



General

The CCU-IV Charge Controller System is a charge regulator for medium and large size Photo Voltaic systems for industrial applications.

These systems generally consist of an array of solar modules, a support structure, a charge control unit, cabling and a battery bank with enclosure. An array field of solar modules consists of solar modules wired into strings (series or parallel).

The system regulates the incoming power from the solar modules to the battery bank and the outgoing power from the battery bank to the load(s). It is available in many versions with various options, covering a wide range of solar module input and power handling capacity.

A basic CCU-IV Charge Controller System consists of one Master Unit, normally mounted in an (IP66) GRP enclosure. Enclosures for hazardous area with full Explosion proof Zone 1 certification according ATEX are also available.

The Master unit is provided with a maximum of three separate switch-able solar sub-array inputs.

This basic configuration can be extended by one or more slave units. A slave unit adds three solar sub-array inputs to the controller.

Standard available IP66 GRP enclosures are:

- Enclosure 1 for one master and one other optional (no power dissipating) unit.
- Enclosure 3 for one master, one slave unit and one other optional (no power dissipating) unit.
- Enclosure 6 for one master, two slaves unit and three other optional (no power dissipating) units.

For larger power systems, or upon request, project-special solutions can be provided.

Configurations up to 50 kWp solar module power have been installed successfully.

Options are: alarm relays, meter unit, output relay unit 12/24 or 48V, output voltage regulator unit, etc.

Operating principle of the CCU-IV Charge Control System

The Tss4U CCU-IV Charge Control Unit is a solid-state controller that regulates the charging of the batteries by the solar modules, and the discharge to the user's load.

It protects the battery against the damaging effects of over-charge and excessive discharge by keeping the charge/discharge cycle within prescribed limits. The special charge regulating technique enables a more efficient use of the available energy and the battery is charged faster.

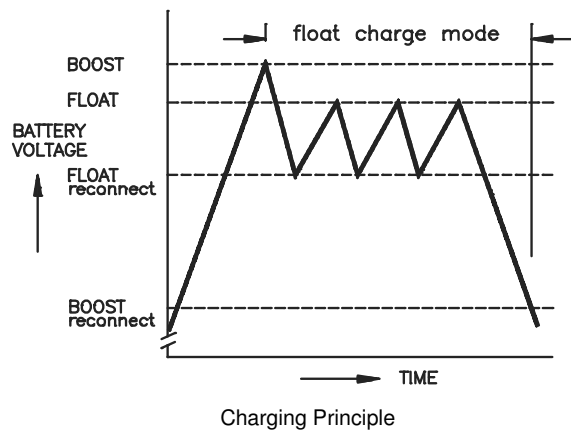
Basically the Charge Control Unit is housed in a fibre-glass reinforced polyester (GRP) IP 66 enclosure and includes for each individual cable clearly indicated terminals to interconnect all the system components. The system voltage of the controller is nominal 12, 24 or 48 Vdc.

The solar modules can be split up into 3 different groups and can be connected separately.

A combined external battery voltage and temperature sensor is standard.

The charge process is regulated by the charge controller, which can switch on and -off one, two, or three module strings.

For maximum battery efficiency (for a longer lifetime) the charge controller performs a boost and float charge process (see diagram). This means that initially the battery is charged to a somewhat higher voltage, after that, the voltage is kept at a float charge level by selecting the appropriate number of module strings. The charge voltage levels are temperature compensated.



The switching frequency and resulting electro-magnetic field complies with EMC-regulations.

When the battery connection is interrupted the modules will switch off within 0,1 seconds to avoid any damage to the appliances by the higher open circuit voltage of the modules. A battery (system) voltage of more than the given values (System High Voltage), see table below, will switch off the load relay.

At low State Of Charge of the battery the Charge Control Unit will switch off the load.

When the batteries are charged to a higher state of charge afterwards, the load is switched on again automatically. A circuit breaker safeguards the output(s) against overload and short circuit.

Main protection features:

The Master unit can switch off the load by means of integrated MOSFET's, maximum ratings: 25A for 12/24V versions and 16A for 48V versions.

With a Solid State Output Relay unit option this is 60A for 12/24V versions and 40A for 48V versions.

The Master Control Unit switches off:

- the load in case of battery excessive deep discharge
- the load in case of system high voltage
- the solar arrays in case of battery overcharge

Features

- Advanced temperatures compensated boost and float battery charge process
- Built in overload and underload protection batteries
- Reverse polarity protection on solar array module input and on battery side
- Battery overcharge and excessive discharge protection
- Protection against reverse current during night
- Terminals for voltage / temperature sensor
- Load output with SOC (State of Charge) dependent switch off limit (excessive discharge protection)
- Load current compensated switch-off limit
- Over-voltage protection for load
- A central connection point for all major system components (batteries, solar modules, loads)
- Field adjustable float charge level

Advantages

- Low frequency PWM (Pulse Width Method) charge regulating technique
- Three solar array inputs with separate solid state on/off switches
- Modular concept (CCU-IV range)
- Test switch for system diagnostic capabilities
- Separated build in control signals for powering alarm switching relays

Options

- Alarm relay(s) (low voltage and general alarm)
- Slave units to increase array input current
- Meter unit for on-line diagnostics purposes
- Output Relay capable of switching 60 A (constant current)
- Data logger for measuring hourly averages
- Output Regulator for voltage limiting or output regulator for Cathodic Protection
- Large-voltage transient protection of electronics with transient voltage suppressor
- Customized options are available upon request

