

Settings and operation must be verified by electric operation of the actuator to ensure correct operation.
8 Commissioning – Primary Functions continued

Viewing the Primary Function Settings

Crossroads (Cr)

<table>
<thead>
<tr>
<th>Configuration</th>
<th>rE</th>
<th>Remote Control</th>
<th>secondary settings</th>
<th>see p25</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC</td>
<td>LO</td>
<td>LC</td>
<td>rS</td>
<td>LO</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Closed Limit</td>
<td>LO</td>
<td>Open Limit</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>cL</td>
<td>Configure Local</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>rP</td>
<td>Remote Priority</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>EA</td>
<td>ESD Action</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>EO</td>
<td>ESD Local Stop Override</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ec</td>
<td>ESD Type</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>AA</td>
<td>Analogue Signal Failure Action</td>
</tr>
</tbody>
</table>

The actuator can be factory set to be clockwise or anti-clockwise to close.

Fig. 8.2 Primary Setting Function Displays

Primary Functions Contents

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC</td>
<td>Closed Limit</td>
<td>19</td>
</tr>
<tr>
<td>LO</td>
<td>Open Limit</td>
<td>20</td>
</tr>
<tr>
<td>rE</td>
<td>Remote Control Menu</td>
<td>21</td>
</tr>
<tr>
<td>rS</td>
<td>Remote Select</td>
<td>22</td>
</tr>
<tr>
<td>cL</td>
<td>Configure Local</td>
<td>23</td>
</tr>
<tr>
<td>rP</td>
<td>Remote Priority</td>
<td>23</td>
</tr>
<tr>
<td>EA</td>
<td>ESD Action</td>
<td>24</td>
</tr>
<tr>
<td>EO</td>
<td>ESD Local Stop Override</td>
<td>24</td>
</tr>
<tr>
<td>Ec</td>
<td>ESD Type</td>
<td>25</td>
</tr>
<tr>
<td>AA</td>
<td>Analogue Signal Failure Action</td>
<td>25</td>
</tr>
</tbody>
</table>

The actuator can be factory set to be clockwise or anti-clockwise to close.
From the normal position display, using the setting tool, press the \texttt{m} key. The display will change to:

Assuming that the default password [Id] is still in use press the \texttt{<} key to enter the default password. The display will change to:

indicating that the setting mode is available.

If the actuator has been configured with a new password previously it will be necessary to use the + or – keys to change the password within the range [00]-[FF] prior to pressing the \texttt{<} key.

Press the \texttt{\downarrow} key. The display will change to:

If the Open and Close limits have been set previously the \texttt{\rightarrow} key can be pressed now to reach the final Primary Settings and the Secondary Settings menus.

Assuming that the limits of travel have not been set, move the actuator electrically, using local controls, to the valve fully closed mechanical limit and back off about 2% by running the actuator in the open direction.

In this example let us say that this position corresponds to 30% of available positional feedback span.

If the Open and Close limits have to be set press the \texttt{m} key and the display will change to:

where 30 indicates 30% of total available positional feedback span.

\textbf{PRESS THE} \texttt{<} \textbf{KEY} and the display will flash indicating that the value has been set. Green LED will illuminate.

\textbf{PRESS THE} \texttt{\downarrow} \textbf{KEY} to reach the Open Limit (LO) menu.
Move the actuator electrically using local controls to the valve fully open mechanical limit which in this example can be 72% and back off about 2% by running the actuator in the close direction about 2% so that the display shows the Open limit position as 70% for example.

**Note.** If required it is possible to set the Open Limit before setting the Close Limit.

**PRESS THE ← KEY** and the display will flash indicating that the value has been set. Red LED will illuminate.

**PRESS THE ↓ KEY** to return to Positional Display.
From the Positional Display press the key to display the password entry screen. If necessary, enter the password and press the key. The display will flash and the horizontal setting bars will appear.

Press the key to arrive at the Crossroads (Cr).

Press the key to move to the Remote Control menu.

This menu deals with various remote control options and should be completed before proceeding to the Secondary menu settings.
From the Remote Control (rE) menu, press the \( \downarrow \) key and the display will change to one of the following Remote Select (rS) configuration options.

The default setting for Remote Select is [rE]. Hard wired remote control.

Use the + or – keys to move to the next or previous option.

[OE] Option Control with hardwired ESD override. Select this option for use with one of the above serial control options when a hardwired ESD override facility is also required.

[AI] Analogue Control. The actuator is remotely controlled by an external analogue signal in the range 0 to 20mA or 0 to 10 Volts with or without offset zero. See page 32 for signal/actuator calibration instructions.

Continue pressing the + or – key until the correct option is displayed.

After selection of the required remote control option press the \( \leftarrow \) key. The displayed value will flash indicating that it has been set.

**Press the \( \downarrow \) key** to display the next item in the Remote Controls Menu.
The default setting for Configure Local is push to run control [Pr].

If self-maintained actuator local control is required press the + or – key. The display will change to [nn].

PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.

The default setting for Remote Priority is Stayput [SP] if both Open and Close remote controls are asserted.

If Close priority is required press the + or – key until [CL] is displayed.

If Open priority is required press the + or – key until [OP] is displayed.

PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.
The default setting for ESD Action is De-energise all solenoid valves [E].

If Close action is required press the + or – key until [C] is displayed.

If Open action is required press the + or – key until [O] is displayed.

If stop in position action is required press the + or – key until [IP] is displayed.

**PRESS THE ** Е KEY.

The displayed option will flash indicating that it has been set.

**ESD Action – De-energise all solenoid valves**

**PRESS THE ** Е KEY to display the next item in the Remote Controls Menu.

The default setting for ESD Local Stop Override is [OF] no override.

If local stop override is required press the + or – key until [On] is displayed

**PRESS THE ** Е KEY.

The displayed option will flash indicating that it has been set.

**ESD Local Stop Override – Do not override**

**PRESS THE ** Е KEY to display the next item in the Remote Controls Menu.
The default setting for ESD Contact Type is [NO] normally open.

If a normally closed contact is required press the + or – key until [NC] is displayed.

Normally open [NO] - Apply signal to ESD. Normally closed [NC] - Remove signal to ESD

PRESS THE ← KEY.
The displayed option will flash indicating that it has been set.

**ESD Contact Type – Normally open**

PRESS THE ↓ KEY to display the next item in the Remote Controls Menu.

The default setting for Analogue Signal Failure Action is [OF] no alarm. This means that in the event of an analogue signal failure there will be no alarm.

If an alarm is required press the + or – key until [A] is displayed

If an alarm plus ESD is required press the + or – key until [AE] is displayed

PRESS THE ← KEY.
The displayed option will flash indicating that it has been set.

