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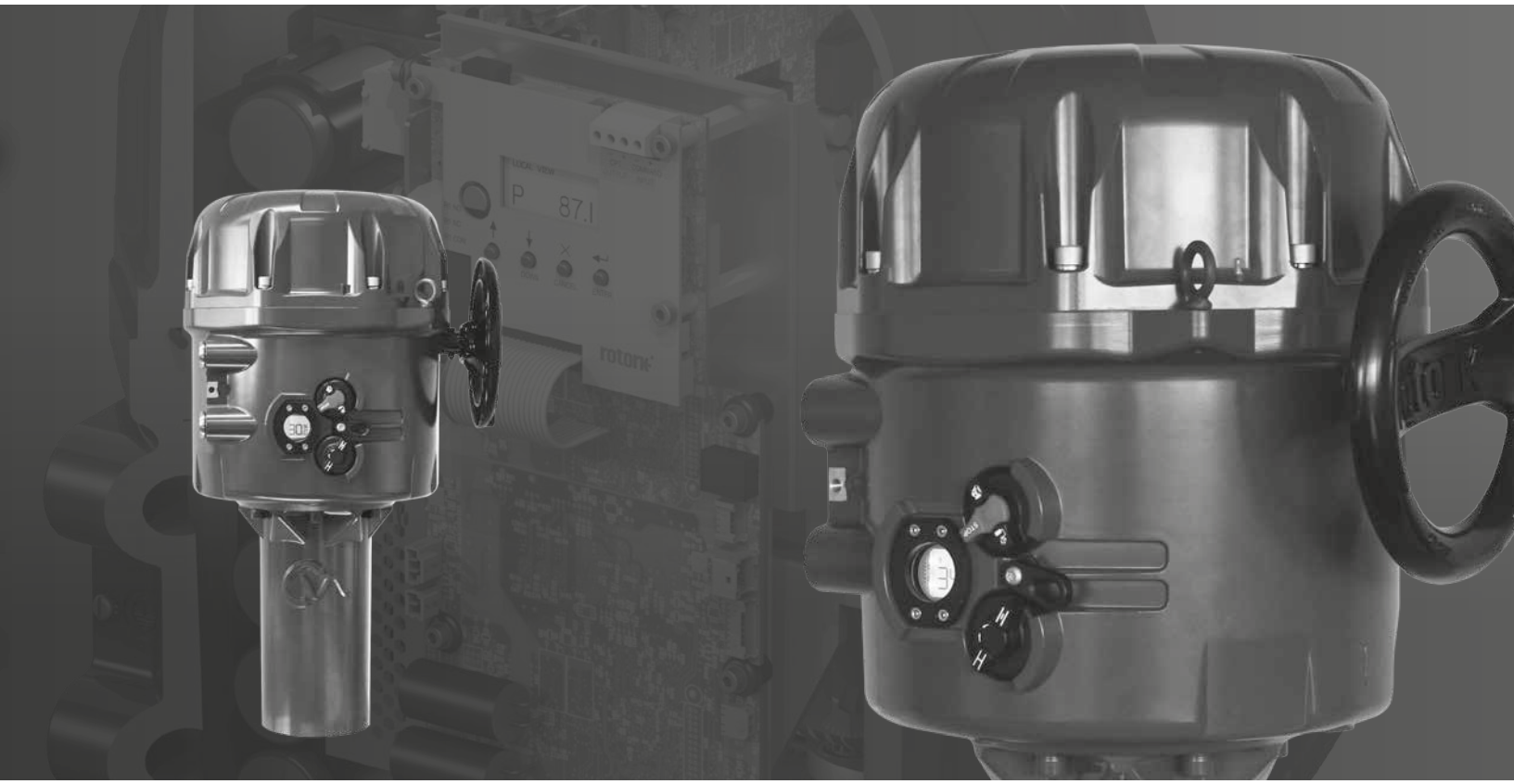
for Future Generations

CMA Range

CML1500 and CML3000 Installation & Maintenance Instructions



Linear Control Valve Actuators

Contents

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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.

1. Introduction

Rotork 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.

This manual is for use with CML-1500 and CML-3000 actuators only. For installation and maintenance instructions of other CMA actuators, please refer to PUB094-009.

The following instructions must be followed and integrated with 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 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. 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

2. General Information

2.1 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 'IET 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.

2.2 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.

2.3 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 0.1% of full stroke.

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 continuous modulation.

Refer to Appendix A – Approvals for further detail concerning approved actuators.

2.3.1 CML - Linear

The CML range of actuators are high precision linear actuators capable of producing a modulating thrust from 100 to 3000 pounds force (13.35 kN) depending on model size.

NOTE: Thrust and Speed are dependent on frame size.

See PUB094-001 for full details.

The actuator comprises:

- Absolute encoder
- LCD user interface
- DC brushless electric motor
- Simple, maintenance free geartrain
- Motor controller with travel and thrust adjustment
- Manual overide
- Hazardous area certification meeting international and national requirements
- Local controls & external display
- Options
    - Reserve Power Pack (RPP)
    - Bus system option PCB
    - Remote Input Relay Output RIRO option PCB card

2.4 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.

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 control procedures.

⚠ WARNING

Protection provided by the equipment may be impaired if used in a manner not specified by Rotork.

2.5 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 (Polytetrafluoroethylene) sealed metal plugs.

2.6 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.

2.7 Abbreviations used in this Manual

A	Ampere
AC	Alternating Current
°C	Degrees Celsius
CW	Clockwise
ACW	Anti-clockwise
CCW	Counter-clockwise
DC	Direct Current
EEPROM	Electrically Erasable Programmable Read Only Memory
°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
CPT	Current Position Transmitter
SEC	Second
V	Volts
VA	Volt Amps
VAC	Volts AC
VDC	Volts DC
VR	Variable Resistance
W	Watt
⎓	Direct current
⏚	Protective Conductor Teminal
RPP	Reserve Power Pack

2.8 Warranty Information

Warranty: Subject to the following, Rotork expressly warrants the products manufactured by it as meeting the applicable Rotork 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 with respect to the products. Rotork 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's General Conditions of Sale - Product, for complete warranty information.

2.9 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.**

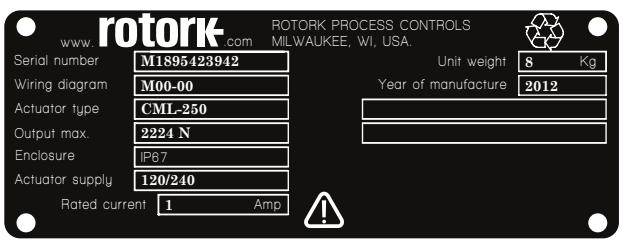


Fig 2.1 Actuator identification label

3. Health & Safety

⚠ 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

Protection provided by the equipment may be impaired if used in a manner not specified by Rotork.

⚠ 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: ELECTROSTATIC DISCHARGE

The equipment utilizes a non-metallic outer coating and has a potential static hazard. Clean only with a damp cloth.

⚠ 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.

⚠ WARNING: PROTECTION EQUIPMENT

Appropriate personal protection equipment must be worn when using this product.

⚠ WARNING: LOCAL CONTROLS

Selecting STOP position on the Local/Stop/Remote control knob does not guarantee that the actuator will lock in place. ESD and the RPP power failure action can be configured to override STOP, possibly resulting in actuator movement.

⚠ WARNING: ENCLOSURE

Screws securing the outer window frame maintain the integrity of the flame proof enclosure and must NOT be removed.

⚠ WARNING: HAZARDOUS AREA

Do not remove the top cover assembly or conduit entry blanking plugs when an explosive environment is present.

⚠ WARNING: RESERVE POWER PACK

Actuators supplied with the Reserve Power Pack (RPP) may move when the power supply is removed.

Do not remove the actuator top cover whilst the position display is illuminated and/or flashing.

The RPP may take up to 15 minutes to fully discharge after removal of the power supply.

The RPP contains super capacitors that include toxic/ irritant materials. If the actuator top cover has to be removed, ensure that the RPP is fully discharged and the area is adequately ventilated prior to removal of the top cover. Allow any vapours to disperse before working in the enclosure.

If the RPP is damaged, ensure adequate ventilation, wear Butyl or Neoprene gloves and safety goggles. Wash hands after handling damaged super capacitor cells.

Dispose of RRP module in accordance with federal, state and local regulations.

A material data sheet is available from Rotork upon request.

4.1 Outside the Actuator

4.1.1 Local Controls & External LCD Display

Actuators are supplied with local controls and an external backlit display.

Selecting Local/Stop/Remote Operation

The red and black selector determines operating mode as LOCAL, STOP or REMOTE. This can be locked in place with a 6.5mm hasp padlock. STOP remains available when the unit is locked in LOCAL or REMOTE. LOCAL or REMOTE is not available when the unit is locked in STOP.

Local Control

In LOCAL mode, the black selector can be rotated for Open or Close operation.

Actuator operation can be configured for Push-to-Run or Self-Maintained. Refer to section 10.2.8.

Remote Control

In REMOTE mode, the actuator will respond to configured remote control signals. Refer to section 10.2.8.

Status Display

The external LCD display shows position and fault status of the actuator. Charge status is also shown when RPP is fitted.

4.1.2 Reserve Power Pack (RPP)

The optional RPP stores electrical energy with super capacitors so that a preconfigured power loss action is performed on power failure.

Charging of the super capacitors will only take place with the top cover fitted.

Electrical operation is inhibited during the initial charging period. Charging can take up to 5 minutes.

When power is lost, the actuator will perform the configured fail to position action. The external LCD display will alternately flash red and white whilst the RPP is discharging. The RPP can take up to 15 minutes to fully discharge.

