rotork®
Controls

CK Range

Multi-turn • Part-turn • Control Systems
Modular Design Electric Valve Actuators

CK range

Keeping the World Flowing

rotork®

Keeping the World Flowing

RELIABILITY IN FLOW CONTROL CRITICAL APPLICATIONS

Reliable operation
when it matters

Assured reliability for critical applications and environments.

Whether used 24/7 or infrequently, Rotork products will operate reliably and efficiently when called upon.

Quality-driven
global manufacturing

Products designed with 60 years of industry and application knowledge.

Research and development across all our facilities ensures cutting edge products are available for every application.

Customer-focused service
worldwide support

Solving customer challenges and developing new solutions.

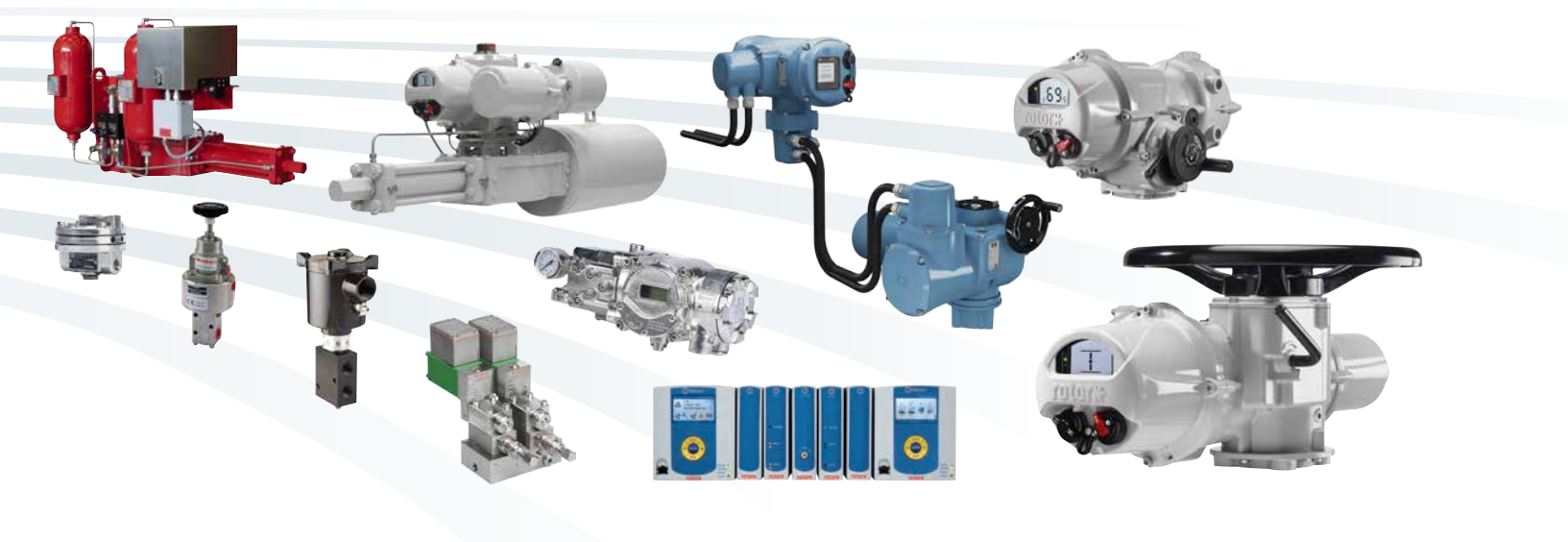
From initial enquiry through to product installation, long-term after-sales care and Client Support Programmes (CSP).

Low cost
of ownership

Long-term reliability prolongs service life.

Rotork helps to reduce long term cost of ownership and provides greater efficiency to process and plant.

CK Range



Comprehensive product range
serving multiple industries

Improved efficiency, assured safety and environmental protection.

Rotork products and services are used throughout industry inclusive of Power, Oil & Gas, Water & Wastewater, HVAC, Marine, Mining, Pulp & Paper, Food & Beverage, Pharmaceutical and Chemical industries around the world.

Market leader
technical innovator

The recognised market leader for 60 years.

Our customers have relied upon Rotork for innovative solutions to safely manage the flow of liquids, gases and powders.

Global presence
local service

Global company with local support.

Manufacturing sites, service centres, sales offices and *Centres of Excellence* throughout the world provide unrivalled customer services and fast delivery.

Corporate social
responsibility

A responsible business leads to being the best business.

We are socially, ethically, environmentally responsible and committed to embedding CSR across all our processes and ways of working.

Modular design providing **flexibility and configurability** to suit your application

- **Suitable for high temperature and strong vibration environments** using separately mounted controls
- **Oil bath lubrication** for extended life and mounting in any orientation
- **IP68 8m for 96 hours –** double-sealing as standard
- **Increased protection** by using independent torque and position sensing
- **Rapid and secure commissioning & configuration** using local controls or setting tool
- **Fast and efficient maintenance and commissioning** due to plug and socket connections
- **Safe motor-independent handwheel operation** available at all times
- **Data extraction** for analysis, diagnostics and asset management
- **Local operation, configuration and commissioning** up to 100 m from actuator, with remotely mounted Centronik module
- Backed by **Rotork Global Support**

The CK actuator range has been designed to meet the needs of diverse actuation applications required by the valve industry and its customers. The modular design concept enables quick product configuration from stock to customer specification with a very short lead time.

The CK range provides the customer with a range of options to suit all of their actuation requirements.

CK actuators are designed for minimum user interaction. Their primary goal is to provide safe and reliable actuation in harsh environments.

The modular product range includes simple, robust actuators (CK) suited to harsh environments, actuators with remote starters (CK plus separate Centronik module), through to intelligent actuators (CKc) with integrated starters for applications that require enhanced actuator status, feedback and control.

CK range

CK Range – Introduction

CK	Standard isolating duty
CKR	Standard regulating / modulating duty
CKC	Centronik isolating duty
CKRC	Centronik regulating / modulating duty

CK multi-turn and part-turn modular actuators for diverse applications

- CK is the solution for users with centralised motor control centres or high temperature and/or sustained vibration applications
- Mechanical or digital switch mechanism* options available
- All major components of CK Range actuators are modular
- Modular construction facilitates:
  - Fast order turnaround and quick delivery
  - Off-the-shelf solution for spares and upgrading
  - Interchangeable motors for different speeds
  - Controls package upgrades
  - Indication output changes
- Hollow output drive to accept rising valve stems
- Plug and socket electrical connection for easier field wiring
- Detachable thrust and non-thrust base options
- Standard B1 coupling with B3 and B4 available
- Secure padlockable manual handwheel drive, fully independent of the motor drive train
- Low speed clutch operable at all times, providing a manual override even when the motor is running
- Torque protection and position limits – independent torque and position limit control for each direction of travel
- Continuous mechanical valve position indication even without power
- Watertight - IP68 (8 m / 96 hrs), NEMA 4 & 6 rating as standard providing enhanced environmental protection

CK range performance data

- Direct output torque range:
  10 - 500 Nm (7 - 369 lbf.ft)
- Max. torque with multi-turn gearbox:
  10,800 Nm (8,000 lbf.ft)
- Max. torque with quarter-turn gearbox:
  205,600 Nm (151,600 lbf.ft)

CKC Centronik isolating and CKRC modulating duty actuators

- Centronik module can by close coupled or remote mounted up to 100m from actuator
- CK Centronik provides intelligent integral controls for integration with all types of site control systems
- Remotely mounted Centronik module option facilitates use in harsh environments or restricted space installations
- Microprocessor based controls for functionally sophisticated applications and/or for integration of actuators into fieldbus systems
- Non-intrusive setting of Centronik module via local control knobs, infrared or optional *Bluetooth*® wireless communication
- Multilingual user interface
- Fully configurable LCD display
- Optional analogue control input and Current Position Transmitter (CPT) 0-20 and 4-20 mA
- Optional Current Torque Transmitter (CTT) 0-20 and 4-20 mA for digital switch mechanism only
- Constant valve position monitoring with DSM module even during power loss
- Network bus connectivity
- Datalogging and analysis with Insight 2 software
- Isolating duty Class A & B and modulating duty Class C

