

ZT11

Pressure Sensor for the Semiconductor Industry

Outline

This is a pressure sensor with a thin-film semiconductor strain gauge.

We have added an increased-safety construction type to our lineup, further enhancing safety when using equipment.

Features

- A zero adjustment mechanism is provided on the side of the case to improve workability.
- Lineup includes UHP-grade models equivalent to Hastelloy® C-22.
- Added increased safety (Ex ec) models to our line up.

| Product appearance | | |
|--------------------|------------------------------|--------------------------------------|
| Type | Standard (Gauge pressure) | Increased safety (Gauge pressure) |
| Model number | ZT11-2 | ZT11-F, H |
| Label color | Green | Black |



List of grade

Cleanliness These pressure sensors have been assembled, adjusted, inspected and packaged in a clean room, paying special attention for maintaining cleanliness.

| Grade | UHP (Ultra-High Purity) | EP (Electro Polishing) | GP (General Purpose) | |
|-------------------------------------|---|----------------------------|------------------------------|--|
| Surface roughness of gas contact | 0.13 μm Ra Avg. | 0.18 μm Ra Avg. | 0.5 μm Ra Avg. | |
| Wetted parts | Pressure sensor | Hastelloy® C-22 equivalent | SUS316L | |
| | Fitting | SUS316L | | |
| Maximum allowable pressure *1 | 200% of rated pressure | 150% of rated pressure | | |
| Leakage (Helium leak rate) | 5 × 10 ⁻¹² Pa · m ³ /s or under | | | |
| Particle | Zero count for size 0.1 μm or greater (In our inspection standard) | | No regulation | |
| Cleaning | Ultra clearance (Cleaning) | | Degreasing | |
| Operating media *2 (Recommended) | High-purity gas, semiconductor material gas, etc. | | Purge gas, exhaust gas, etc. | |

*1 The maximum allowable pressure is the highest pressure at which the product safely returns to normal operation once the pressure is reduced back within the rated range after temporary overpressure. It can withstand several static overpressure events of about 10 minutes each without performance degradation, but repeated overpressure exposure is not guaranteed.

*2 Please confirm if the gas contact part material is suitable for the gas to be measured.

* UHP and EP grade products are double-packed (N2 sealed).

Specification

| Item | Descriptions | | | | |
|--------------------------------------|---|---|----|---|--|
| Measurement fluid | Various kinds of process gases for semiconductor | | | | |
| Fitting shape | Type T integral structure (forged), Type S, Surface-mount fitting | | | | |
| Connection | Integral structure compatible with 1/4 VCR®, 1/2 (3/8) VCR®, 1/4 UJR™, 1.125 C-Seal | | | | |
| Internal volume | Approx. 0.9 cm³ (For Type S and 1/4UJR™, it depends on the fitting shape.) | | | | |
| Pressure sensor seal method | Welding type | | | | |
| Pressure range*1 | Gauge Pressure | 0 to 0.3, 0.5, 1, 2, 3.5, 5, 10, 20 MPa -0.1 to 0.3, 0.5, 1, 2, 3.5, 5, 10, 20 MPa | | | |
| Power supply voltage | Standard | 10 to 30V DC (4 to 20mA DC) 13 to 32V DC (0 to 10V DC) | | | |
| | Increased safety "ec" | 12 to 24V DC (4 to 20mA DC) | | | |
| Load resistance | 4 to 20mA DC: R max. (Ω) = $50E - 500$ [E: Power supply voltage], 0 to 10V DC: 10k Ω min. | | | | |
| Output | 4 to 20mA DC or 0 to 10V DC | | | | |
| Transmission system | 2-wire system (4 to 20mA DC) or 3-wire system (0 to 10V DC) | | | | |
| Accuracy | $\pm 0.25\%$ F.S. (at 23°C) (Including linearity, hysteresis and repeatability) | | | | |
| Temperature coefficient (ZERO, SPAN) | $\pm 0.02\%$ F.S./°C | | | | |
| Operating temperature | Standard | -20 to 70°C (No freezing or condensation) | | | |
| | Increased safety "ec" | Temperature class | T4 | -20 to 70°C (No freezing or condensation) | |
| | | | T5 | -20 to 70°C (No freezing or condensation) | |
| | | | T6 | -20 to 30°C (No freezing or condensation) | |
| Strage temperature | -30 to 80°C (No freezing or condensation) | | | | |
| Insulation resistance | 100M Ω or over (joint to I/O terminal package: 50VDC) | | | | |
| Electrical connections | M12 connector connection (4-pin) or Bayonet connector connection (4-pin) | | | | |
| Case material | SUS305, PBT | | | | |
| Protection class*2 | Standard | IP67 (IEC60529) | | | |
| | Increased safety "ec" | IP65 (IEC60529) | | | |
| Zero adjustment mechanism | External adjustment method (Side of case) | | | | |
| Weight | Approx. 70 g (for M12 connector, Type S; excluding cable; varies depending on fitting shape) | | | | |

*1 For Surface-mount C-seal fittings, the maximum available pressure rating is 1MPa.

