

# ICMmonitor



ICMmonitor - Digital Partial Discharge Detector

Instruments

The ICMmonitor is a compact, stand-alone instrument for evaluating the condition of medium and high voltage insulation. It comprises a spectrum analyzer, an acoustic detector, and a conventional PD monitor in one instrument. This combination enables PD measurements even with high levels of background A built-in multiplexer offers scanning of three-phase systems or multiple sensors. It is used principally for permanent, continuous on-line monitoring of rotating machines, cable systems, power transformers, and gas-insulated switch gear (GIS).

Partial discharge (PD) measurements are a proven method for effective, non-destructive evaluation of electrical insulation, preventing expensive unplanned outages by detecting insulation problems before they can cause breakdowns. The Power Diagnostix ICMmonitor is a non-invasive digital PD detector for permanent installation and continuous monitoring of medium and high-voltage insulation.

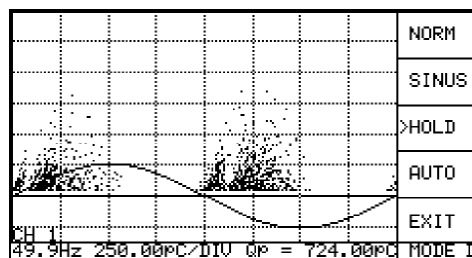
### Embedded Display

The ICMmonitor has a simple push-button interface to navigate on-screen menus in an embedded LCD panel. The LCD display modes include a monochrome phase-resolved PD pattern

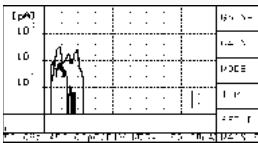
display for characterization of defects, a scope-like display showing phase-summed charge pulses superimposed with the applied voltage wave, a time trending display, and a monitoring display showing bar graphs of two key partial discharge quantities (Qp and NQS). Qp is the apparent charge value of the PD activity, and NQS is the absolute discharge current obtained by integrating the discharge values (summing up the total charge moved and dividing by the time interval,  $Q/t = [As]/[s]$ ).

### Noise Rejection

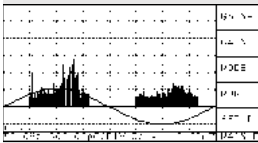
The ICMmonitor features various noise handling techniques. The noise gating module can be connected to an antenna or a current transformer to sense and remove noise without losing significant PD data. Another method available is simple windowing, that suppresses phase-stable noise for certain portions of each applied high voltage wave. Additionally, appropriate choice of the external preamplifier can limit noise by detecting PD in a frequency band outside the range of the noise.



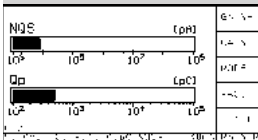
Monochrome PD pattern display



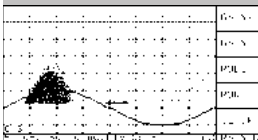
Projection display



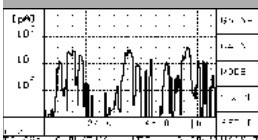
SCOPE display (NORM mode)



