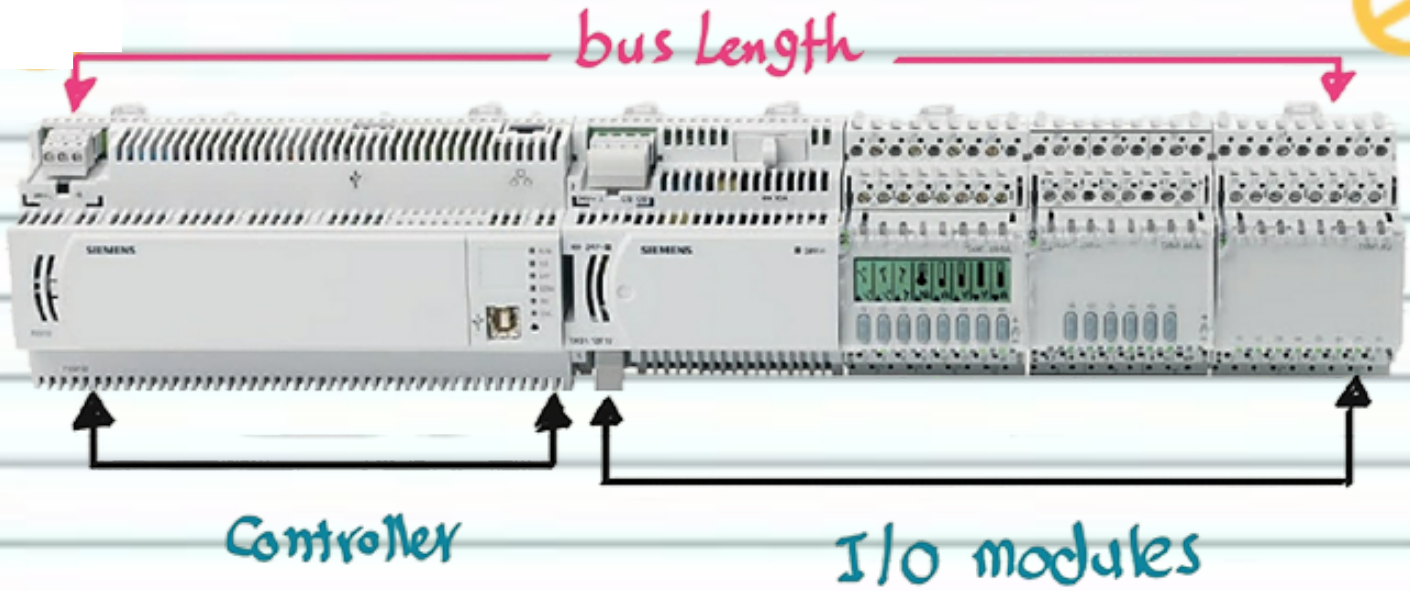
DDC Panel

- In the last lecture, we discussed the two essential components on this board, namely:
  - the processor
  - the Modules
- And we learned how to differentiate between types of Digital/Analog , input/output signals.
- Before delving into the details of this lecture, let's take a look at examples of processors and modules and understand what factors we need to consider when choosing them

Example: PXC Series devices produced by Siemens.



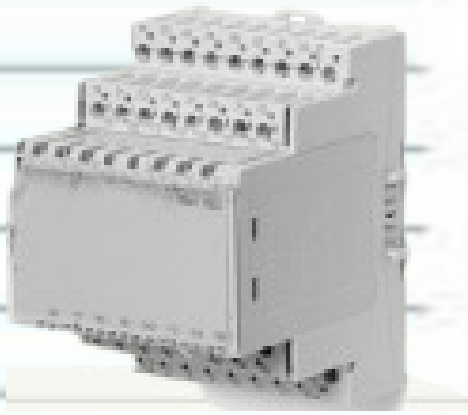
- **Everything you want to monitor represents a point, and everything you want to control represents a point. It is essential to ensure that the controller can handle and support all the points that will be connected to its modules (this point is very important and requires careful attention)**

BACnet/IP	PXC00-E.D	PXC50-E.D	PXC100-E.D	PXC200-E.D
BACnet/LonTalk	PXC00.D	PXC50.D	PXC100.D	PXC200.D
Number of physical data points TX-I/O	–	80	200	350

This model, like yours, can support up to 200 points, both input and output. It is important to consider leaving spare points when calculating, typically around 15% to 25%, from receiver

Ex(2):

This model may be a Digital Input **(DI)** and can be installed with the previous controller (from the same family)



