EWPC 907 rel. 12/96 ing

temperature controller with dual output

WHAT IT IS

The EWPC 907 is a temperature controller with dual output, acting either independently or dependently (2-stage); the primary output provides field selectable ON/OFF, PD or PID and SOFT START control.

HOW IT IS MADE

- **Housing: black ABS plastic, autoestinguish.**
- **Dimensions: front 74x32 mm (2.913x1.260"), depth 67 mm (2.637")**
- **Mounting: flush panel mount with mounting bracket**
- **Protection: the instrument front-panel is waterproof IP65; an optional snap-on cover can be supplied to provide additional protection of the rear terminal block**
- **Connections: screw terminal block (2.5 mm^2; one wire each terminal only, in compliance with VDE norms)**
- **Display: 12.5 mm LED (0.50").**
- **Push buttons: located on front panel.**
- **Outputs: two (2) SPST relays 8(3)A 250V AC**
- **Auxiliary output: 12 Vdc/60 mA (for transducer power supply, e.g. humidity sensor, pressure transducer, etc.)**
- **Inputs (depending on model): PTC / RTD (Ni100, Pt100) / TC (J, K) / 4...20 mA (Ri = 41 Ω)**
- **Resolution: 1 °C (°F) or 0.1 °C (°F). The right-most digit can also be set to read-out in 0 or 5 only, or in all 10 digits**
- **Accuracy: better than 0,5% of full scale**
- **Power supply (depending on model): 12 Vac/dc or 24 Vac/dc**

GENERAL DESCRIPTION

The EWPC 907 is a temperature controller with dual output, acting either independently or dependently (2-stage); the primary output provides field selectable ON/OFF, PD or PID and SOFT START control.
The front keypad of these controllers offers several alpha-numeric menu prompts to configure the controller for each specific application (see further).
The EWPC 907 is supplied in the popular "32x74" ELIWELL housing.

FRONT KEYPAD

SET: pushed once the setpoint 1 value will be displayed for 3 seconds (Led "I" blinks). Pushed once again within 3 seconds the setpoint 2 value will be displayed (Led "II" blinks). The setpoint can be changed with the "UP" or "DOWN" button.
UP: used to increase the setpoint value, as well as the parameter when in programming. When held down for a few seconds, the change rate accelerates.
DOWN: used to decrease the setpoint value, as well as the parameter when in programming. When held down for a few seconds, the change rate accelerates.
Led "I": status light of output 1.
Blinks when in setpoint 1 display/change mode or during programming.
Led "II": status light of output 2.
Blinks when in setpoint 2 display/change mode.

PARAMETER PROGRAMMING

Programming is easily accessed by holding the "SET" button down for more than 4 seconds; the first parameter is displayed while the status light Led "I" remains blinking during the programming period.
Other parameters are accessed with the "UP" and "DOWN" button. With the "SET" button, the actual setting of each parameter is displayed. To change a parameter setting, push the "SET" plus the "UP" (or "DOWN").
The system will automatically return to its normal operating mode a few seconds after the programming procedure is completed or interrupted.

