

**G-TRAN SERIES**  
**SENSOR UNIT**  
**MODEL SC1 COLD-CATHODE ION GAUGE**  
**SPECIFICATIONS**



This manual is for the SC1 cold-cathode ion gauges of the following serial numbers.

Serial No. 02300G and higher

**Components Division,**  
**ULVAC , Inc.**

# 1. SPECIFICATIONS

## 1.1. Key Specifications

Name	Inverted magnetron type vacuum gauge Model SC1	
Connectable sensor head	One pc.	
Compatible sensor head	C-21, C-23, C-24, C-25	
Measurable pressure range	1.0 × 10 <sup>-5</sup> to 1 Pa	
Measurement accuracy (N <sub>2</sub> ) (when shipped from factory)	Scale factor 2 *Scale factor 2: -50% to +100%	
Applied voltage	Approx. 2.6 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	
	Setpoint actuating set value 2	
Control output signal	Open collector output, negative logic [24 VMAX, 50 mAMAX, saturation voltage is 1V]	
	Setpoint actuating signal -1 [ON/OFF]	
	Setpoint actuating signal -2 [ON/OFF]	
	Discharge confirm signal [OK/NG]	
LED display	POWER	SET-1
	ERROR	SET-2
Power supply	24 VDC ± 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)	
Outside dimensions	See Dimensional Drawing.	

## 1.2. Standard Accessories

Connector	D-sub 15 socket (M2.6 screw)	1 pc.
Clamp hood		1 pc.
Quick Manual		1 pc

## 1.3. Options

Display unit	Digital	Model IM1R1 (24VDC power supply type) Model IM2R1 (100VAC power supply type) Model ISG1 (24VDC power supply type)
		See 3.1 Key Specifications "Compatible Sensor Head".
Sensor head	See 3.1 Key Specifications "Compatible Sensor Head".	
Display cable	2 m, 5 m, and 10 m (between measuring unit and display unit)	
JCSS Calibration certificate		
Calibration certificate		
Test results certificate		

