



Solar Tracker Controller Parameters

V1.1, November - 2018

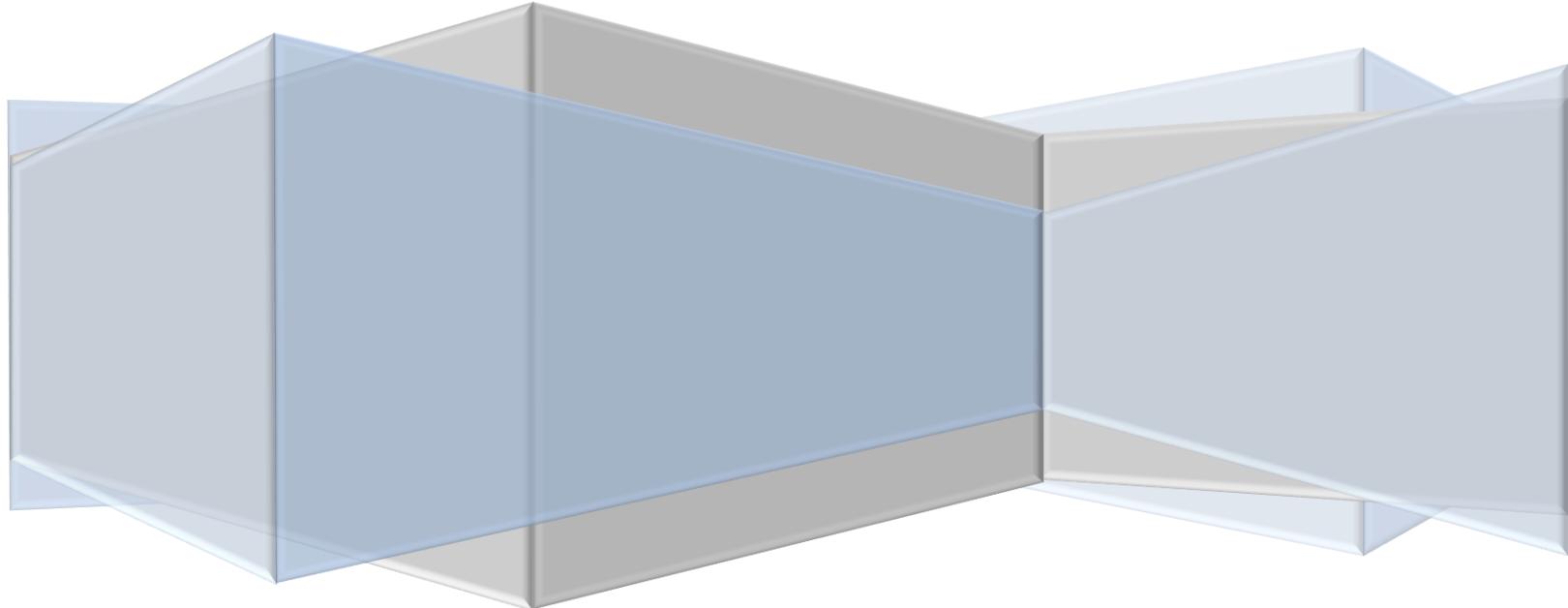


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1. Introduction

The purpose of this manual is to review the solar tracker controller parameters. The parameters are used to describe a solar tracker for a controller. It is assumed the reader is familiar with the controller installation and operational aspects. For such details, please see the references section. Note: parameters are regularly added or modified via new software releases. Thus, the

parameters listed in this document serve to illustrate the parameter set at document publication, but are not absolute.

2. Local and Remote Management

For details on how to access the CX3 controller, both local and remotely, please consult the *Lauritzen Communication and Network Services in Lauritzen Controllers* manual. The controller parameters are identical whether they are accessed directly from a local controller's webserver, or remotely.

3. Local Management, Admin Account Pages

The Admin login account requires a password for access. The password is managed through your Lauritzen server within the PlantManagement/ClientConfiguration/Services page. The Admin account will in addition to the read-only Guest pages, also grant access to the following Administrator pages;

3.1. SCX Admin Overview Page

The Standalone SCX Admin Overview Page contains the following

The screenshot shows a web browser window titled "cpv, Lauritzen Solar Track" with the URL "n11843/main.html". The page features the Lauritzen Inc. logo and tagline "Bringing new ideas to renewable energy". A navigation menu on the left includes sections for Monitoring (Overview, Fault Status, Current Time & Location), Controls (Controller Commands), System Parameters (Geographic Location, IP Configurations, Network Services, System Parameters, Set Time and Date, Wind Sensing), Tracker Specifics (Analog Input, Auxiliary Output, Back-Tracking Controls, Tracker Operations, Tracker Parameters, Target Finder), and a Log Out/Contact Us link.

