PRIMEON

Centrally controlled and automated
cable fault location and cable diagnostics system

Megger

A prime example of flexibility, safety, and customisation

- Various system configurations
- Various types of vehicles
- Electric and 4x4 cars
- Trailer and skid solutions
- Renewables editions

2025-10-24

EN
ENGLISH

The benchmark for compact cable fault location and testing systems

Modern cable fault location with automation and central control

The vehicle-installed PRIMEON sets a new standard for modern cable fault location technology: It is a complete solution for finding faults in low-voltage (LV) and medium-voltage (MV) power cables, and it can be configured and further equipped with functionally integrated optional packages for VLF cable testing and cable diagnostics.

PRIMEON comes with the latest generation built-in Teleflex® RDR cable radar for time domain reflectometry (TDR), and also includes an insulation testing module, a powerful high voltage (HV) DC source, a multi-stage surge generator (thumper) for pinpointing in conjunction with the digiPHONE+2, a high-frequency burner for conditioning and converting faults, and a universal core set of HV prelocation methods. Everything is operated from one single control unit running the central control software with its graphical user interface (GUI).

The well-equipped toolbox for cable fault location

Cable faults in underground cable installations are as diverse as the cable designs themselves. Some faults are low-resistance faults, often detectable with a TDR but rather difficult to pinpoint; others are high-resistance faults and require HV prelocation methods such as ARM, yet are comparatively straightforward to inpoint, and some faults appear and disappear without warning, the so-called intermittent faults. Each has its own character – and each demands a different approach.

That is why Primeon does not rely on one or a small set of methods. It combines a comprehensive range of proven, complementary fault location techniques within one unified system – ready to address any challenge the underground cable poses.

With this flexibility, technicians can select exactly the right tool for the task at hand, whether the fault is obvious, tricky, or intermittent. In the end, Primeon gives you what matters most: confidence, efficiency, and the certainty of finding every fault under any conditions.

9 fault locating techniques

PRIMEON is a fault locating powerhouse and offers
9 different built-in technologies to find faults successfully.

