rotork®

Process Controls

CMA Range

Installation & Maintenance Instructions
(Before May 2014)

Linear, Rotary and Quarter-Turn
Control Valve Actuators

Redefining Flow Control

Contents

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Process Controls

Linear CML

Quarter-Turn CMQ

Rotary CMR

THIS MANUAL CONTAINS IMPORTANT SAFETY INFORMATION. PLEASE ENSURE IT IS THOROUGHLY READ AND UNDERSTOOD BEFORE INSTALLING, OPERATING OR MAINTAINING THE EQUIPMENT.

DUE TO WIDE VARIATIONS IN THE TERMINAL NUMBERING OF ACTUATOR PRODUCTS, ACTUAL WIRING OF THIS DEVICE SHOULD FOLLOW THE PRINT SUPPLIED WITH THE UNIT.

Introduction

Rotork Process Controls designs, manufactures, and tests its products to meet many national and international standards. For these products to operate within their normal specifications, they must be properly installed and maintained.

The following instructions must be followed and integrated with your safety program when installing and using Rotork Process Controls products:

- Read and save all instructions prior to installing, operating and servicing this product.
- If you don't understand any of the instructions, contact Rotork Process Controls for clarification.
- Follow all warnings, cautions and instructions marked on, and supplied with, the product.
- Inform and educate personnel in the proper installation, operation and maintenance of the product.
- Install equipment as specified in Rotork Process Controls installation instructions and per applicable local and national codes. Connect all products to the proper electrical sources.
- To ensure proper performance, use qualified personnel to install, operate, update and maintain the unit.
- When replacement parts are required, ensure that the qualified service technician uses replacement parts specified by Rotork Process Controls. Substitutions may result in fire, electrical shock, other hazards, or improper equipment operation.
- Keep all product protective covers in place (except when installing, or when maintenance is being performed by qualified personnel), to prevent electrical shock, personal injury or actuator damage.
- Operation of actuator in an inappropriate fashion may cause harm or damage to unit or other equipment surroundings.

Identifying your CMA actuator:

This manual is for use with CMA actuators manufactured *before* May 2014.

If you do not know the production date of your unit please contact Rotork with your serial number to get the date of manufacture for your actuator.

General Information

INTRODUCTION

This manual has been produced to enable a competent user to install, operate, adjust and inspect the Rotork Range of Compact Control 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 their duties under the Health and Safety at Work Act 1974.

For the USA: NFPA70, National Electrical Code® is applicable. The mechanical installation should be carried out as outlined in this manual and also in accordance with any relevant national standard codes of practice. If the actuator nameplate indicates that it is suitable for use in a Potentially Explosive Atmospheres (Hazardous Areas) then the actuator is suitable for use in Zone 1 and Zone 2 (or Div 1 and Div 2) hazardous area classifications, as defined by the actuator's nameplate marking.

Any equipment connected to the actuator should be of an equivalent (or better) hazardous area certification. The installation, maintenance and use of the actuator installed in a hazardous area must be carried out by a competent person and in accordance with all relevant codes of practice for the particular Hazardous Area certification.

Any inspection or repair of Hazardous Area approved actuators should not be undertaken unless it conforms to National Legislation and Statutory Provisions relating to the specific Hazardous Area.

Only Rotork approved actuator replacement parts should be used. 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 a Hazardous Area unless it 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.

ENCLOSURE MATERIALS

The enclosures on the Rotork Range of Control Valve Actuators are manufactured from aluminium alloy with stainless steel fasteners.

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

Should further information and guidance relating to the safe use of the Rotork Control Valve Actuator Range be required, it will be provided on request.

General Information

GENERAL ACTUATOR DESCRIPTION

Building on Rotork's historical success with innovative technology, the CMA offers a highly accurate and responsive method of automating control valves and pumps without the complexity and cost of a pneumatic supply.

With a minimum resolution of 0.2% of full stroke for Linear & Quarter-turn units and 2 degrees of full stroke for Multi-turn, the Rotork CMA range helps to maximize product quality and plant capacity.

CMA range actuators are self contained, purpose designed and built for continuous remote electrical operation of control valves.

CMA range of actuators delivers a series of sizes suitable for almost all linear, quarter- turn and rotary control valve and pump applications requiring exact position control and unrestricted continuous modulation.

Refer to Hazardous Area Approval section for further detail concerning approved actuators

CML - Linear

The CML is a high precision linear actuator. It is capable of producing between 100 to 750 pounds of force and a maximum of 2 inch stroke length at a speed of between 0.125 to 0.25 inches per second.

NOTE: Thrust and Speed are dependant on frame size.

See page 7 for full details.

CMQ - Quarter-Turn Actuators

The CMQ is a high precision quarter-turn actuator capable of producing between 250 to 1000 lbf.in at speeds between 5 to 22 seconds for a 90 degree operation.

NOTE: Torque and operating times are dependant on frame size.

See page 7 for full details.

CMR - Rotary

The CMR is a high precision rotary unit with torque outputs between 50 to 250 inch pounds at output speeds between 5 to 24 RPM depending on frame size.

NOTE: Torque and operating times are dependant on frame size.

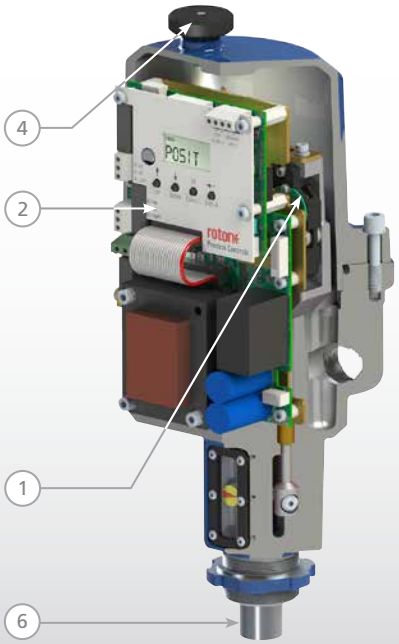
The actuator comprises:

- Absolute Encoder
- LCD User Interface
- DC brushless electric motor
- Simple, maintenance free geartrain
- Motor controller with travel and torque/thrust adjustment
- Manual Overide
- Hazardous area certification meeting international and national requirements

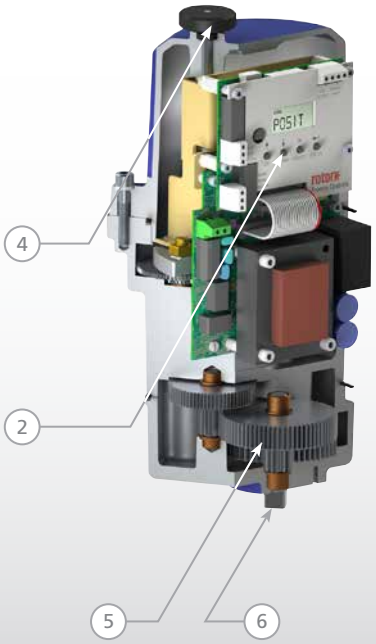
General Information

Advanced Engineering

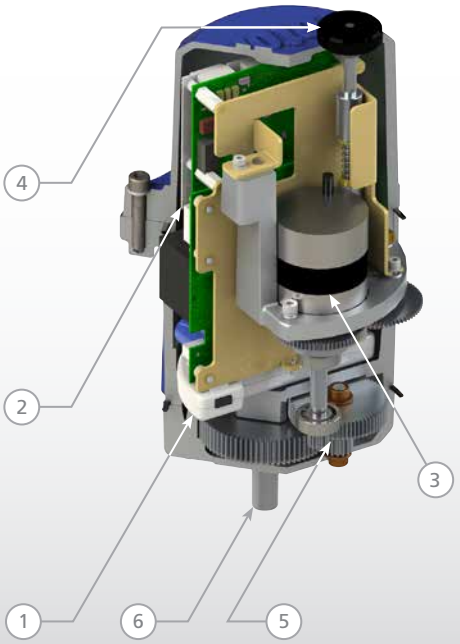
CML
Linear Actuator



CMQ
Quarter-Turn Actuator



CMR
Rotary Actuator



1 Encoder Technology

The CMA utilizes absolute encoder technology where a unique digital code corresponds to the angular position (CMQ), stroke length (CML) or rotary (CMR) position of the actuator.

To achieve high resolution, the position sensor location eliminates any backlash effect in the gearing. The sensor is a 12-bit rotary magnetic encoder, fitted at the output gear stages, removing any internal backlash effect that may exist in the drive train.

2 User Interface

The CMA LCD display is a 6-character, single line display. Two graphic symbols are provided for notification of alarm conditions. The menu style is an intuitive common tree structure similar in function to the menu system used on PCs.

Two relays can be programmed to close upon reaching a desired position or any other available fault condition among the programmable options.

3 DC Brushless Motor

The CMA uses a high efficiency, continuous rated, brushless DC motor. This allows maintenance-free operation even with continuous unrestricted modulation duty.

4 Hand Drive

A hand drive mechanism is provided as standard for all CMA actuators to allow manual operation of the valve. Pressing down on the hand-knob shaft allows it to engage a gear in the upper section of the drive train. Releasing causes the spring to disengage the gear.

5 Gear Train

The simple yet durable high efficiency spur gear drive is lubricated for life. It has proven high reliability.

The CML and CMQ standard build is capable of resisting any back drive from the load, up to 125% of the rated thrust or torque of the actuator.

6 Output Drive

The CMQ base conforms to MSS SP-101 or ISO5211.
The CMR and CML may be adapted to suit individual valves.

General Information

Mechanical Performance

The rated force (thrust or torque) for each size of actuator is detailed below. The minimum settable force is 40% of the maximum rated. Operating time tolerance +/-10%.

The CML and CMQ can resist backdriving forces from the valve up to 125% of rated load without movement.

All CMA actuators are factory calibrated.

CML: Linear Actuator

Model	Min Thrust (lbf)	Min Thrust (N)	Max Thrust (lbf)	Max Thrust (N)	Speed (inches/sec)	Speed (mm/sec)	Stroke (inches)	Stroke (mm)
CML-100	40	177.9	100	444.8	0.25	6.35	1.5	38.1
CML-250	100	444.8	250	1112	0.125	3.18	1.5	38.1
CML-750	300	1334.5	750	3336.2	0.063	1.68	2	50.8

CMQ: Quarter-Turn Actuator

Model	Min Torque (lbf.in)	Min Torque (Nm)	Max Torque (lbf.in)	Max Torque (Nm)	Time for Quarter-Turn (secs)
CMQ-250	100	11.3	250	28.2	10
CMQ-500	200	22.6	500	56.5	15
CMQ-1000	400	45.2	1000	113.0	22

CMR: Rotary Actuator

Model	Min Torque (lbf.in)	Min Torque (Nm)	Max Torque (lbf.in)	Max Torque (Nm)	Speed (RPM)	Total turns available
CMR-50	20	2.3	50	5.6	11	90° to 320 turns in 2° increments
CMR-100	40	4.5	100	11.3	10	90° to 320 turns in 2° increments
CMR-200	80	9.0	200	22.6	5	90° to 320 turns in 2° increments
CMR-89	35.6	4.0	89	10.1	24	90° to 320 turns in 2° increments
CMR-125	50	5.6	125	14.1	18	90° to 320 turns in 2° increments
CMR-250	100	11.3	250	28.2	10	90° to 320 turns in 2° increments

Vibration, Shock and Noise

CMA actuators are suitable for applications where vibration and shock severity does not exceed the following:

Type	Level
Plant induced vibration	1 g RMS total for all vibration within the frequency range of 10 to 1000Hz.
Shock	5 g peak acceleration.
Seismic	2 g acceleration over a frequency range of 1 to 50 Hz if it is to operate during and after the event.
	5 g over a frequency range of 1 to 50 Hz if it is only required to maintain structural integrity.
Emitted noise	Independent tests have shown that at 1 m generated noise does not exceed 61 db (A).

Levels quoted are those present at the actuator mounting interface. It should be noted that the effects of vibration are cumulative and therefore an actuator subjected to significant levels may have reduced life.

General Information

RECEIVING / INSPECTION

Carefully inspect for shipping damage. Damage to the shipping carton is usually a good indication that it has received rough handling. Report all damage immediately to the freight carrier and Rotork Controls Ltd.

Unpack the product and information packet taking care to save the shipping carton and any packing material should return be necessary. Verify that the items on the packing list or bill of lading agree with your own documentation.

Rotork cannot accept responsibility for deterioration caused on-site once the covers are removed. Every Rotork actuator has been fully tested before leaving the factory to give years of trouble free operation providing it is correctly commissioned, installed and sealed.

⚠ WARNING

Before installing the actuator, make sure that it is suitable for the intended application. If you are unsure of the suitability of this equipment for your installation consult Rotork prior to installation.

⚠ WARNING: ELECTRIC SHOCK HAZARD

Installation and servicing must be performed only by qualified personnel.

⚠ WARNING: ELECTROSTATIC DISCHARGE

This equipment houses static sensitive devices. To protect the internal components never touch the printed circuit boards without using electrostatic (ESD) control procedures.

STORAGE

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

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

EQUIPMENT RETURN

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 adress on the nameplate, quoting the actuator type and serial number.

