User's Manual

Y/13A, Y/13HA and Y/15A Pneumatic Differential Pressure Transmitters

IM 02C01C02-01EN

YOKOGAWA
Yokogawa Electric Corporation

IM 02C01C02-01EN
8th Edition

Y/13A, Y/13HA and Y/15A
Pneumatic Differential Pressure Transmitters

IM 02C01C02-01EN 8th Edition

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Model Y/13A PNEUMATIC DIFFERENTIAL PRESSURE TRANSMITTER (Style C) .....CMPL 02C01C02-01E

Model Y/15A PNEUMATIC DIFFERENTIAL PRESSURE TRANSMITTER (Style C) .....CMPL 02C01C01-01E

Model Y/13HA PNEUMATIC DIFFERENTIAL PRESSURE TRANSMITTER (Style C) .....CMPL 02C01C03-01E

Revision Information

1. Introduction

Thank you for purchasing the Yokogawa's instrument.

The instrument is correctly calibrated at the factory before shipment. To ensure correct and efficient use of the instrument, please read this manual thoroughly and fully understand how to operate the instrument before operating it.

■ Regarding This Manual

- This manual should be provided to the end user.
- The contents of this manual are subject to change without prior notice.
- All rights reserved. No part of this manual may be reproduced in any form without Yokogawa's written permission.
- Yokogawa makes no warranty of any kind with regard to this material, including, but not limited to, implied warranty of merchantability and fitness for a particular purpose.
- If any question arises or errors are found, or if any information is missing from this manual, please inform the nearest Yokogawa sales office.
- The specifications covered by this manual are limited to those for the standard type under the specified model number break-down and do not cover custom-made instrument.
- Please note that changes in the specifications, construction, or component parts of the instrument may not immediately be reflected in this manual at the time of change, provided that postponement of revisions will not cause difficulty to the user from a functional or performance standpoint.

■ Safety Precautions

- For the protection and safety of the operator and the instrument or the system including the instrument, please be sure to follow the instructions on safety described in this manual when handling this instrument. In case the instrument is handled in contradiction to these instructions, Yokogawa does not guarantee safety.
- Yokogawa assumes no responsibilities for this product except as stated in the warranty.
- If the customer or any third party is harmed by the use of this product, Yokogawa assumes no responsibility for any such harm owing to any defects in the product which were not predictable, or for any indirect damages.
- The following safety symbols are used in this manual:

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

IMPORTANT

Indicates that operating the hardware or software in this manner may damage it or lead to system failure.

NOTE

Draws attention to information essential for understanding the operation and features.

1.1 Safety Precautions

WARNING

- Instrument installed in the process is under pressure. Never loosen or tighten the process connector bolts as it may cause dangerous spouting of process fluid.
- During draining condensate or venting gas in transmitter pressure-detector section, take appropriate care to avoid contact with the skin, eyes or body, or inhalation of vapors, if the accumulated process fluid may be toxic or otherwise harmful.
  Since draining condensate or bleeding off gas gives the pressure measurement disturbance, this should not be done when the loop is in operation.
- If the accumulated process fluid may be toxic or otherwise harmful, take appropriate care to avoid contact with the body, or inhalation of vapors even after dismounting the instrument from process line for maintenance.

IMPORTANT

- Supply air must be clean and dry.
  - Supply air (pressurized) must not be dewed event at -40°C.
  - Air filter with 5μm (0.0002 inch) of filter element maximum opening shall be recommended.
  - Oil filter should be provided to remove oil in the supply air.
- Maximum supply air pressure of transmitter without fixed pressure regulator (GAS or NAS type) is 215 kPa. Should the pressure exceed 215 kPa, it is possible to break the pneumatic amplifier, bellows etc.
- When weling piping during construction, take care not to allow welding currents to flow through the transmitter.
- Do not step on this instrument after installation.
- Applying a leakag-detecting fluid to the instrument may damage the plastic parts resulting from corrosion or cracking.

1.2 Warranty

- The warranty shall cover the period noted on the quotation presented to the purchaser at the time of purchase. Problems occurred during the warranty period shall basically be repaired free of charge.
  - In case of problems, the customer should contact the Yokogawa representative from which the instrument was purchased, or the nearest Yokogawa office.
  - If a problem arises with this instrument, please inform us of the nature of the problem and the circumstances under which it developed, including the model specification and serial number. Any diagrams, data and other information you can include in your communication will also be helpful.
  - Responsible party for repair cost for the problems shall be determined by Yokogawa based on our investigation.
- The Purchaser shall bear the responsibility for repair costs, even during the warranty period, if the malfunction is due to:
  - Improper and/or inadequate maintenance by the Purchaser.
  - Failure or damage due to improper handling, use or storage which is out of design conditions.
  - Use of the product in question in a location not conforming to the standards specified by the Yokogawa, or due to improper maintenance of the installation location.
  - Failure or damage due to modification or repair by the party except Yokogawa or who is requested by Yokogawa.
  - Malfunction or damage from improper relocation of the product in question after delivery.
  - Reason of force majeure such as fires, earthquakes, storms/floods, thunder/lightening, or other natural disasters, or disturbances, riots, warfare, or radioactive contamination.

1.3 Control of Pollution Caused by the Product

This is an explanation for the product based on “Control of Pollution caused by Electronic Information Products” in the People’s Republic of China.

产品中有害物质或元素的名称及含量

型号	部件名称	有害物质					
		铅（Pb）	汞（Hg）	镉（Cd）	六价铬（Cr(VI)）	多溴联苯（PBB）	多溴二苯醚（PBDE）
P10 Series 气动差压/压力变送器	壳体	×	○	×	×	○	○
	膜盒组件	×	○	×	×	○	○
	基板组件	×	○	×	×	○	○
	电源连接线	×	○	×	×	○	○

○：表示该部件的所有均质材料中的有害物质的含量均在 GB/T26572 标准中所规定的限量以下。

×：表示至少该部件的某些均质材料中的有害物质的含量均在 GB/T26572 标准中所规定的限量以上。

环保使用期限：

该标识适用于 SJ /T11364 中所述，在中华人民共和国销售的电子电气产品的环保使用期限。

注）该年数为“环保使用期限”，并非产品的质量保证期。

2. General

Model Y/13A is used for the illustrations in this User's Manual.
Model Y/15A and Y/13HA are similar.

2.1 Outline

Model Y/13A, Y/15A and Y/13HA Transmitter are pneumatic force-balance instruments that measure differential pressure and transmit it as a proportional pneumatic output signal. The transmitters are available with 0.2 to 1.0kgf/cm^2 or bar, 20 to 100 kPa, or 3 to 15 psi output signal. The transmitters are used in flow, liquid level, and other differential pressure applications.

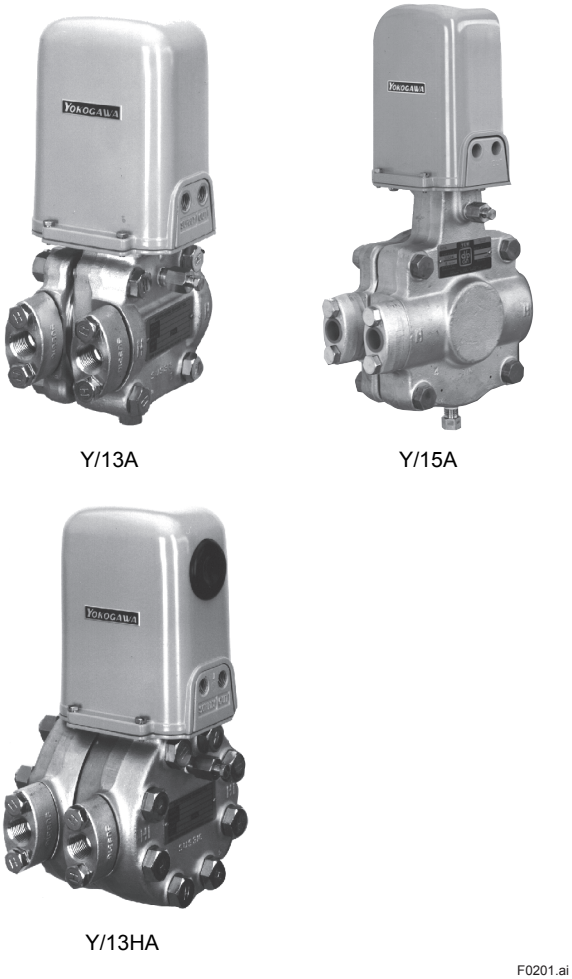


Figure 2.1 Outline

2.2 Principle of Operation

The high and low pressures are connected to opposite sides of a twin-diaphragm capsule. The force on the capsule is transmitted through a flexure to the lower end of the force bar. The diaphragm seal serves both as a fulcrum for the force bar and as a seal for the pressure chamber. The force is transmitted through the flexure connector to the range bar which pivots on the range adjustment wheel.
Any movement of the range bar causes a minute change in the clearance between the flapper and nozzle. This produces a change in output pressure from the amplifier to the feedback bellows until the force in the feedback bellows balances the force on the diaphragm capsule.
The output pressure which is established by this force balance is the transmitted signal and is proportional to the differential pressure applied to the diaphragm capsule. This signal is transmitted to a pneumatic receiver to record, indicate, and/or control.

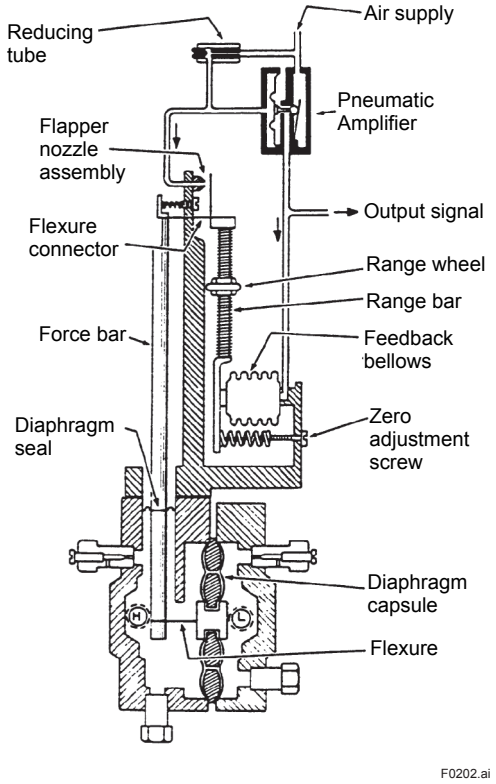


Figure 2.2 Principle of Operation

2.3 Standard Specifications

Span Limits:
Refer to Table 2.1.
Span is continuously adjustable within range limits.

Range Limits *:
Refer to Table 2.1.
*: When lower range-value is other than zero optional kit for elevated-zero or suppressed-zero ranges is installed.

Static Pressure Limits:
Refer to Table 2.1.

Output Signal:
Refer to Table 2.1.

Accuracy (includes linearity, hysteresis and repeatability):
Spans between 1.25 and less than 130 kPa, 125 and less than 13400 mmH_2O, 12.5 and less than 1300 mbar, or 5 and less than 525 inH_2O differential pressure (ΔP): ±0.5 % of span.
Spans between 130 and 210 kPa, 13400 and 21600 mmH_2O, 1300 and 2100 mbar, or 525 and 850 inH_2O differential pressure (ΔP): ±0.75 % of span.

Repeatability:
0.1% of span.

Dead Band:
0.05% of span.

Air Supply Pressure:
140 kPa, 1.4 kgf/cm^2 or bar, or 20 psi.

Air Consumption:
0.5 m^3/h at 0 °C, 101.3 kPa {1.033 kgf/cm^2} absolute (0.3 scfm).

Ambient Operating Temperature Range:
-40 to 120 °C (-40 to 250 °F).

Process Temperature Limits:
-40 and 120 °C (-40 and 250 °F) at capsule.

Mounting:
Bracket for nominal 50 mm (2 inches) horizontal or vertical pipe.

Air Connection:
Tapped for JIS R1/4 or 1/4NPT, whichever specified.

Process Connections:
JIS Rc1/2, Rc1/4, 1/2NPT, or 1/4NPT female, whichever specified.

Wetted Parts Material:
Body: Forged JIS SUS 316 stainless steel.
Process Connectors: Y/13A, Y/15A…SCS 14 A (equivalent to SUS 316 stainless steel casting), Y/13HA…Forged JIS SUS316 stainless steel.
Capsule(Body): SUS 316L stainless steel.
Force Bar: SUS 316 stainless steel.
Force Bar Seal: Cobalt-nickel alloy.
Process Connector Gaskets: Y/13A, Y/15A…Teflon(PTFE).
Y/13HA…Glass reinforced Teflon (TFE)
Capsule Gaskets: SUS 316L stainless steel coated with Teflon.
Force Bar Seal Gasket: Silicone elastomer (Y/13A, Y15A), Buna N (Y/13HA)

Connection Hardware:
JIS SCM435 chrome-molybdenum steel cap screws and nuts for body; JIS SCM435 cap screws for process connectors.

Cover:
Cast aluminum, finished with gray polyurethane paint. Gasketed for National Electrical Manufacturers Association (NEMA) (USA) Type 3 weatherproof service.

Approximate Weight:
Y/13A: 9.5 kg (21 lb).
Y/15A, Y/13HA: 15 kg (33 lb).

Table 2.1 Span, Range and Static Pressure Limits.

Capsule		–	M-calibration	P-calibration	bar-calibration
L	Span Limits	1.25 to 6.2 kPa	125 to 635 mmH_2O	5 to 25 inH_2O	12.5 to 62 mbar
	Range Limits	-12.5 to 12.5 kPa	-1270 to 1270 mmH_2O.	-50 to 50 inH_2O	-125 to 125 mbar
	S. P. Limits	3.5 MPa	35 kgf/cm^2	500 psi	35 bar
M	Span Limits	5 to 51 kPa	0.5 to 5.2 mH_2O	20 to 205 inH_2O	50 to 510 mbar
	Range Limits	-51 to 51 kPa	-5.2 to 5.2 mH_2O	-205 to 205 inH_2O	-510 to 510 mbar
	S. P. Limits	10 MPa (Y/13A) 41 MPa (Y13HA)	100 kgf/cm^2 (Y/13A) 420 kgf/cm^2 (Y/13HA)	1500 psi (Y/13A) 6000 psi (Y/13HA)	100 bar (Y/13A) 410 bar (Y/13HA)
H	Span Limits	50 to 210 kPa	5 to 21.6 mmH_2O	200 to 850 inH_2O	0.5 to 2.1 bar
	Range Limits	-210 to 210 kPa	-21.6 to 21.6 mmH_2O	-850 to 850 inH_2O	-2.1 to 2.1 bar
	S. P. Limits	10 MPa (Y/13A) 41 MPa (Y13HA)	100 kgf/cm^2 (Y/13A) 420 kgf/cm^2 (Y/13HA)	1500 psi (Y/13A) 6000 psi (Y/13HA)	100 bar (Y/13A) 410 bar (Y/13HA)
Output Signal		20 to 100 kPa	0.2 to 1.0 kgf/cm^2	3 to 15 psi	0.2 to 1.0 bar
Option Code		Standard Specifications	CAL-M	CAL-E	CAL-B

2.4 Model and Suffix Codes

Model	Suffix Codes	Description
Y/13A	. . . . .	Medium and High differential pressure use.
Diaphragm Capsule	**-M**	Medium range capsule. Span: 5 to 51 kPa.
	-H	High range capsule. Span: 50 to 210 kPa.
Body Material *1	**S**	Forged SUS 316 stainless steel.
Process Connection	**1**	JIS Rc 1/4 female.
	2	JIS Rc 1/2 female.
	3 *2	ANSI 1/4 NPT female.
	4 *2	ANSI 1/2 NPT female.
	8	Diaphragm sealed transmitters (Refer to GS 06P01D01-00EN).
Options	/ □ / □	
Combinations	// □ / □	

Model	Suffix Codes	Description
Y/15A	. . . . .	Low differential pressure use.
Diaphragm Capsule	**-L**	Low range capsule. Span: 1.25 to 6.2 kPa.
Body Material *1	**S**	Forged SUS 316 stainless steel.
Process Connection	**1**	JIS Rc 1/4 female.
	2	JIS Rc 1/2 female.
	3 *2	ANSI 1/4 NPT female.
	4 *2	ANSI 1/2 NPT female.
Options	/ □ / □	
Combinations	// □ / □	

Model	Suffix Codes	Description
Y/13HA	. . . . .	Pneumatic differential pressure transmitter, high static pressure use.
Diaphragm Capsule	**-M**	Medium range capsule. Span: 5 to 51 kPa
	-H	High range capsule. Span: 50 to 210 kPa
Body Material *1	**S**	Forged SUS 316 stainless steel.
Process Connection	**1**	JIS Rc 1/4 female.
	2	JIS Rc 1/2 female.
	3 *2	ANSI 1/4 NPT female.
	4 *2	ANSI 1/2 NPT female.
	6	1/4 inch Sch80 pipe buttweld.
	7	1/2 inch Sch160 pipe buttweld.
Options	/ □ / □	
Combinations	// □ / □	

*1: ⚠ 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 diaphragm itself can be damaged and that material from the broken diaphragm and the fill fluid 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 ºC [302 ºF] or above). Contact Yokogawa for detailed information of the wetted parts material.

*2: Air connections, vent and drain plug connections are also tapped for ANSI NPT threads in addition to the process connections.

2.5 Options and Combinations

■ Options

Item	Description		Code
Kit for elevated-zero or suppressed-zero ranges	Permits adjustments up to range limits of capsule. Upper range-value must not exceed upper range-limit of capsule.	Elevated-zero	**L**
		Suppressed-zero	**R**
Air set	Supply pressure: 0.2 to 1 MPa, 2 to 10 kgf/cm^2 or bar, or 30 to 150 psi. Output pressure: 140 kPa, 1.4 kgf/cm^2 or bar, or 20 psi. Maximum operating temperature: 80 °C (180 °F). Refer to Table 2.2.		**GAS-F□ NAS-F□**
Low differential span	Refer to Table 2.3.		**LD**
Cover color other than standard finish	Specify in color block □by color code. Refer to GS22D01F01-00E.		**SCF-□**
Coating other than standard finish	Epoxy resin-baked coated.		**EPF**
High process temperature*1	Glass reinforced Teflon gaskets are used in the process connector and force bar seal. Maximum process temperatures to 190 °C(375 °F).		**DG5**
Oxygen service preparation*1	Degrease cleansing treatment		**OSW**
	Degrease cleansing treatment with fluorinated oilfilled capsule.		**OSFC**
High damping capsule*1	Filled with high viscosity fluid (time constant is approximate 1.3 sec: Y/13A and Y/13HA, 2.6 sec: Y/15A). Not applicable for high range capsule.		**HVC**
Force bar seal gasket*2	GF Teflon		**GFT**
Stainless steel bolts and nuts	JIS SUS 630 bolts and nuts for the body and JIS SUS 630 bolts for process connectors		**SSB**
	JIS SUS 630 bolts and nuts for the body and JIS SUS 630 bolts for process connectors and sealant (liquid silicone rubber) are coated on surface of SUS630 nuts.		**SSB-S**
Ammonia service*1	Force bar gasket: Neoprene rubber		**AMM**
Stainless tube	Tube and connectors between air-set (fixed pressure regulator with filter) and transmitter are made by stainless steel. However, connection of pressure gauge remains as standard material (Bs-Ni3).		**SST**
ANSI connection	Air connections: Tapped for 1/4NPT. Applicable for Y/13A-□S8, Y/13HA-□S6 or Y/13HA-□S7.		**NPT**
Tropicalization	When there is a possibility to generate rusts using under the condition of high temperature and high humidity area, silicone grease is coated on whole screws. Silicon grease which has stronger oil film feature.		**PSG**
M-calibration	Output signal: 0.2 to 1.0 kgf/cm^2		**CAL-M**
P-calibration	Output signal: 3 to 15 psi		**CAL-E**
bar-calibration	Output signal: 0.2 to 1.0 bar		**CAL-B**
Stainless Tag plate	Stainless Tag plate fixed with screws. Up to 16 characters.		**TP-S**
Reverse output signal*3	Reverse output signal		**ROUT**

*1: Not applicable for Diaphragm seal.
*2: Not applicable for option code DG5, OSW, OSFC and Y/13HA.
*3: Not applicable for option code EPF.

Table 2.2 Air Set

Air Connection	Gauge Scale	Option Code
JIS Rc 1/4 female	0 to 200 kPa 0 to 2 kgf/cm^2 0 to 30 psi 0 to 2 bar Without gauge	GAS-FP GAS-FM GAS-FE GAS-FB GAS-F
1/4 NPT female	0 to 200 kPa 0 to 2 kgf/cm^2 0 to 30 psi 0 to 2 bar Without gauge	NAS-FP NAS-FM NAS-FE NAS-FB NAS-F

Table 2.3 Low Differential Spans

Capsule	Span (kPa)	Accuracy (%)	
		Suffix Code LD	Suffix Code LD+R (L)
L	0.5 to 3.1	±0.5	±1.0
M	2.5 to 25	±0.5	
H	25 to 65	±0.5	
	65 to 105	±0.75	

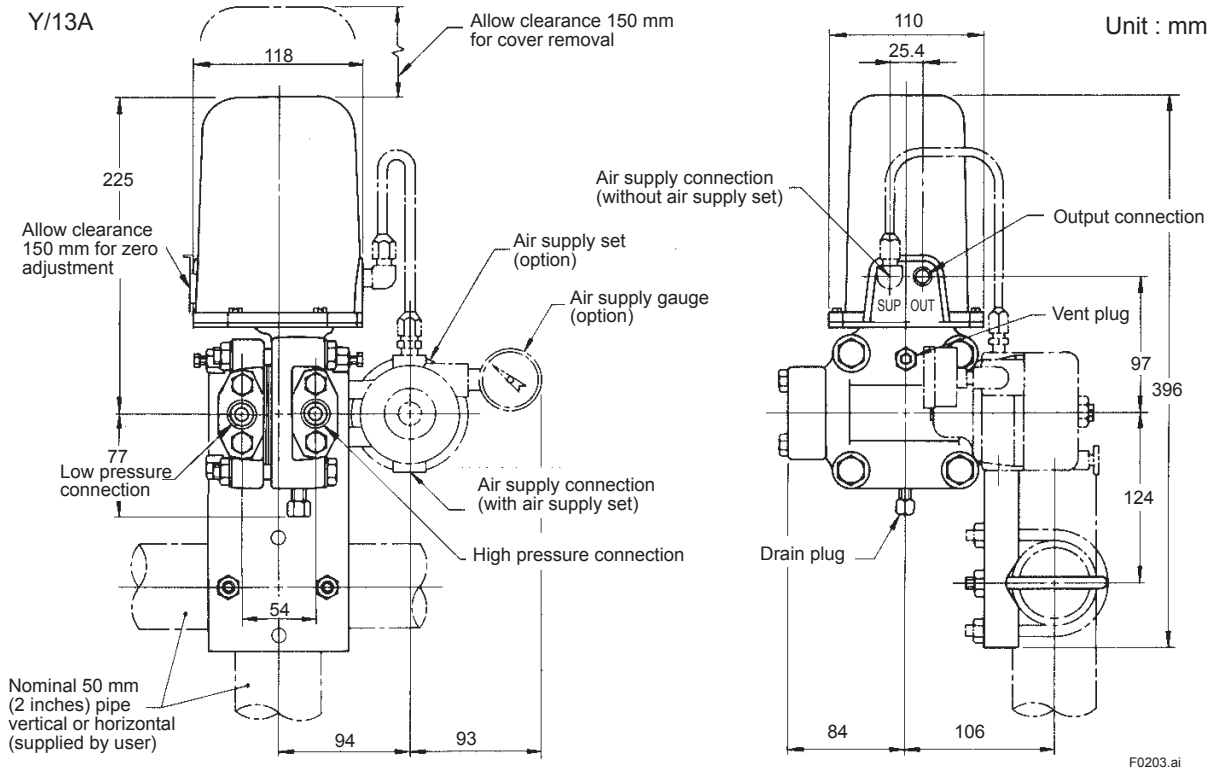
■ Combinations

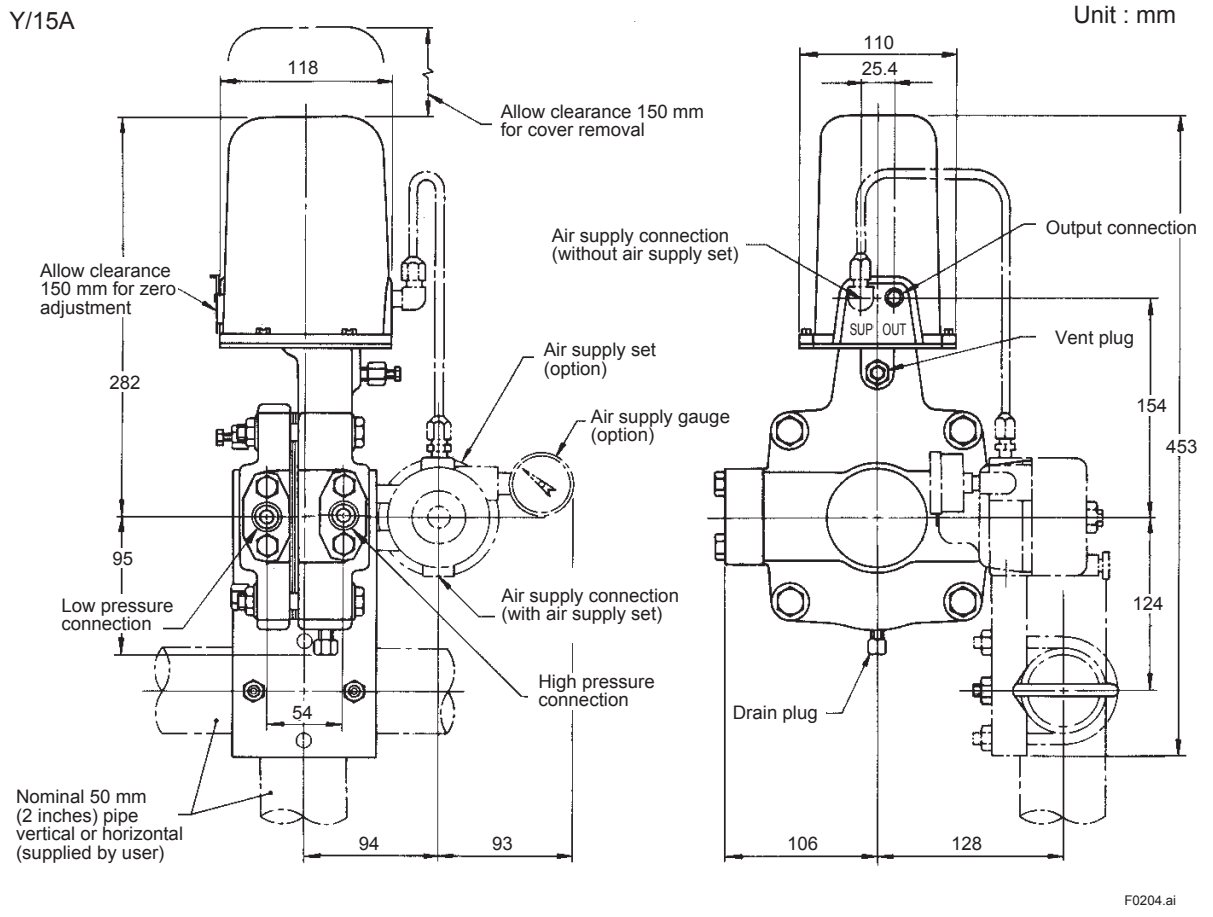
Item	Description	Code	Applicable model
Diaphragm seal	Refer to GS 06P01D01-00E	**DFS**	**Y/13A**
Integral flow orifice	Refer to GS 06P01E01-00E	**IFO**	**Y/13A** **Y/15A** **Y/13HA**

<Reference>

Teflon: Trademark of E.I. DuPont de Nemours & Co.
Buna N: Trademark of Bunawerk Huis Gmbh.

