

General Specifications

Models CA100SG/SN/SC and
200SG/SN/SC
Capacitance Magnetic Flowmeter



GS 01E08B01-00E

ADMAG CA magnetic flowmeter is excellent at measurement in ultra-low conductivity fluids down to 0.01 μ S/cm, adhesive fluids, or slurry fluids. Since ADMAG CA employs a non-wetted electrode construction, picking up the signal voltage by electrode plates provided outside a ceramic pipe through the capacitance of the pipe.

FEATURES

- Non-wetted electrodes
 - Immune to adhesive or slurry fluids
 - Wide measurable range, minimum 0.01 μ S/cm of conductivity. (for size 15 to 100mm (0.5 to 4in.))
 - Leak Proof Electrode
- Excellent on corrosive fluid and abrasive fluid
 - Alumina ceramics (99.9%)
- Dual compartment housing separates the wiring section from the electronics and protects the electronics from corrosive environments.
- High accuracy, \pm 0.5% of flow rate (size 25 to 100mm (1 to 4 in.))

STANDARD SPECIFICATIONS

Degrees of Protection :
IP67, Type 4X

Grounding:

- 100 Ω or less
- When optional code A (lightning protector) is selected, Class C (10 Ω or less)
- In case of TIIIS Flameproof type, Class A (10 Ω or less) or Class C (10 Ω or less)
- In case of explosion proof type except TIIIS, follow the domestic electrical requirements as regulated in each country.

Magnetic Flow Converter

- * : For models with no indicator, a hand-held terminal is necessary to set parameters.
- ** : Pulse output and alarm output use common terminals, therefore these functions are not available at the same time.

Output Signal:

- Current output;
4 to 20mA DC (Load resistance 0 to 750 Ω)
- Pulse output / Alarm output;
Transistor contact
(contact rating: 30V DC (OFF), 200mA(ON))

Communication signals (optional):

- BRAIN communication signals (superimposed on a 4 to 20mA DC signal)
- Load resistance; 250 to 600 Ω (including cable)
- Load capacity; 0.22 μ F or less (including cable)
- Load inductance; 3.3mH or less (including cable)
- Maximum cable length; 2km (6560 ft) (using CEV cable)



Space from power line; 15cm or more (parallel wiring should be avoided)
Input Impedance of Receiver Connected to the Receiving Resistance; 10k Ω or larger (at 2.4kHz)

Indicator*:

7 segment LCD (with no backlight)

Instantaneous Flow Rate Display Function:

Flow rate can be displayed either in engineering units or in percent of span. (for models with indicator)

Totalizer Display Function:

Totalized volume in engineering units can be displayed by setting a totalizing factor. (for models with indicator)

Span Setting Functions*:

Volumetric flow setting is possible by setting volume unit, time unit, flow rate value and flow tube size.

Volume units; m³, l (liter), cm³, gallon (us), barrel (=158.987 l (liter))

Velocity units; m, ft

Time units; s (sec), min (minute), h (hour), d (day)

Flow Tube Size; mm, inch

Data Security During Power Failure:

Data storage in EEPROM - no back-up battery required.

Damping Time Constant*:

Settable from 1 to 200 seconds. (63% response time)

Pulse Output Function:**

Scaled pulse can be output by setting a pulse factor.

Pulse Width: Duty 50% or fixed pulse width (0.5, 1, 20, 33, 50, or 100 ms) - user selectable.

Output Rate: 0.0001 to 1000pps (when pulse output function is selected.)

Alarm Output Function:**

Indicates that an alarm occurs (Normal Close Fixed).

Self Diagnostics Function*:

Converter failure, flow tube failure, erroneous setting, etc. can be diagnosed and displayed (for models with indicator).

Electrical Connection:

JIS G 1/2 (PF 1/2) female, ANSI 1/2 NPT female, DIN Pg 13.5 female, ISO M20 x 1.5 female

Terminal Connection: M4 screw terminal

Case Material: Aluminum alloy

Coating: Polyurethane corrosion-resistant coating

Color of Coating:

- Cover; Deep sea moss green (equivalent to Munsell 0.6GY3.1/2.0)
- Case; Frosty white (equivalent to Munsell 2.5Y8.4/1.2)

■ Magnetic Flow Tube

Size:

15, 25, 40, 50, 80, 100, 150, 200 mm
(0.5, 1, 1.5, 2, 3, 4, 6, 8 in.)