*2 Mated state with connector cable

Increased safety type pressure sensor (Type of protection: "ec")

Features

- Acquired certifications for increased safety type construction ("ec") from IECEx, ATEX, JAPAN, TS, KCs, and NEPSI.
EX ec II C T4/T5/T6 Gc
- This pressure sensor can be used without a safety barrier in Zone 2 (Category 3G) areas.

*For the increased safety (Ex ec) type, only M12 connector with 4 to 20mA DC output is available

Attention

Please be sure to use the M12 connector cable specified by us.



(Gauge pressure)

Increased Safety specification

| Specifications | | | | | | |
|--------------------------------|---|---|-------------------------------|---|--|--------------------------------------|
| Intrinsically safe standard | IECEx (International) | ATEX (Europe) | TS (Taiwan) | KCs (Korea) | JAPAN | NEPSI (China) |
| Certificate number | IECEx CML 21.0001X | CML 20ATEX3232X | TD10003L (Identification No.) | 21-AV4BO-0262X | CML 23JPN3070X | GYJ23.1080X |
| Hazardous area classifications | Zone 2 | Category 3G | Zone 2 | | | |
| Applicable standards | IEC 60079-0: 2017 IEC 60079-7: 2017 | EN 60079-0: 2018 EN 60079-7: 2015+A1: 2018 | CNS3376-0 CNS3376-7 | IEC 60079-0: 2017 IEC 60079-7: 2017 (Notice 2021-22) | JNIOSH-TR-46-1:2020 JNIOSH-TR-46-5:2018 | GB/T 3836.1-2021 GB/T 3836.3-2021 |
| Applicable directive | | 2014/34/EU (ATEX Directive) | | | | |
| Ex marking | | | Ex ec | II C | T4/T5/T6 | Gc |
| | | | | | | Equipment protection level |
| | | | | | | Temperature class |
| | | | | | | Group of gases |
| | | | | | | Increased safety "ec" |
| Container protection class | IP65 (Cable with M12 connector fitted.) | | | | | |
| Withstand voltage | 500V AC for 1 minute | | | | | |
| Operating temperature | Temperature class | | T4 | | -20 to 70°C (No freezing or condensation) | |
| | | | T5 | | | |
| | | | T6 | | -20 to 30°C (No freezing or condensation) | |
| Power supply voltage | 12 to 24V DC | | | | | |

*For the increased safety (Ex ec) type, only M12 connector with 4 to 20mA DC output is available.

Label

Increased safety "ec" for overseas



Increased safety "ec" for JAPAN



* The label is an example of Increased safety "ec", gauge pressure, label color: black.

* For overseas and for JAPAN are printed differently on the label.

For overseas

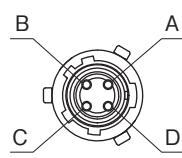


For JAPAN



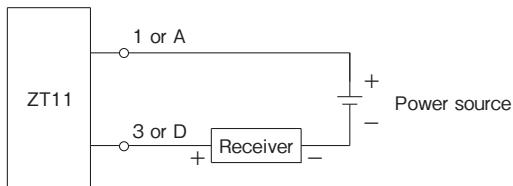
Electrical connection

| M12 Connector terminal array | Terminal number | 2-wire system | 3-wire system | Cable color |
|---|-----------------|------------------|------------------|-------------|
|  | 1 | Power source (+) | Power source (+) | Brown |
| | 2 | — | — | White |
| | 3 | Power source (-) | Common | Blue |
| | 4 | — | Output (+) | Black |

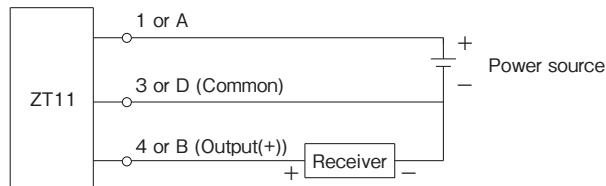
| Bayonet Connector terminal array | Terminal number | 2-wire system | 3-wire system | Cable color |
|---|-----------------|------------------|------------------|-------------|
|  | A | Power source (+) | Power source (+) | Red |
| | B | — | Output (+) | Green |
| | C | — | — | Blue |
| | D | Power source (-) | Common | White |

Wiring

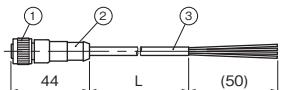
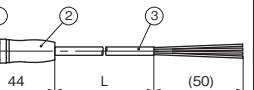
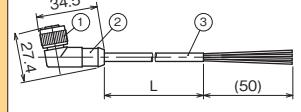
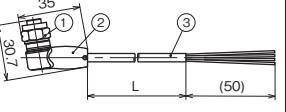
2-wire system