* Digital Switch Mechanism (DSM) only with CKC and CKRC actuators

Components of the modular CK actuator design

1 Centronik module

2 Multilingual display and non-intrusive local controls

3 Optional control boards

4 Plug and Socket connection

5 Double-sealing water and dust ingress protection

6 Interchangeable motor module

7 Manual handwheel

8 Mechanical switch mechanism

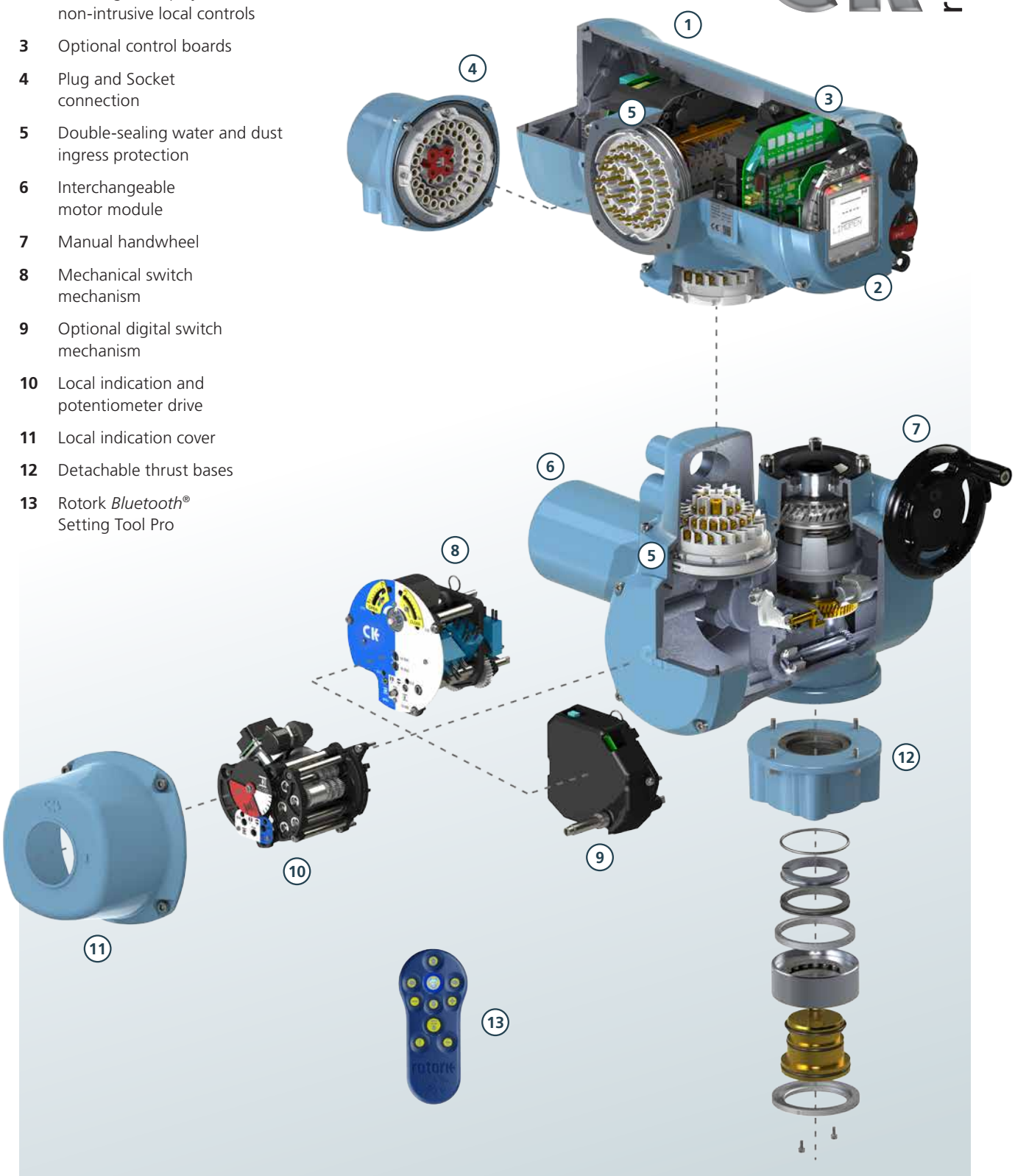
9 Optional digital switch mechanism

10 Local indication and potentiometer drive

11 Local indication cover

12 Detachable thrust bases

13 Rotork *Bluetooth*® Setting Tool Pro



CK Standard Range

Multi-turn CK actuator

The Rotork CK and CKR actuators are the simplest models in the CK range. They are designed for use with external controls and motor switchgear. CK actuators comprise the following components:

- Motor, drive train and independently declutchable manual override handwheel for hand operation including padlock able hand/auto lever
- Standard valve flange mounting including removable drive nut for machining to match the valve stem
- Electric plug and socket connection for power and control wiring
- Drive train permanently immersed in an oil bath to ensure maximum efficiency and avoid the damaging tunneling affects associated with grease filled actuators.

To operate a CK or CKR, external controls with motor switchgear must be wired to the applicable actuator terminals. The wiring diagram and terminal plan will detail electrical connection requirements for operation.

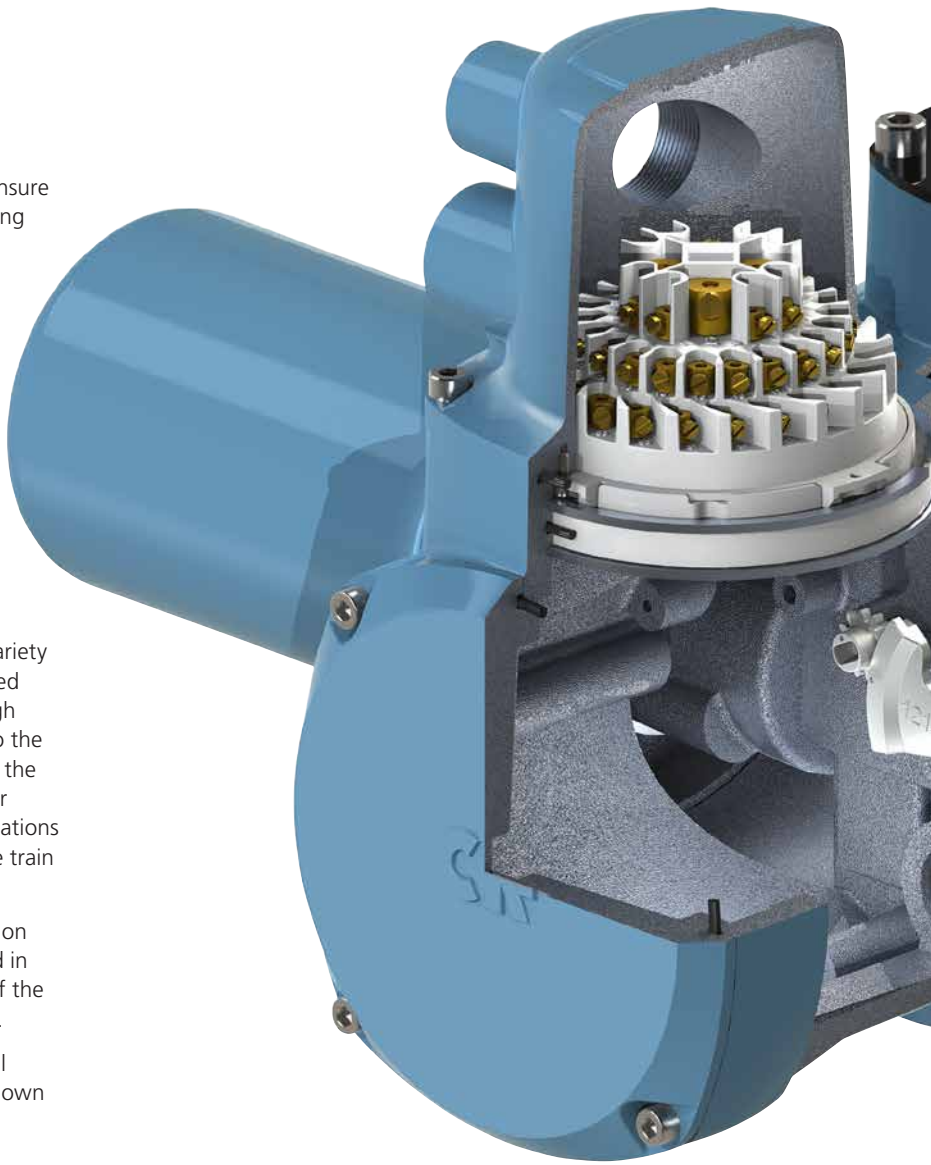
A CK or CKR actuator can be upgraded with a Centronik control module to provide a ready-to-operate actuation solution with integral controls and motor switchgear.

Motor

To meet the specific torque characteristics of the wide variety of applications in our global market, Rotork has developed a full range of 3-phase and single-phase motors with high starting torque. Special features have been designed into the drive train to ensure uninterrupted operation even when the valve or damper torque demand increases due to wear or requirement for maintenance. For isolating service applications this includes a hammer blow mechanism within the drive train to provide an impact force on motor start.

To avoid damage to the actuator motor, thermal protection is included as standard using a thermo switch embedded in the motor windings. This will inhibit actuator operation if the ambient temperature of the motor exceeds specification.

Should the motor require replacement, quick fit electrical connections and mechanical fittings reduce the service down time required.



Actuator switch mechanism

The purpose of the actuator switch mechanism is to sense valve position and torque so the actuator controls can control the motor. Depending on the application, it will seat at the ends of travel either on torque or position. Therefore it is also vital that end travel torque and position limits are adjustable to suit the particular application requirements. Depending on the customer specification, the CK range actuator will be supplied with either a mechanical switch mechanism or a digital switch mechanism.

Mechanical Switch Mechanism (MSM)

Instantaneous position and torque are sensed mechanically and IP67 rated micro switches provide end of travel indication as well as torque trip indication. The end of travel torque trip and position limits for both directions require mechanical setup.

An optional module can be added to provide intermediate travel switches and potentiometer to drive a continuous remote analogue signal for position feedback to the plant control room or DCS.

Digital Switch Mechanism (DSM) – CKc / CKRC only

The DSM, connected to the Rotork Centronik module, enables the user to perform non-intrusive configuration of the actuator limit positions and torque trip levels.

Through the use of a multiple geared absolute encoder, Centronik equipped CK actuators can measure absolute position with built in redundancy and self-checking. Torque sensing is also achieved through a separate sensor, integral to the digital switch mechanism and provides accurate torque measurement up to rated torque.

Position and torque information is processed within the Centronik module for full operational control of the valve or damper. Actuator status information is continuously monitored and recorded digitally in the actuator datalogger.

CK range

CKc Centronik Range

Centronik

The close coupled or remote mounted Centronik control module comprises of intelligent electronic controls with a visual user interface for setting configuration. When the Centronik is fitted in combination with the digital switch mechanism, all position and torque settings can be adjusted non-intrusively via the display screen with a Rotork setting tool. If the optional *Bluetooth* wireless module is included in the Centronik then configuration can be performed wirelessly with the Rotork Setting Tool or through Insight 2 PC software.

Centronik actuators (CKc and CKRC) perfectly suit site locations where complex system integration is required. When applicable, actuator configuration can be performed over the network interface. The communication options also support site asset management attributes for detailed identification and logging purposes.

Remotely mounted electronics

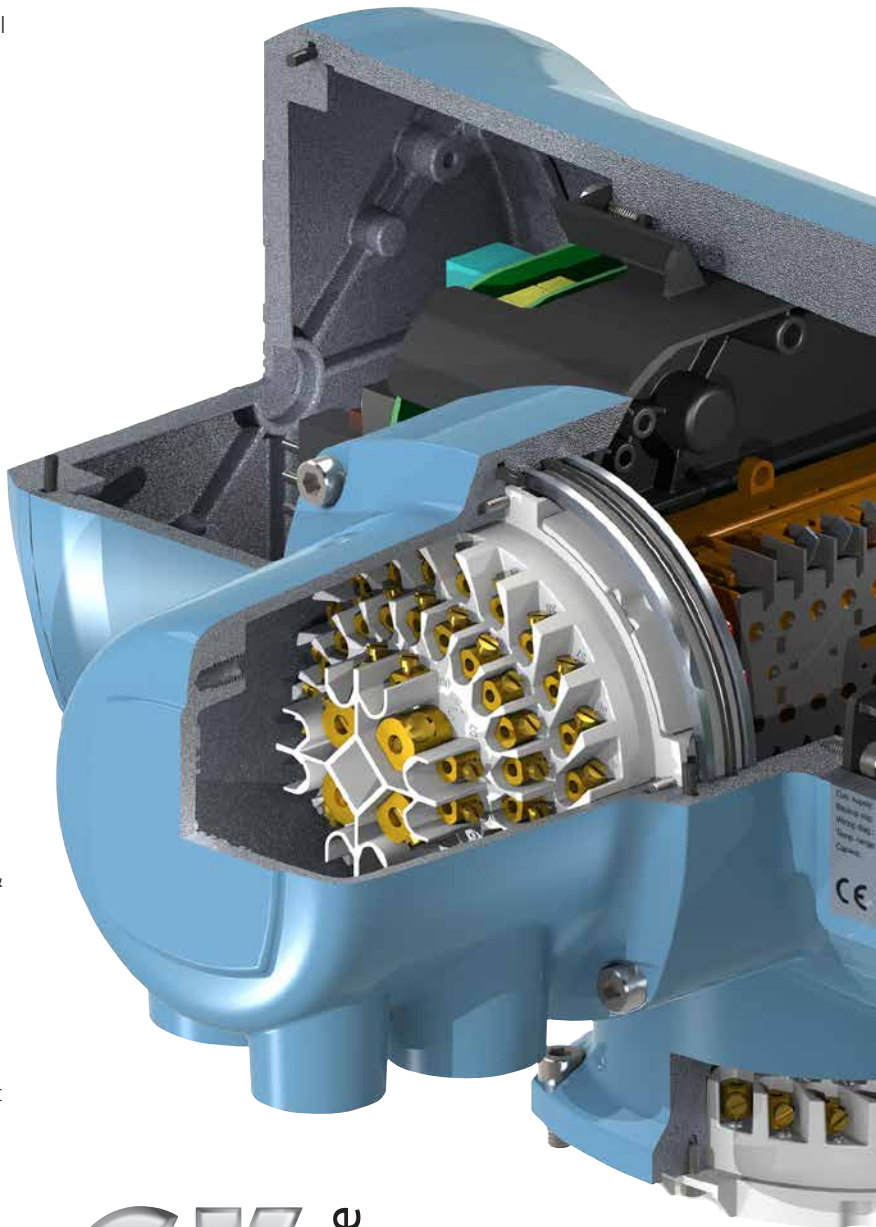
Rotork provide an option to remotely mount the Centronik module of a CKc or CKRC actuator for applications where high ambient temperatures or excessive levels of vibration are present at the valve or damper location. A cable length of up to 100 metres also enables sufficient access to Centronik equipped actuators where the valve or damper location is restricted by site space constraints.

