Platinum™
S E R I E S
athenacontrols.com

Temperature Controller
1/8 DIN - 48 x 96mm
Platinum™ Series X400 Line

CE
c(UL)us

Cost Effective Solutions

This 48x96mm size controller of the Platinum™ Series, provides a high degree of functionality and reliability at a low price, outstanding flexibility enables you to configure this controller to most application including heat/cool control.

Standard features include: Autotune software, dedicated auto/man key, four outputs, three digital inputs, IP65 front panel protection, current transformer input, and auxiliary power supply.

Options include: serial communications, analog control or retransmission output, start up and timer functions, two front bezel colors, valve drive output, and an 8 segment setpoint program. Some options are mutually exclusive.

ATHENA®
The Temperature Control Company

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Platinum™
SERIES
athenacontrols.com
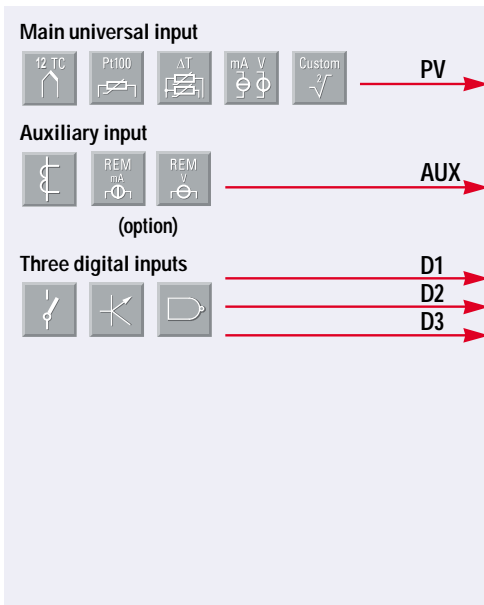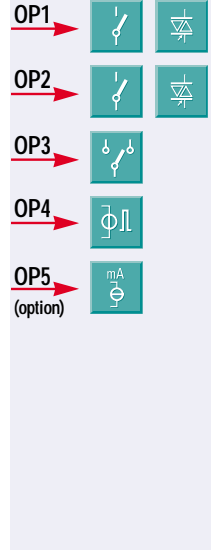## the right solution to your needs

Your needs	Our solutions
Heater failure	Heater break alarm with current transformer
Use of differents actuators	Analog output, heat/cool, valve control output
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 signalling	Absolute, band and deviation alarms, Latching/Blocking
Interfacing with other devices	Serial communications at 9600 baud Modbus/Jbus protocol, analog retransmission output, Remote Setpoint and 3 digital inputs
Frequent Setpoint change	Two stored Setpoints selected by keypad, serial communications or digital inputs
Quick learning	Platinum™ Series has 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 comprehensive 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 years warranty
Technical support	Technical application assistance from ATHENA sales and after sales serviceand after sales service

Resources

Main universal input

| 12 TC | Pt100 | ΔT | mA V | Custom √² | → PV |

Auxiliary input

REM mA   REM V   (option) → AUX

Three digital inputs → D1 D2 D3

X400

Modbus RS485
Parameterisation
Supervision
(option)

Setpoint

| LOC | 2 MEM | REM | 1 x 8s |

D1, D2 or D3 connected functions

| | 2 MEM | REM | | RUN | HOLD PV | TIMER |

Special functions (option)

START UP   TIMER

Fuzzy tuning with automatic selection

One shot Auto tuning   One shot Natural Frequency

OP1   OP2   OP3   OP4   OP5 (option)

Operating mode

		Control				Alarms			Retransmission
									PV/SP
1	Single output	OP1				OP2	OP3		OP5
2		OP4			OP1	OP2	OP3		OP5
3		OP5			OP1	OP2	OP3		
4		OP1	OP2				OP3		OP5
5		OP1	OP4			OP2	OP3		OP5
6	Heat/Cool	OP4	OP2	OP1			OP3		OP5
7		OP1	OP5			OP2	OP3		
8		OP5	OP2	OP1			OP3		
9		OP5	OP4	OP1	OP2		OP3		
10	Valve	OP1	OP2				OP3	OP5	

