



DEHNrecord Smart Device

Power quality in a low-voltage system





Creating transparency in a low-voltage system

Corporations, small businesses, private households – the supply of electrical energy is crucial for everybody. And it is not just availability that is important here, but also about getting the best quality of supply. Power supply companies, power grid operators and municipal utility companies have the duty to ensure the reliable and seamless operation of the power grids and to prevent damage within their own network, but above all in customer installations too. This is not only of economic significance – a high availability of electricity is also of the utmost importance to your customers.

To this end, power supply companies and power grid operators have the following obligations:

- To ensure that the power supply is guaranteed without disruptions.
- To ensure the best possible power quality across the network.
- To prevent disruptions, such as voltage interruptions, harmonics or flickers.
- To prevent failures in their own grid and damage in customer installations.
- To exclude liability if customers wish to assert claims.
- To comply with the relevant standards.



Rely on 111 years of experience

Safety has been a concern for DEHN for 111 years. We also use the experience in reliable lightning and surge protection that we have gathered over this time for subfields such as power quality. DEHN therefore grapples intensively with the subject of supply reliability and, with the DEHNrecord SD measuring and analysis device, offers a clever addition to the product range.

Reliability even with fluctuating supply grids

Power supply grids are becoming increasingly susceptible to malfunctions. The reasons for this are varied:

Decentralised commercial supply

Due to the advancing energy revolution, electricity is increasingly being obtained from renewable energy sources, such as wind power and photovoltaics. However, they are subject to daily or seasonal fluctuations in weather conditions, which have an impact on the power grid.

Decentralised private supply

The irregular infeed from privately operated photovoltaic systems with their own power consumption and storage has a negative impact on supply reliability.

Fluctuating consumption

There are increasingly more decentralised loads that do not use power constantly, but rather highly irregularly. This includes heat pumps or even charging posts for electric vehicles.

Increased proportion of electronic systems

The increased use of sensitive electronics also places new demands. Digitalisation, Industry 4.0, smart homes and the like enlarge the proportion of electronic systems, both in the power grid, in commercial and industrial installations, and also in the private residential sector. Yet they react especially sensitively to the slightest disruption to power quality.



The risk associated with malfunctions and damage increases immensely as a result. For this reason, continuous monitoring is important. Not using modern and high-quality measurement and analysis devices means detecting malfunctions or problems too late – or not at all, in the worst case scenario.

The consequences can be serious:

- Power supply failure
- Malfunctions and damage in the power grid
- Damage and malfunctions to customer installations
- More work for staff and higher cost outlays due to troubleshooting and repairs.

This should be prevented in the long term. Also, so that final customers, be they commercial, industrial or private, suffer no disadvantages. Go for high-quality measuring equipment that provides useful information and which is installed extensively in low-voltage systems. This is an investment that will pay off.

DEHNrecord SD

The multifunctional measuring and analysis device for monitoring intelligent low-voltage systems

