

# MASS VIEW

The intelligent alternative for VA meters: mass flow meters for gases with flow display

## > Introduction

Bronkhorst®, specialists in low flow measurement and control, have designed an innovative series of mass flow meters, regulators and controllers with integrated display. The MASS-VIEW® series provides modern, novel and economical alternative to variable area meters (VA meters), also known as rotameters or purgemeters. Unlike conventional VA meters these new flow meters measure mass flow instead of volume flow.

For easy VA meter replacement the MASS-VIEW®'s mechanical construction offers the most common options for process connection on the market.

## > MASS-VIEW® series thermal mass flow meters

Bronkhorst designed MASS-VIEW® series operate on the principle of direct thermal mass flow measurement (no by-pass). An advantage of using this type of sensor is that the instrument measures direct mass flow, without the need of temperature and pressure correction. Other benefits, compared to conventional VA meters are higher accuracy, wider rangeability (up to 1:100), free of parallax errors and an inherently safer construction, by eliminating glass components in the flow path. MASS-VIEW® flow meters can be supplied in full scale ranges from 0.05 up to 500 l<sub>n</sub>/min (Air equivalent), with a pressure rating of 10 bar(g) or 150 psi(g). A bright graphical OLED display, clearly visible at wide angles, allows reading of actual flow (value and a bar graph), total flow and type of gas.

The display features easy set up via a user-friendly menu, using a 4-way navigation push button. The pre-installed gases eliminate the need to recalibrate for different gases and therefore reduce the cost of ownership. Additional features & functions include a variety of alarm and counter functions, an analog output signal, digital interfaces and two relay contacts. Flow control may be achieved with an optional needle valve. These high quality needle valves offer smooth and fine adjustment of the gas flow rates. The latest innovation to the MASS-VIEW® product line is the addition of an integrated auto-compensating controller. The desired flow rate is set via the needle valve in the usual way, however, any upstream pressure variation is now automatically compensated to ensure a steady, constant flow.

## > MASS-VIEW® features

- ◆ Clear indication in:
  - actual flow rate (bar graph and value)
  - desired flow units
  - type of gas
  - totalized flow
- ◆ Bright, wide-angle OLED display
- ◆ Free of parallax errors
- ◆ Virtually independent of pressure and temperature variations
- ◆ Low pressure drop
- ◆ Wide flow ranges
- ◆ Fast response
- ◆ High accuracy
- ◆ Electronic output, analog (0 ... 5 Vdc) and digital interface

## > Digital features

- ◆ RS232 interface and Modbus ASCII/RTU communication
- ◆ Configurable password protection
- ◆ Alarm and counter functions
- ◆ Multi Gas / Multi Range
- ◆ Pre-installed gases
- ◆ Digitally calibrated
- ◆ Free Bronkhorst software tools



## > Technical specifications

### Performance

Accuracy	: $\pm 2\%$ RD for flow > 50% of max. capacity; $\pm (1\% \text{ RD} + 0.5\% \text{ FS})$ on lower flows
Repeatability	: < 0.2% FS typical < 0.6% FS typical for MV-108 / MV-308
Pre-installed gases	: Air, Ar, N <sub>2</sub> , O <sub>2</sub> , CO <sub>2</sub> , CH <sub>4</sub> , C <sub>3</sub> H <sub>8</sub> , N <sub>2</sub> O, CO and C <sub>4</sub> H <sub>10</sub> Air, N <sub>2</sub> , O <sub>2</sub> , CO (models MV-101, MV-301 and MV-401) (special models available for H <sub>2</sub> and Helium)
Controller	: Use a clean and dry gas, filter recommended
Standard calibration gas	: Air, other gases are converted using our Fluidat® conversion model which will introduce extra inaccuracy
Rangeability	: up to 1:100
Operating pressure	: 0 ... 10 bar(g) / 0 ... 150 psi(g)
Pressure coefficient	: $\pm 0.2\%$ RD/bar typical at Air
Operating temperature	: 0 ... 50°C (32 ... 122°F)
Temperature coefficient	: Zero: <0.1% FS/°C, Span: <0.2% RD/°C
Attitude sensitivity	: < 0.1% FS
Response time (t <sub>63%</sub> )	: 2 s