Fig 5.1 External view of actuator

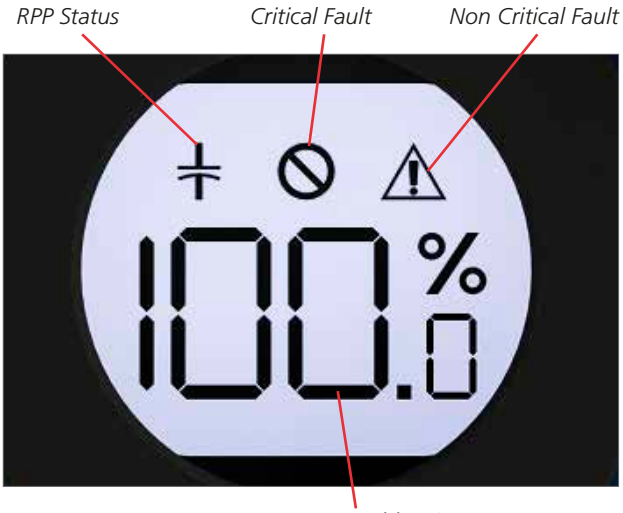


Fig 5.2 Positional display

Fig 5.3 Actuator flashes Red and White alternately when power failure occurs

4.2 Inside the Actuator

4.2.1 User Interface

Configuration of setting parameters is performed via the internal user interface. The user interface comprises LCD display and push buttons.

Fig 5.4 Internal interface

4.2.2 Terminal Block

Connections for the power, control and indication wiring are provided by terminal blocks fitted to the top side of the electrical chassis. Wiring must always use appropriate crimps and follow good wiring practices.

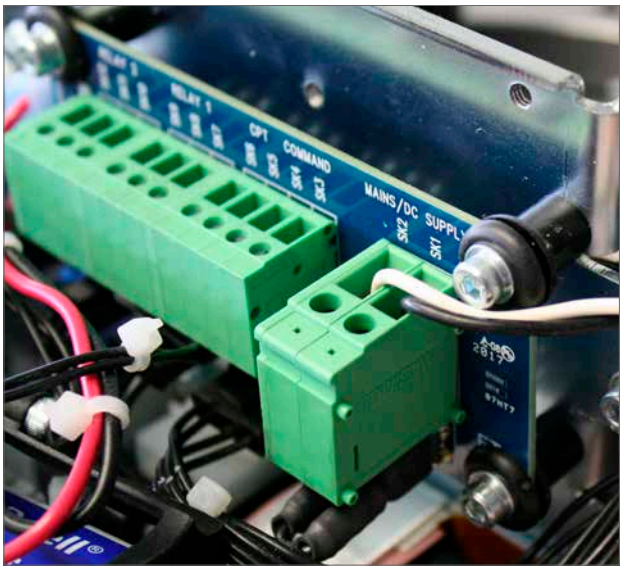


Fig 5.5 Terminal Block

4.2.3 LCD Display

The user interface has a LCD Display that shows STATUS and configuration information.

The default screen is the POSIT parameter.

The active operating mode, LOCAL or REMOTE, is shown in the top left corner of the LCD.

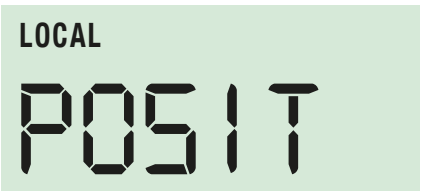


Fig 5.6 LCD display

4.2.4 Setup Pushbuttons

4 push buttons are positioned below the LCD display to enable menu navigation and parameter configuration.

Push button functions are as follows:

'UP'

Navigate menus in view mode. Increase parameter values in Edit Mode.

'DOWN'

Navigate menus in view mode. Decrease parameter values in Edit Mode.

'MODE/CANCEL'

Exit and return to previous menu. Cancel changes to the active configuration parameter.

ENTER

Enter sub menu or configuration parameter. Save changes to the active configuration parameter.

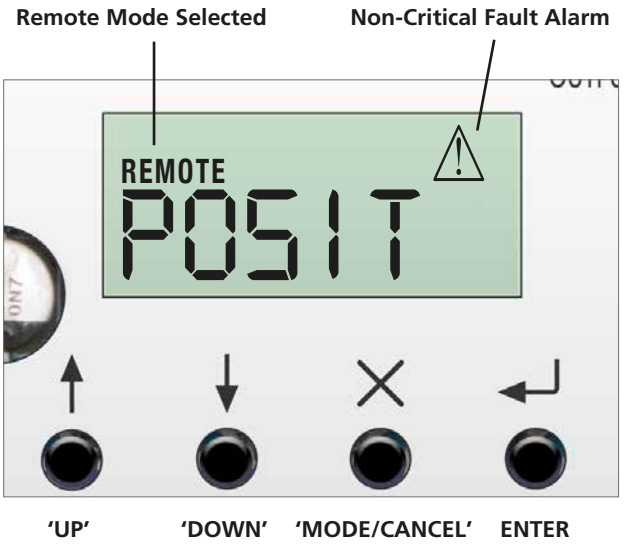


Fig 5.7 Symbol and status information

4.2.5 Fault Indication

⚠ NON-CRITICAL FAULT

An alarm condition exists which does not prohibit actuator movement.

Non-critical faults are:

STALL

Thrust Overload

Loss of Communications

Loss of Demand Signal

Over Temperature

Power Loss

⃠ CRITICAL FAULT

An alarm exists which prohibits actuator movement.

Critical faults are:

Loss of Feedback

EEPROM Fault

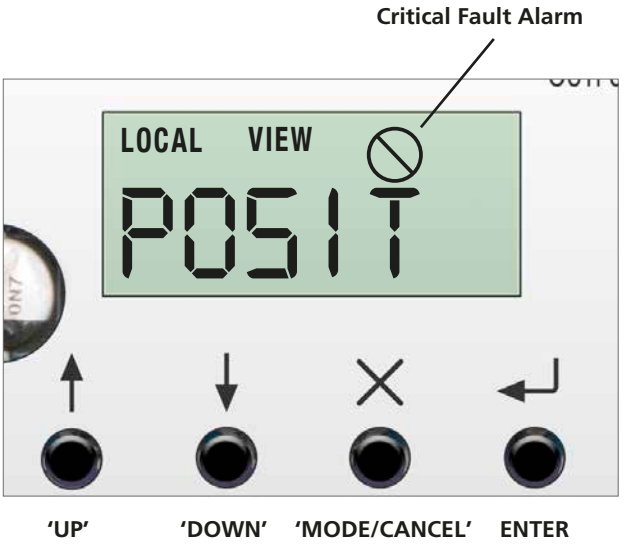


Fig 5.8 Symbol and status information

5. Installation

5.1 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
- Protection provided by the equipment may be impaired if used in a manner not specified by Rotork

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.

Tools & Equipment Required (General Guideline Only)

Top Cover Fixings	- 8 mm Allen Wrench
Electrical Connections	- Terminal Screw Driver - Power Supply
Command & Feedback	- 4 to 20 mA Command source/meter
Actuator to Valve fixings	- As required

5.2 Mounting the Actuator

⚠ 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

⚠ WARNING

The actuator can weigh up to 50 Kg (110 lbs). It is necessary to lift the actuator using mechanical lifting equipment, certified slings and shackles must be attached to the lifting eyes provided. Trained and experienced personnel should ensure safe lifting practices at all times.

DO NOT LIFT THE ACTUATOR AND VALVE COMBINATION VIA THE ACTUATOR. ALWAYS LIFT THE VALVE / ACTUATOR ASSEMBLY VIA THE VALVE.

5.2.1 Handwheel Operation

The handwheel is located on the side of the CMA.

The handwheel is always available to be operated.

When the actuator is commanded to move electrically, the handwheel can still be safely operated, but it will affect the speed or direction of the output drive.

Verify direction of output shaft rotation for clockwise operation of the handwheel.

⚠ 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 Wheel is Turned Clockwise
CMA - Linear	
CML-1500/3000	Extend

Table 1

Fig 6.1 CML-3000

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.

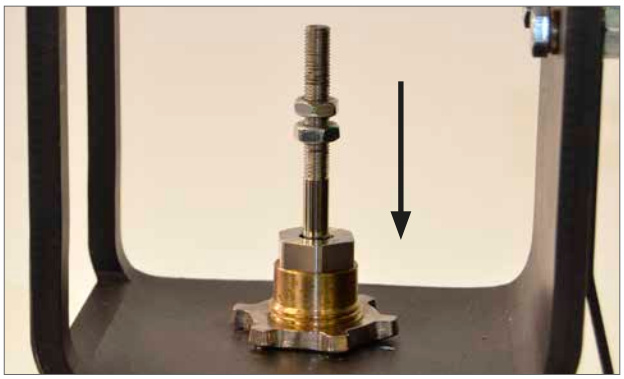


Fig 6.2 Valve shaft

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 handwheel to the retracted position to allow installation. Push and turn the handwheel to retract the output shaft.

Fig 6.3 Manual operation of the actuator

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.

⚠ **WARNING**

Do not fully tighten the coupling at this stage.

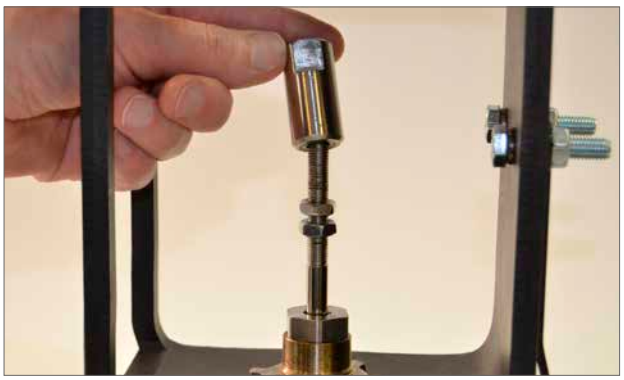


Fig 6.4 Coupling attachment to valve shaft

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.

