

# MASS-FLOW *Select*

New Mass Flow Meters/Controllers featuring flexibility and cost reduction

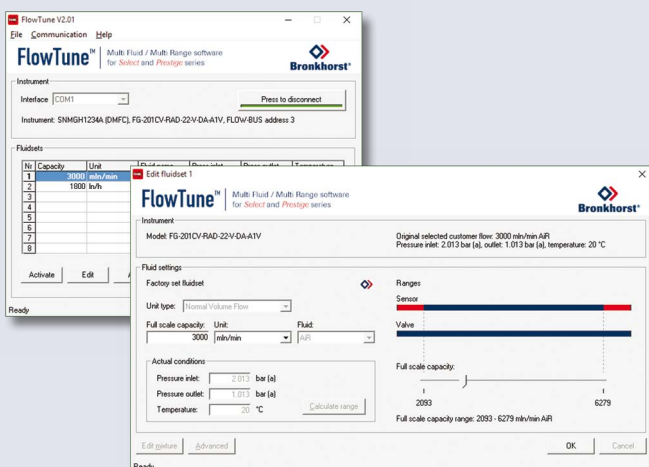


Bronkhorst High-Tech B.V. manufactures the largest variety of thermal Mass Flow Meters and Controllers for gases and liquids available on the market. In this leaflet Bronkhorst present their latest development, the "MASS-FLOW *Select*" Series of Digital Mass Flow Meters and Controllers for Gases. These new instruments offer greater flexibility for user selection of both flow ranges and gas types whilst maintaining their high accuracy with turndown ranges for measurement and control up to 187,5 to 1 !

As a result of the new feature, Original Equipment Manufacturers are able to drastically reduce the variety of spare instruments they keep on stock and thus reduce the cost of ownership. Users of MFC's in pilot plants or laboratories can rescale their instruments on site, saving time and money; substantial costs for mounting and dismantling and also for service and recalibration are no longer

applicable! For the convenience of the user, Bronkhorst High-Tech has developed an easy-to-use software tool called "FlowTune". By hooking up the instrument to the RS232 port of a lap-top and running this freeware configuration tool, the selection of different gas types and flow ranges is as simple as 1, 2, 3.

The instruments with the new "MASS-FLOW *Select*" features, covering flow ranges from 0...0,7 ml<sub>n</sub>/min up to 0...1670 l<sub>n</sub>/min, are available in two configurations. The EL-FLOW *Select* series have a housing designed for laboratory and clean processing conditions, the IN-FLOW *Select* series are of rugged design according to IP65 (dust- and waterproof). The latter are also ATEX Category 3, approved for use in Zone 2 hazardous areas. In addition to the standard analog I/O-signals and the RS232 connection, there is the possibility of integrating an interface board with DeviceNet™, PROFIBUS DP, Modbus, EtherCAT®, PROFINET or FLOW-BUS protocol.



## > Multi Gas / Multi Range features (MBC3 pc-board required)

- ◆ Measurement and control of gas flow ranges from 0-0,7 ml<sub>n</sub>/min up to 0-1670 l<sub>n</sub>/min covered with one product line
- ◆ Rangeability up to 187,5 : 1
- ◆ Flexible, user-programmable ranges and gas types
- ◆ Storage of max. 8 calibration curves
- ◆ Easy-to-use configuration software
- ◆ Multi Gas / Multi Range functionality up to 10 bar; pressure rating up to 100 bar
- ◆ High accuracy and repeatability

> **Model numbers and Air flow ranges**  
(valid for operating conditions from 0.8 to 10 bar abs and 0 to 70°C)

> **Minimum/Maximum flow ranges for other gases**  
(valid for operating conditions from 0.8 to 10 bar abs and 0 to 70°C)

