Offprint

Enhanced efficiency with decentral control

Otmar Feurstein, Editor in chief

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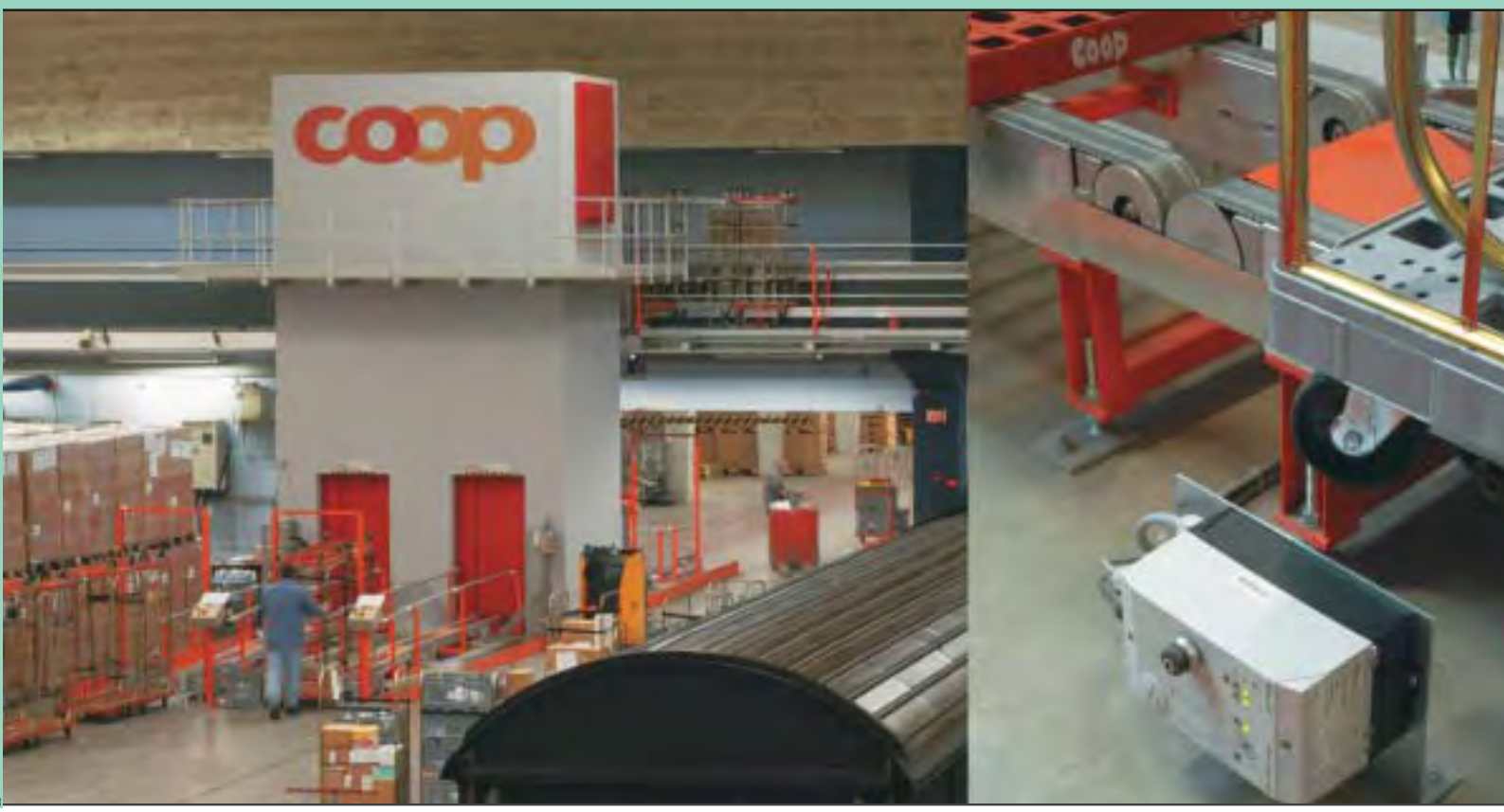

