User's Manual

PM100 External Pressure Sensor

This manual describes the safety precautions for using the external pressure sensor. To ensure correct use, please read this manual thoroughly.
After reading this manual, keep it in a safe place.
This instrument is the external pressure sensor for CA700. Please read this manual together with the user's manual of the CA700.

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Printed in Japan

YOKOGAWA

IM PM100-01EN
3rd Edition

Checking the Contents of the Package

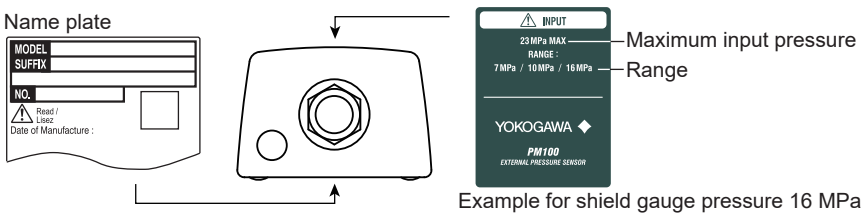
Unpack the box, and check the following before operating the instrument. If the wrong items have been delivered, if items are missing, or if there is a problem with the appearance of the items, contact your nearest YOKOGAWA dealer.

Instrument

Check that the product that you received is what you ordered by referring to the model name and suffix code given on the name plate.

MODEL	Suffix Code	Specifications
PM100		External Pressure Sensor
	-E	For countries other than Japan
	-J	For Japan
	-05	Shield gauge pressure: 16 MPa (7/10/16 MPa range)
	-06	Shield gauge pressure: 70 MPa (25/50/70 MPa range)
	-P3	1/2NPT Female thread

Name plate



Example for shield gauge pressure 16 MPa model.

Standard Accessories

Item	Model/Part No.	Quantity	Notes
Connection cable	95020	1	PM100 connection cable
Conversion connector	91083*1	1	Converts to 1/8NPT female thread
	91084*2	1	Converts to 1/4NPT female thread (only for 16 MPa model)
	91085*2	1	Converts to Rc1/4 female thread (only for 16 MPa model)
	91086*3	1	Converts to 1/4NPT female thread (only for 70 MPa model)
	91087*3	1	Converts to Rc1/4 female thread (only for 70 MPa model)
Cap for the pressure input port	G9330DB	1	Comes attached to the PM100
Manuals	IM PM100-01EN	1	This guide.
	IM PM100-92Z1	1	Chinese document
	PIM 113-01Z2	1	List of worldwide contacts

*1 Maximum usable pressure is 84 MPa.
*2 Maximum usable pressure is 57.1 MPa.
*3 Maximum usable pressure is 98 MPa.

Optional Accessories

The following optional accessories are available for purchase separately. For information about ordering accessories, contact your nearest YOKOGAWA dealer.

Item	Model or Component Number	Notes
Connection cable	95020	PM100 connection cable
Conversion connector	91083	Converts to 1/8NPT female thread (maximum working pressure is 84 MPa.)
	91084	Converts to 1/4NPT female thread (maximum working pressure is 57.1 MPa.)
	91085	Converts to Rc1/4 female thread (maximum working pressure is 57.1 MPa.)
	91086	Converts to 1/4NPT female thread (maximum working pressure is 98 MPa.)
	91087	Converts to Rc1/4 female thread (maximum working pressure is 98 MPa.)

List of Manuals

The following manuals are provided for the PM100.

Manual Title	Manual No.	Notes
PM100 External Pressure Sensor User's Manual	IM PM100-01EN	This manual. The manual explains the handling precautions, features, specifications, how to operate the PM100, and so on.
PM100 External Pressure Sensor	IM PM100-92Z1	A document for China.

The "-EN" in the manual number is the language code.

Associated manual

Manual Title	Manual No.	Notes
CA700 Pressure Calibrator User's Manual	IM CA700-01EN	The manual explains the handling precautions, features, specifications, how to operate the CA700, how to set the measurement range of the PM100 and so on.

Contact information of Yokogawa offices worldwide is provided on the following sheet.

Document No.	Description
PIM 113-01Z2	List of worldwide contacts

Conventions Used in This Manual

The notes and cautions in this manual are categorized using the following symbols.

