Pressure Calibrator
CA700
New Standard for Field Calibration
The CA700 is a highly accurate and highly functional pressure calibrator specifically designed for the calibration of differential pressure and pressure transmitters, which are widely used in plant processes these days and are improving in terms of accuracy and functionality. The CA700 has achieved the highest accuracy and widest range in the portable class, enabling field calibration with greater accuracy than ever before.
■ High Accuracy and Long Stability
- Achieves the highest accuracy in the portable class
  - Basic accuracy: Pressure (measurement) / 0.01% rdg.
  - Current/voltage (source/measurement) / 0.015% rdg.

■ Rangeability
- Achieves the highest resolution and widest range in the portable class
  - 0.001 kPa (200.000 kPa range)

■ User Support
- Strong support for field calibration and maintenance work
  - Calibration procedures of pressure transmitters and pressure switches are embedded.
  - “As Found”, “As Left” data and error rate (%) can be recorded.

■ Field Use
- IP54 dustproof and waterproof robust case enables use in harsh environments.

■ Accessories
- Three high-performance hand pump models for different pressure ranges are available.
High Accuracy and Long Stability

The highest accuracy in the portable class achieved with a silicon resonant sensor

The CA700 employs a silicon resonant pressure sensor with which Yokogawa has achieved the highest accuracy in the portable class of a 0.01% of reading for pressure measurement and 0.015% of reading for current and voltage measurement. This calibrator is ideal for input and output testing of differential pressure and pressure transmitters as it accurately measures the input and output and calculates the error rate.

Rangeability

Has the highest resolution and the widest range in its class

The CA700 has achieved a resolution of 0.001 kPa (200,000 kPa range) which is 10-fold higher than that of general field calibrators. The excellent sensing characteristics of a silicon resonant sensor make it possible to achieve a very wide range and enable one CA700 calibrator to replace multiple field calibrators.
User Support

Strong support for field calibration and maintenance work

Calibration procedures for differential pressure and pressure transmitters are embedded, so routinely used as 50-percent step, up-and-down, 5-point calibration and 25-percent step, up-and-down, as well as 9-point calibration can be performed right out of the box. Calibration operation can be sped up by following the navigation instructions, resulting in increased efficiency of field work. Measurement data is automatically recorded to the calibrator so it can be saved to a USB memory stick or transferred to a PC as text data using a USB cable. Input and output values, error rate, date and time, and pass or fail can be displayed on a PC monitor.

Field Use

IP54 waterproof and dustproof robust case enables use of this calibrator in harsh environments

Calibration of pressure transmitters is usually carried out in harsh environments where there are many pipes and handrails or in wet areas. The CA700 has a robust case designed according to the IP54 waterproof and dustproof standards. A shoulder strap can be attached to the calibrator to make it easy to carry around in the field. In addition, an easy-to-read LCD and tilt stand suitable for outdoor work exposed to direct sunlight extend the range of use of this calibrator from indoor bench use to outdoor field use.
**Field Calibration of Differential Pressure and Pressure Transmitters**

Calibration of pressure transmitters is required to accurately measure the input and output values and to calculate the error rate. The CA700 ensures reliable calibration with its function to accurately measure the input and output values of pressure and current. Additionally, its embedded calibration procedures enable users to perform certain calibration following the prescribed procedure.

**Pressure Switch Test**

A pressure switch test measures the pressure at the time when the contact opens and closes and the resistance at the time when the dead band contact closes. A test procedure is embedded to enable users to carry out a test following the prescribed procedure.

**Check and I/O Adjustment of an Electro-pneumatic Converter**

Input and output adjustment of an electro-pneumatic converter is carried out by applying rising and falling currents of 0, 25, 50, 75, and 100% of the span. A reliable test can be carried out with the CA700 that has a 4-20 mA step function for signal generation and a capability to accurately measure the generated pressure.

**20 mA SIMULATE (Two-wire Transmitter Simulator)**

The CA700 can also be used as a transmitter simulator to carry out a loop test. It can absorb (SINK) the set current from an external voltage generating device (e.g., a distributor system or PLC) of instrumentation equipment. 4-20 mA current can be sourced with an accuracy of 0.015% of the reading.

**Two-wire Transmitter Loop Check**

DC mA signals can be measured by supplying power to the transmitter from a 24 V DC power supply. DC mA signal measurement and zero-point check can be performed with an accuracy of 0.015% of the reading. A 250-ohm resistor for HART and BRAIN communication is included in this calibrator so there is no need to attach an external resistor when connecting to a handy terminal.

