General Specifications

Model TDLS8000
Tunable Diode Laser Spectrometer

GS 11Y01D01-01EN

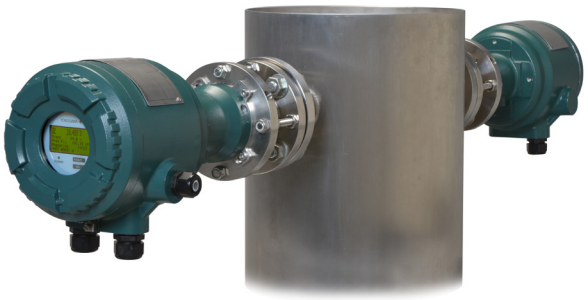
■ Overview

Yokogawa's new TDLS™8000 houses all of the industry's leading features in one robust device. The platform design is for in situ measurements which negate the need for sample extraction and conditioning.

The non-contacting sensor allows for a variety of process types including corrosive, abrasive and condensing.

The first generation platform has been proven in many others for the measurements of O_2, CO, CH_4, NH_3, H_2O and many more NIR absorbing gases.

This second generation platform has improved reliability and ease of installation and maintenance while still meeting or exceeding designed application demands.



TDLS8000 Tunable Diode Laser Spectrometer

■ Features

- **SIL2, TruePeak™ combined with smart laser technology**
  - Measurement integrates the area of the absorbance and gets a true, interference-free analysis under changing pressure, temperature and background
  - Laser module is replaceable on site without any calibration or adjustment
  - Internal reference cell in the laser module ensures peak locking during trace measurement
  - Laser and Detector modules are sealed to protect them from dirty purge gas
  - On board diagnostics and low TCO(*1) (no moving parts, high MTTF(*2) for components)
  - IEC61508 SIL designed & approved, SIL 2 capability for single analyzer use, SIL 3 capability for dual analyzer use (except H_2O (%) analyzer)
- **Intuitive touchscreen HMI**
  - Large HMI provides easy operation and control of up to 4 analyzers at the same time·A standard mini display at both sides enables easy optical alignment
- **HART and Modbus TCP communications standard**
- **8-stage auto-gain adapts to difficult applications**
  - Auto-gain enables wide signal ranges against dynamic variation of transmission.
- **Fully field repairable with 50 days of data and spectra storage**
- **Compact design for one-man installation without sacrificing ruggedness**
  - IECEx, ATEX, FM(US, Canada), Korea Ex, NEPSI, EAC, INMETRO, Japan hazardous area approvals based on Nonincendive/Type n or Explosionproof/ flame proof.
  - Purge gas is no need for explosion protection.
- **In-situ or extractive analysis and fast response (2-5 seconds, 1 second (optional))**
- **Process pressures up to 1 MPa abs. and process temperatures up to 1,500ºC (Note)**

  Note: Maximum process temperatures and pressures will vary by application
  *1: Total Cost of Ownership
  *2: Mean Time To Failure
- **10 language display options**
  YH8000 offers easy touch screen operation and simple menu structure in 10 languages. Menus of display, execution and setting are displayed in a selected language.

Typical gases measured include:

- Oxygen in process and combustion applications. Process temperatures can be as high as 1,500ºC, and process pressures can be as high as 1 MPa abs. Measurement span is typically between 1% and 25% oxygen.
- Carbon monoxide in process and combustion applications. Process temperatures can be as high as 1,500ºC. Two versions are available, high sensitivity with ppm detection limits, and standard sensitivity for higher ppm and percent level CO measurement

Other applications and gas measurements are possible with the TDLS8000. Please fill out the Application Data Sheet at the end of this document and send to Yokogawa.

YOKOGAWA

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2-9-32, Nakacho, Musashino-shi, Tokyo, 180-8750 Japan

GS 11Y01D01-01EN

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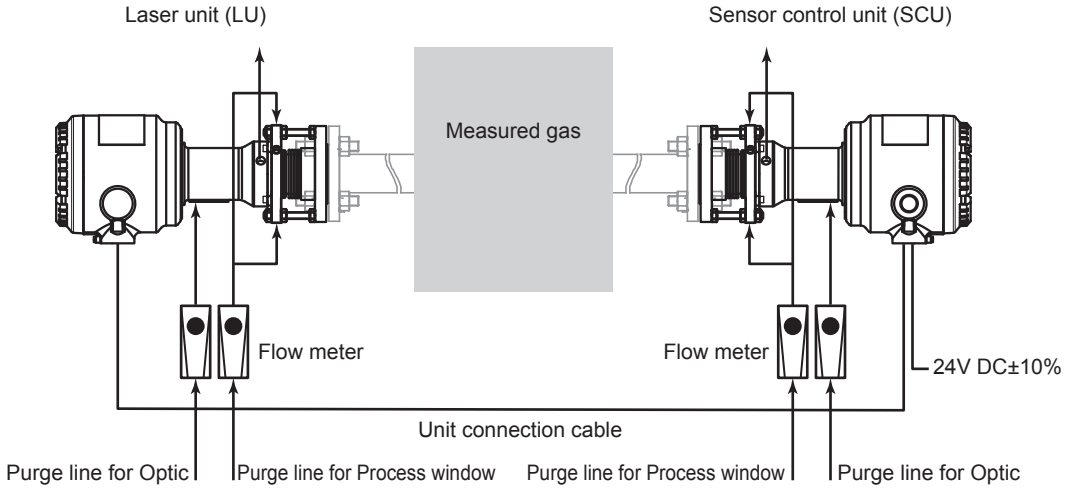
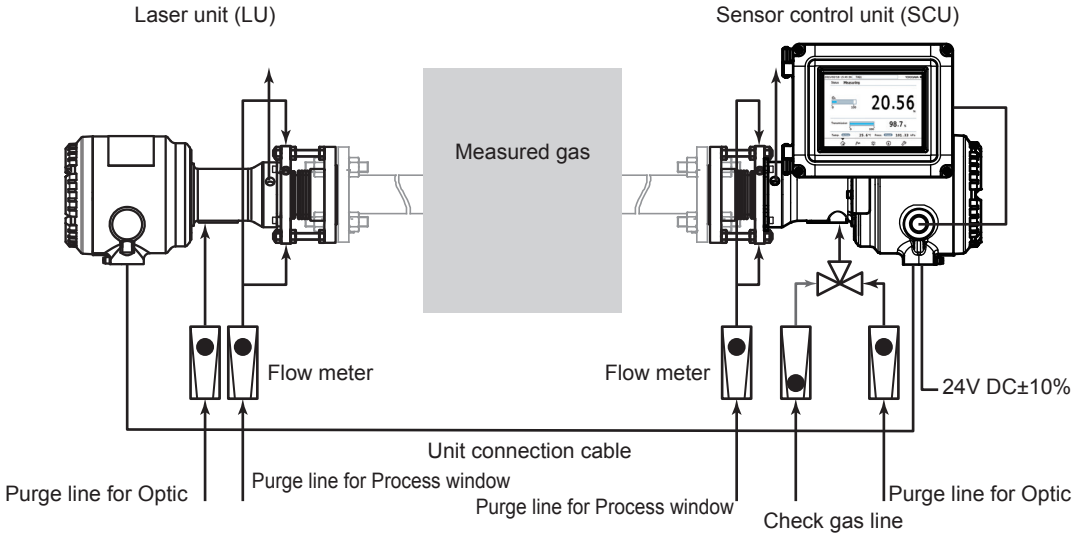
■ System configuration

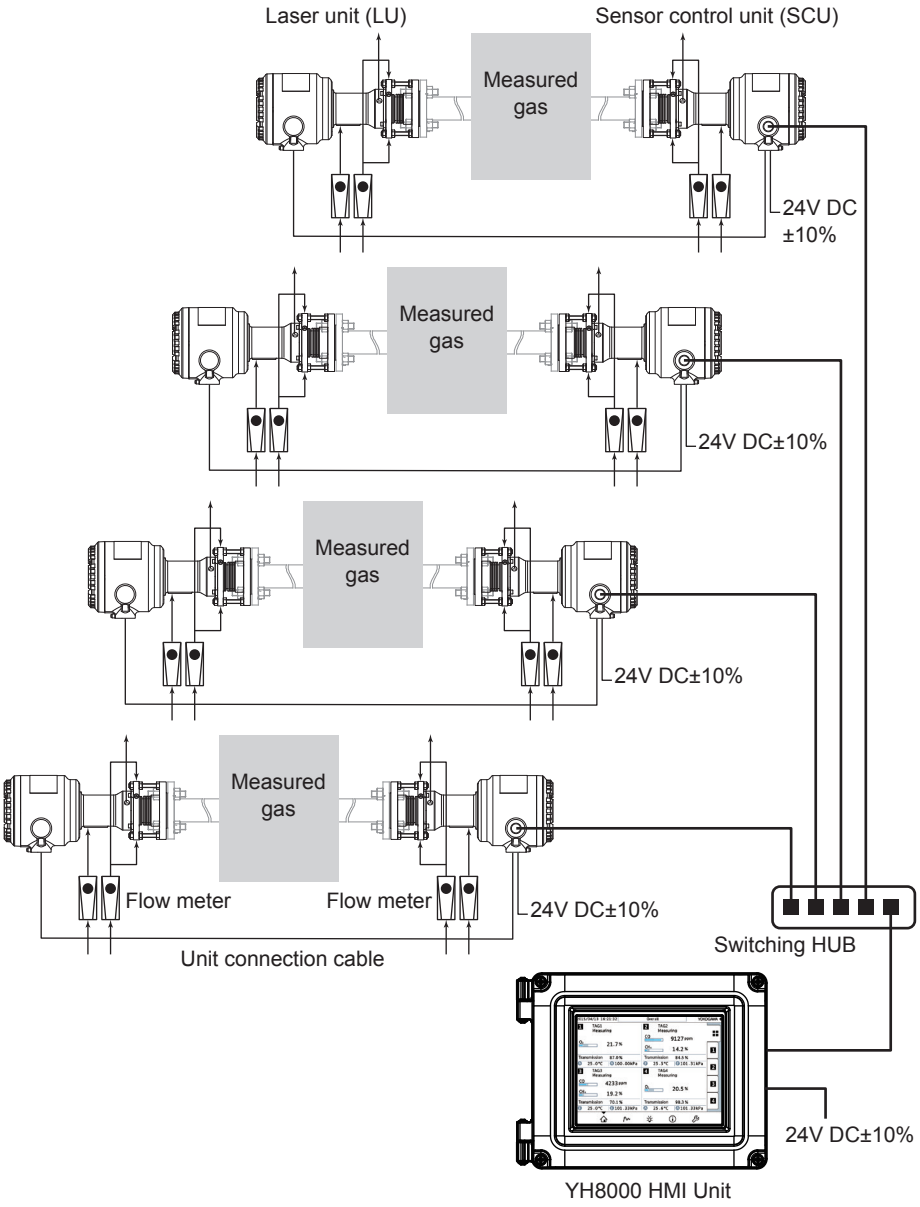
Standard System Configuration



System Configuration with YH8000 HMI Unit and Validation gas line



Multi Analyzer Configuration with Remote HMI



Note: If power supply is 100 to 240 V AC, purchase the Universal Power Supply, separately.
If four multi analyzer configuration with remote HMI is made, five universal power supply including YH8000 are needed.

■ STANDARD SPECIFICATIONS

TDLS8000 Tunable Diode Laser Spectrometer

Measurement object:
O_2, CO, CO or CH_4, CO_2, CO + CO_2, H_2O, NH_3, H_2S, HCl concentration in combustion exhaust gas and process gas
If other gas measurements are required, consult with Yokogawa

Measurement system:
Tunable diode laser spectroscopy
Light source; Near-infrared tunable diode laser

Measured components and ranges:

Measured component		Min. range	Max. range
O_2		0-1%	0-25%
CO (ppm)		0-200 ppm	0-10,000 ppm
CO or CH_4 (*3)	CO	0-200 ppm	0-10,000 ppm
	CH_4	0-5%	
NH_3		0-30 ppm	0-5,000 ppm
H_2O (ppm) in non HC (*1)		0-30 ppm	0-30,000 ppm
H_2O (ppm) in HC (*2)		0-30 ppm	0-30,000 ppm
CO (%)		0-20%	0-50%
CO (%) + CO_2 (%)		0-30%	0-100%
H_2S		0-5%	0-100%
CO_2 (%) High Range		0-1%	0-5%
CO_2 (%) Extend. Range		0-30%	0-50%
H_2O (%)		0-10%	0-100% (*4)
HCl		0-50 ppm	0-5,000 ppm

*1: Non hydrocarbon background.
*2: Hydrocarbon background.
*3: Please consult with Yokogawa if CO or CH_4 ingredient coexists.
*4: If it exceeds 50%, please consult with Yokogawa.

Please consult with Yokogawa if the measuring range for your sample gas is outside of the above ranges

Optical path length:
Optical distance between the laser unit and the sensor control unit
Standard; 0.5 to 6 m (Application dependent)
Max; 30 m (With optional Large Aperture Optics (LAO))
25 m (Zone 1/Div.1/Flameproof "d" with LAO)
Note: LAO unit can be selected only with analyzers for O_2, CO(ppm) and CO+CH_4.
If your optical path length is under 0.5 m or over 30 m, please consult with Yokogawa.

Safety, EMC, and RoHS conformity standards:
Safety conformity standards:
CE, UKCA EN61010-1, EN61010-2-030
UL UL61010-1, UL 61010-2-030
CSA CAN/CSA-C22.2 No.61010-1, CAN/CSA-C22.2 No.61010-2-030
GB GB30439 Part 1
Installation altitude: 2000 m or less
Installation category:
I (Anticipated transient overvoltage 330V)
Measuring category: O (Other)
Pollution degree: 2, Indoor/Outdoor use
Note: Installation category, called overvoltage category, specifies impulse withstand voltage. Pollution degree indicates the degree of existence of solid, liquid, gas or other inclusions which may reduce dielectric strength.

