

G-TRAN Series 1-Channel Display Unit Model ISG1 Specifications



This specifications is for the display units of the following serial numbers:

Serial Nos. 095601 and higher.

Model	Serial numbers
ST2-1 Multi Ionization Gauge	00901 ~
SH2-1 Multi Ionization Gauge	06001 ~
ST200-A Multi Ionization Gauge	00001 ~
SH200-A Multi Ionization Gauge	00001 ~
SC1 Cold-Cathode Ion Gauge	02300G ~
SW1-1 Pirani Vacuum Gauge	00001 ~
SP1 Pirani Vacuum Gauge	00001 ~
CCMT-D series Ceramic Capacitance Manometer	00001 ~

**Components Division,
ULVAC, Inc.**

SPECIFICATIONS

Name	1-channel digital display unit ISG1		
Number of sensor units connected	1 pc.		
Sensor unit	G-Tran series	Pirani sensor unit SP1	4.0×10^{-1} to $3.0 \times 10^{+3}$ Pa
		Pirani box unit BPR2	
		Pirani sensor unit SW1-1	5.0×10^{-2} to $1.2 \times 10^{+5}$ Pa
		Cold cathode ionization gauge SC1	1.0×10^{-5} to $1.0 \times 10^{+0}$ Pa
		Hot cathode ionization gauge BMR2	5.0×10^{-8} to $9.9 \times 10^{+0}$ Pa
		Multi-Ionization SH2/SH200-A	5.0×10^{-8} to $9.9 \times 10^{+0}$ Pa
		Multi-Ionization SH2/SH200-A (SPU Combination mode)	5.0×10^{-8} to $9.9 \times 10^{+4}$ Pa
		Multi-Ionization SH2/SH200-A (SAU Triple Combination mode)	5.0×10^{-8} to $9.9 \times 10^{+5}$ Pa
		Multi-Ionization SH2/SH200-A (SWU Combination mode)	5.0×10^{-8} to $1.0 \times 10^{+5}$ Pa
		Multi-Ionization ST2/ST200-A	1.0×10^{-5} to $9.9 \times 10^{+0}$ Pa
		Multi-Ionization ST2/ST200-A (SPU Combination mode)	1.0×10^{-5} to $9.9 \times 10^{+4}$ Pa
		Multi-Ionization ST2/ST200-A (SAU Triple Combination mode)	1.0×10^{-5} to $9.9 \times 10^{+5}$ Pa
		Multi-Ionization ST2/ST200-A (SWU Combination mode)	1.0×10^{-5} to $1.0 \times 10^{+5}$ Pa
		Ceramic capacitance manometer	CCMT-1000A/1000D
	CCMH-1000A		
	CCMT-100A/100D		$0.0 \times 10^{+0} \sim 1.3 \times 10^{+4}$ Pa *1
	CCMH-100A		
	CCMT-10A/10D		$0.0 \times 10^{-1} \sim 1.3 \times 10^{+3}$ Pa *1
	CCMH-10A		
	CCMT-1A	$0.0 \times 10^{-2} \sim 1.3 \times 10^{+2}$ Pa *1	
CCMT-1D			
Analog input	Reading the analog signal (voltage) from the sensor		
	Update time	70 ms	
	Internal processing	5 times moving average	
	Resolution	0.2 mV	
Display	Digital display of mantissa part 2 digits, exponential part 1 digit $\square.\square \times 10^{\square}$		
	Unit	Pa (Pascal)	
	Pressure range	Pressure range of each sensor unit	
	Update time	200 ms	

