MX Series II Operating Manual

MX Series II
Modular Automation for Nano and Analytical Scale HPLC
And Low Pressure Fluid Switching Applications

IDEX

HEALTH & SCIENCE

Table of Contents

MX Series II Modules are self-contained automated valves available in a variety of flow paths for use in many applications. For multiple valve applications, the MX II's unique "Snap n' Stack" system allows modules to be stacked on top of each other or connected side to side to conserve bench space and reduce tubing connection volumes. Each module can be operated via push button, allowing the Module to function as a stand-alone manual valve, or can be operated remotely by contact closure, I^2C, RS-232, or USB for automated control.

Unpacking the Module

Inspect contents for damage and/or shortage. Keep the original packaging in case the device needs to be returned for repair.

Contents:

- ✓ MX Series II Module
- ✓ Power Supply
- ✓ Power Cord
- ✓ Interface cable
- ✓ USB cable
- ✓ Rubber feet (4)
- ✓ Jumper wires (3) **(for multi-position valves only)**
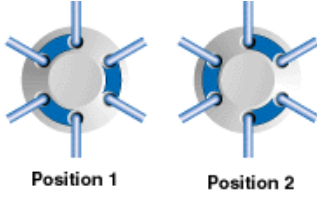- ✓ Fittings (varies by model)

Updates:

For the latest MX Series II documents please see web page: Operation Manuals & Instruction Cards (https://www.idex-hs.com/support/literature-downloads/operation-manuals).

MX II Flow paths

Two-Position

Six Port

Position 1   Position 2

MXT715-000 (Ultralife[TM], this model has MBB) MXP7900-000 (DuraLlife[TM]) MXP9900-000 (PEEK) MXP7980-000 Nano scale (DuraLife[TM] II) MXX777-601 (RPC-7) MXX777-612 (RPC-7)

Six Port- Vertical Port for Sample injection
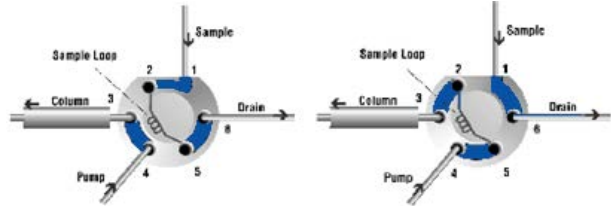
MXP7920-000 (DuraLlife[TM]II)

Six Port- Double Three-Way

MXX777-603 (RPC-7)
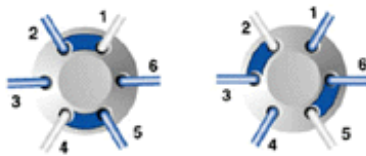
Ten Port

Position 1   Position 2
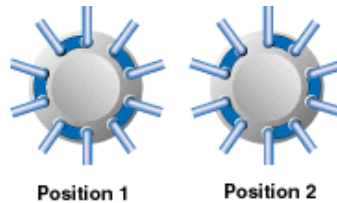
MXP7960-000 (DuraLlife[TM]) MXP9960-000 (PEEK) MXP7986-000 Nano scale (DuraLife[TM] II) MXT715-102 (SupraLife[TM])

Multi-position

Seven Port

MXT715-105 (Ultralife[TM]) MXP7970-000 (DuraLlife[TM]) MXX777-605 (RPC-7) MXX777-616 (RPC-7)

Eleven Port

MXX778-605 (RPC-7)

* Please note that these are representations of the flow paths and may not show the true positions

Specifications

Device Specifications

- Operating temperature range: 0º - 50ºC, non-condensing.

- Storage and shipping temperature: -20º - 65ºC.
  NOTE: Shipping, storing or operating this valve below 0°C with water in the fluid passages may cause failure of the sealing surfaces.

- Maximum operating pressures by model

0.9 MPa (9 bar, 125 psi)	**34 MPa (345 bar, 5000 psi)**
MXX777-601	MXP7980-000
MXX777-603	MXP7986-000
MXX777-605	MXP9900-000
MXX777-612	MXP9960-000
MXX777-616	
MXX778-605	

41 MPa (414 bar, 6000 psi)	**103 MPa (1034 bar, 15,000 psi)**
MXP7900-000	MXT715-000
MXP7920-000	MXT715-105
MXP7960-000	MXT715-102
MXP7970-000	

- Wetted surfaces by model

DuraLife™	**UltraLife™**
MXP7900-000	MXT715-000
MXP7920-000	MXT715-105
MXP7960-000	MXT715-102

DuraLife™ II (Biocompatible, titanium)	**PEEK (Biocompatible)**	**RPC-7 (Biocompatible)**
MXP7980-000	MXP9900-000	MXX777-601
MXP7986-000	MXP9960-000	MXX777-603
MXP7970-000		MXX777-605
		MXX777-612
		MXX777-616
		MXX778-605

- Connections by model

10-32 threaded fittings

MXP7900-000
MXP7920-000
MXP7960-000
MXP7970-000
MXP9900-000
MXP9960-000

10-32 threaded fittings with Ultra High Pressure ferrules
MXT715-000
MXT715-105
MXT715-102

M4 fittings

MXP7980-000
MXP7986-000

IDEX Health & Science Fitting-less Tubing Connection System (no threaded fittings required)
MXX777-601
MXX777-603
MXX777-605
MXX777-612
MXX777-616
MXX778-605

- Approximate Weight (varies by model):

  o MXT models: 0.96 kg (2.1 lb)
  o MXP models: 0.56 kg (1.2 lb)
  o MXX models: 0.46 kg (1.0 lb)

- Dimensions (HxWxD):

  o MXP and MXX models 11.7 cm (4.6 in) x 7.6 cm (3.0 in) x 15.7 cm (6.2 in)
  o MXT models 11.7 cm (4.6 in) x 7.6 cm (3.0 in) x 19.0 cm (7.5 in)

- CE Certification:
  o The CE mark represents compliance with emissions requirements for Class A products and the minimum immunity requirements of EN 61326-1:2013.

Cautions

- Use only contact closure, I^2C, RS-232 (if factory-set for RS-232), or USB for connections from your instrument or computer to the MX II Module.
- Do not supply more than 24 VDC to the MX II Module or it will be damaged.
- Rinse the valve after using buffer solutions to prevent the formation of crystals that can scratch and damage the sealing surfaces.
- Use only the supplied Universal Power Supply with the MX II Module.
- Operate within a temperature range of 0-50°C only, non-condensing.
- When controlling the module via I^2C, RS-232, or USB, make certain the module is not set to Level Logic control. Any other setting (BCD, Pulse logic, etc.) is acceptable.