DESCRIPTION OF PARAMETERS

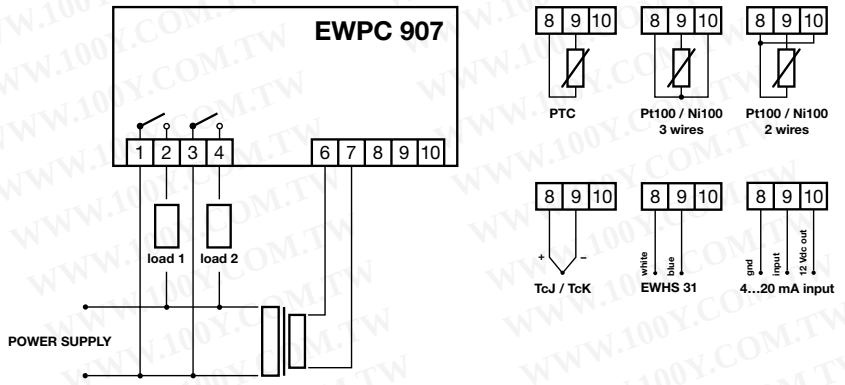
Any parameter which does not apply to a particular instrument version or configuration is automatically removed from the programming menu.
E.g.: a control for Thermocouple input will not offer parameters "Lci" and "Hci".
d1: differential 1.
Activated only in ON/OFF control mode. Must be set with negative (-) value for heating applications.
d2: differential 2.
The switching differential (hysteresis) setpoint 2 must be set with positive value (make on rise) or with negative value (make on fall). See parameter "HC2".
LS1: Lower Set (limit) 1.
This is the lower limit below which the user cannot change the setpoint 1; normally set at the lowest value recommended for the sensor.
LS2: Lower Set (limit) 2.
This is the lower limit below which the user cannot change the setpoint 2; normally set at the lowest value recommended for the sensor.
HS1: Higher Set (limit) 1.
Similar to "LS1", however setting an upper limit for the setpoint 1.
HS2: Higher Set (limit) 2.
Similar to "LS2", however setting an upper limit for the setpoint 2.
Pb: Proportional band.
This value, expressed in degrees, determines the band-width around the setpoint within which the instrument provides proportional control. See also "PROPORTIONAL CONTROL".

DEFAULT SETTINGS - STANDARD MODELS

Parameter	Description	Range	Default	Unit
d1	differential 1	–1 / min	–1	°C / °F
d2	differential 2	min / max	1 (C) / –1 (H)	°C / °F
LS1	Lower Set limit 1	min / max	min	°C / °F
LS2	Lower Set limit 2	min / max	min	°C / °F
HS1	Higher Set limit 1	min / max	max	°C / °F
HS2	Higher Set limit 2	min / max	max	°C / °F
Pb	Proportional band	0.1 (1) / max	40	°C / °F
It	Integral time	0 / 999	300	seconds
dt	derivative time	0 / 999	50	seconds
Sr	Sampling rate	1 / 10	3	seconds
rSt	manual reSet	min / max	0	°C / °F
Ar	Anti reset wind-up band	0 / max	20	°C / °F
od	output delay	0 / 500	0	seconds
Ct	Cycle time	1 / 500	25	seconds
drb	dynamic restart band	0 / max	20	°C / °F
dSi	dynamic Set increment	0 / max	10	°C / °F
dSt	dynamic Set time	1 / 999	120	seconds
Lci	Lower current input	min / max	min	°C / °F
Hci	Higher current input	min / max	max	°C / °F
CAL	CALibration	min / max	0	°C / °F
Ft	Function type	on / Pi	Pi	flag
PSE	Probe SElection	Ni / Pt / Fe / Cr	/	/
OCO	Output COnnection	di / in	in	flag
HC2	Heating / Cooling output 2	H / C	H	flag
rP1	relay Protection 1	ro / rc	ro	flag
rP2	relay Protection 2	ro / rc	ro	flag
LF1	Led Function 1	di / in	di	flag
LF2	Led Function 2	di / in	di	flag
dP	decimal Point	on / oF	oF	flag
hdd	half digit display	n / y	n	flag
tAb	tAble of parameters	/	/	/