### Controller

min. $\Delta p$	: 1 bar(d) (for models MV-4x5 2 bar(d))
max. $\Delta p$	: 7 bar(d)
Control Accuracy	: Less than 0,5-1% RD/bar

### Mechanical specifications

Materials	: Meter: aluminium, Viton® (wetted parts) Needle valve: SS316, Viton®, PTFE; (for models MV-3x2 and MV-4xx: Fluorosint®, Brass, Buna N) Controller: membrane Fiber-reinforced nitrile
Gas connections (in/out)	: G 1/4" BSPP female thread G 1/2" BSPP female thread for MV-108 / MV-308 (compression fittings optional)
Weight	: meter/regulator: 0.7 kg controller: 1.4 kg MV-108 / MV-308: 0.8 kg

### Electrical specifications

Electrical connection	: 8-pin RJ-45 modular jack
Output	: analog: 0 ... 5 Vdc digital: RS232 / RS485 (Modbus ASCII/RTU)
Required supply voltage	: 15 ... 24 Vdc (+/-10%)
Power consumption	: approx. 135 mA
Min. and max. relay contacts	: switching current 0.5 A, 24 Vdc, one side grounded (0 Vdc power)

### Safety

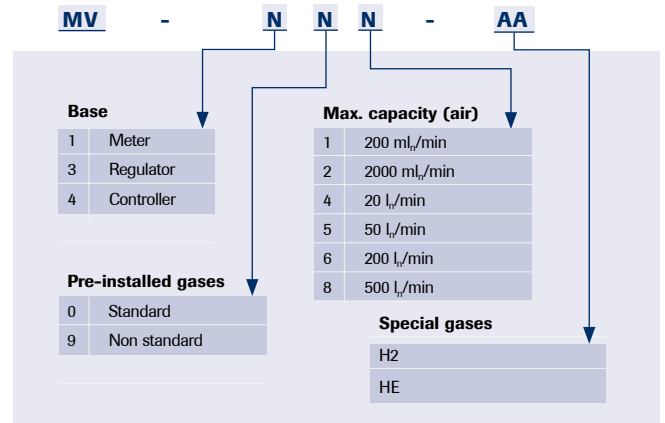
Test pressure	: 21 bar(a) / 300 psi(a)
Ingress protection	: IP-50
EMC	: EU declaration

### Warranty

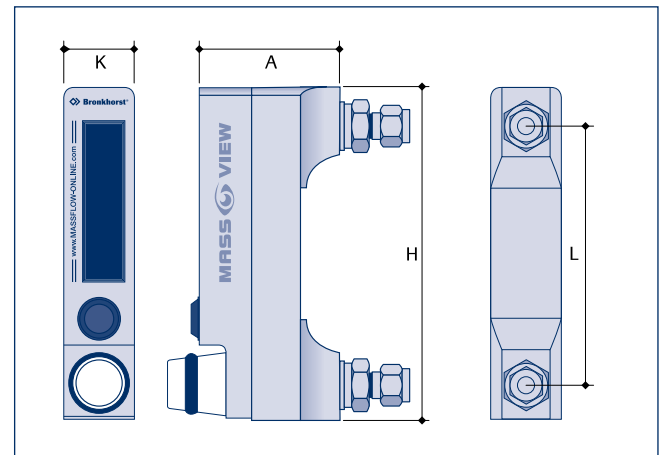
All instruments and accessories are warranted for a period of 3 years from order date.

Technical specifications are subject to change without notice.

## > Model number identification

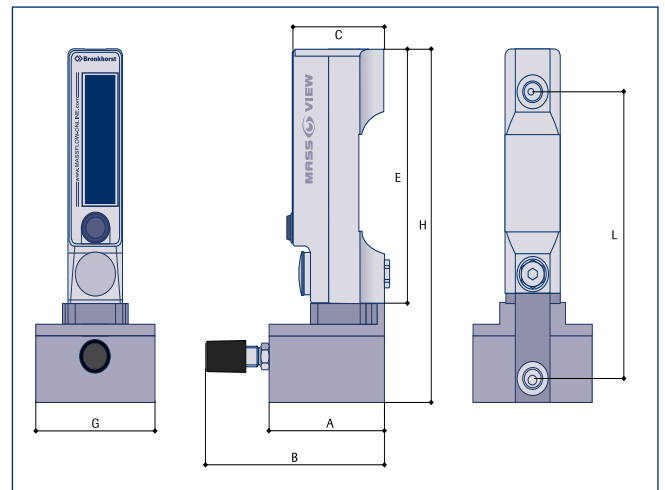


## > Dimensions



Model	A	H	K	L
MV-101/102/104/106/191/192/194/196	63	159	38	114
MV-108	75	159	38	114
MV-301/302/304/306/391/392/394/396	63	159	38	114
MV-308	75	159	38	114

Dimensions in mm.



