Process Solutions
Automation & Control
Powering Productivity ISO 9001:2015 Certified

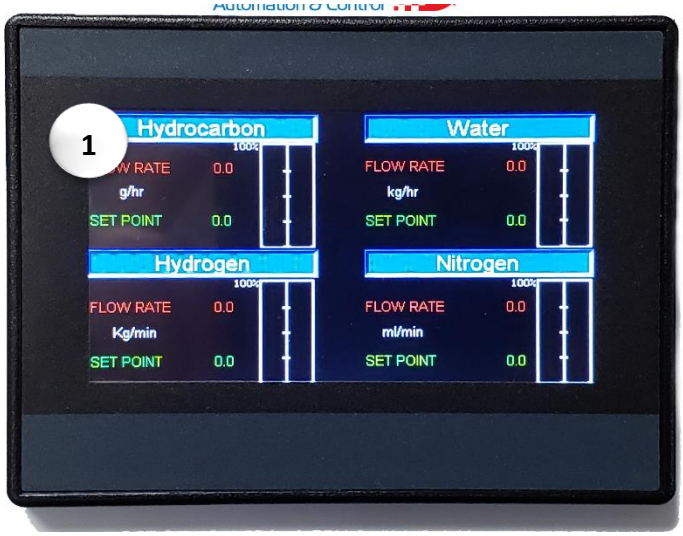
PSC6194 Controller
Readout & Control System

Quick Start Guide

Product Overview

To control the liquid and gas supply flows, Process Solutions Corp. offers a custom engineered solution consisting of a 4.3” color touchscreen PLC readout and control system. The touchscreen enables the user to easily view or change functions. The PSC6194 controller serves as a power supply unit, for up to two meters and two controllers, and comes equipped with Analog IOs and Modbus interface. The controller also provides data logging of instrument data.

Display



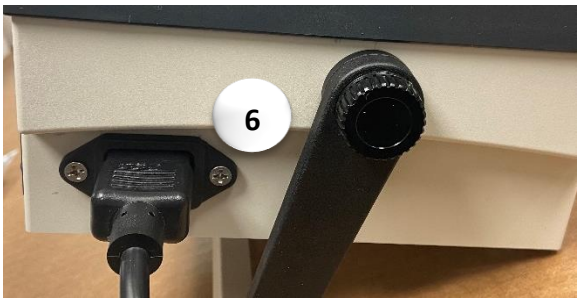
The controller consists of the following:

1. 4.3” color touchscreen PLC
2. Flow Controller – *Remote control analog IO connection (Ch. 1 & 2)*
3. Flow Meter – *Remote control analog IO connection (Ch. 3 & 4)*
4. RS-485/Power (+) – *communicates and powers meters/controllers via Modbus*

Connections

5. Ethernet Lan1
   a. *Program PLC*
   b. *Additional communication port*
6. Power Port –
   a. *120 Vac wall plug connection*
   b. *Plug must be disconnected to Power Off*

