MEASUREMENT & ANALYTICS | DATA SHEET | DS/C1900RC-EN REV. AI

C1900 SERIES

Circular chart recorder/controller

ENGINEERED
TO OUTRUN

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

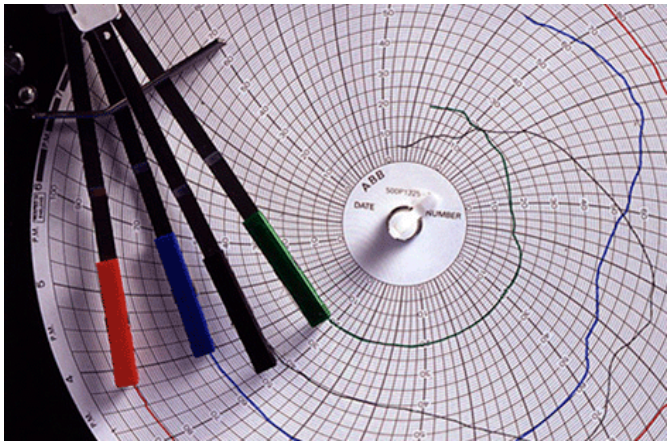
The C1900 is a fully programmable circular chart recorder/controller combining two PID control loops with 4-pen recording. The C1900's straightforward operator controls and robust construction make it suitable for a variety of industrial environments. Excellent standard facilities are complemented by 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

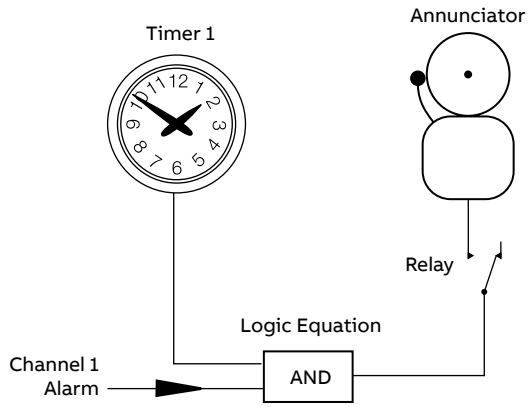
The clearly labeled tactile keypads permit operator adjustments and configuration programming without the need to open the recorder's door. Separate operator panels for each controller provide a direct route for accessing individual control loops. Clear text prompts on the digital displays guide the 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.



01 Alarm annunciation enabled during night hours only

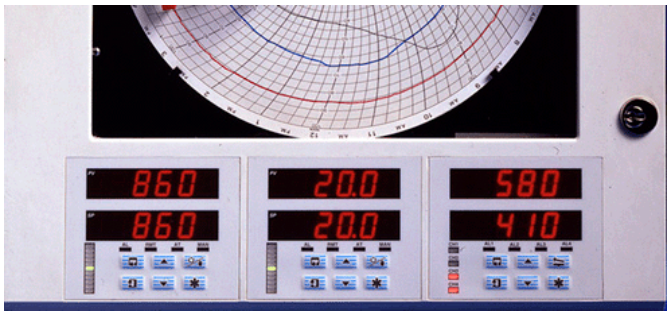
User configurable math functions, mass flow calculations, RH tables and logic equations are all fully supported. The C1900 also offers two event timers driven by the recorder's real-time clock.

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

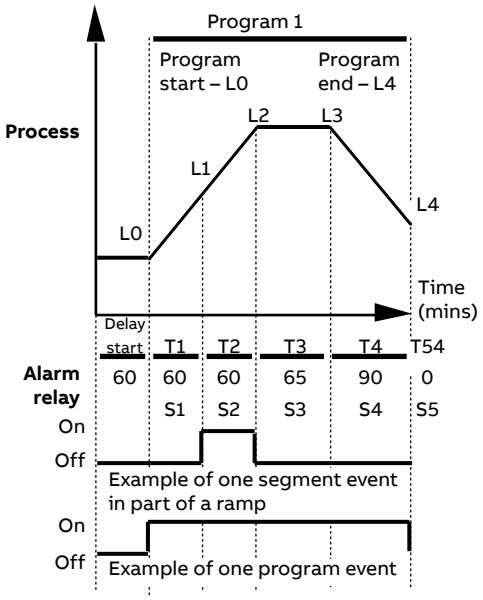
Operation of the autotune function on either loop instigates a tuning routine which allows the C1900 to calculate the optimum PID parameters for that particular loop. Following the completion of autotune, the PID values are automatically updated.

