titron®

BAUR automatic cable test van

The figure is illustrative.

The intelligent system for cable fault location, testing, and diagnostics

- Simple, convenient, and fast operation
- High-performance technology and the highest safety standard
- Customised, process-oriented, and adaptable
- Complete 3-phase cable fault location and diagnostics system in a vehicle up to 3.5 t

titron® is a fully automatic, centrally controlled, and intelligent system for cable fault location, cable testing, and diagnostics.

Thanks to the innovative operational concept and high-performance technology, the **titron®** system is able to carry out measurements faster, more easily, and with greater precision. All of the test van's functions are controlled centrally via the BAUR software. The intuitive user interface of the BAUR software provides optimal support to both asset managers and measurement engineers in their workflows.

Fault location. Recommendations for the cable fault location process are generated based on a multitude of factors that link the system, in an intelligent manner, to an algorithm specifically designed for this purpose. Nevertheless, the user is still, at any time, able to override the given specifications of the system and to carry out the measurement process based on his own experience and knowledge. For cable fault location, the BAUR software includes a multitude of precise fault location methods for every type of fault and various cables.[1)]

Testing and diagnostics. With the diagnostics methods based on dissipation factor and partial discharge measurement, proven methods are available for comprehensive cable analysis. This not only enables the early detection and location of PD-related weak points in medium-voltage cables and cable accessories, but also the assessment of dielectric ageing based on the dissipation factor values.[2)]

NEW!

- **Optimum ergonomics and flexibility**
- **High vehicle load capacity with full system configuration**

High voltage and functions

- Available test voltages:
  - DC voltage
  - VLF truesinus®
  - Surge voltage
- Cable and cable sheath testing
- Cable fault location
- Tracing
- Cable diagnostics

Higher efficiency through innovative technology

- Time savings thanks to parallel dissipation factor and partial discharge measurement
- Interface to GIS systems
- Central data management
- Surge energy up to 3000 J, complete surge energy on all voltage levels
- Precise fault location methods for every type of fault and various cables, e.g.
  - SIM/MIM – the most effective method for cable fault location
  - Conditioning-SIM/MIM – helpful in locating wet faults that are difficult to detect
  - DC-SIM/MIM – for breakdown faults and intermittent faults
  - 3-phase current coupling methods for the fault location in branched networks
- BAUR Fault Location App[3)] for remote control of the cable fault pin-pointing process
- Maximum safety for the operator and the system

Further information can be found in the following data sheets:
[1)] IRG 4000 time domain reflectometer and BAUR software for cable fault location
[2)] BAUR software for cable testing and diagnostics
[3)] BAUR Fault Location App

Note: The availability of individual methods, functions, and voltage levels depends on the system configuration. An overview of the available optional functions can be found on page 5.

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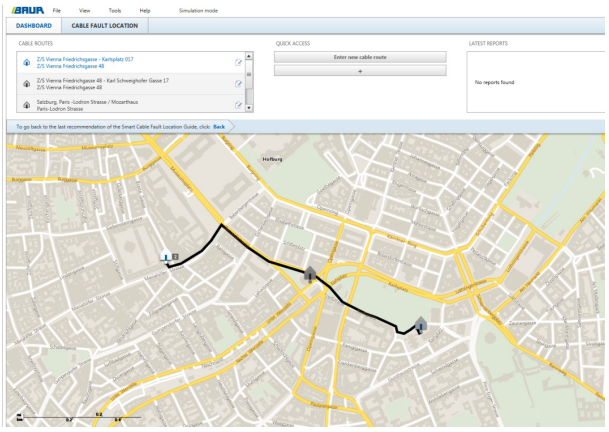
titron®
The state-of-the-art in cable fault location

Central automatic control with complete system monitoring

- Central system control via the BAUR software and high-performance industrial PC
- Highest level of efficiency and measurement precision through the optimally adjusted measurement path, combined with modern digital signal processing
- Extremely high reliability by monitoring and recording all system events
- Quick start: ready for operation in just a few seconds

