

rotork®

Keeping the World Flowing
for Future Generations

Solenoid Valves



alcon
SOLENOID VALVES
A rotork® Brand

m&m
international
A rotork® Brand



Instrumentation and control

Rotork is a specialist manufacturer of products for flow control, pressure control, flow measurement and pressure measurement.

Our solutions are trusted wherever there is a need for high precision and reliability, including pharmaceutical, oil and gas, biomedical and manufacturing industries.

We have production facilities throughout the world, complemented by a large network of distribution and support centres.

A full listing of our worldwide sales and service network is available on our website at www.rotork.com



Worldwide Industry and Application Experience

With over 60 years of extensive knowledge and experience, Rotork has provided products and services worldwide for virtually every industrial actuator application.

Rotork offer a range of precision control and valve accessory products in partnership with our prestigious brands, including Fairchild, Soldo®, Midland-ACS™, Bifold®, M&M and Alcon:

Instrument Valves

- Valve actuation accessories
- Solenoid valves
- Piston valves
- Instrument valves
- Medium pressure valves
- Subsea valves and connectors

Controllers

- Valve positioners
- Rail systems
- I/P and E/P converters

Measurement

- Valve position sensors
- Transmitters and switches

Instrument Pumps

- Pumps
- Intensifiers and accumulators

Rotork is proud to offer a diverse range of products which serve many different duties in a wide variety of applications. We also offer a factory customisation service to create one-off units to meet specific needs.

Introduction

Part of the Rotork Group, Alcon Solenoid Valves and M&M International are leading manufacturers of combustion, industrial, medical and laboratory gas control solenoid valves. Whether designing solutions for stand-alone valves or a customised OEM installation we have developed an enviable reputation for quality products, reliability and innovation.

With facilities based in the UK, Italy and the USA, and sales offices worldwide, we can provide solenoid valves to function in the most arduous of conditions and extreme temperatures, anywhere in the world.

Our product line covers a full range of valves for general and special-purpose including:

- Air
- Water
- Steam
- Automation
- Cryogenics
- Gases
- Oil & Fuel
- Actuation
- High Pressure
- Hazardous Area
- Aggressive Media
- Vacuum

Our solenoid valves can be manufactured with increased safety electrical coils and enclosures covered by ATEX, UL, IECEx or CSA approvals, to meet application demands.

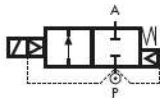
The advantages of solenoid valves manufactured by Alcon and M&M include:

- Robust construction for industrial applications featuring stainless steel orifice on most models
- Stainless steel operators with low residual magnetism according to 1.4105 EN 10088 (AISI 430F)
- High quality seal materials
NBR, FKM, EPDM, PTFE, Sigodur (filled PTFE), Ruby, Kalrez®
- Fully interchangeable coils* with a wide range of AC and DC voltages. Coil orientation possible through 360°
- Coils tested 100% in compliance with the current EC directives compliance to RoHS directive and to relevant international standards upon request
- Development and realisation of special projects

*where applicable



LC203/204/205 Series, General Purpose – 2/2 Normally Closed, Latching

Specifications	
Function (single acting)	 <p>Flow direction overseat 1 → 2</p>
Maximum Viscosity	Max. 21cST (3 °E)
Body Material (Std)	Brass CW617N (EN 12165)
Flange	Stainless Steel 1.4305 EN 10088 (AISI 303)
Tube	Stainless Steel AISI 304
Plunger	Brass CW614N (EN 12164)
Magnet	Neodym-Iron-Boron
Top Stop	Stainless Steel 1.4105 EN 10088 (AISI 430F) or equivalent
Springs	Stainless Steel AISI 302
Seal Material (Std)	NBR
Connection Type (Std)	G parallel thread (ISO 228-1)
Shading Ring	Copper
Electrical Characteristics	
Low Power Coil Voltage DC (=)	24 V
Voltage Tolerance	+10% to -5% (DC)
Duty Cycle	100% ED
Protection Class	IP65 (EN 60529) with plug and gasket correctly fitted *
Electrical Connection	to industrial form B
Coil Insulation	Class F 155 °C
Power Rating (Low Power)	DC 3 W ¹
Coil Absorbition (20 °C)	500mA for 20Q0 250mA for 21Q0 125mA for 22Q0

