C1900 series
Circular chart recorder / controller
Measurement made easy
C1900 – dependable recording and full PID control united in a rugged, functional instrument

1 to 4 pen recording
- full application flexibility

1 or 2 controllers
- integrated control and recording

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

PID autotune on demand
- optimum loop control

20 programmable ramp/soak profiles
- multiple recipe capability

NEMA 4X/IP66 construction
- hose-down protection

0.1% measurement accuracy
- precise process information

RS485 Modbus serial communications
- open system compatibility
C1900

The C1900 is a fully programmable circular chart recorder/controller combining two PID control loops with 4-pen recording. 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 LED displays provide a clear indication of all process signals. Dedicated operator stations for each controller give continuous displays of set points, measured values and high-visibility deviation bargraphs. Active alarms are signalled by flashing LEDs below the main displays.

4-pen recording

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; 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.

Straightforward operation

The clearly-labelled tactile keypads permit operator adjustments and configuration programming without the need to open the recorder’s door. Separate operator panels for each controller provide a direct route for accessing individual control loops. 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.

Flexibility to solve problems

The C1900 offers seamless integration of loop functionality to solve process problems, eliminating the need for auxiliary devices.

Totalizers, math, logic and timers

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.

Modbus RS485 communications

Communications with PCs or PLCs are achieved via the RS485 serial communications link. 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.
**Versatile process control**
The C1900 provides full PID control of one or two process loops in addition to its powerful recording facilities. The control loops can operate independently or be soft-linked together to implement Cascade or Master/Slave control strategies. Each loop has a dedicated 1/4 DIN-style operator panel for ease of operation and clarity of display.

**Analog, relay or valve positioning output**
The control output is selectable to fit any application with a choice of analog, time proportioning or valve positioning relays; use of a feedback potentiometer to ensure precise valve control is fully supported. Heat/cool operation is available on both loops.

**Extensive ramp / soak programming**
Full control of temperature profiles is provided by 10 program recipes for each controller. A total of 99 ramp / soak segments are available for allocation to these programs. Segment events can be incorporated into the recipes to perform specific functions (e.g. operate relays) at predefined points within the program.

**Remote program selection**
External panel switches can be connected to the C1900’s digital inputs to allow remote selection of stored profiles and to initiate ramp/soak programs.

**Auto / Manual and local / remote**
Dedicated membrane keys on each operator panel enable one-touch operation for selection between manual and automatic loop control and for switching from local to remote set point.

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Programmed process warm-up triggered by real-time clock
Built to meet your needs
The C1900’s modular architecture gives 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 output and two digital inputs. Further input and output capability is provided by a range of plug-in modules:

- Analog input and relay – remote set point
- 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

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.

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.

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 an optional power switch within the instrument.

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, and is guaranteed by a 2 year parts and labour warranty.
Specification

Summary
1, 2, 3 or 4 pens
1 or 2 PID control loops
10 in. chart size
Standard I/O with each pen includes:
- Analog input, analog output, transmitter power supply, relay output and 2 digital inputs.

Construction
Size (h x w x d)
386.8 x 382.0 x 141.5 mm (15.23 x 15.04 x 5.57 in.)
Weight
8.2 kg (18 lb)
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)
5 to 80 %RH (chart only)
Case sealing
NEMA 4X (IP66)
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
Isolation
- 500 V DC (channel / channel)
- 2 kV DC (channel / ground)
Memory protection
Nonvolatile EEPROM
Approvals
- CSA
- UL
- CSA/FM Class 1 Div. 2
- CE

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

Analog input performance
<table>
<thead>
<tr>
<th>Type</th>
<th>Range Lo</th>
<th>Range Hi</th>
<th>Min. Span</th>
<th>Accuracy</th>
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<td>mV</td>
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<td>150</td>
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<td>±0.1 % reading or 10 µV</td>
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<td>mA</td>
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...Analog input performance

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<th>Range Hi</th>
<th>Min. span</th>
<th>°F</th>
<th>Range Lo</th>
<th>Range Hi</th>
<th>Min. span</th>
<th>Accuracy (excl. CJC)</th>
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<td>–18</td>
<td>1800</td>
<td>1278</td>
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<td>3270</td>
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<td>81</td>
<td>–140</td>
<td>1650</td>
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<td>±0.5 °C (±0.9 °F)</td>
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<td>900</td>
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<td>–140</td>
<td>1650</td>
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Process inputs and outputs – general

Noise rejection
- Common mode >120 dB at 50/60Hz
- Normal (series) mode >60 dB at 50/60Hz

