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# Instruction manual

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## FlowTune

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### ATTENTION

Please read this instruction manual carefully before installing and operating the instrument.  
Not following the guidelines could result in personal injury and/or damage to the equipment.



## Disclaimer

The information in this manual has been reviewed and is believed to be wholly reliable. No responsibility, however, is assumed for inaccuracies. The material in this manual is for information purposes only.

## Symbols



*Important information. Discarding this information could cause injuries to people or damage to the Instrument or installation.*



*Helpful information. This information will facilitate the use of this instrument.*



*Additional info available on the internet or from your local sales representative.*



*Making changes in FlowTune will affect the current settings of the instrument. Unless you are fully aware of the effect of the changes you are going to make, we recommend you do NOT use FlowTune.*

*Be aware that values can be entered outside of the specifications of the instrument. Make sure that the instrument will not be used outside the specified limits.*

*Special (but not only) attention should be given to:*

- *General compatibility of the instrument for the selected gas (e.g. degreased for O2 use)*
- *Sealing material*
- *Maximum pressure tested*
- *Leak integrity*
- *Valve orifice size.*

*Neglecting these considerations may cause serious damage or personal injury.*

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# 1 GENERAL PRODUCT INFORMATION

## 1.1 INTRODUCTION

This manual will explain the operation of the software tool FlowTune. It has been written based on FlowTune V2.01, but should be suited for former (and future) versions as well, although functionality may differ from what is described.

FlowTune is an offline instrument configuration software program for digital instruments of the EL-FLOW Prestige and MASS-FLOW Select series to select the fluidset, change the full scale flow (capacity), change the engineering units and to change or add a fluid (gas).

FlowTune is designed for EL-FLOW Prestige series instruments to be operated within its specified operation conditions and MASS-FLOW Select series instruments to be operated in an environment with pressure conditions of 10 bar (a) or less and temperatures between 0 °C and 70 °C. It is not advised to use the software to configure instruments which will be used in an environment exceeding these conditions.

## 1.2 REFERENCES TO OTHER APPLICABLE DOCUMENTS

Manuals and guides for digital instruments are modular. General instructions give information about the functioning and installation of instruments. Operational instructions explain the use of the digital instruments features and parameters. Fieldbus specific information explains the installation and use of the fieldbus installed on the instrument.

### 1.2.1 Manuals and user guides

CANopen interface	(document nr. 9.17.131)
DeviceNet interface	(document nr. 9.17.026)
EtherCAT interface	(document nr. 9.17.063)
FLOW-BUS interface	(document nr. 9.17.024)
Modbus (ASCII / RTU / TCP) interface	(document nr. 9.17.035)
Operation instructions digital instruments	(document nr. 9.17.023)
PROFIBUS DP interface	(document nr. 9.17.025)
PROFINET interface	(document nr. 9.17.095)
RS232 interface with FLOW-BUS protocol	(document nr. 9.17.027)
EtherNet/IP interface	(document nr. 9.17.132)
POWERLINK interface	(document nr. 9.17.142)

### 1.2.2 Technical drawings

Hook-up diagram laboratory style MBC RS232 + analog	(document nr. 9.16.062)
Hook-up diagram industrial style MBC-II RS232 + analog	(document nr. 9.16.051)
Hook-up diagram EL-FLOW Base Series Analog + RS232 + ...	(document nr. 9.16.091)
Hook-up diagram laboratory-style MBC3 RS232 + Analog	(document nr. 9.16.119)
Hook-up diagram CORI-FLOW RS232 + analog	(document nr. 9.16.044)
Hook-up diagram LIQUI-FLOW L30 digital RS232 + analog	(document nr. 9.16.073)



Manuals and Software tooling can be found at:  
<http://www.bronkhorst.com/en/downloads>

## 1.3 SUPPORTED INSTRUMENTS

EL-FLOW Prestige mass flow meters/controllers

Other digital mass flow meters/controllers (best from versions V8.00, minimum V7.32)