ABBREVIATIONS USED IN THIS MANUAL

A	Ampere
AC	Alternating Current
°C	Degrees Celsius
CW	Clockwise
ACW	Anti-clockwise
CCW	Counter-clockwise
DC	Direct Current
°F	Degrees Fahrenheit
G	Earth Ground
Hz	Hertz
kg	Kilogram
L	Line (power supply)
lbf	Pounds Force
lbf.in	Inch Pounds
lbf.ft	Foot Pounds
mA	Milliamp
mfd	Microfarad
mm	Millimeters
N	Newton (force)
NEMA	National Electrical Manufacturing Association
Nm	Newton Meter
NPT	National Pipe Thread
PCB	Printed Circuit Board
PL	Position Limit switch
RPM	Revolutions per Minute
SEC	Second
V	Volts
VA	Volt Amps
VAC	Volts AC
VDC	Volts DC
VR	Variable Resistance
W	Watt

WARRANTY INFORMATION

Warranty: Subject to the following, Rotork Process Controls expressly warrants the products manufactured by it as meeting the applicable Rotork Process Controls product specifications and that such products are free from defects in material and workmanship for a period of one (1) year from the date of delivery. The foregoing is the sole and exclusive warranty made by Rotork Process Controls with respect to the products. Rotork Process Controls makes no other warranties, either express or implied (including, without limitation, warranties as to merchantability or fitness for a particular purpose). The purchaser retains responsibility for the application and functional adequacy of the offering. See Rotork Process Controls' General Conditions of Sale - Product, for complete warranty information.

IDENTIFICATION LABEL

An identification label is attached to each actuator. When ordering parts, requesting information or service assistance, please provide all of the label information. **You must supply the serial number with all enquiries.**

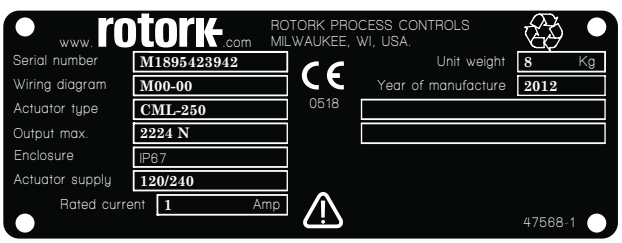


Fig 9.1 Actuator identification label.

Approvals

Non-Hazardous and Hazardous Certified Enclosures

All CMA actuator hazardous and non-hazardous area enclosures are watertight to IP67/NEMA 4 & 6.

CMA actuators are available with the following enclosure types for which the ambient working temperature ranges are stated.

Where option temperatures are indicated, changes to some actuator components are required and therefore the temperature requirement must be specified. Hazardous area approvals for other country standards are available; please contact Rotork.

CMA range actuators are built in accordance with the following standards:

Non-Hazardous Area Enclosures

WT: Standard Watertight

Standard	Rating	Standard Temperature	Low Temp Option
BS EN 60529 (1992)	IP67	-30 to +70 °C (-22 to +158 °F)	-40 to +60 °C (-40 to +140 °F)
NEMA (US)	4 & 6	-30 to +70 °C (-22 to +158 °F)	-40 to +60 °C (-40 to +140 °F)
CSA (Canadian)	4 & 6	-30 to +70 °C (-22 to +158 °F)	-40 to +60 °C (-40 to +140 °F)

Hazardous Area Enclosures

European ATEX Directive

Directive/Standard	Rating	Standard Temperature	Low Temp Option
Directive = 94/9/EC	II 2GD	-20 to +65 °C (-4 to +150 °F)	-40 to +60 °C (-40 to +140 °F)
Standard = EN 60079-0 EN 60079-1	Ex d IIB T4 Gb Ex tb IIIC T85°C Db		

International Hazardous Area IECEx

Directive/Standard	Rating	Standard Temperature	Low Temp Option
No Directive	II 2GD	-20 to +65 °C (-4 to +150 °F)	-40 to +60 °C (-40 to +140 °F)
Standard = IEC 60079-0 IEC 60079-1	Ex d IIB T4 Gb Ex tb IIIC T85°C Db		

Approvals

Special Conditions For Safe Use (ATEX & IECEx approved actuators)

In accordance with clause 5.1 of IEC/EN 60079-1, the critical dimensions of the flamepaths are:

CML-100/250

Flamepath	Maximum Gap (mm)	Maximum Width L (mm)
Lid/base	0.15	12.8
Base/pinion shaft	0.145	13.5
Base/feedback shaft bush	-0.02	13.7
Feedback shaft bush/feedback shaft	0.06	13.7
Handknob shaft/lid	0.1	25.9

CMQ-250/500

Flamepath	Maximum Gap (mm)	Maximum Width L (mm)
Lid/base	0.15	12.8
Base/pinion shaft	0.235	29.8
Base/feedback shaft bush	-0.02	13.7
Feedback shaft bush/feedback shaft	0.06	13.7
Handknob shaft/lid	0.1	25.9

CMR-50/100/200

Flamepath	Maximum Gap (mm)	Maximum Width L (mm)
Lid/base	0.15	12.8
Base/pinion shaft	0.235	29.8
Base/output shaft	0.145	12.8
Handknob shaft/lid	0.1	25.9

CML-750

Flamepath	Maximum Gap (mm)	Maximum Width L (mm)
Lid/base	0.15	12.8
Base/pinion shaft	0.235	37.3
Base/feedback shaft bush	-0.02	13.7
Feedback shaft bush/feedback shaft	0.06	13.7
Handknob shaft/lid	0.1	25.9

CMQ-1000

Flamepath	Maximum Gap (mm)	Maximum Width L (mm)
Lid/base	0.15	12.8
Base/pinion shaft	0.235	37.3
Base/feedback shaft bush	-0.02	13.7
Feedback shaft bush/feedback shaft	0.06	13.7
Handknob shaft/lid	0.1	25.9

CMR-89/125/250

Flamepath	Maximum Gap (mm)	Maximum Width L (mm)
Lid/base	0.15	12.8
Base/pinion shaft	0.235	37.3
Base/ourtput shaft	0.145	13
Handknob shaft/lid	0.1	25.9

Note: Negative Sign denotes an interference fit.

⚠ **WARNING**
The equipment utilises a non-metallic outer coating and has a potential static hazard. Clean only with a damp cloth.

Installation & Setup

COMMISSIONING

The Rotork CMA Range of actuators provide simple, safe and rapid commissioning.

TOOLS & EQUIPMENT REQUIRED
(General Guideline Only)

Top Cover Fixings	-	6mm Allen Wrench
Electrical Connections	-	Terminal Screw Driver
Command & Feedback	-	4 to 20 mA Command source/meter
Actuator to Valve fixings	-	As Required.

⚠ **CAUTION**

It is essential that the setup procedure is carried out when the valve is not under working process conditions, as full valve movement may occur.

⚠ **IMPORTANT**

It is essential that the actuator is mounted correctly to the valve!

The height of the yoke or pillar and mounting plate, in relation to the top of the valve spindle is critical to ensure full stroke movement of the valve.

The Installation & Setup will include the following steps:

1. Ensure valve position is noted and safe (Offline).
2. Actuator output shaft is retracted. (Linear Units only)
3. Actuator is in closed position. (Rotary Units only).
4. Mount and align actuator to valve.
5. Set limits of travel.
6. Configure control and indication parameters

Installation & Setup

INSTALLING YOUR ACTUATOR

The following instructions must be followed and integrated into your safety program when installing and using Rotork products.

- Read and save all instructions prior to installing, operating and servicing this product.
- If you don't understand any of the instructions contact Rotork for clarification.
- Follow all warnings, cautions and instructions marked on and supplied with the product.
- Inform and educate personnel in the proper installation, operation and maintenance of the product.

Install equipment as specified in Rotork installation instructions and as per applicable local and national codes of practice. Connect all products to the proper electrical sources.

- To ensure proper performance, use only qualified personnel to install, operate, update and maintain the unit.
- When replacement parts are required, ensure that the qualified service technician uses only replacement parts specified by Rotork.
- Substitutions will invalidate any hazardous area certification and may result in fire, electrical shock, other hazards or improper operation.
- Keep all product protective covers in place (except during installation or maintenance by qualified personnel) to prevent electrical shock, personal injury or damage to equipment.
- Operation of the actuator in an inappropriate fashion may cause harm or damage to the unit or surrounding equipment.

The end user should take care when assessing the local ambient temperature to take into account the heat from any connecting pipe-work or inherent heat from process plant etc.

⚠ WARNING

Before installing the actuator, make sure that it is suitable for the intended application. If you are unsure of the suitability of this equipment for your installation consult Rotork prior to installation.

⚠ WARNING: ELECTRIC SHOCK HAZARD

Installation and servicing must be performed only by qualified personnel.

⚠ WARNING: ELECTROSTATIC DISCHARGE

This equipment houses static sensitive devices. To protect the internal components never touch the printed circuit boards without using electrostatic (ESD) control procedures.

⚠ WARNING: ENCLOSURE MATERIALS

CMA actuator castings are manufactured from aluminium alloy with stainless steel fasteners. The user must ensure that the operating environment and any materials surrounding the actuator cannot lead to a reduction in the safe use of, or the protection afforded by the actuator. Where appropriate the user must ensure the actuator is suitably protected against its operating environment.

HANDWHEEL OPERATION

The handwheel is located on the top cover of the CMA (All Variants). Push and hold the hand wheel down and rotate to extend/ retract or rotate the actuator output drive.

Fig. 12.1

Verify direction of output shaft rotation for clockwise operation of the handwheel. (Varies with frame size).

⚠ WARNING: OPERATING BY HAND

Note that under no circumstances should any additional lever device such as a wheel key or wrench be applied to the hand-wheel in order to develop more force when closing or opening the valve as this may cause damage to the valve and/or actuator. It may also cause the valve to become stuck in the seated or back seated position.

Model	Output When Hand Knob is Turned Clockwise
CMA - Linear	Extend or Retract
CML-100/250	Retract
CML-750	Extend

CMA - Quarter-turn	
CMQ-250	Anticlockwise
CMQ-500	Anticlockwise
CMQ-1000	Anticlockwise

CMA - Rotary	
CMR-50	Clockwise
CMR-89	Clockwise
CMR-100	Clockwise
CMR-125	Clockwise
CMR-200	Clockwise
CMR-250	Clockwise

Installation & Setup

STANDARD ACTUATOR

The standard actuator is not supplied with local control knobs or external display. Removal of top cover assembly is required to adjust configuration parameters and facilitate connection of power and field wiring.

Fig. 13.1

LOCAL INDICATOR

CML has one indicator as standard. All variants can be fitted with optional extended cover with local display window.

Fig. 13.2

MAIN PRINTED CIRCUIT BOARD (PCB) LAYOUT

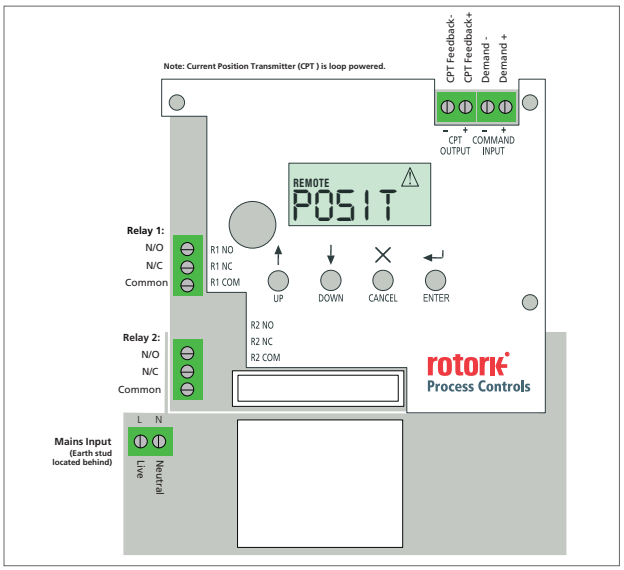


Fig 13.3 Main PCB.

LCD DISPLAY

The main PCB has a LCD Display used to show STATUS and configuration information

On power up the default screen is the POSIT parameter.

The actuator will indicate Local or Remote mode selected in top left hand corner of the LCD.

See Basic Setup Mode for details.

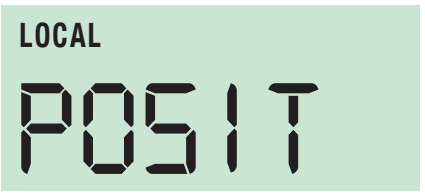


Fig. 14.1

SETUP PUSHBUTTONS

Four push button switches are located on the main PCB below its LCD Display and are used to view and change the actuator configuration parameters.

The Switch Functions are as follows:

'UP'

Used to navigate menus in view mode. Increase parameter values in Edit Mode.

'DOWN'

Used to navigate menus in view mode. Decrease parameter values in Edit Mode.

'MODE/CANCEL'

Used to exit and go to previous Menu.

ENTER

Used to enter and save changes to configuration parameters

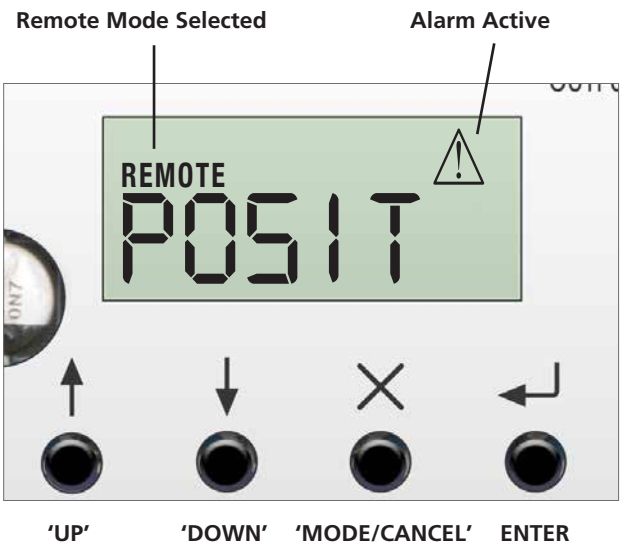


Fig. 14.2

⚠ **NON-CRITICAL FAULT**

An alarm condition exists which does not prohibit actuator movement. Refer to the Status Menu for the specific alarm condition.

