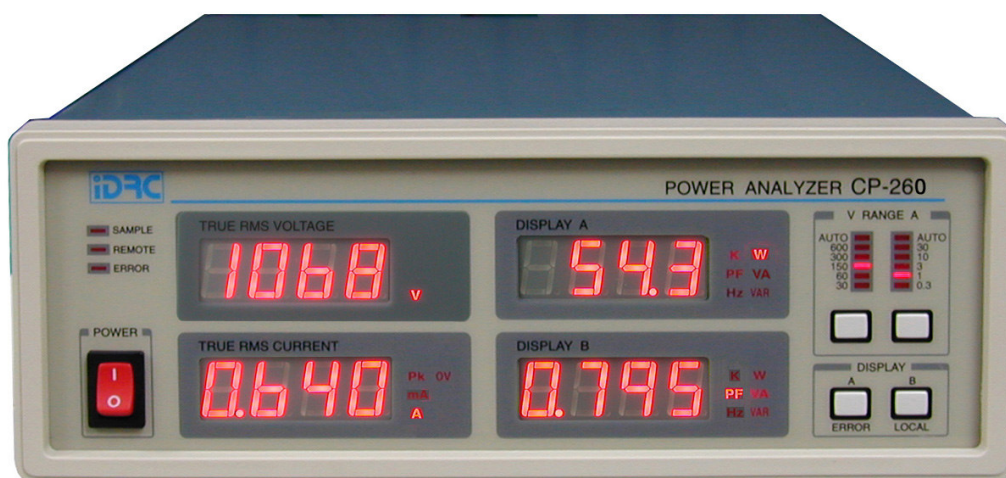


CP-240、CP-260、CP-280、CP290

DIGITAL POWER METER

OPERATION MANUAL



CERTIFICATION

IDRC certifies that this product was thoroughly tested and inspected and found to meet Published specifications when shipped from the factory. IDRC further certifies that its calibration measurements are traceable to the ITRI (Industrial Technology Research Institute/Center for Measurement Standards), to the extent allowed by ITRI's calibration facility.

WARRANTY PERIOD - ONE YEAR FREE CHARGE

This product is warranted against defects in materials and workmanship for a period of ONE YEAR from date of shipment. During warranty period, IDRC will at its option, either repair or replace products which prove to be defective. IDRC are not liable errors contained herein or for incidental or consequential damages.

WARRANTY SERVICE

We will repair or replace the instrument during the warranty period provided it is returned to your nearest IDRC authorized service center. Buyer shall pre-pay shipment charges to service center and service center will pay shipment charges to return product to buyer. The freight prepaid by Buyer if the product return to IDRC International Sale Dept. the RMA (Return Material Authorization Number) must be obtained directly from the IDRC for warranty repairs. No liability will be accepted if returned without such permission.

LIMITATION OF WARRANTY

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by the buyer, Buyer-supplied products interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance. No other warranty is expressed or implied. IDRC specifically disclaims the implied warranties of merchantability and fitness for a particular purpose.

ALL RIGHTS RESERVED

No part of this publication may be produced, stored in a retrieval system, or transmitted in any form, or by means, electronic, mechanical photocopying, recording or otherwise without prior permission of IDRC.

CONTENTS

- 1.GENERAL DISCRIPTION
 - 1.1 Equipment Check List..... 1-1
 - 1.2 Accessories(optional)..... 1-1
- 2.SPECIFICATIONS..... 2-1
- 3.PANEL DESCRIPTIONS
 - 3.1 FRONT PANEL DESCRIPTIONS..... 3-1
 - 3.2 REAR PANEL DESCRIPTIONS..... 3-2
- 4.OPERATION..... 4-1
- 5.RS-232 INTERFACE COMMAND..... 5-1

APPENDIX

- 1.ERROR CODE’S MESSAGE..... A1-1
- 2.FIGURES’ DISPLAYED EQUIVALENT TABLE..... A1-2

1. GENERAL DISCRIPTION

1.1 Equipment Check List

The following items comprise a complete instrument :

- * User Manuel
- * AC Line Power Cord
- * AC Male Plug with Power Cord for connect to Source terminal
- * AC Female Socket with power cord for connect to LOAD terminal
- * Hook Terminal x 4
- * Spare fuse: 250mA (500mA(FAST))
- * Traceable Calibration Certificate

1.2 Accessories (Optional)

- *CPA-100: Universal Test Adapter
- *CPA-231: Universal Test Adapter
- *CPA-232: Universal Test Adapter
- *CPR-200: Rack Mount Kit for 19 inch Cabinet

2. SPECIFICATION

Model			CP-240	CP-260	CP-280	CP-290	
Voltage (V)	Ranges (Auto or Manual)(5 range)		30V 60V 150V 300V 600V RMS				
	Display Resolution		4 digits				
	Operating Principle		Digital Calculation True RMS				
	Crest Factor		Up to 1.7(at FULL SCALING)				
	Frequency Range		10Hz to 550Hz				
	Accuracy(23°C±5°C)	47 to 63Hz	±0.1%reading ±0.1% range ±2C				
		10Hz to 550Hz	±0.2%reading ±0.1%range ±0.1%/ 100Hz				
	Maximum Input	Continuous	600V RMS/1000Vpk				
	Input impedance		2M ohm and 10PF on all ranges				
	Effective input range		20% to 120% of the range				
Current (A)	Ranges(Auto or Manual) (5 ranges)		0.3A 1A 3A 10A 30A RMS		0.01A 0.03A 0.1A 0.3A 1A RMS	0.03A 0.1A 0.3A 1A 3A RMS	
	Display Resolution		4 digits				
	Operating Principle		Digital Calculation True RMS				
	Frequency Range		10Hz to 550Hz				
	Crest Factor		Up to 2 (at FULL SCALING)				
	Accuracy (23°C±5°C)	47 to 63 Hz	±0.1%reading ±0.1%range ±3C				
		10Hz to 550Hz	±0.3%reading ±0.1%range ±3C ±0.1%/100Hz				
	Maximum Input	Continuous	30A RMS / 60Apk		1A RMS/2Apk	3A / 6Apk	
	Input impedance		All ranges <=2m ohm				
	Effective input range		10% to 110% of the range				
Power (W)	Ranges (Auto or Manual) (25 ranges corresponding to V and A)		9W to 18KW		0.3W to 600W	0.9W to 1800W	
	Display Resolution		4 digits				
	Operating Principle		Digital Calculation True Watt				
	Frequency Range		10Hz to 550Hz				
	Accuracy (23°C±5°C)	47Hz to 63Hz	PF= 1~ 0.6	±0.1%reading ±0.1%range ±5C			
			PF= 0.5~ 0.1	±0.1%reading ±0.1%range ±0.01% / -0.1PF ±5C			
			10Hz to 550Hz	±0.3%reading ±0.1%range ±0.1%/100Hz ±5C			
	Effective input range		2% to 110% of the range(at 47 to 63Hz) 5% to 110%of the range(at all range)				
	Frequency (Hz)	Display Resolution / Maximum resolution		4 digits / 0.01Hz			
Operating Principle		Reciprocal Counting method					
Accuracy(23°C±5°C)		±0.02% ±1C					
Measuring Input		Voltage					
Effective input range		5% to 100% of the voltage range					
Measuring Range		10Hz to 10KHz					
Interface	RS-232		NO	YES	YES	YES	
NO Fuse Breakers (N.F.B.)			NO	YES	NO	NO	