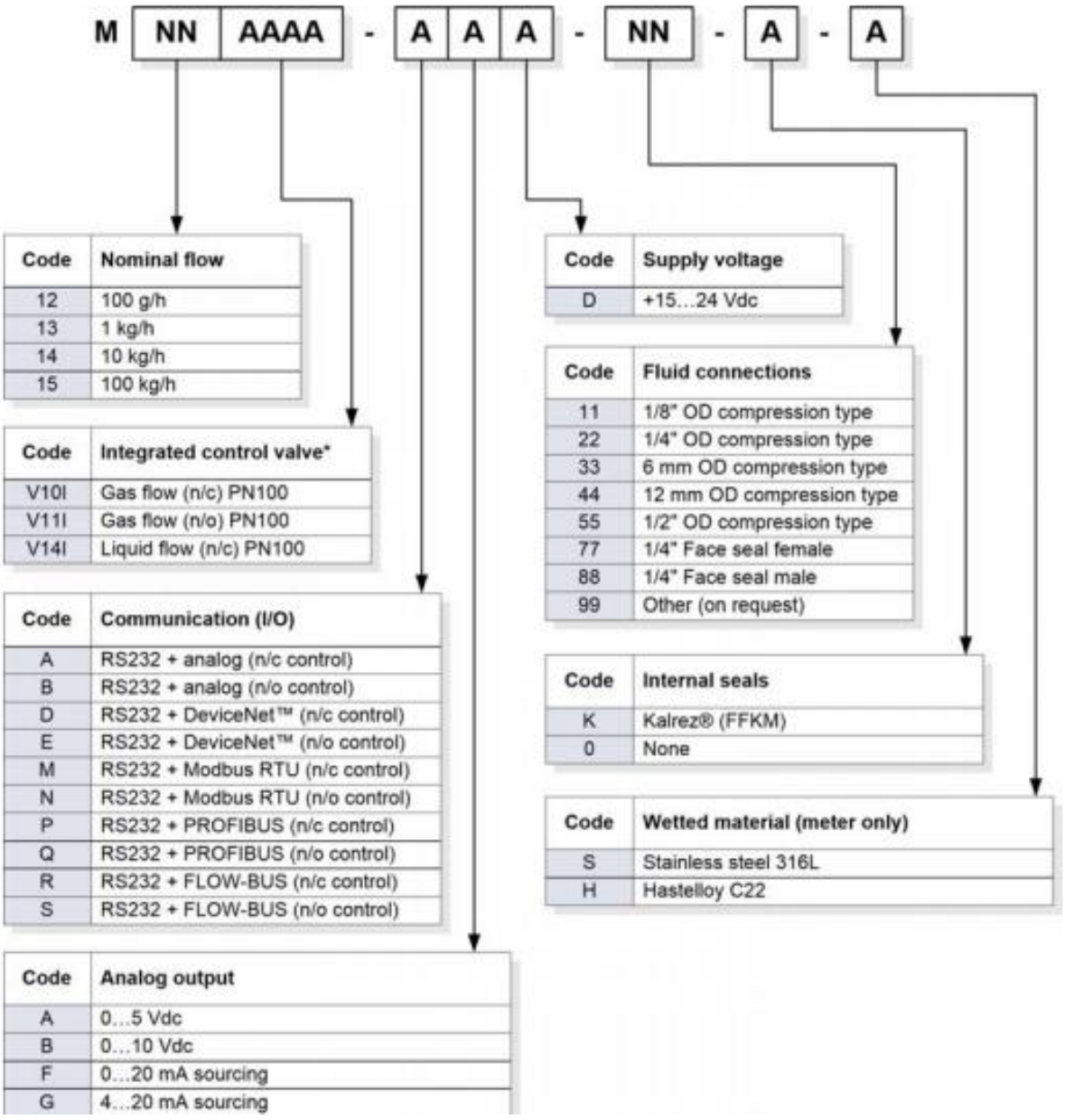
Powering Up



Model Key

The model key on the product label contains information about the technical properties of the instrument as ordered. The specific properties can be retrieved with the diagram below (Mini-Cori controller example).

Refer to the Communication (I/O) to determine if the Bronkhorst instrument is equipped with Modbus communication.



Code	Nominal flow
12	100 g/h
13	1 kg/h
14	10 kg/h
15	100 kg/h

Code	Integrated control valve*
V10I	Gas flow (n/c) PN100
V11I	Gas flow (n/o) PN100
V14I	Liquid flow (n/c) PN100

Code	Communication (I/O)
A	RS232 + analog (n/c control)
B	RS232 + analog (n/o control)
D	RS232 + DeviceNet™ (n/c control)
E	RS232 + DeviceNet™ (n/o control)
M	RS232 + Modbus RTU (n/c control)
N	RS232 + Modbus RTU (n/o control)
P	RS232 + PROFIBUS (n/c control)
Q	RS232 + PROFIBUS (n/o control)
R	RS232 + FLOW-BUS (n/c control)
S	RS232 + FLOW-BUS (n/o control)

Code	Analog output
A	0…5 Vdc
B	0…10 Vdc
F	0…20 mA sourcing
G	4…20 mA sourcing

Code	Supply voltage
D	+15…24 Vdc

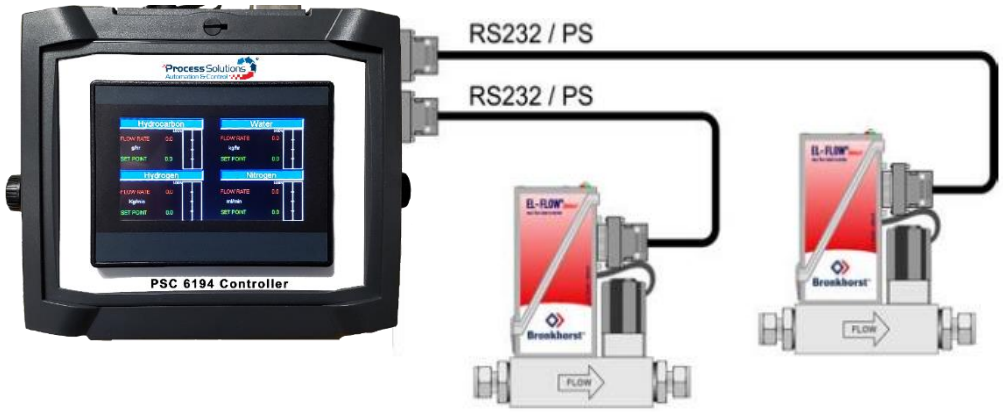
Code	Fluid connections
11	1/8" OD compression type
22	1/4" OD compression type
33	6 mm OD compression type
44	12 mm OD compression type
55	1/2" OD compression type
77	1/4" Face seal female
88	1/4" Face seal male
99	Other (on request)

Code	Internal seals
K	Kalrez® (FFKM)
0	None

Code	Wetted material (meter only)
S	Stainless steel 316L
H	Hastelloy C22

Analog Setup

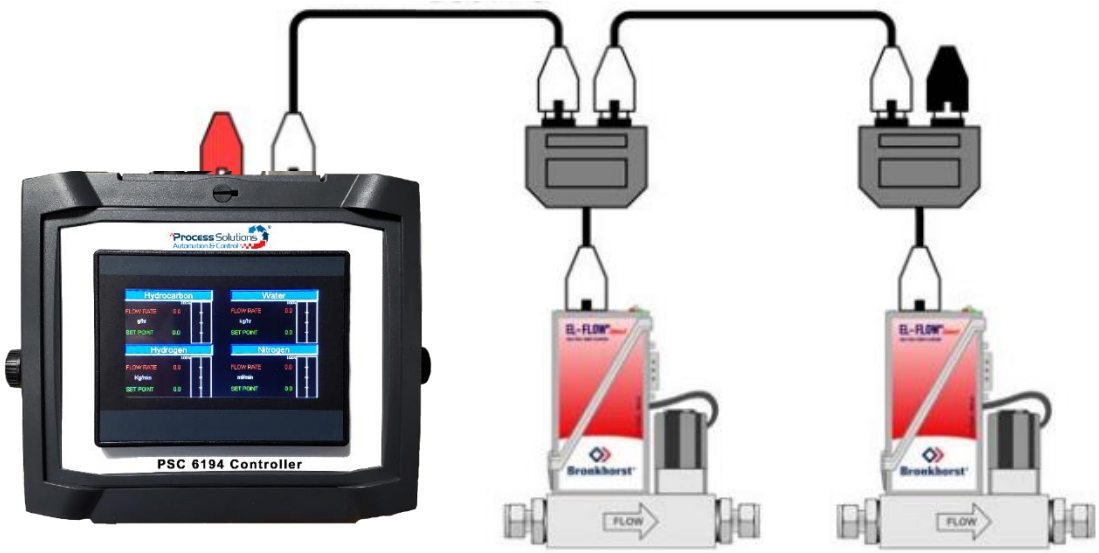
Connecting Bronkhorst flow instruments to PSC controller via RS232, Channel 1 – 4.
Bronkhorst instruments must be configured in Analog Mode to communicate via RS232.



