

rotork®

Keeping the World Flowing
for Future Generations



R series

RDx-S-AC-xxxPx-10.3 user manual



 **HANBAY INC.**
A rotork® Brand



RDx-S-AC-xxxPx-10.3 Fail-Safe

(110-240 VAC; Spring Return; Limit Switch Feedback; For internal & ball valves)

Hazardous Location (Only models RDx-S-AC-**B**xxxPx w/ ex-proof lid engraving)

USER MANUAL

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INTENDED USE

Rotork R-Series actuators are intended to be used in combination with any valve to regulate the flow automatically. The output of the actuator is rotary or linear, and is paired with the valve stem to achieve the desired flow control.

MANUFACTURER DETAILS

Rotork manufactures the R-Series actuator at the following facilities:

Hanbay Inc.
135 Brunswick Blvd.
Pointe-Claire, QC H9R5N2 Canada

Fairchild Industrial Products Company
3920 West Point Blvd.
Winston Salem, NC 27103 USA

MEANING OF SYMBOLS



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.



The Lightning Flash with arrowhead symbol within an equilateral triangle, is intended to alert the user to the presence of un-insulated "dangerous voltage" within the product enclosure that may be of sufficient magnitude to constitute a risk of shock to persons.

INSTALLATION

The safety of any system incorporating the equipment is the responsibility of the assembler of the system. Any parts found to be defective should be examined and/or replaced by Rotork.

Environmental Conditions

The R-Series actuator has an IP68 rating and is recommended for outdoor use. The relative humidity of the environment has no effect on the R-Series.

The ambient temperature range for the standard R-Series is -20 to 40 °C (-4 to 104 °F).
The internal heater option shifts the temperatures to a lower range of -40 to 40 °C (-40 to 104 °F).

The standard R-Series has been approved for use at altitudes of up to 2000 m.



Mounting

The holes indicated in the image are intended for a mounting bracket. They are threaded for 1/4-20 and are 0.4" deep.

Grounding and Securing

The other two visible holes are threaded 10-32, 0.50" deep, and are intended to be used to lock the lid in position (top) and as an external grounding connection (bottom) using user-supplied screws.

For detailed dimensions see p.11.

Additionally, there is a grounding connection supplied internally.



Wiring

Wiring for Explosion Proof Actuators



The **RDx-S-AC-BxxPx** Explosion-Proof actuator does **not** come with a pre-installed cable, nor cable gland. A cable gland that meets site specifications for the appropriate hazardous location rating is required for installation. The cable gland and the cable for hazardous location should be installed by qualified personnel in accordance with site and local requirements.

The actuator comes standard with a 1/2" FNPT thread cable entry. See p.11 for location of 1/2" FNPT housing access. A cable with 7 wires is required; it is recommended to use 3x 16 AWG for wires supplying power and ground, and 4x 20 AWG for wires used for the control and feedback signals.



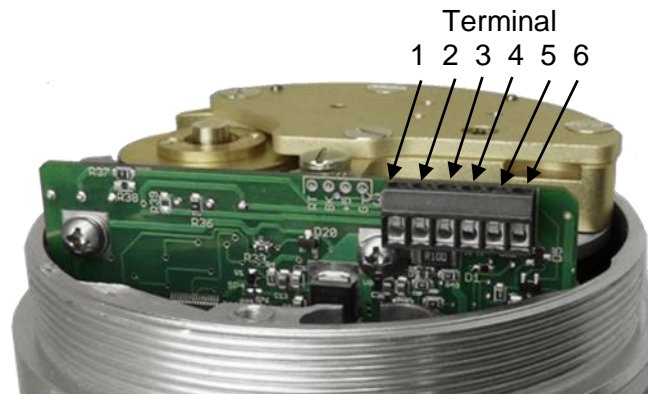
Standards for cable gland and cable in hazardous locations:

Compliance Standards Required to be Met	Cable Types Permitted in Class I Division 1 Hazardous Locations
ANSI / UL 514B, ANSI / UL 1203, ANSI / UL 2225, C22.2	Non-Armored Extra Hard Usage Cord & TC-ER-HL
ANSI / UL 514B, ANSI / UL 1203, ANSI / UL 2225	Armored IEEE 45 & IEEE 1580 Marine Shipboard Cable
ANSI / UL 514B, ANSI / UL 1203, ANSI / UL 2225	MC-HI, ITC-HL
ANSI / UL 514B, ANSI / UL 1203, C22.2	Teck 90 (Canada Only)

* In explosion-proof models, the FNPT thread is not intended for conduit connection. Cable gland only.

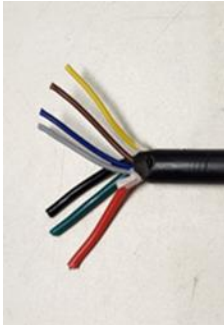
Once the cable and cable gland are installed, connect the wires to the pins on the terminal block as indicated here:

Pin	Description
6	Already connected to power supply (connect live wire to loose black cable with crimp connector, see p. 6)
5	Already connected to power supply (connect neutral wire to loose white cable with crimp connector, see p.6)
4	Signal (provide 24 V)
3	Limit Switch Common
2	Limit Switch - Valve Closed
1	Limit Switch - Valve Open



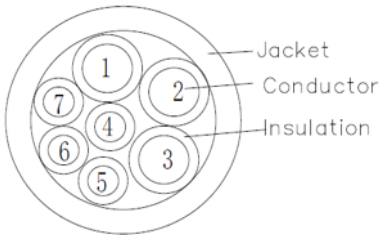
Wiring for Non-Explosion Proof actuators

The actuator comes standard with a pre-installed cable gland and a 10' cable. Cut the cable to the length required, then connect according to the following wire color schematic:



Wire color schematic for cable

Colour	Function
Red (1)	Live 110-240 VAC (18 AWG)
Black (2)	Neutral 110-240 VAC (18 AWG)
Green (3)	Ground \perp (18 AWG)
Blue (4)	Signal (provide 24 V)
Brown (5)	Limit Switch Common
Grey (6)	Limit Switch - Valve Closed
Yellow (7)	Limit Switch - Valve Open

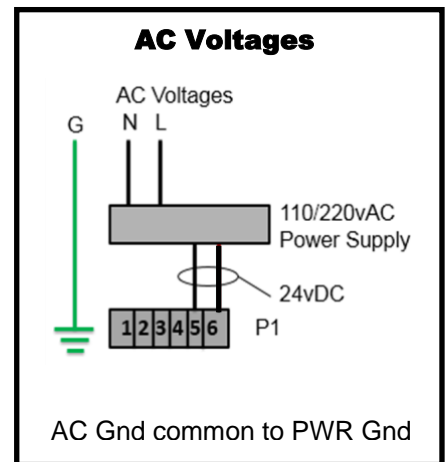


Power Supply and Current Draw

The **RDx-S-AC-xxxPx** actuator may be connected to voltages ranging within 110-240 VAC at 50/60 Hz. The AC supply to the actuator must be limited by a 2 A fuse or circuit breaker; it is recommended to have this installed near the actuator.

The current draw will range from minimum 10 mA to maximum 1.5 A while the actuator is active. When not moving, the actuator draws approx. 5 mA.

AC power is connected to the **WHITE & BLACK** wires with crimp connectors (WM18225-DN & WM18230-ND 18-22 AWG). Ground is connected on the **GREEN** ground screw, shown below.