Features and Benefits

- Pilot operated, latching
- Special operator with reduced stroke for low power coils
- Robust construction for industrial applications
- Stainless steel AISI 430F operators with low residual magnetism
- Manufactured in compliance to RoHS directive and to relevant international standards
- Choice of high quality seal materials
- Response time 50 to 500 ms



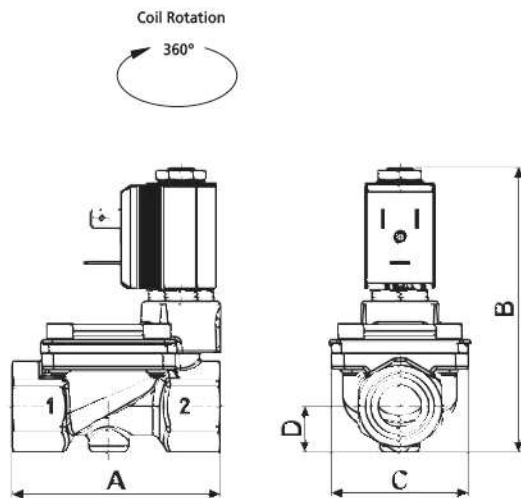
Pipe Size	Cv (gpm)	Kv (m³/h)	OPD (bar)		Orifice (mm)	Seal Material	Valve Code ¹
			AC Voltages	DC Voltages			
¼"	1.83	1.56	-	0.3 - 5	13	NBR	LC203DBZ
						FKM	LC203DVZ
						EPDM	LC203DEZ
¾"	3.86	3.30				NBR	LC204DBZ
						FKM	LC204DVZ
						EPDM	LC204DEZ
½"	4.42	3.78				NBR	LC205DBZ
						FKM	LC205DVZ
						EPDM	LC205DEZ

¹ Non standard, MOQ required.

Seal Material ¹ and Media Temperature Range	Media	Ambient Temperature Range	
		Min	Max
NBR (-10 °C to +90 °C)	Water, oil, air	-10 °C	+50 °C
FKM (-10 °C to +130 °C)	Water, oil, air	-10 °C	+50 °C
EPDM (-10 °C to +120 °C)	Water, hot water	-10 °C	+50 °C

¹ See corrosion reference guide and sealing solutions for material compatibility.

LC203/204/205 Series, General Purpose – 2/2 Normally Closed, Latching



Preferred Valve Mounting Options



Pipe Size	A	B	C	D	Weight (kg)
1/4" - 3/8" - 1/2"	67	90	45.6	15	0.4

Dimensions (mm)

Solenoid enclosures

2-Q0 Type Coil - Insulation class F

External material: PBT (reinforced fiberglass 30%)
 Electrical connection: Industrial form B
 Winding insulation: Class H (E180)
 Enclosure classification: Conforms to IP65 (according to EN 60529) with plug and gasket correctly fitted*

* Plug and gasket not supplied as standard, must be ordered separately.



Type 600 001- Plug

Rated Voltage (max.): 250 VAC / 300 VDC
 Nominal Current: 10A (rated) / 16A (max)
 Wire cross-section: 1.5 mm² max
 Cable Entry: PG9 (6 to 8 mm)
 Enclosure classification: Conforms to IP65 (according to EN 60529) with supplied gasket
 Insulation class: group C- VDE 0110
 Housing colour: black
 UL approved, file No: E205538



Coding chart

Main Valve Assembly

Pipe Size
03 1/4"
04 3/8"
05 1/2"

Seals
B NBR
V FKM
E EPDM

Option
w/o option

Voltage / Frequency - Class F, Low Power
20Q0 6 VDC
21Q0 12 VDC
22Q0 24 VDC

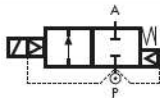
Plug
w/o plug
0B1 c/w plug

LC	2	.	.	D	.	Z
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Product coding example:

LC205DBZ 20Q0
 1/2" G, auto operation, brass body, NBR seals, 13 mm orifice, 6 VDC, without plug.

