imc POLARES

Version 1.13

Power quality analyzer per EN 50160, power measurement devices and event analyzer

imc POLARES is a multi-function measurement device for all physical quantities designed for standards-compliant evaluation of the quality of electrical supply networks.

imc POLARES is a power measurement and power analysis system all in one. The power on up to 4 differently circuited lines are measured and analyzed to a resolution of up to the 50th upper harmonic frequency.

A variety of event and triggering mechanism can be defined, enabling efficient evaluation of external influences on the power quality.

Order code: **imc Polares**

Construction

- Compact, robust plastic housing 260 x 75 x 300 (W x H x D in mm)
- Weight: 2,5 kg without power supply unit
- 3“ LCD - Display, 2-color
- 2 slots for storage media or WLAN card
  1 x slot for PCMCIA - Flash card or WLAN - card (WLAN card optional)
  1 x slot for CompactFlash card (CompactFlash card optional)

Terminal connections

- 4x isolated voltage inputs: 4mm safety jacks as per IEC 1010, Cat. III.
- 4x isolated current transformer inputs: COMBICON DFK feed-through plug connectors, current transformers not included, see options
- Separate 4 mm safety ground connection socket
- PC connected via Ethernet TCP/IP 10/100 MBit via RJ 45
- DSUB connection terminal for external DCF or GPS radio clock
- BNC connection for synchronization of multiple devices
- Prepared RJ 11 connector for optional modems

Power supply

- 10 – 32 V DC or
  110 V / 230 V via included power adapter.
- Internal UPS, buffer time 30[1] sec per power outage, total buffer time < 8 min[2] .
- Automatic measurement operation with self-activation following power outage
- Automatic charging control
- Automatic data saving upon power outage
- Power consumption < 15 Watt with charged UPS battery

[1]*Other times available upon request*
[2]*The total time depends on the device configuration*

Operating conditions

- Storage temperature: -20°C .. 85°C
- Operating temperature: -10°C .. 55°C no condensation, extended temperature range optional
- Rel. humidity 5 .. 95 %
- Shock resistance 30 g pk over 3 ms

Included software

- Complete turnkey PQA software for standards-compliant operation, adjustment, display of measured data and report composition under MS Windows2000, -XP, Vista and Windows7.

Included accessories

- 230/110 V power adapter (optionally with country-specific power cable)
- 2 GB – Compact Flash storage
- English operating instruction printed
- German and English operating instruction and system manual as online help and PDF on CD

Measurement properties

Measurement channels

- 8 isolated, differential, analog inputs for current and voltage measurement

Data storage

- HD – Controller for PCMCIA Flashcards and CompactFlash card for up to 16 GB (optional) to date

Miscellaneous

- PC-independent measurement operation
- Message transmission upon occurrence of various events.
  E-Mail, SMS or fax upon, for example, power outage/ voltage dip, device disturbance etc.

Optional expansions:

- Database module
  - Analysis of and search for events such as standards violations.
  - Tabular event classification by duration, amplitude etc.
- In-Rush module
  - Software for freely configured short-term measurement.
  - Freely configurable measurement data capture, up to 50 kHz sampling rate per channel.
  - Definable threshold or rage triggers, trigger combinations, pre-triggers etc.
- Extended temperature range
  for operation temperatures of –20°C .. 85°C with condensation as per IEC 60664 Pollution Degree 2
- German and English system manual printed
- Removable Flash PCMCIA storage media and CompactFlash cards.
  Shock-resistance during operation 1000 g, upon request also in the extended temperature range,
  CompactFlash cards available in volumes of 1.0GB, 2.0GB, 8.0GB and 16GB.
  - We cannot take responsibility or offer guarantees for the functioning of and reliability of data stored on storage media which we have not specially tested and approved. Please contact our Hotline for more info.
- Wireless LAN PCMCIA card for access points and Clients.
  Additional WLAN accessories (access points, converters, antennas) upon request.
- Modems installed at factory (optional)
  - Analog modem: , V.92 / 56k max., Fax Group 3
  - Euro-ISDN modem (optional): 64k max., B-Channel-Protocol, X.75, PPP
  - GSM dual-band modem 900/1800: 14.4k GSM circuit switched data / 9.6k max., Fax Group 3, Fax Class 2

Current transformers (optional):

- Clamp current probe
  Mini measurement probe, AC-current measurement, 10 A~ / 1V~, 1 channel
  IEC 1010.2.032, CAT III, 600 V for industrial applications
  Slip-proofing, cable crush guard
  Enclosed diameter up to 20 mm
  Connected directly to the device's current probe input.
  Includes »PLUG & MEASURE« sensor recognition, per-channel memory chip (TEDS).
- Flexible current transformer, length 45 cm or 80 cm
  (Rogowski-coil) AC-current measurement, 2000 A~ / 2 V~, 1 channel
  IEC 61010-1, CAT III, 1000 V for industrial applications
  Direct conection.
  Includes »PLUG & MEASURE« sensor recognition, per-channel memory chip (TEDS).
- Re-equipping with and calibration of customer-supplied current probes possible upon request.