Technical data

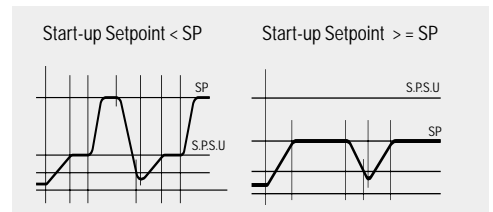| Features at env. 25°C	Description			
Total configurability	From keypad or serial communications, the user selects: type of input - associated functions and corresponding outputs - type of control algorithm - type of output and safe conditions - alarm types and functionallity - control parameter values			
PV input for signal ranges see table 1)	Common characteristics	A/D converter with 50,000 points Update measurement time: 0.2 sec)	Sampling time : 0.5 sec Input shift: - 60…+ 60 digit Input filter : 1...30 sec (OFF= 0)	
	Accuracy	0.25% ± 1 digit (T/C and RTD) 0.1% ± 1 digit (mA and mV)*	Between 100 and 240V~error is minimal	
	Resistance thermometer (for ∆T: R1+R2 must be <320Ω)	Pt100Ω at 0°C (IEC 751) °C/°F selectable	2 or 3 wire connection Burnout (with any combination)	Line: 20 Ω max (3wire) Thermal drift 0.35°C/10°C env. T. <0.35°C/10 Ω line resist.
	Thermocouple	L,J,T,K,S,R,B,N,E, W3,W5 (IEC 584) °C/°F selectable	Internal cold junction compensation with NTC Error 1°C/20°C ± 0.5°C Burnout	Line: 150 Ω max Thermal drift <2µV/°C env. T. <5µV/10 Ω line resist.
	DC input (current)	0/4…20mA, 2.5Ωext. shunt Rj >10MΩ	Burnout. Engineering units, floating decimal point, configurable Low Range -999…9999 High Range -999…9999 100 digits minimum	Thermal drift: <0.1% / 20°C env. T.
	DC input (voltage)	0/10…50mV, Rj >10MΩ		
Auxiliary inputs	Remote Setpoint (option) Not isolated accuracy 0.1%	Current 0/4…20mA Rj = 30Ω Voltage 1-5/0-5/0-10V Rj = 300KΩ	Bias in engineering units and ± range Ratio from -9.99…+99.99 Local + Remote	
	CT current transformer	50 or 100mA input hardware selectable	Current visualization 10…200 A with 1A resolution and Heater break alarm	
Digital inputs 3 logic	The closure of the external contact produces any of the following actions	Auto/Man mode change, Local/Remote Setpoint mode change, Stored Setpoints activation, keypad lock, measure hold		
		Timer activation, program run/hold (if options installed)		
Operating modes	1 output or Heat/Cool P.I.D. loop or ON/OFF with 1, 2 or 3 alarms			
Control mode	Algorithm	P.I.D. with overshoot control or ON/OFF PID with valve algorithm, for controlling motorised positioners		
	Proport. band (P)	0.5…999.9%		
	Integral time (I)	0.1…100.0 min	User Enabled/Disabled	
	Derivative time (D)	0.01…10.00 min		
	Error dead band	0.1…10.0 digit		
	Overshoot control	0.01…1.00		
	Manual reset	0.0…100.0%	Single Output PID algorithm	
	Cycle time (Time proportional only)	1…200 sec		
	Control output high limit	10.0…100.0%		
	Soft-start output value	0.1…100.0%	User Enabled/Disabled	
	Output safety value	0.0…100.0% (-100.0…100.0% for Heat/Cool)		
	Control output hysteresis	0.1…10.0%	ON/OFF algorithm	
	Dead band	-10.0…10.0%	Heat/Cool PID algorithm with overlap	
	Relative cool gain	0.1…10.0		
	Cycle time (Time proportional only)	1…200 sec		
	Cool output high limit	10.0…100.0%		
	Cool output hysteresis	0.1…10.0%		
	Motor travel time	15…600 sec	Valve PID algorithm without position potentiometer	
	Motor minim. step	by 0.1…5.0%		

