

## Product Datasheet - Technical Specifications



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### Your contact

**Technical and commercial sales, price information,  
quotations, demo/test equipment, consulting:**

Tel.: **+49 - 81 41 - 52 71-0**

FAX: **+49 - 81 41 - 52 71-129**

E-Mail: [sales@meilhaus.com](mailto:sales@meilhaus.com)

Downloads:

[www.meilhaus.com/en/infos/download.htm](http://www.meilhaus.com/en/infos/download.htm)

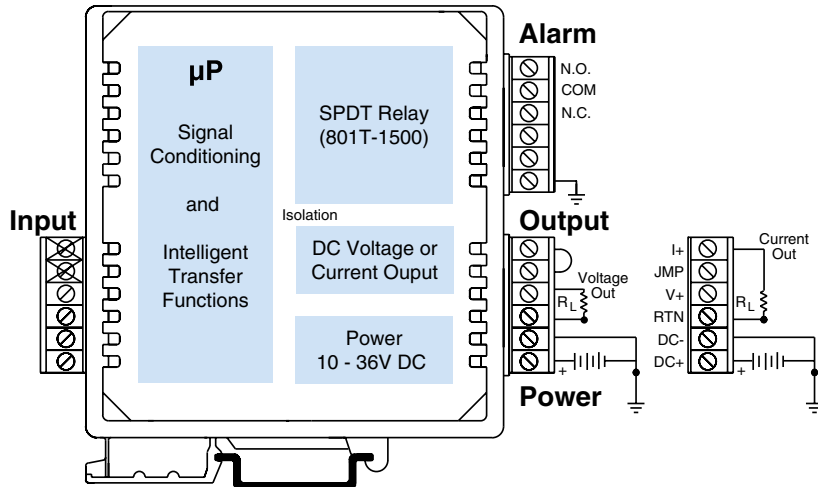
**Meilhaus Electronic GmbH** | Tel. **+49 - 81 41 - 52 71-0**  
Am Sonnenlicht 2 | Fax **+49 - 81 41 - 52 71-129**  
82239 Alling/Germany | E-Mail [sales@meilhaus.com](mailto:sales@meilhaus.com)

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# IntelliPack®: 800T Series

## IntelliPack 801T Temperature Transmitters



Thermocouple, RTD, millivolt, and resistance input ♦ Limit alarm

### 801T Transmitters

#### Thermocouple, RTD, Millivolt, and Resistance Input

##### Models

801T-0500: Universal temperature transmitter  
801T-1500: Transmitter with limit alarm

##### Input Ranges

TC types: J, K, T, R, S, E, B, N  
Millivolt:  $\pm 15.625\text{mV}$  to  $\pm 1.0\text{V DC}$   
RTD: 100 ohm Pt, 120 ohm Ni, 10 ohm Cu  
Resistance: 0 to 500 ohms

##### Output Ranges

0 to 1mA, 0 to 20mA, 4 to 20mA DC  
0 to 5V, 0 to 10V DC

##### Limit Alarm

SPDT electro-mechanical relay (-1500 unit only)

##### Power Requirement

10 to 36V DC

##### Approvals

UL, cUL listed.

### Description

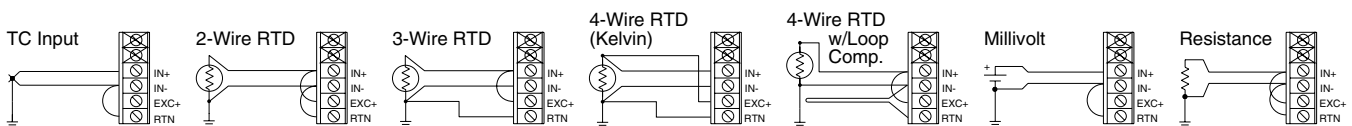
These transmitters isolate and convert sensor inputs to noise-free, proportional DC current or voltage output signals. An optional relay output adds a local limit alarm function.

Each unit offers a selection of input and output ranges, as well as several signal conditioning options. This flexibility enables a single IntelliPack to handle a broad range of applications. As your needs change, you can easily reconfigure the unit for different ranges or functions.

