



## Cable fault location expertise for long submarine and land cables

Reliable fault location for  
maximum cost effectiveness

# Indispensable and robust, but sadly not indestructible: long submarine and land cables for global power supply

Due to the growing demand for power and increasing dependence on renewable energy – more and more of which is being generated offshore – submarine power cables are becoming indispensable for a reliable energy supply. Amongst experts, submarine cables are classified as critical infrastructure. Why critical? Firstly due to the harsh environment in which they are installed. Secondly – and this is also the most common cause of faults – submarine cables are exposed to damage due to fishing or heavy anchors at irregular intervals at all water depths. Statistics collected worldwide over a long period of time show that there is a very high probability that one or more cable faults will occur on long submarine cable links during their service life.

## What should I do in the event of a fault? Act quickly!

When a cable fault occurs on an submarine cable, cable fault location and repair usually take a long time. And protracted downtime translates into losses in the millions for the cable operator – with the downtime costs rising each and every day!

Many cable operators therefore invest in a suitable fault location system even before the cable is put into operation. Immediate availability

when a fault occurs means that the fault can be located straight away, thus reducing cable downtime in the long term. Due to the enormous time saving, the investment pays for itself after just one cable fault.

## Classic cable fault location methods: usually unsuitable

Depending on the fault type and breakdown voltage, high voltage may be used for cable testing and cable fault location. Long cables store a lot of energy during this process. Most devices can't cope with the discharge of this enormous amount of energy. Moreover, standard devices are also

not protected against the very high-energy transient waves. This inevitably leads to the destruction of equipment and a high risk for operating personnel. Rely on BAUR from the outset for solutions especially designed for long submarine and land cables.

## Save millions in downtime costs!

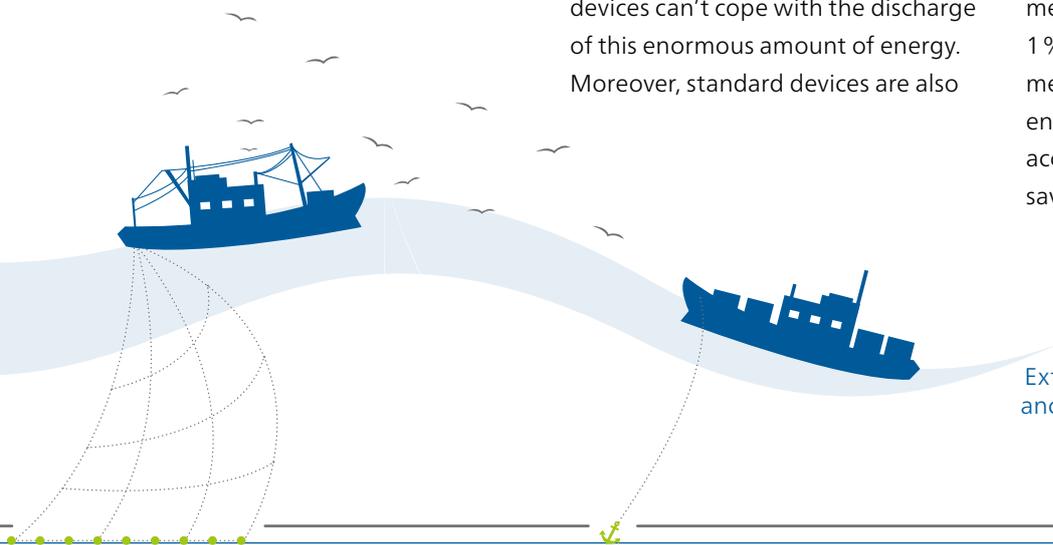
No matter what the application, BAUR has the technology to allow you to locate cable damage rapidly and accurately. Suitable measurement methods provide a measuring accuracy of less than 1 %. For very long cables, stationary measurement systems at both cable ends significantly improve measuring accuracy. Imagine the time and cost savings!

## The biggest threats to submarine cables:

External forces exerted by heavy ships' anchors and trawl nets of fishing boats at all sea depths.

Seabed

Submarine cable



# Cable fault location by BAUR

## Proven system for fast and efficient cable fault location

Since 2010, BAUR has been developing individual product solutions for fast and efficient fault location on damaged land and submarine cables. With the powerful systems and wide-ranging expertise of BAUR specialists, critical cable faults on important submarine cables have been located rapidly, efficiently and with outstanding accuracy in recent years. You, too, can rely on BAUR expertise and the high-performance technologies that have been tried and tested worldwide.