**Analogue Signal Failure Action – No alarm**

To return to valve position display, see page 16.
The Secondary Functions can be configured to suit site control and indication requirements. It is important that Primary Functions such as limit and remote control settings are configured before work commences on commissioning the Secondary Functions (refer to page 17). The layout of the Secondary Functions accessed with the Setting Tool are detailed in Fig. 9.1. To successfully commission the Secondary Functions, information about the site or process control system will be required.

The supplied actuator Wiring Diagram details control and indication devices fitted to the actuator along with terminal connection detail and standard remote control wiring systems.

Settings and operation must be verified by electric operation of the actuator to ensure correct operation.
### Crossroads

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Remote Control</th>
<th>FN Settings</th>
<th>Controller Set-up</th>
<th>Int. Timer</th>
<th>Help Screens</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC</td>
<td>rS</td>
<td>db</td>
<td>dC</td>
<td>OJ</td>
<td>H1</td>
</tr>
<tr>
<td>Closed Limit</td>
<td>Remote Select</td>
<td>Demand Band</td>
<td>Demand Low</td>
<td>I. Timer Enabled</td>
<td>Limit Flags</td>
</tr>
<tr>
<td>LO</td>
<td>rL</td>
<td>HS</td>
<td>dO</td>
<td>I. Timer Dir</td>
<td>H2</td>
</tr>
<tr>
<td>Open Limit</td>
<td>rP</td>
<td>Hysteresis</td>
<td>Demand High</td>
<td>I. Timer En</td>
<td>H3</td>
</tr>
<tr>
<td>rP</td>
<td>Remote Priority</td>
<td>HL</td>
<td>Hold Limit</td>
<td>Remote Control</td>
<td>H4</td>
</tr>
<tr>
<td>rP</td>
<td>rP</td>
<td>oP (CL)</td>
<td>Set CPT Closed</td>
<td>Digital Feed</td>
<td>H5</td>
</tr>
<tr>
<td>rP</td>
<td>rP</td>
<td>oP (OP)</td>
<td>Set CPT Open</td>
<td>Control Flags</td>
<td>H6</td>
</tr>
<tr>
<td>LS</td>
<td>rS</td>
<td>LH</td>
<td>Limit Hysteresis</td>
<td>rP</td>
<td>rP</td>
</tr>
<tr>
<td>Configure Local</td>
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<td>rP</td>
<td>Press Hysteresis</td>
<td>Low Power</td>
<td>rP</td>
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<td>LS</td>
<td>rP</td>
<td>rP</td>
<td>CPT LED Colour</td>
<td>Password Edit</td>
<td>Jn</td>
</tr>
<tr>
<td>LS</td>
<td>rP</td>
<td>rP</td>
<td>CLs LED Colour</td>
<td>Jn Timer</td>
<td>Jn</td>
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<td>Password</td>
<td>Ld</td>
<td>PE</td>
<td>Jn Off Time</td>
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<td>Password Edit</td>
<td>Jn Off Time</td>
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</tr>
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<td>P. Stroke Pos</td>
<td>Jn Off Time</td>
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<td>PS</td>
<td>Reset to Defaults</td>
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<td>Limit</td>
<td>PS</td>
<td>Confirm Faults</td>
<td>JE</td>
<td>rP</td>
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<td>Limit</td>
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<td>Limit</td>
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<td>rP</td>
<td>Limit</td>
<td>PS</td>
<td>Confirm Faults</td>
<td>JE</td>
<td>rP</td>
</tr>
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<td>rP</td>
<td>Limit</td>
<td>PS</td>
<td>Confirm Faults</td>
<td>JE</td>
<td>rP</td>
</tr>
</tbody>
</table>

### Primary Functions

- **Commissioning – Secondary Functions cont.**

**Fig. 9.2 Setting Menu Structure**

1. **Positional Display**
   - **P?**
   - Password

2. **Crossroads Configuration**
   - **Cn**
   - **rE**

3. **Remote Control**
   - **db**
   - **dC**
   - **OJ**
   - **H1**

4. **Deadband**
   - **Demand Low**
   - **I. Timer Enabled**

5. **Demand High**
   - **I. Timer Dir**

6. **Hysteresis**
   - **Set CPT Closed**
   - **Remote Control**

7. **Hold Limit**
   - **Set CPT Open**
   - **I. Timer Start**

8. **Closed Limit**
   - **Open Limit**
   - **Local Control**

9. **Remote Priority**
   - **I. Timer Stop**
   - **Remote Signals**

10. **Configure Local**
    - **Digital Feedback**

11. **Remote Signals**
    - **Remote Control**

12. **Deadband**
    - **Remote Control**

13. **Use Remote**
    - **Remote Control**

14. **Remote Select**
    - **Remote Control**

15. **Open Limit**
    - **Remote Control**

16. **Remote Select**
    - **Remote Control**

17. **Remote Priority**
    - **Remote Control**

18. **Local Control**
    - **Remote Control**

19. **I. Timer**
    - **Remote Control**

20. **Help Screens**
    - **Remote Control**

21. **Controller Set-up**
    - **Remote Control**

22. **Int. Timer**
    - **Remote Control**

23. **CS**
    - **Remote Control**

24. **It**
    - **Remote Control**

25. **HP**
    - **Remote Control**

26. **Display**
    - **Remote Control**

27. **Password**
    - **Remote Control**

28. **Crossroads**
    - **Remote Control**

29. **Program Status**
    - **Remote Control**

30. **Fig. 9.2 Setting Menu Structure**
    - **Remote Control**
Having established that the Primary Functions have been correctly set, the Secondary Functions can now be configured to suit site control and indication requirements.

It is possible to move through the various Secondary Functions as shown in Fig. 9.1 using the $k$, $m$, $+$ and $-$ keys.

From the Positional Display press the $m$ key to display the password entry screen. If necessary, enter the password and press the $k$ key. The display will flash and the horizontal setting bars will appear. Press the $m$ key to arrive at the Crossroads (Cr). Press the $k$ key to access your chosen secondary menu. The secondary menus include further control settings and help screens.
From (Cr) press the ➔ key twice to move to [Fn].
This menu deals with various control settings and options.

PRESS THE ↓ KEY as required to access the various Settings menu items.

**9.2 Settings Menu**

**Posn. Deadband (db)**

In the display Position Deadband is expressed as a % of operating range where 10 = 1%.
The default value is 1% [10] Deadband.
The minimum settable value is 0.1% and the maximum settable value is 9.9%.
Press the + or – key to increase or decrease the set value.
When the desired value is on the display PRESS THE ➔ KEY.
The displayed value will flash indicating that it has been set.

