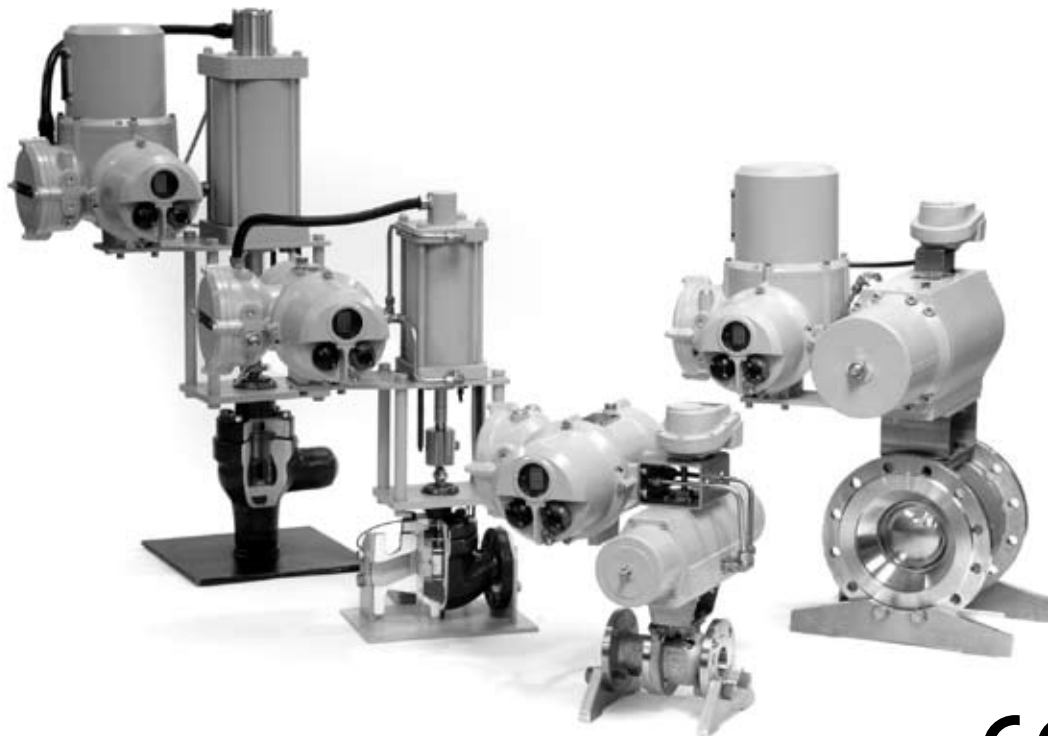




rotork[®] skilmatic

SI Range

Installation and
Maintenance
Instructions

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.



Rotork Setting Tool Pro



Rotork Setting Tool

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.

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1 Health and Safety

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: Control and Indication

Where the actuator build allows remote control and indication supplies higher than 150V a.c. but below 300V a.c. (refer to actuator wiring diagram) the actuator installation altitude must be restricted to less than 2000m as defined by BS EN 61010 or IEC 61010 (safety requirements for electrical equipment for measurement, control and laboratory use).

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).

2 Storage

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
Piston rod:	Stainless steel
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 its 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 Operating your Skilmatic SI Actuator

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.



Fig. 3.1

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

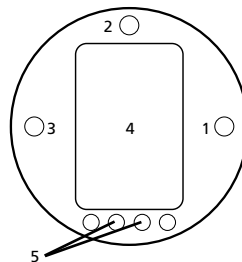


Fig. 3.2 The Actuator Display

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)

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.

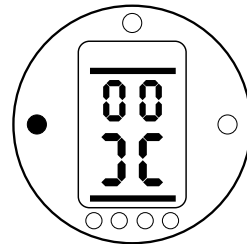


Fig. 3.3 0%, Fully Closed

3 Operating your Skilmatic SI Actuator continued

Mid Travel

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

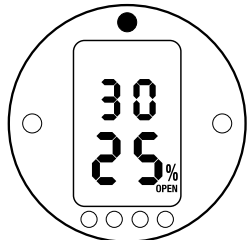


Fig. 3.4 30% of maximum rated pressure, 25% Open

Open

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

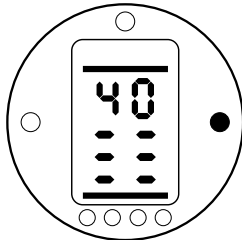


Fig. 3.5 40% of maximum rated pressure, Fully Open

With the main power supply off, the liquid crystal display is blank.

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.

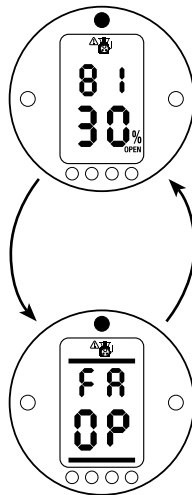


Fig. 3.6

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)

4 Optional Manual Operation

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

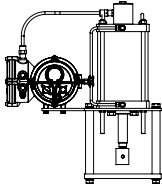


Fig. 5.2

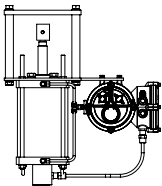
5 Mounting the Actuator continued

5.2 Mounting Orientation SI-1-L Actuators

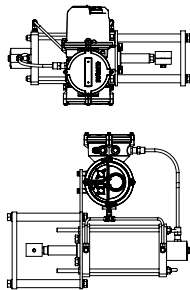
SI-1-L actuators can be mounted in the positions shown below:



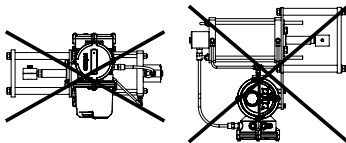
RECOMMENDED - The actuator can be mounted and serviced in this position.



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

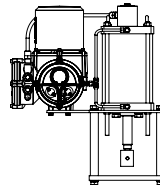


PERMITTED - The actuator can be mounted in these orientations. The unit will have to be removed for servicing.



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

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.

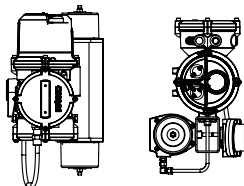
- Ensuring that the valve is still fully closed, fit the split coupling to clamp the actuator piston rod to the valve stem.

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

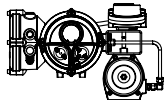
- Replace the lock nuts or clamp on to the valve bonnet and tighten to the manufacturers recommended torque.
- Ensure that the valve is still in the fully open position and fit the split coupling to clamp the actuator piston rod to the valve stem.