### 5 questions to the expert.

**Manfred Bawart,**

cable fault location expert and author of specialist publications (published in) CIGRE, CIREN, IEEE Electrical Insulation Magazine, IEEE-PES, Jicable etc.

#### 1. What is the service life of a long submarine cable? And how often during this lifetime does cable damage occur?

Submarine cables for power transmission are designed to be very robust and have a service life of over 50 years. Nevertheless, cable system failures do occur during this long service life, mostly caused by external forces such as heavy ships' anchors, fishing operations, the installation of wind turbines and natural forces.

#### 2. If a cable is damaged, what action do you recommend taking first?

Preparation is crucial for fast and successful cable fault location. In particular, you should bear in mind that the measurement methods commonly used for land cables are unfortunately not appropriate for long land and submarine cable systems. Special measurement methods and optimised measuring technology that depend on the cable and fault type are used. This permits successful and highly accurate cable fault location, even on very long cable systems.

#### 3. On average, how long does cable fault location take using BAUR technology?

Rapid and successful cable fault location depends upon the on-site

availability of suitable fault location systems and trained personnel, or expert support on a case-by-case basis. In the case of very long cable systems, the availability at both ends of custom fault location systems that have been specially adapted to the cable in question offers significant advantages. Immediate availability and increased measurement accuracy mean that pre-location is usually completed within a few hours.

The more precise measurement obtained by working from both ends guarantees rapid pin-pointing and thus saves several days or weeks of unnecessary and expensive investigations on the seabed. Particularly in deep-sea areas, this method largely eliminates long and expensive section losses due to the cable being cut in the wrong place.

#### 4. How exactly can you home in on the fault location?

Cable fault pin-pointing is usually rather difficult. High-precision measurement results from pre-location are therefore very important. Special pre-location methods, the availability of accurate cable data and measurement from both ends guarantee highly accurate measurements. A comparison of the measurement results from several measurement methods permits greater confidence when determining where to cut the cable. Measurement accuracies in the range of 0.05 % to 1 % of the cable length are possible. Reference measuring points of known cable joints permit further fine-tuning of the measurement results.



#### 5. What is special about the BAUR technology?

BAUR offers custom fault location systems for long land and submarine cables, HVDC cables, monopoles or bipoles, as well as for particularly long AC cable systems with cross bonding earth treatment.

The measurement methods are adapted to the cable in question and take into account the expected fault type and also the enormous cable length.

# BAUR solutions for XL cable fault location

- Suitable for all cable types:**
- HVDC submarine cable links, monopole, bipole
  - HVDC land cable links
  - AC submarine cable systems
  - Combined AC land and submarine cable systems

