

IDAX300-350

Insulation diagnostic analysers



- **State-of-the-art measurement of moisture content, tan delta/power factor and oil conductivity using DFR (Dielectric Frequency Response)**
- **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**
- **Fastest system on the market, due to its novel and reliable combination of frequency and time domain measurement data**
- **Optional switchbox accessory for quicker, easier, and safer handling when testing bushings and transformers**

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 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. The IDAX software incorporates an ITC corrected frequency sweep specifically designed for assessment of instrument transformers and bushings.

Thanks to a novel approach to the combination of time and frequency domain data, IDAX provides the shortest measurement time in the marketplace for a full DFR measurement from 1 kHz to 10 μHz. Separate reference models are fitted to each data set (time or frequency) prior to transformation and combination, which eliminates the risk of artifacts introduced by approximations or transformation of incomplete data sets.

IDAX is exceedingly easy to use with an automated test flow and presentation of results that uses an easy-to-understand 'traffic light' system.

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, blue, 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 on-board 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 maximises the outcome of maintenance activities allowing for load and service life optimisation.

Power transformers

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

- **Limits the loading capability as higher moisture decreases the bubble inception temperature**

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- Lowers the dielectric strength of the oil which has a direct effect on the insulation properties
- Ages the cellulose insulation with less mechanical strength as a consequence

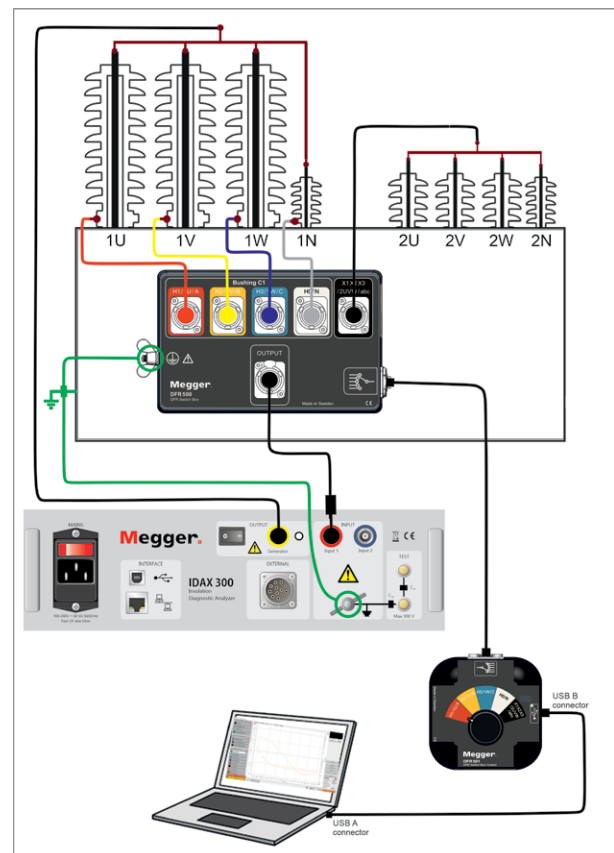
DFR by IDAX is the only reliable method to determine the humidity in power transformers without decommissioning or disassembly. Normally, single frequency tan delta/power factor tests can, due to temperature effects, give incorrect results, and oil analysis is unreliable as moisture mainly resides in the solid insulation. In the power transformer application, IDAX uses a unique two-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 to 80 % of all transformer fires. A failing 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 positive 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 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 OIP, RIP, RBP, OIP CT and user defined materials.

To save valuable test time and make the bushing connections more convenient a DFR switchbox that enables connection to the transformer and all high side bushings at once is available as an optional, but highly recommended, accessory. It offers one time connection to the transformer and its bushings, thus completely eliminating time consuming re-connections and hazardous ladder climbs between tests. The connection box, which is put on top of the transformer, is controlled through a small, easy-to-understand and color coded switch box at your test position.



Cables

Together with the 20/30 kV amplifiers VAX220 (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 comparing it to the DFR curves, water treeing can be detected. DFR makes it possible to separate the characteristic response of water trees from the influence of accessories and creep currents.

Monitoring 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 temperature measurements, IDAX can give accurate information about when the process goals (for instance dryness of a transformer) are 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.

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SPECIFICATIONS IDAX300/350

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) 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 – 240 V ±10 %, 50/60 Hz
Power consumption	250 VA (max)
Dimensions	
IDAX300	340 x 330 x 100 mm (13.38" x 13" x 3.93")
IDAX300 Flight case	520 x 430 x 220 mm (20.5" x 17" x 8.7")
IDAX350	520 x 430 x 220 mm (20.5" x 17" x 8.7")
Weight	
IDAX300	4.9 kg (11 lbs), 21 kg (43 lbs) incl. accessories in flight case
IDAX350	13,7 kg (30.2 lbs) 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)

Inaccuracy¹⁾

IDAX300 (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) 10 mA, 1:10 SNR (VAX020)
Max DC interference	2 µA (IDAX) 20 µA (VAX020)

Typical measurement durations

DFR	PDC	Equiv. freq. range	Time
1 kHz-10 mHz	—	1 kHz - 10 mHz	5 min
1 kHz- 1 mHz	—	1 kHz - 1 mHz	36 min
1 kHz- 1 mHz	—	1 kHz - 1 mHz	23 min ²⁾
1 kHz - 0.1 Hz	1000 s	1 kHz - 1/0.1 mHz	18 min
1 kHz - 0.1 Hz	10000 s	1 kHz - 100/10 µHz	2 h 55 min

2) DFR multi-tone below 0.01 Hz

Test modes³⁾

UST-R, UST-B, UST-RB
GST-GND, GSTg-R, GSTg-B, GSTg-RB
UST-R & UST-B, UST-R & GSTg-RB⁴⁾
UST-B & GSTg-RB, UST-RB & GSTg-RB⁴⁾

3) IDAX300 can measure multiple test modes in an automatic sequence.

4) IDAX300S/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 0 – 50 mA peak
Voltage/current ranges, 200 V	0 – 200 Vpeak 0 – 50 mA peak
Frequency range	DC, 0.1 mHz - 10 kHz

EXTERNAL

For external amplifier E.g., VAX020

PC requirements

For IDAX300 and IDAX350 remote controlled

Operating system Windows XP / 7 / 8 / 10, and 11

Processor	Pentium 500 MHz
Memory	512 Mb RAM or more
Interface	USB 2.0 and Ethernet

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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



DFR500 Switchbox, AG-98090



VAX020, 2 kV amplifier, AF-59090

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



Hot collar/guard ring straps, three of different lengths



Temperature and humidity meter



Non-insulated shorting leads:
3 m (10ft) 1 pc
6 m (20ft) 1 pc



ORDERING INFORMATION

Item	Part. No.
IDAX300¹⁾ IDAX300 with one ammeter and 18 m cable kit	AG-19090
IDAX300²⁾ IDAX300 with one ammeter and 9 m cable kit	AG-19091
IDAX300S¹⁾ IDAX300 with two ammeters and 18 m cable kit	AG-19092
IDAX350¹⁾ IDAX300S 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 5.3	AG-8100X
Transport case	GD-30090

Optional software

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

Optional accessories

DFR500 Switchbox	AG-98090
VAX020, 2 kV amplifier	AF-59090
IDAX calibration box CAL300	AG-90010
IDAX demo box IDB300	AG-90020
Additional ammeter (factory upgrade to IDAX300S)	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 VAX020, 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 Hot collar/guard ring straps, three of different lengths Temperature and humidity meter Non-insulated shorting leads: 3 m (10ft) 1 pc 6 m (20ft) 1 pc	

Postal address

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