

PRODUCT CATALOG

ELECTRONIC HARMONICS METER RELAY

HLC-110/ HLC-110L

ELECTRONIC HARMONICS METER RELAY

HLC-110/ HLC-110L

OUTLINE

* RMS value, fundamental wave RMS value, 5-time harmonic conversion RMS value/ content ratio, n-time harmonic RMS value/ content ratio/ distortion factor can be measured or monitored by 1 unit.

* Most suitable for constant monitoring of harmonics due to harmonics detection and alarm output.



HLC-110/110L
110*110*105mm (600g)

FEATURES

* Alarm output can be extracted: 2 items from 5-time harmonic conversion content ratio, n-time harmonic content ratio and distortion factor.

* Analog output 2 circuits can be attach from measurement elements.

* Record of max.or min value can be retained.

TYPE AND SPECIFICATION CODE

Specification Code

Type	A 3 4 5 6					7 0 9						
	(3) Input circuit	(4) Input range		(5) Auxiliary power		(6) External operation input		(7) Analog output	(9) Alarm output			
HLC-110 No Backlight HLC-110L With Backlight	1	1Φ2W		1	AC85-253V DC80-143V For Both use	0	None	0	No analog/ communication	2	Output: a contact for each (relay)	
	2	1Φ3W				5	5A	2	Reset			1
	3	3Φ3W		6	1A	2		2	0-1mA			
			9	150V	2			DC20-56V	3			1-5V
			A	300V					4	0-5V		
			Z	Except above			5	0-10V				
			1Φ3W									
			5	5A								
			6	1A								
			9	150-300V								
		Z	Except above	Z	Except above	Z	Except above	Z	Except above	Z	Except above	
									Z	Except above		
									Z	Except above		

ELECTRONIC HARMONICS METER RELAY

HLC-110/ HLC-110L

Equipment Specification

Connect system	Input, Auxiliary power M4 screw
	Output, M3 screw
LCD display	Main monitor : Character height 11mm 4 digits
	Sub monitor (L): Character height 6mm 4 digits
	Sub monitor (R): Character height 6mm 4 digits
	Bar graph: 30 dots
Display update time	RMS value: 4 sec. or less (Bar graph: 4 sec. or less) Harmonics: 10 sec. or less (Bar graph: 10 sec. or less)
Measurement	RMS value, fundamental wave RMS value, 5-time harmonic conversion RMS value/ content ratio, n-time harmonic RMS value/ content ratio / distortion factor
Operating temperature/ Humidity range	-10 to +55°C, 30 to 85% RH (No condensation)
Storage temperature range	-25 to +70°C
Material	ABS (V-0) Exterior color: Black (Munsell N1.5)
Mass	600g
Size	Refer to outline drawing (Compatible with wide angle indicator)

Auxiliary Power Specification

Power consumption (With Backlight)	AC85 - 253V 50/60Hz	10VA
	DC80 - 143V	5W
	DC20 - 56V	6W
Power consumption (No Backlight)	AC85 - 253V 50/60Hz	8VA
	DC80 - 143V	4W
	DC20 - 56V	5W
Rush current (For Backlight & No Backlight both use)	AC110V	5.3A (Approx. 1.6ms)
	AC220V	10.5A (Approx. 1.6ms)
	DC110V	3.7A (Approx. 1.6ms)
	DC24V	5.0A (Approx. 2.0ms)
	DC48V	9.9A (Approx. 2.0ms)

ELECTRONIC HARMONICS METER RELAY

HLC-110/ HLC-110L

Input Specification

Input Consumption VA	Voltage circuit rated value: 110V(FS: 150V)		0.25VA or less
	Voltage circuit rated value: 220V(FS: 300V)		0.5VA or less
	Current circuit: 5A, 1A		0.1VA or less
External Operation Input (Reset)	Input Specification	<p><u>Shift input display</u>: Indication reshuffling is possible by adding a voltage signal, function same as a DISPLAY switch.</p> <p><u>Reset input</u>: Reset of the maximum, minimum and warning output are possible by adding a voltage signal.</p> <p>Rating same with auxiliary power, smallest pulse width 300ms impress continuation are possible.</p>	
	Power Consumption	AC, DC100/110V	0.4VA, 0.4W
		AC200V/220V	1.4VA
		DC24V	0.3W
		DC48V	1.2W
	Contact Capacity	AC, DC100/110V	3mA
		AC200V/220V	6mA
		DC24V	10mA
		DC48V	20mA

Output Specification

Analog output: 2 circuits	
Rated value	4 - 20mA: 550Ω or less, 0 - 1mA: 10kΩ or less 1 - 5V: 600Ω more than, 0 - 5V: 600Ω more than 0 - 10V: 2kΩ more than Specify in each circuit identical value. Non-insulation (minus common) between analog output.
Response time	10 sec. or less (In case of average time limit 0 sec.) Time to be within ±1 % of final constant value
Output Ripple	Less than 1% p-p against output span
Alarm output: 2 points	
Output system	Non-voltage 1a contact
Contact capacity	AC250V 8A, DC125V 0.3A (Resistance load) AC250V 2A, DC125V 0.1A (Inductive load)