EL-FLOW <i>Select</i> MFM Model #	EL-FLOW <i>Select</i> MFC Model #	IN-FLOW <i>Select</i> MFM Model #	IN-FLOW <i>Select</i> MFC Model #	Air flow ranges Minimum/Nominal/Maximum	Min/Max range	Ar	CH <sub>4</sub>	C <sub>2</sub> H <sub>6</sub>	CO	CO <sub>2</sub>	H <sub>2</sub>	He	N <sub>2</sub>	N <sub>2</sub> O	O <sub>2</sub>	ml <sub>r</sub> /min
F-110C - 002	F-200CV - 002 <sup>1)</sup>	F-110CI - 002		Min. 0.014 - 0.7 ml <sub>r</sub> /min Air Nom. 0.014 - 2 ml <sub>r</sub> /min Air Max. 0.014 - 5 ml <sub>r</sub> /min Air	Min Max	0.02 - 1 0.02 - 6	0.012 - 0.6 0.012 - 3.5	0.008 - 0.4 0.008 - 2	0.014 - 0.7 0.014 - 5	0.012 - 0.6 0.012 - 3	0.014 - 0.7 0.014 - 5	0.02 - 1 0.02 - 7	0.014 - 0.7 0.014 - 5	0.012 - 0.6 0.012 - 3	0.014 - 0.7 0.014 - 5	
F-110C - 005	F-200CV - 005 <sup>1)</sup>	F-110CI - 005		Min. 0.06 - 3 ml <sub>r</sub> /min Air Nom. 0.06 - 5 ml <sub>r</sub> /min Air Max. 0.06 - 9 ml <sub>r</sub> /min Air	Min Max	0.07 - 3.5 0.07 - 9.5	0.04 - 2 0.04 - 5.5	0.028 - 1.4 0.028 - 4	0.06 - 3 0.06 - 9	0.04 - 2 0.04 - 4.5	0.06 - 3 0.06 - 7.2	0.07 - 3.5 0.07 - 10	0.06 - 3 0.06 - 9	0.04 - 2 0.04 - 4.5	0.06 - 3 0.06 - 9	
F-111B - 020	F-201CV - 020	F-111BI - 020	F-201CI - 020	Min. 0.16 - 8 ml <sub>r</sub> /min Air Nom. 0.16 - 20 ml <sub>r</sub> /min Air Max. 0.16 - 30 ml <sub>r</sub> /min Air	Min Max	0.2 - 10 0.2 - 30	0.11 - 5.5 0.11 - 18	0.08 - 4 0.08 - 13	0.16 - 8 0.16 - 30	0.14 - 7 0.14 - 16	0.144 - 7.2 0.144 - 25	0.2 - 10 0.2 - 35	0.16 - 8 0.16 - 30	0.12 - 6 0.12 - 16	0.16 - 8 0.16 - 30	
F-111B - 050	F-201CV - 050	F-111BI - 050	F-201CI - 050	Min. 0.4 - 20 ml <sub>r</sub> /min Air Nom. 0.4 - 50 ml <sub>r</sub> /min Air Max. 0.4 - 75 ml <sub>r</sub> /min Air	Min Max	0.54 - 27 0.54 - 75	0.34 - 17 0.34 - 47	0.22 - 11 0.22 - 34	0.4 - 20 0.4 - 75	0.3 - 15 0.3 - 39	0.42 - 21 0.42 - 65	0.56 - 28 0.56 - 90	0.4 - 20 0.4 - 75	0.3 - 15 0.3 - 38	0.4 - 20 0.4 - 73	
F-111B - 100	F-201CV - 100	F-111BI - 100	F-201CI - 100	Min. 0.8 - 40 ml <sub>r</sub> /min Air Nom. 0.8 - 100 ml <sub>r</sub> /min Air Max. 0.8 - 150 ml <sub>r</sub> /min Air	Min Max	1.12 - 56 1.12 - 150	0.64 - 32 0.64 - 95	0.42 - 21 0.42 - 70	0.8 - 40 0.8 - 150	0.62 - 31 0.62 - 79	0.84 - 42 0.84 - 130	1.12 - 56 1.12 - 180	0.8 - 40 0.8 - 150	0.6 - 30 0.6 - 77	0.8 - 40 0.8 - 140	