Monitoring

- Overview
- Fault Status
- Current Time & Location

Controls

- Controller Commands

System Parameters

- Geographic Location
- IP Configurations
- Network Services
- System Parameters
- Set Time and Date
- Wind Sensing

Tracker Specifics

- Analog Input
- Auxiliary Output
- Back-Tracking Controls
- Tracker Operations
- Tracker Parameters
- Target Finder

Controller Identification

Serial Number	11843 (0x2E43)
Software	scx v30
BIOS Name	cpv

SCX Current Status

Tracker State	IDLE
Error	NONE
Warning	NONE
AUX Output	OFF

Control Buttons

Stop Button	OFF
Service Mode	OFF
Local Clean Mode	OFF
Local Storm Mode	OFF

SCX Current Data

Tracker Position (az,el)	(189.584,34.439)	degrees
Solar Position (az,el)	(189.649,55.628)	degrees
Location (lat,long)	(37.579,-120.871)	degrees

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3.2. FMCX Admin Overview Page

The Master Controller FMCX Admin Overview Page contains the following.

The screenshot shows a web browser window titled "weather, Lauritzen Solar" with the URL "n10883/main.html". The page header includes the Lauritzen Inc. logo and the tagline "Bringing new ideas to renewable energy", along with "Log Out" and "Contact Us" links. A sidebar on the left lists navigation categories: Monitoring (Overview, Fault Status, Recent Position, Current Time & Location), Controls (Controller Commands, Sub-System Commands), System Parameters (Geographic Location, IP Configurations, Network Services, System Parameters, Set Time and Date, Wind Seneing), and Tracker Specifics (Analog Input, Auxiliary Output, Back-Tracking Controls, Tracker Operations, Tracker Parameters, Target Finder). The main content area is divided into three sections: "Controller Identification" (Serial Number: 10883 (0x2A83), Software: fxcc v25, BIOS Name: weather), "FCX Status" (Error: TRACKER_WITH_ERROR, Warning: TRACKER_WITH_EXCEPTION, MasterStop: LOCAL_STOP, Solar Position (az,el): (187.031,55.800) degrees, Avg Windspeed: 0 mps, Peak Windspeed: 4 mps, Location (lat,long): (37.579,-120.871) degrees), and "Tracker Status" (trk(10894) STOP). At the bottom, a copyright notice reads "©2018 Lauritzen Inc. Contact Us".

4. Controller System Parameters

In this section, the controller System Parameters is discussed. The System related Parameters manage aspects such as network communication, network services, local time, and wind sensing.

4.1. Geographic Location

The Geographic location of a controller can best be obtained through a GPS radio connected to a controller, or by doing a lookup onto a map. One such option is to use this online site:

<https://getlatlong.net/>

In cases where a tracker does not follow the standard North/South, or flat level terrain, the Yaw and Tilt can be compensated. Note: in case of Master/Slave tracker domain setup, this dictates the parameters across the domain.

The screenshot shows a web browser window titled "Mogens" displaying the "geography.html" page from "cpv, Lauritzen Solar Track". The page features the Lauritzen Inc. logo and tagline "Bringing new ideas to renewable energy". A sidebar on the left contains navigation links for Monitoring, Controls, System Parameters, and Tracker Specifics. The main content area is divided into two sections: "Geographic Location" and "Orientation". Under "Geographic Location", Latitude is set to 37.579 and Longitude to -120.871. Under "Orientation", Yaw is set to 0.00 and Tilt is set to 0.00. A "Save" button is located at the bottom of the form.

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4.2. IP Configurations

The network parameters are managed in the following IP Configuration page. A controller has two sets of networks configurations; CFG0 and CFG1. For as long as the controller can communicate with its assigned server, it will remain with the selected configuration. In case of a server timeout, the controller will reset the Ethernet interface, and load the alternate network configuration. It is strongly recommended a controller use DHCP for network parameters.