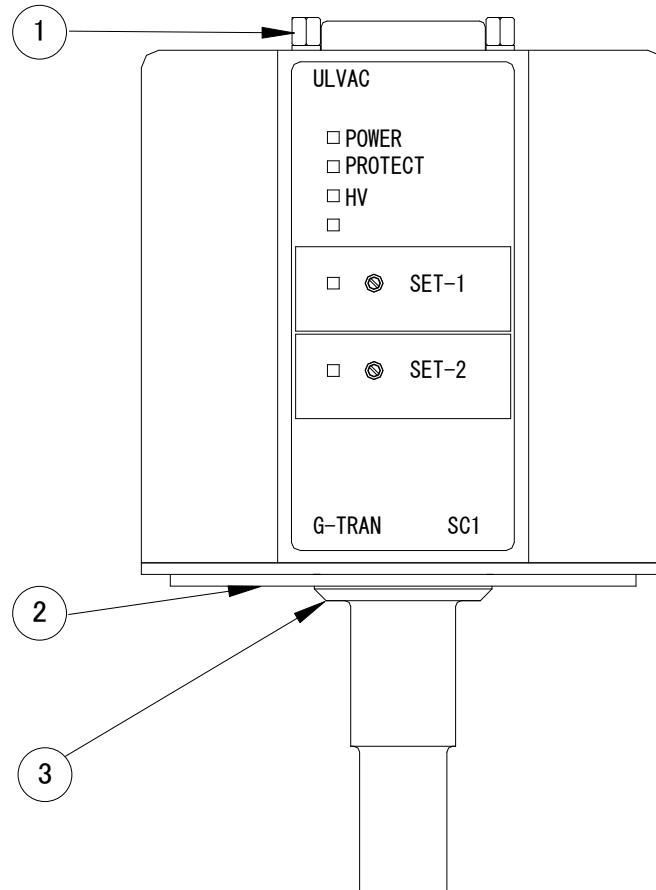
Traceability certificate	

#### 1.4. Service Parts

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

## 2. NOMENCLATURE AND FUNCTIONS OF COMPONENTS

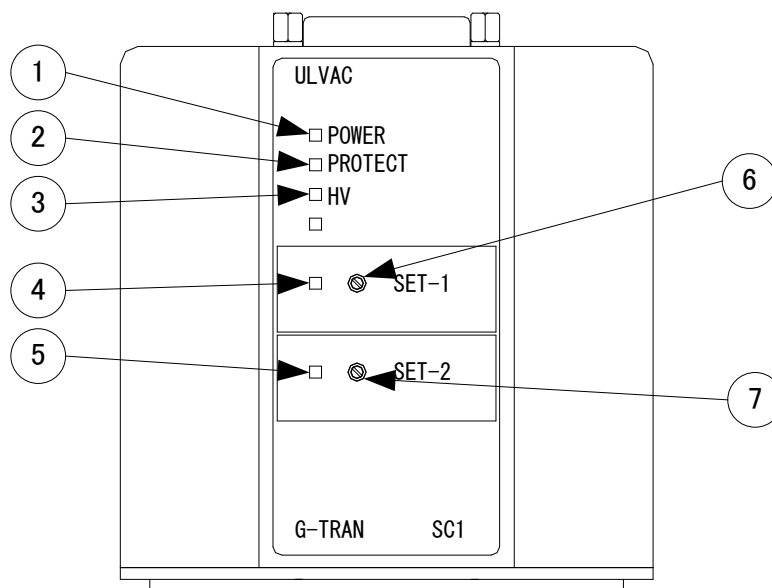
### 2.1. Assembly



Assembly

No.	Component (Inscription)	Function
①	I/O connector	I/O connector for power supply, data and signal (D-sub 15-pin) See section 2.3 for pin No.
②	CCG sensor fixing plate	Metal plate that fixes the sensor head to the SC1.
③	C ring	Ring that fixes the magnet. Do not remove it.

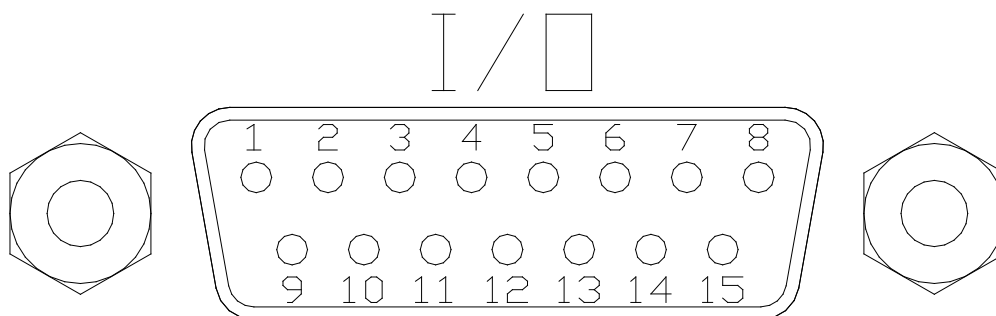
## 2.2. Front Panel



Front panel

No.	Component (Inscription)	Function
①	POWER lamp (POWER)	Lights when power is supplied to the sensor unit.
②	PROTECT lamp (PROTECT)	(Not used)
③	HV lamp (HV)	Lights when HV ON signal input.
④	SET-1 lamp (SET-1)	Lights when setpoint 1 is actuated.
⑤	SET-2 lamp (SET-2)	Lights when setpoint 2 is actuated.
⑥	SET-1 setting trimmer (SET-1)	Sets the value of setpoint 1 by adjusting the trimmer.
⑦	SET-2 setting trimmer (SET-2)	Sets the value of setpoint 2 by adjusting the trimmer.