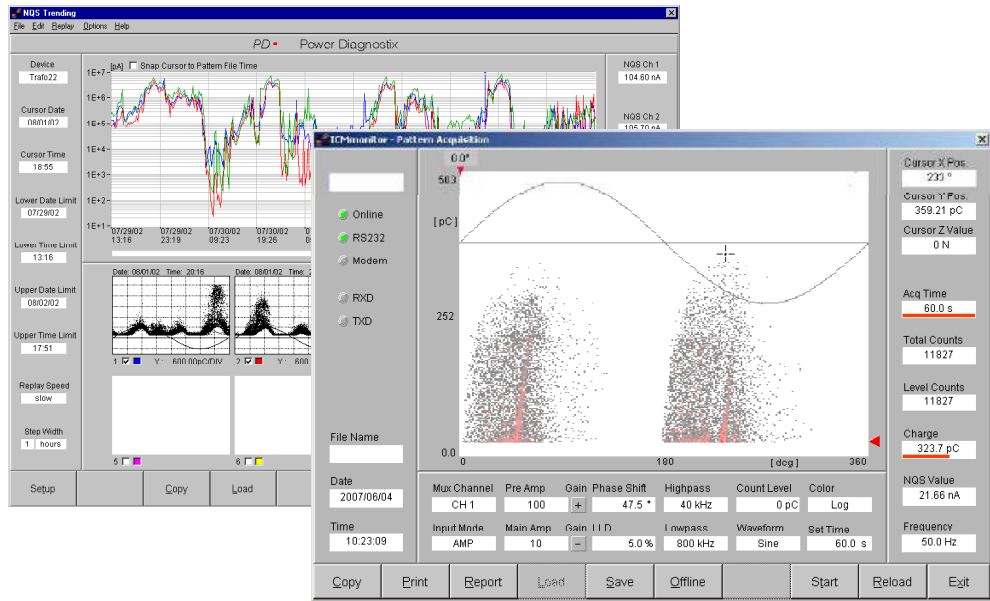
Monitoring display



SCOPE display (HOLD mode)



Trending display



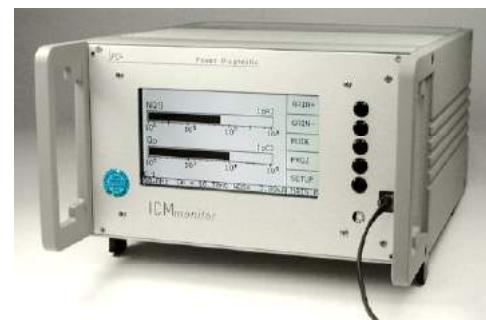
## Alarms and Trending

Users can set alarm levels of NQS or  $Q_p$  that will trigger when those values are exceeded. A triggered alarm will sound, appear on the LCD display, and activate an output on the ICMmonitor that can be used to drive a relay for interfacing with a local alarm system. The ICMmonitor also collects and displays PD data over a specified time interval for easy trending and observations of changes in the  $Q_p$  and NQS levels in the monitored system. Optionally, up to eight DC signals such as temperature or load can be added to this trending.

## Telemonitoring

Although the ICMmonitor is an autonomous unit, it can be connected to download data or to implement remote control of the unit. With its built-in TCP/IP interface or analog modem,

the ICMmonitor can be controlled and observed remotely over a telephone or Internet connection anywhere in the world. Optionally, if a monitored system exceeds an alarm level set by the user, the ICMmonitor can place a call to a user-selected number. The ICMmonitor software automatically maintains the trending information as well as the phase-resolved pattern of a multitude of ICMmonitor units.



Portable ICMmonitor with modem

The multifunctional ICMmonitor, with its embedded display, convenient trending, and settable alarms, is an ideal solution for continuous on-line monitoring of rotating machines and other electric devices in industrial and utility applications.

Observing the frequency spectrum of a harshly disturbed PD signal allows to select frequency bands with less disturbances. Using this center frequency for a PD acquisition, gives a largely improved signal-to-noise ratio resulting in a clear pattern acquisition. The combination of spectrum analyzer and PD detector within one instrument greatly expands the measurement possibilities when analyzing the insulation systems in a noisy environment.

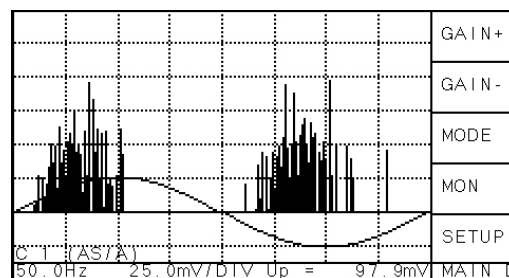
The standard version of the ICMmonitor comes with a four channel multiplexer to directly select the input signal. The instrument provides five different display modes and several interfaces like e.g. TCP/IP or modem for remote control and diagnosis.

**SPEC Mode**

The SPEC mode shows the frequency spectrum of the input signal up to 10 MHz. Three traces for the current input channel allow storing, comparing and processing of this spectrum. The bandwidth of the demodulated signal can be set to 9 kHz or 270 kHz, respectively.

**SCOPE Mode**

The SCOPE mode displays the PD pattern versus phase as known from the ICMseries. Hereby, the selected center frequency and bandwidth of the SPEC mode is used, in order to disregard frequency ranges occupied with disturbances. The SCOPE mode offers viewing an oscilloscopic display (below) as well as a pattern display.



