Datasheet - 06.2016

Flow-X® SERIES DATASHEET

FLOW COMPUTERS

IDEAL PLATFORM FOR EVEN THE MOST DEMANDING FLOW MEASUREMENT APPLICATIONS

The highest accuracy in flow computing

- ✓ *Analog inputs 0.002% at room temperature and 0.008% over full ambient temperature range*
- ✓ *Real-time clock and time integration 5 ppm including aging and temperature effects*
- ✓ *Support of most accurate oil and gas calculations e.g. GERG-2008*
- ✓ *64-bit resolution from input to output*

Complete

- ✓ *4 periods: hourly, daily & 2 user-definable sets period data*
- ✓ *Bi-directional flow*
- ✓ *Two provers*
- ✓ *Ticket recalculations*
- ✓ *Advanced control (sampling, valves, flow, loading, batching)*
- ✓ *Mass and volume per component*
- ✓ *Multi-lingual operator interface*

Cost-effective for single-stream applications

- ✓ *Each module is a complete flow computer*

Simple concept

- ✓ *No variety of expansion boards*
- ✓ *No hardware switches, instead fully software configurable*

Secure

- ✓ *Personal user accounts to prevent unauthorized access*
- ✓ *Audit trail shows the actual person*

Flexible

- ✓ *Enclosures for panel mounting, DIN-rail mounting and 19" rack mounting*
- ✓ *Interface to any Modbus and HART capable field device*
- ✓ *Custom Modbus interfaces to control systems*

FLOW-X SERIES

FLOW-X/M - FLOW COMPUTER MODULE

The core element of all available flow computer models is the Flow-X module: Flow-X/M. One module contains everything to support one full meter run. The module needs to be placed in one of the available enclosures. The software on the Flow-X/M determines its application for gas or liquid.

Physical

Weight
0,8 kg / 1.7 lbs

Dimensions (w x h x d)
50/2.0 x 166/6.5 x 115/4.5 [mm/inch]

Display & buttons

Display type
Graphical 196 x 64 pixel LCD. White LED, 100 step dimmable

Buttons
4 navigation buttons

System

Processors
32-bit microprocessor with math coprocessor and FPGA.

Memory
1 GB on-board memory for time-stamped data, report archive and audit trail

Clock
RTC 2 PPM, with internal lithium cell, Accuracy better than 1 s/day

Watchdog
Watchdog timer for general protection of the flow computer correct operation

I/O per Flow-X/M

Analog inputs	6*	Analog transmitter input, high accuracy. Input types are 4-20mA, 0-20mA, 0-5V, 1-5V. Accuracy 0.002% FS at 21°C, 0.008% at full ambient range of 0-60°C, resolution 24 bits. Inputs are fully floating (optically isolated).
4-wire PRT inputs	2	Resolution 0.02 °C for 100 ohms input. Error depending on range: 0 - 50 °C: Error <0.05 °C or better -220 - +220 °C: Error <0.5 °C or better
HART	4*	Independent HART loop inputs, on top of 4-20 mA signals. Support includes multi-drop for each transmitter loop, as well as support for redundant FC operation
Analog outputs	4	Analog output for flow control, pressure control 4-20mA, outputs floating. Resolution 14 bits, 0.075% FS.
Pulse Inputs	1	Single or dual pulse input. Adjustable trigger level at various voltages. Frequency range up to 1MHz. Compliant with ISO6551, IP252, and API 5.5. True Level A and level B implementation.
Density/viscosity	4**	Periodic time input, 100µs - 5000µs. Resolution < 1ns.
Digital inputs	16**	Digital status inputs. Resolution 100ns (10MHz)
Digital outputs	16**	Digital output, open collector (0.5A DC). Rating 100mA @24V.
Pulse outputs	4**	Open collector, max. 10Hz
Sphere detector inputs	4**	Supports 1, 2 and 4 detector configurations mode. Resolution 100ns (10MHz)
Prover bus outputs	2**	Pulse outputs for remote proving flow computers. Resolution 100ns (1MHz).
Frequency outputs	4**	Frequency outputs for emulation of flow meter signals. Maximum frequency 10KHz, accuracy 0.1%.
Serial	2	RS485/RS232 serial input for ultrasonic meter, printer or generic, 115kb
Ethernet	2	RJ45 Ethernet interface, TCP/IP