EMC conformity standards:
CE, UKCA EN55011 Class A Group 1
EN61326-1 Class A Table 2 (For use in industrial location), EN61326-2-3
RCM EN55011 Class A Group 1
KC KN11 Class A Group 1, KN61000-6-2 (Korea Electromagnetic Conformity)

RoHS conformity standards: EN IEC 63000:2018*
*: For only TDLS8000-G1, -G2, -S1, -S2

Information of the WEEE Directive
This product is purposely designed to be used in a large scale fixed installations only and, therefore, is out of scope of the WEEE Directive. The WEEE Directive does not apply.
The WEEE Directive is only valid in the EU and UK.

Laser classification: CAN/CSA-E60825-1-15, CE, UKCA EN 60825-1:2014, FDA 21CFR part 1040.10, GB7247.1-2012, Class 1 laser product

SIL Certification: The TDLS8000 expect digital output (2 points), digital input (2 points), valve control output (2 points), and digital communications (HART, Modbus/TCP) are certified in compliance with the following standard.
IEC 61508:Functional safety of Electrical/electronic/programmable electronic related systems; SIL 2 capability for single analyzer use, SIL 3 capability for dual analyzer use.
(H_2O (%) analyzer is not applicable)

Marine certification: DNV Type Approval
Certificate No: TAA000030E
URL: https://approvalfinder.dnv.com/#approval/TAA000030E
(For only TDLS8000/WCD)

Display: 128 x 64 dots LCD; On Sensor Control Unit
Status LEDs; 3 on Sensor Control Unit (Green: Power, Orange: DO, Red: Fault)
4 digit 7-segment LEDs: On Laser Unit

Display items:
LCD on Sensor Control Unit; Gas concentration, Transmission, Process gas temperature (AI), Process gas pressure (AI), System status, Alarm information, System information (Product serial no., Laser module serial no., Output signal, IP address, HART address, Optical path length, Analyzer internal temperature)
7-segment LEDs on Laser Unit; Transmission

Analog output: 2 points, 4 to 20 mA DC (Isolated from the power supply and ground, Max. load resistance 550 Ω)
Output types; Gas concentration, Transmission, Process gas temperature, Process gas pressure
Output range; 3.0 to 21.6 mA DC

Digital communications:
HART; On analog output signal 1 (AO-1)
Load resistance; 250 to 550 Ω (Include cable resistance)
Ethernet; RJ-45 connector in Sensor Control Unit
Protocol; Modbus/TCP
Communication speed; 100 Mbps

Digital output: 2 points, contact rating 24V DC, 1A
DO;
Function: Activate during Warning / Calibration / Validation / Warm up / Maintenance conditions

Contact Specification: Relay contact output (Isolated from the power supply and ground), C-contact (NC/NO/COM)

Fault;

Function: Activate during Fault condition or when the system power is off

Contact Specification: Relay contact output (Isolated from the power supply and ground), A-contact (NC/COM)

Valve control output: 2 points

Function; Activate calibration or validation solenoid valves for zero, span or validation gas.

Output signal; 24V DC, 500 mA Max. per terminal

Alarm:

Warning; Gas concentration low, Gas concentration high, Transmission low, Process pressure low, Process pressure high, Process temperature low, Process temperature high, Validation required, Validation failure, Zero calibration error, Span calibration error, Non process alarm, External alarm, Detector signal high, Absorption too high

Fault; Laser module temperature low, Laser module temperature high, Laser temperature low, Laser temperature high, Peak center out of range, Reference peak height low, Transmission lost, Reference transmission low, Reference peak height high, Laser unit failure, Laser module error, File access error, E2PROM access error

Digital input: 2 points

Function; External Alarm/Calibration start/ Validation start/Stream switch (Valve control)

Contact specification; Zero voltage contact input (Isolated from the power supply and ground)

Input signal; Open signal: 100 kΩ or more, Close signal: 200 Ω or less

Analog input: 2 points

Signal type; 4 to 20 mA DC (Isolated from the power supply and Ground), with selectable powered/unpowered function

Input signal range; 2.4 to 21.6 mA DC

Input types; Process gas temperature, Process gas pressure

Transmitter power supply; 15 V DC or higher (at 20 mA DC) 26 V DC or less (at 0 mA DC)

Note: This voltage is generated between the AI terminals of TDLS8000. When calculating the minimum operating voltage for transmitters, consider to allow margins for voltage drop in external wiring.

Self-diagnostics:

Laser Unit temperature, Sensor Control Unit temperature, Laser temperature, Detector signal level, Memory read/write function, Peak locking condition

Calibration:

Calibration method; Zero/Span calibration

Calibration mode; Manual, Auto (Time initiate, Remote initiate (DI/Modbus)), Semi-Auto (YH8000/HART)

Validation:

Validation method; Up to 2 points

Validation mode; Manual, Auto (Time initiated, Remote initiate (DI/Modbus)), Semi-Auto (YH8000/HART)

Note: Validation check is not available when Large Aperture Optics "-LA" of the Optic Accessory is specified or H_20 ppm measurement "-H1" of the Gas Parameter is specified. As well, when gas concentration is unstable, please consult Yokogawa.

Power supply: 24V DC +/-10%

If your power supply is 100 to 240 V AC, Universal Power Supply, M1276WW (sold separately), is required

Power consumption:

Max. 20W; TDLS8000 only

Max. 60W; TDLS8000 with YH8000 and 2 solenoid valves

Protection degree: IP66, Type 4X

Material: Case; Aluminum alloy

Wetted materials:

316 SS, BK-7 glass, Teflon encapsulated FKM (O-ring for alignment flange), Silicone (O-ring for LAO)

Paint color: Mint green (RAL 190 30 15 or equivalent)

Weight:

Sensor Control Unit; Approx. 8 kg

Laser Unit; Approx. 8 kg

Large Aperture Optics; Approx. 14 kg

ANSI Class 150-2-RF (Eq.) Alignment Flange; Approx. 5 kg/pc

ANSI Class 150-3-RF (Eq.) Alignment Flange; Approx. 7 kg/pc

ANSI Class 150-4-RF (Eq.) Alignment Flange; Approx. 9 kg/pc

DIN PN16-DN50-A (Eq.) Alignment Flange; Approx. 5 kg/pc

DIN PN16-DN80-A (Eq.) Alignment Flange; Approx. 6 kg/pc

JIS 10K-50-FF (Eq.) Alignment Flange; Approx. 5 kg/pc

JIS 10K-80-FF (Eq.) Alignment Flange; Approx. 6 kg/pc

Flow Cell Alignment Flange; Approx. 5 kg/pc

Cable gland for Japan Ex "-J1"; (/JA1) Approx. 320 g/pc, (/JB3, /JB4) Approx. 450 g/pc

Cable gland for Japan Ex "-J2"; (/JC1, /JD1) Approx. 150 g/pc, (/JE3, /JE4) Approx. 200 g/pc

Process gas condition:

Process gas temperature; Max. 1,500ºC, Application dependent

Process gas pressure; Max.1 MPa abs., Min. 90 kPa abs., Application dependent
Max. 15 kPa G with LAO unit

Note: When using TDLS8000 as CE/UKCA marking compliance product, it has following limitation.

General purpose model (-G1, -G2):

The upper limit of the measurement gas pressure is 50kPa in gauge pressure. Consult with Yokogawa Europe B.V. in the case of witnessing high pressure in Europe.

ATEX model (-S1, -S2):

The upper limit of the measurement gas pressure is 500kPa abs. The unstable gas defined by following cannot be measured.

An unstable gas in this context is a gas liable to transform itself spontaneously, producing a sudden pressure increase.
Such transformation as an example can result from a relatively small variation of an operating parameter (e.g. pressure, temperature, presence of catalyzing material) in a confined volume.
This includes gases that are classified as chemically unstable gases according to CLP Regulation (EC) No 1272/2008 as amended.

Typical examples of unstable gases: acetylene (UN 1001), methyl acetylene (UN 1060), vinylfluoride (UN 1860), ozone and dinitrogen oxide (UN 1067).
For further examples, see Table 35.1 of the UN Manual of Tests and Criteria.

Dust in process gas; 20 g/m^3 or less
(Dust loading levels are dependent upon the application, OPL and other installation factors)

Warm-up time: 5 min.

Installation condition:

Ambient operating temperature; -20 to 55ºC

Storage temperature; -30 to 70ºC

Humidity; 0 to 95%RH at 40ºC (Non-condensing)

Mounting flange type; ASME B16.5, DIN, JIS

Cable entries;

Sensor Control Unit: 1/2NPT or M20x1.5mm,one hole
3/4NPT or M25x1.5mm, three holes

Laser Unit: 3/4 NPT or M25x1.5mm, one hole

Purge gas connections;
1/4NPT or Rc1/4
If other gas connections are required, please consult with Yokogawa.

Purge gas; Theoretically, instrument air could be used as a purge gas for all of the below applications except for oxygen or H_2O measurement. Choosing between using nitrogen or instrument air or purge gas will ultimately depend upon further application details and the desired precision of the measurement. All gasses should be clean and dry.

Recommended purge gasses:

O_2 analyzer: N_2 (99.99% or greater, application dependent)

H_2O ppm analyzer: N_2 (99.99% or greater with < 20 ppm H_2O for feed to the optional dryer package)

CO, CO or CH_4, CO_2, CO + CO_2, NH_3, H_2S, HCl analyzer: N_2 (99.99% or greater, application dependent) or Instrument air

Purge gas flow rates;

Optic: Application dependent (typ. 2 to 20L/min)
2 to 20L/min and 50 to 70mL/min (Zone 1/Div.1/Flameproof “d”)
* Not more than 10kPa at the inlet for Zone 1/Div.1/Flameproof “d” and Zone 2/Div.2/Type of protection “n”

Process window: Application dependent (typ. 5 to 30L/min)

Hazardous area classifications:

Division 1, Zone 1: Explosionproof

TDLS8000-D1 (FM Approval for US)

Division system:

Type of protection:
Explosionproof for Class I, Division 1, Groups A, B, C, D, T5
Dust-Ignitionproof for Class II/III, Division 1, Groups E, F, G, T5

Enclosure rating: Type4X

Applicable standards:
FM Class 3600: 2018
FM Class 3615: 2018
FM Class 3616: 2011
FM Class 3810: 2018
ANSI/NEMA250: 2003

Zone system:

Type of protection:
Class I, Zone 1, AEx db [op is T6 Ga] IIC T5 Gb
Zone 21, AEx tb [op is T85˚C Da] IIIC T100˚C Db

Enclosure rating: IP66

Applicable standards:
ANSI/UL 60079-0:2019
ANSI/UL 60079-1:2015
ANSI/UL 60079-28:2017
ANSI/UL 60079-31:2015
ANSI/IEC 60529:2004

TDLS8000-C1 (FM Approval for Canada)

Type of protection:
Ex db [op is T6 Ga] IIC T5 Gb
Class II/III, Division 1, Groups E, F, G, T5
Ex tb [op is T85˚C Da] IIIC T100˚C Db

Enclosure rating: IP66, Type4X

Applicable standards:
CAN/CSA-C22.2 No.0:2010 (R2015)
CSA-C22.2 No. 0.4:2017
CSA C22.2 No. 0.5:2016
CSA C22.2 No. 25:2017
CSA C22.2 No.94.2:2015
CAN/CSA-C22.2 No.61010-1:2012
CAN/CSA-C22.2 No.61010-2-030:2012
CAN/CSA-C22.2 No.60529:2016
CSA C22.2 No.60079-0:2019
CAN/CSA-C22.2 No.60079-1:2016
CAN/CSA-C22.2 No.60079-28:2016
CAN/CSA-C22.2 No.60079-31:2015
ANSI/ISA 12.27.01:2011

TDLS8000-S1 (ATEX)

Type of protection:
II 2(1) G Ex db [op is T6 Ga] IIC T5 Gb
II 2(1) D Ex tb [op is T85˚C Da] IIIC T100˚C Db

Enclosure rating:
IP66 (In Accordance with EN 60529)

Applicable standards:
EN IEC 60079-0:2018
EN 60079-1:2014, EN 60079-28:2015, EN 60079-31:2014

TDLS8000-E1 (IECEx)

Type of protection:
Ex db [op is T6 Ga] IIC T5 Gb
Ex tb [op is T85˚C Da] IIIC T100˚C Db

Enclosure rating:
IP66 (In Accordance with IEC 60529)

Applicable standards:
IEC 60079-0:2017, IEC 60079-1:2014, IEC 60079-28:2015, IEC 60079-31:2013

TDLS8000-K1 (Korea Ex)

Type of protection:
Ex db IIC T5 Gb
Ex tb IIIC T100˚C Db

Enclosure rating:
IP66 (In accordance with IEC 60529)

Applicable standards:
Notice of Ministry of Labor No. 2021-22 Harmonized with IEC 60079-0: 2017, IEC 60079-1: 2014, IEC 60079-31: 2013