3-wire system



M12 cable with connector (Optional)

| | PUR cable (Oilproof) | PVC cable (Stainless nut) |
|------------------------------------|---|---|
| Straight |  |  |
| Type L |  |  |
| Material | ① Zinc die casting (Nickel plating) ② TPU (Green) ③ PUR (Black) | ① Stainless ② PP (White) ③ PVC (Gray) |
| Cable length (L) | 3m or 5m | 3m or 5m |
| Cross-section area of conductor | 0.34mm ² (22AWG) | 0.34mm ² (22AWG) |
| Core diameter including insulation | 1.27mm | 1.26mm |
| External cable diameter | 4.7mm | 4.7mm |

* The degree of protection is ensured only when the M12 connector cable is in the mated state.

* Please contact us regarding the Bayonet connector cable.

Caution

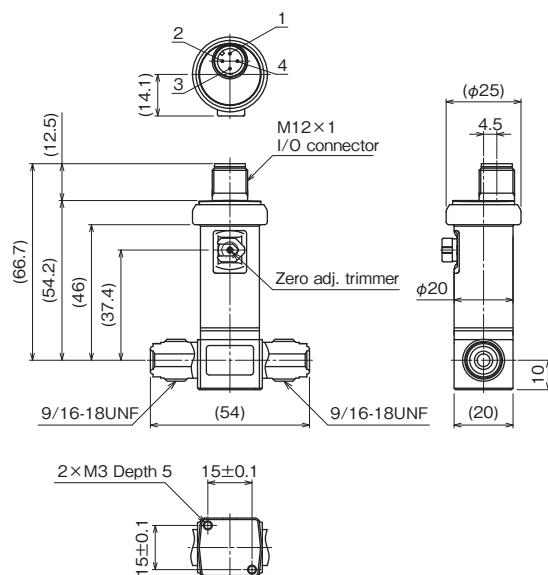
Please be sure to use the M12 connector cable specified in the left column when using the "ec" increased safety type.

Dimensions 1

ZT11-1, 5 (gauge pressure),
ZT11-E, G (type "ec" gauge)

Unit: mm

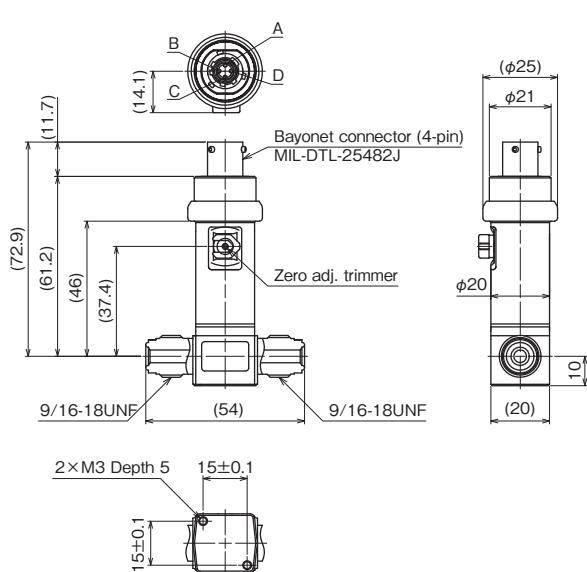
Type T (M12 connector)



1/4 Compatible with VCR®

□ ZT11-13□
 □ ZT11-E3□
 □ ZT11-G3□

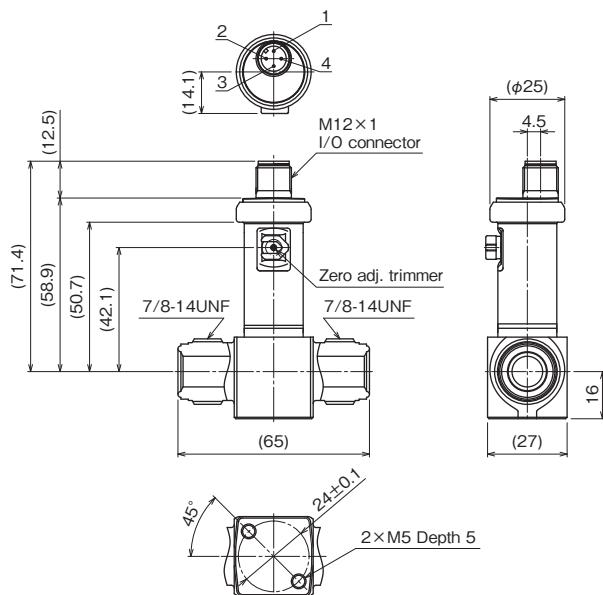
Type T (Bayonet connector)