F-111B - 200	F-201CV - 200	F-111BI - 200	F-201CI - 200	Min. 1.6 - 80 ml <sub>r</sub> /min Air Nom. 1.6 - 200 ml <sub>r</sub> /min Air Max. 1.6 - 300 ml <sub>r</sub> /min Air	Min Max	2.4 - 120 2.4 - 300	1.3 - 65 1.3 - 190	0.88 - 44 0.88 - 140	1.6 - 80 1.6 - 300	1.22 - 61 1.22 - 150	1.68 - 84 1.68 - 260	2.4 - 120 2.4 - 360	1.6 - 80 1.6 - 300	1.2 - 60 1.2 - 150	1.6 - 80 1.6 - 290	
F-111B - 500	F-201CV - 500	F-111BI - 500	F-201CI - 500	Min. 4 - 200 ml <sub>r</sub> /min Air Nom. 4 - 500 ml <sub>r</sub> /min Air Max. 4 - 750 ml <sub>r</sub> /min Air	Min Max	5.4 - 270 5.4 - 750	3.2 - 160 3.2 - 470	2.2 - 110 2.2 - 340	4 - 200 4 - 750	3 - 150 3 - 390	4.2 - 210 4.2 - 650	5.6 - 280 5.6 - 900	4 - 200 4 - 750	3 - 150 3 - 380	4 - 200 4 - 730	
F-111B - 1K0	F-201CV - 1K0	F-111BI - 1K0	F-201CI - 1K0	Min. 8 - 400 ml <sub>r</sub> /min Air Nom. 8 - 1000 ml <sub>r</sub> /min Air Max. 8 - 1500 ml <sub>r</sub> /min Air	Min Max	11.2 - 560 11.2 - 1500	6.4 - 320 6.4 - 950	4.2 - 210 4.2 - 680	8 - 400 8 - 1500	6.2 - 310 6.2 - 790	8.4 - 420 8.4 - 1300	11.2 - 560 11.2 - 1800	8 - 400 8 - 1500	6 - 300 6 - 770	8 - 400 8 - 1400	
F-111B - 2K0	F-201CV - 2K0	F-111BI - 2K0	F-201CI - 2K0	Min. 16 - 800 ml <sub>r</sub> /min Air Nom. 16 - 2000 ml <sub>r</sub> /min Air Max. 16 - 3000 ml <sub>r</sub> /min Air	Min Max	24 - 1200 24 - 3000	13 - 650 13 - 1900	8.8 - 440 8.8 - 1300	16 - 800 16 - 3000	12.2 - 610 12.2 - 1500	16.8 - 840 16.8 - 2600	24 - 1200 24 - 3600	16 - 800 16 - 3000	12 - 600 12 - 1500	16 - 800 16 - 2900	
F-111B - 5K0	F-201CV - 5K0	F-111BI - 5K0	F-201CI - 5K0	Min. 0.04 - 2 l <sub>r</sub> /min Air Nom. 0.04 - 5 l <sub>r</sub> /min Air Max. 0.04 - 7.5 l <sub>r</sub> /min Air	Min Max	0.054 - 2.7 0.054 - 7.5	0.032 - 1.6 0.032 - 4.7	0.022 - 1.1 0.022 - 3.3	0.04 - 2 0.04 - 7.5	0.03 - 1.5 0.03 - 3.9	0.042 - 2.1 0.042 - 6.5	0.056 - 2.8 0.056 - 9	0.04 - 2 0.04 - 7.5	0.03 - 1.5 0.03 - 3.8	0.04 - 2 0.04 - 7.3	
F-111B - 10K	F-201CV - 10K	F-111BI - 10K	F-201CI - 10K	Min. 0.08 - 4 l <sub>r</sub> /min Air Nom. 0.08 - 10 l <sub>r</sub> /min Air Max. 0.08 - 15 l <sub>r</sub> /min Air	Min Max	0.112 - 5.6 0.112 - 15	0.064 - 3.2 0.064 - 9.5	0.042 - 2.1 0.042 - 6.9	0.08 - 4 0.08 - 15	0.062 - 3.1 0.062 - 7.9	0.084 - 4.2 0.084 - 13	0.112 - 5.6 0.112 - 18	0.08 - 4 0.08 - 15	0.06 - 3 0.06 - 7.7	0.08 - 4 0.08 - 14	
F-111B - 20K	F-201CV - 20K	F-111BI - 20K	F-201CI - 20K	Min. 0.16 - 8 l <sub>r</sub> /min Air Nom. 0.16 - 20 l <sub>r</sub> /min Air Max. 0.16 - 25 l <sub>r</sub> /min Air	Min Max	0.2 - 10 0.2 - 25	0.13 - 6.5 0.13 - 16	0.088 - 4.4 0.088 - 11	0.16 - 8 0.16 - 25	0.122 - 6.1 0.122 - 14	0.168 - 8.4 0.168 - 25	0.24 - 12 0.24 - 30	0.16 - 8 0.16 - 25	0.12 - 6 0.12 - 14	0.16 - 8 0.16 - 25	