Warnings

- Do not submerge the MX II Module in liquids.
- Confirm that there is adequate ground between the controlling instrument and the MX II Module. This is especially important with electrospray mass spectroscopy.
- Plug the Universal Power Supply into the MX II Module first, and then plug the Universal Power Supply into an AC power source.
- When disconnecting, unplug at the AC power source first.

General Description

The MX Series II Module is small and capable of both automated and manual control.

Available flow path configurations are shown on page 4. The diagrams are representations of the flow paths and may not show the true positions of the ports and grooves. The circles represent the ports in the valve stator. The grooves represent the connecting passages in the rotor seal.

All electrical and communication connections to the MX II Module are made at the rear panel.

Electrical Connections

- Plug the Universal Power Supply male barrel connector into the MX II Module female port.
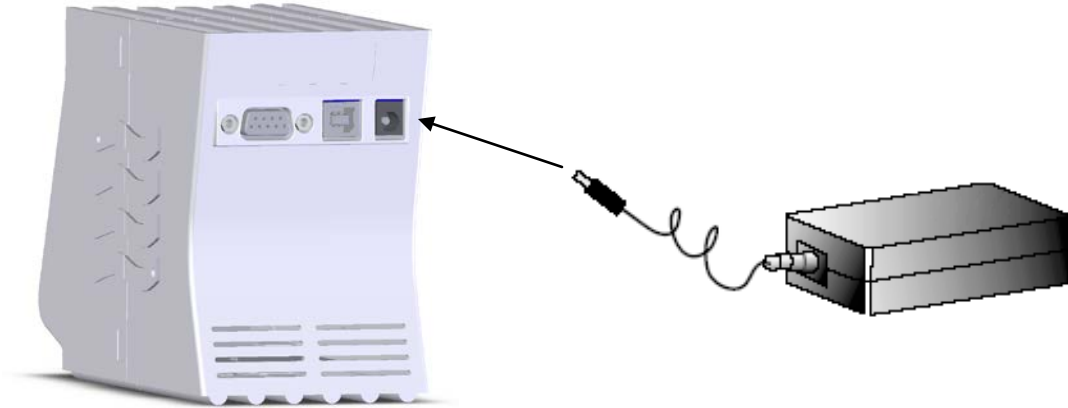
- Plug the female connector of the Power Cord into the Universal Power Supply.
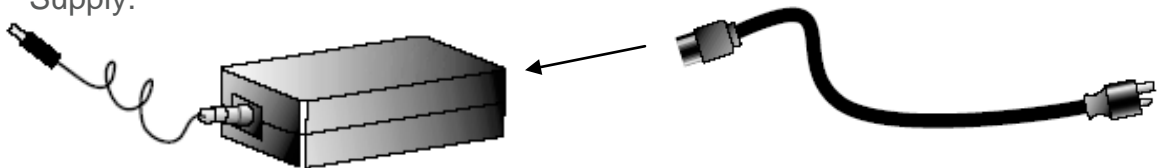
- Plug the opposite end of the Power Cord into a properly grounded power source. The Universal Power Supply can be operated from inputs of 100-240 VAC, 50-60 Hz. The output is 24 VDC, 1.88 A.

Communication Cable Connections

To operate the MX II Module manually as a stand alone unit, no additional connections are required, continue to page 11.

There are several ways to automate control of the MX II Module.
- **For two position modules only**
    - Level Logic control via a single line of the supplied interface cable and the contact closure terminal of a controlling instrument.
- **For all valves** (Note: 2 position valves must be reconfigured before using a communication type other than level logic. See pages 13-14.)
    - 4-Line Binary Coded Decimal (BCD), using the supplied interface cable and contact closure terminals of a controlling device
    - USB control via connection to a computer.
    - Additional methods of control are available. For more information about control with Pulse logic, Dual-pulse, Inverted BCD, I^2C, RS-232, or USB, please see the **MX Series II™ Driver Development Package** [*Driver/ Controller Development Assistance Package for IDEX Health & Science MX II*

(2321500)] available for download on the following web page: [Operation Manuals & Instruction Cards (https://www.idex-hs.com/support/literature-downloads/operation-manuals)](https://www.idex-hs.com/support/literature-downloads/operation-manuals).

- o For additional information on USB/RS-232 and I^2C communications download the following documents from the same web page.
  - UART/USB Communication Protocol for TitanEX™/ TitanEZ™/ TitanHP™, TitanHT™ Driver Boards and MX Series II™ Modules (2321382)
  - RheoLink™ (I²C) Communication Protocol for TitanEX™/ TitanEZ™/ TitanHP™, TitanHT™ Driver Boards and MX Series II™ Modules (2321383)

Interface Cable Connection for Remote Operation via Instrument

- Connect the interface cable to the mating connector on the back of the MX II Module.
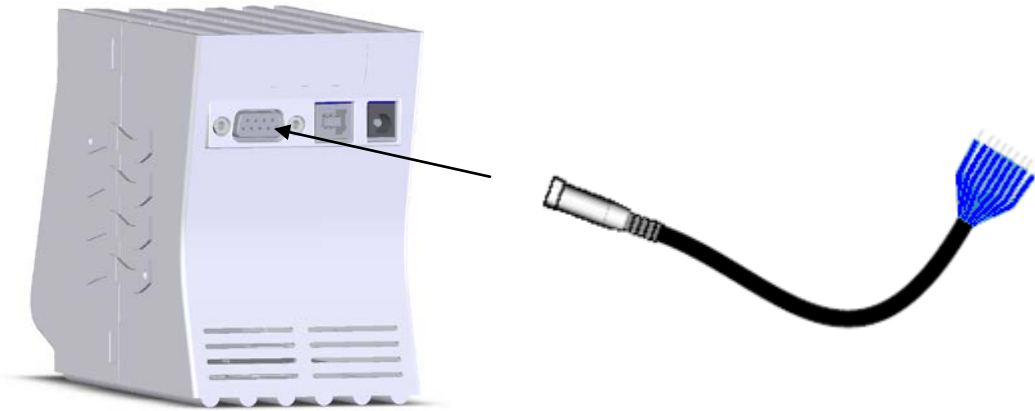
- Connect the interface cable wires to the controlling instrument contact closure as instructed below. The controlling instrument must have one contact closure output (event relay) for two-position valves and four contact closure outputs for multi-position valves.

Two-position MX Series II Modules (Level Logic Control)

- Connect wire #1 of the interface cable from the MX II Module to the ground terminal of the controlling instrument event relay 1 (GND).
- Connect wire #6 from the MX II interface cable to the controlling instrument event relay 1 (R1).
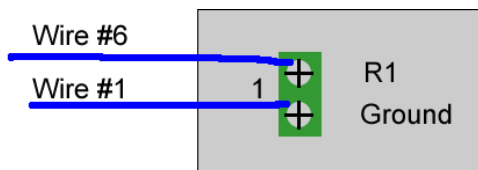- See the example on page 12 of generic time programming commands for this type of control.

