MDx-xxxDT-4.06

Contents

Installation

Mounting:

Usually, the actuator has to be mounted and supported as shown in the picture to the left.

Exceptionally, and only if the application is vibration free and the tubing is minimum ¼" dia. stainless, the actuator may be suspended on the tubing itself.

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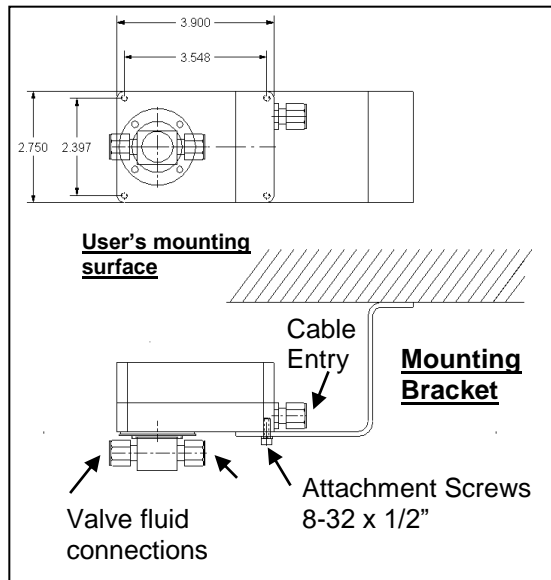
Wiring:

The actuator comes standard with a Turck 6 position connector and a 20' cable with plug. Cut the cable to the length required and then connect according to the following wire color schematic:

Wire color schematic for "Turck6" cable:

Pin	Colour	Function
6	White ->	+24VDC
5	Black ->	Power Gnd
4	Pink ->	Output TT2
3	Grey ->	Output TT1
2	Blue ->	Signal TT2
1	Brown->	Signal TT1

Otherwise, if the Turck cable is not included in your actuator, see pg.8 for more detailed wiring instructions.

Connect the power:

The **MDx-xxxDT** may be connected to voltages ranging from 12 – 24 VDC

The power consumption will range from max. 3.0A to approx min. 100mA when the actuator is active. When not moving, the actuator draws around 30mA.

Terminal
1 2 3 4 5 6

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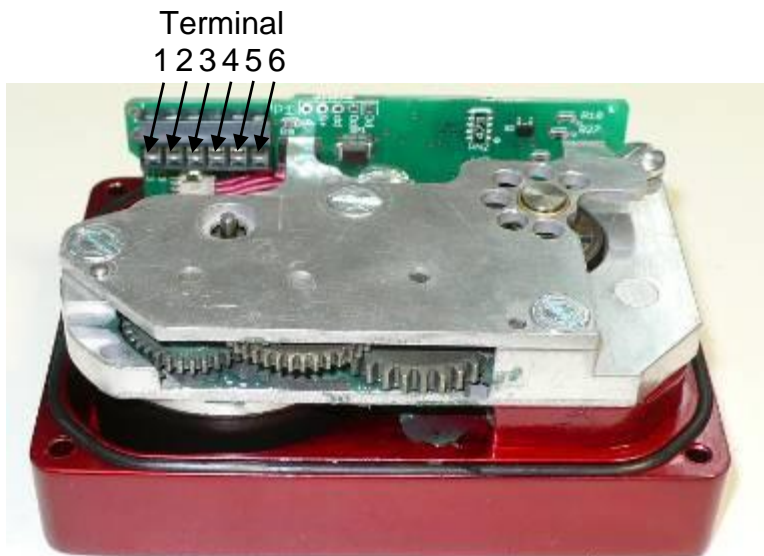
Connect the signal:

Locate the correct connection terminals as shown on the previous page then connect your input signal on pos. 1 and 2 and the output signals on 3 and 4 as shown below.
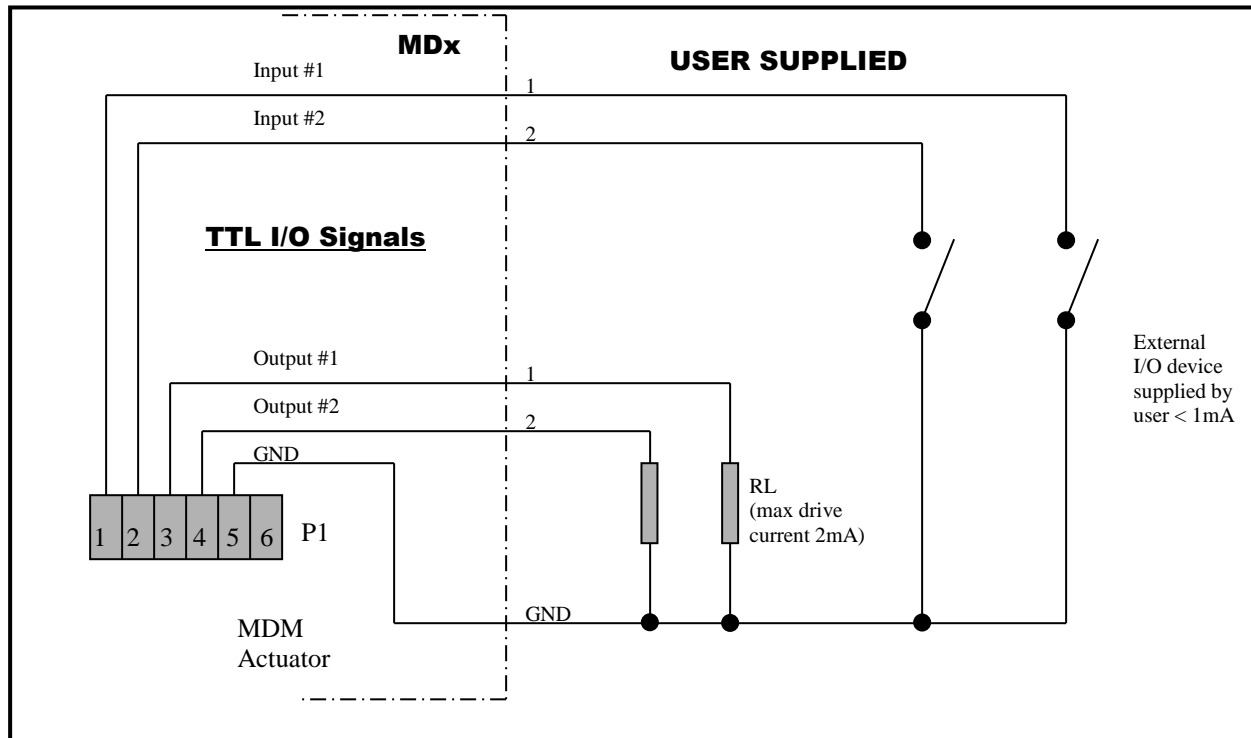

Operation

DIP switches:

The DIP switches allow you to change the settings on your actuator. To flip a switch, gently use a small flat-head screwdriver. See chart below for DIP switch functionality.
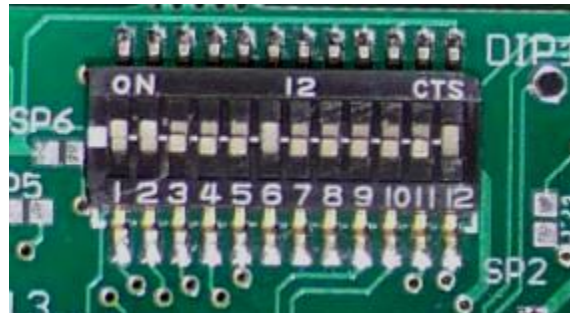
DIP switches. In this example DIPs 1, 2, 6 and 12 are on.

DIP	Function
1	Speed: Choose how quickly the actuator will turn the drive wheel. See pg 6-7.
2	DIPs 1 and 2 are the regular speed settings.
3	
4	DIPs 3-5 are the extra-slow settings. When any of these are active, DIPs 1 and 2 are disabled.
5	
6	Set actuator type. See pg 5.
7	
8	When on, actuator is set for 4 positions.
9	Re-calibrate. See pg 5.
10	Power: Set how much torque the actuator exerts on the valve lever. See pg 5-7.
11	
12	Direction of rotation. See pg 4.

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Functionality of the MDx-xxxDT:

The MDx can operate as a 3-position or 4-position actuator. The 4th position is enabled by turning Dip 8 ON.

