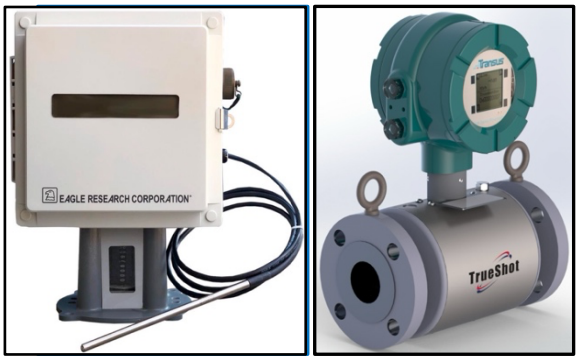
TrueShot™ UIM Connections to the Eagle Research MPplus II

Written by John Lansing

INTRODUCTION

This document discusses wiring connections and software settings required to connect a TMCO TrueShot™ UIM (2, 3 or 4-path) gas ultrasonic meter to the Eagle Research MPplus II™ Electronic Volume Corrector (EVC) using the TrueShot's low frequency output (ACF/Pulse). Traditionally the output from the TrueShot is a high-speed pulse configured for Pulses/ACF. However, the electronics also supports a low frequency output in ACF/Pulse for use with Electronic Volume Correctors. This document discusses configuring and connecting the TrueShot UIM gas ultrasonic meter to the Eagle Research MPplus II series EVC.



PULSE CONNECTION TO THE EAGLE RESEARCH MPPLUS II

This Application Note primarily discusses the connections that are required to obtain the correct of number pulses from the TrueShot UIM 2, 3 or 4 path versions. It does not go into detail on how to use the Eagle Research software as the client should be familiar with its configuration settings.

The Eagle Research electronic volume corrector (EVC) has two pulse inputs that can be configured for either Form A or Form C. This is described in the Eagle MPplus II Manual [Ref 1] on page 5 and shown in Figure 1 below. Configuring the pulse input for Form A or Form C is shown in Figure 2 below.

PULSE INPUTS	10	+
	11	PUL1
	12	-
	13	PUL2

Figure 1 – MPplus II Terminal Connections

Figure 2 shows the software configuration settings to ensure Form A is configured for the input (red rectangle). It also shows the configuration setting needed to accept "Cubic Units/Pulse" which is configured for 5 ACF/Pulse (green arrow). This can be changed to any value like 10, 100 or 1000 ACF/Pulse depending upon the meter's size. This is discussed below in the section titled "Configuring for Low Frequency Output (ACF/Pulse)."

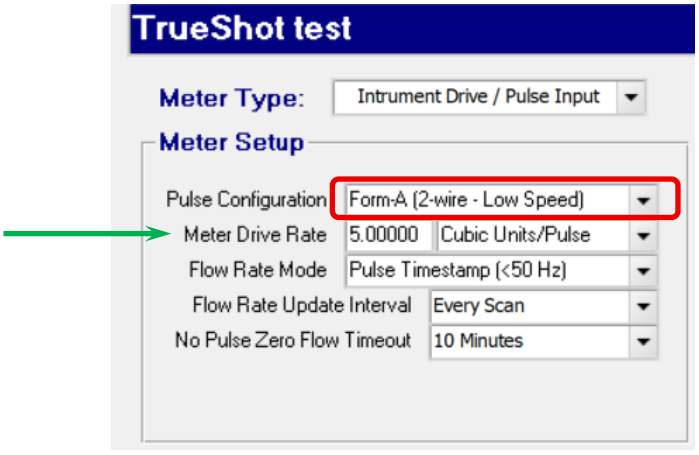


Figure 2 – Configuring for Form A Configuring EVC for ACF/Pulse

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The positive output pulse connection from the TrueShot is D0 A should be connected to Terminal 11 and the negative TrueShot D0 B to the Eagle Terminal 12. Figure 3 shows where the Eagle MPplus II main board connections are located. It should be used to connect to the TrueShot UIM D0 output that is highlighted with a red rectangle as shown in Figure 4.

