AIA*compact*

The AIA*compact* is a portable unit for in-service acoustic and electric (UHF) partial discharge measurements on gas-insulated switchgear (GIS), transformers, and cable accessories. It is fitted with a battery pack for independent operation up to three hours. The instrument adapts to a variety of piezo-electric acoustic sensors and is supplied with suitable sensor fixtures. Additionally, the AIA*compact* allows partial discharge measurements on embedded or external UHF sensors.

Stand-alone Instrument

Acoustic partial discharge measurements can be easily applied on gas-insulated switchgear and other high voltage equipment without the need of interrupting the operation. Such online measurements help to identify internal imperfections of the insulation system, which may lead to breakdown and system failure in the future.

Acoustic partial discharge measurements rely on the close acoustic contact of the area producing the discharge to the point of access, where the sensor is placed. Most of the partial discharge activity in GIS offer such a good contact and, hence, can be detected at a good sensitivity.
Therefore, discharges from sharp points or cones as well as discharge activity from delamination can be identified at a sensitivity that is mostly comparable to the conventional electrical detection according to the IEC 60270.

For some defect types, such as the so-called hopping or bouncing particles, the acoustic detection is by far superior to the electrical detection. Such free particles can cause flashover and severe breakdown especially in the initial phase after erection or maintenance of gas-insulated switchgear.

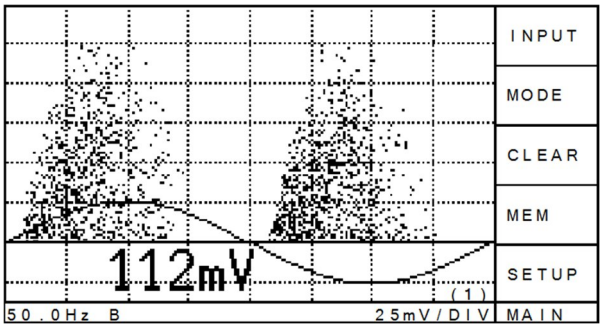
Based on the proven hardware core of the ICM*compact*, the AIA*compact* offers automatic detection of the sensor or preamplifier used. Normally, the instrument is operated with acoustic sensors with remote supplied embedded preamplifiers directly connected to the signal input. Alternatively, the RPA1F can be inserted close to the sensor to boost the signal, which can be mandatory, in case longer signal cables are used or in case of low-level measurements.

UHF measurements on embedded or external sensors are possible with the use of the FCU2, a logarithmic frequency converter, which covers 100 MHz to 1800 MHz. As with the other converter units, the AIA*compact* changes into the logarithmic display for UHF detection. To protect the instrument's hardware it is advisable to connect an input protection unit like IPU2B to the sensor's output.

Standard Display Modes

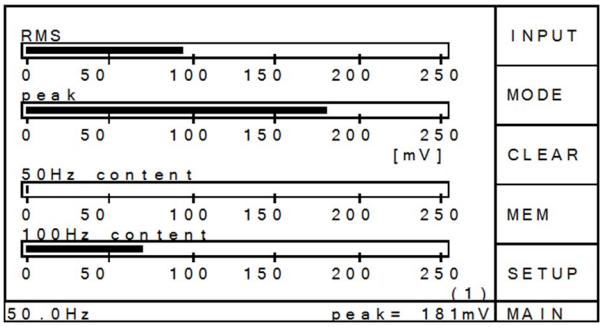
The instrument offers three main display modes, which are selected using dedicated control buttons: Scope, Meter, and Time.

a) SCOPE



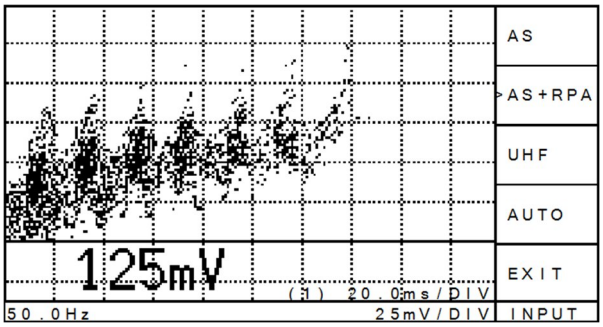
In SCOPE mode, the AIA*compact* shows the phase-resolved partial discharge signal or pattern. Here, the 'Freeze' function allows keeping such a captured pattern for further evaluation or for taking screenshots.

b) METER



The METER mode offers four bar graph displays showing derived quantities of the captured activity. The graphs display the RMS and the peak PD level, as well as their 50 Hz (60 Hz) and 100 Hz (120 Hz) content. The instrument automatically synchronizes to the line frequency.

c) TIME



Within the TIME mode, the AIA*compact* displays five or ten AC cycles triggered by a partial discharge event. Thus, this display shows the pattern of consecutive partial discharge events and, hence, offers a clear identification of bouncing particles and the severity of their activity.

Optional Features

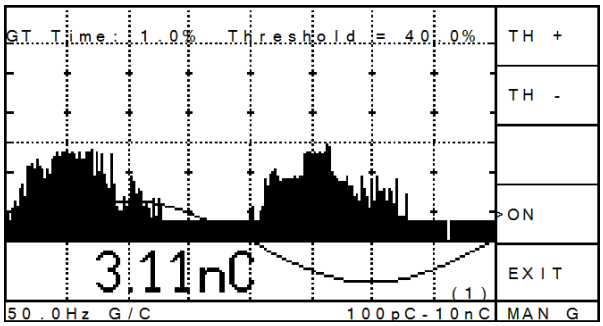
a) MUX12

Every AIA*compact* comes with a built-in 4-channel multiplexer, which allows switching between four input channels. Push buttons at the panel of an instrument enable to directly select one of the four signal sources. Hereby, the partial discharge signal (AMP) and the voltage signal (SYNC) are split and can be selected separately. All settings, e. g. input mode and calibration factor, are stored separately for each channel. Instruments with MUX12 option come with a built-in 12-channel multiplexer instead of the standard 4-channel multiplexer.

