

General Specifications

Model DM8 Vibration Type Liquid Density Meter

GS 12T3A1-E

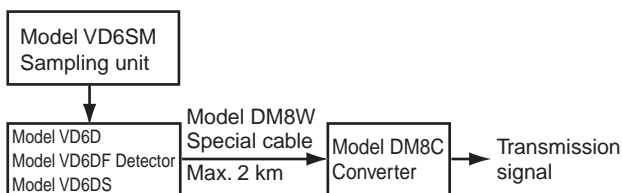
Overview

In 1967, YOKOGAWA developed the Model VD6 Vibration Type Liquid Density Meter in response to user requests for an online density meter, to assist in process automation and saving labor resources and energy while further improving and stabilizing quality. This was an important development in the instrumentation field, because density is a fundamental physical quantity, the accurate measurement of which is important for almost all processes. The VD6 density meter has gone on to develop an excellent reputation as a highly stable high sensitivity meter.

The Model DM8 Vibration Type Density Meter is a highly reliable, multi-function meter developed on the basis of our experience with the VD6 and which takes advantage of the latest computer technology to integrate a wide range of sensor techniques. Its converter incorporates a microprocessor to directly convert frequency signals from the sensor into density values and display them and is provided with a variety of functions such as one-touch calibration, self diagnosis, digital output (RS-232C), etc.



System Configuration



Standard Specifications

1. General Specifications

Measurement object: Liquid density
 Measurement principle: Vibration density measurement
 Measurement range:
 Density: 0.5 to 2.0 g/cm³
 Temperature: -10 to 100 °C
 Distance between Detector and Converter: Up to 2 km
 Power supply: 90 to 132 V AC or 180 to 264 V AC,
 50/60 Hz
 Power consumption: 20 VA

2. Detector

(1) General Purpose Detector Model VD6D

Detector construction: Non-explosion protection, rain-proof construction
 Case material: Cast Aluminium alloy
 Case coating: Epoxy resin, baked finish
 Case color: Jade green (equivalent to Munsell 7.5BG4/1.5)
 Wetted part materials:
 Base: SUS316
 Vibrator: SUS316 or Ni (Au Blazing: BAu-4)

Measuring liquid temperature: -10 to 100 °C
 Measuring liquid pressure: 2 MPa G or less
 Withstandable pressure: 4.9 MPa G
 Steam tracing: Available
 Process connection: Rc1/4
 Electrical connection: G3/4
 Mounting: 50 mm dia. pipe mounting
 Ambient temperature: -10 to 50 °C
 Weight: Approx. 12 kg

(2) Flameproof (Explosionproof) Detector Model VD6DF

Detector construction: JIS d2G3 or NEC Class I, Division 1, Groups C and D, Flameproof construction
 Process connection: Rc1/4 or 1/4NPT female (only for VD6DF-□□*B/FM)
 Electrical connection: G3/4 or 3/4NPSM female (only for VD6DF-□□*B/FM)
 Specifications are the same as for the (1) General Purpose Detector except for the above construction.

(3) Sanitary Use Detector Model VD6DS

Process connection: Special joint for connection to JIS 6A (6 mm dia.) pipe (within gasket)
 Wetted part materials: Added to the standard model
 Gasket: Teflon
 O-Ring: Viton
 Stream tracing: Not available
 Specifications are the same as for the (1) General Purpose Detector except for the above two items.
 Temperature detector protecting tubes are detachable.

These detectors cannot be used with highly corrosive liquids and solutions likely to stick to sensors. If it is desired to be applied to solutions containing slurry or sludge, consult with YOKOGAWA. For measuring NaOH solutions, use sensors with a nickel vibrator.

