



HARMONIC INDICATOR HAR 9000

FEATURES

- ✍ Display of true RMS voltage and current
- ✍ Readings on full scale of voltage and current
- ✍ THD in % of voltage
- ✍ THD in % of current
- ✍ Individual Harmonic Display in % of voltage and current
- ✍ Individual Harmonic Display in magnitude for voltage and current
- ✍ Total demand distortion (TDD)
- ✍ Measures upto 31st Harmonics
- ✍ Suitable for continuous harmonic monitoring
- ✍ RS485 Communication port with MODBUS-RTU protocol
- ✍ Derating of Transformers, cables, breakers can be decided
- ✍ Effects of the mitigating devices / Filters can be quantified

APPLICATIONS

- ✍ To measure the harmonics at the non linear load for equipment selection and finalize the operating method of the load
- ✍ To measure the harmonics in the branch circuit where the non-linear load is connected along with other neighboring linear loads, to safeguard the linear loads by suitable filters / mitigating devices
- ✍ To measure the harmonics at the Transformer secondary to safeguard the transformer and other connected loads by suitable filters and mitigating devices
- ✍ To measure at the point of commencement of supply to ascertain that the presence of harmonics is within statutory limits stipulated by EB.
- ✍ To measure the harmonics at the DG bus to ascertain the generated voltage is within the specified harmonic level
- ✍ To measure the harmonics at APFC panels to safeguard the capacitors and to know the harmonic amplification due to parallel resonance



INTRODUCTION: Major parameter affecting the Power Quality is the presence of harmonics in the Power System. Harmonic Currents are generated by Non-linear loads in the Power System as detailed in Appendix - 1. Harmonic currents so generated cause distortion in voltage in turn causes further harmonic currents in good Linear loads such as Transformers, Induction motors, Heaters and Capacitors. Additional Harmonic currents in the linear loads further distort the voltage. Finally harmonic currents originated in the non-linear load are multiplied and spreaded to all circuits and components of the Power System creating a lot of undesirable effects. Effects of Harmonics are detailed in Appendix - 2. There are a lot of international standards specifying the limits for current and voltage Harmonics as detailed in Appendix - 3 for various system voltages for trouble free running of the equipments with minimum losses in the Power System.

NEED OF HARMONIC MEASUREMENT: To know the level of Harmonics generated by the non-linear loads and to know the total harmonics in the particular feeder, transformer or at the point of commencement of supply, a good Harmonic Indicator with reasonable accuracy is required to mitigate the Harmonics to the limit specified by the standards. As of now, expensive Power Flow study is to be conducted for a specific time which requires experts for measurement and analysis. This method does not reveal the details for other times as the Harmonics present will vary with load and other power supply situations with EB or DG. Hence a sample measurement will not be adequate to design the mitigating devices or any alternate methods. A simple low cost panel mounted Harmonic Indicator with reasonable accuracy will be immensely useful to address all the issues created by Harmonics. ICD has developed such a meter to indicate both voltage and current harmonics present. Individual and total Harmonic currents are indicated in magnitude as well as in percentage of fundamental.

GENERAL DESCRIPTION: Input to the ICD Harmonic Indicator is 3 voltage signals and 3 current signals from 3 phase supply with suitable PT's and CT's. Advanced microcontroller is used to compute all the indicated values with better accuracy. Meter is tested at Government Approved Laboratory for Total Harmonics. RS 485 communication facilitates data acquisition for analysis.

TECHNICAL SPECIFICATION

MEASURED QUANTITIES

Parameter Shown : 1) 3 Phase Voltage
 2) 3 Phase Current
 3) THD in % for R, Y, B Voltage and R, Y, B Current
 4) Individual Harmonic Display (2-31st) in percentage as well as magnitude for R, Y, B voltage and R, Y, B current
 5) TDD in % for R, Y, B voltage and R, Y, B current

RATINGS

Voltage Range : 80V to 520V AC line to line for LT
 25V to 140V AC line to line for HT
 Standard Current : 1A / 5A
 Max. Current : 1.5A / 7.5A
 Frequency Range : 40.00 to 60.00 Hz (Fundamental)
 Auxiliary Supply : 240V AC (-20% to +10%)
 Operating Temperature : 55° C (Max.)

