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BUS Topology for Power Transfer

Machine and facilities developers are advancing the implementation of device function decentralization with standardized interfaces. The objective is to integrate cost-optimized installation technology for power distribution and consequently to optimize installation technology that has developed over the course of many years. There are a number of solutions available for power distribution that will be further developed in the future.

Conventional wiring is characterized by the point-to-point installation of the signal and power transfers. In practice, this means that each motor is connected to a power cable from the control cabinet. All sensor and actuator terminals, such as for proximity switches or valves, are also wired in parallel.

The introduction of serial bus components for connecting sensors and actuators marked a key step in technical progress in the wiring area. New installation concepts in data transmission have brought clear user advantages with regard to laying cables. The existing signal components for receiving or emitting control signals are available in a very wide range of protection classes, from IP 20 to IP 68. In contrast, the last 20 years have seen almost no changes in supplying power to smaller motors (up to around 2.2 kw). The motors are often still supplied with a separate cable from the control cabinet.

Han-Power S Metal for 7 x 6.0 mm² and 5 x 10 mm² conductors.

DECENTRALIZED STRUCTURE

When frequency converters are installed centrally, special cables with optimized and complex shielding are needed to meet the technical demands. The high total costs and considerable space requirements of installation engineering as it has developed are reinforcing the trend towards decentralized installation engineering, e.g. in materials handling. Intelligent motor control units are relocated so that they are directly at the machine or conveyor belt. The HARTING Technology Group is supporting this change in installation engineering with their products.

An essential element in this new wiring technology is a power bus system that allows a number of “consumers” to be connected on one cabling line, while still complying with all relevant national and international standards. This innovation must fall back on existing and standardized interfaces. The compact and rugged Han® connector must meet the requirements with regard to the number of poles, voltage and current-carrying capacity. ISO 23570 has standardized connectors for this area.

In principle, it is possible to distinguish two connection types in this installation concept:

- Power bus distribution on an uncut cabling line, where the individual wires are tapped.
- Power branch is completely pluggable, in order to provide a quick and time-saving electrical connection for machine and facility modules.

The basic conditions are primarily the same for the two types: use of the standard 230/400 V industrial power line in accordance with VDE or 600 V in accordance with UL connection options for up to a maximum of seven conductors, core cross-section at least 4 mm², connection with standard tool and modular design. On the basis of these specifications, HARTING has created a new line: The Han-Power® Series.

HAN-POWER® SERIES

Like the standard product series, the products in the new Han-Power series meet all relevant specifications.

HAN-POWER® S

The decentralized installation concept already provides a first connector at the control cabinet, which is optimized for the particular application. The electric line that is used, with 5 x 6 mm² and 2 x 2.5 mm² cable plus PE conductor, is wired to the

Han® Q 4/2 connector and transferred from the IP 20 area to the IP 65 area. The safe-to-touch contact insert is needed for higher currents up to 40 A.

The Han Q 4/2 connector, which is equipped with the known Han C contacts, can be utilized for applications from 2.5 mm² to 6.0 mm² conductor cross-section. The power line is laid without taking the decentralized motor control unit into consideration. The branch is made with a Han-Power S, so that the power line is not interrupted.

The power cable is stripped to a length of around 15 cm and laid into the Han-Power S. The strands, which are still completely enclosed by the insulation, are then threaded into the insulation-piercing connecting device; optimal contacts and the separation of the strand insulation are assisted by screws. The IDC terminals are only loaded with the phase current to the decentralized "consumer". The HARAX® contact technology will ensure the long-term stability (see IEC 60947-7-1). Furthermore, contacts must be guaranteed under extreme conditions, such as short-circuit currents of several kA.

Han-Power T Q 5/0: the compact interface connection for energy distribution.

The various conveyor systems require new concepts, which must be designed for the particular application (in automotive industry, airport engineering and general logistics centers). The cable cross-section is an important criterion for minimizing the line voltage drop in all applications in which goods are moved over a distance of more than 100 m.

The applications in place to date are chiefly equipped with a Han-Power S Q 4/2. Products installed in airport logistics can quickly and reliably connect wires with a conductor cross-section of up to 6.0 mm² and precisely fulfill the demands for baggage handling.

A metal version is the optimal answer for applications in which mechanical stability against impact is additionally required. This new and universal system solution supports the user in system installation and maintenance.

The trend-setting installation with optimized handling and expansion of the usable conductor cross-sections creates additional advantages. For the first time, the Han-Power® S Metal makes power distribution and branching possible even for conductor cross-sections up to 10 mm².

The described installation concept is deployed in a very wide range of manufacturing facilities and logistics centers that are newly constructed or modified with decentralized components. The test run and function test are performed at the permanent location after the system has been completed.

HAN-POWER® T

Before the setting up of production lines, thought must be given to the installation concept: How are the individual modules transported and constructed so that the previously tested electrical installation can be retained?

The electrical installation must be left in place, in order to use the function test advantages and to rule out wiring mistakes in a tested system. The power line is laid using ready-made cables with connectors. For the branch, a Han-Power T with the right connectors for the application is used. The branch to the "consumer" is also accomplished with a connector, in order to provide the greatest possible reliability and flexibility. The decentralized motor control unit, with a conductor cross-section of up to 6.0 mm², is connected via the Han Q 4/2 connector. For smaller power levels, a Han-Power T with Han® Q 5/0 connector is available. By using these connectors, modifications can be made quickly and production line down time is minimized. Additional system elements are quickly and simply plugged in using components that have already been installed.

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