Fig 1. Wire connections for two-position MX Series II Modules. Wire colors will vary.

For Information on wiring to monitor feedback signals, please see the **MX Series II™ Driver Development Package** document mentioned above.

Multi-position MX Series II Modules (BCD Control)

- Connect the wire #1 of the interface cable from the MX II Module to the ground terminal of the controlling instrument event relay 1 (GND).
- Using the provided jumper wires, jumper the ground terminals of event relays 2 (R2), 3 (R3), and 4 (R4), as shown in figure 2.
- Connect wire #9 from the MX II interface cable to the controlling instrument event relay 1 (R1).
- Connect wire #8 from the interface cable to event relay 2 (R2).
- Connect wire #7 from the interface cable to event relay 3 (R3).
- Connect wire #6 from the interface cable to event relay 4 (R4).
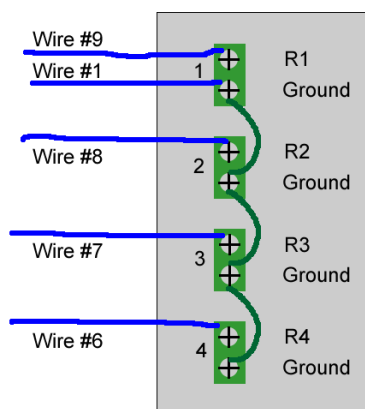
Fig 2. Wire connections for multi-position MX Series II Modules. Wire colors will vary.

- See the example on page 13 of generic time programming commands for this type of control.

  For Information on wiring to monitor feedback signals, please see the **MX Series II™ Driver Development Package** document mentioned above.

Start Signal for Data Acquisition (For 2-Position Valves only)

MX Series II 2-position modules have the capability to issue a signal to a chromatographic system for starting data acquisition. The start signal is sent exactly when the valve moves from the Load to Inject position for maximum accuracy of retention times. If your system requires a high to low transition (contact closure signal) to start data acquisition, simply connect the wire #8 of the interface cable to the start-acquisition connector on your instrument. If instead your system requires a low to high transition, connect the wire #9 of the interface cable to the start-acquisition connector on your instrument.

Needle Port Installation for Syringe Loading Injectors

For model MXP7920-000, a needle port is included in the fittings so it may be used as syringe loading injector. To install the needle port in model MXP7920-000, screw the nut into the vertical port. If the inner tube is not snug around the syringe needle, then tighten the fitting until it fits snugly.

Control Panel Overview

The MX II Module control panel is shown in figure 3.

- (1) Remote Button
- (2) Remote Indicator Light
- (3) Manual Forward Position Selector Button
- (4) Manual Backward Position Selector Button

Figure 3 . MX Series II Control Panel

Local or Manual Operation

- Put the MX II Module in the local mode by pushing the Remote Button. Local Mode is indicated when the LED light next to the Remote Button is not illuminated.
- Use the Forward Position Selector Button to move the valve in the clockwise direction.
- Use the Backward Position Selector Button to move the valve in the counterclockwise direction.

Remote Operation from a Controlling Instrument

1. **Input Line Control** (controlling with a contact closure or event relays)
   a) Level logic control (1-line with ground) (for models with two positions)- The instrument used to control these models must have one contact closure output .
      (1) When the logic state is changed to OPEN, (HIGH or OFF), the valve will rotate to position 1. When the logic state is changed to CLOSED, (LOW, ON, or GROUND), the valve will rotate to position 2.
      (2) Wire the interface cable to the instrument for 1 line control (see fig 1)
      (3) See page 12 for 1-line level logic generic time programming example. (Note- the actual programming will vary depending on the manufacturer of the instrument used.

Program 1			
	Time	Relay 1	Comments
	Initial	Open	Valve is in Position 1
	30	Closed	Valve moves to Position 2
	40	Open	Valve moves to Position 1

b) **4-line BCD control** (for all valve models- Note that 2 position models must be reconfigured before using BCD control. See pages 13-14.) - The instrument used to control these models must have four contact closure outputs. The fluid processor can be controlled with 4 event relays. The relays must be capable of simultaneous operation in order to access any position directly from any other position. The position of the valve is dictated by the states of the four event relays. This method of control allows direct access to any chosen position.

(1) BCD control uses binary logic ($2^0=1$, $2^1=2$, $2^2=4$, and $2^3=8$). When activated each relay can be thought of as producing the following numbers:

External Event or Relay #	1	2	3	4
Number Produced	1	2	4	8

(2) When multiple relays are turned on at the same time, these numbers are additive. Here is a partial table of the numbers produced (used to set valve position) for the following relay states:

Desired Valve Position	External Event or Relay #			
	1	2	3	4
1	Open	Closed	Closed	Closed
2	Closed	Open	Closed	Closed
3	Open	Open	Closed	Closed
4	Closed	Closed	Open	Closed
5	Open	Closed	Open	Closed
6	Closed	Open	Open	Closed
7	Open	Open	Open	Closed
8	Closed	Closed	Closed	Open
9	Open	Closed	Closed	Open
10	Closed	Open	Closed	Open

(3) Connect the wires of the interface cable to the instrument with 4-line BCD control as shown in figure 2.

(4) A 4-line BCD generic time programming example follows. (Note- the actual programming will vary depending on the manufacturer of the instrument used.)

Program 2					
Time	Relay 1	Relay 2	Relay 3	Relay 4	Comments
Initial	Closed	Open	Open	Closed	Valve is in Position 6
10	Open	Closed	Closed	Closed	Valve moves to Position 1
20	Closed	Open	Closed	Closed	Valve moves to Position 2
30	Open	Open	Closed	Closed	Valve moves to Position 3
40	Closed	Closed	Open	Closed	Valve moves to Position 4
50	Open	Closed	Open	Closed	Valve moves to Position 5
60	Closed	Open	Open	Closed	Valve moves to Position 6
70	Open	Open	Open	Closed	Valve moves to Position 7
80	Closed	Closed	Closed	Open	Valve moves to Position 8
90	Open	Closed	Closed	Open	Valve moves to Position 9

