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 ¼ 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.

Autotune
Operation of the autotune function on either loop instigates a tuning routine which allows the C1900 to calculate the optimum PID parameters for that particular loop. Following the completion of autotune, the PID values are automatically updated.

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.

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.
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>
</tr>
</thead>
<tbody>
<tr>
<td>mV</td>
<td>0</td>
<td>150</td>
<td>5</td>
<td>±0.1 % reading or 10 µV</td>
</tr>
<tr>
<td>V</td>
<td>0</td>
<td>5</td>
<td>0.1</td>
<td>±0.1 % reading or 20 mV</td>
</tr>
<tr>
<td>mA</td>
<td>0</td>
<td>50</td>
<td>1</td>
<td>±0.2 % reading or 0.2 µA</td>
</tr>
<tr>
<td>Ω (high)</td>
<td>0</td>
<td>10 k</td>
<td>400</td>
<td>±0.2 % reading or 0.1 Ω</td>
</tr>
<tr>
<td>Ω (low)</td>
<td>0</td>
<td>10 k</td>
<td>400</td>
<td>±0.5 % reading or 10 Ω</td>
</tr>
</tbody>
</table>
...Analog input performance

<table>
<thead>
<tr>
<th>Type</th>
<th>°C</th>
<th>°F</th>
<th>Accuracy (excl. CJC)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Range Lo</td>
<td>Range Hi</td>
<td>Min. span</td>
</tr>
<tr>
<td>B</td>
<td>-18</td>
<td>1800</td>
<td>1278</td>
</tr>
<tr>
<td>E</td>
<td>-100</td>
<td>900</td>
<td>81</td>
</tr>
<tr>
<td>J</td>
<td>-100</td>
<td>1300</td>
<td>117</td>
</tr>
<tr>
<td>K</td>
<td>-200</td>
<td>1300</td>
<td>162</td>
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<tr>
<td>N</td>
<td>-18</td>
<td>1700</td>
<td>576</td>
</tr>
<tr>
<td>S</td>
<td>-18</td>
<td>1700</td>
<td>576</td>
</tr>
<tr>
<td>T</td>
<td>-250</td>
<td>300</td>
<td>108</td>
</tr>
<tr>
<td>PT100</td>
<td>-200</td>
<td>600</td>
<td>45</td>
</tr>
</tbody>
</table>

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)

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^3/2, x^5/2, linear

- Sample interval
  - 250 ms per channel

- Isolation
  - 500 V DC channel/channel

- Digital filter
  - 0 to 60s programmable

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

- **Chart**
  - **Chart size**: Approx. 254 mm (10 in.) diameter
  - **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**: 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
+, −, ×, ÷, 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>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Analog I/P</td>
<td>Analog O/P</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>------------</td>
<td>------------</td>
</tr>
<tr>
<td>Standard I/O</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Analog I/P + relay</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>4 relays</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>8 digital I/P</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>8 digital O/P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RS485 communications</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Overall dimensions
Dimensions in mm (in.)
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

4-relay output module

Digital input / output module

Power supply connections
## Ordering information

### Part 1

<table>
<thead>
<tr>
<th>C1900 Recorder/Controller</th>
<th>19XX</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>XXX</th>
<th>OPT</th>
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</thead>
<tbody>
<tr>
<td>Recorder/Controllers *</td>
<td></td>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One control unit, one pen (red)</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One control unit, two pens (red, green)</td>
<td>13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One control unit, three pens (red, green, blue)</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One control unit, four pens (red, green, blue, black)</td>
<td>22</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two control units, two pens (red, green)</td>
<td>23</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two control units, three pens (red, green, blue)</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### Chart type

- Taylor ER/C charts
- KPC 105 PX and PXR type charts
- Chessell Brand charts

### Electrical code

- Standard
- CSA approved
- UL approved
- CSA/FM Class 1 Div. 2 approval
- CSA + UL approved***

### Option module

- None
- Additional modules – complete Part 2

### Options

- None
- Totalizer
- Ramp/Soak profile
- Math and timer
- Totalizer, math and timer
- Totalizer, ramp/soak profile, math and timer

### Door lock

- Not fitted
- Fitted

### Power supply

- 115 V AC
- 230 V AC
- 115 V AC with on/off switch
- 230 V AC with on/off switch

### Part 2 additional modules

<table>
<thead>
<tr>
<th>Module position 2/channel 2 input*</th>
<th>Module type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module position 3/channel 3 input*</th>
<th>Module type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module position 4/channel 4 input*</th>
<th>Module type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module position 5</th>
<th>Module type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module position 6</th>
<th>Module type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 2 4 5 8</td>
<td></td>
</tr>
</tbody>
</table>

### Special settings

- Company standard
- Custom configuration (customer to complete and supply C1900RC custom configuration sheet – INF08/032)
- Special
- Engineered configuration (customer to supply configuration details required)

### Calibration certificate **

- C1

### Printed instruction manual

- English

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* 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.

*** Instrument supplied with both CSA and UL approvals.
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.
1 9 2 2 R A A 0 1 1 0 2 3 0 0 STD
2 control, 2 pen
Remote set point + relay
4 relays

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