ELECTRONIC HARMONICS METER RELAY

HLC-110/ HLC-110L

PERFORMANCE

Item	Measuring element	Specification	Allowance *(1)		Note
		Measuring range/ Display specification	Display	Analog output *(2)	
Ammeter digital display	Distortion factor	0.0 - 100.0% (2nd - 15th harmonics) Max. phase display (Automatic change)	±2.5%	±2.5%	Single phase: No phase display Single phase 3 wire: R-T-N (Harmonics is excluded N phase). Analog output of content ratio: Lower limit to upper limit output against 0-100%.
	RMS value	AC5.00A - 8.00kA R-S-T Phase change	±1.5%	±1.5%	
	5-time harmonic conversion content ratio	0.0 - 100.0% Max. phase display (Automatic change)	±2.5%	±2.5%	
	5-time harmonic conversion RMS value	AC5.00A - 8.00kA R-S-T Max. phase display (Automatic change)	±1.5%	±1.5%	
	Fundamental wave RMS value	AC5.00A - 8.00kA R-S-T Max. phase display (Automatic change)	±1.5%	±1.5%	
	n-time harmonic content ratio	0.0 - 100% n = 3,4,5,7,9,11,13,15 Max. phase display (Automatic change)	±2.5%	±2.5%	
	n-time harmonic RMS value	AC5.00A - 8.00kA R-S-T Max. phase display (Automatic change)	±1.5%	±1.5%	
Voltmeter digital display	Distortion factor	0.0 - 20.0% (2nd - 15th harmonics) Max. phase display (Automatic change)	±1.0%	±2.5%	Single phase: No phase display Single phase 3 wire: RN-TN-RT (Harmonics is excluded RT line). Analog output of content ratio: Lower limit to upper limit output against 0-20%.
	RMS value	AC150V - 45.0kV RS-ST-TR Phase change	±1.5%	±1.5%	
	5-time harmonic conversion content ratio	0.0 - 20.0% Max. phase display (Automatic change)	±1.0%	±2.5%	
	5-time harmonic conversion RMS value	AC150V - 45.0kV RS-ST-TR Max. phase display (Automatic change)	±1.5%	±1.5%	
	Fundamental wave RMS value	AC150V - 45.0kV RS-ST-TR Max. phase display (Automatic change)	±1.5%	±1.5%	
	n-time harmonic content ratio	0.0 - 20.0% n = 3,4,5,7,9,11,13,15 Max. phase display (Automatic change)	±1.0%	±2.5%	
	n-time harmonic RMS value	AC150V - 45.0V RS-ST-TR Max. phase display (Automatic change)	±1.5%	±1.5%	
Bar graph display	Bar graph display of main monitoring element				
Display setting potential element	Main monitor, Sub-monitor (L), Sub-monitor (R), Bar graph	Distortion factor, RMS value, 5-time harmonic conversion content ratio, 5-time harmonics conversion RMS value, fundamental wave RMS value, n-time harmonic content ratio, n-time harmonics RMS value (n = 3,4,5,7,9,11,13,15)			
Time update display	Harmonics (Distortion factor, n-time RMS value/ content ratio, 5-time RMS value/ content ratio Fundamental wave RMS value: 10 sec. or less, RMS value: 4 sec. or less)				
Analog output response time	10 sec. or less (Average time limit: 0 min.)				
Setting time limit	Display/ analog output measurement	Average time limit: 0min./ 1min./ 2min./ 5min./ 10min./ 15 min./ 30min. Average measuring			
	Detection	Mean value mode	Detection when average measured value exceeds above setting.		
		Counter time limit mode *(3)	Detection by counter time limit characteristics of instantaneous value regardless of average setting time limit.		
Contact alarm output	Function	5-time harmonic conversion content ratio, n-time harmonic content ratio (n = 3,4,5,7,9,11,13,15), Distortion factor measured value alarm display, alarm contact output at upper limit setting value (Detection max. phase in case of three phase).			
	Setting accuracy	Ammeter : ±2.5%, Voltmeter : ±1.0% % against relative harmonic content ratio 100%			
	Range setting	Ammeter : 5-time harmonic conversion content ratio, n-time harmonic content ratio (n = 3,4,5,7,9,11,13,15), Distortion factor 5 - 100% (1% step), function exclusion, with setting index indication. Voltmeter : 5-time harmonic conversion content ratio, n-time harmonic content ratio (n = 3,4,5,7,9,11,13,15), Distortion factor 1 - 20% (0.1% step), functional exclusion, with setting index indication.			
	Contact output	Non-voltage a-contact 2 items (upper limit 1, upper limit 2) Independence setting			
	Reset system	Automatic or manual (setting)			
Option	Analog output, reset input (max. value, min. value, alarm output)				
Analog output *(2)	Output potential element	Distortion factor, RMS value, 5-time harmonic conversion content ratio, 5-time harmonic RMS value, fundamental wave RMS value, n-time harmonic content ratio, n-time harmonics RMS value (n = 3,4,5,7,9,11,13,15)			

*(1) Allowance:

- Distortion factor, content ratio of digital display: % against content ratio 100%.
- RMS value, n-time RMS value of digital display: % against voltage or current range.
- Analog output: % against output span.

*(2) Analog output is option

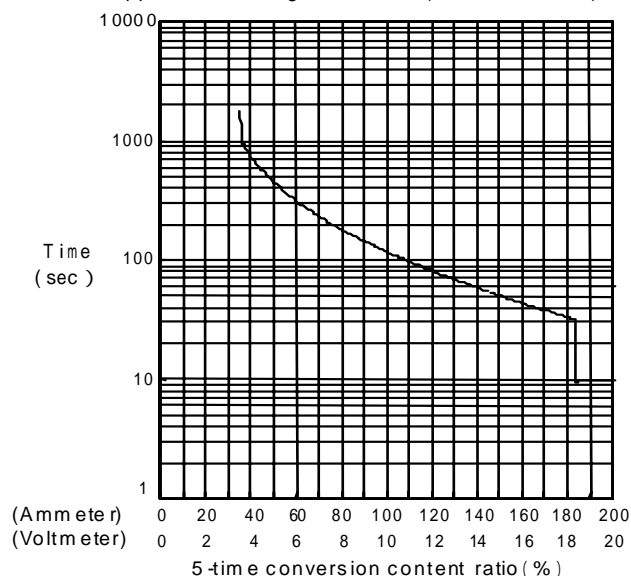
*(3) Only 5-time harmonic conversion content ratio is possible. Either upper limit 1 or upper limit 2 can be setting.

ELECTRONIC HARMONICS METER RELAY

HLC-110/ HLC-110L

PERFORMANCE (Continued)

Alarm output counter time limit characteristic
Upper limit setting value 35% (voltmeter 3.5%)



(Ammeter) 0 20 40 60 80 100 120 140 160 180 200
(Voltmeter) 0 2 4 6 8 10 12 14 16 18 20

5-time conversion content ratio (%)

ITEMS TO SPECIFY WHEN PURCHASE

Specify for type product , specification and units require.

