# TWO-LOOP CONTROLLER

## with advanced functions and RS-485 MODBUS

programming by Function Blocks

# DS-4200

Desin Instruments

## DESCRIPTION

The **DS-4200** High Series are powerful fully configurable panel mounting processor incorporating the new technology Function Blocks Programmable, advanced PID control and RS-485 MODBUS communication. These devices are dedicated specifically to the measuring, calculation and control in industrial processes under PC supervision.

- **PAC TECHNOLOGY** (PROGRAMMABLE AUTOMATION CONTROLLER)
- **FULLY PROGRAMMABLE BY KEYBOARD OR REMOTE PC**
- **TWO MODELS: RELAY OUTPUTS OR PULSE-COUNTER INPUT**
- **54 PREPROGRAMMED FUNCTION BLOCKS**
- **2 CONFIGURABLE ANALOG RTD, T/C, mV, mA INPUTS**
- **2 CONFIGURABLE ISOLATED 4-20 mA ANALOG OUTPUTS DEFINIBLE AS RETRANSMISSION AND/OR CONTROL OUTPUT**
- **2 SPST RELAY OUTPUTS (VERSION DS-4200/RR)**
- **1 PULSE-COUNTER AND FRECUENCY INPUT (DS-4200/DIO)**
- **2-3 LOOP PID CONTROL AUTOTUNING FUZZY LOGIC**
- **MATH FUNCTIONS AS INTEGRATOR, DERIVATOR, ETC.**
- **RS-485 MODBUS COMMUNICATION AS STANDARD**
- **PROASIS® DCS-WIN SUPERVISORY SOFTWARE INCLUDED**


***1/8 DIN*** ***(96 x 48 mm)***

CE

## FEATURES

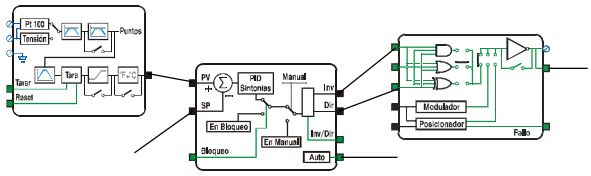
The Panel mounting **DS-4200** Series is a new generation of programmable instruments for multi-loop control, developed with PAC technology that combines the specific features of Analog Control and Logic Functions.

These devices are programmable through a whole library of **Function Blocks.** Programming is simply accomplished interconnecting the virtual blocks like the classic structures used discreet components (counter, integrators, holders, logic and analog operators, linearizers, positioners, timers, totalizers, PID, Auto-Manu station, etc.).

The **DS-4200** Series can be programmed, configured and para-meterized locally by front panel keyboard and remote mode from PC via RS-485 Modbus communication with the graphic tool **LoopWin** (Windows©) software (optional) making programming faster, easier and more flexible than the only configurable classic instruments.

The **DS-4200** Series are presented in two different versions, the **DS-4200/RR**version with relay outputs or **DS-4200/DIO** version with logic input and ouput.

The **DS-4200** it prepares communication RS-485 MODBUS RTU as standard, allowing to be connected to a fieldbus net in a distributed control system.




**LIST OF AVAILABLE FUNCTION BLOCKS:**

- Multisensor analog Input, with filter, ranges, etc.
- Counter and Frequency functions by means logic inputs
- Analog Integration and Derivation with adjustable time
- Configurable Analog Output. Display configurator
- Arithmetic calculator. Linearizer. Hold, peak and valley
- Timers. Logic operators And, Or, Xor, Set
- Analog and Logic signal alarms
- Local, remote and auxiliar setpoints
- Flow, HTG, $F_o$ and Psychrometric special function blocks
- PID Autotuning and Fuzzy logic, Bumpless Auto/Manual station, Antireset Windup, Output limits, etc.

**APPLICATIONS**

Indication and/or PID Control of two variables, independents or related to each other, with treatment, calculation, conversion and transmission in mA and Modbus of analog measures and digital signals for control of multivariable processes with logic functions, linear and non-linear signals.

