

The right choice for high performance and flexibility

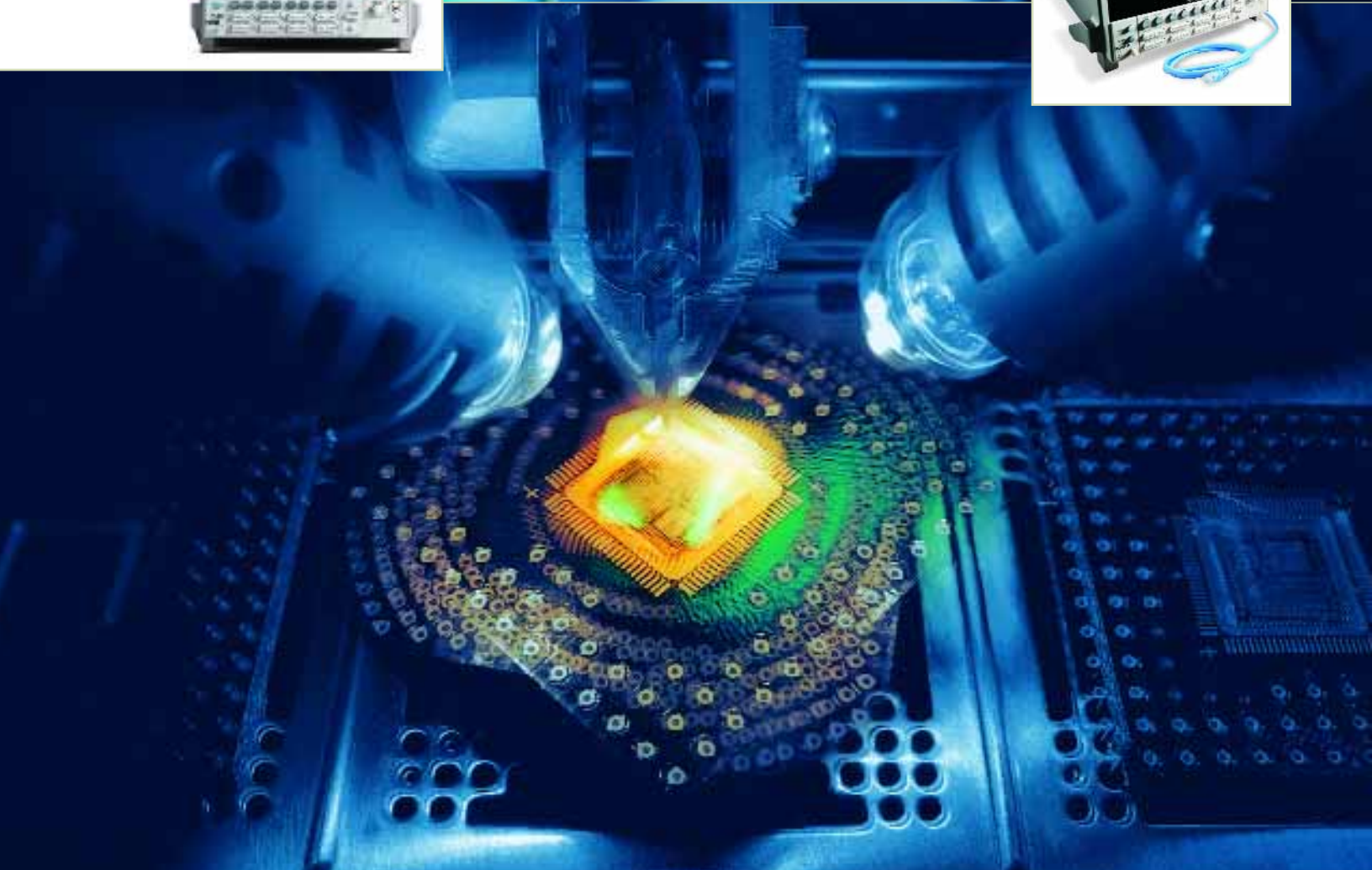
Integra Series Integrated Multimeter/Data Acquisition Systems



**CUSTOMIZABLE
START-UP SOFTWARE**



KEITHLEY



Integra systems combine the accuracy and sensitivity R&D users need with the high throughput production test demands.

Integra systems bring together precision measurement, switching, and control capabilities to give you affordable alternatives for configuring powerful, sophisticated test and data acquisition systems.

Discover Integra's advantages over building systems from separate sources, meters, and switches or using PC data acquisition boards.

- ***Higher flexibility***

A choice of 12 different plug-in modules makes Integra systems almost infinitely adaptable to changing application requirements. Adding new test functions or increasing the channel count is as simple as plugging a new module into the mainframe's back panel or migrating to a new mainframe, while preserving your investment in test code development.



- ***Higher built-in functionality***

Integra systems make it simple to create a complete solution in one enclosure. Fourteen measurement functions plus integrated signal conditioning, scaling, stimulus, filtering, and I/O capabilities make external circuitry unnecessary for many applications.

- ***Faster return on investment***

High speed scanning and measurement allow greater production test throughput. The exceptional accuracy and repeatability of Integra systems ensure valid results and higher yields.

- ***Faster startups***

Simple wiring, high hardware compatibility, and uncomplicated trigger synchronization and timing make configuring the hardware a snap. A variety of standard and optional software packages simplify getting new applications online quickly and economically.