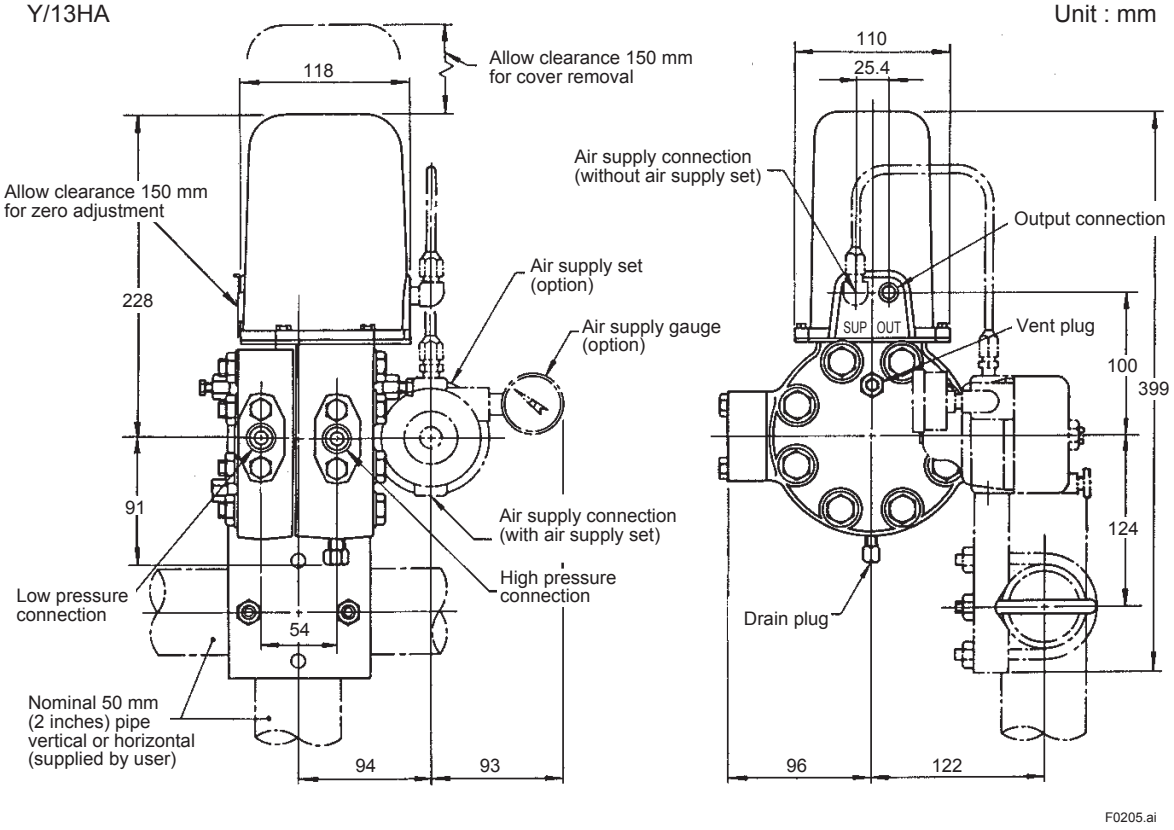
2.6 Dimensions





Y/13HA

Unit : mm



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3. Installation

3.1 Transmitter Mounting

Transmitter may be mounted in any position.
Pressure connections may be made on either side.
Mounting bracket goes on side opposite pressure connectors.
After transmitter is mounted, tighten all bolts.
Pipe may be clamped to another pipe, or flanged and bolted to floor or wall.
U-bolt secures assembly to 50 mm (2 inch pipe).
U-bolt may be revolved 90° for use with horizontal pipe.
Optional air-set can be mounted as illustrated below.
For fixed regulator and associated parts, refer to Customer Maintenance Parts List involved.

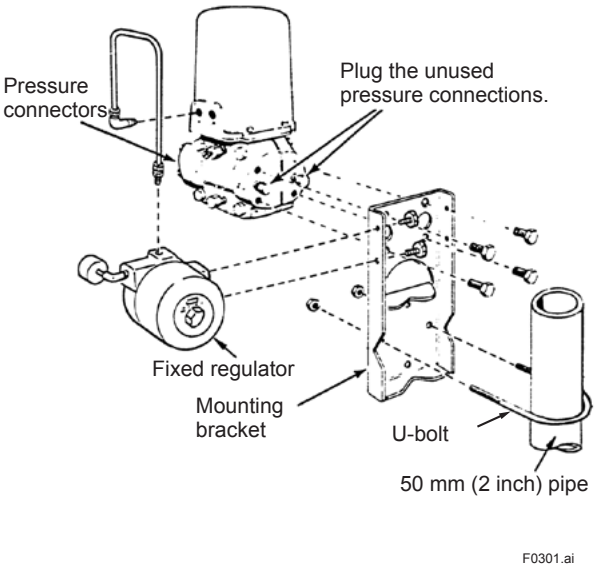


Figure 3.1 Transmitter Mounting

3.2 Air Supply and Transmission Piping

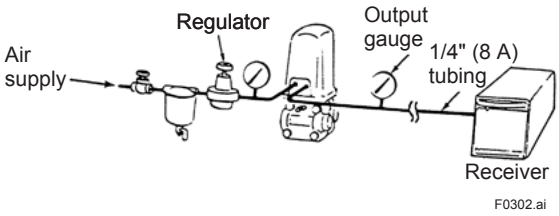


Figure 3.2 Air Supply and Transmission Piping

NOTE

- Air supply must be regulated at a fixed pressure 1.4 kgf/cm^2 or bar, 140 kPa, or 20 psi.
- Transmitter uses 0.5 Nm^3/h of air in normal operation.
- Air must be clean and dry. Blow out filter regularly.
- Transmission line must be free of leaks.

3.3 Typical Piping for Pressure Applications

(For flow application piping, refer to section 4.1.2, 4.2.2, 4.3.2)

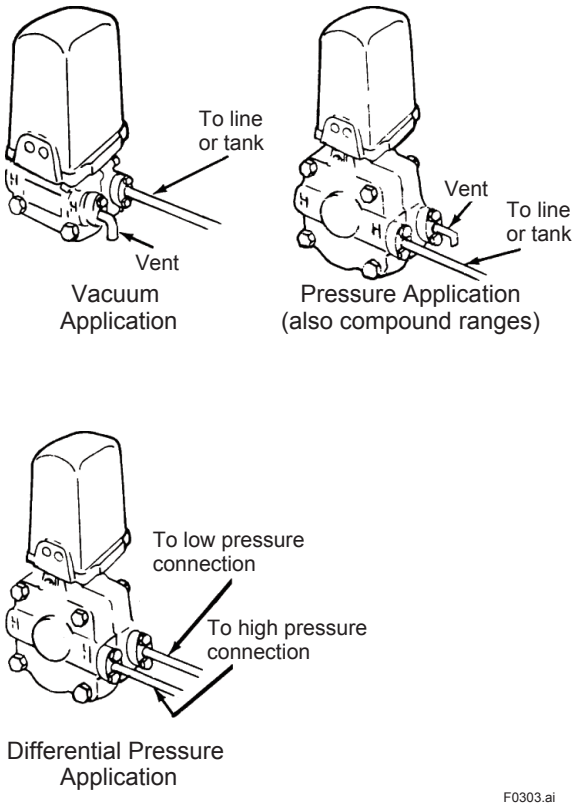


Figure 3.3 Typical Piping for Pressure Applications

4. Installing Impulse Piping

4.1 Gas Flow Measurement

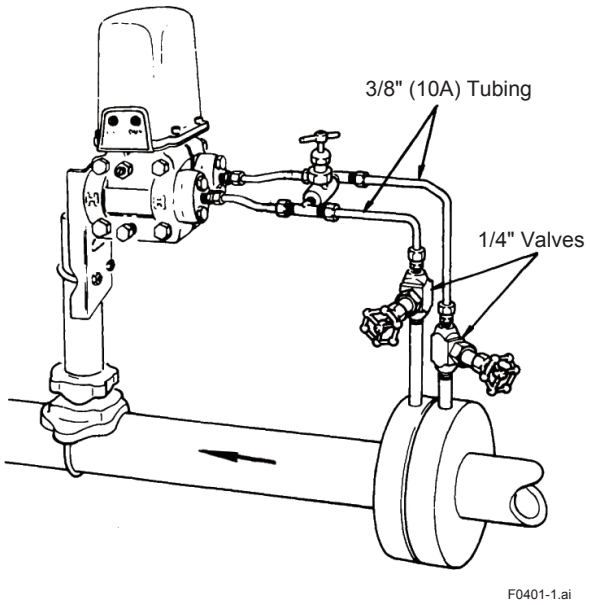
4.1.1 Precautions for piping

In measuring gas flow, it is important to keep moisture out of the connecting lines. Therefore, except when a seal liquid is used, make the pressure connections to the TOP of a horizontal flow line, and mount the transmitter ABOVE the connections.

4.1.2 Piping

(1) Gas Flow With No Seal Liquid

Horizontal line



Vertical line

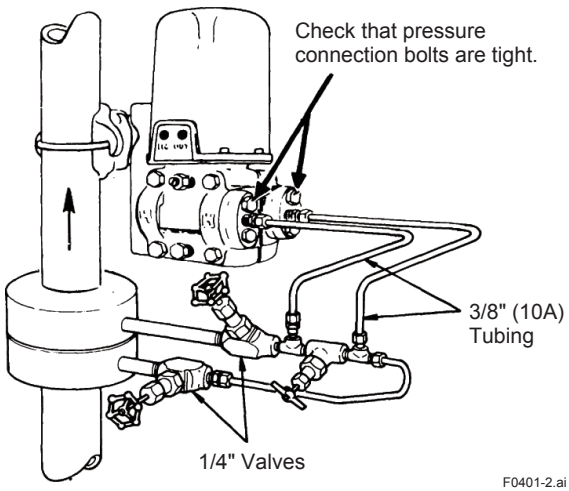


Figure 4.1 Piping With No Seal Liquid

IMPORTANT

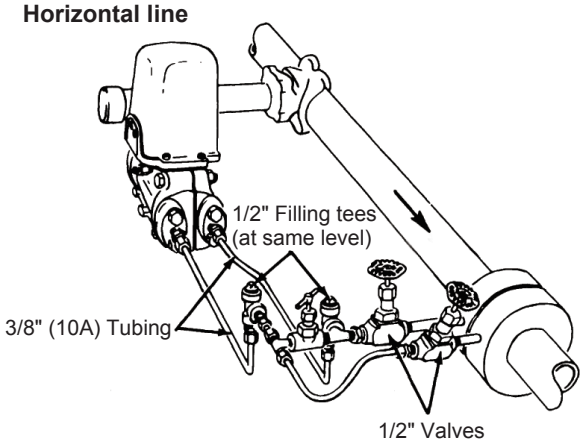
When attaching the connector, tighten bolts by the following torque.

Y/13A, Y/15A	: 39 to 49 N·m (4 to 5 kgf·m)
Y/13HA	: 49 to 59 N·m (5 to 6 kgf·m)

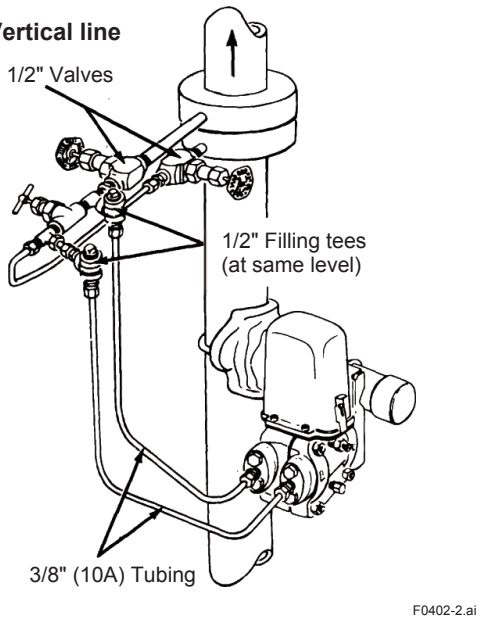
(2) Gas Flow Using a Seal Liquid

If the gas being measured must not come in contact with the transmitter, the connecting tubing and transmitter body must be filled with suitable seal liquid.

Horizontal line



Vertical line



The two filling tees must be at the same level, so that equal liquid heads exist on the two sides of the transmitter.

Figure 4.2 Piping Using a Seal Liquid

■ Filling System with Seal Liquid, When Used

1. Close both pressure connection valves and open bypass valve.
2. Remove plugs from filling tees and pour in seal liquid until both tees overflow.
3. Partially open vents until all air has been forced out of transmitter body and lines. Close vents.
4. Refill tee connections. Replace plugs and close bypass valve.
   Check for leaks.

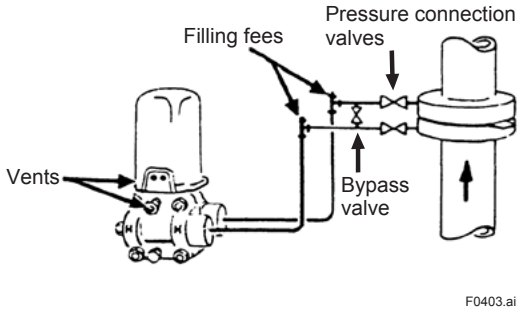


Figure 4.3 Filling System

Caution: To prevent loss of seal liquid and contamination by line fluid, never open both pressure connection valves at same time if bypass valve is open.

4.1.3 Zero Adjustment

1. Adjust air supply to pressure at which instrument will operate.
2. Close both pressure connection valves and open bypass valve.
3. Connect 0 to 1.5 kgf/cm^2 or bar, 0 to 150 kPa, or 0 to 22 psi mercury manometer or test gauge to output connection.
4. Slightly open upstream valve.
5. Adjust zero screw so that output is 0.2 kgf/cm^2 or bar, 20 kPa, or 3 psi on manometer.
6. Reconnect air signal line. If necessary change zero adjustment on receiver so that reading is zero.

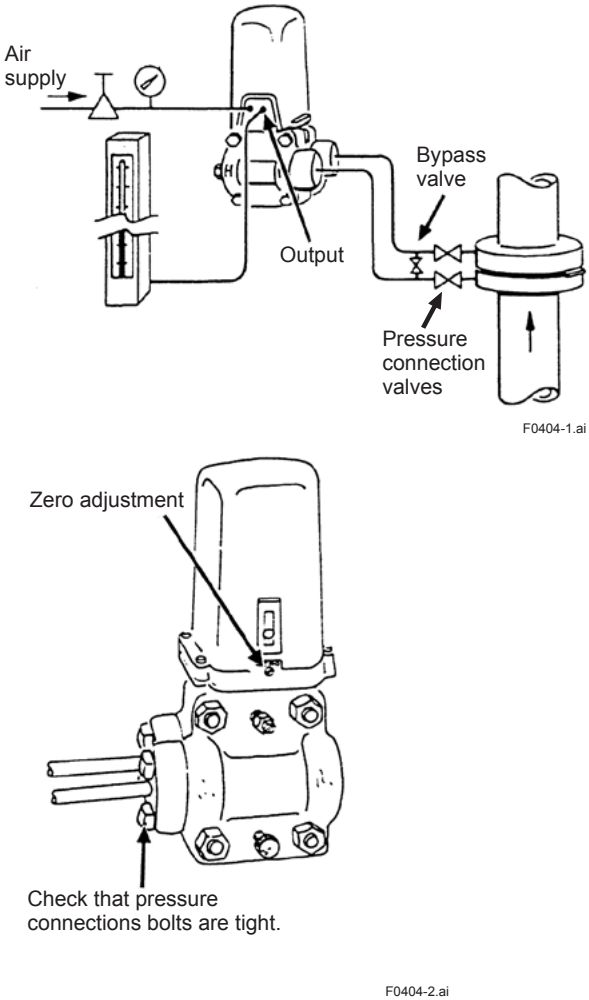


Figure 4.4 Zero Adjustment

4.1.4 Putting Transmitter into Operation

1. Close both pressure connection valves and then open bypass valve.
2. Slowly open upstream valve.
3. Close bypass valve.
4. Slowly open downstream valve.

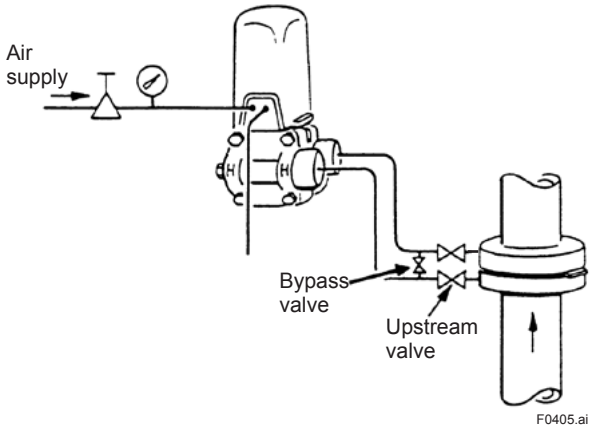


Figure 4.5 Putting into Operation

To take the transmitter out of operation, turn off the air supply, and close the downstream and then the upstream valve.
Then open the bypass valve.

4.2 Liquid Flow Measurement

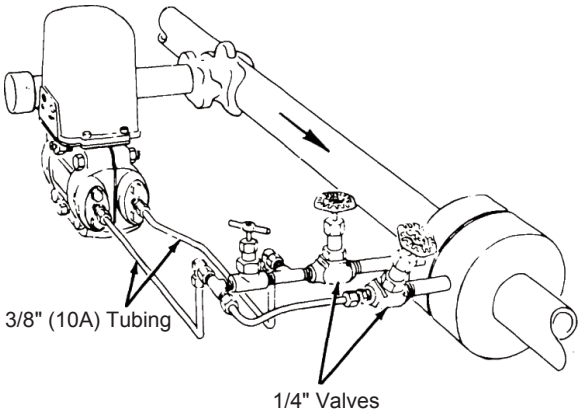
4.2.1 Precautions for Piping

With a horizontal line, the pressure connections should be made at the SIDE of the line to allow trapped vapors to escape from the connecting lines, and to prevent sediment from entering these lines. Mount the transmitter LOWER than the pressure connections.

4.2.2 Piping

(1) Liquid Flow With No Seal Liquid

Horizontal line



Vertical line

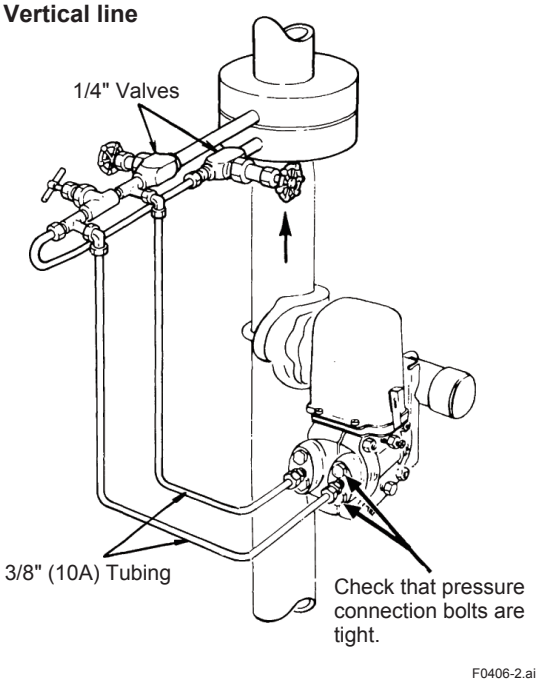


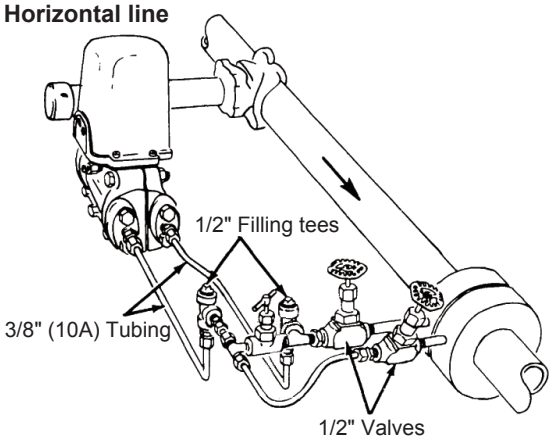
Figure 4.6 Piping With No Seal Liquid

IMPORTANT

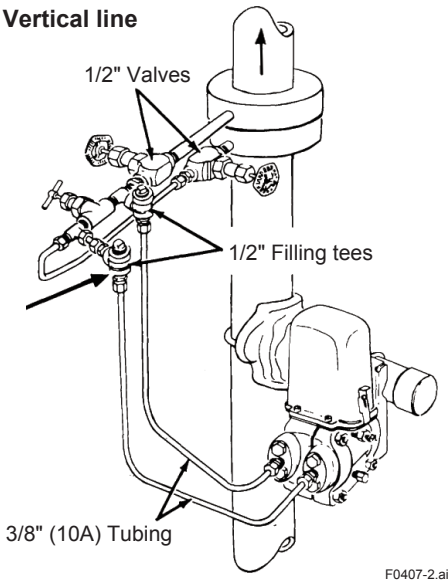
When attaching the connector, tighten bolts by the following torque.
Y/13A, Y/15A : 39 to 49 N·m (4 to 5 kgf·m)
Y/13HA : 49 to 59 N·m (5 to 6 kgf·m)

(2) Liquid Flow Using a Seal Liquid
If liquid being measured must not come in contact with transmitter, 3/8" (10A) tubing and transmitter body must be filled with suitable seal liquid. See below.