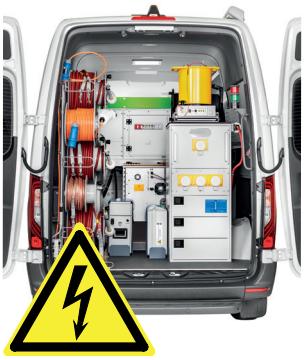
The innovative operational concept



- Intuitive modern user interface in multiple languages – no long introduction or familiarisation period is required
- Process-oriented support for both asset managers and measurement engineers for the efficient planning and performance of measurements, as well as the precise monitoring of the condition of cable networks
- BAUR GeoBase Map:
  - Unique combination of road maps, including the cable route
  - GPS-based system location determination
  - Cable routes and cable faults displayed on the map
- Optimal operator support during cable fault location provided by the Smart Cable Fault Location Guide
- Cable Mapping Technology CMT: Overview of cable accessories and faults in relation to the cable length
- All data on the cable route, such as the geographic position, voltage level, joints, all measured values, etc. is automatically saved and can be accessed at any time.
- Quick and easy compilation of clear and precise measurement records – with freely selectable company logo, comments and figures of the traces.
- Fast and precise location of the cable fault in combination with the BAUR Fault Location App

Comprehensive safety concept in accordance with the latest standards

- Safety concept in compliance with EN 61010-1 and EN 50191
- Monitoring of all safety-relevant parameters (protective and auxiliary earthing, rear door and HV connection sockets)
- Separation into the operating area and HV area
- Red and green signal lamps to indicate the operating state
- Emergency off button in the operating area and optional external emergency stop feature
- Key-operated switch to prevent unauthorised operation
- All operation-related error messages are displayed clearly on the screen and are immediately visible to the user.



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Figures and screenshots are illustrative

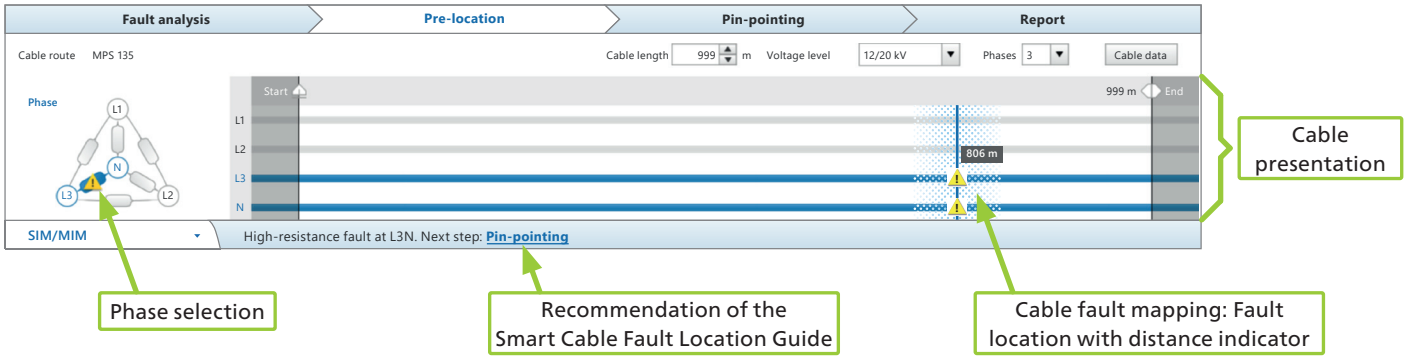
titron®

Find your cable fault with just a few clicks!

Smart Cable Fault Location Guide

- The intelligent Smart Cable Fault Location Guide leads the operator step-by-step – quickly and efficiently – to the cable fault.
- A special algorithm continuously analyses the current measurement results, which it uses to generate optimum recommendations for the operator regarding the further procedure required to reliably locate the cable fault.
- Automatic fault analysis with clear graphical presentation giving a better overview.
- Test voltage wizard:
  - The system recommends voltage values according to the cable data and the fault type.
  - The test voltages can be defined according to the user.
- Automatic cursor positioning at the cable end and at the fault location
- Automatic adjustment of method-related parameters for quick and efficient fault location.
- Clear graphical presentation of the measurement results with helpful functions for evaluation
- Envelope curve display for intermittent faults – even small changes in impedance are made visible and saved.

All this **with full flexibility for experienced operators!** Experienced measurement engineers can use their know-how directly at any point during the measurement process and select a user-specific procedure.