Integral controls

Actuators equipped with the Centronik module (CKc or CKRC) are offered as a ready-to-operate actuation solution. The motor switch gear, power supply components and integral control logic interface allow a unit to be operated with the local controls when applying only an adequate power supply. Remote operation can be achieved using appropriate commands to the pre-defined terminals. Electrical mating between the Centronik module and CK actuator uses a plug & socket connection matching the terminal housing connector.

Motor switchgear

For CKc units, the motor switching is controlled with a reversing contactor. This enables integrated directional control for isolating duty applications. For modulating duty applications that require a higher duty cycle we offer the CKRC actuator with an integral solid state starter. Please contact Rotork to determine which option best suits your application.



CK range

Electrical plug & socket connection

The Rotork plug & socket connection utilises a uniform fitment between electrical modules. This maintains the terminal pin allocations for the various actuator functions.

A plug & socket connection is used between a CK (or CKr) and the terminal housing to provide a quick disconnect method for maintenance work. This solution also prevents the field wiring connections being disturbed.

For Centronik actuators, a plug & socket connection is also used between the CK (or CKr) and Centronik control module. This enables quick removal and connection of the actuator controls during maintenance periods. The terminal housing plugs into the Centronik pack in the same manner as a CK or CKr actuator.

Diagnostics

The intelligent Centronik module has the ability to log specific data sets that are particularly relevant to actuator operation. Attributes such as actuator build and serial number are stored as static information; while active attributes such as Open/Close operations, Open/Close limit switch trips, Open/Close torque trips, motor starts and number of actuator power cycles are collected over the lifetime of the actuator. These provide a log of actuator activity that can be used for process analysis and preventative maintenance scheduling.

Auto Limit Setting

In certain applications it is useful to have an automatic limit setting function. This uses hard stops in the valve to sense the correct position limits. CK actuators equipped with the digital switch mechanism are able to perform an automatic setting process that spans the complete valve stroke. Movement continues in both directions in turn until 40% torque is measured. Once the operation is complete in both directions, the positions limits are calibrated at the measured end of travel points and the actuator is commissioned with the valve.

Bluetooth®

CKc Centronik Range

Operating control mode

The Open/Close and Local/Stop/Remote selectors are magnetically coupled to the designated switches with no physical penetration through the control cover. This further enhances the environmental protection of the CK actuator range. The Local/Stop/Remote selector knob defines the current actuator operating mode and is lockable in any position.

Local will provide operation via the open/close selector knob and allow configuration changes. Stop will prevent all actuator operation unless an ESD command is set to override a local stop condition. Remote will prevent any local operation of the actuator or modification of the setting configuration; operation is only viable through the hardwired digital inputs, analogue control source or network option card.

Valve and damper position indication

In addition to the local indication LEDs, the graphical display will show the current position in large seven segment characters. If a mechanical switch mechanism is fitted then it must be equipped with the optional potentiometer to report position to the Centronik module.

Control commands

Operating control commands such as intermediate analogue position and digital open/close signals can be displayed locally on the actuator to ensure correct communication with the DCS.

Automatic self-test diagnostics

Actuator conditions are monitored throughout operation to ensure reliable actuation. Should an alarm condition occur, the graphical display will provide an alarm status description on screen that will offer the site operator a start point to continue fault finding. Alarm conditions can also be separated into the NAMUR categories to suit system integration.

Main settings menu

The main menu provides the user with an intuitive logical structure for all actuator configuration settings.

Non-intrusive configuration

Provided the unit is fitted with a digital switch mechanism, the end of travel position limits and torque trip limits can be set via the Centronik user interface display and local open/close selector.

The Rotork Setting Tool will enable setting modification using infrared or *Bluetooth* wireless communication. For units fitted with the mechanical switch mechanism, position and torque limits require manual calibration.

Remotely mounted starters

Rotork provide an option to remotely mount the Centronik module of a CKc or CKrc actuator for applications where high ambient temperatures or excessive levels of vibration are present at the valve location. A cable length of up to 100 metres (328 ft) also enables sufficient access to Centronik equipped actuators where the valve location is restricted by site space constraints.

CKc Centronik Range

Modern actuators can be adapted to a wide variety of special applications. Monitoring and diagnostic functions generate signals and collect operating feedback data.

For actuators with the optional Centronik module, accessing detailed operating data is performed via the clearly structured and intuitive multilingual user interface. Functionality of the Centronik module will vary depending on additional option cards fitted (for network and analogue systems) and the type of actuator switch mechanism fitted.

The mechanical switch mechanism will only report actuator movement, position limit and torque limit information. If an optional potentiometer drive is fitted, intermediate position feedback can be communicated to the Centronik display. Configuration of the actuator limits will require manual setup.

The digital switch mechanism can report all position and torque information to the Centronik module for data logging and operator feedback. Configuration of actuator limits can be performed through the non-intrusive display interface with a Rotork Setting Tool or via Insight 2 PC software package if the optional *Bluetooth* wireless module is fitted.

Password protection

The Centronik module incorporates a password protection system to prevent unauthorised access to actuator setting modification. This is an important part of maintaining the operating site's security integrity.

Bluetooth® wireless security

For Centronik modules that include optional *Bluetooth* wireless technology, communication is performed via secure infrared initiation with the Rotork Setting Tool or through a *Bluetooth* wireless enabled PC running Insight 2 PC software. Every CKc or CKrc is immune to connection by non-Rotork devices or programmes and a valid password entry is required to edit any actuator configuration settings.

Backlit display

The multilingual user interface display on the Centronik module shows text and numerical figures relevant to actuator operation. Graphical symbols are also visible for appropriate functions. The display backlight is designed to provide good visibility in direct sunlight or challenging weather conditions.

Indication LEDs

The Centronik display incorporates indication LEDs that can show position, torque, alarm status and connection activity. For position feedback; open and closed limit indication is user configurable (red or green) and intermediate position is yellow. It is important that operations and maintenance personnel can safely work around the actuated valve and know its status at all times. Duplicated LEDs facilitate wider viewing angle. Alarm status will trigger a solid red LED at any point of travel. An active *Bluetooth* wireless connection will be indicated as a solid blue LED.

Position display

Non-Intrusive setting

Asset management

Actuator error

CK Range – Control Options

Stopping at the valve limits

Regardless of the actuator duty cycle, the actuator must automatically stop movement at each end of travel to fully shut or open the valve or damper.

Mechanical Switch Mechanism (MSM)

- For position limit seating, pre-set limit switches will disengage the motor supply when the actuator reaches the set position.
- For torque limit seating, pre-set torque switches will disengage the motor supply when the torque delivered by the actuator reaches the set limit.

Digital Switch Mechanism (DSM) – CKc / CKRC only

- For position limit seating, pre-set position values are stored as the travel limits. When the current position value is equal to the set limit value the motor supply will be disengaged.
- For torque limit seating, pre-set torque values are stored as the torque limits. When the required torque of the actuator matches or exceeds the set limit the motor supply will be disengaged.

Operation protection

Torque protection to prevent equipment damage

If the operating torque output of the actuator exceeds the set torque limit during operation, the torque switch will trip, inhibiting movement in that direction. It can then only be operated in the reverse direction to potentially free the obstruction before being allowed to continue in the original direction.

Thermal motor protection

CK actuators include motor insulation to protect against thermal degradation. Isolating duty actuators (CK, CKc) include Class F or greater insulation. Modulating duty actuators (CKR, CKRC) include Class H insulation. All CK actuators include self-resetting thermostatic switches embedded into the motor windings to ensure operating temperatures remain within the designed thermal ratings.

CK Range – Control Options

Actuator controls

Rotork actuators are designed to be integrated within any automation system or application around the world. With the optional Centronik module, CKc range actuators provide an easy solution for integrally controlled actuation that avoids the lengthy process of installing external controls for each actuator on site. The integral control approach to actuation improves the ease of commissioning and integrating actuators into a DCS.

External controls

The term "external controls" refers to the controls associated with standard actuators without integral controls or motor switchgear. Only a few components are housed in the actuator enclosure to provide feedback and connectivity to the external controls.

External controls will commonly be housed in a control cabinet with a controlling system such as a PLC for actuator operation. This external controller provides the logic that oversees control and feedback signals, including motor operation in the open and closed direction, limit switch status, torque switch status, motor protection and intermediate position (if applicable). External motor control switchgear will normally be located in the plant's motor control centre. Care and attention must be paid during the wiring and programming stages to ensure the control system operates the valve or damper in the correct direction. Should additional local control for plant operation use be required, additional hardware must be installed and incorporated into the external controller programming appropriately.

Actuators that require external controls within the Rotork CK range are designated as CK for isolating duty and CKR for modulating duty.

Centronik (CKc)

Actuators that include the integral Centronik control module are designated CKc for isolating duty and CKRC for modulating duty. The addition of the Centronik module to the CK provides intelligent, integral control for use with all site control systems. It permits the use of hardwired, network or analogue control & indication, offering cost-effective implementation with centralised control systems.

Centronik actuators allow the valve maker/integrator the ability to pre-test the motorised valve assembly using local control with no extra wiring or motor control gear required.

Configuring an actuator fitted with Centronik is easy and non-intrusive. A password protected setup menu can be viewed on the Centronik display. Standard navigation through the menu driven configuration screens is carried out using the local open/close selector. Settings can also be adjusted through the use of a Rotork Setting Tool via infrared or optional *Bluetooth* wireless communication. The Centronik display also provides position indication, status and alarms for operation. Centronik includes data logging capabilities showing actuator starts, status and events on screen.