This symbol is used in conjunction with the word "WARNING" or "CAUTION."

Ce symbole est accompagné des termes "AVERTISSEMENT" et "ATTENTION."

WARNING Calls attention to actions or conditions that could cause serious or fatal injury to the user, and precautions that can be taken to prevent such occurrences.

AVERTISSEMENT Attire l'attention sur des gestes ou des conditions susceptibles de provoquer des blessures graves (voire mortelles), et sur les précautions de sécurité pouvant prévenir de tels accidents.

CAUTION Calls attention to actions or conditions that could cause light injury to the user or damage to the instrument or user's data, and precautions that can be taken to prevent such occurrences.

ATTENTION Attire l'attention sur des gestes ou des conditions susceptibles de provoquer des blessures légères ou d'endommager l'instrument ou les données de l'utilisateur, et sur les précautions de sécurité susceptibles de prévenir de tels accidents.

Note Calls attention to information that is important for the proper operation of the instrument.

Safety Precautions

This product is designed to be used by a person with specialized knowledge.
The general safety precautions described herein must be observed during all phases of operation. If the product is used in a manner not specified in this manual, the protection provided by the product may be impaired. YOKOGAWA assumes no liability for the customer's failure to comply with these requirements.
This manual is part of the product and contains important information. Store this manual in a safe place close to the instrument so that you can refer to it immediately. Keep this manual until you dispose of the instrument.

The following symbols are used on this instrument.

Handle with care. Refer to the user's manual or service manual. This symbol appears on dangerous locations on the instrument which require special instructions for proper handling or use. The same symbol appears in the corresponding place in the manual to identify those instructions.

Failure to comply with the precautions below could lead to injury or death or damage to the instrument.

WARNING

Use the Instrument Only for Its Intended Purpose

The PM100 is a sensor for measuring pressure. Use it only for measuring pressure.

Check the Physical Appearance

Do not use the instrument if there is a problem with its physical appearance.

Conversion connector

- Models with different shield gauge pressures include conversion connector with different maximum working pressures. Use the appropriate conversion connector for the PM100 shield gauge in use.
- Do not use the included conversion connectors with other instruments.

Measure High-Pressure Fluids Properly

- Use piping and pressure connectors that can withstand the pressure to be measured.
- Make sure that there are no leaks from the piping, connectors, and joints and that the joints are not loose. If the fluid under measurement leaks or if a joint comes loose, the pressure can endanger the user or the surrounding instruments. Note that higher the pressure, greater the danger.
- Depending on the amount or type of gas, if you are handling gas that is 1 MPa or higher, supervision may be required under the High Pressure Gas Safety Act.
- Do not measure flammable, explosive, poisonous, or corrosive fluids(for example acetylene, ammonia, or hydrogen sulfide).
  Such an act can endanger the user.
  This instrument is not intended for Group-1 substances and mixtures (dangerous fluids) as listed in Directive 2014/68/EU Article 13 (1) a;.
- If high-pressure fluid or gas bursts out, do not bring your hand or body close to where it is bursting out. High-pressure fluid or gas could penetrate through the skin, causing serious injury.
- Please increase pressure slowly when pressurizing. If it is pressurized suddenly, this instrument and connected tubing may sweep by the straightening force.

Observe the Pressure Limit

Do not apply pressure exceeding the allowable input range. Physical explosion or the like could endanger the user or the surrounding instruments.

Do Not Remove Covers or Disassemble or Alter the Instrument

Only qualified YOKOGAWA personnel may remove the covers and disassemble or alter the instrument.

Do Not Operate in an Explosive Atmosphere

This instrument is not explosion-proof.
Do not operate the instrument in the presence of flammable gases or vapors. Doing so is extremely dangerous.

Install or Use the Instrument in Appropriate Locations

The instrument complies with protection level IP54. Do not install the instrument in locations whose level exceeds this protection level.

CAUTION

- When transporting or handling the instrument, do not apply vibration or shock. Make sure not to drop the instrument.
- When the instrument is not being used, attach caps to the pressure input port and cable connection terminal.
- Drastically reducing the pressure applied to the instrument can cause condensation to form inside the instrument and cause the instrument to malfunction. When changing the pressure, change it gradually so that condensation does not occur.