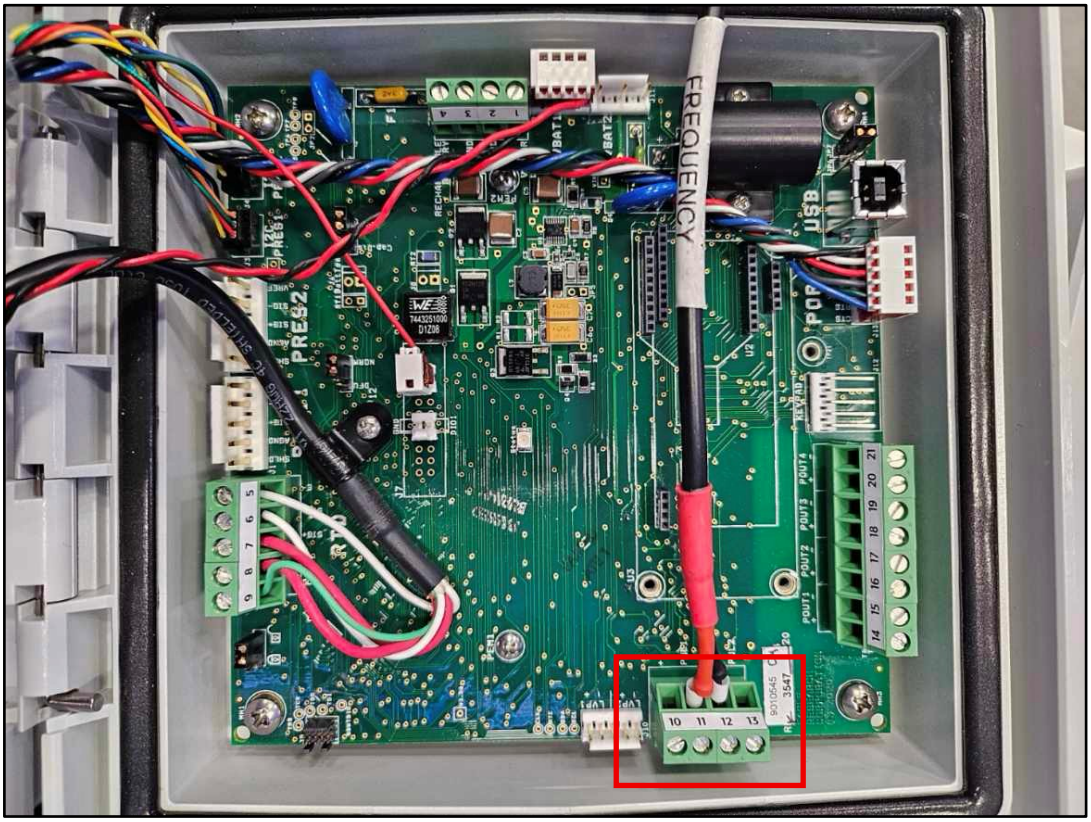

Figure 3 – Eagle MPplus II™ Electronics Board

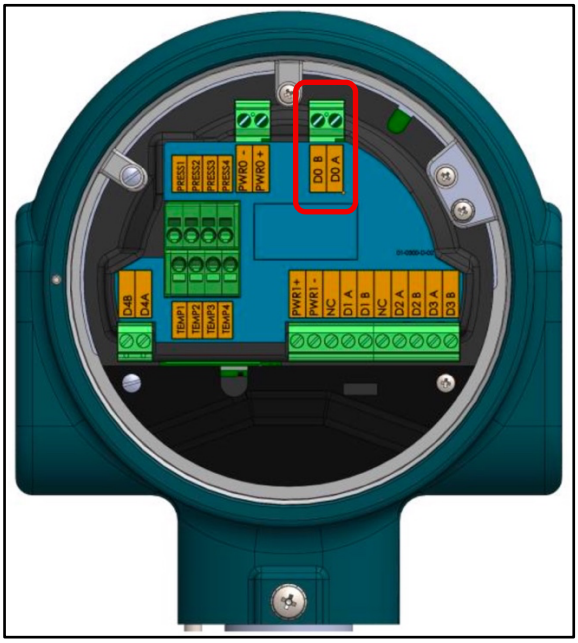

Figure 4 – D0 Connections

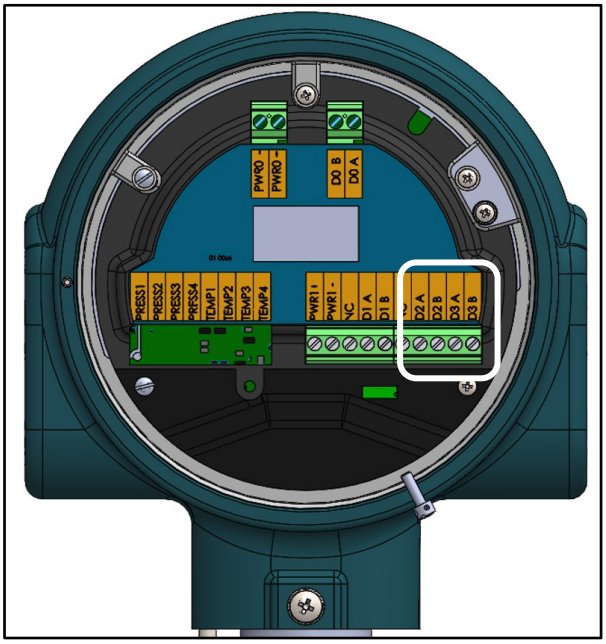

Figure 5 – D2 & D3 Connections

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It is recommended to use D0 A and D0 B (see red box in Figure 4) be used as this is the primary frequency output. There are two additional frequency / status outputs highlighted with a white box in Figure 5 (D2 & D3). Under Configuring the TrueShot UIM, in the following section, the example will show setting up the ACF/Pulse for D0. The additional outputs (D2 and D3) can be configured for a variety of outputs including additional ACF/Pulse, Pulse/ACF, Warnings, Alarms and flow direction.

Note: The connection to the TrueShot is polarity sensitive. In Figures 4 & 5, D0 A is the positive input and D0 B is the negative connection. The output device is will only conduct and provide the MPplus II with pulses if the positive (TrueShot D0 A) terminal is connected to the Eagle EVC input Terminal 11 and D0 B terminal is connected to the MPplus II Terminal 12. A reverse connection will not damage the electronics, but the EVC will not be able to count pulses and thus not register any volumes.

CONFIGURING THE TRUESHOT UIM

Before configuring the TrueShot UIM for ACF/Pulse, TIM software [Ref 2] must be in the Superuser mode. Reference 2 is a link to download the latest version of TIM. Older versions may not support all the UIM features. After starting the TIM software, click on the “Login”, which is in upper right-hand corner of the software, as shown in Figure 6. Once this is clicked, a dialog box will appear in the middle of TIM as shown in Figure 7. Click the “User” pull-down arrow below “Log in as” and select “Superuser” as shown in Figure 8. Then enter 2719 in the Password box. Click LOGIN (green rectangle) and the TIM will now be in Superuser mode. This is required to make any configuration changes. Additional details about TIM Software can be viewed in the Transus TIM Quickstart Manual, Version 1.8, [Ref 3] that is posted on the TMCO website.