Mogens

weather, Lauritzen Solar X

Not secure | n10883/ipcfg.html

Apps Latest Headlines Primary Imported From Firefox Bookmarks Other bookmarks

Log Out Contact Us

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Monitoring

- Overview
- Fault Status
- Recent Position
- Current Time & Location

Controls

- Controller Commands
- Sub-System Commands

System Parameters

- Geographic Location
- IP Configurations
- Network Services
- System Parameters
- Set Time and Date
- Wind Sensing

Tracker Specifics

- Analog Input
- Auxiliary Output
- Back-Tracking Controls
- Tracker Operations
- Tracker Parameters
- Target Finder

Network MAC Address & IP Settings

MAC Address	0.4.163.18.213.140
IP Config Selection	SEL_CFG0
Address	
Configuration No0	
DHCP Discovery	SWON
Static IP Address	192.168.20.10
Mask	255.255.255.0
Gateway	192.168.20.1
Server Contact Information	
Server IP Address	74.95.193.125
Server Port Number	2048

Save

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The screenshot displays a web-based configuration interface for a solar tracker system. The main content area is titled "Network MAC Address & IP Settings". It includes fields for MAC Address (0.4.163.18.213.140), IP Config Selection (SEL_CFG0), and Address. Below this is a section for "Configuration No0" with fields for DHCP Discovery (SWON), Static IP Address (192.168.20.10), Mask (255.255.255.0), and Gateway (192.168.20.1). Another section, "Server Contact Information", contains fields for Server IP Address (74.95.193.125) and Server Port Number (2048). On the left side, there is a sidebar with several sections: "Monitoring" (Overview, Fault Status, Recent Position, Current Time & Location), "Controls" (Controller Commands, Sub-System Commands), "System Parameters" (Geographic Location, IP Configurations, Network Services, System Parameters, Set Time and Date, Wind Sensing), and "Tracker Specifics" (Analog Input, Auxiliary Output, Back-Tracking Controls, Tracker Operations, Tracker Parameters, Target Finder). At the bottom left of the main content area is a blue "Save" button. The footer of the page contains the copyright notice "©2018 Lauritzen Inc. Contact Us".

4.3. Network Services

A controller has several integrated network services. Depending on the local network type, security considerations may be an issue, which warrant curtailment of the services. The Network Services page permits the administrator to turn-off/on individual services.

The screenshot shows a web browser window titled "weather, Lauritzen Solar" with the URL "n10883/services.html". The page features the Lauritzen Inc. logo and tagline "Bringing new ideas to renewable energy". A navigation menu on the left includes sections for Monitoring, Controls, System Parameters, and Tracker Specifics, each with sub-options. The main content area is titled "Services" and contains several configuration options:

EnableTelnet	SWON ▾	Enable telnet-server
EnableWS	SWON ▾	Enable web-server
EnableDiscovery	SWON ▾	Enable client IP discovery
EnableGuest	SWON ▾	Enable guest login
pwd	1364	Telnet admin password
InfoSharing	INFO_BROADCAST ▾	Enable information sharing services
StatusBroadcast	SWOFF ▾	Enable instant status broadcasting
StatusPort	0	UDP port to be used with status broadcasting
EnableUDPREception	SWOFF ▾	Enable reception of external UDP commands (port 56)

A "Save" button is located at the bottom left of the configuration panel, and the footer contains the copyright notice "©2018 Lauritzen Inc. Contact Us".

4.4. System Parameters

The System Parameter section includes parameters for that govern general control system operation.

The screenshot shows a web browser window titled "weather, Lauritzen Solar T" with the URL "n10883/sysparam.html". The page features the Lauritzen Inc. logo and navigation links for "Log Out" and "Contact Us". On the left, a sidebar lists several categories: Monitoring, Controls, System Parameters, and Tracker Specifics, each with a list of sub-options. The main content area is titled "Timezone & Timers" and contains the following configuration settings:

Setting	Value	Description
TimeZone	PST	Controller's Timezone of operation
CommReboot4DeadHost	CHR_8HR	Delay after which host cannot be contacted and until reboot request is posted
HostContactPeriod	HCP_AUTO	Frequency by which we contact server
DataInterval	DATAINT_10MIN	Sampled data integration period
Network Specifics		
Gateway	SWON	Operate as Gateway only (applies to field master controller)
NetBiosName	weather	Name by which I'm known to WinPC's
ServerDomain	lauritzen-inc.com	Domain name of server

A "Save" button is located at the bottom left of the configuration area. The footer of the page includes the copyright notice "©2018 Lauritzen Inc. Contact Us".