Example of specification. Refer to page 1 for specification code.

Type		Specification code								
HLC-110	L	A	3	5	1	2	1	0	2	
No Backlight :	Blank	Hard	Input	Input	Auxiliary	External	Analogue	Alarm		
With Backlight :	L	Model	Circuit	Range	Power	Operation	Output	Output		
						Input				

*Change from initial setting can be accepted with compensation. Specify the items to change.

Refer to p.14 for initialization value.

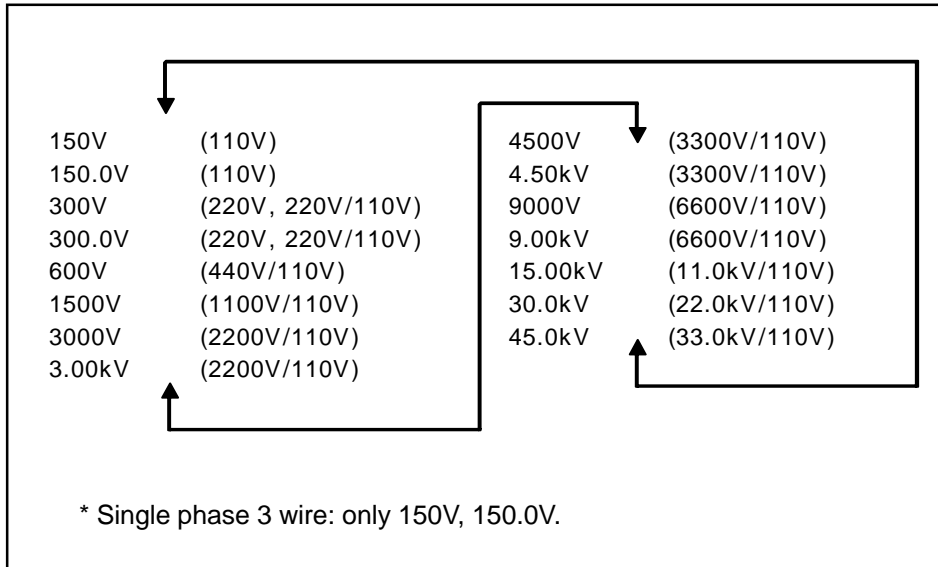
*Have a consultation for specification which is not in specification code.