It: Integral time.
The higher this setting, the "smoother" the integral action. A setting of "0" completely eliminates the integral function and changes the controller from PID to PD (output 1). See also "PROPORTIONAL CONTROL".
dt: derivative time.
The effect of the derivative action is in direct proportion to this time setting.
See also "PROPORTIONAL CONTROL".
Sr: Sampling rate.
Time between two successive read-outs, for the computation of the derivative. A low setting increases the response time, but also the sensitivity to noise.
Recommended setting is from 1 to 3.
rSt: manual reSet.
This allows the proportional band to be moved up or down. This parameter is expressed in degrees and must be set at a value opposite and corresponding to the noticed error.
Ar: Anti-reset wind-up band.
This is the half-band (on either side of the setpoint) in which the integral action takes place. The higher this setting, the stronger the integral action. Recommended initial setting: half of the value of parameter "Pb".
od: output delay.
This provides a delay selection for the outputs in applications where noise may cause brief erroneous signals from the sensor to the controller. Factory set at "0".
Ct: Cycle time.
This is the total time of one ONOFF cycle of the relay during the proportional action. See "PROPORTIONAL CONTROL".
drb: dynamic restart band.
This is a "soft start" function; when the temperature goes beyond this "restart band" (on either side of the setpoint), another soft start cycle is initiated. The value of this parameter represents half of the total band; see also "SOFT START".
dSi: dynamic Set increment.
This represents the dynamic increase of the setpoint; see "SOFT START". A setting of "0" disables this function.
dSt: dynamic Set time.
Time value between two successive dynamic setpoint increases.
Lci: Lower current input.
Read-out corresponding to the "low end scale" input signal of 4 mA; only for models with current input.
Hci: Higher current input.
Read-out corresponding to the "high end scale" of 20 mA; only for models with current input.
CAL: CALibration.
This offers an adjustment up or down of the read-out, if needed. Factory set at "0".
Ft: Function type.
Control mode selection (only for output 1; output 2 is always ON/OFF).
on = ON/OFF;
nr = not applicable;
Pi = PID.
PSE: Probe SElection.
Input type (for RTD or Thermocouples only).
RTD models: Ni = Ni100; Pt = Pt100.
T/C models: Fe = TcJ; Cr = TcK.
OCO: Output COnnection.
Setpoint dependency.
di = setpoint 2 dependent on setpoint 1 (for 2-stage control;
in = setpoint 2 independent from setpoint 1.
HC2: Heating / Cooling (output) 2.
Relay switch function output 2.
H = Heating;
C = Cooling.
rP1: relay Protection 1.
Determines the status of the relay in case of sensor defect. Factory set at "ro".
ro = relay open; rc = relay closed
rP2: relay Protection 2.
Same as "rP1".
LF1: Led Function 1.
Determines whether the status light is ON or OFF in relation to output 1.
di = direct = light ON when output 1 is energized;
in = reverse = light OFF when output 1 is energized.
LF2: Led Function 2.
Same as "LF1".
dP: decimal Point.
Choose whether the resolution is required with or without decimal point.
oF = without decimal point;
on = with decimal point.
NOTES: (a) the decimal point of models with current or voltage input is shifted: the actual value of parameters "Lci" and "Hci" must be multiplied by 10; (b) on all versions, if a unit is changed from without decimal point to with decimal point, all parameter values expressed in degrees will automatically be divided by 10, including the setpoint (c) the decimal point selection is not available on models for thermocouple input.
hdd: half digit display.
The right-most digit can be set to read-out in 0 or 5 only, or in all 10 digits.

CONNECTIONS



hdd = n : e.g. 070, 071, 072 etc. (if without decimal point) or 70.0, 70.1, 70.2 etc. (if with decimal point);
hdd = y : e.g. 070, 075, 080, etc. (if without decimal point) or 70.0, 70.5, 71,0, etc. (if with decimal point).
tAb: tAble of parameters.
This shows the configuration of the parameters as set in the factory; can not be modified (for factory identification and diagnostic purposes only).

PROPORTIONAL CONTROL

In the event that the factory set parameter values in a PID temperature controller do not give optimum results, the following steps may be followed to enhance the operation for each specific application:
» set the controller for ON/OFF control mode with parameter "Ft" (Ft = "on");
» select a value for setpoint 1 which will keep the temperature swing within acceptable limits, for example 10% below the normal operating temperature;
» set the switching differential ("d1") at 3% of the setpoint 1 temperature;
» start the system and wait for the temperature swings to become constant;
» check the process temperature (use a data recorder if possible) at regular intervals; determine the time between two successive temperature peaks (Tu) as well as the total temperature swing (dT; see diagram on the right).
Parameters "Pb", "It", "dt" and "Ct" can now be calculated as follows:
"Pb"=2xdT ; "It"=Tu/2 ; "dt"=Tu/8 ; "Ct"=Tu/20.
Additional fine tuning of the above parameters may be tried, keeping in mind however the following:
the "Proportional action" activates the output in direct proportion to the shift in stable system temperature ;
the "Derivative action" effects the output depending on the speed of temperature change;
the "Integral action" activates the output in proportion to the continuous integral calculation of the deviation values.
As a result:
a) an increase in the proportional band width reduces the temperature swing, but increases the shift in stable system temperature;
b) an excessive reduction of the proportional band width reduces deviation, but will also make the system less stable;
c) an increase in the derivative time reduces temperature swings when the system has become stable, but may cause wider temperature swings and increased deviation from setpoint;
d) an increase in the integral time reduces the deviation between setpoint and system value when system has become stable;
e) a weak integral action always has a temperature deviation which, in general, can be eliminated by reducing the proportional band width and by increasing first of all the derivative action, then the integral action.