### 2.3. Input/Output Connector



Input/output connector pin assignment

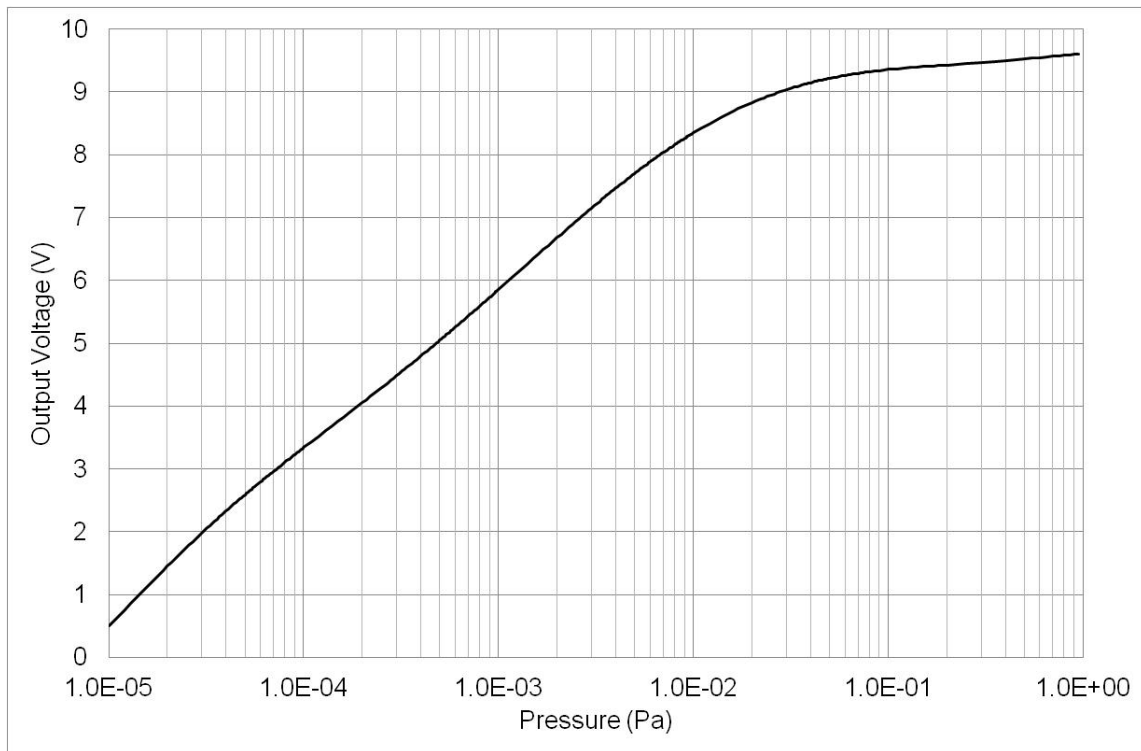
Terminal No.*	Box unit	Direction of signal	Connected to
1	Power supply +24 V	←	Power
2	NC	—	
3	Setpoint actuating signal 1	→	Remote host display unit
4	Discharge OK/NG	→	
5	HV ON/OFF	←	
6	NC	—	
7	Setpoint 1 set value	→	
8	Measurement value (nonlinear output)	→	
9	Power ground	—	Power
10	OUT-COM (setpoint)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

\* Do not make wiring connection to “NC”. Malfunction or damage can result.

### 2.3.1. Measurement value voltage output form

All measurable pressure ranges are output by an analog voltage of 0 to 10 volts (non-linear). See section 4.1 for the relationship between the pressure and the measurement value output voltage.

The measurement value voltage is output between the measured value of I/O connector [8 pin] and GND [10 pin or 15 pin]. See section 2.3.



Pressure-measurement value output graph (Pa)

### 2.3.2. Measurement value outputs in each condition

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

Table. Measurement Value Output Voltages

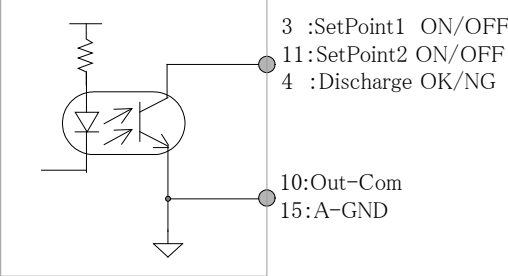
Operating condition	Measurement value output voltage
In normal measurement	Voltage corresponding to measured pressure
When discharge is not set up	10 V or more
Below measurable lower limit	Voltage corresponded to pressure (reference only)
Below measurable greatly lower limit <sup>※1</sup>	10 V or more

※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).

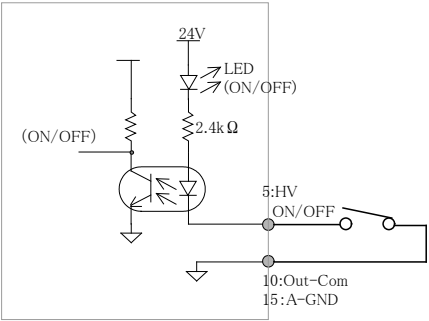
### 3. I/O Signal Output

#### 3.1. Signal Output



Signal output internal circuit diagram

#### 3.2. Signal inputs



Signal input Internal circuit diagram

#### 4. 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
- 2) Sensor head on delivery

##### 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.

The content of this document is subject to change without notice in future.



