■ Overview

Yokogawa's TDLS™8100 is a laser gas analyzer that measures the concentration of various gases (O_2, CO, CH_4, NH_3, HCl and many more NIR absorbing gases), in various processes such as petrochemical, power generation.

Since it can be inserted directly into duct, the sampling equipment is not required and installation cost and maintenance cost can be reduced. Moreover, it is possible to measure with high accuracy compared to other process analyzers because the measurement is rarely affected by interference of other components in high-speed measurement.

Also, in the conventional laser gas analyzer TDLS™8000, it was necessary to open the installation flange at both ends of the duct, but TDLS™8100 only needs to be done on one side, and if a gas sampling probe is already installed in the existing process, it is possible to replace the gas sampling equipment. If a gas sampling probe is already installed in the existing process, it is easily possible to replace with TDLS8100.
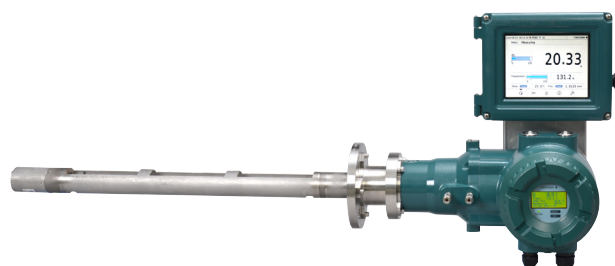
TDLS8100 with YH8000 HMI Unit

■ Features

- **SIL2, TruePeak™ Direct Absorption Spectroscopy combined with smart laser technology**
- By calculating the area of the absorbance peak the measurement is not affected by changes of the peak shape due to background gases.
- Fully field repairable
- Continuous diagnostics and 50 days of data storage
- Laser module is replaceable on site without any calibration or adjustment
- Internal reference cell in the laser module ensures peak locking during trace measurement (for O_2 and CO only)
- Laser and Detector modules are sealed to protect them against ingress.
- 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
- **Intuitive touchscreen HMI**
- Large HMI provides easy operation and control of up to 4 analyzers (TDLS8000 and TDLS8100) at the same time
 A standard mini display 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.

- **Compact design for one-man installation without sacrificing ruggedness**
- FM (US, Canada), IECEx, ATEX hazardous area, Korea, NEPSI, Japan approvals based on Explosionproof/flame proof.
- **In-situ analysis and fast response (2 seconds, 1 second (optional))**
- **Process temperatures up to 600 ºC, process pressures up to 500 kPa abs., and process gas flow velocity 1 m/s or more.**
    Note: Maximum process temperatures and pressures will vary by application.
- **10 different languages display options**
 YH8000 offers easy touch screen operation and simple menu structure in 10 languages.

Typical gases measured include:

- Oxygen in process applications.
 Process temperatures can be as high as 600ºC, and process pressures can be as high as 500kPa abs. Measurement span is typically between 1% and 25% oxygen.
- Carbon monoxide in process applications.
 Process temperatures can be as high as 600ºC.

Other applications and gas measurements are possible with the TDLS8100.
Please fill out the Application Data Sheet at the end of this document and send to Yokogawa.

*1:   Total Cost of Ownership
*2:   Mean Time To Failure

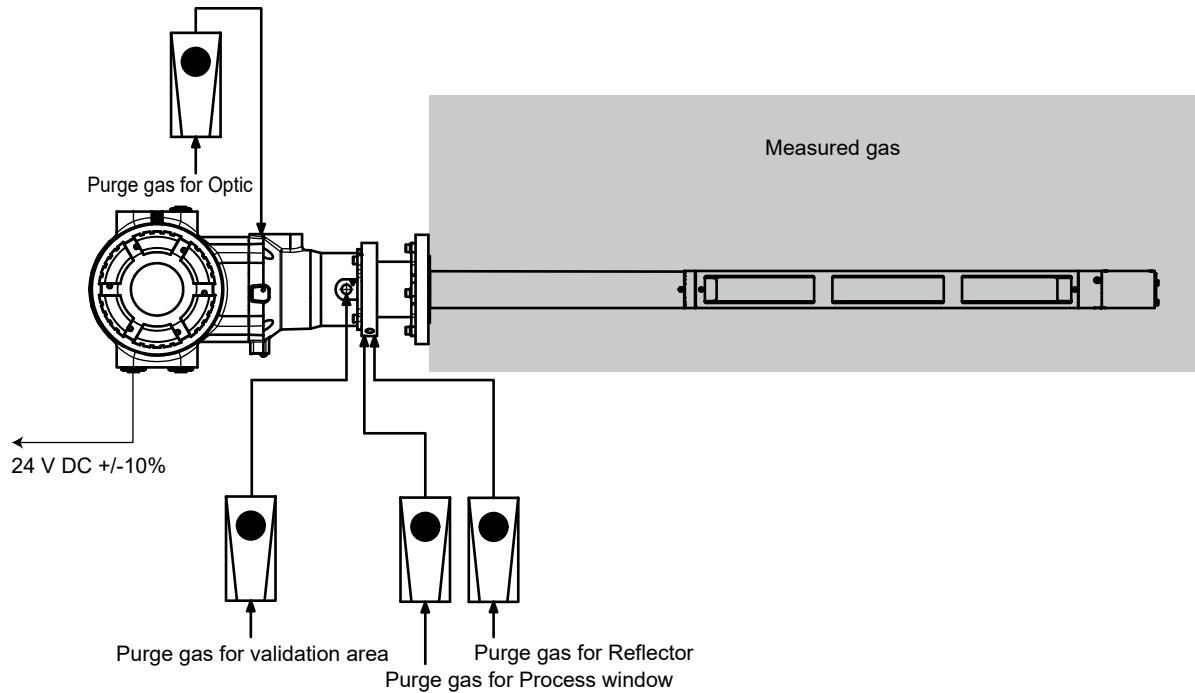TDLS, TruePeak are trademarks or registered trademarks of Yokogawa Electric Corporation.
All other company and product names mentioned in this document are trademarks or registered trademarks of their respective companies.

Please select appropriate equipment in accordance with the laws and regulations of the relevant country/region, when it is used in a location where explosive atmospheres may be present.