TDLS8000-J1 (Japan Ex)
Type of protection: Ex db IIC T5 Gb
Applicable standards:
JNIOSH-TR-46-1:2015
JNIOSH-TR-46-2:2018
TDLS8000-N1 (NEPSI)
Type of protection:
Ex db [op is T6 Ga] IIC T5 Gb
Ex tb [op is T85°C Da] IIIC T100°C Db
Enclosure rating:
IP66 (In accordance with GB/T 4208-2017)
Applicable standards:
GB/T 3836.1-2021
GB/T 3836.2-2021
GB/T 3836.22-2017
GB/T 3836.31-2021
TDLS8000-Q1, -R1 (EAC)
Type of protection:
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Ex tb [op is T85˚C Da] IIIC T100˚C Db X
Enclosure rating:
IP66 (In accordance with GOST 14254)
Applicable standards:
GOST 31610.0-2014
GOST IEC 60079-1-2013
GOST 31610.28-2017
GOST IEC 60079-31-2013
TDLS8000-U1 (INMETRO)
Type of protection:
Ex db [op is T6 Ga] IIC T5 Gb
Ex tb [op is T85˚C Da] IIIC T100ºC Db
Enclosure rating: IP66
Applicable standards:
ABNT NBR IEC 60079-0:2020
ABNT NBR IEC 60079-1:2016
Versão Corrigida:2020
ABNT NBR IEC 60079-28:2016
Versão Corrigida:2021
ABNT NBR IEC 60079-31:2014

Division 2, Zone 2: Nonincendive/Type n
TDLS8000-D2 (FM Approval for US)
Division system:
Type of protection:
Nonincendive for Class I, Division 2, Groups A, B, C, D, T5
Dust-Ignitionproof for Class II/III, Division 1, Groups E, F, G, T5
Enclosure rating: Type 4X
Applicable standards:
FM Class 3600: 2018
FM Class 3611: 2018
FM Class 3616: 2011
FM Class 3810: 2018
ANSI/NEMA250: 2003
Zone system:
Type of protection:
Class I, Zone 2, AEx nA nC [op is T6 Ga] IIC T5 Gc
Zone 21, AEx tb [op is T85˚C Da] IIIC T100˚C Db
Enclosure Rating: IP66
Applicable standards:
ANSI/UL 60079-0:2019
ANSI/UL 60079-15:2013
ANSI/UL 60079-28:2017
ANSI/UL 60079-31:2015
ANSI/IEC 60529:2004

TDLS8000-C2 (FM Approval for Canada)
Type of protection:
Ex nA nC [op is T6 Ga] IIC T5 Gc
Ex tb [op is T85˚C Da] IIIC T100˚C Db
Class II/III, Division 1, Groups E, F, G, T5
Enclosure rating: IP66, Type 4X
Applicable standards:
CSA C22.2 No. 25:2017
CSA C22.2 No.94.2:2015
CAN/CSA-C22.2 No.60529:2016
CAN/CSA-C22.2 No. 60079-0:2019
CAN/CSA-C22.2 No.60079-15:2016
CAN/CSA-C22.2 No.60079-28:2016
CAN/CSA-C22.2 No.60079-31:2015
CAN/CSA-C22.2 No.61010-1:2012
CAN/CSA-C22.2 No.61010-2-030:2012
ANSI/ISA 12.27.01:2011
TDLS8000-S2 (ATEX)
Type of protection:
II 3(1) G Ex nA nC [op is T6 Ga] IIC T5 Gc
II 2(1) D Ex tb [op is T85˚C Da] IIIC T100˚C Db
Enclosure rating:
IP66 (In accordance with EN 60529)
Applicable standards:
EN IEC 60079-0:2018,
EN 60079-15: 2010,
EN 60079-28: 2015,
EN 60079-31: 2014
TDLS8000-E2 (IECEx)
Type of protection:
Ex nA nC [op is T6 Ga] IIC T5 Gc
Ex tb [op is T85˚C Da] IIIC T100˚C Db
Enclosure rating:
IP66 (In accordance with IEC 60529)
Applicable standards:
IEC 60079-0:2017, IEC 60079-15: 2010,
IEC 60079-28: 2015, IEC 60079-31: 2013
TDLS8000-K2 (Korea Ex)
Type of protection: Ex nA nC IIC T5 Gc
Ex tb IIIC T100˚C Db
Enclosure rating:
IP66 (In accordance with IEC 60529)
Applicable standards:
Notice of Ministry of Labor No. 2021-22
Harmonized with IEC 60079-0: 2017,
IEC 60079-15: 2010, IEC 60079-31: 2013
TDLS8000-N2 (NEPSI)
Type of protection:
Ex nA nC [op is T6 Ga] IIC T5 Gc
Ex tD A21 IP66 T100ºC
Enclosure rating:
IP66 (In accordance with GB 4208)
Applicable standards:
GB 3836.1-2010, GB 3836.8-2014,
GB 12476.1-2013, GB 12476.5-2013,
IEC 60079-28:2015
TDLS8000-Q2, -R2 (EAC)
Type of protection:
2Ex nA nC [op is T6 Ga] IIC T5 Gc X
Ex tb [op is T85ºC Da] IIIC T100ºC Db X
Enclosure rating:
IP66 (In accordance with GOST 14254)

Applicable standards:
GOST 31610.0-2014
GOST 31610.15-2014
GOST 31610.28-2017
GOST IEC 60079-31-2013

TDLS8000-U2 (INMETRO)
Type of protection:
Ex nA nC [op is T6 Ga] IIC T5 Gc
Ex tb [op is T85ºC Da] IIIC T100ºC Db
Enclosure rating:
IP66
Applicable standards:
ABNT NBR IEC 60079-0:2020
ABNT NBR IEC 60079-15:2019
ABNT NBR IEC 60079-28:2016
Versão Corrigida:2021
ABNT NBR IEC 60079-31:2014

TDLS8000-J2 (Japan Ex)
Type of protection:
Ex nA nC [op is T6 Ga] IIC T5 Gc
Ex tb [op is T85ºC Da] IIIC T100ºC Db
Applicable standards:
JNIOSH-TR-46-1:2020
JNIOSH-TR-46-8:2015
JNIOSH-TR-46-9:2018
JNIOSH-TR-46-11:2020
Enclosure rating:
IP66 (In accordance with IEC 60529)

PERFORMANCE

Repeatability / Linearity:

Measured gas		Repeatability	Linearity
O_2		+/- 1% reading or +/- 0.01 $\%O_2$, whichever is greater	+/- 1% F.S.
CO (ppm)		+/- 2% reading or +/- 1 ppm CO, whichever is greater	+/- 1% F.S.
CO or CH_4	CO	+/- 2% reading or +/- 1 ppm CO, whichever is greater	+/- 2% F.S.
	CH_4	+/- 4% reading or +/- 0.02% CH_4, whichever is greater	+/- 4% F.S.
NH_3		+/- 2% reading or +/- 1 ppm NH_3, whichever is greater	+/- 2% F.S.
H_2O (ppm) in non HC		+/- 2% reading or +/- 0.1 ppm H_2O, whichever is greater	+/- 1% F.S.
H_2O (ppm) in HC		+/- 2% reading or +/- 0.1 ppm H_2O, whichever is greater	+/- 1% F.S
CO (%)		+/- 1% reading or +/- 0.01% CO, whichever is greater	+/- 1% F.S.
CO (%) + CO_2 (%)	CO	+/- 1% reading or +/- 0.1% CO, whichever is greater	+/- 1% F.S.
	CO_2	+/- 1% reading or +/- 0.1% CO_2, whichever is greater	+/- 1% F.S.
H_2S		+/- 1% reading or +/- 0.005% H_2S, whichever is greater	+/- 1% F.S.
CO_2 (%) High Range		+/- 1% reading or +/- 0.005% CO_2, whichever is greater	+/- 1% F.S.
CO_2 (%) Extend. Range		+/- 1% reading or +/- 0.02% CO_2, whichever is greater	+/- 1% F.S.
H_2O (%)		+/- 1% reading or +/- 0.02% H_2O, whichever is greater	+/- 2% F.S.
HCl		+/- 1% reading or +/- 2.5 ppm HCl, whichever is greater	+/- 2% F.S.

Measurement conditions: Gas temperature; 25 ºC, Gas pressure; 0.1 MPa, Optical path length; 1 m

Data Update Cycle:
Standard; Approx. 2 seconds (Response time may increase for non-standard applications)
If less than 2 seconds response is required, please consult with Yokogawa

Zero Drift: Typically <0.1% of the minimum range over 24 months

Influences on the Measurement - Application dependent

A. Temperature: The temperature of the measured gas should be taken into account by the analyzer so that the reading can be corrected on a real time basis. The effect is specific to each different measurement gas.
   a. If the gas temperature is constant at the desired measurement condition, then a fixed gas temperature may be programmed into the analyzer. This fixed value can be used in real time by the analyzer to provide a temperature-compensated reading.
   b. If the gas temperature is relatively equal to the ambient temperature, then an integral sensor value may be utilized by the analyzer. This active ambient value is used real time by the analyzer to provide a temperature compensated reading.
   c. If the gas temperature is variable, then an external sensor value may be utilized by the analyzer. This active input value can be used in real time by the analyzer to provide a temperature compensated reading.

B. Pressure: The pressure of the measured gas must be taken into account by the analyzer so that the reading can be corrected on a real time basis. The effect is specific to each different measurement gas.
   a. If the gas pressure is constant at the desired measurement condition, then a fixed gas pressure may be programmed to the analyzer. This fixed value can be used in real time by the analyzer to provide a pressure compensated reading.
   b. If the gas pressure is variable, then an external sensor value may be utilized by the analyzer. This active input value can be used in real time by the analyzer to provide a pressure compensated reading.

● YH8000 HMI Unit

The YH8000 is an HMI designed specifically for the TDLS8000 series. The YH8000 features an easy-to-use touchscreen 7.5 inch color LCD which can be used to display maintenance information, display alarm statuses and records, and set all parameters of the TDLS8000.

The YH8000 can be installed directly on the TDLS8000 series or installed remotely.

An Ethernet connection is used to connect the YH8000 to up to four TDLS8000 series simultaneously via a hub.

Display: Touchscreen 7.5 inch TFT color LCD panel, 640 x 480 (VGA)
Communication: Ethernet; RJ-45 connector

Communication speed; 100 Mbps
Case: Aluminum alloy
Paint color: Mint green (RAL 190 30 15 or equivalent)
Protection degree of enclosure: IP65, Type 4X
Window: Polycarbonate
Weight: Approx. 4 kg
Cable gland for Japan Ex; (/JA1, /JA2) Approx. 320 g/pc
Mounting: Analyzer mount (Front, left-side, right-side) with tilt function, Pipe mount, or Panel mount (Stainless steel)
Cable Entries: 1/2NPT or M20x1.5 mm, two holes
Installation conditions:
Ambient operating temperature; -20 to 55ºC
Storage temperature: -30 to 70ºC
Humidity: 10 to 90%RH at 40ºC (Non-condensing)
Power Supply: 24V DC +/-10%
Power consumption: Max.12 W

Safety, EMC, and RoHS conformity standards:
Safety conformitystandards:
CE, UKCA EN61010-1
UL UL61010-1
CSA CAN/CSA-C22.2 No.61010-1
GB GB30439 Part 1
Installation Altitude: 2000 m or less
Installation category: I
(Anticipated transient overvoltage 330 V)
Pollution degree: 2, Indoor/Outdoor use
EMC conformity standards:
CE, UKCA EN55011 Class A Group 1
EN61326-1 Class A Table 2 (For use in industrial location)
RCM EN55011 Class A Group 1
KC KN11 Class A Group 1, KN61000-6-2 (Korea Electromagnetic Conformity)
RoHS conformity standards: EN IEC 63000:2018*
*: For only YH8000-G1, -G2, -S2
Information of the WEEE Directive
This product is purposely designed to be used in a large scale fixed installations only and, therefore, is out of scope of the WEEE Directive.
The WEEE Directive does not apply.
The WEEE Directive is only valid in the EU and UK.

Hazardous area classifications:

Division 2, Zone2: Nonincendive/Type n

YH8000-D2 (FM Approval for US)
Division system
Type of protection: Nonincendive for Class I, Division 2, Groups A, B, C, D, T5
Enclosure rating: Type 4X
Applicable standards: FM Class 3600: 2018
FM Class 3611: 2018
FM Class 3810: 2018
NEMA 250: 2003
Zone system
Type of protection:
Class I, Zone 2, AEx nA ic IIC T5 Gc
Enclosure rating: IP65
Applicable standards: ANSI/UL 60079-0:2019,
ANSI/UL 60079-11:2013
ANSI/UL 60079-15:2013
ANSI/UL 121201:2019
ANSI/IEC 60529-2004

YH8000-C2 (FM Approval for Canada)
Type of protection: Ex nA ic IIC T5 Gc
Enclosure rating: IP65, Type 4X
Applicable standards:
CAN/CSA No.94.2-07 (R2012)
CAN/CSA-C22.2 No.60079-0:19
CAN/CSA-C22.2 No.60079-11:14
CAN/CSA-C22.2 No.60079-15:16
CAN/CSA-C22.2 No.61010-1-12
CAN/CSA No.60529:05 (R2010)

YH8000-S2 (ATEX)
Type of protection: II 3 G Ex nA ic IIC T5 Gc
Enclosure rating:
IP65 (In accordance with EN 60529)
Applicable standards:
EN IEC 60079-0:2018,
EN 60079-11: 2012, EN 60079-15: 2010

YH8000-E2 (IECEx)
Type of protection: Ex nA ic IIC T5 Gc
Enclosure rating:
IP65 (In accordance with IEC 60529)
Applicable standards: IEC 60079-0: 2017,
IEC 60079-11: 2011, IEC 60079-15: 2010

YH8000-J2 (Japan Ex)
Type of protection: Ex nA ic IIC T5 Gc
Enclosure rating:
IP65 (In accordance with IEC 60529)
Applicable standards: JNIOSH-TR-46-1:2020
JNIOSH-TR-46-6:2015
JNIOSH-TR-46-8:2015

YH8000-K2 (Korea Ex)
Type of protection: Ex nA ic IIC T5 Gc
Enclosure rating: IP65 (In accordance with IEC 60529)
Applicable standards: Notice of Ministry of LaborNo. 2021-22
Harmonized with IEC60079-0: 2017, IEC 60079-11: 2011, IEC 60079-15:2010

YH8000-N2 (NEPSI)
Type of protection: Ex ec ic IIC T5 Gc
Enclosure rating: IP65 (In accordance with GB/T 4208-2017)
Applicable standards: GB/T 3836.1-2021,
GB/T 3836.3-2021,
GB/T 3836.4-2021

YH8000-R2 (EAC)
Type of protection: 2Ex nA ic IIC T5 Gc X
Enclosure rating: IP65 (In accordance with GOST 14254)
Applicable standards: GOST 31610.0-2014
GOST 31610.15-2014
GOST 31610.11-2014

YH8000-U2 (INMETRO)
Type of protection: Ex nA ic IIC T5 Gc
Enclosure rating: IP65
Applicable standards:
ABNT NBR IEC 60079-0:2020
ABNT NBR IEC 60079-11:2013
Versão Corrigida:2017
ABNT NBR IEC 60079-15:2019

● IF8000 Isolation Flanges

A process isolation flange protects the TDLS8000 from the process gas pressure and the heat, dust, and corrosive elements of the process gas. A process isolation flange must be installed in the following situations.• When the process gas pressure exceeds 500 kPa

- When the process temperature is high and the temperature of the process window area exceeds 55ºC even when process window purge is performed.
- When the process dust level is high and the adherence of dust or intrusion of corrosive elements cannot be prevented even when process window purge is performed.

