

Keeping the World Flowing for Future Generations

CMA range



Control and monitoring facilities

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Introduction

This document provides a comprehensive overview of the applications and associated functions available with Rotork CMA actuators – comprising CML linear, CMR multi-turn and CMQ part-turn actuators.

Building on Rotork's historical success with innovative technology, the CMA offers an all-electric solution for automating control valves. With an increased focus on production costs and site efficiency, accurate control of product through the process is paramount. The Rotork CMA range helps to maximise product quality and plant capacity by achieving resolution figures better than 0.20% with the ability to eliminate position overshoot.

Configuration is performed using the push buttons and display included on the user interface within the actuator.



Linear CML



Part-turn CMQ with local controls



Multi-turn CMR





Part-turn CMQ

Linear CML-1500/3000

Power supply voltages

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

| Single-phase 50 Hz / 60 Hz | 100 VAC, 115 VAC, 120 VAC, 208 VAC, 220 VAC, 230 VAC, 240 VAC |
|-------------------------------|--|
| DC | 24 VDC |

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

AC powered CML-1500 and CML-3000 actuators include a switch mode power supply that accommodates 110 - 240 VAC.

Remote control

Analogue and network control

The standard form of control is via a 4 to 20 mA current loop. Feedback is achieved by a loop powered 4 to 20 mA signal and two volt-free contacts for status. Other optional control methods are available including HART[®], Foundation Fieldbus[®], *Pakscan*[™], Modbus[®], Profibus[®] and DeviceNet[®]. These network type options are covered by the relevant systems publications.

Hardwired discrete control

For discrete hardwired control, the optional RIRO card (Remote In Remote Out) can be fitted. The option allows the user to hardwire a discrete digital control (24 VDC nominal or 120 VAC nominal) for open and close operation. The option also allows up to four extra relay contacts to be available.

Standard control

Standard wiring options

The following standard wiring diagram matrix allows the user to configure which controls options are required. Using the matrix a wiring diagram can be generated applicable to the relevant analogue or network control application:

| | Μ | 0 | 0 | - | 0 | 0 |
|---------------|--|-------------------------------|---|---|---|---|
| | | | | | | |
| CMA actuator | Μ | | | | l | |
| Voltage | 0 - AC 1 - 24 VDC 3 - AC (CML 4 - 24 VDC (| -1500/3000) CML-1500/3000) | | | l | |
| Local control | 0 - None 2 - Local controls | | | | | |
| Option 1 | Basic 4 - 20 mA position control/feedback Internally powered 4 - 20 mA CPT Torque indication (CTT) Internally powered 0 - 10 VDC CPT RIRO F - Foundation Fieldbus H - HART K - Pakscan M Modbus single channel N - DeviceNet P - Profibus single channel | | | | | |
| Option 2 | 0 - None D - RIRO S - Reserve I | Power Pack (RPP) | | | | |

Contact Rotork to confirm availability of option combinations not currently listed at **www.rotork.com/en/support/** wiring/cma The following table of remote inputs are available with the RIRO option:

| Function | Description | |
|----------|--|--|
| Open | Actuator is driven towards the Open Limit when active | |
| Close | Actuator is driven towards the Close Limit when active | |
| ESD | Actuator is given an ESD command (actual action defined by the actuator controller) | |
| Maintain | Travel is maintained for Open and Close when active | |
| PSH | Primary Switch Hardwire: This switches control between primary (analogue: default) and Hardwire control. When Hardwire is selected, the RIRO inputs are active (say from a control panel). On deselection of the Hardwire, control reverts to the Primary selection. | |

Remote input electrical characteristics

Voltage ranges

DC – 20 to 60 V (24 V nominal) AC – 60 to 125 V (110 V nominal)

Voltage / current specifications

The following table describes the requirements for correct hardwired remote control. This table allows the user to correctly specify the input voltage / current required to operate the actuator.

| | | Guaranteed OFF | Guaranteed ON | Maximum Permissible |
|----------|-----------|-------------------|------------------|------------------------|
| DC | 24 V nom | 8 | 16 | 60 |
| DC | mA | 2 | 8 | - |
| AC | 110 V nom | 40 | 80 | 160 |
| 50/60 Hz | mA | 2 | 8 | - |

Signal pulse specification

The signal pulse must be a minimum of 20 ms.