TX-I/O™

Digital input modules

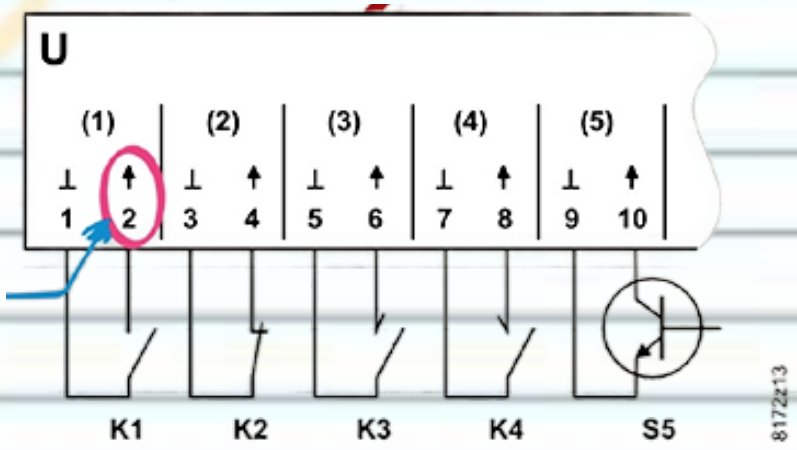
TXM1.8D

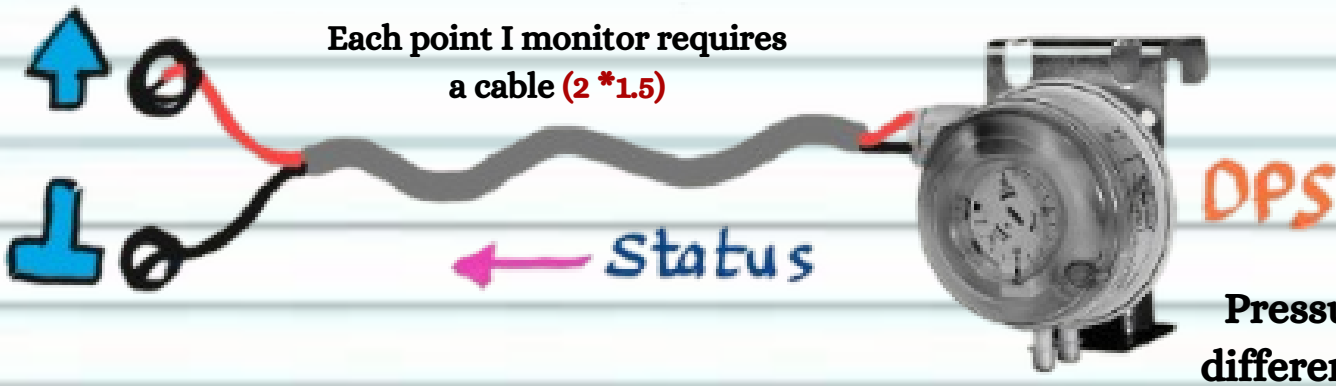
TXM1.16D

- The module can accommodate 16 points, and since it is an input module, we can refer to it as **'Digital Status,'** indicating its capability to read digital input signals.

Connection

The arrow pointing inward indicates that the signal is entering the controller.





