OVAL INSTRUCTIONS

Ins. No. T-518-13-E

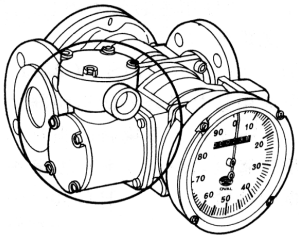
NONCONTACT PULSE GENERATORS MODEL PG30/PG30EP

■ GENERAL

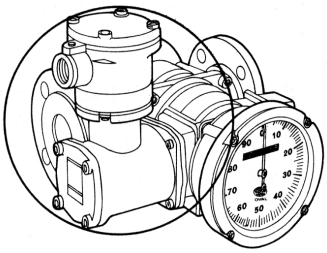
When used in conjunction with an OVAL flowmeter, the Model PG30/PG30EP noncontact pulse generator provides voltage frequency pulses proportional to the flowrate of process fluid. Incorporated in the pulse generator are a premolded pulse generating element and a circuit which prevents false pulses otherwise generated by minute vibration of generator components. As the toothed disk rotates, a succession of voltage pulses (quasi rectangular wave) is generated.

Generated pulses come either pulses in scaled units or unscaled pulses, depending on the position of flowmeter at which the generator is mounted. Pulses in scaled units can be used in remote totalizing, batching, blending systems and the like built around an OVAL flowmeter which serves as the sensing terminal. Unscaled pulses are converted into an analog signal for use in flow indicator/recorder/controller applications. Models PG30S/PG30SEP are compatible in the latter applications.

★For complete details of Models PG30S/PG30SEP,see OVAL Products General Specifications GS No T-523-E.



MODEL PG30



MODEL PG30EP

Pulse generators come in the following two designs:

(1)Standard type……PG30

(2)Pressure-resistant explosionproof configuration……PG30EP (JIS explosionproof, NEPSI explosionproof)

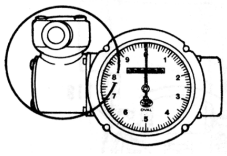
★ Information about Models PG30S and PG30SEP appears in Instruction Manual No. T-523-E.

■ PULSE GENERATOR INSTALLATION EXAMPLES

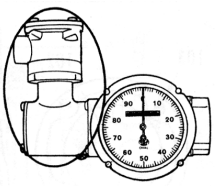
Generated pulses in scaled units…The rotor revolution is guided into gear reduction and instrumental error correction stages for the flowmeter to produce pulses of required scaled unit. The obtained pulse signal is used primarily for remote totalization.

GB type

Pulse generator for totalizer

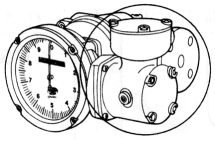


Pulse generator for totalizer



Where pulses of scaled units or unscaled pulses are required

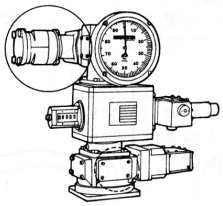
LW13 type



Meter sizes 52 or 53; where pulses in scaled units are required.

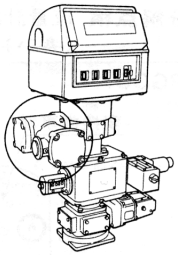
If unscaled pulses uncompensated for temperature are required, it is mounted to the area encircled (○) of transmission gear box GB.

CB type



Equipped with register Model LW11;where pulses of scaled units compensated for temperature are required.

PB type



Equipped with register Model LW42 or 43;where pulses of scaled units compensated for temperature are required.

■ OPERATING PRINCIPLE

1. Operation can best be understood by referring to Fig.1. Oscillator coil L_1 in the HF oscillator continuously generates a 1MHz high frequency wave (waveform ①). As a toothed disk, located between the coil and detector rotates, a high frequency induction field created is intermittently interrupted. The resultant signal induced in pickup coil L_2 of detector is a wave modulated by the toothed disk (waveform ②). The signal is then detected(waveform ③) and further shaped into a rectangular signal (waveform ④).
   Hysteresis characteristics are also provided electrically by changing trigger levels at the leading edge and trailing edge of the signal.
2. Fig.2 shows how our proprietary double pulse generator works. With two pairs of HF send/receive coils arranged opposite to each other, intermittent interruption of the magnetic field takes place by the rotating toothed disk and causes each coil to produce a single pulse per gap (or slot) between the teeth.
   Because two coils are so located as to produce pulses 90°out of phase from each other, by exclusive OR (XOR) of pulses from these two coils, two pulses per gap between the teeth are obtained after all.