Computing Function		
Apparent Power	Reactive power	Power factor
$VA = V \cdot A$	$VAR = \sqrt{(VA^2 - W^2)}$	$PF = W / (VA)$
Computing Range : VA , VAR : Voltage and current range / PF:Zero to unity leading or lagging		
Computing Accuracy : VA*VAR $\pm 0.05\%$ of rated value / PF : ± 0.001		

Interface	
RS-232 :	Baud Rate : 9600bps
	Transmission system : Start-stop synchronization 8 bits , none parity , 1 stop bit.(8,n,1)

CP-240 、CP-260 Voltage, Current,Watt Range and Resolution :					
V \ A	300.0mA	1.000A	3.000A	10.00A	30.00A
30.00V	9.000W	30.00W	90.00W	300.0W	900.0W
60.00V	18.00W	60.00W	180.0W	600.0W	1.800KW
150.0V	45.00W	150.0W	450.0W	1.500kW	4.500KW
300.0V	90.00W	300.0W	900.0W	3.000KW	9.000KW
600.0V	180.0W	600.0W	1.800KW	6.000KW	18.00KW

CP-280 Voltage, Current,Watt Range and Resolution :					
V \ A	10.00mA	30.0mA	100.0mA	300.0mA	1.000A
30.00V	300.0mW	900.0mW	3.000W	9.000W	30.00W
60.00V	600.0mW	1.800W	6.000W	18.00W	60.00W
150.0V	1.500W	4.500W	15.00W	45.00W	150.0W
300.0V	3.000W	9.000W	30.00W	90.00W	300.0W
600.0V	6.000W	18.00W	60.00W	180.0W	600.0W

CP-290 Voltage, Current,Watt Range and Resolution :					
V \ A	30.0mA	100.0mA	300.0mA	1.000A	3.000A
30.00V	900.0mW	3.000W	9.000W	30.00W	90.00W
60.00V	1.800W	6.000W	18.00W	60.00W	180.0W
150.0V	4.500W	15.00W	45.00W	150.0W	450.0W
300.0V	9.000W	30.00W	90.00W	300.0W	900.0W
600.0V	18.00W	60.00W	180.0W	600.0W	1800W

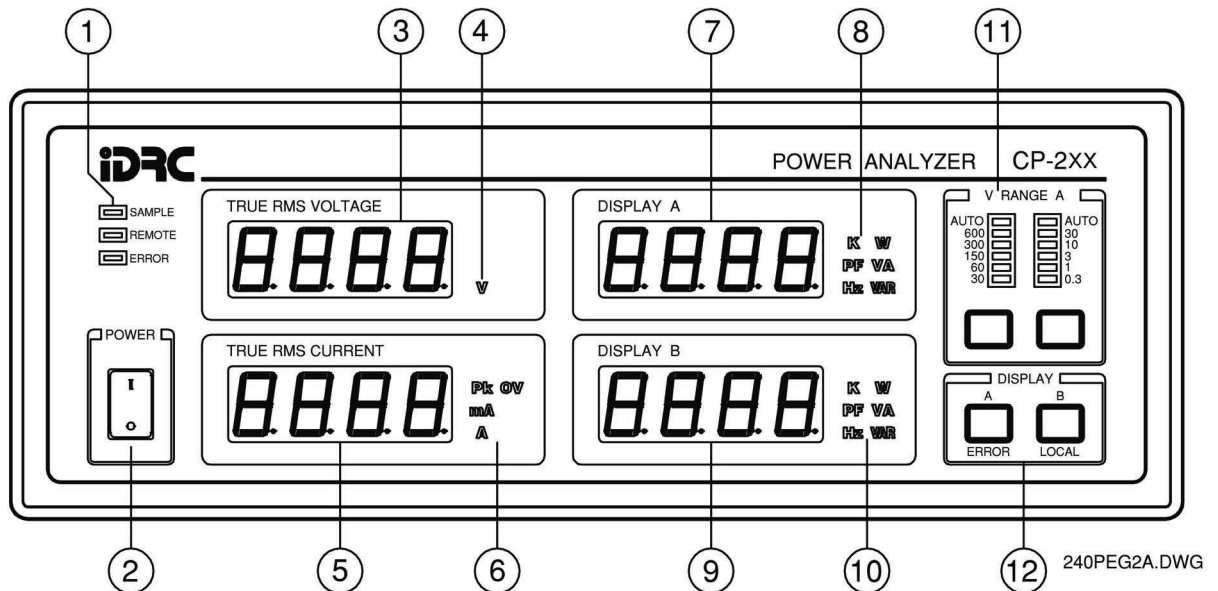
General specification :	
Dielectric Strength	2.2KV AC(50/60Hz) for one minute between input terminals and case.
Insulation Resistance	more than 20Mohm at 500Vdc between input terminals and case between case and power line
Operating Temperature	5 to 50°C (41 to 104°F)
Humidity Range	10 to 90% (relative humidity)non-condensing
Line Requirements	AC115V or 230V±15% , 47 to 63Hz 15VA
Dimensions/Weight	260x110x360(WxHxD)/4.2Kgs net