■ System configuration

Standard System Configuration

Purge gas for Optic

Measured gas

24 V DC +/-10%

Purge gas for validation area

Purge gas for Reflector

Purge gas for Process window

System Configuration with YH8000 HMI Unit and Validation gas line

Purge gas for Optic

Measured gas

24 V DC +/-10%

Check gas for validation

Purge gas for Reflector

Purge gas for validation area

Purge gas for Process window

Multi Analyzer Configuration with Remote HMI

Measured gas

Measured gas

Measured gas

Measured gas

24 V DC +/-10%

24 V DC +/-10%

24 V DC +/-10%

24 V DC +/-10%

YH8000 HMI Unit

24V DC±10%

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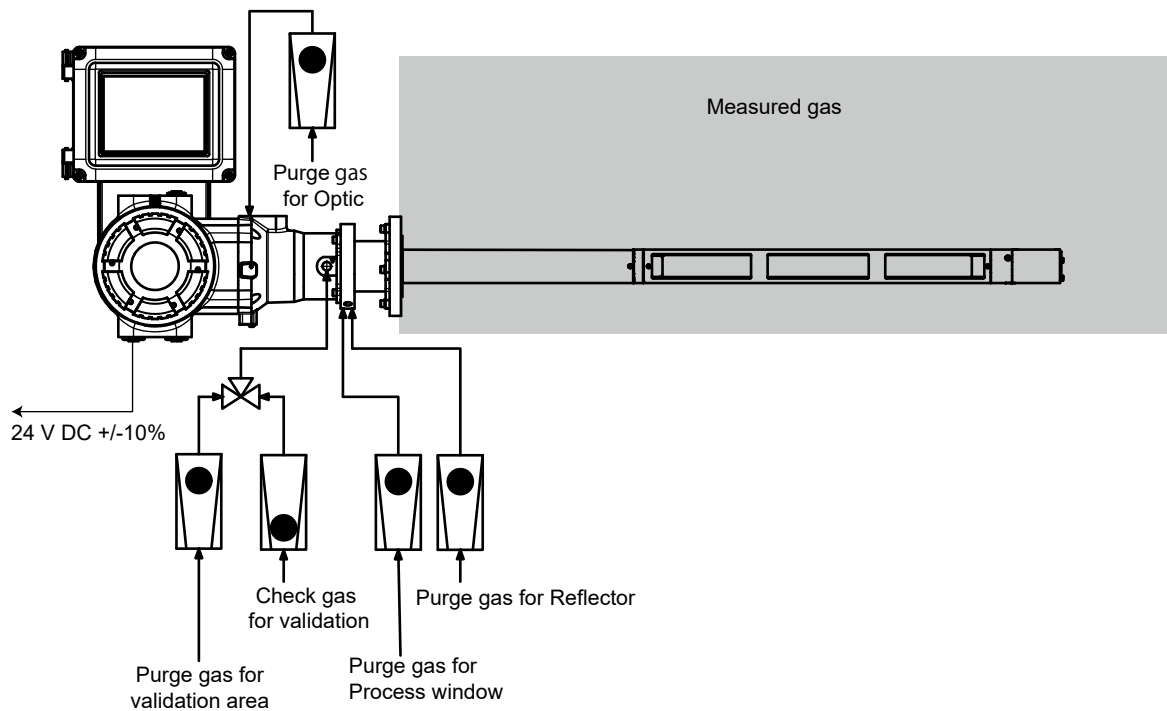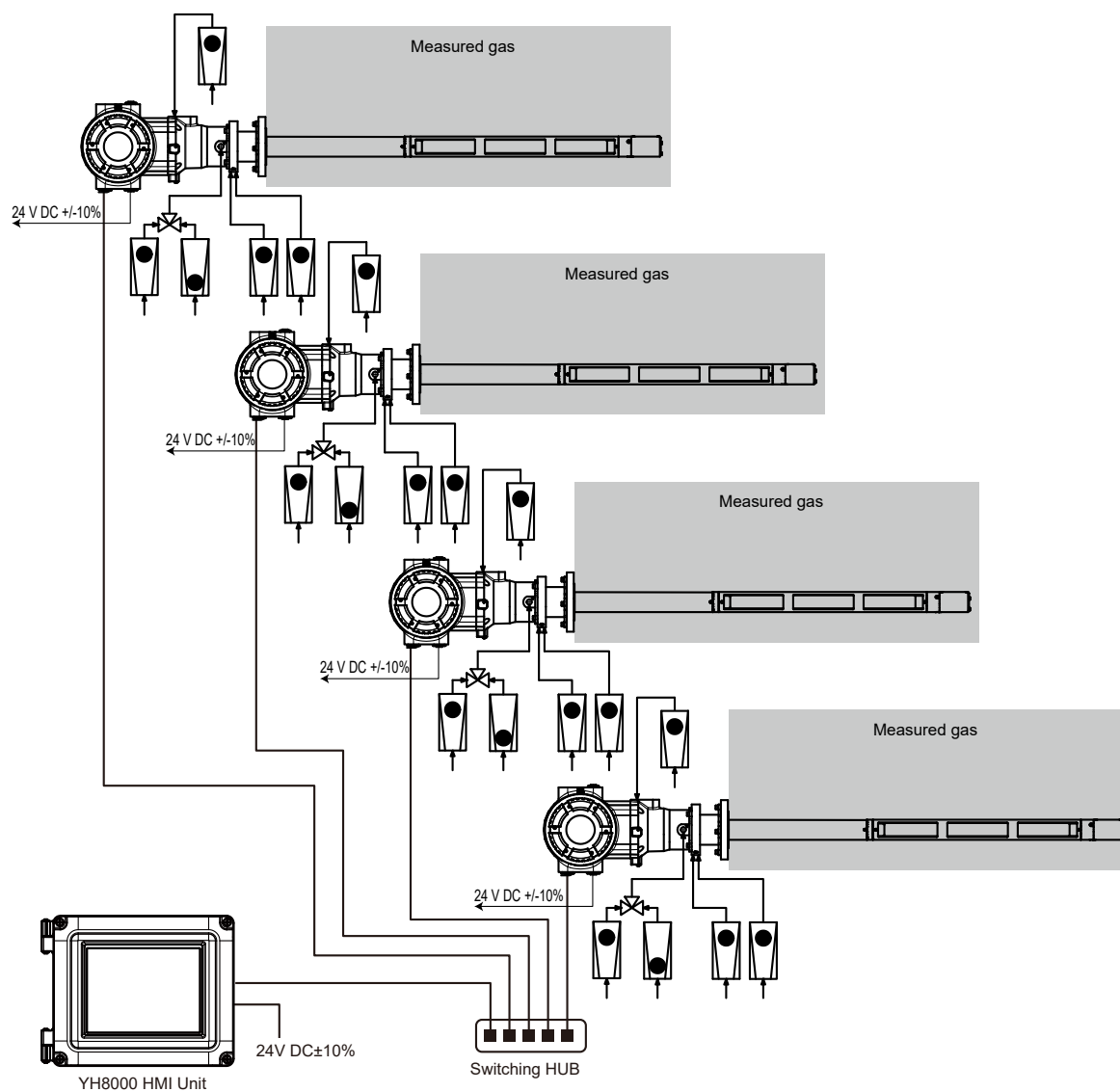
Note: If power supply is 100 to 240 V AC, purchase the Universal Power Supply, separately.
If four multi analyzer configuration with remote HMI is made, five universal power supplies including YH8000 are needed.

■ STANDARD SPECIFICATIONS

● **TDLS8100 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 with Yokogawa if CO and CH$_4$ ingredient coexists.
*2: In the case of explosionproof type, oxygen concentration shall not exceed that found in normal air, typically 21%.

