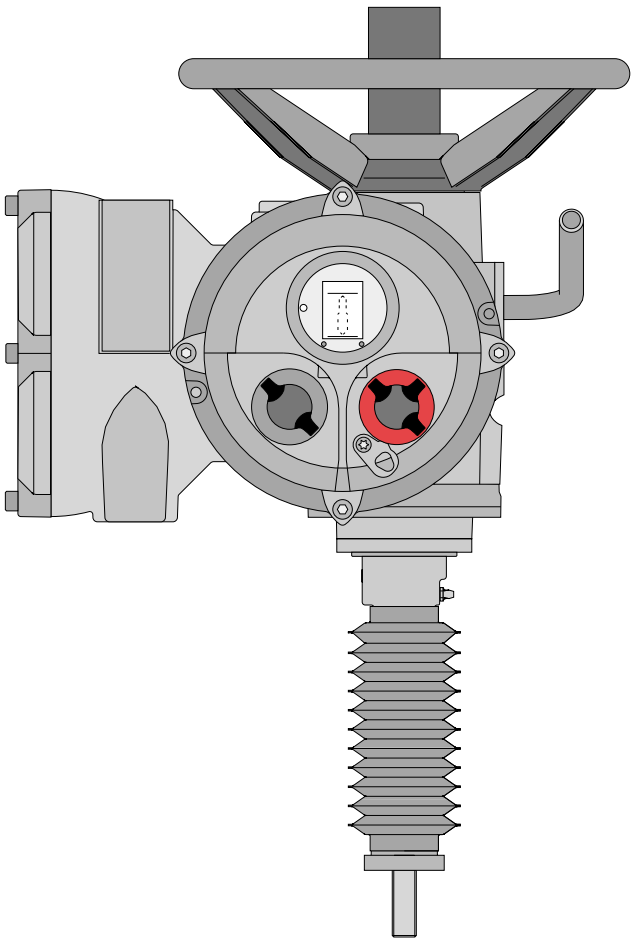
rotork

'IQM' & 'IQML' RANGE

CONTROL AND MONITORING FACILITIES



Publication E420E issue 7/02

IQM - STANDARD FACILITIES

SPECIFICATION

The type IQM actuator specification is generally as described in Publication No. E410E having a solid state reversing starter in place of the electro-mechanical contactors, suitably rated 4-pole winding, low inertia motor and with the "hammerblow" backlash omitted from the output gear train.

All other standard and optional IQ actuator features are available with IQM modulating actuators subject to the following:

Supply Voltage - maximum 480 volts, 50/60Hz.

Apply for higher voltages up to 575 volts.

Minimum voltage for the size IQM30 is 380 volts, 50/60Hz.

PERFORMANCE

The actuators are suitable for up to 1200 starts per hour with a duty in accordance with IEC 34-1 to S4 50%. See E410E for temperature rating.

SOLID STATE STARTER

The actuator design incorporates a solid state starter to achieve an increased design life. Five pairs of 1600 volt thyristors switch all three phases of the incoming power supply. Thyristors are considered to be more suitable than triacs for reversing applications and have a higher resistance to transients in the power supply.

The design also includes snubbing and transient protection circuits.

DYNAMIC BRAKING

The facility for dynamic braking is included as standard with the ability to select this function by fitting an electrical link at the actuator terminal block.

POSITIONAL ACCURACY

Repeatability with pulse control is 0.1 output turns.

POWER FUSE

It is essential that the power supply for each actuator is protected by suitably rated high speed fuses mounted at the power distribution panel. The required fuse characteristics are as follows:

	IQM10 to IQM20	IQM25 and IQM35
Rated current	10A	20A
Pre-arcing	1^2t 5.4 A^2s	1^2t 30 A^2s
Total	1^2t 55 A^2s	1^2T 250 A^2s
Rated voltage	660V (IEC)	660V (IEC)
Suggested fuse	Ferraz G330010	Ferraz K330013

CIRCUIT DIAGRAM

Standard IQM actuators are in accordance with wiring diagram 5000-000 as shown on page 6.