Remote Control from a Computer

1. **USB Control with IDEX Health & Science TitanMX™ Software**
   a) Download MX Series II™ Control Software Program from the following webpage: Operation Manuals & Instruction Cards (https://www.idex-hs.com/support/literature-downloads/operation-manuals) to your computer and run the setup application file. ***The computer needs to be under administrator control for successful installation.***

   b) Follow the instructions on the screen.
   c) Make sure to mark the checkbox to get a desktop icon.
   d) When the software installation is complete, connect the USB cable to the MX II Module and an available USB port on your computer.
   e) Connect the power cord to the MX II power supply and plug into an outlet. The remote LED on the front panel of the module should be lit.
   f) Wait for the computer to find new hardware, install device driver software, and indicate that the device is ready to use.
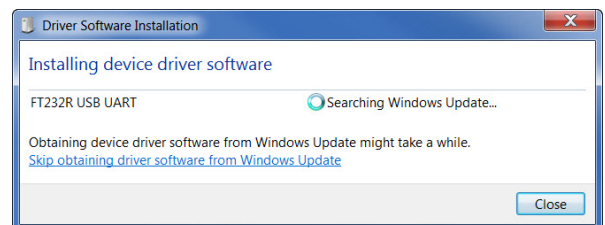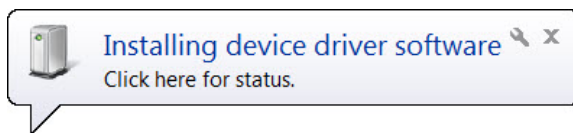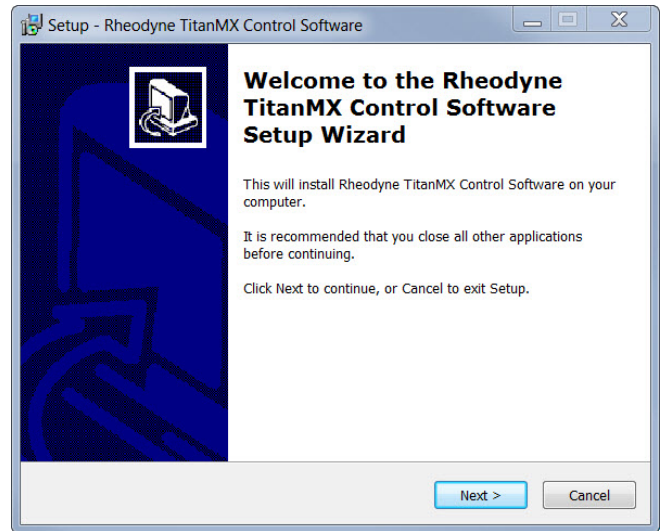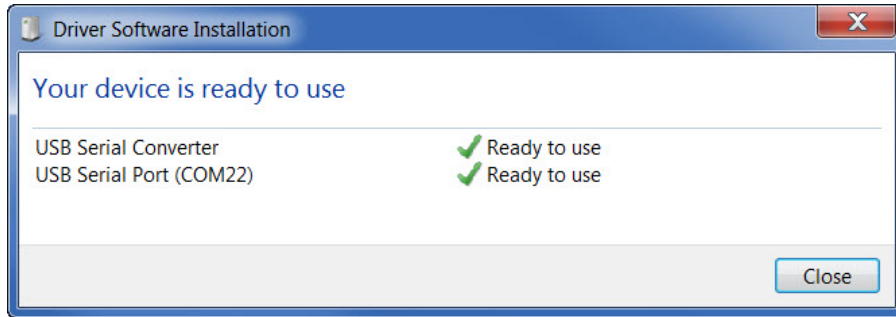
Note: Driver installation may take up to 5 minutes or longer.
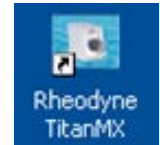
g) Double click on the IDEX Health & Science TitanMX icon to launch the software.

h) If there is more than one valve connected to the computer, a small window with a drop down menu will open to indicate the number or devices connected to the computer. Press OK.
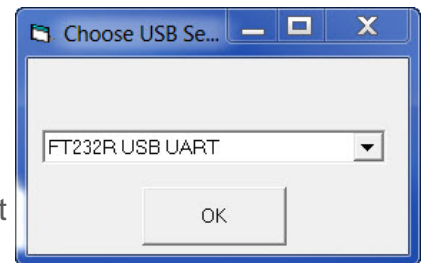
i) To connect to another valve via USB, double click on the IDEX Health & Science TitanMX icon again. Repeat as many valves as are connected to the computer.

j) **For 2-position valves only:** Click on the configuration tab. In the Set Command Mode list box select BCD. Then, click on the Set Command Mode button.
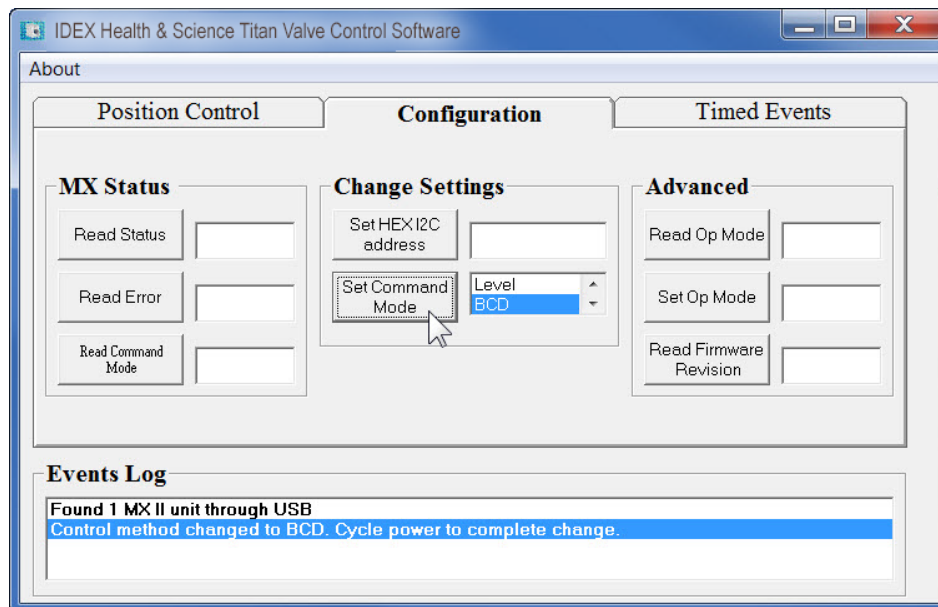
k) Unplug the power to the MX II Module.