**Posn. Hysteresis (HS)**

In the display Position Hysteresis is expressed as a % of operating range where 10 = 1%
The default value is 0.5% [05] Hysteresis.
The minimum settable value is 0.1% and the maximum settable value is 9.9%.
Press the + or – key to increase or decrease the set value.
When the desired value is on the display PRESS THE ➔ KEY.
The displayed value will flash indicating that it has been set.

**Hold Limit (HL)**

The default setting for Hold Limit is [On], Hold Limit set.
If Hold limit is set the system will start the pump when pressure drops below the factory set values or moves from the limit. As standard the actuators are set to maintain pressure in the closed limit, and maintain position in the open limit.
If Hold Limit is not required press the + or – key until [Off] is displayed
PRESS THE ➔ KEY.
The displayed option will flash indicating that it has been set.

**Press the ➔ Key** to display the next item in the Functions Menu.
Used with analogue control only. Not used for option card.
In the display Limit Hysteresis is expressed as a % of operating range where \(10 = 1\%\).

The default value is 0.5% [05] Hysteresis for Position Limit.

The minimum settable value is 0.1% and the maximum settable value is 9.9%.

Press the + or – key to increase or decrease the set value.

When the desired value is on the display PRESS THE \(\downarrow\) KEY.

The displayed value will flash indicating that it has been set.

PRESS THE \(\downarrow\) KEY to display the next item in the Functions Menu.

In the display Pressure Hysteresis is expressed as a % of operating range where \(01 = 10\%\).

The default value is 10% [10] Hysteresis for maintained pressure.

The minimum settable value is 1% and the maximum settable value is 99%.

Press the + or – key to increase or decrease the set value.

When the desired value is on the display PRESS THE \(\downarrow\) KEY.

The displayed value will flash indicating that it has been set.

PRESS THE \(\downarrow\) KEY to display the next item in the Functions Menu.

The default value is green [9r] for the closed position (inert) with the red LED indicating the Open position.

If the Closed Limit of travel is to be indicated by the red LED press the + or – key until the display changes to [rd].

When the desired value is on the display PRESS THE \(\downarrow\) KEY.

The displayed value will flash indicating that it has been set.

PRESS THE \(\downarrow\) KEY to display the next item in the Functions Menu.
Partial Stroke Position (PP) and Partial Stroke Limit (PS).

Partial stroke can be set up for use with system sensitive valves that only operate infrequently to test their ability to operate when needed. Typically it may be possible to operate the valve from fully open to 90% open without affecting the rest of the system process. Partial Stroke Position (PP) and Partial Stroke Limit (PS) allow this facility to be incorporated into the site control functionality.

This is the position to which the actuator will move when commanded to partial stroke.
In the display this is expressed as a % of opening stroke, where 90 = 90% Open
The default value is [90], 90% Open
The minimum settable value is 1% and the maximum settable value is 99%.
Press the + or – key to increase or decrease the set value.
When the desired value is on the display PRESS THE ➥ KEY.
The displayed value will flash indicating that it has been set.

PRESS THE ➥ KEY to display the next item in the Functions Menu.

This is the position from which the actuator should be commanded to partial stroke and will be either the Open Limit of travel or the Closed Limit of travel.
The default value is [OP], the Open Limit.
If the Closed Limit is the position from which the actuator should be commanded to partial stroke use the + or – keys until [CL] is displayed.
PRESS THE ➥ KEY.
The displayed option will flash indicating that it has been set.

PRESS THE ➥ KEY to display the next item in the Functions Menu.
From the Positional Display press the $\downarrow$ key to display the password entry screen. If necessary, enter the password and press the $\leftarrow$ key. The display will flash and the horizontal setting bars will appear.

Press the $\downarrow$ key to arrive at the Crossroads (Cr).

Press the $\rightarrow$ key three times to move to the Controller Set-up menu.

**PRESS THE $\downarrow$ KEY** as required to access the various Settings menu items.

This function calibrates the actuator for a voltage or current Close demand signal when analogue control is being used.

With the actuator display showing (dC), apply the analogue Close demand voltage or current signal corresponding to the Close position.

**PRESS THE $\leftarrow$ KEY.**

The display will flash and show analogue input as a percentage of full scale.

In this example $[14] = 14\%$ of full scale Demand. Any value can be set, high or low for either.

**PRESS THE $\downarrow$ KEY** to display the next item in the Controller Set-up Menu.

This function calibrates the actuator for a voltage or current Open demand signal when analogue control is being used.

With the actuator display showing (dO), apply the analogue Open demand voltage or current signal corresponding to the Open position.

**PRESS THE $\leftarrow$ KEY.**

The display will flash and show analogue input as a percentage of full scale.

In this example $[91] = 91\%$ of full scale Demand. Any value can be set, high or low for either.

**PRESS THE $\downarrow$ KEY** to display the next item in the Controller Set-up Menu.
Setting instructions for actuators where the Current Position Transmitter (CPT) is in use. This provides an analogue 4–20mA output position feedback signal.

Connect a current measuring device to the CPT terminals. Press the + or – keys until the required output is shown on the measuring device.

NOTE: The CPT loop is powered by the actuator as standard.

PRESS THE ← KEY.
The display will flash to indicate that the option has been set.
PRESS THE ↓ KEY to display the next item in the Controller Set-up Menu.

It is possible to use an external supply such as a solar power supply for the actuator’s 24V d.c. system. If this is the case it is beneficial to limit current consumption while the actuator is at rest.

There are 3 menu options associated with this function,

[OFF] Low Power function Off. This is the default setting.
[ON] Low power ON. In this mode the display backlight will be switched off when not being used for set-up.
[EL] Extra low power ON. In this mode the function of the monitor relay is inverted and the CPT disabled to further reduce power consumption.

Use the + or – keys to select from the above options.

When the desired value is on the display
PRESS THE ← KEY.
The display will flash to indicate that the desired option has been accepted.

PRESS THE ↓ KEY to display the next item in the Controller Set-up Menu.
The default value is [Id].

To configure a new password, the actuator must be in setting mode.
The value for the password will only be displayed if it has been entered correctly and accepted.

Use the + or – keys to change the password in the range HEX [00] to [FF] until the desired password is displayed.

PRESS THE ← KEY.
The displayed option will flash indicating that it has been set.

Next time that the setting mode is required it will be necessary to enter the new password and press the  ➩ key.

PRESS THE  ↓ KEY to display the next item in the Controller Set-up Menu.

