C1300
Advanced circular chart recorder
Measurement made easy
C1300 – dependable recording in a rugged, functional instrument

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High-definition backlit display
• latest LCD panel display technology ensures instrument operation and configuration is as easy as possible

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Simple-to-configure totalizers
• automatic calculation of the relationship between units of measure and volume flow units

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Designed to survive
• environmental protection options up to NEMA 4X for the entire recorder, providing reliable operation for wall-, panel- and pipe-mount versions

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Fully field-upgradeable
• additional options easy to add

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Configuration backup
• ability to backup and restore configurations from a PC
The C1300 is an advanced, programmable circular chart recorder for up to four process signals. The C1300’s straightforward operator controls and robust construction make it suitable for a variety of industrial environments. With many features supplied as standard and a powerful range of options, the C1300 is a truly flexible unit that can adapt to match your process requirements.

**Comprehensive process information**
The C1300 incorporates up to two graphical display panels to keep the operator informed of process status. Each panel is capable of displaying up to eight lines of descriptive text to simplify both configuration and operation of the recorder. The display technology used increases visibility in high ambient light conditions.

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

### Standard hardware per pen
- Universal input
  - Thermocouple
  - RTD
  - mA
  - mV
- 2-Wire transmitter PSU
- 1 Relay output
- 1 Analog output
- 2 Digital inputs

### Software functions
- Up to 16 process alarms
- 8 logic equations

### Optional software functions
- Up to 4 totalizers
- 2 real-time alarms (timers)
- 4 math blocks

### Key
- **Standard**
- **Option**

### Serial communications
- RS485 Modbus™ RTU

### Up to 8 additional relays
### Up to 16 additional digital inputs
### Up to 16 additional digital outputs
Advanced totalizer technology
The C1300 features some of the most advanced totalizing features of any recording instrument, giving it the ability to autoconfigure totalizers to specific requirements. For example, it is possible to measure flow in one volumetric unit and totalize in another; the C1300 automatically calculates the relationship between the two volume units and configures this information. No longer is it necessary to deal with unit conversion tables and timebases.

Totalizer control is enhanced further by reset functionality that is set in real-time. If the totalizer is required to reset at midnight every Sunday simply set it to do so. Totalizer logs also eliminate the requirement for the operator to go to the recorder at the same time each day to take readings. The totalizer log contains historical information of the date, time and individual totalizer values; enabling comparison of process volumes directly from the front panel of the recorder.

Timers and clock
The C1300 provides 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; such as allowing alarm annunciation only during night hours.

PC configuration backup
Fitted as standard to every C1300 is a PC Configuration Backup port. Using this port, an instrument’s configuration can be both uploaded and downloaded to a PC, enabling a backup of a recorder’s configuration to be saved for future use. Configuration time of multiple units with similar configurations is also greatly reduced via use of this feature.
Math and logic
Optional math functions, mass flow calculations and RH tables are available, enabling the solving of real process problems, quickly and simply. Math functions include addition, subtraction, multiplication and division.

Logic capability is provided as standard, for interlocking and integration of discrete and continuous functions to address a wide range of process criteria.

Boolean logic functions enable the grouping of alarms to a single ‘common-trouble’ relay, saving time and money or allowing interlocking to create almost infinite combinations of ‘If…Then’ scenarios.

Built to meet your needs
The C1300’s modular architecture enables a high level of hardware choice.

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

Further input and output capability is provided by a range of plug-in modules:
- Four relays – channel alarm outputs
- Eight digital inputs – linked using logic equations
- Eight digital outputs – TTL level alarm outputs
- True-time event pen (Violet) – event pen is additional to standard pens
- Modbus RS485 communications – interfaces with PCs

Expandable for the future
The C1300 can be upgraded quickly to meet your changing process requirements.

Additional recording channels, math capability or input and output functions can be retrofitted on-site using plug-in modules and easily-fitted pen arms. Input calibration data is stored on each card, enabling quick changes of input modules without the need for recalibration.

Changes to input sensors or recording requirements are accommodated by reconfiguration using the keypad.

Modbus RS485 communications
Communications with PCs or PLCs are achieved via the RS485 serial communications link, enabling the C1300 to serve as the front end of plant-wide data acquisition systems. Using Modbus RTU protocol all process inputs and other variables can be read continuously by a host PC running any of a wide range of standard SCADA packages.
...C1300

4-Pen recording
Available with up to four trending pens, the C1300 enables pen ranges to be configured independently from each other and their corresponding inputs. This enables the pens to be scaled to the best effect and potentially minimizes the requirement for costly multiple-scaled consumables. The C1300 also offers a true-time event-pen facility that ensures that process actions are logged on the same timeline as Pen 1.

Designed to survive
Optional NEMA 4X protection ensures the C1300 can survive in the harshest environments and makes the recorder ideal for use in panels that are hosed down regularly. The tough, acid-resistant case provides NEMA 4X rating for all mounting options.

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 provide trouble-free connection of input and output wiring. Mains isolation can be provided by an optional power switch within the instrument.

