SO YOU WOULD LIKE TO WORK ON MOTOR CONTROL CENTRES?

This month's column is directed at young electricians and apprentices who would like to work on motor control centres (MCCs) to give them an overview of what MCCs are all about and to give them an idea of what is required to work in this field.

To begin at the beginning: a MCC is a floor-mounted steel structure made up of one or more enclosed vertical sections, which distributes power via the busbar and/or cable arrangement to the control modules which, in turn, control the power to electric motors.

One vertical section can stand by itself as a complete MCC, or several sections may be bolted and bussed together. Wherever motors are used, they must be controlled by using motor circuits and motor control circuits. This is made up of contactors and overload relays. The contactors are designed to start and to stop the motor. The motor overload relay is designed to disconnect the power to the motor when an overload condition exists. This will also require using stop and start push buttons and other devices in the control circuit to control the operation of motors. In many commercial and industrial applications, quite a few electric motors are required and this is often controlled from a central location and the MCC is designed for this function. So, a MCC is basically a grouping of a combination of starters in one assembly.

The other devices that are usually included in the MCC are circuit breakers or fuses, timers, relays, indicator lights and panel meters. In addition, MCCs can incorporate a variety of other devices such as power meters, programmable logic controllers and so on, depending on the requirements. A main switch and lock-out facilities will always be installed. The locking out of cubicles with the switch in the open position is a critical criteria for safety compliance.

MCCs are different from other distribution devices, such as panel boards and switchboards. MCCs usually contain combinations of motor control units, while panel boards and switchboards contain circuit-protection devices such as circuit breakers and fusible switches.

Circuit breakers are used for overcurrent protection and, in addition to that, a circuit breaker manually energises and de-energises a circuit. The advantage of circuit breakers is that they allow a circuit to be reactivated after a short circuit or overload. Another device that is used for overcurrent protection is a fusible disconnect switch, so when heat is produced by overcurrent, the current-carrying element will cause the element to melt open, disconnecting the load. The electrician should have sound knowledge on protective devices rated for anticipated fault currents. Electrical diagrams are provided, for example reticulation drawings and schematic diagrams.

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While an electrical engineer will be responsible for the designing of the electrical gear that is to be installed in a MCC, a qualified electrician will install, join and terminate low voltage cables and conductors and they would also have to commission the MCC's panel.

The requirements

- Safety comes first so anyone working on a MCC must begin by making sure the MCC is clean.
- The electrician working on the MCC must be able to do a layout, prepare the sub-section cubicles and select and fit the electrical components into the subsection cubicles.
- Working according to instructions, the electrician also has to do the preparation of the cables and wiring.
- The electrician is responsible for the labelling of components such as cables and wires and this has to be accurate. He or she must know how to work in accordance with the electrical regulations and be familiar with cable/wiring sizes and colour coding.
- The electrician must have a sound knowledge of the protective devices rated for anticipated fault currents that are stipulated in the electrical diagrams provided. He or she must be able to read electrical drawings, for example reticulation drawings and schematic diagrams.
- The electrician must know what protection is needed for the main and control circuits and he or she must be able to demonstrate knowledge of legislation and standards relevant to the electrical industry.
- The electrician must also know how to use hand and power tools correctly. This will include – but is not limited to drilling, cutting, filling, measuring and stripping cables and conductors.
- The electrician must be able to work with test instruments and be able to interpret the readings and, if needed, be able to do maintenance.
- The earthing of a MCC is of utmost importance and one would need to understand protective earthing and that all the metal parts of the enclosure that require earthing (such as the earthing of the cabinet and doors) and that they are bonded to earth in accordance with the electrical regulations.
- The electrician must be familiar with the power and hand tools used in the wiring and construction of MCCs, that are used for drilling, cutting, filling (filing?), measuring and for the stripping of cables and conductors.
- Test instruments such as an insulation tester, multimeter, etc, will be used to measure the motor control centre cables/conductors and other relevant devices before any authorised permission is given for commissioning the motor control centre and, if needed, to rectify any fault readings that are displayed on the test instrument.
- The earthing of a MCC is of utmost importance and all metal parts of the enclosure that require earthing – for example, earthing of cabinet and doors – are bonded to earth in accordance with the electrical regulations.
- To work on MCCs, it is necessary to pass the installation rules that cover the legislation and regulations required in this field. This will expand the qualified artisan's expertise and he or she will be able to approach motor control centre companies for employment. He or she can also apply to become an electrical contractor in order to undertake contract work in a company that requires motor control centres.

(Thanks to Paul Sloan, training manager at P & T Technology, for his contribution to this article.)

Easy-to-install cable trays and accessories for commercial and industrial applications

ACDC Dynamics is a distributor of the Mavil range of cable transportation systems, which are designed for use in commercial and industrial environments. The range includes BRN galvanised perforated sheet cable trays; SP cable tray support systems; and BFR steel wire mesh cable trays with the portable Speedy Curva bending machine.

"The Speedy Curva automatic bending machine is a smart solution to bending cable trays to exact requirements on site," explains ACDC's Nordier Smith. "This means that only straight cable trays need to be delivered to site, which results in savings on transport costs," says Smith, adding that "the use of the Speedy Curva bending machine is particularly suited for modifying large quantities of cable ladders".

Smith says the BFR steel wire cable trays are available in six finishes and are suitable for installation in all kinds of environments – from harmless to harsh and corrosive conditions. The tray sizes range from 30 to 110 mm internal height and from 50 to 600 mm internal width and the matching covers allow for small and large cable structures and even greater cable capacity.

"The Speedy Curva automatic bending machine is a smart solution to bending cable trays to exact requirements on site. This means that only straight cable trays need to be delivered to site, which results in savings on transport costs, and the use of the Speedy Curva bending machine is particularly suited for modifying large quantities of cable ladders".

"Installation is quick due to the practical speed-lock coupler and clip system for support systems in horizontal, vertical and multi-level applications – and the BFR cable trays can be customised on site using the Speedy Curva automatic bending machine."

The BRN galvanised perforated cable trays are available in four heights from 30 to 80 mm and in eight widths from 95 to 605 mm and come in Z275 and GAC galvanised finishes with matching snap-on covers.

He says that punched ribs on the bases of the trays permit higher load resistance while reducing the number of supports required.

The range includes junctions, bends and curves with speed-lock couplers that simplify installation in horizontal, vertical and multi-level applications.

The SP cable tray support systems feature 'quick fix' and coupling innovations from a 'family' of four metal support ranges in three finishes, which allow for installation even in corrosive environments.

- The Omega range for light loads, for wall or ceiling mounting.
- The CSU range for medium loads, for wall or ceiling cantilever mounting.
- The C40 Pluriel range for medium loads on specific profiles for surface and suspended mounting.
- The Mavistrut range for heavy loads on mechanically installed brackets to wall, surface or ceiling, with snap-fit systems.

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NEW MULTI-PURPOSE SOLUTION TO CABLE LOCATION

A professional general-purpose cable locator is available from the Comtest Group, Fluke's authorised test and measurement distributor. The Fluke 2042 traces cables in walls and underground, locates fuses and breakers on final circuits and locates interruptions and short circuits in cables and electrical floor heating systems. It can also be used for tracing metal water and heating pipes. The unit is shipped as a complete kit comprising a transmitter and receiver in a purpose-made carry case. The transmitter has a LC-display for level and code receiving, and live voltage indication. The receiver has a backlit LC-display with a torch function for use in dimly lit locations. The digitally-coded sender-signal guarantees clear signal identification. It also features additional transmitters to distinguish between several signals. The Fluke 2042 is rated CATIII/300V and has safety certificate EN 61010-16.

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