Modbus Setup

Connecting Bronkhorst flow instruments to PSC controller via RS485/Power.
Bronkhorst instruments must be configured in Modbus Mode to communicate.

Communication settings are:	
Baud rate: 38400	MFC#1: Address 1
Parity: Even	MFC#2: Address 2
Data Bit: 8	MFM#1: Address 3
Stop Bit: 1	MFM#2: Address 4



Configure Control Mode

To change Bronkhorst instrument from Analog to Modbus, or vice versa, the control mode must be configured via FlowDDE(https://www.bronkhorst.com/en-us/products-en/accessories-and-software/flowware/flowdde/).

Connecting to FlowDDE

In the messages section the general procedure to start serving client applications with the FlowDDE server is described in four steps:

1. Connect an instrument to a COM port of the PC
2. Set the communication settings
3. Start the communication
    a. Press F3 or
    b. Communication tab > Open Communication
4. Wait until FlowDDE is ready
    a. Message: “Server is active and ready for any client”

If further instruction is needed, please refer to the FlowDDE Manual found in the link above.

Analog to Modbus Configuration

After opening communication, use the following steps to change the Control Mode from Analog operation to Modbus operation:

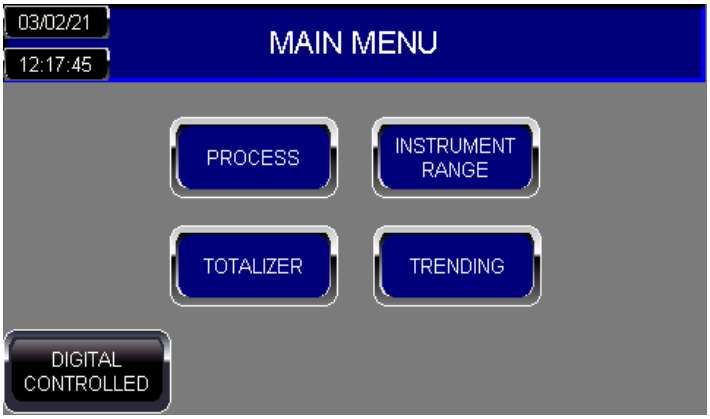
1. FLOW-BUS tab > Test Flow-BUS and DDE
    a. Or Press F6
2. Select the following parameters to view simultaneously
    a. Parameter 7 – *InitReset*
    b. Parameter 12 – *IO Status*
3. Set parameter *InitReset* to 64 (unlocked)
4. Read parameter *IO Status*
5. Subtract 64 from the read value
    a. New Parameter Value: 15 or 11
6. Write the new value to parameter *IO Status*
7. Set parameter *InitReset* to 82 (locked)
8. Restart Bronkhorst instrument
    a. InitReset must be unlocked/locked for the new Control Mode to remain after the instrument is restarted

Modbus to Analog Configuration

After opening communication, use the following steps to change the Control Mode from Modbus operation to Analog operation:

1. FLOW-BUS tab > Test Flow-BUS and DDE
    a. Or Press F6
2. Select the following parameters to view simultaneously
    a. Parameter 7 – *InitReset*
    b. Parameter 12 – *IO Status*
3. Set parameter *InitReset* to 64 (unlocked)
4. Read parameter *IO Status*
5. Add 64 from the read value
    a. New Parameter Value: 79
6. Write the new value to parameter *IO Status*
7. Set parameter *InitReset* to 82 (locked)
8. Restart Bronkhorst instrument
    a. InitReset must be unlocked/locked for the new Control Mode to remain after the instrument is restarted

Basic Operation



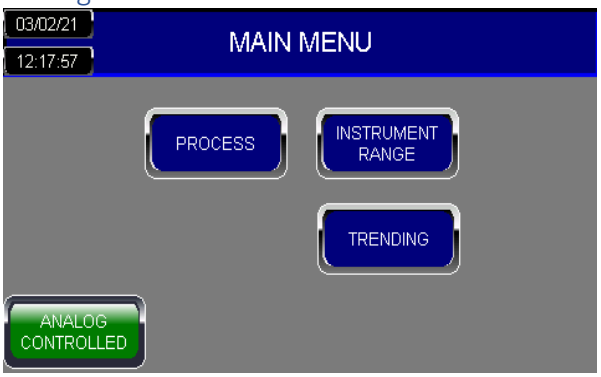
Main Menu

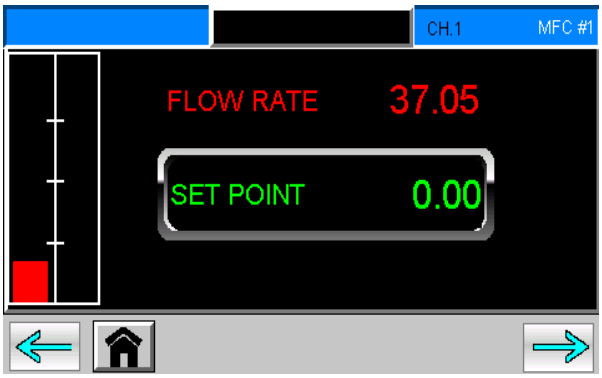
The display consists of the following readout areas:

1. Process – *readouts and set points Bronkhorst meter/controllers*
2. Instrument Range – *set full range according to instrument*
3. Trending – *Flow vs. Time plots for each instrument*
4. Communication Mode – *Analog Controlled or Digital Controlled*
5. Date and Time Settings
6. Totalizer* - *Only available via Modbus (Digital Controlled) and Coriolis Instrument*

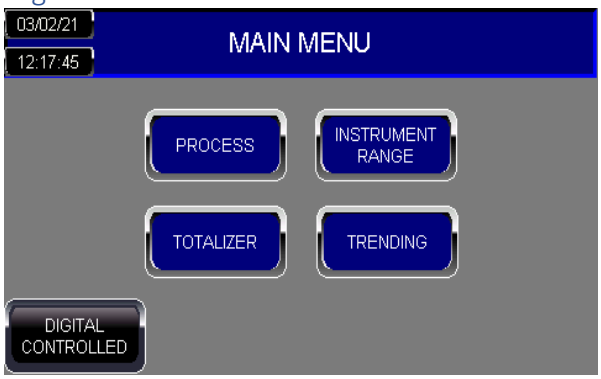
User Interface

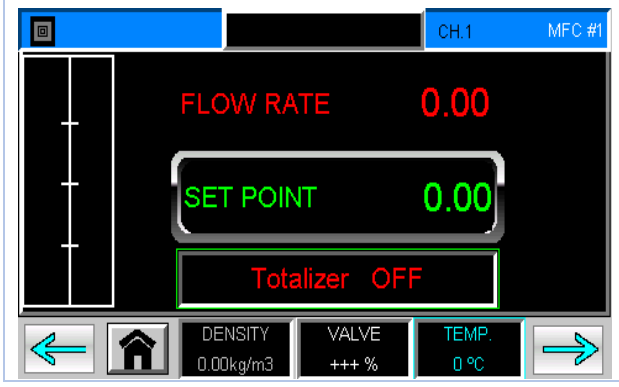
Analog Controlled





Digital Controlled





Communication Mode

The PSC6194 controller is equipped with two forms of communication:

Analog Controlled – Analog IOs, 4 – 20 mA signal
Digital Controlled – Modbus communication

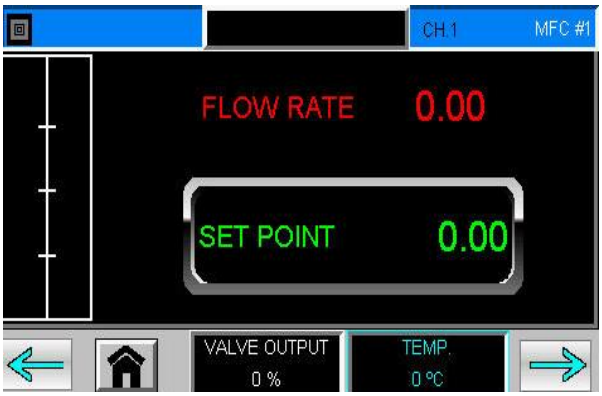
Communication settings are:	
Baud rate: 38400	MFC#1: Address 1
Parity: Even	MFC#2: Address 2
Data Bit: 8	MFM#1: Address 3
Stop Bit: 1	MFM#2: Address 4

Modbus features:

- Density Values
- Temperature Values
- Totalizer

Both Communication Modes support up to four instruments, 2 Mass Flow Controllers and 2 Mass Flow Meters.

Process Screen



Process Screens

The Process Screens will display the flow rates, set points and other process conditions for the Bronkhorst instruments.

The Process screens consist of:

Arrows: To navigate between Process screens

Status: Green – Communicating,
Grey – Not Communicating,
Blinking – Error

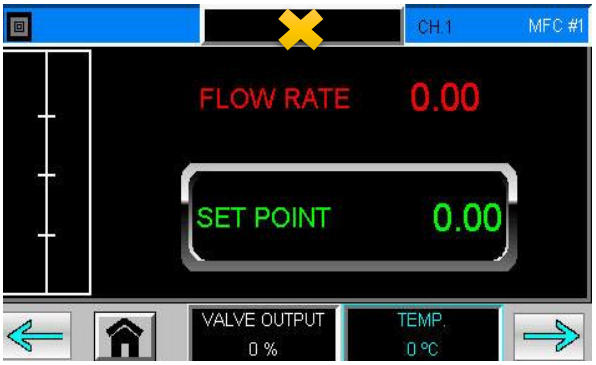
Instrument Label: (Blue Label) Displays channel and instrument number on the top right corner.

Units: (Black Label) To configure the instrument's units (i.e. g/hr)

Home: To return to Main Screen

**Density, Temperature and Totalizer values are only available via Modbus*

Process Screen



Keyboard

Labeling Units

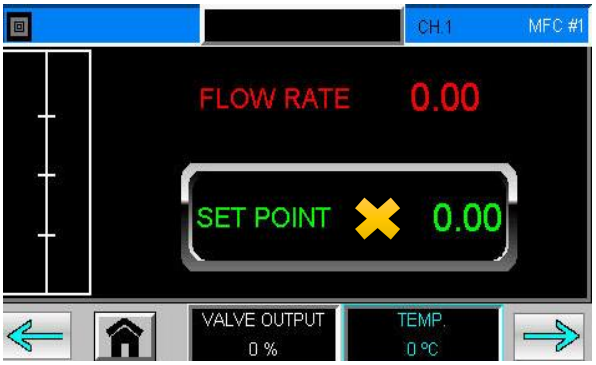
To edit the Instruments' Units, press the black label, as shown by the **X** on the image, for the keyboard to appear.
(i.e. g/hr, kg/hr, etc.)

Use the touchscreen to name the instrument and press ENTER.

