

Control Options

Rotork actuators are designed to be integrated within any automation system or application around the world. CK range actuators are compatible with full external controls or more complex control systems with the Atronik or Centronik control module.

External controls (CK & CKr)

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 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.



Control Options

Atronik (CKA & CKRA)

The addition of the Atronik module to the CK provides reliable, integral control for use with most site control systems. It permits the use of hardwired, analogue or basic network control and indication.

Atronik equipped 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.

Atronik configuration is achieved by intrusive adjustment of the DIP switches. Optional extras utilise configuration by DIP switches in a similar manner to the standard control and feedback features.

Actuators that include the integral Atronik control module are designated CKA for isolating duty and CKRA for modulating duty.



Centronik (CKc & CKRc)

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 is visible 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 with 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.

Actuators that include the integral Centronik control module are designated CKc for isolating duty and CKRc for modulating duty.



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 actuators
- 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.

For more information on Insight 2 and the Rotork Bluetooth® Setting Tool *Pro* please refer to PUB095-001.



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 external hardwired control system. CKA actuators provide an integral starter with simple status indication. CKc actuators provide a fully intelligent solution for complex autonomous site control.



Atronik Inputs

Standard:

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

Optional:

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

Atronik Outputs

Standard:

- One galvanic isolated, volt-free change over contact for availability/fault indication.
- Two galvanic isolated, volt-free relay contacts. Configurable functions and normally open (N/O) contact form.

Optional:

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

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

Hardwired digital control to the DCS

Atronik and Centronik control modules have the facility to accommodate a number of hardwired inputs and outputs for actuator control and feedback. Specific functions and terminal allocations are detailed on the actuator wiring diagram and terminal plan.



Centronik 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.

Centronik 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.

Communication Interfaces

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 Atronik or Centronik control modules. Field upgrades for CK and CKR actuators allow integration into existing site network systems.

Serial communication

Rotork has developed the Atronik and Centronik control modules 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™

**PROFI®
BUS**

DeviceNet®
CONFORMANCE TESTED

FOUNDATION

Modbus®

HART®
COMMUNICATION PROTOCOL



PLC/DCS

CKRC Field Unit

CKRA Field Unit

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 CK 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.

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.

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.