Electrical Specifications			
Model / Type:	12V	24V	48V
Nominal system voltage	12 Vdc	24 Vdc	48 Vdc
Nominal array input current	3 x 18 A	3 x 18 A	3 x 10 A
Maximum array input current with 2 slave units	192 A (54 A + 2x 69 A)	192 A (54 A + 2x 69 A)	120 A (30 A + 2x 40 A)
Maximum modules input voltage	40 Vdc	50 Vdc	90 Vdc
Nominal output current	25 A	25 A	16 A
Nominal output current with Output Relay Unit (option)	60 A	60 A	40 A
Nominal output current combined	25 + 60 A	25 + 60 A	16 + 40 A
Maximum output current with Output Relay Unit	100 A (1 min.)	100 A (1 min.)	80 A (1 min.)
Maximal battery input voltage	25 Vdc	40 Vdc	65 Vdc
Typical settings ⁽¹⁾			
System high voltage	15,3 V	30,5 V	61,0 V
Boost @ 20 °C	14,5 V	29,0 V	58,0 V
Float @ 20 °C	14,2 V	28,4 V	56,8 V
Pre-warning low voltage (alarm)	11,8 V	23,6 V	47,2 V
Disconnect output "high" (alarm)	15,3 V	30,5 V	61,0 V
Disconnect output "low" (alarm)	11,5 V	23,0 V	46,0 V
Temperature compensation	-5mV / °C / cell		

⁽¹⁾ Standard settings for VRLA batteries, settings can be changed at factory for other batteries

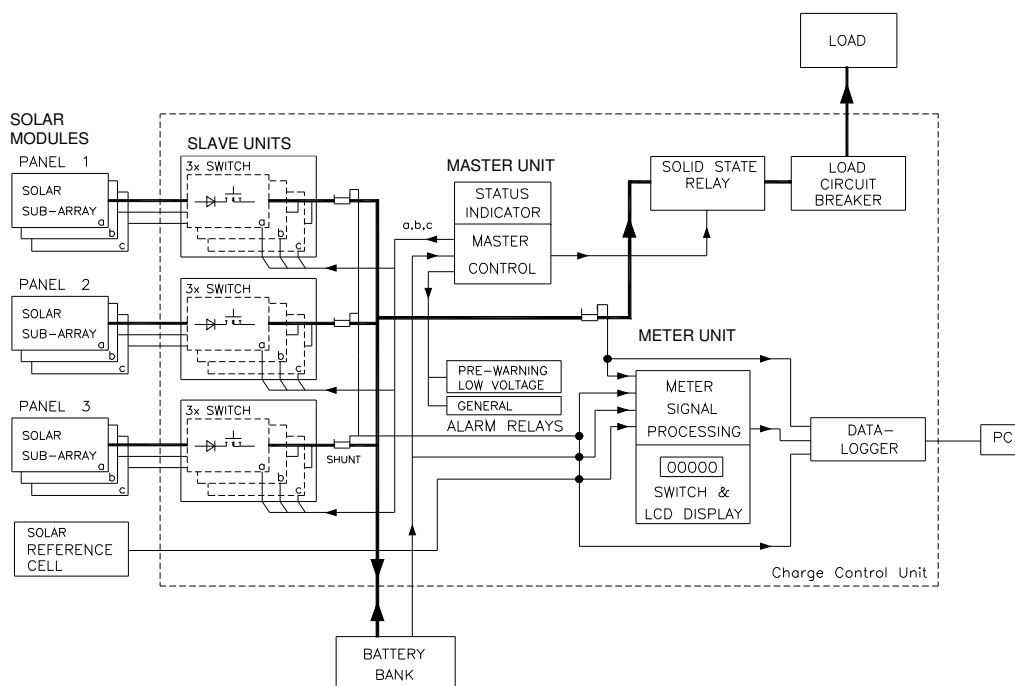
General specifications	
Model / Type:	12, 24 and 48V
Operating temperature	-10°C to +55°C
Operating relative humidity	5% to 95% non condensing
Storage temperature	-30°C to +70°C
Construction	IP66
Dimensions (H x W x D) ⁽²⁾	Enclosure 1 (max 1 unit): 64,5 x 30 x 24 cm Enclosure 3 (max 3 units): 64,5 x 40 x 24 cm Enclosure 6 (max 6 units): 64,5 x 60 x 24 cm

⁽²⁾ Including hinges

Optional

Alarm relays with voltage-free contacts for pre-warning low voltage and general alarm.
The alarm status for different system conditions is as follows:

Status overview (for 12, 24 and 48 V systems)			Pre-warning alarm relay	General alarm relay	Load
Conditioning					
Normal (12 V)	Normal (24 V)	Normal (48 V)	OFF	OFF	ON
Vbat <11,8 V	Vbat <23,6 V	Vbat <47,2 V	ACTIVE	OFF	ON
Vbat <11,5 V	Vbat <23,0 V	Vbat <46,0 V	ACTIVE	ACTIVE	OFF
Vbat >15,3 V	Vbat >30,5 V	Vbat >61,0 V	OFF	ACTIVE	OFF



Typical CCU IV Charge Control System

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