For aplications requiring seperately mounted starters, please see details of M Range Syncroset actuators given on page 11.

CONTROL

Opto-isolators are used to interface the actuator's internal logic circuits with the remote controls. The basic circuits permit various control facilities to be selected whether internally or externally fed. As standard the actuators are designed for positive switching remote control from digital signals.

Various control functions may be configured on site at the time of commisioning using the Rotork IQ Setting Tool. In the absence of specific instructions, actuators will be dispatched with the control functions configured as shown on the diagram on page 6.

PULSE CONTROL

Where pulse control is used the minimum pulse length should be 18ms and the minimum time between pulses should be 500ms. Typical duration of motor energisation in response to each minimum pulse control signal in the same direction will be between 20 and 30ms. Where special units designed for use with AC remote control supplies are required, the minimum pulse length should be 300ms.

REMOTE CONTROL POWER SUPPLIES

Remote controls may be powered by the internally derived 24 volt DC power supply. Alternatively remote controls may be powered by an external supply of 24DC. The appropriate connections are shown on page 6. Please apply if suitability for other remote control supplies is required.

LOCAL CONTROLS

The actuator is provided with Open, Close and Stop facilities and Local/Remote selection, Local, Open and Close control is configurable to either self-maintained or push-to-run.

EXTERNAL INTERLOCKS

Facilities are provided for the connection of external contacts to inhibit Open and/or Close valve operation.

STATUS FEEDBACK

Four configurable status feedback contacts and monitor relay are available as standard with IQM actuators.

PROTECTION

The motor is protected against single phasing or incorrect phase rotation by the Rotork patented, Syncrophase circuit and against overheating by the thermostat in the motor winding. Opto-isolators provide protection against high voltage transients for the interface with the remote controls.

EMERGENCY SHUTDOWN (ESD)

The ESD facility may be configured for Open or Close operation with the option of by-passing the motor protection thermostat, using the IQ Setting Tool.

IQM - OPTIONAL FACILITIES

OPTIONAL FACILITIES

The following optional facilities are available, and are covered by the appropriate alternative wiring diagrams as indicated in the wiring diagram number matrix on page 5.

FOLOMATIC CONTROLLER

The Folomatic enables standard IQM actuators to control the position of a valve in proportion to an analogue current or voltage signal.

A voltage derived from the actuator position sensor is electronically compared with a voltage proportional to the input signal. The difference between them (error) triggers the open or close thyristor circuit, via logic circuits, to drive the actuator in the direction which will cancel the error. Valve position is therefore automatically adjusted in proportion to analogue signal. Unnecessarily frequent switching is prevented by the Motion Inhibit feature.

The Folomatic can be configured to suit the following:

Analogue signals/ input impedence:	0-5mA/1k ohm 0-10mA/500 ohm 0-20mA/250 ohm	0-5v/1 M ohm 0-10v/78 kohm 0-20V/52 kohm

Position corresponding to low input signal:	Closed limit, or percentage Open or Open limit.
Position corresponding to high imput signal:	Closed limit, or percentage Open or Open limit.
Deadband:	0-9.9% of travel between Open and Closed limit positions.
Motion Inhibit time:	2-99 secs. between actuator movements.
Action on loss of input signal:	Stay-put or move to high signal position or move to low signal position. Available for minimum set 'low' signal of 0.5mA. Response on loss of signal will occur if signal falls below 50% of set 'low' signal.
Overall accuracy (actuator mechanical output position/ demand value):	0.5% of maximum signal with dynamic braking and minimum of 10 turns for full valve stroke, assuming a deadband setting of <0.2%.