Coating:

- Size 15 to 100mm (0.5 to 4 in.) : No coating (Stainless steel surface)
- Size 150, 200mm (6, 8 in.) : Polyurethane corrosion-resistant coating Frosty white (Munsell 2.5Y8.4/1.2)

Flow Tube Material:

Housing: Stainless steel (15 mm: SCS11, 25 to 200 mm: SUS304)

Wetted Part Material:

Pipe: Alumina ceramics (99.9%)
Earth Ring:Stainless steel (SUS316), Hastelloy C276 equivalent, Titanium

Note: • Hastelloy is a registered trademark of Haynes International Inc.

Gasket:

- Fluoro resin PTFE with filler (between flow tube body and earth ring)
- Fluoro rubber, viton (between flow tube body and earth ring; for optional code / FRG)
- Non-asbestos joint sheet sheathed with fluoro resin PTFE (between earth ring and process flange; for optional code / BCF or /BSF)
- Chloroprene rubber (between earth ring and process flange; for optional code / BCC or /BSC)

Electrode Construction: Non-wetted type.

■ HAZARDOUS AREA CLASSIFICATION

■ FM: (Only for sizes 15 to 100mm)

Applicable Standard:

FM 3600, FM 3615, FM 3810, ANSI/NEMA 250 Explosion proof for Class I, Division 1, Groups A, B, C and D.

Dust-ignitionproof for Class II/III, Division 1, Groups E, F and G.

Temp. Code: T6

Ambient Temp.: -20°C to +50°C (-4 to 122°F)

Maximum power supply voltage : 240 Vac/ 120 Vdc

Enclosure: Type 4X

Note: Installation shall be in accordance with the manufacturer's instructions and the National Electric Code, ANSI/NFPA-70

■ CSA: (Only for sizes 15 to 100mm)

Applicable Standard: CSA Standard C22.2

No.0, No.0.4, No.0.5, No.25, No.30, No.94, No.61010-1

Certificate: 1500865

Explosion proof for Class I, Groups B, C and D; Class II, Groups E, F and G; Class III

Temp. Code: T6 T5 T4

Process Temp.: 70 85 120°C

Ambient Temp.: -20°C to +50°C (-4 to 122°F)

Maximum power supply voltage: 240 Vac/ 120 Vdc

Enclosure: Type 4X

Note: Installation shall be in accordance with the manufacturer's instructions.

All wiring shall comply with Canadian Electrical Code Part I and Local Electrical Codes.

■ TIIS: (former JIS; For sizes 15 to 100mm)

Certificate:

Size (mm)	Certificate	Size (mm)	Certificate
15	TC13644	50	TC13647
25	TC13645	80	TC13648
40	TC13646	100	TC13649

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Construction: Ex d e IIC T4 X

: Converter; Flameproof

Flow Tube; Increased Safety

: Gas Group and Temperature Class; IIC T4

Ambient Temperature : -20 to 50°C

Fluid Temperature : 120°C or less

Maximum power supply voltage: 250V AC/ 130V DC

Grounding: JIS Class C(10Ω or less) or JIS Class A(10Ω or less)

Note: Maintenance and repair of the converter should be done in non-hazardous location after cutting off the power supply.

STANDARD PERFORMANCE

Accuracy :

Size 15 to 100mm (0.5 to 4 in.):
(fluid conductivity of 0.1μ S/cm or more)

Size in mm (inch)	Span in m/s (ft/s)	Accuracy
15 (0.5)	0.5 to 1 (1 to 3)	±1.0% of span
	1 to 10 (3 to 33)	±0.5% of span (at indications below 50% of span) ±1.0% of rate (at indications 50% of span or more)
25 to 100 (1 to 4)	0.5 to 1 (1 to 3)	±0.5% of span
	1 to 10 (3 to 33)	±0.25% of span (at indications below 50% of span) ±0.5% of rate (at indications 50% of span or more)

