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5 things you should know about switching and protecting large motors

Large motors are used to doing serious work. Many people and businesses depend on large motors, sometimes even without realizing it. Large motors move water, wastewater, oil, and gas. Conveyors and lifts designed for heavier loads depend on large motors. Commercial buildings rely on large motors to run HVAC systems. Industries depend on large motors to provide compressed air and hydraulic pressure.

Farms rely on large motors to operate agriculture equipment. These large motors often go unnoticed until they stop operating. Downtime can mean reduced output, lost revenue, unplanned costs, and inconvenience to customers.

The design of a motor switching, and protection scheme can play a large factor in the ability of the equipment to address issues and recover from downtime. The design of the motor controls and protection can also impact the initial cost of the equipment, even more so with larger motors. More than just material costs, build time and commissioning costs are also impacted by the design.

Here are 5 things control panel design engineers and specifiers should know about switching and protection large motors.

1. There are different types of motor controllers and motor protection forms.

The simplest form involves a motor starter (a contactor plus an overload relay), where the contactor applies the full voltage of the supply circuit to the motor when operated. Some systems require a phased start due to the mechanical impact on the system or the delicacy of the loads being moved. In these cases where care must be applied during the starting phase, a multi-speed or wye-delta starter scheme (consisting of several contactors/overload relays, or a soft starter may be used to ramp up the start of the motor.

Some applications require the ability to adjust/ regulate the speed of the motor, possibly needed for the desired pace of the equipment or to reduce energy consumption. In these cases, an adjustable frequency drive is often used. Sizing a contactor for a large motor is simple for most applications in the US.

Whether using an IEC type or NEMA type starter, the contactor or starter is sized based on the motor horsepower rating and motor voltage. The next factor is the coil voltage, which is often different from the motor voltage.

Typically, the voltage in the control circuit is 120 Vac. 24 Vdc is often used in equipment that often have a Programmable Logic Controller (PLC) or other electronic devices that operate at that voltage. Control voltages may sometimes be the same as the motor voltage in cases where the equipment motor(s) operates on a single-phase voltage, or in commercial equipment applications using 240 Vac or less.

When using an overload relay, there are a couple of considerations that will factor into the type of overload relay used. These considerations include but are not limited to

- whether communication or data is needed
- trip class (how sensitive the trip response should be)
- sensitivity to ground fault
- sensitivity to phase imbalance

When sizing overload protection, the protection for most motors should be sized no larger than 115% of the motor Full Load Amps (FLA) in most cases.

This likely raises a question, “How is the overload protection sized in the design phase before the motor FLA is known?”. It’s not unusual for the motor selection to be determined after the panel is designed or even built.

However, both the NEC and UL provide motor FLA tables that design engineers use to select their overload protection devices.

One other important note to consider. Many overload protection devices are designed to trip at 115% of the amp size on the setting dial. This makes selection much easier for design engineers when applying sizing requirements.

Another tip: Overload protection devices typically have a range of current that can be set to a specific current level. Since the actual motor FLA may be a little higher or lower than the design FLA, it’s a good idea to select an overload device with a range that allows some room to dial up or down as need once the motor is in place.

Sizing motor controllers and motor protection for other situations can be somewhat more involved or have specific rules. It is always a good idea to consult an experienced resourced knowledgeable of codes & standards and the specific motor/load application.

2 Motor protective circuit breakers – what they are and when they make sense.

All motor circuits need an overcurrent protective device to protect against short circuits. This historically has been accomplished using fuses or a circuit breaker for larger motors. Ideally a circuit breaker or fuse could do both the job of short-circuit protection as well as motor overload protection.

If one attempted to size a circuit breaker or fuse to align with the motor FLA, odds are the circuit protection opened the circuit during motor start-up. Motors have a high inrush, and thus breakers are often sized up-to 250% of the motor FLA and fuses are sized up-to 175% or 300% depending on the fuse type.

Because the breaker/fuse must be sized to account for the motor inrush, a separate overload relay device is needed to protect the motor from overload. Wouldn't it be great if a single circuit breaker device could protect at the short-circuit, motor inrush and motor overload range? Well, that does exist.

Called a Motor Protective Circuit Breaker (MPCB), MPCB's are UL 489 rated like a molded case circuit breaker, and tested and rated under UL 489 Supplement SH, which test the breaker for use as a motor overload protective device.

MPCB's are different from standard circuit breakers in that they include a motor overload current dial, like an overload relay device. Some MPCB's also have selectable features such as trip class and ground fault.

Why use an MPCB?