Model	A	B	C	E	G	H	L
MV-401/402/404/405	79	123	63	159	81.5	221	179

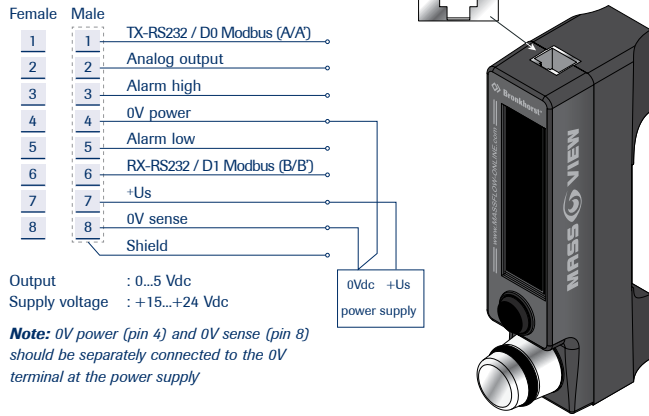
Dimensions in mm.

## > Optional adapter sets (inlet and outlet)

Metric sizes	Inch sizes
3 mm OD compression type	1/8" OD compression type
6 mm OD compression type	1/4" OD compression type
12 mm OD compression type	1/2" OD compression type

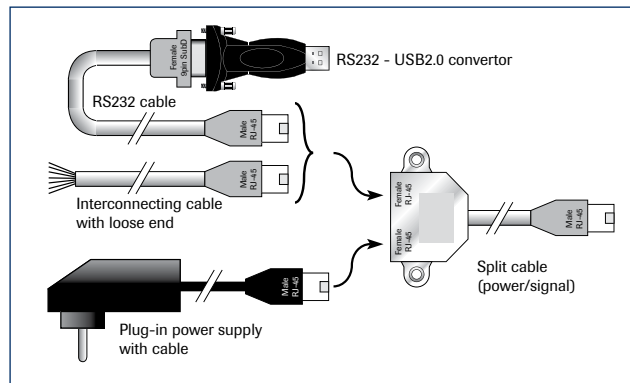
## > Electrical connection

### Hook-up diagram



## > Cabling options

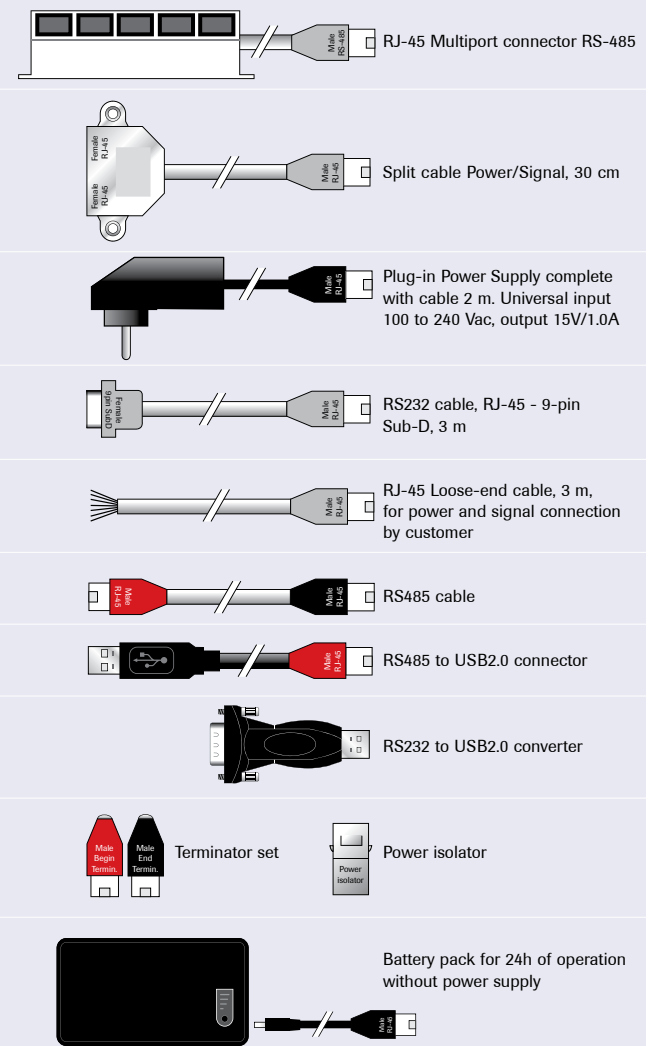
Combinations for separate connection of power and I/O signals.