SOFT START (RAMP-TO-SETPOINT)

The SOFT START feature is available on output 1 only.
This function provides automatically a progressive (ramped) increase of the setpoint value starting from the value of Ta (ambient temperature at start-up) up to the actually selected setpoint temperature (see diagram on the right), thus eliminating any possible temperature "overshooting".
The following parameters determine this function:
- "drb", half of the band width around setpoint, outside of which the ramping of the control point takes place;
- "dSt", the time between two successive control point increases (this time is expressed in seconds);
- "dSi", the value, in degrees, of each control point increase (a setting of "0" disables this function).

INSTALLATION

The instrument is designed for flush panel mount. Prepare a 71x29 mm panel cutout; insert the instrument through the front and fasten with the U-bracket supplied with the unit.
The ambient temperature around the instrument should be kept between –5 and 65 °C (23…149 °F).
Select a location which will not be subject to high humidity or condensation and allow some ventilation to provide cooling to the instrument.

ELECTRICAL WIRING

The instrument is equipped with an internal screw terminal block suitable for max 2.5 mm^2 wiring (one wire each terminal only, in compliance with VDE norms).
Make sure that the power supply corresponds with the rating shown on the instrument, i.e. 12 Vac/dc or 24 Vac/dc.
Refer to the instrument label for the applicable terminals to be used for the sensor cable; separate the wiring of the input signals from those of the power supply and switched output wiring.
The relay output contacts are voltage free and independent; do not exceed the resistive rating of 8 Amp at 250 Vac. For larger loads, please use an external contactor or relay.

ERROR ANNOUNCIATION

Any sensor input defect will be displayed as follows: "---" in case of shorted sensor; "EEE" in case of sensor break, or sensor absence. The "EEE" error message also appears in the event of ovverrange or underrange of the system temperature.
It is recommended to doublecheck the sensor wiring before diagnosing a probe as defective.

TECHNICAL DATA

Housing: black ABS plastic, autoestinguish.
Dimensions: front 74x32 mm (2.913x1.260"), depth 67 mm (2.637").
Mounting: flush panel mount with mounting bracket.
Protection: the instrument frontpanel is waterproof IP65; an optional snap-on cover can be supplied to provide additional protection of the rear terminal block.
Connections: screw terminal block (2.5 mm^2; one wire each terminal only, in compliance with VDE norms).
Display: 12.5 mm LED (0.50").
Push buttons: located on front panel.
Data storage: non-volatile EEPROM memory.
Operating temperature: –5…65 °C; (23…149 °F).
Storage temperature: –30…75 °C; (–22…167 °F).
Outputs: two (2) SPST relays 8(3)A 250V AC.
Auxiliary output: 12 Vdc/60 mA (for transducer power supply, e.g. humidity sensor, pressure transducer, etc.).
Inputs (depending on model): PTC / RTD (Ni100, Pt100) / Tc (J, K) / 4…20 mA (Ri = 41 Ω).

Resolution: 1 °C (°F) or 0.1 °C (°F). The right-most digit can also be set to read-out in 0 or 5 only, or in all 10 digits.
Accuracy: better than 0.5% of full scale.
Power supply (depending on model): 12 Vac/dc ±15% or 24 Vac/dc ±15%.

