ADCMT®

4000
2 Slot Modular Instrument

2U half-size compact mainframe with 2 slots

- Maximum number of modules: 2
- Maximum power: 150 W
- Interface: USB, GPIB, LAN, RS232
- Handler interface: 4 channels
- Digital I/O: 8 bits

New

GPIB USB LAN RS232

Micro-current/ultra-high resistance meter modules for 4000

- 1-channel IR meter 40051 and 2-channel IR meter 40052
- Current measurement range: 10 fA to 3.2 mA
- High-speed current measurement at 1.5 ms by integration method
- Voltage source: ±200 V/3.2 mA
- Contact check: 0 to 100 pF with resolution of 0.1 pF
- Handler interface: INDEX, EOM, HI, GO, LO, NC

http://www.adcmt-e.com

4000 2 Slot Modular Instrument

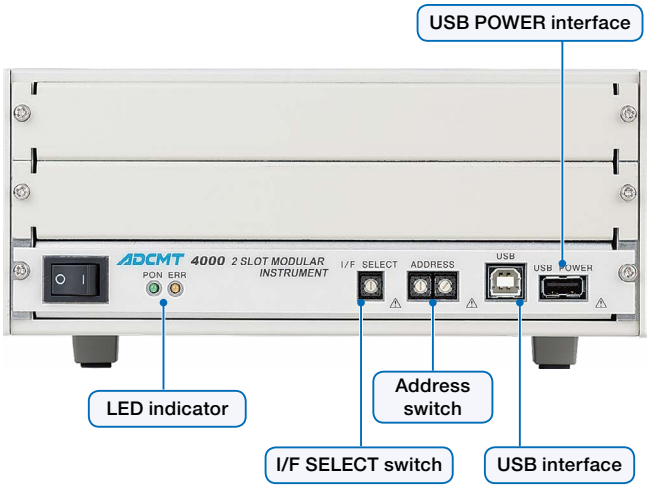
The 4000 is a 2-slot modular instrument of 2U half-size mainframe to which 2 units of 0.7U half-size modules can be installed.

It is equipped with various interfaces; USB, GPIB, LAN and RS232, making it possible to build inspection systems for R&D or production lines of electronics components by connecting to a personal computer or programmable controller.

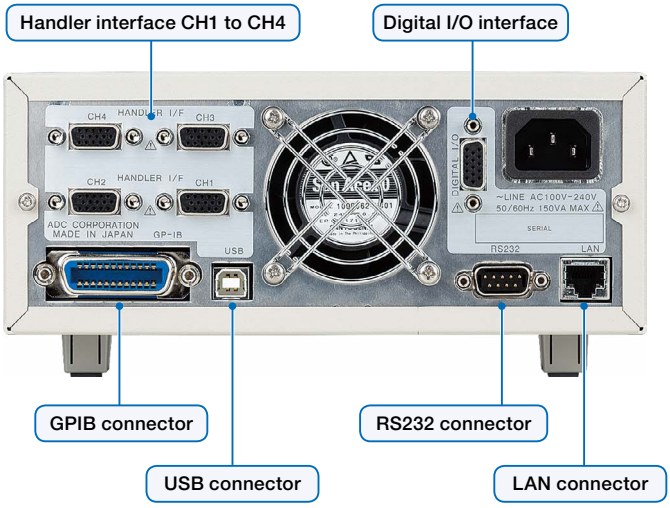
In addition, the 4-channel handler interface allows you timing control with automatic machines, and device selection according to measurement and judgment results by the modules.

In inspection lines, you can easily perform system setup or maintenance of modules that are mounted on system racks without removal such as module replacement, operation check via USB on the front panel.

Moreover, by using the digital I/O of 8 bits having a 5 V/200 mA power supply, easy relay control and signal generation are available.



