

# MANAGING ALTERNATIVE ENERGY SOURCES

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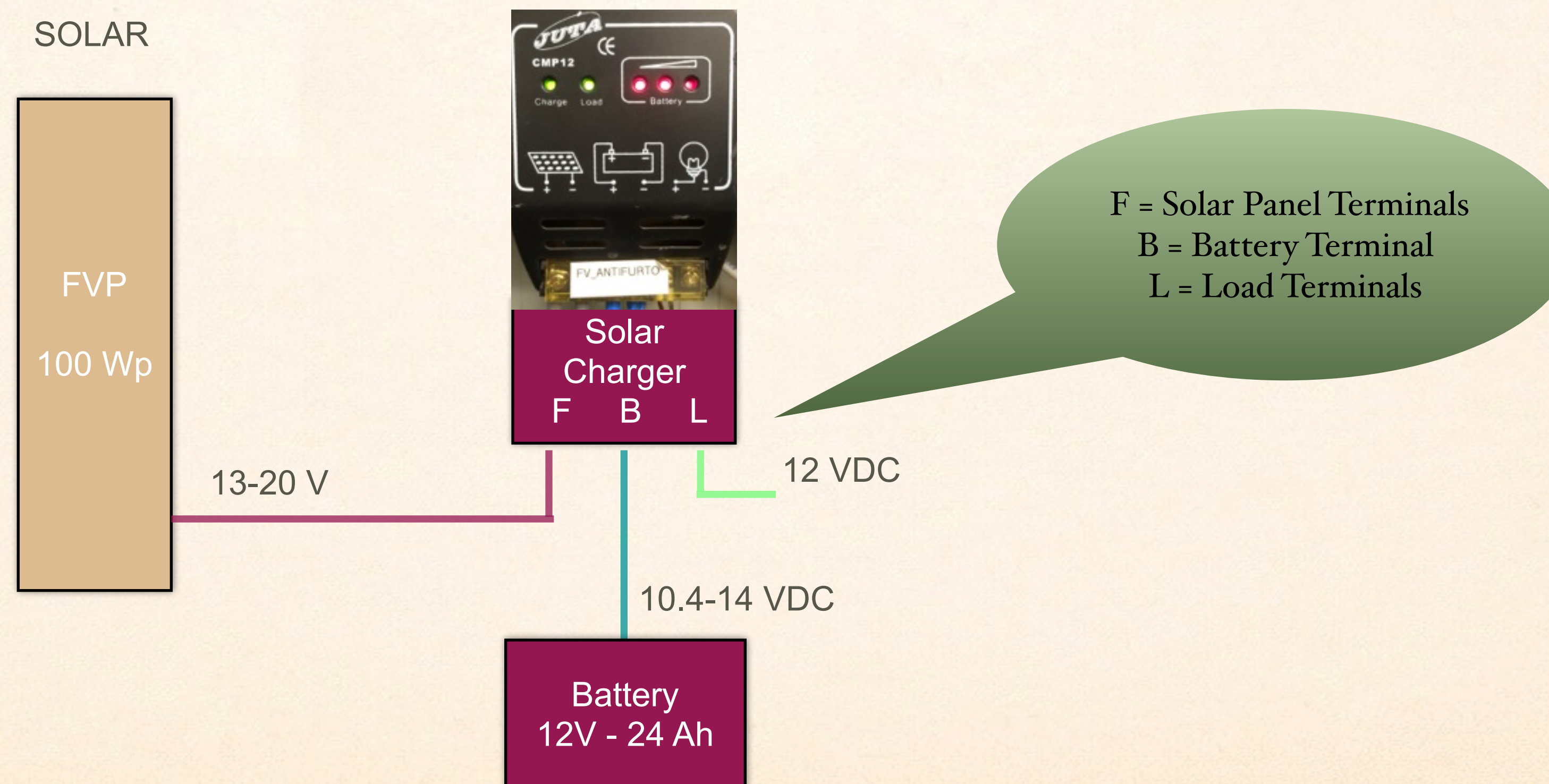
# ALTERNATIVE ENERGY

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1. An isolated **DC solar cell panel** charges **backup batteries** using a **solar charger**.
2. The **charge condition** of the battery is constantly **monitored** by the solar charger to insure proper operation of the **SCS bus** during long **blackouts** and periods of **low sunlight**.
3. The **electric grid** serves as backup energy when either the sunlight or the battery tension are low.