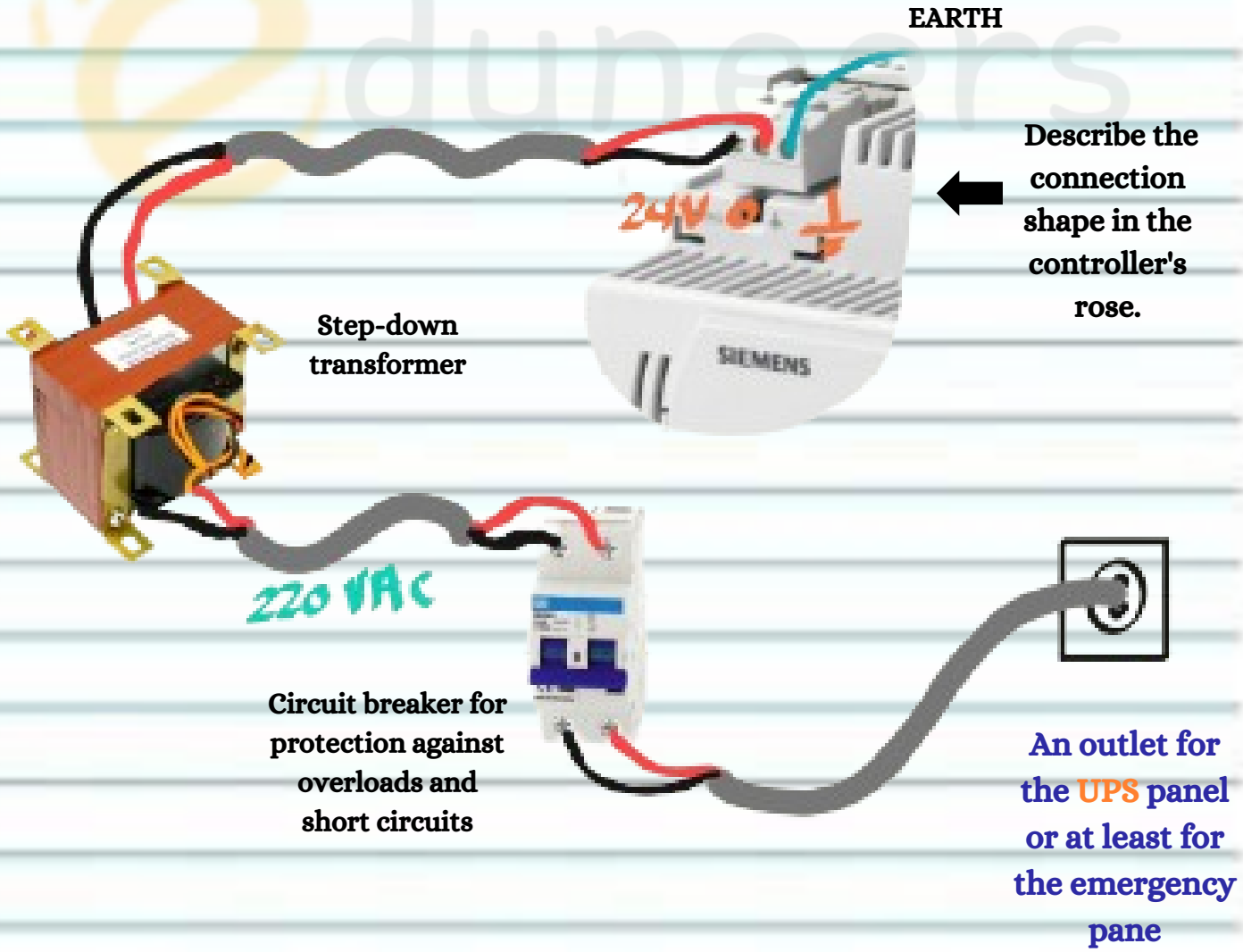
Pressure differential switch

- Let's continue with the rest of the components on our panel....

CONTROL TRANSFORMER

- A small transformer that reduces the voltage from 220V to 24VAC

Here's some information for you.... The PXC family we mentioned in the previous example, all operate on 24VAC. That's why this transformer is essential



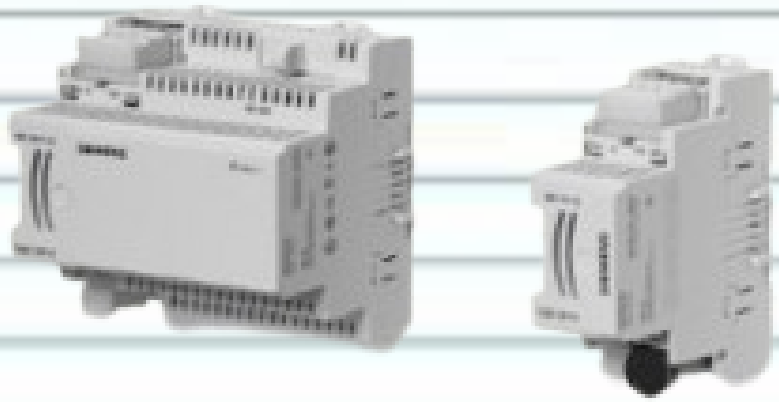
POWER SUPPLY UNIT
PSU

- In the previous step, the controller was powered, and in this step, the modules are supplied using a power supply supported by the same company because they are designed to work together through a common connection known as the bus

Supply (bus connector on side)	Operating voltage		DC 21.5 26 V (SELV/PELV) or DC 24 V class 2 (US)
	Max. power consumption	TXM1.80	1.1 W
		TAMI 16D	14 W
	(for the sizing of power supplies, see CM110562)		

- The datasheet of the DI module from the last session contained these two terms

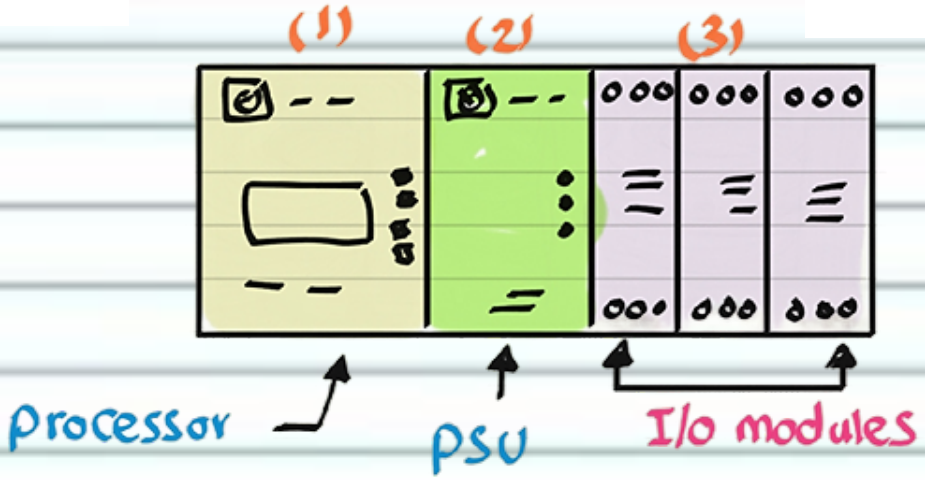
Ex:



TX-I/O™

Power supply module, bus connection module

The arrangement of the bus...



- **Each I/O row begins with one of these devices** Before each row of modules
- **TXS1.12F10 power supply module**

  - Up to 4 power supply modules can be operated in parallel

  - AC 24 V input ← It will also draw from the transformer

  - Generation/transfer of DC 24 V, 1.2A for the supply of TX-I/O modules an field devices

  - Fresh provision of AC 24 V V for for field field device device supply supply

  - Transfer of the bus signal

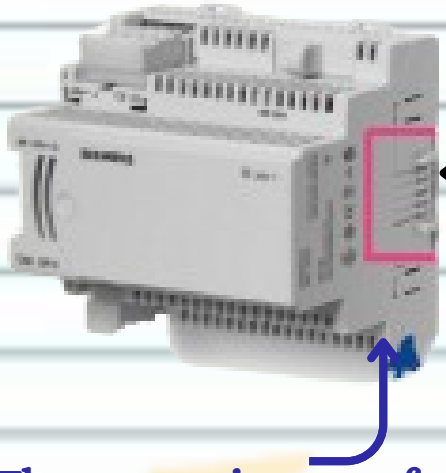
- **From the datasheet, we understood the following**

From the panel's dedicated transformer

The maximum allowable current to be drawn from the power supply is 1.2A After this, it will heat up and may burn, so be cautious. The devices connected to it should have a draw that is approximately 25% less than this number.