- Fewer devices save panel space
- Fewer devices take less time to wire
- Most MPCB's have large overload adjustment range, simplifying inventory
- Overload trip reset options – Some MPCB's have pre-trip alarms that can be wired to open the contactor instead of tripping the MPCB (or the overload relay in the traditional approach). This can be beneficial where manual resetting is difficult to accomplish and offers the option to reset (or restart) the unit from a more convenient location.
- Interaction through mobile device – Some MPCB's can wirelessly communicate with mobile devices, allowing users to view fault history and adjust protection settings. When using an MPCB may not make sense:
- MPCB's are typically the size of a molded case circuit breaker, and may require more width on circuits for 40 HP and less. Typically, MPCB's are used above 40 HP.
- MPCB's use an electronic trip unit, which has a higher cost than thermal-magnetic molded case circuit breakers.

However, the MPCB takes the place of a molded case circuit breaker and overload relay, so this may not result in a higher material cost.

3 Avoid large control transformers.

Large contactors have larger coils compared to smaller sized contactors. This traditionally means a larger transformer is needed, and a power supply may be so large that it becomes cost prohibitive.

If PLC's are used in signaling the contactor operation, then an interposing relay is needed to protect the PLC IO from coil surges. New coil technology provides an additional way to construct coil control that saves material costs and wiring.

A PLC input on the contactor coil allows the coil to be powered using the motor voltage, while receiving the operation signal direct from the PLC (without an interposing relay necessary). This not only simplifies control wiring but also eliminates the need for a large transformer.

4 Know your SCCR code

This requires that the control panel be marked with a Short-Circuit Current Rating (SCCR), and that the panel SCCR be sufficient for the available short-circuit current (also referred to as available fault current) where the control panel is installed.

Determining the control panel SCCR can be complex, but an over-simplified explanation uses a weakest-link approach based on the component SCCR's of the devices in the power circuit according to UL 508A. The SCCR of the contactor and overload relays are typically marked on the product label or instruction manual. The rating specifics the SCCR level (kA) based on the voltage and the required overcurrent protective device.

What to watch out for regarding large motor contactor and overload relay SCCR:
Is the required breaker size large enough? It can be difficult to pass an SCCR device test using larger size circuit breakers.

Essentially the larger the breaker, the higher potential for let-through current, making it more difficult for the contactor during the short-circuit test. As a result, it is not unusual to see large motor contactor SCCRs that require a breaker size that is too small for the motor inrush. This results in a bump up to a larger contactor with a higher permissible breaker size, taking more space in the panel and adding more cost.

- Delta or wye voltage? Some device SCCR's are approved for 480Y/277V, instead of 480V delta.

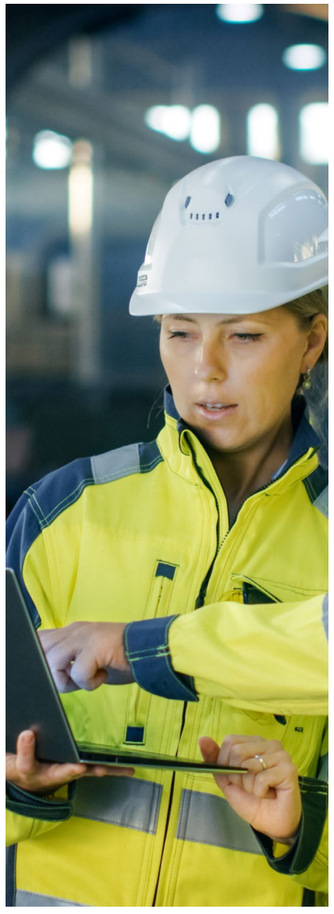
If the voltage supply is 480V delta, then an SCCR rated at 480Y/277V cannot be used. A 480V delta rated SCCR can be used for either 480Y/277V or 480V delta though.

5 Keep your system running.

Given that most large motors are doing serious work, unexpected downtime can have significant consequences. There can be several factors that impact the performance and/or life of the contactor. One of these factors relates to the operation of the coil in adverse power conditions.

With the strain on electrical grids, it is not unusual to see a drop or rise in voltage that is feeding the contactor coil.

Newer coil technology can increase the acceptable voltage range, making these conditions more forgivable. Another issue relates to the maintenance of contactors in operation. As the contacts close, the contact tips experience high inrush current, which results in wear over time to the contact tips.



Eventually these contacts must be replaced. The issue is that the need for this maintenance is often not realized until the contactor can no longer effectively close the circuit to the motor. Then it becomes a race to either source and replace the contacts or swap out the contactor with one in reserve.

However, Schneider Electric has developed a patented algorithm for TeSys Giga contactors that identifies when 15% of usable contact life remains. The contactor diagnostic LED indicator informs maintenance when the contactor reaches this point. Power quality doesn't only plague the contactor coil. It also can affect the overload relay, which can then result in tripping.

Protection against phase imbalance is commonly included in larger overload relays. Some conditions, such as remote locations or circuits with loading that is not effectively balanced, are more prone to experience phase imbalance. This can be particularly true in oil & gas applications and agriculture.