Fig 6.5 Mounting flange

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.

⚠ **WARNING**

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

Misalignment will result in increased mechanical wear and possible damage to the valve stem.

Fig 6.6 Secure mounting fixing

Fig 6.7 Connection of valve shaft and actuator shaft

5.3 Electrical Installation

5.3.1 Cable Entries

The 4 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 blanking plug.

Wiring installation must comply with local statutory regulations.

Fig 6.8 Cable gland installation

5.3.2 Connecting to Terminals

The wiring diagram supplied is particular to each actuator and must not be interchanged with any other actuator. Check the actuator nameplate to confirm wiring diagram number.

Refer to the wiring diagram to identify functions of terminals.

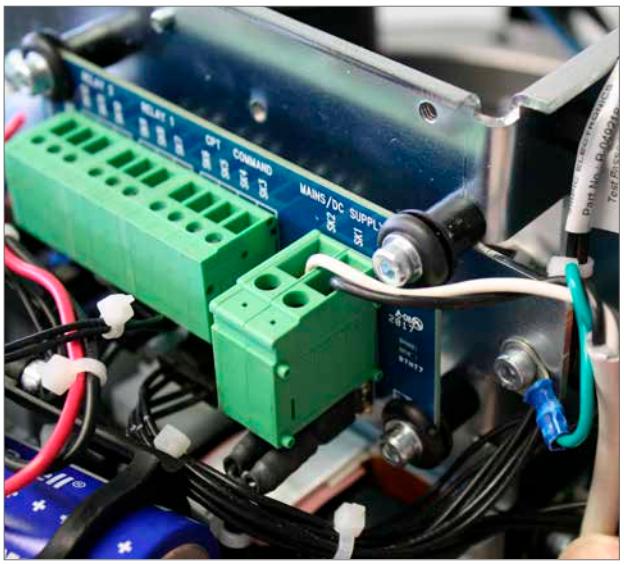


Fig 6.9 Terminal block

5.3.3 Cover Removal Precautions

⚠ **WARNING**

Carefully follow warning guidance provided in section 3 when removing the actuator top cover.

⚠ **WARNING**

Ensure all connected power supplies are isolated before removing the actuator top cover.

Verify the supply voltage matches 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 PUB094-006 which details the electric motor performance data for CMA range actuators.

5.3.4 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. Consult local and certifying agency codes to determine which earth connections must be used. Refer to Fig 6.10.

5.3.5 Removing Top Cover

Using a 8 mm Allen key loosen the captive fixings securing the top cover to the actuator body. 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.

4 set screws are provided to aid removal of the cover. Refer to Fig 6.12.

Fig 6.10 External protective earth

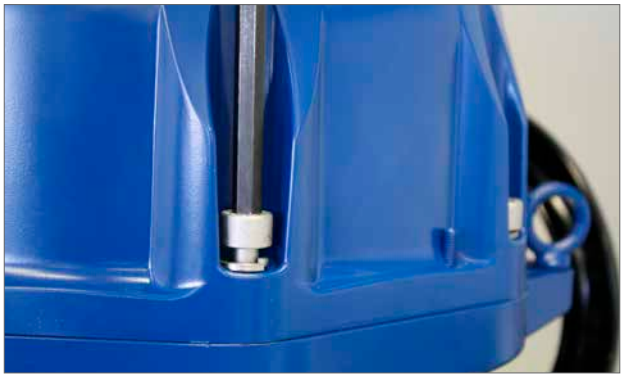


Fig 6.11 Cover screw location

Fig 6.12 Set screw location

Fig 6.13 Cover removal

Fig 6.14 Internal electronics

5.3.6 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.

Wire type must meet local and certifying agency (FMC, FM, IEC Ex, ATEX, etc) requirements and have a minimum temperature rating of 88 °C.

Terminate the power, control and indication wiring with appropriate ferrules. Connect wiring to the terminal block connectors. Ferrules for power connector must be Phoenix Contact AI 2,5 - 8 or AI 1,5 - 8 series ferrules or equivalent with a temperature range of -40 to +105 °C (+40 to +221 °F), 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 actuator body.

18 AWG wire is recommended for remote control and indication connections is with the RIRO option.

⚠ WARNING: Ensure the power supply voltage matches that stamped on the actuator nameplate.

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 ⎓

Supply voltage fluctuations not to exceed +/- 10% of the nominal supply voltage.

Supply frequency tolerance +/- 10%.

5.3.7 Fuses

The DC fuse is a 10 amp, 250 volt, type 3AG. The AC fuse is a 5 amp fuse which is not serviceable. (Rated to supply 500 watts at 110 volts, which is twice the output power of the supply).

5.3.8 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 the maximum voltage that can be applied is 30 VDC.
Rated Current is 3 A.

5.3.9 CPT Feedback

The Loop-powered transmitter provides 4 to 20 mA signal that corresponds to position. Loop supply is 24 VDC nominal (18-30 VDC max).

5.3.10 Demand

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

Fig 6.15 Display interface

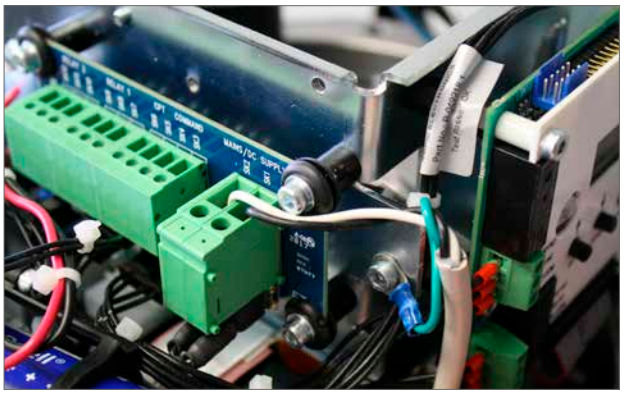


Fig 6.16 Wiring installation

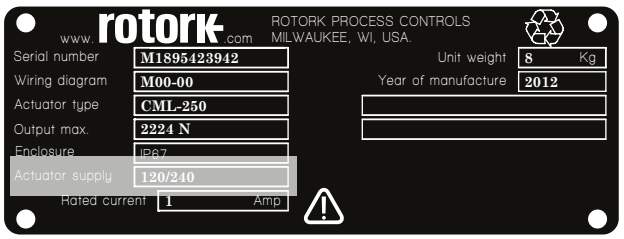


Fig 6.17 Actuator identification label

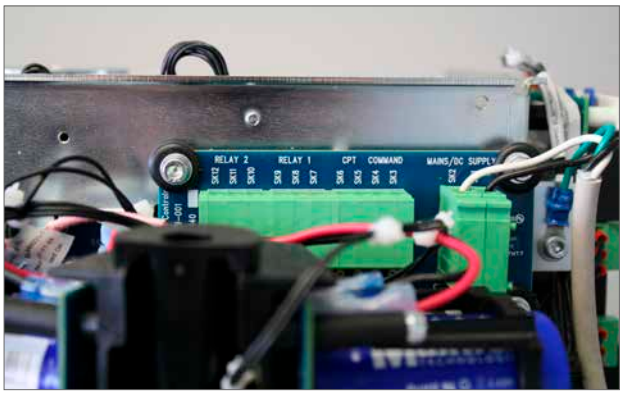


Fig 6.18 Terminal Block

6.1 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 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 performed by using the 4 push buttons mounted below the LCD display on the user interface.

Fig 7.1 Default display

Actuator must be set to LOCAL with the Local/Stop/ Remote selector to change configuration parameters.

Power supply must be restored to perform setup of the actuator. Power supply should only be restored once the cover is safely removed (refer to section 5.3.3).

Charging of the Reserve Power Pack (RPP) is prevented whilst the top cover is removed. This is prevented with an automatic switch to reduce the risk of electrical shock during setup.

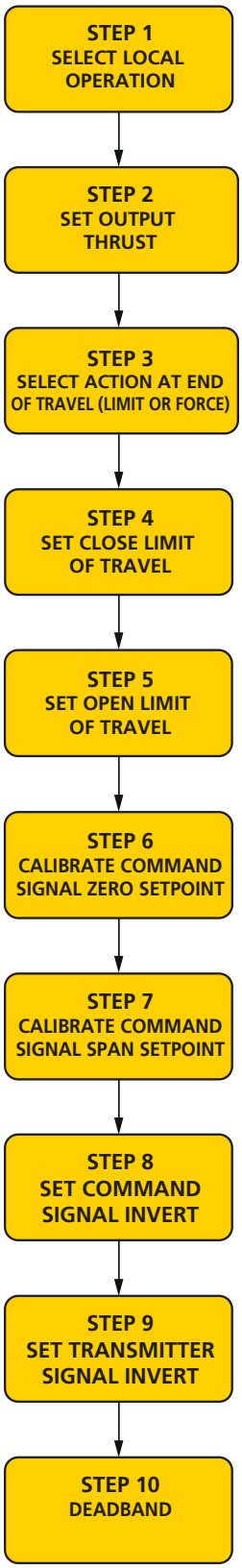
The power loss action is also disabled whilst the actuator top cover is removed as the RPP will not contain any charge.

Changing control mode to STOP or REMOTE when editing a configuration parameter will cancel the setting change and return the setting to the last saved value.

