

Technology Manual

MKS G-SERIES WEB BROWSER TUTORIAL



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1 Overview of the Web Browser Tutorial

- The Web Browser Tutorial is a detailed technical document on the utilization and functionality of the G series MFC embedded Web Browser that is accessible via the Ethernet port located on the side (or top depending on the Model) of the G Series MFC.
- This Ethernet port provides the ability and methodology to customize the MFC configuration as well as diagnostic tools to effectively learn how the MFC works or troubleshoot if there are questions about its performance.
- The only equipment required for access to the MFC Web Browser is a computer (laptop) and a standard Ethernet Cable.

1.1 Major Topics in this Tutorial include:

1. How to establish communication from the laptop to the MFC - *Ethernet Communication from the Computer to the MFC*, page 7
2. Opening Web Browser and Transitioning to the Setup Mode – *Opening the Web Browser and Transitioning to the Setup Mode*, page 14
3. Description of Setup Mode pages and features which are common for all G series Models – *Browsers Pages and Basic Features available for All G series Models in the Setup Mode*, page 19
4. Description of Setup Mode pages and features which are specific to different G Series MFC I/O – *Browser Pages and Features Related to Specific G series MFC I/O*, page 49
5. Important application notes and instructions about how to get the java- based plot page operational – Appendix A
6. Description on how to reset the default IP Address (192.168.2.155) for G series Models – Appendix B
7. Schematic for communicating to single and multiple MFC's using the Web Browser – Appendix C
8. Proper technique for zeroing the MFC – Appendix D

2 Ethernet Communication from the Computer to the MFC

Connect standard Ethernet Cable from the Laptop / Computer to the Ethernet port on the side of the MFC.

2.1 Find the Control Panel for Windows 10

1. **Windows 10** – Control panel may be found using the <Search> located in the startup bar at the bottom of the Desk Top page.



2. Type in <Control Panel> and select:

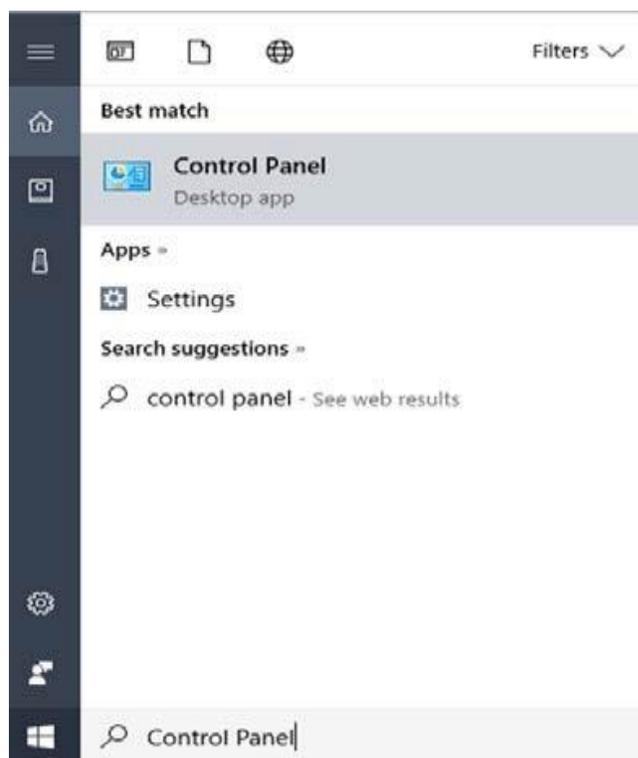


Figure 1

2.2 Select <Network and Internet>

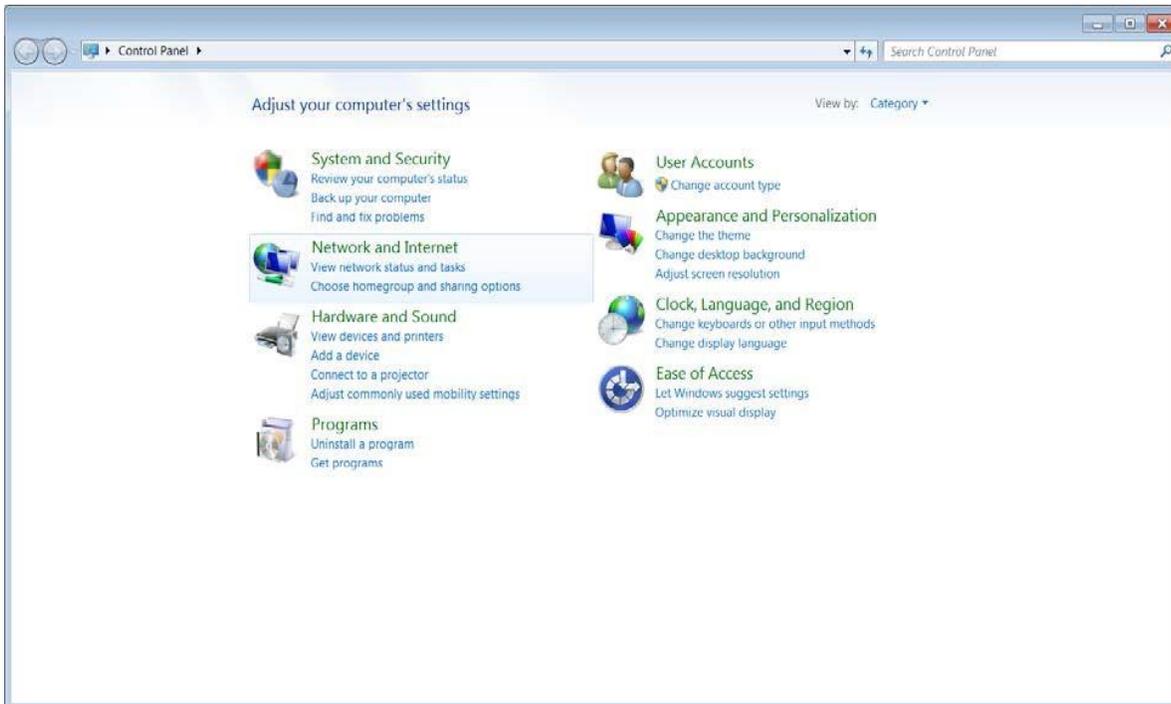


Figure 2

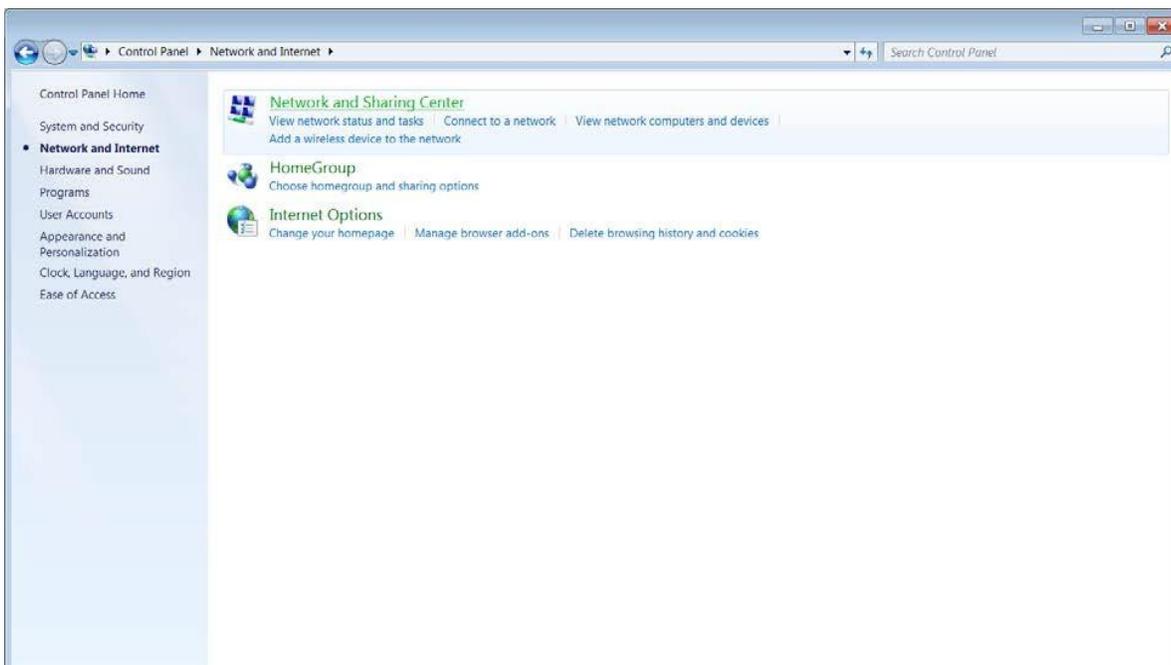


Figure 3

2.3 Open Network and Sharing Center to View Active Networks

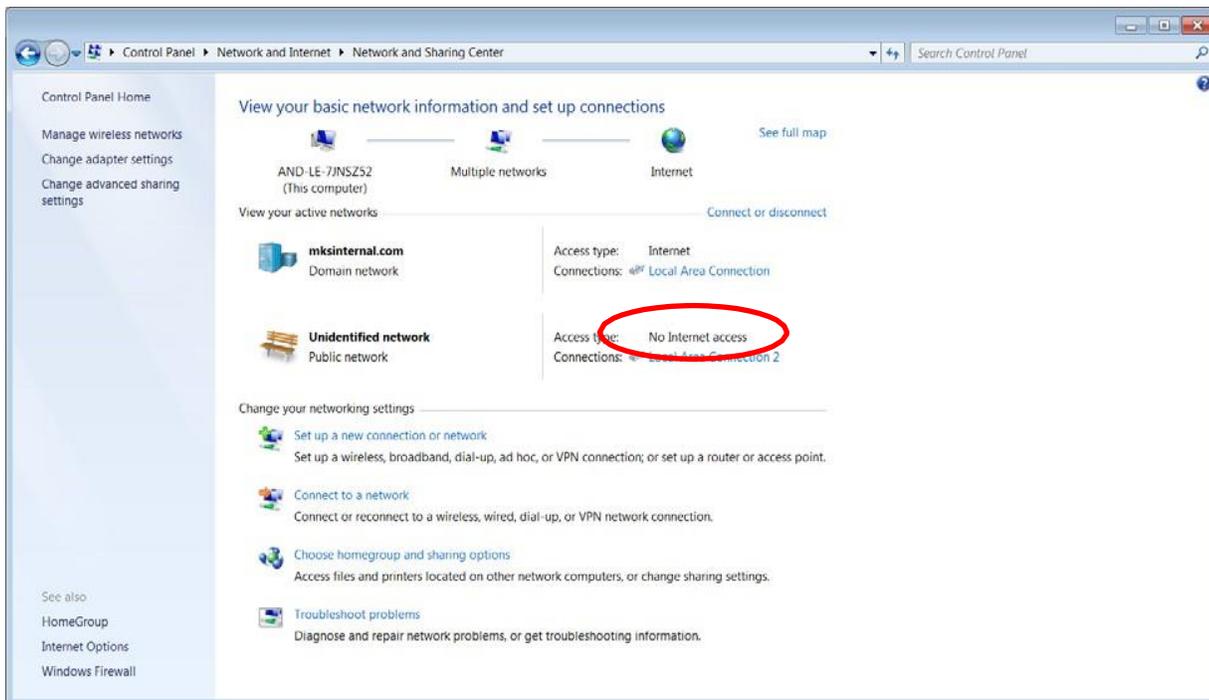


Figure 4

1. Double click on the local area connection to open.

2. Select <Properties>.

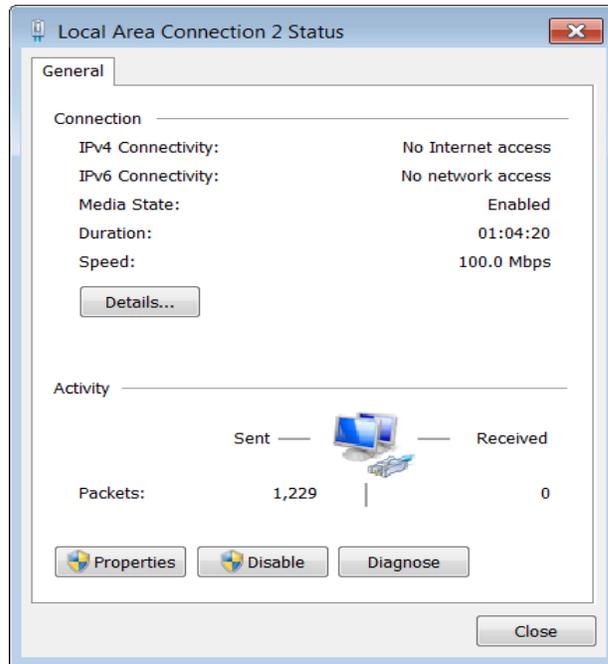


Figure 5

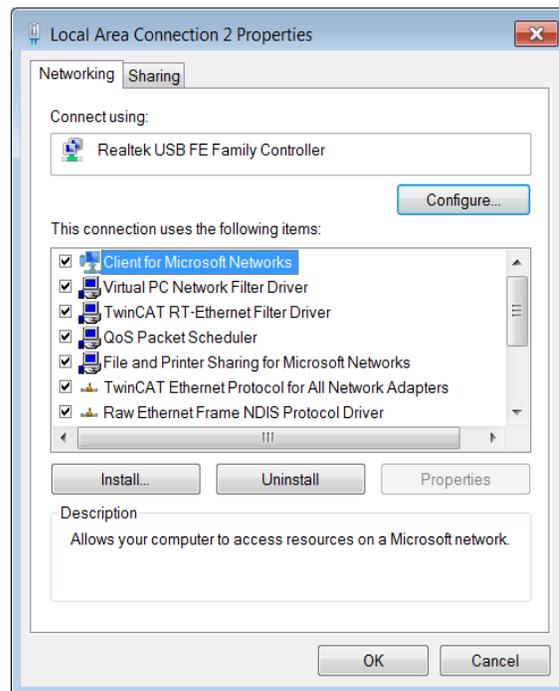


Figure 6

2.4 Locate Internet Protocol Version 4 (TCP/IPv4)

Scroll down and find <Internet Protocol Version 4 (TCP/IPv4). Left Click to highlight and select <Properties>.

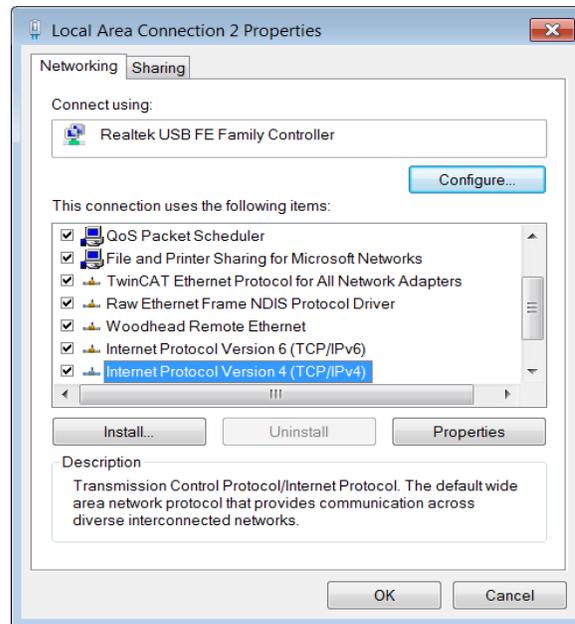


Figure 7

A new pop up will appear related to “Internet Protocol Version 4 (TCP/IPv4) Properties” which allows you to change the default IP address of the communication port.

2.5 Set Unique Static IP Address for the Computer NIC Card

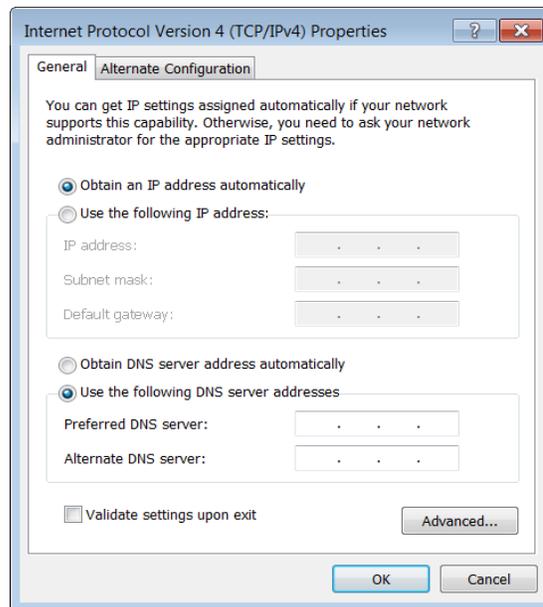


Figure 8

1. Select “Use the following IP Address”. Enter a unique IP address. In this case a unique address 192.168.2.2 was entered the IP Address line. Hit the <Tab> key on the left-hand side of the keyboard and a Subnet mask is entered as 255.255.255.0.

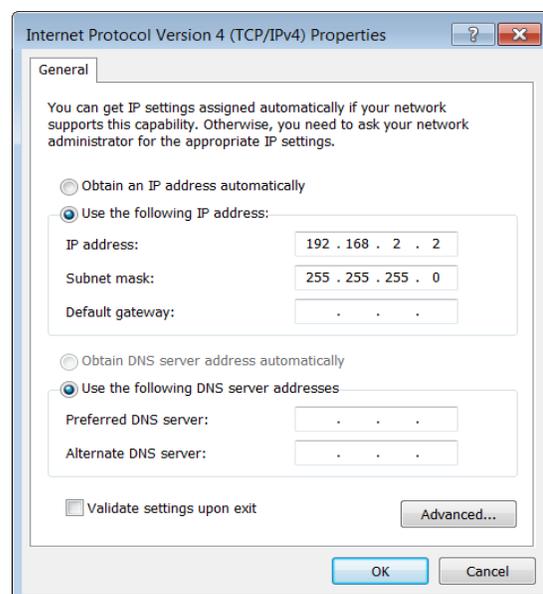


Figure 9

2. Click OK to select and close the window.
3. Once the address has been updated close the remaining network connection windows.
4. The laptop is ready for Ethernet communication with MKS MFC devices.

3 Opening the Web Browser and Transitioning to the Setup Mode

3.1 Device Page – Monitor Mode

1. The Device page of the Web Browser can be open using any of the existing online Browser's such as Chrome, Edge, and Internet Explorer 11.

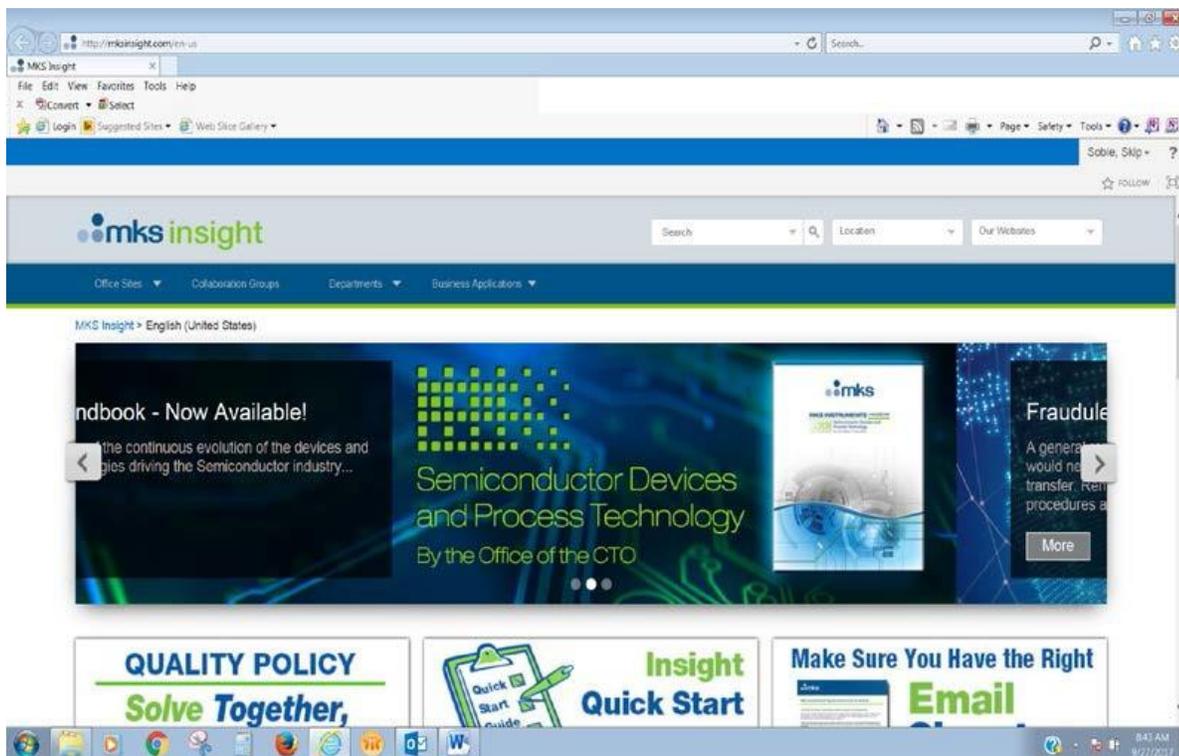


Figure 10

2. Type in the IP Address of the MFC into the URL address bar. G series MFC Default Address is 192.168.2.155

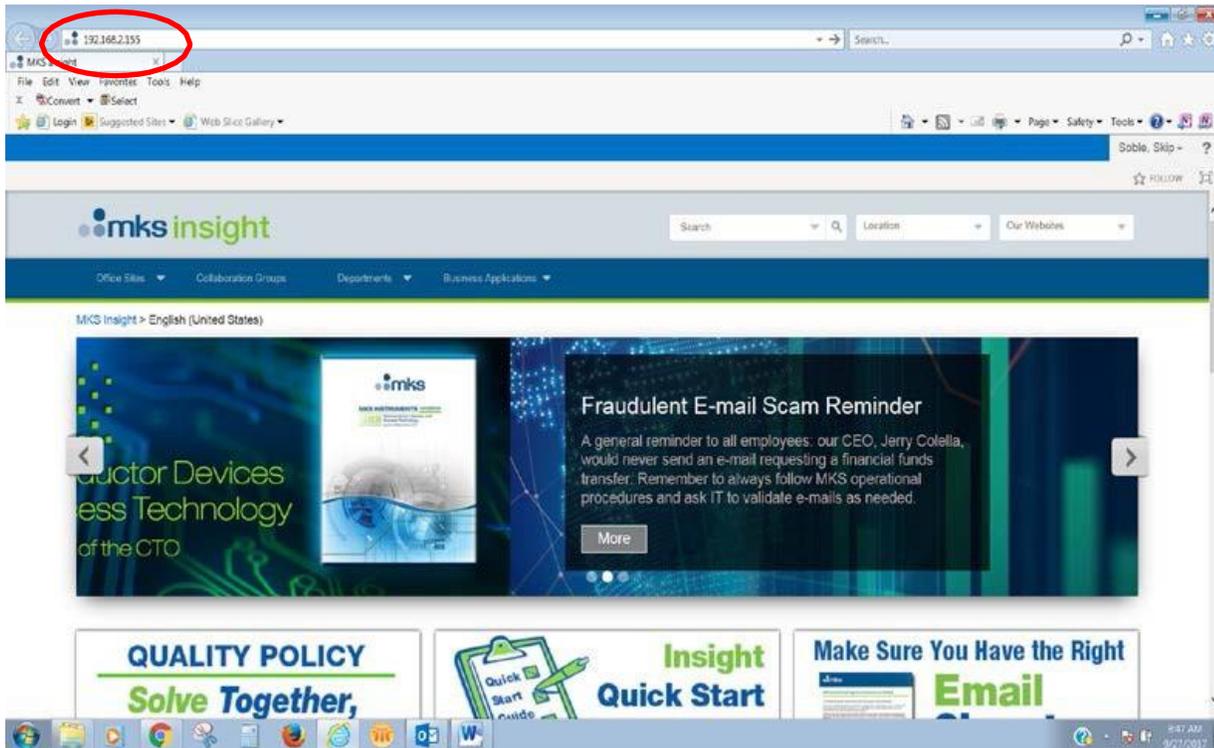


Figure 11

3. Hit Enter and the Web Browser opens in the <Monitor Mode>

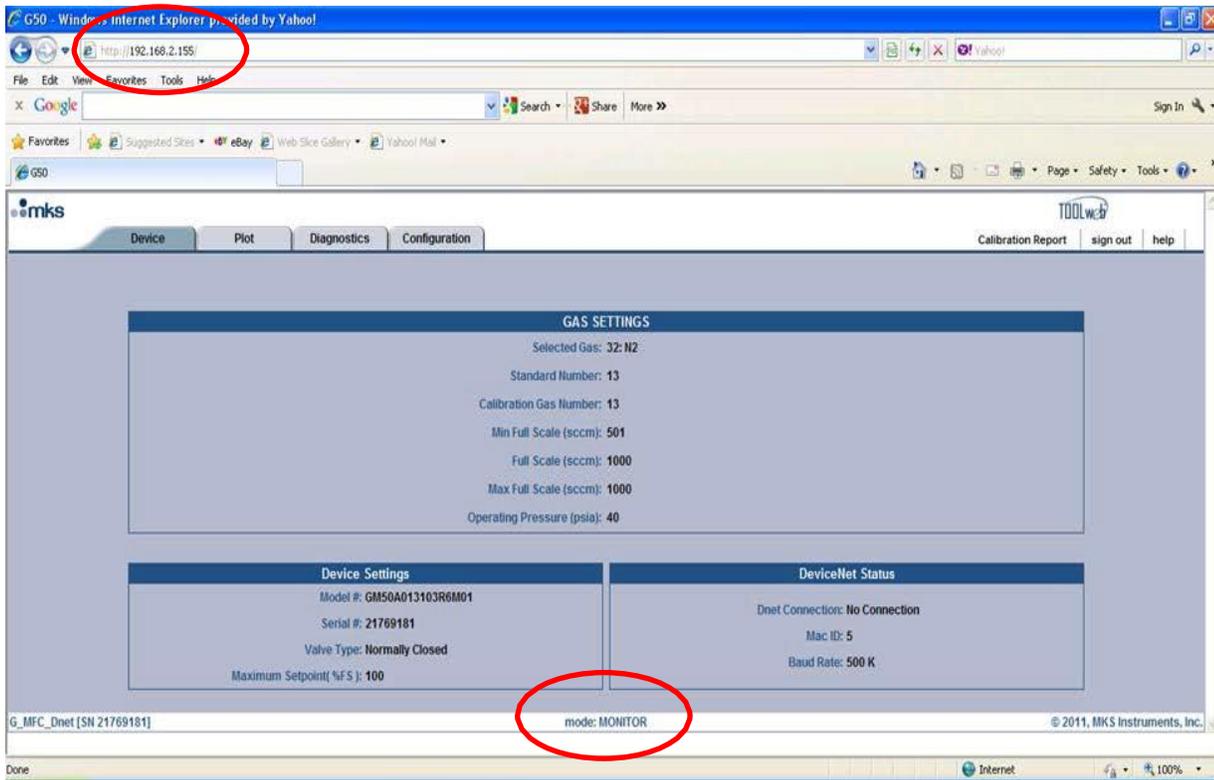


Figure 12

4. The front page of the browser opens in the monitor mode and displays the current setup of the device:

- Gas Setting - Selected Gas, Min and Max full scale
- Device Settings – Model Code and Serial Number

3.1.1 Transitioning to Setup Mode from the Configuration Tab

- The configuration page provides information about the current firmware revision.
- At the bottom of the page is a box that provides additional open access to the Web Browser by entering the password “config” and hitting the <Change Settings> button.
- The Web Browser will open in the <Setup Mode>.

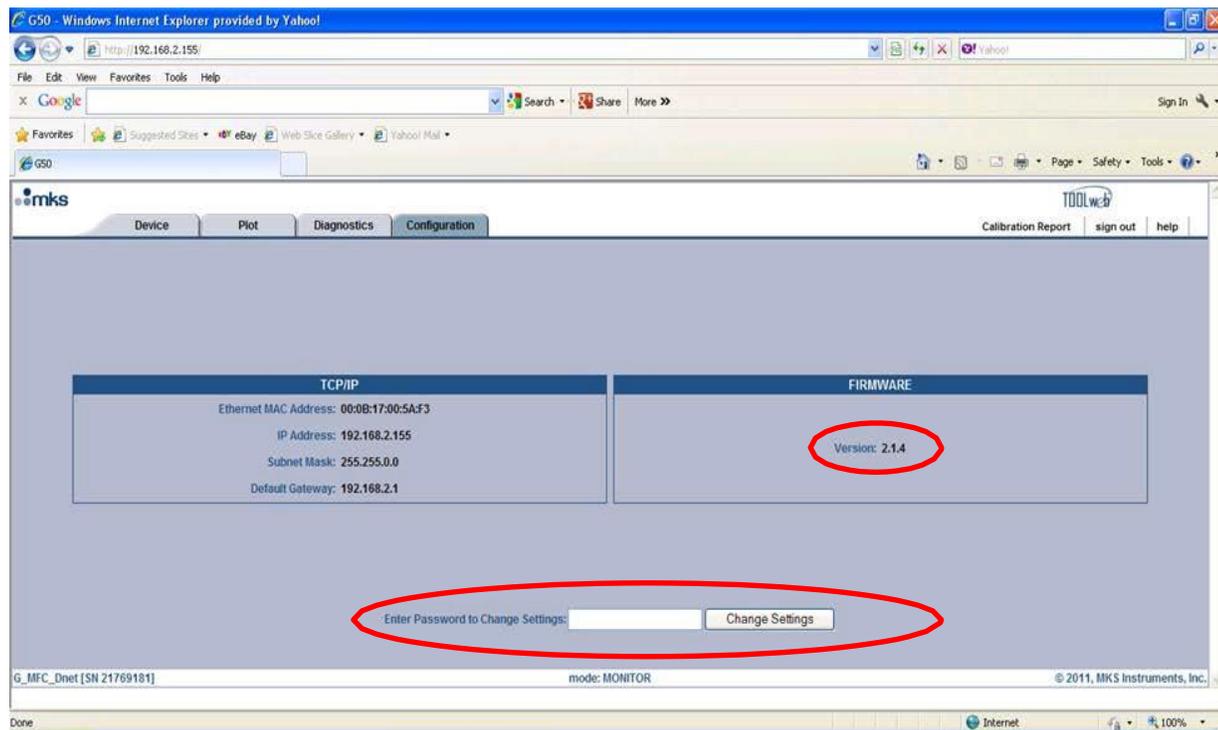


Figure 13

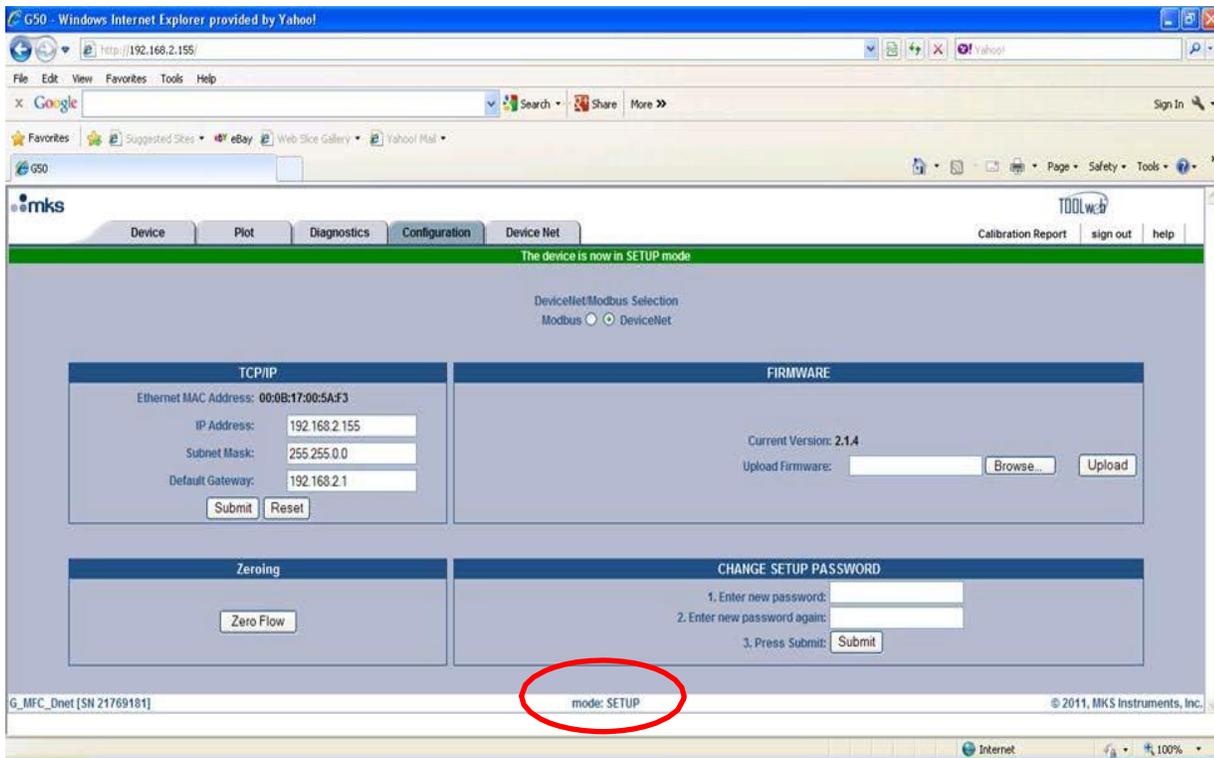


Figure 14

- The Setup Mode allows for the User to be able to access and make changes to a variety of Device features on each of the Tabs located at the top of the page.
- The Setup Mode Pages or Tabs and the availability of various features may differ depending on the G series I/O. Additional details about the different pages, features, and the type of information derived by using the Web Browser are described in detail in Parts 4 and 5.

