HIOKI

Ohmmeter Replacement Guide
(From 3227 to RM3544)

1. Measurement

2. Functionality

3. External Control (EXT I/O)

4. Commands

Please prepare copies of the user manuals for the old and new instruments and review the applicable sections of each.
If you do not have access to these manuals, they can be downloaded in PDF format from your myHIOKI website.
http://www.hioki.com/
Please note that this guide may be revised or up dated without notice.

1. Measurement

(1) Range structure comparison

3227 (For SLOW/MEDIUM display digits)

Range	Display range	Measurement current	Open terminal voltage
-	-	-	-
300mΩ	300.00mΩ	100mA	
3Ω	3.0000Ω	100mA	
30Ω	30.000Ω	10mA	
300Ω	300.00Ω	1mA	7.0V max
3kΩ	3.0000kΩ	1mA	
30kΩ	30.000kΩ	10μA	
300kΩ	300.00kΩ	10μA	
-	-	-	-

RM3544

Range	Display range	Measurement current	Open terminal voltage
30mΩ	35.000mΩ	300mA	
300mΩ	350.00mΩ	300mA	
3Ω	3.5000Ω	30mA	
30Ω	35.000Ω	10mA	
300Ω	350.00Ω	1mA	5.5V max
3kΩ	3.5000kΩ	1mA	
30kΩ	35.000kΩ	100μA	
300kΩ	350.00kΩ	5μA	
3MΩ	3.5000MΩ	500nA	

The RM3544 has a five-digit display. The number of display digits can be changed (from 4 to 5 digits).

○ How to set the number of display digits

Menu [P.2/2] Setting screen (SETTING) → Measurement Setting screen (MEAS) → Number of measurement digits (Ω DIGITS)

(2) Temperature sensor

Do not use the 9188 Temperature Sensor that came with the 3227 with the RM3544.

Only use the optional, Hioki-specified Z2001 Temperature Sensor. Please note that the Z2001 is not a standard accessory of the RM3544.

(3) Measurement leads

Use of 3227 measurement leads (9287-10, etc.) with the RM3544 is not recommended (and doing so will place the performance of the instrument outside the accuracy guarantee). The leads that come with the RM3544 and optional measurement leads (L2101, etc.) include a guard terminal in order to reduce the effects of external noise. Although there is no difference in the leads' center value (average value), use of the 3227 measurement leads with the new instrument will make measurement more susceptible to the effects of noise, so their performance should be verified in the environment in which they are to be used first.

If you plan to make your own measurement leads, refers to "Appendix 10: Making Your Own Measurement Leads" in the RM3544 User Manual.

2. Functionality

(1) Hold function

The RM3544 incorporates an auto-hold function. Please note that the manner in which this function operates differs from the 3227's hold function. If you have been using the 3227's hold function in combination with its EXT I/O functionality, change the RM3544's trigger source to external trigger [EXT].

○ How to change the trigger source setting

Menu [P.2/2] Setting screen (SETTING) → EXT I/O Setting screen (I/O) → Set the trigger source (TRIG SOURCE) to external trigger (EXT).

(2) Manual comparator

The RM3544 does not provide functionality that corresponds to the 3227's manual comparator function (MANU signal).

(3) Comparator table

The RM3544's panel load function corresponds to the 3227's comparator table.

○ Panel data saved

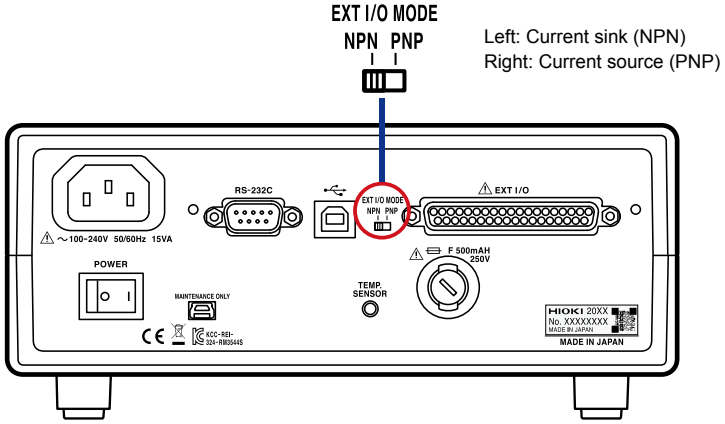
Resistance measurement range, measurement speed, zero-adjustment, averaging, comparator, judgment tone, scaling, temperature correction (TC), auto-hold

3. External Control (EXT I/O)

The timing of some aspects of the RM3544's operation differs from that of the 3227. Be sure to review the timing charts in the RM3544's User Manual.

