

# HARTING Component Range

# HARTING Global

#### Transforming customer wishes into concrete solutions.

The HARTING Technology Group develops tailor-made solutions and products for electrical and electronic connector technology, for energy and data transmissions and networking. Founded in 1945 in Minden Germany, HARTING now employs around 5,000 people worldwide. In a society shaped more and more by knowledge and information, the networking between customers, suppliers, technology and business partners plays a critical role. This applies nationally, but most of all internationally.

With 58 sales companies and production facilities worldwide, HARTING is able to achieve the necessary proximity to markets and customers. Being directly on site gives HARTING the opportunity to pick up on trends from the relevant markets and process them in a versatile manner.

#### We aspire to top performance.

Connectors are the key components for electrical and optical connectivity, as well as infrastructure technology. They enable the modular construction of devices, machines and facilities in a wide variety of industries.

Their reliability is crucial for ensuring smooth functionality in manufacturing, telecommunications, medical applications, and everywhere else.

The consistent further development of our technologies in respect to "Integrated Industry" guarantees that our customers enjoy investment security and benefit from durable, long term functionality in the age of the fourth industrial revolution.



### Close proximity to the customer.

Increasing industrialisation is creating growing markets that are characterized by widely diverging demands and requirements. The search for perfection, efficient processes and reliable technologies is a common factor in all sectors across the globe.

The HARTING professionals at our international subsidiaries engage in close, partnership-based interaction with our customers, right from the very early product development phases, in order to best implement customer demands and requirements. Our people on location form the interface to the centrally coordinated development and production departments. In this way, our customers can rely on consistently high, superior product quality – worldwide.

### Our claim: Pushing Performance.

HARTING provides more than optimally attuned components. In order to provide our customers with the optimum solution, HARTING is able to play a closely integrative role in the value creation process. Our aim is to generate maximum benefit for our customers – with no compromises!

### Quality creates reliability - and warrants trust.

The HARTING brand stands for outstanding quality and reliability. This standard is the result of consistent quality management. EN ISO 9001, the EU Eco-Audit and ISO 14001:2004 are the key elements here. We take a proactive stance towards new requirements, which is why HARTING is the first company worldwide to have obtained the IRIS quality certificate for rail vehicles.

**Device Connectivity** 

Installation Technology

**Smart Connectivity** 

### Our core competence

Connecting and networking with industrial, logistics and information technology.

#### Device Connectivity

Complete connector and installation strategies for industrial infrastructures

#### Installation Technology

Repeatedly setting new standards with our connectors, such as the Han<sup>®</sup> series

#### • Smart Connectivity

Connectors and devices as cyber-physical systems for connecting the facility to the cloud

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## Industrial Connectors Han<sup>®</sup>: General information

For generations, HARTING's industrial connectors (Han<sup>®</sup>) have been creating reliable, pluggable connections for transmitting power, signals and data – even under the toughest environmental conditions.

In addition to the proven portfolio of heavy-duty industrial rectangular connectors, the Han<sup>®</sup> series provides modular, compact and very lightweight connectors for interfaces in industry/ automation, traffic, power engineering, automotive and device connectivity. Connectors of this latest generation, namely the Han-Smart<sup>®</sup>, bring intelligence to the connector.

Han<sup>®</sup> connectors are used wherever reliable, robust and pluggable electrical connections are required. The product portfolio includes contacts and inserts for transmitting interference-sensitive signals. It also includes modular inserts or contacts for transmitting power up to 650 A. Hoods and housings are available throughout the entire range from protection classes IP20 to IP69K.

HARTING's connector product portfolio includes almost all applicable types of connectors in nine different hood and housing types: Han A®, Han B®, Han HPR®, Han-Eco®, Han® M, Han-INOX®, Han® EMV, Han-*Yellock*®, and Han® Ex. So connectors can safely perform their tasks even under difficult conditions, for example in harsh industrial environments, or on the exterior of vehicles and wind turbines.



# Industrial Connectors Han<sup>®</sup>: General information

### Advantages

- · Connectors make it easier to install machines and facilities on site
- Safe processes because of pre-assembly of facility components in factory halls/production facilities
- Fast replacement of production units/modules during tool changes or machine changeovers
- Faster disassembly and reinstallation of units in case of malfunctions (repair and service!)
- Improved safety on machines and facilities/Extended options for operations by workers who are not trained electricians.
- · Complies with the International Railway Industry Standard

Number of contacts: 1 to 400 poles + PE

Rated voltage: 25 V to 5000 V

Rated current: 5 A to 650 A

**Connection types**: screw termination, crimp termination, *HARAX*<sup>®</sup> IDC termination, cage-clamp termination, axial screw termination, solder termination, wire wrap terminal and Han-Quick Lock<sup>®</sup>

Hood/housing types: Han<sup>®</sup> Standard, Han<sup>®</sup> M, Han<sup>®</sup> HPR, Han<sup>®</sup> EMC, Han<sup>®</sup> HMC, Han<sup>®</sup> High Temp, Han-Eco<sup>®</sup>, Han-*Yellock<sup>®</sup>* 

Accessories: caps, cable glands and PCB adapters

Approvals: UL and CSA for inserts, Nema 4/12 for hoods and housings



# Han<sup>®</sup> HC: High current connectors

The HARTING Han<sup>®</sup> HC series of high current connectors offers solutions for power transmission in the 70 A to 650 A range. The inserts are preferably placed in Han<sup>®</sup> HPR hoods and housings to ensure robustness, protection against water pressure, vibration resistance and EMC.

Our broad product portfolio is the first choice for the transportation market; it connects and supplies power for traction inverters or auxiliary converters, drive motors and subsystems such as brakes or air conditioning units. High current connectors are also frequently used for many applications in the fields of wind energy, power generation, transmission and distribution (PGTD).