	Accuracy	$\pm 2\% \pm 1$ digit against the pressure value from the measurement unit * CCM series: 1/10 or less of the full scale ± 4 digits	
Analog output		0 V to 10 V DC pseudo-log. output, log, linear output	
		Note: The output differs with each unit.	
	Update time	70 ms	
	Resolution	1 mV	
	Output error	± 10 mV	
	Impedance	100 Ω	
	Accuracy	± 10 mV against the voltage converted value of pressure display	
Control input signal	Actuated by open collector input, negative logic		
	Filament, etc. ON/OFF signal, zero point adjustment signal, etc.		
Control output signal	Open collector output, negative logic [Rating: 40 V _{MAX} , 90 mA _{MAX} , 70 mW]		
	Signal of error, filament and other on signal and others Setpoints 1, 2, 3		
Communication	RS-485		
	Baud rate	9600/19200/38400 bps	
	Number of nodes	32 (including host)	
	Distance	30 m	
	Memory function	Set value by communication is backed up by EEPROM.	
CAL function	Arbitrary value [0.1×10^{-3} to $9.9 \times 10^{+3}$] is multiplied by the measurement value and displayed.		
LED display	ERROR	ST-1	
	DGS	ST-2	
	ZERO	ST-3	
Line voltage	24 VDC ± 1 V Ripple and noise below 1%		
Current consumption	2 W (display unit alone) Maximum 30 W (when BRM2 is used) Note: Power consumption by other interfaced units is to be added.		
CE standard	Low voltage directive 2014/35/EU: EN61010-1:2010(3rd Edition),A1:2019 EMC directive 2014/30/EU: EN61326-2-3:2013 Radiation field intensity measurement: CISPR11:2009+A1:2010:Group 1 Class A Static electricity test: IEC61000-4-2:2008 Radiation electromagnetic field test: IEC61000-4-3:2006+A1:2007+A2:2010 Transient burst test: IEC61000-4-4:2004+A1:2010 Lightening surge test: IEC61000-4-5:2005 Conduction test: IEC61000-4-6:2008 Commercial magnetic field test: IEC61000-4-8:2009 RoHS 2011/65/EU: EN50581:2012		
Over-voltage category	Category I: Connected to a circuit that holds down transient over-voltage at a sufficiently low level		
I/O connector	Sensor unit side	D-sub15 socket (M2.6 screw)	
	Control host side	D-sub 15 pin M2.6 screw)	
	Power supply	Phoenix Model MSTB2.5/3-STF, 08	
Connected cable length	Length of cable from this unit to the sensor unit, calculated with 24AWG.		
	Pirani sensor unit SPI	up to 50 m	
	Pirani box unit BPR2	up to 100 m	
	Pirani gauge SW1	up to 100 m	
	Cold cathode ion gauge SC1	up to 100 m	
	Hot cathode ion gauge BMR2	up to 10 m	
	Multi Ionization SH2/ST2, SH200-A/ST200-A	up to 40 m	
	Multi Ionization SH2/ST2, SH200-A/ST200-A (SPU /SWU Combination)	up to 40 m	

	Multi Ionization SH2/ST2, SH200-A/ST200-A (SAU Triple Combination)	up to 40 m
	Ceramic capacitance manometer CCMT series	up to 100 m
	Ceramic capacitance manometer CCMH series	up to 15 m
Operating temperature range	10 to 40°C	
Operating humidity range	15 to 80% (not condensing)	
Storage	-20 to 65°C (non-operating, not condensing)	
Weight	250 g	
Outside dimensions	DIN 48 × 96 mm, basic unit 70 mm deep JIS rack size 50 × 100mm is also available as option.	

*1 : Pressure display of CCM series: The minimum digit are 1.0, 2.0 … 9.0, the decimal point is not displayed.

2. Standard Accessories

Power connector	MSTB 2, 5/3-STF-5, 08 made by PHOENIX	1 pc.
DIN panel fixing tools	fitting	2 pcs.
Quick manual		1 pc

3. Options

AC Adapter	OUTPUT:DC24V, INPUT:AC90~264V
JIS rack size type	
Display unit cable	2, 5, 10 m long (between the basic unit and sensor unit)
Inspection record	
Sensor unit, sensor head	Refer to the applicable sensor units below.
D-sub connector (Pin)	To sensor connector
D-sub connector (socket)	To I/O connector
JCSS alibration certificate	Only combination with sensor unit
General proofreading test	Only combination with sensor unit
Inspection certificate	
Calibration certificate	