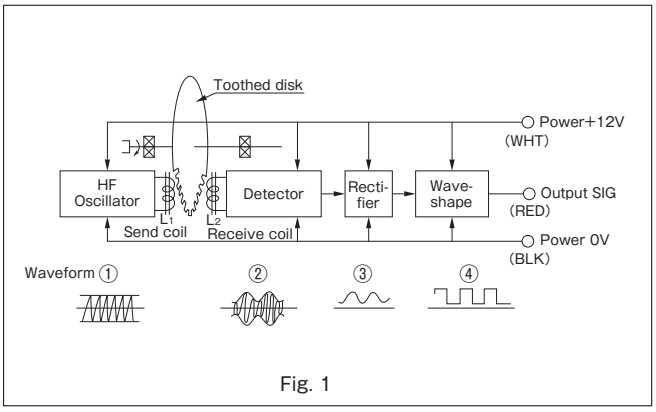


Fig. 1

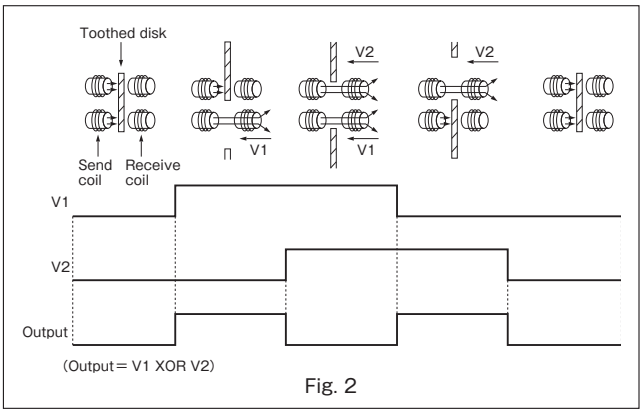


Fig. 2

■ WIRING INSTRUCTIONS

1. Cables for field wiring

Recommended cables for field wiring are 3-conductor, shielded, chloroprene cabtyre cables [kind 2] (JIS C 3311) or 2-conductor, shielded, vinyl cabtyre cables (JIS C 3312) 1.25mm^2 to 2.0mm^2 in conductor area unless otherwise specified.

2. Transmission Length

The maximum Transmission length is one kilometer when cables 2mm^2 in conductor area conforming to JIS C 3311 or C3312 are used.

➡ NOTE: If it exceeds one kilometer, consult the factory.

3. Conduit work is suggested.

Cable connections: PG30 ……Rc (PT) 3/4 female
PG30EP…G3/4 female screw (JIS explosionproof)
M25 x 1.5 female screw (NEPSI explosionproof)

➡ NOTE: With conduit, a minimum of five full threads should engage the mating thread.

4. Conduit work for Model PG30EP (JIS explosionproof)

(1) Use steel conduit conforming to the requirements specified in JIS C 8305.
(2) Conduit accessories should be of flameproof rating.
(3) Sealing work should be taken into consideration.
(4) Where rusting the screw threads is anticipated, apply a coat of non-drying sealing compound externally following the screw engagement of conduit.

5. Inductive Interference Prevention

Field wiring should be routed sufficiently away from existing power cables or power circuits, if any, to prevent potential stray current pickup.

If you want to use both scaled unit pulses and unscaled pulses, use two separate cables.

※ NEPSI explosionproof products do not come with pressure-tight packing.
Please use packing that satisfies the following conditions:
Applicable standards: Chinese GB/T standards compliant
Explosionproof specification: Ex db IIB T4 Gb
Screw size: M25 x 1.5

Wiring connections

Remove the lid of PG30/PG30EP housing to gain access to a 3-post terminal block. Terminal identification label is found on the reverse side of the lid. Remove a wiring connection instruction label put on the terminals.

Terminal No. 1 → +12V WHT
2 → SIG RED
3 → 0V BLK

If grounding at the pulse generator end is desired —
With PG30EP, use the earth ground terminal furnished.
With PG30, no ground terminal is provided; take off a screw as shown in Fig 3 and earth ground using a terminal lug.

