

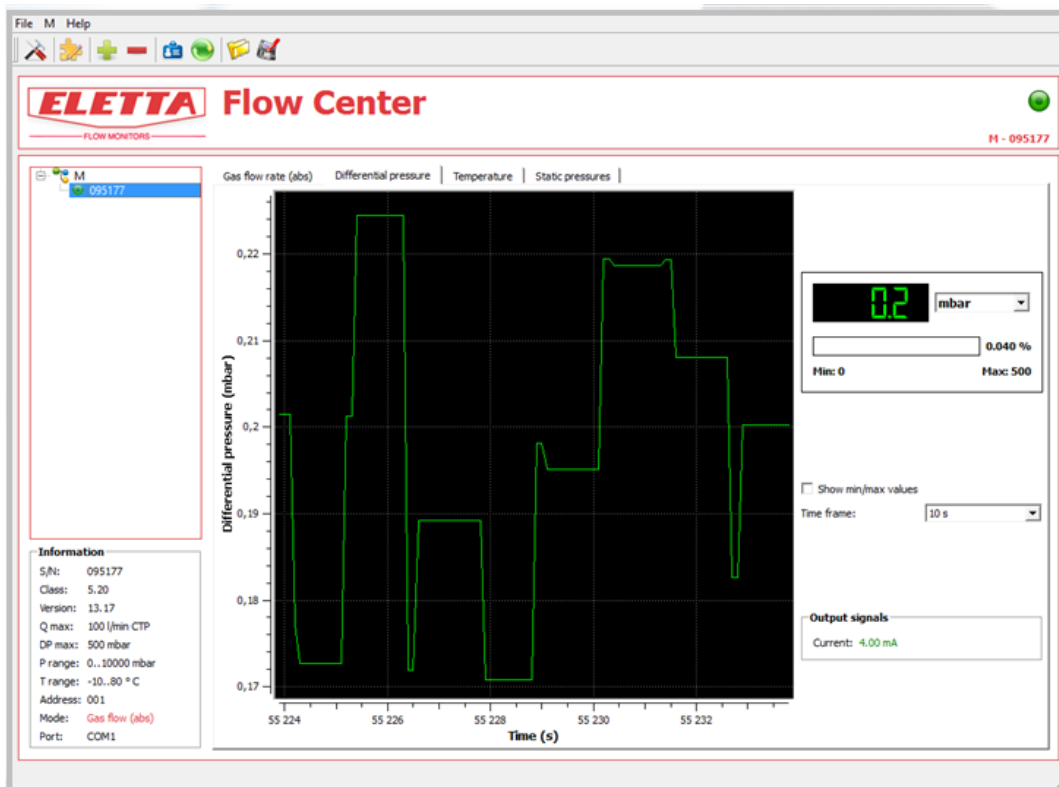
## TIVG-F upgrade kit with M310

### Overview

Installations with TIVG-F can from 2014 be upgraded with M310 available from Eletta Flow. The TIVG-F converts differential pressure measurement over an orifice (known restriction in the direction of the media flow) and converts the orifice pressure difference to a mechanical movement of a dial. The flow,  $Q$ , is related to the square-root of the  $dP$ . The turndown of the TIVG-F is 1:3,333, which mean that the min indicated measurable flow is 1/3 of the max flow - for example 21-70 l/min. The M310 is a flow measurement device which is based upon a  $dP$  measurement performed by using 2 absolute transducers. The mean  $dP$  over orifice with precision measured with M310 is around 5 mBar. The TIVG-F  $dP$  range is up to 250 mBar, which mean that the M310 will measure between 5-250 mBar. This will give a  $dP$  turndown of  $250/5 = 50$ . The corresponding turndown for flow will then be the square root of that value  $\sim 7,07$ . For the same example as above, the M310 will instead measure between approx 10-70 l/min. So for the same installation, min flow limit will be decreased showing flow where the TIVG-F will not.