Networks

Modern facilities require seamless control and feedback from the actuator to the control room plus asset management data. Plant managers need operational data in real time. Process operators need full control of their facilities at all times. Maintenance managers need asset management data so that they can plan maintenance outages efficiently. To meet these requirements, digital communication networks allow electric actuators and other field devices to be controlled and monitored by computer. Using a fieldbus network reduces the requirement for extensive site wiring and purpose built hardware.

Rotork actuators are network compatible when you select the CKc or CKRC Centronik option. Field upgrades for CK and CKR actuators allow integration into existing site network systems.

Insight 2 – Analysis and Configuration Software

For actuators with close coupled or remote mounted Centronik control, all settings can be directly performed at the actuator using the local control knobs and Rotork Setting Tool. If the actuator is equipped with the optional *Bluetooth* wireless communication module, settings can be adjusted using a device equipped with Rotork's Insight 2 PC software.

The extensive Insight 2 PC software package can be used on any CKc actuator equipped with *Bluetooth* wireless technology. It enables the operator to view the actuator configuration and data log files for review and modification purposes. If carrying a PC to the actuator in the plant is not desirable then a Rotork Setting Tool can be used to transfer actuator attributes to Insight 2 from any CKc or CKRC actuator.

Rotork Insight 2 PC software

Actuator configurations and data log information can be saved locally on any PC that has Insight 2 PC software installed. This data will ensure replacement modules can be quickly configured with the original actuator settings.

Rotork Insight 2 diagnostics

Insight 2 PC package is the ideal tool to view and save the Centronik data log. This provides site plant operators with useful data to evaluate process characteristics and valve wear trends.

Bluetooth® connection

Connection between the actuator and programming device is based on standard *Bluetooth* wireless communication protocol, supported by most laptops and PDAs. The connection is password protected to exclude any unauthorised access.

The addressed actuator indicates access via a blue indication LED visible on the actuator display. The actuator can be clearly identified on Insight 2 by its unique serial number and user defined *Bluetooth* wireless ID tag.

Insight 2 PC software functions

- Programming the operation settings of CKc or CKRC actuator
- Reading all current configuration settings
- Viewing the data log file of the connected actuator
- Various live actuator operations
- Saving data log and configuration data for future use
- Loading new configuration data into a CKc or CKRC.

Insight 2 PC software and Centronik display languages currently include English and Spanish. Other languages will be available in the near future. Please contact Rotork for more information.

Networks – Communication Interfaces

The CK range is designed to accommodate all system integration requirements. The modular design approach offers various levels of actuator intelligence within the CK range. A CK without integral controls would be suitable for a simple hardwired control system. However the CKc actuator equipped with Centronik controls can connect to all major fieldbus networks for complex autonomous site control.

Ever changing site requirements and actuator functions have been considered with the CK range. CK actuators can always be upgraded to include Centronik controls for improved system capabilities and DCS integration.

Hardwired digital control to the DCS

The Centronik module has the facility to accommodate a number of hardwired inputs and outputs for actuator control and feedback. You will need to refer to the actuator wiring diagram and terminal plan supplied with each actuator for the specific functions and terminal allocations.

Inputs

Standard:

- Six galvanic isolated command inputs. Open, Close, Stop/ Maintain, ESD, Open Interlock and Close Interlock.

Optional:

- Analogue input for positioning. 4-20 mA, 0-5 V, 0-10 V or 0-20 V loop configuration.

Outputs

Standard:

- One galvanic isolated, volt-free change over contact for availability/fault indication.
- Four galvanic isolated, volt-free relay contacts. Configurable function and contact form (N/O or N/C).

Optional:

- Eight additional galvanic isolated, volt-free relay contacts. Configurable function and contact form (N/O or N/C).
- Analogue position output. 0-20 or 4-20 mA loop configuration. Signal inversion possible (Close limit position = low or high signal).
- Analogue torque output. 0-20 or 4-20 mA loop configuration.

All optional equipment can be fitted to accompany or replace standard control and feedback solutions.

Networks – Communication Interfaces

Serial communication

Rotork has developed the Centronik module with consideration to the continuous development of industrial network systems. With a dedicated systems support team, Rotork can engineer new functionality for compatible fieldbus networks that relate specifically to valve actuation.

All fieldbus communication options for the CK range are fully upgradable to suit future firmware releases, which enable extended functionality.

Fieldbus communication can be used independently or in conjunction with digital hardwired control systems depending on the specific application or site requirements.

Pakscan™

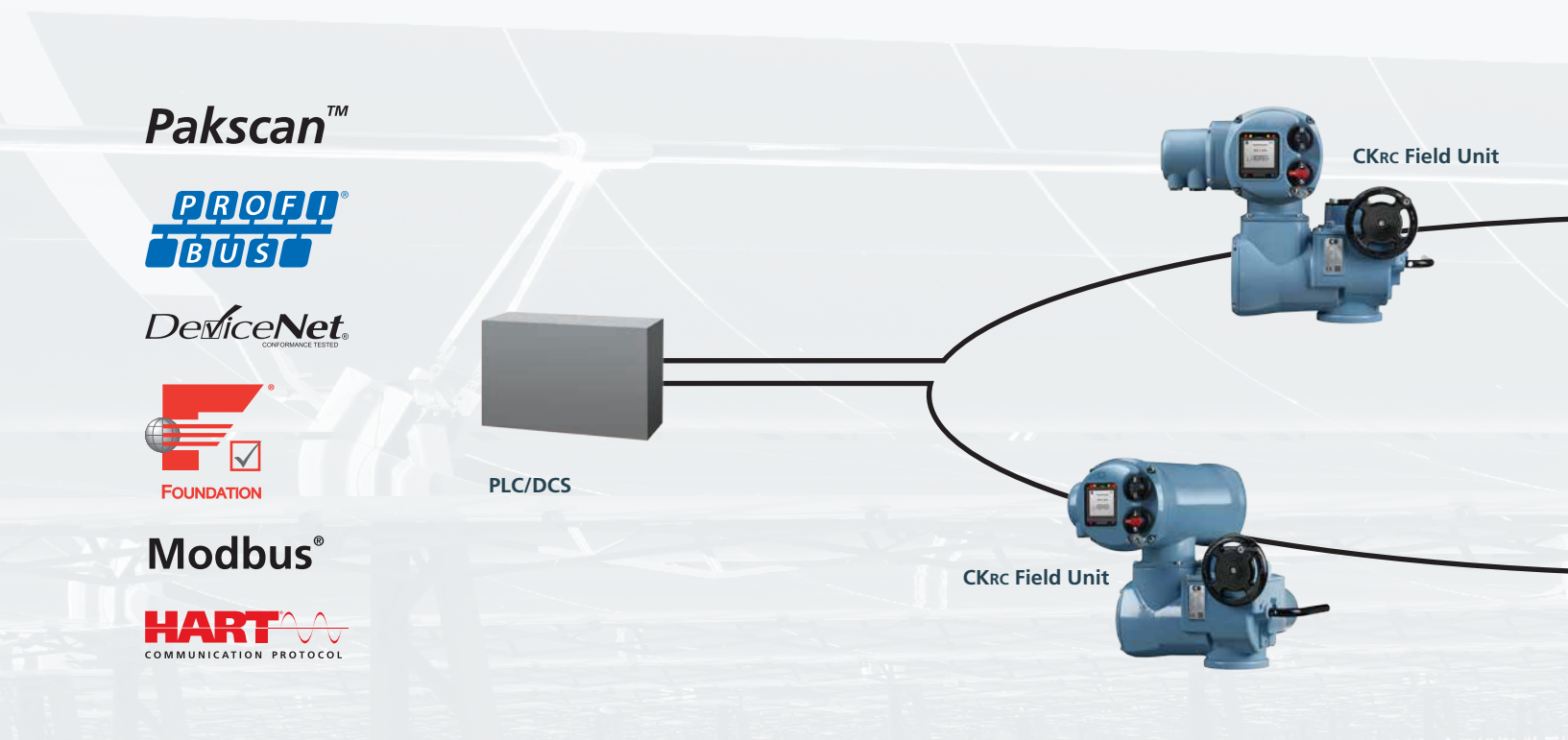
An internally mounted *Pakscan* field unit is available for remote control and status indication over a fault tolerant two wire serial link. System variables programmable over the *Bluetooth* data link. For more information please contact Rotork.

Profibus®

A Profibus DP interface module is available to integrate CKc and CKRC actuators into a Profibus network. Full compatibility with EN 50170 is provided and the Profibus network allows full actuator control and feedback of data to the host. For more information please contact Rotork.

Foundation Fieldbus®

An IEC 61158-2 compliant Foundation interface module allows the actuator to be connected to a Foundation network. The device has link scheduler capability as well as digital and analogue function block capability. Foundation Fieldbus actuators can communicate directly between themselves without the need for a host supervisory system. For more information please contact Rotork.



Networks – Communication Interfaces

Modbus®

Modbus modules suitable for single or dual communication highways may be included in CKc or CKRC actuators and provide Fieldbus communication of all the actuator control functions and feedback data. Data is carried on an RS485 data highway and the communications protocol used is Modbus RTU. System variables such as unit address and data baud rate are programmed over the infrared or *Bluetooth* wireless communication data link. For more information please contact Rotork.

DeviceNet®

DeviceNet is a communications protocol which utilises the CAN bus network. The Centronik DeviceNet® module Electronic Data Sheet (EDS) file is used to set up the actuator parameters and allow system performance to be optimised. Status, alarms and control functions are available over the DeviceNet network. For more information please contact Rotork.

