

## Electric contactor functions

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### I. INTRODUCTION :

Progress in societies does not come except through scientific research and various studies.

Without this research, no society can move forward. The world of technology, electricity and physics ect, is a world full of various and developed information over time. As engineers and scientists, we must meet through these different research and studies, that could help our society to reach scientific facts.

I wanted from this research to reach a result through which the reader could get a good amount of information about contactors and its accessories ,how it works and how we maintain them .

#### Electric contactor functions and how to maintain them



Basically, a contractor is an electrical automatic switch.

With this switch we can turn the electric power on and off automatically depending on what the user might need .

As a matter of fact this contactor can turn the electric power automatically using the magnetic field which controls the contacts to close or open the electric circuit .

It is a special type of relay.

- *We might ask what is the different between the contactor and the relay ?*



when we use a higher current applications we should use contactors , carrying capacity is involved. When we are using a lower current application the right dissuasion here is to use a relay .

Contactors are compact and can be field mounted easily. Usually, these devices feature multiple contacts. Contacts of the contactors or the relay mostly will be normally open , meaning that it is going to be open when we first start it , and when ever the power is on the contacts will be closed .

There are different types of contactors, and the various types have their own sets of features, applications, and capabilities. Contactors can take over a vast

The knife blade were invented in early 1800s. we could say that they are the first contactor were used at that time . Their applications were mostly to control electric motors.

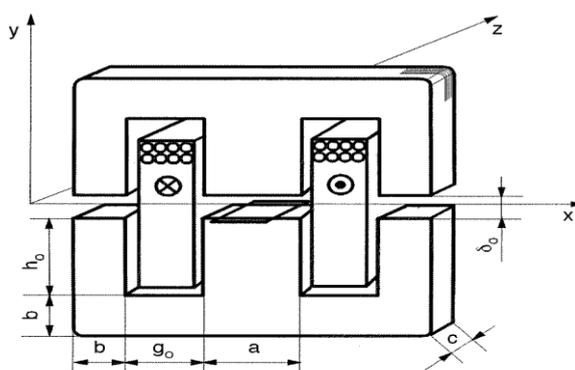
They consisted of a metal strip which is designed to drop into a contact when operational.

The switch was build and designed with a lever for pushing up or down . At that time the size of the contactor was huge comparing to the one we are using today , it had to stand next to the knife switchblade to level the switch into a closed position. However, because of the old technology ,this kind of switches was not useful enough and we have to create a new way to use switches to close or open the circuit automatically, and there was functional problems that came with it. The main

problem was that it made the contacts wear out quickly. Opening or closing the contact manually was not quick enough to prevent arcing as a result. The soft copper switches underwent corrosion, this process made them more vulnerable to dirt and moisture which led to rusting. By the time passing, technology has become more developed by scientists and engineers.

The larger the motors, the more currents they require to work. It might be very dangerous to

operate such high current and high voltage carrying switches, so we cannot use these kind of contactor because they are no more effective or efficient. Even though technology was improving day after day, the knife blade switches could not be fully developed due to the problems and risks of operational hazards and short life of the contacts. As a matter of fact, these devices come in different sizes, from small hand-held dimensions to large sizes



**Figure 3.**  
The E-type contactor electromagnet

- **The magnetic contact switch consists of two main parts.**

- 1- The upper part.
- 2- The lower part.

**First: the upper part:**

It contains a moving iron core that has the same shape as the bottom part and is attached to it a group of contact points and it consists of three main points in a disconnection position and an unlimited number of auxiliary contact points, including the open and the closed.

**Second: the lower part**

It is called the iron core, and it is a fixed part in the shape of the letter E around the middle rib. There is an insulated wire coil and around the other two ribs a closed loop of copper or aluminum to strengthen the magnetic field.

- **The way the magnetic contact switch works:**

When the current reaches the magnetic contact switch, a magnetic field occurs, which attracts the upper core to the lower core, and all contact points change position, so the open points become closed and the closed points open.

**How to know and identify contactors parts ?**

- We identify the main contacts closed and open auxiliary contacts

Key points as followed:

take the numbers 1,3,5 as input and 2,4,6 as output

Auxiliary points:

**1- Normal open and abbreviated as (no) NORMALLY OPEN:** numbers 13 and 14, and these numbers might be different according to the manufacturer.

**2 - NORMALLY CLOSED, which is abbreviated as (nc):** the numbers 11,12, and these numbers different according to the manufacturer

It can be determined whether the point is open or closed by the ohm meter, which we can measure the resistance.

**Ends of the (COIL):**

The two ends of the coil are known as A1, A2 or A-B, and when measuring the two ends by an ohm meter, it will give a specific resistance value, not zero, and this is very important for maintenance.

- **What are the conditions that must be met when buying a contactor?**

A suitable contactor must be chosen for the work required in it, meaning a contactor must be chosen with a current intensity suitable for the load required to run, and whenever the intensity of the contactor current is higher than the required load the operation is the better, and gives the contactor a longer life, but economically, a suitable contactor must be chosen on what we need exactly.

- **AUXILIARY REALAY**

It is similar to the contactor in the business idea, except that there are no main points, that is, it works in control circuits only and has a coil and has three parts:

- 1- A joint party.
- 2- Connector with NC subscriber.
- 3- Non-conductive NC terminal.

- **OVER LOAD RELAY:**

Its main function is to protect the motor from high current, so it disconnects the electrical circuit when the current is high.

- **How it works:**

It consists of three coils connected in series with the motor and has a current intensity scale that is set to the same value as the motor current, and in the event that the current intensity increases for any reason, the coil temperature rises from what leads to its expansion, so the piece to be moved is moved to make the cutting process.

Its parts:

- 1- Open point 98-97
- 2- Closed point 95-96
- 3- An indication lamp, if lit, means that the machine has stopped operating due to the work of the OVER LOAD RELAY.