

Temperature Controller

1/16 DIN - 48 x 48 mm

Platinum™ Series M400 Line



Flexibility, with ease of operation and highly valued features

Athena's Platinum™ Series M400 is a compact 48x48 mm size controller with Heat/Cool capability, suitable for a wide range of applications. It offers easy configuration and simple operation, combined with standard features including

auto-tuning, auto/manual, 3 standard outputs, and IP65 front-panel protection. Options include serial communications, analog control or retransmission output, transmitter power supply, start-up and timer special functions, auxiliary current transformer input, choice of two front-bezel colors, and DIN rail mounting.



ATHENA CONTROLS, INC.
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The right solution for your needs



Your Need	Our Solution
Heater failure alert	Heater break alarm with current transformer
Both heating and cooling functions	Heat/cool double action
Easy replacement and quick start-up	Configuration by simple to use codes
Correct tuning for any condition	Automatic selection between two different tuning methods
Alarm signaling	Absolute, band, and deviation alarms, latching/blocking
Interfacing with other devices	Serial communications at 9600 baud Modbus/Jbus protocol, analog retransmission output
Short learning curve	All Platinum Series models share the same operating method
Ergonomic compatibility with other devices	Two colors: beige or dark gray front panels
Environmental protection	IP65 front-panel protection (indoor dust and water protection)
Easy to use	Ergonomic keypad, clear and easily understood display
Noise immunity	Electromagnetic compatibility
Universal input signals, linear as well as non-linear	Configurable input (TC, RTD, mA, volt and ΔT, infrared sensor)
Cost reduction	Built-in timer and start-up functions
Reliability and safety	CE compatibility, cULus, 3 year warranty
Technical support	Technical applications assistance from ATHENA sales and after sales service

Resources Operating Mode

Main universal input

5 TC, Pt100, ΔT, mA V, Custom PV

Thermo-couple, RTD, Delta RTD, Milliamp/Volt, Custom

Auxiliary input (option)

AUX

Digital input (option)

DI

Setpoint

LOC, STAND BY, Special functions, START UP, TIMER (option)

Digital input functions

STAND BY, Special functions, TIMER

M400

OP1

OP2

OP3

OP4 (option)

Fuzzy tuning with automatic selection

Continuous tuning

	Control	Alarms	Retransmission*
			PV/SP
1 Single output	OP1	OP2 OP3	OP4
2 Single output	OP2	OP1 OP3	OP4
3 Heat/cool	OP1 OP3	OP2	OP4
4 Heat/cool	OP1 OP2	OP3	OP4
5 Heat/cool	OP2 OP3	OP1	OP4

Modbus RS485
Parameter Supervision (option)

* The OP4 analog output option can be configured as process variable (PV) or setpoint (SP) retransmission –or– as an analog control output. The OP1, OP2, or OP3 output can be replaced by the OP4 analog control output option; the replaced output is forfeited.

Technical Data

Features at Env. 25°C	Description	
Total configurability	From keypad or serial communications, the user selects: type of input - associated functions and corresponding outputs - type of control algorithm - type of output and safe conditions - alarm types and functionality - control parameter values	
Process Variable(PV) input (for signal ranges see Table 1)	Common characteristics	A/D converter with 50,000 points Sampling time: 0.5 sec Update measurement time: 0.2 sec Input shift: ± 60 digits Input filter: 1...30 sec (OFF= 0)
	Accuracy	0.25% ± 1 digit (T/C and RTD) Between 100 and 240V ~ error is minimal 0.1% ± 1 digit (mA* and mV)
	Resistance thermometer (for ΔT: R1+R2 must be <320Ω)	Pt100Ω at 0°C (IEC 751) 2 or 3 wire connection °C /°F selectable Line: 20Ω max (3 wire) Thermal drift 0.35°C/10°C env. T. <0.35°C/10Ωline resist.
	Thermocouple	L, J, T, K, S (IEC 584) Internal cold junction compensation °C /°F selectable Line: 150Ω max Thermal drift <2μV/°C env. T. <5μV/Ω line resist.
	DC input (current)	0/4...20mA with 2.5Ω ext. Shunt Rj > 10MΩ Engineering units, floating decimal point, Low range -999...9999 Input drift: <0.1% / 20°C env. T.
	DC input (voltage)	0/10...50mV, Rj > 10MΩ High range -999...9999 100 digits minimum
Auxiliary input	CT current transformer 50 or 100mA input hardware selectable Current visualization 10...200 A with 1A resolution and heater break alarm	
Digital input (option)	The closure of the external contact produces any of the following actions: Auto/manual mode change, stand-by setpoint activation, keypad lock, timer start	
Operating modes	1 single output or heat/cool P.I.D. loop or ON/OFF with 1 or 2 alarms	
Control mode	Algorithm	P.I.D. with overshoot control or ON/OFF
	Proport. band (P)	0.5...999.9%
	Integral time (I)	0.1...100.0 min
	Derivative time (D)	0.01...10.00 min
	Cycle time	1...200 sec.
	Dead band	-10.0...10.0
	Relative cool gain	0.1...10.0
	Cool cycle time	1...200 sec.
	Overshoot control	0.01...1.00
	High limit	100.0...10.0% (heat) -100.0...-10.0% (cool)
Hysteresis	0.1...10.0%	
OP1 output	SPST relay N.O., 2A/250V~ for resistive load Triac, 1A/250V~ for resistive load	
OP2 output	Logic (SSR drive) not isolated: 5V-, ± 10%, 30mA max SPST relay N.O., 2A/250V~ for resistive load	
OP3 output	SPST Relay N.O., 2A/250V~ for resistive load Triac, 1A/250V~ for resistive load	
OP4 (option) analog output**	Galvanically isolated: 500V~/1min Resolution: 12bit (0.025%) Accuracy: 0.1%	Current output: 0/4...20mA 750Ω/15V max
AL2-AL3 alarms	Hysteresis 0.1 ... 10.0% of range	
	Action	Active high Action type
		Active low Action type
		Special functions
Setpoint	Local and stand-by selectable by keypad, digital input, or serial communications	
	Up and down ramps	0.1...999.9 digit/min (OFF = 0)
	Low limit	from low range to high limit
	High limit	from low limit to high range
Tuning	One-shot fuzzy tuning: Step response or natural frequency method, auto-selected Adaptive tune: Self-learning and continuous calculation of P.I.D. parameters	
Auto/manual Station	Standard with bumpless function, by keypad, digital input, or serial communications	