Horizontal line



Vertical line



The two filling tees must be at the same elevation.

Figure 4.7 Piping Using a Seal Liquid

■ Filling System with Line Liquid (No Seal Liquid Required)

1. Open bypass and both pressure connection valves.
2. Partially open vents until all air has been forced out of transmitter body and lines. Close vents and bypass valve.
   Check for leaks.

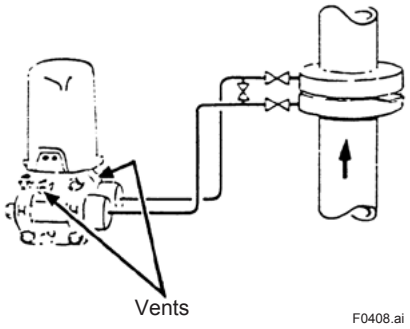


Figure 4.8 Filling System with Line Liquid

■ Filling System with Seal Liquid

1. Close both pressure connection valves and open bypass valve.
2. Remove plugs from filling tees and pour in seal liquid until both tees overflow.
3. Partially open vents until all air has been forced out of transmitter body and lines. Close vents.
4. Refill tee connections. Replace plugs and close bypass valve.
   Check for leaks.

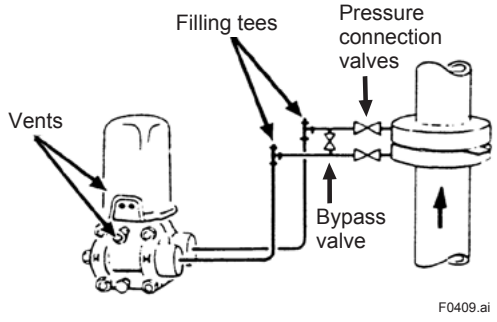
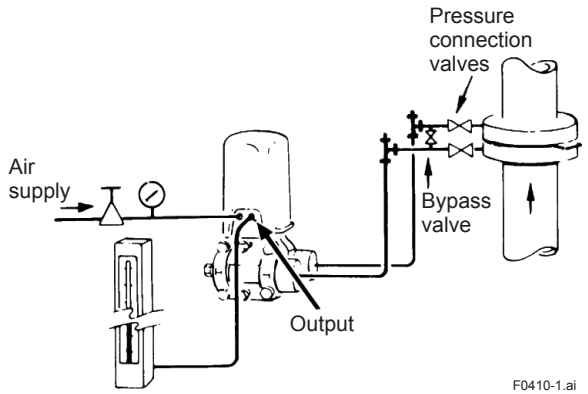


Figure 4.9 Filling System with Seal Liquid

Caution: To prevent loss of seal liquid and contamination by line fluid, never open both pressure connection valves at same time if bypass valve is open.

4.2.3 Zero Adjustment

1. Adjust air supply to pressure at which instrument will operate.
2. Close both pressure connection valves and open bypass valve.
3. Connect 0 to 1.5 kgf/cm^2 or bar, 0 to 150 kPa, or 0 to 22 psi mercury manometer or test gauge to output connection.
4. Slightly open upstream valve.
5. Adjust zero screw so that output is 0.2 kgf/cm^2 or bar, 20 kPa, or 3 psi on manometer.
6. Reconnect air signal line. If necessary change zero adjustment on receiver so that reading is zero.



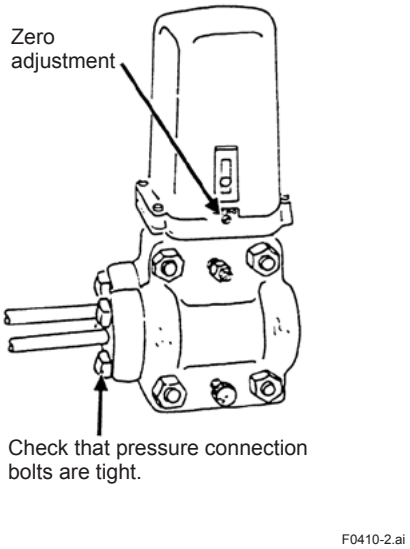


Figure 4.10 Zero Adjustment

4.2.4 Putting Transmitter into Operation

1. Close both pressure connection valves and then open bypass valve.
2. Slowly open upstream valve.
3. Close bypass valve.
4. Slowly open downstream valve.

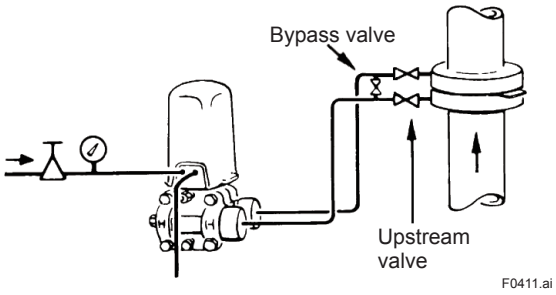


Figure 4.11 Putting into Operation

To take the transmitter out of operation, turn off the air supply, and close the downstream and then the upstream valve. Then open the bypass valve.

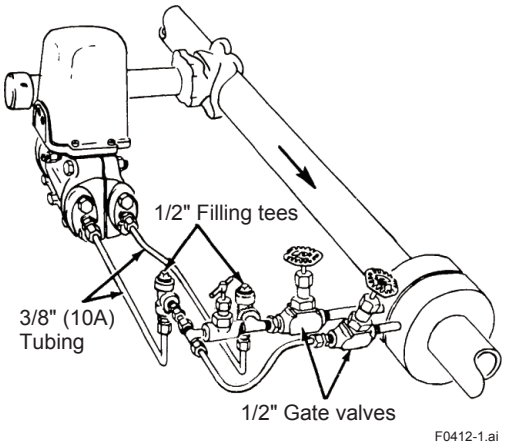
4.3 Steam Flow Measurement

4.3.1 Precautions for Piping

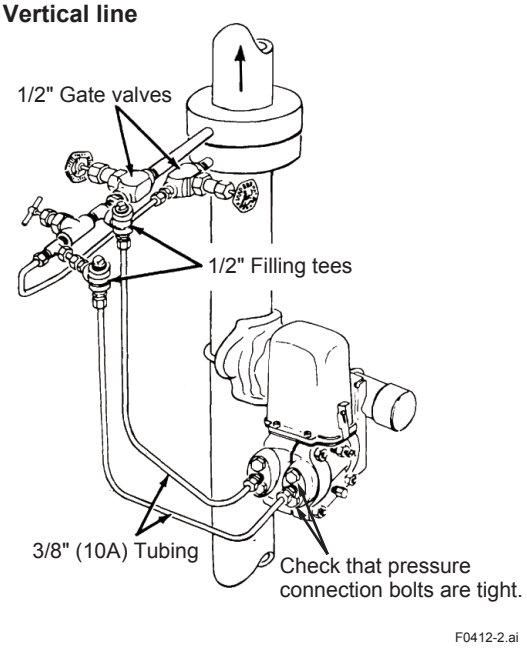
In measuring steam flow, the vapor pressures at the primary element are conveyed to the measuring instrument through two equal liquid heads. Condensing chambers are not necessary, as the transmitter has essentially zero displacement and sufficient vapor will condense in the piping to insure a constant liquid head. It is important, however, to insure that condensation occurs at the same level in both connecting lines, thus preventing error due to unequal liquid columns on the two sides of the instrument. Full-opening 1/2" gate valves should be employed at the connections to permit free counter-current flow of vapors and condensate.
With a horizontal line, the pressure connections should be made at the SIDE to allow trapped vapors to escape from the connecting lines, and to prevent sediment from entering these lines.
Mount the transmitter LOWER than the pressure connections.

4.3.2 Piping

Horizontal line



Vertical line



The two filling tees must be at the same elevation.
The lines from the tees to the transmitter body must be filled with water.

Figure 4.12 Piping

IMPORTANT

When attaching the connector, tighten bolts by the following torque.

Y/13A, Y/15A	: 39 to 49 N·m (4 to 5 kgf·m)
Y/13HA	: 49 to 59 N·m (5 to 6 kgf·m)

■ Filling System with Water

1. Close both pressure connection valves and open bypass valve.
2. Remove plugs from filling tees and pour in water until both tees overflow.
3. Partially open vents until all air has been forced out of transmitter body and lines. Close vents.
4. Refill tee connections. Replace plugs and close bypass valve. Check for leaks.

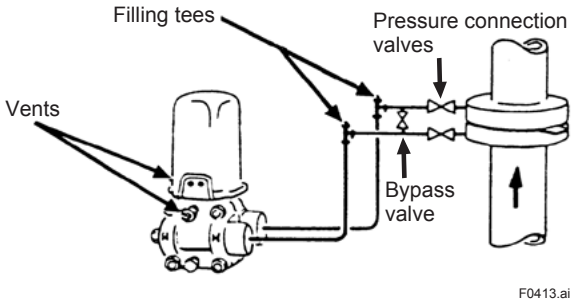


Figure 4.13 Filling System with Water

4.3.3 Zero Adjustment

1. Adjust air supply to pressure at which instrument will operate.
2. Close both pressure connection valves and open bypass valve.
3. Connect 0 to 1.5 kgf/cm^2 or bar, 0 to 150 kPa, or 0 to 22 psi mercury manometer or test gauge to output connection.
4. Slightly open upstream valve.
5. Adjust zero screw so that output is 0.2 kgf/cm^2 or bar, 20 kPa, or 3 psi on manometer.
6. Reconnect air signal line. If necessary change zero adjustment on receiver so that reading is zero.

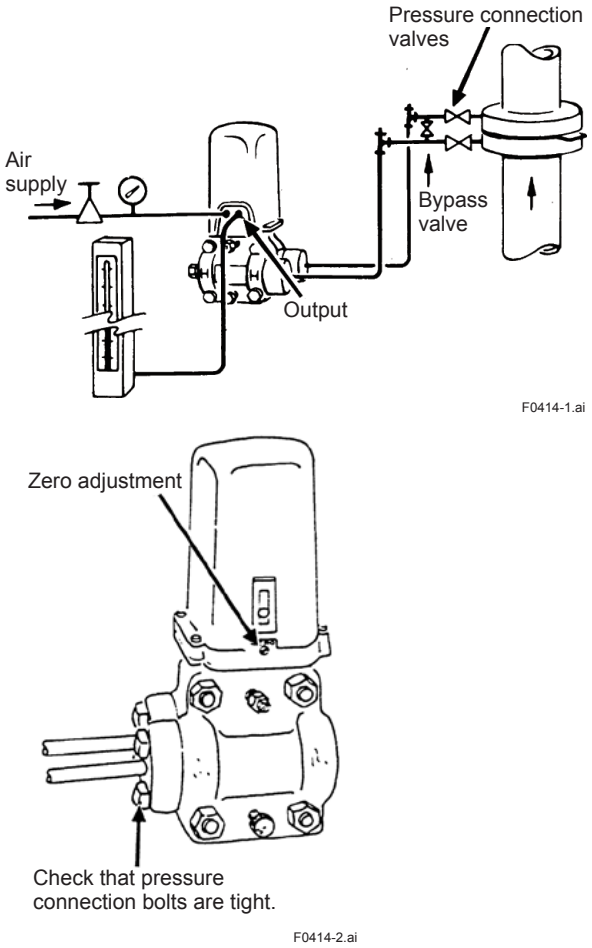


Figure 4.14 Zero Adjustment

4.3.4 Putting Transmitter into Operation

1. Close both pressure connection valves and then open bypass valve.
2. Slowly open upstream valve.
3. Close bypass valve.
4. Slowly open downstream valve.

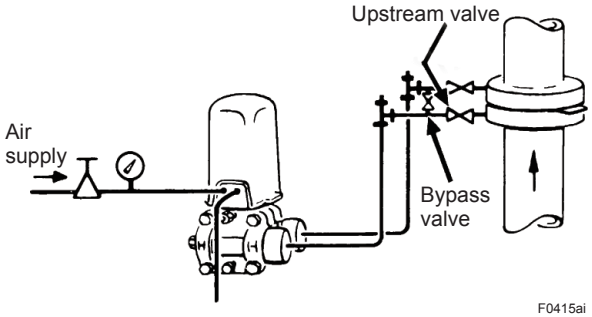


Figure 4.15 Putting into Operation

To take the transmitter out of operation, turn off the air supply, and close the downstream and then the upstream valve. Then open the bypass valve.

4.4 Liquid Level Measurement (Open Tank)

4.4.1 Determination of differential pressure range

With an open tank, the pressure at the high-pressure side of the transmitter is a measure of the liquid level.

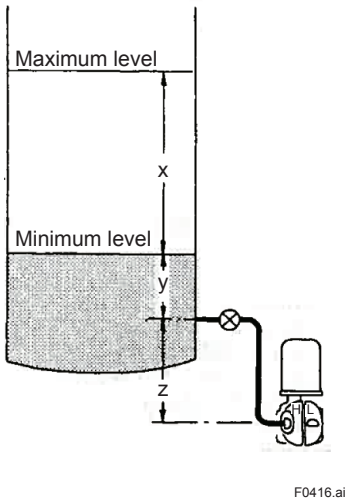


Figure 4.16 Differential Pressure Range (Open Tank)

$$\text{Span} = xG_L$$
$$\text{Zero Suppression} = yG_L + zG_S$$

Where G_L = specific gravity of liquid in tank
G_S = specific gravity of liquid in outside filled line

If transmitter is at level of lower tank tap, or if air purge is used, z = 0.
(Note: The density of the gas in the tank has been disregarded in these calculations.)

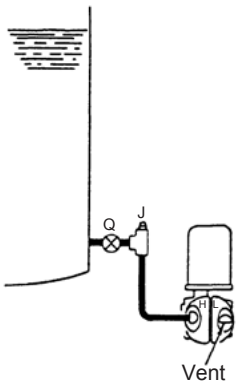
Example: Assume an open tank with x = 2 m, y = 0.125 m, and z = 0.25 m. The specific gravity of the tank liquid is 0.8; the specific gravity of the liquid in the connecting leg is 0.9.

$$\text{Span} = 2\ (0.8) = 1.6\ mH_2O$$
$$\text{Zero Suppression} = 0.125\ (0.8) + 0.25\ (0.9)$$
$$= 0.1 + 0.225 = 0.325\ mH_2O$$
$$\text{Range} = 0.325 \text{ to } 1.925\ mH_2O$$

4.4.2 Piping

NOTE

- Use 1/2"(15A) pipe or 3/8"(10A) tubing for the lines between the cell and the tank.
- To prevent entrance of dirt through the vented connection, install a pipe elbow in the opening with the elbow pointing downward.



F0417.ai

Figure 4.17 Direct Connected or with Seal Liquid

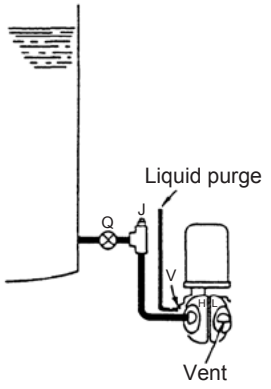


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Figure 4.18 Purge Liquid Heavier than Tank Liquid

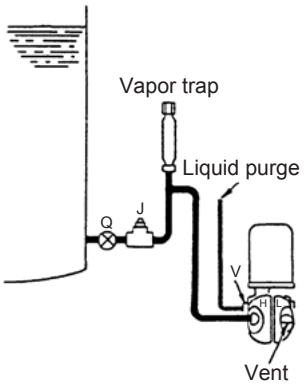

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Figure 4.19 Purge Liquid Lighter than Tank Liquid

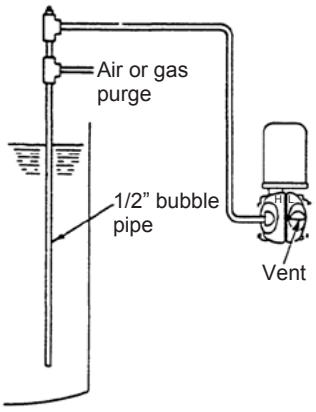

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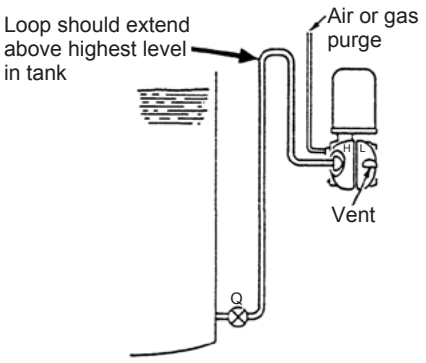
Figure 4.20 Air or Gas Purge Using Bubble Pipe



F0421.ai

Figure 4.21 Air or Gas Purge Directly Into Side of Tank

4.4.3 Preparation for Zeroing

(1) Direct Connect or Liquid Purge (Refer to Figure 4.17, 4.18, 4.19)
Make sure that the high-pressure side of the cell and all piping is filled with liquid, free of air bubbles. Open valve Q. If a purge is used, turn on the purge. Establish a known level of liquid in the tank.
If the minimum level is at the vessel tap, a simple way to establish a known head of liquid for zeroing is to close valve Q and open plug J. Turn on the purge, if used.

(2) Air or Gas Purge (Refer to Figure 4.20, 4.21)
Open valve Q, if used. Turn on the purge. Establish a known level of liquid in the tank.

4.5 Liquid Level Measurement (Closed Tank - Dry Outside Leg)

4.5.1 Determination of differential pressure range

With a closed tank, the effect of tank pressure on the measurement is cancelled by piping this pressure to the low-pressure side of the transmitter.

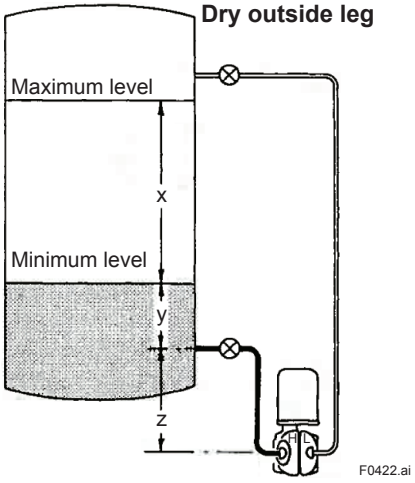


Figure 4.22 Differential Pressure Range (Closed Tank - Dry Outside Leg)

$$\text{Span} = xG_L$$
$$\text{Zero Suppression} = yG_L + zG_S$$

Where G_L = specific gravity of liquid in tank
G_S = specific gravity of liquid in outside filled line

4.5.2 Piping

NOTE

- Use 1/2"(15A) pipe or 3/8"(10A) tubing for the lines between the cell and the tank.

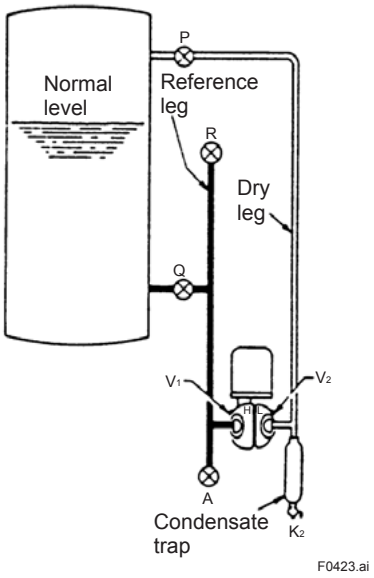


Figure 4.23 Direct Connected

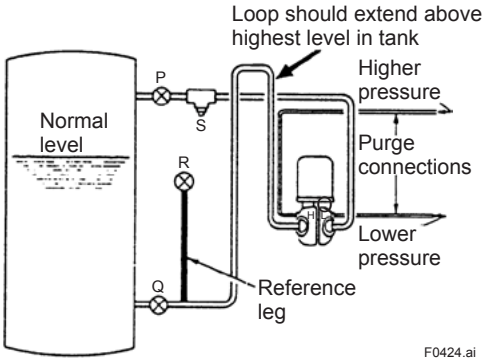


Figure 4.24 Air or Gas Purge

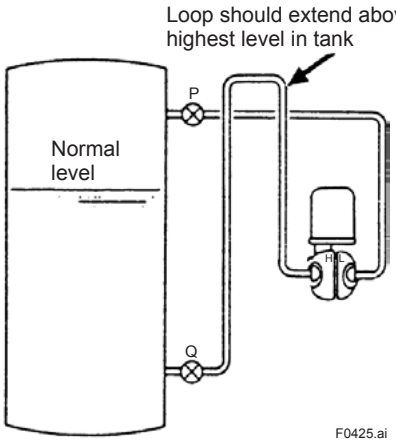


Figure 4.25 Self Purge (for Liquefied Gases)

4.5.3 Preparation for Zeroing

(1) Direct Connection (Refer to Figure 4.23)
Close valves P and Q. Open R and the cell vent screws V_1 and V_2. Pour tank liquid at ambient temperature through R until liquid, free of air bubbles, flows from V_1. Shut V_1 and continue filling with liquid until it overflows at R. Open K_2 and drain the condensate trap.

(2) Air or Gas Purge (Refer to Figure 4.24)
Close valves P and Q. Open S and R. Through R, fill the reference leg with tank liquid at ambient temperature. Start the flow of purge gas in the two purge lines.

(3) Self Purge (Refer to Figure 4.25)
Establish a known level of liquid in the tank. Open valves P and Q.

Note: Temperature of the lines between cell and tank must be high enough to vaporize any tank liquid that runs into the lines. Heat the lines if necessary. Temperature of the vapor in contact with the diaphragm capsule must be greater than -40 °C.

■ Reference Leg

A reference leg is a convenient device for establishing a check point for the cell. Locate valve R at a height equivalent to the check level (usually normal or minimum level in the tank).
If the liquid in the reference leg is of different density than the tank liquid, alter the length of the reference leg to compensate for this difference by an amount equal to the ratio of densities.

Example: If the specific gravity of the tank liquid is 0.6 and the specific gravity of the liquid in the reference leg is 0.8, make the length of the reference leg 0.6/0.8 or 3/4 of the vertical distance from the bottom of the reference leg to the reference level in the tank.

4.6 Liquid Level Measurement (Closed Tank-Wet Outside Leg)

4.6.1 Determination of differential pressure range

With a closed tank, the effect of tank pressure on the measurement is cancelled by piping this pressure to the low-pressure side of the transmitter.

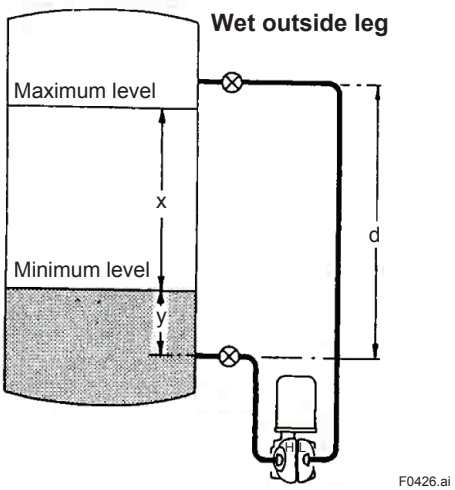


Figure 4.26 Differential Pressure Range (Closed Tank-Wet Outside Leg)

$$\text{Span} = xG_L$$
$$\text{Zero Elevation} = dG_S - yG_L$$

Where G_L = specific gravity of liquid in tank
G_S = specific gravity of liquid in outside filled line

Example: Assume a closed tank with x = 2 m, y = 0.5 m, and d = 3 m. The specific gravity of the tank liquid is 0.8; a sealing liquid with a specific gravity of 0.9 is used.

$$\text{Span} = 2\ (0.8) = 1.6\ mH_2O$$
$$\text{Zero Elevation} = 3\ (0.9) - 0.5\ (0.8)$$
$$= 2.7 - 0.4 = 2.3mH_2O$$
$$\text{Range} = -2.3 \text{ to } -0.7\ mH_2O$$

(Minus sign indicates that the higher pressure is applied to the low side of the cell.)

4.6.2 Piping

NOTE

- Use 1/2"(15A) pipe or 3/8"(10A) tubing for the lines between the cell and the tank.
- Refer to section 4.5.3 titled Reference Leg.