3-pos Functionality (Dip 8 OFF)

Input#1 (Pin 1)	Input#2 (Pin 2)	Action taken
High	High	Moves to or remains in center position
Low	High	Moves to or remains in right position
High	Low	Moves to or remains in left position
Low	Low	Moves to or remains in left position (Input#2 has precedence over Input #1)

The feedback from the MDx-xxxDT is as follows:

Output#1 (Pin 3)	Output#2 (Pin 4)	Meaning
High	High	Actuator output is in center position
High	Low	In Right position
Low	High	In Left position
Low	Low	Actuator is moving, or has stalled and given up trying to reach a requested position. You may retry to reach any position by cycling alternate inputs and trying the original again. Repeated failures to reach position will require troubleshooting.
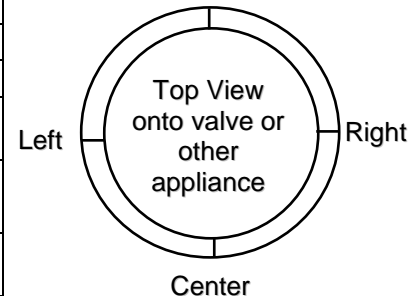
4-pos Functionality (Dip 8 ON)

Input#1 (Pin 1)	Input#2 (Pin 2)	Action taken
High	High	Moves to or remains in center position
Low	High	Moves to or remains in right position
High	Low	Moves to or remains in left position
Low	Low	Moves to or remains in back position

The feedback from the MDx-xxxDT is as follows:

Output#1 (Pin 3)	Output#2 (Pin 4)	Meaning
Low	Low	Actuator is at requested position
High	Low	Actuator is moving
Low	High	Actuator has stalled. The stall can be cleared by making the actuator turn in the other direction.
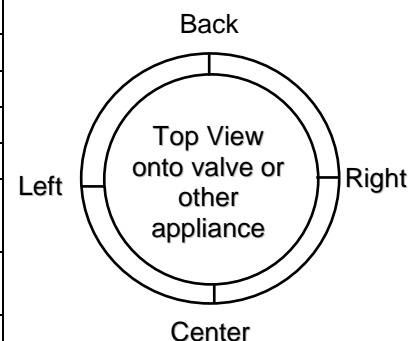
Direction of rotation and using Input 1

To change the direction of rotation on the actuator change the setting on Dip12 and power up the actuator again.

⚠️ VERY IMPORTANT: Input 1 must always be used if only one input is used to operate the valve. When the actuator is operated using input 1 an automatic calibration is done every time the valve is actuated. This does not happen on input 2.

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Torque Settings:

Effect of power settings and speed settings:
To accommodate different valves and other applications, with different torque requirements, the actuator can be set to apply different torques on the valve stem.

Please see the box to the right and the tables on the following pages to select the power setting that is right for your application.

The actuator will try to reach the speed set by Dip1 and Dip2. If the torque required is too high, the actuator will automatically slow down and deliver the maximum available torque for a given "Permanent Power Setting",
i.e: the torque shown in line 1 of the tables on pg 6-7.

Permanent power settings:		
Dip10	**Dip11**	**Power**
Off	**Off**	**16%**
Off	**On**	**33%**
On	**Off**	**66%**
On	**On**	**100%**

⚠️ **Note: 66% setting and 100% setting may alter duty cycle:**
- When operating above 66% power, Duty cycle is reduced to 50% - 25% maximum. At these levels, the electronics produce more heat which must be dissipated (depending on environmental temperature)

Setting the type of actuator

The actuator electronics must be set to correctly operate with the mechanical assembly based on the amount and ratio of gears of the actuator. The factory default should always be left in place but in the event of an upgrade or change to the mechanics of the actuator Dip settings 6 and 7 as outlined in the table sets the actuator to a specific type:

Actuator type:		
Dip6	**Dip7**	**Type**
Off	**Off**	**Reserved**
Off	**On**	**MDM**
On	**Off**	**MDH**
On	**On**	**MDU**

Calibration

The center position calibration routine can be initiated by switching Dip9 momentarily "on" then "off". This will cause the actuator to go through a series of movements to determine the proper center position. This function is useful if the actuators output gear gets manually rotated while the actuator is powered down and can't properly realign to the center by itself.

Troubleshooting:

Upon noticing a problem, your first step should almost always be to recalibrate the actuator by switching DIP 9 on then off, all while the actuator is powered. This alone can solve basic problems. See above for instructions.

If the actuator does not move, try following these steps:
1) Re-calibrate the actuator. This will move the actuator regardless of what signal it is receiving.
2) A sticking valve may be the problem. Remove the valve from the actuator, and re-test the actuator.
3) Remove power. Re-check the wiring and the power/signal apparatus. Power actuator, and re-calibrate. If the problem persists, please call Hanbay for technical support.

