

# rotork®

Keeping the World Flowing  
for Future Generations



## R series

RDx-S-xxxPx-10.3 user manual



 **HANBAY INC.**  
A rotork® Brand



## RDx-S-xxxPx-10.3 Fail-Safe

(12-24 VDC; Spring Return; Limit Switch Feedback; For Internal & Ball Valves)

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

# USER MANUAL

## Contents

<b><u>INTENDED USE</u></b>	<b>3</b>
<b><u>MANUFACTURER DETAILS</u></b>	<b>3</b>
<b><u>MEANING OF SYMBOLS</u></b>	<b>3</b>
<b><u>INSTALLATION</u></b>	<b>3</b>
Environmental Conditions	3
Mounting	4
Grounding and Securing	4
Wiring	5
<i>Wiring for Explosion Proof Actuators</i>	5
<i>Wiring for Non-Explosion Proof Actuators</i>	6
Power Supply and Current Draw	6
Control Signal	7
<b><u>GENERAL SPECIFICATIONS</u></b>	<b>8</b>
<b><u>OPERATION</u></b>	<b>9</b>
Functionality	9
<i>Spring Return</i>	9
<i>Feedback via Limit Switches</i>	9
Torque and Speed	9
Safety features	10
<i>Fusible Link</i>	10
<i>Thermal Cutoff</i>	10
<b><u>CERTIFICATIONS</u></b>	<b>11</b>
Hazardous Location Rating (Ex)	11
Electrical Compliance (EC)	12
Electromagnetic Compatibility (EMC)	12
Dust and Water Ingress Protection (IP)	12
<b><u>ACTUATOR DIMENSIONS</u></b>	<b>13</b>
<b><u>PART NUMBER BREAKDOWN</u></b>	<b>14</b>
<b><u>LABEL BREAKDOWN</u></b>	<b>14</b>

## 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-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 6 wires is required; it is recommended to use 16-24 AWG for all wires.



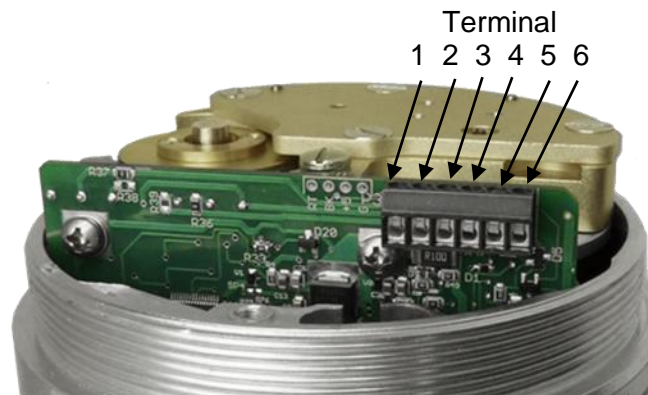
#### Standards for cable gland and cable in hazardous locations:

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:

Terminal #	Description
6	+24 VDC (± 20%)
5	Power gnd.
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 Turck 6-position connector and a 20' cable (6x 22 AWG) with plug. Cut the cable to the length required, then connect according to the following wire color schematic.

Pins indicate the connection of the cables to the terminal block on the PCB board within the actuator. These are pre-wired at the factory for non-explosion proof actuators.

### Wire color schematic for "Turck 6" cable:

Pin	Colour	Description
6	White	+24 VDC ( $\pm 20\%$ )
5	Black	Power gnd.
4	Blue	Signal (provide 24 V)
3	Brown	Limit Switch Common
2	Grey	Limit Switch - Valve Closed
1	Pink	Limit Switch - Valve Open



**Note:** Power ground must be externally connected to earth ground, or one of the case grounding screws (see **Grounding and Securing** section) must be used to connect a grounding wire of minimum 22AWG.

