VARIANT

Megger
Power on

Cable fault location, testing and diagnostics with a modular system

- Modular design, variably expandable
- Reliable due to redundant system architecture
- easyGO® user interface
- ARM® multi-shot pre-location
- Powerful 0.1 Hz VLF test up to 18 uF
- Autonomous operation with Li-Ion battery power

Variant – the allrounder from Megger

With the new Variant, Megger provides a fully equipped measuring station for all work required VDE-compliant cable testing and fault location on PVC, PE, VPE and paper-insulated cables in the voltage range up to 33 kV, or higher.

During the development of the Variant system, special attention was paid to reliability and availability:

- Modular and thus fail-safe system
- easyGO® and expert operating mode
- Emergency operation in case of system control failure

Additional advantages of the system include simple service and easy maintenance.

Heavy devices are installed so they can be easily extended. Electronic components were placed so that testing and calibration can be easily performed from the control room.

Variant system components

System components:

1	System control **NSF** with operating mode switch, phase switch and safety system
2	**Teleflex VX** with ARM® multi-shot technology
3	Surge generator **SWG 1750**
4	HV operating unit **BPS**
5	ARM® filter **ARM 300**
6	**MFM 10** sheath fault location system
7	**FLG 200** audio frequency generator
8	Ergonomic work station with desk and drawer cabinet

System description

Control system

The heart of the Variant is the new system controller **NSF**. It makes possible safe and intuitive operation of the measuring system. The NSF consists of a one-phase or three-phase device selector and an operating and display module. All system, status and safety informations are displayed on the colour TFT display in a clear manner. In addition, the NSF reliably checks all safety-relevant parameters.

Linux operating system

An integrated recovery system, separate hardware storage for data and programs ensure safe and stable operation over the entire service life of the measuring system.

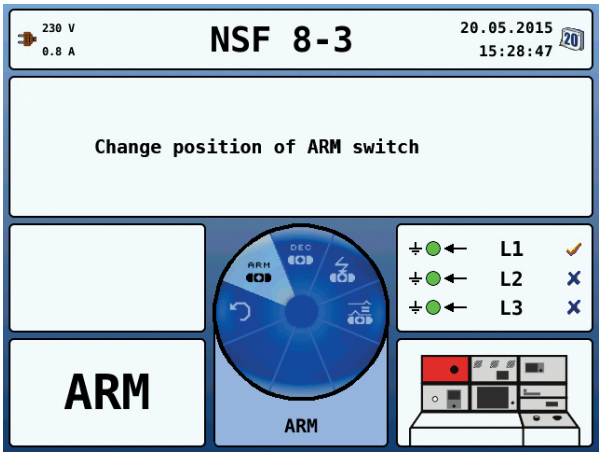
Due to its architecture, the Linux operating system always runs at the same speed and is therefore completely maintenance-free. No viruses, no defragmenting, no expensive antivirus programs and all completely free and without the need for licenses. With its modular design, the Linux operating system can be optimally adapted to the PC and its computing power.

Emergency operation

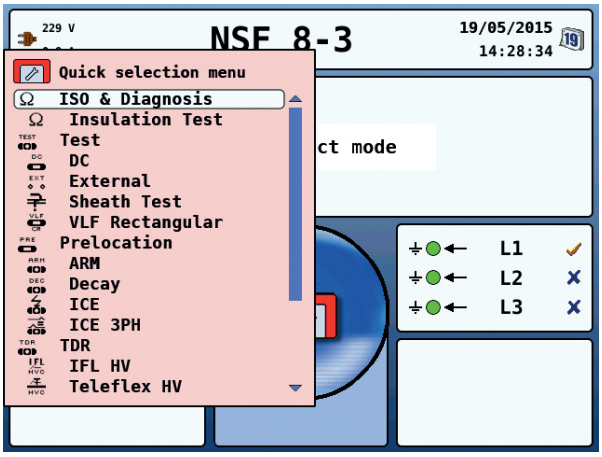
When the control system fails, all important operating modes can be used with the emergency operating mode.

Two operating modes are available to the user of the Variant:

In easyGO® mode for inexperienced users, the system recommends the next operating step, guiding the user to ensure successful location of the fault.



Experienced users can choose expert mode. This operating mode shortens the operating procedure and makes it possible to successfully find the fault more quickly.



The safety concept

An essential part of Variant is the safety system, which monitors all safety-relevant parameters.

It has a unique discharge and earthing module, whose operating state can be viewed from the operating station. A safety transformer ensures trouble-free operating.

The following systems are monitored:

- Loop resistance:
  System earth to station earth
  Auxiliary earth to station earth
- Step voltage: Earth to vehicle chassis
- Fast ramp voltages
- Rear door switch
- Safety-key switch
- Internal/external emergency stop

Safety equipment in accordance with BGI 891 and VDE 0104

Scope of functionality

Pre-location

Teleflex VX – the world's most powerful reflectometer

When using the reflection measurements, intelligent algorithms determine the necessary setting parameters and make possible

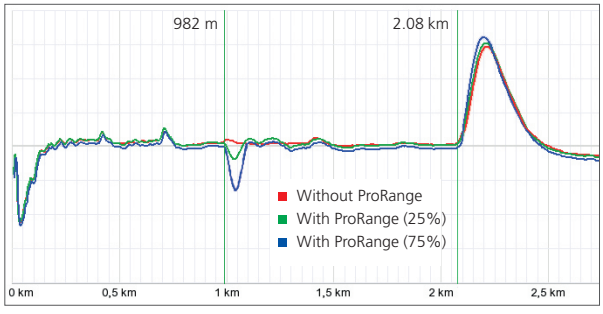
- Automatic configuration of the measurement range
- Automatic amplification adjustment
- Automatic measurement of the cable end
- Automatic measurement of the fault location

Only for Teleflex VX:

- Distance range up to **1280 km**
- Large range due to pulse widths up to **10 µs**
- High resolution due to fast sampling rates of **400 MHz**
- High level of data security due to separate hardware (2 GB flash memory for system and 2 GB for data)
- License-free Linux operating system for best system stability with internal 2 GB recovery system

ProRange

For ProRange, the gain is adapted based on the distance. Distant joints, fault locations and cable ends are better detected. For cables with high attenuation (long cables, moist mass-impregnated cable, crossbonding), this new feature is especially advantageous.

