



OUTPUT TRANSDUCERS

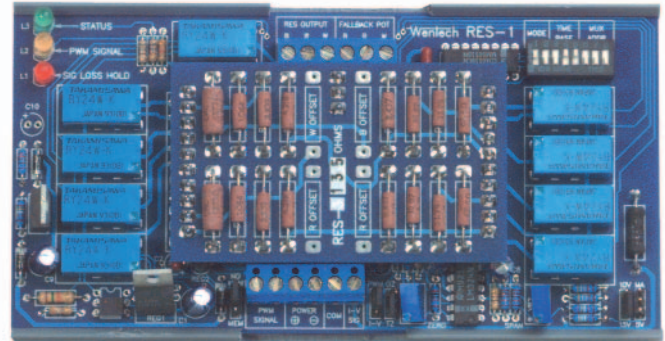
UNIVERSAL RESISTANCE TRANSDUCER MODEL RES-1

DESCRIPTION

The **Model RES-1 Universal Resistance Transducer** provides a precision resistance output for DDC control of electric actuators or other electronic devices that operate from a variable resistive circuit. Various jumper-selectable analog and pulse-width modulated (PWM) inputs are available, and the transducer may be powered from 24 VAC/DC. The **Model RES-1** is furnished with snap-track for easy mounting and may be operated in a multiplexed PWM mode so that one BAS output may address up to eight **Model RES-1s**.

FEATURES

- *Ideal for controlling electric actuators*
- *Replaces potentiometer or temperature sensor in boiler/chiller reset circuits*
- *0-20 mA, 4-20 mA, 0-5V, 1-5V, 0-10V, 2-10V, 0-15V, 3-15 VDC, or PWM input signals, jumper-selectable*
- *AC/DC powered*
- *Replaces motorized slide-wire potentiometer controller*
- *0-135 Ω , 0-270 Ω , 0-500 Ω , and 0-1000 Ω standard, custom ranges available*
- *Snap-track mounting*
- *Failsafe mode and signal loss feature*
- *LED indication*



OPERATION

The **Model RES-1** simulates a three-wire potentiometer output proportional to an analog or PWM input signal. The resistance between output terminals B and R increases (W and R decreases) as the input signal increases. The resistance between output terminals B and R decreases (W and R increases) as the input signal decreases.

When 24V power is interrupted at the **Model RES-1** power terminals, the failsafe mode internally connects the output terminals to the fallback pot terminals, allowing an alternate back-up controller or potentiometer to be used for control.

SPECIFICATIONS			
Supply voltage	24 VAC $\pm 10\%$ @ 220 mA (5.3 VA) 24 VDC $\pm 10\%$ @ 100 mA	Output resistors	1W
Input signal	0-20 mA, 4-20 mA, 0-5V, 1-5V, 0-10V, 2-10V, 0-15V, 3-15 VDC or PWM, jumper selectable	Output resolution	255 steps
PWM time base	0.1-2.65, 5.2, 12.85, 25.6, or 0.59-2.93 sec DIP switch selectable	Accuracy/ Repeatability	$\pm 1\%$ of span
Input impedance		Linearity	$\pm 1\%$ of span
Current	250 Ω	Temp range	32° to 158°F (0° to 70°C)
Voltage	49.9 k Ω min	LT Option	-40° to 158°F (-40° to 70°C)
Output ranges	0-135 Ω , 0-270 Ω , 0-500 Ω , 0-1000 Ω , custom ranges available; min span 30 Ω , max span 1 M Ω	Humidity	5% to 95% noncondensing
		Dimensions	6.5"L x 3.25"H x 1.25"D (16.5 x 8.3 x 3.2 cm)
		Weight	0.7 lb (0.32 kg)



OUTPUT TRANSDUCERS

UNIVERSAL RESISTANCE TRANSDUCER MODEL RES-1

CURRENT OR VOLTAGE ANALOG CONTROL

JUMPER SETTINGS For current or voltage analog control, set jumpers for required input signal as shown below.



Example: Jumpers shown at left are set for 4-20 mA input with memory feature* disabled.

Desired Input Signal	0-20 mA	4-20 mA	0-5V	1-5V	0-10V	2-10V	0-15V	3-15V
Set Jumpers On	I-V,TZ,MA	I-V,OZ,MA	I-V,TZ,5V	I-V,OZ,5V	I-V,TZ,10V	I-V,OZ,10V	I-V,TZ,15V	I-V,OZ,15V

* Memory Feature

If the MEM/NOMEM jumper is in the NOMEM position at power-up, the resistance between B and R goes to minimum until the first analog input is received. In the MEM position at power-up, the resistance returns to its last value when power was interrupted and remains there until a new input signal is received. The last resistance output value will be stored in memory for up to six hours after power loss.

