General Specifications

Model TDLS8200
Probe type
Tunable Diode Laser Spectrometer

GS 11Y01D03-01EN

■ Overview

Yokogawa's TDLS™8200 is a dual laser gas analyzer that measures the concentration of O_2, CO, CH4, NH_3, HCl ,which are important for combustion control and safety related measurements with the ability to measure various other NIR absorbing gases.

The TDLS8200 is installed in-situ, directly into the process eliminating the need for sample extraction and conditioning providing a near real time measurement. The single flange design reduces installation costs and expands installation flexibility where traditional cross-duct analyzers were not feasible due to obstructions or accessibility. Based on solid-state technology means virtually no measurement drift and reduced calibration frequency. The analyzer auto-gain feature and reference cell ensures measurements are unaffected by dynamic process conditions, upsets, or varying background composition to maintain real time measurements.

The modular design of the TDLS8200 allows for full field serviceability with the ability to replace components without having to return the analyzer to the manufacturer. A storage period of up to 50 days of data, spectra, and history files (validation and configuration changes) allow for advanced diagnostics and provides invaluable information into analyzer performance and process details.

TDLS8200 Probe type
Tunable Diode Laser Spectrometer

■ Features

- **Dual laser measurement technology allows for O_2, CO, and CH_4 to be measured in-situ with a single analyzer**
- **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 Detector Module is replaceable on site without any calibration or adjustment.
  - Internal reference cell in the Laser Detector Module ensures peak locking during trace measurements.
  - Laser Detector Modules are isolated from aggressive and corrosive processes.
  - On board diagnostics and low TCO(*1) (no moving parts, high MTTF(*2) for components)

    *1: Total Cost of Ownership
    *2: Mean Time To Failure
- **IEC61508 SIL certified, SIL 2 capability for one TDLS8200 use, SIL 3 capability for duplicate TDLS8200s use**
- **Intuitive touchscreen HMI YH8000**
  - YH8000 offers intuitive touch screen operation and simple menu structure in multiple languages allowing for control of up to four analyzers simultaneously (including TDLS8000)
- **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.
- **Full field serviceability with 50 days of data and spectra storage**
- FM (US, Canada), IECEx, ATEX hazardous area, Korea, NEPSI, Japan approvals based on Explosionproof/flame proof.
- **In-situ analysis and near real time measurements (2-5 seconds, 1 second optional)**
- **Process pressures up to 500 kPa abs., process temperatures up to 850ºC, and process gas flow velocity 1 m/s or more.**

  Note: Maximum process temperatures, pressures, and flow velocity will vary by application.

Typical gases measured include:

- Oxygen, carbon monoxide, and methane in process applications.
  Process temperatures can be as high as 850ºC, and process pressures can be as high as 500kPa abs.

YOKOGAWA

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

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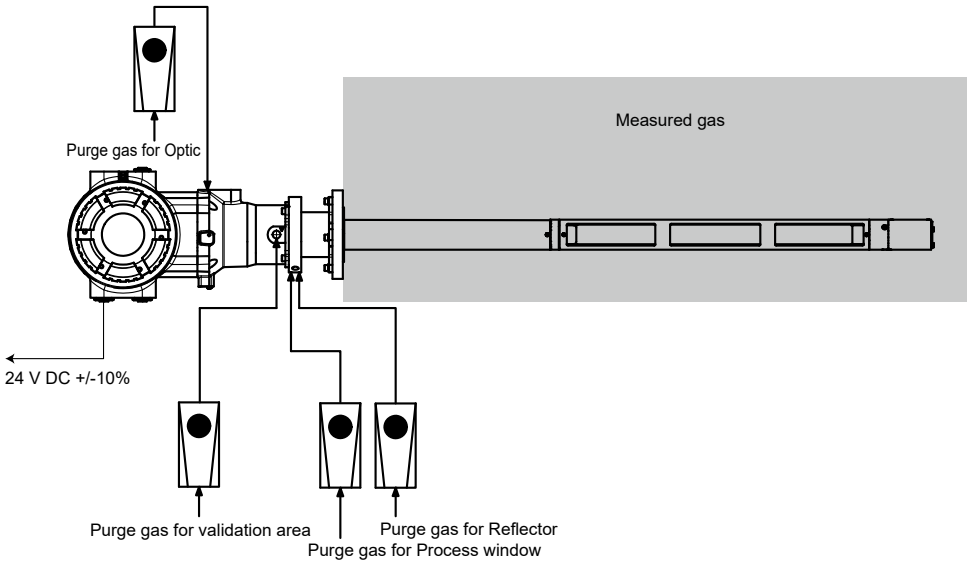
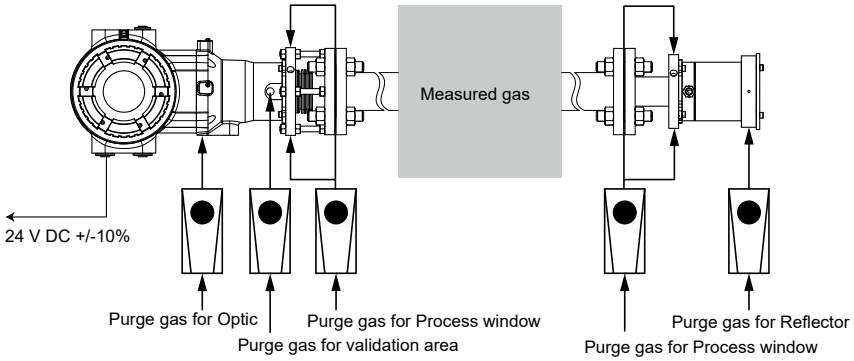
■ System configuration

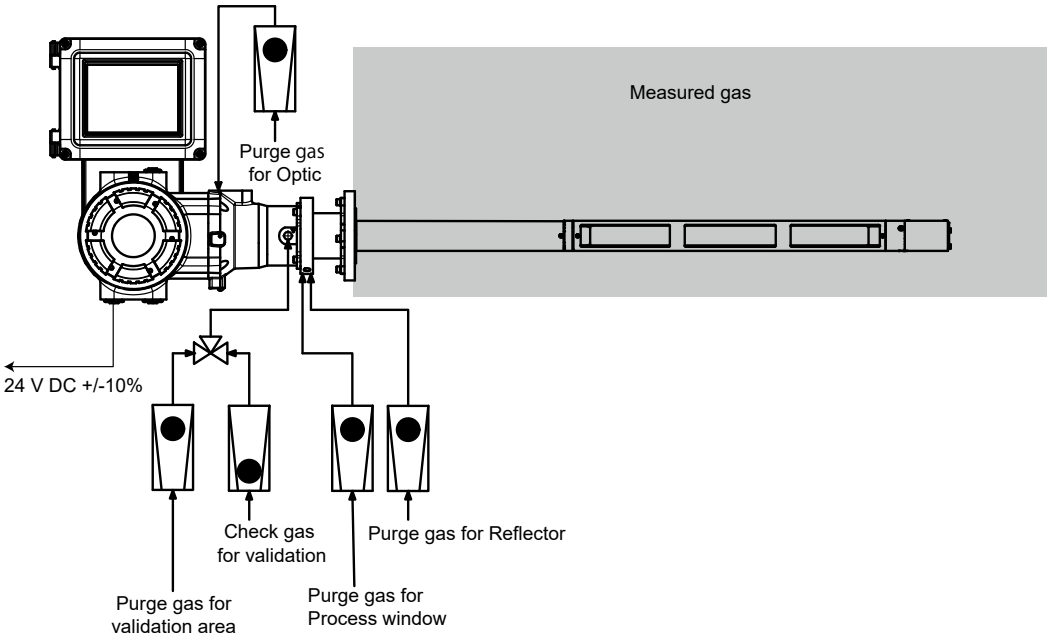
Standard System Configuration



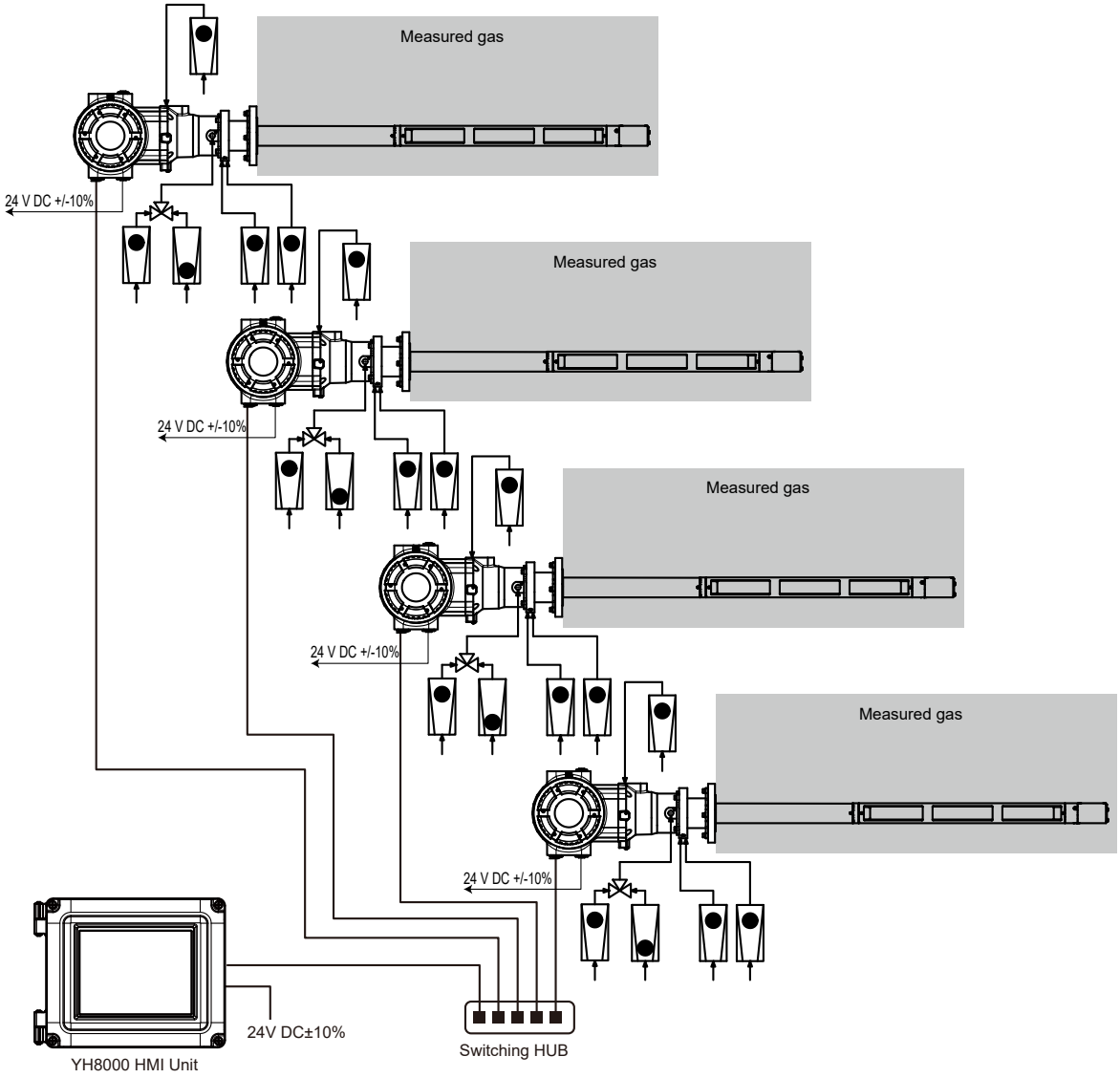
System Configuration of Reflect type (-REF)



