EWTR/HR/PR 910 rel. 12/96 ing

controllers one output 72x72

WHAT IT IS

The EWTR 910 is a new series of micro-processor based and fully programmable process controllers for single setpoint applications; the output provides ON-OFF or PID control. Three different versions of this controller are available: EWTR 910 for Temperature, EWHR 910 for Relative humidity and EWPR 910 for Pressure control.

HOW IT IS MADE

- **Dimensions: front 72x72 mm (2.84x2.84"), depth 102 mm (4.00")**
- **Mounting: flush panel mount with mounting bracket. Panel cut-out 67x67 mm (2.64x2.64")**
- **Connections: quick-disconnect screw terminal blocks (2.5 mm^2; one wire each terminal only)**
- **Display: 12.5 mm LED (0.50")**
- **Output: one (1) SPDT relays 8(3)A 250V AC, or one (1) "static" (switched) output 0/12 Vdc 40 mA**
- **Programmable analog output (optional): 4…20 mA or 0…5 V, depending on model**
- **Auxiliary output: 12 Vdc/60 mA (for transducer power supply, e.g. temperature sensor, etc.; ground goes to terminal 10)**
- **Inputs (depending on model): PTC / RTD (Ni100, Pt100) / TC (J, K) / 4…20 mA (Ri = 41 Ω) for EWTR 910, EWHS 28/31 for EWHR 910 and EWPA 007/030 for EWPR 910**
- **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): 220, 110, 24 Vac, 50/60 Hz; 12 Vac/dc**

GENERAL DESCRIPTION

The EWTR 910 is a new series of microprocessor based and fully programmable process controllers for single setpoint applications; the output provides ON-OFF or PID control.
Three different versions of this controller are available: EWTR 910 for Temperature, EWHR 910 for Relative humidity and EWPR 910 for Pressure control.
The instrument is supplied in the standard EW 72x72 housing.

FRONT KEYPAD

SET: with this button the setpoint value can be displayed. To change the value, this button should be activated together with the "UP" or "DOWN" button. In case parameter "dro" is set at "S", the setpoint value (SV) can be changed with the "UP" or "DOWN" button only, while the process temperature (PV) can be displayed with the "SET" 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: same functions except to decrease a value.
PRG: programming access button. To access programming, this button must be pushed together with the concealed button located under "PRG" and "SET", all at the same time.
Led "OUTPUT": status light of the output.
Led "SV" (Set Value): to indicate that the Set Value (SV) is displayed. This occurs when "SET" is pushed (parameter "dro" set at "P"); it will stay on steady if parameter "dro" is set at "S".

PARAMETER PROGRAMMING

Access the programming by pushing "PRG", then the concealed button below "PRG" and "SET", all at the same time.
The first parameter will appear and the "OUTPUT" status light will blink throughout the programming. Select the desired parameter 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").
To exit the programming, push "PRG" plus the concealed button.

DESCRIPTION OF PARAMETERS

Any parameter which does not apply to a particular instrument version is automatically removed from the programming menu.
E.g.: a control for Thermocouple input will not offer parameters "Lci" and "Hci".
d1: differential setpoint 1.
The switching differential (hysteresis) can be set with positive value (make on rise) or with negative value (make on fall). See parameter "HC1".
LS1: Lower Set 1.
This is the lower limit below which the user cannot change the setpoint; normally set at the lowest value recommended for the sensor.
HS1: Higher Set 1.
Similar to "LS1", however setting an upper limit for the setpoint.
Pb: Proportional band.
Only for models with PID option. This value, expressed in degrees, determines the band-width around the setpoint within which the instrument provides proportion-