F-111AC - 50K	F-201AV - 50K	F-111AI - 50K	F-201AI - 50K	Min. 0.4 - 20 l <sub>r</sub> /min Air Nom. 0.4 - 50 l <sub>r</sub> /min Air Max. 0.4 - 75 l <sub>r</sub> /min Air	Min Max	0.54 - 27 0.54 - 75	0.32 - 16 0.32 - 47	0.22 - 11 0.22 - 34	0.4 - 20 0.4 - 75	0.3 - 15 0.3 - 39	0.42 - 21 0.42 - 65	0.56 - 28 0.56 - 90	0.4 - 20 0.4 - 75	0.3 - 15 0.3 - 38	0.4 - 20 0.4 - 73	
F-111AC - 70K	F-201AV - 70K	F-111AI - 70K	F-201AI - 70K	Min. 0.6 - 30 l <sub>r</sub> /min Air Nom. 0.6 - 70 l <sub>r</sub> /min Air Max. 0.6 - 100 l <sub>r</sub> /min Air	Min Max	0.9 - 45 0.9 - 100	0.5 - 25 0.5 - 60	0.4 - 20 0.4 - 45	0.6 - 30 0.6 - 100	0.5 - 25 0.5 - 50	0.6 - 30 0.6 - 90	0.9 - 45 0.9 - 125	0.6 - 30 0.6 - 100	0.5 - 25 0.5 - 50	0.6 - 30 0.6 - 90	
F-112AC - M10	F-202AV - M10 <sup>1)</sup>	F-112AI - M10	F-202AI - M10 <sup>1)</sup>	Min. 0.8 - 40 l <sub>r</sub> /min Air Nom. 0.8 - 100 l <sub>r</sub> /min Air Max. 0.8 - 150 l <sub>r</sub> /min Air	Min Max	1.12 - 56 1.12 - 150	0.64 - 32 0.64 - 95	0.42 - 21 0.42 - 68	0.8 - 40 0.8 - 150	0.62 - 31 0.62 - 79	0.84 - 42 0.84 - 130	1.12 - 56 1.12 - 180	0.8 - 40 0.8 - 150	0.6 - 30 0.6 - 77	0.8 - 40 0.8 - 140	
F-112AC - M20	F-202AV - M20 <sup>1)</sup>	F-112AI - M20	F-202AI - M20 <sup>1)</sup>	Min. 1.4 - 70 l <sub>r</sub> /min Air Nom. 1.4 - 200 l <sub>r</sub> /min Air Max. 1.4 - 250 l <sub>r</sub> /min Air	Min Max	2 - 100 2 - 250	1.1 - 55 1.1 - 170	0.7 - 35 0.7 - 120	1.4 - 70 1.4 - 250	1 - 50 1 - 130	1.4 - 70 1.4 - 200	2 - 100 2 - 300	1.4 - 70 1.4 - 250	1 - 50 1 - 130	1.4 - 70 1.4 - 250	
F-113AC - M50	F-203AV - M50 <sup>1)</sup>	F-113AI - M50	F-203AI - M50 <sup>1)</sup>	Min. 4 - 200 l <sub>r</sub> /min Air Nom. 4 - 500 l <sub>r</sub> /min Air Max. 4 - 750 l <sub>r</sub> /min Air	Min Max	5.4 - 270 5.4 - 750	3.2 - 160 3.2 - 470	2.2 - 110 2.2 - 340	4 - 200 4 - 750	3 - 150 3 - 390	4.2 - 210 4.2 - 650	5.6 - 280 5.6 - 900	4 - 200 4 - 750	3 - 150 3 - 380	4 - 200 4 - 730	
F-113AC - 1M0	F-203AV - 1M0 <sup>1)</sup>	F-113AI - 1M0	F-203AI - 1M0 <sup>1)</sup>	Min. 8 - 400 l <sub>r</sub> /min Air Nom. 8 - 1000 l <sub>r</sub> /min Air Max. 8 - 1670 l <sub>r</sub> /min Air	Min Max	11.2 - 560 11.2 - 1670	6.4 - 320 6.4 - 900	4.2 - 210 4.2 - 750	8 - 400 8 - 1500	6.2 - 310 6.2 - 850	8.4 - 420 8.4 - 1350	11.2 - 560 11.2 - 1850	8 - 400 8 - 1670	6 - 300 6 - 840	8 - 400 8 - 1500	

