TOTECH
Making Powerful Decisions

TCG-SpotPriceTracker
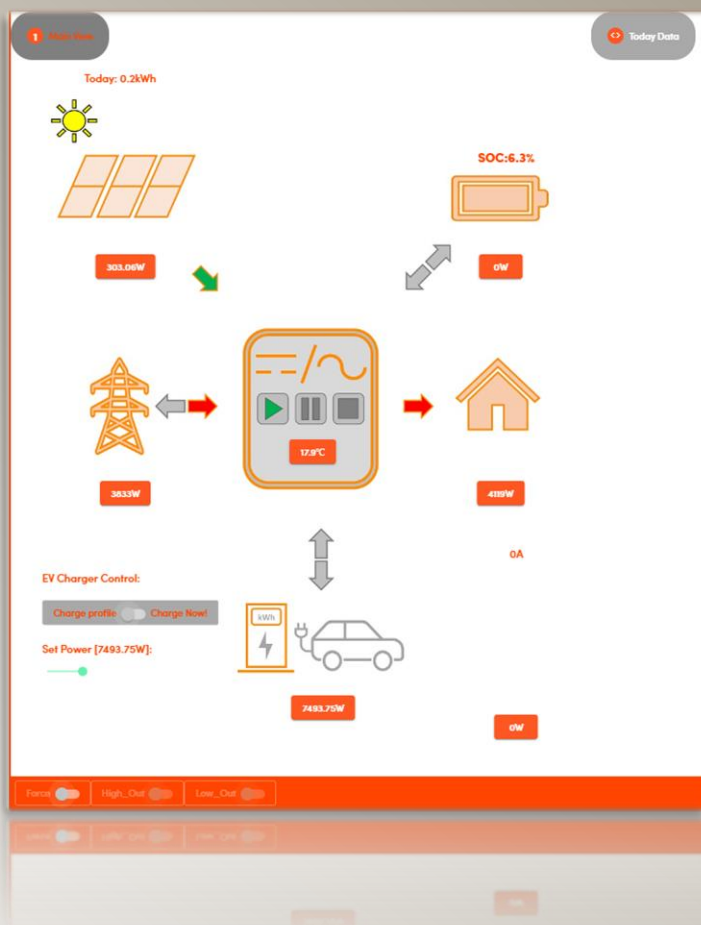## Product description manual

TCG-SpotPriceTracker

The TCG-SpotPriceTracker is a price-driven energy management system (EMS) that automatically lowers your energy costs in many different ways It gets its energy price data from the cloud and generates a daily control profile for the energy storage system, EV charger and the relay outputs based on the price limits that the user has set in the web-based interface.

The SpotPriceTracker continuously communicates with the solar hybrid system and the EV charger to get measurement data and send control commands. Based on price data, measurements and user set limits, it sets the whole system into the correct operation mode

Webapplication

The webapplication is the user interface for the TCG-SpotPriceTracker EMS. The main view show the measurements and the current state of the system

Additional measurements and information popup when clicking on the various main measurements in the process picture or in the header and footer bar.

Data view:

The data views ("Today" and "Tomorrow") show the energy prices hour by hour and the set limits is shown in the price graph.

It is also in this view where you can adjust the limits with the slider controls. The price-data together with the limits and the algorithm generates the daily control profiles for the ESS, EV charger and the Relay outputs.

ESS profile:

Uses all the limits and levels to decide how it will use the battery during the day.

- It buys extra energy into the battery when the electricity price is below the low limit. The battery needs only two hours to charge so it will find the two cheapest hours below the low limit.
- It holds the energy in the battery when the price is between the low limit and the mid limit.
- It consumes the energy from the battery to the load when the price is higher than mid limit and lower than high limit (aka peak-shaving).
- Finally, it sells energy from the battery to the grid when the price is higher than the high limit. (So, the high limit should be set high enough to actually make a profit from selling, usually peak-shaving is the way you generate the savings on you energy costs)

EV charger profile:

Uses only the low limit and have only two levels.

- It charges the electric vehicle when the price is below the low limit. (observe that both the ESS charging and the EV charging will loadbalance but ESS takes priority on the two cheapest hours because the EV will charge during all the hours below the limit if needed).
- When the price is above the low limit it does not charge.

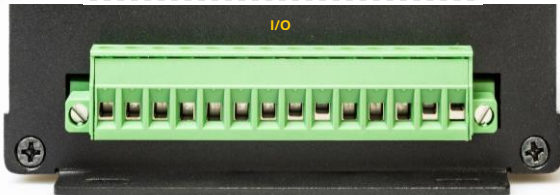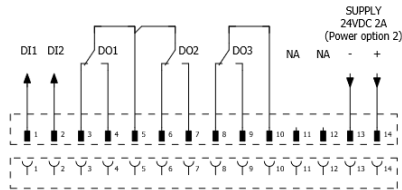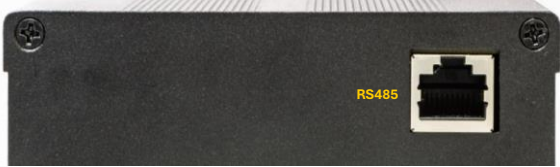## Relay profile:

Uses two limits and have two levels.