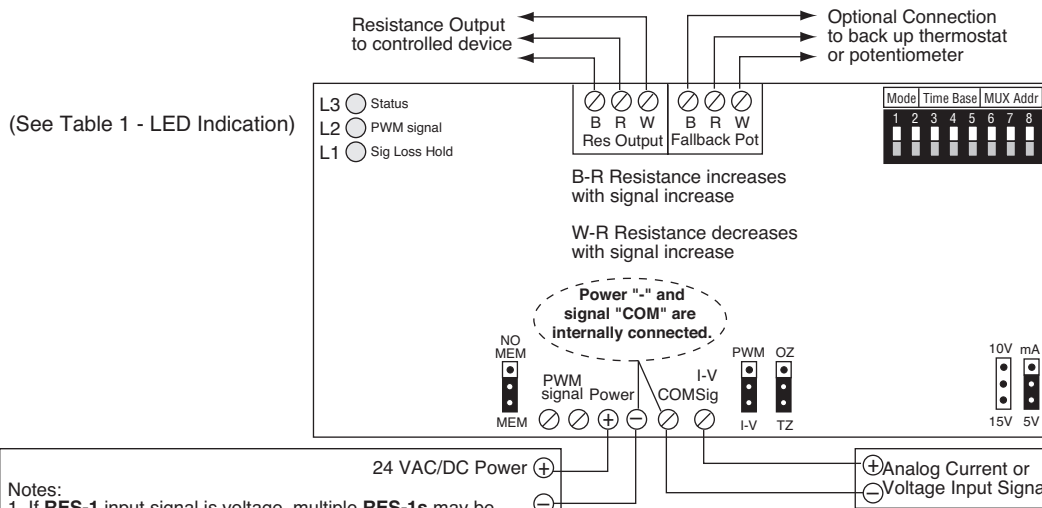
DIP SWITCH SETTINGS

OPERATING MODE	SWITCH		SWITCH						
	1	2	3	4	5	6	7	8	
Analog Input, No Sig Loss Hold**	Off	Off	Any Analog Input	Off	Off	Off	Off	Off	Off
Analog Input with Sig Loss Hold**	Off	On							

** Signal Loss Feature

In the event of a loss of the input signal, the **RES-1** can remember the last signal and continue to provide an output based on the last commanded signal. DIP switch 2 must be on to enable the Sig Loss Hold feature. The Sig Loss Hold feature cannot be used with any analog input signal range that starts at 0V or 0 mA and should be disabled by setting DIP switch 2 off.

ANALOG CONTROL WIRING



- Notes:
1. If **RES-1** input signal is voltage, multiple **RES-1s** may be powered from the same power supply or transformer.
 2. If **RES-1** input signal is current from a current sourcing controller, multiple units may be powered from the same power supply or transformer.
 3. If input signal is current from a current sinking controller, each **RES-1** must have a separate power supply or transformer.

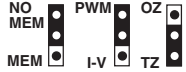


OUTPUT TRANSDUCERS

UNIVERSAL RESISTANCE TRANSDUCER MODEL RES-1

PWM / MULTIPLEXED PWM CONTROL

JUMPER SETTINGS For single-unit PWM or multiplexed PWM control, set jumpers to PWM and TZ. All other input jumpers are unused and ignored.



Example: Jumpers shown for PWM input with memory feature* disabled.

* Memory Feature

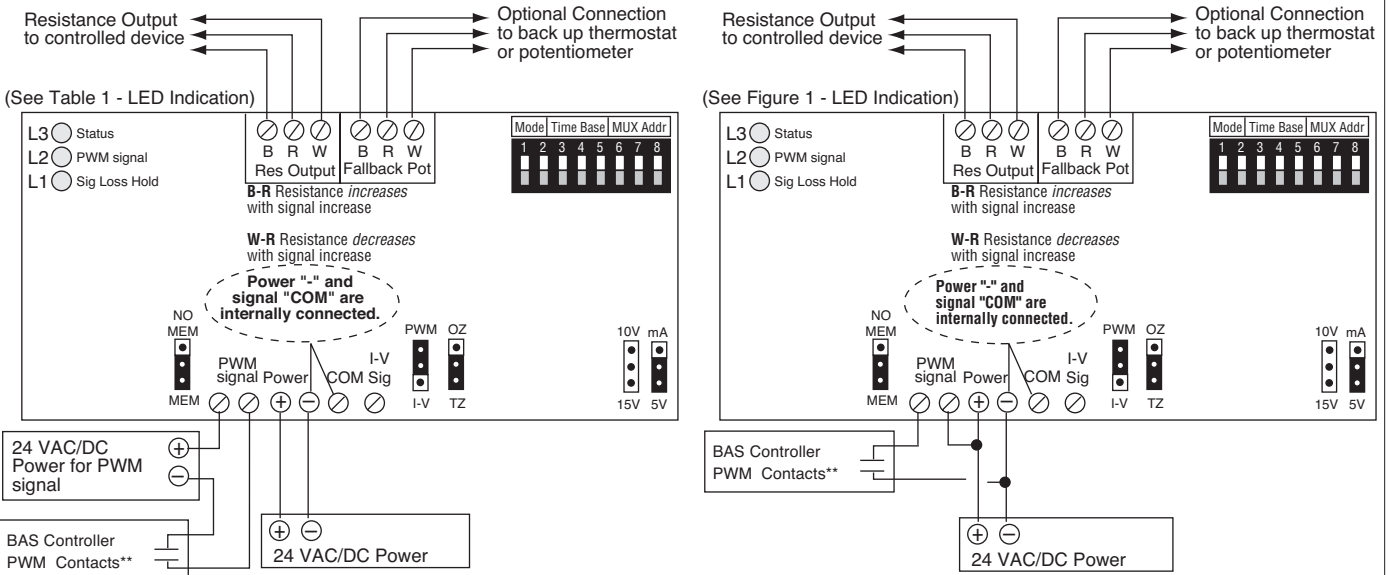
If the MEM/NOMEM jumper is in the NOMEM position at power-up, the resistance between B and R goes to minimum until the first analog input is received. In the MEM position at power-up, the resistance returns to its last value when power was interrupted and remains there until a new input signal is received. The last resistance output value will be stored in memory for up to six hours after power loss.