NOTE

For additional information about G series MFC Configurations refer to the G series Manual or the G series Datasheet located on the MKS Website.

4 Browsers Pages and Basic Features available for All G series Models in the Setup Mode

Table 1

Browser Pages and Basic Features		
MFC Function	Browser Tab	MFC I/O Type
Create a new gas	Device	All MFC Models
Re-range Full Scale	Device	All MFC Models
Select an existing gas table	Device	All MFC Models
Plot and Save Data	Plot Page	All MFC Models
Pass/ Fail Diagnostics	Diagnostics	All MFC Models
Change MFC IP address	Configuration	All MFC Models
Change the firmware version	Configuration	All MFC Models
Set a set point delay time	Configuration	All MFC Models
Zero the MFC	Configuration	All MFC Models
Change the setup password	Configuration	All MFC Models
MFC External Calibration	Calibration	All MFC Models

4.1 Device Tab

4.1.1 Gas Settings Section

Information in this section of the <Configuration> page describes what gas, and gas instance, is currently selected on the MFC. The full scale of the device is also shown for the current setup.

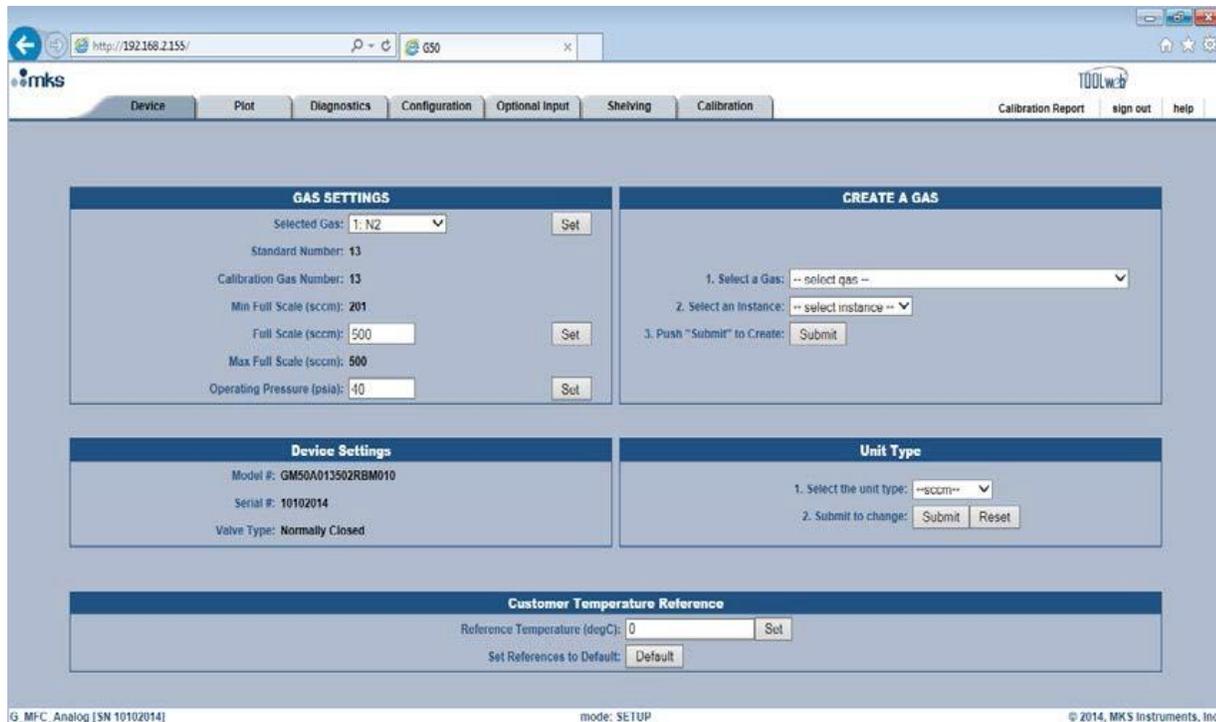


Figure 15

The MFC is shipped to the customer with 2 gas tables loaded on the Device (unless a special is ordered by the customer that requests a different set up).

- Instance 32 is the manufacturing N2 calibration table.
- Instance 1 is the nameplate gas ordered by the customer

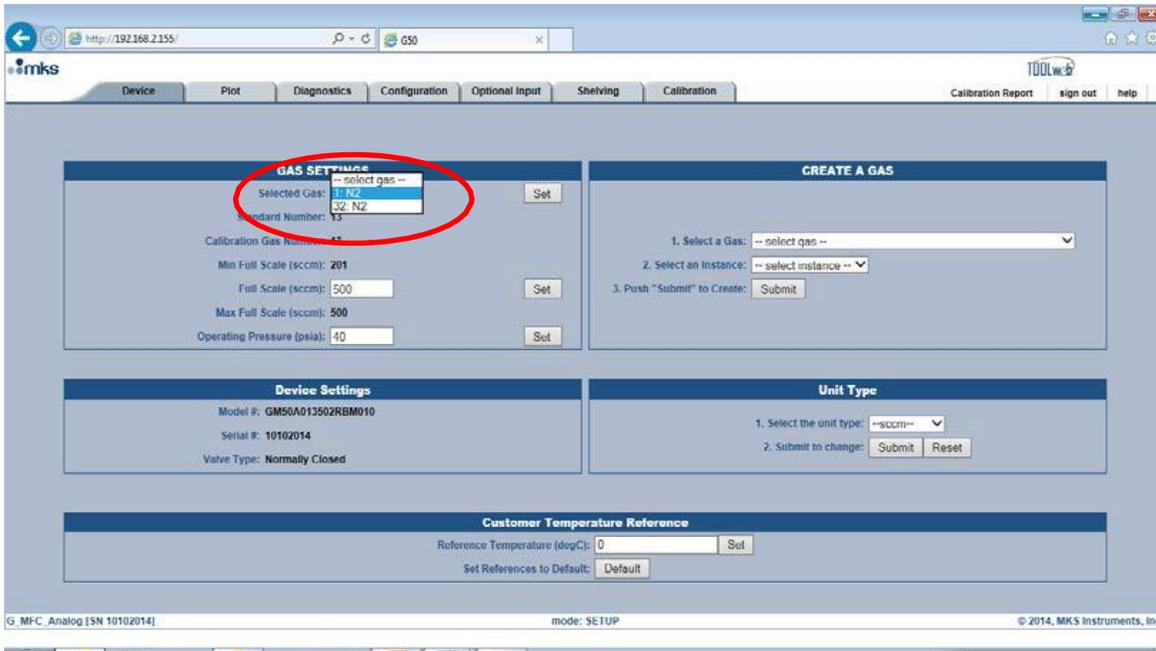


Figure 16

The last step in the configuration process during manufacturing is to setup Instance 1 to the correct Gas type and Full scale per the device model code. The device ships to the customer configured in Instance 1.

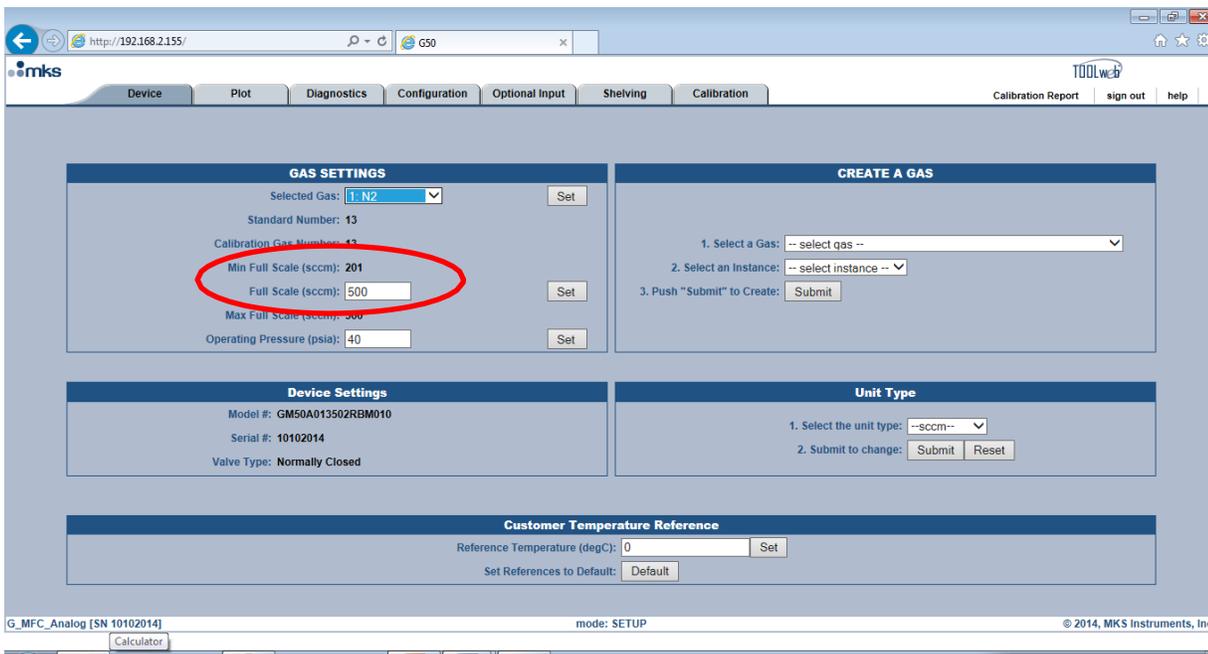


Figure 17

Device Full Scale is defined by the model code, but the MFC can be re-ranged to any value between the Min FS and the FS of the device.

To change the FS value, enter the target full scale value into the FS box and hit <Set>.

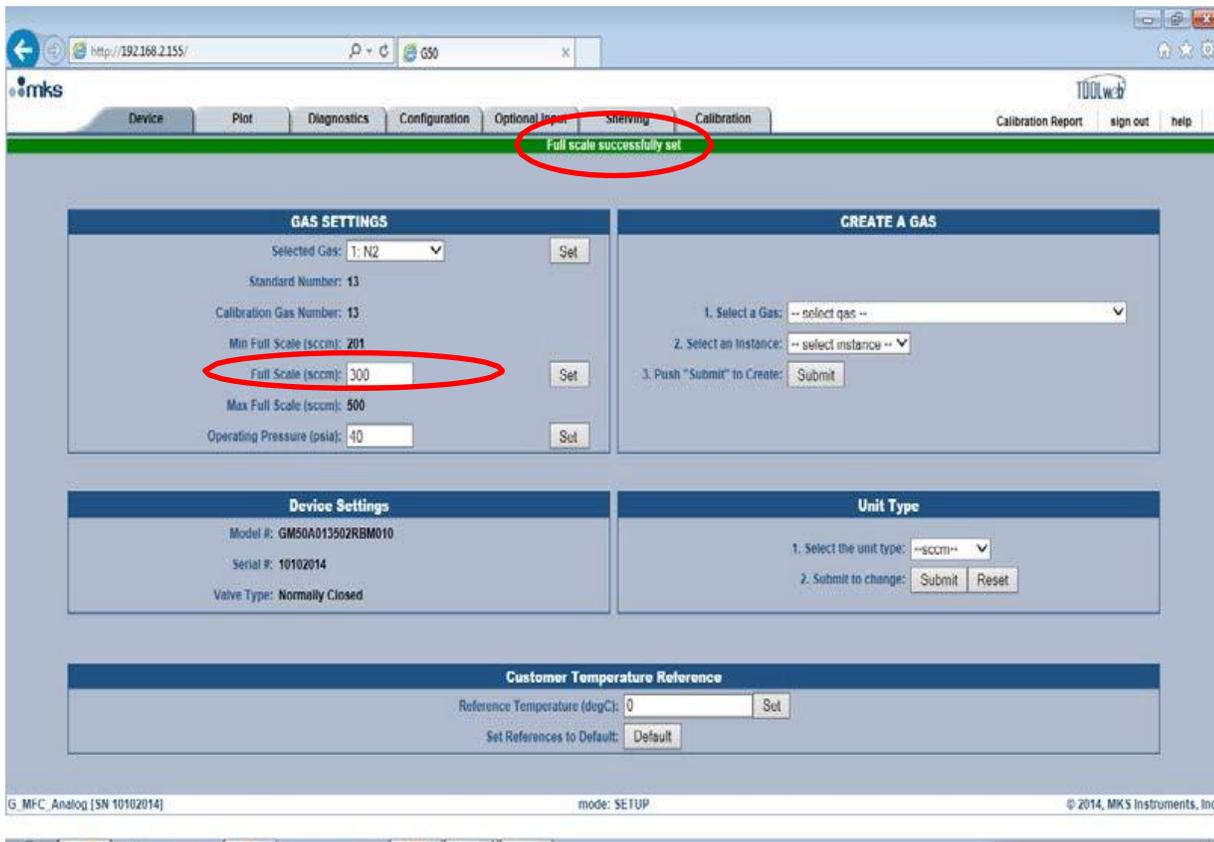


Figure 18

4.1.2 Create a Gas

The ability to create a new gas table (and set the Full-Scale range) allows the user the flexibility to utilize one MFC mechanical configuration for different gas, and, gas mixtures.

1. The selection process begins by using the pull-down menu to find and left click on a gas choice.

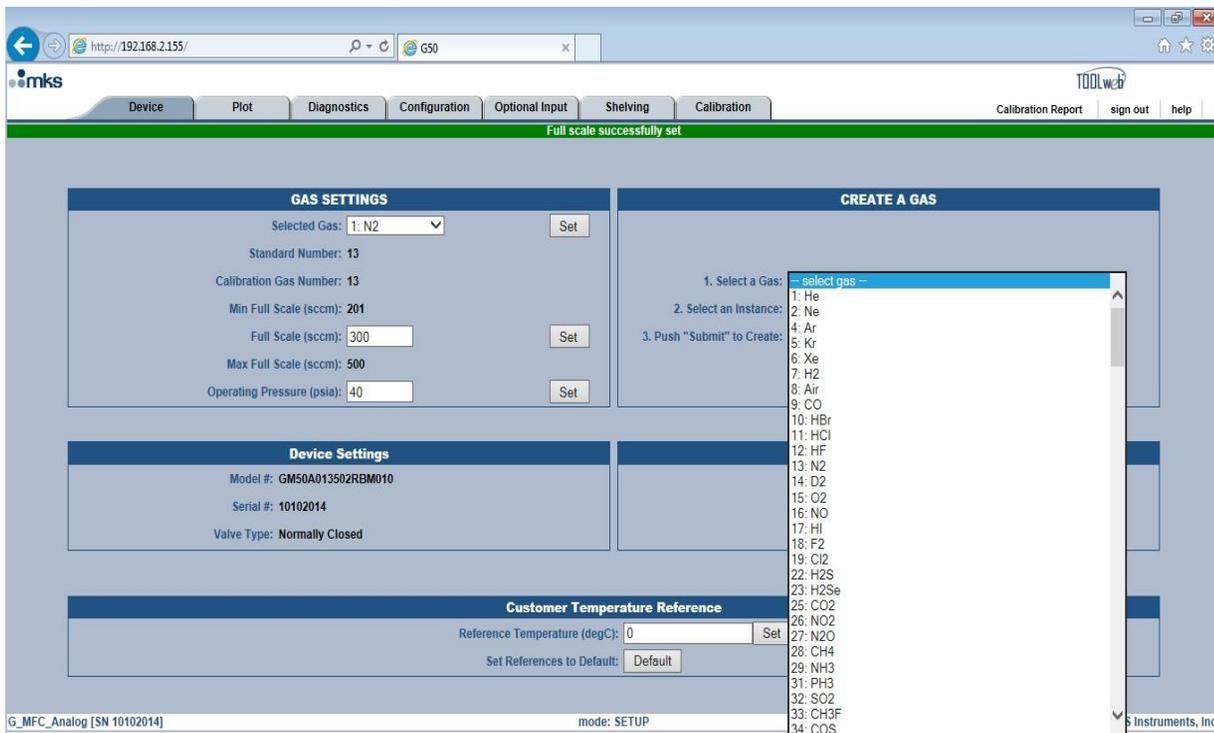


Figure 19

2. After selecting a Gas, select an unused instance in which to build the new calibration table.

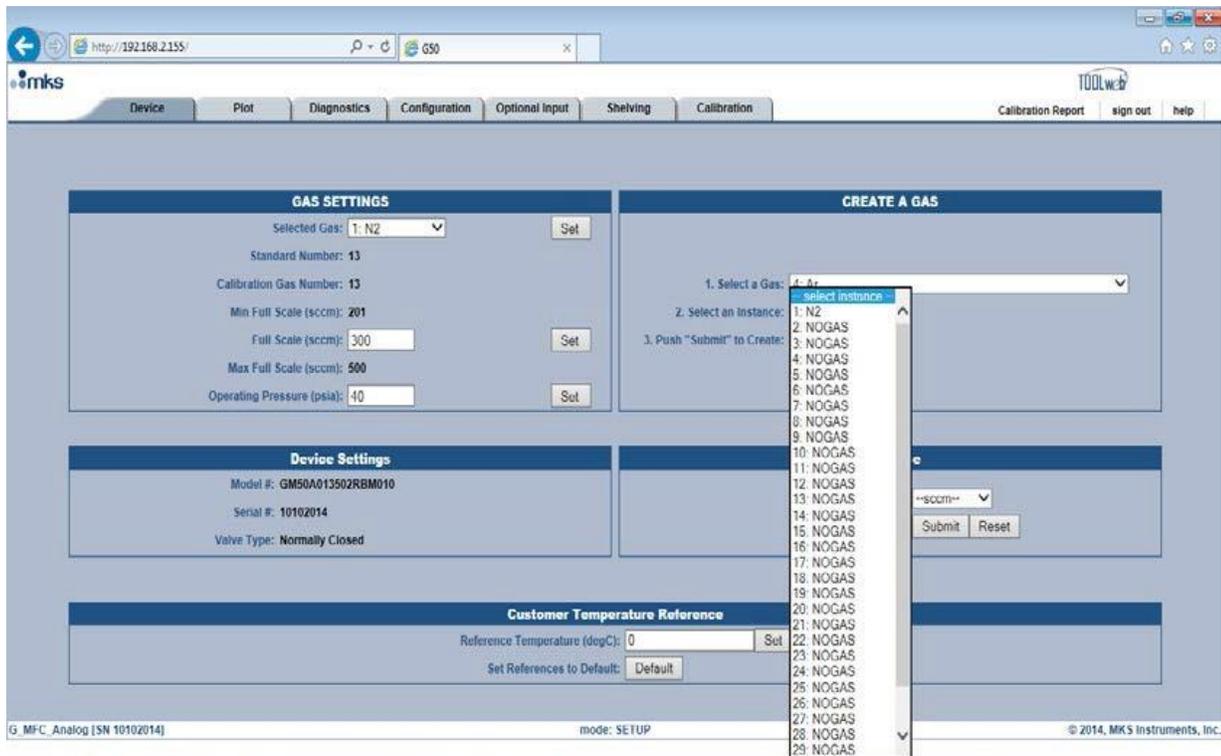


Figure 20

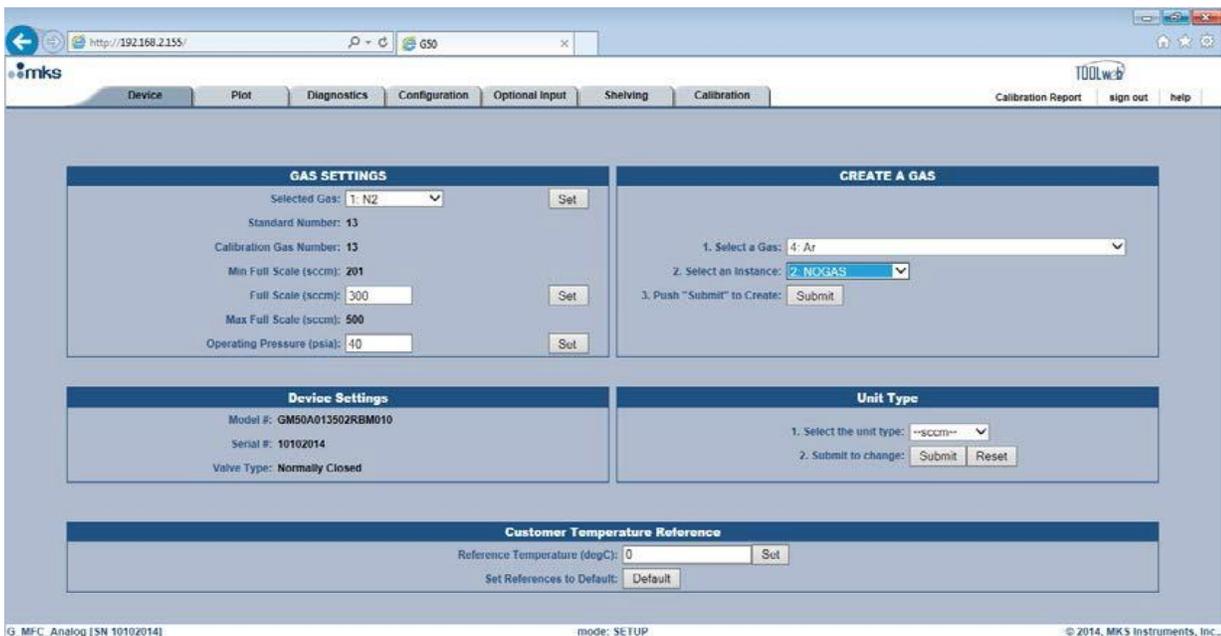


Figure 21

- Hit Submit. It takes approximately 40 seconds to complete the process. After successful completion, the new gas created will listed as the current gas selection in Gas Settings. The Full Scale may be re-ranged to values dependent upon the gas type.

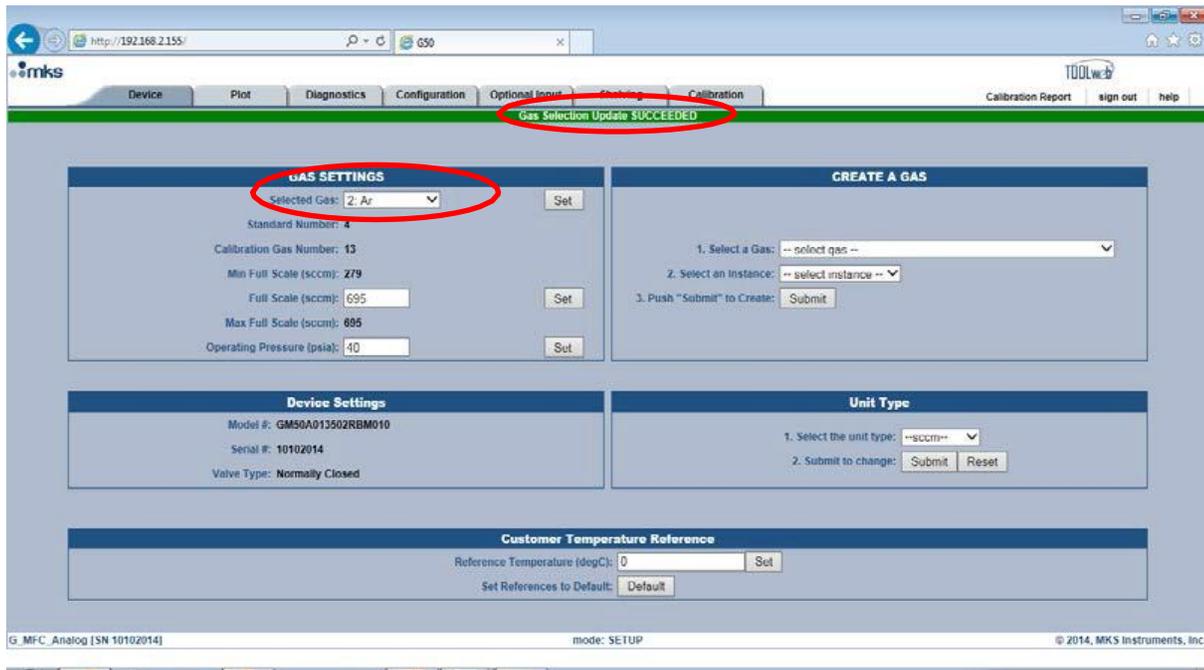


Figure 22

SPECIAL APPLICATION NOTE

While the device is going through its internal steps to create a new gas table, do not recycle or un-power the MFC. This will corrupt the flash and cause a catastrophic failure to occur on the MFC.

4.2 Plot Tab for G Series MFC Models

SPECIAL NOTES FOR THE PLOT PAGE

- The plot page requires a java applet to run and plot data on the graph which is supported only by IE 11. Other Browsers such as Chrome and Edge will not work with the Plot Page.
- Both the Java and IE 11 must be 32 bit even if the Windows Operating System of the computer is 64 bit. Additional details are provided in Appendix A.
- The java applet has security requirements that must be addressed before the plot page will open. Details on how to address this issue are described in detail in Appendix A.
- Saving the data also requires some special setup procedures. Details on how to save data are described in Appendix A.

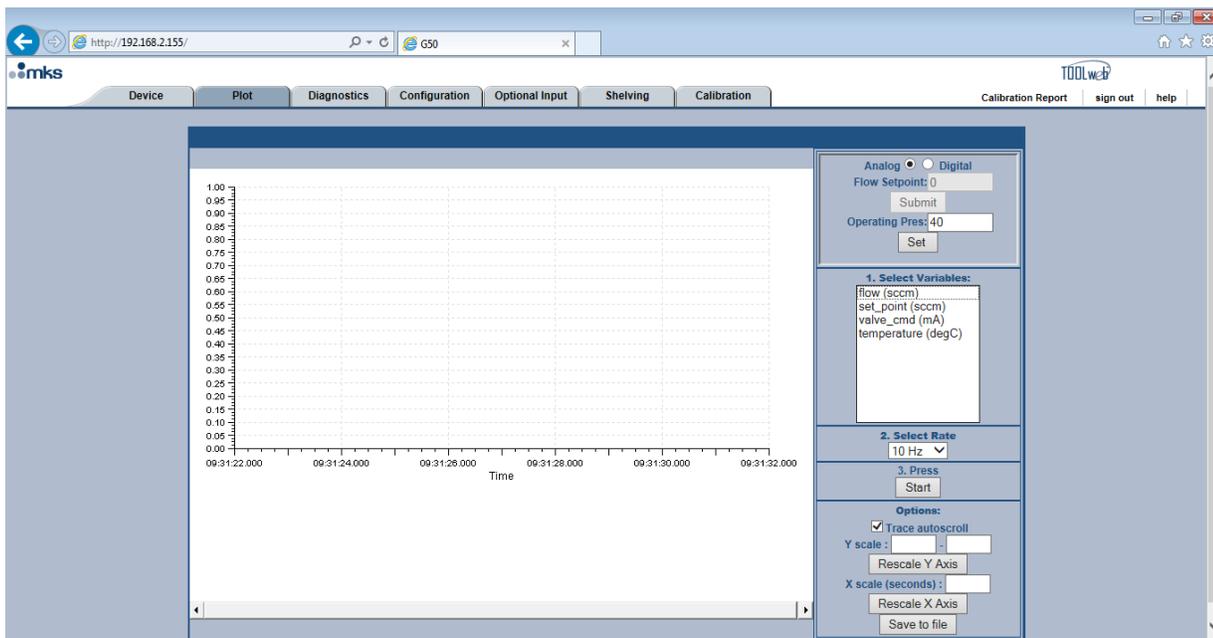


Figure 23

1. The variables that can be graphed on the plot page can be selected by holding down the control key and left click on each individual entry to highlight.

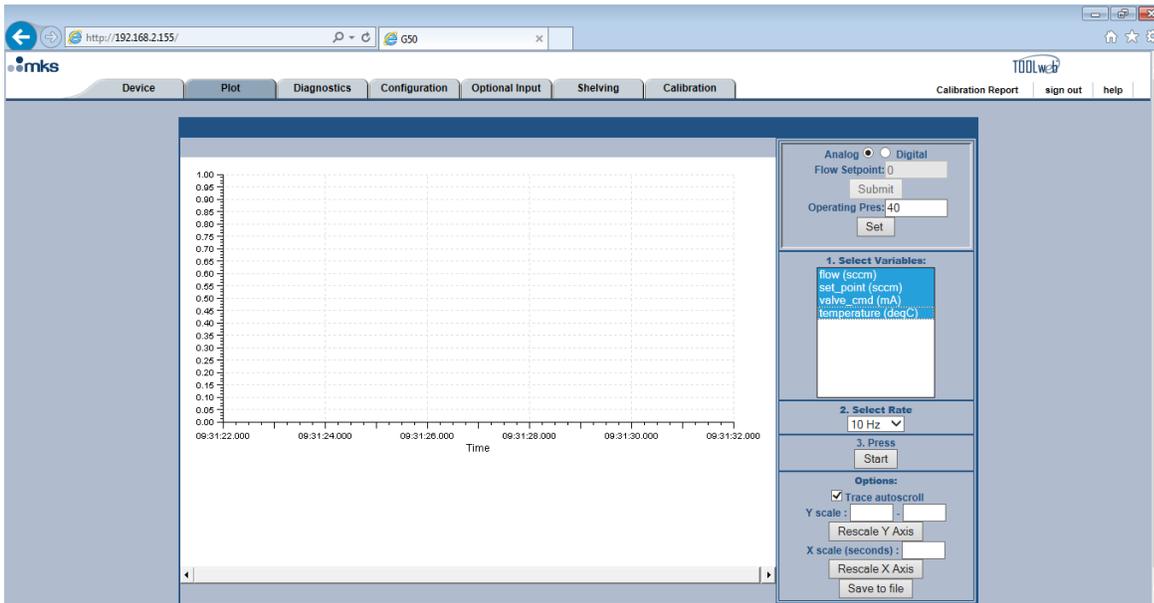


Figure 24

2. Select the data collection rate using the pull-down menu. A value of 10Hz, or 10 reading per second, is the standard default. For more resolution the maximum data collection rate is 100 Hz.