FIND IT FAST

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Modular design and limitless flexibility

With three different mainframes and 12 plug-in switch/control modules to choose from, building Integra systems that combine all the capabilities your applications demand is fast and uncomplicated. Their modular architecture lets you buy just enough capability for today's application, without limiting your flexibility to expand as your application's needs change. Each Integra system combines Keithley's expertise in high performance digital multimeters, switches, and data acquisition/control in one compact, easy-to-use package.

MEASUREMENT CAPABILITIES:

Best-in-class measurement performance—up to 10× better performance at equivalent speed or up to 10× faster at equivalent performance

DATA ACQUISITION CAPABILITIES:

Greater accuracy and repeatability than plug-in data acquisition boards or VXI/PXI systems

SWITCHING AND CONTROL CAPABILITIES:

Higher throughput than conventional DMM/switch systems

DATALOGGING CAPABILITIES:

Higher accuracy, stability, and resolution than dataloggers or recorders

The two-slot **MODEL 2700** offers 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 or 96 matrix crosspoints. That means significantly more channels in less space than competing solutions. The Model 2700 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.





A built-in 10/100BaseTX Ethernet interface makes the MODEL 2701 the best choice for distributed data acquisition applications that demand stable, high precision measurements. Just connect it directly to an Ethernet port—there's no need for additional interface cards, proprietary cables, or software. The Model 2701 is a cost-effective solution for industrial monitoring and control applications. It combines remote communications with high measurement precision for research and development tasks, such as remote equipment diagnostics and economical monitoring of lab environments.

With five module slots, the MODEL 2750 simplifies configuring solutions for measurement and control applications with hundreds of channels. Its expanded resistance measurement ranges let it address applications that normally require costly and complex micro-ohmmeters. Production-floor features like open test lead indication and a relay cycle counter help eliminate troublesome "false failures" than can result from problems with test stand wiring, connections, relays, or cabling.

To find the Integra solution best suited to your application, see the selector guides on pages 7 and 13.

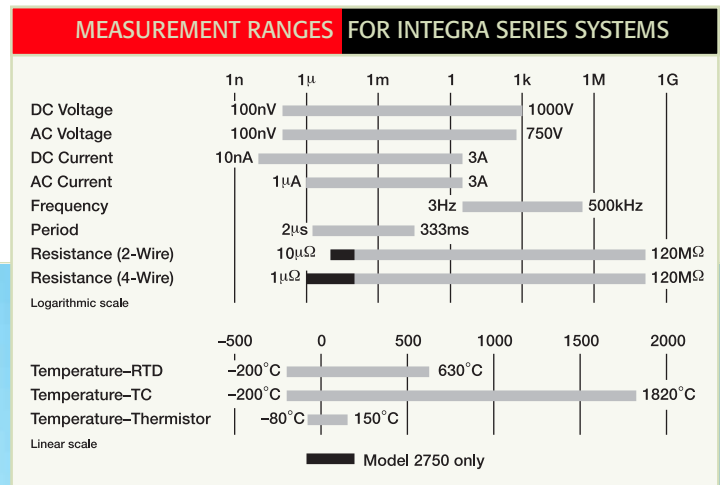
SIMPLIFY TEMPERATURE MONITORING AND DATALOGGING

Integra systems are ideal for monitoring and logging temperature—one of the most commonly measured physical parameters. They support temperature sensing with thermocouples, RTDs, and thermistors:

- Built-in signal conditioning, 300V isolation, noise rejection, and filtering ensure your results are valid.
- High accuracy thermocouple measurements are combined with open thermocouple detection for improved safety.
- A choice of automatic, external, or simulated cold-junction compensation (CJC) methods provides greater measurement flexibility.

High functionality without the high price tag

If you had unlimited money and time to spend, there would be no problem building all the functions you wanted into your test and measurement or data acquisition systems. But, in the real world of shrinking capital equipment budgets and short deadlines, you need the built-in functionality and capabilities only Integra solutions can deliver.



High measurement accuracy

The patented 22-bit integrating A/D converters in every Integra mainframe provide true 6½-digit measurements. And, while conventional DMMs typically measure and correct for the zero drift of their front-end circuitry, an Integra system's "servo" front end eliminates zero drift—increasing measurement speed by eliminating the wasted time usually required to check zero. For each major measurement function, you can choose either averaging or advanced digital filtering to reduce noise still further and increase the effective resolution.

High measurement speeds

Get up to 3500 readings/second on a single channel for production testing at 3½-digit resolution.

Built-in signal conditioning

Advanced signal conditioning hardware filters out unwanted noise and provides necessary isolation. It also simplifies installation, lowers cost, and improves reliability.

Per-channel configurability

It's simple to configure a different set of measurement parameters for each channel being measured. Just determine the measurement function, speed, range, resolution, filtering, mathematical scaling (m**X**b, %, etc.), and other parameters that are best for each signal—your Integra system does the rest.

Scanning

Step manually through channels or scan signals from multiple channels into memory at up to 500 channels/second.