New Password set as IE
All SI actuator functions are configured to a set of Rotork Skilmatic default (standard) settings before despatch, see the table opposite. When requested, alternative settings specified with the order will be used. When site commissioning takes place, entered settings overwrite Rotork Skilmatic defaults and these “current” settings are used for operation along with the remaining unadjusted defaults.

Should difficulty be encountered during commissioning the default settings can be reinstated, returning the actuator configuration to its original manufactured state. Site commissioning must then begin again.

If reset to factory defaults takes place, all Primary and Secondary Functions including limit positions will return to their default setting. See the table opposite for Rotork Skilmatic standard settings. Primary setting (including limits) and secondary settings must then be checked and reset as required (refer to Primary Functions page 17 and Secondary Functions page 26).

Rotork Skilmatic standard default settings for SI actuators:

<table>
<thead>
<tr>
<th>Function</th>
<th>Default Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>(P?) Password</td>
<td>Will be reset to [Id]</td>
</tr>
</tbody>
</table>

**Primary Functions – [rE] Remote Control**
- (rS) Remote Select [rE] Hardwired Control
- (cL) Configure Local Controls [nN] Maintained
- (rP) Remote Priority [SP] Stayput
- (EA) ESD Action [E] De-energise all Solenoid Valves
- (EO) ESD Local Stop Override [OF] Do not Override
- (Ec) ESD Contact Type [nO] Normally Open
- (AA) Analogue Signal Failure Action [OF] No Alarm

**Secondary Functions – [Fn] Settings**
- (db) Position Deadband Adjustment [10] 1.0%
- (hS) Position Hysteresis Adjustment [05] 0.5%
- (HL) Hold Position Limit [ON] Hold Limit
- (LH) Position Limit Hysteresis [05] 0.5%
- (PH) Hysteresis for Maintained Pressure [10] 10%
- (Ld) Closed LED Colour [9r] Green
- (PP) Partial Stroke Position [90] 90% Open
- (PS) Partial Stroke Limit [OP] Open Limit
Rotork Skilmatic standard default settings for SI actuators:

<table>
<thead>
<tr>
<th>Function</th>
<th>Default Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Secondary Functions – [CS] Controller Set-up</strong></td>
<td></td>
</tr>
<tr>
<td>(LP)</td>
<td>Low Power Mode Selection</td>
</tr>
<tr>
<td><strong>Secondary Functions – [It] Interrupter Timer</strong></td>
<td></td>
</tr>
<tr>
<td>(OJ)</td>
<td>Interrupter Timer Enable</td>
</tr>
<tr>
<td>(Js)</td>
<td>Interrupter Timer Start Direction</td>
</tr>
<tr>
<td>(JC)</td>
<td>Interrupter Timer Close Position</td>
</tr>
<tr>
<td>(JO)</td>
<td>Interrupter Timer Open Position</td>
</tr>
<tr>
<td>(JS)</td>
<td>Interrupter Timer Interval</td>
</tr>
<tr>
<td>(JE)</td>
<td>Interrupter Timer ESD Override</td>
</tr>
</tbody>
</table>

Having selected \( \text{(rd)} \) in the \([\text{CS}]\) Controller Set-up menu, the display will show the current password, for example \([\text{Id}]\).

Use the + key to increase the password value by 1, \([\text{IE}]\) in this example.

**PRESS THE \( \text{←} \) KEY.**

All settings will be returned to factory default values as shown in the table.
In the event of a fault occurring the indication display will alternate between the actuator position display and the fault screen (FA)\[XX\] where \[XX\] is the code for the particular fault.

At the same time the Actuator Fault Icon will be displayed.

The table below defines these fault displays and shows the associated Monitor Relay and Fault Relay states.

After the table individual explanations of each fault code and suggested action are shown. Note that in some cases it will be necessary to contact Rotork Skilmatic to clear the fault satisfactorily.

**Fault Indication Table:**

<table>
<thead>
<tr>
<th>Display</th>
<th>Fault Name</th>
<th>Monitor Relay</th>
<th>Fault Relay</th>
</tr>
</thead>
<tbody>
<tr>
<td>[EE]</td>
<td>EEPROM Fault</td>
<td>Off</td>
<td>On</td>
</tr>
<tr>
<td>[hA]</td>
<td>Hardware Fault</td>
<td>Off</td>
<td>On</td>
</tr>
<tr>
<td>[LC]</td>
<td>Local Controls Fault</td>
<td>Off</td>
<td>On</td>
</tr>
<tr>
<td></td>
<td>(assumes Local Stop)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[PU]</td>
<td>Hydraulic Power Unit Fault</td>
<td>On</td>
<td>On</td>
</tr>
<tr>
<td>[dr]</td>
<td>Solenoid Driver Fault</td>
<td>On</td>
<td>On</td>
</tr>
<tr>
<td>[PO]</td>
<td>Position Sensor Fault</td>
<td>Off</td>
<td>On</td>
</tr>
<tr>
<td>[Pr]</td>
<td>Pressure Sensor Fault</td>
<td>On</td>
<td>On</td>
</tr>
<tr>
<td>[OP]</td>
<td>Over Pressure in Mid Travel</td>
<td>On</td>
<td>On</td>
</tr>
<tr>
<td>[dl]</td>
<td>Actuator Running in Wrong Direction</td>
<td>On</td>
<td>On</td>
</tr>
<tr>
<td>[UP]</td>
<td>Under Pressure at End of Travel</td>
<td>On</td>
<td>On</td>
</tr>
<tr>
<td>[St]</td>
<td>Actuator Stalled</td>
<td>On</td>
<td>On</td>
</tr>
<tr>
<td>[PS]</td>
<td>Unsuccessful Partial Stroke</td>
<td>On</td>
<td>On</td>
</tr>
<tr>
<td>[dn]</td>
<td>Loss of Demand Signal (Positioning)</td>
<td>On</td>
<td>On</td>
</tr>
</tbody>
</table>

**Note:** If there is more than 1 fault the highest priority fault will be displayed first. After this fault has been cleared the next highest priority fault will be displayed and so on.
Electronics Hardware Fault.

This fault may be cleared by removing power from the actuator, waiting for 20 seconds and then restoring the power supply.

Alternatively, in setting mode and from the Crossroads (Cr) display position press the ➡️ key until Controller Set-up [CS] is displayed.

PRESS THE 🔽 KEY repeatedly until Confirm Faults (CF) is displayed. The display will show the current fault, [hA].

PRESS THE ← KEY to accept the fault.

Note that although acceptance of the fault may permit the actuator to be controlled it is probable that the fault is still present and it should be investigated and a solution found.

If the fault persists contact Rotork Skilmatic.

Checksum Error Within the Electronics Hardware.

This feature is checked at power up only and may be cleared by removing power from the actuator, waiting for 20 seconds and then restoring the power supply.