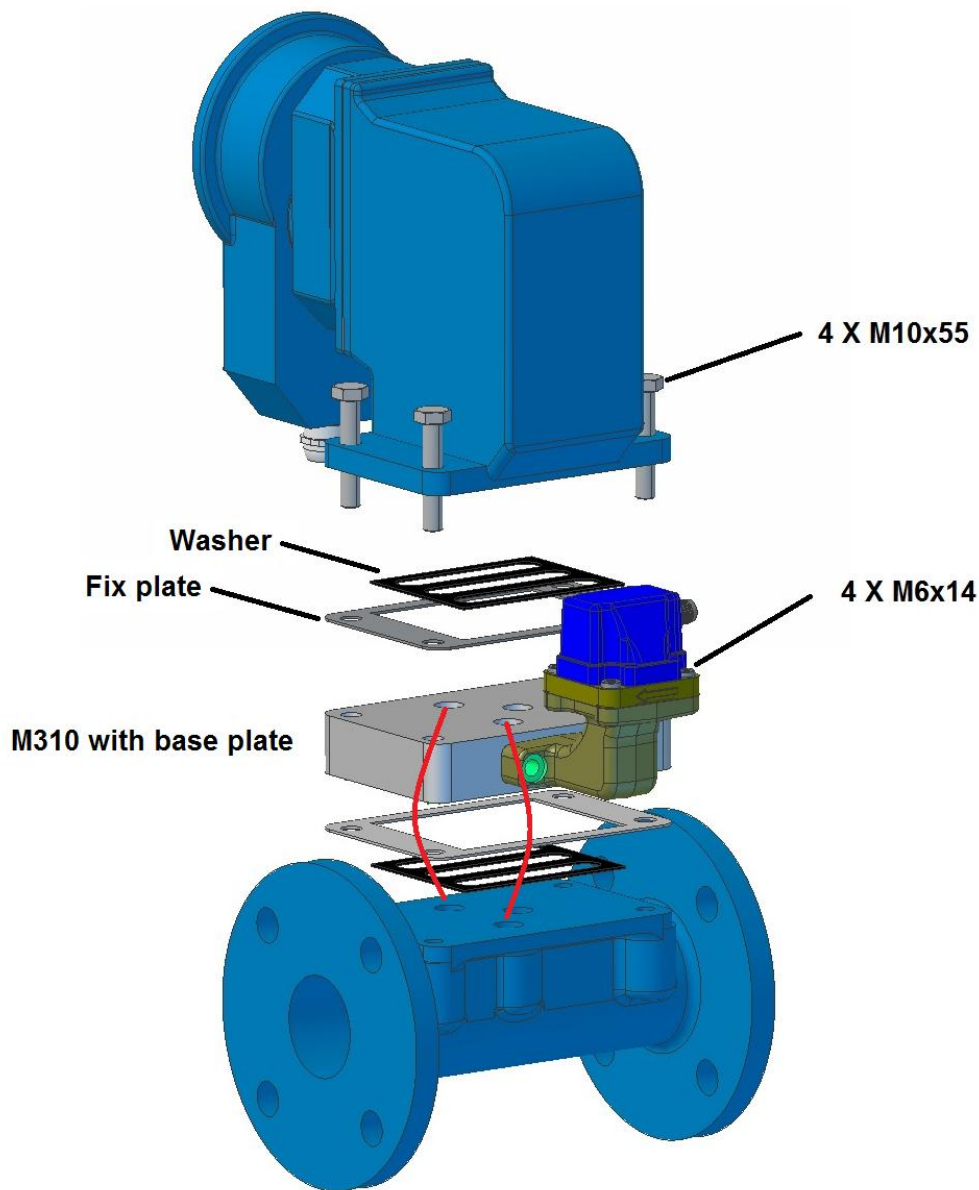
The M310 has an analogue output 4-20mA. The M310 can also be ordered with a communication cable to be used with Eletta's own Flowcenter software which give the customer the availability to mount a flatscreen next to the installation showing real-time measurement of the M310. Available parameters is Static pressure upstream and downstream,  $dP$  measurement, temperature and flow. The M310 is equipped with PT compensation for gas flow. Normal installation using the M310 is analogue output. Please refer to [www.eletta.com](http://www.eletta.com) for manuals.





