C1900 series
Circular chart recorder
Measurement made easy
A rugged, reliable recorder with the full capability to meet your needs

1 to 4 pen recording
• full application flexibility

NEMA 4X/IP66 construction
• hose-down protection

Analog, relay outputs, digital inputs and transmitter power supply as standard
• range of inputs and outputs built-in

Multiple indicator panels
• continuous display of all signal values

0.1% measurement accuracy
• precise process information

High noise immunity
• robust, dependable operation

RS485 Modbus serial communications
• open system compatibility

Totalizers and math functions built-in
• fully integrated solutions
C1900

The C1900 is a fully programmable circular chart recorder for up to four process signals. The C1900’s straightforward operator controls and robust construction make it suitable for a variety of industrial environments. Excellent standard facilities are complemented by a powerful range of options to give the flexibility to match your application.

Comprehensive Process Information

The C1900 lets you see the status of your process at a glance: high visibility 6-digit displays provide a clear indication of up to four process values simultaneously and active alarms are signalled by flashing LEDs below the main display.

Simple Operation

The clearly-labelled tactile keypad gives direct access for operator adjustments and configuration programming, without the need to open the recorder’s door. Clear text prompts on the digital displays guide the user around the various menus. A password-protected security system prevents unauthorized access to configuration adjustment menus.

The chart is easily set up to show the information you need in the way you want. Pen ranges are individually set to give the best resolution for each signal; the time per revolution can be selected between 1 hour and 32 days. Additionally a true time event pen facility enables one pen to be set up as a 3-position event marker on the same time line as Pen 1.
Flexibility to Solve Problems
The C1900 offers seamless integration of loop functionality to solve process problems, eliminating the need for auxiliary devices.

Totalizers, Math And Logic
Integrating fluid flow to calculate total volume is performed by the built-in totalizers available for each channel. Relays can be assigned to increment or reset external counters to match the recorder’s totalizer values. User configurable math functions, mass flow calculations and RH tables are all fully supported. Logic capability allows interlocking and integration of discrete and continuous functions to solve a wide range of process problems.

Timers and Clock
The C1900 offers two event timers driven by the recorder’s real-time clock. The timers can be configured to operate relays, start/stop the chart or trigger other actions within the recorder.

Modbus RS485 Communications
Communications with PCs or PLCs are achieved via the RS485 serial communications link, enabling the C1900 to serve as the front end of plant-wide data acquisition systems. Using Modbus RTU protocol all process inputs and other variables can be continuously read by a host PC running any of a wide variety of standard SCADA packages.
Built to Meet Your Needs

The C1900’s modular architecture gives rise to a high level of hardware choice: up to five I/O modules can be added to the basic instrument.

The standard input/output module supplied with every pen comes complete with a fully isolated analog input, a relay output, transmitter power supply, isolated analog retransmission and two digital inputs.

Further input and output capability is provided by a range of plug-in modules:
- Analog input and relay – for use with math functions
- Four relays – channel alarm outputs
- Eight digital inputs – linked using logic equations
- Eight digital outputs – TTL level alarm outputs
- Modbus RS485 communications – interfaces with PCs

Designed to Survive

NEMA 4X protection ensures the C1900 can survive in the harshest environments and makes the recorder ideal for use in panels which are regularly hosed down. The tough, acid-resistant case and secure cable-entry glands maintain the NEMA 4X rating for wall-mounted or pipe-mounted instruments.

Noise Immunity

Recording accuracy is maintained in noisy industrial environments due to the advanced EMC shielding within the recorder. The power supply has been designed to give excellent protection from power spikes and brownouts and all configuration and status information is held in nonvolatile memory to ensure rapid recovery after a power failure.

Expandable for the Future

The C1900 may be quickly upgraded to meet your changing process requirements. Additional recording channels, math capability or input and output functions can be retrofitted on-site using plug-in cards and easily fitted pen arms. Input calibration data is stored on each card, allowing quick changes to input cards without the need for recalibration. Changes to input sensors or recording procedures are accommodated by reconfiguration using the main keypad.