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 configuration of TDLS8200 with remote HMI is made, five universal power supplies including YH8000 are needed.

■ STANDARD SPECIFICATIONS

- **TDLS8200 Probe type Tunable Diode Laser Spectrometer**

Measurement object:
O_2, CO, CO or CH_4, NH_3, 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% (*2)
CO (*1)	0-200 ppm	0-10,000 ppm
CH_4 (*1)	0-5%	
NH_3	0-30 ppm	0-5000 ppm
HCl	0-50 ppm	0-5000 ppm

*1: Please consult Yokogawa if CO and CH_4 component coexists.
*2: In the case of explosionproof type, oxygen concentration shall not exceed that found in normal air, typically 21%.
Please consult with Yokogawa if the measuring range for your measurement gas is outside of the above ranges.

Process length *1 (Reflect type):
0.25 to 0.51m (20 inch)
Measurement optical path length *2 (Reflect type):
0.5 to 1.02m (40 inch)
*1: The region length of the measurement gas present between the analyzer and the reflector.
*2: The distance that the measurement light passes through the measurement gas. (twice the process length)

Safety and EMC conformity standards:
Safety conformity standards:
CE EN61010-1, EN IEC 61010-2-030
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 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)

Laser classification:
CSA E60825-1:15, GB7247.1-2012, FDA 21 CFR part 1040.10, Class 1 laser product

SIL Certification:
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.
However, analog output (AO-4, AO-5), contact output (2 points), contact input (2 points), contact output for valve drive (2 points), digital communication (HART, Modbus/TCP) are outside the scope of the certification.

RoHS conformity standards: EN IEC 63000:2018

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.

Display: 128 x 64 dots LCD; On Sensor Control Unit Status LEDs; (Green: Power, Orange: DO, Red: Fault)

Display items:
Gas concentration, Transmission, Process gas temperature (AI), Process gas pressure (AI), System status, Alarm information, System information (Product serial no., Laser detector module serial no., Output signal, IP address, HART address, Optical path length, Analyzer internal temperature)

Analog output:
5 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
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, validation or blow-back 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, 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/Blow-back 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)

Self-diagnostics:
Laser detector Unit temperature, Laser temperature, Detector signal level, Memory read/write function, Peak locking condition

Calibration:
- Calibration method; Zero/Span calibration
- Calibration mode; Manual

Validation:
- Validation method; Up to 2 points
- Validation mode; Manual, Auto (Time initiated, Remote initiate (DI/Modbus)), Semi-Auto (YH8000)

Power supply: 24V DC +/-10%

Power consumption:
- Max. 25W; TDLS8200 only
- Max. 60W; with YH8000 and 2 solenoid valves

Protection degree: IP66, Type 4X

Material: Case; Aluminum alloy

Wetted materials: Fused silica, 316 SS (Eq.), BK-7 glass, Teflon encapsulated FKM, ASE wool, Alloy 800 (or equivalent, only for Mid temp.), Alloy 800H/HT (or equivalent, only for Mid temp.), PEEK (only for Flowcell type)
- Paint color: Mint green (RAL 190 30 15 or equivalent)

Weight (approx.):
- Probe part (Standard); 0.7 m 2.7 kg, 1 m 4.3 kg, 1.5 m 7.0 kg, 2 m 9.8 kg
- Probe part (High temp.); 1 m 20.0 kg, 1.5 m 25.0 kg
- Flowcell part; 11 kg
- Reflector unit (Reflect type);
  - ANSI Class 150-2-RF (Eq.) 9 kg/pc
  - ANSI Class 150-3-RF (Eq.) 11 kg/pc
  - ANSI Class 150-4-RF (Eq.) 14 kg/pc
  - DIN PN16-DN50-D (Eq.) 9 kg/pc
  - DIN PN16-DN80-D (Eq.) 11 kg/pc
  - JIS 10K-50-FF (Eq.) 9 kg/pc
  - JIS 10K-80-FF (Eq.) 10 kg/pc
- Alignment flange part (Reflect type)
  - ANSI Class 150-2-RF (Eq.) 5 kg/pc
  - ANSI Class 150-3-RF (Eq.) 7 kg/pc
  - ANSI Class 150-4-RF (Eq.) 9 kg/pc
  - DIN PN16-DN50-D (Eq.) 5 kg/pc
  - DIN PN16-DN80-D (Eq.) 6 kg/pc
  - JIS 10K-50-FF (Eq.) 5 kg/pc
  - JIS 10K-80-FF (Eq.) 6 kg/pc
- Analyzer part; explosion proof; Approx. 16.5 kg general purpose; 15.6 kg (Not include flange)

Process gas condition:
- Process gas temperature; Max. 850ºC, Application dependent, 150°C or less for Flowcell type
- Process gas pressure; Max.500 kPa abs., Min. 90 kPa abs., Application dependent
- Process gas velocity; over 1m/s (recommendation over 5 m/s) over 0 m/s for Reflect type
- Dust in process gas; When the process dust load is high, please consult with Yokogawa.

Note: When using TDLS8200 as CE 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. 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.

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
- Gas connections; 1/4NPT or Rc1/4
- Cable entries; 1/2NPT or M20x1.5mm, one hole. 3/4NPT or M25x1.5mm, three holes

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 the below applications except for oxygen 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 gases should be clean and dry.

Recommended purge gases:
O_2 analyzer: N_2 (99.99% or greater, application dependent)
CO, CO or CH_4, NH_3, HCl analyzer:
N_2 (99.99% or greater, application dependent) or Instrument air (dew point; less than -20ºC/no dust/no oil mist)
Purge gas flow rates:
Optic: 2 to 20L/min (Application dependent)
100 to 200mL/min (explosionproof)
* Not more than 10 kPa at the inlet for explosionproof.
Process window/Reflector:
0.5 to 100 L/min (Application dependent)

Hazardous area classifications:

Division1, Zone1 Explosionproof

TDLS8200-D1 (FM Approval for US)
Division system:
Type pf protection:
Explosion proof; Class I, Division 1, Groups A, B, C, D, T6
Dust-Ignitionproof; Class II/III, Division 1, Groups E, F, G T6
Enclosure rating: Type4X
Applicable standards:
FM Class 3600: 2018,
FM Class 3615: 2018,
FM Class 3616: 2011,
FM Class 3810: 2018,
NEMA 250: 2014,
ANSI/UL 50E:2015
ANSI/UL 61010-1:2012
ANSI/UL 61010-2-30:2012
ANSI/ISA-12.27.01: 2011
Zone system:
Type of protection:
Class I, Zone 1, AEx db [op is Ga] IIC T6 Gb
Zone21, AEx tb [op is Da] IIIC T85°C Db
Enclosure rating: IP66
Applicable standards:
ANSI/UL 60079-0:2013
ANSI/UL 60079-1: 2015,
ANSI/UL 60079-28:2017,
ANSI/UL 60079-31: 2015,
ANSI/IEC 60529:2004
ANSI/UL 61010-1:2012
ANSI/UL 61010-2-30:2012
ANSI/ISA-12.27.01: 2011

TDLS8200-C1 (FM Approval for Canada)
Type of protection:
Ex db [op is Ga] IIC T6 Gb
Ex tb [op is Da] IIIC T85°C Db
Enclosure rating: IP66, Type4X
Applicable standards:
CSA C22.2 No.94.2-15:2015,
CAN/CSA C22.2 No.60079-0: 2015,
CAN/CSA C22.2 No.60079-1: 2016,
CAN/CSA C22.2 No.60079-28: 2016,
CAN/CSA C22.2 No.60079-31: 2015,
CAN/CSA C22.2 No.60529: 2016,
CAN/CSA-C22.2 No. 61010-1-12:2012,
CAN/CSA-C22.2 No. 61010-2-030-12:2016,
ANSI/ISA-12.27.01: 2011

TDLS8200-E1 (IECEx)
Type of protection:
Ex db [op is Ga] IIC T6 Gb
Ex tb [op is Da]IIIC T85ºC 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

TDLS8200-S1 (ATEX)
Type of protection:
II 2(1) G Ex db [op is Ga] IIC T6 Gb
II 2(1) D Ex tb [op is Da] IIIC T85ºC 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

TDLS8200-K1 (Korea Ex)
Type of protection: Ex db IIC T6 Gb
Ex tb IIIC T85ºC 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

TDLS8200-N1 (NEPSI)
Type of protection: Ex db [op is Ga] IIC T6 Gb
Ex tb [op is Da] IIIC T85ºC 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

TDLS8200-J1 (Japan Ex)
Type of protection: Ex db [op is Ga] IIC T6 Gb
Ex tb [op is Da] IIIC T85ºC Db
Enclosure rating: IP66
(In Accordance with IEC 60529)
Applicable standards: JNIOSH-TR-46-1:2020
JNIOSH-TR-46-2:2018
JNIOSH-TR-46-9:2018
JNIOSH-TR-46-11:2020

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
HCl		+/- 1% reading or +/- 2.5ppm 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:

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

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 TDLS8200.