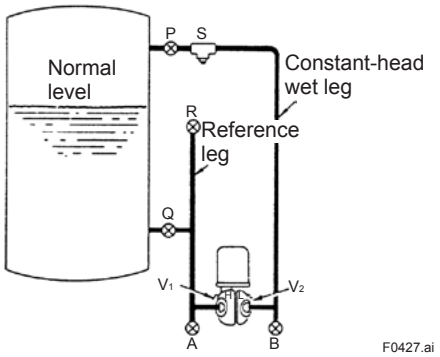


Figure 4.27 Direct-Connected, with Constant-Head Leg

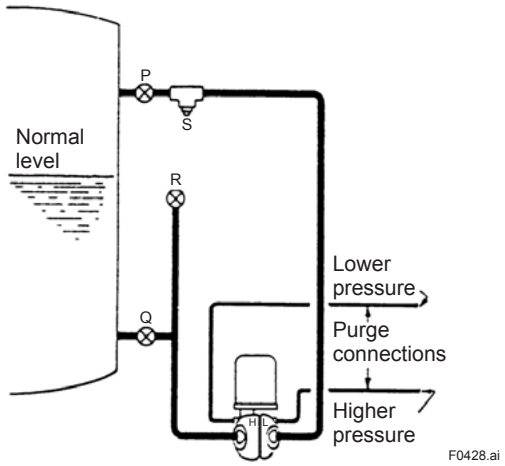


Figure 4.28 Purge Liquid Heavier Than Tank Liquid

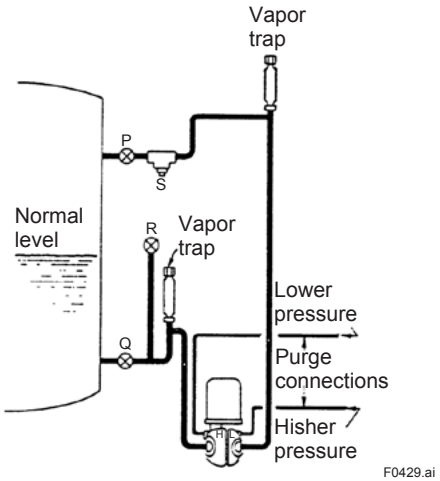


Figure 4.29 Purge Liquid Lighter Than Tank Liquid

4.6.3 Preparation for Zeroing

Using tank liquid, sealing liquid, or liquid purge fluid, fill the piping system from low points in such a way that no air or vapor remains in the system. In Figure 4.27, A and B are filling valves. Valves P and Q should be closed.
With R and S open, and with liquid just at the point of overflowing from them, the cell is under a differential pressure corresponding to normal or minimum level.

4.7 Transmitter with Zero Elevation or Zero Suppression Kit

If the transmitter requires zero elevation or zero suppression (see equations and examples in Section 4.4.1, 4.5.1, 4.6.1), it is equipped with a zero elevation or zero suppression kit. The spring exerts a force through the force bar to the diaphragm capsule. The tension of a zero suppression spring can be adjusted to cancel any initial force or pressure exerted on the high-pressure side of the diaphragm capsule; the tension of a zero elevation spring can be adjusted to cancel any initial force on the low-pressure side of the capsule. Procedures for making these adjustments are given in Sections 4.7.1 and 5.1.3.

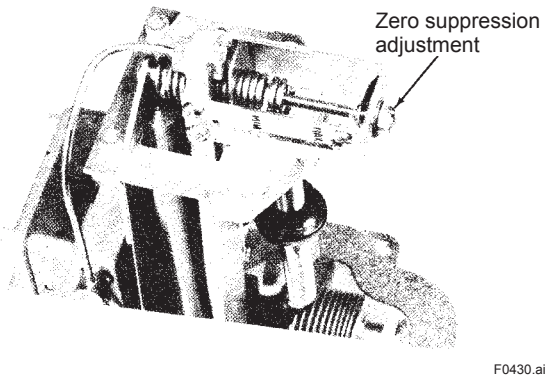


Figure 4.30 Zero Suppression Kit

Note: During manufacture, each transmitter with a zero elevation spring is calibrated with the spring adjusted for a specified amount of zero elevation. (If the sales order does not specify the amount of zero elevation desired, the transmitter is calibrated for an amount of zero elevation equal to zero.) A change in the amount of zero elevation causes the span of the transmitter to change by a small amount. If, in Section 4.7.1, it is necessary to change the zero elevation by more than 25% of span, the transmitter should be recalibrated if maximum accuracy is desired.

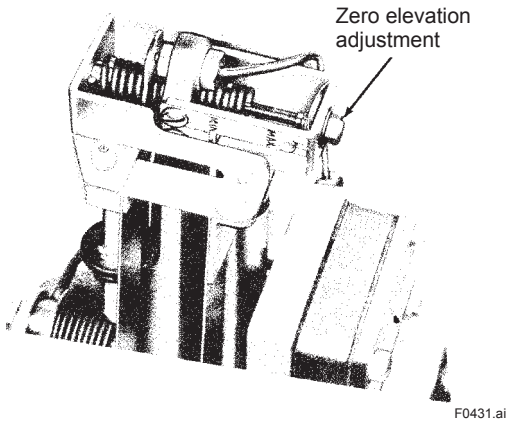
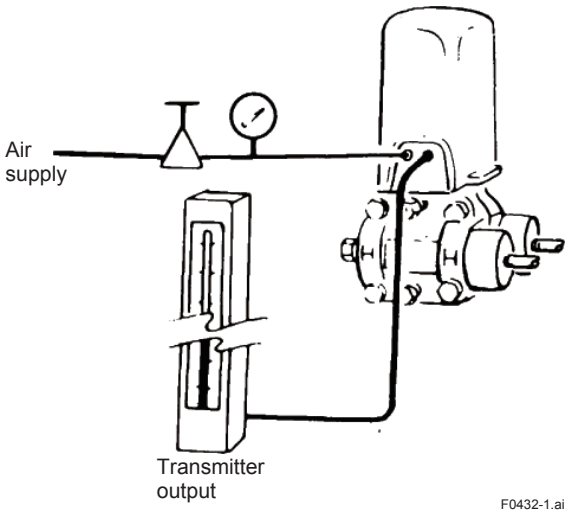


Figure 4.31 Zero Elevation Kit

4.7.1 Zero Adjustment

1. Perform Preparation for Zeroing described in Section 4.4.3, 4.5.3, or 4.6.3.
2. Adjust air supply to pressure at which transmitter will operate.
3. Connect a 0 to 1.5 kgf/cm^2 or bar, or 0 to 150 kPa, or 0 to 22 psi mercury manometer or test gauge to output connection.
4. If a differential pressure corresponding to minimum level is applied to transmitters, adjust output reading to 0.2 kgf/cm^2 or bar, 20 kPa, or 3 psi. If the differential pressure corresponds to a level above minimum level, output reading should be adjusted to the calculated value (see formula below). Make the adjustment as follows:
   a. For transmitters without zero suppression or zero elevation kit, adjust zero screw until correct output is obtained.
   b. For transmitter with zero suppression or zero elevation kit, adjust zero suppression or zero elevation screw until correct reading is obtained. Fine adjustments may be made with zero screw.
5. Reconnect output line. If necessary, adjust receiver screw until reading is correct.



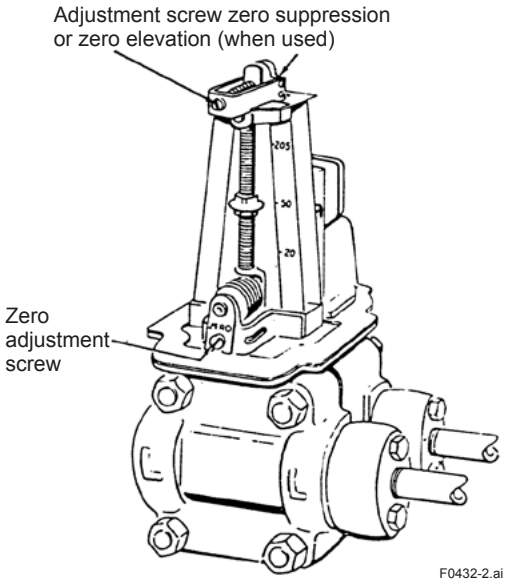


Figure 4.32 Zero Adjustment

■ To Calculate Output

Output pressure =

$$(0.8)\left(\frac{\text{reference level} - \text{minimum level}}{\text{maximum level} - \text{minimum level}}\right) + 0.2$$

Example: Reference level is 1200 mmH_2O above minimum level.
Maximum level is 2000 mmH_2O above minimum level.
Output pressure =

$$(0.8)\left(\frac{1200}{2000}\right) + 0.2 = 0.68 \text{ kgf/cm}^2$$

Note: With 20 to 100 kPa or 3 to 15 psi output, substitute 20 and 80 or 3 and 12 for 0.2 and 0.8 respectively, in the equation above.

5. Maintenance

5.1 Calibration Notes

Calibration is required if transmitter has been taken apart for cleaning or parts replacement, if range is to be changed, or if amount of zero elevation or zero suppression is to be changed substantially. Transmitter can be calibrated to 0.2 to 1.0 kgf/cm^2 or bar, 20 to 100 kPa, or 3 to 15 psi, signal pressure range. These ranges are not exactly equivalent; therefore transmitter must be calibrated to same signal pressure range as receiver with which it is used.

5.1.1 Piping for Bench Calibration

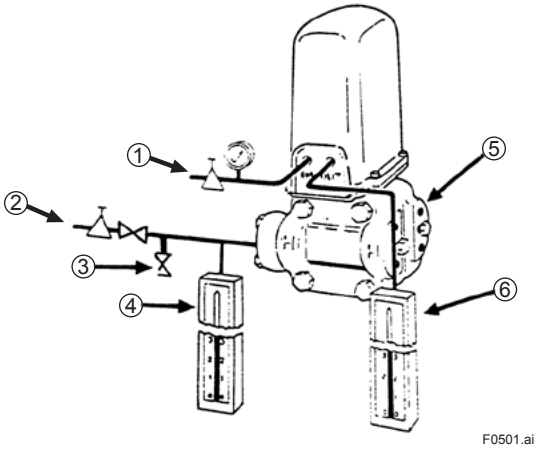


Figure 5.1 Piping for Calibration

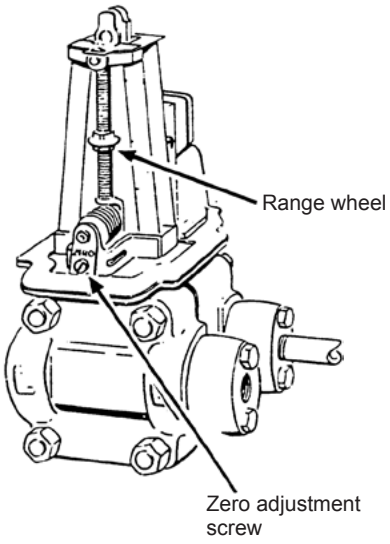
① Regulate air supply to pressure at which transmitter will be operating.
② Calibrating Air Supply
③ Bleeder Valve (needle type)
④ Manometer for reading input signal pressure. Use water column for differentials up to 2.0 mH_2O, 20 kPa, 2.0 bar, 80 inH_2O. Use mercury column for differentials of 2.0 to 21.6 mH_2O, 20 to 210 kPa, 2 to 2.1 bar, or 80 to 850 inH_2O water.
⑤ Vent low-pressure side of transmitter.
⑥ 0 to 1.5 kgf/cm^2 or bar, 0 to 150 kPa, or 0 to 22 psi output test gauge or manometer.

NOTE

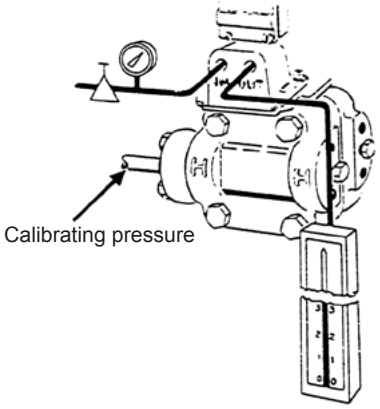
- The standard transmitter operation is for the output to increase as the measurement (input) increases. If desired, the transmitter can have the opposite action by installing the optional zero elevation attachment and reversing the transmitter pressure connections.
- All calibration and adjustment procedures remain the same except that the output is 0.2 kgf/cm^2 or bar, 20 kPa, or 3 psi with a maximum measurement and 1.0 kgf/cm^2 or bar, 100 kPa, or 15 psi with a minimum measurement.

5.1.2 Bench Calibration Procedure (Transmitter WITHOUT Optional Zero Elevation or Zero Suppression Kit)

1. Set up calibration equipment as shown on section 5.1.1.
   If diaphragm capsule was removed or if flexure locknut was loosened, adjust locknut (see section below).
2. Position range wheel at desired differential range.
   Tighten locknut under wheel.
3. With no pressure differential on transmitter, adjust zero screw so that output on manometer reads 0.2 kgf/cm^2 or bar, 20 kPa, or 3 psi.
4. Raise air pressure at high-pressure connection to maximum value of desired range. Output reading on manometer should be 1.0 kgf/cm^2 or bar, 100 kPa, or 15 psi.
   If output reading is not correct, adjust range wheel until reading is correct (raising range wheel will lower output reading). Tighten range wheel locknut after each adjustment.
5. Repeat Steps 3 and 4 until both outputs are within desired accuracy without adjustment. Check that range wheel locknut is securely tightened.



F0502-1.ai



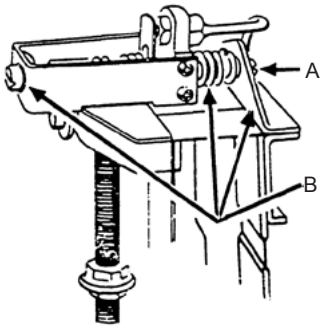
F0502-2.ai

Figure 5.2 Calibration Procedure

5.1.3 Bench Calibration Procedure (Transmitter WITH Optional Zero Elevation or Zero Suppression Kit)

Note: Illustration for Steps 2 and 6 show zero suppression kit. If transmitter has zero elevation kit, location of screws mentioned in Step 2 are reversed.

1. Set up calibration equipment as shown on section 5.1.1.
   If capsule was removed or flexure locknut was loosened, adjust locknut (Refer to section 5.1.5).
2. Disconnect zero elevation or zero suppression spring from force bar as follows:
   A. Remove screw from end of spring.
   B. Turn adjustment screw clockwise until spring is clear of bracket. Spring must not bind against flapper or casting.



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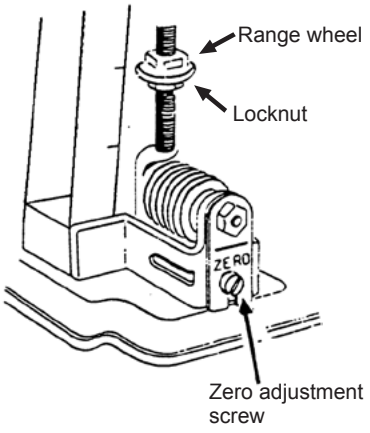
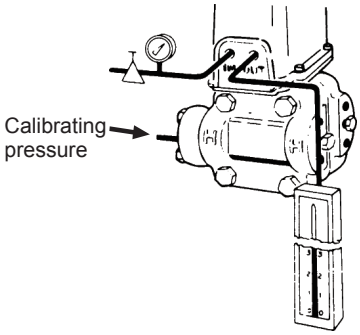
3. Position range wheel at desired differential range. Tighten locknut under wheel.



F0503-2.ai

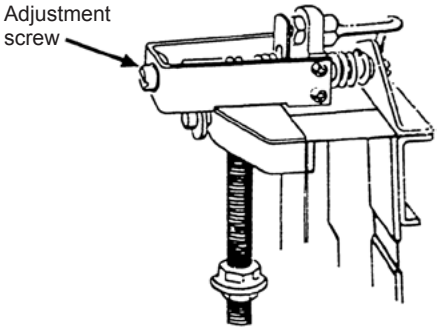
4. With no differential pressure on transmitter, adjust zero screw so that output on manometer reads 0.2 kgf/cm^2 or bar, 20 kPa, or 3 psi. Reinstall screw removed in Step 2-A.

5. Set calibrating pressure equal to lower differential limit.
   With zero elevation kit, apply pressure to low-pressure side of transmitter and vent high-pressure side.



F0503-3.ai

6. Turn adjustment screw so that output is 0.2 kgf/cm^2 or bar, 20 kPa, or 3 psi. Fine adjustment can be made with zero screw.



F0503-4.ai

7. Set calibrating pressure equal to upper differential limit. Output should be 1.0 kgf/cm^2 or bar, 100 kPa, or 15 psi.
8. If output is not correct, adjust range wheel until reading is correct (raising range wheel will lower OUT reading). Tighten range wheel locknut after each adjustment.
9. Repeat Steps 5 through 8 until both outputs are within desired accuracy without adjustment. Check that range wheel locknut is securely tightened.

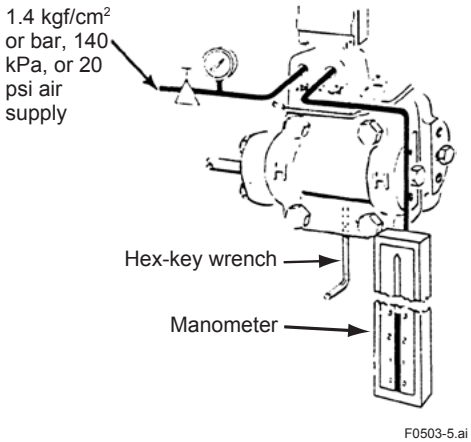
5.1.4 To Change Range of Transmitter

The range of the transmitter, as calibrated at the factory, is stamped on the data plate. By recalibration, the range can be changed to any values within the limits of the diaphragm capsule. If the desired range is outside the limits of the particular capsule installed in the transmitter, but within the range of the other available capsule, install this new capsule. (Note that there is only one capsule available for Model Y/15A.) The data plate should be altered to indicate the new range.
Refer to section 2.3 (Table 2.1) about the Span Limits, Range Limits and static Pressure Limits for the various capsules.

5.1.5 Flexure Locknut Adjustment

Make this adjustment if capsule was removed or if flexure locknut was loosened.

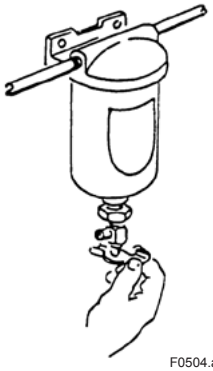
1. Remove bottom drain plug, and loosen flexure locknut with a 1/4" hex-key wrench.
2. With no differential on capsule, adjust zero screw so that output pressure on manometer is 0.2 kgf/cm^2 or bar, 20 kPa, or 3 psi.
3. Carefully tighten flexure locknut so that output pressure does not change by more than 0.027 kgf/cm^2 or bar, 2.7 kPa, or 0.4 psi.
   If output pressure is not within these limits, loosen locknut and carefully retighten.
   If output pressure is still not within limits, it indicates that index marks on capsule and body are not aligned. Correct by repositioning capsule (Refer to section 5.6).
4. When output pressure is within limits with the locknut tightened, replace bottom plug.
5. Calibrate transmitter.



F0503-5.ai

Figure 5.3 Flexure Locknut Adjustment

5.2 Supply Air Filter



Blow filter out at least once a day.

Figure 5.4 Air Filter

5.3 To Clean Restrictor

A plugged restrictor will cause low output pressure.

1. Remove amplifier (Refer to section 5.9).
2. Lift out restrictor with tweezers.
3. Clean with a 0.18 mm dia. wire
4. Apply thin film of Vaseline, or similar lubricant to O-ring.

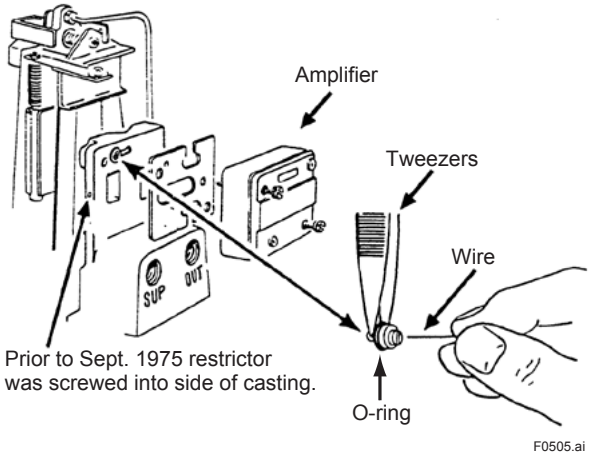
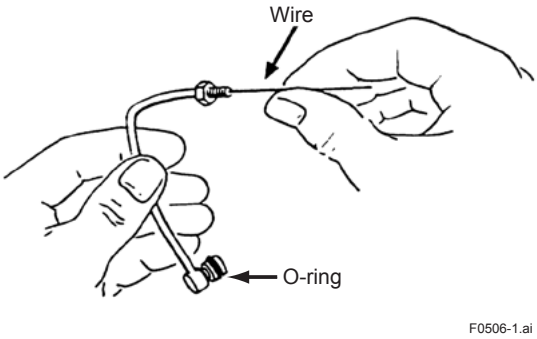


Figure 5.5 Cleaning of Restrictor

5.4 To Clean Nozzle Assembly

An accumulation of dirt at the flapper nozzle may cause a zero shift.

1. Unscrew nozzle nut. Do not let soldered nut on opposite side of casting turn.
2. Ease nozzle out of casting.
3. Loosen clamp screw and rotate S-clamp. Withdraw nozzle O-ring connection with twisting motion. Do not bend tubing.
4. Clean nozzle with 0.73 mm dia. wire, compressed air, or suitable solvent. Wipe top of flapper clean.



5. Before replacing, apply a thin film of Vaseline or similar lubricant to O-ring. Replace nozzle assembly in reverse order. Check reference adjustment. (Refer to section 4.1.3, 4.2.3, 4.3.3)

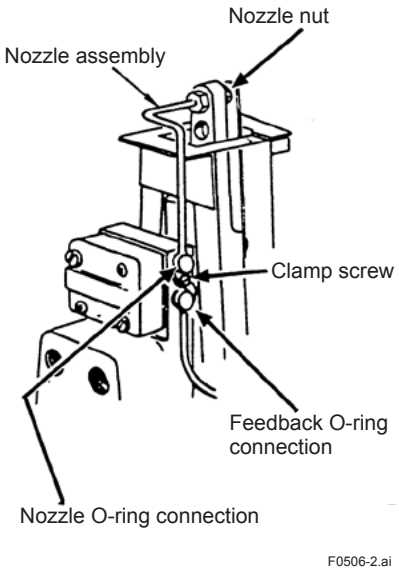
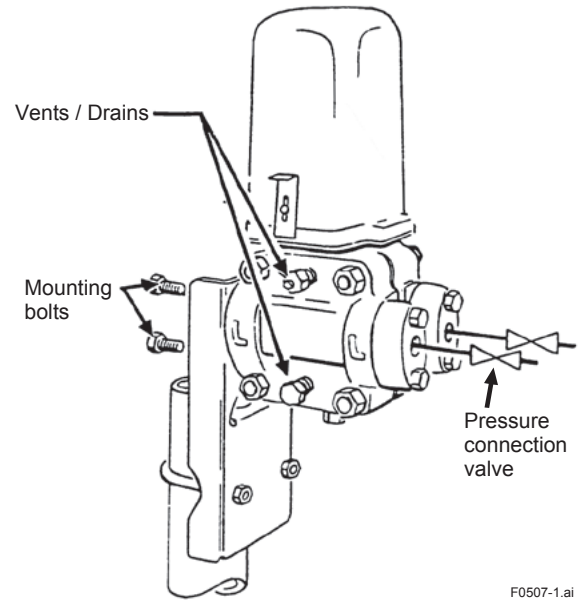


Figure 5.6 Cleaning of Nozzle Assembly

5.5 To Remove Diaphragm Capsule

1. Close pressure connection valve.
2. Open vents and drains on pressure side.
3. If unit is mounted, remove 2 mounting bolts from low pressure side.
4. Remove bottom plug. Insert 1/4" hex-key wrench in opening and loosen, but do not remove, flexure locknut.
5. Remove the 4 body nuts (Model Y/13HA has 8 nuts) and lift off low-pressure side of unit. Do not remove bolts.
6. Lift out capsule. Do not bend flexure.



