Hybrid motor starters with IO-Link interface

Consistently networked in accordance with Industry 4.0

CONTACTRON hybrid motor starters now come equipped with an IO-Link interface. Now, in addition to specific diagnostic data, you can also transmit other process data, such as the currently flowing motor current, to the control level. The networking capability of the motor control also complies with the Industry 4.0 concept (lead image).

Lead Image

The majority of electric motors are still not controlled. They are often installed in the periphery of the central operating unit and they drive conveyor belts, pumps, grinding and cutting machinery, chip shredders, as well as numerous other applications. The vast majority of these components are comprised of three-phase asynchronous motors, which cover a power range of less than 3 kW. Each of the motors must be switched on, turned, and switched off again as required based on a control signal. In addition, the motor should be protected against overload, which can occur in the event of a blockage, for example. Furthermore, some safety-related applications that pose a danger to the operator and machine under certain circumstances, e.g. when an emergency stop button is pressed or a photoelectric barrier is crossed, need to be shut down safely (Figure 1).

Figure 1 - CONTACTRON hybrid motor starters with integrated IO-Link interface

Less wiring effort and space required

The application requirements described present a significant challenge for the circuit technology of a motor starter combination. The selection of components also needs to be well thought out. Two contactors are usually required for one reversing starter. One device

implements forward running, the other reverse running, whereby two phases are switched for the reverse running contactor compared to the forward running contactor. When it comes to motor protection, a corresponding relay is used that is usually based on bimetal technology. The bimetal is heated thermally based on the flowing current. It opens in the event of an overcurrent, and sends a signal to shut down. In order to also satisfy the highest requirements for emergency switch-off in accordance with DIN EN ISO 13849-1, a redundantly-designed emergency stop is required which is performed using two emergency stop contactors connected in series.

The installation of this type of reversing contactor combination requires considerable space and wiring effort. If the effort involved in control and interlocking wiring is also taken into consideration, this additionally gives rise to the risk of wiring errors – a risk which should not be underestimated – that can later be difficult to find and correct. The common practice of using blue coloured wires throughout for the control wiring also further makes troubleshooting difficult.

Significantly longer service life

Users in machine building and systems manufacturing in particular require switch combinations that are compact and easy to install. Therefore, Phoenix Contact has developed Contactron hybrid technology, which combines up to four functions in one device as required. Among these are motor start with reversing function including a locking circuit and load wiring. Furthermore, the devices protect the motor using an integrated motor protection relay with automatic and remote reset function. Also, the implemented safety function provides the emergency stop requirement according to PL e in accordance with EN ISO 13849-1 or SIL 3 in accordance with EN 62061. This is accomplished using enable inputs on the device. Even with these numerous functions, the hybrid motor starter is just 22.5 mm wide (Figure 2). Thanks to the space-saving design, it can be used in a control box in a decentralised location (Figure 3).

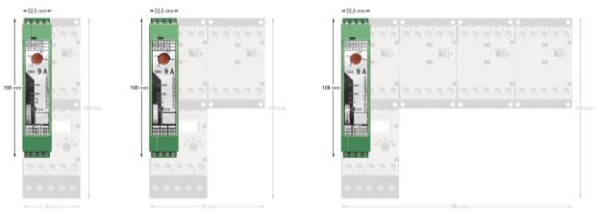

Figure 2 - The hybrid motor starters save space in the control cabinet

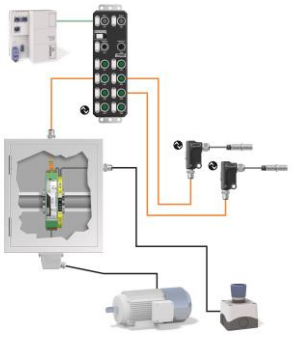

Figure 3 - Any IO-link master can be connected to the hybrid motor starter with IO-Link interface; thanks to th small amount of space required, distributed application can also be performed easily

The Contactron technology is a combination of wear-free semiconductor technology and robust relay technology, which is controlled by a microprocessor. This enables soft switching and thus considerably reduces the load on the relay contacts. While the semiconductors perform the switch-on and switch-off processes, the relay contacts conduct the current with minimal loss. This eliminates the need for complicated, expensive heatsinks. The service life of the hybrid motor starters is also considerably lengthened, by a factor of ten, when compared to purely electromechanical switching devices. Only eight terminal points are required for the main current path. And last but not least, the internal load and locking circuits minimise the wiring effort.