Output up to 40 kV

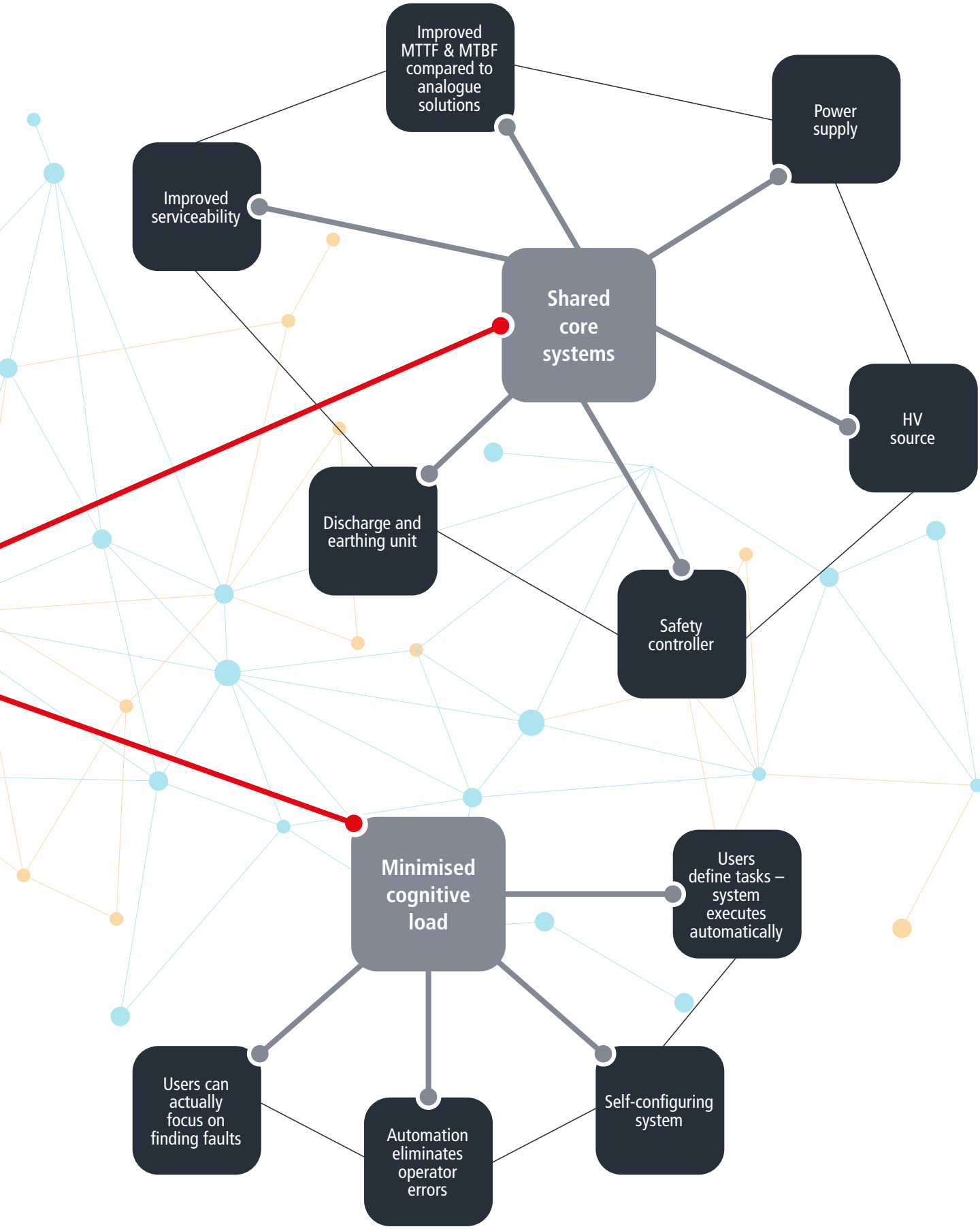
1. Insulation resistance measurement
2. DC breakdown detection (DC hipot)
3. Fault conversion by DC burning
4. Prelocation with Time Domain Reflectometry (TDR / cable radar)
5. Arc Reflection (ARM) with inductive ARM filter, including BestPicture® Multishot technology
6. Current decoupling (ICE)
7. Voltage decoupling (Decay)
8. Pinpointing high-resistance faults in the main insulation, using surging (thumping) across multiple voltage ranges (together with the digiPHONE+2)
9. Detecting and pinpointing LV earth faults and MV sheath faults using the voltage gradient method (step voltage method)

Fault identification

Fault prelocation

Fault pinpointing

Key benefits of an integrated, digital, fully automated central control


Improved MTTF & MTBF compared to analogue solutions
Power supply
Improved serviceability
Shared core systems
HV source
Discharge and earthing unit
Safety controller
Minimised cognitive load
Users define tasks – system executes automatically
Users can actually focus on finding faults
Automation eliminates operator errors
Self-configuring system