AC Input
Black – Live
White – Neutral

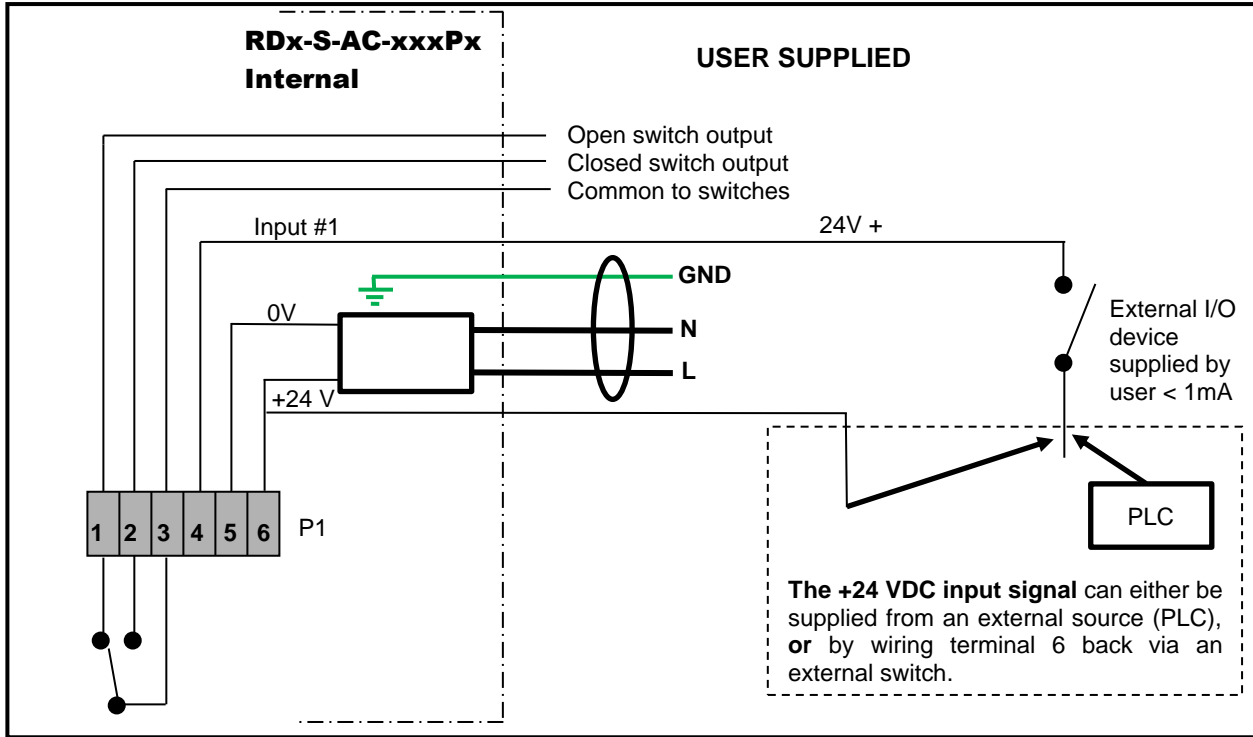


Internal Wires for 24vDC
White +24vDC
Black 0vDC

Ground Connection

Control Signal and Feedback

Locate the correct connection terminals/wires, as shown on the previous page, then connect your input signal on position 4 (green wire), as shown below.



GENERAL SPECIFICATIONS

Stall protection	Electronic position and motion detection
Gears & Bearings	Metal and bronze, oiled/greased for life
External fasteners	Stainless Steel
Life Expectance	250'000 cycles in specified conditions
Motor	Brushless DC
Motor Control	By current sense and motion detection
Positioning precision	$\pm 3^\circ$
Power setting	Adjustable
Mechanical Shock	Repeated ≤ 130 g-force, no effect Occasional ≤ 150 g-force, no effect >150 g-force not tolerated
Mechanical Vibration	Random SAE J1211, Chassis, Exterior
Thermal Shock	-20 to +60 °C (-4 to 140 °F) in 10 min.
Weight	1620 g

OPERATION

Functionality

Input #1 (Terminal 4)	Action taken
Low (gnd.)	Moves to or remains in closed position
High (+24 VDC)	Moves to or remains in open position