- The Bus is configured using two methods

[1] If all the modules are placed next to each other on the panel, a connector called the Bus Connector is used, and here are its forms

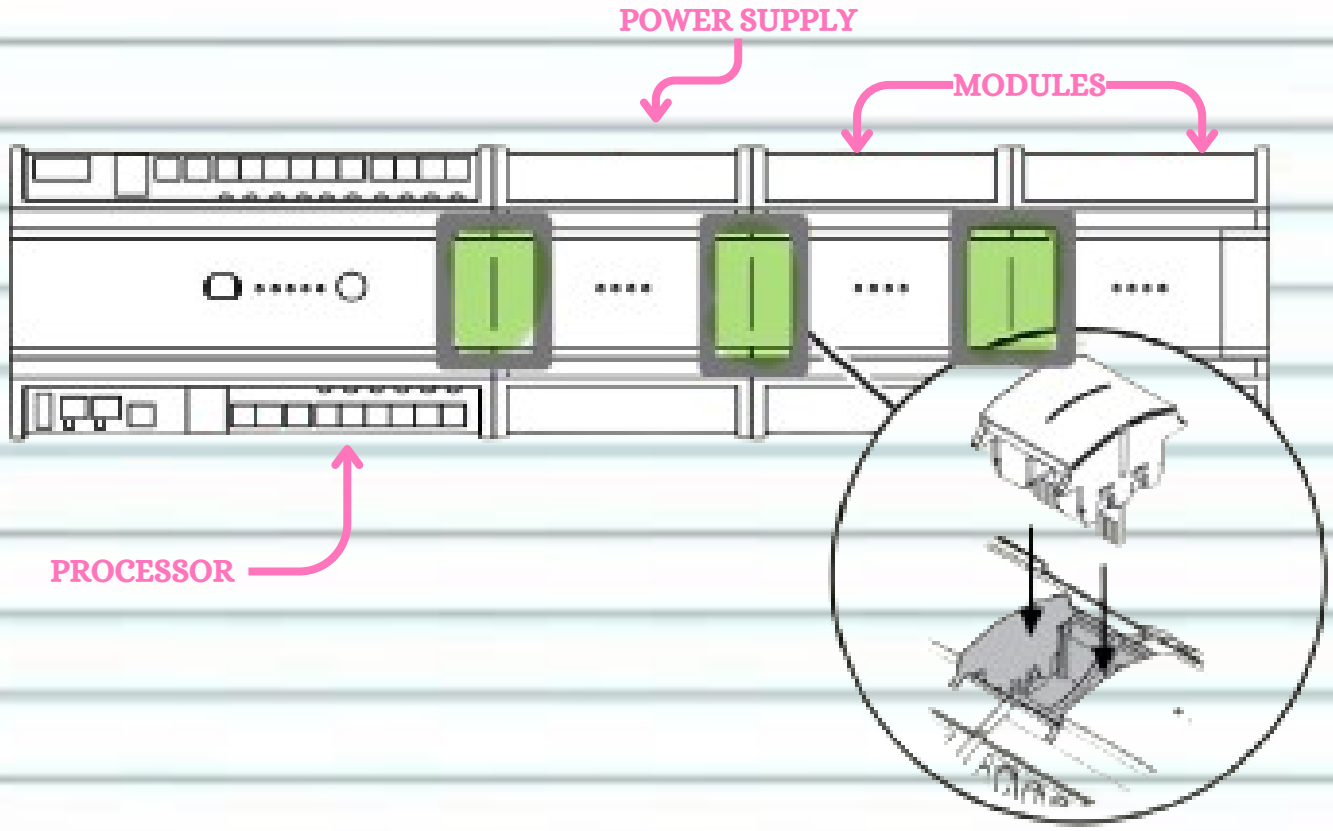


These terminals have a place to fit into the device next to them, using the same concept as a plug and socket.