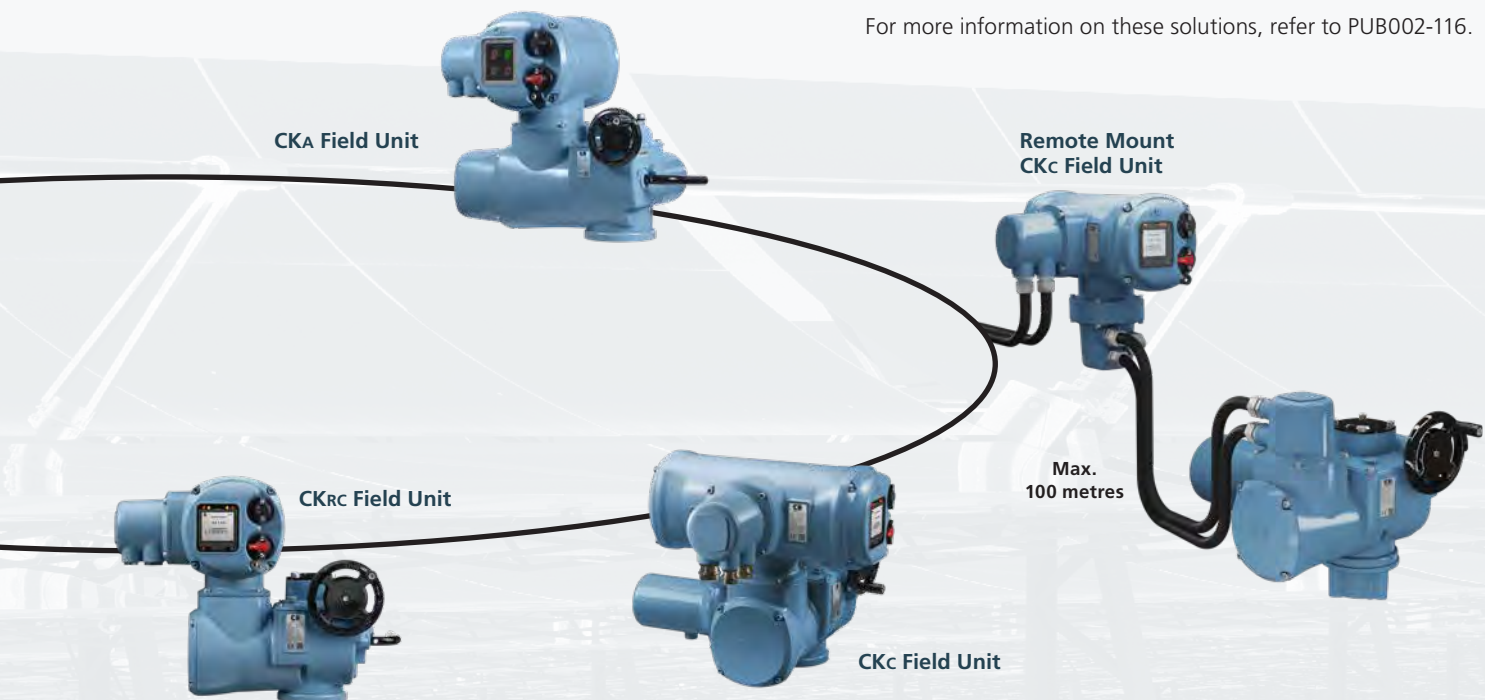
HART®

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

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

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 as standard to suit various gland/cable size requirements. Please refer to the technical data section of this brochure for further details.

Additional conduit entries

Alternative socket housings are available with up to six conduit entries. Blank housings can be supplied to meet bespoke conduit entry requirements.

Plug & socket sealing

All plug & socket connections include robust double sealed protection. The IP68 rating is maintained whilst the terminal housing or control module is unmated.

Disconnect module

For Atronik and Centronik network options, a larger disconnect module can be supplied as a substitute for the standard terminal housing. The disconnect module ensures that network loops remain complete whilst the module is disconnected from the actuator. This facilitates continued operation of the network loop during maintenance activities.

Temporary environmental protection

During maintenance activities, the terminal housing plug may be disconnected from the actuator or control socket. 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 CK range 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.

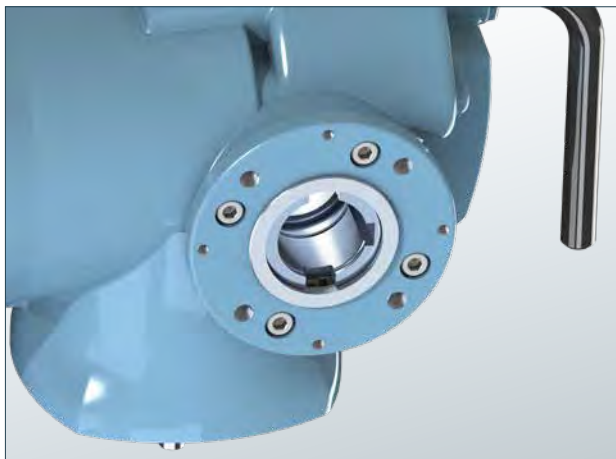
Output drive couplings

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



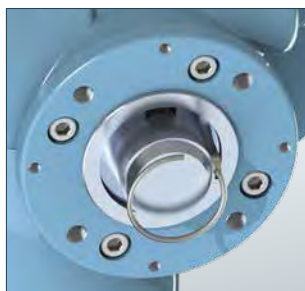
B1 to B3 adaptor



B1 to B4 adaptor



B1 base view with B3 adaptor



B1 base view with B4 adaptor

Thrust – 'A' type coupling



Thrust base: exploded view

CK Switch Mechanisms

Mechanical Switch Mechanism (MSM)

The MSM instantaneously senses position and torque mechanically and IP67 rated micro switches provide end of travel indication as well as torque trip indication. Torque and position switches for both directions require mechanical configuration.

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 additional indication drive, the indication mechanism includes holes to access the switch mechanism interface.

Reduction gearing

The 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 between the OPEN and CLOSE limits.