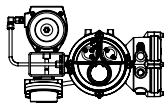
PERMITTED - The actuator can only be mounted in these orientations. The unit will have to be removed for servicing.

5.4 Mounting Orientation SI-1-Q Actuators

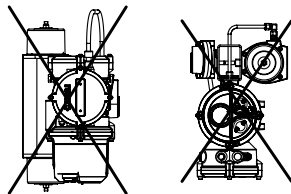
SI-1-Q actuators can be mounted in the positions shown below:



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

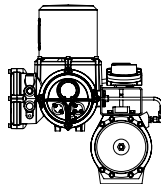


PERMITTED - Consult Rotork Skilmatic. It may be possible to mount the actuator in this position but it may need to be removed for servicing.



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

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.

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.

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.

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.



Fig. 6.1

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.



Fig. 6.2

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

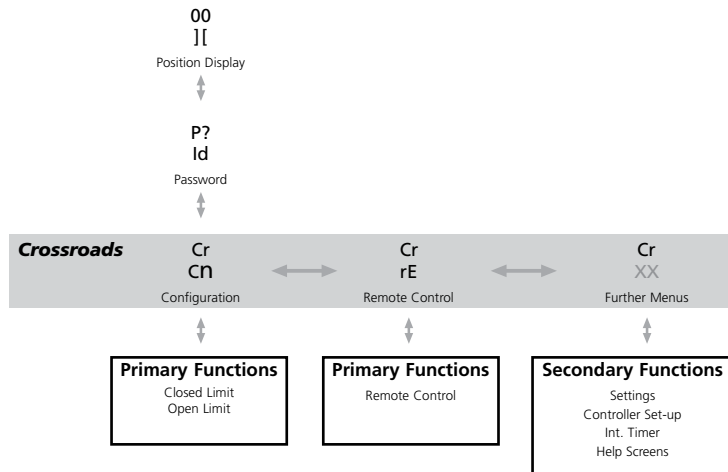
Settings covering the control, indication and optional equipment functions.

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 "[]".

Actuator Display



Note: The Primary Functions must be commissioned first.

7 Commissioning continued

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	Instruction
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

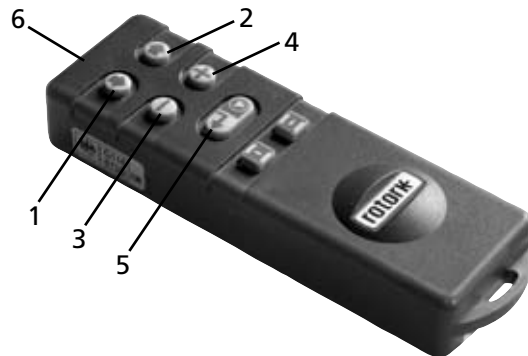


Fig. 7.1 The Setting Tool

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 Tamb = -30°C to 50°C

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

Operating range 0.75m (from actuator display window)

Name

1. ↓ Key*

2. ↑ Key

3. → Key*

4. ← Key

5. - Key

6. + Key

7. ↓ Key

8. ⏎ Key

9.

Instruction

Display next function down

Display previous function up

Display next function across

Display previous function across

Decrease/change displayed function's value or option setting

Increase/change displayed function's value or option setting

Initiate download/upload mode

Enter displayed value or option setting

Infra-red Transmitter Window

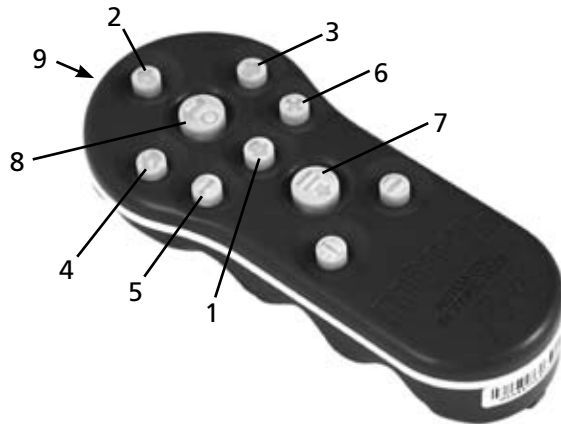


Fig. 7.2 The Setting Tool *Pro*

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

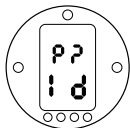
7 Commissioning continued

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.



The actuator function settings can be protected by the use of a password

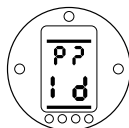
7.4 Setting Mode – Password

To enable setting and adjustment of the actuator functions the correct password must be entered. The factory set (default) password is **[1d]**. 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.



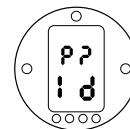
Default password, setting mode enabled

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

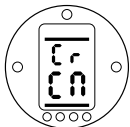
Once the password has been entered in the required mode

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.

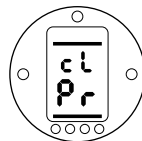
The actuator display indicator lamps will continue to indicate valve position.

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

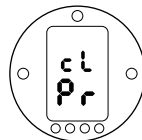
The setting for the displayed function is shown in the lower portion of the screen. Depending on the actuator function displayed, its setting may be an option or a value. In setting mode the Setting Tool **+** or **-** keys will cause the setting to be changed. In checking mode the settings cannot be 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.



*Typical Actuator Function Display
Setting Mode Enabled*



*Typical Actuator Function Display
in Checking Mode*

TOP PORTION

Function e.g.
(cl) = Configure
Local Controls

LOWER PORTION

Function Setting
or Value
e.g. **[Pr]** = Push-to-Run

TOP PORTION

Function e.g.
(cl) = Configure
Local Controls

LOWER PORTION

Function Setting
or Value
e.g. **[Pr]** = Push-to-Run

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.
4. With any actuator function screen displayed, select Remote control using the red Local/Stop/Remote selector.