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

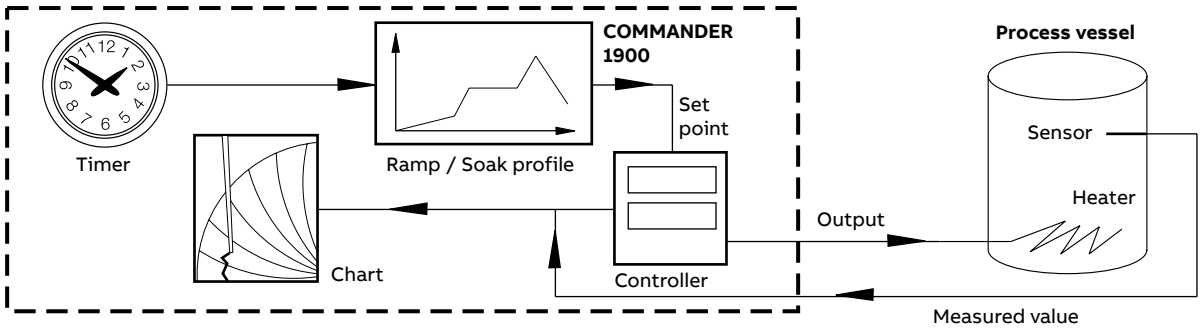
Full control of temperature profiles is provided by 10 program recipes for each controller. A total of 99 ramp/soak segments are available for allocation to these programs. Segment events can be incorporated into the recipes to perform specific functions (e.g. operate relays) at predefined points within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



O2 Ramp/Soak program with time event relay sequences

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.



O3 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:

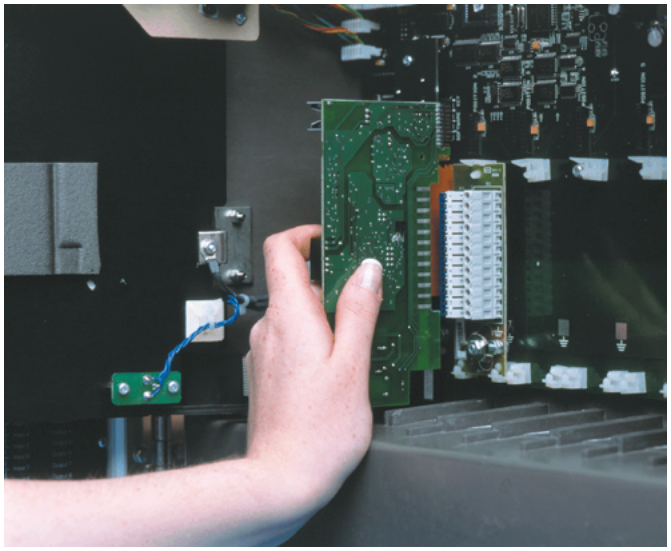
- **Analog input and relay** – remote set point
- **Four relays** – channel alarm outputs
- **Eight digital inputs** – linked using logic equations
- **Eight digital outputs** – TTL level alarm outputs
- **MODBUS RS485 communications** – interfaces with PCs

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

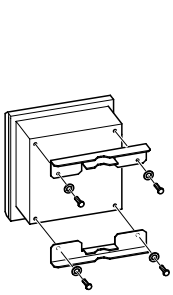
NEMA 4X protection ensures the C1900 can survive in the harshest environments and makes the recorder ideal for use in panels which are regularly hosed down. The tough, acid-resistant case and secure cable-entry glands maintain the NEMA 4X rating for wall-mounted or pipe-mounted instruments.

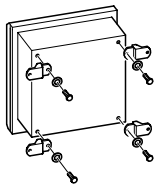
Noise immunity

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.

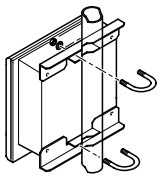
Easy to install

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.

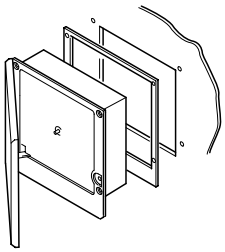




Wall-mounting



Pipe-mounting



Panel-mounting

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.