4000 Front Panel



4000 Rear Panel

40051/40052 IR Meter Unit

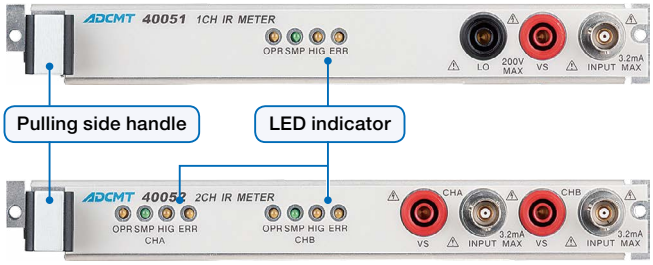
The 40051 and 40052 IR meter units are to be mounted into the 2-slots modular instrument 4000.

The 1-channel 40051 and 2-channel 40052 are integration-method IR meters, suitable for current measurement of high-capacity samples such as capacitors.

The 40051 or 40052 is capable of current measurement ranging from 10 fA to 3.2 mA and is equipped with a DC voltage generator of ±200 V/3.2 mA. So, its voltage source current measurement function makes it possible resistance measurement of between 312 Ω to 2×10^{16} Ω.

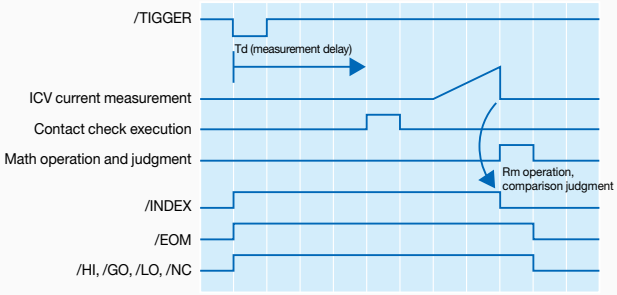
In addition, it has a contact check function (C.CHK) by capacity (C) measurement to judge the contact status of high-resistance samples.

Moreover, the 40051 or 40052 is equipped with the handler interface to be controlled from automatic machines in production lines.



Handler interface timing and measurement time under the conditions of DC measurement mode by external trigger

[Handler Interface Timing]



[Measurement time]

INDEX and EOM times in DC mode (Td=0.05 ms)

Measurement time		Typical value	Ti=1 ms
INDEX time (From trigger input to falling edge of /INDEX)		integration time (Ti)+αms	1.5 ms
	Contact check ON	+1.5 ms	3.0 ms
EOM time (From trigger input to falling edge of /EOM)		/INDEX + 0.25 ms	1.75 ms
	Resistance measurement	+0.06 ms	1.81 ms
	Comparison judgment	+0.05 ms	1.86 ms

Ti	α
1/2/5 ms	0.5/0.6/0.7
0.5/1 PLC	1.6/1.6
100 ms	12
200 ms	22

INDEX and EOM times in fixed sweep mode: DC mode + 0.1 ms + Hold time (Th)

2 Slot Modular Instrument 4000 Specifications

Indicators (LEDs)

PON: Power ON
ERR: Error (Fan stopped, self-test error)

Interface Specifications:

USB interface:	USB 2.0 Full-Speed
(Front/Rear)	Connector: Type B
USB POWER:	Power: +5 V/1 A max
(Front)	Connector: Type A
GPIB interface:	Compliant to IEEE-488.1-1978
(Rear)	Interface functions: SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0, E2
	Connector: Amphenol 24-pin
LAN interface:	Compliant to IEEE802.3 (10BASE-T, 100BASE-TX)
(Rear)	Connector: RJ-45
RS232 interface:	Standard: RS232 (EIA232)
	Baudrate: Up to 19200
	Connector: D-Sub 9 pin
Handler interface:	Input: /TRIGGER, INTERLOCK
(Rear, 4 channels)	Output: /INDEX, /EOM, /COMPLETE, /HI, /GO, /LO, /NO.CONTACT, /VS LIMIT, /ALARM
	Input level: Hi; +4 to +30 V, Lo; 0 to +0.8 V
	Output level: Hi; 30 V max, Lo; 0.8V max, sink; 50 mA max
	Connector: D-Sub 15 pin
Digital I/O:	Input/Output: 8 bits
(Rear)	Input level: Hi; +4 to +30 V, Lo; 0 to +0.8 V
	Output level: Hi; 30 V max, Lo; 0.8 V max, sink: 50 mA max
	Power supply: +5 V/200 mA
	Connector: D-Sub 15 pin