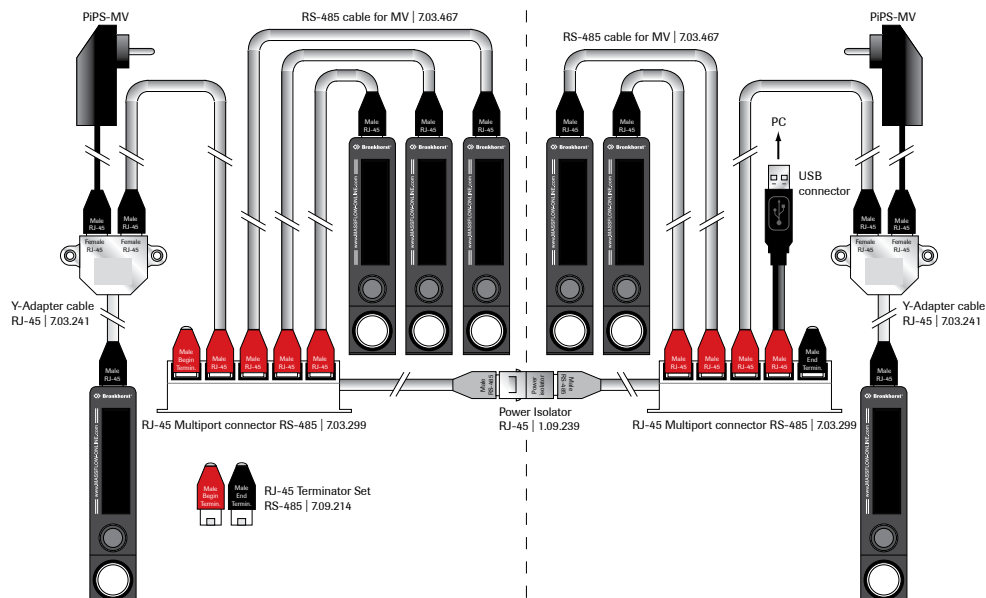
## > Accessories

Following accessories are offered as an option for the MASS-VIEW® instruments.

### Power supply and electrical connection



Example of 7 MASS-VIEW meters/regulators with RS485 - USB signal connection. Two separated power networks are required due to the maximum power supply of 15 Watt for one PiPS-MV.



