InstruTech®

FlexRax® 4000 Multi-Gauge Vacuum Measurement Controller

- **Measurement range from 2 x 10^{-11} to 1,000 Torr**
- **Capable of operating up to 4 ionization and 4 convection gauges simultaneously as well as display pressures from up to 2 capacitance diaphragm gauges**
- **Capable of providing up to 8 analog outputs, 16 setpoint relays and RS485 / RS232 interface**
- **Windows® Embedded Compact operating system provides reliable and stable instrument operation (operating system updates is <u>not</u> required)**

Description

The *FlexRax®* is a 19-inch wide, 2U, full-rack vacuum gauge controller capable of operating multiple vacuum gauges simultaneously. The type and number of gauges operated will depend on user specified option cards installed at the factory. This results in significant cost savings since the user can specify a FlexRax configuration to operate only the gauges required for the application. Furthermore, the user can easily install additional option cards in the field for future expansion of gauges to operate.

FlexRax can operate up to 10 vacuum gauges simultaneously as listed below:

- Up to a total of four ionization gauges (IG) configurable for:
  - A) Up to two classic size BA600 series Bayard-Alpert (B-A) glass or nude ionization gauges or other equivalent brands of glass/nude B-A IG
  - B) Up to two InstruTech® IGM400 Hot Cathode or two CCM500 cold cathode IG modules
- Up to four CVG101 convection gauges (CG)
- Up to two analog input signals from other devices such as capacitance diaphragm gauges (CDG) or InstruTech *CVM201, CVM211, IGM401 and CCM501* gauge modules

Compatible Vacuum Gauges

BA601

BA602

BA603

IGM400 Hot Cathode

CCM500 Cold Cathode

CVG101 Convection

Features

Easy to read LCD with backlighting provides sharp contrast with wide viewing angle. The instrument can be configured to display up to 6 gauges in a single screen or assign any number of gauges to various screens for auto-scrolling of display. The state of all setpoint relays and engineering units of measure will be displayed on the main screen. Filament operation including filament current, filament voltage, emission current and ion current can be displayed in real time to allow monitoring of filament condition. The system can be personalized by assigning specific names to individual gauges or use the factory default gauge symbols. Error messages will be displayed for all fault conditions.

High efficiency power supply design and effective thermal management techniques are used to enable operation of the *FlexRax* without the need for air movement devices such as troublesome fans often required in even single ionization gauge power supplies. Filament switching control from the *FlexRax* combined with capability to operate two conventional B-A ionization gauges *simultaneously,* offers the user low cost of ownership and unparalleled ease of use.