## 1.4 SYSTEM REQUIREMENTS

<b>Processor</b>	x86 or x64 700 MHz or higher
<b>Memory (RAM)</b>	64 MB
<b>Hard disk</b>	20 MB available disk space
<b>Display</b>	800 x 600 or higher resolution, 256 colors or more
<b>Connections</b>	RS232 port with FIFO buffers
<b>Operating system</b>	Windows 7, Windows 8.1 or Windows 10



*To avoid communication errors, it is advised to use a serial (RS232) port with hardware buffer overrun detection. Few USB-RS232 converters have this feature, but e.g. the Digitus part no. DA-70156 has.*

## 1.5 INSTALLATION AND START UP

Follow on-screen instructions when installing FlowTune.

FlowTune will be installed in **C:\Program Files (x86)\Bronkhorst\FlowTune**.

Start FlowTune through the Start menu: **Start >> (All) Programs >> Bronkhorst >> FlowTune**.

There is no need to start the FlowDDE server.



*C:\Program Files (x86) is a system folder and depends on the Windows version and language.*

## 2 INTERFACES

### 2.1 RS232 ON MULTIBUS INSTRUMENT

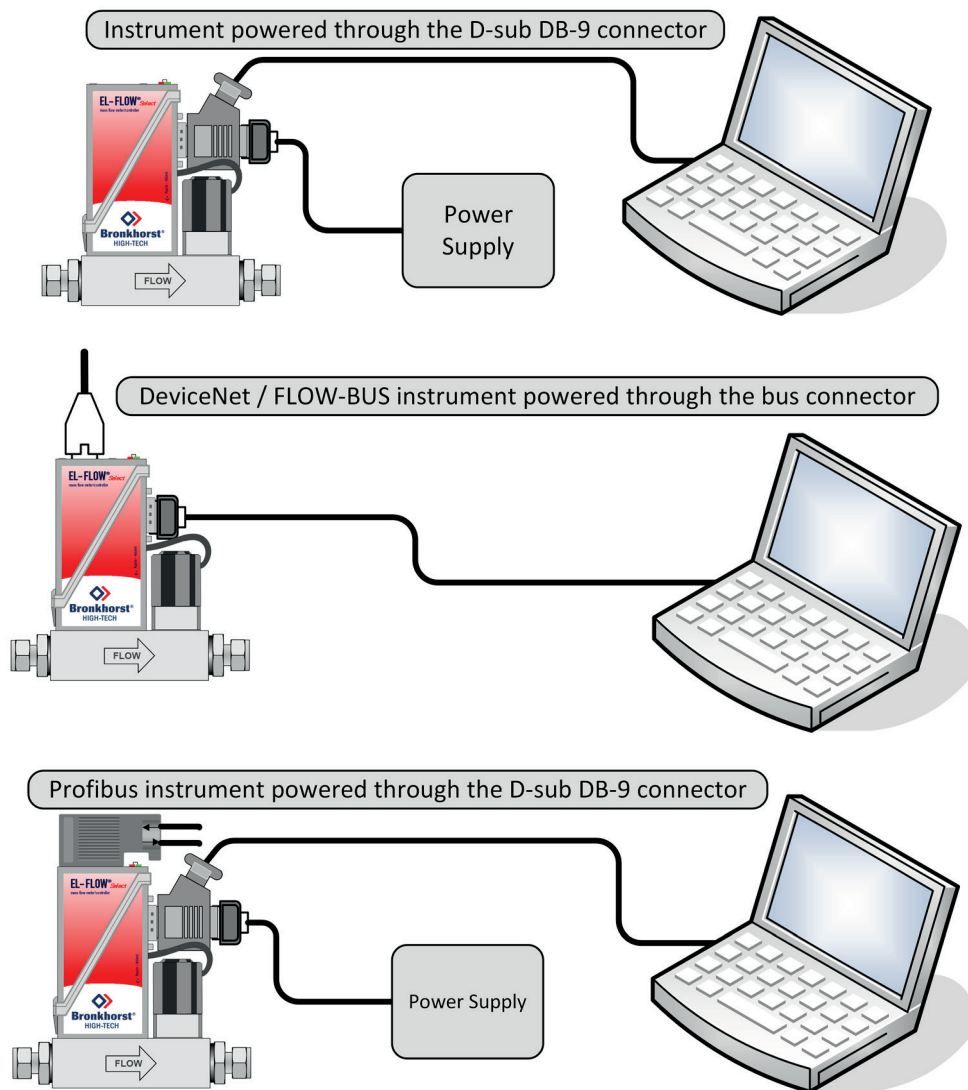
The RS232 interface on a multibus instrument can be connected to any RS232 V24 serial (computer) port. Make sure to respect the hook-up diagram. Bronkhorst® offers special cables for communication, separating the RS232 lines from the power and analog in- and output. On the 9-pin male D-sub connector of the instrument RX and TX are available on pin 6 and pin 1.

