

LIQUI-FLOWTM mini

Digital Mass Flow Meters for Liquids

Quick Installation Guide

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Start-up LIQUI-FLOW mini in 10 steps

SCOPE OF THIS GUIDE

LIQUI-FLOW™ mini instruments are one of the smallest micro fluidic Mass Flow Meters (MFM) of its kind. The instruments are capable of measuring ultra low flow rates in ranges starting from 1.5...75 mg/h up to 12...600 mg/h, based on water. The straight, duplex steel sensor tube (W1.4462) has an internal volume of less than 1 mm³ and operates on the thermal measuring principle. Due to its high pressure rating of max. 1000 bar (15000 psi) the MFM is suited for HPLC systems. The instruments are equipped with a microprocessor-based printed circuit board, offering high accuracy and excellent temperature stability. The RJ45 connection is used for power supply and for both analog and digital (RS232) communication.

This manual covers the short-form instructions for LIQUI-FLOW™ mini mass flow instruments regarding:


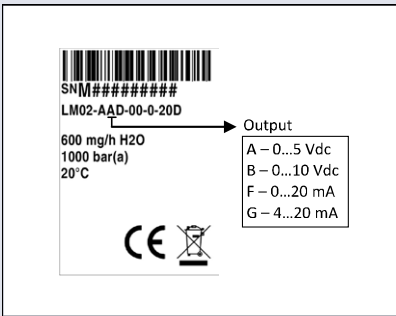

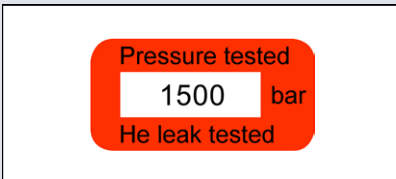

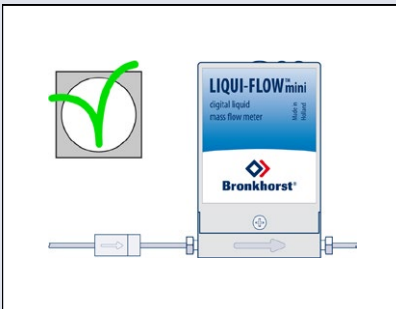
- start-up
- mounting
- zeroing
- operation


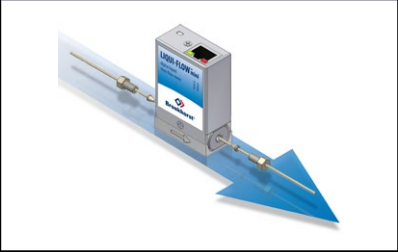


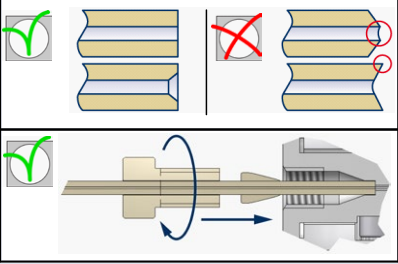




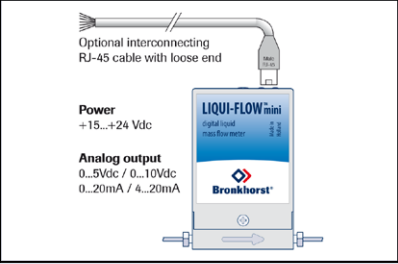

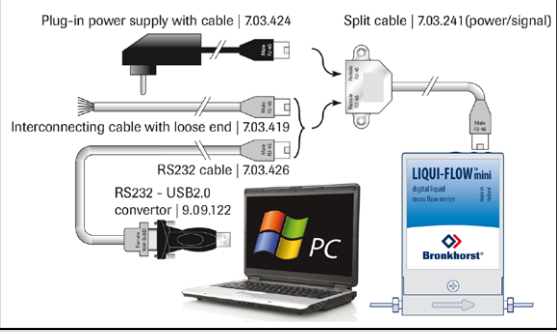
This manual will help you start-up your LIQUI-FLOW™ mini in only 10 steps. More detailed information can be found in documents listed below:



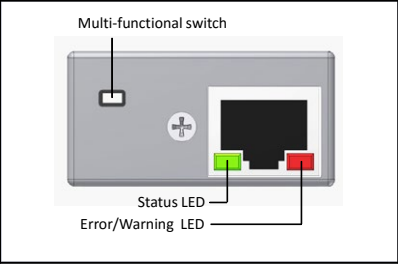






- Instruction manual LIQUI-FLOW™ mini series (document nr. 9.17.065)
Consists information for basic and advanced operation, more detailed product information and instructions for troubleshooting
- FlowPlot Manual (document nr. 9.17.030)
- Hookup diagram LIQUI-FLOW™ mini (document nr. 9.16.097)

These documents can be downloaded from the website: www.bronkhorst.com or can be sent by e-mail on request.

