LV-Guard 250

BAUR online LV fuse and fault location system

- **Automatic reconnection of the power supply**
- **TDR with each overcurrent occurrence**
- **Online step voltage measurement**

Ensuring the highest level of supply security

- Intelligent and multifunctional electronic fuse
- Reduced downtime in the supply network
- Cable fault location with ongoing power supply
- Reduced time and costs in the fault location process

The online LV fuse and fault location system LV-Guard 250 is used

- for the temporary supply of power to the connected low-voltage network with automatic reconnection in the event of a fault
- for fault location and fault analysis in low-voltage and lighting networks with ongoing power supply.

The power switch of the LV-Guard 250 is used in low-voltage distributions instead of the NH fuse. If a cable fault occurs, or if there are temporary overloads, the LV-Guard 250 trips, briefly interrupts the power supply and then automatically switches back on. This way, consumers remain supplied at all times. For every cable fault or overcurrent event, current and voltage diagrams and reflection images* are automatically produced that permit a precise determination of the fault distance. For pin-pointing, both surge mode and an online step voltage procedure* are available.

The design of the power switch and the technology used make an independent and safe operation possible, even in the closed distribution cabinet, without the presence of a security guard being required.

There are different LV-Guard sets available, depending on the application scenario: As a web solution with centralised control over the internet or solutions with local multifunctional radio control.

Functions

- Intelligent fuse in continuous operation up to 250 A (instead of the NH fuse)
- SMS notification in the event of disruptions
- Storage of current and voltage data for fault analysis
- Fault pre-location with connected consumers:
  - Electric arc reflection method*
  - Detection of phase-to-phase faults*
  - Impedance evaluation
- Fault pin-pointing with connected consumers:
  - Surge mode with 230 V
  - Pin-pointing with step voltage*

Advantages

- Higher security of power supply in the low-voltage grid
- Reduced underground work for fault location
- Fault location possible by web control from any desired location*
- Automatic reconnecting of the power switch after faults and temporary overloads
- Avoidance of power failure related penalties and product liability claims

Features

- TDR measurement with a sampling rate of 200 MHz
- Device control and access to measurement data via the Internet (integrated GSM/GPRS)*
- GPS-based location display*
- Time Domain Reflectometry-loop for the detection of phase-to-phase faults
- Position indicator to determine velocity of pulse propagation

* Availability of the function depends on the compilation of the set

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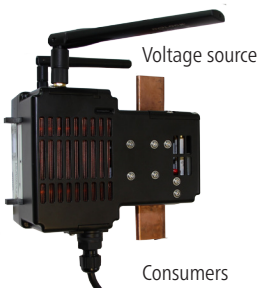
LV-Guard 250
System components

LV-Guard 250 power switch

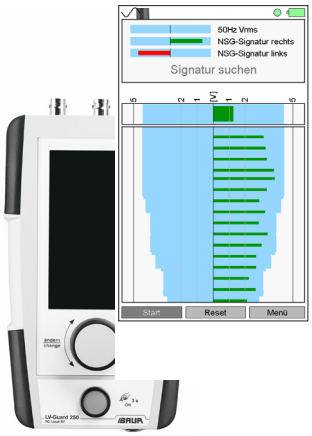


The LV-Guard 250 intelligent electronic power switch is inserted directly into the fuse block instead of the NH fuse. It permits the continuous supply of power to the low-voltage network and at the same time takes over the function of an electronic fuse. If it is tripped, a fault pattern is automatically recorded: Depending upon the equipment, TDR reflection images, current and voltage diagrams and impedance values are available to you.

The following can be set:
- Fuse rating from 10 A to 250 A
- Delay between disconnection and reconnection between 2 seconds and 2 minutes
- Number of reconnect operations

Acoustic pin-pointing

The LV-Guard permits direct acoustic pin-pointing with 230 V surge mode.
The following parameters can be selected for the surge mode:
- Manual triggering or automatic cycle (the cycle time can be selected)
- Max. surge energy (number of half-waves of the grid voltage from 1 to 4)
- Reduction of the surge energy with ignition lag
  (phase angle control for the surge impulse)

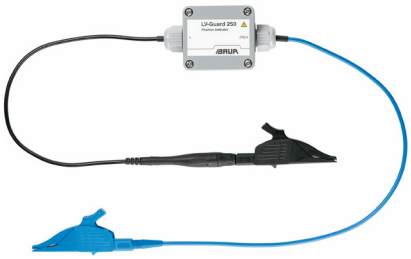


Pin-pointing with step voltage measurement in grid operation*

The LV-Guard can generate a pulsed, encoded signal as offset on the alternating voltage for the location of faults due to earth contact. The multifunctional RC Local SV* radio control decodes and displays the amplitude and polarity of the signal. This means that faults due to earth contact can be located without disconnecting customers. RC Local SV can also be used for conventional step voltage location with pulsed DC voltage.