CONNECTIONS

The analogue signal should be connected to terminals 26 (+ve) and 27 (-ve). If no remote manual control is required, link terminals 39 to 5 and 41 to 4. Terminal 39 is provided for remote manual/auto selection. The remote control connections for actuators to standard wiring diagrams are as follows:

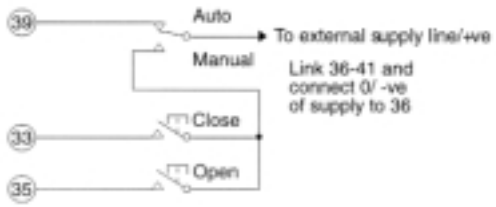


Fig 1a. Externally fed remote controls

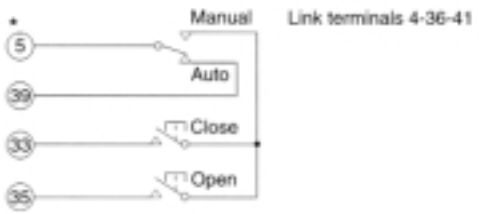


Fig 1b. Internally fed remote controls

CURRENT POSITION TRANSMITTER (CPT)

The CPT provides an internally powered electrically isolated 4-20mA analogue valve position feedback signal, which is available at terminals 22 (+ve) and 23 (-ve). The maximum external impedence that may be connected to the signal is 500 ohms. Repeatability is within ±1% and linearity ±2.5% of total valve travel.

ALARM RELAYS

A set of three alarm relays can be provided with the following functions:

Relay 1	'Battery low' signal (Normally open contact rated for 5A 250 volts AC, 30 volts DC).
Relay 2	'Thermostat tripped' signal (change-over contact rated for 30 Watts, 62.5VA, 110 Volts).
Relay 3	'Remote selected' signal (contact as Relay 2)

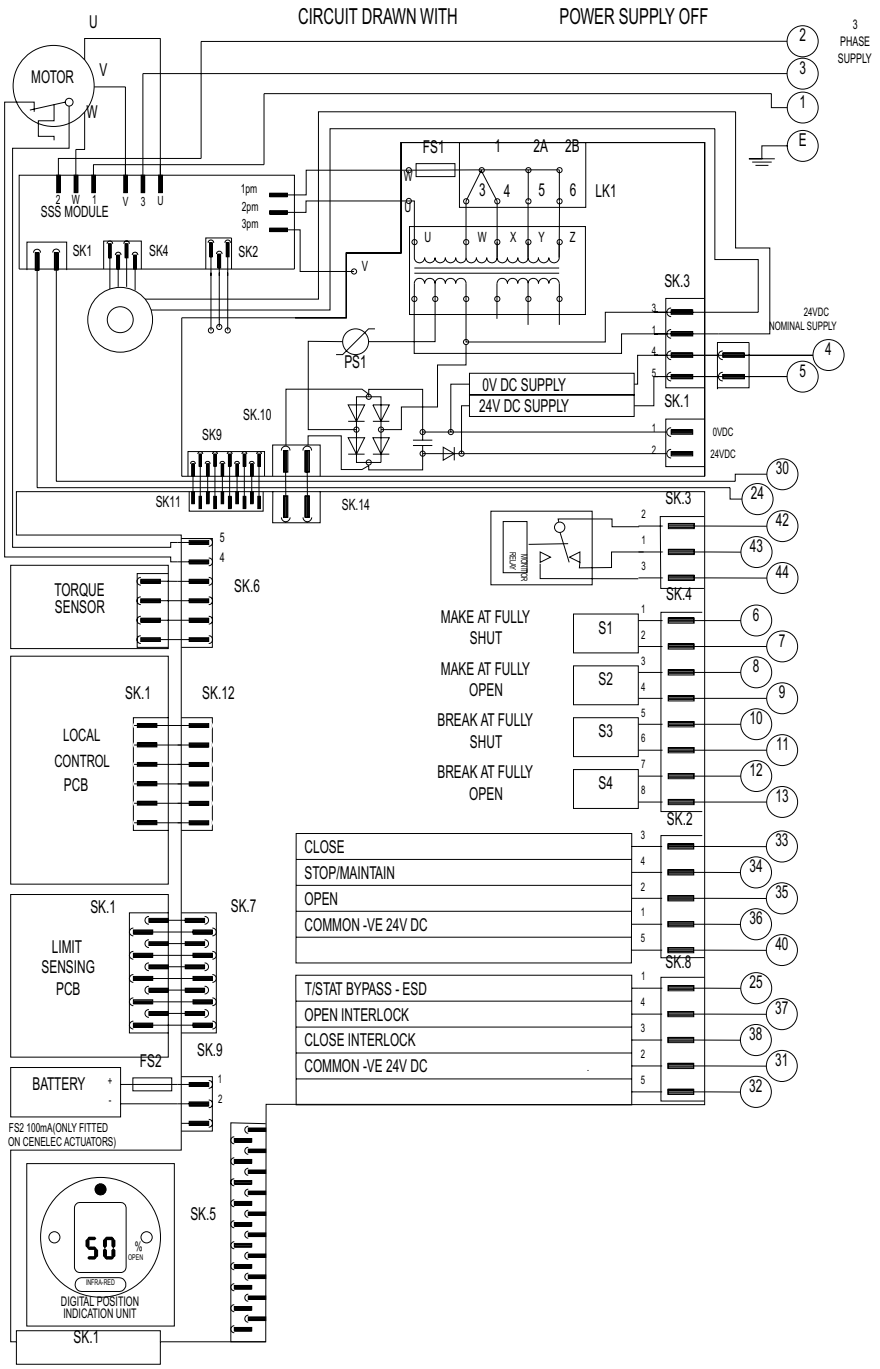
The following optional facilities available on standard IQ actuators are also available on IQM units.