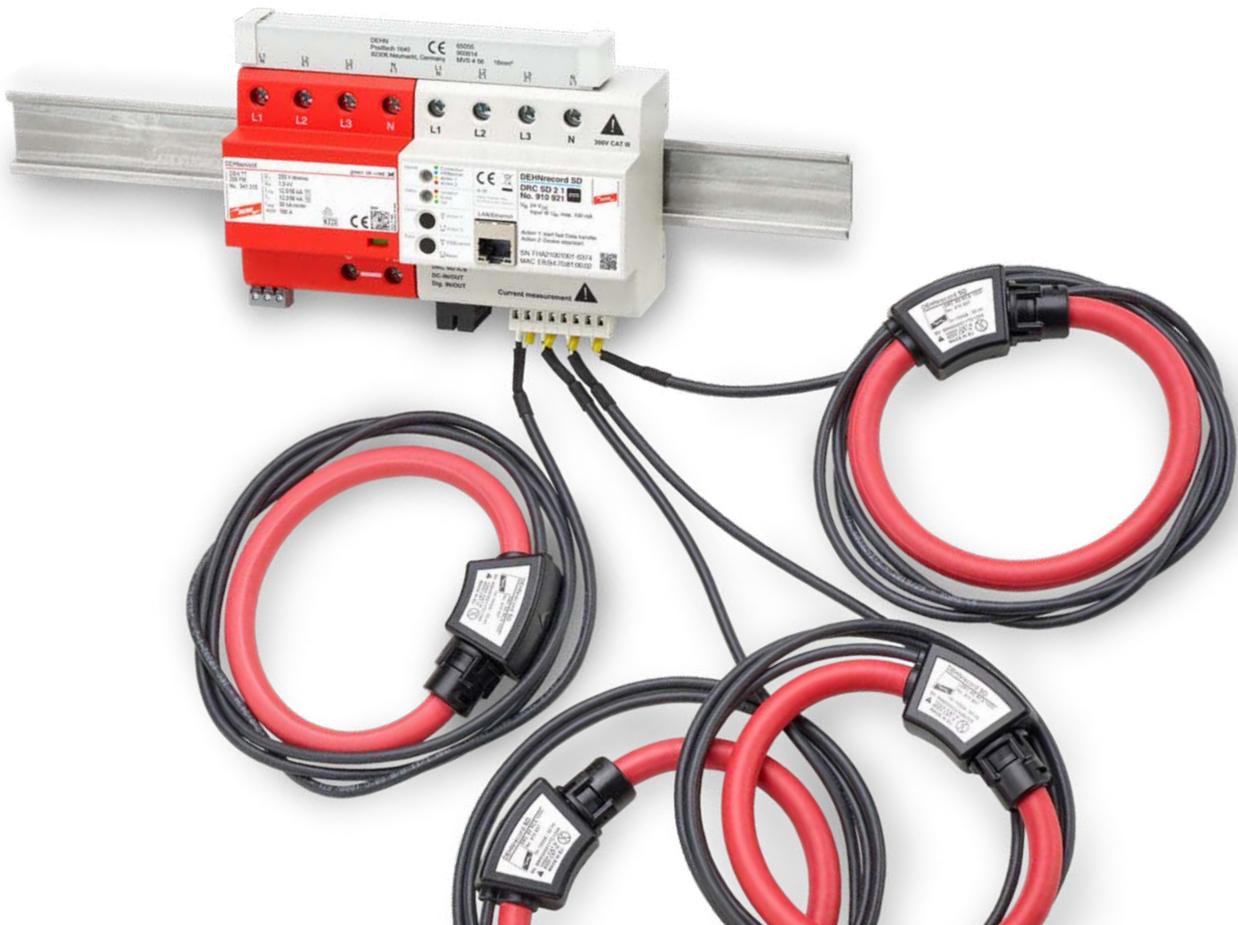
In order to ensure the best-possible power quality in the long term, you need power-quality measuring equipment which:

- is certified to class A.
- is permanently installed and of a high quality.
- is used extensively.
- reaches deep inside the low-voltage system.
- covers all relevant measurement parameters.
- is ideally expandable in terms of its functionality.

Preventing damage and malfunctions in the long term

DEHN has developed a multifunctional measuring and analysis device for precisely this requirement which measures to class A standard. We install DEHNrecord SD extensively in low-voltage systems, starting in transformer substations, cable distribution cabinets, utilities substations in front of renewable generating systems or charging parks for electric

mobility, right through to customer installations in the commercial and industrial sectors. Permanent monitoring of the quality of the power supply provides you with certainty and also protects from possible liability claims in the event of failures.



Advantages for you at a glance



Identify problems promptly



Analyse the causes of defects



Localise and rectify defects quickly

Many functions in one device

DEHNrecord SD impresses with its multi-functionality: With this device, the measurement of all relevant parameters is very easy. Commonly applied standards are complied with.