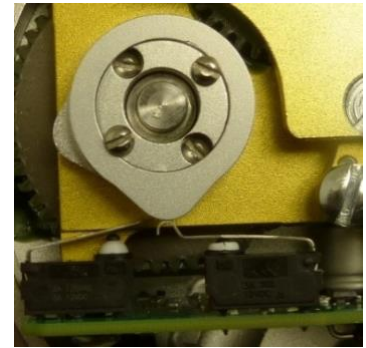
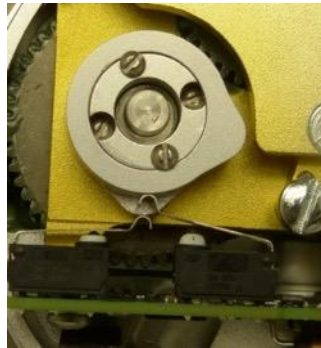
Spring Return

The spring-return add-on closes the attached valve whenever power is turned off or lost for any reason.

Feedback via Limit Switches

Actuator Position	Action taken
Open	Terminal 1 is connected to Terminal 3
Closed	Terminal 2 is connected to Terminal 3
In between	Nothing is connected to Terminal 3

Limit switches are triggered mechanically when the actuator is fully closed or fully open.



IMPORTANT: The limit switches are rated for 3 A @ 125 VAC and @ 12 VDC. Exceeding this will lead to damage, preventing the actuator from working properly.

Torque and Speed

Model	Torque [in-lbs]	Speed Range [time to open]	Speed Range [time to close]
RDM (internal valves)	140	4	2 (2 sec power loss)
RDM (ball valves)	40	4	2 (time upon power loss depends on valve)

Note: Opening and closing times are for the actuator. The valve may be fully open or closed before the actuator reaches these limits.

Safety Features

Fusible Link

This part is used only in combination with internal valves. It is UL approved and will fail mechanically at 100 °C (212 °F).

Upon failure, the valve becomes de-coupled from the actuator, allowing the valve to be shut by its own spring.



Thermal Cutoff

This part is used with all valves. It is UL approved and found on the PCB board within the actuator enclosure, as shown below. When a temperature of 128 °C (262 °F) is reached, it severs the electrical connection, making the actuator close itself via spring-return.



CERTIFICATIONS

Hazardous Location Rating (Ex)

Actuator model number: RCx-**B**xxAx

Canada:

Class I, Division 1, Groups B, C, D (T5)
Class II, Division 1, Groups E, F, G (T5)

CSA C22.2 No. 30-M1986
CSA C22.2 No. 25-17

Ambient temperature range: -50°C to +40°C

* Serial number will be engraved on lid.
Lid engraving with Canadian hazardous location certification:



USA:

Class I, Division 1, Groups B, C, D (T5)
Class II, Division 1, Groups E, F, G (T5)

UL 1203 (Edition 5.0)

Ambient temperature range: -20°C to +40°C

* Serial number will be engraved on lid.
Lid engraving with USA hazardous location certification:



International (IECEx) – available upon request:

Ex db IIB+H2 T3 Gb

IEC 60079-0:2017, 7th Edition
IEC 60079-1:2014, 7th Edition

*Serial number will be engraved on the lid.

Electrical Compliance (EC)

Canada & USA:

CSA.UL 61010-1

Europe:

EC Declaration of Conformity (CE)

UK Declaration of Conformity (UKCA)

Electromagnetic Compatibility (EMC)

United States:

FCC 47 CFR Part 15, Subpart B (Unintentional radiators), Class A

Canada:

ICES-001 Issue 5, July 2020, Class A

Europe:

EN 61326-1:2013 (Group 1, Class A; Industrial electromagnetic environment)