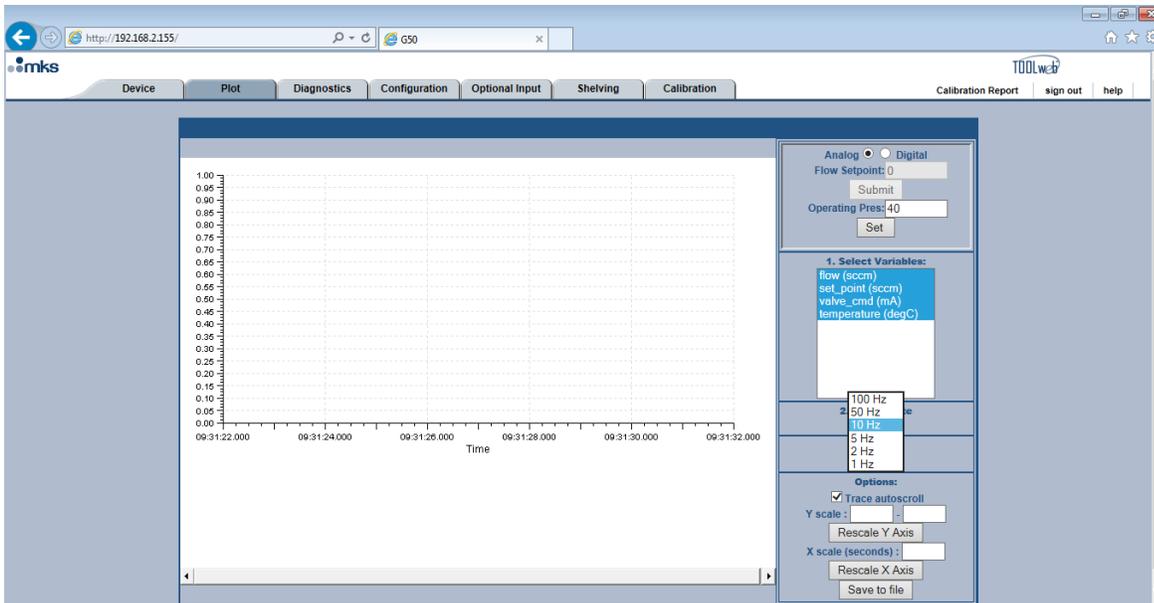


Figure 25

3. Push <Start> to activate the plot page for the variables selected.

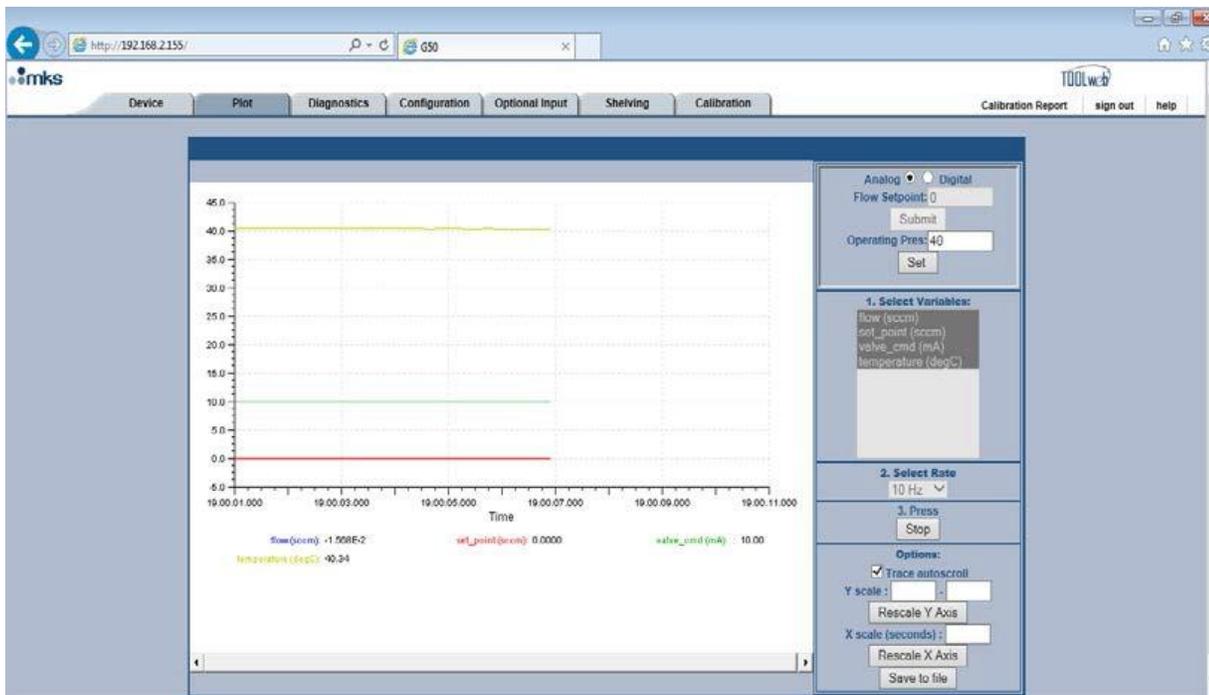


Figure 26

In the screen shot above all variables have been selected and the actual readings are listed below the graph.

4.2.1 Sending Set Point over Ethernet

SPECIAL APPLICATION NOTE

There will be some slight variations depending on the MFC primary I/O for the device to accept and respond to an Ethernet set point.

- **Analog (9 or 15 pin)** – Toggle the selection from Analog to Digital at the top of the Plot page to send a set point over Ethernet communication.
- **DeviceNet** – Already a digital protocol, however the MFC must not have a polled connection for the MFC to accept a digital set point over the Ethernet port.
- **RS485** – Already a digital protocol, no special setup for in order to send set points through the Ethernet port to the device.

- **Profibus** – Similar to DeviceNet in that the MFC should be powered but not connected to the Profibus network for the MFC to accept an Ethernet set point command.
- **EtherCAT** – Already a digital protocol, no special setup for in order to send set points over Ethernet.

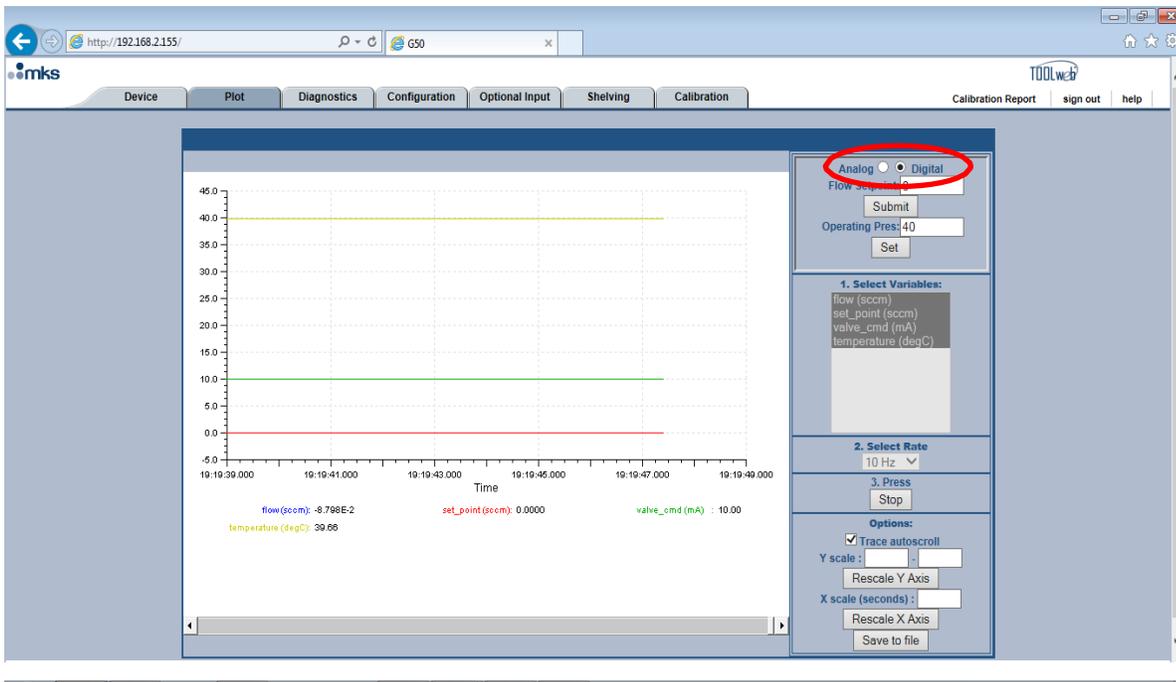


Figure 27

1. In this example, the Analog MFC above has been toggled to the “Digital” mode and can now accept a set point via Ethernet. Type in the set point value and hit <Submit>

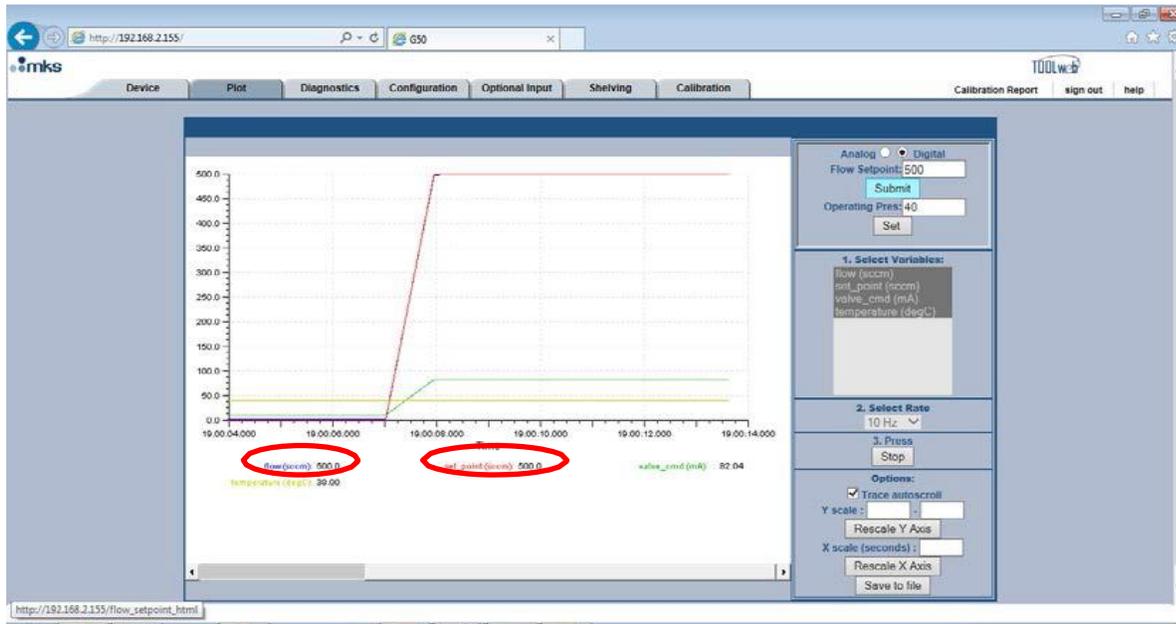


Figure 28

Device accepts and responds to a 500 sccm set point.

APPLICATION NOTE

The update rate of the browser plot page does not provide full resolution of the data. To properly review actual real time data, the data should be saved in a .csv file for independent analysis.

2. After stopping the device data collected during that period can be saved in a .csv format that can be analyzed later in excel spreadsheet. Specific details on saving data are provided in Appendix A.

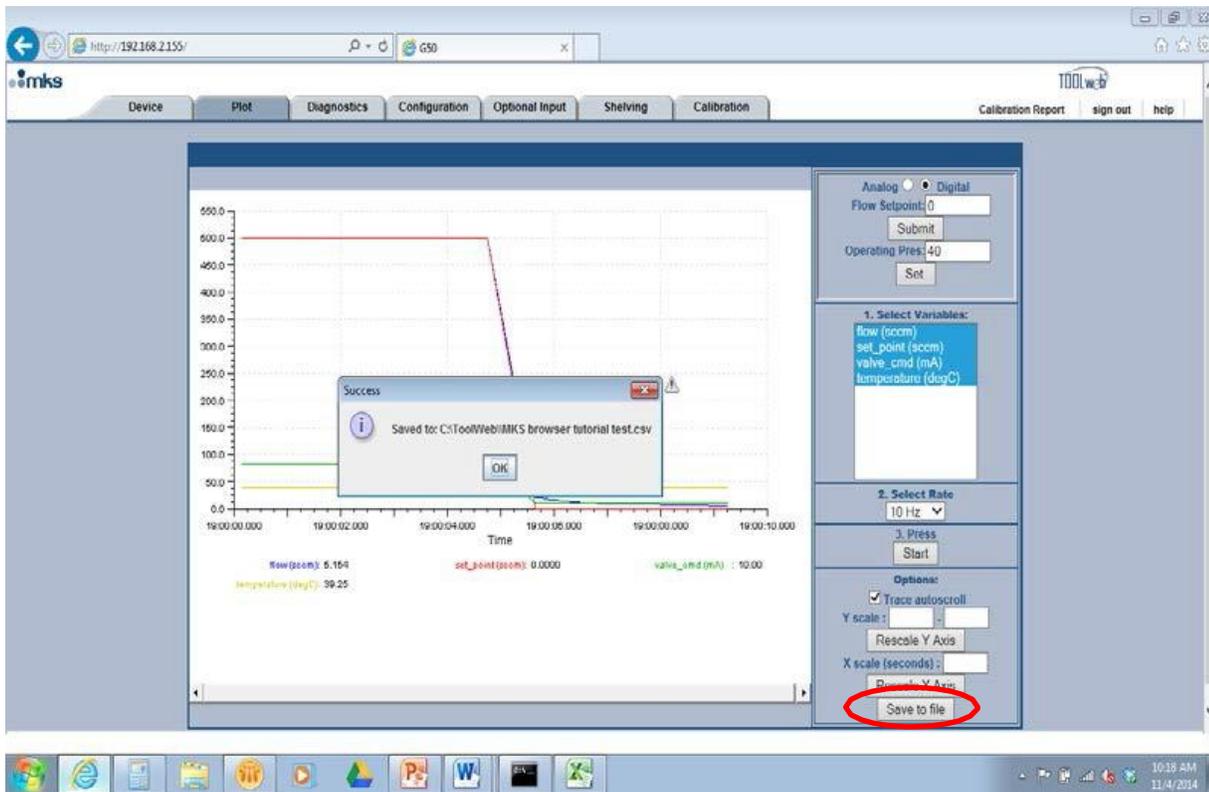


Figure 29

4.3 Diagnostics Tab

The Diagnostics tab allows the user to run basic pass/fail tests on the flow and temperature sensor. These tests consist of taking 100 readings from the flow and temperature sensors and statistically analyzing the data to make sure the outputs are valid.

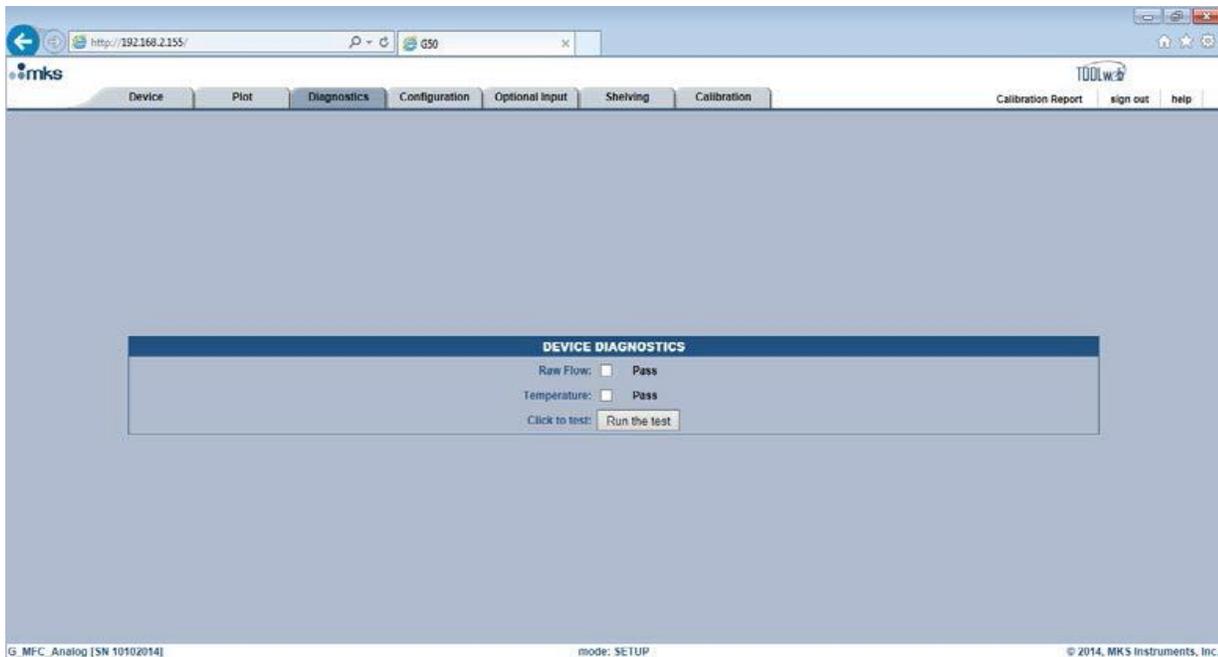


Figure 30

1. To run the test, check the <Raw Flow> and <Temperature> box. Hit the <Run the Test> button.
2. After completion of the test the bar at the top will provide pass / fail result.

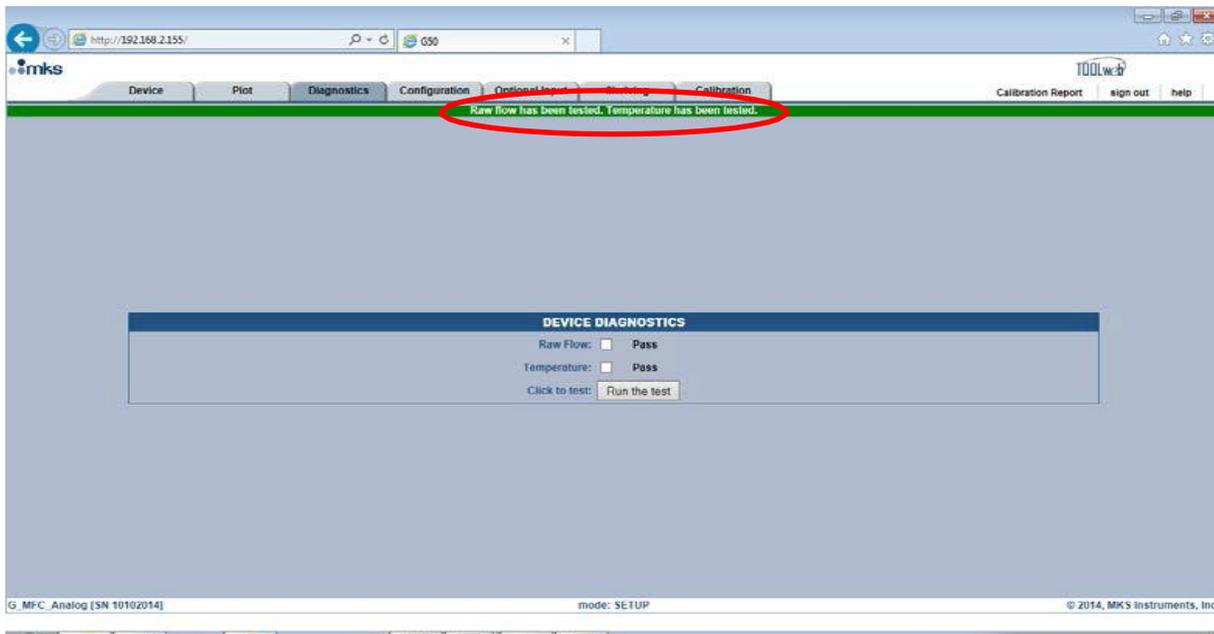


Figure 31

4.4 Configuration Tab

The Configuration page has several features that can be beneficial to assist the user in setting up the MFC and allowing access to upgrade the firmware of the device at some future date should the need arise.

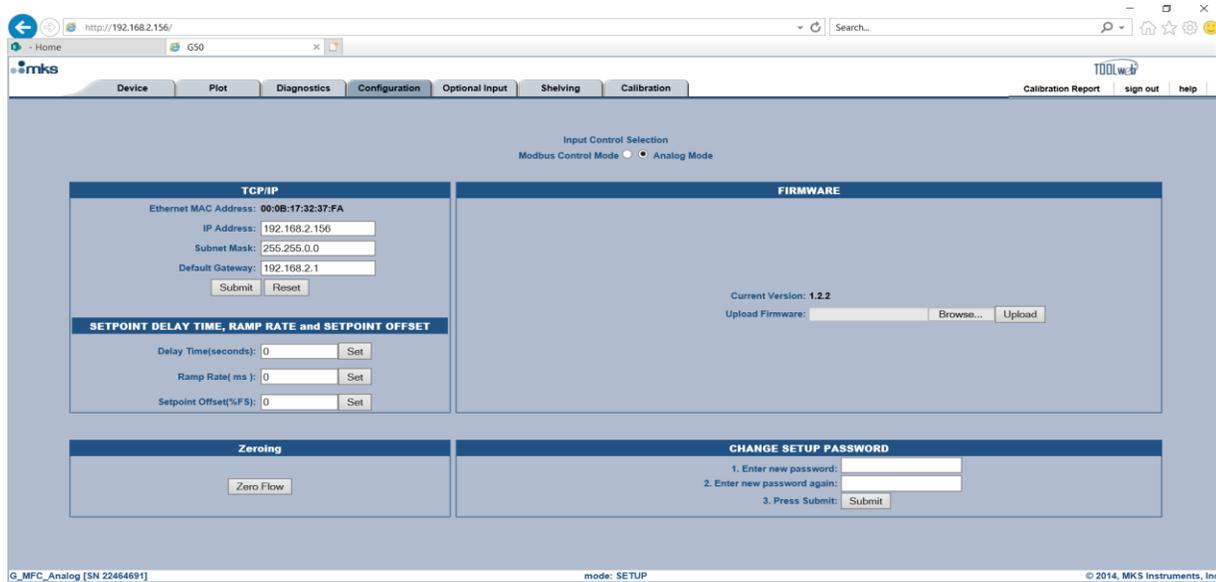


Figure 32

4.4.1 Changing the IP Address of the MFC

1. On the left hand side of the configuration page the IP address of the MFC is displayed.
2. Changes can be made to the IP Address on the configuration page. In order to open a Browser tab for more than one MFC, each MFC must have a distinct and different IP Address.
3. Changes in the IP Address can be made by altering the current number and hitting <Submit>.

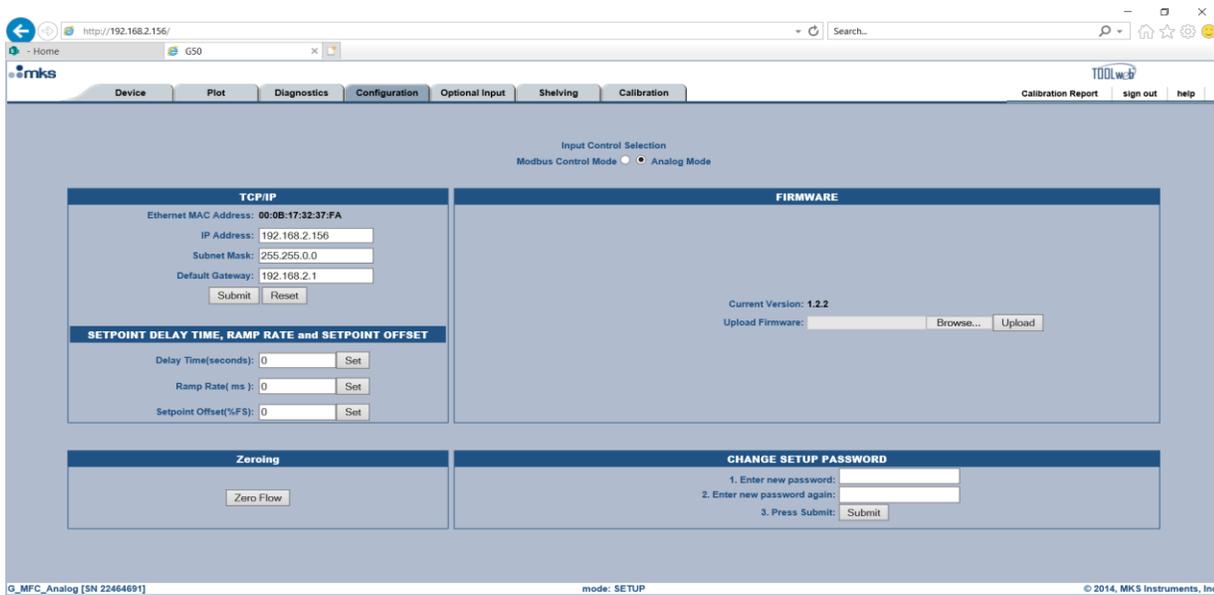


Figure 33

4.4.2 Set Point Delay

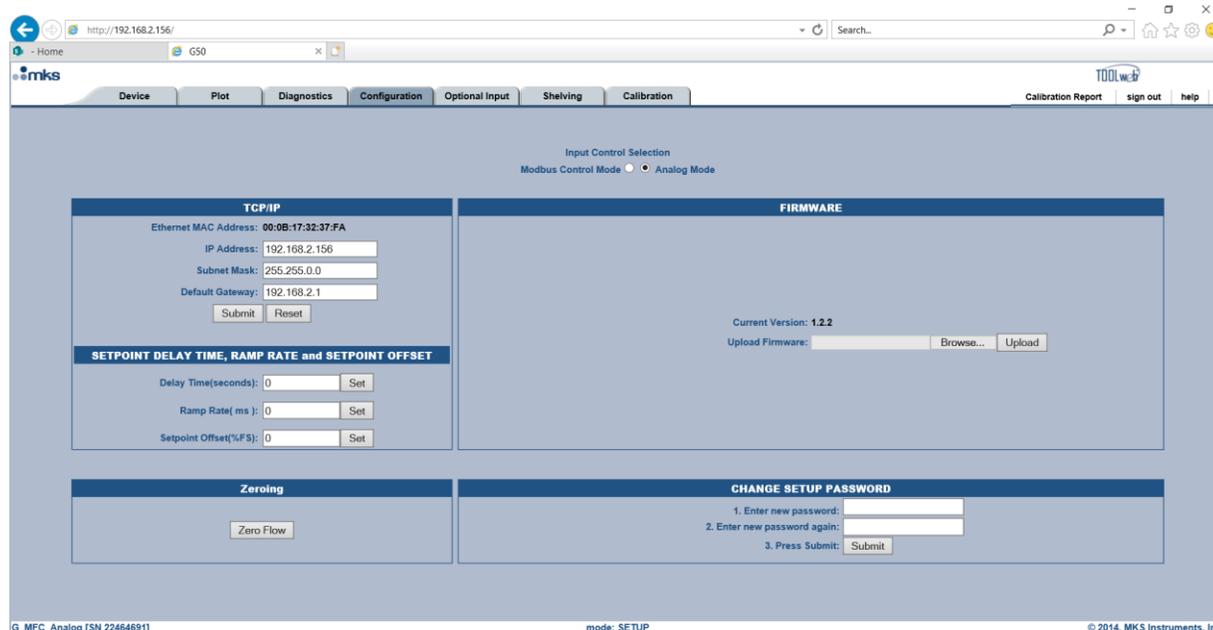


Figure 34

The set point delay feature allows the user to alter the transient response of an MFC. Defaults for Set Point Delay “as shipped” from the factory is 0.

Delay time, which is set in the box and initiated by selecting <Set> is expressed in seconds.

4.4.3 Zeroing the MFC

Zeroing the MFC correctly is one of the most basic requirements for the MFC to meet and maintain published specifications for gas calibration accuracy. For additional information on the proper methodology for zeroing an MFC see Appendix D

The MFC can be zeroed in a various ways:

- The button to zero the MFC is located on the top of the MFC. It is identified as <Zero> / <Select> / <PB> depending on the MFC Model. Hold the button down for 3 sec to complete a flow zero
- Hit the <Zero> button at the bottom of the configuration page
- MFC Flow Zero commands are also supported in digital I/O's as a common attribute. Reference the appropriate device type Communication Supplement for the exact command string.

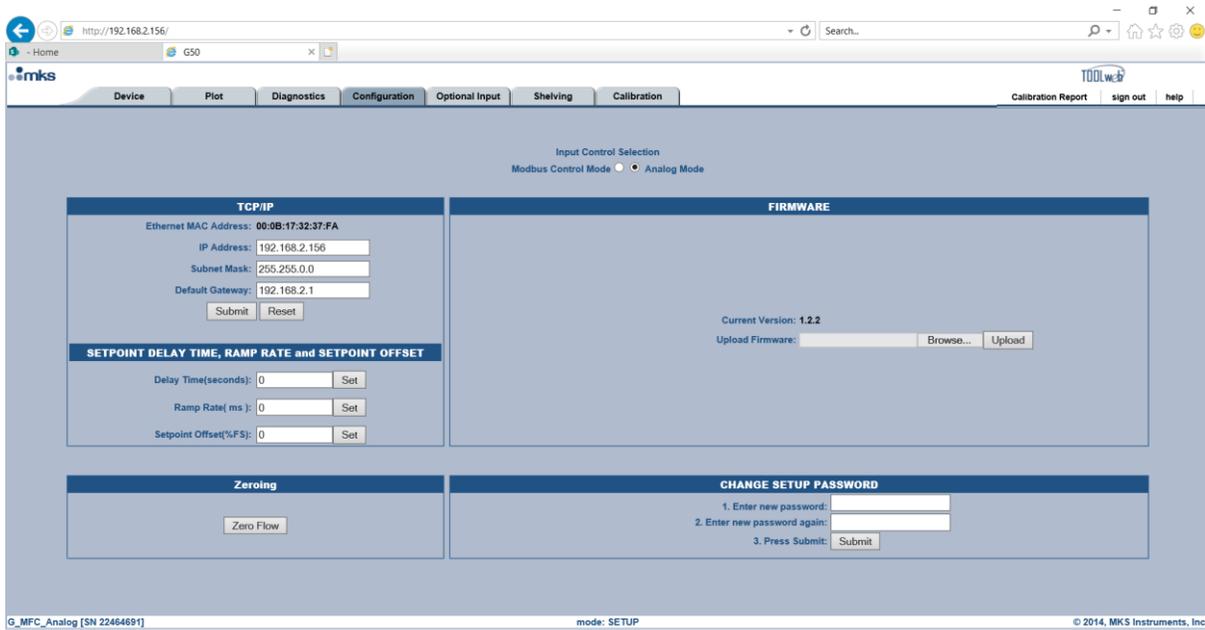


Figure 35

4.4.4 Updating MFC Firmware Revision

The current version of MFC firmware is displayed on the <Configuration> page. Updating the MFC with a new version of firmware is simple process to complete using the <Update Firmware> box.