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 conformity standards:
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.60079-0:2019, CAN/CSA-C22.2 No.60079-11:2014, CAN/CSA-C22.2 No.60079-15:2016, CAN/CSA-C22.2 No.61010-1:2012, CAN/CSA No.60529:2005 (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

- **Calibration Cell**

Used for off-line calibrations and validations.

Optical Path Length:	500 mm
Material:	316 SS (eq.), Aluminum, BK-7, FKM
Part No.:	K9777ZA (for O_2, CO), K9777ZK (for NH_3), K9777ZL (for HCl)
Weight:	Approx. 4.6 kg

■ MODEL AND CODES

- **TDLS8200 Probe type Tunable Diode Laser Spectrometer (Note)**

Model	Suffix Code	Option Code	Description
TDLS8200	.....	.....	Probe type Tunable Diode Laser Spectrometer
Structure	**-G1**	.....	General Purpose, cable entry/piping: NPT
	-G2	.....	General Purpose, cable entry: Metric thread, piping: Rc
	-D1	.....	FM (US) explosionproof, cable entry/piping: NPT
	-C1	.....	FM (Canada) explosionproof, cable entry/piping: NPT
	-E1	.....	IECEx explosionproof, cable entry:Metric thread, piping:Rc
	-S1	.....	ATEX explosionproof, cable entry: Metric thread, piping: Rc
	-K1	.....	Korea explosionproof: cable entry:Metric thread, piping: Rc
	-N1	.....	NEPSI explosionproof: cable entry:Metric thread, piping: Rc
	-J1	.....	Japan Ex explosionproof: cable entry:Metric thread, piping: Rc (*1)
Temperature	**-L**	.....	Standard < 600°C (*2) (*3)
	-M	.....	Mid temperature < 850°C (*4)
1st Gas Parameter	**-C2**	.....	Carbon Monoxide ppm, < 500°C (*5)
	-C3	.....	Carbon Monoxide ppm, < 850 °C (*2)(*5)(*6)
	-C4	.....	CO ppm < 850°C or CH4 0-5%, combustion (*2)(*5)(*6)
	-X1	.....	Oxygen < 600°C, 0-25% (*7)
	-X2	.....	Oxygen < 850°C, 0-25%
	-A1	.....	NH_3 up to 0-5,000 ppm, < 450°C DeNOx (*8)
	-L1	.....	HCl 0-50 ppm/0-5,000 ppm, < 500°C (*8)
2nd Gas Parameter	**-NN**	.....	None
	-X1	.....	Oxygen < 600°C, 0-25% (*7)
	-X2	.....	Oxygen < 850°C, 0-25%
Probe length	**-070**	.....	0.7m
	-100	.....	1m
	-150	.....	1.5m
	-200	.....	2m
	-REF	.....	Reflect type (*9)
	-EXT	.....	Flowcell type (*10)
Probe material	**-S**	.....	316 SS
	-A	.....	Alloy 800, Mid temperature
Flange	**-U2**	.....	ANSI CLASS150-2-RF (Eq.)
	-U3	.....	ANSI CLASS150-3-RF (Eq.)
	-U4	.....	ANSI CLASS150-4-RF (Eq.)
	-D5	.....	DIN PN16-DN50-D (Eq.)
	-D8	.....	DIN PN16-DN80-D (Eq.)
	-D1	.....	DIN PN16-DN100-A (Eq.)
	-J5	.....	JIS 10K-50-FF (Eq.)
	-J8	.....	JIS 10K-80-FF (Eq.)
	-J1	.....	JIS 10K-100-FF (Eq.)
	-J6	.....	JIS 10K-65-FF (Eq.)
	-P4	.....	JPI Class 150 4 RF(Eq.)
	-P3	.....	JPI Class 150 3 RF(Eq.)
	-NN	.....	None (*11)
I/O interface	**-A1**	.....	Analog with HART + Modbus Ethernet
SI Unit	**-J**	.....	Only SI unit
	-N	.....	SI unit or non SI unit (*12)
—	**-N**	.....	Always -N
Option		**/RX**	Reference Cell for O_2 (*13)
		/RC	Reference Cell for CO (*6)
		/SCT	Stainless Steel Tag Plate
		/SIL	with IEC61508 SIL2 (SC3)
		/W	Wall bracket for Flowcell type (*11)
		/JA1	Cable gland for Japan Ex (Cable O.D. 8-12mm, G1/2) 1pc, for local HMI
		/JB1	Cable gland for Japan Ex (Cable O.D. 10-16mm, G3/4) 1 pcs
		/JB2	Cable gland for Japan Ex (Cable O.D. 10-16mm, G3/4) 2 pcs
		/JB3	Cable gland for Japan Ex (Cable O.D. 10-16mm, G3/4) 3 pcs

*1: For Japan Ex model (TDLS8200-J1), specified cable glands shall be attached to each cable entry for wiring. Select one cable gland out of three types: (/JB1, /JB2, or /JB3). If you need, specify (/JA1) as well. For detailed information, refer to Japanese General Specifications.
*2: When Temperature "-L" is selected, the temperature specification of "-C3" or "-C4" is 600°C or below.
*3: When Temperature "-L" is selected, select codes as follows:
1st/2nd Gas Parameter: other than "-X2"
Probe material: "-S"

*4: When Temperature “-M” is selected, only the following specifications (a) or (b) can be selected.

(a) TDLS8200-**-M-aa-bb-ccc-A-dd-A1-*-N (Option)

-aa (1st Gas Parameter):	“-C3”, “-C4”, “-X2”
-bb (2nd Gas Parameter,):	“-X2” (1st Gas Parameter “-C3” or “-C4” is selected), “-NN”
-ccc (Probe length):	“-100”, “-150”
-dd (Flange):	all except “-U2”, “-D5”, “-J5”, and “-NN”

(b) TDLS8200-**-M-ee-ff-REF-S-gg-A1-*-N (Option)

-ee (1st Gas Parameter):	“-C3”, “-C4”, “-X2”
-ff (2nd Gas Parameter):	“-X2” (1st Gas Parameter “-C3” or “-C4” is selected) “-NN” (1st Gas Parameter “-X2” is selected)
-gg (Flange):	“-U2”, “-U3”, “-U4”, “-D5”, “-D8”, “-J5”, “-J8”

*5: When CO and CH_4 component coexist, please contact YOKOGAWA.

*6: When 1st Gas Parameter “-C3” or “-C4” is specified, Option “/RC” must be selected . “/RC” can be selected when “-C2”, “-C3”, or “-C4” is specified for 1st Gas Parameter.

*7: 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.

*8: When 1st Gas Parameter “-A1” or “-L1” is specified, only “-NN” can be selected for 2nd Gas Parameter.

*9: When Probe length “-REF” (Reflect type) is specified, for Flange only “-U2”,“-U3”,“-U4”,“-D5”,“-D8”,“-J5”,“-J8” can be selected.
Also, specify 1st Gas Parameter and 2nd Gas Parameter from the following.
1st Gas Parameter: “-X1”, “-X2”, “-C2”, “-C3”, “-C4”
2nd Gas Parameter: “-X1”, “-X2”, “-NN” (1st Gas Parameter “-X1”, “-X2” is selected)

*10: When Probe length “-EXT” (Flowcell type) is specified, select codes as follows:
Temperature: “-L”
1st Gas Parameter: “-X1”, “-C2”,
2nd Gas Parameter: “-X1”, “-NN” (1st Gas Parameter “-X1” is selected)
Probe material: “-S”
Flange: “-NN”
Note when “-EXT” (Flowcell type) is specified, measurement gas temperature must be below 150°C.

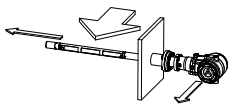
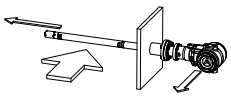
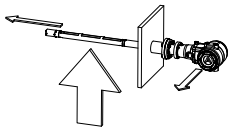
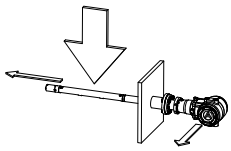
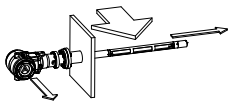
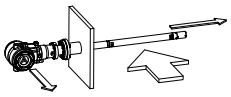
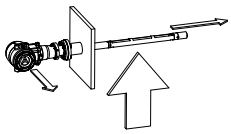
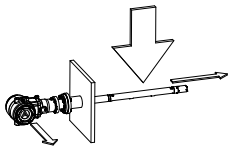
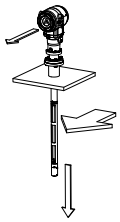
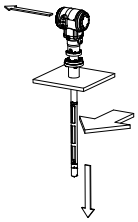
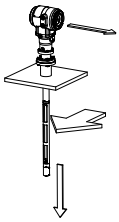
*11: Available only when Probe length “-EXT” (Flowcell type) is specified.

*12: Available only to an end user located outside of Japan

*13: The Option “/RX” can be selected when 1st/2nd Gas Parameter “-X1” “-X2” is selected.