Specifications

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)
TYPE 4X (wall & pipe mounting only)
Fast transients
IEC 801-4 Level 3
Altitude
2,000 m (6,562 ft) max. above sea level

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

- cULus
- 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

Type	Range Lo	Range Hi	Min. Span	Accuracy
mV	0	150	5	±0.1 % reading or 10 µV
V	0	5	0.1	±0.1 % reading or 20 mV
mA	0	50	1	±0.2 % reading or 0.2 µA
Ω (high)	0	10 k	400	±0.2 % reading or 0.1 Ω
Ω (low)	0	10 k	400	±0.5 % reading or 10 Ω

…Analog input performance

Type	°C			°F			Accuracy (excl. CJC)
	Range Lo	Range Hi	Min. span	Range Lo	Range Hi	Min. span	
B	–18	1800	1278	0	3270	710	±2 °C (above 200 °C) (3.6 °F above 434 °F)
E	–100	900	81	–140	1650	45	±0.5 °C (±0.9 °F)
J	–100	900	90	–140	1650	50	±0.5 °C (±0.9 °F)
K	–100	1300	117	–140	2350	65	±0.5 °C (±0.9 °F)
N	–200	1300	162	–325	2350	90	±0.5 °C (±0.9 °F)
R	–18	1700	576	0	3000	320	±1 °C (above 300 °C) (1.8 °F above 572 °F)
S	–18	1700	576	0	3000	320	±1 °C (above 200 °C) 1.8 °F above 572 °F)
T	–250	300	108	–400	550	60	±0.5 °C (±0.9 °F)
PT100	–200	600	45	–325	1100	25	±0.5 °C (±0.9 °F)

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)

3 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

...Specifications

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
- cULus General Safety: Approved

Emissions and Immunity
Meets requirements of IEC 61326 for an industrial environment

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

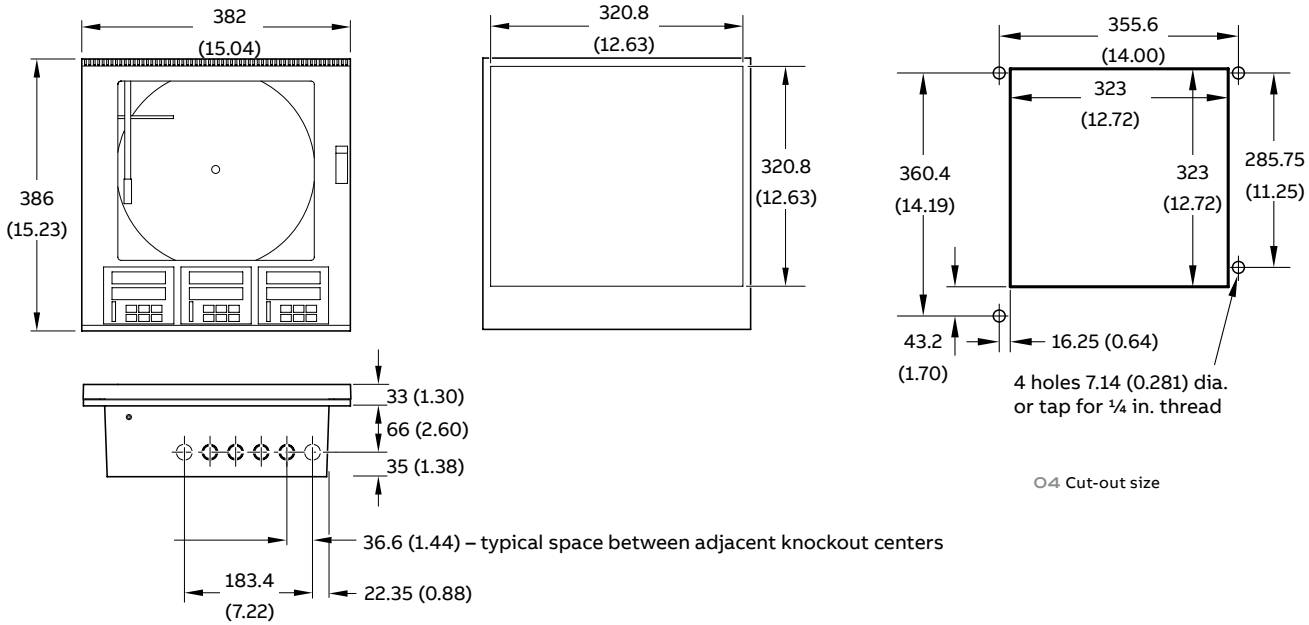
General
All modules isolated from each other 500 V DC
Module specific
- Analog O/P isolated from all other I/Ps and O/Ps
- Common of digital I/Ps not isolated from –ve of PV I/P