Setup is very easy. IntelliPack modules are quickly configured with the user-friendly Windows software program. Field adjustments are simple with the module's front-panel push-buttons and status LEDs. Once configured, IntelliPacks operate independent of any host computer.

### Key Features & Benefits

- High-resolution Sigma-Delta A/D converter delivers high accuracy with low noise.
- Advanced microcontroller provides intelligent signal processing power for linearization, averaging, and square root computations.
- Windows XP/Vista/7 software configuration speeds setup and replacement.
- Multi-purpose inputs and outputs reduce spare stock requirements.
- Relay output option provides local limit alarm capability.





## Performance Specifications

### General Input

#### Analog to Digital Converter (ADC)

16-bit  $\Sigma$ - $\Delta$  A/D converter.

#### Resolution

$\pm 0.005\%$  of span or  $0.1^\circ\text{C}$ .

#### Ambient Temperature Effect

Better than  $\pm 0.005\%$  of input span per  $^\circ\text{C}$  or  $\pm 1\mu\text{V}$ , whichever is greater.

#### Noise Rejection

Normal Mode: Better than 40dB @ 60Hz.

Common Mode: Better than 130dB @ 60Hz.

#### Input Response Time (for input step change)

Less than 200mS typical  
to 98% of final output value.

#### Input Overvoltage Protection

Bipolar Transient Voltage Suppressors (TVS).

### Thermocouple Input

#### Thermocouple Input Ranges

Thermocouple type user configured. Signal linearization, cold-junction compensation, and open circuit or lead break detection are included.

TC	$^\circ\text{C}$ Range ( $^\circ\text{F}$ Range)	Accuracy
J	-210 to 760 $^\circ\text{C}$ (-346 to 1400 $^\circ\text{F}$ )	$\pm 0.5^\circ\text{C}$
K	-200 to 1372 $^\circ\text{C}$ (-328 to 2502 $^\circ\text{F}$ )	$\pm 0.5^\circ\text{C}$
T	-260 to 400 $^\circ\text{C}$ (-436 to 752 $^\circ\text{F}$ )	$\pm 0.5^\circ\text{C}$
R	-50 to 1768 $^\circ\text{C}$ (-58 to 3214 $^\circ\text{F}$ )	$\pm 1.0^\circ\text{C}$
S	-50 to 1768 $^\circ\text{C}$ (-58 to 3214 $^\circ\text{F}$ )	$\pm 1.0^\circ\text{C}$
E	-200 to 1000 $^\circ\text{C}$ (-328 to 1832 $^\circ\text{F}$ )	$\pm 0.5^\circ\text{C}$
B	260 to 1820 $^\circ\text{C}$ (500 to 3308 $^\circ\text{F}$ )	$\pm 1.0^\circ\text{C}$
N	-230 to 1300 $^\circ\text{C}$ (-382 to 2372 $^\circ\text{F}$ )	$\pm 1.0^\circ\text{C}$

#### Thermocouple Break Detection

TC sensor failure can be configured for either upscale or downscale.



Optional terminal blocks: barrier strip (left) and spring clamp (right). Cage clamp terminal is standard.

### RTD Input

#### RTD Input Ranges

100 ohm Platinum, 120 ohm Nickel, or 10 ohm Copper; user-configured.

RTD	$^\circ\text{C}$ Range ( $^\circ\text{F}$ Range)	Accuracy
Pt <sup>1</sup>	-200 to 850 $^\circ\text{C}$ (-328 to 1562 $^\circ\text{F}$ )	$\pm 0.25^\circ\text{C}$
Pt <sup>2</sup>	-200 to 850 $^\circ\text{C}$ (-328 to 1562 $^\circ\text{F}$ )	$\pm 0.25^\circ\text{C}$
Ni	-80 to 320 $^\circ\text{C}$ (-112 to 608 $^\circ\text{F}$ )	$\pm 0.25^\circ\text{C}$
Cu	-200 to 260 $^\circ\text{C}$ (-328 to 500 $^\circ\text{F}$ )	$\pm 1.00^\circ\text{C}$

Alpha: Pt1 (a = 1.3850), Pt2 (a = 1.3911), Ni (a = 1.6720), Cu (a = 1.4272).