* Specifications subject to change without notice

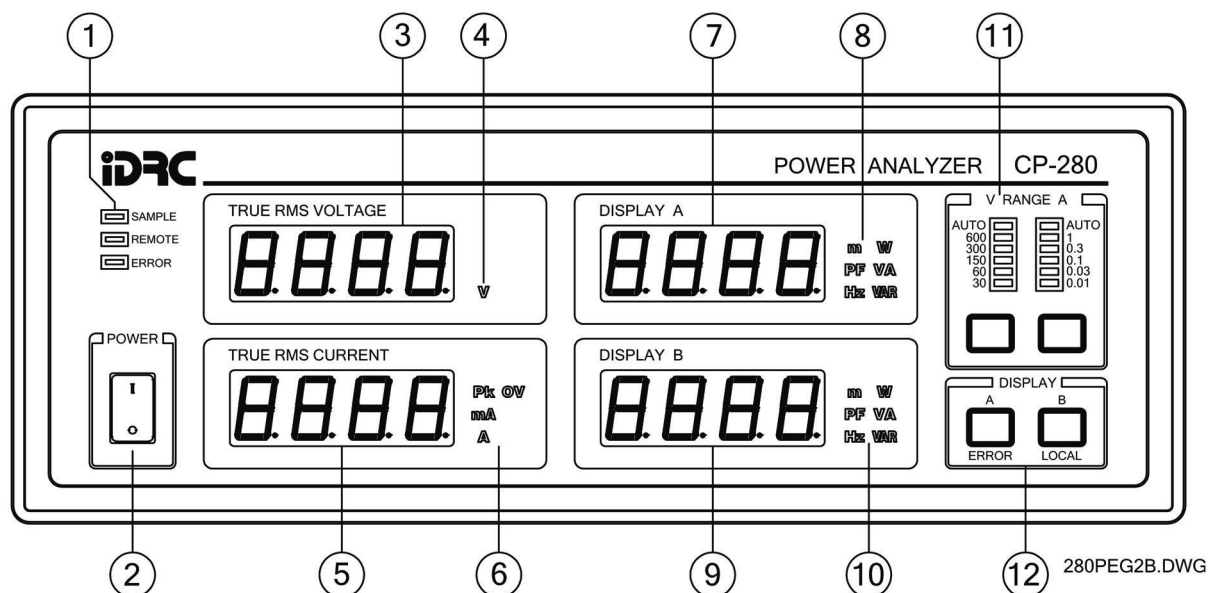
3. PANEL DESCRIPTIONS

3.1 FRONT PANEL DESCRIPTIONS

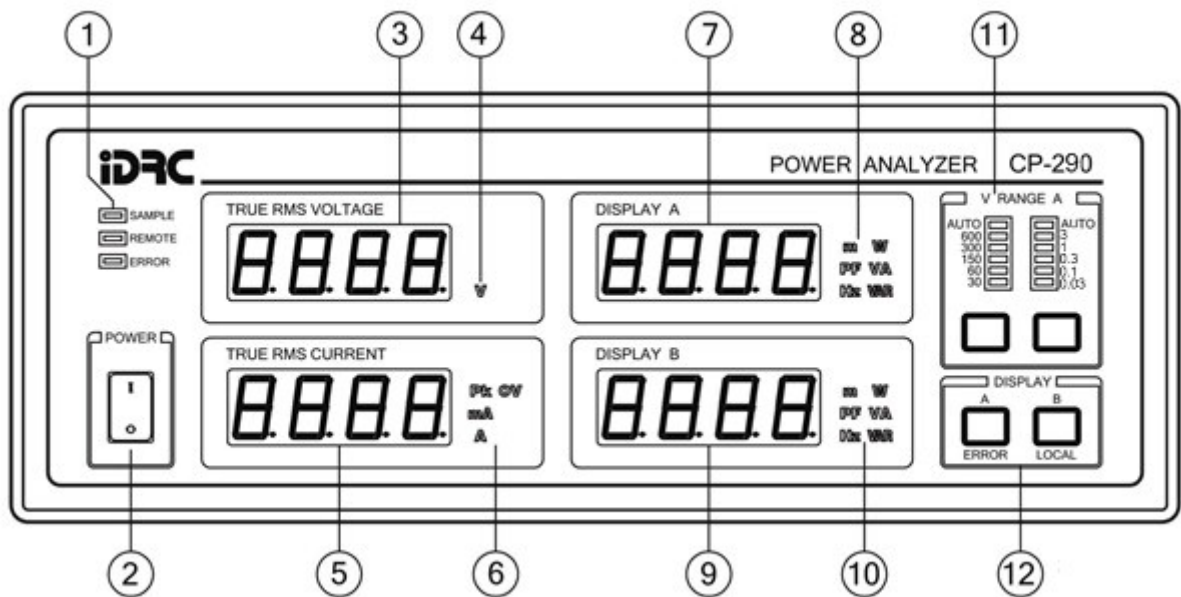
【FIG 3-1】 CP-240/260 Front Panel



【FIG 3-2】 CP-280 Front Panel



【FIG 3-3】 CP-290 Front Panel



(1). STAUS LED display block

1. SAMPLE : Sample Rate, 3 times/sec.
2. REMOTE : LED ON to indicate remote control engaged
3. ERROR : Error code.

(2). POWER : Power Control On/Off Switch

(3). VOLTAGE DATA DISPLAY : Display Data of Voltage

- * All data is TRUE RMS (Root Mean Square).
- * 4 digits 7-segments display.

(4). VOLTAGE UNIT DISPLAY : Display Unit of Voltage

(5). CURRENT DATA DISPLAY : Display Data of Current

- * All data is TRUE RMS (Root Mean Square).
- * 4 digits 7-segments display.

(6). CURRENT UNIT DISPLAY : Display Unit of Current

1. PK OV : 'PK OV ' LED annunciators will light When the peak of current waveform is great than 2 times of each current range, But that can not change current range.
2. mA : Milli Ampere.
3. A : Ampere.