Position indicator

The position indicator permits the precise determination of the pulse propagation speed. It is also possible to measure several reference points near to the fault location using the position indicator and thus to narrow down the fault position.



TDR bridge

The TDR bridge makes it possible to locate cable faults between all phases with only one power switch.

* Option: Step voltage measurement with RC Local SV radio control

LV-Guard 250
Controls

RC Local radio control

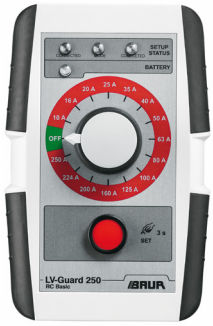
The multifunctional RC Local radio control is used for the commissioning and control of the power switch on site and for the pre-location and pin-pointing of cable faults. A high-resolution daylight colour display is available for the display of measured values and fault location diagrams.

The following functions are available to you:

- Selection of fuse rating
- Switching on and off of the power switch
- Display of current, voltage and impedance
- Display of reflection images*
- Setting and control of the surge mode for cable fault pin-pointing
- Step voltage measurement (RC Local SV)

RC Basic radio control

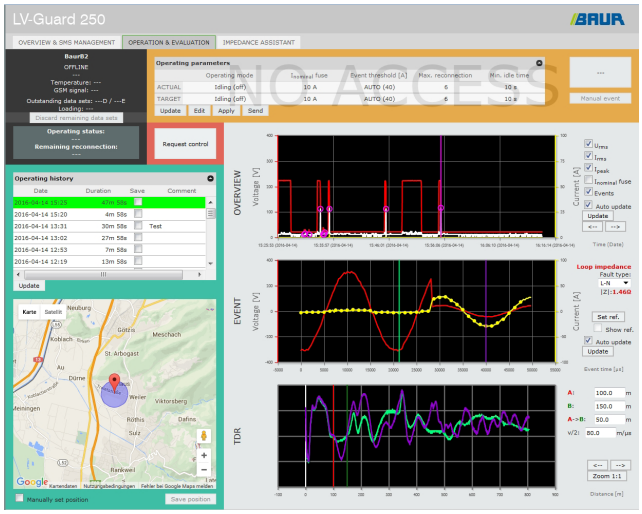
The RC Basic radio control is used for the commissioning of the power switch and for setting the fuse rating. The following functions are available to you:



- Switching on and off of the power switch
- Setting the fuse rating

WEB Center web control

The power switch is operated over the internet via a system-independent web interface that is compatible with the browsers that are currently in common use. In addition to device control, the measured data recorded by the LV-Guard 250 is displayed graphically and numerically:



- Operating data of the power switch
- Event data such as fuse tripping
- Reflection images before and during the occurrence of events.

All data is automatically uploaded to the WEB Center server and can be permanently stored there.

With its integral GPS receiver and using GSM triangulation, the LV-Guard 250 determines its position and displays this automatically on the web interface map. In large networks, several power switches can thus be managed and fault location performed centrally.