Alternatively, in setting mode and from the Crossroads (Cr) display position press the ➡️ key until Controller Set-up [CS] is displayed.

PRESS THE 🔽 KEY repeatedly until Confirm Faults (CF) is displayed. The display will show the current fault, [EE].

PRESS THE ← KEY to accept the fault.

Note that although acceptance of the fault may permit the actuator to be controlled it is probable that the fault is still present and it should be investigated and a solution found.

A full functional test should be carried out to ensure any underlying fault does not effect the actuator performance.

If the fault persists contact Rotork Skilmatic.
Local Controls Fault. If this fault indication is displayed it is likely that more than one local control contact per control knob is selected providing conflicting signals to the control circuit. For example both Local and Remote selected or simultaneously selected Open and Close switch contacts. The actuator will not operate. The fault cannot be viewed or accepted through the (CF) Menu option. If the fault persists contact Rotork Sklimatic.

Position Sensor Fault. This fault indicates that the Position Sensor is either short circuited or open circuit. The actuator will not operate. The fault cannot be viewed or accepted through the (CF) Menu option. If the fault persists contact Rotork Sklimatic.

Pressure Sensor Fault. This fault indicates that the Pressure Sensor is either short circuit or open circuit. The actuator will not operate. The fault cannot be viewed or accepted through the (CF) Menu option. If the fault persists contact Rotork Sklimatic.
Unsuccessful Partial Stroke.

This display indicates that a fault occurred while the actuator was attempting a partial stroke.

To clear the fault try operating the actuator in the reverse direction and then re-attempting the partial stroke. If this is successful the fault will be cleared.

Alternatively, in setting mode and from the Crossroads (Cr) display position press the ↓ key until Controller Set-up [CS] is displayed.

PRESS THE ↓ KEY repeatedly until Confirm Faults (CF) is displayed. The display will show the current fault, [PS].

PRESS THE ← KEY to accept the fault.

Obstruction in Mid Travel.

This fault indicates that the valve is obstructed or has become tight.

When the fault appears the actuator stops and cannot be re-started in the same direction.

Reverse the actuator, which will clear the fault and then re-try the original command.

Alternatively, in setting mode and from the Crossroads (Cr) display position press the → key until Controller Set-up [CS] is displayed.

PRESS THE ↓ KEY repeatedly until Confirm Faults (CF) is displayed. The display will show the current fault, [OP].

PRESS THE ← KEY to accept the fault.

Note that although acceptance of the fault may permit the actuator to be controlled it is probable that the fault is still present and it should be investigated and a solution found.

Note that although acceptance of the fault may permit the actuator to be controlled it is probable that the fault is still present and therefore it is essential that the actuator should be reversed before trying to move the valve in the original direction. This will give an opportunity for the obstruction to clear.
Under Pressure at End of Travel.
This fault indicates that the valve is obstructed or has become tight at the end of travel preventing the actuator from moving off or onto the set limit of travel, or that the actuator is unable to pump.

Remove the command signal and re-apply it.

Alternatively, in setting mode and from the Crossroads (Cr) display position press the ➡️ key until Controller Set-up [CS] is displayed.

PRESS THE ➡️ KEY repeatedly until Confirm Faults (CF) is displayed. The display will show the current fault, [UP].

PRESS THE ←️ KEY to accept the fault.

Note that although acceptance of the fault may permit the actuator to be controlled it is probable that the fault is still present and it should be investigated and a solution found.

Actuator Stalled in Mid Travel.
This fault indicates that the actuator has either failed to start or stopped moving after receiving a command signal when in mid travel.

To clear the fault remove the original command signal and then re-try the original command. The fault will clear when the actuator moves.

Alternatively, in setting mode and from the Crossroads (Cr) display position press the ➡️ key until Controller Set-up [CS] is displayed.

PRESS THE ➡️ KEY repeatedly until Confirm Faults (CF) is displayed. The display will show the current fault, [St].

PRESS THE ←️ KEY to accept the fault.

Note that although acceptance of the fault may permit the actuator to be controlled it is probable that the fault is still present and it should be investigated and a solution found.
Actuator Running in Wrong Direction.

This fault indicates that the actuator has started moving in the opposite direction to the given command. When this occurs the actuator is stopped.

The fault clears automatically when movement in the correct direction is detected.

To clear the fault remove the command signal and re-apply it.

Alternatively, in setting mode and from the Crossroads (Cr) display position press the ➔ key until Controller Set-up [CS] is displayed.

PRESS THE ➔ KEY repeatedly until Confirm Faults (CF) is displayed. The display will show the current fault, [dl].

PRESS THE ← KEY to accept the fault.

Note that although acceptance of the fault may permit the actuator to be controlled it is probable that the fault is still present and it should be investigated and a solution found.

Loss of Demand Signal During Anologue (Positioning) Control.

This fault indicates that the analogue Demand signal has dropped below half of the minimum set Demand Signal. In a 4–20mA system the Demand signal has dropped to less than 2mA.

Depending how (AA) (Analogue Signal Failure Action) has been set the Alarm Relay may be energised and an ESD may be performed.

To correct the fault restore the correct Demand Signal value.

The fault cannot be viewed or accepted through the Confirm Faults (CF) Menu option.

Hydraulic Power Unit Fault.

If the hydraulic power unit fails consult Rotork Skilmatic.

The fault cannot be viewed or accepted through the Confirm Faults (CF) Menu option.
Solenoid Driver Fault.

If a solenoid driver fault appears consult Rotork Skilmatic.

The fault cannot be viewed or accepted through the Confirm Faults (CF) Menu option.
The primary function of the Interrupter Timer is to slow the rate of closing and/or opening of the valve in situations where hydraulic shock could be present. The interrupter timer is used to slow the actuator as it approaches the fully closed & open position and/or leaves the fully closed & open position. This action is achieved by pulsing the actuator using a variable On and Off pulse. The On and Off pulses are adjustable in the ratio of up to 100:1 and the points in travel at which the timer switches on and switches off are also adjustable.

When enabled the interrupter timer operates in both Local and Remote control.

**Note:** The interrupter timer does not operate during mains power failure. Systems should take this into account.

Access to the timer set-up menu is as follows:

From the (Cr) Crossroads display position press the ➦ key until Interrupter Timer [It] is displayed

**PRESS THE ➦ KEY** to display the first item in the Interrupter Timer Set-up Menu.

The default setting for (OJ) is [OF] Timer Disabled.

![Timer Disabled](image)

To enable the timer use the + or – keys to toggle between [OF] and [ON] and press the ➦ key when the desired value is displayed.

The display will flash to indicate that the desired option has been accepted.