(7). DISPLAY A's block DATA DISPLAY : Display Data of DISPLAY A's block

(8). DISPLAY A's block UNIT DISPLAY: Display Unit of DISPLAY A's block

1. K : Kilo, X1000 (CP-240, CP-260).
- m : milli, X1/1000 (CP-280 , CP-290)
2. W : Watt (Active Power).

- 3. PF : Power Factor.
- 4. VA : Apparent Power
- 5. Hz : Frequency
- 6. VAR : Reactive power

(9). DISPLAY B's block DATA DISPLAY : Display Data of DISPLAY B's block

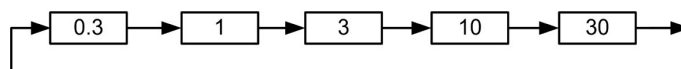
(10). DISPLAY B's block UNIT DISPLAY: Display Unit of DISPLAY B's block

- 1. K : Kilo, X1000 (CP-240, CP-260).
- m : milli, X1/1000 (CP-280 Only).
- 2. W : Watt (Active Power).
- 3. PF : Power Factor.
- 4. VA : Apparent Power
- 5. Hz : Frequency
- 6. VAR : Reactive power

(11). V RANGE A's block Range LEDs & Selection Keys

- 1. Range LEDs: Display Range of Voltage and Current
 - *. Left side for Voltage Range display or AUTO ON.
 - *. Right side for Current Range display or AUTO ON.
- 2. Selection Keys: Select Range of Voltage and Current
 - *. AUTO : LONG Press (≥ 1 Sec) to select Automatic Range, AUTO LED ON.
 - *. MANUAL : BRIEF Press to select Manual Range, AUTO LED OFF.

EXAMPLE : Depress Current Range Selection keys to scroll for following Range.



(12). DISPLAY block selection keys

- 1. A : Depress A key to Select UNIT of DISPLAY A's block.
- ERROR : When ERROR LED ON, Depress ERROR key to show Error Code In DISPLAY A's block DATA DISPLAY. Error Code will be cleaned up after showed.

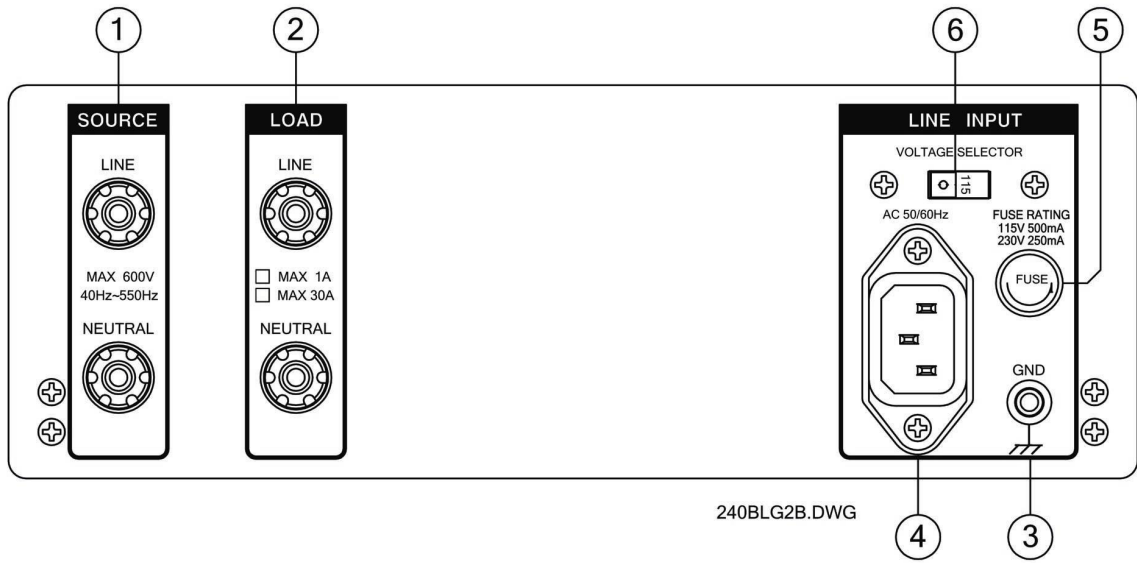
(Reference of Error Code: APPENDIX 1: ERROR CODE'S MESSAGE)

- 2. B : Depress B key to Select UNIT of DISPLAY B's block.
- LOCAL : Set the system to LOCAL control.

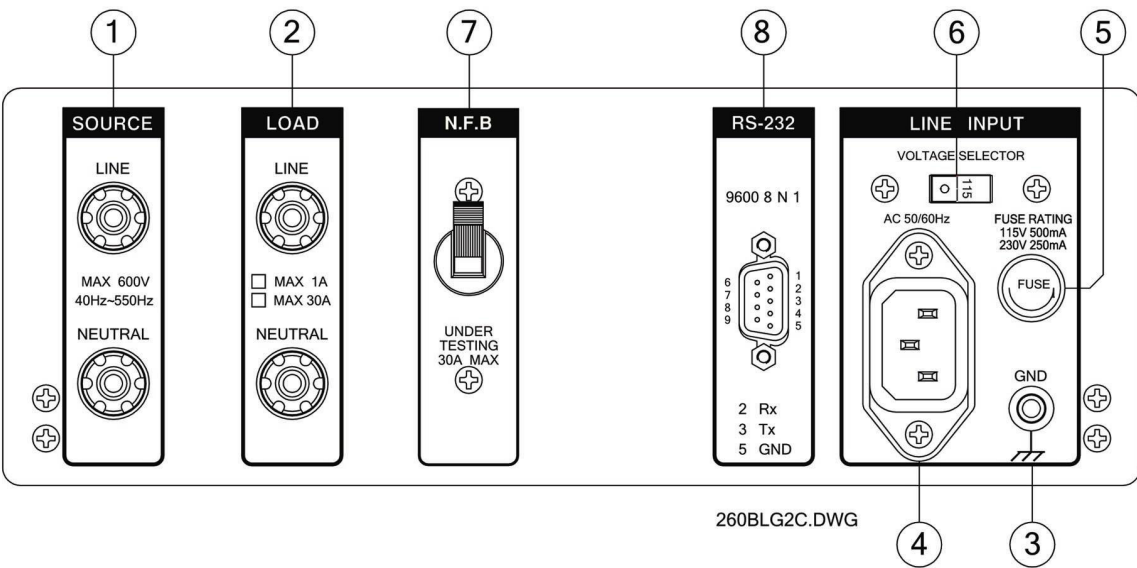
※NOTE : When displays "UUUU", it means reading value is over setted range, please depress RANGE key again or select AUTO RANGE.