Minimal Maintenance

Excellent long-term stability keeps recalibration to a minimum, cutting the costs of ownership. User-selectable chart speeds and long-life pens combine to limit usage of consumables.

Built-in Quality

The C1900 is designed, manufactured and tested to the highest quality standards, including ISO 9001.

Easy to Install

A choice of mounting options enables simple installation of the recorder in a panel, on a wall or on a pipe. Detachable terminal blocks allow for trouble-free connection of input and output wiring, with mains isolation provided by a power switch within the instrument.
Summary

1, 2, 3 or 4 pens

10 in. chart size

Standard I/O with each pen includes:
- Analog input, analog output, transmitter power supply, relay output and 2 digital inputs.

Specification

General

Construction
- Size: 15.23 in. (h) × 15.04 in. (w) × 5.57 in. (d) (386.8 × 382.0 × 141.5mm)
- Weight: 18lb (8.2kg)
- Case material: Glassfiber-filled reinforced polyester
- Window material: Polycarbonate
- Door latch: High-compression with optional lock

Environmental
- Operational temperature range: 0° to 55°C (32° to 130°F)
- Operational humidity range: 5 to 95%RH (non-condensing)
- Fast transients: IEC 801-4 Level 3

Installation
- Mounting options: Panel, wall or pipe
- Terminal type: Screw
- Wire size (max.): 14 AWG (I/O), 12 AWG (power)

Operation and Configuration
- Programming method: Via front panel keys
- Security: Password-protected menus

Safety
- General safety: IEC348
- Dielectric: 500V DC (channel/channel)
- Memory protection: Nonvolatile EEPROM
- Approvals: CSA, UL, CSA/FM Class 1 Div. 2, CE

Power Supply
- Voltage: 100 to 240V AC ±10% (90V min. to 264V max. AC), 50/60 Hz
- Consumption: <30VA (typical for full spec. unit)
- Line interruption: Up to 60ms
Process Inputs And Outputs

General
- Noise rejection:
  - Common mode: >120 dB at 50/60 Hz
  - Normal (series) mode: >60 dB at 50/60 Hz
- CJC rejection ratio: <0.05°C/°C
- Sensor break protection: Upscale or downscale drive
- Out of range detection: 0 to 100% of engineering span
- Temperature stability: <0.02% of reading/°C or 1 µV/°C annually
- Input impedance:
  - >10 MΩ (mV and V inputs)
  - 39Ω (mA inputs)

Analog Inputs
- Signal types: mV, V, mA, Ω
- Thermocouple types: B, E, J, K, N, R, S, T
- Resistance Thermometer: Pt100
- Other linearizations: x^1/2, x^2/3, x^5/2, linear
- Sample interval: 250ms per channel
- Dielectric: 500V DC channel/channel
- Digital filter: 0 to 60s programmable

2-Wire Transmitter Power Supply
- Number: 1 per channel
- Voltage: 24V DC nominal
- Drive: Up to 25 mA
- Isolation: 500V DC channel/channel

Analog Outputs
- Type: 4 to 20mA
- Accuracy: ± 0.1%
- Maximum load: 750W
- Dielectric: 500V DC

Relay Outputs
- Type: SPDT
- Rating: (with non-inductive load) 5A at 115/230V AC

Digital Inputs
- Type: TTL or volt-free
- Minimum pulse: 250 ms
- Dielectric: 50V DC between modules, no isolation within module

Digital Outputs
- Type: 5V TTL
- Dielectric: 500V DC between modules, no isolation within module
- Serial Communications
  - Connections: RS485, 4-wire
  - Protocol: Modbus RTU