Specifications

measurement range: (vacuum gauge dependent)	BA601 EB-degas B-A UHV nude ionization gauge: 2×10^{-11} to 1×10^{-3} Torr BA602 and BA603 I^2R degas B-A nude or glass ionization gauge: 4×10^{-10} to 1×10^{-3} Torr IGM400 hot cathode ionization gauge: 1×10^{-9} to 5×10^{-2} Torr CCM500 cold cathode ionization gauge: 1×10^{-9} to 1×10^{-2} Torr Convection gauges: 1×10^{-4} to 1,000 Torr
units of measure	Torr, mbar, Pa - user selectable
function: ionization gauge (4 max)	powers & operates up to two BA600 series nude/glass or equivalent brands of B-A hot cathode IG powers & operates up to two IGM400 hot cathode or CCM500 cold cathode ion gauge modules
convection gauge (4 max)	powers & operates up to four *Worker Bee™* CVG101 or Granville-Phillips® Convectron® convection gauge transducers
capacitance diaphragm gauge (2 max)	accepts analog input signals from CDGs or other InstruTech vacuum gauge modules (external power source for these type auxiliary devices will be required)
IG filament/sensor control - on /off	front panel push buttons, automatic using convection gauges, digital input or serial communication
IG filament switching	filament 1 or 2 selection using front panel push buttons
IG emission current	100 µA, 4 mA, 10 mA or automatic switching between 100 µA and 4 mA
IG degas	BA602/603: nominal 40 W resistive (I^2R), BA601: 40 W electron bombardment (EB), IGM400: 3 W EB
IG overpressure protection	turns off ion gauge filament/sensor at the following default settings: BA601, BA602, BA603: 1×10^{-3} Torr at 100 µA emission current, 5×10^{-4} Torr at 4 mA emission current, 1×10^{-4} Torr at 10 mA emission current IGM400 hot cathode: 5×10^{-2} Torr at 100 µA and 1×10^{-3} Torr at 4 mA emission current CCM500 cold cathode: 1×10^{-2} Torr
setpoint relays	up to 16 user programmable single-pole, double-throw (SPDT), 2A at 30 Vdc, 2A at 250 Vac, resistive load, assignable to any of the gauges (**Note-** Contact rating applies to units shipped after Feb 28, 2017. See User Manual for older units specs)
analog output	up to 8 analog outputs can be assigned to any of the gauges. IG: Log linear 0 to 10 Vdc, 1 V/decade, various scaling selections also provides analog output compatibility with Granville-Phillips® (GP) controller models 307, 350, and 358 IG: Log Linear 1.7 V to 9.3 Vdc (nominal 1.8 to 8.7 Vdc) 0.8 V/decade IG: Linear 0 to 10 Vdc (useable over 3 decades, compatible with GP 307, 350 & 358) Wide range combination IG + CG: Log linear 0.5 to 7 Vdc, 0.5 V/decade CG: Log linear 0 to 7 Vdc or 1 to 8 Vdc, 1 V/decade, or Linear 0 to 10 Vdc, or Non-Linear
analog input (or use, alternatively, for remote IG filament/sensor turn on)	accepts up to two 0-10 Vdc analog inputs from 100 mTorr, 1, 10, 100, 1000 Torr F.S. CDG or analog inputs from InstruTech gauges CDM900, CVM201, CVM211, IGM401, CCM501, CCM502, PCM301. alternatively, analog input can be used as digital input for remote IG sensor turn on by applying a continuous ground or remove ground for remote IG sensor turn off
serial communications	RS485 / RS232 - ASCII protocol (RS232 protocol compatible with GP 307 controller)
source power	100-240 Vac, 50/60Hz, nominal, universal input power - 600 VA operating
temperature	operating: 0 to + 40 °C storage: -40 to + 70 °C
humidity	0 to 95% relative humidity, non-condensing
weight	14 lb. (6.4 kg)
CE compliance	EMC Directive 2004/108/EC, EN61326-1, EN55011 Low Voltage Directive 2006/95/EC, EN61010-1
environmental	RoHS compliant