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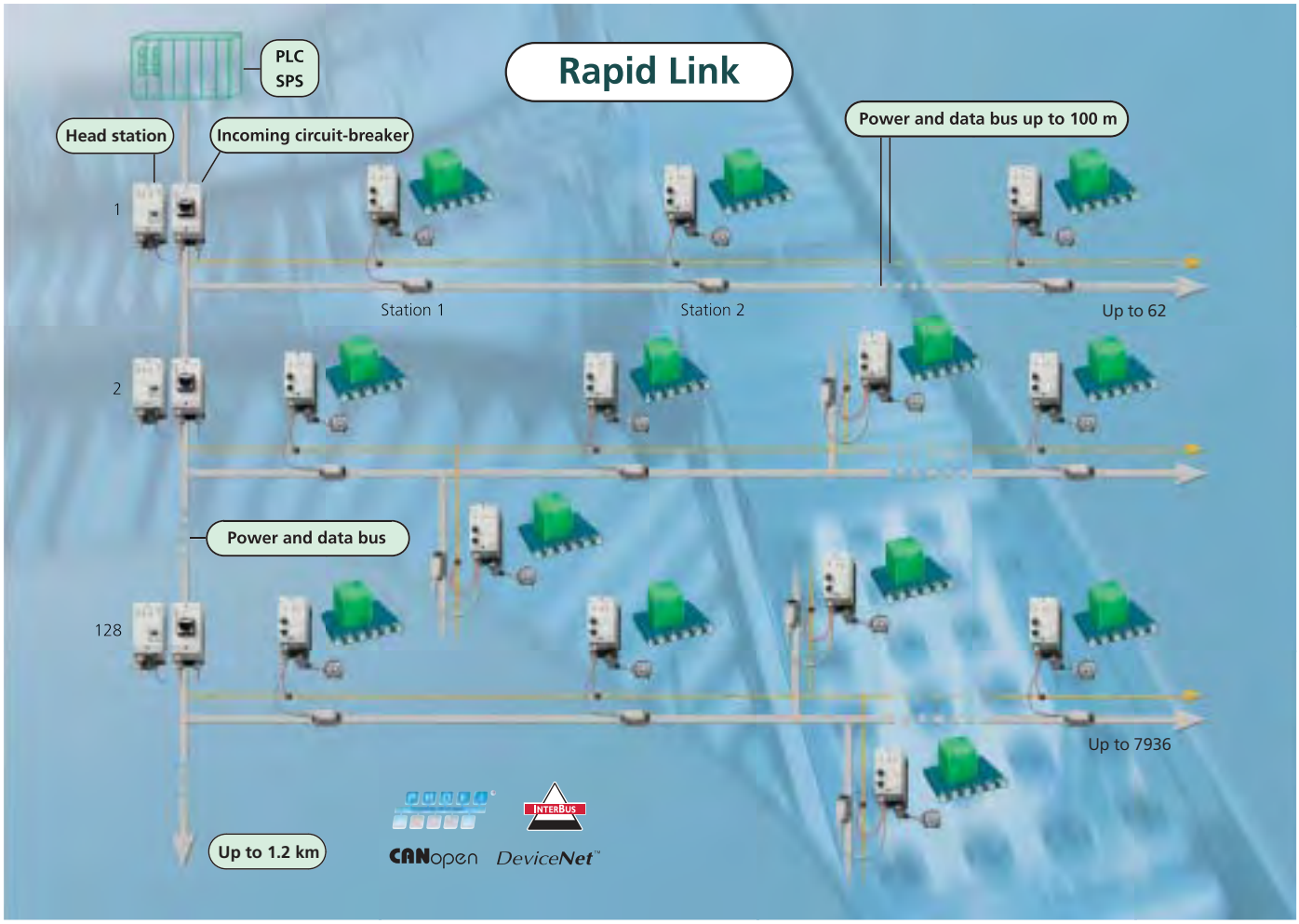