l) Wait 10 seconds. Re-plug in the power to the MX II Module and press the Read Command Mode button.
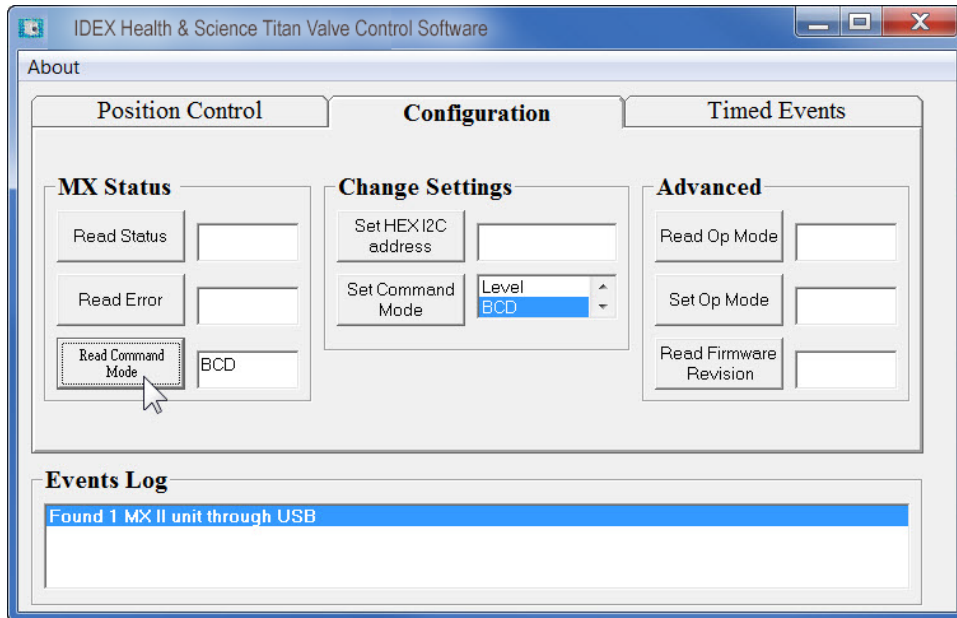
m) If it does not return BCD in the box next to the button repeat steps g-l.
n) **For all valves-** Click the Position Control tab. Click the position buttons to change the position of the valve.
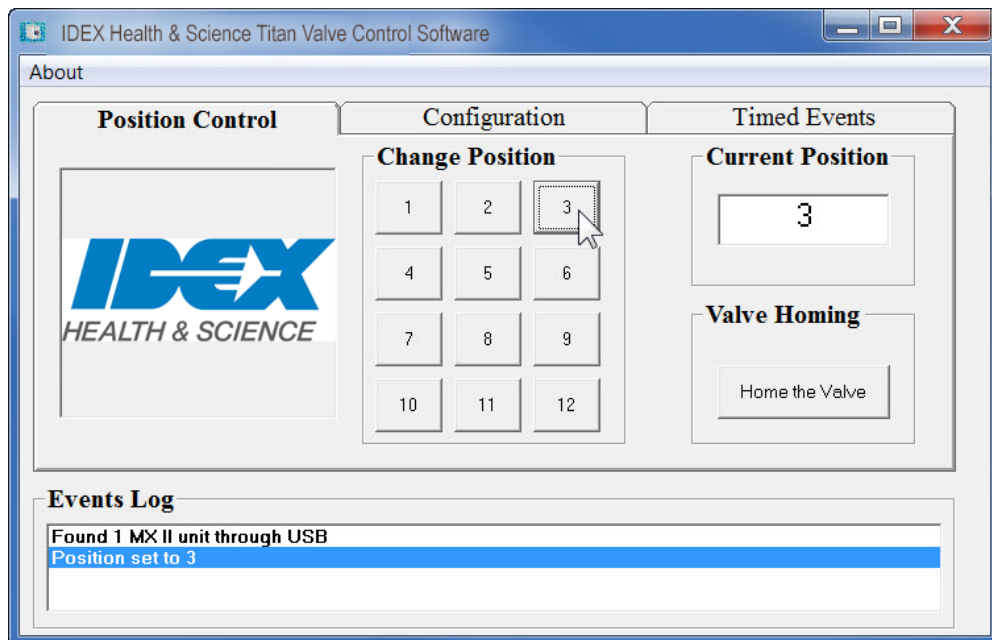
Note- the valve will not respond to positions unavailable on your model.

2. Using the Timed Events Table (This mode of control should <u>not</u> be used when the MX II Module is being controlled by another instrument. In that case use the timed events table from the controlling instrument.)

a) Click on the Timed Events Tab.
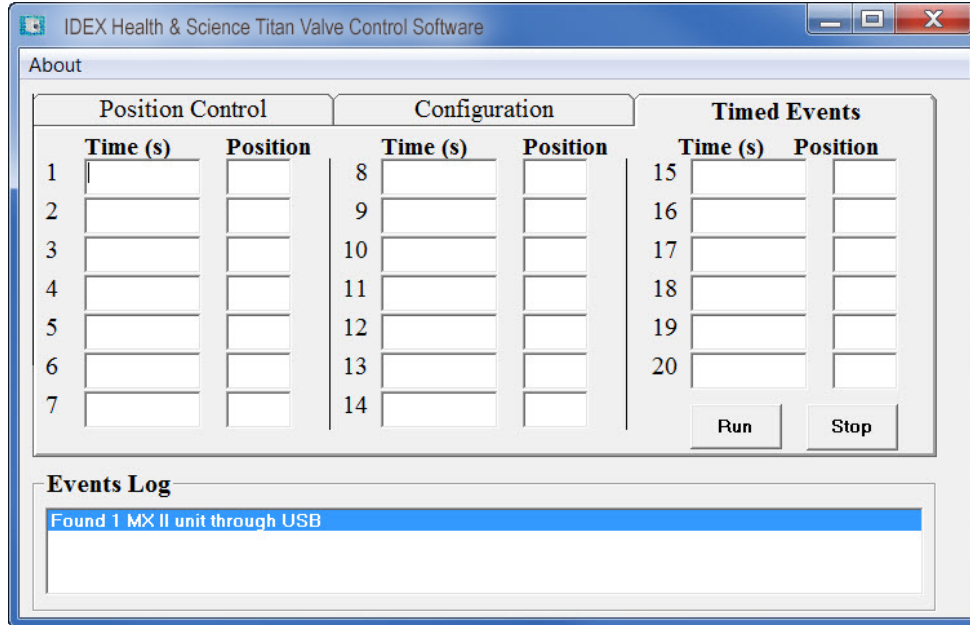
b) To set the starting position of the valve, enter 0 (zero) in the first time field. Enter the desired position of the valve set in the adjacent position field. Continue entering the times (in seconds) when you wish the valve to change positions and the position it should move to in the adjacent field until the program is complete. (You may use up to 20 timed events. Times may be entered to the tenths of a second. Max time is one week – 604800 seconds.)
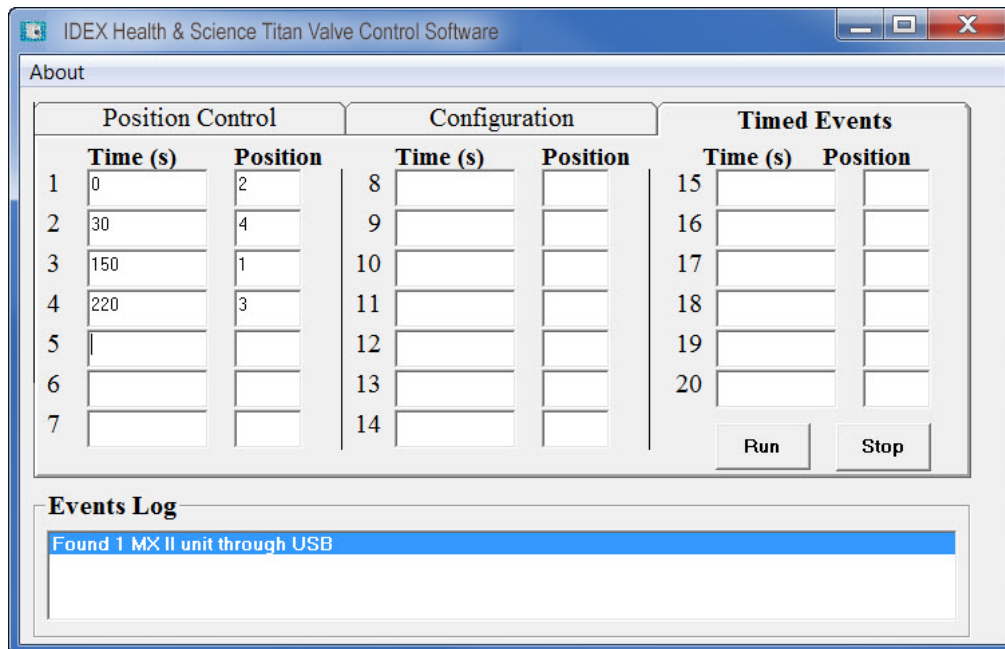
c) Click Run to begin the program.
d) The events log will list the wait times and position movements as they occur.

