# IDAX 300/350
## Insulation Diagnostic Analyzers


- **State-of-the-art measurement of moisture content, tan delta/power factor and oil conductivity using DFR (Dielectric Frequency Response)**
- **Easy-to-use: Software with automated measurement flow and analysis of test results "Traffic light" interpretation of test results**
- **Dedicated test procedures for power transformers, bushings and current transformers**
- **Automated individual temperature correction (ITC) for accurate comparison with reference data/tests**
- **Reliable measurements even in high-interference environments**
- **Interfaces to high voltage amplifiers**
- **Versions with or without on-board computer**

## DESCRIPTION

IDAX is an insulation diagnostic instrument based on DFR (Dielectric Frequency Response), also known as FDS (Frequency Domain Spectroscopy). DFR technology is an established test procedure in laboratories that in an innovative effort by Megger has been adapted for field use in the IDAX range of instruments.

In short, DFR is the measurement of capacitance and losses (tan delta or power factor) over multiple frequencies. The measured DFR curve is dependent on insulation geometry, moisture, oil conductivity and temperature. By advanced curve fitting to the reference material model, it is possible to calculate moisture content mainly in solid insulation, the oil's conductivity at 25°C reference temperature and tan delta/power factor at 20°C reference temperature. In the calculations ITC (Individual Temperature Correction), another important Megger innovation is used to translate test data from the test object temperature to the reference temperatures. In the latest release, the IDAX SW incorporates a new ITC corrected frequency sweep specifically designed for assessment of instrument transformers and bushings. IDAX is exceedingly easy to use with an automated test flow and presentation of results in an easy to understand "traffic light" manner.

The IDAX DFR method is now part of international guides and standards e.g. Cigre TB 254, Cigre TB 414, Cigre TB 445, Cigre TB 775, IEEE C57.152-2013, IEEE C57.161-2018

### IDAX is available in multiple versions

- IDAX 300 – A compact and light 3-channel input (red, bue and ground), 3 terminal (generator, measure and guard) and one ammeter instrument for use with an external computer that runs the IDAX diagnostic software.
- IDAX 300/S – As IDAX 300 but with two ammeters for two simultaneous measurements.
- IDAX 350 – As IDAX 300/S but housed in a rugged and waterproof case together with an onboard computer that can also be used to control other Megger instruments.

For extended applications IDAX interfaces seamlessly with VAX high voltage amplifiers; VAX020 for 2 kV and VAX220/230 for 20/30 kV (on request).

## APPLICATIONS

IDAX provides an accurate and reliable condition assessment of insulation in transformers, bushings, current transformers, generators and cables. The IDAX system maximizes the outcome of maintenance activities allowing for load and service life optimization.

### Power transformers

Moisture that accumulates in the insulating system of a power transformer affects several properties:

- Limits the loading capability as higher humidity brings the transformer closer to bubble inception
- Lowers the dielectric strength of the oil which has direct effect on the insulation properties
- Ages the cellulose insulation with less mechanical strength as a consequence.

DFR by IDAX is the only reliable method to determine the humidity in power transformers without decommissioning or disassembly. Normal, single frequency tan delta/power factor tests can due to temperature effects give false results and oil analysis is unreliable as moisture mainly resides in the solid insulation. In the power transformer application IDAX uses a unique 2 material model and ITC for accurate calculation of humidity, oil conductivity and tan delta/power factor.

### Bushings and current transformers

Ingress of moisture is a normal part of bushing and current transformer life cycle that can have catastrophic consequences; bushing malfunction is the cause of 17% of all transformer failures and up to 70-80% of all transformer fires. A falling bushing is also very likely to explode which can damage the entire substation. Normal testing at line frequency is not enough as it can give false OK results, only through DFR the true status of the bushing can be assessed. Beside assessment of high moisture levels, DFR has also proven to be successful in detecting traces of partial discharges in HV and EHV bushings.

For testing of bushings and current transformers the IDAX is used together with the VAX020; Voltage up to 2 kV gives excellent signal-to-noise-ratio and measurement up to 1 kHz enables diagnosis of low capacitance objects. A special single material version of ITC is used to bring test results to a reference temperature regardless of test object temperature. IDAX has support for Support for OIP, RIP, RBP and OIP CT and user defined materials.