RS232 communication is possible by:

- 9-pin Sub D-connector (non-IP65 instruments, e.g. EL-FLOW)
- 8-pin DIN connector (IP65 instruments, e.g. CORI-FLOW)

For the exact connections please advise your hook-up diagram.

#### 2.1.1 Applications, e.g. EL-FLOW



*For proper cable installation please consult the applicable hook-up diagram mentioned in paragraph 1.2.2*



*By default, the interface offers communication at a baud rate of 38400 baud. On instruments that offer the possibility to change the RS232 baud rate, the baud rate may be configured differently.*

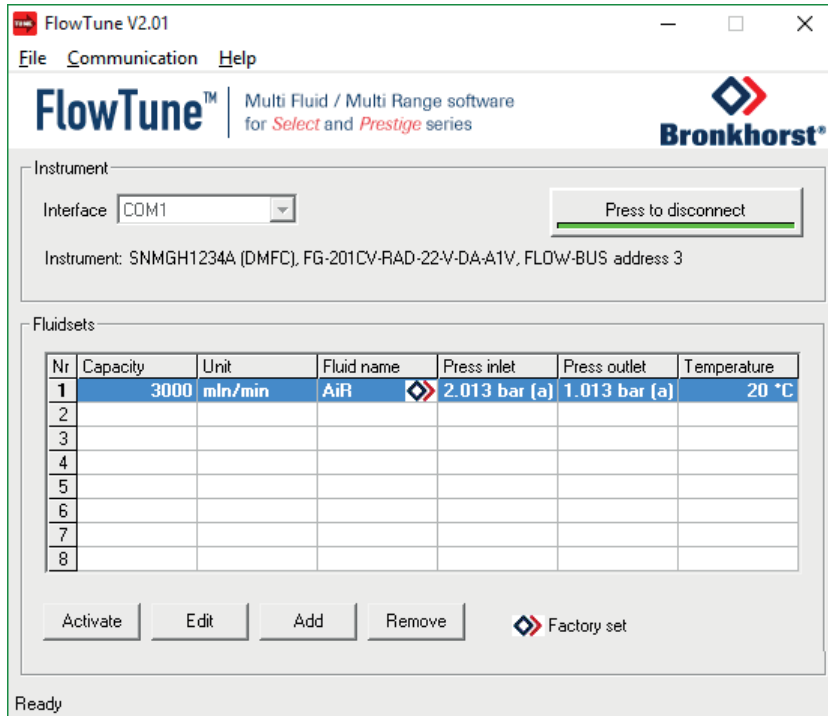
## 3 OPERATION

### 3.1 BASIC

For all digital mass flow meters/controllers several basic operations are possible.

#### 3.1.1 Open communication

After startup, the FlowTune main window is displayed.



The upper part of the window is used to set the connection to the instrument and view the connected instruments identification parameters.

Using the information of chapter 2 and/or the hook-up diagram, physically connect the instrument to the COM port of the PC. At **Interface**, the COM-port interface can be selected. After selecting an interface, press **Press to Connect** to open the communication to the instrument. While the connection is open, the green bar of the button is lit and the button shows **Press to disconnect**.