2, 3, or 4-wire configurations supported. Module provides sensor excitation, linearization, lead-wire compensation, and sensor break detection.

#### RTD Excitation Current

1mA DC typical, all types.

#### RTD Lead-Wire Compensation

25 ohms per lead.

#### RTD Break Detection

RTD sensor failure can be configured for either upscale or downscale.

### Millivolt Input

#### DC Millivolt/Voltage Input Ranges

$\pm 1.0\text{V}$	$\pm 125\text{mV}$	$\pm 31.25\text{mV}$
$\pm 500\text{mV}$	$\pm 62.5\text{mV}$	$\pm 15.625\text{mV}$
$\pm 250\text{mV}$		

#### Millivolt Accuracy

Better than  $\pm 0.05\%$  of input span.

### Resistance Input

#### Resistance Input Range

0 to 500 ohms.

#### Resistance Accuracy

$\pm 0.05$  ohms.

### Output (DC V/mA)

#### D/A Converter

16-bit  $\Sigma$ - $\Delta$ .

#### Current Output

Ranges: 0-1mA, 0-20mA, 4-20mA.

Compliance: 10V minimum (500 ohm load).

Accuracy: 0.025% of span.

#### Voltage Output

Ranges: 0-5V, 0-10V.

Compliance: 10mA maximum with short circuit protection. 1 ohm output impedance.

Accuracy: 0.025% of span.

Accuracy (overall input to output)  
0.075% of span.

### Output (Relay)

#### Relay

One SPDT electro-mechanical relay.

#### Relay Ratings (CSA ratings)

25V DC @ 5A.

120/240V AC @ 5A.

#### Relay Time Delay

Adjustable alarm delay of up to 25 seconds.

#### Contact Material

Silver-cadmium oxide (AgCdO).

#### Expected Mechanical Life

20 million operations.

### Environmental

#### Ambient Temperature

Operating: -25 to 70 $^\circ\text{C}$  (-13 to 158 $^\circ\text{F}$ ).

Storage: -40 to 85 $^\circ\text{C}$  (-40 to 185 $^\circ\text{F}$ ).

#### Relative Humidity

5 to 95%.

#### Power Requirements

10 to 36V DC. 75mA @ 24V. 120mA @ 15V.

#### Isolation (optical)

4-way (input/output/relay/power).

1500V AC for 60 seconds or 250V AC continuous.

#### Radiated Field Immunity (RFI)

EN61000-4-3, EN50082-1.

#### Electromagnetic Field Immunity (EMI)

Less than  $\pm 0.25\%$  of output span effect under the influence of electromagnetic fields from switching solenoids, commutator motors, and drill motors.

#### Electrical Fast Transient (EFT)

EN61000-4-4, EN50082-1.

#### Surge Withstanding Capability (SWC)

EN61000-4-5, EN50082-1.

#### Electrostatic Discharge (ESD)

EN61000-4-2, EN50082-1.

#### Radiated Emissions

EN50081-1 for Class B equipment.

#### Approvals

UL listed (USA, Canada).

UL3121 - general product safety.

# IntelliPack®: 800T Series

## Configuration

### Software Configuration

Units are fully programmable via the Windows XP/Vista/7 IntelliPack Configuration Program. Configuration downloads from PC through EIA232 serial port using Acromag 800C-SIP kit.

### Field Configuration

Output, zero/full-scale, relay setpoint and deadband are configurable via push-buttons and a standard calibrator.

### LED Indicators

LEDs indicate power, status, calibration, and alarm.

## Physical

### Enclosure

Case: Self-extinguishing NYLON type 6.6 polyamide thermoplastic UL94 V-2 NEMA Type 1 enclosure.

### Connectors (Removable Terminal Blocks)

Wire Range: AWG #14-22 (AWG #12 stranded only).

### Printed Circuit Boards

Military grade FR-4 epoxy glass circuit board.

### Dimensions

1.05W x 4.68H x 4.35D inches.  
26.7W x 118.9H x 110.5D millimeters.

