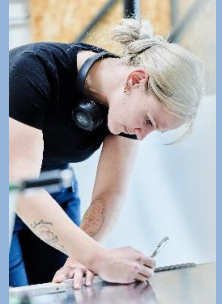


# Mulilo Danish Vocational Education & Training Program in Maintenance Technology

## Education Materials (Examples)



In our MDVP Maintenance Technology vocational education and training program, you will get access to a wide variety of education and training materials, covering all you need to know about setting up, checking and servicing installations for energy, heating, and cooling systems. And you will meet examples of these installation types in a wide variety of settings: from homes to commercial buildings and industrial facilities.

Here, we want to give you a little taste of the types of materials you will be meet during the program.

**All materials are yours to keep and use – also after you complete your vocational education and training at Techcollege.**

## Materials from three Danish skilled vocational specialist education programs

Your vocational education and training in the MDVP Maintenance Technology program includes elements from no less than 3 full Danish VET education programs.

You will be introduced to topics and materials drawn from the official Danish Electrician, Automation Technology, and Sanitation & Energy Systems Technology vocational profiles, and when you complete your education and training, you will be able to perform system maintenance assignments from all of these profiles.



DK VET Program

**Electrician**



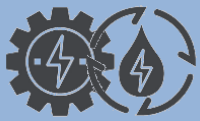
DK VET Program

**Automation Technology**



DK VET Program

**Sanitation & Energy  
Systems Technology**



# Education Materials (Examples) for the Mulilo Danish Vocational Education & Training Program in Maintenance Technology

## 1. Presentations of theory and technical subjects

Your trainer will introduce and present new theory and new technical subjects with the use of digital presentations (made in Microsoft PowerPoint or similar). All of these presentations will be placed on our **Digital Learning Platform** for you to download and store on your own computer.

The goal of the presentations is to give you a quick overview of the most important concepts and learning points of the subject – and you can add your own notes to each presentation to help you remember the key details.

Here is an example of (parts of) a presentation introducing the concept of control circuits, how to design them, and the use of relays in controlling the electrical current in the circuit:

### Presentation of Overload Relays:

#### Overload Relay

The overload relay protects the motor against overloads (Too much current)

A motor is rated for a certain number of amps, if we exceed that amount, the motor risks getting too hot or even catching fire. This would require an expensive repair or replacement motor.

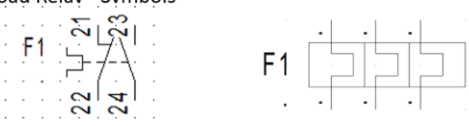
The overload relay measures the amount of current flowing to the motor, by the amount of heat it generates (More current = more heat)

It measures this heat in the three phases (L1-L2-L3)

If it gets too hot (too many amps) the overload relay trips and disconnects the motor.



#### Overload Relay - Symbols



The symbol for the Overload Relay in the Control Circuit.

It has four terminals. 21-22 is a normally closed and 23-24 is normally open.

When the overload relay is activated, they terminals change position

We can use these to turn on lights or turn off the motor, by removing power to the

This is the same overload relay, as seen in the control circuit. But this is the part of the overload relay, which measures the current.


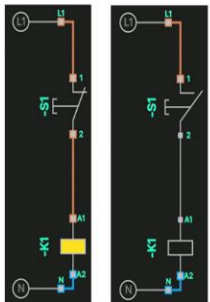

This is where the three phases flow through the relay.

It is in the so-called power circuit that the relay measures the current,

### Introduction to electrical motor control:

To stop the motor, we need something that can control the electricity to A1.

We can do this by using a NC (Normally Closed) switch to control the contactor.