DISPLAY

Type : 2 Row 16 Character LCD with Backlit
 Character Size : 4.35 (H) x 2.95 (W) mm
 LCD Power Save Mode : Provided. When no key is pressed for 3 minutes, the LCD Backlit is switched OFF to save power and enhance the life of LCD. The LCD is switched ON when any key is Pressed

KEY FUNCTIONS

Key Pad : 4 Keys namely Index, Shift, Increment and Enter used for Program mode setting and Run mode selection
 Program mode Parameters : PT Primary Voltage, CT Primary Current, Device address
 Unauthorised Person Entry Protection : Provided through Password Facility

COMMUNICATIONS

Type : RS485, Ethernet
 Protocol : MODBUS - RTU, MODBUS - TCP
 Isolation : Provided
 Traffic Status : Indicated through TXD, RXD LED

CASE AND DIMENSIONS

Enclosure : ABS Plastic
 Dimension : 96(H) x 96(W) x 120(D) mm
 or 96(H) x 96(W) x 80(D) mm
 Cutout : 88(H) x 88(W) mm
 Mounting : Flush / Panel

PARAMETERS DISPLAYED

PARAMETERS	RANGE	RESOLUTION	ACCURACY
R, Y, B Voltage (LT Meter)	180 V - 270 V	0.1 V	± 0.5% + 2 least digit
R, Y, B Voltage (HT Meter)	Primary Voltage	0.01 kV	± 0.5% + 2 least digit
Current	0 - 100 A 100 A & above	0.1 A 1 A	± 0.5% + 2 least digit
THD R, Y, B Voltage R, Y, B Current	0 - 100%	0.1%	± 2% Over full scale for load above 20% ± 5% Over full scale for load below 20%
Individual Harmonic Display (2-31st Harmonic in Percentage)	0 - 100%	0.1%	± 2% Over full scale for load above 20% ± 5% Over full scale for load below 20%
Individual Harmonic Display (2-31st Harmonic in Magnitude) Voltage	0 - 100 V	0.1 V	± 2% + 2 least digit
Individual Harmonic Display (2-31st Harmonic in Magnitude) Current	0 to Primary Current set	1 A	± 2% + 2 least digit
TDD R, Y, B Voltage R, Y, B Current	0 - 100 %	0.1%	± 2% Over full scale for load above 20% ± 5% Over full scale for load below 20%

Appendix - 1: ORIGIN OF HARMONICS

HARMONIC DISTURBANCES ARE CREATED BY NON-LINEAR LOADS

- Power Electronic loads (Rectifiers, Variable speed drives, UPS systems, Invertors etc.)
- Ferro magnetic devices (Transformers)
- Arcing devices (Arc Furnace equipments)

Appendix - 2: EFFECTS OF HARMONICS

- Tripping of circuit breakers and fuses
- Overloading / decrease of life time of transformers
- Overloading of capacitors
- Losses in distribution equipment
- Excessive currents in the neutral conductor
- Malfunctioning of the electronic controls and computers
- Measurement errors in the metering systems

Appendix - 3: LIMITS OF HARMONICS

CURRENT LIMITS, LOW VOLTAGE SYSTEMS IEEE-519 Maximum odd harmonic current limits for general distribution systems 120V through 69kV		CURRENT LIMITS, HIGH VOLTAGE SYSTEMS IEEE-519 Maximum odd harmonic current limits for general distribution systems 69.001kV through 161kV		VOLTAGE LIMITS IEEE-519 Voltage distortion limits		
Isc/IL	THD	Isc/IL	THD	Bus voltage at PCC	Individual Harmonics	THD
<20	5.0%	<20	2.5%	69kV and below	3.0%	5.0%
20-50	8.0%	20-50	4.0%	69.001kV-161kV	1.5%	2.5%
50-100	12.0%	50-100	6.0%	above 161kV	1.0%	1.5%
100-1000	15.0%	100-1000	7.5%			
>1000	20.0%	>1000	10.0%			

PLEASE PROVIDE THE FOLLOWING DETAILS WHILE PLACING YOUR ORDER / ENQUIRY

- Voltage Input
- Current Input
- HT / LT Application
- CT Primary
- PT Primary
- Self Powered / External Supply.

OUR RANGE OF PRODUCTS

Volt Meter, Ammeter, VAF Meter, Energy Meter, Dual Source Meter, Load Manager, Power Multimeter, Trivector Meter, Maximum Demand Controller, Harmonic Indicator, Power Factor Controller, Smart PF Controller, Power Factor Correction Panel, AC Voltage Controller, AC Current Controller, Motor Protection System, Voltage/Current/Power/Frequency Transducer, Power Transmitter, Energy Management and Billing Systems etc...



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