Size 150, 200mm (6, 8 in.):
(fluid conductivity of 1μ S/cm or more)

Size in mm (inch)	Span in m/s (ft/s)	Accuracy
150, 200 (6, 8)	0.5 to 1 (1 to 3)	±1.0% of span
	1 to 10 (3 to 33)	±0.5% of span (at indications below 50% of span) ±1.0% of rate (at indications 50% of span or more)

Fig1.eps

Repeatability:

±0.1% of rate (Minimum ±1mm/s)

Maximum Power Consumption:

14W

Insulation Resistance:

- 100MΩ between power terminals and ground terminal at 500 V DC.
- 100MΩ between power terminals and each output terminal at 500 V DC.
- 20MΩ between each output terminal and ground terminal at 100 V DC.

Withstanding Voltage:

- 1500 V AC for 1 minute between power terminals and ground terminal.

CAUTION

When performing the Voltage Breakdown Test, Insulation Resistance Test or any unpowered electrical test, wait 10 seconds after the power supply is turned off before removing the housing cover. Be sure to remove the Short Bar at terminal "G". After testing, return the Short Bar to its correct position. Screw tightening torque should be 1.18N-m (0.88ft-lb) or more, because the G-terminal is thought as a protective grounding and should conform to the Safety Requirements.

EMC Conformity Standard:

AS/NZS CISPR 11

NORMAL OPERATING CONDITIONS

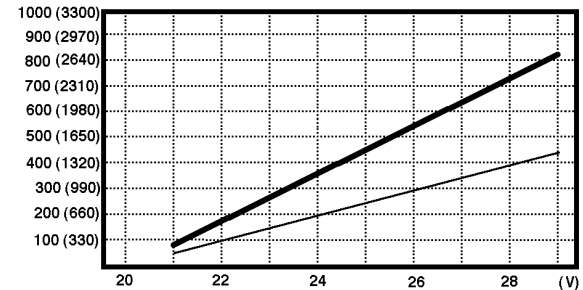
Ambient Temperature: -20 to 50°C (-4 to 122°F)

Ambient Humidity: 5 to 80%RH (no condensation)

Power Supply : -A1; Range 80 to 264 V AC, 47 to 63 Hz/ 100 to 130 V DC, -D1; Range 20.4 to 28.8 V DC

Supplied Power and Max. Cable Length for 24V DC version:

Allowed cable length m (ft)



— Cable cross section area : 1.25mm²

— Cable cross section area : 2mm²

Measurable Fluid Conductivity:

- Size 15 to 100mm (0.5 to 4 in.): 0.01μS/cm or more
- Size 150, 200mm (6, 8 in.): 1μS/cm or more
- * In case of size 15 to 100mm (0.5 to 4 in.) for fluid of which conductivity is from 0.01μS/cm to 0.1μS/cm, refer to accuracy in the figure below.

Measured Data for Reference:

Measured Condition

Size : 25mm(1 in.)
Fluid name : Glycerin + Ethylene glycol
Viscosity : 30cSt
Flow velocity : 1m/s
Damping : 3 seconds
Measured Time : 20 seconds