# SPECIFICATIONS

**ANALOG INPUTS:**
- Inputs ..... multisensor T/C(1) or Pt100 (2) or mV/mA
  Note: Only one of two multisensor inputs can be used to T/C input, being the other one for cold junction compensation with Pt100 sensor (included).
- Input impedance: ..... > 1 MΩ for mV
  external Shunt 3.74 Ω (mín. 0.5 %) for mA
- T/C Cold Junction Compensation : ..... by sensor in terminals
- CJC range: ..... 30 to 210 °F ( 0 to 100 °C)
- Standards: ..... IEC584 (T/C) & IEC751 (Pt 100)
- Input types and configurable ranges (only multisensor inputs):

| | | |
|---|---|---|
| T/C T | -300.0/750.0 °F | -200.0/400.0 °C |
| T/C E | -300/1800 °F | -200/1000 °C |
| T/C J | -300/2190 °F | -200/1200 °C |
| T/C K | -300/2300 °F | -200/1300 °C |
| T/C N | 0/2300 °F | 0/1300 °C |
| T/C R | 0/3000 °F | 0/1700 °C |
| T/C S | 0/3000 °F | 0/1700 °C |
| T/C B | 1200/3200 °F | 600/1800 °C |
| Pt 100 | -300.0/1470.0 °F | -200.0/800.0 °C |

  Voltage: -75 mV /+75 mV
  Current: 0...4-20 mA (with external shunt 3.74 Ω)
  Programmable range: -1999 to +9999 or ± 32000 points
- Accuracy at 25 °C: ..... ± 0.1 %
- A/D converter resolution: ..... 64000 points
- Sampling rate: ..... 125 ms

**ANALOG OUTPUT:**
- Outputs: ..... Two programmable mA (V w/ external shunt)
- Output range: ..... 0-20 mA & 4-20 mA
  ..... 0-1 V, 0-5 V or 0-10 V options
- Current loop max. load: ..... 500 Ohms
- Accuracy at 25 °C: ..... ± 0.1 %
- D/A converter resolution: ..... 12 bits
- Update time: ..... 125 ms
- Insulation: ..... 1000 V

**DIGITAL OUTPUTS (VERSION DS-4000/RR):**
- 2 Relay SPST outputs (Y1 and Y2) ..... 1 A to 250 Vac sharing a common terminal
- Configurables each one as ..... On-Off Control
  ..... Measuring Alarms
  ..... Optional programmed functions
- Output insulation: ..... 1000 V

**DIGITAL OR COUNTER INPUT (VERSION DS-4000/DIO):**
- 1 Logic input (DI 2): .... Frequency and Counter 2.5 kHz max.
- Functions: ..... Counter block with frecuency divider Totalyzer, Frequencymeter and Periodmeter up to 9999 u/t
- Max. count ..... 4 digits (9999) or 32 bit in internal register
- Preset for counter: ..... up to 9999 with configurable output
- Type: ..... 24 Vac/dc (H>8 V) and (L<5 V) 1000 V insulation

**Note**: ..... (The Option /DIO is non-compatible with relay output s)

**CONTROL LOOPS AND OUTPUTS TYPE:**
- 3 PID bimodal control loops w/Autotuning & Fuzzy Logic Configurable as Time Proportional discontinuous control (Relay output) or Continuous (4-20 mA) or Bimodal (mA + mA)

**ALARM LOOPS:**
- 6 programmable Alarm blocks
- Modes: Independent, Deviation or Band deviation alarm limits

**DISPLAY:**
Upper (PV) ..... 4 green digits 14 mm (0.55") high
Lower (SP) ..... 4 red digits 10 mm (0.4") high
- 6 Leds status indicators
- 4 standard keys to set-up and data introducing