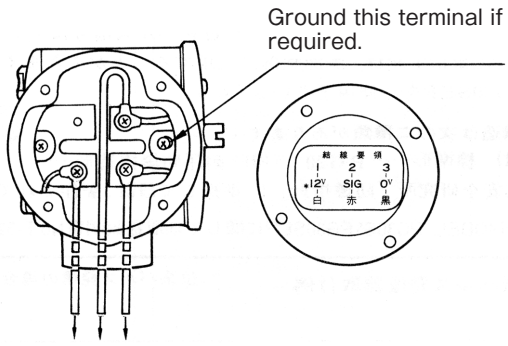


Fig. 3

■ DISASSEMBLY AND INSPECTION

◎ **The pulse generator should be disassembled for inspection once a year.**
(Make sure that the transmitter cables are not lodged between the casing parts while reassembling.)

If there is no or few (or too many) pulses from the pulse generator while the flowmeter register pointer moves or the counter operates properly, trouble is suspected in the pulse generator. Inspect its components according to the procedure described below.

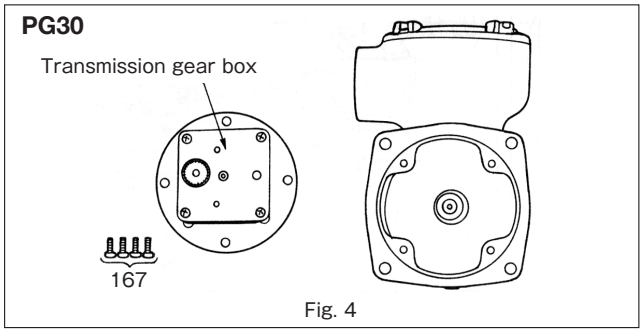


Fig. 4

1. Remove the pulse generator from the flowmeter. Take off four screws (167) to gain access to the transmission gear box. Check for any gear slipping on its shaft or crimp connections that are loose.

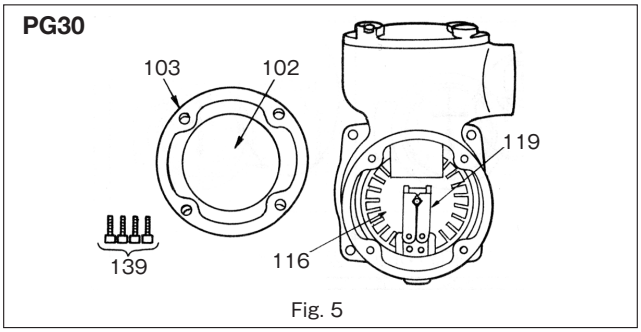


Fig. 5

2. Take off four screws (139) holding the housing lid (102) in place and remove the lid.
Check to see that toothed disk (116) turns smoothly and that the brake shoe (119) works properly.

The same procedure applies to Model PG30EP.

⚠ **CAUTION: If something is wrong with spring (122) and/or brake shoe (119), replace the whole brake shoe assembly (plate (120) inclusive).**

● **Monitoring the Output Waveform**

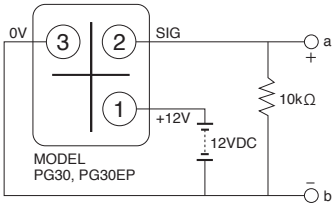


Fig. 6

Shown in Fig.6 above is the setup for observing the output pulse waveform. Couple the oscilloscope across terminals a and b and monitor the waveform while allowing the pulse generator to rotate at a constant rpm. Connecting the voltmeter across terminals a and b enables you to make an ON/OFF level measurement. However, you cannot make a pulse ON/OFF ratio (or duty factor) measurement with voltmeter alone.

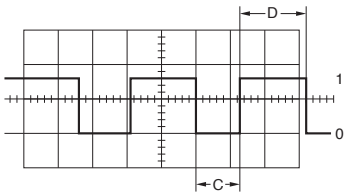


Fig. 7

Correct ON/OFF ratio C/D ranges from 25/75 to 60/40 when "1"= 6.2 to 7.6V and "0"= 0.5 max.
If a correct waveform like the one shown in Fig.7 is not obtainable, replace the noncontact switch unit with a new one according to the procedure outlined in the next section.
(The ON/OFF ratio is a value measured under steady state rotation.)