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

Long-term drift
- <0.01 % of reading 10 µV annually

Input impedance
- >10 MΩ (mV and V inputs)
- 39 Ω (mA inputs)

2-wire transmitter power supply

Number
- 1 per channel

Voltage
- 24 V DC nominal

Drive
- Up to 25 mA

Isolation
- 500 V DC channel / channel

Analog outputs

Type
- 4 to 20 mA

Accuracy
- ±0.1 %

Maximum load
- 750 Ω

Dielectric
- 500 V DC

Relay outputs

Type
- SPDT

Rating (with non-inductive load)
- 5 A at 115 / 230 V AC

Digital inputs

Type
- TTL or volt-free

Minimum pulse
- 250 ms

Dielectric
- 50 V DC between modules, no isolation within module
**Specification**

**Digital outputs**
Type
- 5 V TTL
Rating
- 5 mA per output
Isolation
- 500 V DC between modules, no isolation within module

**Serial communications**
Connections
- RS485, 4-wire
Protocol
- Modbus RTU

**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

**Display and operator panels**
Displays
Number
- Dual display for process value and set point for each controller, plus individual display for each record-only channel
Type
- 6-digit red LED, 14 mm (0.56 in.) high
Status indicators
- Indicate channel number on display (on record-only channel)
- Indicate remote set point, autotune or manual operation
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, deviation high / low, output high / low, high / low process time delay
Adjustments
- Hysteresis, time delay
Logic equations
Number
- 8
Function
- OR, AND
Inputs
- Alarm states, digital inputs, totalizers, logic
Outputs
- Relays, digital outputs, chart stop, alarm acknowledge

**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
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

**PID control**
- **No. of loops**: 1 or 2

**Control outputs**
- Relay, logic or DC analog

**Control types**
- Time-proportioning, analog

**Control action**
- PID, on/off, motorized valve position, boundless

**Autotune**
- On demand, at start-up or at set point

**Option modules**
- **Number**: 5 plus 1 x standard input/output module

**Connection**
- Plug-in cards with detachable connection blocks

**General**
- All modules isolated from each other 500 V DC

**Module specific**
- Analog O/P isolated from all other I/Ps and O/Ps
- Common of digital I/Ps not isolated from –ve of PV I/P

Option module types

<table>
<thead>
<tr>
<th>Option module types</th>
<th>I/O per module</th>
<th>Max. no. per instrument</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Analog I/P</td>
<td>Analog O/P</td>
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<td>Standard I/O</td>
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<td>Analog I/P + relay</td>
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<td>4 relays</td>
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<td>8 digital I/P</td>
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<td>8 digital O/P</td>
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<tr>
<td>RS485 communications</td>
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</table>


Overall dimensions

Dimensions in mm (in.)

- Overall dimensions:

  - 382 (15.04) mm
  - 320.8 (12.63) mm
  - 183.4 (7.22) mm

- Cut-out size:

  - 323 (12.72) mm
  - 355.6 (14.00) mm
  - 360.4 (14.19) mm
  - 285.75 (11.25) mm

- 4 holes 7.14 (0.281) dia. or tap for 1/4 in. thread

- 16.25 (0.64) mm

- 43.2 (1.70) mm

- 33 (1.30) mm

- 35 (1.38) mm

- 66 (2.60) mm

- 36.6 (1.44) - typical space between adjacent knockout centers

- 22.35 (0.88) mm
**Electrical connections**

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</table>

**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**

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**4-relay output module**

**Digital input / output module**

- **Common**
- **Input 1**
- **Input 2**
- **Input 3**
- **Input 4**
- **Input 5**
- **Input 6**
- **Input 7**
- **Input 8**
- **Output 1**
- **Output 2**
- **Output 3**
- **Output 4**
- **Output 5**
- **Output 6**
- **Output 7**
- **Output 8**

**Power supply connections**

- Earth (ground) stud
- Line
- Neutral
- Power switch (optional)
- Fuse (optional)
## Ordering information

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### Part 2 additional modules

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### Special settings

| Company standard | | | | | | | | | | |
| Custom configuration (customer to complete and supply C1900RC custom configuration sheet – INF08/031) | | | | | | | | | | |
| Special | | | | | | | | | | |
| Engineered configuration (customer to supply configuration details required) | | | | | | | | | | |
| 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**

0  No module fitted / pen input channel *
1  Standard input / output
2  Analog input (math input) + relay
3  Four relays
4  Eight digital inputs
5  Eight digital outputs
6  True time event pen (violet)
8  Modbus RS485 communications

* 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.**

2 control, 2 pen
Remote set point + relay
4 relays

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**Acknowledgements and trademarks**

Modbus™ is a trademark of Modicon, Inc.