Performance specifications of Integra mainframes

MAINFRAME	MODEL 2701	MODEL 2700	MODEL 2750
Description	Ethernet-based, high speed system	GPIB-based system	GPIB-based system with low ohms capability
Number of slots for plug-in modules	2	2	5
Number of diff. input channels	80	80	200
Number of matrix crosspoints	96	96	240
Measurement speed	3500/s	2000/s	2500/s
Scan rate	500/s	180/s	230/s
Memory buffer	450,000 readings	55,000 readings	110,000 readings
Ohms resolution	100μΩ	100μΩ	1μΩ
Dry circuit ohms (20mV clamp)	No	No	Yes (with 1μΩ sensitivity)
Communications	Ethernet, RS-232, Trigger Link	GPIB, RS-232, Trigger Link	GPIB, RS-232, Trigger Link
Width (2U height)	Half-rack	Half-rack	Full-rack (19 inches)



REDUCE THE COST OF DISTRIBUTED NETWORK MEASUREMENTS

The Ethernet communications feature included in the Model 2701 makes it easy to test devices located throughout any size of facility, in faraway facilities, and in areas that are difficult to access. The Model 2701 has its own IP address, so it can be accessed from the World Wide Web. Integra systems can provide:

- Stable, high precision measurements, even in noisy industrial environments
- Automatic notification of critical events
- Digital I/O for automated control of mechanisms on the production line



Mainframes and modules work together to provide all

If there's a power failure, valuable data is protected with the battery-backed non-volatile memory and scans can automatically be resumed right where they stopped when power returns.

Open lead detection protects against false readings due to lead disconnections.

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

Built-in signal conditioning and statistical analysis is configurable per channel for maximum flexibility.



Large memory buffer (450,000 readings) for storing data without tying up the network.

Its familiar DMM-like front panel scheme makes the Integra Series easy to use on the bench or in the rack. Select or change functions with the press of a button.

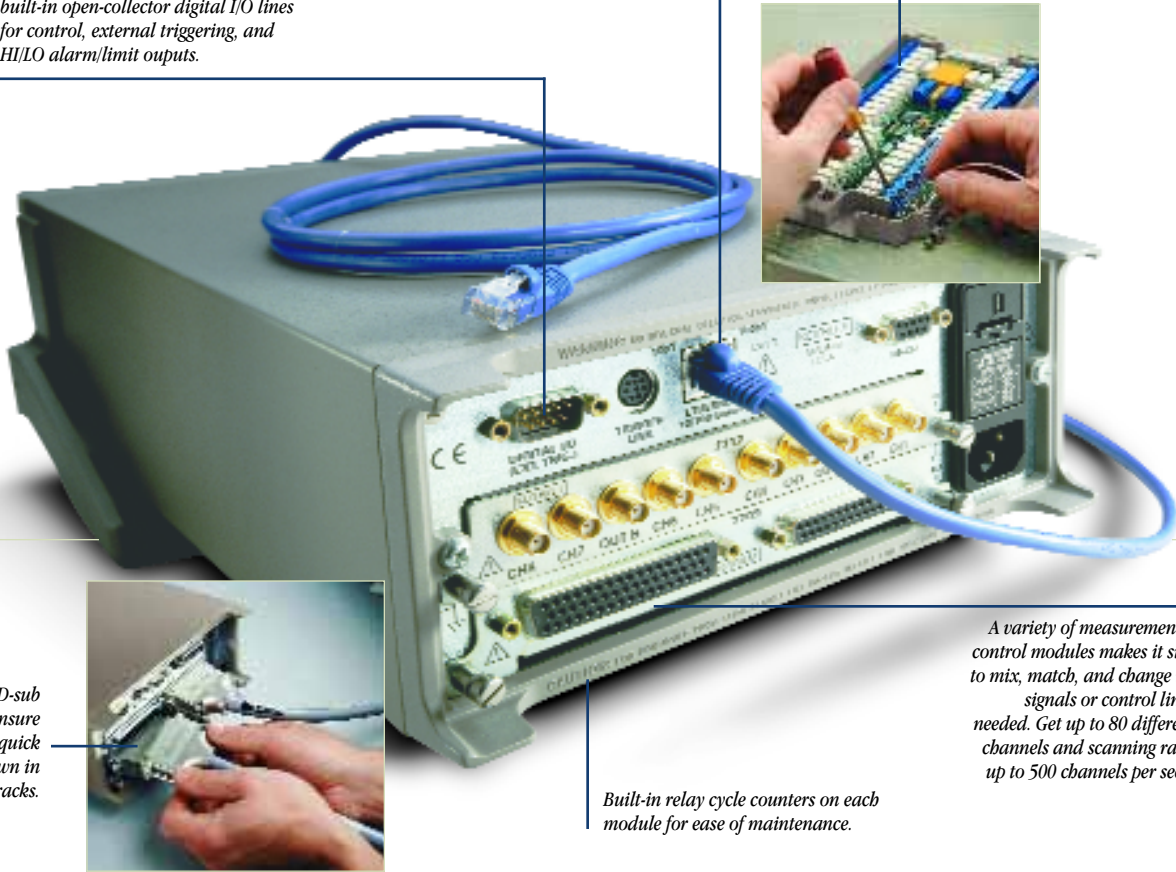


the functions your applications demand

Immediate alarm notification independent of the PC provided by built-in open-collector digital I/O lines for control, external triggering, and HI/LO alarm/limit outputs.

Fast and convenient 10/100BaseTX Ethernet with TCP/IP protocol. (Model 2701)

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



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

A variety of measurement and control modules makes it simple to mix, match, and change input signals or control lines as needed. Get up to 80 differential channels and scanning rates of up to 500 channels per second.