■ LUBRICATION

Do not fail to use proper lubricants shown below, or equivalent, at disassembly and inspection.

L: Lubricating oil
G: Grease

Gear Train		Bearings		Brake Shoe
Spur	Bevel	Plain	Ball	
G2	G2	L3	L3	L3

● Lubricating Oil Specifications and Examples of Products

Symbol	Viscosity or Consistency	Pour Point or Drop Point	Example of Products by Trade Name
L3	36.4cst/30℃	− 37.5℃	Launa 40 (manufactured by ENEOS Corporation)
G2	300/25℃	300℃ and above	Jun BG Grease (Nihon Tokushu-koyu Co., Ltd.)

● Noncontact Switch Unit Replacement

PG30

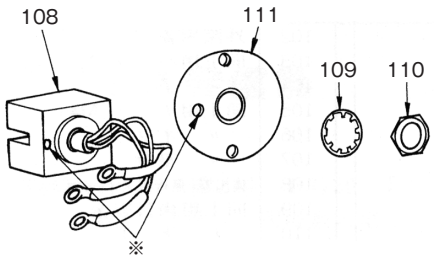


Fig. 8

1. Disconnect wiring connections. Take off two terminal fitting screws (106) and remove terminals (104). The noncontact switch unit (108) can be separated by taking off two additional screws (130).
2. Remove nut (110) and toothed washer (109) holding the noncontact switch unit (108) to mounting bracket (111), and remove the switch unit. Install a new switch unit in alignment with locating slot (marked ※). Ensure correct wiring connections with due regard to color coded leads (white, red and black).

PG30EP

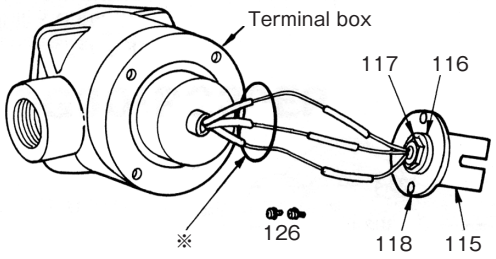
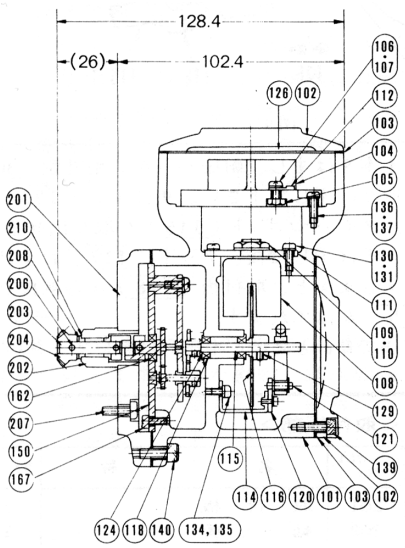
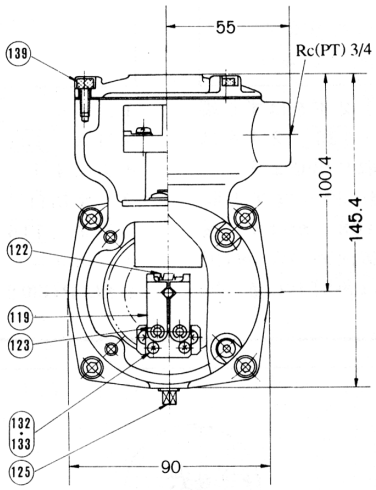


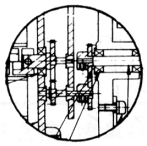
Fig. 9

1. Take off four bolts (329) and remove the casing of pressure-resistant gasket (301) from housing (101). Then, take off two screws (126) securing the noncontact switch unit (115) in place and remove the switch unit.
2. Unsolder wire lead connections (marked ※), take off nut (117) and toothed washer (116) holding the noncontact switch unit (115) to mounting bracket (118), and separate the switch unit.
   Replace with a new noncontact switch unit in the same manner as described for PG30 pulse generator and solder wire leads to their connections.