The image beneath shows an AIA*compact* with MUX12 in a robust Explorer case.

Please remark: The MUX12 option is available with full 19" enclosure or Explorer case, only.

b) Analog Gating



In case the AIA*compact* is used for partial discharge measurements in an environment with high frequency (HF) disturbance, an effective noise reduction is required. HF disturbances, which hamper partial discharge detection and which can be handled by the gating function, are, for instance radar signals, corona discharge or thyristor firing. Using the analog gating function blinds out such impulse noise.

c) Battery

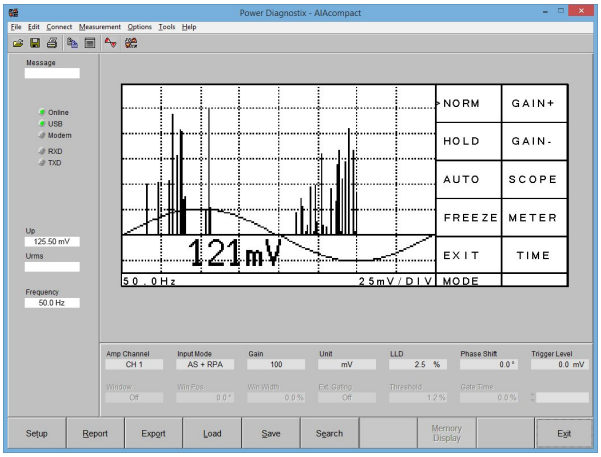
A battery for the AIA*compact* offers cordless operation of the instrument and remote infrared sync transmission up to 3 hours.

d) 57kB Modem

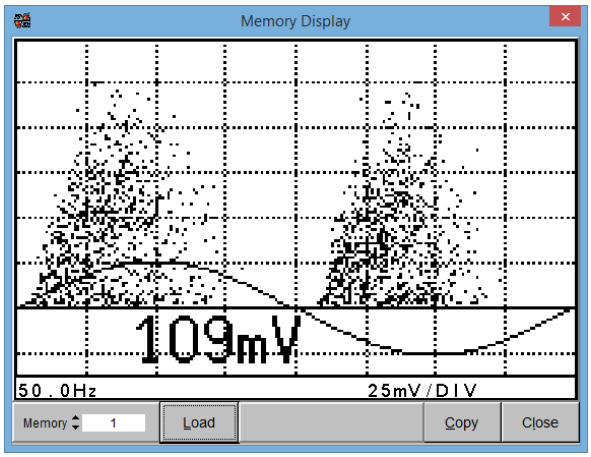
A built-in analog modem allows accessing the AIA*compact* via a common phone line.

e) Software

The instrument can be connected to a PC or laptop via an USB interface. The main panel shows an image of the instrument's LCD (display). The acquired data are constantly refreshed.



The ten menu buttons can be used in the same manner as on the real instrument, which allows a remote control even over longer distances. For this, the USB link can be extended by a fiber optic cable or in combination with a modem on both sides (instrument and PC) by a common phone line. Optionally, the software allows acquisition of color PD patterns.



Technical Data

Main Unit

Mains supply:	85–264 V_{AC}, 47–440 Hz (automatic)
Line fuse:	1.6 A, (time-lag)
Power requirements:	Approx. 20 VA
Display:	Backlit LCD
Display resolution:	128 x 240 pixels b/w
Operation:	2x5 menu supported pushbuttons, 1 power button
Memory:	7 addresses (< version 3.0)
	120 addresses (>= version 3.0)
Remote connection:	USB
Lower cut-off (-6 dB):	40 kHz
Upper cut-off (-6 dB):	800 kHz
Synchronization:	Line, IR, with automatic change to external
Synchronization range:	20–310 Hz (< version 3.0)
	10–520 Hz (>= version 3.0)
Ext. synchronization:	Max. 100 V_{rms} or ±200 V_{peak} into 1 MΩ// 200 pF
Recorder output:	0–10 V with R_O=100 Ω
Operation temperature:	10–40°C (non condensing)
Size:	Width: 236 mm Height: 133 mm Depth: 301 mm (incl. BNC-conn.)
Weight:	Approx. 4.6 kg (desktop model) Approx. 5.5 kg (Explorer case)

RPA1F

Frequency range:	40 kHz–800 kHz
Input impedance:	10 kΩ // 50 pF
Input sensitivity:	<200 µV @ 500 MHz (-61 dBm @ 500 MHz)
Roll-off:	40 dB/dec.

FCU2

Frequency range:	100 MHz–1800 MHz
Input impedance:	50 Ω // 50 pF
Input sensitivity:	<200 µV @ 500 MHz (-61 dBm @ 500 MHz)
Output signal:	Approx. 2 MHz (depends on input signal)
Dynamic:	>3.5 decades log. scale
Operation temperature:	-10–60°C (non-condensing)
Weight:	75 g
Overall size: (H x W x D)	26 x 26 x 86 mm^3
Power requirements:	11–15 V_{DC}, 0.31 W
Enclosure:	IP52: aluminium; HF sealed IP65: aluminium; water proofed & HF sealed

IPU2B

Operation temperature:	-10–60°C (non-condensing)
Weight:	65 g
Overall size: (H x W x D)	26 x 26 x 60 mm^3
Enclosure:	IP52: aluminium; HF sealed IP65: aluminium; water proofed & HF sealed

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