Figure 1; System Parameters

4.4.1. Time Zone & Timers

The **Timezone** parameter specifies the local time zone in which the controller resides. Note; solar calculations are independent of the time zone.

CommReboot4DeadHost specifies when a controller reset is forced – after server communication has stopped or interrupted. The forced reset will only be dispatched after daily tracker operations.

HostContactPeriod specifies the frequency of controller-initiated server contacts. The purpose

is to minimize network traffic. When set to AUTO, the controller will throttle back contacts to 10-minute intervals, unless a problem is present.

DataInterval specifies the data recording period. Controllers typically contain a 1024-entry circular buffer, where a buffer entry is consumed for every data recording. At a rate of one data recording per 10 minutes, the buffer will overwrite within 10,240 minutes (170 hours), in case of no server communication.

4.4.2. Network Specifics

The **Gateway** parameter is only used for Field Master controllers. For those systems, it defines if the master unit is to operate as a communication gateway only, or also include solar tracking operations.

The **NetBiosName** parameter identifies the controller by a logical name as defined by this parameter. Additionally, the controller may also be referred to by its serial number as in “xxxxx”, where “xxxxx” is the serial number. Thus, for controller 12345, it may be referred to as “n12345”. For more information about NetBIOS usage, please see

<https://en.wikipedia.org/wiki/NetBIOS>

ServerDomain species the domain name of the server to which the controller is to remain in contact with. Normally this would be *lauritzen-inc.com*.

4.5. Set Time and Date

The screenshot shows a web browser window titled "weather, Lauritzen Solar T". The address bar indicates the page is "Not secure" and shows the URL "n10883/time.html". The browser interface includes standard controls like back, forward, and search, along with a bookmarks bar.

The main content area displays the Lauritzen Inc. logo and tagline "Bringing new ideas to renewable energy". A navigation menu on the left lists categories such as Monitoring, Controls, System Parameters, and Tracker Specifics, each with sub-options. The "System Parameters" section includes "Set Time and Date", which is currently selected.

In the center, a form titled "Set Time and Date" contains two input fields: "Time" (set to "01:16 :30 PM") and "Date" (set to "09/13/2018"). Below the form are two buttons: "Set Time" and "Set Date".

The footer of the page includes the copyright notice "©2018 Lauritzen Inc. Contact Us".

4.6. Wind Sensing

The screenshot shows a web browser window for 'weather, Lauritzen Solar' at URL n10883/anemometer.html. The page title is 'Lauritzen Inc.' with the tagline 'Bringing new ideas to renewable energy'. The top navigation bar includes 'Log Out' and 'Contact Us'. On the left, a sidebar menu lists categories: Monitoring (Overview, Fault Status, Recent Position, Current Time & Location), Controls (Controller Commands, Sub-System Commands), System Parameters (Geographic Location, IP Configurations, Network Services, System Parameters, Set Time and Date, Wind Sensing), and Tracker Specifics (Analog Input, Auxiliary Output, Back-Tracking Controls, Tracker Operations, Tracker Parameters, Target Finder). A 'Save' button is located at the bottom of the sidebar. The main content area displays configuration settings for an Anemometer model:

Anemometer model		
AnmModel	APRS40	Anemometer model
Timers		
FaultTimer	AF_OFF	Anenometer fault detection
Storm2Clear	AF_OFF	Last storm-detect to all-clear delay
Wind-speed thresholds		
MaxPeakWindSpeed	8	(m/s) Threshold for peak-wind-speed
MaxAvgWindSpeed	6	(m/s) Threshold for avg-wind-speed
MaxWind2ExitStorm	6	(m/s) Peak-Wind speed in order to exit storm
HighWindSpeedMark	4	(m/s) Used to temporarily disable motor ops
Wind Vane model and filter		
WV_Model	DISABLE	Wind vane model
WdFilter	NONE	Type of wind-dir noise-filter to be used

At the bottom of the page is the copyright notice: ©2018 Lauritzen Inc. Contact Us.

5. Tracker Specific Parameters

In this section, the tracker specific parameters are discussed.

