mini CORI-FLOW™ Series ML120

(Ultra) Low Flow Coriolis Mass Flow Meters / Controllers

Quick Installation Guide

Doc. no.: 9.17.093 rev. E Date: 06-04-2020

Starting up the mini CORI-FLOW™ ML120 in 10 steps

Bronkhorst®

SCOPE OF THIS GUIDE

mini CORI-FLOW™ instruments are highly accurate instruments for measuring and controlling the mass flow rate of liquids and/or gases, independent of fluid properties. These smart Coriolis instruments offer multiple process values as input or output parameters. Many parameters can be read and/or changed using analog or digital interfaces. Output parameters are: mass flow, density, temperature, totalized mass flow, alarms. Input parameters are: setpoint (desired mass flow rate for controllers), reset alarm/counter.

This Quick Installation Guide will help you start up your **mini CORI-FLOW™ ML120** in 10 steps, covering the following subjects:

1. Check functional properties
2. Check pressure
3. Check piping
4. Mounting/installing
5. Leak check
6. Electrical connection
7. Operational interface
8. Multifunctional switch
9. Purging
10. Zeroing

Other applicable documents:

- Manual for mini CORI-FLOW™ ML120 series	9.17.097
- Hook-up diagram mini CORI-FLOW and CORI-FLOW (general)	9.16.132
- FlowPlot manual	9.17.030

Fieldbus/interface manuals	**Manual**	**Hook-up diagram**
- RS232 interface with FLOW-BUS protocol	9.17.027	9.16.132
- FLOW-BUS interface	9.17.024	9.16.133
- PROFIBUS DP interface	9.17.025	9.16.134
- EtherNet/IP interface	9.17.132	9.16.222
- CANopen interface	9.17.131	9.16.218
- DeviceNet™ interface	9.17.026	9.16.135
- Modbus ASCII / RTU interface	9.17.035	9.16.136
- EtherCAT® interface	9.17.063	9.16.137
- PROFINET interface	9.17.095	9.16.146
- Modbus TCP interface	9.17.035	9.16.235

*These documents can be downloaded from **www.bronkhorst.com/en/qrcoriolis** or can be sent by email on request.*

Temperature considerations

*After having used the **mini CORI-FLOW™ ML120** for the first time at low temperature, re-tighten the fluid adapter screws in order to prevent any leakage. Please note: if you do not tighten, a leaking adapter / fitting can cause damage. After the first shrinking and re-tightening of the screws, no further precaution is necessary.*

*Note that the maximum temperature in the housing of the **mini CORI-FLOW™ ML120** is 70 °C.*
To check this, the internal temperature sensor can be used. Temperature can be readout digitally via FlowDDE or a Bronkhorst® readout and control module (E-8000 or BRIGHT).
Make sure the temperature value readout here (=actual temperature in housing) does not exceed 70 °C.

Starting up

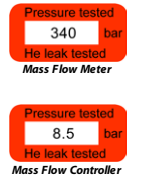
1

Check functional properties
Before installing the instrument, check if the properties stated on the instrument label match your requirements:
- Flow rate
- Fluid to be measured
- Up- and downstream pressures
- Input/output signals *(see also step 6)*
- Temperature
- Valve type *(N.C. - Normally Closed / N.O. - Normally Open)*

2

Check test-pressure
Before installation, make sure that the tested pressure is in accordance with normal safety factor for your application.
The tested pressure is stated on the instrument with a red sticker. If this sticker is missing, or if the tested pressure is insufficient, the instrument must **not** be mounted in the process line and should be returned to the factory.

Important: the tested pressure should always be higher than the (normal) operating pressure.



3

Check if system piping is clean
For reliable measurement, always make sure the fluid stream is clean.
Use filters to assure a moisture, oil and particle free gas stream (recommended pore-size: 0.5…25 µm).
If back flow can occur, installing a downstream filter and a check valve is recommended too. For high flow rates, select a suitable filter size, to avoid a too high pressure drop or cavitation.

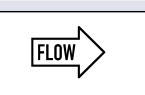
Warning
During the manufacturing process, the instrument has been tested with water. Despite the fact that it has been purged thoroughly afterward, the instrument cannot be guaranteed to be absolutely free of water droplets upon delivery. For applications where remaining water particles might cause undesired reactions, such as corrosion, Bronkhorst strongly recommends performing an additional, adequate drying procedure.

4

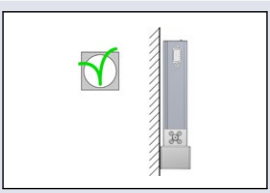
a. Mount/install instrument properly
Install the **mini CORI-FLOW™ ML120** Meter/Controller in the line and tighten the fittings according to the instructions of their supplier.

