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Introduction

The plug-in controller ATR900 or 901 is specially dedicated to applications in the glass and pottery industry. This controller provides high accuracy of the programmed firing cycle and reliable monitoring of the firing. It can store up to 4 completely configurable programs, each consisting of max. 15 segments. Delayed start is also available as well as other software functions. All parameters are protected by a password to avoid unauthorized access.

1.0 Ordering code ATR900

ATR900-					
Digital input	1				No digital input
	2				1 digital input
Relay output	1				Relay 10A
	2				Relay 10A
Power supply		A			24V AC ?15% 50/60Hz
		B			230V AC ?15% 50/60Hz
		C			110V AC ?15% 50/60Hz
Connector			Z		15 poles
			Y		No connector

1.1 Ordering code ATR901

ATR901-					
Digital input	1				No digital input
	2				1 digital input
Relay output	1				Relay 10A
	2				Relay 10A
Power supply		A			24V AC ?15% 50/60Hz
		B			230V AC ?15% 50/60Hz
		C			110V AC ?15% 50/60Hz
Connector			Z		15 poles
			Y		No connector / 5 cycles-15 steps (temperature, time, dwell)

2. Electrical wirings

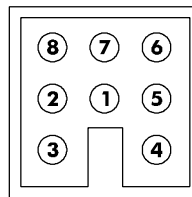


Although this controller has been conceived to resist the worst noises in an industrial environment, please notice the following safety guidelines:

- ? Separate control wires from power wires
- ? Avoid mounting close to remote control switching systems, electromagnetic relays, powerful engines
- ? Avoid proximity of power systems, especially those with phase control

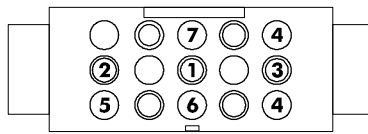
2.1 Pin Assignment

**Front view
8 poles connector**

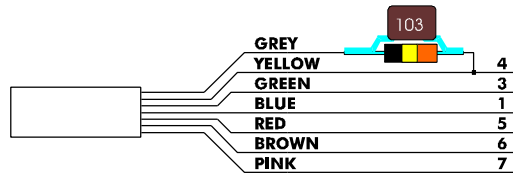


- 1) Neutral
- 2) Neutral
- 3) Thermocouple +
- 4) Thermocouple -
- 5) Power supply (phase)
- 6) Control output (phase)
- 7) Aux output (phase)
- 8) Not connected

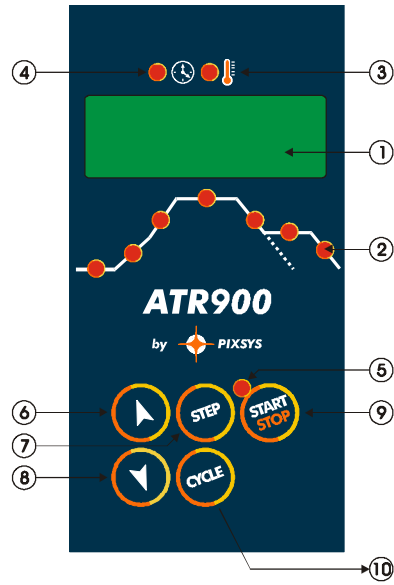
**Front view
15 poles connector**









No connector








3. Displays and keys




3.1 Displays		
1		Main display normally displays the actual kiln temperature. During configuration or programming it will display setpoint value, number of segments or other values (temperature, rate, dwell etc.).
2		Secondary display shows the number of segment in progress or the number of segment which is being programmed.-




3.2 Leds		
2		Leds shows the segment number of the firing cycle. All leds are flashing when a delayed start has been programmed. When the cycle foresees more than 7 segments, the 7th led stays ON also for the additional segments.
3		Led is ON when the operator is entering a temperature or if the function "simple controller" is running.
4		Led is ON when the operator is entering a time value for each segment of a program.
5		Led flashes when the control output is on during a firing cycle or when the function "simple controller" is running.