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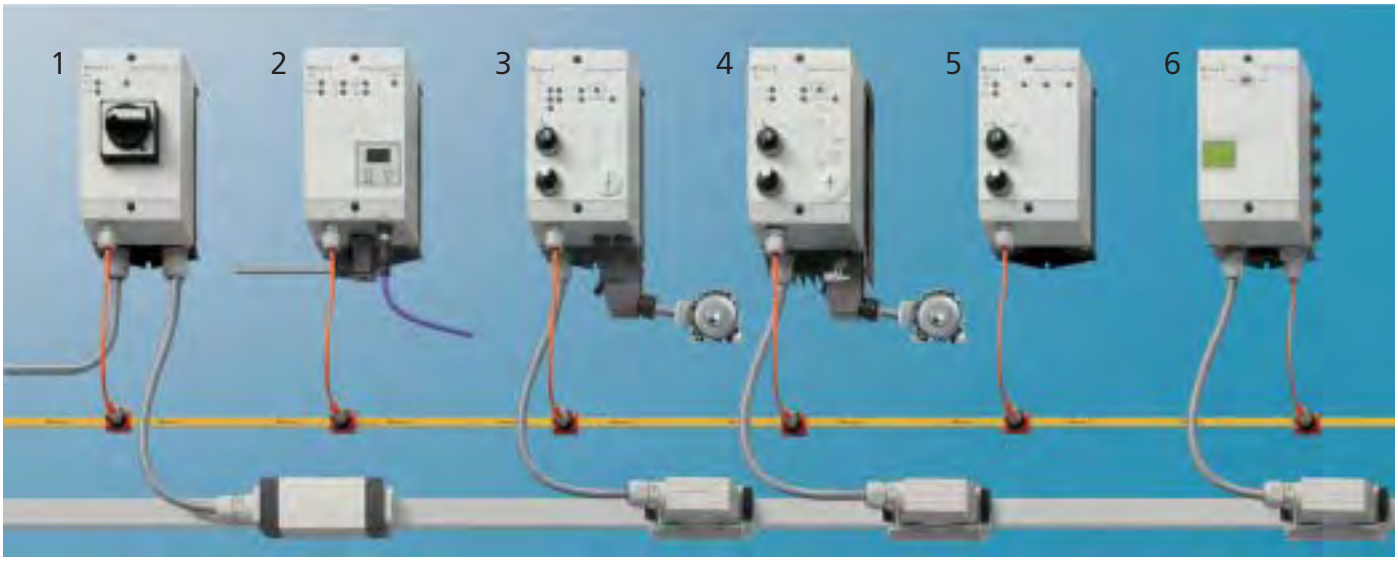
Secure decisive cost advantages for your material handling projects with Rapid Link, the decentral control and installation range with IP65 degree of protection. The combination of data and power bus simplifies planning and reduces the installation effort. Rapid Link transforms conveyor technology to a modular concept and provides a clear overview in the installation.



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THE SWITCHING AND INSTALLATION SYSTEM FOR CONVEYOR TECHNOLOGY

Enhanced efficiency with decentral control

Projects in conveyor technology are characterised by implementation times which are becoming shorter and shorter. Moeller's Industrial Automation Division recognised this trend in the industry and has developed a new product: the Rapid Link. This switching and installation system is predestined for roller conveyors, buffer roller conveyors, belt conveyors, monorail overhead conveyor systems and skid conveyors. In the Coop Distribution Centre at Wangen near Olten in Switzerland, these types of automation components are in use in the circulation of reusable containers (wheelcontainers and reusable containers).

Mr. Marco Wirz, Electrical Engineer (HTL) and Automation Account Manager of Moeller Electric AG in Switzerland answered as follows when posed with the question how Moeller came to the conclusion that the market needed Rapid Link: "It is the result of an approach by a customer to our company. Our engineers and designers implemented the required features for this switch and installation system into a new product."

A Coop employee commented: "We used to clear 28 to 29 railroad cars per day with 14 to 15 people. At the moment, we clear the same number or more with just nine to ten people. The newly designed reusable container circulation system works impeccably."

Otmar Feurstein
Editor in chief

During the tendering phase of the project, Coop precisely defined the required circulation capacity at 5000 wheelcontainers per day. The wheelcontainer system has proven to be the best solution in the chain stores. Hand-pallet trucks are no longer necessary and the goods can still be transported onsite by rolling them. Hayek Engineering was designated with responsibility for the engineering for Coop. Gilgen Logistics Systems AG from Oberwangen were awarded the tender for the reusable container conveyor.