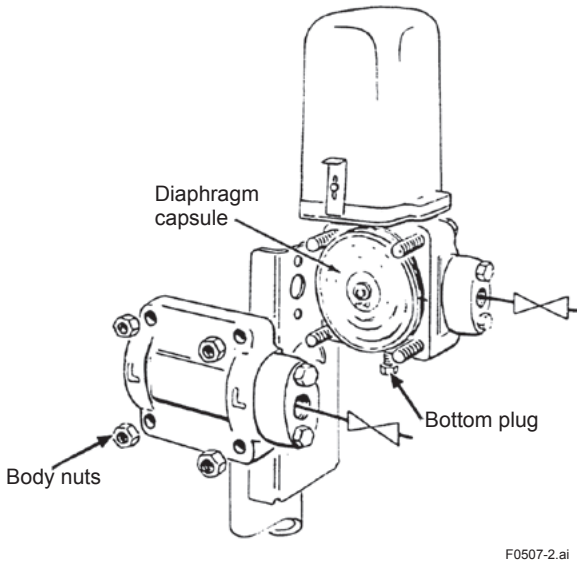
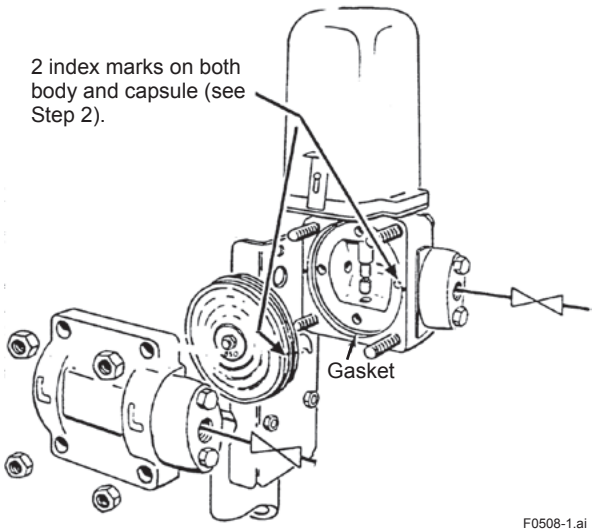


Figure 5.7 Remove the Diaphragm Capsule

5.6 To Replace Diaphragm Capsule

1. Use new gaskets in castings on both sides of capsule.
2. Position capsule in its cavity so that flexure fits on force bar.
   Align index marks on capsule and body and tighten flexure locknut with wrench.
3. Replace low-pressure side of unit, tightening the 4 nuts finger tight.
   Loosen flexure locknut and then complete tightening the 4 nuts gradually and uniformly to 90 N·m torque. (With Model Y/13HA tighten the 8 bolts gradually to 110 N·m.)
4. Replace remaining parts in reverse order. Make flexure locknut adjustment and then calibrate transmitter (Refer to section 5.1.5).



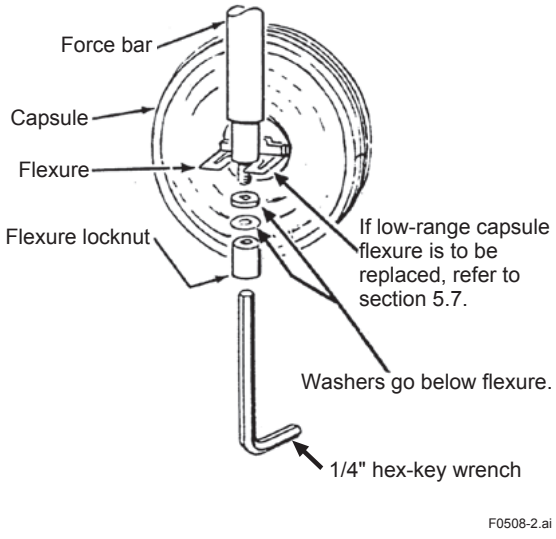
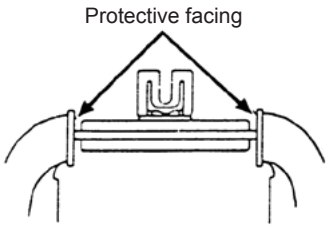


Figure 5.8 Replace the Diaphragm Capsule

5.7 To Replace Capsule Flexure

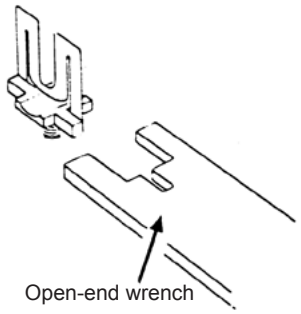
Note: Flexures of high range capsules cannot be replaced.

1. Remove capsule from unit (Refer to section 5.5).
   Use protective facing on jaws of vise to prevent damaging capsule.



F0509-1.ai

2. Use open-end wrench (preferably one shaped to fit flexure base) to remove and replace flexure. Tighten to 5 to 5.5 N·m torque. Do not bend flexure.



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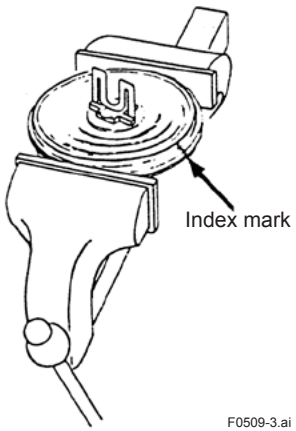
3. After flexure is replaced, scribe 2 new index marks on opposite edges of capsule in line with flexure. Use new index marks when replacing capsule. Adjust flexure locknut (Refer to section 5.1.5).



F0509-3.ai

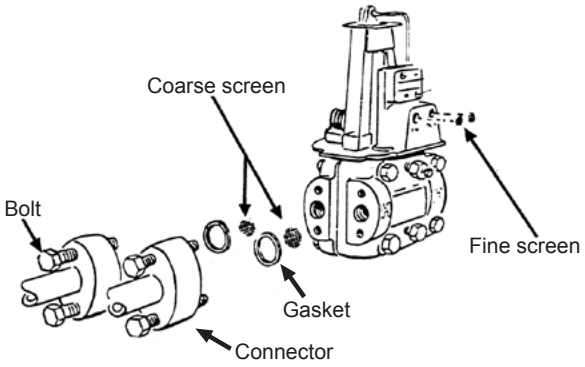
5.8 To Clean or Replace Screen Filters

Remove coarse screen filter with pointed tool for cleaning or replacement.
If fine screen air filters become clogged, remove with pointed tool and replace.
Use new gasket each time connection is broken. In replacing assembly, tighten bolts uniformly.

IMPORTANT

When attaching the connector, tighten bolts by the following torque.

Y/13A, Y/15A	: 39 to 49 N·m (4 to 5 kgf·m)
Y/13HA	: 49 to 59 N·m (5 to 6 kgf·m)



F0509-4.ai

Figure 5.9 Clean or Replace Screen Filters

5.9 To Remove Pneumatic Amplifier

To remove amplifier, remove 2 large screws and pry off. A gasket is furnished with each replacement amplifier. When replace the pneumatic amplifier, tighten the screws by the torque of 1.6 to 1.8 N·m (16 to 18 kgf·cm). For servicing details, refer to Appendix 1.

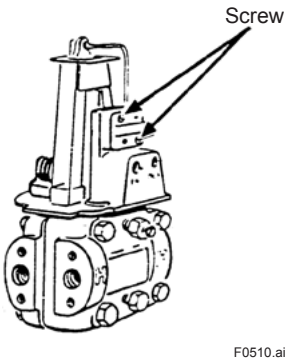
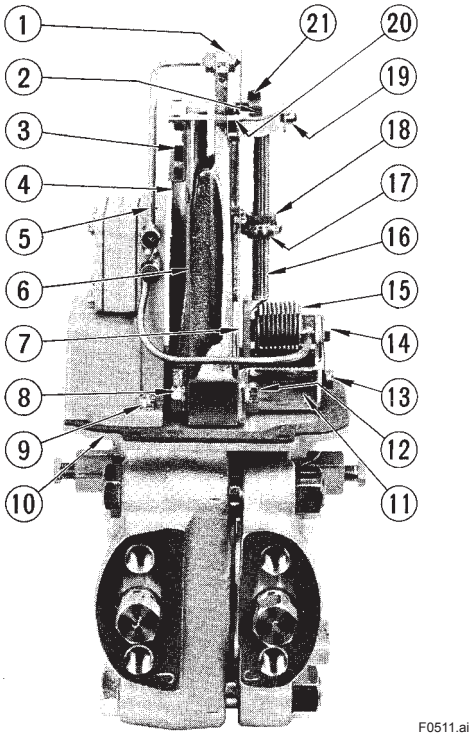


Figure 5.10 Remove Pneumatic Amplifier

5.10 Further Disassembly

IMPORTANT

Normal servicing of the transmitter does not require the removal of any parts other than those already mentioned. Further disassembly is not recommended by YOKOGAWA. The following procedures are described for emergency use only and the user must assume responsibility for loss of accuracy or damage to the transmitter.



5.10.1 To Remove Feedback Bellows and Zero Spring (behind Zero Screw)

1. Carefully pry out feedback O-ring connection at amplifier (Refer to section 5.4).
2. Using 7/16" open-end wrench, remove the two 1/4" cap screws ⑫ holding bracket ⑪.
3. Unscrew completely zero adjustment screw ⑬ to release zero spring. Bracket ⑪ and feedback bellows ⑮ can now be removed.
4. Remove nut ⑭ to disconnect feedback bellows from bracket.
5. Remove zero spring by unscrewing it from range bar ⑯. Be careful not to change alignment on the spring clamp.

6. Reverse this procedure to reassemble, making sure that post on bracket is within zero spring alignment clamp. Tighten zero adjustment screw until about 6 mm of thread remains exposed. When replacing feedback connection, apply a thin film of Vaseline or similar lubricant to O-ring.
7. Calibrate transmitter (Refer to section 5.1).

5.10.2 To Remove Back Flexures

Unless front flexure ⑥ has already been removed, 7/64" hex-key wrench used in Step 2 must be cut down to fit into screws ⑳.

1. Using 7/16" open-end wrench, remove 1/4" cap screws ⑫ holding bracket ⑪.
2. Using a 7/64" hex-key wrench, remove two screws and plates ⑳ holding back flexures ⑦, and remove back flexures.
3. Reverse this procedure to reassemble. Do not tighten cap screws ⑫.
4. Loosen cap screws ⑧ and force bar screws ③. Apply 10 kgf/cm^2 or bar, 1 MPa, or 150 psi to both side of transmitter. Tap the body lightly and tighten all screws.
5. Calibrate transmitter (Refer to section 5.1).

5.10.3 To Remove Force Balance Unit

1. Remove relay mounting assembly ⑤ (Refer to section 5.10.4).
2. Remove capsule (Refer to section 5.5).
3. Using a 3/16" hex-key wrench, remove the three socket-head screws holding force balance unit to body. In removing screws, be careful not to damage flexures ⑥ and ⑦. Withdraw force balance unit from body.
4. Reverse this procedure to reassemble. When tightening screws removed in Step 3, follow procedure on section 5.10.9 to maintain original static alignment accuracy. Replace O-ring that fits around force bar on top of body, and the two gaskets that go on each side of diaphragm capsule.
   Apply a thin film of Vaseline or a similar lubricant to the O-ring.
5. Calibrate transmitter (Refer to section 5.1).

5.10.4 To Remove Relay Mounting Assembly

1. Carefully pry out nozzle and feedback O-ring connections at amplifier (Refer to section 5.4).
2. Remove relay mounting assembly ⑤ by unscrewing the two screws ⑨ above mounting plate and small screw ⑩ beneath mounting plate.
3. Reverse this procedure to reassemble. When replacing O-ring connections, apply a thin film of Vaseline or similar lubricant to O-rings.

5.10.5 To Remove Front Flexure

1. If transmitter has optional zero elevation or zero suppression kit, remove this assembly.
2. Carefully pry out both feedback and nozzle O-ring connections at amplifier and remove nozzle tubing from casting ① (Refer to section 5.4).
3. Remove relay mounting assembly ⑤ (Refer to section 5.10.4).
4. Using a 7/64" hex-key wrench, remove top plate ② by removing two plate screws ㉑.
5. Using a 9/64" hex-key wrench, remove force bar screws ③.
6. Remove cap screws ⑧ and plates and lift front flexure ⑥ off of dowel.
7. Reverse this procedure to reassemble. If force bar has been removed or force balance unit loosened from body, top of front flexure should be visually lined up with casting ①, so that there is no twist evident in flexures. Then tighten plate screws ㉑. Do not tighten cap screws ⑧.
8. Loosen cap screws ⑫ and force bar screws ③. Apply 10 kgf/cm^2 or bar, 1 MPa, or 150 psi to both sides of transmitter. Tap body lightly and tighten all screws.
9. Check static alignment (Refer to section 5.10.7).

5.10.6 To Remove Force Bar

1. Remove force balance unit (Refer to section 5.10.3).
2. Using a 9/64" hex-key wrench, remove the two force bar screws ③. Force bar ④ can now be removed. This unit should not be further disassembled; if its diaphragm seal is removed from force bar, leaks are likely to occur after reassembly. If either force bar or its seal requires replacing, they both should be replaced as a unit.

3. Reverse this procedure to reassemble. Replace O-ring at force bar seal. Before inserting force bar into top-works, lubricate O-ring and top of force bar with Vaseline or similar lubricant. Carefully ease force bar into O-ring recess to avoid damaging O-ring.
4. When reassembled, loosen the four cap screws ⑧ and ⑫ and two force bar screws ③. Apply 10 kgf/cm^2 or bar, 1 MPa, or 150 psi to both sides of transmitter.
   Tap body lightly and tighten all screws.
5. Calibrate transmitter (Refer to section 5.10.7).

5.10.7 Static Alignment

This adjustment is required if front flexure or force bar is replaced.

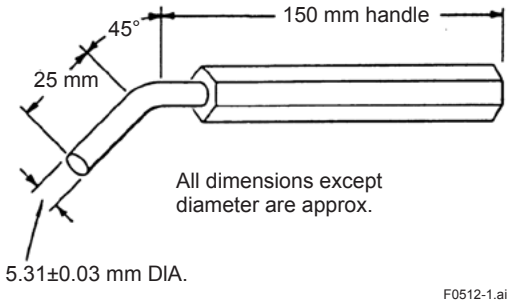
1. Connect transmitter to an input air supply regulated at a fixed value 1.4 kgf/cm^2 or bar, 140 kPa, or 20 psi.
2. Check with a 1/4" hex-key wrench through bottom plug hole that capsule flexure locknut is tightly fastened to force bar. Replace bottom plug.
3. Rotate range wheel ⑱ to approximate operating position. Tighten locknut ⑰.
4. Vent both sides of transmitter and adjust zero screw ⑬ so that output is 0.2 kgf/cm^2 or bar, 20 kPa, or 3 psi.
5. Apply gradually and simultaneously to both sides of transmitter (output must not go off scale), a pressure equal to highest static pressure anticipated during normal operation.

   Note: Do not exceed static pressure limits.
6. After 2 minutes observe transmitter output. If output has not changed, static alignment is correct. If output change is more than desired, slowly vent pressure and make static alignment as follows.
   Loosen the two plate screws ㉑ and adjust static alignment wheel ⑲ to bring output back to 0.2 kgf/cm^2 or bar, 20 kPa, or 3 psi. Turn wheel clockwise to lower output. Tighten plate screws ㉑ after each adjustment of alignment wheel.
7. Remove bottom plug and loosen, then carefully retighten capsule flexure locknut.
8. Repeat Steps 6 and 7 until output change is satisfactory. Calibrate transmitter (Refer to section 5.1).

5.10.8 Flapper Alignment

The flapper is aligned at the factory; a realignment is required only if the force balance unit has been disassembled. This alignment procedure requires a spacing tool (see illustration), a 1/8" open-end wrench, and a small screwdriver. (The wrench and screwdriver are included in tool kit model 6925-6000, obtainable from YOKOGAWA.)

Caution: Use care in turning thin flexure alignment screw to prevent shearing.



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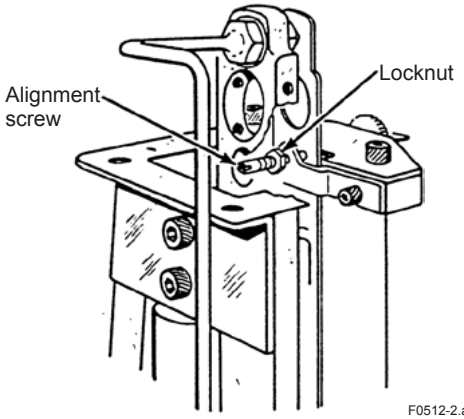

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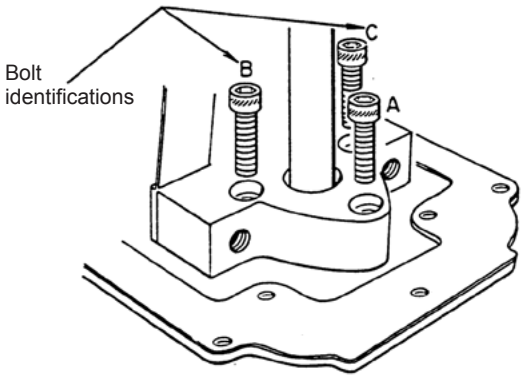
1. If transmitter has optional zero elevation or zero suppression kit, remove this assembly.
2. Connect an air supply regulated at a fixed pressure 1.4 kgf/cm^2 or bar, 140 kPa, or 20 psi to input, and a 0 to 1.5 kgf/cm^2 or bar, 0 to 150 kPa, or 0 to 22 psi test gauge or manometer to output.
3. Loosen flexure locknut at bottom of force bar (Refer to section 5.6).
4. Turn range wheel to top of range bar.
5. Using spacing tool as feeler gauge, insert tool at lower end of range bar between threaded surface and machined casting surface. Adjust zero screw to get correct spacing for tool.
6. Loosen flapper alignment screw locknut and adjust screw so that output is 0.2 kgf/cm^2 or bar, 20 kPa, or 3 psi.

7. Repeat Step 5. If output is not between 0.23 and 0.33 kgf/cm^2 or bar, 23 and 33 kPa, or 3.4 and 4.8 psi, repeat Steps 5 and 6 until output is within these limits.
8. Retighten flapper alignment screw locknut. Reinstall optional zero elevation or zero suppression kit. Tighten flexure locknut and check calibration. (Refer to section 5.1.5).

5.10.9 Bolt Tightening Procedure - Force Balance Unit

When reinstalling the 3 socket-head bolts that hold the force balance unit to the transmitter body, follow the bolt tightening procedure shown below.



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Step No.	Bolt	Torque (kgf·cm/N·m)			
		Models Y/13A & Y/15A		Model Y/13HA	
1	A	6	0.6	11	1.1
2	B	6	0.6	11	1.1
3	C	6	0.6	11	1.1
4	B	35	3.5	34	3.4
5	C	35	3.5	46	4.6
6	A	23	2.3	46	4.6
7	B	52	5.2	74	7.4
8	C	52	5.2	74	7.4
9	A	35	3.5	91	9.1
10	B	75	7.5	103	10.3
11	C	75	7.5	103	10.3
12	A (B)	58	5.8	137	13.7
13	C			137	13.7
14	A			126	12.6

(B); available for Model Y/13HA

Appendix 1. 80A Pneumatic Amplifier (Part No. F9138YA)

The function of the pneumatic amplifier is to convert a small change in the input signal (an air pressure signal) to a large change in the output signal. Typically a 0.07 kgf/cm^2 (0.07 bar, 7 kPa, or 1 psi) change in the input will produce approximately a 0.8 kgf/cm^2 (0.8 bar, 80 kPa, or 12 psi) change in the output.

A1.1 Principles of Operation

The air supply enters the pneumatic amplifier through a port on the surface of the instrument on which the amplifier is mounted. The input signal (nozzle pressure) enters the amplifier through another port and acts on the diaphragm. Since the stem valve is mounted on the diaphragm, the two move in unison.

As the input signal increases, the stem pushes against a ball valve which in turn moves a flat spring, allowing the supply air to enter the amplifier body. Further motion of the stem valve, causes it to close off the exhaust port. Thus, when the input pressure increases, the stem (exhaust) valve closes and the supply valve opens; when the input decreases, the stem valve opens and the supply valve closes. This varies the pressure to the output.

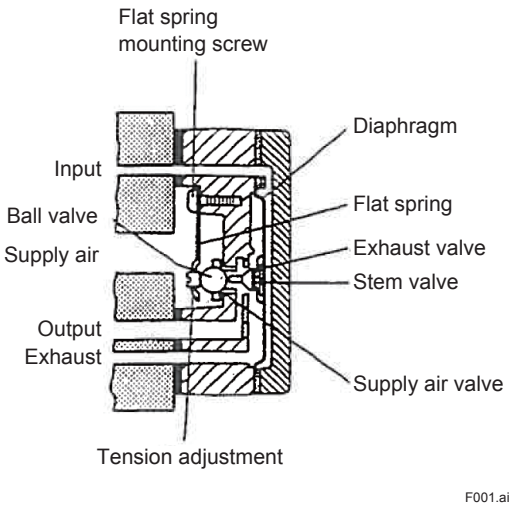


Figure A1. Cross Sectional View

A1.2 Cleaning the Pneumatic Amplifier

Should the pneumatic amplifier require cleaning, remove it from the instrument. Loosen the two cover screws and the spring mounting screw to disassemble the pneumatic amplifier. Clean the disassembled parts with a suitable solvent (do not allow solvent to contact the gasket) and dry them carefully with compressed air. When reassembling the pneumatic amplifier, all corresponding holes must line up and all outside edges must coincide with other edge of the amplifier body casting. Tighten all screws.

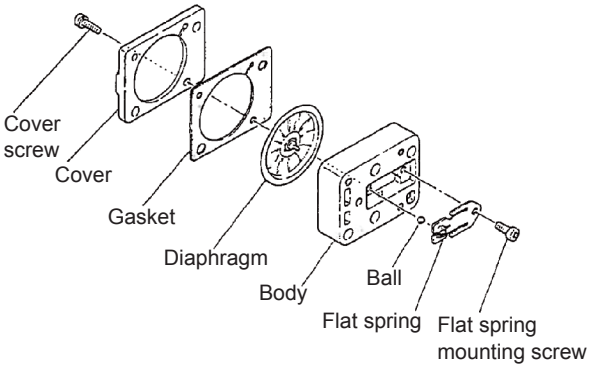


Figure A2. Exploded View

CAUTION

After reassembling the amplifier, perform a calibration with the calibrator. (Refer to section A1.3)

A1.3 Calibration Procedure using Calibrating Fixture

This procedure requires a Model 6971 calibrator, which is available from Yokogawa.

(1) Mount the amplifier on the calibrator with the flat spring mounting screw to the left. (Be sure to mount the amplifier in the correct direction.) Fasten the amplifier with the two wing nuts.

(2) Air supply.
Apply air at 1.4 kgf/cm^2 or bar, 140 kPa, or 20 psi to air supply coupling ②.

(3) Self-centering the stem valve.
   a. Seal nozzle ③ by manual contact for several seconds, until the nozzle pressure (diaphragm back-up pressure) is 1.4 kgf/cm^2 or bar, 140 kPa, or 20 psi and confirm that the nozzle pressure exceeds 1.0 kgf/cm^2 or bar, 100 kPa, or 15 psi.
   b. Open nozzle ③ and manually close the air check valve, until the nozzle input pressure is zero (atmospheric pressure).
   c. Repeat steps a and b above.

(4) Nozzle input pressure adjustment.
Turn nozzle ③ with a wrench while observing nozzle input pressure gauge ⑤, so the nozzle input pressure is 0.25 kgf/cm^2 or bar, 25 kPa, or 3.6 psi.

(5) Output pressure confirmation.
Read the output pressure on output pressure indicator ⑥. When output pressure falls between 0.55 and 0.60 kgf/cm^2 (0.55 and 0.60 bar, 55 and 60 kPa, or 7.8 and 8.5 psi), apply air pressure at 0 and 1.4 kgf/cm^2 (0 and 1.4 bar, 0 and 140 kPa, or 0 and 20 psi) by one cycle the same as step (2). Next, confirm that output pressure falls between 0.55 and 0.60 kgf/cm^2 (0.55 and 0.60 bar, 55 and 60 kPa, or 7.8 and 8.5 psi) under the same condition as step (4). When the output pressure falls within this range, output adjustment is completed, but if it does not, perform output pressure adjustment as per step (6).

(6) Output pressure adjustment.
   a. Close the air supply valve.
   b. Remove plug ⑨ using a 3/16" Allen wrench.
   c. Insert a screwdriver in the plug hole and turn the tension adjustment (turn it clockwise to decrease output, and counterclockwise to increase output).
   d. Install plug ⑨.
   e. Repeat steps (2) through (6).