Starting-up

	<p>1. Check LIQUI-FLOW™ mini properties Before installing it is important to read the attached label and check:</p> <ul style="list-style-type: none"> • Flow rate • Fluid to be measured • Pressure • Output signal • Temperature 	
	<p>2. Check test-pressure Check the red-coloured sticker and make sure the test-pressure is in accordance with normal safety factors for your application. LIQUI-FLOW™ mini instruments are tested up to the pressure indicated on the red sticker.</p>	
	<p>3. Check if system piping is clean For reliable measurement always make sure the fluid stream is clean.</p> <p>Use filters to assure a particle-free liquid stream. Recommended pore-size: 2 µm.</p> <p>If back flow can occur, a downstream filter is recommended too.</p>	

	<p>4a. Mount / install instrument properly For LIQUI-FLOW™ mini the upright position is preferred. When using a LIQUI-FLOW™ mini instrument in up- or downward position make sure to “zero” the instrument prior before use (see step 10). Avoid installation in close proximity of mechanic vibration and/or heat sources. The housing of the instrument is according to class IP40, which means that the instrument is suitable for indoor (dry) applications, like laboratories or well protected (OEM) housings.</p> <p>Install the LIQUI-FLOW™ mini instrument in the line, in accordance with the direction of the FLOW arrow. The arrow for flow direction is indicated on the body of the instrument. If applicable follow the guidelines of the supplier of the fittings. Special types of fittings are available on request.</p>	
	<p>4b. Compression type fittings For leak tight installation of compression type fittings make sure that the tube is inserted up to the shoulder in the fitting body and that no dirt or dust is present on tube, ferrules or fittings. Tighten the nut finger tight; while holding the instrument, then tighten the nut one turn.</p>	
	<p>4c. 10-32 UNF fittings Tighten the 10-32 UNF fittings according to the instructions of the supplier of the fittings. Only use 1/16” tubing with a straight and clean cut without burrs to ensure leak tightness. Deburr the tubing prior to installation. A new ferrule connection <u>must</u> be made for each new adapter to ensure leak-tightness and minimum dead volume, due to tolerances in the adapter dimensions.</p>	
	<p>Location Install the instrument on a stable position and assure that mechanical vibration, heat source influence and draft are reduced to a minimum.</p>	
	<p>5. Leak check Check the system for leaks before applying (fluid) pressure. Especially if toxic, explosive or other dangerous fluids are used!</p>	
	<p>6. Electrical connection Electrical connections must be made with a standard cable or according to the LIQUI-FLOW™ mini hook-up diagram. These diagrams can be found on the “Documentation and software tools” CD-ROM and at the download section of www.bronkhorst.com. LIQUI-FLOW™ mini instruments are powered with +15...+24 Vdc.</p>	
	<p>7a. Analog operation: For analog operation refer to the “Hook-up diagram LIQUI-FLOW™ mini” or use an RJ-45 loose-end cable (7.03.419) to connect the required signals.</p>	 <p>Optional interconnecting RJ-45 cable with loose end</p> <p>Power +15...+24 Vdc</p> <p>Analog output 0...5Vdc / 0...10Vdc 0...20mA / 4...20mA</p>
	<p>7b. Digital RS232 operation Digital operation over RS232 can be established when using the following setup. Using RS232 or USB-RS232 convertor with a PC will allow you to use (free) Bronkhorst® software for Windows, such as FlowDDE and FlowPlot.</p>	 <p>Plug-in power supply with cable 7.03.424</p> <p>Split cable 7.03.241 (power/signal)</p> <p>Interconnecting cable with loose end 7.03.419</p> <p>RS232 cable 7.03.426</p> <p>RS232 - USB2.0 convertor 9.09.122</p> <p>PC</p>

	<p>7c. Bus / Digital RS485 operation With digital operation over RS485 a bus-system with multiple instruments can be set up. Refer to the “Instruction Manual LIQUI-FLOW™ mini series” for possible systems.</p>
	<p>8. Micro-switch operation Using the micro-switch on the instruments, several actions can be monitored and started. The green LED is used for status indication. The red LED is used for errors/warnings/messages. The micro-switch can be used to start several actions, such as auto-zero, restore factory settings and bus-initialisation actions, if applicable. See specific zero-procedure below and section 3.3 of the Instruction Manual for more details.</p> 
	<p>Unless specified otherwise, the LIQUI-FLOW™ mini instrument is set for RS232 communication at 38k4 baud on node address 03 by default.</p>
	<p>Warm-up time: Let the LIQUI-FLOW™ mini warm-up for at least 30 minutes for best accuracy.</p>
	<p>Do not apply pressure until electrical connections are made. When applying pressure to the system, avoid pressure shocks in the system and increase pressure gradually. Also decrease pressure gradually when required.</p>
	<p>9. Purging In systems for use with toxic or other dangerous fluids, purging for at least 30 minutes with a dry, inert gas (like Nitrogen or Argon) is absolutely necessary before use. After use with toxic or other dangerous fluids, complete purging is also required before exposing the system to air.</p>
	<p>10. Zeroing (optional) The zero point of each instrument is factory adjusted. If required the zero point can be re-adjusted over RS232 or by means of using the micro-switch. Procedure for zeroing by-micro switch:</p> <ul style="list-style-type: none"> • Warm-up, pressure up the system and fill the instrument according to the process conditions. • Make sure no flow is going through the instrument by closing valves near the instrument. • The setpoint must be 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 release the micro-switch. • The zeroing procedure will start at that moment and the green LED will blink fast. The zeroing procedure waits for a stable signal and saves the zero. If the signal is not stable, zeroing will take long and the nearest point to zero is accepted. The procedure will take approximately 10 seconds. • When the indication is showing 0% signal and the green indication LED is burning continuously again, the zeroing action was successful.
	<p>Ready Your LIQUI-FLOW™ mini instrument is now ready for operation.</p>