Mr. Othmar Neuhaus, Electrical Engineer (HTL), Head of Control Engineering and holder of commercial authority at Gilgen Logistics Systems AG: "We had to tread new paths with this system. Moreover, we were pressed for time. AS-interface, the data bus of Rapid Link considerably reduced the time required for engineering design. Furthermore, the system can be commissioned in stages. A major advantage, as the conveyer can be tested module by module beforehand."

I asked Andreas Köstinger, Electrical Engineer (HTL), Hardware Planner for control engineering at Gilgen Logistics Systems AG how the decision to use Rapid Link was made: "In a previous project, we used a product from competitors with a similar design. The motor starters from Moeller were not on the market at the time. We were always convinced of the advantages posed by the positioning of the motor starter directly at the drive. A reference project did not exist."

Over 100 motors in total were used in this

The buffered wheelcontainers wait on the upper level for their distribution to the individual conveyor routes.

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Xtra Combinations

That's the name of the new world of automation from Moeller. This means: Users now get their entire automation competence from one competent partner company. Industrial and building automation plus power distribution. All from a single manufacturer. A complete package or individual combinations depending on the application. And everything fits together perfectly: Core products, PLC's, operating and process display units, communication, software standards, accessibility via the Internet, design and solution competence and professional service. All backed up by more than 100 years of Moeller's experience and competence with switchgear, controlgear and control engineering in automation and power distribution.

installation. The drives for the lifts, turntables and shuttle cars are controlled separately; all belt conveyors for the horizontal routes are controlled via Rapid Link. All the installation parts are practically made to measure.

Othmar Neuhaus: "The problem with conventional installations was that it was only possible to commence planning the control panel after all the considerations with the drives had been clarified. With Rapid Link, we did not even have to consider it. We were able to use the same motor starter everywhere thanks to the adjustable current range from 0.6 to 5 A. The customer receives the advantage of reduced spare part requirement. Moreover, all the sensors are switched to the motor starter. Additional slaves are not required to process the sensor signals."

I asked Mr. Andreas Köstinger what the main criteria were during the planning of this conveyor system. He replied: "The conveyor system uses optical sensors to detect if reusable containers are required, or when full or empty wheelcontainers are being transported. The buffer station had to be used more effectively. The main criteria was the recognition of the container type. The decision as to which type is sent on which route is made on the transverse shuttle car. It is essential to ensure that both types are available for use in time."

