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.

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

* Manual and electrical (local and remote) 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.

Refer to Publication E180E2 for repair, overhaul and spare part instructions.

THE ROTORK IQ RANGE – THE FIRST VALVE ACTUATOR 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 torque levels, position limits and all other control and indication functions can be made safely, quickly and conveniently, even in hazardous locations. The IQ allows commissioning and adjustment to be carried out with the main power supply to the actuator switched on or off.

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

Instantaneous valve torque and position can be monitored on the actuator with a single key press of the Setting Tool.

The on board Datalogger captures operational and valve torque data enabling informed maintenance choices to be made. IQ Insight software for PC and PDA allows the Datalogger to be interrogated, as well as the complete actuator set up to be configured and recorded.

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 IQ and other Rotork actuator ranges.
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This manual is produced to enable a competent user to install, operate, adjust and inspect Rotork IQ range valve 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 (or Div 1 and Div 2) explosive atmospheres only. It should not be installed in atmospheres where gases are present with an ignition temperature less than 135°C, 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 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:**

**Motor Temperature**

With excessive use the motor surface temperature could reach 132°C (270°F).

**Thermostat Bypass**

If the actuator is configured to bypass the motor thermostat, when using the ESD function, the hazardous area certification will be invalidated.

**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 remote control and indication supplies must be derived from a supply which is designated as installation category (overvoltage category) II as defined in BSEN 61010 (Safety Requirements For Electrical Equipment for measurement, control and laboratory use).

**Enclosure Materials**

IQ10 to IQ35 are manufactured from aluminium alloy with stainless steel fasteners and the thrust bases are manufactured in cast iron. IQ40 to IQ95 enclosures are manufactured in aluminium alloy and cast iron with stainless steel fasteners and the thrust bases are manufactured in cast iron.

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

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

**WARNING:** Operating by Hand

With respect to handwheel operation of Rotork electric actuators, see warning on p3.
3.1 Operating by Hand

**WARNING**

With respect to handwheel operation of Rotork electric 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 more force when closing or opening the valve as this may cause damage to the valve and/or actuator or may cause the valve to become stuck in the seated/backseated position.

To engage handwheel drive depress the Hand/Auto lever into “Hand” position and turn the handwheel to engage the clutch. The lever can now be released when it will return to its original position. The handwheel will remain engaged until the actuator is operated electrically when it will automatically disengage and return to motor drive. If required the Hand/Auto lever can be locked in either position using a padlock with a 6.5mm hasp.

3.2 Operating Electrically

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.

Do not operate the actuator electrically without first checking, using the infra-red Setting Tool, that at least the Primary Settings have been made *(refer to Section 8 page 20)*.

**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.

Fig. 3.1

**Local Control**

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

**Remote Control**

Rotate the red selector to the Remote position (clockwise), this gives remote...
3.3 Display–Local Indication

The liquid crystal display screen has 2 modes of position indication:
1. Valve position – power on
2. Valve position – power off

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 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 on request.

Open
Red indicator and open symbol displayed

Mid Travel
Yellow indicator and percentage open value displayed

Closed
Green indicator and closed symbol displayed

With the main power supply switched off, the liquid crystal display screen is powered by a battery and continues to display actuator position. However, the battery does not support screen backlighting, or position indicator lamps.
3.4 Display–Alarm Indication

The IQ display incorporates valve, control system, actuator and battery alarm indication in the form of four display icons. Located in the top portion of the display, each icon represents certain alarm conditions. Standard help screens are also available to assist in determining the actuator operational and alarm status (refer to Help Screens page 67).

Valve Alarm

The valve alarm icon, Fig 3.6, is displayed when a valve problem causes the actuator to “trip-off” due to the configured torque value being developed (refer to [TC]/[TO] pages 25/26). The possible causes are:

- Valve tight or obstructed in mid travel.
- Valve stuck or jammed
- Valve process conditions changed (increase in pressure, flow etc.)

Once the actuator has tripped off on torque, electrical operation in the same direction is inhibited. The icon will remain displayed until movement in the opposite direction takes place.

The valve alarm icon will not be displayed when stopping at end of travel for valves configured to torque seat or torque back seat at end of travel (refer to [C2]/[C3] pages 23/24).

Try handwheel operation of the valve to “feel” for stiffness (refer to page 3).

Control Alarm

Local and Remote operation will be inhibited while an active ESD or interlock signal is present (refer to [A1] ESD Action page 34, [A8] External Interlocks page 36 and Conditional Control [A9] page 36.)

Investigate the operational conditions of the actuator remote control system.

Fig. 3.6

Fig. 3.7
Actuator Alarm

Fig. 3.8
The actuator alarm icon, Fig. 3.8, is displayed when an active actuator alarm is present.

Electrical operation will be inhibited while an alarm is present. The possible causes are:
- Transformer thermostat tripped
- Battery low on power up*  
- Power supply fault

*see Battery Alarm

(To identify the specific cause of the alarm refer to Help Screens pages 67-71).

Battery Alarm

Fig. 3.9
The battery alarm icon, Fig. 3.9, is displayed when the actuator detects its battery as being low, discharged or missing.

If, on power up, the actuator detects a discharged battery and actuator power loss inhibit feature [OS] is enabled (refer to page 62), both battery and actuator alarm icons (Fig.3.8 and 3.9) will be displayed. Electrical operation will be inhibited.

When the battery alarm icon is displayed, the battery should be replaced immediately (refer to page 65).

The actuator checks the battery status at approximately 10 minute intervals. After replacing a battery the alarm icon will continue to be displayed until the next check indicates the battery is healthy. This may take up to 10 minutes.
Preparing Drive Bush

4.1 IQ10 to IQ35
Thrust Base Types A and Z

Removal of Drive Bush for Machining

Turn actuator onto its side, remove the two cap-headed screws holding base plate onto thrust base, pull out the drive bush complete with its bearing assembly.

Before machining the drive bush the thrust bearing must be removed.

IQ10, IQ12 and IQ18 actuators have a sealed thrust bearing located on the drive bush and retained by the steel bearing stop ring. The bearing stop ring is locked with one socket set screw.

IQ20, IQ25 and IQ35 have a thrust race ball bearing within the steel bearing housing, located on the drive bush and retained by the steel bearing stop ring. The bearing is sealed within its housing by O-rings located on the drive bush and on the bearing stop ring. The bearing stop ring is locked with two socket set screws.

1. Locate and loosen the locking socket set screw(s) in the bearing stop ring.
2. Unscrew the bearing stop from the drive bush. Slide the bearing off the drive bush. Keep the drive bush and stop ring in a safe clean place.
3. For all sizes ensure the drive bush male thread (stop ring) is not damaged during machining. For sizes IQ20, IQ25 & IQ35, ensure the O-ring located in the drive bush is not damaged during machining. Machine drive bush to suit the valve stem, allowing generous clearance on the screw thread for rising stem valves.

Re-assembly

1. Remove all swarf from the drive bush, ensuring the O-rings on the drive bush and bearing stop ring (where fitted) are undamaged, clean and greased.
2. Slide the bearing assembly onto the drive bush and ensure it is fitted down to the drive bush shoulder.
3. Screw the stop ring with the locking socket set screw(s) uppermost on to the drive bush until it comes to a stop – hand tight and lock with the locking socket set screws. The locking socket set screws must be done up tight to prevent the assembly working loose, as shown in Fig 4.2. Refer to the table below for required tightening torques.

<table>
<thead>
<tr>
<th>Socket set screw size</th>
<th>Allen key bit size</th>
<th>Torque Nm</th>
<th>Torque lbs/ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>M4</td>
<td>M2</td>
<td>2.2</td>
<td>1.62</td>
</tr>
<tr>
<td>M6</td>
<td>M3</td>
<td>7.8</td>
<td>5.75</td>
</tr>
</tbody>
</table>

4. Refit the drive bush assembly into the base casting on the actuator, ensuring that the slots in the drive bush are located into the drive dogs of the hollow output shaft.
5. Refit the base plate and secure with cap-headed screws.

Fig. 4.1 Components of Type A Thrust Base

Fig. 4 Bronze Drive Bush Fitted into Thrust Taking Base

Fig. 4.2
4.2 IQ10 to IQ35
Non-Thrust Base Type B

Undo the four set screws securing the base plate to the gearcase and remove the base plate.

The drive bush and its retaining clip can now be seen.

**Types B3 and B4 removal:**
(refer to Fig. 4.3)

Using external circlip pliers, expand the circlip while pulling on the drive bush. The drive bush will detach from the actuator centre column with the circlip retained in its groove.

**Type B1**
(Refer to Fig. 4.4)

The procedure for removal and refitting of the B1 drive bush is the same as for B3 and B4, However the circlip is replaced with a custom spring clip. The spring clip operates in the same manner as the B3/B4 circlip but is expanded using long-nose pliers.

4.3 IQ40 to IQ95
Thrust Base Types A and Z

Removal of Drive Bush for Machining

Engage “hand” and turn handwheel until retainer set screw is visible through hole in actuator base.

**Fig. 4.4**

**Fig. 4.5 Locating Set Screw**

Loosen set screw and unscrew retainer using hammer and punch. Remove drive bush and machine to suit valve stem or gearbox input shaft.

Allow generous clearance on screw thread for rising stem valves.

**Fig. 4.6 Removal of Retainer**

**Fig. 4.7 Type A Drive Bush**

If the actuator has a type A drive bush (Fig. 4.7) this can be fitted in position 1 or 2 to suit the position of the valve mounting flange.

**Fig. 4.8 Type A Drive Bush in Position 1**
If the actuator has a type Z3 drive bush (Fig. 4.10) this can only be fitted below the actuator base (Fig. 4.11).

**Re-Assembly**

Having confirmed the position required, insert the machined drive bush ensuring that the actuator output shaft dogs are in full engagement with the bush. Fit drive bush retainer securely, turning clockwise until fully tightened using hammer and punch. Rotate by hand wheel to align retainer set screw with hole in the side of base and tighten.

**4.4 IQ40 to IQ95 Non-Thrust Base Type B**

**Type B1**

Output shaft bored and keyed to ISO 5210 standard. There is no drive bush to machine.
Mounting the Actuator

(Refer to Weights and Measures page 74 for actuator weight.)

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

If it is necessary to lift the actuator using mechanical lifting equipment certified slings should be attached as indicated in Fig. 5 for vertical valve shafts and Fig. 5.1 for horizontal shafts.

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.

A suitable mounting flange conforming to ISO 5210 or USA Standard MSS SP101 must be fitted to the valve.

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.
5.1 Rising Stem Valves – Top Mounting

a) Fitting the Actuator and Base as a Combined Unit – All Actuator Sizes

Fit the machined drive bush into the thrust base as previously described, lower the actuator onto the threaded valve stem, engage “hand” and wind the handwheel in the opening direction to engage the drive bush onto the stem. Continue winding until the actuator is firmly down on the valve flange. Wind two further turns, fit securing bolts and tighten fully.

b) Fitting Thrust Base to Valve – Actuator Sizes 10 to 35 only

Fit the machined drive bush into the thrust base as previously described. Remove the thrust base from the actuator, place it on the threaded valve stem with the slotted end of the drive bush uppermost and turn it in the opening direction to engage the thread. Continue turning until the base is positioned onto the valve flange. Fit securing bolts but do not tighten at this stage. Lower the actuator onto the thrust base and rotate the complete actuator until the drive dogs on the actuator output shaft engage into the drive bush. Actuator flange should now be flush with base flange.

