FRANKLIN AID

Franklin Electric

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In today's edition of the AID we will inform about motor protection and its settings.

The functional principle of a bimetal release:

The bimetal release consists of two mechanically connected metal strips with different thermal expansion coefficients that conduct the motor current. Due to the current flowing through them, these metal strips will heat up. If the current reaches excessive values, the resulting deflection of the bi-metal strip will open the electrical circuit and protect the connected load.

Motor protection switch:

These switches are combined devices that protect the load against both overloads and short circuits. The overload function is usually done using the a.m. thermal effect of the electrical current (bi-metal), whereas the short-circuit protection is given by factory pre-set magnetic releases.
Additionally, these motor protection devices feature manual controls that can be used to switch the load under normal operating conditions. These controls are also used to re-arm the protection device after the fault condition has been cleared.

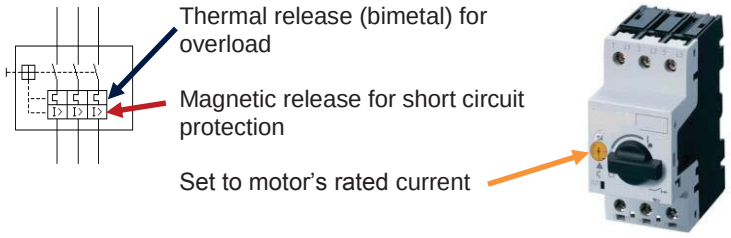

Figure 1: Motor protection switch

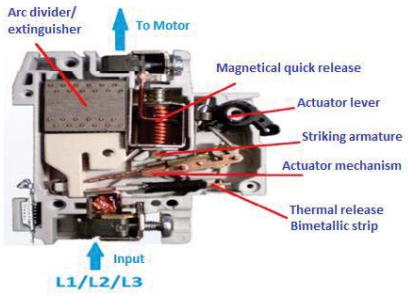

Figure 2: Sectional view of motor protection switch (thermal and magnetic release)

Motor protection relay:

The thermal overcurrent relay is designed to protect the consumers from excess heating due to overload or phase failure. Additionally, it usually features a trip-free mechanism to prevent re-arming as long as the heat has not dissipated. Motor protections relays generally trigger when 1.2 of the preset current has been reached, however, they do not protect from short circuits. Additional safety fuses or automatic circuit breakers are required for short circuit protection when protection relays are being used.

Figure 3:
Motor protection relay

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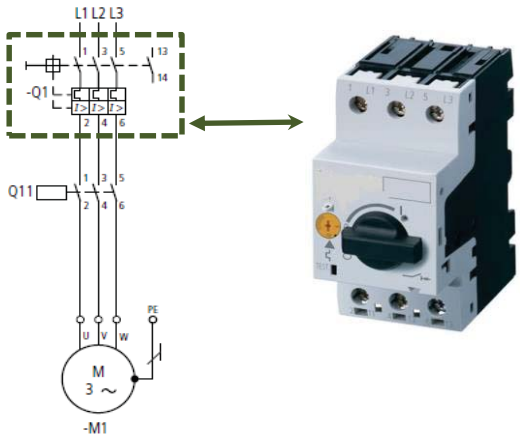
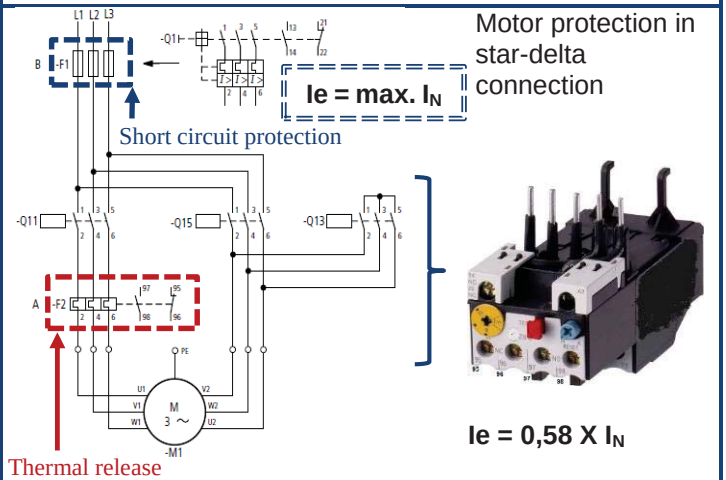
Motor protection switch – use and settings:

Direct motor start DOL	Star-delta-start up YΔ
	

The setting of the motor protection switch depends on the installation point in the electric circuit. For direct motor start the overload protection may be set at motor rated nameplate current $\mathbf{I_N}$. If the motor protection switch was installed in a star-delta start-up in the delta connected branch as in above picture, its setting has to be motor nominal current $\mathbf{I_N}$ times 0.58.

We remind our customers that with submersible borehole installations, the switching time from star to delta connection is best chosen as short as practical (~3 seconds). This is due to the extremely low moments of inertia associated with borehole pumps.

Choosing the overload protection for submersible motors:

Submersible motors should be protected by switchgear in conformity with EN 60947–4–1 (VDE 0660 T. 102), Class 10 (release within 10 seconds at 7,2xIn). Additionally, the overload protection should be phase failure sensitive and temperature compensated.

However, the optimum setting of the overload is taking into account the motor current at the duty point of the pump system.

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***PRACTICE:**

The motor protection device has triggered and the motor and pump are disconnected from the circuit. What should be checked prior to restart:

1. Does the overload setting correspond to the normal current respectively maximum nominal current of the installed motor?
2. Was there a temporary voltage change in the feeder? (under voltage – overvoltage – phase asymmetry – voltage breakdown)?
3. Is the insulation resistance of the lead and motor within Franklin Electric's specifications?
4. Are the winding resistances within specification?

   3. and 4.: The measuring has to be carried out as close to the motor as possible.
   PLEASE NOTE: The voltage supply has to be reliably switched off and be protected against accidental restart!!!
   The measuring may only be carried out by authorized personnel!
5. Does the pump seem to have a mechanical damage, which might have shown in a changed amount of water or in pressure prior to the release of the overload?

The above is a short troubleshoot assistance. For a more detailed analysis, the pump and motor has to be pulled.

The Franklin Electric Service Team wishes a Merry Christmas, a Happy New Year and continued good success with Franklin Electric products in 2015

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