Convincing performance during testing and measuring:

- Power quality measurement to class A; certified in line with IEC 61000-4-30.
- Event messages in the event of limit value violations based on the standard EN 50160.
- In addition to standard limit values, individual limit values can be parametrised.
- Measurement of power-frequency overvoltages, limit values as per EN 50550 and individual definition.
- Measurement of lightning-induced impulse currents* up to 100 kA (8/20 μ s and 10/350 μ s)
- Correctly signed 4-pole load profile and power measurement.
- Integrated digital inputs and outputs for additional control messages (e.g. remote monitoring of SPDs or individual control impulses in the event of limit value violation).

Advantages for you at a glance:

- Optimised network extension: you learn exactly where action is required.
- Quick and efficient fault localisation: you rapidly isolate defects through additional measurements of impulse currents* and power-frequency surges.
- Predictive maintenance: you recognise trends and fault scenarios at an early stage.
- The network is always in view: you succeed in monitoring deep inside the low-voltage system.
- Legal certainty: you can make use of seamless and legally secure measurements to class A standard for preservation of evidence in the event of a dispute.

* The impulse current measurement function is **not** currently included in the functionality. Devices including the impulse current measurement function are expected to be available only from Q4/2021.



Combining cleverly provides added value

Solutions that engage perfectly

Power supply companies and power grids have to meet two basic, imperative requirements: to offer a robust power grid and to ensure reliable protection from lightning surges and overvoltages. DEHN understands why this only works in tandem.

Robust power grid

Crucial to this is a high power quality. Its importance is increasing due to changing conditions: since more and more decentralised infeeds and loads are arriving, power grids are becoming more volatile and multi-directional. Furthermore, sensitive electronics respond sensitively to fluctuations in many areas. To be able to guarantee power quality over the long term despite this and to respond quickly to abnormalities, one thing is key: to install extensively deep inside a low-voltage system high-grade power quality measuring equipment which provides useful information.

Lightning and surge protection

You must also meet the normative requirements for the use of lightning current and surge arresters. Due to the increasing installation of sensitive electronic equipment, requirements intensify not only from a technical perspective, but also in terms of standards.

The solution

With DEHNrecord SD, DEHN provides you with an intelligent solution which meets both requirements in an innovative and unique manner. With us, you therefore get both from one source.

- We protect your power grid with high-performance lightning current and surge arresters, such as DEHNventil, DEHNshield or DEHNguard ACI. They are installed directly at the infeed point of the low-voltage main distribution board.
- The multifunctional measuring and analysis device documents malfunctions reliably in line with standards and can be adapted perfectly to the installation point of lightning current and surge arresters.



