DOPPELMAYR

Connect: Intelligent control

Future-fit and digitally networked ropeway operations

Contents

Smart ropeway operations

Connect's well-conceived control options lighten the workday load for your personnel, ensuring greater efficiency, safety and satisfaction within the team.

Modern and intuitive

The command center for modern ropeway technology

With cutting-edge ropeway technology, Doppelmayr lays the foundation for the continuous evolution of its transport systems.

Decades of experience with projects around the globe feed into development – and also into the modern ropeway control system Connect.

With its intuitive user interface and top-quality industrial electronics, you as the operator maintain an overview in day-to-day operations.

Comprehensive information and communication features enable efficient operations as well as the convenient handling of your installation.

Synergies: Connect is available for all ropeway systems. With continuous-movement ropeways, funiculars and aerial tramways as well as surface lifts, you and your team benefit from a high standard and a harmonized operating concept.

Enhanced quality in the workplace

Ergonomic, functional, transparent

Jointly developed with ergonomics experts, the user interface is reduced to the essential. Key information such as rope speed, drive torque, wind values and alerts are always in view, irrespective of user navigation.

To optimize the workplace environment, the space required for control cabinets and the exhaust heat produced have been reduced along with disturbing fan noise.

Benefits of Connect:

- Intuitive and transparent ropeway operation
- Harmonized operating concept, terminology, mimic diagrams and documentation across all ropeway systems
- Smart assistance functions
- Deactivation concept with up to 180 deactivatable points
- Clear and ergonomic work procedures with greater freedom of movement thanks to mobile hardware
- High spare parts availability and reduced delivery times due to a cross-system Connect concept

More about Connect

Total focus on user friendliness

The Connect control system places a clear emphasis on the needs and tasks of the user. From the central control desk, users have an optimal overview of the ropeway installation and – with optional monitors – can simultaneously keep an eye on passengers. The high-resolution touchscreen is ergonomically angled and made from premium materials.

All operator control units, whether on the platform, in the control room or in the parking system, follow the same operating logic.

The operating elements are made from materials with tried and tested resilience to snow, ice, rain, heat and UV radiation.

Connect radio remote control in the station

Passenger and maintenance modes

The simple operating mode concept with a clear distinction between passenger and maintenance modes ensures clarity and straightforward operating procedures.

Optimal mobility

Your ropeway crew can operate most effectively when they can act flexibly during operations. Here again, Connect scores with supporting hardware to provide additional mobility when handling a wide range of tasks.

VoIP telephone system and optional DECT phones

A VoIP telephone system is used for internal ropeway communications. As an option, wireless phones are also available, which give your crew greater freedom of movement.

Tablet

A mobile application, which is connected to the control system via the ropeway's internal wireless network and operated with a tablet, is available as an option. This makes daily operations as well as maintenance and repair work much easier.

Radio remote control

The optional radio remote controls give personnel additional freedom of movement when carrying out maintenance work and taking care of passengers. They are available for use in the station, in the parking system and on the line and offer the following control options:

Station
- Fixed speed stages
- Carrier identification
- Loading gate control
- Elevating platform control
- Stop and emergency stop for ropeway

Parking system
- Fixed speed stages
- Select rail
- Swing rails in and out
- Wake up
- Start carrier launch
- Stop and emergency stop for parking system

Line
- Speed control
- Select travel direction forward / backward
- Reset functions for maintenance mode
- Start and emergency stop for ropeway
- LED status display (reset, ready to run)

Targeted assistance

Assistance functions that make a difference

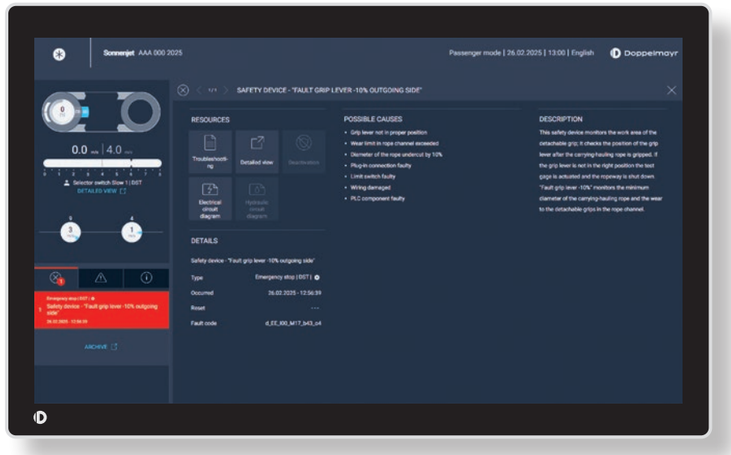
Automatic announcements

Essentials in view

Adaptive speed control

Assisted troubleshooting

Electronic carrier identification



Assisted troubleshooting

In the event of a report, an exact description, possible causes and quick links to documents, such as troubleshooting manual or circuit diagrams, are provided in the Solution Center. Operation and maintenance manuals as well as hydraulic diagrams are also stored in the system and can be accessed by the operator in their local language to help find a solution. That means the operating crew can rely on valuable assistance to resolve unforeseen situations.

Electronic carrier identification

All carriers can be electronically tagged with the aid of RFID (Radio Frequency Identification) technology. This means that numerous measured values and functions, such as carrier identification, grip force measurement or current measurement for the seat heating, can be uniquely assigned to the individual carriers.

Essentials in view

Shutdowns, alerts and other information are intelligently controlled via the Notification Center. This ensures that reports with the highest priority are always displayed on the first level of the Connect control system.

Adaptive speed control

Passenger volumes on ropeways can fluctuate significantly. Adjusting rope speed makes it possible to save energy. If the number of waiting passengers is low, the speed of the ropeway is automatically reduced. If a line of passengers forms, the speed is increased back up. The rules for slowing the installation are defined individually in line with customer requirements.

Automatic announcements

Connect enables prerecorded announcements to be broadcast automatically in the station and on the line. These are available in 25 languages and can be time-controlled as required.

Safety on all levels

We know what it takes.

IT security

Connect satisfies the highest standards with regard to protection and defense against external unauthorized access.

Remote maintenance system

When required, we provide you with fast, straightforward assistance over the air to analyze and resolve any problems.

Deactivation concept

Following the failure of a safety device, it can be of benefit, in specific situations, to continue operations using the main drive if functional, rather than evacuating the line using the emergency drive. Step-by-step guidance is provided throughout the entire deactivation process.

Redundancy concept for main drives

The optional redundancy concept provides an additional safeguard for the availability of the ropeway installation. If individual drive components should fail, operation can be maintained at full or reduced transport capacity.

Why a control system upgrade is worthwhile

With the Connect control system, you will be upgrading your existing system to state of the art. Safeguard the availability of your installation with this modern ropeway control system and benefit from further retrofit advantages.

More about control system upgrades

Rope position detection

Reduce the risk of deropement with RPD Nexo.

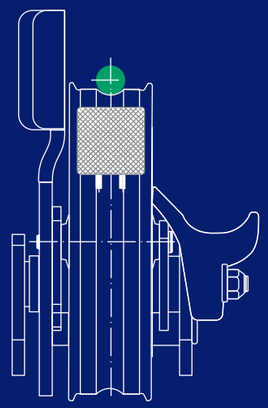
Installed directly on the sheave assembly, the Rope Position Detection (RPD) system Nexo identifies a deviation of the rope from the sheave liner groove at an early stage. This significantly reduces the risk of deropement. The RPD Nexo system is rugged, resilient to all weather conditions, and can be retrofitted to existing installations.

Eases the workload for the operating crew
As a reliable early warning system, RPD Nexo operates with non-contact sensors and a fail-safe bus system from tower to tower. If the rope type-dependent limit values are exceeded, the ropeway is automatically slowed down or stopped. Connect provides your ropeway team with a wide range of monitoring and diagnostics functions that can be used to identify error sources quickly and efficiently.

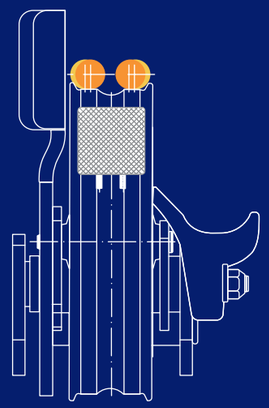
The following situations are detected:

- Rope in normal position
- Rope deviation from the groove
- Deropement beyond side plate
- Inward deropement
- Blocked sheave
- Excessive sheave liner wear
- Lost sheave

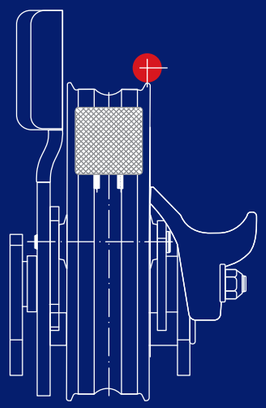
More about RPD Nexo



Normal operation



Slowdown of the ropeway



Ropeway is stopped

AURO

Technology

Cameras and sensors help to ensure smooth ropeway operations – particularly in the loading and unloading zones. The AURO system independently identifies situations that deviate from normal operation and slows or shuts down the installation. It is restarted by a ropeway operative in the Ropeway Operation Center (ROC). This can be located in the ropeway control room or elsewhere. The result: the perfect interaction between human and technology.

In the case of chairlifts, AI-assisted image processing from Mantis Ropeway Technologies, a development partner to the Doppelmayr Group, is also used. This can identify and evaluate the hazard potentials associated with passenger movements, which are higher than on gondola lifts, in fractions of a second.

More about AURO

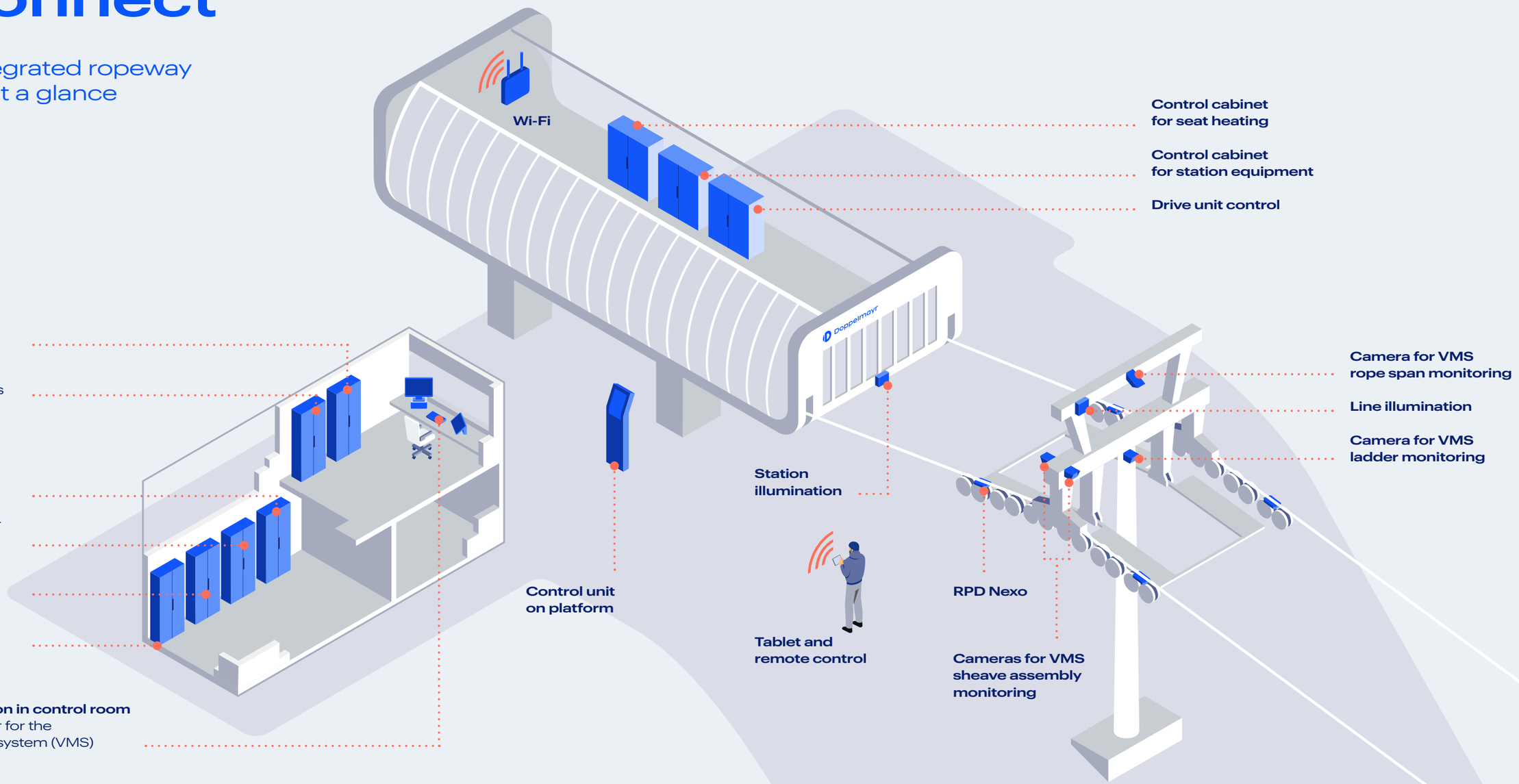
The future is autonomous

Fit for tomorrow's ropeway mobility with Connect and AURO

Doppelmayr is setting new benchmarks with AURO (Autonomous Ropeway Operation) for continuous-movement ropeways, aerial tramways, funiculars and chairlifts. AURO ropeways bring passengers safely and reliably to their destinations – with unmanned operations and cutting-edge digital network technology.

The components of Connect

Modern, integrated ropeway operations at a glance



LED illumination
On request, platform, shaft and ladder can also be separately illuminated. The energy-efficient line illumination is designed to illuminate the rope spans during night trips. Special attention was paid to environmental compatibility during development.

CCTV
Selected station zones can also be monitored on request. The moving images are shown on a separate monitor in the control room by means of the video management system (VMS).

Connect for aerial tramways and funiculars

Why make it complicated when you can make it simple.

The many years of professional expertise of Doppelmayr Group member Frey Stans in the area of control systems for aerial tramways, funiculars and continuous-movement ropeways enabled us to optimally leverage the benefits of the Connect control system. That means aerial tramways and funiculars enjoy the same advantages of Connect as continuous-movement systems (cf. p.7).

In addition, the operators of aerial tramways and funiculars benefit from the option of integrating the Energy Storage System For Ropeways (ESFOR) into their ropeway system. ESFOR enables the better use of self-generated electricity and therefore reduces dependence on power from the grid. The recuperation, intermediate storage and subsequent reuse of braking energy makes it possible to increase the efficiency of the system as a whole. At the same time, ESFOR optimizes the power consumption of the ropeway and enables an emergency drive concept without diesel generator.

More about ESFOR

Connect Cabin

Integrated and central control of functions

Digitalization provides exciting new functions for controlling a ropeway. With Connect, Doppelmayr has created the technical basis for a networked ropeway system that enables the integrated control of numerous functions. A major focus is not only on the station and the line but, needless to say, on the passenger area – to be more precise, the cabin.

Functions like communication, lighting, ventilation and infotainment features offer a host of options for customizing cabin fittings. Ideally, these are integrated into the central ropeway control system.

This is where Connect Cabin comes into the picture. Cabin functions are wirelessly integrated into the Connect control system by means of a Mobility Client Control Unit (MCCU). Safety and comfort as well as operational efficiency can be significantly enhanced as a result.

All about the cabin

Maximum individuality through modular concepts

A modern control system has to ensure efficient and, above all, safe operation. Connect Cabin allows the most important cabin functions to be operated directly via the ropeway control system. That significantly eases working procedures.

Apart from controlling functions, Connect Cabin also allows batteries, charging operations and consumer status to be monitored.

While some functions can also be operated without integration into the control system, integration is a prerequisite for other more complex features.

Safety

- Intercom system
- CCTV
- Door monitoring

Comfort

- Lighting
- Seat and window heating
- Ventilation and air-conditioning
- Cabin occupancy detection

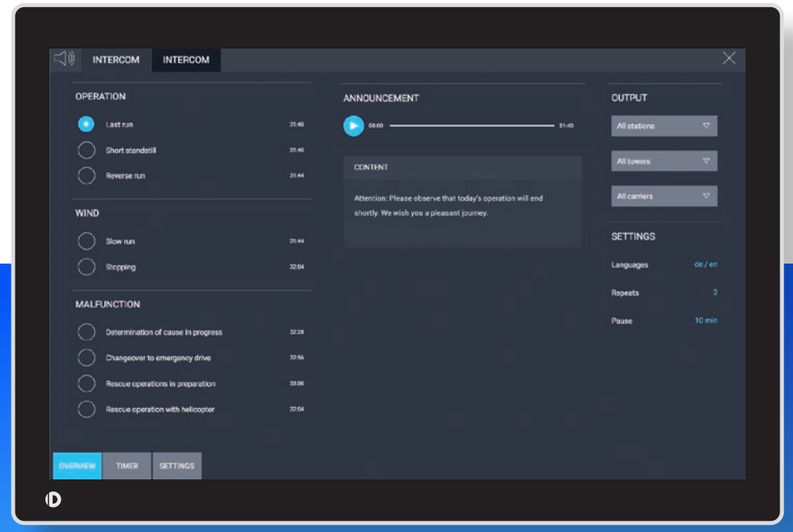
Infotainment

- Cabin Display
- Public Wi-Fi
- Charging station
- Audio concept

Intercom system

Ropeway operatives and passengers can communicate with one another using the intercom system. In the event of multiple call requests from the carriers, the requests are placed in a queue.

A capability for direct communication between passengers and ropeway crew is an important tool for obtaining or providing information in exceptional situations. Functional communication is also the basis for rapid action.



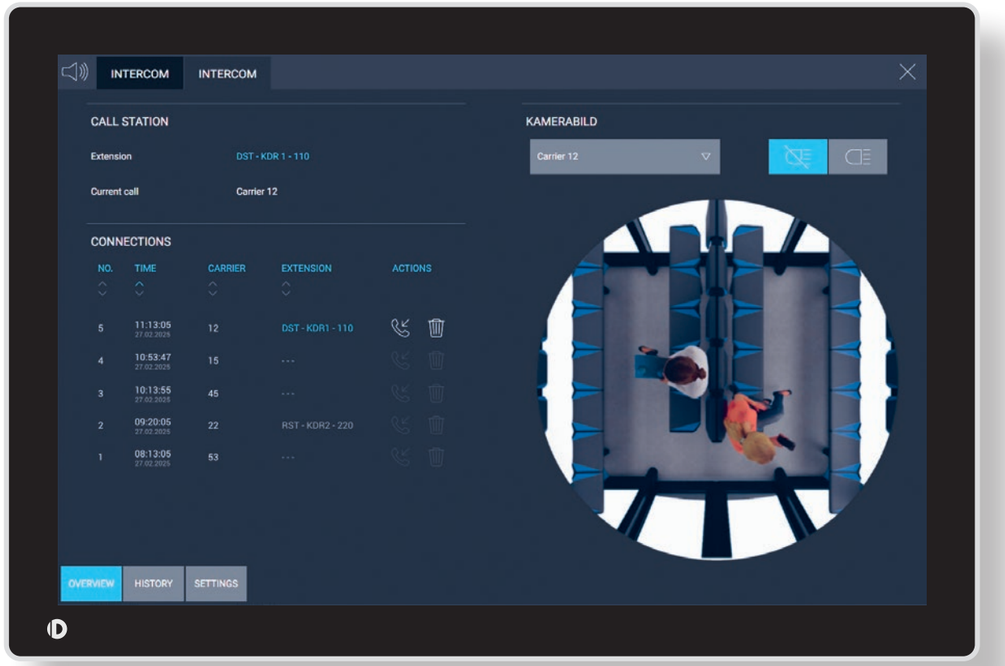
Prerecorded announcements for use in a wide range of situations enable your personnel to provide a professional and fast response in many different scenarios. With more than 25 supported languages, your international guests will also be optimally informed at all times.

Connected in every situation

Different functional scopes are available, depending on the transmission technology used.

These range from simply playing prerecorded announcements – which can be time- or location-dependent – through situational two-way communication with one cabin in specific situations to communication with one, several or all cabins using the ropeway telephone.

Operating companies can choose from a wide range of options for communicating with their passengers. On request, and with the right transmission technology, automatic function tests, automatic announcements from Connect, and the combined use with CCTV are also possible.



See what's going on

A camera in the ceiling gives your personnel a view of the cabin interior when needed (CCTV).

On request, the video signal can be shown on the display of the Connect control system and, in combination with the intercom system, can provide added value when it comes to assessing situations.

Door monitoring

Proper door locking is essential for safety reasons. Different door monitoring methods are used, depending on the door system. In the case of mechanical door opening and closing, the position of the door actuating lever initiates the signal back to the control system. In special cases, the Digital Power Line (DPL) system can also be installed. With an electromechanical door drive, such as on the ATRIA and STELLA cabin models, this is standard. Door actuation is then independent of specific opening and closing points, making multiple door closure attempts and individual door operation possible. In this case, the signal is sent to the control system by means of current collectors on the cabin and power rails in the stations.

Atmospheric and functional lighting

A lighting scheme that is individually designed to suit the ride experience enhances the wellbeing of your guests. A range of options are available to achieve that goal.

RGB lighting

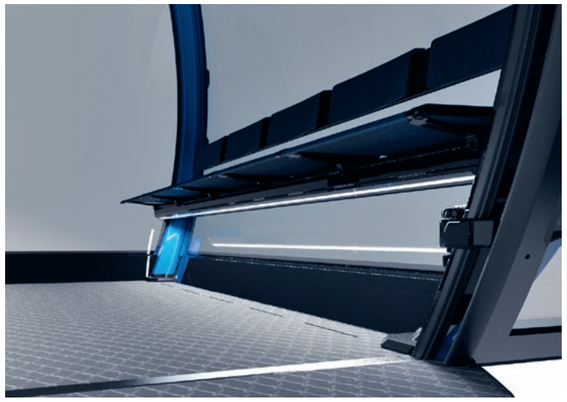
For individual lighting moods and special occasions.

Ceiling lighting

Direct or indirect lighting in the ceiling for a pleasant ambience.

Entrance lighting

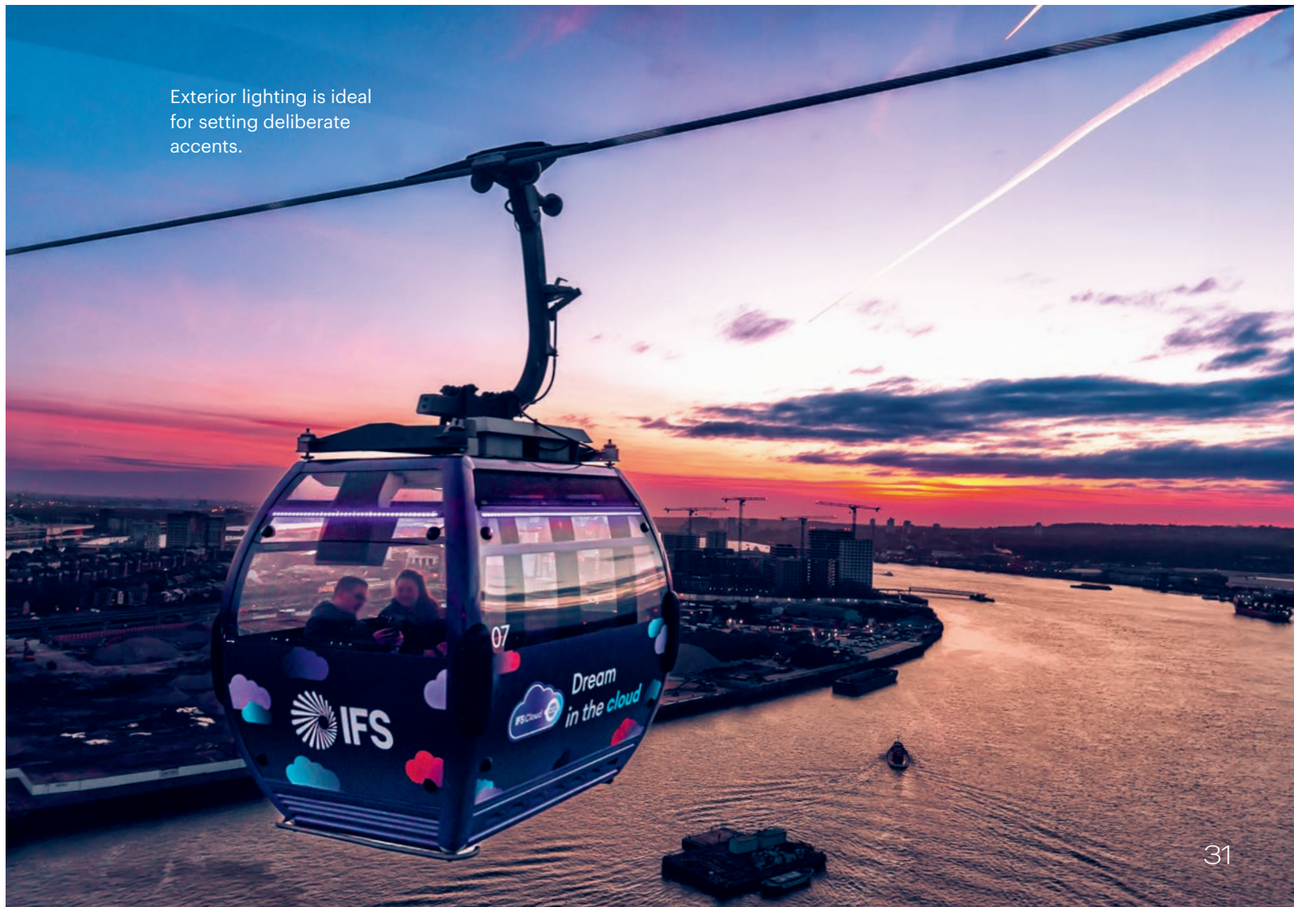
Illuminates the boarding and disembarkation area during darkness.



Lighting under seat bench

For glare-free views during nighttime trips.

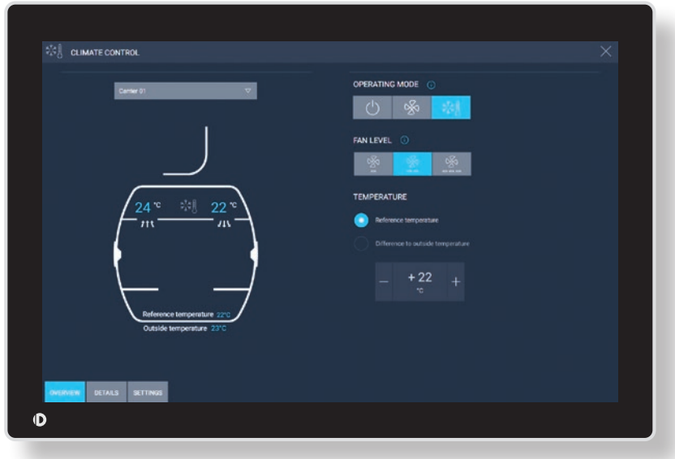
A feel-good space



Exterior lighting is ideal for setting deliberate accents.

Ventilation and air-conditioning

A well-ventilated or air-conditioned cabin significantly enhances ride comfort. The choice of ventilation concept is always based on the location and the ropeway system.



For a comfortable ropeway experience

Active ventilation

Active ventilation in the ceiling guarantees constant, uniform ventilation throughout the cabin. The fins are flush-fitted inside the air vents and blend in perfectly with the ceiling. In combination with a hopper window, the cabin can be actively supplied with fresh air.

Air-conditioning

Air-conditioning ensures pleasant temperatures inside the cabin at all times. It has cooling and heating functions, and is recommended for tricable gondola systems in particular, where a wheel carriage generator can be used. The air-conditioning unit is mounted on the roof and therefore does not restrict passenger space inside the cabin.

With Connect, the air-conditioning can be run at three different speeds or in automatic mode. The temperature inside the cabin is monitored. The air-conditioning can be controlled for individual cabins, for selected cabins as a group or for all cabins simultaneously.

Seat and window heating

ATRIA and STELLA

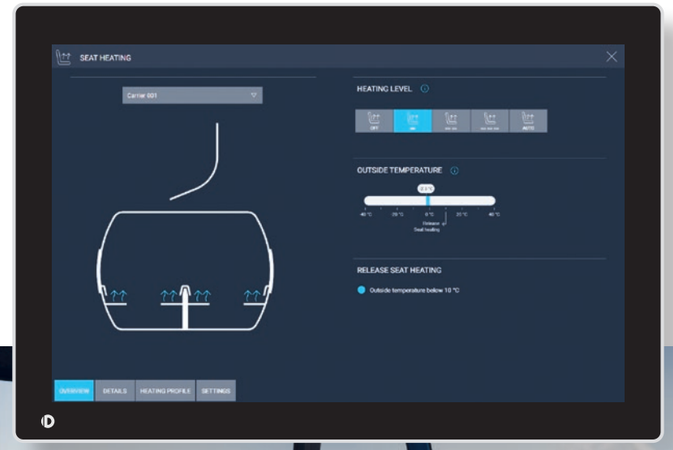
Window heating prevents icing and fogging – so that your guests can enjoy a perfect view of the surroundings at all times. Heated seats ensure a comfortable ride experience, even in cold temperatures.

The power required for permanent seat and window heating is provided by wheel carriage generators. Detailed settings are performed by means of heating profiles in Connect.

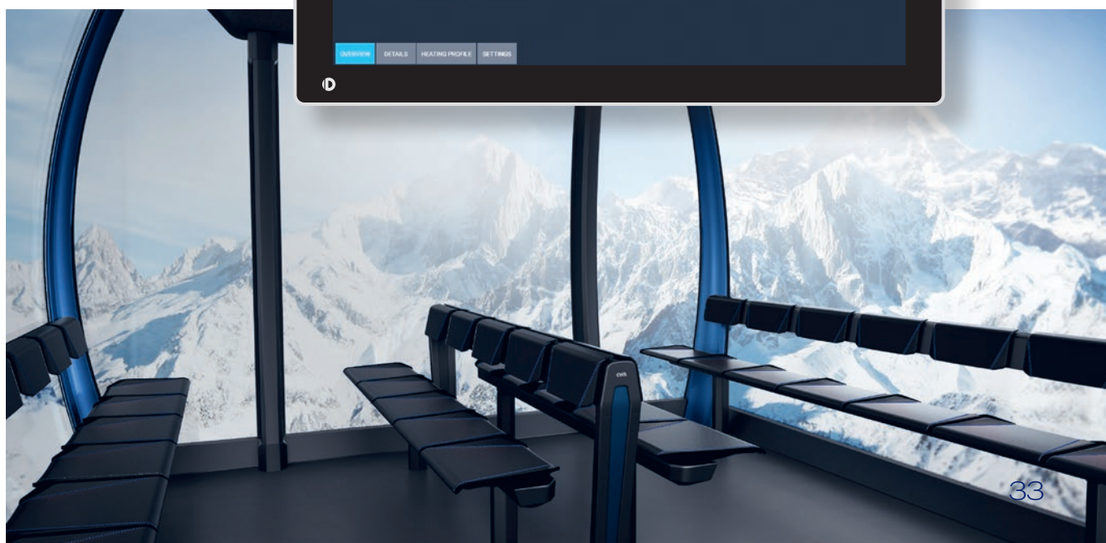
Seat and window heating can also be configured with the Connect for individual cabins, all cabins or for selected cabins as a group. In addition, indoor and outdoor temperatures are displayed on the monitor.

OMEGA V

On monocable gondolas, the seat heating is powered as the cabin transits through the station. The heat produced ensures a lasting feeling of cozy warmth during the trip.



Window heating for ATRIA and STELLA cabins is only available if real glass is used.



Cabin occupancy detection

Comfort and functionality go hand in hand in the case of cabin occupancy detection. RGB interior lighting and screens in front of the boarding area indicate to passengers and ropeway crew which cabins are free and which are occupied. This is made possible by a camera inside the cabin.

In addition to the exceptional convenience, this feature offers additional benefits in the event of an installation malfunction. Situational access to the camera ensures that personnel know how many people are present in which cabin. An emergency mode of the RGB lighting can also be useful in the event of an evacuation operation in poor visibility.

Occupancy status is indicated to passengers by screens as well as RGB lighting in the cabins.

Power on
the move for
your guests

Charging solutions for mobile devices

USB charging point

Passengers can use the USB charging point to charge their cell phones, cameras, portable speakers or other electronic devices via cable during the trip.

Inductive charging station

Smartphones can be charged wirelessly using the inductive charging station, which is fitted to the optional handrail.

A win-win situation
thanks to an additional
touchpoint.

Wi-Fi for passengers

With public Wi-Fi, passengers enjoy the comfort of stable internet access. Visitors from abroad in particular save on possible high roaming charges. In addition, operators or third parties can use the Wi-Fi homepage to display useful, up-to-the-minute and precisely localized information on tourist attractions and events. This touchpoint enables better knowledge of customers and helps to promote dialogue through targeted surveys, prize competitions and feedback opportunities.

Cabin display

This feature enables you to provide passengers with information or advertising content via a monitor in the cabin. Content administration is performed, for example, by the operator or an advertising partner through a web interface.

Audio concept

Location- and event-based announcements

A ride on a ropeway is an experience in its own right. It can also be used to enhance the destination's experiential concepts through informative and entertaining content. For example, entertaining audio tracks can be used to set the right mood for specific attractions.

Detailed event-related planning for individual cabins, cabin groups or for all cabins is also possible. For a particularly high-quality sound system, additional loudspeaker options in the cabin ceiling are available on request.

Connect Cabin option packages

A networked ropeway experience with Connect Cabin requires the appropriate control technology infrastructure (MCCU) in the cabin. We think solutions in terms of functionality and cost-effectiveness – for the benefit of our customers. That's why we offer different option packages that allow the infrastructure to be specifically aligned with individually planned cabin functions. The packages Light to Premium therefore provide the technical basis for control of the associated cabin functions.

Light

- Prerecorded announcements

Basic

- Time- and location-dependent prerecorded announcements
- Entrance lighting (on/off)

Advanced

- Contains Basic package
- Intercom
- CCTV
- Indirect lighting under seat bench (on/off)
- Active ventilation
- Public Wi-Fi

Premium

- Contains Advanced package
- Cabin occupancy
- Ceiling lighting
- Exterior lighting (on/off)
- RGB lighting
- Seat heating
- Window heating
- Air-conditioning
- Cabin Display
- Audio concept

On-board power supply

In the parking system, during station transit or during the trip

The best suited form of power supply will depend on the type of installation and environmental conditions.

While a tricable system offers the possibility of power generation by means of a carriage wheel generator, monocable systems rely on power modules.

A power module supplies energy to the cabin when the ropeway is in operation. When selecting the right module capacity, the electric consumption is calculated on the basis of the installed functions. Charging is by means of a socket on the cabin, by power rails during station transit, or additionally using solar panels.

The power supply status can be checked in the Connect ropeway control system and, with Connect Cabin, it can actually be monitored in real time and for specific cabins. This includes, for example, the generator capacity, the battery voltage, the charge and battery temperature.

Individual solutions

Type	Carriage wheel generator (tricable gondolas only)	Power module			
Component	1-8 generators	High-performance capacitor / battery	Battery (small)	Battery (medium)	Battery (large)
Capacity	500 W per generator in 24h-operation	80 W in 24h-operation	400 Wh	800 Wh	9,600 Wh
Charging	Power during the trip and from buffer when stationary	Charging via power rail during operating hours	Charging out of operating hours in the parking system by means of socket on cabin or power rail	Charging out of operating hours in the parking system by means of power rail	During and out of operating hours by means of power rail
Other	No charging required out of operating hours	No charging required out of operating hours	Additional charging via solar panels possible	Additional charging via solar panels possible	Additional charging via solar panels possible

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