

Series 6800 for thermocouple applications is a ready-to-run, high performance measurement system available in many configurations. Each 6800 utilizes an amplifier, filter and digitizer plus a Uniform Temperature Reference (UTR) creating a very flexible system.

The Uniform Temperature Reference (UTR) converts from specific thermocouple wire to copper wire within a uniform temperature environment. A single UTR can accommodate up to 32 thermocouples of different types. A precision RTD sensor measures the temperature of the thermocouple wire connection and this measurement is used by the included turnkey software to make cold junction temperature compensation and display temperatures in Celsius, Fahrenheit or Kelvin. PI660 Software provides compensation and look-up table conversion for B, C, E, J, K, N, R, S and T thermocouples. The UTR includes an open thermocouple detect circuit for each channel.

Each channel has a differential  $\pm 10V$  input and can digitize and record data to 16-bit resolution. Digitization rates up to 2,000 samples per second per channel are provided. Additionally, individual channels have an upper and lower programmable alarm capability that is checked each time the output is digitized. Solutions are available for providing digital outputs based on these alarm conditions.

Systems interface to a familiar Windows based Operator Workstation over USB where the included software, PI660, is used for setup, display and acquisition of measurement data. PI660 allows for acquisition and control of one or many 6800 systems and provides real time data display. Data can be displayed and recorded in any number of ways, creating a versatile system that can fit any application and can be easily expanded or customized, should test requirements change.

Multiple systems can be combined for larger and/or distributed installations, made capable with an onboard, distributed sample clock bus. Programming and data transfer are over USB which provides high data transfer rates with low, predictable latency. It interfaces to the USB port provided on most PC computers, including laptops.

Data Redundancy is optionally available. A 2.5" HD (Model 6095) mounts on the USB controller board in each system and provides a redundant recording point for the DAS. In the unlikely event the Operator's Workstation or DAS Software fails, data will continue to record and can be recovered from the system post test.

The Operator's Workstation (6800-PCCOWU) is the primary control and data recording point for the Series 6800 DAS. The PCCOWU runs PI660 Data Acquisition Software for system setup, calibration, display, recording, distribution and export.



### COMMON FEATURES

- 32 to 128-Channel Configurations
- AC Powered, 19" Rack-Mount 3U Enclosure
- Uniform Temperature Reference (UTR) Included
- IRIG Time A, B or G Recording
- Includes Turnkey Software
- Optional Redundant Storage
- Multiple Systems Easily Combined



### SPECIFICATIONS

#### THERMOCOUPLE CONFIGURATIONS

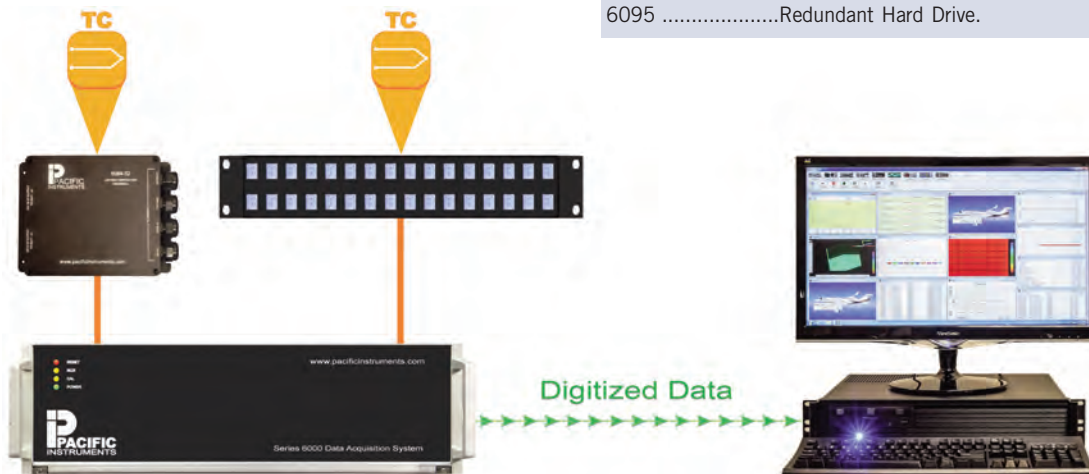
6860-32	.....32-Ch TC Scanner w/ external UTR
6860-64	.....64-Ch TC Scanner w/ external UTR
6860-96	.....96-Ch TC Scanner w/ external UTR
6860-128	.....128-Ch TC Scanner w/ external UTR