DEHNshield TT 255 FM



DEHNguard M TT ACI 275 FM



DEHNshield TNC 255 FM



DEHNguard M TNC ACI 275 FM

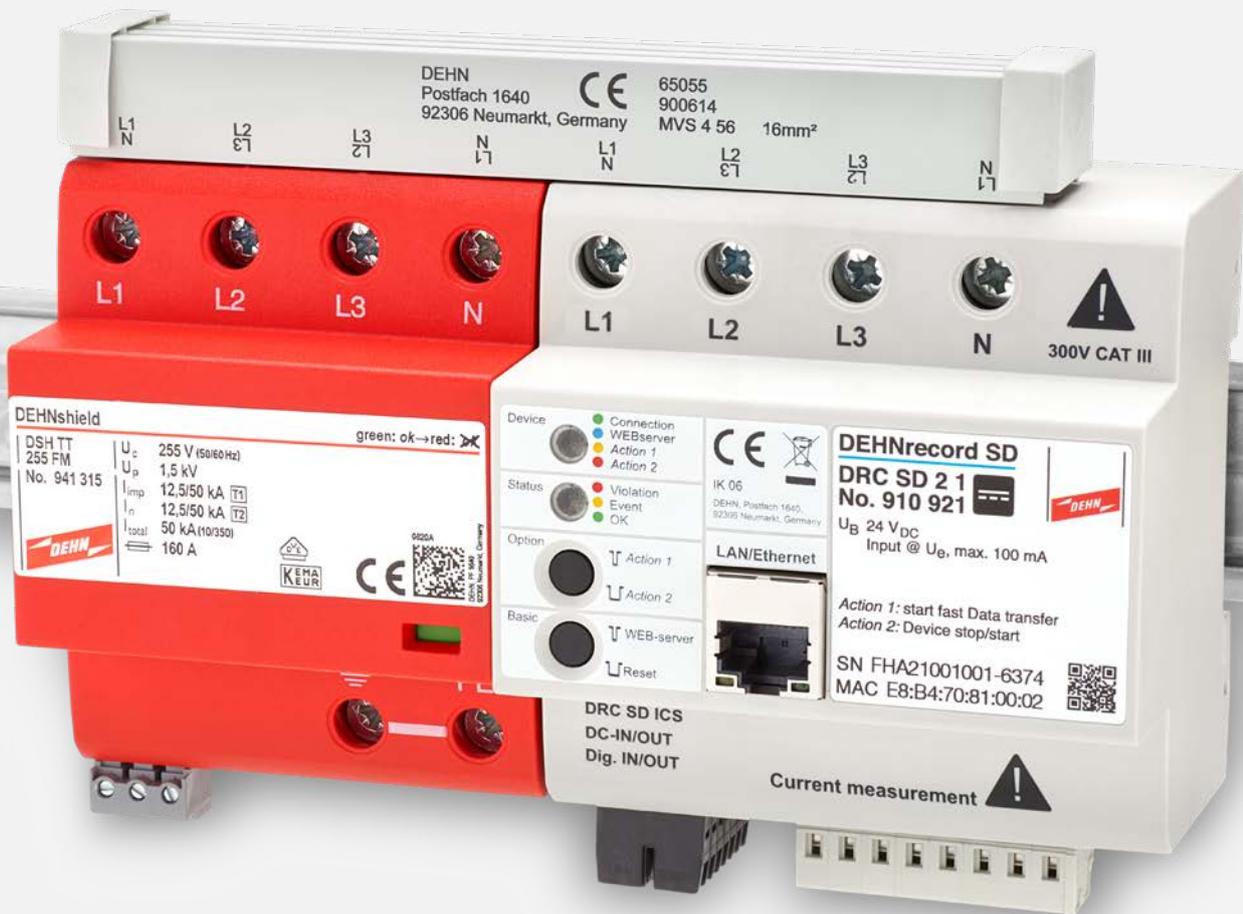


Combined with lightning and surge protection

The installation point of lightning current and surge protection is the right place for the DEHNrecord SD measuring device. Together, these components form the perfect system solution with the protection concepts from DEHN. This means you are fully covered.

Advantages for you at a glance:

- Quick and easy installation; no additional wiring necessary
- Direct adaption at the surge arrester
- No backup fuse necessary for DEHNrecord SD
- Direct measurement at the perfect installation point
- Cost savings due to fewer components
- Due to the combination with the surge arrester, a higher overvoltage category (IV) is achieved



Communications link and data management

DEHNrecord SD is ideal for network integration. This makes data management more efficient and makes it easier for you to rectify potential problems.

Impressive performance with monitoring and networking:

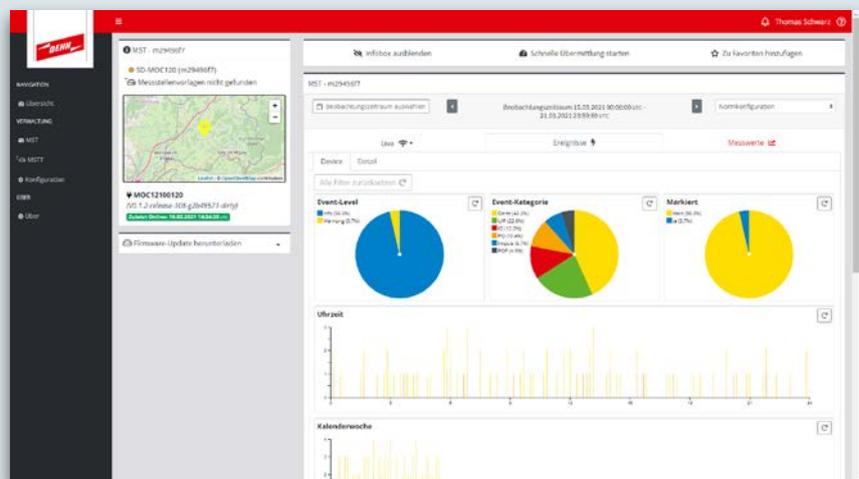
- Edge computing for decentralised data processing and efficient data handling
- Cyclical transmission of mean values
- Event messages in the event of limit value violations; e.g. through email notifications and fault record communication
- Fast data transmission for current live status also possible without limit value violation through trigger function
- Communications link through Modbus TCP/IP and/or MQTT protocol for transmission on cloud platforms
- Web-browser-based parameterisation and display of the measured data and firmware updates
- Parameterisation of geodata provides a quick overview in the network area
- Due to the integrated measurement point operating concept, no data is lost in the event of defective hardware or device replacement

Advantages for you at a glance:

- Flexibility with communication linking: due to universal Modbus TCP interface and/or linking to cloud platforms through MQTT protocol
- Independent of time and location: device configuration, data display and firmware updates through Web browser or cloud on the go via smartphone and tablet
- Fast and efficient update function: Firmware updates for individual devices or as a mass roll-out
- The right data at the right time: thanks to edge computing, instead of a flood of data, an efficient and appropriately sized data volume, since only standardised mean values are sent cyclically. Detailed fault record communication only in the case of a limit value violation
- Quick response times: email notification in the event of limit values being exceeded allows for prompt action when problems arise
- Expandable base: due to high-precision measurement on a class-A basis, the foundations are laid for possible data correlations and AI services

Manage data securely and clearly

In addition to monitoring via Modbus interface, DEHNrecord also offers an IoT-compatible solution. Integrate DEHNrecord SD into a cloud to access measurement results at any time – even on the go. Thanks to the right interface, the device is suitable for a wide variety of cloud solutions.



The cloud monitor dashboard

More efficient asset management

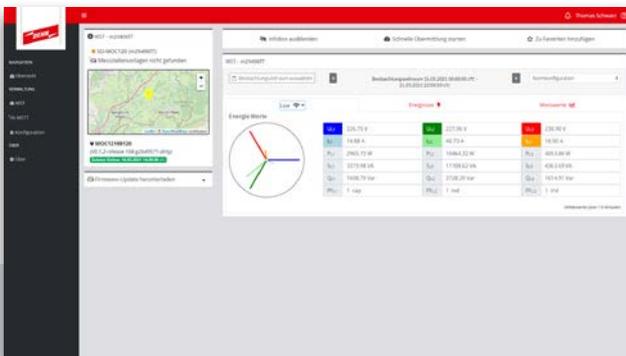
DEHNrecord SD pays off. As the device comes with numerous functions and is able to be integrated very well, it is characterised by a high degree of economic efficiency. At little cost, you can achieve impressive results.

Compelling technology for evaluation:

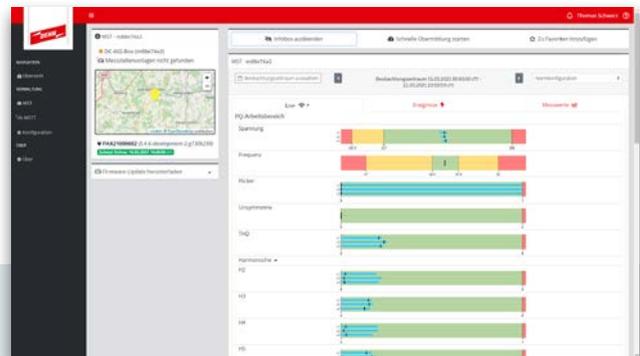
- Tailor-made, clever device concept optimises economic efficiency in mains operation
- Easy retrofitting due to the very compact housing (equivalent to 5 standard DIN modules)
- No additional wiring when used on a busbar
- No separate backup fuse necessary when combined with a lightning current and surge arrester