3.2 REAR PANEL DESCRIPTIONS

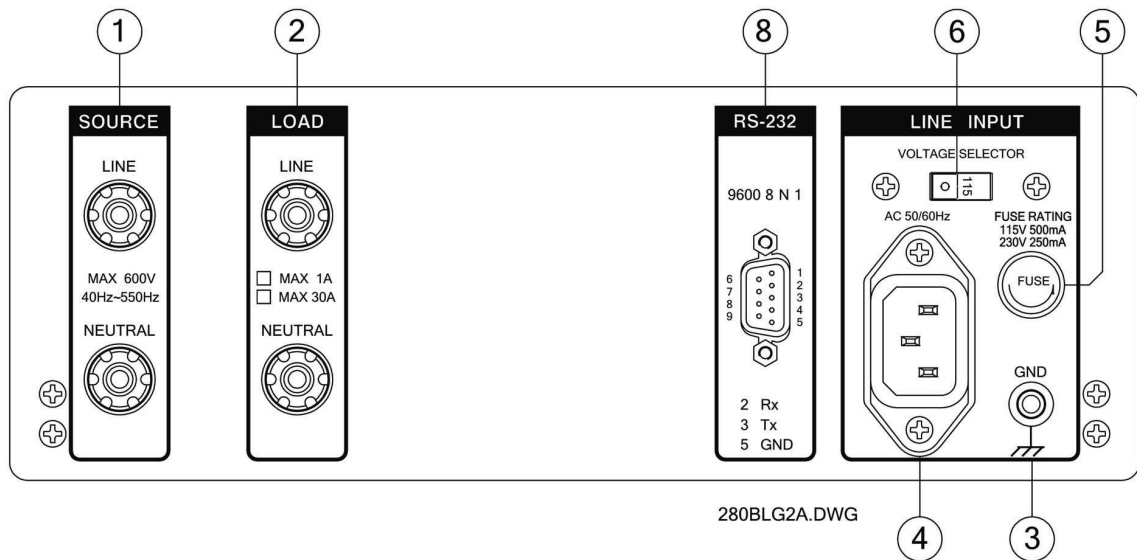
【FIG 3-4】 CP-240 Rear Panel



【FIG 3-5】 CP-260 Rear Panel



【 FIG 3-6 】 CP-280, CP290 Rear Panel



- (1). SOURCE : Source terminals Binding Post Connectors
MAX INPUT VOLTAGE : 600V
- (2). LOAD : Load terminals Binding Post Connectors
MAX CURRENT : 30A
- (3). GROUND TERMINAL: Earth / GROUND terminal
- (4). AC LINE SOCKET : AC line input socket
* Connect to a three wire power cord.
- (5). FUSE : Fuse holder
* Fuse is FAST Blow type
* Fuse rate is 500mA when line voltage is 117V range Fuse rate is 250mA when line voltage is 230V range
- (6). VOLTAGE SELECTOR : AC LINE voltage select switch
- (7). N.F.B. : No Fuse Breaker switch (CP-260 ONLY)
* Power Breaker switch will turn off when LOAD terminals current exceed the maximum of rate Load current.
* Power Breaker switch control the LOAD terminals AC power on/off
- (8). RS-232 : RS-232 9 pins D-connector (CP-260, CP-280 ONLY)
*PINS : Pin2 ----- Rx
Pin3 ----- Tx
Pin5 ----- GND

4. OPERATION

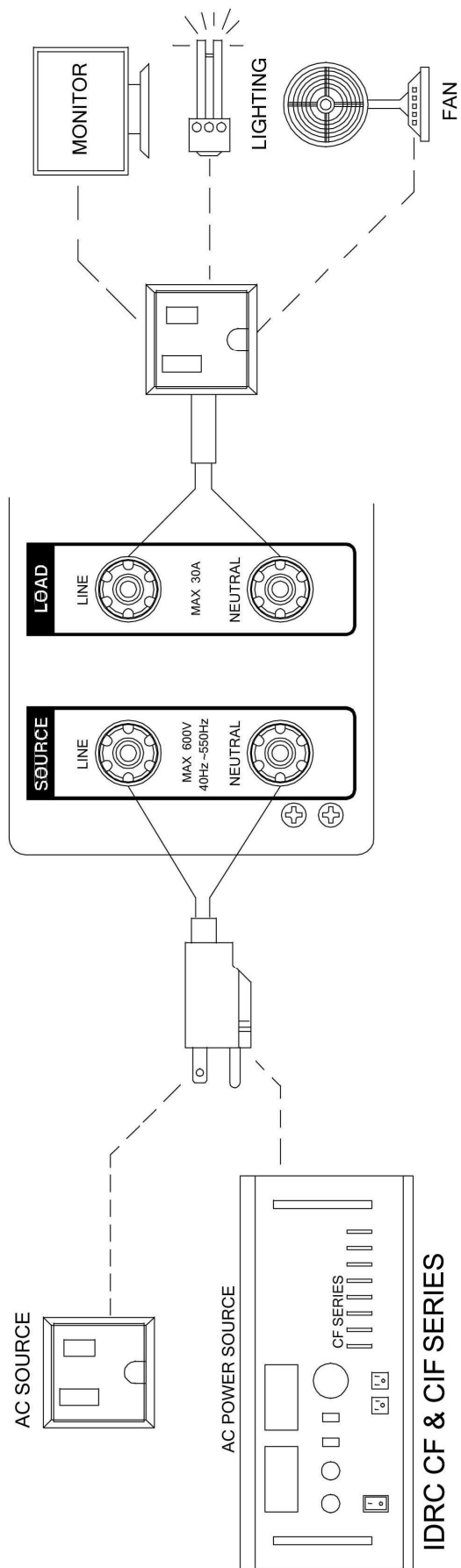
4.1 GENERAL PROCEDURES

- (1). Turn off all the switches before enabling the power. Adjust AC line input voltage to match local voltage by shunting the LINE VOLTAGE SELECTOR switch located on the rear panel
- (2). Make sure that AC LINE SOCKET connected to the required power. Then turn on POWER switch.
- (3). When POWER turn on, all the 7-segment displays with dot LED and LED annunciators will light about 1 second, and then displays Model No, Version and Serial Number of the Power Meter. After above step then functions going to working.