Eliwell S.p.A.
via dell'Artigianato, 65
Zona Industriale
32010 Pieve d'Alpago (BL)
Italy

Telephone +39 (0)437 986111
Facsimile +39 (0)437 989066

A Siebe Group Company

關於感測器

與 ELIWELL 產品配套使用的感測器主要有三類：溫度、濕度、壓力，現分別介紹如下：

一、溫度

現在可以用於測量溫度的材料很多，有很多種類型的溫度感測器，在此我們僅僅介紹以下 4 種，ELIWELL 均有對應的儀錶可以使用以下種類的溫度感測器。

a、 熱敏電阻型溫度感測器

PTC 正溫係數熱敏電阻溫度感測器：量程範圍：-50℃~+150℃
輸出信號：電阻信號，25℃時輸出阻值爲 990Ω
測量精度：±1℃

NTC 負溫係數熱敏電阻溫度感測器：量程範圍：-55℃~+110℃　25℃-10kΩ
輸出信號：電阻信號，25℃時輸出阻值爲 10KΩ
測量精度：±1℃

b、 鉑電阻

PT100：溫度範圍：-100℃~+600℃
輸出信號：電阻信號，0℃時輸出阻值爲 100Ω
測量精度：±0.1℃
種類：2 線制、3 線制（ELIWELL 產品只能和 3 線制的 PT100 配套使用）

2 線制 PT100 和 3 線制 PT100 之間的區別：顧名思義，3 線制 PT100 比 2 線制 PT100 在感測器導線上多一根電纜線，多的這一根電纜線是起溫度補償作用的，產品其他性能相同。

銷售注意事項：PT100 溫度變化 1℃，其阻值變化約 0.4Ω，是非常小的數值。ELIWELL 目前配套提供的 PT100 感測器導線長度爲 1.5m。如果用戶需要延長感測器導線長度，則建議用戶自己配套 PT100 感測器，因爲延長一段感測器導線，導線阻值可能增加 10~20Ω（視延長感測器導線長度而定）。按照 PT100 的溫度阻值特性，將使儀錶顯示溫度與實際溫度相差 20~50℃，ELIWELL 儀錶將無法校正這麼大的溫度偏差。敬請注意。（備註：PT100 在出廠前都經過標定）

c、 熱電偶

K 型熱電偶：量程範圍：0℃~+1200℃
J 型熱電偶：量程範圍：0℃~+600℃

使用注意事項：1. 熱電偶溫度傳感器具有正負極性，在與儀錶連接時需要注意；

2. 熱電偶溫度感測器多用於高溫場合，100℃以下不建議使用，因爲產品不具備好的穩定性。

d、 類比量輸出的溫度變送器

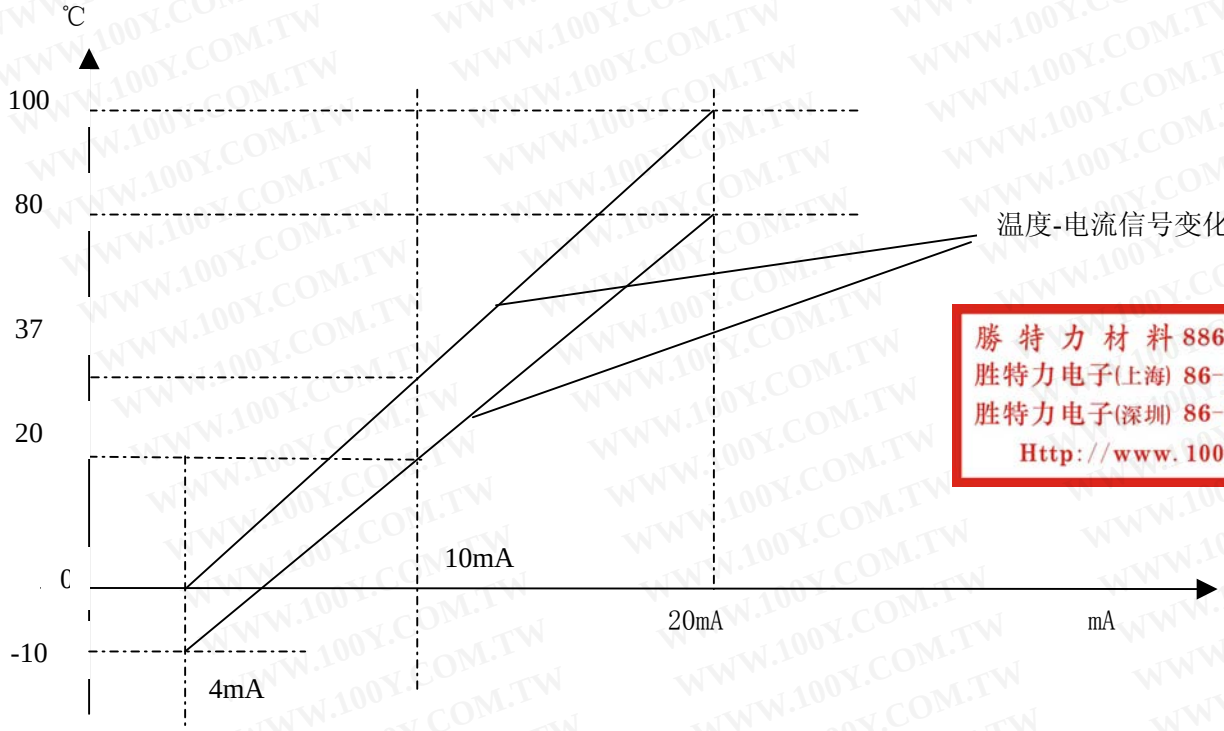
變送器正常工作需要使用直流電源：8~28Vdc，有的變送器自身具備電源，有的變送器需要外界提供電源，視各工廠提供不同產品而定。ELIWELL 能爲變送器提供符合要求的 12Vdc 直流電源。
變送器輸出信號（常用的）：電流信號：0~20mA、4~20mA；電壓信號：0~1V、0~5V、0~10V。

