Product overview

Isolated power panels and transformer cabinets for all medical locations

Product key standard

S												Single
		IPS										Isolated Power System (IPS)
				09								Number of internal rows (cabinet height)
						A						ATICS automatic transfer switching device, 63 A
							B					ATICS bypass switch for maintenance and service
									12			Number of MCBs per system, outgoing circuits
										B20		Type of MCBs
											E	Insulation fault locator EDS151
S	-	IPS	-	09	-	A	B	-	12	B20	E	Example

Product key costumized

S																	Number of IT systems per cabinet (S-single, D-double, T-triple, F-four-fold, V-five-fold)
	IPS																Isolated Power System (IPS)
			F														Cabinet versions: F=floorstanding; W=wall-mounted; RW= flush-mounted
				EDS													Insulation fault locator EDS151
					A												ATICS automatic transfer switching device, 63 A
						BP											ATICS bypass switch for maintenance and service
								1									Number of fields (cabinet width): 1= 374 mm; 2= 624 mm; 3= 874 mm
									12								Number of rows (cabinet height): 12= 1913 mm; 14= 2213 mm
										S							Plinth (100 mm)
												6300					Transformer [VA]
														12			Number of MCBs per system, outgoing circuits
															B20		Type of MCBs
																P	Customized, eg. with additional TN-S breakers, RCDs, surge protection device (SPD), etc.
S	-	IPS	-	F			-	1	12		-	10000	-	12	B20		Example

Isolated power panels and transformer cabinets for all medical locations

Standard-compliant. Safe. Reliable.

Especially in medical locations, safe power supply is a sensitive and complex subject. It is precisely here that safe and reliable technology is absolutely essential.

Competent implementation of the respective standard requirements in an individual installation is of vital importance for safe and correct operation. Predictive project planning includes considering the complexity of all related equipment against the backdrop of the set guidelines – before laying the first cable.

A control cabinet is a tool

The control cabinet is an essential tool for reliable operation. It combines two power supplies independent of each other, makes them automatically available, allows for components to detect first faults at an early stage and thereby avoid shutdowns, enables individual use of final circuits and signals operating states.

This tool strictly implements the standard requirements and takes into account the different demands

- of the patients on fault-free operation
- of the medical staff on user friendliness
- of the technical staff on easy maintenance of the important power supply.

It goes without saying that the control cabinet is placed outside the medical locations but always in close proximity to the group 2 medical location. A control cabinet must not be hidden, it has to be easy to find.

The challenge for consultants and architects is to enable fast and easy access, which is indispensable. Faults must be eliminated as fast as possible.

Keep the future space requirements in mind

We all need to save costs but in the right place!
Does it make sense to go for the smallest possible option?

For our tool, the group 2 control cabinet, this means: Leaving free space is a must. Earlier standards demanded at least 25 %, i.e. 25 % of a control cabinet should stay empty for retrofitting but also for easy access to each built-in device, each measuring point and also for good cover options when work has to be carried out on live equipment.

All components must be labelled clearly and in conformity with the documentation. This applies to any electrical installation. It is essential in medical locations.

Complete, up-to-date documentation turns control cabinets into professional tools. Any changes must be indicated in the documentation.

We are a professional partner – from the first conversation over realisation to commissioning and initial measurement of final circuits – always with the necessary documentation and taking into account all related equipment.