3.3 Keys		
6		Increases the displayed value: ? Parameter value during configuration ? Setpoint value if operating as “simple controller” (see 5.3) ? Time or temperature value if entering a firing cycle.
7		? Scroll through the parameters during configuration. ? Scroll through the segments within the selected program
8		Decreases the displayed value: ? Setpoint value if operating as “simple controller” (see 5.3) ? Time or temperature value if entering a firing cycle ? Parameter value during configuration
9		START / STOP key ? ESCAPE –key if programming parameters or cycles.
10		Scrolls through the cycles to select or start one ? Keep pressing it for about 5 sec. to enter configuration mode..


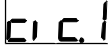
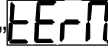
4. Programming and configuration














4.1 Entering or modifying a firing curve

The controller must be in STOP-mode. Press  and follows the points below.






	Key	Display	Do
1	Press 	Main display displays 	Press the key to scroll through the available programs and finally the function “simple controller”  , until the chosen program is displayed.



	Key	Display	Do
2	Press 	Displays the 1 st segment of the selected program. The number of segments (1-9, A,B,C,D,E,F,) is displayed on the 2 nd display. Press  to scroll through and enter time and temperature values (and auxiliary relay if available) for each segment.	To program the delayed start of firing cycle, enter the time value (0:00-09:59) for step 0. Otherwise skip to step no. 1
3	  	Increase or decrease the displayed value.	Enter duration of segment (hours:minutes) To set the maximum rise speed, press  until JUMP is displayed.  is On. Enter the setpoint value (required temperature). Led  is On To finish the firing cycle, enter End (keep pressing  until 'END' is displayed). If auxiliary output is enabled, select on to close the relay or off to close it.
4	 	Press  to end programming and press it again to start the firing cycle.	Press  to skip to the 1 st segment of the next program.


4.2 Entering or modifying a firing cycle - Version 2.x			
Press START/STOP and follow the points below:			
	Key	Display	Do
1	Press 	Main display displays 	Press the key to scroll through the available programs and the function "simple controller"  , until the choosen program is displayed.




<p>2</p>		<p>Press this key to enter the first step of the cycle and scroll all the relevant data (temperature, time, dwell, state of relay if available) To modify them, check point 4.3</p>	
<p>3</p>	  	<p>Increase or decrease the value on display</p> <p>Press  to scroll data about the cycle.</p>	<p>? Enter setpoint value.¹ Set  to finish the cycle. Led  is ON.</p> <p>? Set the duration of heating up ramp or cooling ramp (hours: minutes)  for heating up with maximum power Led  is ON</p> <p>? Enter the value for dwell (hours: minutes) Set  if dwell is not required. Led  is flashing.</p> <p>? If the auxiliary relay is enabled, select  to close the relay or  to open it.</p>


^{1 1} N.B. If the temperature value is the same as in previous step, the dwell is entered with a single time value.

5. Cycle start and special functions			
5.1 Program start			
Press START/STOP and follow the points below.			
	Key	Display	Do
1	Press 	Display displays 	Keep pressing the key until the chosen program is displayed
2		Program starts and buzzer sounds briefly. From now on, display shows the actual temperature of the kiln. Led START is On.	 To stop or pause the firing cycle, press  .

5.2 Changing the setpoint value during a firing.			
	Key	Display	Do
1	 	Only possible if this function has been enabled (see parameter 14). Press the key once to display the setpoint value. Then press once more to change this value. After a few seconds, the display will revert to the actual temperature. The new setpoint value is automatically stored.	Enter new setpoint value.

5.3 Jump to the next segment during the cycle			
Follow the points below:			
	Press	Display	Do
1	 Press the key for a few seconds	The controller jumps to the next segment of the running cycle	

5.4 Function HOLD			
Follow the points below:			
	Press	Display	Do
1	 Press the key for a few seconds.	The controller holds the temperature which is currently visualized on display until the key CYCLE is pressed by the operator again. The display visualizes alternating the temperature value and the writing 	The function can be interrupted by pressing the  key again for a few seconds.

5.5 Visualize Power consumption			
Press START/STOP and follow the points below.			
	Key	Display	Do
1		Press the key to visualize the power consumption during last cycle. Enter the plant power on P-15 to rate power consumption	

5.6 Funtion WAITING

During rising segments , the controller usually jumps to the next segment of cycle only when the kiln reaches the programmed setpoint value. In case that the kiln is not able to reach setpoint within the given time (due for example to excessive load), the controller would hold the running segment until the process reaches the setpoint.