General Specifications

Operation environment:	Temperature; 0°C to +50°C
	Relative humidity; 85% or less with no condensation
Storage environment:	Temperature; -25°C to +70°C
	Relative humidity; 85% or less with no condensation
Power supply:	100 VAC to 240 VAC
Power frequency:	50 Hz/60 Hz
Power consumption	Mainframe with units: 150 VA or less (depending on the units)
	Mainframe only (without unit): 35 VA or less
Dimensions:	Approx. 212 (W) × 88 (H) × 400 (D) mm (not including feet)
Mass:	3.3 kg or less (not including units and feet)

Supplied accessories

Model	Quantity	Name
A01402	1	Power supply cable

Optional accessories

Model	Name
A02263	JIS standard, rack mount set (single)
A02264	JIS standard, rack mount set (twin)
A02463	EIA standard, rack mount set (single)
A02464	EIA standard, rack mount set (twin)
A02039	Panel mount set (single)
A02040	Panel mount set (twin)

IR Meter Unit 40051/40052 Specifications

All accuracy specifications are guaranteed for one year at a temperature of 23±5°C and a relative humidity not exceeding 70%.

Measurement Functions

1. DC current measurement
Integration time: 200 ms

Range	Maximum display	Resolution	Accuracy ±(% of reading + digits)		Temperature coefficient*1 ±(ppm of reading + digits)/°C
			At 23°C±5°C, for one year	Within ±3°C for 24 hrs after INTCAL	
300 pA	319.999 pA	1 fA	0.65 + 120	0.4 + 100	600 + 15
3 nA	3.19999 nA	10 fA	0.65 + 35	0.4 + 35	600 + 2
30 nA	31.9999 nA	100 fA	0.5 + 25	0.3 + 25	600 + 1
300 nA	319.999 nA	1 pA	0.5 + 25	0.3 + 25	600 + 0.5
3 µA	3.19999 µA	10 pA	0.5 + 25	0.3 + 25	600 + 1
30 µA	31.9999 µA	100 pA	0.5 + 25	0.3 + 25	600 + 0.5
300 µA	319.999 µA	1 nA	0.5 + 21	0.3 + 21	600 + 0.5
3 mA	3.19999 mA	10 nA	0.5 + 22	0.35 + 22	600 + 0.5

Input voltage drop: ±1.5 mV + (50 Ω × measurement current) or less
Input bias current: 100 fA or less
Settling time: Same time as the integration time (until the specified accuracies are satisfied.)
Maximum allowable input current: 3.2 mA
NMRR: 60 dB or more (at 50 Hz/60 Hz ±0.08%)
*1 At temperature of 0 to 50°C and relative humidity of 70% or less
±50 fA/°C is added to the digits item between +40°C and +50°C.

2. Resistance value display (RM operation)
(Resistance value obtained by "voltage source value/current measurement value")
Measurement accuracy:
±((rdg item of current measurement range + setting item of voltage source range) + (digits item of voltage source range × resolution × 100/source voltage value) + (resistance reading value × digits item of current measurement range × resolution × 100/source voltage value))% + 50 Ω
Temperature coefficient:
±((rdg item of current measurement range + setting item of voltage source range) + (digits item of voltage source range × resolution × 100/source voltage value) + (resistance reading value × digits item of current measurement range × resolution × 100/source voltage value))%/°C + 5 Ω/°C
Maximum display: 1 to 5 digits (1 to 9.9999)