⃠ **CRITICAL FAULT**

An alarm exists which prohibits actuator movement. Refer to the Status Menu for the specific alarm condition.

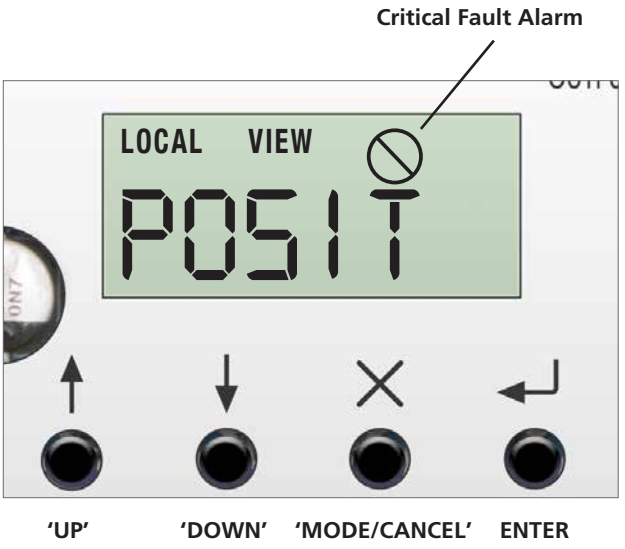


Fig. 14.3

Mounting the Actuator

The CMA Actuator is available for Linear, Quarter-turn or Rotary valves, dampers or other devices.

Each of these applications may require different methods of mounting the actuator to the valve.

Typical examples only are described in this publication and do not cover all possible variants of valve types.

CML - LINEAR UNIT - MOUNTING

⚠ **CAUTION**

It is essential that the actuator mounting procedure is carried out when the valve is not under working process conditions, as full valve movement may occur.

⚠ **IMPORTANT**

It is essential that the actuator is mounted correctly to the valve.

The height of the yoke or pillar and mounting plate, in relation to the top of the valve spindle is critical to ensure full stroke movement of the valve.

The Installation & Setup will include the following procedures:

1. Ensure Valve is closed and safe (Offline).
2. Actuator output shaft is retracted.
3. Mount and align actuator to valve.
4. Carry out Basic Setup

CML-100 & CML-250

CML-750

Mounting the Actuator

Move Valve stem to the closed position

To enable the actuator to be installed correctly the valve must be in the closed (down) position to allow fitting of the valve stem/actuator coupling.

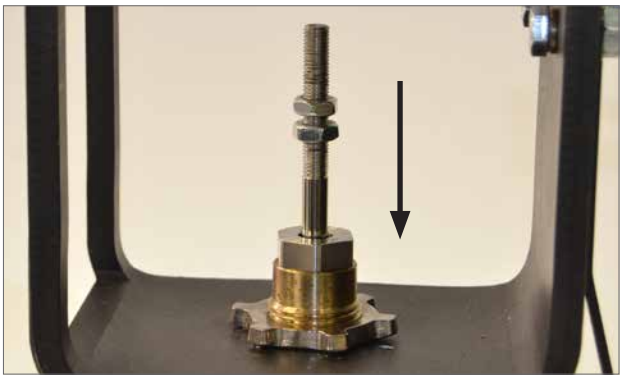


Fig. 16.1

Actuator Output Shaft

The actuator is supplied with the output shaft in the fully retracted position. If the output shaft is in the extended position it may be necessary to manually operate the actuator using the hand wheel to the retracted position to allow installation. Push and turn the hand wheel to retract the output shaft.

Fig. 16.2

Valve Stem Coupling

Machine the valve stem to actuator output shaft coupling adaptor to suit. **(NOT SUPPLIED)**

Fit the coupling to the valve stem. It may be necessary to use a locking nut to eliminate any backlash.

Leave the coupling loose and free to rotate at this stage.

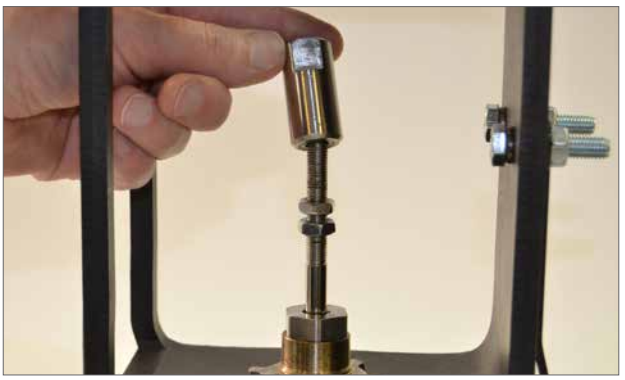


Fig. 16.3

CML-100 & CML-250 Units Only

Remove the locking ring from the base of the actuator and position the unit on to the valve mounting flange.

CML-750 Units

Position the actuator on to its mounting flange, fit four off fixings but do not fully tighten at this stage.

Fig. 16.4

Mounting the Actuator

Replace the locking ring.

DO NOT FULLY TIGHTEN AT THIS STAGE.

Fig. 17.1

Extend the actuator output shaft to bring the end of the shaft and the coupling together. Rotate the coupling as required to get a good firm contact between the valve stem and the output shaft.

Adjust and tighten locking nut(s) if fitted on valve stem side of the coupling. Ensure that the actuator is centrally aligned with the valve stem.

If the actuator output shaft reaches its fully extended position it will be necessary to retract the actuator shaft a sufficient distance to allow adjustment of the coupling to ensure a tight shut off in thrust seating valves.

Fig. 17.2

⚠ **WARNING**

It is critical that there is correct alignment between actuator output shaft and the valve stem.

Note: Mis-alignment will result in increased mechanical wear and possible damage to the valve stem.

CML-100 & CML-250 Units only

Tighten the locking ring fully to secure the actuator in position. Push and turn the manual override to verify correct operation of the valve.

Refer to the table on page 12.

CML-750 Units

Tighten the four fixings fully.

Fig. 17.3

Go to page 23 for electrical installation and basic setup instructions.

Mounting the Actuator

CMQ - QUARTER-TURN UNIT - MOUNTING

⚠ **CAUTION**

It is essential that mounting procedure is carried out when the valve is not under working process conditions, as full valve movement may occur.

⚠ **IMPORTANT**

It is essential that the actuator is mounted correctly to the valve, damper or other device.

The Installation & Setup will include the following procedures:

1. Prepare the Drive Coupling.
2. Ensure Valve position is noted and safe (Offline).
3. Mount and align actuator to valve.
4. Adjust Actuator Stop Bolts.
5. Carry out Basic Setup.

Fig. 18.1

ACTUATOR STOP BOLTS

The Quarter-turn CMQ actuators have two end of travel stop bolts adjustable between 80 to 100 degrees of travel rotation.

The Stop Bolts are set to a nominal 90 degrees of travel at the factory. These must be adjusted to suit the required valve travel BEFORE attempting to set the electrical travel limits.

The Clockwise end of travel stop bolt is on the right as viewed in Fig. 18.2.

Fig. 18.2

Mounting the Actuator

Securing Actuator to Valve

Before fitting actuator to the valve ensure that the actuator and valve are in the same position. The position of the actuator can be confirmed by using the hand wheel

A suitable mounting flange conforming to ISO 5211 or USA standard MSS SP-101 depending on the actuator supplied must be provided to mount the unit to the valve top works assembly.

Actuator to mounting flange assembly fixings must conform to Material Specification ISO Class 8.8. Delta GZ coated Grade A4 stainless steel fixings are recommended.

Actuator is supplied with a square output drive shaft. A coupling and adaptor bracket is required to mate the actuator to the valve stem.

Fig. 19.3 shows a typical valve adaptation kit.

Fit suitable mounting brackets and adaptors to the valve body.

Ensure that valve stem and actuator output shaft are in the same position (Open or Closed).

Align the actuator output shaft with stem adaptor

Position actuator on to the valve mounting flange. It may be necessary to adjust the position of the actuator to enable alignment of the fixing bolts.

Tighten base fixings in accordance with table 2.

Thread Size	Torque Nm	Torque lbf.ft
5/16 UNC	14	9.5
M8	14	9.5

Table 2

Push and turn the manual override to verify correct operation of the valve.

Refer to the table on page 12.

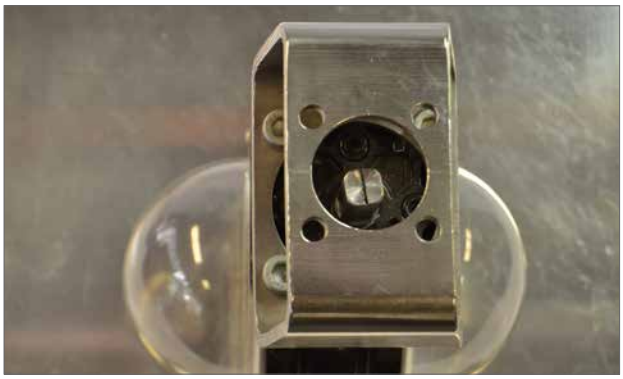


Fig. 19.1

Fig. 19.2

Fig. 19.3

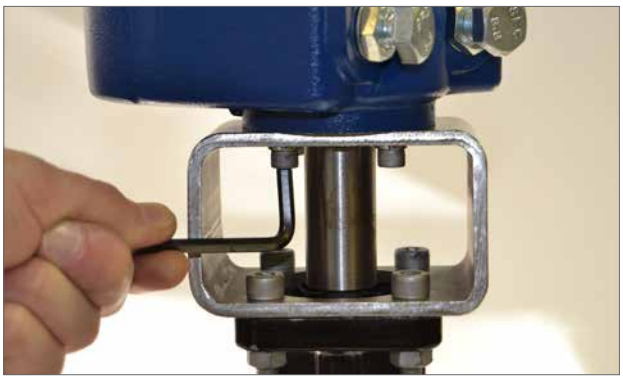


Fig. 19.4

Mounting the Actuator

Stop Bolt Adjustment

It is recommended that stop bolt adjustment be carried out by the valvemaker/supplier before the valve is fitted in to the pipework.

Once installed the valvemaker/supplier should be consulted before stop bolt re-adjustment is carried out. After setting or adjustment of stop bolts the actuator limits must be reset.

The CMA stop bolts are located on the lower body assembly. The stop bolt adjustment allows +/- 5° variation of travel at each end position. Screwing bolts in reduces the range of movement, out increases range of movement.

For clockwise closing valves the right hand bolt is the closed stop as shown in Fig 20.2. The left hand bolt is the open stop.

Stop bolts are factory set to give a nominal travel of 90 degrees travel.

Adjustment for non seating valve types

For closed and open stop position adjustment. Undo stop bolt locknut. Move actuator and valve to the required stopping position (it may be necessary to unscrew stop bolt to allow more travel). Screw stop bolt in until a stop is felt. Tighten stop bolt lock nut.

Adjustment for seating valve types

Undo stop bolt locknut. Move actuator and valve to the required stopping position (it may be necessary to unscrew stop bolt to allow more travel). Screw stop bolt in until a stop is felt and then back off by 1 to 3 turns. Tighten stop bolt lock nut.

Go to page 23 for electrical installation and basic setup instructions.

Fig. 20.1

Fig. 20.2

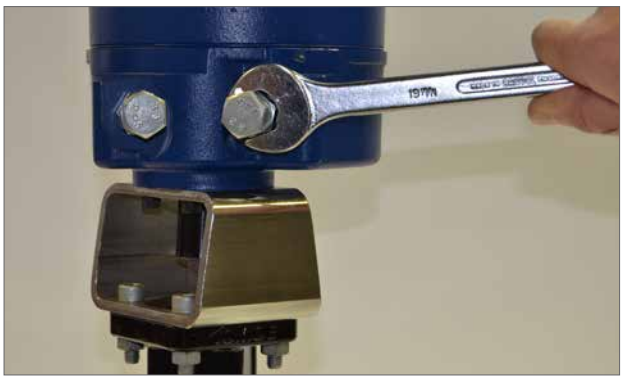


Fig. 20.3

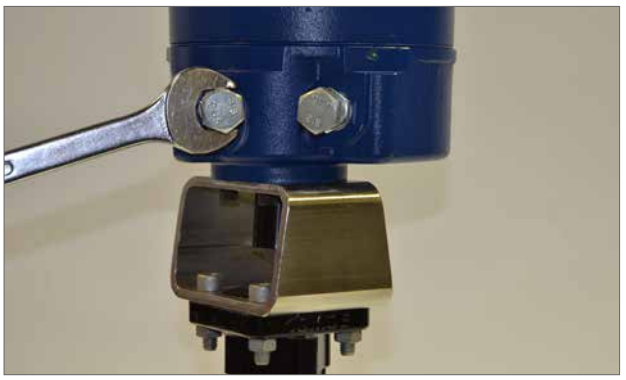


Fig. 20.4

Mounting the Actuator

CMR - ROTARY (MULTI-TURN) UNIT MOUNTING (NON THRUST)

⚠ CAUTION

It is essential that mounting procedure is carried out when the valve is not under working process conditions, as full valve movement may occur.

⚠ IMPORTANT

It is essential that the actuator is mounted correctly to the valve, damper or other device.