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Appendix

Speed Settings:

The maximum speed of the actuator can be set by using the first two positions of the **DIP switch selector**.
As a result of this setting, the actuator will limit the maximum speed. The tables below show the maximum torques that can be expected at the given maximum speeds. DIPs 1 and 2 will have effect on the speed only if DIPs 3, 4 and 5 are OFF.
The torque available also depends on the voltage provided in the power connection and on the Permanent Power settings on DIP 10, 11 as shown on pg 5.

Speed and Torque of MD**M**-xxxDT Actuators

Dip1	Dip2	Time for 1/4 turn (sec)	Torque in in-lbs 16% Power*		Torque in in-lbs 33% Power*		Torque in in-lbs 66% Power*		Torque in in-lbs 100% Power*	
			12VDC	24VDC	12VDC	24VDC	12VDC	24VDC	12VDC	24VDC
OFF	OFF	4	6	15	13	30	27	60	40	90
OFF	ON	3	5	13	11	27	21	53	32	80
ON	OFF	2	4	12	7	23	15	47	22	70
ON	ON	1	N/A	11	N/A	22	N/A	43	N/A	65

To convert in-lbs to Nm, divide the in-lbs value by 9

Speed and Torque of MD**H**-xxxDT Actuators

Dip1	Dip2	Time for 1/4 turn (sec)	Torque in in-lbs 16% Power*		Torque in in-lbs 33% Power*		Torque in in-lbs 66% Power*		Torque in in-lbs 100% Power*	
			12VDC	24VDC	12VDC	24VDC	12VDC	24VDC	12VDC	24VDC
OFF	OFF	15	22	51	44	101	91	203	135	304
OFF	ON	11	17	44	37	91	71	179	108	270
ON	OFF	8	14	41	24	78	51	159	74	236
ON	ON	4	N/A	37	N/A	74	N/A	145	N/A	219

To convert in-lbs to Nm, divide the in-lbs value by 9

Speed and Torque of MD**U**-xxxDT Actuators

Dip1	Dip2	Time for 1/4 turn (sec)	Torque in in-lbs 16% Power*		Torque in in-lbs 33% Power*		Torque in in-lbs 66% Power*		Torque in in-lbs 100% Power*	
			12VDC	24VDC	12VDC	24VDC	12VDC	24VDC	12VDC	24VDC
OFF	OFF	60	86	203	176	405	365	810	540	1215
OFF	ON	45	68	176	149	365	284	716	432	1080
ON	OFF	30	54	162	95	311	203	635	297	945
ON	ON	15	N/A	149	N/A	297	N/A	581	N/A	878

To convert in-lbs to Nm, divide the in-lbs value by 9

N/A in these tables means:
The actuator will not be able to reach the requested speed for this combination of power / voltage / speed settings. It will always run slower to be able to overcome the internal torque requirements, so these setting can be applied but the full speed will not be reached.

Set the slow speed:

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The actuator speed can be reduced by using DIPs 3, 4 and 5. When the slow speed setting is being used, DIPs 1 and 2 will not control the speed any more.

The torque available also depends on the voltage provided in the power connection and on the Permanent Power settings on DIP 10, 11 as shown below. *

Slow speed and Torque of MD**M**-xxxDT Actuators

Dip3	Dip4	Dip5	Time for ¼ turn (sec)	Torque in in-lbs 16% Power*		Torque in in-lbs 33% Power*		Torque in in-lbs 66% Power*		Torque in in-lbs 100% Power*	
				12VDC	24VDC	12VDC	24VDC	12VDC	24VDC	12VDC	24VDC
OFF	OFF	OFF		Dip1 and Dip2 speed setting							
OFF	OFF	ON	5	6	15	13	30	27	60	40	90
OFF	ON	OFF	10	6	15	13	30	27	60	40	90
OFF	ON	ON	20	6	15	13	30	27	60	40	90
ON	OFF	OFF	40	6	15	13	30	27	60	40	90
ON	OFF	ON	80	6	15	13	30	27	60	40	90
ON	ON	OFF	160	6	15	13	30	27	60	40	90
ON	ON	ON	320	6	15	13	30	27	60	40	90