Example of integration time of 200 ms and input voltage of ±100 V

Current range	Measurement range [Ω]	Accuracy	
		At 23°C ±5°C, for one year	Within ±3°C for 24 hrs after INTCAL
300 pA	3.12×10^{11} to 1×10^{16}	$0.68+0.05+1.2\times10^{-13}$ Rm+50 Ω	$0.43+0.05+1\times10^{-13}$ Rm+50 Ω
3 nA	3.12×10^{10} to 1×10^{15}	$0.68+0.05+3.5\times10^{-13}$ Rm+50 Ω	$0.43+0.05+3.5\times10^{-13}$ Rm+50 Ω
30 nA	3.12×10^{9} to 1×10^{14}	$0.53+0.05+2.5\times10^{-12}$ Rm+50 Ω	$0.33+0.05+2.5\times10^{-12}$ Rm+50 Ω
300 nA	3.12×10^{8} to 1×10^{13}	$0.53+0.05+2.5\times10^{-11}$ Rm+50 Ω	$0.33+0.05+2.5\times10^{-11}$ Rm+50 Ω
3 µA	3.12×10^{7} to 1×10^{12}	$0.53+0.05+2.5\times10^{-10}$ Rm+50 Ω	$0.33+0.05+2.5\times10^{-10}$ Rm+50 Ω
30 µA	3.12×10^{6} to 1×10^{11}	$0.53+0.05+2.5\times10^{-9}$ Rm+50 Ω	$0.33+0.05+2.5\times10^{-9}$ Rm+50 Ω
300 µA	3.12×10^{5} to 1×10^{10}	$0.53+0.05+2.1\times10^{-8}$ Rm+50 Ω	$0.33+0.05+2.1\times10^{-8}$ Rm+50 Ω
3 mA	3.12×10^{4} to 1×10^{9}	$0.53+0.05+2.2\times10^{-7}$ Rm+50 Ω	$0.38+0.05+2.2\times10^{-7}$ Rm+50 Ω

Rm: resistance reading value

3. Additional errors in DC current measurement
Additional error for each integration time other than 200 ms. For each integration time (IT), the following accuracies are added to the accuracies of the integration time of 200 ms

±(% of reading + digits)

Integration time (IT)	1 ms, 2 ms		5 ms		0.5 PLC		1 PLC		100 ms	
Range	rdg	digits	rdg	digits	rdg	digits	rdg	digits	rdg	digits
300 pA	0	30	0	30	0	30	0	30	0	30
3 nA	0	265	0	265	0	165	0	65	0	15
30 nA	0.15	125	0.15	55	0.15	25	0.15	5	0	5
300 nA	0.15	25	0	55	0	25	0	5	0	0
3 µA	0	25	0	25	0	5	0	0	0	0
30 µA	0	5	0	55	0	25	0	0	0	0
300 µA	0	25	0	25	0	5	0	0	0	0
3 mA	0	15	0	5	0	5	0	2	0	0

PLC: Power Line Cycle (50 Hz: 20 ms, 60 Hz: 16.67 ms)

Integration time by ICV method (Ti) against setting integration time (IT)

Range	Setting integration time (IT)						
	1 ms	2 ms	5 ms	0.5 PLC	1 PLC	100 ms	200 ms
300 pA	100 ms						200 ms
3 nA	5 ms		5 ms	0.5 PLC	1 PLC	100 ms	200 ms
30 nA to 30 µA	1 ms	2 ms	5 ms	0.5 PLC	1 PLC	100 ms	200 ms
300 µA	1 ms	2 ms	5 ms	0.5 PLC	1 PLC	1 PLC×4	1 PLC×8
3 mA	1 ms	2 ms	1 ms×2	2 ms×2	2 ms×4	2 ms×20	1 ms×40

* The expressions such as "2 ms × 2" indicate that measurement is performed by using the average of two measurements with integration time of 2ms.

