



Application Note 3023 Automatic Control of an MX7B/MX7M with an MX2A/MX4A

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1 Scope

1.1 Purpose

This document explains how the relay set point of an MX2A or MX4A rough vacuum active gauge can be used to automatically enable and disable an MX7B or MX7M cold cathode high vacuum active gauge.

1.2 Relevant Televac Products

This document applies to the Televac products listed below:

Description	Part Number
MX2A	2-8910-1XX
MX4A	2-8930-1XX
MX7B	2-8940-XXX
MX7M	2-8950-XXX
MX2A/MX4A 15 Conductor Cable	2-9858-XXX
MX7B/MX7M 6 Conductor Cable	2-9873-XXX
MX7B/MX7M 15 Conductor Cable	2-9858-XXX

2 Background

The Televac MX2A and MX4A are thermal conductivity gauges for rough vacuum measurement ($1 \cdot 10^{-3}$ Torr to 1000 Torr). The Televac MX7B and MX7M are cold cathode gauges for high and ultra high vacuum measurement ($1 \cdot 10^{-11}/1 \cdot 10^{-8}$ Torr to $1 \cdot 10^{-2}$ Torr).

Due to the design of cold cathodes, it is important that they are not turned on at pressures above 1×10^{-2} Torr. Turning the cold cathode on at higher pressures will lead to sputtering, oxidation, and contamination; these will cause inaccurate readings and damage to the sensor. Therefore, it is necessary to use a rough vacuum gauge, such as the MX2A or MX4A, to disable the cold cathode at pressures above 1×10^{-2} Torr.

The MX2A and MX4A both include relay set point, which is essentially a switch that can be set to a specific vacuum reading. In this case, the set point will be 1×10^{-2} Torr. The relay can be wired to the cold cathode's voltage supply, creating an active gauge system capable of measuring from $1 \times 10^{-11}/1 \times 10^{-8}$ Torr to 1000 Torr.

3 Configuring the MX2A/MX4A Set Point

The MX2A and MX4A have 2 set points. This application works best with the relay set point, so this application note will focus on set point 2. Set point 2 has 2 settings:

1. SP2H (Set Point 2 High) – the vacuum reading where the set point deactivates
2. SP2L (Set Point 2 Low) – the vacuum reading where the set point activates

We recommend the following settings for SP2 to control an MX7B or MX7M.

1. SP2H – 0.012 Torr (12 mTorr, 12 microns, 1.2×10^{-2} Torr)
2. SP2L – 0.010 Torr (10 mTorr, 10 microns, 1.0×10^{-2} Torr)

Note that these are just recommendations. Your system may require different settings.

To change the SP2H and SP2L settings, do the following:

1. Press the SEL button until the screen says "Setpoints".
2. Use the up/down arrows until the screen says "SP2L".
3. Press ENT. The top of the screen will now say "ADJ".
4. Use the up/down arrows to adjust the value to the desired SP2L. In our recommendations above, this would be 0.010.
5. Press ENT again to save the change. The "ADJ" at the top of the screen will disappear.
6. Press the down arrow. The screen should now show SP2H. If it does not, press the arrows until it does.
7. Press ENT. "ADJ" will reappear on the top of the screen.
8. Use the up/down arrows to adjust the values to the desired SP2H. In our recommendations above, this would be 0.012.
9. Press ENT again to save the new setting. The "ADJ" at the top of the screen will disappear.
10. Press SEL until you reach the measurement screen or wait for the screen to timeout.

SP2H and SP2L can also be changed using the RS-485 W3 command. The following command will change SP2H and SP2L to our recommended values. Note that X is the address of the unit (default 0) and <cr> is a carriage return (which is sent when the enter key is pressed):

```
*XW310021202<cr>
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See the manual for the MX2A and MX4A for more information on the W3 command.

4 Enabling Pin Control on the MX7B/MX7M

The MX7B/MX7M must be put into pin control mode before it can be turned on and off with an MX2A/MX4A. To put the gauge into pin control mode, follow these steps:

1. Press SEL until the screen says "System Settings". If initially on the measurement screen, it should be pressed 2 times to reach this screen.
2. Press SEL until Vsense Control is shown on the screen. This should be the 4th setting.
3. Use the up and down arrows to set this to Pin Control.

This can also be done with the RS-485 W8 command. The following command will set the unit to pin control mode. Note that X is the address of the unit (default 0) and <cr> is a carriage return (which is sent when the enter key is pressed).

*XW81<cr>

For more information on the W8 command, see the MX7B and MX7M manuals.

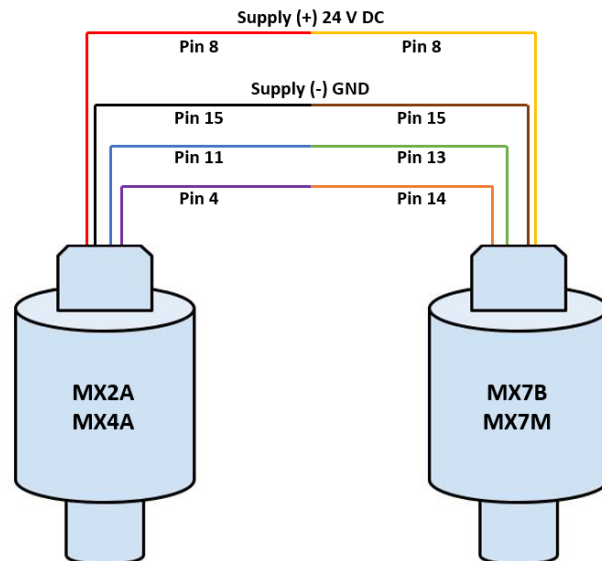
Now, the MX7B/MX7M is ready to be controlled by the MX2A/MX4A's relay.

5 Connecting the MX2A/MX4A to the MX7B/MX7M

The MX7B/MX7M's pin control toggles based on pins 13 and 14. When they are shorted, the cold cathode turns on. Otherwise, the cold cathode will be off.

The MX2A/MX4A's relay will connect pins 11 and 3 when the pressure is above the setpoint, and will connect pins 11 and 4 when the pressure is below the setpoint. Therefore, this can be used to short pins 13 and 14. The following table and diagram show the connections that will allow the relay to control the MX7B/MX7M:

MX2A/MX4A	MX7B/MX7M
Pin 11 (SP2 COM)	Pin 13
Pin 4 (SP2 NO)	Pin 14



The MX7B/MX7M will now only turn on the cold cathode if the MX2A/MX4A detects pressure lower than $1 \cdot 10^{-2}$.

Note that it is necessary to supply power to units. Additionally, it may be necessary to connect to the analog or RS-485 connections depending on the application.

6 Contact Us

Please feel free to contact us with any questions:

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