Scope display



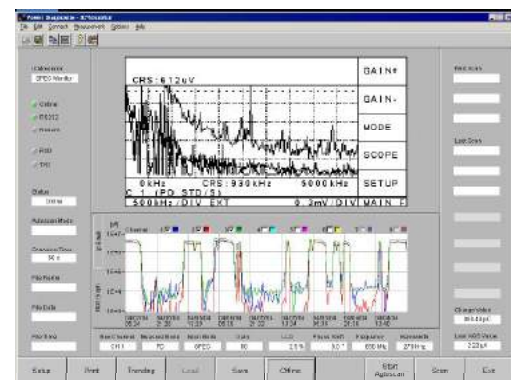
1/2 19" rack mountable version without display

**MON Mode**

The monitoring display allows to set alarm levels of NQS or Qp that will trigger when those values are exceeded.

**TIME Mode**

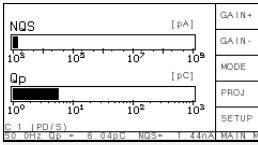
Additionally, the SPECmonitor collects and displays PD data over a specified time interval for easy trending and observations of changes in the Qp and NQS levels of the monitored system.



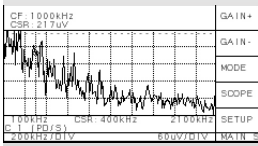
ICMmonitor software

**Software**

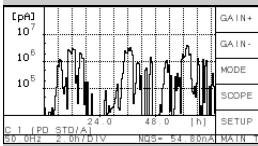
Besides this autonomous functions, the instrument can be connected to a computer via serial interface, modem, or TCP/IP. A special software allows the remote control of the instrument and the download of the stored data. An autoscan function takes the trending information as well as the phase-resolved pattern of one or multiple units.



Monitoring display



Spectrum display



Trending display



Bushing adapter and coupling unit



19" rack mountable version

### Accessories

It is possible to connect acoustic sensors (AS), UHF sensors, or the standard coupling unit from the bushing test tap to the ICMmonitor.

Different preamplifiers like RPA1F, RPA1L or FCU2 can be used in case of weak signals or to drive long cable lengths.



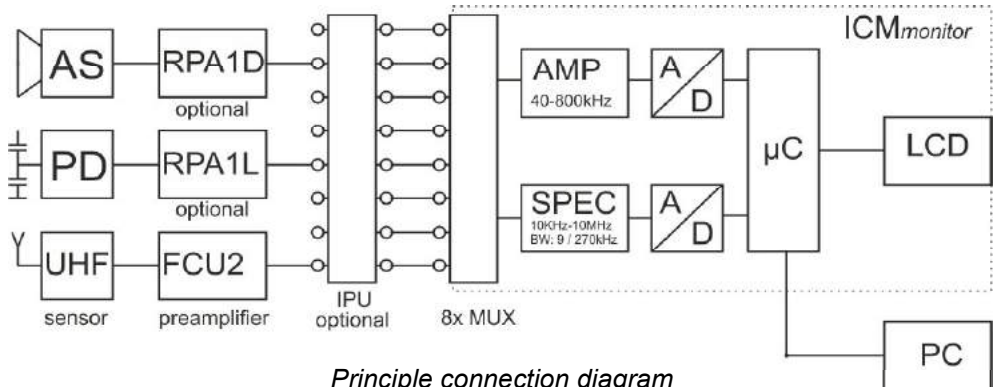
Acoustic sensor with magnetic holder

### Options

- MUX8/MUX12. 8- oder 12-channel multiplexer
- AUXIN4/AUXIN8. 4- oder 8-channel analog input that adds monitoring capability of isolated 0(4)-20 mA trending signals
- AUXOUT4/AUXOUT8. 4- oder 8-channel analog output enabling external monitoring of NQS or Qp levels
- IEC61850. Hardware based protocol converter for communication with the instrument according to IEC 61850
- Built-in 57.6kBit/s modem for remote communication



ICMmonitor in a full 19" rack



Principle connection diagram

The multifunctional ICMmonitor, with its embedded display, convenient trending, and settable alarms, is an ideal solution for continuous on-line monitoring of rotating machines and other electric devices in industrial and utility applications.