



# Introduction

## Intended use

The ES-FLOW™/GEMÜ 650 Liquid Dosing Set has been developed to accurately measure and control volume flow rates in a fluid system, using the media and operating conditions (e.g. temperature, pressure) as specified at ordering time.

Any other use than mentioned here is considered unintended.

Bronkhorst High-Tech B.V. cannot be held liable for any damage and/or injury resulting from unintended, improper or unsafe use, or use with other media and/or under other conditions than specified.

## Scope of this guide

This document contains general assembly instructions for the **Liquid Dosing Set ES-FLOW™/GEMÜ 650** (LDS). It does not in any way replace the manuals for the individual components; for correct installation, operation and maintenance the respective manuals are indispensable.

## Scope of delivery

	<b>Art. no.</b>
Physical items:	
• ES-FLOW™ Ultrasonic Volume Flow Controller	7.11.674
• GEMÜ 650 MG8 Diaphragm Valve (control valve)	2.17.421 / 422 / 423
• Festo VEAA Proportional Pressure Regulator (pilot valve)	2.17.424
• Festo 4 mm OD Push Fitting	2.04.804
• Actuation cable 4-pin M8 male/female, 1 m	7.03.764
Documentation:	
• Manual ES-FLOW™ Ultrasonic Volume Flow Controller	9.17.145
• Manual GEMÜ 650 Diaphragm Valve (operating instructions)	-
• Manual Festo VEAA Proportional Pressure Regulator	-



- *The ES-FLOW™ manual can be downloaded from the [www.bronkhorst.com](http://www.bronkhorst.com) website ([www.bronkhorst.com/downloads/](http://www.bronkhorst.com/downloads/)).*
- *The manuals for the control valve and the pilot valve can be downloaded from the websites of their respective manufacturers.*

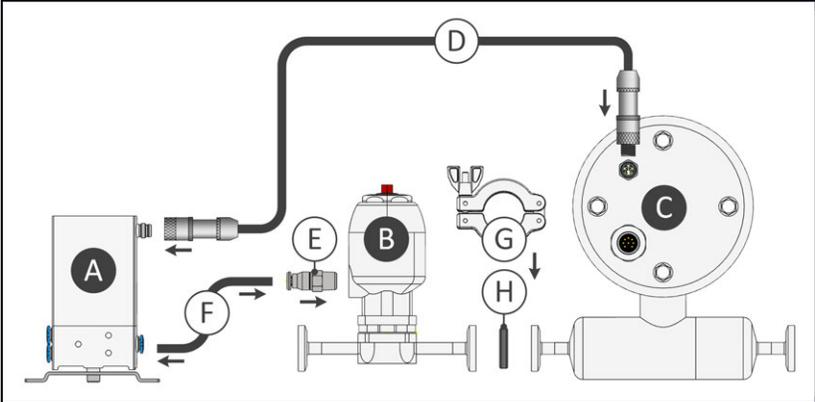
## Additional accessories (not included)

- flexible tube 4 mm OD
- 3x Tri-Clamp clamp matching the individual components
- 3x matching Tri-Clamp gasket

# Safety precautions

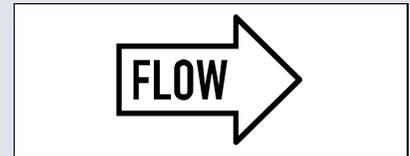
	<p><b>Please read this document entirely and carefully before installing and operating the equipment. Not following the guidelines could result in personal injury and damage to the product and the system(s) it is incorporated in or connected with.</b></p>
	<p><b>General</b></p> <ul style="list-style-type: none"> <li>• The product(s) described in this document may only be used by qualified personnel who are familiar with combined fluid and electrical systems and who recognize the associated hazards (e.g. (high) fluid pressure, electric shock).</li> <li>• The end user is considered to be familiar with the required safety precautions to prevent damage and/or injury while working with the process media (as described in the associated Material Safety Data Sheets) and the equipment.</li> <li>• The end user is responsible for taking the necessary safety precautions and proper use of appropriate (personal) protective equipment.</li> <li>• The equipment and its accessories must be used in accordance with their intended use, specifications and operating instructions.</li> <li>• Individual instruments may not be disassembled or modified in any way for any purpose. Any unauthorized modification, for any purpose whatsoever, will be considered unintended and improper use, will void warranty and cancel the manufacturer's liability. Unauthorized modifications can undo safety features, compromise system specifications (such as ingress protection rating) and cause failure to comply with applicable laws, regulations and directives.</li> <li>• If the product is defective or otherwise does not meet your requirements, please contact your Bronkhorst representative for assistance or advice.</li> </ul>
	<p><b>Restraining factors</b></p> <p>The maximum operating pressure and the ingress protection rating (IPxx) of the complete assembly are equal to those of the component with the lowest respective value.</p>