#### OPERATOR'S WORKSTATION (6800-PCCOWU)

Input	.....USB 2.0 ports for up to four 6800 Systems. Additional systems accommodated by adding USB expansion cards.
Operating System	..Windows 7, 64-Bit (other Windows configurations available).
Processor	.....Intel Core i5 or better. 8GB RAM.
Media	.....Dual 160GB SSD or better and CD/DVD.
Ethernet	.....Gigabit Ethernet.
Display	.....24" Widescreen.
Power	.....115 or 230 VAC, 47 to 63 Hz..
Temperature	.....0°C to +50°C operating.
Size	.....2U high, 19" Rack-Mount.

#### ACCESSORIES

6800-PCCOWU	.....Operators Workstation.
6095	.....Redundant Hard Drive.





## FEATURES

- 32, 64, 96 or 128 Channel Configurations in a 3U Rack Mount Enclosure
- Utilizes External Uniform Temperature References (UTRs)
- UTR Model 6860-UTR, Screw Terminal Reference Allows for Integration of Any TC type
- UTR Model 6860-UTR-2U is a 2U, Rack Mountable UTR with Front Mounted 2-pin Mini TC Jacks (T, K, E or J)
- IRIG Time A, B or G
- PI660 Turnkey Software Included

## SPECIFICATIONS

### INPUT

Configuration .....32 channels differential, 2-wire with shield.  
Range..... $\pm 2$  millivolts to  $\pm 10$  Volts full scale.  
Impedance .....50 Megohms, shunted by 1,000 pf.  
Protection ..... $\pm 25$  Volts differential and common mode.  
Type .....B, C, E, J, K, N, R, S, and T.

### AMPLIFIER

Gain .....Programmable 1-5000, in 1, 2, 3, 5 steps, with  $\pm 0.05\%$  accuracy.  
Gain Stability ..... $\pm 0.01\%$ ,  $\pm 0.005\%/^{\circ}\text{C}$ .  
Linearity ..... $\pm 0.02\%$ .  
Common Mode .....75 dB plus gain in dB to 110 dB, DC to 60Hz.  
CM Voltage ..... $\pm 10$  Volts.  
Source Current ..... $\pm 25$  nA,  $\pm 0.1$  nA/ $^{\circ}\text{C}$ .  
Zero .....Automatic to  $\pm 1$   $\mu\text{V}$  RTI,  $\pm 0.5$  mV RTO.  
Zero Stability ..... $\pm 5$   $\mu\text{V}$  RTI,  $\pm 1$  mV RTO,  $\pm 1$   $\mu\text{V}/^{\circ}\text{C}$  RTI,  $\pm 0.2$  mV/ $^{\circ}\text{C}$  RTO. Short term:  $\pm 2$   $\mu\text{V}$  RTI,  $\pm 0.4$  mV RTO for 8 hours.  
Noise (1kHz) .....2  $\mu\text{V}$  rms RTI plus 0.5 mV rms RTO.  
Crosstalk.....-86 dB for full scale signal on adjacent channels.  
Bandwidth .....Determined by input filter, 1 kHz (-3dB) maximum.

### FILTER

Type .....Two-pole, low-pass, RC Filter with 100 Hz (-3 dB frequency) or wideband.  
Other .....Other filter frequencies are available.

### DIGITIZER

Resolution .....16-bits, two's complement output.  
Sample Rate.....Programmable up to 2K samples per second per channel.  
Linearity ..... $\pm 2$  LSB ( $\pm 0.006\%$ ).  
Continuity .....Monotonic to 15 bits.

### CALIBRATION

Voltage Subst.....Alternate input for external calibration reference. Programmable attenuation steps of 1, 0.1, and 0.01 with  $\pm 0.01\%$  accuracy. Output of the attenuator is provided on a rear panel connector for calibration.  
Zero .....Amplifier input disconnected and shorted for zero calibration.