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

IMPROVE ENVIRONMENTAL TESTING RELIABILITY

Integra Series systems can optimize the accuracy and repeatability of a variety of stress tests, including burn-in, vibration, temperature, over-voltage, voltage cycling, etc. They also:

- Provide up to 200 individually configurable channels to support mixed-signal measurements
- Support multiple measurement points on a device and multiple probe stations
- Safeguard acquired data and allow unattended operation with battery-backed setups, non-volatile RAM, and automatic startup

Higher throughput and simpler integration assure you

Get better measurements faster

By helping you make more accurate measurements, reduce test times, and boost throughput and yields, Integra systems ultimately ensure a better return on your hardware investment. For many applications, Integra systems can perform complex test sequences without the expense of a PC controller. The 6½-digit multimeter built into every Integra mainframe ensures high measurement accuracy, even in high throughput applications. For larger, more complex configurations, our unique Trigger Link interface allows tightly synchronized triggering with other instruments in ATE systems. This eliminates the long lag times, other timing problems, and signal errors often associated with building systems of multiple instruments.

Three steps—zero hassles

It's simple to configure an Integra-based solution—it doesn't require a lot of technical support or a lot of time. Simply plug in the modules that support your application. At power-up, the mainframe will automatically detect which modules are installed, minimizing set-up time. It's just as easy to configure your instrument settings, either with the front panel controls or a computer controller (via the GPIB, RS-232, or Ethernet interface).

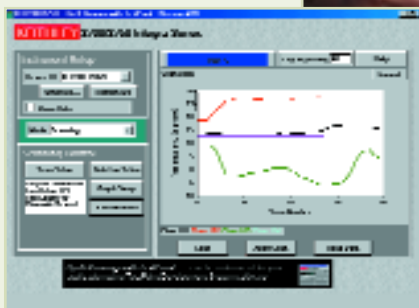
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Step 1: Plug in one or more modules.

Step 2: Make the connections to your devices under test.

Step 3: Initialize your software.



3

2

Integra bundles let you recoup your investment even faster

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

- **The 2700-DAQ-20** 2700/7700 value pack provides a basic 20-channel system.
- **The 2700-DAQ-40** includes the Model 2700 and two Model 7708 modules, plus ExceLINX™-1A point-and-click data acquisition software, 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.



of faster ROI

Software for every user—from novices to expert programmers

Integra systems are compatible with a variety software solutions, from a simple start-up package for a single instrument to tools and packages that can help you create automated, multi-instrument test systems.

Customizable start-up software

offers basic datalogging capabilities that can get a system “up & running” almost immediately. With just a few clicks of the mouse, this TestPoint™-based software can confirm the system’s hardware, wiring, and communications are installed and operating correctly. It can also configure instrument functions and perform simple data acquisition tasks.

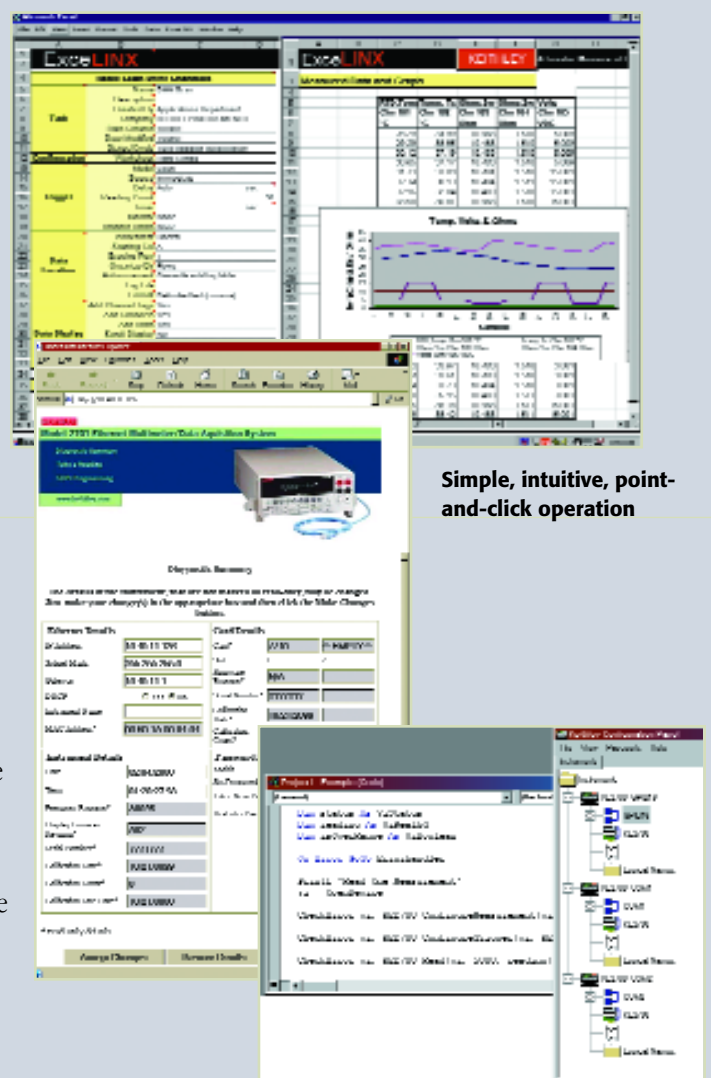
ExceLINX-1A is an economical, easy-to-use, add-in utility for Microsoft® Excel and Integra systems. No programming is required; enter values quickly through popup menus and eliminate time-consuming coding.

Built-in web diagnostic tool

(Model 2701 only) sends command strings and receives data over the network. It also reads and sets network parameters.

Software drivers for use with most of the popular programming environments, including Visual Basic, C/C++, LabWindows/CVI, TestPoint™ and LabVIEW™. These drivers are IVI and VISA based for maximum flexibility.

The TestPoint application development package makes it easy to customize the free start-up software for more demanding applications.