5.2 Valve with Gearbox – Side Mounting

Check that the mounting flange is at right angles to the input shaft, and that the drive bush fits the shaft and key with adequate axial engagement. Engage “hand”, offer up actuator to the input shaft and turn handwheel to align keyway and key. Tighten mounting bolts.

5.3 Non-Rising Stem Valves – Top Mounting

Treat as for side mounting except that when thrust is taken in the actuator, a thrust nut must be fitted above the drive bush and securely tightened.

5.4 Handwheel Sealing

Ensure that sealing plug in centre of handwheel (or spindle cover tube depending on which is fitted) is sealed with PTFE tape and fully tightened, ensuring that moisture does not pass down the centre column of the actuator.
5.5 IQM Modulating Actuators
The IQM range of actuators are suitable for modulating control duty of up to 1200 starts per hour in accordance with IEC 34-1 to S4 50%.

IQM actuators have a dynamic braking facility as standard. If mechanical overrun of the actuator and valve prove to be excessive for accurate control, the brake can be enabled by fitting a link to the actuator terminal block as indicated by the wiring diagram. With dynamic braking enabled, motor heating effects increase and therefore the number of actuator starts should be reduced to prevent motor thermostat tripping (refer to publication E 410E for more information).

Commissioning of IQM range actuators is identical to the standard IQ (refer to Sections 7, 8 and 9 commencing on page 16).

5.6 IQML Linear Drive Unit
Consists of a lead screw assembly arrangement attached to the base of the actuator in order to provide a linear output stroke between 8mm (⅜ in) minimum and 120mm (4¾ in) maximum.

The IQML can be supplied with or without a yoke mounting adaptor. This adaptor consists of four pillars and a base flange to suit the valve.

5.7 IQML Adjusting Linear Stroke
With actuator securely fitted to valve, but with the linear drive disconnected, ensure valve is at its fully closed (down) position.

Remove cover tube from actuator handwheel, locate the down stop adjustment on the linear drive unit and with two spanners loosen the lock nut, run the lock nut and tubular down stop to the end of the thread.
5.7 IQML Adjusting Linear Stroke continued

Turn the actuator handwheel clockwise, linear drive will move down towards the valve spindle, couple linear drive to valve spindle.

Turn the tubular down stop clockwise into the actuator until it comes to a mechanical stop. If the valve must close onto its seat by “TORQUE ACTION” then back off (anti-clockwise) the down stop by one third of one turn (equivalent to 1mm). Run the lock nut down onto the tubular down stop and tighten with two spanners. There is no “up stop” (open) on the linear drive unit, the mechanical stop in the valve will give this position. Refit the top cover tube to the handwheel using PTFE tape to seal the thread.

The linear drive unit is pre-packed with grease type Rocol MTS 1000, use this or an equivalent high temperature-bearing grease.

A grease nipple is situated in the base of the actuator to enable lubrication of the lead screw. Periodically, depending on usage and temperature, apply two pumps of a grease gun.
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 overcurrent protection devices rated in accordance with Rotork publication No. E130E Electric motor performance data for IQ range actuators.

WARNING:
Actuators for use on phase to phase voltages greater than 600V a.c. must not be used on supply systems such as floating, or earth-phase systems, where phase to earth voltages in excess of 600V a.c. could exist.

6.1 Earth/Ground Connections
A lug with a 6mm diameter hole is cast adjacent to the conduit entries for attachment of an external protective earthing strap by a nut and bolt. An internal earth terminal is also provided, however it must not be used alone as the protective Earth Connection.

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

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

The wiring code card fixed in the cover is particular to each actuator and must not be interchanged with any other actuator. If in doubt check the serial number on the code card with that of the actuator.

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

Remove 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.
6.4 Connecting to Terminals
On EEExde enclosure units connections to the power and control terminals must be made using AMP type 160292 ring tabs for power and earth terminals and AMP type 34148 ring tabs for the control 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 power terminal screen.

Begin by connecting these cables and replace screen.

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.
7.1 The Setting Procedure
The Rotork IQ range of actuators is the first that enables commissioning to be carried out without removing covers.

Setting torque, limit and other functions is 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.

Commissioning may be carried out with main power switched on or off. Refer to page 20 for Power Off Setting.

The setting procedure is divided into two stages:

1. Primary Functions
Settings for end of travel limit actions, torque values, limit positions etc.

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

All IQ actuator functions are configured before dispatch to Rotork 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 9.16 page 63).

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.

Note: The Primary Functions must be commissioned first.
7.2 The Setting Tool

Specification

<table>
<thead>
<tr>
<th>Enclosure</th>
<th>IP67</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certification</td>
<td>EEx ia IIC T4 (intrinsically safe)</td>
</tr>
<tr>
<td></td>
<td>FM, INT SAFE, Class I &amp; II Div 1 Groups A B C D E F G, T4A</td>
</tr>
<tr>
<td></td>
<td>CSA, Exia, Class I, II Div 1 Groups A B C D</td>
</tr>
<tr>
<td>Power supply</td>
<td>9V Battery (supplied and fitted)</td>
</tr>
<tr>
<td>Operating range</td>
<td>0.75m (from actuator display window)</td>
</tr>
</tbody>
</table>

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. Enter Key | Enter displayed value or option setting

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

Infra-red local operation (when enabled)

5. ‭ Key | Stop actuator
6. ‣ Key | Open actuator
7. ‡ Key | Close actuator
8. Infra-red Transmitter Window

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

PRESS THE ↓ KEY.
The actuator display will change and the Torque & Position display will be seen. (For instantaneous torque & position monitoring, refer to Section 10, page 66.)

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 [ld]. 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 enter key.

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

Default Password, Setting Mode Enabled

7.5 New Password [PC]
To configure a new password, the actuator must be in setting mode with the password display – setting mode enabled – showing,

PRESS THE → KEY.
The display will change to [PC]. Using the + or - key scroll through the available passwords until the desired password is displayed.

PRESS THE ← KEY.

Password Changed to [IE]

NOTE: The new password becomes effective the next time setting mode is entered.

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 procedure 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 19).
7.7 Procedure Branch – Crossroad [Cr]

To access the Primary Function settings press the arrow Q key (refer to Section 8 Commissioning Primary Functions page 20).

To access the Secondary Function settings press the arrow O key (refer to Section 9 Commissioning Secondary Functions page 31).

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 FIRST function on the next level DOWN within the procedure.

The arrow key will always display the NEXT function on the SAME level and will wrap around the functions on the same level.

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.

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.

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 Q and O arrow keys together.

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


Typical Actuator Function Display Setting Mode Enabled
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.

ELECTRICAL OPERATION MUST NOT TAKE PLACE UNTIL THE PRIMARY SETTINGS HAVE BEEN MADE AND CHECKED.

This instruction assumes setting mode has been entered (refer to section 7.4 page 18).

**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 Q key and, when appropriate, the O 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 21). The right-hand side of Fig. 8.1 explains the function of each LCD display.

**Power Off Setting**

IQ allows settings to be viewed and set without main power. To enable this function, engage handwheel drive and rotate until the output drive moves (refer to page 3). The Setting Tool can now be used. As long as a Setting Tool key press takes place within the 30 seconds timeout period, Power Off Setting will remain enabled. If no infra-red Setting Tool communication takes place the display will return to indicating position. The actuator must then be operated by handwheel to re-enable Power Off Setting.

**Settings and operation must be verified by electric operation and function test of the actuator to ensure correct operation.**
Viewing the Primary Function Settings

**Position Display**
(This may be an open or closed symbol or a % open value.)

**Torque and Position Display**

**P? → PC → Ir → Lc**
Password → Password Change → IrDA → Cell Phone

**cr**
Procedure Branch (crossroad)

**c1 → c2 → c3**
Direction to Close → Close Action → Open Action

**tC → tO**
Torque Value Closing → Torque Value Opening

**LC → LO**
Limit Closed → Limit Open

**Position Display**

Refer to Section 7 Commissioning

---

**PRIMARY FUNCTIONS CONTENTS**

- C1  Direction to Close  22
- C2  Close Action  23
- C3  Open Action  24
- tC  Torque Value Closing  25
- tO  Torque Value Opening  26
- LC  Set Limit Closed  27
- LO  Set Limit Open  27

The actuator can be configured to be clockwise or anti-clockwise to close.
Manually operate actuator and valve to establish correct closing direction. If the handwheel labelling is found to be incorrect please apply to Rotork for conversion labels.

Using the + or - key, display character conforming to correct closing direction.

Having ensured that the display corresponds to the established closing direction

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

PRESS THE ➔ KEY.
The actuator can be configured to close on torque for seating valves and limit for non-seating valves.

(Refer to valve manufacturer for recommended selection).

In the absence of valvemaker instructions refer to the following table

<table>
<thead>
<tr>
<th>Valve type</th>
<th>Close</th>
<th>Open</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wedge gate</td>
<td>“torque”</td>
<td>“limit”</td>
</tr>
<tr>
<td>Globe</td>
<td>“torque”</td>
<td>“limit”</td>
</tr>
<tr>
<td>Butterfly</td>
<td>“limit”</td>
<td>“limit”</td>
</tr>
<tr>
<td>Thru conduit</td>
<td>“limit”</td>
<td>“limit”</td>
</tr>
<tr>
<td>Ball</td>
<td>“limit”</td>
<td>“limit”</td>
</tr>
<tr>
<td>Plug</td>
<td>“limit”</td>
<td>“limit”</td>
</tr>
<tr>
<td>Sluice gate</td>
<td>“limit”</td>
<td>“limit”</td>
</tr>
<tr>
<td>Penstock</td>
<td>“limit”</td>
<td>“limit”</td>
</tr>
<tr>
<td>Parallel slide</td>
<td>“limit”</td>
<td>“limit”</td>
</tr>
</tbody>
</table>

Using the + or – key, display the desired option.

Using the + or – key, display the desired option.

NOTE: When set to close on torque, the actuator will apply the value of torque as set for [tC] in seating the valve (refer to [tC] page 25).

Using the + or – key, display the desired option.

NOTE: When set to close on torque, the actuator will apply the value of torque as set for [tC] in seating the valve (refer to [tC] page 25).

Having selected the required option

PRESS THE ← KEY.

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

PRESS THE → KEY.
The actuator can be configured to open on torque for back seating valves or limit for non back seating valves. Refer to valve manufacturer for recommended setting. In the absence of valvemaker instructions set “Open Limit”.

Using the + or − key display the desired option.

[Ot] in the Setting Field Indicates Open on Torque - default setting.

[Ol] in the Setting Field Indicates Open on Limit

NOTE: When set to open on torque, the actuator will apply the value of torque as set for [tO] in back seating the valve (refer to [tO] page 26).

PRESS THE ← KEY.
The displayed option will flash, indicating that it has been set.
PRESS THE → KEY.
The value of torque available in the close direction can be configured. Refer to valve manufacturer for recommended value.

The closing torque value can be varied between 40% and Rated, in 1% increments.

Using the + and - keys display recommended value. In the absence of a recommended torque value, try a low setting and increase until satisfactory valve operation is achieved.

**PRESS THE ← KEY.**

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

Should the set value of torque be developed in closing, the actuator will torque trip and stop.