	IDEX Health & Science Titan Valve Control Software	— □ X

About

	Position Control			Configuration			Timed Events	
	Time (s)	Position		Time (s)	Position		Time (s)	Position
1	0	2	8			15		
2	30	4	9			16		
3	150	1	10			17		
4	220	3	11			18		
5			12			19		
6			13			20		
7			14				Run	Stop

Events Log

Waited 30 seconds
Position set to 4
Waited 120 seconds
Position set to 1
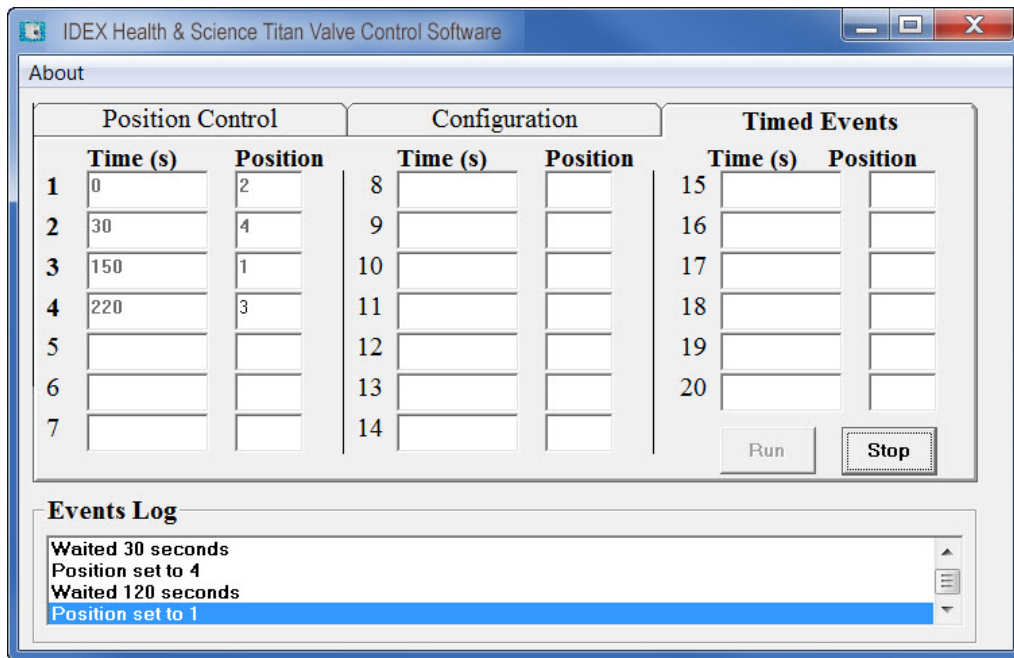
e) Please note that the events must be listed in chronological order or an error will occur and the program will terminate at the point of the error.
f) If an invalid position is requested this will also result in an error which will stop the program at that point.
g) The program may be stopped at any time by clicking Stop. Please note that if a run is stopped and Run is pressed again, the program will restart at the beginning.
h) The events table cannot be saved. It will clear when the program is closed.

Maintenance

Electrical Maintenance

- If an electrical problem is encountered, please consult Electrical Connections on page 8 and Troubleshooting on pages 23-27. If the problem persists contact your vendor for assistance.
- No routine maintenance is required for the electronic components.

Valve Maintenance

- With normal use the MX II Module will provide tens of thousands of cycles. The main cause of failure, which results in internal (port-to-port) or external valve leakage, is often abrasive particles in the sample and/or mobile phase or crystallization of buffer solutions. This can cause scratches on the rotor seal, stator face seal, or stator.
- MXT and MXP models may be repaired by valve pod replacement or replacement of the rotor seal (and stator face seal for some models) and/or stator. Rapid Replacement Pods (valve pods), stators, and RheBuild® kits (for replacement seals) are available.
- For long life (up to 1 million actuations) MXX models, the rotor seal and stator are not end-user serviceable. The RheBuild kit is a Core Assembly Module (CAM) and is available for most MXX models.
- To obtain part numbers for replacement parts, go to: MX Series II (https://www.idex-hs.com/valves/stand-alone-valve-products/mx-series-iitm.html), select your valve model family and model number, and select Related Parts tab.

Rotor Seal Replacement (valve pod can remain in module)

- Remove the stator screws from the stator with the hex key provided. Loosen the screws sequentially a quarter turn at a time to avoid damaging the screws.
- Remove the stator (and the stator face seal if present) from the valve/pod body.
- Remove the rotor seal; a flat head screwdriver can help to pry it up if necessary.
- Remove the stator face seal from the stator (if present).
- Mount the new stator face seal (if present) on the stator. The three pins on the stator face seal fit into the stator in only one way.
- Mount the new rotor seal with the grooves facing out toward the stator. The 3 pins on the shaft assembly fit into the holes in the rotor seal only one way.
- Mount the stator on the valve assembly so that the stator locating pins in the body enter the mating holes on the stator.
- Replace stator screws. Tighten ¼ turn at a time sequentially until the stator is flush against the stator ring. Download "RheBuild Kit Instruction Supplement - Stator Screw Torques" from: Operation Manuals & Instruction Cards (https://www.idex-hs.com/support/literature-downloads/operation-manuals)

Rapid Replacement Pod (valve pod)

Please note that MXP and MXT valve pods are <u>not</u> interchangeable.
- Disconnect all tubing and sample loops prior to valve pod removal.

