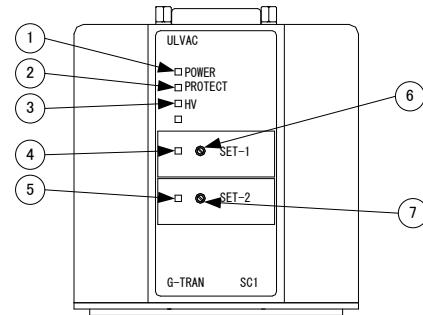


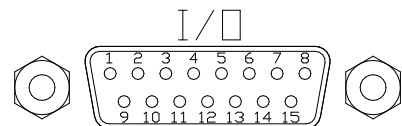
# G-TRAN SERIES Cold Cathode Ion gauge SC1 Quick Manual

**Introduction**  
 This quick manual is for quick check of operation and display of the product. Please refer to instruction manual in advance for detailed information about operation, precautions and safety for proper use. Available for download from ULVAC website. <https://showcase.ulvac.co.jp/en>  
 This manual is for the following gauges. Serial Nos. 02300G and higher.

## 1. Part Name and Functions



Component (Inscription)	Function
POWER lamp (POWER)	Lights when power is supplied to the sensor unit.
PROTECT lamp	(Not used)
HV lamp (HV)	Lights when HV ON signal input.
SET-1 lam (SET-1)	Lights when setpoint 1 is actuated.
SET-2 lamp (SET-2)	Lights when setpoint 2 is actuated.
SET-1 setting trimmer (SET-1)	Sets the value of setpoint 1 by adjusting the trimmer.
SET-2 setting trimmer (SET-2)	Sets the value of setpoint 2 by adjusting the trimmer.



(D-sub 15 socket (M2.6 screw))

Terminal No	Box unit
1	Power supply +24 V
2	NC
3	Setpoint actuating signal 1
4	Discharge OK/NG
5	HV ON/OFF
6	NC
7	Setpoint 1 set value
8	Measurement value (nonlinear output)
9	Power ground
10	OUT-COM (setpoint)
11	Setpoint actuating signal 2
12	NC
13	NC
14	Setpoint 2 set value
15	Analog GND

## 2. Installation

### 2.1. Preparation

- Unpack the unit and check quantities.
- Check components to see if any components are damaged.

### 2.2. Installation

#### 2.2.1. Installing the sensor unit

Install the sensor head to the gauge port of the vacuum system.

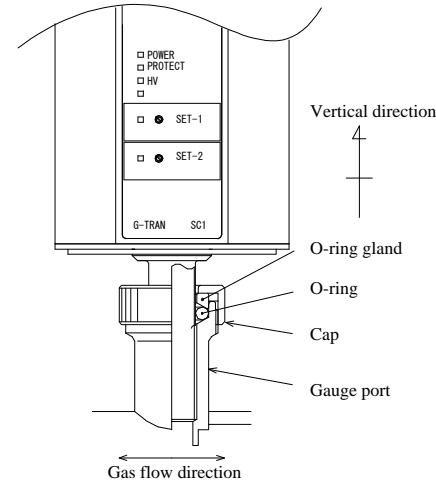
#### (1) Measuring position

This gauge measures the static pressure in the position where the sensor head is installed. If there is a gas flow, source of outgas or intense electrons or ions in the vacuum system, carefully select the measuring position so that measurement is least affected by them.

#### (2) Installing the sensor head

Install the sensor head in such a manner that the plane of the sensor mounting port is parallel to gas flow. Ensure that gas does not enter the sensor head in the form of beam.

O-rings to be used in installing the sensor head should be as free from outgas as possible. Use of rubber pipes or grease that release much outgas can be a cause of error.



#### 2.2.2. Electrical connection

Cautions:

- Install the sensor head first and make electrical connection finally.
- GND [10pin] and GND [15pin]** are common. Use these for the setpoint actuating signal GND, setpoint set value GND and burnout detection GND.
- Power GND [9pin] and GND [10pin] [15pin] are common inside after being filtered through the filter.** Use power +24V [1 pin] and power GND [9pin] in power line connection. If other GND is used, measurement may be affected by noise.
- Fix the cable so that undue force is not exerted to the connections of the cable.
- Securely tighten the connector fixing screws.
- In supplying power to the sensor unit, do not mistake pin numbers.