Cleaning

- Cleaning units 91040 and 91041 for the CA700 cannot be used to clean the pressure input port of the PM100.
- A pressure sensing diaphragm can be seen through the pressure input port of the PM100. When cleaning the PM100, be especially careful not to touch the diaphragm.
- To clean the instrument, wipe with a cloth dampened with neutral agent or water. Do not use abrasive cleaners or organic solvents.

Operating Environment Limitations

This product is a Class A (for industrial environments) product. Operation of this product in a residential area may cause radio interference in which case the user will be required to correct the interference.

French

AVERTISSEMENT

Utiliser l’instrument aux seules fins pour lesquelles il est prévu

Le PM100 est un capteur pour mesurer la pression. Utiliser cet instrument uniquement pour mesurer la pression.

Inspecter l’apparence physique

Ne pas utiliser l’instrument si son intégrité physique semble être compromise.

Connecteur de conversion

- Les modèles dotés de différentes jauge de blindage comprennent un connecteur de conversion avec différentes pressions maximales de service. Choisir le connecteur de conversion approprié pour la jauge de blindage PM100 utilisée.
- N'utilisez pas les connecteurs de conversion inclus avec d'autres instruments.

Mesure du fluide haute pression

- Utiliser une tuyauterie et des connecteurs pression pouvant résister à la pression à mesurer.
- S’assurer de l’absence de fuites au niveau de la tuyauterie, des connecteurs et des joints, et vérifier que les joints ne sont pas desserrés. En cas de fuite du fluide mesuré ou de desserrage d’un joint, la pression risque de mettre en danger l’utilisateur ou les instruments environnants. Il est à noter que plus la pression est élevée, plus le danger est important.
- En cas de manipulation de gaz à 1MPa ou plus, la législation relative à la sécurité des gaz haute pression peut rendre une surveillance obligatoire, en fonction de la quantité ou du type de gaz.
- Ne pas mesurer des liquides inflammables, explosifs, toxiques ou corrosifs (par exemple : acétylène, ammoniaque ou sulfure d'hydrogène).
  Une telle action peut s'avérer dangereuse pour l'utilisateur.
  Cet instrument ne s'adresse pas aux substances et mélanges du Groupe 1 (liquides dangereux) tels que listés dans la Directive 2014/68/EU Article 13 (1) a ;.
- Si un liquide ou un gaz sous haute pression jaillissent, ne pas approcher la main ou le corps du jet. Le liquide ou le gaz sous haute pression pourraient pénétrer par la peau, entraînant des blessures graves.
- Augmenter la pression lentement lors de la pressurisation. En cas de pressurisation soudaine, cet instrument et les tubes connectés peuvent balayer la zone sous la force de redressage.

Respecter la limite de pression

Ne pas appliquer de pression supérieure à la plage d’entrée autorisée. Le cas échéant, un endommagement de l’équipement risquerait de se produire.

Ne pas retirer le capot, ni démonter ou modifier l'instrument

Seul le personnel YOKOGAWA qualifié est habilité à retirer le capot et à démonter ou modifier l'instrument.

Ne pas utiliser dans un environnement explosif

Cet instrument n’est pas antidéflagrant.
Ne pas utiliser l’instrument en présence de gaz ou de vapeurs inflammables. Cela pourrait être extrêmement dangereux.

Installer et/ou utiliser l’instrument aux emplacements appropriés

L’instrument est conforme au niveau de protection IP54. Ne pas installer l’instrument à un emplacement de niveau supérieur à ce niveau de protection.

ATTENTION

- Lors du transport ou de la manipulation de l'instrument, ne pas faire de vibration ni de choc. S'assurer de ne pas laisser tomber l'instrument.
- Lorsque l'instrument n'est pas utilisé, attacher les capuchons au port d'entrée de la pression et au terminal de connexion des câbles.
- Une réduction drastique de la pression appliquée à l'instrument peut entraîner une condensation à l'intérieur de l'instrument, ainsi que son dysfonctionnement. Lors d'un changement de pression, changer graduellement pour éviter toute condensation.

