KEITHLEY

Integra Series
Model 2700 Multimeter/
Data Acquisition System

A complete solution for PC-based multi-point measurement and control

Get a DMM, a switch mainframe, and a data acquisition/control system for the price of a PC plug-in board

The **Model 2700 Multimeter/Data Acquisition System** combines the functionality and high channel count of a switch mainframe with the accuracy, convenience, and traceability of a true 6½-digit (22-bit) DMM. It packs all these capabilities into a compact half-rack unit at a price that's comparable to a high performance data acquisition board. Keithley's growing family of Integra Series plug-in modules gives the Model 2700 the industry's lowest per-channel installed cost in a high performance data acquisition and control package. Mix or match any two modules to get up to 80 differential channels of multiplexed measurement and control. That means significantly more channels in less space than competing solutions.

An astonishing range of functions and built-in signal conditioning

Each channel of the Model 2700 can be configured separately for any of 14 measurement functions and provides built-in signal conditioning. The Model 2700's high noise isolation up to 1000V allows it to measure virtually any electrical or physical parameter with high accuracy:

- DC volts
- Temperature measurements with thermocouples, RTDs, or thermistors
- 2-wire Ω
- 4-wire Ω
- Continuity
- DC current
- AC volts
- Frequency
- Period
- AC current
- Event counter/totalizer
- Digital I/O

Perform system level control functions

Optional plug-in modules allow the Model 2700 to manage a variety of system control tasks:

- Actuate indicator lights and/or relays to provide alarm limit status, and directly interface with mechanical systems through open-collector digital I/O.
- Control power to the DUT, switch in or change loads, and perform general signal routing through isolated switching.
- Bias the DUT or perform analog control through dual ±12V analog output ports.
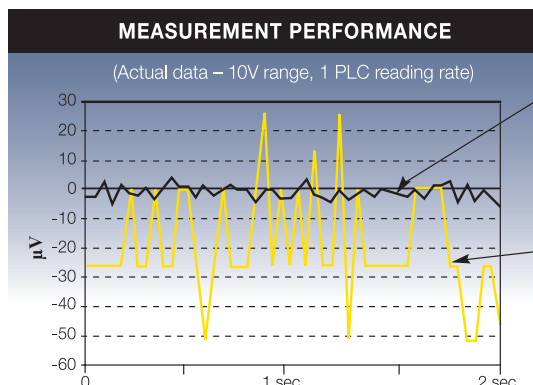- Route DC, AC, or RF signals from the DUT to other test equipment in the rack.

Wide testing flexibility

This economical, easy-to-configure solution is widely used in applications like temperature logging, precision measurement and control, and mixed signal data acquisition for product development, ATE, component testing, and process monitoring. The plug-in approach eliminates the triggering, timing, and processing issues that often complicate building systems from separate instruments and switches. The tight switching-and-measurement integration also helps reduce test time significantly. That means higher throughput and a better return on equipment investment.

Powerful software options

The Model 2700 is compatible with a variety of software options to match a variety of test programming needs. For example, the free TestPoint runtime offers basic datalogging capabilities. This start-up utility can be modified with the powerful TestPoint application development package. Optional ExceLINX-1A software makes it easy to acquire data directly into an Excel spreadsheet. Free IVI (VISA-based) drivers simplify developing fully custom programs in Visual Basic, C/C++, LabVIEW, LabWindows/CVI, or TestPoint.

MEASUREMENT PERFORMANCE

(Actual data – 10V range, 1 PLC reading rate)

Keithley's patented measurement engine provides true 6½- digit (22-bit) performance at higher reading rates.

Typical 6½-digit meters only deliver 5½-digit (<18-bit) performance under similar conditions.

Engineers trust Keithley to provide best-in-class measurement performance. In many cases, our products provide up to 10X better performance at equivalent reading rates or up to 10X greater speed at equivalent measurement performance. Our patented A/D converter and high performance signal conditioning circuitry make this possible.