*Requires field calibration for 0.1% accuracy

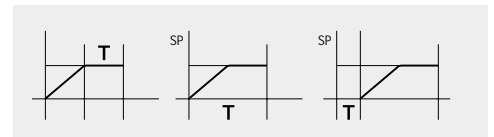| Input type	Scale range	
RTD Pt100 IEC751	-99.9…300.0	°C
	-99.9…572.0	°F
RTD Pt100 IEC751	-200…600	°C
	-328…1112	°F
TC L Fe-Const DIN43710	0…600	°C
	32…1112	°F
TC J Fe-CU45% NI IEC584	0…600	°C
	32…1112	°F
TC T Cu-CuNi	-200…400	°C
	-328…752	°F
TC K Cromel-Alumel IEC584	0…1200	°C
	32…2192	°F
TC S Pt10% Rh-Pt IEC584	0…1600	°C
	32…2912	°F
TC R Pt13% Rh Pt IEC584	0…1600	°C
	32…2912	°F
TC B Pt30% Rh Pt 6% IEC584	0…1800	°C
	32…3272	°F
TC N Nicrosil-Nisil IEC584	0…1200	°C
	32…2192	°F
TC E Ni10% CR CuNi IEC584	0…600	°C
	32…1112	°F
TC NI-NiMo18%	0…1100	°C
	32…2012	°F
TC W3%Re W25%Re	0…2000	°C
	32…3632	°F
TC W5%Re W26%Re	0…2000	°C
	32…3632	°F
0/4…20 mA 0/10…50 mV	Configurable engineering units mA, mV, V, bar, psi, Rh, ph	

Table 1: PV input

Special functions

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

- Start-up

Start-up Setpoint < SP   Start-up Setpoint > = SP

- Timer

The use of these functions avoids additional device installation (e.g. external timer), therefore allowing a significant costs reduction.
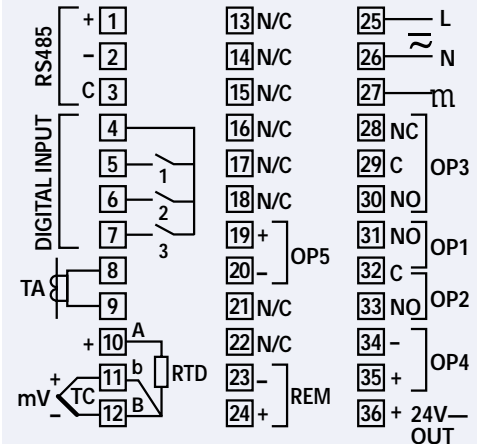
Moreover there are:
• **Keypad lock/unlock** function, to avoid incorrect operator actions

• **Outputs lock/unlock** function, at any moment it is possible to stop the control action, but not the process variable display, without switching-off the power supply.