### Shipping Weight

1 pound (0.45 Kg) packed.

## Ordering Information

IMPORTANT: All IntelliPacks require initial software configuration (order 800C-SIP). See Note 1 below.

### 801T-0500

IntelliPack transmitter (TC/RTD/mV/resistance input).

### 801T-1500

Same as above, plus an SPDT relay output.

### 800C-SIP

Software Interface Package.

Only one kit is required for all IntelliPack models. See diagram on Page 83 for included parts.

### 5034-225

USB-to-RS232 adapter. See page 121 for more info.

### PS5R-VD24

Power supply (24V DC, 2.1A).

See Power Supplies on Page 199.

### TBK-B01

Optional terminal block kit, barrier strip style, 2 pcs. (Does not include terminal block for input wiring.)

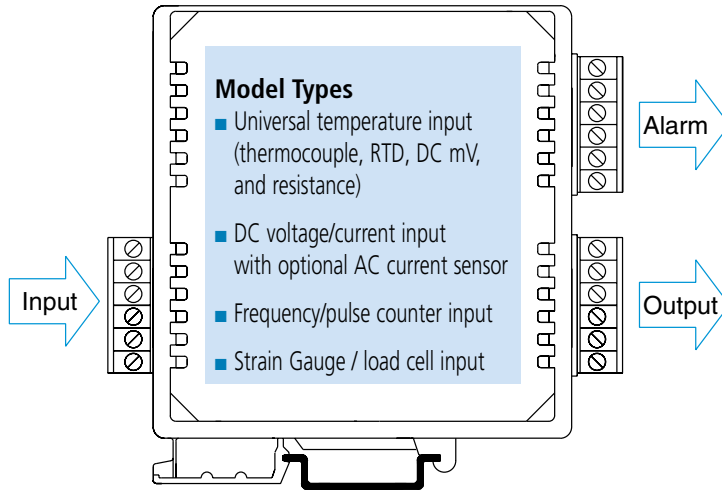
### TBK-S01

Optional terminal block kit, spring clamp style, 2 pcs. (Does not include terminal block for input wiring.)

NOTE 1: To order factory configuration, call Acromag for a configuration form which must accompany your order. Also, append "-C" to model number (example: 801T-1500-C). 800C-SIP kit is still recommended.

# IntelliPack®: 800 Series

## IntelliPack 800 Series Signal Conditioners



Universal temperature input ♦ DC voltage/current input ♦ Frequency input ♦ Strain gauge input

### 800T Models

- 801T: Universal temperature input (thermocouple, RTD, DC mV, and resistance)
- 811T: DC voltage/current input with optional AC current sensor
- 841T: Frequency/pulse counter input
- 851T: Strain gauge / load cell input

IntelliPack transmitters isolate and convert sensor inputs to noise-free, proportional DC current or voltage output signals. An optional relay output adds a local limit alarm function.

Each unit offers a selection of input and output ranges, as well as several signal conditioning options. This flexibility enables a single IntelliPack to handle a broad range of applications. As your needs change, you can easily reconfigure the unit for different ranges or functions.

The internal microprocessor provides several computation functions. A linearizer function lets you linearize/characterize the input signal with custom break points. The averaging function outputs a signal that is proportional to the average of the previous "n" samples, where n is user-defined. IntelliPacks can also generate an output signal that is proportional to the square root of the input signal. Other functions are possible (consult factory).

Setup is very easy. IntelliPack modules are quickly configured with the user-friendly Windows software program. Field adjustments are simple with

the module's front-panel push-buttons and status LEDs. Once configured, IntelliPacks operate independent of any host computer.