**PRESS THE → KEY.**

**NOTE:** Rated torque is quoted on the actuator nameplate.
The value of torque available in the open direction can be configured. Refer to valve manufacturer for recommended value.

The opening torque value can be varied between 40% and Rated, in 1% increments. In addition “Boost” can be configured when no open torque protection is required.

**BOOST SHOULD NOT BE SELECTED WHEN THE ACTUATOR HAS BEEN CONFIGURED TO OPEN ON TORQUE** (refer to [C3] page 24) unless back seating at Rated torque is acceptable.

Using the + and - keys display the recommended torque value.

In the absence of a recommended torque value, try a low setting and increase until satisfactory valve operation is achieved.

**NOTE:** Rated torque is quoted on the actuator nameplate. Boost torque is at least 140% of Rated torque.

Should the set value of torque be developed in opening, the actuator will torque trip and stop.

**PRESS THE ↓ KEY.**

In checking mode, on pressing the ↓ key after reviewing open torque setting, the display will revert to valve position.
NOTE: It is possible to set the Open Limit Position [LO] first.

With [LC] displayed

![Limit Closed](image)

Move valve manually to the closed position. Allow for overrun by winding actuator output open by two handwheel turns.

PRESS THE ← KEY.

The two bars will flash and the closed indicator lamp will illuminate, indicating closed limit position has been set.

PRESS THE → KEY.

To check closed limit position hand wind valve open until the amber lamp illuminates. Wind valve back closed until the closed lamp illuminates.


With [LO] displayed

![Limit Open](image)

Move valve manually to the open position. Allow for overrun by winding actuator output closed by two handwheel turns.

PRESS THE ← KEY.

The two bars will flash and the open indicator lamp will illuminate, indicating open limit position has been set.

PRESS THE ↓ KEY.

The open symbol (refer to Fig. 3.3. page 4) should now appear.

If the procedure has been followed as described, the positional display will indicate that the actuator is in the open position.

Select Remote control momentarily, using the red selector to exit setting procedure and then select required control: Local, Stop or Remote.

With the correct settings made electric operation can now be carried out safely.
The Secondary Functions can be configured to suit site control and indication requirements. It is important that Primary Functions such as limits and torque switch settings are set before work commences on commissioning the Secondary Functions (refer to page 20). 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.

**Power Off Setting**  
IQ allows settings to be viewed and set without main power. To enable this function, engage handwheel drive and rotate until the output drive moves by one turn (refer to page 3). The Setting Tool can now be used. As long as a Setting Tool key press takes place within the 30 seconds timeout period, Power Off Setting will remain enabled. If no infra-red Setting Tool communication takes place the display will return to indicating position. The actuator must then be operated by handwheel to re-enable Power Off Setting.

**Settings and operation must be verified by electric operation and function test of the actuator to ensure correct operation.**
Fig. 9.1 Secondary Functions
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.

The actuator wiring diagram will indicate any options fitted.

Options Setting Tool Local Control [Or] and Power Loss Inhibit [Os] are standard features, their use being optional.

In order to display the Secondary Functions it is necessary to press the key until [Cr] appears.

If you have chosen to enter Secondary Functions in the checking mode the display will be as Fig. 9.2.

If you have chosen to enter Secondary Functions in the setting mode the display will be as Fig. 9.3 (refer to Section 7).
9.2 Indication Contacts S1, S2, S3 and S4

Indication contacts S1 [r1], S2 [r2], S3 [r3] and S4 [r4] may each be set to trip for any one of the following functions:

<table>
<thead>
<tr>
<th>Code</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>[CL]</td>
<td>closed end position</td>
</tr>
<tr>
<td>[OP]</td>
<td>open end position</td>
</tr>
<tr>
<td>[Po]</td>
<td>intermediate position</td>
</tr>
<tr>
<td>[tC]</td>
<td>torque trip close</td>
</tr>
<tr>
<td>[tO]</td>
<td>torque trip open</td>
</tr>
<tr>
<td>[tt]</td>
<td>torque trip any position</td>
</tr>
<tr>
<td>[tI]</td>
<td>torque trip mid travel</td>
</tr>
<tr>
<td>[dC]</td>
<td>actuator closing</td>
</tr>
<tr>
<td>[dO]</td>
<td>actuator opening</td>
</tr>
<tr>
<td>[d?]</td>
<td>actuator rotating</td>
</tr>
<tr>
<td>[St]</td>
<td>motor stalled</td>
</tr>
<tr>
<td>[bA]</td>
<td>battery low</td>
</tr>
<tr>
<td>[HA]</td>
<td>hand operation</td>
</tr>
<tr>
<td>[bL]</td>
<td>blinker</td>
</tr>
<tr>
<td>[LS]</td>
<td>local stop</td>
</tr>
<tr>
<td>[O]</td>
<td>open interlock</td>
</tr>
<tr>
<td>[Cl]</td>
<td>close interlock</td>
</tr>
<tr>
<td>[IL]</td>
<td>interlock active</td>
</tr>
<tr>
<td>[ES]</td>
<td>ESD signal</td>
</tr>
<tr>
<td>[LP]</td>
<td>lost phase **</td>
</tr>
<tr>
<td>[Lo]</td>
<td>local selected</td>
</tr>
<tr>
<td>[rE]</td>
<td>remote selected</td>
</tr>
<tr>
<td>[AA]</td>
<td>actuator alarm *</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>[24]</td>
<td>24V power failure ***</td>
</tr>
<tr>
<td>[Rr]</td>
<td>motor running</td>
</tr>
<tr>
<td>[UA]</td>
<td>Valve alarm*</td>
</tr>
<tr>
<td>[Ht]</td>
<td>thermostat tripped</td>
</tr>
<tr>
<td>[CA]</td>
<td>Control alarm*</td>
</tr>
<tr>
<td>[RP]</td>
<td>relay parity</td>
</tr>
</tbody>
</table>

The S contact form can be set normally open [no] or normally closed [nc].

The procedures for setting up contacts S2, S3 and S4 are the same as those shown for S1.

Unless specified with order, the default settings for indication contacts are as follows:

- **S1** – [CL] closed end position [no]
- **S2** – [OP] open end position [no]
- **S3** – [CL] closed end position [nc]
- **S4** – [OP] open end position [nc]

**[LP]** Function not available if the 3 phase supply is lost.

* Contact alarm indication will operate under the same conditions as the display alarm indication icons (refer to page 5 for information).
When the S contact function is set to [PO], the required intermediate position value must be set. **No other contact function requires a value to be set.**

The value can be set from 1% open to 99% open in 1% increments.

Using the + or - key, display the required value.

**PRESS THE ← KEY.**

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

**Value Set to Indicate 25% Open**

**PRESS THE → KEY.**

Use the + or - keys to select between [no] (normally open) and [nc] (normally closed).

**PRESS THE ← KEY.**

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

**Contact S1 Configured as a Normally Open Contact**

**NOTE:** If function [PO] is selected and it is configured as a normally open contact it will make at the set value with the actuator moving in the open direction.

To access S2–S4 **PRESS THE Q KEY.**

**PRESS THE ↓ KEY.**
9.3 Control Mode Configuration

The Control Mode Configuration affects how the actuator will respond under conditions of emergency shut down, local control, remote control interlocks, and 2-wire remote control. Also included is an unseating torque switch bypass function. Unless specified with order, the control mode configuration will be set as shown for default configuration on page 63.

If it is necessary to change the configuration follow the instructions in this section.

There are 10 configurable control functions:

A1 ESD action
A2 ESD contact type
A3 ESD thermostat bypass
A4 ESD override interlock
A5 ESD override local stop
A6 Maintained local control
A7 2-wire remote control
A8 External interlocks
A9 Conditional Control
At Torque switch bypass.

A1 ESD Action

An active ESD signal applied to the actuator will override any existing or applied local or remote control signal. ESD can be configured to override the transformer thermostat, active interlocks or local stop selection. Refer to A3, A4 and A5.

The default action under an active ESD signal is to stay put [SP].

Press the + or – key to select the required ESD action:
- [CL] Close on ESD
- [SP] Stay put on ESD
- [OP] Open on ESD

PRESS THE ← KEY.

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

A2 ESD Contact Type

The default setting for ESD Contact Type is [NO].

The actuator responds to a remote control ESD signal derived from a normally open contact making. For ESD, where a remote control ESD signal is derived from a normally closed contact breaking, the signal being removed, press the + or – key.

The display will change to [NC].

PRESS THE ← KEY.

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

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

A3 ESD Thermostat Bypass

The default setting for Motor Thermostat Bypass is [OF] during ESD. The thermostats remain in circuit and enabled during ESD.

The motor thermostats can be bypassed during ESD as a factory set, hard-wired option only. Contact Rotork for information.

Danger: Actuator hazardous area certification is invalidated while the thermostats are bypassed.

A3 should be set to reflect the factory set configuration of thermostat bypass.

During an ESD event:
- [A3] = [OF] thermostats enabled
- [A3] = [ON] thermostats bypassed

Thermostats Enabled During ESD

Actuator Responds to a Remote, Normally Open ESD Contact Making (Signal Applied)

Note: If Folomatic analogue control is required A2 must be set to [NO].
The default setting for ESD Override Interlocks is [OFF]. ESD action will not override an active interlock applied to the actuator.

If an applied ESD signal is required to override active interlocks causing the ESD action as set for A1, press the + or - key. The display will change to [ON].

PRESS THE → KEY.

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

---

The default setting for ESD Override Local Stop is [OFF]. ESD will not override local stop when selected.

If an applied ESD signal is required to override local stop causing the ESD action as set for A1, press the + or - key. The display will change to [ON].

PRESS THE → KEY.

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

---

The default setting for Local Actuator Pushbutton control is self-maintained [ON]. If non-maintained actuator pushbutton control is required (jogging, inching, push to run), press the + or - key. The display will change to [OFF].

PRESS THE → KEY.

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

---

The default setting for 2-wire Remote Control is Stayput [SP]. If a open and closed remote control signal are applied simultaneously the actuator will stayput (stop if running). Refer to actuator wiring diagram or publication E120E.

Use the + or - key to select the required priority:

[OP] Open

[SP] Stay put

[CL] Close

PRESS THE → KEY.

The displayed option will flash indicating that it has been set.
Actuators are delivered with the interlock facility disabled [OF]. Refer to the actuator wiring diagram or publication E120E for interlock control circuits.

To enable remote external interlocks press the + or - key. The display will change to [ON].

**PRESS THE [ ] KEY.**

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

---

**A8 External Interlocks**

Interlocks Disabled

Note: If interlocking is required in only one direction, it will be necessary to connect a link between the actuator terminals associated with the other direction.

---

**A9 Conditional Control**

Where a high level of safety integrity is required, Conditional Control can be configured. In this mode two discreet signals are required for remote operation. Remote control will be conditional on both a control signal (open or close) and the appropriate interlock signal being applied simultaneously. Failure of either or a spurious signal will not cause operation.

Interlocks [A8] must be set [ON]. Interlock signals are not required for local operation.

The default setting for conditional control is [OF]. To enable conditional control press the + or - key. The display will change to [ON].

**PRESS THE [ ] KEY.**

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

---

**At Torque Switch Bypass**

The default setting for Torque Switch Bypass is [OF], the torque switches are not bypassed during the unseating movement.