Negative Switching	(see publication E120E)
Interrupter Timer	(see publication E120E)
Pakscan	(see publication S000E)

IQM - ACTUATOR CONTROL CIRCUITS

BASIC IQM ACTUATOR WIRING DIAGRAM 5000-000

Positive switching remote controls. Refer to Rotork for non-standard voltage option. Circuit is drawn with power supply off.



Transformer Tapping Options

Type 1

TAP	NOM 50/60HZ	50HZ	60HZ
W	220/230	176-242	198-259
X	380/400	304-418	342-446
Y	415/420	332-457	374-487
Z	440/460	352-484	396-517

Fuse FS1 - 250mA Anti-Surge

Type 2

TAP	NOM 50/60HZ	50HZ	60HZ
W	346/380	285-388	321-419
X	480/500	406-552	432-564
Y	240/240	192-261	216-282
Z*	550/575	445-605	501-654

Fuse FS1 250mA Anti-Surge

NOTE *150mA Anti-Surge

The actuator must be protected using suitably rated high speed semi-conductor fuses on the incoming supply.
Suggested fuses:-
IQ10-20: 10 Amp Ferraz G330010
IQ25-35: 20 Amp Ferraz K330013
All transformer types - PS1 Self resetting fuse

NOTE

Where customers wish to have the thermostat by-passed during emergency shutdown operation, it should be noted that any actuator hazardous enclosure certification will be invalidated while the thermostat is by-passed.

Max external load on terminals 4&5 to be 5W.

For typical remote control indicating,monitoring and alarm circuits see publication E420E

Control signal threshold voltages to be minimum 'ON' 20V AC/DC maximum 'OFF'= 3V minimum control signal duration to be 100mS.

Current drawn from each remote control signal is 5mA on 24V DC

Wires are identified at each end by terminal No. or tag No.

Iindication contacts S1-S4 are shown in their default configuration. Contacts may be configured for any of the functions described in E170E.

IQM - OPTIONAL FEATURES

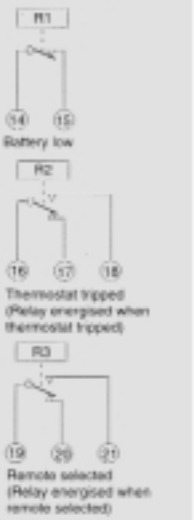
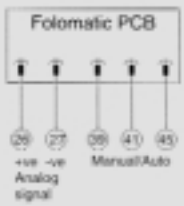
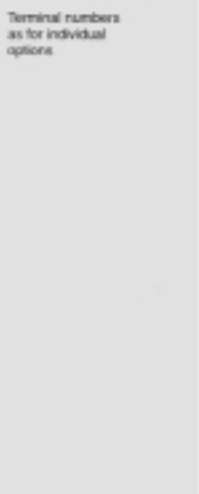
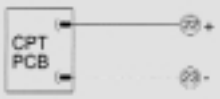
STANDARD ACTUATOR DIAGRAMS

The typical remote control interlock and monitoring circuits illustrated are applicable to actuators with the following standard Rotork wiring diagrams.