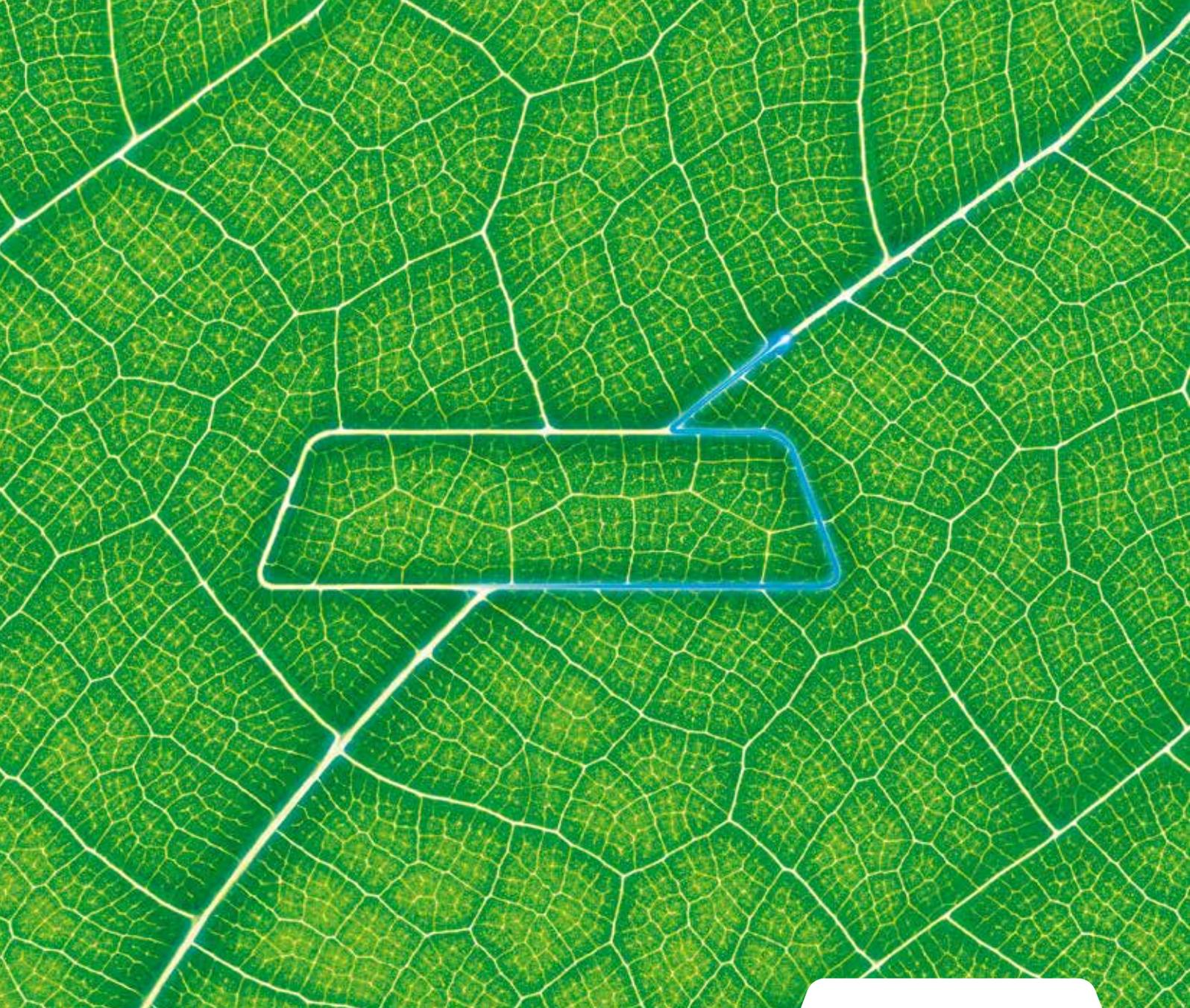
Cost risk in the event of cable failure

Low

Device type	Area of application	Advantages	BAUR solution
<b>Portable devices</b>	<ul style="list-style-type: none"> <li>· For cable fault location on multiple cables</li> <li>· For cable systems with high relevance – high costs in the event of power failure, high risk for security of supply</li> </ul>	<ul style="list-style-type: none"> <li>· Small and handy</li> <li>· Rapid transportation to place of use</li> <li>· Great flexibility of use</li> <li>· Also available for long cables (special version)</li> </ul>	 <p><b>shirla</b></p>
<b>Mobile systems</b>	<ul style="list-style-type: none"> <li>· For cable fault location on multiple cables</li> <li>· For cable systems with very high relevance – very high costs in the event of power failure, very high risk for security of supply</li> </ul>	<ul style="list-style-type: none"> <li>· Compact: all cable fault location methods integrated into a single system</li> <li>· Rapid transportation to place of use</li> <li>· Great flexibility of use</li> </ul>	 <p><b>Cable test van</b></p>  <p><b>Systems on wheels for indoor use</b></p>
<b>Stationary systems – can also be deployed at both ends for long cable routes</b>	<ul style="list-style-type: none"> <li>· For cable systems with extremely high relevance – extremely high costs in the event of power failure, extremely high risk for security of supply</li> </ul>	<p><b>Time saving:</b></p> <ul style="list-style-type: none"> <li>· No loss of time due to transportation</li> <li>· Immediate deployment in the event of a cable system failure</li> <li>· Cable fault location within the shortest possible time / on the first day</li> </ul> <p><b>Precision:</b></p> <ul style="list-style-type: none"> <li>· Improved positional accuracy thanks to deployment at both ends of the cable</li> </ul> <p><b>Cost saving:</b></p> <ul style="list-style-type: none"> <li>· Reduction of downtime and holding time costs – these can amount to several € 100,000 per day</li> <li>· Investment pays for itself after just one fault</li> </ul>	   <p><b>System in containers</b></p>

High





## Other BAUR Brochures



Cable fault location



Cable test vans  
and systems



Our brochures and user manuals are also  
available online at [www.baur.eu/brochures](http://www.baur.eu/brochures)