* Analog input = 6 (of which 4 support HART)
** Total number of digital inputs + digital outputs + pulse outputs + density inputs + sphere detector inputs + Prover bus outputs + Frequency outputs = 16

ENCLOSURE OPTIONS

The Flow-X module can be used in several different enclosures. The Flow-X/S and Flow-X/K are single module enclosures providing respectively onboard wiring terminals and remote IO connectivity through 37 pins D-sub connectors. The Flow-X/P is a multi-stream flow computer with an integral station module and touch screen and can hold up to 4 modules. The Flow-X/R is a 19" rack enclosure for up to 8 modules.

	Flow-X/S	Flow-X/K	Flow-X/P	Flow-X/R
Type	DIN rail enclosure with direct field connection	Compact DIN rail enclosure	Panel enclosure for multi stream	Rack enclosure
Dimensions (h x w x d) [mm/inch]	250/9.8 x 142/5.6 x 164/6.5*	177/7.0 x 310/12.2 x 55/2.2*	137/5.4 x 235/9.3 x 322/12.7	355/14.0 x 482/19.0 x 135/5.3
Weight [kg/lbs]	2,5 / 5.4*	1,7 / 3.6*	3,7 / 8.2	5,0 / 11.0
Mount type	Wall / DIN rail	Wall / DIN rail / Rack**	Panel / Rack	Rack / Wall
Mount position	Horizontal & vertical	Vertical	Horizontal & vertical	Vertical
Interface	4 line LCD Web server	4 line LCD Web server	7" color touch screen*** Web server	4 line LCD Web server
Max. Flow-X/Ms	1	1	4	8
Maximum I/O	2 x 39 screw terminals 2 x Ethernet 1 x 8 pin power	2 x 37 pin D-Sub 2 x Ethernet 1 x 4 pin power	8 x 37 pin D-Sub 2 x Ethernet 1 x 4 pin power	16 x 37 pin D-Sub 16 x Ethernet 8 x 4 pin power****

* With Flow-X/M module
** In combination with an DIN rail - Rack adapter
*** Integrated in the enclosure

**** Each individual stream module is individually and independently powered (24DVC) and individually exchangeable

FLOW-X SERIES

SYSTEM SPECIFICATION

Environmental Data

Ambient operating temperature
0 .. 60 °C

Storage temperature
-20.. 70 °C

Operating humidity
Max. 90% relative humidity, non-condensing

Sunlight
Store and operate out of direct sunlight

Power Supply

DC power supply
External, 20 V DC - 32 V DC, nominal 24 V DC, with redundant connections

Communication

Modbus RTU / ASCII Master and Slave
Modbus TCP Server and Client
HART Master
Flow-X Client protocol
Web services API

Calculations

Liquid
API 5, 6, 23, 24, 53, 54, 59 and 60 tabes (A.B. D and E)
API 11.1 1980 (API 2540) and 2004/2007
API 1952 historical tables
API 11.2.1, 11.2.2, 12.2, 21.1, 21.2
API 11.3.2.1 Ethylene (API-2565)
GPA TP15, TP16, TP25, TP27
Propylene (API 11.3.3.2)
Butadiene (ASTM D1550)
Ethylene (IUPAC 1988, NIST 1045, API 2565)
Carbon dioxide (NIST)

Gas
AGA5, AGA7, AGA8, AGA10, AGA11
AGA-NX19
SGERG-88
GERG-2008
GPA 2172
IAPWS-IF97 (steam and water)
ISO 6976 (all editions)
Gas viscosity
GSSSD MR113