**Input Command Check and Adjustment of Recorders and Controllers**

Instrumentation loop test and operation/command check can be performed by sourcing DC 1-5 V / 4-20 mA instrumentation signals with an accuracy of 0.015% of the reading. Furthermore, two patterns of linear sweep and step sweep can be selected (the sweep time can be specified from 15, 30, 45, and 60 sec).
Three High-Performance Hand Pump Models Available

Low Pressure Hand Pump 91051
- Ultra-compact hand pump
- Pressure generation range: -83 to 700 kPa
- Ideal for pressure adjustment in low pressure range
- Smooth pressurization with less internal leaking
- Strainer preventing debris from entering the pump included

Pneumatic Hand Pump 91056
- High-performance small hand pump with a wide range of pressure generation
- Pressure generation range: -83 to 4000 kPa
- Pressure generation ranging from low to medium pressures
- Fine adjustment and pressure reduction possible with one hand
- Smooth pressurization with less internal leaking
- Strainer preventing debris from entering the pump included

Hydraulic Hand Pump 91061
- High-performance hand pump capable of generating a pressure of up to 70 MPa
- Pressure generation range: 0 to 70 MPa
- Easy grip operation to generate high pressures
- Smooth pressurization with less internal leaking
- Strainer preventing debris from entering the pump included
## Pressure Measurement

### Basic Specifications (Measurement Unit) 23°C±3°C

<table>
<thead>
<tr>
<th>Model</th>
<th>CA700-E-01</th>
<th>CA700-E-02</th>
<th>CA700-E-03</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pressure type</strong></td>
<td>Gauge</td>
<td>Gauge</td>
<td>Gauge</td>
</tr>
</tbody>
</table>
| **Measurement range** | Positive pressure: 0 to 200 kPa  
Negative pressure: -80 to 0 kPa | Positive pressure: 0 to 1000 kPa  
Negative pressure: -80 to 0 kPa | Positive pressure: 0 to 3500 kPa  
Negative pressure: -80 to 0 kPa |
| **Measurement display range** | To 240.000 kPa | To 1200.00 kPa  | To 4200.00 kPa   |
| **Resolution** | 0.001 kPa         | 0.01 kPa         | 0.01 kPa         |
| **Measurement accuracy** | Positive pressure: 20 to 200 kPa ±0.01% of reading + 0.003 kPa  
Negative pressure: ±0.02% of reading + 0.005 kPa | Positive pressure: ±0.01% of reading + 0.04 kPa  
Negative pressure: ±0.2% of reading + 0.08 kPa | Positive pressure: ±0.01% of reading + 0.15 kPa  
Negative pressure: ±0.2% of reading + 0.08 kPa |
| **Response time** | 2.5 s or less    |                  |                  |
| **Allowable input** | 2.7 kPa abs to 500 kPa gauge | 2.7 kPa abs to 3000 kPa gauge | 2.7 kPa abs to 4500 kPa gauge |
| **Internal volume** | Approx. 6 cm³    |                  |                  |
| **Temperature coefficient** | ±0.001% of reading + ±0.01% of full scale/°C or less |                  |                  |
| **Influence of positional setup** | Zero-point drift ±0.3 kPa or less |                  |                  |
| **Measurement fluid** | Gas and liquid (non-corrosive, non-flammable, non-explosive, and non-toxic fluids) |                  |                  |
| **Pressure sensor element** | Diaphragm         |                  |                  |
| **Pressure display units** | kPa and other units | (Pa, hPa, MPa, mbar, bar, atm, mmHg, lbf/in², kPa, psi) | (Pa, hPa, MPa, mbar, bar, atm, mmHg, lbf/in², kPa, psi) |

### DC Current Measurement

<table>
<thead>
<tr>
<th>Range</th>
<th>Resolution</th>
<th>Measurement range</th>
<th>Measurement accuracy (1 year)</th>
<th>Remark</th>
</tr>
</thead>
</table>
| 20 mA      | 1 μA       | 0 to ±20.000 mA   | 0.015% of reading + 3 μA     | Input resistance: 10 Ω or less.  
The maximum display is 1.2-fold of range. |
| 100 mA     | 10 μA      | 0 to ±100.00 mA   | 0.015% of reading + 30 μA    |                             |

### DC Voltage Measurement

<table>
<thead>
<tr>
<th>Range</th>
<th>Resolution</th>
<th>Measurement range</th>
<th>Measurement accuracy (1 year)</th>
<th>Remark</th>
</tr>
</thead>
</table>
| 5 V        | 0.1 mV     | 0 to ±0.0005 V    | 0.015% of reading + 0.5 mV   | Input resistance: approx. 1 MΩ.  
The maximum display is 1.1-fold of range. |
| 50 V       | 1 mV       | 0 to ±50.000 mV   | 0.015% of reading + 5 mV     |                             |