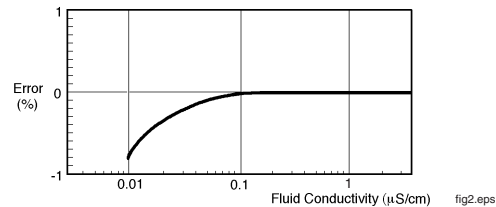


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MODEL AND SUFFIX CODES

Model	Suffix Code	Description
CA115S	Size 15mm (0.5 in.)
CA202S	.....	Size 25mm (1 in.)
CA204S	.....	Size 40mm (1.5 in.)
CA205S	.....	Size 50mm (2 in.)
CA208S	.....	Size 80mm (3 in.)
CA210S	.....	Size 100mm (4 in.)
CA215S	.....	Size 150mm (6 in.)
CA220S	.....	Size 200mm (8 in.)
Use	G	General purpose type
	N	FM/CSA Explosion proof type (Only for sizes 15 to 100mm)(*3)
	C	TIIS Flameproof type (Only for sizes 15 to 100mm)(*2)
Pipe (*4)	-C	Ceramics
Process Connection (*5)	K1	JIS 10K wafer
	K2	JIS 20K wafer
	B1	ANSI 150 wafer
	B2	ANSI 300 wafer
	E2	DIN PN10/16 wafer
	H1	JIS F12 (75M) wafer (*1)
Electrode material	-N	Always N
Earth ring material (*4)	S	SUS316
	H	Hastelloy C276 equivalent
	V	Titanium
Electrical connection	J	JIS G1/2 (PF1/2) female (*2)
	A	ANSI 1/2NPT female (*3)
	D	DIN Pg13.5 female
	M	ISO M20X1.5 female
Power supply	-A1	80 to 264V AC / 100 to 130V DC
	-D1	20.4 to 28.8V DC
Indicator (*6)	DH	Horizontal (7 Segment LCD)
	DV	Vertical (7 Segment LCD)
	N	None (Not available for TIIS Flameproof type)
Optional specification	/□	Optional Code

*1: H1 is only for size 80 to 200mm (3 to 8 in.).

*2: Select JIS G1/2 female electrical connection (code J) and optional code /JF3 with /G11 or /G12 in case of requirement of TIIS Flameproof type.

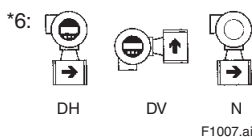
*3: Select ANSI 1/2 NPT female electrical connection (code A) in case of requirement of FM/CSA explosion proof type.

*4: ⚠ Users must consider the characteristics of selected wetted parts material and the influence of process fluids. The use of inappropriate materials can result in the leakage of corrosive process fluids and cause injury to personnel and/or damage to plant facilities. It is also possible that the instrument itself can be damaged and that fragments from the instrument can contaminate the user's process fluids.

Be very careful with highly corrosive process fluids such as hydrochloric acid, sulfuric acid, hydrogen sulfide, sodium hypochlorite, and high-temperature steam (150°C [302°F] or above).

Contact Yokogawa for detailed information of the wetted parts material.

*5: Allowable fluid pressure should also be limited according to fluid temperature and pressure.



OPTIONAL SPECIFICATIONS

A: Available N: Not available

ITEM	Specification	Use			Code
		General Purpose	Ex.Proof		
		CA***SG	CA***SC	CA***SN	
Waterproof Gland	Waterproof Glands are attached to Power and signal wiring ports. For JIS G1/2 only.	A	N	N	ECG
Waterproof Gland with Union Joint	Waterproof Glands (union joint) are attached to Power and signal wiring ports. For JIS G1/2 only.	A	N	N	ECU
Gasket for PVC pipe (Note 4)	Gaskets are attached between earth ring and flow tube.	A	A	A	FRG
Lightning Protector	Built-in Lightning Protector (Only for 24VDC version)	A	A	A	A
BRAIN Communication	Digital communication with BRAIN protocol	A	A	A	BR
Epoxy Coating	Coating is changed to Epoxy coating.	A	A	A	EPF
High Anti-corrosion Coating	Coating is changed to three-layer coating (Urethane coating on two-layer epoxy coating)	A	A	A	X2
Material Certificate	Reproduced material certificate for earth ring.	A	A	A	M01
Bolt & Nut Assembly (Note 1)	Carbon steel bolts/nuts and chloroprene gaskets assembly.	A	A	A	BCC
	Carbon steel bolts/nuts and non-asbestos PTFE-wrapped gaskets assembly.	A	A	A	BCF
	Stainless steel bolts (SUS304)/nuts (SUS403) and chloroprene gaskets assembly.	A	A	A	BSC
	Stainless steel bolts (SUS304)/nuts (SUS403) and non-asbestos PTFE-wrapped gaskets assembly.	A	A	A	BSF
TIIS Flameproof (Note 2)	TIIS Flameproof type	N	(Note3)	N	JF3
Flameproof Packing Adapter for TIIS Flameproof	One Flameproof Packing Adapter and a blind plug are attached.	N	(Note3)	N	G11
	Two Flameproof Packing Adapters are attached.	N	(Note3)	N	G12
FM Approval (Note 2)	FM Explosionproof	N	N	A	FF11
CSA Certification (Note 2)	CSA Explosionproof	N	N	A	CF11
Mirror Finished Ceramics	Mirror Finishing on the inside of ceramic tube (Rmax. <= 1micro-meter)	A	A	A	MRR
180 deg. Rotate Converter	Set "01" in the parameter number 14, or "REVERSE" in the parameter number B14. Then reverse the direction of the flow direction arrow on the flowtube. (Note 5)	A	A	A	CRC
Oil-prohibited Use	Degreased cleansing treatment	A	A	A	K1
Oil-prohibited Use with Dehydrating Treatment	Degreased cleansing treatment; Packing with desiccant	A	A	A	K5
Hydrostatics Test Certificate	Test pressure depends on process connection (Test duration 10minutes) Test result is full in NOTE of QIC.	A	A	A	T01
Calibration Certificate	Level2: Declaration and Calibration Equipment List	A	A	A	L2
	Level3: Declaration and Primary Standard List	A	A	A	L3
	Level4: Declaration and YOKOGAWA Measuring Instruments Control System	A	A	A	L4