Flow
ISO 5167 (all editions)
ISO/TR15377
AGA3
GOST 8-586
V-cone

Certificates

CE	Marking as per Conformité Européene, Directive 93/68/EEC. Declaration of conformity
EN 12405-1	European Standard for Gas meters and Gas-volume electronic conversion devices; part of MID
OILML R117	Dynamic measuring systems for liquids other than water standard, Edition 2007; part MID Software Guide - Measuring
WELMEC 7.2	Instruments Directive 2004/22/EC; included in MID
WELMEC 8.3	Quality of production, final product inspection and product testing
WELMEC 8.8	Intended use as 'electronic calculating and indicating device' part of measuring system of liquids other than water (MI-005) and intended use as 'Calculator and Indicator device for a gas meter' (MI-002)
EN 61326-1997	Electromagentic Compliance specification for Industrial locations; included in MID
EN 55011	Electromagnetic Compliance specificationl included MID
CSA C22.2 61010-1	Issued:2004/07/12 Ed:2 (R2009) Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use Part 1: General Requirements, with general instruction No. 1: 2008/10/28 - (R2009)
UL 61010-1	Issued: 2004/07/12 Ed:2 Rev:2008/10/28 UL Standard for Safety Electrical Equipment for Measurement, Control, and Laboratory Usel; Part 1: General Requirements
2004/108/EC	Electric compatibility directive
2004/22/EC	Measuring Instruments Directive

Casing

EN 60950

IEC compatibility

IEC 60068-2-1
IEC 60068-2-2
IEC 60068-2-3
IEC 60068-2-31
IEC 60068-2-36
IEC 60654-2
IEC 61000-4-2
IEC 61000-4-3
IEC 61000-4-4
IEC 61000-4-5
IEC 61000-4-6
IEC 61000-4-8
IEC 61000-4-17
IEC 61000-4-29
IEC 61000-6-2
IEC 61000-6-4:2001+ A1:2011

FLOW-X/S SPECIFICATION

Physical

Dimensions (w x h x d) (with module)

142/5.6 x 250/9.8 x 164/6.5 [mm/inch]

Weight (with module)

2,5 kg / 5.4 lbs

Mounting options

Wall mounted, 4 screws

DIN rail, 2 rails

Streams

Single stream

Connectors

Ethernet

2 x shielded 8 pole snap-in RJ45 connectors

Power

1 x 8 pole connector

(Phoenix Contact, MSTBVA 2,5/8-G-5.08)

I/O

2 x screw terminal strips with each 39 terminals

(Phoenix Contact, SMKDS 2,5/3-5,08)