Key benefits of the toolbox philosophy

Application	Description
DC test (DC hipot)	To perform proof testing with DC if required, also core hardware to perform fault identification, fault conversion and charging the surge generator during capacitor discharge mode
Fault identification	To differentiate and identify various fault types, for example by insulation resistance measurement and by charging the cable with ramped DC in order to ignite the fault and measure the breakdown voltage
Fault prelocation	To determine the distance to the fault and identify the optimal starting point for pinpointing.
Cable radar (TDR)	Time domain reflectometry: runtime-based measurement of impedance changes in the cable using high frequency low voltage impulses; Dynamic distance-dependent de-attenuation: Essential technology to counteract the exponential attenuation on cables in order to measure far-away reflections; particularly effective on long cables, cables with many joints, or paper-lead cables (PILC)
Inductive ARM BestPicture® Multishot	Arc Reflection Method - standard high-voltage technology in the industry to get a distance of the fault, using two TDR traces, a LV reference trace and a HV fault trace **Multishot technology:** Instead of just one trace, capturing a group of HV fault traces during a single ARM shot **BestPicture® technology:** Analysing the Multishot group of HV fault traces, and selecting and displaying the best trace automatically **Arc reflection filter:** Separation and coupling device is series inductive reactor, providing superior arc ignition and arc stabilisation compared to resistive filters
Current decoupling (ICE)	Alternative to ARM, based on initiation of a travelling wave and measuring the current component, particularly effective on long cables, paper cables, etc.
Voltage decoupling (Decay)	Alternative to ARM, based on initiation of a travelling wave and measuring the voltage component, particularly effective on long cables, paper cables, high breakdown voltage faults etc.
Pinpointing	For magnetic-acoustic pinpointing of the exact fault position of high-resistance faults in the main insulation of the cable, by applying the coincidence method („thunder and lightning“) using the digiPHONE+2
Fault conversion	When required, changing the characteristics of the fault by burning, which means: continuously applying HV DC to ignite an arc first and to subsequently drive a high current into the fault, resulting in a reduction in fault impedance until other methods may be applicable or more promising
Sheath integrity	To test the cable‘s oversheath (outer jacket) for damage such as cuts, cracks, holes etc.; then pinpointing the exact position of the damaged spots using the voltage gradient method (step voltage method)

Feature	Performance
DC test (DC hipot)	
High voltage output	Up to 40 kV DC
Fault identification	
Insulation test	Up to 20 kV DC, 100 Ω ... 650 MΩ
Breakdown test	Ramped DC, breakdown detection up to 40 kV
Fault prelocation	
Cable radar (TDR)	Teleflex® RDR: - Bipolar impulse generation and amplitude up to ±100 V - Dynamic distance-dependent de-attenuation ProRange +40 dB - Phase comparison and difference mode - Auto mode, no user intervention required - Export mode with full control over all parameters - Auto-ranging cable end recognition - Auto-find cursor to fault position - Mode for locating intermittent faults (IFL)
Inductive ARM BestPicture® Multishot technology	Up to 32 kV and 2000 J **Multishot technology:** Capturing a group of 32 HV fault traces during a single ARM shot **BestPicture® technology:** Best-of-32; selecting and displaying the best HV fault trace from the group of 32 Multishot traces **Arc reflection filter:** inductive
ICE	Up to 32 kV
Decay	Up to 40 kV
Pinpointing	
Surging (Thumping)	8 / 16 / 32 kV with 2000 / 2000 / 2000 J Optionally available: additional 4 kV stage with 1100 J Fast surge rate of 3 seconds at full voltage of 32 kV
Fault conditioning and fault conversion	
High frequency burner	Up to 40 kV DC Burn current up to 850 mA
Sheath integrity	
Sheath testing	Up to 20 kV DC
Sheath fault pinpointing	Up to 20 kV DC using the HV DC source, with pulse sequences of 0.5:1 , 1:3 and 1:4

A benchmark for safety

Safety is paramount

The PRIMEON solution comes with a sophisticated built-in safety system compliant to numerous national and international safety standards, for example:

5 SAFETY RULES
Working in a de-energised state

1 – Turn-off power and disconnect.
2 – Secure against reconnection and reclosing.
3 – Verify that the installation is de-energised
4 – Earth and short-circuit.
5 – Cover or close off adjacent live parts.

- DIN EN 50191 and VDE 0104: Erection and operation of electrical test equipment
- DIN EN 61010: Safety requirements for electrical measurement equipment, control, and laboratory
- VDE 0105: Operation of electrical installations
- DGUV Information 203-034 (formerly BGI 891): Requirements for setting up and operating electrical test systems
- DGUV Information 203-048 (formerly BGI 5191): Operation of cable test vans

Furthermore, the PRIMEON comes with a proper discharging and earthing unit which is capable of safely and quickly discharging medium voltage cables of typical lengths in than 1 second even after it has been charged to 40 kV DC.