使用注意事項：1. 溫度變送器具有正負極性，在與儀錶連接時需要注意；

2. 正式工作前，需要預先告知配套使用的儀錶當前選用的溫度變送器輸出信號種類，及其對應的溫度測量範圍（例如：選用的溫度變送器是 4~20mA 電流信號輸出的，對應的溫度範圍是 0℃~+100℃）；

3. 從下圖中可以看到：同樣是 4~20mA 輸出的溫度變送器，對應的溫度範圍不同，溫度-電流信

號變化直線斜率是不同的。當溫度變送器輸出 10mA 信號時，對於 0℃~+100℃的溫度範圍，對應可能是 37℃；對於-10℃~+80℃的溫度範圍，對應可能是 20℃。所以當用戶提出儀錶顯示溫度不正確時，可建議用戶先檢查注意事項 2 設定的儀錶參數值是否正確。



二、濕度變送器

濕度變送器最大量程範圍：0~100%rH 相對濕度。
變送器正常工作需要使用直流電源：8~28Vdc，有的變送器自身具備電源，有的變送器需要外界提供電源，視各工廠提供不同產品而定。ELIWELL 能爲變送器提供符合要求的 12Vdc 直流電源。
變送器輸出信號（常用的）：電流信號：0~20mA、4~20mA；電壓信號：0~1V、0~5V、0~10V。

使用注意事項： 1. 濕度變送器具有正負極性，在與儀錶連接時需要注意；

2. 正式工作前，需要預先告知配套使用的儀錶當前選用的濕度變送器輸出信號種類，及其對應的濕度測量範圍（例如：選用的濕度變送器是 4~20mA 電流信號輸出的，對應的濕度範圍是 0~100%rH 相對濕度）；

三、壓力變送器

變送器正常工作需要使用直流電源：8~28Vdc，有的變送器自身具備電源，有的變送器需要外界提供電源，視各工廠提供不同產品而定。ELIWELL 能爲變送器提供符合要求的 12Vdc 直流電源。
變送器輸出信號（常用的）：電流信號：0~20mA、4~20mA；電壓信號：0~1V、0~5V、0~10V。
本公司可以提供的壓力變送器型號：ELIWELL：EWPA007、EWPA030
ALCO：PT3-07A、PT3-18A、PT3-30A、PT3-07V、PT3-18V、PT3-30V

使用注意事項： 1. 壓力變送器具有正負極性，在與儀錶連接時需要注意；

2. 正式工作前，需要預先告知配套使用的儀錶當前選用的壓力變送器輸出信號種類，及其對應的壓力測量範圍（例如：選用的壓力變送器是 4~20mA 電流信號輸出的，對應的壓力範圍是 -0.5~+7bar）；
3. 在選用壓力變送器時，需要注意變送器標定的壓力是絕對壓力還是相對壓力。絕對壓力和相對壓力之間相差 1bar.