1/4 Compatible with VCR®

□ ZT11-53□

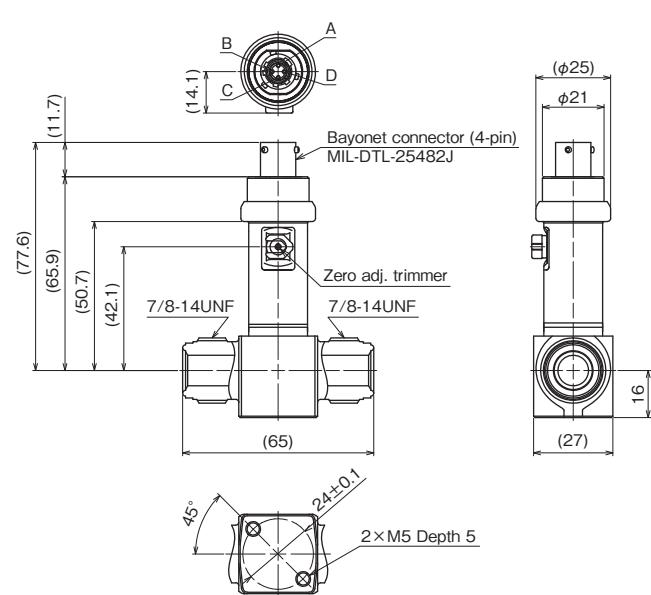
Type T (M12 connector)



1/2 (3/8) Compatible with VCR®

□ ZT11-14□
 □ ZT11-E4□
 □ ZT11-G4□

Type T (Bayonet connector)



1/2 (3/8) Compatible with VCR®

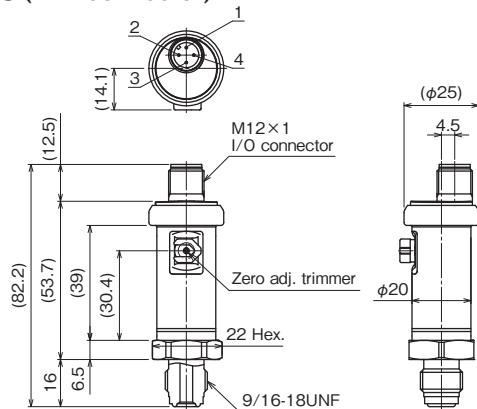
□ ZT11-54□

Dimensions 2

ZT11-2, 6 (gauge pressure),
ZT11-F, H (type "ec" gauge),

Unit: mm

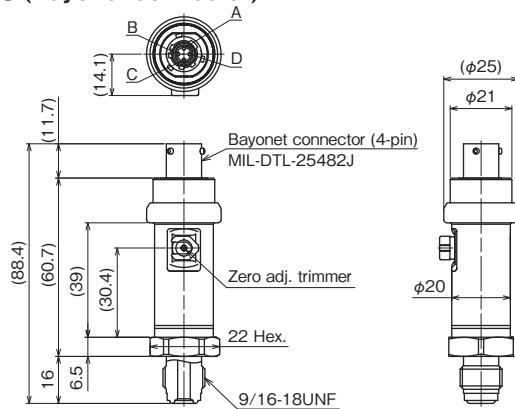
Type S (M12 connector)



1/4 Compatible with VCR®

ZT11-23
 ZT11-F3
 ZT11-H3

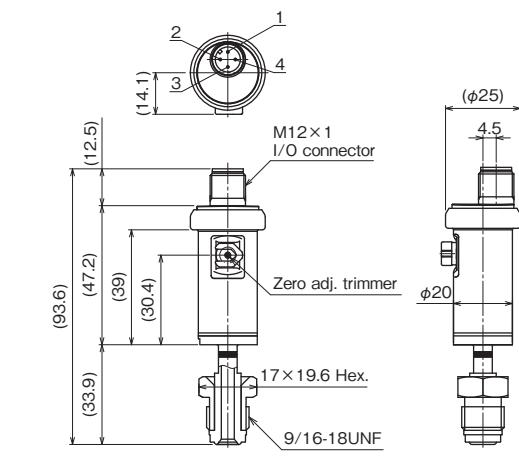
Type S (Bayonet connector)



1/4 Compatible with VCR®

ZT11-63

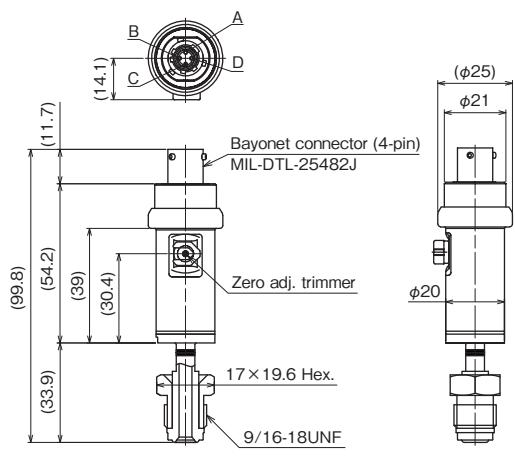
Type S (M12 connector)