### Cables

Together with the 20/30 kV amplifiers VAX220/230 (available on request), IDAX can be used to assess the status of XLPE cables. Frequency sweeps are done at 25%, 50%, 75% and 100% of service phase to ground voltage and by comparison of the DFR curves water treeing can be detected. DFR makes it possible separate the characteristic response of water trees from influence of accessories and creep currents.

### Monitoring of dielectric properties in industrial processes

In many industrial processes such as dry-out of transformers, impregnation of dry cellulose with liquids or resins and curing of resins or epoxy knowledge of dielectric properties over time is invaluable. By repeated DRF sweeps at fixed time intervals combined with measurement of temperature, IDAX can give accurate information about when the process goals (for instance dryness of a transformer) is reached and when the process can be terminated. This greatly improves repeatability in the process and is a game changer for process efficiency and throughput.

# SPECIFICATIONS IDAX 300/350

## Environmental

| | |
|---|---|
| *Application field* | The instrument is intended for use in medium and high-voltage substations and industrial environments. |
| *Ambient temperature* | |
| *Operating* | IDAX300: -20°C to +55°C (-4°F to +131°F)<br>IDAX350: -10°C to +55°C (14°F to +131°F) |
| *Storage* | -40°C to 70°C (-40°F to +158°F) |
| *Humidity* | < 95%RH, non-condensing |

## CE-marking

| | |
|---|---|
| *LVD* | 2014/35/EC |
| *EMC* | 2014/30/EC |
| *RoHS* | 2011/65/EC |

## General

| | |
|---|---|
| *Mains voltage* | 100 – 240V ±10%, 50/60 Hz |
| Power consumption | 250 VA (max) |
| *Dimensions* | |
| *IDAX 300* | 335 x 300 x 99 mm (17.7" x 6.3" x 16.1") |
| *IDAX 300 Flight case* | 520 x 430 x 220 mm (20.5" x 17" x 8.7") |
| *IDAX 350* | 520 x 430 x 220 mm (20.5" x 17" x 8.7") |
| *Weight* | |
| *IDAX 300* | 4.9 kg (11 lbs),<br>21 kg (43 lbs) incl. accessories in flight case |
| *IDAX 350* | 13.5 kg (29.8 lbs)<br>Accessories 8.5 kg (18 lbs) in soft bag |

## Measurement section

| | |
|---|---|
| **Inputs** | Red, blue, ground |
| *Capacitance range* | 10 pF – 100 µF |
| *Inaccuracy* | 0.5% + 1 pF |
| *Tan delta range* | 0 - 100 (with retained accuracy of capacitance; otherwise higher) |
| *Power factor range* | 0 - 1 (with retained accuracy of capacitance; otherwise higher) |
| *Inaccuracy*[1)] | |
| *IDAX300 (0.1 mHz – 1 kHz) (at 200 Vpeak)* | |
| *>1000 pF* | 0.5% of rd + 0.01% absolute |
| *>300 pF* | 0.5% of rd + 0.02% absolute |
| *>10 pF* | 0.5% of rd + 0.10% absolute |
| *With VAX020 amplifier (at 2 kVpeak)* | |
| *>100 pF* | 0.5% of rd + 0.01% absolute |
| *>30 pF* | 0.5% of rd + 0.02% absolute |
| *>10 pF* | 0.5% of rd + 0.03% absolute |

1) At 22°C ±10°C

| | |
|---|---|
| *Max AC interference* | 1 mA, 1:10 SNR (IDAX)<br>10 mA, 1:10 SNR (VAX020) |
| *Max DC interference* | 2 µA (IDAX) 20 µA (VAX020) |
| *Test modes*[2)] | UST-R<br>UST-B<br>UST-RB<br>GST-GND<br>GSTg-R<br>GSTg-B<br>GSTg-RB<br>UST-R & UST-B[3)]<br>UST-R & GSTg-RB[3)]<br>UST-B & GSTg-RB[3)]<br>UST-RB & GSTg-RB[3)] |

2) IDAX300 can measure multiple test modes in an automatic sequence.
3) IDAX 300S/350 can measure two test modes simultaneously.