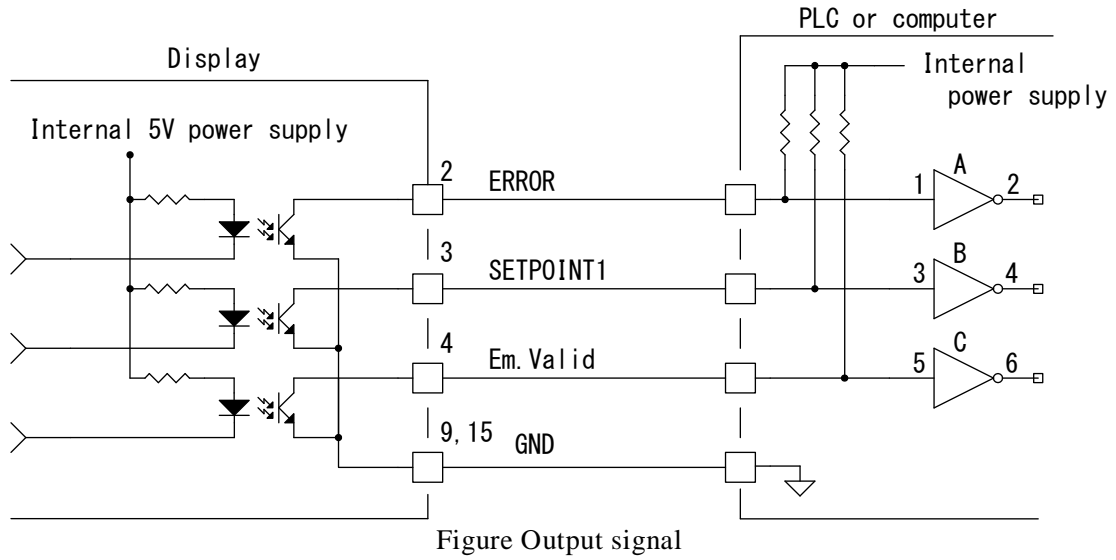
4. Connection with Sensor

SENSOR	Description	Remarks
1	+24V power output	24VDC power to the sensor unit
2	Sensor error input	Error signal, Protection signal, etc.
4	FIL/HV input	Emission valid, HV ok signal is input.
5	FIL/HV ON, ADJ adjustment output	Filament ON, HV ON, adjusted signal is output.
6	FIL 1/2 output	Outputs filament 1/2 changeover signal.
8	Pressure signal input	Pressure signal is input.
9	Power supply GND	Power GND to the sensor unit
13	DEGAS ON output	Degas ON signal is output.
15	Pressure signal input	Pressure signal is input.