6.2 Basic Menu Structure

BASIC	
POSIT Position	POSITION
SET PT Setpoint	SETPOINT
THRUST Thrust Display	THRUST
LOCREM Local / Remote Operation	LOCAL/REMOTE OPERATION
MANJOG Manual Jog	MANJOG
THRSTC Close Thrust	CLOSE THRUST
THRSTO Open Thrust	OPEN THRUST
CL ACT Close Action	CLOSE ACTION
OP ACT Open Action	OPEN ACTION
CL LIM Close Limit (zero)	CLOSE LIM
OP LIM Open Limit (span)	OPEN LIMIT
CMD4 Field Command Signal4	FIELD COMMAND SIGNAL 4
CMD20 Field Command Signal20	FIELD COMMAND SIGNAL 20
CMD IV Command Invert	COMMAND INVERT
CPT IV Transmitter Invert	TRANSMITTER INVERT
DBAND Deadband	DEADBAND
STATUS	STATUS
FLTHST Fault History Access	FAULT HISTORY
ADVANC Advanced Menu	ADV MENU ACCESS
DEFLTS Default Menu Access	DEFAULTS

6.3 Basic Setup Flowchart



STEP 1
SELECT LOCAL OPERATION

6.4 Select Local Operation

The LOCAL/STOP/REMOTE selector determines the actuator operating mode at all times. LOCAL mode must be active in order to edit and save configuration parameters.

Fig 7.2 Actuator in STOP

Rotate the LOCAL/STOP/REMOTE selector anti-clockwise until the LOCAL symbol is directed towards the LCD position display.

Fig 7.3 Actuator in LOCAL

The user interface LCD display will show the current active mode.

Fig 7.4 REMOTE mode indication

Fig 7.5 LOCAL mode indication

STEP 2
SET OUTPUT
THRUST

6.5 Set Output Thrust

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

Use UP/DOWN buttons until THRSTC is displayed.

Press ENTER to view the Close output Thrust set value.

The Thrust Output is adjustable between 60% and 150% of its rated value.

Fig 7.7 shows the Closing Thrust value set to 60% of its rated value.

NOTE: When the Thrust is selected above the 100% Rated value this additional effort is only available at the end of travel to seat the valve for tight shut off applications.

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

Fig 7.6 Close thrust setting

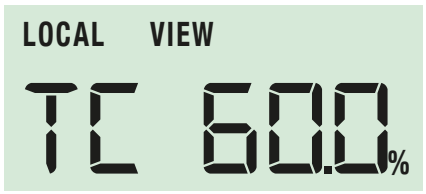


Fig 7.7 View close thrust value

6.5 Set Output Thrust (cont'd)

If the Close Thrust value requires adjustment press ENTER.

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

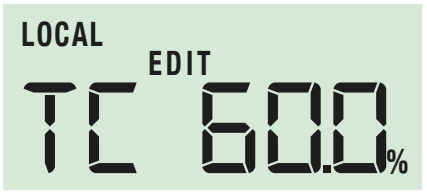


Fig 7.8 Edit close thrust value

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

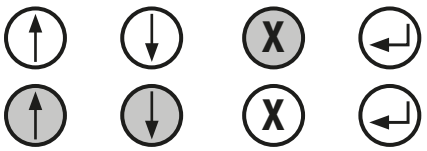
Fig 7.9 Edit close thrust value

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

Fig 7.10 Save new value

Press CANCEL to return to previous menu.

Use UP/DOWN buttons until THRSTO is displayed.



Press ENTER to view the Open output Thrust set value.

The Thrust Output is adjustable between 60% and 150% of its rated value.

Fig 7.12 shows the Opening Thrust value set to 100% of its rated value.

Press ENTER to change the Open Thrust set value.

NOTE: When the Thrust is selected above the 100% Rated value this additional effort is only available at the end of travel to seat the valve for tight shut off applications.

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

Fig 7.11 Open thrust setting

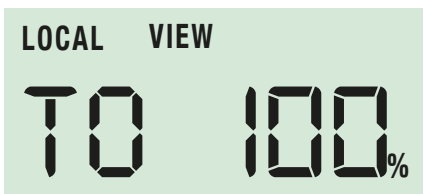


Fig 7.12 View open thrust value

6.5 Set Output Thrust (cont'd)

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

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

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

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

Press CANCEL to return to previous menu.

Fig 7.13 Edit open thrust value

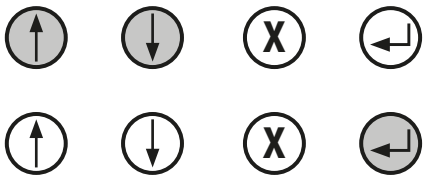


Fig 7.14 Save new value

Fig 7.15 Open thrust setting

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

6.6 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 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 thrust to the valve seat in either direction.

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

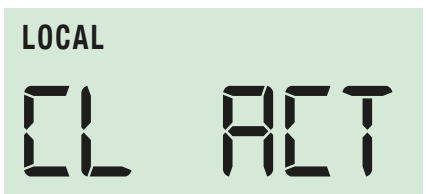


Fig 7.16 Close action setting

Press ENTER to view the Close Action setting.

6.6 Select Action at End of Travel (cont'd)

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

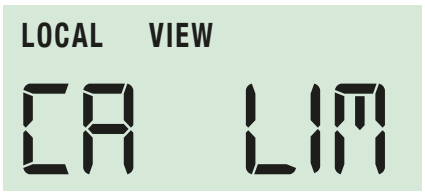


Fig 7.17 View close action value

To change the end of travel action press ENTER.

The actuator is now in EDIT Mode.

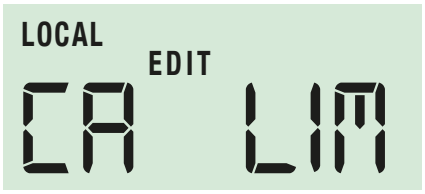


Fig 7.18 Close on position limit

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

Fig 7.19 shows the Closed End of Travel Action set to FRC (FORCE) and the set output closing thrust will be applied to the valve seat at the end of travel.

Fig 7.19 Close on force limit

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 7.20 Save new value

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

Fig 7.22 Default display

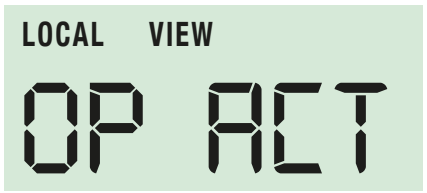


Fig 7.21 Open action setting

STEP 4
SET CLOSE LIMIT
OF TRAVEL

6.7 Set Closed Limit of Travel

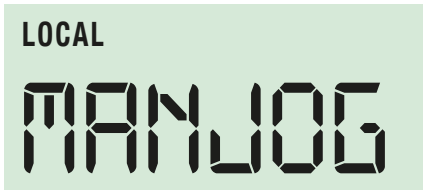


Fig 7.23 Manual jog setting

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

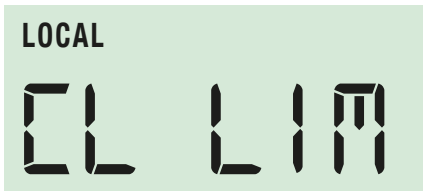


Fig 7.24 Close limit setting

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

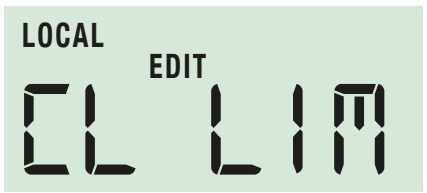


Fig 7.25 Edit close limit position

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 7.26 Save new limit position

THE CLOSED END OF TRAVEL LIMIT IS SET.

Press CANCEL to go back to top level menu.

STEP 5
SET OPEN LIMIT
OF TRAVEL

6.8 Set Open Limit of Travel

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

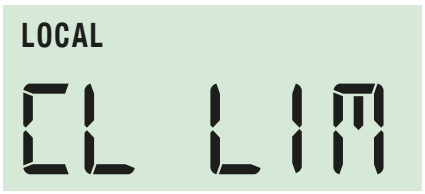


Fig 7.27 Close limit setting

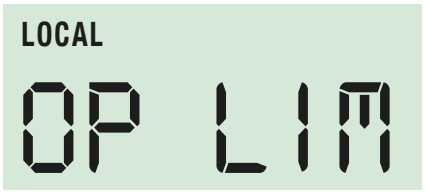


Fig 7.28 Open limit setting

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

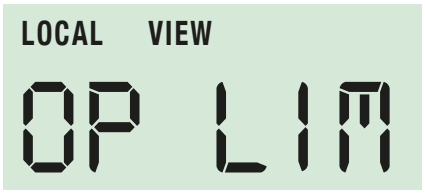


Fig 7.29 View open limit setting

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

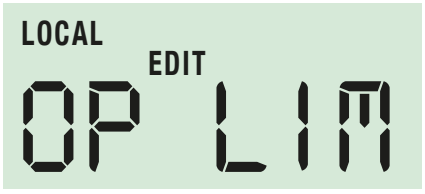


Fig 7.30 Edit open limit position

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

Fig 7.31 Save new limit position

THE OPEN END OF TRAVEL LIMIT IS SET.

Press CANCEL to go back to top level menu.

STEP 6
CALIBRATE COMMAND
SIGNAL ZERO SETPOINT

6.9 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 28.

6.9.1 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 7.32 Control input connection

STEP 6
CALIBRATE COMMAND
SIGNAL ZERO SETPOINT

6.9.2 Calibrate Command Signal Zero Setpoint Using an External 4-20 mA Signal

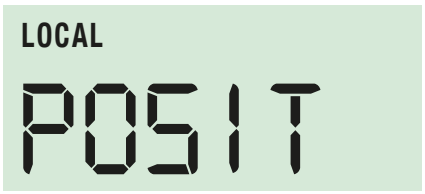


Fig 7.33 Default display

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

Fig 7.34 Low command setting

Press ENTER until 'EDIT' is displayed.

Apply LOW setpoint signal (4 mA).

Fig 7.35 Edit low set point signal

Press ENTER.

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

Fig 7.36 Save low set point signal

Press CANCEL to go back to top level menu.