Safety and EMC conformity standards:
Safety conformity standards:
CE   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   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:
The TDLS8100 except 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.
RoHS conformity standards: EN IEC 63000:2018*
*: For only TDLS8100-G1, -G2, -S1

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:
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
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, 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)

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, 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)

Power supply: 24V DC +/-10%

Power consumption:
Max. 20W; TDLS8100 only
Max. 60W; TDLS8100 with YH8000 and 2 solenoid valves

Protection degree: IP66, Type 4X

Material: Case; Aluminum alloy

Wetted materials: 316 SS(eq.), BK-7 glass, Teflon encapsulated FKM, ASE wool

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

Weight (approx.):
Probe part;
0.7 m 2.7 kg, 1 m 4.3 kg, 1.5 m 7.0 kg, 2 m 9.8 kg

Analyzer part;
explosion proof 15.7 kg, general purpose 14.8 kg (Not include flange)

Process gas condition:
Process gas temperature; Max. 600ºC, Application dependent
Process gas pressure; Max. 500 kPa abs., Min. 90 kPa abs., Application dependent
Process gas velocity; over 1m/s (recommendation over 5 m/s)
Dust in process gas; When the process dust load is high, please consult with Yokogawa.

Note: When using TDLS8100 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. ATEX model (-S1): 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.

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; 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 gasses should be clean and dry.

Recommended purge gasses:
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) 2 to 20L/min and 100 to 200mL/min (explosionproof)
* Not more than 10 kPa at the inlet for explosionproof
Process window/Reflector: 5 to 30L/min (Application dependent)

Hazardous area classifications:

Division1, Zone1 Explosionproof
TDLS8100-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/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/ISA-12.27.01: 2011

TDLS8100-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

TDLS8100-E1 (IECEx)
    Type of protection:
        Ex db [op is Ga] IIC T6 Gb
        Ex tb [op is Da]IIIC T85°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

TDLS8100-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 T85°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

TDLS8100-K1 (Korea Ex)
    Type of protection: Ex d IIC T6
                Ex tb IIIC T85°C
    Enclosure rating: IP66 (In Accordance with IEC 60529)
    Applicable standards:

Notice of Ministry of Labor No. 2019-15
Harmonized with IEC 60079-0: 2017,
                IEC 60079-1: 2014,
                IEC 60079-31: 2013

TDLS8100-N1 (NEPSI)
    Type of protection: Ex db [op is Ga] IIC T6 Gb
                Ex tD [op is 20] A21 IP6X T85°C
    Enclosure rating: IP66
                (in accordance with GB/T 4208-2017)
    Applicable standards: GB 3836.1-2010
                GB 3836.2-2010
                IEC 60079-28:2015
                GB 12476.1-2013
                GB 12476.5-2013

TDLS8100-J1 (Japan Ex)
    Type of protection: Ex db IIC T6 Gb
                Ex tb IIIC T85°C Db
    Enclosure rating: IP66
                (In Accordance with IEC 60529)
    Applicable standards: JNIOSH-TR-46-1:2015
                JNIOSH-TR-46-2:2018
                JNIOSH-TR-46-9:2018

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 +/- 1ppm 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 °C,
                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 TDLS8100.

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   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   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 (maufactured in Japan) and -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.

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 60079-11:2018
                           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:
                  IP54 (In accordance with IEC 60529) *1
      *1: IP54 that is minimum requirement of Ex standards is confirmed at the conformance assessment of Japan Ex. YH8000 can be used in the environment required IP65.
   Applicable standards: JNIOSH-TR-46-1:2015
                  JNIOSH-TR-46-6:2015
                  JNIOSH-TR-46-8:2015

YH8000-K2 (Korea Ex)
- Type of protection: Ex nA nL IIC T5
- Enclosure rating: IP65 (In accordance with IEC 60529)
- Applicable standards: Notice of Ministry of LaborNo. 2013-54 Harmonized with IEC60079-0: 2011, IEC 60079-11: 2011, IEC 60079-15:2010

YH8000-N2 (NEPSI)
- Type of protection: Ex nA ic IIC T5 Gc
- Enclosure rating: IP65 (In accordance with GB 4208)
- Applicable standards: GB 3836.1-2010, GB 3836.4-2010, GB 3836.8-2014

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

● **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

● **TDLS8100 Probe type Tunable Diode Laser Spectrometer** (Note)

Model	Suffix Code	Option Code	Description
TDLS8100	....	....	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 (*6)
Temperature	**-L**	....	Standard < 600 degC
Gas Parameter	**-X1**	....	O_2 < 600°C, 0-25% (*1)
	-C2	....	CO ppm <500°C (*2)
	-C3	....	CO ppm <600°C for combustion (*2)
	-C4	....	CO ppm <500°C or CH_4 0-5%. for combustion (*2)
	-A1	....	NH_3 up to 0-5,000ppm <450°C DeNOx
	-L1	....	HCl 0-50ppm/0-5,000ppm <500°C
—	**-NN**	....	Always -NN
Probe length	**-070**	....	0.7m
	-100	....	1m
	-150	....	1.5m
	-200	....	2m
Probe material	**-S**	....	316SS
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.)
	-J5	....	JIS 10K-50-FF(Eq.)
	-J8	....	JIS 10K-80-FF(Eq.)
I/O interface	**-A1**	....	Analog with HART + Modbus Ethernet
SI Unit	**-J**	....	Only SI unit
	-N	....	SI unit or non SI unit (*3)
Always -N	**-N**	....	Always -N
Option		**/RX**	Reference Cell for O_2 (*4)
		/RC	Reference Cell for CO (*5)
		/SCT	Stainless Steel Tag Plate
		/SIL	With IEC61508 SIL2 (SC3)
		/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:   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.
*2:   When CO and CH_4 ingredient coexist, please contact YOKOGAWA.
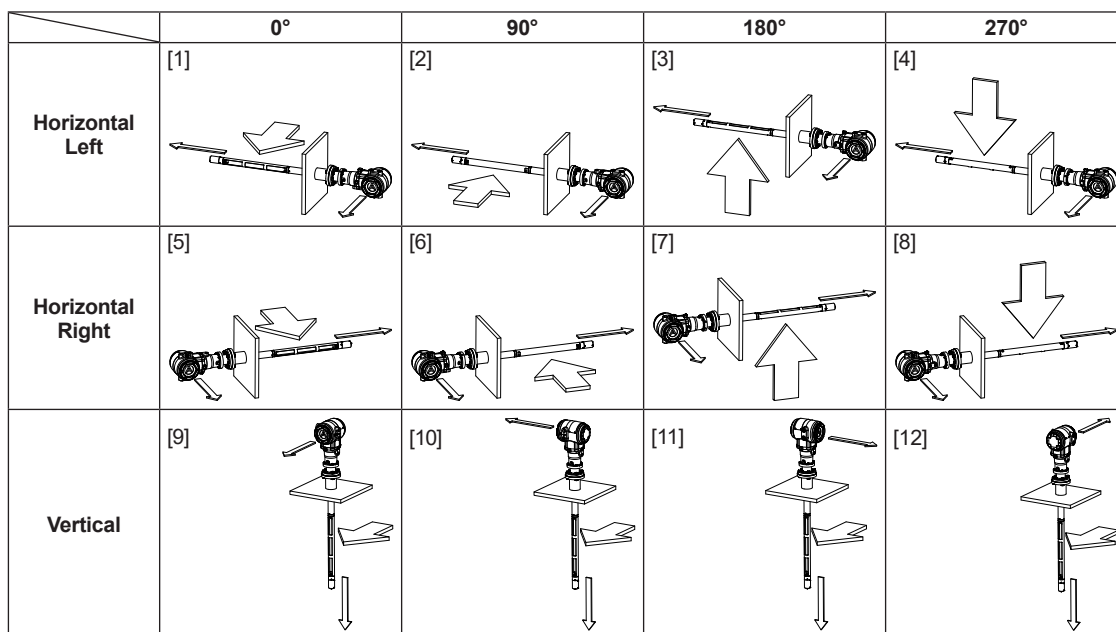*3:   Enable only to an end user located outside of Japan
*4:   The Option "/RX" can be used when Gas Parameter "-X1" is selected.
*5:   The Option "/RC" can be used when Gas Parameter "-C2", "-C3" or "-C4" are selected. When both "-C3" or "-C4" of the Gas Parameter is selected, "/RC" must be specified.
*6:   For Japan Ex model (TDLS8100-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.

