VALVE POSITIONER
(for Modbus; built-in SSR)

MODEL **MEXM**

BEFORE USE ....

Thank you for choosing M-System. Before use, please check contents of the package you received as outlined below.
If you have any problems or questions with the product, please contact M-System's Sales Office or representatives.

■ PACKAGE INCLUDES:

Valve positioner (body + base socket)................................(1)
Terminating resistor (110 Ω, 0.25 W)................................(1)

■ MODEL NO.

Confirm Model No. marking on the product to be exactly what you ordered.

■ INSTRUCTION MANUAL

This manual describes necessary points of caution when you use this product, including installation, connection and basic maintenance procedures.

POINTS OF CAUTION

■ CONFORMITY WITH EU DIRECTIVES

• This equipment is suitable for Pollution Degree 2, Installation Category II (transient voltage 2500V) and Measurement Category II (control output, transient voltage 2500V). Reinforced insulation (Modbus or control output or feedback resistance to power: 300V and Modbus or feedback resistance to control output: 250V) is maintained. Prior to installation, check that the insulation class of this unit satisfies the system requirements.
• The equipment must be mounted inside a suitable fire enclosure.
• Altitude up to 2000 meters.
• The equipment must be installed such that appropriate clearance and creepage distances are maintained to conform to CE requirements. Failure to observe these requirements may invalidate the CE conformance.
• The actual installation environments such as panel configurations, connected devices, connected wires, may affect the protection level of this unit when it is integrated in a panel system. The user may have to review the CE requirements in regard to the whole system and employ additional protective measures* to ensure the CE conformity.
  * For example, installation of noise filters and clamp filters for the power source, input and output connected to the unit, etc.
• Install lightning surge protectors for those wires connected to remote locations.

■ POWER INPUT RATING & OPERATIONAL RANGE

• Locate the power input rating marked on the product and confirm its operational range as indicated below:
  100 – 240V AC rating: 85 – 264V, 50/60 Hz,
  approx, 1.5VA at 100V AC
  approx, 4VA at 200V AC
  approx, 6VA at 264V AC
  100 – 240V DC rating: 85 – 264V, approx, 1W

■ GENERAL PRECAUTIONS

• Before you remove the unit from its base socket or mount it, turn off the power supply and power to a motor for safety.

■ ENVIRONMENT

• Indoor use.
• When heavy dust or metal particles are present in the air, install the unit inside proper housing with sufficient ventilation.
• Do not install the unit where it is subjected to continuous vibration. Do not subject the unit to physical impact.
• Environmental temperature must be within -5 to +60°C (23 to 140°F) with relative humidity within 30 to 90% RH in order to ensure adequate life span and operation.

■ WIRING

• Do not install cables close to noise sources (relay drive cable, high frequency line, etc.).
• Do not bind these cables together with those in which noises are present. Do not install them in the same duct.

■ AND ....

• The unit is designed to function as soon as power is supplied, however, a warm up for 10 minutes is required for satisfying complete performance described in the data sheet.

COMPONENT IDENTIFICATION

Body   Base Socket

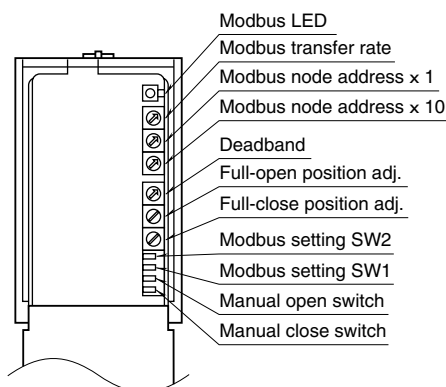Connection Diagram

Front Cover

Specifications
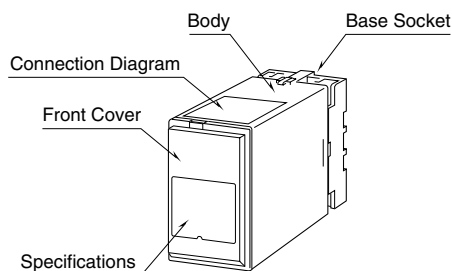
■ HOW TO OPEN THE FRONT COVER:

Position your finger on the hook at the top of the front cover and pull.
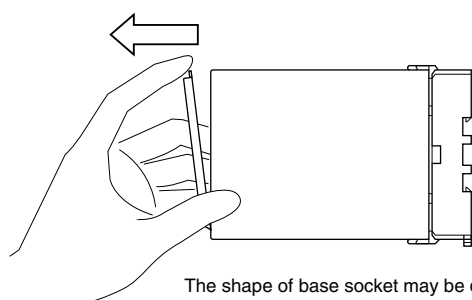
The shape of base socket may be different for some models.