4.2 CABLE CONNECTION

Refer to Figure 4-1

【FIG 4-1】



5. RS-232 INTERFACE COMMANDS

- Command:

- *CLS Clear the status byte summary register and all events registers.
- *ESE <Enable Value>
 Enable bits in the standard Event status enable register.
- *ESE? Query standard Event enables register.
- *ESR? Query standard Event register.
- *IDN Identification query.
- *OPC Sets the “operation complete” bit(bit 0) in the Standard Event.
- *OPC Return “1” to the output buffer after the command is executed.
- *RST Reset the instrument to its power-on configuration.
- *SRE <Enable Value>
 Enable bits in the Status Byte enable register.
- *SRE? Query the Status Byte enable register.
- *STB? Read status byte query.
- *TST? Perform a complete self-test of instrument .
 Return “0” if the self-test is successful , or “1” if it test fails.

- SCPI Command:

CALCulate:FORM1

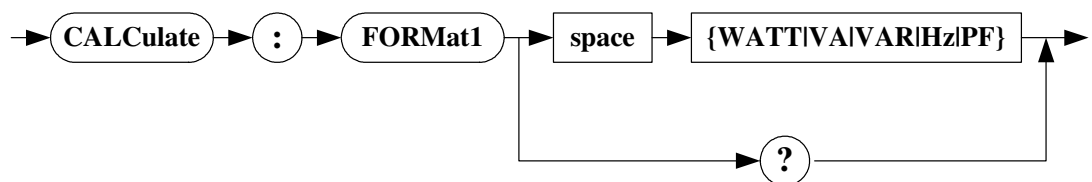
Sets or queries the display-a measurement parameter.

Group: CALCulate

Command Syntax: CALCulate:FORMat1 {WATT|VA|VAR|Hz|PF}

Query Syntax : CALCulate:FORMat1?

Return Format : {WATT|VA|VAR|Hz|PF}



Argument: WATT Voltage true RMS value

VA Voltage average value

VAR Voltage +peak value

Hz Voltage -peak value

PF Power factor value

Example: CALCulate:FORMat1 PF

Sets the display-a measurement parameter to PF.

CALCulate:FORM2

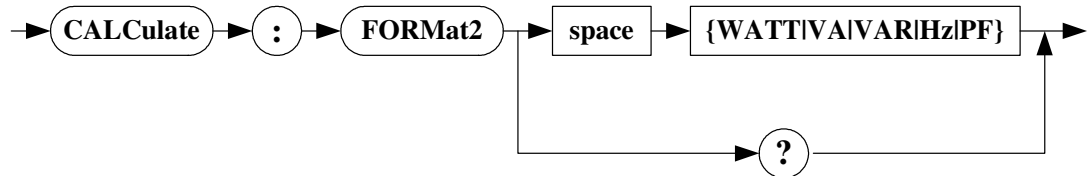
Sets or queries the display-b measurement parameter.

Group: CALCulate

Command Syntax: CALCulate:FORMat2 {WATT|VA|VAR|Hz|PF}

Query Syntax : CALCulate:FORMat2?

Return Format : {WATT|VA|VAR|Hz|PF}



Argument: WATT Current true RMS value

VA Current +peak value

VAR Current -peak value

Hz Current peak to peak value

PF Power factor value

Example: CALCulate:FORMat2 VA

Sets the display-b measurement parameter to VA.

DISPlay:CONTRast

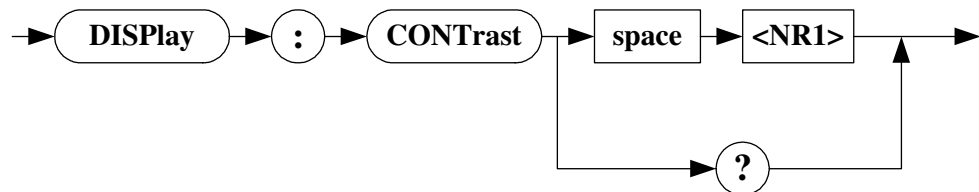
Sets or queries the display contrast parameter.

Group: DISPlay

Command Syntax: DISPlay:CONTRast <NR1>

Query Syntax : DISPlay:CONTRast?

Return Format : <NR1>



Argument: <NR1> is a value in the range from 0 to 9.

Example: DISP:CONTRast 3

Sets the display contrast parameter to 3.

FETCh?

Retrieves the measurements taken by the INITIAL commands of subsystem and places them into the output buffer.

Group: FETCh

Query Syntax: FETCh?

Return Format : <NRf>



[SENSe]:CURR:RANG:AUTO

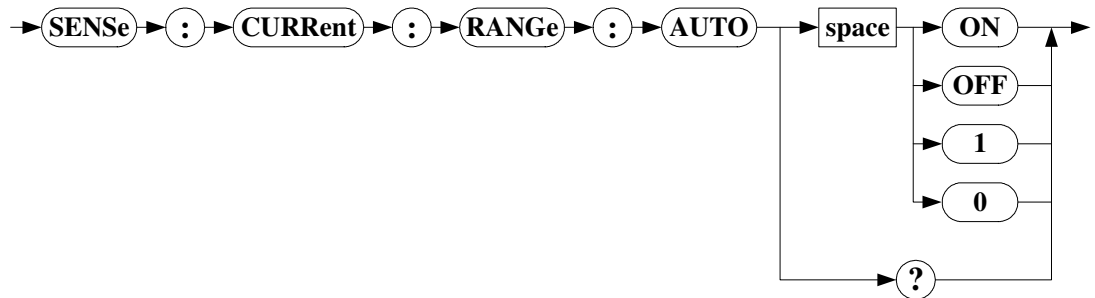
Sets the current auto-rang ON/OFF, queries the current setting.

Group: SENSe

Command Syntax: [SENSe]:CURRent:RANGe:AUTO { ON | OFF | 1 | 0 }

Query Syntax : [SENSe]:CURRent:RANGe:AUTO?

Return Format : { 1 | 0 }



Argument: <ON> or 1 current auto range mode.
<OFF> or 0 current hold range mode.