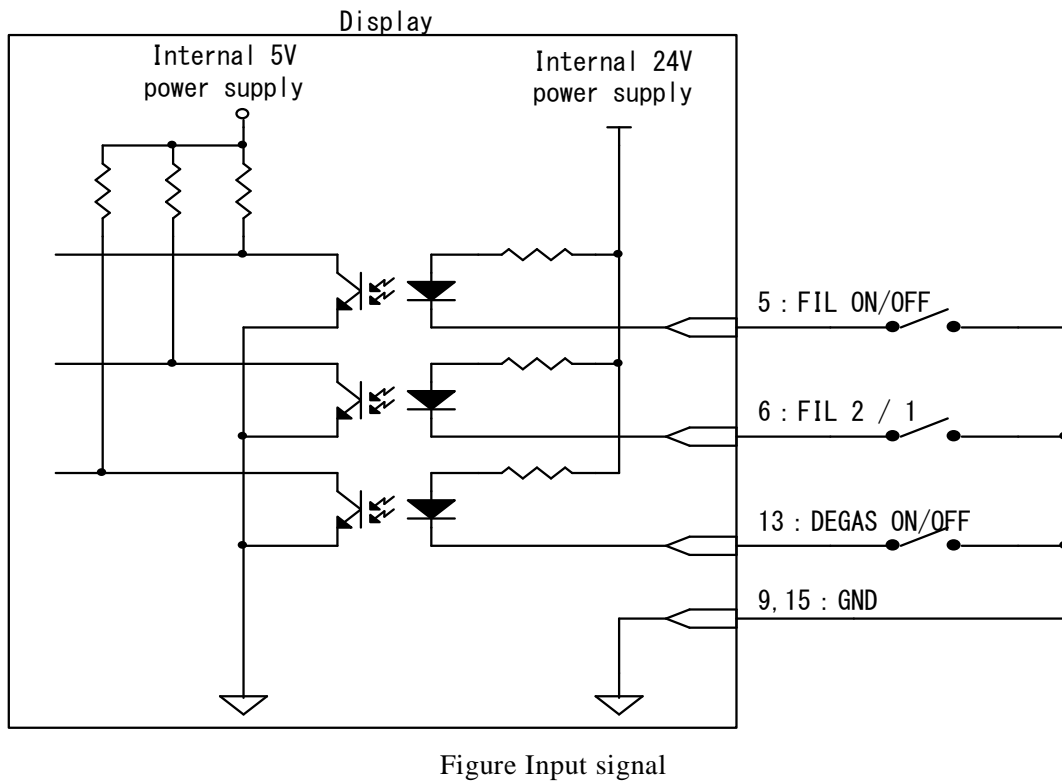
5. Connection with External Devices

『I/O』	Description	Remarks
2	Output signal	Error signal, etc., Lo when actuated, 30VDC _{MAX} , 50mA _{MAX} , 70mW
3	Setpoint 1 actuating signal	Setpoint 1 actuating signal Lo when actuated, 30VDC _{MAX} , 50mA _{MAX} , 70mW
4	Output signal	Emission Valid, HV check, etc Lo when actuated, 30VDC _{MAX} , 50mA _{MAX} , 70mW
5	Input signal	Filament ON, Adjust, etc Actuated when shorted to GND
6	Input signal	Select Filament 1/2, etc Actuated when shorted to GND
7	Setpoint 3 actuating signal	Setpoint 3 actuating signal Lo when actuated, 30VDC _{MAX} , 50mA _{MAX} , 70mW
8	Pressure signal output+	0 to 10 VDC
9	Signal GND	GND of pressure signal, burnout signal, setpoint, etc.
10	RS485 -	Serial communication RS485 – output
11	Setpoint 2 actuating signal	Setpoint 2 actuating signal Lo when actuated, 30VDC _{MAX} , 50mA _{MAX} , 70mW
12	RS485 +	Serial communication RS485 + output
13	Input signal	Degas ON Actuated when shorted to GND
15	Signal GND	GND of pressure signal, burnout signal, setpoint, etc.

5.1. Output signal (Lo when actuated)



5.2. Input signal (Actuated when shorted to GND)



6. Output voltage

Output voltage is outputted with the I/O connector +[8pin] → GND [15 pin].

The sign in a calculating formula

P : Pressure value (Pa)

V : Measurement value output voltage (V)

E : Measurement value output voltage V from which fractions are rounded off

6.1. Pirani gauge SW1

$$P = 10^{(V - 3)} \leftrightarrow V = \text{LOG}(P) + 3$$

Status	Measurement value output voltage
In normal measurement	Voltage corresponding to the measured pressure
Above the measurable higher limit	8.1 V or more
Below the measurable lower limit	1.7 V or less
In case of filament burnout	9 V or more

6.2. Pirani gauge SP1, BPR2

$$P = 10 \times (V - E) \times 10^{(E-1)}$$

Condition	Measured output voltage
In normal measurement	Voltage corresponding to the measured pressure
Above the measurable higher limit	5.1 V
Below the measurable lower limit	0 V
When filament has burnt out	9 V or more

6.3. Hot cathode gauge BMR2

$$P = 10 \times (V - E) \times 10^{(E-8)}$$

State	Measurement value output voltage
In normal measurement	Voltage corresponding to measured pressure
Above measurement higher limit	9.9 V or more
Below measurement lower limit	0.5 V or less
When filament is OFF	9.9 V or more

6.4. Multi-Ionization Gauge SH2/ST2, SH200-A/ST200-A (Ionization Mode)

$$P = 10 \times \left\{ \frac{(V - 7.25)}{0.75} + 2 \right\}$$

Status	Measurement value output voltage
In normal measurement	Voltage corresponding to measured pressure
At above measurement higher limit	9 V or more
At below measurement lower limit	0.5 V or less
When filament is OFF	9 V or more

6.5. Multi-Ionization Gauge SH2/ST2, SH200-A/ST200-A (SPU Combination mode)

$$P = 10 \times \left\{ \frac{(V - 7.25)}{0.75} + 2 \right\}$$

Status	Measurement value output voltage
During normal measurements	Voltage corresponding to the measured pressure 0.27 to 8.75 V
1×10^4 Pa or higher	8.75 V
SH2 gauge FIL OFF	Voltage corresponding to the measured by SPU 5 V to 8.75V
SH2/SH200 error (Errors such as a filament break)	Voltage corresponding to the measured by SPU 5 V to 8.75V
SPU error (Errors such as a filament break)	9.9 V or higher
Power supply voltage abnormality, sensor unit fault, etc.	0.1 V or less