To bypass the torque switches during the unseating movement press the + or - key.

The display will change to [ON].

**PRESS THE [ ] KEY.**

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

The torque switches will be bypassed from closed limit to 5% open when opening and from open limit to 95% when closing. Bypassing the torque switches makes torque in excess of rated and up to actuator stall available for unseating a “sticky” valve. Outside these positions the torque setting will revert to the values set for [tC], see page 25 and [tO] page 26.
Extra indication contacts S5 [r5], S6 [r6], S7 [r7] and S8 [r8] are available as an option.

Check actuator circuit diagram for inclusion.

When the Extra Contact Option is included the set-up procedure and available contact functions for S5 – S8 are identical to S1–S4 (refer to Section 9.2 page 32).

Unless specified with order the default setting for the extra indication contacts will be as follows:

S5 [r5] Close limit indication
S6 [r6] Open limit indication
S7 [r7] Torque trip mid travel
S8 [r8] Remote control selected

**NOTE:** If the Extra Contact Option is not included in the actuator build, any settings made for S5–S8 will have no effect on the indication output of the actuator.

The action of turning on the Extra Contact Option makes an additional series of set-up screens available.

Press the + or − key to select the Extra Contact Option set-up screens [ON].

**PRESS THE ← KEY.**

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

**PRESS THE ↓ KEY TO ACCESS S5 TO S8 SET-UP DISPLAYS.**

The procedure for setting S5 to S8 is the same as that for S1 to S4 (refer to Section 9.2 page 32).
9.5 Option CPT [OI] (Current Position Transmitter)

Setting instructions for actuators including a CPT providing 4-20 mA analogue position feedback.

The CPT is an optional extra. It may be internally or externally powered.

Check wiring diagram for inclusion and connection details.

With [HI] Displayed, the (CPT) 20mA Output will Correspond to Actuator Fully Open

If 20mA is required to correspond to actuator closed use the + or − key to change to [LO].

PRESS THE  → KEY.

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

NOTE: If the actuator has options Folomatic and CPT, redefining the CPT, will require the Folomatic to be recommissioned (refer to Section 9.6 Folomatic [OI] page 39).
Setting instructions for actuators including a Folomatic (proportional) Controller for use in (analogue) valve position control.

The Folomatic is an optional control device. Check actuator wiring diagram for inclusion.

Before setting the parameters for Option Folomatic ensure Remote Control Source [Od] has been selected to [bo] in Section 9.7.

Folomatic set-up screens can be turned OFF to provide extra security. Once selected ON the option function displays allow commissioning of the Folomatic to be undertaken.

NOTE: Turning ON/OFF the Folomatic set-up screens (when fitted) does not affect its operation.

This instruction lists the Folomatic function displays in their sequence and assumes that all Folomatic functions are to be checked/set.

The actuator should be selected in Local or Stop with the set point signal connected to terminals 26(+ve) and 27(–ve) (refer to wiring diagram).

Before commissioning of the Folomatic functions can begin, the Folomatic Feedback must be set to suit the applied set point signal.

With [HI] displayed, an increasing set point signal will correspond to valve opening.

If a high set point signal is required to correspond to valve closing use the + or – key to change to [LO].

PRESS THE ➔ KEY.

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

If setting [OI] is modified after commissioning the Folomatic, it will be necessary to recommission the Folomatic.

Press the ➔ key to access the Folomatic set-up display [OF].

The action of turning on the Folomatic option makes an additional series of settings available.

Folomatic set-up Screens OFF

Use the + or – key to select Folomatic Display [ON].

PRESS THE ➔ KEY.

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

Press the ➔ key to access the Folomatic set-up displays.

Folomatic set-up Screens ON
Using the + or − key select [I] for current set point signal or [U] for voltage set point signal.

**Current Mode Selected**

PRESS THE ← KEY.
The displayed option will flash indicating that it has been set.
Press the → key to display [Fr].

---

Using the + or − key select [05], [10] or [20] to correspond with the set point signals within the range of 0–5mA or volts, 0–10mA or volts or 0–20mA or volts (i.e. 4–20mA).

**0–20mA or Voltage Range Selected**

PRESS THE ← KEY.
The displayed option will flash indicating that it has been set.
Press the → key to display [FL].

---

**APPLY MINIMUM SET POINT SIGNAL**

Using the + or − key select:

[00] to [99] = percent open
[00] to [99] = valve open

to correspond with the LOW set point signal.

**Valve Closed on LOW Signal**

PRESS THE ← KEY.
The displayed value will flash indicating that it has been set.
Press the → key to display [FH].

---

**APPLY MAXIMUM SET POINT SIGNAL**

Using the + or − key select:

[00] to [99] = percent open
[00] to [99] = valve open

to correspond with the HIGH set point signal.

**Valve Open on HIGH Signal**

PRESS THE ← KEY.
The displayed value will flash indicating that it has been set.
Press the → key to display [Fd].
If the actuator hunts or responds unnecessarily to a fluctuating set point signal the deadband must be increased. If more accurate control is required the deadband may be decreased.

Use the + or - key to select the deadband width. Range 00–99 corresponds to 0–9.9% of setpoint signal. 

NOTE: Maximum deadband is 9.9% of valve stroke. Normally minimum deadband should not be less than 1%.

The motion inhibit timer introduces a delay in the actuator response to a rapidly fluctuating set point signal, preventing unnecessary movement. Once the system stabilises the actuator will respond to steady changes in the set point signal as necessary. Use + or - key to adjust motion inhibit time in seconds: range 0–99. Normally it is recommended that motion inhibit time should not be set to less than 5 seconds (refer to note on page 62).

NOTE: Motion inhibit timer adjustment.

Failsafe action when [FA] enabled. Use + or - key to select, on loss of set point signal:

[Lo] – move valve to position corresponding to minimum set point. 

[SP] – stayput on loss of set point. 

[HI] – move valve to position corresponding to maximum set point.

Commissioning of the Folomatic is now complete. Remote control may be selected.
The available forms of remote control are listed below:

Standard hardwired control
Analogue control-Option Folomatic
Network control including:
  Option Pakscan
  Option Modbus
  Option Profibus

The setting for Remote Control Source will depend on the type of remote control required and the option specified and fitted. Check actuator circuit diagram for remote control form.

The setting of Remote Control Source will be determined by the option that has been fitted, if any.

- **[RE]** Standard hardwired remote control.
- **[bo]** Option Folomatic.
- **[oP]** Options Pakscan, Profibus, Modbus, Foundation Fieldbus or DeviceNet.
- **[OF]** All remote control disabled (Actuator available for local control only).

To change the remote source press the + or - key until the required setting is displayed.

PRESS THE **→** KEY.

The displayed option will flash indicating that it has been set.
Setting instructions for actuators including an optional Pakscan Field Control Unit – check wiring diagram for inclusion.

Before setting the parameters for Option Pakscan ensure Remote Control Source [Od] has been selected to [Op] in Section 9.7. (refer to page 42)

Pakscan set-up screens can be turned off to provide extra security. The action of turning screens on or off does not affect its operation.

Use the + or – key to turn on Pakscan set-up screens.

**Pakscan Set-up Screens ON**

Press the ➦ key.
The displayed option will flash indicating that it has been set.

Press the ▼ key to display the Pakscan set-up screens.

The actuator Pakscan Field Control Unit must be allocated a unique loop address.
The actuator must be in “Loopback” for its address to be set or changed. Loopback can be achieved in two ways:
1. Turn OFF the master station.
2. Isolate the actuator from the 2-wire control loop.

Using the + or – keys display the required loop address.

Address to be set within the range 01–F0 Hexadecimal. (refer to table on page 75).

**Pakscan Address**

Press the ➦ key.
The displayed option will flash indicating that it has been set.

Press the ➸ key to display [Pa].

The actuator Pakscan Field Control Unit baud rate must be set to the loop baud rate. For a Pakscan 2-wire control loop the selected baud rate must be common to the master station and all the field control units included in the loop.
The actuator must be in “Loopback” for its baud rate to be set or changed.
Loopback can be achieved in two ways:
1. Turn OFF the master station.
2. Isolate the actuator from the 2-wire control loop.

**Pakscan Baud Rate**

Press the ➦ key.
The displayed option will flash indicating that it has been set.

Press the ➸ key to display [Pb].

Continued
Using the + or - keys display the required baud rate.

- 01 = 110 baud
- 03 = 300 baud
- 06 = 600 baud
- 12 = 1200 baud
- 24 = 2400 baud

2400 baud rate set

PRESS THE ← KEY.
The displayed option will flash indicating that it has been set.
Press the → key to display [PF].

---

The IQ actuator has the facility to accept 4 auxiliary inputs (AUX1–AUX4). These are used when supplementary remote control or digital auxiliary inputs are required in addition to the standard control and feedback features incorporated into the Pakscan card. It is also possible to have a combination of both remote control and volt-free inputs to provide, for example, open and close control as well as a high and low tank level alarm indication, supplied via an external transducer.

The hexadecimal number displayed under PF can be considered as a “software mask”. It is this mask that tells the Pakscan card what type of input to expect, control or input signal, and what form the input will be, normally open or normally closed (refer to page 75 for Binary, Hexadecimal and Decimal Conversion Table).

To decipher the mask the number needs to be split into two separate hexadecimal characters, each of which can be sub-divided into 4 binary bits. The first 4 bits represent the function and the second 4 represent the input source (known as invert). Pictorially this can be represented as:

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<tbody>
<tr>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bits</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESD</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stop/Maintain</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Close</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(When used for remote control of the actuator bits 4 to 1 of the function character have been designated as follows:

- Bit 4 (AUX4) – ESD
- Bit 3 (AUX3) – Stop/Maintain
- Bit 2 (AUX2) – Close
- Bit 1 (AUX1) – Open

(When used for digital signal inputs they are simply designated as AUX 4 to AUX 1)
Rules

1. Function bit set to “0”
Any function bit set to “0” indicates that the particular aux input is to be treated as a digital signal for field status reporting, e.g. a level switch or motor running status.
If the corresponding invert bit is set to a “0”, an open contact is reported as a logic “1” and a closed contact is reported as a logic “0” (i.e. this will invert the input).
If the corresponding invert bit is set to a “1”, an open contact is reported as a logic “0” and a closed contact is reported as a logic “1” (i.e. this gives a noninverting input).

2. Function bit set to “1”
Any function bit set to “1” indicates that the particular aux input is to be treated as a digital command to operate the actuator.
When the corresponding invert bit is set to a “0” this represents an N.C. contact as being the command source, i.e. a closing contact de-energises the input and an opening contact energises the input.
When the corresponding invert bit is set to a “1”, this represents an N.O. contact as being the command source, i.e. a closing contact energises the input and an opening contact de-energises the input.

3. ESD Control
When using ESD (aux input 4), the ESD contact mode setting [A2] should be set to the default value of [NO]. The [A1]–ESD direction setting should be set to either Open or Close the valve (refer to page 34).

4. Stop/Maintain Control
When energised this will make the Aux input Open/Close/ESD control push-to-run, (non-maintained).
When de-energised, the Aux input Open/Close/ESD control will be maintained.

5. Remote I/P Setting
Ensure that the correct [Od] setting is selected (refer to page 42).
For Pakscan this is [OP].
The factory default for [PF] is [OF].