LC203/204/205 Series, General Purpose – 2/2 Normally Closed, latching

Specifications	
Function (single acting)	 <p>Flow direction overseat 1 → 2</p>
Maximum Viscosity	Max. 21cST (3 °E)
Body Material (Std)	Brass C37700 (UNS Designation)
Flange	Stainless Steel AISI 303 (1.4305 EN 10088)
Tube	Stainless Steel AISI 304
Plunger	Brass C37700 (UNS Designation)
Magnet	Neodym-Iron-Boron
Top Stop	Stainless Steel AISI 430F or equivalent
Springs	Stainless Steel AISI 302
Seal Material (Std)	NBR
Connection Type	NPT
Shading Ring	Copper
Electrical Characteristics ¹	
Low Power Coil Voltage DC (=)	24 V
Voltage Tolerance	+10% to -5% (DC)
Duty Cycle	100% ED
Enclosure Classification	NEMA type 4 (UL 50) and IP65 (EN 60529) with plug and gasket correctly fitted *
Electrical Connection	to industrial form B
Coil Insulation Class	155 (F) to UL429 and to EN 60730-1
Power Rating (Low Power)	DC 3 W
Coil Absorption (20 °C)	500mA for 20Q0 250mA for 21Q0 125mA for 22Q0

¹ These coils are not UL approved.

Features and Benefits

- Pilot operated, latching
- Special operator with reduced stroke for low power coils
- Robust construction for industrial applications
- Stainless steel AISI 430F operators with low residual magnetism
- Coils tested 100% in compliance to RoHS directive and to relevant international standards
- Choice of high quality seal materials
- Response time 50 to 500 ms



Pipe Size	Cv (gpm)	Kv (m ³ /h)	OPD psi (bar)		Orifice inches (mm)	Seal Material	Valve Code
			AC Voltages	DC Voltages			
1/4	1.83	1.56	-	4.4 - 73 (0.3 - 5)	33/64 (13)	NBR	LC203DBZN
						FKM	LC203DVZN
						EPDM	LC203DEZN
3/8	3.86	3.30				NBR	LC204DBZN
						FKM	LC204DVZN
						EPDM	LC204DEZN
1/2	4.42	3.78				NBR	LC205DBZN
						FKM	LC205DVZN
						EPDM	LC205DEZN

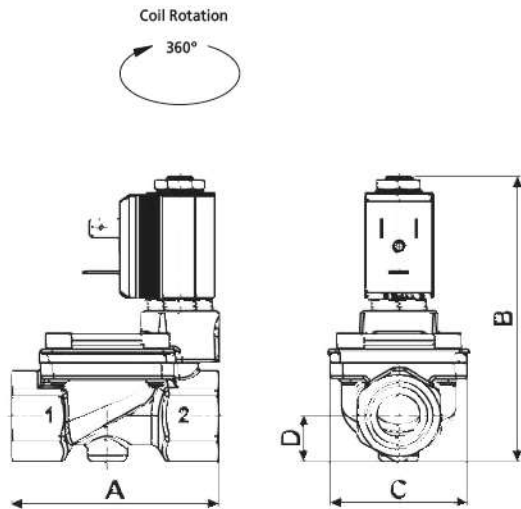
Options Available

Valve Options (see coding chart)
G parallel thread (ISO 228-1)

Seal Material ² and Media Temperature Range	Media	Ambient Temperature Range	
		Min	Max
NBR 14 °F to 194 °F (-10 °C to +90 °C)	Water, oil, air	14 °F (-10 °C)	122 °F (+50 °C)
FKM 14 °F to 266 °F (-10 °C to +130 °C)	Water, oil, air	14 °F (-10 °C)	122 °F (+50 °C)
EPDM 14 °F to 248 °F (-10 °C to +120 °C)	Water, hot water	14 °F (-10 °C)	122 °F (+50 °C)

² See corrosion reference guide and sealing solutions for material compatibility.