NOTES

1 Data logger - diagram number changes to '1' for fifth digit, e.g. 600-000 becomes 600-010.

2 For negative switching - diagram number changes to '7' for first digit, e.g. 600-000 becomes 700-000.

	Alarm relays	Folomatic control unit	Alarm relays and Folomatic
			
Basic	5000-000	5100-000	5000-100	5100-100
Current position transmitter (CPT)  CPT is internally powered	5010-000	5110-00	5010-100	5110-100

IQ SETTING TOOL

The IQ Setting Tool makes it possible to read and set all the actuator functions, such as valve travel and torque or travel limit control, without removing any covers. The IQ Setting Tool transmits signals to an infra-red receiver built into the actuator.

The IQ Setting Tool has a 'programming' mode which enables the valve manufacturer to configure the actuator to suit his valve and the site commisioning engineer to configure the actuator for a variety of different control functions. The IQ Setting Tool also has a 'checking' mode which enables all the existing actuator settings to be interrogated. Protection against unauthorized changes to setting is provided by a 'password'.

CONFIGURATION

The following actuator functions are configured by the IQ Setting Tool:

- Direction of actuator output rotation for closing the valve.
- Selection of torque or turns limitation for valve opening and closing travel.
- Torque setting for Open and Close valve operation.
- Setting of actuator output turns to suit the valve travel.
- "Open/close" remote control signal priority.
- Selection of function and contact mode for each of the four standard indication contacts.
- Valve to Open or Close with ESD signal.
- External interlock facility.

The standard configuration for the IQM actuator is given on page 6.

In addition, the IQ Setting Tool will enable configuration of the following optional assemblies when fitted to the actuator:

- CPT - selection of open or closed valve position corresponding to a maximum signal.
- Pakscan - address, baud rate and protocol.
- Folomatic - signal range, increasing signal is to correspond to opening or closing of the valve, action on loss of signal, amount of deadband and the motion inhibit time delay.

Publication E170E, supplied with each actuator gives full instructions for the operation of the IQ Setting Tool.

IQM - REMOTE DIGITAL CONTROL CIRCUITS

The infra red setting tool enables various different remote controls to be configured. Unless specified requirements are stated with the order, actuators will be supplied configured as follows:

Maintained local control

Clockwise to close

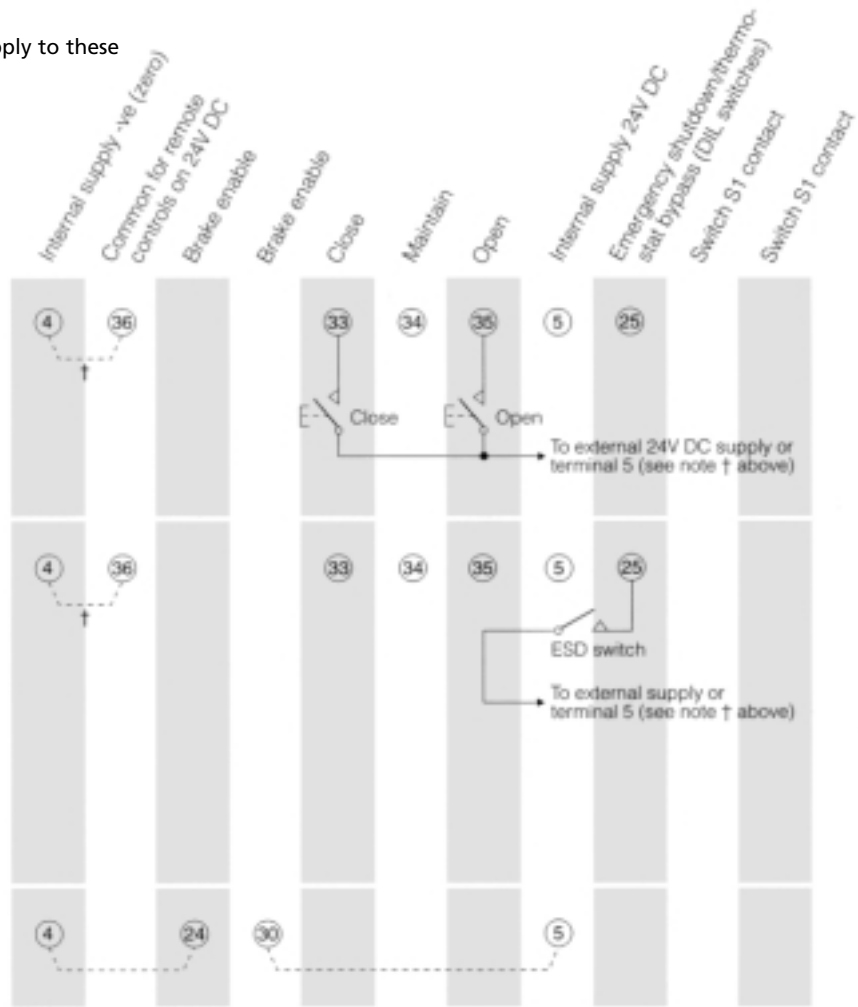
Thermostat by-passed on ESD

Open and closed interlocks enabled

Close signal priority

The typical remote control circuits shown below apply to these unless otherwise stated.

Max. external load on 24v DC supply from acutuator terminals 4 - 5 to be 5W.



Form A
Open/close push to run control
(local control remains self maintained).

Form F
Emergency shut-down to close valve overriding thermostat (actuator hazardous enclosure certification is invalidated while thermostat overidden) and any existing signal may be added to any of the circuits above.

Actuators may be configured so that thermostat is not by-passed during ESD operation.

To override external interlocks on ESD additional remote contacts must be provided.

Brake enable connections

† Note

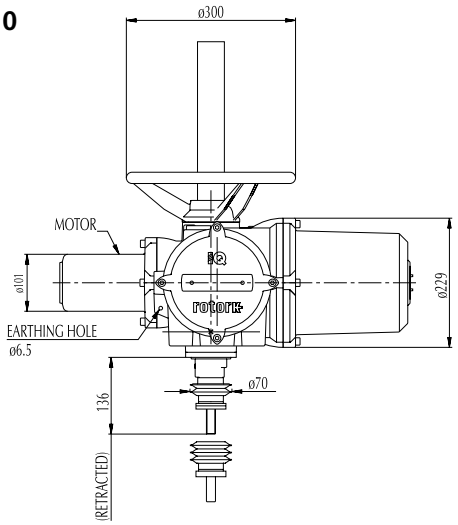
Remote controls may be fed from the internal 24V DC supply at terminal 5 when terminals 4-36 must be linked, or from an external supply when the zero/-ve of the supply should be connected to terminal 36.

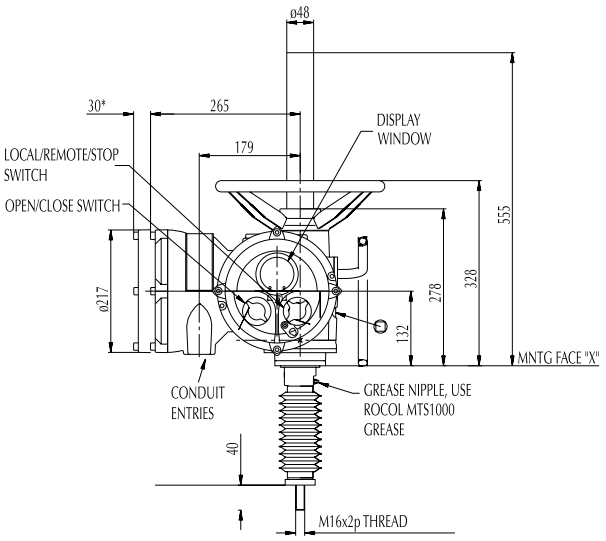
Terminals 4-36 also to be linked for form A and F control.