**PRESS THE ➦ KEY** to display the next item in the Interrupter Timer Set-up Menu.

The default for timer direction is [CL], timer operation will start in closing and stop in opening – pulsing operation around the close position.

If pulsing operation is required to stop in closing and start in opening – around the open position, use the + or – key.

The display will change to [OP].

**PRESS THE ➦ KEY.**

The displayed option will flash indicating that it has been set.

**Pulsed Operation Around the Closed Position**

NOTE: Instructions (JC) and (JO) are for timer operation around the Closed position. For timing around the Open position, read stop for start (JC) and start for stop (JO).

**PRESS THE ➦ KEY** to display (JC).

Using the + or – key select the position for the TIMER TO START WHEN THE VALVE IS CLOSING.


[00] to [99] = percentage open

[≡≡] = valve open

The default value for (JC) is [25], 25% Open.

**Timer Set to Start Pulsing when Closing Valve Reaches 25% Open**

**PRESS THE ➦ KEY.**

The displayed option will flash indicating that it has been set.

If the timing is not required in the closing stroke select (JC) to [11] valve closed position.

**PRESS THE ➦ KEY** to display (JO).
Using the + or − key select the position for the TIMER TO STOP WHEN THE VALVE IS OPENING.

[ ] = valve closed
[00] to [99] = percentage open
[ === ] = valve open

The default value for (JO) is [25], 25% Open.

**Timer Set to Stop Pulsing when Opening Valve Reaches 25% Open**

The default for Timer ON and OFF times will be in units of 100ms which is represented by [OF].

If (JS) is selected to [ON] the unit of time measurement will be 1 second.

**Interrupter Timer Interval set for units of 100ms**

This unit of time measurement will be applied to the times selected in (JN) and (JF).

**PRESS THE ← KEY.**

The displayed option will flash indicating that it has been set.

If timing is not required in the opening stroke select (JO) to [ ].

**PRESS THE ↓ KEY to display (JF).**

**PRESS THE ↓ KEY to display (JN).**

**PRESS THE ↓ KEY to display (JS).**

Using the + or − key select the actuator run pulse in the range 100ms to 99 seconds.

Using the + or − key select the actuator stop pulse in the range 100ms to 99 seconds.

(JF) set to 25 gives an Interrupter Timer off pulse length of 2500ms or 25 seconds depending on whether (JS) is set to [OF] or [ON].

(JN) set to 05 gives an Interrupter Timer on pulse length of 500ms or 5 seconds depending on whether (JS) is set to [OF] or [ON].
The interrupter timer may be overridden when the actuator is under ESD signal command. C or O must be selected for the interrupter timer to override the ESD action. If E is selected then the interrupter timer does not operate.

Refer to (EA), (EO), (Ec) (see Primary menu page 22 and 23).

The default for ESD override interrupter timer is [OF]. The interrupter timer will continue “stop/start” action during ESD action.

If ESD must override the timer use the + or – to display [ON].

ESD Override Timer OFF
PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.
With the actuator powered up and Local or Stop selected, eleven Help Screens can be accessed using the Setting Tool (refer to Fig. 9.1 page 27 for their location).

With Remote selected press the key on the Setting Tool. The Help Screens will be displayed.

Each screen uses bars to indicate the status of a particular control or indication function. Each bar reacts to changes in the status of its actuator function by turning “on” or “off”.

From the Crossroads display position press the key until Help Screens [HP] is displayed.

PRESS THE DOWN KEY to display the first screen (H1).

For troubleshooting, access the following Help Screens and refer to text:

- **H1** – Actuator limit status indicators.
- **H2** – Local control indicators.
- **H3** – Remote signal indicators.
- **H4** – Digital feedback indicators.
- **H5** – Timer, fault and monitor relay indicators.
- **H6** – Solenoid and pump driver outputs.
- **H7** – Fault indicators 1.
- **H8** – Fault indicators 2.
- **H9** – Fault indicators 3.
- **HA** – Driver logic indicators.
- **HB** – System status indicators.

Note: Bar indication is real time and reactive.
Local Mode Selected
Bar On = Local Control selected.

Local Stop
Bar On = Local Stop selected.

Remote Mode Selected
Bar On = Remote Control selected.

Local Open
Bar On = Local Open selected.

Local In-hand
Bar On = Neither local open or local closed selected.

Local Close
Bar On = Local Close pushbutton operated.

Local Fitted
Bar On = Local controls fitted.

Hand Operation
Bar On = Manual override in use.

Note: Bar indication is real time and reactive.

Remote 1: Remote 2:
Open ESD
Remote 1:   Remote 2:
Close   Maintain
Remote 1:   Remote 2:
Maintain   Close
Remote 1: Remote 2:
ESD Open

Remote 1: Remote 2:
Open ESD
Remote 1:   Remote 2:
Close   Maintain
Remote 1:   Remote 2:
Maintain   Close
Remote 1: Remote 2:
ESD Open

All remote signals designated with ‘1’ are standard hard wired remote inputs.

When a network system such as Pakscan, Profibus or Foundation Fieldbus is in use, remote control inputs are designated with a ‘2’.

Remote 1: Open

Remote 1: Close
Bar On = Remote Close Signal Present.

Remote 1: Maintain
Bar On = Remote Maintain signal present.

Remote 1: ESD
Bar On = ESD signal present.

Remote 2: Open
Bar On = Remote Open signal present from network.

Remote 2: Close
Bar On = Remote Close signal present from network.

Remote 2: Maintain
Bar On = Remote Maintain signal present from network.

Remote 2: ESD
Bar On = ESD signal present from network.

Note: Bar indication is real time and reactive.
Note: Bar indication is real time and reactive.

**Partial Stroke / Remote-Local Command**
Bar On = If in analogue control mode - a remote local command is present. If in hardwired remote control mode - partial stroke command is present.

**Over Pressure**
Bar On = Hydraulic system over pressure.

**Hydraulic Status**
Bar On = Hydraulic system active.

**Solenoid Driver Fault**
Bar On = Solenoid driver fault present.

**Fault Relay Output**
Bar On = Fault relay energised.

Note: Bar indication is real time and reactive.

**Interrupter Timer Started**
Bar On = Interrupter timer running.

**Interrupter Timer Inhibiting**
Bar On = Interrupter timer off pulse present.

**Interrupter Timer Waiting for First Movement**
Bar On = Interrupter timer is waiting for first movement.

**Monitor Relay Output**
Bar On = Monitor relay energised.
Solenoid No.1
Bar On = Solenoid No.1 energised.

Solenoid No.2
Bar On = Solenoid No.2 energised.

Solenoid No.3
Bar On = Solenoid No.3 energised.