8 Commissioning – Primary Functions



Fig. 8.1

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 ↓ key and, when appropriate, the → 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

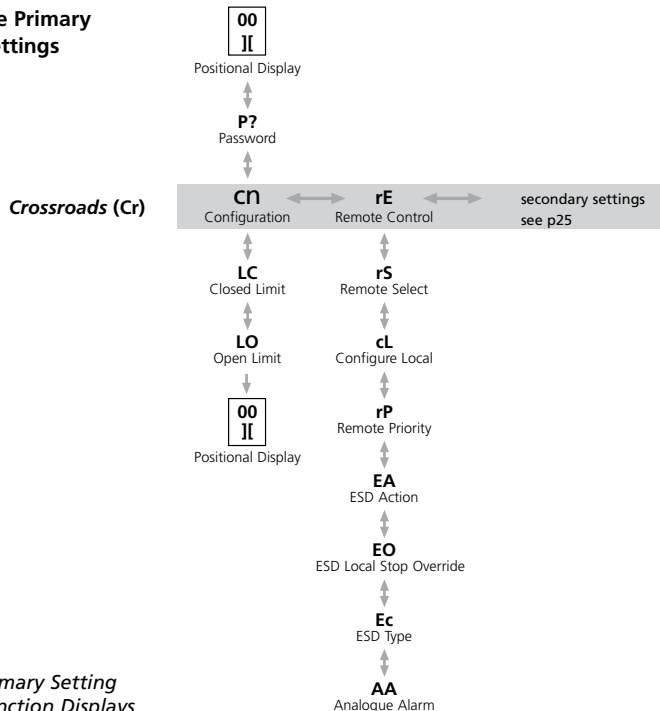
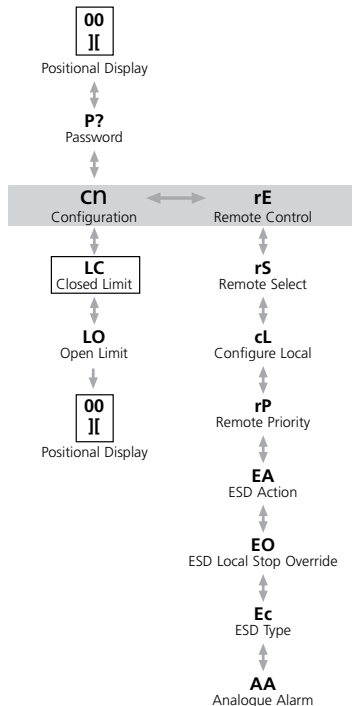


Fig. 8.2 Primary Setting Function Displays

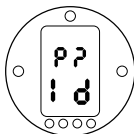
Primary Functions Contents

		page
LC	Closed Limit	19
LO	Open Limit	20
rE	Remote Control Menu	21
rS	Remote Select	22
cL	Configure Local	23
rP	Remote Priority	23
EA	ESD Action	24
EO	ESD Local Stop Override	24
Ec	ESD Type	25
AA	Analogue Signal Failure Action	25

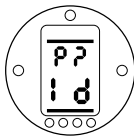
The actuator can be factory set to be clockwise or anti-clockwise to close.



From the normal position display, using the setting tool, press the **↓** key. The display will change to:



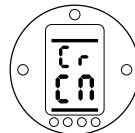
Assuming that the default password **[Id]** is still in use press the **←** key to enter the default password. The display will change to:



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 **←** key.

Press the **↓** key. The display will change to:

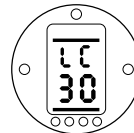


If the Open and Close limits have been set previously the **→** key can be pressed now to reach the final Primary Settings and the Secondary Settings menus.

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 **↓** key and the display will change to:

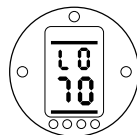


where 30 indicates 30% of total available positional feedback span.

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

PRESS THE **↓ KEY** to reach the Open Limit **(LO)** menu.

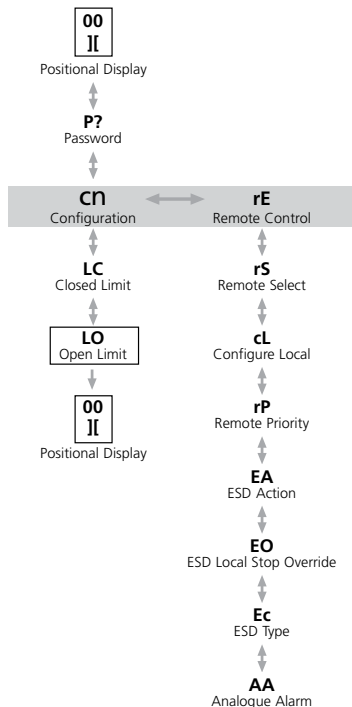
Move the actuator electrically using local controls to the valve fully open mechanical limit which in this example can be 72% and back off about 2% by running the actuator in the close direction about 2% so that the display shows the Open limit position as 70% for example.

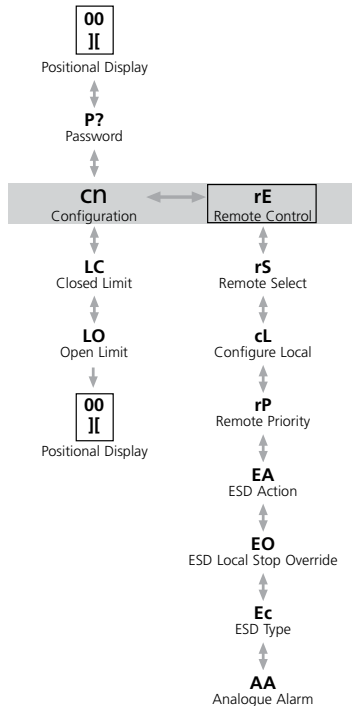


PRESS THE ← KEY and the display will flash indicating that the value has been set. Red LED will illuminate.

PRESS THE ↓ KEY to return to Positional Display.

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

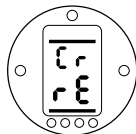




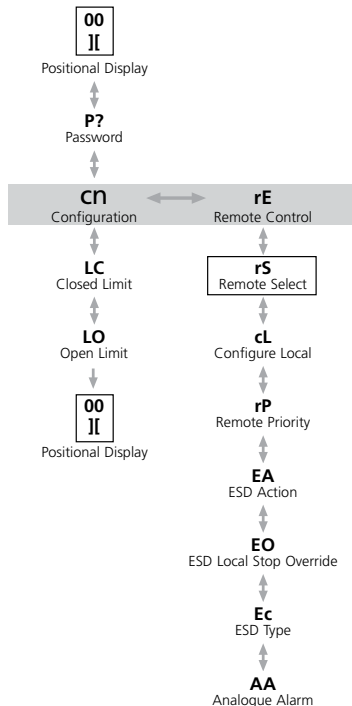
From the Positional Display press the **↓** key to display the password entry screen. If necessary, enter the password and press the **←** key. The display will flash and the horizontal setting bars will appear.