Screenshot is illustrative

titron®

A sophisticated workstation – ergonomic, practical, and comfortable

Better ergonomics in the workplace

- Optimum ergonomics in the workplace for greater efficiency
- Large work surface and lots of storage space (up to 32 RU)
- Easily accessible data interfaces for the simple connection of additional equipment, e.g. printer, laptop, etc.
  - 4 x USB 3.0
  - 1 x Ethernet
- Sockets directly on the workstation
- Charging options for portable devices, e.g. the protrac® portable pin-pointing system, even while on the move
- LV connector panel directly on the workstation for connecting external devices, e.g. the TG 20/50 audio frequency transmitter or an external ohmmeter
- Movable seat console with lots of storage space and optional backrest

Inverter with integrated battery charging function

- Industrial PC can be supplied with power via the vehicle battery for several hours
- Automatic switchover to supply via vehicle battery in the event of mains failure
- System sockets can be supplied with power via the vehicle battery while on the move (up to max. 800 W)
- Automatic switch off of the inverter if critical battery voltage is not reached
- Vehicle battery is charged as soon as the system is connected to the mains voltage

Easy and convenient to operate

- Large monitors for greater productivity and a better overview during evaluation
  The following are available:
  - 1 x 24" monitor
  - 1 x 19" monitor
  - 2 x 19" monitors
- Standard, convenient operation by means of a mouse and keyboard
- Proven Windows operating system
- Installation of office software, e.g. MS Office programs, company-internal ERP systems, GIS and web applications, is possible.
- GIS interface enables the exchange of cable data between your GIS system and the BAUR software.
- Time savings thanks to interactive user support
- Online support via the Internet
  - With your permission, BAUR's customer service department can access the computer of your cable test van, identify your problem, and quickly find a solution.
  - During the fault location, your engineers can share the desktop with the test engineer on site and support him in the analysis of the measurement results (where applicable, a licence for a desktop-sharing program may be required).

Figures are illustrative

Data sheet: BAUR GmbH · 826-132-1 · 02.2021 · Subject to modifications

Technical data

			titron® 3-phase	titron® 1-phase	titron® compact
I. High voltage					
Surge voltage					
Surge voltage ranges	0 – 8 kV, 0 – 16 kV, 0 – 32 kV		✓	✓	✓
Surge energy	3000 J @ 8, 16, and 32 kV 2050 J @ 8, 16, and 32 kV 1540 J @ 8, 16, and 32 kV		Surge energy of choice	Surge energy of choice	Surge energy of choice
Surge capacitor extension	SZ 1550:	SZ 2650:	Option	Option	Option
For surge energy class 3000 J:	1820 J @ 4 kV	2890 J @ 4 kV			
For surge energy class 2050 J:	1580 J @ 4 kV	2660 J @ 4 kV			
For surge energy class 1540 J:	1460 J @ 4 kV	2530 J @ 4 kV			
Surge sequence	5 – 20 pulses/min, single surge		✓	✓	✓
Capacitor charge time	Max. surge voltage 32 kV in 3 s		✓	✓	✓
Voltage sources					
SSG 40 surge voltage generator					
DC voltage	0 – 40 kV, I_{max} = 50 mA		✓	✓	✓
viola VLF HV generator			Option	Option	Option
DC voltage	0 to ±60 kV				
VLF voltage	truesinus® 0 – 44 kV_{rms}	Square wave 0 – 60 kV			
Frequency range	0.01 – 0.1 Hz				
Max. capacitive load	Up to 10 µF; 0.85 µF @ 0.1 Hz at 44 kV_{rms} 2.7 µF @ 0.03 Hz at 44 kV_{rms}; 7.7 µF @ 0.01 Hz at 44 kV_{rms}				
PHG 70 VLF HV generator			Option	Option	Option
DC voltage	0 to ±70 kV; I_{max} = 10 mA @ 70 kV; 90 mA @ 20 kV				
VLF voltage	truesinus® 0 – 38 kV_{rms}	Square wave 0 – 57 kV			
Frequency range	0.01 – 1 Hz				
Max. capacitive load	Up to 20 µF; 3 µF @ 0.1 Hz at 38 kV_{rms}				
PHG 80 VLF HV generator			Option	Option	Option
DC voltage	0 to ±80 kV; I_{max} = 1.8 mA @ 80 kV; 90 mA @ 20 kV				
VLF voltage	truesinus® 0 – 57 kV_{rms}	Square wave 0 – 80 kV			
Frequency range	0.01 – 1 Hz				
Max. capacitive load	Up to 20 µF; 1.2 µF @ 0.1 Hz at 57 kV_{rms} 3 µF @ 0.1 Hz at 38 kV_{rms}				