Option module types

Option module types	I/O per module							Max. no. per instrument
	Analog I/P	Analog O/P	Trans. PSU	Relays	Digital I/P	Digital O/P	Comms.	
Standard I/O	1	1	1	1	2			3
Analog I/P + relay	1			1				5
4 relays				4				2
8 digital I/P					8			3
8 digital O/P						8		3
RS485 communications							1	1

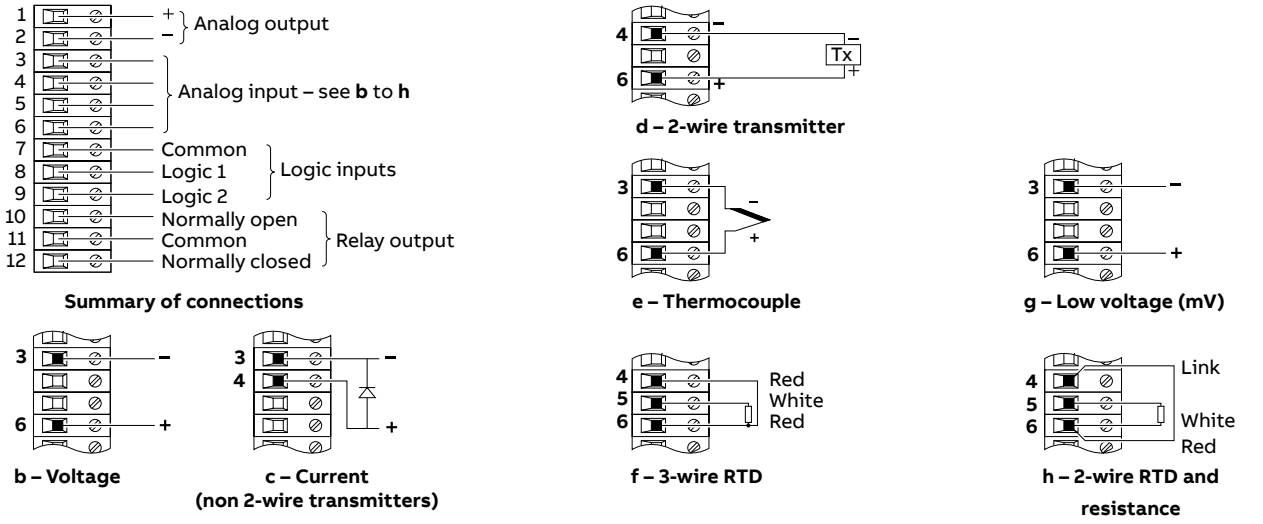
Overall dimensions

Dimensions in mm (in).