### OPERATION

Protocol .....Control and data interface is USB 2.0.  
Software .....Window's driver (XP and 7, Both 32 and 64-bit). Fully compatible with all implementations of PI660 operating software.  
Control Inputs.....TTL inputs for Start, Stop and Trigger assert flags in the header of output data that initiate software control operations.  
Alarms .....Warning and alarm buses may be independent or shared between enclosures and may initiate an output from a digital I/O type module.

### DATA FORMAT

Data Word .....16/24/32-bits, 2's complement binary.  
Scan Table .....Maximum format length is 65,536 samples.  
Sample Rates .....Multiple sample rates consisting of the highest sample rate divided by binary numbers. Highest sample rate is programmable with 1 $\mu\text{s}$  resolution.

### DATA INTERFACE

Output Rate .....Processor dependent, typically over 5 million 16-bit samples/second.  
Latency.....Processor and scan table dependent, typically less than 5 milliseconds.  
Clock Stability.....100 ppm over temperature range.

### CONNECTIONS

Calibration/Control..15-Pin Type D mounted on rear panel. Mating connector supplied.  
Synchronization.....Sampling clock synchronization for multiple rack systems. RJ45 connector on controller board. Category 5, 2-meter cable supplied.  
USB.....Two-meter cable supplied.

### MECHANICAL

Power .....115 or 230 VAC,  $\pm 10\%$ , 47 to 63 Hz, 400 Watts.  
Temperature .....0 $^{\circ}\text{C}$  to +50 $^{\circ}\text{C}$  operating.  
Humidity .....95% without condensation.  
Shock/Vibration .....Normal shipping and handling of laboratory instruments.  
Size .....19 inches wide, 5 inches high, 18 inches deep (including connectors).  
Weight .....Approximately 25 pounds with all channel modules.

### ORDERING INFORMATION

6860-32 .....32-Ch TC Scanner w/ external UTR  
6860-64 .....64-Ch TC Scanner w/ external UTR  
6860-96 .....96-Ch TC Scanner w/ external UTR  
6860-128 .....128-Ch TC Scanner w/ external UTR  
6800-PCCOWU .....Operators Workstation

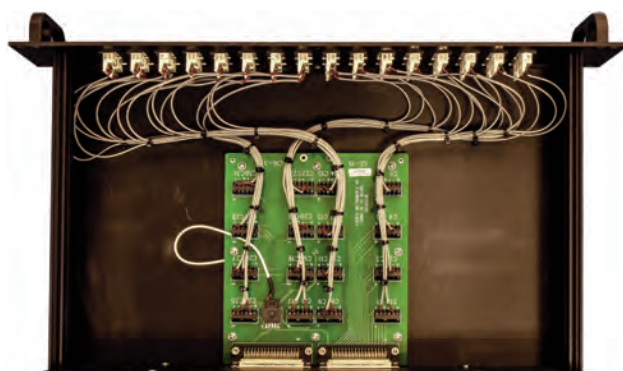
The included Uniform Temperature Reference (UTR) converts from specific thermocouple wire to copper wire within a uniform temperature environment. A precision RTD sensor measures the temperature of the thermocouple wire connection and this measurement is used by software to make cold junction temperature compensation and display temperatures in Celsius, Fahrenheit or Kelvin. PI660 Software provides compensation and NIST traceable look-up table conversion for B, C, E, J, K, N, R, S and T thermocouples. The UTR includes an open thermocouple detect circuit for each channel.

The 6860-UTR has screw terminals for thermocouple terminations inside the enclosure and accessed by removing the cover. It may be installed remotely from the data acquisition system to reduce wiring costs and improve measurement accuracy. It is supplied with a 2-meter cable for use with the 6860. Custom cable lengths can be supplied according to application requirements.

The 6860-UTR-2U is for rack mounting and has thermocouple-type specific mini-jacks on the front panel. The mini-jack type must correspond to the type of the connected thermocouple and must be specified when ordering. Output from the thermocouple mini-jack goes to screw terminals where it is converted to copper in a uniform temperature environment measured by the precision RTD sensor. It is supplied with a 2-meter cable for use with the 6860. Custom cable lengths can be supplied according to application requirements.



**6860-UTR**



**6860-UTR-2U**

## SPECIFICATIONS

### ACCURACY

6860-UTR..... $\pm 0.25^{\circ}\text{C}$ .  
6860-UTR-2U ..... $\pm 0.5^{\circ}\text{C}$ .