All safety features have been designed to support and emphasise the "5 safety rules":

- Functionality of a key switch for lockout-tagout, to interlock/lock-out and prevent the system from being unintentionally re-energised
- Emergency stop to shut down hazardous events immediately
- Status indicator lights to visually signal the earthing state of the system in the operator room and in the connection room
- EN50191-compliant external safety device with a 15 m long yellow signalling cable
- Door contacts (limit switches) to monitor and to restrict access to the HV compartment with its connection panel and rear door cable flap
- Connection monitoring (F-Ohm, fault loop resistance) to check for sufficient contact to the operational earth (HV return) and safety earth (station earth)
- Reference earth to vehicle frame monitoring (F-U, fault voltage) to check for effective station earth incl. voltage-time integral, and for hazardous touch potentials
- Mains input protection device NAS 16 to prevent damage to the system from the mains side, e.g.from surges, overvoltage, or undervoltage

Note:
Never complacently or blindly rely on any technical apparatus for safety and always observe your local occupational safety procedures, especially the five safety rules! Statistically, all personnel-related electrical accidents are caused by the violation of one or more of the 5 safety rules!

Linux operating system

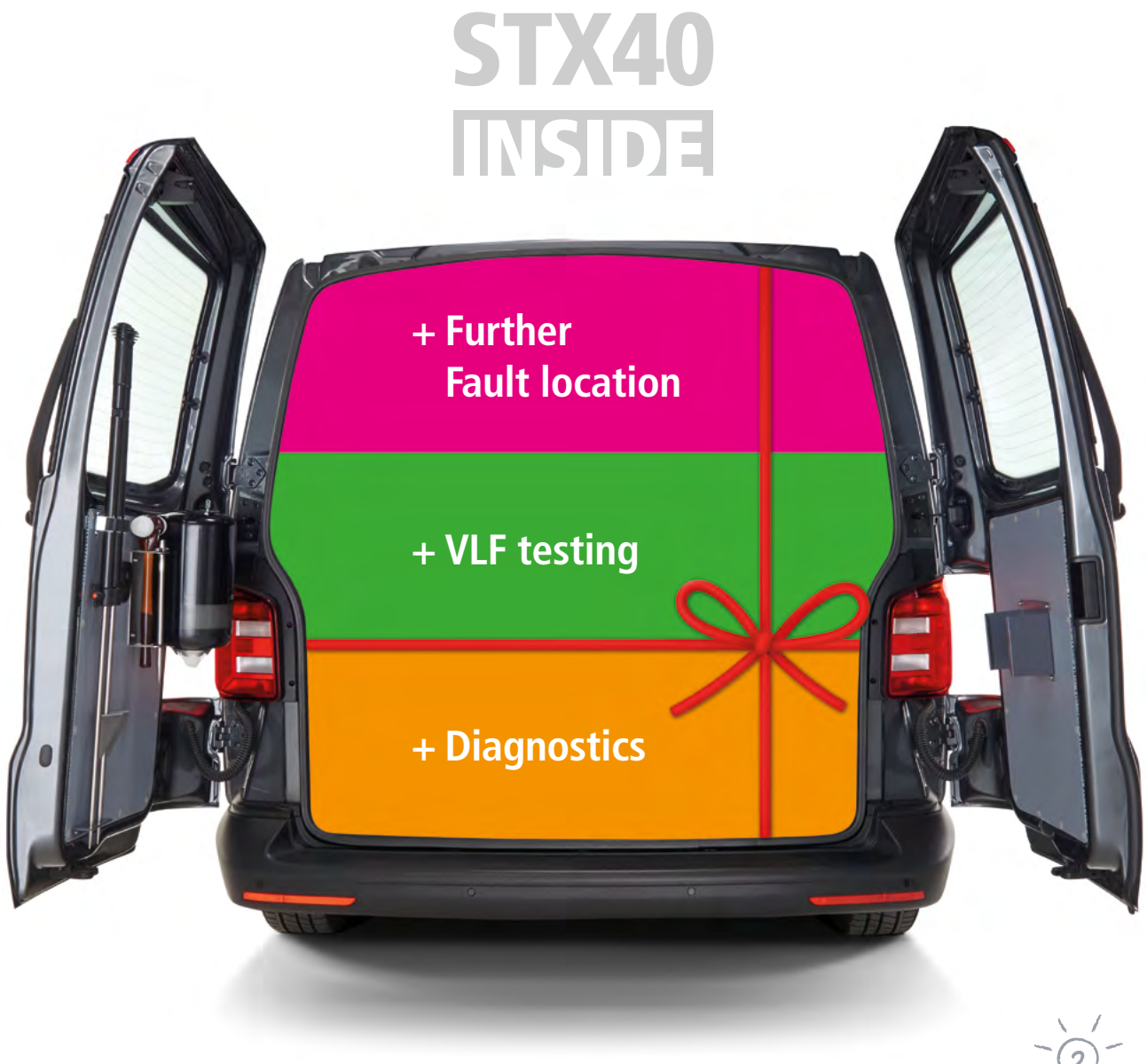
The control software of the PRIMEON is based on Linux.

