

# MDx-AC-xxxDT-10.41 (120-240 VAC; TTL Control)

# **USER MANUAL**

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# INSTALLATION

## Mounting

In most cases, the actuator must be mounted and supported as shown in the image to the right. The mounting bracket is not supplied by Hanbay.

Exceptionally, the actuator may be suspended on the tubing itself but ONLY if the application is vibration free and the tubing is minimum  $\frac{1}{4}$ " dia. stainless.



## Wiring

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 colour schematic for cable:

Colour	Function
Red (1)	Live 120-240 VAC (16 AWG)
Black (2)	Neutral 120-240 VAC (16 AWG)
Blue (3)	Ground 上 (16 AWG)
Green (4)	Output TTL2 (20 AWG)
Grey (5)	Output TTL1 (20 AWG)
Yellow (6)	Signal Input TTL 2 (20 AWG)
Blue (7)	Signal Input TTL 1 (20 AWG)



If the cable is not included with your actuator, connect the wires according to the chart below:

Pin	Function
6	Already connected to power supply
	(connect live wire to loose red cable, see below)
5	Already connected to power supply
	(connect neutral wire to loose black cable, see below)
4	Output TTL2
3	Output TTL1
2	Input TTL2
1	Input TTL1



## **Power Supply and Current Draw**

The MDx-AC-xxxDT may be connected to voltages ranging within 120-240 VAC.

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.



## **Control Signal and Feedback**

## MDx-AC-xxxDT5

Actuators with part numbers MDx-AC-xxxDT5 have the standard 5 V TTL control and feedback signals. Locate the correct connection terminals/wires (as shown on the previous page), then set-up the PLC as shown below.

- Connect your input signal on positions 1 and 2 (brown and blue wires)
  The input signals are high by default (+5 V). To change the value, send a low signal (0 V).
  See the Functionality section for details
- Feedback is connected to positions 3 and 4 (grey and pink wires) The maximum drive current is 2.5 mA.



#### MDx-AC-xxxDT24

Actuators with part numbers MDx-AC-xxxDT24 have the 24 V TTL control and feedback signals. Locate the correct connection terminals/wires (as shown on the previous page), then set-up the PLC as shown below.

- Connect your input signal on positions 1 and 2 (brown and blue wires)
  The input signals are low by default (0 V). To change the value, send a high signal (+24 V).
  See the Functionality section for details.
- Feedback is connected to positions 3 and 4 (grey and pink wires) The maximum drive current is 0.5 A.



# **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 the table below for DIP switch functionality.



In this example DIPs 1, 2, 5 and 12 are on.

DIP 1	DIP 2	Description	Recommended Use
Off	Off	Fastest settling	Use only for low torque valves
Off	On	Medium-fast	Typical setting
On	Off	Medium-slow	Typical setting
On	On	Slowest settling	Use for high torque valves

DIP switches 1 and 2 set the actuator position control parameters. High settling speed settings are suitable for fast positioning of light valves. Longer settling times will allow heavier valves to reach their target positions; trying to use a fast settling settling on a high torque valve will increase current consumption when holding position, and cause heating of the motor.

		Torque	Approximate	Ар	proximate sta	Il torque (in-	bs)
		description	stall current (A)	RDL	RDM	RDH	RDF
Off	Off	Low	1.0	63	212	430	715
Off	On	Medium-low	1.5	72	236	522	832
On	Off	Medium-high	2.0	77	243	525	949
On	On	High	3.0	83	247	532	1067

DIP switches 10 and 11 set the actuator torque. These settings are adapted to the valve at the factory. Wornin valves may require a higher torque setting after some time. The actuator will use 100% of available torque to try and reach maximum speed.



# Note: Medium-high and high settings require voltage supply minimum values as follows:

- Supply voltage needs to be min 14 VDC for medium-high
- Supply voltage needs to be 16 VDC for high
- When operating above 20 VDC and 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)

DIP 3	Reserved for custom function.
DIP 4	Sets direction of offset (offset only required in RDH and RDF models).
DIP 5	Sets the highest amount of offset, typically 12°. NOTE: To set maximum offset DIPs 5,6, and 7
	will need to be high for a total of 21°. The maximum offset can also be set differently at the
	factory (upon customer request).
DIP 6	Sets medium offset, typically 6°.
DIP 7	Sets the lowest amount of offset, typically 3°.
DIP 8	With DIP 8 in the ON position, the actuator will move to 4 positions. When DIP 8 is in the OFF
	position, the actuator is limited to three positions. DIP 8 also changes the function of the output
	signals. See p.7 for details.
DIP 9	Run / Calibrate
	Putting DIP 9 into the off position will disable the actuator positioning control, and the motor will
	not move regardless of the input signals.
	When DIP 9 is moved back into the on position, the actuator will perform its homing routine, and
	then move to the position commanded by the input signals.
DIP 12	DIP 12 sets the direction of rotation

## Functionality

The MDx-AC-xxxDT can operate as a 3-position or 4-position actuator. The 4<sup>th</sup> position is enabled by turning DIP 8 ON.