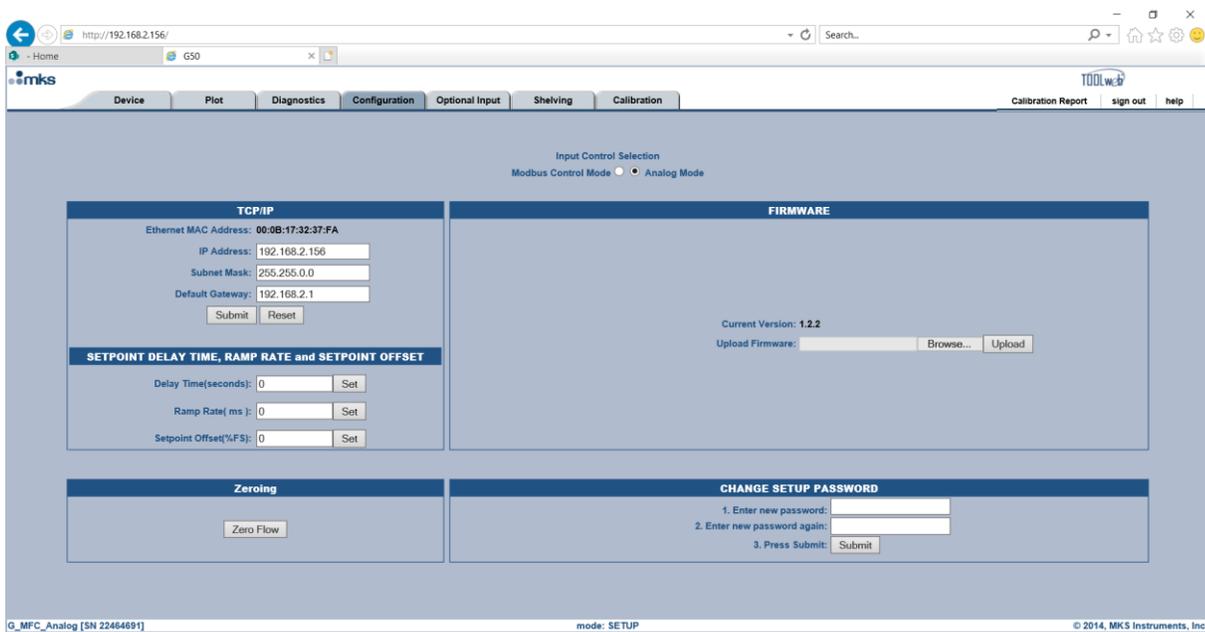


Figure 36

4.4.5 Procedures for Updating the MFC Firmware Revision

1. Open the Web Browser to the <Configuration> tab while in the <Setup> Mode

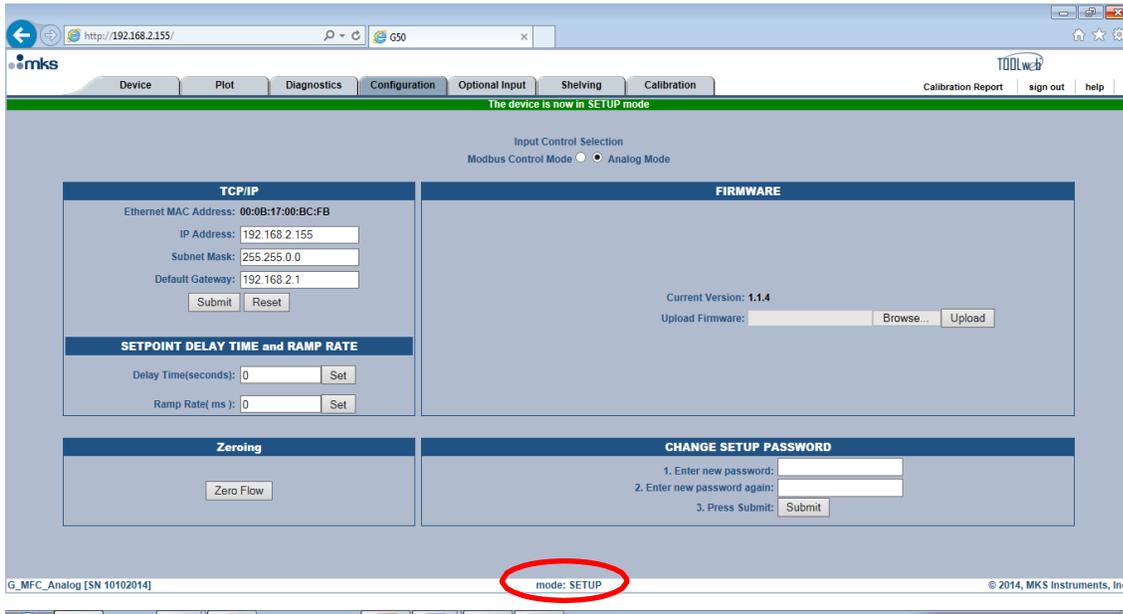


Figure 37

2. Left click on the <Browse> button and locate the new version of Firmware that is to be loaded into the MFC.

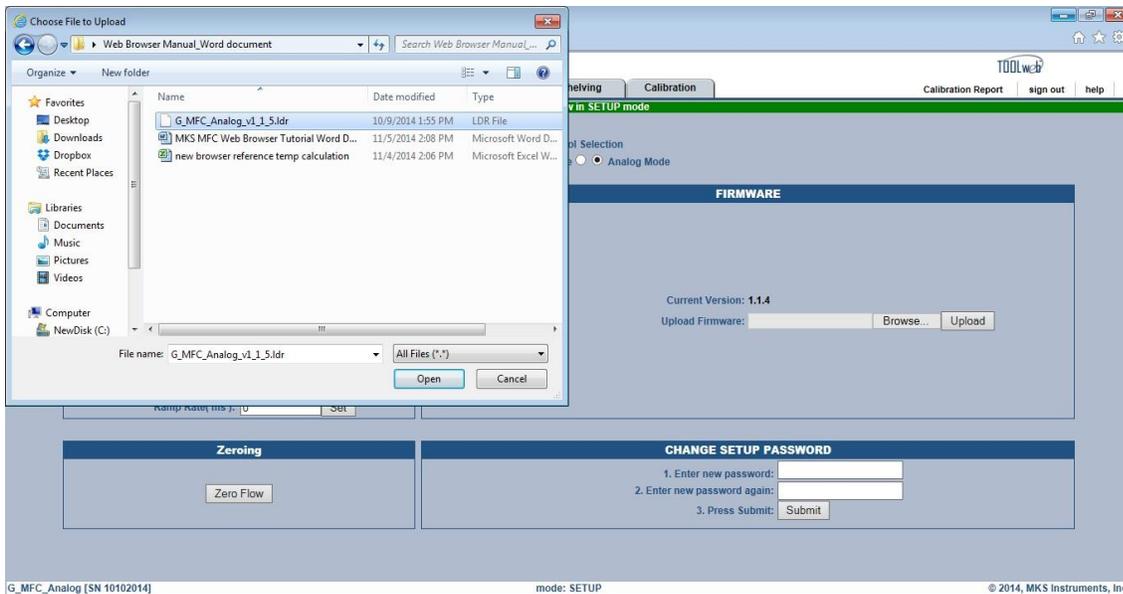


Figure 38

- Once selected hit <Open> to transfer the firmware file into the Browser.

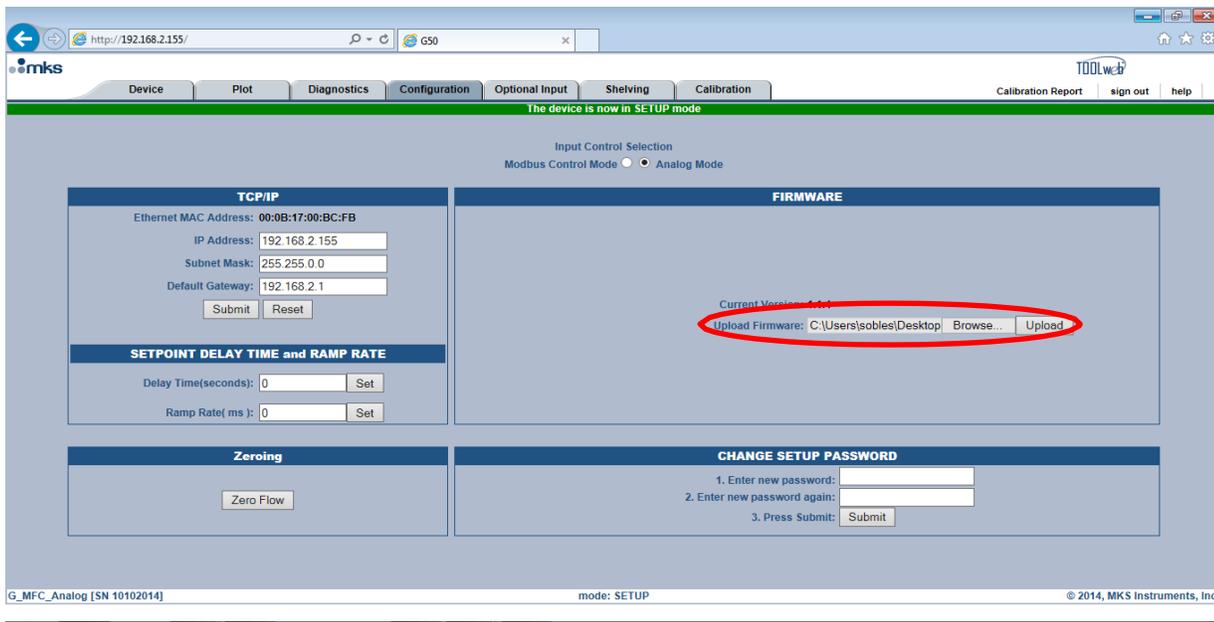


Figure 39

- Hit <Upload>. The process to upload new firmware takes about 30 to 40 seconds to complete. After completion, the Browser will ask the user to reset (power cycle) the device.

SPECIAL APPLICATION NOTE

While the MFC is in the process of completing the Firmware, Upgrade do not remove the power from the device. If the power is interrupted while the device is saving to its flash memory, the flash will be corrupted and the MFC will experience a catastrophic failure.

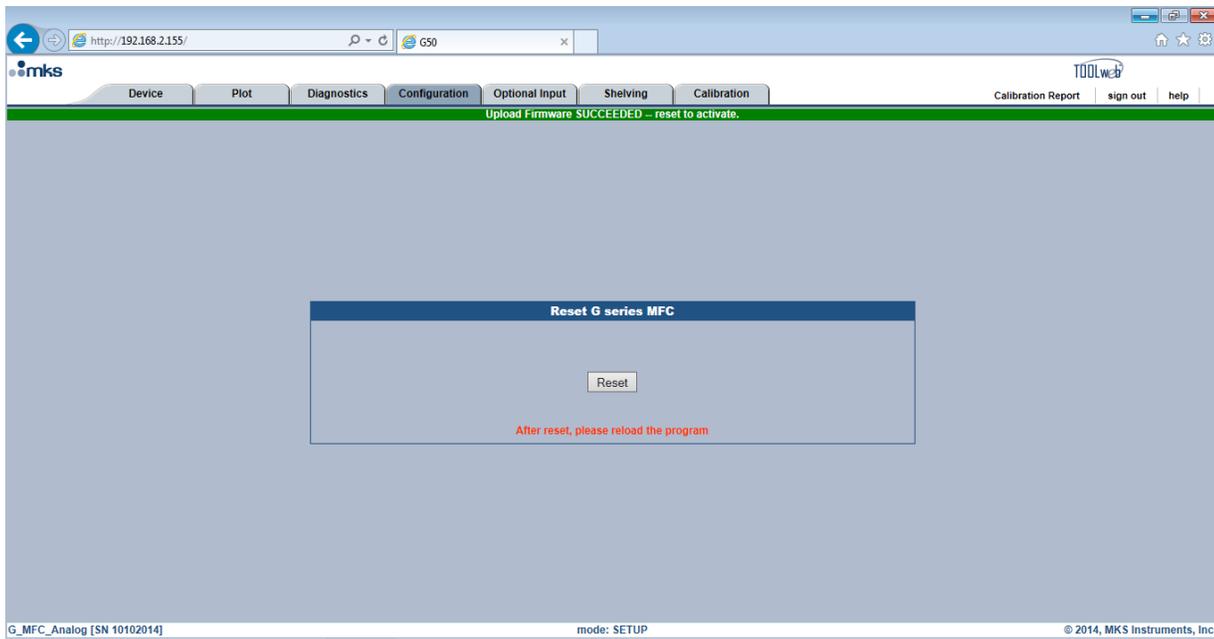


Figure 40

5. Hit the <Reset> button. Wait 15 seconds before continuing to the next step.
6. Verify that the new version of Firmware loaded correctly by re-refreshing (or closing and re-opening) the Browser and opening the <Configuration> page (Setup Mode).

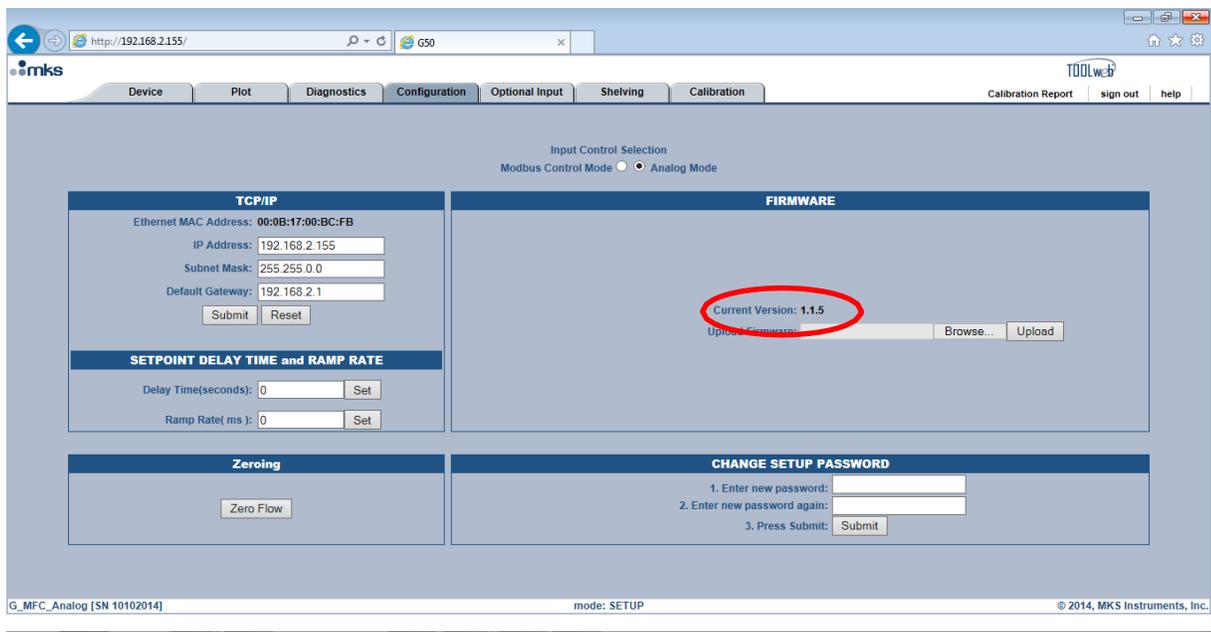


Figure 41

- In order to complete the process of upgrading the firmware of an MFC any new parameters or changes to existing parameters being introduced into the MFC, each gas table currently in the MFC must be individually re-created (see Device Tab Instructions).

4.4.6 Changing the Setup Mode Password

The password to get from the Monitor Mode to the Setup Mode can be changed from its default <config> to something that may be more familiar to the MFC user.

- From the <Configuration> page enter the new password into the appropriate box at the bottom of the page.
- Press <Submit>

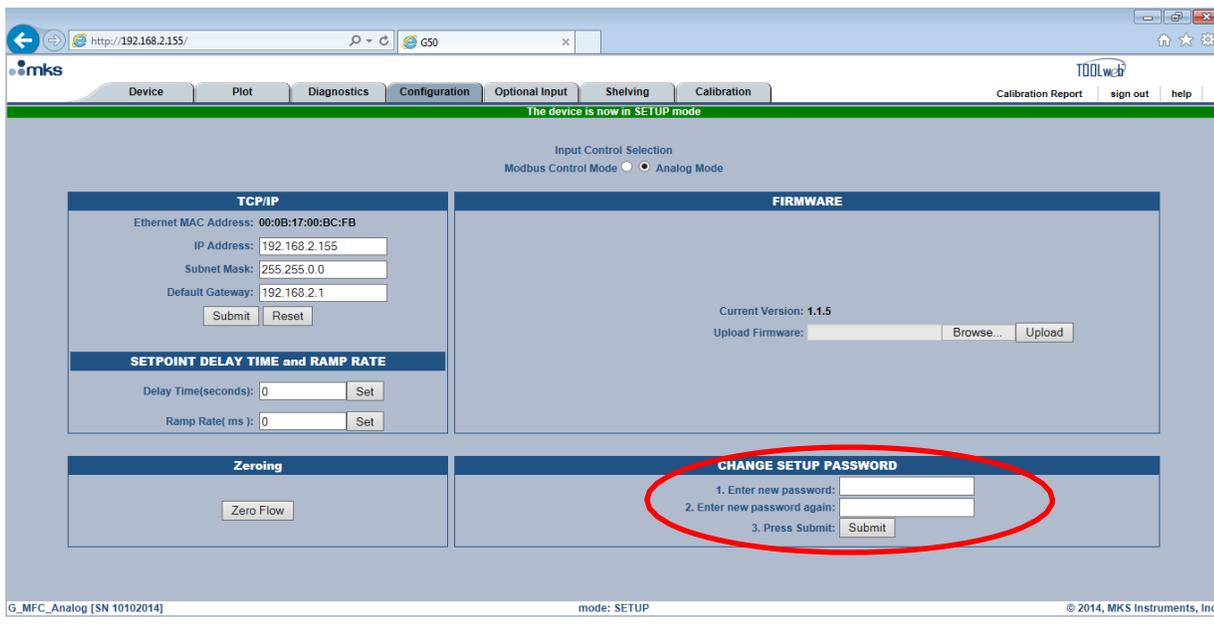


Figure 42

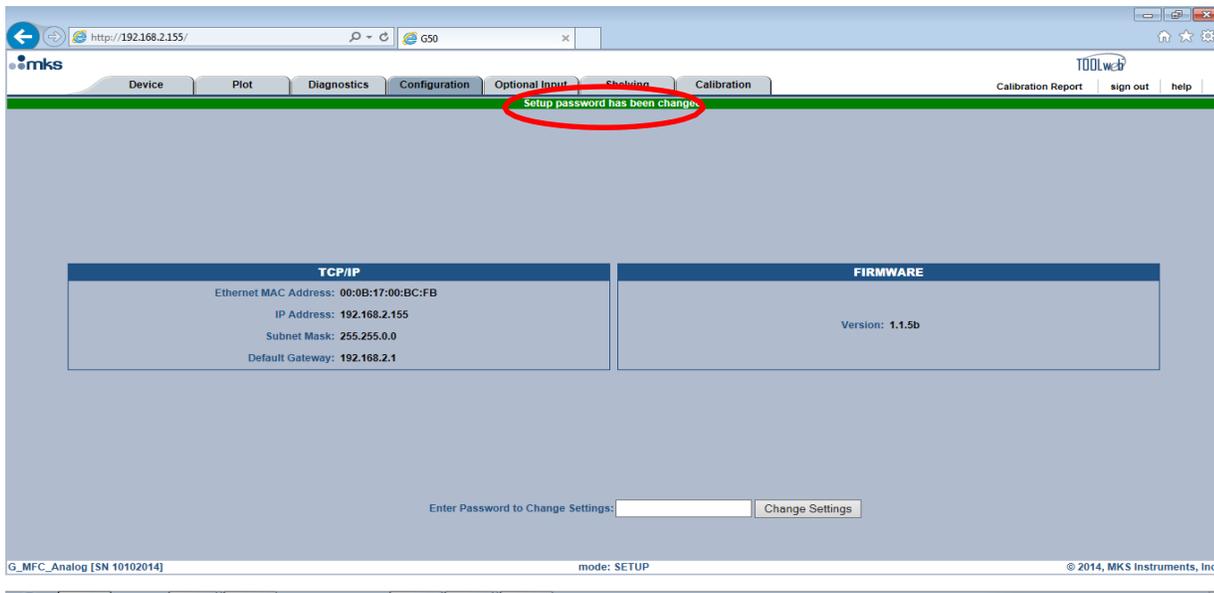


Figure 43

3. Re-enter the new password and hit <Change Settings>
4. After changing the password, the user must take care to remember the new password.

NOTE

If the password is lost or forgotten, there is no way to recover this information or reset to the default password.

4.5 Calibration Tab

The Calibration page (also referred to as External Calibration) allows the user to adjust a calibration table associated with a nameplate gas based upon flow accuracy data generated by the user’s internal flow accuracy standard (secondary MFM standard, Chamber Rate of Rise, etc.).

Modification of a gas table using this technique affects only the instance that is currently selected. It is important to verify the current gas table selected matches the name plate gas that is to be modified using the External Calibration page.

Each gas table on the MFC can have its own, individual External Calibration Table.

SPECIAL APPLICATION NOTE

It is recommended that the user go to the <Device> tab and make sure the name plate gas being selected for modification is set to its maximum full-scale value before determining the set points to be run to determine <Actual> flow accuracy. After collecting all the appropriate data and enabling the table, the user can return to the <Device> Tab and re-range the full scale of the gas table as necessary.

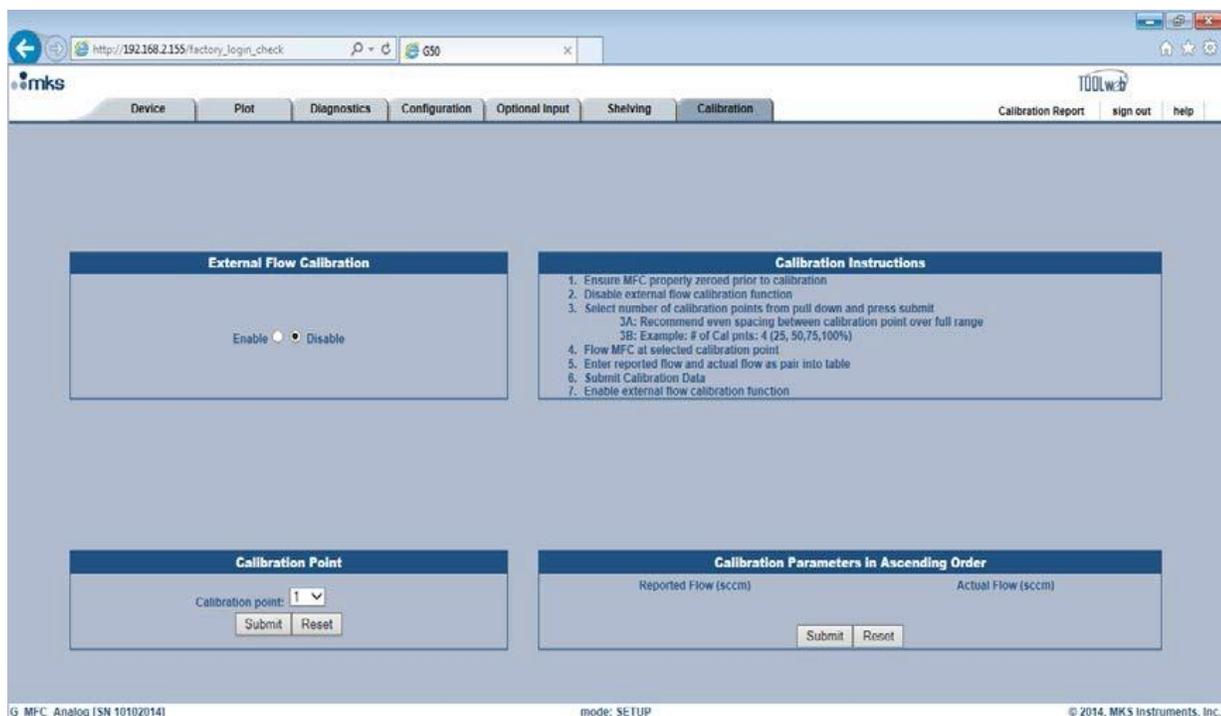


Figure 44

4.5.1 Selecting Calibration Points

The format is like the Shelving page. First select the number of calibration points. The more points used the better the mathematical fit for the shifted or new calibration curve.

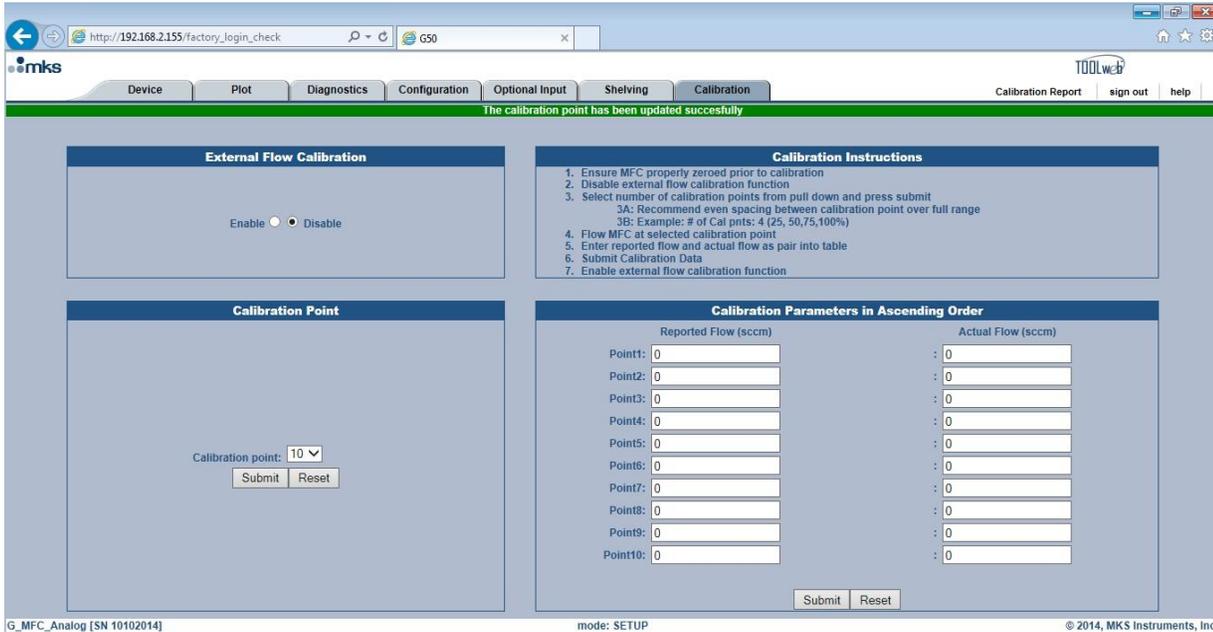


Figure 45

4.5.2 Completing the Calibration Parameters Section

1. Fill in the table for the Reported Flow. Note that the values must be non-zero and in an ascending order.

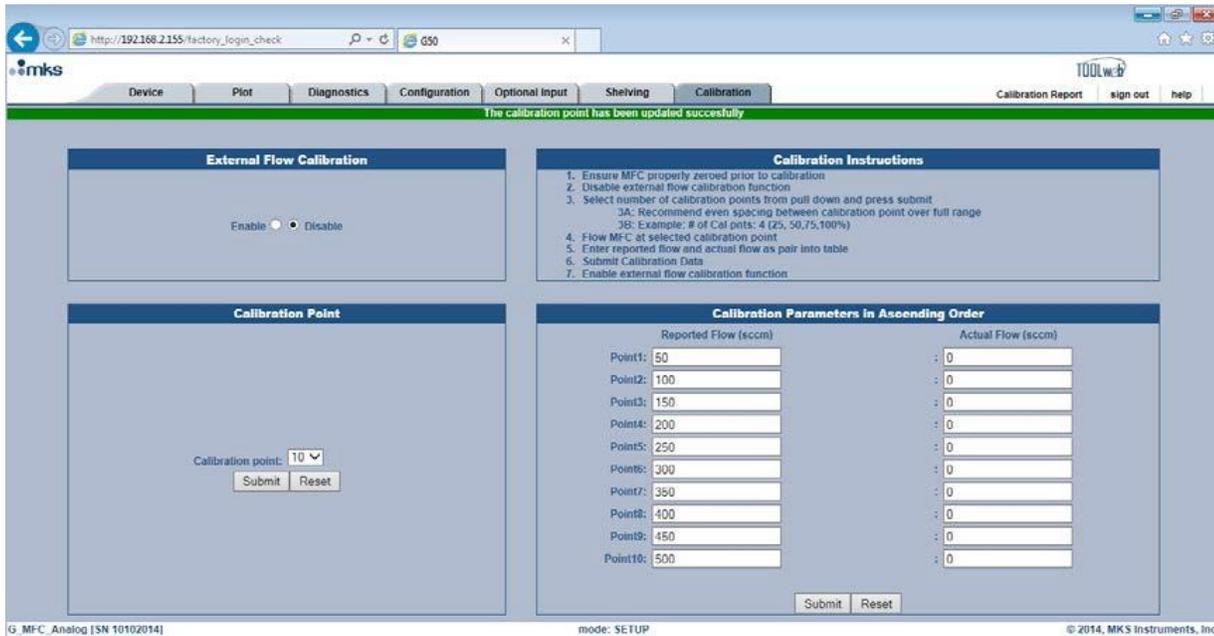


Figure 46

- Run each data point using internal standard and determine the <Actual> Flow. Put the values for each set point into the table. After entering the values, hit <Submit>. If all the criteria are met the new table will be accepted.

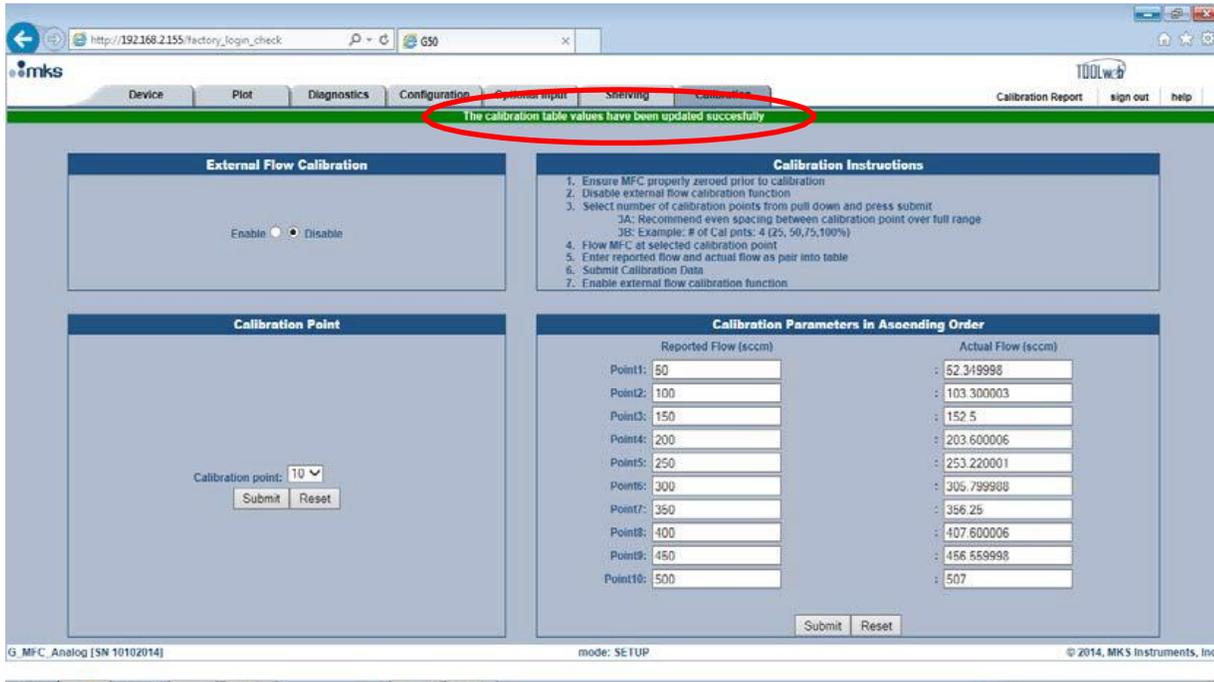


Figure 47

4.5.3 Activating the Modified Calibration Table

1. To make the new table active for the gas instance selected, select <Enable>.

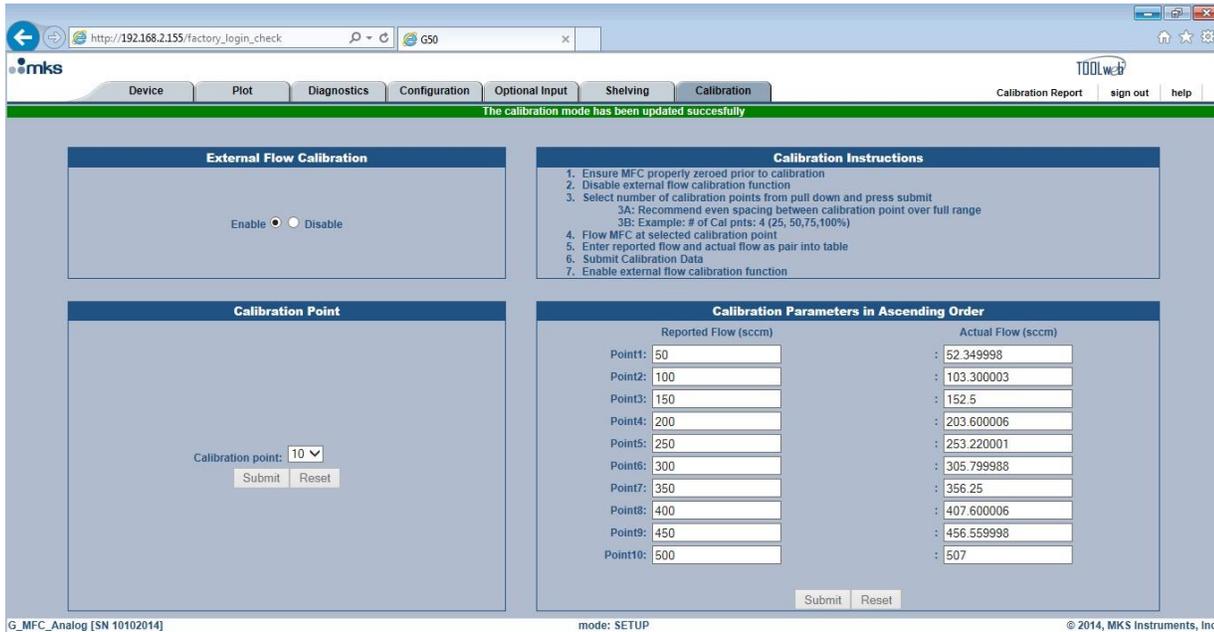


Figure 48

2. After enabling the table, the ability to make changes and submit these changes is not available unless <Disable> is selected.