Fig 7.37 Default display

STEP 7
CALIBRATE COMMAND
SIGNAL SPAN SETPOINT

6.9.3 Calibrate Command Signal Span Setpoint Using an External 4-20 mA SIGNAL

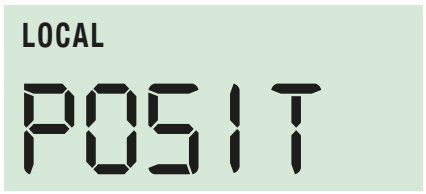


Fig 7.38 Default display

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

Fig 7.39 High command setting

Press ENTER until 'EDIT' is displayed.

Apply HIGH setpoint signal (20 mA).

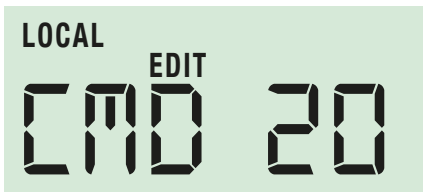


Fig 7.40 Edit high set point signal

Press ENTER.

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

Fig 7.41 Save high set point signal

Press CANCEL to go back to top level menu.

Fig 7.42 Default display

STEP 8
SET COMMAND
SIGNAL INVERT

6.10 Set Command Signal Invert

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

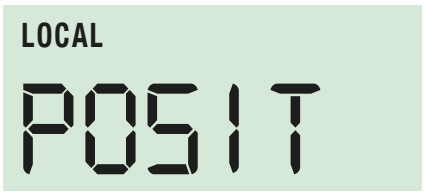


Fig 7.43

Press ENTER until 'EDIT' is displayed.

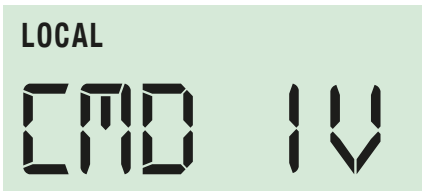


Fig 7.44

Screen shows Command Signal Invert set to OFF.

Command Signal Invert is adjustable to ON or OFF.

Use the UP/DOWN buttons to set the Command Signal Invert ON or OFF.

Set to OFF for 4 mA as the close position and 20 mA as the open position.

Set to ON to invert the signal, 4 mA is open and 20 mA is close.

Fig 7.45

Press ENTER to save the current Command Signal Invert setting.

Fig 7.46

Press CANCEL to go back to top level menu.

Fig 7.47

STEP 9
SET TRANSMITTER
SIGNAL INVERT

6.11 Set Transmitter Signal Invert

Press the DOWN arrow until the CPT IV menu is displayed.

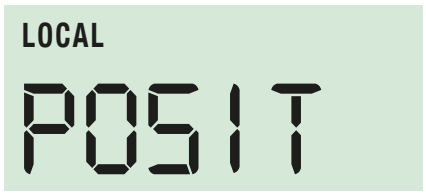


Fig 7.48

Press ENTER until 'EDIT' is displayed.

Fig 7.49

Screen shows Transmitter Signal Invert set to OFF.

Transmitter Signal Invert is adjustable to ON or OFF.

Use the UP/DOWN buttons to set the Transmitter Signal Invert ON or OFF.

Set to OFF for 4 mA as the close position and 20 mA as the open position.

Set to ON to invert the signal, 4 mA is open and 20 mA is close.

Fig 7.50

Press ENTER to save the current Transmitter Signal Invert setting.

Fig 7.51

Press CANCEL to go back to top level menu.

Fig 7.52

STEP 10
DEADBAND

6.12 Set Deadband

Press the DOWN arrow until the DBAND menu is displayed.

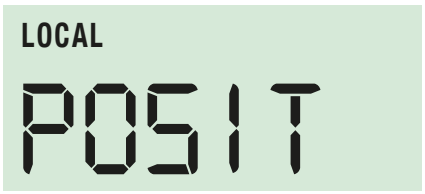


Fig 7.53 Default display

Press ENTER until 'EDIT' is displayed.

Fig 7.54 Deadband setting

Screen shows the Deadband set to 0.1%.

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

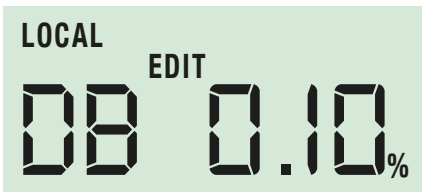


Fig 7.55 Edit deadband value

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.

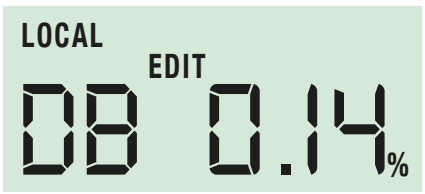


Fig 7.56 Edit deadband value

Press ENTER to save the current Deadband Value.

Fig 7.57 Save new value

Press CANCEL to go back to top level menu.

6.13 Completing Basic Setup

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

Fig 7.58 Cover spigot face

Carefully align the top cover.

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

Lower the top cover in to place. Check that no cables are trapped.

Fig 7.59 Cover alignment

Tighten the eight cap head screws.

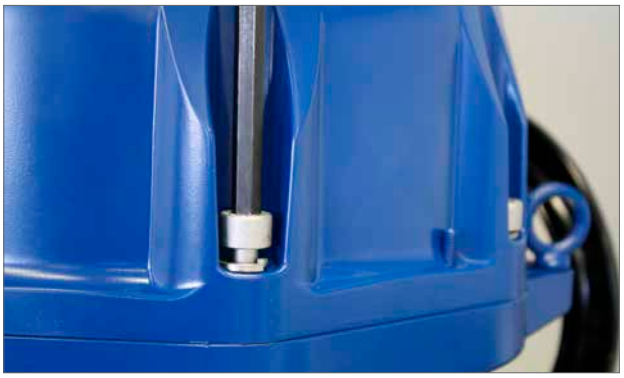
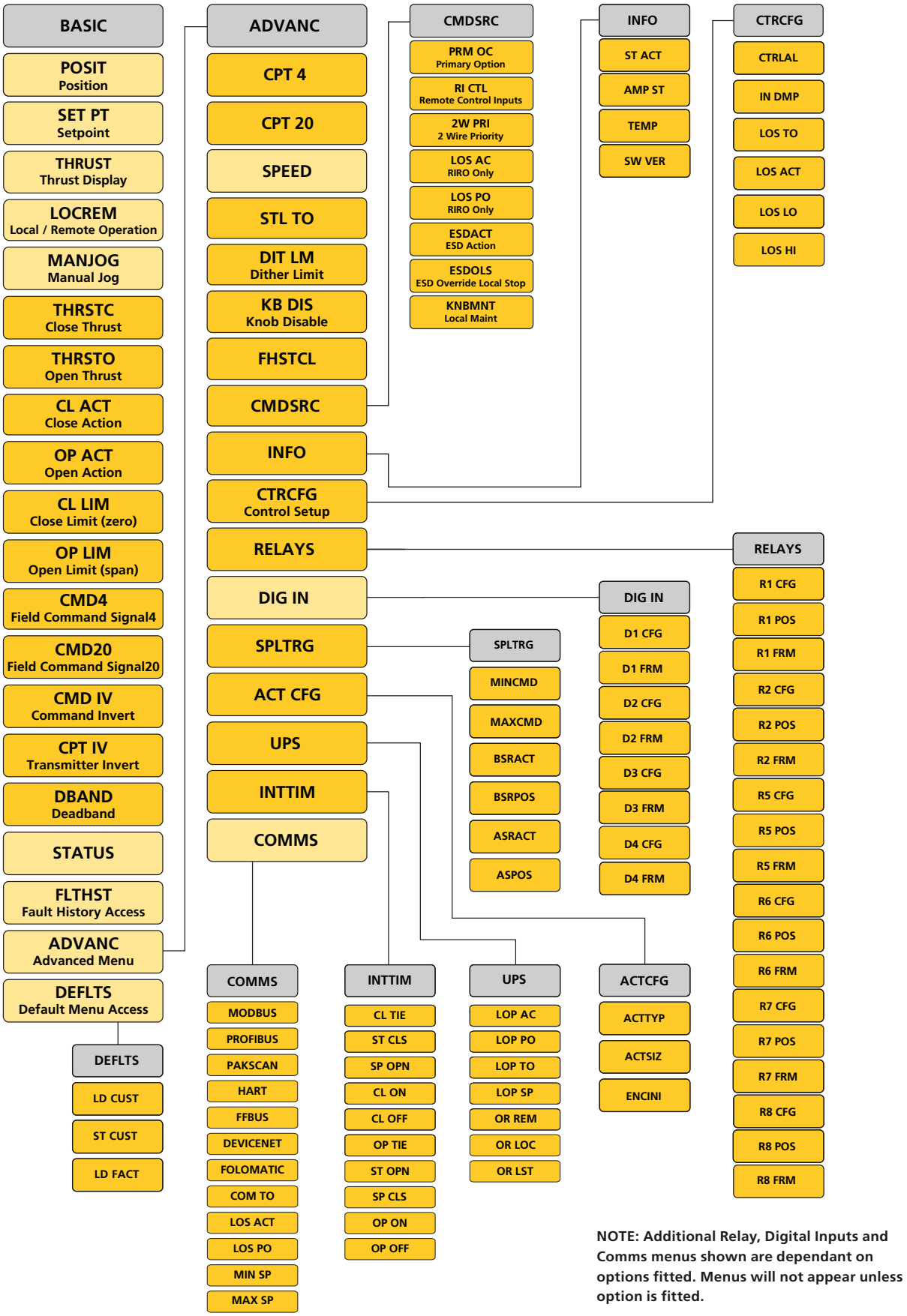


Fig 7.60 Cover screw location

6.14 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

7.1 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 8.2 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.