<sup>1)</sup> Multi Gas / Multi Range option not available for these models



> **Notes**

- ◆ Multi Gas / Multi Range is optional on the *Select* series and must be requested at the point of ordering
- ◆ Extended rangeability for digital communication only; turndown 50:1 when using analog I/O options
- ◆ The selected orifice of the control valve may limit the rangeability
- ◆ Standard accuracy (based on actual calibration): ±(0,5% RD + 0,1% FS);  
ranges from 0-5 to 0-10 ml<sub>r</sub>/min: ±1% FS; ranges ≤ 0-5 ml<sub>r</sub>/min: ±2% FS
- ◆ Maximum range for gases not mentioned in this list; rule of thumb: nominal range for Air x Conversion Factor;  
e.g. F-111B - 1K0: maximum range for SF<sub>6</sub> = 1000 x 0.27 = 270 ml<sub>r</sub>/min
- ◆ Minimum range for gases not mentioned in this list; rule of thumb: minimum range for Air x Conversion Factor;  
e.g. F-111B - 1K0: minimum range for SF<sub>6</sub> = 400 x 0.27 = 108 ml<sub>r</sub>/min
- ◆ The Conversion Factors for these calculations can be extracted from Fluidat on the Net ([www.fluidat.com](http://www.fluidat.com)): Go to 'Flow calculations' and select 'Gas Conversion factor'. Select 'Fluid from' and make sure 'Fluid to' is Air. Select the applicable instrument model from the pulldown menu. Then press 'Calculate' and look up the conversion factor from the table.