The Installation & Setup will include the following procedures:

1. Prepare the Drive Coupling.
2. Ensure Valve position is noted and safe (Offline).
3. Mount and align actuator to valve/pump.
4. Carry out Basic Setup.

A suitable mounting flange must be provided to mount the unit to the valve top works assembly. Mounting flange assembly fixings must conform to Material Specification ISO Class 8.8. Delta GZ coated Grade A4 stainless steel fixings are recommended. CMA Rotary actuators are supplied with base assembly suitable for Non Thrust applications requiring between 180 degrees and 320 turns operation. For applications that require thrust to be taken by the actuator apply to Rotork Process Controls.

Drive Coupling

Machine and fit coupling adaptor to the actuator output shaft and secure appropriately.

Align and Mount Actuator

Ensure that the actuator/stem coupling is aligned correctly with the stem of the valve or actuated device. Mount the actuator to the flange adaptor, ensure that the actuator is central and there is no mis-alignment between the coupling and shaft.

Fig. 21.1

Fig. 21.2

Fig. 21.3

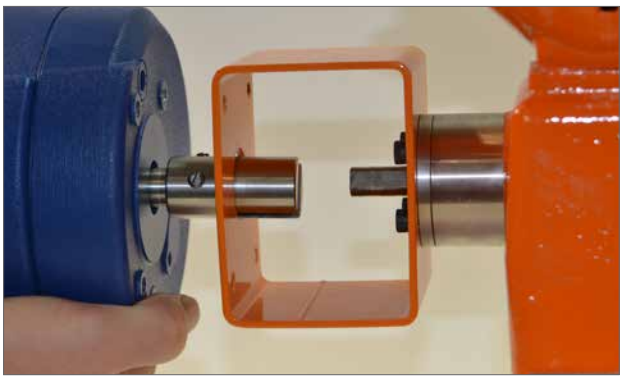


Fig. 21.4

Mounting the Actuator

CMR - ROTARY (MULTI-TURN) UNIT MOUNTING (NON THRUST)

Tighten base fixings in accordance with table 3.

Thread Size	Torque Nm	Torque lbf.ft
5/16 UNC	14	9.5
M8	14	9.5

Table 3

Push and turn the manual override to verify correct operation of the valve.

Refer to the table on page 12.

Go to page 23 for electrical installation and basic setup instructions.

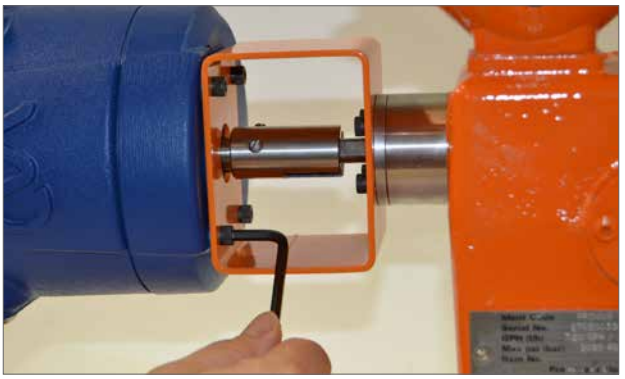


Fig. 22.1

Fig. 22.2

Installation & Setup

Electrical Installation

Cable Entries

The cable entries are tapped either ¾" NPT or M25. Remove any transit plugs. Make off 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 steel or brass threaded plugs.

If the actuator is to be installed in a hazardous area, a suitably certified cable gland must be fitted with the use of a certified thread adaptor where appropriate.

Unused entries must be closed with a suitably certified stopping plug.

Wiring installation must comply with local statutory regulations.

Connecting to Terminals

The wiring diagram supplied is particular to each actuator and must not be interchanged with any other actuator. If in doubt check the wiring diagram number with that on the actuator.

Refer to the wiring diagram to identify functions of terminals. Check that the supply voltage is the same as that marked on the actuator nameplate.

Fig. 23.1

Electrical Installation

⚠ **WARNING**

Ensure all power supplies are isolated before removing actuator covers.

Check that the supply voltage agrees with that stamped on the actuator nameplate. A fused switch or circuit breaker must be included in the wiring installation of the actuator. The switch or circuit breaker must be installed as close as possible to the actuator and shall be marked to indicate that it is the disconnecting device for that particular actuator. Actuator must be mounted such that it is not difficult to operate the disconnecting device.

The actuator must be protected with an over current protection device rated in accordance with PUB094-001 which details the electric motor performance data for CMA range actuators.

Earth Ground Connections

A lug is cast adjacent to the conduit entries for attachment of an external protective Earth (Ground) cable. An internal earth terminal is also provided. However it must not be used alone as the protective Earth Connection. See Fig. 24.1.

Removing Terminal cover

Using a 6 mm Allen key loosen the captive fixings securing the terminal compartment cover. 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.

If necessary locate the two set screws Fig. 24.2 and use them to lift the cover away from its seat.

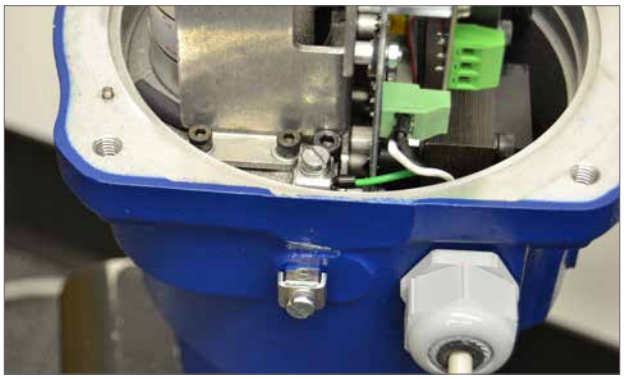


Fig. 24.1

Fig. 24.2

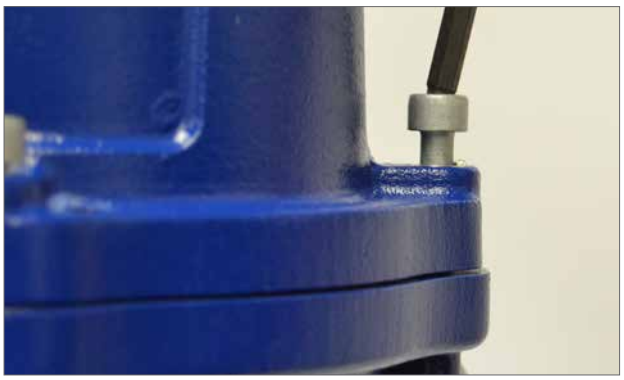


Fig. 24.3

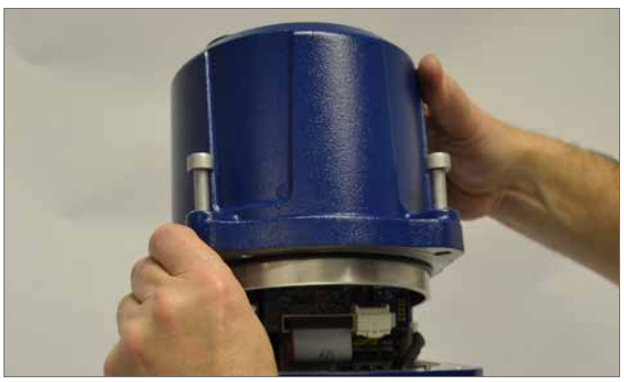


Fig. 24.4

Installation & Setup

Installation Wiring

Route cabling through the most appropriate conduit entry making sure that cables will not foul on the cover assembly or internal components after refitting. Refer to the actuator wiring diagram for connection details.

Terminate the power, control and indication wiring with appropriate ferrules. Connect wiring to the terminal block connectors. Ferrules for power connector must be Pheonix Contact AI 2,5 - 8 or AI 1,5 - 8 series ferrules or equivalent with a temperature range of -40 to 105 ºC, a minimum current rating of 5 A across the temperature range and approved for field wiring purposes. Take care to route the wiring away from the spigot housing on the gearcase.

⚠ **WARNING: The actuator must be checked to ensure that the voltage specified on the actuator identification nameplate matches the supply voltage.**

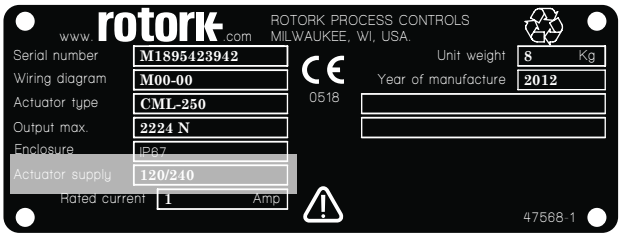


Fig 25.3 Actuator identification label.

CMA is configured at the factory for use with one of the following power supply voltages:

Single-Phase 50 Hz / 60 Hz	110, 115, 120, 208, 220, 230, 240 VAC
DC	24 VDC Only

Note: Supply voltage tolerance +/- 10%.
Supply frequency tolerance +/- 10%.

Relays

Each relay features Normally Open (N/O) and Normally Closed (N/C) volt-free contacts. Due to the constraints of the Low Voltage Directive, the maximum allowable voltage that can be applied to the relay terminals is 150 VAC. For DC however, the maximum voltage that can be applied is 30 VDC.
Rated Current is 3 A.

CPT Feedback

The Loop-powered transmitter provides 4 to 20 mA signal that corresponds to position. Loop supply is 24 VDC nominal (20-30 VDC max).

Demand

The 4-20 mA command signal is used to control actuator position.

Fig. 25.1

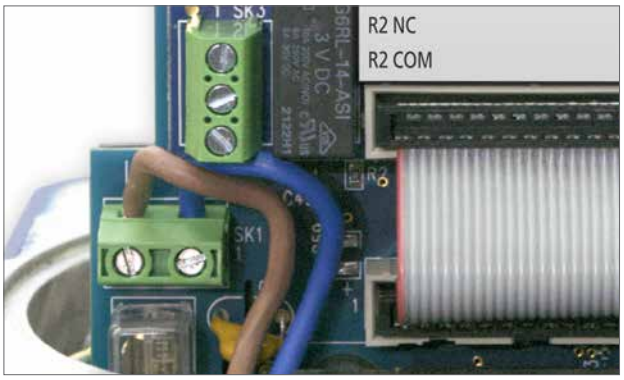


Fig. 25.2

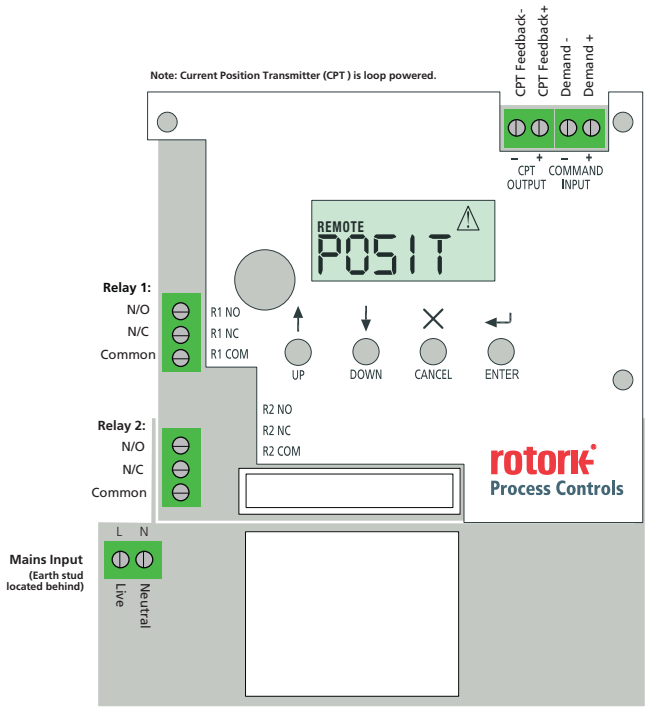


Fig 25.4 Main PCB.

Basic Setup

BASIC SETUP

Basic setup is required once the actuator has been mounted on to the valve.

Procedures include:

Step 1 Select Local Operation.

Step 2 Set Output Torque/Thrust.

Step 3 Select Action at End of Travel (Limit or Force).

Step 4 Set Close Limit of Travel.

Step 5 Set Open Limit of Travel.

Step 6 Calibrate Command Signal Zero Setpoint.

Step 7 Calibrate Command Signal Span Setpoint.

The Basic Setup procedure is carried out by using the 4 Pushbutton switches mounted below the LCD display on the main PCB.

NOTE: SETTINGS CAN ONLY BE CHANGED WITH THE ACTUATOR SET TO LOCAL OPERATION.