3. Converter Model DM8C

Display: Digital display, five digit LED

Display contents:

- Density (g/cm³) after conversion to reference temperature (center temperature)
- Density (g/cm³) at the measuring temperature
- Measuring liquid temperature (°C)
- Set density value for the calibration liquid (g/cm³) (displayed on call)
- Temperature coefficient set value for the calibration liquid ($\times 10^{-5}$ g/cm³/°C) (displayed on call)
- Output signal set value (%) (displayed on call)
- Setting for output range low limit (g/cm³) (displayed on call)
- Setting for output range high limit (g/cm³) (displayed on call)
- Reference temperature (center temperature) set value (°C) (displayed on call)
- Temperature coefficient set value for the measuring liquid ($\times 10^{-5}$ g/cm³/°C) (displayed on call)
- Fault contents display

Output signal:

Analog output:

- 4 to 20 mA DC (load resistance 550 Ω or less), and 0 to 1 Ω DC (load resistance 250 k Ω or more), isolated output.

Density (g/cm³) after conversion to the reference temperature

Digital output:

To RS-232C

Density (g/cm³) after conversion to the reference temperature

Density (g/cm³) at the measured temperature

Measured liquid temperature

Calibration state

Failure alarm

Output signal span: 0.05 to 0.5 g/cm³ settable

Reference temperature set range: 0 to 100 °C (in increments or decrements of 1 °C)

Contact output on failure: One point. Contact closed on failure or power failure. Contact open when normal.

Permissible voltage: 220 V DC, 250 V AC

Permissible current: 2A (resistive load)

Permissible contact power: 60 W

Fault detecting contents: Detector failure and converter failure

Failure output:

Analog signal: Falls down to about -10 % of the output signal span

Digital signal: Error message outputs

Output signal hold: Holds in the CAL. or Maintenance mode.

Settable range for temperature coefficient: 0 to 0.002 g/cm³/°C

Calibration procedure: One-touch calibration by strong calibration liquid density (one-point calibration)

Ambient temperature: -10 to 55 °C

Power supply: 90 to 132 V AC or 180 to 264 V AC, 50/60 Hz

Case construction: Dust and rain proof construction

Coating color:

Door: Equivalent to Munsell 2.8GY6.4/0.9

Case: Equivalent to Munsell 2.0GY3.1/0.5

Coating finish: Baked finish epoxy resin

Mounting: To panel, wall or JIS 50A pipe

Air purge connector: Rc1/8, Rc1/4, or 1/4NPT female is also optionally available

Electrical connection: Five holes, 27 mm dia.

Attached with four plastic waterproof plugs equivalent to JIS A15, and one plastic waterproof plug equivalent to JIS A20.

Weight: Approx. 7.5 kg

4. Special Cable Model DM8W

Type: Six-conductor double shield cable

Insulator: Polyethylene

Sheath: Polyvinyl chloride

Insulation resistance: 1000 M Ω /km

Conductor resistance: 15.31 Ω /km

Finished O.D.: 15.8 mm

5. Sampling Unit Model VD6SM

External dimensions: Approx. 400(W) \times 400(D) \times 1350(H) mm

Coating finish: Epoxy resin, baked gray finish (equivalent to Munsell N7)

Watted part materials: SUS316, Teflon (gasket for flowmeter, pressure gauge and strainer), Ni for /FN option.

Weight: Approx. 80 kg

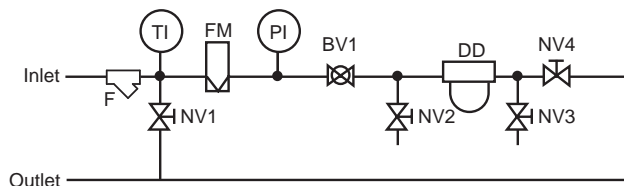
Process conditions:

Inlet temperature: 0 to 100 °C

Inlet pressure: 0 to 1 MPa

Required differential pressure: At least 100 kPa

Flow rate: 1 to 10 l/min



Sampling System Diagram

Element specifications

F: Strainer body; SUS316,

element; SUS316, Ni fo /FN option

PI: Pressure gauge, 0 to 1 MPa or 0 to 2 MPa, SUS316

TI: Thermometer, 0 to 100 °C or 0 to 150 °C, SUS316

FM: Flowmeter, tapered metal tube flowmeter, 1 to 10 l/min, SUS316

BV: Ball valve, SUS316

NV: Needle valve, SUS316

DD: Density detector

Note: This sampling system cannot normally be applied to food applications, if it is desired to be applied to food applications, consult with YOKOGAWA.