*Requires field calibration for 0.1% accuracy

**PV/SP Retransmission or analog control output

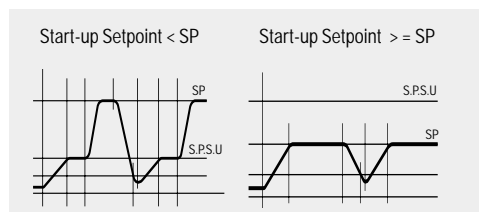
Input Type	Scale Range
RTD Pt100Ω a 0°C	-99.9...300.0 °C
	-99.9...572.0 °F
	-200...600 °C
T/C type L Fe-Const.	-328...1112 °F
	0...600 °C
T/C type J Fe-Cu 45% Ni	32...1112 °F
	0...600 °C
T/C type T Cu - CuNi	32...1112 °F
	-200...400 °C
T/C type K Chromel-Alumel	-328...752 °F
	0...1200 °C
T/C type S Pt10%Rh-Pt	32...2192 °F
	0...1600 °C
0/4...20 mA	Configurable engineering units mA, mV, V, bar, psi, RH, pH
0/10...50 mV	

Table 1: Process Variable (PV) inputs/signal ranges

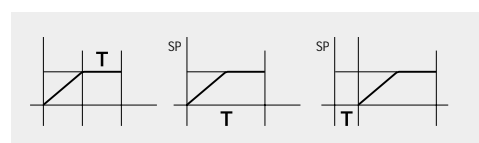
Special Functions

To improve instrument performance and to reduce wiring and installation costs, two special functions are available:

- Start-up



- Timer



The use of these functions avoids additional device installation (e.g., an external timer), therefore allowing a significant cost reduction.

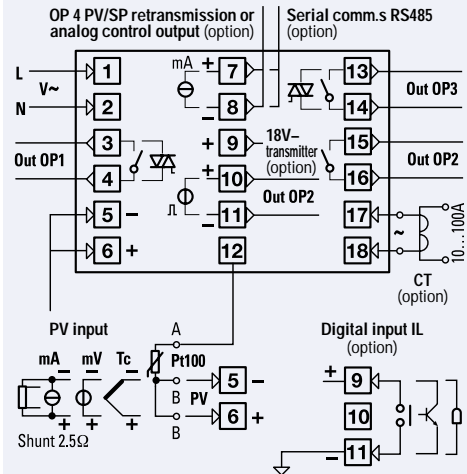
In addition, there are:

- **A Keypad lock/unlock** function, to avoid incorrect operator actions
- **An Output lock/unlock** function, that makes it possible to stop the control action at any time, without affecting the process variable display, and without switching-off the power supply.