Analog input performance

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<tr>
<th>Type</th>
<th>Range Lo</th>
<th>Range Hi</th>
<th>Min. Span</th>
<th>Accuracy</th>
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<tr>
<td>mV</td>
<td>0</td>
<td>150</td>
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<td>V</td>
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<td>0.1</td>
<td>±0.1% reading or 20mV</td>
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<td>mA</td>
<td>0</td>
<td>50</td>
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<td>±0.2% reading or 0.2µA</td>
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<td>Ohms (high)</td>
<td>0</td>
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<td>Ohms (low)</td>
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<tr>
<th>°C</th>
<th>°F</th>
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<td>B</td>
<td>1800</td>
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<tr>
<td>E</td>
<td>900</td>
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<td>J</td>
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<td>K</td>
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<tr>
<td>T</td>
<td>300</td>
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<tr>
<td>PT100</td>
<td>600</td>
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</table>

Accuracy (excl. CJC)
- B: ± 2 °C (above 200 °C) (3.6 °F above 434 °F)
- E: ± 0.5 °C (± 0.9 °F)
- J: ± 0.5 °C (± 0.9 °F)
- K: ± 0.5 °C (± 0.9 °F)
- N: ± 0.5 °C (± 0.9 °F)
- R: ± 1 °C (above 300 °C) (1.8 °F above 572 °F)
- S: ± 1 °C (above 200 °C) 1.8 °F above 572 °F
- T: ± 0.5 °C (± 0.9 °F)
### Recording System

**Pens**
- **Number**: 1, 2, 3, or 4 (red, blue, green, black)
- **Response**: 7 seconds (full scale)
- **Resolution**: 0.1% steps
- **Pen lift**: Motor-driven, with optional auto-drop

**Event Pens**
- **Standard**: 3-position event recording on any channel
- **Real time**: 3-position event recording on the same time line as Pen 1

**Chart**
- **Chart size**: 10 in. or 105 mm
- **Chart speed**: 1 to 167 hours or 7 to 32 days per revolution
- **Rotation accuracy**: <0.5% of rotation time

### Event Pens

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- **Standard**: 3-position event recording on any channel
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### Chart

- **Chart size**: 10 in. or 105 mm
- **Chart speed**: 1 to 167 hours or 7 to 32 days per revolution
- **Rotation accuracy**: <0.5% of rotation time

### Display and Operator Panels

**Displays**
- **Number**: 2 (1 or 2 pens) or 4 (3 or 4 pens)
- **Type**: 6-digit red LED, 0.56 in. (14mm) high
- **Status indicators**: Indicate channel number on display
- **Alarm indicators**: Indicate channels with active alarms

**Panel keys**
- **Function**: Programming access, increment/decrement, pen lift and user-defined function key

### Alarms and Logic

**Alarms**
- **Number**: 4 per channel
- **Type**: High/Low process, fast/slow rate of change, time delay
- **Adjustments**: Hysteresis, time delay

**Logic Equations**
- **Number**: 4
- **Function**: OR, AND
- **Inputs**: Alarm states, digital inputs, totalizers, logic
- **Outputs**: Relays, digital outputs, chart stop, alarm acknowledge

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### Advanced Software Functions

**Totalizers**
- **Number**: 1 per pen
- **Size**: 99,999,999 max.
- **Output**: External counter driver, ‘wrap’ pulse signal

**Math**
- **Number of equations**: 4
- **Type**: +, −, x, ÷, low & high select, max., min., average, mass flow, RH

**Timers**
- **Number**: 2
- **Type**: Real-time clock driven event, adjustable duration
- **Output**: Relay, digital output, logic equation

**Option Module**
- **Number**: 5 plus 1 x standard input/output module
- **Connection**: Plug-in cards with detachable connection blocks

### EMC

**Design & Manufacturing standards**
- CSA General Safety: Approved
- UL General Safety: Approved
- CSA/FM Class 1 Div. 2: Approved

**Emissions and Immunity**
- Meets requirements of:
  - EN 50081-2
  - EN 50082-2
  - IEC 61326 for an Industrial Environment
  - CE Mark
## Option Module Types

<table>
<thead>
<tr>
<th>Option module types</th>
<th>Analog I/P</th>
<th>Analog O/P</th>
<th>Trans. PSU</th>
<th>Relays</th>
<th>Digital I/P</th>
<th>Digital O/P</th>
<th>Comms.</th>
<th>Max. no. per instrument</th>
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# Ordering Information