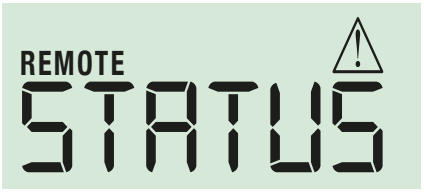


Fig 8.1 Status menu

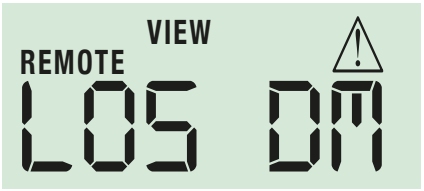


Fig 8.2 Loss of demand active

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.

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.

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

7.1 Status Indication (cont'd)

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 (ESD) 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

DITHER

DITHER - Dither

Notification is generated when the actuator has performed more than the starts per hour set in DIT LM. A start is defined as a single movement of at least 1% position change.

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.

8. Fault History Menu

FLTHST
Fault History Access

8.1 Fault History

Alarms and Faults are stored and listed by event number and type. Time intervals between events are indicated between each event, Fig 9.2 shows event 16 is Local selected status.

Fig 9.1 Fault history menu

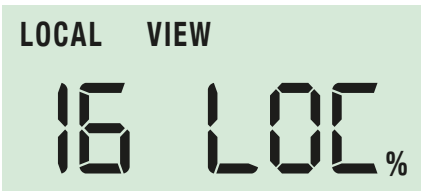


Fig 9.2 Event 16 showing LOCAL mode

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	**STC**	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 Temperature	**OTP**	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.

8. Fault History Menu

FLTHST
Fault History Access

8.1 Fault History (cont'd)

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 (ESD) feature was activated.
Dither	**DIT**	The unit has exceeded 3,600 starts per hour where the change in position is greater than 1% of travel.
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.
Loss of Power	**LOP**	Loss of power occurred. Units with RPP only.
Charge Mode	**CHG**	Charge Mode initiated. Units with RPP only.

DEFLTS
Default Menu Access

9.1 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 10.1 Defaults menu

Fig 10.2 Confirm setting overwrite

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 10.3 Load customer default settings

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 10.4 Save customer default settings

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 10.5 Load factory default settings

9.2 Parameter Default Values

9.2.1 Basic Menu

PARAMETER	DEFAULT VALUE
Position	No default setting is a read parameter
Setpoint	No default setting is a read parameter
Thrust	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
Command Signal Invert	Set at factory to OFF
Transmitter Signal Invert	Set at factory to OFF
Deadband	1.0%
STATUS	No Default / status access
ADVANCED MENU	No Default / menu access
DEFAULTS	No Default / default access

9.2.2 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
SPEED	100%
Stall Time out	2.0 Seconds
Dither Limit	Set at factory to 3,600
Knob Disable	Set at factory to OFF
FHSTCL	No default setting / history clear access
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

9.2.3 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

9.2.4 Control Configuration Menu

PARAMETER	DEFAULT VALUE
Control Algorithm	Open loop
Input Dampening	0 seconds
Input Signal Loss Time out	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
THRST O	100%
THRST C	100%
CL ACT	LIM
OP ACT	LIM

9.2.5 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)

9.2.6 Split Range Menu

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

9.2.7 Actuator Config Menu

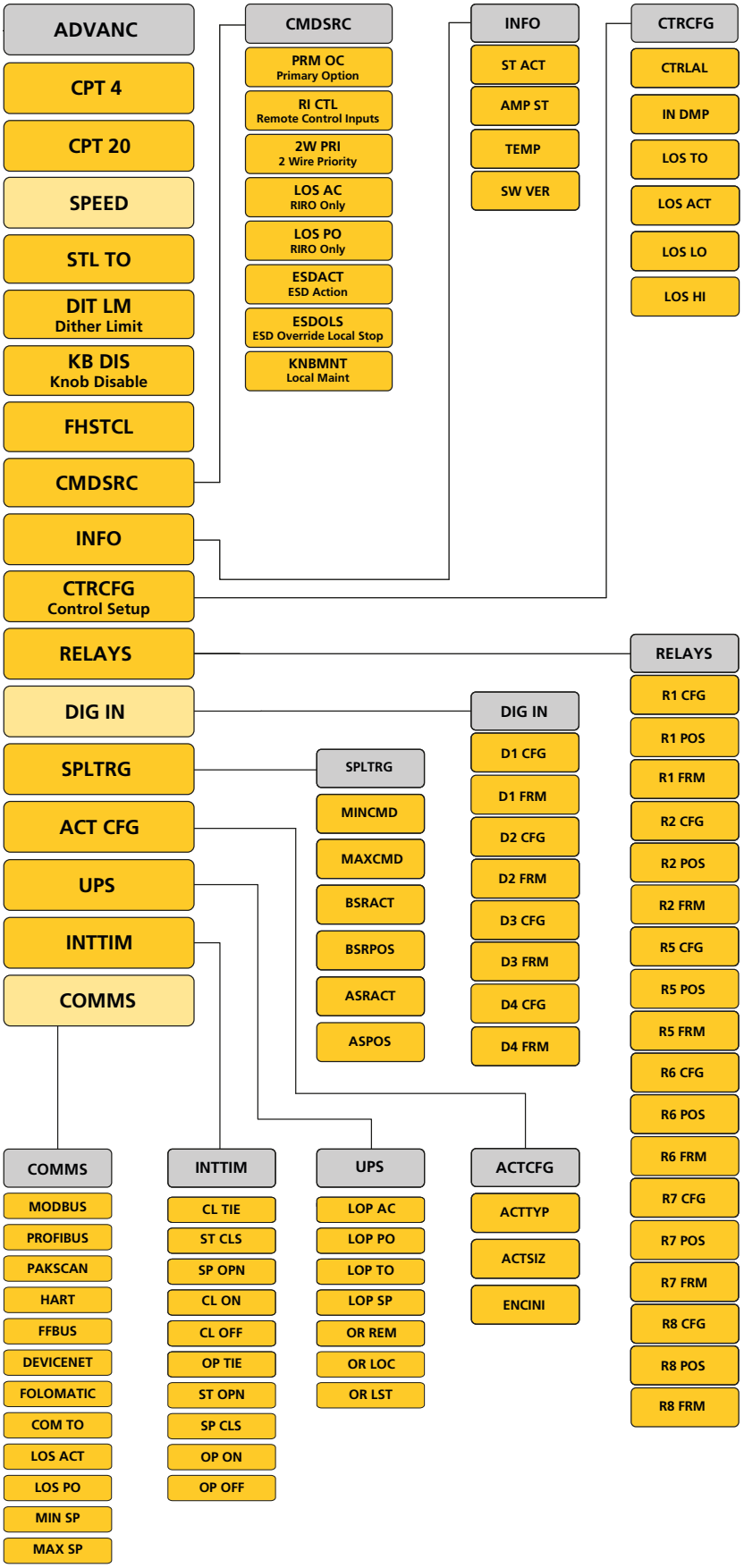
PARAMETER	DEFAULT VALUE
Actuator Type	Set at Factory to match actuator build
Actuator Size	Set at Factory to match actuator build
Encoder Initialization	Set at Factory at middle of travel

9.2.8 UPS Menu

PARAMETER	DEFAULT VALUE
Loss of Power Action	Disabled - No action
Loss of Power Position	50%
Loss of Power Time out	0 Seconds
Loss of Power Speed	100%
Override Remote Control	ON - Loss of power action overrides remote control
Override Local Control	OFF - Local control overrides loss of power action
Override Local Stop Control	OFF - Local Stop control overrides loss of power action

10. Advanced Menu

10.1 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 SETTINGS	**ADVANC**
CPT 4 - Current POS Transmitter - Zero/4 ma	**CPT 4**
CPT 20 - Current POS Transmitter - SPAN (20 mA)	**CPT 20**
SPEED - Adjust Actuator Output Speed	**SPEED**
STL TO - STALL TIME	**STL TO**
DIT LM - Dither Limit	**DIT LM** Dither Limit
KB DIS - Knob Disable	**KB DIS** Knob Disable
FHSTCL - Fault History Clear	**FHSTCL**
CMDSRC - COMMAND SOURCE	**CMDSRC**
INFO	**INFO**
CTRCFG - CONTROL CONFIGURATION	**CTRCFG** Control Setup
RELAYS - RELAY CONFIGURATION	**RELAYS**
DIG INPUTS - Configure Digital Inputs (if fitted)	**DIG IN**
SPLTRG - SPLIT RANGE	**SPLTRG**
ACT CFG - ACTUATOR CONFIGURATION	**ACT CFG**
UPS - Configure settings for the Reserve Power Pack (if fitted)	**UPS**
INTTIM - Timer Interrupt	**INTTIM**
COMMS - Configure COMMS Option Cards (if fitted)	**COMMS**

ADVANC

10.2 Advanced Menu

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

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 to the parameter you wish to modify. 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.

CPT 4

10.2.1 CPT 4 Current Position Transmitter - Zero Adjustment

Connect a suitable meter. Enter Edit mode and use the UP/DOWN pushbuttons to adjust the 4 mA (ZERO) output.

CPT 20

10.2.2 CPT 20 Current Position Transmitter - Span Adjustment

Connect a suitable meter. Enter Edit mode and use the UP/DOWN pushbuttons to adjust the 20 mA (SPAN) output.

SPEED

10.2.3 SPEED - Adjust Actuator Output Speed

Actuator output speed can be varied between 50% and 100% of its rated speed. Default is 100%.

STL TO

10.2.4 STL TO - Stall Time

Motor stall time adjustable between 1 to 10 seconds. Default is 2 seconds.

DIT LM

10.2.5 DIT LIM - Dither Limit

Actuator dither status alarm will trigger when the set number of starts is exceeded. Adjustable between 10 to 3,600 starts per hour. Default is 3,600.