# SOLAR CHARGER

CONTROLS THE POWER SUPPLY USING A RELAY



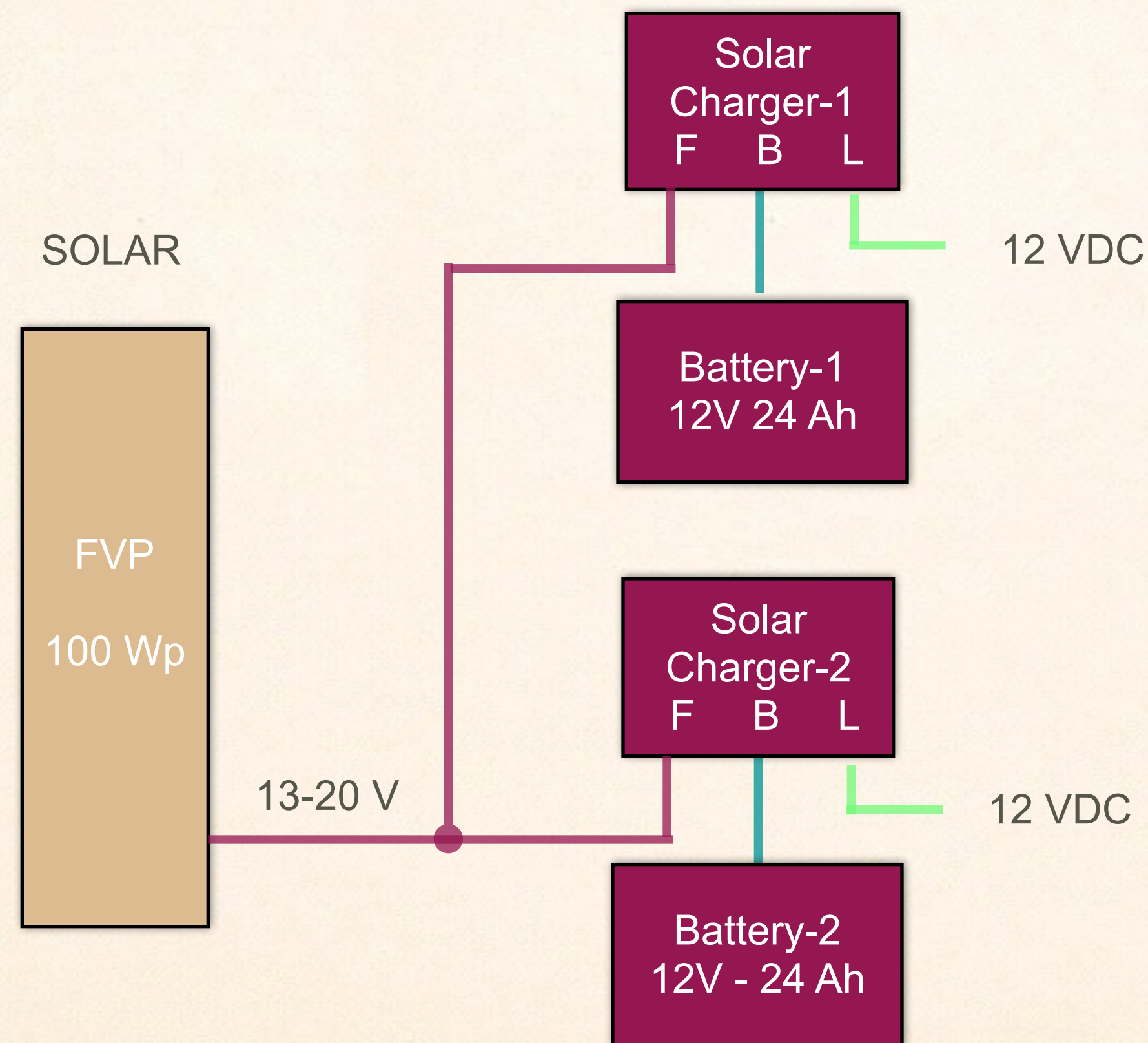
# SOLAR CHARGER

A SOLAR PANEL CHARGES THE BATTERY UNTIL ITS TENSION REACHES 12.4 VDC. THE LOAD GOES ON (12 VDC), AND IT STAYS ON UNTIL THE BATTERY TENSION DROPS BELOW 10.4 VDC.