Blinker contact for movement indication

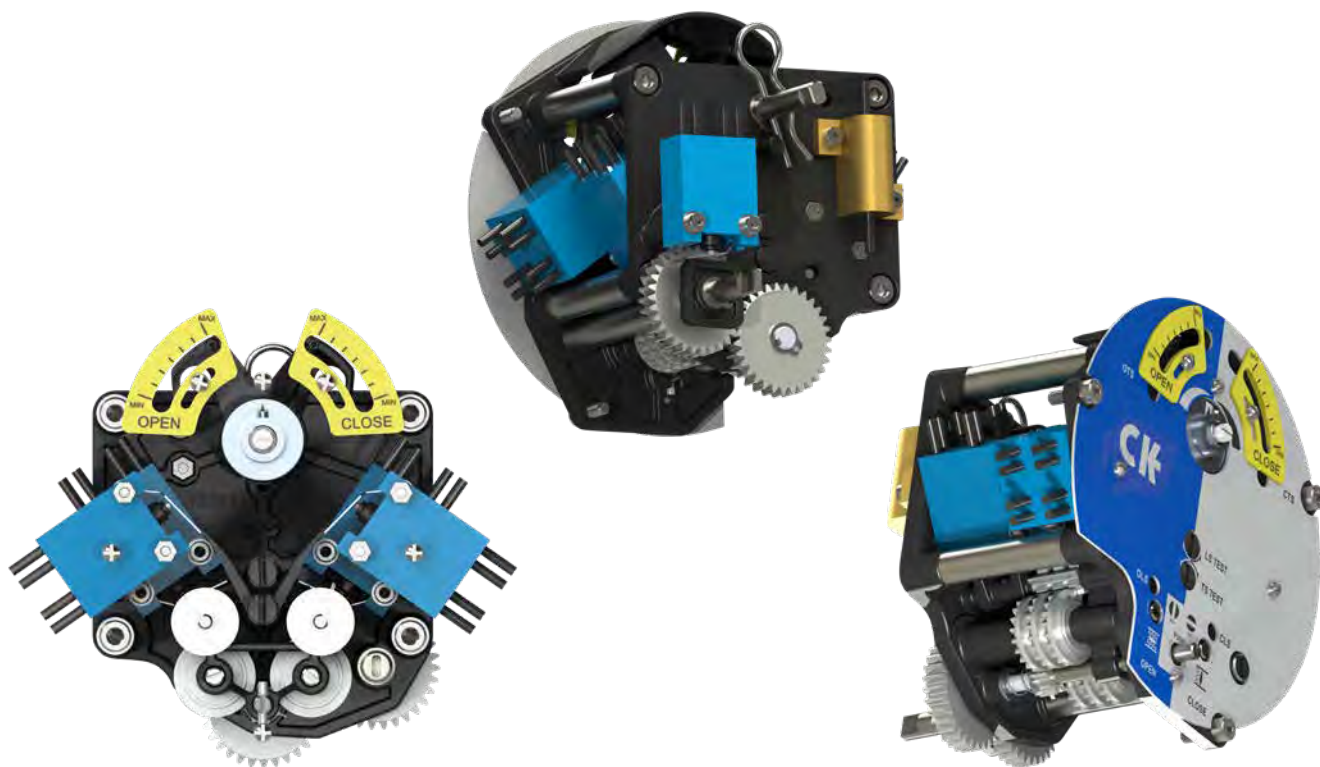
A blinker contact is fitted to the mechanical switch mechanism to provide movement indication throughout valve travel. The blinker contact is separate to other micro switches.

Heater

The resistive heater maintains a stable and humidity free environment for the internal switch mechanism compartment of the CK actuator. The heater utilises 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 position indication and two for torque trip indication in each direction. Two additional position limit switches and two additional torque switches are available for applications that require dual potential switching. Four extra switches can also be added for intermediate position indication with the Additional Indication Drive (AID) option.



CK Range Mechanical Switch Mechanism (MSM)

CK Switch Mechanisms

Digital Switch Mechanism (DSM)

The DSM is designed exclusively for use with the Centronik control module. Non-intrusive configuration of the actuator position limits and torque trip limits is then possible via the local Centronik display. The DSM consists of a position sensing absolute encoder and torque sensing gear combined into one package.

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 data logger.

Absolute encoder

Rotork's proven absolute encoder design accurately senses position and torque using only five moving parts. Through the use of multiple gears, 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. The optional advanced data logger will capture this information and record it in a detailed event log. This can be used for analysis at periodic service intervals or downloaded into the Insight 2 PC software package.



CK Centronik Digital Switch Mechanism (DSM)

Additional Indication Drive (AID)

The optional AID module accompanies a mechanical (MSM) or digital (DSM) switch mechanism to provide additional features that meet various application 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 included 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 a Centronik control module for increased functionality.

Intermediate Position Switches

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



CK Range optional Additional Indication Drive (AID)

Accessibility

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 control module of a CK range actuator. A cable length of up to 100 m (328 ft) enables sufficient access to control module settings where the valve or damper 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, Atronik and Centronik control modules can be rotated in 90° increments at the actuator mating face.

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

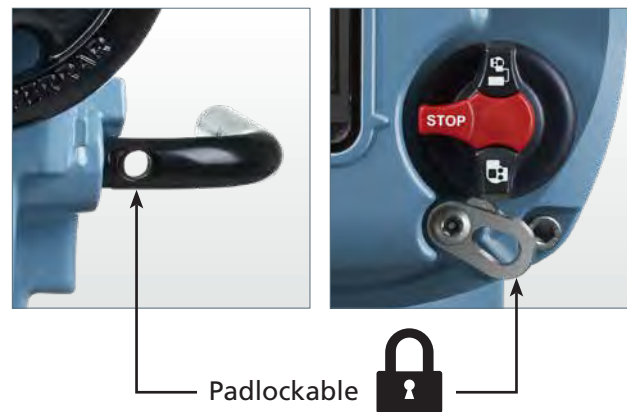
Unauthorised Operation Protection

Hand / Auto lever

The hand/auto (manual operation engagement) lever can be padlocked in place, restricting manual operation to authorised personnel only. This suits 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 suits a padlock with hasp diameter of 6.5 mm.



Remote mounted Centronik controls up to 100m from actuator



Hand / Auto lever with padlock security feature