## Calibration

| | |
|---|---|
| *Field calibration* | Possible with IDAX Calibration Box CAL300 (AG-90010) |

## Time Domain Current Measurement (PDC)

| | |
|---|---|
| *Range* | ±50 mA |
| *Resolution* | 0.1 pA |
| *Inaccuracy* | 0.5% ±1 pA |
| *Input resistance (DC mode)* | ≤10 kΩ |

## Outputs

### GENERATOR

| | |
|---|---|
| *Voltage/current ranges, 10 V* | 0 – 10 Vpeak<br>0 – 50 mA peak |
| *Voltage/current ranges, 200 V* | 0 – 200 Vpeak<br>0 – 50 mA peak |
| *Frequency range* | DC – 10 kHz |

### EXTERNAL

| | |
|---|---|
| *For external amplifier* | E.g. VAX020 |

## PC Requirements

### For IDAX300 and IDAX350 remote controlled

| | |
|---|---|
| *Operating system* | Windows XP / 7 / 8 /10 |
| *Processor* | Pentium 500 MHz |
| *Memory* | 512 Mb RAM or more |
| *Interface* | USB 2.0 and Ethernet |

# INCLUDED ACCESSORIES

Picture shows some of the included accessories. Generator cable, USB cable, Ground cable and Measurement cables.


Transport case (GD-30090) with wheels and space for cables and accessories.

## OPTIONAL ACCESSORIES


VAX 020, 2 kV amplifier, AF-59090

### Accessory kit, AG-90100

**Bushing tap adapters**

| | |
|---|---|
| 4 mm female/male jack connector<br>4 mm female/female joiner |  |
| "J" probe adapter |  |
| ABB bushing adapter |  |
| 1" thread adapter<br>0.75" thread adapter |  |
| Two special adapters |  |
| Hot collar/guard ring straps, three of different lenght |  |
| Temperature and humidity meter |  |
| Non-insulated shorting leads:<br>1 m (3 ft) (3 pcs)<br>2 m (6 ft) (3 pcs) |  |

## ORDERING INFORMATION

| Item | Cat. No. |
|---|---|
| **IDAX 300[1)]** | |
| IDAX 300 with one ammeter and 18 m cable kit | AG-19090 |
| **IDAX 300[2)]** | |
| IDAX 300 with one ammeter and 9 m cable kit | AG-19091 |
| **IDAX 300S[1)]** | |
| IDAX 300 with two ammeters and 18 m cable kit | AG-19092 |
| **IDAX 350[1)]** | |
| IDAX 300S with internal computer | AG-19192 |

### Included accessories

| | |
|---|---|
| Mains cable | |
| Ground cable 5 m (16 ft) | GC-30060 |
| [1)] Generator cable 18 m (60 ft) | GC-30312 |
| [1)] Measurement cable, red 18 m (60 ft) | GC-30326 |
| [1)] Measurement cable, blue 18 m (60 ft) | GC-30336 |
| [2)] Generator cable 9 m (30 ft) | GC-30310 |
| [2)] Measurement cable, red 9 m (30 ft) | GC-30324 |
| [2)] Measurement cable, blue 9 m (30 ft) | GC-30334 |
| USB cable, 3 m (10 ft) | GA-30030 |
| Windows software, IDAX 5.1 | AG-8100X |
| Transport case | GD-30090 |

### Optional software

| | |
|---|---|
| Process monitoring<br>IDAX Monitoring software license | AG-8200X |
| Commissioning, 2 days | AG-90300 |
| Cabling, connectors, etc | on request |

### Optional accessories

| | |
|---|---|
| VAX 020, 2 kV amplifier | AF-59090 |
| IDAX calibration box CAL 300 | AG-90010 |
| IDAX demo box IDB 300 | AG-90020 |
| Additional ammeter (factory upgrade to IDAX 300S) | AG-90200 |
| Generator cable, 9 m (30 ft) | GC-30310 |
| Measurement cable, 9 m (30 ft), red | GC-30320 |
| Measurement cable, 9 m (30 ft), blue | GC-30330 |
| Generator cable VAX 020, 18 m (60 ft) | GC-30350 |
| Accessory kit | AG-90100 |

Bushing tap adapters:
- 4 mm female/male jack connector
- 4 mm female/female joiner
- "J" probe adapter
- ABB bushing adapter
- 1" thread adapter
- 0.75" thread adapter
- Two special adapters

Hot collar/guard ring straps, three of different lenght
Temperature and humidity meter
Non-insulated shorting leads:
- 1 m (3 ft) (3 pcs)
- 2 m (6 ft) (3 pcs)

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