■ Characteristics

(overall characteristics after combining the detector and the converter)

Repeatability: 5×10^{-4} g/cm³ (for digital output)
1 % of span (for analog output)

Linearity: ± 0.5 % of span (when span is 0.2 g/cm³ or less)
 ± 1 % of span (when span is more than 0.2 g/cm³)

Temperature characteristics: ± 0.5 % of span/ ± 10 °C
(Compensating error for changes in the measuring liquid temperature and detector temperature)

Flow characteristics: ± 0.1 % of span in the 0 to 5 l/min range

Pressure characteristics: ± 0.0005 g/cm³/ ± 98 kPa change

Viscosity error: ± 0.1 % of span in the 0 to 1500 cp range

■ Standard Accessories

Syringe (for injecting standard solution or solvent)	1 pc.	for Detector (VD6)
Brush (for cleaning the detector)	1 pc.	
Allen wrench for terminal box	1 pc.	
Allen wrench for locking the cover	1 pc.	
O-Ring	1 bag	
Silica gel	2 packs	for Converter (DM8C)
Fuse for the converter (3A)	1 pc.	

(3) Sanitary Use Detector

Model	Suffix code	Option code	Description
VD6DS	-----	-----	Sanitary use detector
Vibrator material	-S3	-----	SUS316
-----	*B	-----	Style B

■ Model and Suffix Code

1. Detector

(1) General Purpose Detector

Model	Suffix code	Option code	Description
VD6D	-----	-----	General purpose detector
Vibrator material	-S3	-----	SUS316
-----	-N1	-----	Ni
-----	*B	-----	Style B

(2) Flameproof Detector

Model	Suffix code	Option code	Description
VD6DF	-----	-----	Flameproof detector
Vibrator material	-S3	-----	SUS316
-----	-N1	-----	Ni
-----	*B	-----	Style B
(Option)		/FM	NEC Class 1, Division 1, Group C and D, explosionproof

2. Converter

Model	Suffix code	Option code	Description
DM8C	-----	-----	Converter
Power supply	-A1	-----	90 to 132V AC, 50/60Hz
-----	-A2	-----	180 to 264V AC, 50/60Hz
-----	*B	-----	Style B
(Option)		/AP1	Rc1/4
Air purge connector		/AP2	1/4NPT female

3. Special Cable

Model	Suffix code	Option code	Description
DM8W	-----	-----	Special cable
Cable length	-L□□□□	-----	Length (unit: m)
-----	*A	-----	Style A

(Note) Enter the cable length in “-L□□□□ in m.”