■ ASSEMBLY DRAWING AND PARTS LIST, MODEL PG30







Transmission gear engagement in the transmission gear box shipped from our factory before April, 1987, is shown in the inset.

Pulse Generator Assembly

▲ : Replacement parts

Sym.No.	Part Name	Q 'ty
101	Housing	1
102	Housing lid	2
103	Gasket, Housing lid	2
104	Terminal	1
105	Nut, Terminal (M4)	3
106	Screw	3
107	Washer	3
108	Detector (noncontact switch unit)	1set
109	Toothed washer, Detector	
110	Nut, Detector	
111	Mounting bracket, Detector	1
112	Crimp terminal	6
114	Holder	1
115	Shaft	1
116	Toothed disk (with hub)	1
118	Ball bearing (CF-1040ZZ)	2
119	Brake shoe	▲ 1set
120	Plate	
121	Shoe shaft	
122	Spring	
123	Clip ring	

Sym.No.	Part Name	Q 'ty
124	Thrust spacer	1
125	Blind plug (PT1/8, hex socket head)	1
126	Terminal identification label	1
127	Wiring instruction label	1
129	Toothed disk setscrew (M3×4)	1
130	Fitting screw, Detector mounting bracket (M4×8)	2
131	Washer, Detector mounting bracket (M4)	2
132	Plate fitting screw (M3×6)	2
133	Washer, Plate fitting screw (M3)	2
134	Holder fitting screw (M3×6)	2
135	Washer, Holder fitting screw (M4)	2
136	Terminal fitting screw (M4×10)	2
137	Washer Terminal fitting screw (M4)	2
139	Housing lid bolt (M4×12)	8
140	Housing bolt (M5×12)	4

Mounting Bracket Assembly

Sym.No.	Part Name	Q 'ty
201	Mounting bracket	1
202	Bearing	1
203	Transmission shaft	1
204	Bevel gear	1
205	Coupling	1

Sym.No.	Part Name	Q 'ty
206	Coupling retaining pin	2
207	Fitting bolt, Mounting bracket	4
208	Thrust seat	1
209	Gasket, Mounting bracket	1
210	Oil retaining bearing	2

Transmission Gear Box

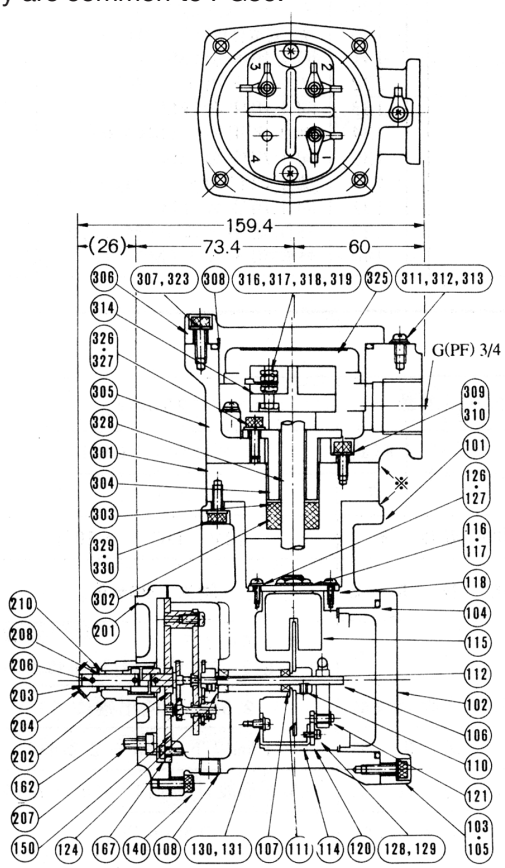
➡ NOTE: Shaded area in the drawing

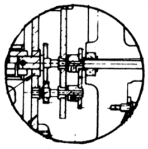
Sym.No.	Part Name	Q 'ty
150	Transmission Gear Box	1 set
162	Ball Bearing B (LF1260ZZ)	1
167	Fitting Screw, Transmission Gear Box	4

A replacement transmission gear box is available as an assembly. When ordering this box, please specify the gear ratio (e.g., 1/10 or 1/1) stamped on its plate.