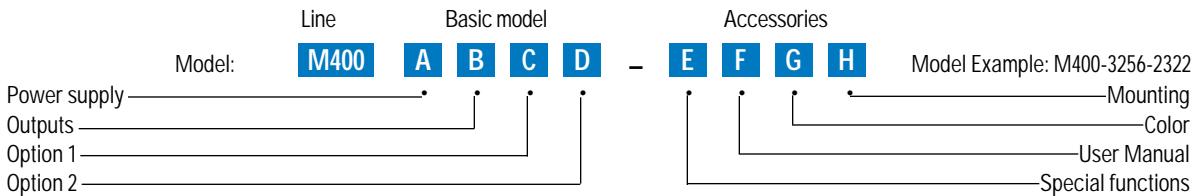
Technical Data

Features at Env. 25°C	Description	
Ser. comms. (opt.)	RS485 isolated, Modbus/Jbus protocol 1200, 2400, 4800, 9600 bit/sec, two wires	
Aux. power sup.	+18V±20%, 30mA max for external transmitter supply (option)	
Operational safety	Measured input	Detection of out of range, short circuit, or sensor break with automatic activation of the safety strategies and alerts on display
	Control output	Safety value: 0...100%. (-100...100% for Heat/Cool mode) (user enabled/disabled).
	Parameters	A permanent, non-volatile memory stores for unlimited time all the parameter and configuration values
	Password	A password protects access to the instrument's configuration
General characteristics	Power supply	100-240V~ (-15% +10%) 50/60Hz or 24V~ (-25% +12%), 50/60Hz and 24V- (-15% +25%). Power consumption 2.6W max
	Safety	Compliance EN61010-1 (IEC 1010-1), installation class 2 (2500V), pollution class 2, class II instrument
	Electromagnetic compatibility	Compliance to CE standards for industrial system and equipment
	Protection EN60529 (IEC 529)	IP65 front panel
	Overall dimensions	¹ / ₁₆ DIN - 48 x 48mm, depth 120 mm, weight 130g appr. Panel cut-out: 45 ^{+0.6} x 45 ^{+0.6} mm
	Approvals	cULus

Electrical Wiring



Ordering Codes



Power Supply		A	
100-240V~ (-15% +10%)		3	
24V~ (-25% +12%) or 24V- (-15% +25%)		5	
Output OP1	Output OP2*	Output OP3	B
Relay	Logic or relay	Relay	1
Relay	Logic or relay	Triac	2
Triac	Logic or relay	Relay	4
Triac	Logic or relay	Triac	5
Option 1	Option 2	C	D
None	None	0	0
	Current transformer input (CT)	0	3
	Transmitter power supply	0	6
	+ Analog** output OP4 + CT	0	7
	+ 18V	0	8
	+ Analog** output+ CT	0	9
RS485	None	5	0
Modbus/Jbus protocol	Transmitter power supply	5	6
	+ CT	5	8
Digital input	None	9	0
	CT	9	3
	Analog control output	9	7
	Analog control output + CT	9	9
Special Functions		E	
None		0	
Start-up + timer		2	
User Manual		F	
English-Spanish		3	
Front-Bezel Color	0/4-20 mA input shunt resistor***	G	
Dark gray (std)	Standard resistor	0	
Beige	Standard resistor	1	
Dark gray	High-accuracy resistor	2	
Beige	High-accuracy resistor	4	
Mounting	(Din rail excludes UL)	H	
Panel (std)		0	
Din rail with display		1	
Din rail without display		2	

Input Type	Scale Range
RTD Pt100 IEC751	-99.9...300.0 °C -99.9...572.0 °F
RTD Pt100 IEC751	-200...600 °C -328...1112 °F
TC L Fe-Const DIN43710	0...600 °C 32...1112 °F
TC J Fe-Cu45% Ni IEC584	0...600 °C 32...1112 °F
TC T Cu-CuNi	-200...400 °C -328...752 °F
TC K Chromel-Alumel IEC584	0...1200 °C 32...2192 °F
TC S Pt10%Rh-Pt IEC584	0...1600 °C 32...2912 °F
0...50mV linear (0...20mA)	Engineering units
10...50mV linear (4...20mA)	Engineering units

Output Configuration	
P.I.D.	control OP1 / alarm AL2 on OP2 control OP2 / alarm AL2 on OP1
On - off	control OP1 / alarm AL2 on OP2 control OP2 / alarm AL2 on OP1
Heat / Cool action	control OP1-OP3 / alarm AL2 on OP2 control OP1-OP2 / alarm AL2 on OP3 control OP2-OP3 / alarm AL2 on OP1

Single Output Action Type	Heat/Cool Control Action
Reverse	Linear cool
Direct	On-off cool

AL2 Type and Function	
Disabled	
Sensor break/loop break alarm	
Absolute	active high active low
Deviation	active high active low
Band	active out active in
Heater break by CT (if present)	active during ON output state active during OFF output state

* OP2 field-configurable via hardware jumper

** Field software-configurable for control or retransmission

*** Std. shunt resistor without field calibration = 1.10% input accuracy
High-accuracy shunt resistor without field calibration=0.20% input accuracy
Either shunt resistor with field calibration=0.10% input accuracy