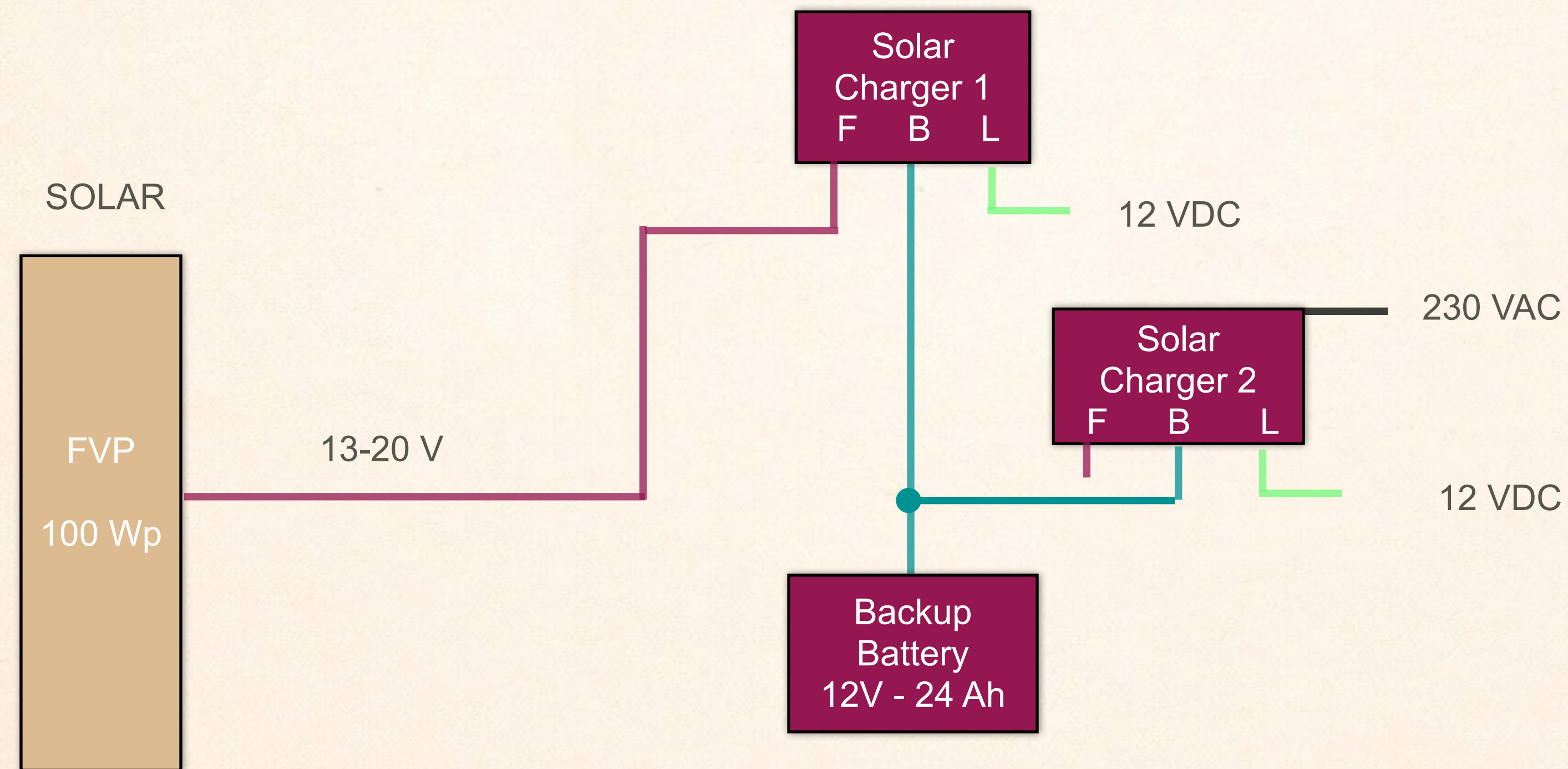


# SHARING A SOLAR PANEL

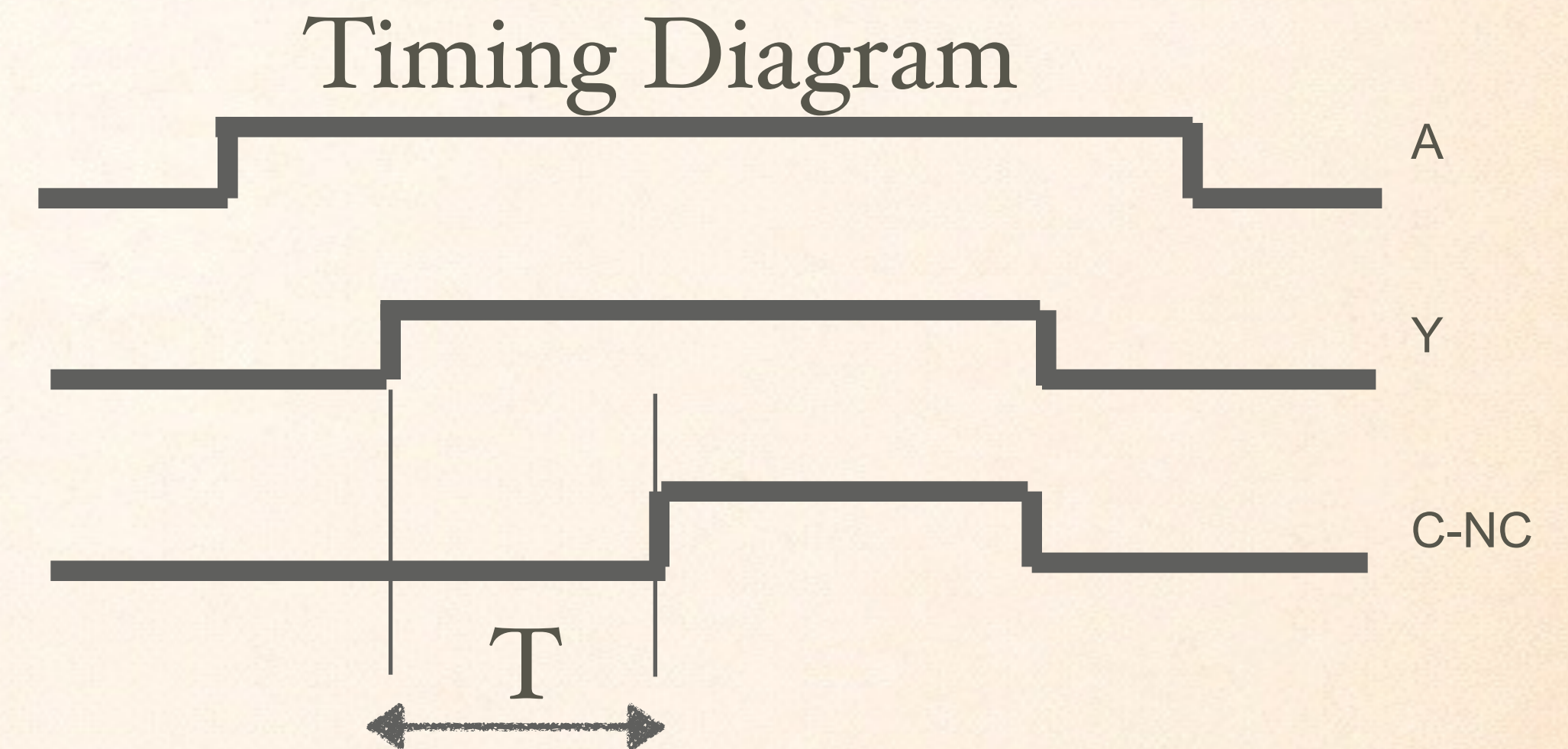
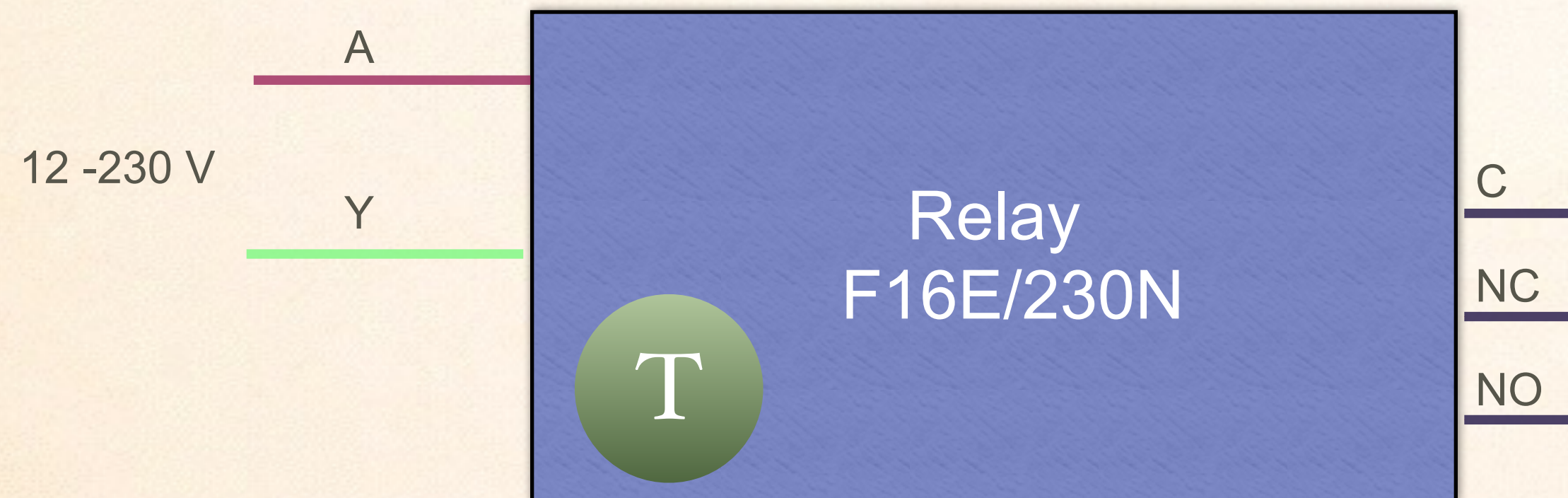
TO CHARGES SEVERAL BATTERIES