## > Capacities

Selectable ranges in $l_p/\text{min}$ (SLM)	Air	N <sub>2</sub>	O <sub>2</sub>	CO	Ar	CO <sub>2</sub>	CH <sub>4</sub>	C <sub>3</sub> H <sub>8</sub>	N <sub>2</sub> O	C <sub>4</sub> H <sub>10</sub>
<b>MV-101, MV-301</b>										
Range 1 (max.)	0.01 ... 0.2	0.01 ... 0.2	0.01 ... 0.2	0.01 ... 0.2	-	-	-	-	-	-
Range 2	0.01 ... 0.1	0.01 ... 0.1	0.01 ... 0.1	0.01 ... 0.1	-	-	-	-	-	-
Range 3 (min.)	0.01 ... 0.05	0.01 ... 0.05	0.01 ... 0.05	0.01 ... 0.05	-	-	-	-	-	-
<b>MV-102, MV-302</b>										
Range 1 (max.)	0.02 ... 2	0.02 ... 2	0.02 ... 2	0.02 ... 2	0.04 ... 4	0.02 ... 2	0.01 ... 1	0.01 ... 1	0.02 ... 2	0.01 ... 1
Range 2	0.02 ... 1	0.02 ... 1	0.02 ... 1	0.02 ... 1	0.04 ... 2	0.02 ... 1	0.01 ... 0.5	0.01 ... 0.5	0.02 ... 1	0.01 ... 0.5
Range 3	0.02 ... 0.5	0.02 ... 0.5	0.02 ... 0.5	0.02 ... 0.5	0.04 ... 1	0.02 ... 0.5	0.01 ... 0.2	0.01 ... 0.2	0.02 ... 0.5	0.01 ... 0.2
Range 4 (min.)	0.02 ... 0.2	0.02 ... 0.2	0.02 ... 0.2	0.02 ... 0.2	0.04 ... 0.5	0.02 ... 0.2	0.01 ... 0.1	0.01 ... 0.1	0.02 ... 0.2	0.01 ... 0.1
<b>MV-104, MV-304</b>										
Range 1 (max.)	0.2 ... 20	0.2 ... 20	0.2 ... 20	0.2 ... 20	0.4 ... 40	0.2 ... 20	0.1 ... 10	0.1 ... 10	0.2 ... 20	0.1 ... 10
Range 2	0.1 ... 10	0.1 ... 10	0.1 ... 10	0.1 ... 10	0.2 ... 20	0.1 ... 10	0.01 ... 0.5	0.05 ... 5	0.1 ... 10	0.05 ... 5
Range 3	0.05 ... 5	0.05 ... 5	0.05 ... 5	0.05 ... 5	0.1 ... 10	0.05 ... 5	0.01 ... 0.2	0.02 ... 2	0.05 ... 5	0.02 ... 2
Range 4 (min.)	0.04 ... 2	0.04 ... 2	0.04 ... 2	0.04 ... 2	0.08 ... 5	0.04 ... 2	0.01 ... 0.1	0.02 ... 1	0.04 ... 2	0.02 ... 1
<b>MV-106, MV-306</b>										
Range 1 (max.)	2 ... 200	2 ... 200	2 ... 200	2 ... 200	4 ... 400	2 ... 200	1 ... 100	1 ... 100	2 ... 200	1 ... 100
Range 2	1 ... 100	1 ... 100	1 ... 100	1 ... 100	2 ... 200	1 ... 100	0.5 ... 50	0.5 ... 50	1 ... 100	0.5 ... 50
Range 3	0.5 ... 50	0.5 ... 50	0.5 ... 50	0.5 ... 50	1 ... 100	0.5 ... 50	0.2 ... 20	0.2 ... 20	0.5 ... 50	0.2 ... 20
Range 4 (min.)	0.4 ... 20	0.4 ... 20	0.4 ... 20	0.4 ... 20	0.8 ... 50	0.4 ... 20	0.2 ... 10	0.2 ... 10	0.4 ... 20	0.2 ... 10
<b>MV-108, MV-308</b>										
Range 1 (max.)	5 ... 500	5 ... 500	5 ... 500	5 ... 500	10 ... 1000	5 ... 500	2.5 ... 250	2.5 ... 250	5 ... 500	2.5 ... 250
Range 2	2 ... 200	2 ... 200	2 ... 200	2 ... 200	5 ... 500	2 ... 200	1.25 ... 125	1.25 ... 125	2 ... 200	1.25 ... 125
Range 3	1 ... 100	1 ... 100	1 ... 100	1 ... 100	2 ... 200	1 ... 100	0.625 ... 62.5	0.625 ... 62.5	1 ... 100	0.625 ... 62.5
Range 4 (min.)	1 ... 50	1 ... 50	1 ... 50	1 ... 50	2 ... 100	1 ... 50	0.5 ... 25	0.5 ... 25	1 ... 50	0.5 ... 25
<b>MV-401</b>										
Range 1 (max.)	0.02 ... 0.2	0.02 ... 0.2	0.02 ... 0.2	0.02 ... 0.2	-	-	-	-	-	-
Range 2	0.02 ... 0.1	0.02 ... 0.1	0.02 ... 0.1	0.02 ... 0.1	-	-	-	-	-	-
Range 3 (min.)	0.02 ... 0.05	0.02 ... 0.05	0.02 ... 0.05	0.02 ... 0.05	-	-	-	-	-	-
<b>MV-402</b>										
Range 1 (max.)	0.02 ... 2	0.02 ... 2	0.02 ... 2	0.02 ... 2	0.04 ... 4	0.02 ... 2	0.01 ... 1	0.01 ... 1	0.02 ... 2	0.01 ... 1
Range 2	0.02 ... 1	0.02 ... 1	0.02 ... 1	0.02 ... 1	0.04 ... 2	0.02 ... 1	0.01 ... 0.5	0.01 ... 0.5	0.02 ... 1	0.01 ... 0.5
Range 3	0.02 ... 0.5	0.02 ... 0.5	0.02 ... 0.5	0.02 ... 0.5	0.04 ... 1	0.02 ... 0.5	0.01 ... 0.2	0.01 ... 0.2	0.02 ... 0.5	0.01 ... 0.2
Range 4 (min.)	0.02 ... 0.2	0.02 ... 0.2	0.02 ... 0.2	0.02 ... 0.2	0.04 ... 0.5	0.02 ... 0.2	0.01 ... 0.1	0.01 ... 0.1	0.02 ... 0.2	0.01 ... 0.1
<b>MV-404</b>										
Range 1 (max.)	0.2 ... 20	0.2 ... 20	0.2 ... 20	0.2 ... 20	0.4 ... 20	0.2 ... 20	0.1 ... 10	0.1 ... 10	0.2 ... 20	0.1 ... 10
Range 2	0.1 ... 10	0.1 ... 10	0.1 ... 10	0.1 ... 10	0.2 ... 20	0.1 ... 10	0.01 ... 0.5	0.05 ... 5	0.1 ... 10	0.05 ... 5
Range 3	0.05 ... 5	0.05 ... 5	0.05 ... 5	0.05 ... 5	0.1 ... 10	0.05 ... 5	0.01 ... 0.2	0.02 ... 2	0.05 ... 5	0.02 ... 2
Range 4 (min.)	0.04 ... 2	0.04 ... 2	0.04 ... 2	0.04 ... 2	0.08 ... 5	0.04 ... 2	0.01 ... 0.1	0.02 ... 1	0.04 ... 2	0.02 ... 1
<b>MV-405</b>										
Range 1 (max.)	0.5 ... 50	0.5 ... 50	0.5 ... 50	0.5 ... 50	-	-	-	-	-	-
Range 2	0.2 ... 20	0.2 ... 20	0.2 ... 20	0.2 ... 20	-	-	-	-	-	-
Range 3	0.1 ... 10	0.1 ... 10	0.1 ... 10	0.1 ... 10	-	-	-	-	-	-
Range 4 (min.)	0.05 ... 5	0.05 ... 5	0.05 ... 5	0.05 ... 5	-	-	-	-	-	-