- · Available with crimp, axial screw or screw termination technology
- High current carrying capacity
- Operationally safe and robust version for different environmental conditions
- · Compact: high power density in relatively small dimensions
- High number of contacts is possible
- · Safely transmits power because of high contact masses



Han-Modular<sup>®</sup>: Modular connectors

The Han-Modular<sup>®</sup> series enables you to optimally design connectors for supplying machines and facilities. This is made possible by combining individual modules for different transmission media. Signals, data, power and compressed air are available in standard size industrial hoods and housings.

Han-Modular<sup>®</sup> delivers very versatile solutions with many functions which require minimal space and are easy to handle.

- · Combining several connectors into one unit
- Almost unlimited combination possibilities with over 100 different connector modules
- Quicker installation
- · Significantly less space required
- · Cost savings for components and the entire facility
- · Future-safe design due to easy extensions



Han-*Yellock*®: Form follows function

Its form is an expression of its functionality: Han-Yellock<sup>®</sup> is versatile, delivers maximum safety, relieves technically complex components (such as electrical cabinets), and can be assembled almost without any tools. Han-Yellock<sup>®</sup> represents connection technology where design and functionality match each other. The structure is as functional as the exterior is elegant. This connector has already established itself in facility and machinery construction as well as in robotics.

In addition to its innovative push-button locking mechanism, the system is characterised by the following features:

- The ability to multiply potentials within the connector enables users to avoid wiring work within machines and electrical cabinets
- Compatibility with Han-Modular<sup>®</sup> enables versatile transmission of signals, data and power
- Because the inserts can be mounted without tools, users save time during installation; the simple insertion and removal process also simplifies handling
- · The connector's design has already received several awards
- Thanks to their circumferential seals, the Han-Yellock<sup>®</sup> hoods and housings comply with protection classes IP65 and IP67



## Han<sup>®</sup> Ex: Connectors for explosive hazardous areas

The connectors of the Han<sup>®</sup> Ex series are designed so that they comply with the requirements of the ignition protection type "intrinsic safety". This means that they are constructed so that, even in the event of a fault, there is no risk of explosion in zones 1 or 2. In intrinsically safe circuits, the aim is to limit the energy in such a way that even a spark does not ignite the environment. HARTING has therefore selected an alloy for the Han<sup>®</sup> Ex hoods and housings in such a way that they are suitable for use in methane coal dust atmospheres. The hoods and housings are in the Han<sup>®</sup> standard format and have IP65 protection class when plugged in. Their blue colour is the symbol for intrinsically safe circuits. The inserts offer a high number of poles even in the most confined spaces, yet still meet all standards for the ignition protection type.

- Suitable for use in potentially explosive zones 1 and 2 (e. g. in methane and coal dust atmospheres)
- · Use only in intrinsically safe circuits
- Easy to replace electrically supplied components in hazardous
   areas
- Inserts for Han<sup>®</sup> E contacts (6 to 24 poles)



# Han-Eco<sup>®</sup>: Connectors made from high-performance plastic

Han-Eco<sup>®</sup> is a series of hoods and housing made of highperformance plastic. It is suitable for both indoor and outdoor applications because of its outstanding resistance to environmental influences. The material plastic has significant weight and cost advantages over classic metal hoods and housings.

### Han-Eco<sup>®</sup> Modular

Using Han-Eco<sup>®</sup>, modular interfaces can be placed within the plastic hood and housing. The connectors in the Han-Modular<sup>®</sup> series snap into the plastic frame embedded in the hood and housing, without the need for any tools. A hinged frame, as with Han<sup>®</sup> B, is not required. With the combination of Han-Eco<sup>®</sup> and Han-Modular<sup>®</sup>, users can quickly assemble a variety of interfaces for a "hybrid" supply of data, signals, power and compressed air to the machine. The solution offers a lot of contact in a small space. In each of the four standard sizes there is one module more of space than in the equivalent counterpart of the Han<sup>®</sup> B Standard or Han-Eco<sup>®</sup> B series.

### Han-Eco<sup>®</sup> A

Thanks to its narrow shape, the Han-Eco<sup>®</sup> A series offers an attractive plastic alternative for many applications. Like the Han-Eco<sup>®</sup> B, the Han-Eco<sup>®</sup> A also enables the simple, quick and spacesaving assembly of connectors in bulkhead mounted housings. The retaining frame with its pre-assembled insert snaps into the bulkhead mounted housing attached to the electrical cabinet from the rear. In addition this rear mounting, the "conventional" front mounting method is of course still possible.



# Han-Eco<sup>®</sup>: Connectors made from high-performance plastic

### Han-Eco<sup>®</sup> B

The Han-Eco<sup>®</sup> B series is fully compatible with the Han<sup>®</sup> B industry standard and is available in sizes 6B to 24B. Both standard inserts and modules can be used in conjunction with the hinged frame of the Han-Modular<sup>®</sup> range. Like Han-Eco<sup>®</sup> A, the Han-Eco<sup>®</sup> B enables the rear mounting of inserts into the bulkhead mounted housing. When installing a electrical cabinet, for example, the prepared ends of the cable harnesses can be mounted from the inside of the electrical cabinet – at the rear – in the bulkhead mounted housing.

This option simplifies the cabinet installation and helps save costs. The electrical cabinet units – including the bulkhead mounted housing – and cable sets can be prefabricated separately and quickly assembled on site. This makes an improved division of labour possible. If required, further processes can be outsourced.

### The plastic and metal versions are fully compatible

The mating compatibility between Han-Eco® B plastic and Han® B metal hoods and housings offers significant advantages. This compatibility ensures that there is no friction loss at the changeover from metal to plastic hoods and housings. Existing testing equipment can be used for both variants without any adaptation.