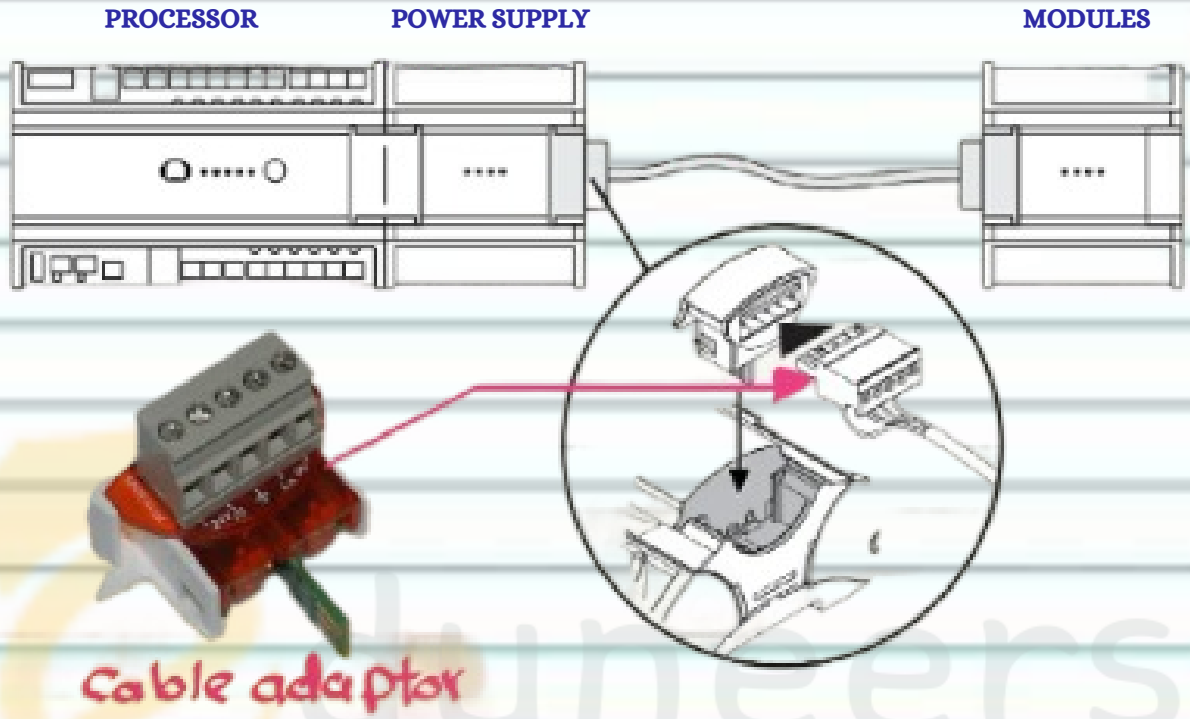
The connection transfers 24 VDC for powering the modules, and it also transfers data between these devices

"Another shape"

- From the Trend brand, a subsidiary of Honeywell



[2] Sometimes, the loads are located far away from the panels, requiring the modules to be transported a distance and installed on a panel close to them. Here, the bus is configured as follows



Question : Is the distance of the bus optional?

- Any distance between two devices in any system can be encountered in your life. The crucial element is the cable connecting these devices. Therefore, in the same catalog, Trend provides information on the possible distances based on the chosen cables

Cable model

Brand name

BELDEN

Cable Type	
Belden 3084A	Belden 7895A
total bus length up to 100 m (109 yards) or total bus length up to 300 m (328 yards) if IQ4/IO modules are within 100m (109 yards) of a power supply	total bus length up to 300 m (328 yards)

- **Final note**

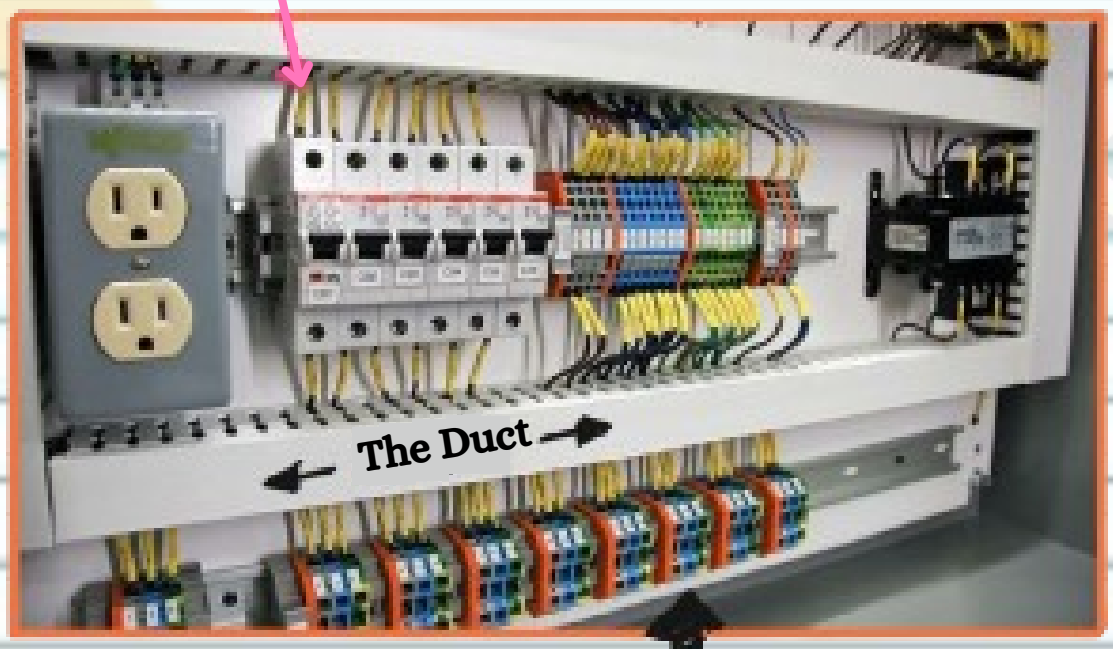
Sometimes, it provides you with ports to supply the **output field devices** from the **PSU**. What you think about that ....