### 24 V Loop Power Supply

<table>
<thead>
<tr>
<th>Supply voltage</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 V ± 1 V</td>
<td>Load current 24 mA when communication resistance OFF</td>
</tr>
<tr>
<td>24 V ± 6 V</td>
<td>Load current 24 mA when communication resistance ON</td>
</tr>
</tbody>
</table>

### DC Current Source

<table>
<thead>
<tr>
<th>Range</th>
<th>Resolution</th>
<th>Source range</th>
<th>Accuracy (1 year)</th>
<th>Remark when communication resistance OFF</th>
</tr>
</thead>
</table>
| 20 mA      | 1 μA       | 0 to 20.000 mA | 0.015% of setting + 3 μA | Compliance voltage: 24 V. The maximum setting is 1.2-fold of range.  
External power supply: 5 to 28 V. The maximum setting is 1.2-fold of range. |
| 20 mA SIMULATE | 1 μA | 0 to 20.000 mA | 0.015% of setting + 3 μA |                             |

### DC Voltage Source

<table>
<thead>
<tr>
<th>Range</th>
<th>Resolution</th>
<th>Source range</th>
<th>Accuracy (1 year)</th>
<th>Remark</th>
</tr>
</thead>
</table>
| 5 V        | 0.1 mV     | 0 to ±5.000 V | 0.015% of setting + 0.5 mV | Load resistance: 5 kΩ or more.  
The maximum setting is 1.1-fold of range. |

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**Notes:**

*1: Zero-point calibration condition: Under atmospheric pressure
*2: Yokogawa’s pressure standards accuracy is excluded.
*3: Conditions of response time measurement:
  The response time is defined as the time for the readout to settle within ±1% of the full scale from the time when the positive pressure is released to atmosphere when it is at its full-scale value (where the input unit is under no load).
*4: Full scale of each model
  CA700-E-01: Positive pressure 200 kPa and negative pressure 80 kPa
  CA700-E-02: Positive pressure 1000 kPa and negative pressure 80 kPa
  CA700-E-03: Positive pressure 3500 kPa and negative pressure 80 kPa
*5: Liquid temperature 5 to 50°C
General Specifications

Display
Dot matrix LCD (320x240 dots)

Backlight
LED

Display refresh rate
Approx. 300ms (3 times/sec)

Warm-up time
Approx. 5 minutes

Power supply
Six alkaline AA batteries

Battery life
Approx. 35 hours when measuring current with the 24V loop power supply OFF and approx 10 hours with the 24V loop power supply ON

Auto power-off
Approx. 60 minutes (the function can be disabled)

Insulation resistance
100 MΩ or more (500 VDC) between the input terminal and case and between the input port and case

Withstand voltage
500 VAC for 1 minute between the input terminal and case and between the input port and case

Protection grade
IP54 dustproof and waterproof structure

Dimensions
Approx. 264 (W) x 188 (H) x 96 (D) mm, excluding protrusions

Weight
Approx. 2kg (including batteries)

Compliance standards
Safety: EN61010-1, EN61010-2-030, contamination class 2
EMC: EN61326-1 Class A, EN55011 Class A Group 1

Operating temperature / humidity ranges
-10 to 50°C and 20 to 80%RH (no condensation)

Storage temperature / humidity ranges
-20 to 60°C and 20 to 80%RH (no condensation)

Interfaces
Select and switch between USB A mass-storage device, USB mini-B communication device class, and mass storage class

External sensor
The dedicated external sensor PM100 (optional) can be connected to the CA700 via a connector

Accessories*
A set of 1.7m long black and red lead wires with alligator clips for generation and measurement, six alkaline AA batteries, R1 1/4” – 1/8” NPT female thread x 1, ferrite core x 2, R 1/4” – 1/4” NPT female thread x 1, accessory case, instruction manual (CD), startup guide, shoulder strap

* The type of the included conversion connector varies depending on the suffix code (–P1 and –P2). For details, refer to “CA700 Accessories” on the next page.