Nettoyage

- Les unités de nettoyage 91040 et 91041 pour le CA700 ne peuvent pas être utilisées pour nettoyer le port d'entrée de la pression du PM100.
- Une membrane de détection de pression est visible par le port d'entrée de la pression du PM100. Lors du nettoyage du PM100, prendre soin de ne pas toucher la membrane.
- Pour nettoyer l'instrument, frotter avec un chiffon humidifié d'eau ou d'un agent neutre. Ne pas utiliser de nettoyants abrasifs ou de solvants organiques.

Limitations relatives à l’environnement opérationnel

Ce produit est un produit de classe A (pour environnements industriels). L’utilisation de ce produit dans un zone résidentielle peut entraîner une interférence radio que l’utilisateur sera tenu de rectifier.

Waste Electrical and Electronic Equipment

Waste Electrical and Electronic Equipment
(This directive is valid only in the EU.)
This product complies with the WEEE directive marking requirement. This marking indicates that you must not discard this electrical/electronic product in domestic household waste.
Product Category
With reference to the equipment types in the WEEE directive, this product is classified as a “Monitoring and control instruments” product.
When disposing of products in the EU, contact your local Yokogawa Europe B.V. office. Do not dispose in domestic household waste.

Pressure Equipment Directive

This product is categorized as Sound Engineering Practice(SEP) under the Pressure Equipment Directive(PED).

Authorized Representative in the EEA

Yokogawa Europe B.V. is the authorized representative of Yokogawa Test & Measurement Corporation for this product in the EEA. To contact Yokogawa Europe B. V., see the separate list of worldwide contacts, PIM 113-01Z2.

Overview

The PM100 is a pressure sensor that is connected to a CA700 pressure calibrator for use. For details on how to use the sensor on the CA700 and range setting of the PM100, see the CA700 User’s manual.

Handling Precautions

Storage Location

Avoid the following kinds of places for storing the instrument:

- Where the temperature falls outside the storage temperature and humidity ranges
- In direct sunlight or near heat sources
- Outdoors or locations subject to rain or water
- In an environment with excessive amounts of soot, steam, dust, or corrosive gas
- In an environment subject to large levels of mechanical vibration
- On an unstable surface
- Where an excessive amount of soot, dust, salt, or iron is present

Installation Location

Install the instrument in a place that meets the following conditions.

Flat, Even Surface

To measure pressure using the pressure sensor in the instrument, install the instrument on a stable surface that is level in all directions. Pressure may not be measured correctly when the instrument is placed in an unstable or inclined place.

Operating Altitude and Ambient Temperature and Humidity

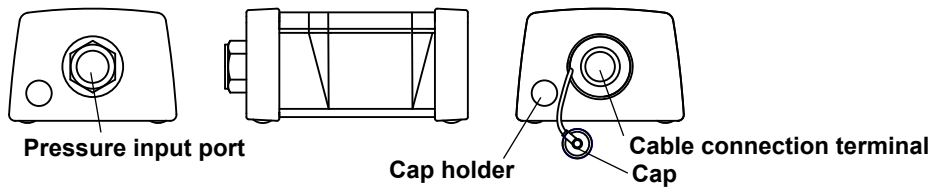
Use the instrument in the following environment.

Ambient temperature:	–10°C to 50°C
Ambient humidity:	20% RH to 80% RH, no condensation
Operating altitude:	Up to 2000 m

Note

- To ensure high measurement accuracy, operate the instrument within 23°C ± 3°C.
- When using the instrument in a place where the ambient humidity is 30% or less, take measures to prevent static electricity such as using an anti-static mat.
- Condensation may occur if the instrument is moved to another place where the ambient temperature or humidity is higher, or if the temperature changes rapidly. In such cases, before you use the instrument, allow it to adjust to the surrounding temperature for at least an hour.

Component Names



Connection

WARNING

- Before applying pressure to the instrument, make sure that tubing is connected properly. Improper connection may cause gas or liquid to leak, which may in turn cause injury or damage to the instrument.
- After use, be sure to depressurize adequately so that compressed gas or liquid does not burst out. Then remove tubing.
- The withstand pressure of the conversion connector supplied with the instrument is the same as the instrument’s allowable input. Do not use the conversion connector with other instruments.