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## PART 2 – Additional Modules

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## Special Settings

<table>
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<tr>
<th>Company Standard</th>
<th>Custom configuration (customer to complete and supply C1900R custom configuration sheet – INF08/032)</th>
<th>STD</th>
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<tbody>
<tr>
<td>Special</td>
<td>Engineered configuration (customer to supply configuration details required)</td>
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</table>

## Calibration certificate **

* Each pen fitted has an associated standard input/output module comprising Analog Input, Analog Output, Relay, Transmitter Power Supply and Two Digital Inputs. Additional Input/Output modules may be fitted in the unused module positions as required. These additional modules should be specified in PART 2 of the ordering information.

** When a calibration certificate is ordered it is performed according to the specified configuration type:
- CUS/ENG – Inputs and outputs calibrated according to the customer supplied configuration details and ranges.
- STD – Inputs and outputs calibrated according to the instrument factory standard configuration and ranges.
Accessories

- Case-to-panel gasket: C1900/0149
- Wall-mount kit: C1900/1712
- Pipe-mount kit: C1900/0713
- Pack of red pens: C1900/0121
- Pack of green pens: C1900/0122
- Pack of blue pens: C1900/0120
- Pack of black pens: C1900/0119
- Pack of purple pens: C1900/0123
- After-sales engineered configuration service: ENG/REC

Key to module types

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No module fitted / Pen input channel *</td>
</tr>
<tr>
<td>1</td>
<td>Standard Input/Output</td>
</tr>
<tr>
<td>2</td>
<td>Analog input (Math input) + Relay</td>
</tr>
<tr>
<td>3</td>
<td>Four Relays</td>
</tr>
<tr>
<td>4</td>
<td>Eight Digital Inputs</td>
</tr>
<tr>
<td>5</td>
<td>Eight Digital Outputs</td>
</tr>
<tr>
<td>6</td>
<td>True Time Event Pen (Violet)</td>
</tr>
<tr>
<td>8</td>
<td>Modbus RS485 Communications</td>
</tr>
</tbody>
</table>

* On 2, 3 or 4 pen instruments a standard I/O module is always fitted in the corresponding module position (enter ‘0’ in the corresponding order code field).

Example: 1 9 1 3 J A A 0 1 1 0 3 0 8 STD

- 3 pens
- 4 relays
- Modbus RS485 Communications

Module Positions
Electrical Connections

Summary of Connections

- **b** – Voltage
- **c** – Current (non 2-wire Transmitters)
- **d** – 2-wire Transmitter
- **e** – Thermocouple
- **f** – 3-wire RTD
- **g** – Low Voltage (mV)
- **h** – 2-wire RTD and Resistance

Standard Input/Output Modules

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normally Closed</td>
<td>Normally Open</td>
<td>Logic 1</td>
<td>Logic 2</td>
<td>Normally Open</td>
<td>Common</td>
<td>Normally Closed</td>
<td>Common</td>
<td>Normally Open</td>
<td>Logic Inputs</td>
<td>Normally Closed</td>
<td>Common</td>
</tr>
</tbody>
</table>

Relay Output

1. Relay 1
2. Relay 2
3. Relay 3
4. Relay 4

Four-Relay Output Module

Power Supply Connections

- Earth (Ground) Stud
- Power Switch (Optional)
- Fuse (Optional)
Overall dimensions

Dimensions in mm (in.)

- Overall dimensions
  - 382 (15.04)
  - 320.8 (12.63)
  - 355.6 (14.00)
  - 386 (15.23)
  - 323 (12.72)
  - 285.75 (11.25)
  - 43.2 (1.70)
  - 16.25 (0.64)

- Cut-out size
  - 36.6 (1.44) – Typical Space Between Adjacent Knockout Centers
  - 4 holes 7.14 (0.281) dia. or tap for ¼ in. thread

- Dimensions in mm (in.)
  - 183.4 (7.22)
  - 22.35 (0.88)
  - 33 (1.30)
  - 66 (2.60)
  - 45 (1.78)
  - 35 (1.38)