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 **↓** 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.

[OF] No remote control system required, actuator to be subject to local pushbutton control only.

[rE] Hard wired remote control. For example hard wired digital inputs from remote pushbuttons.

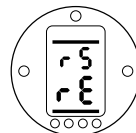
[OP] Option Control. This option should be selected if the actuator is fitted with one of the option card control system options, Pakscan, Profibus, Foundation Fieldbus, DeviceNet or Modbus.

[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 **←** key. The displayed value will flash indicating that it has been set.



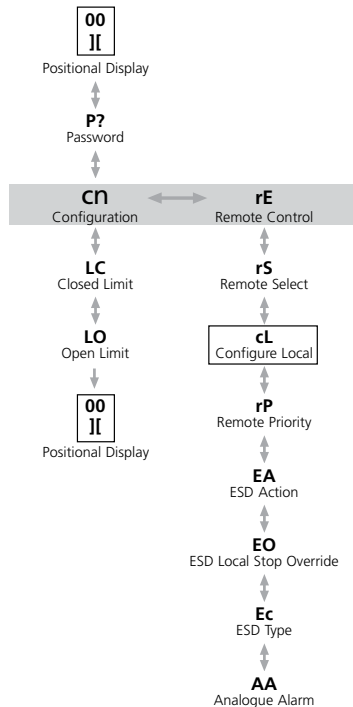
Remote Select – Hard wired remote control

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

Cr
rE

Configure Local

cL

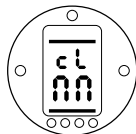


The default setting for Configure Local is push to run control **[Pr]**.

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.



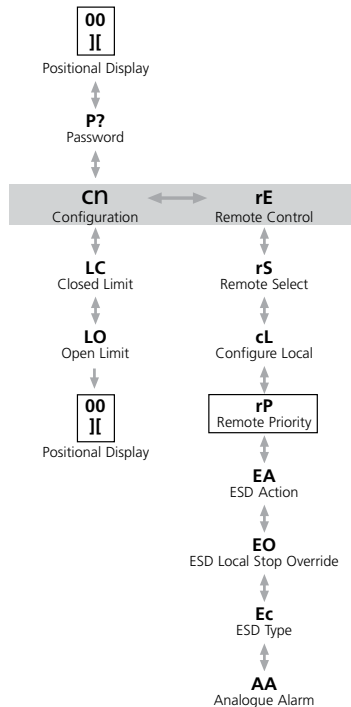
Configure Local – Self-maintained control

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

Cr
rE

Remote Priority

rP



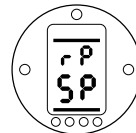
The default setting for Remote Priority is Stayput **[SP]** if both Open and Close remote controls are asserted.

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.



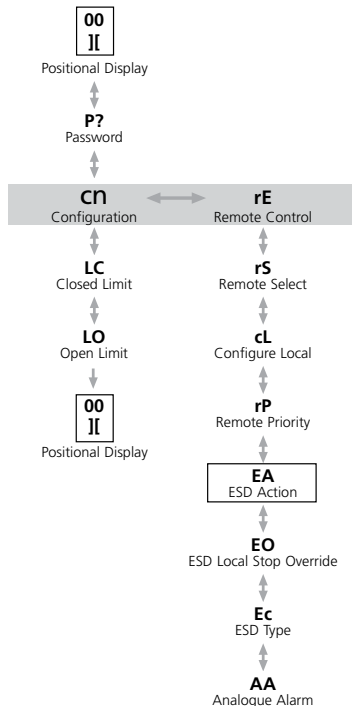
Remote Priority – Stayput

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

Cr
rE

ESD Action

EA



The default setting for ESD Action is De-energise all solenoid valves [E].

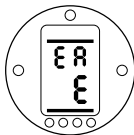
If Close action is required press the + or – key until [C] is displayed.

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 ← KEY.

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



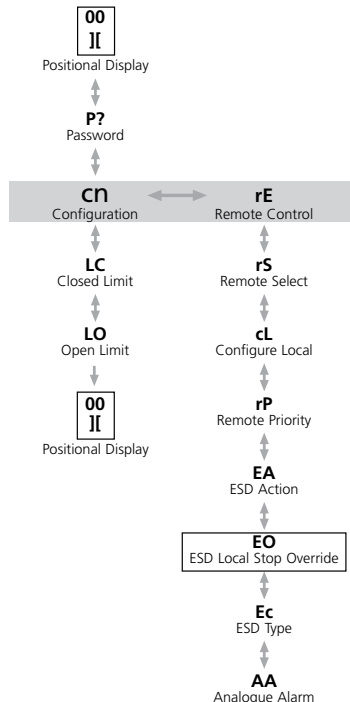
ESD Action – De-energise all solenoid valves

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

Cr
rE

ESD Local Stop Override

EO

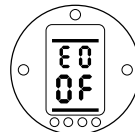


The default setting for ESD Local Stop Override is [OF] no override.

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

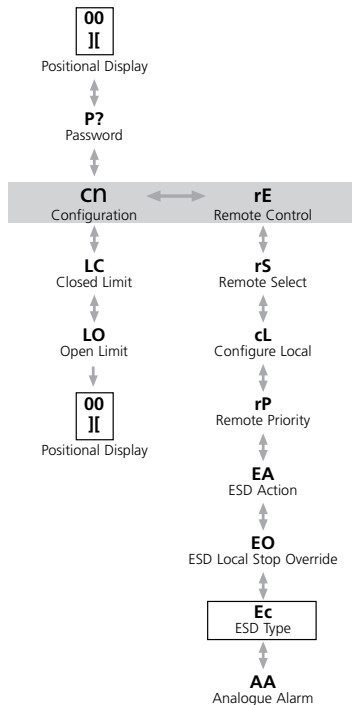
PRESS THE ← KEY.

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



ESD Local Stop Override – Do not override

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

ESD Contact Type **EC**

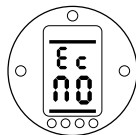
The default setting for ESD Contact Type is **[no]** normally open.