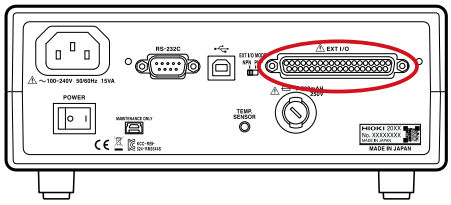
(1) Switching between current sink (NPN) and current source (PNP)

The RM3544 allows you to switch between NPN and PNP operation. To control the instrument in the same way as the 3227, set the NPN/PNP switch to NPN. The instrument ships with the switch in the NPN position. The EXT I/O mode cannot be changed using commands.



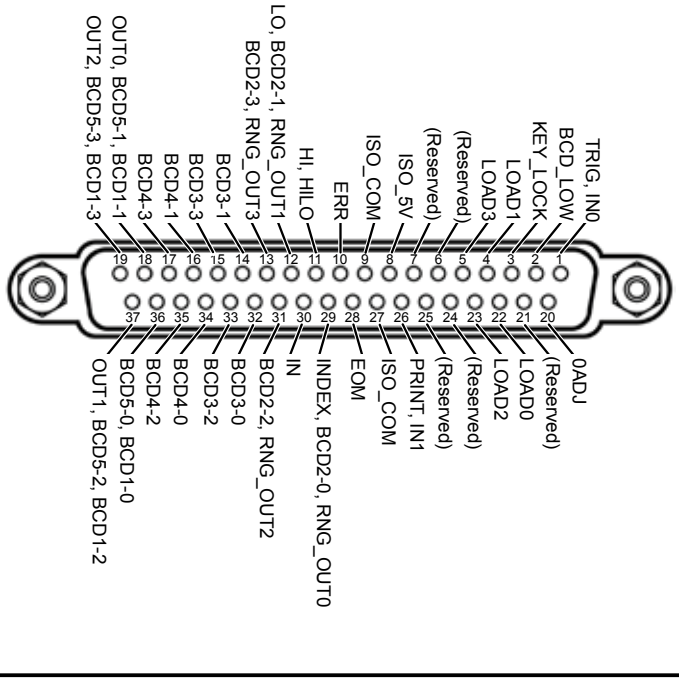
(2) Connector

The RM3544 connector is configured as follows:



Connector: (Instrument Side)
37-pin D-sub female with #4-40 screws

Mating Connectors:
DC-37P-ULR (solder type) /
DCSP-JB37PR (pressure weld type)
Japan Aviation Electronics Industry Ltd.



(3) Signal table

Power

Description	3227	RM3544
Power	5V	ISO_5V
Ground/common	GND	ISO_COM

Input

Description	3227	RM3544
TRIG (measurement start)	TRIG	TRIG
Manual mode	MANU	-
Range setting	RANGE	-
Zero adjustment	0ADJ	0ADJ
Printer output	PRINT	PRINT
Table/panel	COMP0 to 3	LOAD0 to 4
BCD low-order byte output*	-	BCD_LOW
Key lock	-	KEY_LOCK
General-purpose input	-	IN

Output

Description	3227	RM3544
Comparator Hi	Hi	HI
Comparator IN	IN	IN
Comparator Lo	Lo	LO
Comparator HiLo	-	HILO
Measurement current error	NG	ERR
Measurement complete	EOC	EOM
Analog measurement complete	-	INDEX
Range data output	-	RNG_OUT0 to 3
BCD output *	BCD (digit 1) – bit 3	BCD5-3
	BCD (digit 1) – bit 2	BCD5-2
	BCD (digit 1) – bit 1	BCD5-1
	BCD (digit 1) – bit 0	BCD5-0
	BCD (digit 2) – bit 3	BCD4-3
	BCD (digit 2) – bit 2	BCD4-2
	BCD (digit 2) – bit 1	BCD4-1
	BCD (digit 2) – bit 0	BCD4-0
	BCD (digit 3) – bit 3	BCD3-3
	BCD (digit 3) – bit 2	BCD3-2
	BCD (digit 3) – bit 1	BCD3-1
	BCD (digit 3) – bit 0	BCD3-0
	BCD (digit 4) – bit 3	BCD2-3
	BCD (digit 4) – bit 2	BCD2-2
	BCD (digit 4) – bit 1	BCD2-1
	BCD (digit 4) – bit 0	BCD2-0
	BCD (digit 5) – bit 3	BCD1-3
	BCD (digit 5) – bit 2	BCD1-2
	BCD (digit 5) – bit 1	BCD1-1
	BCD (digit 5) – bit 0	BCD1-0
General-purpose output	-	OUT0 to 2

* BCDm-n: Outputs the nth bit of digit m. (BCD1-x is the lowermost digit, while BCDx-0 is the LSB.)
Please note that the RM3544 and 3227 digit definitions are reversed.
(For example, the digit “5” in the value 12.345 Ω is output as the fifth digit by the 3227 but as the first digit by the RM3544.)