1/4 UJR™

ZT11-2NE, 2NG
 ZT11-FNE, FNG
 ZT11-HNE, HNG

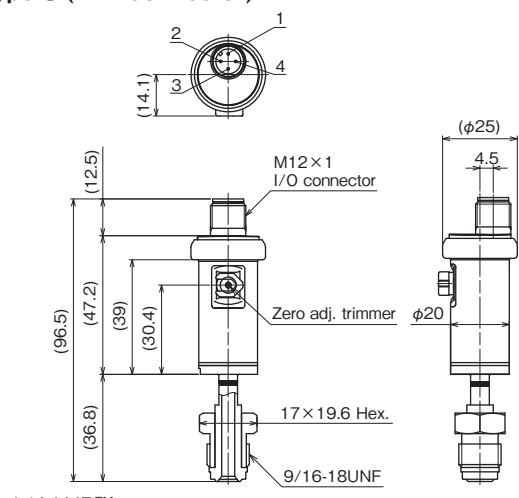
Type S (Bayonet connector)



1/4 UJR™

ZT11-6NE, 6NG

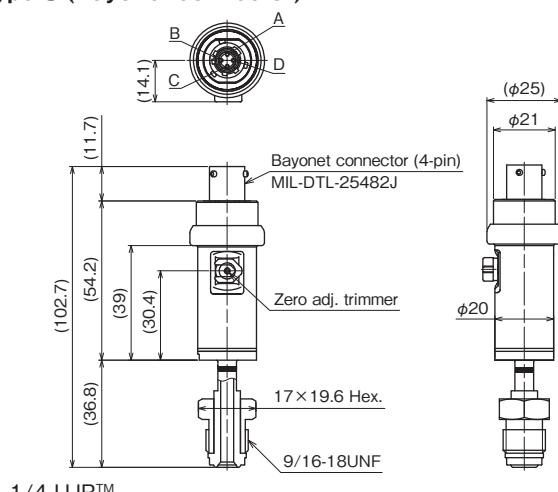
Type S (M12 connector)



1/4 UJR™

ZT11-2NC
 ZT11-FNC
 ZT11-HNC

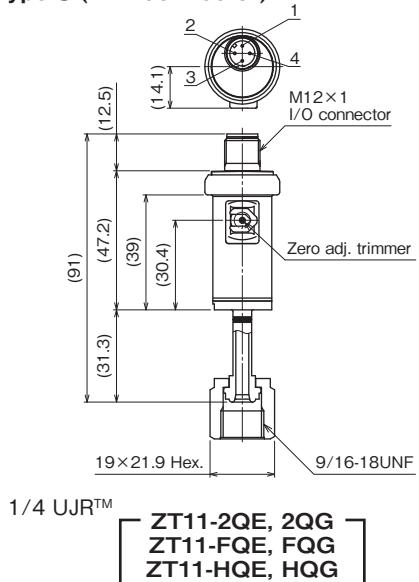
Type S (Bayonet connector)



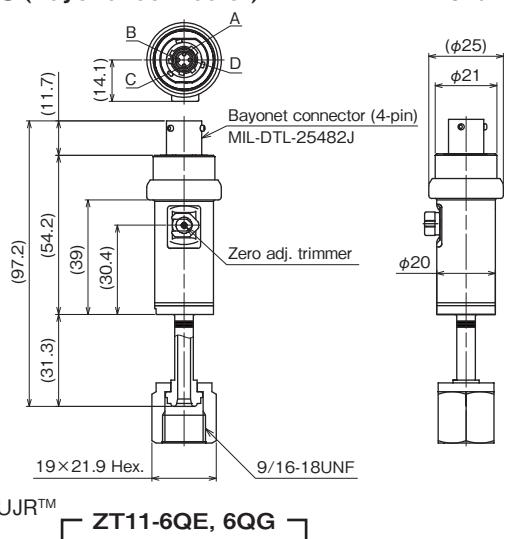
1/4 UJR™

ZT11-6NC

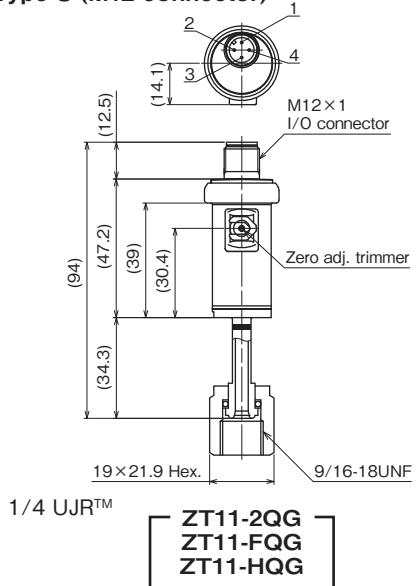
Type S (M12 connector)



