



**Features**

- 4 voltage channels and 4 current channels with transformer isolation, using internal CT and PT (96×96 model is without PT, but it is possible to be added)
- Nominal Voltage for voltage channels can be either 100V or 110V, phase to ground (can be chosen up to 230V)
- Nominal Current for current channels is either 1A or 5A
- Current Measurement Range
  - For 5A, it is from 10mA to 10A, and 1A to 100A
  - For 1A, it is from 2mA to 2A, and 200mA to 20A
- Maximum 64 digital input channels with nominal voltage equal to 110 or 48 or 24VDC, and are isolated by Opto-coupler isolation (in 96×96 model, maximum number of digital inputs is 32 )
- Sampling Period for each voltage and current channel is equal to 128μs (approximately 7kHz)
- 16 bit A to D IC is used
- It comes in two models, compatible with 19" standard racks and 96×96 standard
- Real-time displaying of measured and calculated quantities on 4×20 characters LCD display
- Can be used for different types of distribution networks, and extra high voltage distribution networks (380V to 400kV)
- Measurement Precision for voltages and currents is better than 0.2%
- Capability of Logging, Event Recording, Online Trend and Archive Trend
- Memory backup battery works up to two years without mains power (efficient battery life line is 10 years).
- Connects to PC via residential telephone lines, PLC and DLC networks, RS485 (if its card is ordered), or RS232, or Infrared with transmission rate equal to 115200 bps
- Power Supply can be from 80 to 250VAC, and 100 to 300VDC
- In order to send alarm or command, digital outputs can be added in the form of open collector NPN circuits which can tolerate currents up to 100mA and voltages up to 40VDC



IPF-9600



IPF-1900

**Memory**

The device has 64MB of Flash Memory, 33 MB of that is allocated for Log, 27MB is for Fault, and 4MB is for Event.

**Using GPS**

GPS system can be used to adjust clock of the device, therefore all devices which are positioned in different geographical places have clocks synchronized by global time with accuracy of better than 1ms.

**Standalone**

The device works independent of other devices and peripheral PC. As mentioned before each device has a Flash Memory in which, data of logs, events, faults, and other needed data is stored. Whenever PC is on, the stored data can be read and saved by the PC.

**Software Upgrade**

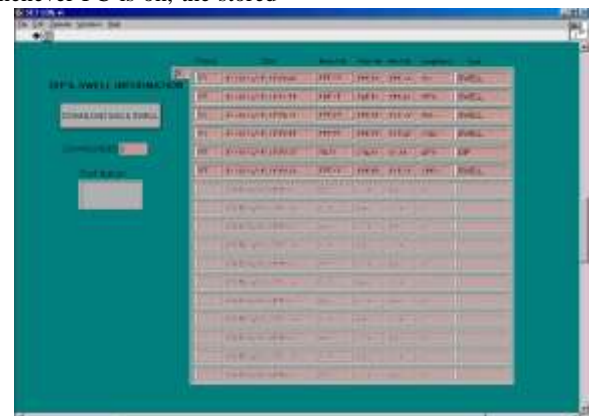
System Software Upgrade can be done without making any changes in the hardware. The new software can be uploaded from PC and via a communication link.

**Measurable Quantities**

- Frequency
- RMS of voltage and current
- Active Power, Reactive Power, and Apparent Power of each phase
- Power Factor of each phase, and Total Power Factor
- Active and Reactive Energy
- Maximums and minimums of the quantities during averaged cycles in each storing period, which enables device to record changes that has happened even during 10ms

**Recording, calculating, and displaying Power Quality Measures such as**

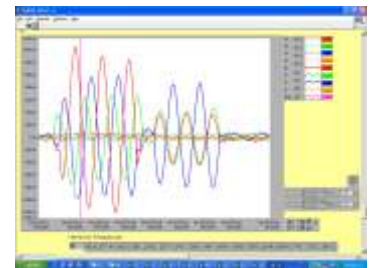
- Voltage and current harmonic components. They can be displayed up to 15<sup>th</sup> online (extendible to 31st), and up to 60<sup>th</sup> Offline.
- Voltage and current unbalance percentage, short term and long term power- outs, and Dips& Swells in voltage.
- Transient Errors
- Logging Memory is 33MB. It can for example store data of all measurable quantities (Approximately 380) for two months while sampling period is chosen as one minute