Some motors can deal with these more abusive environments, and the phase imbalance protection on overload relays can become a nuisance. If this applies, be sure to consider overload relays with the option to turn off phase imbalance. An example offer with such a feature is the Schneider Electric TeSys Giga overload relay.

FOR MORE INFORMATION Operating smarter can make a significant difference in various phases of equipment - from design to operation and maintenance.

Schneider Electric leads the market with innovative motor control solutions that help equipment manufacturers and panel builders succeed. The latest motor control solution for large motor, TeSys Giga, brings new solutions to old problems.

Scan or click the QR code below to learn more about TeSys Giga motor starters or to connect with a knowledgeable sales representative.

3 Reasons you should use interchangeable trip units

Let's face it. Resources are in short supply these days. Whether talking about engineers, installers, or product availability, panel builders are increasingly having to adjust, accommodate, or wait. Often solutions to these challenges add the burden of additional costs. With all of these challenges it becomes more imperative to think outside the box, and do things smarter.

Interchangeable trip units are one-way customers keep customers moving forward. Here are three reasons you should use interchangeable trip units in your motor control design.

1 Interchangeable trip units are convenient

In an ideal world, components are always readily available, customers know what they want ahead of time and never change their mind, and installers are always available when needed. Life happens. Traditional overload protection has a fixed FLA dial range, and typically exist in the form of an overload relay attached to the load side of a contactor, or in the form of a manual motor starter that is installed on the lineside of the contactor.

If the motor size changes, this likely means the overload protection device (and possibly the contactor and branch breaker/fuse) has to be changed to align with the new motor size. There are other impacts to consider.

Wire sizes may need to be adjusted. Control panels may also not be large enough to accept larger motor control devices. Consider the TeSys Ultra combination motor starters, which consist of two main parts: the switching base, and the trip unit that plugs into the switching base. This combination motor starter serves all four required motor branch circuit functions: disconnect, short circuit protection, motor controller and motor overload protection. With this solution, designers have the flexibility to make last minute changes with ease.

2 Plug & play trip units shorten lead-time

Selection of typical overload devices often occur after the motor sizes have been defined. For standardized equipment or machines this is usually not an issue. However, there are many applications where a common control panel is used across a range of motor sizes. Take for example pump panels.

The control operation can be common for a particular pump but is needed for a range of pump sizes. Let's say for example above that a panel builder builds a common set of pump panels for 1, 3, 5, 7 ½, 10, 15, and 20HP 480V for a pumping OEM. The control panel builder can't start a build until the pump OEM orders the sizes needed.

The order kicks off the build process: procurement, receiving, pulling, assembly, wiring, testing, and shipping. Leadtime from order receipt to fulfillment could be 2 or 3 weeks in this scenario.

Now let's view the above scenario using the TeSys Ultra motor starters with interchangeable trip units. In this scenario, the control panels can be standardized on the largest size (20HP), and builds can start before receiving the order. Control panels can be stocked on the shelf ahead of an order, and appropriate trip units can be applied at the end. This means the panel builder could ship the same day the order is received. Shorter lead-times can give panel builders and contractors an edge when competing for customers.

3 You can simplify engineering and procurement

For applications ranging from 0.15 to 32 amps, TeSys Ultra combination motor starters can help keep designs simple. By standardizing on the upper end of this range (32 amp) engineers can simplify the design, bill of materials, and can realize the benefits of interchangeable trip units. The TeSys Ultra combination motor starters are UL Type E approved, meaning it serves as the complete branch motor control circuit by itself.

It doesn't need a circuit breaker or fuse for branch circuit protection. Not only does this save panel space, but it also gives engineers the ability to cover a larger motor range with a single design. Fewer parts also mean simpler procurement and inventory management.

Consider the TeSys Ultra range from 0.15 to 32 amps. 14 traditional overload device sizes, 5 contactor sizes and 7 circuit breaker sizes can be replaced by as few as five trip unit sizes and a single switching base.

FOR MORE INFORMATION

Operating smarter can make a significant difference when resources and materials are in short supply. Schneider Electric leads the market with innovative motor control solutions that help panel builders succeed. Scan or click the QR code below to learn more about TeSys Ultra or to connect with a knowledgeable sales representative.