# SHARING A BACKUP BATTERY



# CLOSE DELAYED TIME RELAY



## Legend for Relay

A = Solenoid enable input

Y = Trigger input

T = Time Delay setting

C = Common

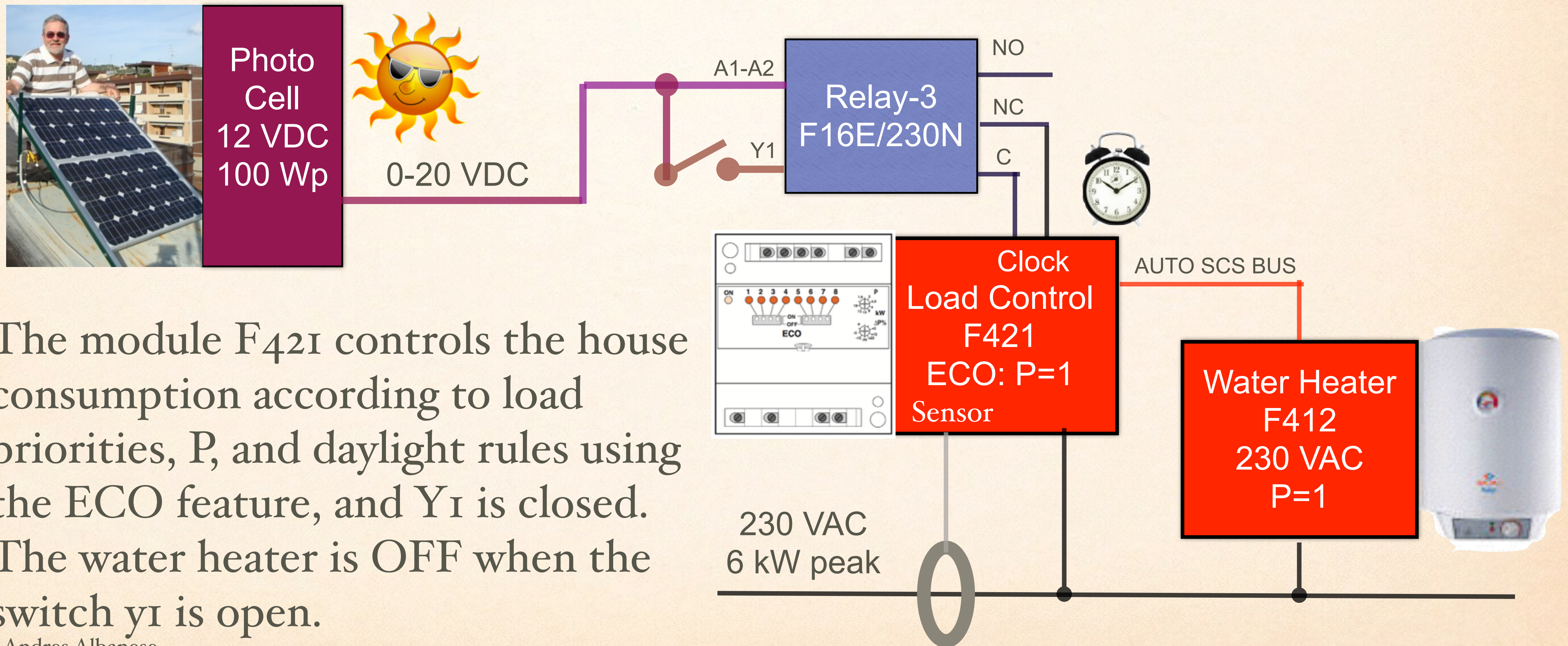
NC, NO = Normally Closed, Normally Open

# AUTOMATIONS

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1. Electric Water Heater ON during day light
2. Powering the SCS-Security Bus
3. Powering the SCS-Automation Bus

