UNDERSTAND CONNECTOR SELECTION TO AVOID DOWNTIME

A typical manufacturing plant today will have thousands, or even many thousands, of electrical connections on both fixed equipment and moving machines. And it's just a matter of time before some of those connections fail or wear out, bringing production machines to a dead stop. One way to minimize this downtime is to "connectorize" power and signal cables.

Multi-conductor cables can often be replaced in just minutes if they have connectors at both ends. Hard-wiring that same cable could take hours.

CONNECTORS PREVENT DOWNTIME.

Power and signal disruptions have many mechanical and electrical causes, everything from forklift accidents to over-current conditions. With all the mission-critical electrical connections in a modern plant, downtime from damaged electrical connections is a matter of "when" not "if."

Think of connectors as a low-cost insurance policy against this downtime. While connectors do add a small premium to the initial cost of cabling, they will pay for themselves many times over if they eliminate even a few minutes of downtime on a busy production line.

CONNECTOR SELECTION MADE EASY

For all their downtime-prevention benefits, there is one problem with connectors. Call it "connector confusion."

There are currently dozens of connector varieties and thousands of individual connectors on the market, and even experienced engineers can find it difficult to select the right connector for the job at hand.

Fortunately, connector confusion can be minimized by gathering information on four key technical factors. This information is readily available to any engineer who has already sized the application's power or signal cables:

- Number of contacts. It may seem obvious that the number of contacts in the connector should match or exceed the number in the cable. But one common mistake is to miscount by not considering the ground. Cable conductor counts typically include ground while connectors do not.
- Wire gauge (AWG). Cable's wire gauge needs to be within the allowed range of the connector contacts. In general, screw contacts will accommodate a broader range of wire gauges than comparable crimped contacts.

- Cable outside diameter (OD). This fundamental piece of dimensional information is too often overlooked during the specification process. Forgetting OD can have serious consequences. If the OD of the cable is too small relative to the housing, a poor seal will result, creating a performance issue. If the OD is too big, the cable may not fit in the housing easily or at all, creating a potentially costly installation issue.
- Maximum voltage & current. Always double check to make sure the application's voltage and current are within the rated capacity of the connector. For safety's sake, this is the cardinal rule of specifying connectors.

Taken together, these factors determine whether the connector will function as a true extension of a given cable. It's important to emphasize that all four factors must be taken into consideration. A connector, for instance, may meet the requirements on number of contacts, wire gauge and outside diameter but not satisfy the application's current or voltage requirements.

The four key connector factors should be thought of as a starting point. They don't capture the effects of difficult operating environments or unusual electrical requirements. But they will help you quickly narrow down the otherwise overwhelming field of connector products.

The new EPIC® ULTRA housing is designed for use in harsh operating conditions and is compatible with a wide range of electrical inserts and termination methods.

A NEW CONNECTOR FOR HARSH OPERATING CONDITIONS

Connectors often have to operate in corrosive, electrically noisy or mechanically challenging environments. Our latest connector housings have been designed to thrive in these environments.

Resists Corrosion. Called EPIC® ULTRA, this new rectangular connector housing features nickel-plated zinc hoods and bases with stainless-steel hardware. Together, these corrosion-resistant materials allow the new housing to survive in applications that that would prove challenging for traditional painted aluminum housings.

These applications include equipment installed in outdoor coastal and off-short settings–such as wind farms, marinas, and amusement parks. EPIC® ULTRA is also intended for use in indoor washdown areas–such as those found in food and beverage plants, wineries and breweries.

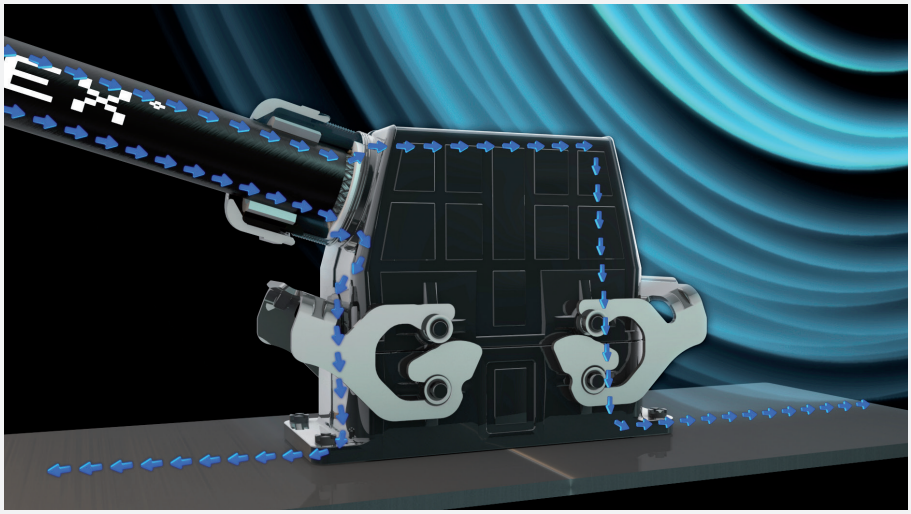
Resists Electrical Noise. EPIC® ULTRA features an integrated brush-style cable gland, which provides a fast and easy method to terminate a cable shield with a 360-degree, low resistance contact area. Along with the nickel-plated housing, the SKINTOP® forms a conductive shell–or Faraday cage–around the electrical contacts to virtually eliminate electrical interference.