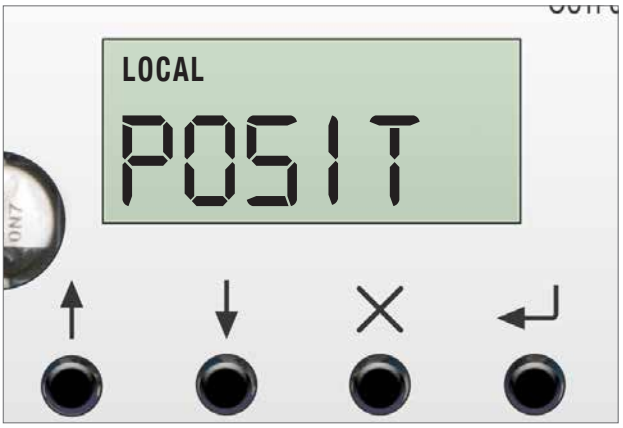
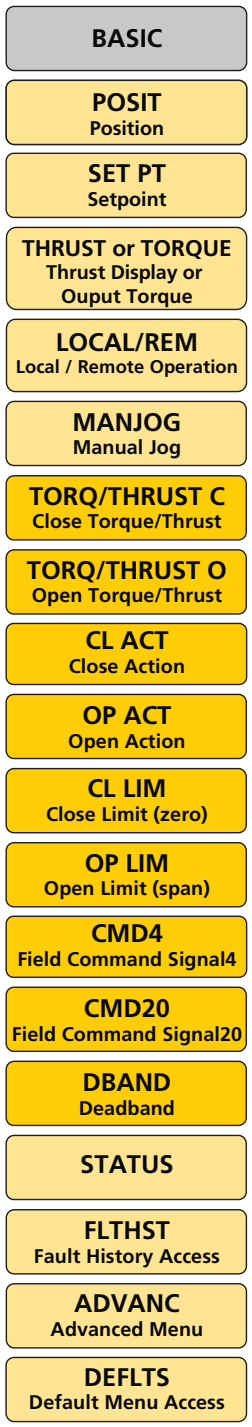


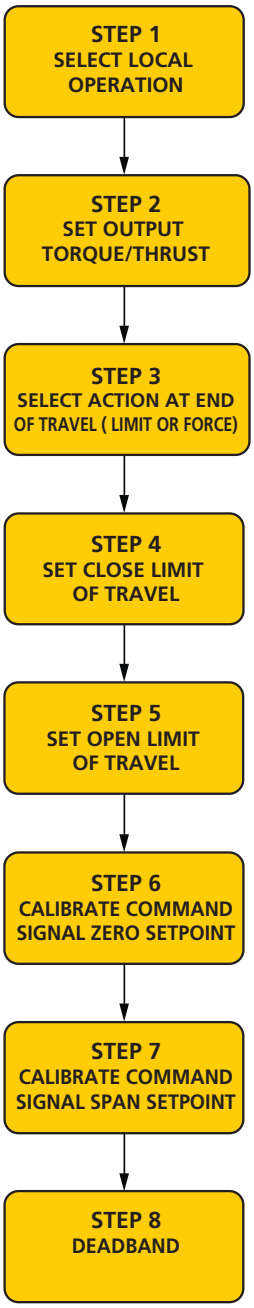
Fig. 26.1

Basic Setup

BASIC MENU STRUCTURE



BASIC SETUP FLOWCHART



STEP 1
SELECT LOCAL
OPERATION

1. SELECT LOCAL OPERATION

Screen shows the actuator set to Remote operation mode with alarms active. The Actuator must be set to Local operation mode before the travel limits can be set.

Using the 4 push button switches mounted below the LCD.

Fig. 29.1

PRESS 'DOWN'

SETPOINT parameter is now displayed.

Press ENTER to view the current setpoint if required.

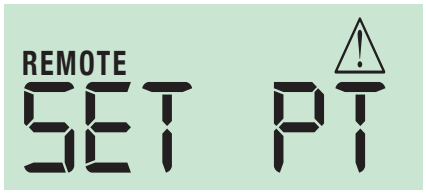


Fig. 29.2

PRESS 'DOWN'

THRUST or TORQUE parameter is now displayed depending on actuator type CML, CMQ, CMR.

Press ENTER to view current Thrust or Torque output value.

Fig. 29.3

PRESS 'DOWN'

LOCAL/REMOTE parameter is now displayed.

Fig. 29.4

1. SELECT LOCAL OPERATION

PRESS ENTER

The display now goes in to VIEW mode.

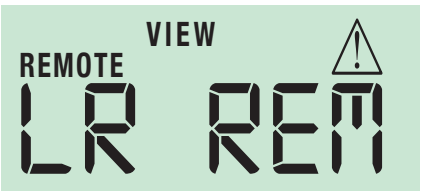


Fig. 30.1

PRESS ENTER

The display now goes in to EDIT mode.

Fig. 30.2

Use the UP or DOWN button to scroll through the settings until LR LOC is displayed.

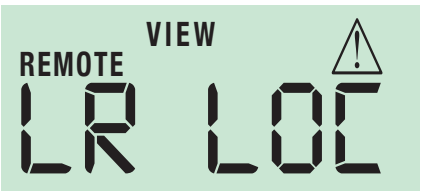


Fig. 30.3

PRESS ENTER

The actuator is now selected to LOCAL Operation mode and the change is acknowledged as 'SAVED'.

Fig. 30.4

Press CANCEL to go back to top level menu.

STEP 2
SET OUTPUT
TORQUE/THRUST

2. SET OUTPUT TORQUE/THRUST

Before operating the actuator electrically it may be necessary to reduce the output torque or thrust of the actuator to prevent valve becoming jammed at the end of travel during setup.

Use UP/DOWN buttons until TORQ C or THRSTC is displayed.

Fig. 31.1

Press ENTER to view the Close output Torque or Thrust set value.

The Torque or Thrust Output is adjustable between 40% and 100% of its rated value.

Fig 31.2 shows the Closing Torque value set to 40% of its rated value.

NOTE: The output Torque or Thrust setting must be sufficient to operate the valve under full working process conditions.

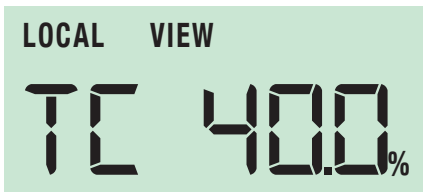


Fig. 31.2

2. SET OUTPUT TORQUE/THRUST

If the Close Torque/Thrust value requires adjustment press ENTER.

The actuator is now in EDIT Mode and the parameters can be modified.

Fig. 32.1

Use the UP/DOWN buttons until the correct Torque/Thrust Value is displayed.

Fig. 32.2

Press ENTER to save the changes. Visually confirm that the parameter is saved.

Fig. 32.3

Press CANCEL to return to previous menu.

Use UP/DOWN buttons until TORQ O or THRSTO is displayed.

Press ENTER to view the Open output Torque or Thrust set value.

The Torque or Thrust Output is adjustable between 40% and 100% of its rated value.

Fig 32.5 shows the Opening Torque value set to 100% of its rated value.

Press ENTER to change the Open Torque or Thrust set value.

NOTE: The output Torque or Thrust setting must be sufficient to operate the valve under full working process conditions.

Fig. 32.4

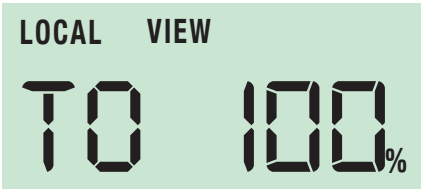


Fig. 32.5

2. SET OUTPUT TORQUE/THRUST

The actuator is now in EDIT Mode and the parameters can be modified.

Use the UP/DOWN buttons until the correct Torque/Thrust Value Is displayed.

Press ENTER to save the changes. Visually confirm that the parameter is saved.

NOTE: The Output Torque or Thrust setting must be sufficient to operate the valve under full working process conditions.

Press CANCEL to return to previous menu.

Fig. 33.1

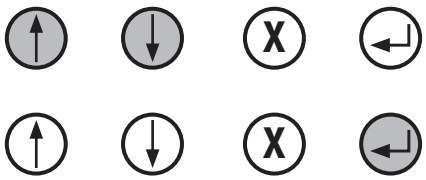


Fig. 33.2

Fig. 33.3

STEP 3
SELECT ACTION AT END OF TRAVEL (LIMIT OR FORCE)

3. SELECT ACTION AT END OF TRAVEL

The actuator can be configured to stop on position limit at the end of travel where valves do not require torque or thrust to be applied to the valve seat.

To provide tight shut off at end of travel the actuator can be configured to apply its configured torque or thrust to the valve seat in either direction.

Use the UP/DOWN buttons until CL ACT is displayed.

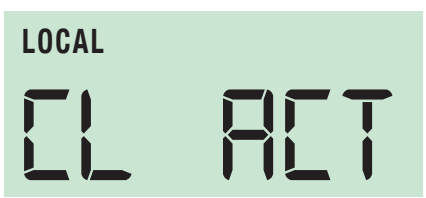


Fig. 33.4

Press ENTER to view the Close Action setting.

3. SELECT ACTION AT END OF TRAVEL

CA LIM shows the actuator is set for Position Limit action at the Closed end of travel.

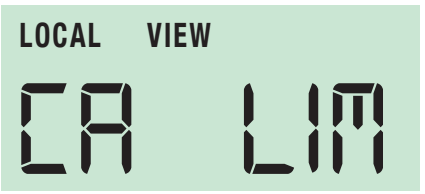


Fig. 34.1

To change the end of travel action press ENTER.

The actuator is now in EDIT Mode.

Fig. 34.2

Use the UP/DOWN buttons to select the required end of travel action.

Fig 34.3 shows the Closed End of Travel Action set to FRC (FORCE) and the set output closing torque or thrust will be applied to the valve seat at the end of travel.

Fig. 34.3

Press ENTER to save any changes.

Press CANCEL to return to previous menu.

NOTE Ensure that any changes to parameters are SAVED before returning to VIEW Mode.

Use the UP/DOWN Buttons to select the Open Action (OP ACT) and repeat the procedure to select the Action at End of Travel.

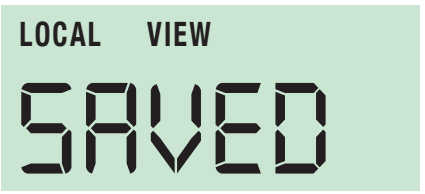


Fig. 34.4

AFTER SAVING ANY CHANGES PRESS CANCEL UNTIL YOU HAVE RETURNED TO THE TOP LEVEL BASIC MENU AND POSIT IS DISPLAYED.

Fig. 34.6

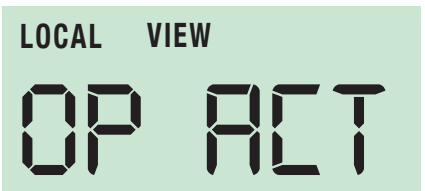


Fig. 34.5

STEP 4
SET CLOSE LIMIT
OF TRAVEL

4. SET CLOSED LIMIT OF TRAVEL

Fig. 35.1

To set the Closed limit of travel for the actuator press the DOWN button until CL LIM is displayed.

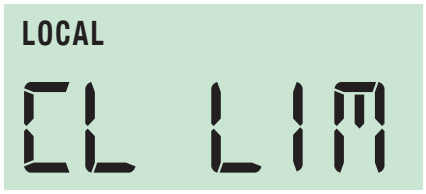


Fig. 35.2

Press ENTER to put the actuator in to EDIT Mode. This will allow parameter changes to be made.

Fig. 35.3

Use the UP and DOWN buttons to move the actuator output drive to the required CLOSED Position.

Press ENTER and the new CLOSED End of Travel Limit is saved to the actuators memory.

Fig. 35.4

THE CLOSED END OF TRAVEL LIMIT IS SET.

Press CANCEL to go back to top level menu.

STEP 5
SET OPEN LIMIT
OF TRAVEL

5. SET OPEN LIMIT OF TRAVEL

Press the DOWN arrow until the OP LIM menu is displayed.

Fig. 36.1

Fig. 36.2

Press ENTER to put the actuator in to EDIT Mode.
This will allow parameter changes to be made.

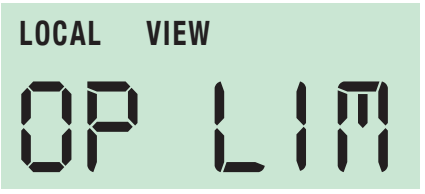


Fig. 36.3

Use the UP and DOWN buttons to move the actuator output drive to the required OPEN Position.

Fig. 36.4

Press ENTER and the new OPEN End of Travel Limit is saved to the actuators memory.

Fig. 36.5

THE OPEN END OF TRAVEL LIMIT IS SET.

Press CANCEL to go back to top level menu.

STEP 6
CALIBRATE COMMAND
SIGNAL ZERO SETPOINT

6. CALIBRATE COMMAND SIGNAL ZERO SETPOINT

After the open/close limit is set the 4 to 20 mA signal is automatically calibrated to those positions. The 4 mA input command will send you to CLOSED LIMIT, the 20 mA and will send you to OPEN LIMIT. However to calibrate to field signal follow page 38.

BASIC SETUP

The CMA proportional controller enables the actuator to automatically position a valve or actuated device in proportion to an analogue mA current. A signal derived from the actuator position feedback is compared with a signal proportional to the input signal. The difference (error) is used to energize the motor and drive the output to the required position to cancel the error.

Unwanted frequent operation can be prevented by adjustment of the deadband.

NOTE: The 4 mA command signal is automatically referenced to the fully closed limit position. If necessary reverse the limits of travel to achieve the desired command signal response.

Fig. 37.1

STEP 6
CALIBRATE COMMAND
SIGNAL ZERO SETPOINT

6. CALIBRATE COMMAND SIGNAL ZERO SETPOINT USING AN EXTERNAL 4-20 mA SIGNAL

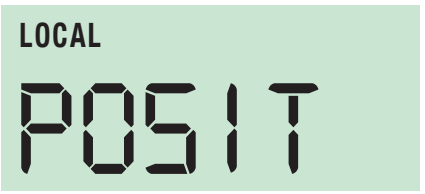


Fig. 38.1

Press the DOWN arrow until the CMD 4 menu is displayed.

Fig. 38.2

Press ENTER until 'EDIT' is displayed.

Apply LOW setpoint signal (4 mA).

Fig. 38.3

Press ENTER.