## > Capacities for H<sub>2</sub> and He

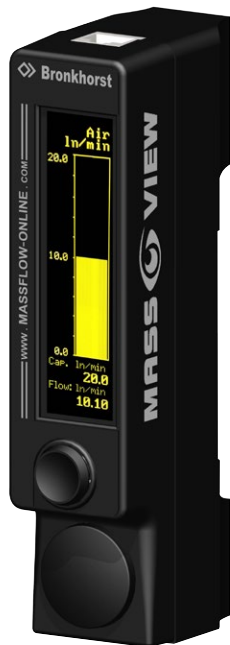
Selectable ranges in $l_p/\text{min}$ (SLM)	H <sub>2</sub>
<b>MV-191-H2, MV-391-H2</b>	
Range 1 (max.)	0.02 ... 0.2
Range 2	0.02 ... 0.1
Range 3	0.02 ... 0.05
<b>MV-192-H2, MV-392-H2</b>	
Range 1 (max.)	0.05 ... 1
Range 2	0.05 ... 0.5
Range 3	0.05 ... 0.2
Range 4 (min.)	0.05 ... 0.1
<b>MV-194-H2, MV-394-H2</b>	
Range 1 (max.)	0.1 ... 10
Range 2	0.1 ... 5
Range 3	0.1 ... 2
Range 4 (min.)	0.1 ... 1
<b>MV-196-H2, MV-396-H2</b>	
Range 1 (max.)	1 ... 100
Range 2	0.5 ... 50
Range 3	0.2 ... 20
Range 4 (min.)	0.2 ... 10