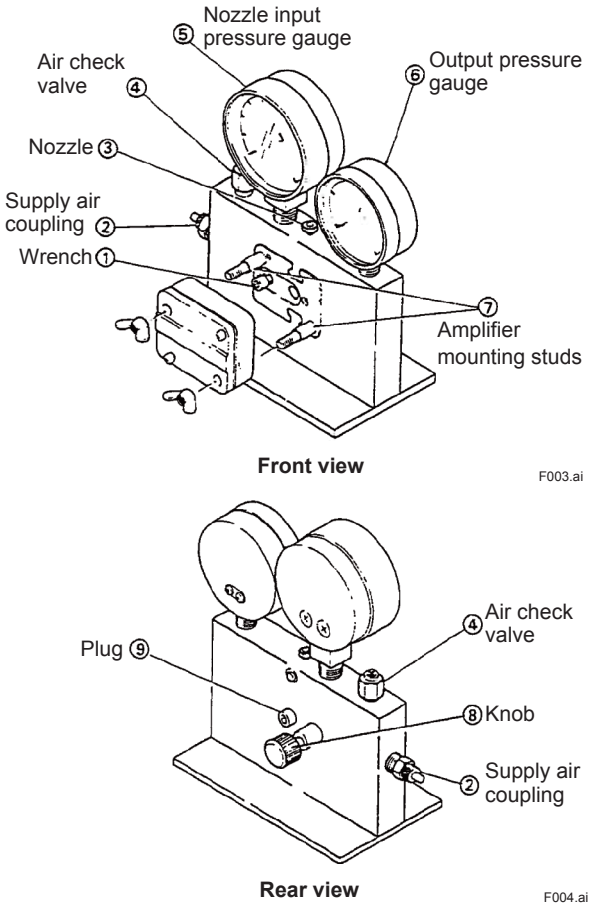
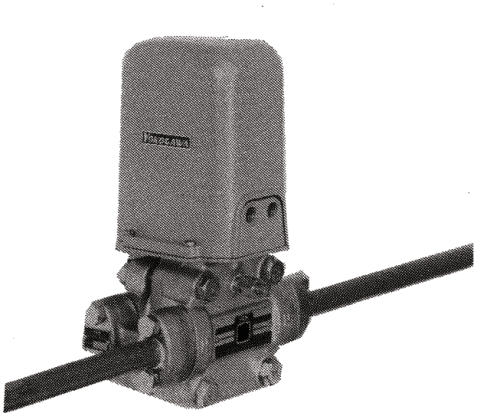


Figure A3. Model 6971 Pneumatic Amplifier Calibrator

NOTE: The above amplifier output pressure adjustment can be performed by removing the amplifier from the calibrator.

Appendix 2. Integral Flow Orifice



Pneumatic transmitter

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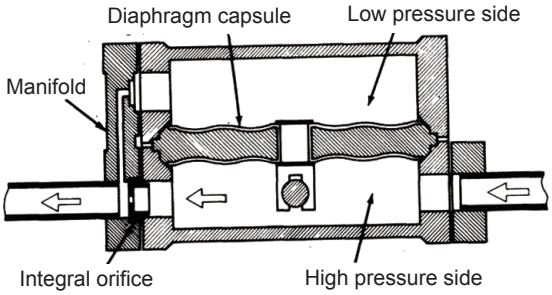

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Figure A4. Sectional View of Bottom Works

A2.1 General

Integral orifice manifold assemblies are designed to be fitted to pneumatic transmitters and measure very low flow rates: ranges of 1.0 to 1920 litre/h (equivalent water flow at 4°C, 1 atm.) and 0.03 to 55 Nm^3/h (equivalent air flow at STP 0°C, 1 atm.).
The integral orifice is mounted on the bottom work (pressure chamber) using integral orifice assemblies, and so, the orifice can be replaced without disassembling the bottom work.
The integral orifice equipped transmitters do not require pressure taps like ordinary orifice flowmeters and are mounted directly in process pipes. Fluids flow through the high pressure chamber of the transmitters and the integral orifice as shown in Figure A4.
The Integral Orifice Manifold Assembly can be used with the following transmitters.

Pneumatic model	Normalized equivalent flow		Span Limits (ΔP)				Max. Working Pressure		
	water	air	mmH_2O	kPa	mbar	inH_2O	kgf/cm^2 or bar	MPa	psi
Y/15A	1 to 330 litre/h	0.03 to 9 Nm^3/h	125 and 635	1.25 and 6.2	12.5 and 62	5 and 25	35	3.5	500
Y/13A	2 to1920 litre/h	0.05 to 55 Nm^3/h	500 and 5200 * 5000 and 21600	5 and 51 * 50 and 210	50 and 510 * 500 and 2100	20 and 205 * 200 and 850	100	10	1500
Y/13HA							420	41	6000

* Specified either range at order time

A2.2 Principles of Operation

When fluid passes through an integral orifice, a pressure difference will occur between upstream and downstream sides of the orifice. This differential pressure is proportional to the square of the flow rate and moves the transmitter capsule to operate transmitters.

A2.3 Installation

The Model Y15A transmitter must be mounted so that the diaphragm capsule is vertical.
Other models can be mounted in any position.
For other mounting details, refer to the transmitter installation instructions.

A2.4 Calibration

Yokogawa determines differential range of the transmitter from the fluid conditions provided by the customer, calculating equivalent flow rates and using nomographs. The instrument is calibrated according to the calculation and the nomograph so that its tolerance is ±5% of span. However, if more accurate measurement is required, recalibrate the instrument in-site with known fluid rates.
For calibration, the instrument should be checked at least at 0% and 70% of the rated flow. For calibration details, refer to the transmitter calibration procedure in the relevant transmitter Instruction Manual.

A2.5 Orifice Selection Nomograph

Figure A5 is a nomograph (based on metric (SI) units) and determination of defferential pressure for a given flow rate. To use the nomograph all fluid rates must be converted to water or air equivalents at standard temperature and pressure. Equations for approximate conversions are as follows:

(1) Equivalent Air Flow

$$= Q \sqrt{\frac{T}{273.15} \times G \times \frac{1.0332}{P}} \quad \ldots\ldots (1A)$$

Where Q = process gas flow rate at 0°C and atmospheric pressure – the flow unit is normal (standard) cubic meters per hour (Nm^3/h)
T = absolute temperature of process gas, K = °C + 273.15
G = ratio of process gas density to the density of air at the same conditions.
P = absolute pressure of the process gas – the pressure unit is kgf/cm^2 abs.

(2) Equivalent Water Flow

$$= V \times G_B \sqrt{\frac{1}{G_F}} \quad \ldots\ldots\ldots\ldots\ldots (2A)$$

Where V = process liquid flow rate at base temperature (4°C) – the flow unit is liters per hour (litre/h)
G_B = process liquid specific gravity at base temperature
G_F = process liquid specific gravity at flowing temperature

NOTE: The above equations are approximate. Viscosity and Reynolds Number corrections are disregarded. Precise calculations must include these factors.

A2.6 How to Use Nomograph

In Figure A5 enter the calculated flow rate (equivalent air or water flow) on the EQUIVALENT FLOW SCALE and select one of the six orifice sizes. Extend a line from the center of orifice mark through the calculated flow rate value to the differential pressure scale.
Figure A5 shows orifice selection and determination of differential range using a 200 litre/h flow. If a 4.039 mm bore orifice is selected, (dotted line (b)) differential range obtained is 1.58 mH_2O – if a 2.527 mm bore orifice is selected, (dotted line (a)) differential range obtained is 9.2 mH_2O.
The dotted lines (c) and (d) in Figure A5 indicate maximum or minimum flow rate of integral orifices. For flow rate higher than the maximum line (c), an ordinary orifice must be used. For flow rate lower than the minimum line (d), a special integral orifice must be used – for details, contact Yokogawa.

A2.7 Operating Cautions

To maximize instrument life and maintain accuracy, the fluid to be measured must not contain suspended solids. The fluid temperature limit is 120°C.

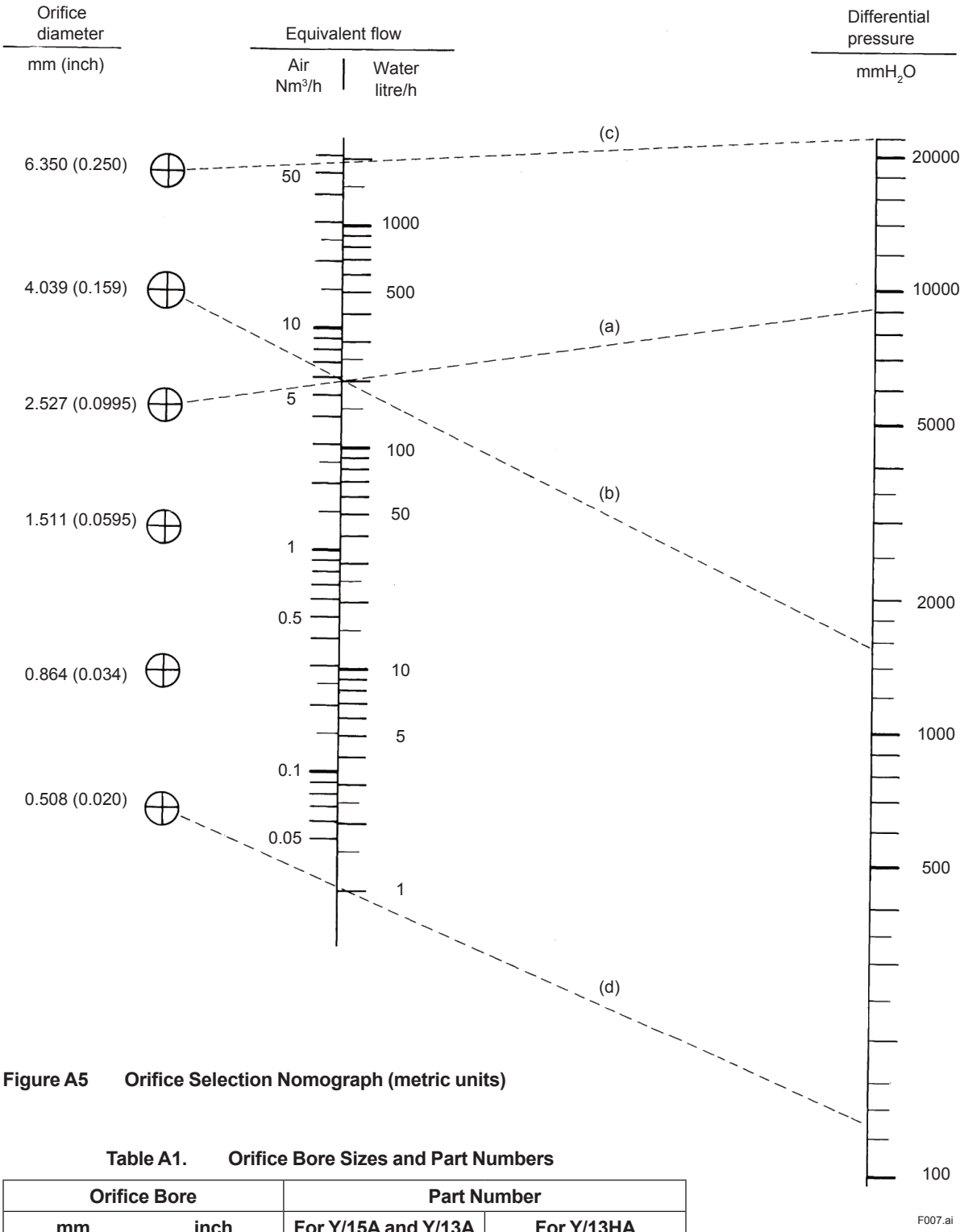


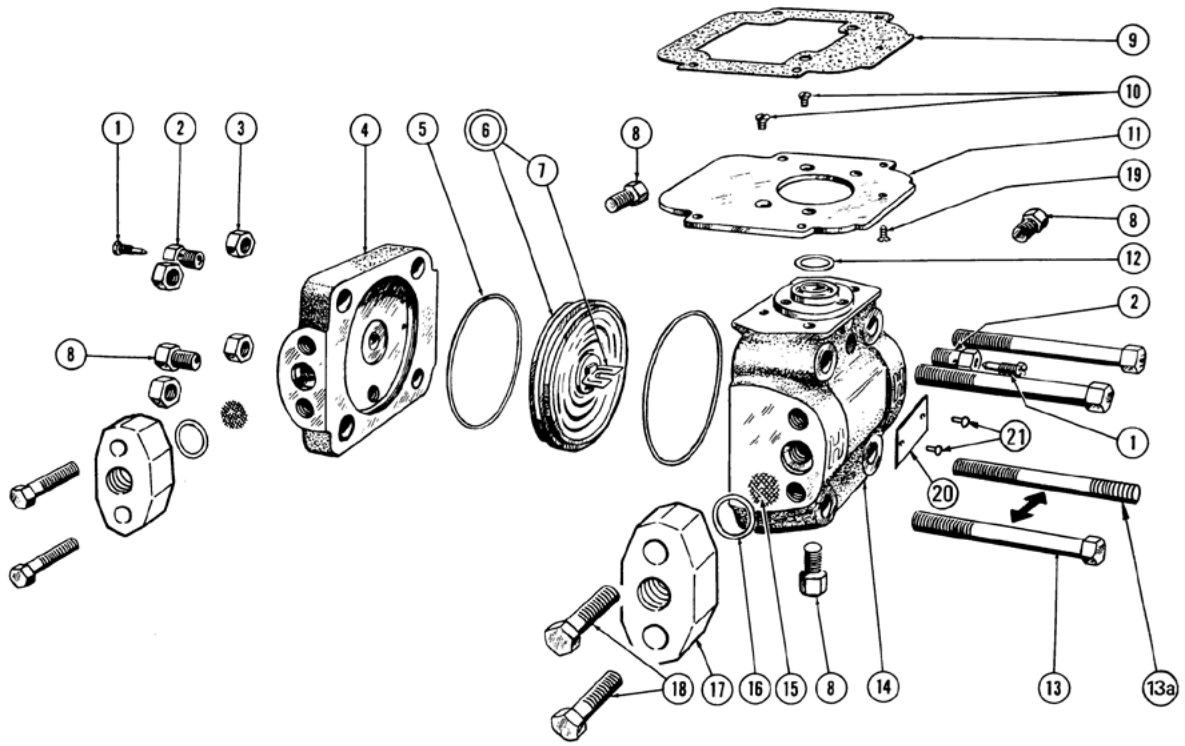
Figure A5 Orifice Selection Nomograph (metric units)

Table A1. Orifice Bore Sizes and Part Numbers

Orifice Bore		Part Number	
mm	**inch**	**For Y/15A and Y/13A**	**For Y/13HA**
0.508	0.020	D0117BW	0051066
0.864	0.034	D0117BX	0051067
1.511	0.0595	D0117BY	0051068
2.527	0.0995	D0117BZ	0051069
4.039	0.159	D0117CA	0051070
6.350	0.250	D0117CB	0051071
Set of six orifices (as described above)		D0117BT	F9101ZG

Customer Maintenance Parts List

Model Y/13A
PNEUMATIC DIFFERENTIAL PRESSURE TRANSMITTER (Style C)



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Item	Part No.	Qty	Description
1	D0114PB	2	Vent Screw SUS316 Stainless Steel (standard)
2	Below	2	Vent Plug (SUS316 Stainless Steel)
	D0114PA		ANSI connection
	P0101AB		JIS connection
3	Below		Nut
	X0104AB	4	SCM435 (standard)
	X0118AP	8	SUS630 Stainless Steel
4	See Table 1	1	Cover (see page 4)
5	Below	2	*Gasket
	F9202XQ		Teflon Coating SUS316 L s.s. (standard)
	D0114TP		Teflon (PTFE)(used for special material diaphragm assembly)
	F9101ZK		Teflon Coating SUS316L s.s. (clean for oxygen service)
6	See Table 2	1	Diaphragm Assemlby (see page 4)
7	See Table 2	1	Flexure Assembly (see page 4)
8	See Table 1	4	Plug (see page 4)
9	F9100AT	1	Gasket
10	0030597	2	10-32 × 3/8 F.H.Screw
11	U0102MK	1	Plate

Item	Part No.	Qty	Description
12	Below	1	*O-Ring
	U0102MY		Silicone Elastomer (standard)
	0051652		Glass Fiber Filled Teflon (to 190°C)
	F9101ZJ		Glass Fiber Filled Teflon (clean for oxygen service)
	F9202LZ		Neoprene (for ammonia service)
13	X0100BM	4	Bolt SCM435 (standard)
13a	F9101YA	4	Bolt SUS630 Stainless Steel
14	See Table 1	1	Body (see page 4)
15	D0114FL	2	*Screen SUS316 Stainless Steel (standard)
16	Below	2	*Gasket
	D0114RB		Teflon (PTFE)(standard)
	D0120AC		Chemloy (to 190°C)
	U0102XC		Teflon (clean for oxygen service)
17	See Table 1	2	Connector (see page 4)
18	Below	4	Cap Screw
	X0100MN		SCM435 (standard)
	F9273DZ		SUS630 Stainless Steel
19	X0100BX-J	1	Screw
20	—	1	Data Plate
21	0046879	2	Salf-tapping Screw

*Denotes parts more frequently replaced.

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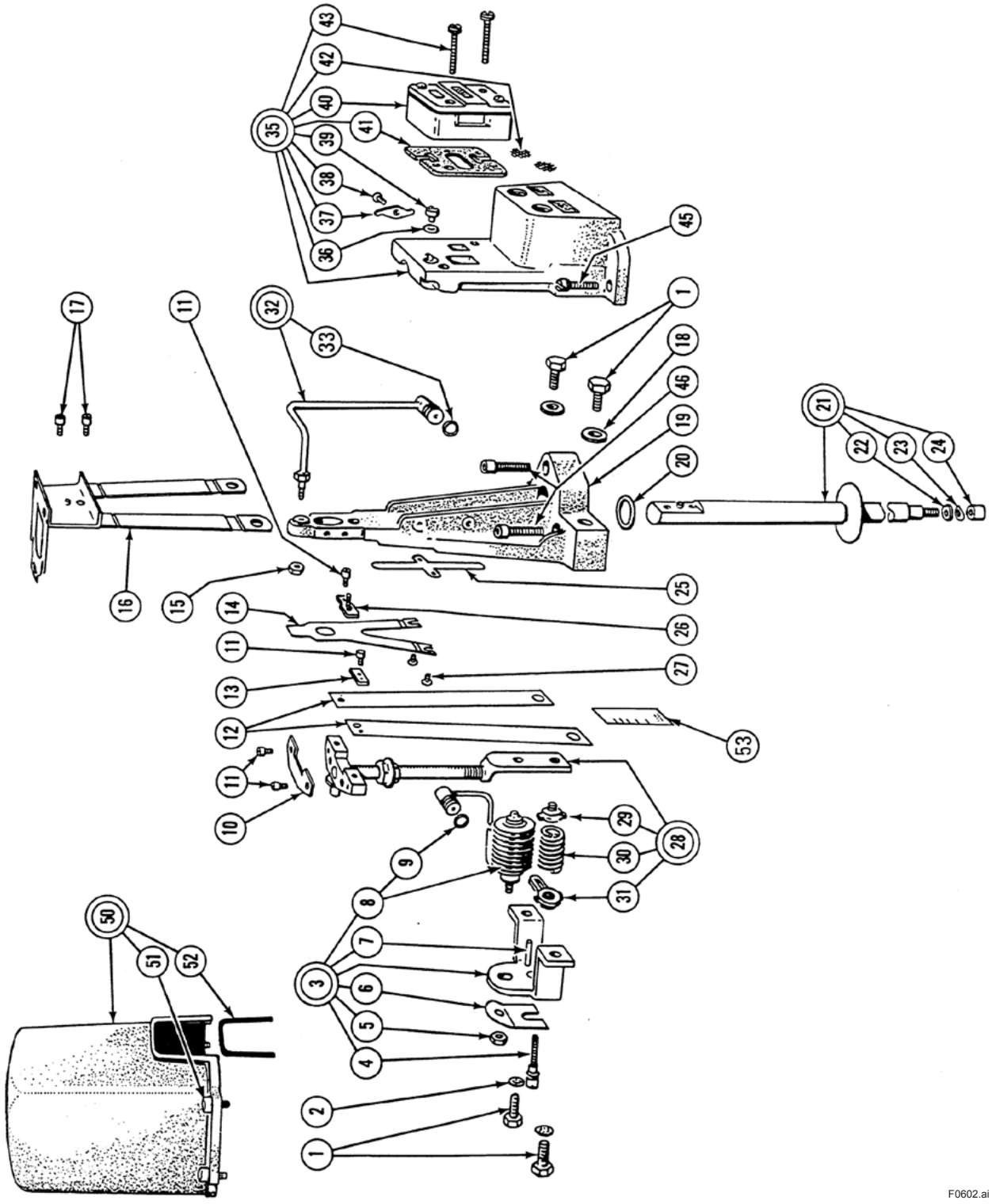
10th Edition: Apr. 2017(YK)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Force Balance Unit (items 1 through 33)

Part No.N0999SH: for Y/13A-M

Part No.N0999SM: for Y/13A-H

Part No.N0999SE: Low Spans

(for Y/13A- ☐ /LD)

Item	Part No.	Qty	Description
1	U0102LN	4	1/4-28 × 1/2 Hex H.Screw
2	0048219	2	Lockwasher
3	U0119TA	1	Bracket Assembly (N0999SH, N0999SM)
	U0119TF	1	Bracket Assembly (N0999SE)
4	U0102FY	1	Screw
5	0017611	1	Nut
6	U0102FZ	1	Spring
7	U0102NA	1	Pin
8	U0119TC	1	Bellows Assembly (N0999SH, N0999SM)
	U0119TG	1	Bellows Assembly (N0999SE)
9	D0123MZ	1	*O-Ring
10	U0102KP	1	Plate
11	X0100MK	4	6-32 × 3/16 Socket H.Cap Screw
12	U0102KL	2	Flexure
13	U0102LP	1	Plate
14	N0999MH	1	Flapper
15	X0104EB	1	Nut
16	N0999FM	1	Flexure Assembly
17	X0100ML	2	8-32 × 1/4 Socket H.Cap Screw
18	X0166MX	2	Washer
19	N0999ML	1	Base
20	N0143XN	1	O-Ring
21	N0143NL	1	Force Bar Assembly (SUS316 s.s.)
22	N0143SB	1	Washer (SUS316 s.s.)
23	U0102MX	1	Dished Washer (cobalt alloy)
24	U0102LE	1	Nut (SUS316 s.s.)
25	N0142NY	1	Spacer
26	U0102TE	1	Bracket Assembly
27	0023442	2	3-48 × 3/16 Fil.H.Screw
28	N0999MP	1	Range Bar Assembly (N0999SE)
	N0999QA	1	Range Bar Assembly (N0999SH, N0999SM)
29	U0102KR	1	Spring Holder
30	N0999MG	1	Spring (N0999QA)
	N0999MC	1	Spring (N0999MP)
31	U0102KC	1	Spring Holder
32	U0119TB	1	*Nozzle Assembly (N0999SH, N0999SE)
	U0119TD	1	*Nozzle Assembly (N0999SM)
33	D0123MZ	1	*O-Ring

Other Parts (items 35 through 53)

Item	Part No.	Qty	Description
35	D0124JD	1	Relay Mounting Assembly (ANSI connection)
	F9101DF	1	Relay Mounting Assembly (JIS connection)
36	A037744	1	*O-Ring
37	U0102MF	1	Clamp
38	X0100AA	1	6-32 × 7/32 Fil.H.Screw
39	D0124JG	1	*Restrictor
40	F9138YA	1	*Pneumatic Amplifier, 80A
41	C0100EM	1	*Gasket
42	U0103FP	2	*Screen
43	X0116CS	2	10-32 × 1 Pan H.Screw
45	0006535	2	10-32 × 3/4 Fil.H.Screw
46	X0100MM	3	1/4-28 × 3/4 Cap Screw
50	U0102MM	1	Cover Assembly
51	X0100RP	4	10-32 × 9/16 Hex H.Screw
52	U0102MS	1	Gasket
53	Below	1	Scale
	F9103AE		for M Range (kPa) (standard)
	F9103AF		for H Range (kPa) (standard)
	D0117BL		for M Range (psi)
	D0117FC		for H Range (psi)
	D0117BL-J		for M Range (kgf/cm^2)
	D0117FC-J		for H Range (kgf/cm^2)
-	N0138GA	1	Dashpot Assembly (not shown) (clean for oxygen service)

*Denotes parts more frequently replaced.