The actuator Zero setpoint is automatically calibrated to the applied analogue signal.

Fig. 38.4

Press CANCEL to go back to top level menu.

Fig. 38.5

STEP 7
CALIBRATE COMMAND
SIGNAL SPAN SETPOINT

7. CALIBRATE COMMAND SIGNAL SPAN SETPOINT USING AN EXTERNAL 4-20 mA SIGNAL

Fig. 39.1

Press the DOWN arrow until the CMD 20 menu is displayed.

Fig. 39.2

Press ENTER until 'EDIT' is displayed.

Apply HIGH setpoint signal (20 mA).

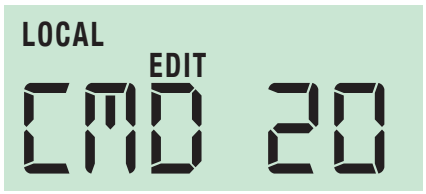


Fig. 39.3

Press ENTER.

The actuator SPAN setpoint is automatically calibrated to the applied analogue signal.

Fig. 39.4

Press CANCEL to go back to top level menu.

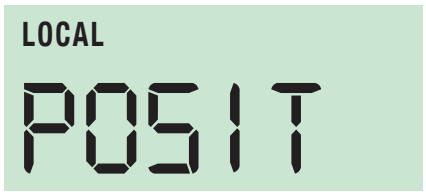


Fig. 39.5

STEP 8
DEADBAND

8. SET DEADBAND

Press the DOWN arrow until the DBAND menu is displayed.

Fig. 40.1

Fig. 40.2

Press ENTER until 'EDIT' is displayed.

Screen shows the Deadband set to 0.1%.

Deadband is adjustable between 0 to 10% of the Analogue signal.

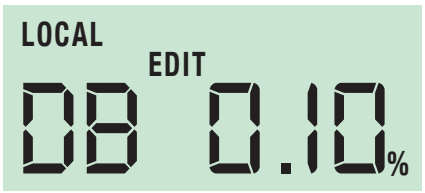


Fig. 40.3

Use the UP/DOWN buttons to select the desired Deadband.

Select the value of Deadband that gives the required control response.

It may be necessary to increase the deadband if the actuator 'Hunts' or overshoots the command setpoint giving spurious operation.

Fig. 40.4

Press ENTER to save the current Deadband Value.

Fig. 40.5

Press CANCEL to go back to top level menu.

Basic Setup

⚠ WARNING

IF NO FURTHER SETTING IS REQUIRED THE ACTUATOR MUST BE SET TO REMOTE OPERATION MODE BEFORE REFITTING COVER!

Fig. 41.1

For Further information on the Basic and Advanced setting menus refer to page 43.

If no further adjustment is necessary the top cover can now be replaced.

REFIT TOP COVER ASSEMBLY

⚠ WARNING

ISOLATE ALL ELECTRICAL SUPPLIES BEFORE REASSEMBLY.

⚠ CAUTION

REASSEMBLY WITH THE TOP COVER INCORRECTLY ALIGNED MAY RESULT IN DAMAGE TO THE ELECTRONIC AND MANUAL OVERIDE COMPONENTS.

Fig. 41.2

Visually check the alignment of the cover and the Handwheel shaft with its original orientation.

Fig. 41.3

As you look at the LCD window, replace the housing so that the Rotork Logo can be read on the cover right side up.

Fig. 41.4

Basic Setup

Ensure that the spigot face is clean and greased with the O-ring seal fitted and in good condition.

Fig. 42.1

Carefully align the cover assembly and hand wheel shaft

Ensure that all wiring is fitted correctly and will not foul the top cover assembly once fitted.

Lower the top cover in to place. Check operation of the hand wheel and that no cables are trapped.

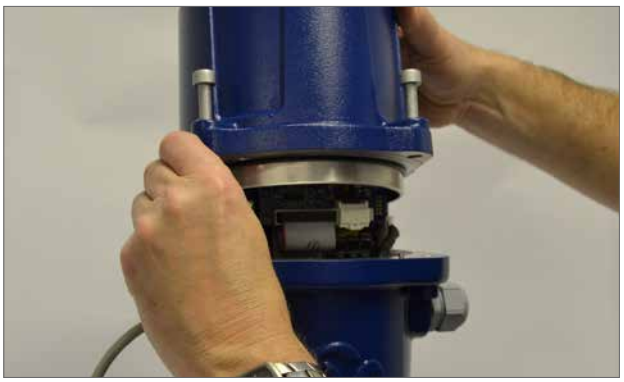


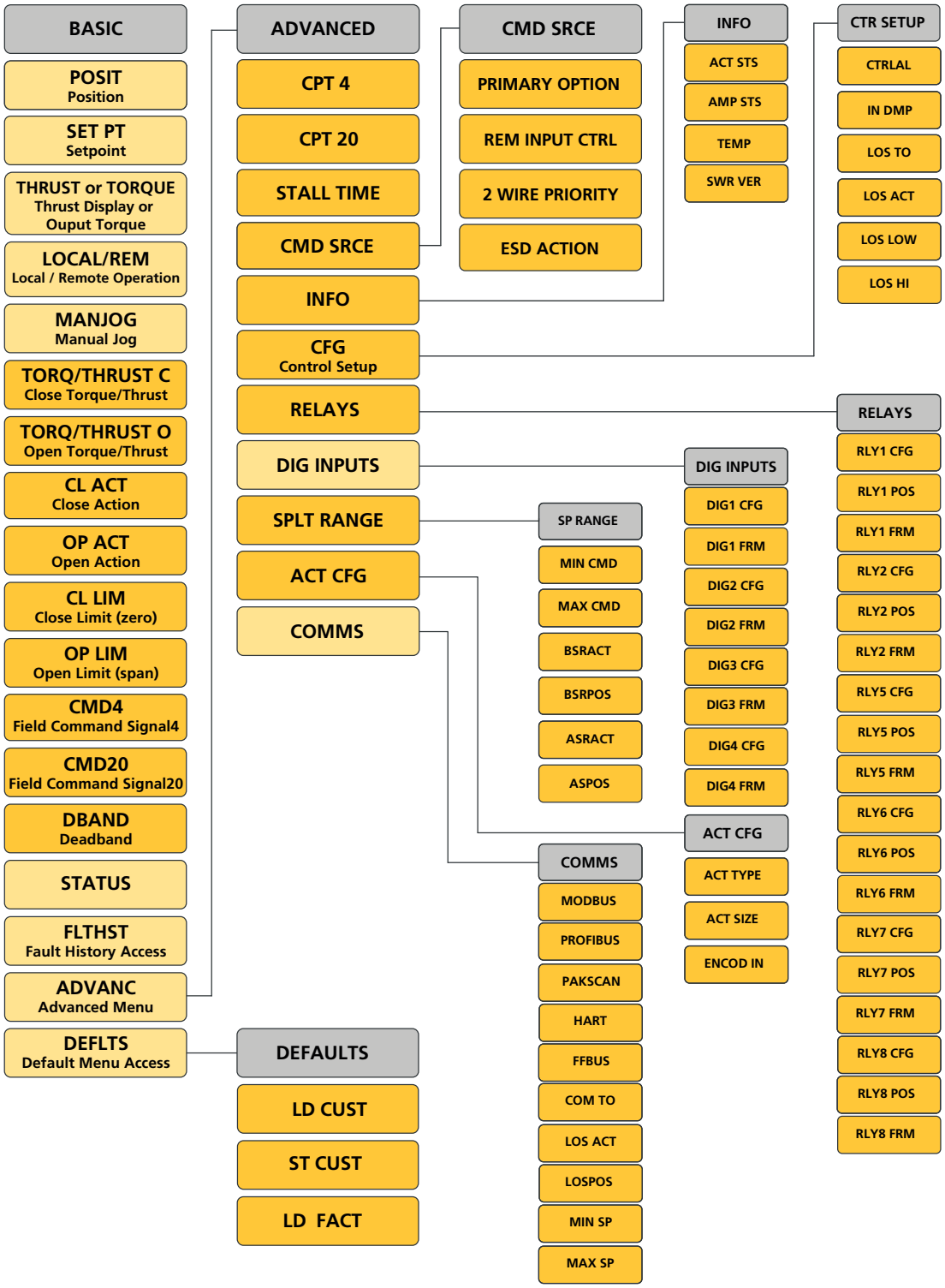
Fig. 42.2

Tighten the four cap head screws.

Fig. 42.3

Menu Structure

MENU STRUCTURE



NOTE: Additional Relay, Digital Inputs and Comms menus shown are dependant on options fitted. Menus will not appear unless option is fitted.

Status Alarm Menu

STATUS

STATUS INDICATION

The actuator status can be monitored in both Local and Remote control modes.

Enter the VIEW mode to display current actuator Status.

Use the UP/DOWN Pushbuttons to scroll through currently active alarms and status.

Fig 44.2 indicates that the actuator is selected for remote operation and a Loss of signal demand alarm is currently active.

See below for full list of possible Status & Alarm conditions.

Fig. 44.1

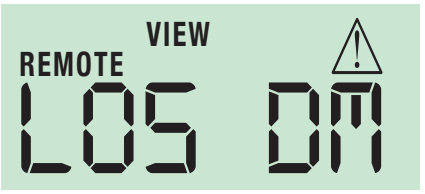


Fig. 44.2

LOS DM

LOS DM - LOS Demand

The input demand signal is outside the minimum or maximum range defined by the LOS LO and LOSS HI set parameters.

LOS FB

LOS FB - LOS Feedback

Loss of internal position feedback. Actuator will lock in place.

STL OP

STL OP - Stall Opening

Motor stalled in Open direction. Manually operate or drive the actuator in the closed direction to clear the alarm.

STL CL

STL CL - Stall Closing

Motor stalled in Closed direction. Manually operate or drive the actuator in the open direction to clear the alarm.

OTQ OP

OTQ OP - Over Torque Opening

Max Torque exceeded in Open direction. Manually operate or drive the actuator in the closed direction to clear the alarm.

OTH OP

OTH OP - Over Thrust Opening

Max Thrust exceeded in Open direction. Manually operate or drive the actuator in the closed direction to clear the alarm.

OTQ CL

OTQ CL - Over Torque Closing

Max Torque exceeded in Closed direction. Manually operate or drive the actuator in the open direction to clear the alarm.

OTH CL

OTH CL - Over Thrust Closing

Max Thrust exceeded in Closed direction. Manually operate or drive the actuator in the open direction to clear the alarm.

Status Alarm Menu

STATUS

OVTEMP

OVTEMP - Over Temperature

Internal Temperature Sensor Tripped.

LOSCOM

LOSCOM - Loss of Remote Bus Communications

Loss of serial bus communications greater than the COM TO communications time out period has occurred.

LOCAL

LOCAL - Local Control Selected

Actuator is selected for Local Operation. The actuator will not respond to remote commands. Local operation must be selected to modify parameters.

CL LIM

CL LIM - At Closed Limit

The actuator position is at or below the closed end of travel limit.

OP LIM

OP LIM - At Open Limit

The actuator position is at or above the open end of travel limit.

ESD

ESD - Emergency Shutdown active

Emergency Shut Down command is active. The actuator will not respond to any other commands until the ESD condition is removed.

MONRLY

MONRLY - Monitor Relay Tripped

Monitor Relay tripped and actuator is not available for remote control.

R1 ENR

R1 ENR - Relay 1 Energised

R2 ENR

R2 ENR - Relay 2 Energised

CR FLT

CR FLT - Critical Fault

Critical Fault detected -Actuator disabled.
Loss of Feedback
EEPROM fault

NC FLT

NC FLT - Non Critical Fault

Non Critical fault detected- Actuator alarms active but actuator remains functional. This may require intervention to restore electrical operation.

Motor Stall

Torque/Thrust Overload
Loss of communications
Loss of Demand Signal
Over temperature

EE FLT

EE FLT - EEPROM Parameters

EEPROM parameters out of range .

Actuator is disabled , restore defaults and check basic and advanced parameters.

EC FLT

EC FLT - EEPROM Fault Customer Defaults

Customer defaults stored incorrectly or corrupted in the EEPROM. Actuator runs. Cycle the power and restore the customer defaults to remove the alarm.

EF FLT

EF FLT - EEPROM Factory Defaults

Actuator runs. Cycle power to remove the alarm. If problem persists contact Rotork Process Controls.

Fault History Menu

FLTHST
Fault History Access

FAULT HISTORY

Alarms and Faults are stored and listed by event number and type. Time intervals between events are indicated between each event, Fig 46.2 shows event 16 is Local selected status.

Fig. 46.1

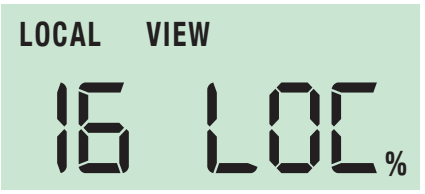


Fig. 46.2

CMA FAULT HISTORY STRING DEFINITIONS

FAULT	STRING	DESCRIPTION
LOS Command	**CMD**	Loss of Command Signal – The input command signal exceeded the range configure by the LOS LO and LOS HI parameters
LOS Feedback	**FB**	Loss of Feedback Position – An error has occurred in reading the feedback device.
Stall Opening	**STO**	The actuator has been commanded to move in the open direction and has not done so for longer than the time limit set in STL TO parameter.
Stall Closing	**SCL**	The actuator has been commanded to move in the closed direction and has not done so for longer than the time limit set in STL TO parameter.
Over Thrust Opening	**OTH**	The actuator has exceeded the Thrust Limit while running in the open direction.
Over Thrust Closing	**CTH**	The actuator has exceeded the Thrust Limit while running in the closed direction.
Over Torque Opening	**OTQ**	The actuator has exceeded the Torque Limit while running in the open direction.
Over Torque Closing	**CTQ**	The actuator has exceeded the Torque Limit while running in the closed direction.
Over Temperature	**TMP**	The actuator's current internal temperature has exceeded the maximum limit.
Loss of Comms	**COM**	Communications between the actuator and its communications card has been lost for longer than the time specified in the COM TO parameter.
Local Control	**LOC**	The actuator was configured for LOCAL control.