High ease of use meets high measurement accuracy

If there's a power failure, the battery-backed set-up memory and non-volatile RAM data storage means scans can automatically be resumed right where they stopped when power returns.

Front panel input jacks simplify manual probing, troubleshooting, and calibration. Includes 1000V protection in case of accidental overload.

On-board statistical analysis is available at the push of a button, including channel average and ratio, mX+b scaling, min, max, average, and standard deviation.
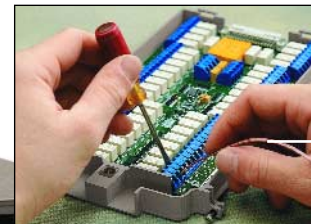
Its familiar DMM-like front panel scheme makes the Model 2700 easy to use on the bench or in the rack. Select or change functions with the press of a button.

Non-volatile memory stores up to 55,000 time-stamped readings.

GPIB and RS-232 communications are standard.

Screw terminals use oversize connectors for easier, mistake-free wiring.

Built-in open-collector digital I/O lines provide for control, external triggering, and HI/LO alarm/limit ouputs.
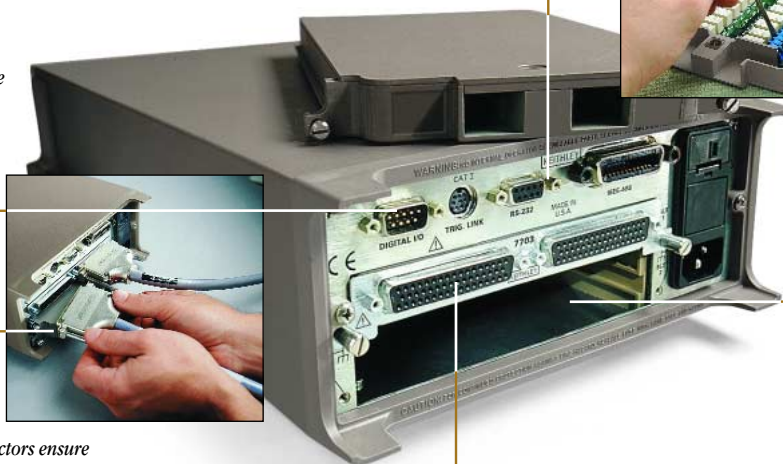
A variety of measurement and control modules makes it simple to mix, match, and change input signals or control lines as needed. Install up to two modules at a time to create a "mini-ATE" system with up to 80 channels.

Rugged 50-pin D-sub connectors ensure dependability and quick setup/teardown in production test racks.

Built-in relay cycle counters on each module for ease of maintenance.

Versatile plug-in options
## for any application

We're continuing to expand our line of Integra plug-in switch/control modules:

	7700	20-channel differential multiplexer with automatic CJC and screw terminals for general purpose or thermocouple measurements.
NEW!	**7701**	32-channel differential multiplexer with D-sub connectors, IDC ribbon cable compatible
	7702	40-channel differential multiplexer with screw terminals
	7703	32-channel high speed differential multiplexer with reed relays and D-sub connectors
	7705	40-channel switch/control module, SPST independent switch with D-sub connectors (Form C configurable)
	7706	All-in-one I/O module, 20-channel differential multiplexer, 2 analog outputs, 16 digital outputs and event counter/totalizer with screw terminals
NEW!	**7707**	32 open-collector digital I/O and 10-channel differential multiplexer with D-sub connectors, IDC ribbon cable compatible
NEW!	**7708**	40-channel differential multiplexer with automatic CJC and screw terminals for general purpose or thermocouple measurements
NEW!	**7709**	6×8 matrix switch module, with D-sub connectors, IDC ribbon cable compatible
NEW!	**7711**	2GHz RF switch module with dual 1×4 configuration
NEW!	**7712**	3.5GHz RF switch module with dual 1×4 configuration

Additional hardware accessories:

KPCI-488	IEEE-488/GPIB interface for PCI bus
7007-2	2-meter double shielded premium GPIB/IEEE-488 cable
7705-MTC-2	2-meter male to female 50-pin D-sub cable for 7703, 7705, 7707, and 7709
7707-MTC-2	2-meter male to female 25-pin D-sub cable for 7707 and 7709
7788	50-pin D-shell connector kit (2 each)
7789	50-pin/25-pin D-shell connector kit (1 each)
7790	50-pin male, 50-pin female and 25-pin male IDC D-shell kit (1 each)

Visit www.keithley.com for more information on modules and accessories
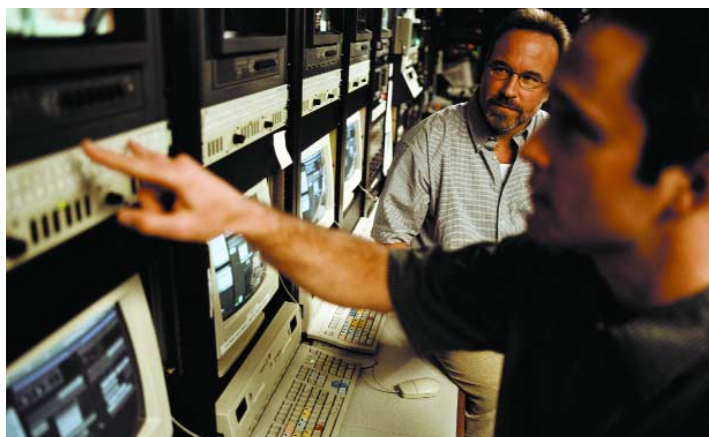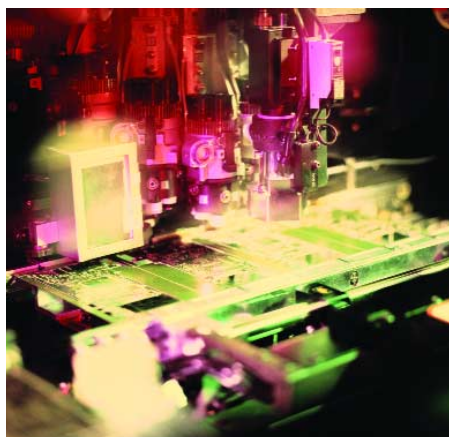
Ideal for production testing

Use the Model 2700 for high throughput production testing of multiple points on a DUT and/or testing multiple DUTs in batch mode. D-sub and SMA rear panel connectors make it fast and easy to disconnect the Model 2700 from the test fixture. Free instrument drivers designed for use in a variety of popular Application Development Environments simplify creating custom systems for production test.

Versatile enough for environmental stress, burn-in, and QA testing

The Model 2700 is ideal for both short- and long-term monitoring and characterization tasks. It's immune to power failures, resuming scanning where it left off when power is restored–all set-up information is battery backed and data is stored in non-volatile RAM. Input channels can handle virtually any input while its digital output lines can trigger external alarms or perform other controls independent of a PC.