5.1. Analog Inputs

CX3 controllers have two analog inputs which can be used to measure items like temperature, solar irradiance and more.

The screenshot shows a web browser window titled "weather, Lauritzen Solar". The URL is "n10883/analog.html". The page displays the "Lauritzen Inc." logo and a navigation menu on the left side. The main content area is titled "Irradiance Input (broadcast as ch0)" and "Analog Input (broadcast as ch1)". It contains fields for sensor type and name, and a "Misc Analog Controls" section with a "snow_detect_threshold" input field set to 0. A note indicates "(C) Threshold below which snow can be detected". A "Save" button is located at the bottom left of the configuration panel.

Irradiance Input (broadcast as ch0)

irrad_sensor: TYPE_ANALOG Type of irradiance sensor

irrad_name: GNI Logical name of sensor

Analog Input (broadcast as ch1)

alog_sensor: TYPE_Z10K Type of analog sensor

alog_name: Logical name of sensor

Misc Analog Controls

snow_detect_threshold: 0 (C) Threshold below which snow can be detected

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5.2. Auxilary Output

The screenshot shows a web browser window for 'weather, Lauritzen Solar' at URL 'n10883/aux.html'. The browser interface includes a title bar with 'Mogens' and standard controls, a toolbar with 'Not secure', 'Log Out', and 'Contact Us', and a sidebar with various system monitoring and control links.

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AUX Output Control

mode		ON	Operational mode of AUX port
Brake controls			
time2release	<input type="text" value="0"/>	(sec)	time to release brake before motor-power
time2engage	<input type="text" value="0"/>	(sec)	time to engage brake after motor-power
Night light control			
night_threshold	<input type="text" value="0.00"/>		Solar elevation threshold for night light
Pulse Control			
pulse_on_time	<input type="text" value="0"/>	(msec)	Pulse on-time
pulse_period	<input type="text" value="0"/>	(msec)	Pulse period
Reserved			
rsv1	<input type="text"/>		

Save

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5.3. Back-Tracking Operations

The screenshot shows a web browser window titled "weather, Lauritzen Solar" with the URL "n10883/bt.html". The page header includes the Lauritzen Inc. logo and the tagline "Bringing new ideas to renewable energy". On the right side of the header is a "Log Out" link. The left sidebar contains a navigation menu with sections: Monitoring (Overview, Fault Status, Recent Position, Current Time & Location), Controls (Controller Commands, Sub-System Commands), System Parameters (Geographic Location, IP Configurations, Network Services, System Parameters, Set Time and Date, Wind Sensing), and Tracker Specifics (Analog Input, Auxiliary Output, Back-Tracking Controls, Tracker Operations, Tracker Parameters, Target Finder). A "Save" button is located at the bottom of this sidebar. The main content area is titled "Operational mode" and contains a dropdown menu set to "SWOFF" with the option "enable back tracking". Below this is a section titled "Mutual shading parameters" with two input fields: "tracker_spacing" set to "1.00" and "tracker_height" set to "1.00". The footer of the page includes the copyright notice "©2018 Lauritzen Inc. Contact Us".

5.4. Tracker Operations

The screenshot shows a web browser window with the URL `n10883/trk_ops.html`. The left sidebar contains a navigation menu with sections like Monitoring, Controls, System Parameters, and Tracker Specifics. The main content area displays various configuration parameters:

Mode	DISABLE	Operational mode of tracker
MoveCycle	600	(sec) Defines how often we move tracker
Angular limits of operation		
MinElev	0.00	Min (noon) elevation limit
MaxElev	60.00	Max (morning/afternoon) elevation limit
MinAzim	90.00	Min (morning) azimuth limit
MaxAzim	270.00	Max (afternoon) azimuth limit
Positions of non-operation		
StowPosition_az	0.00	Night time position
StowPosition_el	0.00	Night time position
StormPosition_az	0.00	Storm position
StormPosition_el	0.00	Storm position
CleanPosition_az	0.00	Clean position
CleanPosition_el	0.00	Clean position
Wind follow parameters		
WindFollow		Wind follow function and parameters to be used
Misc controls		
EnbLocalControl	ELC_STRM_CLN	Enable local storm/clean switch
EnbBatteryControl	ACPWR_OFF	Enable AC-loss detection
MinSolarElev	-0.01	(deg) Minimum solar elevation for tracker operation
Days2ResetEncCntr	0	(days) Period after which we reset encoder counters
TestPause	0	(sec) Pause between test moves

A blue 'Save' button is located at the bottom left of the configuration area.