Advantages for you at a glance:

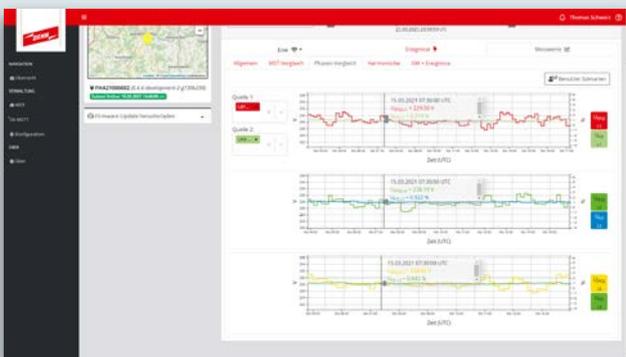
- Functions with added value for an optimum cost / benefit ratio
- Considerable installation cost savings due to the combination of SPD and measuring device
- Reduction in service and maintenance costs thanks to parameterisation, read-outs and updates via remote access through cloud or Web server



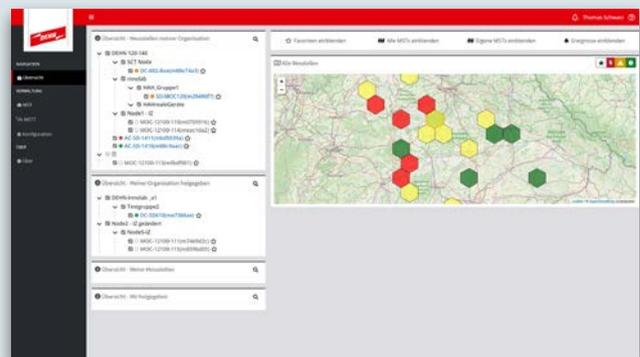
Load profile and power measurement



Power quality parameters and work areas



Measured value comparisons



Installation locations of measuring devices; e.g. as a power quality map

Measurements with maximum reliability

DEHNrecord SD delivers reliable measurement results. This not only tells you about acute limit value breaches but also documents values as a whole. The best pre-conditions for proper evaluation.

How measurement works with DEHNrecord SD



Current values / states
are cyclically available and are visualised according to their position.



Detailed data / signal sequences
are defined in addition to the characteristics of the events.



Event-based fault recording
depending on the standards and the configured parameters (cloud, email, I/Os, etc.).



Fast data transfer
for visualising the current measuring situation on site.

These parameters are measured with DEHNrecord SD

Power quality

Measurement as per EN 61000-4-30, class A, limit value definition as per EN 50160 and customised

Amplitude, frequency, flickers, dips, swells, interruptions, unbalance, up to the 50th harmonic, signal voltage

Impulse currents*

Recorded up to 100 kA (8/20 μ s and 10/350 μ s)

Recording through external sensor and evaluation in terms of duration, rise time and charge

Power frequency overvoltage

As per EN 50550 and customised

A notification and/or shutdown function can be generated. In addition, e.g. undervoltage can be detected.

Voltage, current, performance, energy

5-minute mean values by default by means of voltage-controlled Rogowski coils, or alternatively split-core transformers

Correctly signed measurement, current measurement range for the specified standard – Rogowski coils up to 2,000 A, and up to 120 A for standard split-core transformers. Load and neutral conductor currents are measured through up to four external measuring coils and, together with the voltages, the corresponding power and energy values are determined.