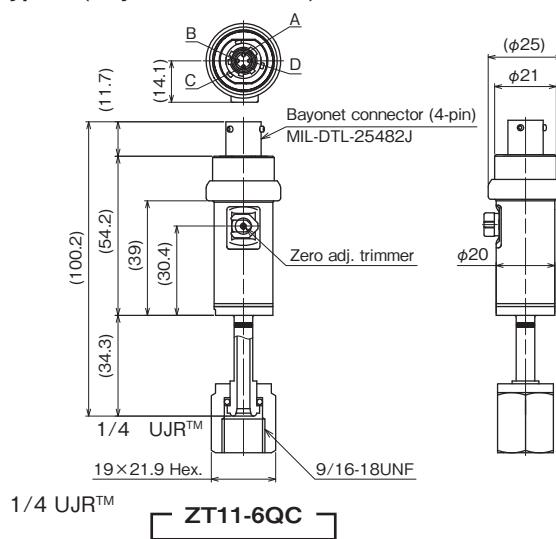
Type S (Bayonet connector)



Type S (M12 connector)



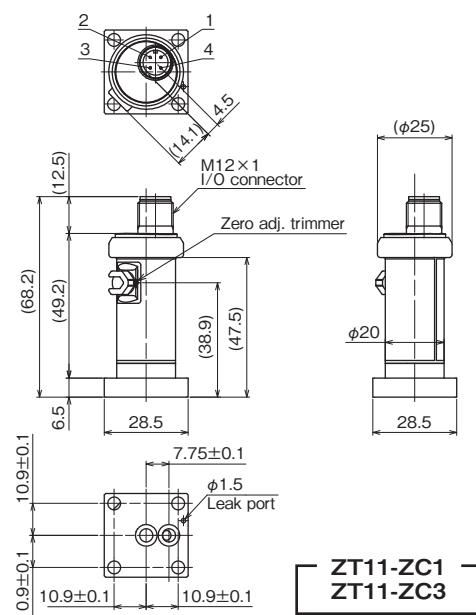
Type S (Bayonet connector)



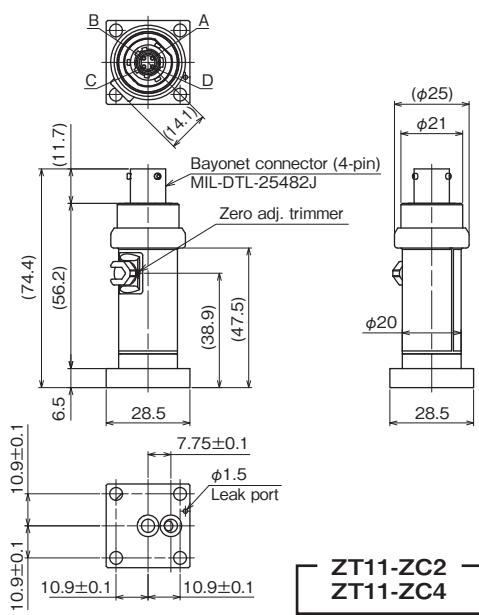
Dimensions 3

ZT11-Z (gauge pressure),

Surface-mount fitting (M12 connector)



Surface-mount fitting (Bayonet connector)



Gauge pressure range product

Model number configuration

Please specify the model number, each specs and the range for ordering.