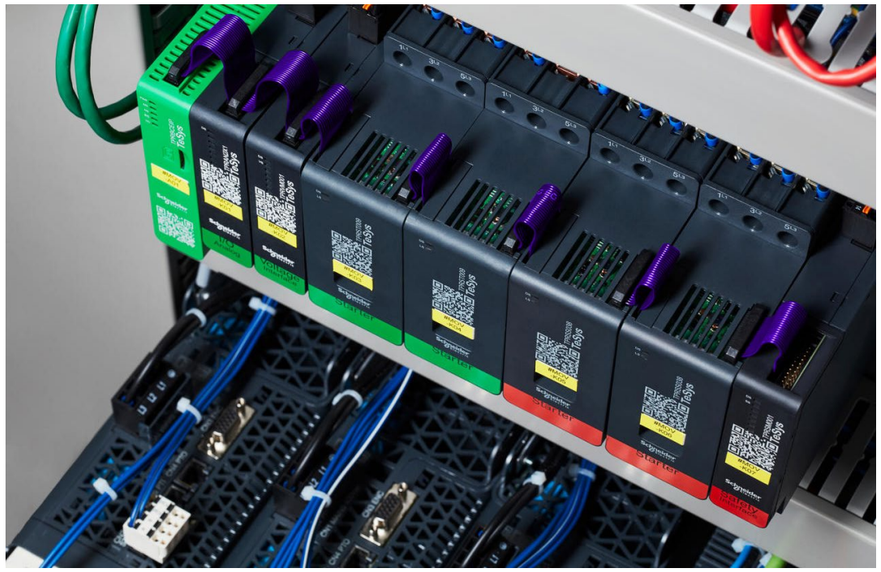
5 reasons system integrators should upgrade their motor starter

Motor starters play a key role in control panels. They turn motors on and off, as well as protect motors from overloading. System integrators often face specific project requirements that relate to the function or output of a motor starter. But system integrators also face challenges: They must meet completion deadlines. They face a labor shortage.

Mistakes often take time to correct, which increases project time and costs, affecting profitability. Fortunately, new innovations in motor starters are helping system integrators overcome these challenges and achieve better overall experiences. Here are five reasons system integrators should upgrade their motor starters with new innovations in mind:

1 Eliminate control wiring

Motor starters need control signals when motor operation is needed. Programmable logic controllers (PLCs typically determine this operation control. However, doing so isn't as simple as wiring directly from a PLC output to the contactor coil. Often, an interposing relay is used to prevent damage to the PLC output that results from contactor coil operation. Thus, two sets of wiring are needed. Another approach uses additional devices such as surge suppressors, adding further cost.



It may also be necessary to inform the PLC device regarding the status of the contactor (OPEN or CLOSED), as well as the status of the overload relay (TRIPPED or NOT TRIPPED). This requires additional control wiring from the auxiliary contacts on the starter to PLC inputs.

Occasionally, it may be necessary to enable a remote reset of the overload relay by signal from a PLC output. As one can imagine, the control wires can become quite numerous. Now imagine a control panel with multiple starters. The complexity significantly increases. Installing all this wiring can be involved.

Each wire must be cut to length, stripped, labelled (not required, but a good and sometimes necessary practice), landed to the termination point, and tightened by the screw to the required torque specification. A single mistake can result in lost time spent troubleshooting and correcting. New innovations change the approach of sending operation signals and receiving status signals. The TeSys island communicating motor starter system applies a bus coupler to manage the communication upstream to the PLC, and downstream to each starter connected to the bus coupler.

A single communication cable connects to the PLC. Connecting TeSys island devices to the bus coupler is also simple. Each device has an attached ribbon cable that easily connects to the port on the adjacent device, thus connecting the bus coupler to each device in an “island” of motor starters. TeSys island significantly reduces wiring complexity and installation time.

Eliminating the manual control wiring between PLC and multiple motor starters is a tremendous time-saver for system integrators. It also prevents wiring mistakes and troubleshooting.

2 Simplify PLC programming

The PLC is often used to write the logic of operation for a control panel. This is often developed by a programmer, applying the desired operation of each motor starter device based on the conditions that would dictate when the motor should turn on and off.

Examples of such conditions could be the status of a float switch, the status of an external operator control, the operational status of other equipment, and more. Each input and output used in this ladder logic must be mapped to the PLC so that it knows to which device it is talking.

The programmer can then build the operational program (often using ladder logic) that applies each input and output in a prescriptive manner to achieve the desired operation. This construction must be accomplished for each motor circuit in the PLC program.

However, the manner of operation of the starter itself is consistent from one starter to the next. Each non-reversing starter tends to operate the same as other no reversing starters, with the difference being the specific conditions that would dictate when the individual starter should operate.

Function blocks provide an alternate way to simplify the approach of developing the operational logic. Function blocks contain a packaged set of logic rules that define how an individual starter operates. The idea is akin to writing a macro that executes a set of prescribed logic when called to operate.

In the case of TeSys island, these common starter operations are already defined for the programmer. This approach means the programmer can forego writing the repetitive starter logic operations in the PLC program, and instead use simple functional commands, such as RUN or STOP. The packaged set of logic rules that govern how the starter operates reside in the bus coupler of the TeSys island system.

Thus, the designer can simply insert a simple function block command such as RUN when needed. That leaves more time to focus on prescribing the logical order of the conditions for operation. This not only saves programming time but also simplifies reading the PLC program.