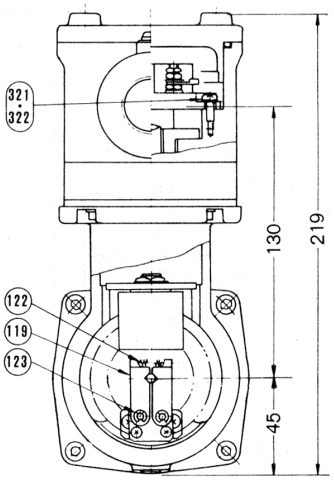
■ ASSEMBLY DRAWING AND PARTS LIST, PG30EP (JIS explosionproof)

Refer to page 3 for the change gear section (150) and mounting plate section (200) since they are common to PG30.





Transmission gear engagement in the transmission gear box shipped from our factory before April, 1987, is as shown in the inset.



Once disassembled, apply a liquid sealant (Hermeseal # 723, or equivalent).

Pulse Generator Assembly

▲ : Replacement parts

Sym.No.	Part Name	Q 'ty
101	Housing	1
102	Housing lid	1
103	Housing lid bolt (M5×15)	4
104	O-ring (JIS G70)	1
105	Washer, Housing lid (M5)	4
106	Shaft	1
107	Ball bearing (L-1040ZZ)	2
108	Blind plug (Rc(PT)1/8, hex. socket head)	1
110	Setscrew (M3×4)	1
111	Toothed disk (with hub)	1
112	Thrust spacer	1
114	Holder	1
115	Detector (noncontact switch unit)	1set
116	Toothed washer, Detector	
117	Nut, Detector	

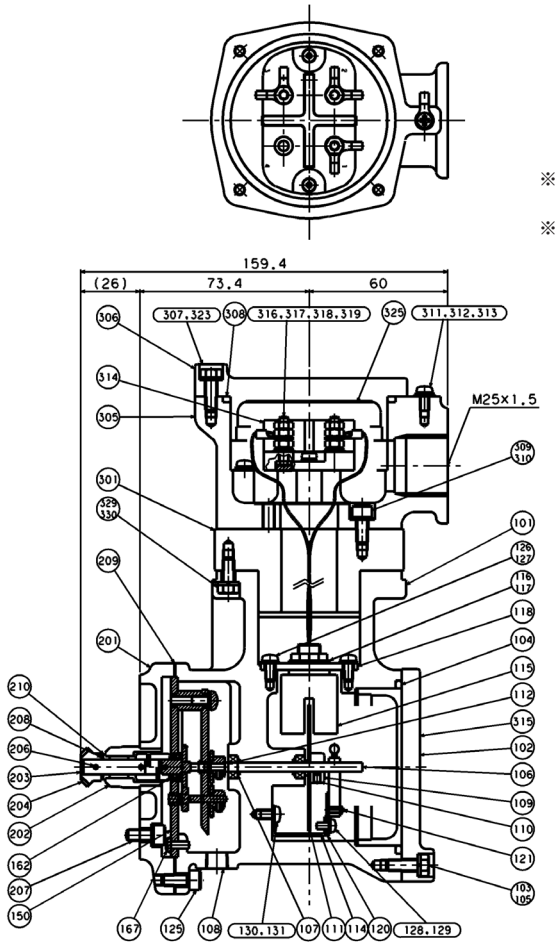
Sym.No.	Part Name	Q 'ty
118	Mounting bracket, Detector	1
119	Brake shoe	▲ 1set
120	Plate	
121	Shoe shaft	
122	Spring	
123	Clip ring	
124	Thrust spacer	1
126	Fitting screw, Detector mounting bracket (M4×8)	2
127	Washer, Detector mounting bracket (M4)	2
128	Plate fitting screw (M3×6)	2
129	Washer, Plate fitting screw (M3)	2
130	Holder fitting screw (M4×6)	2
131	Washer, Holder fitting screw (M4)	2

Terminal Box Assembly

Sym.No.	Part Name	Q 'ty
301	Pressure-resistant packing casing	1
302	Pressure-resistant packing	1
303	Pressure-resistant packing washer	1
304	Pressure-resistant packing retainer	1
305	Terminal box housing	1
306	Terminal box housing lid	1
307	Fitting bolt, Terminal box housing lid	4
308	O-ring (JIS G70)	1
309	Bolt, Terminal box housing (M5 ×12)	4
310	Washer (M5)	4
311	Ground terminal screw (M4×8)	2
312	Washer (M4)	2
313	Crimp terminal (for ϕ4)	8
314	Terminal block	1