Number of Data Records

<table>
<thead>
<tr>
<th>Device operation status</th>
<th>Number of data records that can be saved</th>
<th>Number of files that can be saved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement / Source</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Save</td>
<td>2000</td>
<td>45</td>
</tr>
<tr>
<td>Logging</td>
<td>2000</td>
<td>45</td>
</tr>
<tr>
<td>Leak test</td>
<td>2000</td>
<td>45</td>
</tr>
<tr>
<td>Transmitter calibration (Number of calibration points: 5)</td>
<td>As Found 9 250</td>
<td></td>
</tr>
<tr>
<td>Pressure switch calibration</td>
<td>As Found 1 250</td>
<td></td>
</tr>
</tbody>
</table>

* The maximum number of files is 250.
* The total data capacity is approx. 3.5 MB

Hand Pump Specifications

<table>
<thead>
<tr>
<th>Product name</th>
<th>Model</th>
<th>Pressure generation range</th>
<th>MWP (maximum working pressure)</th>
<th>Connection port</th>
<th>Pressurized media</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand Pump (Low Pressure)</td>
<td>91051</td>
<td>-83 to 700 kPa</td>
<td>1030 kPa</td>
<td>1/8&quot; NPT female thread</td>
<td>Air</td>
</tr>
<tr>
<td>Hand Pump (Pneumatic)</td>
<td>91056</td>
<td>-83 to 4000 kPa</td>
<td>5130 kPa</td>
<td>1/8&quot; NPT female thread / 1/4&quot; NPT female thread</td>
<td>Air</td>
</tr>
<tr>
<td>Hand Pump (Hydraulic)</td>
<td>91061</td>
<td>0 to 70 MPa</td>
<td>70 MPa</td>
<td>1/4&quot; NPT female thread / 1/4&quot; NPT female thread</td>
<td>Liquid</td>
</tr>
</tbody>
</table>

Hand Pump External Dimensions

91051

91056

91061

The external dimensions vary slightly depending on the stroke adjustment of the handle.
## Model and Suffix Code

### CA700

<table>
<thead>
<tr>
<th>Product name</th>
<th>Model</th>
<th>Suffix code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Calibrator</td>
<td>CA700</td>
<td>General use type</td>
<td>-E All countries except Japan</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-01</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-02</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-03</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-U1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-U2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-P1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-P2</td>
</tr>
</tbody>
</table>

*1: Only kPa, Pa, hPa, MPa, mbar, bar, atm are available.

### Separately Sold Accessories *

<table>
<thead>
<tr>
<th>Product name</th>
<th>Model</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrying Case</td>
<td>93050</td>
<td>Bag for the calibrator, accessories, and peripheral devices</td>
</tr>
<tr>
<td>Grabber Clip</td>
<td>98026</td>
<td>A set of separate red and black clips (for 2 m long wires)</td>
</tr>
<tr>
<td>Cleaning Unit *3</td>
<td>91040</td>
<td>Can connect to –P1 or –P2, input and output port are Rc1/8&quot; female thread</td>
</tr>
<tr>
<td>Cleaning Unit *3</td>
<td>91041</td>
<td>Can connect to –P1 or –P2, input and output port are 1/8&quot; NPT female thread</td>
</tr>
</tbody>
</table>

*2: These accessories are not included in the CA700 calibrator package.

*3: Available to clean the pressure sensor of main unit (CA700) after liquid pressure measurement.

### CA700 Accessories *

<table>
<thead>
<tr>
<th>Product name</th>
<th>Model</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector *5</td>
<td>91080</td>
<td>R 1/4&quot; male thread to 1/8&quot; NPT female thread conversion connector (for –P1)</td>
</tr>
<tr>
<td>Connector *5</td>
<td>91081</td>
<td>R 1/4&quot; male thread to 1/4&quot; NPT female thread conversion connector (for –P1)</td>
</tr>
<tr>
<td>Connector *6</td>
<td>91082</td>
<td>1/4&quot; NPT male thread to 1/8&quot; NPT female thread conversion connector (for –P2)</td>
</tr>
<tr>
<td>Lead Wires for Source / Measurement</td>
<td>98064</td>
<td>Red and black alligator clip lead wires, 1.7 m long</td>
</tr>
<tr>
<td>Accessory Bag</td>
<td>B9108XA</td>
<td>For lead wires and connector</td>
</tr>
</tbody>
</table>

*4: Included in the CA700 calibrator package at the time of purchase.

*5: Included in the package when suffix code –P1 is selected.

*6: Included in the package when suffix code –P2 is selected.
### Model and Suffix Code

#### Pressure Hand Pump Kits *

<table>
<thead>
<tr>
<th>Product name</th>
<th>Model</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand Pump Kit (Low Pressure)</td>
<td>91050</td>
<td>Hand pump (91051), connector set (91052), case (93052)</td>
</tr>
<tr>
<td>Hand Pump Kit (Pneumatic)</td>
<td>91055</td>
<td>Hand pump (91056), connector set (91057), case (93053)</td>
</tr>
<tr>
<td>Hand Pump Kit (Hydraulic)</td>
<td>91060</td>
<td>Hand pump (91061), connector set (91062), case (93053)</td>
</tr>
</tbody>
</table>

*7: These accessories are not included in the CA700 calibrator package at the time of purchase.