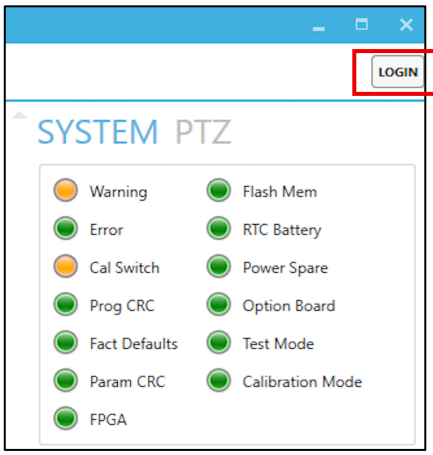

Figure 6 - Login

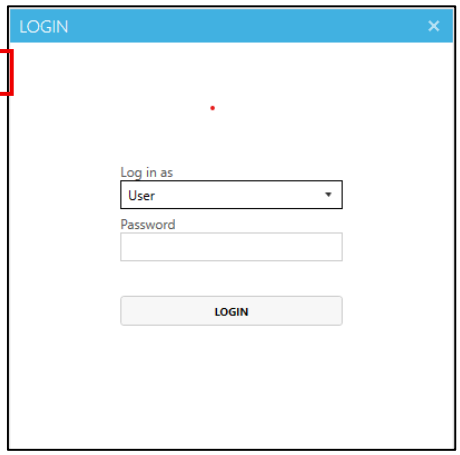

Figure 7 – Log in as

Figure 8 – Superuser Selected

Once the TIM software is in “Superuser” mode, it will be displayed in the lower right. TIM software will indicate Superuser mode in this tool bar regardless of which TIM menu has been selected. Figure 9 below shows TIM is connected to meter with a serial number of 240152 and the Access level” is now in Superuser.

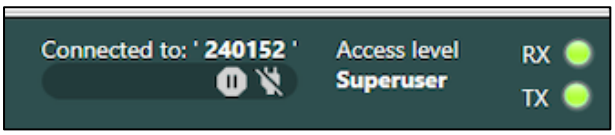

Figure 10 – TIM in Superuser Mode

The TrueShot meter’s digital outputs (pulse / status) can be configured to provide a variety of different outputs. From the factory the meter is typically configured for Pulses/ACF. Figure 10 below shows a typical “OUTPUT D0” configuration for a 2” UIM 3.

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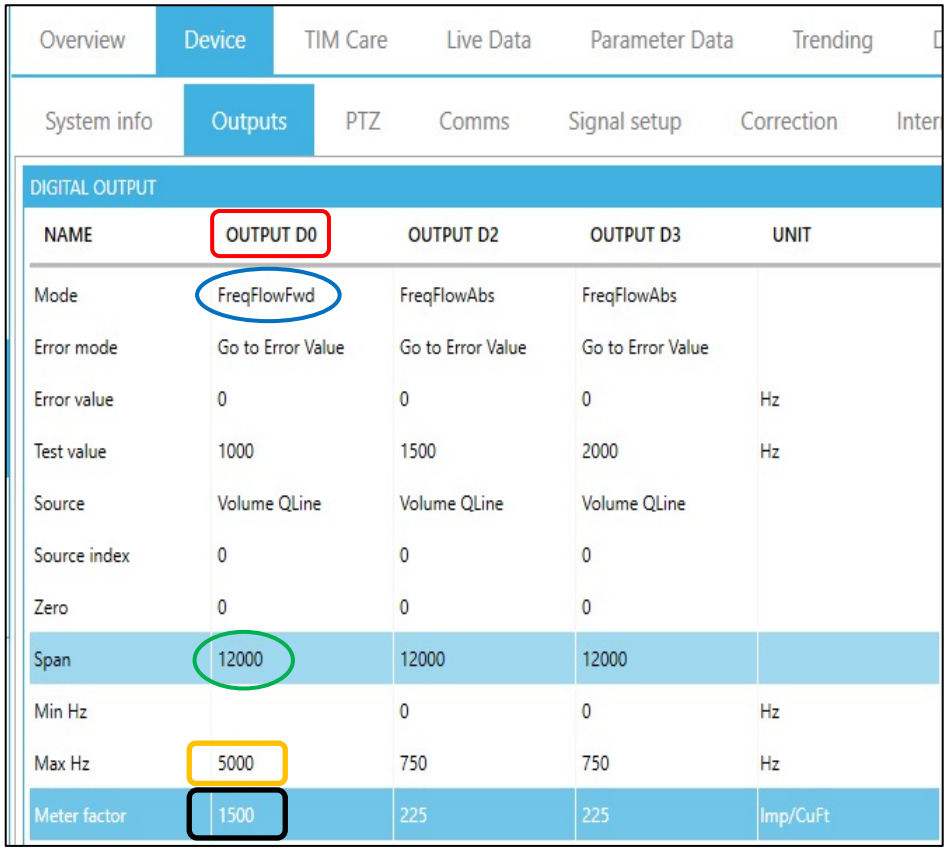
"Output D0" (highlighted in red) is currently configured for forward flow only with a high frequency output. The setting in "Mode" (blue oval) is "FreqFlowFwd" is the factory default. This means the meter's D0 will output high frequency pulses (pulses/ACF).