(Note) When arranging TDLS8100, please refer to the following matrix and specify "probe, indicator direction" with the number of [ ].

	0°	90°	180°	270°
Horizontal Left	[1]	[2]	[3]	[4]
Horizontal Right	[5]	[6]	[7]	[8]
Vertical	[9]	[10]	[11]	[12]

vertical upwards is not possible

● **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
	-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 Type of protection "n", Metric thread for cable entry
	-R2	....	EAC 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.
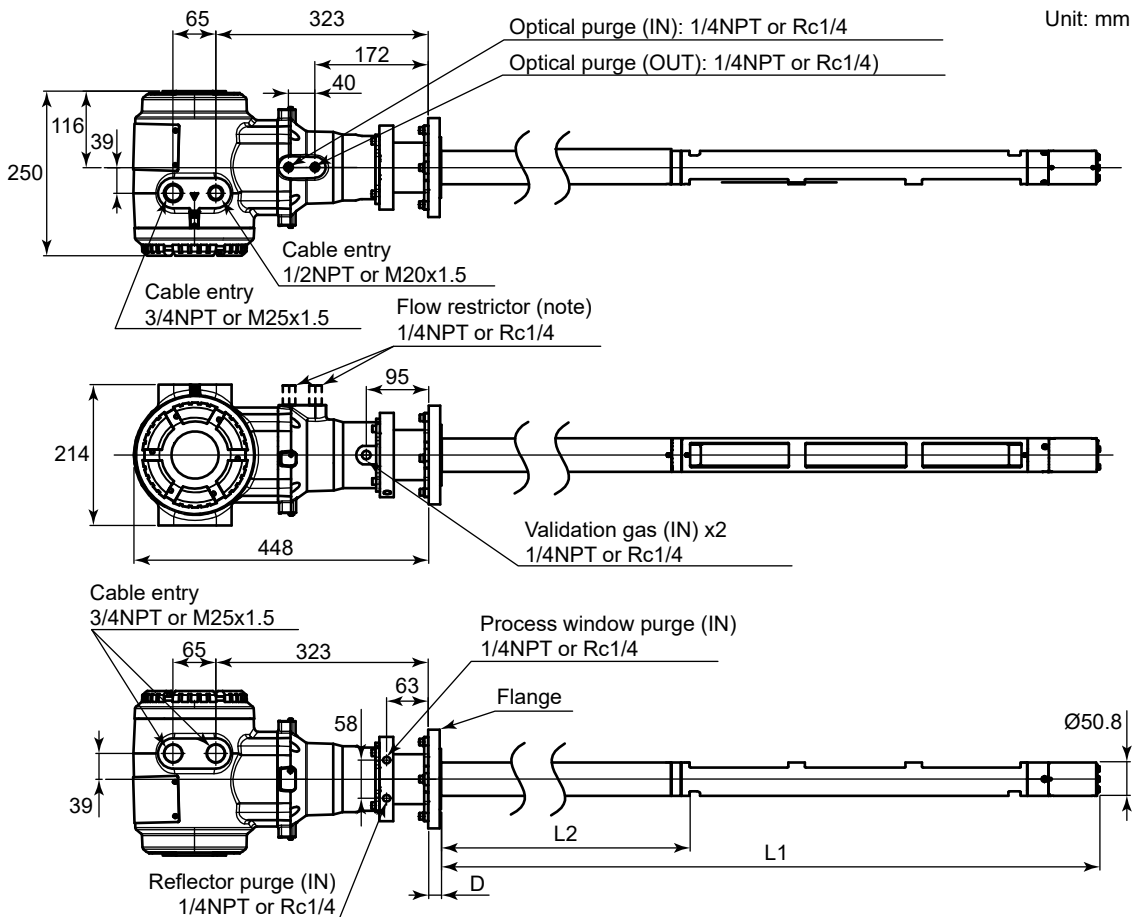For detailed information, refer to Japanese General Specifications (GS 11Y01D01-01JA).
The Option "/JA1" and "/JA2" can be used only when Japan Ex/Zone 2 certified model (YH8000-J2) is selected.
If "/JA1" or "JA2"is necessary for other model, please contact Yokogawa.

■ EXTERNAL DIMENSIONS

■ TDLS8100 Probe type Tunable Diode Laser Spectrometer

Unit: mm

Optical purge (IN): 1/4NPT or Rc1/4
Optical purge (OUT): 1/4NPT or Rc1/4)
Cable entry 1/2NPT or M20x1.5
Cable entry 3/4NPT or M25x1.5
Flow restrictor (note) 1/4NPT or Rc1/4
Validation gas (IN) x2 1/4NPT or Rc1/4
Cable entry 3/4NPT or M25x1.5
Process window purge (IN) 1/4NPT or Rc1/4
Flange
Reflector purge (IN) 1/4NPT or Rc1/4