Digital inputs

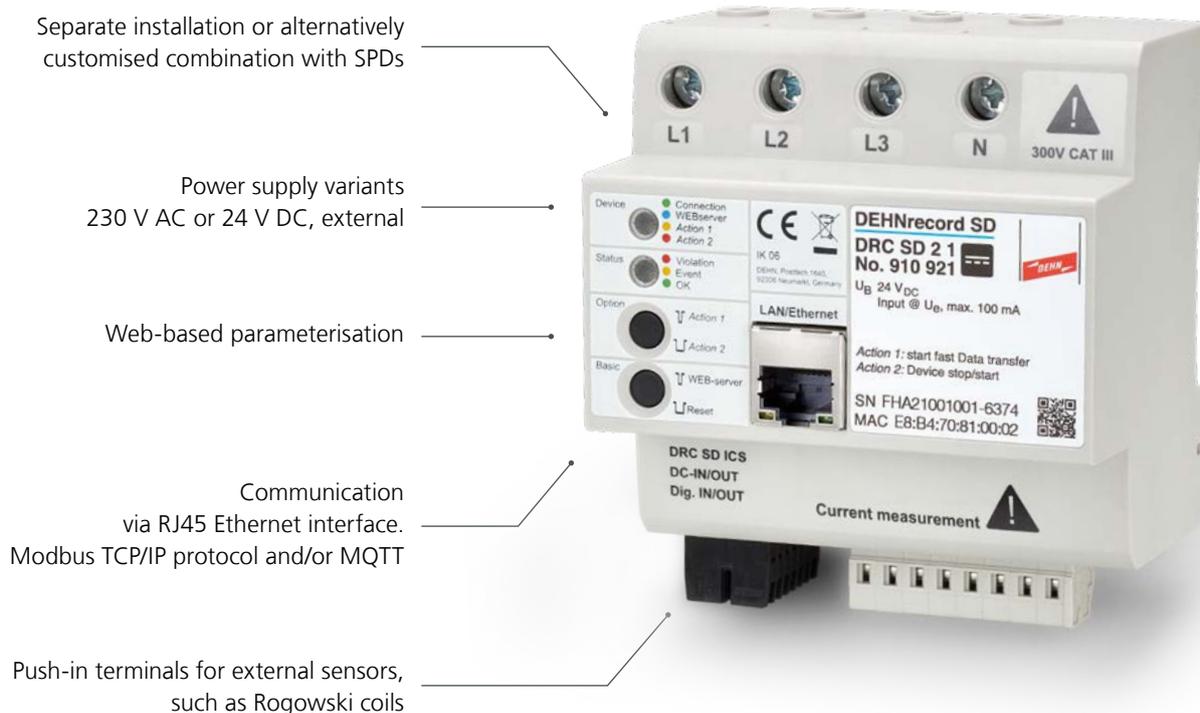
Monitoring of state changes

Three digital inputs and two digital outputs. Can be monitored for status changes or logically linked with each other. E.g. integration of remote signalling contact of SPDs for remote monitoring or control impulse in the event of limit value violations, etc.

* The impulse current measurement function is **not** currently included in the functionality. Devices including the impulse current measurement function are expected to be available only from Q4/2021.

Technical details well thought out

DEHNrecord SD provides the greatest-possible flexibility: it can be used on its own or combined at your discretion. When it comes to configuration and read-outs, you also have a variety of options. The product thus fits your specific application.



The features:

- Separate installation or customised combination with SPDs through busbar
- Space requirement of only 5 standard DIN modules
- Power supply variants: 230 V AC through L1 or 24 V DC external
- Web-based parameterisation of basic settings, limit values, geodata, etc.
- Universal communication using RJ45 Ethernet interface via Modbus TCP/IP protocol and/or MQTT 3.1 protocol. Linking, e.g. to external gateways
- Red/green LED status indication
- Button for Web service activation

The solution for every application

DEHNrecord SD is perfectly suited to use in low-voltage systems. This application is increasingly important. Yet permanent monitoring with high-quality and multi-functional measuring and analysis devices is indispensable in other applications, too.

Reliable monitoring without compromise

In intelligent transformer substations, the DEHNrecord SD serves as the basis for the measurement of power quality deep within the low-voltage system. This use is also recommended in industrial low-voltage switchgear installations. In data centres, reliable monitoring demanded by standards is thus ensured.