To supply the field devices, an AC/DC 12 ..... 24 V supply voltage is connected via a T 10A fuse to the island bus ("Field supply V=", maximum admissible current 6 A)

It tells you that if you want to power the field devices, whether it needs a 24 VDC /12 VDC or needs 24VAC /12VAC , you can easily draw them from the designated location, and it has protection with a fuse 10 A, but you must consider that the maximum allowable current to draw from this port is 6 A .

TERMINAL BLOCKS

- In order for the panel to be organized and the wires to have their place away from the devices, these Terminal Blocks are used. They look like this
- The wires run inside ducts, and they are connected to them. In the end, you will have a very well-organized panel

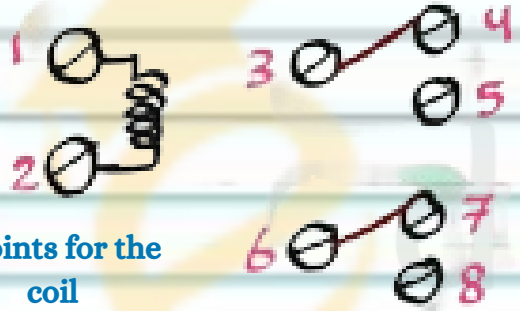


- Each circuit has a number or label, and this information is very important for maintenance later on

Relays

- The relay has the same idea as the contactor exactly in terms of their appearance, but the difference is that the relay is used in control circuits because the allowed currents passing through it are much smaller than those for the contactor. Also, it has many auxiliary points .....

- You will find a type of it with 8 points



2 points for the coil

2 switch groups SPDT

- There is another type with 12 points

2 points for the coil

3 switch groups SPDT

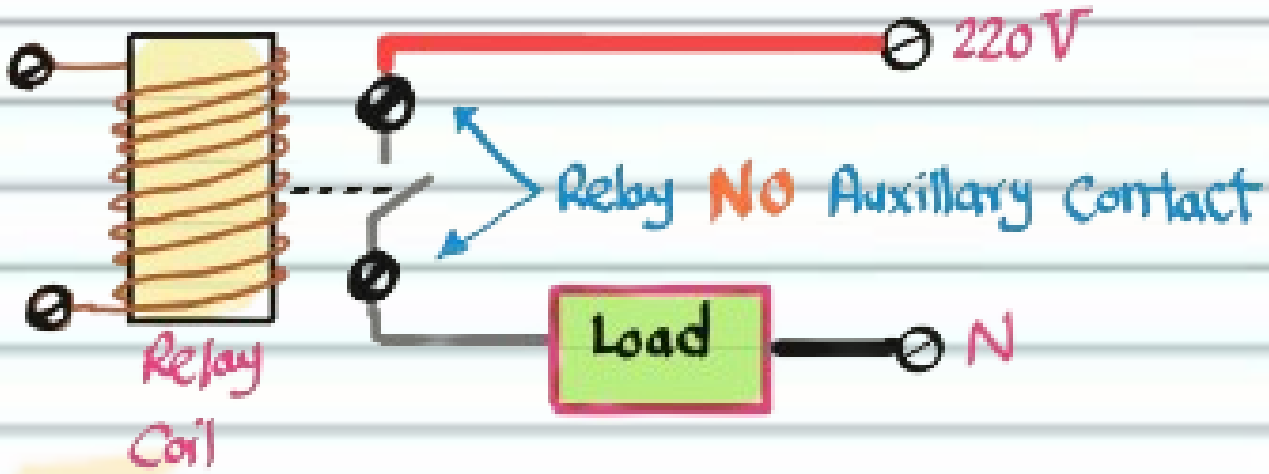
" Single pole Double Through "

- where is using it

A command outside the controller, its type DO

Think with me, why are we doing this?

- First: Protection for the module because the relay completely isolates the thing it controls from the thing it is controlled by



- Second: It is very likely that the thing you want to control requires a different electrical supply than what is output from the module. For example, if the module outputs 24VDC and you have a contactor or actuator that needs 220VAC, you can control the relay coil with +24VDC and solve the problem, as you can see in the diagram above

Keep in mind

- Make sure that the load you connect to the relay points draws a current less than the rated current specified on the relay

- Up to this point, we have covered all the essential components in the BMS panel

But... I still have an important question!

- We agreed at the beginning of the lecture that the controller must have the ability to deal with all the points connected to its modules.

what should be done if the number of points is large?

- It's quite obvious that you'd say I should get another controller to connect the rest of the points.

Honestly, I'm waiting for this answer so we can ask a second question.

How do we connect the controllers together ?

- Simply put, we can say that the controllers are connected to each other in a method called 'daisy chain' where each controller receives from the one before it and passes on to the controller after it, and so on.

- The cable used has 3 wires, including the ground wire.
  It is connected to the 485-RS port.

How will the distances be managed?