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

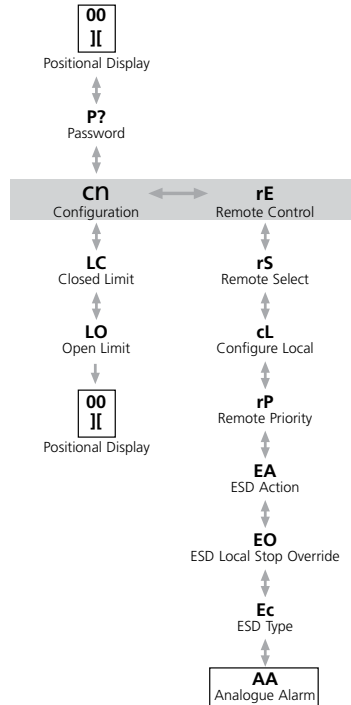
PRESS THE ← KEY.

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.

Analogue Signal Failure Action **AA**

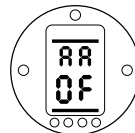
The default setting for Analogue Signal Failure Action is **[OF]** no alarm. This means that in the event of an analogue signal failure there will be no alarm.

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.

9 Commissioning – Secondary Functions



Fig. 9.1

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.

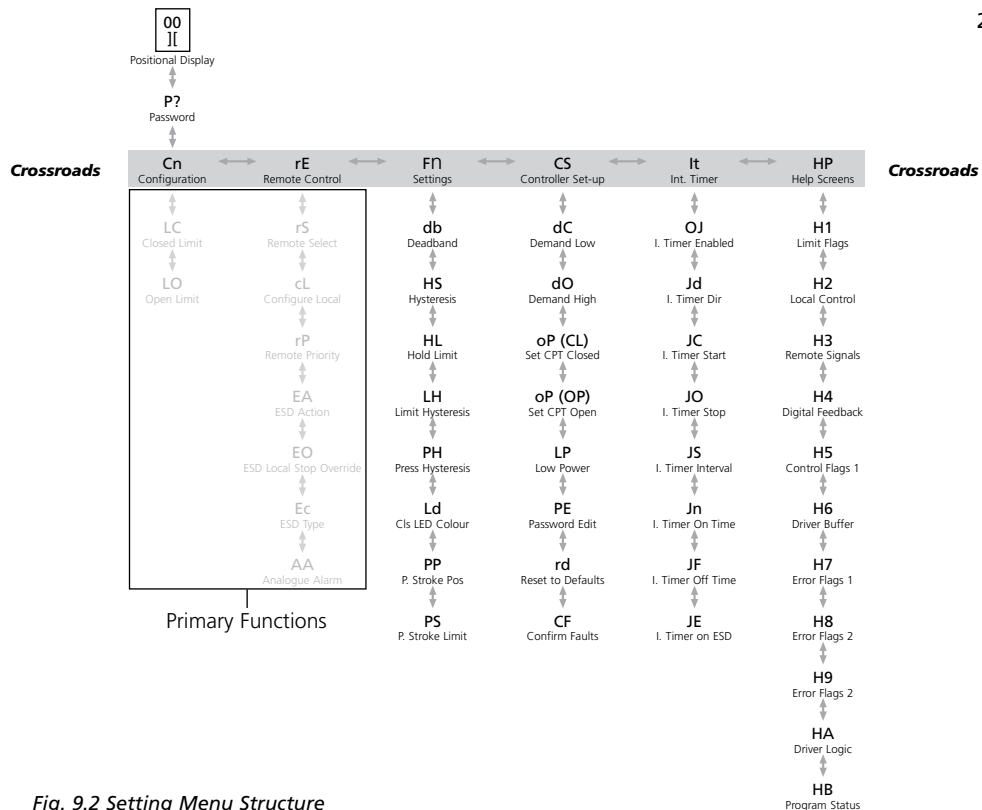


Fig. 9.2 Setting Menu Structure

9 Commissioning – Secondary Functions cont.

Secondary Functions Contents

	page
9.1	Accessing the Secondary Functions 28
9.2	Settings Menu 29
9.3	Controller Set-up Menu 32
9.4	Interrupter Timer Menu 44
9.5	Help Screens Menu 47

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 ➡, ↓, + and – keys.

9.1 Accessing the Secondary Functions

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 access your chosen secondary menu.

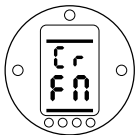
The secondary menus include further control settings and help screens.

9.2 Settings Menu

Cr
FN

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.

Cr
FN

Posn. Deadband **db**

In the display Position Deadband is expressed as a % of operating range where 10 = 1%.

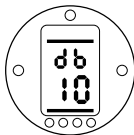
The default value is 1% **[10]** Deadband.

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.



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

Used with analogue control only. Not used for option card.

Cr
FN

Posn. Hysteresis **HS**

In the display Position Hysteresis is expressed as a % of operating range where 10 = 1%

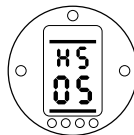
The default value is 0.5% **[05]** Hysteresis.

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.



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

Used with analogue control only. Not used for option card.

Cr
FN

Hold Limit **HL**

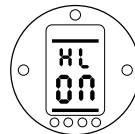
The default setting for Hold Limit is **[On]**, Hold Limit set.

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.



Limit Hysteresis **LH**

In the display Limit Hysteresis is expressed as a % of operating range where 10 = 1%.

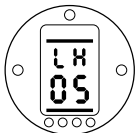
The default value is 0.5% **[05]** Hysteresis for Position Limit.

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 ← KEY.**

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



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



Pressure Hysteresis **PH**

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

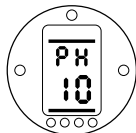
The default value is 10% **[10]** Hysteresis for maintained pressure.

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 ← KEY.**

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



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



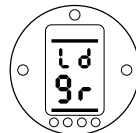
Closed LED Colour **Ld**

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 ← KEY.**

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



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

Partial Stroke PP & PS

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.

Cr Fn Partial Stroke Position PP

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.

Cr Fn Partial Stroke Limit PS

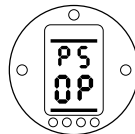
This is the position from which the actuator should be commanded to partial stroke and will be either the Open Limit of travel or the Closed Limit of travel.

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.

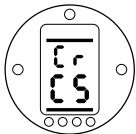
9.3 Controller Set-up Menu

Cr
CS

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 three times to move to the Controller Set-up menu.



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

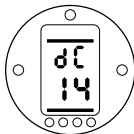
Cr CS Demand Input Calib. dC

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 **← 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 **↓ KEY** to display the next item in the Controller Set-up Menu.

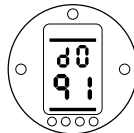
Cr CS Demand Input Calib. dO

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 **← KEY.**

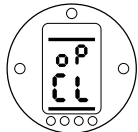
The display will flash and show analogue input as a percentage of full scale.



