TURCK

Industrial Automation

BL ident® – MODULAR RFID SYSTEM

BL ident® modular RFID system – HF/UHF

The company

The company

TURCK is one of the leading manufacturers in industrial automation. With more than 3.200 employees in 27 countries as well as sales partners in further 60 states, we are always close to you. As a specialist in sensor, fieldbus, connection and interface technology and also human-machine interfaces (HMI) and RFID, we offer efficient solutions for factory and process automation. With our state-of-the-art production facilities in Germany, Switzerland, the USA, Mexico and China we, as a family-owned company, are able to react quickly and flexibly to the demands of local markets.

The product portfolio

Whether for machine & system engineering, the automotive sector, transport & handling, food & beverage or for chemical and pharmaceutical industries. But this is not all! Our efficiently standardized products help you to cut down on costs for purchase, storage, installation and operational safety. You get the best solutions for your automation lines. This is possible thanks to the industry-specific knowledge we have acquired in close cooperation with our customers and through continuous further development of electronics and production on the highest level.

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Our service

With nearly 50 years of experience and extensive know-how, we support you in each phase of the project, from a first analysis up to tailor-made solutions and commissioning of your application. We aim at enhancing the efficiency and productivity of your production processes and machines continuously. With the excellent quality of our products, the support of our specialists and our fast delivery service, your systems will always run to the highest possible capacity.

The product data base

Whether software tools for programming, configuration or commissioning support, our data sheets or CAD data are available in 80 export formats. Our website www.turck.com helps you to find products and solutions fast, seven days a week, at any place worldwide and in nine different languages. You have access to nearly all products and solutions – clearly structured, completely documented and free for download.

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BL ident® modular RFID system – HF/UHF

Both technologies, proven interference immune HF and long range UHF are combined in one identification solution, in *BL ident*® the modular RFID system. Even in harsh industrial environments and with data exchange on-the-fly you achieve noticeably longer ranges. *BL ident*®, the all-in-one system, offers data carriers, read/write heads, connection technology and interfaces (complete sets with gateway and pluggable RFID modules), that can be combined in any way required. The I/O systems BL67 (field application), BL20 (cabinet mounting) and *BL compact* (field application) are the basic components of the modular concept. Fieldbus interfaces for PROFIBUS-DP, DeviceNet™, EtherNet/IP, EtherCAT® , PROFINET IO and Modbus TCP are available.

How do I find the right solution for my application?

The **Overview** in chapter one informs about construction, system integration and application areas of the *BL ident*® system. Information on the combination possibilities of *BL ident*® modules can be obtained from the chapters „Read/write heads and data carriers“. **Type codes** and **Tables** include details about the device types and technical features and are to be found in all chapters. Should you already know the type code or the ID number of a sensor, please refer to the **Type index** on page 124. It guides you to the desired product. You find a **QR-Code** on the first page of each chapter. It will guide you directly to our online product database with detailed information on the product groups of your choice.

BL ident® modular RFID solution

Scan the QR code to access our products on the internet

BL ident® modular RFID system – HF/UHF

BL ident® is an all-in-one RFID system designed for industrial applications. The I/O systems BL67 (field application), BL20 (cabinet mounting) and *BL compact* (field application) are the basic components of the modular concept.
Whether deployed in production control, logistics or automation processes: You can use both technologies, interference immune HF (13.56 MHz, ISO 15693) and long range UHF (865…928 MHz country-specific, ISO 18000-6C/EPCglobal Class 1 Gen 2) in one identification solution, in *BL ident*® the modular RFID system from TURCK. No matter if applied in harsh industrial environments or data exchange on-the-fly, you achieve considerably longer ranges.
Data carriers, read/write heads, connection technology and interfaces (gateway and RFID electronic modules) can be combined to a customized *BL ident*® solution. You can choose from extremely fast and almost infinitely writable FRAM data carriers, but also from high-temperature versions for paint-spray lines that resist up to +240 °C. *BL ident*® can be integrated in existing system configurations via gateways which are available for all standard fieldbus protocols.
The system has a very long service life because it operates wear-free and contactless. It is insensitive to temperature fluctuations, dirt, water and oils. *BL ident*® is a future-proof investment and interoperable, thanks to the open and worldwide applied standards *BL ident*® – Use the advantages of HF and UHF combined in one RFID solution!

Our strengths

HF and UHF – Parallel operation

You can use both technologies, interference immune HF (13.56 MHz, ISO15693) and long range UHF (865…928 MHz, ISO 18000-6C/EPCglobal Class 1 Gen 2) in one identification solution, in *BL ident*® the modular RFID system from TURCK. Even in harsh industrial environments and with data exchange on-the-fly you can control your systems seamlessly across greater distances with RFID. HF and UHF read/write heads can be connected and operated at the same interface. No matter what technology you use, one function block provides identical control functionality for both types.

Modular system

Each *BL ident*® system can be customized to fit in your application and it can also be extended at a later stage if required. Up to 16 read/write heads can thus be connected to a bus node. Additional sensors and actuators can be connected by simply adding further I/O modules. The product range features IP69K rated components for very demanding applications with many different data carriers and read/write heads as well as extendible IP20/IP67 interfaces (gateways and RFID modules) that are easily connected to the control environment and for which many matching extension cables are available. *BL ident*® is thus quickly and flexibly integrated in existing topologies even under demanding application conditions.

Long ranges with highspeed data transmission

Read/write ranges of up to one meter in the HF range and several meters in the UHF range are possible. The *BL ident*® data carriers with FRAM memory guarantee fast 0.5 ms/byte transmission. The data carriers can be read and written on the fly – the FRAM data carriers up to 10^{10} times. TURCK *BL ident*® interface sets with CODESYS programmable gateways (acc. to IEC 61131-3) transmit the process relevant data quickly to the control system.

For all application areas

BL ident® has the right data carrier for every application – extremely small ones (Ø 7.5 mm), devices with FRAM memory for max. 8 kbyte highspeed reading and many writing cycles, thermostable data carriers for max. 240 °C and data carriers for direct mounting on metal or in Ex-areas. Customized solutions are also possible, thanks to the open and worldwide applied standards (ISO 15693 and ISO 18000-6C)

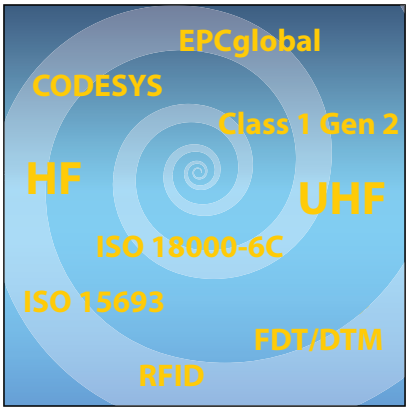
Flexibly connected to the system

BL ident® interfaces (gateway and RFID modules) in IP20 and IP67 connect the RFID system to the control system. All standard protocols are possible, PROFIBUS-DP, EtherNet/IP™, Modbus TCP, DeviceNet™, PROFINET IO, CANopen und EtherCAT® . For complex applications use the programmable gateways. They are the right choice for peripheral and independent control tasks. For simple I/O communication use the RFID modules from our portfolio. They are quickly integrated just like I/O modules without any control and programming effort involved. In combination with ready-made *BL ident*® extension cables you get more flexibility when connecting the read/write heads.

Application-optimized components

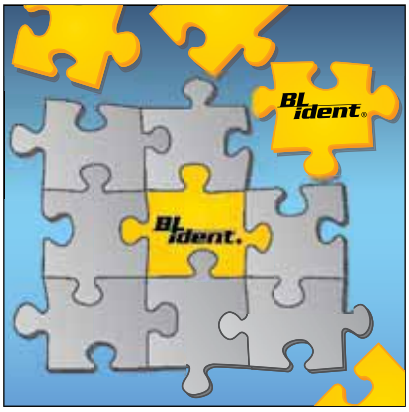
No matter what requirements the application may impose, *BL ident*® proofs its strengths especially in demanding environments. For example, the thermostable HF and UHF data carriers resist temperatures of up to 240 °C and can be used in paint-spray lines or autoclaves. Or read/write heads made for roller conveyors in intralogistics or for highspeed applications. Read/write heads and data carriers that are resistant to all common acid and alkaline cleaning agents are especially suited for Food & Beverage applications. ATEX approved components are available for process automation systems. *BL ident*® even offers the right solution for components that must be mounted on metal.

Your advantages



Future-proof investment

BL ident® can be adapted flexibly to new system demands. Additionally required read/write units are simply added by connecting further RFID modules to the available interface. Changing the fieldbus is no problem either. *BL ident*® is easily migrated to other fieldbuses by merely exchanging the gateway. Modules and read/write units can be used with all fieldbuses. Even changing the frequency band is easy with *BL ident*® . UHF and HF read/write heads can be connected to the same gateway and operated in parallel.
International standards (ISO 15693/ ISO 18000-6C) ensure global interoperability of the system and secures your future investments.

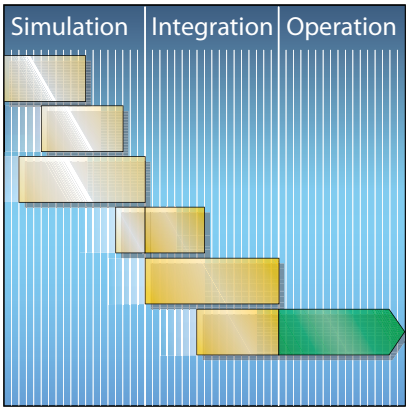


Maximum flexibility

Whatever the tasks are, with *BL ident*® you solve even complex jobs. The modular principle allows you to implement perfectly tailored RFID solutions without any compromise. Our product portfolio offers the right modules for any application. You can choose from data carriers (also called tags) in all shapes and sizes, for high-temperature applications or autoclaves as well as types for the food industry and the Ex-area. Moreover, we offer an extensive selection of read/write heads, rugged, rectangular and cylindrical types, as well as interfaces for all standard fieldbus systems. Use our tailor-made connection and fieldbus technology and our HMI solutions to integrate your RFID solution easily in your system.

Efficient production

With *BL ident*® you can adapted your production and assembly processes flexibly and fast to new demands. The RFID system from TURCK guarantees short changeover times to keep up with the required cycle times. In addition, RFID data carriers improve the transparency of production processes: Through maintenance reports written to the data carriers, preventive maintenance can be refined and parts can be replaced before they fail and provoke a system breakdown. All production relevant data is stored on the *BL ident*® data carriers, attached directly at the object. Different production locations can thus be linked. The supply chain management becomes transparent from production to logistics, thanks to the rugged and rewritable data carriers.

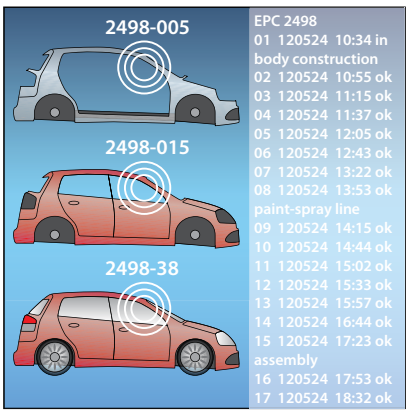


Fast implementation of projects

BL ident® enables you to implement projects fast thanks to highest possible modularity and flexibility. The air interfaces of different system setups can be simulated under customized conditions, before installing the hardware. For HF applications use the RFID simulator and for UHF use Ray-Tracer. You can check your RFID solution according to involved costs and efforts already in the planning stage and thus implement your project much faster. The advantage: Less time for piloting fosters quick return on investment (ROI) and this is essential for business success.

High availability

The rugged and modular *BL ident*® concept extends the service intervals and increases the availability of your system. If you wish to extend your system, you can plug and remove the electronic modules and the read/write heads in ongoing operation. Thanks to the rugged design, up to 8 kbyte of product-related data can be written to the data carriers during the production process and stored for up to 10 years. The gathered information helps you to assess possible interferences instantly and to improve the availability of your systems.



Automatic data collection and highest possible transparency

Whether used in industrial production, logistics or QA processes, with *BL ident*® from TURCK you cover the entire production process from start to end. All information is centrally available - no matter how rough the application environments are. The data carriers are mounted on products or containers where they identify intermediate and end production stages. The read/write heads can be mounted in many different ways. They read data before or after relevant production processes or at the end of the production chain. This provides more transparency and gives you the possibility to operate your plant highly efficient and to use the gathered data in many ways. The end product is delivered together with a QM protocol containing all the production steps.

System – Modular and flexible structu

BL ident® interfaces

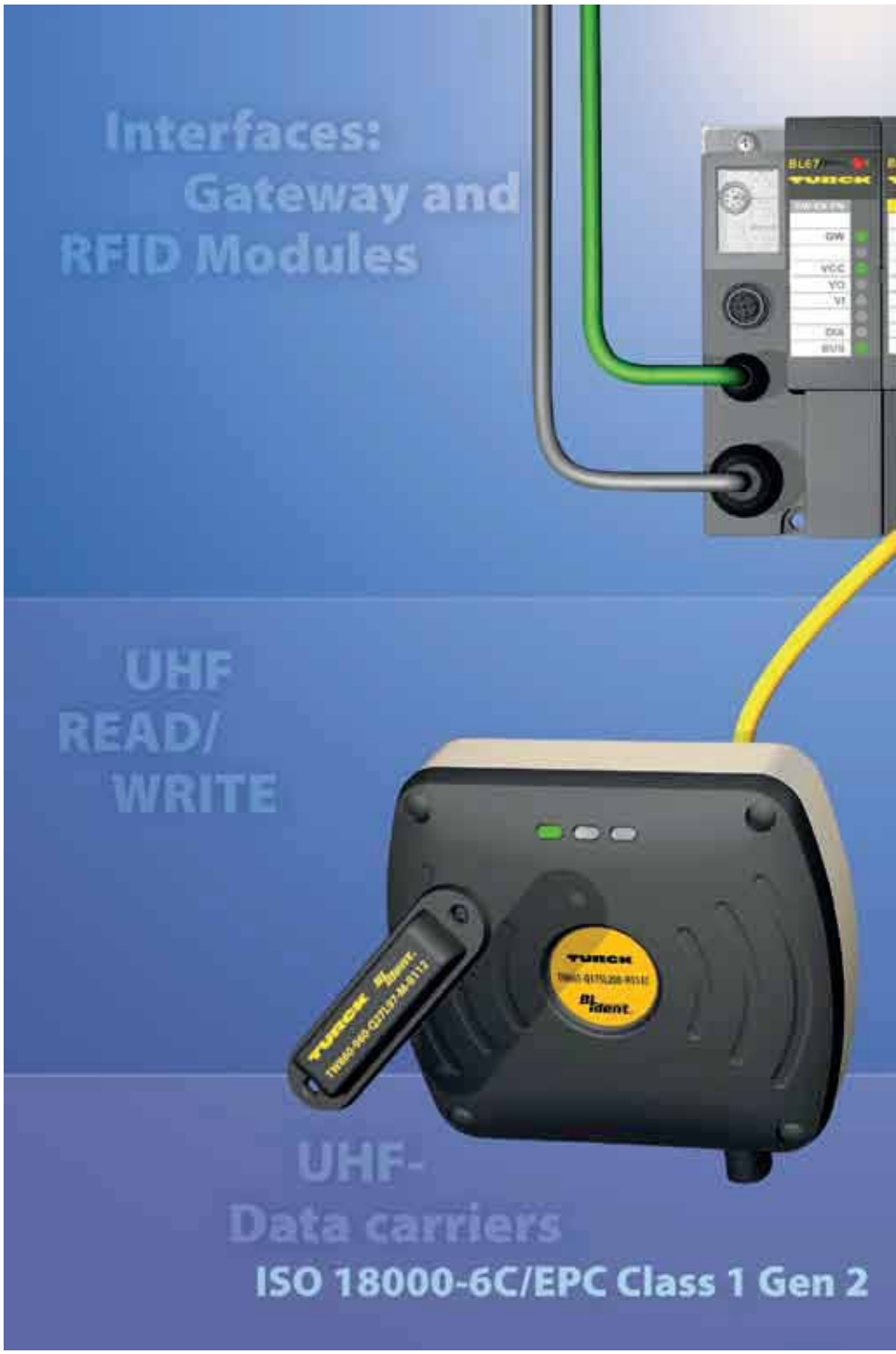
- Up to 16 channels per interface
- Cabinet installation (BL20)
- Field installation (BL67)
- Fieldbus connection for PROFIBUS-DP, DeviceNet™, CANopen, PROFINET IO, Modbus TCP, EtherNet/IP™, EtherCAT® CODESYS programmable gateways
- Additional compact fieldbus connections with RFID and I/Os for installation in the field (*BL compact*)
- Interfaces for Ex applications (BL20)

BL ident® read/write heads

- Fully encapsulated, rugged HF read/write heads, rectangular and cylindrical design
- UHF read/write heads designed for industrial use
- Read/write heads for the Ex-area (ATEX) and Food industry applications (Wash-Down, IP69K)
- HF (13.56 MHz) and
- UHF (865 to 928 MHz) devices
- Read/write ranges, 1 meter (HF) or several meters (UHF), depending on environment

BL ident® data carriers

- EEPROM data carriers with 128 byte memory, FRAM data carriers of up to 8 kbyte for high speeds and nearly unlimited write cycles
- High-temperature data carriers -40…+240 °C, depending on environment
- Data carriers for autoclaves, resist high-pressure steam jet cleaning at +121 °C
- Data carriers for direct mounting on metal
- Open, worldwide valid standards (ISO 15693 und ISO 18000-6C)
- Data carriers for use in Ex-areas



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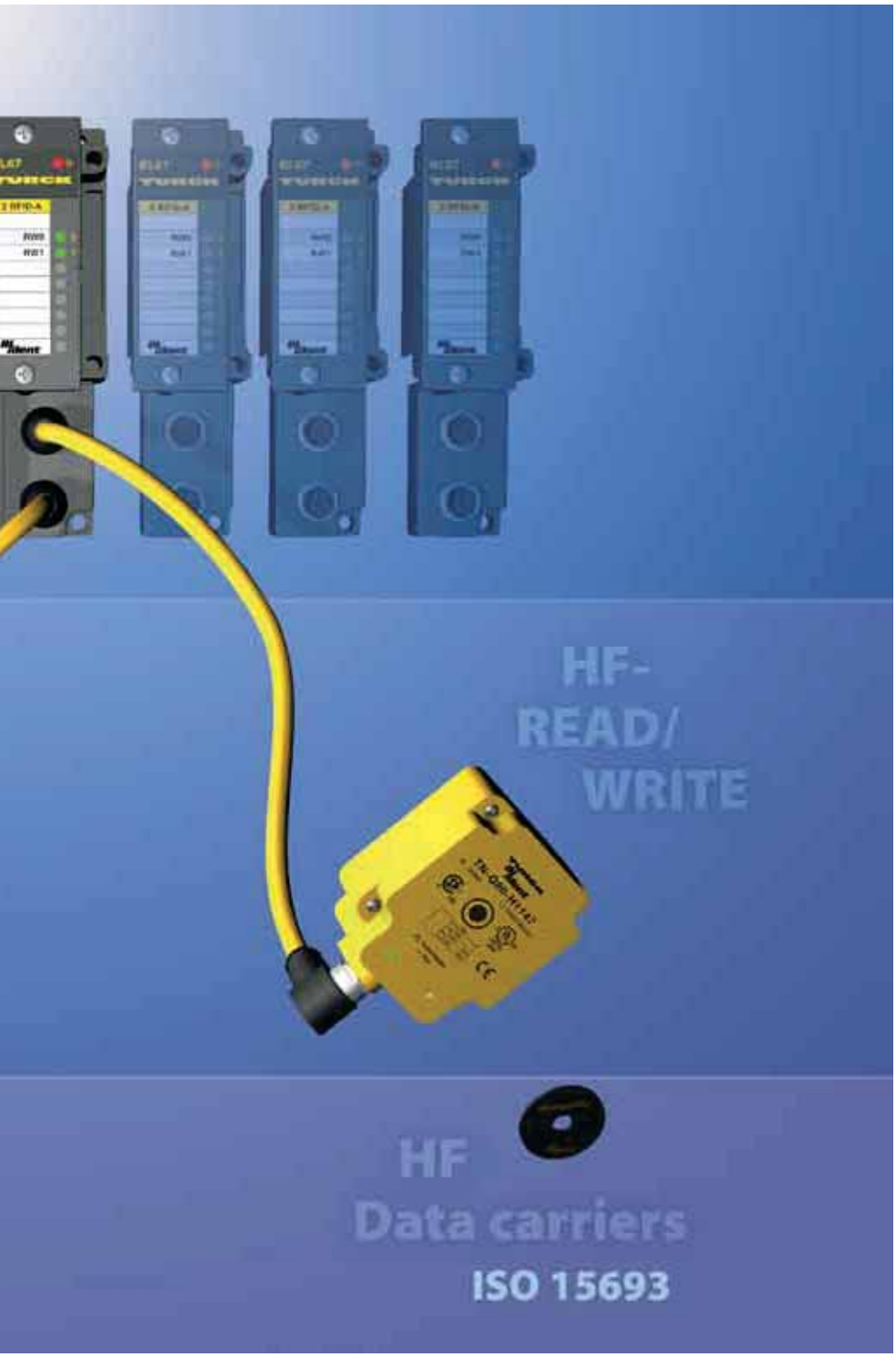
and flexible ure



BL ident® connectivity

- Ready-made fieldbus and power cables
- Connection accessories for bus and power supply
- Ready-made cables for connection of interface and read/write head
- Connection and extension cables for food applications
- Max. cable length to read/write head 50 m

BL ident® accessories

- Extensive range of accessories for exact fitting and easy mounting of read/write heads and data carriers
- Closure caps and housings provide extra protection against welding sparks
- Mobile HF and UHF handhelds for reading and writing of mobile data carriers; available with touch screen, Bluetooth, WLAN, barcode scanner and application software

System integration – Quick and easy

For all standard control systems

BL ident® is easily and flexibly connected to the control system via gateways. All standard industrial protocols are available, such as PROFIBUS-DP, DeviceNet™, EtherNet/IP, EtherCAT®, PROFINET IO and Modbus TCP. Connection to the fieldbus is established via *BL ident*® interfaces. They are obtainable as a set together with the gateway and one to four RFID modules. 2, 4, 6, 8 or 16 channels are possible per interface. More interface sets can subsequently be added. We offer RFID-S modules for simple I/O communication and RFID-A modules for more complex applications with function blocks (PIB). Our product portfolio also comprises the compact IP67 interfaces of the *BL compact* series for small spaces.

Peripheral RFID communication

BL20 and BL67 interfaces as well as CODESYS programmable gateways relieve the higher level control system. The gateways are easy to program and fulfill local control and diagnostic tasks. The local intelligence is very important for the handling of data and easy integration in the control environment. The Proxi Ident Block (PIB) which is needed for control tasks is operated via the programmable gateway.

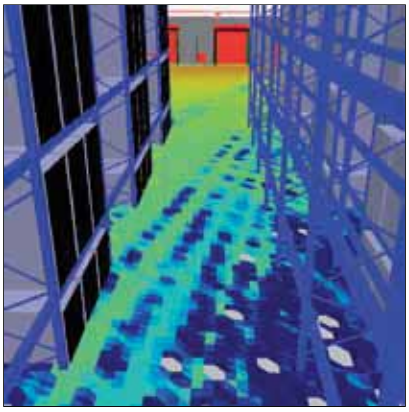
Easy I/O communication

Simple I/O communication needing no function blocks can be implemented with *BL ident*® solutions based on the 8-byte I/O modules BL20-2RFID-S and BL67-2RFID-S (S = simple RFID Interface). They reduce the programming effort considerably and allow you to connect *BL ident*® to all standard control systems without function block.

Quick and easy operation

BL ident® – HF-RFID simulator

General information on RFID components are simply not enough to choose the right components for your application. It is rather the complex interaction between read/write head and data carriers that delivers useful parameters such as data volume, speed and read-write distance. The *BL ident*® simulator helps you to simulate your application and to pre-select the required RFID-HF components. It allows you to „play" with values and to find out the possibilities and limits of different combinations. The simulator also generates the required technical documentation such as technical data sheets. The online version of the simulator is free for download on www.turck.com.



BL ident® – UHF-RFID Ray-Tracer

The Ray-Tracer software allows you to simulate different UHF-RFID system constellations under real conditions. You can narrow down the choice of suitable components prior to installation of the UHF-RFID hardware. The Ray-Tracer also analysis the technical feasibility of UHF-RFID solutions under given complex application conditions. The results provided, help to evaluate the expected costs and efforts for planning and analysis of UHF-RFID systems. Please don't hesitate to contact us. We will implement the simulation for your UHF application.

Efficient parametrization

BL ident® is parametrized via the graphical user interface of the FDT/DTM based application PACT*ware*® . Read and write commands as well as diagnostic functions are easily implemented without control system. This makes testing and commissioning on site easy. UHF read/write heads can be tested, parametrized and configured thoroughly according to the required demands with the software tools „RDemo" and „WebConfig". Read/write properties can be optimized even under difficult application conditions.

TURCK system solutions

BL20/BL67 – Remote-I/O systems in IP20/IP67

BL ident® can be extended with standard I/O modules in IP20/IP67. The Remote I/O systems BL20 for cabinet installation and BL67 for field installation offer flexibility and planning freedom on all levels: The modules are operated via the gateway and thus independently from the fieldbus. Thanks to the modular concept, the system can be customized to plant-specific analog and digital signal processing. BL67 electronic modules can be hot-swapped without having to disconnect the field wiring.

BL compact modules in IP67

BL compact combines the signal variety of BL67 systems with the simple design of the block IOs. The outcome is a compact IP67 module, custom-made, space-saving and easy to service.
The *BL compact* portfolio comprises tailor-made interfaces for the *BL ident*® RFID system. They are equipped with standard metal round connectors and the electronics is potted and incorporated in a fiber-glass reinforced plastic housing. LEDs indicate local diagnostics and status. The modules are available as 2 or 4-channel RFID blocks or as a combination of 2 RFID channels with digital I/O channels for example, for trigger signals or for point-to-bus control.