### Key Features & Benefits

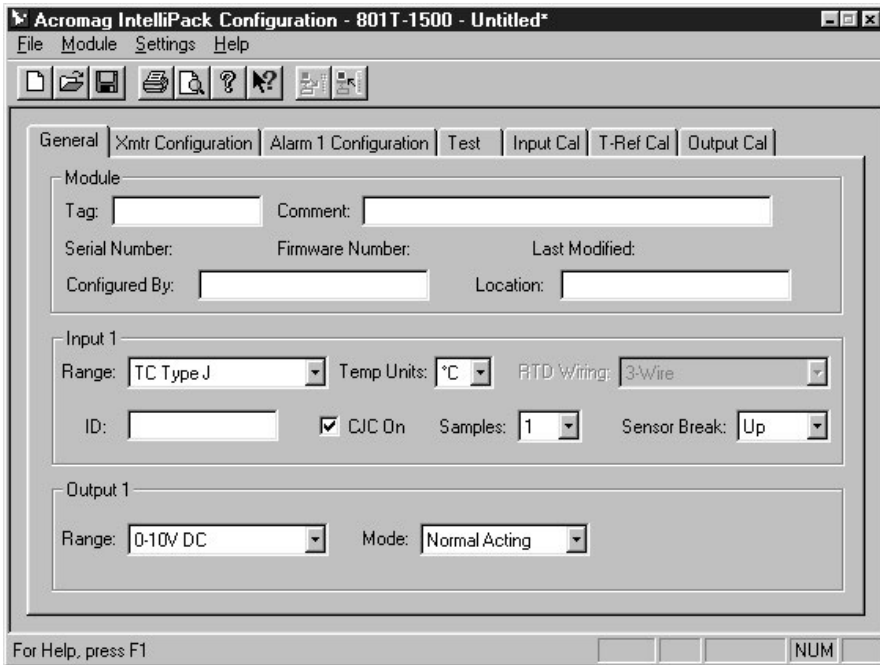
#### General operation

- Advanced microcontroller has integrated, downloadable flash memory and EEPROM for intelligent signal processing.
- Windows /XP/Vista/7 software configuration speeds setup and replacement.
- Push-button reprogrammability facilitates changes in the field without a host PC.
- Plug-in terminal blocks make module installation and removal easy.
- Built-in self-diagnostic routines operate upon power-up and during operation for easy maintenance and troubleshooting.
- 4-way optical isolation separates input, output, power, and relay contacts from each other.
- EMC compliant. Ruggedized circuitry meets directives to provide increased transient immunity and low emissions.
- Wide ambient temperature range ensures reliable performance from -25 to 70°C.
- Wide DC supply range with diode-coupled reverse polarity protection is useful for redundant supplies and battery backup.

#### Transmitter Operation

- Multi-purpose inputs accept many signal types to reduce spare stock requirements.
- User-programmable outputs let you select and change ranges to meet your needs (0-1mA, 0-20mA, 4-20mA, 0-5V, 0-10V DC).
- Intelligent signal processing functions perform mathematical computations on the input signal for customized outputs.
  - signal linearization (25 breakpoints)
  - average signal computation
  - square root computation
  - pulse counter (frequency input)
- High-resolution Sigma-Delta A/D converter delivers high accuracy with low noise.
- Relay output option provides local limit alarm capability in addition to the DC current/voltage output signal.
- High-power relays switch voltages up to 230V AC at currents up to 5A.
- User-programmable relay settings let you customize the alarm operation.
  - high or low limit setpoint
  - automatic or latching alarm reset
  - failsafe or non-failsafe operation
  - relay delay to filter transient signals
- Input excitation supply provides power for a





After the initial software configuration, a PC is no longer required. Field calibration is easily handled with the IntelliPack's push-buttons, status LEDs and a standard field calibrator.

## Intelligent Transfer Functions

IntelliPack transmitters support the signal processing functions listed below. The functions are easily selected via the configuration software. The next page shows sample screens for the following applications.