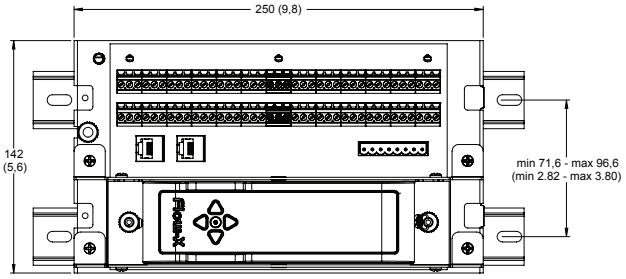


Figure 1. Horizontal DIN rail mount

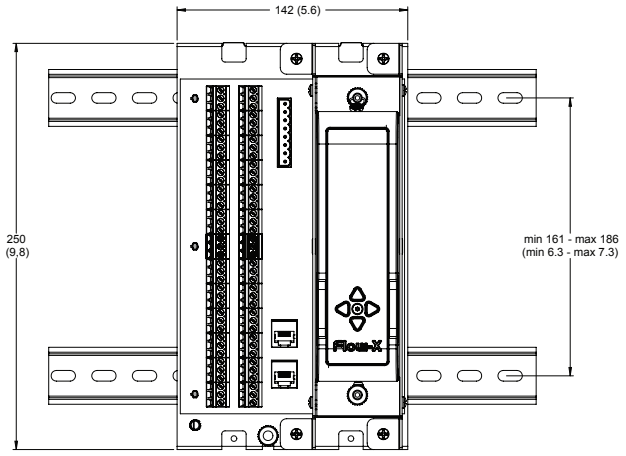


Figure 2. Vertical DIN rail mount

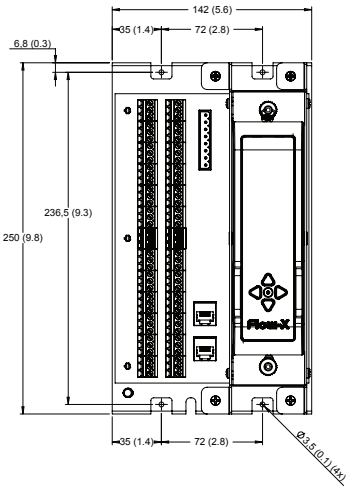


Figure 3. Wall mount

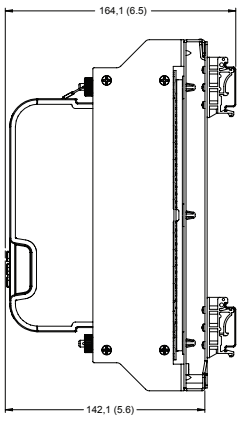


Figure 4. Side view

FLOW-X/P SPECIFICATION

Physical

Dimensions (w x h x d) (without bracket)
137/5.4 x 235/9.3 x 322/12.7 [mm/inch]

Weight
3,7 kg / 8.2 lbs

Mounting options
Enclosure is delivered with mounting bracket for installation in a cabinet (Panel mounted)

Streams
1-4 (Multi)stream

Connectors

Ethernet
2 x shielded 8 pole snap-in RJ45 connectors

Power
1 x 8 pole connector
(Phoenix Contact, MSTBVA 2,5/8-G-5.08)

I/O
3 x 9-pin D-sub male connectors
8 x 37-pin D-sub female connectors

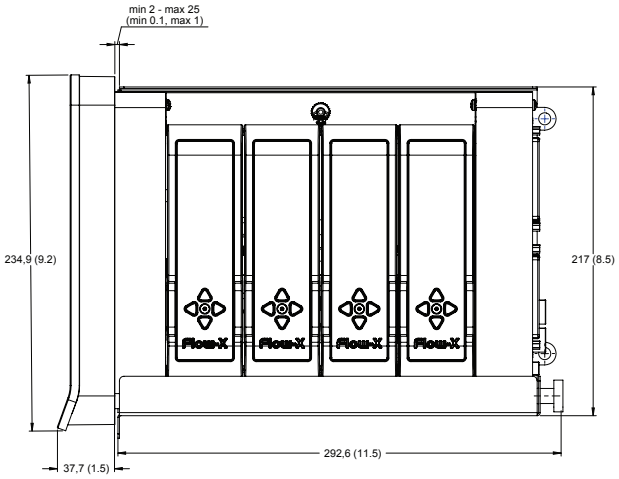


Figure 6. Side view with bracket

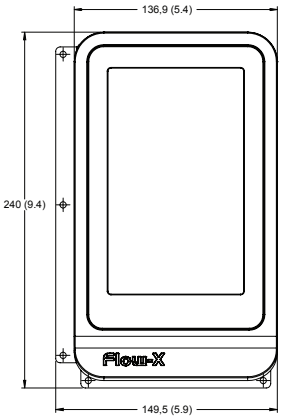


Figure 5. Front view with bracket

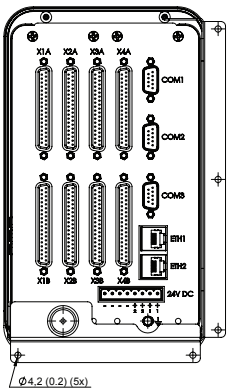


Figure 7. Rear view with bracket

FLOW-X/R SPECIFICATION

Physical

Dimensions (w x h x d)
482/19.0 x 355/14.0 x 135/5.3 [mm/inch]

Weight
5,0 kg / 11.0 lbs

Mounting options
Front mounted for in a 19" rack (8 Height units) (fig. 10)
Back mounted for Wall mounting (fig. 11)