VT250 – HMI operator panels

The HMIs (Human Machine Interfaces) of the VT250 series are equipped with a 5.7"-TFT color touch screen that can be used as an operating or control panel. The VT250 hardware supports all relevant fieldbus and RT-Ethernet protocols. The controller integrated in the VT250 is configured with CODESYS 3, the IEC 61131 compliant programming software. PLCs and all supported fieldbuses can also be configured with this software, thanks to OOP-programming (object-oriented programming). QVIS, is the visualization software which was especially developed for embedded systems. QVIS and CODESYS are closely linked and responsible for the import of icons and exchange of data. QVIS also provides drivers for different control systems to implement different visualization solutions.

Connection technology

Ready-made cables in different lengths for secure transmission of data in harsh industrial environments. Whether shielded, with PUR sheath or PVC, silicone and halogen-free, highly flexible, irradiated, highly stable or resistant to weld splatter and oils: TURCK offers the matching connectivity for your application. With a cable length of maximally 50 m between interface and read/write head, flexible integration in your system is guaranteed. This helps you to reduce the number of bus notes and bus addresses. Extension cables especially made for the food industry, withstand cyclic cleaning processes and thus guarantee failsafe operation of your machines.

Programming software CODESYS

Gateways are programmed with CODESYS to become peripheral control units. The GUI supports all IEC-61131-3 programming languages

- Instruction List (IL)
- Ladder Diagram (LAD)
- Function Block Diagram (FBD)
- Structured Text (ST)
- Sequential Function Chart (SFC)

Numerous available diagnostic and commissioning tools as well as preassembled function blocks for the RFID system *BL ident*® make BL20 and BL67 extremely versatile.

Easily parametrized via FDT/DTM

The FDT frame application PACT*ware*™ (Process Automation Configuration Tool) supports you in planning and implementing your RFID application independently from the fieldbus used. Whether in online or offline mode, for system startup or for testing, with PACT*ware*™ you can easily configure and parametrize modules. Different devices and DTMs (Device Type Manager programs) for communication are available. They are set up and integrated via the GUI (standard Graphical user interface). The DTMs can be integrated in any FDT frame application. DTMs and PACT*ware*™ are available as freeware on www.turck.com.

HF and UHF – Advantages in a double

Integrative RFID identification in production, logistics and distribution

HF 13.56 MHz and UHF 840…960 MHz frequencies have become standard in industrial use for read/write heads and passive data carriers. Both technologies HF and UHF operate at long ranges, transmit data rates at high speed and are very rugged and best suited for the intended processes and purposes. With the TURCK RFID system *BL ident*® both technologies can be operated in parallel for entire control of the supply chain, from production, over distribution up to logistics.

No additional effort for mounting and commissioning

Extensive configuration is not required. Just connect HF or UHF read/write heads to the same *BL ident*® interface. Mixed operation of HF and UHF is also possible. Cable lengths of up to 50 m between interface and read/write head, provide many installation options. Unlike passive antennas with external electronics which require high-frequency cables, TURCK read/write heads have the antenna and the electronics incorporated in the same housing and thus transmit data without problems even when exposed to electromagnetic interference.

Long range operation even in harsh industrial environments

UHF RFID systems transmitting within 865…928 MHz are preferably used for long range and fast data transmission between read/write head and data carrier. *BL ident*® achieves ranges of several meters, depending on the combination of read/write head and data carrier used. You will not only gain more operational reliability in automated processes but also achieve highest possible flexibility in manually operated identification systems. The data carriers are entirely maintenance-free, thanks to power supplied passively via the read/write head's electromagnetic field.

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e pack

Bulk reading – simultaneously, fast, securely

BL ident® can exchange data simultaneously with many data carriers – in HF as well as in UHF mode. Bulk reading on-the-fly is also possible. The UHF technology is thus especially suited for applications in which object have to be captured very fast.

Optimization potential on the basis of approved industrial standards

Both technologies HF (13.56 MHz, ISO 15693) and long range UHF (840…960 MHz country-specific, ISO 18000-6C/EPCglobal Class 1 Gen 2) have become RFID standard especially in industrial environments. Thanks to international standards and global applicability, read/write heads and data carriers can be combined in many different ways, thus providing highest investment security – even across borders and continents.

Applications – Many solutions

Integrative identification of all components in car assembly processes

RFID solutions are in use for two decades already, especially in the automotive industry where they are deployed for tracking car bodies conveyed by automated transport systems. Owing to TURCK's RFID expertise, end-to-end identification in automotive production is now possible. Not only the transport systems can be equipped with RFID data carriers but also every car body and single component. The automotive industry thus profits from integrative identification and quality assurance. Through the entire production process, including also the paint-spray lines where data carriers are exposed to temperatures of around 200 °C, they remain firmly attached to the body. The long range *BL ident*® UHF technology enables fast and reliable transfer of product data over several meters, between data carrier and read/write head.

RFID solutions for the food industry

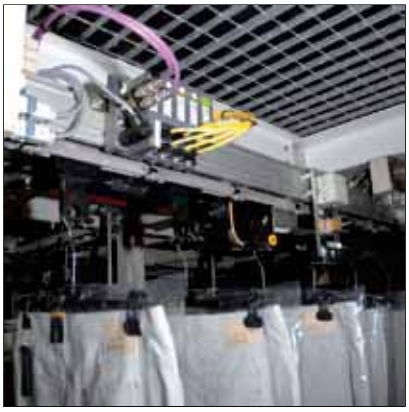
BL ident® provides a complete solution package for the special requirements of the food and feed industry: Besides special data carriers for autoclaves that withstand high-pressure steams at +140 °C, the product portfolio also comprises read/write heads for Wash-Down applications, Food & Beverage extension cables, as well as fieldbus and interface components for cabinet (BL20) and field (BL67) installation. *BL ident*® RFID systems can be deployed in autoclaves and also in Track & Trace applications from end to end. The fully automated exchange of data between data carriers, read/write head and higher level control system, makes the entire supply chain secure and always traceable. The end product is delivered together with a QM protocol containing all the production steps.

Secure identification of tumbler screens in the dust Ex-zone 22

The chemical group WACKER produces among other products dispersible polymer powders in different granulation for different designated purposes. To ensure correct sieving, the mesh width of the tumbler screens should be monitored automatically by an RFID system. The choice felt on *BL ident*® because it is approved for dust Ex-zone 22. Four tumbler screens are equipped with Ex-zone 2 and 22 approved TNLR-Q80 read/write heads an all screens with TW-R50-Ex data carriers. In addition, TURCK has also customized the accompanying function block to the existing Siemens PLC S7.

Just in time delivery of pressed parts.

The US-American company Tower Automotive maintains a production site in Gent (Belgium) where daily around 700 pressed parts are produced and send directly to Volvo. In order to guarantee just-in-time delivery, Tower Automotive has to ensure a reliable production flow. Transparent production or rather „Tracking & tracing" is thereby very important. To fulfill this task, the planners at Tower Automotive decided for the TURCK RFID technology. *BL ident*® withstands high temperatures of +180 °C in curing ovens and reads and writes on the fly. Thanks to this advantage, Tower Automotive was able to reduce the read/write time by two seconds per station and was thus able to speed up the production process.



Smooth flow of goods in the logistics center

The clothing manufacturer Leineweber maintains a logistic center in Herford near Bielefeld where hanger goods like trousers from the trade mark BRAX are sorted. *BL ident*® the RFID system from TURCK guarantees that up to 750.000 single pieces can be processed by the fully automated system, thus ensuring that the trousers reach their destination. The technicians have installed 28 read/write heads which are connected to the control system via seven I/O stations with PROFIBUS connectivity. 1.700 data carriers are installed in the skids where they identify every single piece of clothing. The distance between the data carriers is 250 mm. At a transport speed of 34 meters per minute and a daily production cycle of 16 hours, the RFID system reads data carrier IDs 130,560 times a day.

Long-range UHF technology in logistics

Thanks to the long-range UHF technology, many more industries can now profit from the advantages of *BL ident*® , and in particular from the additional saving potential it provides. The UHF data carriers are not only applied in industrial core processes such as production lines, but also in upstream and downstream processes such as the intralogistics. A well-known North European supermarket chain has equipped its logistics center entirely with the TURCK UHF technology. As many as 300 RIFD read stations identify pallet types and goods on the fly. The TURCK solution convinced with its high-speed reading rates, fast bulk reading of several data carriers as well as flexible data linking and programmability of the handhelds.

Interfaces – HF and UHF

Scan the QR code to access our products on the internet

BL ident® interfaces (sets) fieldbus connection – HF/UHF

BL ident® interfaces are obtainable as a set together with the gateway and one to four RFID modules in IP20 or IP67. The interfaces provide the connectivity to PROFIBUS-DP, EtherNet/IP™, Modbus TCP, DeviceNet™, PROFINET IO, CANopen und EtherCAT®. You can subsequently connect RFID modules to the interface. Maximally 16 channels can be operated in parallel. In addition to fieldbus-specific diagnostic messages, also fieldbus status and power supply of the individual channels is signalled via LEDs. Programmable gateways enable distributed and fast signal processing. Our product portfolio also comprises standard function modules for easy integration in the control and fieldbus network. Even simple I/O communication needing no function blocks, can be implemented with *BL ident*® solutions based on the 8-byte I/O modules BL20-2RFID-S and BL67-2RFID-S (S = simple RFID Interface). They reduce the programming effort considerably and allow you to connect *BL ident*® to all standard control systems without function block.

BL compact offers tailor-made, compact, fully potted and IP67 rated interfaces as an alternative to the BL20 and BL67 interface sets. They are the perfect solution for applications demanding a space-saving arrangement of components.

Modular interfaces (sets) – BL20/BL67

***BL ident*® interface set: Gateway + Electronic modules (each with a base module) – Protection class IP20**					
Fieldbus	**Interface set:**	**Gateway**		**Electronic modules**	
	Type x = Number of channels	Type[1]	Gateway, programmable	Type BL20-2RFID-A: Function block PIB[2]	Typ BL20-2RFID-S: 8-byte I/O communication
PROFIBUS-DP	TI-BL20-DPV1-x	BL20-GW-DPV1		x[3]	
	TI-BL20-DPV1-S-x	BL20-GW-DPV1			x
	TI-BL20-E-DPV1-x	BL20-E-GW-DP		x[3]	
	TI-BL20-E-DPV1-S-x	BL20-E-GW-DP			x
DeviceNet™	TI-BL20-DN-S-x	BL20-GWBR-DNET			x
	TI-BL20-E-DN-S-x	BL20-E-GW-DN			x
CANopen	TI-BL20-E-CO-S-x	BL20-E-GW-CO			x
Modbus TCP	TI-BL20-EN-S-x	BL20-GW-EN			x
	TI-BL20-PG-EN-x	BL20-PG-EN	x	x	
	TI-BL20-PG-EN-S-x	BL20-PG-EN	x		x
EtherNet/IP™	TI-BL20-EIP-S-x	BL20-GW-EN-IP			x
	TI-BL20-PG-EIP-x	BL20-PG-EN-IP	x	x	
	TI-BL20-PG-EIP-S-x	BL20-PG-EN-IP	x		x
PROFINET IO	TI-BL20-E-PN-x	BL20-E-GW-PN		x[3]	
	TI-BL20-E-PN-S-x	BL20-E-GW-PN			x
EtherCAT®	TI-BL20-E-EC-S-x	BL20-E-GW-EC			x

***BL ident*® interface set: Gateway + Electronic modules (each with a base module) – Protection class IP67**					
Fieldbus	**Interface set:**	**Gateway**		**Electronic modules**	
	Type x = Number of channels	Type[1]	Gateway, programmable	Typ BL67-2RFID-A: Function block PIB[2]	Typ BL67-2RFID-S: 8-byte I/O communication
PROFIBUS-DP	TI-BL67-DPV1-x	BL67-GW-DPV1		x[3]	
	TI-BL67-DPV1-S-x	BL67-GW-DPV1			x
	TI-BL67-PG-DP-x	BL67-PG-DP	x	x	
	TI-BL67-PG-DP-S-x	BL67-PG-DP	x		x
DeviceNet™	TI-BL67-DN-S-x	BL67-GW-DN			x
Multiprotocol: Modbus TCP + EtherNet/IP™	TI-BL67-EN-S-x	BL67-GW-EN			x
Modbus TCP	TI-BL67-PG-EN-x	BL67-PG-EN	x	x	
	TI-BL67-PG-EN-S-x	BL67-PG-EN	x		x
EtherNet/IP™	TI-BL67-PG-EIP-x	BL67-PG-EN-IP	x	x	
	TI-BL67-PG-EIP-S-x	BL67-PG-EN-IP	x		x
PROFINET IO	TI-BL67-EN-PN-x	BL67-GW-EN-PN		x[3]	
PROFINET IO + AIDA connection technology	TI-BL67-PN-AC-x	BL67-GW-EN-AC		x	
	TI-BL67-PN-AC-S-x	BL67-GW-EN-AC			x

[1] Refer to the corresponding type codes for more information
[2] Extended RFID communication with PIB function block
[3] Extended RFID communication with PIB function block via Siemens S7 control

Type code – example

T	I	–	BL67	–	PG	–	DP	–	S	–	2

Type code – explanation

T	I	Interface set	–	BL67	Modular I/O system	–	PG	Programmable gateway	–

Device Type
I Interface set: gateway and RFID modules

TURCK RFID system *BL ident*®

Modular I/O system
BL20 cabinet mounting (IP20)
BL20-E cabinet mounting (IP20) ECONOMY version
BL67 field application (IP67)

Programmable gateway
PG Programmable gateway

DP	Fieldbus	–	S	Communication	–	2	Number of channels

Fieldbus
DP/DPV1 PROFIBUS-DP
EN-PN PROFINET IO
EN Modbus TCP
EIP EtherNet/IP™
EC EtherCAT®
DN DeviceNet™
CO CANopen

Communication
A data transfer via function block (PIB) in the control unit or programmable Gateway
S data transfer via I/O communication

Number of channels
2 2 channels for 2 read/write heads
4 4 channels for 4 read/write heads
6 6 channels for 6 read/write heads
8 8 channels for 8 read/write heads

Compact interfaces – *BL compact*

BL compact interfaces in IP67 – Possible combinations and functions

Fieldbus	*BL ident*® interface – Type[1] (Gateway + I/O communication)	Function	Type …2RFID-A: PIB function block	Type …2RFID-S: 8-byte I/O-communication
PROFIBUS-DP	BLCDP-2M12MT-2RFID-A BLCDP-2M12MT-2RFID-S	2 x read/write heads	x[2]	 x
	BLCDP-6M12LT-2RFID-A-8DI-PD BLCDP-6M12LT-2RFID-S-8DI-PD	2 x read/write heads + 8 x digital inputs	x[2]	 x
	BLCDP-6M12LT-2RFID-A-8XSG-PD BLCDP-6M12LT-2RFID-S-8XSG-PD	2 x read/write heads + 8 x digital inputs/outputs (configurable)	x[2]	 x
DeviceNet™	BLCDN-2M12S-2RFID-S	2 x read/write heads		x
	BLCDN-4M12L-2RFID-S-2RFID-S	4 x read/write heads		x
	BLCDN-6M12LT-2RFID-S-8XSG-PD	2 x read/write heads + 8 x digital inputs/outputs (configurable)		x
CANopen	BLCCO-2M12S-2RFID-S	2 x read/write heads		x
	BLCCO-6M12T-2RFID-S-8XSG-P	2 x read/write heads + 8 x digital inputs/outputs (configurable)		x
Multiprotocol: Modbus TCP + EtherNet/IP™	BLCEN-2M12LT-2RFID-S	2 x read/write heads		x

[1] Refer to the corresponding type codes for more information
[2] Extended RFID communication with PIB function block via Siemens S7 control

Type code – example

BLCDP	–	2	M12	S	T	–	2RFID-A	–	8DI-PD

Type code – explanation

BLCDP	Compact I/O system	–	2	M12	S	T	Housing	–	2RFID-A	RFID communication	–

BLCDP – Compact I/O system

BLC – compact I/O system for field application (IP67),fieldbus type:

BLCDN	DeviceNet™
BLCDP	PROFIBUS-DP
BLCCO	CANopen

T – Housing

Connector for power supply

T	separate M12 connector
blank	no separate connector

S – Housing

Housing size

S	small housing 93 x 71 x 32.5
M	middle housing 113 x 71 x 32.5
L	large housing 168 x 71 x 32.5

M12 – Housing

Connector type

M8	connector M8 x 1
M12	connector M12 x 1
M16	connector M16 x 0.75

2 – Housing

Number of connectors

1	1 connector
2	2 connnectors
4	4 connnectors
6	6 connnectors
8	8 connnectors
16	16 connnectors

2RFID-A – RFID communication

RFID communication

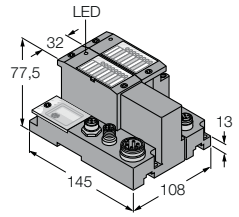
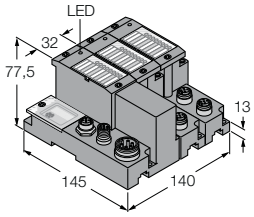
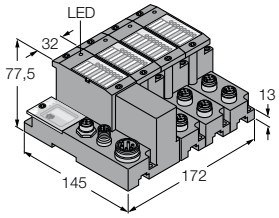
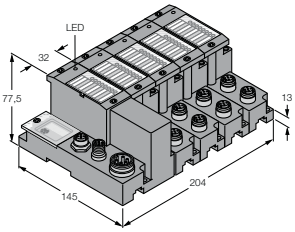
2RFID-A	data transmission via function block (PIB)
2RFID-S	data transmission via I/O communication

8DI-PD	Inputs/Outputs

8DI-PD – Inputs/Outputs

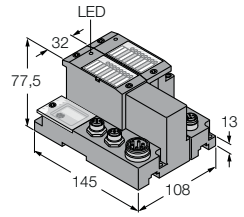
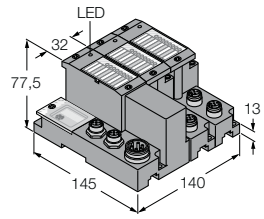
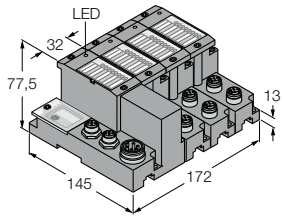
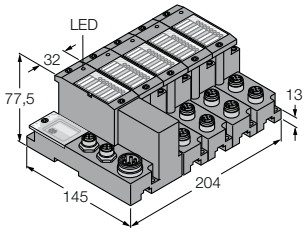
Inputs/Outputs

8XSG-PD	8 digital inputs/ outputs, configurable, PNP, diagnostics
8DI-PD	8 digital inputs, PNP, diagnostics

	Fieldbus	Number of channels	Ident no.	Type
	PROFIBUS-DP	2	1545028	**TI-BL67-DPV1-2**
	PROFIBUS-DP	2	1545106	**TI-BL67-DPV1-S-2**
	PROFIBUS-DP	4	1545029	**TI-BL67-DPV1-4**
	PROFIBUS-DP	4	1545107	**TI-BL67-DPV1-S-4**
	PROFIBUS-DP	6	1545030	**TI-BL67-DPV1-6**
	PROFIBUS-DP	6	1545108	**TI-BL67-DPV1-S-6**
	PROFIBUS-DP	8	1545031	**TI-BL67-DPV1-8**
	PROFIBUS-DP	8	1545109	**TI-BL67-DPV1-S-8**

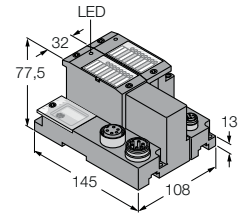
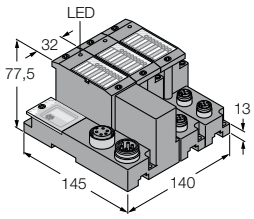
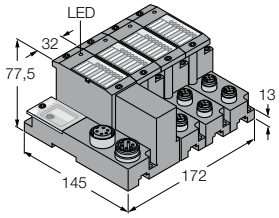
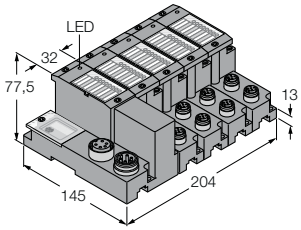
Wiring diagrams (page 122) read/write head HF und UHF:

Cable type: S2500: w01 und w02
S2503: w03 und w04

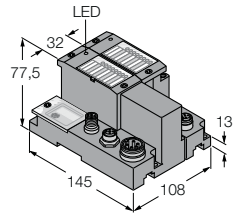
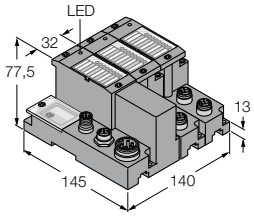
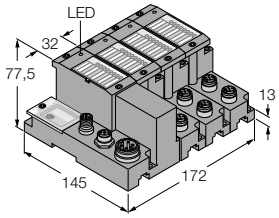
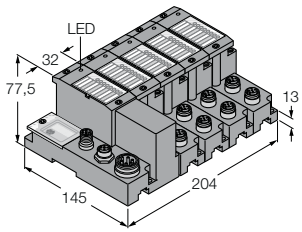
	Fieldbus	Number of channels	Ident no.	Type
	PROFIBUS-DP	2	1545061	**TI-BL67-PG-DP-2**
	PROFIBUS-DP	2	1545094	**TI-BL67-PG-DP-S-2**
	PROFIBUS-DP	4	1545062	**TI-BL67-PG-DP-4**
	PROFIBUS-DP	4	1545095	**TI-BL67-PG-DP-S-4**
	PROFIBUS-DP	6	1545063	**TI-BL67-PG-DP-6**
	PROFIBUS-DP	6	1545096	**TI-BL67-PG-DP-S-6**
	PROFIBUS-DP	8	1545064	**TI-BL67-PG-DP-8**
	PROFIBUS-DP	8	1545097	**TI-BL67-PG-DP-S-8**

Wiring diagrams (page 122) read/write head HF und UHF:

Cable type: S2500: w01 und w02
S2503: w03 und w04

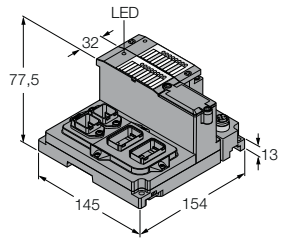
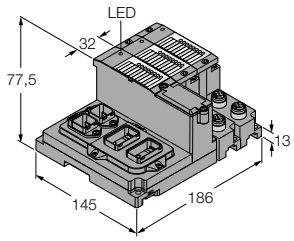
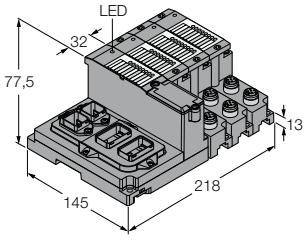
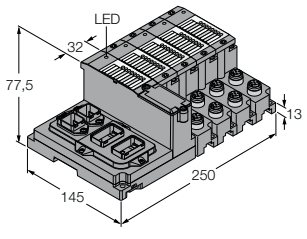
	Fieldbus	Number of channels	Ident no.	Type
	DeviceNet™	2	1545114	**TI-BL67-DN-S-2**
	DeviceNet™	4	1545115	**TI-BL67-DN-S-4**
	DeviceNet™	6	1545116	**TI-BL67-DN-S-6**
	DeviceNet™	8	1545117	**TI-BL67-DN-S-8**

Wiring diagrams (page 122) read/write head HF und UHF:
Cable type: S2500: w01 und w02
S2503: w03 und w04

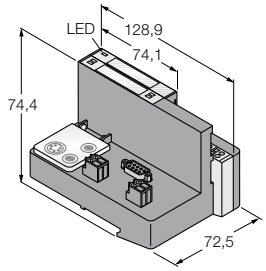
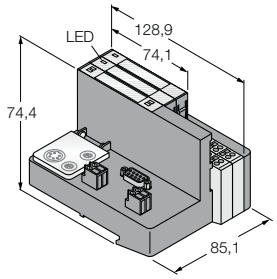
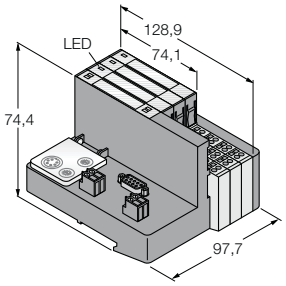
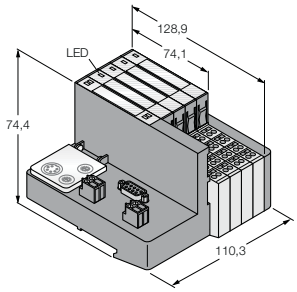
	Fieldbus	Number of channels	Ident no.	Type
	Modbus TCP	2	1545150	**TI-BL67-EN-S-2**
	Modbus TCP	2	1545065	**TI-BL67-PG-EN-2**
	Modbus TCP	2	1545098	**TI-BL67-PG-EN-S-2**
	EtherNet/IP™	2	1545069	**TI-BL67-PG-EIP-2**
	EtherNet/IP™	2	1545102	**TI-BL67-PG-EIP-S-2**
	PROFINET IO (RT)	2	1545040	**TI-BL67-EN-PN-2**
	Modbus TCP	4	1545151	**TI-BL67-EN-S-4**
	Modbus TCP	4	1545066	**TI-BL67-PG-EN-4**
	Modbus TCP	4	1545099	**TI-BL67-PG-EN-S-4**
	EtherNet/IP™	4	1545070	**TI-BL67-PG-EIP-4**
	EtherNet/IP™	4	1545103	**TI-BL67-PG-EIP-S-4**
	PROFINET IO (RT)	4	1545041	**TI-BL67-EN-PN-4**
	Modbus TCP	6	1545152	**TI-BL67-EN-S-6**
	Modbus TCP	6	1545067	**TI-BL67-PG-EN-6**
	Modbus TCP	6	1545100	**TI-BL67-PG-EN-S-6**
	EtherNet/IP™	6	1545071	**TI-BL67-PG-EIP-6**
	EtherNet/IP™	6	1545104	**TI-BL67-PG-EIP-S-6**
	PROFINET IO (RT)	6	1545042	**TI-BL67-EN-PN-6**
	Modbus TCP	8	1545153	**TI-BL67-EN-S-8**
	Modbus TCP	8	1545068	**TI-BL67-PG-EN-8**
	Modbus TCP	8	1545101	**TI-BL67-PG-EN-S-8**
	EtherNet/IP™	8	1545072	**TI-BL67-PG-EIP-8**
	EtherNet/IP™	8	1545105	**TI-BL67-PG-EIP-S-8**
	PROFINET IO (RT)	8	1545043	**TI-BL67-EN-PN-8**