Table 1 Cover,Plug,Body and Connector Part Number

Item No.	Description	SUS316 Stainless Steel	
		ANSI	JIS
4	Cover	D0114RY	F9101AJ
8	Plug	D0114RZ	F9200CS
14	Body	D0114RX	F9101AF
17	Connetor,1/2	F9277YZ*	F9277YY*
	Connector,1/4	F9277YX*	F9277YW*

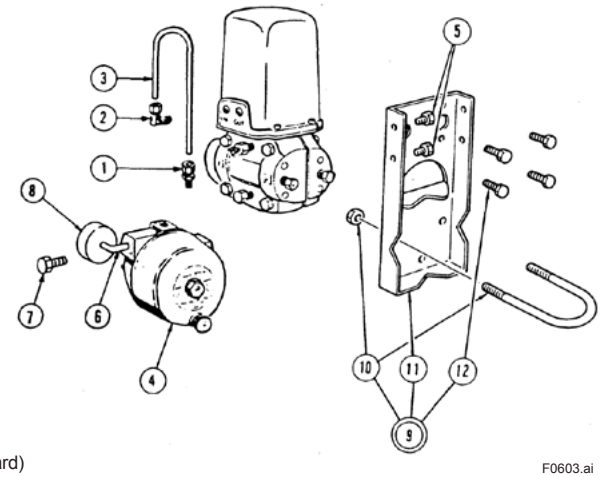
*:SCS14A

Table 2 Diaphragm Assembly Part Number

Capsule	Material	Diaphragm Assembly (item 6)	Flexure Assembly (item 7)
Medium Range Capsule	SUS316L Stainless Steel (standard)	N0142NU	F9200LL
	SUS316L s.s.(oxygen service)	N0148UB	F9200LL
	High Viscosity Fill (SUS316L s.s.)	F9200SR	F9200LL
High Range Capsule	SUS316L Stainless Steel (standard)	F9200MM	Not Removable
	SUS316L s.s. (oxygen service)	A0129CA	

Integral Air Filter Set and Mounting Set

Item	Part No.	Qty	Description
1	0050386	1	Connector Assembly (JIS connection)(prior to Aug.1987)
	0050325	1	Connector Assembly (ANSI connection)(prior to Aug.1987)
	G9611AD	1	Connector Assembly (JIS connection)(since Aug.1987)
	G9611AW	1	Connector Assembly (ANSI connection)(since Aug.1987)
2	0050392	1	Elbow Assembly (JIS connection) (prior to Aug.1987)
	0050332	1	Elbow Assembly (ANSI connection) (prior to Aug.1987)
	G9611CD	1	Elbow Assembly (JIS connection) (since Aug.1987)
	G9611CN	1	Elbow Assembly (ANSI connection) (since Aug.1987)
3	0051229	1	Tube (prior to Aug.1987)
	F9101EK	1	Tube (since Aug.1987)
4	F9140DA-C	1	Filter-Regulator (JIS connection)
	F9140DB-C	1	Filter-Regulator (ANSI connection)
5	F9147MQ	2	1/4-20 × 1/2 H.H.Screw
6	Below	1	Elbow
	G9612DB		For JIS connection } Prior to
	G9612DD		For ANSI connection } Apr.1998
	F9140FH		For JIS connection } Since
	F9140FJ		For ANSI connection } Apr.1998
7	F9145BF	1	Plug (JIS connection)
	D0114PN	1	Plug (ANSI connection)
8	See Table 3	1	Pressure Gauge
9	D0117XL	1	Mounting Set
10	D0117XL-A	1	U-Bolt/Nut Assembly
11	F9270AX	1	Bracket
12	Below	4	7/16-20 × 5/8 Cap Screw
	F9270AY		S10C,S12C or S15C Carbon Steel (standard)
	F9273CZ		SUS630 Stainless Steel



F0603.ai

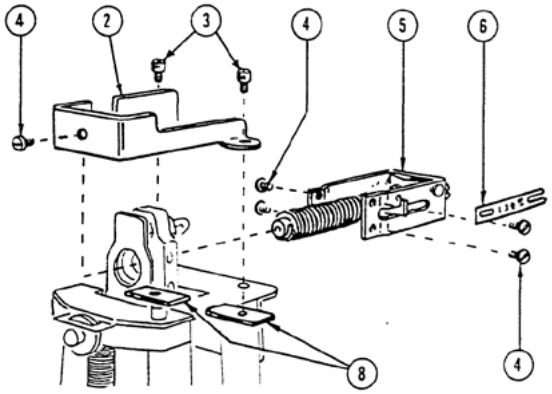
Table 3 Pressure gauge

Suffix Code	Prior to Apr.1998	Since Apr.1998
/G(N)AS-FM	G9615AA	G9615AT
/G(N)AS-FE	G9615AE	G9615EK
/G(N)AS-FP(0 to 200 kPa)	G9615AH	G9615EA
/G(N)AS-FB(0 to 2 bar)	G9615AM	G9615EC

Note) In order for gauge shipped befor April, 1998 to be replaced, please use gauge and elbow, which part numbers are effective April,1998.

Zero Elevation Kit

(Suffix Code : L)

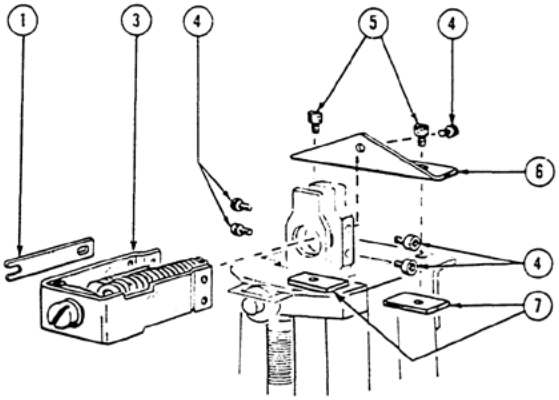


F0604.ai

Item	Part No.	Qty	Description
—	U0122BS	1	Zero Elevation Kit (standard)
2	U0122BT	1	Bracket
3	A0100YC	2	6-32 × 1/4 Socket H.Screw
4	F9147CV	5	5-40 × 5/32 Pan H.Screw
5	U0122BB	1	Spring Assembly
6	U0102TF	1	Scale (MIN-MAX)
8	N0138BS	2	Plate

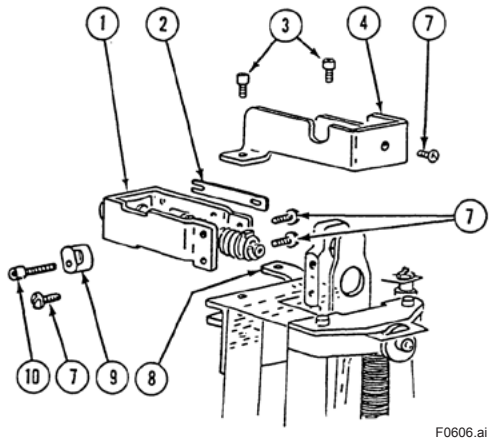
Zero Suppression Kit

(Suffix Code : R)



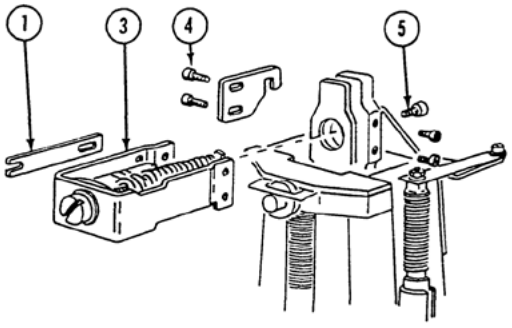
F0605.ai

Item	Part No.	Qty	Description
—	U0122BA	1	Zero Suppression Kit (standard)
1	U0102TF	1	Scale (MIN-MAX)
3	U0122BB	1	Spring Assembly
4	F9147CV	5	5-40 × 3/16 Socket H.Screw
5	A0100YC	2	6-32 × 1/4 Socket H.Screw
6	U0102RW	1	Bracket
7	N0138BS	2	Plate



F0606.ai

Item	Part No.	Qty	Description
—	U0122BZ	1	Zero Elevation Kit (clean for oxygen service)
1	U0122BB	1	Spring Assembly
2	U0102TF	1	Scale (MIN-MAX)
3	A0100YC	2	6-32 × 1/4 Socket H.Screw
4	U0122BT	1	Bracket
7	F9147CV	4	5-40 × 5/32 Pan H.Screw
8	F9100EW	1	Bracket
9	U0122BX	1	Stop
10	U0122BY	1	5-40 × 1/2 Socket H.Screw

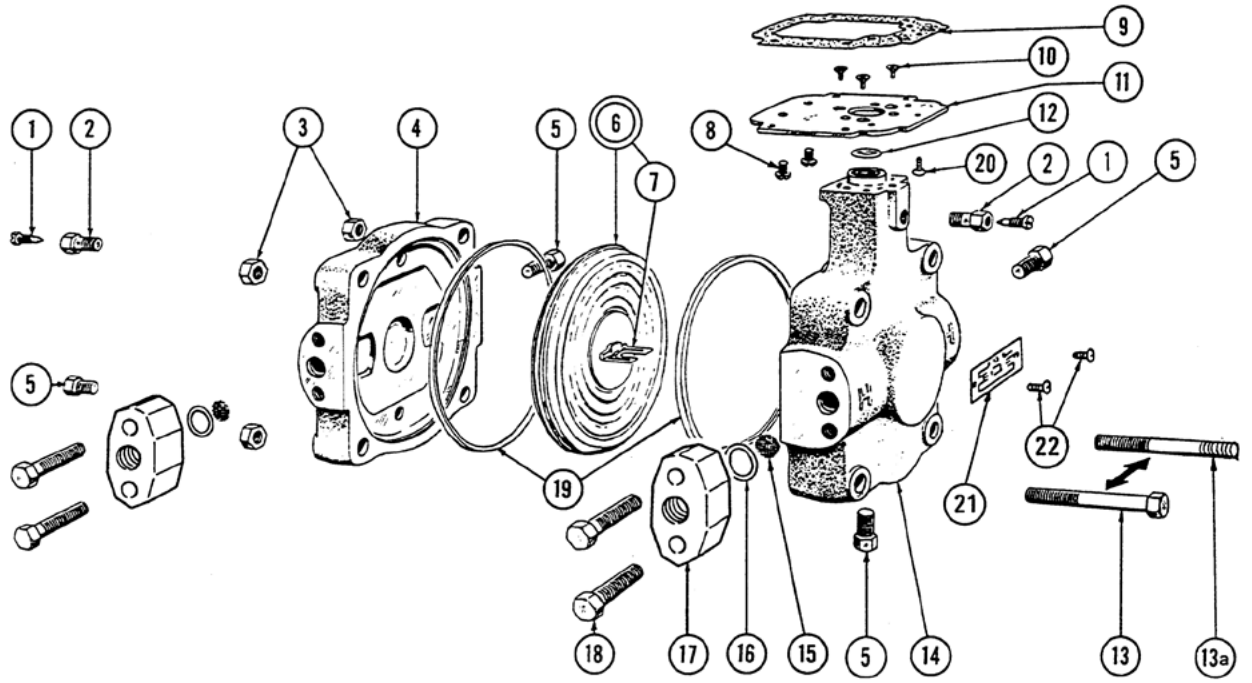


F0607.ai

Item	Part No.	Qty	Description
—	U0122BN	1	Zero Suppression Kit (clean for oxygen service)
1	U0102TF	1	Scale (MIN-MAX)
3	U0122BB	1	Spring Assembly
4	X0116ET	2	5-40 × 1/4 Screw
5	F9147CV	3	5-40 × 3/16 Screw

Customer Maintenance Parts List

Model Y/15A
PNEUMATIC DIFFERENTIAL PRESSURE TRANSMITTER (Style C)



F0701.ai

Item	Part No.	Qty	Description
1	D0114PB	2	Vent Screw (SUS 316 Stainless Steel)
2	Below	2	Vent Plug (SUS 316 Stainless Steel)
	F9101AB		JIS connection
	D0114PA		ANSI connection
3	Below		Nut
	X0104AB	4	SCM435 (standard)
	X0118AP	8	SUS630 Stainless Steel
4	See Table 1	1	Cover (see page 5)
5	See Table 1	4	Plug (see page 5)
6	Below	1	Diaphragm Assembly (SUS 316L s.s.)
	N0150TN		Silicone Filled (standard)
	N0150TP		Fluorolube Filled (clean for oxygen service)
	F9200SQ		High Viscosity Fill
7	F9200LL	1	Flexure Assembly
8	X0100SB	2	1/4-28 x 3/8 R.H.Screw
9	F9100AT	1	Gasket
10	0012691	3	8-32 x 3/8 F.H.Screw
11	U0102RC	1	Plate
12	Below	1	*O-Ring
	U0102MY		Silicone Elastomer (standard)
	0051652		Glass Fiber Filled Teflon (to 190°C)
	F9101ZJ		Glass Fiber Filled Teflon (clean for oxygen service)
	F9202LZ		Neoprene (for ammonia service)

Item	Part No.	Qty	Description
13	X0100BM	4	Bolt (SCM435) (standard)
13a	F9101YA	4	Bolt (SUS630 Stainless Steel)
14	See Table 1	1	Body (see page 5)
15	D0114FL	2	*Screen (SUS 316 Stainless Steel)
16	Below	2	*Gasket
	D0114RB		Teflon (PTFE) (standard)
	D0120AC		Chemloy (to 190°C)
	U0102XC		Teflon (clean for oxygen service)
17	See Table 1	2	Connector (see page 5)
18	Below	4	Cap Screw
	X0100MN		SCM435 (standard)
	F9273DZ		SUS630 Stainless Steel
19	Below	2	*Gasket
	F9202QW		Teflon Coating SUS 316 L s.s. (standard)
	F9101ZL		Teflon Coating SUS 316 L s.s. (clean for oxygen service)
20	X0100BX-J	1	Screw
21	—	1	Data Plate
22	0046879	2	Self-tapping Screw

Note: *Denotes parts more frequently replaced.

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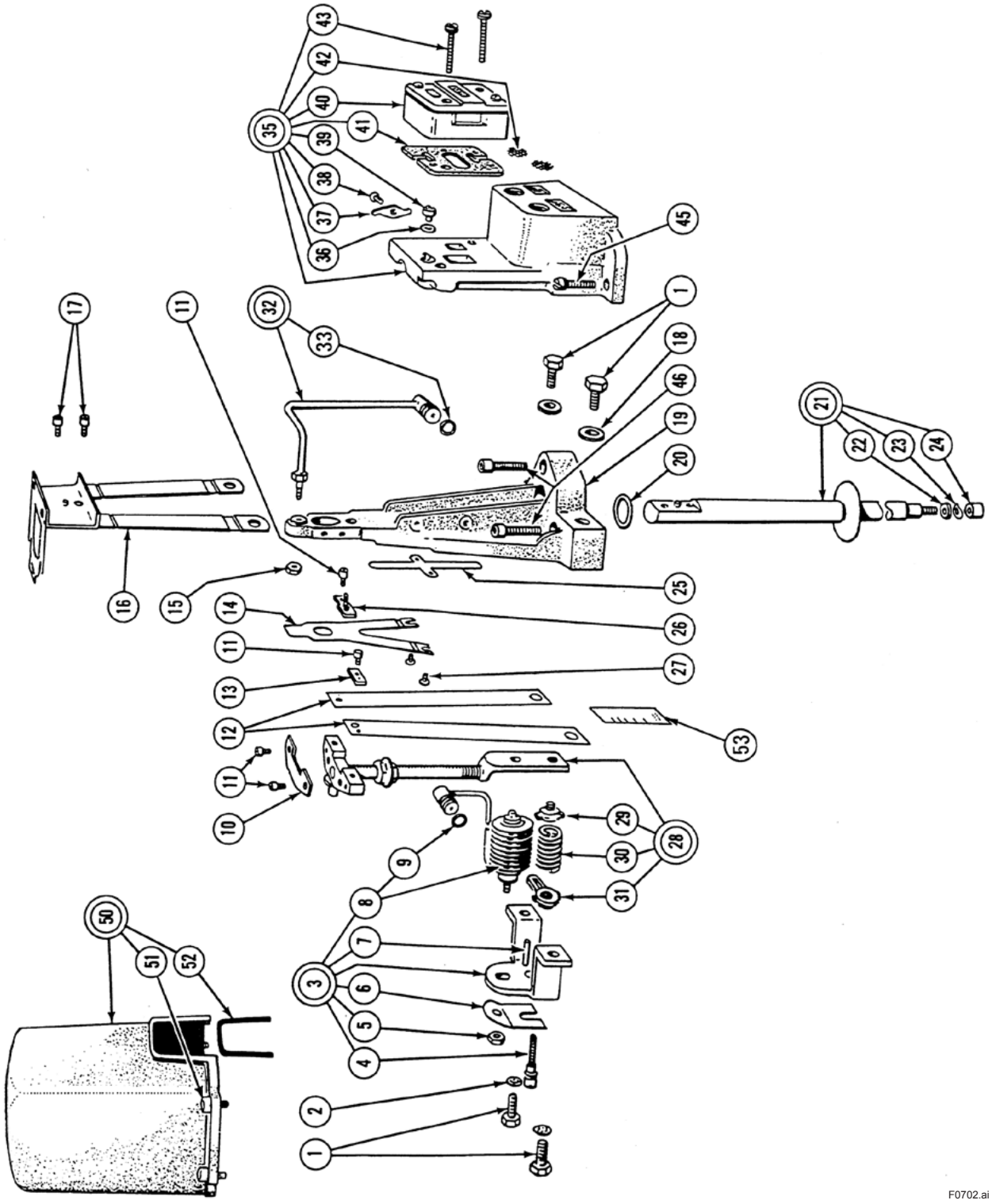
9th Edition: Apr. 2017(YK)


F0702.ai

Force Balance Unit (items 1 through 33)

Part No.N0999SL: Standard

Part No.N0999SG: Low Spans
(for Y/15A-□ /LD)

Item	Part No.	Qty	Description
1	U0102LN	4	1/4-28 × 1/2 Hex H.Screw
2	0048219	2	Lockwasher
3	U0119TA	1	Bracket Assembly (N0999SL)
	U0119TF	1	Bracket Assembly (N0999SG)
4	U0102FY	1	Screw
5	0017611	1	Nut
6	U0102FZ	1	Spring
7	U0102NA	1	Pin
8	U0119TC	1	Bellows Assembly (N0999SL)
	U0119TG	1	Bellows Assembly (N0999SG)
9	D0123MZ	1	*O-Ring
10	U0102KP	1	Plate
11	X0100MK	4	6-32 × 3/16 Socket H.Cap Screw
12	U0102KL	2	Flexure
13	U0102LP	1	Plate
14	N0999MH	1	Flapper
15	X0104EB	1	Nut
16	N0999FM	1	Flexure Assembly
17	X0100ML	2	8-32 × 1/4 Socket H.Cap Screw
18	X0166MX	2	Washer
19	N0999ML	1	Base
20	N0143XN	1	O-Ring
21	N0143MK	1	Force Bar Assembly (SUS 316 s.s.)
22	N0143SB	1	Washer (SUS 316 s.s.)
23	U0102MX	1	Dished Washer (cobalt alloy)
24	U0102LE	1	Nut (SUS 316 s.s.)
25	N0142NY	1	Spacer
26	U0102TE	1	Bracket Assembly
27	0023442	2	3-48 × 3/16 Fil.H.Screw
28	N0999MP	1	Range Bar Assembly (N0999SG)
	N0999QA	1	Range Bar Assembly (N0999SL)
29	U0102KR	1	Spring Holder
30	N0999MG	1	Spring (N0999QA)
	N0999MC	1	Spring (N0999MP)
31	U0102KC	1	Spring Holder
32	U0119TB	1	*Nozzle Assembly
33	D0123MZ	1	*O-Ring

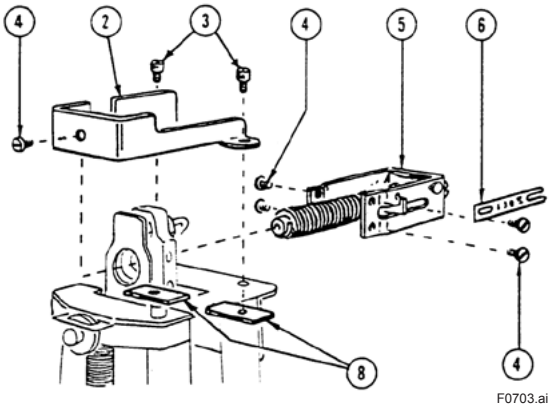
Other Parts (items 35 through 53)

Item	Part No.	Qty	Description
35	D0124JD	1	Relay Mounting Assembly (ANSI connection)
	F9101DF	1	Relay Mounting Assembly (JIS connection)
36	A037744	1	*O-Ring
37	U0102MF	1	Clamp
38	X0100AA	1	6-32 × 7/32 Fil.H.Screw
39	D0124JG	1	*Restrictor
40	F9138YA	1	*Pneumatic Amplifier,80A
41	C0100EM	1	*Gasket
42	U0103FP	2	*Screen
43	X0116CS	2	10-32 × 1 Pan H.Screw
45	0006535	2	10-32 × 3/4 Fil.H.Screw
46	X0100YC	3	1/4-28 × 7/8 Cap Screw
50	U0102MM	1	Cover Assembly
51	X0100RP	4	10-32 × 9/16 Hex H.Screw
52	U0102MS	1	Gasket
53	Below	1	Scale
	F9103AD		(kPa) (standard)
	D0117TX		(psi)
	D0117TX-J		(kgf/cm^2)
-	N0138GA	1	Dashpot Assembly (not shown) (clean for oxygen service)

* Denotes parts more frequently replaced.

Zero Elevation Kit

(Suffix Code : L)

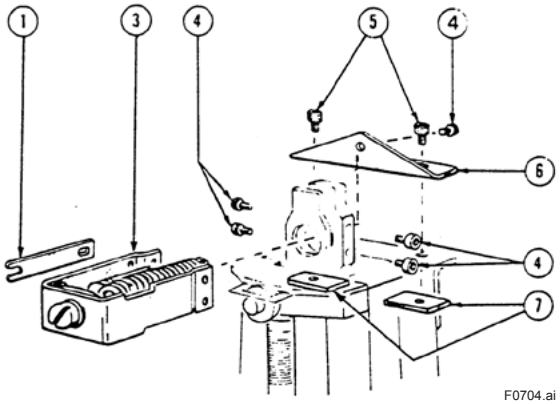


F0703.ai

Item	Part No.	Qty	Description
-	U0122BS	1	Zero Elevation Kit (standard)
2	U0122BT	1	Bracket
3	A0100YC	2	6-32 × 1/4 Socket H.Screw
4	F9147CV	5	5-40 × 5/32 Pan H.Screw
5	U0122BB	1	Spring Assembly
6	U0102TF	1	Scale (MIN-MAX)
8	N0138BS	2	Plate

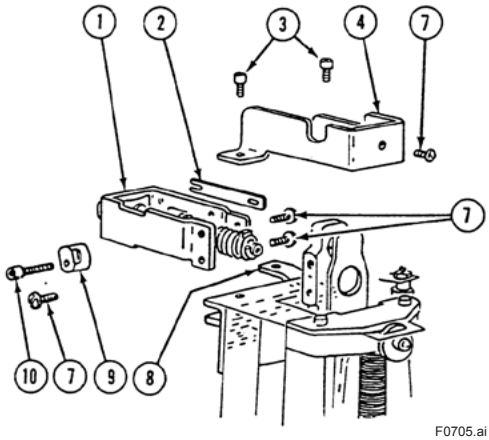
Zero Suppression Kit

(Suffix Code : R)



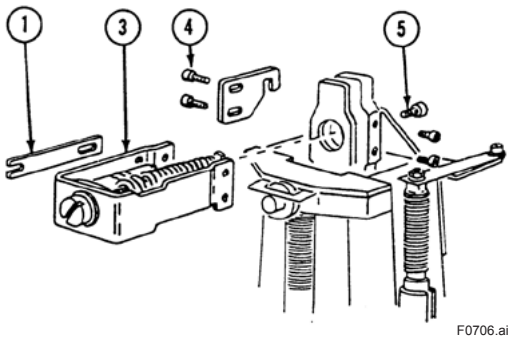
F0704.ai

Item	Part No.	Qty	Description
-	U0122BA	1	Zero Suppression Kit (standard)
1	U0102TF	1	Scale (MIN-MAX)
3	U0122BB	1	Spring Assembly
4	F9147CV	5	5-40 × 3/16 Socket H.Screw
5	A0100YC	2	6-32 × 1/4 Socket H.Screw
6	U0102RW	1	Bracket
7	N0138BS	2	Plate
8	F9147CV	1	5-40 × 5/32 Pan H.Screw



F0705.ai

Item	Part No.	Qty	Description
-	U0122BZ	1	Zero Elevation Kit (clean for oxygen service)
1	U0122BB	1	Spring Assembly
2	U0102TF	1	Scale (MIN-MAX)
3	A0100YC	2	6-32 × 1/4 Socket H.Screw
4	U0122BT	1	Bracket
7	F9147CV	4	5-40 × 5/32 Pan H.Screw
8	F9100EW	1	Bracket
9	U0122BX	1	Stop
10	U0122BY	1	5-40 × 1/2 Socket H.Screw



F0706.ai

Item	Part No.	Qty	Description
-	U0122BN	1	Zero Suppression Kit (clean for oxygen service)
1	U0102TF	1	Scale (MIN-MAX)
3	U0122BB	1	Spring Assembly
4	X0116ET	2	5-40 × 1/4 Screw
5	F9147CV	3	5-40 × 3/16 Screw