During operation avoid external vibrations and shocks.

b. Flow direction
Install the **mini CORI-FLOW™ ML120** in accordance with the direction of the FLOW arrow, indicated on the front side of the housing, between the fluid connections.



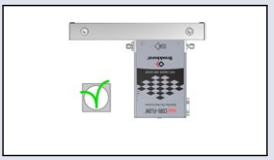
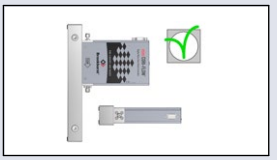
c. Base mounting
Mount the **mini CORI-FLOW™ ML120** instrument, with screws in the body, to a rigid, stiff base body or heavy mass, such as a wall, heavy rig or stable construction. This is essential to achieve optimal accuracy.



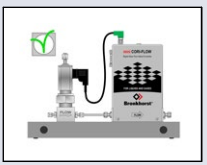
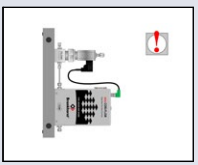
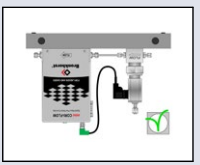
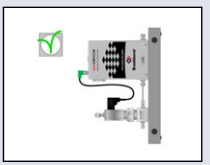
By default the **mini CORI-FLOW™ ML120** will be delivered on a special mounting block for achieving optimal accuracy.This mounting block has a mass and stiffness precisely tuned for the specific model.

Removing the mounting block will cause inaccuracy unless the instrument is firmly mounted on a vibration free, stiff and rugged surface. Mounting on plates of machine cabinets is not recommended.

d. Mounting position general
For gas and liquid **mini CORI-FLOW™ ML120** meters can be mounted in any position for a proper measurement.

e. Mounting position when using mini CORI-FLOW™ ML120 with external valve with purge connector
For the **mini CORI-FLOW™ ML120** series instruments with external liquid valve with a purge connector, the mounting position can be critical for a good quality of de-gassing.

Please consult the Instruction Manual for additional information on mounting the mini CORI-FLOW instruments.

Gas free operation
In order to remove gas bubbles during start-up, flushing with relatively high flow rate of liquid for a few seconds is recommended.

Leak tightness
Verification of leaks is required prior starting up of the process.

5

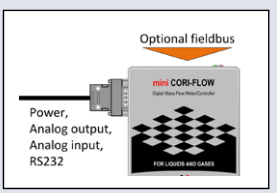
Leak check
Check the system for leaks before applying (fluid) pressure, especially if toxic, explosive or other dangerous fluids are used.

Avoid condensation due to cold liquids/gases at high humidity environments.

Liquid tight is not the same as gas tight
Please note that connections which are tight for liquid, could still be untight for gas. This might result in gas enclosure in the liquid, e.g. when using external valves, which can lead to errors in measurement.

6

Electrical connection
Electrical connections must be made with a standard cable or according to the **mini CORI-FLOW™ ML120** hook-up diagram.



mini CORI-FLOW™ ML120 instruments have a IP40 ingress protection rating.

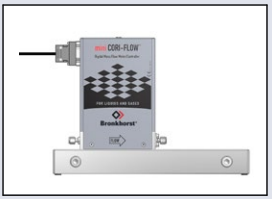
7

a. Analog/local operation
Connect the device to the power supply/readout unit using a cable with 9-pin sub-D connector. For mass flow controllers, the setpoint is proportional to the flow range. This principle also applies to digital operation.

Power : +15...+24 Vdc

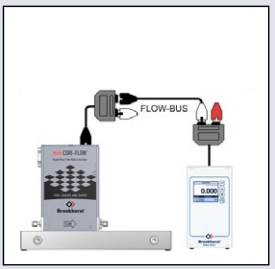
Analog output : 0...5 Vdc / 0...10 Vdc 0...20 mA / 4...20 mA

Analog input *(controller)* : 0...5 Vdc / 0...10 Vdc 0...20 mA / 4...20 mA



b. Digital RS232 or fieldbus operation

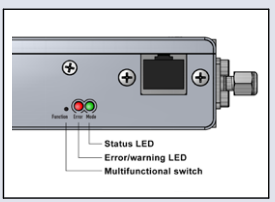
Connecting the instrument with an RS232 cable to a PC will enable you to use the (free) Bronkhorst® software for Windows, such as FlowDDE and FlowPlot.
See the mini CORI-FLOW™ ML120 manual (document number 9.17.097) for further explanation on RS232 operation of the mini CORI-FLOW™ ML120.