The IF8000 isolation flanges can be used for additional protection in in-situ or bypass installations.

Note: Must use in conjunction with alignment flanges

Process connections: (see below table)
Heatresistance temperature: 200ºC max
Measured gas pressure: Max. 1 MPa abs.
Wetted materials: Sapphire, 316 SS, Monel 400, FFKM (O-ring)

Weight;

Process connection	Analyzer connection	Weight (Approx.)	
		316SS	Monel 400
ANSI Class 150-2-RF Flange	ANSI Class 150-2-RF Flange	5 kg/pc	6 kg/pc
ANSI Class 300-2-RF Flange		7 kg/pc	7 kg/pc
ANSI Class 150-3-RF Flange		8 kg/pc	9 kg/pc
ANSI Class 300-3-RF Flange		11 kg/pc	12 kg/pc
ANSI Class 150-4-RF Flange		12 kg/pc	14 kg/pc
DIN PN16-DN50 Flange	DIN PN16-DN50 Flange	7 kg/pc	7 kg/pc
DIN PN16-DN80 Flange		10 kg/pc	11 kg/pc
JIS 10K-50-FF Flange		7 kg/pc	7 kg/pc
JIS 10K-80-FF Flange		9 kg/pc	10 kg/pc

Note: When using TDLS8000 as CE/UKCA marking compliance product, the upper limit of the measurement gas pressure is 50kPa in gauge pressure.
Consult with Yokogawa Europe B.V. in the case of witnessing high pressure in Europe.

● YC8000 Flow Cell

Used for extracting sample streams at any location.

Note: Must use in conjunction with alignment flanges (“-FC”)

Gas temperature: 200ºC max
Gas pressure: Max. 1 MPa abs.
Wetted materials: Sapphire, 316 SS, Monel 400, FFKM (O-ring)

Weight;

Material/Optical Path Length	1016 mm (40 inch)	1524 mm (60 inch)
Monel 400	Approx. 15 kg	Approx. 18 kg
316 SS	Approx. 14 kg	Approx. 17 kg

Note: When using TDLS8000 as CE/UKCA marking compliance product, the upper limit of the measurement gas pressure in YC8000 is 50kPa in gauge pressure.

● Calibration Cell

Used for off-line calibrations and validations. Appropriate process windows are included on calibration cell.

Optical Path Length: 660 mm
Material: 316 SS

Part No.	Description	Weight
K9772XA	Calibration Cell with free-standing frame for O_2	Approx. 14 kg
K9772XB	Calibration Cell with free-standing frame for O_2 LAO	
K9772XC	Calibration Cell with free-standing frame for ppm H_2O in non- hydrocarbon	
K9772XD	Calibration Cell with free-standing frame for NH_3	
K9772XE	Calibration Cell with free-standing frame for ppm H_2O in hydrocarbon background	
K9772XF	Calibration Cell with free-standing frame for ppm CO	
K9772XG	Calibration Cell with free-standing frame for ppm CO LAO	
K9772XH	Calibration Cell with free-standing frame for CO (%) + CO_2 (%), CO_2 (%) Extend. Range	
K9772XJ	Calibration Cell with free-standing frame for HCl	
K9772XL	Calibration Cell with free-standing frame for CO(%), CO_2 (%) High Range	
K9772XM	Calibration Cell with free-standing frame for H_2S	

Note: When using TDLS8000 as CE/UKCA marking compliance product, the upper limit of gas pressure in calibration cell is 50kPa in gauge pressure.

● Unit Connection Cable

Use for interconnecting the Sensor Control Unit and the Laser Unit.

Construction:
Double-shielded (Overall shield and Individual shields) 4-pair cable

Part No.	Cable length
K9775XA	5 m
K9775XB	10 m
K9775XC	20 m
K9775XD	30 m
K9775XE	40 m
K9775XF	50 m
K9775XG	60 m

Note: When cable length is not more than 25m, Belden 1475A may be used as Unit Connection Cable.

■ MODEL AND CODES

- **TDLS8000 Tunable Diode Laser Spectrometer**

Model	Suffix Code	Option Code	Description
TDLS8000	.....	.....	Tunable Diode Laser Spectrometer
Type	**-G1**	.....	General Purpose, cable entry/piping:NPT
	-G2	.....	General Purpose, cable entry:Metric thread, piping:Rc
	-GQ	.....	EAC with PA General Purpose, cable entry:Metric thread, piping:Rc
	-GR	.....	EAC General Purpose, cable entry:Metric thread, piping:Rc
	-D2	.....	FM (US) Class I Div 2, Zone2, cable entry/piping:NPT
	-C2	.....	FM (Canada) Class I Zone2, cable entry/piping:NPT
	-S2	.....	ATEX Type of protection “n”, cable entry:Metric thread, piping:Rc (*14)
	-E2	.....	IECEx Type of protection “n”, cable entry:Metric thread, piping:Rc
	-K2	.....	Korea Ex Type of protection “n”, cable entry:Metric thread, piping:Rc
	-N2	.....	NEPSI Type of protection “n”, cable entry:Metric thread, piping:Rc
	-Q2	.....	EAC with PA Type of protection “n”, cable entry:Metric thread, piping:Rc
	-R2	.....	EAC Type of protection “n”, cable entry:Metric thread, piping:Rc
	-U2	.....	INMETRO Type of protection “n”, cable entry: Metric thread, piping: Rc
	-D1	.....	FM (US) Class I Div 1, Zone1, cable entry/piping:NPT (*1)
	-C1	.....	FM (Canada) Class I Zone1, cable entry/piping:NPT (*1)
	-S1	.....	ATEX Flameproof ”d”, cable entry:Metric thread, piping:Rc (*1) (*14)
	-E1	.....	IECEx Flameproof “d”, cable entry:Metric thread, piping:Rc (*1)
	-K1	.....	Korea Ex Flameproof “d”, cable entry: Metric thread, piping: Rc (*1)
	-J1	.....	Japan Ex / Zone 1, cable entry:Metric thread, piping:Rc (*1) (*11)
	-J2	.....	Japan Ex / Zone 2, cable entry:Metric thread, piping:Rc (*11)
	-N1	.....	NEPSI Flameproof “d”, cable entry:Metric thread, piping:Rc (*1)
	-Q1	.....	EAC with PA Flameproof “d”, cable entry:Metric thread, piping:Rc (*1)
	-R1	.....	EAC Flameproof “d”, cable entry:Metric thread, piping:Rc (*1)
	-U1	.....	INMETRO Flameproof “d”, cable entry:Metric thread, piping:Rc (*1)
Gas Parameter	**-X1**	.....	O_2 < 600°C, 0-25% (*2)
	-X2	.....	O_2 < 1500°C, 0-25% Combustion
	-C1	.....	CO (%) 0-20%/0-50% <500°C
	-C2	.....	CO ppm 0-200ppm/0-10,000ppm <500°C (*3)
	-C3	.....	CO ppm <1500°C Combustion (*3)
	-C4	.....	CO ppm <1500°C or CH_4 0-5% Combustion (*3)
	-C5	.....	CO (%) + CO_2(%) 0-30%/0-100% <150°C
	-A1	.....	NH_3 up to 0-5,000ppm <450°C $DeNO_X$
	-S1	.....	H_2S 0-5%/0-100% <100°C (*2)
	-D1	.....	CO_2 High Range 0-1%/0-5% <100°C
	-D5	.....	CO_2 Extend. Range 0-30/0-50% <150°C
	-H1	.....	H_2O ppm non-Hydrocarbon Background (*1)
	-H3	.....	H_2O ppm Hydrocarbon Background (*1)
	-H4	.....	H_2O 0-10%/0-100% <500°C (*1)
	-L1	.....	HCl 0-50ppm/0-5,000ppm <500°C
Optics Accessory	**-NN**	.....	Without Alignment Flanges (*4)
	-LA	.....	Large Aperture Optics, ANSI CLASS150-4-RF (*5) (*6)
	-U2	.....	ANSI CLASS150-2-RF(Eq.) Alignment Flange, pipng: NPT
	-U3	.....	ANSI CLASS150-3-RF(Eq.) Alignment Flange, pipng: NPT
	-U4	.....	ANSI CLASS150-4-RF(Eq.) Alignment Flange, pipng: NPT
	-D5	.....	DIN PN16-DN50-D(Eq.) Alignment Flange, pipng: Rc
	-D8	.....	DIN PN16-DN80-D(Eq.) Alignment Flange, pipng: Rc
	-J5	.....	JIS 10K-50-FF(Eq.) Alignment Flange, pipng: Rc
	-J8	.....	JIS 10K-80-FF(Eq.) Alignment Flange, pipng: Rc
	-FC	.....	Flow Cell Alignment Flange (*6)
I/O Interface	**-A1**	.....	Analog with HART+Modbus Ethernet
SI Unit	**-N**	.....	SI Unit or non SI Unit (*7)
	-J	.....	Only SI Unit
—	**-N**	.....	Always -N

Option	**/D**	Diverging Beam without LAO (*8)
	/RX	Reference Cell for O_2 (*9)
	/RC	Reference Cell for CO (*10)
	/SCT	Stainless Steel Tag Plate
	/JA1	Cable gland for Japan Ex “-J1” (Cable O.D. 8-12mm, G1/2) 1pc, for local HMI
	/JB3	Cable gland for Japan Ex “-J1” (Cable O.D. 10-16mm, G3/4) 3 pcs
	/JB4	Cable gland for Japan Ex “-J1” (Cable O.D. 10-16mm, G3/4) 4 pcs
	/JC1	Cable gland for Japan Ex “-J2” (Cable O.D. 6-9.5mm, M20) 1pc, for local HMI
	/JD1	Cable gland for Japan Ex “-J2” (Cable O.D. 8.5-13.4mm, M20) 1pc, for local HMI
	/JE3	Cable gland for Japan Ex “-J2” (Cable O.D. 9.5-15.4mm, M25) 3 pcs
	/JE4	Cable gland for Japan Ex “-J2” (Cable O.D. 9.5-15.4mm, M25) 4 pcs
	/P2	130<P<400kPa (abs.) (*12)
	/P3	P>400kPa (abs.) (*12)
	/WCD	DNV Type Approval (*13)

*1: Type “-D1”, “-C1”, “- S1”, “-E1”, “-K1”,“-J1”, “-N1”,“-Q1”, “-R1”, “-U1” cannot be selected with “-H1” “-H3”, or “-H4”.
*2: When the process gas pressure is out of 90 to 130 kPa (abs.) or the process gas contains $CO_2 \geq 40$ % or $H_2 \geq 20$ % as coexisting gas components, please contact YOKOGAWA.
*3: When CO or CH_4 ingredient coexist, please contact YOKOGAWA.
*4: When “-NN” is selected, Zone2/Div2/Type of protection “n”, FM (Canada) Zone1 is not available.
*5: For applications whose optical path length is 6 m or longer, select the “-LA”. A condensing lens unit (LAO unit) is added to the SCU side.
“-LA” can be selected when Oxygen or CO (-C2, -C3, -C4) analyzer is selected.
“-LA” can be selected with Zone 1/Div.1/Flameproof “d” when Gas Parameter “-X2”, “-C3”, “-C4” is selected.
*6: When FM (US) or FM (Canada) is specified, the connecting port for window purge is 1/4NPT.
When ATEX, IECEx, Korea Ex, NEPSI, EAC or Japan Ex is specified, the connecting port for window purge is Rc1/4.
*7: Available only to an end user located outside of Japan.
*8: The Option “/D” can be selected when Large Aperture Optics “-LA” of the Optic Accessory is not specified and Oxygen or CO (-C2, -C3, -C4) analyzer is selected.
*9: The Option “/RX” can be used when Oxygen analyzer is selected. When both “-X2” of the Gas Parameter and “-LA” of the Optics Accessory are selected, “/RX”must be specified.
*10: The Option “/RC” can be used when CO analyzer is selected. When both “-C3” or “-C4”of the Gas Parameter is selected, “/RC” must be specified.
*11: For Japan Ex model (TDLS8000-J1, TDLS8000-J2), specified cable glands shall be attached to each cable entry for wiring. Select one cable gland out of two types: (/JB3 or /JB4 for “-J1”, /JE3 or /JE4 for “-J2”). If you need, specify (/JA1 for “-J1”, / JC1 or /JD1 for “-J2”) as well. For detailed information, refer to Japanese General Specifications.
The Option “/JA1”, “/JB3” and “/JB4” can be used only when Japan Ex/Zone 1 model (TDLS8000-J1) is selected.
The Option “/JC1”, “/JD1”, “/JE3” and “/JE4” can be used only when Japan Ex/Zone 2 (TDLS8000-J2) model is selected.
If “/JA1”, “/JB3”, “/JB4”, “/JC1”, “/JD1”, “/JE3” or “/JE4” is necessary for other model, please contact Yokogawa.
*12: P is the process gas pressure. The option “/P2” and “/P3” can be selected with the gas parameter “-X1”. When the gas parameter is not “-X1”, please contact YOKOGAWA.
*13: TDLS8000-G2-aa-bb-A1-c-N (Option)
-aa: -X1, -X2, -D1, -D5
-bb: -D5, -D8, -J5, -J8
-c: -N, -J
(Option): Only /D, /RX, /SCT can be selected.
A noise filter must be prepared. Refer to “■ WIRING” on page 22.
Cable glands (M25, 3 pcs, Applicable cable diameter 9-17mm) are attached.
*14: This model is available for UKCA.