Examples
1. The full range of remote controls is needed. Open and Close are NO and ESD and Stop/maintain is NC.
   Aux I/P  4 3 2 1
   Function  1 1 1 1 = F
   Invert  0 0 1 1 = 3 i.e. set [PF] to [F3]

2. Open and close control is required along with 2 inverted digital signal inputs (Note that with this setting the open and close commands will be maintained.)
   Aux I/P  4 3 2 1
   Function  0 0 1 1 = 3
   Invert  0 0 1 1 = 3 i.e. set [PF] to [33]

3. Only an ESD input is needed. The requirement is for push to run control with a NO contact input.
   Aux I/P  4 3 2 1
   Function  1 1 0 0 = C
   Invert  1 0 0 0 = 8 i.e. set [PF] to [C8]
Using the + or - keys display the required mask setting.

**Auxiliary Input Mask [OF]**

**PRESS THE ← KEY.**

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

If Pakscan positioning control is required, return to the position display by pressing ↓ and → keys together.

Display [OF] (refer to page 58).

**Setting [PP] is not used by Pakscan. Entered settings will be ignored.**
## 9.9 Bus System Option Modbus [OP]

Setting instructions for actuators including an optional Modbus RTU module – check wiring diagram for inclusion.

Before setting the parameters for Option Modbus ensure Remote Control Source [Od] has been selected to [oP] in Section 9.7. (refer to page 42).

Modbus module set-up screens can be turned off to provide extra security. The action of turning screens on or off does not affect its operation.

Use the + or – keys to turn on Modbus set-up screens.

![Modbus Set-up Screens [ON]]

**PRESS THE ← KEY.**

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

Press the ↓ key to display the Modbus set-up screens.

The Modbus module must be allocated a unique address.

To set the address the Modbus module must be isolated from the host by disconnecting the RS485 highway or turning off the host device.

Using the + or – keys display the required address.

Address to be set within the range 01 to F7 Hexadecimal (refer to page 75 for conversion). If an address value outside this range is entered, the address set will revert to 01 (for 00) or F7 (for value above F7).

![Modbus Address]

**PRESS THE ← KEY.**

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

Press the → key to display [PA].

The Modbus module must be set to the RS485 highway baudrate. To set the baudrate the Modbus module must be isolated from the host by disconnecting the RS485 highway or turning off the host device.

Using the + or – keys display the required baudrate:

- [01] 110
- [03] 300
- [12] 1200
- [48] 4800
- [19] 19200
- [06] 600
- [24] 2400
- [96] 9600
- [38] 38400

![Modbus Baudrate]

2400 Baud

**PRESS THE ← KEY.**

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

Press the → key to display [Pb].
The IQ actuator has the facility to accept 4 auxiliary inputs (AUX1 – AUX4). These are used when supplementary remote control or digital auxiliary inputs are required in addition to the standard control and feedback features incorporated into the Modbus module. It is also possible to have a combination of both remote control and volt-free inputs to provide, for example, open and close control as well as a high and low tank level alarm indication, supplied via an external transducer.

The hexadecimal number displayed under PF can be considered as a “software mask”. It is this mask that tells the Modbus module what type of input to expect, control or input signal, and what form the input will be, normally open or normally closed (refer to page 75 for Binary, Hexadecimal and Decimal Conversion Table). To decipher the mask the number needs to be split into two separate hexadecimal characters, each of which can be sub-divided into 4 binary bits. The first 4 bits represent the function and the second 4 represent the input source (known as invert). Pictorially this can be represented as:

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</table>

Bits

<table>
<thead>
<tr>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
</table>

When used for remote control of the actuator bits 4 to 1 of the function character have been designated as follows:

- Bit 4 (AUX4) = ESD
- Bit 3 (AUX3) = Stop/Maintain
- Bit 2 (AUX2) = Close
- Bit 1 (AUX1) = Open

(When used for digital signal inputs they are simply designated as AUX 4 to AUX 1.)

Rules

1. **Function bit set to “0”**
   Any function bit set to “0” indicates that the particular aux input is to be treated as a digital signal for field status reporting, e.g. a level switch or motor running status.

   - If the corresponding invert bit is set to a “0”, an open contact is reported as a logic “1” and a closed contact is reported as a logic “0” (i.e. this will invert the input).
   - If the corresponding invert bit is set to a “1”, an open contact is reported as a logic “0” and a closed contact is reported as a logic “1” (i.e. this gives a noninverting input).

2. **Function bit set to “1”**
   Any function bit set to “1” indicates that the particular aux input is to be treated as a digital command to operate the actuator.

   - When the corresponding invert bit is set to a “0” this represents an N.C. contact as being the command source, i.e. a closing contact de-energises the input and an opening contact energises the input.
   - When the corresponding invert bit is set to a “1”, this represents an N.O. contact as being the command source, i.e. a closing contact energises the input and an opening contact de-energises the input.

3. **ESD Control**
   When using ESD (aux input 4), the ESD contact mode setting [A2] should be set to the default value of [NO]. The [A1]–ESD direction setting should be set to either Open or Close the valve (refer to page 34).
Using the or keys display the required mask setting.

Auxiliary Input Mask [OF]

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

Using the or keys display the required parity bit:

No Parity Bit

PRESS THE ➪ KEY.
The displayed option will flash indicating that it has been set.
For Modbus module positioning settings and action on loss of signal setting [OF] (refer to page 58).

If Modbus positioning control and action on loss of communication are required, return to the position display by pressing \( \downarrow \) and \( \rightarrow \) keys together.

Display [OF] (refer to page 58).
Setting instructions for actuators including an optional Profibus DP module – check wiring diagram for inclusion.

Before setting the parameters for Option Profibus ensure Remote Control Source [Od] has been selected to [Op] in Section 9.7. (refer to page 42).

Profibus module set-up screens can be turned off to provide extra security. The action of turning screens on or off does not affect its operation.

Use the + or - keys to turn on Profibus set-up screens.

Profibus set-up screens [On]

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

Press the ↓ key to display the Profibus set-up screens.

The Profibus DP module must be allocated a unique address.
To set the address the Profibus module must be isolated from the host by disconnecting the RS485 highway or turning off the host device.
Using the + or - keys display the required address.
Address to be set within the range 01 to 7E Hexadecimal (refer to page 75 for conversion). If an address value outside this range is entered, the address set will revert to 01 (for 00) or 7E (for value above 7E).

PRESS THE ➤ KEY.
The displayed option will flash indicating that it has been set.
Press the ➤ to display [Pb].
The IQ actuator has the facility to accept 4 auxiliary inputs (AUX1–AUX4). These are used when supplementary remote control or digital auxiliary inputs are required in addition to the standard control and feedback features incorporated into the Profibus module. It is also possible to have a combination of both remote control and volt-free inputs to provide, for example, open and close control as well as a high and low tank level alarm indication, supplied via an external transducer.

The hexadecimal number displayed under PF can be considered as a “software mask”. It is this mask that tells the Profibus module what type of input to expect, control or input signal, and what form the input will be, normally open or normally closed (refer to page 75 for Binary, Hexadecimal and Decimal Conversion Table).

To decipher the mask the number needs to be split into two separate hexadecimal characters, each of which can be sub-divided into 4 binary bits. The first 4 bits represent the function and the second 4 represent the input source (known as invert). Pictorially this can be represented as:

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<td>Bits</td>
<td>Bits</td>
</tr>
<tr>
<td>4 3 2 1</td>
<td>4 3 2 1</td>
</tr>
</tbody>
</table>

When used for remote control of the actuator bits 4 to 1 of the function character have been designated as follows:

- Bit 4 (AUX4) – ESD
- Bit 3 (AUX3) – Stop/Maintain
- Bit 2 (AUX2) – Close
- Bit 1 (AUX1) – Open

(When used for digital signal inputs they are simply designated as AUX 4 to AUX 1.)
Rules

1. Function bit set to “0”
Any function bit set to “0” indicates that the particular aux input is to be treated as a digital signal for field status reporting, e.g., a level switch or motor running status.

If the corresponding invert bit is set to a “0”, an open contact is reported as a logic “1” and a closed contact is reported as a logic “0” (i.e., this will invert the input).

If the corresponding invert bit is set to a “1”, an open contact is reported as a logic “0” and a closed contact is reported as a logic “1” (i.e., this gives a noninverting input).

2. Function bit set to “1”
Any function bit set to “1” indicates that the particular aux input is to be treated as a digital command to operate the actuator.

When the corresponding invert bit is set to a “0” this represents an N.C. contact as being the command source, i.e., a closing contact de-energises the input and an opening contact energises the input.

When the corresponding invert bit is set to a “1”, this represents an N.O. contact as being the command source, i.e., a closing contact energises the input and an opening contact de-energises the input.

3. ESD Control
When using ESD (aux input 4), the ESD contact mode setting [A2] should be set to the default value of [NO]. The [A1]–ESD direction setting should be set to either open or close the valve (refer to page 34).

4. Stop/Maintain Control
When energised this will make the Aux input Open/Close control push to run. When de-energised, the Aux input Open/Close control will be maintained. ESD is always push to run (non maintained).

5. Remote Source Setting [Od]
Ensure that the correct [Od] setting is selected (refer to page 42).

For Profibus this is [OP].
The factory default for [PF] is [OF]

Examples
1. The full range of remote controls is needed. Open and close are NO and ESD and Stop/maintain is NC.

   Aux I/P  4 3 2 1
   Function 1 1 1 1 = F
   Invert 0 0 1 1 = 3 i.e. set [PF] to [F3]

2. Open and close control is required along with 2 inverted digital signal inputs. (Note that with this setting the open and close commands will be maintained.)

   Aux I/P  4 3 2 1
   Function 0 0 1 1 = 3
   Invert 0 0 1 1 = 3 i.e. set [PF] to [33]

3. Only an ESD input is needed. The requirement is for push to run control with a NO contact input.

   Aux I/P  4 3 2 1
   Function 1 1 0 0 = C
   Invert 1 0 0 0 = 8 i.e. set [PF] to [C8]
Using the + or − keys display the required mask setting.

**Auxiliary Input Mask OF**

**PRESS THE ← KEY.**

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

If Profibus positioning control and action on loss of communication are required, return to the position display by pressing ↓ and ➔ keys together. Display [OF] (refer to page 58).

Setting [PP] is not used by Profibus. Entered settings will be ignored.
Setting instructions for actuators including an optional DeviceNet DFU module – check wiring diagram for inclusion.

DeviceNet module set up screens can be turned off to provide extra security. The action of turning screens on or off does not affect its operation.

Use the + or − key to turn on DeviceNet set up screens.

**DeviceNet Set-up Screens ON**

**PRESS THE ← KEY.**

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

Press the ↓ key to display the DeviceNet set up displays.

**DeviceNet Address**

The DeviceNet module must be allocated a unique address.

Using the + or − keys display the required address.

Address to be set within the range 01 to 3F Hexadecimal. See page 72 for conversion. If an address value outside this range is entered, the address set will revert to 01 (for 00) or 3F (for value above 3F).

**PRESS THE ← KEY.**

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

Press the → key to display [Pb].

**DeviceNet Baudrate**

The DeviceNet module must be set to the DeviceNet highway baudrate.

Using the + or − keys display the required baudrate:

- [01] 125 k baud
- [03] 250 k baud
- [06] 500 k baud

**PRESS THE ← KEY.**

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

Press the → key to display [PF].
Press the ➔ key to display [PF].