Perfect for research and product development

A DMM-like front panel, half-rack footprint, 80-channel capacity, outstanding measurement performance, and low cost make the Model 2700 ideal for R&D applications. The free TestPoint™ runtime start-up software included with the Model 2700 and the economical ExceLINX-1A add-in utility provide basic datalogging capabilities, so it's easy to get new applications "Up & Running" quickly and inexpensively.
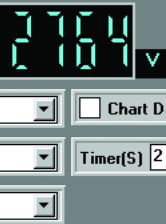
Powerful, easy-to-use
software options
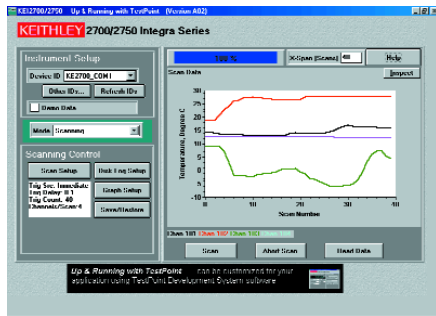
**Free Customizable Start-up Software.** This free TestPoint runtime offers basic datalogging capabilities that can get a system up and running almost immediately. With just a few clicks of the mouse, this software can confirm that the system's hardware, wiring, communications, and software drivers are installed and operating correctly. It can also be used to configure instrument functions and perform simple data acquisition tasks. Data from multiple channels can be saved to disk and up to eight channels of data can be graphed automatically. If the application demands greater functionality, this runtime can be modified with the TestPoint package.
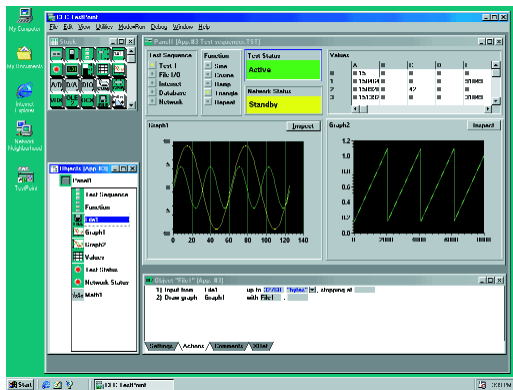
TestPoint Application Development Package. If the free start-up software doesn't provide a feature the job demands, there's no problem—just use the economical TestPoint application development package to modify it. TestPoint's object oriented, drag-and-drop technology offers the flexibility needed to build basic systems quickly, without in-depth programming. Expanding TestPoint applications is easy, too, with optional Internet, database, and statistical process control toolkits.
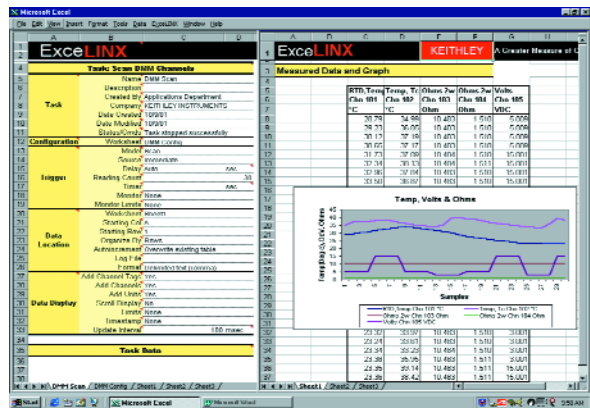
ExceLINX-1A. This powerful and economical add-in utility for Microsoft® Excel makes it simple to acquire data from the Model 2700 directly into Excel, then employ Excel's graphics, charting, and analysis capabilities to turn that data into useful information. No programming is required to use ExceLINX—a few mouse clicks are all it takes to configure channels, set parameters, triggers, and scan lists.
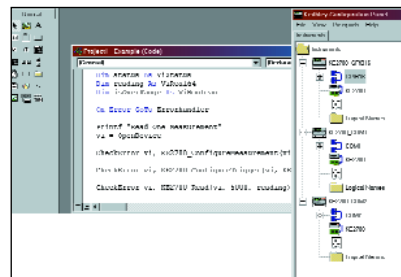
Free IVI (VISA-based) Instrument drivers. Experienced programmers who prefer to build fully custom systems from scratch can take advantage of our instrument driver, which is designed for use with Application Development Environments such as Visual Basic, C/C++, LabVIEW™, LabWindows™/CVI, and TestPoint. This IVI-style driver (VISA based) supports all of the instrument's functionality, and comes with numerous programming examples to help programmers get started quickly.

Three new system bundles make it easy to get applications off to a quick, economical start:

- The **2700/7700** value pack provides a basic 20-channel system.
- The **2700-DAQ-40** includes the Models 2700 and 7708 plus ExceLINX-1A for a 40-channel system.
- The **2700-DAQ-80** provides one Model 2700, two Model 7708 modules, and ExceLINX-1A for an 80-channel system.