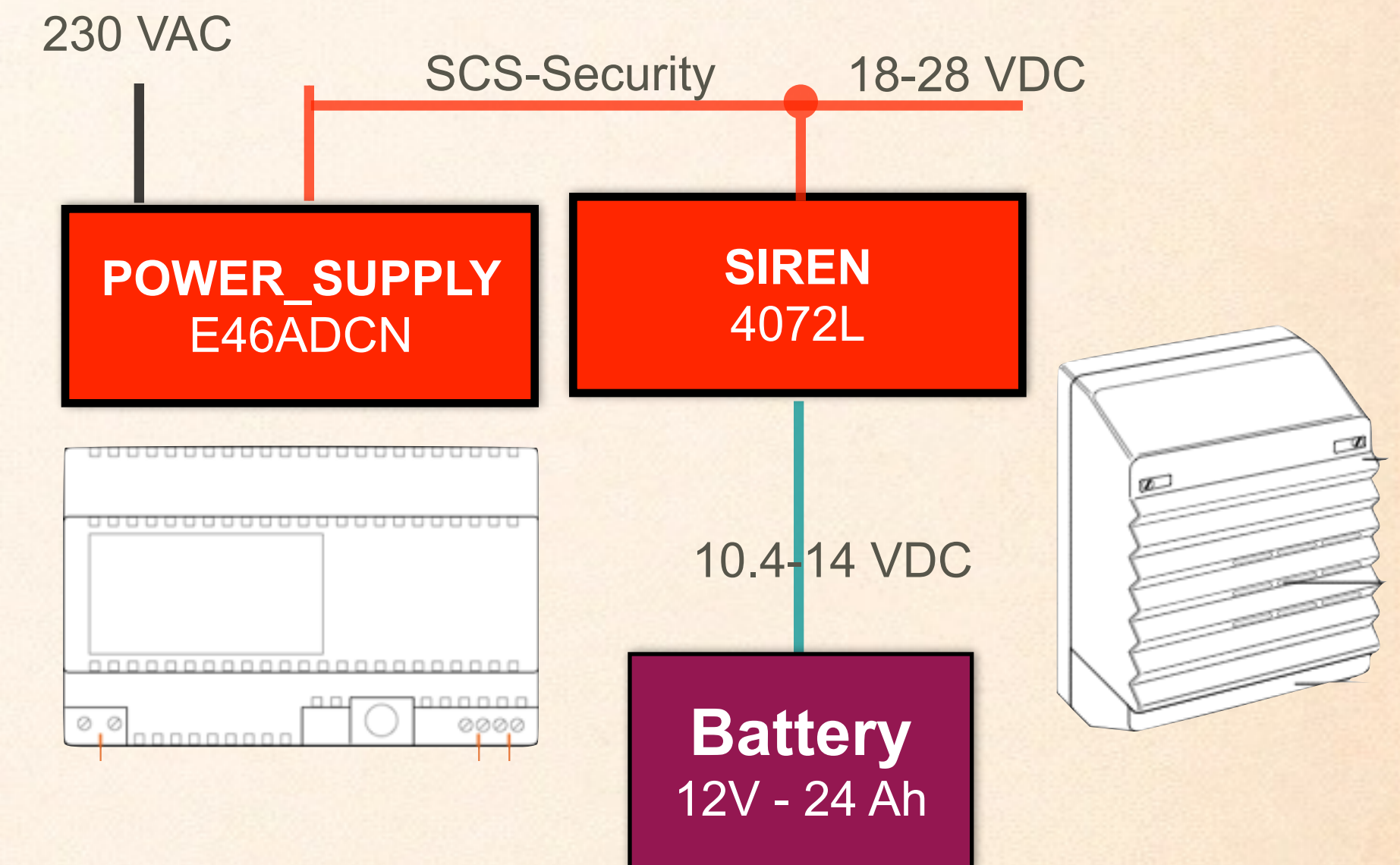
# ELECTRIC WATER HEATER LOAD & PHOTOVOLTAIC CONTROL



The module F421 controls the house consumption according to load priorities, P, and daylight rules using the ECO feature, and Y1 is closed. The water heater is OFF when the switch y1 is open.

# SCS-SECURITY SYSTEM

The operation criteria is to have the backup battery always charged and ready to respond to an eventual alarm. Energy saving is achieved by charging the backup battery using a solar cell panel during the day, and using the electric grid during the night. The security systems must always be ready to sustain a 24 hours blackout.