- **YH8000 HMI Unit**

Model	Suffix Code	Option Code	Description
YH8000	.....	.....	HMI Unit
Type	**-G1**	.....	General Purpose, NPT thread for cable entry
	-G2	.....	General Purpose, Metric thread for cable entry
	-GR	.....	EAC General Purpose, Metric thread for cable entry
	-D2	.....	FM (US) Class I Div 2, Zone2, NPT thread for cable entry
	-C2	.....	FM (Canada) Class I Zone2, NPT thread for cable entry
	-S2	.....	ATEX Type of protection “n”, Metric thread for cable entry (*4)
	-E2	.....	IECEx Type of protection “n”, Metric thread for cable entry
	-J2	.....	Japan Ex/Zone 2, Metric thread for cable entry (*2)
	-K2	.....	Korea Ex Type of protection “n”, Metric thread for cable entry
	-N2	.....	NEPSI Increased safety “ec”, Metric thread for cable entry
	-R2	.....	EAC Type of protection “n”, Metric thread for cable entry
	-U2	.....	INMETRO Type of protection “n”, Metric thread for cable entry
Language	**-E**	.....	English and 9 languages (*1)
—	**-N**	.....	Always -N
Option		**/M**	Mounting kit for TDLS8000 series (*3)
		/P	Pipe mount
		/W	Wall mount
		/S	Sun Shield
		/C	Local HMI connection cable: 3m
		/SCT	Stainless Steel Tag Plate
		/JA1	Cable gland for Japan Ex (Cable O.D. 8-12mm, G1/2), 1 pc(*2)
		/JA2	Cable gland for Japan Ex (Cable O.D. 8-12mm, G1/2), 2 pc(*2)

*1: These languages are message languages on the display.
One analyzer has English and 9 languages.
All languages are as follows; English, German, French, Spanish, Portuguese, Russian, Hungarian, Korean, Chinese and Japanese.

*2: For Japan Ex/Zone 2 certified model (YH8000-J2), specified cable glands shall be attached to each cable entry for wiring.
Select the Option “/JA1” or “/JA2”.
For detailed information, refer to Japanese General Specifications (GS 11Y01D01-01JA).
The Option “/JA1” and “/JA2” can be used only when Japan Ex/Zone 2 certified model (YH8000-J2) is selected. If “/JA1” or “/JA2” is necessary for other model, please contact Yokogawa.

*3: /M cannot be selected with TDLS8000 Type “-D1”, “-C1”, “-S1”, “-E1”, “-K1”, “-J1”, “-N1”, “-Q1”, “-R1”, “-U1”.

*4: This model is available for UKCA.

• IF8000 Isolation Flanges

Model	Suffix Code	Option Code	Description
IF8000	.....	.....	Isolation Flange for TDLS8000 (2pcs/unit) (*1)
Process Connection (*2)	**-21**	.....	ANSI CLASS150-2-RF(Eq.)
	-23	.....	ANSI CLASS300-2-RF(Eq.)
	-31	.....	ANSI CLASS150-3-RF(Eq.)
	-33	.....	ANSI CLASS300-3-RF(Eq.)
	-41	.....	ANSI CLASS150-4-RF(Eq.)
	-50	.....	DIN PN16-DN50-D(Eq.)
	-80	.....	DIN PN16-DN80-D(Eq.)
	-J5	.....	JIS 10K-50-FF(Eq.)
	-J8	.....	JIS 10K-80-FF(Eq.)
Analyzer Connection (*3)	**-21**	.....	ANSI CLASS150-2-RF(Eq.)
	-50	.....	DIN PN16-DN50-D(Eq.)
Material	**-MN**	.....	Monel 400
	-SS	.....	316/316L SS
Window Type (*4)	**-12**	.....	O_2 (-X1, -X2)
	-13	.....	H_2O (-H1)
	-14	.....	NH_3 (-A1)
	-15	.....	H_2O (-H3)
	-16	.....	CO (-C2, -C3, -C4)
	-17	.....	CO+CO_2 (-C5), CO_2 (-D5)
	-18	.....	HCl (-L1), H_2O (-H4)(*5)
	-20	.....	CO (-C1), CO_2 (-D1), H_2S (-S1)
—	**-N**	.....	Always -N

*1: IF8000 is delivered with two sets (for LU and SCU).
*2: When ANSI flange of the Process Connection is selected, the “-21” of Analyzer Connection must be specified.
When DIN or JIS of the Process Connection is selected, the “-50” of Analyzer Connection must be specified.
*3: The Analyzer Connection must be selected according to the flange size of TDLS8000.
*4: Select according to the TDLS8000 Gas Parameter.
*5: When TDLS8000 H_20 (%) analyzer: (-H4) manufactured before 2019 is combined, “-20” (-C1, -D1, -S1) must be specified.

• YC8000 Flow Cell

Model	Suffix Code	Option Code	Description
YC8000	.....	.....	Flow Cell for TDLS8000
Flow Cell Type	**-EN**	.....	Enhanced
Optical Path Length	**-40**	.....	Forty Inches
	-60	.....	Sixty Inches
Material	**-MN**	.....	Monel 400
	-SS	.....	316/316L SS
Port Configuration	**-3**	.....	3 ports
Window Type (*2)	**-XX**	.....	O_2 (-X1, -X2)
	-H3	.....	H_2O (-H3)
	-HH	.....	H_2O (-H1)
	-NH	.....	NH_3 (-A1)
	-CC	.....	CO (-C2, -C3, -C4)
	-C2	.....	CO+CO_2 (-C5), CO_2 (-D5)
	-HC	.....	HCl (-L1), H_2O (-H4) (*1)
	-MC	.....	CO (-C1), CO_2 (-D1), H_2S (-S1)
Inside Wall Treatment	**-NN**	.....	No treatment (cleaned)
	-EP	.....	Electro-polish
—	**-N**	.....	Always -N

*1: When TDLS8000 H_20 (%) analyzer: (-H4) manufactured before 2019 is combined, “-MC” (-C1, -D1, -S1) must be specified.
*2: Select according to the TDLS8000 Gas Parameter.

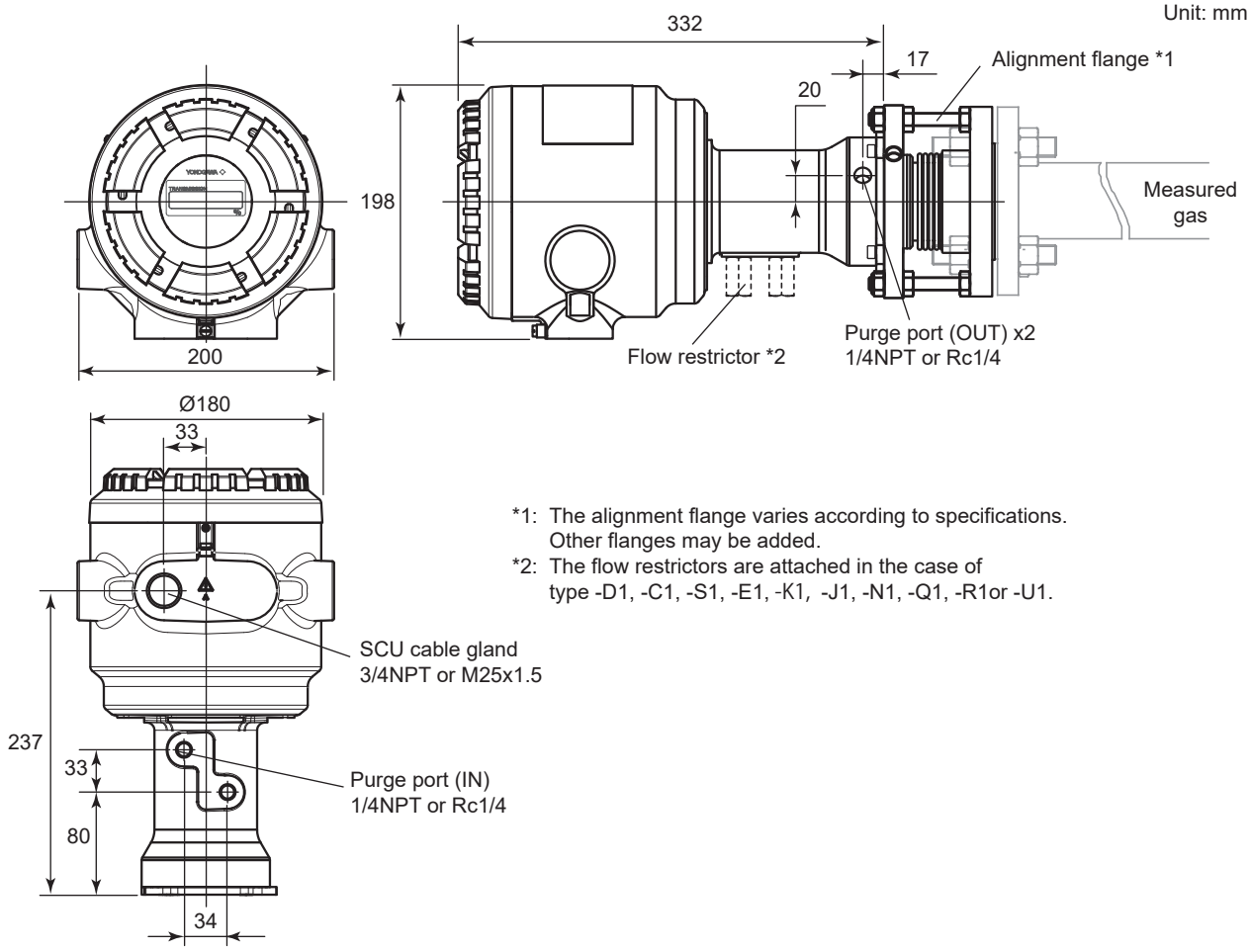
■ EXTERNAL DIMENSIONS

For the external dimensions of Japan Ex model (TDLS8000-J1, TDLS8000-J2, YH8000-J2), see Japanese General Specifications (GS 11Y01D01-01JA).

TDLS8000 with Alignment Flange

- **LU**

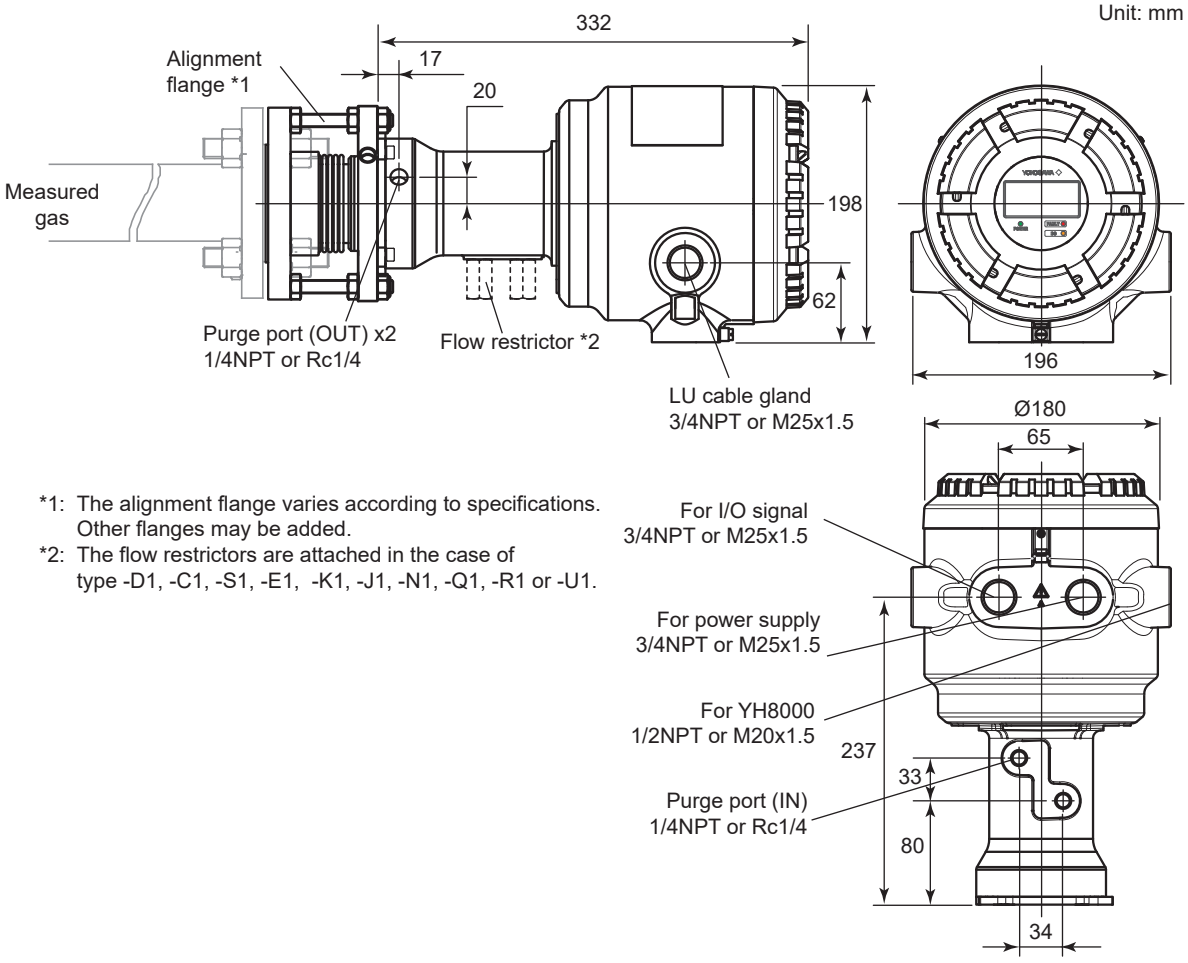
Unit: mm



*1: The alignment flange varies according to specifications. Other flanges may be added.
*2: The flow restrictors are attached in the case of type -D1, -C1, -S1, -E1, -K1, -J1, -N1, -Q1, -R1or -U1.