## 3. Cautions in Handling

- Start measurement more than one minute after turning on power and the output is stabilized.
- Do not turn off the power to the sensor head during a sequence of measurements.
- The characteristics of the sensor head may change if it is exposed to a chemically active or highly adsorptive gas. In that event, fill the sensor head with nitrogen or inert gas or dry air with the sensor head energized with power and pump it for purging and repeat this step. It may be restored to the original condition. However, do not spray such gas to the opening of the sensor head for purging. If there is no prospect of the characteristic being restored, replace the sensor head with a new one.
- The magnetron type vacuum gauge is sensitive to all types of gas, but the sensitivity varies with the type of gas. The unit displays pressure by assuming that the gas is air.
- This gauge uses no consumable part like hot filament, but if a high voltage is applied for an extended time at a pressure exceeding the higher limit of measurable pressure, the sensor head interior may be contaminated.
- Be careful about pressure when starting measurement (start discharge by turning on HV). It is difficult to discharge in the 10-5Pa(10-7Torr) range. In case it was impossible to discharge, keep pressure more than 10-3Pa(10-5Torr) range and turn on HV.
- When pressure is more than measurable range, turn off HV and stop measurement.

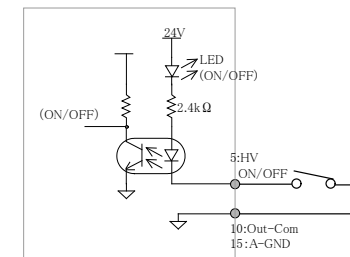
## 4. Output Signals

### 4.1. Control Operation

#### 4.1.1. High Voltage ON/OFF [HV ON/OFF]

Turns ON/OFF the sensor head high voltage. (Lo input when HV is ON.)

※When currents more than 0.1mA flow, between a signal pin and GND terminals, in SC1 internal circuit, there is a case to process as the signal input.

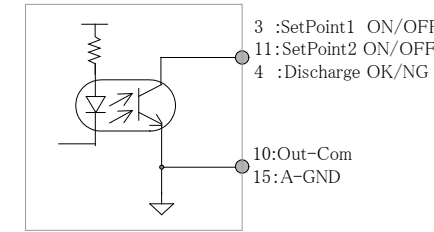


### 4.2. Output Signals

Signals are outputted from the connector at the top of the sensor unit in the open collector format. Fig. 7-1 shows its internal circuit.

#### 4.2.1. Setpoint actuating signal [SET-1 ON/OFF][SET-2 ON/OFF]

The internal transistor will be actuated if the measured value is lower than the set pressure. (Lo output when setpoint is ON.)

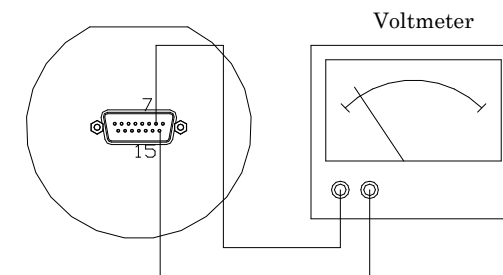


#### 4.2.2. Discharge valid signal [Discharge OK/NG]

If the discharge current is flowing normally when the high voltage is turned ON, Discharge Valid will be OK and the internal transistor will operate (Lo output when Emission Valid is OK). The Display unit (IM1R1/IM2R1) works while watching this signal. When the cable production, a constipated line is necessary.

## 5. Setting of Sstpoint

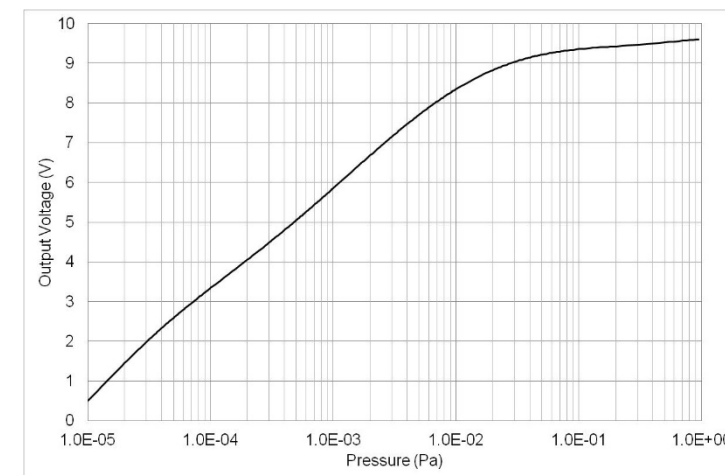
To use the setpoint, make necessary settings according to the following procedure. (Both setpoints 1 and 2 have been factory set at near  $1.0 \times 10^{-2}$  Pa (approx. 8.4 V). Connect pin 1 [+24V power] and pin 9 [power GND] of the I/O connector of SC1 and connect a voltmeter between the setpoint set value and GND. Between 7-pin [setpoint 1 set value] and 10-pin or 15-pin [GND] Between 14-pin [setpoint set value 2] and 10-pin or 15-pin [GND]