LC203/204/205 Series, General Purpose – 2/2 Normally Closed, latching



Preferred Valve Mounting Options



Pipe Size	A	B	C	D	Weight Lb (kg)
1/4 - 3/8 - 1/2	2.64 (67)	3.54 (90)	1.80 (45.6)	0.59 (15)	0.88 (0.4)

Dimensions inches (mm)

Solenoid enclosures

2-Q0 Type Coil - Insulation class F

External material: PBT (reinforced fiberglass 30%)
 Electrical connection: Industrial form B
 Winding insulation: Class H (E180)
 Enclosure classification: Conforms to NEMA type 4 (UL 50) and IP65 (according to EN 60529) with plug and gasket correctly fitted *



* Plug and gasket not supplied as standard, must be ordered separately.

Type 600 001- Plug

Rated Voltage (max.): 250 VAC / 300 DC
 Nominal Current: 10A (rated) / 16A (max)
 Wire cross-section: 0.0023 inch² max (1.5 mm² max)
 Cable Entry: PG9 (0.24 to 0.31 inch / 6 to 8 mm)
 Enclosure classification: Conforms to IP65 (according to EN 60529) with supplied gasket
 Insulation class: group C- VDE 0110
 Housing colour: black
 UL approved, file No: E205538



Coding chart

Main Valve Assembly

Pipe Size
03 1/4
04 3/8
05 1/2

Seals
B NBR
V FKM
E EPDM

Thread Pipe	Option
N NPT	w/o option
GAS	

Voltage / Frequency - Class F, Low Power
20Q0 6 VDC
21Q0 12 VDC
22Q0 24 VDC

Plug

Plug
w/o plug
081 c/w plug

LC	2	.	.	D	.	Z	N
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Product coding example:

LC205DBZN 20Q0
 1/2 NPT, auto operation, brass body, NBR seals, 3/8 orifice, 6 VDC, without plug.

Modes of Operation

Valve Selection

A solenoid valve should be chosen whenever the following conditions are met:

- ✓ Media without dirt particles
- ✓ Moderate flow volumes
- ✓ Average differential pressures
- ✓ High speed in operation
- ✓ Media with a viscosity not higher than 21 cST(3°E)

2/2 N/C Normally Closed



*Solenoid Operated
Direct Acting*



*Solenoid
Pilot Operated*

2 way, normally closed, energise to open, on/off operation (de-energise to close), with one inlet and one outlet connection. There are 2 types of valve operation – Direct Acting and Pilot Operated.

- a) Direct Acting – The coil supplies all the power to open the valve and the valve will operate from zero pressure.
- b) Pilot Operated – this can either be diaphragm or piston operated. These valves have a pilot hole which is opened/closed by the coil acting upon a plunger and diaphragm or piston used to control the main orifice. The operation relies on the media pressure difference between the inlet and outlet and a minimum operating pressure is required to operate these valves unless stated as zero.

2/2 N/O Normally Open



*Solenoid
Direct Acting*



*Solenoid
Pilot Operated*

2 way, normally open, energise to close, de-energise to open, with one inlet and one outlet connection. Can be either direct acting or pilot operated.

3/2 N/C Normally Closed



Valve open when energised, closed when de-energised. This valve operates on the same principle as the 2/2 N/C version except the valve has 3 connections, 2 orifices, one permanently open, one permanently closed. The use of these are for operation of actuators for large valves where single cylinder spring return system is employed.

3/2 N/O Normally Open



Valve open when de-energised, closed when energised.

3/2 UNI Universal



Valve may be used as normally closed, normally open or diversion/selector valve.

5/2



These valves are available in 2 forms;

- a) Single Solenoid – 2 position, spool and sleeve type, which is based on an air pilot return mechanism. When de-energised, the valve allows one inlet and one outlet to be connected, exhausting the other inlet/outlet connection through an exhaust port. On energisation, the action reverses.
- b) Dual Solenoid Valves – these spool and sleeve type solenoid valves are momentary contact type. When one coil is energised, one inlet is connected to one outlet, with the other inlet/outlet connection connected to an exhaust port, when the coil is de-energised and other coil energised, the action is reversed.

These valves are for use on double acting cylinder applications.

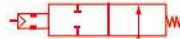
Modes of Operation

2/2 N/C Normally Closed Pneumatic



2 way, normally closed, pressurise to open, de-pressurise to close with the aid of a return spring, having one inlet and one outlet connection. Can be direct acting air operated against a return spring. Note: These valves are operated via a 3 way solenoid valve which is always required.