DIP SWITCH SETTINGS

OPERATING MODE	SWITCH		PWM TIME BASE (sec)	SWITCH			OPERATING MODE	SWITCH		
	1	2		3	4	5		6	7	8
PWM Input, Single RES-1 (No MUX)	On	Off	0.1-2.65	Off	Off	Off	Single RES-1 PWM Control	Off	Off	Off
PWM Input Multiplex Mode	On	On	0.1-5.2	Off	Off	On	Multiplexed PWM Control	Refer to the "Multiplexed PWM Operation" page at the beginning of the "Output Transducers" section.		
			0.1-12.85	Off	On	Off				
			0.1-25.6	Off	On	On				
			0.59-2.93	On	Off	Off				

Signal Loss Feature: The signal loss hold feature is not available when the RES-1 is configured for PWM input.

PWM CONTROL WIRING



Separate 24V Supplies for Power and Signal

Common 24V Supply for Power and Signal

**PWM signal input terminals are optoisolated and polarity insensitive. PWM computer contacts can switch either PWM wire lead.



OUTPUT TRANSDUCERS

UNIVERSAL RESISTANCE TRANSDUCER MODEL RES-1

INSTALLATION

**CAUTION: Make all connections with power removed.
Failure to do so could result in circuit board damage.**

Mount device inside an enclosure near the controlled equipment, avoiding areas of temperature extremes, corrosive vapors, or electro-magnetic interference. Use track slots for screw attachment. Note: Protect circuit board from metal filings created during panel construction.

Make all connections according to wiring diagram or as shown in the job diagram and in compliance with national and local codes. Use shielded #18 gauge cable for connections from the transducer to the controller. The unit comes precalibrated for easy application.

CHECK-OUT PROCEDURE

Tools required: Volt ohmmeter, Model CLC-100-PW1 signal analyzer or other signal source.

1. Verify that the input selector jumpers and switches are in the correct position for input signal to be used.
2. Verify that either 24 VAC or VDC is present at the power terminals.
3. With controlled device disconnected, connect an ohmmeter to the B and R terminals on the **RES-1** output. With no signal input, the resistance between B and R should be at minimum, and the resistance between W and R should be at maximum resistance.
4. Apply the minimum input signal for the range selected to the input terminals. The **RES-1** should output less than 2% of full range, the minimum resistance of the **RES-1**. Zero and full scale pots are factory set and should not be adjusted.
5. Slowly increase the input signal. The resistance reading will increase linearly toward full range. If the resistance does not vary with the input signal, check the polarity of the input wiring.

TABLE 1. LED INDICATION

L3 STATUS (green)	L2 PWM SIGNAL (yellow)	L1 SIGNAL LOSS HOLD (red)
Steady Green Power on	Steady Yellow PWM signal present	Steady Red Output being held due to loss of signal
Slow Green Blink Attention mode (Multiplex mode)		
Rapid Green Blink Select mode (Multiplex mode)		

ORDERING INFORMATION

MODEL	DESCRIPTION
RES-1	Universal Resistance Transducer, 135Ω Output
	OUTPUT (leave blank for standard 135Ω output)
500	500Ω
270	270Ω
1000	1000Ω
S	Special range* (specify when ordering)
LT	Low temperature option

*Contact Kele for special ranges



Example: RES-1 Universal resistance transducer, 135Ω output