## 6. Measurement Value Output

### 6.1.1. Measurement value voltage output form

All measurable pressure ranges are output by an analog voltage of 0 to 10 volts (non-linear). The measurement value voltage is output between the measured value of I/O connector [8 pin] and GND [10 pin or 15 pin].



### 6.1.2. Measurement value outputs in each condition

Table 9-1 gives the measurement value outputs in several conditions that can occur during measurement.

Operating condition	Measurement value output voltage
In normal measurement	Voltage corresponding to measured pressure
When discharge is not set up	10 V or more
Below measurable lower limit	Voltage corresponded to pressure (reference only)
Below measurable greatly lower limit※1	10 V or more

※1: There is possibility that output voltage is less than 0V due to change of environmental temperature when output voltage is around 0V. If output voltage value is minus, it shows output voltage is more than 10V (same condition as it does not discharge).

## 7. Mounting/Dismounting the sensor head

### 7.1. Preliminary Operation

- Unpack the case and check quantities of components.
- Check the gauge to see if any component is damaged in transit.
- Before removing the sensor head, verify that the main power to the gauge is turned off. This vacuum gauge is energized with a high voltage. For safety, remove the IO connector before starting maintenance.



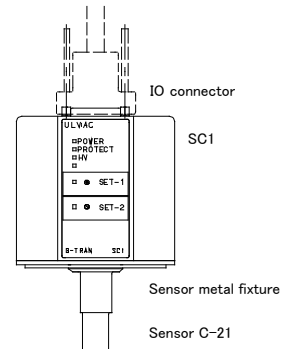
### 7.2. Applicable Sensor Heads

The G-TRAN SC1 gauge accepts four types of sensor heads C-21, -23, -24 and -25.

### 7.3. Installation and Removal of C-21

#### 7.3.1. Components

This vacuum gauge consists of SC1 measuring circuit, C-21 sensor head and sensor metal fixtures that fix SC1 and C21. Power to the sensor is supplied and signals from the sensor are taken out through the IO connector. Do not connect the IO connector when the sensor head is being installed or removed.



#### 7.3.2. Mounting/removing

- Remove the sensor metal fixture by removing 3 screws.
- Remove the screws on the outer periphery of the metal fixture.

The electrode in the sensor head can be cleaned without removing the sensor metal fixture from the sensor head. To replace the sensor head body, remove the 3 screws on the inner periphery of the sensor metal fixture.

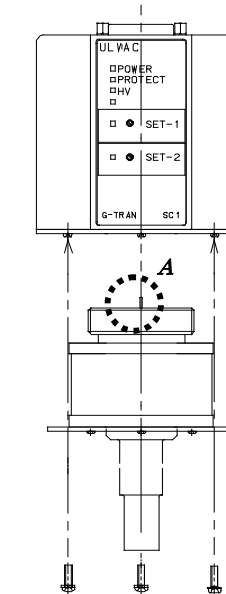
- Remove the sensor head (C-2\*).

The sensor head includes a magnet. When handling a tool in the vicinity of the sensor head, be careful with a metal object nearby (The tool will be attracted by the magnet).

- For the cleaning of the sensor head interior, refer to the next paragraph.
- To install the sensor head, fix it to the SC1 circuit using the sensor metal fixture.

The sensor head and circuit are connected through the terminal in the middle of the sensor head ("A" section in the figure at left). Be slow in installing the sensor head while verifying that the sensor head terminal is inserted into the connector of the circuit board. After installing the sensor head, check that the sensor head turns without resistance. If the sensor head is correctly inserted, it should go into the depth of the SC1 gauge and can be fixed with the sensor metal fixture.