# SCS-SECURITY

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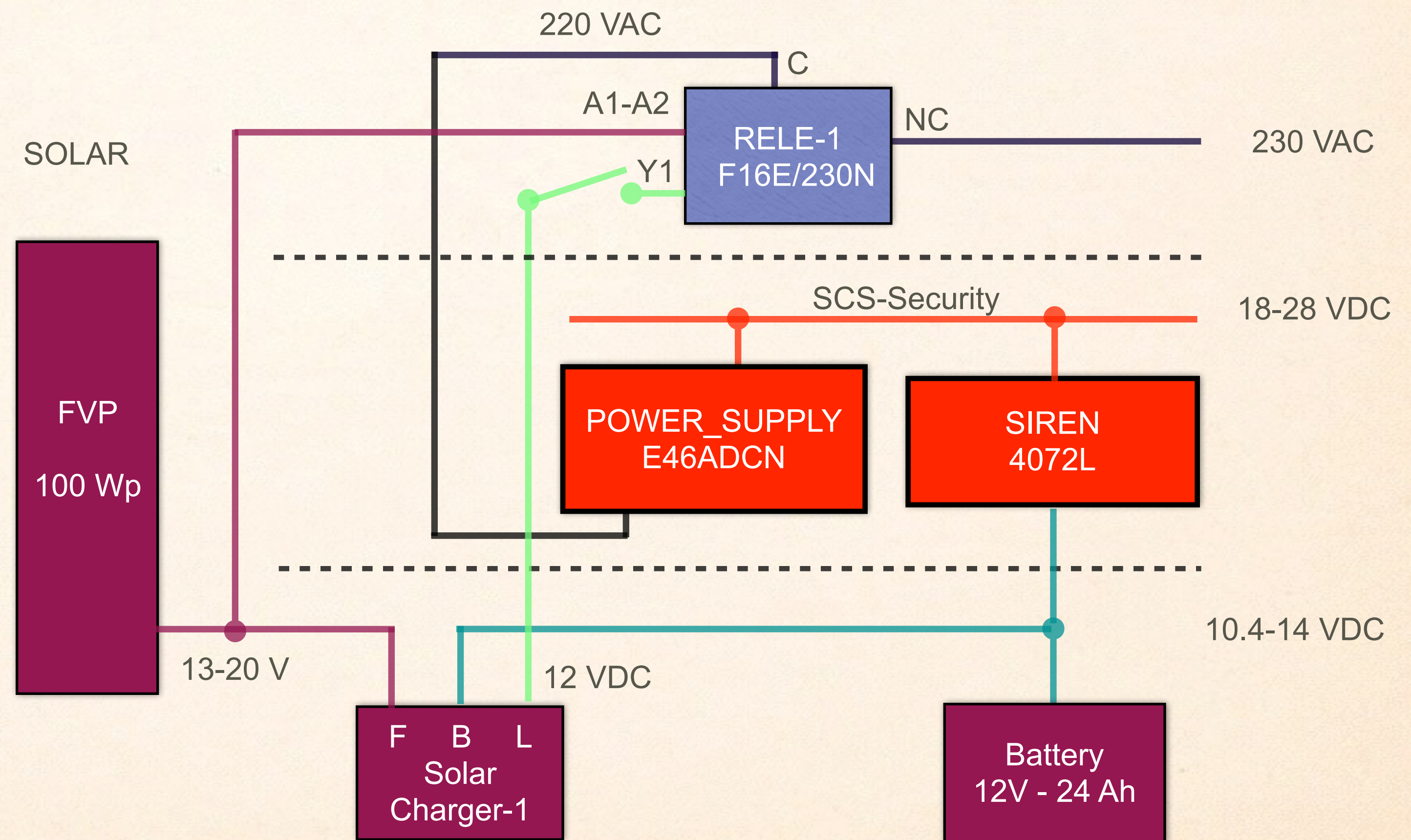
Grid 230 VAC: Power Supply and Time Delayed Relay

SCS Bus 18-28 VDC: Central, Siren, and Sensors

Battery 12 VDC: Solar Charger

# SCS-SECURITY (4072L)

THE POWER SUPPLY IS OFF ON SUNNY DAYS WHEN THE BATTERY IS CHARGED AND THE SWITCH Y1 (APL=43) IS CLOSED. OTHERWISE, THE POWER SUPPLY IS ON.