| Model | | | Pressure Sensor (gauge pressure) for Semiconductor Industry | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|--|--|---------------------------|--|---------------------------------------|--|-----------------|------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Z | T | 1 | ① ② ③ ④ V ⑥ ⑦ X ⑨ X ⑩ X ⑪ X ⑫ X ⑬ X ⑭ X ⑮ | | | | | | | | | | | | | | | | | | | | | |
| Pressure Sensor (gauge pressure) for Semiconductor Industry | | | | | | | | | | | | | | | | | | | | | | | | |
| Model number | | | Selective spec. | | | Additional spec. (Option) | | | | | | | | | | | | | | | | | | |
| ① Mounting (Attention) | | | 1 | Type T M12 connector connection Construction: IP67 | | | | | | | | | | | | | | | | | | | | |
| | | | 2 | Type S M12 connector connection Construction: IP67 | | | | | | | | | | | | | | | | | | | | |
| | | | 5 | Type T Bayonet connector connection Construction: IP67 | | | | | | | | | | | | | | | | | | | | |
| | | | 6 | Type S Bayonet connector connection Construction: IP67 | | | | | | | | | | | | | | | | | | | | |
| | | | E | Type T Increased safety "ec" for overseas | | | M12 connector connection Construction: IP65 | | | | | | | | | | | | | | | | | |
| | | | F | Type S Increased safety "ec" for overseas | | | M12 connector connection Construction: IP65 | | | | | | | | | | | | | | | | | |
| | | | G | Type T Increased safety "ec" for JAPAN | | | M12 connector connection Construction: IP65 | | | | | | | | | | | | | | | | | |
| | | | H | Type S Increased safety "ec" for JAPAN | | | M12 connector connection Construction: IP65 | | | | | | | | | | | | | | | | | |
| ② Connection of fitting | | | 3 | 1/4 | Compatible with VCR® Male integrated Type S Type T | | | | | | | | | | | | | | | | | | | |
| | | | 4 | 1/2 (3/8) | Compatible with VCR® Male integrated Type S Type T | | | | | | | | | | | | | | | | | | | |
| | | | N | 1/4 | UJR™ Male nut Type S Type T | | | | | | | | | | | | | | | | | | | |
| | | | Q | 1/4 | UJR™ Female nut (Without pure ring)*1 Type S Type T | | | | | | | | | | | | | | | | | | | |
| ③ Wetted parts by grade | | | C | UHP Grade · Pressure sensor : Hastelloy®C-22 equivalent (All welding) · Fitting : SUS316L | | | | | | | | | | | | | | | | | | | | |
| | | | E | EP Grade · Pressure sensor: SUS316L (All welding) · Fitting: SUS316L | | | | | | | | | | | | | | | | | | | | |
| | | | G | GP Grade · Pressure sensor: SUS316L (All welding) · Fitting: SUS316L | | | | | | | | | | | | | | | | | | | | |
| ④ Pressure range*2 | | | C | -0.1 to 0.3MPa | | | 1 | 0 to 0.3MPa | | | | | | | | | | | | | | | | |
| | | | D | -0.1 to 0.5MPa | | | 2 | 0 to 0.5MPa | | | | | | | | | | | | | | | | |
| | | | E | -0.1 to 1MPa | | | 3 | 0 to 1MPa | | | | | | | | | | | | | | | | |
| | | | F | -0.1 to 2MPa | | | 4 | 0 to 2MPa | | | | | | | | | | | | | | | | |
| | | | G | -0.1 to 3.5MPa | | | 5 | 0 to 3.5MPa | | | | | | | | | | | | | | | | |
| | | | H | -0.1 to 5MPa | | | 6 | 0 to 5MPa | | | | | | | | | | | | | | | | |
| | | | J | -0.1 to 10MPa | | | 7 | 0 to 10MPa | | | | | | | | | | | | | | | | |
| | | | K | -0.1 to 20MPa | | | 8 | 0 to 20MPa | | | | | | | | | | | | | | | | |
| ⑤ Accuracy | | | V | ±0.25%F.S. (Temperature coefficient ±0.02%F.S./°C) | | | | | | | | | | | | | | | | | | | | |
| | | | ⑥ Power source | | | ⑥ | ⑦ | ⑥ Power source | | | ⑦ Output | | | | | | | | | | | | | |
| | | | | | | M | 1 | 10 to 30V DC | | | 4 to 20mA DC (2-wire system) | | | | | | | | | | | | | |
| | | | | | | N | 1 | 12 to 24V DC (Increased safety "ec") | | | 4 to 20mA DC (2-wire system) | | | | | | | | | | | | | |
| | | | | | | 9 | 7 | 13 to 32V DC | | | 0 to 10V DC (3-wire system) | | | | | | | | | | | | | |
| ⑨ Connector cable | | | 0 | Nil | | | | | | | | | | | | | | | | | | | | |
| | | | 1 | M12 connector PUR cable (Oilproof) | | | Straight | | | Cable length 3m | | | | | | | | | | | | | | |
| | | | 2 | M12 connector PVC cable (Stainless nut) | | | L type | | | | | | | | | | | | | | | | | |
| | | | 3 | M12 connector PUR cable (Oilproof) | | | Straight | | | | | | | | | | | | | | | | | |
| | | | 4 | PVC cable (Stainless nut) | | | L type | | | | | | | | | | | | | | | | | |
| | | | 5 | M12 connector PUR cable (Oilproof) | | | Straight | | | Cable length 5m | | | | | | | | | | | | | | |
| | | | 6 | PVC cable (Stainless nut) | | | L type | | | | | | | | | | | | | | | | | |
| | | | 7 | PVC cable (Stainless nut) | | | Straight | | | | | | | | | | | | | | | | | |
| | | | 8 | Bayonet connector cable | | | L type | | | Cable length 3m | | | | | | | | | | | | | | |
| | | | J | Bayonet connector cable | | | Straight | | | Cable length 5m | | | | | | | | | | | | | | |
| | | | K | Bayonet connector cable | | | Straight | | | Cable length 5m | | | | | | | | | | | | | | |
| ⑯ Documents | | | 0 | Nil | | | | | | | | | | | | | | | | | | | | |
| | | | 1 | Required (Please specify the desired documents separately.) Submission drawings, instruction manual, inspection procedure, mill sheet, test report (1 pc 1 copy), inspection / traceability certificate, strength calculation, attended inspection | | | | | | | | | | | | | | | | | | | | |

Attention
Please be sure to use the M12 connector cable specified by us.
* Specify "X" if there is no applicable specification.