Wiring diagrams (page 122) read/write head HF und UHF:

Cable type: S2500: w01 und w02
S2503: w03 und w04

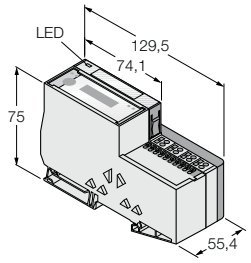
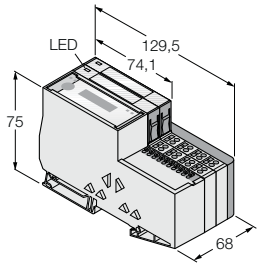
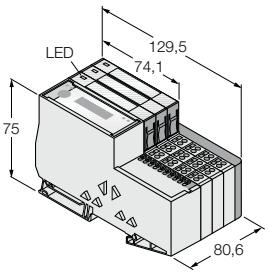
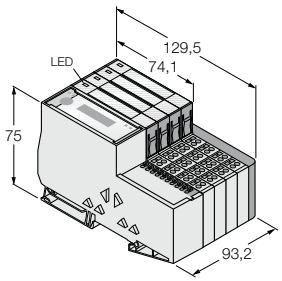
	Fieldbus	Number of channels	Ident no.	Type
	PROFINET IO (RT)	2	1545168	**TI-BL67-PN-AC-S-2**
	PROFINET IO (RT)	4	1545169	**TI-BL67-PN-AC-S-4**
	PROFINET IO (RT)	6	1545170	**TI-BL67-PN-AC-S-6**
	PROFINET IO (RT)	8	1545171	**TI-BL67-PN-AC-S-8**

Wiring diagrams (page 122) read/write head HF und UHF:
Cable type: S2500: w01 und w02
S2503: w03 und w04

	Fieldbus	Number of channels	Ident no.	Type
	PROFIBUS-DP	2	1545004	**TI-BL20-DPV1-2**
	PROFIBUS-DP	2	1545074	**TI-BL20-DPV1-S-2**
	PROFIBUS-DP	4	1545005	**TI-BL20-DPV1-4**
	PROFIBUS-DP	4	1545075	**TI-BL20-DPV1-S-4**
	PROFIBUS-DP	6	1545006	**TI-BL20-DPV1-6**
	PROFIBUS-DP	6	1545076	**TI-BL20-DPV1-S-6**
	PROFIBUS-DP	8	1545007	**TI-BL20-DPV1-8**
	PROFIBUS-DP	8	1545077	**TI-BL20-DPV1-S-8**

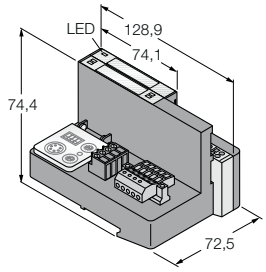
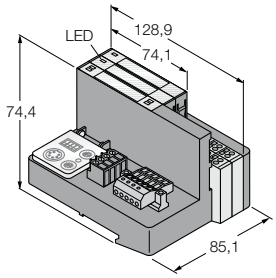
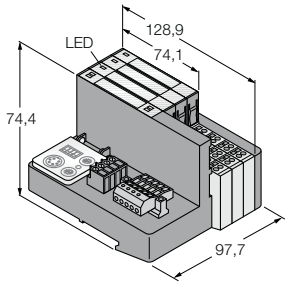
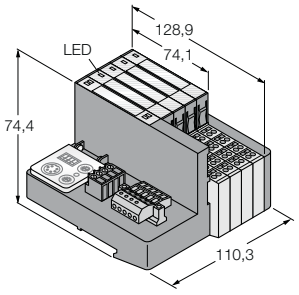
Wiring diagrams (page 122) read/write head HF:
Cable type: S2500: w07 und w02
S2503: w08 und w04

Wiring diagrams (page 122) read/write head UHF:
Cable type: S2500: w09 und w02
S2503: w10 und w04

	Fieldbus	Number of channels	Ident no.	Type
	PROFIBUS-DP	2	1545122	**TI-BL20-E-DPV1-2**
	PROFIBUS-DP	2	1545126	**TI-BL20-E-DPV1-S-2**
	CANopen	2	1545134	**TI-BL20-E-CO-S-2**
	PROFIBUS-DP	4	1545123	**TI-BL20-E-DPV1-4**
	PROFIBUS-DP	4	1545127	**TI-BL20-E-DPV1-S-4**
	CANopen	4	1545135	**TI-BL20-E-CO-S-4**
	PROFIBUS-DP	6	1545124	**TI-BL20-E-DPV1-6**
	PROFIBUS-DP	6	1545128	**TI-BL20-E-DPV1-S-6**
	CANopen	6	1545136	**TI-BL20-E-CO-S-6**
	PROFIBUS-DP	8	1545125	**TI-BL20-E-DPV1-8**
	PROFIBUS-DP	8	1545129	**TI-BL20-E-DPV1-S-8**
	CANopen	8	1545137	**TI-BL20-E-CO-S-8**

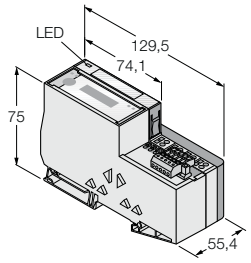
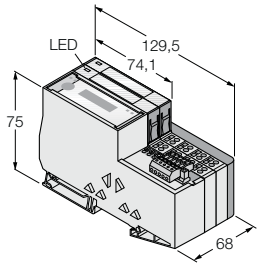
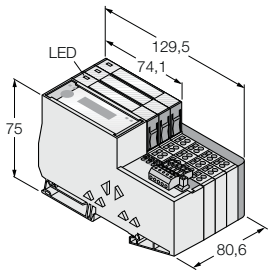
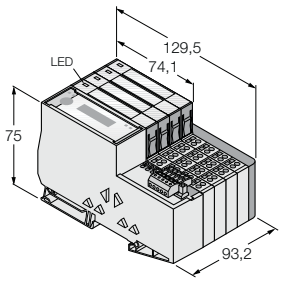
Wiring diagrams (page 122) read/write head HF:
Cable type: S2500: w07 und w02
S2503: w08 und w04

Wiring diagrams (page 122) read/write head UHF:
Cable type: S2500: w09 und w02
S2503: w10 und w04

	Fieldbus	Number of channels	Ident no.	Type
	DeviceNet™	2	1545078	**TI-BL20-DN-S-2**
	DeviceNet™	4	1545079	**TI-BL20-DN-S-4**
	DeviceNet™	6	1545080	**TI-BL20-DN-S-6**
	DeviceNet™	8	1545081	**TI-BL20-DN-S-8**

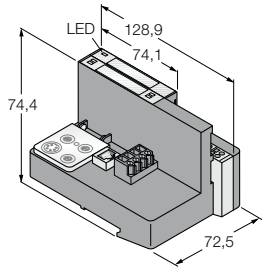
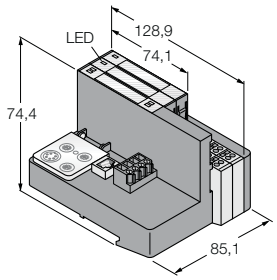
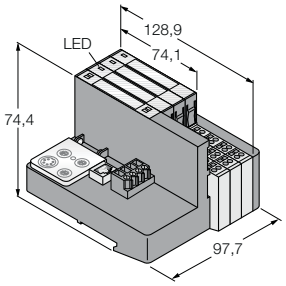
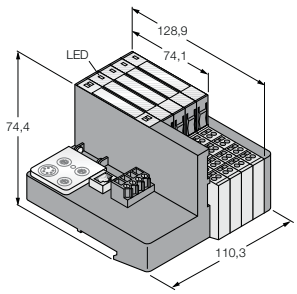
Wiring diagrams (page 122) read/write head HF:
Cable type: S2500: w07 und w02
S2503: w08 und w04

Wiring diagrams (page 122) read/write head UHF:
Cable type: S2500: w09 und w02
S2503: w10 und w04

	Fieldbus	Number of channels	Ident no.	Type
	DeviceNet™	2	1545130	**TI-BL20-E-DN-S-2**
	DeviceNet™	4	1545131	**TI-BL20-E-DN-S-4**
	DeviceNet™	6	1545132	**TI-BL20-E-DN-S-6**
	DeviceNet™	8	1545133	**TI-BL20-E-DN-S-8**

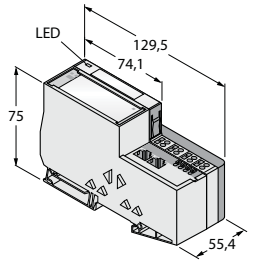
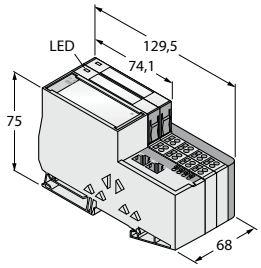
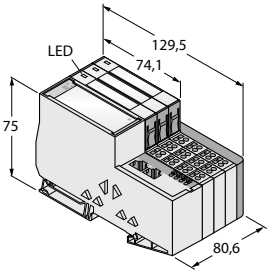
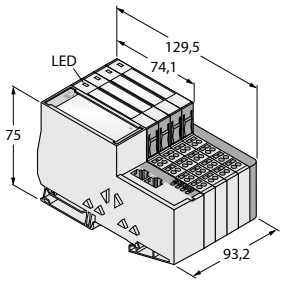
Wiring diagrams (page 122) read/write head HF:
Cable type: S2500: w07 und w02
S2503: w08 und w04

Wiring diagrams (page 122) read/write head UHF:
Cable type: S2500: w09 und w02
S2503: w10 und w04

	Fieldbus	Number of channels	Ident no.	Type
	Modbus TCP	2	1545138	**TI-BL20-EN-S-2**
	Modbus TCP	2	1545053	**TI-BL20-PG-EN-2**
	Modbus TCP	2	1545086	**TI-BL20-PG-EN-S-2**
	EtherNet/IP™	2	1545082	**TI-BL20-EIP-S-2**
	EtherNet/IP™	2	1545057	**TI-BL20-PG-EIP-2**
	EtherNet/IP™	2	1545090	**TI-BL20-PG-EIP-S-2**
	Modbus TCP	4	1545139	**TI-BL20-EN-S-4**
	Modbus TCP	4	1545054	**TI-BL20-PG-EN-4**
	Modbus TCP	4	1545087	**TI-BL20-PG-EN-S-4**
	EtherNet/IP™	4	1545083	**TI-BL20-EIP-S-4**
	EtherNet/IP™	4	1545058	**TI-BL20-PG-EIP-4**
	EtherNet/IP™	4	1545091	**TI-BL20-PG-EIP-S-4**
	Modbus TCP	6	1545140	**TI-BL20-EN-S-6**
	Modbus TCP	6	1545055	**TI-BL20-PG-EN-6**
	Modbus TCP	6	1545088	**TI-BL20-PG-EN-S-6**
	EtherNet/IP™	6	1545084	**TI-BL20-EIP-S-6**
	EtherNet/IP™	6	1545059	**TI-BL20-PG-EIP-6**
	EtherNet/IP™	6	1545092	**TI-BL20-PG-EIP-S-6**
	Modbus TCP	8	1545141	**TI-BL20-EN-S-8**
	Modbus TCP	8	1545056	**TI-BL20-PG-EN-8**
	Modbus TCP	8	1545089	**TI-BL20-PG-EN-S-8**
	EtherNet/IP™	8	1545085	**TI-BL20-EIP-S-8**
	EtherNet/IP™	8	1545060	**TI-BL20-PG-EIP-8**
	EtherNet/IP™	8	1545093	**TI-BL20-PG-EIP-S-8**

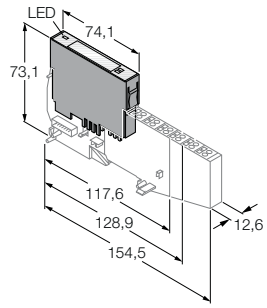
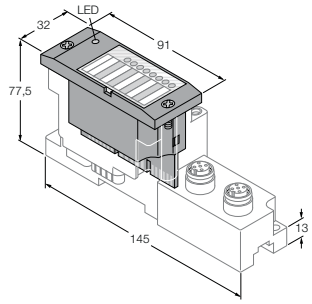
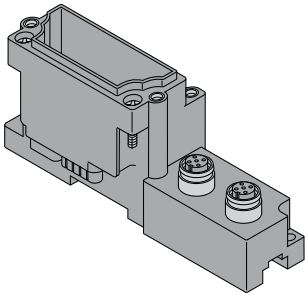
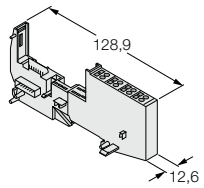
Wiring diagrams (page 122) read/write head HF:
Cable type: S2500: w07 und w02
S2503: w08 und w04

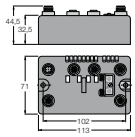
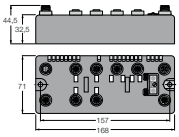
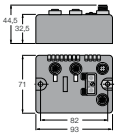
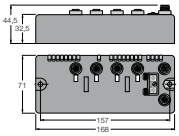
Wiring diagrams (page 122) read/write head UHF:
Cable type: S2500: w09 und w02
S2503: w10 und w04

	Fieldbus	Number of channels	Ident no.	Type
	PROFINET IO (IRT)	2	7030467	**TI-BL20-E-PN-2**
	PROFINET IO (IRT)	2	7030471	**TI-BL20-E-PN-S-2**
	EtherCAT®	2	7030479	**TI-BL20-E-EC-S-2**
	PROFINET IO (IRT)	4	7030468	**TI-BL20-E-PN-4**
	PROFINET IO (IRT)	4	7030472	**TI-BL20-E-PN-S-4**
	EtherCAT®	4	7030480	**TI-BL20-E-EC-S-4**
	PROFINET IO (IRT)	6	7030469	**TI-BL20-E-PN-6**
	PROFINET IO (IRT)	6	7030473	**TI-BL20-E-PN-S-6**
	EtherCAT®	6	7030481	**TI-BL20-E-EC-S-6**
	PROFINET IO (IRT)	8	7030470	**TI-BL20-E-PN-8**
	PROFINET IO (IRT)	8	7030474	**TI-BL20-E-PN-S-8**
	EtherCAT®	8	7030482	**TI-BL20-E-EC-S-8**

Wiring diagrams (page 122) read/write head HF:
Cable type: S2500: w07 und w02
S2503: w08 und w04

Wiring diagrams (page 122) read/write head UHF:
Cable type: S2500: w09 und w02
S2503: w10 und w04

	Fieldbus	Number of channels	Ident no.	Type
	PROFIBUS-DP DeviceNet™ CANopen Modbus TCP PROFINET IO (RT) EtherNet/IP™	2	6827306	**BL20-2RFID-S**
	PROFIBUS-DP Modbus TCP PROFINET IO (RT) EtherNet/IP™	2	6827233	**BL20-2RFID-A**
	PROFIBUS-DP DeviceNet™ CANopen Modbus TCP PROFINET IO (RT) EtherNet/IP™	2	6827305	**BL67-2RFID-S**
	PROFIBUS-DP Modbus TCP PROFINET IO (RT) EtherNet/IP™	2	6827225	**BL67-2RFID-A**
	–	–	6827186	**BL67-B-2M12**
	–	–	6827046	**BL20-S4T-SBBS**

	Fieldbus	Number of channels	Ident no.	Type
	PROFIBUS-DP	2	6811166	BLCDP-2M12MT-2RFID-A
	PROFIBUS-DP	2	6811177	BLCDP-2M12MT-2RFID-S
	PROFIBUS-DP	2	6811174	BLCDP-6M12LT-2RFID-A-8XSG-PD
	DeviceNet™	2	6811049	BLCDN-6M12LT-2RFID-S-8XSG-PD
	PROFIBUS-DP	2	6811173	BLCDP-6M12LT-2RFID-A-8DI-PD
	PROFIBUS-DP	2	6811179	BLCDP-6M12LT-2RFID-S-8XSG-PD
	PROFIBUS-DP	2	6811178	BLCDP-6M12LT-2RFID-S-8DI-PD
	CANopen	2	6811303	BLCCO-6M12LT-2RFID-S-8XSG-P
	DeviceNet™	2	6811002	BLCDN-2M12S-2RFID-S
	CANopen	2	6811300	BLCCO-2M12S-2RFID-S
	DeviceNet™	4	6811055	BLCDN-4M12L-2RFID-S-2RFID-S

Connectivity solutions – HF and UHF

Scan the QR code to access our products on the internet

BL ident® RFID cables – HF/UHF

We provide ready-made *BL ident*® extension cables for safe communication between interface and read/write head. They are optimally adapted to the individual components and thus guarantee safe operation of the entire system. The standard versions (…S2500) are suited for all standard tasks of highly complex applications; the economy versions (…S2503) convince through a good price/performance ratio and are best suited for high demands.

For extreme environmental conditions we offer the FB-… series. Through combination with read/write heads of the Wash-Down series, the FB cables achieve IP69K rating. This opens up new fields of application for *BL ident*® such as the food industry for example.
The TURCK product portfolio also comprises ready-made bus and supply cables which help you to reduce wiring errors.

Type code

Type code – example

...	–	RK4.5T	–	5	/	S2500

Type code – explanation

...	Usage	–	RK4.5T	Connector type	–	5	Cable length	/

Usage

FB–	Food & Beverage type; resistant to all common acid and alkaline detergents and disinfectants; IP67 and IP69K

Connector type

RK4.5T	female straight; 5-pin
WK4.5T	female angled; 5-pin
RS4.5T	male straight; 5-pin

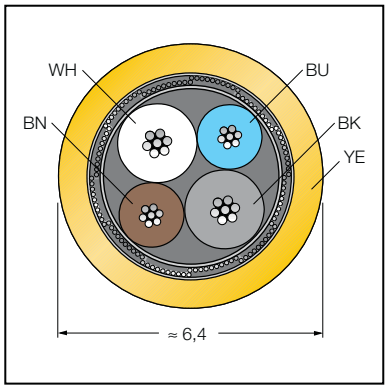
Cable length

0.3	0.3 m
2	2 m
5	5 m
10	10 m
25	25 m
50	50 m

S2500	Connector quality

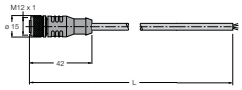
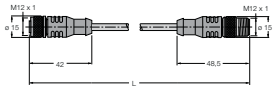
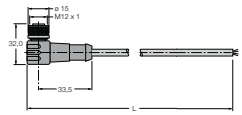
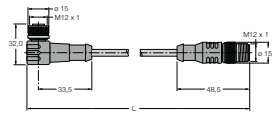
Connector quality

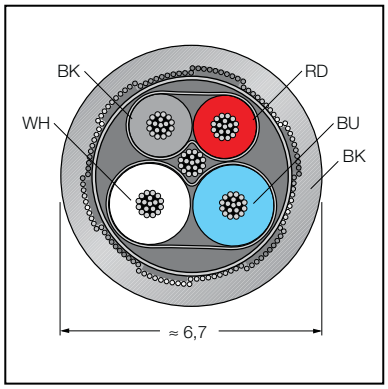
S2500	standard version: cable: UL 20963; cable jacket: PUR, yellow, qualified for drag chain use, oil-resistant, highly flexible
S2503	economic version: cable: UL 20549; cable jacket: PUR, black; qualified for drag chain use, oil-resistant, flexible



- 4-pin, AWG 224 / AWG 22
- Sheath material: PUR jacket, yellow
- Halogen and LABS free
- Shield: Aluminium foil, tinned copper braid
- Sheath diameter: 6.4 mm
- Qualified for drag chain use, oil-resistant, highly flexible
- Cable UL Style 20963

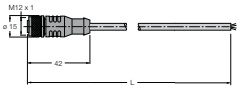
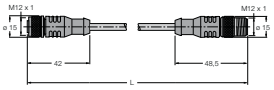
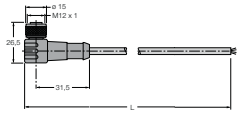
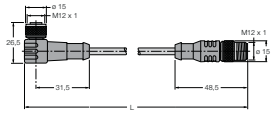
Cable type	S2500
Cable jacket	PUR, yellow
Cable diameter	Ø 6.4 mm
Shield	yes
Core cross-section	2 x 0.2 mm²
DC resistance (loop)	103 Ω /km
Core cross-section	2 x 0.34 mm²
Trailing capability	yes
halogen-free	yes
Connector A side	male/female, M12 x 1, straight/ angled
Types	RK4.5T, RS4.5T, WK4.5T
Number of pins	5
Contacts	metal, CuZn, gold-plated
Contact carriers	plastic, CuZn, black
Grip	plastic, TPU, black
Coupling nut/screw	metal, CuZn-Ni, nickel-plated
Protection class	IP67
Rated voltage [Umax]	30 V
Ambient temperature	
Stationary usage	-40 … 90 °C
Non-stationary usage	-25 … 90 °C

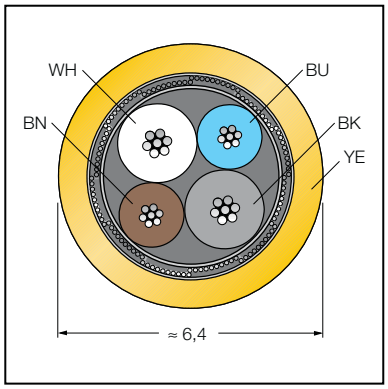
	Cable length [m]	Wiring diagram male	Wiring diagram female	Ident no.	Type
	100	–	–	8036048	KABEL-BLIDENT-100M
	2	–	w05	8035244	RK4.5T-2/S2500
	5	–	w05	6699206	RK4.5T-5/S2500
	10	–	w05	6699207	RK4.5T-10/S2500
	25	–	w05	6638421	RK4.5T-25/S2500
	50	–	w05	6699422	RK4.5T-50/S2500
	0.3	w02	w05	6699210	RK4.5T-0,3-RS4.5T/S2500
	2	w02	w05	6699200	RK4.5T-2-RS4.5T/S2500
	5	w02	w05	6699201	RK4.5T-5-RS4.5T/S2500
	10	w02	w05	6699202	RK4.5T-10-RS4.5T/S2500
	25	w02	w05	6699211	RK4.5T-25-RS4.5T/S2500
	50	w02	w05	8035246	RK4.5T-50-RS4.5T/S2500
	2	–	w05	8035245	WK4.5T-2/S2500
	5	–	w05	6699208	WK4.5T-5/S2500
	10	–	w05	6699209	WK4.5T-10/S2500
	25	–	w05	6699423	WK4.5T-25/S2500
	50	–	w05	6699424	WK4.5T-50/S2500
	2	w02	w05	6699203	WK4.5T-2-RS4.5T/S2500
	5	w02	w05	6699204	WK4.5T-5-RS4.5T/S2500
	10	w02	w05	6699205	WK4.5T-10-RS4.5T/S2500
	25	w02	w05	6638425	WK4.5T-25-RS4.5T/S2500
	50	w02	w05	6638426	WK4.5T-50-RS4.5T/S2500



- 4-pin, AWG 19/24 (data line), AWG 19/22 (supply line)
- Sheath material: PUR jacket, black
- Halogen and LABS free
- Shield: Aluminium foil, tinned copper braid
- Sheath diameter: 6.7 mm
- Qualified for drag chain use, oil-resistant, highly flexible
- Cable UL Style 20549

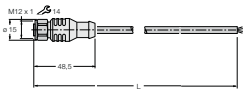
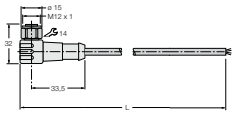
Cable type	S2503
Cable jacket	PUR, black
Cable diameter	Ø 6.7 mm
Shield	yes
Core cross-section	2 x 0.25 mm²
DC resistance (loop)	164 Ω /km
Core cross-section	2 x 0.34 mm²
Trailing capability	yes
Connector A side	male/female, M12 x 1, straight/ angled
Types	RK4.5T, RS4.5T, WK4.5T
Number of pins	5
Contacts	metal, CuZn, gold-plated
Contact carriers	plastic, CuZn, black
Grip	plastic, TPU, black
Coupling nut/screw	metal, CuZn-Ni, nickel-plated
Protection class	IP67
Rated voltage [Umax]	300 V
Ambient temperature	
Stationary usage	-50 … 80 °C
Non-stationary usage	-25 … 80 °C

	Cable length [m]	Wiring diagram male	Wiring diagram female	Ident no.	Type
	100	–	–	7030351	KABEL-E-BLIDENT-100M
	2	–	w06	7030341	RK4.5T-2/S2503
	5	–	w06	7030342	RK4.5T-5/S2503
	10	–	w06	7030343	RK4.5T-10/S2503
	25	–	w06	7030344	RK4.5T-25/S2503
	50	–	w06	7030345	RK4.5T-50/S2503
	2	w04	w06	7030331	RK4.5T-2-RS4.5T/S2503
	5	w04	w06	7030332	RK4.5T-5-RS4.5T/S2503
	10	w04	w06	7030333	RK4.5T-10-RS4.5T/S2503
	25	w04	w06	7030334	RK4.5T-25-RS4.5T/S2503
	50	w04	w06	7030335	RK4.5T-50-RS4.5T/S2503
	2	–	w06	7030346	WK4.5T-2/S2503
	5	–	w06	7030347	WK4.5T-5/S2503
	10	–	w06	7030348	WK4.5T-10/S2503
	25	–	w06	7030349	WK4.5T-25/S2503
	50	–	w06	7030350	WK4.5T-50/S2503
	2	w04	w06	7030336	WK4.5T-2-RS4.5T/S2503
	5	w04	w06	7030337	WK4.5T-5-RS4.5T/S2503
	10	w04	w06	7030338	WK4.5T-10-RS4.5T/S2503
	25	w04	w06	7030339	WK4.5T-25-RS4.5T/S2503
	50	w04	w06	7030340	WK4.5T-50-RS4.5T/S2503



- The new standard for the food industry
- Resistant to all common acid and alkaline detergents and disinfectants
- Protection classes IP67 and IP69K
- No hardening, no discoloration due to detergent resistant PVC free plastics
- Also available in other cable lengths

Cable type	PP
Cable jacket	PP, yellow
Cable diameter	Ø 6.4 mm
Core cross-section	0.25 mm²
Core cross-section	0.34 mm²
Connector A side	female connector, M12 x 1, straight/ angled
Types	RK4.5T, WK4.5T
Number of pins	5
Contacts	metal, CuZn, gold-plated
Contact carriers	plastic, CuZn, black
Grip	PP, white
Coupling nut/screw	stainless steel, 1.4404
Ampacity	4 A
Protection class	IP67, IP69K, (screwed together)
Rated voltage [Umax]	250 V
Ambient temperature	
Non-stationary usage	-25 … 90 °C

	Cable length [m]	Wiring diagram femal	Ident no.	Type
	5	w05	7030281	FB-RK4.5T-5/S2500
	10	w05	7030282	FB-RK4.5T-10/S2500
	25	w05	7030283	FB-RK4.5T-25/S2500
	50	w05	7030284	FB-RK4.5T-50/S2500
	5	w05	7030285	FB-WK4.5T-5/S2500
	10	w05	7030286	FB-WK4.5T-10/S2500
	25	w05	7030287	FB-WK4.5T-25/S2500
	50	w05	7030288	FB-WK4.5T-50/S2500

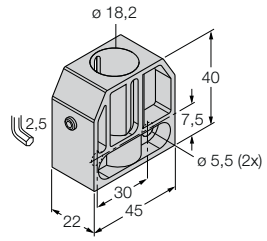
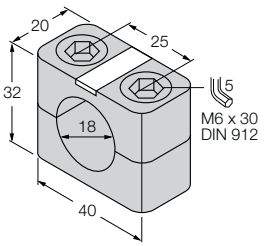
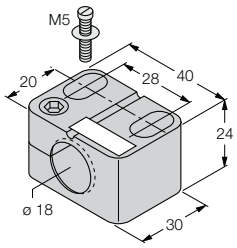
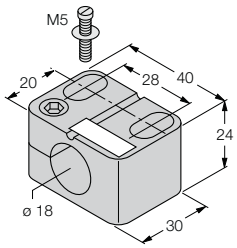
Accessories – HF and UHF

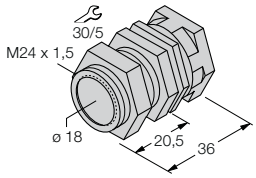
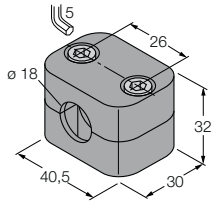
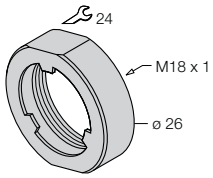
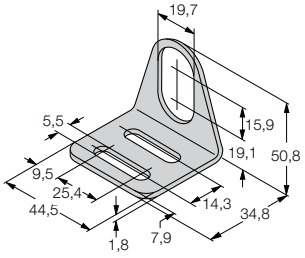
BL ident® accessories – HF/UHF

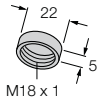
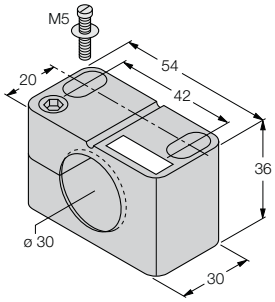
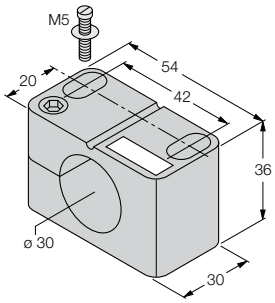
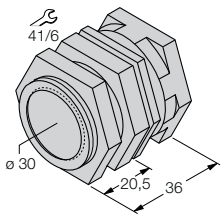
We offer the matching accessories for the read/write heads and data carriers. Mounting adapters for read/write heads and data carriers, also labels and protective frames for the data carriers.