Since power cables are part of the critical infrastructure, using Linux comes with many benefits in comparison with vulnerable Windows-based solutions:

- No blue screen of death
- No anti-virus protection necessary
- High degree of inherent cyber security
- Resilient and stable, even after loss of power / mains failure
- No data loss
- No UPS (Uninterruptible Power Supply) necessary
- Black start, straightforward rebooting
- Connectivity and remote access via LTE and TeamViewer

LINUX
INSIDE

Create your perfect package – choose a setup that perfectly meets your daily needs



PRIMEON comes with a best-in-class radar, but you need more?

Increased impulse voltage and impulse width, plus advanced denoising technology, advanced averaging and long-range signature boost mode! Get the TDR technology which holds the world record for best TDR measurements!

Upgrade your TDR with the performance package Teleflex® Unleashed!

Packages to add for

Fault location

Need more performance for certain applications?
Add up to 3 fault locating packages to your Primeon base system and expand your capabilities!

Utility location package (FL1)

Add a centrally controlled audio frequency generator which is able to provide powerful signal outputs at various frequencies for performing tasks such as line location, cable route tracing and pinpointing of low resistance faults. Don't forget to order a utility locator like the Ferrolux or the NTRX line location set of the digiPHONE+2.

Fault conversion package (FL2)

Add a resonance burner which is able to condition, convert, and prelocate faults at significant power levels. Unlike old-fashioned burn-down units based on 50 Hz transformers, a resonance burner has a continously variable output and delivers more active power into the fault while at the same time its reactive power demand is greatly reduced.

By using the unique ARM Live Burning technology, it is possible to prelocate challenging faults which are hard to ignite and difficult to stablise.

Sheath Integrity package (FL3)

Add a portable sheath tester that can identify, prelocate and pinpoint sheath faults. Damage to the cable's outer sheath is identified by DC testing and prelocated by voltage drop bridge measurement. For sheath fault pinpointing the voltage gradient method (step voltage method) is used.

FL1

Utility location

Tone generator

Functionally integrated, automated, and centrally controlled

250 W transmitting power
SignalSelect® function
Multi-transmission mode (sending multiple signals at different frequencies simultaneously)

Five audio frequencies:
491 Hz, 982 Hz, 8.44 kHz, 480 Hz, 9.82 kHz

FL2

Fault conversion

Resonance burner and ARM® Live Burning

Integrated and automatically switched

Fault ignition up to 15 kV DC
Burn-down current up to 25 A

Prelocation with ARM® Live Burning

Uninterrupted burn-down process with optimal regulation (continously variable output, no tap positions, no manual switching, no burn range takeover)

FL3

Sheath integrity

Sheath fault tester

Testing up to 10 kV DC

Prelocation with voltage drop bridge

Pinpointing with voltage gradient method (step voltage method)

Packages to add for
Testing

Did you know?
VLF testing has been a well-established well-proven technology for onsite cable testing for over 35 years now. The original VLF was invented and introduced by HDW Elektronik Kiel in 1986!