# Han-Eco<sup>®</sup>: Connectors made from high-performance plastic

#### Advantages

- · Time and cost savings due to option of rear mounting
- · Weight reduction with plastic instead of metal hoods and housings
- Separate prefabrication of complete cable harnesses is possible (since the insert with its retaining frame can be snapped in from behind)
- · Reduced production costs due to better division of labour
- No time lost when switching to plastic hoods and housings due to plug compatibility between metal and plastic
- · Plastic is corrosion resistant
- Fire resistance according to UL94 V0

#### Characteristics

### Material

Hoods/housings:	polyamide, fibre-glass reinforced
Locking element:	polyamide, fibre-glass reinforced
<ul> <li>Hoods/housings seal:</li> </ul>	NBR/FPM
<ul> <li>Limiting temperatures:</li> </ul>	-40 °C to +125 °C
• Flammability acc. to UL 94:	VO
<ul> <li>Protection class according to DIN EN 60 529 when in interlocked state</li> </ul>	IP65



# Fibre optic: Optical fibre solutions

In addition to their use in telecommunications, the usage of fibre optic cables is also of great importance for applications in industrial environments. For telecommunications, it is the features:

- · high transmission capacity
- low cable attenuation
- no cross-talk

that are essential for the application. Additional specific chararacteristics such as:

- · immunity to electromagnetic interference
- galvanic isolation between transmitter and receiver
- small cable dimensions

are the decisive aspects for the industrial sector.

HARTING provides solutions ranging from transmitter/receiver modules and connectors to complete cabling systems.

- Easy handling: POF cables can be processed using HARTING's quick installation technology, without any special tools
- Multi-channel electro-optical transducers and transmission systems
- Designed for use in harsh industrial environments and in the traffic technology sector
- Hybrid solutions: saves space by combining different transmission media in one connector
- Connect electrically transmit optically! Integration of the I/O conversion into the connector



# HARTING MICA<sup>®</sup>: Unmatched versatility – to digitally transform your business

The HARTING MICA<sup>®</sup> (Modular Industry Computing Architecture) provides a quick and easy solution for implementing digitisation projects directly at facilities and machines.

The modular industrial-grade mini-computer enables a variety of application scenarios – thanks to modular hardware and flexible Linux-based open-source software that can adapt to any challenge. Everything is packed in robust mechanics designed especially for industrial environments.

- The one-time investment for MICA® is significantly lower compared to complete industrial PCs
- MICA<sup>®</sup> Virtual Industrial Computing enables sensors, field devices or processes to be operated at the same time – isolated and independent of each other
- Nothing can shake MICA<sup>®</sup>. Its solid compact aluminium enclosure, IP67 protection, and temperature/vibration resistant electronics are designed for harsh industrial applications and railway environments
- MICA<sup>®</sup>'s Linux-based open source approach allows you to choose which development environment and programming language you will use. This enables applications to be created quickly and securely
- Ready-made MICA<sup>®</sup> solution packages for connecting injection moulding machines, wireless machine monitoring and much more are helping to accelerate digitisation projects, but at the same time are versatile enough to be adapted quickly to customerspecific requirements



# UHF RFID: Systems for identification and more

RFID (Radio Frequency Identification) systems from HARTING identify metal containers, machines, tools, trains, printed circuit boards or other assets in highly demanding and harsh industrial environments.

RFID technology enables precisely controlled automation, transparent processes, reduced downtimes and thus the reduction of costs.

We can provide you with complete RFID sytems, with everything from extremely robust RAIN RFID transponders to stationary and mobile RFID readers. HARTING'S RAIN RFID connects the real physical world with your cloud application. Create your digital twin.

- · Detects several objects without a line of sight
- The objects receive a memory because of the bidirectional communication
- · Worldwide partner network can smoothly implement your solution
- Passive RFID sensor transponders transmit maintenance-free and reliable condition-related information (e. g. wheel bearings are too hot, the nacelle door is closed) or wirelessly switch contacts (e. g. to trigger motors on moving objects)
- Versatile solutions thanks to powerful embedded software. We also support standards in data processing and communications.
   GS1 ALE 1.1 Middleware, OPC UA, LLRP, ModbusTCP, ISO 15 961 / 15 962 and many more enable a future-safe solution



# Unmanaged Ethernet Switches: For setting up Ethernet networks

Networks in modern production facilities are becoming increasingly complex. In the unmanaged Ethernet Switches of our Ha-VIS eCon series, models with RJ45 and fibre optic ports are available for efficiently constructing and expanding your Ethernet network. With the switches in our Ha-VIS eCon 2000 and Ha-VIS eCon 3000 families, you can react optimally to any room-specific or application situation.

- · Many different variants with copper and fibre optic ports
- · Compact design: flat or narrow
- Integrated PoE+ standard
- Extended temperature range
- Fast and Full Gigabit Ethernet
- Outstanding energy efficiency



### **Robust Ethernet Switches for harsh environments**

The Fast and Gigabit Ethernet switches from our Ha-VIS eCon 4000 and Ha-VIS eCon 7000 (both "unmanaged") series are designed to be used directly in trains, busses and in industrial areas.

Thanks to their high degree of protection (IP40 to IP67 - according to EN DIN 60 529), vibration-proof Ethernet interfaces (M12, M12 PushPull) and metal hoods and housings, they are suitable for harsh industrial environments and almost all mounting scenarios outside the electrical cabinet. Because decentralised installation (outside of electrical cabinets) is possible, the cabling paths between switches and field devices can be shortened.

- · Plug & Play installation
- · Wide temperature range and excellent mechanical stability
- Less space required, since it can be directly mounted on the machine or facility
- · Switches and end devices are easy to cable



PCB connectors: General information

Devices and applications are getting smaller and more compact. So circuit boards and device innards must move closer together. HARTING is responding to the miniaturisation trend with appropriate solutions for the various dimensions and applications that require connecting PCBs. Our *har*-flex<sup>®</sup> and *har*-flexicon<sup>®</sup> product range provides everything from the classic DIN-41612 rail that has evolved over the years through to the very small 1.27 mm pitch solutions.

PCB connectors are, however, more than just an important interface for connecting printed circuit boards to each other within a device. Each device relies on inputs and outputs, which are normally implemented using robust, metric circular connectors, using RJ45 or ix Industrial<sup>®</sup>. Here, the connector socket usually leads from the circuit board directly through the housing wall; it establishes an IP20–IP67 protected connectors, HARTING also offers a versatile range of PCB sockets for any type of application.