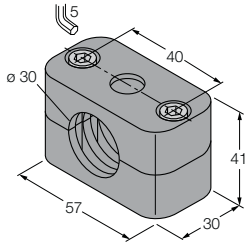
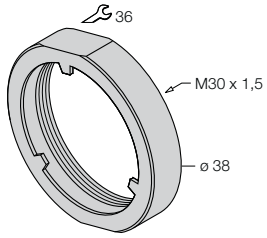
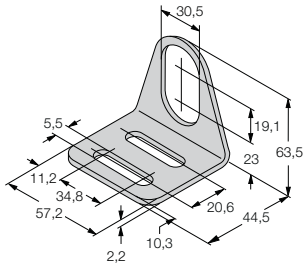
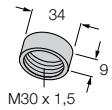
BL ident® mobile handhelds – HF/UHF

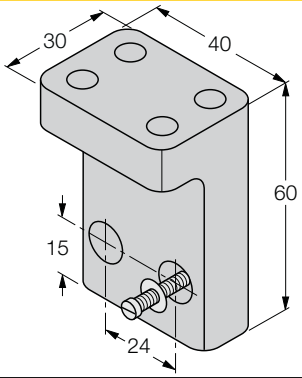
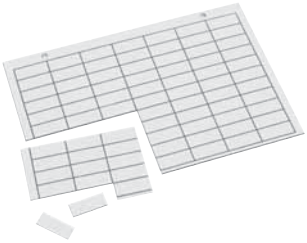
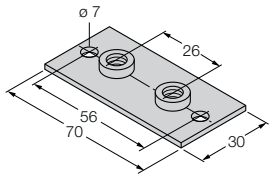
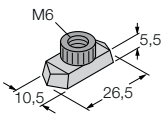
TURCK offers industrial-suited handhelds for mobile reading and writing of data carriers suited for HF and UHF applications. The data is displayed on a touch screen and can be edited and written on data carriers if wanted. On request, we deliver them with Bluetooth, WLAN, barcode scanner and application software.

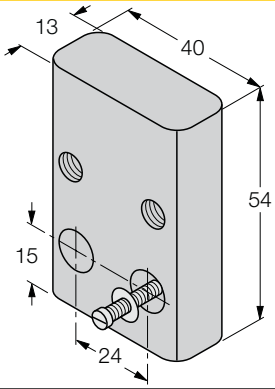
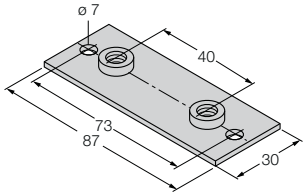
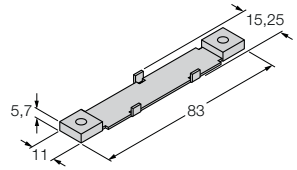
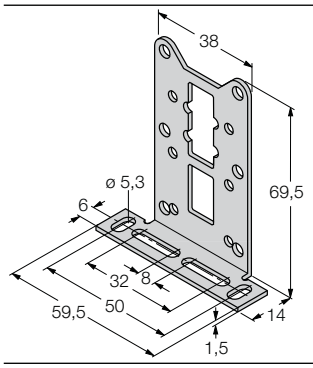
	Housing quality	Description	Ident no.	Type
	PA	▪ Mounting bracket for threaded barrel devices; material: PA66-GF	69471	**BS 18**
	PBT	▪ Fixing clamp; material: PA66-GF	69472	**BSN 18**
	PA	▪ Fixing clamp for threaded barrel devices, with dead-stop; material: PA6	6947214	**BST-18B**
	PA	▪ Fixing clamp for threaded barrel devices, without dead-stop; material: PA6	6947215	**BST-18N**

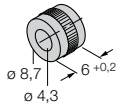
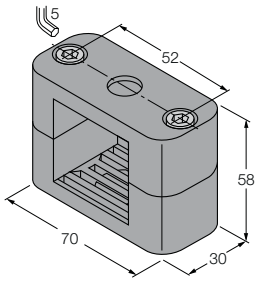
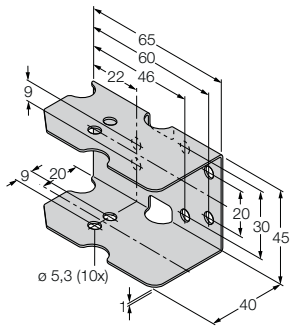
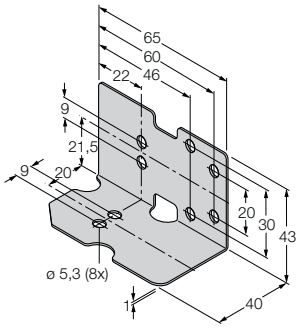
	Housing quality	Description	Ident no.	Type
	CuZn	▪ Quick-mount bracket with dead-stop; material: Chrome-plated brass Male thread M24 x 1.5. Note: The switching distance of proximity switches can be reduced by the use of quick-mount brackets.	6945102	**QM-18**
	PP	▪ Mounting bracket for smooth and threaded barrel devices; material: Polypropylene	6901320	**BSS-18**
	VA	▪ Protective nut for M18 x 1 threaded barrels; material: Stainless steel A2 1.4305 (AISI 303)	6905310	**PN-M18**
	VA	▪ Mounting bracket for threaded barrel devices; material: Stainless steel A2 1.4301 (AISI 304)	6945004	**MW-18**

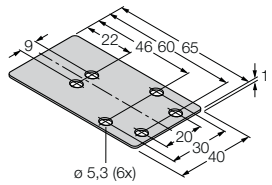
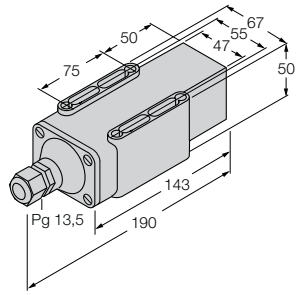
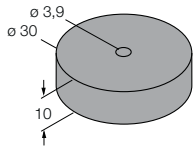
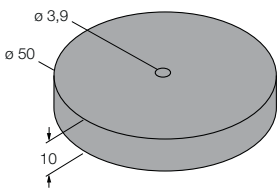
	Housing quality	Description	Ident no.	Type
	PTFE	▪ PTFE-coated caps; for use in welding systems and grinding machinery; protection against intense sparking	69663	**SKN/M18**
	PA	▪ Fixing clamp for threaded barrel devices, with dead-stop; material: PA6	6947216	**BST-30B**
	PA	▪ Fixing clamp for threaded barrel devices, without dead-stop; material: PA6	6947217	**BST-30N**
	CuZn	▪ Quick-mount bracket with dead-stop; material: Chrome-plated brass Male thread M36 x 1.5. Note: The switching distance of proximity switches can be reduced by the use of quick-mount brackets.	6945103	**QM-30**

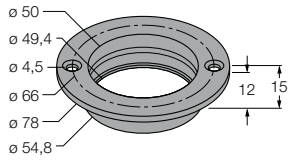
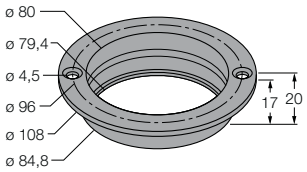
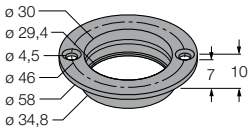
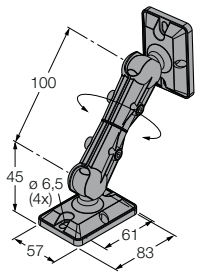
	Housing quality	Description	Ident no.	Type
	PP	▪ Mounting bracket for smooth and threaded barrel devices; material: Polypropylene	6901319	**BSS-30**
	VA	▪ Protective nut for M30 x 1 threaded barrel devices; material: Stainless steel A2 1.4305 (AISI 303)	6905308	**PN-M30**
	VA	▪ Mounting bracket for threaded barrel devices; material: Stainless steel A2 1.4301 (AISI 304)	6945005	**MW-30**
	PTFE	▪ PTFE-coated caps; for use in welding systems and grinding machinery; protection against intense sparking	69664	**SKN/M30**

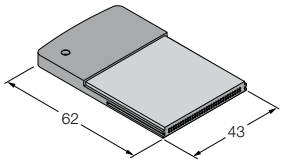
	Housing quality	Description	Ident no.	Type
	PA	▪ Base part for BST-12 and BST-18 fixing clamps	6947219	**BST-UH**
	PA	▪ Label for BST	6947220	**BST-BS**
	ST 37	▪ Weld-on plate for BSS mounting bracket, long	6901316	**BSS-SPV2**
	–	▪ DIN rail nut for BSS mounting bracket	6901323	**BSS-TSM (2 pcs.)**

	Housing quality	Description	Ident no.	Type
	PA	▪ Base part for BST-12 and BST-18 fixing clamps	6947218	**BST-UV**
	ST 37	▪ Weld-on plate for BSS mounting bracket, long	6901347	**BSS-SPV4**
	–	▪ Metal clip with clamp magnets, mounting accessories for data carrier TWxxx-Q14L60-M-B110	7030377	**TH-Q14L60**
	VA	▪ Mounting bracket for rectangular Q14 or Q20; material VA 1.4301	6945006	**MW-Q14/Q20**

	Housing quality	Description	Ident no.	Type
	CuZn	▪ Mounted with active face downwards, for Q14	6950011	**MH-Q14**
	PP	▪ Mounting bracket for rectangular devices; material: Polypropylene	6901318	**BSS-CP40**
	VA	▪ Protective frame (U profile) CK40	6900483	**MF-CK40-3S**
	VA	▪ Protective frame (angle) for rectangular CK40	6900482	**MF-CK40-2S**

	Housing quality	Description	Ident no.	Type
	VA	▪ Protective frame (one side) rectangular CK40	6900481	**MF-CK40-1S**
	Ultem	▪ Protective frame for rectangular CP40; material housing/cover: ULTEM; temperature resistant up to +170 °C, especially UV and ozone resistant; protection class IP 68, 5 m w.g.	69497	**SG40/2 (ULTEM)**
	–	▪ Spacer for indirect mounting of data carriers on metal.	6900512	**DS-R30**
	–	▪ Spacer for indirect mounting of data carriers on metal	6900386	**DS-R50**

	Housing quality	Description	Ident no.	Type
	–	▪ The flange facilitates mounting of the data carrier TW-R50-M-B128 (-K2) on or in the metal.	6901151	**MF-R50**
	–	▪ The flange facilitates mounting of the data carrier TW-R80-M-B128 (-K2) on or in metal.	6901152	**MF-R80**
	–	▪ The flange facilitates mounting of the data carrier TW-R30-M-B128 (-K2) on or in the metal.	6901150	**MF-R30**
	–	▪ Arm bracket for UHF RFID read/write heads TNxxx-Q175L200-H1147, TNxxx-Q240L280-H1147 and TNxxx-Q280L640-H1147	7030296	**RH-Q240L280/ Q280L640**

	Operating frequency [MHz]	Electrical features	Ident no.	Type
	13.56	▪ Mobile handheld with HF antenna ▪ Incl. TURCK RFID software for reading and writing of data ▪ Display of decimal, binary, hexadecimal and ASCII codes ▪ With RS232 interface ▪ Fold-out antenna ▪ Protection class IP65 ▪ Incl. docking station with power supply	1542331	**PD-IDENT**
	13.56	▪ Mobile handheld with HF antenna ▪ Incl. TURCK RFID software for reading and writing of data ▪ Display of decimal, binary, hexadecimal and ASCII codes ▪ RS232 interface ▪ With WLAN function ▪ Fold-out antenna ▪ Protection class IP65 ▪ Incl. docking station with power supply	1542340	**PD-IDENT-WLAN**
	–	▪ Mobile handheld, PDA-type ▪ Display of decimal, binary, hexadecimal and ASCII codes ▪ Incl. TURCK RFID software for reading and writing of data ▪ WLAN and Bluetooth ▪ Incl. docking station with power supply ▪ PDA-IDENT-IA antenna, for use with RFID	1542344	**PDA-IDENT**
	13.56	▪ Internal antenna (CF-card) for use with PDA-Ident	1542345	**PDA-IDENT-IA**

	Operating frequency [MHz]	Electrical features	Ident no.	Type
	13.56	▪ Mobile handheld with HF antenna ▪ 1D laser scanner for barcodes ▪ Keyboard function (HID) for wireless transfer of read data via Bluetooth ▪ Incl. docking station with power supply, PC data interface via USB cable ▪ Pistol grip ▪ Optionally available on request: Barcode 1D or 2D imager ▪ Optionally available on request: WLAN	7030461	**PD-IDENT-HF-RBSUP**
	868	▪ Mobile handheld with UHF antenna ▪ Incl. docking station with power supply, PC data interface via USB cable ▪ Pistol grip ▪ Optionally available on request: Barcode scanner (1D / 2D imager or 1D laser) ▪ Optionally available on request: Bluetooth and WLAN	7030422	**PD-IDENT-UHF-RUP-868**
	13.56	▪ Mobile handheld with HF antenna ▪ Keyboard function (HID) for wireless transfer of read data via Bluetooth or USB ▪ With only three keys very easy to use ▪ Incl. power supply unit, battery and bracket ▪ Optionally available on request: Barcode 1D laser, 1D or 2D imager	7030525	**PD-IDENT-HF-RBUP-SMART**

	Operating frequency [MHz]	Electrical features	Ident no.	Type
	13.56	▪ Mobile handheld with HF antenna ▪ Microsoft Windows CE 5 ▪ Customized software solution on request ▪ Bluetooth ▪ Protection class IP65 ▪ Incl. docking station with power supply, USB cable ▪ Optionally available on request: Barcode scanner (1D / 2D imager or 1D laser) ▪ Optionally available on request: WLAN, 4400 mAh battery and software development kit (SDK)	7030499	**PD-IDENT-HF-RBTW**
	868	▪ Mobile handheld with UHF antenna ▪ Microsoft Windows CE 5 ▪ Customized software solution on request ▪ Bluetooth ▪ Protection class IP65 ▪ Incl. docking station with power supply, USB cable ▪ Optionally available on request: Barcode scanner (1D / 2D imager or 1D laser) ▪ Optionally available on request: WLAN, 4400 mAh battery and software development kit (SDK)	7030421	**PD-IDENT-UHF-RBTW-868**
	915…920	▪ Mobile handheld with UHF antenna ▪ Microsoft Windows CE 5 ▪ Customized software solution on request ▪ Bluetooth ▪ Protection class IP65 ▪ Incl. docking station with power supply, USB cable ▪ Optionally available on request: Barcode scanner (1D / 2D imager or 1D laser) ▪ Optionally available on request: WLAN, 4400 mAh battery and software development kit (SDK)	7030514	**PD-IDENT-UHF-RBTW-915-920**

Read/write heads and data carriers – HF

Scan the QR code to access our products on the internet

BL ident® read/write heads and data carriers – HF

RFID systems transmitting at 13.56 MHz (HF) are almost insensitive to electromagnetic disturbance. This frequency band has become standard in many RFID application areas, especially in the industrial sector. Data carriers are interoperable and can be combined flexibly, thanks to the international radio transmission protocol ISO 15693. *BL ident*® HF device achieve transmission ranges of up to 100 cm, depending on the combination of read/write head and data carrier used. This means high operational safety for automated processes where data carriers are constantly in motion, and it also provides high flexibility for manually executed identification tasks. The data carriers are entirely maintenance-free, thanks to power supplied passively via the read/write head's electromagnetic field.
The radio interface for read/write heads and data carriers meets international uniform standards, allowing for all our *BL ident*® HF components to be installed in any application worldwide. You find the table with combination possibilities and achievable ranges of TURCK read/write heads and data carriers on page 86 ff.

Type code – HF and UHF

Type code – example

T	N	LR	...	–	Q80	–	H1147	–	S	–	Ex

Type code – explanation

T	N	LR	...	Read/write head	–	Q80	Housing	–	H1147	Connector type	/

Working frequency

blank	13.56 MHz
865	865…868 MHz
902	902…928 MHz
840/920	840.5…844.5 MHz & 920.5…924.5 MHz
902/915	902…907 MHz & 915…928 MHz
917	917…920.8 MHz

Special range

ER	extended range
LR	long range
SLR	super long range

Read/write heads, **mounting condition**

B	flush mountable
N	non-flush mountable

TURCK RFID-System *BL ident*®

Housing

M18	thread M18
M30	thread M30
Q14	rectangular 55.5 x 30 x 14 mm
CK40	rectangular 40 x 40 x 65 mm, variable orientation of active face
Q80	rectangular, 114 x 80 x 40 mm
S32XL	ring shaped, 180 x 120 x 32 mm
Q350	rectangular, 370 x 350 x 20 mm
Q80L400	rectangular, 400 x 80 x 25 mm
Q120L130	rectangular, 120 x 130 x 60 mm
Q240L280	rectangular, 238 x 278 x 86 mm
Q280L640	rectangular, 640 x 280 x 105 mm
Q175L200	rectangular, 175 x 200 x 60 mm

Connector

0,15-RS4.47T	pigtail (150 mm) with male connector M12
H1147	connector M12 x 1
H1147L	connector M12 x 1, lateral
V1147	connector M8

S	S-Number	–	Ex	Approvals

S-Number

S1126	optimized for different data carriers

Approvals

Ex	approval for Ex-Area

Type code – example

T	W	...	–	Q51	–	M	–	HT	–	B128	–	Ex

Type code – explanation

T	W	...	Data carrier	–	Q51	Housing	–	M	On metal	–

Working frequency

blank	13.56 MHz
125	125 KHz
865-868	865…868 MHz
865-928	865…928 MHz
860-960	860…960 MHz
902-928	902…928 MHz

Data carrier, memory access

W	read/write
R	read only

TURCK RFID-System *BL ident*®

Housing

R...	round & diameter
I...	inlay & dimensions
L...	label & dimensions
BD10x1.5-19	screw housing, plastic, M10 x 1.5, wrench size 19 mm
BS10x1.5-19	screw housing, metal/ plastic, M10 x 1.5, wrench size 19 mm
BV10x1.5-19	screw housing , stainless steel/ plastic, M10 x 1.5, wrench size 19 mm
QxLy	rectangular: x - width, y - length
Q51	quadratic, lateral lenght: 51 mm

On metal

M	for direct mounting on metal
MF	for direct mounting on metal, foil shielded

HT	High temperature	–	B128	Memory capacity total	–	Ex	Approvals

High temperature

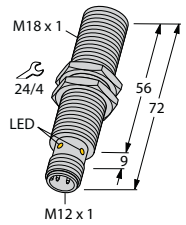
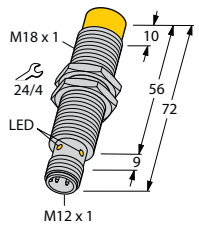
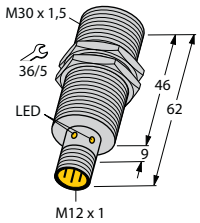
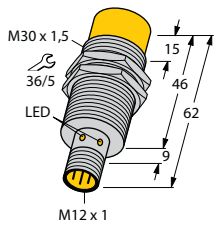
HT	High temperature

Memory capacity total

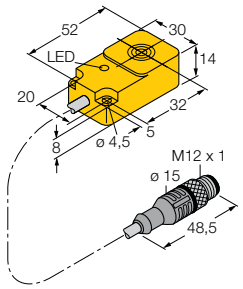
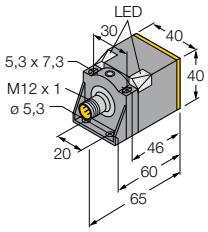
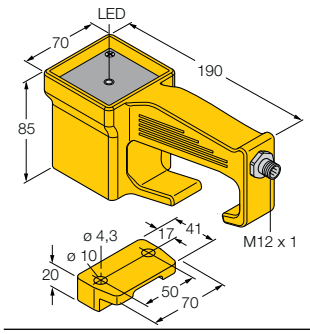
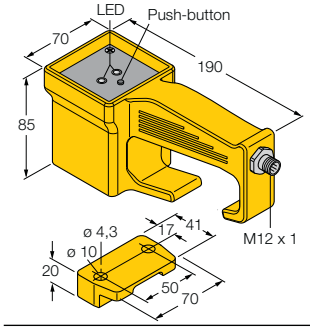
B44	44 Byte
B64	64 Byte
B110	110 Byte
B112	112 Byte
B128	128 Byte
B138	138 Byte
K2	2 kByte
K8	8 kByte

Approvals

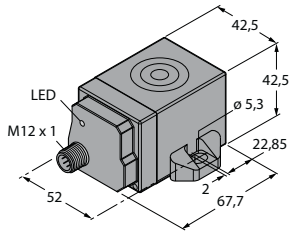
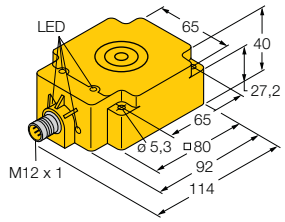
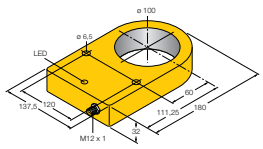
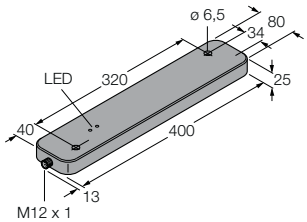
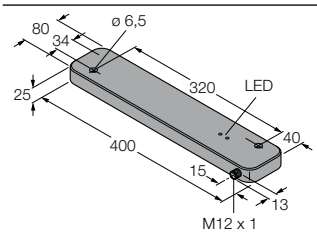
Ex	Approval for Ex-Area

	Operating frequency [MHz]	Quality active face	Mounting conditions	Housing quality	Housing length [mm]	Protection class	
	13.56	PA	flush	CuZn	72	IP67	
	13.56	LCP	flush	VA	72	IP68 / IP69K	
	13.56	LCP	flush	VA	72	IP68 / IP69K	
	13.56	PA	non-flush	CuZn	72	IP67	
	13.56	LCP	non-flush	VA	72	IP68 / IP69K	
	13.56	LCP	non-flush	VA	72	IP68 / IP69K	
	13.56	PA	flush	CuZn	62	IP67	
	13.56	LCP	flush	VA	62	IP68 / IP69K	
	13.56	LCP	flush	VA	62	IP68 / IP69K	
	13.56	PA	non-flush	CuZn	62	IP67	
	13.56	LCP	non-flush	VA	62	IP68 / IP69K	
	13.56	LCP	non-flush	VA	62	IP68 / IP69K	