The function WAITING allows to set a fixed waiting time on parameter P-16 : in this case the controller waits only for the fixed time before jumping to the next segment.

When this function is working and the controller jumps to the next segment as result, the display will visualize **ouEr** . The writing may be stopped by pressing the key STEP or START.






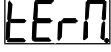




P-16 set to zero means that the function is disabled. The fuction does anyway not work during holding and cooling ramps as well as during rising steps if time is set to zero.

5.7 RECOVERY

The function allows the recovery of an interrupted cycle and the firing prosecution in case of black-out. It may be activated by setting parameter P-17 to 1. If the function has been previously activated, the cycle will restart from the point of interruption. The controller stores both the running cycle and the interrupted segment.




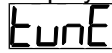

5.8 Function SIMPLE CONTROLLER

ATR901 may also be used as a “simple controller” to fire a set temperature. Press START/STOP and follow the sections below.

	Key	Display	Do
1	Press 		Keep pressing  until display shows  .
3	Press  or 	Display the temperature setting and to increase or decrease it. After a few seconds  is displayed again.	
4	Press 	The actual temperature of the kiln is shown. Led STARTS to flash. Icontrol output is active.	To modify the temperature setting, see following section no. 5
5	Press  or 	Display shows temperature setting . Increase or decrease the value.	To exit the function “simple controller”, press  .



5.9 Auto-tune


The Auto-tuning process may also be initiated when the function “simple controller” is running, if it has been previously enabled by parameter P-12. Access to this function may be disabled (see parameter P-12)

	Key	Display	Do
1	Press 	Display shows  flashing.	
2	Press 	Display alternates between  and temperature of kiln. Led STARTS to flash. The controller starts the self-tuning process .	Wait until display shows the kiln temperature again, after the process has been completed. To interrupt the process, press  .


6. Configuration













6.1 To change values

To increase or decrease the displayed value, just press  or .

Press  to skip to next parameter.

6.2 Setting of configuration parameters

To enter or change the configuration parameters the controller must be in STOP-mode. Press  and follow the points below.

	Key	Display	Do
1	Press  for about 5 sec.	Display visualizes  and the 1 st number on the left flashes.	
2	 		Enter password  . Press  to skip to next number and then to display the 1 st parameter.
3		Display  flashing.	
4		Press this key to scroll through all the parameters.	When the display reaches the required parameter, wait for a few seconds for it to change to the value.
5	 	Increase or decrease the value	Enter the new value.
6		End of configuration. The controller is set as STOP-mode	