Note 1: It is available only for JIS 10K wafer, JIS 20K wafer or ANSI 150 wafer type.

2: It is available only for size 15 to 100mm (0.5 to 4 in.).

3: Select optional code /JF3 with /G11 or /G12 in case of requirement of TIIS Flameproof type.

/G11 is selectable only for DC power supply and 4-conductor cable use.

4: ⚠ Users must consider the characteristics of selected wetted parts material and the influence of process fluids. The use of inappropriate materials can result in the leakage of corrosive process fluids and cause injury to personnel and/or damage to plant facilities. It is also possible that the instrument itself can be damaged and that fragments from the instrument can contaminate the user's process fluids.

Be very careful with highly corrosive process fluids such as hydrochloric acid, sulfuric acid, hydrogen sulfide, sodium hypochlorite, and high-temperature steam (150°C [302°F] or above).

Contact Yokogawa for detailed information of the wetted parts material.

5: For model CA115, the arrow on the flowtube comes to the back side of the display.

ACCESSORIES

Data sheet	(1-sheet)
Unit labels	(1-sheet)
Centering device	(1-set)
Plug (for DC power supply only)	(1-piece)
Hexagonal Wrench (only for hazardous duty type instrument)	(1-piece)

TERMINAL CONNECTION

Terminal Symbols	Description
Ⓧ	Protective grounding
L/+ N/-	Power Supply
I+ I-	Current Output 4 to 20mA DC
P+ P-	Pulse or alarm output (Select one)

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■ SIZING DATA

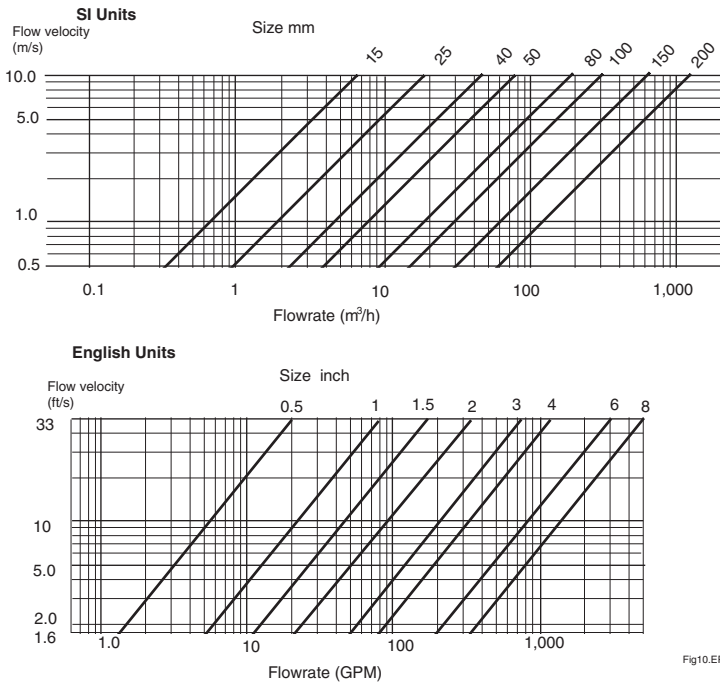
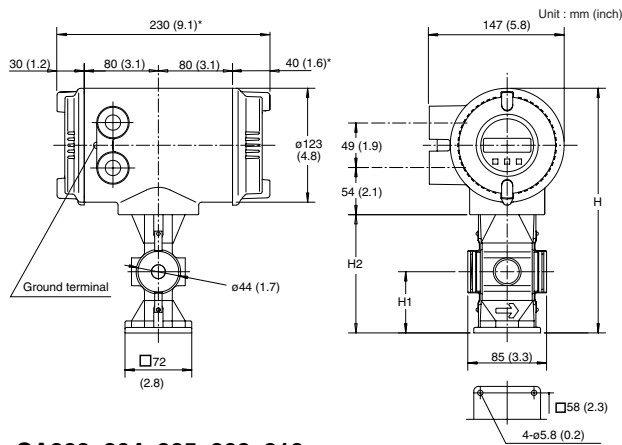