Sym.No.	Part Name	Q 'ty
315	Flameproof enclosure rating nameplate	1
316	Hex bolt for terminal (M4×18)	3
317	Washer (M4)	6
318	Washer (M4)	3
319	Nut (M4)	9
321	Terminal block fitting screw (M4×10)	2
322	Washer (M4)	2
323	Washer, Terminal box housing lid (M5)	4
325	Wiring instruction label	1
326	Pressure-resistant packing retaining bolt (M5×15)	4
327	Washer	4
328	Cabtyre cable	1
329	Bolt, Pressure-resistant packing casing (M5×12)	4
330	Washer (M5)	4

■ ASSEMBLY DRAWING AND PARTS LIST, PG30EP (NEPSI explosionproof)



※ When disassembled, apply liquid packing (HERME SEAL # 723 or equivalent).
※ Refer to page 6 for the transmission section (100), change gear section (150) and mounting plate section (200) since they are common to PG30EP (JIS explosionproof).

Terminal Box Assembly

Sym.No.	Part Name	Q 'ty
301	Outer housing	1
305	Terminal box outer housing	1
306	Lid for the same	1
307	Fastening bolts for the same	4
308	O-ring (JIS G70)	1
309	Fastening bolts for terminal box outer housing (M5 × 12)	4
310	Washers for the same (M5)	4
311	Terminal screws for grounding (M4 × 8)	2
312	Washers for the same (M4)	2
313	Crimp-style terminals (for ϕ4)	8
314	Terminal board	1
315	Explosionproof configuration display nameplate (for NEPSI explosionproof)	1

Sym.No.	Part Name	Q 'ty
316	Hexagon headed bolts for terminals (M4 × 18)	3
317	Plain washers for the same (M4)	6
318	Spring washers for the same (M4)	3
319	Nuts for the same (M4)	9
321	Fastening screws for terminal board (M4 × 10)	2
322	Washers for the same (M4)	2
323	Washers for lid for terminal box outer housing (M5)	4
325	Connection wiring diagram display nameplate	1
329	Bolts for outer housing (M5 × 12)	4
330	Washers for the same (M5)	4

Ordering Instructions: Please supply us with the details of your order, which should include the flowmeter model, product No., Instruction manual No., symbol No., quantity desired, and part name.

■ GENERAL SPECIFICATIONS

Model	PG30		PG30EP	
Number of pulses per revolution of the pointer	100P/rev	1000P/rev	100P/rev	1000P/rev
Change gear ratio	2/1	20/1	2/1	20/1
Number of slits	25 slits			
Transmission system	High-frequency transmission double pulse detection (three-wire system)			
Sensor model	SHW-1001			
Power supply ※	12VDC ±10%, Ripple 100mV$_{p\text{-}p}$ or less			
Consumption current	27mA or less			
Output signal (rated range)	"0" = 0.5V or less "1" = 6.9V ± 0.5V (Load resistance: 10kΩ , power supply: 12VDC, 20℃)			
Waveform ratio (rated range)	"0"/"1" = 30/70 to 60/40 (Load resistance: 10kΩ , power supply: 12VDC, 20℃)			
Response frequency	25 kHz (at detection end)			
Transmission length	1 km or less (Refer to Wiring section 2)			
Paint color	2.5G8/2			

※ : Our standard product (DC power supply device) is available. Please purchase as needed.

■ EXPLOSIONPROOF SPECIFICATIONS

Model	PG30	PG30EP	
Explosionproof type	Non-explosionproof	JIS explosionproof	NEPSI explosionproof
Explosionproof configuration	—	Pressure-resistant explosionproof configuration	
Explosionproof specification	—	d2G4	Ex db ⅡB T4 Gb
Power connection port	Rc3/4 female screw	G3/4 female screw	M25 × 1.5 female screw
Operating temperature range	-10 to 65℃ (at 95%RH)	-10 to 65℃ (at 95%RH)	-10 to 60℃

All specifications are subject to change without notice for improvement.

2024.06 Revised △
T-518-13-E（1）

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