- **It activates DO1 when the price is above the high limit, so this output should be used to disconnect or prevent loads because the price is high (load shedding)**
- **It activates DO2 when the price is below the low limit, so this output should be used to connect additional loads because the price is low (load adding). Observe that this output is also activated when there is overproduction, so the additional load will be connected to increase the self-consumption of solar power**
- **DO3 is free to use for customer specific applications. DI1 and DI2 is also meant for customer specific applications**

Configuration:

This view have some additional settings that is needed but not so often changed

- **SpotPrice bidding zone.** Here you set what energy price bidding zone to use. Usually it is the country code but there are some countries that have multiple zones
- **Charge Power.** Here you can set the charge power that the TCG-SpotPriceTracker will use when it charges the ESS battery. Usually it is set to full power because you want to maximize buying in as much energy as possible on the cheapest 2 hours

- **Discharge Power** Here you can set the discharge power. Usually it is also set to full discharge power because if the price is high enough to go over the high limit you want to sell as much as possible on the highest price hour. The discharge power setting is not used in the consume mode because it automatically discharges what the load is using.
- **Inverter IP address** This is needed for the communication between the TCG-SPotPriceTracker and the hybrid-inverter. It is usually set during commissioning of the system by the installer and does not have to be changed
- **Prevent selling** This setting decides at what price-level the system should decrease production to meet the loads demand and avoid selling excess energy that the load, battery or EV charger is unable to consume. Usually it is set to zero to avoid selling at negative prices.

Note!

- Power option 1: (C-USB) no 24VDC is supplied to the 14-pin I/O connector.
- Power option 2: (24VDC) the 14-pin I/O connector is supplied with 24VDC (max 2A).
- The maximum voltage and current for the output dry-contacts DO1, DO2 & (DO3) is 30VDC 2A.
- DI1,DI2 & DO3 are reserved for customer/projects, specific use, or future use.

TCG - SpotPriceTracker: Technical Details

Product			Connectivity		
Platform	Totech Cloud Gateway		WiFi	IEEE 802.11 a/b/g/n/ac	
Name	TCG - SpotPriceTracker		Ethernet	10M / 100M / 1000M	
Version	2.xx.xx		I/O	2 DI / 3 DO	
CPU	Quad-core Cortex-A53 @ 1.5GHz		Serial	2 x RS485 (+ 1 via USB)	
	RoHS, CE (CPU module board)		Protocolls	Modbus Serial & TCP	
				P1HAN (ASCII)	
				Internet PushToCloud	
			Connectors	2 x RJ45 (Ethernet & RS485)	
				USB-C (Power Only)	
				HDMI (not used)	
				USB-A	
Power Option 1: USB-C				2 - pin (24 VDC)	
Voltage	5 VDC			4 - pin (RS485)	
Current	≤ 1.4 A			14 - pin (I/O)	
Power	≤ 7 W			SMA WiFi antenna	
				LED indicators	
Power Option 2: 24VDC Connector			**Compatibility**		
Voltage	24 VDC		Inverters	SolaX X3-ULTRA, Sungrow SHxxRT	
Current	≤ 0.3 A		EV Chargers	SolaX EVC (G2), Sungrow AC011E-01	
Power	≤ 7 W				

Disclaimer

Ab Totech Oy reserve the rights to continously develop new features and improve the TCG-SpotPriceTracker software and algoritms.

Users that sign up to the cloud service will:

- not in any way own the actual hardware
- not be allowed to tamper with the hardware
- know that updates can be done at any time over the air (OTA)
- know that the hardware must be allowed continuous internet access
- know that the hardware must be returned in case the subscription is ended

Failure to comply is considered a void of the signup agreement and can result in termination of the subscription

Ab Totech Oy can not be held liable in any way for the actual level of savings or profits that the service we provide is resulting in because the profits and savings are dependent on so many factors (most of them outside our reach of influence) eg:

- The users settings of the energy price limits
- The proper dimensioning of the whole system
- The parameter settings and configuration of the hybrid inverter
- The energy price, taxes and grid fees
- The weather
- How much actual energy consumption can be moved around hour by hour with the different features that the TCG-SpotPriceTracker have. For example how much "room" is available in the EV battery depends on how the car is used day by day

Finally, the users of our services can not in any way claim that using our services has caused any damage to any other devices in the whole energy system. The TCG-SpotPriceTracker has been extensively tested in multiple setups and has not and can not cause damage in a properly setup system. In fact, using our services and the TCG-SpotPriceTracker improves the safety of the whole system because of our battery maintenance algoritms (requires that the hybrid inverter is properly setup) and load balancing features.

Co-funded by the European Union

The EV Charger implementation, that is an important addon feature to the TCG-SpotPriceTracker product was partially funded by the European Union project EURA2021. This part of the product makes it optimize the whole residential energy system to an even higher degree.

The EURA2021 also partially funded the efforts to internationalize the product and market it, they helped fund the work with this product information broschure and also the product information that is published on our website totech.fi.

Thanks to this funding we now have a test setup in Estonia and our product is well known by partners and resellers in many countries in Europe

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