COMMANDER 100

Universal Process Controller

Specification DataFile

- **PID controller with ‘one shot’ auto-tune**
  - single loop, heat/cool and ramp/soak as standard

- **Quick code, front face or PC configuration**
  - easy commissioning and operation using our Windows™-based software

- **Universal process input with transmitter power supply**
  - direct connection for any process signal

- **Hoseproof front panel and full noise immunity**
  - reliability in the harshest environments

- **RS485/MODBUS serial communications**
  - SCADA, PLC and open systems integration

COMMANDER 100 – the-easy-to-use 1/8 DIN controller with extensive application capabilities
The COMMANDER 100 Universal Process controller is a highly versatile, single loop controller designed to be exceptionally easy to operate and set up.

Universal input and integral transmitter power supply ensure that the COMMANDER 100 has the capabilities to measure a wide range of process signals such as temperature, pressure, flow and level.

Analog, logic and relay control outputs are all fitted as standard, with the option to add further i/o capabilities such as additional relays, remote set point and digital input, to suit your application.

The configuration of the COMMANDER 100 is simply achieved by moving the security switch and entering a simple code from the front panel keys. No passwords, no input links, no complications.

With hoseproof front panel protection and superior RF immunity as standard the COMMANDER 100 has been designed to control reliably in the harshest of today's industrial environments.

Universal Process Input

- Thermocouple
- RTD
- 4 – 20mA
- Volts, millivolts

Transmitter Power Supply

Auxiliary Inputs

- Digital
- Remote Set Point

Primary Outputs

- 1 x Analog
- 1 x Logic
- 1 x Relay

Additional Alarm Outputs

- 2 x Relays

Serial Communications

RS485 MODBUS RTU

PID Control

Alarms

PV

Retransmission

Alarm annunciator

SCADA systems (on PC)

KEY: Standard Option
**PID Control**
Simple PID control is available using any of the unit’s three built-in outputs.
- 4 – 20mA analog
- Logic 18V time proportioning (to drive solid state relays)
- 5A relay for Time proportioning or On/Off control

**Heat/Cool**
Heat/Cool control strategies may be implemented on the standard COMMANDER 100, using a combination of the analog, logic and relay outputs.

**Ramp/Soak Set Point Profiles**
The ramp/soak facility available on every COMMANDER 100 provides for a single program, four-segment profile. This facility also includes guaranteed ramp/soak, repeat program, skip and reset.

**Master/Slave and Cascade**
Two or more COMMANDER 100s can be used in master/slave, or cascade, configuration with the addition of the remote set point option to the basic unit.

**RS485/MODBUS**
Fitted with an optional RS485 serial communication board, the COMMANDER 100 can communicate with PLCs and SCADA systems using the MODBUS protocol.
Specifying

Summary
P, PI, PID single loop controller
Autotune facility
Fully user configurable
Hoseproof front face

Operation

Display
High-intensity 7-segment, 2 x 4-digit LED display
Display range –999 to +9999
Display resolution ±1 digit
Display height 10mm (0.39 inches)

Configuration
User defined via front panel or PC Configurator

Standard Functions

Control types
Programmable for manual, on/off, time proportioning,
current proportioning and heat/cool control.

Set points
Local
Remote
4 selectable fixed value
Ramping set point

Profile controller
Number 4 ramp/soak segments
Features Guaranteed ramp/soak, self seeking
set point, program repeat
Controls Run, hold and stop from front panel
switches
Run/hold or run/stop from digital input

Alarms
Number Two user-defined
Type High/low process
High/low deviation
Loop break alarm

Outputs

Control output/retransmission
Analog, configurable in the range of 4 to 20mA
Max. load 15V (750Ω at 20mA)
Accuracy ≤ 0.25% of span
Dielectric 500V d.c. from i/p (not isolated from logic o/p)

Logic output
18V d.c. at 20mA
Min. load 400Ω
Dielectric 500V d.c. from i/p (not isolated from control o/p)

Relay output
One relay as standard (SPDT) – 5A @ 115/230V a.c.

Analog Inputs

Number
One as standard
One optional – 4 to 20mA remote set point input

Input sampling rate
250ms per channel

Type
Universally configurable to provide (Channel 1 only):
Thermocouple (THC)
Resistance Thermometer (RTD)
Millivolt
Current
D.C. voltage

Input impedance
mA 100Ω
mV, V >10MΩ

Linearizer functions
Programmable for standard inputs:
SqRoot, THC types B, E, J, K, N, R, S, T or Pt100

Broken sensor protection
Upscale drive on THC and RTD
Downscale drive on milliamps and voltage

Cold junction compensation
Automatic CJC incorporated as standard
Stability – < 0.05°C/°C change in ambient temperature

Input protection
Common mode isolation >120dB at 50/60Hz with 300Ω imbalance
Series mode rejection >60dB 50/60Hz

Transmitter power supply
24V, 30mA max. powers one 2-wire transmitter

Options
One option board can be installed from:
Type 1 – One relay
Type 2 – Two relays + one digital input + remote set point
Type 3 – One relay + one digital input + remote set point
+ MODBUS serial communications

Relay output
SPDT – 5A @ 115/230V a.c.