Selectable ranges in $l_p/\text{min}$ (SLM)	He
<b>MV-191-HE, MV-391-HE</b>	
Range 1 (max.)	0.02 ... 0.2
Range 2	0.02 ... 0.1
Range 3	0.02 ... 0.05
<b>MV-192-HE, MV-392-HE</b>	
Range 1 (max.)	0.05 ... 2
Range 2	0.05 ... 1
Range 3	0.05 ... 0.5
Range 4 (min.)	0.05 ... 0.2
<b>MV-194-HE, MV-394-HE</b>	
Range 1 (max.)	0.2 ... 20
Range 2	0.1 ... 10
Range 3	0.1 ... 5
Range 4 (min.)	0.1 ... 2
<b>MV-196-HE, MV-396-HE</b>	
Range 1 (max.)	1 ... 100
Range 2	0.5 ... 50
Range 3	0.2 ... 20
Range 4 (min.)	0.2 ... 10

## > Applications

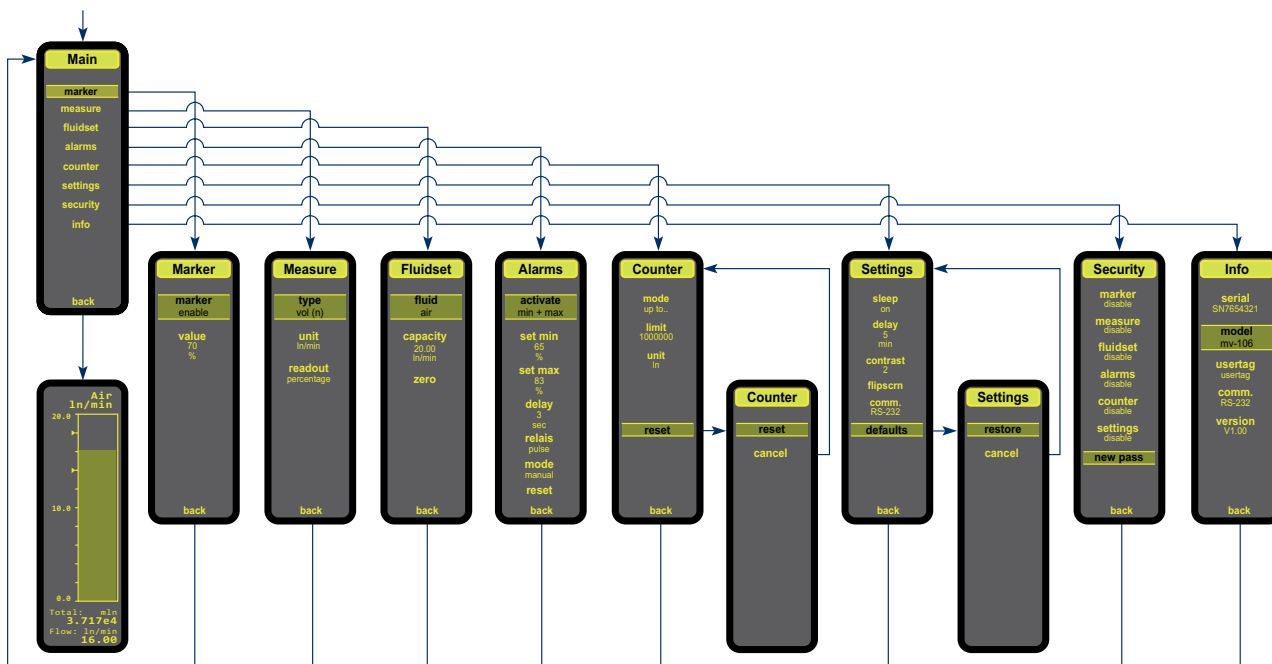
The fields of application for MASS-VIEW® are diverse:

- ◆ Burner control (furnace construction)
- ◆ Welding (welding gas monitoring)
- ◆ Leak measurements (quality, environment)
- ◆ Coating (equipment construction)
- ◆ Regulation of gaseous atmospheres (biotechnology)
- ◆ Measurement of gas consumption (hospitals)
- ◆ Test equipment (production maintenance)
- ◆ Local preparation of a gas mixture
- ◆ Flow rate monitoring (laboratories)
- ◆ Cutting (steel sheets)
- ◆ Cost centre billing
- ◆ Analytical equipment
- ◆ Aeration / sparging (food products, ice cream / edible oils)
- ◆ Blanketing (food)
- ◆ Fermentation (food, biotechnology, pharma)