Streams
1-8 (Multi)stream

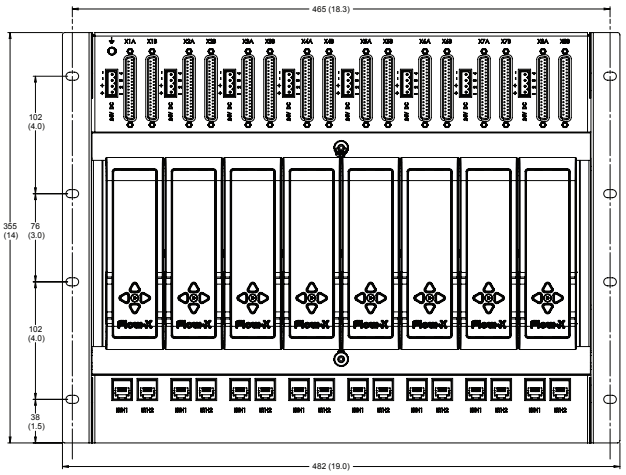


Figure 8. Front view

Connectors

Ethernet
16 x shielded 8 pole snap-in RJ45 connectors

Power
8 x 4 pole connector
(Phoenix Contact, MSTBVA 2,5/4-G-5.08)

I/O
16 x 37-pin D-sub female connectors

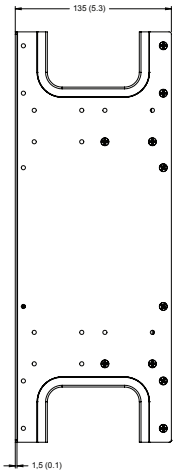


Figure 9. Side view

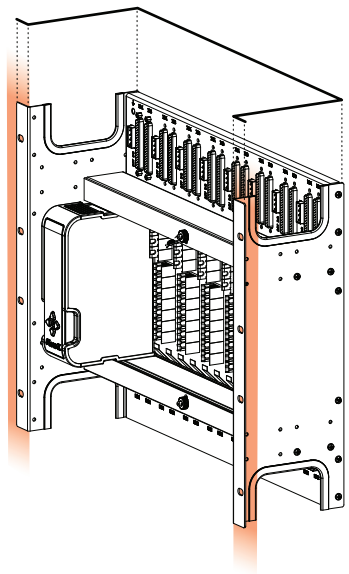


Figure 10. Front mounted (Rack)

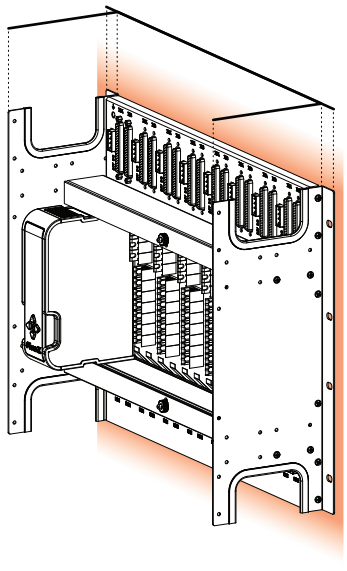


Figure 11. Back mounted (Wall)

FLOW-X/K SPECIFICATION

Physical

Dimensions (w x h x d) (with module)
60/2.4 x 353/13.9 x 131/5.2 [mm/inch]

Weight (with module)
1,7 kg / 3.6 lbs

Mounting options
Wall mounted, 4 screws
DIN rail, 2 rails
8 Height units in a 19" rack (with DIN rail adapter)

Streams
Single stream

Connectors

Ethernet
2 x shielded 8 pole snap-in RJ45 connectors

Power
1 x 4 pole connector
(Phoenix Contact, MSTBVA 2,5/4-G-5.08)