For MXP Models:

Removing the valve pod with a Pod Popper™ (provided with new valve pods)
- Insert the Pod Popper tab in any of the valve pod slots.
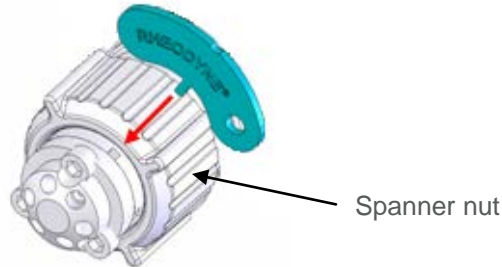
Spanner nut

- With the Pod Popper in place, turn the spanner nut counter clockwise until the valve pod detaches from the MX II Module. (Do not use wrenches on the spanner nut.)

- Remove the Pod Popper and spanner nut from the valve pod.

Removing the valve pod (without a Pod Popper)
- Unscrew the spanner nut and remove from valve.
- Grasp the valve pod firmly and pull straight out of the actuator. It may help to wiggle the valve pod to remove.

Replacing the valve pod
- The union at the base of the valve pod and the union in the valve actuator need to be oriented properly when sliding the valve pod into the actuator housing. There are 3 grooves along the side of the valve pod that engage the ribs in the actuator housing.
- Prior to reinstalling the valve pod, apply power to the MX II Module and set the module to position 1. Disconnect power.
- Align the flat on the shaft of the valve pod to the appropriate mark on the stator ring: the "6" mark for a 6-port (or 7-port selector) valve or the "10" mark for a 10-port (or 11-port selector) valve.

flat on shaft
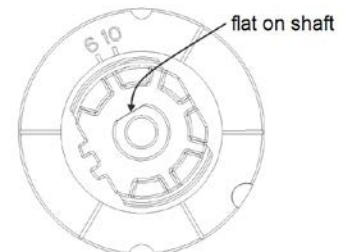
- Insert the valve pod into the actuator with the 3 grooves on the valve pod engaging the ribs in the actuator housing. If properly aligned, the unions will engage securely and the valve pod will be held securely in the actuator.
- Replace the spanner and tighten clockwise, (Hand tighten only, do not use wrenches on the spanner nut.)

For MXT Models:
- Turn the spanner nut counterclockwise to remove.
- Gently pull the Rapid Replacement Pod (valve pod) from the MX II Module (MX II).
- To replace, insert the valve pod and insert into the MX II. Rotate until the unions within the actuator and the valve pod engage.
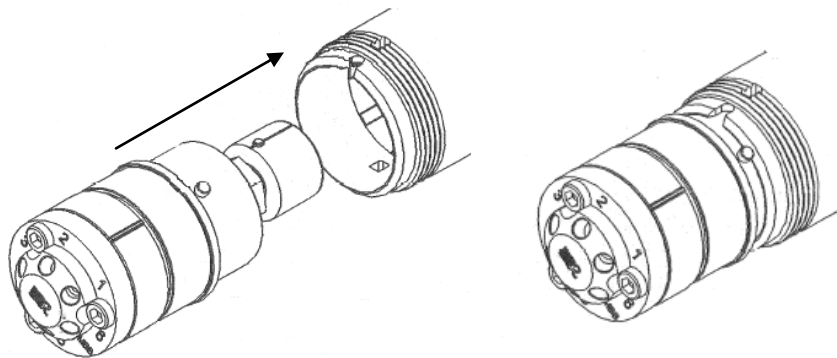
- Continue to rotate until the clocking pin aligns with the notch in the housing.
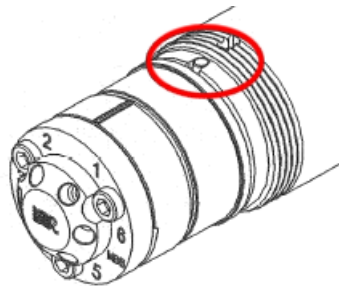
- Press the valve pod into the modules.
- Replace the spanner nut and tighten clockwise, (Hand tighten only, do not use wrenches on the spanner nut.)

BCD - Binary Coded Decimal
This is a method of line control where four digital control lines plus a ground line are used to control the MX II Module. BCD Control is the default line control setting for multi position valves. Two position valves may be reconfigured for BCD control via the USB Graphical User Interface (GUI).

Contact Closure
It means that a relay of some type closes or opens a set of contacts in accordance with an instrument event. If one contact (terminal) is connected to the MX II line input, and the other to the MX II ground, open contacts will produce a logic high state, while closed contacts (contact closure) will produce a logic low state.

Event Relay
See External Event Relay

External Event Relay
These are the terminals on the controlling instrument where the MX II Module is connected using the interface cable. They are also known as Timed Event Terminals, External Event Terminals, or Time Function Switches. Each relay has two terminals. If the relay is a contact closure type, one terminal is connected to the MX II Module control line, the other is connected to the MX II ground. Closed relay will produce a logic low, while an open relay will produce a logic high. If a relay actively drives the MX II input line, it must produce a 4.0-5.0 Volt signal (logic high), or a zero Volt signal (logic low) on the terminal connected to the MX II control line. The other terminal

(ground terminal) needs to be connected to the MX II ground.

Ground
Common reference point required between two or more devices.

Input
This is the electrical communication coming into a device. For example, the MX II Module accepts line control and USB communication as inputs.

Level Logic
This is a type of line control that can only be used for controlling 2 position MX II Modules. Two lines are used to control the MX II Module- control (pin 6) and ground (pin 1). Any change in the control signal's logic state will cause the valve to change position.

Line Control
This is a remote control scheme employing separate wires. Each wire is used with a common ground to send control signals to the MX II Module. Please note the MX II must receive 4.0-5.0 Volts as logic high. Lower voltage may result in incorrect performance.

Logic State
Line control inputs of the MX II Module must be in one of the two logic states: high or low. High logic state may be achieved by driving the line input of the MX II with digital logic (4.0-5.0 Volts) or by using a contact closure event relay in the OPEN state. Low logic state may be achieved by driving the line input of the MX II with digital logic to 0 Volts (ground) or by using a contact closure event relay in CLOSED state.

MBB (Make-Before-Break)
A passage in the stator, or stator face assembly, that allows old connections to remain until new connections are completed when switching from load to inject. This virtually eliminates pressure transients, a benefit with fragile columns or flow sensitive detectors.