ELECTRONIC HARMONICS METER RELAY

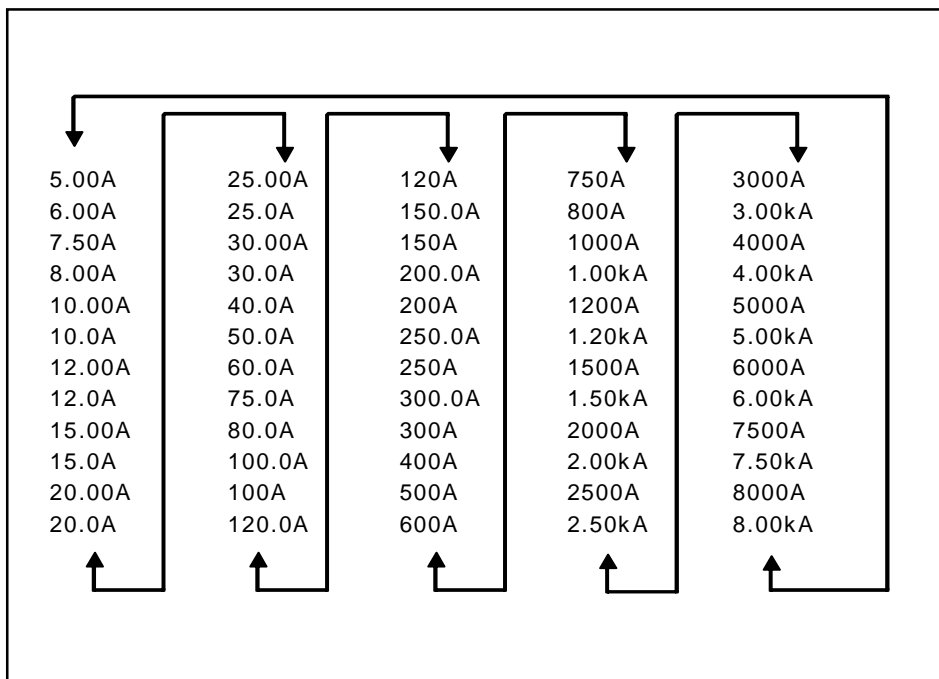
HLC-110/ HLC-110L

Measuring Range

* Voltage Measuring Range



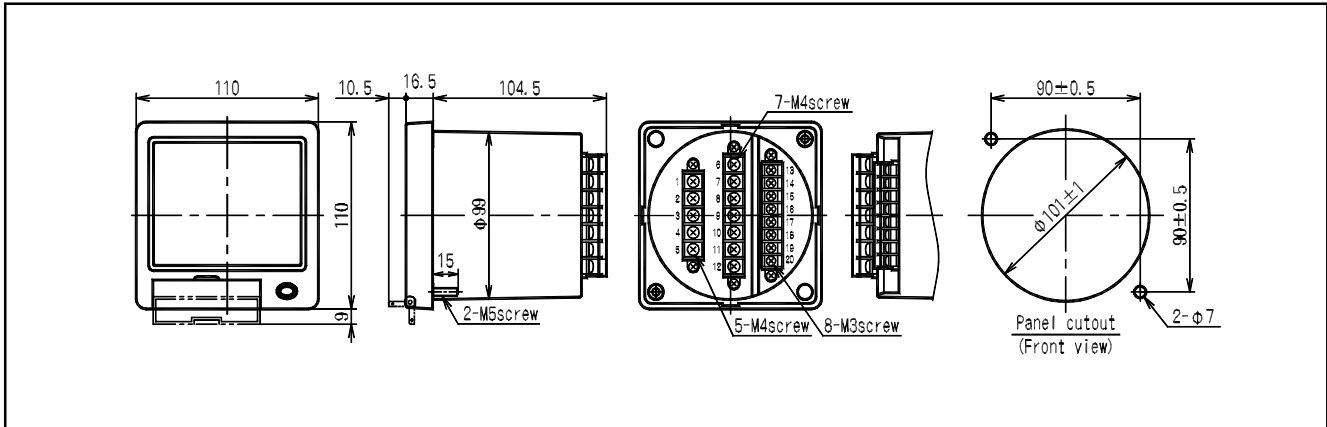
* Current Measuring Range



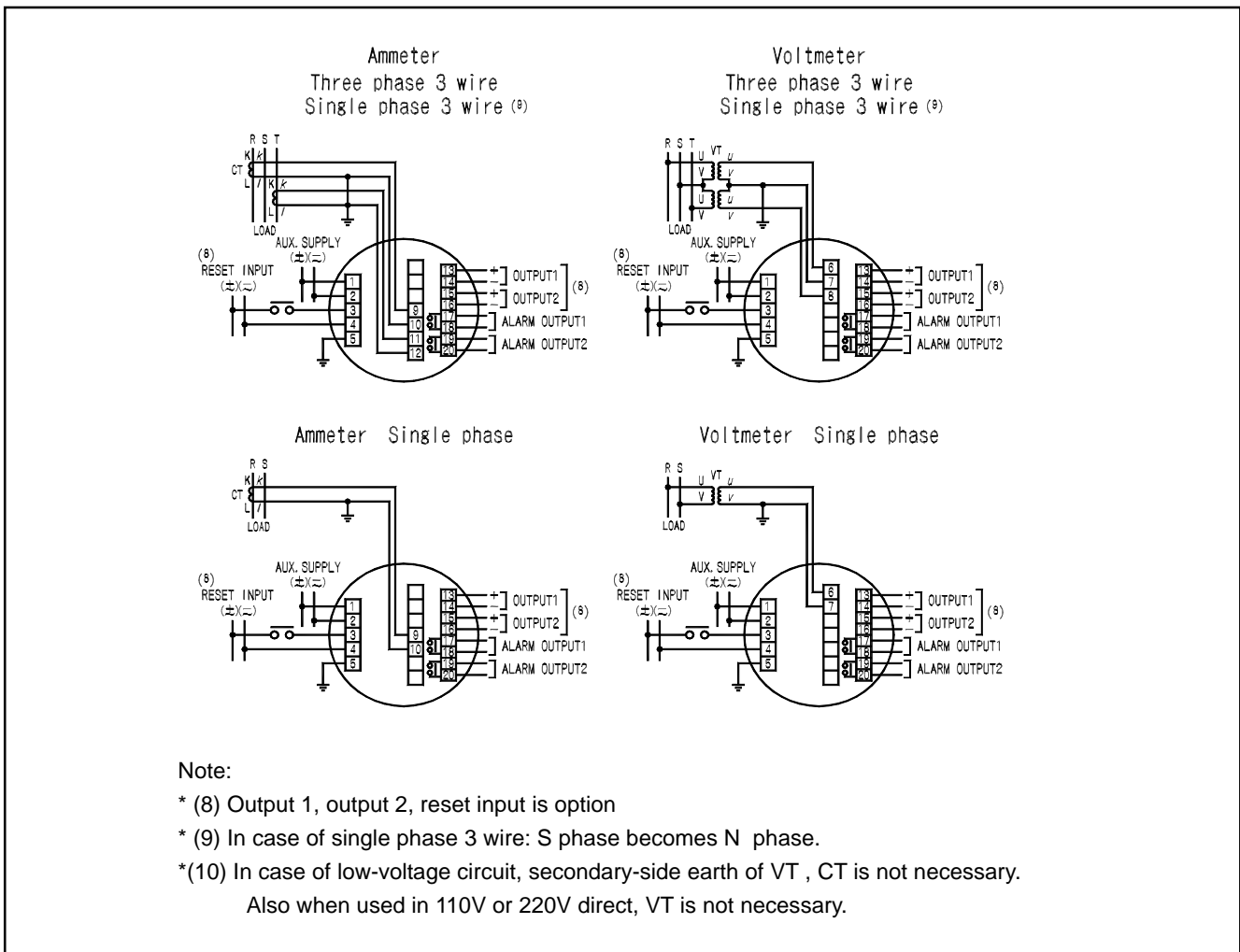
ELECTRONIC HARMONICS METER RELAY

HLC-110/ HLC-110L

Outline Drawing (unit: mm)



Connection Diagram (10)



ELECTRONIC HARMONICS METER RELAY

HLC-110/ HLC-110L

NAME AND THE FUNCTION OF EACH PART

5-time Conversion, n-time, Distortion Factor

When upper limit detection, measurement item detected will blink.

Upper Limit Setting Index

Upper limit alarm setting value is indicated. Upper limit 1 and upper limit 2 can be set individually.

Bar Graph Display

Indicated main monitor measurement value.

Phase Display

Always change and display the max. phase by automatically. (RMS value measurement is excluded).
No display single phase.

SET

This switch is for setting mode use. When press the ON continuously more for 3 sec. display mode will be change to setting mode. This switch is used to set a setting value in setting mode.

-

This switch is used for confirm time limit setting, upper limit 1 and upper limit 2 setting value, voltage (current) and flicker value. This switch also use to carry down the setting value in setting mode. And in **+** main monitor change-over switch operation mode, use this switch to change the measuring elements to opposite direction. (Usual operation)

+

This switch use to changeover the measuring elements for main monitor. Measurement is change by this order.