In practice

Products

A brief overview of the most important terms and abbreviations

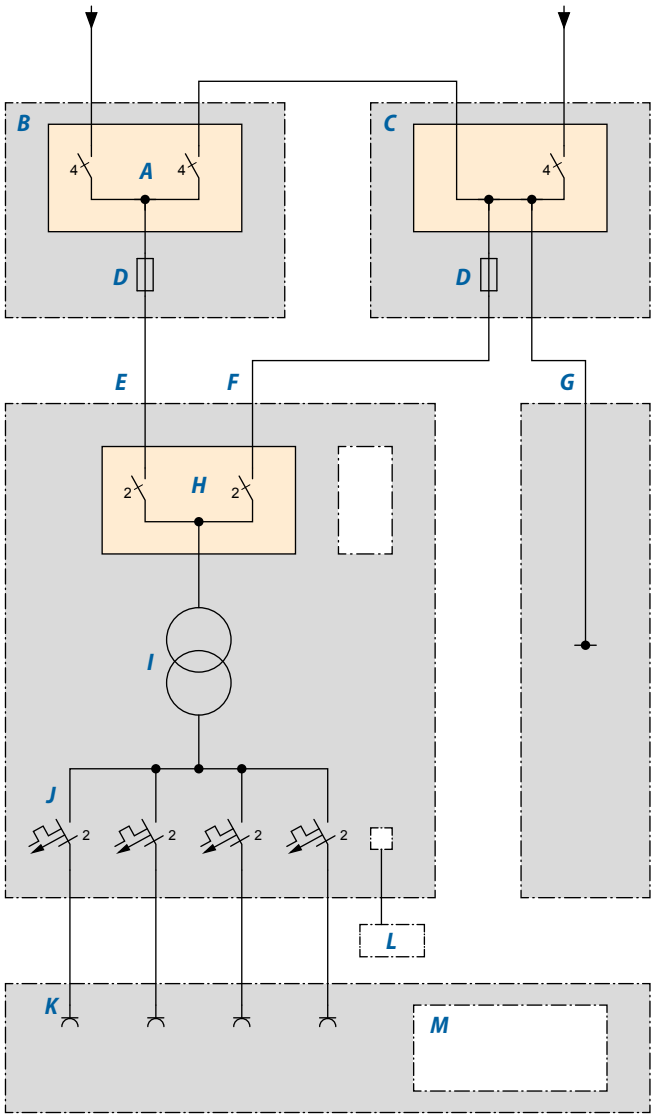
TN-S system
Wherever electric current is to be used the TN-S system represents the common power supply. The TN-S system is an earthed system, in which it is accepted that the first insulation fault leads to a shutdown of the concerned loads without prior signal.

Medical IT system
Each group 2 medical location must have at least one medical IT system, i.e. a power supply that is completely isolated from earth or the protective earth conductor. The advantage: A first insulation fault in a device or in an installation does not lead to a shutdown but to an alarm.

Isolated power panel for group 2 medical locations
Medical IT systems differ significantly from the systems that are typically used in the industrial sector and feature many more components. All components must be placed in close proximity to the group 2 location and have to be easily accessible, clearly structured and maintenance-friendly. The 2 group isolated power panel offers the necessary space.

Changeover process
In many areas of power supply, shutdowns without duration limit are accepted. An impermissible state for any group 2 medical location. Two power supplies independent of each other are a must. However, the medical staff can only make the quickest possible use of this advantage if the changeover is carried out automatically. Only mechanical switching contacts are permissible for implementation. Galvanic separation of the system that has failed is also a must in this case to achieve immediate, fault-free continued operation.

Insulation fault location system (EDS)
In group 2 medical locations with many socket-outlet circuits or loads (e.g. intensive care units) it is often time-consuming and difficult for medical or technical staff to locate faulty circuits or loads. The EDS insulation fault location system solves this problem by means of automatic localisation of the insulation fault. Two main advantages arise from this: Time and cost-optimised fault localisation and availability, since the installation continues to operate during the automatic fault location.



A	Transfer switching equipment for safety power supply in the main distribution board of the building
B	Isolated main distribution board of the building for safety power supply
C	Isolated main distribution board of the building for general power supply
D	Short-circuit protection equipment
E	Preferred supply conductor IT system
F	Redundant supply conductor IT system safety power supply
G	Independent, isolated and unbranched supply conductor general power supply, TN-S system
H	Automatic changeover process with insulation monitoring
I	IT system transformer up to 10,000 VA
J	2-pole fuses to secure the final circuits
K	Socket-outlets with voltage indication and identification
L	Additional equipotential bonding (ZPA)
M	Visual and audible signalling of operating and fault messages

An important difference

Operating theatres

Surgery should always be performed without any interruptions, regardless of the duration. First faults, even in the power supply, must not lead to an interruption of the ongoing action. Such faults have to be eliminated as quickly as possible. Of course, this is always after completing surgery!

For the design of the control cabinet in an operating theatre, this implies that: The IT system with current, temperature and insulation monitoring, immediate signalling and an upstream changeover device is the right choice for the IPS in an **operating theatre**.

Intensive care units

The medical procedure in **intensive care units** is fundamentally different, the patient requires reliable power supply around the clock. Searching for a fault may not be possible for a relatively long period of time. Therefore, the control cabinet for an **intensive care unit** requires an extension that indicates first faults in the electrical installation or in the devices used automatically so that the devices which cause faults can be eliminated during ongoing operation under voltage. The solution is the isolated power panel for **intensive care units.**

At least two medical IT systems

The standard from 2002 which is still valid and the standard valid since October 2012 state that at least the following is required:

One medical IT system for

one group 2 medical location.

Unfortunately, none of the standards is clear in this regard. Some consultants or experts have a different approach that stems from the following standard requirement:

710.512.1.102 – Power supply for medical locations of group 2
In case of a single fault, a total loss of power in a group 2 medical location shall be prevented.

This means that not only for intensive care units but also for operating theatres two medical IT systems are required so that, in case of a first fault at an arbitrary point of the power supply, immediate action can be taken.

Based on the fact that operating theatres very often form a group of two rooms and each room has at least one IT system transformer, final circuits can be collected from each transformer for each operating theatre.
A first fault is always reported to both operating theatres, regardless of the cause. Complementing the selective fault detection becomes necessary.
A first fault caused by a medical electrical device or system in a room, shall only "impair" the corresponding room and shall therefore only be signalled in this room.

The solution is an IPS that features a selective fault location system.

Safe power supply for operating theatres and intensive care units requires high availability

The correct system from an electrotechnical point of view

Experimenting with medical IT systems is a no-go; transparency has to be provided in due time for the benefit of the patient

The standard from 2002 which is still valid and the standard valid since October 2012 put it in a nutshell: The isolated power panel for group 2 locations has to be reliable. It is where the voltage is constantly measured at the preferred supply conductor and also where changeover to the second redundant conductor takes place when the preferred supply conductor fails. Downstream of this changeover device, only the transformer for the medical IT system and the final circuits connected to the IT system are installed.

According to the standard from 2002, upstream of this IPS for group 2 medical locations two independent supply conductors are required, which start in the main distribution board (of the building). This standard also includes the possibility of larger cross sections.

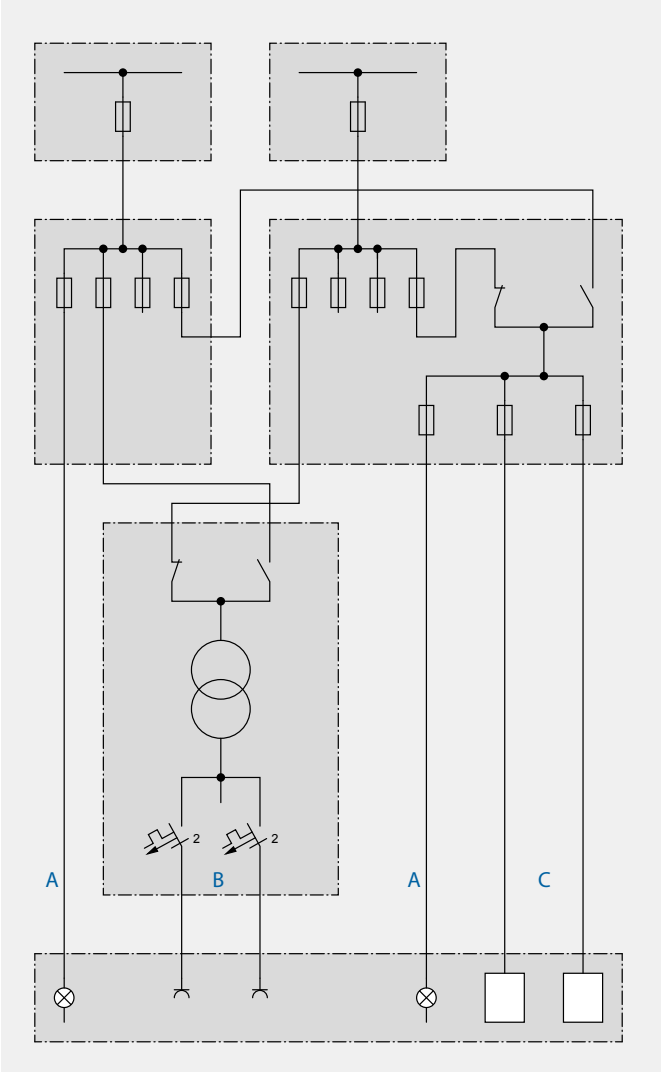
The standard valid since October 2012 does not contain any information regarding this issue. Thus, the following question arises: Which is the best way to set up this installation?

For correct systems from an electrotechnical point of view, the IEC 60364-1:2005 applies.

In the context mentioned here, a larger cross section means that there are several loads at the end of this supply conductor. In this case, the standard mentioned above states: The fault of a load must not impair the operation of the other loads.

This means that power supply systems must disconnect faults selectively, regardless of the power supply source.

This presupposes that the entire system is designed in a reliable, transparent and maintenance-friendly manner.



Sketch of the final circuits for group 2 medical locations

A	Lighting circuits, supplied by a minimum of two independent power supply sources, TN-S system, RCD up to 30 mA or RCM
B	Socket-outlet circuits, supplied by a medical IT system
C	X-ray machines, large-scale equipment, operating theatre table, supplied by a minimum of two independent power supply sources, can be used automatically via a changeover process, TNS system, RCD up to 30 mA or RCM

Instructions from standards on group 2 isolated power panels

It has to be kept in mind that all standards, in particular the current versions, only describe minimum requirements, i.e. the expert will be even more demanded to be at the cutting edge of technology with his installation.

Extracts from DIN VDE 0100-710:2002-11 valid until 9 January 2015

Two independent power supply sources are essential for group 2 medical locations, what is unclear here is the required connection between these power supply sources and the IPS. This connection is accurately described in the standard that is still valid.

710.512.1.6.1 – Power supply for medical locations of group 2

When supplying an IPS or an IPS section from the safety power supply and the normal power supply the preferred supply must be directly from the main distribution of the building of the safety power supply and the redundant supply directly from the main distribution board of the building of the normal power supply.

Generally, an isolated power panel for group 2 medical locations requires two separate supply conductors which have clearly defined and marked start points each. The conductors must be laid continuously, must not branch and must end in the group 2 isolated power panel. Both supply conductors are only protected against short circuit at the beginning.

The main focus of the described installation is on clarity and transparency for the supply for shutdown in the event of a fault as well as for maintenance.

Related to the economic efficiency of this type of installation the valid standard to this date informs as follows:

It is permissible to supply multiple IPS (even in the IT system) via two supply conductors if they are arranged within one fire section.

Every IPS in group 2 medical locations must have two independent supply conductors.

If the voltage fails at the end of one or more of the line conductors that supply under normal operating conditions (preferred supply), the power supply must be switched automatically to the second supply conductor via a changeover device.

The medical IT system hast to be protected against arbitrary first faults and with that in mind, we would like to draw attention again to the following fundamental requirement:

If there is more than one IT system downstream a changeover device a short-circuit protective device must be provided in each transformer supply conductor in order to avoid a total failure of all IT systems in the event of a fault.

These protective devices must not trip in the event of overload but only in the event of a short circuit with practically no resistance in or at the transformer or in the event of a short circuit in the IPS upstream the protective devices of the final circuits.

A medical IT system downstream a changeover device should be the rule and therefore obvious for a safe and reliable power supply for group 2 medical locations.

Extracts from DIN VDE 0100-710:2012-10 valid since October 2012

710.512.1.102 – Power supply for medical locations of group 2

In case of a single fault of supply, a total loss of power in a group 2 medical location shall be prevented.

NOTE: Regardless of the implementation of a medical IT system and management of the total selectivity of the protective devices, this may be achieved by:

the provision of two independent supply lines (see also 710.536.101) or

a local additional power supply unit or

an additional power supply unit for several rooms of group 2

or

other equally effective technical measures to ensure the continuity of mains power

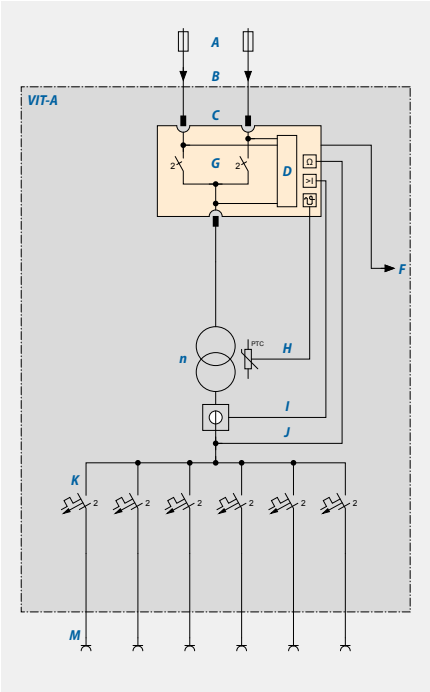
At European level exists an unanimous opinion regarding the structure of the power supply for medical locations of group 2. Arbitrary faults that we are aware of, that we have to think of, must not lead to failure of the power supply. The word "must" emphasizes the requirement.

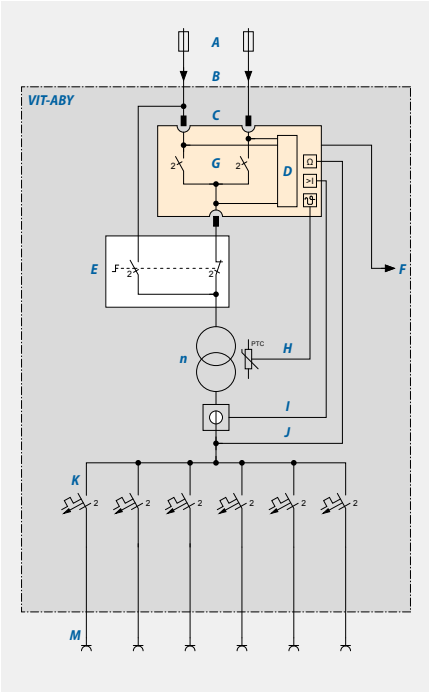
710.510.101 – Distribution boards

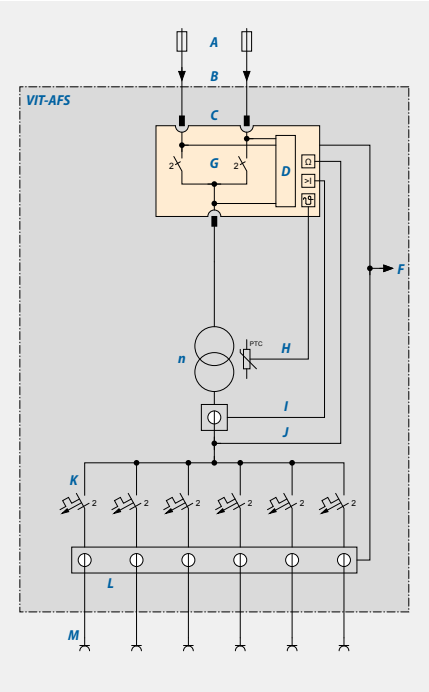
NOTE: A distribution board for medical locations is a board which fulfils all the functions for the supplied medical location area assigned to it and where the voltage is monitored for operating the safety power system.

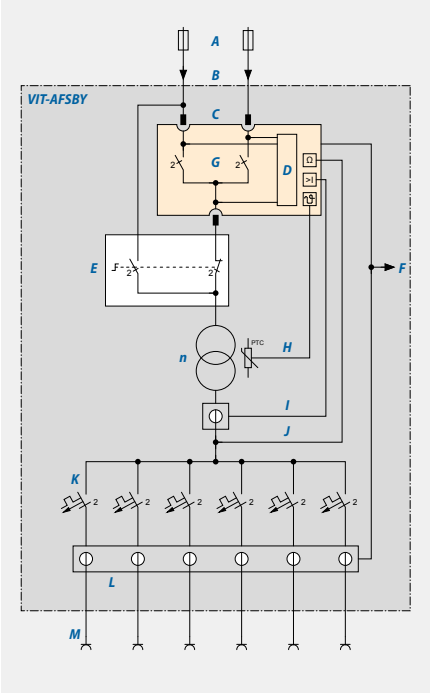
Safety power supplies must change over automatically and be always ready for securing continued supply.

Schematic circuit diagram









A	Protection only against short circuits
B	Incoming supply via two independent power supply sources
C	ATICS® transfer switching device, nominal current 63 A
D	Triple voltage monitoring
E	2-pole bypass switch
F	Bus output for panels and alarm indicator and test combinations
G	Changeover controls
H	Temperature monitoring in the transformer
I	Current monitoring for the medical IT system
J	Insulation monitoring for the medical IT system
K	2-pole fuses to secure the final circuits
L	Insulation fault location system with LED indication for each channel
M	Socket-outlets with voltage indication and identification
n	Transformer from 1600 VA up to 10,000 VA

Standard IPS

These IPS and the corresponding transformer cabinets are preconfigured and can be ordered directly ex stock. Making changes to the different components is not possible. You can configure the IPS and transformer cabinets according to your requirements.