- **SCU**

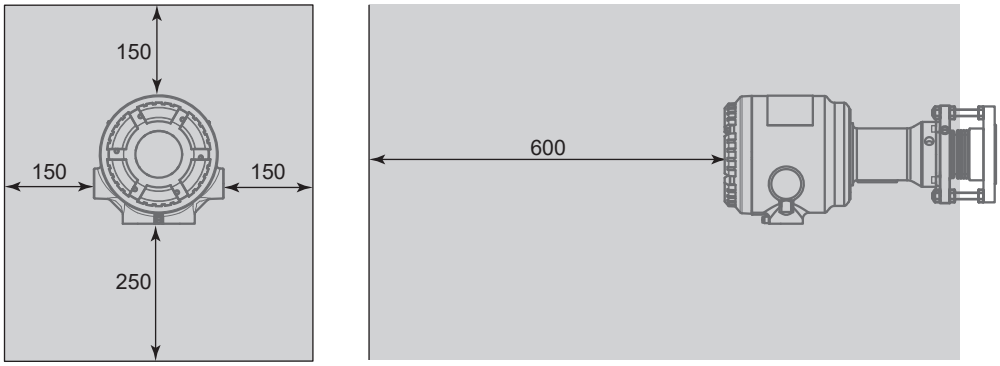
Unit: mm



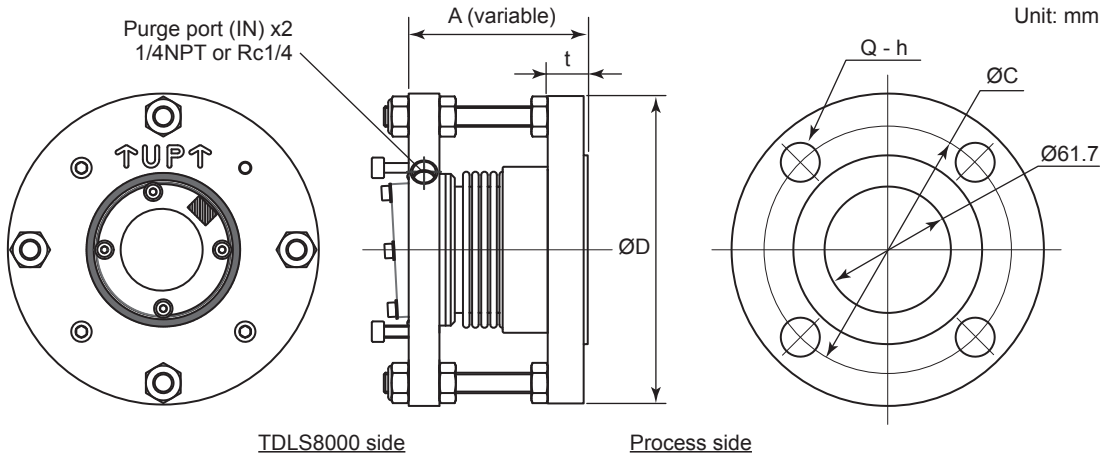
*1: The alignment flange varies according to specifications. Other flanges may be added.
*2: The flow restrictors are attached in the case of type -D1, -C1, -S1, -E1, -K1, -J1, -N1, -Q1, -R1 or -U1.

- **Maintenance space**

Unit: mm



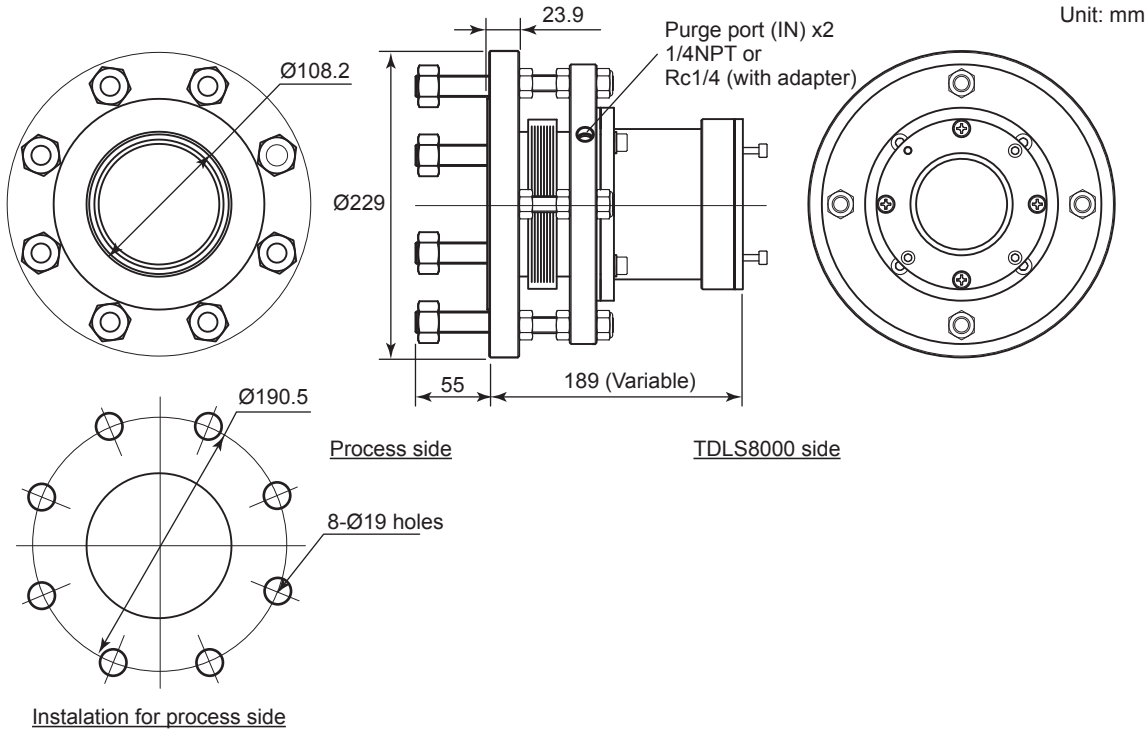
- **Alignment Flange**



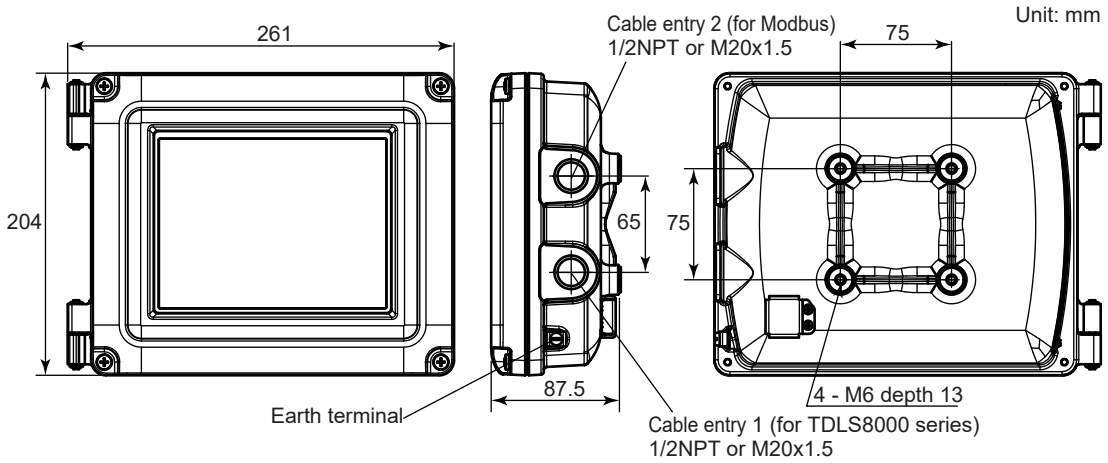
Optics Accessory code (flange)		Hole QTY Q	Hole h	Hole P.C.D C	Thickness t	Outside dia. D	Distance A	Purge port
-U2	ANSI CLASS150-2-RF(Eq.)	4	19	120.7	19.5	150	87	1/4NPT
-U3	ANSI CLASS150-3-RF(Eq.)	4	19	152.4	24.3	190	92	1/4NPT
-U4	ANSI CLASS150-4-RF(Eq.)	8	19	190.5	23.9	228.6	92	1/4NPT
-D5	DIN PN16-DN50-D(Eq.)	4	18	125	18	165	86	Rc1/4
-D8	DIN PN16-DN80-D(Eq.)	8	18	160	20	200	88	Rc1/4
-J5	JIS 10K-50-FF(Eq.)	4	19	120	16	155	84	Rc1/4
-J8	JIS 10K-80-FF(Eq.)	8	19	150	18	185	86	Rc1/4

- **LAO (Large Aperture Optics); Optics Accessory code "-LA"**

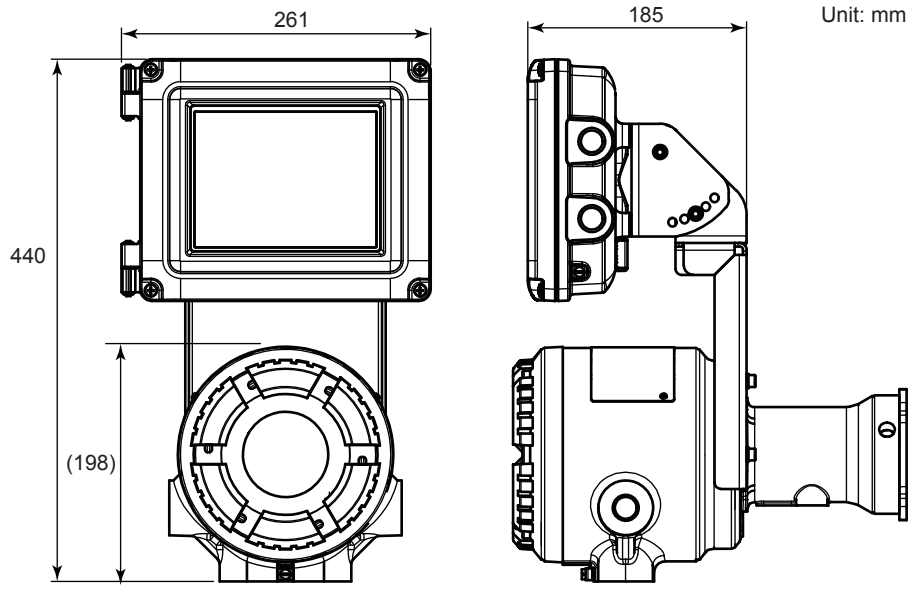
This accessory is only for SCU side. For LU side, the Alignment flange ANSI CLASS150-4-RF (Eq.) will be mounted. When piping is Rc1/4, a conversion adapter will be attached on the Alignment flange of the LU side.



