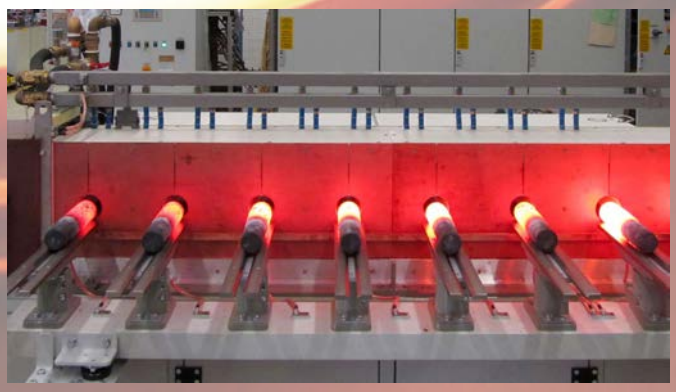
BENDER
The Power in Electrical Safety©

Product overview

Insulation monitoring devices for inductive heating and reactors for silicon production



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Insulation monitoring devices for inductive heating and reactors for silicon production

Inductive heating
Systems for inductive heating of workpieces or melting materials usually work with an induction coil into or through which the parts to be heated are inserted or passed. The capacities of such plants range from a few kW to several MW. The core of these plants is the induction coil, also known as inductor.

Alternating current flows through the inductor, creating an alternating magnetic field, specifically in its interior. The material to be heated or melted forms a second, short-circuited coil, in which a voltage is induced that causes eddy currents. This current causes the material to heat up, whereby the heat does not enter the material from the surface, but is generated in the material itself. The heat generated by the material and the operating current flowing through the inductor cause the material to heat up.

Therefore, inductors are usually water-cooled to keep the operating temperature within limits.
The electrical power for inductors is taken from a low or medium-voltage system and fed to the inductor via frequency converters. The supply system is very often designed as an IT system, i.e. a system isolated from earth. This system type has the following advantages for safe operation of these plants:

- High availability; even in the event of an insulation fault, the system can continue to be operated
- Lower leakage currents to PE
- Early detection of insulation deterioration

Due to the water cooling and the design of the inductor, experience has shown that the insulation resistance of these systems is rather low and often lies in the range of a few 10 Ω to a few kΩ.
To monitor the insulation as recommended in VDE0100-410 or IEC 60364-4-41, appropriate insulation monitoring devices are required for these applications.

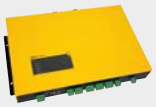
Reactors for silicon production
Another application in the field of metal processing is the monitoring of power supplies for CVD reactors used for silicon production. These power supplies are often set up as IT systems. The dangers that can lead to an insulation fault in these applications are:

- Silicon fragments that fall down and cause short circuits in the area of the electrical feedthrough
- Heating rods that break off or fall over and touch the reactor wall

This damage can lead to a chain reaction that would completely destroy the reactor.

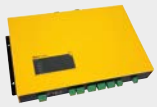
In this application it is important to achieve a safe and fast detection of insulation faults and at the same time avoid any false tripping. This functionality is very important to ultimately protect the material in the production process and the reactor from damage.

Overview and main functions

		 isoLR1685DP-325	 iso1685P-425	 iso1685DP-425
Special application		Inductive heating in systems with very low insulation level	Inductive heating in systems with low insulation level	Inductive heating in systems with low insulation level
Voltage system	**3(N)AC**	■	■	■
	AC	■	■	■
	AC/DC	■	■	■
	DC	■	■	■
Locating current injector for insulation fault location		■	■	■
Nominal system voltage U_n		AC 0…690 V/DC 0…690 V	AC 0…1000 V/DC 0…1500 V	AC 0…1000 V/DC 0…1500 V
Tolerance of U_n		AC +10 %/DC +5 %	AC +10 %/DC +5 %	AC +10 %/DC +5 %
Frequency range of U_n		DC, 1…460 Hz	DC, 1…460 Hz	DC, 1…460 Hz
System leakage capacitance C_e		150/500/2000 µF	150/500 µF	150/500/2000 µF
Response value	**Response value R_{an}**	20 Ω…100 kΩ	200 Ω…1 MΩ	200 Ω…1 MΩ
	Alarm contacts	3	3	3
	Relay mode	N/O or N/C operation device error N/C operation	N/O or N/C operation device error N/C operation	N/O or N/C operation device error N/C operation
	Response time t_{an}	typically 10 sec.	typically 10 sec.	typically 10 sec.
Mounting	**DIN rail**	■	■	■
	Screw mounting	■	■	■
Display	**LC display**	■	–	■
	Operation LED	■	■	■
	Alarm LEDs	■	■	■
Interface	**RS-485 with BMS protocol**	■	■	■
	Modbus	RTU	–	RTU

Ordering information

Supply voltage U_s	Response value R_{an}	Nominal system voltage U_n	Type	Art. No.
DC 18…30 V	20 Ω…100 kΩ	AC 0…690 V/DC 0…690 V	**isoLR1685DP-325**	**B91065803**
	200 Ω…1 MΩ	AC 0…1000 V/DC 0…1500 V	**iso1685P-425**	**B91065801**
			iso1685DP-425	**B91065802**
		AC 0…2000 V/DC 0…3000 V	**isoHV1685D-425**	**B91065805**
	10 kΩ…1MΩ	AC 0…3500 V	**iso1685FR-525**	**B91065800**
AC 88…264 V, DC 77…286 V	10 Ω…10 kΩ	3(N)AC 0…50 V/DC 0…50 V	**IRDH275B-135**	**B91065138**
–	10 Ω…10 kΩ	AC 0…2500 V	**AGH507S**	**B915570**

			
isoHV1685D-425	**iso1685FR-525**	**IRDH275B-135**	**AGH507S**
Inductive heating in systems with low insulation level	Reactors for silicon production with fast detection of insulation faults	Inductive heating in aluminium melting systems with very low insulation level	Inductive heating in systems with very low insulation level in combination with IRDH275-135
■	■	■	■
■	■	■	■
■	–	■	–
■	–	■	–
–	–	–	–
AC 0…2000 V/DC 0…3000 V	AC 0…3000 V	3(N)AC 0…50 V/DC 0…50 V	AC 0…2500 V
AC +10 %/DC +5 %	10 %	+ 15 %	+ 15 %
DC, 1…460 Hz	50/60 Hz	50…3000 Hz	50…3000 Hz
150/500/2000 µF	0.2 µF	150/500 µF	150/500 µF
200 Ω…1 MΩ	10 kΩ…1 MΩ	10 Ω…10 kΩ	10 Ω…10 kΩ
3	3	2	–
N/O or N/C operation device error N/C operation	N/C operation	N/O or N/C operation	–
typically 10 sec.	≤ 150 ms	≤ 5 sec.	–
■	■	■	–
■	■	■	■
■	–	■	–
■	■	–	–
■	■	■	–
■	■	■	–
RTU	–	–	–

Support during all stages

Comprehensive service for your installation: remote, by telephone, on site

Competent service for maximum safety and high availability of your installation

Fault location – made easy

With portable insulation fault location systems, existing insulation faults can be quickly located. They are the best alternative if no stationary insulation fault location systems are available.

From planning to modernisation – During all phases of your project we are at your disposal with our comprehensive know-how.

In addition, we provide first-class service for the maximum safety of your electrical installations.
We offer services ranging from support over telephone to repairs and on-site service – with modern measuring devices and competent employees.

Secure yourself:

- High availability of your installation through fast reaction to fault messages
- Increased profitability of your capital expenditure (CapEx) via optimised maintenance processes
- Targeted operating expenditure (OpEx) due to less downtimes and shorter service visits
- Support for your predictive system monitoring and regular tests of your system/power quality/monitoring devices
- Automatic control, analysis, correction, new settings/updates
- Competent assistance with setting changes and updates

Bender Remote Assist
Bender Remote Assist offers you support via remote access, high-quality service and advice for your challenging task consisting in ensuring consistent high safety in your systems.

Many service visits, fault clearance but also analyses and controls can be carried out remotely – without the expenses of time and money that an on-site visit of a technician implies.

This fast, efficient help and advice by our expert network allows the highest possible availability of your system.

Bender. Making your world safe.

Our world is globally networked, digital, mobile and highly automated. And regardless of whether in industry, inside
or outside buildings, in operating theatres and power plants, in trains, under water or underground: It never stands still and is more than ever dependent on a reliable and above all secure power supply.

That is exactly our mission: We make electrical power safe. With our technologies we ensure permanent availability of electricity and guarantee perfect protection against the hazards of electric shock.
We protect buildings, plants and machines and therefore your investments and plans.
But above all, we protect the lives of the people behind it.

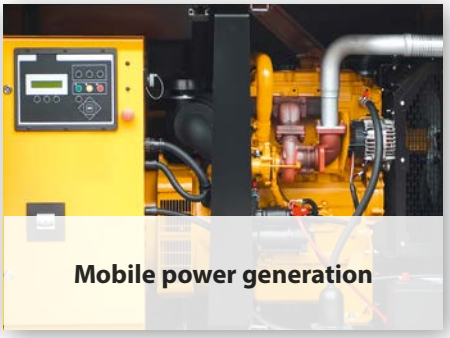

Mechanical and plant engineering


Healthcare


Oil, gas

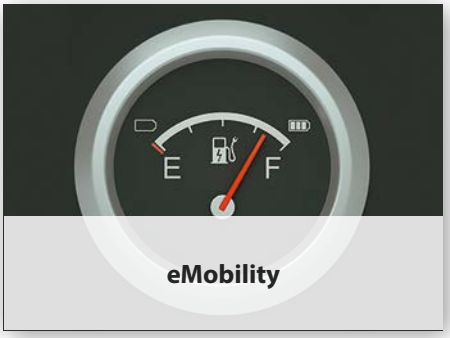

Renewable energy


Public power supply network


Mobile power generation

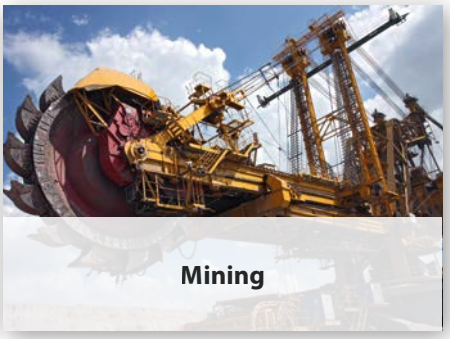

Ships and ports


Railway



eMobility


Data centres


Mining

www.bender.de

Bender GmbH & Co. KG
Londorfer Straße 65 • 35305 Grünberg • Germany
Tel.: +49 6401 807-0 • info@bender.de • www.bender.de

BENDER Group

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