* Using the LV-Guard 250 TDR power switch

LV-Guard 250 – set overview

Web solutions Perfect for teams

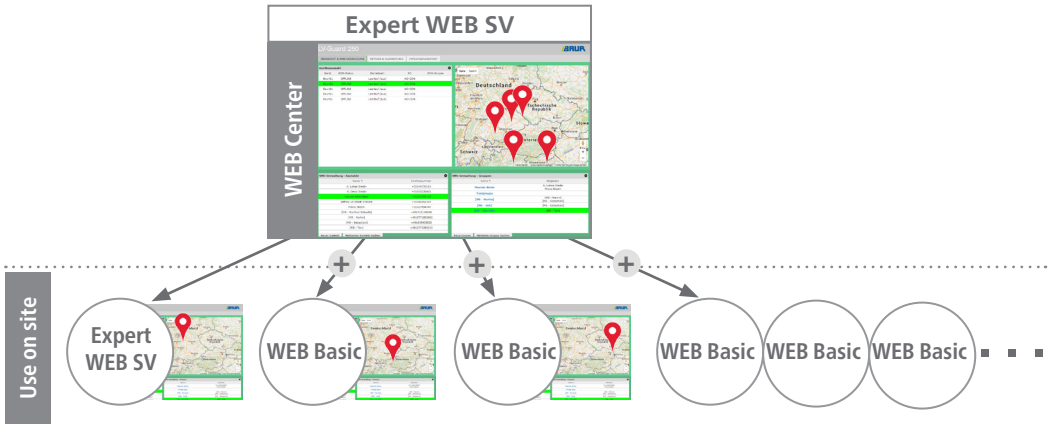
The **Basic WEB**, **Expert WEB** and **Expert WEB SV** web solutions are suitable for companies that wish to manage fault location and monitoring in their network over the internet and have mobile teams nearby that can be deployed. In the event of a fault, the technician who is near to the fault location replaces the NH fuse with the LV-Guard power switch and sets the fuse rating by radio control. The consumers are supplied with power for as long as the fault location does not break down. If a breakdown occurs, the LV-Guard 250 automatically takes several reflection images, which are uploaded to the web server. The fault location experts can now use the recorded measured data for fault location from any given location by web control and can decide upon further measures with the technician on site.

Basic WEB set: Offers all functions of the LV-Guard 250 with control and cable fault location over the web. The technician can set the fuse rating and switch the power switch on and off on site using simple radio control.

Expert WEB set: Offers all functions of the LV-Guard 250 with control and cable fault location over the web. All aspects of cable fault location and the control of the power switch can also be performed on site using a multifunctional RC Local radio control.

Expert WEB SV set: Extends the functions of the Expert WEB set by adding the pin-pointing of faults due to earth contact using the step voltage method (with the aid of RC Local SV radio control).

The WEB sets can be combined as desired. Several power switches can thus be managed by web control and fault pre-location takes place centrally. Example of a set combination:



Solutions for control on site

The **Expert** and **Basic Local** sets are recommended for customers who wish to use the functions of the LV-Guard 250 but do not require control via the web server, or where no mobile radio data connection is available at the place of use.

Expert set: Offers all functions of the LV-Guard 250 with a local multifunctional RC Local SV radio control. All important information and measured data are displayed on a high-resolution daylight colour display. Step voltage measurement is also available to the operator for the location of faults due to earth contact.

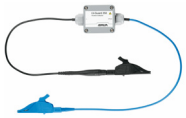
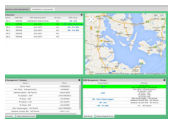
Basic Local set: Offers the basic functions of the LV-Guard 250: Intelligent fuse inc. fault pre-location based upon impedance values and acoustic pin-pointing. The multifunctional RC Local radio control is available for the control of the power switch and cable fault location.

LV-Guard 250
Function overview of the sets

Functions:	Control on site		Administration over the web		
	Basic Local set	Expert set	Basic WEB set	Expert WEB set	Expert WEB SV set
↗ Intelligent fuse settable from 10 to 250 A	✓	✓	✓	✓	✓
↗ Setting, switching on and switching off of power switch	✓	✓	✓	✓	✓
↗ SMS notification if a fault is detected	✓	✓	✓	✓	✓
↗ Control and accessing of measured data over the web	✗	✗	✓	✓	✓
↗ Management of several power switches over the web	✗	✗	✓	✓	✓
↗ TDR arc reflection method, including the TDR measurement via 3 phases	✗	✓	✓*	✓	✓
↗ Impedance measurement	✓	✓	✓*	✓	✓
↗ Determination of v/2, position determination	✗	✓	✓*	✓	✓
↗ Acoustic pin-pointing	✓	✓	✓*	✓	✓
↗ Step voltage measurement	✗	✓	✗	✗	✓

* Only via web control

Standard delivery

		Control on site		Administration over the web		
		Basic Local set	Expert set	Basic WEB set	Expert WEB set	Expert WEB SV set
	LV-Guard 250 power switch	✓				
	LV-Guard 250 TDR power switch		✓	✓	✓	✓
	Power supply unit	✓	✓	✓	✓	✓
	TDR bridge		✓	✓	✓	✓
	Position indicator		✓	✓	✓	✓
Controls 	Web Center control			✓	✓	✓
	RC Local SV radio control		✓			✓
	RC Local radio control	✓			✓	
	RC Basic radio control			✓		
	Multi-provider SIM card (annual licence)	✓	✓	✓	✓	✓
	Web server licence (server use, map material, software support)*			✓	✓	✓
	Connection and adapter set	✓	✓	✓	✓	✓
	Earth spikes for step voltage measurement		✓			✓
	Transport case	✓	✓	✓	✓	✓
	User manual	✓	✓	✓	✓	✓

* Alternatively a web server service package incl. web server licence and SIM card is possible.

