

rotork®

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

CMA – in control

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:

	M	0	0	-	0	0
CMA actuator	M					
Voltage	0 - AC 1 - 24 VDC 3 - AC (CML-1500/3000) 4 - 24 VDC (CML-1500/3000)					
Local control	0 - None 2 - Local controls					
Option 1	0 - Basic 4 - 20 mA position control/feedback 1 - Internally powered 4 - 20 mA CPT 2 - Torque indication (CTT) 3 - Internally powered 0 - 10 VDC CPT D - 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 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 Hardware: This switches control between primary (analogue: default) and Hardware control. When Hardware is selected, the RIRO inputs are active (say from a control panel). On deselection of the Hardware, 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
	mA	2	8	-
AC 50/60 Hz	110 V nom	40	80	160
	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.
OTP	Over Temperature	Active when temperature is over limit.
COM	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

Analogue feedback output

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

Indication contact

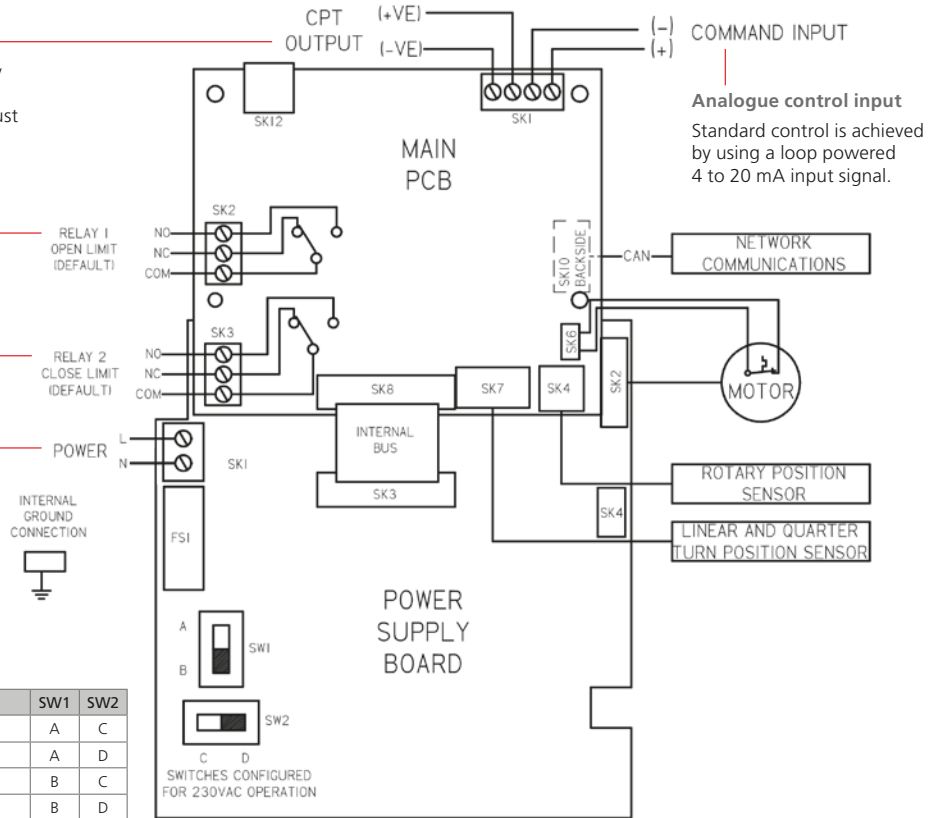
Each switch is SPDT and can be wired Normally Open (NO) or Normally Closed (NC).