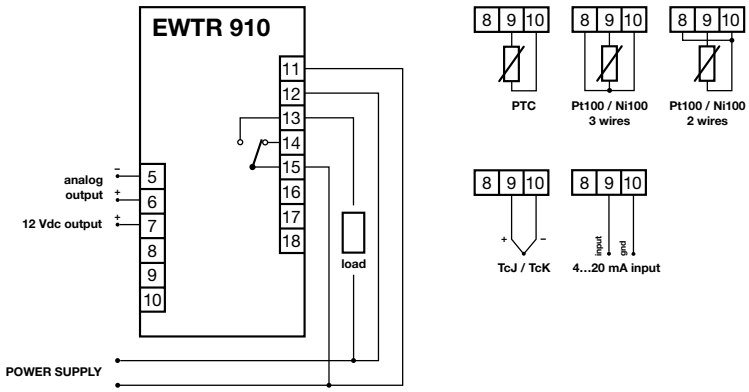
DEFAULT SETTINGS - STANDARD MODELS

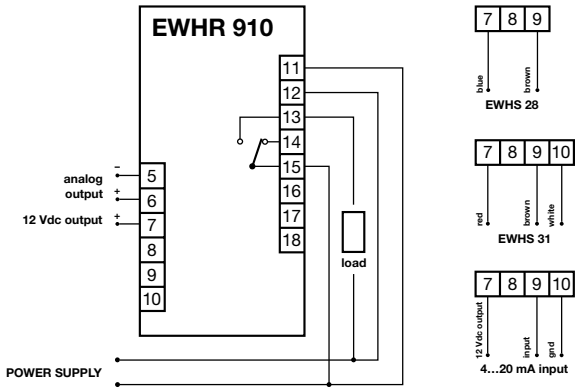
Parameter	Description	Range	Default	Unit
d1	differential set 1	min / max	1 (C) / –1 (H)	various
LS1	Lower Set limit 1	min / max	min	various
HS1	Higher Set limit 1	min / max	max	various
Pb*	Proportional band	0.1 (1) / max	100	various
It*	Integral time	0 / 999	500	seconds
dt*	derivative time	0 / 999	30	seconds
Sr*	Sampling rate	1 / 10	1	seconds
rSt*	manual reSet	min / max	0	various
Ar*	Anti reset	0 / max	100	various
Ct*	Cycle time	1 / 500	30	seconds
od	output delay	min / max	0	seconds
Lci	Low current input	min / max	min	various
Hci	High current input	min / max	max	various
LAO**	Low Analog Output	min / max	min	various
HAO**	High Analog Output	min / max	max	various
CAL	CALibration	min / max	0	various
PSE	Probe SElection	Ni / Pt / Fe / Cr	/	/
AOF**	Analog Output Function	ro / Er	ro	flag
HC1	Heating / Cooling out 1	H / C	/	flag
rP1	relay Protection 1	ro / rc	ro	flag
LF1	Led Function 1	di / in	di	flag
dP	decimal Point	on / oF	oF	flag
dro	display read-out	S / P	P	flag
AOS**	Analog Output Security	Ao / AF	AF	flag
hdd	half digit display	n / y	n	flag
tAb	tAble of parameters	/	/	/

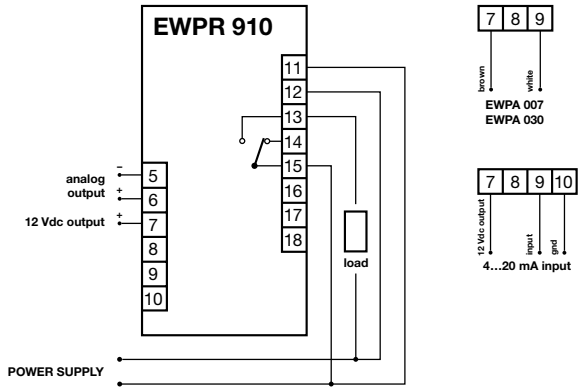
* Parameters visible only for special models with proportional operation (PID).
** Parameters visible only for special models with analog output.

al control. See also “PROPORTIONAL CONTROL”.
It: Integral time, expressed in seconds.
Only for models with PID option. 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, also expressed in seconds.
Only for models with PID option. The effect of the derivative action is in direct proportion to this time setting. See also “PROPORTIONAL CONTROL”.
Sr: Sampling rate, in seconds.
Only for models with PID option. 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.
Only for models with PID option. 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.
Only for models with PID option. 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”.
Ct: Cycle time (in seconds).
Only for models with PID option. This is the total time of one ON+OFF cycle of the relay during the proportional action. See “PROPORTIONAL CONTROL”.
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”.
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.
LAO: Low Analog Output.
Low end of scale setting of analog output (only for models with this option; see parameter “AOF”).
HAO: High Analog Output.
High end of scale setting of analog output (only for models with this option; see parameter “AOF”).
CAL: CALibration.
This offers an adjustment up or down of the read-out, if needed.
Factory set at “0”.
PSE: Probe SElection.
Input type (for RTD or Thermocouples only).
RTD models: Ni = Ni100; Pt = Pt100.
T/C models: FE = TcJ; Cr = TcK.
AOF: Analog Output Function.
Analog output function (only for models with this option; see parameters “LAO” and “HAO”).
ro (read-out) = proportional to the system temperature, within the read-out values specified by parameters “LAO” and “HAO”.
Er (Error) = proportional to temperature deviation from Setpoint, within the values specified by parameters “LAO” and “HAO”.
HC1: Heating / Cooling output 1.
Relay switch function output 1.
H = Heating (humidification; reverse action);
C = Cooling (dehumidification; direct action).
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
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.
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.
dro: display read-out.
Display read-out reversal.
P (Process value) = system temperature display.
S (Setpoint value) = setpoint temp. display.
AOS: Analog Output Security (only for models with this optional analog output). Sensor protection analog output.
Ao (Analog output on) = analog output ON (100%) in case of sensor defect;
AF (Analog output oFf) = analog output OFF (0%) in case of sensor defect.
hdd: half digit display.
The right-most digit can be set to read-out

CONNECTIONS







in 0 or 5 only, or in all 10 digits.
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). Useful when measuring values varying rapidly (e.g. %R.H.).
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:
» select a value for Setpoint 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 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).
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.

INSTALLATION

The instrument is designed for flush panel mounting; the required panel cut-out is 67x67 mm (2.64x2.64"). Insert the instrument from the front and tighten from the rear with the two mounting brackets provided.
The ambient temperature around the instrument should be kept between –5 and 65 °C (23 and 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

Two quick-disconnect terminals are provided for easy and convenient wiring, even before the instrument is actually installed.
Make sure that the power supply corresponds with the rating shown on the instrument; the power supply must be kept within plus or minus 15% of the nameplate voltage.
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 72x72 mm (2.84x2.84"), depth 102 mm (4.00").
Mounting: flush panel mount with mounting bracket. Panel cut-out 67x67 mm (2.64x2.64").
Connections: quick-disconnect screw terminal blocks (2.5 mm^2; one wire each terminal only).
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).
Output: one (1) SPDT relay 8(3)A 250V AC, or one (1) "static" (switched) output 0/12 Vdc 40 mA.
Programmable analog output (optional): 4…20 mA or 0…5 V, depending on model.
Auxiliary output: 12 Vdc/60 mA (for transducer power supply).
Inputs (depending on model): PTC / RTD (Ni100, Pt100) / TC (J, K) / 4…20 mA (Ri = 41 Ω) for EWTR 910, EWHS 28/31 for EWHR 910 and EWPA 007/030 for EWPR 910.
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%; 220, 110, 24 Vac ±10%, 50/60 Hz.

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