Ambient temperature [°C]	Remark to product	Approval features	Ident no.	Type
-25…+70	–	–	7030001	**TB-M18-H1147**
-25…+70	Wash-Down (IP69K)	–	7030224	**TB-EM18WD-H1147**
-25…+70	ATEX	▪ ATEX category II 3 G, Ex-zone 2 ▪ ATEX category II 3 D, Ex-zone 22	7030381	**TB-EM18WD-H1147-EX**
-25…+70	–	–	7030002	**TN-M18-H1147**
-25…+70	Wash-Down (IP69K)	–	7030223	**TN-EM18WD-H1147**
-25…+70	ATEX	▪ ATEX category II 3 G, Ex-zone 2 ▪ ATEX category II 3 D, Ex-zone 22	7030382	**TN-EM18WD-H1147-EX**
-25…+70	–	–	7030003	**TB-M30-H1147**
-25…+70	Wash-Down (IP69K)	–	7030221	**TB-EM30WD-H1147**
-25…+70	ATEX	▪ ATEX category II 3 G, Ex-zone 2 ▪ ATEX category II 3 D, Ex-zone 22	7030385	**TB-EM30WD-H1147-EX**
-25…+70	–	–	7030004	**TN-M30-H1147**
-25…+70	Wash-Down (IP69K)	–	7030222	**TN-EM30WD-H1147**
-25…+70	ATEX	▪ ATEX category II 3 G, Ex-zone 2 ▪ ATEX category II 3 D, Ex-zone 22	7030386	**TN-EM30WD-H1147-EX**

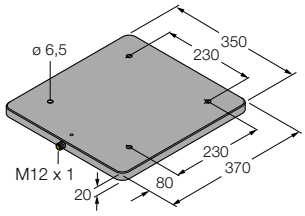
	Operating frequency [MHz]	Quality active face	Mounting conditions	Housing quality	Housing length [mm]	Protection class	
	13.56	PBT	non-flush	PBT	52	IP67	
	13.56	PA	non-flush	PBT	65	IP67	
	13.56	–	non-flush	–	190	IP67	
	13.56	–	non-flush	–	190	IP67	

	Ambient temperature [°C]	Remark to product	Approval features	Ident no.	Type
	-25…+70	Flat design	–	7030235	**TN-Q14-0.15-RS4.47T**
	-25…+70	–	–	7030006	**TN-CK40-H1147**
	-25…+70	Flexible use	–	7030236	**HT-IDENT-H1147**
	-25…+70	Flexible use	–	7030238	**HT-IDENT-H1187**

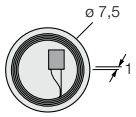
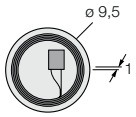
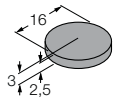
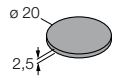
	Operating frequency [MHz]	Quality active face	Mounting conditions	Housing quality	Housing length [mm]	Protection class	
	13.56	–	non-flush	PA	68	IP68 / IP69K	
	13.56	PBT	non-flush	PBT	92	IP67	
	13.56	PBT	non-flush	PBT	92	IP67	
	13.56	PBT	non-flush	PBT	92	IP67	
	13.56	PBT	non-flush	PBT	92	IP67	
	13.56	ABS	non-flush	POM	180	IP67	
	13.56	–	non-flush	PBT	400	IP67	
	13.56	–	non-flush	PBT	400	IP67	

Ambient temperature [°C]	Remark to product	Approval features	Ident no.	Type
-25…+70	Wash-Down (IP69K), super long ranges	–	7030424	**TNSLR-Q42TWD-H1147**
-25…+70	–	–	7030007	**TN-Q80-H1147**
-25…+70	ATEX	▪ ATEX category II 3 G, Ex-zone 2 ▪ ATEX category II 3 D, Ex-zone 22	7030302	**TN-Q80-H1147-EX**
-25…+70	–	–	7030230	**TNLR-Q80-H1147**
-25…+70	ATEX	▪ ATEX category II 3 G, Ex-zone 2 ▪ ATEX category II 3 D, Ex-zone 22	7030303	**TNLR-Q80-H1147-EX**
-25…+70	–	–	7030008	**TN-S32XL-H1147**
-25…+70	For roller conveyors (vertical or horizontal orientation)	–	7030204	**TNLR-Q80L400-H1147**
-25…+70	For roller conveyors (vertical or horizontal orientation)	–	7030234	**TNLR-Q80L400-H1147L**

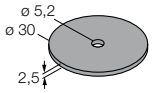
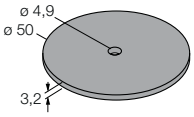
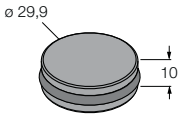
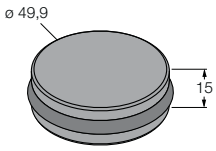
	Operating frequency [MHz]	Quality active face	Mounting conditions	Housing quality	Housing length [mm]	Protection class	
	13.56	–	non-flush	PBT	370	IP67	



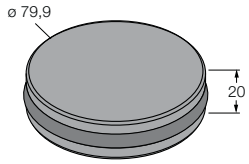
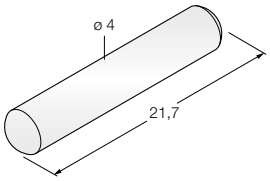
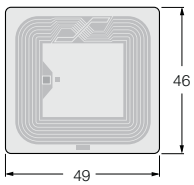
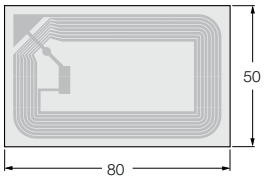
	Ambient temperature [°C]	Remark to product	Approval features	Ident no.	Type
	-25…+70	Super long ranges	–	7030454	**TNSLR-Q350-H1147**

	Operating frequency [MHz]	Quality active face	Housing quality	Housing length [mm]	Memory [Byte]	Number of read operations	Number of write operations	Typical read time [ms/Byte]	Typical write time [ms/Byte]	Protection class	
	13.56	Epoxy	Epoxy	–	128	unlimited	10^5	2	3	IP68	
	13.56	Epoxy	Epoxy	–	128	unlimited	10^5	2	3	IP68	
	13.56	PA	PA	–	128	unlimited	10^5	2	3	IP69K	
	13.56	PA	PA	–	2048	unlimited	10^{10}	0.5	0.5	IP69K	
	13.56	PA	PA	–	128	unlimited	10^5	2	3	IP69K	
	13.56	PA	PA	–	128	unlimited	10^5	2	3	IP69K	
	13.56	PA	PA	–	2048	unlimited	10^{10}	0.5	0.5	IP69K	
	13.56	PA	PA	–	2048	unlimited	10^{10}	0.5	0.5	IP69K	

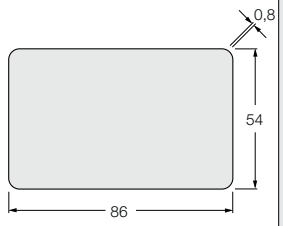
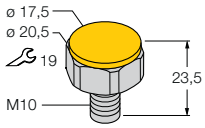
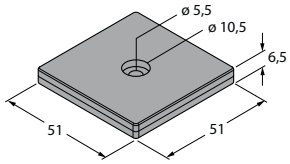
	Ambient temperature [°C]	Extended temperature range [°C]	Storage temperature [°C]	Remark to product	Approval features	Ident no.	Type
	-25…+85	–	-40…85	Small design	–	7030231	**TW-R7.5-B128**
	-25…+85	–	-40…85	Small design	–	7030252	**TW-R9.5-B128**
	-25…+85	160 (1x35 h) 220 (1x30 s)	-25…120	extended storage temperature range	–	6900501	**TW-R16-B128**
	-25…+85	160 (1x35 h) 220 (1x30 s)	-25…120	extended storage temperature range	–	7030410	**TW-R16-K2**
	-25…+85	140 (1x100 h)	-45…85	–	–	6900502	**TW-R20-B128**
	-25…+85	140 (1x100 h)	-45…85	ATEX	▪ ATEX category II 2 G, Ex-zone 1 ▪ ATEX category II 2 D, Ex-zone 21	7030242	**TW-R20-B128-EX**
	-25…+85	140 (1x100 h)	-45…85	–	–	6900505	**TW-R20-K2**
	-25…+85	140 (1x100 h)	-45…85	ATEX	▪ ATEX category II 2 G, Ex-zone 1 ▪ ATEX category II 2 D, Ex-zone 21	7030245	**TW-R20-K2-EX**

	Operating frequency [MHz]	Quality active face	Housing quality	Housing length [mm]	Memory [Byte]	Number of read operations	Number of write operations	Typical read time [ms/Byte]	Typical write time [ms/Byte]	Protection class	
	13.56	PA	PA	–	128	unlimited	10^5	2	3	IP69K	
	13.56	PA	PA	–	128	unlimited	10^5	2	3	IP69K	
	13.56	PA	PA	–	2048	unlimited	10^{10}	0.5	0.5	IP69K	
	13.56	PA	PA	–	2048	unlimited	10^{10}	0.5	0.5	IP69K	
	13.56	PA	PA	–	128	unlimited	10^5	2	3	IP69K	
	13.56	PA	PA	–	128	unlimited	10^5	2	3	IP69K	
	13.56	PA	PA	–	2048	unlimited	10^{10}	0.5	0.5	IP69K	
	13.56	PA	PA	–	2048	unlimited	10^{10}	0.5	0.5	IP69K	
	13.56	PA	PA	–	8192	unlimited	10^{10}	0.5	0.5	IP69K	
	13.56	PET	PET	–	128	unlimited	10^5	2	3	IP68	
	13.56	PET	PET	–	2048	unlimited	10^{10}	0.5	0.5	IP68	
	13.56	PET	PET	–	128	unlimited	10^5	2	3	IP68	
	13.56	PET	PET	–	2048	unlimited	10^{10}	0.5	0.5	IP68	

Ambient temperature [°C]	Extended temperature range [°C]	Storage temperature [°C]	Remark to product	Approval features	Ident no.	Type
-25…+85	140 (1x100 h)	-45…85	–	–	6900503	**TW-R30-B128**
-25…+85	140 (1x100 h)	-45…85	ATEX	▪ ATEX category II 2 G, Ex-zone 1 ▪ ATEX category II 2 D, Ex-zone 21	7030243	**TW-R30-B128-EX**
-25…+85	140 (1x100 h)	-45…85	–	–	6900506	**TW-R30-K2**
-25…+85	140 (1x100 h)	-45…85	ATEX	▪ ATEX category II 2 G, Ex-zone 1 ▪ ATEX category II 2 D, Ex-zone 21	7030246	**TW-R30-K2-EX**
-25…+85	140 (1x100 h)	-45…85	–	–	6900504	**TW-R50-B128**
-25…+85	140 (1x100 h)	-45…85	ATEX	▪ ATEX category II 2 G, Ex-zone 1 ▪ ATEX category II 2 D, Ex-zone 21	7030244	**TW-R50-B128-EX**
-25…+85	140 (1x100 h)	-45…85	–	–	6900507	**TW-R50-K2**
-25…+85	140 (1x100 h)	-45…85	ATEX	▪ ATEX category II 2 G, Ex-zone 1 ▪ ATEX category II 2 D, Ex-zone 21	7030247	**TW-R50-K2-EX**
-25…+85	140 (1x100 h)	-45…85	–	–	7030233	**TW-R50-K8**
-25…+85	140 (1x100 h)	-45…85	for mounting in/on metal	–	7030210	**TW-R30-M-B128**
-25…+85	140 (1x100 h)	-45…85	for mounting in/on metal	–	7030206	**TW-R30-M-K2**
-25…+85	140 (1x100 h)	-45…85	for mounting in/on metal	–	7030209	**TW-R50-M-B128**
-25…+85	140 (1x100 h)	-45…85	for mounting in/on metal	–	7030229	**TW-R50-M-K2**

	Operating frequency [MHz]	Quality active face	Housing quality	Housing length [mm]	Memory [Byte]	Number of read operations	Number of write operations	Typical read time [ms/Byte]	Typical write time [ms/Byte]	Protection class	
	13.56	PET	PET	–	128	unlimited	10^5	2	3	IP68	
	13.56	PET	PET	–	2048	unlimited	10^{10}	0.5	0.5	IP68	
	13.56	glass	–	–	128	unlimited	10^5	2	3	IP68	
	13.56	PP	PET	–	128	unlimited	10^5	2	3	IP40	
	13.56	Paper	PET	–	128	unlimited	10^5	2	3	IP40	

	Ambient temperature [°C]	Extended temperature range [°C]	Storage temperature [°C]	Remark to product	Approval features	Ident no.	Type
	-25…+85	140 (1x100 h)	-45…85	for mounting in/on metal	–	7030207	**TW-R80-M-B128**
	-25…+85	140 (1x100 h)	-45…85	for mounting in/on metal	–	7030205	**TW-R80-M-K2**
	-25…+85	–	-40…140	Glass data-carrier, for use in autoclaves	–	7030237	**TW-R4-22-B128**
	-20…+70	–	-20…70	Smart-Label, self-adhesive	–	7030390	**TW-L49-46-F-B128**
	-20…+70	–	-20…70	Smart-Label, self-adhesive	–	7030389	**TW-L80-50-P-B128**

	Operating frequency [MHz]	Quality active face	Housing quality	Housing length [mm]	Memory [Byte]	Number of read operations	Number of write operations	Typical read time [ms/Byte]	Typical write time [ms/Byte]	Protection class	
	13.56	PC	PC	–	128	unlimited	10^5	2	3	IP67	
	13.56	POM	POM	–	128	unlimited	10^5	2	3	IP68	
	13.56	POM	POM	–	2048	unlimited	10^{10}	0.5	0.5	IP68	
	13.56	LCP	S235JRG2/ LCP	–	128	unlimited	10^5	2	3	IP68	
	13.56	LCP	S235JRG2/ LCP	–	2048	unlimited	10^{10}	0.5	0.5	IP68	
	13.56	PA	1.4401/ LCP	–	128	unlimited	10^5	2	3	IP68	
	13.56	PA	1.4401/ LCP	–	2048	unlimited	10^{10}	0.5	0.5	IP68	
	13.56	PPS	–	51	128	unlimited	10^5	2	3	IP68	

	Ambient temperature [°C]	Extended temperature range [°C]	Storage temperature [°C]	Remark to product	Approval features	Ident no.	Type
	-25…+50	–	-25…50	credit-card size	–	6900479	**TW-L86-54-C-B128**
	-25…+85	–	-45…85	data carrier, can be screwed in metal	–	6901384	**TW-BD10X1.5-19-B128**
	-25…+85	–	-45…85	data carrier, can be screwed in metal	–	6901381	**TW-BD10X1.5-19-K2**
	-25…+85	–	-45…85	data carrier, can be screwed in metal	–	6901383	**TW-BS10X1.5-19-B128**
	-25…+85	–	-45…85	data carrier, can be screwed in metal	–	6901380	**TW-BS10X1.5-19-K2**
	-25…+85	–	-45…85	data carrier, can be screwed in metal	–	6901385	**TW-BV10X1.5-19-B128**
	-25…+85	–	-45…85	data carrier, can be screwed in metal	–	6901382	**TW-BV10X1.5-19-K2**
	-25…+85	200 (60 min.) 220 (45 min.)	-55…185	High- temperature, for use in autoclaves	–	7030364	**TW-Q51-HT-B128**

Data carriers	Read/write heads	TB-M18-H1147	TB-EM18WD-H1147	TN-M18-H1147	TN-EM18WD-H1147	TB-EM18WD-H1147-EX	TN-EM18WD-H1147-EX	TB-M30-H1147	TB-EM30WD-H1147	TN-M30-H1147	TN-EM30WD-H1147	TB-EM30WD-H1147-EX	TN-EM30WD-H1147-EX	
TW-R7.5-B128	**E**	8	8	8	8			8	8	10	10			
	M	14	14	16	16			18	18	30	30			
	L	16	16	20	20			20	20	28	28			
TW-R9.5-B128	**E**	9	9	9	9			9	9	11	11			
	M	15	15	18	18			20	20	33	33			
	L	18	18	22	22			22	22	31	31			
TW-R16-B128	**E**	10	10	12	12			12	12	20	20			
	M	17	17	23	23			23	23	38	38			
	L	14	14	26	26			20	20	44	44			
TW-R16-K2	**E**	10	10	12	12			12	12	20	20			
	M	17	17	23	23			23	23	38	38			
	L	14	14	26	26			20	20	44	44			
TW-R20-B128	**E**	8	8	10	10			15	15	22	22			
	M	15	15	22	22			27	27	40	40			
	L	12	12	26	26			20	20	34	34			
TW-R30-B128	**E**	8	8	10	10			13	13	22	22			
	M	17	17	25	25			30	30	43	43			
	L	22	22	34	34			32	32	56	56			
TW-R20-K2	**E**	5	5	12	12			15	15	17	17			
	M	12	12	20	20			22	22	31	31			
	L	16	16	24	24			20	20	32	32			
TW-R30-K2	**E**	6	6	16	16			15	15	23	23			
	M	14	14	31	31			27	27	42	42			
	L	18	18	32	32			32	32	50	50			
TW-L49-46-F-B128	**E**	12	12	21	21			21	21	25	25			
	M	25	25	38	38			35	35	54	54			
	L	29	29	37	37			37	37	57	57			
TW-L80-50-P-B128	**E**	12	12	17	17			17	17	25	25			
	M	20	20	34	34			36	36	55	55			
	L	54	54	61	61			64	64	71	71			
TW-BD10x1.5-19-K2	**E**	6	6											
	M	14	14											
	L	16	16											
TW-R30-M-B128	**E**	8	8	6	6									
	M	12	12	14	14									
	L	16	16	16	16									
TW-R50-M-B128	**E**	8	8	10	10			15	15	20	20			
	M	18	18	22	22			27	27	36	36			
	L	22	22	22	22			22	22	34	34			
TW-R30-M-K2	**E**	7	7	6	6									
	M	10	10	13	13									
	L	18	18	10	10									
TW-R50-M-K2	**E**	7	7	10	10			10	10	15	15			
	M	15	15	22	22			21	21	30	30			
	L	24	24	32	32			26	26	32	32			
TW-R4-22-B128	**E**	3	3	5	5			5	5	10	10			
	M	9	9	13	13			16	16	28	28			
	L	12	12	20	20			22	22	38	38			
TW-L86-54-C-B128	**E**	10	10	15	15			20	20	30	30			
	M	21	21	39	39			45	45	77	77			
	L	70	70	74	74			80	80	92	92			

read/write range [mm]: E = recommended; M = maximum; L = Length of transmission zone at recommended range

NOTE :
The maximum read/write range (M) and length of the transmission zone (L) are standard values measured under laboratory conditions.

TN-CK40-H1147	HT-IDENT-H1147	HT-IDENT-H1187	TN-Q14-0.15-RS4.47T	TN-Q80-H1147	TN-Q80-H1147-EX	TNLR-Q80-H1147	TNLR-Q80-H1147-EX	TNLR-Q80L400-H1147 (längs)	TNLR-Q80L400-H1147 (quer)	TNLR-Q80L400-H1147L (längs)	TNLR-Q80L400-H1147L (quer)	TNLR-Q350-H1147	TN-S32XL-H1147	TNSLR-Q42TWD-H1147	TNSLR-Q350-H1147
13	13	13	10	10		20								20	
30	30	30	30	34		41								41	
42	42	42	28	62		60								60	
14	14	14	11	11		22								22	
33	33	33	33	37		45								45	
46	46	46	31	68		66								66	
28	28	28	20	20		50		30	50	50	30	60	20	50	72
50	50	50	38	52		85		95	95	95	95	203	67	85	244
54	54	54	44	60		90		410	74	74	410	360	125	90	432
28	28	28	20	20		50		30	50	50	30	60	20	50	72
50	50	50	38	52		85		95	95	95	95	203	67	85	244
54	54	54	44	60		90		410	74	74	410	360	125	90	432
30	30	30	22	35		50		40	60	60	40	100	36	50	120
50	50	50	40	65		88		102	102	102	102	215	72	88	258
50	50	50	34	72		92		404	86	86	404	350	103	92	420
30	30	30	22	35		60		60	90	90	60	80	30	60	96
53	53	53	43	72		115		152	152	152	152	218	80	115	262
62	62	62	56	80		116		434	132	132	434	350	120	116	420
22	22	22	17	25		40		30	15	15	30	80	20	40	96
40	40	40	31	52		75		64	64	64	64	155	60	75	186
36	36	36	32	70		84		390	70	70	390	310	130	84	372
30	30	30	23	35		60		50	70	70	50	100	30	60	120
55	55	55	42	67		98		122	122	122	122	250	82	98	300
56	56	56	50	80		104		416	100	100	416	380	132	104	456
42	42	42	25	51		76		68	74	74	68	170	68	76	204
76	76	76	54	97		131		176	175	176	176	353	119	131	424
80	80	80	57	98		136		394	149	149	394	389	148	136	467
42	42	42	25	55		76			136	136		204	68	76	245
81	81	81	55	108		142			229	229		425	136	142	510
93	93	93	71	115		144			204	204		440	161	144	528
23	23	23	20	25		35								35	
46	46	46	36	53		58								58	
48	48	48	34	66		64								64	
15	15	15	15	15		30								30	
37	37	37	30	41		58								58	
46	46	46	32	58		76								76	
20	20	20	10	20		40		20	40	40	20	50	10	40	60
40	40	40	20	48		73		80	78	78	80	197	42	73	236
50	50	50	32	68		86		368	68	68	368	328	118	86	394
60	60	60	20	70		120		120	200	200	120	360	90	120	432
115	115	115	65	146		215		360	345	345	360	662	180	215	794
132	132	132	98	158		214		484	306	306	484	660	206	214	792

Data carriers: = PHILIPS I-Code SLI (SL2) = Fujitsu FRAM

Data carriers	Read/write heads	TB-M18-H1147	TB-EM18WD-H1147	TN-M18-H1147	TN-EM18WD-H1147	TB-EM18WD-H1147-EX	TN-EM18WD-H1147-EX	TB-M30-H1147	TB-EM30WD-H1147	TN-M30-H1147	TN-EM30WD-H1147	TB-EM30WD-H1147-EX	TN-EM30WD-H1147-EX
TW-R50-B128	E			20	20			20	20	40	40		
	M			41	41			43	43	72	72		
	L			70	70			46	46	76	76		
TW-Q51-HT-B128	E			22	22			22	22	44	44		
	M			45	45			47	47	79	79		
	L			77	77			51	51	84	84		
TW-R50-K2	E			12	12			15	15	30	30		
	M			30	30			33	33	58	58		
	L			60	60			36	36	76	76		
TW-BD10X1.5-19-K2	E			8	8			10	10				
	M			17	17			20	20				
	L			22	22			22	22				
TW-R20-B128-EX	E					8	8					15	22
	M					15	15					27	40
	L					12	12					20	34
TW-R20-K2-EX	E					5	5					15	17
	M					12	12					22	31
	L					16	16					20	32
TW-R30-B128-EX	E					8	8					13	22
	M					17	17					30	43
	L					22	22					32	56
TW-R30-K2-EX	E					6	6					15	23
	M					14	14					27	42
	L					18	18					32	50
TW-R50-B128-EX	E						20					20	40
	M						41					43	72
	L						70					46	76
TW-R50-K2-EX	E						12					15	30
	M						30					33	58
	L						60					36	76
TW-BS10X1.5-19-K2	E							4	4				
	M							12	12				
	L							17	17				
TW-BS10X1.5-19-B128	E									5	5		
	M									15	15		
	L									21	21		
TW-BD10X1.5-19-B128	E									14	14		
	M									29	29		
	L									30	30		
TW-R80-M-B128	E												
	M												
	L												
TW-R80-M-K2	E												
	M												
	L												
TW-L80-50-F-B128	E												
	M												
	L												

read/write range [mm]: E = recommended; M = maximum; L = Length of transmission zone at recommended range

NOTE :
The maximum read/write range (M) and length of the transmission zone (L) are standard values measured under laboratory conditions.

	TN-CK40-H1147	HT-IDENT-H1147	HT-IDENT-H1187	TN-Q14-0.15-RS4.47T	TN-Q80-H1147	TN-Q80-H1147-EX	TNLR-Q80-H1147	TNLR-Q80-H1147-EX	TNLR-Q80L400-H1147 (längs)	TNLR-Q80L400-H1147 (quer)	TNLR-Q80L400-H1147L (längs)	TNLR-Q80L400-H1147L (quer)	TNLR-Q350-H1147	TN-S32XL-H1147	TNSLR-Q42TWD-H1147	TNSLR-Q350-H1147
	45 85 96	45 85 96	45 85 96	40 72 76	65 118 120		80 165 168		100 256 484	150 256 230	150 256 230	100 256 484	200 462 530	80 150 160	80 165 168	240 554 636
	50 94 106	50 94 106	50 94 106	44 79 84	72 130 132		88 182 185		110 282 532	165 282 253	165 282 253	110 282 532	220 508 583	88 165 176	88 165 176	264 609 700
	38 81 82	38 81 82	38 81 82	30 58 76	50 100 110		90 144 150		90 216 466	120 216 190	120 216 190	90 216 466	200 405 480	60 128 160	90 144 150	240 486 576
	20 39 44	20 39 44	20 39 44													
						35 65 72		50 88 92								
						25 52 70		40 75 84								
						35 72 80		60 115 116								
						35 67 80		60 98 104								
								80 165 168								
						50 100 110		90 144 150								
	6 18 34	6 18 34	6 18 34													
				5 15 21												
				14 29 30												
	25 53 68	25 53 68	25 53 68		40 76 76		50 90 90		30 77 398	40 77 56	40 77 56	30 77 398				
	15 47 54	15 47 54	15 47 54		20 55 64		35 78 80		30 68 390	30 77 64	30 77 64	30 68 390				
									85 229 414			85 229 414				

Data carriers: = PHILIPS I-Code SLI (SL2) = Fujitsu FRAM

Read/write heads and data carriers – UHF

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BL ident® read/write heads and data carriers – UHF

High-speed transmission of data across long ranges are the core features of RFID systems transmitting within a frequency band of 865…928 MHz (UHF). Therefore UHF became standard for applications demanding greater distances between read/write head and data carrier.
The international radio transmission protocol ISO 18000-6 C, based on EPCglobal Class 1 Gen 2, guarantees moreover investment security and flexibility regarding the combination of read/write heads and data carriers for UHF applications.
The achievable ranges depend on the individual application conditions and the combination of read/write heads and data carriers used. Radio ranges of several meters are possible with the *BL ident*® system. This means high operational safety for automated processes where data carriers are constantly in motion, and it also provides high flexibility for manually executed identification tasks. The *BL ident*® data carriers are entirely maintenance-free, thanks to power supplied passively via the read/write head's electromagnetic field.
Bulk reading is also possible: *BL ident*® systems using UHF frequencies are capable of reading many data carriers of the same type simultaneously automatically, once they are in the air-interface of the read/write head. This saves you valuable processing time with each identification event.