Other fields of application of the measuring and analysis devices are renewable generating systems, grid-connected storage systems and transfer points into the public power grid. Reliable measurement is also increasingly important in commercial and industrial plants. This way you get an overview of the entire plant.



Intelligent transformer substations



Industrial low-voltage switchgear installations



Source: Digiplex datacenter, Norway

Data centres



Renewable generating systems



Commercial and industrial plants

Product overview

DEHNrecord SD			Part No.
	DEHNrecord SD DRC SD 1 1	230 V AC power supply	910 920
	DEHNrecord SD DRC SD 2 1	24 V DC power supply	910 921
Accessories			Part No.
	Impulse current sensor DRC SD ICS 100	For the recording of lightning-induced impulse currents* up to 100 kA (8/20 µs and 10/350 µs)	910 935
	Split-core transformer DRC SD SCS 100	Measuring range up to 120 A Conductor length: 1000 mm For maximum cable diameter of 16 mm	910 936
	Rogowski coil DRC SD RCS 1000	Measuring range up to 2,000 A Cable length either 1,000 mm or 3,000 mm For maximum conductor diameter of 95 mm	910 937
	Busbar MVS 3 6 6	3-phase / 6-pole for TN-C system	900 595
	Busbar MVS 4 8 8	4-phase / 8-pole for TN-S system	900 850
	Power supply unit PSU DC24 30W	For DIN rail mounting for DRC SD with 24 V DC power supply	910 499
Combination with lightning current and surge arrester; e.g.			Part No.
	DEHNguard M TT ACI 275 FM	Modular surge arrester, type 2, for use in TT and TN-S system; with remote signalling contact; can be used without additional backup fuse	952 341
	DEHNguard M TNC ACI 275 FM	Modular surge arrester, type 2, for use in TN-C system; with remote signalling contact; can be used without additional backup fuse	952 330
	DEHNshield TT 255 FM	Compact combined arrester, type 1 and type 2, based on RAC spark gap technology, for use in TT and TN-S system; with remote signalling contact	941 315
	DEHNshield TNC 255 FM	Compact combined arrester, type 1 and type 2, based on RAC spark gap technology, for use in TN-C system; with remote signalling contact	941 305

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More than just a product

Reliable technology and comprehensive services from one source. As your partner, we are ready to support you with practical solutions and expertise for all sectors of the energy industry.



Intelligent planning

Plan simply and reliably. The DEHNsupport Toolbox will help you in this regard. You save even more time with DEHNconcept when planning comprehensive lightning and surge protection concepts for intelligent power grids.



Rapid clarification regarding technical queries

Got questions regarding technical installations and on application? Get in touch personally with our technical support team – accessible via telephone: +49 9181 906-1750 or via email: technik.support@dehn.de



Expand your specialist knowledge easily

Gather practical information in the seminars of the DEHNacademy, the planning engineer forums and the "technology meet-ups". Specially conceived for your queries and requests is the power utility seminar: new to the programme of the DEHNacademy. You can find information on the Web: de.hn/ew19evu



Fair partnership for the best solution

Our goal is to be a reliable, fair partner for our industrial, commercial and technical customers all over the world. To this end, we always focus on the best protection solution. Proximity to and close contact with our customers is of great importance to us, be it on-site support by our experienced team, our telephone hotline or personal contact at trade fairs.

Worldwide presence with subsidiaries, representative offices and partners

Our sales teams in our global network in Germany, in our 20 subsidiaries and offices as well as more than 70 international partners ensure the competent and customer-oriented marketing of our products.

You can find your current local contact person on the Internet at: www.dehn-international.com/en/contact



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Czech Republic:	DEHN s.r.o.	www.dehn.cz
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Surge Protection
Lightning Protection/Earthing
Safety Equipment
DEHN protects.

DEHN SE
Hans-Dehn-Str. 1
92318 Neumarkt
Germany

Tel. +49 9181 906-0
Fax +49 9181 906-1100
info@dehn-international.com
www.dehn-international.com



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