Fig10.EPS

Note; Measurable flow velocity is from 0m/s.

■ EXTERNAL DIMENSIONS

• CA115

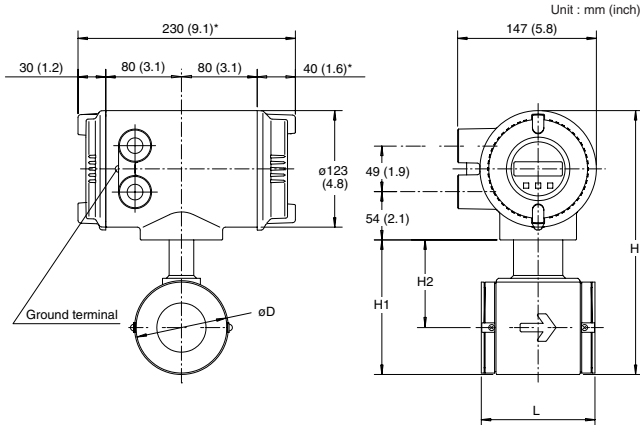


CA115S		Unit : mm (inch)	
Type	General (G)	Ex-proof (N/C)	
Size code	115		
Size	15 (0.5)		
Lining	Ceramics		
Height	H	267.5 (10.5)	265 (10.4)
Height	H1	66 (2.6)	66 (2.6)
Height	H2	127.5 (5.0)	125 (4.9)
Weight	kg (lb)	4.7 (10.4)	4.7 (10.4)

Fig. 12

* The length marked as * is shorter by approx. 10 mm (0.4") for non indicator type.

• CA202, 204, 205, 208, 210



202
204
CA205S
208
210

		Unit : mm (inch)									
Type		General (G)					Ex-proof (N/C)				
Size code		202	204	205	208	210	202	204	205	208	210
Size		25 (1.0)	40 (1.5)	50 (2.0)	80 (3.0)	100 (4.0)	25 (1.0)	40 (1.5)	50 (2.0)	80 (3.0)	100 (4.0)
Lining		Ceramics									
Face to face length	L	93 (3.7)	106 (4.2)	120 (4.7)	160 (6.3)	180 (7.1)	93 (3.7)	106 (4.2)	120 (4.7)	160 (6.3)	180 (7.1)
Outer diameter	øD	67.5 (2.7)	86 (3.4)	99 (3.9)	129 (5.1)	155 (6.1)	67.5 (2.7)	86 (3.4)	99 (3.9)	129 (5.1)	155 (6.1)
Height	H	250.6 (9.9)	271 (10.7)	283.5 (11.2)	313.5 (12.3)	349.5 (13.8)	248.6 (9.8)	269 (10.6)	281.5 (11.1)	311.5 (12.3)	347.5 (13.7)
Height	H1	110.6 (4.4)	131 (5.2)	143.5 (5.6)	173.5 (6.8)	209.5 (8.2)	108.6 (4.3)	129 (5.1)	141.5 (5.6)	171.5 (6.8)	207.5 (8.2)
Height	H2	76.8 (3.0)	87.5 (3.4)	94 (3.7)	109 (4.3)	132 (5.2)	74.8 (2.9)	85.5 (3.4)	92 (3.6)	107 (4.2)	130 (5.1)
Weight	kg (lb)	4.6 (10.1)	5.5 (12.1)	6.5 (14.3)	9.2 (20.3)	12.3 (27.1)	4.6 (10.1)	5.5 (12.1)	6.5 (14.3)	9.2 (20.3)	12.3 (27.1)

Fig. 13

* The length marked as * is shorter by approx. 10 mm (0.4") for non indicator type.