**Fault & Event Recorder Features**

- Capable of recording currents up to twenty times of the nominal current
- Capable of recording voltages up to two times of the nominal voltage
- Internal Memory which can store almost 100000 events
- Data Storing Time Range can be up to 300ms for pre-fault, and from 1s to 100s for post-fault
- Flash Memory Cards are used which are highly reliable
- Memory implemented in the device is able to store 200s of fault waveforms altogether (for example one hundred, two second long faults or forty, five second long faults or two, one hundred second long faults).
- Measurement Precision Class is better than 0.5%
- It can be triggered due to the change in the status of digital inputs
- RMS voltages and currents trespassing certain threshold level can trigger Fault & Event Recorder
- It can be triggered due to the change in the slope of current
- It can be triggered due to the current unbalances



**Software Features**

It has 8 windows which connect user to the device graphically

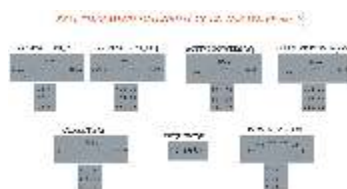
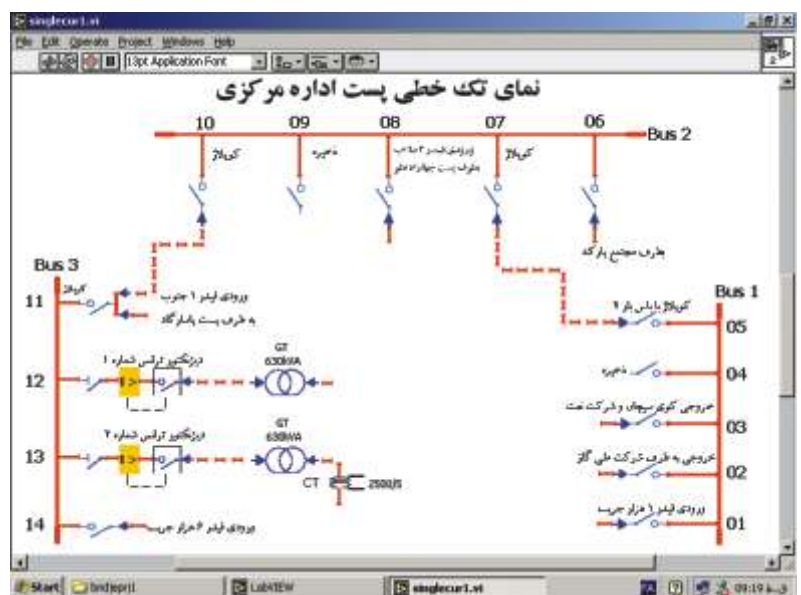
**Online Windows**

- Capability of determining type of connection to the PC, and adjusting threshold levels for faults to be taken on digital and analog inputs
- Can be connected to several devices using RS485 cards (if ordered)
- Defining database for digital inputs and different devices
- Ability to adjust clock of the device using clock of the PC or GPS (if ordered)
- Providing Fault and Event Lists which contain fault or event reason, their time of occurrence up to millisecond, values of quantities at the time of occurrence, threshold levels at the time of occurrence, and ability to store these lists in a computer file.
- Real-time displaying of voltage and current waveforms
- Displaying waveforms and status of digital inputs before and after the fault occurrence
- Real-time displaying of voltages' and currents' values for three phases and average of them, frequency, active, reactive and apparent powers of each phase and also the total value of these powers, power factor of each phase, total power factor, THD, and odd harmonics of voltages and currents up to 9<sup>th</sup> for each phase . All these quantities will be updated every one second
- Ability to change logging adjustments including number of quantities, recording maximums and minimums of the quantities in 10ms periods, Log Rate, and Dip & Swell limits, and also storing the taken log in computer files
- Reading Energy Information, including imported and exported energy in 4 tariffs, active and reactive energy imported or exported, demand, and ability to reset demand and imported energy
- Providing Dip & Swell Lists and ability to save them in a computer file
- Providing On/Off and Outage Lists which contain their occurrence time



**Offline Windows**

- Reading saved log files generated by different devices and comparing their information, and also displaying their waveforms
- Reading saved fault files and displaying polar view of voltages and currents at fault occurrence time, and displaying voltage and current harmonic components up to 60<sup>th</sup>
- Reading Energy Management information, and displaying daily energy consumption information, and daily load curve
- Ability to print information in all offline pages
- Ability to export fault, event, and log information to Excel and Delphi softwares or other databases
- Displaying Single Line Diagram



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