Fault History Menu

FLTHST
Fault History Access

CMA FAULT HISTORY STRING DEFINITIONS

FAULT	STRING	DESCRIPTION
At Close Limit	**CLL**	The actuator was at or below the CLOSE LIMIT setting.
At Open Limit	**OPL**	The actuator was at or above the OPEN LIMIT setting.
ESD Active	**ESD**	The Emergency Shut Down feature was activated.
Dither	**DIT**	The unit has exceeded 2000 starts per hour where the change in position is greater than 1% of travel.
Critical Fault	**CRF**	A critical fault has been detected. The conditions that may trigger this status alarm are Loss of Feedback or EEPROM fault. Fix the issue. Cycling the power will not clear the alarm, if problem persists contact Rotork Process Controls.
General Fault	**GNF**	A General fault has been detected. The conditions that trigger this status are TBD but are currently: Stall Open/Close, Over torque/ Thrust-Open/Close, Loss of comms, and Loss Command.
Relay One Energized	**R1**	Relay one is energized.
Relay Two Energized	**R2**	Relay two is energized.
EEPROM Fault, params	**EE**	An error was found in the current parameter area of the EEPROM.
EEPROM Fault, customer	**CEE**	An error occurred when the customer defaults were stored. The actuator will still run but the customer defaults should be checked and reconfigured if necessary. Save any changes before cycling the power. Cycling the power will clear the fault, contact Rotork if the problem persists.
EEPROM Fault, factory	**FEE**	An error occurred when the Factory defaults were stored. The actuator will still run but the Factory defaults should be checked and resaved. Cycling the power will clear the fault, contact Rotork if the problem persists.
Reset	**RST**	The actuator was reset (power cycled).
Monitor Relay	**MNR**	The actuator was not available for proper remote operation (General or Critical Fault).
Local Control Knob Stop	**LCS**	The local control knob was set to the LOCAL STOP position.
Local Control Knob Remote	**LCR**	The local control knob was set to the REMOTE position.
Local Control Knob Local	**LCL**	The local control knob was set to the LOCAL STOP position.

Default Menu

DEFLTS
Default Menu Access

DEFAULT MENUS

Set the actuator to **LOCAL** control to access menu.

Use the Enter/Cancel pushbuttons to select Customer or Factory default options.

Select Edit mode and **ENTER** to load the selected defaults.

Fig. 48.1

Fig. 48.2

LD CUS

LD CUS - LOAD CUSTOMER DEFAULTS

Select **EDIT** mode and press **ENTER**.

The **CONFRM** parameter is now displayed, press **ENTER** to return the actuator to the stored customer defaults.

Fig. 48.3

ST CUS

ST CUS - SAVE CURRENT SETTINGS

Select **EDIT** mode and press **ENTER**.

The **CONFRM** parameter is now displayed, press **ENTER** to save the current settings to the actuators customer default memory.

Fig. 48.4

LD FAC

LD FAC - LOAD FACTORY DEFAULTS

Select **EDIT** mode and press **ENTER**.

The **CONFRM** parameter is now displayed, press **ENTER** to restore factory defaults.

Fig. 48.5

Default Menu

PARAMETER DEFAULT VALUES

BASIC MENU

PARAMETER	DEFAULT VALUE
Position	No default setting is a read parameter
Setpoint	No default setting is a read parameter
Thrust or Torque	No default setting is a read parameter
Local/Remote	LOC - local
Manual Jog	No default setting is a control
Close Limit (zero)	Set to fully extended at factory
Open Limit (span)	Set to fully retracted at factory
CMD 4	Set at factory via a 4 mA input
CMD 20	Set at factory via a 20 mA input
Deadband	0.2%
STATUS	No Default / status access
ADVANCED MENU	No Default / menu access
DEFAULTS	No Default / default access

ADVANCED MENU

PARAMETER	DEFAULT VALUE
CPT 4 (Current Pos tx cal)	Set at factory to output 4 ma
CPT 20 (Current Pos tx cal)	Set at factory to output 20 ma
Stall Time out	2.0 Seconds
Command Source	Analog
INFORMATION ACCESS	No Default / menu access
CONTROL CFG ACC	No Default / menu access
RELAY ACC	No Default / menu access
SPLIT RANGE	No Default / menu access
ACTUATOR CONFIG	No Default / menu access

INFORMATION MENU

PARAMETER	DEFAULT VALUE
Actuator Starts	No default setting is a read parameter
Amplifier Starts	No default setting is a read parameter
Temperature	No default setting is a read parameter
Software Version	No default setting is a read parameter

Default Menu

CONTROL CONFIGURATION MENU

PARAMETER	DEFAULT VALUE
Control Algorithm	Open loop
Input Dampening	0 seconds
Input Signal Loss Timeout	0 seconds
Input Signal Loss Action	Close
Input Signal Loss Position	50%
Input Signal Loss Low Level	3.6 mA
Input Signal Loss High Level	20.4 mA
TORQ O	100%
TORQ C	100%
CL ACT	LIM
OP ACT	LIM

RELAYS 1 & 2 MENU

PARAMETER	DEFAULT VALUE
Relay 1 Config	None
* Relay 1 Pos	25%
Relay 1 Form	Energize on Condition
Relay 2 Config	None
* Relay 2 Pos	75%
Relay 2 Form	Energize on Condition

* Only shown when configured as Drive to Position (won't be configured for position on default)

SPLIT RANGE

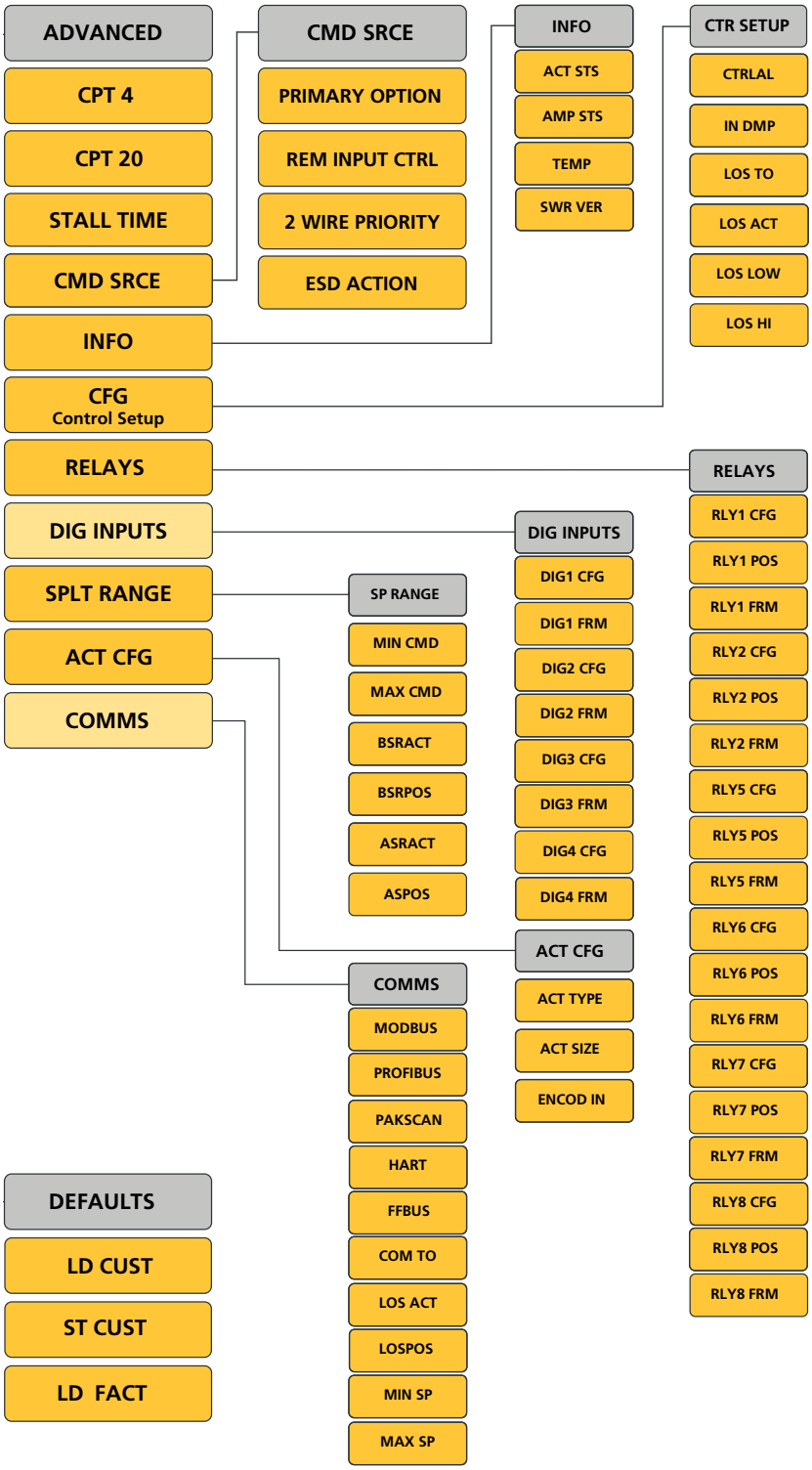
PARAMETER	DEFAULT VALUE
Lower Range Value	4 mA
Upper Range Value	20 mA
CMD Below Split Range Action	Disabled - no action
CMD Above Split Range Action	Disabled - no action

ACTUATOR CONFIG MENU

PARAMETER	DEFAULT VALUE
Actuator Type	Set at Factory to match actuator build
Actuator Size	Set at Factory to match actuator build
Encoder Initialization	Set at Factory at middle of travel

Advanced Menu

ADVANCED MENU ACCESS



NOTE: Additional Relay, Digital Inputs and Comms menus shown are dependant on options fitted. Menus will not appear unless option is fitted.

Advanced Menu

ADVANCED SETTINGS	**ADVANCED**
CPT 4 - Current POS Transmitter - Zero/4 ma	**CPT 4**
CPT 20 - Current POS Transmitter - SPAN (20 mA)	**CPT 20**
STL TO - STALL TIME	**STALL TIME**
CMD SRC - COMMAND SOURCE	**CMD SRCE**
INFO	**INFO**
CTRCFG - CONTROL CONFIGURATION	**CFG** Control Setup
RELAYS - RELAY CONFIGURATION	**RELAYS**
DIG INPUTS - Configure Digital Inputs (if fitted)	**DIG INPUTS**
SPL TRG - SPLIT RANGE	**SPLT RANGE**
ACTCFG - ACTUATOR CONFIGURATION	**ACT CFG**
COMMS - Configure COMMS Option Cards (if fitted)	**COMMS**

ADVANCED

ADVANCED MENU

Parameters can only be changed with actuator selected to Local Operation Mode only.

Press UP/DOWN pushbuttons until ADVANC menu is displayed. Press Enter to gain access to the Advanced Menu parameters.

Use the UP/DOWN pushbuttons to scroll through the Advanced menu Parameters. Once the correct parameter is displayed and you wish to modify the parameter press 'Enter' to go to Edit Mode .

Use the UP/DOWN pushbuttons to modify the parameter setting. Press Enter again to store selection. The display will confirm that your selection has been SAVED.

Press Cancel to return to previous menu.

CPT4

1. CPT 4 Current Position Transmitter - Zero Adjustment

The CPT is factory set but can be adjusted if necessary.
Calibrate 4 mA Transmitter output.
Connect MA source and meter.
Enter Edit mode and use the UP/Down pushbuttons to adjust the 4 mA (ZERO) output.

CPT20

2. CPT 20 Current Position Transmitter - Span Adjustment

The CPT is factory set but can be adjusted if necessary.
Connect MA source and meter.
Enter Edit mode and use the UP/Down pushbuttons to adjust the 20 mA (SPAN) output.

STL TO

3. STL TO - STALL TIME

Motor stall time adjustable between 1 to 100 seconds.
DEFAULT is 2 Seconds.

CMD SRCE

4. CMD SRCE - COMMAND SOURCE

Select between Analogue , Digital or Bus Remote Commands

PRM-OC Primary Option Selection

Select the on board Analogue or Bus System option for primary remote control.

PO - ANA	**Standard Analogue Control**
PO - HRT	**HART Option Control**
PO - PB	**Profibus Option Control**
PO - MOD	**Modbus Option Control**
PO - PAK	**Pakscan Option Control**
PO - FFB	**Foundation Fieldbus Control**

RI - CTL Remote Input Control Selection

Select alternative options for remote control

RC - OFF	**No Remote Control**
RC - DIO	**Respond to configured Digital Command Inputs when DIO option card is fitted.**
RC - POC	**Respond to Primary Option control**
RC - PSH	**Respond to switched control between Primary and Digital input commands.** (Requires DIO option to be fitted and one of the inputs to be configured for Manual/Auto operation).

2W -PR Remote control two wire priority

Select the actuator action when two conflicting remote control requests (Open & Close) are present.