Actuator power supply

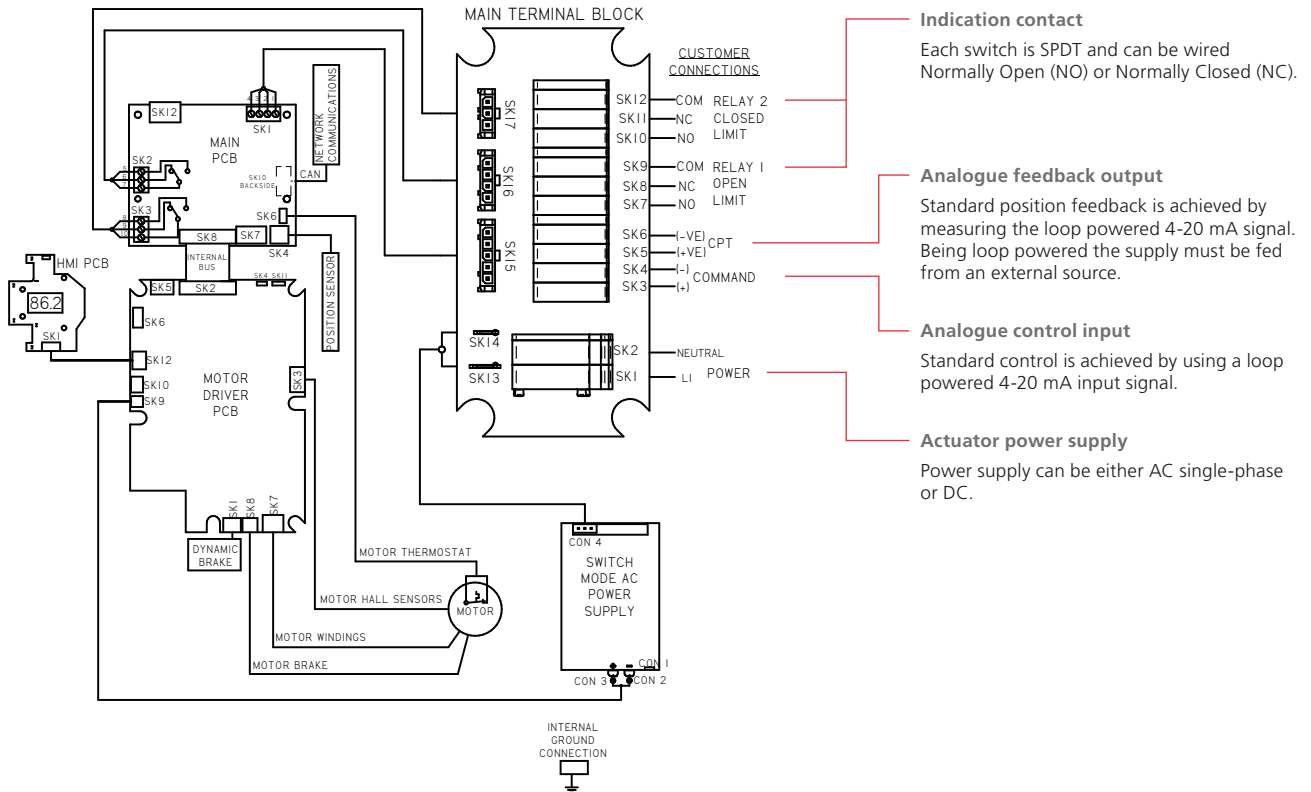
Power supply can be either AC single phase or DC.

Switch position

Input voltage	L1	L2	SW1	SW2
100 VAC	Line	Neutral	A	C
115 VAC	Line	Neutral	A	D
208 VAC	Line	Neutral	B	C
230 VAC	Line	Neutral	B	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.

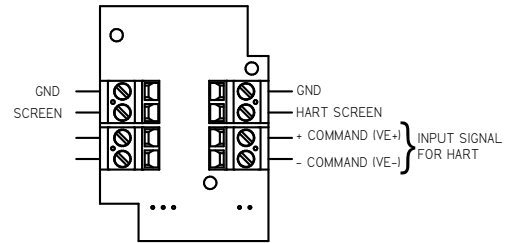
Control and feedback option wiring

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

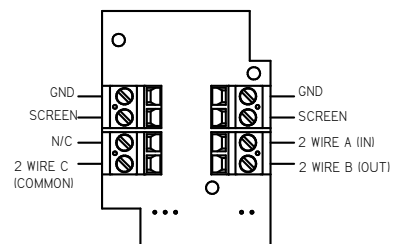


Pakscan™

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.

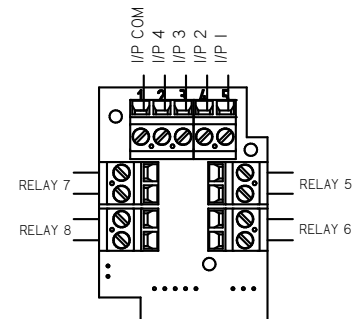


RIRO

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.

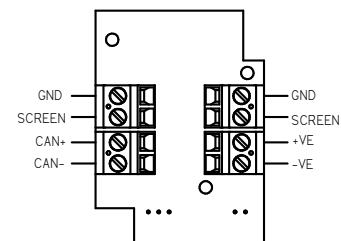
Digital control and relay contacts can be configured through the CMA Human Machine Interface (HMI).

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.



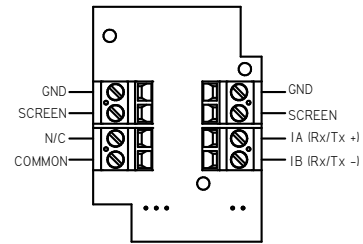
Control and feedback option wiring

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

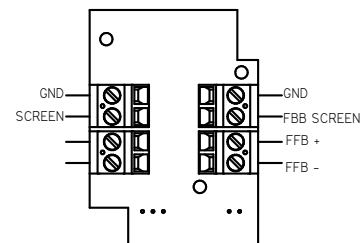


Foundation Fieldbus®

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

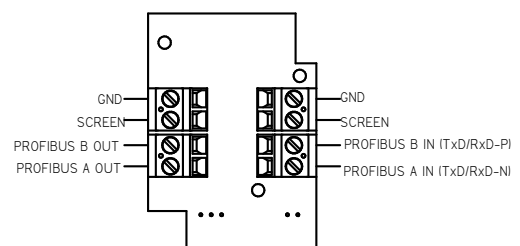


Profibus® single channel

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



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

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