Testing in accordance with international standads

VLF testing is supported by many international standards, namely VDE 0276, CENELEC HD 620, IEC 60060, IEC 60502 and IEEE 400.2.

VLF CR: Benefits of choosing Cosine-Rectangular for withstand testing

The Cosine-Rectangular waveshape offers unique benefits as an excitation voltage for VLF testing: Very high test capacitance, greatly reduced power consumption and considerably less heat losses, three very important factors for cable test vans which have to work anywhere and in any climate, while having limited input power supply and limited operating temperatures. VLF CR makes it possible to test all three phases in parallel as well as to test long onshore and offshore MV and HV cables. Furthermore, research studies have shown that VLF CR testing at 3x U_0 RMS is the most effective waveshape to break down weak spots, even more effective than 50 Hz testing.

BASIC

- ☑ **Sinusoidal**
- ☐ Cosine-rectangular
- ☐ Suitable for long cables
- ☐ Testing all 3 phases simultaneously

Moderate test capacitance of 1 µF at full output and 0.1 Hz.

44 kV_{RMS} (62 kV_{peak})

AMBITION

- ☐ Sinusoidal
- ☑ **Cosine-rectangular**
- ☑ **Suitable for long cables**
- ☑ **Testing all 3 phases simultaneously**

Very high test capacitance of 5 µF (M) or 4.4 µF (L) at full output and 0.1 Hz.

40 kV_{RMS} or 60 kV_{RMS}

M
25 kV cable

L
35 kV cable

Packages to add for

Testing and Diagnostics

Can't find the right product for your daily needs? Reach out to us!
Our project team will be happy to help you with special adaptions and customisation!

BASIC

- ☑ **VLF testing**
- ☐ PD testing
- ☑ **Tan delta**
- ☑ **Sinusoidal**
- ☐ Cosine-rectangular
- ☐ Slope
- ☐ DAC (damped AC)

Entry-level solution.
Cable testing and limited diagnostics using 0.1 Hz VLF Sine.

44 kV_{RMS} (62 kV_{peak})

ADVANCED

- ☑ **VLF testing**
- ☑ **PD testing**
- ☑ **Tan delta**
- ☑ **Sinusoidal**
- ☐ Cosine-rectangular
- ☐ Slope
- ☐ DAC (damped AC)

Entry-level solution.
Cable testing and limited diagnostics using 0.1 Hz VLF Sine, including sinusoidal PD testing.

44 kV_{RMS} (62 kV_{peak})

COMFORT

Add on option for testing and diagnostics packages: internal PD detector permanently installed in the vehicle for PD testing with the highest possible degree of safety and the highest ever comfort and convenience.

AVAILABLE FOR:

- ☑ **DYNAMIC M**
- ☑ **ULTIMATE M**
- ☑ **DYNAMIC L**
- ☑ **ULTIMATE L**

DYNAMIC

- ☑ **VLF testing**
- ☑ **PD testing**
- ☐ Tan delta
- ☐ Sinusoidal
- ☑ **Cosine-rectangular**
- ☑ **Slope**
- ☑ **DAC (damped AC)**

Professional solution.
Powerful cable testing and diagnostics with near line frequency technologies
Slope and DAC for PD testing.

M
25 kV cable

L
35 kV cable

ULTIMATE

- ☑ **VLF testing**
- ☑ **PD testing**
- ☑ **Tan delta**
- ☑ **Sinusoidal**
- ☑ **Cosine-rectangular**
- ☑ **Slope**
- ☑ **DAC (damped AC)**

The ultimate testing and diagnostics machine.
All technologies and waveshapes included.
Maximum benefits for the user.

M
25 kV cable

L
35 kV cable

Flexibility at its best

Internal PD coupler for diagnostics packages

The Primeon system can be equipped with a permanently installed PD coupler.