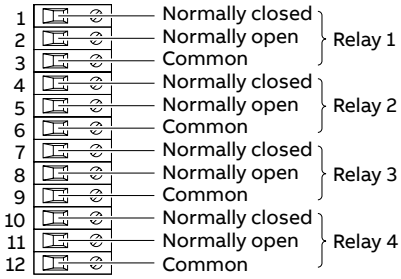


04 Cut-out size

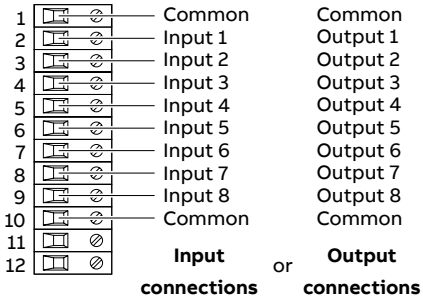
Electrical connections



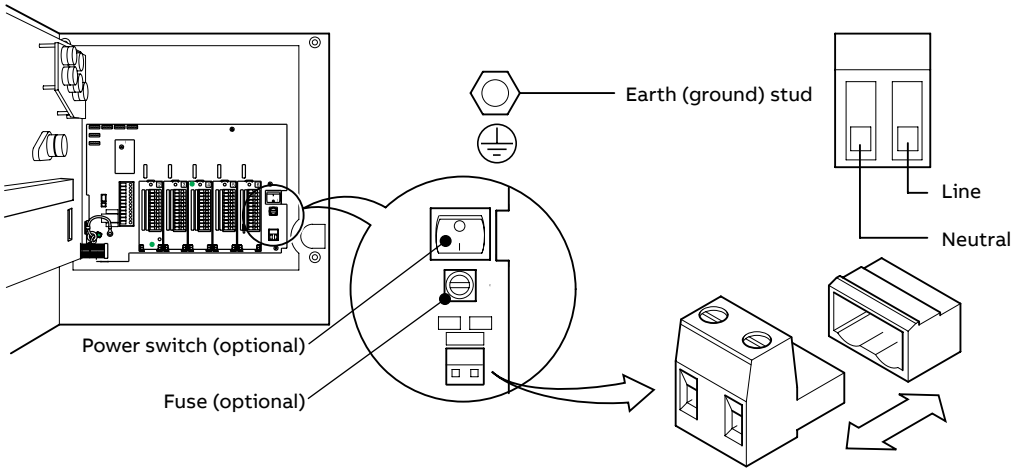
05 Standard input/output modules



06 4-relay output module



07 Digital input / output module



08 Power supply connections

Ordering information

Part 1

C1900 Recorder/Controller	19XX	X	X	X	X	X	X	X	X	X	X	XXX	OPT
Recorder/Controllers *													
One control unit, one pen (red)	11												
One control unit, two pens (red, green)	12												
One control unit, three pens (red, green, blue)	13												
One control unit, four pens (red, green, blue, black)	14												
Two control units, two pens (red, green)	22												
Two control units, three pens (red, green, blue)	23												
Two control units, four pens (red, green, blue, black)	24												
Chart type													
Taylor ER/C charts		R											
KPC 105 PX and PXR type charts		S											
Chessell Brand charts		D											
Electrical code													
Standard			A										
cULus approved			U										
Option module													
None				0									
Additional modules – complete Part 2				A									
Options													
None					0								
Totalizer					3								
Ramp/Soak profile					5								
Math and timer					A								
Totalizer, math and timer					B								
Totalizer, ramp/soak profile, math and timer					C								
Door lock													
Not fitted						1							
Fitted						2							
Power supply ***													
115 V AC							1						
230 V AC							2						
115 V AC with on/off switch							4						
230 V AC with on/off switch							5						

Part 2 additional modules	Module type							
Module position 2/channel 2 input*	0	1	2					
Module position 3/channel 3 input*	0	1	2					
Module position 4/channel 4 input*	0	1	2	3	4	5	6	
Module position 5	0		2	3	4	5		
Module position 6	0	2	4	5	8			

Special settings		
Company standard	STD	
Custom configuration (customer to complete and supply C1900RC custom configuration sheet – INF08/032)	CUS	
Special	SXX	
Engineered configuration (customer to supply configuration details required)	ENG	
Calibration certificate **		C1
Printed instruction manual		
English		M5
German		M1
Spanish		M3
French		M4
Italian		M2

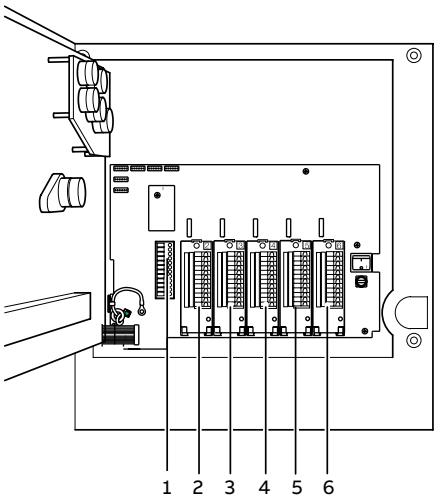
* Each pen fitted has an associated standard input/output module comprising analog input, analog output, relay, transmitter power supply and two digital inputs.
Additional input/output modules may be fitted in the unused module positions as required. These additional modules should be specified in Part 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 is supplied with a universal 100 to 240 V AC, 50/60 Hz power supply.

Accessories

Case-to-panel gasket	C1900/0149
Wall-mount kit	C1900/1712
Pipe-mount kit	C1900/1713
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



09 Module positions

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

Trademarks

- Modbus is a registered trademark of Schneider Electric, USA Inc.

Additional information
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DS/C1900RC-EN Rev. AI 10.2026