Source Functions

● Voltage source

Range	Maximum display	Resolution	Accuracy ±(% of setting + digits)	Temperature coefficient ±(ppm of setting + digits)/°C
30 V	±32.000 V	1 mV	0.03 + 6	20 + 0.5
200 V	±200.00 V	10 mV	0.03 + 5	20 + 0.5

Settling time: 3.5 ms or less (until the final value ±0.1% is reached.)
Maximum allowable input voltage: ±200 V peak
Maximum capacitance load: 1000 µF

●Output noise

Peak to peak values under the following load conditions

Range	Load resistance	DC to 100 Hz	DC to 10 kHz
30 V	No load or maximum load	1 mV	3 mV
200 V		3 mV	10 mV

●Current limit

Range	Maximum display	Resolution	Accuracy ±(% of setting + digits)	Temperature coefficient ±(ppm of setting + digits) / °C	Setting range
3 mA	3.200 mA	1 µA	0.1 + 23	30 + 0.6	0.03 mA to 3.200 mA

Setting Time

Source delay time (Tds), Period (measurement cycle) (Tp), Measurement delay time (Td):

Setting time	Resolution	Setting accuracy
0.030 ms to 60.000 ms (Source delay) 0.100 ms to 60.000 ms (Period) 0.050 ms to 60.000 ms (Measurement delay)	1 µs	±(0.1% + 10 µs)
60.01 ms to 600.00 ms	10 µs	
600.1 ms to 6000.0 ms	100 µs	
6001 ms to 59998 ms	1 ms	

Hold time (Th):

Setting time	Resolution	Setting accuracy
0 ms to 6000.0 ms	0.1 ms	±(2% + 2 ms)

Source and Measurement Functions

Source mode: DC mode, Sweep mode
Sweep type: Fixed level sweep
Sweep repeat count: 1 to 1,000
Maximum number of sweep steps: 10,000 steps/channel
Measurement data buffer memory: 10,000 data/channel

Comparison operation: HI, GO, LO

Contact check function:
- Measurement range: 0 to 100 pF
- Measurement frequency: 500 kHz, 315 kHz
- Resolution: 0.1 pF/500 kHz, 0.2 pF/315 kHz
- Open Cal: 0 pF to 90 pF
- Maximum cable length: TRIAX cable 3 m

Measurement terminal: INPUT TRIAXIAL connector
LO Safety socket (40051 only)
Voltage output terminal: VS Safety socket

Maximum input voltage/current between terminals:

	Internal shield	VS	LO	Chassis
INPUT	3.2 mA	3.2 mA	3.2 mA	3.2 mA
Internal shield		200 V	short *2	*3
VS			200 V	*3
LO				*3

*2 The internal shield is connected to the LO terminal.
*3 The chassis is connected to the LO or the VS terminal depending on the relay. 200 V at the terminal where no connection is made.

Indicators (LEDs)

OPR Operate (output ON)
SMP Sampling indicator
HIG VS-GND connecting status
ERR Error (VS LIMIT, self test error, unit error)

General Specifications

Operation environment: Temperature; 0°C to +50°C
Relative humidity; 85% or less with no condensation
Storage environment: Temperature; -25°C to +70°C
Relative humidity; 85% or less with no condensation
Warm-up time 60 minutes or longer
(until the specified accuracies are satisfied.)
Power consumption 40051: 7.5 VA or less, 40052: 15 VA or less
Dimensions: Approx. 207 (W) × 26 (H) × 365 (D) mm
Mass: 40051: 0.8 kg or less, 40052: 1.0 kg or les

Optional accessories

Model	Description
A01009	TRIAX- TRIAX cable
A01239	High-voltage TRIAX- TRIAX cable
A01010	TRIAX-alligator cable
A01011	TRIAX- BNC cable
A04201	TRIAX J- TRIAX J adapter
A04202	TRIAX-J - BNC-P 1 adapter (inside-outside)
A04203	TRIAX-J - BNC-P 2 adapter (outside-outside)
A04204	BNC-J - TRIAX-P 1 adapter (outside-inside)
A04205	BNC-J - TRIAX-P 2 adapter ((outside-(inside+outside))
A04206	TRIAX-J - BNC-P 3 adapter ((inside+outside)-outside)
A04207	BNC-J - M-P
A04208	TRIAX-J receptacle

• Please read through the operation manual carefully before using the products.
• All specifications are subject to change without notice.

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