

**FEATURES**

- Jumper selectable analog input
- DIP switch selectable pulse input type
- DIP switch selectable time bases
- 256 step output resolution
- Field changeable resistance output module

**APPLICATIONS**

- 0-20mA to resistance
- 0-10V to resistance
- PWM to resistance
- Three point floating to resistance
- Phase cut to resistance

**DESCRIPTION & OPERATION**

The UIRO accepts all standard analog input signals as well as digital PWM and three point floating inputs and converts them to a linear 256 step resistance output. The UIRO is useful when interfacing to resistance input damper positioners and chillers. It uses state of the art micro controller technology that gives it superior control system performance. The universal input allows the user to utilize the same unit in virtually all applications. When a field change is required, the UIRO can be user reconfigured without requiring a complete change out. Resistance output changes are accomplished by replacing the resistor module.

The UIRO uses two half-wave bridge rectifiers, filtered and regulated supplies to provide power to an embedded micro controller and relay circuitry. The micro controller interprets the input signals and provides a corresponding eight bit output signal. This signal is used to drive output relays that switch through a binary weighted resistance ladder. The analog input may be configured to accept 0-10VDC or 0-20mA signal by making a jumper selection. The pulse inputs will accept pulse width modulated, or 3 point floating signals at time bases of 2.5, 5, 10, 25, 60, 120 and 255 seconds.

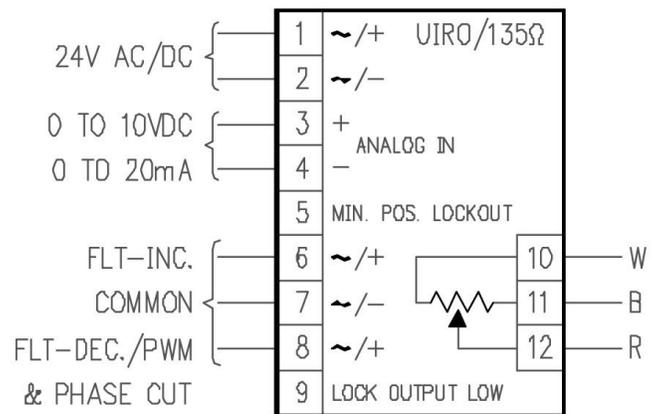
The PWM input can be configured to accept a 10 to 90% phase cut input with a jumper in either J1 or J2 position and DIP switch selection. DIP switch settings also select pulse input type and time base. Zero and Span adjustments are available for adjustments to input signals or for sequencing applications. The UIRO has a manual position pot and a minimum position lock. To lock out or disable the manual position function short terminal #5 to terminal #4, to lock the resistance output to its minimum value, short terminal #9 to terminal #4.



**SPECIFICATIONS**

Size:	3"W x 5.5"L x 1.5"H
Mounting:	3" RDI snap track (supplied)
Power:	24VAC ± 10% 50/60Hz 4.5VAC
Input Signal:	0-20mA, 0-5V, 0-10VDC (4-20mA upon request) 10-90% Phase cut PWM or 3 point floating @ 2.5, 5, 25, 60, 120, 255 sec.
Output Signal:	Custom and standard resistance Ranges. Standard ranges are: 0-135Ω            0-1KΩ 0-270Ω            0-5KΩ 0-500Ω            0-10KΩ
Adjustment:	Zero – 256 step absolute Span – 64 step approximated 1/3X to 3X
Ambient Temperature:	0 to 50°C

**WIRING CONFIGURATION**



ORDERING INFORMATION

**UIRO/SEL/XXX STD RANGE UIRO**  
 Std Resistance Output Option Code  
 Onboard Universal Selectable input

**UIRO/SEL/XXX-XXX CUSTOM RANGE UIRO**  
 Ending Resistance  
 Beginning Resistance  
 Onboard Universal Selectable Input

ONBOARD UNIVERSAL SELECTABLE INPUT

- PC 10-90% STAEFA Phase cut
- mA 0-20mA input (JP1)
- 5V 0-5VDC input (no JP)
- 10V 0-10V DC input (JP2)
- PWM Pulse Width Modulation input
- FLT 3 Point Floating (Tri-State) input

STANDARD RESISTANCE OUTPUT CODES

- 135Ω 0-135V 3-wire resistance output
- 270 Ω 0-270V 3-wire resistance output
- 500 Ω 0-500V 3-wire resistance output
- 1K Ω 0-1000V 3-wire resistance output
- 5K Ω 0-5000V 3-wire resistance output
- 10K Ω 0-10,000V 3-wire resistance output

To order just the standard resistance output module use part # RM\_XXX (XXX standard resistance value).  
 To order a custom output resistance output modules use part # RM\_XXX-XXX (XXX-XXX being the beginning and ending resistance values).