Solenoid No.4
Bar On = Solenoid No.4 energised.

Pump
Bar On = Pump running.

Closing
Bar On = Actuator Closing.

Accumulator Under Pressure
Bar On = Hydraulic pressure low.

Note: Bar indication is real time and reactive.

Pressure Transducer Fault
Bar On = Pressure Transducer error [Pr].

Note: Bar indication is real time and reactive.

EEPROM Checksum
Bar On = EEPROM checksum error [EE].

Hardware Fault
Bar On = Hardware fault present [HA].

Local Controls Fault
Bar On = Local controls fault [LC].

Hydraulic Power Fault
Bar On = Hydraulic Power fault [PU].

Solenoid Driver Fault
Bar On = Solenoid Driver error [dr].

Position Transducer Fault
Bar On = Position Transducer error [PU].
**H8**

- **Loss of Analogue Demand Signal**
  - Bar On = Analogue demand signal not present [dn].

- **Actuator Stalled in Slow Mode**
  - Bar On = Actuator is stalled in slow mode [SL].

- **Actuator Stalled**
  - Bar On = Actuator movement is stalled [St].

- **Partial Stroke Fault**
  - Bar On = Actuator has failed to complete desired movement [PS].

- **Loss of Analogue Demand Signal**
  - Bar On = Analogue demand signal not present [dn].

**Obstruction in Mid Travel**
Bar On = Actuator operation has stopped due to an obstruction in mid-travel [OP].

**Running in Wrong Direction**
Bar On = Actuator is running in the wrong direction [dI].

**Unable to Reach Pressure**
Bar On = Actuator is unable to reach required pressure [uP].

**Help Screen 8**

Note: Bar indication is real time and reactive.

**H9**

- **Position Checking Fault**
  - Bar On = Actuator has a position checking fault.

- **Setting Out of Bounds**
  - Bar On = Actuator settings are out of bounds.

**Help Screen 9**

Note: Bar indication is real time and reactive.
**Open Command**
Bar On = Actuator is acting on an Open command.

**Close Command**
Bar On = Actuator is acting on a Close command.

**ESD Command**
Bar On = Actuator is acting on an ESD command.

**All Stop Command**
Bar On = Stop actuator and pump.

**Slow Mode Command**
Bar On = Actuator is running at a slower rate.

**Inhibit Command**
Bar On = Actuator is operating using the interrupter timer.

**De-energise All Command**
Bar On = Actuator has command to de-energise all solenoids.

**No Expected Movement**
Bar On = Actuator has no commands to move.

Note: Bar indication is real time and reactive.

**For Rotork Skilmatic use only.**

Note: Bar indication is real time and reactive.
Maintenance

Every Rotork Skilmatic actuator has been fully tested before despatch to give years of trouble-free operation providing it is installed, sealed and commissioned in accordance with the instructions given in this publication.

The SI actuator’s unique double sealed, non-intrusive enclosure provides complete protection for the actuator components.

Covers should not be removed for routine inspection as this may be detrimental to the future reliability of the actuator.

The electrical power unit cover is bonded by the Rotork Skilmatic quality control seal. It should not be removed as the module contains no site-serviceable components.

All electrical power supplies to the actuator must be isolated before any maintenance or inspection is carried out.

Electrical supplies must be isolated before actuator covers are removed.

Routine maintenance should include the following:

* Check actuator to valve fixing bolts for tightness.
* Ensure valve stems and drive nuts are clean and properly lubricated.
* If the motorised valve is rarely operated, a routine operating schedule should be set up.
* Check the actuator enclosure for damage, loose or missing fasteners.
* Ensure there is not an excessive build up of dust or contaminant on the actuator.
* Check for any loss of hydraulic fluid. If it is necessary to top up hydraulic fluid ensure that the correct type of fluid is used. See actuator name plate.

Hydraulic Oil

Standard Applications

10 cSt Mineral Oil

Unless specially ordered for extreme climate conditions or other special environments, Rotork Skilmatic SI actuators are despatched with hydraulic systems filled with 10 cSt mineral oil. This oil is suitable for actuators operating in ambient temperatures in the range –20ºC to +60ºC.

Low Temperature Environments

20 cSt Silicone Fluid.

This oil is suitable for actuators operating in ambient temperatures in the range –40ºC to +60ºC.

Sensitive Environments

15 cSt Bio-degradable Fluid.

Food Industry Environments

15 cSt Food Grade Fluid.
## 10.1 Environmental

End user advice on disposal at end of life of the product

<table>
<thead>
<tr>
<th>Subject</th>
<th>Definition</th>
<th>Remarks / examples</th>
<th>Hazardous</th>
<th>Recyclable</th>
<th>EU Waste Code</th>
<th>Disposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical &amp; Electronic Equipment</td>
<td>Printed circuit boards</td>
<td>All Products</td>
<td>Yes</td>
<td>Yes</td>
<td>20 01 35</td>
<td>Use specialist recyclers</td>
</tr>
<tr>
<td></td>
<td>Wire</td>
<td>All Products</td>
<td>Yes</td>
<td>Yes</td>
<td>17 04 10</td>
<td></td>
</tr>
<tr>
<td>Glass</td>
<td>Lens/Window</td>
<td>All SI actuators</td>
<td>No</td>
<td>Yes</td>
<td>16 01 20</td>
<td>Use specialist recyclers</td>
</tr>
<tr>
<td>Metals</td>
<td>Aluminium</td>
<td>Power unit &amp; Quarter-turn enclosure</td>
<td>No</td>
<td>Yes</td>
<td>14 04 02</td>
<td>Use licensed recyclers</td>
</tr>
<tr>
<td></td>
<td>Copper/Brass</td>
<td>Pump parts, SI-2 motor windings, Wire</td>
<td>No</td>
<td>Yes</td>
<td>17 04 01</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Steel</td>
<td>Linear actuator &amp; Q100 to Q130 actuators</td>
<td>No</td>
<td>Yes</td>
<td>17 05 05</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mixed Metals</td>
<td>SI-2 motors</td>
<td>No</td>
<td>Yes</td>
<td>17 04 07</td>
<td></td>
</tr>
<tr>
<td>Plastics</td>
<td>Glass filled nylon</td>
<td>Covers, electronics chassis</td>
<td>No</td>
<td>No</td>
<td>17 02 04</td>
<td>Use specialist recyclers</td>
</tr>
<tr>
<td>Oil</td>
<td>Mineral</td>
<td>Standard actuator</td>
<td>Yes</td>
<td>Yes</td>
<td>13 01 10</td>
<td>Will require special treatment before</td>
</tr>
<tr>
<td></td>
<td>Food Grade</td>
<td>Food industry applications</td>
<td>Yes</td>
<td>Yes</td>
<td>13 01 12</td>
<td>disposal, use specialist recyclers or</td>
</tr>
<tr>
<td></td>
<td>Silicone</td>
<td>Low temp applications</td>
<td>Yes</td>
<td>Yes</td>
<td>13 01 11</td>
<td>waste disposal companies</td>
</tr>
<tr>
<td>Rubber</td>
<td>Seals &amp; Orings</td>
<td>Cover and shaft sealing</td>
<td>Yes</td>
<td>No</td>
<td>16 01 99</td>
<td>May require special treatment before</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>disposal, use specialist waste disposal</td>
</tr>
</tbody>
</table>