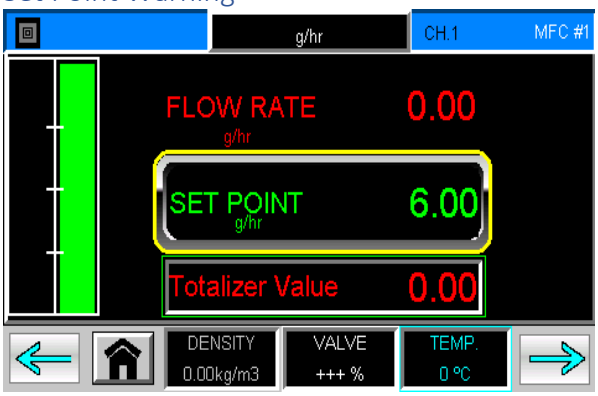
ENTER – Save value and return to previous screen.

ESC – Return to previous screen without saving.

Process Screen



Set Point Warning



Edit Set Points

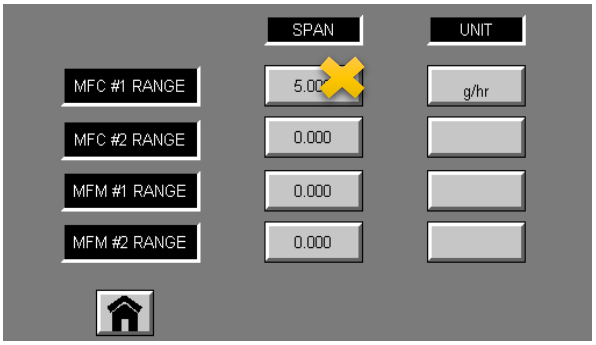
To edit the set point of the instruments, press the boxed number, as shown by the **X** on the image, for the numerical pad to appear.
Set the value and press ENTER.

No Border – Valid Set Point
Yellow Border – the Set Point is set <u>above</u> the Instrument Range.
Red Border – the Set Point is <u>locked</u> due to the Totalizer. Please see Totalizer settings for details.

ENTER – Save value and return to previous screen.
ESC – Return to previous screen without saving.

The value must be within the Instrument's range, or the Status light will start blinking with an error.

Instrument Range Screen

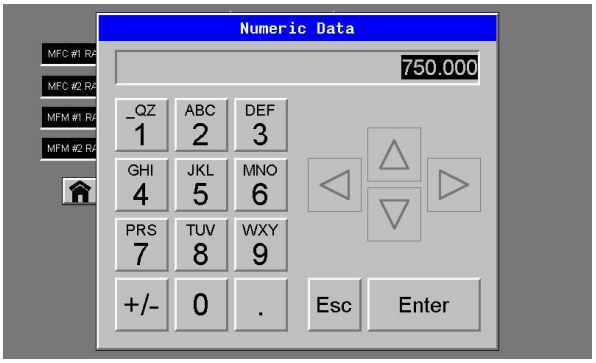


Instrument Range

The Instrument ranges <u>must</u> be set to the **FULL** flow range of the Bronkhorst instrument, shown on instrument label.

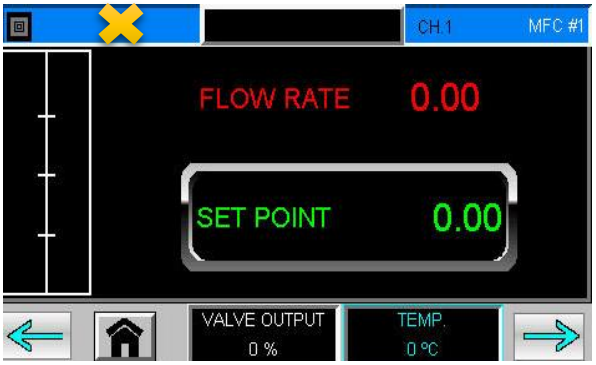
To edit range, press on the corresponding SPAN value, as shown by the **X** on the image, for the Numeric Keyboard.

Numerical Keypad

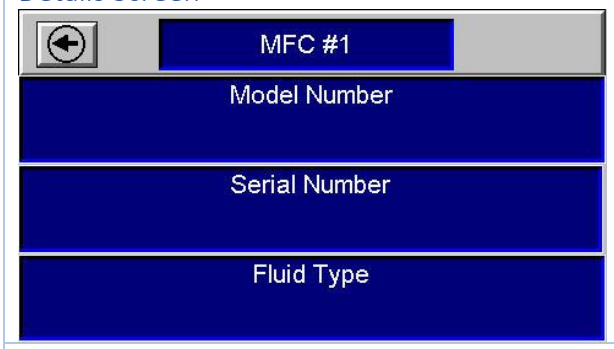


ENTER – Save value and return to previous screen.
ESC – Return to previous screen without saving.
HOME – Return to Main Screen

Process Screen



Details Screen



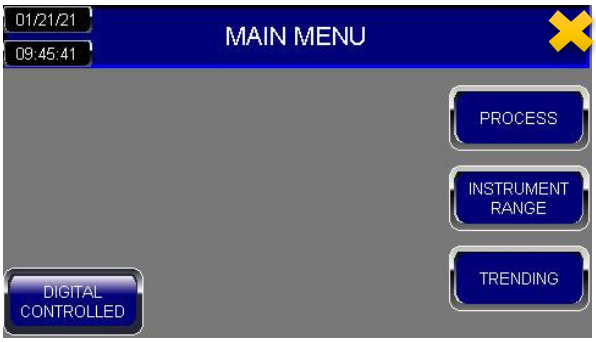
View Details

To view the instrument details, press the BLUE label, as shown by the **X** on the image. The next screen displays the following instrument details:

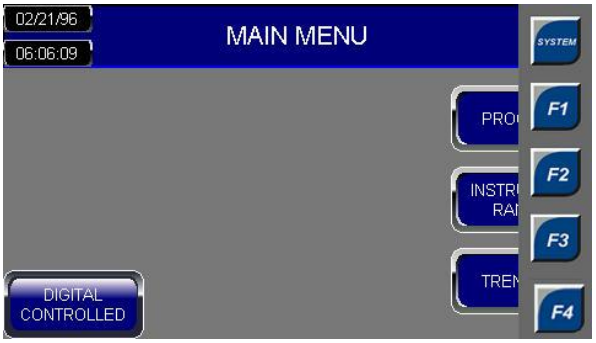
- Instrument Number
- Model Number
- Serial Number
- Fluid Type

Press the Arrow button on the Details Screen to return to the previous screen.