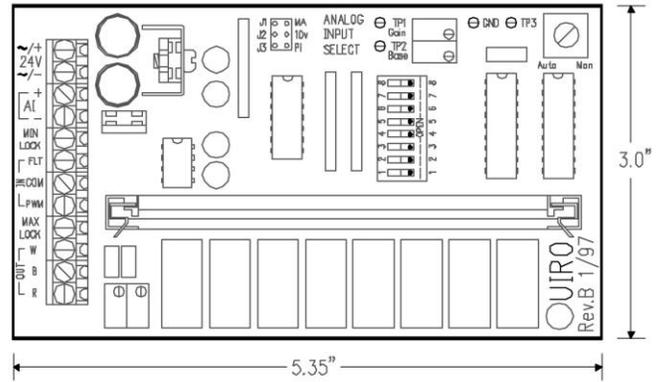
ORDERING CODE EXAMPLES

- UIRO//135Ω Universal input to Std. 135V
- UIRO//1K Ω Universal input to Std. 1000V
- UIRO//270-Adj. Universal input to custom output (Standard RM\_270 with UIRO 2K adjustment start/stop points).
- UIRO//1450-1720 Universal input to custom output (Custom RM\_1450 to 1720Ω).
- RM\_/500 Ω Replacement Resistor Module Std. 0 to 500V range.
- RM\_/1100-1430 Replacement resistor module Custom 1100 to 1430Ω range.

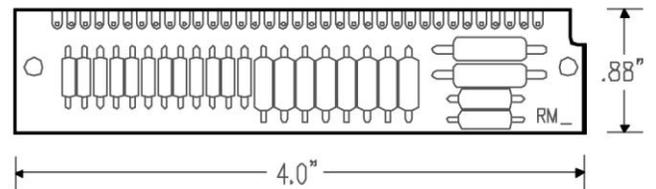
UIRO CALIBRATION ISTRUCTIONS FOR 4-20MA OPERATION

The UIRO is factory configured for 0-100% of selected input (0-10V or 0-20mA). The factory settings for the base & gain potentiometers are as follows. [Gain pot set for 2.5V (Tp1) and the base pot set for 0V (Tp2)]. When a 4-20mA signal is to be inputted into the UIRO, select mA input; and then set the Gain pot for 3.0V (Tp1) and Base pot for 1.0V (Tp2).