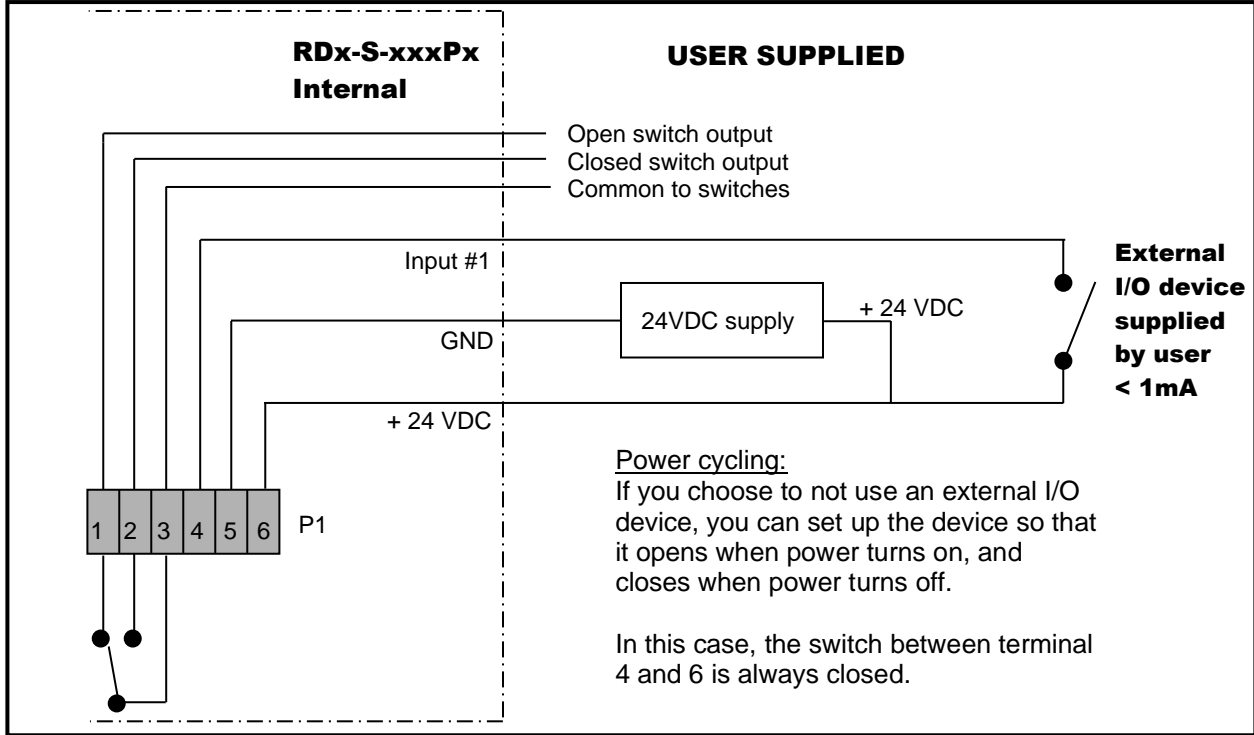
## Power Supply and Current Draw

The **RDx-S-xxxPx** may be connected to voltages ranging within 12-24 VDC. The DC supply to the actuator must be limited by a 4 A fuse or circuit breaker; it is recommended to have this installed near the actuator.

The current draw will range from minimum 100 mA to maximum 3 A while the actuator is active. When not moving, the actuator draws approx. 50 mA.

## Control Signal

Locate the correct connection terminals/wires as shown on the previous page, then connect your input signal on terminal 4 (blue wire for non-explosion proof models), as shown below.



## GENERAL SPECIFICATIONS

<b>Stall protection</b>	Electronic position and motion detection
<b>Gears &amp; Bearings</b>	Metal and bronze, oiled/greased for life
<b>External fasteners</b>	Stainless Steel
<b>Life Expectance</b>	250'000 cycles in specified conditions
<b>Motor</b>	Brushless DC
<b>Motor Control</b>	By current sense and motion detection
<b>Positioning precision</b>	$\pm 3^\circ$
<b>Power setting</b>	Adjustable
<b>Mechanical Shock</b>	Repeated $\leq 130$ g-force, no effect Occasional $\leq 150$ g-force, no effect >150 g-force not tolerated
<b>Mechanical Vibration</b>	Random SAE J1211, Chassis, Exterior
<b>Thermal Shock</b>	-20 to +60 °C (-4 to 140 °F) in 10 min.
<b>Weight</b>	1500 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

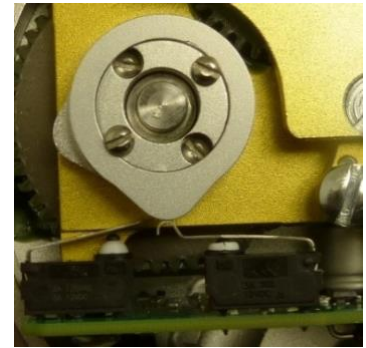
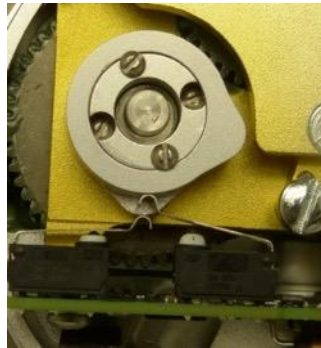
### Spring Return

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 (IECEEx) – 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