Process Screen



Function Buttons



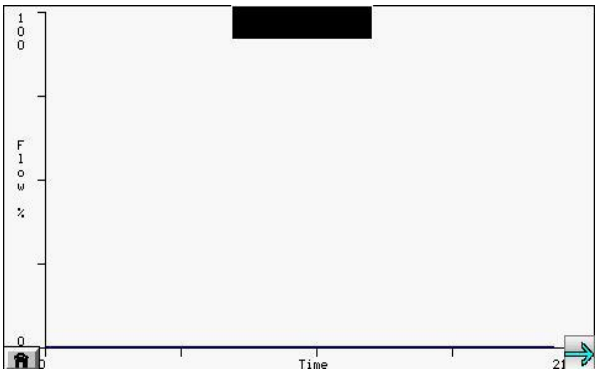
System Menu

To access the System Menu, press the top right corner, as shown by the **X** on the image, for the Functions Buttons to appear.

Select the SYSTEM button to view the System Menu.

ESC – Return to previous screen without saving.

Trending Screen



Trending

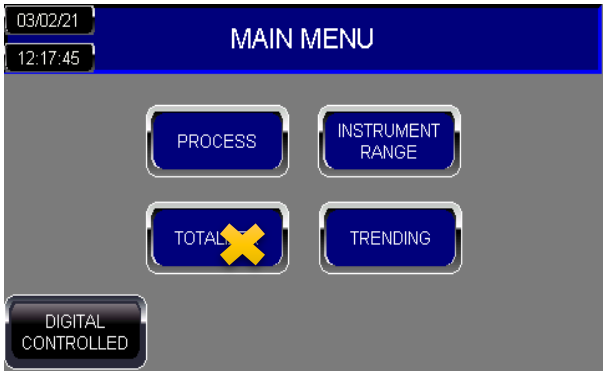
The Trending screens compare the Flow vs. Time values for each instrument.

The Instruments' Units are displayed on the black label.

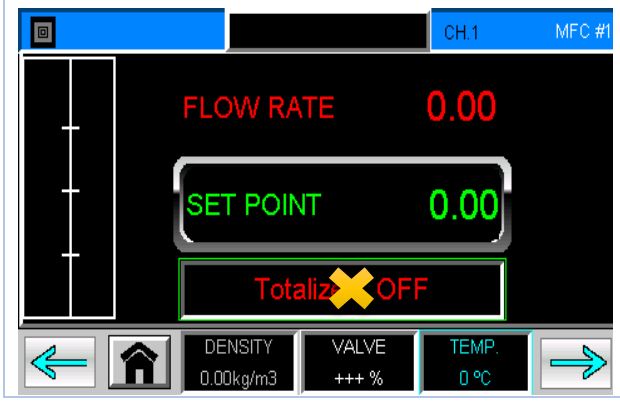
ARROWS – navigate between screen
HOME – Return to Main Screen

Totalizer

Main Screen



Process Screen

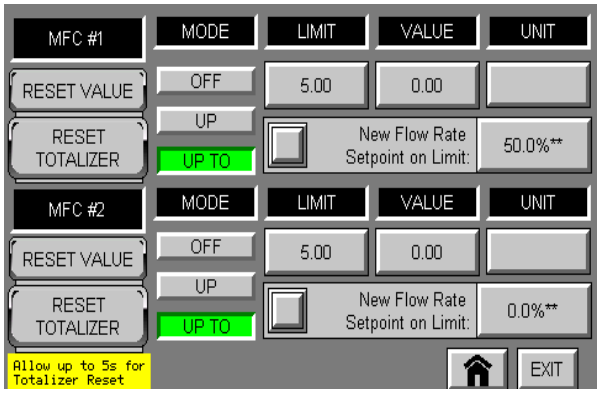


Accessing Totalizer

The Totalizer is only available via Modbus for Coriolis Instruments.

The Totalizer may be accessed from the Main Screen or the Mass Flow Controllers' Process Screens, MFC# 1 and 2, as shown by the **X**.

Totalizer Screen



Totalizer Screen

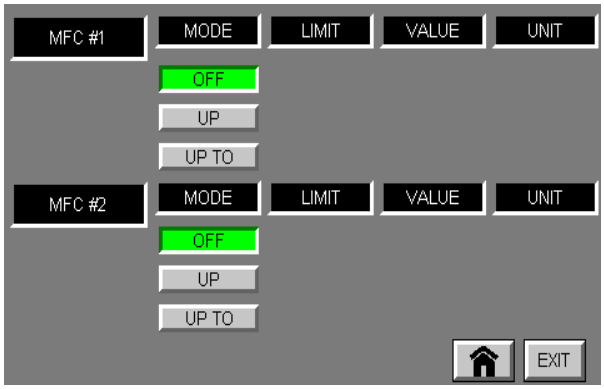
The Totalizer Screen displays two separate Totalizers for both MFC# 1 and 2. Each Totalizer contains the following settings:

Mode – Mode of the corresponding Totalizer
Limit – Totalizer limit/batch size in units selected with parameter *Unit*.
Value – Current totalizer value in units selected with *Unit*.
Unit – This parameter contains the name of the totalizer readout unit.
Setpoint Mode – Specifies whether or not to change the setpoint after reaching the totalizer limit.
New Setpoint(%) – New (safe) setpoint when a totalizer limit is reached until *Totalizer Reset*.
Reset Value – Resets totalizer *value* only.
Reset Totalizer – Resets totalizer *value* and *new setpoint* setting.