		VIT-09-A-12B16	VIT-09-AB-12B16	VIT-09-A-12B16E	VIT-09-AB-12B16E	VIT-12-A-18B16E	VIT-12-AB-18B16E
IPS	**Component option 1 – ATICS®**						
	ATICS®	■		■		■	
	ATICS® with bypass		■		■		■
	Component option 2 – circuits breakers						
	B16A	2	2				
	B16A with EDS			2	2	3	3
Transformer cabinet	**Component option 3 – isolating transformers**						
	ES710-4000S-GL	■	■	■	■	■	■
	ES710-5000S-GL	■	■	■	■	■	■
	ES710-6300S-GL	■	■	■	■	■	■
	ES710-8000S-GL	■	■	■	■	■	■

Variants

	Dimensions in mm			Weight	Type	Art. No.
	Width	Depth	Height			
IPS	300	350	1400 (1425)[1]	approx. 40 kg	VIT-09-A-12B16	B22100100
					VIT-09-AB-12B16	B22100101
					VIT-09-A-12B16E	B22100102
					VIT-09-AB-12B16E	B22100104
			1850 (1875)[1]	approx. 50 kg	VIT-12-A-18B16E	B22100103
					VIT-12-AB-18B16E	B22100105
Transformer cabinet	300	350	500 (550)[2]	approx. 75 kg	TX4000SN-GL	B22100114
					TX5000SN-GL	B22100115
				approx. 80 kg	TX6300SN-GL	B22100116
				approx. 90 kg	TX8000SN-GL	B22100117

[1] incl. connection set transformer cabinet
[2] incl. base

Individual IPS

Not every hospital is the same, besides every country has its own normative particularities.
We gladly offer advice regarding your individual requirements.
We offer IPS with any configuration and focus on your needs.

Bender. So that your world is safer.

Our world is networked on a global scale; it is digital, mobile and highly automated – whether in manufacturing industry, inside or outside buildings, in operating theatres and power stations, in trains, underwater or underground: it never stands still and it is more dependent than ever on a reliable and, above all, safe electrical power supply.

And exactly that is our mission: we make electricity safe. Using our technologies we ensure that electricity is permanently available and guarantee faultless protection against the hazards of electric shock. We protect buildings, plants and machinery and therefore your investments and plans. But what we primarily protect are the lives of the people who are involved with electricity.

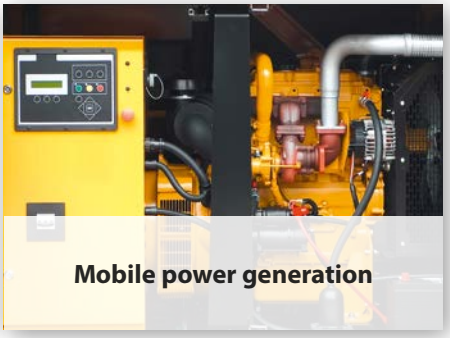
Mechanical and plant engineering

Oil, gas

Renewable energy

Hospital engineering, ambulant surgery

Public power supply network

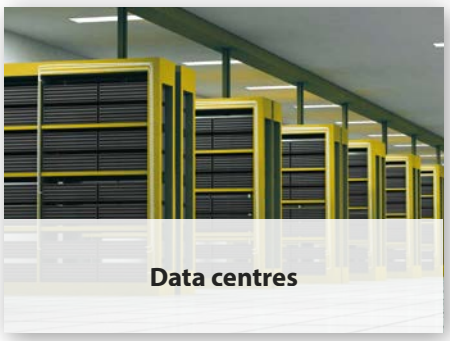


Mobile power generation

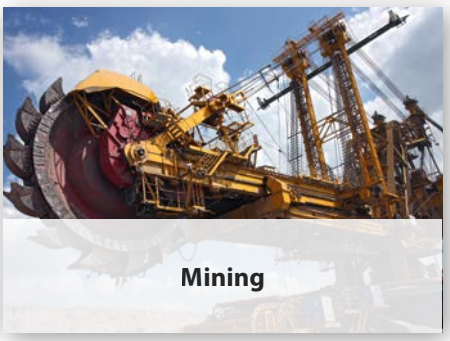
Ships and ports

Railway

eMobility



Data centres



Mining

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