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

PRESS THE **↓ 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.



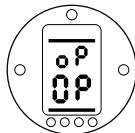
Connect a current measuring device to the CPT terminals. Press the + or – keys until the required output is shown on the measuring device.

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.



Use the + or – keys until the required output is shown on the measuring device.

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,

[OF] 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.

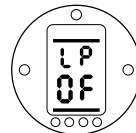
[EL] Extra low power ON. In this mode the function of the monitor relay is inverted and the CPT disabled to further reduce power consumption.

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

When the desired value is on the display

PRESS THE ← KEY.

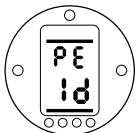
The display will flash to indicate that the desired option has been accepted.



Low power function off

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

The default value is **[Id]**.



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.

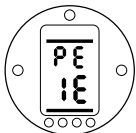
To configure a new password, the actuator must be in setting mode.

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.



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:

Function		Default Setting	
(P?)	Password	Will be reset to [Id]	
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

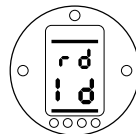
Rotork Skilmatic standard default settings for SI actuators:

Function	Default Setting
Secondary Functions – [CS] Controller Set-up	
(LP) Low Power Mode Selection	[OF] Not Low Power

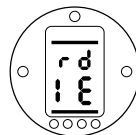
Secondary Functions – [It] Interrupter Timer

(OJ) Interrupter Timer Enable	[OF] Timer Off
(Jd) Interrupter Timer Start Direction	[CL] Start Closing
(JC) Interrupter Timer Close Position	[25] 25% Open
(JO) Interrupter Timer Open Position	[25] 25% Open
(JS) Interrupter Timer Interval	[OF] Time In 100ms
(JE) Interrupter Timer ESD Override	[OF] No Override

Having selected **(rd)** in the **[CS]** Controller Set-up menu, the display will show the current password, for example **[ld]**.



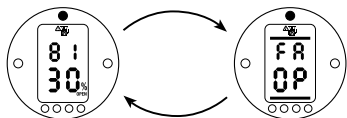
Use the **+** key to increase the password value by 1, **[IE]** in this example.



PRESS THE  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.



Fault Icon

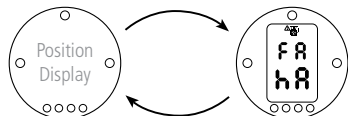
The table below defines these fault displays and shows the associated Monitor Relay and Fault Relay states.

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:

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

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.

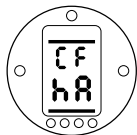
**Electronics Hardware Fault.**

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.

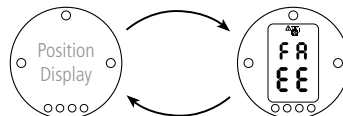
PRESS THE ↓ KEY repeatedly until Confirm Faults (**CF**) is displayed. The display will show the current fault, [**hA**].

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.

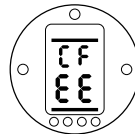
**Checksum Error Within the Electronics Hardware.**

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**].

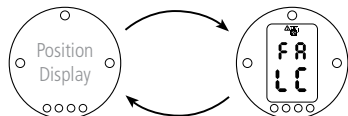
PRESS THE ← KEY to accept the fault.



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.

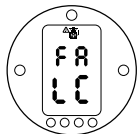
A full functional test should be carried out to ensure any underlying fault does not effect the actuator performance.

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.

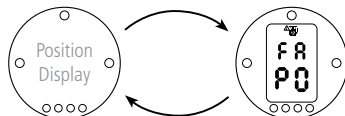
The actuator will not operate.



This problem will clear automatically as soon as the conflict disappears.

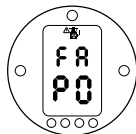
The fault cannot be viewed or accepted through the **(CF)** Menu option

If the fault persists contact Rotork Skilmatic.

**Position Sensor Fault.**

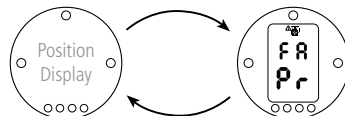
This fault indicates that the Position Sensor is either short circuited or open circuit.

The actuator will not operate.



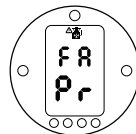
The fault cannot be viewed or accepted through the **(CF)** Menu option.

If the fault persists contact Rotork Skilmatic

**Pressure Sensor Fault.**

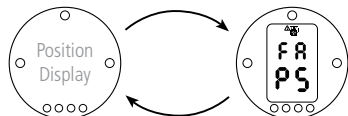
This fault indicates that the Pressure Sensor is either short circuit or open circuit.

The actuator will not operate.



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

If the fault persists contact Rotork Skilmatic

**Unsuccessful Partial Stroke.**

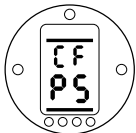
This display indicates that a fault occurred while the actuator was attempting a partial stroke.

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.

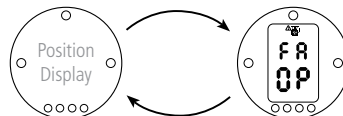
Alternatively, in setting mode and from the Crossroads (**Cr**) display position press the ➡ key until Controller Set-up [**CS**] is displayed.

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.



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.

**Obstruction in Mid Travel.**

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

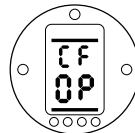
When the fault appears the actuator stops and cannot be re-started in the same direction.

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

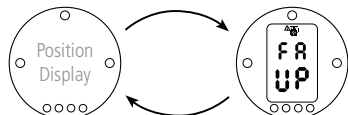
Alternatively, in setting mode and from the Crossroads (**Cr**) display position press the ➡ key until Controller Set-up [**CS**] is displayed.

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 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.**

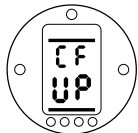
This fault indicates that the valve is obstructed or has become tight at the end of travel preventing the actuator from moving off or onto the set limit of travel, or that the actuator is unable to pump.

Remove the command signal and re-apply it.

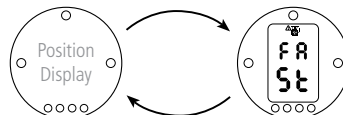
Alternatively, in setting mode and from the Crossroads (**Cr**) display position press the ➡ key until Controller Set-up [**CS**] is displayed.