KB DIS

10.2.6 KB DIS - Knob Disable

The local control knobs can be disabled using this setting. Setting OFF will maintain normal operation of the local control knobs. Setting ON will disable the local control knobs and prevent operating mode changes. Operating mode is set with the internal HMI. The external display will continue to provide position and status feedback.

FHSTCL

10.2.7 FHSTCL - Fault History Clear

Enter Edit mode. The CONFIRM parameter is now displayed, press Enter to clear the stored fault history.

CMDSRC

10.2.8 CMDSRC - 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
- **PO - DEV** DeviceNet Option Control
- **PO - FOL** Folomatic Option 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 PRI Remote Control 2 Wire Priority

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

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

LOS AC Actuators with RIRO Digital Input/Output Option only

Action on loss of internal communications.

- **LA- DIS** Disabled
- **LA- CLS** Run Closed
- **LA- SPT** Stayput or Stop
- **LA-OP** Run Open
- **LA-POS** Go to position

LOS PO Set the Loss Of Internal Comms Failure Position when LA-POS selected

COMMAND SOURCE	CMDSRC
Primary Option Selection	PRM OC Primary Option
Remote Input Control Selection	RI CTL Remote Control Inputs
Remote Control 2 Wire Priority	2W PRI 2 Wire Priority
Actuators with RIRO Digital Input/Output Option	LOS AC RIRO Only
Loss of Internal Comms Failure Position	LOS PO RIRO Only
Emergency Shutdown Action	ESDACT ESD Action
Emergency Shutdown Override Local Stop	ESDOLS ESD Override Local Stop
Maintain Local Control	KNBMNT Local Maint

ESDACT Emergency Shutdown Action

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

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

ESDOLS Emergency Shutdown Override Local Stop

Units with Local Controls only.

- **EO - OFF** Local Stop overrides ESD Command
- **EO - ON** ESD overrides all local control modes

KNBMNT Maintain Local Control

- **KM - OFF** Local Open/Close selector is push to run. Unit only runs whilst the Open or Close selector knob is held in position.
- **KM - ON** Local Open/Close selector is maintained. Unit only runs once the Open or Close selector knob is operated.

Select 'STOP' to cancel the movement.

INFORMATION	INFO
ST ACT - ACTUATOR STARTS	ST ACT
AMP ST - AMPLIFIER STARTS	AMP ST
TEMP - TEMPERATURE	TEMP
SW VER - SOFTWARE VERSION	SW VER

CTRCFG - Control Setup	CTRCFG
CTRLAL - 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 LO - Loss of Signal Low	LOS LO
LOS HI - Loss of Signal High	LOS HI

INFO

10.2.9 INFO

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

CTRCFG

10.2.10 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.

RELAYS

10.2.11 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 R5 to R8.

These relays have the same functions and method of Configuration as Relays R1 and R2.

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
LFB	Loss of Feedback Signal
STO	Motor Stalled in Open Direction
STC	Motor Stalled in Closed Direction
OTH	Open Thrust Overload
CTH	Close 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)
LOP	Loss of Power
CHG	Charge Mode
DIG	Energised by Bus Command

RELAYS	RELAYS
R1 CFG - Relay 1 Config	R1 CFG
R1 POS - Relay 1 Pos	R1 POS
R1 FRM - Relay 1 Form	R1 FRM
R2 CFG - Relay 2 Config	R2 CFG
R2 POS - Relay 2 Pos	R2 POS
R2 FRM - Relay 2 Form	R2 FRM
R5 CFG - Relay 5 Config	R5 CFG
R5 POS - Relay 5 Pos	R5 POS
R5 FRM - Relay 5 Form	R5 FRM
R6 CFG - Relay 6 Config	R6 CFG
R6 POS - Relay 6 Pos	R6 POS
R6 FRM - Relay 6 Form	R6 FRM
R7 CFG - Relay 7 Config	R7 CFG
R7 POS - Relay 7 Pos	R7 POS
R7 FRM - Relay 7 Form	R7 FRM
R8 CFG - Relay 8 Config	R8 CFG
R8 POS - Relay 8 Pos	R8 POS
R8 FRM - Relay 8 Form	R8 FRM

Namur 107

7MN	Maintenance Alarm
7OS	Out of specification Alarm
7FC	Function check Alarm
7FL	Failure Alarm
R1(2) POS	Select Position Here
R1(2) FRM	Relay Form
	EOC Energise on Condition Active (Normally Open Contact)
	DOC De-energise on Condition Active (Normally Closed Contact)

DIG IN

10.2.12 DIGITAL INPUT

DIO - Digital Input and Output option PCB

The DIO Option PCB provides 4 Digital Inputs that can be configured for hard wired remote control.

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	Switch between Primary and Hardwired Control
D1-FRM	Contact Form
D1-NO	Normally Open contact
D1-NC	Normally Closed contact

DIGITAL INPUT — DIG IN

D1 CFG - Digital 1 Config — D1 CFG

D1 FRM - Digital 1 Form — D1 FRM

D2 CFG - Digital 2 Config — D2 CFG

D2 FRM - Digital 2 Form — D2 FRM

D3 CFG - Digital 3 Config — D3 CFG

D3 FRM - Digital 3 Form — D3 FRM

D4 CFG - Digital 4 Config — D4 CFG

D4 FRM - Digital 4 Form — D4 FRM

SPLTRG

10.2.13 SPLTRG - Split Range Operation

MINCMD - Minimum Split Range Command value (4-20 mA) for fully closed (zero).

MAXCMD - Maximum Split Range Command value (4-20mA) for fully open (span).

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

- **DIS** - Disabled
- **CLS** - Close
- **OPN** - Open
- **SPT** - Stayput
- **POS** - Go to Position

BSRPOS - 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.

- **DIS** - Disabled
- **CLS** - Close
- **OPN** - Open
- **SPT** - Stayput
- **POS** - Go to Position

ASPOS - Position when command rises above the maximum split range set value.

SPLIT RANGE OPERATION — SPLTRG

MINCMD - Minimum Split Range Command — MINCMD

MAXCMD - Maximum Split Range Command — MAXCMD

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 - ACTUATOR CONFIGURATION ACTCFG

ACTTYP - ACTUATOR TYPE ACTTYP

ACTSIZ - ACTUATOR SIZE ACTSIZ

ENCINI - ENCODER INITIALIZATION ENCINI

ACTCFG

10.2.14 ACTCFG - Actuator Configuration

ACTTYP - 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.

ACTSIZ - Actuator Size

This parameter matches the Thrust characteristic of the actuator model. For example CML-1500 lbf.

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 invalidate the current travel limit settings. The travel limits MUST be reset before putting the actuator back in to service.

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.

UPS

10.2.15 UPS - Reserve Power Pack Configuration

The Reserve Power pack consists of an super capacitor pack that can be configured to carry out an action on the loss of power.

LOP AC - Loss of Power Action

Action to be taken on Power Loss:

OPN - Run to the configured OPEN limit

SPT - Stayput, remain at current position

CLS - Run to the configured CLOSE limit

POS - Run to configured position (See LOP PO)

DIS - Action disabled

LOP PO - Loss of Power Position

When LOC AC is set to POS the actuator will run to its configured loss of power position. Can be set between 0 to 100% of travel.

LOP TO - Loss of Power Timeout

On loss of power the LOC AC action can be delayed. Timeout can be set between 0 to 5 seconds.

LOP SP - Loss of Power Speed

The speed at which the actuator will travel when executing the LOC AC operation. Can be set between 50 to 100% of its Rated speed.

OR REM - Override Remote Control Mode

OFF - Actuator will respond to the command inputs when selected for remote operation and the RPP is active.

ON - The LOP AC action will override the Remote command inputs.

OR LOC - Override Local Control Mode

OFF - Local open and close operation enabled whilst RPP is active.

ON - The LOP AC action will override Local operation.

OR LST - Override Local Stop mode

OFF - Local Stop mode has priority over all control modes.

ON - The LOP AC action will override Local stop mode.

RESERVE POWER PACK CONFIGURATION UPS

LOP AC - Loss of Power Action LOP AC

LOP PO - Loss of Power Position LOP PO

LOP TO - Loss of Power Timeout LOP TO

LOP SP - Loss of Power Speed LOP SP

OR REM - Override Remote Control Mode OR REM

OR LOC - Override Local Control Mode OR LOC

OR LST - Override Local Stop Mode OR LST

INTTIM

10.2.16 INTTIM - Timer Interrupt

The timer interrupt function enables pulsed "stop/start" operation by the actuator as a response to local and remote control commands. This effectively increases the valve stroke time and can be adjusted to prevent hydraulic shock (water hammer) and flow surges in pipelines.

CL TIE - Closed-end Timer Interrupt Enable
OFF - Closed end Timer Interrupt is disabled.
ON - Closed end Timer Interrupt is enabled.

ST CLS - Start Close, start position for closed end timer interrupt - Position below which the closed end timer interrupt is active when closing. Can be set from 0 to 100% position. Must be set below SP CLS (Stop Close).

SP OPN - Stop Open, stop position for closed end timer interrupt - Position above which the closed end timer interrupt is inactive when opening. Can be set from 0 to 100% position. Must be set below ST OPN (Start Open).

CL ON - Close ON Time
The actuator run (ON) time around the closed end of travel, when the closed end timer interrupt is enabled and active. Can be set from 1 to 99 seconds.

CL OFF - Close OFF Time
The actuator Inhbit (OFF) time around the closed end of travel, when the close end timer interrupt is enabled and active. Can be set from 1 to 99 seconds.

OP TIE - Open end Timer Interrupt Enable
OFF - Opened end Timer Interrupt disabled.
ON - Opened end Timer Interrupt enabled.

ST OPN - Start Open, start position for opened end timer interrupt - Position above which the opened end timer interrupt is active when opening. Can be set from 0 to 100% position. Must be set above SP OPN (Stop Open).