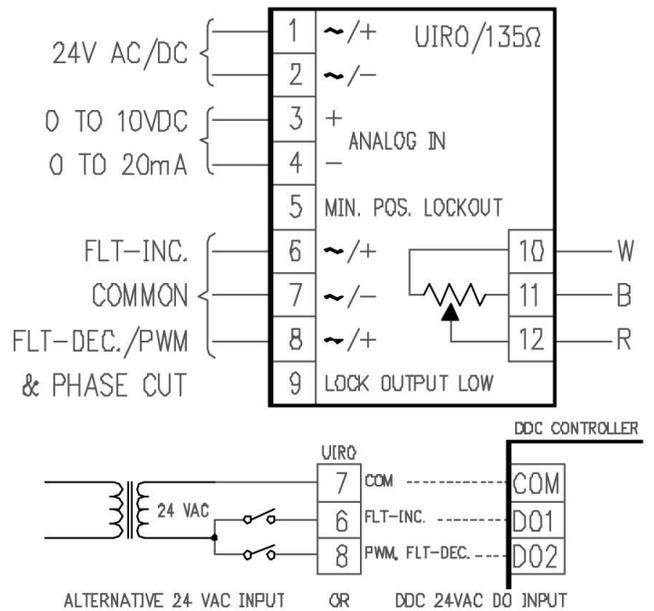
PHYSICAL CONFIGURATION



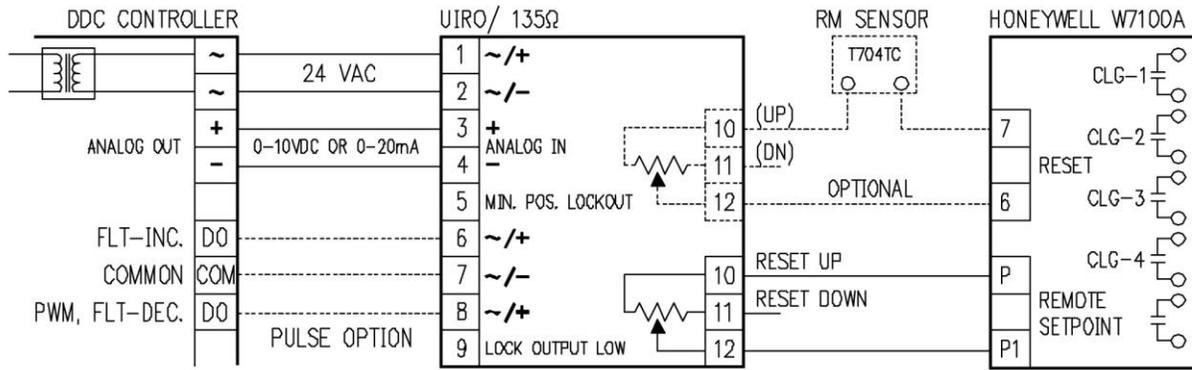
RM\_ PHYSICAL CONFIGURATION



WIRING CONFIGURATION

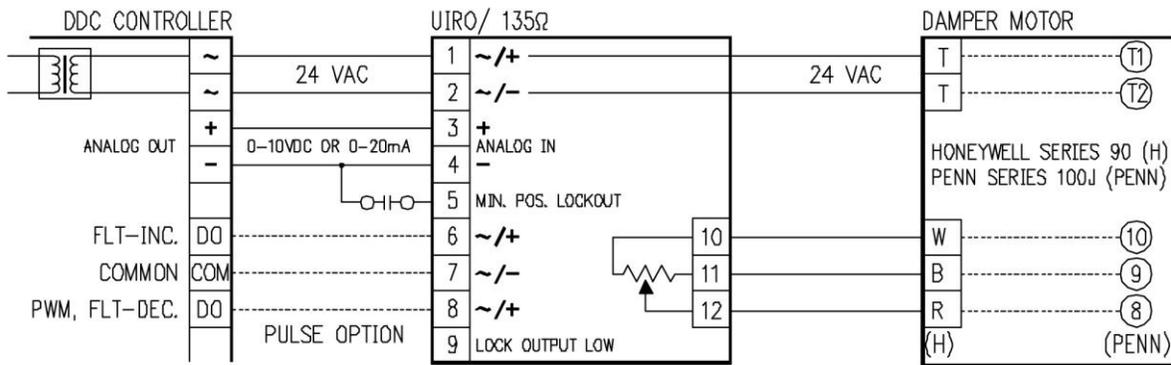


**APPLICATION 1  
RESET OF HONEYWELL W7100 SERIES DISCHARGE TEMPERATURE CONTROLLER**



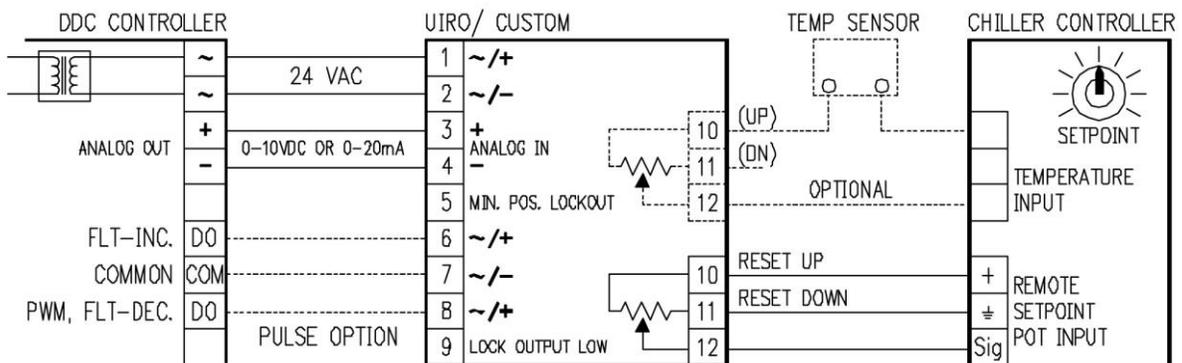
The UIRO can accept a variety of input signals and output a 3 wire resistance output that can be used in resetting a Honeywell W7100 series discharge temperature controller. This can be accomplished in two ways; first, provide a 0-135V up to 0-1000V resistance directly into the remote set point input, the second way directly resets the temperature input by adding resistance to the room sensor. A 135V resets the controller by 13.5°F, 500V resets the controller by 50°F, while 0 to 1000V resets the controller by 100°F.