Unique information on the status and motor current

In light of Industry 4.0, users are demanding devices that are not only compact, easy to wire and durable but also can be networked comprehensively. The Contactron product family responds to this desire through IFS (InterFace System) technology, which uses additional gateways as interface converters and is capable of operating multiple motor starters at one bus address (Figure 4). The network connection uses a DIN rail connector, which provides the 24 V supply voltage and is also used to control the devices. Consequently, the complex control wiring becomes obsolete. All switching commands and diagnostic functions are transmitted over one bus line such as Profibus, Profinet or Ethernet/IP. The variant for IO-Link communication does not need a gateway and communicates directly via IO-Link.

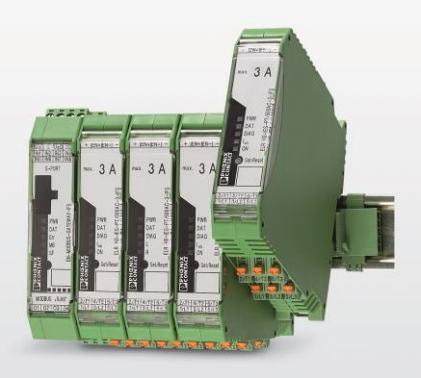

Figure 4 - The hybrid motor starters with IFS interface are networked into the most common bus systems via a corresponding gateway

The IO-Link devices thus provide the controller with unique information on their status. In the event of a fault, messages from the peripheral equipment caused by overload, asymmetry or phase failure and device-specific messages can be precisely allocated to the respective device. Furthermore, the value of the currently flowing current is transmitted to the controller and can be evaluated as necessary. With the launch of the IO-Link motor starters, Phoenix Contact supports the desire of users for comprehensive networking capability all the way to the sensor and actuator as the final link in the automation chain. Therefore, IO-Link is becoming increasingly important in the machine building and systems manufacturing industry. The advantages of the transmission standard lie in the easy, clear, fast wiring and in the similarly easy commissioning. Furthermore, individual components can be replaced

without major effort in parameter configuration or addressing. This increases the availability of the systems and shortens service and maintenance times.

Easy connection to any IO-Link master

The Phoenix Contact IO-Link motor starters can be connected to all IO-Link masters from any manufacturer. An input-output device description file (IODD) enables fast coupling to the master, thereby providing a good description of the input and output data required to control the motor starter. As a result, the devices provide users with support in seamlessly connecting all automation components and a consistent flow of information serves as the basis for a variety of areas for optimisation potential.

More information:
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Complete portfolio for clever switching

CONTACTRON hybrid motor starters are an important part of the comprehensive switching device range of Phoenix Contact. The portfolio has been expanded through the addition of the compact, modular PLC Interface relay system for electrical isolation, power amplification and contact multiplication. Pluggable coupling relays from the RIFLINE complete series feature up to four changeover contacts. From NO contacts that are 6 mm wide to robust 3x16A contacts, the RIFLINE system includes all the designs. Various function modules that can be plugged into the relay base provide protection from highly induced voltages, signal the switching state of the relay by way of LED or turn it into a time relay (Figure 5).

Figure 5 - Phoenix Contact offers a comprehensive product range for switching

The monitoring relays of the EMD product range record parameters such as voltage, current, performance and temperature. Deviations from central setpoint definitions are reported immediately. When it comes to protecting people and machines, the SIL coupling modules from the PSR range, which are the slimmest SIL coupling modules in the world, boast a high power density and a safety level up to SIL 3 and PL e. And don't forget the programmable PLClogic logic relay system that can be used to easily switch and control the I/O signals of small applications in a space-saving design. Phoenix Contact switching devices have been shown to be a clever solution because they are efficient.