TCX2

Solar Tracker Motor Controller

SPECIFICATIONS

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ALSO AVAILABLE ONLINE: ONTRACKSOLAR.COM

The Ontrack TCX2 Tracker Controller, is a cost effective, microprocessor-based solar tracking controller suitable for dual-axis or single-axis tracking applications. It is a network-ready controller, and may be configured to operate as a single tracker application, or be part of a larger commercial multi-tracker solar array.

Features

- Calculates Solar Position using NREL's published solar position algorithm
- Capable of controlling either a single or dual-axis tracker
- Dual H-bridge PWM DC motor drivers with integrated motor current sensing and soft motor-start and stop
- Dual-encoder inputs for each actuator
- External limit switch Inputs
- Integrated support for anemometer
- Input for emergency stop
- Optional Inputs include:
  Irradiance Measurement, AC-power-loss, Energy Meter Pulse
- Input for external Clean/Normal\Storm mode switch
- RS-485 interface with 2.5KV galvanic isolation
- Ethernet 10/100-base-T interface with 1.5KV galvanic isolation
- GPS receiver interface (option)
- Remote & Local Monitoring via Internet; also Android or iOS apps available (optional)

Description

One Platform, Multiple Applications – The controller can be used as a stand-alone solar tracker controller, or as a component in commercial solar tracking applications requiring interconnected tracking and field controllers.

Communication – Using the integrated Ethernet interface, the controllers are not only Internet capable, but have complete back-end, and remote support through the Valhalla server and website, including remote control, monitoring, and software updates.

Modulated Power Output - Each of the two DC motor drivers contains circuitry to regulate motor power and detect overloads, prevent burn out, and extend the life of the motors. Both motor voltage and current are recorded by the platform which can be downloaded for monitoring

Low Voltage Power - To ease installation, the controller is operated by a single 24V DC power supply.

Sensory Inputs - for inputs the controller platform has two dual channel encoders, four limit switches, one stop button, anemometer, and analog and general purpose switched inputs. The encoder inputs can be either reed switches or Hall sensors, with either a pull up/down or high-impedance termination. An optional dual analog input can be used for additional analog sensors such as temperature or irradiance measurement.

Electrical Ratings

Parameter	Min	Typical	Max	Units
Controller Voltage Supply	8	24	70	V
Controller Power Consumption		0.4	1	W
Motor Voltage Supply	10	24	40	V
Motor Current	NA	3	10	A

Thermal/Mechanical Characteristics

Parameter	Min	Typical	Max	Units
Storage Temperature	-40	40	120	Celsius
Operating Temperature	-10	40	70	Celsius
Controller Dimensions		155X160		mm
Motor Current		0.275		kg

Operational Overview

The TCX2 Controller calculates the sun's position based on current longitude, latitude and time-of-day. In a commercial solar tracker field, the geographical location and local time-of-day is usually derived from a local GPS receiver hosted on one of the solar tracking controllers and is broadcast on the local Ethernet network to the other controllers.

When the Sun is below the horizon, the controller will move the panel to a configurable stow position. In areas with snow conditions, this position is set at an angle where snow-buildup would be minimized, while in non-snow locations a more horizontal position is usually preferred.

The tracker controller will typically operate with the input from an anemometer that is used to detect high wind-speeds.

Three wind-speed thresholds are defined for safe tracker operation:

1) Instantaneous wind-speed beyond which a storm condition is triggered
2) Average wind-speed beyond which a storm condition is triggered
3) Instantaneous wind-speed beyond which azimuth operation is unsafe

Once a storm condition has been triggered, the tracker is brought to a predefined storm-position, by moving elevation first, followed by azimuth – if permitted. Errors can occur in electro-mechanical systems and the TCX2 controller incorporates an automatic error recovery of pre-specified errors.

Storm operation mode in single tracker installations is controlled locally from a tracker-mounted anemometer. Storm operational modes can also be issued from a single central weather station to a field of trackers. Anemometer failure or absent weather stations after a timeout will force a Storm condition.

Two additional inputs can be monitored and which affect tracker operation. One is the Clean/Storm mode switch used to force the tracker to the predefined storm-position or clean-position. The other is the loss of AC-power input that will force the tracker to storm-position and cease operation until AC-power has been re-established.

The controller may also be connected to either an energy meter – used to measure performance of the local PV system, or a Solar PV Inverter from where diagnostic data may be collected. Field maintenance, such as module washing is done by switching the operational mode to Clean.

The controller may operate autonomously without use of a network/Ethernet connection, or it may be connected to the Ontrack server for remote monitoring and control. When connected to the server, interval captured data, events and current status is periodically transported to the server for further analysis.

The controller includes both a local web server for monitoring of tracker status or and an optional iPhone interface to help field technicians during and after installation.

The controller has an integrated comprehensive error detection and recovery module. If the recovery module is unable to perform error recovery then the given tracker – if possible - is placed on standby and the field is restarted.

The controller has the ability to run and optional back tracking algorithm. At very low solar elevations (i.e. early morning or late afternoon), mutual shading can occur where a tracker that is closer to the sun will shade its respective neighbor to the rear. When such shading occurs, backtracking can be employed to fold back the elevation to the point where all PV panels are fully exposed to the direct solar irradiance.

Operator Interface:

The Ontrack Solar control system offers up to three different operator interfaces. Each controller is web enabled allowing the operator / installer to configure and maintain the system locally with a windows PC running Internet Explorer. An optional Remote Access app using an iOS (Phone / iPad) or Android device Interface is also available if all the controllers are on a local wired cat5 Ethernet network with a dedicated wireless access point installed.

The Remote Access interface is designed to be used as a local service tool that has been shown to reduce technician time in the field. It is no longer necessary to open controller enclosures, carry expensive laptop computers or other custom diagnostics gear. Remote Access is particularly useful when having to perform initial solar calibration of a tracker, because a technician can perform the task while standing adjacent to the tracker. World Wide Remote monitoring, data logging, control and trouble shooting is available if all the controllers are connected to a local Ethernet network connected to the Internet.

By using a PC connected to the Internet running Internet Explorer, a user connected to the Ontrack server is able to have complete monitoring and control capability (user definable) from anywhere in the world. There is a yearly subscription fee for this service. This service also allows our factory technicians to remotely assist in startup and system trouble-shooting, should the need arise.