Digital input
Type – Volt-free
Minimum pulse – 250ms
(not isolated from remote set point)

MODBUS serial communications
Connections – RS422/485, 2 or 4-wire
Speed – 2.4k or 9.6k baud rate
Protocol – MODBUS RTU slave

Remote Set Point Input
4 to 20 mA d.c., 100Ω nominal input impedance
Preset to process variable engineering units
(not isolated from digital inputs)
### Standard Analog Input Ranges

<table>
<thead>
<tr>
<th>Thermocouple</th>
<th>Maximum Range °C</th>
<th>Maximum Range °F</th>
<th>Accuracy (% of reading)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>−18 to 1800</td>
<td>0 to 3270</td>
<td>0.25% or ±2°C (above 200°C)</td>
</tr>
<tr>
<td>E</td>
<td>−100 to 900</td>
<td>−140 to 1650</td>
<td>0.25% or ±0.5°C</td>
</tr>
<tr>
<td>J</td>
<td>−100 to 900</td>
<td>−140 to 1650</td>
<td>0.25% or ±0.5°C</td>
</tr>
<tr>
<td>K</td>
<td>−100 to 1300</td>
<td>−140 to 2350</td>
<td>0.25% or ±0.5°C</td>
</tr>
<tr>
<td>N</td>
<td>−200 to 1300</td>
<td>−325 to 2350</td>
<td>0.25% or ±0.5°C</td>
</tr>
<tr>
<td>R</td>
<td>−18 to 1700</td>
<td>0 to 3000</td>
<td>0.25% or ±1.0°C (above 300°C)</td>
</tr>
<tr>
<td>S</td>
<td>−18 to 1700</td>
<td>0 to 3000</td>
<td>0.25% or ±0.5°C (above 200°C)</td>
</tr>
<tr>
<td>T</td>
<td>−250 to 300</td>
<td>−400 to 550</td>
<td>0.25% or ±0.5°C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RTD</th>
<th>Maximum Range °C</th>
<th>Maximum Range °F</th>
<th>Accuracy (% of reading)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT100</td>
<td>−200 to 600</td>
<td>−325 to 1100</td>
<td>0.25% or ±0.5°C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Linear Inputs</th>
<th>Range</th>
<th>Accuracy (% of reading)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milliamps</td>
<td>0 to 20</td>
<td>0.25% or ±2μA</td>
</tr>
<tr>
<td>Milliamps</td>
<td>4 to 20</td>
<td>0.25% or ±2μA</td>
</tr>
<tr>
<td>Volts</td>
<td>0 to 5</td>
<td>0.25% or ±200μV</td>
</tr>
<tr>
<td>Volts</td>
<td>1 to 5</td>
<td>0.25% or ±200μV</td>
</tr>
<tr>
<td>Millivolts</td>
<td>0 to 50</td>
<td>0.25% or ±200μV</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Square Root Input</th>
<th>Range</th>
<th>Accuracy (% of reading)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milliamps</td>
<td>4 to 20</td>
<td>0.25% or ±2μA</td>
</tr>
</tbody>
</table>

### Environmental

#### Operating limits
- 0 to 55°C (32 to 131°F)
- 5 to 95% RH non-condensing

#### Temperature stability
- < 0.02% of reading or 2μV/°C (1μV/°F)

#### Front face
- IP65 (NEMA3), case rear IP20

### EMC

#### Emissions
- Meets requirements of EN50081-2

#### Immunity
- Meets requirements of EN50082-2

#### Design and manufacturing standards
- Designed to meet CSA requirements
- CE Mark

### Electrical safety
- IEC 348

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### Physical

#### Size
- 48 wide x 96 high x 125mm (1.89" wide x 3.78" high x 4.92")

#### Weight
- 250g (0.5lb) approximate

### Electrical

#### Voltage
- 85 to 265V a.c. (50/60Hz)
- 24V d.c.

#### Power consumption
- < 6VA
Dimensions

Cut out dims. $45 \pm 0.6$ wide x $92 \pm 0.8$ high
($1.77 \pm 0.02$ wide x $3.62 \pm 0.03$ high)

Dimensions in mm (inches)

Wiring Connections

Remote Set Point Input (–)  Remote Set Point Input (+)
Digital Input (–)  Digital Input (+)
Relay 2 Normally Open  Relay 2 Common
Relay 2 Normally Closed

4-Lead RTD

3-Lead RTD

Millivolts and Volts

Thermocouple,

Millivols and Volts

(-)  (+)

1  2  3  4

1  2  3  4

1  2  3  4

1  2  3  4

1  2  3  4

1  2  3  4  5

Relay 3 Normally Open  Relay 3 Common  Relay 3 Normally Closed

Milliamps

(100Ω shunt placed across Terminals 1 and 2)

Milliamps using internal 2-wire transmitter power supply
(100Ω shunt placed across Terminals 1 and 2)
## Ordering Guide

<table>
<thead>
<tr>
<th>Option Board</th>
<th>C100</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>- None</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- One additional relay</td>
<td>0</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Two additional relays + one digital input + remote</td>
<td>0</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>set point 4–20mA</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- One additional relay + one digital input + RS485</td>
<td>0</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MODBUS</td>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Power Supply</th>
<th>85V to 265V a.c.</th>
<th>0</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24V d.c.</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Build                                                  | Kent-Taylor Standard | 0 |   |   |   |   |   |
|                                                      | CSA approval (pending) | 1 |   |   |   |   |   |
|                                                      | UL approval (pending)  | 2 |   |   |   |   |   |

| Programming/Special Features                           | Configured to factory standard | S | T | D |   |   |   |
|                                                      | Configured to customer detail   | C | U | S |   |   |   |
|                                                      | Agreed special features         | S | P | X | X |   |   |

### Instrument Coding Example

**COMMANDER 100 Universal Process Controller**

- One additional relay
- 85V to 265V a.c. power supply
- Standard build
- Configured to factory standard
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