Simple, intuitive, point-and-click operation

COMBINE LOW COST AND WIDE FLEXIBILITY FOR ATE/SYSTEM INTEGRATORS

You can count on low development and support costs and a high return on your hardware investment when you choose Integra Series systems. Their high flexibility makes them easy to reconfigure as your needs changes. They also:

- Provide precision DCV and ACV measurements, signal routing, and line/load control
- Handle multiple applications simultaneously by configuring each channel for a different function
- Supply an external trigger for easy synchronization with the test device’s control hardware
- Switch RF signals to 3.5GHz

Plug into higher performance...

A long-term solution

Integra systems combine wide configuration flexibility with high reliability and ease of use, so you'll be able to rely on them for many years.

Configuring an Integra system is simple—just select the mainframe and modules that meet your current needs. If your application grows, you can either move into a larger mainframe or daisy chain multiple systems together. In either case, only minor software modifications are needed. If your application's requirements change, simply replace the existing modules with new ones that support your new needs—they're ready to use as soon as you plug them in.

Modules with a rich choice of functions

Integra plug-in modules address the testing needs of a wide range of test, measurement, switching, control, and data acquisition applications.

Measurements

- AC volts
- AC current
- DC volts
- DC current
- Temperature
 - T/C w/automatic CJC
 - T/C w/external CJC
 - RTD
 - Thermistor
- Resistance (2- or 4-wire)
- Continuity
- Frequency

Data Acquisition

- Analog I/O
- Digital I/O
- Counters
- Timers
- Built-in signal conditioning on each channel
- Integrated scaling, stimulus, and filtering
- High noise isolation

Switching

- AC switching
- DC switching
- RF switching (up to 3.5GHz)
- Multiplex switching
- Matrix switching
- Independent switching



Use any combination of Series 7700 modules—both matrices and multiplexers, just one type of module, or mix and match any combination. All modules function simultaneously.



...with Series 7700 switch/control modules

Basic configuration information for Integra plug-in modules

Module	# of Diff Analog Inputs	Configuration	2- or 4-Pole	Type of Connector	Max. Voltage	Max. Switched Current	Bandwidth	Other
7700	20	Multiplexer w/CJC	1x20 or two 1x10	Screw terminals	300V	1A	50MHz	Automatic CJC
7701	32	Multiplexer	1x32 or two 1x16	D-sub (IDC)	150V	1A	2MHz	32 channels of common-side 4-wire Ω
7702	40	Multiplexer	1x40 or two 1x20	Screw	300V	1A	2MHz	Maximum 125 VA. 2 current channels @ 3A
7703	32	Reed Relay Multiplexer	1x32 or two 1x16	D-sub (solder or crimp)	300V	500mA	2MHz	Reed relays
7705	N/A	40 channel independent SPST	N/A	D-sub (solder or crimp)	300V	2A	10MHz	Programmable for Form C
7706	20	Multiplexer w/CJC + Analog Output + Digital Outputs + Counter/Totalizer	1x20 or two 1x10	Screw terminals	300V	1A	2MHz	Two $\pm 12V$ analog outputs, 100kHz counter, & 16 digital outputs
7707	10	Digital I/O + Multiplexer	1x10 or two 1x5	D-sub (IDC)	300V	1A	2MHz	32 digital I/O (33V, 100mA)
7708	40	Multiplexer w/CJC	1x40 or two 1x20	Screw terminals	300V	1A	2MHz	Automatic CJC
7709	48	6 x 8 Matrix	2- or 4-pole	D-sub (IDC)	300V	1A	2MHz	Daisy chain for larger matrix
7710	20	Solid-state Multiplexer w/CJC	1x20 or two 1x10	Removable Screw terminals	60V	0.1A	2MHz	Long relay life, higher speed, 500 channels/s, long-life contacts
7711	8	2GHz Multiplexer	Dual 1x4	SMA	60V	0.5A	2GHz	Insertion loss <1.0dB @ 1GHz, VSWR <1.2 @ 1GHz
7712	8	3.5GHz Multiplexer	Dual 1x4	SMA	42V	0.5A	3.5GHz	Insertion loss < 1.1dB @ 2.4GHz

For complete specifications on all each mainframe and plug-in module, visit www.keithley.com or call your local Keithley office.

EXPAND YOUR CAPABILITIES FOR RESEARCH AND DEVELOPMENT

When developing new materials or pioneering new technologies, you need tools with high accuracy and wide testing versatility. Integra Series systems give you:

- A choice of plug-in modules that let you mix, match, and change input signals or control lines as needed
- Multiple trigger sources, including analog and digital
- Fewer errors—by detecting lead disconnects and open thermocouples, by providing 1000V protection in case of accidental overload, and by offering alarm limits per channel

Condensed Specifications

DC CHARACTERISTICS

CONDITIONS: MED (1 PLC) or 10 PLC or MED (1 PLC) with Digital Filter of 10

ACCURACY: \pm (ppm of reading + ppm of range)