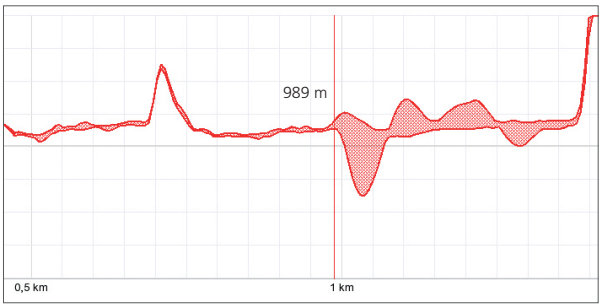


ARM® multi-shot

ARM® multi-shot technology makes it possible to display 15 measurements per surge pulse. An automated analysis supports the user, immediately displaying the best result – a very useful feature, in particular for wet and oil-filled joints.

IFL

The IFL mode is used for intermittent faults in branched low voltage networks. Using an envelope, short-term changes in the impedance curve can be clearly shown.



ICE / Decay

With the proven current catching method (ICE) and for the decay travelling wave method, the measurement of the fault location is performed automatically.

Pinpointing

High-impedance and intermittent faults are precisely measured with the help of acoustic location. With its high surge energy and controllable voltage levels of 8, 16 and 32 kV, all requirements for low and medium voltage networks are covered. The surge generator can be configured, as it is necessary. Surge energy up to 3500 J and additional voltage levels are available.

The ground noise locator **digiPHONE+** uses special digital filters to eliminate interfering background noise. The operator only has to adjust the volume in the headphones using the selector knob. All other setting parameters are automatically determined and set using the **digiPHONE+**.

Special features:

- **BNR – Background Noise Reduction**
  produces silence, making an undisturbed listening process possible, ensuring that only the sounds of the fault can be heard.
- **APM – Automatic Proximity Mute**
  gently switches the headphones off when the sensor handle is approached.
  This protects the ears.
- **Routing**
  shows the position of the sensor for the cable route in the display.

digiPHONE+

Left: Receiver with headphones
Right: Sensor

The integrated audio frequency system is used to locate cable routes and for precise location of cable faults.

The powerful FLG 200 audio frequency generator with 200 W transmission power supports the patented SignalSelect® process and the capacitive step voltage process.

The FLE 10 receiver operates with 4 reception frequencies.

- Measurement procedures:
  Minimum, Maximum, Super-Maximum
- Automatic depth measurement at the press of a button in "cm" and 45 degree method
- Graphic display of the signal direction of flow (SignalSelect®) to prevent faulty measurements
- Right-left display to locate the cable position

Burning

Another option is fault conversion using performance burning:

- **BPS 5000:**
  Test voltage 15 kV with 110 A burning current

For the burn down method, the arc burning process can be observed "live" at the fault location via reflection measurement.

This method is particularly useful for difficult faults in oil-filled joints.

Sheath fault – testing & tracking

Test
The test is performed according to DIN VDE 0276-620 with up to 5 kV.

Pre-location
With up to 110 kV output voltage, highly sensitive measurement equipment and a fully automatic measurement procedure, even high-impedance errors in long cables (e.g. offshore) are no problem.

Special features:

- easyGO® operation using touch screen and jogdial
- Bi-polar locating technology for elimination of thermoelectric offset voltages and galvanic effects (moist joints)
- Independent of the resistances of sheath and conductor and the auxiliary line and connection clamps
- Test current up to 750 mA
- Audio frequency output for line tracing 8.44 kHz, 15 W (option)

Pinpointing
Pinpointing is performed with the new ESG NT step voltage receiver; the audio frequency option makes it possible to simultaneously locate the cable route.

ESG NT step voltage receiver

Cable testing and diagnostics

Insulation test
Automatic measurement of insulation resistance and the test specimen capacity with up to 1000 V test voltage. The measurements are automatically saved to the history database.

DC testing
DC testing is possible with a maximum voltage of up to 110 kV and 50 mA.

VLF test according to DIN VDE 0276
The 0.1 Hz VLF CR test system (option) is used to test all types of medium voltage cables. The patented technology makes possible especially large specimen capacities up to 18 µF. It is thus possible to test all three cores simultaneously in many cases. That will reduce the testing time by two hours.

As an alternative to VLF CR technology, a 0.1 Hz sine wave VLF testing system is available: For standard-compliant testing and as a voltage generator for the optional TanDelta diagnostics system (for assessment of age-related damage to MSP cables).

Partial discharge diagnostics
Another option is the 50 Hz slope partial discharge measuring system. It discovers local fault locations, such as installation faults at joints and terminations. It provides TE diagnostics with a voltage shape close to the normal operating frequency and thus information that corresponds to the behaviour of the test object at operating parameters.

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