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.**

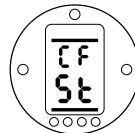
This fault indicates that the actuator has either failed to start or stopped moving after receiving a command signal when in mid travel.

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

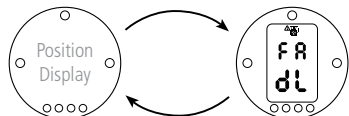
Alternatively, in setting mode and from the Crossroads (**Cr**) display position press the ➡ key until Controller Set-up [**CS**] is displayed.

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.

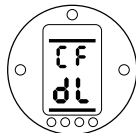
The fault clears automatically when movement in the correct direction is detected.

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

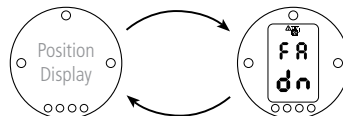
Alternatively, in setting mode and from the Crossroads (**Cr**) display position press the ➡ key until Controller Set-up [**CS**] is displayed.

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.



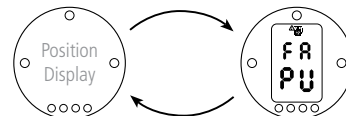
Loss of Demand Signal During Analogue (Positioning) Control.

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.

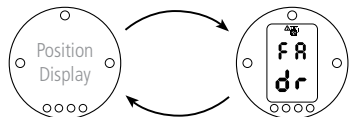
The fault cannot be viewed or accepted through the Confirm Faults (**CF**) Menu option.



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.

9.4 Interrupter Timer Menu

Cr
It

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:

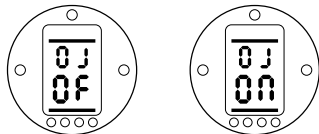
From the **(Cr)** Crossroads display position press the **→** key until Interrupter Timer **[It]** is displayed

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

Cr
It Interrupter
Timer Enable

OJ

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



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.

Cr
It Interrupter
Timer Direction

Jd

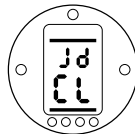
The default for timer direction is **[CL]**, timer operation will **start in closing** and **stop in opening** – pulsing operation around the close position.

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)**.

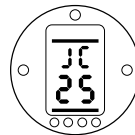
Cr
It Interrupter
Timer Start

JC

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

[11] = valve closed
[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)**.

Cr It Interrupter Timer Stop **JO**

Using the **+** or **-** key select the position for the **TIMER TO STOP WHEN THE VALVE IS OPENING**.

[11] = 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*

PRESS THE ← KEY.

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

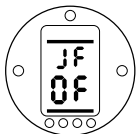
If timing is not required in the opening stroke select **(JO)** to [11].

PRESS THE ↓ KEY to display **(JS)**.

Cr It Interrupter Timer Interval **JS**

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.



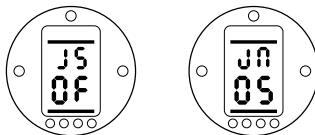
*Interrupter Timer Interval set for
 units of 100ms*

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

PRESS THE ↓ KEY to display **(Jn)**.

Cr It Interrupter Timer On Time **Jn**

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

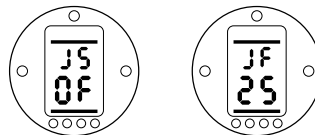


(Jn) set to 05 gives an Interrupter Timer on pulse length of 500ms or 5 seconds depending on whether **(JS)** is set to **[OF]** or **[On]**.

PRESS THE ↓ KEY to display **(JF)**.

Cr It Interrupter Timer Off Time **JF**

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]**.

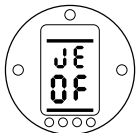
PRESS THE ↓ KEY to display **(JE)**.

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 ↓ 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.

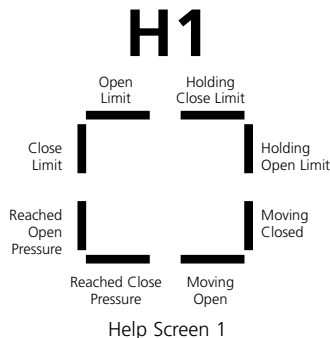
H7 – Fault indicators 1.

H8 – Fault indicators 2.

H9 – Fault indicators 3.

HA – Driver logic indicators.

HB – System status indicators.



Open Limit

Bar On = Actuator has reached Open Limit.

Close Limit

Bar On = Actuator has reached Close Limit.

Reached Open Pressure

Bar On = Actuator has reached Open pressure.

Reached Close Pressure

Bar On = Actuator has reached Close pressure.

Moving Open

Bar On = Actuator is moving in the Open direction.

Moving Closed

Bar On = Actuator is moving in the Closed direction.

Holding Open Limit

Bar On = Actuator is maintaining Open Limit position.

Holding Close Limit

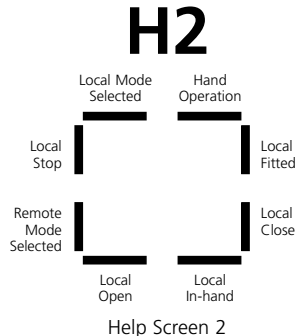
Bar On = Actuator is maintaining Close Limit position.

Note: Bar indication is real time and reactive.



Local Controls

H2



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

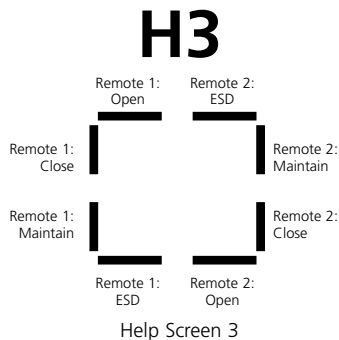
Bar On = Manual override in use.

Note: Bar indication is real time and reactive.



Remote Signals

H3



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.

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'.

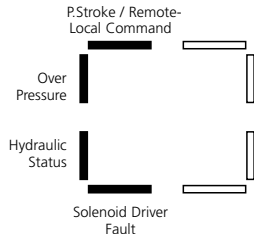
Remote 1: Open

Bar On = Remote Open Signal Present.

Remote 1: Close

Bar On = Remote Close Signal Present.

H4



Help Screen 4

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.

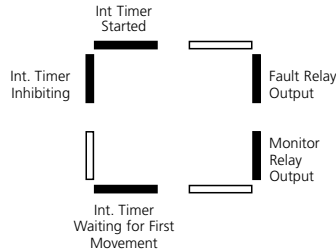
Hydraulic Status

Bar On = Hydraulic system active.