FUNCTION	RANGE	RESOLUTION	TEST CURRENT $\pm 5\%$ OR BURDEN VOLTAGE	INPUT RESISTANCE OR OPEN CKT. VOLTAGE		ACCURACY: \pm (ppm of reading + ppm of range) (ppm = parts per million) (e.g., 10ppm = 0.			TEMPERATURE COEFFICIENT	
				2700/2701	2750	24 Hour 23°C $\pm 1^\circ$	90 Day 23°C $\pm 5^\circ$	1 Year 23°C $\pm 5^\circ$		
Voltage ¹	100.0000 mV	0.1 μV		>10 G Ω	>10 G Ω	15 + 30	25 + 35	30 + 35	(1 + 5)/°C	
	1.000000 V	1.0 μV		>10 G Ω	>10 G Ω	15 + 6	25 + 7	30 + 7	(1 + 1)/°C	
	10.00000 V	10 μV		>10 G Ω	>10 G Ω	10 + 4	20 + 5	30 + 5	(1 + 1)/°C	
	100.0000 V	100 μV		10 M Ω $\pm 1\%$	10 M Ω $\pm 1\%$	15 + 6	35 + 9	45 + 9	(5 + 1)/°C	
	1000.000 V	1 mV		10 M Ω $\pm 1\%$	10 M Ω $\pm 1\%$	20 + 6	35 + 9	50 + 9	(5 + 1)/°C	
Resistance	1.000000 Ω^{24}	1 $\mu\Omega$	10 mA		5.9 V	80 + 40	80 + 40	100 + 40	(8 + 1)/°C	
	10.000000 Ω^{24}	10 $\mu\Omega$	10 mA		5.9 V	20 + 20	80 + 20	100 + 20	(8 + 1)/°C	
	100.00000 Ω	100 $\mu\Omega$	1 mA	6.9 V	12.2 V	20 + 20	80 + 20	100 + 20	(8 + 1)/°C	
	1.000000 k Ω	1 m Ω	1 mA	6.9 V	12.2 V	20 + 6	80 + 6	100 + 6	(8 + 1)/°C	
	10.000000 k Ω	10 m Ω	100 μA	6.9 V	6.8 V	20 + 6	80 + 6	100 + 6	(8 + 1)/°C	
	100.00000 k Ω	100 m Ω	10 μA	12.8 V	12.8 V	20 + 6	80 + 10	100 + 10	(8 + 1)/°C	
	1.000000 M Ω	1.0 Ω	10 μA	12.8 V	12.8 V	20 + 6	80 + 10	100 + 10	(8 + 1)/°C	
	10.000000 M Ω	10 Ω	0.7 μA // 10M Ω	7.0 V	7.0 V	150 + 6	200 + 10	400 + 10	(70 + 1)/°C	
	100.00000 M Ω	100 Ω	0.7 μA // 10M Ω	7.0 V	7.0 V	800 + 30	2000 + 30	2000 + 30	(385 + 1)/°C	
	Dry Circuit Resistance	1.000000 Ω	1 $\mu\Omega$	10 mA		20 mV	80 + 40	80 + 40	100 + 40	(8 + 1)/°C
		10.000000 Ω	10 $\mu\Omega$	1 mA		20 mV	25 + 40	80 + 40	100 + 40	(8 + 1)/°C
100.00000 Ω		100 $\mu\Omega$	100 μA		20 mV	25 + 40	90 + 40	140 + 40	(8 + 1)/°C	
1.000000 k Ω		1 m Ω	10 μA		20 mV	25 + 90	180 + 90	400 + 90	(8 + 1)/°C	
Continuity (2W)	1.000 k Ω	100 m Ω	1 mA	6.9 V	12.2 V	40 + 100	100 + 100	100 + 100	(8 + 1)/°C	
Current	20.00000 mA	10 nA	< 0.2 V			60 + 30	300 + 80	500 + 80	(50 + 5)/°C	
	100.0000 mA	100 nA	< 0.1 V			100 + 300	300 + 800	500 + 800	(50 + 50)/°C	
	1.000000 A	1.0 μA	< 0.5V ⁹			200 + 30	500 + 80	800 + 80	(50 + 5)/°C	
	3.000000 A	10 μA	< 1.5V ⁹			1000 + 15	1200 + 40	1200 + 40	(50 + 5)/°C	

DC MEASUREMENT SPEEDS

Single Channel, 60Hz (50Hz) Operation

FUNCTION	DIGITS	READINGS/s	PLCs
DCV, DCI, Ω (<10M), Thermocouple, Thermistor	6.5	5 (4)	10
	6.5	35 (28)	1
	6.5	45 (36)	1
	5.5	150 (120)	0.1
	5.5	300 (240)	0.1
	5.5	500 (400)	0.1
2701 and 2750 only	4.5	2500 (2000)	0.01
2701 only	3.5	3500 (2800)	0.002
4W Ω (<10M)	6.5	1.4 (1.1)	10
	6.5	15 (12)	1
	5.5	33 (25)	0.1
4W Ω OComp, RTD	6.5	0.9 (0.7)	10
	6.5	8 (6.4)	1
	5.5	18 (14.4)	0.1
Channel (Ratio), Channel (AVG)	6.5	2.5 (2)	10
	6.5	15 (12)	1
	5.5	25 (20)	0.1

Multiple Channels, Into Memory

	Channels/s		
	2700	2701	2750
7710 Scanning DCV	180/s	500/s	230/s
7710 Scanning DCV with Limits or Time Stamp On	170/s	500/s	230/s
7710 Scanning DCV alternating 2W Ω	45/s	115/s	60/s

Multiple Channels, Into and Out of Memory to GPIB or Ethernet

	Channels/s		
	2700	2701	2750
7702 Scanning DCV	65/s	75/s	65/s
7700 and 7708 Scanning Temperature (T/C)	50/s	50/s	50/s
7710 Scanning DCV	145/s	440/s	210/s
7710 Scanning DCV with Limits or Time Stamp On	145/s	440/s	210/s
7710 Scanning DCV alternating 2W Ω	40/s	115/s	55/s