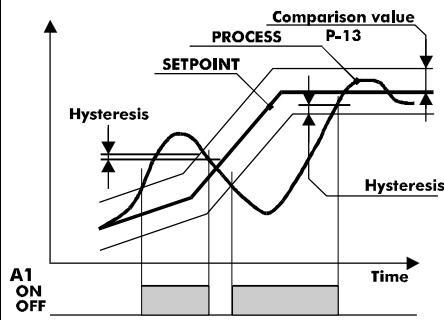
7. Configuration parameters

P-01	Analogic input AN1																														
	<i>Type of thermocouple</i>																														
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 5%; text-align: center;">0</td><td>Type K (-50/1300°C)</td></tr> <tr><td style="text-align: center;">1</td><td>Type J (-50/1200°C)</td></tr> <tr><td style="text-align: center;">2</td><td>Type S (-50/1800°C)</td></tr> <tr><td style="text-align: center;">3</td><td>Type R (-50/1800°C)</td></tr> </table>	0	Type K (-50/1300°C)	1	Type J (-50/1200°C)	2	Type S (-50/1800°C)	3	Type R (-50/1800°C)																						
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2	Type S (-50/1800°C)																														
3	Type R (-50/1800°C)																														
P-02	Limits of the scale (0/3200 °C or °F)																														
	<i>This parameter defines the maximum temperature of the kiln. All parameters which are expressed as percentage values (ON/OFF hysteresis, proportional band) also refer to this scale</i>																														
P-03	Auxiliary output A1																														
	<i>Operating of second relay</i>																														
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 5%; text-align: center;">0</td><td>Disabled</td></tr> <tr><td style="text-align: center;">1</td><td>Set the status of the relay at end of cycle</td></tr> <tr><td style="text-align: center;">2</td><td>Set the status of relay for each segment of the cycle</td></tr> <tr><td style="text-align: center;">3</td><td>Same operating of both relays for maximum power</td></tr> <tr><td style="text-align: center;">4</td><td>General alarm (relay N.O.)</td></tr> <tr><td style="text-align: center;">5</td><td>Band alarm (relay N.O.)</td></tr> <tr><td style="text-align: center;">6</td><td>Upper deviation alarm (relay N.O.)</td></tr> <tr><td style="text-align: center;">7</td><td>Lower deviation alarm (relay N.O.)</td></tr> <tr><td style="text-align: center;">8</td><td>Set the status of relay during the cycle (N.O. at Start and Stop, Closed during the cycle)</td></tr> <tr><td style="text-align: center;">9</td><td>General alarm (relay N.C.)</td></tr> <tr><td style="text-align: center;">10</td><td>Band alarm (relay N.C.)</td></tr> <tr><td style="text-align: center;">11</td><td>Upper deviation alarm (N.C.)</td></tr> <tr><td style="text-align: center;">12</td><td>Lower deviation alarm (N.C.)</td></tr> <tr><td style="text-align: center;">13</td><td>Set the status of relay during the cycle (N.C. at Start and Stop, Open during the cycle)</td></tr> <tr><td style="text-align: center;">14</td><td>Control of safety contactor</td></tr> </table>	0	Disabled	1	Set the status of the relay at end of cycle	2	Set the status of relay for each segment of the cycle	3	Same operating of both relays for maximum power	4	General alarm (relay N.O.)	5	Band alarm (relay N.O.)	6	Upper deviation alarm (relay N.O.)	7	Lower deviation alarm (relay N.O.)	8	Set the status of relay during the cycle (N.O. at Start and Stop, Closed during the cycle)	9	General alarm (relay N.C.)	10	Band alarm (relay N.C.)	11	Upper deviation alarm (N.C.)	12	Lower deviation alarm (N.C.)	13	Set the status of relay during the cycle (N.C. at Start and Stop, Open during the cycle)	14	Control of safety contactor
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14	Control of safety contactor																														
P-05	Offset correction for sensor input (-150/150 °C or °F)																														
P-06	Gain calibration for sensor input (-5.0%...+5.0%)																														
	<i>These parameters act to adjust eventual mistakes caused by damages or errors on thermocouple wiring and to set the precision of thermocouple on a well definite point of the scale.</i>																														

P-07	Proportional band (0-1800 °C or °F).
P-08	Integral time (0/9999 sec). (Zero excludes integral)
P-09	Derivative time (0.0/999.9 sec). (Zero exclude derivative)
P-10	Cycle time for output with proportional time (1/120 sec).
	<i>These parameters set the values for P.I.D. control mode. In case of ON/OFF modulation (proportional band set to 0), parameter P-10 acts as hysteresis</i>
P-11	Measure units
	<i>Units of temperature measurement</i>
	0 °C.
	1 °F.
P-12	Delayed start
	<i>Programming of delayed start (entering step 0) and Autotuning function</i>
	0 Step 0 enabled Auto-tune disabled
	1 Step 0 disabled Auto-tune enabled
	2 Step 0 enabled Auto-tune enabled
	3 Step 0 disabled Auto-tune disabled
P-13	Treshold for alarm (0/3200 °C or °F)
	<i>This parameter defines the treshold for intervention of alarm.</i>
P-14	Change of setpoint value during a firing curve
	<i>This parameter allows the setpoint values to be modified during a firing.</i>
	0 Setpoint change disabled
	1 Setpoint change enabled
P-15	Power consumption of the kiln (0.0/999.9 – Kwatt/h)
	<i>This parameter defines the power of the plant. If the value has been entered, press the key STEP after cycle end to visualize the power consumption Kwatt/h for the last cycle. The value gets lost when the controller is switched off.</i>
P-16	Function WAITING (0/9999 minutes)
	<i>This parameter allows to set a fixed waiting time in case that setpoint value is not reached. If parameter is set to zero, the function is disabled.</i>
P-17	Funtion RECOVERY
	<i>Recovery of interrupted cycle and firing prosecution after a black-out.</i>
	0 Recovery excluded
	1 Recovery enabled