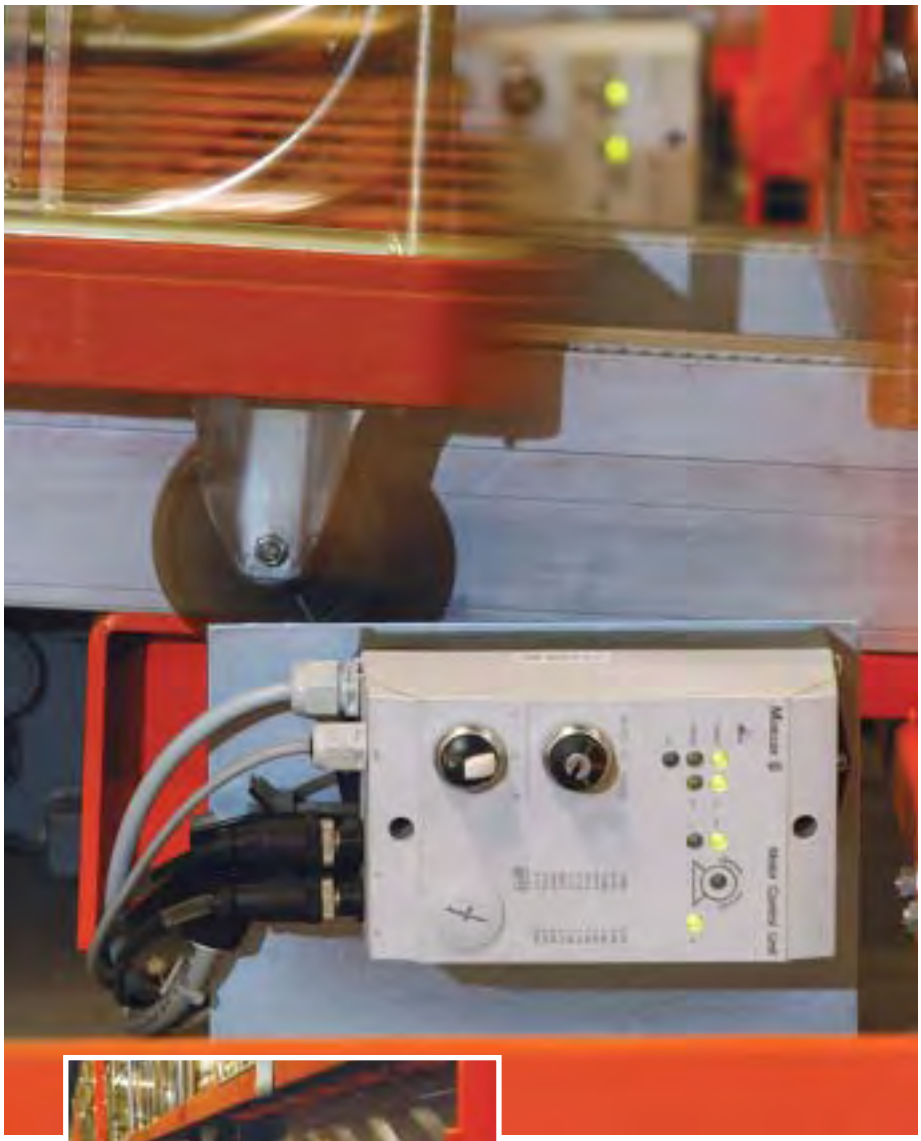
When a Coop employee was asked if everything always worked to perfection, he answered: "Occasionally, the goods being conveyed may get stuck. This generates a time-out in the control. We simply switch off this section of the conveyor and remedy the cause of the fault. We have not yet experienced any breakdowns due to problems with the installation."

Othmar Neuhaus: "We have signed a service contract with Coop. We also trained the personnel. Training was given in operation of the installation as well as training in the areas of control, mechanics and run-time software."

We wanted to know if users can make changes to the program. Andreas Köstinger answered: "Normally, this is not desired. The user can determine priorities. For example, the buffer area is immediately cleared by intervention of the program, if it is necessary. The user can also block certain areas or add more to other individual routes. This is implemented using our operator units."

What is adjustable on Rapid Link I asked: "The user can set the desired current range. This is performed easily using a DIP switch. Addressing of the AS-interface must be performed separately by the user. All-in-all, it is possible to say that Rapid Link comes very close in the demand for Plug and Play" explained Othmar Neuhaus.

And to my question concerning the bus system used he answered: "We use the AS-i bus. Particularly because of the very wide range of sensors and actuators available on



Used for the first time in an installation in Switzerland: Rapid Link in the Coop distribution centre in Wangen near Olten.

The ready-to-connect Motor Control Unit, connected to a belt conveyor of a horizontal conveyor.

Photos: Stefan Kubli

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the market for this fieldbus. We require just two cables for the entire lengths of the conveyor. On the one hand, the power cable to which the branches can be fitted without interruption. On the other hand, the data cable with which the individual Rapid Links are accessed. The time and effort required for installation is significantly lower than conventional solutions. The individual conveyor modules are mechanically and electrically compact and can be coupled to one another with the minimum of effort."

Andreas Köstinger wanted to know if there are any more customers for Rapid Link in Switzerland: "No, not yet. But Gilgen have done some pioneering work in the field. However, we are more than sure that this product will make an excellent name for itself in the area of conveyor technology."

Othmar Neuhaus added: "We have installed a test installation at our head office, which can be used to test customer requirements. It is also equipped with Rapid Link."

Rapid Link in detail

This system is used in small and larger conveyor installations, particularly in the areas of distribution and production logistics. It offers all the necessary functions in IP65, in order to switch and protect all the spatially distributed drives decentrally via PROFIBUS DP and AS-interface. The Rapid Link units can be installed at any location and supplied with electrical power via the simple to install flexible busbar available in 2.5 mm^2 or 4 mm^2 with 400 VAC or 24 VDC supply voltages. The insulation displacement method enables fast and fault-free connection without needing to strip wires.