✓ = included in standard delivery / Option = available as an optional extra / – = not available

Technical data

			titron® 3-phase	titron® 1-phase	titron® compact
I. High voltage (continued)					
Voltage sources (continued)					
PGK HB AC/DC HV test set			Option	Option	Option
DC voltage					
PGK 70 HB:	0 to ±70 kV, I_{max} = ±3 mA / ±12 mA[1)], 1.2 kVA				
PGK 70/2,5 HB:	0 to ±70 kV, I_{max} = ±20 mA / ±84 mA[1)], 6.5 kVA				
PGK 110 HB:	0 to ±110 kV, I_{max} = ±5 mA / ±17 mA[1)], 2.65 kVA				
PGK 110/5 HB:	0 to ±110 kV, I_{max} = ±22 mA / ±104 mA[1)], 11.7 kVA				
PGK 150 HB:	0 to ±150 kV, I_{max} = ±4 mA / ±20 mA[1)], 2.65 kVA				
PGK 150/5 HB:	0 to ±150 kV, I_{max} = ±18 mA / ±77 mA[1)], 11.7 kVA				
AC voltage					
PGK 70 HB:	0 – 55 kV_{rms}, I_{max} = 7 mA_{rms} / 20 mA_{rms} [1)], 1.2 kVA				
PGK 70/2,5 HB:	0 – 55 kV_{rms}, I_{max} = 50 mA_{rms} / 117 mA_{rms} [1)], 6.5 kVA				
PGK 110 HB:	0 – 80 kV_{rms}, I_{max} = 14 mA_{rms} / 30 mA_{rms} [1)], 2.65 kVA				
PGK 110/5 HB:	0 – 110 kV_{rms}, I_{max} = 66 mA_{rms} / 137 mA_{rms} [1)], 11.7 kVA				
PGK 150 HB:	0 – 150 kV_{rms}, I_{max} = 9 mA_{rms} / 23 mA_{rms} [1)], 2.65 kVA				
PGK 150/5 HB:	0 – 110 kV_{rms}, I_{max} = 50 mA_{rms} / 108 mA_{rms} [1)], 11.7 kVA				
PGK E DC HV tester			Option	Option	Option
DC voltage					
PGK 50 E:	0 – 50 kV, I_{max} = -2 mA / -25 mA[1)], 1.6 kVA				
PGK 80 E:	0 – 80 kV, I_{max} = -1.5 mA / -20 mA[1)], 1.4 kVA				
II. Cable fault location					
Insulation resistance measurement					
Voltage	up to 1,000 V	Measurement range: 0 ohm – 5 GOhm	✓	✓	✓
3-phase measurement L-N, L-L	via HV connection		✓	–	–
3-phase measurement L-N, L-L	via LV connection with TDR connection cable, 50 m		Option	Option	✓
Pulse reflectometry					
The technical data for time domain reflectometry is provided in the data sheet for the IRG 4000 time domain reflectometer.					
Fault conditioning through burning					
ATG 2 burn down transformer	0 – 10 kV, up to 32 A; 2.3 kVA		Option	Option	Option
ATG 6000 burn down transformer	0 – 15 kV, up to 90 A; 5.75 kVA		Option	Option	Option