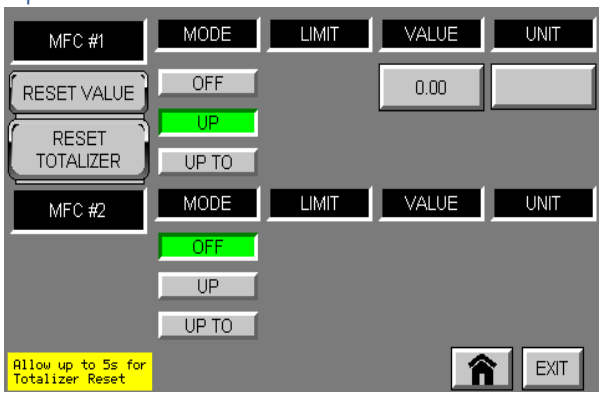
All settings are editable.

EXIT – Return to previous screen without saving.
HOME – Return to Main Screen

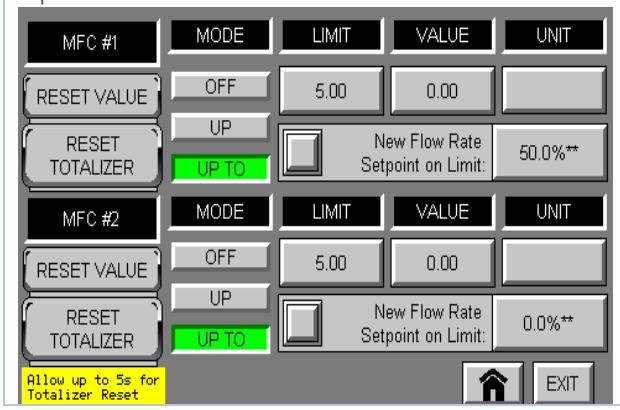
OFF Mode



Up Mode



Up To Mode



Totalizer Modes

The Mode of the corresponding Totalizer can be selected and changed from the Totalizer Screen.

The avaliable modes are:
OFF – Totalizer off (default)
UP – Counting up continuously
UP TO – Counting up until limit is reached (set by *Totalizer Limit*)

Each Mode will display different settings:
OFF –

- Mode only

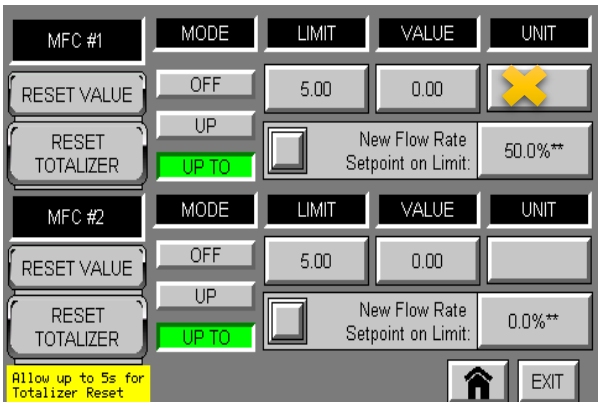
UP –

- Mode,
- Value,
- Unit and
- Reset Buttons

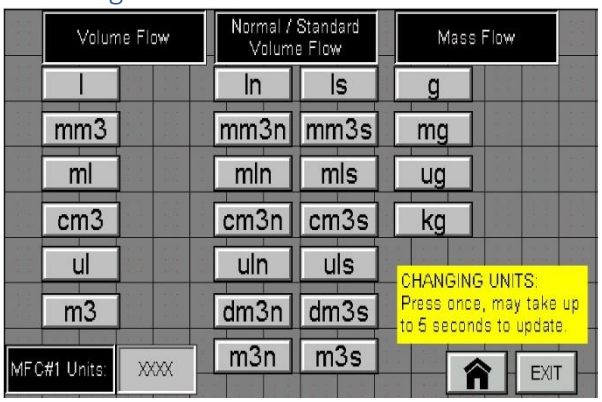
UP TO –

- Mode,
- Limit,
- Value,
- Unit,
- New Setpoint Mode,
- New Setpoint and
- Reset Buttons

Configure Units



Units Page



Totalizer Unit

To configure the totalizer units, press the box below the *Unit label*, as shown by the **X**, to navigate to the corresponding *Units Page*.

Once at the *Unit Page*, press the desired *Unit* **once** and allow up to 5 seconds to update. The configured unit will be displayed at the bottom left corner.

The Units available to configure from will depend on the Instrument Mode. Instrument Mode must be configured by FlowDDE.