Summary
- 1, 2, 3 or 4 pens
- 10 in. or 105mm chart size
- Standard I/O with each pen includes:
  - analog input, analog output, transmitter power supply, relay output and 2 digital inputs
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**Specification**

**Construction**
- **Size (H x W x D)**
  386.8 x 382.0 x 135 mm (15.23 x 15.04 x 5.57 in.)
- **Weight**
  8.2 kg (18 lb)
- **Case material**
  Glass fiber-filled reinforced polyester
- **Window material**
  Polycarbonate or glass
- **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 3 (IP54)
  - NEMA 4X (IP66) (optional)

**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**
  EN61010
- **Installation category**
  II
- **Pollution degree**
  2
- **Dielectric**
  - 500 V DC (channel/channel)
  - 2k V DC (channel/ground)
- **Memory protection**
  Nonvolatile FRAM
- **Approvals**
  - CE
  - CSA General Safety (option)
  - UL General Safety (option)

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

**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 (0.1 °F/°F)
- **Sensor break protection**
  Upscale or downscale drive
- **Out of range detection**
  0 to 100% of engineering span
- **Temperature stability**
  <0.02 % of reading/°C (0.04 % of reading/°F) or 1µV/°C
- **Long-term drift**
  <0.01 % of reading or 10 µV annually
- **Input impedance**
  - >10 MΩ (mV and V inputs)
  - 39 Ω (mA input)

**Analog Inputs**
- **Signal types**
  mV, V, mA, Ω
- **Thermocouple types**
  B, E, J, K, N, R, S, T
- **Resistance thermometer**
  Pt 100
- **Other linearizations**
  x^{1/2}, x^{3/2}, x^{5/2}, linear
- **Sample interval**
  250 ms per channel
- **Dielectric**
  500 V DC channel / channel
- **Digital filter**
  0 to 60 s (programmable)
- **Engineering range**
  –999 to 9999

<table>
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<tr>
<th>Type</th>
<th>Range low</th>
<th>Range high</th>
<th>Minimum span</th>
<th>Accuracy</th>
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<td>mV</td>
<td>0</td>
<td>150</td>
<td>5</td>
<td>±0.1 % reading or 10 µV</td>
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<tr>
<td>V</td>
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<td>5</td>
<td>0.1</td>
<td>±0.1 % reading or 20 mV</td>
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<td>mA</td>
<td>0</td>
<td>50</td>
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<td>Ω (low)</td>
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<td>Ω (high)</td>
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<td>10 k</td>
<td>400</td>
<td>±0.5 % reading or 10 Ω</td>
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*Analog input performance*
### Specification

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<tr>
<th>Type</th>
<th>°C Range low</th>
<th>°C Range high</th>
<th>°F Range low</th>
<th>°F Range high</th>
<th>Accuracy (excluding CJC)</th>
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<tr>
<td>B</td>
<td>–18</td>
<td>1800</td>
<td>0</td>
<td>3270</td>
<td>±2 °C (above 200 °C) (3.6 °F above 434 °F)</td>
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<td>E</td>
<td>–100</td>
<td>900</td>
<td>–140</td>
<td>1650</td>
<td>±0.5 °C (±0.9 °F)</td>
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<tr>
<td>J</td>
<td>–100</td>
<td>900</td>
<td>–140</td>
<td>1650</td>
<td>±0.5 °C (±0.9 °F)</td>
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<tr>
<td>K</td>
<td>–100</td>
<td>1300</td>
<td>–140</td>
<td>2350</td>
<td>±0.5 °C (±0.9 °F)</td>
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<td>N</td>
<td>–200</td>
<td>1300</td>
<td>–325</td>
<td>2350</td>
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<td>R</td>
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<td>0</td>
<td>3000</td>
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<tr>
<td>S</td>
<td>–18</td>
<td>1700</td>
<td>0</td>
<td>3000</td>
<td>±1 °C (above 200 °C) 1.8 °F above 572 °F)</td>
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<td>T</td>
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<td>300</td>
<td>–400</td>
<td>550</td>
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<td>–200</td>
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Thermocouple performance

#### 2-Wire transmitter power supplies
- **Number**: 1 per channel
- **Voltage**: 24 V DC nominal
- **Drive**: Up to 25mA
- **Isolation**: 500 V DC channel-to-channel

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

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

#### Digital outputs
- **Type**: 5 V TTL
- **Rating**: 5 mA per output
- **Dielectric**: 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, green, blue, black)
  - **Response**: 7 seconds (full scale)
  - **Resolution**: 0.1% steps
  - **Pen lift**: Motor-driven, with optional autodrop

- **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**: 105 mm or 10 in.
- **Chart speed**: 1 to 167 hours or 7 to 32 days per revolution
- **Rotation accuracy**: <0.5% of rotation time
Graphical display panels
Displays
Number
  1 (1 or 2 pens) or 2 (3 or 4 pens)
Type
  High contrast 128 x 64 STN dot matrix LCD (graphics) module
Status indicators
  Indicate channel number on display
Alarm indicators
  Indicate channel with active alarms
Panel keys
Function
  Programming access, increment/decrement, pen lift and menu key