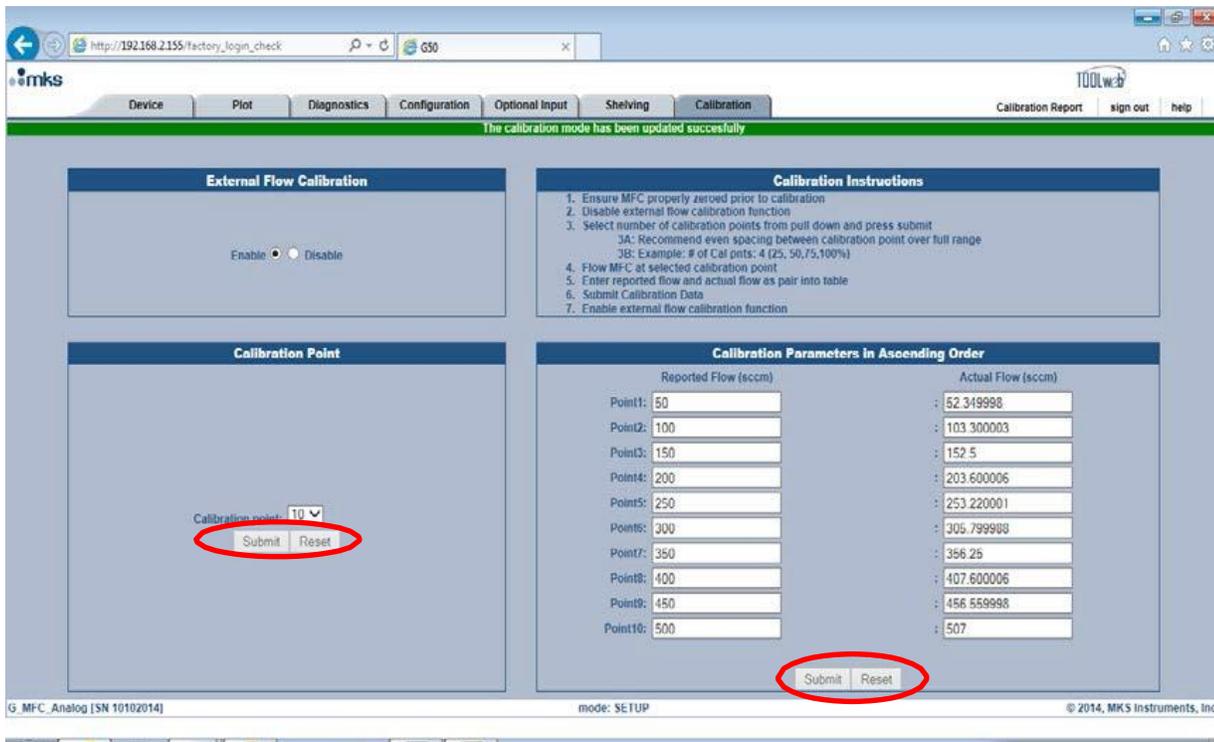


Figure 49

5 Browser Pages and Features Related to Specific G series MFC I/O

Table 2

Browser Pages and Basic Features		
Web Browser Description	Web Browser Tab	Model
Modbus Mode	Configuration	All MFC Models except Profinet and EtherCAT
Change unit type	Device	9 pin / 15 pin / 4 to 20 mA
Set ramp rate	Configuration	9 pin / 15 pin / 4 to 20 mA
Set point offset (% FS)	Configuration	9 pin / 15 pin 0-5VDC
Optional input control	Optional Input	15 pin 0-5VDC
Select baud rate	RS485	RS485
Select MAC address	RS485	RS485
DeviceNET Configuration	DeviceNET	DeviceNET
EtherCAT Status	EtherCAT	EtherCAT
Profinet Status	Profinet	Profinet
Profinet Setup	PnetDataConfig	Profinet

5.1 Analog 9 and 15 pin G series MFC I/O

5.1.1 Device Tab - Customer Reference Temperature

Conversion from Volumetric Flow to Mass Flow requires the MFC manufacturer to select Standard Temperature and Pressure Condition (STP) references in order to calibrate the MFC

MKS uses STP conditions of 760 T (atm) and 0 oC (273K).

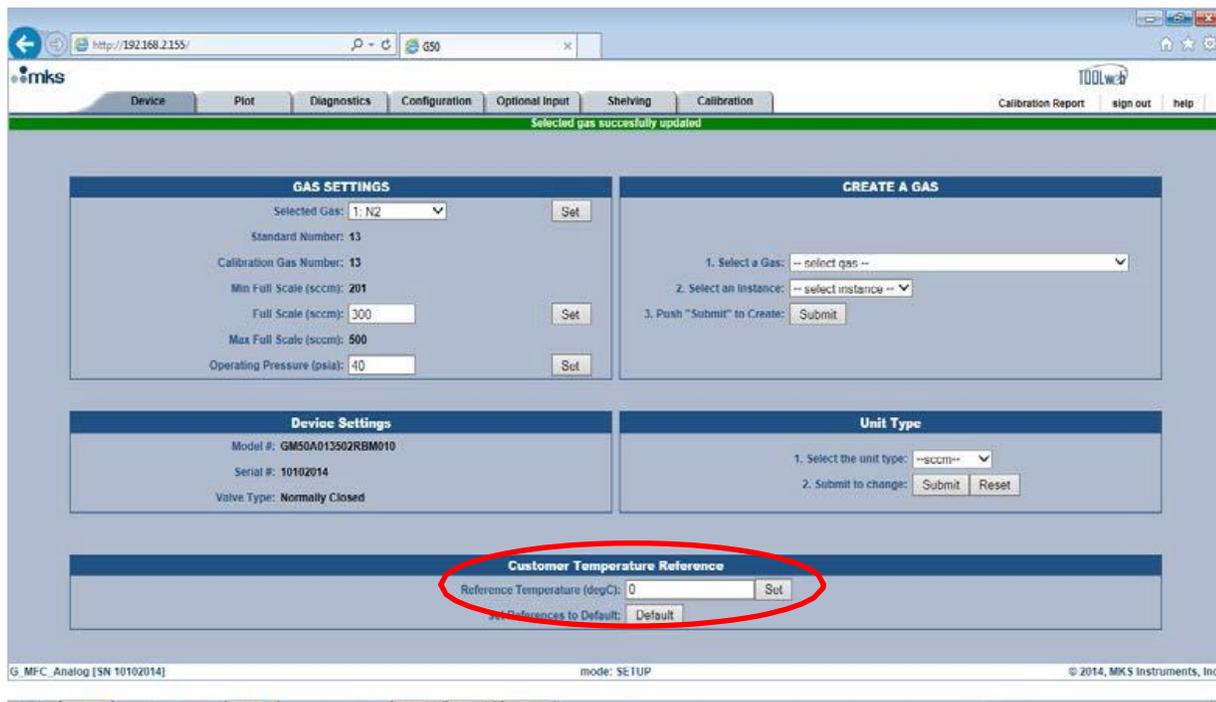


Figure 50

Other MFC products or technologies used in an application or as secondary standards could be calibrated using a different reference temperature (20oC and 25oC are other common reference temperatures used in industrial applications)

This Browser feature allows the customer to be able to setup and install an MKS Flow Control Product in an application where the current products being utilized are calibrated to a different reference condition by entering the correct reference temperature and hitting the <Set> button.

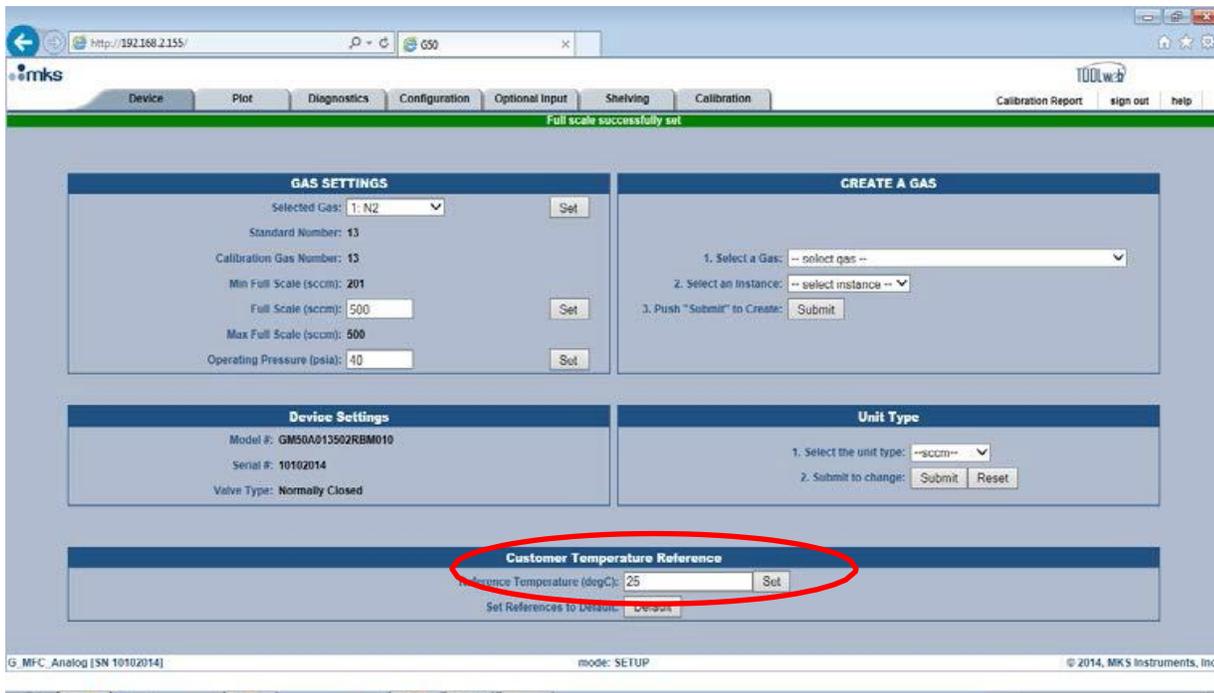


Figure 51

Example:

What is the effect of using an MFC that is calibrated at STP conditions of 760 T/ 0°C to replace one that is calibrated to STP conditions 760 T / 25°C?

MFC Set point for MFC X(sccm)	500
Reference Temperature for MFC X (°K)	298.15
Reference Temperature for MKS MFC (°K)	273.15
Reference Pressure (atm)	1
Calculated MFC Flow for MKS Flow Controller	458.07

In this example MFC X is currently being used in an application and has been calibrated to a reference temperature of 25°C (298.15 °K). Installing an MKS Flow Controller as a replacement would result in 8.4% less actual flow for the same MFC set point of 500 sccm.

5.1.2 Device Tab - Unit Type

MKS MFC's uses sccm (standard cubic centimeters per minute) as its default data type. Utilizing the pull down menu under <Unit Type>, a user can select other flow units for an MFC.

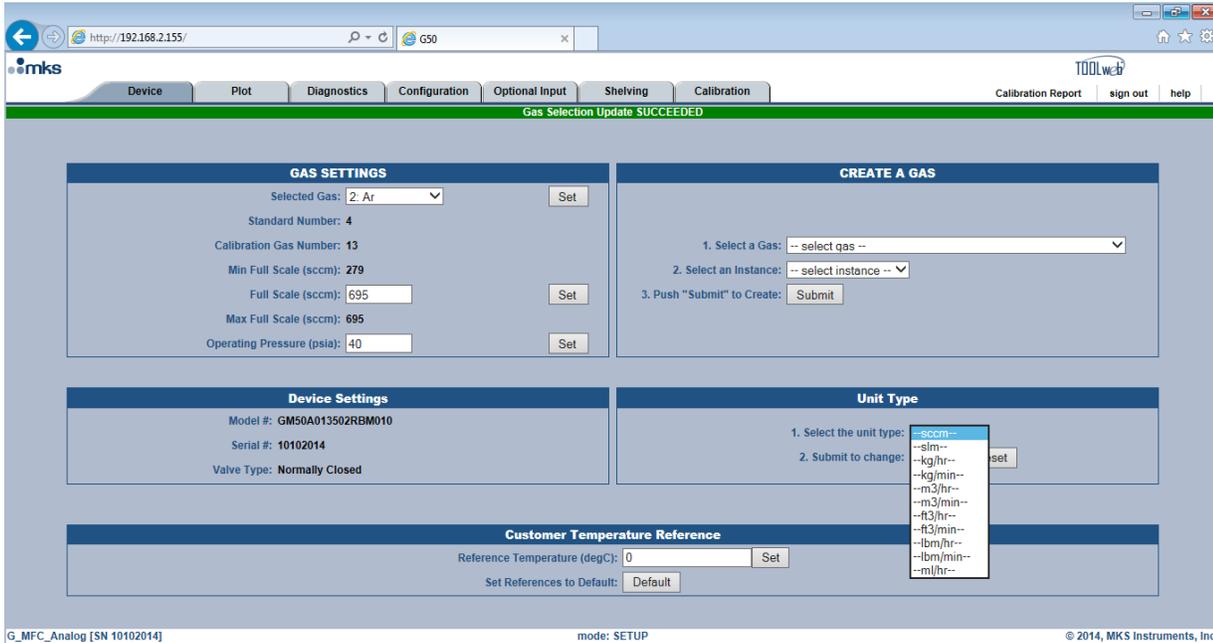


Figure 52

Once the flow unit type has been selected, hit <Submit> to change.

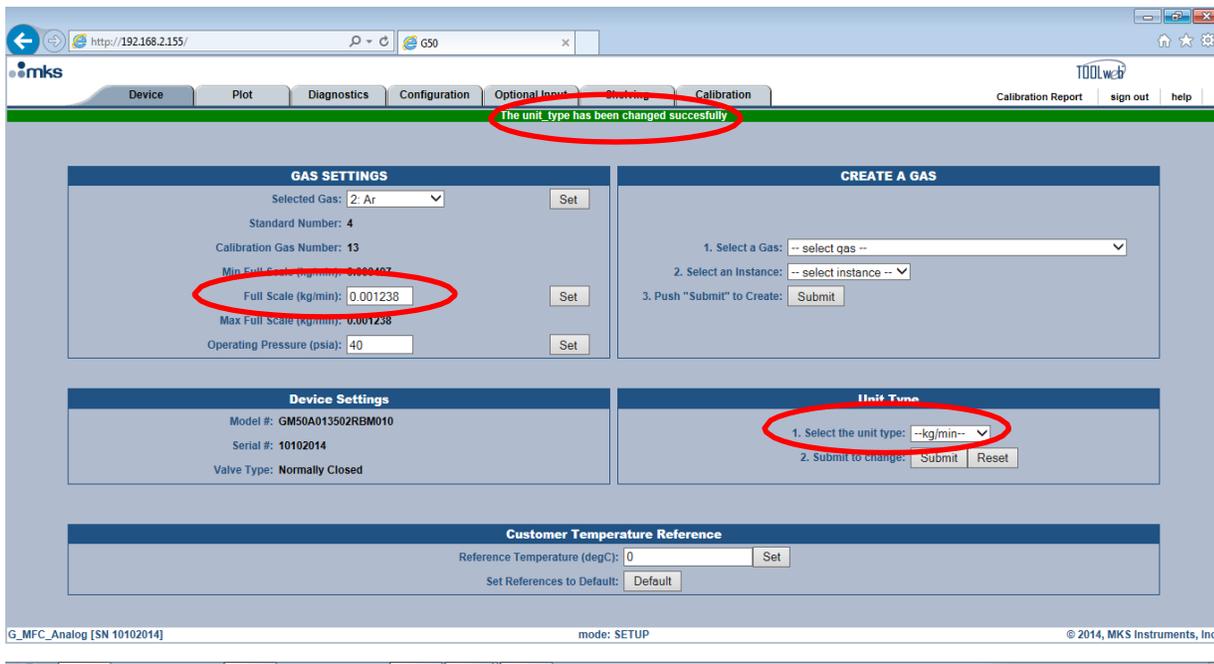


Figure 53

Once the unit type has been successfully changed, the Full-Scale value is automatically converted into the new units.

5.1.3 Configuration Tab- Ramp Rate and Setpoint Offset

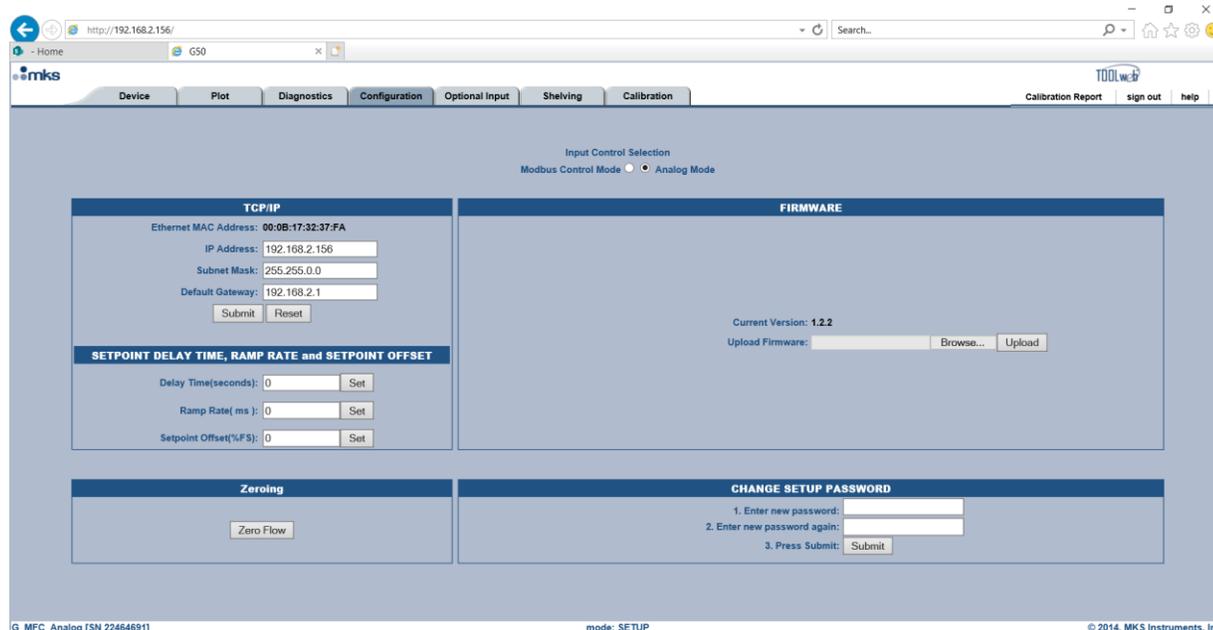


Figure 54

- **Ramp Rate** – Expressed in msec the trajectory and time between 0 and the determined point can be controlled using the Analog I/O attribute
- **Setpoint Offset** – Expressed as a %FS once implemented the set point and the resulting reported flow will be offset by the value entered in this field.

5.1.4 Configuration Tab – Conversion to Modbus TCP/IP

A selection at the top of the page allows the user to change the control mode from Analog to Modbus TCP / IP. Control of the device after toggling this button is via Ethernet.

The MFC will remain in this digital mode (even after power cycling) until the device is toggled back to Analog on this page.

MKS has developed a Modbus specification document that describes which MFC functions are supported when using this communication protocol.

A simple Labview VI and the Modbus Labview Drivers have been documented and are available to customers upon request.

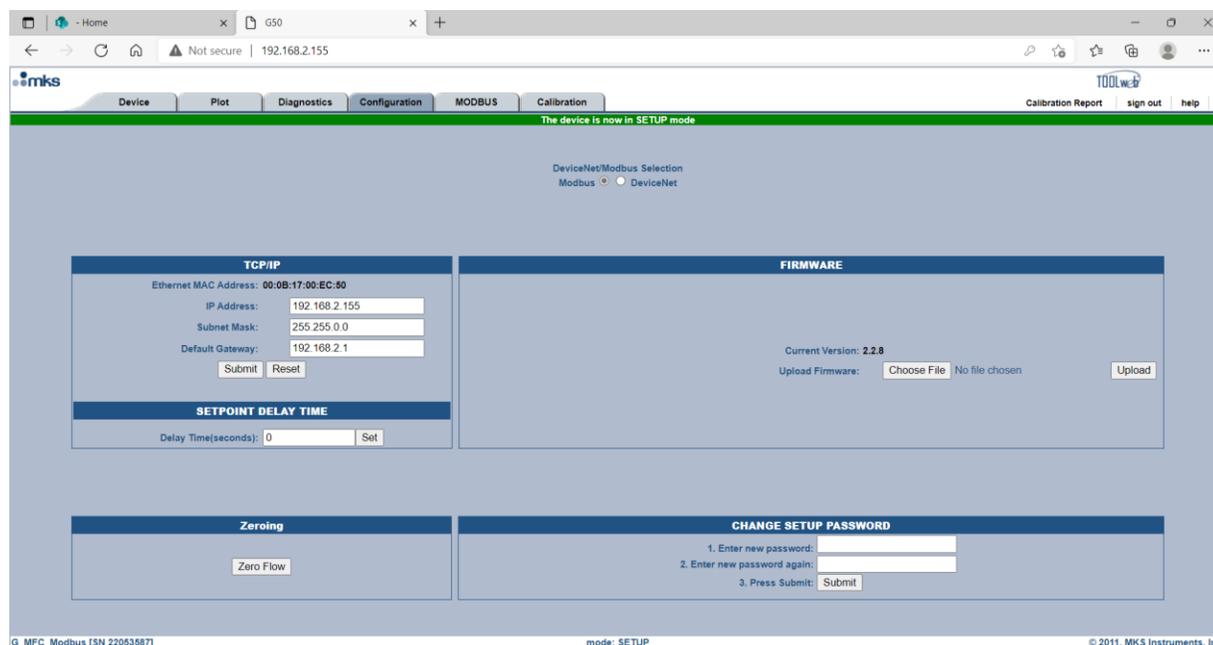


Figure 55

5.2 Optional Input Tab – Using the MFC as a Pressure Controller (15 pin Analog 0-5VDC I/O only)

Optional Input provides the user with the ability to take an external control signal from a pressure transducer and feed that signal back into the MFC through Pin 10. Response to a set point then uses that output signal from the transducer to drive the MFC valve and modulate gas flow such that the Pressure in the volume is controlled to the application pressure.

Using this mode relegates the MFC to controlling the Pressure output as determined by the set point. Flow under these control conditions is independent of the set point being delivered to the device.

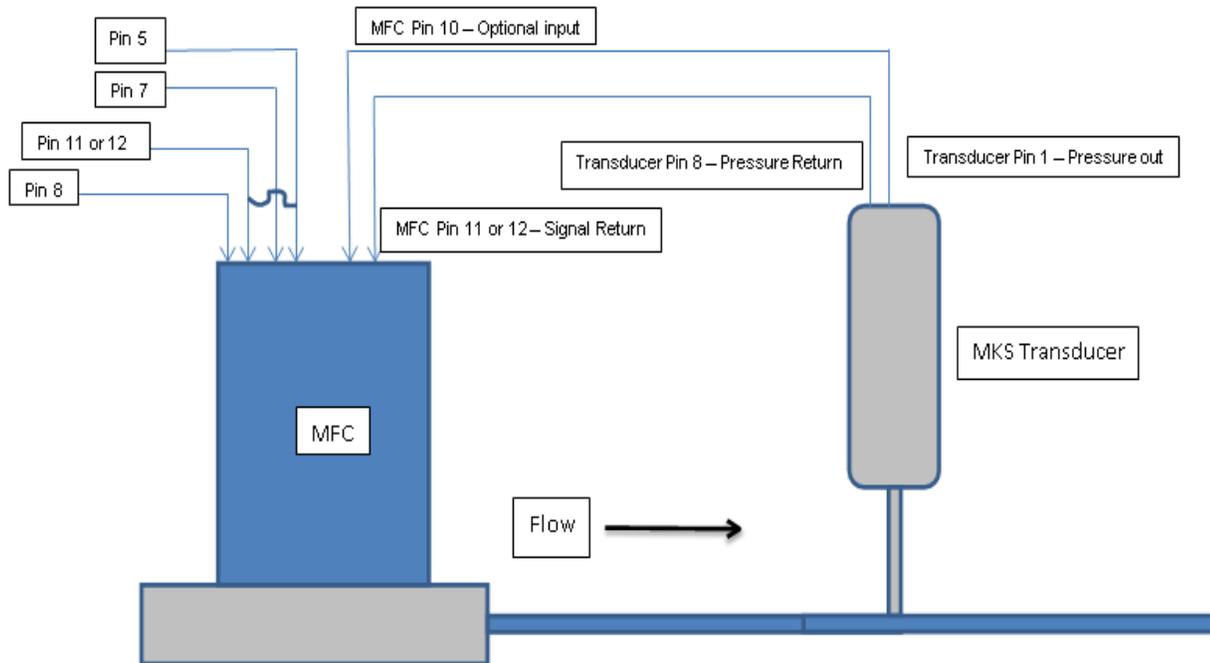
This control feature of the MFC is available only with Analog 15 pin D 0-5 VDC devices.

The MFC allows the user to select an Upstream or Downstream pressure control scheme depending upon the application.

5.2.1 Basic Wiring Diagram for Optional Input:

Baratron to MFC: Two wires

1. Transducer pressure output Pin 1 MFC Optional Input Pin 10
2. Transducer pressure return Pin 8 MFC Signal Common Pin 11 or 12



MFC Requirements

- 1) Power – Pin 7
- 2) Power common – Pin 5
- 3) Set point – Pin 8
- 4) Signal common – Pin 11 or 12

**Pin 5 and 12 should be connected or jumped together for Model Code B, for Model Code M these pins are tied internally in the MFC

Figure 56

5.2.2 Optional Input Configuration via the Web Browser

The web browser is used to enable the Optional Input function.

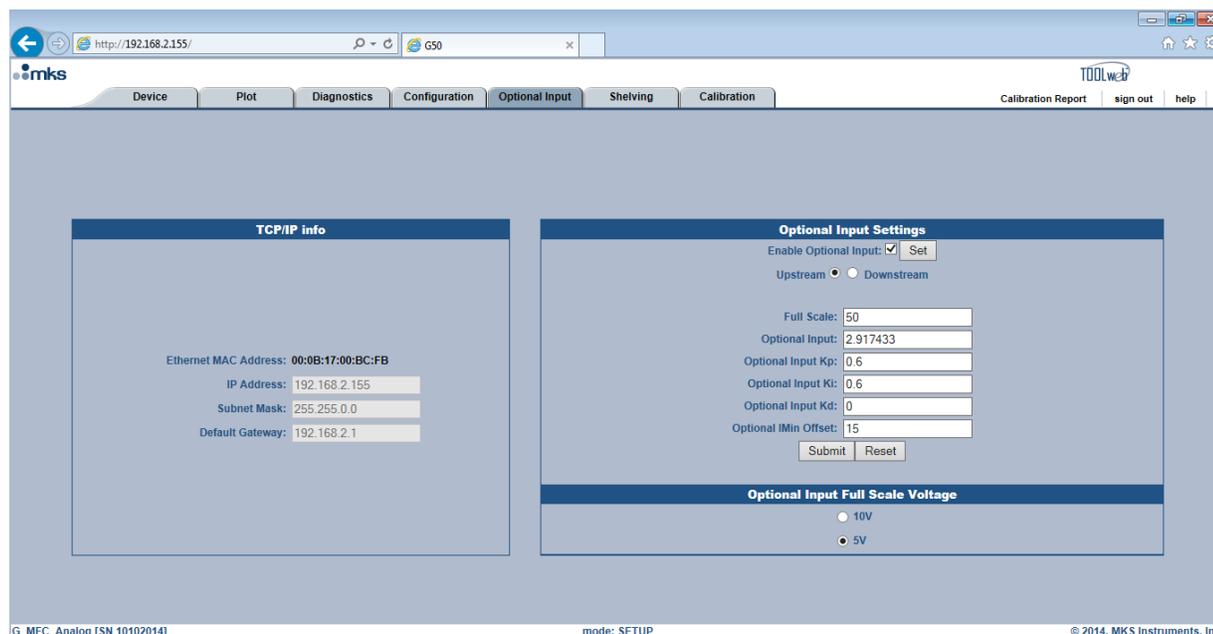


Figure 57

Setting up the MFC requires that Optional Input is enabled by checking the enable box and hitting <Set>.

- Optional Input may be set for Upstream or Downstream Control as determined by the application.
- Full-scale and Full-Scale voltage of the Transducer must be defined.
- Response to set point can be adjusted using Optional Input Kp and Ki.
- These values can also be adjusted on the <Plot> page as shown below.
- To save changes made to define the Optional Input setup, select <Submit>.

NOTE

The key parameters for tuning an Optional input pressure response is Opt_kp and ki.

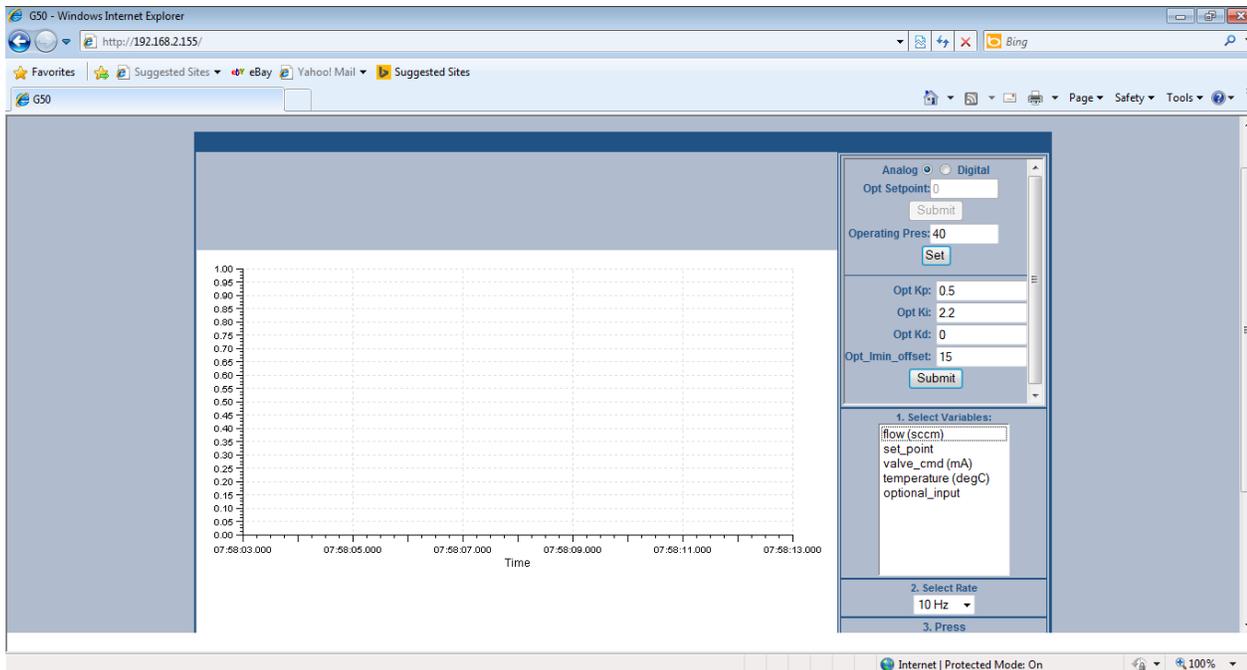


Figure 58

Opt_in_min_offset is a factor that is applied to the valve command minimum (valve current starting point) to effectively lower the command min by the value of the offset. For example, an **Opt_in_min_offset** of 15, the default, would shift the valve command minimum down by 15 mA.