# SCS-SECURITY POLICY

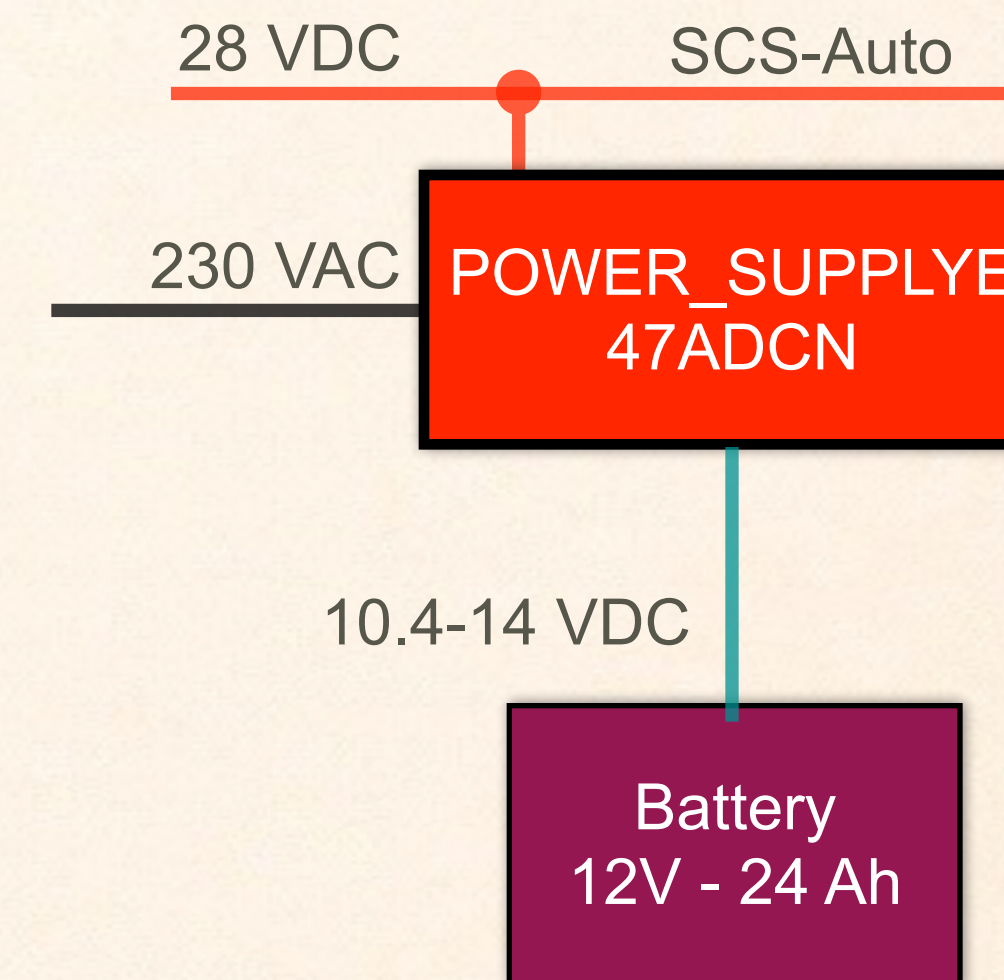
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Security systems is powered by three energy sources:

1. Solar Panels - During the day
2. Electric Grid- During the night
3. Backup Battery - During blackouts

# SCS-AUTOMATION

In the automation system the optimization criteria is to use the backup battery most of the time, therefore, the energy saving in the automation system is achieved by charging the battery during the day using the solar energy and using the stored energy during the night. The automation system minimizes the energy consumption from the grid.



# SCS-AUTOMATION

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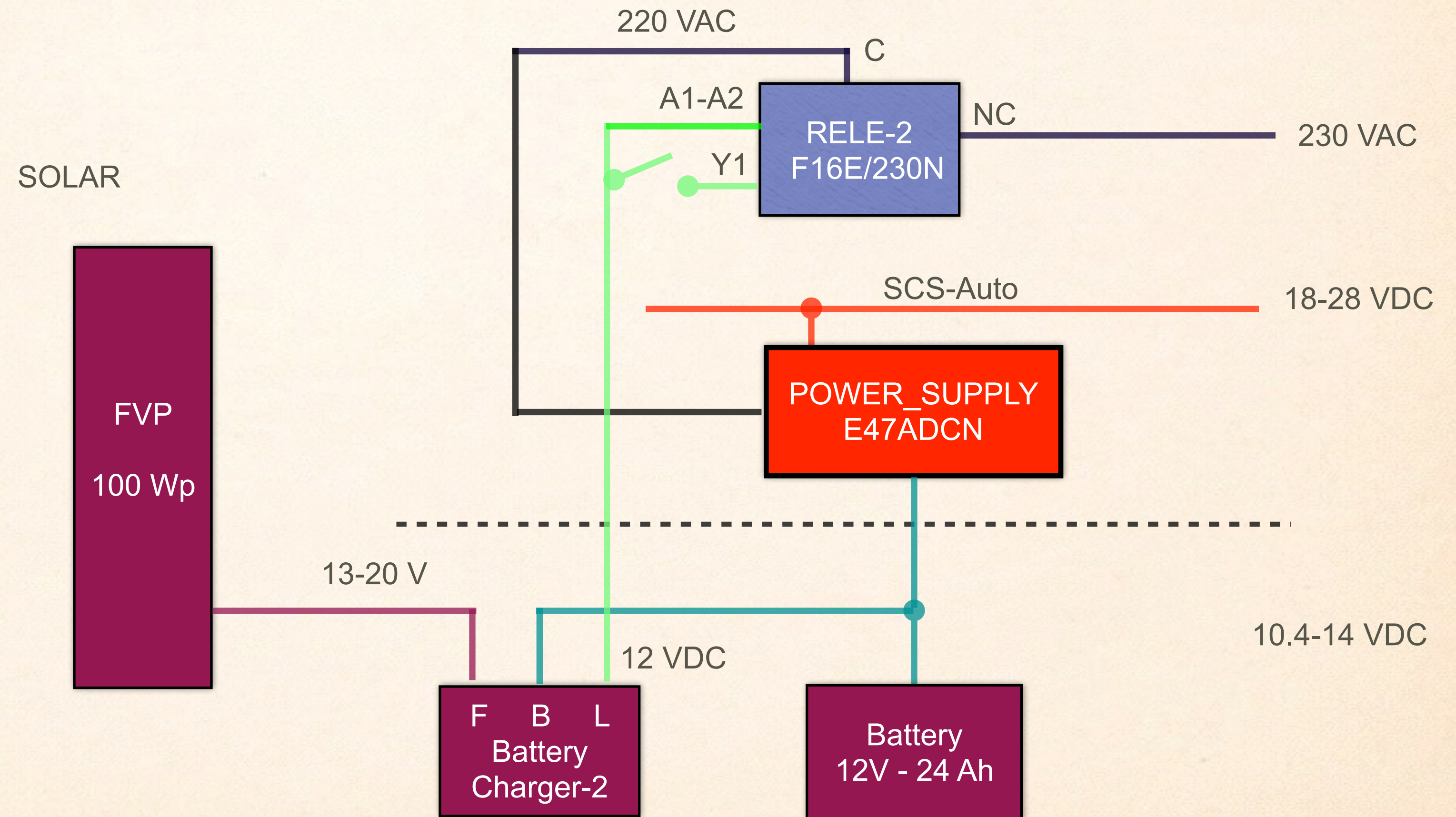
Grid 230 VAC: Power Supply and Time Delayed Relay

SCS Bus 28 VDC: MH200N, L4684, F454, F421, ...