Distortion factor → 5-time conversion content ratio → 3-time content ratio → 4-time content ratio → 5-time content ratio → 7-time content ratio → 9-time content ratio → 11-time content ratio → 13-time content ratio → 15-time content ratio → RMS value R phase (RS) → * (4) RMS value S phase (ST) → * (4) RMS value T phase (TR) → 5-time conversion RMS value → 1-time RMS value → 3-time RMS value → 4-time RMS value → 5-time RMS value → 7-time RMS value → 9-time RMS value → 11-time RMS value → 13-time RMS value → 15-time RMS value →

The function can be replaced with **DISPLAY** switch by setting * (5)

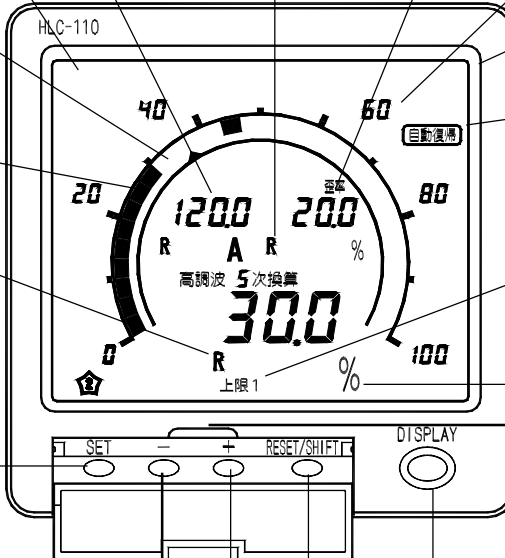
This switch is used to carry up the setting value in setting mode

If not operate for 10 min. display will return to original setting being completed setting pattern.

Digital Display

3 elements can be measured and monitored simultaneously.

Sub monitor (L) Main monitor Sub monitor (R)



Scale Number

Set automatically with measuring range setting.

Max. Min.

Max. and Min. value are indicated.

Automatic Reset, Manual Reset

Indicated the return method of upper limit detection.

Upper Limit 1, Upper Limit 2

Indicated selection of upper limit setting index or contact at detection.

Unit Display

Set automatically with measuring range setting.

In the display mode, max. and min. value of measuring elements are displayed by pressing +/- simultaneously for 1 sec.

DISPLAY

Use this switch to change the AC. 3 phase (*6). The function can be replaced with **+** switch. Setting mode will return to display mode after 1 action. If not operate for 10 min, display will return to original setting being completed setting display.

RESET/ SHIFT

Alarm display and output of upper limit value 1 and 2, max. and min. hold value of each measurement can be reset by pressing ON continuously more for 1 sec. Use this to shift an item in the setting mode.

Note:

* (4) RMS value for S phase (ST), T phase (TR) can be skip in single phase. There is no display of R phase (RS).

* (5) No function to replace **+** switch and **DISPLAY** in single phase.

* (6) Measuring element changeover in single phase.