**TRANSMITTER POWER SUPPLY:**
- Type and output values: ..... switched 24 Vdc max. 40 mA

**DIGITAL COMMUNICATIONS:**
- Type: ..... RS-485 Modbus RTU
- Baud rate: ..... 9600, 19200, 38400 bauds

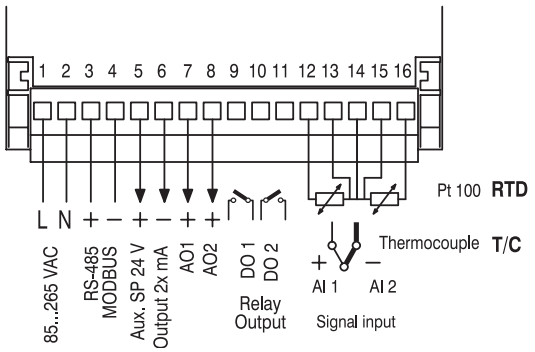
**ENVIRONMENTAL LIMITS:**
- Operating ambient: ..... 0 to 50 °C and 95 %RH max.

**CE STANDARDS:**
- EN 50081 Emission, EN 50082 Immunity, EN 61010 Electric Safe

**POWER:**
- Nominal operating voltage: ..... 85 to 265 Vac/dc 5 VA
  (optional 12 or 24 Vac/dc)

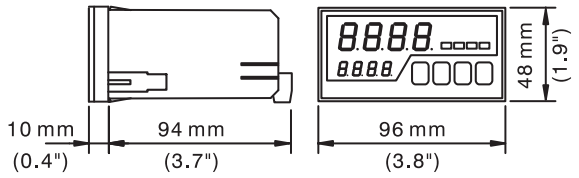
**ENCLOSURE:**
- Type: ..... ABS and Polycarbonate.
- Front protection: ..... NEMA 4 (IP54)

# WIRING DIAGRAM




| | | |
|---|---|---|
| 1<br>2 | — | Mains Power Supply 85...265 Vac/dc<br>(Optionally 12 or 24 Vac/dc) |
| 3<br>4 | +<br>– | RS-485 MODBUS Communication port |
| 5<br>6<br>7<br>8 | +<br>–<br>+<br>+ | Auxiliary supply output (+) 24 Vdc 40 mA<br>Common of (-) 24 Vdc SA 1 - SA 2 outputs<br>SA 1 (AO 1) 0...4/20 mA Analog output<br>SA 2 (AO 2) 0...4/20 mA Analog output |
| 9<br>10<br>11 | | Output Y1 (DO1). Relay SPST<br>Common (only in version DS-4200/RR)<br>Output Y2 (DO2). Relay SPST |
| 9<br>10<br>11 | –<br>+ | Logic output Y1 (DO1) by SPST Relay.<br>Common (only in version DS-4200/DIO)<br>Logic input (DI 2). Counter and Frequency |
| 12<br>13<br>14<br>15<br>16 | + –<br>+ – | Analog input AI 1<br>Multisensor RTD, T/C, mV, mA (w/Shunt 3.74Ω)<br><br>Analog input AI 2 (CJC function for T/C)<br>Multisensor RTD, mV, mA (w/Shunt 3.74Ω) |

# DIMENSIONS




Panel mounting: cutout 1.8" x 3.5" $^{+0,2}_{-0}$ (45 x 90 $^{+0,5}_{-0}$ mm)
Weight: 10.9 oz (310 g); with packing 13.1 oz (370 g)

# HOW TO ORDER

Factory configured standard version:

**DS-4200/RR** **2 Analog universal inputs and 2 Analog mA outputs**
**2 Independent settable alarm relay outputs**

**DS-4200/DIO** **2 Analog 4-20 mA inputs and 2 Analog mA outputs**
**1 Pulse-counter and frequency input**
**1 SPST Relay output**

This configuration is user-configurable by LoopWin PC graphic tool. Under request, with additional cost, it can be supplied configured.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