Upon connection, FlowTune will read several settings from the instrument and basic information from the fluidsets. Be aware that reading the data from the fluidsets implies that the active fluidset is changed temporarily. FlowTune will warn the user about the instrument changing its state. While FlowTune is connected, the instruments output signals may fluctuate and for controllers the valve will be set to its safe state. For normally open valves, the valve will fully open, whereas for normally closed valves, the valve will fully close. After the user has accepted, FlowTune will read the fluidset data. The reading actions may take some time; the current action is mentioned in the status bar. After reading is finished, the serial number, device type, model key, the fieldbus name and its address is displayed at **Instrument**.



*It is advised to use FlowTune only on instruments in a safe environment, i.e. not operating. FlowTune will force the instrument to its safe state when the connection is made. Be sure to close the communication properly to restore the instrument to its operating state.*

#### 3.1.2 Close communication

The communication can be closed by pressing **Press to disconnect** or via the menu option **Communication >> Close communication**. Prior to closing the communication, the instrument is restored to its normal operating state.

#### 3.1.3 Change the fieldbus address

The fieldbus address can be changed by **Communication >> Change fieldbus address**.

### 3.1.4 Activate a fluidset

In the lower part of the main window, the fluidsets field contains a table showing basic information about the available fluidsets in the instrument. It is filled after FlowTune has read the data from the instrument. Each line represents one fluidset. The table consists of six columns: capacity, unit, fluidname, pressure inlet, pressure outlet and temperature. The **Capacity** field shows the full scale flow in the unit shown in the **Unit** field. The fluidset is filled for the fluid in the **Fluidname** field at the **Pressure inlet**, **-outlet** and **Temperature** in their fields.

Whenever a fluidset is filled by Bronkhorst®, a Bronkhorst® logo is shown in the fluidname field. The logo can also contain a small certificate image; this means that the fluidset is an actual fluid calibration. The meaning of the logos is explained in the small legend below the fluidsets table.

Each instrument can contain up to eight different fluidsets, however, in the instrument only one fluidset is active at a time. The currently active fluidset is bolded in the table. To activate another fluidset, select the desired fluidset and click the **Activate** button.

## 3.2 MODIFY A FLUIDSET

For digital instrument in the MASS-FLOW Select series, fluidsets can be changed, added or removed. Before making any changes, please be fully aware of the effect of the changes you are going to make. Click the **Details** button in the information bar at the top for some attention points.

### 3.2.1 Edit or add a fluidset

Properties of a fluidset can be changed in the Edit fluidset window, which can be opened from the main window by selecting the fluidset to be changed followed by clicking **Edit**. To add a new fluidset to the instrument, click the **Add** button.

**Edit fluidset 1**

**FlowTune™** | Multi Fluid / Multi Range software for *Select* and *Prestige* series

**Bronkhorst®**

⚠ Please be fully aware of the effect of the changes you are going to make. [Details](#)

**Instrument**

Model: FG-201CV-RAD-22-V-DA-A1V

Original selected customer flow: 3000 mln/min AiR  
Pressure inlet: 2.013 bar (a), outlet: 1.013 bar (a), temperature: 20 °C

**Fluid settings**

Factory set fluidset

Unit type: Normal Volume Flow

Full scale capacity: 3000 Unit: mln/min Fluid: AiR

**Actual conditions**

Pressure inlet: 2.013 bar (a)  
Pressure outlet: 1.013 bar (a)  
Temperature: 20 °C [Calculate range](#)

**Controller settings**

Speed: 3.0 \*  
slower | nominal | faster

**Ranges**

Sensor

Valve

Full scale capacity: 2093 | 6279

Full scale capacity range: 2093 - 6279 mln/min AiR

[Edit mixture](#) [Advanced](#) [OK](#) [Cancel](#)

Ready

In this window, detailed information about the fluidset is shown. The **Unit type** determines the conditions used to express the capacity. For gas flow devices, four different unit types are available: Mass Flow, Normal Volume Flow, Standard Volume Flow and Custom Volume Flow, whereas for liquid instruments only Mass Flow and Volume Flow are



available. The unit type determines the unit list at **Unit**. The text field and slider at the right both represent the **Full scale capacity** of the fluidset in the instrument expressed in the selected unit, i.e. the capacity at which the instrument points 100% measure. The fluid structure formula is shown at **Fluid**.