3 Required to provide data? We've got it covered

Traditional motor starters work well when data isn't needed, but some projects require system integrators to provide status and performance data. The types of performance data that may be required could include motor current, voltage, power factor, power, or energy consumption (for the entire system or by each load), and so on. One common approach is to replace the traditional thermal overload relay with a communicating electronic overload relay. In other cases, a voltage, power, or energy monitoring device may be necessary. Each device must be installed, wired, connected, configured. Now that sourcing the required data has been solved, the next challenge is displaying it.

Some electronic overload relays display data on their device face, but the amount of data that can be viewed at one time can be very limited. In other cases, data that's communicated to the PLC could be mapped and displayed on an interface built by the system integrator.

This gives the system integrator the opportunity to better organize and present the data, but it requires programming and validation time, which extends project time and costs. TeSys island motor starters simplify projects that require data.

It includes, as standard, a myriad of performance data and device statuses, not only for the entire island of devices, but also for each individual load. Performance data and status can be easily viewed using the web-based interface included in the bus coupler. This can be accessed using any browser-based device using the service port on the bus coupler. Should the system integrator desire to present his or her own view of the data and status, he or she can easily access the data from the TeSys island starter system.

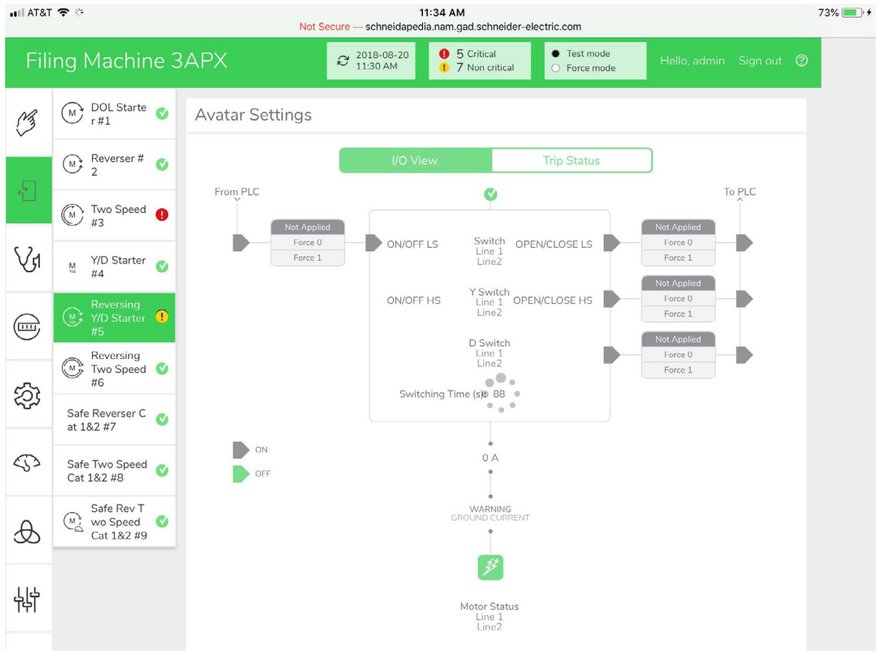
4 Test with ease

Once the control panel is wired and the PLC program is implemented, the control panel typically is tested to verify that the desired operation is achieved. This likely needs to be completed before the control panel leaves the panel shop to minimize additional costly time in the field during installation. Traditional approaches using standard motor starters would require simulating conditions to determine if the desired operation is achieved.

However, this may not always be very practical to execute, such as in the case where float switches, emergency shut offs, or control signals from other systems are needed. It's also likely necessary to test the load operation once the system is installed in the field. In some cases, it may be necessary to adjust settings in the field to fine-tune the system's, followed by an operational test to verify the desired outcome. However, it may not be easy to arrange the specific conditions needed to turn on a particular load for a brief test.

TeSys island communicating motor starters give system integrators a new way to solve this challenge easily. A web-based interface, provided with each TeSys island bus coupler, can be accessed easily with a laptop or web browser-based device using the service port on the bus coupler. This interface allows the user to view the configuration and adjust settings. The interface also allows for the operator to FORCE on or off specific motor starters (i.e., bypassing the PLC).

Operators can also use the interface to validate PLC operation in a TEST mode, simulating operation of a motor load or input without operation physically occurring. This enhanced flexibility during the testing and commissioning phase enables much more simulation ability, helping system integrators more efficiently verify the correct operation of their system.