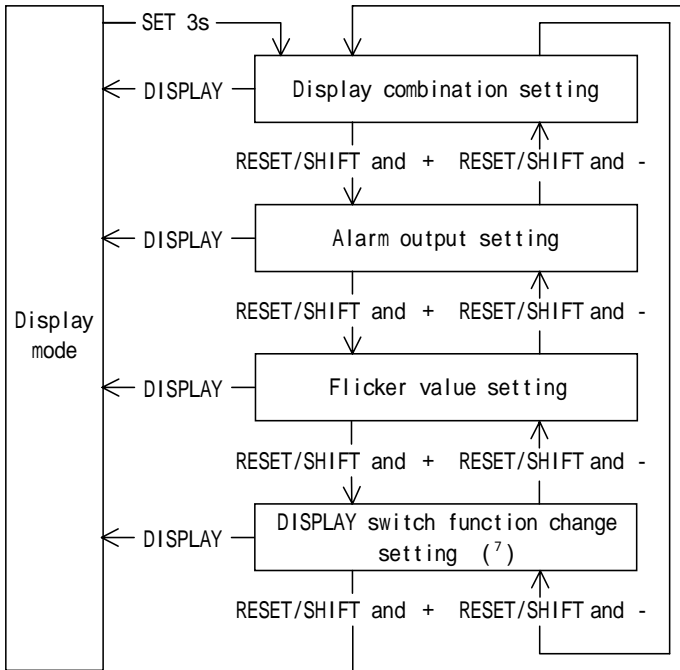
ELECTRONIC HARMONICS METER RELAY

HLC-110/ HLC-110L

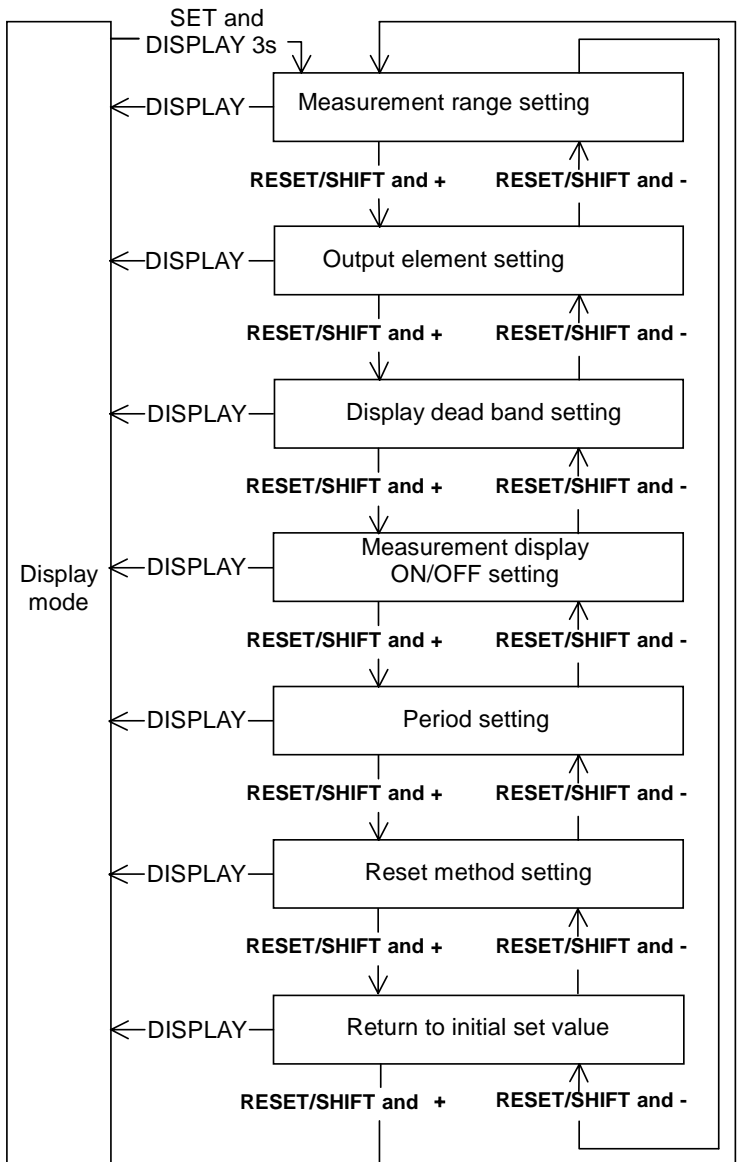
SETTING

Please refer to instruction manual for attachment setting method details.

Setting - 1



Setting - 2



Note:

*(7) Skip in case of single phase.

Refer to Page 13 for display combination (pattern).

ELECTRONIC HARMONICS METER RELAY

HLC-110/ HLC-110L

LC-110 SERIES COMMON SPECIFICATION

Approved Standard/ Pulse Output/ Intensity

Item		Electronic multi meter	Electronic harmonics meter relay	Electronic demand multi meter	Electronic max./ min. multi meter	Electronic overload/ leakage detection meter relay	Electronic three phase current meter	Electronic three phase voltage meter	Electronic DC receiving meter	Electronic DC input meter																																																							
Type	No Backlight	QLC-110	HLC-110	DLC-110	MLC-110	LLC-110	ALC-110	VLC-110	XLC-110	TLC-110																																																							
	With Backlight	QLC-110L	HLC-110L	DLC-110L	MLC-110L	LLC-110L	ALC-110L	VLC-110L	XLC-110L	TLC-110L																																																							
Approved standard		JIS C 1102 -1, -2, -3, -4, -5, -7 JIS C 1111 JIS C 1216 JIS C 1263 Performance conformed EIA standard RS-485	JIS C 1102 -1, -2, -7 JIS C 1111 Performance conformed	JIS C 1102 -1, -2, -3, -5, -7 JIS C 1216 Performance conformed EIA standard RS-485	JIS C 1102 -1, -2, -7 JIS C 1111 Performance conformed EIA standard RS-485	JIS C 1102 -1, -2, -7 JIS C 1111 JIS C 8325 JIS C 8374 JIS C 1216 Performance conformed	JIS C 1102 -1, -2, -7 JIS C 1111 Performance conformed	JIS C 1102 -1, -2, -7 JIS C 1111 Performance conformed	JIS C 1102 -1, -2, -7, -9 JIS C 1111 JIS C 1010-1 Performance conformed EIA standard RS-485	JIS C 1102 -1, -2, -7, -8, -9 JIS C 1111 JIS C 1010-1 Performance conformed EIA standard RS-485																																																							
Pulse output	Output element	Watt-hour OR var-hour	-	Watt-hour	-	Watt-hour	-	-	-	-																																																							
	Output pulse constant	<p>*Output system: Photo MOS - FET relay 1 a contact. Contact capacity: AC, DC125V 70mA (resistance load, inductive load) Output ON resistance: 10Ω or less.</p> <p>*Pulse width: 250ms ±10% (There is a case of 100 - 130ms by range setting.) When the output pulse cycle at the rated electric power becomes the speed of 2 pulses or more per second by setting voltage measurement range, current measurement range, and output pulse unit, the output pulse width becomes 100 - 130ms.</p> <p>*Output pulse cycle = Rated electric power [kW] / output pulse unit [kWh / pulse] / 3600 [sec.] For example: when voltage measurement range: 9000V (6600V / 110V), current range: 80.0A (80A / 5A), output pulse unit: 0.1 kWh / pulse rated electric power = 1kW × (6600 / 110V) × (80 / 5A) = 960 [kW] output pulse cycle = 960 [kW] / 0.1 [kWh / pulse] / 3600 [sec.] = 2.667 pulse / sec. pulse width becomes 100 - 130ms.</p> <p>*Output pulse unit can be set in following range. Output pulse unit is not changed by changing measuring range.</p> <p>Three phase 3 wire / Three phase 4 wire: Full load power (kW, kvar) = 3 × rated voltage (V) × rated current (A) × 10⁻³</p> <p>Single phase 3 wire : Full load power (kW, kvar) = 2 × rated voltage (V) × rated current (A) × 10⁻³</p> <p>Single phase : Full load power (kW, kvar) = Rated voltage (V) × rated current (A) × 10⁻³</p> <table border="1"> <thead> <tr> <th colspan="2">Full load power (kW, kvar)</th> <th colspan="4">Output pulse unit kWh (kvarh) / pulse</th> <th>Multiplying factor</th> </tr> </thead> <tbody> <tr> <td colspan="2">Below 1</td> <td>0.1</td> <td>0.01</td> <td>0.001</td> <td>0.0001</td> <td>0.01 *(1)</td> </tr> <tr> <td>1 or more</td> <td>Below 10</td> <td>1</td> <td>0.1</td> <td>0.01</td> <td>0.001</td> <td>0.1</td> </tr> <tr> <td>10 or more</td> <td>Below 100</td> <td>10</td> <td>1</td> <td>0.1</td> <td>0.01</td> <td>1</td> </tr> <tr> <td>100 or more</td> <td>Below 1000</td> <td>100</td> <td>10</td> <td>1</td> <td>0.1</td> <td>10</td> </tr> <tr> <td>1,000 or more</td> <td>Below 10,000</td> <td>1,000</td> <td>100</td> <td>10</td> <td>1</td> <td>100</td> </tr> <tr> <td>10,000 or more</td> <td>Below 100,000</td> <td>10,000</td> <td>1,000</td> <td>100</td> <td>10</td> <td>1,000</td> </tr> <tr> <td>100,000 or more</td> <td>Below 1,000,000</td> <td>100,000</td> <td>10,000</td> <td>1,000</td> <td>100</td> <td>10,000</td> </tr> </tbody> </table>									Full load power (kW, kvar)		Output pulse unit kWh (kvarh) / pulse				Multiplying factor	Below 1		0.1	0.01	0.001	0.0001	0.01 *(1)	1 or more	Below 10	1	0.1	0.01	0.001	0.1	10 or more	Below 100	10	1	0.1	0.01	1	100 or more	Below 1000	100	10	1	0.1	10	1,000 or more	Below 10,000	1,000	100	10	1	100	10,000 or more	Below 100,000	10,000	1,000	100	10	1,000	100,000 or more	Below 1,000,000	100,000	10,000	1,000	100
Full load power (kW, kvar)		Output pulse unit kWh (kvarh) / pulse				Multiplying factor																																																											
Below 1		0.1	0.01	0.001	0.0001	0.01 *(1)																																																											
1 or more	Below 10	1	0.1	0.01	0.001	0.1																																																											
10 or more	Below 100	10	1	0.1	0.01	1																																																											
100 or more	Below 1000	100	10	1	0.1	10																																																											
1,000 or more	Below 10,000	1,000	100	10	1	100																																																											
10,000 or more	Below 100,000	10,000	1,000	100	10	1,000																																																											
100,000 or more	Below 1,000,000	100,000	10,000	1,000	100	10,000																																																											