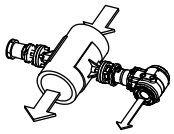
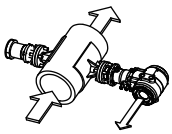
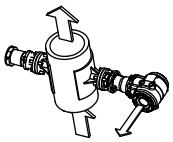
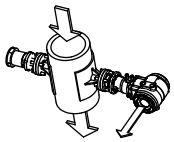
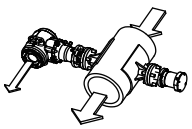
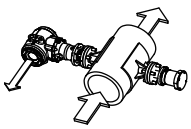
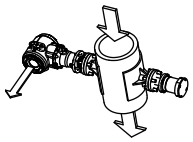
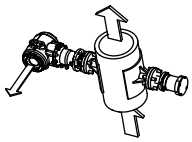
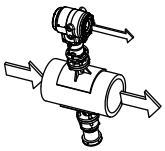
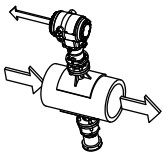
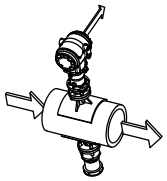
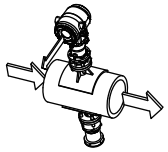
(Note) When arranging TDLS8200, please refer to the following matrix and specify the number in [ ].

Probe type

Horizontal Left	[1] 	[2] 	[3] 	[4] 
Horizontal Right	[5] 	[6] 	[7] 	[8] 
Vertical	[9] 	[10] 	[11] 	[12] 

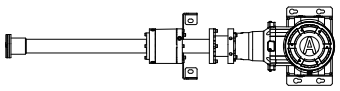
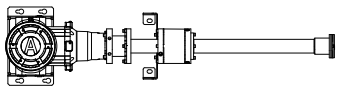
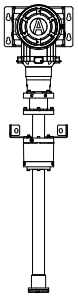
(Note) Vertical upwards is not possible.

Reflect type (-REF)

Horizontal	[1] 	[2] 	[3] 	[4] 
	[5] 	[6] 	[7] 	[8] 
Vertical	[9] 	[10] 	[11] 	[12] 

(Note) Vertical upwards is not possible.

Flowcell type (-EXT)

[4] 	[7] 	[10] 

● 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 (*3)
	-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
		/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.
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.

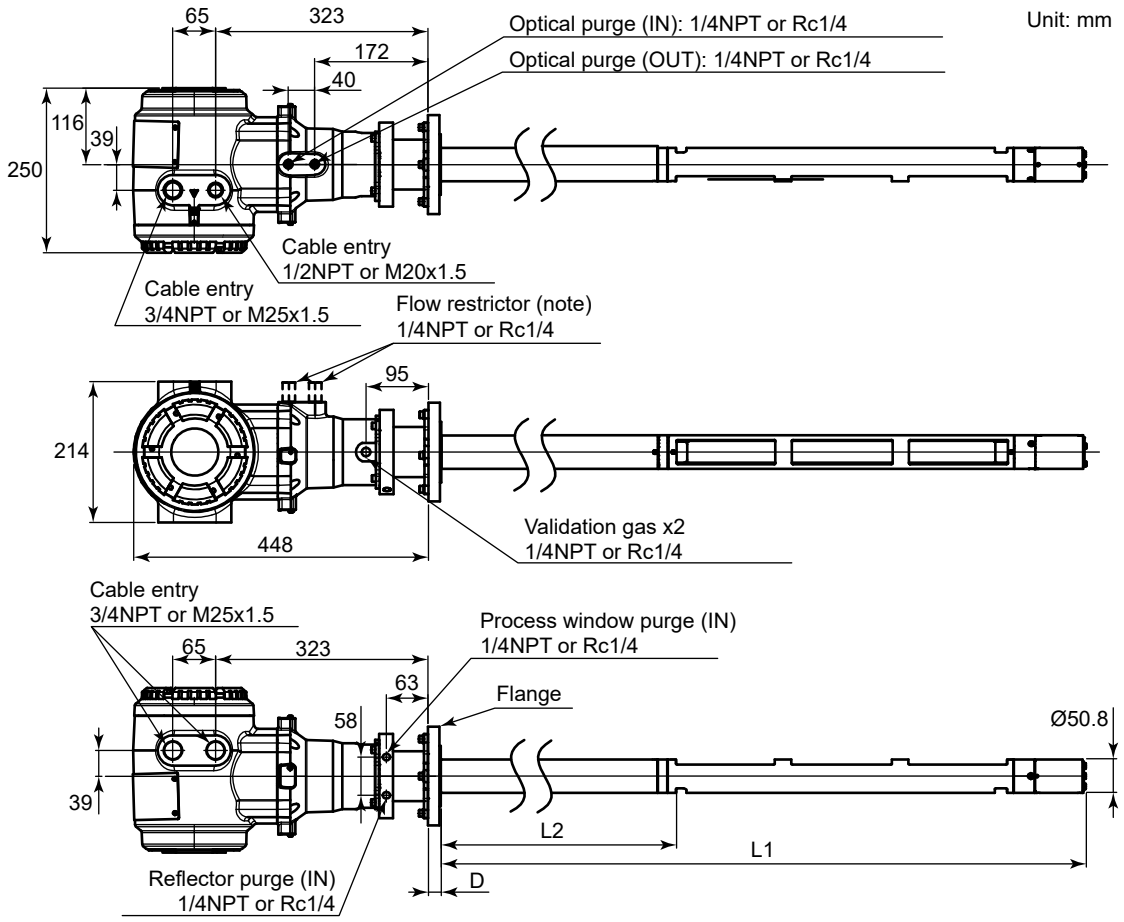
*3: This model is available for UKCA.

■ EXTERNAL DIMENSIONS

■ TDLS8200 Probe type Tunable Diode Laser Spectrometer, Standard (Temperature: “-L”)

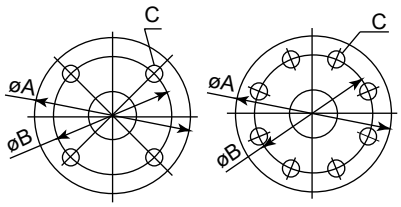
See page 16 for Reflect type, page 18 for Flowcell type.

Unit: mm



Flange	A	B	C	D
ANSI Class150-2-RF	150	120.7	4-Ø19	20
ANSI Class150-3-RF	190	152.4	4-Ø19	24
ANSI Class150-4-RF	230	190.5	8-Ø19	24
DIN PN16-DN50-D	165	125	4-Ø18	20
DIN PN16-DN80-D	200	160	8-Ø18	20
JIS 10K-50-FF	155	120	4-Ø19	16
JIS 10K-80-FF	185	150	8-Ø19	18

L1	700	1000	1500	2000
L2	78	378	878	1378

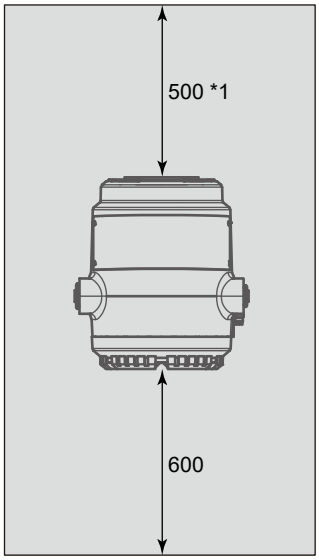


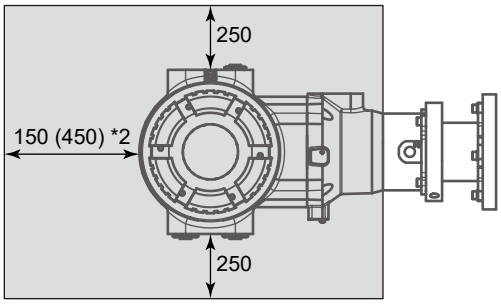
Flange

(note) The flow restrictors are attached in the case of type -C1, -D1, -E1, -S1, -K1, -N1, -J1

- **Maintenance space**

Unit: mm

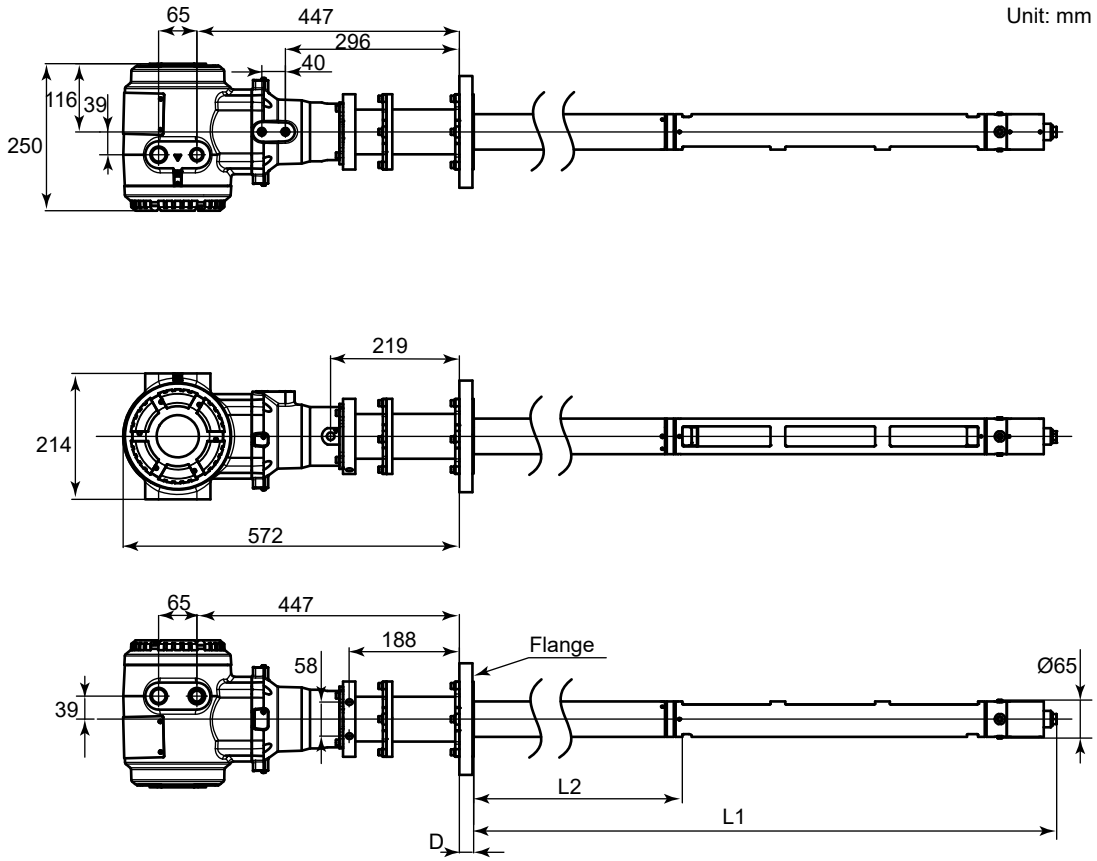




*1: When installing YH8000 on TDLS8200 with /M, it is necessary to secure this space.
*2: When connecting the calibration cell, it is necessary to secure this space. If install or uninstall of probe, need the additional space depend on probe length.