6.6. Multi-Ionization Gauge SH2/ST2, SH200-A/ST200-A (SAU Combination mode)

$$P = 10 \times \{ (V - 7.25) / 0.75 + 2 \}$$

Status	Measurement value output voltage
During normal measurements	Voltage corresponding to the measured pressure 0.27 to 8.75 V
Atmospheric pressure or higher	9.5V
B-A gauge FIL OFF	Voltage corresponding to the measured by SPU, SAU 5 V to 8.75V
SH2/SH200 error (Errors such as a filament break)	Voltage corresponding to the measured by SPU, SAU 5 V to 8.75V
SPU error (Errors such as a filament break)	Voltage corresponding to the measured by SAU 8.677V to 8.75V
SAU error (Errors such as a filament break)	9.9 V or higher
Power supply voltage abnormality, sensor unit fault, etc.	0.1 V or less

6.7. Multi-Ionization Gauge SH2/ST2, SH200-A/ST200-A (SWU Combination mode)

$$P = 10 \times \{ (V - 7.25) / 0.75 + 2 \}$$

Status	Measurement value output voltage
During normal measurements	Voltage corresponding to the measured pressure 0.27 to 9.5V
Atmospheric pressure or higher	9.5V
B-A gauge FIL OFF	Voltage corresponding to the measured by SPU, SAU 5 V to 9.5V
SH2/SH200 error (Errors such as a filament break)	Voltage corresponding to the measured by SPU, SAU 5 V to 9.5V
SWU error (Errors such as a filament break)	9.9 V or higher
Power supply voltage abnormality, sensor unit fault, etc.	0.1 V or less

6.8. Cold cathode gauge SC1

$$P=10 \times (V-E) \times 10^{(E-8)}$$

Status	Measurement value output voltage
In normal measurement	Voltage corresponding to the measured pressure
Above the measurable higher limit	8.1 V or more
Below the measurable lower limit	3 V
When HV is OFF	10 V
No discharge	10 V

6.9. Ceramic capacitance manometer CCM series

$$P = k \times V \times 13.33$$

K	Type of sensor		
1000	CCMT-1000A	CCMT-1000D	CCMH-1000A
100	CCMT-100A	CCMT-100D	CCMH-100A
10	CCMT-10A	CCMT-10D	CCMH-10A
1		CCMT-1D	CCMH-1A

State	Measurement value output voltage	Remarks
In normal measurement	Voltage corresponding to measured pressure	
Above measurable higher limit	10 V	The display is "FFF".
Below measurable lower limit	0 V	The display blinks.

7. RS485

7.1. Communication Specifications

Two-wire system		Maximum number of connections	32 (including host)
Half duplex		Baud rate	9600/19200/38400
Start-stop synchronization system		DATA	8 bits
ASCII code		Parity	None
Transmission distance	30 m	Stopbit	1 bit

7.2. Standard Data Format

:	AD0	AD1	CMD	D0	Dn	SH	SL	CHKH	CHKL	CR
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- : Colon
- AD0 Device address high order 4 bits (uppercase character : 0 – 9)
- AD1 Device address low order 4 bits (uppercase character : 0 – 9)
- CMD Various commands (note uppercase character/lowercase character)
- D0 Data <4 bit> (uppercase character : 0 to 9, A –F)
- Dn Data <4 bit> (uppercase character : 0 - 9, A – F)
- SH High order 4 bits of status
- SL Low order 4 bits of status
- CHKH High order 4 bits of checksum (uppercase character : 0 - 9, A – F)
- CHKL High order 4 bits of checksum (uppercase character : 0 - 9, A – F)
- CR Carriage return

- * Checksum is an exclusive logic sum (XOR) from AD0 to SL.
- * Convert all with the ASCII code.

7.2.1. Command list

Command	Description	Command	Description
'D'	Reads measurement value and status	'1W'	Writes setpoint 1
'SR'	Reads status	'2W'	Writes setpoint 2
'SW'	Writes status	'3W'	Writes setpoint 3
'T'	Reads software	'ZER'	Adjusts SW1 zero point
'1R'	Reads setpoint 1	'ATM'	Adjusts SW1 atmospheric pressure
'2R'	Reads setpoint 2	'CLR'	Resets adjustment of SW1 zero point, atmospheric pressure adjustment
'3R'	Reads setpoint 3	'CZR'	CCM zero point adjustment
		'CCR'	Resets CCM zero point adjustment