Output
This is the electrical communication coming out of a device. For example, the MX II Module has two output lines which are provided via the terminal block. Pin number 5 on the rear panel connector (DB-9) is the Busy/Done feedback (LO = busy, HI = done) and Pin number 4 is the Error feedback (HI = error detected, LO = no error detected).

State
See Logic State.

Terminal
The position at the event relay where the wire is connected. Each event relay has two terminals.

Universal Power Supply
This is the adapter that converts electrical power from a wall socket to usable power to run the MX II Module. The input required is 100-240 VAC, 50-60 Hz. The output of the power supply is 24 VDC.

USB – Universal Serial Bus
A method of serial communication. Please note that if USB communication is used on two position valves, the MX II Module must first be reconfigured for BCD (or any mode other than Level Logic). This can be done using the IDEX Health & Science Titan Control Software in the configuration section. Once the module is configured, cycle the power and the new configuration will be saved.

Troubleshooting

Symptom	Cause	Solution
1. Valve leaks between the Stator and Stator Ring or from a port	**A:** The Rotor Seal and/or Stator Face Seal may have been damaged by abrasive particles in the sample and/or mobile phase or crystallization of buffer solutions.	Replace the Rotor Seal and Stator Face Seal using the MX II Module RheBuild® Kit available from your vendor. Filter sample and mobile phase. Flush the valve frequently to prevent crystallization of buffer solutions.
	B: The pressure rating of the valve has been exceeded.	Confirm that the pressure increase is not caused by a blockage in the flow path. If no blockage, lower the flow rate or change the post MX Module tubing to a larger ID to decrease the pressure.
	C: The stator port is damaged and a fitting does not seal correctly.	Replace the Stator.
2. Valve is not rotating.	**A:** There is no power to the MX II Module.	Confirm there is power at the source and all electrical connections are secure.
	B: The program and/or wiring to control the MX II Module is incorrect.	Check the program used to control the MX II Module. Review the wiring on pages 9-10.
	C: Nothing happens when pressing the Forward Position Selector button while attempting to change the valve position.	Set the control mode to local (manual) mode. Push the Remote button. The LED should be off.
	D: Attempting to rotate the valve using the Remote (automated) control mode (with either 0/5Volts or contact closure).	Verify that you have programmed the computer or instrument control software correctly and that the device is outputting a correct output (either 0/5Volts or contact closure).
	E: Additional problems.	See **Troubleshooting Flowcharts** on pages **24-26**.

3: Remote Control Problems	**A:** Problems arise when attempting to use Input Line Control.	See Flowchart on **Troubleshooting Remote Input Line Control** on page 26.
	B: Problems arise when attempting to use USB Control.	See Flowchart on **Troubleshooting Remote USB Software Control** on page 27.

Troubleshooting Flowcharts

Local (Manual), Power and Display Problems

```
                                    ( Start )  ←  (1)
                                        │
                                   < Is the Position
                                      LED lit? >
                         NO ←──────────┴──────────→ YES
                          │                          │
                   < Does the                   < What is
                     Remote LED light up?         Displayed On
                     (Press Remote button a       the LED? >
                     few times) >
              NO ←──────┴────── YES                  │ PE
               │                 │                   │
         < Is the Power          │         [ PE – Position Error. Push
           Supply Lit? >         │           BOTH up and down
    NO ←──────┴──── YES          │           buttons at the same time.
     │            │    EE        │           This will try to home the
< Is the Power    │              │           valve. ]
  Supply Connected to            │                   │
  Power Source? >                │              < What is
NO ←──┴──── YES                  │                Displayed On
 │          │                EE  │                the LED? >
 │          │              ←─────┴────── Valid Position
[ Plug the Power    < Is the Power                   │
  Supply Into        Supply Connected to             │
  Power Source ]     the MX Unit? >                  │
     │          Yes ←──┴──── NO      [ EE – Non Recoverable Error. Push
[ Double check   │         │           BOTH up and down buttons at the
  that the Power │    [ Connect MX     same time. This will display the
  Source has     │      Unit to Power  ERROR CODE. Note this for when
  Power ]        │      Supply ]       you contact your vendor. ]
     │           │         │                         │
    (1)          │        (1)      YES        ( The Unit is
                 │                  │            Operational )
                 ↓                  ↓
        ( Call vendor to arrange
           for repair )
```

Remote (Automated) Input Line Control Problems

Start → 1

Is the Remote LED Lit?
- YES → Does the Device to Controller wiring match the wiring described in text?
- NO → Push the Remote Button to light up the LED → 1

Does the Device to Controller wiring match the wiring described in text?
- NO → Connect the wiring to match Figures 1-2 → 1
- YES ↓

If you have used the Rheodyne TitanMX software to change the command mode through USB, please make sure that it is set to the method you are trying to use.

Run Controller Timed Event Program with MX II Module connected to Controller (See example in Input Line Control Section)

Does it actuate?
- YES → 2
- NO ↓

Disconnect the MX II Module from the instrument. Using the Rheodyne supplied interface cable touch the wire number 1 to wire number 6 for level logic (generally two position valves). For BCD controlled units (generally multi position valves) touch wires number 1, 6, and 7 together (to force position 3) or wires number 1, 6, and 8 together (to force position 5).

Does the MX module actuate when the wires are touched?
- YES → Reconnect the MX Unit to the Controller. Confirm that Controller Program is correct. Run Controller Program (see examples in Input Line Control section)
- NO → Call vendor to arrange for repair

Does the MX Unit work now?
- YES → Done ← 2
- NO → Problem is in Controller or Program

Remote (Automated) USB Software Control Problems

TitanMX Software Error – Found 0 USB Devices

Prior to beginning, check the following:
1. The MX II Module has Power
2. The remote LED is ON.
3. The MX II Module is Connected via USB cable.

In Configuration Tab. Press "Read Status" button, this will force the software to try to reestablish communication.

Status Returned?

NO → Shutdown Computer, Shutdown MX II Module

Yes → 2

Turn on MX Module, Make Sure it is plugged in through USB cable

Wait a few seconds (to give the computer time to recognize the USB device)

In Configuration Tab. Press "Read Status" button, this will force the software to try to reestablish communication.

Status Returned?

Yes – Returned an Error Code (example 66, 99)

Yes – Returned Valid Position

NO → Does the unit work in Local Mode (turn Remote LED OFF) and try manually moving the positions.

Yes → UnInstall the Rheodyne TitanMX Control Software.
Shut down the PC.
Reinstall the Software (make sure you have no error messages)
Restart the PC

NO → Call vendor to arrange for repair

The TitanMX software is operational but the MX II Unit is not. Please record the Error Code

2

The Unit is Operational ← Yes ← Software found USB Device? → NO → Call vendor to arrange for repair