Slow speed and Torque of MD**H**-xxxDT Actuators

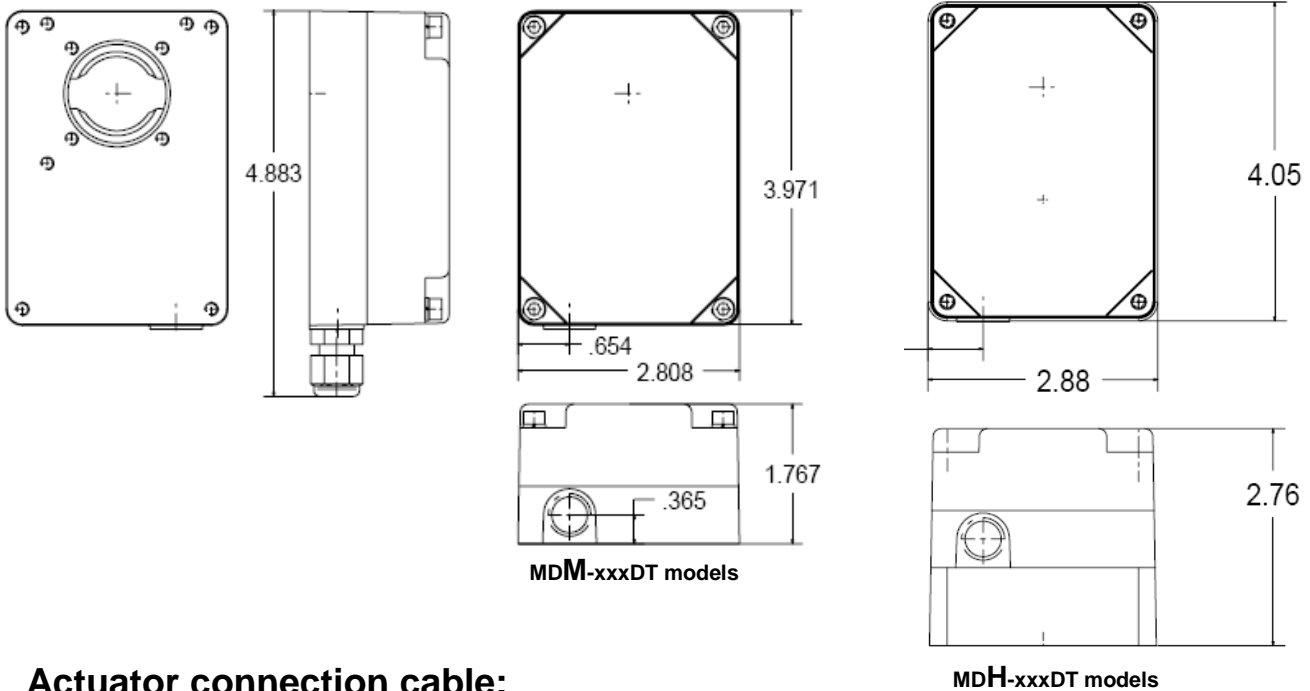| Dip3	Dip4	Dip5	Time for ¼ turn (sec)	Torque in in-lbs 16% Power*		Torque in in-lbs 33% Power*		Torque in in-lbs 66% Power*		Torque in in-lbs 100% Power*	
				12VDC	24VDC	12VDC	24VDC	12VDC	24VDC	12VDC	24VDC
OFF	OFF	OFF		Dip1 and Dip2 speed setting							
OFF	OFF	ON	11	22	51	44	101	91	203	135	304
OFF	ON	OFF	11	22	51	44	101	91	203	135	304
OFF	ON	ON	20	22	51	44	101	91	203	135	304
ON	OFF	OFF	40	22	51	44	101	91	203	135	304
ON	OFF	ON	80	22	51	44	101	91	203	135	304
ON	ON	OFF	160	22	51	44	101	91	203	135	304
ON	ON	ON	320	22	51	44	101	91	203	135	304

Slow speed and Torque of MD**U**-xxxDT Actuators

Dip3	Dip4	Dip5	Time for ¼ turn (sec)	Torque in in-lbs 16% Power*		Torque in in-lbs 33% Power*		Torque in in-lbs 66% Power*		Torque in in-lbs 100% Power*	
				12VDC	24VDC	12VDC	24VDC	12VDC	24VDC	12VDC	24VDC
OFF	OFF	OFF		Dip1 and Dip2 speed setting							
OFF	OFF	ON	50	108	253	219	506	456	1013	675	1519
OFF	ON	OFF	50	108	253	219	506	456	1013	675	1519
OFF	ON	ON	50	108	253	219	506	456	1013	675	1519
ON	OFF	OFF	50	108	253	219	506	456	1013	675	1519
ON	OFF	ON	80	108	253	219	506	456	1013	675	1519
ON	ON	OFF	160	108	253	219	506	456	1013	675	1519
ON	ON	ON	320	108	253	219	506	456	1013	675	1519

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Main Dimensions

MDM-xxxDT models

MDH-xxxDT models

Actuator connection cable:

Select a connection cable with 6 leads.