# *har*-flex<sup>®</sup>, MCE: PCB connectors from a single mould

*har*-flex<sup>®</sup> PCB connectors are suitable for all-purpose usage in and on the device. These mezzanine connectors feature a continuous availability of even pole numbers from 6 to 100. The advantage is that the connector always fits optimally to the particular application on the device circuit board – even for medium and small batch counts. With a thickness of 1.6 mm, the Micro Card Edge (MCE) surface-mount (SMT) connector is available for printed circuit boards. It can transmit high data rates of up to 14 Gbps, which makes it ideal for use in high-speed applications.

- Versatility to transform a customised version to a standard component
- Short delivery time, since no specific production tools are required
- MCE for board-to-board and daughter cards that are plugged directly onto the board
- Versatile design of the stacking height of parallel boards by connecting via "intermediate boards" of different lengths
- Suitable for telecommunications, medical and industrial technology



# *har*-flexicon<sup>®</sup>: Miniature SMD connectors

HARTING *har*-flexicon<sup>®</sup> is the miniature SMD connector for quickly connecting single wires. It ensures a perfect connection between the periphery and the PCB for industrial devices. *har*-flexicon<sup>®</sup> is very small, yet fast and simple to operate. The large-area SMT fasteners on the *har*-flexicon<sup>®</sup> ensure a robust connection to the printed circuit board.

These handle the plug-in and pulling forces so that the solder contacts on the connection side are protected from them. The use of reflow- and SMD-solder components in automated assembly and soldering processes standardises and thus optimises the production of printed circuit boards.

- · Robust and miniaturised design
- Efficient connections to the PCB thanks to fully automated processing
- Fast and tool-free connections for individual conductors using the push-in spring-cage connection
- Low-cost processing because of the automatic assembly (SMT) and reflow soldering processes
- High strength on the printed circuit board due to large-area SMT fasteners on the sides
- · High assembly density in 1.27 mm and 2.54 mm pitches



# DIN 41 612, *har*-bus<sup>®</sup> 64: Robust classics for printed circuit boards

No matter whether printed circuit boards are arranged vertically, next to each other or on top of each other: the connectors from the DIN 41 612 series (in compliance with IEC 60 603-2) are ideally suited for establishing cost-effective and robust connections between two printed circuit boards or a cable and a printed circuit board. A centre board with daughter cards on both sides is also possible, depending on the mechanical and electrical requirements of your device.

### Features

- Different types: 2, 3 or 5 contact rows with 3 to 32 contacts each
- Transmits up to 1 A and 15 A
- Up to 10 special contacts are available, in addition to signal and power
- Any combination of coaxial, fibre optic, high voltage and high current contacts up to 40 A
- Special variants for railway technology with improved fire protection values
- Suitable for termination techniques such as soldering, THR (Through Hole Reflow), and press-fit PCB connections
- Cable plug connections: IDC, crimp, Faston, cage clamp

Special feature: har-bus® 64 for VME 64x applications

• 160 poles and backwards/forwards compatible with 96-pole type C



# SEK: Insulation displacement connectors

IDC connectors for flat ribbon cables can connect up to 64 contacts in one cable in a compact, safe and cost-effective way. They are a simple and robust way to connect printed circuit boards – even over larger distances – when a direct connection from PCB to PCB is not possible. The connection from the printed circuit board and plug connection into the housing wall can also be easily made with many contacts.

Due to their easy-to-operate and reliable IDC mechanism, the SEK connectors can be fully assembled in the field.

- · A compact, affordable and reliable solution for your application
- From 6 to 64 contacts with 2.54 mm pitch

### HARTING's SEK connectors:

- A flat ribbon cable connects the printed circuit board in the application
- Transmits data and signals
- Gas-tight contact/connection to the electrical conductor via IDC termination
- · Self-connecting, simple assembly
- Connection of numerous wires/several conductors simultaneously in only one work step, and with only one press-in step
- THT, THR and press-fit technology = variable PCB termination technology



# SEK: Insulation displacement connectors

### 1. Comprehensive portfolio

Both straight and 90° angled contacts are available. Sturdy locking levers are used to securely connect male and female connectors. The female connectors are optionally available with a strain relief clamp.

### 2. Low-profile connectors

Their low height of 9.4 mm allows you to save space. They also ensure secure connections – even in confined spaces.

### 3. Through hole reflow soldering

Connectors suitable for through hole reflow soldering are made of temperature-resistant plastic (PCT).

### 4. Automatic assembly

Because of their tape & reel packaging, the IDC connectors can be integrated in automatic "Pick & Place" assembly processes and processed with other SMD components. This simplifies the PCB assembly process and reduces process costs.

### 5. Direct connection to the PCB

This cost-effective solution without plug-in complexity is made possible by directly connecting the ribbon cable to the circuit board. HARTING offers two-row or four-row PCB connectors for this purpose.



# TCA: High speed connectors for ATCA

Our TCA connectors were developed for the open hardware systems AdvancedTCA<sup>(B)</sup>, AdvancedMC<sup>TM</sup> and MicroTCA<sup>TM</sup>.

They were specified by the PCI Industrial Computer Manufacturers Group (PICMG), a consortium of over 450 product suppliers.

These innovative systems are being used more and more in industrial control systems and computer systems.

Our new "con:card+" connectors feature press-fit technology. They have significantly improved upon the contact reliability of the AdvancedMC<sup>™</sup> connectors for MicroTCA<sup>™</sup> and AdvancedTCA<sup>®</sup>. Their core element is the GuideSpring. It uses defined positioning to compensate tolerance deviations in the AdvancedMC<sup>™</sup>.

