



The ST1-10 and 20A are light seeking tracker controls designed for DC motor systems. In unobstructed sunlight it typically tracks within one degree of actual sun position.

Input voltage range: 10-56VDC

Output current:

ST1-10A	10 Amps continuous
ST1-20A	20 Amps continuous

After the power up, the ambient light level will determine the operating mode.

The following "normal" operating modes apply:

- 1) Useable sun—the unit points toward highest illumination, which is usually the sun's disk but may be toward the horizon if there is substantial reflection from the ground.
- 2) Partially obscured sun (e.g. cumulous clouds with breaks)—unit pauses at last "valid" control point to wait for conditions to change.
- 3) Heavy overcast or night—unit moves to "park" position to await light level recovery.

The low light PARK position is determined by S1-2 OFF = Park at East limit; S1-2 ON = Park at FLAT.

Overload Protect—typically, motor failure or mechanical system jam (from ice build up) or heavy wind load: Tracker will attempt to move the array for 0.1 second. If motor overcurrent condition is sensed, tracker will terminate Drive and flash the PAUSE LED (at 2Hz rate) for 1 hour before attempting another move.

Indicators on the control PCB: PWR, PRK, PAUSE, TRACK, E/W DRIVE, E/W LIMIT.

Notes on initial installation, power up and adjustments.

The remote sensor needs to be attached to the array frame such that the mounting surface of the sensor is parallel with the plane of the array—where on the array is not critical as long as the sensor receives unobstructed sun during the hours when the array is expected to track.

When power is applied, if the ambient light level is above the track threshold, it will then commence tracking.

Position trimpot RT1 setting is to halt movement of the array under conditions of overcast sun where pause is not invoked (e.g. if the control commands west move with overcast sun, rotate RT1 counterclockwise to halt movement and vice-versa).

RT2 (Wind speed trip) sets the wind speed at which the wind alarm park is activated. Full counter-clockwise is 20 MPH, full clockwise is 40 MPH.

RT3 (Light Sensitivity) is to adjust the light level at which the tracker control changes from track to pause-- Clockwise for greater sensitivity (tracks at lower light levels).

S1-1 (DLY) on the PCB controls the delay function. The idea here is that, during the initial installation, this is in the OFF position. In this state, the direction detect is instantaneous—a useful condition when tweaking the track trimpots and setting the PAUSE threshold. *When the DLY switch is in the ON position (for normal, unattended operation), the following delays are added to the system operation:*

A one minute delay is added to tracking corrections so that a requirement for a position change must remain constant for one minute to be considered valid. This is to reject transient events such as something flying over the sensor and, in cases where the sensor is shaded by moving vegetation during part of the tracking day, to hold off and/or reduce movement during back and forth shading events which aren't representative of true sun position and are not dark enough to invoke the PAUSE function. During this delay, the PAUSE LED will flash 4 times per second.

A ten *minute* delay is added to the change from PAUSE to PARK. This is for conditions of changing cloud cover (where the sun occasionally pokes through) to keep the tracker from sending the array back and forth between PARK and TRACK positions. Light conditions must remain below PARK threshold for 10 minutes or more before the controller will allow movement. (There is only a 10 second delay when changing from PARK to TRACK.)

S1-4 OFF: highest tracking accuracy. S1-4 ON: degraded accuracy to reduce oscillation in systems with fast mechanical drives.

The limit switches can be magnetically actuated reed switches or mechanically actuated type. They are "normally open" and close when drive system nears limit of non-destructive travel.

If your system has linear actuators with built-in limit switches, the limit switch inputs to the control can be left disconnected and the control will operate properly.

The tracker control PCB needs to be housed indoors or in a weatherproof enclosure.

**DO NOT** use the light sensor cable strain relief nut to mount the light sensor, as this can compromise the mechanical and hermetic integrity of the unit and cause failure.

Notes on optional features:

**Manual alarm**—overrides all light sensed functions and moves array to the flat park position. The switch to this input is normally open and closes for a manual alarm condition.

**Anemometer sensed wind alarm condition**—RT2 sets wind speed at which wind alarm park is activated. The wind alarm park state overrides all light sensed functions and moves the array to the flat park position. With S1-1 in the ON position, recovery from wind alarm is delayed for one hour to prevent see-sawing during gusty wind conditions. With S1-1 OFF, there is only a 10 second delay for recovery. During the delayed recovery, the D/R led is lit, indicating that light control functions are being overridden.

**Flat park input**—this is for a normally open switch that closes when the array is flat. The control protocol is this: *When power is applied to the unit, the control assumes that the array is flat or "east" of flat.* When a manual alarm or wind alarm is signaled, the control moves the array to close the flat park switch.

Revisions

2010-03-09: "limit" wording added to park description. RT1 function description changed.

2011-02-05: 10 & 20A versions with Rev. P circuit board.

2012-06-04: Changes for anemometer, flat park and manual alarm inputs.