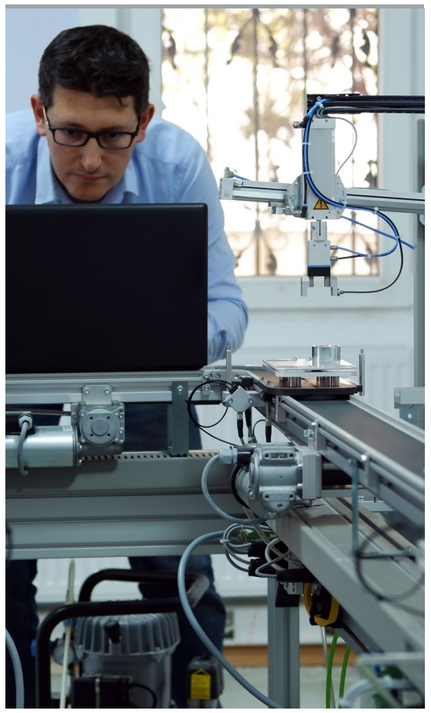


5 Troubleshoot remotely

On the occasion when a system unexpectedly stops, system integrators are often tasked with identifying the issue(s) and resolving them in a timely manner. Like a pair of shoes, sometimes a new installation needs to be broken in.

Sometimes the entire system of equipment needs some time to run and reach a normal running state before it can be tweaked and fine-tuned. Even the established systems are comparable to older shoes that may need some maintenance from time to time to maintain optimal performance.

Fine-tuning or troubleshooting often requires the system integrator to be on site. Sometimes it's a simple job, other times not so much. The job site can sometimes be remote, adding travel time and cost. TeSys island communicating motor starters not only provide access to performance data and statuses, but also provide fault history and event logs. This access to information and history gives valuable insight and makes troubleshooting much easier.



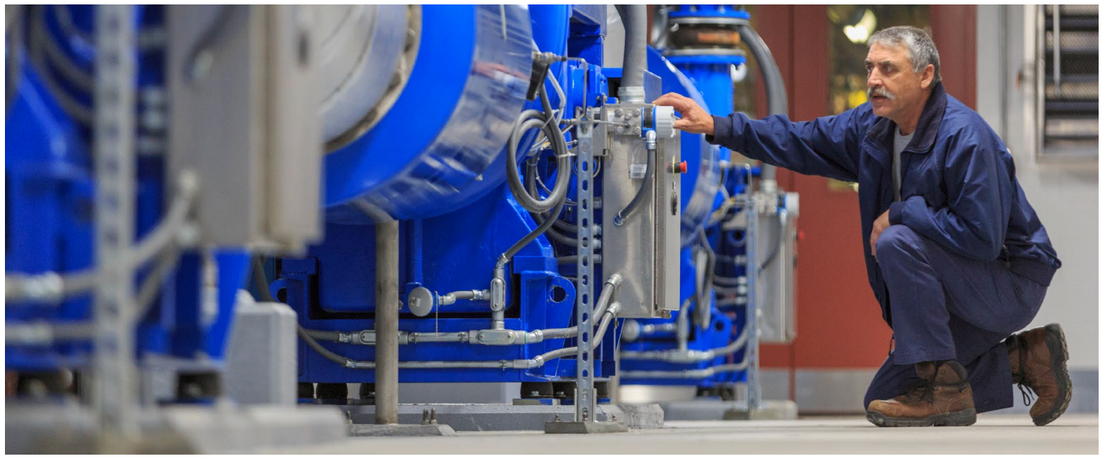
Additionally, starter settings can be easily adjusted through the same bus coupler interface, without having to adjust PLC programming. Now imagine it is 8PM, the project is two hours from your location, but you can access information from the office or from home.

The ability to view and adjust remotely can have a significant benefit when project sites are farther away. "TIME IS MONEY" For system integrators, the old adage "time is money" rings very true. The more time spent on a project, whether it be on design, programming, installation, testing, commissioning, or troubleshooting, the less profit is retained for a system integrator.

The new approach to motor starters offered through TeSys island can be a game-changer for system integrators. Not only can a solution like TeSys island help reduce costs and affect profitability, it can also shorten project lead times, reduce dependency on limited skilled labor, and help provide end customers with a quality system integrator experience.

CLICK HERE

to learn more or contact your local Schneider Electric™ sales representative to discuss how you can improve motor control using TeSys island communicating motor starters.



4 Innovations in higher amp contactors you should know about

Resources are in short supply these days. Whether talking about design, installation, operation or maintenance, challenges resulting from limited labor resources have amplified negative impacts.

With limited resources, it is imperative to think outside the box, and do things smarter. Newer technologies in motor control are one-way customers keep customers moving forward. These innovations often have a larger benefit impact for larger motor applications where serious work is getting done. Here are four innovations in large motor contactors you should know about.

1 Know when it's time to change the contacts

There is some important work that large motors do. Downtime can have a significant impact. Contact tips in contactors wear down as the contactor opens and closes over time. At some point they need to be replaced. Traditional contactors do not warn that contact replacement is needed. This often results in unplanned downtime.