- The GuideSpring makes reliable system operations possible even with circuit boards that are manufactured in large series according to modern methods
- Extremely smooth contact surfaces combined with a more robust coating ensure the required 200 mating cycles between the PCB and connector



# *har*-bus<sup>®</sup> HM: Hard metric connectors

*har*-bus<sup>®</sup> HM connectors are the basis for constructing highperformance backplanes for industrial automation devices such as drive controllers, control computers, and industrial computers in 19" technology. The 2 mm hard metric connector *har*-bus<sup>®</sup> HM is standardised in compliance with IEC 61076-4-101. It features from 5 to 8 signal rows. In addition to the standard modules, the complete product portfolio includes all variants for CompactPCI, including Hot Swap and CTI (Computer Telephony Integration).

- Modules available in 5+2-row types A, B, AB and C as well as 8+2row types D, E and DE
- All male and female connectors in press-fit technology
- The high current connector *har*-bus<sup>®</sup> HM Power meets the requirements of the OBSAI specification V1.1. In this configuration, up to 23 A at 70 °C can be transmitted through one contact.
- Can be assembled with up to four contacts, with four contact positions, so that plug-in and disconnecting are possible during operations



# I/O Connectors: General information

The abbreviation I/O stands for Input and Output. This refers to everything (data and signals) that goes into a device and everything that is returned to the PLCs or networks. The relevant connectors are typically located on the outside of a housing and constitute the device connectivity.

HARTING provides various solutions for this sector which are adapted to varying degrees of demanding environmental conditions, depending on the area of application. Interfaces are available for applications of any size: starting from IP20 connectors, such as the well-known RJ45, to new solutions such as ix Industrial<sup>®</sup>. If devices and their interfaces come into contact with water, oils or other substances in working environments, then IP65/IP67 protected interfaces are required. HARTING provides users with robust solutions in PushPull variant 4/14 housings, metric M8, M12, M23 housings or as proven D-Sub interfaces.



# T1 Industrial: Single pair Ethernet technology

Single pair Ethernet (SPE) is a technology that can transmit TCP/IPbased data streams over only one pair of wires.

The Ethernet technology based on IEEE 802.3bp 1000BASE-T1 is already available today and delivers 1 Gbit/s transmission speed. Another standard for even higher data rates of up to 10 Gbit/s (IEEE 802.3ch) for high-resolution sensors and video transmissions is currently in the works. Another important standard for 10 Mbit/s (IEEE 802.3cg) enables transmission distances of up to 1,000 metres; it can therefore replace almost all Fieldbus types.

Standardised and harmonised interfaces are the key to a complete SPE ecosystem consisting of sensors, actuators, control systems and connection technologies. They provide the necessary investment security for implementing automation solutions.

HARTING's T1 Industrial connector family is based on a standard SPE mating face, which is used for all variants from IP20 to IP65 / IP67. This enables both 1 Gbit/s for shorter distances and 10 Mbit/s for longer distances with compatible mating faces.

- Internationally standardised mating face according to IEC 63 171-6 (previously IEC 61 076-3-125)
- Development of a future-safe communication network with harmonised cabling according to ISO/IEC 11 801 and TIA 42
- Designed for industrial applications in up to M3I3C3E3 environmental conditions
- Meets all IEEE 802.3 requirements



# PushPull: Solutions with PushPull locking

The PushPull connector family is designed for transmitting optical and electrical communications, as well as signals and power. As a true device connector, the PushPull is perfect for device communications because of its high assembly density, high bandwidth and outstanding signal integrity. The product range is supplemented by power connectors up to 690 V and 16 A. The PushPull connectors are integrated in installation systems, such as the PROFINET system of the PNO (PROFIBUS user organization). These installation systems are already widely used in all areas of facility automation in the automotive industry and in the cabling of industrial buildings.

- · Safe, quick and convenient to install
- · Intuitive operations and locking with just one click
- Extensive compatibility during installation due to the internationally standardised system interfaces
- Reliable in any environment
- Scalable PCB termination technology from the panel feed through to the pick-and-place solution
- Transmits data up to 10 GBit/s and power up to 690 V/16 A
- Suitable without restrictions for industrial applications thanks to the robustness and high protection class IP65/IP67
- A complete installation system with network components and system cables
- · The perfect termination technique for on-site assembly



# ix Industrial<sup>®</sup>: Ethernet interfaces

Standardised according to IEC 61076-3-124, this newly designed Ethernet interface sets a new standard for its robustness. The HARTING ix Industrial<sup>®</sup> is a robust miniaturised Ethernet interface that has the potential to replace today's RJ45.

The Cat.  $6_A$  performance of its mating face ensures that it will work in the future for 1/10 Gbit/s Ethernet. Its high current-carrying capacity enables many current and future PoE applications. This interface combines both data transmission and power supply, thus further reducing the installation space required by your applications for their connection technology.

- Secure connection: with an active locking of socket and plug connector using two stable metal snap-in hooks
- High shock and vibration resistance according to EN 50 155
- 5,000 mating cycles
- 70 % smaller than typical RJ45 sockets
- · Reliable data transmission even in EMC-critical applications



# D-Sub: Robust classics for I/O applications

### PCB connectors

When using HARTING's D-Sub connectors for the PCB, you are not limited to only transmitting bus signals in your devices. In addition to our classic D-Subs, HARTING offfers many other solutions for transmitting signals, data and high currents. With our D-Sub Mixed, for example, we can create nearly unlimited variants to satisfy your particular modular requirements. Our additional options, such as adding filter elements or water resistance, help you to solve problems and save space on your PCB. HARTING has been a leading supplier of D-Sub connectivity for industrial environments for decades. We've been investing continually to keep pace with new technologies. For the D-Sub, these are mostly focused on the termination technique. We offer D-Sub connectors for your THR and SMT processes, so that you can access more potential savings during production.

- A versatile portfolio: D-Sub Standard, D-Sub High Density, D-Sub Mixed, D-Sub Filter, D-Sub Waterproof, D-Sub THR, D-Sub SMT
- For wave and reflow soldering: Through hole technology, surface mount technology and through hole reflow
- Modular connector for the PCB D-Sub Mixed
- Speedy installation in a modern production process helps to reduce costs
- · Very versatile and customer-friendly



# D-Sub: Robust classics for I/O applications

### Cable connectors and hoods and housings

In addition to PCB connectors, HARTING offers a comprehensive portfolio of cable connectors and hoods and housings for connecting to devices.