## 5. APPENDIX

### 5.1. Pressure-Measurement Value Voltage Table

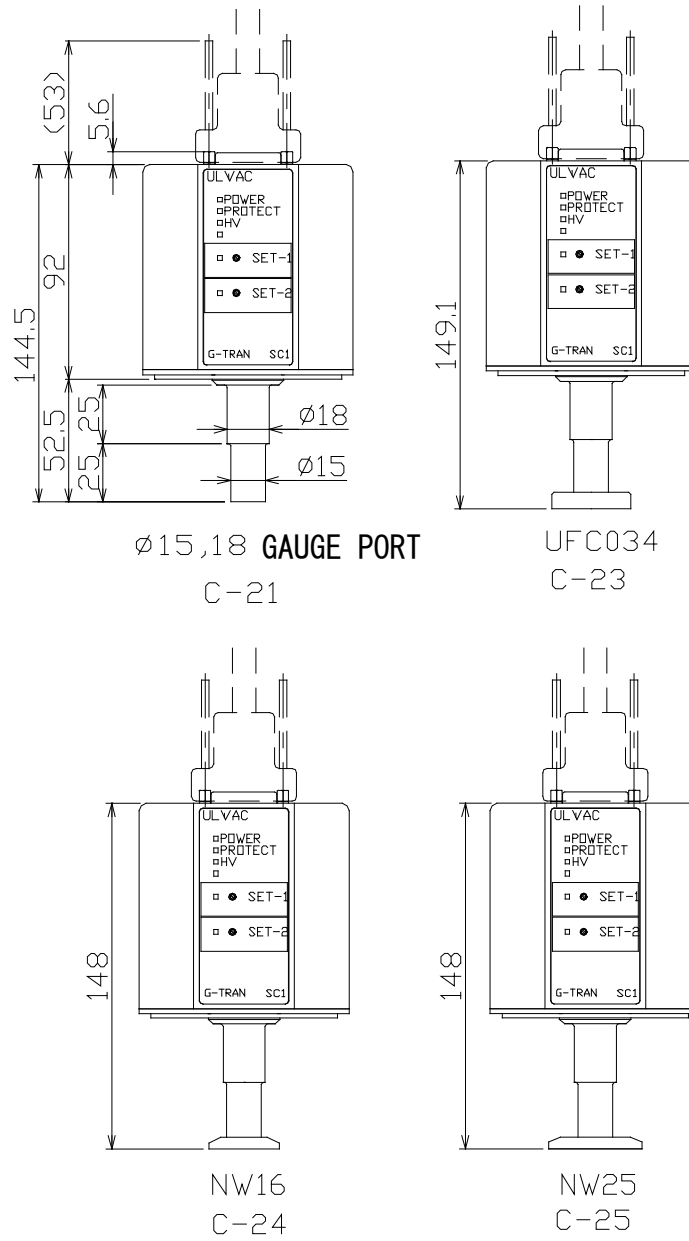
Pressure [Pa]	Measurement value output [V]	Pressure [Pa]	Measurement value output [V]	Pressure [Pa]	Measurement value output [V]
1.00E-05	0.500	6.00E-05	2.795	2.00E-04	4.056
1.10E-05	0.629	6.10E-05	2.814	2.10E-04	4.107
1.20E-05	0.749	6.20E-05	2.831	2.20E-04	4.156
1.30E-05	0.859	6.30E-05	2.849	2.30E-04	4.202
1.40E-05	0.962	6.40E-05	2.866	2.40E-04	4.247
1.50E-05	1.058	6.50E-05	2.883	2.50E-04	4.290
1.60E-05	1.147	6.60E-05	2.900	2.60E-04	4.332
1.70E-05	1.230	6.70E-05	2.916	2.70E-04	4.372
1.80E-05	1.309	6.80E-05	2.932	2.80E-04	4.411
1.90E-05	1.382	6.90E-05	2.948	2.90E-04	4.448
2.00E-05	1.452	7.00E-05	2.963	3.00E-04	4.485
2.10E-05	1.518	7.10E-05	2.978	3.10E-04	4.520
2.20E-05	1.580	7.20E-05	2.994	3.20E-04	4.555
2.30E-05	1.639	7.30E-05	3.008	3.30E-04	4.588
2.40E-05	1.695	7.40E-05	3.023	3.40E-04	4.620
2.50E-05	1.748	7.50E-05	3.037	3.50E-04	4.652
2.60E-05	1.799	7.60E-05	3.051	3.60E-04	4.683
2.70E-05	1.847	7.70E-05	3.065	3.70E-04	4.713
2.80E-05	1.894	7.80E-05	3.079	3.80E-04	4.742
2.90E-05	1.939	7.90E-05	3.092	3.90E-04	4.771
3.00E-05	1.981	8.00E-05	3.106	4.00E-04	4.799
3.10E-05	2.022	8.10E-05	3.119	4.10E-04	4.826
3.20E-05	2.062	8.20E-05	3.132	4.20E-04	4.853
3.30E-05	2.100	8.30E-05	3.145	4.30E-04	4.879
3.40E-05	2.137	8.40E-05	3.157	4.40E-04	4.905
3.50E-05	2.172	8.50E-05	3.170	4.50E-04	4.930
3.60E-05	2.206	8.60E-05	3.182	4.60E-04	4.955
3.70E-05	2.239	8.70E-05	3.194	4.70E-04	4.979
3.80E-05	2.272	8.80E-05	3.206	4.80E-04	5.003
3.90E-05	2.303	8.90E-05	3.218	4.90E-04	5.026
4.00E-05	2.333	9.00E-05	3.230	5.00E-04	5.049
4.10E-05	2.362	9.10E-05	3.241	5.10E-04	5.071
4.20E-05	2.390	9.20E-05	3.253	5.20E-04	5.093
4.30E-05	2.418	9.30E-05	3.264	5.30E-04	5.115
4.40E-05	2.445	9.40E-05	3.275	5.40E-04	5.136
4.50E-05	2.471	9.50E-05	3.286	5.50E-04	5.157
4.60E-05	2.496	9.60E-05	3.297	5.60E-04	5.178
4.70E-05	2.521	9.70E-05	3.308	5.70E-04	5.198
4.80E-05	2.545	9.80E-05	3.319	5.80E-04	5.218
4.90E-05	2.569	9.90E-05	3.329	5.90E-04	5.238
5.00E-05	2.592	1.00E-04	3.340	6.00E-04	5.257
5.10E-05	2.614	1.10E-04	3.439	6.10E-04	5.276
5.20E-05	2.636	1.20E-04	3.528	6.20E-04	5.295
5.30E-05	2.657	1.30E-04	3.611	6.30E-04	5.313
5.40E-05	2.678	1.40E-04	3.687	6.40E-04	5.332
5.50E-05	2.699	1.50E-04	3.758	6.50E-04	5.350
5.60E-05	2.719	1.60E-04	3.825	6.60E-04	5.367
5.70E-05	2.739	1.70E-04	3.887	6.70E-04	5.385
5.80E-05	2.758	1.80E-04	3.946	6.80E-04	5.402
5.90E-05	2.777	1.90E-04	4.003	6.90E-04	5.419