7.3. Command

7.3.1. Reading the measurement value/status

Command	:	AD0	AD1	D	CHKH	CHKL	CR
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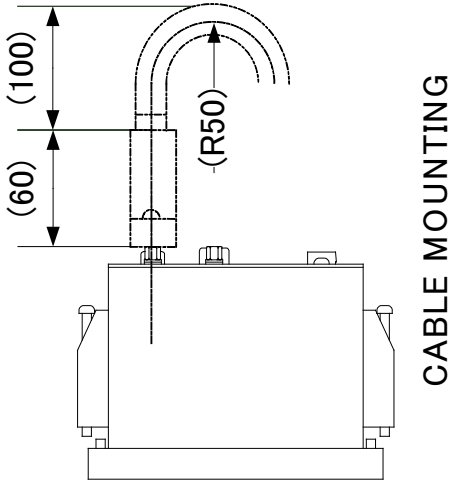
Format of returning from this instrument to PC

:	AD0	AD1	D	X	.	X	X	E	±	X	X	SH	SL	CHKH	CHKL	CR
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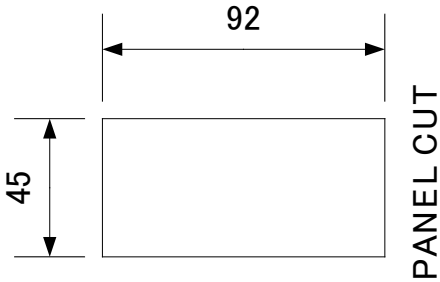
- * The measured pressure value is entered in the “X.XXE±XX” section.
- Example 1: 3.00E+03 ⇒ 3.00 × 10⁺³
- Example 2: 5.00E+00 ⇒ 5.00 × 10⁺⁰
- Example 3: 4.00E-01 ⇒ 4.00 × 10⁻¹
- * Measurement range is exceeded when “F.FFE+FF” is returned
- * Filament has burnt out when “E.EEE+EE” is returned.
- * For the status “SH” and “SL”, refer to instruction manual.
- * CCM series: When SH are all 0, pressure is plus. When SH are all 1, pressure is minus.

8. Dimensional Drawings

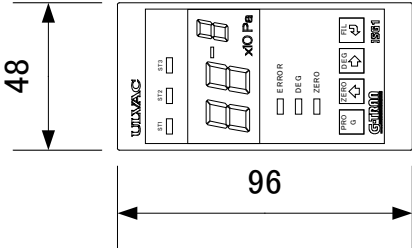
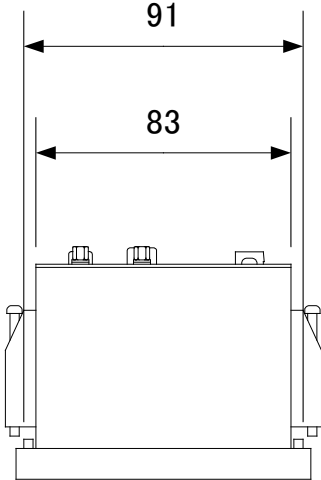
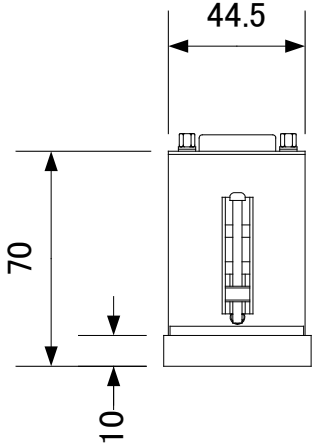
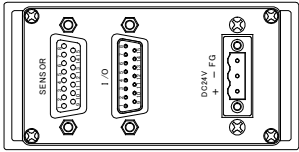
8.1. DIN panel size



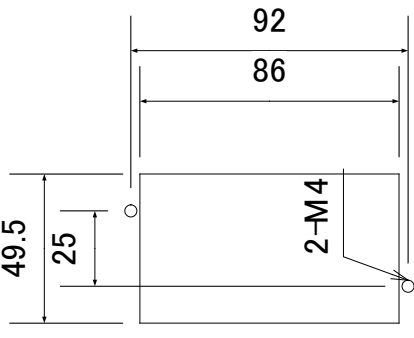
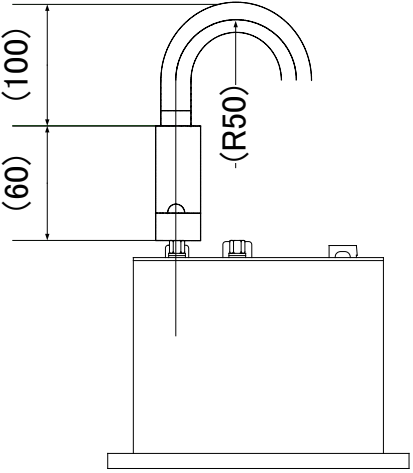
CABLE MOUNTING



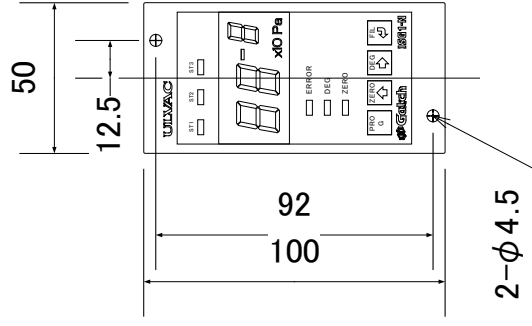
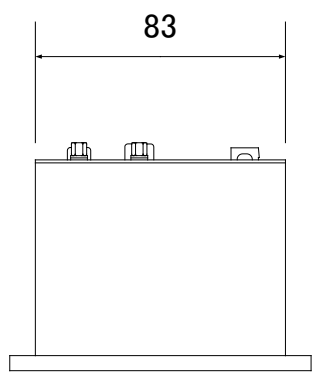
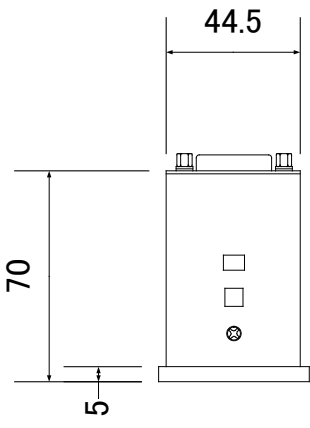
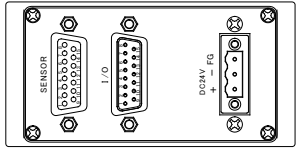
PANEL CUT



8.2. JIS panel size



PANEL CUT



9. WARRANTY

This product was shipped after rigid company inspection. However, in case any failure occurs under ULVAC's responsibility, such as defect in manufacturing and damage during transportation, Buyer shall inform ULVAC, Inc. or the local ULVAC representatives. ULVAC will repair or exchange it at free of charge.

Warrantable Items

- 1) This unit

Duration of guarantee

One (1) year after shipping date from ULVAC

Warranty scope

- 1) Domestic business in Japan: Product, which has damage, caused by a failure on delivery.
- 2) Direct export transaction: Product, which has damage, caused by a failure on delivery. The warranty scope shall conform to the new INCOTERMS.
- 3) Products not satisfying meet the standard specifications although the product is used under the normal service conditions such as temperature range and power etc.

Response procedure

- 1) Domestic business in Japan: ULVAC send a replacement or Buyer return the defective items to ULVAC, Inc. or to the local ULVAC representatives for repair. If field service is required, Buyer shall ask ULVAC, Inc. or the local ULVAC representatives.
- 2) Direct export transaction: ULVAC send a replacement or Buyer return the defective items to ULVAC, Inc. or to the local ULVAC representatives for repair. Return charge shall be paid by Buyer.

Disclaimer

- 1) Failure occurred after expiration of warranty period
- 2) Failure caused by force majeure, such as fire, storm and flood damage, earthquake, lightning strike, war etc
- 3) Failure occurred due to carelessness handling or faulty usage
- 4) Products remodeled, disassembled or repaired without ULVAC's acceptance
- 5) Failure occurred under abnormal environment, such as intense electromagnetic field, radiation, high-temperature, high-humidity, flammable gases, corrosive gases, dust etc.
- 6) Failure occurred by noise
- 7) Product deficiency or secondary damage occurred to Buyer, from law suit to ULVAC by third party for patent infringement.
- 8) Sensor head being used (expiration of life, measurement error, etc.)
- 9) Sensor head cable in use (cable burnout due to improper installation, poor contact, etc.)

Others

- 1) In case, special agreement or memorandum for specifications is made individually, the descriptions are prior to this article "13 Product Warranty".
- 2) Buyer shall inform ULVAC when this product is exported out of Japan. In the meantime, Buyer shall take necessary procedures according to Foreign Exchange and Foreign Trade Law.
- 3) As for the question and consultation, Buyer shall check the model and serial number and ask the local representative or ULVAC, Inc.
- 4) The content of this document is subject to change without notice in future.