Most beneficial advantages:

- Work safely by avoiding any risk of contact or exposure to HV
- Suitable for all waveforms
- Output of up to 62 kV RMS, suitable for 35 kV cables
- Completely independent of the weather conditions
- No lifting of the PD coupler and carrying it around

Various setups possible to accommodate your preferences

Scan the QR code
Watch 3D examples

Choose the control unit and cabinets that suits you best!

25.6 cm
10.1 inch

Standard mount
rotatable, tiltable

25.6 cm
10.1 inch

Tablet-style mobile mount
flat back plate, freely moveable

39.6 cm
15.6 inch

Standard mount
rotatable, tiltable

39.6 cm
15.6 inch

Heavy-duty comfort mount
rotatable, tiltable, swivelling, latching

Customised cabinet interior provides plenty of space for our wide range of connection accessories

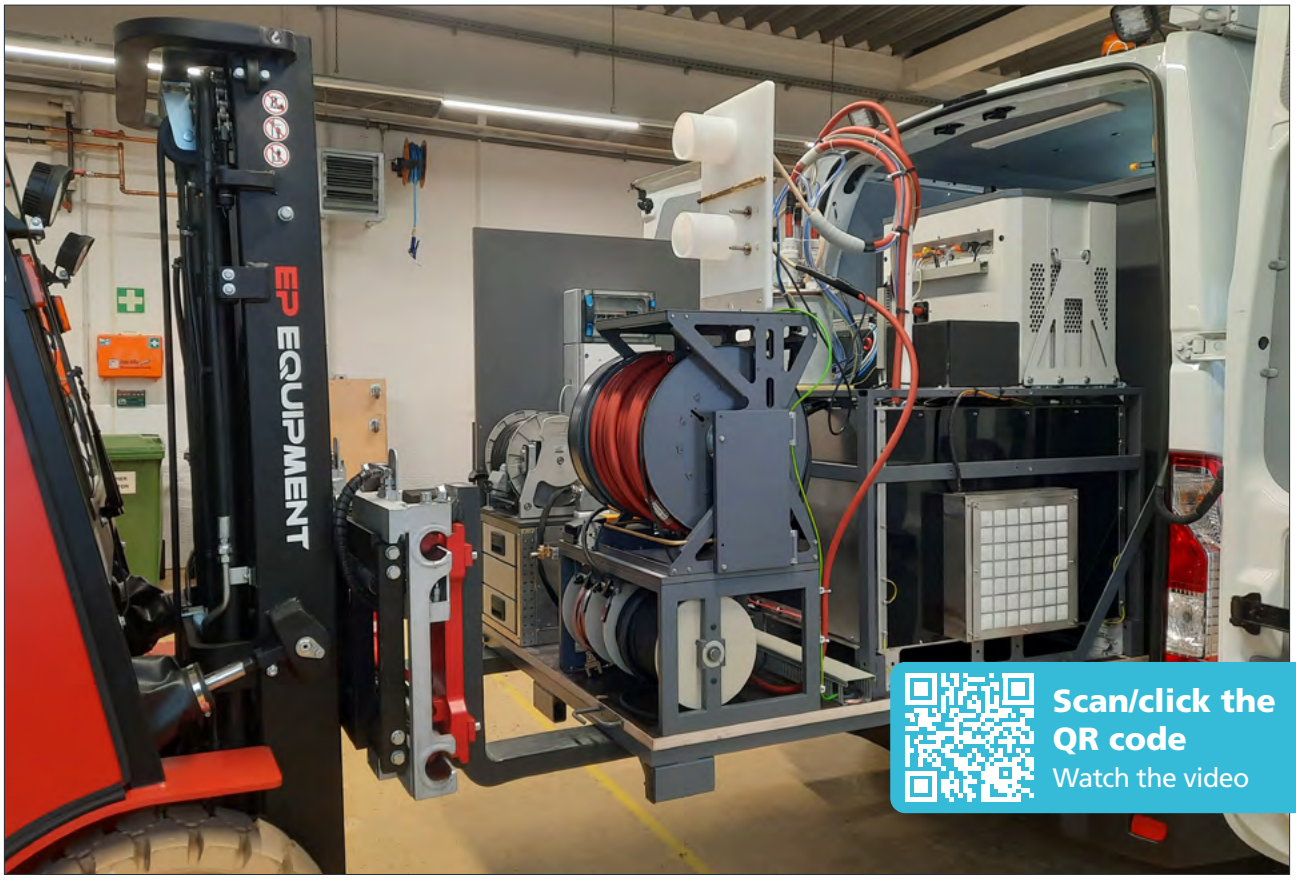
PRIMEON system fits into many different types of vehicles. 4x4 Pickup trucks? No problem!