#### Hand Pump Kit Accessories *

<table>
<thead>
<tr>
<th>Product name</th>
<th>Model</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand Pump (Low Pressure)</td>
<td>91051</td>
<td>Hand pump: -83 to 700 kPa (pressure generation range)</td>
</tr>
<tr>
<td>Hand Pump (Pneumatic)</td>
<td>91056</td>
<td>Hand pump: -83 to 4000 kPa (pressure generation range)</td>
</tr>
<tr>
<td>Hand Pump (Hydraulic)</td>
<td>91061</td>
<td>Hand pump: 0 to 70 MPa (pressure generation range)</td>
</tr>
<tr>
<td>Hand Pump Connector (Low Pressure)</td>
<td>91052</td>
<td>Connector set for the 91051 (quick adapter, pressure conversion adapter, flexible hose, sealing tape)</td>
</tr>
<tr>
<td>Hand Pump Connector (Pneumatic)</td>
<td>91057</td>
<td>Connector set for the 91056 (quick adapter, sealing cap, flexible hose, sealing tape, and hex wrench)</td>
</tr>
<tr>
<td>Hand Pump Connector (Hydraulic)</td>
<td>91062</td>
<td>Connector set for the 91061 (high-pressure hose, quick adapter, conversion adapter, sealing tape, and hex wrench)</td>
</tr>
<tr>
<td>Hand Pump Case (Low Pressure)</td>
<td>93052</td>
<td>Case for the 91051 (91051, 91052, and instruction manual)</td>
</tr>
<tr>
<td>Hand Pump Case (Pneumatic/Hydraulic)</td>
<td>93053</td>
<td>Case for the 91056/91061 (91056, 91057, 91061, 91062, and instruction manual)</td>
</tr>
</tbody>
</table>

*8: These accessories are included in the hand pump kit (91050, 91055, and 91060) at the time of purchase. They can also be purchased separately.
Related Products

**PC-based field device management tool**
- Multi-vendor, multi-protocol support BRAIN, FOUNDATION™ Fieldbus H1, HART®, PROFIBUS and ISA100.11a
- Automatic device data acquisition upon connection to a device or a segment (Segment Viewer)
- Easy acquisition and diagnosis of device status (Device Viewer)
- Categorization, sorting and filtering (History)
- Multi-parameter setup (Parameter Manager)

**Handheld Terminal for BRAIN Communication**
- Online monitoring and communication.
- Easy setup and alteration procedures in English prompting interactive sequences.
- Diagnostics/security with error messages. (Self-check function, Security code protection of setpoints, Low battery voltage alarm and Automatic power-off)
- Printer prints out tag numbers and other parameters on the spot.

**FieldMate® Versatile Device Management Wizard**

**Highly Accurate All-In-One Calibrator**
- Dual display of source and measurement with an accuracy of 0.02%
- Multiple sources and measurements of DCV, DCmA, Ω, TC, RTD, Hz, and PULSE
- 24 V loop power supply and output signal measurement at the same time
- Current sink function to simulate a transmitter
- A variety of sweep functions selectable (Step, Linear, Program, and Sweep)
- Three power supply options available (AA batteries, AC adapter [sold separately], and NiMH batteries [sold separately])

**Handy Calibrator**

CA150

**Best-Selling Field Calibrator Model with High Performance and Low Price**
- Small, light, and high performance at a low price
- Source and measurement of DCV, DCmA, Ω, TC, RTD, Hz, and PULSE
- DMM-like operation with a rotary switch
- Source and measurement (counting) of dry contact pulses

**Handy Calibrator**

CA71

**Clamp-on Measurement of 4-20 mA Instrumentation Signals**
- Process signal measurement with no need to disconnect a loop
- Accuracy 0.2% + 5 dgt and resolution 0.01 mA
- Simultaneous display of percentage (%) of the measured value and span
- LED backlight ideal for measuring in dark places
- Thick signal wire with a diameter of up to 6 mm can be clamped easily.

**Clamp-on Process Meter**

CL420

**Safety DMM Equipped with a Loop Power Supply and 4-20 mA Output**
- 24 V loop power supply and measures output signal at the same time
- Resistor (250Ω) for HART and BRAIN communication embedded and selectable.
- Transmitter simulation (current sink) function
- Step, Auto-step, and Linear sweep functions are selectable
- 6,000-count DMM function
- EN61010-1 CATIV600V and CATIII1000V safety design

**Process Multimeter**

CA450

**NOTICE**

Before using the product, read the instruction manual carefully to ensure proper and safe operation.