#### Documentation

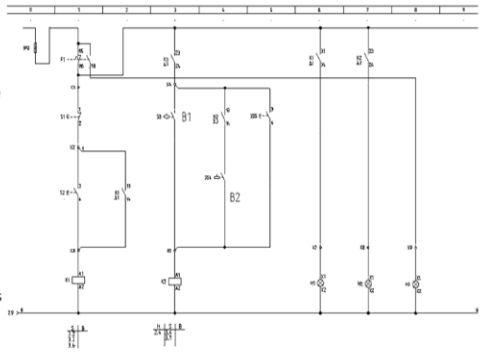
Control Circuit – A draw showing the way the control circuit is connected and built.

Keep in mind, doesn't show the geographical placement of components, but instead show how the wiring flows.

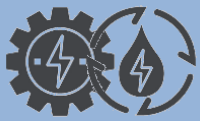
Is useful when constructing the control circuit, allows the builder to follow wires from terminal to terminal.

The current flows from the live in the top, and flow downwards towards neutral.

The control of this movement, allows us to turn on or off motors or lights, etc.



JaM	Project Title: 5-Workshop	Project ID: 1000000000	Project Name: 5-Workshop	Project Date: 2023-05-01	Project Status: In Progress	Project Manager: Ulf
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# Education Materials (Examples) for the Mulilo Danish Vocational Education & Training Program in Maintenance Technology

## 2. Material Compendia for you to use as Reference

For the different subjects in your vocational education and training, we put together a number of digital compendia, which you may download from our **Digital Learning Platform**, store on your own computer, and use as reference material to help you when you are working on exercises and project assignments.

The goal of each compendium is to give you an easy reference access to key knowledge and data relevant for the current subject or task – that you can come back to and use whenever you need it.

Here is an example of an initial compendium of relevant symbols to use when designing/drawing electrical control circuits:

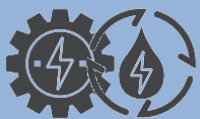
## Power Circuit Symbols

Name	Symbol
Contactor	
Overload Relay	
Motor	
Circuit Breaker/Fuses	

## Relay Logic – Symbols

### Control Circuit Symbols

Name	Symbol	Function	Designated
Start Button		When pressed, allows the current to flow from terminal 3 to 4	S
Stop Button		When pressed it breaks the flow of current from terminal 1 to 2	S
Auxiliary Contact Block NO		When activated by the contactor, allows current from terminal 3 to 4	Designated after the contactor the block is mounted on: K1/K2/K3
Auxiliary Contact Block NC		When activated by the contactor, it breaks the current from terminal 1 to 2	Designated after the contactor the block is mounted on: K1/K2/K3
Lamp		A light source. Turns on when a current is applied to it. X1 is the live wire and X2 is neutral.	P or H
Contactor		Activated when current is applied to it. A1 is live and A2 is neutral. Allow the current to flow in the Power Circuit.	Q or K
Overload Relay		Detects the amount of current passing through it in the power circuit. Trips if the current exceeds the set value.	F
Terminal		Wires can be connected in stand-alone terminals.	X



# Education Materials (Examples) for the Mulilo Danish Vocational Education & Training Program in Maintenance Technology

## 3. Workshop Assignments

During your training, you will perform many practical assignments in our electrical installations and sanitation systems workshops. Some are small exercises with a specific task, some are larger projects where you build or service a complete systems installation. You will work both individually and in teams. In many of the assignments, we have created realistic domestic, commercial or industrial systems specifications for set-up, diagnosis, and repair tasks, where you must consult or produce systems documentation materials – and then perform the task in practise.

Here is the task description of an early workshop assignment in the program, where you will design and build a simple electrical control circuit:

Maintenance - KENI

### Task 3: Control Circuit Start/ stop with a latching circuit and indicator lights

A contactor shall be activated with the push of the start button. When start is not pressed, the contactor shall continue to be activated (Using a latching circuit, with an auxiliary contact block)  
With a press on the stop button, the contactor shall be deactivated.  
When the contactor is activated, a green lamp must activate.  
When the contactor is deactivated, a red lamp must be active.

Assignment:

- Draw a control circuit
- Build the control circuit
- Show and test the control circuit

Control Circuit

L1

N

5 of 6