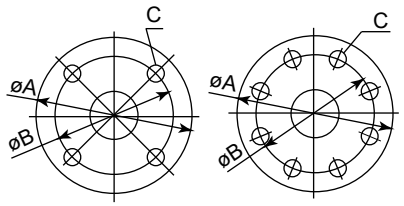
■ TDLS8200 Probe type Tunable Diode Laser Spectrometer Mid temperature, (Temperature: “-M”)

Unit: mm



Flange	A	B	C	D
ANSI Class150-3-RF	190	152.4	4-Ø19	24
ANSI Class150-4-RF	230	190.5	8-Ø19	24
DIN PN16-DN80-D	200	160	8-Ø18	20
DIN PN16-DN100-A	220	180	8-Ø18	22
JIS 10K-65-FF	175	140	4-Ø19	18
JIS 10K-80-FF	185	150	8-Ø19	18
JIS 10K-100-FF	210	175	8-Ø19	18

L1	1000	1500
L2	363	863



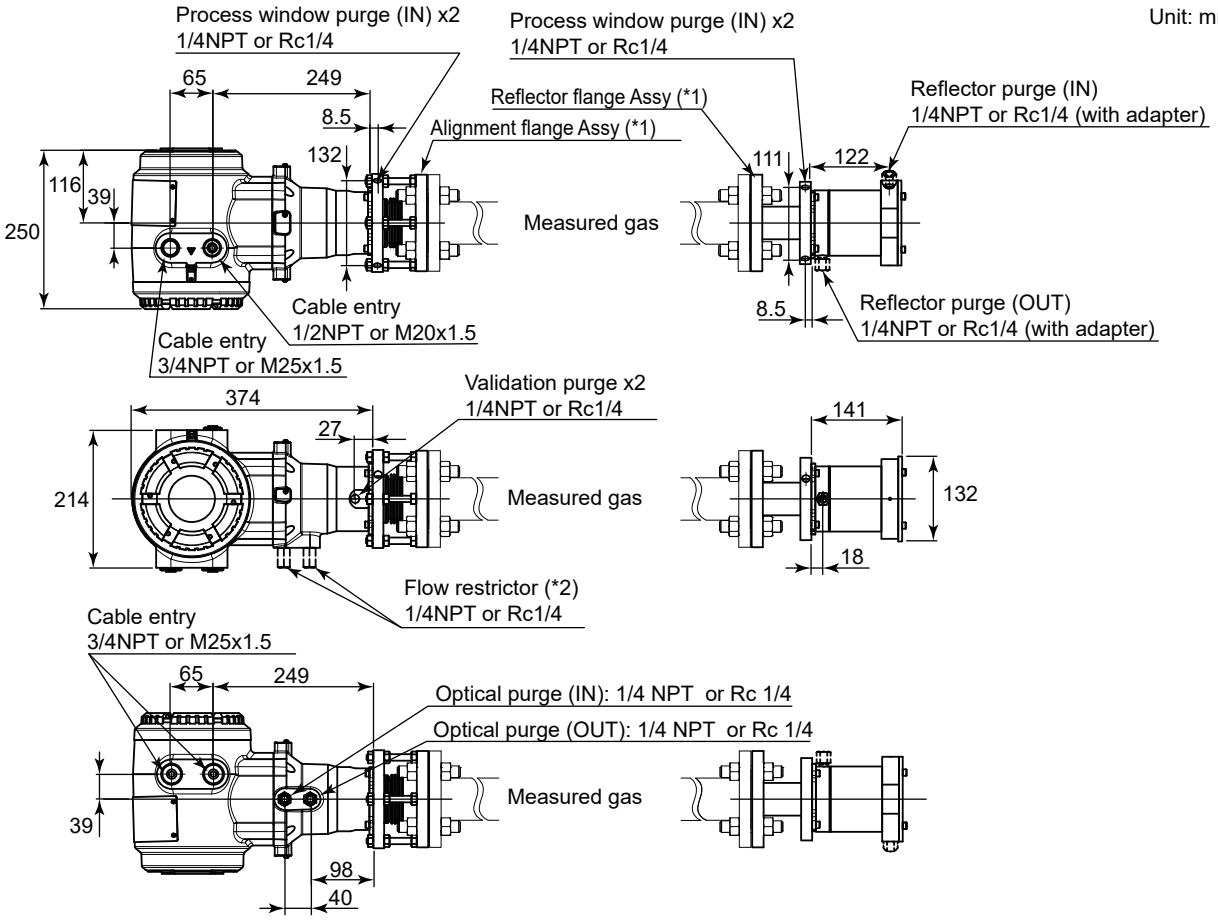
Flange

- **Maintenance space**

Same as the standard probe on page 14.

■ TDLS8200 Probe type Tunable Diode Laser Spectrometer, Reflect type (Probe length: “-REF”)

Unit: mm

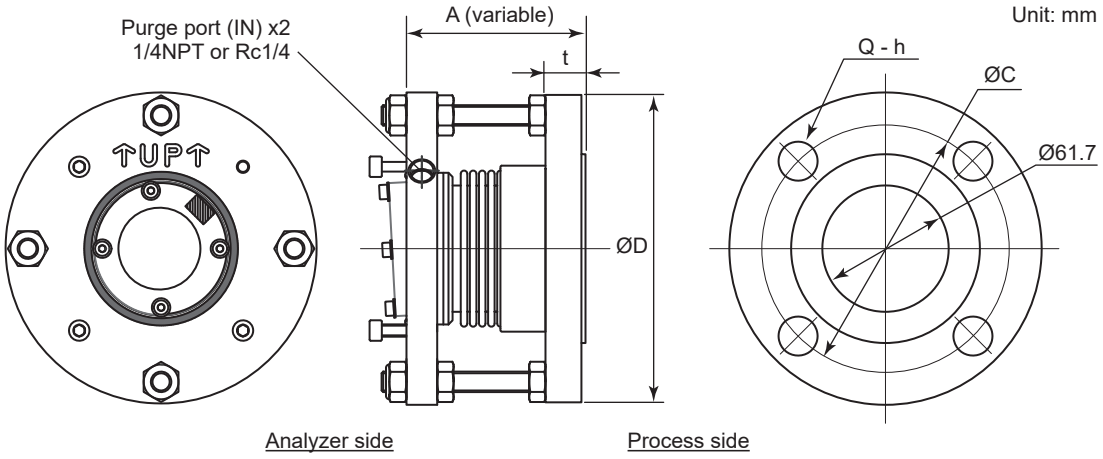


(*1) The alignment flange and the reflector flange varies according to specifications.
(*2) The flow restrictors are attached in the case of type -C1, -D1, -E1, -S1, -K1, -N1, -J1.

● Maintenance space

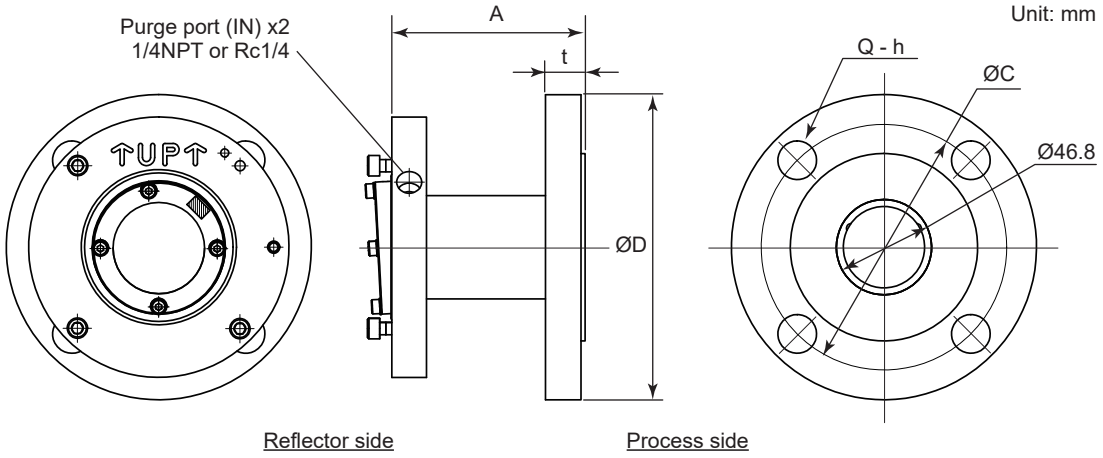
Same as the standard probe on page 14.