To change the full scale capacity, edit the value in the text field or move the slider. The minimum and maximum allowed full scale capacity is indicated at the slider. The unit in which the capacities are expressed can be changed at **Unit**, after which the capacity in the previous unit is converted to the capacity in the new unit. For instrument operation, this action has no effect other than changing the real output value and unit.

In addition to the capacity and the unit, the fluid and fluid conditions can be changed for fluidsets which are not factory set. The fluid pull-down is enabled in this case. Also enabled are the **Actual conditions**, i.e. the operating **Pressure inlet**, **Pressure outlet** and **Temperature**. One or more of these conditions can be changed after which the full scale capacity range can be recalculated. The pressure conditions must be entered in bar (a). The allowed temperature range is 0 to 70 °C. Changes which are not yet calculated are highlighted in yellow and the **Calculate range** button is enabled. For EL-FLOW Prestige instrument, two more buttons are enabled as well. In the **Edit mixture** window a mixture consisting of up to five standard fluids can be composed. Fluids that are not present in the standard fluid list can be entered by means of the **Advanced** window, in which for such fluids, the physical fluid properties, like density and heat capacity, can be entered manually.

Once a new fluid is selected from the list or the **Calculate Range** button is pressed, FlowTune configures the instrument immediately for EL-FLOW Prestige series and the instrument calculates the fluid properties, converts the calibration curve, calculates the new capacity range and a new controller gain (Kp). For MASS-FLOW Select series instruments, the instrument is not yet configured and these calculations are performed by FlowTune based on properties from the instrument and the FlowTune databases. Conversion is based on fluid properties, sensor and restriction properties, valve properties and the original calibration curve. This ensures the conversion and the new ranges to be calculated correctly. The result of these calculations is visualized in the indicators in the right part of the window. One or two indicators (depending on the type of instrument) show a capacity range, the upper one for the sensor and the lower one for the valve (available for controllers only). A valid capacity range is indicated in blue, whereas an invalid capacity range is indicated in red. Both capacity ranges are calculated based on the properties of the instrument, the selected fluid and the actual conditions. The full scale capacity can be scaled in the area where the two ranges overlap. Dotted lines at the minimum and the maximum allowed full scale capacity point out the resulting full scale capacity range as shown in the slider.

For some applications, it may be needed to adjust the controller speed. This can be done by moving the **Speed** slider at the Controller settings section to faster or slower. The speed slider represents a multiplier for the controller gain. The value 1 is marked by nominal, at which the controller gain calculated by FlowTune is used. After the desired changes have been made, the changed or new fluid can be accepted and written to the instrument by clicking **OK**. Note that the calibration curve of that fluidset is overwritten in case a fluid conversion has been performed. On **Cancel** no changes are made to the instrument.



*Changes have no effect on the instrument settings until confirmed by the **OK** button. On **OK**, the new settings are written to the instrument and the window is closed. On **Cancel** no changes are made to the instrument.*

### 3.2.2 Remove a fluidset

Fluidsets added by FlowTune can also be removed from the instrument. The **Remove** button in the main window removes the selected fluidset from the instrument. The active fluidset or factory set fluidsets cannot be removed.

## 4 SERVICE

For current information on Bronkhorst® and service addresses please visit our website:

 <http://www.bronkhorst.com>

Do you have any questions about our products? Our Sales Department will gladly assist you selecting the right product for your application. Contact sales by e-mail:

 [sales@bronkhorst.com](mailto:sales@bronkhorst.com)

For after-sales questions, our Customer Service Department is available with help and guidance. To contact CSD by e-mail:

 [aftersales@bronkhorst.com](mailto:aftersales@bronkhorst.com)

No matter the time zone, our experts within the Support Group are available to answer your request immediately or ensure appropriate further action. Our experts can be reached at:

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