Typical Display Configurations

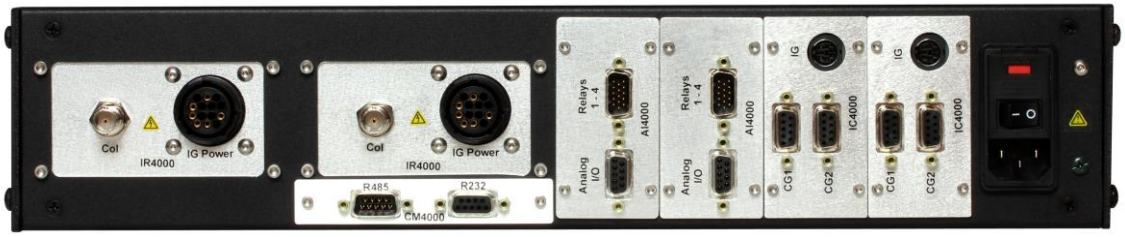
Six gauge display

Four gauge display

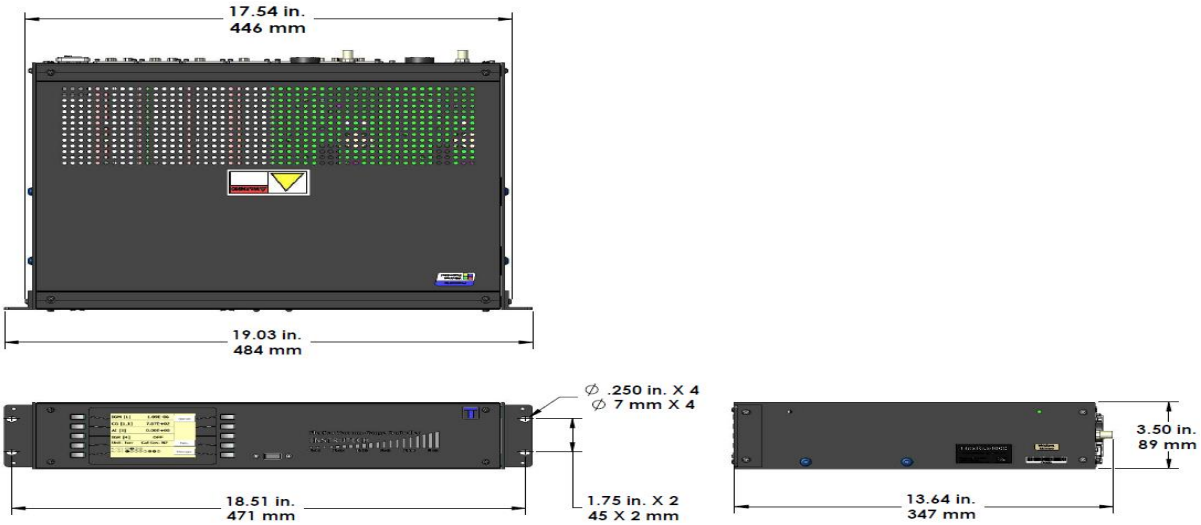
Three gauge display

One gauge display - auto scroll one gauge at a time

Controls & Connections



Outline Drawing



Ordering Information — *FlexRax Part Numbers*

Option cards selection

FLX4000 - # - # - # - # - # - # - #

slot 1
IC = IC4000 option card (operates 2 convection and 1 InstruTech IGM400 or CCM500 ion gauge) — IC
AI4 = AI4000-4 option card (provides 4 setpoint relays, 4 analog outputs, 1 analog input) — AI4
AI8 = AI4000-8 option card (provides 8 setpoint relays, 4 analog outputs, 1 analog input) — AI8
X = None — X

slot 2
Same options listed for slot 1 above. Select one of the following: IC, AI4, AI8 or X

slot 3
AI4 = AI4000-4 option card (provides 4 setpoint relays, 4 analog outputs, 1 analog input) — AI4
AI8 = AI4000-8 option card (provides 8 setpoint relays, 4 analog outputs, 1 analog input) — AI8
None — X

slot 4
Same options listed for slot 3 above. Select one of the following: AI4, AI8 or X

slot 5
IR = IR4000 option card (operates one I^2R degas nude or glass B-A ionization gauge) — IR
IE = IE4000 option card (operates one EB degas nude UHV B-A ionization gauge) — IE
X = None — X

slot 6
Same options listed for slot 5 above. Select one of the following: IR, IE or X

slot 7
CM = CM4000 option card (provides RS485/RS232 serial communications) — CM
X = None — X

* Maximum of two IC and two AI4 or AI8 option cards per *FlexRax* controller.
Example: FLX4000-IC-IC-AI8-X-IR-IR-CM operates up to four convection gauges, up to two IGM400/CCM500 InstruTech IG modules and two I^2R nude or glass IGs. It also provides 8 setpoint relays, 4 analog outputs and RS232/RS485 serial communications.

Ordering Information — *Gauge Cable Assembly Part Numbers*

Gauge Cable Length	BA601/602 Nude IG Bakeable Cable 200 °C*	BA601/BA602 Nude IG	BA603 Glass IG	IGM400/CCM500 Miniature IG	CVG101 Convection
					
10 ft. (3 m)	IRNBD441-1-10F	IRN441-1-10F	IRG441-1-10F	BXC400-1-10F	CB421-1-10F
25 ft. (8 m)	IRNBD441-1-25F	IRN441-1-25F	IRG441-1-25F	BXC400-1-25F	CB421-1-25F
50 ft. (15 m)	IRNBD441-1-50F	IRN441-1-50F	IRG441-1-50F	BXC400-1-50F	CB421-1-50F
>50 ft. consult factory	consult factory	consult factory	consult factory	consult factory	consult factory

* The IRNBD441 bakeable Nude IG cable is provided with push-on sockets for connection to the Nude gauge pins (BA601/BA602 pins) and is bakeable to 200 °C. All other cables listed above are rated for 50 °C ambient temperature. All IG cables listed above can be used with either single or dual filament ion gauges and filament switching is controlled from the FlexRax controller.

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