Type code – HF and UHF

Type code – example

T	N	LR	...	–	Q80	–	H1147	–	S	–	Ex

Type code – explanation

T	N	LR	...	Read/write head	–	Q80	Housing	–	H1147	Connector type	/

Working frequency

blank	13.56 MHz
865	865…868 MHz
902	902…928 MHz
840/920	840.5…844.5 MHz & 920.5…924.5 MHz
902/915	902…907 MHz & 915…928 MHz
917	917…920.8 MHz

Special range

ER	extended range
LR	long range
SLR	super long range

Read/write heads, **mounting condition**

B	flush mountable
N	non-flush mountable

TURCK RFID-System *BL ident*®

Housing

M18	thread M18
M30	thread M30
Q14	rectangular 55.5 x 30 x 14 mm
CK40	rectangular 40 x 40 x 65 mm, variable orientation of active face
Q80	rectangular, 114 x 80 x 40 mm
S32XL	ring shaped, 180 x 120 x 32 mm
Q350	rectangular, 370 x 350 x 20 mm
Q80L400	rectangular, 400 x 80 x 25 mm
Q120L130	rectangular, 120 x 130 x 60 mm
Q240L280	rectangular, 238 x 278 x 86 mm
Q280L640	rectangular, 640 x 280 x 105 mm
Q175L200	rectangular, 175 x 200 x 60 mm

Connector

0,15-RS4.47T	pigtail (150 mm) with male connector M12
H1147	connector M12 x 1
H1147L	connector M12 x 1, lateral
V1147	connector M8

S	S-Number	–	Ex	Approvals

S-Number

S1126	optimized for different data carriers

Approvals

Ex	approval for Ex-Area

UHF HF and LF

Type code – example

T	W	...	–	Q51	–	M	–	HT	–	B128	–	Ex

Type code – explanation

T	W	...	Data carrier	–	Q51	Housing	–	M	On metal	–

Working frequency

blank	13.56 MHz
125	125 KHz
865-868	865…868 MHz
865-928	865…928 MHz
860-960	860…960 MHz
902-928	902…928 MHz

Data carrier, memory access

W	read/write
R	read only

TURCK RFID-System *BL ident*®

Housing

R...	round & diameter
I...	inlay & dimensions
L...	label & dimensions
BD10x1.5-19	screw housing, plastic, M10 x 1.5, wrench size 19 mm
BS10x1.5-19	screw housing, metal/ plastic, M10 x 1.5, wrench size 19 mm
BV10x1.5-19	screw housing , stainless steel/ plastic, M10 x 1.5, wrench size 19 mm
QxLy	rectangular: x - width, y - length
Q51	quadratic, lateral lenght: 51 mm

On metal

M	for direct mounting on metal
MF	for direct mounting on metal, foil shielded

HT	High temperature	–	B128	Memory capacity total	–	Ex	Approvals

High temperature

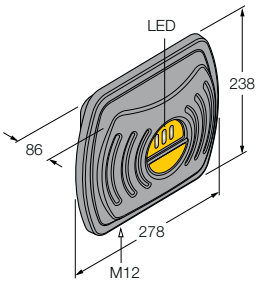
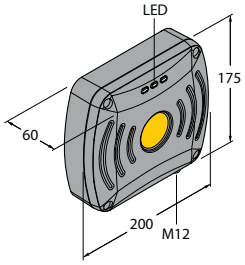
HT	High temperature

Memory capacity total

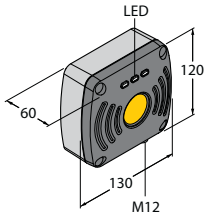
B44	44 Byte
B64	64 Byte
B110	110 Byte
B112	112 Byte
B128	128 Byte
B138	138 Byte
K2	2 kByte
K8	8 kByte

Approvals

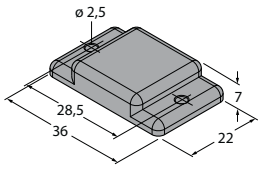
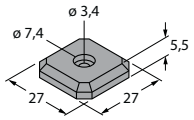
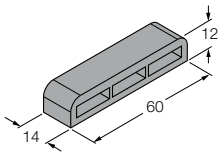
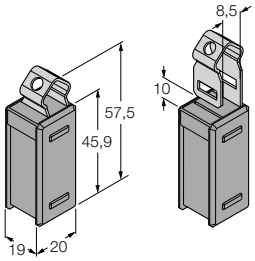
Ex	Approval for Ex-Area

	Operating frequency [MHz]	Quality active face	Mounting conditions	Housing quality	
	865…868	ABS	non-flush	AL	
	902…928	ABS	non-flush	AL	
	920…925	ABS	non-flush	AL	
	902…907.5 + 915…928	ABS	non-flush	AL	
	865…868	ABS	non-flush	AL	
	902…928	ABS	non-flush	AL	
	920…925	ABS	non-flush	AL	
	917…920.8	ABS	non-flush	AL	

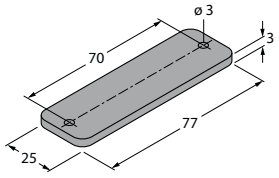
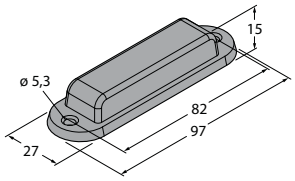
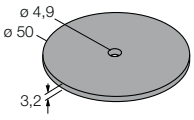
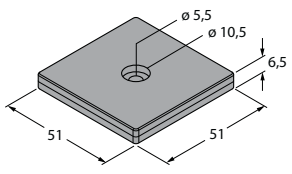
Devices available from 10/2013. Technical change to alterations.

	865…868	ABS	non-flush	AL	
	902…928	ABS	non-flush	AL	
	920…925	ABS	non-flush	AL	
	917…920.8	ABS	non-flush	AL	

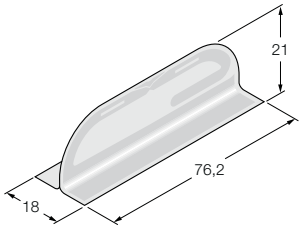
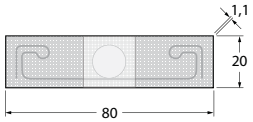
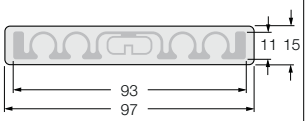
	Housing length [mm]	Protection class	Ambient temperature [°C]	Wiring diagram 3	Ident no.	Type
	278	IP65	-20…+50	w009	7030295	**TN865-Q240L280-H1147**
	278	IP65	-20…+50	w009	7030304	**TN902-Q240L280-H1147**
	278	IP65	-20…+50	w009	7030360	**TN840/920-Q240L280-H1147**
	278	IP65	-20…+50	w009	7030465	**TN902/915-Q240L280-H1147**
	200	IP67	-25…+50	w009	7030452	**TN865-Q175L200-H1147**
	200	IP67	-25…+50	w009	7030457	**TN902-Q175L200-H1147**
	200	IP67	-25…+50	w009	7030466	**TN840/920-Q175L200-H1147**
	200	IP67	-25…+50	w009	7030513	**TN917-Q175L200-H1147**
	130	IP67	-25…+50	w009	7030520	**TN865-Q120L130-H1147**
	130	IP67	-25…+50	w009	7030535	**TN902-Q120L130-H1147**
	130	IP67	-25…+50	w009	7030536	**TN840/920-Q120L130-H1147**
	130	IP67	-25…+50	w009	7030537	**TN917-Q120L130-H1147**

	Operating frequency [MHz]	Quality active face	Housing quality	Housing length [mm]	Memory [Byte]	Number of read operations	Number of write operations	Typical read time [ms/Byte]	Typical write time [ms/Byte]	Protection class	Ambient temperature [°C]	
	865…868	TPE	–	36	112	unlimited	10^5	2	3	IP67	-40…+85	
	865…868	–	PA	–	112	unlimited	10^5	2	3	IP68	-20…+80	
	902…928	–	–	–	112	unlimited	10^5	2	3	IP68	-20…+80	
	865…868	–	–	–	110	unlimited	10^4	2	3	IP67	-35…+85	
	902…928	–	–	–	110	unlimited	10^4	2	3	IP67	-35…+85	
	865…928	–	–	–	110	unlimited	10^4	2	3	IP67	-30…+70	

	Extended temperature range [°C]	Storage temperature [°C]	Remark to product	Mechanische Features	Ident no.	Type
	–	-40…200	High-temperature, for direct mounting on metal	▪ Only for direct mounting on metal	7030450	**TW865-868-Q22L36-M-HT-B112**
	–	-20…80	For direct mounting on metal	▪ Only for direct mounting on metal	7030374	**TW865-868-Q27-M-B112**
	–	-20…80	For direct mounting on metal	▪ Only for direct mounting on metal	7030406	**TW902-928-Q27-M-B112**
	–	-35…85	For direct mounting on metal and outdoor use	▪ For direct mounting on metal	7030376	**TW865-868-Q14L60-M-B110**
	–	-35…85	For direct mounting on metal and outdoor use	▪ For direct mounting on metal	7030408	**TW902-928-Q14L60-M-B110**
	–	-30…70	–	▪ Mounted with metal eyelet	7030375	**TW865-928-Q20L58-B110**

	Operating frequency [MHz]	Quality active face	Housing quality	Housing length [mm]	Memory [Byte]	Number of read operations	Number of write operations	Typical read time [ms/Byte]	Typical write time [ms/Byte]	Protection class	Ambient temperature [°C]	
	860…960	TPE	TPE	77	112	unlimited	10^5	2	3	IP67	-40…+70	
	860…960	–	Polycarbonate/ABS	97	112	unlimited	10^5	2	3	IP69K	-40…+80	
	865…868	PA	PA	–	110	unlimited	10^4	2	3	IP69K	-20…+85	
	902…928	PA	PA	–	110	unlimited	10^4	2	3	IP69K	-20…+85	
	865…868	PPS	–	51	110	unlimited	10^4	2	3	IP68	-25…+85	

	Extended temperature range [°C]	Storage temperature [°C]	Remark to product	Mechanische Features	Ident no.	Type
	–	-40…70	–	▪ Flexible design, for mounting on curved or irregular surfaces	7030458	**TW860-960-Q25L77-B-B112**
	–	-40…80	For direct mounting on metal and outdoor use	▪ For direct mounting on metal	7030464	**TW860-960-Q27L97-M-B112**
	140 (1x100 h)	-40…90	–	–	7030257	**TW865-868-R50-B110**
	140 (1x100 h)	-40…90	–	–	7030404	**TW902-928-R50-B110**
	200 (60 min.) 220 (45 min.)	-55…185	High-temperature	–	7030447	**TW865-868-Q51-HT-B110**

	Operating frequency [MHz]	Quality active face	Housing quality	Housing length [mm]	Memory [Byte]	Number of read operations	Number of write operations	Typical read time [ms/Byte]	Typical write time [ms/Byte]	Protection class	Ambient temperature [°C]	
	865…928	PET	PET	–	110	unlimited	10^4	2	3	IP67	-35…+85	
	865…868	–	–	–	44	unlimited	10^5	2	3	IP40	-20…+65	
	860…960	PET	PET	97	44	unlimited	10^5	2	3	IP40	-10…+85	

	Extended temperature range [°C]	Storage temperature [°C]	Remark to product	Mechanische Features	Ident no.	Type
	–	-35…85	Smart-Label, self-adhesive	▪ For direct mounting on metal	7030380	**TW865-928-L76-18-21-F-M-B110**
	180 (up to 5 bar for 10 minutes)	–	Smart-Label, self-adhesive	–	7030484	**TW865-868-L80-20-T-B44**
	–	–	Smart-Label, self-adhesive	–	7030524	**TW860-960-L97-15-F-B44**

General information

Materials – Abbreviations and definitions

ABS

ABS Acrylonitrile-Butadiene-Styrene
Impact resistant, stiff

AL

Al Aluminium
Low specific weight, good resistance to oxidation

CuZn-Ni

Nickel-plated brass

EP

EP Epoxy resin
Is a compound of polymers (Polyether) and a suitable hardener, forming a thermosetting plastic of high durability and chemical resistance.

LCP

LCP Liquid Cristal Polymers, liquid cristal Copolyester
High thermostability and resistance to chemicals, low thermal expansion, good chemical properties, flame retardant

PA

PA (Polyamide)
Wear-free, stiff, impact resistant, good thermostability

PBT

PBT Polybutylene Terephthalate (thermoplastic polyester)
Rigid, stiff, solid, tough (even at low temperatures), good resistance to chemicals, flame retardant, self-extinguishing and UV resistant

PC

PC Polycarbonate
transparent, highly resistant to impacts, very stiff, solid, tough, good thermostability, flame retardant, self-extinguishing

PET

PET Polyethylene Terephthalate
Highly formstable, rugged and stiff, highly wear-free

POM

POM Polyoxymethylene
Highly resistant to impacts, good mechanical stability, good resistant to chemicals

PP

PP Polypropylene
Excellent resistance to chemicals, even to acids, alkalis and solvents, high thermostability, high mechanical stability

PPS

PPS Polyphenylene Sulfide
Highly rugged and thermostable, high resistance against chemicals, flame-retardant.

PTFE

PTFE Polytetrafluorethylene;
Highly thermostable and chemical-resistant plastic

PUR

PUR Polyurethane
Elastic, wear-free, impact resistant, good resistance to oils, lubricants and solvents

S235JR

S235JR unalloyed structural steel acc. to EN 10025
Material no. 1.0038; former DIN 17100 St37-2

TPE

TPE Thermoplastic Elastomer:
Thermoplastic elastomers are plastics behaving similar to conventional elastomers at room temperature but deform under heat supply.

TPU

TPU Thermoplastic Polyurethane (PUR) Elastomer:
Highly impact resistant and formstable, resistant to many chemicals, thermostable, broad temperature range.

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ULTEM (PEI)

PEI Polyetherimide
Highly rugged, stiff and hard, high thermostability, operates in a broad temperature range, good resistance to high-energy radiation, flame retardant and self-extinguishing, transparent and UV resistant

V4A

VA high-quality stainless steel
V4A denotes a certain type of steel and stands for the CrNiMo steels with the material grade numbers 1.4401 (AISI 316), 1.4571 (AISI 316Ti) and 1.4404 (AISI 316L)

VA

VA high-quality stainless steel
Corrosion and acid-resistant steel, highly stable for higher demands – also suitable for the food industry

Explosion protection

Directives and standards

History

Until the end of 1975, numerous national directives covering the field of explosion protection existed in the individual European states. On 18 December 1975, the first framework directive on explosion protection above ground came into effect, applying in the member states of the European Union: 76/117/EWG.

Until 1990, the directive 76/117/EWG was modified several times. The different national directives were directly related to standards that applied exclusively to electrical equipment and to explosion protection above ground. The fact that national directives were still in effect restricted free trade in this area.

In the beginning of 1994, the "Framework Directive 94/9/EC of the European Parliament and Council of 23 March 1994 on the approximation of the laws of the Member States concerning equipment andprotective systems intended for use in potentially explosive atmospheres" was passed. This directive has regard to the "European Treaty" of 1985, in particular article 100a (amendment of 2 February 1992), establishing the European Community.

„ATEX 100a" is the common shortcut for it and is derived from the French "atmosphère explosible" (explosive atmosphere). In addition to article 100a, there are further articles which are in progress of being transposed into directives. Whenever the ATEX directive is quoted in our TURCK documentation, reference is made to the new directive of explosion protection ATEX 100a.

Within the member states of the European Union the ATEX 100a was translated into national legislation, e.g. in the Federal Republic of Germany by the "Gerätesicherheitsgesetz (§11 GSGV)" – since 1 December 2011 „ Produktsicherheitsgesetzt (§34 ProdSG) and the "Explosionsschutzverordnung (EXVO) (11. ProdSV)".

The national directives applying for explosion protection were valid until 30.06.2003. The ATEX 100a came into force on the 01.07.2003 and has been updated and renamed to ATEX 95a.
Efforts to harmonize the explosion protection directives on international level, resulted in the establishment of the IEC 60079. The pursuit towards free trade worldwide was the leading motive for it. In a first step, the IECEx framework was defined, fixing the conditions of approval for devices. Furthermore a quality management system is stipulated which is binding for the manufacturer.

Installation and operation of electrical equipment in hazardous areas – standards and regulations

Involved with installation, acceptance and operation of electrical equipment are:

- The legislator having industrial supervision, trade organizations, TÜV and experts as supervisory authorities.
- All plant personnel are required to observe strict guidelines such as health and safety and other work regulations that govern the maintenance and operation of electrical equipment located in the hazardous area.
- Plant builders who must meet safety requirements according to EN 60079-14, (RL 1999/92/EG), ATEX 137.
- The manufacturers of components bound by constructional requirements set forth by IEC/EN 60079 resp. ATEX 95a (RL 94/9/EG).

EN 60079-14 resp. DIN VDE 0165 – Installation of electrical equipment in explosion hazardous areas

The DIN VDE 0165 includes the safety requirements that must be observed (e. g. identification and classification of explosion hazardous locations, temperature classes, cable routing, requirements for the installation of electrical devices in zones 0, 1 and 2, many specific provisions). Contrary to the standards described above, which are primarily for manufacturers, this standard applies to plant builders, operators and test personnel.

The rules for interconnection derive from the installation regulations acc. to IEC 60079-14 or rather EN 60079-14. According to these, the safety-related maximum values of the equipment's input and output parameters must be compared in order to evaluate if several interconnected devices with intrinsically safe circuits comply with the demands on intrinsic safety.

BetrSichV – Industrial safety regulations

The industrial safety regulations BetrSichV provides information about the safety and health protection of work equipment and their intended use. Furthermore BetrSichV regulates the operational safety of systems requiring monitoring and the organization of health and safety of workers.

ATEX 137 – Directive for system operators

The directive 1999/92/EC of the European Parliament and Council of 16 December concerning the essential health and

safety requirements is intended to guard workers against the potential hazards of an explosive atmosphere (formerly ATEX 118, now ATEX 137). It is directed at system operators and employers and contains binding regulations. Among other things, this stipulates the assessment of risks resulting from a potentially explosive atmosphere, the keeping of areas exposed to potentially explosive atmospheres and the keeping of an explosion protection document.

ExVO – Explosion protection directive

The ExVO regulates the placing on the market of devices, protective systems and components intended for use in potentially explosive atmospheres and is the German transposition of the directive 94/9/EC. It describes the essential health and safety requirements and mandatory conformity assessment procedures. The ExVO is thus mainly aimed at manufacturers of devices, maintenance and test personnel.

Like the directive 94/9/EC, ExVO excludes the following equipment from its scope (summarised): Medical devices, explosive substances, or unstable chemicals, personnel protection equipment, seagoing vessels, offshore systems and products for military purposes.

EN 60079-0 – Electrical equipment for use in explosion hazardous areas, general requirements

EN 60079-0 contains general provisions for the construction and testing of any electrical apparatus to be used in explosion hazardous areas. The EN 60079 standards listed below describe different technical implementations of ignition protection classes:

- Pressure-tight encapsulation (EN 60079-1)
- Pressurized encapsulation (EN 60079-2)
- Powder-filled encapsulation (EN 60079-5)
- Oil immersion (EN 60079-6)
- Increased safety (EN 60079-7)
- Intrinsic safety (EN 60079-11)
- Ignition protection n (EN 60079-15)
- Moulded encapsulation (EN 60079-18)
- Intrinsically safe electrical systems (EN 60079-25)
- Optical radiation (EN 60079-28)

EN 60079-11 – Increased safety (i)

All methods of protection attempt to contain an explosion on the inside of the housing and to prevent penetration of an ignitable gaseous mixture.

The method of "intrinsic safety" is based on a different approach. It limits the electrical energy to such an extent, that elevated temperatures, sparks or arcs are incapable of generating the energy needed to ignite an explosive atmosphere.

Due to the limitation of electrical energy, these circuits are especially suited to application in the field of measuring, control and instrumentation. The method of "intrinsic safety" has some significant advantages over other protection methods, e.g. maintenance and wiring of live circuits. Thanks to the use of inexpensive components, these systems are easy to handle and cost effective, and several suppliers offer components with protection class „i".

Definition of terms

Explosion

An explosion is an exothermic reaction of a material (such as gas, fumes, or dust) occurring at a high reaction speed. The risk of an explosion exists wherever there is the probability of an explosive atmosphere. An explosive atmosphere may occur wherever dusts, flammable gases or liquids are handled, processed, transported or stored. Such hazardous atmospheres can be present for instance in chemical industries, gas stations, refineries, power plants, paint shops, vehicles, sewage plants, grain mills, airports, grain silos and filling plants.

Explosion hazards

Explosion hazards only exist in locations

- in which ignitable concentrations of flammable substances can exist under normal operating conditions or in the event of faults, and when these conditions provide the probability that a dangerous substance to air mixture is enough to form an explosive mixture;
- where the explosive or ignitable mixtures can come in contact with a source of ignition and continue to burn after ignition.

Explosive mixture (general term)

A combustible (flammable) mixture is a mixture of gases or vapours, or a mixture of gases and vapours with mists and dusts, capable of propelling a reaction after ignition.

Explosive atmosphere

An explosive atmosphere contains gases, vapours, fumes or

dusts mixed with air as well as the usual filler materials that can explode spontaneously under atmospheric conditions (see also 'Explosive mixture'). An explosive atmosphere may occur wherever dusts, flammable gases or vapours are handled, processed, transported or stored.

Explosive atmosphere (hazardous)

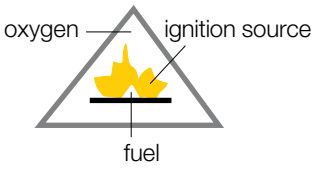
A hazardous explosive atmosphere is a mixture containing concentrations of flammable gases or vapors that, when ignited, can cause damage to persons directly or indirectly through an explosion.

Hazardous area

A hazardous area is an area in which there is a risk of explosion, i.e. a hazardous explosive atmosphere can occur due to local operating conditions. Such hazardous atmospheres can be present for instance in chemical industries, gas stations, refineries, power plants, paint shops, vehicles, sewage plants, grain mills, airports, grain silos and filling plants.

Ignition triangle

In order to have an explosion, the following three components must be present simultaneously:



Possible sources of ignition
- hot surfaces
- flames and hot gases
- mechanically generated sparks
- electrical installations
- transient currents
- static electricity
- lightning, ultrasonic energy

oxidizers
- air (21 % oxygen)
- pure oxygen
- oxygen releasing compounds (potassium permanganate)

Flammable substances
- Flammable concentrations of gases and powders from liquids or solids with ignition capability.

Explosive limits

A mixture is only explosive if the concentration is within certain material specific limits. These limits are called the upper and lower explosion limits and are listed in appropriate tables.

Flash-point

The flash-point is the lowest temperature at which a liquid releases sufficient vapors that can be ignited when close to an energy source and extinguished when the energy source is removed.

Primary ans secundary explosion protection measures

Basically there are two methods used to prevent an explosion.

Primary explosion protection

The primary method of explosion protection comprises measures which prevent formation of a dangerous atmosphere:
- avoiding the use of flammable liquids
- increasing the flashpoint
- limiting the concentration to safe levels
- natural and technical ventilation
- Monitoring of the concentration…

(see also 'Secondary explosion protection')

Secondary explosion protection

The secondary method of explosion protection comprises measures which prevent ignition of a dangerous atmosphere. Here, constructive or electrical techniques are used to
- segregate the electrical parts of the equipment likely to ignite a dangerous mixture, by keeping the explosive atmosphere away from the ignition source
- prevent an explosion by impeding the propagation to the surrounding explosive atmosphere

(see also 'Primary explosion protection')

Electrical equipment featuring ignition protection class „Intrinsic Safety" (IEC/EN 60079-11)

Intrinsically safe and associated electrical equipment

The term "intrinsic safety" implies that the electrical energy of an intrinsically safe circuit is limited to such an extent that a thermal effect or spark is incapable of igniting an explosive atmosphere under specified conditions.

TURCK devices for use in explosion hazardous areas comply with the ignition protection class "intrinsic safety". The devices are divided into two different kinds of electrical equipment, intrinsically safe equipment and associated equipment. The different devices types are differently lablled (see „Marking of devices") . Intrinsically safe electrical equipment incorporates only intrinsically safe circuits. Direct installation in explosion hazardous areas is permitted, provided that all related requirements are met. An example is a NAMUR sensor approved according to EN 60947-5-6 or a transmitter.

Associated electrical equipment is any equipment which may incorporate both intrinsically safe and non-intrinsically safe circuits. Intrinsically safe devices may be connected to associated electrical equipment, provided that all essential conditions for this kind of interconnected assembly are fulfilled. An isolating switching amplifier would be an associated electrical device and the connected NAMUR sensor is the intrinsically safe device.

Associated electrical equipment must generally be installed outside the hazardous area. If installed within the hazardous area, additional protection measures must be provided. Many TURCK devices are approved for zone 2, allowing to install de-

vices in the Ex-area. All TURCK devices featuring intrinsically safe circuits are classified as associated equipment, such as the interfacemodul for example.

Simple electrical equipment

Simple components and simple equipment that do not generate or store more than 1.5 V, 0.1 A and 25 mW, and do not require a test certificate are classified as "simple electrical equipment" (e.g. thermocouples). This equipment is defined in the standard EN 60079-14.

Categories

Intrinsically safe and associated electrical equipment are divided into 3 categories according to 60079-11. This classification is determined by the failure probability and the ignition capability of the intrinsically safe circuitry.