4X4 OFF ROAD

Scan/click the QR code
Watch the video

The control unit is freely movable but can also be attached to the passenger seat so that the system can be operated from the back seat.

More examples of special installations – trailer and skid solutions



Scan/click the QR code
Watch the video

And yes,
we can also do EVs!

A new milestone in advancing e-mobility and cable fault location

We have successfully integrated our PRIMEON system into a fully electric vehicle platform. This shows that modern cable fault location technology can operate safely and without interference even in cars with battery-powered drives and lot of sensitive onboard electronics.

The first project revealed that there are a lot of hurdles associated with electric vehicles and that in-depth training by TÜV Süd was necessary, but eventually all challenges could be overcome, including mechanical mounting and electrical wiring, and it was proven that cable fault location in zero-emission vehicles can be done in a qualified, standard-compliant way.

This is another step towards sustainable, e-powered cable test systems – built to the same level of safety and performance that Megger stands for.

Picture of an Opel Vivaro-e

What else can we offer you for your daily demands?

DIGIPHONE+2

Pinpointing with magnetic-acoustic surge wave receiver

DIGIPHONE+2 NT SET

Additionally sheath fault location using
50/60 Hz voltage gradient method

DIGIPHONE+2 NTRX SET

Additionally cable tracing with
detection of current direction

PINPOINTING with optional SHEATH FAULT LOCATION and CABLE TRACING

Datasheet
digiPHONE+ 2 Series

DCI3

Reliable cable identification of energised
and de-energised cables

CABLE and PHASE IDENTIFICATION

DCI3
Datasheet

MFM10

Battery operated sheath fault location system

SHEATH FAULT LOCATION

MFM10
Datasheet

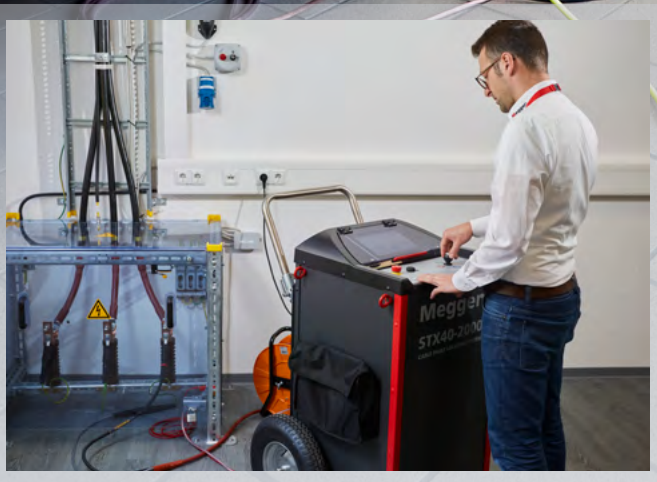
You will not be left alone: training & support from the specialists

A tremendous benefit to purchasing any test instrument from Megger is that we won't disappear after your purchase! We do have broad and in-depth technical expertise, application knowledge and experience in the field which we can all share with you.

We have invested heavily in creating a local support network of engineers to provide a rapid response by people who understand your challenges and needs.

Product and application training can also be offered at your premises or in specialist training facilities around the world. More information on course availbility and other technical resources can be found on our website **www.megger.com**.

Trainings with high practical value!



Megger. We are building the best cable test vans in the world. For over 50 years now.
www.cabletestvan.com

Scan/click the QR-code
Ask for our all-round carefree packages especially for your wind farm or pv/solar plant.

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