I/O
2 x 37-pin D-sub female connectors

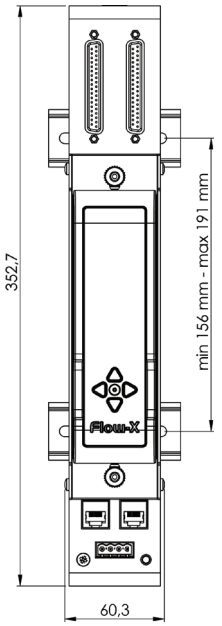


Figure 12. Front view

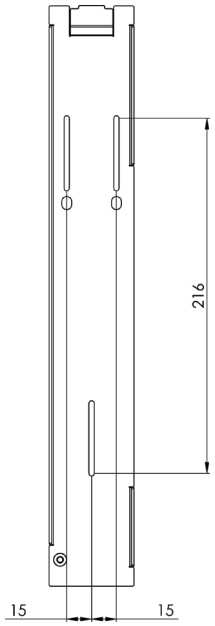


Figure 13. Drill positions for wall mounting

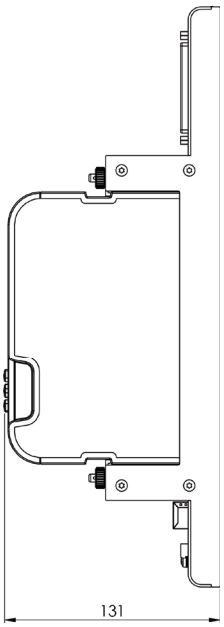


Figure 14. Side view

FLOW-X SERIES

ACCESSOIRES

37 pin Sub D Terminal Block with cable

IO terminal block for Flow-X/P, Flow-X/K and Flow-X/R enclosures.

Type
DECA MOD-37-F02

Dimensions (w x h)
113/4.4 x 85,2/3.4 [mm/inch]

Connectors
1 x 37-pin D-sub female connectors
1 x double row screw terminal strip with 37 terminals

Cable
1, 2 or 3 meter; straight or 45° angled

Compatible with
All Flow-X computers, except Flow-X/S

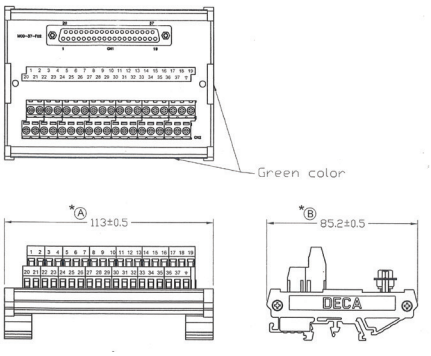


Figure 15. Dimensions Terminal Block

External Touch screen (Flow-X/T)

The Flow-X/T is a color touch screen mountable in a panel. We deliver them in 2 sizes: 7” and 10.4”.

Operator interface for Flow-X/S, Flow-X/K and Flow-X/R enclosures.

Physical

Weight
0,7 kg / 1.43 lbs | 1,7 kg / 3.75 lbs

Dimensions (w x h x d)
222/8.7 x 152/6.0 x 56/2.2 [mm/inch]
280/11.0 x 227/8.9 x 56/2.2 [mm/inch]

Mounting options
Panel installation with mounting brackets (included)
Panel cutout, see figure 16 & 17 on the next page

Operating temperature
0 °C ~ 70 °C

EMI/EMC Certifications
CE/FCC/KCC Class A

Display

Display Type
7” TFT-LCD (800 x 480 px) | 10.4” TFT-LCD (800 x 600 px)

Backlight
LED Backlight (ON/OFF switchable)

Touch
4 wire resistive panel

Connectors

Ethernet
1 x RJ-45 (100 Base-TX)

Power
12V ~ 24 V DC (500mA | 800mA)

I/O
1 x RS-232/RS-485, 2 x RS-232
2 x USB (1 x type A & 1 x type B)
1 x Audio Line out (0.8W embedded micro speaker)