In some pressure control circumstance, normally associated with trying to control to very low at optional input set points (trying to control at very low pressures) the following condition can occur:

MFC command min (valve starting point in flash memory) > valve_cmd at set point (valve mA at steady state for a given set point)

If this condition is true, the MFC is going to essentially start at a higher current than necessary to achieve set point and the response is going to overshoot when the set point is initiated. This parameter can be used to correct overshoot in this very special circumstance.

The default value, 15, should be adequate for most optional input control scenarios and does not need to be changed for the application.

5.2.3 Optional Input Plot Page Example

Pressure control data collected, saved from the plot page, and transferred into an excel spreadsheet is presented in the graph below.

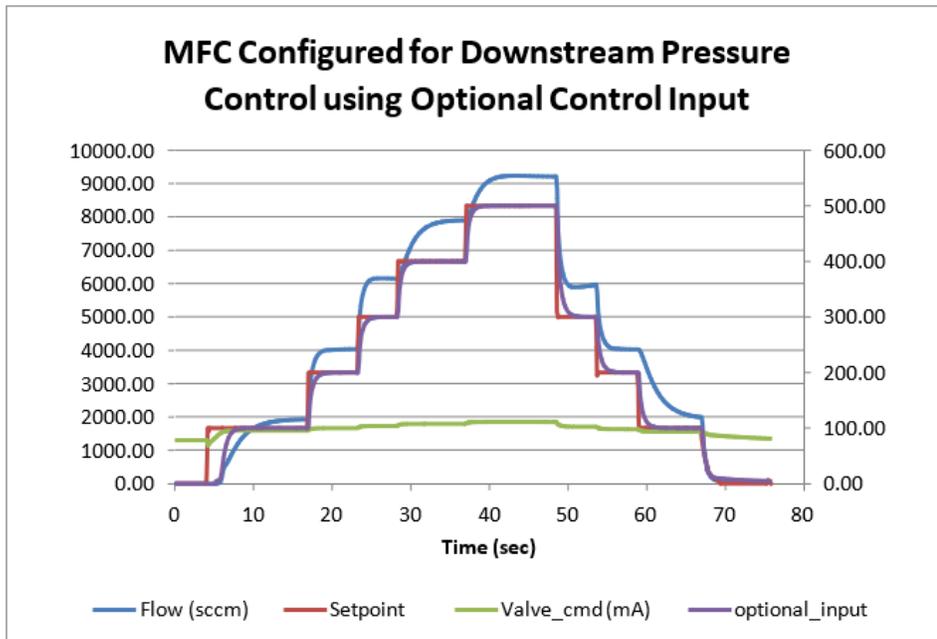


Figure 59

5.3 DeviceNET G series MFC Digital I/O

5.3.1 DeviceNET Tab

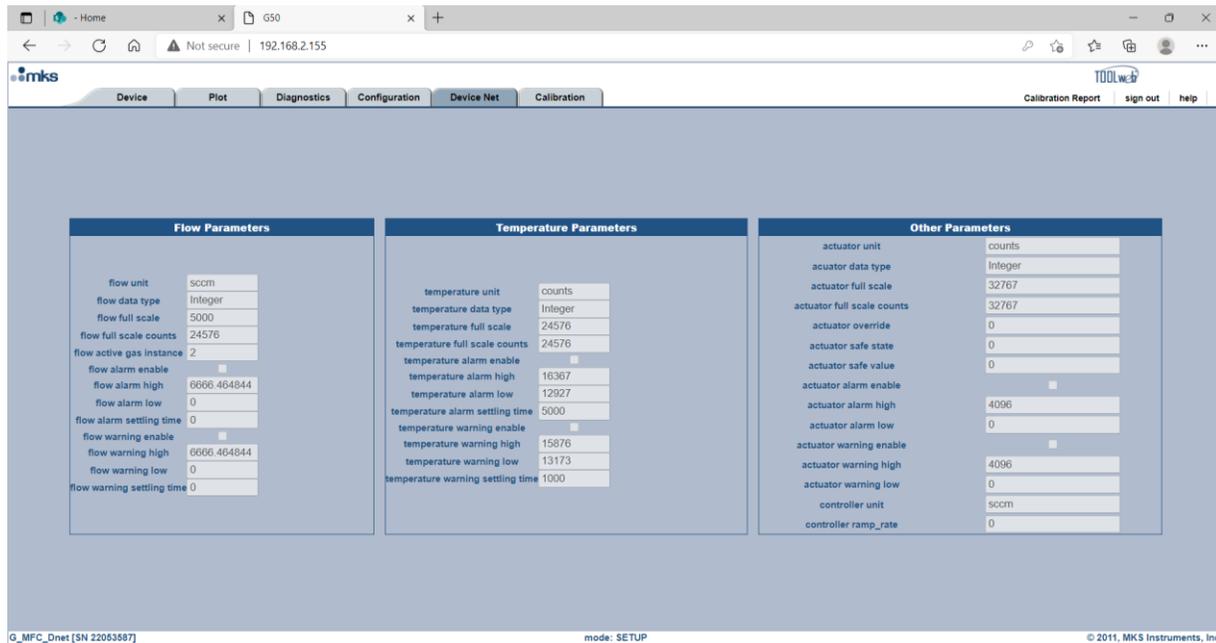


Figure 60

DeviceNET Tab is not active and as such DeviceNET attributes cannot be changed or altered using the Web Browser. These types of changes must be done following DeviceNET protocols.

The page does display information about the DeviceNET setup and can be utilized as a quick check for how some critical attributes are currently configured.

5.3.2 Configuration Tab – DeviceNET to Modbus TCP/IP Conversion

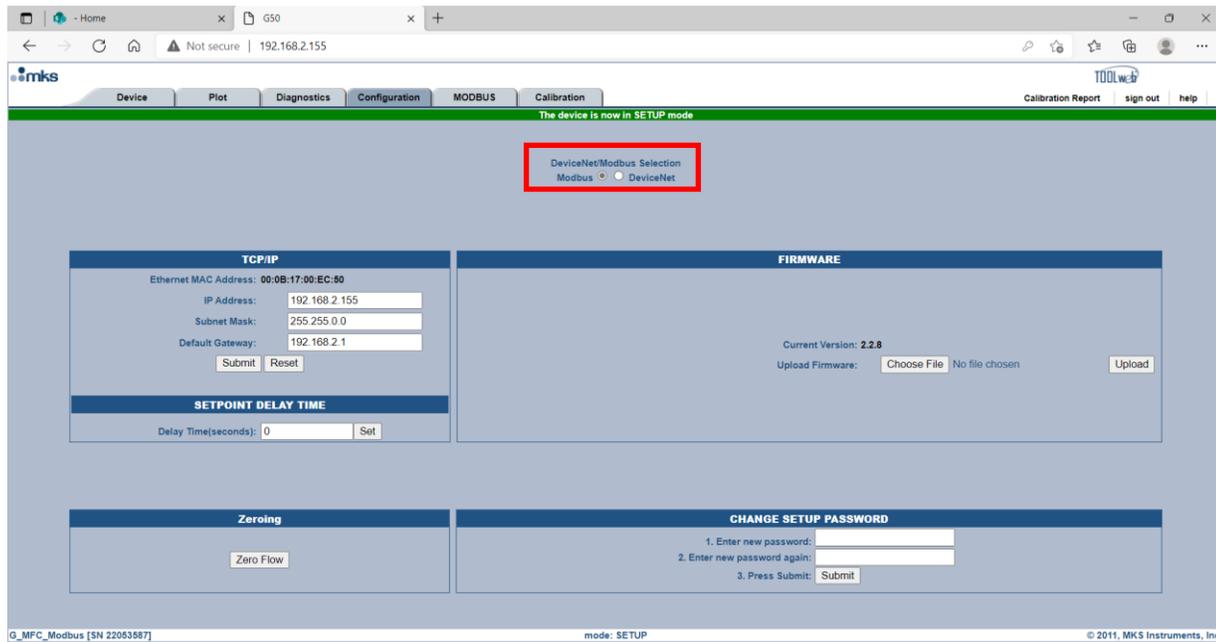


Figure 61

- This selection allows the conversion of the device from DeviceNet to Modbus TCP/IP
- Once selected DeviceNet protocols and commands will be ignored until it is returned to DeviceNet using the radio selection button and reconnected to the DeviceNet Master

Once selected and the device is selected a new MODBUS tab is observed at the top of the page. This tab is not “active” but does provide critical information about the Modbus protocol implemented in the MFC:

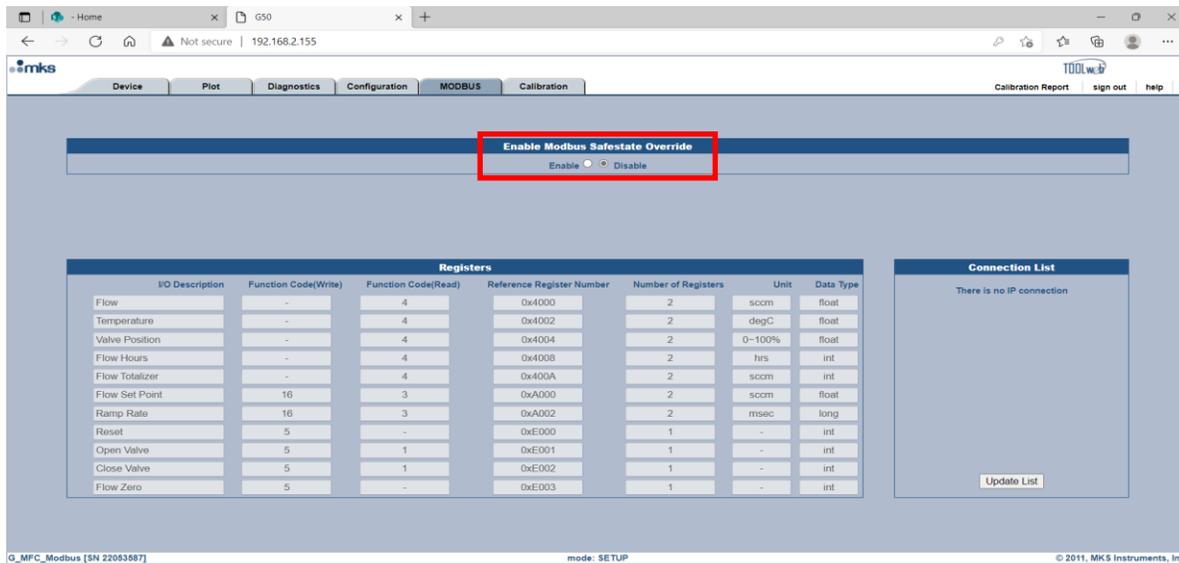


Figure 62

Noted at the top is Enable Modbus Safe state Override. The default is disabled and as a result if the TCP/IP communication is lost the current set point on the MFC will be reset to 0. If enabled, the MFC will continue to respond and hold its last set point even after losing TCP/IP communication.

5.4 Profibus G series Digital I/O

5.4.1 Profibus Tab

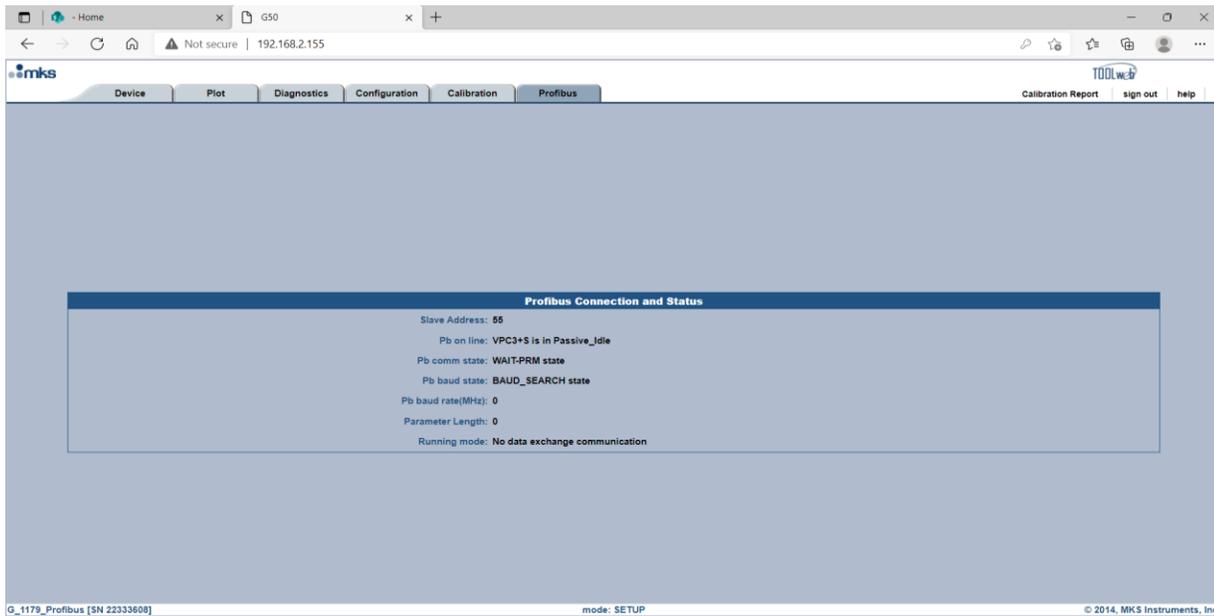


Figure 63

Profibus tab is not active and as such does not provide a Profibus link directly to the Master for active control of the MFC over its primary I/O

The page does provide basic information about the slave address and the status of a Profibus Connection between the Master and Slave MFC.

5.5 Configuration Tab – Profibus to Modbus TCP/IP Conversion

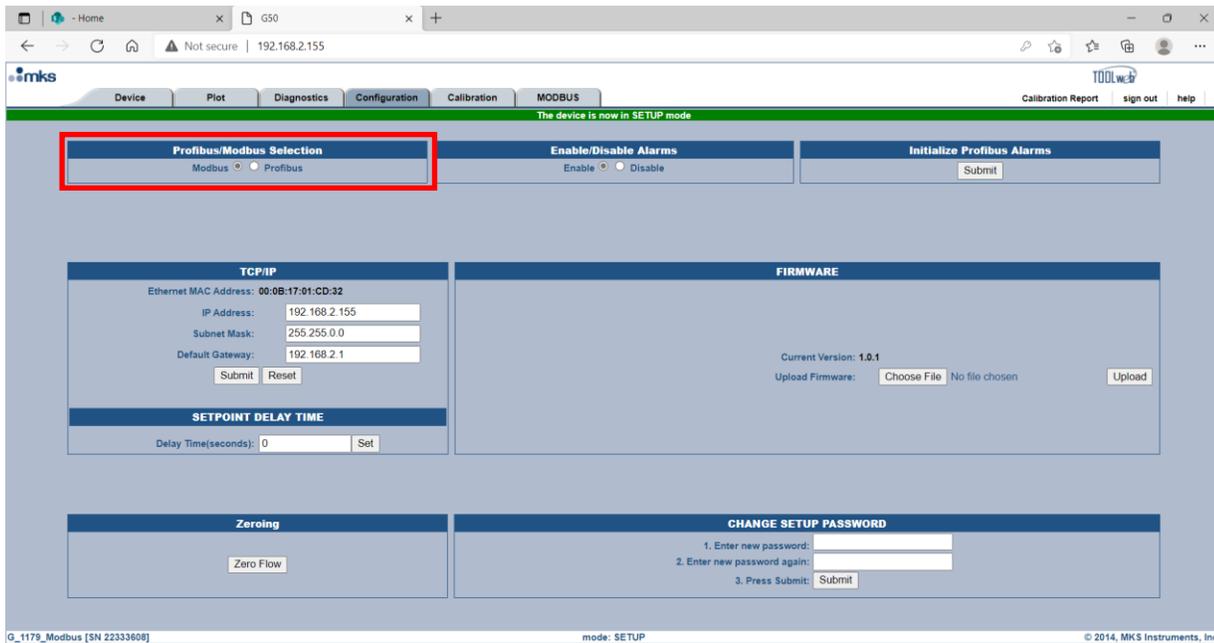


Figure 64

- This selection allows the conversion of the device from Profibus to Modbus TCP/IP
- Once selected Profibus protocols and commands will be ignored until it is returned to Profibus using the radio selection button and reconnected to the Profibus Master

Once selected and the device is selected a new MODBUS tab is observed at the top of the page. This tab is not “active” but does provide critical information about the Modbus protocol implemented in the MFC:

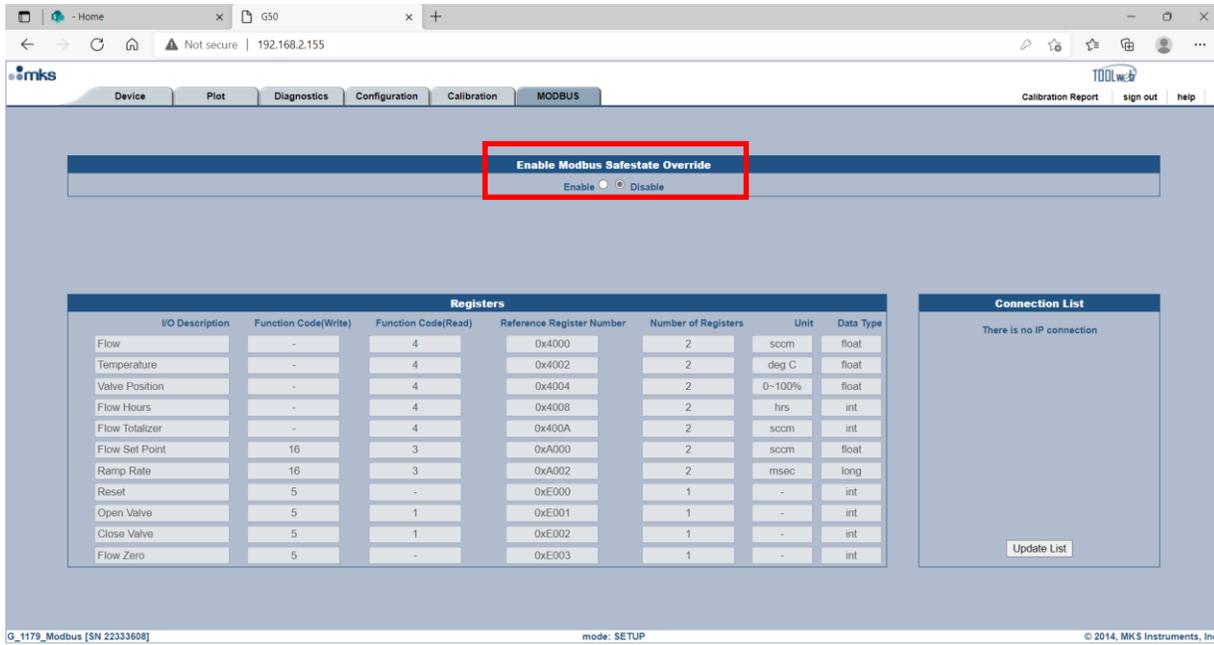


Figure 65

Noted at the top is Enable Modbus Safe state Override. The default is disabled and as a result if the TCP/IP communication is lost the current set point on the MFC will be reset to 0. If enabled, the MFC will continue to respond and hold its last set point even after losing TCP/IP communication

5.6 EtherCAT G series Digital I/O

5.6.1 EtherCAT Tab

EtherCAT tab is not directly active but it does provide basic information about the current status between the Master and the MFC Slave

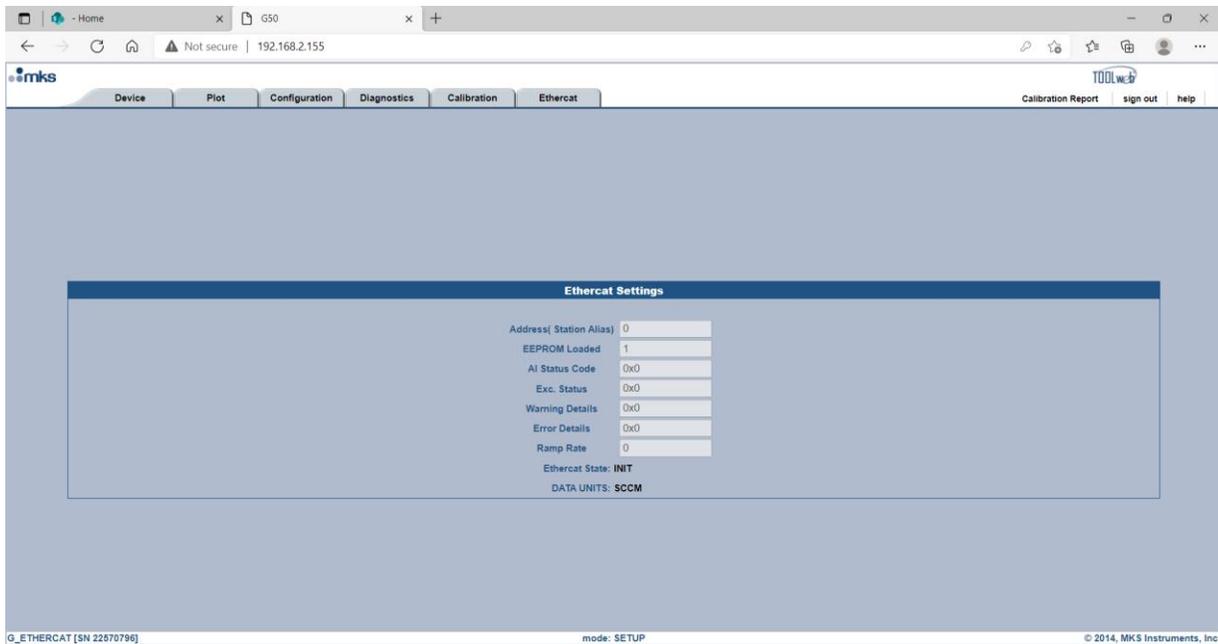


Figure 66

5.7 RS485 G Series Digital I/O

5.7.1 RS 485 Tab

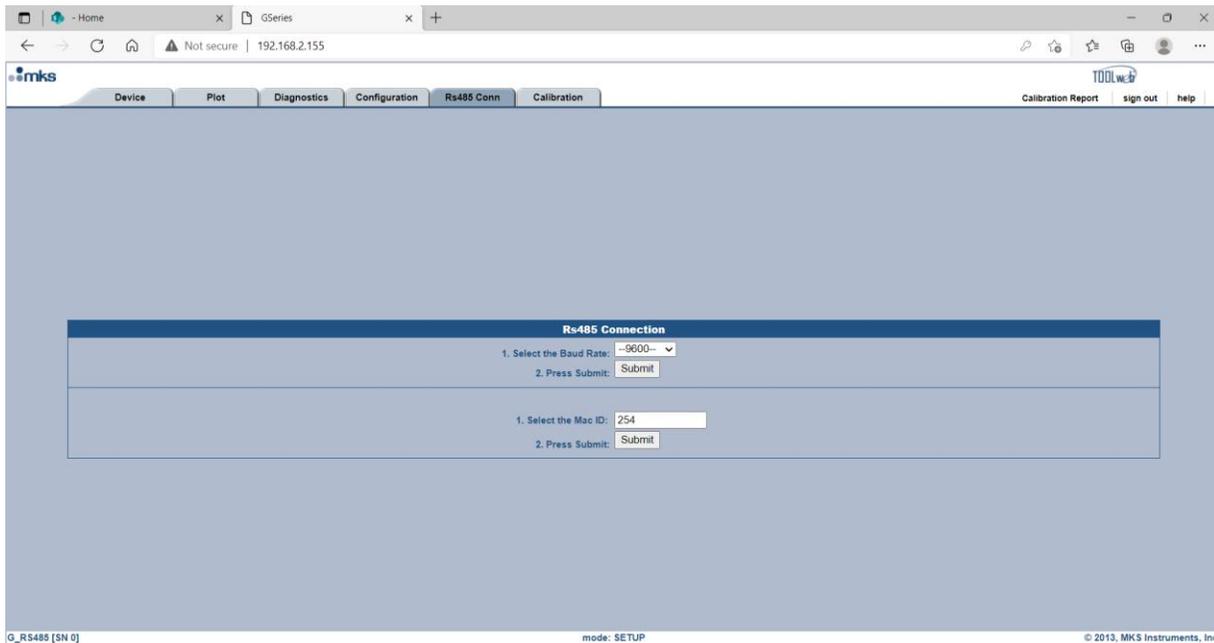


Figure 67

The RS 485 Tab has 2 active fields that allows the user to select a Baud Rate supported by Rs 485 FW and select the unique MAC Address for the slave MFC.

5.7.2 Configuration Tab – RS 485 conversion to Modbus TCP/IP

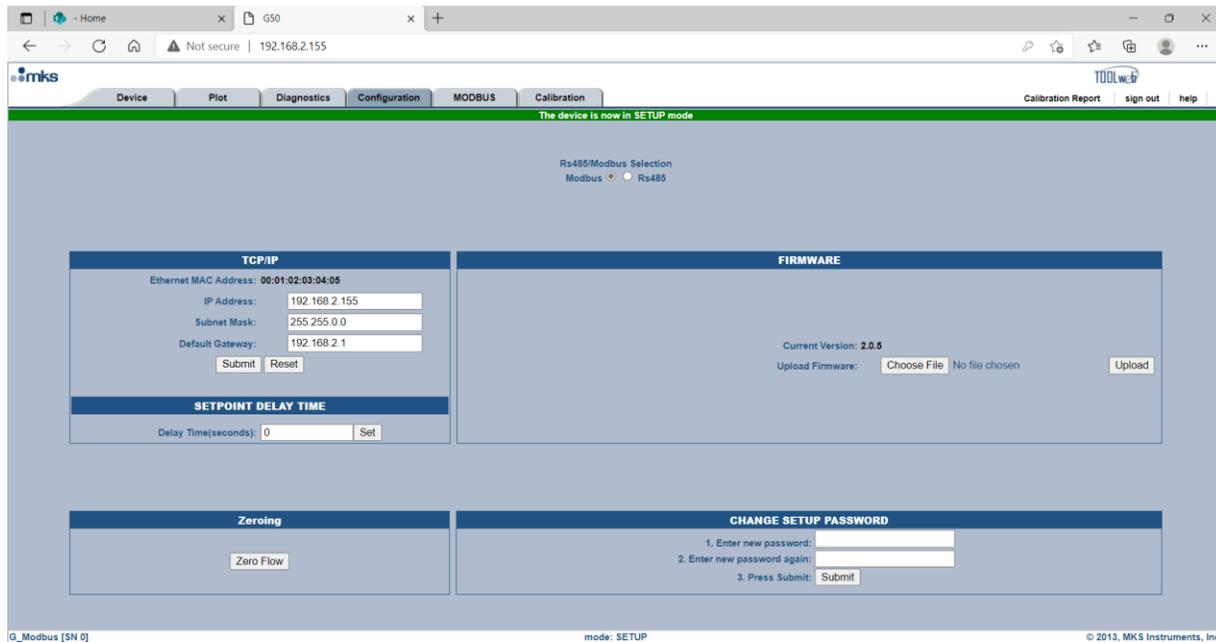


Figure 68

- This selection allows the conversion of the device from RS 485 to Modbus TCP/IP
- Once selected Profibus protocols and commands will be ignored until it is returned to Profibus using the radio selection button and reconnected to the Profibus Master

Once selected and the device is selected a new MODBUS tab is observed at the top of the page. This tab is not “active” but does provide critical information about the Modbus protocol implemented in the MFC:

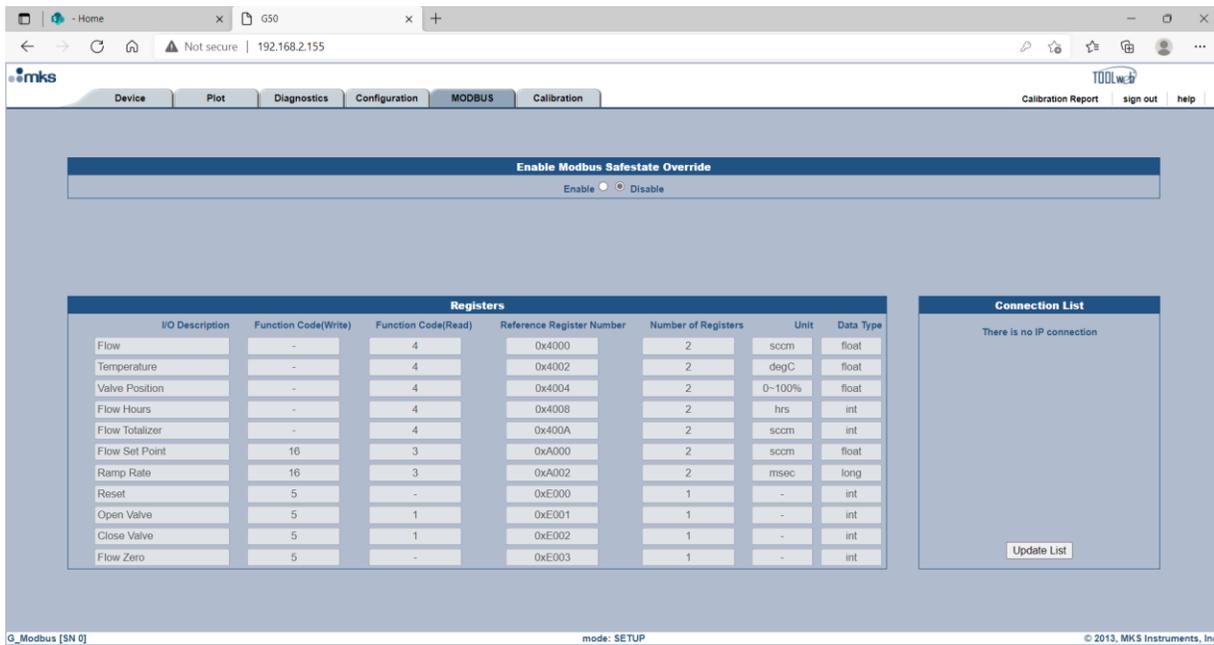


Figure 69

Noted at the top is Enable Modbus Safe state Override. The default is disabled and as a result if the TCP/IP communication is lost the current set point on the MFC will be reset to 0. If enabled, the MFC will continue to respond and hold its last set point even after losing TCP/IP communication