**APPLICATION 2  
CONTROL OF HONEYWELL SERIES 90 OR PENN 100J SERIES DAMPER MOTORS**



The UIRO can accept a variety of input signals and output a 3-wire resistance output that can be used to control a Honeywell or Penn actuator. A damper minimum position value can be added by using the auto/manual potentiometer. The minimum value can be measured between Tp3 and Gnd, (0 to 5VDC represents 0 to 100% of the output) and be disabled by connecting terminal 5 (minimum position lock out) to terminal 4 (common) allowing the actuator to close completely.

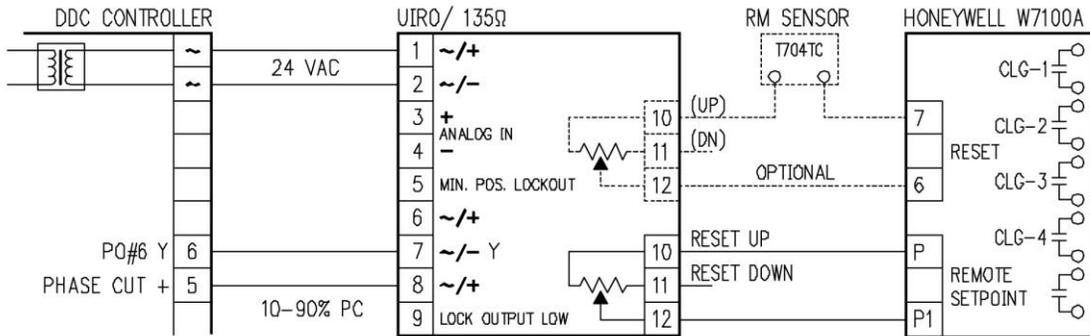
**APPLICATION 3  
REMOTE RESET OF CHILLER TEMPERATURE CONTROLLER**



The UIRO can be used with an automation system to reset packaged chiller temperature controls equipped with remote input or remote set point potentiometers. The UIRO 3-wire output replaces the remote set point potentiometer and should be the same resistance value. Check the chiller specifications for reset resistance values for the desired °F of reset.

**APPLICATION 4**

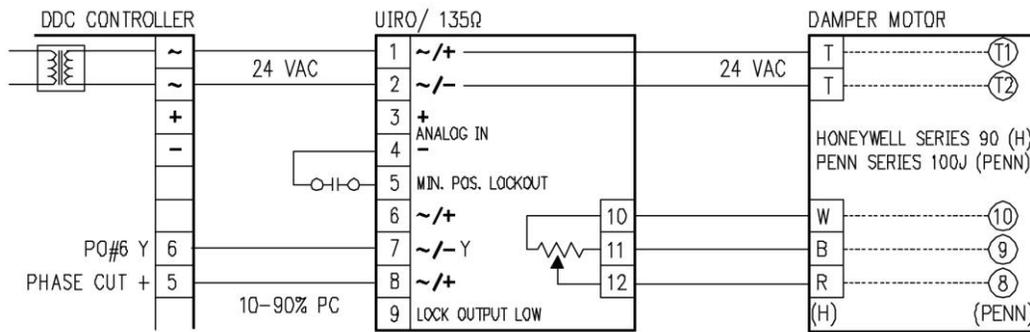
**RESET OF HONEYWELL W7100 SERIES DISCHARGE TEMPERATURE CONTROLLER**



The UIRO can be field configured to accept STAEFA’s phase cut signal and output a 3-wire resistance output that can be used in resetting a Honeywell W7100a series discharge temperature controller. This can be accomplished in two ways; first, provide a 0-135V up to 1000V resistance directly into the remote set point, the second directly resets the temperature input by adding resistance to the room sensor. A 135V resets controller by 13.5°F, 500V resets by 50°F, 1000V resets controller by 100°F.