CAUTION

When connecting a tube to the PM100 connector, use a wrench or the like to fix the hexagonal section of the PM100 in place. Using a wrench only on the tube side may break the inside of the instrument.

French

AVERTISSEMENT

- Avant de mettre l’instrument sous pression, s’assurer que les tubes sont correctement connectés. Une connexion incorrecte peut provoquer une fuite de gaz ou de liquide, ce qui à son tour peut être à l’origine de blessures ou d’un endommagement de l’instrument.
- Après utilisation, veiller à effectuer une dépressurisation correcte, de façon à éviter que le gaz ou le liquide comprimé ne jaillisse hors de l’instrument. Retirer ensuite les tubes.
- La pression de résistance du connecteur fourni avec l’instrument est identique à l’entrée autorisée pour l’instrument. Ne pas utiliser le connecteur avec d’autres instruments.

ATTENTION

Lors de la connexion d'un tube au connecteur du PM100, utiliser une clé pour fixer la section hexagonale du PM100. L'utilisation d'une clé uniquement du côté du tube risquerait de casser l'intérieur de l'instrument.

Connecting to the CA700

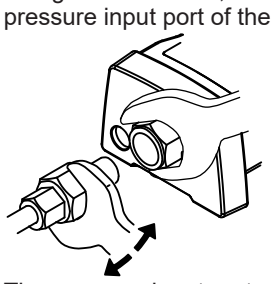
Using the connection cable supplied with the PM100, connect the PM100’s cable connection terminal to the CA700’s external sensor terminal.
Firmly tighten the screws on both ends of the connection cable. The IP54 specifications cannot be met if the screws are loose.

Note

- Power to the PM100 is supplied from the CA700 through the connection cable.
- The PM100 is available when connecting to the following CA700.
  16 MPa model: CA700 in 1.10 or later firmware versions
  70 MPa model: CA700 in 1.20 or later firmware versions
  You can download the latest firmware version of the CA700 from our website.
- Be careful not to bend the connection cable as an accessory in a radius of 30 mm or less. Doing so causes breaks in the connection cable.

Pressure Input Port

1. Wrap seal tape around the threads of the tube.
2. Using two wrenches, firmly attach the conversion connector of the tube to the pressure input port of the instrument.



3. The pressure input port of the PM100 is 1/2NPT female thread (-P3 input connection specification). If the tubing connector does not match the port, use the supplied connector.
   91083 (conversion connector): Converts to 1/8NPT female thread (maximum working pressure is 84 MPa.)
   91084 (conversion connector): Converts to 1/4NPT female thread (maximum working pressure is 57.1 MPa.)
   91085 (conversion connector): Converts to Rc1/4 female thread (maximum working pressure is 57.1 MPa.)
   91086 (conversion connector): Converts to 1/4NPT female thread (maximum workinge pressure is 98 MPa.)
   91087 (conversion connector): Converts to Rc1/4 female thread (maximum working pressure is 98 MPa.)

Specifications

16 MPa Model

Item	Specification		
Pressure type	Shield gauge pressure		
Measurement range	0 to 7 MPa sg	0 to 10 MPa sg	0 to 16 MPa sg
Measurement display range	to 8.4000 MPa	to 12.0000 MPa	to 19.2000 MPa
Accuracy (6 months after calibration)† (after zero calibration††)	Positive pressure ±(0.01% of reading + 2 kPa)	Positive pressure ±(0.01% of reading +3 kPa)	Positive pressure ±(0.01% of reading +5 kPa)
Accuracy (1 year after calibration)† (after zero calibration††)	Positive pressure ±(0.01% of reading +2.8 kPa)	Positive pressure ±(0.01% of reading +3.8 kPa)	Positive pressure ±(0.01% of reading +5.8 kPa)
Display resolution	0.0001MPa(0.1kPa)		
Allowable input	2.7 kPa abs to 23 MPa sg		
Temperature effect	±(0.001% of reading + 0.16 kPa)/°C or less		
Orientation effect	Zero point ± 1 kPa or less		
Response time†††	2.5s or less		