## Overview

	<p><b>Components</b></p> <ul style="list-style-type: none"> <li>A. Pilot valve</li> <li>B. Control valve</li> <li>C. Flow controller</li> <li>D. Actuation cable</li> <li>E. 4 mm OD push fitting</li> <li>F. 4 mm OD flexible tube*</li> <li>G. Tri-Clamp clamp*</li> <li>H. Gasket*</li> </ul> <p>* ) Not included in scope of delivery</p>
	<p>This representation shows the ES-FLOW™ from the rear and assumes that the process liquid flows from right to left through the flow controller and the control valve. Depending on the ordered configuration of the ES-FLOW™, the normal flow direction may differ from this assumption, which affects the way in which the components are to be connected in step 2a.</p>

# Installation

<p><b>1</b></p>	<p><b>General attention points</b></p> <ul style="list-style-type: none"> <li>• Use the equipment in an environment with a stable ambient pressure and temperature.</li> <li>• Place the assembly on an even, level surface with a rigid and stable underground.</li> <li>• The construction or surface to which the equipment is mounted should be able to support the dimensions and weight of the entire assembly.</li> <li>• Preferably install the ES-FLOW™ in a horizontal pipe segment or a segment where the flow direction is upward.</li> <li>• Where applicable, use the provided mounting holes to fixate the equipment. Consult the according dimensional drawing(s) for the exact sizes and locations of the mounting points.</li> </ul>
<p><b>2</b></p>	<p><b>Fluid connections</b></p> <ol style="list-style-type: none"> <li>Install the control valve downstream from the flow controller. Observe the flow arrow on the measuring tube of the ES-FLOW™.</li> <li>When coupling the instrumentation, follow the installation instructions in the related manuals (see page 2).</li> <li>At each Tri-Clamp connection, make sure to put a gasket between the coupling flanges.</li> <li>Follow the instructions of the manufacturer of the Tri-Clamp clamps.</li> </ol>
	<ul style="list-style-type: none"> <li>• Do not apply fluid pressure until all required fluid connections and electrical connections have been made.</li> <li>• Check the fluid system for leaks before applying pressure, especially when using hazardous media (e.g. toxic or flammable).</li> </ul>
<p><b>3</b></p>	<p><b>Pneumatic connections</b></p> <ol style="list-style-type: none"> <li>Screw the push fitting into the control valve body.</li> <li>Connect the pressure regulator and the control valve using the flexible tube.</li> <li>Connect the pilot valve to the pneumatic gas supply following the installation instructions in the manual of the pilot valve (see page 2).</li> </ol>
	<ul style="list-style-type: none"> <li>• The tube between the pressure regulator and the control valve should be as short as possible.</li> <li>• Make sure that the pneumatic pressure meets the specifications of the tube, control valve and pilot valve.</li> <li>• For the required actuation pressure of the control valve, check the according manual (see page 2).</li> </ul>
<p><b>4</b></p>	<p><b>Electrical connections</b></p> <ul style="list-style-type: none"> <li>• Use the supplied actuation cable to connect the flow controller with the pilot valve.</li> <li>• Connect the ES-FLOW™ electrically as described in the according manual (see page 2).</li> </ul>
	<p>Always isolate electrical power before connecting or disconnecting equipment.</p>



# Maintenance

	<p>In order to keep the equipment in optimal shape, it needs regular preventive maintenance. Especially the control valve contains some mechanical parts that are subject to wear and tear. Follow the service and maintenance instructions in the according manuals (see page 2).</p>
	<p>Before loosening fluid connections or disassembling/reassembling any parts of the system (electrical or fluid related), make sure that:</p> <ul style="list-style-type: none"> <li>• the fluid system is brought to atmospheric pressure.</li> <li>• the equipment is isolated from the electrical power source.</li> </ul>