New digital pc-board with optional add-on interface board to PROFIBUS, DeviceNet™, Modbus, EtherCAT®, PROFINET or FLOW-BUS featuring rotary switches for selecting the node address

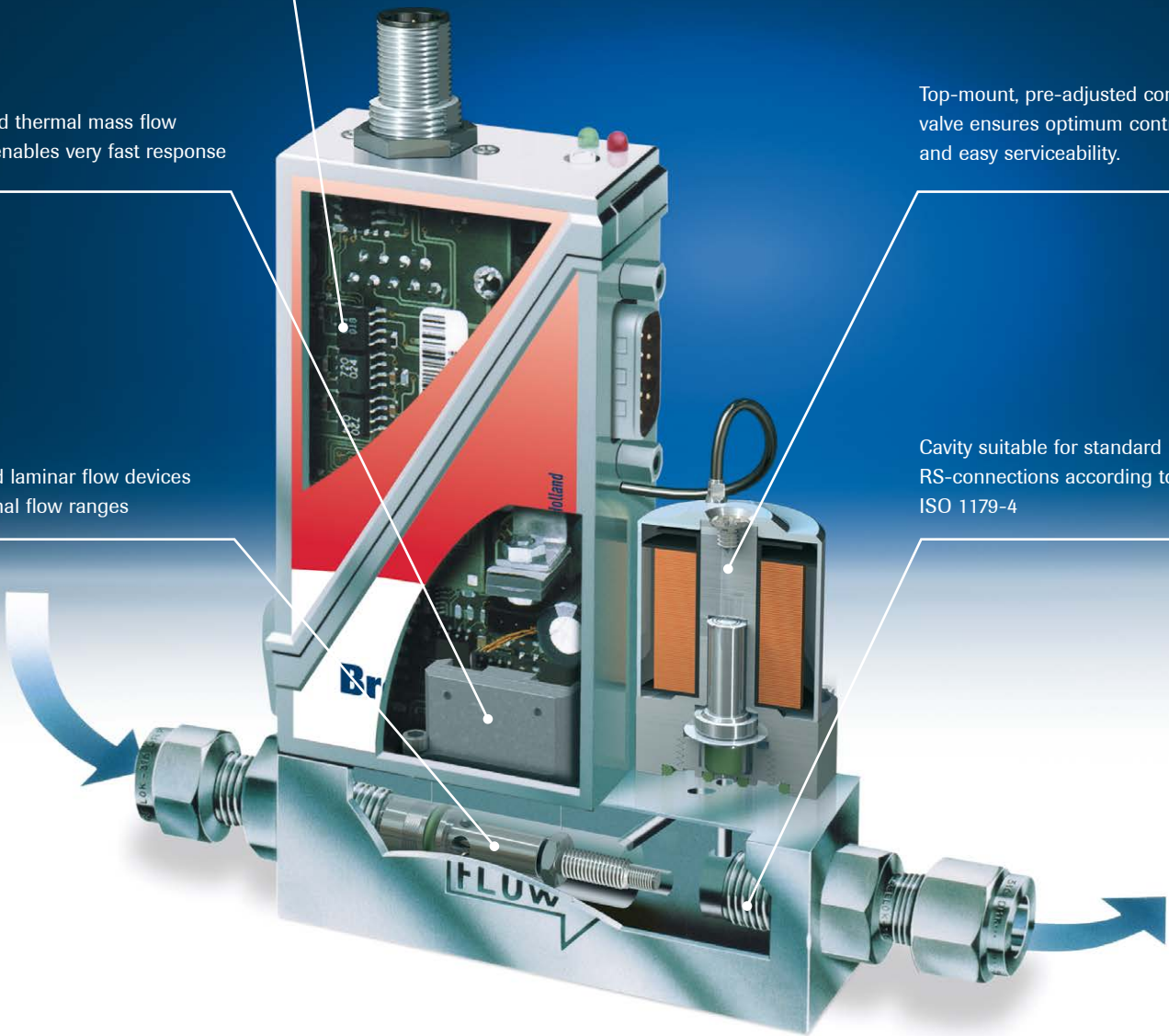
# The advanced technology of MASS-FLOW *Select*

Improved thermal mass flow sensor enables very fast response

Patented laminar flow devices in nominal flow ranges

Top-mount, pre-adjusted control valve ensures optimum control and easy serviceability.

Cavity suitable for standard RS-connections according to ISO 1179-4



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HIGH-TECH

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