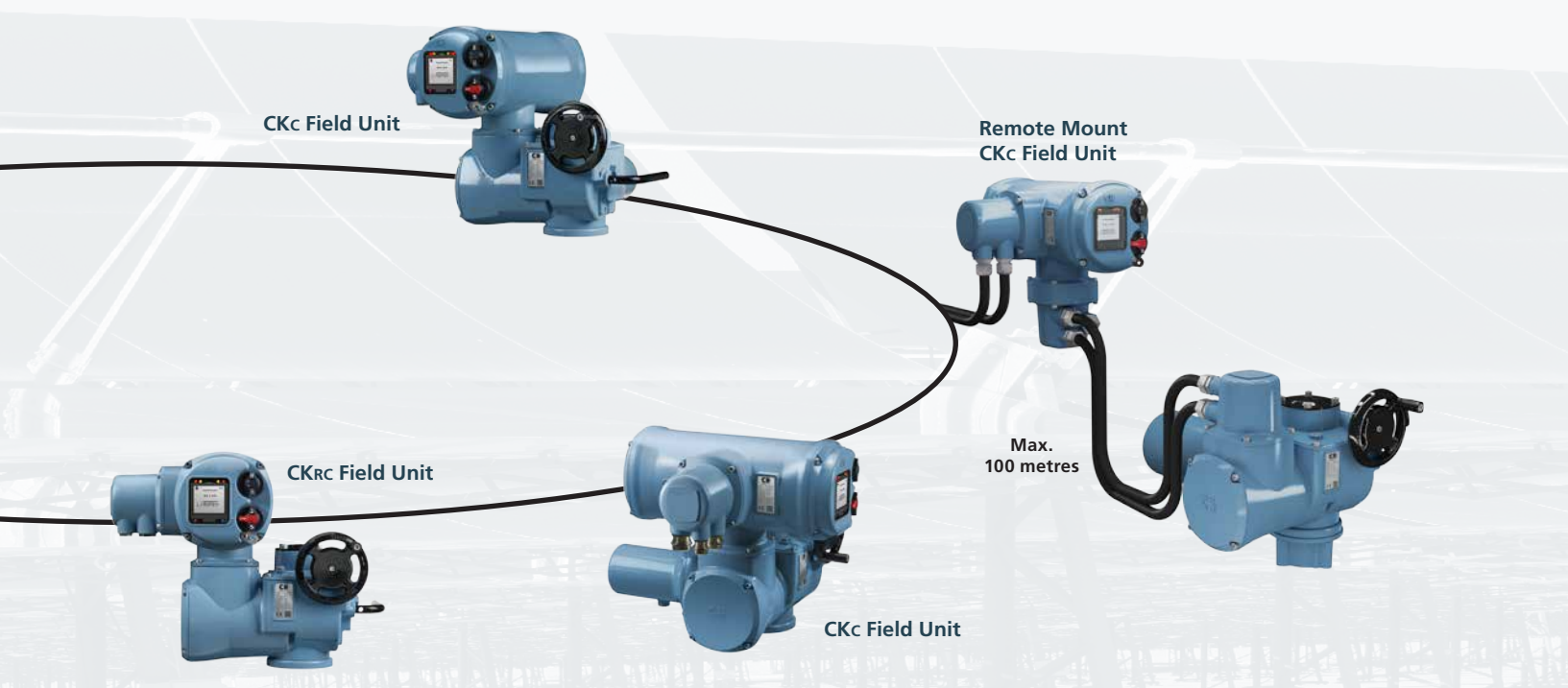
HART®

Highway Addressable Remote Transducer (HART) is a process control communication protocol. The signal consists of two parts, the analogue 4-20 mA current loop and a superimposed digital 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 user configurable settings can be made over the HART communication protocol. For more information please contact Rotork.

Profinet and Modbus TCP

Industrial Ethernet solutions are fast becoming a popular choice for industrial automation. Rotork has developed a solution that allows a Modbus TCP or Profinet connection to CK range actuators.

For more information on these solutions, refer to PUB002-116.



Electrical Connections

Modular electrical connections

The Rotork plug & socket has been designed to work efficiently and effectively within the modular design approach for the CK range. All Rotork plug & socket connections are universal within the CK range and remain uniform between CK and CKc actuator types. For further details on the plug & socket connection type please refer to the actuator terminal plan.

Additional conduit entries

The standard plug and socket housing offers three entries for power and field wiring connections. An optional four entry socket housing offers increased flexibility for more complex system integration. A blank plug and socket housing is also available for bespoke conduit entry thread requirements.

Terminal housing

The terminal housing module for the CK range includes one plug & socket connection with separate power and control field wiring terminals. Three conduit entries are provided to suit various gland/cable size requirements. Please refer to the technical data section of this brochure for further details.

Plug & socket sealing

All plug & socket connections include, as standard, robust double sealed protection. To prevent fluid or dust ingress during maintenance, the IP68 rating is maintained whilst the terminal housing or Centronik module is unmated.

Disconnect module

In place of the standard CK terminal housing, a larger disconnect module can be supplied that ensures network loops remain complete whilst the module is disconnected from the actuator. This ensures continued operation is possible during maintenance activities.

Temporary Environmental Protection

During maintenance activities, the actuator socket may be disconnected from the field wiring plug. An optional parking housing can be supplied that enables the loose plug to be fixed in place to prevent physical or environmental damage (water ingress) to the terminal pins. The parking housing includes fixing points to wall mount the unit and the inclusive parking cover can be used to protect the exposed socket on the actuator during transport.

Double O-ring sealed modular plug and socket connections

Mechanical Connections

Reliable valve interfacing

All Rotork mounting flange dimensions are in compliance with ISO 5210 or MSS SP-102. Please refer to the technical data section of this brochure for further details.

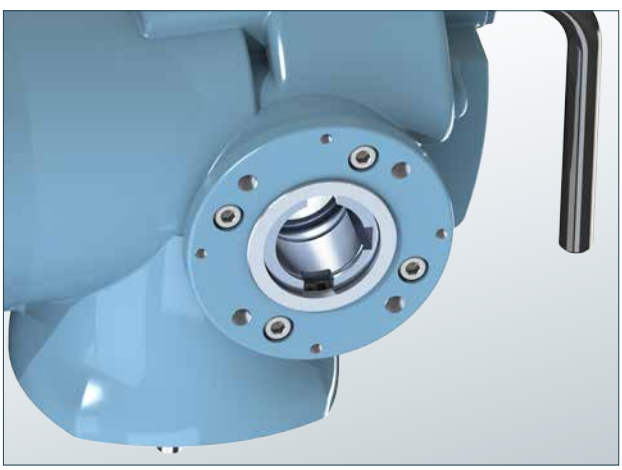
Output drive couplings

All CK range actuators have a **B1** (bore & key) output drive type as standard. **B3** (bore & key) and **B4** (blank) are available through the use of adapter sleeves designed to insert into the standard B1 output.

Thrust bearing coupling

A detachable thrust base can be fitted for thrust bearing applications. The **A** type drive assembly is supplied as a self-contained cartridge assembly, facilitating quick removal and reassembly. Please refer to the technical data section of this brochure for details of maximum axial thrust ratings.

Non-thrust – 'B' type coupling



B1 base view

B1 to B3 adaptor

B1 to B4 adaptor

B1 base view with B3 adaptor

B1 base view with B4 adaptor

Thrust – 'A' type coupling

Thrust base: exploded view

Mechanical Switch Mechanism **(MSM)**

Setting of position and torque limits

After removal of the switch mechanism cover, limit and torque settings are easily accessed and adjusted using a flat pan screwdriver. For units fitted with the local indication cover, the indication mechanism will need to be temporarily detached to access the switch mechanism interface.

Reduction gearing

The Rotork reduction gear module, within the mechanical switch mechanism, can be adjusted to suit the required output turns for full valve travel. The standard reduction gearing can accommodate application requirements of up to 1,500 turns.

Extended range gearing

The standard reduction gear module can be expanded to suit application requirements of up to 15,000 output turns betweenthe OPEN and CLOSE limits.

Blinker contact for movement indication

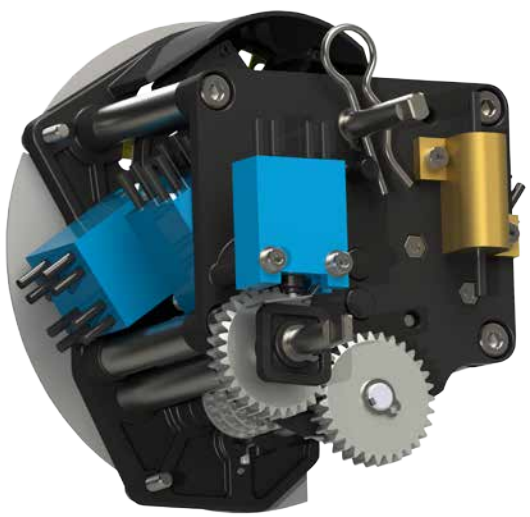
A blinker contact is fitted as standard to the mechanical switch mechanism to provide movement indication throughout valve travel. The blinker contact is separate to other micro switches.

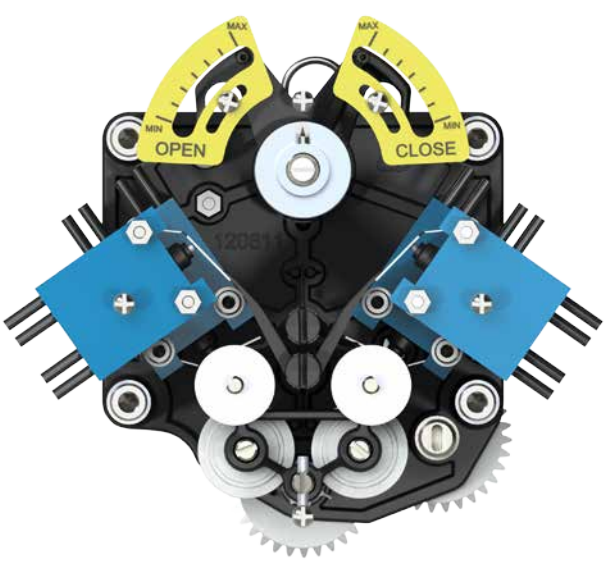
Heater

The resistive heater maintains a stable and humidity free environment for the internal switch mechanism compartment of the CK actuator. This will utilise an independent power supply to ensure the integrity of the switch mechanism is maintained during a mains power loss.

Indication and control switches

Four switches are present as standard, two for end of travel indication and two for torque trips in each direction. An additional two limit switches and two torque switches are available for applications that require dual potential switching. Four extra switches can also be added for intermediate position indication between the OPEN and CLOSE limits.





Digital Switch Mechanism **(DSM)**

The Rotork digital switch mechanism is designed for use with the Rotork Centronik module. This enables the user to perform non-intrusive configuration of the actuator position limits and torque trip limits via the local display.

Absolute encoder

The Rotork absolute encoder is a contactless position and torque sensor using only five moving parts. Through the use of multiple gearing, Rotork has been able to develop a positioning encoder that incorporates redundancy and self-checking. The orientation of the three position spur gears dictates the current actuator position between the set travel limits, up to 8,000 output turns apart. Torque sensing is performed through an integral sensor providing accurate torque measurement up to rated torque.

Datalogging

Position and torque are monitored at all times during actuator operation. Hall effect sensors contained within the gear assembly of the absolute encoder ensure all movements are recorded in the Centronik data log. This can be used for analysis at periodic service intervals or downloaded into the Insight 2 PC software package.

Additional Indication Drive **(AID)**

The optional AID module accompanies a mechanical (MSM) or digital (DSM) switch mechanism to provide additional features that meet various applications requirements.

Mechanical position indication

A configurable position disc is included with every AID module. This provides local mechanically driven actuator position at all times, even during actuator power loss.

Analogue signal output

A potentiometric output or loop powered 4-20 mA position transmitter can be provided within the AID module to provide analogue position at all times, even during actuator power loss. The potentiometer can also be used in combination with a mechanical switch mechanism to provide intermediate position to the Centronik control module.

Intermediate Position Switches

Extra intermediate position switches can be provided within the AID module. These are supplied in pairs and are manually adjustable with a simple spring loaded cam design. The switches will continue to function during actuator power loss conditions.

Flexible Modularity

The major advantage that a modular actuator concept provides is the ease at which site upgrades can be performed.