Configuration for High Frequency (Pulses/ACF)

Typically, the TrueShot UIM comes from the factory set for Pulses/ACF (high frequency output). In the following example, the "Span" is set for 12000 ACFH (highlighted in the light blue band and green oval) and a full-scale frequency of 5000 Hz at the bottom ("Max Hz", highlighted with an orange rectangle). Thus, for this configuration, the meter will be generating 1500 pulses per ACF (displayed in the "Meter Factor" at the bottom of Figure 10 below as the "Max Hz" value, and is highlighted with a black box).



NAME	OUTPUT D0	OUTPUT D2	OUTPUT D3	UNIT
Mode	FreqFlowFwd	FreqFlowAbs	FreqFlowAbs	
Error mode	Go to Error Value	Go to Error Value	Go to Error Value	
Error value	0	0	0	Hz
Test value	1000	1500	2000	Hz
Source	Volume QLine	Volume QLine	Volume QLine	
Source index	0	0	0	
Zero	0	0	0	
Span	12000	12000	12000	
Min Hz		0	0	Hz
Max Hz	5000	750	750	Hz
Meter factor	1500	225	225	Imp/CuFt

Figure 10 – Typical Defaults UIM Configuration for Pulses/ACF

Configuring for Low Frequency Output (ACF/Pulse)

The TrueShot UIM meter can easily be configured for a low frequency pulse output in the form of ACF/Pulse. Typical settings for linear meters are 5, 10, 100 and 1000 ACF/Pulse. The TrueShot will support any desired value like 5 ACF/pulse as shown in Figure 2. The choice of ACF/Pulse depends on meter's flow rate capacity. To configure the TrueShot for ACF/Pulse, select the pull-down menu by clicking on the "FreqFlowFwd" down arrow on the right as shown in Figure 11 below (red rectangle).

After clicking on the "FreqFlowFwd" (red rectangle in Figure 11 below), a variety of selections will be presented. The TrueShot can be configured for low frequency (ACF/Pulse) in the forward flow direction (LFpulseFWD), or reverse flow direction (LFpulseREV). Selecting LFpulseFWD (blue oval in Figure 11) will tell the meter to provide a short duration pulse after a specified number of actual cubic feet has been measured.