WP-STP	**Stayput or STOP**
WP-CLS	**Run Closed**
WP-OPN	**Run Open**

ESDACT Emergency Shutdown Action

Select the actuator action when an ESD command is active via the COMMS Bus sytem or hardwired input.

EA-DIS	**Disabled**
EA-CLS	**Run Closed**
EA-STP	**Stayput or STOP**
EA-OPN	**Run Open**

COMMAND SOURCE	**CMD SRCE**
Primary Option Selection	**PRIMARY OPTION**
Remote Input Control Selection	**REM INPUT CTRL**
Remote control two wire priority	**2 WIRE PRIORITY**
Emergency Shutdown Action	**ESD ACTION**

Advanced Menu

INFORMATION	INFO
ACT STS - ACCOUNT STARTS	ACT STS
AMP-STS - AMPLIFIER STARTS	AMP STS
TEMP - TEMPERATURE	TEMP
SWR VER - SOFTWARE VERSION	SWR VER

CTRCFG - Control Setup	CTR SETUP
CRTLAL - Control Algorithm	CTRLAL
IN DMP - Input Damping	IN DMP
LOS TO - Loss of Signal Time Out	LOS TO
LOS ACT - Loss of Signal Action	LOS ACT
LOS LOW - Loss of Signal Low	LOS LOW
LOS HI - Loss of Signal High	LOS HI

INFO

5. INFO

Select between Actuator Starts, Amplifier Starts, Temperature and Software Version.

CTRCFG

6. CTRCFG - Control Setup

CTRLAL - Control Algorithm

Currently supports Open Loop control Only.

IN DMP- Input Damping

Time period over which the command input signal is averaged.

Range is 0 to 10 Seconds.

LOS TO - Loss of Signal Time Out.

Loss of signal timeout can be set to between 0 to 5 seconds in 0.1 second increments.

Default is 0 seconds.

LOS ACT - Loss of Signal Action.

Action on loss of command signal.

Selections are:

CLS - Close

OPN - Open

SPT - Stayput

POS - Run to Position

DIS - Disabled

LOS LO - Loss of Signal Low

The threshold of command signal below the level classed as 'LOST'. Adjustable between 3 to 4 mA. Default = 3.6 mA.

LOS HI - Loss of Signal High

The threshold of command signal above the level classed as Lost or out of range. Adjustable between 20 to 21 mA. Default = 20.4 mA.

Advanced Menu

RELAYS

7. RELAYS

There are two configurable relays mounted on the main PCB.

R1(2) CFG - RELAY 1(2) CONFIGURATION

The menu structure is the same for both relays. 1C or 2C denotes which relay menu is active.

DIO DIGITAL INPUT AND RELAY OUTPUT OPTION PCB (If Fitted)

The DIO option pcb provides an additional 4 configurable Relays RLY5 to RLY8.

These relays have the same functions and method of Configuration as Relays RLY1 and RLY2.

Relay Indication functions are as follows:

NON - No Function.

POS - Intermediate position indication. If selected then an additional POS menu is available. Go to R1(2) POS menu, select and save the position in travel at which the relay is to activate.

GNF General Fault

CMD Loss of Command Signal.

FB Loss of Feedback Signal

STO Motor Stalled in Open Direction.

STC Motor Stalled in Closed Direction

OTQ(TH) Open Torque/Thrust Overload

CTQ(TH) Close Torque/Thrust Overload.

OTP Over Temperature

COM Loss of Bus Communications.

LOC Local Selected

CLL Closed Limit

OPL Open Limit.

ESD Emergency Shutdown Active.

CRF Critical Fault.

DIT Dither
Exceeding 2000 1% position changes per hour.

MNR Monitor Relay Active (Available)

R1(2) FRM - Relay Form

EOC - Energise on Condition Active (Normally Open Contact).

DOC - De-energise on Condition Active (Normally Closed Contact).

RELAYS	RELAYS
RLY1 CFG - Relay 1 Config	RLY1 CFG
RLY1 POS - Relay 1 Pos	RLY1 POS
RLY1 FRM - Relay 1 Form	RLY1 FRM
RLY2 CFG - Relay 2 Config	RLY2 CFG
RLY2 POS - Relay 2 Pos	RLY2 POS
RLY2 FRM - Relay 2 Form	RLY2 FRM
RLY5 CFG - Relay 5 Config	RLY5 CFG
RLY5 POS - Relay 5 Pos	RLY5 POS
RLY5 FRM - Relay 5 Form	RLY5 FRM
RLY6 CFG - Relay 6 Config	RLY6 CFG
RLY6 POS - Relay 6 Pos	RLY6 POS
RLY6 FRM - Relay 6 Form	RLY6 FRM
RLY7 CFG - Relay 7 Config	RLY7 CFG
RLY7 POS - Relay 7 Pos	RLY7 POS
RLY7 FRM - Relay 7 Form	RLY7 FRM
RLY8 CFG - Relay 8 Config	RLY8 CFG
RLY8 POS - Relay 8 Pos	RLY8 POS
RLY8 FRM - Relay 8 Form	RLY8 FRM

R1(2) POS - Select Position here

R1(2) FRM - Relay Form

OC - Energize on condition

DC - De-energize on condition

DIG - Energise Relay by Bus Command

Namur 107 Menus

7MN - Maintenance Alarm

7OS - Out of specification Alarm

7FC- Function check Alarm

7FL- Failure Alarm

DIG INPUTS

8. DIGITAL INPUT

DIO - Digital Input and Relay Output option PCB (if fitted)

The DIO Option PCB provides 4 off Digital Contact Inputs D1 to D4 that can be configured for hard wired remote control.

For example:

D1 CFG Configuration

D1-NON	**Disabled**
D1-OPN	**Open Command Input**
D1-CLS	**Close Command Input**
D1-MAIN	**Stop/Maintain Command Input**
D1-ESD	**ESD Command Input**
D1-PSH	**Primary switched Input—Switch between Primary and Hardwired Control**
D1-FRM	**Contact Form**
D1-NO	**Normally open contact**
D1-NC	**Normally closed contact**

DIGITAL INPUT — DIG INPUTS

DIG1 CFG - Digital 1 Config — DIG1 CFG

DIG1 FRM - Digital 1 Form — DIG1 FRM

DIG2 CFG - Digital 2 Config — DIG2 CFG

DIG2 FRM - Digital 2 Form — DIG2 FRM

DIG3 CFG - Digital 3 Config — DIG3 CFG

DIG3 FRM - Digital 3 Form — DIG3 FRM

DIG4 CFG - Digital 4 Config — DIG4 CFG

DIG4 FRM - Digital 4 Form — DIG4 FRM

SPLT RG

9. SPLTRG -SPLIT RANGE OPERATION

MINCMD - Minimum Split Range Command Select value of 4 to 20 mA input to correspond to minimum (Zero) position.

MAXCMD - Maximum Split Range Command Select value of 4 to 20 mA input to correspond to maximum (Span) position.

BSRACT - Below Split Range Action
Action when command signal falls below the minimum split range set value.

Options are as follows:

Disabled
Close
Open
Stayput
Go to Position

BSRPOS - Set Go to Position when command falls below the minimum split range set value.

ASRACT - Above Split Range Action
Action when command signal rises above the maximum split range set value.

Options are as follows:

Disabled
Close
Open
Stayput
Go to Position

ASRPOS - Set Go to Position when command rises above the maximum split range set value.

SPLIT RANGE OPERATION — SP RANGE

MINCMD - Minimum Split Range Command — MIN CMD

MAXCMD - Maximum Split Range Command — MAX CMD

BSRACT - Below Split Range Action — BSRACT

BSRPOS - Set Go to Position — BSRPOS

ASRACT - Above Split Range Action — ASRACT

ASPOS - Set Go To Position — ASPOS

ACTCFG

10. ACTCFG - Actuator Configuration

ACT TYP - Actuator Type

AT QT - Quarter-turn Unit

AT ROT - Rotary Unit

AT LIN - Linear Unit.

This setting must match the configuration of the unit to ensure correct operation.

ACT SIZ - Actuator Size

This parameter matches the Torque or Thrust characteristic of the actuator model. For example CMQ-500 lbf.in.

This setting must match the configuration of the unit to ensure correct operation.

⚠ **CAUTION**

ENCINI - Encoder Initiation.

This procedure is only necessary after replacement of electronics assemblies or disassembly of the actuator drive system. The Encoder **MUST** be re-initialised before electrical operation.

This procedure will remove ANY previous travel limit settings and characterisation settings.

Select the ENCINI menu and enter the Edit mode.

Use the UP or DOWN pushbuttons to move the actuator to the centre position of travel.

Press ENTER to Re-Initialise the Encoder.

The travel Limits must now be Reset and any characterisation parameters Re-installed.

ACT CFG - ACTUATOR CONFIGURATION ACT CFG

ACT TYPE - ACTUATOR TYPE ACT TYPE

ACT SIZE - ACTUATOR SIZE ACT SIZE

ENCOD IN - ENCODER INITIALIZATION ENCOD IN

Advanced Menu

COMMS

11. COMMS - Bus Option Card Configuration

The following menus appear automatically when a Bus Option Card is fitted.

For full details of each Bus Option Card and its menu settings please refer to the relevant technical manual.

MODBUS

MODBD	**Modbus BaudRate**
MODFT	**Modbus Field Type**
MODAD	**Modbus Address**
MODPR	**Modbus Parity**
MODTM	**Modbus Termination**
MOD2A	**Modbus Second Address**

PROFIBUS

PROFT	**Profibus Field Type**
PROAD	**Profibus Address**
PRORT	**Profibus Redundancy Type**
PRORM	**Profibus Redundancy Mode**
PROT1	**Profibus Termination1**
PROT2	**Profibus Termination2**
GSDAC	**Profibus GSD Active Characterisation Active**

PAKSCAN

PAKAD	**Pakscan Address**
PAKBD	**Pakscan Baud Rate**

HART

HRTAD	**Hart Address**
HRTDS	**Hart Demand Source**

FOUNDATION FIELDBUS

FFFT	**Foundation Fieldbus Type**

STANDARD PARAMETERS (ALL BUS CARDS)

COMTO	**Comms Time Out**
LOSACT	**Loss of Comms Action**
LOSPOS	**Loss of Comms Position**
MINSP	**Minimum Span**
MAXSP	**Maximum Span**

Power Ratings

Listed below are the nominal current ratings for the CMA:

CML-100/250, CMQ-250/500, CMR-50/100/200

Current rating at nominal line voltages (A)										
Ambient	**Type**	**Power (W)**	**24 VDC**	**110 VAC**	**115 VAC**	**120 VAC**	**208 VAC**	**220 VAC**	**230 VAC**	**240 VAC**
20 °C	CML	16.36	0.68	0.21	0.20	0.19	0.11	0.11	0.10	0.10
	CMQ	26.90	1.12	0.35	0.33	0.32	0.18	0.17	0.17	0.16
	CMR	23.14	0.96	0.30	0.29	0.28	0.16	0.15	0.14	0.14
-20 °C	CML	27.82	1.16	0.37	0.35	0.37	0.20	0.19	0.18	0.17
	CMQ	40.39	1.69	0.53	0.51	0.49	0.28	0.27	0.26	0.25
	CMR	31.46	1.32	0.41	0.40	0.38	0.22	0.21	0.20	0.19
-30 °C	CML	36.50	1.52	0.47	0.45	0.43	0.25	0.24	0.23	0.22
	CMQ	52.60	2.19	0.68	0.65	0.63	0.36	0.34	0.33	0.31
	CMR	34.50	1.44	0.45	0.43	0.41	0.24	0.22	0.21	0.21
-40 °C	CML	44.50	1.85	0.58	0.55	0.53	0.31	0.29	0.28	0.26
	CMQ	59.50	2.48	0.77	0.74	0.71	0.41	0.39	0.37	0.35
	CMR	37.50	1.56	0.49	0.47	0.45	0.26	0.24	0.23	0.22

CML-750, CMQ-1000, CMR-89/125/250

Current rating at nominal line voltages (A)										
Ambient	**Type**	**Power (W)**	**24 VDC**	**110 VAC**	**115 VAC**	**120 VAC**	**208 VAC**	**220 VAC**	**230 VAC**	**240 VAC**
20 °C	CML	51.46	2.14	0.67	0.64	0.61	0.35	0.33	0.32	0.31
	CMQ	41.46	1.73	0.54	0.52	0.49	0.28	0.27	0.26	0.25
	CMR	59.50	2.48	0.77	0.74	0.71	0.41	0.39	0.37	0.35
-20 °C	CML	59.50	2.48	0.77	0.74	0.71	0.41	0.39	0.37	0.35
	CMQ	59.50	2.48	0.77	0.74	0.71	0.41	0.39	0.37	0.35
	CMR	59.50	2.48	0.77	0.74	0.71	0.41	0.39	0.37	0.35
-30 °C	CML	59.50	2.48	0.77	0.74	0.71	0.41	0.39	0.37	0.35
	CMQ	59.50	2.48	0.77	0.74	0.71	0.41	0.39	0.37	0.35
	CMR	59.50	2.48	0.77	0.74	0.71	0.41	0.39	0.37	0.35
-40 °C	CML	59.50	2.48	0.77	0.74	0.71	0.41	0.39	0.37	0.35
	CMQ	59.50	2.48	0.77	0.74	0.71	0.41	0.39	0.37	0.35
	CMR	59.50	2.48	0.77	0.74	0.71	0.41	0.39	0.37	0.35

Rotork Sales and Service

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.

Local representative:

rotork®

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www.**rotork**.com

A full listing of our worldwide sales and service network is available on our website.

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