Remotely mounted starters

Rotork provide an option to remotely mount the Centronik module of a CKc or CKrc actuator for applications where high ambient temperatures or excessive levels of vibration are present at the valve location. A cable length of up to 100 metres (328 ft) also enables sufficient access to Centronik equipped actuators where the valve location is restricted by site space constraints.

Rotork module orientation

The plug & socket terminal housing on every CK actuator can be rotated through 360° at 90° increments to best suit the site field wiring requirements. In addition to this, CKc actuators allow the Centronik module to be rotated at 90° increments at the actuator mating face.

The Centronik user interface cover can be fitted to either end of the module and can be rotated through 360° at 90° increments to provide a wide variety of orientation configurations for the best actuation solution.

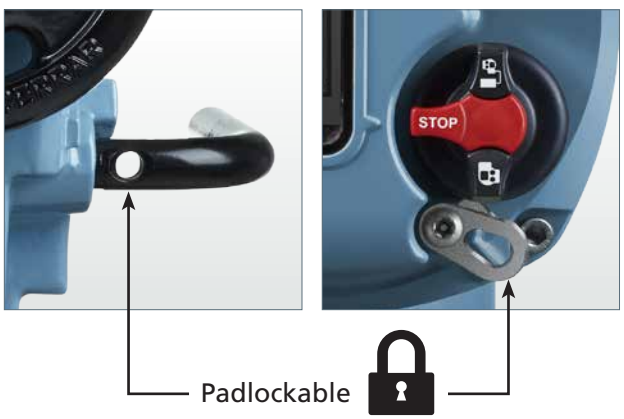
Unauthorised Operation Protection

Hand/Auto lever

The manual operation engagement lever can be padlocked in place, restricting manual operation to authorised personnel only. This will suit a padlock with hasp diameter of 6.5 mm.

Local/Stop/Remote selector switch

To prevent unauthorised changes to the actuator operating mode, a latch can be padlocked in place to maintain local, stop or remote operation. This will suit a padlock with hasp diameter of 6.5 mm.



Valve Protection and Diagnostics

Rotork actuators have been developed with over 60 years of experience in actuation and comply with global safety standards to provide a reliable actuation solution.

Phase rotation correction

All three-phase power supplies for the Centronik range include automatic phase correction to rectify incorrect power cable connection. This is an integral feature to prevent damage to the actuator, improve the ease of commissioning and ensure correct travel direction when receiving operation commands.

Valve overload protection

CK range actuators include torque measurement and independently adjustable torque limiting, for both open and close control. Operation will be inhibited should the torque level measured during travel exceed that set with the torque limit switch for the relevant direction.

Safe manual operation

The handwheel drive is independent of the motor drive and is selected with a lockable manual operation engagement lever acting on a slow speed clutch for safe operation. When the motor runs, the actuator automatically returns to motor drive.

Signal loss failure action

CKc and CKRC actuators have the ability to assign a pre-determined function should a loss of control signal occur. This can be configured for an analogue (mA) control signal or a network communication signal (digital).

Rising valve stem protection

Cover tube adaptions are available for the CK range to suit all applications. Sizes can be specified in 6” increments depending on valve stem travel. Rotork cover tubes are fully sealed to prevent operator access to a moving stem and provide environmental protection to the valve stem.

Remote operation interlocks

Separate interlock signals can be configured so that a signal must be applied to the relevant interlock and control input in order for remote operation to occur.

Centronik security

Configuration via the Centronik module on CKc and CKRC actuators will require a valid password to be entered prior to changing any of the actuator settings.

Secure *Bluetooth*® wireless connection

For Centronik controlled actuators with optional *Bluetooth* wireless module, configuration can be performed using a Rotork Setting Tool or Insight 2 PC Software. Both methods require a valid password to be entered to establish a full connection and every Centronik control module is immune to connection by non-Rotork devices or programmes.

In order for a site to maintain low cost operation, it is important that operators can monitor each actuator performance and schedule preventive maintenance to maximise up-time. Rotork customers expect CK range actuators to realise three main features: extended service intervals, long service life and reliable operation. All of these attributes aid the customer to achieve a minimal cost of operation.

Development of CK multi-turn actuators and Centronik control modules has resulted in special attention to self-monitoring and diagnostic abilities. This enables site operators to schedule adequate maintenance schemes to maximise plant operation times.

Self-monitoring

Centronik equipped actuators have automatic self-test and diagnosis functions that indicate to the user if any fault state becomes active during operation. This status is visible via the local Centronik display and remotely through a DCS. If the optional *Bluetooth* wireless module is fitted within the Centronik controls, settings can also be edited through Rotork Insight 2 PC software.

Detailed diagnostics

Fault conditions and alarm statuses can be classified into the four NAMUR categories for remote diagnosis. When an alarm condition becomes active, a maintenance engineer will attend the actuator where detailed status information is provided via the user interface or through Insight 2 PC software. The extra diagnosis information will help to identify the issue and initiate an appropriate rectification action.

Actuator operating attributes

All major actuator operation attributes are monitored and recorded within the on board Centronik datalogger. Data for significant attributes such as operating starts, stroke torque and device temperature is collected throughout the lifetime of the actuator.

Event reporting

The Centronik control module can record information regarding warning alarms, failure conditions, operation periods, setting modifications and control command inputs in an event report. This can be used to assess a preventive maintenance scheme to maintain absolute actuator reliability.

CK range

Technical Data

The following pages contain details on performance and specification for the Rotork CK Range of actuators.

Please use the following contents table to help access the information you require.

Motor duty ratings

Isolating and modulating duties subject the actuator to different operating loads and mechanical wear trends. For this reason the isolating duty CK can also be offered as a CKR modulating duty actuator.

Motor duty ratings are in compliance with EN 15714-2 and IEC 60034-1 for all CK range actuators. Further information about actuator outputs and duty cycles is available in the Motor classification section.

Isolating duty actuator model designations to EN 15714-2 Class A & B

- CK 30 – CK 500
- CKC 30 – CKC 500

Modulating duty actuator model designations to EN 15714-2 Class C

- CKR 30 – CKR 500
- CKRC 30 – CKRC 500

Operating environments

Rotork actuators are designed for use worldwide in non-hazardous water, power and industrial applications. Focus on making the CK range resistant to the most adverse environments has resulted in exceptional IP68 (8 m / 96 hrs) protection. A good level of environmental protection, wide operating temperature range and extended service intervals provide a versatile actuator suitable for most applications.

Colour

The standard colour is a pale blue - RAL5024. Other colours are available on request, please contact Rotork for more information.

Enclosure protection IP68

Rotork CK range devices are supplied as standard with IP68 enclosure protection in compliance with EN 60529. The Rotork IP68 rating provides protection up to eight metres submersion for a maximum of 96 hours. Up to 10 operations can be performed whilst the actuator is submerged at the maximum immersion depth. Adequate cable glands must be used to maintain the IP68 integrity of the CK range actuator enclosure. Glands are not supplied as standard with CK actuators. In order to maintain IP68 enclosure integrity during service down time periods an optional CK socket field parking housing can be used to cover unmated module faces.

Lubrication

CK Range actuators are factory filled for life with premium quality gear oil selected for the application. Standard oil is automotive grade, easily available worldwide. Oil lubrication out-performs grease over a wide temperature range and allows installation in any orientation. It has none of the problems associated with grease such as separation at elevated temperatures and "tunneling" at lower temperatures, where grease is thrown away from rotating components creating a void or tunnel in the grease around components that require lubrication. Standard oil is automotive grade SAE80EP. Low temperature oil is MOBIL SHC624. Food grade oil is Hydra Lube GB Heavy.

Corrosion protection

Corrosion protection is a vital part of a reliable actuation solution to ensure a long service life is achieved for the product. All CK range actuator finishes are tested in accordance with Rotork 1,000 hour cyclic salt spray test procedure which is the most realistic and arduous test cycle applicable. The test combines cyclic salt spray, drying and humidity at elevated temperatures on complete factory built actuators. This procedure is designed to test the finish coatings and the various substrate materials, fixings and interfaces on an actuator. Substrate materials and finishes are selected to provide maximum corrosion resistance combined with good adhesion.

Corrosivity category	CK paint solution	Exterior environment	Interior Environment
C1 – Very Low	Standard RAL5024 powder coat	N/A	Heated buildings with clean atmospheres, e.g. offices, shops, schools and hotels.
C2 – Low		Atmospheres with low levels of pollution, e.g. rural areas.	Unheated buildings where condensation may occur, e.g. depots and sports halls.
C3 – Medium		Urban and industrial atmospheres, moderate Sulphur Dioxide pollution, e.g. city centres and coastal areas with low salinity.	Production rooms with high humidity and some air pollution, e.g. food processing plants, laundries, breweries and dairy farms.
C4 – High	Standard RAL5024 powder coat plus offshore coating on Ferrous materials	Industrial areas and coastal areas with moderate salinity, e.g. coastal ship and boatyards.	Areas with permanently aggressive atmospheres, e.g. chemical plants and swimming pools.
C5-I – Very High (Industrial)		Industrial areas with high humidity and aggressive atmospheres, e.g. water treatment plants and power stations.	Buildings or areas with extremely aggressive atmospheres containing high humidity and high pollutant concentration, e.g. chemical plants and boiler houses.
C5-M – Very High (Marine)		Coastal and offshore areas with high salinity, e.g. offshore rigs and boats.	Buildings or areas with extremely aggressive atmospheres containing high humidity, high salinity and high pollutant concentration, e.g. cooling towers and boats.

Technical Data

Ambient temperatures

CK range actuators can accommodate a variety of operating temperature requirements that will ensure successful actuation in the harshest non-hazardous environments. The optional low temperature CK build involves replacement seals, lubrication and bearings. Storage temperature is -40 to +80 °C (-40 to +176 °F) for standard temperature builds or -60 to +80 °C (-76 to +176 °F) for optional low temperature builds.