• VCR® is the registered trademark of SWAGELOK.
• UJR™ is the trademark of Fujikin Incorporated.

Gauge pressure range product

Model number configuration

Please specify the model number, each specs and the range for ordering.

| Model | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-----|---|---------------------|---|-----------------|-----------------|----------|-----|---------------------------------|---------------------------|------|------|------|------|--|--|--|--|--|--|--|--|--|--|--|--|
| Z | T | 1 | 1 | — | Z | C | — | V | | X | X | X | X | X | | | | | | | | | | | | |
| Pressure Sensor (gauge pressure) for Semiconductor Industry | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | | | | | | | | | | | | |
| Please specify the model number, each specs and the range for ordering. | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Model number | | | | | Selective spec. | | | | | Additional spec. (Option) | | | | | | | | | | | | | | | | |
| (1) Mounting | Z | Surface-mount fitting | | | | | | | | | | | | | | | | | | | | | | | | |
| (2) Connection of fitting | C | 1.125 C-Seal (Without bolt) | | | | | | | | | | | | | | | | | | | | | | | | |
| (3) Wetted parts by grade/ Electrical connections | 1 | UHP Grade • Pressure sensor : Hastelloy® C-22 equivalent (All welding) • Fitting : SUS316L / M12 connector connection (4-pin) | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | UHP Grade • Pressure sensor : Hastelloy® C-22 equivalent (All welding) • Fitting : SUS316L / Bayonet connector connection (4pin) | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | EP Grade • Pressure sensor: SUS316L (All welding) • Fitting: SUS316L / M12 connector connection (4-pin) | | | | | | | | | | | | | | | | | | | | | | | | |
| | 4 | EP Grade • Pressure sensor: SUS316L (All welding) • Fitting: SUS316L / Bayonet connector connection (4pin) | | | | | | | | | | | | | | | | | | | | | | | | |
| Please specify the pressure range and units separately besides selection of range code. | | (4) Pressure range*1 | C | -0.1 to 0.3MPa | | | | | | | | | | | | | | | | | | | | | | |
| | | | D | -0.1 to 0.5MPa | | | | | | | | | | | | | | | | | | | | | | |
| | | | E | -0.1 to 1MPa | | | | | | | | | | | | | | | | | | | | | | |
| | | | 1 | 0 to 0.3MPa | | | | | | | | | | | | | | | | | | | | | | |
| | | | 2 | 0 to 0.5MPa | | | | | | | | | | | | | | | | | | | | | | |
| | | | 3 | 0 to 1MPa | | | | | | | | | | | | | | | | | | | | | | |
| | | (5) Accuracy | V | ±0.25%F.S. (Temperature coefficient ±0.02%F.S./°C) | | | | | | | | | | | | | | | | | | | | | | |
| | | | (6) Power source | (6) | (7) | (6)Power source | | | (7)Output | | | | | | | | | | | | | | | | | |
| | | | | M | 1 | 10 to 30V DC | | | 4 to 20mA DC (2-wire system) | | | | | | | | | | | | | | | | | |
| | | | | 9 | 7 | 13 to 32V DC | | | 0 to 10V DC (3-wire system) | | | | | | | | | | | | | | | | | |
| | | (9) Connector cable | 0 | Nil | | | | | | | | | | | | | | | | | | | | | | |
| | | | 1 | M12 connector | | | Straight | | Cable length 3m | | | | | | | | | | | | | | | | | |
| | | | 2 | PUR cable (Oilproof) | | | L type | | | | | | | | | | | | | | | | | | | |
| | | | 3 | M12 connector PVC | | | Straight | | | | | | | | | | | | | | | | | | | |
| | | | 4 | cable (Stainless nut) | | | L type | | | | | | | | | | | | | | | | | | | |
| | | | 5 | M12 connector | | | Straight | | | | | | | | | | | | | | | | | | | |
| | | | 6 | PUR cable (Oilproof) | | | L type | | | | | | | | | | | | | | | | | | | |
| | | | 7 | PVC cable | | | Straight | | | | | | | | | | | | | | | | | | | |
| | | | 8 | (Stainless nut) | | | L type | | | | | | | | | | | | | | | | | | | |
| | | | J | Bayonet connector cable | | | | | | Cable length 3m | | | | | | | | | | | | | | | | |
| | | | K | Bayonet connector cable | | | | | | Cable length 5m | | | | | | | | | | | | | | | | |
| | | (15) Documents | 0 | Nil | | | | | | | | | | | | | | | | | | | | | | |
| | | | 1 | Required (Please specify the desired documents separately.) Submission drawings, instruction manual, inspection procedure, mill sheet, test report (1 pc 1 copy), inspection / traceability certificate, strength calculation, attended inspection | | | | | | | | | | | | | | | | | | | | | | |

* Specify "X" if there is no applicable specification.