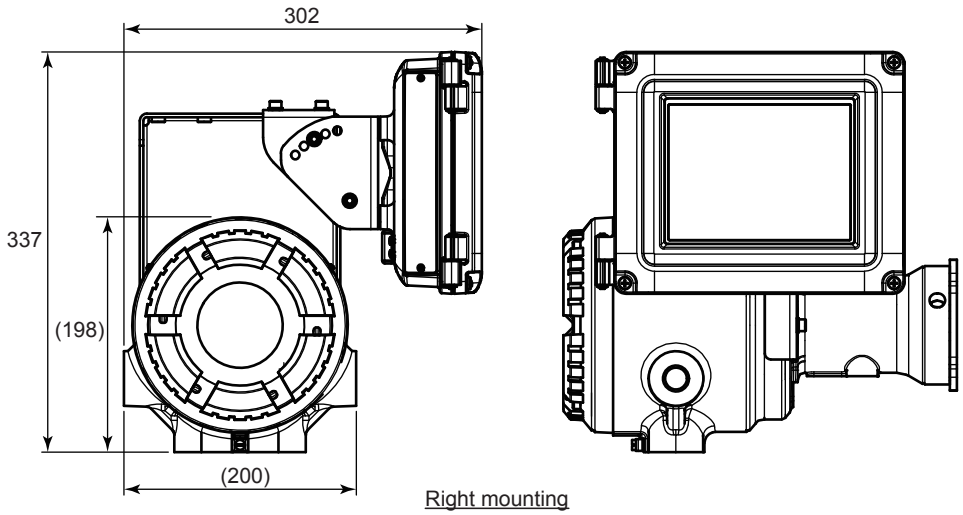
■ YH8000 HMI Unit



Mounting kit for TDLS8000 series (Option code: /M)



Front mounting

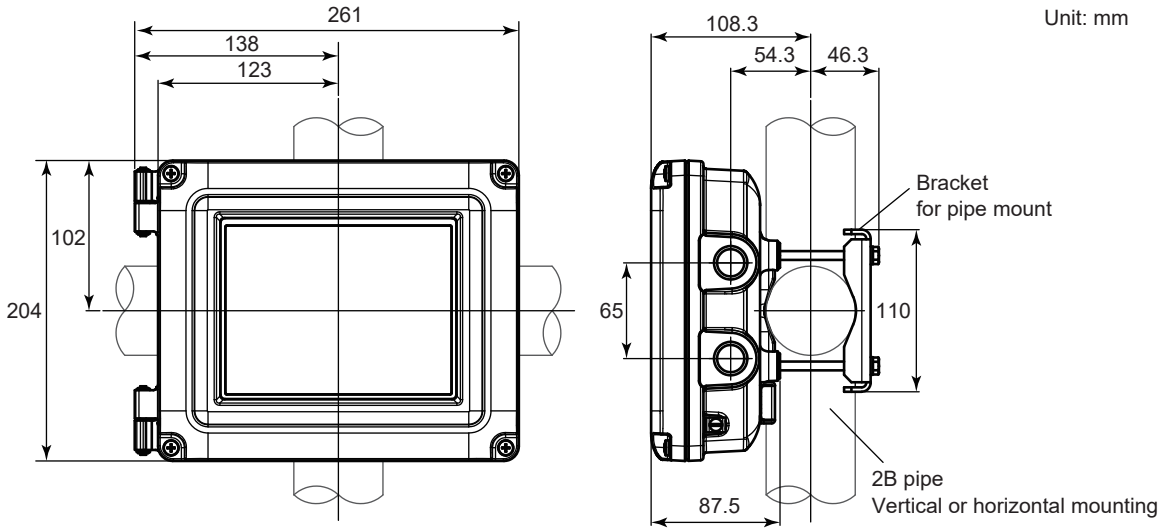


Right mounting

Available for left mounting

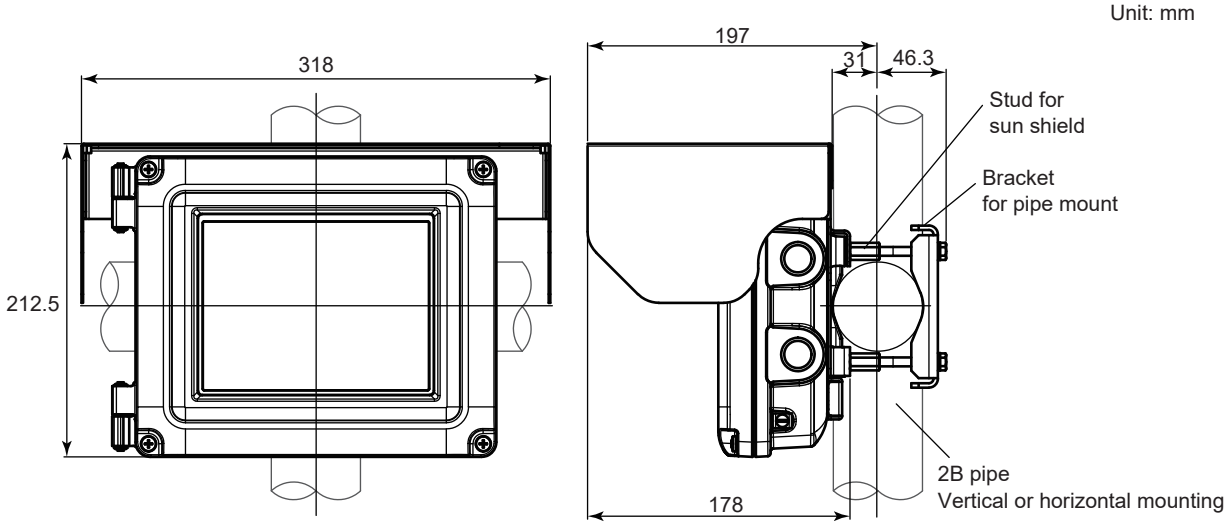
Pipe mount (Option code: /P)

Unit: mm



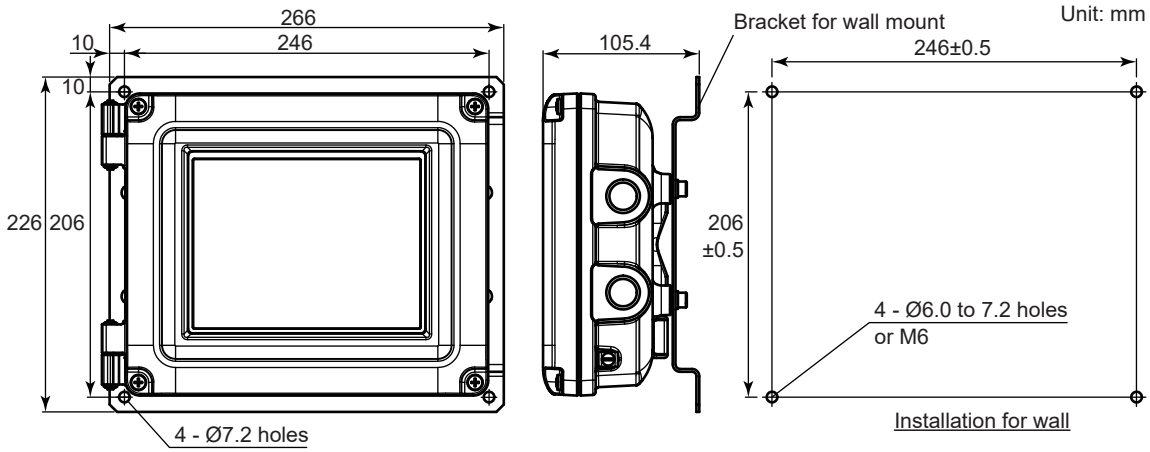
Sun Shield (Option code: /S)

Unit: mm



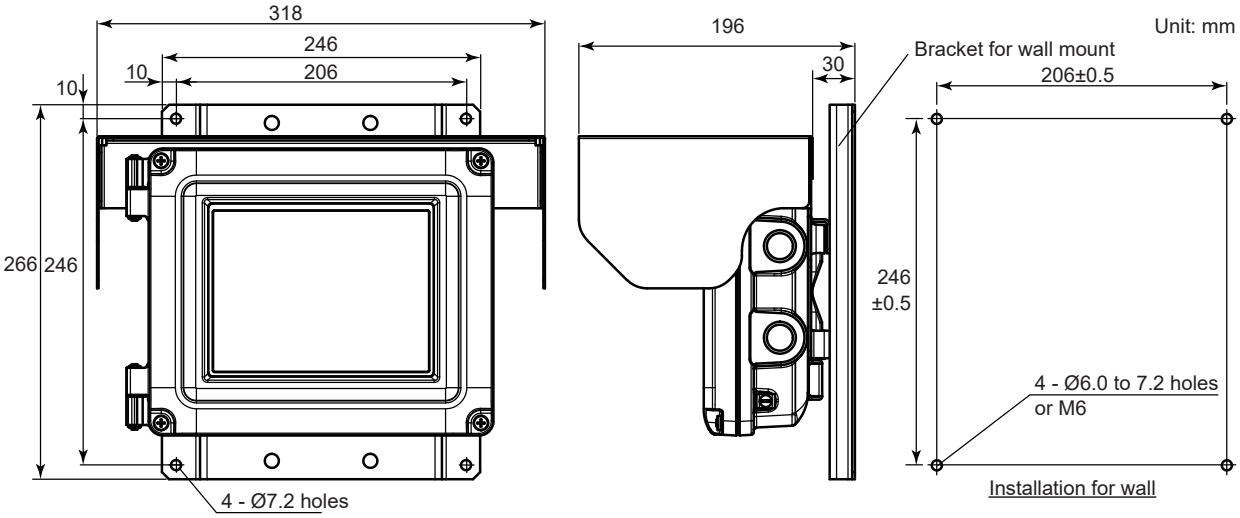
Wall mount (Option code: /W)

Unit: mm



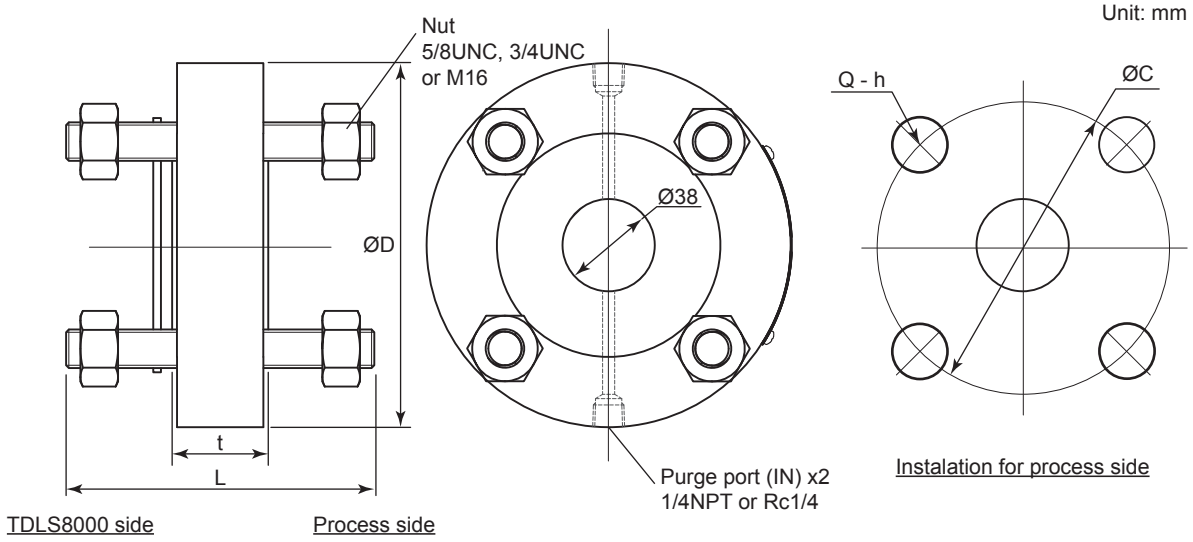
*: The wall construction for mounting has to be designed for 4 times the weight of the YH8000.
Bracket for wall mount can be placed in lengthwise

Sun Shield (Option code: /S)



When the sun shield is mounted, the bracket for wall have to be placed in widthwise.

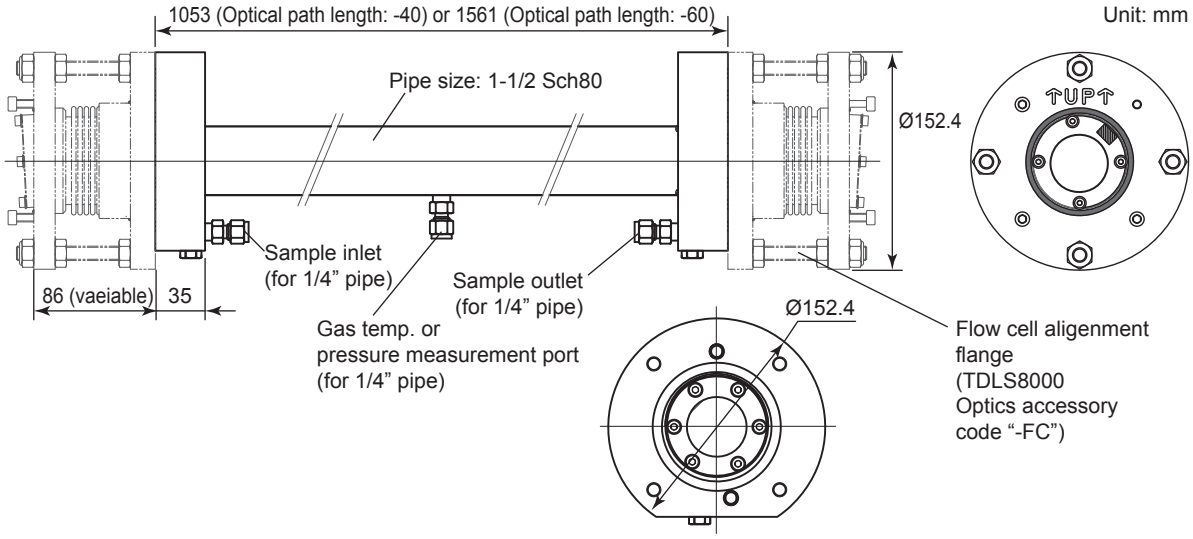
■ IF8000 Isolation Flanges



Process Connection code (flange)		Analyzer Connection code (flange)		Hole QTY Q	Hole h	Nut	Hole P.C.D C	Thickness t	Outside dia. D	Bolt length L	Purge port
-21	ANSI CLASS150-2-RF(Eq.)	-21	ANSI CLASS150-2-RF(Eq.)	4	19	5/8UNC	120.7	39.6	150	127	1/4NPT
-23	ANSI CLASS300-2-RF(Eq.)			8	19		127	39.6	165	137	
-31	ANSI CLASS150-3-RF(Eq.)			4	19		152.4	39.6	190	137	
-33	ANSI CLASS300-3-RF(Eq.)			8	22	3/4UNC	168.3	39.6	210	146	
-41	ANSI CLASS150-4-RF(Eq.)			8	19	5/8UNC	190.5	39.1	228.6	137	
-50	DIN PN16-DN50-D(Eq.)	-50	DIN PN16-DN50-D(Eq.)	4	18	M16	125	41.6	165	137	Rc1/4
-80	DIN PN16-DN80-D(Eq.)			8	18		160	41.6	200	137	
-J5	JIS 10K-50-FF(Eq.)			4	19		120	40.6	165	139	
-J8	JIS 10K-80-FF(Eq.)			8	19		150	40.6	185	139	