Features at env. 25°C	Description			
OP1-OP2 outputs	SPST relay N.O., 2A/250V~ for resistive load Triac, 1A/250V~ for resistive load			
OP3 output	SPDT relay N.O., 2A/250V~ for resistive load (alarm only)			
OP4 output	Logic not isolated: 5V–, ± 10%, 30mA max (control only) SPDT relay N.O., 2A/250V~ for resistive load (control only)			
OP5 (option) analog output	Control or PV/SP retransmission	Galvanically isolated: 500V~ /1min Resolution: 12 bit Accuracy: 0.1%	In current: 0/4…20mA, 750Ω /15V max	
AL1- AL2 - AL3 alarms	Hysteresis	0.1…10.0%		
	Action	Active high	Action type	Deviation threshold ± range
				Band threshold 0…range
		Active low		Absolute threshold, whole range
		Special functions	Sensor break, Heater break and Loop break detection	
			Acknowledge (latching), activation inhibit (blocking)	
			Connected to Timer or program (if options installed)	
Setpoint	Local		Up and down ramps 0.1…999.9 digit/min. (OFF=0)	
	Local plus two stored (tracking or Stand-by)			
	Local and Remote	If option installed	Low limit: from low range to high limit	
	Local with trim			
	Remote with trim		High limit: from low limit to high range	
	Programmable			
Programmable Setpoint (option)	1 program, 8 segments 1 initial and 1 end, from 1 to 9999 cycles or continuous cycling (OFF) Start, stop, hold, etc. activated from the keypad, digital input and serial comm.s			
Special functions (options)	Timer	Automatic start at the power on, manual start by keypad, Digital inputs or serial comm.s		
		Setting time: 1...9999 sec/min		
		Stand-by Setpoint: from Setpoint low limit to Setpoint high limit		
	Start-up	Start-up Setpoint: from Setpoint low limit to Setpoint high limit		
		Hold time: 0...500 min		
		Control output high limit: 5.0...100.0%		
One-shot Fuzzy-Tuning	Depending on the process condition, the controller applies the best method	Step response		
		Natural frequency		
Auto/Man selection	Standard with bumpless function, by keypad, digital input or serial communications			
Serial comm.s (option)	RS 485 isolated, Modbus/Jbus protocol 1200, 2400, 4800, 9600 bit/sec, three wires			
Auxiliary power supply	+24V– ±20%, 30 mA max for external transmitter supply			
Operational safety	Measure 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: -100%…100%		
	Parameters	A non volatile memory stores for unlimited time all the configuration and parameter values		
	Password	Password to access the configuration and parameters data, keypad lock, outputs lock		
General characteristics	Power supply (fuse protected)	100-240~ (-15% + 10%) 50/60Hz or 24~ (-15% + 25%) 50/60Hz and 24V– (analog) (-15% + 25%)	Power consumption 4W max	
	Safety	Compliance EN61010-1 (IEC 1010-1), installation class 2 (2500V), pollution class 2, class II instrument		
	Electromagnetic compatibility	Compliance to the CE standards for industrial system and equipment		
	Protection EN60529 (IEC529)	IP65 front panel		
	Dimensions	1/8 DIN - 48 x 96, depth 110 mm, weight 250g appr.		
	Approvals	cULus		

Electrical wirings

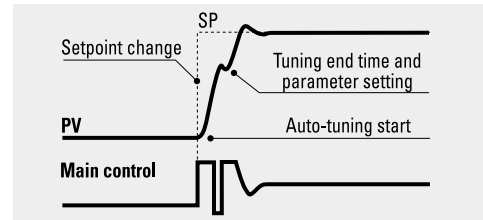## Fuzzy-Tuning

Two methods of tuning are available:
- **Auto-Tuning "one shot"**
- **Natural frequency "one shot"**

The **Fuzzy-Tuning** automatically selects one of the two methods which assure the best result for each condition.

The **Auto-Tuning** method works best on the step response basis.
When activated, if a deviation exists between the Setpoint and process variable larger than 5% of scale range, the controller modifies the output value. Then, in a short time, it calculates the PID parameters and the new algorithm is operational immediately .
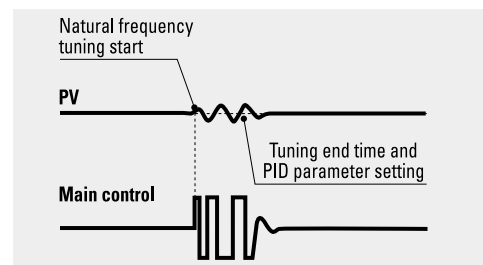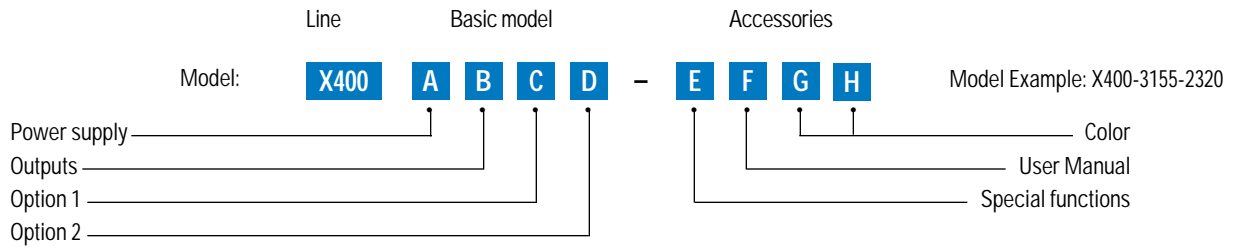The main advantages of this method are fast calculation and quick implementation.