Technical data imc POLARES

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Parameter	typ.	min. / max.	Test conditions/ Remarks
ambient conditions	The *normal* ambient conditions according to EN 61010-1 apply (see “Operating conditions” in Chapter 0). These ambient conditions are can be broadened in accordance with the statements made in these technical specs		
power consumption	11 W	< 20 W	With fully charged UPS rechargeable battery
power supply		10 V to 36V DC	external 110 V to 230 V AC supply unit
UPS	buffer time: 1seconds per power outage		23°C, for fully charged UPS battery, extension possible
electrical safety rated voltage/ measurement category pollution degree		600 V / CAT III 600 V / CAT III 2	in accordance with EN 61010-1 voltage inputs U1 .. U4 current probe inputs I1 .. I4 in accordance with 60664
Isolation strength		5,4 kV_{RMS}	permanent, 50 Hz, 1min test voltage
protection degree		IP 20	
weight	2,5 kg	< 2,6 kg	without power adapter
dimensions (WxHxD)	260 mm x 85 mm x 300 mm		without plug
ambient temp. range	-10°C to 55°C -20°C to 85°C (optional)		no condensation extended temp. range (with condensation as per IEC 60664 Pollution Degree 2)
storage temperature	-20°C to 85°C		
bandwidth	5 kHz 0 to 6,5 kHz 0 to 14 kHz		network analysis <±0,1 % -3 dB
interfaces	Ethernet, wireless LAN modem		TCP/IP
memory capacity	PCMCIA-Flashcard CompactFlash card		up to 16 GB up to 16 GB
accessories	signal-specific connection terminal, table-top power adapter incl. network line (operating temp range 5°C to 40°C)		

Voltage inputs

Parameter	typ.	min. / max.	Test conditions/ Remarks
4 channels for voltage measurement			
terminals	8 x 4 safety jacks, 4 mm		
input range	±1000V		crest value
bandwidth		5 kHz 14 kHz	-3 dB network analysis -3 dB with inrush module
sampling rate	10 kHz	 ≤50 kHz	per channel with network analysis per channel with inrush module
overvoltage protection		±1450V	differential, long-term
input impedance	2,0 MΩ	±1%	
input coupling	DC		isolated
gain uncertainty drift	0,02 % ±5 ppm/K*ΔT_a	≤0,05 % ±15 ppm/K*ΔT_a	 ΔTa=|Ta -25°C| ambient temperature Ta
offset drift	0,02 % ±5 ppm/K*ΔTa	≤0,05 % ±15 ppm/K*ΔT_a	 ΔTa=|Ta -25°C| ambient temperature Ta
isolation suppression		 > 130 dB >70 dB >44 dB	Isolation voltage: 500Vrms. DC 50Hz 1kHz
phase uncertainty		0 Hz bis 2,5 kHz	<±1°
input noise suppression		<60 mV	

Current inputs

Parameter	typ.	min. / max.	Test conditions/ Remarks
4 channels for current measurement with current probes			
terminals	4 x 3-pin Phoenix plugs (PC 4/3-G)		matching plug: PC-4/3-ST(F)-7,62
input range	±5V depending on the current probe used		Converters, e.g.: MN71 0.01 - 12A~ AmpFLEX A100 5 - 2000A~
bandwidth		5 kHz 14 kHz	-3 dB with network analysis -3 dB with inrush module
sampling rate	10 kHz	 ≤ 50 kHz	per channel with network analysis per channel with inrush module
overvoltage protection		±100V	long-term
input impedance	500 kΩ	± 1%	isolated
gain uncertainty drift	0,05 % ±3 ppm/K·ΔT_a	≤ 0,1 % ±15 ppm/K·ΔT_a	 ΔT_a=|T_a -25°C| ambient temperature Ta
offset drift	0,02 % ±3ppm/K·ΔT_a	≤ 0,05 % ±15 ppm/K·ΔT_a	 ΔT_a=|T_a -25°C| ambient temperature Ta
isolation suppression		 >130 dB >105 dB > 80 dB	Isolation voltage: 500 Vrms. DC 50 Hz 1 kHz
phase uncertainty		0 Hz bis 2,5 kHz	<±1°
input noise voltage noise suppression	75 µV	 > 86 dB	 Bandwidth: 100Hz

[2] for input voltages >3 V the impedance is 83 kΩ.