5.8 Profinet G Series Digital I/O

5.8.1 Profinet Tab

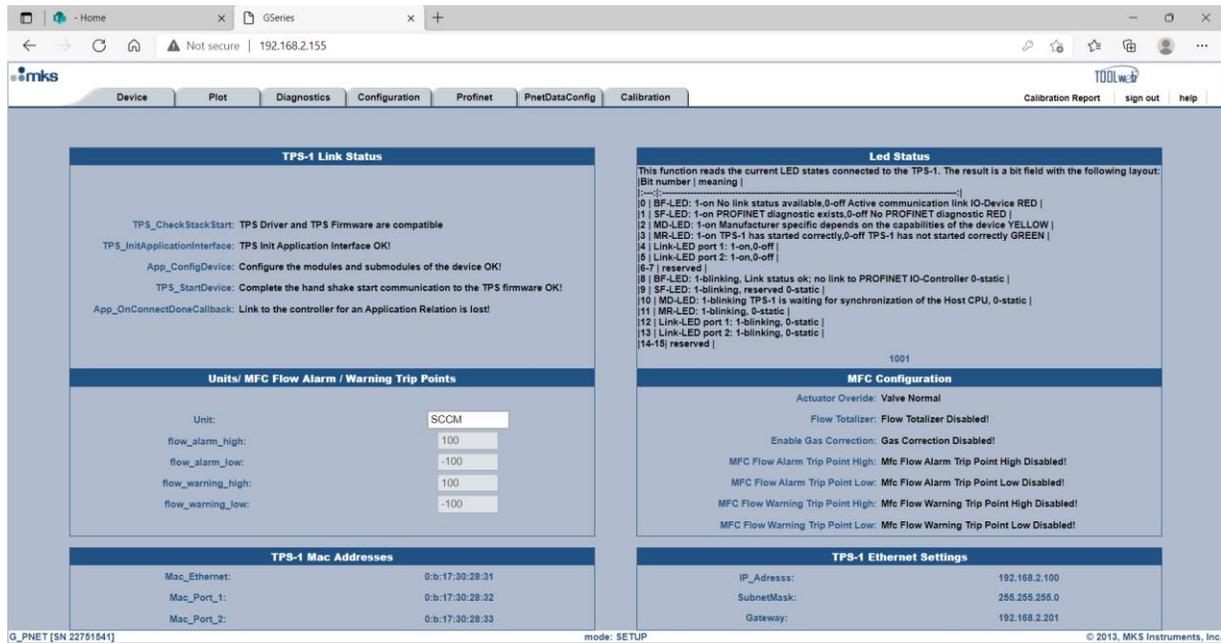


Figure 70

TPS-1 Link Status – Provides information when the MFC is powered up on the initialization process internal to the MFC and a direct indication on the status of the link between the controller (Master) and the MFC (Slave)

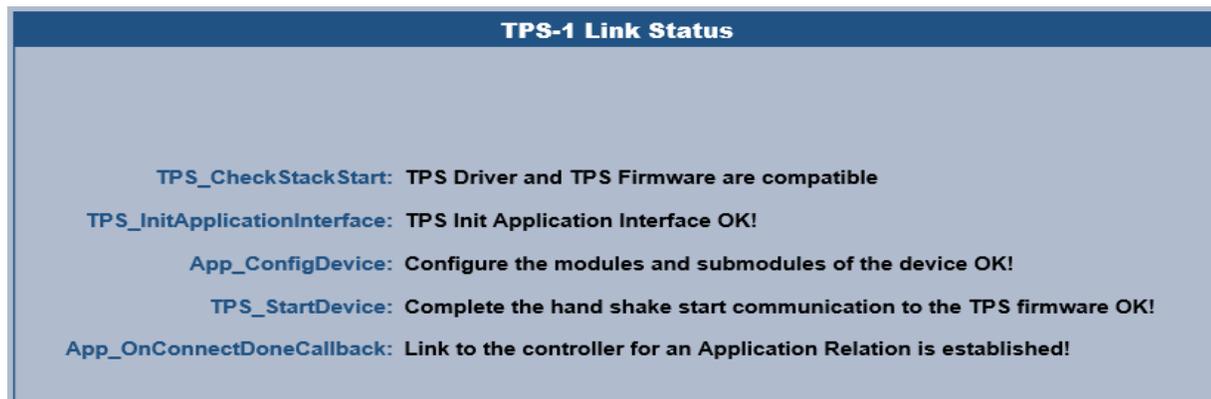


Figure 71

LED Status – Provides current status connected to the Profinet Chip

Led Status

This function reads the current LED states connected to the TPS-1. The result is a bit field with the following layout:

Bit number	meaning
0	BF-LED: 1-on No link status available,0-off Active communication link IO-Device RED
1	SF-LED: 1-on PROFINET diagnostic exists,0-off No PROFINET diagnostic RED
2	MD-LED: 1-on Manufacturer specific depends on the capabilities of the device YELLOW
3	MR-LED: 1-on TPS-1 has started correctly,0-off TPS-1 has not started correctly GREEN
4	Link-LED port 1: 1-on,0-off
5	Link-LED port 2: 1-on,0-off
6-7	reserved
8	BF-LED: 1-blinking, Link status ok; no link to PROFINET IO-Controller 0-static
9	SF-LED: 1-blinking, reserved 0-static
10	MD-LED: 1-blinking TPS-1 is waiting for synchronization of the Host CPU, 0-static
11	MR-LED: 1-blinking, 0-static
12	Link-LED port 1: 1-blinking, 0-static
13	Link-LED port 2: 1-blinking, 0-static
14-15	reserved

100101001

Figure 72

Other Information provided on the page is the Profinet TSP-1 MAC Addresses for and the TSP-1 Ethernet Addresses. These fields cannot be altered via the Web Browser and the TSP-1 Ethernet Address must be set over the Primary I/O.

5.8.2 PnetDataConfig Tab

The information provided over the Primary I/O can be changed from the Default Specification or <Original Specification Mode> which has 7 Modules to an <Extended Specification Mode> using the radio button at the bottom of the page

Once selected 3 additional Modules are available over the primary I/O to provide some additional information about the configuration of the MFC

On the right special notes with regards to these selectable attributes and their functionality

Additional Information is available in a dedicated Profinet Web Browser Tutorial

The screenshot shows a web browser window with the URL 192.168.2.155. The page has a navigation bar with tabs: Device, Plot, Diagnostics, Configuration, Pnet, PnetDataConfig, and Calibration. The main content area is divided into two columns: Specification and Information.

Specification Table:

Name	Fixed In Slot	Type	Category	Comment
Bitfield	1	Unsigned16	input	See Input Bitfield description
FlowSetpoint	2	Integer32	input	in [FLOW_UNIT] in 1E-4 steps
Bitfield	3	Unsigned16	output	See Output Bitfield description
ThermalMassFlowRate	4	Integer32	output	in [FLOW_UNIT] in 1E-4 steps
InternalTemperature	5	Integer32	output	temperature in °C
ValveDriveLevel	6	Integer32	output	0 - 100% (in 1E-4 steps) 0% = valve is closed 100% = valve is in purge position (full open)
FlowTotalized	7	Integer32	output	In 1E-4 Steps
Extended Specification includes the following				
FlowFullScale	8	Integer32	output	Full Scale Value In Flow UNITS
FlowActiveGasInstance	9	Unsigned16	output	Flow Active Gas Instance 1-20
Std_Number	10	Unsigned16	output	Gas Standard Number

Information Text:

Floating point mode use: IEEE-754 Floating-Point Conversion Standard Single precision (32 bits)
 Scaler mode (Current Default) use: 10000 scaler to capture decimal value
 Note there are different GSDML files for Standard and Extended Specification needed

SET MODES OF OPERATION

Data_Selection_Mode_radiobox: Floating Point Mode Scaler Mode
 Specification_Selection_Mode_radiobox: Original Specification Mode Extended Specification Mode

Submit

Footer: G_PNET [SN 22751541] mode: SETUP © 2013, MKS Instruments, Inc.

Figure 73

Appendix A Activating the Plot Page and Saving Plot Data

Three steps must be completed to be able to actively plot selected MFC parameters:

1. A Java applet must be allowed to run for the plot page graph to become active.
2. In order to save data, a special folder called ToolWeb must be created in the computers local C Drive.
3. A special Java policy document must be put into a Java security folder located in C drive before being able to successfully save data to the ToolWeb folder.

Internet Explorer and Java Requirements

- The Browser Plot Page works only with Internet Explorer.
- MKS recommends IE version 11. Older versions may or may not work with latest java installation.
- IE 32-bit version should be used with the Web Browser (even if you have a 64-bit Operating System)
- Java version should also be 32-bit for the plot page application applet

Java 32-bit Version Download

1. Go online to Java.com and download the latest version available on the Java website.



Figure 74

2. Hit Java download.

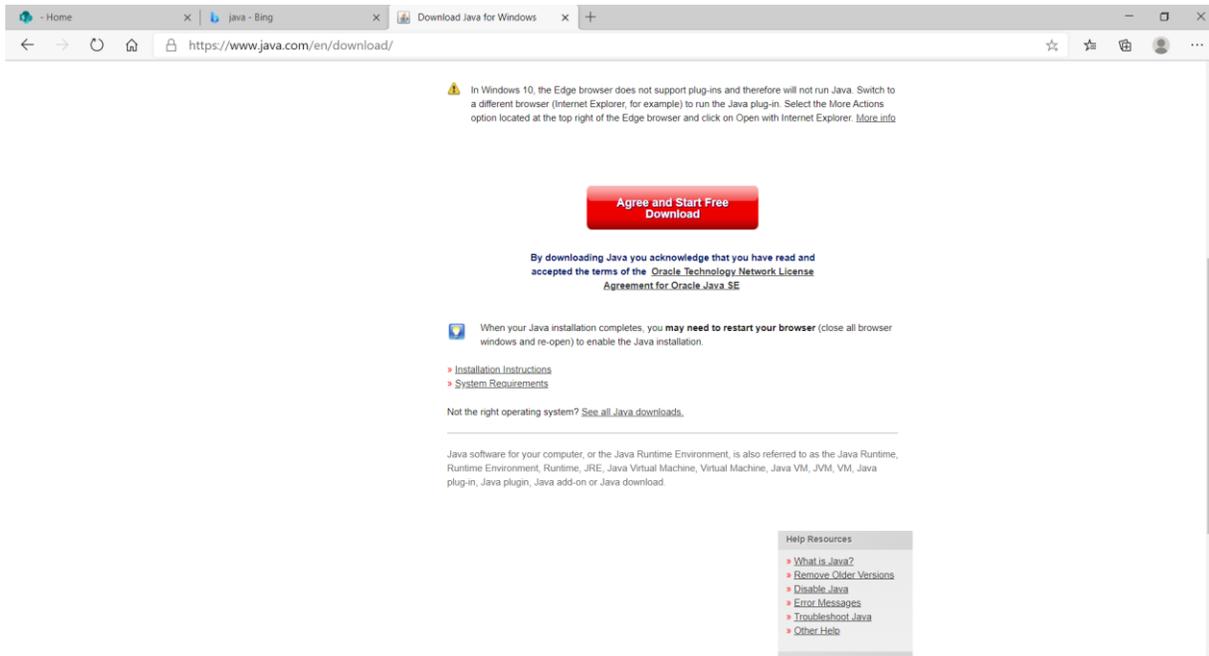


Figure 75

3. Select <See all Java Downloads>

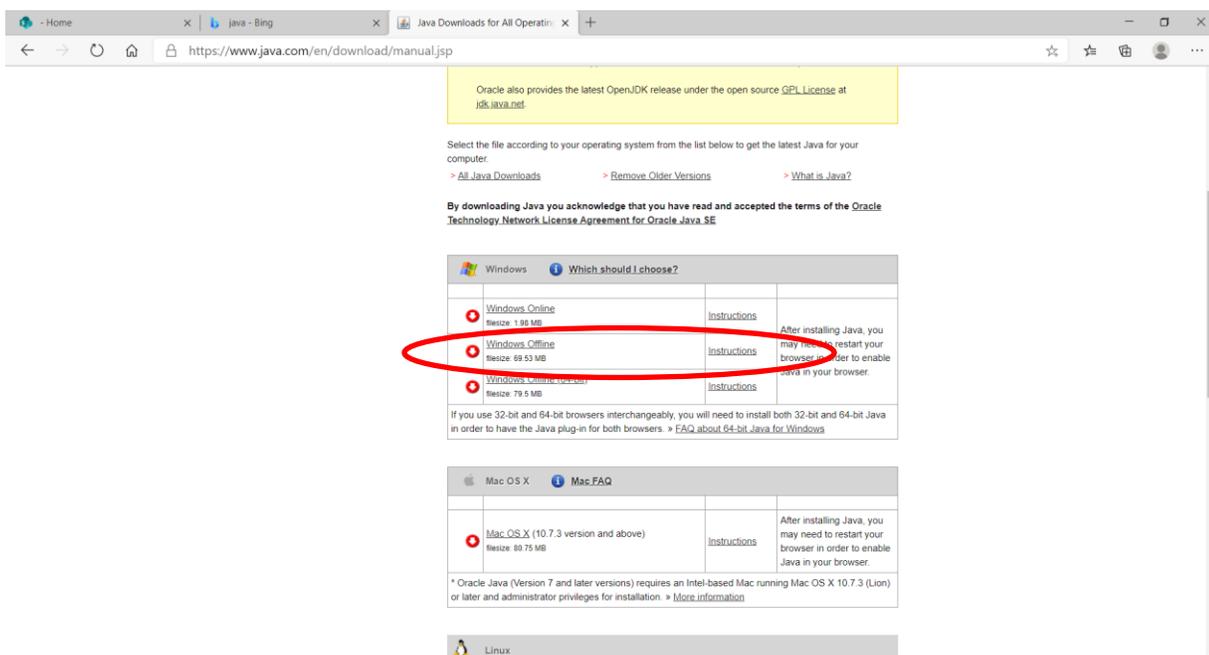


Figure 76

4. Select Windows Offline as show above, this is the 32-bit version of Java
 - a. Download this version
 - b. Close your IE11 browser and re-open
 - c. Go to <Manage Addons> as shown in tutorial
 - d. Find Oracle and make sure the addons are enabled, it should say 32-bit

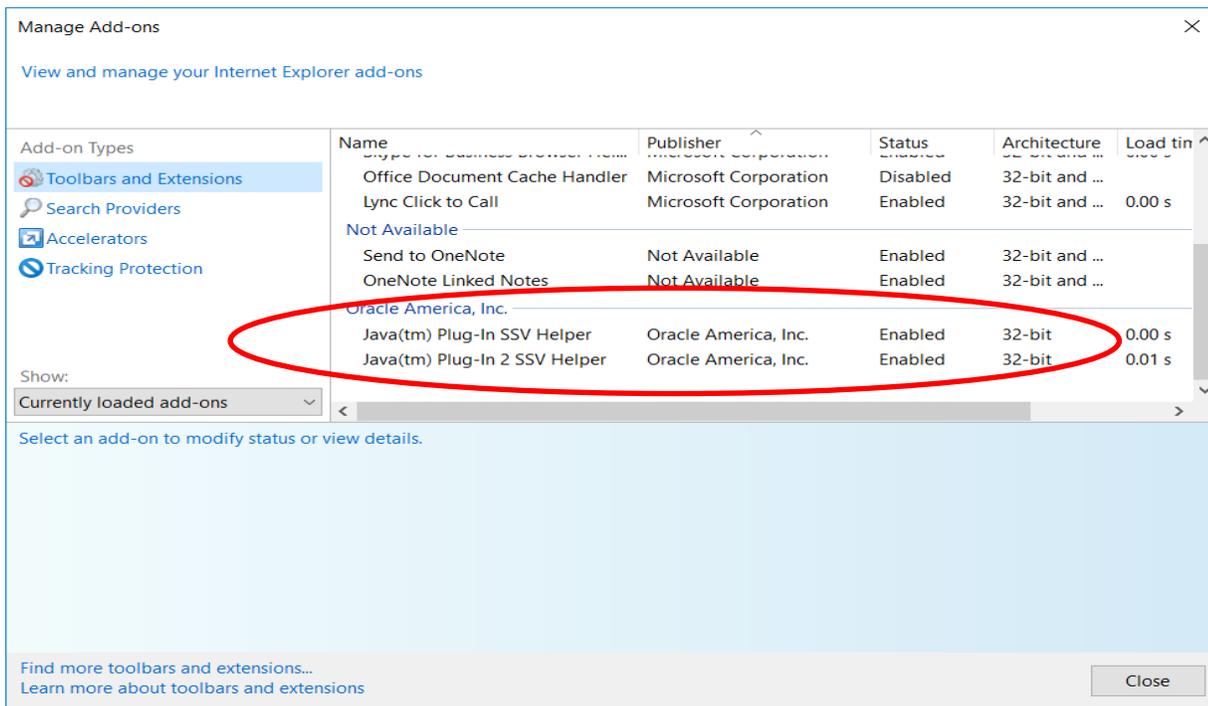


Figure 77

Java Security Document Description

MKS has a special version of the java.policy that needs to be placed in the java security folder. This modified policy allows the user to save data when using the plot page. Contact MKS Applications Engineering Group for Flow Andover, MA.

Java Security Document Placement

1. Once downloaded, follow the file path to locate the new Java folder

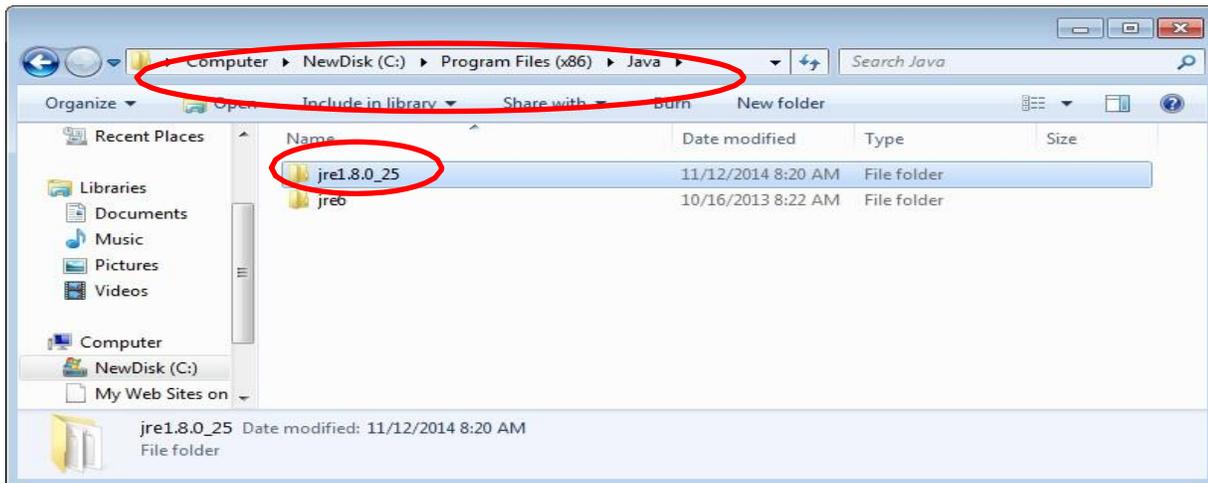


Figure 78

2. Open the folder and follow the path to security folder

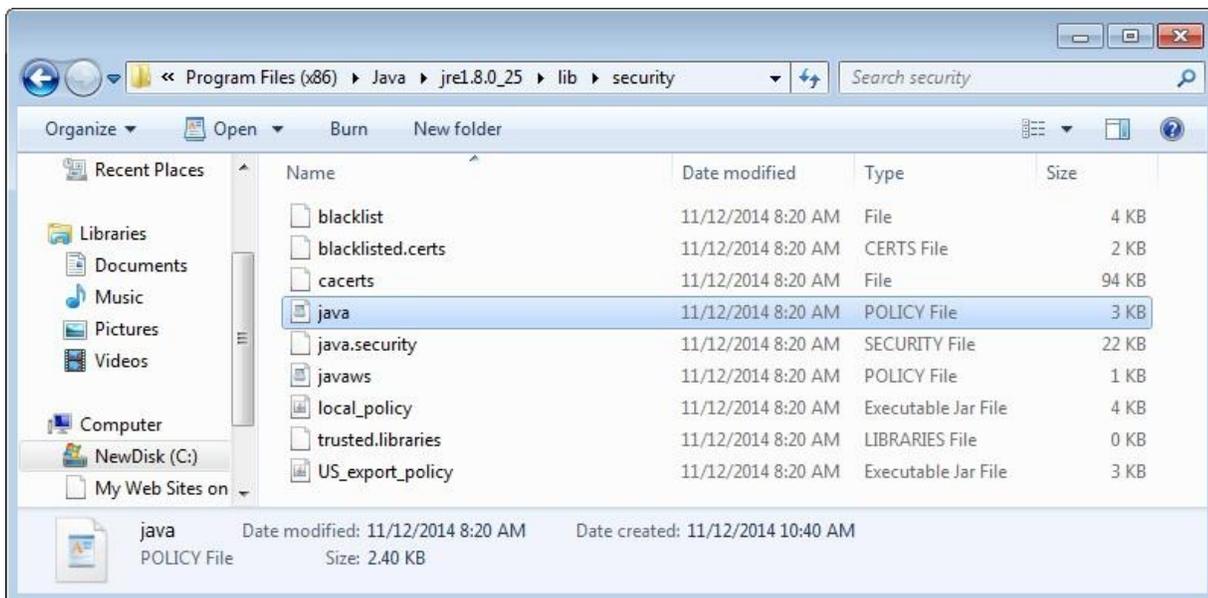


Figure 79

3. Right click on the java file and select the Re-name option. Change the name of the java file to java_old.

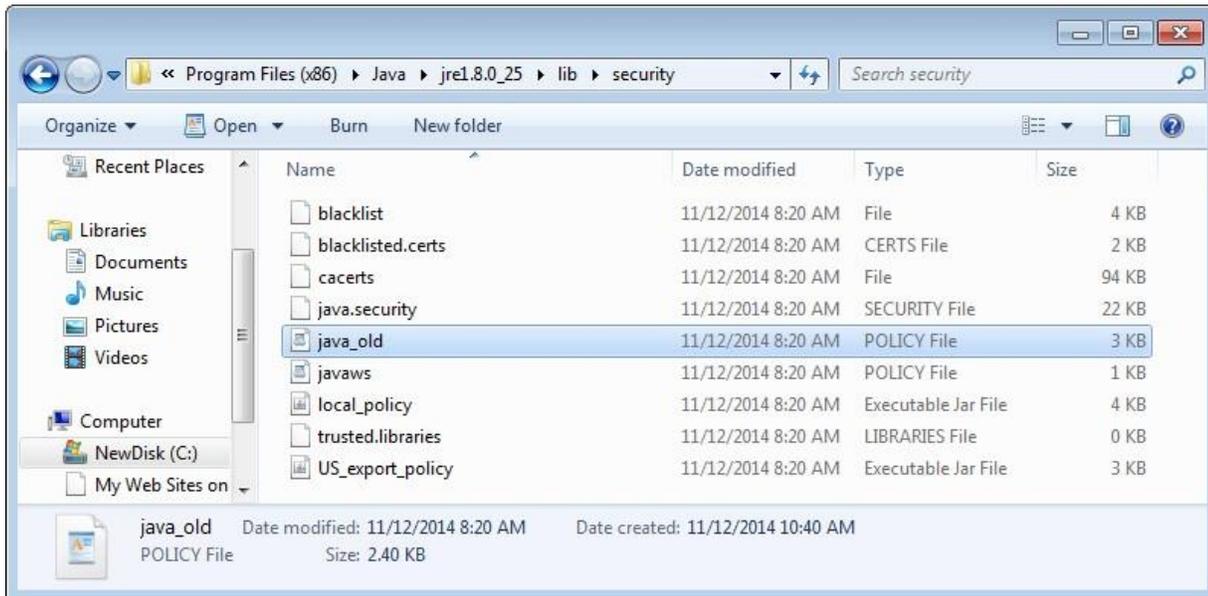


Figure 80

Placing New MKS Java Security File in Java Folder

1. Locate the new java policy security document (supplied by MKS) and drop it into the Java security folder.

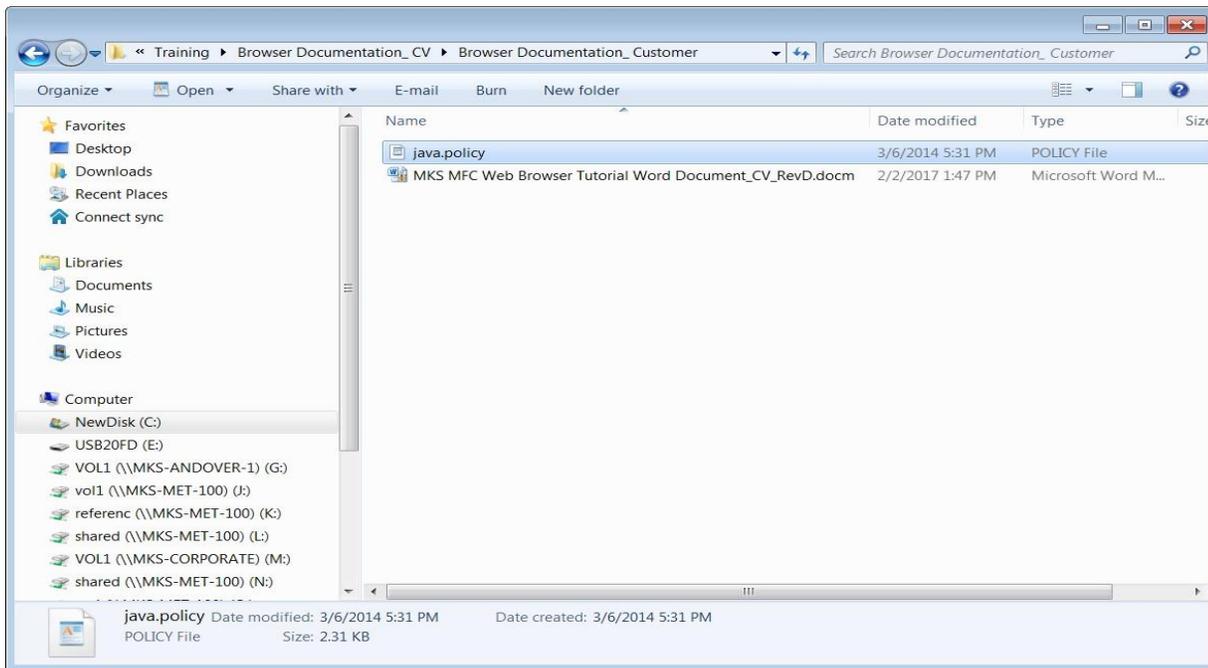


Figure 81

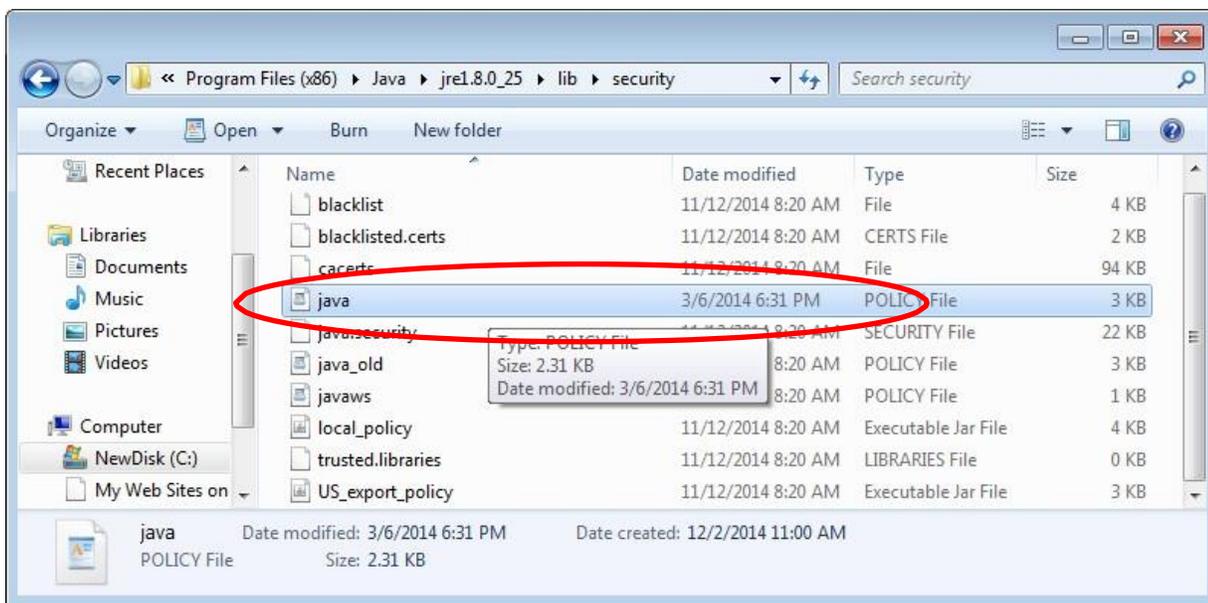


Figure 82

2. The new java policy is in place, close the Folder.

Creating a ToolWeb folder

Open the C drive on the computer. Right click and open a new folder. Rename the new folder ToolWeb. This is the folder where all data collected will be saved.

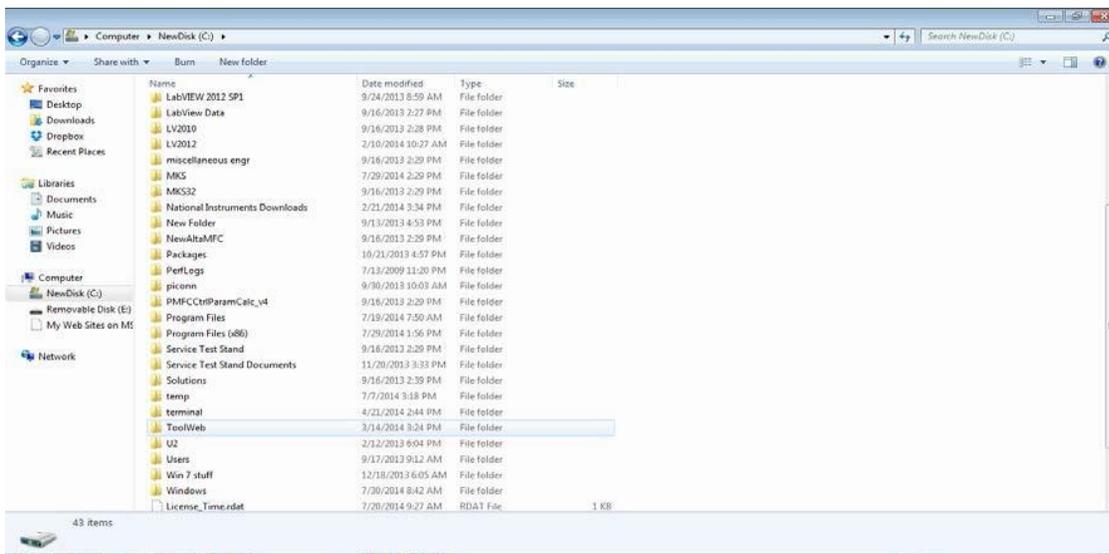


Figure 83

Plot Page Java Applet Issues and Problem Solutions

After installing the latest 32-bit Java and creating the ToolWeb folder described above, there may still be a security issue when launching the plot page of the MFC Browser.

Problem Statement:

An error message pop-up may appear that indicates security settings are preventing the java applet from running.