Pressure [Pa]	Measurement value output [V]	Pressure [Pa]	Measurement value output [V]	Pressure [Pa]	Measurement value output [V]
7.00E-04	5.436	3.00E-03	7.151	8.00E-03	8.156
7.10E-04	5.452	3.10E-03	7.188	8.10E-03	8.167
7.20E-04	5.469	3.20E-03	7.223	8.20E-03	8.178
7.30E-04	5.485	3.30E-03	7.258	8.30E-03	8.188
7.40E-04	5.501	3.40E-03	7.291	8.40E-03	8.199
7.50E-04	5.516	3.50E-03	7.323	8.50E-03	8.209
7.60E-04	5.532	3.60E-03	7.354	8.60E-03	8.219
7.70E-04	5.547	3.70E-03	7.384	8.70E-03	8.230
7.80E-04	5.562	3.80E-03	7.413	8.80E-03	8.239
7.90E-04	5.577	3.90E-03	7.441	8.90E-03	8.249
8.00E-04	5.592	4.00E-03	7.469	9.00E-03	8.259
8.10E-04	5.607	4.10E-03	7.495	9.10E-03	8.268
8.20E-04	5.621	4.20E-03	7.521	9.20E-03	8.277
8.30E-04	5.635	4.30E-03	7.546	9.30E-03	8.287
8.40E-04	5.650	4.40E-03	7.570	9.40E-03	8.296
8.50E-04	5.664	4.50E-03	7.594	9.50E-03	8.304
8.60E-04	5.677	4.60E-03	7.617	9.60E-03	8.313
8.70E-04	5.691	4.70E-03	7.640	9.70E-03	8.322
8.80E-04	5.704	4.80E-03	7.662	9.80E-03	8.330
8.90E-04	5.718	4.90E-03	7.683	9.90E-03	8.339
9.00E-04	5.731	5.00E-03	7.704	1.00E-02	8.347
9.10E-04	5.744	5.10E-03	7.724	1.10E-02	8.423
9.20E-04	5.757	5.20E-03	7.744	1.20E-02	8.491
9.30E-04	5.770	5.30E-03	7.763	1.30E-02	8.550
9.40E-04	5.783	5.40E-03	7.782	1.40E-02	8.603
9.50E-04	5.795	5.50E-03	7.800	1.50E-02	8.651
9.60E-04	5.808	5.60E-03	7.818	1.60E-02	8.694
9.70E-04	5.820	5.70E-03	7.836	1.70E-02	8.733
9.80E-04	5.832	5.80E-03	7.853	1.80E-02	8.768
9.90E-04	5.844	5.90E-03	7.870	1.90E-02	8.801
1.00E-03	5.856	6.00E-03	7.886	2.00E-02	8.831
1.10E-03	5.970	6.10E-03	7.903	2.10E-02	8.858
1.20E-03	6.073	6.20E-03	7.918	2.20E-02	8.884
1.30E-03	6.169	6.30E-03	7.934	2.30E-02	8.908
1.40E-03	6.257	6.40E-03	7.949	2.40E-02	8.930
1.50E-03	6.340	6.50E-03	7.964	2.50E-02	8.950
1.60E-03	6.417	6.60E-03	7.978	2.60E-02	8.969
1.70E-03	6.489	6.70E-03	7.993	2.70E-02	8.987
1.80E-03	6.557	6.80E-03	8.007	2.80E-02	9.004
1.90E-03	6.621	6.90E-03	8.020	2.90E-02	9.020
2.00E-03	6.681	7.00E-03	8.034	3.00E-02	9.035
2.10E-03	6.739	7.10E-03	8.047	3.10E-02	9.049
2.20E-03	6.793	7.20E-03	8.060	3.20E-02	9.062
2.30E-03	6.845	7.30E-03	8.073	3.30E-02	9.075
2.40E-03	6.895	7.40E-03	8.085	3.40E-02	9.087
2.50E-03	6.942	7.50E-03	8.098	3.50E-02	9.098
2.60E-03	6.987	7.60E-03	8.110	3.60E-02	9.109
2.70E-03	7.031	7.70E-03	8.121	3.70E-02	9.119
2.80E-03	7.072	7.80E-03	8.133	3.80E-02	9.129
2.90E-03	7.112	7.90E-03	8.145	3.90E-02	9.138