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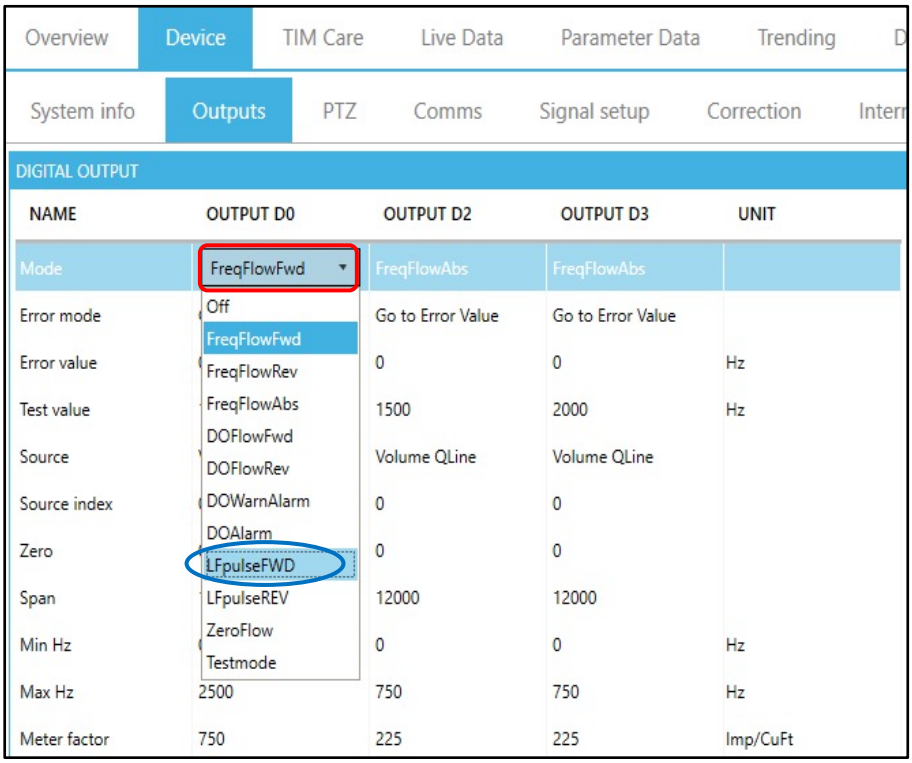

Figure 11 – Selecting D0 Output Functionality

Once this is selected, this dialog box will disappear, and the “OUTPUT D0” dialog box will look like Figure 12 below.

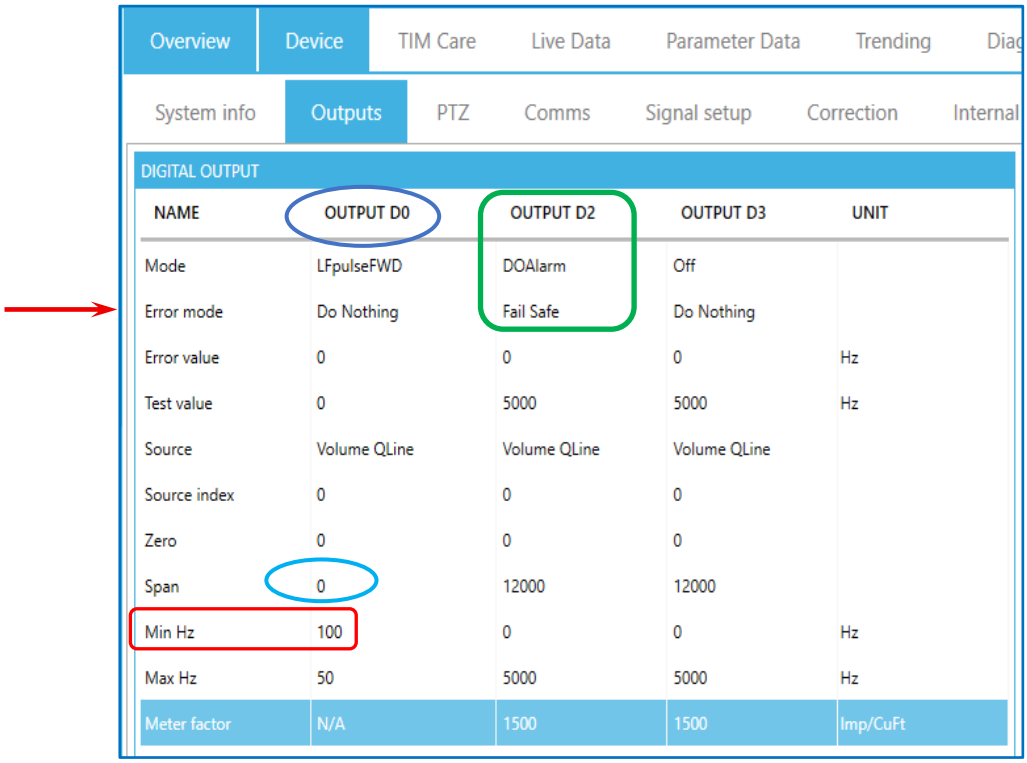

Figure 12 – DO0 Configuration for Forward Flow & 5 ACF/Pulse (LFpulseFWD)

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Once the “LFpulseFWD” has been selected, the meter firmware switches from a high-frequency output to low-frequency pulses. However, two more changes must be made. First, the meter needs to know how many ACF is to be measured for each pulse. This is a configurable value and can be anything from 0.1 to more than 1000 ACF.

