ELIMINATE THE OBVIOUS AND WHAT REMAINS IS THE TRUTH

The fictional detective Sherlock Holmes is credited with saying that "When you have eliminated the impossible, whatever remains, however improbable, must be the truth …"

Many of you have been there. The factory or the plant has stopped working – come to a complete halt. The normally thundering machines are silent. And nobody knows why the plant has stopped working. Finally, it is decided that something has gone wrong with something electrical in one of the control cabinets. The shift electrician is working on the problem. Breathing over his shoulder is the foreman. In the background there is the production manager, and the general manager. All of them hoping for a solution.

The longer all of this goes on, the greater the tension and the greater the pressure. The situation is not helped by the fact that the drawings of the control panel are poor or do not exist at all; or the panel has been modified out of recognition compared to what it used to be. All that is really known is that it used to work and now doesn't.

I'm going to give you some ideas about how to find faults in a control panel or distribution board when you don't have a drawing, or the drawing is out of date.

The first thing to do if you're the lucky person who has to solve the problem is to get everybody who is not involved in the matter to move away. This won't go down well with the managers, but what the heck. Next, get some good lights so you can see into the distribution board/control panel. If necessary, get a chair or stool so you can sit while you work (in thirty five years I have yet had to stand while working on a distribution board/control panel). Once you have done this, take off your rings, watch, bangle, etc. and roll down your sleeves. Following this, have a little safety discussion with your back-up guy or helper. Explain that (a) if you suddenly collapse, possibly been shocked, make sure that somebody does CPR until a doctor says you're dead (b) if there is a huge bang or bright flash - just stay put.

This sounds a bit fussy but it only takes a minute.

To fix the problem you first have to understand what the problem is. This means you should be measuring things - like voltages and so on. So start at the beginning – measure the main incoming supply voltage and all the voltage supplies to components like programmable logic controllers (PLCs), transducers, and so on. Especially measure from earth to the neutral of all the components – there should be no voltage. If there is, one of the neutrals is disconnected.

Next inspect all the PLCs to see that the power light is on.

And now… we get to the deductive logic part.

In no particular order, the following: Generally, PLCs do not fail. If the process is not working, 90% of the time it is due to a false input from a field transducer or limit switch … it is seldom the PLC. So if the process is not working first check on the field transducers.

Next, if an earth leakage protection (ELU) keeps on tripping this often because there is in fact an earth fault. But, electricians often decide that if the ELU trips it must be faulty. Similarly with circuit breakers: if it trips, it's probably overloaded, not faulty.

Check the history of what happened before the outage. Was there a power failure? If so, a battery might have gone flat. Were there trips and power restorations? If so, one or more transducers may have failed. Has there been a lightning storm? If so, follow the process as for trips and power restorations.

Oh, and do check that the micro switch that disconnects the power if the cubicle door is open has been by-passed.

So you will work through the fault. If you follow the steps as outlined above, 80% of the problems will solve themselves. In my next column: some unusual electrical problems …

MOTOR CONTROL AND PROTECTION

New to Magnet's range of Schneider low voltage motor starting solutions are Easy-Pact TVS motor starters, designed for motor control and protection for simple applications.

The E range – an extension of the current range – includes contactors, thermal overload relays, control relays and motor circuit breakers, designed and precision-engineered to give OEMs and panel builders a motor starter solution that offers high performance and safety of personnel, at a competitive price.

"The range ensures compatibility and easy installation in new or existing motor control panels," says Brian Howarth, managing director, the Magnet Group. "Direct mounting of the thermal overload underneath the contactor minimises cabling and installation time thereby enhancing reliability of the system and saving panel space, which contributes to cost saving.

"An important feature of the system is that it has been designed for application optimisation so users are able to select only the components needed for each project. A clear reference system ensures easy product selection for every application and because fewer components are required, design is simplified and stock requirements reduced."

The EasyPact TVS range encompasses nine sizes of contactors that cover a broad range of current ratings (6 A to 630 A). These are used in conjunction with thermal overload relays (0,1 A to 630 A), industrial control relays with four NO/NC contacts, and a newly designed motor circuit breaker from (0,1 A to 32 A).

Utilisation categories are Class AC-1 for loads with cos φ at least equal to 0,95 (resistive load, heating and distribution) and AC-3 for squirrel cage induction motors, with contactor breaking taking place with the motor running.

Thermal overload relays protect ac circuits and motors against overloads, phase failures, long starting times and prolonged stalled rotor conditions. The thermal relay controls the current driven by the motor and if this current exceeds the setting, the auxiliary contacts will change state, causing the motor to stop.

Thermal-magnetic three-pole protection motor circuit breakers are designed for connection by screw clamp terminals to ensure a secure, permanent and durable clamping that is resistant to harsh environments, vibration and impact.

Magnetic elements – for short circuit protection of the motor – have a non-adjustable tripping threshold, which is equal to about 13 times the maximum setting current of thermal trips. Thermal elements – for overload protection – include automatic compensation for ambient temperature variations. For protection to personnel, all live parts are safeguarded against direct finger contact to IP20.

The EasyPact TVS range ensures co-ordination between protection and control components, which means there is a safe and fast restart after a short circuit.

To guarantee suitable protection of electrical components against fire, product damage or power loss, Magnet recommends installation of this system in a spacious CRN steel enclosure. Severe conditions, including dust, humidity and high temperatures, can expose personnel and equipment to risk.

The EasyPact TVS motor starter system, which is suitable for simple applications, including HVAC, lighting in buildings, cooling or extraction fans, small pumps and mixer applications, manufacturing and conveyor belts, conforms to stringent international quality, safety and environmental specifications.

Magnet offers a technical advisory support service throughout the country.

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POWER-GEN AND DISTRIBUTECH AFRICA 2018

POWER-GEN and DistribuTECH Africa 2018 will be staged at the Sandton Convention Centre from 17 – 19 July 2018. Themed 'Powering up a continent', the event brings together up to 3000 key industry stakeholders from across Africa and abroad for three days of high-level debate and analysis.

POWER-GEN and DistribuTECH Africa attract a broad range of delegates, including regional electricity distribution companies, power producers, utilities, oil and gas companies, energy and engineering consultants, government and regulators, environmental agencies, development agencies and investors. Exposure at these conferences allows experts and thought leaders to showcase research papers, best practice methodologies, industry innovations and success stories to the most comprehensive cross-section of African power players under one roof.

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