70 MPa Model

Item	Specification		
Pressure type	Shield gauge pressure		
Measurement range	0 to 25 MPa sg	0 to 50 MPa sg	0 to 70 MPa sg
Measurement display range	to 30.0000 MPa	to 60.0000 MPa	to 77.0000 MPa
Accuracy (6 months after calibration)† (after zero calibration††)	Positive pressure ±(0.01% of reading + 6 kPa)	Positive pressure ±(0.01% of reading +10 kPa)	Positive pressure ±(0.01% of reading +16 kPa)
Accuracy (1 year after calibration)† (after zero calibration††)	Positive pressure ±(0.01% of reading +9.5 kPa)	Positive pressure ±(0.01% of reading +13.5 kPa)	Positive pressure ±(0.01% of reading +19.5 kPa)
Display resolution	0.0001 MPa(0.1 kPa)		
Allowable input	2.7 kPa abs to 98 MPa sg		
Temperature effect	±(0.001% of reading + 0.7 kPa)/°C or less		
Orientation effect	Zero point ± 1 kPa or less		
Response time†††	2.5s or less		

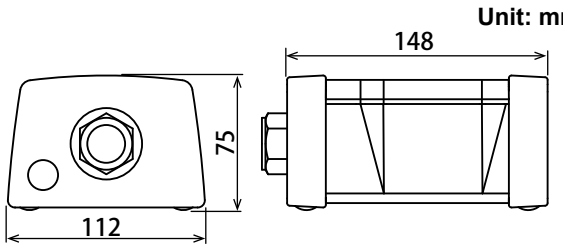
Common Specifications

Item	Specification
Volume	Approx. 6 cm^3
Input connection	1/2NPT female thread
Warm-up time	Approx. 5 minutes
Measured fluid	Gas and liquid (nonflammable, nonexplosive, nontoxic, noncorrosive fluid) only (Measuring the pressure of Group 1 substances and mixtures (dangerous fluids) as listed in Directive 2014/68/EU Article 13 (1) a is not allowed).
Measured fluid temperature	–10 to 50°C, but 5 to 50°C for liquid
Pressure sensor	Silicon resonant sensor
Measurement unit material	Diaphragm: Hastelloy C276 or ASTM N10276 Input port: SUS316L or ASTM grade 316L
Protection level	IP54
Recommended calibration period	1 year
Connection connector	Waterproof connector
Cable length	1 m
External dimensions	112 mm (W) × 75 mm (H) × 148 mm (D) Excluding the input port and protrusions
Weight	Approx. 1.2 kg
Operating environment conditions	Temperature: –10 to 50°C Humidity: 20 to 80% RH (no condensation) Altitude: Up to 2000 m
Storage environment conditions	Temperature: –20 to 60°C Humidity: 20 to 80% RH (no condensation)
Safety standards	Compliant standards EN 61010-1 Pollution degree 2††††
Emissions	Compliant standards EN 61326-1 Class A EMC standards of Australia and New Zealand EN55011 Class A, Group 1 Korea Electromagnetic Conformity Standard (한국 전자파적합성기준) This product is a Class A (for industrial environments) product. Operation of this product in a residential area may cause radio interference in which case the user will be required to correct the interference.
Immunity	Compliant standards EN61326-1 Table 2 (for industrial environments) Influence in the immunity testing environment (criteria A) Measurement input: Within ±20% of range
Environmental standard	Compliant standard: EN50581 Monitoring and control instruments including those for industrial use

† Yokogawa pressure standard accuracy is excluded.
†† Zero calibration condition: Under atmospheric pressure
††† Response time measurement conditions: Time for the readout to settle within 0 MPa ± 3.5 kPa after releasing 3.5 MPa pressure to the atmosphere (where the input unit is under no load)
†††† The pollution degree refers to the degree of adhesion of a solid, liquid, or gas which deteriorates withstand voltage or surface resistivity. Pollution degree 2 applies to normal indoor atmospheres (with only non-conductive pollution).

External Dimensions

Unit: mm



Unless otherwise specified, tolerances are ±3% (however, tolerances are ±0.3 mm when below 10 mm).

Disposing of the Instrument

When disposing of the instrument, follow the laws and ordinances of your country or region.