The liquid tight strain relief on the base of the actuator is designed to accommodate a cable of **O.D. 2.5 - 6.5mm (0.10 - 0.26in)**. Be sure to not use a cable with an OD that is no bigger than this!

1
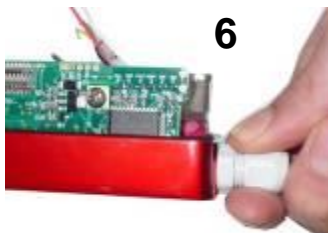
1.- Remove the liquid tight fitting from the actuator casing and insert the cable into it.

2

2.- The cable has to be stripped of its jacket for 2 inches (50mm) and the wires need 1/8" (3mm) stripped ends.

3

3.- Bend the wires so that insertion becomes easy.

4

4.- Carefully insert the cable into the actuator base. Mind the red motor cable and its plug into the board. Moving the plug out of its fully inserted position may cause malfunction of the actuator.

5

5.- Put the liquid tight fitting back and tighten (lightly with tool).

6

6.- Hand tighten the liquid tight fitting to establish seal.

7

7.- Connect wires according to your application (see pg 2).

8

8.- Mount actuator cover and tighten 4 screws.

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Factory presetting

Invoice No:
Line item   :

Full Hanbay Part Number: | M | D | | - | | | | D | | - | | - | |

Hanbay Electronics: | D | | | |

Hanbay Firmware: | D | | | |

Valve Manufacturer:

Valve Type:

☐ Ball Valve

☐ Plug Valve

☐ Other (specify)

Number of positions: 2 ☐   3 ☐   4 ☐

We have set your actuator(s) at our factory after mounting the valve and for testing the assembly.

The Dipswitch settings we applied to your actuator are: (1="On", 0="Off")

Dip1	Dip2	Dip3	Dip4	Dip5	Dip6	Dip7	Dip8	Dip9	Dip10	Dip11	Dip12

Notes & recommendations:

FIRMWARE SETTINGS	
TICK_MS	20
ZERO_POS	25000
C_POS_OFFSET	0
DEGREES_PER_MOVEMENT	90
MAX_STALL_PERIOD	15
MDM_L_DEAD_BAND	30
MDH_U_DEAD_BAND	60
MAX_FULL_SPEED	30
STALL_CLEAR_COUNT	30
SIGNAL_FILTER_MS	60
TOTAL_TIME_1_MS	5000
TOTAL_TIME_2_MS	10000
TOTAL_TIME_3_MS	20000
TOTAL_TIME_4_MS	40000
TOTAL_TIME_5_MS	80000
TOTAL_TIME_6_MS	160000
TOTAL_TIME_7_MS	320000
MDM_STEPS_PER_CHANGE	11
MDH_STEPS_PER_CHANGE	27
MDU_STEPS_PER_CHANGE	150

MODEL NUMBER

M ☐ ☐ - ☐ ☐ ☐ ☐ ☐ - ☐ - ☐

Valve Manufacturers Valve Part Number/CU Number

0 No Valve or Mounting Kits
1 Mounting Kits Only
3 Valve with Mounting Kits, Mounted Assembly
4 Swagelok Bracket, Mounting Kits
5 Swagelok Bracket, Valve with Mounting Kits, Mounted Assembly
6 Drive lever only
7 External Stop

AB Analog Signal Board Base Model
AI Analog Signal Board Isolated Model
AF Analog Signal Board Isolated with Feedback
DC Continuous TTL Input Board
DT TTL Input Board
SB Serial-Analog Signal Board Base Model
SI Serial-Analog Signal Board Isolated Model

DF Continuous TTL Input Analog Feedback
EF Continuous 24V TTL Input Analog Feedback
ET 24V TTL Input Board

0 Nothing Special
5 Remote Control Potentiometer
6 Remote Control Selector Switch
H Heater

0 Nothing Special
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
8 TURCK 6 Position Connector only

0 Nothing Special
B Explosion proof B
C Explosion proof C
X Custom [see CU Number]
M Manual Override
P Position Indication
S Stainless Housing SS316

L Low   **J** – Low Power Motor
M Med   **K** – Low Power Motor
H High   **D** – Low Linear
U Ultra High   **E** – Med Linear

D Discrete
C Continuous

M – BLDC Miniature Actuator

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