TIMER INTERRUPT — INTTIM

CL TIE - Closed-end Timer Interrupt Enable — CL TIE

ST CLS - Start Close — ST CLS

SP OPN - Stop Open — SP OPN

CL ON - Close ON Time — CL ON

CL OFF - Close OFF Time — CL OFF

OP TIE - Open end Timer Interrupt Enable — OP TIE

ST OPN - Start Open — ST OPN

SP CLS - Stop Close — SP CLS

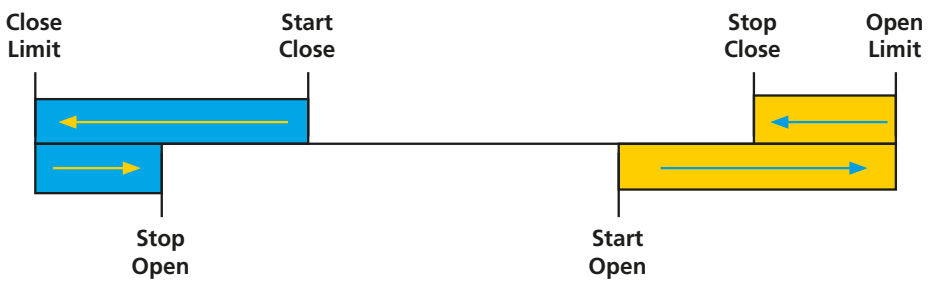
OP ON - Open ON Time — OP ON

OP OFF - Open OFF Time — OP OFF

SP CLS - Stop Close, stop position for opened end timer interrupt - Position below which the opened end timer interrupt is inactive when closing. Can be set from 0 to 100% position. Must be set above ST CLS (Start Close).

OP ON - Open ON Time
The actuator run (ON) time around the opened end of travel, when the opened end timer interrupt is enabled and active. Can be set from 1 to 99 seconds.

OP OFF - Open OFF Time
The actuator Inhbit (OFF) time around the opened end of travel, when the opened end timer interrupt is enabled and active. Can be set from 1 to 99 seconds.



Blue denotes the active area for the closed end timer interrupt, when enabled.

Yellow denotes the active area for the opened end timer interrupt, when enabled.

COMMS

10.2.17 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

FFB FT	**Foundation Fieldbus Type**

DEVICENET

DEVAD	**DeviceNet Address**
DEVBD	**DeviceNet Baud Rate**

COMMS
MOD BD
MOD FT
MOD AD
MOD PR
MOD TM
MOD 2A
PRO FT
PRO AD
PRO RP
PRO RM
PRO T1
PRO T2
GSD AC
PAK AD
PAK BD
HRT AD
HRT DS
FFB FT
DEV AD
DEV BD
F RANG
FCAL L
FCAL H
COM TO
LOS ACT
LOS POS
MIN SP
MAX SP

FOLOMATIC

F RANGE	**Select mA or voltage (5 V or 10 V) type signal**
FCAL L	**Calibrate Low signal setpoint Apply low input analogue signal and save setting**
FCAL H	**Calibrate High signal setpoint Apply High input analogue signal and save setting**

To apply changes the actuator must be set to "LOCAL" operation and in "EDIT" mode.

Save to confirm changes.

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**

11. Maintenance

Routine maintenance should include the following:

- Check actuator to valve fixings bolts for tightness
- Ensure valve stems and drive shafts are clean and properly lubricated
- If the motorized valve is rarely operated, a schedule of operation should be set up and adhered too
- Check the actuator for damage, loose or missing fixings
- Ensure that there is not an excessive build up of dust or contaminate on the actuator

12. Disposal / Recycling

User advice on disposal of your product at the end of its life. Please refer to table below. In all cases check local authority regulations before disposal.

Subject	Definition	Remarks / examples	Hazardous	Recycleable	EU Waste Code	Disposal
Electrical & Electronic Equipment	Printed circuit boards	All products	Yes	Yes	16 02 14	Use specialist recyclers
	Wire	All Products	No	Yes	16 02 16	
Glass	Lens/Window	CMA	No	Yes	20 01 02	
Metals	Aluminium	Brackets/housings	No	Yes	20 01 40	Use specialist metal recyclers
	Copper/Brass	Wire, motor windings/PCBAs	No	Yes	20 01 40	
	Zinc	N/A	No	Yes	20 01 40	
	Iron/Steel	Gears and shafts	No	Yes	20 01 40	
	Mixed Metals	Bushings	No	Yes	20 01 40	
Plastics	Glass-filled nylon	Electronic chassis	No	Yes	07 02 13	Disposal as general commercial waste
	Unfilled	Gears and bearings	No	Yes	07 02 13	
Window Sealant	Silicone	Window adhesive	Yes	No	08 04 09	Will require special treatment before disposal. Use specialist recyclers or waste disposal companies
Adhesive	Anaerobic Sealant	Thread locker	Yes	No	08 04 09	
Grease	Grease	Gears and ball screws	Yes	No	13 02 08	
Rubber	Seals & O-rings	Cover and shaft sealing	No	No	07 02 99	May require special treatment before disposal. Use specialist waste disposal companies

Fig 13.6 CMA Disposal recycle chart

Non-Hazardous and Hazardous Certified Enclosures

All CMA actuator hazardous and non-hazardous area enclosures are watertight to IP66, IP67* and NEMA 4.

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

The limits of frequency of operation are a function of the load on the actuator and the ambient temperature.

Under the heaviest load at the highest temperature the capability is up to 3,600 per hour. Favourable load conditions enable unrestricted starts per hour.

Option temperatures use different actuator components, please specify temperature requirement. 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 Temperature Option
BS EN 60529 (1992)	IP66/67, IP68*	-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)
FMC (Canadian)	4 & 6	-30 to +70 °C (-22 to +158 °F)	-40 to +60 °C (-40 to +140 °F)

*CML-1500 and CML-3000 are IP68 7m for 72 hours

Hazardous Area Enclosures

European ATEX Directive: CE 2809

Directive/Standard	Rating	Standard Temperature	Low Temperature Option
Directive = 2014/34/EU	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, EN 60079-31 EN 80079-36, EN 80079-37	Ex db h IIB T4 Gb Ex h tb IIIC T85°C Db	Units fitted with UPS or HMI option -20 to +60 °C (-4 to +140 °F)	

UKEK Directive: UKCA 1725

Directive/Standard	Rating	Standard Temperature	Low Temperature Option
Directive = 2014/34/EU and SI 2016 NO. 1107	II 2GD	-20 to +65 °C (-4 to +150 °F)	-40 to +60 °C (-40 to +140 °F)
Standard = EN IEC 60079-0:2018, EN 60079-1:2014, EN 60079-31:2014, EN ISO 80079-36:2016, EN ISO 80079-37:2016	Ex db IIB T4 Gb Ex tb IIIC T85°C Db	Units fitted with UPS or HMI Option -20 to +65 °C (-4 to 150 °F)	

International Hazardous Area IECEx

Directive/Standard	Rating	Standard Temperature	Low Temperature Option
No Directive		-20 to +65 °C (-4 to +150 °F)	-40 to +60 °C (-40 to +140 °F)
Standard = IEC 60079-0 IEC 60079-1, IEC 60079-31	Ex db IIB T4 Gb Ex tb IIIC T85°C Db	Units fitted with UPS or HMI option -20 to +60 °C (-4 to +140 °F)	

USA Hazardous Area – Factory Mutual (FM) Certified Explosionproof to NEC Article 500

Class	Division	Group	Standard Temperature	Low Temperature Option
I	1	C, D	-20 to +65 °C (-4 to +150 °F) Units fitted with UPS or HMI option -20 to +60 °C (-4 to +140 °F)	-40 to +60 °C (-40 to +140 °F)
II	1	E, F, G		

Enclosure types 4, IP66/67/68

Canadian Hazardous Area – Factory Mutual Canada (FMC) Certified Explosionproof to Canadian Electrical Code (CEC)

Class	Division	Group	Standard Temperature	Low Temperature Option
I	1	C, D	-20 to +60 °C (-4 to +140 °F) Units fitted with UPS or HMI option -20 to +60 °C (-4 to +140 °F)	-40 to +60 °C (-40 to +140 °F)
II	1	E, F, G		

Directive/Standard	Rating	Standard Temperature	Low Temperature Option
Standard = CSA C22.2 60079-0, CSA C22.2 60079-1, CSA C22.2 60079-31 Enclosure types 4, IP66/67/68	Ex db IIB T4 Gb Ex tb IIIC T85ºC Db	-20 to +60 °C (-4 to +140 °F) Units fitted with UPS or HMI option -20 to +60 °C (-4 to +140 °F)	-40 to +60 °C (-4 to +140 °F)

Environmental Conditions

a) Altitude up to 5000 meters

b CMA adheres to requirements consistent with Overvoltage Category II

c) The CMA adheres to the requirements consistent with a Pollution Degree of 2

Special Conditions For Safe Use (ATEX, IECEx, UKCA and FMC approved actuators)

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

CML-1500/3000

Flamepath	Maximum Gap (mm)	Maximum Width L (mm)
Lid/base	0.20	26.4
Screw shaft bushing / shaft	0.10	68.5
Base / screw shaft bushing	0.361	36.96
Handwheel shaft / base	0.20	27.9

2. The equipment utilises a non-metallic outer coating and has a potential static hazard. Clean only with a damp cloth.
3. The screws securing the outer window frame maintain the integrity of the flameproof enclosure and must not be removed.

Certification Numbers

Europe (ATEX)	FM17ATEX0012X
Great Britain (UKCA)	FM21UKEX0072X
International (IECEx)	IECEx FMG 17.007X
United States (US)	FM17US0101
Canada (FMC)	FM18CA0156X

Notes

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

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