(4) BCD signals

BCD output cannot be read all at once. To acquire all the digits, the BCD_LOW signal must be controlled. For more information, see the RM3544 User Manual.

Pin	BCD_LOW	
	OFF	ON
9	ISO_COM	
10	ERR	
11	HILO	
12	BCD2-1	RNG_OUT1
13	BCD2-3	RNG_OUT3
14	BCD3-1	-
15	BCD3-3	-
16	BCD4-1	-
17	BCD4-3	-
18	BCD5-1	BCD1-1
19	BCD5-3	BCD1-3

Pin	BCD_LOW	
	OFF	ON
28	EOM	
29	BCD4-0	RNG_OUT0
30	IN	
31	BCD2-2	RNG_OUT2
32	BCD3-0	-
33	BCD3-2	-
34	BCD4-0	-
35	BCD4-2	-
36	BCD5-0	BCD1-0
37	BCD5-2	BCD1-2

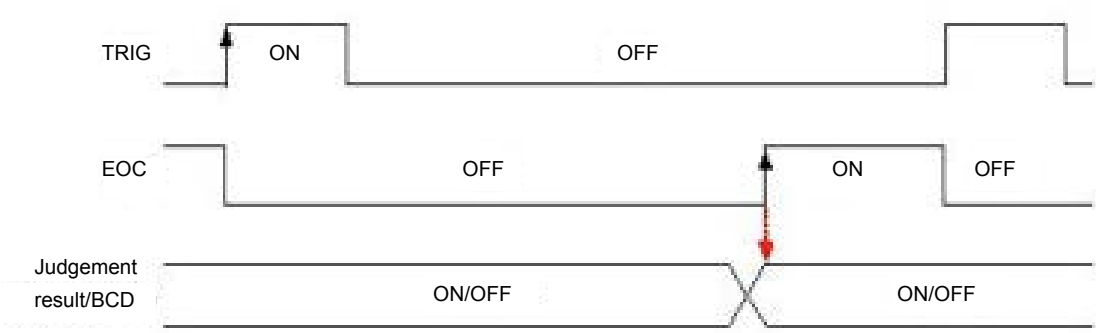
(5) Measurement range setting

The RM3544 does not have a range setting signal. Instead, you should save range information on each panel and then switch ranges using the panel load function. (For example, PANEL1: 30 mΩ range, PANEL2: 300 mΩ range)

(6) Acquiring judgment results

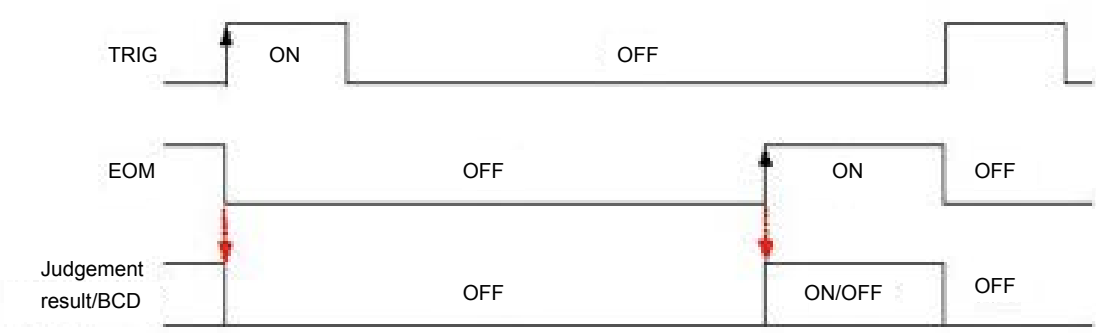
The RM3544 does not provide any functionality that corresponds to the 3227's manual comparator function (MANU signal). The judgment result and BCD signals are cleared at different times on the two instruments. As with the 3227's EOC signal, judgment results should be acquired while the RM3544's EOM signal is on.

3227: Hold state timing chart



○ When the EOC signal turns on, the judgment result and BCD signals change.

RM3544: Timing chart when using the external trigger [EXT] setting



○ When the TRIG signal turns on, the judgment result and BCD signals are cleared.

○ When the EOM signal turns on, the judgment result and BCD signals change

4. Commands

The RM3544's communications interface does not include GP-IB. Use either USB or RS-232C. As a rule, the RM3544 does not provide message compatibility with the 3227. Please replace 3227 messages with their corresponding RM3544 messages.

(1) Command correspondence chart

○ Set the number of measurement digits to 4 to accommodate the 3227.