Current measurement with MN71 current probe

Parameter	Value (typ. / min.max.)		Remarks
input range	10 A, 5 A bis 2,5 A		RMS-values, crest factor <1,5
overload protection		≤200 A	long-term t, f ≤ 1 kHz, crest factor <1,5
measurement uncertainty	0,3 %	≤ 0,7 % ±1 mA	50 Hz, sinus
measurement bandwidth	40 Hz to 6,5 kHz		<±0,5 %
phase uncertainty	40 Hz to 2,5 kHz		< ±1°

Current measurement with AmpFlex A100 (2kA)

Parameter	Value (typ. / min.max.)		Remarks
input range	2000 A		RMS-values, crest factor <1.5
overload protection		≤3000 A	long-term t, f≤1 kHz, crest factor <1.5
measurement uncertainty	0,2 %	≤ 0,6 % ±1 A	50 Hz, sine
measurement bandwidth	40 Hz to 6,5 kHz		< ±0.6%
phase uncertainty	40 Hz to 2,5 kHz		< ±1°

Computations

Computations		
voltage, current	RMS-values Curve plots (reduced RMS values)	Moving RMS value with each half-period over one period One data point at least per 23:30 h
flicker	short-term and long-term flicker momentary flicker value and maximum	optional
frequency	50 Hz 60 Hz	40 Hz to 57,5 Hz 50 Hz to 69 Hz
harmonics	voltage, current, power, cos phi up to the 50th,THD	
interharmonics	up to 10 frequencies 10 Hz to 3000 Hz, resolution: 5 Hz	
symmetry	zero-, positive-, negative phase sequence system	
power	single- or multi-wire, overall system	active, reactive, apparent power power factor
trigger	for voltage and current – RMS-trigger, curve shape trigger signal frequency trigger (e.g. ripple control signals)	amount of triggered recordings limited only by the memory card used
voltage events	overvoltage, dips, outages, rapid voltage fluctuations slow voltage fluctuations	

Evaluations / Standards		
	Voltage quality as per EN 501606 Data search and data comparison across multiple measurements	IEC 61000-4-30, -15, -7 Power calculation as per DIN 40110-1 and –2 optional software module

Synchronization and time base

Parameter	value typical	min. / max.	Remarks
time base per device without external synchronization			
balanced (default)		±10 ppm	at 25°C (accuracy of internal time base)
Drift	±20 ppm	±50 ppm	-40 °C bis +85 °C operating temp.
Ageing		±10 ppm	at 25°C, 10 years

time base per device without external synchronization				
Parameter	**GPS**	**DCF77**	**IRIG-B**	**NTP**
Supported format			B002 B000, B001, B003*	version 4 (downwards compatible)
Precision	±1 µs			<5 ms after ca. 12 h
Jitter (max.)	±8 µs			
Voltage level	TTL	5 V TTL level LOW active	5 V TTL level	---
Input resistance	1 kΩ (pull up)	20 kΩ (pull up)		---
Input connector	DSUB-9	SMB connector "SYNC" short circuit proof, not isolated		Ethernet
Shield potential input		system ground		---

*using BCD information only

Synchronization with DCF77 for several devices (Master/Slave)			
Max. cable length		200 m	SMB cable
Max. number of devices		20	slaves only
Common mode	0 V		theses device must have the same ground voltage level, otherwise signal quality problems (signal edges) may result.Remedy see ISOSYNC
Voltage level	5 V		
DCF input/output	SMB connector "SYNC"		
Shield potential, IRIG-input	system ground		

ISOSYNC with different potentials			
Isolation strength	1000 V		1 minute
Delay	5 µs		@ 25°C
Temperature range		-35°C to +80°C	

Calibration conditions

Calibration conditions		
Parameter	**typ.**	**Test conditions / Remarks.**
temperature	23 °C	±5 °C
humidity	40 %	±30 %
power supply	24 V	60 W power adapter

RS232 interface for GPS

The following RS232 settings are required to use a clock module Meinberg GPS161AHSx or HOPF6875. Garmin GPS receivers will be set to 38400 by *imc POLARES* .

8n1: 8 bit, no parity, 1 stop bit, no flow control

Baudrate: Autobaud for 4800, 9600, 19200, 38400, 57600, 115200.

Internal modem

The following data on the modular modems pertain only to the properties supported by imc. Information on other properties of the modular modems are available upon request.

Analog modem

Supported protocols	**Data transfer** • V.92 / 56k max data speed **Fax Group 3** • Fax Class 2 • Fax Class 2.0/2.1
Accreditation	Global (50 countries)

Euro-ISDN Modem

Protocols supported	**Data transfer** • 64k max data **B-Channel protocol** • X.75 • PPP
Accreditation	Europe

Dual band 900/1800 GSM modem

Protocols supported	**Data transfer** • 14.4k GSM circuit switched data / 9.6k max data speed **Fax Group 3** • Fax Class 2
Accreditation	Europe