The IQ actuator has the facility to accept 4 auxiliary inputs (AUX1–AUX4). These are used when supplementary remote control or volt free digital auxiliary inputs are required in addition to the standard control and feedback features incorporated into the DeviceNet module. It is also possible to have a combination of both remote control and volt free inputs to provide, for example, open and close control as well as a high and low tank level alarm indication, supplied via an external transducer.

The hexadecimal number displayed under [PF] can be considered as a “software mask”. It is this mask that tells the DeviceNet module what type of input to expect, control or input signal, and what form the input will be, normally open or normally closed.

To decipher the mask the number needs to be split into two separate hexadecimal characters, each of which can be sub-divided into 4 binary bits. The first 4 bits represent the function and the second 4 represent the input source (known as invert). Pictorially this can be represented as:

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<tr>
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</tr>
</tbody>
</table>

Bits 4 3 2 1 4 3 2 1

When used for remote control of the actuator bits 4 to 1 of the function character have been designated as follows:

- Bit 4 (AUX4) – ESD
- Bit 3 (AUX3) – Stop/Maintain
- Bit 2 (AUX2) – Close
- Bit 1 (AUX1) – Open

(When used for digital signal inputs they are simply designated as AUX 4 to AUX 1.)

Rules

1. Function bit set to “0”
   Any function bit set to “0” indicates that the particular aux input is to be treated as a digital signal for field status reporting, e.g. a level switch or motor running status. If the corresponding invert bit is set to a “0”, an open contact is reported as a logic “1” and a close contact is reported as a logic “0” (i.e. this will invert the input).
   If the corresponding invert bit is set to a “1”, an open contact is reported as a logic “0” and a close contact is reported as a logic “1” (i.e. this gives a non-inverting input).

2. Function bit set to “1”
   Any function bit set to “1” indicates that the particular aux input is to be treated as a digital command to operate the actuator.
   When the corresponding invert bit is set to a “0” this represents an N.C. contact as being the command source, i.e. a closing contact de-energises the input and an opening contact energises the input.
   When the corresponding invert bit is set to a “1”, this represents an N.O. contact as being the command source, i.e. a closing contact energises the input and an opening contact de-energises the input.

3. ESD Control
   When using ESD (aux input 4), the ESD contact mode setting [A2] should be set to the default value of [NO]. The [A1]–ESD direction setting should be set to either open or close the valve (refer to page 34).
4. Stop/Maintain Control
When energised this will make the Aux input Open/Close control push-to-run. When de-energised, the Aux input Open/Close control will be maintained. ESD is always push to run (non maintained).

5. Remote I/P Setting
Ensure that the correct “Od” setting is selected (refer to page 42).
For DeviceNet this is [OP].
The factory default for [PF] is [OF].

Examples
1. The full range of remote controls is needed. Open and Close are NO and ESD and Stop/maintain is NC.
   Aux I/P 4 3 2 1
   Function 1 1 1 1 = F
   Invert 0 0 1 1 = 3 i.e. set [PF] to [F3]
2. Open and close control is required along with 2 inverted digital signal inputs.
   (Note that with this setting the open and close commands will be maintained.)
   Aux I/P 4 3 2 1
   Function 0 0 1 1 = 3
   Invert 0 0 1 1 = 3 i.e. set [PF] to [33]
3. Only an ESD input is needed. The requirement is for push to run control with a NO contact input.
   Aux I/P 4 3 2 1
   Function 1 1 0 0 = C
   Invert 1 0 0 0 = 8 i.e. set [PF] to [C8]

Using the + or – keys display the required mask setting.

Auxiliary Input Mask OF
PRESS THE ← KEY.
The displayed option will flash indicating that it has been set.
Press the ➔ key to display [PP].

No Parity Bit
PRESS THE ← KEY.
The displayed option will flash indicating that it has been set.
This option is not used by the DeviceNet DFU Module.
If the system control strategy for Pakscan, Modbus or Profibus requires intermediate valve travel positioning, certain control parameters need to be checked: the Limited Range Position Settings, the Motion Inhibit Time and its Deadband. There are an additional two “Action on Loss of Signal” parameters relating only to Modbus and Profibus systems that also need to be checked.

Limited Range Positioning is a selectable option whereby positioning limits, 0% and 100%, can be at different positions to those used for digital Closed and Open limit commands. Limited range positioning can be set using the \[FL\] and \[FH\] screens.

It should be noted that the actuator will respond to a digital Open or Close host command by moving the valve to the set limits irrespective of settings made for positioning control.

Settings for Deadband and Motion Inhibit Time affect accuracy and response time.

**Bus System Positioning Control Settings**

Bus system positioning control set-up screens can be suppressed to provide extra security.

**Display Bus System Positioning Set-up Screens**

Use the + or - key to turn on the positioning set-up screens.

*Press the \[OFF\] \[ON\] key.*

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

Press the \[Down\] key to display Bus System Positioning Control Settings.

Once \[FL\] is displayed, press the \[Next\] key to display \[FH\].

**Bus System Valve Position at 0% DV**

\[FL\] is the position to which the actuator will move if a 0% command is sent and is the position at which the actuator will report 0% to the host.

The default setting is for 0% to be the Close limit.

If altered, it is possible that the position indicated by the actuator display will differ to that indicated by the host.

Use the + or - key to select the desired valve position for a 0% command.

*0% DV = Valve Closed*

*Press the \[FL\] key.*

**Bus System Valve Position at 100% DV**

\[FH\] is the position to which the actuator will move if a 100% command is sent and is the position at which the actuator will report 100% to the host.

The default setting is for 100% to be the Open limit.

If altered, it is possible that the position indicated by the actuator display will differ to that indicated by the host.

Use the + or - key to select the desired valve position for a 100% command.

*100% DV = Valve Open*

*Press the \[FH\] key.*
All positioning commands are subject to a deadband tolerance.

The deadband sets the expected positioning accuracy of the actuator and is dependent on various factors including, actuator output speed, number of turns and valve torque. If the deadband is set too low the valve may “hunt” around the set point.

Use the + or - key to display the required setting:
[00] to [99] – 0% to 9.9% of valve stroke.

2.5% Deadband
PRESS THE ← KEY.
The displayed option will flash indicating that it has been set.
Press the ➔ key to display [Fd].

5 Second MIT
PRESS THE ← KEY.
The displayed option will flash indicating that it has been set.
Press the ➔ key to display [Ft].

Modbus, Profibus & DeviceNet modules can be set to respond on loss of host communication by positioning the valve. Modbus checks for a loss of general highway communications whereas Profibus checks for a loss of communications addressed specifically to itself.

The default setting is off [OF] and the default timeout is 255 sec.

Use the + or - key to display the required setting:
[On] Failsafe determined by setting [FF]
[Off] No failsafe action

Modbus, Profibus & DeviceNet failsafe action when [FA] is enabled.

Use the + or - key to display the required setting:
[Lo] Close valve
[SP] Stay put
[Hi] Open valve

Failsafe Action Enabled
PRESS THE ← KEY.
The displayed option will flash indicating that it has been set.
Press the ➔ key to display [FA].

Failsafe Close
PRESS THE ← KEY.
The displayed option will flash indicating that it has been set.
Press the ➔ key to display [FF].
Setting instructions for actuator including an interrupter timer.

The interrupter timer enables pulsed “stop/start” operation by the actuator as a response to local and remote control commands.

This effectively increases the valve stroke time and can be adjusted to prevent hydraulic shock (water hammer) and flow surges in pipelines.

The interrupter timer is an optional extra – check wiring diagram for inclusion.

When fitted, the timer will be made available for operation.

The Interrupter cannot be enabled or disabled using the Setting Tool.

Interrupter Timer Enabled

When the timer option is available an additional series of settings can be accessed by pressing the \( \downarrow \) key.

NOTE: If the timer option is not available pressing the \( \downarrow \) key will not access setting.

Press the \( \downarrow \) key to display interrupter timer set-up screens.

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 \( \leftrightarrow \) KEY.

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

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 \( \rightarrow \) key to display [JC].

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

\[
[\text{CL}] = \text{valve closed} \\
[00] \text{to [99]} = \text{percentage open} \\
[\equiv\equiv] = \text{valve open}
\]

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

PRESS THE \( \leftrightarrow \) 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 [\( \equiv\equiv \)] valve closed position.

Press the \( \rightarrow \) key to display [JO].
Using the + or − key select the position for the **TIMER TO STOP WHEN THE VALVE IS OPENING**.

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

**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.

Press the ➔ key to display [JF].

Using the + or − key select the actuator run period in the range 1–99 seconds.

**Actuator Run Period Set for 5 Seconds**

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

Press the ➔ key to display [JF].

Using the + or − key select the actuator stop period in the range 1–99 seconds.

**Actuator OFF Period Set for 25 Seconds**

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

Press the ➔ key to display [JE] (refer to note on Page 62).

The interrupter timer may be overridden when the actuator is under ESD signal command. This will mean the actuator will run to limit without “stop/start” action under ESD command.

Refer to A1–A3 (refer to page 34 for ESD settings).

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.
An actuator fitted with the interrupter timer and set as the example shown in these instructions would operate at:
Rated speed from full Open to 25% Open.
\( \frac{1}{4} \) rated speed from 25% Open to Fully Closed and from Fully Closed to 25% Open.
Rated speed from 25% Open to Fully Open.

With a Folomatic option fitted and the Interrupter Timer enabled, the Folomatic Motion Inhibit Timer must be adjusted to the same time as that set for the Interrupter Timer “contactor off”.
Failure to do so will cause the actuator response to defer to the lower time which may cause control or process problems.
For “ON” and “OFF” times in excess of 99 seconds apply to Rotork.

The default setting for Setting Tool Local Control is [OFF].
To enable Setting Tool Control press the + or − key to select [ON].
PRESS THE ➪ KEY.
The displayed option will flash indicating that it has been set.
With the red control selector in Local, the Setting Tool control keys are active (refer to page 17).

The protection may be enabled by using the + or − key to select [ON].
PRESS THE ➪ KEY.
The displayed option will flash indicating that it has been set.
When protection is enabled, on power up if a low battery is detected, the actuator will inhibit electrical operation and display Power Loss Inhibit via actuator alarm display (refer to page 6) and the monitor relay will de-energise. Limits must reset and the battery replaced – refer to page 65.
All IQ functions are configured to a set of Rotork 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 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.

There are two levels of default:

**d1** Rotork standard or customer specified primary and secondary settings.
**d2** Limit positions only – factory set limits.

**NOTE:** Settings associated with control options Folomatic, Pakscan, Modbus Profibus and Foundation Fieldbus are not affected by d1 or d2. Functions will remain as set.

If d1 is entered, all Primary and Secondary Functions except limit positions will return to their default setting. See the table opposite for Rotork standard settings. Primary setting (except limits) and secondary settings must then be checked and reset as required (refer to Primary Functions page 15 and Secondary Functions page 29).

If d2 is entered the limits will be reset, with the actuator positioned at 50%. Limits must then be reset to the suit the valve (refer to Primary Functions page 20).