The setting in the “Max Hz” (red rectangle in Figure 12) is now used for determining the number of ACF per pulse. It now needs to be re-configured. Its functionality has now been changed to provide the correct settings for ACF/Pulse. The actual value to enter, by editing “Max Hz”, is 10 times the desired setting. In other words, if the desired output is 5 ACF/Pulse, then a value of 50 must be entered (as shown in Figure 12). If the output is desired to be 10 ACF/Pulse, then 100 must be entered. Likewise, if the meter is to provide a pulse every 1,000 ACF, then enter 10,000. To edit simply click on the number and a dialog box will appear allowing the desired value to be entered.

The second parameter that needs adjusting is the pulse width (how long the UIM’s output will be in conducting state). This is configured in the “Min Hz” dialog (see blue oval in Figure 12). For this example, 100 has been entered which represents 100 milliseconds of “on time” (output will be conducting). The value in the “Min Hz” parameter is in milliseconds (0.001 second increments). The Eagle MPplus II needs 100 milliseconds to properly record flow. Too short of a pulse width may cause the EVC to miss pulses.

It is recommended to set the “Error Mode” (see red arrow in Figure 12) to “Do Nothing”. This will ensure the frequency output continues to operate as long as at least 1 path is still operating.

Depending upon meter size (maximum flow rate capacity), and the desired ACF/Pulse, it is possible to generate too many pulses per second, and thus the meter’s output will not permit sufficient time to go to zero flowing current (output non-conducting). When this happens the EVC will not count pulses.

The following table (Figure 13) recommends UIM settings for the ACF/Pulse, based upon UIM line size, so that the meter won’t “over-run” the pulse output, thus causing the MPplus II to not count correctly.

	Flow Information	UIM Set for 10 ACF/Pulse	UIM Set for 100 ACF/Pulse	UIM Set for 1000 ACF/Pulse
Line Size	ACF per Second at full scale	Seconds per Pulse when at full scale	Seconds per Pulsewhen at full scale	Seconds per Pulse when at full scale
2	2.778	3.6	36	360
3	6.250	1.6	16	160
4	10.000	1	10	100
6	25.000	Not Recommended	4	40
8	40.000	Not Recommended	2.5	25
10	62.500	Not Recommended	Not Recommended	16
12	100.000	Not Recommended	Not Recommended	10

Figure 13 – Settings for ACF/Pulse

The column labeled “UIM Set for 10 ACF/Pulse” provides recommendations for meter line sizes 2”-4” (10 ACF/Pulse). The ACF per second in each of the 3 columns is based on the meter’s maximum flow rate of about 125% of the expected normal operating range. This will keep the output from “over-running” the pulse input to the Eagle MPplus II EVC. For the 4” meter, if more time between pulses is desired, then configure the meter for 100 ACF/Pulse (enter 1000 for the “Max Hz”). Typically for line sizes 4-8, setting the “Max Hz” to 1000 (which generates a pulse every 100 ACF) is a conservative setting. For meters larger than 8”, the “Max Hz” should be set for 10000 to generate a pulse every 1,000 ACF.

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The following Figure 14 shows an example of the pulse output from the TrueShot with a “Min Hz” pulse duration set of 100 milliseconds (0.100 sec.). The “off time” (non-conducting time) should be at least a second to ensure that too many pulses are not generated too quickly. This graph is not to scale.