2/2 N/O Normally Open Pneumatic



2 way, normally open, pressurise to close, de-pressurise to open with the aid of a return spring, having one inlet and one outlet connection. Can be direct acting air operated against a return spring. Note: These valves are operated via a 3 way solenoid valve which is always required

2/2 N/C Normally Closed Motorised



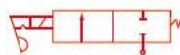
2 way, normally closed, energise to open – (slow opening) de-energise to close – (quick closing) with one inlet and one outlet connection. Motor driven against a return spring.

2/2 N/O Normally Open Motorised



2 way, normally open, energise to close – (slow closing) de-energise to open – (quick opening).

2/2 N/C Normally Closed Manual Reset (Solenoid)



These valves operate on the same principle as 2/2 N/C direct acting version except – once the coil is energised the valve will not open until manually opened by either a lever or push reset device.

2/2 N/C Normally Closed Manual Reset (Motorised)



The operation is similar to 2/2 N/C Normally Closed Manual Reset (Solenoid) except, once the motor is energised the valve will not open till a manual reset/relay button is operated, either remote or integral to the actuator. General use is for both manual reset or safety systems where knowledge of an electrical failure is required.

Optional Features

Manual Override

Normally closed direct acting and pilot operated solenoid valves (only versions specified in each datasheet) can be supplied with a manual override which allows the valve to be opened independently of electrical current.