### Signal Linearizing

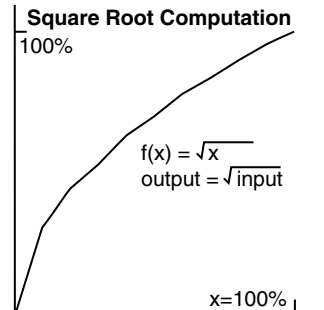
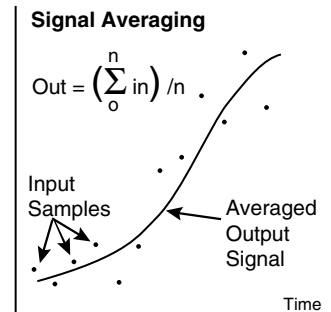
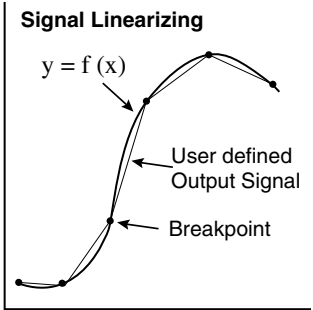
IntelliPacks let you define a transfer function where the output is a function of an equation or a complex curve. The input signal is characterized using straight line approximation with a user-defined table of up to twenty-five breakpoints. Typical applications include linearizing analyzer output, flow rates, transducer non-linearities, tank characterization, and logarithmic equations.

### Signal Averaging

This function provides an output signal that is a run-time average of the input signal. Input data samples are taken every 100mS. The output is computed using a user-defined number of the previous "n" samples. Applications include temperature and level measurements subject to electrical transients, air currents, agitation, and vibration.

### Square Root Computation

IntelliPacks can also output a signal that is proportional to the square root of the input signal. A common use involves flowmeters where the flow rate equals the square root of the measured differential pressure. In this case, the IntelliPack output is equivalent to a linear flow rate signal that is ideal for interfacing to a standard display device.



# IntelliPack®: 800 Series

## IntelliPack 800 Series Signal Conditioners



### Software Configuration Examples

#### Square Root Computation

#### Linearizer/Characterizer

#### Proportional/Inverse

Acromag IntelliPack Configuration - 801T-1500 - Untitled\*

File Module Settings Help

General Xmnt Configuration Alarm 1 Configuration Test Input Cal T-Ref Cal Output Cal

Scaling

Input 1 Range: -210 to 760 °C

Input for 0% Output: -210.0000 °C

Input for 100% Output: 760.0000 °C

Computation

None

Square Root

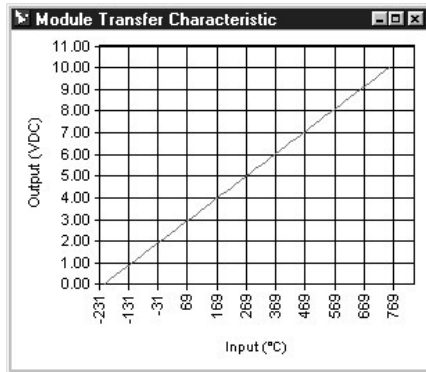
Linearizer Breakpoints: 25

BP	Input %	Output %
1	0.000	0.000
2	4.167	13.053
3	8.333	25.882
4	12.500	38.267
5	16.667	50.000
6	20.833	60.876
7	25.000	70.711
8	29.167	79.335

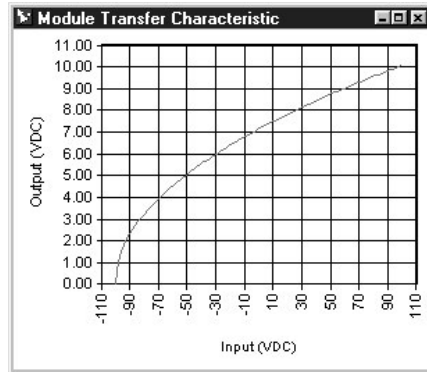
Show Graph

For Help, press F1

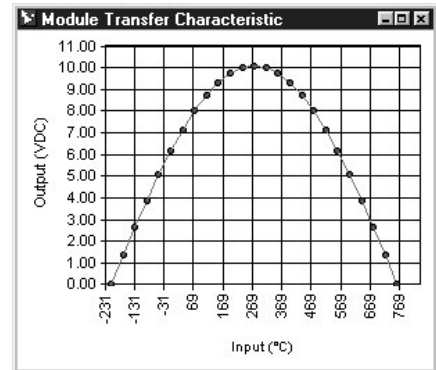
Transmitter configuration property sheet.