Condensed specifications[*]

DC VOLTAGE

1000V protection all ranges; A/D Linearity of 1ppm rdg + 1ppm rng; 1200000 max counts

Range	Resolution	Accuracy (90 day rdg + rng)	Accuracy (1 year rdg + rng)	Input Resistance
100.0000mV	100nV	0.0025% + 0.0035%	0.0030% + 0.0035%	10MΩ or >10GΩ
1.000000V	1.0μV	0.0025% + 0.0007%	0.0030% + 0.0007%	10MΩ or >10GΩ
10.00000V	10μV	0.0020% + 0.0005%	0.0030% + 0.0007%	10MΩ or >10GΩ
100.0000V	100μV	0.0035% + 0.0006%	0.0045% + 0.0007%	10MΩ
1000.000V	1.mV	0.0035% + 0.0006%	0.0050% + 0.0007%	10MΩ

THERMOCOUPLE

Conversion to ITS-90; Automatic, External, or Simulated CJC; Open T/C check.

Type	Range	Accuracy (1 year with simulated CJC)	Accuracy (1 year with automatic CJC)
J	-200 to +760°C	±0.2°C for all ranges	±1.0°C
K	-200 to +1372°C	±0.2°C for all ranges	±1.0°C
N	-200 to +1300°C	±0.2°C for all ranges	±1.0°C
T	-200 to +400°C	±0.2°C for all ranges	±1.0°C
E	-200 to +1000°C	±0.2°C for all ranges	±1.0°C
R	0 to +1768°C	±0.6°C for all ranges	±1.8°C
S	0 to +1768°C	±0.6°C for all ranges	±1.8°C
B	+350 to +1820°C	±0.6°C for all ranges	±1.8°C

RESISTANCE

2- or 4-wire; Offset Compensation selectable; 1000V / 350V protection on source / sense inputs

Range	Resolution	Accuracy (90 day rdg + rng)	Accuracy (1 year rdg + rng)	Test Current
100.0000Ω	100μΩ	0.0080% + 0.0006%	0.0100% + 0.0006%	1mA
1.000000kΩ	1.0mΩ	0.0080% + 0.0006%	0.0100% + 0.0006%	1mA
10.00000kΩ	10mΩ	0.0080% + 0.0006%	0.0100% + 0.0006%	100μA
100.0000kΩ	100mΩ	0.0080% + 0.0010%	0.0100% + 0.0010%	10μA
1.000000MΩ	1.0Ω	0.0080% + 0.0010%	0.0100% + 0.0010%	10μA
10.00000MΩ	10Ω	0.0200% + 0.0010%	0.0400% + 0.0010%	0.7μA
100.0000MΩ	100Ω	0.2000% + 0.0030%	0.1500% + 0.0030%	0.7μA

RTD

D100, F100, PT385, PT3916, or user type; plus probe error

Range	Resolution	Accuracy (1 year)
-200 to +600°C	0.001°C	±0.06°C

THERMISTOR

2.2kΩ, 5kΩ, and 10kΩ; plus sensor error

Range	Resolution	Accuracy (1 year)
-200 to +600°C	0.001°C	±0.08°C

DC CURRENT

250V, 3A fused inputs; Built-in shunt resistors

Range	Resolution	Accuracy (90 day rdg + rng)	Accuracy (1 year rdg + rng)	Input Resistance
20.00000mA	10nA	0.03% + 0.004%	0.05% + 0.004%	<0.2V
100.0000mA	100nA	0.03% + 0.040%	0.05% + 0.040%	<0.05V
1.000000A	1μA	0.05% + 0.004%	0.06% + 0.004%	<0.3V
3.000000A	10μA	0.11% + 0.004%	0.12% + 0.004%	<1.0V

AC VOLTAGE

True RMS; 5:1 max Crest Factor

Range	Resolution	Frequency Range	Accuracy (1 year rdg + rng)
100mV to 750V	0.1μV to 1mV	3Hz – 10Hz	0.35% + 0.03%
		10Hz – 20kHz	0.06% + 0.03%
		20kHz – 50kHz	0.12% + 0.05%
		50kHz – 100kHz	0.6% + 0.08%
		100kHz – 300kHz	4.0% + 0.5%