Resists Mechanical Damage. EPIC® ULTRA's unique mechanical design improves both sealing and strain relief. For one thing, the connector housing's built-in cable gland not only improves sealing and strain relief but also speeds assembly and eliminates a possible leakage point. For another,the lip seal between the top and bottom housing components has been recessed so it is totally enclosed by the housing when mated and latched. This design feature protects it from mechanical damage and exposure to UV radiation when installed outdoors.

KEEPING ELECTROMAGNETIC INTERFERENCE AT BAY

When hardening electrical transmission systems against electromagnetic interference, engineers should pay special attention to connectors and cable glands. These connection technologies, if improperly designed, can become the “weak link” in the shielding chain that ultimately determines the electromagnetic compatibility (EMC) of an electrical transmission system.

And unlike cables, connection technologies have not been covered by global design directives for EMC. So it has been up to individual manufacturers to make sure that their connectors and cable glands provide adequate shielding performance.



Connection technologies with the best EMC performance have been designed to minimize resistance between the cable shield and ground. In connectors, both goals can be achieved by creating a large-area contact between the cable shielding and a highly-conductive, sealed connector housing. This arrangement allows the connector housing to function as Faraday cage, blocking electromagnetic interference.

With cable glands, the maximum shielding performance can be achieved in designs that integrate the gland into the connector housing. These designs not only have beneficial shielding implications, they also eliminate a potential leak path between the connector housing and the strain relief, which increases the ability of the connector assembly to tolerate harsh operating conditions.

	CONNECTOR TYPE	APPLICATION			TECHNICAL DATA				
		POWER	CONTROL SIGNAL	DATA	NUMBER OF CONTACTS	RATED VOLTAGE	RATED CURRENT	TERMINATION TYPE	WIRE RANGE (AWG)
RECTANGULAR	HA	X	X		3,4,10,16,32,48,64 (+PE)	600V	10A, 14A	SC	20-14
	HBE	X	X		6,10,16,24,32,48 (+PE)	600V	16A	SC,CR,CC	20-14, 20-12
	HBS	X			6,12 (+PE)	600V	35A	SC	20-10
	HBVE	X			3,6,10 (+PE)	600V	16A	SC	20-14
	HD		X		7,8,15,25,40,50,64,80,128 (+PE)	600V	10A	CR,FO	26-14
	HDD	X	X		24,42,72,108,144,216 (+PE)	600V	8.5A	CR	26-14
	HEE	X	X		10,18,32,46,64,92 (+PE)	600V	16A	CR	20-12
	HQ	X	X		5 (+PE)	600V	16A	CR	20-14
	MC	X	X	X	2 to 280, Data Bus (+PE), Pneumatic	63-1000V	10-82A	SC,CR,CC,FO,HO	28-4
	MP	X			4/0, 4/2, 4/8 (+PE)	600V	80/16A	SC	16-6,20-14
	STA		X		6,14,20,40	48V	10A	SC,SOL	20-16
CIRCULAR	EAB	X			2,3,4,5,6,7,8,7+2,10,11,14,14+2,17,19,24,26,37	200,500,900V	13,23,46A	CR	18-16,14-12,8
	EAC	X			2,3,4,5,6,7,8,7+2,10,11,14,14+2,17,19,24,26,37	200,500,900V	13,23,46A	CR	18-16,14-12,8
	EPT	X	X		3,5,6,7,8,8+4,10,14+1,16,18,19,21,22+1,26,41,55	600,1000V	7.5,13A	CR	24-20,20-16
	LS1	X			5+PE, 3+PE+4	600V	22/7A	CR	20-14,24-18
	M23	X	X		6,7,8+1,9,12,16,17	150,100,50V	14,7A	CR,SOL	18-14,24-18
PIN & SLEEVE	MultiMax	X			1+N+PE, 2+PE, 2+N+PE, 3+PE, 3+N+PE	125-600V	16-32A	SC	12,8
	CEE	X			1+N+PE, 2+PE, 2+N+PE, 3+PE, 3+N+PE	125-500V	16-125A	SC	12,8,6
	ULYSSE	X			1+N+PE, 2+PE, 2+N+PE, 3+PE, 3+N+PE	125-500V	16-63A	SC	12,8,6
	ALUPRES	X			1+N+PE, 2+PE, 2+N+PE, 3+PE, 3+N+PE	125-500V	16-63A	SC	12,8,6

Termination Type: SC = Screw, CR = Crimp, CC = Cage Clamp, FO = Fiber Optic, SOL = Solder, HO = Hose