Alternatively, the decentral power supply can also be provided by round cable with 2.5 mm^2 or 4 mm^2 cross-sections. Round conductor outgoers can be connected to any location without having to interrupt the cable.

The system overview

The ***Interface Control Unit*** is the interface to the higher level fieldbus. AS-interface when used as the communication interface is ideally combinable with the sensors and actuators available on the market from various manufacturers. The integrated Power Extender only requires a 30 VDC power supply. The data decoupling is implemented in the Interface Control Unit. Multiple AS-interface lines can be established with only one interface. The cable lengths between the power supply and the Interface Control Unit need not be included in the permissible 100 m cable length of an AS-interface line.

Function:

- Master AS-interface Specification 2.1 for 62 stations
- PROFIBUS DP Slave with up to 12 Mbaud
- Power Extender for AS-interface power supply
- External 30 VDC power supply sufficient without data decoupling
- Distinctive diagnostics LED's for Status, Power, Error
- Address display via three position display
- Adjustable via the mode and set buttons
- Installation and exchange via IP65 rated plug

The ***Disconnect Control Unit*** serves as the incoming circuit-breaker and for selective shutdown of individual conveyor sections. At the same time, it acts as the main switch and

The features of Rapid Link

The Rapid Link switching and installation system is characterised by the following features: Fast error free IP65-conform installation. All units are supplied ready-to-connect. Simple planning through elementary and object-oriented function units; commissioning of the drives also without PLC/AS-i interface by manual actuation; a high degree of installation availability through clear diagnostics features and user friendly interfaces. Function units in type-tested series quality save costs, time and space; continuity in design and handling; installation of the branches without interruption of the power cable.

Marco Wirz, Electrical Engineer (HTL), Automation Account Manager, Moeller Electric AG: "Rapid Link is the result of an approach by a customer to our company. Our engineers and designers implemented the required features for this switch and installation system into a new product."

Andreas Köstinger, Electrical Engineer (HTL), Gilgen Logistics Systems AG: "We were always convinced of the advantages posed by the positioning of the motor starter directly at the drive."

Mr. Othmar Neuhaus, Electrical Engineer (HTL), Head of Control Engineering and holder of commercial authority at Gilgen Logistics Systems AG:"All the sensors are switched to the Rapid Link. Additional slaves are not required to process the sensor signals."

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maintenance switch as well as the line protection device. It is particularly suitable for protection of multiple starters and longer cables using adjustable tripping currents.

Function:

- Main switch with interlockable handle conform to IEC/EN 60 947-1
- Protection of the cables against overload and short-circuit conform to IEC/EN 60 947-2 and DIN VDE 0100 T. 430
- Short-circuit protective device for RA-MO motor starters (or motor starter groups) conform to IEC/EN 60 947-4-1, classification type 1
- Protection of equipment against short-circuit
- Rated current 16 to 25 A, short-circuit tripping current 130 A
- AS-interface slave specification 2.1 for 31 stations
- Signalling of the switch position via AS-interface
- Distinctive diagnostics LED's: Status, Power, Error
- Knockout for cable entry with M20 and M25 cable glands
- Supply of the unit via 6 mm² round cables
- Mains power input for the flexible busbars via round cables with 2.5 mm² and 4 mm²
- Using round cable outgoers up to 4 mm²

The ***Motor Control Unit*** is used for actuation of the decentral drives. The motor protection function is implemented electronically, whereby just one device covers a wide range of performance levels. It is possible to select between manual and automatic mode with a keyswitch actuator. In manual mode is possible to operate the drive after installation without the AS-interface being operational. The selectable interlocked manual mode protects the installation against damage. The device is available as a motor starter for one or two directions of rotation.

Function:

- Motor starter with electronic motor protection from 0.18 to 2.2 kW/400 VAC
- Direct-on-line starter, extendable direct-on-line starter
- Reversing starter
- Braking actuation via AC-3 switching contact
- Monitoring of thermistor, Thermoklick and motor connector
- Reset after remedy of the fault by keyswitch actuator position 0
- AS-interface slave specification 2.1 for 62 stations
- Two external inputs via M12
- Quick stop and interlocked manual mode
- Distinctive diagnostics LEDs: Status, Power, Error
- Parametric programming of the power ranges via DIP switch
- Configuration of the default direction of rotation via DIP switch with reversing starter
- Manual operation with Auto-0-Manual, Anticlockwise-0-Clockwise
- Optional: direct-on-line starter with reversing function in manual mode
- Installation and exchange via IP65 rated plug
- Standard motor cable 2 m, with plug for self-fabrication, motor cable up to 10 m possible.