DC SYSTEM SPEEDS

	2700/2750	2701
RANGE CHANGES (excludes 4W Ω):	50/s (42/s)	50/s (42/s)
FUNCTION CHANGES:	50/s (42/s)	50/s (42/s)
AUTORANGE TIME:	<30 ms	<30 ms
ASCII READINGS TO RS-232 (19.2k BAUD):	55/s	300/s
MAX. EXTERNAL TRIGGER RATE:	375/s	2000/s

DC SPEED vs. NOISE REJECTION

Rate	Filter	Readings/s	Digits	RMS Noise 10V Range			CMRR
				2700,2750	2701	NMRR	
10	50	0.1 (0.08)	6.5	< 1.2 μV	< 2.5 μV	110 dB	140 dB
1	Off	15 (12)	6.5	< 4 μV	< 6 μV	90 dB	140 dB
0.1	Off	500 (400)	5.5	< 22 μV	< 40 μV	—	80 dB
0.01	Off	2500 (2000)	4.5	< 150 μV	< 300 μV	—	80 dB
0.002	Off	3500 (2800)	3.5	—	< 1 mV	—	60 dB

DC MEASUREMENT CHARACTERISTICS

DC VOLTS

A-D LINEARITY: 2.0 ppm of reading + 1.0 ppm of range.

INPUT IMPEDANCE: 100mV–10V Ranges: Selectable >10G Ω // with <400pF or 10M Ω $\pm 1\%$.

100V, 1000V Ranges: 10M Ω $\pm 1\%$.

Dry Circuit: 100k Ω $\pm 1\%$ // <1 μF .

EARTH ISOLATION: 500V peak, >10G Ω and <300pF any terminal to chassis.

INPUT BIAS CURRENT: <75pA at 23°C.

COMMON MODE CURRENT: <500nApp at 50Hz or 60Hz.

AUTOZERO ERROR: Add \pm (2ppm of range error + 5 μV) for < 10 minutes and $\pm 1^\circ C$.

INPUT PROTECTION: 1000V all ranges. 300V with plug-in modules.

RESISTANCE

MAXIMUM 4W Ω LEAD RESISTANCE: 80% of range per lead (Dry Ckt mode). 5 Ω per lead for 1 Ω range; 10% of range per lead for 10 Ω , 100 Ω , and 1k Ω ranges; 1k Ω per lead for all other ranges.

OFFSET COMPENSATION: Selectable on 4W Ω , 1 Ω , 10 Ω , 100 Ω , 1k Ω , and 10k Ω ranges.

CONTINUITY THRESHOLD: Adjustable 1 to 1000 Ω

INPUT PROTECTION: 1000V all Source Inputs, 350V Sense Inputs. 300V with plug-in modules.

DC CURRENT

SHUNT RESISTORS: 100mA–3A, 0.1 Ω , 20mA, 5 Ω .

INPUT PROTECTION: 3A, 250V fuse.

AC SPECIFICATIONS

Function	Range	Resolution	Calibration Cycle	Accuracy: \pm (% of reading + % of range), 23°C \pm 5°C				
				3 Hz–10 Hz	10 Hz–20 kHz	20 kHz–50 kHz	50 kHz–100 kHz	100 kHz–300 kHz
Voltage	100.0000 mV	0.1 μ V	90 Days (all ranges)	0.35 + 0.03	0.05 + 0.03	0.11 + 0.05	0.6 + 0.08	4.0 + 0.5
	1.000000 V	1.0 μ V		0.35 + 0.03	0.06 + 0.03	0.12 + 0.05	0.6 + 0.08	4.0 + 0.5
	10.00000 V	10 μ V	1 Year (all ranges)	0.35 + 0.03	0.06 + 0.03	0.12 + 0.05	0.6 + 0.08	4.0 + 0.5
	100.0000 V	100 μ V		0.35 + 0.03	0.06 + 0.03	0.12 + 0.05	0.6 + 0.08	4.0 + 0.5
	750.000 V	1.0 μ V		0.35 + 0.03	0.05 + .003	0.006 + .005	0.01 + .006	0.03 + .01
			(Temp. Coeff.)°C	0.035 + 0.006	0.015 + 0.006	0.015 + 0.006	0.015 + 0.006	0.015 + 0.006
Current	1.000000 A	1.0 μ A	90 Day/1 Year	0.30 + 0.04	0.10 + 0.04	3 Hz–5 kHz		
	3.00000 A	10 μ A		0.35 + 0.06	0.16 + 0.06	0.14 + 0.04 0.18 + 0.06		
			(Temp. Coeff.)°C	0.035 + 0.006	0.015 + 0.006	0.015 + 0.006		
Frequency and Period	100 mV	0.333 ppm	90 Day/1 Year	(3 Hz–500 kHz) (333 ms–2 μ s)				
	to	3.33 ppm		100 ppm + 0.333 ppm (SLOW, 1s gate)				
	750 V	33.3 ppm		100 ppm + 3.33 ppm (MED, 100ms gate)				
				100 ppm + 33.3 ppm (FAST, 10ms gate)				

ADDITIONAL UNCERTAINTY \pm (% OF READING)

Low Frequency Uncertainty	MED	FAST
20 Hz – 30 Hz	0.3	—
30 Hz – 50 Hz	0	—
50 Hz – 100 Hz	0	1.0
100 Hz – 200 Hz	0	0.18
200 Hz – 300 Hz	0	0.10
>300 Hz	0	0

CREST FACTOR:	1–2	2–3	3–4	4–5
Additional Uncertainty:	0.05	0.15	0.30	0.40
Max. Fundamental Freq.:	50kHz	50kHz	3kHz	1kHz
Maximum Crest Factor: 5 at full-scale.				