**APPLICATION 5**

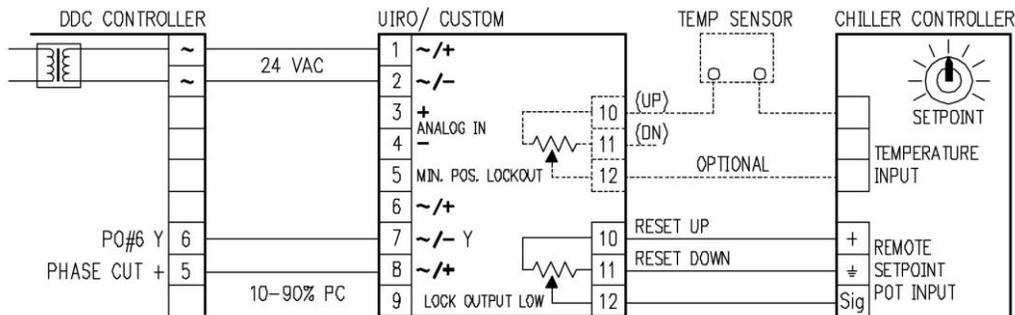
**CONTROL OF HONEYWELL SERIES 90 OR PENN 100J SERIES DAMPER MOTOR**



The UIRO can be field configured to accept STAEFA’s phase cut signal and output a 3-wire resistance output that can be used to control a Honeywell or Penn actuator. A damper minimum position value can be added by using the auto/manual potentiometer. The minimum value can be measured between Tp3 and Gnd, (0 to 5VDC represents 0 to 100% of the output). The minimum signal can be disabled by connecting terminal 5 (minimum position lock out) to terminal 4 (common) allowing the actuator to close completely.

**APPLICATION 6**

**REMOTE RESET OF A CHILLER TEMPERAURE CONTROLLER**



The UIRO can be used with an automation system to reset packaged chiller temperature controls equipped with remote input or remote set point potentiometers. The UIRO 3-wire output replaces the remote set point potentiometer and should be the same resistance value. For remote reset input check the chiller specifications for reset resistance values for the desired °F of reset.

**FIELD SETUP AND CALIBRATION INSTRUCTIONS**

The UIRO has a three position jumper block and an eight (8) position DIP switch block that are used to select between analog and pulsed inputs and the time base for the pulsed input signals.

The three position jumper selects between; current (mA) and voltage (10V) inputs and between pulse inputs (PI) or STAEFA’s phase cut input.

For an analog input of 0-20mA, a jumper or shunt must be installed in the position marked mA (J1).

For an analog input of 0-10VDC, a jumper or shunt must be installed in the position marked 10V (J2).

For an analog input of 0-5VDC, a jumper is not used. The jumper may be placed in position marked PI (J3) for storage.

For an input of 0 to 20V phase cut, a jumper must be installed in either mA (J1) or 10V (J2) as a load for the analog input.

For a pulse input of either PWM or 3 Point Floating, a jumper or shunt must be installed in the position marked PI (J3).

The eight DIP switches are used to select: either pulse or phase cut input, as well as the direct or reverse operation, and the time base of the pulsed input. The truth tables below show the DIP switch settings for each possible selection. A logic 0 is the OFF or OPEN switch position.

**Note** that the DIP switch is marked as to which side is OPEN. When the switch is down towards the side marked OPEN then it is in the logic 0 state.

- DIP switch position 1 is used to lock the output to its lowest resistance. With the switch in the 0 position, the board will operate normally. When the switch is in the 1 position the output will be locked to the lowest resistance output, this function is the same as shorting terminal #9 to terminal #4.
- DIP switch position 2 is used to select either direct or reverse operation. With the switch in the 0 position, the output will operate in direct action and in position 1 the output will be reversed.
- DIP switch positions 3 & 4 are used to select the input type. The table to the right outlines the settings for Phase cut, Tri-State Floating Point (FLT), Continuous Pulse Width Modulation (PWMC), and Directed Pulse Width Modulation (PWMD).
- DIP switch position 5, 6 & 7, are used to select the pulse input’s time base. The table to the right outlines the time base settings for the pulse input signals. There are seven standard time ranges and an option for a custom time base input. The custom time base value should be specified at the time of order.
- DIP switch position 8 (SW8) is used to lockout any change in the resistance output. For normal operation this switch must be in logic 1 or (CLOSED) position. When this switch is in 0 (OPEN) position, there will be no change in the output.