■ FRONT PANEL CONFIGURATIONS

Modbus LED
Modbus transfer rate
Modbus node address × 1
Modbus node address × 10
Deadband
Full-open position adj.
Full-close position adj.
Modbus setting SW2
Modbus setting SW1
Manual open switch
Manual close switch

• Modbus LED

LED ON at power on, momently OFF with communication signal. With switch setting error, two blinks in 1 sec. interval are repeated.

Blinking pattern:

ON   ON

1 sec.
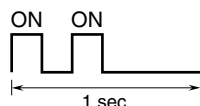
• Modbus setting

Transfer rate:

Transfer rate is configurable via frontal rotary switch. Set 0 – 3; 4 – 9 are unused.
   0: 38.4 kbps (factory setting)
   1: 19.2 kbps
   2: 9600 bps
   3: 4800 bps

Node address:

Node address (decimal number) tens and units places are configurable via frontal rotary switch. (1 – 99) (Factory setting: 00)

Parity, stop bit and data length

Parity, stop bit and data length are configurable via frontal Modbus SW1 and SW2.

Modbus setting		Parity	Stop bit	Data length
SW1	SW2			
OFF	OFF	None	2	8
ON (*)	OFF (*)	Even	1	8
OFF	ON	Odd	1	8
ON	ON	Unused		

(*) Factory setting

• Deadband adjustments

Select range from following table. (factory setting: 1.5%).

Deadband adj. SW	Deadband (%)
0	0.1
1	0.3
2	0.5
3	0.7
4	1.0
5	1.5
6	2.0
7	3.0
8	5.0
9	8.0

• Full-open position adj.

Feedback potentiometer's 75 – 100% position is configurable with full-open position adjustment.

• Full-closed position adj.

Feedback potentiometer's 0 – 25% position is configurable with full-closed position adjustment.

INSTALLATION

Detach the yellow clamps located at the top and bottom of the unit for separate the body from the base socket.

■ DIN RAIL MOUNTING

Set the base socket so that its DIN rail adaptor is at the bottom. Position the upper hook at the rear side of base socket on the DIN rail and push in the lower. When removing the socket, push down the DIN rail adaptor utilizing a minus screwdriver and pull.

Clamp (top & bottom)

DIN Rail 35mm wide

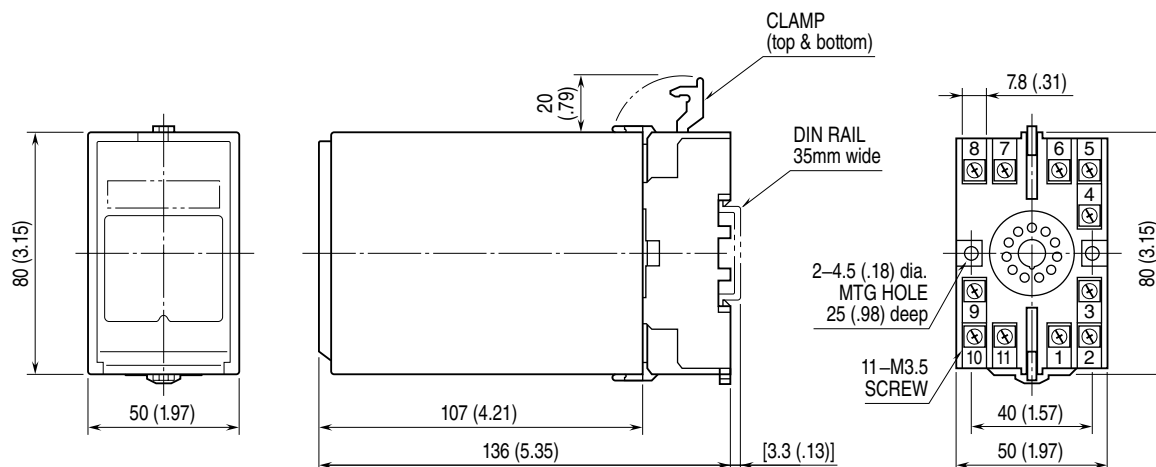Spring Loaded DIN Rail Adaptor
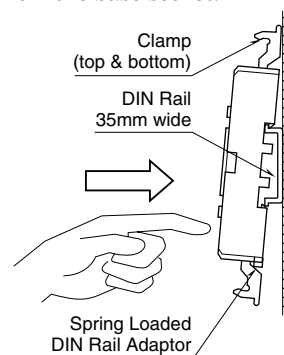
■ WALL MOUNTING