Schneider Electric's TeSys Giga contactors include a diagnostic LED on the contactor face which indicates when the contactor has less than 15% usable life remaining. An optional add-on accessory further allows a wired signal to light an external pilot light or provide an input to a PLC if desired. This 15% remaining contact life alarm gives ample time for maintenance staff to order replacement contacts and schedule the installation on their schedule, instead of reacting to unplanned downtime and rushing.

2 Eliminate the large control transformer

Traditional control schemes typically use a control voltage lower than the main power voltage. This helps reduce risk to those that may be turning selector switches or operating push buttons. A control transformer is used to reduce voltages to a lower AC voltage (typically to 120 Vac), and a power supply is used to reduce to a lower DC voltage (typically to 24 Vdc).

The size of the transformer or power supply gets larger as the size of the contactor gets larger, as more power is needed to operate larger contactor coils. This means a large HP contactor may require a sizable transformer in order to operate it. In fact, it may be too costly to buy a power supply large enough to power a larger contactor 24 Vdc coil.

In this scenario a dedicated control transformer might be added, along with an interposing relay, to allow a 24 Vdc signal (such as may come from a PLC) to indirectly control the operation of the contactor.

This is a somewhat complicated approach to simply control a contactor operation with a PLC. The new TeSys Giga advanced version contactors include a coil input contact that allows control directly from a PLC. So how does this help offset the need for a large transformer or power supply?

It gives the panel designer the ability to power the contactor coil from the main power voltage, while controlling the ON/OFF operation using the PLC input signal. In this scenario, a large transformer or power supply is not needed in order to operate the large contactor coil. This not only save on material costs and panel space, but also simplifies the wiring.

3 Turn a 2-person job into a 1-person job

As control panels get larger, it becomes more difficult to maneuver them during the assembly process. This can sometimes mean electrical components have to be mounted while the panel is standing up (instead of mounting while the back pan is in a horizontal position).

Have you ever had to install a large contactor while the panel is standing up? If you have then you know how difficult it is for a single person to hold a large contactor in position while trying to mount the contactor to the back pan. This makes for a two-person job, but not so for TeSys Giga contactors.

TeSys Giga contactors include a “hang-on” screw mount position that allows the contactor to be hung on a mounting screw on the back pan, thus supporting the contactor position while installation screws secure it to the back pan. Much more efficient.

4 Avoid complaints and customer heartache

Inconsistent voltage is a problem in certain locations. It can be the result of excessive demand on a power grid, excessive voltage drops, phase imbalance, or other causes.

This can impact contactor operation that may appear on its face to be the result of a defective contactor, when it is the result of significant deviation in voltage from the level it should be. Let's examine one such scenario and its potential impact on equipment manufacturers. Let's suppose equipment with a large HP contactor is installed at a location where the voltage supply drops from time to time.

When the contactor is called to operate in this condition, the contactor coil may burn up due to the low voltage and cease to work. To the operator or maintenance technician may initially think there is something wrong with the contactor and contact the equipment manufacturer for resolution.

After taking steps to evaluate the contactor either on site or after shipping the unit to the contactor manufacturer, it eventually becomes evident that there is a voltage problem at the application site. The end user is then asked to check the voltage at their site. The voltage condition is addressed, and the contactor is replaced. However, if the voltage drops are intermittent, the voltage may seem fine during the time it is checked. Of course, the unplanned downtime is frustrating to the end user.

The interruption also costs the equipment manufacturer, not only in terms of time and money but also potentially in terms of customer relationship. TeSys Giga contactor acts differently in this scenario in two ways:

- The TeSys Giga coils have a wide voltage application range, whereas traditional contactors operate at a single nominal voltage. This means that a nominal control voltage of 120 Vac could drop as low as 48 Vac and the TeSys Giga contactor with 48 to 130 V ac/ dc coil operates as desired.

- If the voltage is sufficiently low (below the bottom threshold of the wide TeSys Giga coil range), the TeSys Giga contactor will not attempt to pull in as traditional contactors would (which normally results in damage to the coil and subsequent failure). Now let's consider the previous scenario, this time using TeSys Giga contactors.

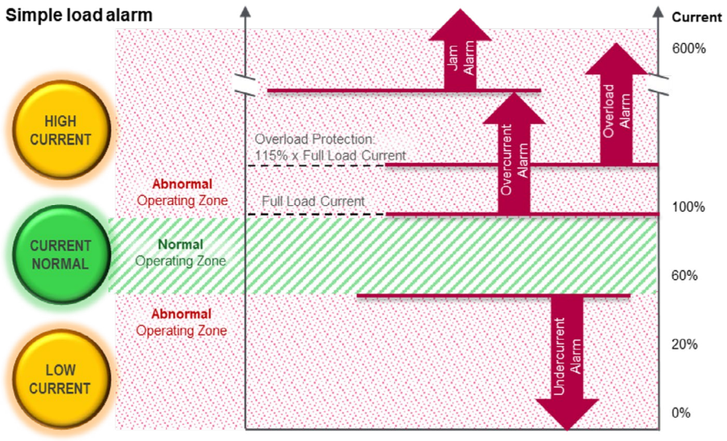
When the voltage drop occurs, TeSys Giga contactors will continue to operate as normal until the voltage drops below the extended voltage range of the coil. Then when the operator or maintenance staff investigates the reason for the contactor not pulling in as expected, they observe the visual diagnostic LED, alerting them to the cause of the undervoltage issue.