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

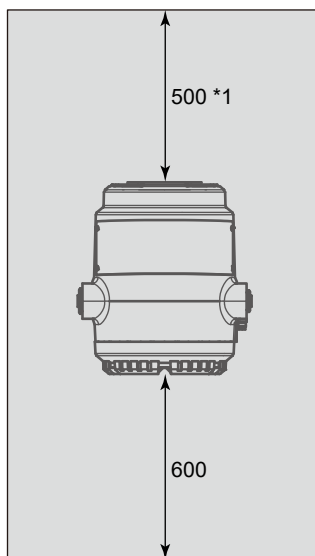| L1	700	1000	1500	2000
L2	78	378	878	1378
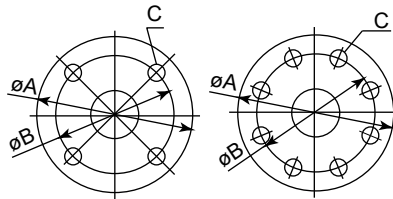
(note) The flow restrictors are attached
in the case of type -C1, -D1, -E1, -S1, -K1, -N1, -J1
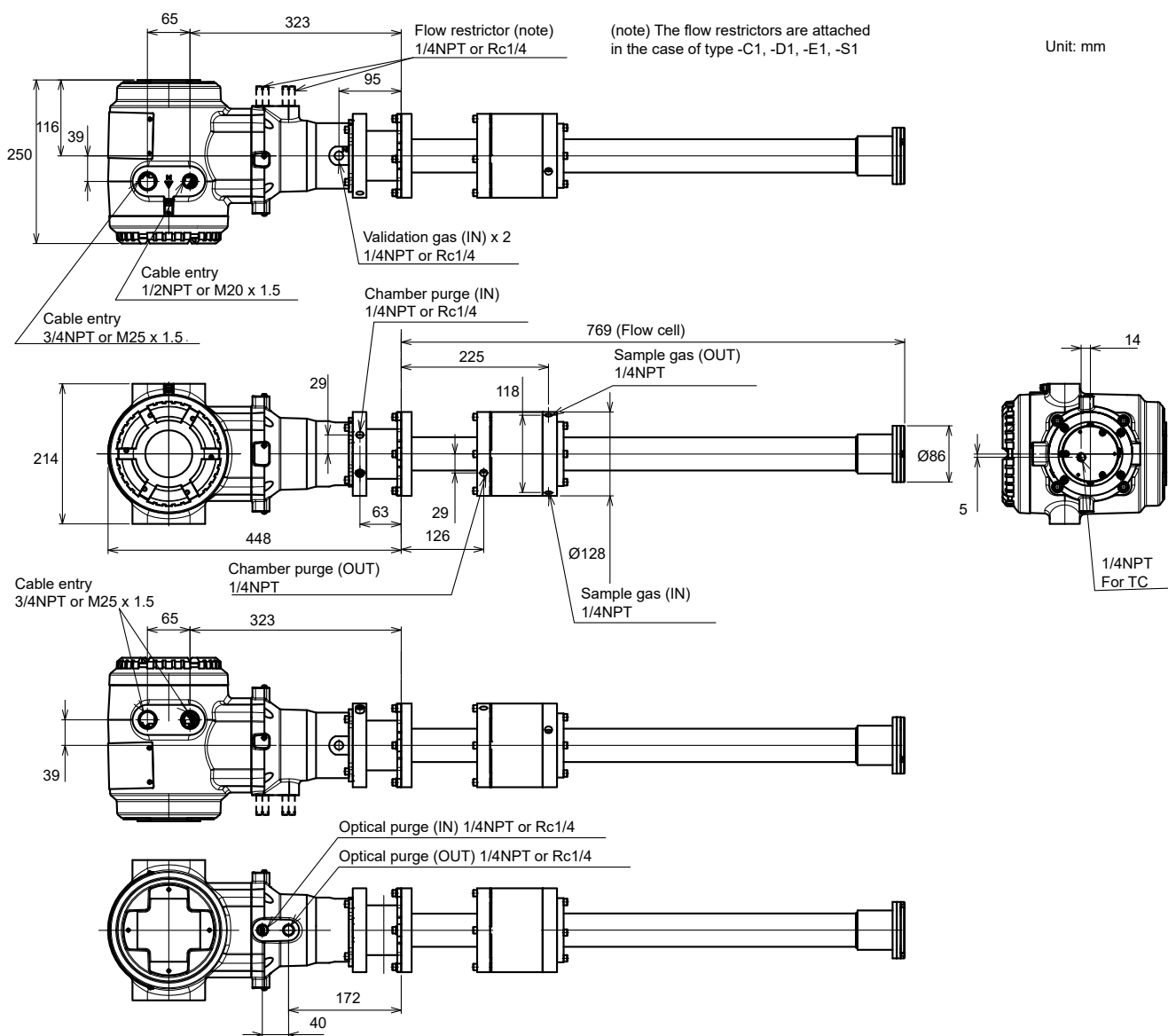
Flange

● **Maintenance space**

Unit: mm
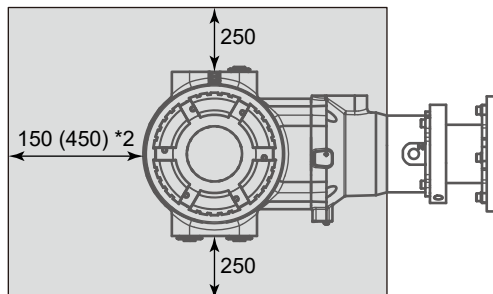
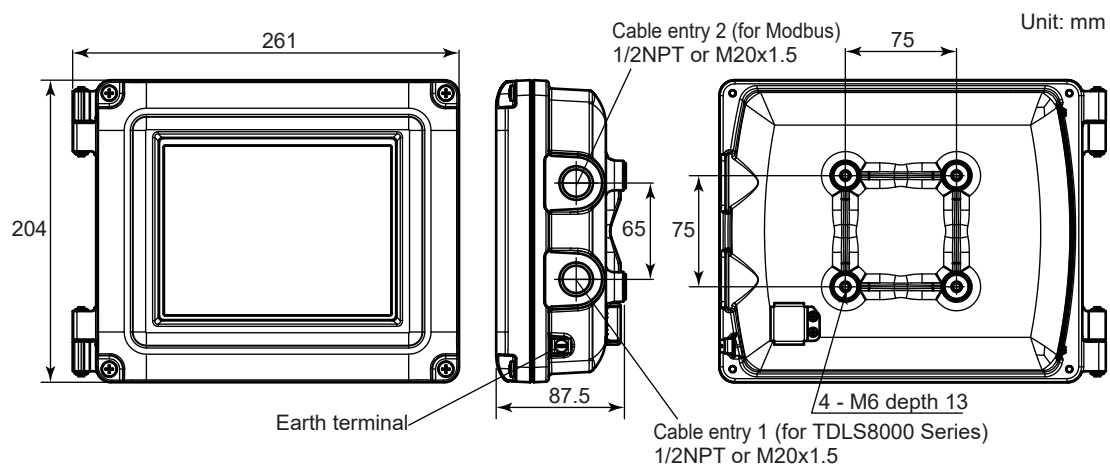*1: When installing YH8000 on TDLS8100 with /M, it is necessary to secure this space.

*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.

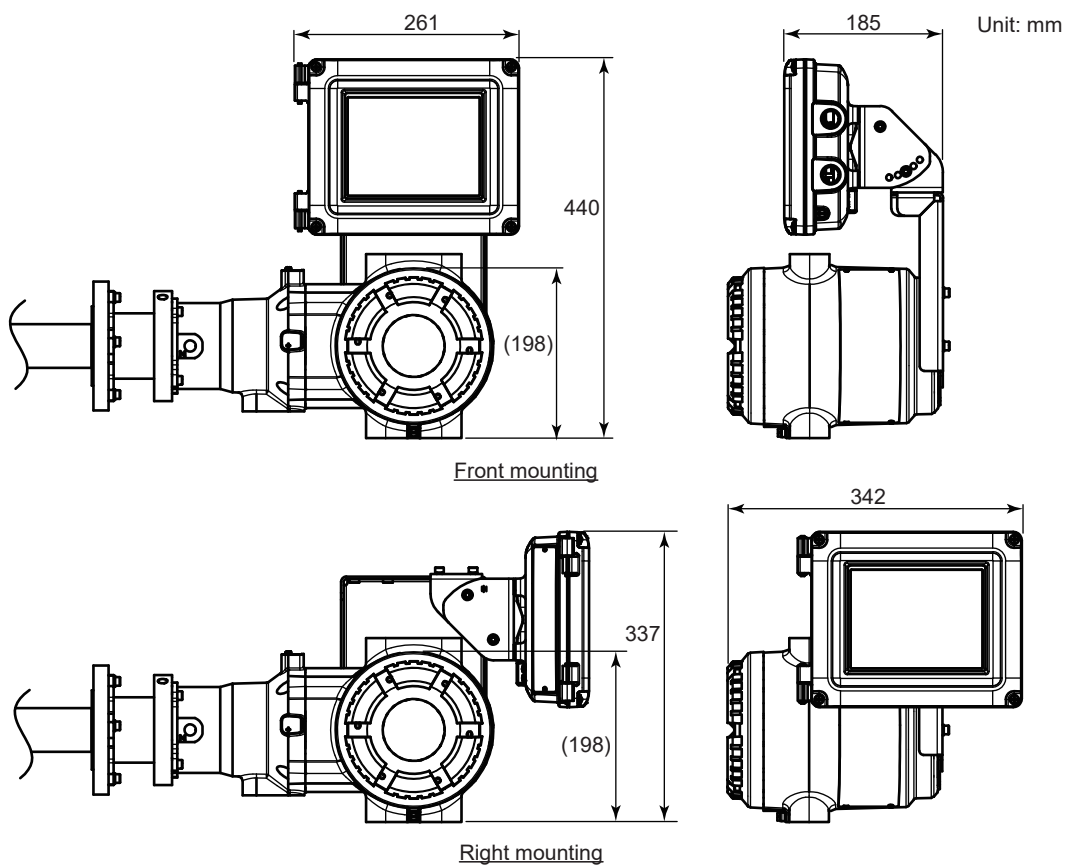## ● Flowcell type (reference)