### Rotork standard [d1] Default settings for IQ:

#### Primary Functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Default Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>P7</td>
<td>Password</td>
</tr>
<tr>
<td>Ir</td>
<td>IrDA – Insight</td>
</tr>
<tr>
<td>Ic</td>
<td>Cell Phone</td>
</tr>
<tr>
<td>C1</td>
<td>Close Direction</td>
</tr>
<tr>
<td>C2</td>
<td>Close Action</td>
</tr>
<tr>
<td>C3</td>
<td>Open Action</td>
</tr>
<tr>
<td>tC</td>
<td>Close Torque</td>
</tr>
<tr>
<td>tO</td>
<td>Open Torque</td>
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</table>

#### Secondary Functions

<table>
<thead>
<tr>
<th>Indication Contact</th>
<th>d1 Default Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>Close, Normally Open</td>
</tr>
<tr>
<td>S2</td>
<td>Open, Normally Open</td>
</tr>
<tr>
<td>S3</td>
<td>Close, Normally Closed</td>
</tr>
<tr>
<td>S4</td>
<td>Open, Normally Closed</td>
</tr>
<tr>
<td>A1</td>
<td>Stay put on ESD</td>
</tr>
<tr>
<td>A2</td>
<td>Normally Open (make for ESD)</td>
</tr>
<tr>
<td>A3</td>
<td>Thermostats Active during ESD</td>
</tr>
<tr>
<td>A4</td>
<td>Interlocks Active during ESD</td>
</tr>
<tr>
<td>A5</td>
<td>Local Stop Active during ESD</td>
</tr>
<tr>
<td>A6</td>
<td>Maintains in Local Control</td>
</tr>
</tbody>
</table>
Rotork standard [d1] Default settings continued:

**Function**
- [A7] 2-wire Remote Control
- [A8] Interlocks
- [A9] Conditional Control
- [AE] Torque Switch Bypass
- [OE] Option Extra Indication Contacts
- [OI] Option CPT
- [OF] Option Folomatic
- [Od] Remote Source
- [OP] Option Bus System Control
- [OJ] Option Interrupter Timer
- [Or] Setting Tool Local Control
- [OS] Power Loss Inhibit

**Option Extra Indication Contacts (when fitted) - refer to wiring diagram**
- [r5] Indication Contact S5
- [r6] Indication Contact S6
- [r7] Indication Contact S7
- [r8] Indication Contact S8

**[d1] Default Setting**
- [SP] Stayput on 2-wire signal
- [OF] I/L function disabled
- [OF] Function disabled
- [OF] Function disabled
- [OF] Unless fitted. See wiring diagram
- [HI] 4mA at Closed
- [OF] Unless fitted. See wiring diagram
- [RE] Unless option fitted (refer to 9.7 page 42.)
- [OP] Unless fitted. See wiring diagram
- [OF] Unless fitted. See wiring diagram
- [OF] Setting Tool Control disabled
- [OF] Protection off

Option Extra Indication Contacts (when fitted) - refer to wiring diagram
- [Cl]/[No] Close, normally open
- [Op]/[No] Open, normally open
- [Tl]/[No] Torque Trip Mid Travel, normally open
- [Re]/[no] Remote Selected, normally open

The Rotork standard default settings are subject to change without notice. If specified with order, [d1] settings will be configured as requested.

To reinstate [d1] settings, with [d1] displayed,

PRESS THE ← KEY.

The setting bars will flash, indicating the [d1] default settings have been reinstated.

To reinstate factory set limits (actuator positioned at 50%) with [d2] displayed,

PRESS THE ← KEY.

The setting bars will flash, indicating the [d2] default limits have been reinstated.

[d1] Displayed

[d2] Displayed
Maintenance

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

The IQ 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 control module cover is bonded by the Rotork 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, except replacement of the battery.

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.
* Replace actuator battery every 5 years.
* 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 lubricant.

WARNING: The battery holder in the actuator gearcase also protects the user from the hazardous live connections inside the actuator and therefore it must not be damaged. The actuator must be isolated or disconnected if the battery holder has to be removed from the actuator gearcase.

The unique circuit has been incorporated into the battery function of the IQ, effectively reducing the overall drain and significantly increasing the battery life.

In normal circumstances battery replacement interval should not exceed 5 years. Ambient temperature and plant operating conditions may affect battery life.

The Actuator Battery

The battery supports the actuator position updating circuits and the position (LCD) display when the main power supply is turned off. It ensures the current position is updated and displayed when manual operation takes place with the main power turned off.

The battery is not required to retain any actuator settings.

Battery Replacement

If the actuator is located within a hazardous area permission must be obtained in the form of a “hot work permit” or other local regulation before removal and/or replacement of the battery.

Removal of the battery with the main electrical power switched off will result in stored Datalogger records being lost. It is therefore recommended that the battery is replaced with the main electrical supply to the actuator switched on.

If main electrical power is not available or if main power has been switched off while the battery was discharged, it is recommended that the actuator limits be checked after battery replacement (refer to Section 8 Commissioning Primary Functions, page 20).

Battery Removal

The actuator must be selected to Stop using the red selector (refer to page 3). Access to the battery is via a labelled sealing plug situated on the main gearcase near the handwheel hub.
Use an 8mm Allen key to remove the sealing plug, ensuring the “O” ring seal remains on the plug. Disconnect the battery wiring loom from the battery terminals. Using the black pull strap, lift the battery out of the rubber sealing pocket.

If in doubt regarding the correct battery type, contact Rotork.

**Fitting Replacement Battery**

Fit the pull strap around the replacement battery and insert into the rubber sealing pocket. Reconnect the battery wiring loom to the battery terminals. Refit the battery sealing plug ensuring “O” ring is in good condition and correctly fitted. Hand tighten sealing plug using an 8mm Allen key.

**Oil**

Unless specially ordered for extreme climatic conditions, Rotork actuators are dispatched with gearcases filled with SAE 80EP oil which is suitable for ambient temperatures ranging from −22°F / −30°C to 160°F / 70°C.

IQ actuators do not require regular oil changes (refer to Weights and Measures Section 11, page 74).

**Battery Types**

For European hazardous area certified actuators (ATEX) use an Ultralife U9VL lithium manganese dioxide battery only.

For FM and CSA certified enclosures use an Ultralife U9VL lithium manganese dioxide battery. Equivalent, UL recognised, batteries may be used.

For watertight (WT) actuator enclosures use an Ultralife U9VL lithium manganese dioxide battery or any equivalent 9V battery.

**Torque and Position Monitoring**

The IQ range of actuators incorporate real time, instantaneous Torque & Position monitoring as standard.

Torque & Position can be used to monitor valve performance during operation. The effect of process changes (differential pressure etc.) can be evaluated. Tight spots in valve travel can be pinpointed as well as gauging torque developed through stroke for torque value setting (refer to pages 25, 26).

Using the Setting Tool, the display can be set to indicate Torque and Position as follows:

With the actuator displaying Current Position and selected to Local or Stop, using the Setting Tool,

PRESS THE → KEY.

The display will split, the top indicating the instantaneous torque (as a % of rated), the bottom indicating the measured position (% open).

Example shows 19% (of rated) torque at 50% open position. Display torque range: [00] to [99]% of rated torque in 1% increments. For values of torque above 99% the display will indicate [HI].

Display position range:

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

For a stationary actuator the display will indicate the actual torque value as applied by the actuator.

To keep the torque + position display active press the + or − keys. The display will remain active for approximately 5 minutes from the last key operation.
Troubleshooting

The IQ range of actuators is the world’s first that can be commissioned and interrogated without removing electrical covers. Help Screen diagnostics enable fast and complete fault finding to be carried out.

With power off, the actuator display is not backlit. Position indicator lamp not illuminated.
With mains power on, the actuator’s display should be backlit (refer to Section 3.3 page 4 – The Actuator Display).

Check that 3 phase supply is available and is of the correct voltage as stated on the actuator nameplate. Measure voltage phase to phase across terminals 1, 2 and 3 of the actuator terminal bung.

With power Off, the actuator does not display position.
With mains power off the actuator battery supports position indication liquid crystal display only.

(Refer to Section 3.3 page 4 – The Actuator Display).

If the display is blank the actuator battery must be replaced and the limits of travel reset (refer to Section 10 page 65 – The Actuator Battery).

With the actuator powered up and Local or Stop selected, eight Help Screens can be accessed using the Setting Tool (refer to Fig. 9.1 page 30 for their location).

With Remote selected press the key on the Setting Tool twice. The Help Screens will 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”.

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

H1 – Factors inhibiting electrical operation.
H2 – Monitor battery level and ESD control input.
H3 – Monitor the position limit and actuator power supply status.
H4 – Monitor remote control inputs to the actuator.
H5 – Monitor remote interlocks local control inputs and motor thermostats.
H6 – Monitor torque switch status and IR Setting Tool communication for vandal proof applications.
H7 – Monitor travel limits, centre column and position limit status.
H8 – Monitor the actuator’s position-sensing devices.
H9 – Rotork use only.

Help screen bars shown are undefined and may be ON, OFF or flashing.
**Factors Inhibiting Electrical Operation**

**H1**

- **Phase Loss**
- **Position Error**
- **Local Controls Error**
- **Battery Low on Power-up**

**Help Screen 1**

**POSITION ERROR**
**Bar ON = Current Position Error Present.**

During power up the actuator position processor compares the current position to that stored in the Eeprom. If there is a discrepancy this is shown as a current position error.

Re-setting of both actuator limits should now be carried out (refer to page 27).

**BATTERY LOW ON POWER UP**
**Bar ON = Low battery detected On Power Up.**

If [OS] is selected [ON] (set as default) the actuator operation will be inhibited when powered up with a discharged battery (refer to [OS] page 58).

The battery should be replaced at the earliest opportunity (refer to page 65).

**LOCAL CONTROLS ERROR**
**Bar ON = Invalid Local Control Signals Detected.**

For example if a Local Open and Close signal is detected at the same time this would be classed as an invalid or fault condition.

**PHASE LOSS**
**Bar ON = Phase Lost (3 Phase Actuators Only).**

Loss of third monitored power supply phase connected to actuator terminal 3.

**Battery Level and ESD Control Input**

**H2**

- **ESD Active**
- **Low Battery**
- **Battery Discharged**

**Help Screen 2**

**LOW BATTERY**
**Bar ON = Battery level low.**
**Bar OFF = Battery OK.**

Bar ON when the battery is low but still able to support the necessary actuator functions.

The battery should be replaced at the earliest possible opportunity.

**ESD SIGNAL ACTIVE**
**Bar ON = ESD Signal is present.**

When applied, an Emergency Shutdown Signal will override any existing local or remote control signal, causing the actuator to respond in the direction selected for ESD.

The ESD function will be determined by the settings on Control Mode Configuration screens [A1] to [A5] (refer to Section 9.3 page 34).

The actuator will not respond to any local or remote control while an ESD signal is maintained.
H3 Factors Inhibiting Electrical Operation

CLOCKWISE LIMIT
Bar ON = Actuator has reached clockwise limit of travel.

ANTI-CLOCKWISE LIMIT
Bar ON = Actuator has reached anti-clockwise limit.

INHIBIT
Bar ON = Actuator inhibited.

Possible Causes:
Phase Loss (3 phase only).
Power Loss Inhibit (page 62).
Internal Failure.

H4 Remote Control Inputs

REMOTE CLOSE 1
Bar OFF = Remote Close Signal Present.
ESD 1
Bar OFF = ESD signal present.