### INPUTS

6860-UTR.....Screw terminals.  
6860-UTR-2U .....Thermocouple mini-jack. Type T standard.  
Other thermocouple types available upon request.

### OUTPUTS

6860-UTR.....2-Meter cables supplied for connection to the 6860 Voltage Input Module. Custom length cables are available.  
6860-UTR-2U .....2-Meter cables supplied for connection to the 6860 Voltage Input Module. Custom length cables are available.

### ENVIRONMENTAL

Temperature ..... $0^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$ . Maximum rate of change for specified accuracy is  $10^{\circ}\text{C}/\text{hour}$   
Humidity .....Up to 95% without condensation.

### SIZE

6860-UTR.....9 inches wide including mounting flanges, 8 inches high, 2.5 inches deep.  
6860-UTR-2U .....19-inch rack mounting, 2U (3.5 inches high). Depth is 8 inches.

## PROFESSIONAL TEST MANAGEMENT FOR THERMOCOUPLE APPLICATIONS

PI660 is a turnkey application that runs on Microsoft Windows Operating Systems through Windows 10 64-Bit. Unlike general purpose programming languages, PI660 is turnkey and offers logical access to the various steps of programming, freeing operators and engineers to focus on what matters most: testing results, not writing software. PI660 is divided into various modes of operation. These modes include User Accounts, System Setup, Test Definition, Display Definition, Calibrations, Acquisition, Export & Playback.

Pre-test operations include: system setup, test definition, calibration and configuring the real time data displays. Test configurations (channel name, gain, excitation, filter, sample rate, EU conversion, etc.) can be made either on line or off line and copied to the system over the network. The Test Operator then simply downloads the configuration to the hardware. Following system setup, the Operator performs any necessary calibrations including: engineering unit cal, zero, bridge balance, tare, etc. Calibration results are saved with the test configuration and are part of the recorded files for post-test data traceability. Based on individual needs or those of data analysts, the Operator can configure the real time data displays at this point as well.

Real-time features include: display, acquisition & data distribution to display clients. Large format and multi display workstations are no problem for PI660. The display engine supports multiple configurations, each saved with the test file, and can include any number or combination of display types, including: Oscilloscope, Spectrum (FFT), Waterfall, Bar graph, Strip chart, Background plot, Digital I/O, X-Y Chart, Dynamometer, Picture, Quick Plot, Surface, Text, Tabular and Video. During acquisition, the test operator can toggle to alternate display pages or even add and remove channels (during recording) to and from the displays to visualize results in real time. PI660 can broadcast data to Display Clients allowing other users to look at their own set of data without impacting data connection on the Server.

Post-test functions include: Quick plotting, data replay and export. Following a test or series of tests, channels can be plotted in PI660 Viewer for a "quick look" at the data. Operators can zoom in to a particular part of interest and even export that specific time slice. An entire data file can also be played back in PI660, on the same or different data displays, while speeding up or slowing down playback to look at every data point in detail. The Operator can export individual channels or batch export all channels from all recorded data to many 3rd party formats for post-test analysis. PI660 Export supports formats including ASCII, Winplot, Dynaworks and many more.



## FEATURES

- **Test Definition-** Setup channel type, gain, filter, sample rate, EU conversion, etc. on one or many channels at a time. Save configuration files for archive or as a base for new tests.
- **Calibration-** Calibrate one or many channels at the same time. Calibration types include: Gain, Shunt, Balance, Tare, Engineering Unit, etc. Calibrations are performed interactively or automatically.
- **Real-Time Display-** Text and graphical data are displayed on the Operator's Workstation and networked Display Clients including; Scope, FFT, Waterfall, Video, Strip Chart and more.
- **Acquisition-** Record full rate or decimated data while displaying data. Synchronize high and low speed channels in the same data file. Recording can be started manually, triggered and/or event based.
- **Post Process-** Easily plot channels for "quick look" at any recorded channel. Replay already recorded data (high or low speed) with existing or new data displays. Export data to popular 3rd party formats; MATLAB, ASCII, Dplot, WinPlot, Dynaworks, etc.



**Metromatics**

For further information or pricing, please contact us:

Melbourne 03 9872 4592 Sydney 02 9460 4355  
Brisbane 07 3868 4255 Adelaide 08 8343 8516

sales@metromatics.com.au  
www.metromatics.com.au