○ If replacing 3540 commands with RM3544 commands, see the corresponding commands.

3227 message	Corresponding RM3544 message	Explanation
Shared commands		
*CLS	*CLS	While shared commands can generally be used, the response from the instrument may differ. See the RM3544 Communications Command User Manual.
*ESE	*ESE	
*ESE?	*ESE?	
*ESR?	*ESR?	
*IDN?	*IDN?	
*OPC	*OPC	
*OPC?	*OPC?	
*RST	*RST	
*SRE	*SRE	
*SRE?	*SRE?	
*STB?	*STB?	
*TRG	*TRG	
*TST?	*TST?	
*WAI	*WAI	
Load measured values		
:MEASure:RESIstance?	:FETCh?	The format differs. See the Communications Command User Manual.
:MEASure:TEMPerature?	:MEASure:TEMPerature? / :FETCh:TEMPerature?	
Zero adjustment		
:ADJust?	:ADJust?	Can be used without modification.
Measurement speed		
:SAMPle	:SAMPle:RATE	The format differs. See the Communications Command User Manual.
:SAMPle?	:SAMPle:RATE?	
Comparator		
:CSET:USE	:CALCulate:LIMit:STATe	The format differs. See the Communications Command User Manual.
:CSET:USE?	:CALCulate:LIMit:STATe?	
:CSET:BEEPer	:CALCulate:LIMit:BEEPer	
:CSET:BEEPer?	:CALCulate:LIMit:BEEPer?	
:CSET:CMODe	:CALCulate:LIMit:MODE	
:CSET:CMODe?	:CALCulate:LIMit:MODE?	
:CSET:PARAmeter	:CALCulate:LIMit:UPPer / :CALCulate:LIMit:LOWer	
:CSET:PARAmeter?	:CALCulate:LIMit:UPPer? / :CALCulate:LIMit:LOWer?	
:COMParator	:SYSTem:PANel:SAVE	The RM3544 does not provide a comparator table. Use the panel load function as a substitute for the comparator table.
:CSET:TABLe		
:COMParator?	:SYSTem:PANel:LOAD	
:CSET:TABLe?		
:CSET:TMODe	:TRIGger:SOURce	The RM3544 does not have an external control terminal mode. The trigger source (internal trigger/ external trigger) serves as a substitute. For timing charts, see the RM3544 User Manual.
:CSET:TMODe?	:TRIGger:SOURce?	

3227 message	Corresponding RM3544 message	Explanation
Temperature conversion (Δt)		
:DELTa:TABLe		The RM3544 does not provide a temperature conversion function.
:DELTa:TABLe?		
:DSET:AUTO		
:DSET:TABLe		
:DSET:TABLe?		
:DELTa:MODE		
:DELTa:MODE?		
:DSET:USE		
:DSET:USE?		
:DSET:PARAmeter		
:DSET:PARAmeter?		
Temperature correction (TC)		
:TC	:CALCulate:TCORrect:STATe	The format differs. See the Communications Command User Manual.
:TC?	:CALCulate:TCORrect:STATe?	
:TCSET	:CALCulate:TCORrect:PARameter	
:TCSET?	:CALCulate:TCORrect:PARameter?	
Hold		
:HOLD	[:SENSe:]HOLD:AUTO / :TRIGger:SOURce	The RM3544's hold function acts as an auto-hold function. To stop measurement, set the trigger source to external trigger.
:HOLD?	[:SENSe:]HOLD:AUTO? / :TRIGger:SOURce?	
Function		
FUNCtion		The RM3544 does not provide a command for changing the display method. (The VIEW key can be used to simultaneously display resistance values and temperatures.)
FUNCtion?		
Measurement range		
:RESIstance:RANGe	[:SENSe:]RESistance:RANGe	The format differs. See the Communications Command User Manual.
:RESIstance:RANGe?	[:SENSe:]RESistance:RANGe?	
:RESIstance:AUTO	[:SENSe:]RESistance:RANGe:AUTO	
:RESIstance:AUTO?	[:SENSe:]RESistance:RANGe:AUTO?	
Supply frequency		
:FERQuency	:SYSTem:LFRequency	The format differs. See the Communications Command User Manual.
:FERQuency?	:SYSTem:LFRequency?	
Communication setting		
:HEADer	:SYSTem:HEADer	The format differs. See the Communications Command User Manual.
:HEADer?	:SYSTem:HEADer?	
:TRANsmit:TERMinator	:SYSTem:TERMinator	
:TRANsmit:TERMinator?	:SYSTem:TERMinator?	
:TRANsmit:SEPArator		The RM3544 does not provide a function for changing the separator.
:TRANsmit:SEPArator?		

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