Example: SENSe:CURRent:RANGe:AUTO 1

Sets the current range to auto range mode.

[SENSe]:CURR:RANG:FIX

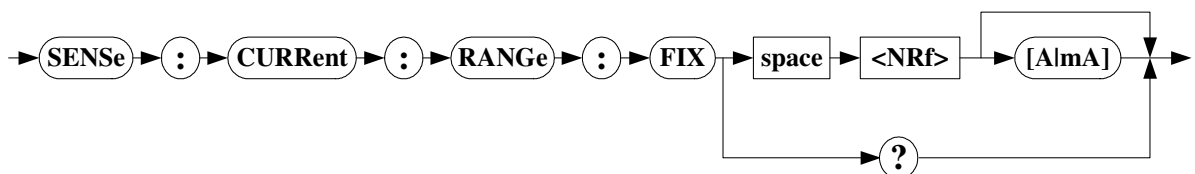
Sets or queries the range of current.

Group: SENSe

Command Syntax: [SENSe]:CURRent:RANGe:FIX <NRf>[A|mA]

Query Syntax : [SENSe]:CURRent:RANGe:FIX?

Return Format : <NRf>



Argument: <NRf>

Example: SENSE:CURRent:RANGe:FIX 500mA
Sets the current range to 0.5A range.

[SENSe]:VOLT:RANG:AUTo

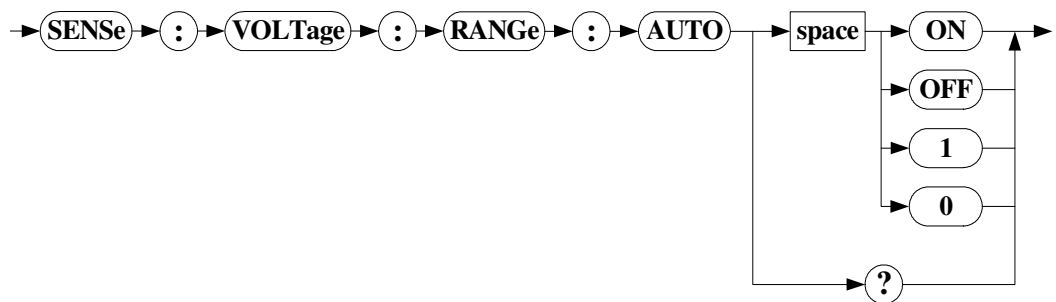
Sets the voltage auto-rang ON/OFF, queries the current setting.

Group: SENSe

Command Syntax: [SENSe]:VOLTage:RANGe:AUTO { ON | OFF | 1 | 0 }

Query Syntax : [SENSe]:VOLTage:RANGe:AUTO?

Return Format : { 1 | 0 }



Argument: <ON> or 1 voltage auto range mode.
<OFF> or 0 voltage hold range mode.

Example: SENSE:VOLTage:RANGe:AUTO OFF
Sets the voltage range to hold range mode.

[SENSe]:VOLT:RANG:FIX

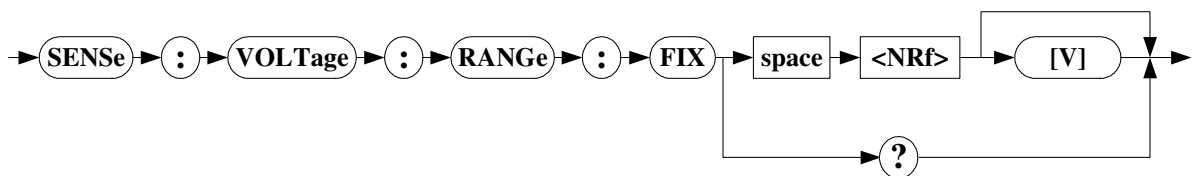
Sets or queries the range of voltage.

Group: SENSe

Command Syntax: [SENSe]:VOLTage:RANGe:FIX <NRf>[V]

Query Syntax : [SENSe]:VOLTage:RANGe:FIX?

Return Format : <NRf>



Argument: <NRf>

Example: SENSE:VOLTage:RANGe:FIX 150V
Sets the voltage range to 150V range.

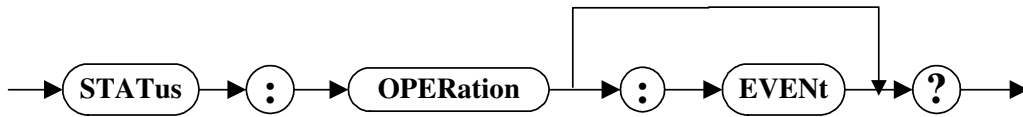
STATus:OPER[:EVENT]?

Queries the event register contents of the Operation Status Register group, and clears it at the same time.

Group: STATus

Query Syntax : STATus:OPERation[:EVENT]?

Return Format: <NR1>

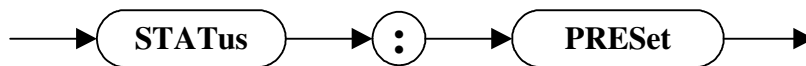


STATus:PRES

Clears the Operation Status and Questionable Status register groups. Both the event and enable registers are cleared.

Group: STATus

Command Syntax: STATus:PRESet



STATus:QUES:ENAB

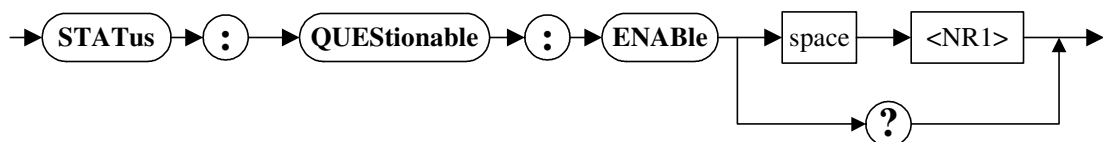
Sets the enable register of the Operation Questionable Register groups and queries the current setting.

Group: STATus

Command Syntax: STATus:QUESTionable:ENABLE <NR1>

Query Syntax : STATus:QUESTionable:ENABLE?

Return Format : <NR1>



Argument: <NR1> is a value in the range from 0 to 65535.

Example: STATus:QUESTionable:ENABLE 1

Enabled voltage overload active.