IEC 61000-6-2:2016

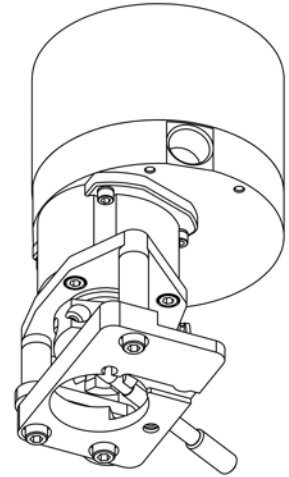
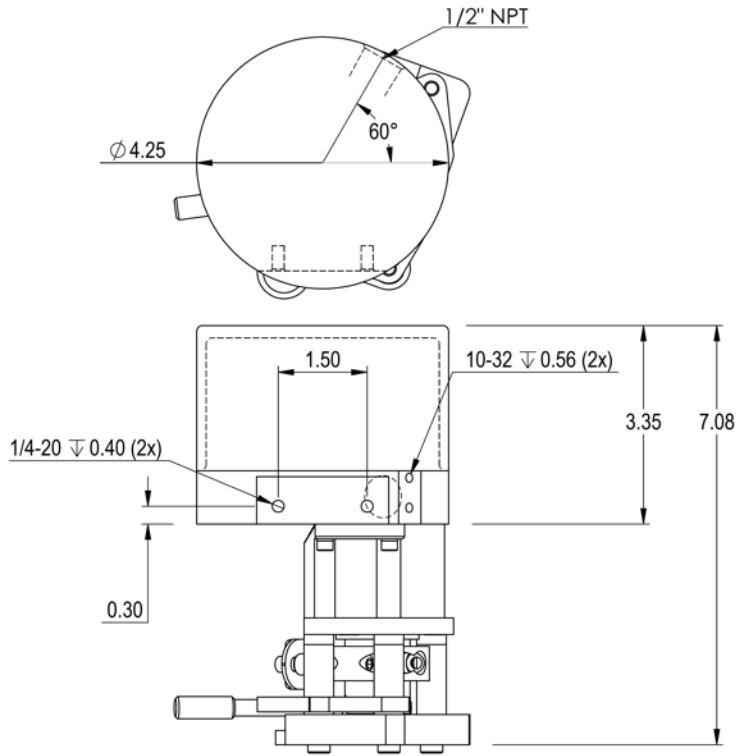
IEC 61000-6-4:2018

Dust and Water Ingress Protection (IP)

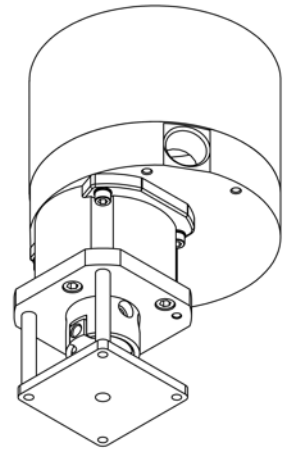
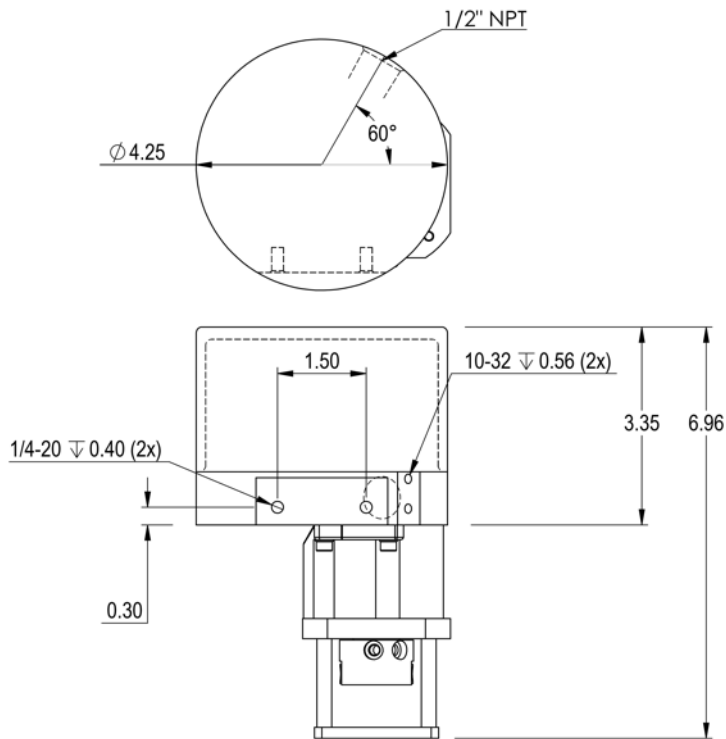
IP68, certified using standard IEC 60529:2013.