Solenoid Driver Fault

Bar On = Solenoid driver fault present.

H5



Help Screen 5

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.

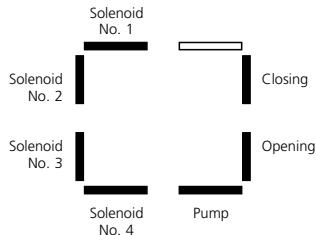
Interrupter Timer Waiting for First Movement

Bar On = Interrupter timer is waiting for first movement.

Monitor Relay Output

Bar On = Monitor relay energised.

H6



Help Screen 6

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.

Opening

Bar On = Actuator opening.

Closing

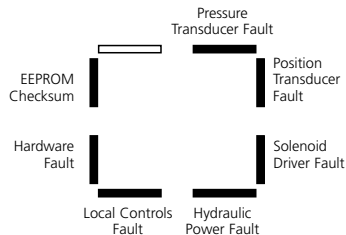
Bar On = Actuator Closing.

Accumulator Under Pressure

Bar On = Hydraulic pressure low.

Note: Bar indication is real time and reactive.

H7



Help Screen 7

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

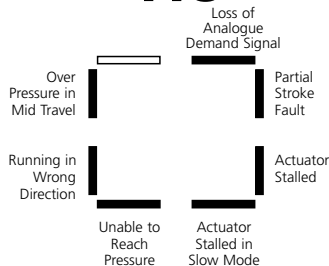
Bar On = Position Transducer error [PU].

Pressure Transducer Fault

Bar On = Pressure Transducer error [Pr].

Note: Bar indication is real time and reactive.

H8



Help Screen 8

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 [dl].

Unable to Reach Pressure

Bar On = Actuator is unable to reach required pressure [uP].

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

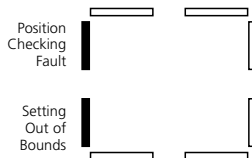
Bar On = Actuator has failed to complete desired movement [PS].

Loss of Analogue Demand Signal

Bar On = Analogue demand signal not present [dn].

Note: Bar indication is real time and reactive.

H9



Help Screen 9

Position Checking Fault

Bar On = Actuator has a position checking fault.

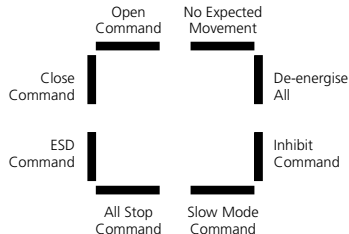
Setting Out of Bounds

Bar On = Actuator settings are out of bounds.

Note: Bar indication is real time and reactive.

Cr HP Driver Logic HA

HA



Help Screen A

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.

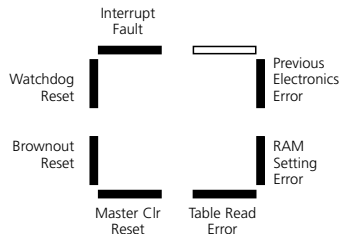
No Expected Movement

Bar On = Actuator has no commands to move.

Note: Bar indication is real time and reactive.

Cr HP System Status HB

HB



Help Screen B

For Rotork Skilmatic use only.

Note: Bar indication is real time and reactive.

10 Maintenance, Monitoring and Troubleshooting

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 -20°C to $+60^{\circ}\text{C}$.

Low Temperature Environments 20 cSt Silicone Fluid.

This oil is suitable for actuators operating in ambient temperatures in the range -40°C to $+60^{\circ}\text{C}$.

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

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

In all cases check local authority regulation before disposal

11 Weights and Measures

Actuator Model	Nett Weight kg/lbs	Actuator Model	Nett Weight kg/lbs
SI-1-Q31	27/60	SI-1-L80/40	55/122
SI-1-Q41	30/66	SI-1-L100/40	75/166
SI-1-Q51	38/84	SI-1-L125/65	85/188
SI-1-Q60	42/93	SI-1-L160/65	120/265
SI-1-Q61	42/93	SI-1-L200/65	160/353
SI-2-Q70	98/216	SI-2-L200/105	220/485
SI-2-Q80	127/280	SI-2-L250/105	250/551
SI-2-Q100	325/717	SI-2-L280/105	270/596
SI-2-Q110	335/739	SI-2-L320/105	290/640
SI-2-Q120	560/1235	SI-2-L350/105	320/706
SI-2-Q130	800/1764	SI-2-L400/105	Consult Skilmatic
		SI-2-L450/105	Consult Skilmatic

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.

12 Skilmatic SI Approvals

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.

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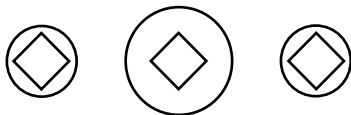
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ATTENTION: RED PLASTIC PLUGS IN CONDUIT ENTRIES ARE FOR TRANSIT ONLY. FOR LONG TERM PROTECTION FIT SUITABLE METAL PLUGS.

ATTENZIONE: I TAPPI IN PLASTICA ROSSA PER L'ENTRATA CAVI SONO SOLO TEMPORANEI. PER UNA PROTEZIONE PERMANENTE PREGO SOSTITUIRLI CON APPOSITI TAPPI METALLICI.

ATENCION: LOS TAPONES ROJOS DE PLASTICO EN LAS ENTRADAS DE CABLE SON UNICAMENTE PARA TRANSPORTE. PARA PROTECCION PERMANENTE COLOCAR TAPONES METALICOS APROPIADOS.

ACHTUNG: DIE ROTEN PLASTIKSTOPFEN SIND NUR FÜR DEN TRANSPORT GEEIGNET. FÜR DAUERHAFTEN SCHUTZ SIND DIESE GEGEN GEEIGNETE BLINDSTOPFEN AUSZUTAUSSCHEN.

ATTENTION: LES BOUCHONS PLASTIQUES ASSURENT UNE PROTECTION TEMPORAIRE. POUR UNE PROTECTION DEFINITIVE UTILISER DES BOUCHONS METALLIQUES.

注意：コンジット口の赤色プラグは、輸送用を目的としたプラグです。
長期に渡る保護の場合、適切なメタルプラグをご使用ください。

注意：接线端红色塑料封口仅为运输途中使用。
长期正常保护时请用金属封口。

주의: 배선인입구의 빨간색 플라스틱 플러그는 오직 임시용입니다.
오래 보관하기 위해서는 규격에 맞는 금속 플러그를 사용하십시오.

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