- Each router can be connected to it

  Max: 50 Controllers

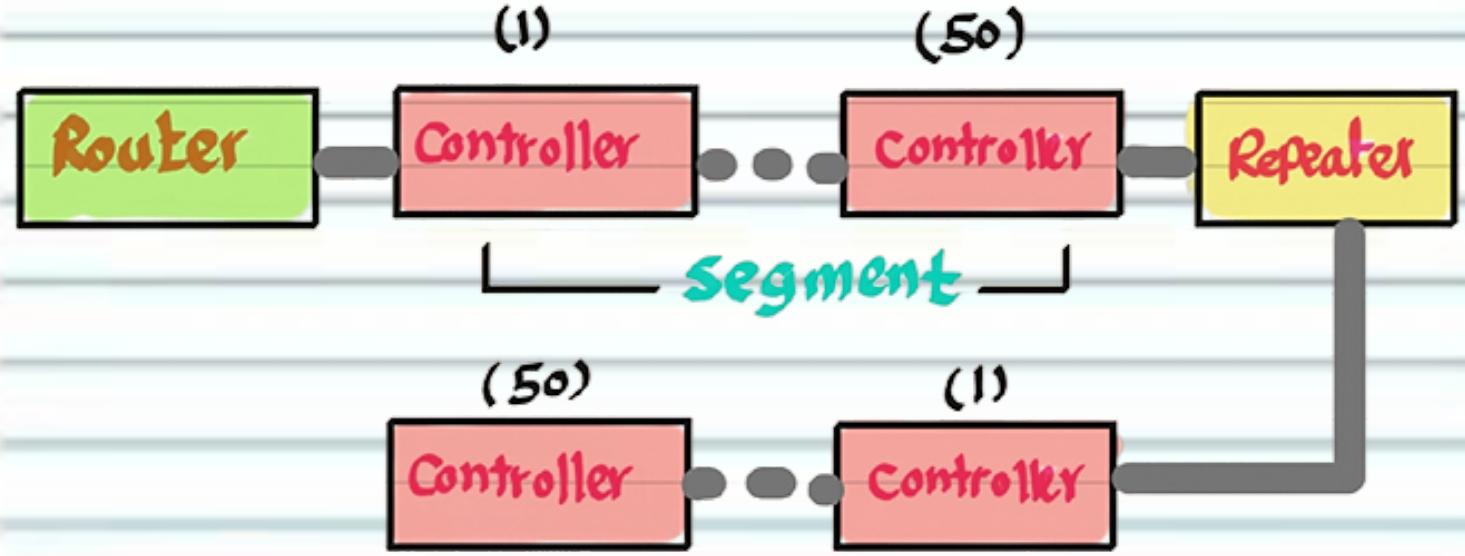
- The maximum distance it can cover from the router to the last device.

  Max: 1200 m

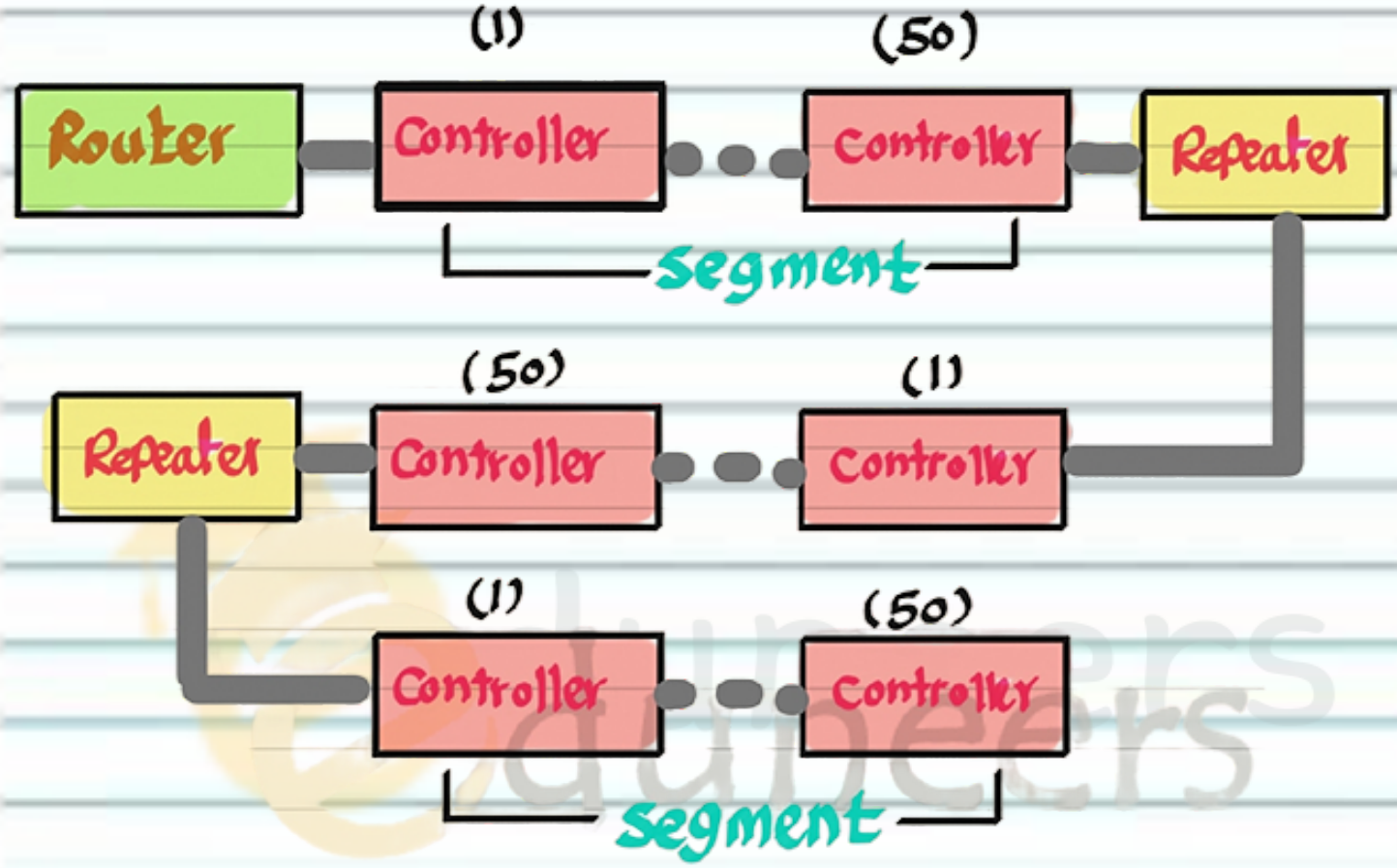
Even if the devices within this distance are far less than 50