ACTUATOR DIMENSIONS

RDM-S-xxxPx models (internal valves)



RDM-S-xxxPx models (ball valves)



PART NUMBER BREAKDOWN

Full Part Number: R D - S - AC - Px - -

	Base Enclosure	Positioning	Gear Train	Special Options	Enclosure Options	Wiring	Thermal Management	PCB	Mounting Kit	Valve Part Number
R			-						-	Valve Manufacturers Part # / CU #
R	R-Series									0 No Valve or Mounting Kit 1 Mounting Kit, Customer Supplies Valve, does not send valve to Hanbay 2 Mounting Kit, Customer Supplies Valve, sends valve to Hanbay 3 Mounting Kit, Hanbay Provides Valve
C	Continuous									
D	Discrete									
J	Extra Low Torque									
L	Low Torque									
M	Medium Torque									
H	High Torque (Add. Gear Stage)									
F	F-Gear Stage (Add. Gear Stage)									
										AB Analog Signal Board AF Analog Signal Board Isolated with Feedback AI Analog Signal Board Isolated Input AS Modbus Control with Feedback DC24 Continuous TTL Board, 0V input / 24V feedback signal DC5 Continuous TTL Board, 0V Input / 5V feedback signal DT24 Discrete TTL Board, 0V Input / 24V feedback signal DT5 Discrete TTL Board, 0V Input / 5V feedback signal PT Propane Board, Limit Switches, Thermal Cut Off
										0 No Option H Internal Heater
										0 Cable Gland (Specify Cable & length at added cost) *If the actuator has an ex-proof enclosure, 0 indicates an NPT plug 4 Custom Dual Gauge Cable, 10ft. 5 TURCK 5 Position Connector w. 20' Cable and Plug 6 TURCK 6 Position Connector w. 20' Cable and Plug 7 TURCK 5 Position Connector Only 9 TURCK 6 Position Connector Only
										0 Standard Anodised Alloy Enclosure B Hazardous Locations-Rated S Stainless Steel Enclosure E Stainless Steel Hazardous Locations-Rated
										0 No Special Options AC 110-240 VAC Power Supply B Battery Backup BS Bottom Stop G G-Stage Gate Valve (with MCM or MCL) HT High Temperature Mounting Kit L1 Linear 16 TPI L2 Linear 8 TPI M Manual Override PM Position Indicator (Multi-turn) QR Quick Release Mounting Kit RS Reverse Spring Return S Spring Return

LABEL BREAKDOWN

Firmware Version

AF-1.05 } MM = Multiturn
 AB-1.05 } MML = Multiturn Low Torque
 AS-1.05 } MMUL = Multiturn Extra Low Torque
 QM = Quarter turn
 QM97 = Quarter turn 97°
 DT-2.01
 DC-2.01
 M-Dx V2.34

Actuator Supply Voltage

12-24 VDC @ 3.0 A or
 110-240 VAC, 50/60 Hz @ 1.5 A

Circuit Board Version

Ax-8.09
 Dx-10.41
 Px-10.3

rotork
HANBAY

www.hanbayinc.com
 (336) 659 3400
 NC, 27103



110-240 VAC, 50/60Hz, 1.5A

Ax-8.09
 AB-1.05MM

User Manual:

RCM-AC-050AB

POWER OFF UNIT BEFORE REMOVING COVER

Made in USA

S/N: 19103201-01



Actuator Part Number

Refer to part number breakdown for available options.

QR Code

Scan this QR code for a direct link to the user manual for your unit!

Actuator Serial Number

This serial number is unique for each individual unit and is directly tied to your order/invoice number.

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