Refer to "EXTERNAL DIMENSIONS."

Shape and size of the base socket are slightly different with various socket types.
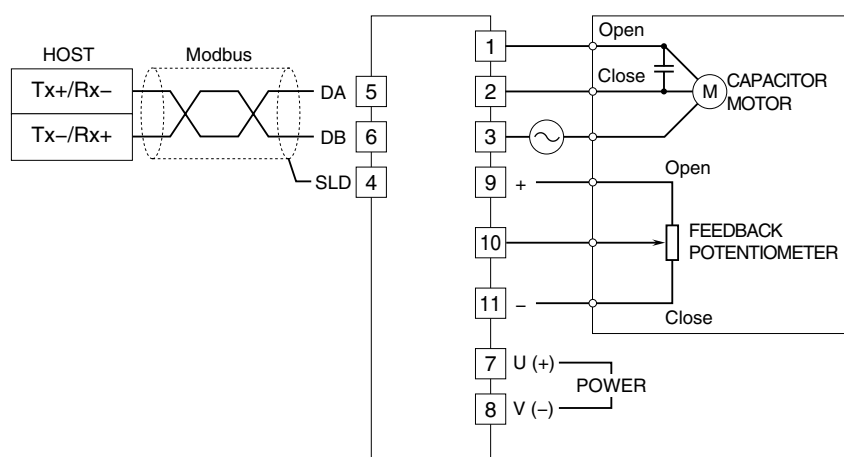
TERMINAL CONNECTIONS

Connect the unit as in the diagram below or refer to the connection diagram on the top of the unit.

■ EXTERNAL DIMENSIONS unit: mm (inch)

CLAMP
(top & bottom)

20 (.79)

DIN RAIL
35mm wide

7.8 (.31)

80 (3.15)

50 (1.97)

107 (4.21)

136 (5.35)

[3.3 (.13)]

2–4.5 (.18) dia.
MTG HOLE
25 (.98) deep

11 –M3.5
SCREW

80 (3.15)

40 (1.57)

50 (1.97)

• When mounting, no extra space is needed between units.

■ CONNECTION DIAGRAM

HOST   Modbus

Tx+/Rx−   DA 5

Tx−/Rx+   DB 6

SLD 4

1   Open

2   Close

3

9   +   Open

10   FEEDBACK
POTENTIOMETER
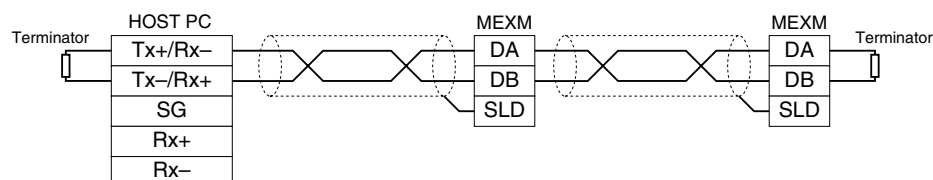
11   −   Close

M CAPACITOR
MOTOR

7   U (+)   POWER

8   V (−)

Notice that when limit switches inserted in motor wiring the
making/breaking may cause stress on the SSRs.

COMMUNICATION CABLE CONNECTIONS

■ HOST PC WIRING

Terminator   HOST PC   MEXM   MEXM   Terminator

Tx+/Rx−   DA   DA

Tx−/Rx+   DB   DB

SG   SLD   SLD

Rx+

Rx−

Connect terminating resistor between DA and DB of both ends of the unit.
Connect the attached terminating resistor to the MEXM.
Master unit is connectable also at both ends or other points.