I need to install more than 50 controllers, or I want the distance between the controllers to be greater than 1200 meters?

A repeater will be installed, and the setup will look like this..



Note that .... the number is limited . In the design, 3 segments are allowed, and after them, another router is required to repeat the connection

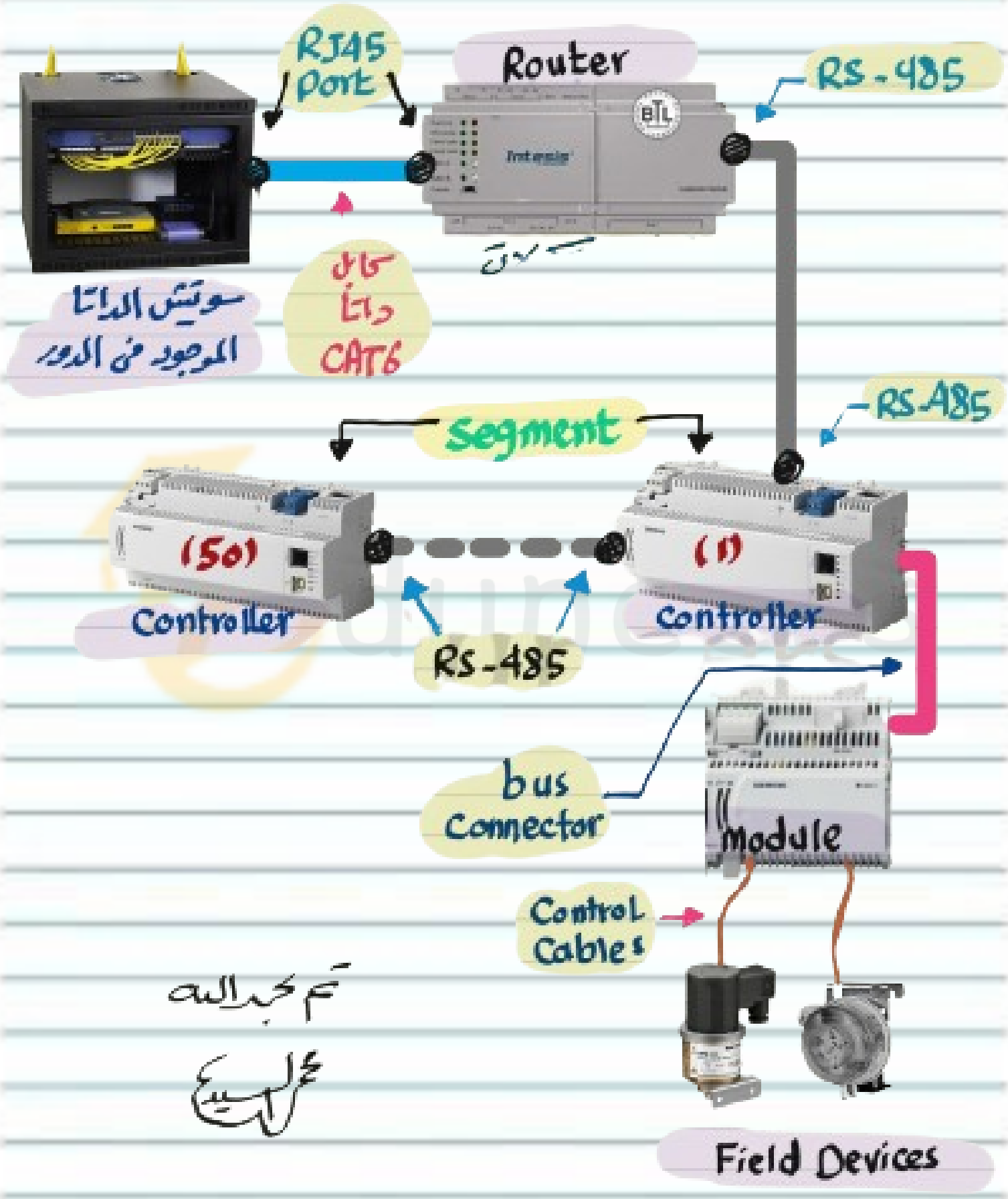


Max : 3 x 50 = 150 Controller OR

Length : 3 x 1200 = 3600 m

- The connections have scenarios, and I'll tell you about them shortly. But for now, what matters to me is that you understand how the controllers connect with each other, what settings are required, and the distances that need to be considered

- **Review with me before we conclude the lecture...**



تم بحمد الله

عمل السيد

<< Translated by me >>

Rama Alshaer