#### Direction of rotation and using input 1

To change the direction of rotation on the actuator change the setting on DIP 12 and cycle power to the actuator.



**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.

## MDx-AC-xxxDT5

Inputs 1 & 2 (pins 1 & 2) are HIGH by default – a LOW signal must be sent to change the value. High  $\geq$  4.5 VDC Low  $\leq$  0.8 VDC



Sending a signal of more than 24 VDC may be harmful to the internal circuit board.

#### 3-pos Functionality (DIP 8 OFF)

Input #1 (Pin 1)	Input #2 (Pin 2)	Action taken
High	High	Moves to or remains in centre 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-xxxDT5 is as follows:

Output #1 (Pin 3)	Output #2 (Pin 4)	Meaning
High	High	Valve is in centre position
High	Low	Valve is in right position
Low	High	Valve is 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 both inputs one after the other. Repeated failures to reach position will require troubleshooting.

# Left (Input #2) Centre

#### 4-pos Functionality (DIP 8 ON)

Input #1 (Pin 1)	Input #2 (Pin 2)	Action taken
High	High	Moves to or remains in centre 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
т	he feedbac	k from the MDx-xxxDT <mark>5</mark> is as follows:
T Output #1 (Pin 3)	he feedbac Output #2 (Pin 4)	k from the MDx-xxxDT <mark>5</mark> is as follows: Meaning
T Output #1 (Pin 3) Low	The feedbac Output #2 (Pin 4) Low	k from the MDx-xxxDT5 is as follows: Meaning Actuator is at requested position
T Output #1 (Pin 3) Low High	The feedbac Output #2 (Pin 4) Low Low	k from the MDx-xxxDT5 is as follows: Meaning Actuator is at requested position Actuator is moving



## MDx-AC-xxxDT24

Inputs 1 & 2 (pins 1 & 2) are LOW by default – a HIGH signal must be sent to change the value. High  $\geq$  20 VDC Low  $\leq$  0.8 VDC



Sending a signal of more than 24 VDC may be harmful to the internal circuit board.

#### 3-pos Functionality (DIP 8 OFF)

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

#### The feedback from the MDx-xxxDT24 is as follows:

Output #1 (Pin 3)	Output #2 (Pin 4)	Meaning	
High	High	Valve is in centre position	
High	Low	Valve is in right position	(1)
Low	High	Valve is in left position	Ì
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 both inputs one after the other. Repeated failures to reach position will require troubleshooting.	

# Left (Input #2) Centre

#### 4-pos Functionality (DIP 8 ON)

Input #1 (Pin 1)	Input #2 (Pin 2)	Action taken
Low	Low	Moves to or remains in centre position
High	Low	Moves to or remains in right position
Low	High	Moves to or remains in left position
High	High	Moves to or remains in back position
Т	he feedback	from the MDx-xxxDT24 is as follows:
T Output #1 (Pin 3)	he feedback Output #2 (Pin 4)	from the MDx-xxxDT24 is as follows: Meaning
T Output #1 (Pin 3) Low	he feedback Output #2 (Pin 4) Low	from the MDx-xxxDT24 is as follows: Meaning Actuator is at requested position
T Output #1 (Pin 3) Low High	he feedback Output #2 (Pin 4) Low Low	Actuator is at requested position      Actuator is moving



## Calibration

The center position calibration routine can be initiated by switching DIP 9 momentarily "off" then "on". This will cause the actuator to go through a series of movements to determine the proper center position. This function is useful if the actuator's 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 toggling DIP 9 while the actuator is powered. This alone can solve basic problems.

#### 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 recalibrate. If the problem persists, please call Hanbay for technical support.

# **ACTUATOR DIMENSIONS**

## MDJ, MDL & MDM -AC-xxxDT models







## MDH-AC-xxxDT models











## MDF-AC-xxxDT models







# LABEL BREAKDOWN