Standard control

Relay functions

The following table of remote output settings are available with the standard 2 relay contacts and the optional 4 RIRO relay contacts:

| Function Code | Function | Description |
|---------------|--------------------------------------|---|
| NON | No Function | Always de-energized to reduce power consumption. |
| POS | Intermediate Position Indication | Active if the actuator passes an intermediate position (open or close direction). |
| GNF | General Fault | General fault detected. Stall Open/Close, over torque/thrust-Open/Close, loss of communication, or loss of command. |
| CMD | Loss of Demand Signal | Active when the demand signal is lost. |
| LFB | Loss of Feedback Signal | Active when the feedback signal is lost. |
| STO | Motor Stalled in Open Direction | Active when the motor fails to move after a valid open command has been sent. |
| STC | Motor Stalled in Closed Direction | Active when the motor fails to move after a valid close command has been sent. |
| OTQ (TH) | Open Torque/Thrust Overload | Active when the opening thrust / torque (at any position) reaches the value set. |
| CTQ (TH) | Close Torque/Thrust Overload | Active when the closing thrust / torque (at any position) reaches the value set. |
| ОТР | Over Temperature | Active when temperature is over limit. |
| СОМ | Loss of Bus Communications | Active when communications signal is lost. |
| LOC | Local Selected | Active when LOCAL control is selected. |
| CLL | Closed Position Limit | Active when the actuator is at Fully Closed position. |
| OPL | Open Position Limit | Active when the actuator is at the Fully Open position. |
| ESD | Emergency Shutdown Active | Active when an ESD signal is present. |
| CRF | Critical Fault | Critical fault detected - Actuator disabled. Loss of feedback, EEPROM fault |
| DIT | Dither | Active if the output exceeds 2,000 position changes > 1% per hour. Output dither. |
| LOP | Loss of Power | Active when the actuator loses power. |
| CHG | Charge Mode | Active when the actuator is charging. |
| UPS | UPS Error | Active when an internal fault is detected in the Reserve Power Pack. |
| DIG | Energised by Bus Command | Relay activated by a command from a communications option card. |
| MNR | Monitor Relay Active (Not Available) | The actuator is not available for remote operation. |
| | | Active when the CMA is NOT available for remote control - control parameter or knob set to LOCAL or LOCAL STOP. Or when set to REMOTE, a fault is present that would prevent remote operation. |

Standard relay contacts

Each switch is SPDT and can be wired Normally Open (NO) or Normally Closed (NC).

RIRO relay contacts

Each switch is an SPDT (Single Pole Double Throw) type. Contact form can be set to NO (Normally Open) or NC (Normally Closed).

All control and indication functions can be set-up using the internal pushbutton interface. Menus are shown in the CMA range installation and maintenance instructions, PUB094-009 or CML-1500/3000 Installation and maintenance instructions, PUB094-019.

Contact ratings

Each relay contact can have up to 150 VAC applied to the terminals. For DC the maximum voltage is 125 VDC.

Limited to 5 A max and 60 W for inductive loads, 150 W for resistive loads.

NOTE: Maximum total combined current through all 4 RIRO relays must not exceed 8 A.

Standard wiring diagrams

Wiring diagram M00-00 CPT (+VE) · (-)COMMAND INPUT Analogue feedback output OUTPUT (-VE)-Standard position feedback is achieved by measuring the loop powered 4 to 20 mA signal. Being loop powered the supply must 666600 0 Analogue control input Standard control is achieved be fed from an external source. MAIN by using a loop powered 4 to 20 mA input signal. PCB RELAY I OPEN LIMIT (DEFAULT) 0 Indication contact NETWORK Each switch is SPDT and can COMMUNICATIONS SKIO be wired Normally Open (NO) 0 O or Normally Closed (NC). RELAY 2 CLOSE LIMIT (DEFAULT) SK8 SK7 кл NOTON INTERNA -0 Actuator power supply POWER BUS М -0 SKI ROTARY POSITION Power supply can be either SENSOR INTERNAL GROUND CONNECTION AC single phase or DC. SK4 INEAR AND QUARTER JRN POSITION SENSO Γ POWER SUPPLY Γ Switch position BOARD В Input voltage L1 L2 SW1 SW2 SW2 100 VAC С Neutra А Line 115 VAC Line Neutral A D SWITCHES CONFIGURED 208 VAC В С Line Neutra OR 230VAC OPERATION 230 VAC Line Neutral В D

Wiring diagram M32-00



Indication contact Each switch is SPDT and can be wired Normally Open (NO) or Normally Closed (NC).