- **Alignment Flange**



Flange code	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

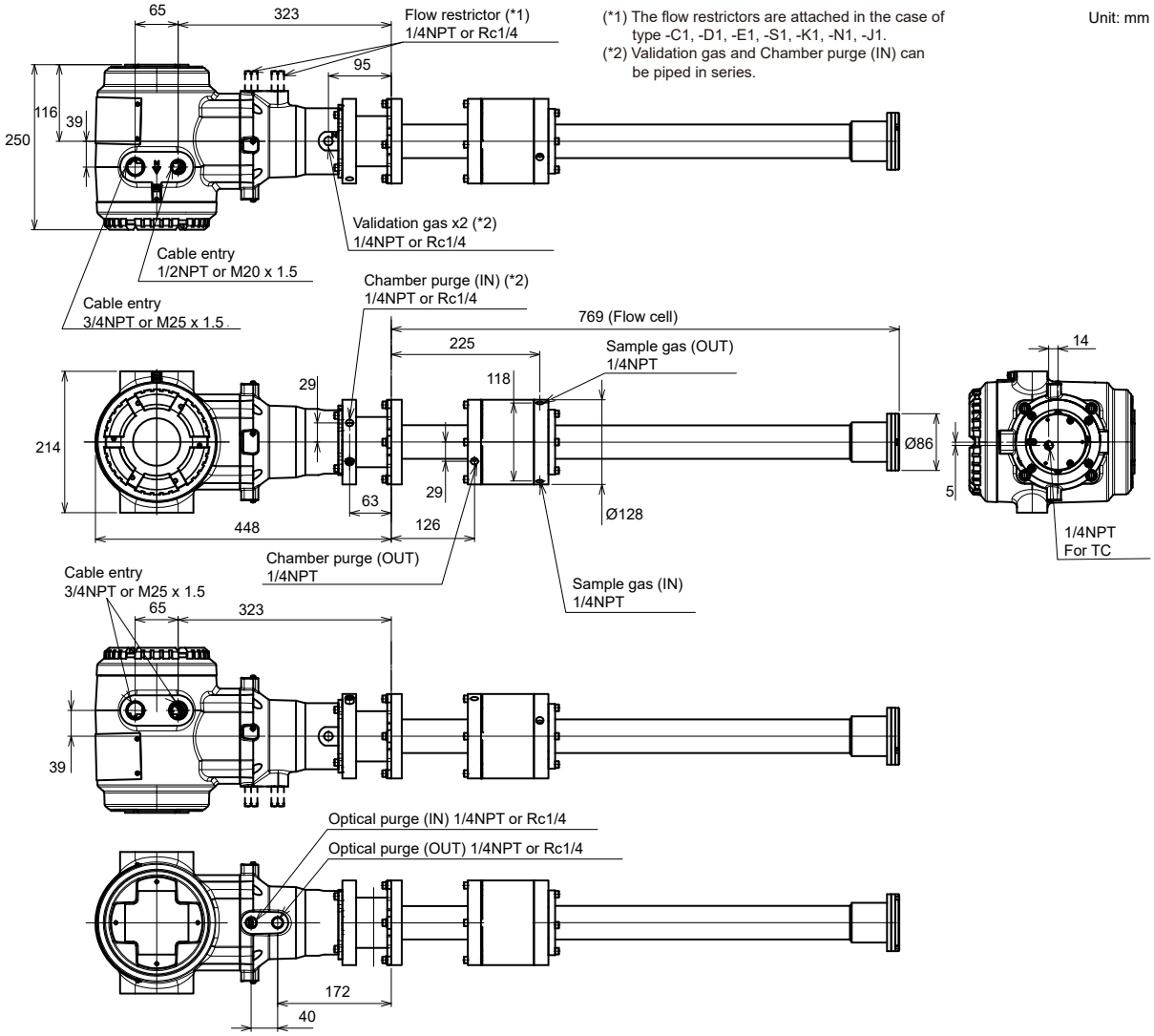
- **Reflector Flange**



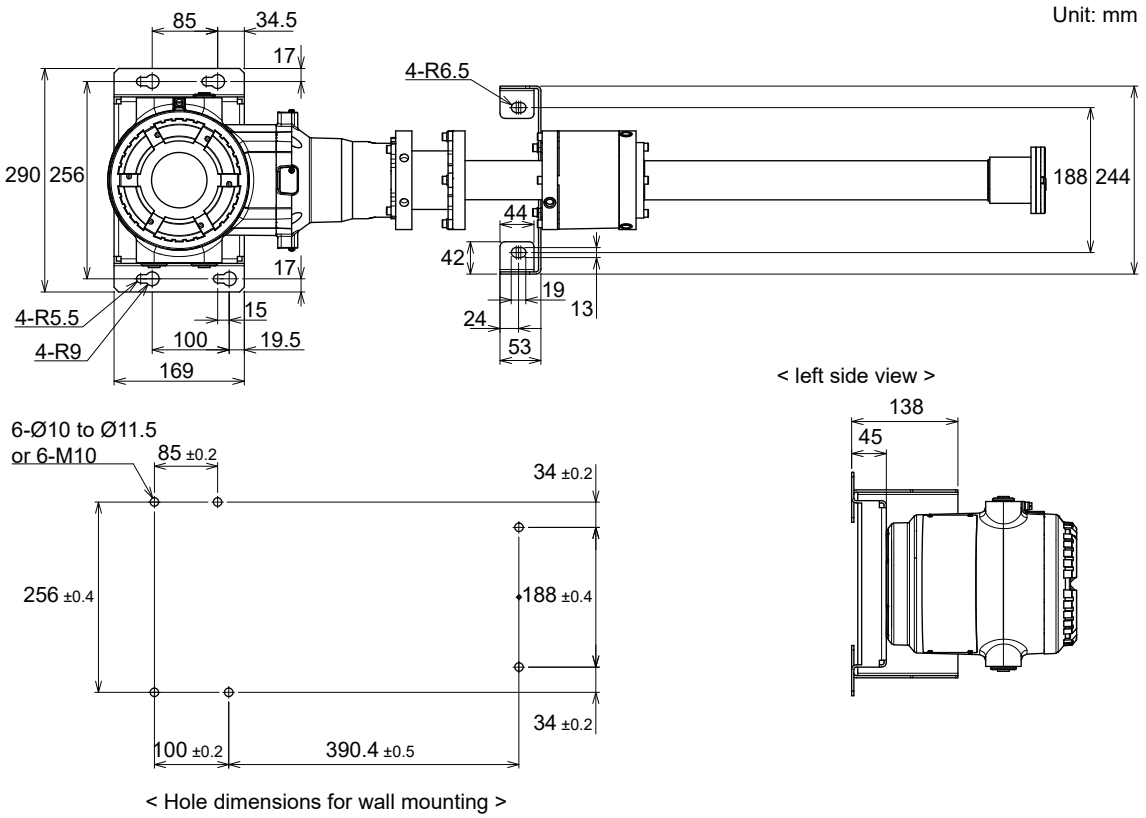
Flange code	Hole QTY Q	Hole h	Hole P.C.D C	Thickness t	Outside dia. D	Distance A	Purge port
-U2 ANSI CLASS150-2-RF (Eq.)	4	19	120.7	19.5	150	95	1/4NPT
-U3 ANSI CLASS150-3-RF (Eq.)	4	19	152.4	24.3	190	100	1/4NPT
-U4 ANSI CLASS150-4-RF (Eq.)	8	19	190.5	23.9	228.6	100	1/4NPT
-D5 DIN PN16-DN50-D (Eq.)	4	18	125	18	165	94	Rc1/4
-D8 DIN PN16-DN80-D (Eq.)	8	18	160	20	200	96	Rc1/4
-J5 JIS 10K-50-FF (Eq.)	4	19	120	16	155	92	Rc1/4
-J8 JIS 10K-80-FF (Eq.)	8	19	150	18	185	94	Rc1/4

■ TDLS8200 Probe type Tunable Diode Laser Spectrometer, Flowcell type (Probe length: “-EXT”)

For applications where the TDLS8000 or TDLS8200 could not be installed or inserted due to the process size, etc., a sampling system can be constructed by replacing the probe part of the TDLS8200 with a flowcell part.



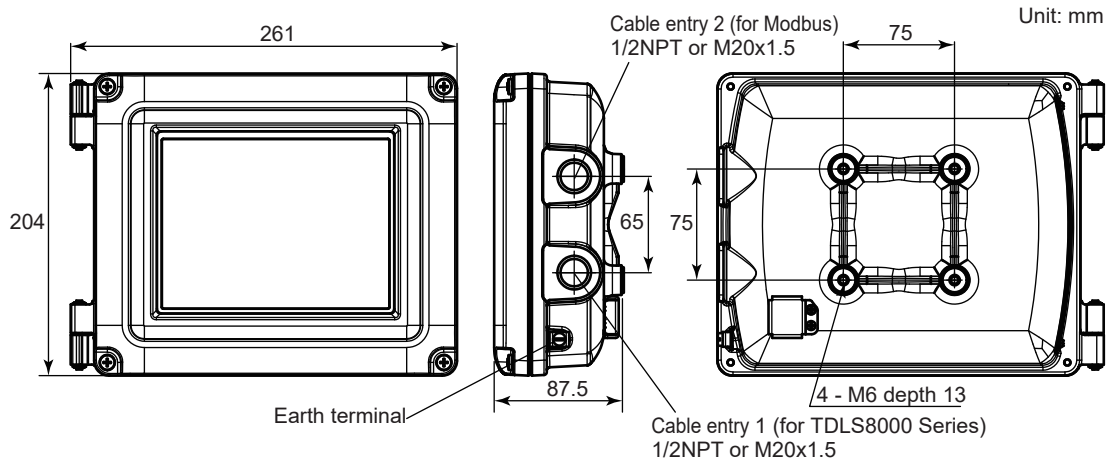
Wall bracket for Flowcell type (Option code: /W)



- **Maintenance space**

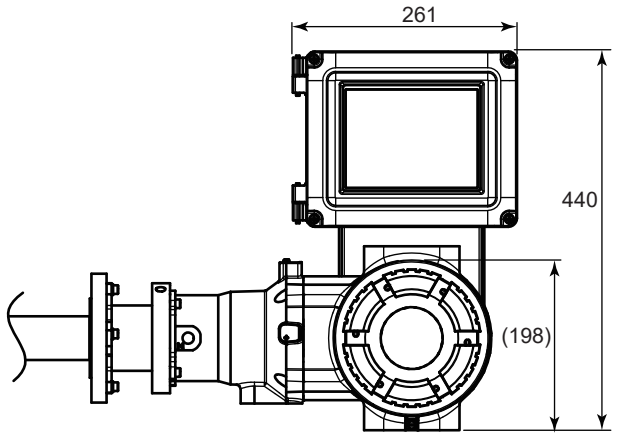
Same as the standard probe on page 14.