For applications where the TDLS8000 or TDLS8100 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 TDLS8100 with a flow cell part . Please contact Yokogawa.
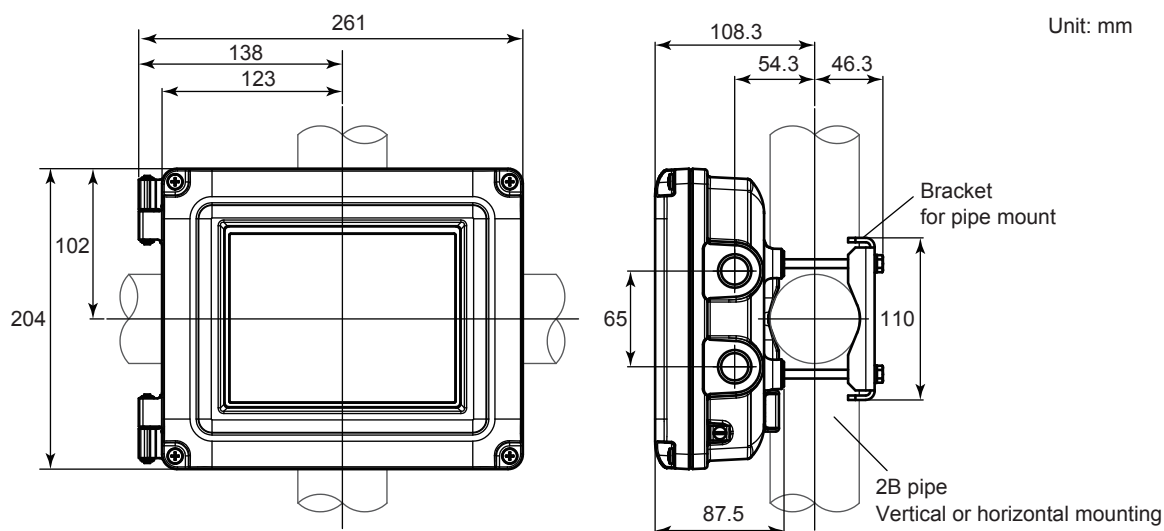
■ YH8000 HMI Unit

Unit: mm

261

204

65

87.5

Earth terminal

Cable entry 2 (for Modbus)
1/2NPT or M20x1.5

Cable entry 1 (for TDLS8000 Series)
1/2NPT or M20x1.5

75

75

4 - M6 depth 13

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

261

440

(198)

Front mounting

185

Unit: mm

337

(198)

Right mounting

342

Available for left mounting

Pipe mount (Option code: /P)

Unit: mm

- 261
- 138
- 123
- 102
- 204
- 108.3
- 54.3
- 46.3
- 65
- 110
- 87.5

Bracket for pipe mount

2B pipe
Vertical or horizontal mounting

Sun Shield (Option code: /S)

Unit: mm

- 318
- 212.5
- 197
- 31
- 46.3
- 178

Stud for sun shield

Bracket for pipe mount

2B pipe
Vertical or horizontal mounting

Wall mount (Option code: /W)

Unit: mm

- 266
- 246
- 10
- 10
- 226
- 206
- 105.4
- Bracket for wall mount
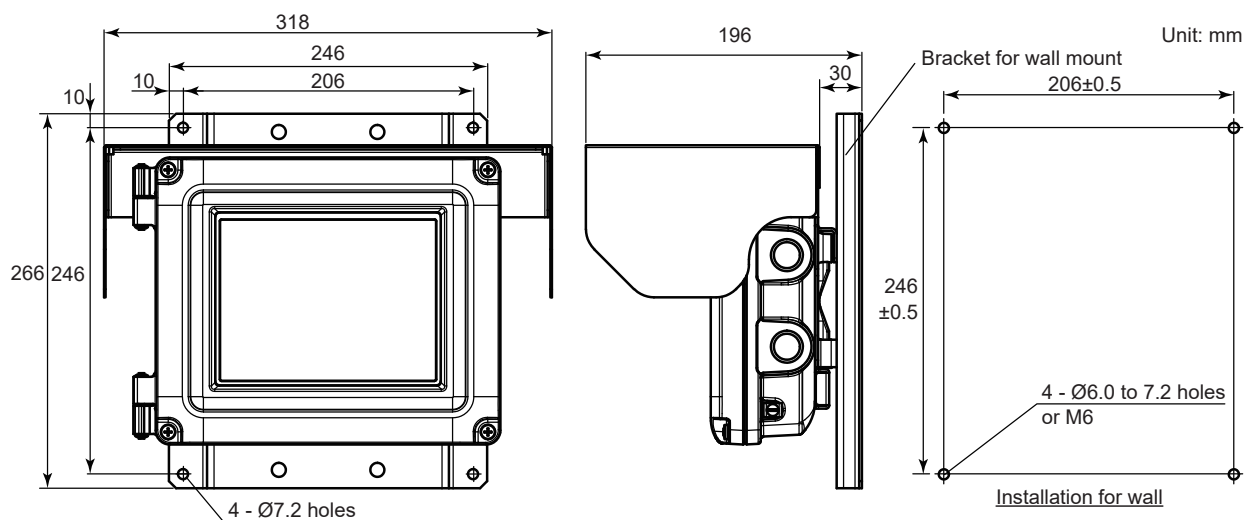- 246±0.5
- 206 ±0.5