* (1) Applied to only DLC-110/ 110L. Even though multiplying factor is 0.01, multiplying factor display is 0.1 (integer digit: 4 digits display Expansion display: 4 digits after decimal point.)

ELECTRONIC HARMONICS METER RELAY

HLC-110/ HLC-110L

LC-110 SERIES COMMON SPECIFICATION

Approved standard/ Pulse output/ Intensity

Strength	Overload capacity	(1) Voltage circuit: 2 times of rated voltage (10sec.) 1.2 times (continuity) (2) Current circuit: 40 times of rated current (1 sec.), 20 times (4 sec.), 10 times (16 sec.), 1.2 times (continuity) (3) Auxiliary power: 1.5 times of rated voltage (10 sec.), 1.2 times (continuity), 1.5 times of rated voltage at DC100/110 (10 sec.), 1.3 times (continuity) (4) DC input circuit (4 to 20mA): 10 times of rated current (5 sec.), 1.2 times (continuity)
	Insulation resistance	(1) Between electrical system and case (ground) DC500V 50MΩ or more (2) Between input, output and auxiliary power DC500V 50MΩ or more (3) Between analog output and pulse output DC500V 50MΩ or more (QLC, DLC, LLC) (4) Between analog output and alarm output DC500V 50MΩ or more (HLC, DLC, MLC, LLC) (5) Between communication output and pulse output DC500V 50MΩ or more (QLC, DLC) (6) Between communication output and alarm output DC500V 50MΩ or more (DLC, MLC) (7) Between pulse output and alarm output DC500V 50MΩ or more (DLC, LLC) (8) Between alarm output 1 and alarm output 2 DC500V 50MΩ or more (HLC, LLC) (9) Between DC input (4 to 20mA), AC input and auxiliary power DC500V 50MΩ or more (QLC with DC input) (10) Between DC inputs DC500V 50MΩ or more (XLC, TLC) (11) Non-insulation by minus common between analog outputs. (QLC, DLC, HLC, XLC, TLC, MLC)
	Withstand voltage	(1) Between electrical system and case (ground) AC2000V 50/60 Hz 1 min. (2) Between input, output and auxiliary power AC2000V 50/60 Hz 1 min. (3) Between analog output and pulse output AC1500V 50/60 Hz 1 min. (QLC, DLC, LLC) (4) Between analog output and alarm output AC1500V 50/60 Hz 1 min. (HLC, DLC, MLC, LLC) (5) Between communication output and pulse output AC1500V 50/60 Hz 1 min. (QLC, DLC) (6) Between communication output and alarm output AC1500V 50/60 Hz 1 min. (DLC, MLC) (7) Between pulse output and alarm output AC1500V 50/60 Hz 1 min. (DLC, LLC) (8) Between alarm output 1 and alarm output 2 AC1500V 50/60 Hz 1 min. (HLC, LLC) (9) Between DC input (4 to 20mA), AC input and auxiliary power AC2000V 50/60 Hz 1 min. (QLC with DC input) (10) Between DC inputs AC2000V 50/60 Hz 1 min. (XLC, TLC) (11) Non-insulation by minus common between analog outputs. (QLC, DLC, HLC, XLC, TLC, MLC)
	Lightning impulse withstand voltage	(1) Between electrical system (analog output/ communication output excluded) and ground 6kV 1.2/50μs positive/negative polarity 3 times for each (QLC, DLC) (2) Between electrical system (DC input 4 to 20mA excluded) and ground 5kV 1.2/50μs positive/negative polarity 3 times for each (3) Between analog output or communication output and ground 5kV 1.2/50μs positive/negative polarity 3 times for each (QLC, DLC) (4) Between auxiliary power and ground 7kV 1.2/50μs positive/negative polarity 3 times for each (LLC)
	Noise capacity	(1) Oscillatory surge voltage 1 to 1.5MHz peak voltage: When attenuated oscillatory waveform (2.5 to 3kV) is applied repeatedly: Measured error: within 10% (power circuit, AC voltage circuit, AC current circuit, XLC, TLC: DC voltage/ current circuit) No communication error/ communication halt (2) Square-wave impulse noise Noise (1μs, 100ns width) is repeatedly applied for 5 min.: Measured error is within 10% AC voltage/ AC current circuit (normal/ common) 1.5 kV or more Power circuit (normal/ common) 1.5 kV or more Pulse output (common) 1.0 kV or more Alarm output (common) 1.0 kV or more Operation input (common) 1.0 kV or more Analog output (Inductive) 1.0 kV or more Communication output (Inductive) 1.0kV or more (3) Radio noise: When radion wave (150, 400, 900MHz) is applied (5W, 1m) intermittently: Measured error is within 10% (4) Electrostatic noise: At the passage of electric current 8kV Measured error: within 10% At no passage of electric current 10kV: No damage (condenser charge system) Note: There are some cases that some item can not be applied for particular model. Refer to type and specification code.
	Vibration/shock	Vibration: 1/2 peak-peak: 0.15mm 10 to 55Hz 1 octave/ min. 5 times sweep Shock: 490m/s ² 3 times for each direction.