They address the voltage issue and resume operation. Motors 16 This latter approach either continues operation as normal, or if the voltage is too low it allows the end user to become aware of the issue directly, without having to involve the equipment manufacturer or contactor manufacturer. It also avoids time and costs related to replacing/repairing the contactor. Much better for all involved.

3 Things You Should Know About Motor Alarms

Traditional motor control protects motors in the event of an overload. Advanced motor starters provide access to data, such as running current, voltage, and status, but equipment designers often struggle with how to use this information practically. But recent innovations in motor control and protection now make it easy to monitor a much larger realm of performance issues and statuses and apply it in a practical manner.

Alarms are the key to making data more practical to realize new equipment capability. They open doors to better information, increased performance, and even more revenue. Here are three things you should know about motor alarms.



1 Motors generally operate within a “normal” current range

Did you know that motor current rises relative to the amount of loading on the motor? Motors are sized to perform a certain amount of work (horsepower, or HP). Thus, there is a “normal” current operating range when motors are working.

Did you know that normal loading isn’t usually 100% of full load amps (FLA)? In most cases, designers typically allow some cushion when sizing motors. Also, motors tend to be most efficient when operating between 60 – 80%.

Did you know that certain conditions or issues can cause the motor current to rise or fall outside the normal range?

Undercurrent can occur when the motor current is under the normal operating range. This could mean the equipment isn’t being loaded up (and could be turned off to save energy), or it could mean other issues like pump cavitation, a broken conveyor belt, the compressor system needs maintenance, or it is time to replace the filter.

Overcurrent is when the motor current is higher than the normal operating range. This could mean loading is unusually high, the compressor system needs maintenance, or possibly a downstream valve is closed.

A steep rise in current (called a “jam”) also indicates an issue such as debris blockage or a mechanical bind. Either way, when your motor current is operating outside of the “normal” range, you need to act.

2 Alarms make it easy to monitor motors for issues

Having access to motor current and voltage is not new, but it’s difficult to know how to use this information. Sure, a PLC program can be written to read and respond to abnormal motor current, but it’s not easy to set or adjust.

TeSys island motor control has solved this conundrum. Alarms allow the programmer to easily set when a particular alarm parameter triggers a warning. For example, an undercurrent alarm can be configured in the motor starter settings to be 60% of the motor FLA. Let’s suppose an installer notices this alarm is too sensitive during commissioning. Changing the sensitivity isn’t an issue with TeSys island. The undercurrent alarm setting can adjust up or down easily. Then, it can be tested again to confirm the correct sensitivity.

3 Alarms can help OEMs make more money

Alarms, instead of traditional motor controls, are capable of informing operators or maintenance teams when action is needed. This can help end users tremendously by giving them the information to help run efficiently, increase output, and keep equipment healthy. This also allows them to manage maintenance proactively instead of reacting to unplanned downtime. But there is another way alarms can help OEMs increase revenue, and that is through post-sale monitoring services and replacement parts.

Knowledgeable maintenance staff and operators are retiring faster than they can be replaced. This technology gives OEMs an opportunity to provide more services to keep their equipment running. Who knows the most about how to maintain a machine? The original equipment manufacturer, of course. What else can motor alarms do? We’ll show you. Motor alarms are easy to configure, adjust, and protect with TeSys island motor starters.

Scan the QR code or click here to learn more.
Or contact your local Schneider Electric™ sales representative to discuss how you can improve operations with motor alarm

Author Bio

Erik L. Barnes is an Offer Marketing Manager at Schneider Electric. He holds a bachelor's degree in mechanical engineering from Pensacola Christian College. He has held positions including applications support, product management for motor control products, UL 508A panel shop manager, and applications marketing. Over his twenty years of experience in electric motor control applications, he has published multiple articles, technical papers and videos focused on control applications including UL 508A device applications, short-circuit current ratings, undervoltage conditions in motor control, and others.

In addition to technical writing, Erik has led numerous training seminars and webinars. He has also led initiatives to develop tools that make it easier to select product in compliance with code requirements, including short circuit current ratings and selective coordination. Erik has received award recognition for his work in education and product application tools. More information on his career and accomplishments can be found at www.linkedin.com/in/erik-l-barnes.