Type	Version	Temperature range		
		CK (without integral starter and controls)	Separate mounted Centronik - CKc	Directly mounted Centronik - CKc
Multi-turn isolating duty 3-phase CK actuators	Standard	-30 to +70 °C (-22 to +158 °F)	-30 to +70 °C (-22 to +158 °F)	-30 to +70 °C (-22 to +158 °F)
	Optional	-40 to +60 °C (-40 to +140 °F)	-40 to +60 °C (-40 to +140 °F)	-40 to +60 °C (-40 to +140 °F)
Multi-turn isolating duty 1-phase CK actuators	Standard	-25 to +70 °C (-13 to +158 °F)	-25 to +70 °C (-13 to +158 °F)	-25 to +70 °C (-13 to +158 °F)
Multi-turn modulating duty 3-phase CK actuators	Standard	-30 to +70 °C (-22 to +158 °F)	-30 to +70 °C (-22 to +158 °F)	-30 to +70 °C (-22 to +158 °F)
	Optional	-40 to +60 °C (-40 to +140 °F)	-40 to +60 °C (-40 to +140 °F)	-40 to +60 °C (-40 to +140 °F)

Actuator Fixings

Frame Size		Unit	CK 30 & CK 60		CK 120	CK 250 & CK 500
Type 'A' Coupling	Flange Size (ISO5210)	-	F07	F10	F10	F14
	Flange Size (MSS SP -102)	-	FA07	FA10	FA10	FA14
	Stem Acceptance Rising*	mm (in)	26 (1)	34 (1 1/3)	40 (1 5/8)	57 (2 1/4)
	Maximum Axial Thrust	kN (lbf)	40 (8,992)	40 (8,992)	70 (15,737)	160 (35,969)
	Stem Acceptance Non-Rising*	mm (in)	20 (3/4)	26 (1)	32 (1 1/4)	45 (1 3/4)
Type 'B' Coupling	Type 'B1' (Fixed bore)	mm (in)	28 (1 1/8)	42 (1 5/8)	42 (1 5/8)	60 (2 3/8)
	Type 'B3' (Fixed bore)	mm (in)	16 (5/8)	20 (3/4)	20 (3/4)	30 (1 1/8)
	Type 'B4' (Blank)*	mm (in)	20 (3/4)	30 (1 1/8)	30 (1 1/8)	45 (1 3/4)

* This coupling type requires machining to match the valve or gearbox stem.
Dimensions given for this coupling are maximum values.

Multi-turn CK range actuator performance

Isolating CK & CKc – 3-phase

The following data is valid for actuators with 3-phase AC motors operated with a Class A & B (EN15714-2) / S2 – 15 minutes (IEC60034-1) duty rating. For further details on the electrical specification of each actuator, refer to the CK electrical motor data sheet.

Size	Torque				RPM (at 50 Hz)	RPM (at 60 Hz)	Hand Wheel Ratio	Actuator Output Flange	
	Maximum		Operational					ISO 5210	MSS SP-102
	Nm	lbf.ft	Nm	lbf.ft					
CK 30	30	22	10	7	9, 12, 18, 24, 36, 48, 72, 96, 144	11, 14, 21, 29, 43, 57, 86, 115, 173	10:1	F07/F10	FA07/ FA10
	25	18			192	230			
CK 60	60	44	20	15	9, 12, 18, 24, 36, 48, 72, 96, 144	11, 14, 21, 29, 43, 57, 86, 115, 173	10:1	F07/F10	FA07/ FA10
	50	37			192	230			
CK 120	120	89	40	30	9, 12, 18, 24, 36, 48, 72, 96, 144	11, 14, 21, 29, 43, 57, 86, 115, 173	10:1	F10	FA10
	100	74			192	230			
CK 250	250	184	83	61	9, 12, 18, 24, 36, 48, 72, 96, 144	11, 14, 21, 29, 43, 57, 86, 115, 173	10:1	F14	FA14
	200	148			192	230			
CK 500	500	369	167	123	9, 12, 18, 24, 36, 48, 72, 96, 144	11, 14, 21, 29, 43, 57, 86, 115, 173	20:1	F14	FA14
	400	295			192	230			

Note: Torque rating is maximum torque setting in both directions. Stall torque will be an average of 1.4 to 2.0 times this value depending on speed and voltage.

Note: Due to the effects of inertia and drive nut wear, 144 & 192 RPM speeds are not recommended for direct mounted gate valve applications.

Isolating duty CK and CKc – 1-phase

The following data is valid for actuators with 1-phase AC motors operated with a Class A & B (EN15714-2) / S2 – 15 minutes (IEC 60034-1) duty rating. For further details on the electrical specification of each actuator, refer to the CK electrical motor data sheet.

Size	Torque				RPM (at 50 Hz)	RPM (at 60 Hz)	Hand Wheel Ratio	Actuator Output Flange	
	Maximum		Operational					ISO 5210	MSS SP-102
	Nm	lbf.ft	Nm	lbf.ft					
CK 30	30	22	10	7	18, 24, 36, 48, 72, 96, 144	21, 29, 43, 57, 86, 115, 173	10:1	F07/F10	FA07/ FA10
	25	18			192	230			
CK 60	60	44	20	15	18, 24, 36, 48, 72, 96, 144	21, 29, 43, 57, 86, 115, 173	10:1	F07/F10	FA07/ FA10
	50	37			192	230			
CK 120	120	89	40	30	18, 24, 36, 48, 72, 96, 144*	21, 29, 43, 57, 86, 115, 173*	10:1	F10	FA10
	100	74			192*	230*			
CK 250	250	184	83	61	18, 24, 36, 48	21, 29, 43, 57	10:1	F14	FA14

Note: *110V and 115V is not available for this actuator size and speed combination.

Regulating / Modulating CKR & CKRC – 3-phase 25%

Regulating / Modulating duty CKR and CKRC actuators. The following data table is valid for actuators with 3-phase AC motors operated with a Class C (EN15714-2) / S4 – 25% (IEC 60034-1) duty rating. For further details on the electrical specification of each actuator, refer to the CK electrical motor data sheet.

Size	Torque				Max. Starts	RPM (at 50 Hz)	RPM (at 60 Hz)	Hand Wheel Ratio	Actuator Output Flange	
	Maximum		Modulating						ISO 5210	MSS SP-102
	Nm	lbf.ft	Nm	lbf.ft						
CKR 30	30	22	15	11	600	9, 12, 18, 24, 36, 48, 72, 96	11, 14, 21, 29, 43, 57, 86, 115	10:1	F07/F10	FA07/FA10
CKR 60	60	44	30	22	600	9, 12, 18, 24, 36, 48, 72, 96	11, 14, 21, 29, 43, 57, 86, 115	10:1	F07/F10	FA07/FA10
CKR 120	120	89	60	44	600	9, 12, 18, 24, 36, 48, 72, 96	11, 14, 21, 29, 43, 57, 86, 115	10:1	F10	FA10
CKR 250	250	184	120	89	600	9, 12	11, 14	10:1	F14	FA14
					600	18, 24	21, 29			
					600	36, 48	43, 57			
					400	72, 96	86, 115			
CKR 500	500	369	200	148	600	9, 12	11, 14	20:1	F14	FA14
					600	18, 24	21, 29			
					600	36, 48	43, 57			
					400	72, 96	89, 115			

Regulating / Modulating CKR & CKRC – 3-phase 50%

Regulating / Modulating duty CKR and CKRC actuators. The following data table is valid for actuators with 3-phase AC motors operated with a Class C (EN15714-2) / S4 – 50% (IEC 60034-1) duty rating. For further details on the electrical specification of each actuator, refer to the CK electrical motor data sheet.

Size	Torque				Max. Starts	RPM (at 50 Hz)	RPM (at 60 Hz)	Hand Wheel Ratio	Actuator Output Flange	
	Maximum		Modulating						ISO 5210	MSS SP-102
	Nm	lbf.ft	Nm	lbf.ft						
CKR 30	30	22	10	7	1200	9, 12, 18, 24, 36, 48, 72, 96	11, 14, 21, 29, 43, 57, 86, 115	10:1	F07/F10	FA07/FA10
CKR 60	60	44	20	15	1200	9, 12, 18, 24, 36, 48, 72, 96	11, 14, 21, 29, 43, 57, 86, 115	10:1	F07/F10	FA07/FA10
CKR 120	120	89	45	33	1200	9, 12, 18, 24, 36, 48, 72, 96	11, 14, 21, 29, 43, 57, 86, 115	10:1	F10	FA10
CKR 250	250	184	90	66	1200	9, 12	11, 14	10:1	F14	FA14
					900	18, 24	21, 29			
					600	36, 48	43, 57			
					400	72, 96	86, 115			
CKR 500	500	369	180	133	1200	9, 12	11, 14	20:1	F14	FA14
					900	18, 24	21, 29			
					600	36, 48	43, 57			
					400	72, 96	89, 115			

Supply voltages/mains frequencies

Compatible power supplies for CK range actuators are shown below. Not all actuator versions or sizes are available with all motor types or voltages/frequencies. For detailed information please refer to the separate motor data sheets.

3-phase AC Modulating Duty

Voltages	Frequency
[V]	[Hz]
220, 240, 380, 400, 415, 440	50
220, 240, 380, 440, 460, 480	60

3-phase AC Isolating Duty

Voltages	Frequency
[V]	[Hz]
220, 240, 380, 400, 415, 440, 500	50
220, 240, 380, 440, 460, 480, 600	60

1-phase AC Isolating Duty

Voltages	Frequency
[V]	[Hz]
110, 115, 220, 230, 240	50
110, 115, 220, 230, 240	60

Permissible power supply tolerances for voltage and frequency

For all CK range actuators:

- Voltage tolerance ± 10%
- Frequency ± 5%
- Maximum starting Volt drop - 15%

Vibration resistance

According to EN 60068-2-6

The actuators are resistant to vibration up to 2 g over a frequency range of 10 to 200 Hz.

Noise level

The noise level originated by the multi-turn CK actuator range does not exceed 70 dB(A) at a distance of 1 m under normal operating conditions.

Design life

According to EN15714-2:2009

An actuator start is any operation that requires the motor to start movement in either direction. If the motor is already moving and a command to operate in the same direction is applied this will not count as a start.

CK & CKc actuators for isolating duty

Type	Design life rating
CK 30 - CK 500	500,000 output turns, seating at rated torque, 33% rated torque through stroke

CKR & CKRC actuators for modulating duty – 50%

Type	Design life rating
CKR 30 - CKR 500	1,200,000 to 1,800,000 starts* at a minimum of 30% rated torque, minimum 1% stroke movement

CKR & CKRC actuators for modulating duty – 25%

Type	Design life rating
CKR 30 - CKR 500	1,200,000* at a minimum of 50% rated torque, minimum 1% stroke movement

* Number of starts determined by actuator output torque as per EN15714-2: 2009.

Motor classification

Type of duty according to IEC 60034-1/EN 15714-2

Type	3-ph AC	1-ph AC
CK 30 – CK 500	S2 – 15 min, S2 – 30 min/Classes A, B	S2 – 15 min/Classes A, B
CKC 30 – CKC 500	S2 – 15 min, S2 – 30 min/Classes A, B	S2 – 15 min/Classes A, B
CKR 30 – CKR 500*	S4 – 25%, S4 – 50% / Class C	-
CKRC 30 – CKRC 500*	S4 – 25%, S4 – 50% / Class C	-

Information on motor duty type is subject to the following conditions: nominal supply voltage, +40 °C (+104 °F) ambient temperature and average load of 33% rated torque.

* High speed CKR actuators have a reduced duty cycle to reduce wear on the actuator drive train. Please refer to the multi-turn CK range actuator performance data for details of duty cycle restrictions.

Rated values for motor protection

As standard, thermo switches are used for motor protection against excessive heat rise. When a Centronik unit is equipped the motor protection signals are processed internally to initiate an alarm status within the actuator. This will prevent further operation until the thermo switch has reset within the correct operating band. Signals in the CK and CKR must be analysed with external controls.