[Example] L0050 for 50 m
L0100 for 100 m
L2000 for 2 km

4. Sampling Unit

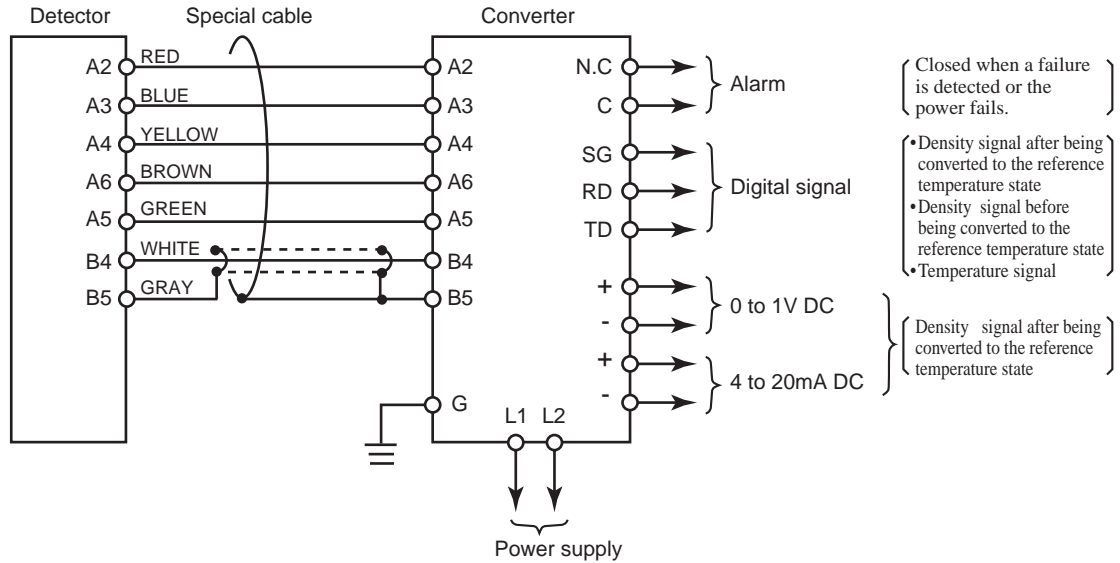
Model	Suffix code	Option code	Description
VD6SM	-----	-----	Sampling unit for Vibration type Density Meter (Note 1)
Piping connection	-JPT -10K -20K -150 -300 -151 -301 -WST	----- ----- ----- ----- ----- ----- -----	Rc1/2 JIS 10K 15 RF Flange JIS 20K 15 RF Flange ANSI Class 150 1/2 RF Flange ANSI Class 300 1/2 RF Flange JPI Class 150 1/2 RF Flange JPI Class 300 1/2 RF Flange 1/2 inch welding socket
Pressure gauge range	-PG10 -PG20 -PK10 -PK20	----- ----- ----- -----	1 MPa 2 MPa Diaphragm type 1 MPa Diaphragm type 2 MPa
Temperature range	-T100 -T150	----- -----	0 to 100°C 0 to 150°C
Style code	*B	-----	Style B
Option		/ST /FN	With steam tracing (Note 2) Ni (Note 3)

(Note 1) VD6SM Sampling unit is not including Detector. Order detector VD6D or VD6DF, separately.
DM8C converter and special cable DM8W are also required for sampling system of density meter.

(Note 2) If steam tracing is necessary, select the diaphragm type pressure gauge.

(Note 3) If measuring solution includes NaOH ($\leq 30\%$), select option code /FN of Ni.