In all cases check local authority regulation before disposal
# 11 Weights and Measures

<table>
<thead>
<tr>
<th>Actuator Model</th>
<th>Nett Weight kg/lbs</th>
<th>Actuator Model</th>
<th>Nett Weight kg/lbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>SI-1-Q31</td>
<td>27/60</td>
<td>SI-1-L80/40</td>
<td>55/122</td>
</tr>
<tr>
<td>SI-1-Q41</td>
<td>30/66</td>
<td>SI-1-L100/40</td>
<td>75/166</td>
</tr>
<tr>
<td>SI-1-Q51</td>
<td>38/84</td>
<td>SI-1-L125/65</td>
<td>85/188</td>
</tr>
<tr>
<td>SI-1-Q60</td>
<td>42/93</td>
<td>SI-1-L160/65</td>
<td>120/265</td>
</tr>
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<td>SI-2-Q100</td>
<td>325/717</td>
<td>SI-2-L280/105</td>
<td>270/596</td>
</tr>
<tr>
<td>SI-2-Q110</td>
<td>335/739</td>
<td>SI-2-L320/105</td>
<td>290/640</td>
</tr>
<tr>
<td>SI-2-Q120</td>
<td>560/1235</td>
<td>SI-2-L350/105</td>
<td>320/706</td>
</tr>
<tr>
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<td>SI-2-L450/105</td>
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</tr>
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</table>

Note - For SI-L actuators, weights are actuator weight only, not including mounting brackets.
11.1 Actuator Nameplate

The actuator nameplate is engraved with the following information:

**Explosionproof Certification:** Details of certification when installed in hazardous environments.

**Operating Temperature:** Maximum and minimum ambient temperatures for the installation.

**Model No.:** Full actuator model code. See data sheet for explanation of model code.

**Power Unit No.:** Model code for power unit only.

**Serial Number:** Always have this to hand if contacting Rotork Skilmatic for assistance.

**Wiring Diagram Number:** Wiring diagram will give information on the actuator specification and terminals for incoming cables.

**Supply Voltage:** Compare this with power supply available on site.

**Rating:** Power consumption of actuator.

**Cable Entries:** Specification of size and thread available for cable glands.

**Enclosure:** The ingress protection rating the actuator is suitable for.

**Oil Type:** Hydraulic oil type, Standard, Low Temperature, Bio-degradable or Food Grade.

**Unit Weight:** Weight of actuator.

**Year of Manufacture:** The year the actuator was manufactured.
Refer to actuator nameplate for unit specific approval details

Rotork Skilmatic SI actuators are approved to ATEX, FM, CSA and IEC standards. See the relevant data sheet for more information.

Rotork Skilmatic can supply actuators to national standards not listed above. For details please contact Rotork Skilmatic.
If your Rotork Skilmatic actuator has been correctly installed and sealed, it will give years of trouble-free service. Should you require technical assistance or spares, Rotork Skilmatic guarantees the best service in the world. Contact your local Rotork Skilmatic representative or the factory direct at the address on the nameplate, quoting the actuator type and serial number.

Australia
Western Australia Agent
Tel: +61 8 9314 1827
Fax: +61 8 9314 1837
E-Mail: sales@pipact.com.au

Austria
Agent
Tel: +43 7224 66008
Fax: +43 7224 66008
E-Mail: kilches_keg@mag entertained.at

Brunei
Agent
Tel: +673 3 336122
Fax: +673 3 336142
E-Mail: cnetz@brunet.bn

Canada
Rotork Company HQ
Tel: +1 403 569 9455
Fax: +1 403 569 9414
E-Mail: info@rotork.ca

Caribbean (Puerto Rico)
Agent
Tel: +1 787 751 4415
Fax: +1 787 250 1842
E-Mail:

China
North/Beijing
Rotork Company
Tel: +86 10 6497 1412/94590
Fax: +86 10 6499 4591
E-Mail: rotorkbj@public3.bta.net.cn

China
Shanghai
Rotork Company
Tel: +86 21 6478 5015
Fax: +86 21 6478 5035
E-Mail: rotorksh@public6.sta.net.cn

China
Sichuan
Rotork Branch
Tel: +86 28 62020500
Fax: +86 28 62020499
E-Mail: rotorknew@public.guangzhou.gd.cn

China
Hong Kong
Rotork Company
Tel: +852 2520 2390
Fax: +852 2528 9746
E-Mail: rotorkhk@netvigator.com

Colombia
Agent Main Office
Tel: +57 1 621 27 40
Fax: +57 1 621 25 61
E-Mail: autom2@col1.telecom.com.co

Costa Rica
Agent
Tel: +506 228 8630/1
Fax: +506 289 4350
E-Mail: eomega@sol.racsa.co.cr

Croatia
Agent
Tel: +385 1 4 577 217
Fax: +385 1 4 577 220
E-Mail:

Cyprus
Agent
Tel: +357 2 434131
Fax: +357 2 433416
E-Mail: ltdinfo@stavrinides.com.cy

Czech Republic
Agent
Tel: +420 5 48321534
Fax: +420 5 48216240
E-Mail:

Algeria
Tel: +213 6 37 4854
Fax: +213 6 37 2613
E-Mail:

Argentina
Tel: +54 11 4755 5560/4753 7533
Fax: +54 11 4755 5560/4753 7533
E-Mail: metalart@ciudad.com.ar

Australia
Rotork Company HQ
Tel: +61 3 53 381566
Fax: +61 3 53 381570
E-Mail: mail@rotork.com.au

Australia
Brisbane
Rotork Company
Tel: +61 7 3373 2050
Fax: +61 7 3255 5388
E-Mail:

Australia
Sydney
Rotork Company
Tel: +61 2 9 567 2735
Fax: +61 2 9 567 2739
E-Mail:
As we are continually developing our products, the design of Rotork Skilmatic actuators is subject to change without notice. The latest product and technical information is available at our website: www.rotork.com.

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