※The sensor head is coaxial, with a terminal in the center. The sensor head may turn after being installed, but this is not the problem of assembly, but because of its structure.



## 8. Specifications

Name	Cold cathode ion gauge SC1
Connectable sensor head	One pc
Compatible sensor head	C-21, C-23, C-24, C-25
Measurable pressure range	$1.0 \times 10^{-5}$ to 1 Pa
Measurement accuracy (when shipped from factory)	Scale factor 2 ※Scale factor 2 : -50% ~ +100%
Applied voltage	Approx. 2.5 kVDC
Operating temperature range	10 to 40°C
Control input signal	HV ON/OFF
Data output	0 V to 10 VDC, non-linear Measurement data Setpoint actuating set value 1/2: data
Control output signal	Open collector output, negative logic [24 VMAX, 50 mA MAX, saturation voltage is 1 V] Setpoint actuating signal -1/2 Discharge confirm signal
LED display	POWER, SET-1, SET-2, HV
Power supply	24 VDC $\pm$ 2 V, 150 mA (sensor unit alone)
Input/output connector	D-sub 15-pin (M2.6 screw)
Weight of main unit	430 g (not including sensor head)

### 8.1. Standard Accessories

Connector	D-sub 15 socket (M2.6 screw)	1 pc.
Clamp hood		1 pc.
Quick manual	this paper	1 copy

### 8.2. Options

Display unit	Digital	IM1R1 (24VDC power supply type) IM2R1 (100VAC power supply type) ISG1 (24VDC power supply type)
Sensor head		C-21, C-23, C-24, C-25
Display cable		2 m, 5 m, and 10 m (between measuring unit and display unit)

### 8.3. Service Parts

Needle electrode (SC1)	
Magnetic pole (SC1)	Magnetic pole-1, Magnetic pole-2, Spacer

## 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: 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.

## 10. Certificate of Decontamination

All material must be certified as decontaminated and this certificate must be submitted to your closest local ULVAC service center or sales office prior to shipment. The form is available for download from ULVAC website.

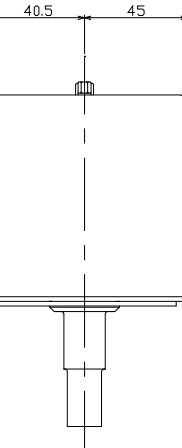
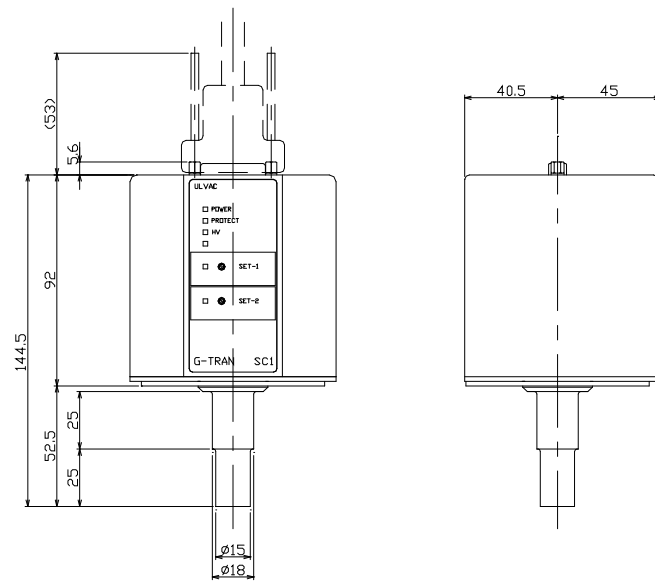
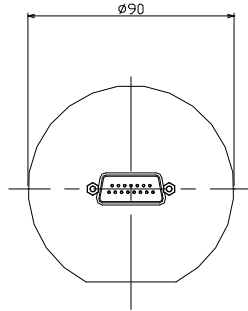
## 11. Network

ULVAC, Inc: <http://www.ulvac.co.jp/eng/index.html>

Service Centers: <http://www.ulvac.co.jp/eng/support/service/index.html>

Sales Offices: [http://www.ulvac.co.jp/eng/support/sales\\_office/index.html](http://www.ulvac.co.jp/eng/support/sales_office/index.html)

## 12. Drawing



ULVAC, Inc.  
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