Integral Air Filter Set and Mounting Set

Item	Part No.	Qty	Description
1	0050386	1	Connector Assembly (JIS connection) (prior to Aug.1987)
	0050325	1	Connector Assembly (ANSI connection) (prior to Aug.1987)
	G9611AD	1	Connector Assembly (JIS connection) (since Aug.1987)
	G9611AW	1	Connector Assembly (ANSI connection) (since Aug.1987)
2	0050392	1	Elbow Assembly (JIS connection)(prior to Aug.1987)
	0050332	1	Elbow Assembly (ANSI connection)(prior to Aug.1987)
	G9611CD	1	Elbow Assembly (JIS connection)(since Aug.1987)
	G9611CN	1	Elbow Assembly (ANSI connection)(since Aug.1987)
3	0051231	1	Tube (prior to Aug.1987)
	F9101EL	1	Tube (since Aug.1987)
4	F9140DA-C	1	Filter-Regulator (JIS connection)
	F9140DB-C	1	Filter-Regulator (ANSI connection)
5	F9147MQ	2	1/4-20 × 1/2 H.H.Screw
6	Below	1	Elbow
	G9612DB		For JIS connection } Prior to
	G9612DD		For ANSI connection } Apr.1998
	F9140FH		For JIS connection } Since
	F9140FJ		For ANSI connection } Apr.1998
7	F9145BF	1	Plug (JIS connection)
	D0114PN	1	Plug (ANSI connection)
8	See Table 2	1	Pressure Gauge
9	D0117XL	1	Mounting Set
10	D0117XL-A	1	U-Bolt/Nut Assembly
11	F9270AX	1	Bracket
12	Below	4	7/16-20 × 5/8 Cap Screw
	F9270AY		S10C,S12C or S15C Carbon Steel (standard)
	F9273CZ		SUS630 Stainless Steel

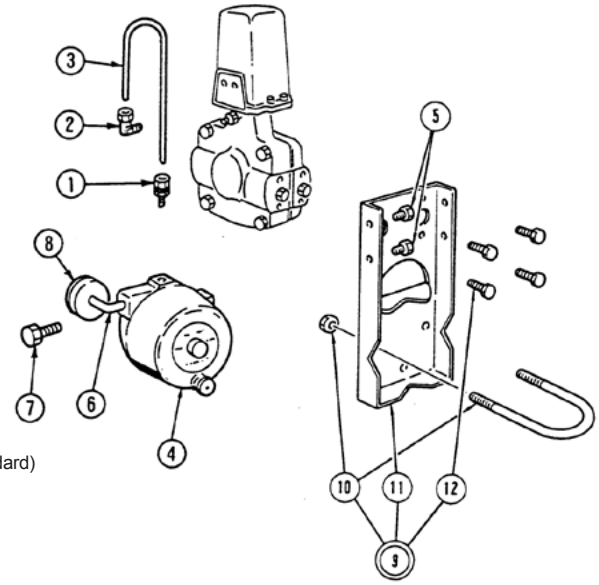


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Table 1 Cover, Plug, Body and Connector Part Number (Parts are illustrated on Page 1)

Item No.	Description	SUS 316 Stainless Steel	
		ANSI	JIS
4	Cover	D0117TT	F9101GD
5	Plug	D0114RZ	F9200CS
14	Body	D0117TS	F9101GB
17	Connector,1/2	F9277YZ*	F9277YY*
	Connector,1/4	F9277YX*	F9277YW*

*:SCS14A

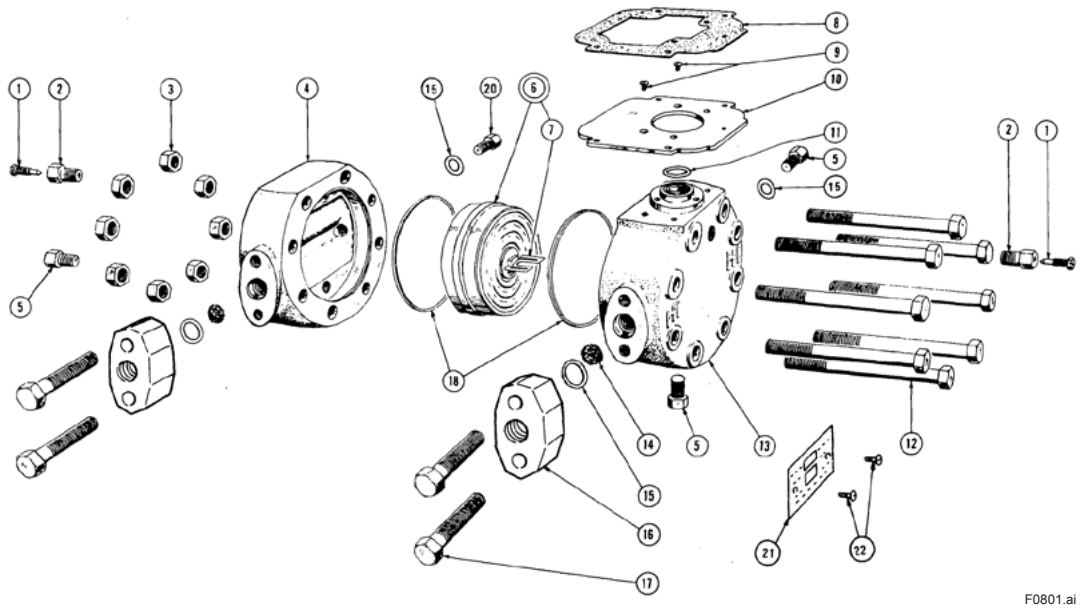
Table 2 Pressure Gauge

Suffix Code	Prior to Apr.1998	Since Apr.1998
/G(N)AS-FM	G9615AA	G9615AT
/G(N)AS-FE	G9615AE	G9615EK
/G(N)AS-FP(0 to 200 kPa)	G9615AH	G9615EA
/G(N)AS-FB(0 to 2 bar)	G9615AM	G9615EC

Note) In order for gauge shipped befor April, 1998 to be replaced,please use gauge and elbow, which part numbers are effective April, 1998.

Customer Maintenance Parts List

Model Y/13HA
PNEUMATIC DIFFERENTIAL PRESSURE TRANSMITTER (Style C)



Item	Part No.	Qty	Description
1	D0114PB	2	Vent Screw (SUS 316 Stainless Steel)
2	Below	2	Vent Plug (SUS 316 Stainless Steel)
	D0114PA		ANSI connection
	P0101AB		JIS connection
3	Below	8	Nut
	X0104ET		SCM435 (standard)
	X0118AW		SUS630 Stainless Steel
4	Below	1	Cover (SUS 316 Stainless Steel)
	0051027		ANSI connection
	F9101ED		JIS connection
5	Below	2	Plug (SUS 316 Stainless Steel)
	D0114RZ		ANSI connection
	F9200CS		JIS connection
6	See Table 1	1	Diaphragm Assembly (SUS 316L s.s.)
7	See Table 1	1	Flexure Assembly (SUS 316L s.s.)
8	F9100AT	1	Gasket
9	0030597	2	10-32 × 3/8 F.H.Screw
10	U0102MK	1	Plate
11	Below	1	*O-Ring
	U0102TB		Buna N (standard)
	0051652		Glass Fiber Filled Teflon (to 190 °C)
	F9101ZJ		Glass Fiber Filled Teflon (clean for oxygen service)
	F9202LZ		Neoprene (for ammonia service)
12	Below	8	Bolt
	X0116AR		SCM435 (standard)
	X0118AT		SUS630 Stainless Steel
13	Below	1	Body (SUS 316 Stainless Steel)
	0051025		ANSI connection
	F9101EB		JIS connection
14	F9101EJ	2	Screen (SUS 316 Stainless Steel)
15	Below	4	*Gasket
	0051024		Chemloy (standard)
	F9101ZT		Clean for Oxygen Service

Item	Part No.	Qty	Description
16	Below	2	Connector (SUS 316 Stainless Steel)
	0051022		ANSI 1/2 NPT female
	0051021		ANSI 1/4 NPT female
	F9101EG		JIS Rc 1/2 female
	F9101EF		JIS Rc 1/4 female
	0051062		1/2 inch Sch. 160 Pipe Butt Weld
	0051059		1/4 inch Sch. 80 Pipe Butt Weld
17	Below	4	Cap Screw
	F9147BP		SCM435 (standard)
	F9101YZ		SUS630 Stainless Steel
18	Below	2	*Teflon Coating Metal Gasket
	F9202XQ		Standard
	F9101ZK		Clean for Oxygen Service
20	Below	2	Plug (SUS 316 Stainless Steel)
	F9101EH		JIS connection
	0051031		ANSI connection
21		1	Data Plate
22	0046879	2	Self-tapping Screw

Note: *Denotes parts more frequently replaced.

Table 1.

Model	Description	Diaphragm Assembly Item 6	Flexure Assembly Item 7
Y/13HA-M	Silicone Filled (standard)	F9200NP	F9200LL
	Fluorolube Filled (oxygen service)	N0148RZ	
	High Viscosity Fill	F9200LW	
Y/13HA-H	Silicone Filled (standard)	F9200NA	Not Removable
	Fluorolube Filled (oxygen service)	A0129CE	

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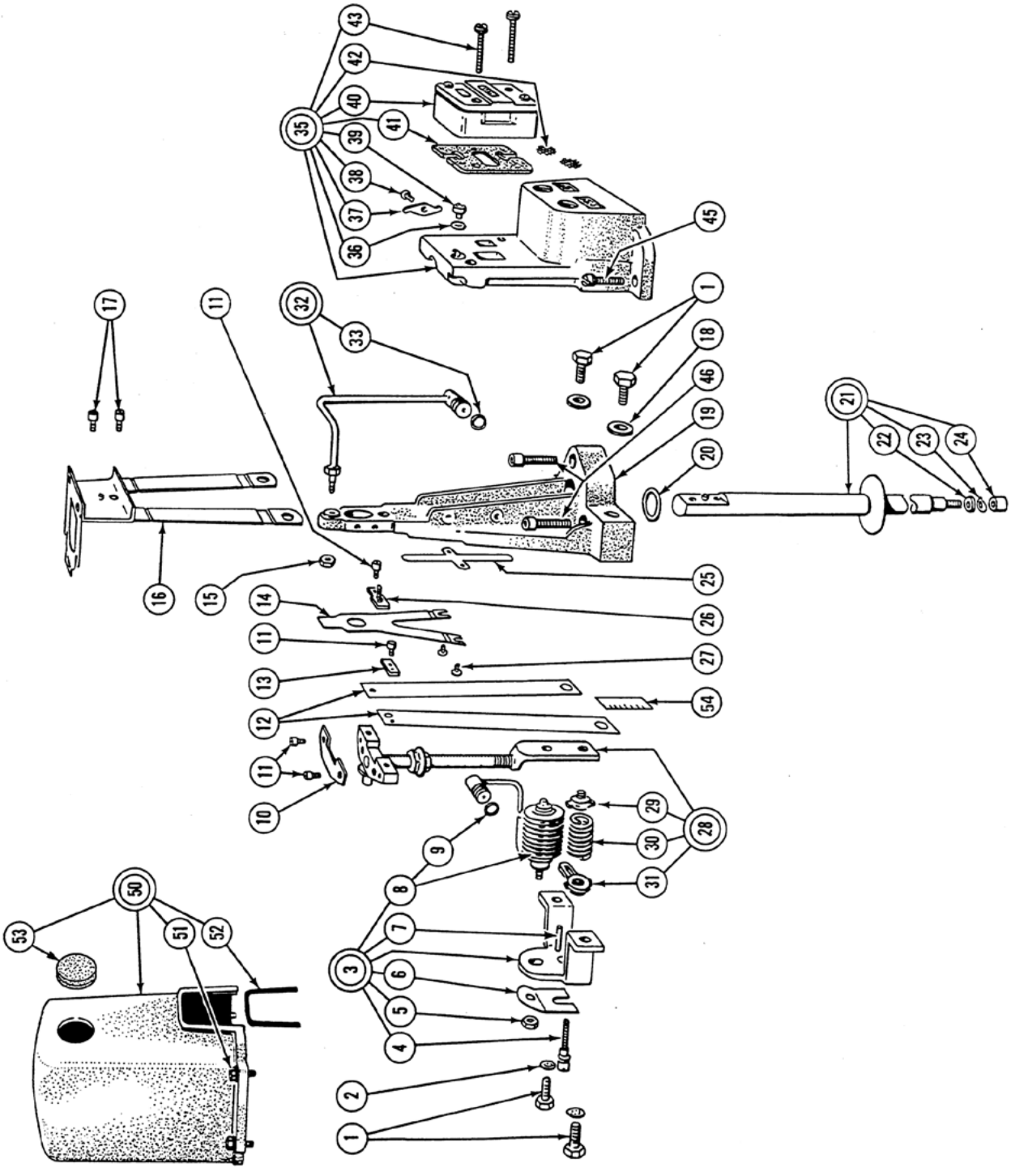
CMPL 02C01C03-01E
9th Edition: Nov. 2012(YK)


F0802.ai

Force Balance Unit (items 1 through 33)

Part No. N0999SJ: Standard

Part No. N0999SF: Low Spans
(for Model Y/13HA- ☐ /LD)

Item	Part No.	Qty	Description
1	U0102LN	4	1/4-28 × 1/2 Hex H.Screw
2	0048219	2	Lockwasher
3	U0119TA	1	Bracket Assembly (N0999SJ)
	U0119TF	1	Bracket Assembly (N0999SF)
4	U0102FY	1	Screw
5	0017611	1	Nut
6	U0102FZ	1	Spring
7	U0102NA	1	Pin
8	U0119TC	1	Bellows Assembly (N0999SJ)
	U0119TG	1	Bellows Assembly (N0999SF)
9	D0123MZ	1	*O-Ring
10	U0102KP	1	Plate
11	X0100MK	4	6-32 × 3/16 Socket H.Cap Screw
12	U0102KL	2	Flexure
13	U0102LP	1	Plate
14	N0999MH	1	Flapper
15	X0104EB	1	Nut
16	N0999FM	1	Flexure Assembly
17	X0100ML	2	8-32 × 1/4 Socket H.Cap Screw
18	X0166MX	2	Washer
19	N0999ML	1	Base
20	N0143XN	1	O-Ring
21	N0143ML	1	Force Bar Assembly (SUS 316 s.s.)
22	N0143SB	1	Washer (SUS 316 s.s.)
23	U0102MX	1	Dished Washer (cobalt alloy)
24	U0102LE	1	Nut (SUS 316 s.s.)
25	N0142NY	1	Spacer
26	U0102TE	1	Bracket Assembly
27	0023442	2	3-48 × 3/16 Fil.H.Screw
28	N0999MP	1	Range Bar Assembly (N0999SF)
	NO999QA	1	Range Bar Assembly (N0999SJ)
29	U0102KR	1	Spring Holder
30	N0999MG	1	Spring (N0999QA)
	N0999MC	1	Spring (N0999MP)
31	U0102KC	1	Spring Holder
32	U0119TB	1	*Nozzle Assembly
33	D0123MZ	1	*O-Ring

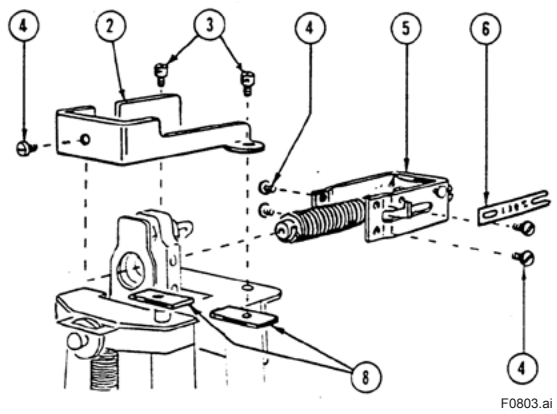
Other Parts (items 35 through 54)

Item	Part No.	Qty	Description
35	D0124JD	1	Relay Mounting Assembly (ANSI connection)
	F9101DF	1	Relay Mounting Assembly (JIS connection)
36	A037744	1	*O-Ring
37	U0102MF	1	Clamp
38	X0100AA	1	6-32 × 7/32 Fil.H.Screw
39	D0124JG	1	*Restrictor
40	F9138YA	1	*Pneumatic Amplifier, 80A
41	C0100EM	1	*Gasket
42	U0103FP	2	*Screen
43	X0116CS	2	10-32 × 1 Pan H.Screw
45	0006535	2	10-32 × 3/4 Fil.H.Screw
46	X0100YC	3	1/4-28 × 7/8 Cap Screw
50	U0102TL	1	Cover Assembly
51	X0100RP	4	10-32 × 9/16 Hex H.Screw
52	U0102MS	1	Gasket
53	U0102TN	1	Safety Plug (glomet)
54	Below	1	Scale
	F9103AE		for M Range (kPa) (standard)
	F9103AF		for H Range (kPa) (standard)
	D0117BL		for M Range (psi)
	D0117FC		for H Range (psi)
	D0117BL-J		for M Range (kgf/cm^2)
	D0117FC-J		for H Range (kgf/cm^2)
-	N0138GA	1	Dashpot Assembly (not shown) (clean for oxygen service)

* Denotes parts more frequently replaced.

Zero Elevation Kit

(Suffix Code : L)



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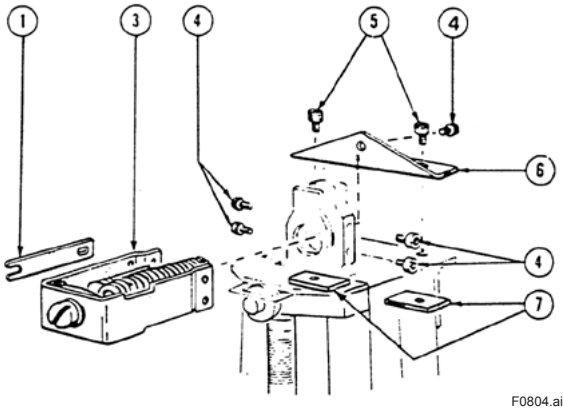
Item	Part No.	Qty	Description
-	U0122BS	1	Zero Elevation Kit (standard)
2	U0122BT	1	Bracket
3	A0100YC	2	6-32 × 1/4 Socket H.Screw
4	F9147CV	5	5-40 × 5/32 Pan H.Screw
5	U0122BB	1	Spring Assembly
6	U0102TF	1	Scale (MIN-MAX)
8	N0138BS	2	Plate

Zero Suppression Kit

(Suffix Code : R)



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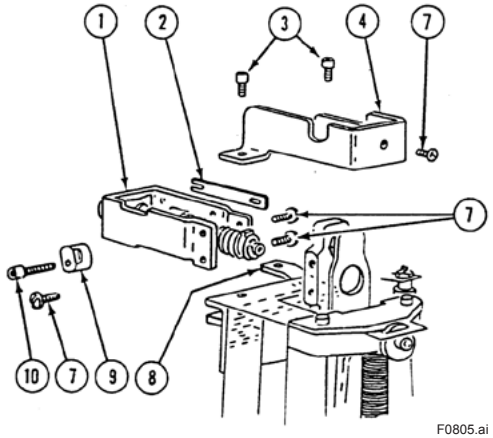
Item	Part No.	Qty	Description
-	U0122BA	1	Zero Suppression Kit (standard)
1	U0102TF	1	Scale (MIN-MAX)
3	U0122BB	1	Spring Assembly
4	F9147CV	5	5-40 × 3/16 Socket H.Screw
5	A0100YC	2	6-32 × 1/4 Socket H.Screw
6	U0102RW	1	Bracket
7	N0138BS	2	Plate



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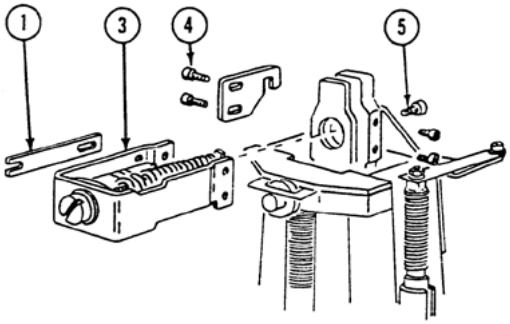
Item	Part No.	Qty	Description
-	U0122BZ	1	Zero Elevation Kit (clean for oxygen service)
1	U0122BB	1	Spring Assembly
2	U0102TF	1	Scale (MIN-MAX)
3	A0100YC	2	6-32 × 1/4 Socket H.Screw
4	U0122BT	1	Bracket
7	F9147CV	4	5-40 × 5/32 Pan H.Screw
8	F9100EW	1	Bracket
9	U0122BX	1	Stop
10	U0122BY	1	5-40 × 1/2 Socket H.Screw



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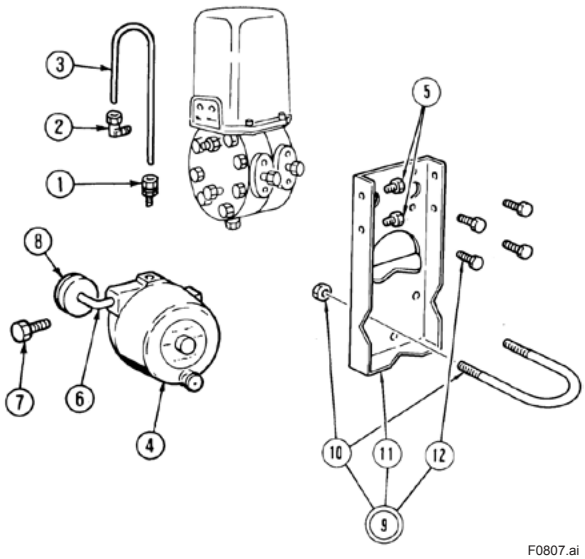
Item	Part No.	Qty	Description
-	U0122BN	1	Zero Suppression Kit (clean for oxygen service)
1	U0102TF	1	Scale (MIN-MAX)
3	U0122BB	1	Spring Assembly
4	X0116ET	2	5-40 × 1/4 Screw
5	F9147CV	3	5-40 × 3/16 Screw

Integral Air Filter Set and Mounting Set



Item	Part No.	Qty	Description
1	0050386	1	Connector Assembly (JIS connection) (prior to Aug.1987)
	0050325	1	Connector Assembly (ANSI connection) (prior to Aug.1987)
	G9611AD	1	Connector Assembly (JIS connection) (since Aug.1987)
	G9611AW	1	Connector Assembly (ANSI connection) (since Aug.1987)
2	0050392	1	Elbow Assembly (JIS connection) (prior to Aug.1987)
	0050332	1	Elbow Assembly (ANSI connection) (prior to Aug.1987)
	G9611CD	1	Elbow Assembly (JIS connection) (since Aug.1987)
	G9611CN	1	Elbow Assembly (ANSI connection) (since Aug.1987)
3	0051235	1	Tube (prior ro Aug.1987)
	F9101EM	1	Tube (since Aug.1987)
4	F9140DA-C	1	Filter-Regulator (JIS connection)
	F9140DB-C	1	Filter-Regulator (ANSI connection)
5	F9147MQ	2	1/4-20 × 1/2 H.H.Screw
6	Below	1	Elbow
	G9612DB		For JIS connection } Prior to
	G9612DD		For ANSI connection } Apr.1998
	F9140FH		For JIS connection } Since
	F9140FJ		For ANSI connection } Apr.1998
7	F9145BF	1	Plug (JIS connection)
	D0114PN	1	Plug (ANSI connection)
8	See Table 2	1	Pressure Gauge
9	D0117XL	1	Mounting Set
10	D0117XL-A	1	U-Bolt/Nut Assembly
11	F9270AX	1	Bracket
12	Below	4	7/16-20 × 5/8 Cap Screw
	F9270AY		S10C,S12C or S15C Carbon Steel (standard)
	F9273CZ		SUS XM7 or SUS304 Stainless Steel

Table 2 Pressure Gauge

Suffix Code	Prior to Apr.1998	Since Apr.1998
/G(N)AS-FM	G9615AA	G9615AT
/G(N)AS-FE	G9615AE	G9615EK
/G(N)AS-FP (0 to 200 kPa)	G9615AH	G9615EA
/G(N)AS-FB (0 to 2 bar)	G9615AM	G9615EC

Note) In order for gauge shipped befor April,1998 to be replaced, please use gauge and elbow, which part numbers are effective April,1998.

Revision Information

- Title : Y/13A, Y/13HA and Y/15A
  Pneumatic Differential Pressure Transmitters
- Manual No. : IM 02C01C02-01EN

Edition	Date	Page	Revised Item
8th	Apr. 2017	—	Incorporate Manual Change 16-026.
		CONTENTS	“2.5 Options”→“2.5 Options and Combinations”. Add “2.7 Control of Pollution Caused by the Product”. Add “Revision Information”.
		1-3	Add “1.3 Control of Pollution Caused by the Product”.
		2-2	Revised Standard Specifications.
		2-3	Revised options.
		2-4	Add Combinations.
		CMPL 02C01C02-01E P.3	Add N0999SH. Add Item 32 U0119TD.
		P.4	Delete F9200WG and D0120KK from Table 2.
		CMPL 02C01C01-01E P.1	Item 6 N0105TN→N0150TN
		Revision Information	Add Revision Information.