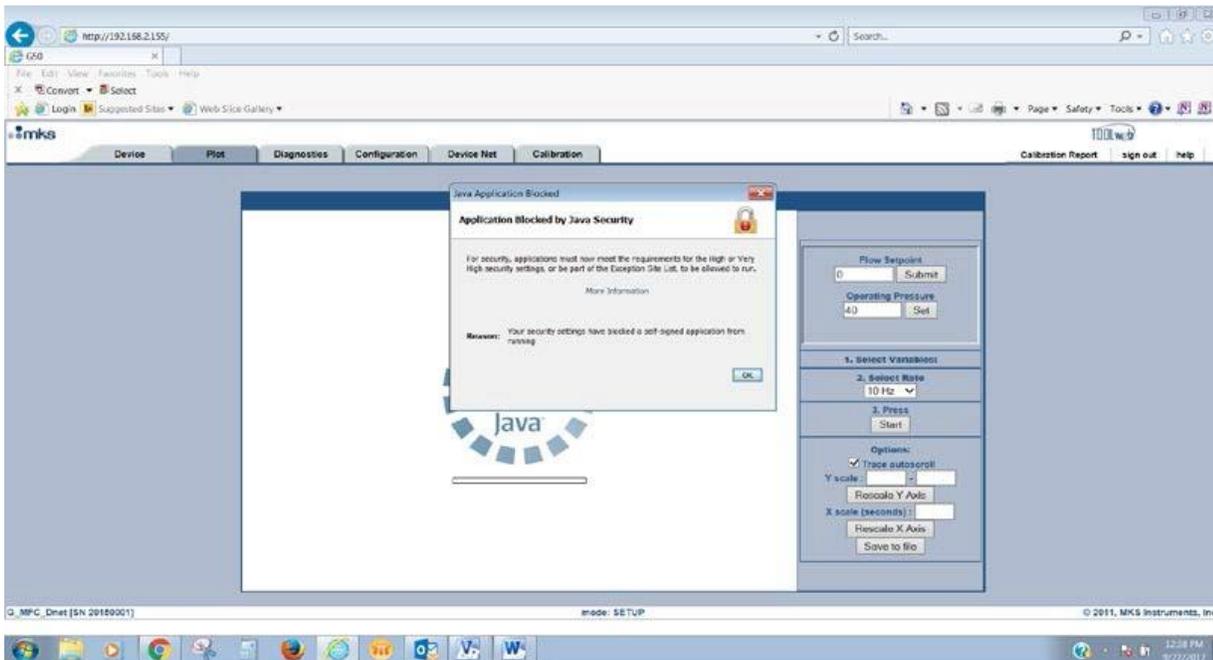


Figure 84

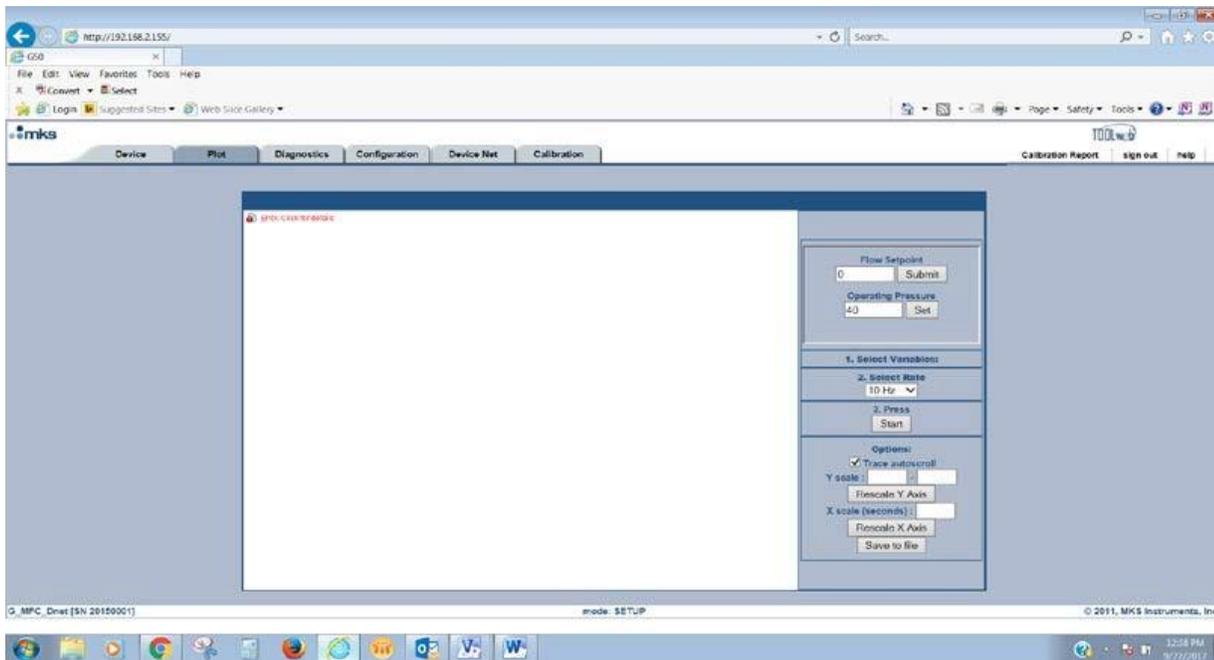


Figure 85

Solution:

1. Locate the Java folder in the <Programs> listing

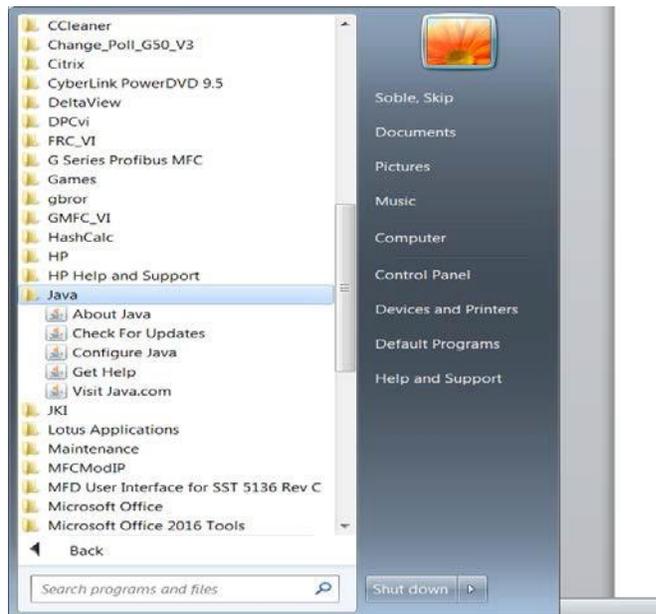


Figure 86

2. Select <Configure Java>. Once open go to the <Security> tab.

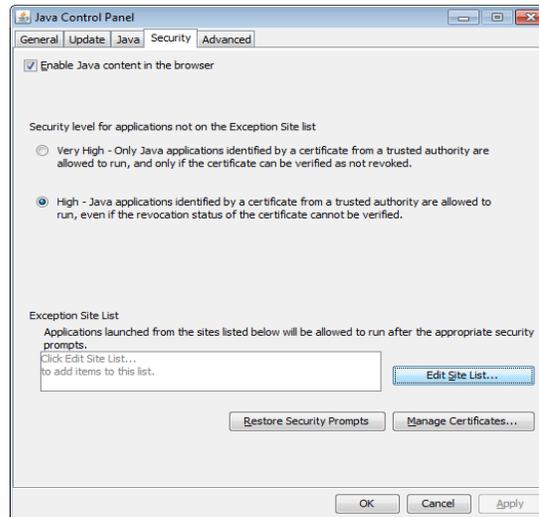


Figure 87

3. Click on <Edit Sites List>. Hit <Add> and type in the IP address of the MFC. Hit <ADD> to save it to the Exception Site List.

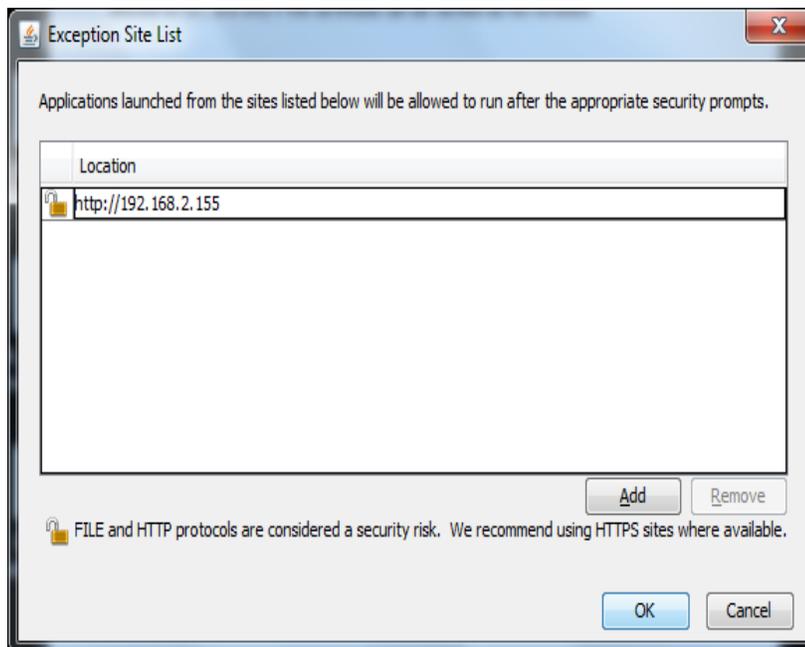


Figure 88

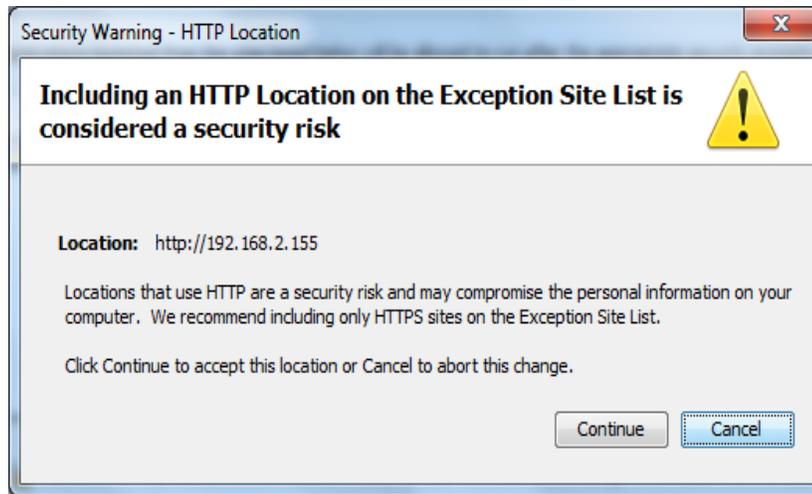


Figure 89

4. Select continue and then OK to close the <Edit List> Window.
5. Select <OK> to close the <Security>window.

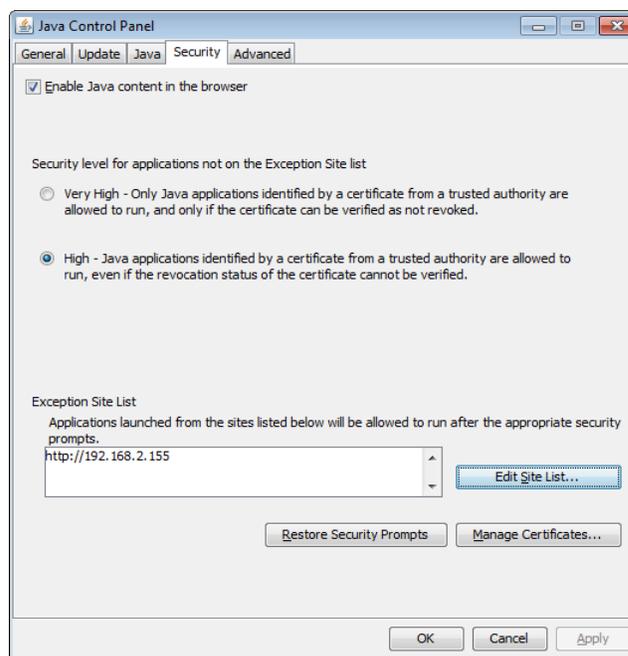


Figure 90

6. The IP Address is now recognized as a “Trusted” Site and the Java applet will run when the Plot page is launched.
7. Close the Browser and re-launch to allow all the java changes to take effect.

NOTE

If the plot page fails to open once a new Browser is launched, close everything down and re- boot the computer.

Problem Statement:

The java applet is being completely ignored and will not launch with Plot application.

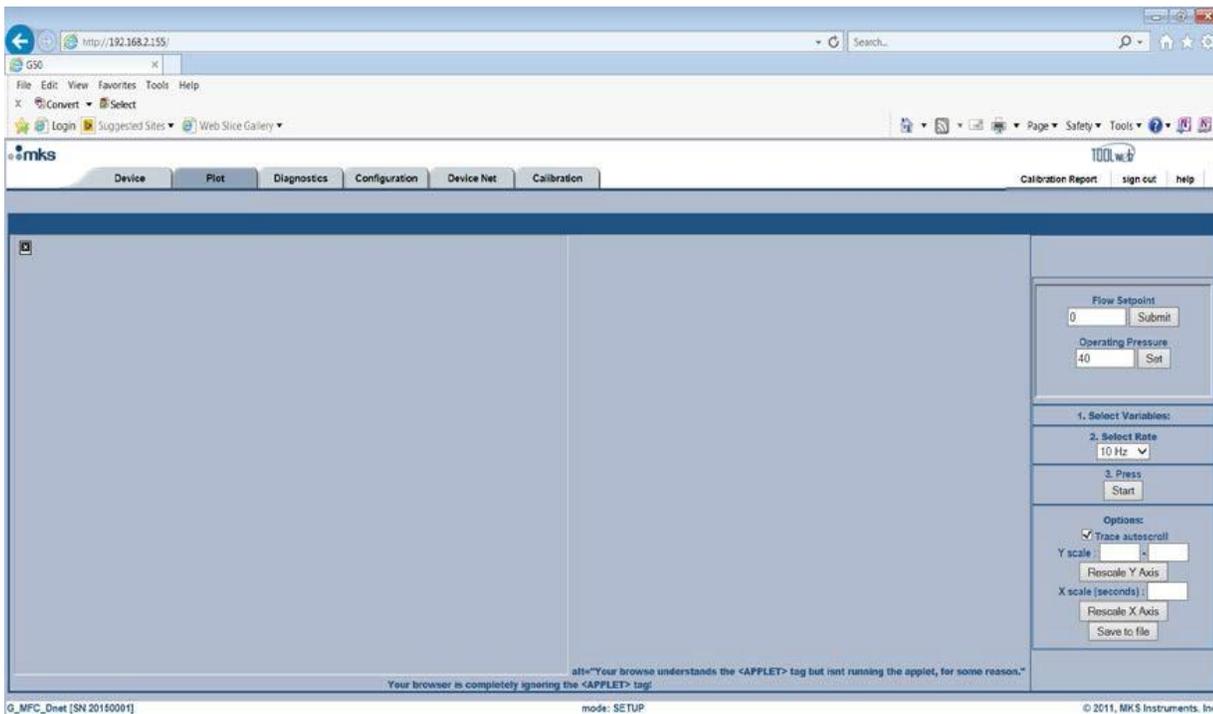


Figure 91

Solution:

1. Go to the “Gear” at the upper right corner of the IE page. Use the pull-down menu to select <Manage Add-Ons>

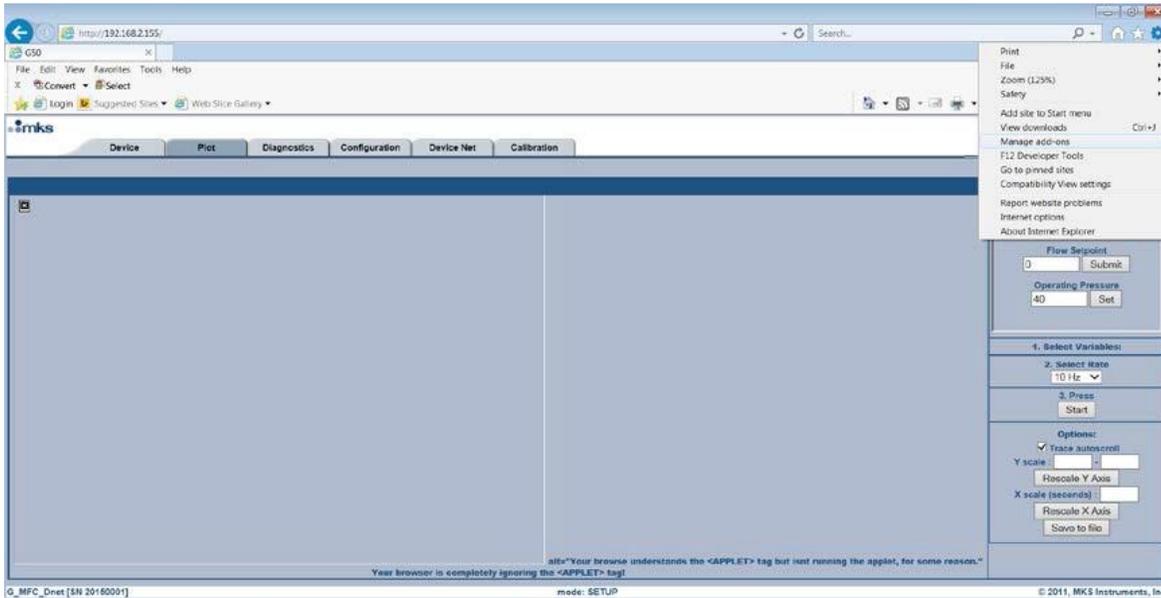


Figure 92

2. Find the <Oracle> Add-ons.

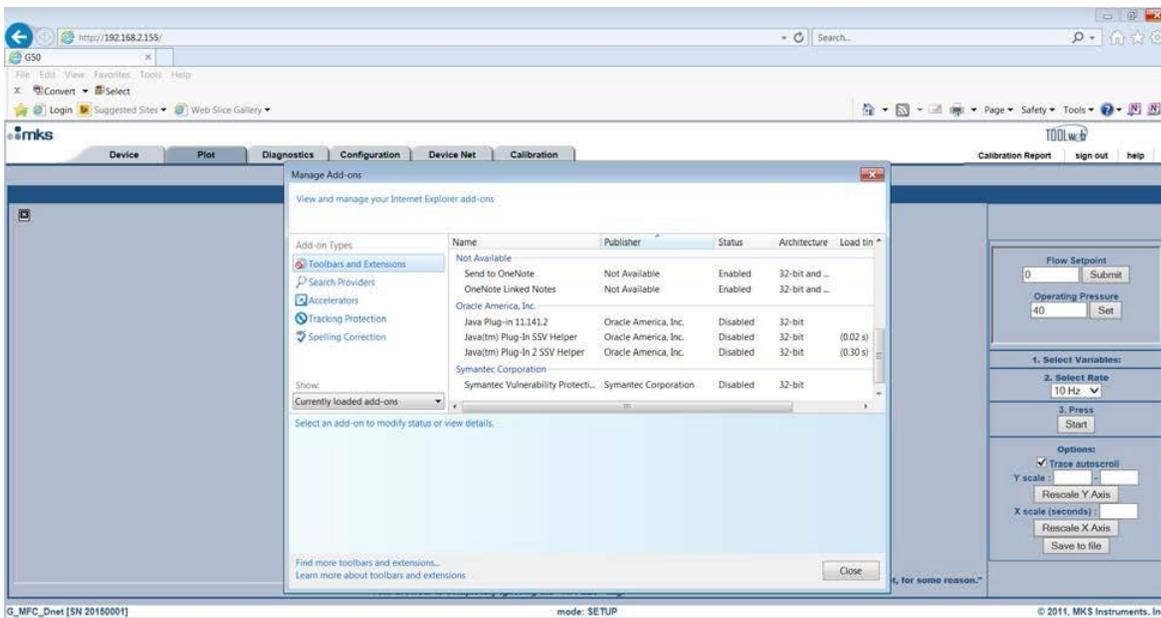


Figure 93

- Verify that the Architecture listed is 32-bit and enable All Add-ons.

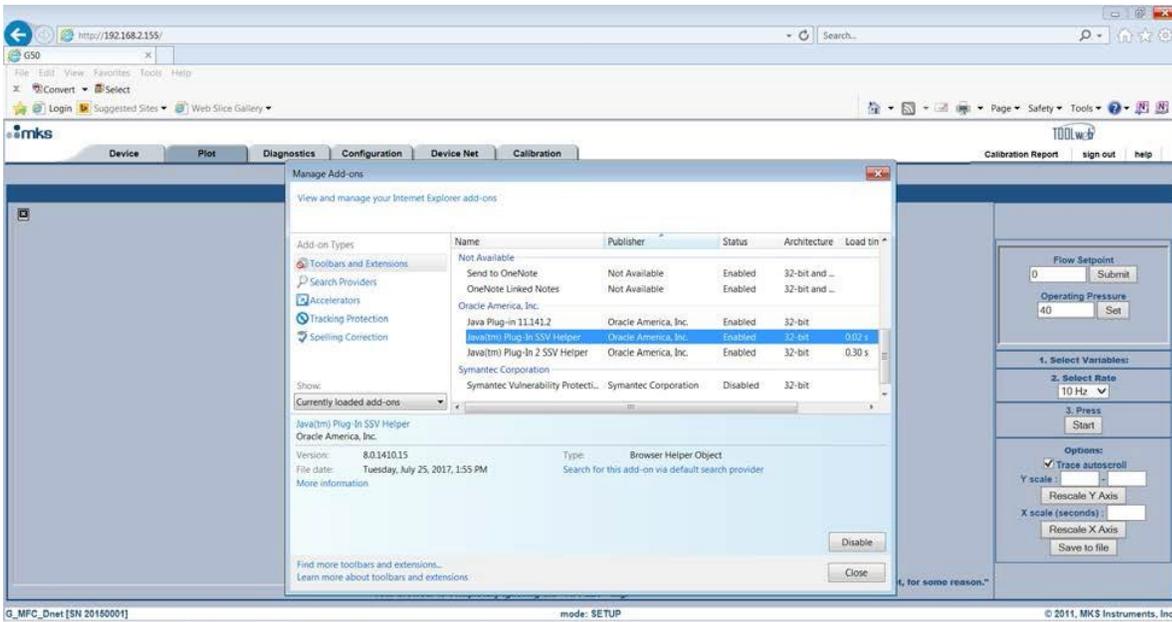


Figure 94

- Close Add on Window and close the Browser Window.
- Re-Launch IE and reconnect to the MFC Browser. Launch Plot page.

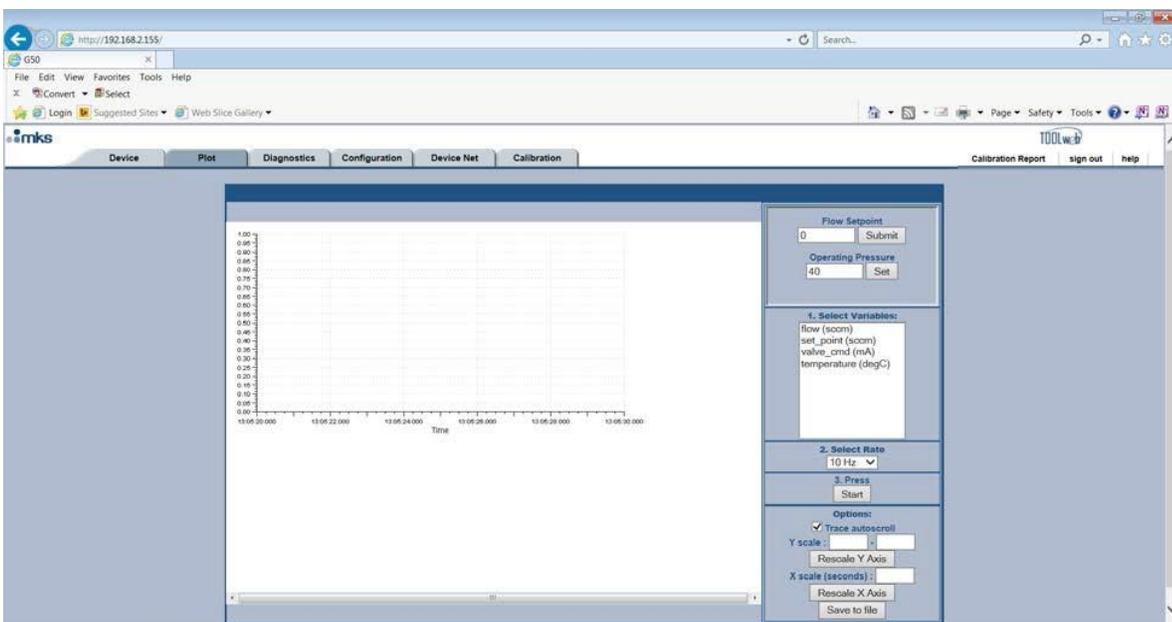


Figure 95

Appendix B Re-setting IP Address to Factory Default 192.168.2.155

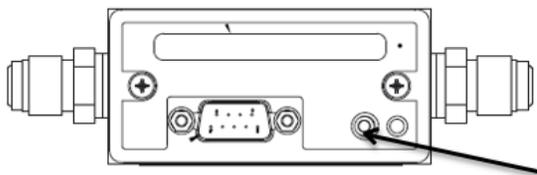
All G series MFC exit the factory with the same default IP Address - 192.168.2.155

IP Addresses can be changed from the <Configuration> tab and if not properly noted by the user could result in not being able to establish Ethernet communication at some future date.

If there is a communication problem when trying to open the Web Browser, one potential cause for the inability to establish Ethernet communication could be that the IP Address has been changed from its factory default.

The IP Address maybe reset to its original factory default using the following steps.

1. Remove power from the MFC.
2. Take a small tool (screwdriver, allen wrench, etc.) and hold down the button on the top of the MFC.

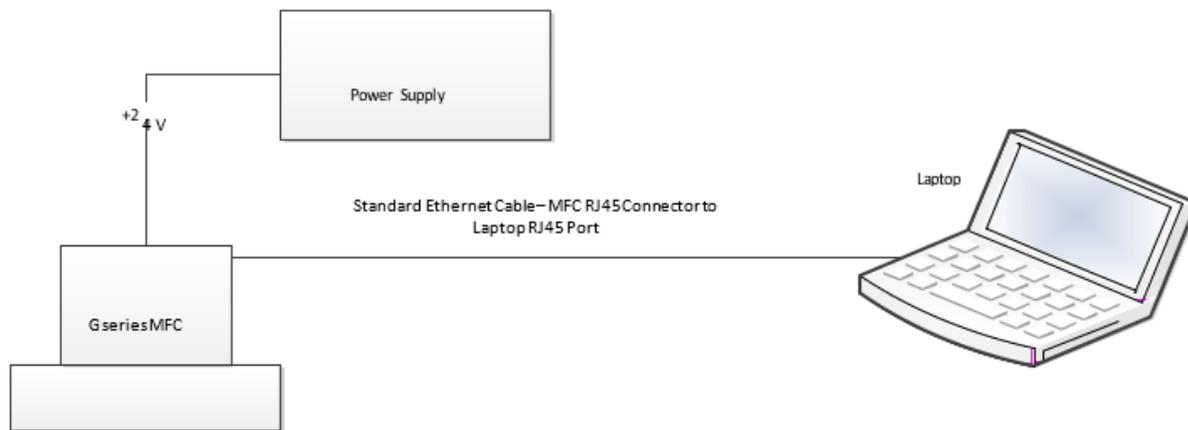


Push Button Location (9 pin Analog)

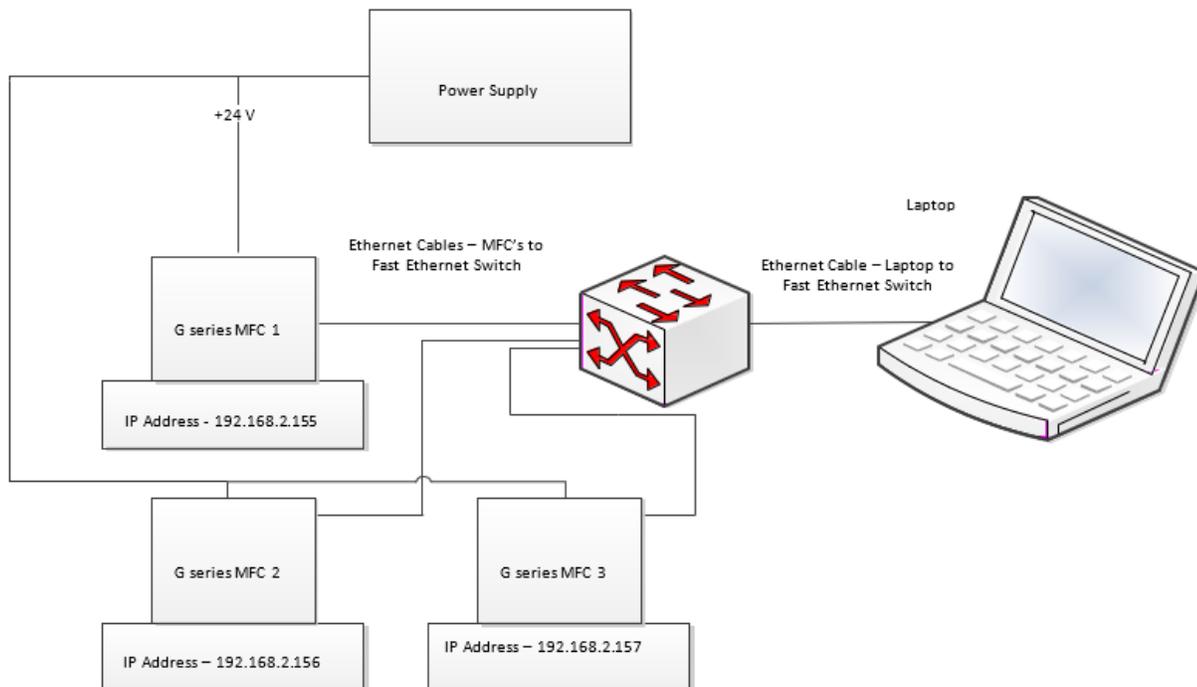
3. Re-connect the power to the device while continuing to hold down the Push Button
4. Continue to hold for 5 secs and then let go of the button.
5. Device LED will be turn RED and then transition to GREEN once it has initialized.
6. Default Address has not been restored to the MFC.

Appendix C MFC Ethernet Communication Configurations

Single MFC Requirements:



Multiple MFC Ethernet Communication via a Fast Ethernet Switch



Note:

- Ethernet Communications can be established between a single laptop and multiple MFC using a high-speed Ethernet Switch.
- Each MFC must have a different IP Address when connected to the switch. See Setup Mode – Configuration Page. After changing note the new address for latter reference.
- Each MFC will have its own Web Browser page that can be used to configure and run than specific MFC IP Address

Appendix D Proper Methodology for Zeroing a G Series MFC

Recommended Techniques for Zeroing an MFC:

- There are a few fundamental considerations when zeroing an MFC
 1. The device should be installed in the orientation and within the environment in which is going to be used.
 2. The MFC should be powered and allowed to reach a stable temperature.
 3. Before a zero is issued any pressure differential across the MFC valve must be eliminated (equalization of the pressure upstream and downstream of the MFC).
- Technically an MFC can be zeroed at atmosphere, vacuum, or at the operating pressure to which the MFC will be exposed to during operation.
- MKS recommends zeroing the device at the operating pressure of the MFC.

Depending on the gas panel configuration, this may be done by one of the following procedures:

System is at operating pressure and has upstream and downstream positive shut off valves

1. Close the downstream valve.
2. Open the MFC's control valve. (Send MFC a full-scale set point or use valve override.)
3. Close the upstream valve.
4. Allow pressure across MFC to equilibrate and the flow output to stabilize at zero.
5. Close the MFC's control valve.
6. Wait one minute and adjust the zero using one of the methods specified for the device I/O type.

Systems at operating pressure with downstream valve only

1. Close the downstream valve.
2. Open the MFC's control valve. (Send MFC a full-scale set point or use valve override.)
3. Allow pressure across MFC to equilibrate and the flow output to stabilize at zero.
4. Close the MFC's control valve.

5. Wait one minute and adjust zero using one of the methods specified for the device I/O type.

Systems with upstream valve only/ system at atmosphere or under vacuum

1. Close the upstream valve.
2. Open the MFC's control valve. (Send MFC a full-scale set point or use valve override.)
3. The MFC may be evacuated to vacuum or exposed to atmosphere on downstream side. For either case, the downstream pressure must be kept constant to insure there is no pressure drop across MFC
4. Allow pressure to equilibrate across MFC.
5. Close the MFC's control valve.
6. Wait one minute and adjust zero using one of the methods specified for the device I/O type