## > Display menu

The 4-way navigation push button provides access to a user-friendly menu, e.g. for zero function, for selection of pre-installed gases in pre-installed capacities, setting of engineering units, alarm functions (minimum/maximum/counter limit) and counter functions. Password protection is provided to prevent unauthorized changes. Below overview of the MASS-VIEW® menu functions illustrates the great versatility of this product line.

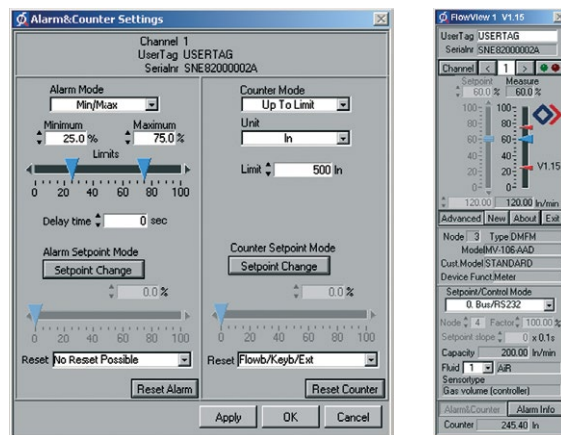


## > Bronkhorst® FlowWare, free software tools

Bronkhorst offers following software support for installation and operation by personal computer:

**FlowDDE** : Software tool to interface between digital instruments and MS Windows software.

**FlowPlot** : Software tool for monitoring and optimizing digital instruments parameters.



**FlowView** : Software tool to operate Bronkhorst digital instruments.



These software tools are freeware for users of our MASS-VIEW® series and other digital Bronkhorst instruments and can be downloaded from <http://www.massflow-online.com>

# Mass Flow ONLINE

## Flow Meters / Regulators / Controllers

### MASS VIEW

Thermal Mass Flow Meters, Regulators & Controllers for gases



- > Bright, wide-angle OLED display
- > Flow ranges: from 10 ... 200 ml<sub>n</sub>/min (sccm) up to 2 ... 500 l<sub>n</sub>/min (SLM) (air equivalent)
- > Output: RS232, Modbus/RS485 or analog
- > Multi Gas / Multi Range (10 pre-installed gases)

### MAG VIEW

Electromagnetic flowmeters for liquids



- > Insensitive to contaminated liquids
- > No mechanical wear
- > Fast response
- > Flow ranges from 0.1 ... 2 l/min up to 5 ... 250 l/min

### SONIC VIEW

Ultrasonic flow sensor for measuring water and aqueous solutions



- > No mechanical wear
- > Just one chemically resistant wetted part (stainless steel)
- > Flow ranges from 1,5 ... 30 l/h up to 5 ... 110 l/min

### FUEL VIEW

Fuel consumption and operating time meter with electronic counter



- > Built-in fuel filter
- > Suitable for Diesel, heating fuel, engine oil and other comparable liquids
- > Flow ranges from 1 ... 50 l/h up to 10 ... 500 l/h

### FLOW ADJUST

Standard and high resolution manual control valves for extremely precise control in low flow

#### Standard Resolution

- > Compact needle valve in aluminium housing
- > 7-turn standard resolution flow adjustment
- > Valve knob included for easy adjustment
- > Two M4 female threads for solid fixation
- > Suitable for gases and liquids
- > Leak-free valve



#### High Resolution (additional to SR)

- > Non-rotating stainless steel valve pin
- > Valve pin o-ring guarantees positive shut-off without stem damage
- > Self-lubricating orifice liner assures long life
- > smooth, non-reversing flow characteristics and 15-turn high resolution

### LIQUI VIEW Base

Vortex meter for monitoring low viscosity, water-like liquids



- > No moving parts
- > Smart and lightweight
- > Low pressure drop
- > Wide flow ranges
- > Fast response
- > Suitable for dirty water
- > Sustainable product design

Bronkhorst distributor



MASS-FLOW ONLINE BV  
www.massflow-online.com