The cable connectors are available in various performance levels for office, industrial use, and applications with special requirements.

Depending on the required mechanical robustness and shielding requirements, a choice is made between plastic hoods and housings without and with shielding plates, metallised plastic and full metal hoods and housings. For applications that must be free of interference, HARTING offers a full metal hoods and housings with crimp flange connection. Ready-made system cables for standard applications such as Fieldbus or cables made according to customer specifications are available for cabling tasks.

- Versatile cable connector portfolio with crimp or manual solder termination for single-wire or ribbon cable connections: *D-Sub Standard*, *D-Sub Mixed*, *D-Sub High Density*
- A versatile housing portfolio featuring different locking types, different cable outlet directions and robust cable strain relief
- HARTING has the proper hood or housing for every application, requirement and size



# *har*-link<sup>®</sup>, bus interfaces: Compact solutions for high data rates

This modular and compact I/O connector system achieves transfer rates of up to 2 Gbit/s.

It meets the requirements of IEC 61 076-4-107. It is characterized by its compact and robust design, as well as its excellent transmission characteristics. All dimensions of *har*-link<sup>®</sup> comply with IEC 917 and IEEE P 1301 – thus ensuring simple implementations in both metric and imperial systems.

- Pluggable during operations (hot plugging), thus ready for use in modern bus systems such as CompactPCI, S-Bus and VME
- Suitable for all transmission protocols with differential low-voltage signals
- Interference-free functionality even in high EM environments thanks to its EMC shielding
- Female connectors made of high-temperature-resistant plastic that can be used in a reflow soldering process
- Cable assemblies and crimping tools for processing *har*-link<sup>®</sup> male connectors



# RJ Industrial<sup>®</sup>, *har*-port: Ethernet data and service interfaces

The modular RJ Industrial<sup>®</sup> connector series is based on the standard RJ45 mating face and was specially developed for use in harsh industrial environments. Particularly important for cabling devices with Ethernet interfaces: For many industrial applications, it must be possible to assemble a connector on site, regardless of whether you are using power connectors or communication connectors. The *HARAX*<sup>®</sup> IDC termination technique has proven itself in industrial applications as a quick connection solution for all Ethernet networks. Using the IDC technique, individual wires (either stranded or solid, with a cross-section of up to AWG 22) can be connected without special tools and without stripping. The 8-pole data module with *HARAX*<sup>®</sup> quick termination technology are both suitable for Gigabit Ethernet networks.

- · All data modules have the same dimensions
- Easy to convert transmission paths by connecting the data module: from 100 Mbit Fast Ethernet to Gigabit
- The RJ45 data module can be used in the PushPull, Han-Max<sup>®</sup> and Han<sup>®</sup> 3 A connector family
- Complete family of connectors for all applications in Fast Ethernet, 1/10 Gigabit Ethernet, PROFINET, Ethernet/IP and other areas
- · Ethernet profiles in industrial environments
- IP20: Standard RJ45 connectors can be assembled in the field or as over-moulded system cables



# Circular connectors (M8, M12, 7/8"): All-purpose use for data, signal and power

Standardised circular connectors with thread dimensions M8, M12, M23, 7/8" and Han-Max<sup>®</sup> are frequently used for the installation of machines and facilities. Our product range of field-assembled and pre-assembled M8, M12, Han<sup>®</sup> M 23 and 7/8" connectors are intended for automation. Our portfolio includes straight and angled versions with plastic or metal hoods and housings. In addition to the standard sensor/actuator circular connectors, standardised circular connectors such as M12 and Han-Max<sup>®</sup> are offered specifically for communication technology (Ethernet, Ethernet/IP, PROFINET, Profibus, Devicenet and CAN).

- HARAX<sup>®</sup> quick termination technology for simple on-site assembly of M8 and M12 connectors without special tools
- Fast and cost-effective implementation of all the wiring and communication tasks in an automation project



# Circular connectors Han<sup>®</sup> M23: Robust all-rounders

Han<sup>®</sup> M23 refers to a range of circular connectors using the M23 metric thread size, which are very well suited for transmitting power and signals in the industrial sector. A characteristic feature of these connectors is that they combine high current carrying capacity with low space requirements. Depending on your requirements, a Han<sup>®</sup> M23 can minimise the space required for a plug-in connection. So this series is suitable for applications in many industrial sectors: for connecting motors, supplying power, or for connecting signal transmitters.

The hoods and housings also provide excellent protection against the ingress of dust and water. They ensure protection class 69K (according to DIN EN 60 529 and VDE 0470-1). Their vibration-resistant construction enables them to be used even under the most extreme conditions (e. g. in rail vehicles).

The Han<sup>®</sup> M23 Signal series provices inserts for signal transmission with 6 to 19 contacts. Han<sup>®</sup> M23 Power enables the parallel transmission of power, signals and data in a single connector. For this "hybrid" use, there are inserts with three power contacts and up to five signal contacts as well as four data lines available. The Han<sup>®</sup> M23 enables you to flexibly combine data, signal and power transmissions to meet your particular requirements. This product series enables the optimum solutions for a wide range of applications.

- Very compact
- Very good EMC characteristics
- Excellent protection against the ingress of dust and water (IP69K)
- · Can be assembled without tools
- Screw-on and quick-release fasteners (Han<sup>®</sup> M23 ComLock) are available



# Cables, cable assemblies, distribution boxes: Solutions for IT, building automation and industry

HARTING's cabling solutions are designed, tested and certified for the complete industrial environment. Depending on your application environment, IP protection, plug-in safety, robustness, vibration resistance and EMC safety can all play a significant role. Reduced installation time and simplified logistics are often the key aspects of custom solutions.