The ***Speed Control Unit*** controls drives via variable speed and enables motor soft start. Up to four setpoint values (fixed speed values) and two directions of rotation can be selected via AS-interface. The unit is ready for

Wheelcontainers on a 90° turntable.

The decision as to which type is to be sent on which route is made on the transverse shuttle car. The entrances to the two lifts can be seen in the background.

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operation for drives with 0.75 kW (factory default). Moreover, the required speeds as well as acceleration and deceleration times can be set individually and are infinitely adjustable. In manual mode, the speed can be set via a potentiometer and the direction of rotation can be set via a selector switch. Commissioning is possible without the AS-interface.

Function:

- Variable speed control for four-pole three-phase current asynchronous motors up to 0.75 kW/400 VAC
- Soft start, soft stop
- Two directions of rotation, up to four fixed speeds
- Factory setting of the speeds: Potentiometer 0 to 50 Hz, 30 Hz, 40 Hz, 50 Hz
- Monitoring of thermistor, Thermoklick and motor connector
- Reset after remedy of the fault by keyswitch actuator position 0
- Integral RFI-suppression filter for EMC conform installation to IEC/EN 61 800-3, 2nd environment (CISPER 11 class A group 2)
- AS-interface slave specification 2.1 for 31 stations
- Distinctive diagnostics LED's: Status, Power, Error
- Parametric programming via an RS422 interface with keypad or PC
- Configuration of the default direction of rotation via DIP switch
- Manual operation with Auto-0-Manual, Anticlockwise-0-Clockwise
- Installation and exchange via IP65 rated plug
- Standard motor cable 2 m, with plug for self-fabrication, motor cable up to 10 m possible.
- It serves for the control of drives, pushers and other material handling units, which are not equipped with their own manual operation features. The assignment of the control circuit devices to the respective drives is implemented via the control program. The optional customised laser inscription of the cover presents the respective relationships.

Function:

- Decentral manual operation via AS-interface with four inputs and three outputs
- Keyswitch actuator Manual-0-Auto
- Three-stage selector switch Anticlockwise-0-Clockwise

Thanks to Rapid Link, the operating personnel can shut down segments of the conveyor at all times and immediately remedy faults.

- AS-interface slave specification 2.1 for 31 stations
- Distinctive diagnostics LED's for Status, Power, Error
- Installation and exchange via IP65 rated plug

The ***Logic Control Unit*** is the application-oriented mini-control which is onsite and autonomously pre-processes the I/O signals. It provides 12 inputs and six outputs via M12 sockets which are linked to each other via a program. Two inputs (17, 18) can be used as analog inputs. This program takes the load off of the higher-level control system and serves for example, for control of light barrier valve-combinations of an accumulating belt conveyor. Furthermore, the operating states are displayed in plain text on the display.

Function:

- Decentral mini-control with easy control relay in IP65
- Connection of up to 12 sensors via six M12 sockets
- Actuation of up to six actuators via transistor outputs
- Connection via six M12 sockets
- Plain text via display
- AS-interface slave specification 2.1 for 31 stations
- Distinctive diagnostics LED's: Power, Error
- Programming with open cover via rocker switch
- PC or plug-in memory card
- Installation and exchange via IP65 rated plug
- Future-safe investment and highly flexible

Flexibility is the trump card

The user retains total flexibility with Rapid Link. The system uses AS-interface, even though it is open for all conventional fieldbus systems: Via the interface unit – conceived as a Gateway solution – hierarchical layered higher level busses such as Profibus DP, Interbus, CANopen or DeviceNet can be installed with common hardware. In addition to the Gateway function, the Interface Control Unit is also used for preparation of the AS-i voltage. Accordingly, Rapid Link is a future-safe and protects financial resources which are invested.

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