REMOTE MAINTAIN 1
Bar OFF = Remote Maintain signal present.
Bar ON = Remote Maintain not present and/or Remote Stop active.

REMOTE OPEN 2
Bar OFF = Remote Open signal present from BUS option pcb.

REMOTE CLOSE 2
Bar OFF = Remote Close signal present from BUS option pcb.
ESD 2
Bar OFF = ESD signal present from BUS option pcb.

REMOTE MAINTAIN 2
Bar OFF = Remote Maintain signal present from BUS option pcb.

H5 Remote Interlocks, Local Control Inputs, & T/stat

OPEN INTERLOCK
Bar ON = Open Interlock Active. (Actuator disabled)

Unauthorised Open electrical operation can be prevented by interlocking the actuator (Open) control with an external interlock contact.

If external interlocks are not required the interlock function must be selected OFF.
CLOSE INTERLOCK
Bar ON = Close Interlock Active. (Actuator disabled)
Unauthorised Close electrical operation can be prevented by interlocking the actuator (Close) control with an external interlock contact.
If external interlocks are not required the interlock function must be selected OFF.

REMOTE NOT SELECTED
Bar ON = Remote control not selected. Bar OFF = Remote control selected.

LOCAL CLOSE NOT PRESENT
Bar ON = Local Close signal not present. Bar OFF = Local Close signal present.

LOCAL OPEN NOT PRESENT
Bar ON = Local Open signal not present. Bar OFF = Local Open signal present.

THERMOSTAT TRIPPED
Bar ON = Thermostat tripped.
The actuator motor is protected by thermostats.
Should the motor become overheated the thermostats will trip and the actuator will stop. On cooling the thermostat will automatically reset, enabling operation. See the actuator nameplate for the motor rating.

LOCAL STOP NOT SELECTED
Bar ON = Local Stop not selected. Bar OFF = Local stop selected.

LOCAL NOT SELECTED
Bar ON = Local control not selected. Bar OFF = Local control selected.

TORQUE SWITCH TRIPPED
Bar OFF = Torque switch tripped.
When the actuator generates a value of torque equal to that set for Open (when opening) or Close (when closing) it will stop, protecting itself and the valve from damage. This feature is known as Over Torque Protection.
Once a torque trip has occurred further operation IN THE SAME DIRECTION is prevented.
This “latching” of the event protects the actuator and valve from repeated “hammering” against the obstruction as a response to a maintained control signal.
To “de-latch” the actuator it must be reversed.
(For actuator torque adjustment, refer to [TC ] and [TO] pages 25 and 26)
IR OPEN SIGNAL NOT PRESENT
Bar OFF = IR Open signal present.

IR CLOSE SIGNAL NOT PRESENT
Bar OFF = IR Close signal present.

IR LOCAL CONTROL DISABLED
Bar OFF = IR Local control enabled.

To operate the actuator locally with the IR Setting Tool refer to the option selection screen [Or] Section 9.14 page 62.

[Or] must be selected to [On].

IR REMOTE CONTROL NOT SELECTED
Bar OFF = IR Remote control selected (vandal-proof units only).

When actuator is supplied without local controls for vandal proof applications the option selection screen [Or] must be set to [Re] for

Remote operation (refer to Section 9.14 page 62).

OPEN LIMIT
Bar ON = Actuator has reached open limit.

CLOSE LIMIT
Bar ON = Actuator has reached Close limit.

ACTUATOR MOVING
Bar ON = Actuator moving.

SWITCH CONTACTS S1, S2, S3, S4
Bar ON = S contact is close circuit.

Bar indication is real time and reactive (refer to Section 9.2 [r1] page 32 for configuration of “S”contacts).

POSITION SENSOR A
Senses output rotation. Used for the position sensing circuit. Correct operation of the sensor is indicated by the bar being ON (and OFF) 12 times per output revolution. When the motor is running, ON and OFF bit duration should be equal.

POSITION SENSOR B
Senses output rotation. Used for the position sensing circuit. Correct operation of the sensor is indicated by the bar being ON (and OFF) 12 times per output revolution.

When the motor is running, ON and OFF bit duration should be equal.

For the two sensors, A and B, correct operation is indicated by the following truth table.

To observe this function, select manual operation and turn the actuator handwheel clockwise, starting with all sensors OFF:

CLOCKWISE 30 Deg.

Sensor B 0 1 1 0 0
Sensor A 0 0 1 1 0
IQ Insight software tool for PC has been developed to enable the actuator configuration and onboard datalogger to be reconfigured and analysed.

To enable communication with IQ Insight the actuator IrDA interface must be enabled.

A PC running IQ Insight software may be located at the actuator or, using a cell phone link, at a remote site (for information on IQ Insight see www.rotork.com).

The default setting for IQ IrDA is [On], enabling IrDA.

To disable IrDA use the + or - key. The display will change to [Off].

PRESS THE ← KEY.

The displayed option will flash indicating it has been set.

IQ Insight – IrDA Communication Enabled.

Using IQ Insight software tool, remote diagnostics can be enabled using a cell phone located at the actuator to transmit and receive data to and from a remote PC running IQ Insight software.

The cell phone must be IrDA compatible and have access to a transmit/receive data line (contact your cell phone manufacturer and service provider).

(For information on IQ Insight software refer to publication E111E).

The actuator IrDA feature must be enabled (refer to [Ir] IQ Insight – IrDA Comms).

Before starting, the cell phone must be configured for “data” as opposed to “voice” and be positioned in direct line of sight to the actuator display, no more than 0.5m (2ft) from the display.

The default setting for IQ Insight – Cell Phone is [Off].

To enable remote diagnostics use the + or - key. The display will change to [On].

PRESS THE ← KEY.

The actuator display will automatically return to indicating the current position.

The actuator will search for a compatible IrDA device within range for approximately 30 seconds.

On establishing communication, the actuator display will indicate the symbol shown below.
The cell phone must be kept within range for the duration of the remote diagnostic session.

If communication is not established or is lost, after 30 seconds the actuator will stop searching.

To resume remote cell phone diagnostics the process outlined above must be started again.

IQ Insight software is available free of charge from the Rotork web site, www.rotork.com, or for sale as a “pak” which includes an IrDA serial link for convenient connection when using a notebook PC in the field.

NOTE: The use of a notebook PC or cell phone with actuators located in hazardous areas will be subject to local regulations.

It is the responsibility of the user to seek guidance and permission.

The IQ Setting Tool is certified Intrinsically Safe (IS) and therefore can be used in defined hazardous areas (refer to page 17).

Diagnostic devices are available for local configuration, analysis and transportation of actuator data to other areas.

Contact Rotork for further information.
Oil

Unless specially ordered for extreme climatic conditions, Rotork actuators are dispatched with gearcases filled with SAE 80EP oil suitable for ambient temperatures ranging from −22°F/−30°C to 160°F/70°C.

**NOTE:** Excludes second stage gearbox if fitted.

Food grade lubricating oil is available as an alternative: contact Rotork.

<table>
<thead>
<tr>
<th>Actuator Size</th>
<th>Nett Weight kg/lbs</th>
<th>Oil Capacity litres/pt.-US</th>
</tr>
</thead>
<tbody>
<tr>
<td>IQ10</td>
<td>32/70</td>
<td>0.3/0.63</td>
</tr>
<tr>
<td>IQ12</td>
<td>32/70</td>
<td>0.3/0.63</td>
</tr>
<tr>
<td>IQ18</td>
<td>32/70</td>
<td>0.3/0.63</td>
</tr>
<tr>
<td>IQ20</td>
<td>52/115</td>
<td>0.8/1.7</td>
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<td>IQ25</td>
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<td>IQ35</td>
<td>75/165</td>
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<tr>
<td>IQ95</td>
<td>230/507</td>
<td>7.0/14.7</td>
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## Binary, Hexadecimal and Decimal Conversion Table

<table>
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<tr>
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Refer to actuator nameplate for unit specific approval details

**European – Hazardous area**

**Ex d IIB T4. ATEX (94/9/EC) II 2GD**
CENELEC Norm EN50014 and EN50018
Temperature -20°C to +70°C (-4°F to +158°F).
*Option -30°C to +70°C (-22°F to +158°F).
*Option -40°C to +70°C (-40°F to +158°F).
*Option -50°C to +40°C (-58°F to +104°F).

**Ex d IIC T4. ATEX (94/9/EC) II 2GD**
CENELEC Norm EN50014 and EN50018.
Temperature -20°C to +70°C (-4°F to +158°F).

**Ex de IIB T4. ATEX (94/9/EC) II 2GD**
CENELEC Norm EN50014, EN50018 and EN50019.
Temperature -20°C to 70°C (-4°F to +158°F).
*Option -30°C to +70°C (-22°F to +158°F).
*Option -40°C to +70°C (-40°F to +158°F).
*Option -50°C to +40°C (-58°F to +104°F).

**Ex de IIC T4. ATEX (94/9/EC) II 2GD**
CENELEC Norm EN50014, EN50018 and EN50019.
Temperature -20°C to +70°C (-4°F to +158°F).

**International – Hazardous area**

**IEC. Exd IIB T4**
IEC60079-0 and IEC60079-1 for Exd IIB T4
Temperature -20°C to +60°C (-4°F to +140°F)

**IEC. Exd IIC T4**
IEC60079-0 and IEC60079-1 for Exd IIC T4
Temperature -20°C to +60°C (-4°F to +140°F)

**USA – hazardous Area**

FM. Class 1, Division 1, Groups C, D, E, F, G hazardous areas.
Factory Mutual - Explosionproof to NEC Article 500.
Temperature -30°C to +60°C (-22°F to +140°F).
*Option -40°C to +60°C (-40°F to +140°F).
*Alternative for Group B hazardous area. Temperatures as for Groups C and D.

**Canada – hazardous Area**

CSA EP. Class 1, Division 1, Groups C and D hazardous areas.
Canadian Standard Association - Explosionproof
Temperature -30°C to +70°C ( -22°F to +158°F).
*Option -50°C to +40°C (-58°F to +104°F).
*Alternative for Group B hazardous area. Temperatures as for Groups C and D.

**International Non hazardous**

WT: Standard watertight, BS EN 60529 :1992, IP68, 7 metres/72 hours.
Temperature -30°C to +70°C (-22°F to +158°F).
*Option -40°C to +70°C (-40°F to +158°F).
*Option -50°C to +40°C (-58°F to +104°F).

**US – Non hazardous**

NEMA 4, 4X and 6.
Temperature -30°C to +70°C (-22°F to +158°F).
*Option -40°C to +70°C (-40°F to +158°F).
*Option -50°C to +40°C (-58°F to +104°F).

**Canada – Non hazardous**

CSA WT: Canadian Standard Association –Watertight.
Wiring and components complying with CSA Enclosure 4 and 4X.
Temperature -30°C to +70°C (-22°F to +158°F).
*Option -40°C to +70°C (-40°F to +158°F).
*Option -50°C to +40°C (-58°F to +104°F).

Rotork can supply actuators to national standards not listed above. For details please contact Rotork.
If your Rotork actuator has been correctly installed and sealed, it will give years of trouble-free service.

Should you require technical assistance or spares, Rotork guarantees the best service in the world. Contact your local Rotork representative or the factory direct at the address on the nameplate, quoting the actuator type and serial number.
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<td>Denmark</td>
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<td>France</td>
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