Pressure [Pa]	Measurement value output [V]	Pressure [Pa]	Measurement value output [V]	Pressure [Pa]	Measurement value output [V]
4.00E-02	9.147	7.50E-01	9.573		
4.10E-02	9.155	8.00E-01	9.581		
4.20E-02	9.163	8.50E-01	9.588		
4.30E-02	9.171	9.00E-01	9.594		
4.40E-02	9.178	9.50E-01	9.600		
4.50E-02	9.185				
4.60E-02	9.192				
4.70E-02	9.198				
4.80E-02	9.204	When HV-OFF	10.000V or more		
4.90E-02	9.210				
5.00E-02	9.216				
5.20E-02	9.227				
5.40E-02	9.237				
5.60E-02	9.246				
5.80E-02	9.255				
6.00E-02	9.263				
6.20E-02	9.271				
6.40E-02	9.278				
6.60E-02	9.284				
6.80E-02	9.290				
7.00E-02	9.296				
7.20E-02	9.302				
7.40E-02	9.307				
7.60E-02	9.312				
7.80E-02	9.317				
8.00E-02	9.321				
8.50E-02	9.332				
9.00E-02	9.341				
9.50E-02	9.349				
1.00E-01	9.356				
1.10E-01	9.369				
1.20E-01	9.379				
1.30E-01	9.388				
1.40E-01	9.396				
1.50E-01	9.403				
1.60E-01	9.410				
1.70E-01	9.415				
1.80E-01	9.421				
1.90E-01	9.425				
2.00E-01	9.430				
2.50E-01	9.450				
3.00E-01	9.468				
3.50E-01	9.483				
4.00E-01	9.498				
4.50E-01	9.511				
5.00E-01	9.523				
5.50E-01	9.535				
6.00E-01	9.546				
6.50E-01	9.556				
7.00E-01	9.565				