4 - Ø7.2 holes

4 - Ø6.0 to 7.2 holes
or M6

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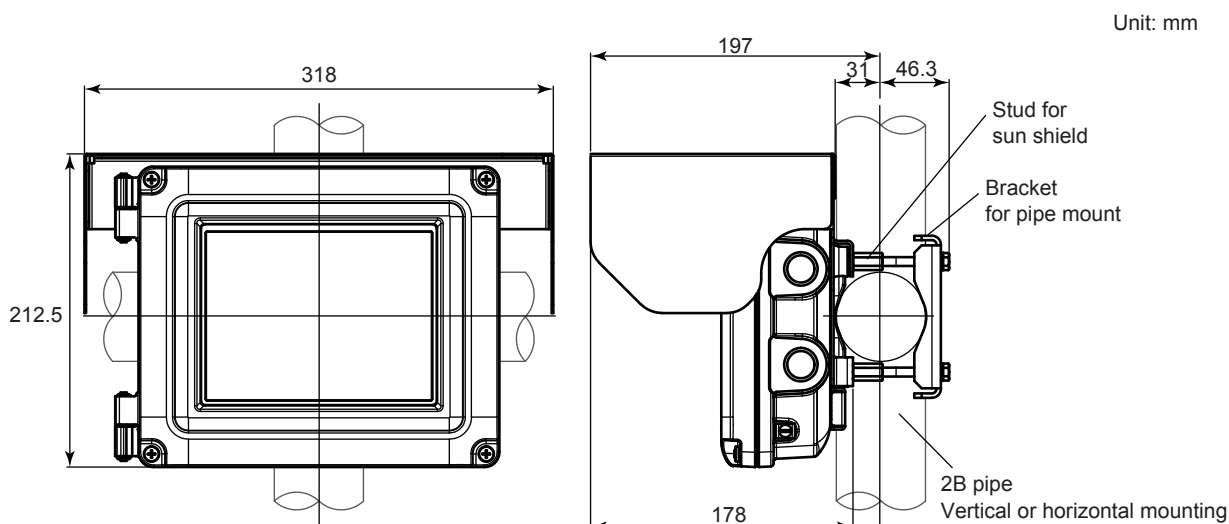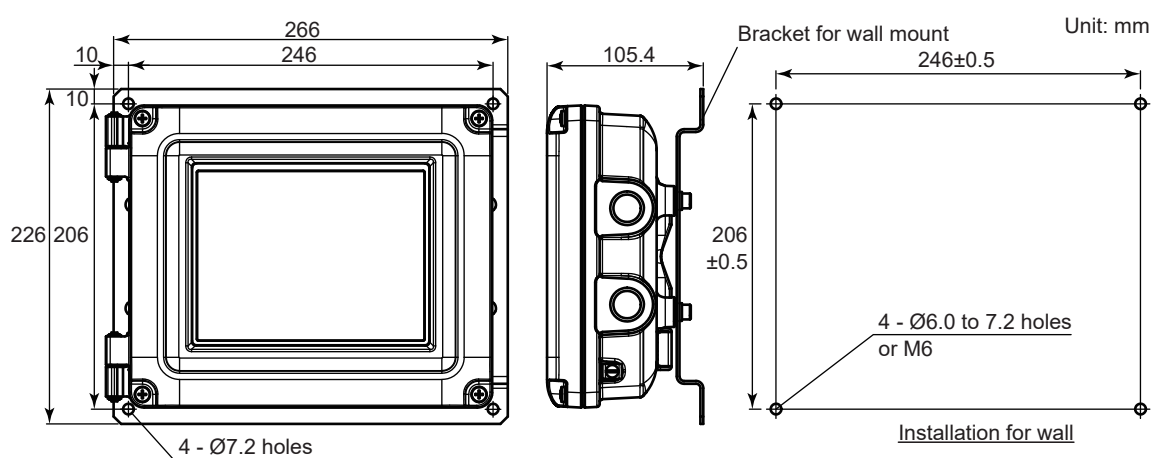
*: The wall construction for mounting has to be designed for 4 times the weight of the YH8000.
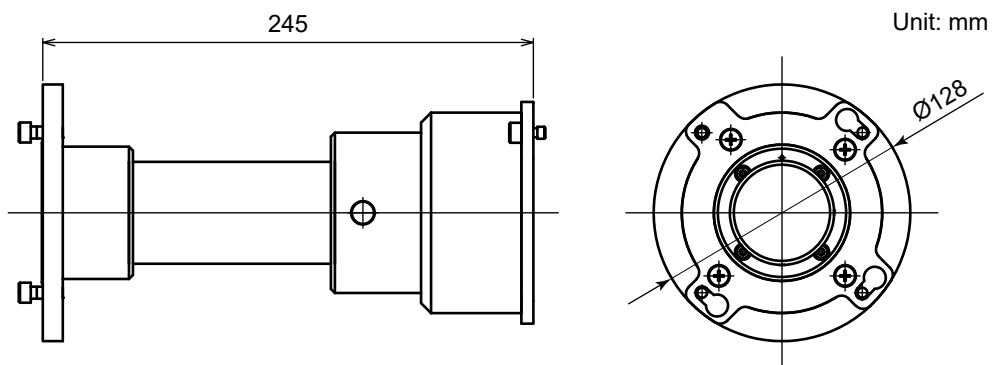Bracket for wall mount can be placed in lengthwise

Sun Shield (Option code: /S)