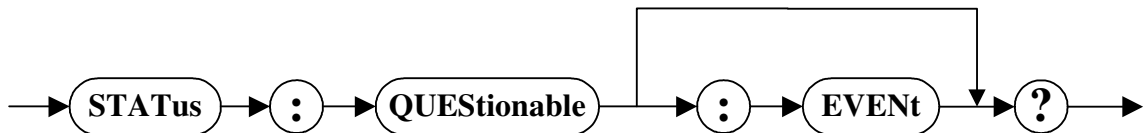
STATus:QUES [:EVENT]?

Queries the event register contents of the Questionable Status Register group and clears it at the same time.

Group: STATus

Query Syntax: STATus:QUESTionable[:EVENT]?

Return Format :



SYSTem:ERR?

Queries the occurred error code and message.

Group: SYSTem

Query Syntax : SYSTem:ERRor?

Return Format : { string }



SYSTem:KLOC

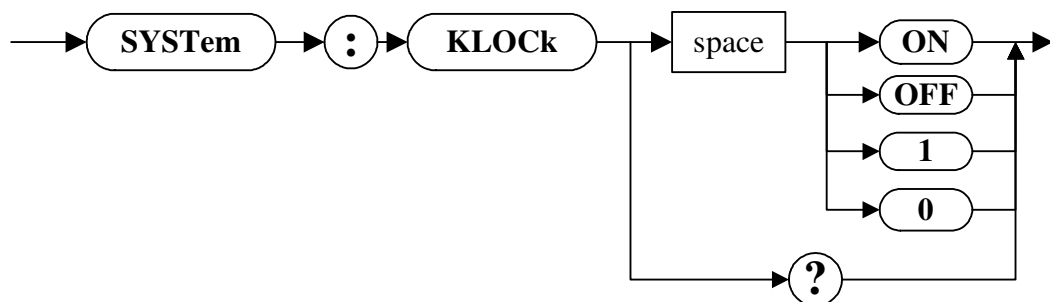
Sets or queries whether the front-panel keys are locked.

Group: SYSTem

Command Syntax: SYSTem:KLOCK { ON | OFF | 1 | 0 }

Query Syntax : SYSTem:KLOCK?

Return Format : { 1 | 0 }



Argument: <ON> or 1 keys are locked.

<OFF> or 0 key are unlocked.

Example: SYSTem:KLOCK?

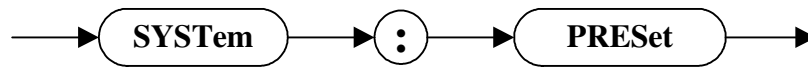
Queries the key status.

SYSTem:PRESet

Resets to the default state.

Group: SYSTem

Command Syntax: SYSTem:PRESet

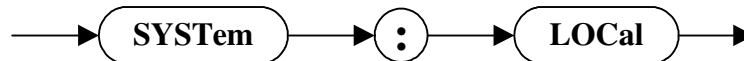


SYSTem:LOCal

Sets the system to local control.

Group: SYSTem

Command Syntax: SYSTem:LOCal

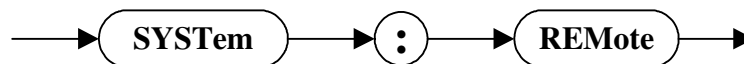


SYSTem:REMOte

Sets the system to remote control.

Group: SYSTem

Command Syntax: SYSTem:REMOte



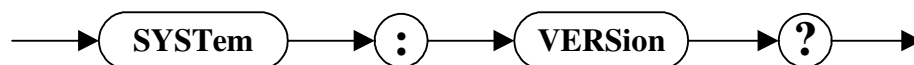
SYSTem:VERSion?

Queries the value corresponding to the SCPI version to which the instrument complies.

Group: SYSTem

Query Syntax : SYSTem:VERSion?

Return Format : <1990.0>



Appendix 1:ERROR CODE'S MESSAGE

Code	Message	Code	Message
=====			
0	No Error	-222	Data out of rang
-100	Command error	-223	Too much data
-101	Invalid character	-224	Illegal parameter valid
-102	Syntax error	-230	Data corrupt or stale
-103	Invalid separator	-241	Hardware missing
-104	Data type error	-310	System error
-105	GET not allowed	-311	Memory error
-108	Parameter not allowed	-313	Calibration memory lost
-109	Missing parameter	-330	Self-test failed
-112	Program mnemonic too long	-350	Queue overflow
-113	Undefined header	-400	Query errors
-121	Invalid character in number	-410	Query INTERRUPTED
-123	Exponent too large	-420	Query UNTERMINATED
-124	too many digits	-430	Query DEADLOCKED
-128	Numeric data not allowed	-440	Query UNTERMINATED after indefinite response
-131	Invalid suffix	60	ROM FAILED
-138	suffix not allowed	61	RAM FAILED
-140	Character data error	62	EEPROM R/W FAILED
-141	Invalid character data	63	ADC FAILURE
-144	Character data too long	64	USER SETTING LOST
-148	Character data not allowed	65	FREQUENCY COUNTER FAILED
-150	String data error	66	RS-232 framing error
-151	Invalid string data	67	RS-232 overrun error
-158	String data not allowed	68	Input buffer overflow
-160	Block data error	69	Output buffer overflow
-161	Invalid block data	70	Command not allowed in local
-168	Block data not allowed	100	Cal secured
-170	Expression error	101	Cal secured code error
-171	Invalid expression	102	Cal voltage offset out of range
-178	Expression data not allowed	103	Cal current offset out of range
-200	Execution errors	104	Cal watt offset out of range
-211	Trigger ignored	105	Cal voltage reading out of range
-213	Init ignored	106	Cal current reading out of range
-221	Settings conflict	107	Cal watt reading out of range

Appendix 2: Displayed Equivalent Table.

Due to the limitation of 7-segment display LED, which cannot display some of the English alphabets thereby please refer to following list to understand what the figure displayed represent.

 → 0	 → A	 → K	 → U
 → 1	 → B	 → L	 → V
 → 2	 → C	 → M	 → W
 → 3	 → D	 → N	 → X
 → 4	 → E	 → O	 → Y
 → 5	 → F	 → P	 → Z
 → 6	 → G	 → Q	
 → 7	 → H	 → R	
 → 8	 → I	 → S	
 → 9	 → J	 → T	