



Capacity from 1—500 kW, 1 or 3 Phase. Suitable for synchronous generator with or without AVR and permanent magnet generator for various application, Off Grid or Grid connected.

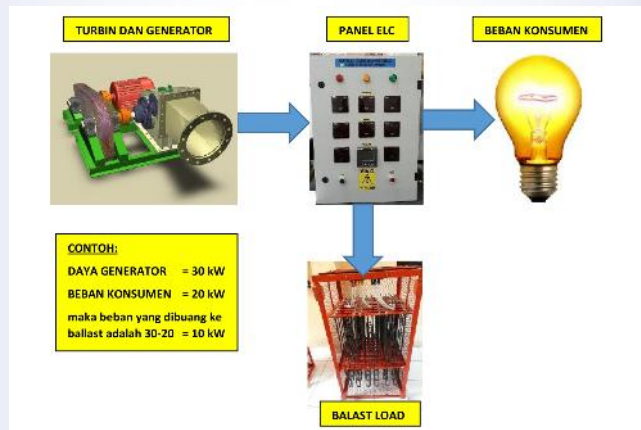


Cubicle size, metering and protection are customize based on customer requirements. Using high quality components to ensure lifetime and performance.



## Digital Electronic Load Controller (ELC)

Digital Electronic Load Controller (ELC) is a controller used in small hydro power to control the load in order to maintain the speed, frequency and voltage of the generator at its rated.



ELC control is working by diverting excess power to dummy load electronically with extremely fast speed (10 ms), no flickering on lamps or hunting speed on generator.



ELC panel is integrated with complete metering and protection, easy in monitoring and user friendly, beside no additional distribution panel required.



Based on micro controller technology (digital) to ensure accuracy, performance and reliability



Simple and easy in installation and operation (plug and play), no setting or adjustment required

## DIGITAL ELECTRONIC LOAD CONTROLLER (ELC)

FOR MICRO AND MINI HYDRO POWER PLANT



**C.V PROTOL MULTI ENERGY**

Small Hydro Control and Renewable Energy

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### DUMMY/BALLAST LOAD

We normally use tubular air heater for dummy load, industrial standard, 1 Phase, 230V, 50 Hz, with total capacity  $\pm 120\%$  of design plant capacity.

Besides air heater it also possible to use water heater type dummy load if required, as long as tank construction and water supply is ensured.



### ELC SPECIFICATION

1. ELC Type : Digital system with microcontroller
2. Control method : Phase angle, PI algorithm, 2 steps.
3. Switching method: Double Thyristor (SCR), 3/6 pcs
4. Power : 1 – 500 kW
5. Voltage : 230/400 Volt, 120/208 Volt
6. Phase : 1 and 3 Phase
7. Frequency : 50 / 60 Hz
8. Freq. accuracy :  $< \pm 0.2$  Hz
9. Freq. sensing : 10 ms or 100 times in 1 minute
10. Recovery time :  $\pm 3$  seconds (adjustable)
11. Standard protection
  - MCCB consumer / main load
  - Contactor consumer / main load
  - Fuse/ MCB protection
  - Over/Under Frequency relay (optional)
  - Lightning arrester (optional)
12. Standard metering (analog or digital)
  - Pilot lamps generator, 3 phase
  - Amperemeter ballast, 3 phase
  - Amperemeter consumer, 3 phase
  - Voltmeter generator, 1 Phase
  - Hour counter, 1 Phase
  - Frequency generator, 1 Phase
  - Digital multi meter (optional)



### PROJECTS REFERENCES

Digital Electronic Load Controller (ELC) made by CV. Protel Multi Energy is operating since 2011 in more than 700 MHPs all over the world with total capacity  $\pm 10$  MW. Ranging from 1 kW to 200 kW capacity.



ELC PME exported to many countries in 5 continent such as: Australia, New Zealand, Philippines, Malaysia, Thailand, Lao PDR, Myanmar, Vietnam, Nepal, Pakistan, India, China, Iran, Turkey, Kosovo, Hongaria, Switzerland, France, Norway, Denmark, Iceland, South Africa, DR.Congo, Kenya, Cameroon, Mozambique, Nigeria, Burundi, Ethiopia, Rwanda, Tanzania, Etc.