Technical data

Power switch			
Automatic fuse and fault location			
Load current	Max. 250 A, no time limit	Current measurement	Sampling rate 3,2 kHz Measurement range and resolution automatically scaling up to 16 kA, resolution 1 A/ 16 A
Fuse rating	10 – 250 A	Voltage measurement	0 – 600 V (against (PE)N) at supply side and phase outgoing side
Fuse characteristic	Based upon real-time calculation of melting integral	Automatic arc reflection method	Resolution 0.4 m (at 80 m/µs) Approx. 40 reflection images in 2.5 grid periods
Hold time until reconnection	1 – 60 s	Step voltage method with ongoing power supply (option)	Continuous operation; LV-Guard grid voltage can be switched on/off
Reconnect attempts	1 – 40	Impedance measurement	present
Surge mode			
Max. pulse current	Approx. 7 000 A_{peak}	Phase angle control to reduce the surge energy for large currents close to transformers or for the protection of cables with small cross-sections	
Max. switching capacity	11 000 A		
Control of surge energy	1-4 half-waves can be set		
Interfaces			
Data transmission	GSM/GPRS module	Location determination	Integrated GPS module Alternative GSM triangulation
Data interface	2.4 GHz radio module		
General information			
Display	OLED	Protection class	II
Memory	4 GB SD card	Degree of protection	IP10 (when inserted)
Power supply	110 – 230 V, self-supply from the LV network	Switch contacts	Semiconductor, wear free
Max. power consumption	45 VA, plus approx. 1 W/1 A continuous load current	Size	NH 2
Fuse	420 A at phase input	Dimensions (W x H x D)	110 x 153 x 86 mm
Temperature monitoring	present	Weight	Approx. 2.5 kg
Power supply unit			
Power supply	110 – 230 V, self-supply from the LV network	Protection class	II
Max. Power consumption	50 VA	Degree of protection	IP54
Rechargeable battery	Backup battery to bridge temporary failures of upstream fuses (approx. 4 h)	Dimensions (W x H x D)	180 x 90 x 70 mm
		Weight	Approx. 0.5 kg
	Input voltage for battery charging ▪ 110 – 230 V during operation ▪ DC 12 V		

Options

- Adapter for connection to NH00 fuse holder up to 150 A (continuous load current)
- Adapter for connection to NH01 fuse holder up to 400 A (continuous load current)
- Adapter to connect to Driescher LV distributions
- Set of fuses for power switch (2x)

Technical data

Controls			
WEB Center web control			
Installation	Server installation	Control of all device functions	
Access	via normal web browser (login)	Display and evaluation of all measured data	
Long-term storage of the measurement results can be selected			
RC Local / RC Local SV radio control			
Power supply	NiMH batteries 4 x AA Mignon	Data interface	2.4 GHz radio module
Max. Power consumption	3 VA during operation	Dimensions (W x H x D)	110 x 220 x 53 mm (without antenna)
Display	Illuminated colour LCD 4.3"	Weight	Approx. 0.7 kg
Step voltage module (RC Local SV)	Hardware and software for fault location with connected consumers	Degree of protection	IP54
	Module for step voltage pin-pointing with pulsed DC voltage		
RC Basic radio control			
Power supply	Batteries 2 x AA Mignon	Data interface	2.4 GHz radio module
Max. power consumption	0.5 VA during operation	Dimensions (W x H x D)	105 x 145 x 43 mm
Degree of protection	IP54	Weight	Approx. 0.5 kg
General information			
Ambient temperature	-25 °C to +50 °C	Safety and EMC	CE compliant in accordance with Low Voltage Directive (2014/35/EC) and EMC Directive (2014/30/EC)
Storage temperature	-30 °C to +50 °C		
Case dimensions	ca. 480 x 180 x 350 mm