M40 hybrid connectors
More than the sum of its parts

Providing machines, systems, and automation components with separate cables for signals, data, and power is time-consuming and cost-intensive. The more complex the regulation and control tasks, the greater the cabling complexity and, therefore, the greater the impact on the availability of the entire system. Hybrid connectors – for transmitting signals, data, and power over a single cable – offer a way out of this dilemma. These include the new M40 circular connector from Phoenix Contact (Figure 1).

Figure 1 - Intelligent solution: hybrid connectors simultaneously transmit signals, data, and power

The versatile hybrid connectors are literally more than the sum of their parts: they provide a new level of flexibility when cabling highly automated systems. Along with the established application for cabling servo motors, hybrid connectors are well-suited for a variety of sophisticated tasks. Phoenix Contact offers robust M23 and now also M40 hybrid connectors specially designed for serial cabling between field devices.
Hybrid connectors for serial cabling

In frequency-controlled drive solutions, the circuit connecting the control cabinet to the engine still commonly uses a star distribution. Previously, almost all serial cabling solutions were bus systems. Using the new M40 hybrid connector and suitable hybrid servo cables, it is now possible to implement serial supply and control of consumers with signals, data, and power. To do this, each device in the supply chain is equipped with two device connectors. One of these is equipped with pin contacts and the other with socket contacts. The connectors are based on the familiar servo motor design and combine suitable contacts for transmitting signals, data, and power in one housing. This makes the M40 hybrid connector suitable for high voltages up to 630/850 V AC/DC and currents up to 70 A.

Higher system availability, lower costs

Hybrid connection technology does more than just reduce the space requirements on the device or in the control cabinet. Machine and system cabling is also more clearly arranged, because only a single cable has to be routed. The resulting narrower cable routes also reduce the costs for the cable run and cable duct. An additional advantage to hybrid system cabling? Devices, machines, and system parts can be started up and serviced more easily, since up to two-thirds fewer connections are required. Many machine and system builders carry out the start-up process during in-house manufacturing, for example. After successfully passing this test, the systems must be quickly and securely dismantled, packaged, and shipped, and then once again be brought into operation by the end customer. Manufacturers and users in particular benefit from the SPEEDCON fast locking system. Just a half turn reliably locks the cable connector system to its counter-piece. Devices can be connected quickly and reliably in this way with just two hand movements (Figure 2).
The new M40 hybrid connector has a broad area of application. Users can implement a simple three-phase supply with L1, N, PE, signals, and data with 630 V AC as well as direct current supplies with up to 850 V DC – for example, for distributed servo drives. Incorrect insertion is prevented, in mechanical terms, by using four different codings, and visually, by using housing markings with colour rings. The standardised M40 size provides the same performance with significant space savings in contrast to the rectangular connectors available on the market (Figure 3).

Regardless of the size, M23 or M40, four-position CAT5 elements are used for data transmission in the robust hybrid connectors from Phoenix Contact. These can be used to cable nearly all common bus systems and custom data interfaces. The integrated data connector is designed with 0.8 mm contacts. Compared to the 0.6 mm contacts available on the market, they are significantly more robust - and also enable easy, reliable assembly.

Versions for numerous applications

The CAT5 data element can be replaced by a 4-position unshielded signal element in applications that do not require a shielded data interface. For this reason, a connector is available with eight 1 mm signal contacts, which offers the same performance features as the power contacts. Currents up to 8 A per contact and a wire cross section up to 1.5 mm² make it possible to implement applications for control electronics including hardware shutdowns. The special thing about the signal contacts; Even voltages of
M40 hybrid connectors – technical data

- Pin assignments: 4+4+4+PE as well as 8+4+PE
- Operating temperature: -40°C to +130°C
- Shielding: 360° external shielding as well as independent shielding of the CAT5 data element
- Interlock: SPEEDCON fast locking system
- Vibration resistance: up to 25g
- Degree of protection: IP66, IP67, and IP68, optional IP69k
- Accessories: Protective caps made from metal and plastic, coloured rings for visual marking
- Approvals: cUL in preparation
- 2 x 2 data: 50 V AC/V DC, 3.6 A, 0.5 mm², optional 4 x signal: 50 V AC/V DC, 8 A, 1.0 mm²,
- 4 x signal: 500 V AC/V DC, 8 A, 1.5 mm²
- 4 x power + PE: 630 V AC/850 V DC, 70 A, 16.0 mm²
- Shock protection on the socket side
- All housings can be optionally assembled with pin or socket inserts

up to 500 V AC can be supplied, thanks to appropriate air clearances and creepage distances (Figure 4).

Numerous housing designs are available both in terms of cabling and devices. Customer-specific designs, even entire system cabling options, are available at any time. The user receives tested cables ex works, even for high power and data rates.

Summary

Automation technology is advancing steadily, especially as regards Industry 4.0. As part of this, all large companies in the automation industry are opting to consistently network their products on the controller and communication level. Industrial applications, machines, and systems are equipped with intelligent control units and interfaces on an ever more regular basis. There is an enormous range of applications for M23 and M40 hybrid connectors, because this affects almost all areas of automation.

Further information
www.phoenixcontact.co.uk

If you are interested in publishing this article, please contact Becky Smith: marketing@phoenixcontact.co.uk or telephone 0845 881 2222.