Category ia:

Category „ia" indicates that the electrical equipment should not be able to ignite a dangerous mixture during normal operation and in the event of a single fault, nor in the event of any combination of two faults. Intrinsic safety must be maintained even when two independent faults occur at the same time. Therefore, components of any equipment of category "ia" that are susceptible to faults must be present in triplicate.

Category ib:

An electrical apparatus, category „ib" should not be capable of causing ignition under normal operating conditions in the event of a single fault. Intrinsic safety must be maintained in the event of a single fault. A fault could be the failure of a component that is susceptible to disturbances. Any electrical equipment classified as "ib" must have all components in duplicate

Category ic:

Electrical equipment classified as category "ic" should not be capable of causing ignition during normal operation. This ignition protection class replaces the ignition protection class „nL" as from 2011 for installation in zone 2. The advantages of intrinsically safe circuits are thus also available there.

Ignition protection class n (EN 60079-15)

Electrical equipment featuring ignition protection class n can only be installed in zone 2 or 22. It should neither cause ignition nor be serviced during normal operation. This should be guaranteed through labels and mechanical locking.

Groups and temperature classes

Electrical equipment for use in explosion hazardous areas is classified into groups and classes based on the likelihood of an explosion danger. This is of great importance from a safety aspect as well as an economical aspect because it determines the requirements that must be met by the electrical equipment. The definition of groups is based on the location in which the equipment is going to be used.

- Group I classified equipment may be used in mines susceptible to firedamp and must conform to EN 60079 and additional mining standards (e.g. EN 50303).
- Group II classified equipment is used in all explosion hazardous areas except mining applications susceptible to firedamp.

Group II classified equipment is used in all explosion hazardous areas except mining applications susceptible to firedamp. Depending on the application, different flammable materials with different ignition energy ratings are needed. From a practical point of view, subdividing Group II is therefore necessary and makes sense, not only for economical reasons.
The subdivision of Group II equipment is based on the different ignition energy of the flammable materials. The different groups are classified by capital letters in ascending alphabetical order according to the hazard risk of the associated material. Materials belonging to group C require less ignition energy than Group A materials (see table 1)

	T1	T2	T3	T4	T5	T6
I	methane					
II A	acetone, ethane, ethyl acetate, ammonia, benzene, acetic acid, carbon monoxide, methanol, propane, toluene	ethyl alcohol, i-amyl acetate, n-butane, n-butyl alcohol,	benzines, diesel fuel, aviation fuels, fuel oils, n-hexane	acetaldehyde, ethyl aether		
II B	town gas (coal gas)	ethylene*)				
II C	hydrogen	ethylene*)				carbon disulfide*)

*) no authorized regulations available

Tab. 1: Flammable materials – groups and temperature classes

Temperature class

The temperature class specifies the maximum allowable surface temperature of an apparatus. In this category, the explosion protected apparatus can be approved for different temperature classes - a decision which depends on technical and economical considerations.
In the majority of cases, explosion proof equipment for the lowest temperature can be very expensive to buy and install. By comparison, using products featuring ignition protection class „intrinsic safety" is more efficient and cheaper. Only intrinsically safe equipment for direct installation in Ex areas requires temperature classification. For associated apparatus this classification is not needed.

Ignition temperature

The ignition temperature (defined as the temperature at which a mixture self-ignites during testing) is directly related to the temperature class. The temperature class indicates the maximum surface temperature of an apparatus and must be lower than the minimum ignition temperature of the flammable material to prevent an ignition (see table 2 on next page).

Temperature class IEC/EN NEC 505-10	Maximum surface temperature of device (°C)	Ignition temperatures of flammable materials (°C)
T1	450	>450
T2	300	>300 ≤ 450
	280	>280 ≤ 300
	260	> 260 ≤ 280
	230	> 230 ≤ 260
	215	> 215 ≤ 230
T3	200	> 200 ≤ 300
	180	> 180 ≤ 200
	165	> 165 ≤ 180
	160	> 160 ≤ 165
T4	135	> 135 ≤ 200
	120	> 120 ≤ 135
T5	100	> 100 ≤ 135
T6	85	> 85 ≤ 100

Tab. 2: Temperature classes with maximum admissible surface temperatures and ignition temperatures

Device groups and categories acc. to the ATEX directive

The ATEX directive prescribes a clear marking of the application and the constructional level of safety. EN 60079-11 also provides detailed information on how the protection measures were realised and which applications are permitted and uses similar terms, but the information provided by EN 60079-11 and ATEX may be essentially different.

The first criterion of the ATEX directive is the device group. Like the groups described above, the different groups are defined and described according to their place of use.
- Device Group I: For mining underground with a potential hazard due to firedamp and/or combustible dusts.
- Device Group II: For all other locations in which a potentially explosive atmosphere exists.

The second criterion is the device category, defining the level of safety:
- Device category 1: Very high level of safety; devices featuring two independent means of protection; even in the event of rare device disturbances, the device remains functional and maintains the requisite level of safety.
- Device category 2: High level of safety; devices featuring one means of protection. Even in the event of frequently occurring device disturbances or equipment faults which normally have to be taken into account, the device provides the requisite level of safety.
- Device category 3: Normal safety; the device ensures the requisite level of safety during normal operation.

Devices classified as Group I (underground mining susceptible to firedamp) uses the prefix M, e. g. M1, in addition to the category classification.

The third criterion is the substance group which characterises the application of devices in particular atmospheres:
- Substance group G: Explosion protection in explosive atmospheres due to gases, vapours or mists (G: gas)
- Substance group D: Explosion protection in explosive atmospheres due to dusts (D: dust)

The equipment category also determines whether the device is an associated apparatus or an intrinsically safe apparatus. If it is an associated apparatus the device category is put into round brackets, for example II (1) G.

Equipment protection level EPL

Devices are classified according to their potential hazard. According to IEC 60079-0 equipment protection levels are defined as follows:

Gas explosion protection

EPL Ga:
- Device with very high protection level
- The device is no potential source of ignition and provides the requisite level of safety when used for its intended purpose and with irregularly arising faults.

EPL Gb:
- Device with high protection level
- The device is no potential source of ignition and provides the requisite level of safety when used for its intended purpose and with irregularly arising faults.

EPL Gc:
- Device with increased protection level
- The device is no potential source of ignition and provides the requisite level of safety.
- The device features additional protection to ensure the requisite level of safety.

Dust explosion protection

EPL Da
- Device with very high protection level
- The device is no potential source of ignition and provides the requisite level of safety when used for its intended purpose and with irregularly arising faults.

EPL Db:
- Device with high protection level
- The device is no potential source of ignition and provides the requisite level of safety when used for its intended purpose and with irregularly arising faults.

EPL Dc:
- Device with increased protection level
- The device is no potential source of ignition and provides the requisite level of safety.
- The device features additional protection, to ensure therequisite level of safety with faults expected to occur regularly.

EPL and zones

Devices with a higher protection rating can be use in applications with lower protection ratings. Devices approved for zone 0 can also be applied in zone 1 and devices for zone 20 in zone 21.

Device protection rating	Zone
Ga	0
Gb	1
Gc	2
Da	20
Db	21
Dc	22

Zone classification

Zone classification

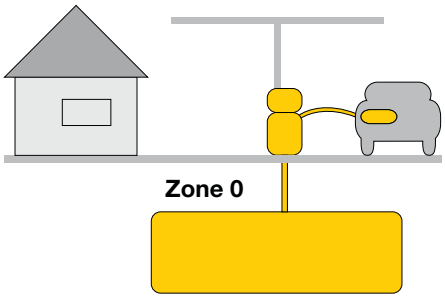
According to EN 60079-10 and EN 1127-1, explosion hazardous areas are divided into zones such as flammables gases, vapours, mists and combustible dust. The classification is based on the likelihood that a dangerous explosive atmosphere occurs. The ATEX directive has re-defined the zone division as follows:
Classification

- Zones 0, 1 and 2 for gases, vapour and mist
- Zones 20, 21 and 22 for dusts

Zone classification for gases

Zone 0

Zone 0 comprises locations in which a dangerous explosive atmosphere is present continuously or frequently. The definition is extended by the term „frequently“. The example shows a gas station with zones classified as 0.

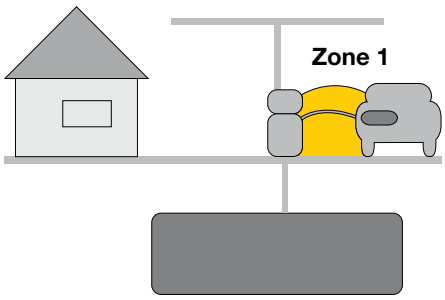


Intrinsically safe devices designed for use in zone 0 must meet category "ia" safety standards and must have no live contacts. Galvanic isolation between intrinsically safe and non-safe devices is to be preferred. If grounding of the intrinsically safe circuit is required for functionality, this must be done outside zone 0, but as close as possible to zone 0. The devices must as well be approved for gas groups IIA, IIB and IIC.

Zone 1

Zone 1 are locations in which explosive atmospheres are likely to occur. Here ATEX does not incorporate any changes. The example shows the area near the gas pump during refuelling classified as zone 1.
Generally the following areas in industrial plants are considered to be zone 1 locations:

- in the vicinity of zone 0
- close to inspection openings
- near filling and draining devices
- inside of machinery

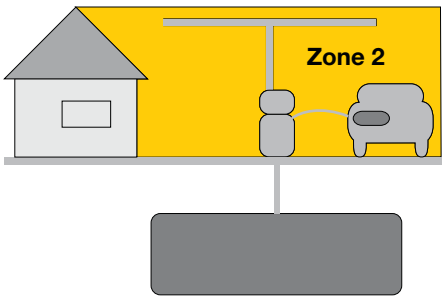


Any device certified for zone 1 must be group IIA, IIB or IIC and at least category "ib".

Zone 2

Zone 2 are locations in which an explosive or dangerous explosive atmosphere is likely to occur only rarely and if, only for a short time. According to the ATEX definition, an explosive atmosphere should not occur, but, if it does, only infrequently and for a short period. The following industrial areas comply with it:

- Areas near zone 0 and 1
- Areas near flange seals whenever standard flange joints are used
- Areas near pipes in closed rooms



Unlike apparatus for zones 0 and 1, devices for use in zone 2 do not require a test certificate by an authorized body. Devices must conform to category 3 and must meet the following criteria (EN 60079-15):

- restricted breathing enclosures (excess temperature 10 k only)
- sealed enclosures (various test methods/requirements)
- simple pressurized enclosure(like „p“ without purging)
- limited energy(intrinsic safety without safety factor, category)
- encapsulated switching devices (simple pressurized enclosure)
- lower requirements for devices in zone 1, e.g.
  - clearances and creepage
  - housing impact test
  - plastic materials
  - construction of lamp holders and starters

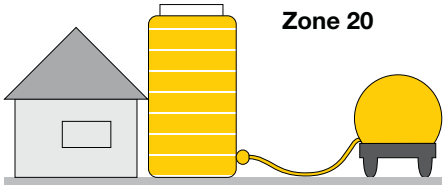
Installation of devices in zones 0 to 2

For installation in zones 0 to 2 (gas, vapour) it is required that intrinsically safe and associated devices must meet at least those requirements applying to the zone in which the intrinsically safe apparatus is to be installed. If a device meets higher requirements, operation is obviously permitted. The national regulations apply to interconnected assembly and installation of devices. Please refer to „Guidelines for use of devices with intrinsically safe circuits“ below.

Combustible dusts and fibers

Zone 20

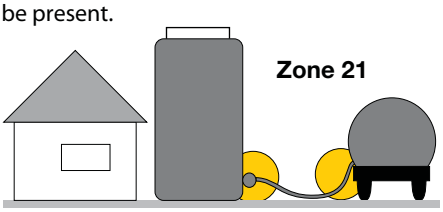
According to ATEX, zone 20 is classified as an area in which a dangerous explosive atmosphere in the form of a dust cloud is continuously present, or occurs frequently, or for a long period. The possibility of a dust deposit with a known or excessive thickness is given. The presence of dust deposits as a single event does not constitute a zone 20 classification. Usually, these conditions can only prevail inside an enclosure, pipes and instruments.



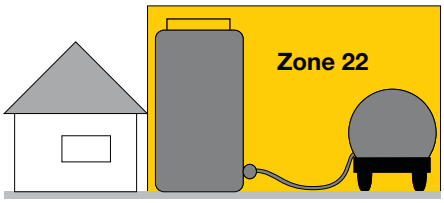
Areas, in which dust deposits occur, but where clouds of dust are not present constantly, frequently or for a long term, do not belong to this zone.

Zones 21 and 22

Zone 21
Areas in which a potentially explosive atmosphere in the form of a dust cloud can occur occasionally during normal operation. Dust deposits or layers of combustible dust will usually be present.



These can be areas in the close vicinity of filling or dust extraction stations, where dust deposits are present and explosive concentrations of flammable dust mixed with air may occur during normal operation.
Zone 22
Areas in which it is unlikely that a potentially explosive atmosphere in the form of a dust cloud occurs during normal operation. If such an atmosphere occurs, then only for a short period, or in the event of dust accumulation, or in layers of combustible dust.



For example, areas in the vicinity of equipment containing dust which can escape through leakages and where dust deposits can build up (e.g. mills from which dust is released and accumulates).

Installation of devices in zone 20 to 22

Regarding areas of combustible dust, installation, operation and maintenance of devices are subject to the national regulations (EN 60079-14/EN 61241-14). Intrinsically safe devices mounted in zone 20 to 22 must have the appropriate approval. Associated equipment does not require an approval for flammable dusts, an approval for gases and vapour is sufficient. It must be ensured that the limit values of intrinsic safety of the EC type examination certificate are met in the case of an interconnected assembly. Then it is permitted to mark the intrinsically safe device as II 1 D and the associated equipment as II (1) G. To avoid mistakes, the marking II (1) G, II (1) D is usual.

During installation the special conditions of dust protection must be observed. Simple devices for use in zones 20 to 22 must have an approval, whereas this is not necessary for simple devices applied in zones 0 to 2.

Zone classification	Likelihood of an explosive atmosphere	Compliance with safety requirements by	Requirements fulfilled by:		
			Equipment group	Related equipment category	Additional equipment category
Zone 0 (gas, . . .) Zone 20 (dust)	Continuously, for long periods or frequently	2 independent means of protection	II	1G (for gas, ...)	–
			III	1D (for dust)	
Zone 1 Zone 21	Occasionally	1 independent means of protection	II	2 G	1
			III	2 D	
Zone 2 Zone 22	Unlikely or infrequently - for a short period only	Normal operation	II	3 G	1 or 2
			III	3 D	

Tab.3: Zone classification – equipment categories

Marking of devices

Marking of devices

Marking of devices conforming to CENELEC

Equipment for explosion protected areas must be clearly marked. There are two different types of marking. According to CENELEC, marking of an apparatus conforming to EN 50014/20 must provide the following information:

- manufacturer's name or trademark
- part number
- serial number
- authorized body
- Ex symbol
- ignition category, e.g. „ia"
- "x" after the test certificate number indicates that special conditions must be met (see certificate for special conditions)
- designated group together with the respective subdivision (e.g. IIC)
- temperature class or maximum surface temperature (for group II devices)
- test authority, date and file number
- device protection rating, e.g. „Ga"

An intrinsically safe device is to be marked as follows:

Ex ia IIC T6 Ga	
Ex	complies with European standard
ia	Ignition protection (category)
IIC	explosion category
T6	temperature class
Ga	device protection rating

Associated equipment is to be marked as follows:

[Ex ia Ga] IIC	
Ex	complies with European standard
Ia	Ignition protection (category)
IIC	explosion category
Ga	device protection rating

Marking of devices conforming to ATEX

The test certificate number of the EC type examination certificate acc. to the ATEX directive:

PTB 97 ATEX 2128X	
PTB	authorized body
97	year of examination
ATEX	acc. to directive 94/9/EG
2128	test certificate number
X	special conditions

Within the European Union the devices must meet the respective requirements. If the manufacturer fulfills these, he is permitted to affix the CE sign with the identification number of the notified body, which carried out the quality assurance system approval.

CE 0102

The test authority TÜV Hannover has the ID number 0044, EXAM (BVS) Bochum 0158 and PTB Braunschweig 0102.
The year of production and the constructional level of safety acc. to ATEX must be also contained in the device's marking.

For intrinsically safe devices the marking would be:

II 1 G	
II	all areas except mining
1	very high safety level suited for zone 0
G	explosion protected against gas, vapour and mist

Associated equipment is identifiable by round brackets enclosing the device category:

II (1) G	
II	all areas except mining
(1)	may not be installed in Ex areas
G	explosion protected against gas, vapour and mist

Manufacturer obligations

The manufacturer must provide a certificate of conformity and EC type examination certificate from an authorized test body.

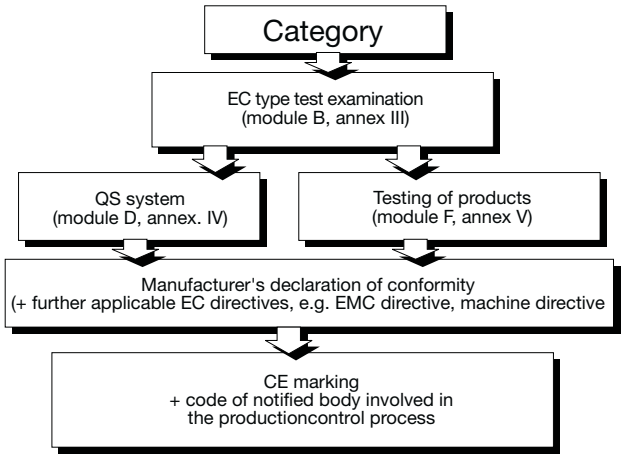
The authorized body implements tests and certifies that the devices comply with the regulations and standards of the explosion hazardous area. The manufacturer is required to supply a type test sample to an authorized test body, which draws up a test report to be submitted to the notified body entitled to issue the EC type examination certificate after verifying conformity. Notified bodies and external inspection bodies are registered centrally.

The EC type examination certificate contains all Ex-relevant data for devices of zone 0 and 1. It is the manufacturer's responsibility to keep a copy of the certificate. Along with the certificate, the manufacturer provides an instruction manual with all relevant Ex data. In addition, the manufacturer issues a declaration of conformity, stating that all applicable standards and directives are met. The user needs these documents to document compliance of the system installation.

CE marking of equipment

Devices for use in explosion hazardous areas are provided with the CE marking and the identification code of the testing

authority. The assessment procedure for CE marking is clearly defined and depends on the device category. The example shown relates to device category 1, featuring the highest safety level. The applicable annexes of the directive 94/9/EC are also shown.

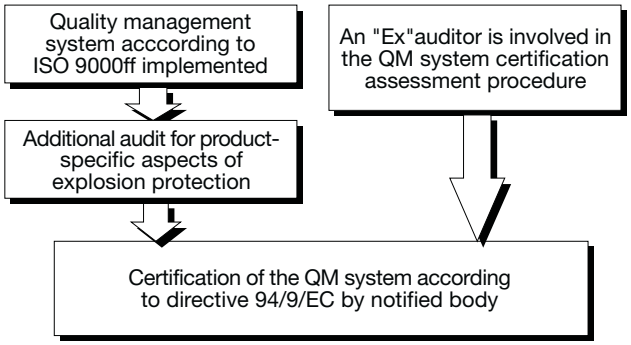


Different annexes apply to the various device categories.

QA – Assessment of the quality assurance system

The manufacturer of intrinsically safe devices, categories 1 and 2, must have an approved quality management system. This approval is needed to ensure that the manufacturer produces the devices according to the test type sample and that conformity to relevant protection regulations is given. Assessment of the quality assurance system is carried out by a notified body. Assessment can be achieved in two different ways:

Assessment and certification can be done directly within the scope of certification according to ISO 9000ff. Approval of those fields associated with explosion protection is accomplished in cooperation with an expert of the notified body. If the ISO certificate has already been granted, it is possible to certify those parts relating to explosion protection subsequently within the scope of an additional audit. The following illustration shows both possibilities:



TURCK's manufacturing sites for explosion protected devices are certified according to ISO 9001 and have a quality system approval.

Guidelines for use of devices with intrinsically safe circuits

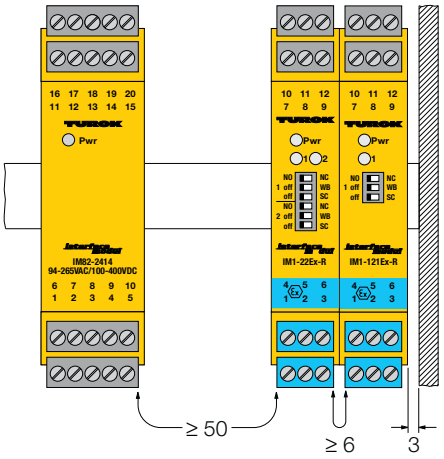
Guidelines for use of devices with intrinsically safe circuits

The national regulations and standards are the basis for use of devices with intrinsically safe circuits. These must be strictly observed and followed. The user is obliged to inform himself of all revisions. The following guidelines relate to the ATEX (94/9/EC) directive of the member states of the European Union, especially to the field of explosion protection in areas exposed to hazards by gas. If the device is classified as associated equipment with intrinsically safe and non-intrinsically safe circuits, it may not be installed in explosion hazardous areas It is only permitted to connect intrinsically safe devices located in the hazardous area to the intrinsically safe circuits of this device. The intrinsically safe connections of TURCK devices carry a blue marking.

When interconnecting devices within such an assembly it is mandatory to provide a proof of intrinsic safety (EN 60079-14: 2004, chap. 12.2.5). This is required to verify that all data related to explosion protection of the devices allow joint operation. Verification must include the internal capacitances and inductances of the cables used. Please refer to the special section „ Proof of intrinsic safety" for more information.

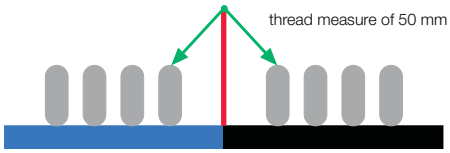
Intrinsically safe circuits should never be interconnected with non-safe circuits. Even if only interconnected once, it is possible that essential protective elements are damaged without the user being aware of this fact. A simple function test is not suited to verify a damage of this kind. Once intrinsically safe circuits have been connected to the non-intrinsically safe circuit, it is not permitted to use the device subsequently as intrinsically safe equipment. The governing regulations cover installation of intrinsically safe circuits, mounting to external connections, cable characteristics and cable installation. Cables and terminals with intrinsically safe circuits must be marked and separated from non-intrinsically safe circuits or feature appropriate isolation (> 1.500 VAC). The following is an excerpt from the requirements according to EN 60079-14:

- Protection against external electrical or magnetic fields (e.g. power lines)
- Prevent conductor splicing of fine wires through wire sleeves
- Minimum cross section of 0.1 mm (also single wires of a conductor): 0.1 mm
- Protection against damage (mechanical, chemical, thermic …)
- Armouring, metal cladding, shielding of cables and lines
- Common use of single-core non-sheathed cables of intrinsically and non-safe circuits in one line is not permitted
- Separate error assessment when using multi-conductor cables and lines
- If cables have to be color-marked, use light-blue.



When mounting IMB devices (interface module backplane), further instructions must be observed, owing to their open construction and special connection technology:

- The devices have to be mounted such as to comply at least with protection class IP20 acc. to IEC publication 60529. Generally, this is achieved by plugging dummy modules (IMB-BM) in the free slots.
- Connections for intrinsically safe and non-intrinsically safe circuits must either be separated by a physical barrier so that they are at least 50 mm (thread measure) apart from each other, or each connection must be provided with cable sleeves which cannot slip off and ensure covering of all bare parts.



A thread measure is defined as the distance between circuits separated by a physical barrier. The reason for this regulation is that it is possible to work with live intrinsically safe circuits; thus it must be avoided that these come into contact accidentally with any non-safe connection components. This distance is only required for external connections which can be accessed by the user. The minimum distance between two intrinsically safe circuits must be 6 mm and separation from other (grounded) metal parts must be 3 mm.

- IMB devices must be coded as a protection measure against mismatching. This is done by inserting coding keys in the appropriate bores; the matching openings are located in the corresponding retainers.

The approval expires, if the device is repaired, altered or opened by a person other than the manufacturer or an expert unless the device-specific instruction manual explicitly permits such interventions. Only an expert is familiar with the information on protection measures needed to assure that the device is still in accordance with the applicable regulations after such an intervention. Visible damages to the device's housing (e. g. black or brown discoloration due to heat accumulation, perforation or deformation) indicate a serious error and the device must be turned off immediately. The associated equipment must also be checked.

Inspection of a device with regard to all relevant aspects of explosion protection may only be carried out by an expert or the manufacturer. The operation of the devices is only permitted in conjunction with the permitted data. The supply voltage for example should never exceed or fall below the indicated maximum value or the temperature range during operation.

Intrinsically safe circuits with galvanic isolation - as is the case with TURCK devices - should not be grounded, unless not absolutely necessary from a functional point of view. Circuits without galvanic isolation, like provided by Zener barriers, always require grounding. EN 60079-14 includes the relevant grounding regulations. Within zone 0 grounding of a circuit is not necessary. If grounding is necessary for functional reasons, then it must be carried out in close vicinity of zone 0.

Prior to every initial set-up or after any change of the device interconnection within the assembly, it must be ensured that all applicable regulations, directives and framework directives are met, that all safety regulations are fulfilled and that the device is functioning properly. Only then the operation is permitted.

Mounting and connection of the device should only be carried out by qualified and trained staff familiar with the relevant national and international regulations of explosion protection to ensure correct operation.

The system operator must ensure that the system is always in the required safe condition. The system must be inspected continuously and necessary maintenance work must be carried out immediately while observing the safety regulations. The system must be tested in case of need, latest every three years.

Proof of intrinsic safety

Proof of intrinsic safety

According to EN 60079-14 a proof of intrinsic safety must be provided to confirm that equipment interconnected within an assembly meets the requirements of intrinsic safety. In this context, a clear distinction is made between two different types of circuits:

- Simple intrinsically safe circuit with a single associated device and at least one intrinsically safe device without additional supply.
- More than one associated devices capable of supplying electrical energy to the intrinsically safe circuit, not only during normal operation but also in a fault condition.