8. Alarm A1

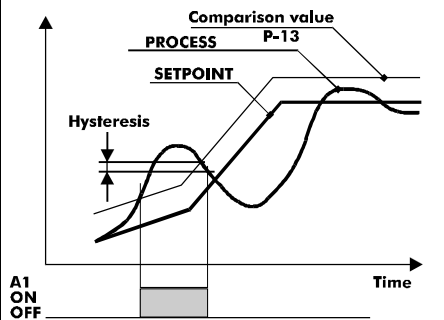
Band alarm (setpoint-process)



The alarm can be:
 ? working outside
 ? working inside
 Example: Outside

N.B. Alarm treshold is set on P-13
 Hysteresis is fixed as 1°C/°F.

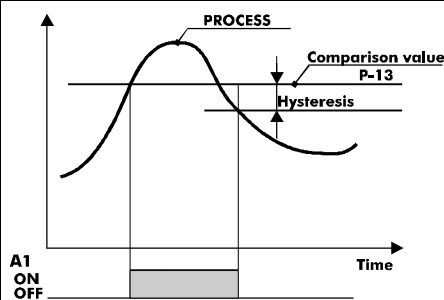
Deviation alarm (setpoint-process)



? Upper deviation
 ? Lower deviation
 Example: Upper deviation

N.B. Hysteresis is fixed as 1°C/°F.

General alarm (process)



The alarm can be:
 ? working over
 ? working under
 Example: working over

N.B. Hysteresis is fixed as 1°C/°F.

9. Fault displays

In case the plant does not work properly, the controller stops the program running and shows a fault condition, activating the internal buzzer. To stop the buzzer press any key. See table below for description of fault messages.

Error	Cause	Do
E-01	Mistake in programming E ² PROM	Contact technical service
E-02	Cold link failed or room temperature out of limits	-
E-03	Wrong cycle data	Program a new cycle
E-04	Parameter error.	Check and/or reconfigure the parameters
E-05	Thermocouple circuit defect	Check sensors wiring
E-06	ADC conversion out of range	-
E-07	Second relay is programmed to control the safety contactor.	Check the operation of the relay and/or of contactor

10. Technical data

10.1 General features

Display	4 digits (+ 1 digit)
Operating temperature	0-45°C, humidity 35..95uR%
Sealing	IP54
Material	Shock-resistant polystyrene
Weight	550 g
Sizes	120x65x65

10.2 Hardware

Analogic input	AN1, Configurable via software	Accuracy (25°C) 0.2 % ± 1 digit
	Input no.1 Thermocouple type K,J,S,R	
Relay output	OUT1, A1	
	Control output and safety relay (alarm or auxiliary)	Contacts 8A-250V~

10.3 Software

Algohythm	ON/OFF with hysteresis 1°C/°F P,PI,PID,PD with Proportional time
Proportional band	0...1800°C / °F
Integral time	0...9999 sec (0 excludes integral)
Derivative time	0,0...999,9 sec (0 excludes derivative)
Programmable cycles	4 (max 15 steps each) + function "simple controller" with programmable setpoint

Notes

Date :	Model ATR
Installer :	Plant :

Notes:

P-01	Analogic input AN1	
P-02	Maximum limit of scale (0/3200 digit)	
P-03	Output A1 (Alarm/Auxiliary relay)	
P-05	Offset correction for sensor input (-150/150 °C or °F)	
P-06	Gain calibration for sensor input (-5.0%...+5.0%)	
P-07	Proportional band (0-1800°C or °F).	
P-08	Integral time (0/9999 sec). (0 excludes integral)	
P-09	Derivative time (0.0/999.9 sec). (0 excludes derivative)	
P-10	Cycle time for output with proportional time (1/120 sec).	
P-11	Measure unit	
P-12	Delayed start / Autotuning	
P-13	Threshold for alarm operation	
P-14	Change of setpoint value during a firing curve	
P-15	Power consumption (0.0/999.9 kW)	
P-16	Waiting	
P-17	Recovery	