Alarms and Logic
Alarms
Number
  4 per channel
Type
  High / Low process, fast/slow rate of change, time delay
Adjustments
  Hysteresis, time delay
Alarm indicators
  Indicate channel with active alarms
Logic equations
Number
  4
Function
  OR, AND
Inputs
  Alarm states, digital inputs, totalizers, logic
Outputs
  Relays, digital outputs, chart stop, alarm acknowledge

Advanced software functions
Totalizers
Number
  Up to 4
Size
  999,999,999 max.
Output
  External counter driver, ‘wrap’ pulse signal
Totalizer log
  Max. 21 entries per totalizer
Math
Number of equations
  4
Type
  +, −, ×, ÷, low & high select, maximum, minimum, average, mass flow, RH
Timers
Number
  2
Type
  Real-time clock driven event, adjustable duration
Output
  Relay, digital output, logic equation

EMC
Emissions and Immunity
Meets requirements of:
  • EN50081-2
  • EN50082-2
  • EN61326 for an industrial environment
  • CE Mark

<table>
<thead>
<tr>
<th>Module type</th>
<th>I/O per module</th>
<th>Max. no. per instrument</th>
</tr>
</thead>
<tbody>
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<td>Analog I/P</td>
<td>Analog O/P</td>
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<td>1</td>
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<td>4 relays</td>
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<tr>
<td>8 digital I/P</td>
<td></td>
<td></td>
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<tr>
<td>8 digital O/P</td>
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<tr>
<td>RS485 communications</td>
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Option module types
## Electrical connections

### Standard input/output modules

<table>
<thead>
<tr>
<th>Relay 1</th>
<th>Relay 2</th>
<th>Relay 3</th>
<th>Relay 4</th>
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<tbody>
<tr>
<td>Normally closed</td>
<td>Normally open</td>
<td>Common</td>
<td>Normally closed</td>
</tr>
<tr>
<td>Common</td>
<td>Normally closed</td>
<td>Normally open</td>
<td>Common</td>
</tr>
<tr>
<td>Relay 1</td>
<td>Relay 2</td>
<td>Relay 3</td>
<td>Relay 4</td>
</tr>
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</table>

### Digital input / output module

<table>
<thead>
<tr>
<th>Input 1</th>
<th>Input 2</th>
<th>Input 3</th>
<th>Input 4</th>
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<tbody>
<tr>
<td>Output 1</td>
<td>Output 2</td>
<td>Output 3</td>
<td>Output 4</td>
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</table>

### 4-relay output module

<table>
<thead>
<tr>
<th>Common</th>
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<tbody>
<tr>
<td>Relay 1</td>
<td>Relay 2</td>
<td>Relay 3</td>
<td>Relay 4</td>
</tr>
</tbody>
</table>

### Analog output

- Analog output

### Analog input

- 1 to 12

### Logic inputs

- Logic 1
- Logic 2

### Relay output

- Normally open
- Normally closed

### 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

### Power supply connections

- Power switch (optional)
- Fuse (optional)
- Earth (ground) stud

- Line
- Neutral

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**Summary of connections**

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tbody>
<tr>
<td>5</td>
<td>6</td>
<td>7</td>
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<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
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</tbody>
</table>

- **3** – 4
- **6** – 7

- **b** – Voltage
- **c** – Current (non 2-wire transmitters)
### Overall dimensions

Dimensions in mm (in.)

- **Overall dimensions**
  - Overall dimensions:
    - Width: 382 (15.04) mm
    - Height: 386.8 (15.23) mm
  - Typical space between adjacent knockout centers: 36.6 (1.44) mm
  - Panel cut-out size:
    - Width: 323 (12.72) mm
    - Height: 323 (12.72) mm

- **Wall-mount dimensions**
  - Wall-mount dimensions:
    - Width: 320.8 (12.63) mm
    - Height: 320.8 (12.63) mm
  - Wall-mount holes:
    - 4 holes 7.14 (0.281) dia.
    - or tap for ¼ in. thread

- **Panel cut-out size**
  - Panel cut-out size:
    - Width: 355.6 (14.00) mm
    - Height: 355.6 (14.00) mm

- **Wall-mount dimensions**
  - Wall-mount dimensions:
    - Width: 360.4 (14.19) mm
    - Height: 360.4 (14.19) mm
  - Wall-mount holes:
    - 4 holes 7.14 (0.281) dia.
    - or tap for ¼ in. thread
## Ordering Information

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<th>C1300 advanced circular chart recorder</th>
<th>131</th>
<th>X</th>
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<td>Three pens (red, green, blue)</td>
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* 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).

** 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.
**Standard accessories**
(supplied with each recorder)

- Set of pens
- Pack of 10 charts (0 to 100, 24 hour)
- Wall-mount kit

**Optional accessories**

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Module identification

Module positions

0  No module fitted / pen input channel
1  Standard input / output
3  Four relays
4  Eight digital inputs
5  Eight digital outputs
6  True-time event pen – violet (additional to standard pens)
8  Modbus RS485 communications

Acknowledgements and trademarks

Modbus™ is a trademark of Modicon, Inc.