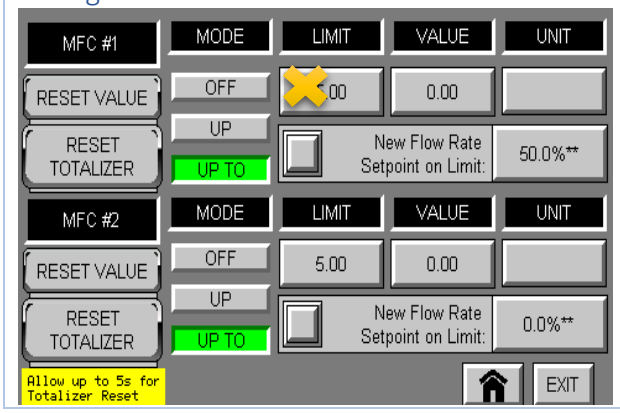
Instrument Modes:
Mass Flow, Normal Volume Flow, Standard Volume Flow, Volume Flow (Actual)

Totalizer Unit supports the following values:

Volume Flow – l, mm3, ml, cm3, ul, m3
Normal/Standard Volume Flow – ln, mm3n, mln, cm3n, uln, dm3n, m3n, ls, mm3s, mls, cm3s, uls, dm3s, m3s
Mass Flow – g, mg, ug, kg

EXIT – Return to previous screen without saving.
HOME – Return to Main Screen

Configure Limit



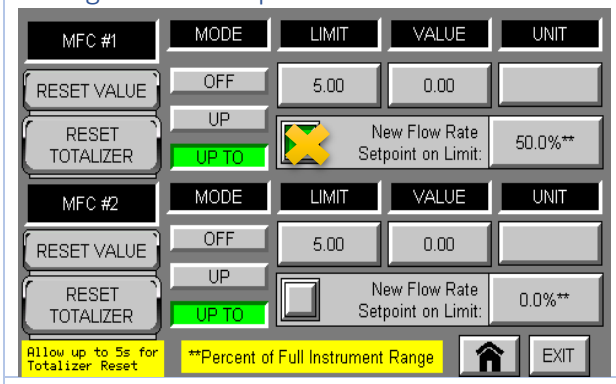
Totalizer Limit

The Totalizer Limit is displayed in units selected with parameter *Unit*.
To edit the Totalizer Limit, press the number box below the Limit Label, as shown by the **X**.

Red Border – when *Value* reaches *Limit*.

ENTER – Save value and return to previous screen.
ESC – Return to previous screen without saving.

Configure New Setpoint Mode

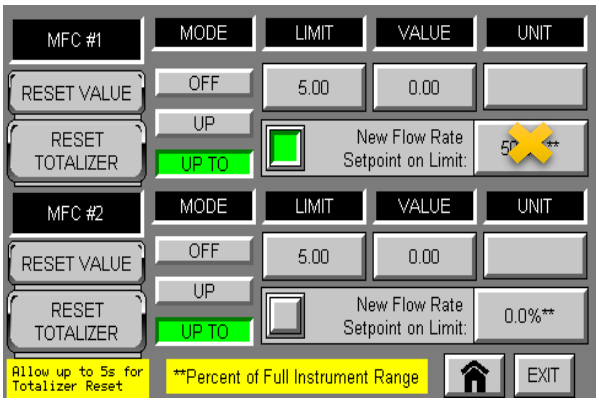


New Setpoint Mode

To configure the New Setpoint Mode, press the checkbox to activate setting, as shown by the **X**.

Grey – No setpoint change.
Green – Active; Change setpoint to *New Setpoint*.

Configure New Setpoint



New Setpoint

To configure a New Setpoint when limit is reached, press the percentage value, as shown by the **X**.

Red Border – when value reaches limit, the new setpoint is locked until *Totalizer Reset* is executed.

New Setpoint is the percent value of the **FULL Instrument range**.

Examples:

<u>New Setpoint at 0%:</u>
Full Instrument Range: 500 grams/hr
Setpoint: 400 grams/hr

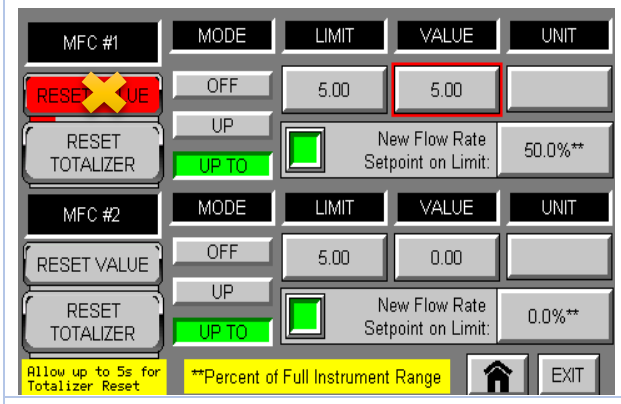
When limit is reached,
New setpoint value: 0 grams/hr

<u>New Setpoint at 50%:</u>
Full Instrument Range: 500 grams/hr
Setpoint: 400 grams/hr

When limit is reached,
New setpoint value: 250 grams/hr

IMPORTANT:
Instrument will not stop flowing after limit is reached unless *New Setpoint Mode* is active/green **AND** *New Setpoint* is 0%.

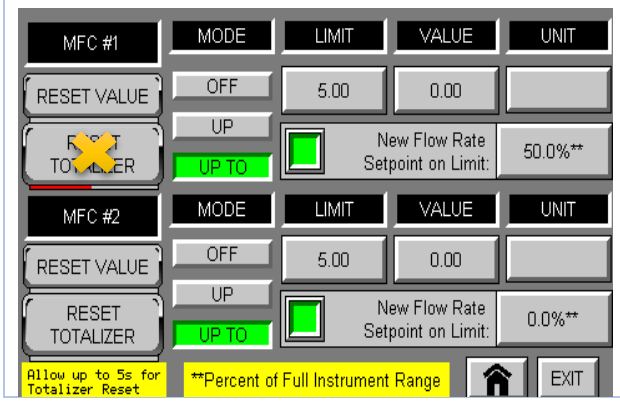
Reset Value



Reset Value

To reset *Value* only, press and hold the *Reset Value* button for 1s, as shown by the **X**. Value will reset immediately.

Reset Totalizer



Reset Totalizer

To reset the *Value* and *Setpoint*, press and hold the *Reset Totalizer* button for 1s, as shown by the **X**.

Allow up to 5 seconds for the Totalizer to Reset.