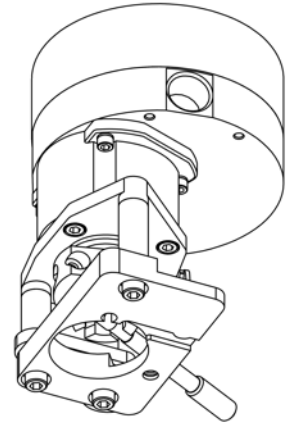
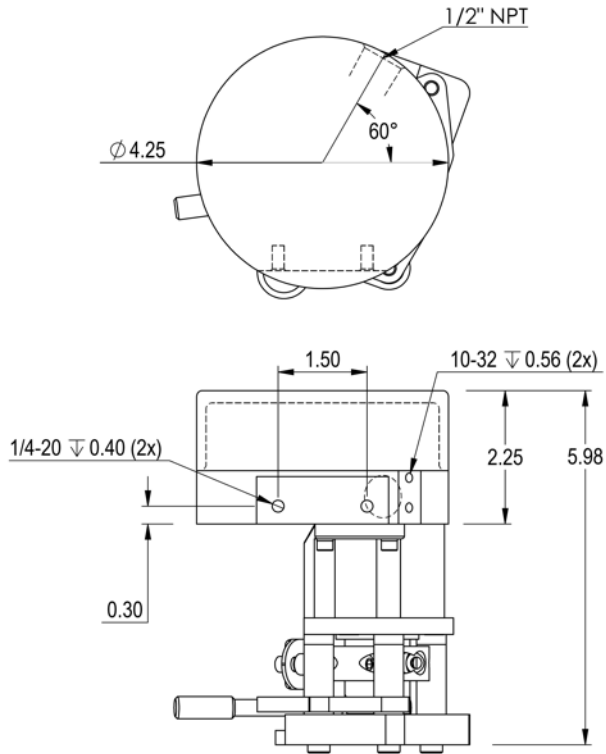
IEC 61000-6-4:2018

## Dust and Water Ingress Protection (IP)

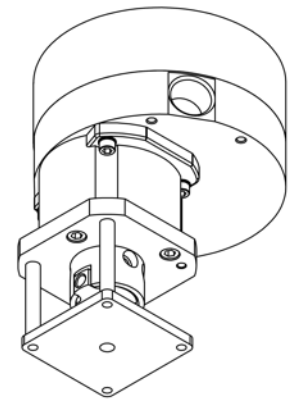
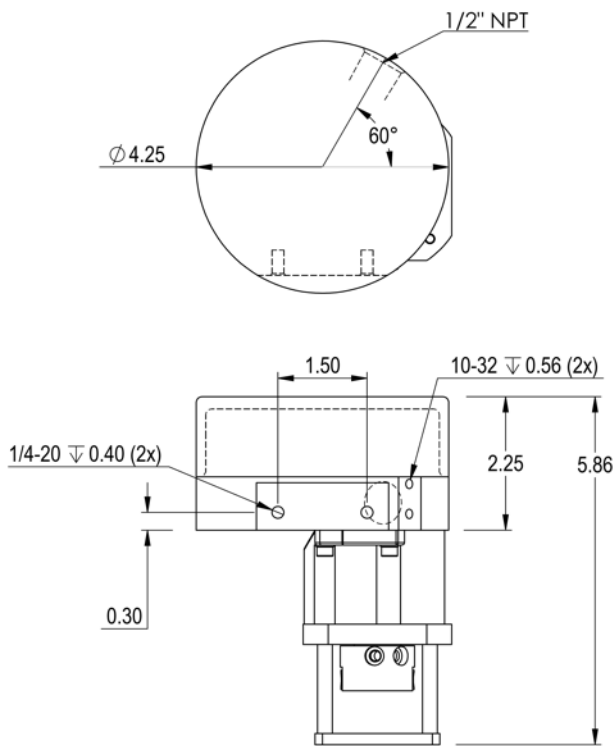
IP68, certified using standard IEC 60529:2013.

# ACTUATOR DIMENSIONS

## RDM-S-xxxPx models (internal valves)



## RDM-S-xxxPx models (ball valves)



# PART NUMBER BREAKDOWN

Full Part Number:

**R** **D**  - **S** -    **Px** -  -

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


### Actuator Series

M-Series or R-Series

### Circuit Board Version

Ax-8.09  
 Dx-10.41  
 Px-10.3

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**HANBAY**

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

R-Series 12-24 VDC 3.0A

**RCM-050AB**

POWER OFF UNIT BEFORE REMOVING COVER

Made in USA

S/N: 19103201-01

Ax-8.09  
 AB-1.05MM

User Manual:



### Actuator Part Number

Refer to part number breakdown for available options.

### Actuator Serial Number

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

### QR Code

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

As part of a process of on-going product development, Rotork reserves the right to amend and change specifications without prior notice. Published data may be subject to change. For the very latest version release, visit our website at www.rotork.com  
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