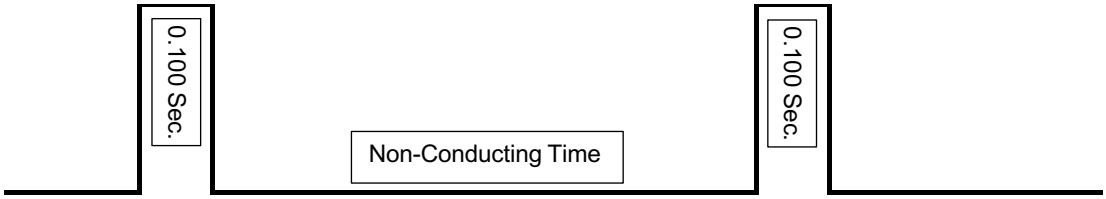

Figure 14 – Example of the TrueShot UIM Pulse Output (not to scale)

Important Note: Remember, after all the UIM parameters are changed, they must be written to the meter. If this step isn’t done, the meter will revert to the previous configuration if power is lost, or if is forced to reboot. Figure 15 shows the location for the “Save Changes in Device” tab and Figure 16 the “Save Parameters to File”. They are both available on the “Device” tab and “System Info” screens.

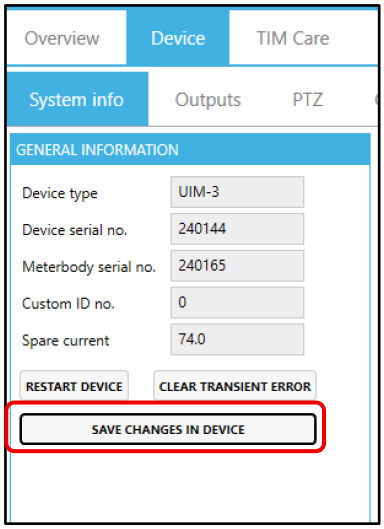

Figure 15 – Save Changes in Device

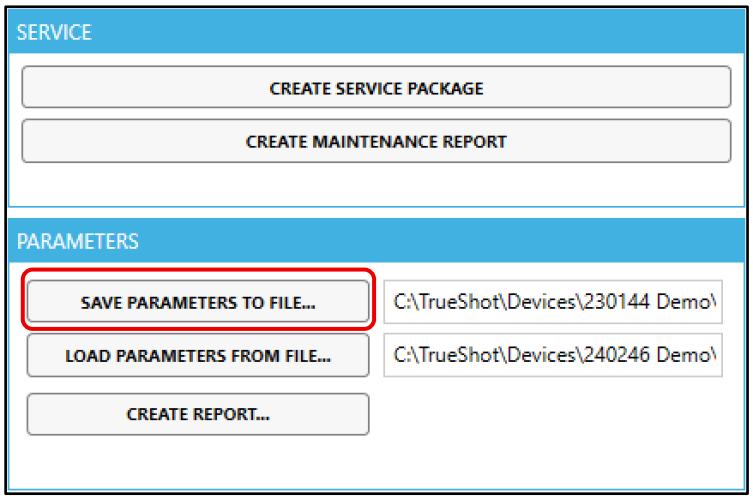

Figure 16 - Save Parameters to File

Conclusions

Configuring the TrueShot UIM, regardless of the number of paths, is the same. Making sure the pulse output doesn’t generate too many pulses between conducting and non-conducting is very important. Figure 13 provides suggested settings based on meter line size and a maximum flow rate of about 125 FPS (most clients limit their meter to 100 FPS during the design phase). Even if the meter generated 2 pulses per second, the Eagle MPplus II™ will be able to count them as there would be approximately 800 milliseconds of “off time”.

References

1. Eagle MPplusII™ Series Manual, Eagle Research Corporation, Rev. 11.11.25, https://www.eagleresearchcorp.com/Support/Downloads
2. Transus TIM Software, Version 1.4.8 https://tmcousa.com/wp-content/uploads/2025/06/Transus_2025_05_23_11_49_51_1.4.8.258_r171.msi_.zip
3. Transus TIM Quickstart Manual, https://tmcousa.com/resources/literatures-downloads/