DIP Sw. 3	DIP Sw. 4	INPUT TYPE
0	0	10 to 90% Phase cut input
0	1	Tri-state Floating point input
1	0	Continuous pulse width modulated input
1	1	Directed pulse width modulated input

DIP Sw. 5	DIP Sw. 6	DIP Sw. 7	TIMING SELECTION
0	0	1	2.5 SECONDS
0	1	0	5 SECONDS
0	1	1	10 SECONDS
1	0	0	25 SECONDS
1	0	1	60 SECONDS
1	1	0	120 SECONDS
1	1	1	255 SECONDS
0	0	0	CUSTOM TIME

The UIRO is equipped with a single turn auto/ manual potentiometer so that a minimum position can be established. The voltage setting for this potentiometer can be measured at TP1. When the auto/ manual potentiometer is set at 0 volts, the UIRO will operate normally. When the potentiometer is set at any other voltage level, then the UIRO will not allow the output to fall below a corresponding percentage of operation. For example: if the auto/ manual potentiometer is set at 2.5 volts (50%) the output will not be allowed to fall below 50% of the resistance output.

There is also a ZERO and a SPAN potentiometer on the board. Please note: These potentiometers are for adjusting the input signal for sequencing or other custom applications. If you are not performing either of these operations, do not adjust these potentiometers. If you require an adjustment to these potentiometers, refer to the back page for instructions. If you are not sure, please call one of our applications engineers before adjusting them.

The ZERO adjustment is an absolute position that biases the input signal off of the normal starting position. The ZERO potentiometer would need to be adjusted to the desired bias voltage. The ZERO can be set up by measuring the voltage at TP2. When the voltage at TP2 is 0 volts, there is no bias on the input. Any other voltage will place a bias on the input. The ZERO potentiometer can be adjusted between 0 and 5VDC. The percentage of bias is directly proportional to the voltage set on the ZERO potentiometer. For example, if a 50% bias is needed, then 50% of 0 to 5 volts is 2.5V; set the ZERO potentiometer to this voltage and the bias will be at 50%.

The SPAN is set up to provide 64 windows of input attenuation or gain. The center position on the SPAN potentiometer (2.5VDC as measured at TP3) is the gain of 1 or no change position. There are 32 windows below that position that will attenuate the input signal (minimum of 1/3x) and 32 windows above it that will amplify the input signal (maximum of 3x). The output timing can be adjusted by using the SPAN potentiometer by selecting the time base above the desired one and calculating how much attenuation it needs to reach the desired time base. Please refer to the table below for voltage settings.

**Note:** All TP measurements are in reference to TP Grd or terminal 2.

TP3 Volts	% Adjust
.078 V	33.3%
.156 V	35.4%
.234 V	37.5%
.312 V	39.6%
.390 V	41.7%
.468 V	43.8%
.546 V	45.8%
.624 V	47.9%

TP3 Volts	% Adjust
.702 V	50.0%
.780 V	52.1%
.858 V	54.2%
.936 V	56.3%
1.014 V	58.3%
1.092 V	60.4%
1.170 V	62.5%
1.248 V	64.6%

TP3 Volts	% Adjust
1.326 V	66.7%
1.404 V	68.8%
1.482 V	70.8%
1.560 V	72.9%
1.638 V	75.0%
1.716 V	77.1%
1.794 V	79.2%
1.872 V	81.3%

TP3 Volts	% Adjust
1.950 V	83.3%
2.028 V	85.4%
2.106 V	87.5%
2.184 V	89.6%
2.262 V	91.7%
2.340 V	93.8%
2.418 V	95.8%
2.496 V	97.9%

TP3 Volts	% Adjust
2.574 V	106.3%
2.652 V	112.6%
2.730 V	118.8%
2.808 V	125.1%
2.886 V	131.3%
2.964 V	137.6%
3.042 V	143.8%
3.120 V	150.1%

TP3 Volts	% Adjust
3.198 V	156.3%
3.276 V	162.6%
3.354 V	168.8%
3.432 V	175.1%
3.510 V	181.3%
3.588 V	187.6%
3.666 V	193.8%
3.744 V	200.1%

TP3 Volts	% Adjust
3.822 V	206.3%
3.900 V	212.6%
3.978 V	218.8%
4.056 V	225.1%
4.134 V	231.3%
4.212 V	237.6%
4.290 V	243.8%
4.338 V	250.1%

TP3 Volts	% Adjust
4.446 V	256.3%
4.524 V	262.6%
4.602 V	268.8%
4.680 V	275.1%
4.758 V	281.3%
4.836 V	287.6%
4.875 V	293.8%
5.000 V	300.0%