Our product range includes moulded cables and pre-assembled cabling with plastic or metal hoods and housings. In addition to standardised patch cords for the M8, M12 and RJ45 variants, growing and more complex markets are also demanding increasingly specific components. HARTING offers a solution that ranges from the assembly of simple connecting cables to complex cabling systems. Our portfolio is supplemented by a variety of sensor/actuator boxes, as well as specific power distributors for the infrastructure cabling of decentralised drive systems.

- System cabling up to category 7<sub>A</sub>
- · Customised cable assembly
- · Cable types to meet market requirements
- · Copper and fibre optic solutions
- · Indoor and outdoor variants



# Cables, cable assemblies, distribution boxes: Customised solutions

HARTING's cabling solutions, as complete systems are suitable for harsh applications, such as railway traffic engineering or wind energy. A tailor-made solution draws on the technical expertise available at the HARTING Technology Group and our entire range of connectivity for transmitting data, signals and power. In order to offer a solution that is not only technically but also economically convincing, the projects are carried out in close dialogue with the customer and in compliance with the relevant standards and regulations. Through standardised project procedures, we ensure continually that we achieve our shared goal quickly and efficiently at every step.

We create a customer-specific product that solves the particular challenges and fulfils the common expectation for quality.

- Developing specific housing, fastening and connectivity solutions
- Modifying standard components from the HARTING portfolio
- · Packaging in custom sets to simplify logistics



## Current sensors, current transformers: For precise control

Whether for transportation or industrial applications: the ability to quickly and accurately detect current is required in order to precisely control power electronics systems such as frequency converters, traction converters, UPS systems or welding systems.

Current sensors are electrical components which deliver a precise, real-time representation of the input and output currents. The measuring signals are then used (e. g. in frequency converters) for precisely controlling the power semiconductors and for monitoring performance and functionality. HARTING's current sensors are based on the Hall effect and are capable of measuring all forms of direct, alternating and mixed currents.

Current transformers for measuring are used to convert high alternating currents in a conductor in a fixed ratio (e. g. 1:600) into electrical signals. This provides reliable input variables for evaluation units. For example, you can monitor the deviating currents in the outgoing and returning conductors in frequency converters, or accurately measure the power consumption of decentralised energy facilities.

#### Your advantages at a glance:

- · Precise measurement results
- · No-contact measurement of current
- · Current sensors for power electronics
- Current transducers for energy measurement and safety technology



Special tool for Han<sup>®</sup> connectors: For all essential termination techniques and assembly steps

HARTING offers a comprehensive portfolio of tools for all essential termination techniques and assembly steps. Our product range includes simple assembly/disassembly tools, hand pliers, more complex hand tools, and fully automated machines for the efficient processing of contacts and connectors.

There are many different tools available for processing crimp contacts. These extend from simple mechanical manual crimping tools to fully automatic machines optimised for the production of crimp contacts in the largest possible quantities. All these HARTING tools and machines produce crimp connections of consistently high quality that meet the decisive relevant standard: DIN EN 60 352-2.

### Han<sup>®</sup> tools portfolio

- Hand crimping tools for Han® contacts
- · Pneumatic crimping tools
- · Semi-automatic and fully automatic crimping machines
- · Assembly and removal tools
- · Screwdrivers and stripping tools
- Punching tools for panel cut outs





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### **Product configurators**

### The Han® Configurator

Do you need to find suitable interfaces for your machine construction quickly and reliably? And you don't want to spend a lot of time on all the details about connectors and various combination possibilities? Our configurator helps you to quickly get all the necessary information and data critical to your decision directly.

Only three input fields (contacts, voltage, current) and just five steps lead to a possible solution.

Suggestions for alternative interfaces are also just a click away. The current configuration can be output live as a 3D model. You can then download the complete documentation (including STEP files) with just one click. Configurations can be saved, loaded and shared within the team.

- Fast and intuitive path to the best interface solution
- Very good reliability that the proposed components / solutions fit to each other
- 3D visualisation of the current configuration
- Download of the complete interface documentation with a single click (including STEP files)
- Optimal teamwork support with save, load and share functions



### www.HARTING.com/hanconfigurator

### Worldwide sales network

Armenia: refer to Russia

#### Australia

HARTING Pty. Ltd. Suite 11 / 2 Enterprise Drive Bundoora 3083, University Hill Melbourne, Victoria Phone 1800 201 081 (toll-free within AUS) +61 3 9466 7088 au@HARTING.com

Australia and Oceania: refer to Australia

#### Austria

HARTING Ges.m.b.H. Deutschstrasse 19 1230 Vienna Phone +43 161 621 21 at@HARTING.com

#### Azerbaijan:

refer to Turkey

#### **Baltic States:**

refer to Finland

#### Belarus:

refer to Russia

#### Belgium

HARTING N.V. Z.3 Doornveld 23 1731 Zellik Phone +32 2 466 0190 be@HARTING.com

Bosnia Herzegovina:

refer to Austria

#### Brazil

HARTING Ltda. Alameda Caiapós, 643 06460-110- Barueri - São Paulo Phone +55 11 5035 0073 br@HARTING.com

#### Canada

HARTING Canada Inc. 475 Dumont Avenue Suite 300 Dorval, Quebec, H9S 5W2 Phone +1 855 659-6653 info.ca@HARTING.com

Central America and the Caribbean: refer to USA

Central Asia: refer to Russia

#### China

HARTING (Zhuhai) Sales Ltd. Room 3501, Grand Gateway I No. 1 Hong Qiao Road Xu Hui District Shanghai 200030 Phone +86 21 3418 9758 cm@HARTING.com

Croatia: refer to Austria

#### Czech Republic

HARTING s.r.o. Mlýnská 2 160 00 Prague 6 Phone +420 220 380 495 cz@HARTING.com

#### Denmark

HARTING ApS Resilience House Lysholt Allé 8 7100 Vejle Phone +45 70 25 00 32 dk@HARTING.com