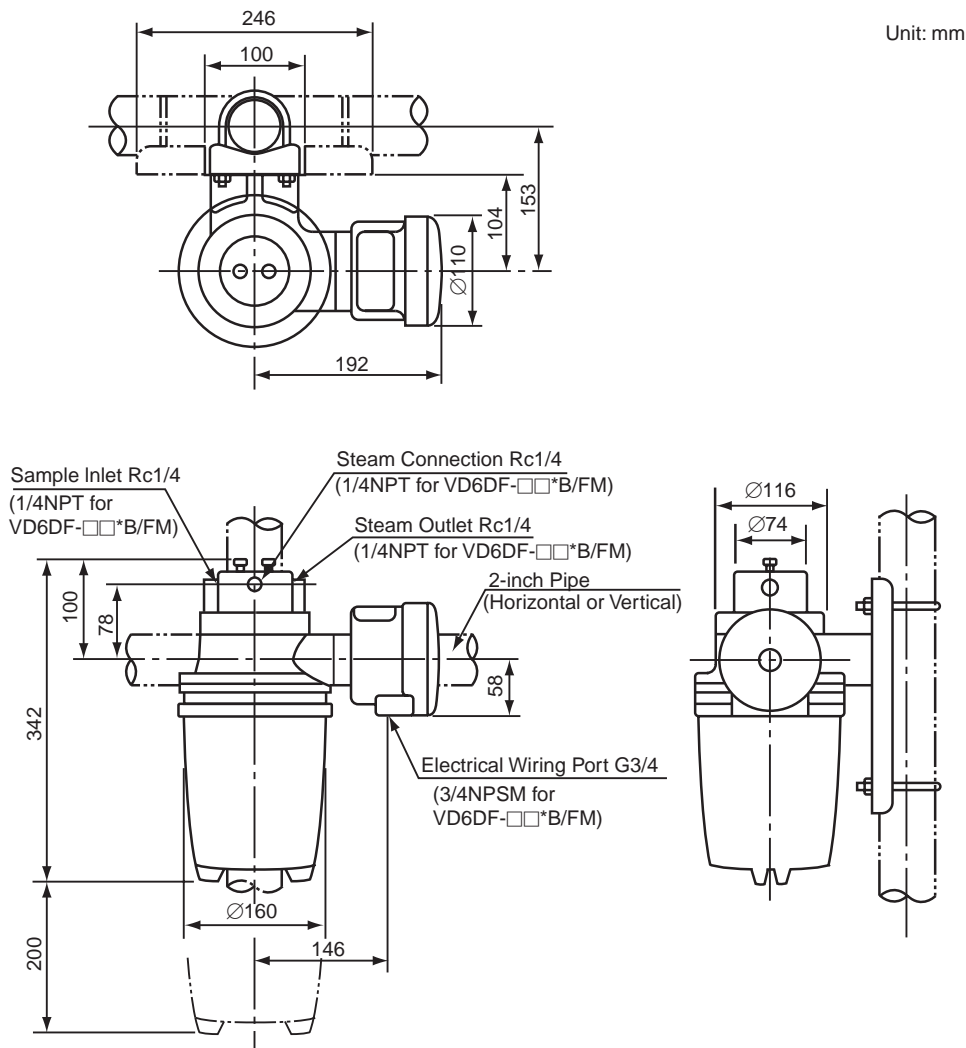
■ Wiring Connection



■ External Dimensions

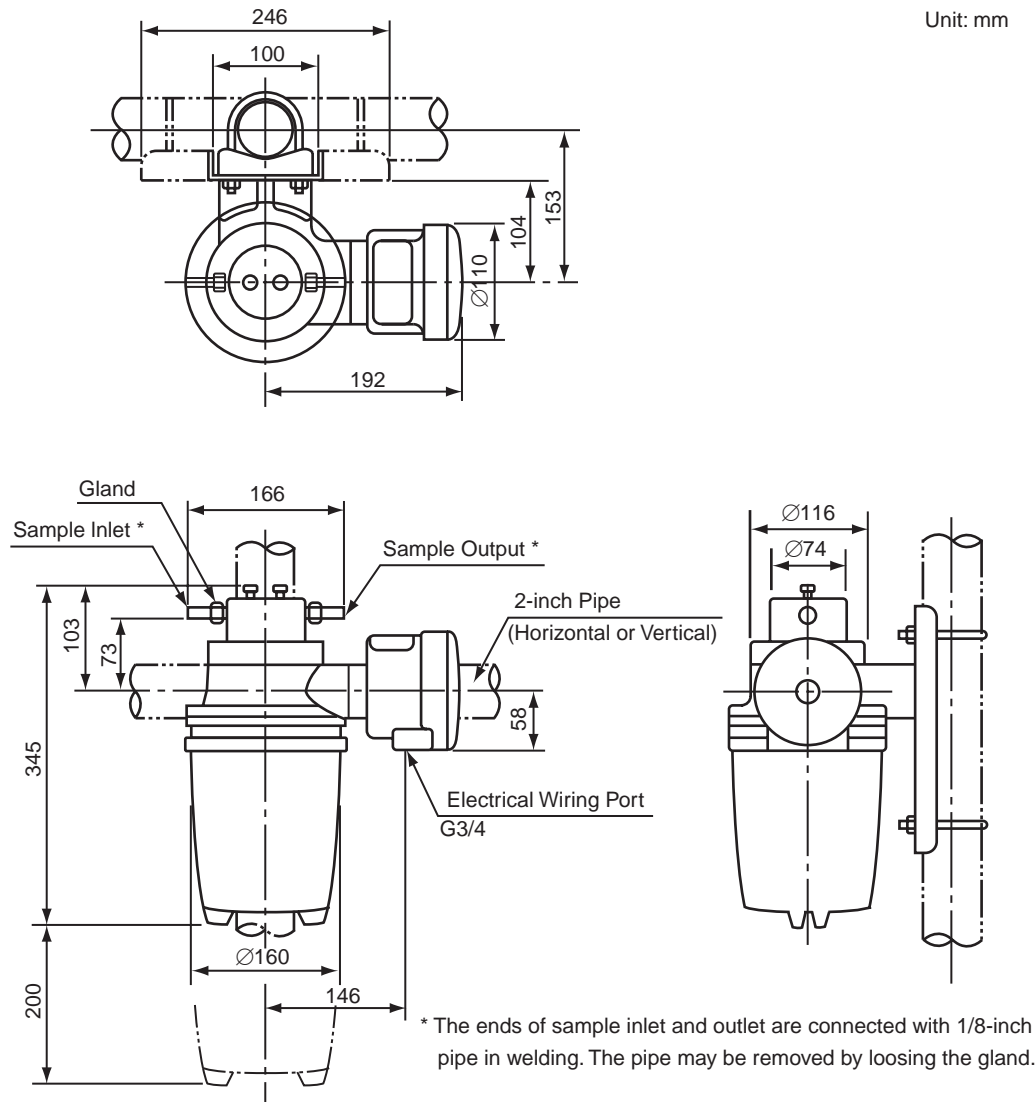
1. Detector

● General Purpose and Flameproof Detector Models VD6D and VD6DF

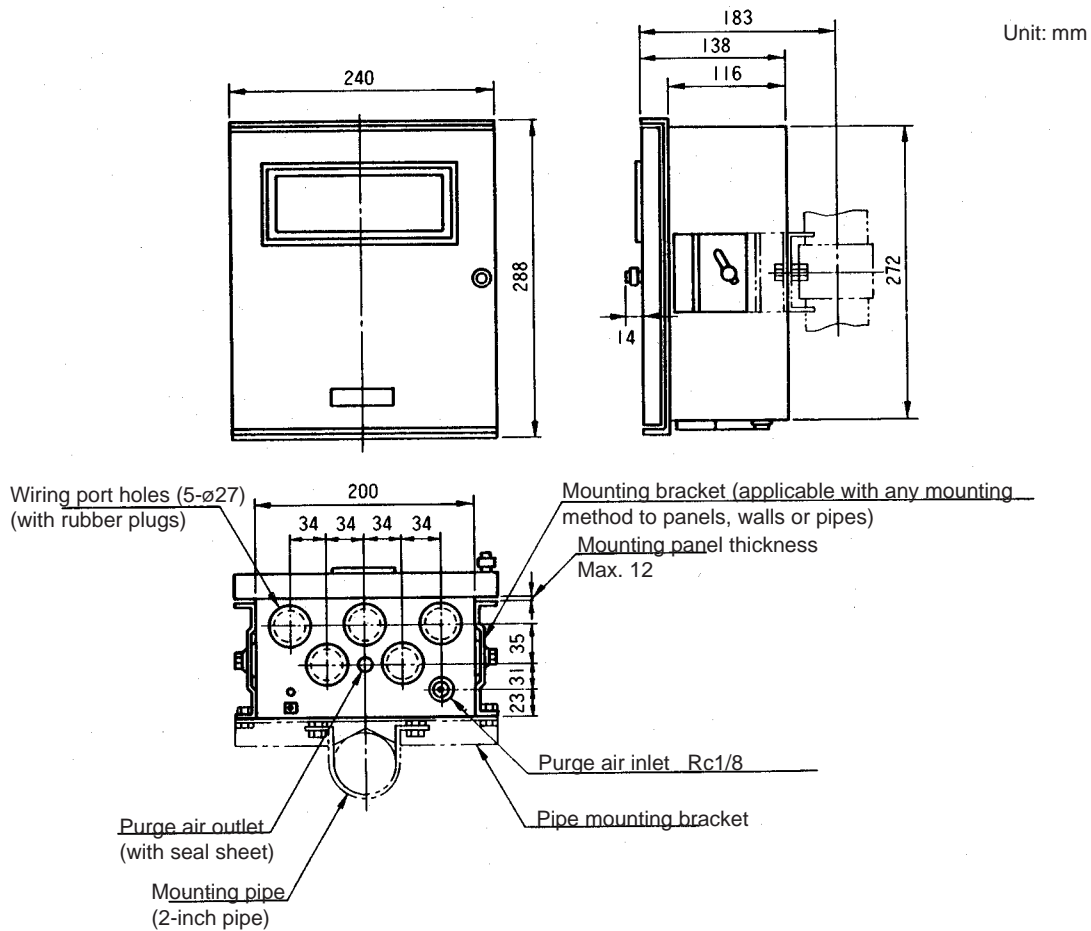


● Sanitary Use Detector Model VD6DS

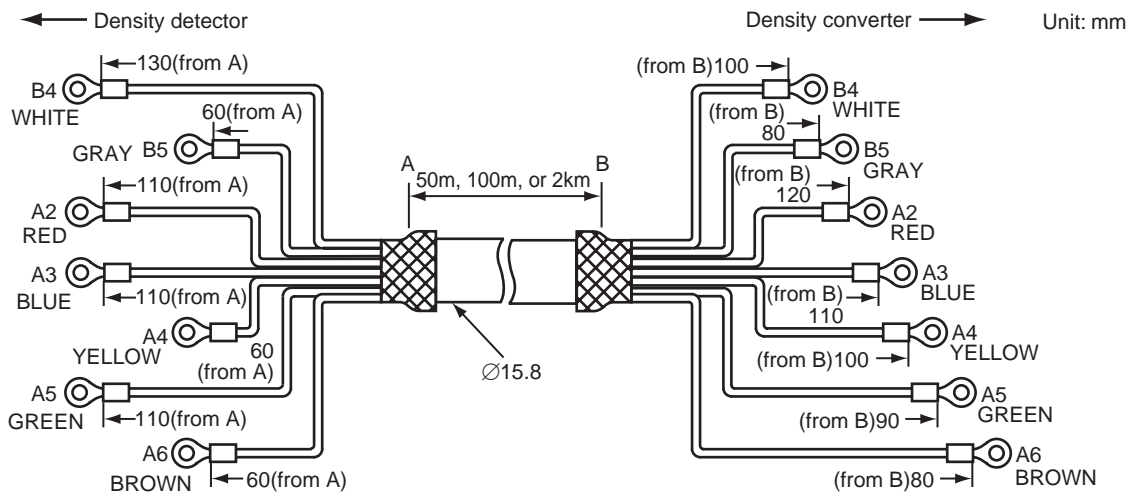
Unit: mm



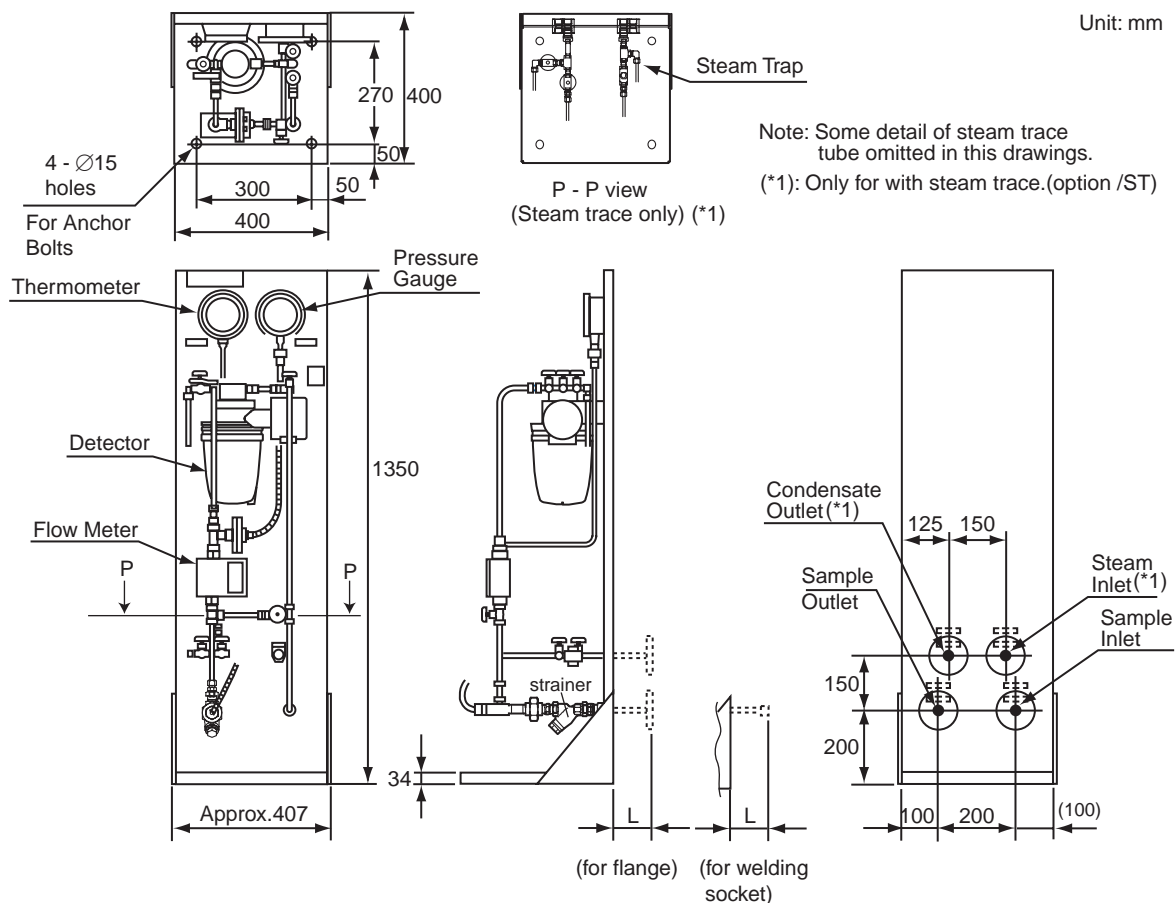
2. Converter Model DM8C



3. Special Cable Model DM8W



4. Sampling Unit Model VD6SM



Model and Codes	Connection Type	L
VD6SM - JPT - P□□ 0 - T1 □ 0 *B	Rc 1/2 female	0