8

Multifunctional micro switch operation

Using the 2 LEDs and the switch on the **mini CORI-FLOW™ ML120**, several actions can be monitored and started. The green LED is used for status indication. The red LED is used for error and warning messages. The switch can be used to execute several functions, such as auto-zero, restoring factory settings and bus initialization. See the **mini CORI-FLOW™ ML120** manual (document no. 9.17.097) for details.



Important: when the red LED blinks fast, the measuring signal is unstable or noisy; the instrument is possibly exposed to vibrations or a pulsating flow.

The micro switch on top of the **mini CORI-FLOW™ ML120** can be operated with a thin, metal or hard plastic pin, for example the end of a paperclip.

9

Purging

Prior to operating the instrument with either corrosive or reactive media, it is absolutely necessary to purge the instrument with a dry, inert gas (e.g. nitrogen or argon) for at least 30 minutes. Complete purging is also necessary after use with corrosive or reactive media, before exposing the instrument to air.

Purging during start-up

- When using liquid media, flush the **mini CORI-FLOW™ ML120** with the actual process fluid to expel gas in the tubing.
- When using gases, flush the instrument with dry gas for some minutes at a high flow rate, in order to remove condensation drops.

Special control mode for purging

In case of purging of a **mini CORI-FLOW™ ML120** controller give setpoint = 100 % to control the valve or the pump. It is also possible to use special control mode = 8 to fully open the valve or set the pump at max. rpm, using a digital interface. This will bypass the PID-controller and might be useful when having the **mini CORI-FLOW™ ML120** set to a low capacity. It will ensure you to get the highest possible flow for purging.

Warming up

For accurate measurement, it is recommended to warm up the instrument for at least 30 minutes. This can also be done while purging or flushing.

10 Zeroing

Before first use, when process conditions change significantly (especially temperature) or when the instrument has been re-mounted (e.g. after servicing) it is recommended to perform an automatic zero action with the **mini CORI-FLOW™ ML120**. This action can be started manually (as described below) or via a digital interface (see document Operation instructions digital instruments: 9.17.023). Under normal (constant) conditions it will not be necessary to zero before each application start-up.

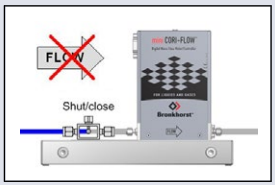
a. Set process conditions

After warming-up, pressuring and purging the system (including the **mini CORI-FLOW™ ML120**) prepare the instrument for actual process conditions.

During zeroing avoid external vibrations and shocks.

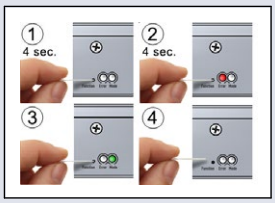
b. Stop flow

Make sure there is no flow through the **mini CORI-FLOW™ ML120** by closing a shut-off valve in front of the instrument. At least one (shut-off) valve in front of the **mini CORI-FLOW™ ML120** is required. High quality shut-off valves are recommended for proper zero point calibration.



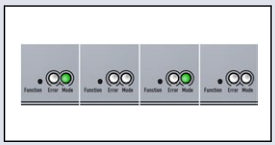
c. Start Auto-Zero

Press micro switch and hold it. After a short time the ● red LED will go ON and OFF, then the ● green LED will go ON. At that moment (which is 8 to 12 seconds after pressing) release the switch.



d. Zeroing procedure

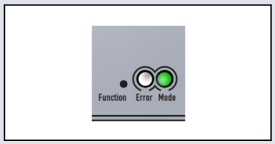
The zeroing procedure will start at that moment and the ● green LED will blink fast. The procedure will take approximately 60 seconds.



If the signal is not stable, the procedure will take longer (up to 6 retries will be performed). The red ● LED will blink when signal is unstable/noisy.

e. Ready

When the indication is showing 0% signal and the ● green indication LED is glowing continuously again, then the zeroing action was successful.



Measurement check

For a controller: send a setpoint to the **mini CORI-FLOW™ ML120** and check the measured value.
Make sure the **mini CORI-FLOW™ ML120** indicates 0% at zero flow.

Your ***mini CORI-FLOW™ ML120*** is now ready for operation.

Bronkhorst®

Bronkhorst High-Tech B.V., Nijverheidsstraat 1a, NL-7261 AK Ruurlo, The Netherlands
T +31(0)573 45 88 00 **I** www.bronkhorst.com **E** info@bronkhorst.com