FREQUENCY and PERIOD

Selectable Gate Times of 10msec, 100msec, 1sec

Range	Frequency Range	Period Range	Accuracy (1 year rdg + rng)
100mV to 750V	3Hz to 500kHz	333msec to 2μsec	0.01% + 0.333ppm (1.0 sec)
			0.01% + 0.3.33ppm (0.1 sec)
			0.01% + 0.33.3ppm (0.01 sec)

AC CURRENT

True RMS; 5:1 Crest Factor

Range	Resolution	Frequency Range	Accuracy (1 year rdg + rng)
1A	1μA	10Hz – 5kHz	0.35% + 0.06%
3A	10μA	10Hz – 5kHz	0.15% + 0.06%

DC READING RATES

Function	Digits	Readings/sec	NPLC
DCV, DCI,	6.5	5	10
2W Ohms	6.5	50	1
	5.5	250	0.1
	4.5	2000	0.01
4W Ohms, RTD	6.5	2.5	10
Thermistor,	6.5	25	1
Thermocouple	5.5	125	0.1
	4.5	250	0.01

DC READING SPEED VS. NOISE REJECTION

NPLC	Digits	Filter	NMRR	CMRR	RMS Noise (10V range)
10	6.5	50	110dB	140dB	<1.2μV
1	6.5	Off	90dB	140dB	<4.0μV
0.1	5.5	Off	–	80dB	<22μV
0.01	4.5	Off	–	80dB	<150μV

SCANNING RATE, INTO AND OUT OF MEMORY TO GPIB

	Channels/s
7703 scanning DCV	185/s
7703 scanning DCV with limits or timestamp on	150/s
7703 scanning DCV alternating 2W	60/s
7702 scanning DCV	60/s
7700, 7706, and 7708 scanning temperature (T/C)	50/s

SYSTEM FEATURES

Scanning Channels	Up to 80 differential
Trigger Source	External digital input, front panel keypad, channel monitor, interval timer, GPIB/RS-232, Trigger Link, immediate
Scan Count	1 to 55,000 or continuous
Scan Interval	0 to 99 hours; 1msec step size
Channel Delay	0 to 9999999sec per channel; 1msec step size
Configuration	Per channel for measurement setups, math, and limits
Power Fail Recovery	Resume scanning sequence; configuration and stored data are preserved
Power up Memory	4 user configurations with labels
Real Time Clock	Included; use to timestamp readings
Data Storage	Non-volatile 55,000 reading buffer with timestamp; continuous fill; query while filling; min/max/avg/std dev
Alarm Limits	2 HI and 2 LO limits per channel; selectable polarity
Digital Inputs	2 TTL level – external trigger plus interlock
Digital Outputs	4 TTL level – selectable polarity; HI/LO limit configurable
Master Alarm	1 TTL level output toggles when any HI/LO limit is exceeded
Front Panel Lock	Software enabled
Communication	IEEE-488.2, RS-232
Per-channel Math	mΞ+b, %
Multi-channel Math	Ratio, Average
Resolution	$6\frac{1}{2}$-digit with 20% overrange; 28-bit readings available over IEEE-488
Software	TestPoint-based start-up applications; LabVIEW, TestPoint, LabWindows/CVI, Visual Basic, C/C++ driver

GENERAL INFORMATION

Power Supply	100V / 120V / 220V / 240V / ±10%
Line Frequency	45Hz to 66Hz; 360Hz to 400Hz
Operating Environment	0°C to 50°C
Size	89mm H x 213mm W x 370mm D
Warranty	3 years on mainframe, 1 year on Measurement & Control Modules
Safety	UL-3111-1, IEC 1919-1, CSA
EMC	CE mark, FCC Class A

*Visit www.keithley.com for detailed specifications.