■ YH8000 HMI Unit

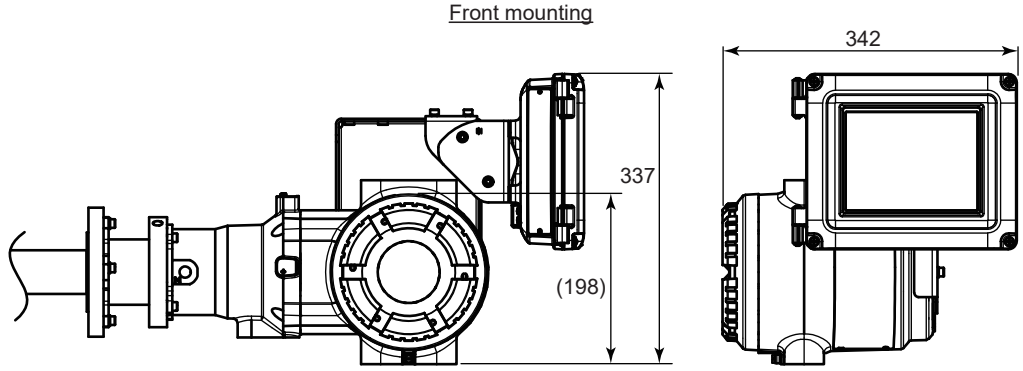


Mounting kit for TDLS8000 series (Option code: /M)

Unit: mm



Front mounting

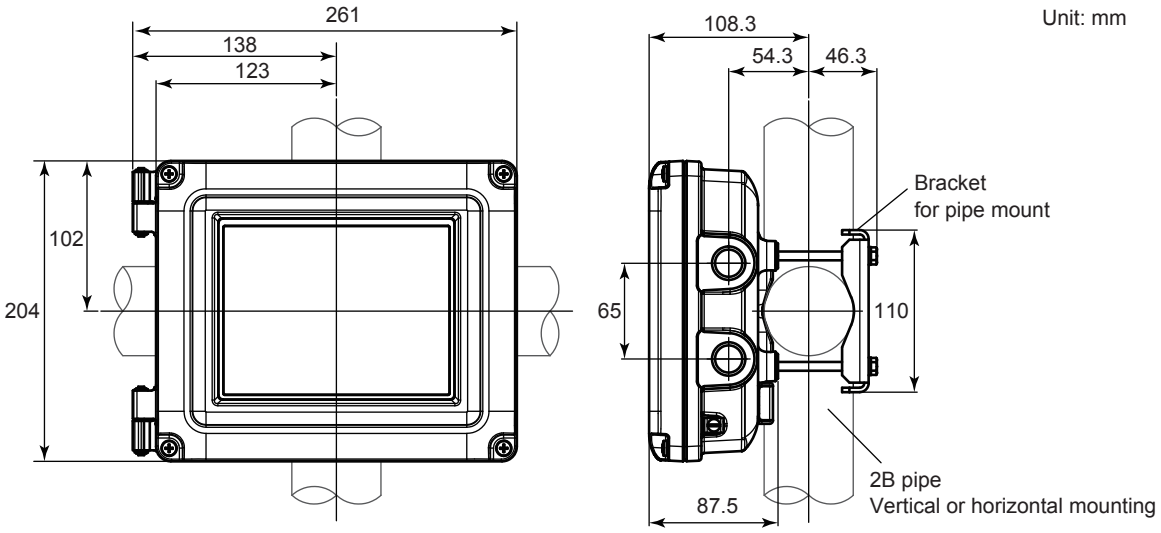


Right mounting

Available for left mounting

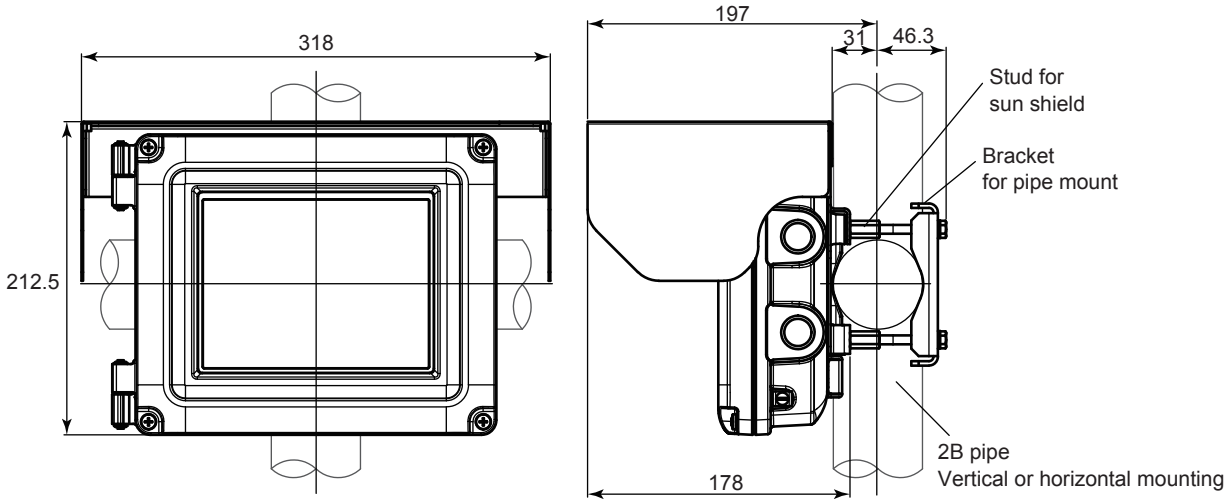
Pipe mount (Option code: /P)

Unit: mm

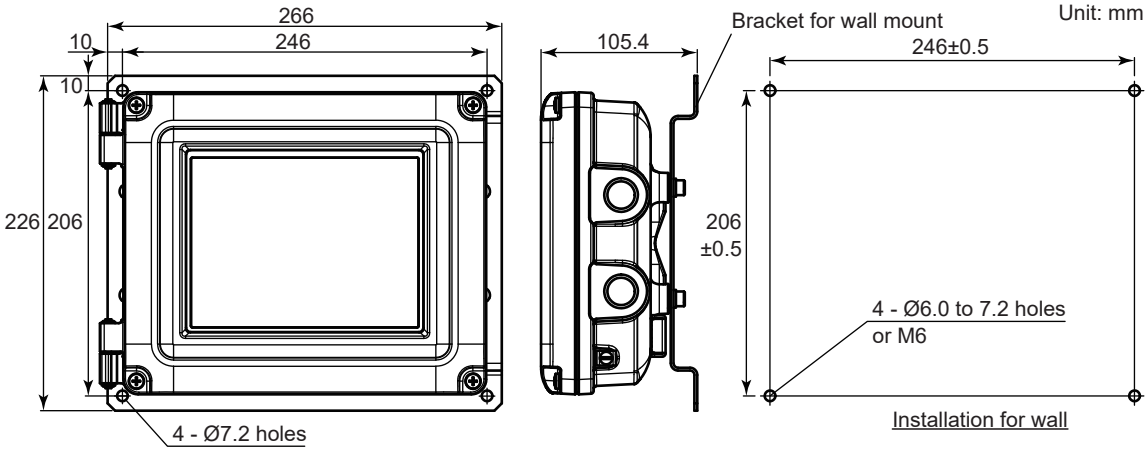


Sun Shield (Option code: /S)

Unit: mm

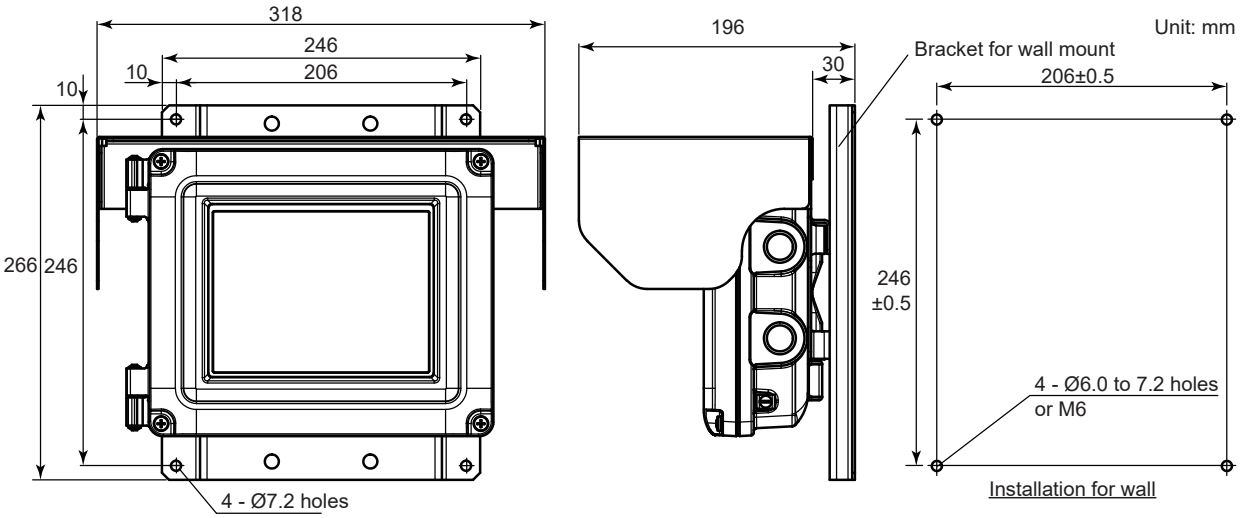


Wall mount (Option code: /W)