VD6SM - 10K - P□□ 0 - T1 □ 0 *B	JIS 10K 15 RF Flange	100
VD6SM - 20K - P□□ 0 - T1 □ 0 *B	JIS 20K 15 RF Flange	100
VD6SM - 150 - P□□ 0 - T1 □ 0 *B	ANSI Class 150 1/2 RF Flange	100
VD6SM - 300 - P□□ 0 - T1 □ 0 *B	ANSI Class 300 1/2 RF Flange	100
VD6SM - 151 - P□□ 0 - T1 □ 0 *B	JPI Class 150 1/2 RF Flange	100
VD6SM - 301 - P□□ 0 - T1 □ 0 *B	JPI Class 300 1/2 RF Flange	100
VD6SM - WST - P□□ 0 - T1 □ 0 *B	1/2 B Welding Socket	100

Inquireis sheet for the Vibration Liquid Density Meter

Thank you for inquiry on our vibrationliquid density meter.

Please specify your requiremets by checking the appropriate boxes and filling in the blanks with the requested information.

1. General Items

Company name: _____
 Contact person: _____ Section: _____
 Address: _____ (Phone No. _____)
 Plant name: _____
 Measurement location: _____
 Purpose: ☐ Indication ☐ Recording ☐ Alarm ☐ Control

2. Measurement conditions

(1) Liquid temperature: _____ to _____, normally _____ [°C]
 (2) Liquid pressure: _____ to _____, normally _____ [kPa]
 (3) Liquid flowrate: _____ to _____, normally _____ [l/min]
 (4) Slurry or soiling components?: ☐ Yes ☐ No
 (5) Name of measured liquid: _____
 (6) Composition of measured liquid: _____
 (7) Other: _____

3. Installation location

(1) Ambient temperature: _____
 (2) Installation location: ☐ Outdoors ☐ Indoors
 (3) Other: _____

4. User requirements

(1) Measurement range: _____
 (2) Vibration material: ☐ SUS316 ☐ Ni
 (3) Cable length between detector and converter: _____ m
 (4) Power supply: ☐ 90 to 132 V AC ☐ 180 to 264 V AC
 (5) Other: _____