The TIVG-F is a measurement device to be used in PN10 systems. The M310 will withstand approx 2-3 times overpressure, but notice must be taken to ensure that water hammer effects are neutralized as much as possible. Fast-closing valves can damage most measurement devices and so also in this case. The M310 is available in other pressure ratings such as M325 and M350. Increasing pressure rating will however also increase the min dP measurable limit - M325 min 12,5 mBar (Q turndown will be = 1:4,5) and M350 min 25 mBar (Q turndown will be 1:3,2).

## Installation

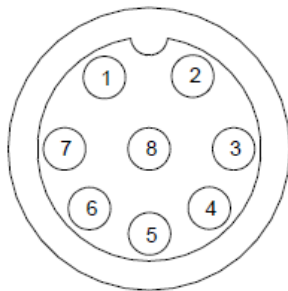


The upgrade kit is a baseplate with a premounted M310. Along with the package is 2 sets of fix plates and washers and 4 x M10X55. With the package there is also either a 2,5m or 10m cable to be used for the M310. Please contact ordering at [eletta](http://eletta.com) if parts are missing.

1. Loosen the 4 M10 on the TIVG-F where the upgrade kit is to be assembled.
2. Remove the housing from the pipe. Do not reuse old washer.
3. Fit the baseplate and make sure there is a fix plate with washer on either side as shown in the picture above. Make sure that the 2 holes match the corresponding 2 holes on the TIVG pipe housing (indicated in red in above picture).

On the M unit there is also a forged arrow indicating the required flow direction. Make sure this arrow points in the same direction as the flow direction arrow on the TIVG-F pipe housing. If the M unit must be rotated 180 degrees, loosen the 4 M6x14, twist the unit and reattach it. Please use STD tightening torques as much as possible.

4. Reattach the TIVG-F housing to the pipe section clamping the base plate in place.
5. Use the 4 M10x55 to tighten the assembly. Use STD tightening torques as much as possible.
6. Connect the M cable. A connection schedule is attached to the cable. Refer to below if necessary. If the cable is to be extended, use a cable with at least 0,25mm<sup>2</sup> wire area. The cable is not shielded, so there is no need to ground the cable. There is a filter card inside the M unit removing external electromagnetic disturbances. There is also a ferrite mounted next to the M12 contact to remove cable induced disturbances. Note that the M unit do not have an alarm output as indicated in below table.



Looking at the female

Connection with M series and colour coding		
+	Pole 1	WHITE
-	Pole 2	BROWN
RS 485A	Pole 3	GREEN
RS 485B	Pole 4	YELLOW
Not active	Pole 5	GREY
Larm	Pole 6	PINK
Not active	Pole 7	BLUE
Not active	Pole 8	RED

7. The M310 unit is calibrated to match 100% flow @ 250 mBar. The 4-20 mA output is directly related to that setting.



### **Accuracy discussion**

There might occur a need to slightly change the corresponding dP for 100% flow. Factory setting is set to 250 mBar. The TIVG-F is calibrated using air with a tolerance. The orifice is also made with a small tolerance. If the installation is old, the orifice could also be somewhat different in bore size to what was originally delivered (The orifice can get worn in time thus increasing bore size. Increased bore size will lower the dP for the same flow thus demanding an increase in flow to match necessary dP). Please discuss this matter with the reseller if the 100% indicated flow on the TIVG-F as read on the dial do not match the 20mA with satisfied precision. The way to solve this is to trim in a wanted 100% flow signal as read out of the TIVG-F dial, check what dP is read out on the M310 and then save that corresponding dP to the unit. The only way to do this is to use Flowcenter and for that there is a need to purchase a usb communication cable for RS485 communication with the unit. Your reseller will help you with this.