• CA215, 220

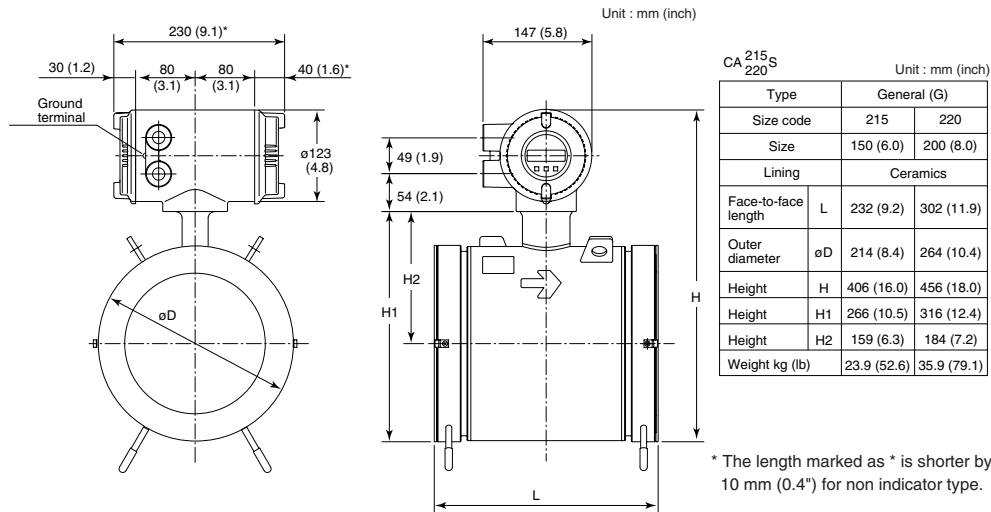
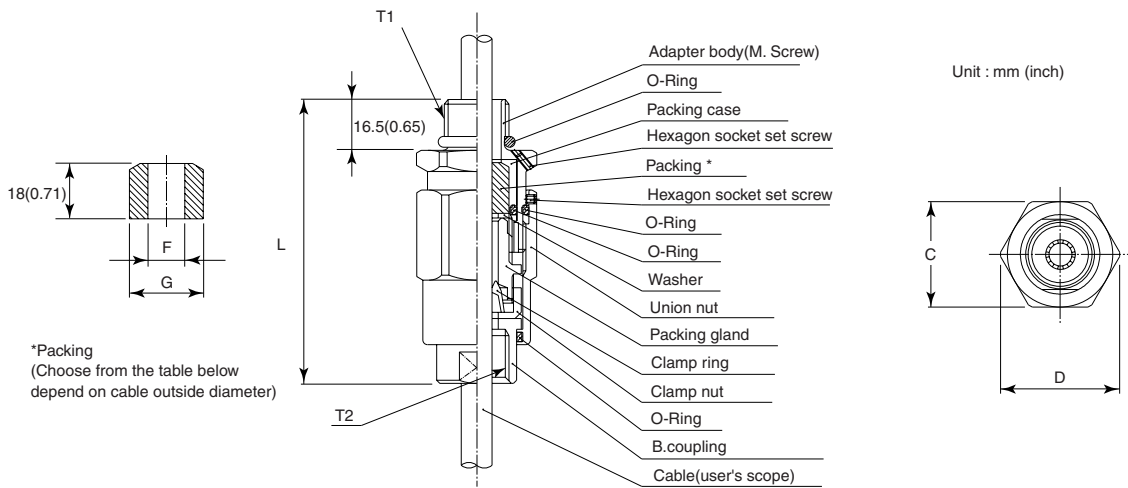