Unit: mm

Bracket for wall mount

206±0.5
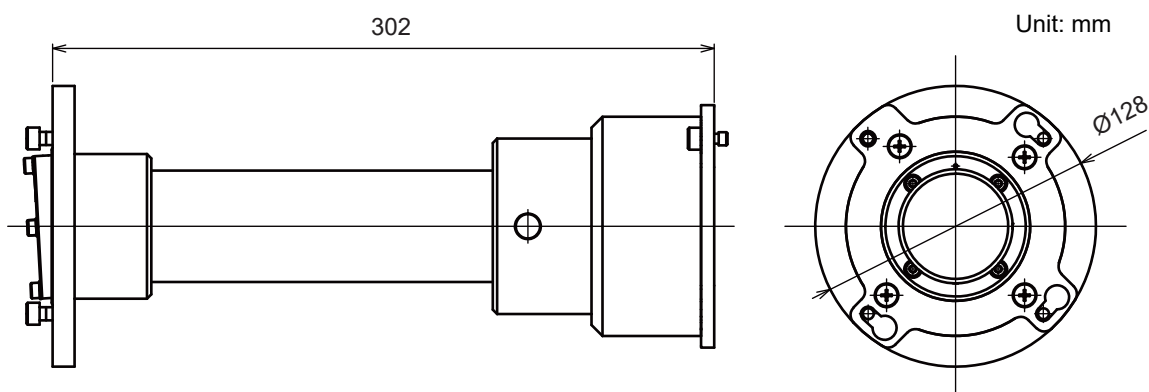
4 - Ø6.0 to 7.2 holes or M6

Installation for wall

4 - Ø7.2 holes

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

■ Calibration Cell

Part number: K9777ZA

Unit: mm
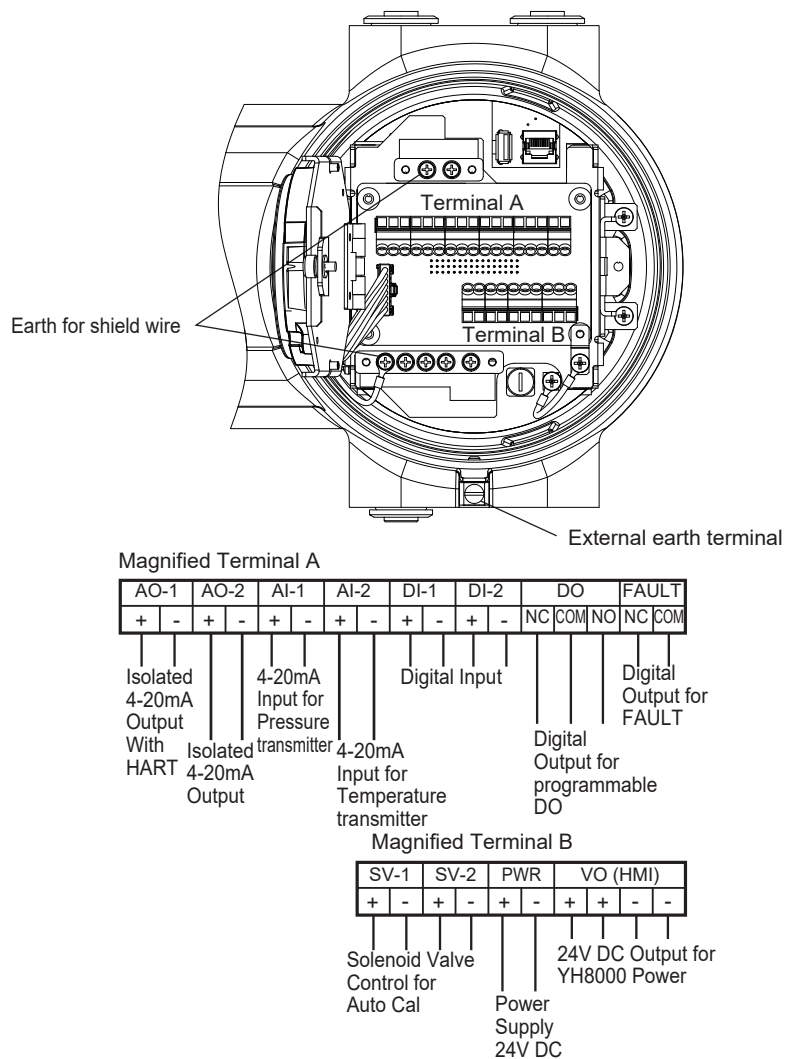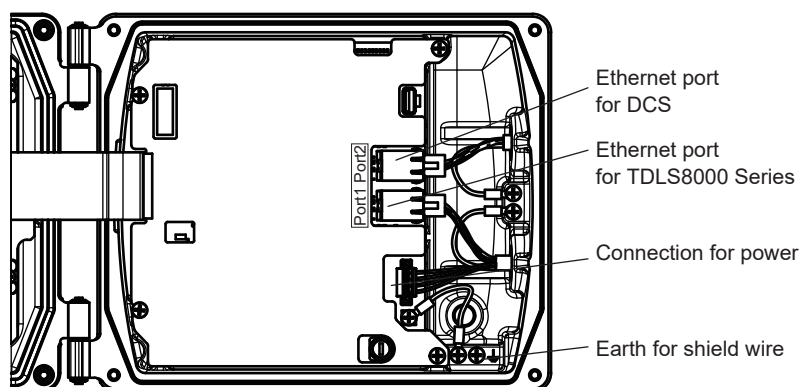
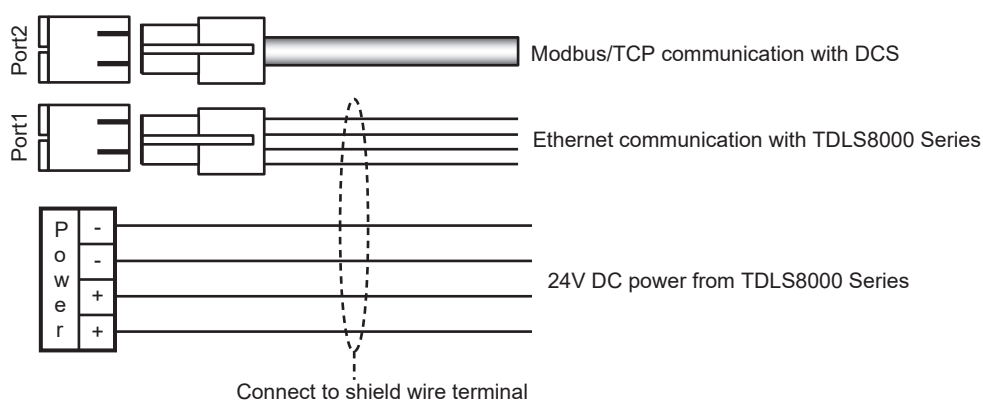245

Ø128

Part number: K9777ZK, K9777ZL

Unit: mm

302

Ø128

■ WIRING

Wiring the TDLS8100 Probe type Tunable Diode Laser Spectrometer

Terminal A

Terminal B

Earth for shield wire

External earth terminal

Magnified Terminal A

AO-1		AO-2		AI-1		AI-2		DI-1		DI-2		DO			FAULT	
+	-	+	-	+	-	+	-	+	-	+	-	NC	COM	NO	NC	COM

Isolated 4-20mA Output With HART

Isolated 4-20mA Output

4-20mA Input for Pressure transmitter

4-20mA Input for Temperature transmitter

Digital Input

Digital Output for programmable DO

Digital Output for FAULT

Magnified Terminal B

SV-1		SV-2		PWR		VO (HMI)			
+	-	+	-	+	-	+	+	-	-

Solenoid Valve Control for Auto Cal

Power Supply 24V DC

24V DC Output for YH8000 Power

Wiring the YH8000 HMI UNIT

Ethernet port
for DCS

Ethernet port
for TDLS8000 Series

Connection for power

Earth for shield wire

Local HMI configuration

Port2 — Modbus/TCP communication with DCS

Port1 — Ethernet communication with TDLS8000 Series

Power
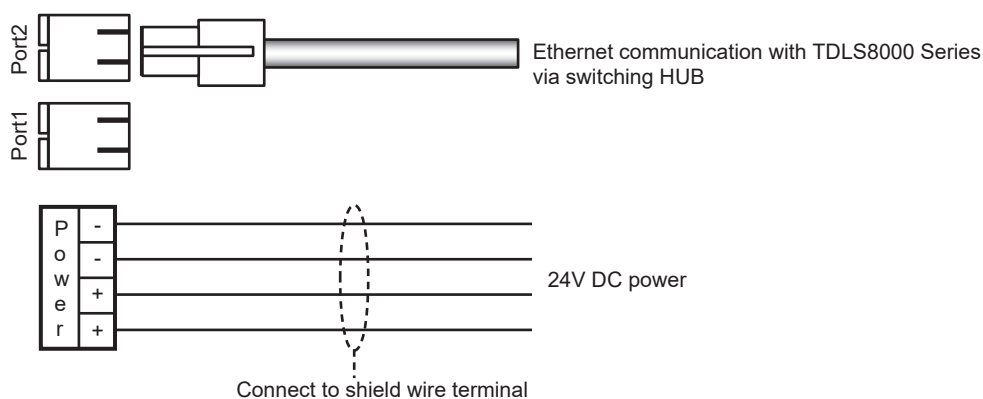-
-
+
+
— 24V DC power from TDLS8000 Series

Connect to shield wire terminal

- 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

Port2 — Ethernet communication with TDLS8000 Series via switching HUB

Port1

Power
-
-
+
+
— 24V DC power

Connect to shield wire terminal

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