Mounting position

Rotork actuators (with or without Centronik module) can be operated without restriction in any mounting position.

Switch mechanism control

Valve travel limit span

	Possible valve travel (turns)	
	Mechanical switch mechanism	**Digital switch mechanism**
Standard	1,500	8,000
Optional	15,000	-

Digital switch mechanism

When using the digital switch mechanism, any change in position or torque will be recorded in digital form and transmitted via internal can bus to the Centronik module data logger. Position limit switches are digitally set through the integral Centronik software.

Mechanical switch mechanism

In a CK or CKR actuator, the mechanical switch mechanism is internally wired to accommodate an external control system. The terminals used for various functions are specified in the actuator wiring diagram and terminal plan. All connections are via the Rotork plug and socket system for simple actuator site integration.

Position and torque limit switches

Selection	Description	Contact type
Standard – 4 switches	2 position switches - 1 for each direction 2 torque switches - 1 for each direction	Each 4-wire switch has a NO and NC contact, sealed to IP67
Optional – 6 switches	4 position switches - 2 for each direction (standard plus additional switches) 2 torque switches - 1 for each direction	Each 4-wire switch has a NO and NC contact, sealed to IP67
Optional – 6 switches	2 position switches - 1 for each direction 4 torque switches - 2 for each direction (standard plus additional switches)	Each 4-wire switch has a NO and NC contact, sealed to IP67
Optional – 8 switches	4 position switches - 2 for each direction (standard plus additional switches) 4 torque switches - 2 for each direction (standard plus additional switches)	Each 4-wire switch has a NO and NC contact, sealed to IP67

Electrical rating				Switch details		
Switch voltage	**30 V**	**125 V**	**250 V**	**Functionality**	**Contact type**	**Contact material**
AC inductive load (cos Ø > 0.8)	5 A	5 A	5 A	4 wire - Lever action	2 snap action contacts	Silver
DC resistive load	0.5 A	0.5 A	0.5 A			

Intermediate position switches

Electrical rating				Switch details		
Switch voltage	**30 V**	**125 V**	**250 V**	**Functionality**	**Contact type**	**Contact material**
AC inductive load (cos Ø > 0.8)	5 A	5 A	5 A	2 wire – Lever action	1 snap action contacts	Silver
DC resistive load	0.5 A	0.5 A	0.5 A			

Blinker contact for movement indication

Electrical rating				Blinker transmitter details		
Switch voltage	**30 V**	**125 V**	**250 V**	**Functionality**	**Contact type**	**Contact material**
AC inductive load (cos Ø > 0.8)	5 A	5 A	5 A	2 wire – Rotation of indented cam	1 snap action contacts	Silver
DC resistive load	0.5 A	0.5 A	0.5 A			

Technical Data

Remote position indication

Precision potentiometer	
Linearity	≤ 2 %
Power	0.5 W
Resistance (standard)	10 kΩ
Resistance (optional)	1 kΩ, 5 kΩ

Electronic remote position transmitter CPT	
Connection	3/4 wire
Signal range	4 - 20 mA
Power supply	24 VDC, ±15 % smoothed

Plug and socket

Rotork Plug & Socket Connector			
Detail	**Motor contacts**	**Protective earth**	**Control contacts**
Max. no. of contacts	3	1	52
Designation	1, 2, 3	PE	4-56
Max. rated current	20 A	-	5 A
Customer connection type	Screw	Ring Tag	Screw
Max. cross section	6 mm^2	M4 Ring Tag	2.5 mm^2
Pin socket carrier material	Polyamide	Polyamide	Polyamide
Contact material	Brass	Brass	Brass – Tin Plated

Conduit entries

Terminal housing conduit entry thread details	
Metric threads (standard)	1 x M20 x 1.5, 1 x M25 x 1.5, 1 x M32 x 1.5
Pg – threads (option)	1 x Pg 13.5, 1 x Pg 21, 1 x Pg 29
NPT – threads (option)	2 x ¾" NPT, 1 x 1¼" NPT

Optional terminal housing conduit entry thread details	
Metric threads	1 x M20 x 1.5, 2 x M25 x 1.5, 1 x M32 x 1.5
Pg – threads	1 x Pg 13.5, 2 x Pg 21, 1 x Pg 29
NPT – threads	1 x ¾" NPT, 2 x 1" NPT, 1 x 1¼" NPT
Blank casting	Subject to third party machining

Controlling interface to the DCS with Centronik module

Terminal housing conduit entry thread details	
Digital input signals	
Standard	24 VDC; OPEN, STOP/MAINTAIN, CLOSE, ESD
Option	115 VAC; OPEN, STOP/MAINTAIN, CLOSE, ESD
Intermediate position set point control	
Optional analogue input	4-20 mA, 0-5 V, 0-10 V, 0-20 V
Output signals	
Standard Monitor relay	1 potential free change over contact, maximum 30 VDC / 150 VAC, 5 A
Standard S1-S4 relays	4 output contacts with user defined trigger conditions, potential free contacts, configurable contact form, maximum 30 VDC / 150 VAC, 5 A
Optional S5-S8 relays	4 additional output contacts with user defined trigger conditions, potential free contacts, configurable contact form, maximum 30 VDC / 150 VAC, 5 A
Intermediate position feedback	
Optional analogue output	4-20 mA
Intermediate torque feedback	
Optional analogue output	4-20 mA (requires digital switch mechanism)
Local controls	
Standard Centronik local controls	Lockable local selector switch; LOCAL, STOP, REMOTE Operation/Navigation switch; OPEN/+, CLOSE/-
Back up supply	
Auxiliary power supply option	Maintain power to Centronik control module on loss of main power supply. Nominal 24 VDC, 1 A (switching inrush 8 A max). 3 mA draw with mains power, 100 mA draw without mains power. Customer supply is not available whilst the Centronik is powered by the auxiliary source.

Approvals

CK range electric actuators have been designed to meet the following approval procedures:

BS and DIN standards

CK range actuators comply with BS EN 15714-2, Industrial valves - Actuators - Part 2: Electric actuators for industrial valves - Basic requirements.

LVD compliance

CK range actuators comply with 2006/95/EC, safety requirements for electrical equipment for measurement, control and laboratory use: General requirements, to demonstrate compliance with this directive.

The following installation assumptions are used to derive the requirements:

- Pollution Degree 2
- Category II Overvoltage Installation Locations
- Actuator installed up to 5,000 metres

EMC compliance

CK range actuators comply with 2004/108/EC, Electrical equipment for measurement, control and laboratory use.

Machinery directive

CK range actuators are supplied with a declaration of incorporation for Machinery directive 2006/42/EC. According to the LVD and EMC directives, the actuators are labelled with the CE mark:

CE

CSA

CK range actuators are approved by CSA. Refer to certificate 70021797.

Manual handwheel operation

Handwheel size and mechanical advantage are generally designed in accordance with standard EN 12570 to give the most efficient compromise of force and turns for emergency operation. Handwheels and adaptions can be provided to meet AWWA specifications.

Actuator drive couplings

The CK range features a removable base and coupling for all sizes. All base dimensions and couplings comply with EN ISO 5210 or MSS SP 102.

NAMUR 107 compatibility

CK actuators with the optional Centronik module provides feedback for alarm statuses in accordance with NAMUR 107 guidelines.

Failure – the actuator has experienced a failure condition and may not respond to remote control commands.

Function check – the actuator settings are being adjusted and is therefore unavailable for operation.

Out of specification – the actuator will recognise a process condition that does not match the configured setting value. Operation can commence during this alarm state.

Maintenance required – the actuator must be examined by a service technician to evaluate maintenance requirements. Operation can commence during this alarm state.

rotork® Site Services

Rotork actuators are recognised as the best in the world for reliability and safety in the most demanding applications. To maintain this hard-earned leadership position, Rotork Site Services is committed to helping clients to maximise the continuous, fault-free operation and working life of all their actuators.

With established operations and worldwide service centres we are able to offer same-day or next-day service to all our customers. Our Rotork factory trained engineers have skills in both multi-purpose and industry specific applications and carry with them spare parts and specialist test equipment. Our operations utilise a documented Quality Management system established in accordance with ISO9001.

Rotork Site Services aims to be your number one choice for taking care of fault diagnosis, service repairs, scheduled maintenance and system integration needs.

Rotork has expertise and specialist knowledge of every aspect of flow control.

Our service solutions increase plant efficiency and reduce maintenance costs.

Workshop services return equipment to as-new condition.

Client Support and Site Services

Global Service and Support

Rotork understands the value of prompt and punctual customer site services and aim to supply our customers with superior flow control solutions, by providing high quality, innovative products and superior service – ***on time, every time.***

Whether you have an actuator requiring on-site servicing, a custom design service requirement or a new actuator installation, we can deliver the fastest turnaround with the least plant disruption.

Accreditation and Assurance

Rotork Site Services is accredited with all major safety authorities around the world, providing our clients with reassurance and peace of mind.

Rotork's engineering teams are experts in the design and implementation of actuation solutions for all circumstances and environments. Our knowledge base draws upon previous installations and environmental situations from all around the world.

Our track record of undertaken engineering projects is second to none. Rotork is trusted by major utility and industrial companies throughout the world to design, install and maintain their actuation stock. We keep their plants operating at peak efficiency, helping them to be more profitable and at the same time meet ever tightening industry watchdog requirements.

We have the knowledge and expertise to design, build and install any standard or custom installation for you, anywhere throughout the world.

Asset Management

Rotork is a corporate member of the Institute of Asset Management, the professional body for whole life management of physical assets.

Giving You Peace of Mind, Guaranteed Quality and Improving Your Site Efficiency

Actuator Workshop Overhaul

- Supporting all Rotork and non-Rotork products
- Workshop facilities including torque testing and re-coating
- Large OEM stock in all workshops
- Fully trained and experienced service engineers
- Fleet of well stocked service vehicles
- Loan actuator facilities

Field Support

- Site repairs
- Commissioning
- Upgrades
- Fault finding
- Maintenance
- Call-out
- Fully equiped service vehicles

Rotork Client Support Programme (CSP)

- Enables users to select a level of service precisely tailored for their individual asset management requirements
- Designed to provide the maximum reliability and availability of actuators over the life of the product – thereby improving production throughput
- Designed to reduce the cost of maintenance year on year
- Designed to allow customers to manage the problem of 'Risk vs Budget' in maintenance operations
- Designed to be flexible – you choose the level of cover you want
- Reports generated on agreed frequency to demonstrate **cost savings** and **performance improvements**

Turnaround, Shutdown and Outage Support

- Preventative maintenance
- Full on-site overhaul and testing facilities
- OEM spares and support
- Support for Rotork and non-Rotork products
- Commissioning support to achieve shutdown time targets
- Project management and supervision of your plant overhaul and return to service dates

Valve Automation Centres

- On Site – Manual Valve Automation
- On Site – Actuator Replacement
- Off Site – New Valve Automation

Keeping the World Flowing

www.rotork.com

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

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Rotork is a corporate member of the Institute of Asset Management

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