Compatible with
All Flow-X computers

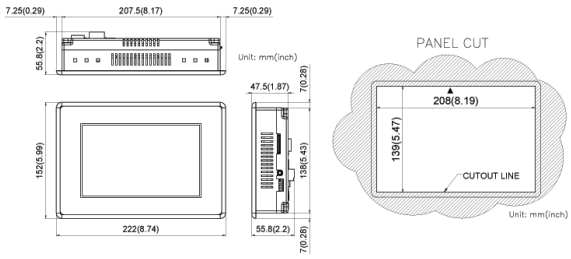


Figure 16. Dimensions External Touch screen 7”

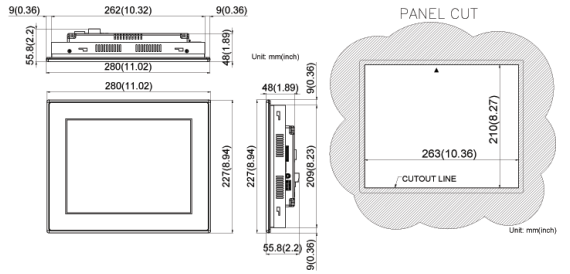


Figure 17. Dimensions External Touch screen 10.4”

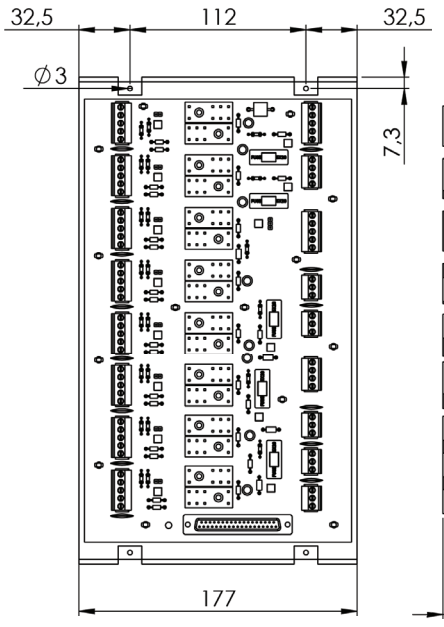


Figure 18. Front view

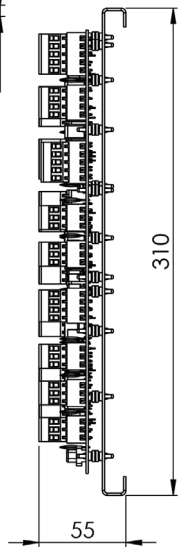
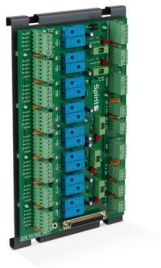


Figure 19. Side view

Flow-X/B



Breakout board with pull-up resistors, fuses & relays for easy field connectivity and to protect the flow computer from any misuse or field influence. Embedded green and red LED lights for simple signal overview of flow equipment.

One Flow-X/B board is required for each 37-pin D-Sub connector.

Physical

Dimensions (w x h x d)
177/7.0 x 130/12.2 x 55/2.2 [mm/inch]

Weight
1,2 kg / 2.6 lbs

Mounting options
Wall mounted, 4 screws

Connectors

Power
1 x 5 pole header & plug connector

I/O Field
8 x 5 pole header & plug connector (DI)
2 x 3 pole header & plus connector (AO)
3 x 3 pole header & plug connector (AI)
1 x 4 pole header & plug connector (PRT)
1 x 4 pole header & plug connector (I/O_GND)
(WE, Serie 311 & 3445-5.08mm)

Compatible with

All Flow-X computers, except Flow-X/S
1 x 5 pole header & plug connector
(WE, Serie 311 & 3445-5.08mm)

I/O Flow-X
1 x 37-pin D-sub female connectors

ABOUT SPIRIT IT

We make flow measuring systems better, smarter and more accurate.

A MEMBER OF THE ABB GROUP

Power and productivity for a better world™

Since November 2014, Spirit IT has become a member of the ABB Group. The acquisition adds a new line of high-performance custody transfer solutions to ABB's measurement business unit.

ABB is a leader in power and automation technologies that improve performance while lowering environmental impact. With thousands of experts around the world and high-performance innovations, ABB's team is dedicated to making measurement easy for its customers.

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