The **Natural frequency** method works best when the process variable is very near to the Setpoint. When activated, it causes a process oscillation around the Setpoint value.
The main advantage of this method is a reduced disturbance to the process.

Ordering codes

	Line	Basic model		Accessories	

Model: **X400** **A** **B** **C** **D** – **E** **F** **G** **H**   Model Example: X400-3155-2320

- Power supply ———————— A
- Outputs ———————— B
- Option 1 ———————— C
- Option 2 ———————— D

- E — Special functions
- F — User Manual
- G — User Manual
- H — Color

Power supply	A
100-240V~ (-15% +10%)	3
24V~ (-25% +12%) or 24V– (-15% +25%)	5

Output OP1	Output OP2	Output OP3	Output OP4	B
Relay	Relay	Relay (alarm)	Logic (control)	1
Triac	Triac	Relay (alarm)	Logic (control)	5
Relay	Relay	Relay (alarm)	Relay (control)	9

Option 1	C
None	0
RS 485 Modbus/Jbus SLAVE	5

Option 2 [1]	D
None	0
Valve drive output (no potentiometer)	2
Analog output OP5 + Remote Setpoint input	5
Valve drive output + Analog OP5 output (retr.) + Remote Setpoint input	7

Special functions	E
None	0
Start-up + Timer Software	2
Setpoint program - one program with 8 segments	3

User Manual	F
English-Spanish	3

Front Bezel Color	0/4-20 mA input shunt resistor [2]	GH
Dark gray (std)	Standard resistor	00
Beige	Standard resistor	10
Dark gray	High-accuracy resistor	20
Beige	High-accuracy resistor	30

[1] Analog Output 5 (OP5) is field configurable for control or retransmision output as 0-20-ma or 4-20mA. The addition of Analog Output 5 (OP5) does not affect any of the other four outputs. Analog Output 5 (OP5) can only be used for retransmission when used with the Valve Drive Output software

[2] 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

Input type	Range scale			
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 Cromel -Alumel IEC584	0…1200	°C	32…2192	°F
TC S Pt10%Rh-Pt IEC584	0…1600	°C	32…2912	°F
TC R Pt13%Rh-Pt IEC584	0…1600	°C	32…2912	°F
TC B Pt30%Rh-Pt Pt6%Rh IEC584	0…1800	°C	32…3272	°F
TC N Nicrosil-Nisil IEC584	0…1200	°C	32…2192	°F
TC E Ni10%CR-CuNi IEC584	0…600	°C	32…1112	°F
TC NI-NiMo 18%	0…1100	°C	32…2012	°F
TC W3%Re-W25%Re	0…2000	°C	32…3632	°F
TC W5%Re-W26%Re	0…2000	°C	32…3632	°F
0…50mV linear (0…20mA)	Engineering units			
10…50mV linear (4…20mA)	Engineering units			

Control mode	
ON-OFF reverse action	
ON-OFF direct action	
P.I.D. single output reverse action	
P.I.D. single output direct action	
P.I.D. Heat/Cool action	Linear cool output
	ON-OFF cool output
	Water cool output
	Oil cool output

Output type - Single action	Output type - Double action
Relay	Heat Relay, Cool Relay
Logic	Heat Relay, Cool Logic
Analog	Heat Logic, Cool Relay
Valve drive	Heat Relay, Cool Analog
	Heat Analog, Cool Relay
	Heat Logic, Cool Analog
	Heat Analog, Cool Logic

AL1-AL2-AL3 type and function	
Disabled or (only AL3) used by Timer or related to the program	
Sensor break/Loop break alarm	
Absolute	active high
	active low
Deviation	active high
	active low
Band	active out
	active in
Heater break by CT	active during ON output state
	active during OFF output state

Setpoint type
Local only
Local and 2 tracking stored Setpoints
Local and 2 Stand-by stored Setpoints
Local and Remote
Local with trim
Remote with trim
Time programmable (if option installed)