Analogue feedback output Standard position feedback is achieved by measuring the loop powered 4-20 mA signal. Being loop powered the supply must be fed from an external source.

Analogue control input Standard control is achieved by using a loop powered 4-20 mA input signal.

Actuator power supply Power supply can be either AC single-phase or DC.

HART®

HART (Highway Addressable Remote Transducer) is a process control communication protocol based upon the Bell 202 telephone communication standard and uses the FSK (Frequency Shift Keying) principle. The signal consists of two parts, the analogue 4-20 mA current loop and a superimposed digital variable frequency signal.

Traditionally the 4-20 mA loop is used for control and the superimposed digital signal for feedback, diagnostics and configuration. Configuration and feedback using the HART digital signal can be achieved using the host connected to the actuator to select the parameters required. The majority of the user configurable settings can be made over the HART communication protocol.

- Up to 63 devices on each network
- Electronic Device Description (DD) files
- HART 7 compatible

Pakscan™

The Rotork *Pakscan* system is a world leader in flow control automation. First launched in 1986, *Pakscan* has been at the forefront of network technology since its inception, helping to control over 100,000 actuators worldwide.

Pakscan network systems offer the customer unrivalled control, reliability and support. This is backed-up by a worldwide service and support network to help keep your plant running 24 hours a day, 7 days a week.

The *Pakscan* system provides the vital link between valve actuators and supervisory control. It is an intelligent, reliable, high integrity, fast and easy to install network between field equipment and the control room, designed specifically for use with Rotork products.

RIRO

For discrete hard-wired control, the optional RIRO (Remote In Remote Out) can be fitted. The option allows the user to hardwire a discrete digital control (24 VDC nominal or 120 VAC nominal) for open and close operation. The option also allows up to four extra relay contacts to be available for various functions.

Digital control and relay contacts can be configured through the CMA Human Machine Interface (HMI).

See standard control function table on Page 3 and standard control relay functions table on Page 4.

DeviceNet®

Rotork's DeviceNet module electronic data sheet description file is used to set up the actuator parameters to allow the systems performance to be optimised. The Rotork module has been certified by the Open DeviceNet Vendor Association.









Modbus[®] single channel

Modbus remains the most popular process communication protocol in use today with the widest acceptance and highest number of applied systems of any automation protocol. Rotork's Modbus interface card allows actuators to be connected to a 2-wire RS485 network for direct communication to a PLC or DCS using Modbus RTU protocol.

The resulting network is able to monitor and control the connected actuator, the Modbus protocol is so simple the system engineer has full control over the data flow on the highway, the information to be collected and controls implemented. There are no complications with device description files or special programming tools required when setting up a Modbus system.

- RS485 2-wire RTU communication
- International open standard
- Single channel
- Integral repeater modules included where necessary
- Up to 115 kbps

Foundation Fieldbus®

Foundation Fieldbus has become widely accepted for use in process control systems. It's primary feature is the ability to distribute control away from the central DCS. The Rotork Foundation Fieldbus interface card connects directly onto the standard Foundation H1 bus system. The function blocks embedded in the module cover the control and monitoring of the valve and actuator.

Using the certified Device Description files the FF card is simple and easy to use. The ability to report extensive actuator feedback within a single input block as well as system diagnostic information makes Rotork the first choice for use with a Foundation Fieldbus system.

- Foundation ITK inter-operability certified
- Fully compliant with IEC61158-2 standard
- Includes Link Master and LAS capability
- Independent HIST approval by major DCS vendors
- Full H1 field capability

Profibus[®] single channel

Profibus is a leading international network protocol for high speed data communications in industrial automation and control. The Rotork Profibus DP interface card provides comprehensive control and feedback data about the valve and actuator using DP-V0 cyclic communications whilst extended actuator diagnostics and configuration is included in the DP-V1 acyclic data supported by this module.

EDD and DTM files allow the Rotork device to be incorporated into asset management systems giving access to performance critical parameters, whilst the independently certified GSD file guarantees device interoperability. Rotork provides an optional switch disconnect module allowing for ease of installation and multiple configuration options within the GSD file to enable a choice of data collection.

- RS485 Profibus DP V0 and V1 compliant
- Single channel
- Fully meets IEC61158-3 standard
- Profibus PNO certified
- Supports speeds up to 1.5 Mbit/s









www.rotork.com

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

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