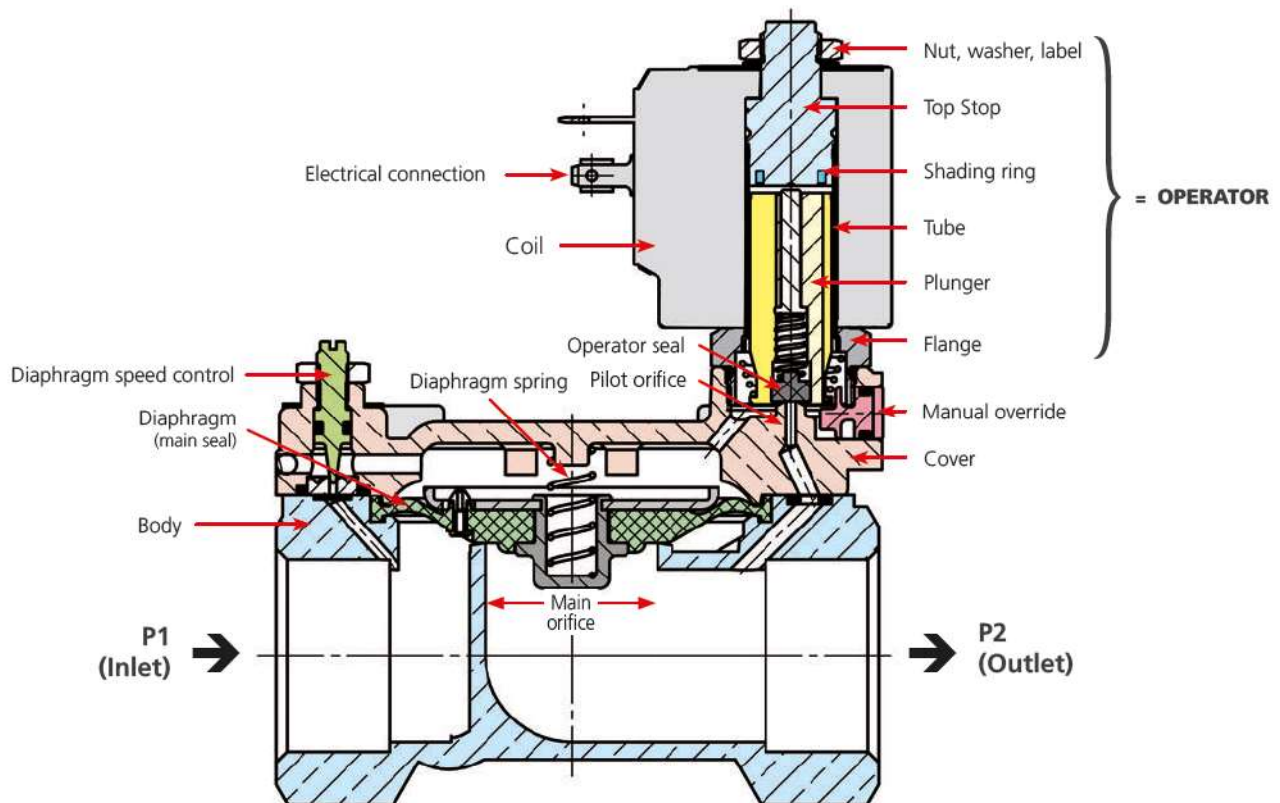
Waterhammer Control

Pilot operated solenoid valves (only versions specified in each datasheet) can be supplied with a system that regulates the closing speed of the diaphragm in order to control waterhammer.

The seal closing speed is operated by the adjusting screw: by screwing it clockwise (in the “+” direction) when using liquid, the valve will close slower reducing any waterhammer effect that may occur in the solenoid valve and the upstream pipes.

In the case of larger valves (1¼”, 1½” and 2”), please adjust the anti-waterhammer screw to ensure that that valve closes as slowly as possible in order to avoid causing any damage that may affect the functioning of the equipment and valve due to the waterhammer effect.

Scheme of Components of Solenoid Valves



Quality Standards

Rotork has a management system certified to ISO 9001, ISO 14001 & OHSAS 18001.

Certifications and approvals



The Ex mark signifies that a product complies with the ATEX Directive 94/9/EC (applicable up to 20th April 2016 but already implemented by Directive 2014/34/EU, effective from 18th April 2014).

The ATEX Directive sets the safety requirements of protection equipment and systems to be used in an environment with a potentially explosive atmosphere.

The Ex mark on a product enables its free movement within the European market (EEA).



Underwriters
Laboratories
Quality Certificate

The UL Listing mark on a product signifies that the product meets UL's Standards for Safety. The UL Listing mark appears on products and components suitable for factory and field installation.

All of the products carrying a UL Listing mark are covered by UL's Follow-up services program to verify that the products continue to be manufactured in compliance with UL's Safety Requirements.

We manufacture and resell valve coils and timers complying with UL 429 and 746C.

The cURus Listing mark on the products indicates that the compliance is accepted both in USA and Canada.

RoHS

The Restriction of Hazardous Substances Directive (RoHS) 2011/65/EU regards the restriction of the use of Lead (Pb), Cadmium (Cd), Mercury (Hg), Hexavalent chromium (Cr6+), Polybrominated biphenyls (PBB) and Polybrominated diphenyl ether (PBDE) in electrical and electronic equipment sold in the European Union.

RoHS is meant to prevent the release of these substances into the environment and protect the human, animal and environmental health, especially during the waste treatment. The CE mark on a product guarantees the compliance with the RoHS Directive.



European
Community
Conformity

The CE marking was introduced in 1993 upon establishment of the European Economic Area. It regulates the entire life cycle of a product: design, manufacturing, placing on the market, disposal and enables its free movement within the European market (EEA).

CE marking signifies that the product conforms with the essential applicable EC requirements, such as safety, public health, consumer protection, and gives the product the presumption of conformity.

By affixing the CE mark on a product, manufacturers and importers are declaring, at their sole responsibility, conformity with all of the legal requirements of the Directive. EC directives that apply to our products are:

Machinery directive

EMC Directive

Low Voltage Directive (2006/95/EC)

The directive 97/23/EC concerns safety of pressure bearing equipment.

The directive 2011/65/EU (RoHS) limits the use of dangerous substances in electrical and electronic equipment.

Miscellaneous

Upon request (to be specified at the time of the Purchase Order) we can provide the following inspection documents, which are also related to requirements of the PED Directive 2014/68/EC as additional evidence of the technical requirements of supplies:

For metal parts in stainless steel AISI 316L or 304L the inspection certificate 3.1 according to the standard EN 10204 (this certificate is mandatory only for products in categories above I, see PED 2014/68/EC ANNEX I, art. 4.3).

For all products the Test Report 2.2 according to the standard EN 10204, is relevant for products in category I or SEP.