Simple circuit

The first definition of a simple intrinsically safe circuit requires the observance of all electrical limit values stated in the EC type examination certificate and the power characteristics. If these conditions are met, the user is entitled to keep a proof of intrinsic safety. Inductances and capacitances of the installed cables must be taken into account.
The intrinsic safety of a simple circuit is verified, if the limit values are maintained according to the following conditions:

Associated equipment	Conditions	Intrinsically safe device + cable
U_0	=	U_I
P_0	=	P_I
L_0	=	L_I+L_C
C_0	=	C_I+C_C

This applies to circuits
- non-linear output characteristic of associated equipment and (at the same time)
- the presence of distributed reactances only.

If massed reactances are present and under the condition of linear limitation by the associated equipment, it must be checked if:
- C_0 > 1% of C_I
- L_0 >1% of L_I

If one of the two conditions apply, the percentage of C_o and L_o must be reduced by half (50 % rule).
The cable characteristics provided by the manufacturer should be used. Should these not be available, the following typical values (acc. to EN 60017-14, part 12.2.2.2.) are recommended: 200 pF/m und 1 mH/m or 30 µH/Ω.

If the value P0 of the associated equipment is not specified, a linear characteristic must be available, on the basis of which P0 can be calculated: $P_0 = ¼ \times I_0 \times U_0$.
The connection of proximity switches to isolating switching amplifiers, or 2-wire transmitters to isolating transducers, or solenoid valves to a valve control module can be considered as simple circuits. The limit value indexes of the certificate of conformity and the EC type examination certificate differ. In this overview the indexes according to EN 60079-14 are used. Index „0" stands for maximum output values and „I" for maximum input values.

The proof of intrinsic safety should be laid down in a standardized document to facilitate clear documentation. The document should contain the date, the name of the manufacturer, the circuit type and the type code.

Interconnection of several devices

The second case considers interconnection of several active associated devices. Here it is not permitted to apply the electric limit values of the EC type examination certificate for the proof of intrinsic safety. This case differs fundamentally from the first one.

Different limit values apply to an assembly of individually associated devices. Such an assembly will always be classified as equipment according to category „ib", even if the single devices comply with to category „ia". An assembly may therefore not be installed in zone 0.

A detailed description of interconnection and assembly is beyond the scope of this introduction. The related calculation methods and an example are contained in annexes A and B of EN 60079-14. Additionally, the ignition curves of IEC 60079-11 are needed. EN 50020 also contains the ignition curves.
When interconnecting associated devices whose typical curves are not entirely linear, a special procedure must be applied. This procedure is explained precisely in EN 60079-25.

Applicability of approvals

Applicability of approvals / national approvals

Equipment certified according to the ATEX directive may be placed on the market, installed and put into service within the member states of the European Union.

Associated equipment: Designation	Type	Manufacturer	Test certificate no.	Expl. group	U_0 [V]	I_0 [mA]	P_0 [mW]	L_0 [µH]	C_0 [nF]
Isolating switching amplifier	IMB-DI-451EX-P/24VDC	TURCK	TÜV 08 ATEX 554880	[Ex ia Ga] IIC	12.0	12.4	37.2	10.0	0.49

Intrinsically safe equipment: No.	Designation	Type	Manufacturer	Test certificate no.	Expl. group	U_i [V]	I_i [mA]	P_i [mW]	L_i [µH]	C_i [nF]
1	Proximity switch	BIM-INT-Y1X	TURCK	KEMA 01 ATEX 1264 X	EEx ia IIC T6	20.0	60.0	80.0	150.0	150.0
2	Proximity switch	BI1-EG05-Y1	TURCK	KEMA 02 ATEX 1090 X	Ex ia IIC T6	20.0	60.0	130.0	150.0	150.0
⇒	Cable inductances and capacitances: (Manufactures spec. or L_C = 1 mH/km. C_C = 110 nF/km)			Total cable length: 130 m					0.13	14.3
	Total inductances and capacitances: (ΣL_i and ΣC_i)								150.13	164.3
	Intrinsic safety is achieved if all conditions are fulfilled: $U_0 \leq Ui$ $I_0 \leq Ii$ $P_0 \leq Pi$ $L_0 \geq \Sigma L_i$ $C_0 \geq \Sigma C_i$									

Example: Proof of intrinsic safety

Even though Switzerland does not belong to the EU, approvals according to ATEX are accepted. An approval by SEV is not required, if the customer provides the mandatory documentation, i.e. the instruction manual, the EC type examination certificate, the CE declaration and the certificate of the quality management audit relating to explosion protection.

Many states outside the European Union explicitly request their own national approval. Therefore TURCK devices feature approvals for many different countries. National approvals are required in countries such as the USA, Canada, China, Japan, Australia, CIS states, whereas other states accept approvals issued by other states. For this reason it is indispensable to be familiar with the national requirements.

In many states approvals are granted for a certain period only. Therefore it is recommended that check is made whether the approval has expired or has been prolonged accordingly. If an approval expires after installation, many countries accept further operation.

Approvals according to ATEX and approvals in the USA and Canada are not subject to a time limit.

Approvals available on the internet

Overview of approvals

TURCK offers their customers the opportunity to view all valid approvals and to download these at:www.turck.com

Glossary

AIDA

AIDA (**A**utomatisierungs **I**nitiative **D**eutscher **A**utomobilhersteller) federation of leading automotive manufacturers with the objective to standardize the production processes.

Air interface

Is the RFID transmission zone established between data carrier and read/write head. Data is transmitted in the air interface and passive data carriers are also fed with power.

Antenna, active

Is composed of an emitter/receiver coil and transmits radio signals between read/write head and data carrier. The active antenna is integrated in the read/write head.

Anticollision principle

Many data carriers are read simultaneously, once they have entered the air interface of a read/write head. In order to avoid collision, the data carriers are not read exactly at the same time but rapidly, one after the other, or at different frequencies within the same frequency band.

Operating frequency

Is the frequency band used for transmission of information between data carriers and read/write head. The RFID frequency bands are specifically defined for each technology and are also subject to certain country-specific limitations.

BL compact

BL compact is a compact, IP67 rated I/O system from TURCK and is suited for confined spaces. BL stands for Bus Link.

None

BL ident® stands for „Bus Link Identification“ and describes the modular design of the RFID system from TURCK.

BL20

BL20 is a compact, IP20 rated modular I/O system from TURCK. BL stands for Bus Link.

BL67

BL67 is a modular, IP67 rated I/O system from TURCK. BL stands for Bus Link.

Bus System

A bus collects and transmits data and control information between different components such as CPU, memory and I/O level following a defined protocol.

CODESYS

CODESYS (Controller Development System) is a development environment and programming system acc. to IEC 61131-3 for PLCs and programmable automation components.

CPU

A CPU (Central Processing Unit) is the core unit of a computer, executing all important computational calculations.

Data preservation

Is defined as ‚duration in years‘ for which data remains on a data carrier, depending on ambient temperature and other environmental influences.

Data carrier

A data carrier is a mobile storage device consisting of a memory chip and an antenna. It can be read and written on the fly by means of RFID technology. The data carrier receives the signals and responds autonomously.

Data carrier, active

Active data carriers have their own energy source which they use to actively send information and to supply the internal memory.

Data carrier, passive

Passive data carriers have no own energy source. In order to send information and write to the internal memory, they receive power from the electromagnetic AC field generated by the read/write head. This is the type of data carrier mainly used in the TURCK *BL ident*® system.

DP Master Class 1

The DP Master Class 1 (DPM1) is a central control unit in a PROFIBUS-DP system, which exchanges data in a defined message cycle with the remote stations (slaves). The DPV1 functions for acyclic transmission of demand data can optionally be used. Typical devices are PLCs or PCs.

DP master class 2

DP master class 2 (DPM2) serves exclusively for the transmission of acyclic demand data in a PROFIBUS-DP system and is used for commissioning processes, maintenance and diagnostics of connected components. A DP master class 2 needs not be connected permanently to the bus system.

DPV1

DPV1 is a functional expansion of the PROFIBUS-DP protocol. It enables acyclic communication of demand data in addition

to the cyclic communication of process data. The acyclic services are conducted at the same time but with lower priority than the cyclic process.

DTM

DTM is an abbreviation for "Device Type Manager". DTMs are normally drivers for devices that are parametrized by computer, which for example can be parametrized via FDT (see also 'FDT' and 'PACTware™').

EAN

EAN stands for „European Article Number" and was replaced by GTIN „Global Trade Item Number" in 2009.

EEPROM

EEPROM (Electrically Erasable Programmable Read-Only Memory) is a non-volatile memory module that can be read, cleared and reprogrammed.

Electronic module

The electronic modules provide the functions of the modular TURCK I/O systems in a fieldbus station independently of the fieldbus used. Plugged on the base modules, they form a functional unit with them and can be replaced at any time by other electronic modules from the same product series because they are not wired. The functions are:

- Digital inputs and outputs
- Analog inputs and outputs
- Technology modules such as RFID
- Power supply

EMC

The electromagnetic compatibility (EMC) denotes the normally desired state in which technical devices do not cause or suffer undesired electrical or electromagnetic interference to or from other devices in the same environment.

EPC

The Electronic Product Code (EPC) is an internationally used coding system by means of which products, product types and packaging are clearly identified through serial numbers.

Protective ground

An electrotechnical term used to signify conductive ground whose electrical potential is always zero. The electrical potential of the ground may not equal zero in the area around grounding devices, in which case this is called the "reference ground".

FDT

An FDT/DTM configuration tool is a modular software concept and is structured in a manufacturer-independent configuration tool as a frame application, the FDT (Field Device Tool) and manufacturer-specific device drivers, the DTMs (Device Type Manager) (see also 'DTM / PACTware™').

Fieldbus

A fieldbus interconnects field components such as sensors and actuators with control components such as the PLC or industrial PCs. Reliable transmission of signals and real-time behaviour are common features of a fieldbus. Fieldbus systems withstand extreme loads and are mostly applied in industrial settings.

FRAM

Also Ferro RAM, Ferroelectric Random Access Memory, is the name given to a non-volatile, electronic memory chip with read/write capability. FRAM chips are low-power consuming memories, fast writable and highly reliable in terms of data availability.

Function block

A function block is a self-contained program that provides different status, input and output bits as well as routines. Multiple instances of a function block can be created.

Gateway

A gateway is a hardware and software component which interconnects different networks using different protocols (protocol converter). For this, all information contained in the telegram of the ‚source' protocol, except for the user data, are ‚translated' into the ‚target' protocol. In modular I/O systems from TURCK, the gateway is the head component of each fieldbus station interfacing the fieldbus with the field level.

Gateway, programmable

The CODESYS programmable gateways (IEC 61131-3) can be operated as autonomous PLCs to control applications or as peripheral components in a network for local and fast signal processing where they relieve the central control of a network.

GSD

The „General Station Description" file, previously known as „Device master file", describes the characteristics of the devices used. The GSD file is a readable text file and is supplied in different languages. Project planning tools require the device information in order to complete configuration and commissioning. The GSD file normally contains general information such as vendor name and version. In case of modular systems,

it also contains the communication features such as module designations, texts for diagnostic messages, parameter options and parameter names of the individual modules.

HF

HF stands for „High Frequency“ and covers the frequency band 13.56 MHz. The HF frequency band is defined by the international valid standard ISO 15693.

I/O system

Is the central point of collection and distribution of digital information or analog signals on the field level. In a point to bus wiring, field signals are collected by an I/O station, converted to a digital protocol and then send to the control via a bus cable.

IEC 61131

Stands for International Electrotechnical Commission 61131 and is an internationally valid standard for programmable logic controllers (PLC), specifying the functions, requirements and the programming language for a PLC.

Initialization (memory)

During initialization, the memory space is reserved and filled with initial values (such as variables, code, buffer, …) required for the execution.

Inlay

The RFID microchip and the antenna are the so called „inlay“ of a Smart Label.

Interface set (*BL ident*®)

The *BL ident*® interface sets are fieldbus stations with a fixed scope of components. They are modularly structured and made up of one gateway and one to four RFID modules, or they are available as *BL compact* system. They provide up to 16 channels and can operated up to 8 read/write heads simultaneously. The installed gateway or rather compact station is conditioned by the fieldbus and the RFID modules used.

ISO 15693

ISO 15693 is the international radio transmission protocol. It describes the physical properties of the RFID data carriers (e.g. dimensions, load, UV and X radiation, max. temperature), the air-interface (e.g. frequency, modulation, transmit power, data rates, coding), as well as initialization, the anticollision and transmission protocol.

ISO 18000-6C

The ISO 18000-6C standard is compatible to the EPC Global Class 1 Generation 2 (also known as UHF Gen 2). It defines the physical and logical demands on transmission between a passive data carrier and a read/write head operating in the UHF frequency band.

Item Level Tagging

Describes the process of labelling goods with data carriers.

Configuration (modular fieldbus stations)

By configuration of a fieldbus station is meant the systematic arrangement of electronic modules according to their function within a station.

Closed loop

In a closed loop RFID system, the data which is stored on tags is transmitted only within the production cycle or intralogistics area.

Circuit, open

In an open loop RFID system, data carriers are attached on every product (Item Level Tagging) and leave the company after running through production and intralogistics.

Read device

see Read/write head

Reading rate

Is the maximum speed at which data is read from a data carrier. The reading rate is defined as bits or bytes per second.

Read range

The read range is the maximum possible distance at which a read/write head can read data from a data carrier. With HF technology read and write range are almost identical, whereas with UHF technology the read range is usually longer than the write range.

LSB

LSB stands for Least Significant Bit; and represents the lowest value of a digital bit string.

MSB

MSB stands for Most Significant Bit; and represents the highest value of the digital bit string.

PACTware™

PACTware™ stands for “Process Automation Configuration Tool” and is an open and manufacturer-independent operator interface for the plant-wide operation of devices, systems and communication components. PACTware™ has the FDT interface integrated. FDT (Field Device Tool) is the standard for the standardization of the interface between the device and the operator interface. The FDT enables the operation of devices between the PACTware™ frame software and the individual software modules (DTM = Device Type Manager) to be integrated simply and quickly. PACTware™ enables the devices of an installation to be configured and operated simply, quickly and efficiently, as well as diagnosed if required.

PIB (Proxy Ident Block)

The Proxy Ident Function Block (PIB) is based on the specification of the „PROFIBUS Users Organisation“ (PNO). The PNO brings together the interests of manufacturers and users and coordinates the maintenance and further development of the PROFIBUS standard. This standard guarantees interoperability between the systems of different manufacturers. Standard communication between field devices and function block in the control system guarantees system transparency. The PIB also provides a set of data bits and commands. Interoperability brings many advantages, such as fast integration of the system in the central control and fast implementation of projects as well as protection of investments.
The modular RFID system *BL ident*® from TURCK is based on an open standard. A PIB function block for the Siemens control series S7 is available as well as a CODESYS function block which can be implemented in the programmable gateways of the modular IO systems BL20/BL67.

Polarization (RFID)

Describes the orientation of an electromagnetic wave. There are essentially two different types, linear and circular polarization. Linear polarized waves can be aligned either vertically or horizontally, depending on the orientation of the antenna. Circular polarized fields are best suited for applications in which Smart Labels are attached to goods because it is difficult to direct the antenna properly towards the field. For this, two antennas are arranged perpendicular to each other and one antenna is triggered with a 90° phase-shifted signal. Here a distinction is made between clockwise and counter-clockwise polarization.

Bulk reading

Acyclic reading/writing of several data carriers. The data is not read simultaneously but in rapid succession. This is done to avoid multiple reading of a data carrier and also known as anticollision principle.

RFID

RFID stands for Radio Frequency Identification, also known as radio identification and describes the contactless identification of objects. Data is thereby read out and written to a storage medium.

Read/Write head

A read/write head transmits data from a control unit to a data carrier and reads data from a data carrier and transmits it to the control unit. The core element of TURCK read/write heads is the active antenna.

Read/write ranges

The attainable distances may vary due to the combination of data carrier and read/write head. The same applies to the read/write distance. It varies, depending on the data volume being read and written to the data carrier and the fly-by speed at which the data carrier passes the read/write head. The UHF read/write heads can achieve read/write ranges of several meters.

Note

The maximally attainable read/write distance is just an ideal value measured under laboratory conditions and may vary due to component tolerances, mounting conditions, ambient conditions and material qualities, especially when mounted in metal or upon contact with liquids. The same applies to the parameters, read/write on the fly and the maximally transferable data volume. These may also vary according to the individual application conditions in which transfer actually takes place. Depending on the data carrier used, the maximum write range can be up to 50 % shorter than the maximum read range. **Testing of the application under real operating conditions is therefore essential!** All UHF read/write heads of the *BL ident*® system are designed for single and multiple access to the data carriers.

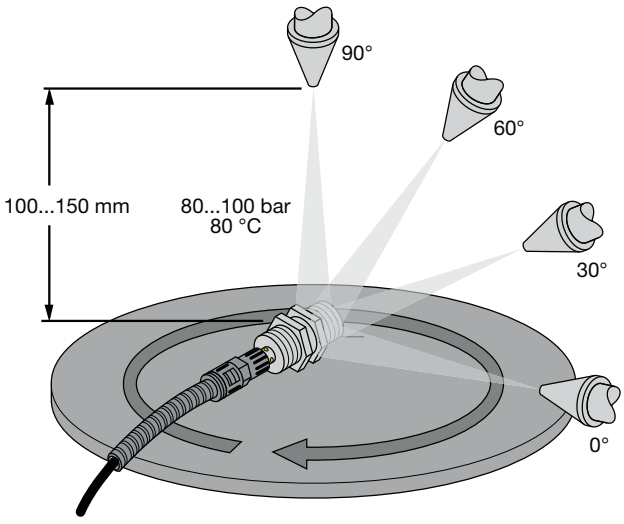
Write range

The write range is the maximum possible distance at which a read/write head can write data to a data carrier. With HF technology read and write range are almost identical, whereas with UHF technology the write range is usually shorter than the read range.

Protection rating

Protection class according to IEC/EN 60529, defines the protection of the enclosure against contact with and ingress of foreign matters and moisture.

The customary protection classes of TURCK products are:
- IP20: Protection against accidental physical contact (intended for installation in cabinets only)
- IP65: Full protection against dust and hose water
- IP67: Full protection against dust and short submersion in water
- IP69K: Full protection against dust and high-pressure/ steam-jet cleaning



Smart Label data carriers

Smart Labels are very flat and cost-effective data carriers on a carrier foil. They are offered as attachable and printable versions and often used as one-way data carriers.

TAG

see Data carrier

Tagging

When an object is equipped with a data carrier.

Tracking & Tracing

Pursuing and tracing back of mobile objects in intralogistics or logistics. The procedure locates the position of goods at a certain point of time. This is meant by „Tracking".
Whereas „Tracing" informs about the production stages, from the raw material, over semi-fabricated products, end product up to logistics.

Transponder

see Data carrier

UHF

UHF stands for „Ultra High Frequency" and covers the frequency band 865…928 MHz. The demands on the frequency band are specified in ISO 18000-6C, whereas the country-specific frequency bands are determined by the corresponding national authorities and recorded in the EPC.

Frequency bands of TURCK products:
- 865…868 MHz: Europe
- 902…928 MHz: North and South America, except Brazil
- 902…907.5 MHz and 915…928 MHz: Brazil
- 920…925 MHz: China
- 917…920.8 MHz: South Korea

Radio Frequencies UHF

The TURCK *BL ident*® system operates at nationally specified transmission frequencies in the UHF range (840…960 MHz) between the data carriers and the read/write heads. UHF systems in this frequency band achieve a higher read/write range than HF systems, typically several meters. UHF transmission frequencies are country-specific, because they are allocated by national regulatory bodies. Before use, make sure that the *BL ident*® read/write heads comply with the countries' specific UHF band. Any application in regions other than the accredited ones is not permitted.

Since *BL ident*® data carriers are non-transmitting passive devices, they are worldwide applicable. In order to achieve the biggest possible air-interface, TURCK offers data carriers which are optimally tuned to country-specific frequency bands. Alternatively, also broadband data carriers are available for international use.

The different TURCK read/write heads support the following transmission frequencies:
- 865…868 MHz (Europe)
- 902…928 MHz (USA/Canada)
- 840…845 MHz and 920…925 MHz (China)
- 902…907.5 MHz and 915…928 MHz (Brazil)
- 917…920.8 MHz (Korea)

All the details concerning UHF such as frequency band, power supply and national regulations are available on:

- http://www.gs1.org/docs/epcglobal/UHF_Regulations.pdf

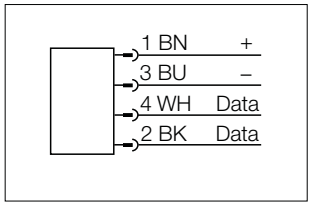
For more information please contact the corresponding national authorities of the country in which you want to deploy the UHF-RFID system.

Transmission zone (RFID)

see Air interface

Wiring diagrams

w01



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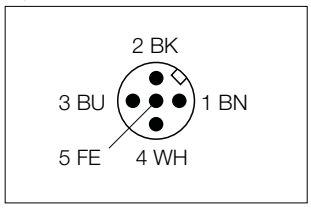

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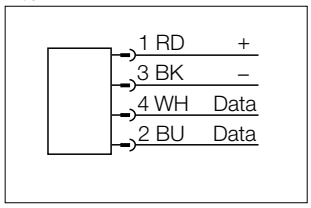

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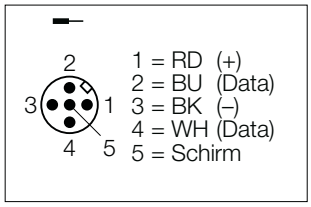

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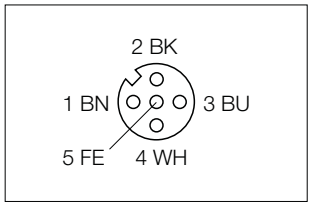

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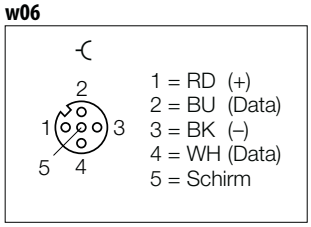

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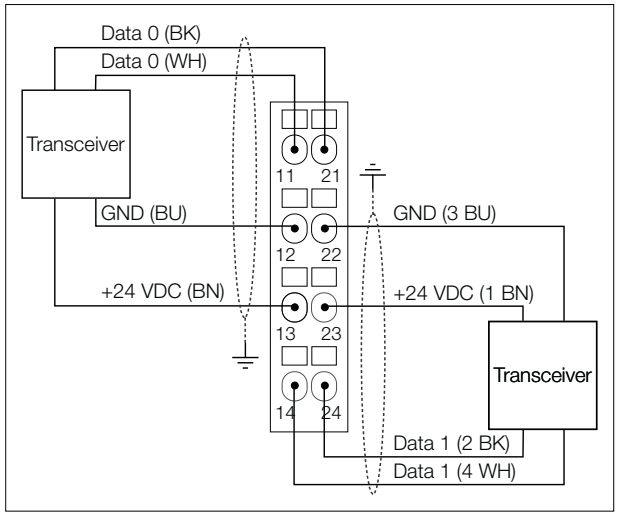

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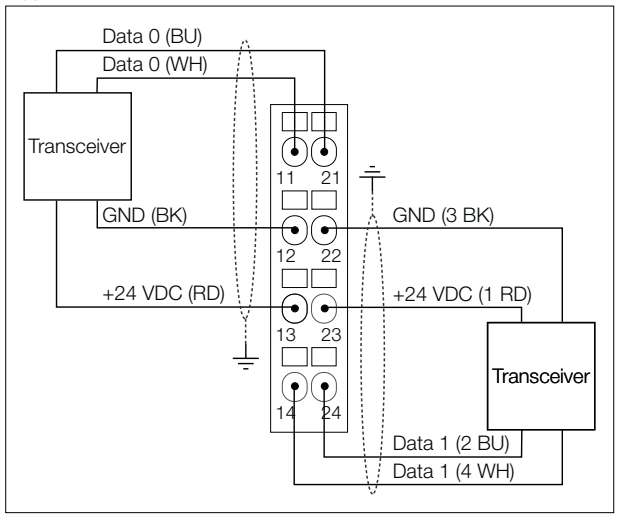

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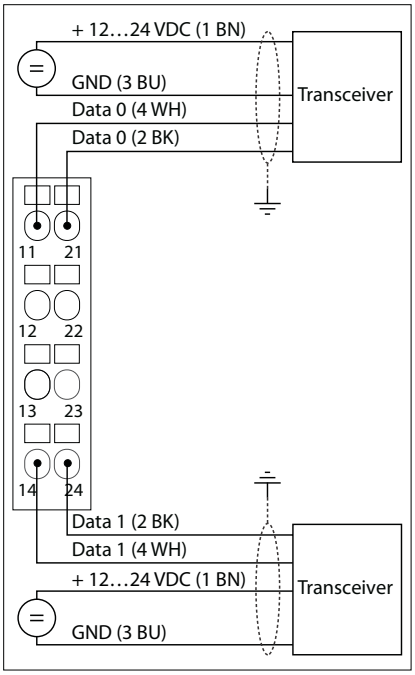

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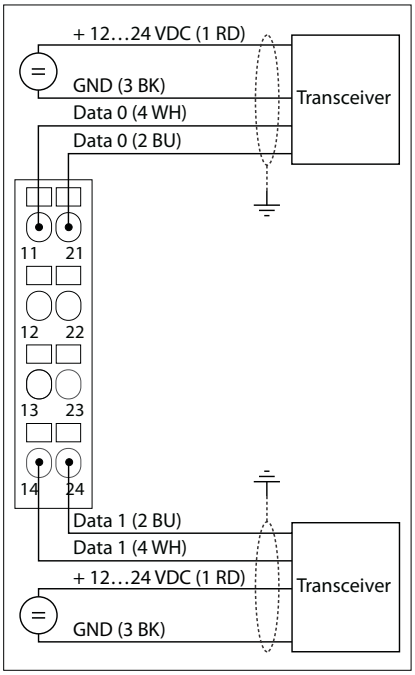

Index of types

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Industrial Automation

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