AC MEASUREMENT SPEEDS

Single Channel, 60Hz (50Hz) Operation

Function	Digits	Readings/s	Rate	Bandwidth
ACV, ACI	6.5	2s/Reading	SLOW	3 Hz – 300 kHz
	6.5	4.8 (4)	MED	30 Hz – 300 kHz
	6.5	40 (32)	FAST	300 Hz – 300 kHz
Frequency, Period	6.5	1 (1)	SLOW	3 Hz – 300 kHz
	5.5	9 (9)	MED	30 Hz – 300 kHz
	4.5	35 (35)	FAST	300 Hz – 300 kHz
	4.5	65 (65)	FAST	300 Hz – 300 kHz
	4.5	65 (65)	FAST	300 Hz – 300 kHz

Multiple Channel

7710 SCANNING ACV: 500/s. 7710 SCANNING ACV WITH AUTO DELAY ON: 2s/reading.

TEMPERATURE

(Displayed in °C, °F, or K. Exclusive of probe errors.)

Thermocouples (Accuracy based on ITS-90.)

Type	Range	Resolution	90 Day/1 Year (23°C \pm 5°C)		Temp. Coefficient 0°–18°C & 28°–50°C
			Relative to Simulated Reference Junction	Using 77XX Module	
J	–200 to +760 °C	0.001 °C	0.2°C	1.0°C	0.03°C/°C
K	–200 to +1372°C	0.001 °C	0.2°C	1.0°C	0.03°C/°C
N	–200 to +1300°C	0.001 °C	0.2°C	1.0°C	0.03°C/°C
T	–200 to +400°C	0.001 °C	0.2°C	1.0°C	0.03°C/°C
E	–200 to +1000°C	0.001 °C	0.2°C	1.0°C	0.03°C/°C
R	0 to +1768°C	0.1 °C	0.6°C	1.8°C	0.03°C/°C
S	0 to +1768°C	0.1 °C	0.6°C	1.8°C	0.03°C/°C
B	+350 to +1820°C	0.1 °C	0.6°C	1.8°C	0.03°C/°C

4-Wire RTD:

(100 Ω platinum [PT100], D100, F100, PT385, PT3916, or user type. Offset compensation On)

–200° to 630°C	0.01 °C	0.06°C	0.003°C/°C
Thermistor: (2.2kΩ, 5kΩ, and 10kΩ)			
–80° to 150°C	0.01 °C	0.08°C	0.002°C/°C

AC SYSTEM SPEEDS

	2700/2750	2701
AC System Speed:	(19.2k)	(115.2K)
Range Changes:	4/s (3/s)	4/s (3/s)
Function Changes:	4/s (3/s)	4/s (3/s)
Autorange Time:	< 3s	< 3s
ASCII Readings to RS-232 (19.2k baud):	50/s	300/s
Max. External Trigger Rate:	250/s	2000/s

AC MEASUREMENT CHARACTERISTICS

AC VOLTS

MEASUREMENT METHOD: AC-coupled, True RMS.

INPUT IMPEDANCE: 1M Ω \pm 2% // by <100pF.

INPUT PROTECTION: 1000Vp or 400VDC. 300Vrms with plug in modules.

AC CURRENT

MEASUREMENT METHOD: AC-coupled, True RMS.

SHUNT RESISTANCE: 0.1 Ω .

BURDEN VOLTAGE: 1A <0.5Vrms, 3A <1.5Vrms. Add 1.5Vrms when used with plug in modules.

INPUT PROTECTION: 3A, 250V fuse.

FREQUENCY AND PERIOD

MEASUREMENT METHOD: Reciprocal counting technique.

GATE TIME: SLOW 1s, MED 100ms, and FAST 10ms.

AC GENERAL

AC CMRR: 70dB.

VOLT HERTZ PRODUCT: \leq 8 \times 10.

(Note: All specifications include module errors.)

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Keithley Instruments, Inc.

Corporate Headquarters • 28775 Aurora Road • Cleveland, Ohio 44139 • 440-248-0400 • Fax: 440-248-6168 • 1-888-KEITHLEY (534-8453) • www.keithley.com

Belgium: Sint-Pieters-Leeuw • 02-363 00 40 • Fax: 02-363 00 64 • www.keithley.nl

China: Beijing • 8610-82251886 • Fax: 8610-82251892 • www.keithley.com.cn

Finland: Helsinki • 09-5306-6560 • Fax: 09-5306-6565 • www.keithley.com

France: Palaiseau Cédex • 01-64 53 20 20 • Fax: 01-60 11 77 26 • www.keithley.fr

Germany: Germering • 089/84 93 07-40 • Fax: 089/84 93 07-34 • www.keithley.de

Great Britain: Theale • 0118 929 7500 • Fax: 0118 929 7519 • www.keithley.co.uk

India: Bangalore • 080 212 8027 • Fax : 080 212 8005 • www.keithley.com

Italy: Milano • 02-48 39 16 01 • Fax: 02-48 30 22 74 • www.keithley.it

Japan: Tokyo • 81-3-5733-7555 • Fax: 81-3-5733-7556 • www.keithley.jp

Korea: Seoul • 82-2-574-7778 • Fax: 82-2-574-7838 • www.keithley.com

Netherlands: Gorinchem • 0183-635333 • Fax: 0183-630821 • www.keithley.nl

Singapore: Singapore • 65-6747-9077 • Fax: 65-6747-2991 • www.keithley.com

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