CHECKING

1) Terminal wiring: Check that all cables are correctly connected according to the connection diagram.

2) Power input voltage: Check voltage across the terminal 7 – 8 with a multimeter.

3) Feedback potentiometer: Check voltage across the terminals 9 – 11 to show approx. 3.3V and 10 – 11 within 0 to approx. 3.3V.

4) Output: Check voltage across the output terminals.

MANUAL OPERATION

Even when there is no input signal from Modbus, there is the possibility to force the position to 0% or 100% using the manual operation switches (OPEN COM and CLOSE COM) in the panel accessible from the frontal side.

Manual operation switch has priority over the opening position from Modbus, therefore, when the control is intended to be from Modbus, be sure to turn off the manual operation switch.

Also turning both (open and close) switches on, both will be out of function.

ADJUSTMENTS

■ FULL-CLOSE POSITION

Turn manual close switch on or apply 0% setpoint signal and adjust the 0% position with full-close position adj. Adjustable within 0 to 25%. (factory setting: 0%)

■ FULL-OPEN POSITION

Turn manual open switch on or apply 100% setpoint signal and adjust the 100% position with full-open position adj. Adjustable within 75 to 100%. (factory setting: 100%)

Check once more full-close position and confirm there is no deviation, if so, adjust repeatedly.

After adjustment, be sure to turn off manual switches.

■ DEADBAND

Protect from hunting, adjusting deadband switch to the most significant value available.

It stops, immediately after a deviation goes into deadband range and the control will be recovered when it is out of the deadband range.

MODBUS SETTINGS

■ COMMANDS

The resistor allocation displayed on address map table , read to the next commands and writing is possible.

FUNCTION	COMMAND	FUNCTION
01	Read Coils	Read Coil (0X)
02	Read Discrete Inputs	Read Discrete Input (1X)
03	Read Holding Registers	Read Holding Register (4X)
04	Read Input Registers	Read Input Register (3X)
05	Write Single Coil	Write on Coil (0X)
06	Write Single Register	Write on Holding Register (4X)
15	Write Multiple Coils	Write on Coil (0X) (multiple addresses)
16	Write Multiple Registers	Write on Holding Register (4X) (multiple addresses)

It is recommended to wait for the response period beyond timeout value, 0.5 seconds, every time command is used.

When there is no response, perform error handling, such as a retry, appropriately.

■ ADDRESS MAP

TYPE	ADDRESS	NAME	FUNCTION
Coil (0X)	1 – 7	(reserved)	
	8	Start running	1: Drives motor to target position. 0: Stops motor (manual open/close swithces function is available)
	9	(reserved)	
	10	Clear motor lock alarm	Setting "1" to clear motor deadlock alarm. Checks motor deadlock alarm turned "0" and sets "0" on that bit.
	11 – 32	(reserved)	
Discrete Input (1X)	1	Motor closing output	0: OFF 1: ON "1" while closing
	2	Motor opening output	0: OFF 1: ON "1" while opening
	3 – 7	(reserved)	
	8	Motor deadlock alarm	0: Normal 1: Motor deadlock alarm at overload etc. Operation is stopped while motor lock alarm Stops alarm after checking the cause of the error using "motor lock alarm stop."
	9	(reserved)	
	10	System error	0: Normal 1: Abnormalities on the system about DIP switch status etc.
	11 – 32	(reserved)	
Input Register (3X)	1	Position output	Actual position of the feedback potentiometer is displayed. Signed: 0.01 % Unit: (e.g.: 100 = 1.00 %)
Holding Register (4X)	1	Target position input	Sets the intended position controlled motor from Modbus master. Signed: 0.01 % Unit: (e.g.: 100 = 1.00 %) Setting available range: -0.50 – +100.50 %

"(Reserved)" means address that is going to have an intended use in the future.

Value can be read or written at moment but when writing in a multiple addresses if straddling reservation address etc, to write on the reserved address, it is recommended to write "0."

"0" is read when there is no other assignation; it is not writable.

LIGHTNING SURGE PROTECTION

M-System offers a series of lightning surge protector for protection against induced lightning surges. Please contact M-System to choose appropriate models.