ELECTRONIC HARMONICS METER RELAY

HLC-110/ HLC-110L

DISPLAY COMBINATION (Pattern)

(1) Single phase/ Three phase 3 wire/ Single phase 3 wire (Ammeter)

No.	No. Pattern	Main monitor	Sub-monitor (L)	Sub-monitor (R)	Bar graph	Note
1	Pattern 1	5-time harmonic conversion content ratio	RMS value A(R)	Distortion factor	Max. + 5-time harmonic conversion content ratio	Standard
2	Pattern 2	5-time harmonic conversion content ratio	5-time harmonic content ratio	7-time harmonic content ratio	Max. + 5-time harmonic conversion content ratio	Specification
3	Pattern 3	Distortion factor	RMS value A(R)	5-time harmonic content ratio	Max. + Distortion factor	
4	Pattern 4	Distortion factor	5-time harmonic content ratio	7-time harmonic content ratio	Max. + Distortion factor	
5	Pattern 5	5-time harmonic content ratio	RMS value A(R)	7-time harmonic content ratio	Max. + 5-time harmonic content ratio	

(2) Single phase/ Three phase 3 wire/ Single phase 3 wire (Voltmeter)

No.	No. Pattern	Main monitor	Sub-monitor (L)	Sub-monitor (R)	Bar graph	Note
1	Pattern 1	Distortion Factor	5-time harmonic content ratio	7-time harmonic content ratio	Max. + Distortion factor	Standard
2	Pattern 2	Distortion Factor	RMS value V(RS)	5-time harmonic content ratio	Max. + Distortion factor	Specification
3	Pattern 3	5-time harmonic conversion content ratio	RMS value V(RS)	Distortion factor	Max. + 5-time harmonic conversion content ratio	
4	Pattern 4	5-time harmonic conversion content ratio	5-time harmonic content ratio	7-time harmonic content ratio	Max. + 5-time harmonic conversion content ratio	
5	Pattern 5	5-time harmonic content ratio	RMS value V(RS)	7-time harmonic content ratio	Max. + 5-time harmonic content ratio	

ELECTRONIC HARMONICS METER RELAY

HLC-110/ HLC-110L

INITIALIZATION VALUE

No	Setting Item		3 Phase 3 Wire / Single Phase				Single Phase 3 Wire	
			Ammeter	Voltmeter		Ammeter	Voltmeter	
				110V input	220V input			
1	Display Combination	Pattern	Pattern 1	Pattern 1		Pattern 1	Pattern 1	
		Main monitor	5-time harmonic conversion content ratio	Distortion factor		5-time harmonic conversion content ratio	Distortion factor	
		Sub monitor (L)	RMS value A(R)	5-time harmonic content ratio		RMS value A(R)	5-time harmonic content ratio	
		Sub monitor (R)	Distortion factor	7-time harmonic content ratio		Distortion factor	7-time harmonic content ratio	
		Bar graph	Max. + 5-time harmonic conversion content ratio	Max. + Distortion factor		Max. + 5-time harmonic conversion content ratio	Max. + Distortion factor	
2	Flicker	Current	Upper limit	100.0A (/5A) *(2)	-		500A (/5A)	-
		Voltage	Upper limit	-	7260V (/121V) *(3)	242V	-	110.0V
			Lower limit	-	5940V (/99V) *(4)	198V	-	90.0V
3	Current range		100.0A (100A/5A) *(2)	-		500A (500A/5A)	-	
4	Voltage Range		-	9000V (6600V/110V) *(5)	300V (220V direct)	-	150V (100-200V)	
5	Output 1 Factor *(1)		Analog output : 5-time harmonic conversion content ratio	Analog output : Distortion factor		Analog output : 5-time harmonic conversion content ratio	Analog output: Distortion factor	
6	Output 2 Factor *(1)		Analog output : RMS value A(R)	Analog output: 5-time harmonic content ratio		Analog output : RMS value A(R)	Analog output : 5-time harmonic content ratio	
7	Alarm Output 1	Detection Characteristic	Counter time limit mode	Mean value mode		Counter time limit mode	Mean value mode	
		Element	5-time harmonic conversion content ratio	Distortion factor		5-time harmonic conversion content ratio	Distortion factor	
		Upper Limit Detection Value	35%	3.5%		35%	3.5%	
8	Alarm Output 2	Detection Characteristic	Function cancellation	Mean value mode		Function cancellation	Mean value mode	
		Element	Function cancellation	5-time harmonic content ratio		Function cancellation	5-time harmonic content ratio	
		Upper Limit Detection Value	Function cancellation	3.5%		Function cancellation	3.5%	
9	Time Limit		0 min. (display average time at counter time limit)	0 min. (display average time and detection time limit)		0 min. (display average time at counter time limit)	0 min. (display average time and detection time limit)	
10	Return Method		Automatic return	Automatic return		Automatic return	Automatic return	

Note:

*(1). Only for select the option.

*(2). 50.0A (/5A) when single phase specification.

*(3). 3630V (/121V) when single phase specification.

*(4). 2970V (/99V) when single phase specification.

*(5). 4500V (3300/ 110V) when single phase specification.