*: 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

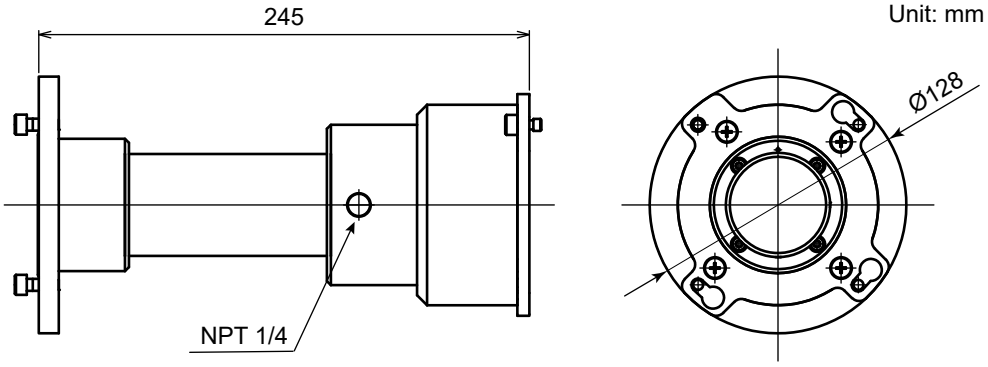
Sun Shield (Option code: /S)



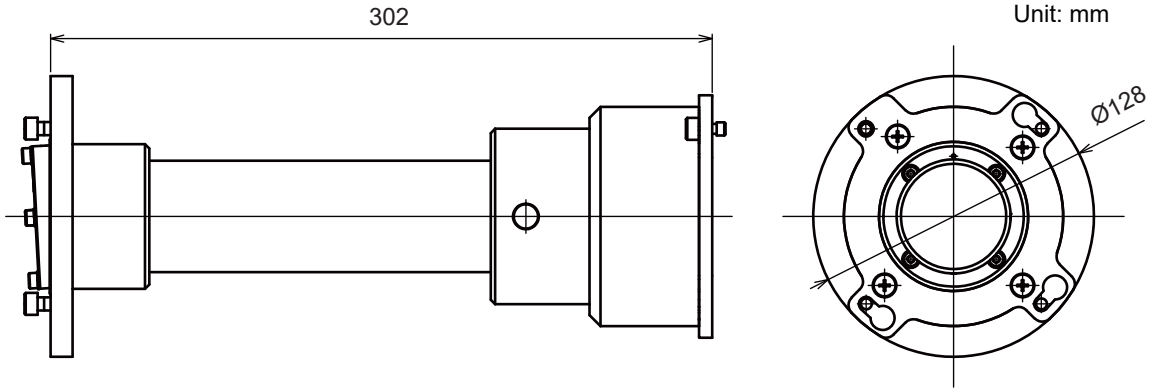
When the sun shield is mounted, the bracket for wall have to be placed in widthwise.

■ Calibration Cell

Part number: K9777ZA

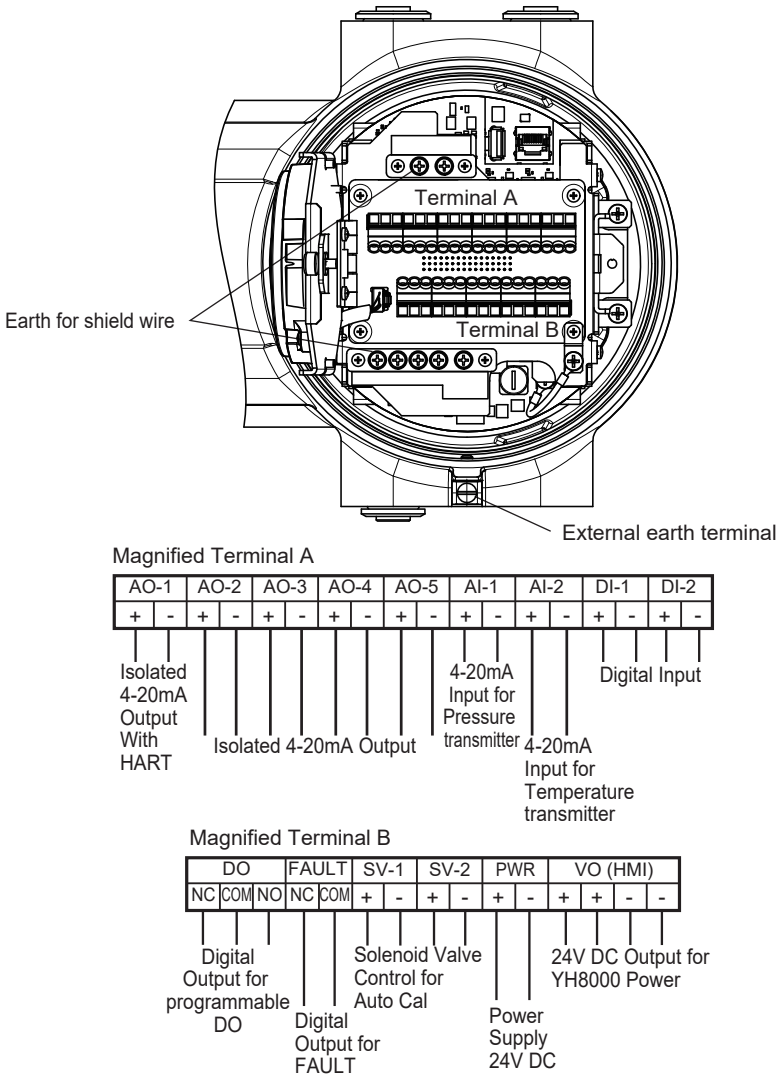


Part number: K9777ZK, K9777ZL

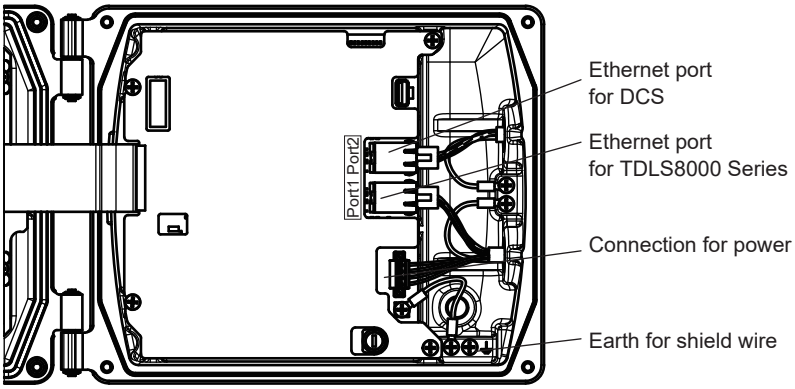


■ WIRING

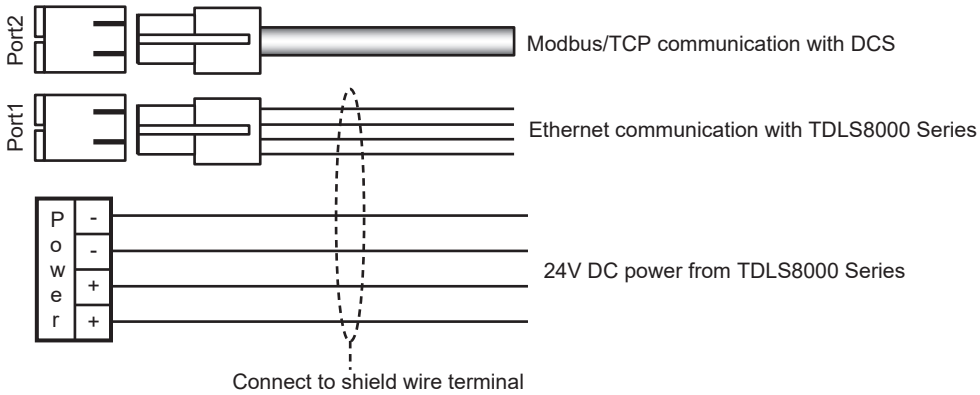
Wiring the TDLS8200 Probe type Tunable Diode Laser Spectrometer



Wiring the YH8000 HMI UNIT

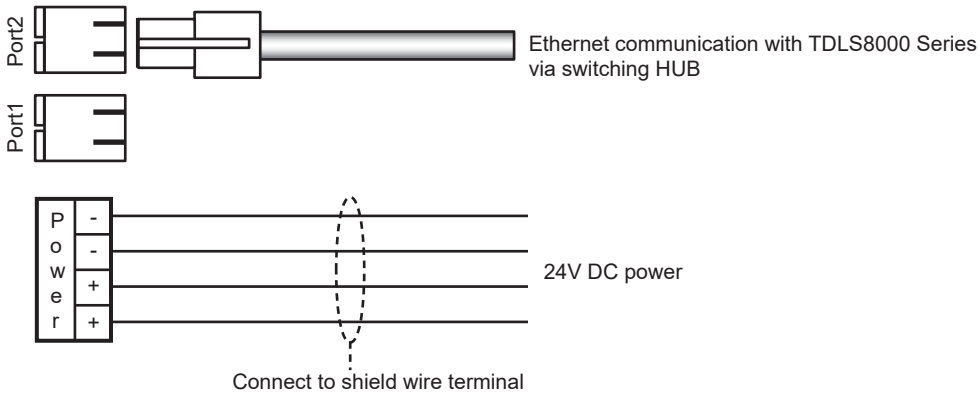


Local HMI configuration



- 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.