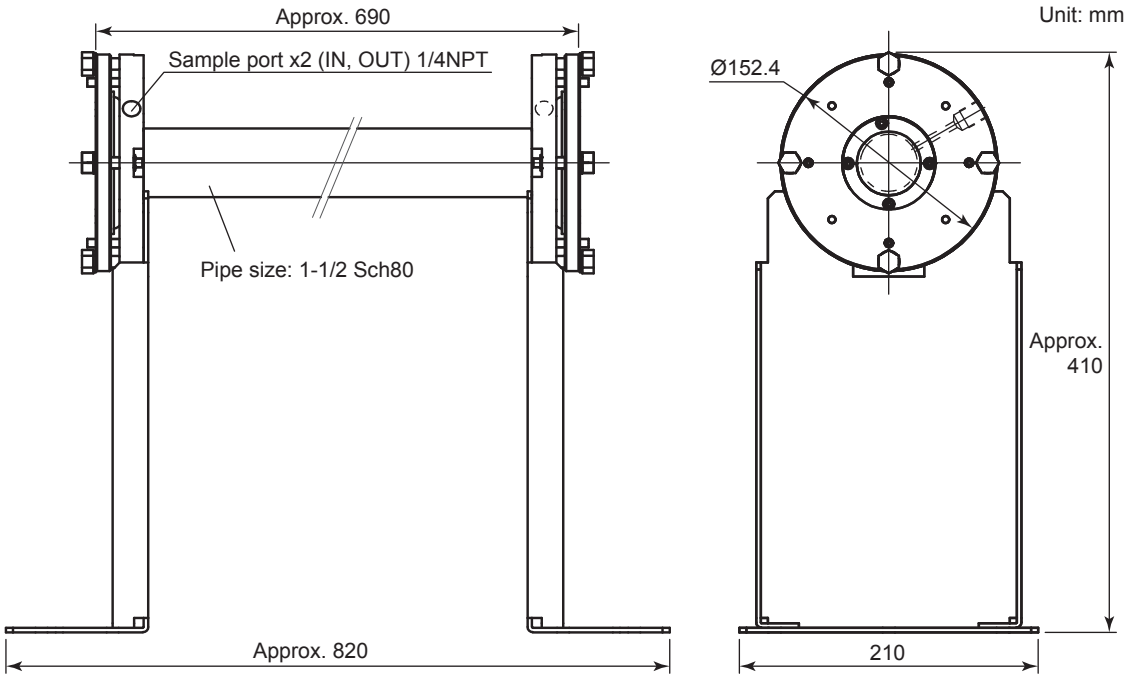
■ YC8000 Flow Cell

TDLS8000 have to be assigned the dedicated Alignment flange (Optic Accessory: -FC).
When piping is Rc1/4, a conversion adopter will be attached on the Alignment flange.



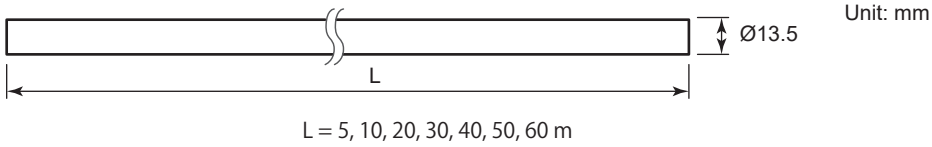
■ Calibration Cell

Part number: K9772XA, K9772XB, K9772XC, K9772XD, K9772XE, K9772XF, K9772XG, K9772XH, K9772XJ, K9772XL, K9772XM



■ Unit Connection Cable

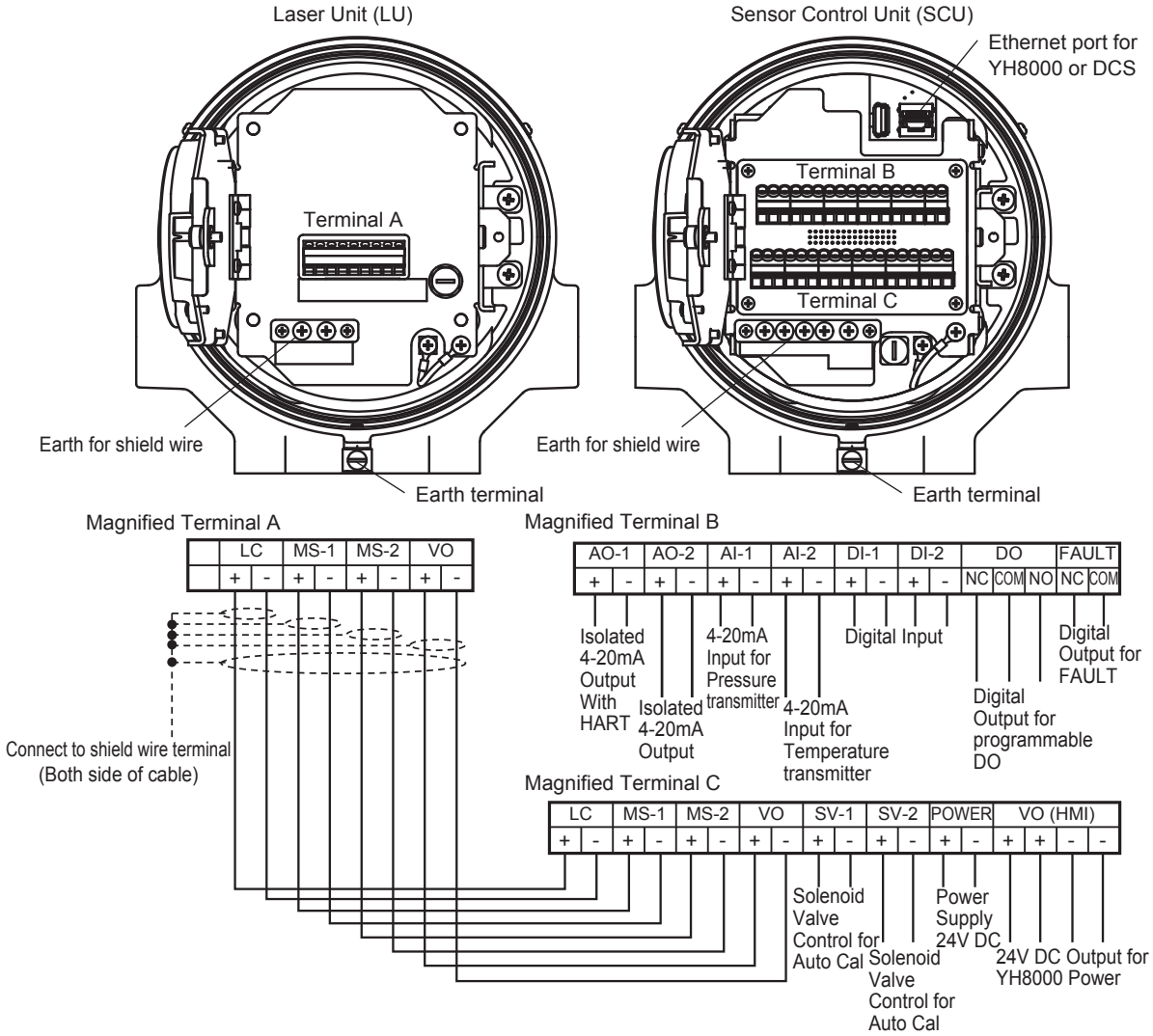
Part number: K9775XA, K9775XB, K9775XC, K9775XD, K9775XE, K9775XF, K9775XG



L = 5, 10, 20, 30, 40, 50, 60 m

■ WIRING

Wiring Laser Unit and Sensor Control Unit

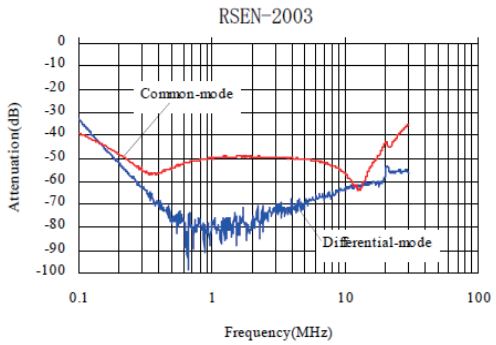


- **Installation of Noise Filter for DNV Type Approval model (/WCD)**

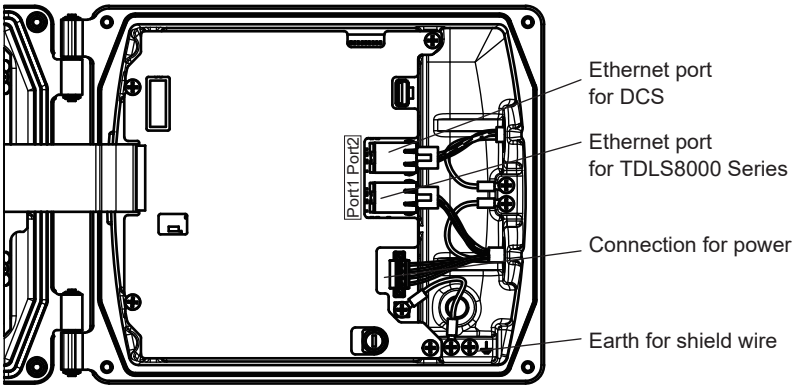
  Install a noise filter on the power line. Following is a recommendation noise filter.

  Manufacturer: TDK-Lambda
  Model: RSEN-2003

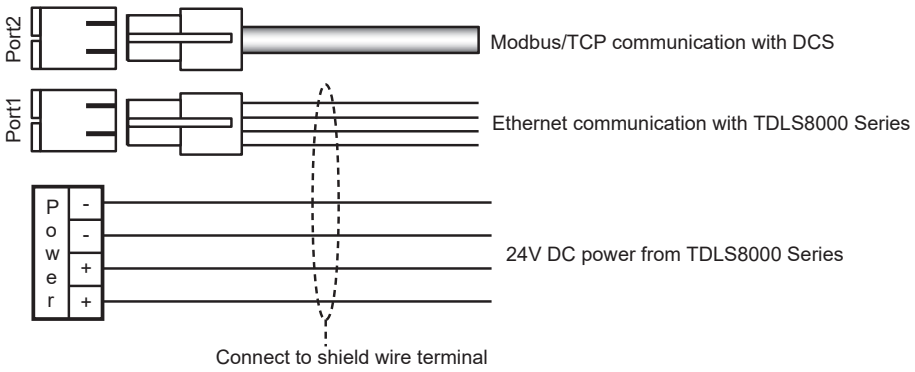
Attenuation frequency characteristics (Reference)



Wiring the YH8000 HMI UNIT

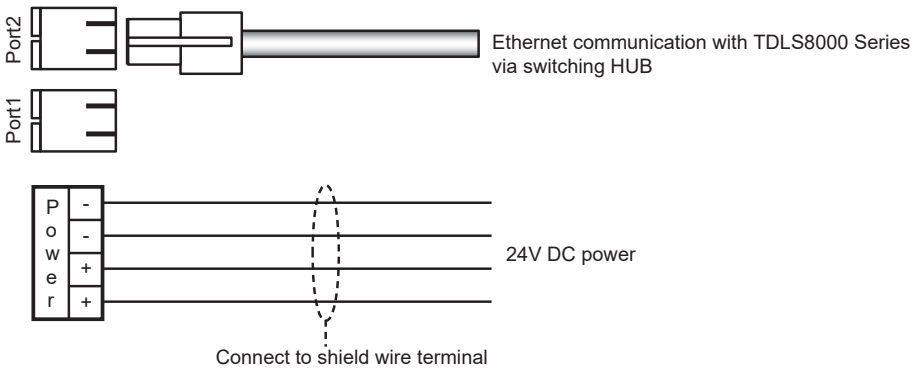


Local HMI configuration



- Connection cable between TDLS8000 Series and YH8000 must be use special cable which can be specified option code "/C."
- Maximum cable length between TDLS8000 Series and YH8000 is 3m.
- Maximum cable length between YH8000 and DCS is 100m.

Remote HMI configuration



- Maximum cable length between YH8000 and Switching HUB is 100m.

TDLS8000 Tunable DiodeLase Gas Analyzer Inquiry Form

Thank you for your inquiry about our TDLS8000 Tunable Diode Laser Gas Analyzer. Please make inquiries by placing checkmarks in the appropriate boxes and filling in the blanks. (The items with check mark and descriptions previously filled on the underlines are fixed requirements.)

1. General Information

Company :_____
Address :_____
Contact Person :_____
Email :_____
Telephone :_____
Fax :_____
Requested delivery date (day/month/year):_____
Plant name :_____
Brief Description of application :_____

2. Installation Details (check one-see drawing)

☐ Cross Stack/Pipe. For measurement across the process.
Path length_____
Process Connection_____
☐ Bypass Leg. Measurement across bypass leg located at process measurement point.
Path length_____
Process Connection_____
☐ Extractive. Sample is extracted and transported (by others) to analyzer.

3. Analyzer Options:

☐ YH8000 HMI Unit ☐ IF8000 Isolation Flanges ☐ YC8000 Flow Cell
☐ Calibration Cell ☐ Unit Connection Cable
Cable length from Analyzer Unit to HMI Unit (specify units) :_____
Area Classification:_____
Ambient Temperature (Min-Max.) Specify units_____

4. Process Wetted Materials

Must Use_____
Must Not Use_____

5. Stream Composition (1 sheet per stream analyzed)

Component	Concentrations			Units	Measured	Range If Measured
Name	Min.	Typ.	Max.	ppm(v)/vol%	Yes/No	

6. Physical Properties

	Units	Min.	Typ.	Max.
Temperature				
Pressure				
Dew Point				
Water Vapor				
Flow				
Velocity				
Particulate Concentration				

Installation location: ☐ Indoor ☐ Outdoor
Ambient temperature: _____ to _____ ºC

7. General Application & Installation Notes/Comments: