



**HIRSCHMANN**

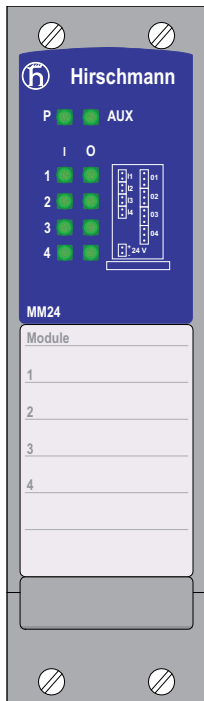
A **BELDEN** BRAND

# Operating instructions

## Installation

Industrial ETHERNET Switch

MICE Digital I/O Module MM24



MM24  
Release 01 04/11

Technical Support  
HAC.Support@Belden.com

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You can get the latest version of this manual on the Internet at the Hirschmann product site ([www.beldensolutions.com](http://www.beldensolutions.com)).

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# Safety instructions

This documentation contains instructions which must be observed to ensure your own personal safety and to avoid damage to devices and machinery.

## ■ Certified usage

The device may only be employed for the purposes described in the catalog and technical description, and only in conjunction with external devices and components recommended or approved by the manufacturer. The product can only be operated correctly and safely if it is transported, stored, installed and assembled properly and correctly. Furthermore, it must be operated and serviced carefully.

## ■ Supply voltage

For safety reasons the devices have been designed to operate at low voltages. Thus, they may only be connected to the supply voltage connections and to the signal contact with SELV circuits with the voltage restrictions in accordance with IEC/EN 60950-1.

The supply voltage is electrically isolated from the housing.

Use undamaged parts.

Relevant for North America:

The device may only be connected to a supply voltage of class 2 that fulfills the requirements of the National Electrical Code, Table 11(b). If the voltage is being supplied redundantly (two different voltage sources), the combined supply voltages must fulfill the requirements of the National Electrical Code, Table 11(b).

Relevant for North America: For use in Class 2 circuits.


Only use copper wire/conductors of class 1, 75 °C (167 °F).

Relevant for North America

for devices certified for hazardous locations:

Power, input and output (I/O) wiring must be in accordance with Class 1, Division 2 wiring methods [Article 501-4(b) of the National Electrical Code, NFPA 70] and in accordance with the authority having jurisdiction.

Relevant for Europe:

Products that are installed in explosive gas atmospheres according to ATEX RL 94/9 EG must have a device label with the identifier  II 3G Ex ... For this product:

The product must be mounted in a suitable IP 54-certified housing – tested to 4 J impact to minimize the risk of mechanical damage.

## ■ Housing



### WARNING

#### **ELECTRIC SHOCK**

Never insert any pointed objects (small screwdrivers, wires, etc.,) into the product!

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**



### CAUTION

#### **OVERHEATING OF THE DEVICE**

When installing the device, ensure that the ventilation slots are not covered.

**Non-adherence to these instructions can lead to minor physical injury or material damage.**

Only technicians authorized by the manufacturer are permitted to open the housing.

The lower panel of the device is grounded by means of the DIN rail and optionally by means of the separate ground screw.

- The ventilation slots must not be covered to promote free air circulation.
- The clearance to the ventilation slots of the housing must be at least 10 cm (3.94 in).
- Make sure that the electrical installation meets local or nationally applicable safety regulations.
- If installed in a living area or office environment, the device must be operated exclusively in switch cabinets with fire protection characteristics according to EN 60950-1.

## ■ Environment

The device may only be operated at the specified ambient temperatures (temperature of the ambient air at a distance of up to 5 cm from the device) and at the specified humidity.

- Install the device in a location where the climatic limit values specified in the technical data are not exceeded.
- The device may only be used in environments with the pollution degrees not exceeding the values specified in the technical data.

- **Qualification requirements for personnel**  
Qualified personnel as understood in this manual and the warning signs, are persons who are familiar with the setup, assembly, startup, and operation of this product and are appropriately qualified for their job. This includes, for example, those persons who have been:

- ▶ trained or directed or authorized to switch on and off, to ground and to label power circuits and devices or systems in accordance with current safety engineering standards;
- ▶ trained or directed in the care and use of appropriate safety equipment in accordance with the current standards of safety engineering;
- ▶ trained in providing first aid.

- **General safety instructions**

Electricity is used to operate this equipment. Comply with every detail of the safety requirements specified in the operating instructions regarding the voltages to apply (see [page 4](#)).

Non-observance of these safety instructions can therefore cause material damage and/or serious injuries.

- Only appropriately qualified personnel should work on this device or in its vicinity. These personnel must be thoroughly familiar with all the warnings and maintenance procedures in accordance with this operating manual.
- The proper and safe operation of this device depends on proper handling during transport, proper storage and assembly, and conscientious operation and maintenance procedures.
- Never start operation with damaged components.
- Only use the devices in accordance with this manual. In particular, observe all warnings and safety-related information.
- Any work that may be required on the electrical installation may only be carried out by personnel trained for this purpose.

- **National and international safety regulations**

- Make sure that the electrical installation meets local or nationally applicable safety regulations.

- **ESD Guidelines**

The media modules MM2-2FXP4 and MM3-4FXP4 contain components highly sensitive to electrostatic fields. These components can be easily destroyed or have their lives shortened by an electrical field or by a discharge caused by touching the contacts. You can find more information about devices vulnerable to electrostatic fields in DIN EN 61340-5-1 (2001-08) and DIN EN 61340-5-2 (2002-01).

■ CE marking

The devices comply with the regulations contained in the following European directive(s):

2004/108/EG

Directive of the European Parliament and the council for standardizing the regulations of member states with regard to electromagnetic compatibility.

In accordance with the above-named EU directive(s), the EU conformity declaration will be at the disposal of the relevant authorities at the following address:

The product can be used in living areas (living area, place of business, small business) and in industrial areas.

▶ Interference immunity: EN 61000-6-2:2005

▶ Emitted interference: EN 55022:2006 + A1:2007 Class A

**Warning!** This is a class A device. This device can cause interference in living areas, and in this case the operator may be required to take appropriate measures.

■ FCC note:

This device complies with part 15 of FCC rules. Operation is subject to the following two conditions : (1) This device may not cause harmful interference; (2) this device must accept any interference received, including interference that may cause undesired operation.

Appropriate testing has established that this device fulfills the requirements of a class A digital device in line with part 15 of the FCC regulations.

These requirements are designed to provide sufficient protection against interference when the device is being used in a business environment.

The device creates and uses high frequencies and can radiate same, and if it is not installed and used in accordance with this operating manual, it can cause radio transmission interference. The use of this device in a living area can also cause interference, and in this case the user is obliged to cover the costs of removing the interference.

■ Recycling note

After usage, this product must be disposed of properly as electronic waste, in accordance with the current disposal regulations of your county, state and country.

# Legend

The symbols used in this manual have the following meanings:

▶	Listing
□	Work step
■	Subheading



# 1 Description of the modules

The MICE Digital I/O Module MM24 supplementary module for switches of the (Power)MICE family has been developed for industrial applications. The MM24 module comprises 4 electrically insulated digital inputs and outputs in accordance with industrial standard EN 61131-2. Via these inputs, the module receives and transmits digital sensor signals. The digital outputs allow the control of different actuators of the system.

Sensors, actuators and other components are supplied with +24 VDC via an electrically insulated output.

The MM24 devices are designed for the special requirements of industrial automation. They meet the relevant industry standards, provide very high operational reliability, even under extreme conditions, and also long-term reliability and flexibility.

The devices work without a fan.

Mount the devices by

- ▶ Simply pushing them onto the backplane of a (Power)MICE chassis.

There are a number of convenient options for managing the device.

Administer your devices via:

- ▶ a Web browser
- ▶ Telnet
- ▶ management software (e.g. HiVision)
- ▶ a V.24 interface (locally on the Switch)

**Note:** For further information about the administration see reference guide "Web-based Interface" (release 7.0 or higher)

For a detailed description of the (Power)MICE chassis as well as other information please refer to the following sources:

- ▶ "Installation Industrial ETHERNET Switch Power MICE" user manual
- ▶ "Installation Industrial ETHERNET Switch Power MICE MS20/MS30" user manual
- ▶ "Basic Configuration" user manual
- ▶ "Redundancy Configuration" user manual
- ▶ "Web-based Interface" reference guide
- ▶ "Command Line Interface" reference guide

## 2 Assembly and start-up

The MM24 modules have been developed for use under harsh industrial conditions. The installation process is correspondingly simple.

On delivery, the module is ready for operation.

The following thematic sequence of installation of the module has proven itself in practice:

- ▶ Unpacking and checking
- ▶ Filling out and attaching labels
- ▶ Connecting the sensors and actuators
- ▶ Installing the MM24 modules

### 2.1 Installing the device

#### 2.1.1 Unpacking and checking

- Check that the contents of the package are complete ([see page 19 “Scope of delivery”](#)).
- Check the individual parts for transport damage.

#### 2.1.2 Filling out and attaching labels

The labels included in the delivery help you to organize your network installation clearly.

The large label areas enable you to designate the modules and uniquely assign the devices to be connected. You can print them, write on them and replace them at any time.



Figure 1: Attaching the labels

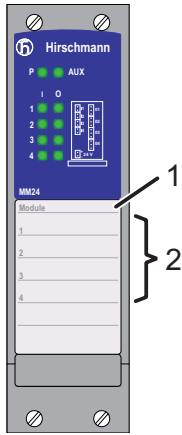


Figure 2: Marking the MM24 module:  
 1 – Module designation  
 2 – Module terminal assignment

- Attach the labels included in the delivery to the MM24 modules as required.

### 2.1.3 Install the MM24 modules

On delivery, the module is ready for operation.

You can install and remove MM24 modules during running operation.

- To install a MM24 module, first remove the protective cap from the connector.
- Connect the actuators and sensors ([see on page 14 “Connection of actuators and sensors”](#)).
- Push the MM24 module onto the backplane of the (Power)MICE chassis.
- Fasten the 4 screws at the corners of the MM24 module.

### 2.1.4 Grounding

The lower panel of the module housing is grounded via the DIN rail.

## 2.2 Pin assignment

On the bottom of the MM24 modules there are terminal blocks for the connection of the

- ▶ digital inputs (I)
- ▶ digital outputs (O)
- ▶ 24 VDC auxiliary voltage

The pin assignment is shown on the module front cover adjacent to the LEDs.

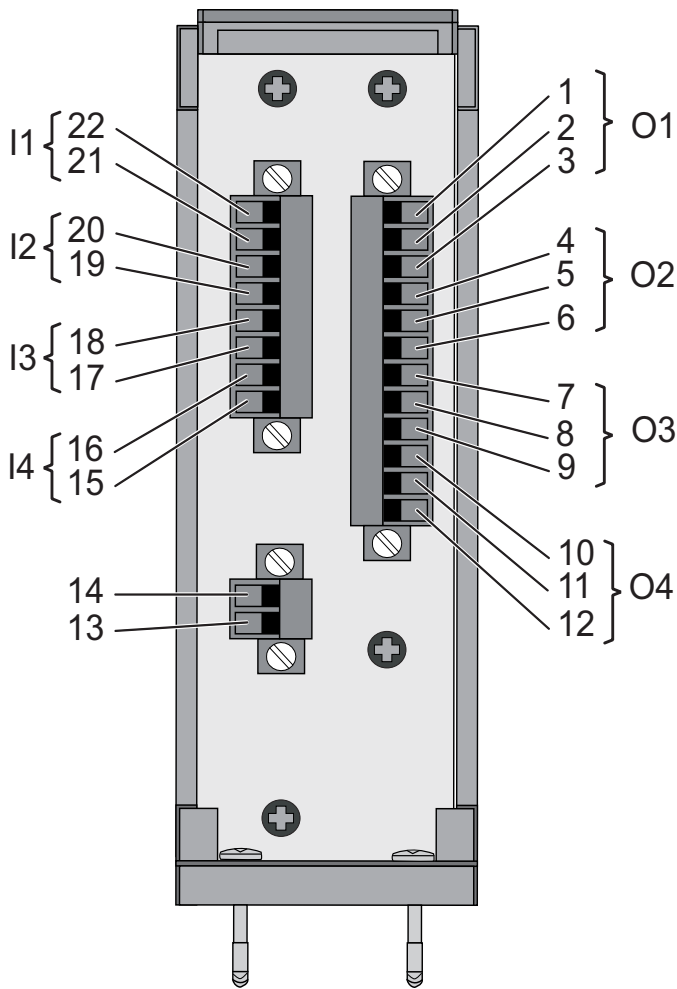


Figure 3: Terminal blocks for digital inputs and outputs as well as 24 VDC auxiliary voltage at MM24

## 2.2.1 Digital outputs

Pin	Signal, terminal	Function
1	OFF-1	NC contact, channel 1
2	CENTRE-1	Centre contact, channel 1
3	ON-1	NO contact, channel 1
4	OFF-2	NC contact, channel 2
5	CENTRE-2	Centre contact, channel 2
6	ON-2	NO contact, channel 2
7	OFF-3	NC contact, channel 3
8	CENTRE-3	Centre contact, channel 3
9	ON-3	NO contact, channel 3
10	OFF-4	NC contact, channel 4
11	CENTRE-4	Centre contact, channel 4
12	ON-4	NO contact, channel 4

*Table 1: Pin assignment of digital outputs*

## 2.2.2 24 VDC auxiliary voltage (AUX)

Pin	Signal, terminal	Function
13	AUX_GND	Reference potential
14	AUX_+24 V	Auxiliary voltage

*Table 2: Pin assignment for auxiliary voltage connection*

## 2.2.3 Digital inputs

Pin	Signal, terminal	Function
15	IN-4-GND	Reference potential, channel 4
16	IN-4	Signal input, channel 4
17	IN-3-GND	Reference potential, channel 3
18	IN-3	Signal input, channel 3
19	IN-2-GND	Reference potential, channel 2
20	IN-2	Signal input, channel 2
21	IN-1-GND	Reference potential, channel 1
22	IN-1	Signal input, channel 1

*Table 3: Pin assignment of digital inputs*

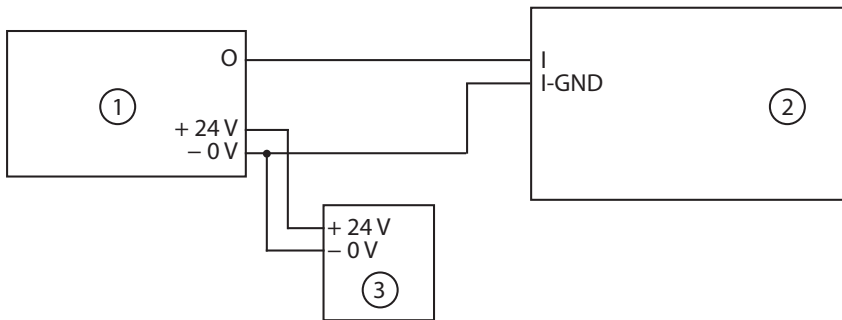
## 2.3 Connection of actuators and sensors

Actuators and sensors can be connected to the MM24 modules.

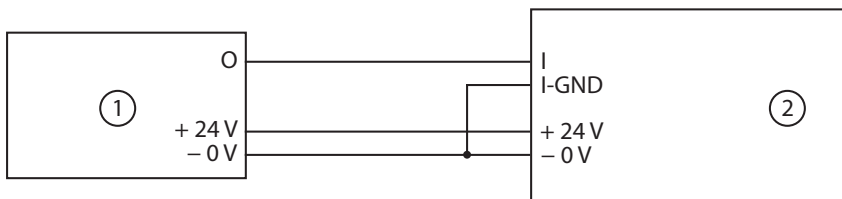
To connect an external device, proceed as follows:

- Release the terminal blocks for the digital inputs and digital outputs from the bottom of the module.
- Connect the digital outputs (see table 1) and digital inputs (see table 3) of the MM24 module as required.

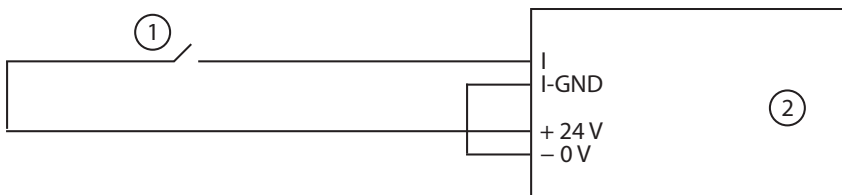
The following 3 connection configurations are possible:



*Figure 4: Connection of a sensor with separate voltage supply*  
1 - Sensor  
2 - MM24 module  
3 - Separate voltage supply for sensor



*Figure 5: Connection of a sensor with auxiliary voltage supply*  
1 - Sensor  
2 - MM24 module



*Figure 6: Circuit via auxiliary voltage supply*  
1 - Switch (2-wire sensor)  
2 - MM24 module

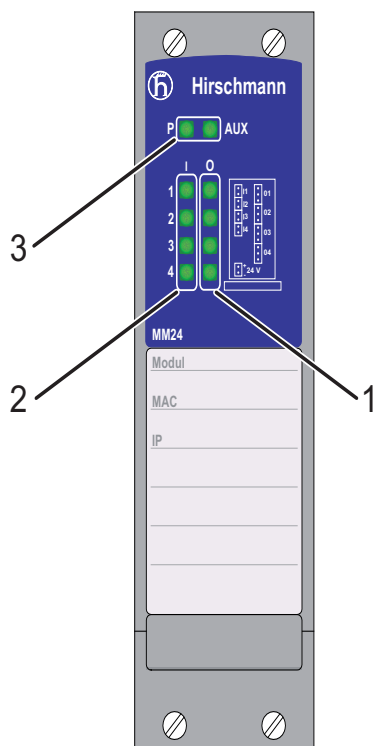
- If required, connect the 24 VDC auxiliary voltage (see table 2).

**Note:** Make sure not to exceed the maximum load.

- Push the terminal blocks back onto the module. Tighten the screws on the terminal blocks.
- By connecting the supply voltage via the terminal block or the terminal blocks, respectively, to the (Power)MICE chassis, the MM24 module is set into operation.

## 2.4 Display elements

After the operating voltage is set up, the software starts and initializes itself.



*Figure 7: Indicator elements at the MM24 module*  
1 – Output signals  
2 – Input signals  
3 – Device status

- Output signal (O)  
Each MM24 module has one LED per output signal.

<b>O1, O2, O3, O4 - output, status of digital output (1 green/yellow LED each)</b>	
Steady green	Signal output active - relay contact activated (operating status)
Steady yellow	Signal output active - relay contact deactivated (idle status)
Flashes yellow	Signal output active – signal output not accessible
No light	Signal output not active

- Input signal (I)  
Each MM24 module has one LED per input signal.

<b>I1, I2, I3, I4 - input, status of digital input (1 green LED each)</b>	
Steady green	Signal input active - high level
Steady yellow	Signal input active - low level
No light	Signal input not active

- Device status (P, AUX)  
These LEDs indicate conditions affecting the operation of the complete module.

<b>P - Power, status of system voltage (green LED)</b>	
Steady green	Internal supply voltage present
No light	Internal supply voltage is too low

<b>AUX - Auxiliary power, status of auxiliary voltage (green LED)</b>	
Steady green	Output for auxiliary voltage is switched on
No light	Output for auxiliary voltage is switched off

## 2.5 Disassembly

- Removing the module  
To remove the module from the backplane of the (Power)MICE chassis, proceed as follows:
  - Remove the 4 screws at the corners of the MM24 module.
  - Pull the module off the (Power)MICE backplane.



## 3 Technical data

### ■ General technical data

Dimensions W x D x H		40 mm × 135 mm × 120 mm
Weight		270 g
Connection length		30 m
Connection type	Input	Terminal block, 8-pin
	Output	Terminal block, 12-pin
	Auxiliary voltage	Terminal block, 2-pin
Insulation voltage	Input to housing	500 VDC
	Output to housing	500 VDC
	Auxiliary voltage to housing	470 VDC (1 mA).
Operating temperature	Standard	0 °C ... +60 °C
	Extended	-40 °C ... +70 °C
Environment	Storage temperature	Ambient air: -40 °C ... +85 °C
	Humidity	10 % to 95 % (non-condensing)
	Air pressure during operation	up to 2000 m (795 hPa)
	Air pressure during storage	up to 4000 m (620 hPa)
Protection class		IP20

### ■ Auxiliary voltage (AUX)

Output voltage range	+24 VDC ... +27 VDC
Maximum output power	3 W
Short-circuit protection	yes (electronically)
Under-voltage deactivation	Yes

### ■ Digital input

Operating voltage range	-32 VDC ... +32 VDC
Nominal input voltage	+24 VDC
Input voltage, low level, status "0"	-0.3 VDC ... +5 VDC
Input voltage, high level, status "1"	+11 VDC ... +30 VDC
Maximum input current at nominal input voltage	15 mA
Permissible closed-circuit current for 2-wire sensors	1.5 mA
Input characteristic acc. to IEC 61131-2 (current-consuming)	Type 3

## ■ Digital output

Maximum operating voltage range	60 VDC 30 VAC
Maximum current load of relay contacts and terminals	1 A
Maximum switching frequency	1 Hz
Relay type	Changeover
Contact voltage	isolated
Protective circuit of relay contacts	No
Digital output acc. to IEC 61131-2 (current-consuming)	Yes

## ■ EMC and immunity

<b>EMC compliance – EN 61000-6-2:2005 EMI TYPE tests, test acc. to:</b>		
IEC/EN 61000-4-2	Electrostatic discharge	
	Contact discharge	4 kV
	Air discharge	8 kV
IEC/EN 61000-4-3	Electromagnetic field	
	80 - 3,000 MHz	10 V/m
IEC/EN 61000-4-4	Fast transients (burst)	
	Power line	2 kV
	I/O Power Line (AUX)	2 kV
	Data Line (I/O)	1 kV
IEC/EN 61000-4-5	Voltage surges	
	Power line, line / line	1 kV
	Power line, line / earth	2 kV
	Data Line (I/O)	2 kV
IEC/EN 61000-4-6	Line-conducted interference voltages	
	150 kHz - 80 MHz	10 V
<b>Stability</b>		
Vibration	IEC 60068-2-6 Test FC test level according to IEC 61131-2	Yes
Shock	IEC 60068-2-27 Test Ea test level according to IEC 61131-2	Yes

## ■ Product code

The product code of your MM24 module is made from combining the required product characteristics (column "Designation") in accordance with the following table.

Example: Product code MM24-IOIOIOIOSZ = MM24 module with 4 I/O ports, temperature range 0 °C to +60 °C and CE certification.

Item	Characteristic	Designation	Property
1 to 4	Product	MM24	MICE Digital I/O Module MM24
5	- (hyphen)	-	
6 to 7	1. port (medium/connector)	IO	IO port
8 to 9	2. port (medium/connector)	IO	IO port
10 to 11	3. port (medium/connector)	IO	IO port
12 to 13	4. port (medium/connector)	IO	IO port
14	Temperature range	S	Standard: Operation from 0 °C to +60 °C
		T	Extended: Operation from -40 °C to +70 °C
		E	Extended: Operation from -40 °C to +70 °C with Conformal Coating
15	Certifications	Z	CE

Table 4: Product code MICE Digital I/O Module MM24

### ■ Scope of delivery

Device	Scope of delivery
MICE Digital I/O Module MM24	MM24-IOIOIOIOxxxx module ML-MS2/MM labels Description and operating instructions Return note

### ■ Accessories

Designation	Order number
Pocket Guide	280 710-851
ML-MS2/MM labels	943 767-001

### ■ Underlying norms and standards

Designation	
EN 61000-6-2:2005	Generic norm – immunity in industrial environments
EN 61000-6-4:2007	Generic norm – emitted interference in industrial environments
EN 55022:2006 + A1:2007	IT equipment – radio interference characteristics
EN 61131-2:2008	Programmable logic controllers
FCC 47 CFR Part 15:2009	Code of Federal Regulations

Table 5: List of based specifications and standards. Certified devices are marked with a certification identifier.

### ■ Certifications

The device has a certification based on a specific standard only if the certification indicator appears on the housing.

However, with the exception of Germanischer Lloyd, ship certifications are only included in the product information under

[www.beldensolutions.com](http://www.beldensolutions.com).



# A Further Support

## ■ Technical Questions and Training Courses

In the event of technical queries, please contact your local Hirschmann distributor or Hirschmann office.

You can find the addresses of our distributors on the Internet:

[www.beldensolutions.com](http://www.beldensolutions.com).

Our support line is also at your disposal:

▶ Tel. +49 1805 14-1538

▶ Fax +49 7127 14-1551

Answers to Frequently Asked Questions can be found on the Hirschmann internet site ([www.beldensolutions.com](http://www.beldensolutions.com)) at the end of the product sites in the FAQ category.

The current training courses to technology and products can be found under <http://www.hicomcenter.com>.

## ■ Hirschmann Competence Center

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- ▶ Training offers you an introduction to the basics, product briefing and user training with certification.
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