5.5. Tracker Parameters

The screenshot shows a web-based configuration interface for a solar tracker named 'Mogens'. The left sidebar contains a navigation menu with sections like Monitoring, Controls, System Parameters, and Tracker Specifics. Under 'Tracker Specifics', the 'Tracker Parameters' section is selected. A 'Save' button is located at the bottom of this sidebar.

The main content area is titled 'Timeout, Polarity & Limit-switches' and contains the following parameters:

tracker_type	1X_SNGL_AZM	type of tracker
mtr_polarity	PWMPOL_INV_AZEL	motor polarity
ext_limit_sw	LIMIT_SW_AZEL	external limit switches
servo_timeout	4	servo timeout (sec)
min_angular_move	1.00	minimum angular movement in any direction
abs_max_current	10.00	(A) absolute max current after which we shutdown
pwm_frequency	3kHz	PWM motor frequency (when in doubt, use 3KHz)
rsv1		

Below this is the 'Azimuth drive controls' section:

az_acc	PWM_ACCM_FBW	acceleration
az_travel_speed	4000	travel speed (clicks/min)
az_brk_type	SRVO_NO_BRAKE	type of motor break to be applied at target
az_maxi	3.00	max motor current (A)
az_enc_type	ENCA_DUAL_PU	encoder type

Then the 'Elevation drive controls' section:

el_acc	PWM_ACCM_FBW	acceleration
el_travel_speed	4000	travel speed (clicks/min, or deg/min)
el_brk_type	SRVO_NO_BRAKE	type of motor break to be applied at target
el_maxi	3.00	max motor current (A)
el_enc_type	ENCA_DUAL_PU	encoder type

The 'Miscellaneous' section contains:

rsv2		
high_wind_mode	HWM_NONE	disable axis during high wind operation
ext_fault_detect	EFD_OFF	where to look for external fault

A 'Reserved' section is also present at the bottom.

5.6. Target Finder

The screenshot shows a web browser window for 'weather, Lauritzen Solar' at address 'n10883/tgt_finder.html'. The page features the Lauritzen Inc. logo and tagline 'Bringing new ideas to renewable energy'. A sidebar on the left contains navigation links for Monitoring, Controls, System Parameters, Tracker Specifics, and a 'Save' button. The main content area displays two parameter entries: 'az' with value 'fn=incl-,pl=xy,iid=0,ni=1' and 'Target-Finder az-parameters', and 'el' with value 'fn=incl-,pl=zy,iid=0,ni=1,ul=5' and 'Target-Finder el-parameters'. The bottom of the page includes a copyright notice '©2018 Lauritzen Inc. Contact Us'.

Mogens

weather, Lauritzen Solar

Not secure | n10883/tgt_finder.html

Apps Latest Headlines Primary Imported From Firefox Bookmarks Other bookmarks

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Log Out Contact Us

Monitoring

- Overview
- Fault Status
- Recent Position
- Current Time & Location

Controls

- Controller Commands
- Sub-System Commands

System Parameters

- Geographic Location
- IP Configurations
- Network Services
- System Parameters
- Set Time and Date
- Wind Sensing

Tracker Specifics

- Analog Input
- Auxiliary Output
- Back-Tracking Controls
- Tracker Operations
- Tracker Parameters
- Target Finder

Save

az fn=incl-,pl=xy,iid=0,ni=1 Target-Finder az-parameters

el fn=incl-,pl=zy,iid=0,ni=1,ul=5 Target-Finder el-parameters

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6. References

- 1) Lauritzen/Manuals: Communication and Network Services in Lauritzen Controllers
- 2) Lauritzen/Manuals: Usage of Wind Sensing Accessories in Lauritzen Controllers
- 3) Lauritzen/Manuals: Usage of External Inclinometers in Lauritzen Controllers
- 4) Lauritzen/Manuals: Encoders, Limit Switches and their use in Lauritzen Controllers

7. Revision History

Revision	Release Date	Comments/Changes
V1.0	Sep-14-2018	Initial Release
V1.1	Nov-12-2018	Added details to System Paramaters

8. Contact and Support

Please contact your local tracker manufacturer for support and warranty issues.

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Information in this manual is subject to change...