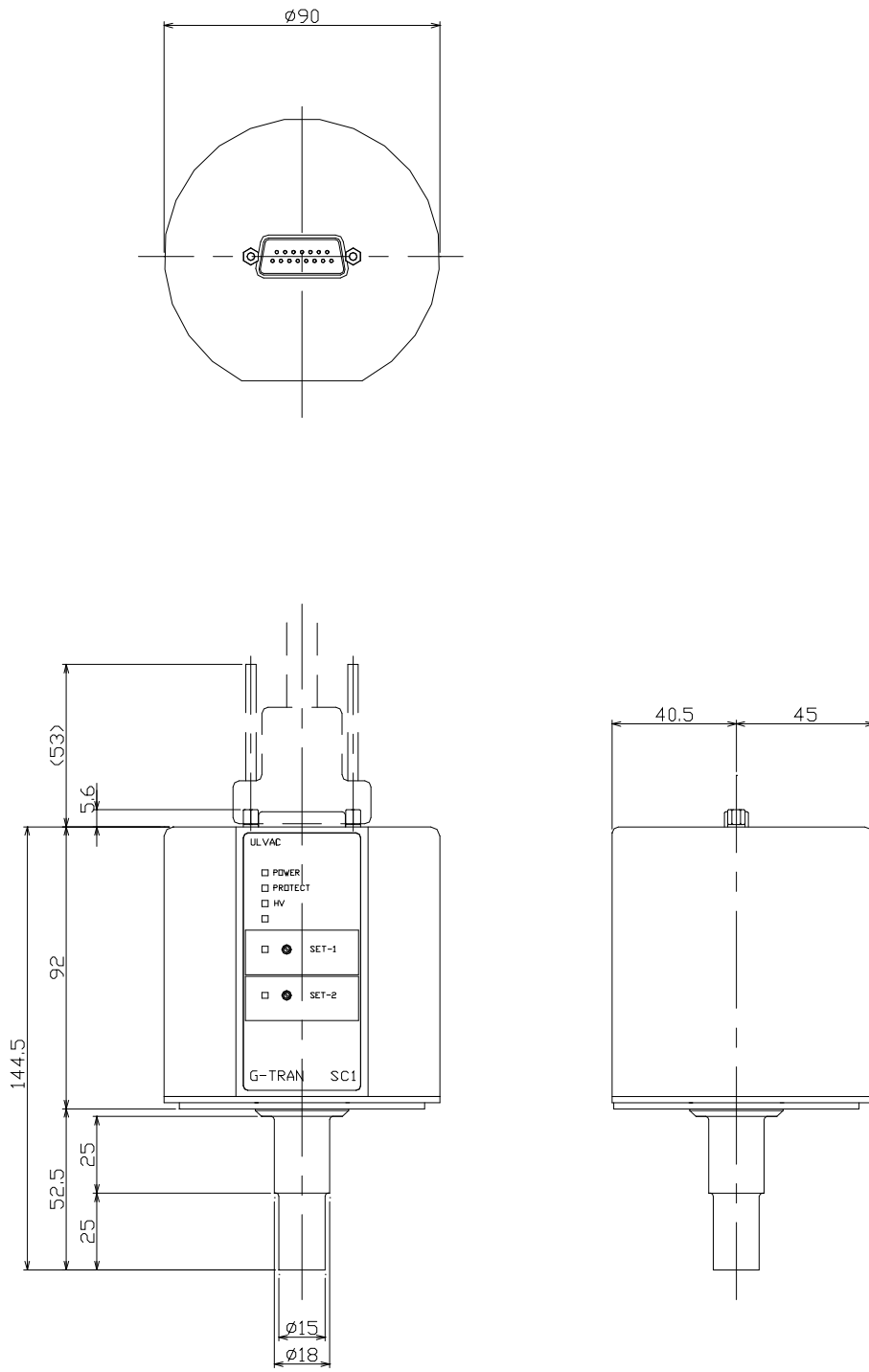
## 5.2. Related Drawings

### 5.2.1. Compatible Sensor Heads



Compatible sensor heads

Sensor head model name	Mounting port diameter
C-21	15, 18 mm dia.
C-23	UFC034
C-24	NW16
C-25	NW16



Dimensional drawing