Battery 12 VDC: Solar Charger

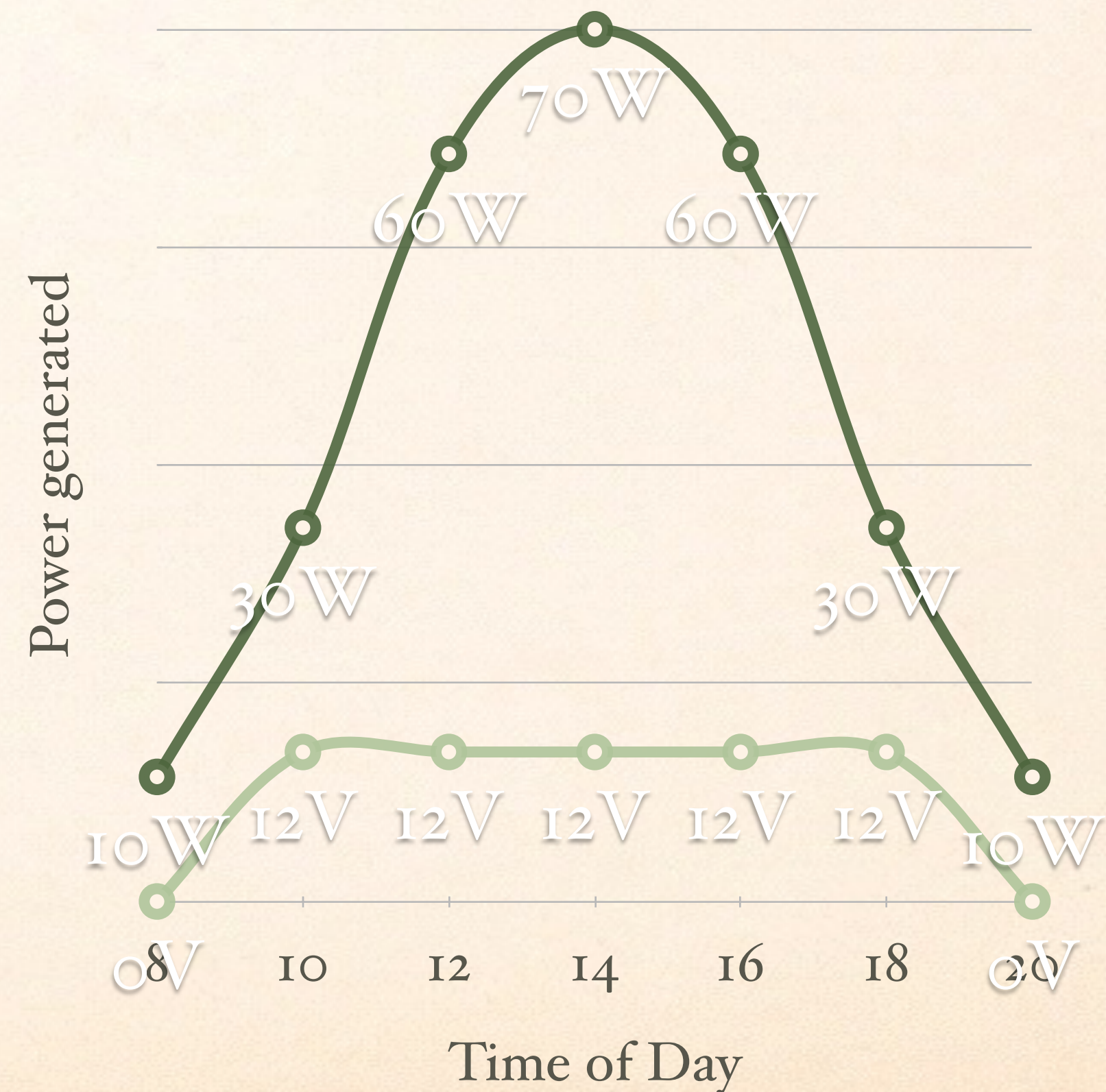
# HYBRID SCS-AUTOMATION

THE POWER SUPPLY IS OFF ON SUNNY DAYS WHEN THE BATTERY IS CHARGED AND THE SWITCH Y1 (APL=43) IS CLOSED. OTHERWISE, THE POWER SUPPLY IS ON.



# SOLAR PANEL POWER

- ❖ During the day, the power supply turns ON when the battery voltage drops below 10.2 V, and it turns OFF when the battery voltage rises above 12.4 V



# SCS-AUTO POLICY

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Automation systems is powered by three energy sources:

1. Solar Panels - During the day
2. Electric Grid- Only when needed
3. Backup Battery - During the nights

# CONCLUSIONS

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1. The electric energy used during the day is free
2. Extends the lifetime of power supply and battery.
3. The system powered by batteries and solar energy is more stable than when it is powered by the grid.
4. The SCS bus is always ON, and it allows operations during blackouts