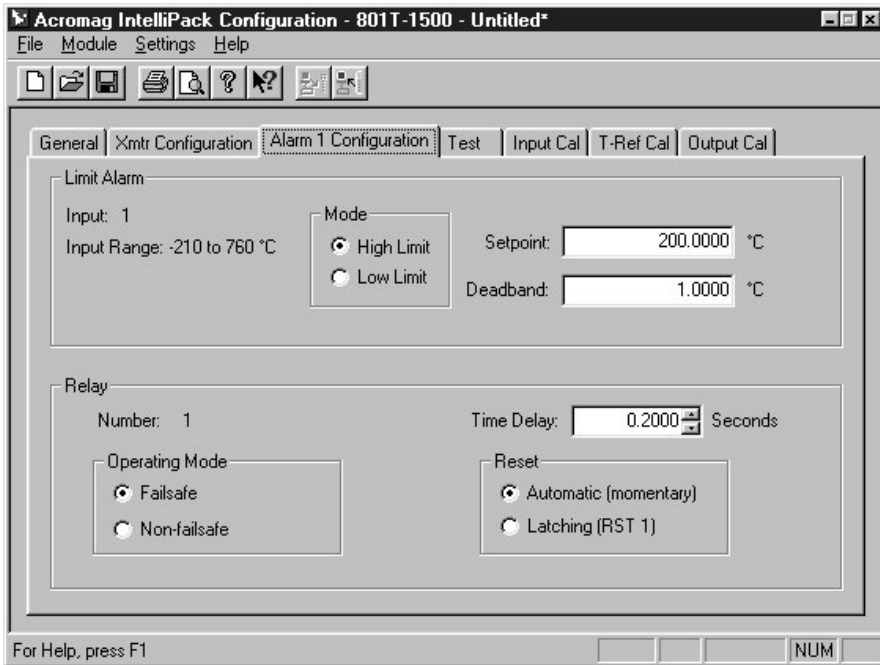
Proportional or inverse output graph.



Square root transfer function graph.

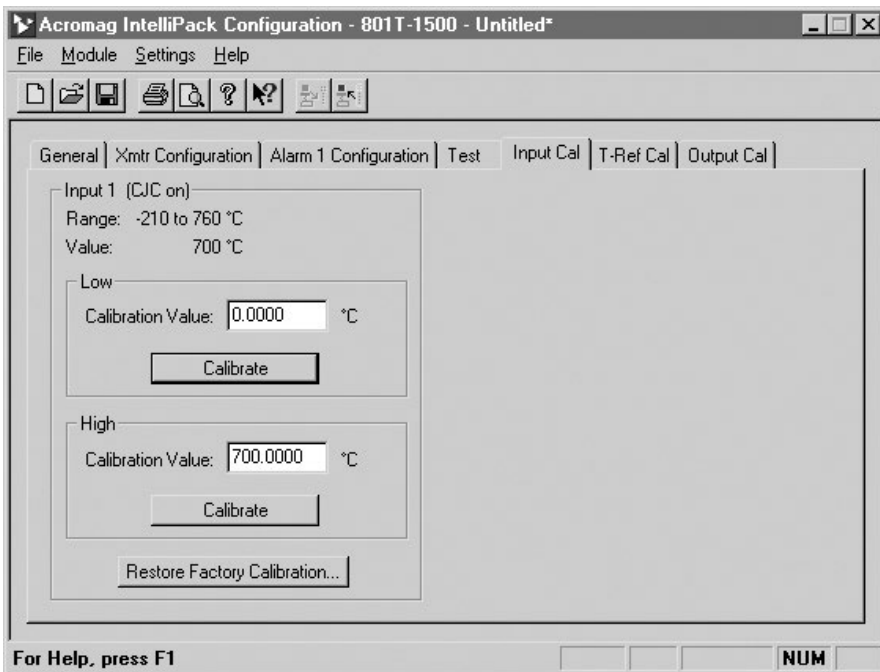


Customizable linearizer transfer function graph.



## Relay Output Limit Alarm Configuration

Limit alarm property sheet.



## Thermocouple Reference Calibration

Thermocouple reference calibration property sheet.