#### Finland

HARTING Oy Teknobulevardi 3-5 01530 Vantaa Phone +358 207 291 510 fi@HARTING.com

#### France

HARTING France EURL ZAC Paris Nord 2 181 avenue des Nations 95934 ROISSY CDG Phone +33 1 4938 3400 fr@HARTING.com

#### Germany

HARTING Deutschland GmbH & Co. KG Simeonscarré 1, D-32427 Minden Phone +49 571 8896 0 de@HARTING.com

Georgia: refer to Russia

#### Great Britain

HARTING Limited Caswell Road Brackmills Industrial Estate NN4 7PW GB - Northampton Phone +44 1604 82 75 00 salesuk@HARTING.com

#### Greece: refer to Italy

Hong Kong HARTING (HK) Limited Regional Office Asia Pacific 3512, Metroplaza Tower 1 223 Hing Fong Road Kwai Fong, N. T. Phone +852 2423 7338 ap@HARTING.com

#### Hungary

HARTING Magyarország Kft. Fehérvári út 89-95 1119 Budapest Phone +36 1 205 34 64 hu@HARTING.com

#### India

HARTING (India) Private Limited 7th Floor (West Wing) Central Square II Unit No.B 19 part, B 20 & 21 TVK Industrial Estate Guindy, Chennai 600032 Phone +91-44-43560415 in@HARTING.com

Ireland:

refer to Great Britain

Israel: refer to Turkey

#### Italy

HARTING S.R.L. Via dell' Industria 7 20090 Vimodrone (MI) Phone +39 02 250801 it@HARTING.com

#### Japan

HARTING K.-K. Yusen Shin-Yokohama 1 Chome Bldg., 2F 1-7-9, Shin-Yokohama, Kohoku-ku Yokohama 222-0033 Phone +81 45 476 3456 jp@HARTING.com

#### Korean Republic

HARTING Korea Co. Ltd. B-B108, Woolim Lions Valley 5th 302 Galmachi-ro, Jungwon-gu Seongnam-si, Gyeonggi-do 13201 Phone +82 31 750 0380 Kr@HARTING.com

Kosovo: refer to Austria

Macedonia: refer to Austria

Malta: refer to Italy

#### Mexico

HARTING Mexico S.A. de C.V. IOS Torre Virreyes Pedregal No. 24, Co. Molino Del Rey Suites 357 A, B, C Del Miguel Hidalgo, Mexico D.F. 11600 Phone +1 800 123 0415 HARTING.mexico@HARTING.com

#### Middle East:

refer to United Arab Emirates

Montenegro: refer to Austria

#### Netherlands

HARTING B.V. Larenweg 44 5234 's-Hertogenbosch Phone +31 736 410 404 nl@HARTING.com

Norway

HARTING A/S Østensjøveien 36 0667 Oslo Phone +47 22 700 555 no@HARTING.com

Pakistan: refer to UAE

#### Poland

HARTING Polska Sp. z o.o. ul. Duńska 11 54-427 Wrocław Phone +48 71 352 81 71 pl@HARTING.com

#### Romania

HARTING Romania SCS Str. Europa Unita nr 21 550018 Sibiu Phone +40 369 102 610 ro@HARTING.com

#### Russia

OOO HARTING Sverdlovskaya nab., 44, lit. Yu, office 612 195027, St. Petersburg Phone +7 812 327 6477 ru@HARTING.com

Serbia: refer to Austria

#### Singapore

HARTING Singapore Pte. Ltd. 25 International Business Park #04-108 German Centre SGP-Singapore 609916 Phone +65 6225 5285 sg@HARTING.com

#### Slovakia

HARTING s.r.o. Slovakia branch Štefániková Trieda 71, (areál pivovaru) 949 01 Nitra Phone+421 37 655 9089 sk@HARTING.com

Slowenia:

refer to Austria

#### South Africa

HARTING South Africa Proprietary Limited Ground Floor, Twickenham Building The Campus Cnr Main & Sloane Street Bryanston Johannesburg (Bryanston) 2021 Phone +27 (0) 11 575 0017 za@HARTING.com

South America: refer to Brazil

South Asia: refer to Singapore

South Pacific: refer to Australia

#### Spain

HARTING Iberia S.A.U. C/ Viriato, 47 8° Planta Edificio Numancia, 1 08014 Barcelona Phone +34 933 638 484 es@HARTING.com

Sub-Sahara countries: refer to South Africa

Sweden HARTING AB Gustavslundsvägen 141B 167 51 Bromma Phone +46 8 445 7171 se@HARTING.com

#### Switzerland

HARTING AG Volketswil branch Hofwiesenstrasse 4 A 8604 Volketswil Phone +41 44 908 20 60 ch@HARTING.com

Taiwan

HARTING Taiwan Ltd. Room 1, 5/F 495 GuangFu South Road RC-110 Taipei Phone +886 227 586 177 tw@HARTING.com

#### Turkey

HARTÍNG Türkei Elektronik Ticaret Limited Sirketi Bayar Cad. Şehit İlknur Keleş Sok. Dural Plaza No:3 K.11 34742 Kozyatagı – Istanbul Phone +90 216 688 81 00 tr@HARTING.com

Ukraine: refer to Poland

#### United Arab Emirates

HARTING Middle East FZ-LLC Knowledge Village Block 2A - Office F72 P.O. Box: 454372 Dubai Phone +971 4 453 9737 uae@HARTING.com

#### USA

HARTING Inc. of North America 1370 Bowes Road Elgin, Illinois 60123, USA Phone +1 847 741 1500 us@HARTING.com

#### Distributors - worldwide

Arrow: www.arrow.com

Digi-Key Corporation: www.digikey.com

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# Other countries and general contacts

HARTING Electric GmbH & Co. KG Postfach 1473 D-32328 Espelkamp, Germany Phone +49 5772 47-97100, electric@HARTING.com

HARTING Electronics GmbH Postfach 1433 D-32328 Espelkamp, Germany Phone +49 5772 47-97200, electronics@HARTING.com



# www.HARTING.com