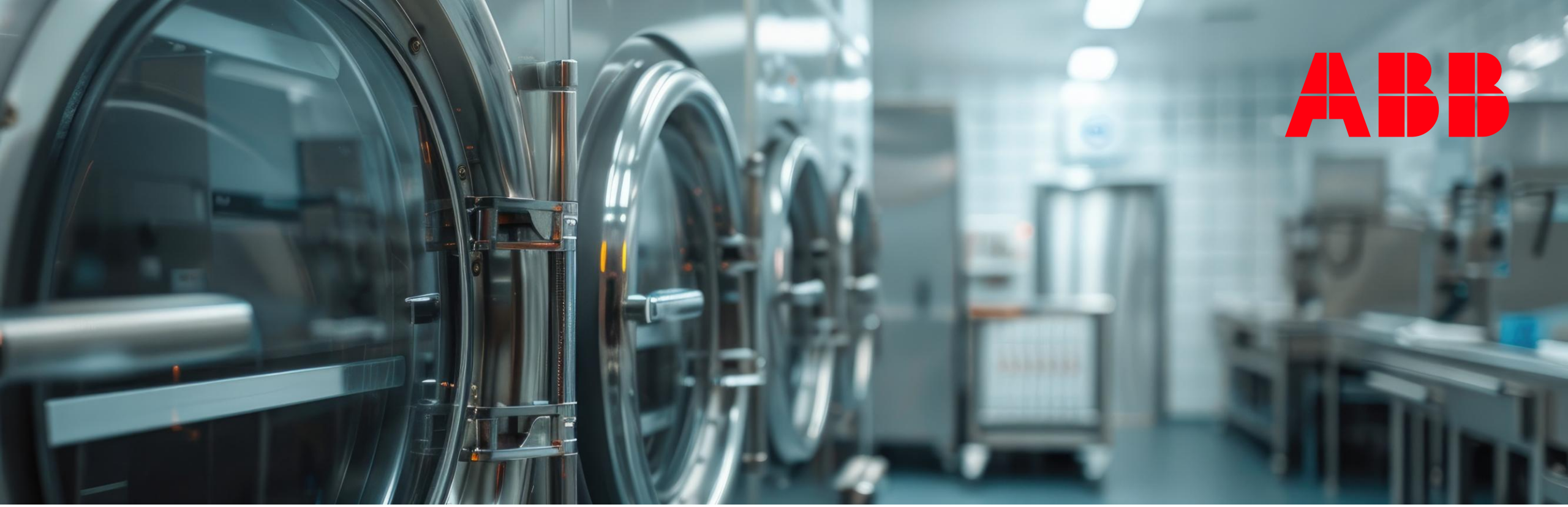

BIOMEDICAL DEVICE MANUFACTURING

Power and control solutions

ENGINEERED TO OUTRUN

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Biomedical devices
Advancements in medical technology

	CURRENT POSITIONING	FUTURE TRENDS
Sterilization	• The use of various sterilization equipment (i.e., ethylene oxide, vaporized hydrogen peroxide, autoclave, etc.) depends on the type of material to be sterilized • Many manual steps are involved within the sterile processing department • Regular manual maintenance to validate, monitor, and record the equipment	• Ethylene Oxide (EtO) use is increasingly restricted. Autoclave sterilization is the best alternative because it is fast, efficient, and just as effective as EtO • Automation such as intelligent load recognition and cycle adjustment capabilities will ensure optimal sterilization with minimal manual operation • Cloud computing will allow live monitoring, remote diagnostics, and automatic software updates
Medical Refrigeration	• Medical refrigerators typically use hydrofluorocarbon (HFC) or hydrochlorofluorocarbon (HCFC) refrigerant and can be energy-intensive • Many manual steps are involved in monitoring the equipment locally • Regular manual maintenance to validate, monitor, and record the equipment	• Hydrocarbon (HC) refrigeration is trending because it is eco-friendly, regulatorily compliant, cost-effective, and increases efficiency and safety • Smart monitoring, remote monitoring capabilities, and real-time data analytics will enable healthcare providers to monitor and manage refrigerated storage conditions • Cloud computing will add vital alerts, temperature records, digital displays, and temperature controllers to medical refrigerators

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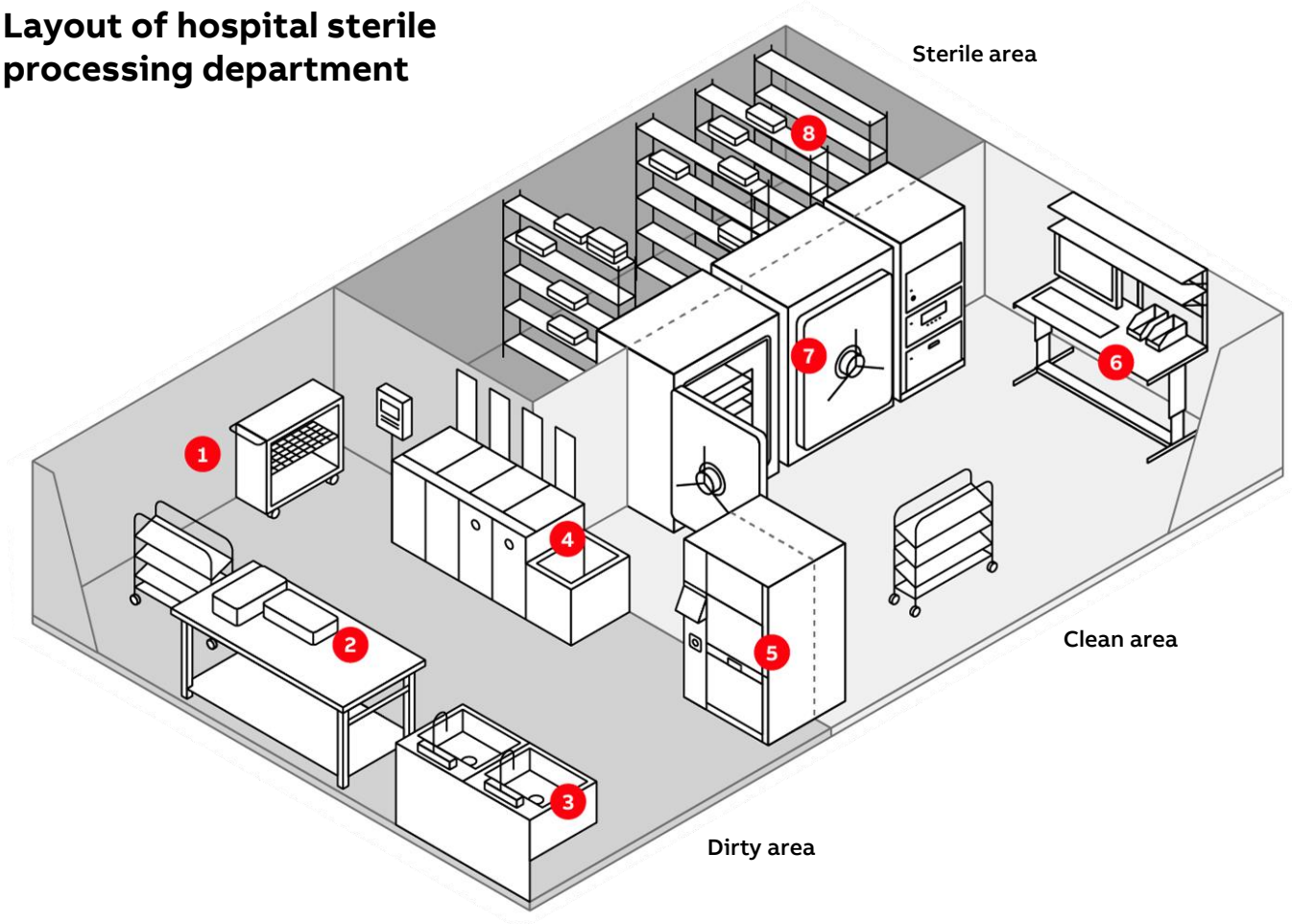
Technology topology
Sterilization

Medical facility sterilization process flow[1, 2]

The sterilization process depends on the sterilizer type, unit design, decontamination, disassembling of the device, loading the sterilizer, monitoring, the sterilant quality and quantity, the appropriateness of the cycle for the load contents and providing optimal conditions.

Layout of hospital sterile processing department



1 Carts
2 Sorting and Prepping Table
3 Manual Washers
4 Ultrasonic Cleaner
5 Washer/ Disinfector
6 Inspecting, Assembling, and Packaging Tables
7 Sterilizers
8 Shelves

Sterile area
Dirty area
Clean area
Pass-through area

Sources:
1. Guideline for Disinfection and Sterilization in Healthcare Facilities
2. What is Sterile Processing?

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Technology topology
Medical refrigeration

Medical refrigerators, by design, maintain consistent, low temperatures with minimal fluctuations, are sturdier, and offer quick temperature recovery.

They can be broadly classified into three categories:

- **Medium temperature refrigeration/Medical refrigerators –** operating at temperatures between 2°C and 8°C (36° and 46°F)
- **Low-temperature refrigeration/Medical freezers –** operating at a temperature range of -50°C and -15°C (-58°F and +5°F)
- **Ultra Low-temperature refrigeration/Ultra cold freezers –** operating at a temperature range of -90°C and -60°C (-130°F and -76°F)

Sources:
1. Practical-guidance-for-vaccine-refrigerated-transportation-and-storage-abstract 2. Vaccine Storage and Handling Toolkit
3. 6 Factors for Choosing Medical Refrigerators for Healthcare Facilities

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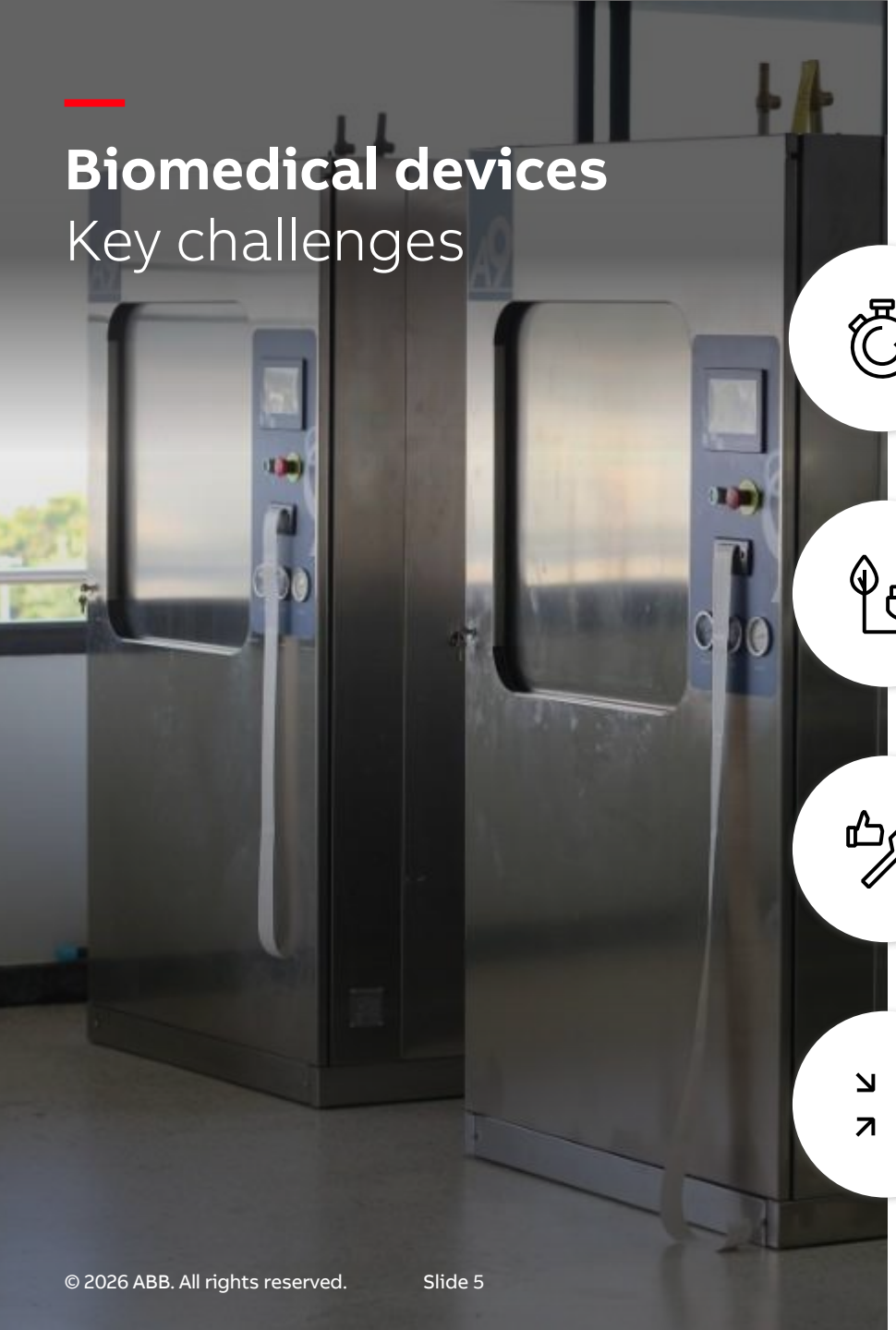

Biomedical devices
Key challenges

Interruptions and downtime due to switching connections, overloads or short circuits allowing continuous operation for the biomedical device manufacturing.

Maintaining required energy efficiency due to increased energy usage and temperature regulation during machine operation.

Time consuming product installation with hardwired connections, screw terminals, and process interruption for equipment upkeep.

Design of compact protection solutions for limited space inside the equipment.

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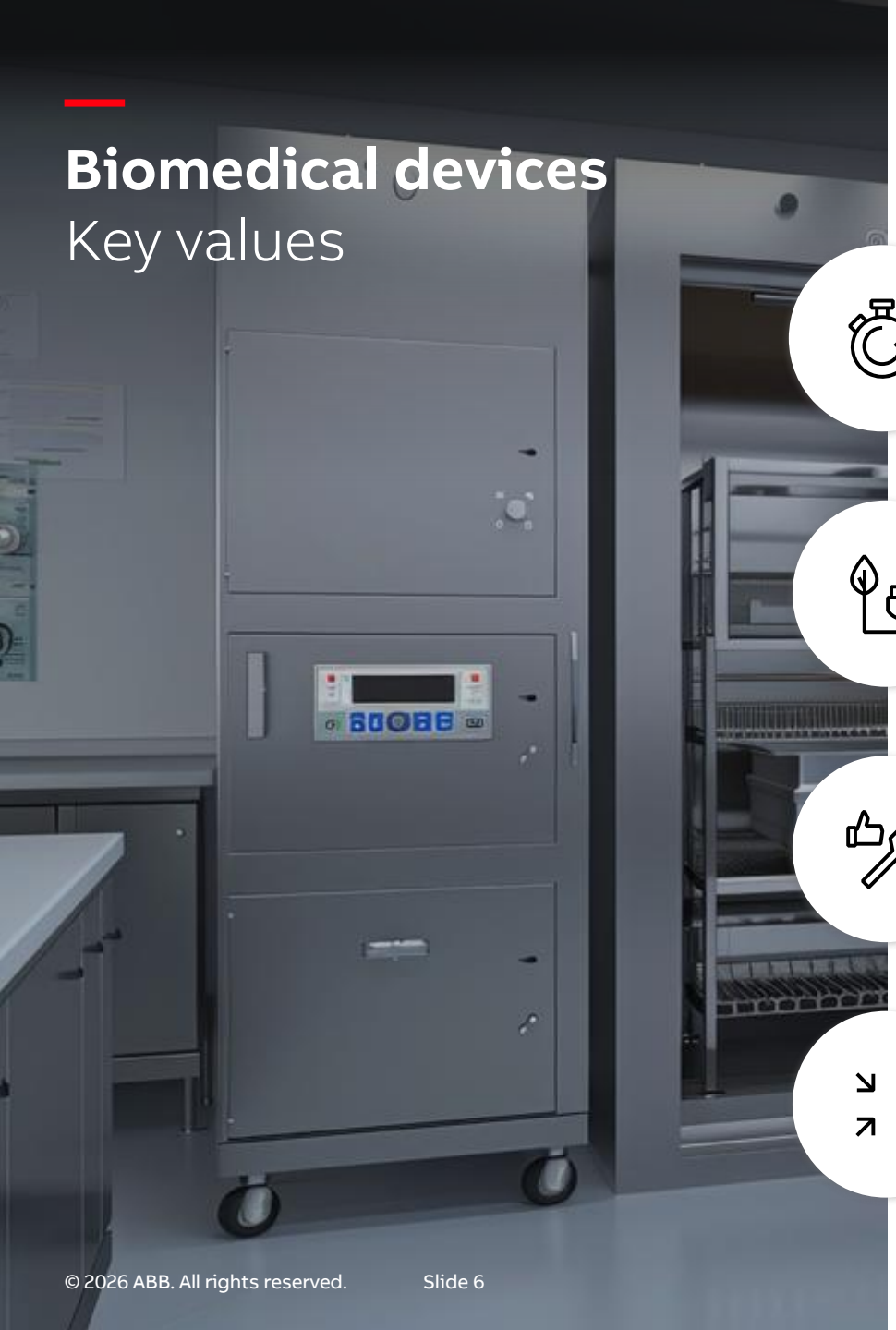

Biomedical devices
Key values

Continuous operation

Help ensure optimal uptime with reliable connections and coordinated products that provide robust switching and motor control as well as protection against overloads and short circuits.

Energy efficiency

Boost control panel energy efficiency with our AF coil technology, reducing energy consumption, dissipating less heat, and decreasing temperature rise while increasing panel density.

Easy to install

Reduce control panel assembly time and simplify installation with our starter connection kits, push-in spring terminals, and snap-in accessories.

Compact design

Save space with narrower designs in circuit breakers and contactors that easily fit your application, helping to reduce the control panel dimensions and costs.

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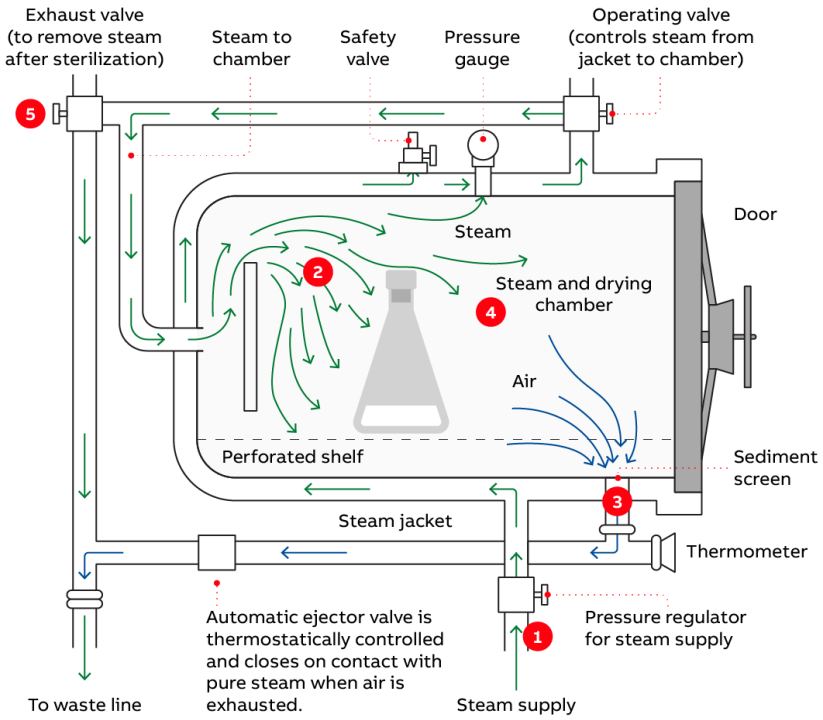
Biomedical devices
Autoclave sterilization

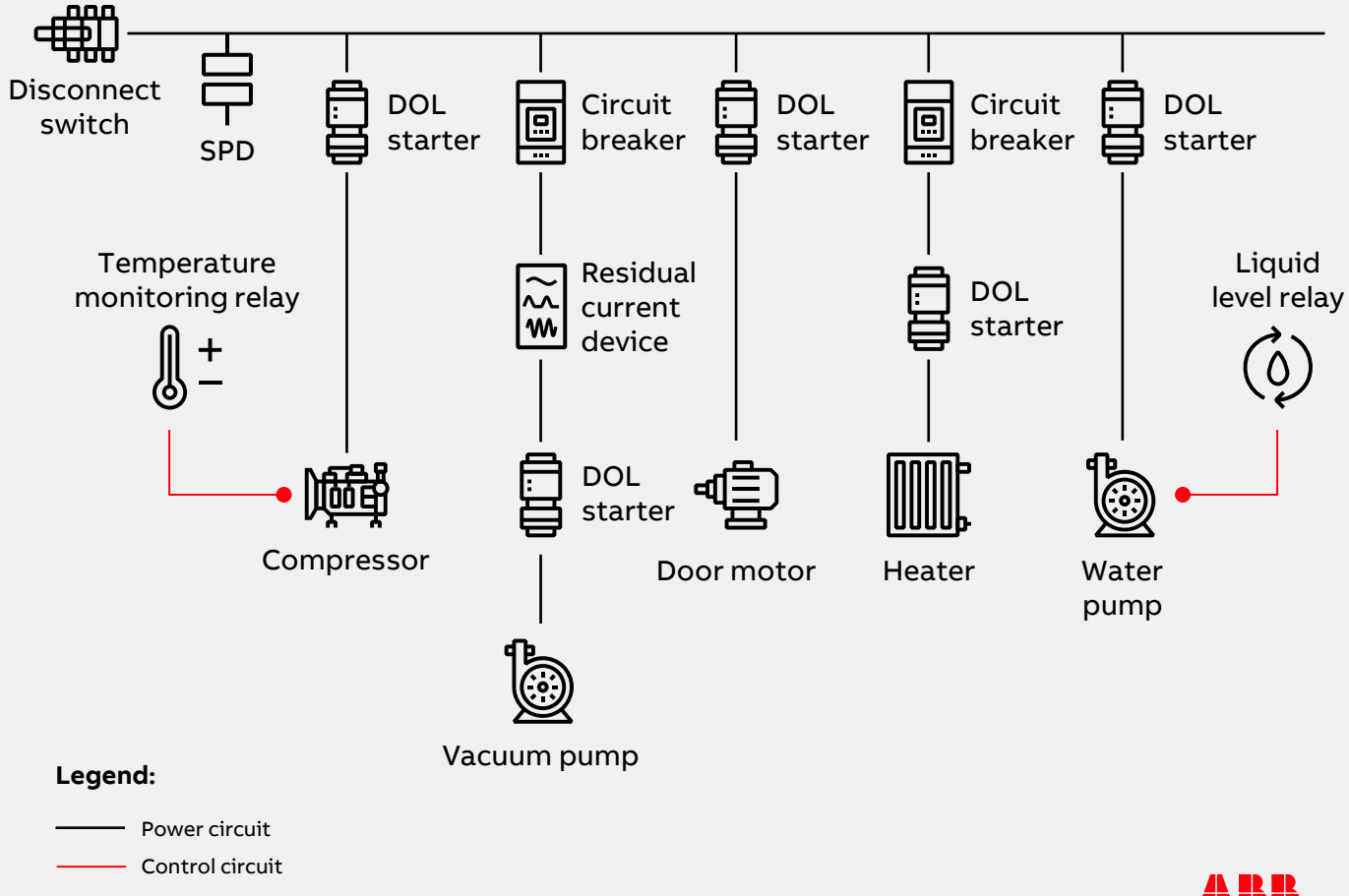
An autoclave is a sealed device that purifies materials with saturated steam under pressure. The figure shows the phases of an autoclave sterilization cycle.

Autoclave sterilization involves:

1. Pre-conditioning and heating
2. Exposure
3. Pressure release
4. Drying
5. Exhaust phase



Power and control solutions for autoclave sterilization



Note: See Biomedical device manufacturing product portfolio for detailed component solutions.

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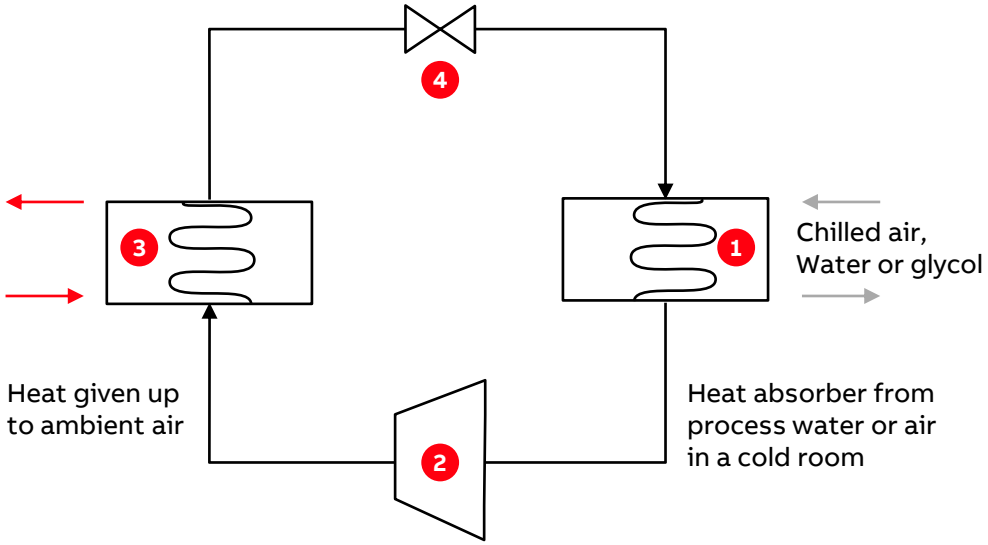
Biomedical devices
Medical refrigeration

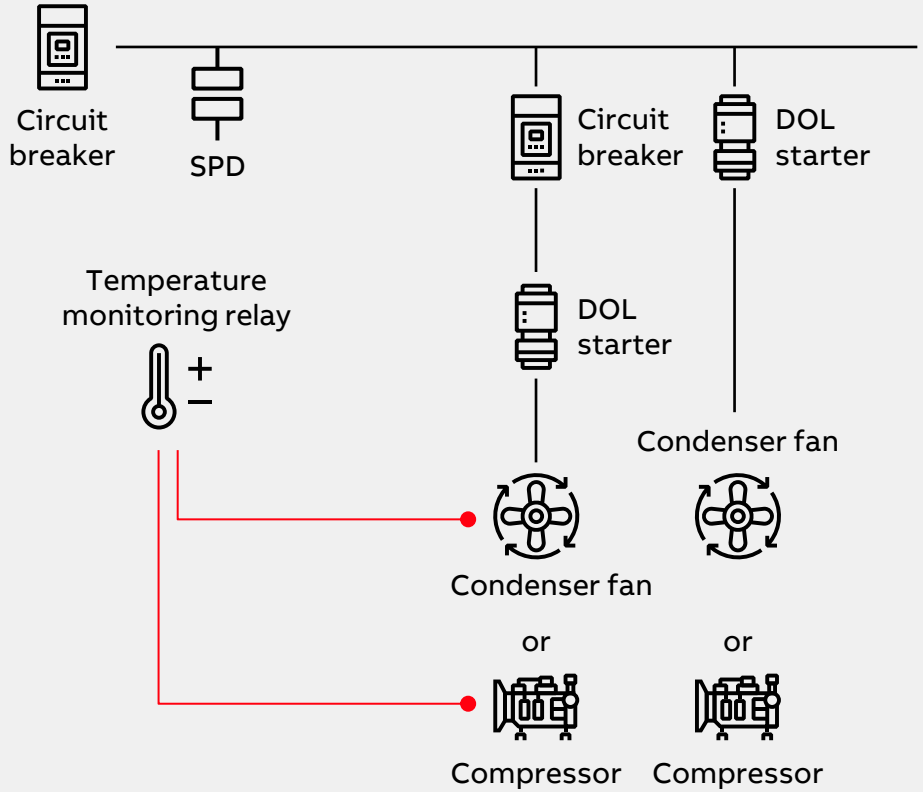
Medical refrigeration is essential for preserving and maintaining the efficacy, integrity, storage, and safety of medical products within the biomedical device industry. The figure shows the overview of a typical medical refrigeration cycle.

Overview of a typical refrigeration cycle

1. Evaporator
2. Compressor
3. Condenser
4. Expansion valve



Power and control solutions for medical refrigeration



Legend:

Power circuit

Control circuit

Note: See Biomedical device manufacturing product portfolio for detailed component solutions.

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Biomedical devices
Collaborative innovation

National and global connectivity

Continuous product improvement

Quality and innovation

Local distribution support

ABB and customer collaboration and support

Strategically focused on segment trends and solutions

Biomedical devices
Resources and tools

Biomedical device manufacturing product portfolio

LINK

Application note: Power and control solutions for autoclave sterilization

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Application note: Power and control solutions for medical refrigeration

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Mt. Juliet distribution center stocking guide

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ABB OEM biomedical equipment manufacturer page

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White paper: Power patient safety | How ABB low-voltage solutions ensure reliable autoclave sterilization

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ABB Sustainability & EcoSolutions™

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