Fig. 14

TIIS Flameproof Packing Adapter (Optional Code /G11 or /G12)



Nominal designation		Dimension			Cable outer diameter	Packing diameter		Identification mark	Weight kg (lb)	Parts No.
T1	T2	C	D	L		F	G			
G 1/2	G 1/2	35 (1.38)	39 (1.54)	94.5 (3.72)	ø8.0 to ø10.0 (0.31 to 0.39)	ø10.0(0.39)	ø20.0 (0.79)	16 8-10	0.26 (0.57)	G9601AM*
					ø10.0 to ø12.0 (0.39 to 0.47)	ø12.0(0.47)		16 10-12		

*: G11: 1-unit
G12: 2-units

● Unless otherwise specified, difference in the dimensions are refer to the following table.

General tolerance in the dimensional outline drawing.

Unit : mm (approx.inch)

Category of basic dimension		Tolerance	Category of basic dimension		Tolerance
Above	Equal or below		Above	Equal or below	
	3 (0.12)	±0.7 (±0.03)	500 (19.69)	630 (24.80)	±5.5 (±0.22)
3 (0.12)	6 (0.24)	±0.9 (±0.04)	630 (24.80)	800 (31.50)	±6.25 (±0.25)
6 (0.24)	10 (0.39)	±1.1 (±0.04)	800 (31.50)	1000 (39.37)	±7.0 (±0.28)
10 (0.39)	18 (0.71)	±1.35 (±0.05)	1000 (39.37)	1250 (49.21)	±8.25 (±0.32)
18 (0.71)	30 (1.18)	±1.65 (±0.06)	1250 (49.21)	1600 (62.99)	±9.75 (±0.38)
30 (1.18)	50 (1.97)	±1.95 (±0.08)	1600 (62.99)	2000 (78.74)	±11.5 (±0.45)
50 (1.97)	80 (3.15)	±2.3 (±0.09)	2000 (78.74)	2500 (98.43)	±14.0 (±0.55)
80 (3.15)	120 (4.72)	±2.7 (±0.11)	2500 (98.43)	3150 (124.02)	±16.5 (±0.65)
120 (4.72)	180 (7.09)	±3.15 (±0.12)			
180 (7.09)	250 (9.84)	±3.6 (±0.14)			
250 (9.84)	315 (12.40)	±4.05 (±0.16)			
315 (12.40)	400 (15.75)	±4.45 (±0.18)			
400 (15.75)	500 (19.69)	±4.85 (±0.19)			

Remarks: The numeric is based on criteria of tolerance class IT18 in JIS B 0401.

■ EARTH RING INSIDE DIAMETER

Unit : mm (inch)

Size	EARTH RING INSIDE DIAMETER
15 (0.5)	∅15 (0.6)
25 (1)	∅27 (1.1)
40 (1.5)	∅40 (1.6)
50 (2)	∅52 (2.1)
80 (3)	∅81 (3.2)
100 (4)	∅98 (3.9)
150 (6)	∅144 (5.7)
200 (8)	∅192 (7.6)

* Please be sure the inner diameter of a gasket does not protrude to the earth ring inside diameter.

T05.EPS

■ GASKET

Use compressed non-asbestos fiber gasket, PTFE gasket or the gasket which has equal elasticity. For PVC piping, select an optional code FRG, please use rubber gasket or others which has equal elasticity.

=== ORDERING INFORMATION ===

Note 1: When ordering, the span flow rate, unit, transmission pulse weight and totalizer display pulse weight can be specified. These parameters will then be set before shipment. A Tokuchu request is necessary except when these parameters are specified within the range.

Note 2: Some options, if ordered, require the relevant specifications to be input when ordering.

1. Model, specification and optional codes
2. Tag number
3. Span flow rate and unit
4. Transmission pulse weight
5. Totalizer display pulse weight
6. Fluid name

=== RELATED INSTRUMENTS ===

Related Product
 Calibrator for magnetic flowmeter
 (AM012)GS 01E06K02-00E
 BT200 Brain TerminalGS 01C00A11-00EN

=== TRADEMARKS ===

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