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[1)] In short-circuit

Technical data

	titron® 3-phase	titron® 1-phase	titron® compact
II. Cable fault location (continued)			
Pre-location methods			
TDR Time Domain Reflectometry	✓	✓	✓
3-phase measurement L-N, L-L via HV connection	✓	–	–
3-phase measurement L-N, L-L via LV connection with TDR connection cable, 50 m	Option	Option	✓
SIM/MIM secondary/multiple impulse method up to 32 kV	✓	✓	✓
DC-SIM/MIM secondary/multiple impulse method used in DC mode up to 32 kV, I_{max} = 120 mA	✓	✓	✓
Conditioning-SIM/MIM fault conditioning with subsequent SIM/MIM measurement	✓	✓	✓
ICM impulse current method up to 32 kV	✓	✓	✓
DC-ICM impulse current method used in DC mode up to 32 kV, I_{max} = 120 mA	✓	✓	✓
Decay method up to 40 kV[1)]	✓	✓	✓
Breakdown voltage detection up to 40 kV[1)]	✓	✓	✓
Differential methods For cable fault pre-location in branched low-voltage and medium-voltage networks: ICM differential method, decay differential method, DC-ICM differential method	Option	–	–
Measuring bridge measurement for the pre-location of cable and cable sheath faults (shirla sheath test and fault location device)	Option	Option	Option
Pin-pointing methods			
Acoustic pin-pointing: Voltage ranges: 0 – 8 kV, 0 – 16 kV, 0 – 32 kV[2)]	✓	✓	✓
Step voltage method up to 40 kV, I_{max} = 50 mA	✓	✓	✓
Tracing, audio frequency methods (twisted field and minimum distortion methods)			
– TG 600 integrated audio frequency transmitter, 600 VA	Option	Option	–
– TG 20/50 mobile audio frequency transmitter, 20 VA/50 VA	Option	Option	Option
All pin-pointing methods: protrac® pin-pointing system	Option	Option	Option
III. Safety devices and protective features			
Safety standard: According to EN 50191 and EN 61010-1 Electrical safety: Overvoltage category IV/300 Safety monitoring: Protective earthing, operational earthing, auxiliary earthing, potential monitoring, HV connections, rear doors, emergency off button Monitoring of the supply voltage: Overvoltage protection, undervoltage protection	✓	✓	✓
Isolation transformer: 5 kVA or 7 kVA with switch current limiter	Option	Option	Option
External emergency off unit with signal lamps, incl. connection cable, 50 m	Option	Option	Option
IV. System data			
Connection cable			
3 x 1-phase HV connection cable, 50 m	✓	–	–
3 x 1-phase HV connection cable, 80 m	Option	–	–
1 x 3-phase HV connection cable, 50 m	Option	–	–
1 x 1-phase HV connection cable, 50 m	–	✓	✓
1 x 1-phase HV connection cable, 80 m	–	Option	Option
TDR connection cable, 3-phase, 25 or 50 m, on hand cable drum, measurement category CAT IV/600 V	Option	Option	✓

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[1)] Optional up to 150 kV (depending on the size of the vehicle), see the optional voltage sources listed in section „I. High voltage" of the technical data

[2)] For data on surge voltage and available options, see section „I. High voltage" of the technical data

Technical data

		titron® 3-phase	titron® 1-phase	titron® compact
IV. System data (continued)				
Phase and device selection				
Automatic phase and device selection		✓	✓ (Device selection)	–
Cable drum rack				
KTG M cable drum rack		✓	✓	✓
KTG M cable drum rack with motor drive		Option	Option	Option
KTG NE cable drum rack with motor drive		Option	–	–
Operating system and display				
Operating system	Windows 10	✓	✓	✓
Memory	8 GB RAM			
Hard disk	SSD industry standard			
Display	1 x 24" monitor (resolution 1920 x 1080)	✓	✓	✓
Instead of 24" monitor	– 1 x 19" monitor (resolution 1280 x 1024) or – 2 x 19" monitors	Option	Option	Option
Remote control of the system				
BAUR Fault Location App	For remote control of the surge voltage generator	Option	Option	Option
Control via laptop		Option	Option	Option
Systems supply and operating conditions				
Input voltage	190 – 264 V, 47 – 63 Hz	✓	✓	✓
Max. power consumption	7.5 kVA			
Inverter with battery charging function	230 V ±2%, 50 Hz ±0.1%, 700 W / 800 VA			
Charger	DC 13.2 – 14.4 V, 35 A			
Ambient conditions				
Ambient temperature	HV area: -20°C to +50°C Operating area: 0°C to +50°C	✓	✓	✓
Storage temperature	-20°C to +60°C			
Mobile power supply				
Synchronous generator	7 kVA, 230 V	Option	Option	Option
Electronic generator	5 kVA, 230 V	Option	Option	Option
Battery-Power system	For battery mode; battery capacity 5 kWh, 230 V	Option	Option	Option
Climate control units				
Fan heater	230 V, 2000 W	Option	Option	Option
Air conditioner	230 V	Option	Option	Option
Weight				
Standard version		From 800 kg	From 800 kg	From 450 kg

Information on individual functions and the required system configuration can be obtained from your BAUR representative.

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