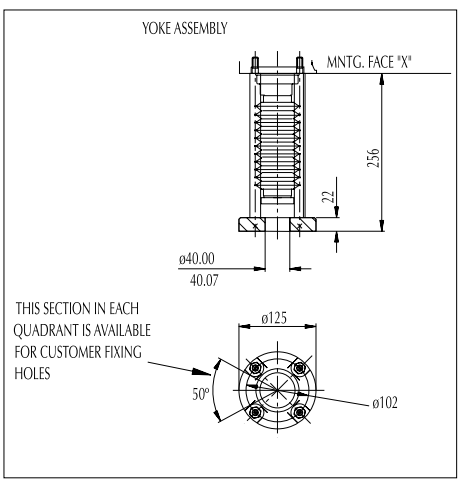
The input to the IQ series actuator logic circuits associated with the remote controls may be used with cable capacitance of up to 2µF between cores.

IQML10 TO IQML25 ACTUATOR DIMENSIONS

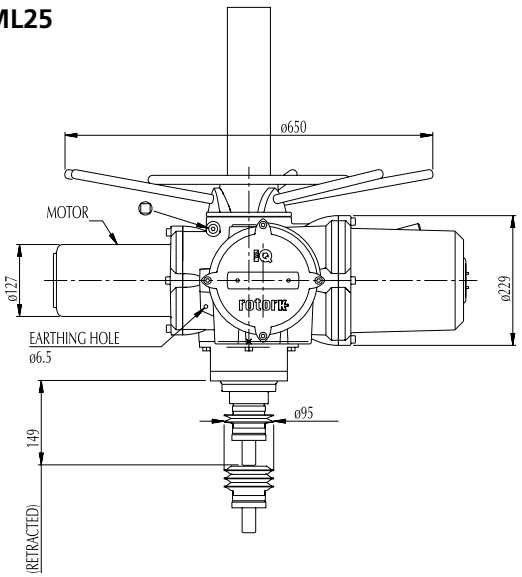
IQML10

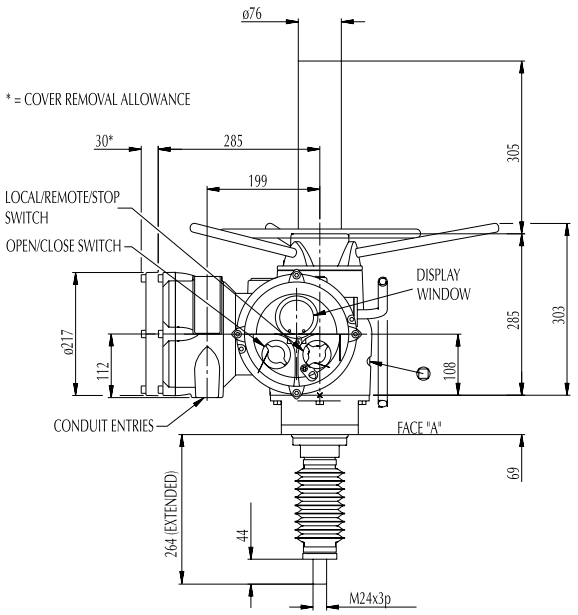


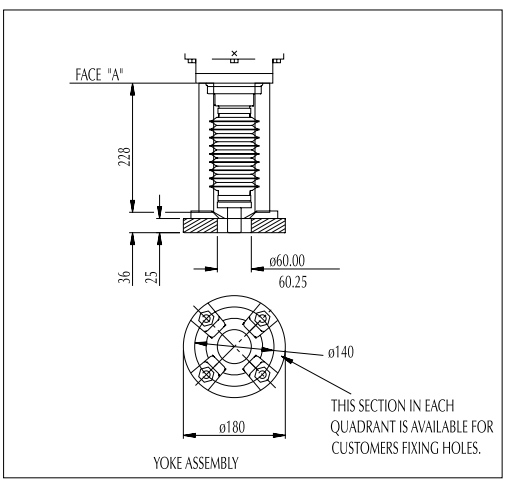




IQML25







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