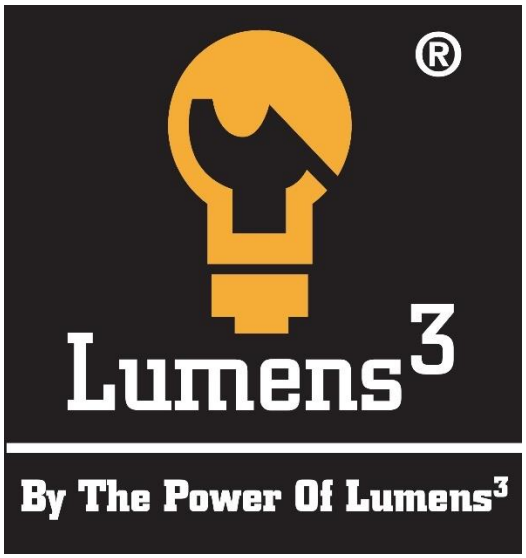
LUMENS^{3}®



URIEL CORPORATION'S
2017 ADVANCED GROW LIGHTING, SENSING SYSTEMS & ACTUATED DEVICES SOFTWARE/FIRMWARE OPERATING MANUAL
RELEASE UPDATE 3.0

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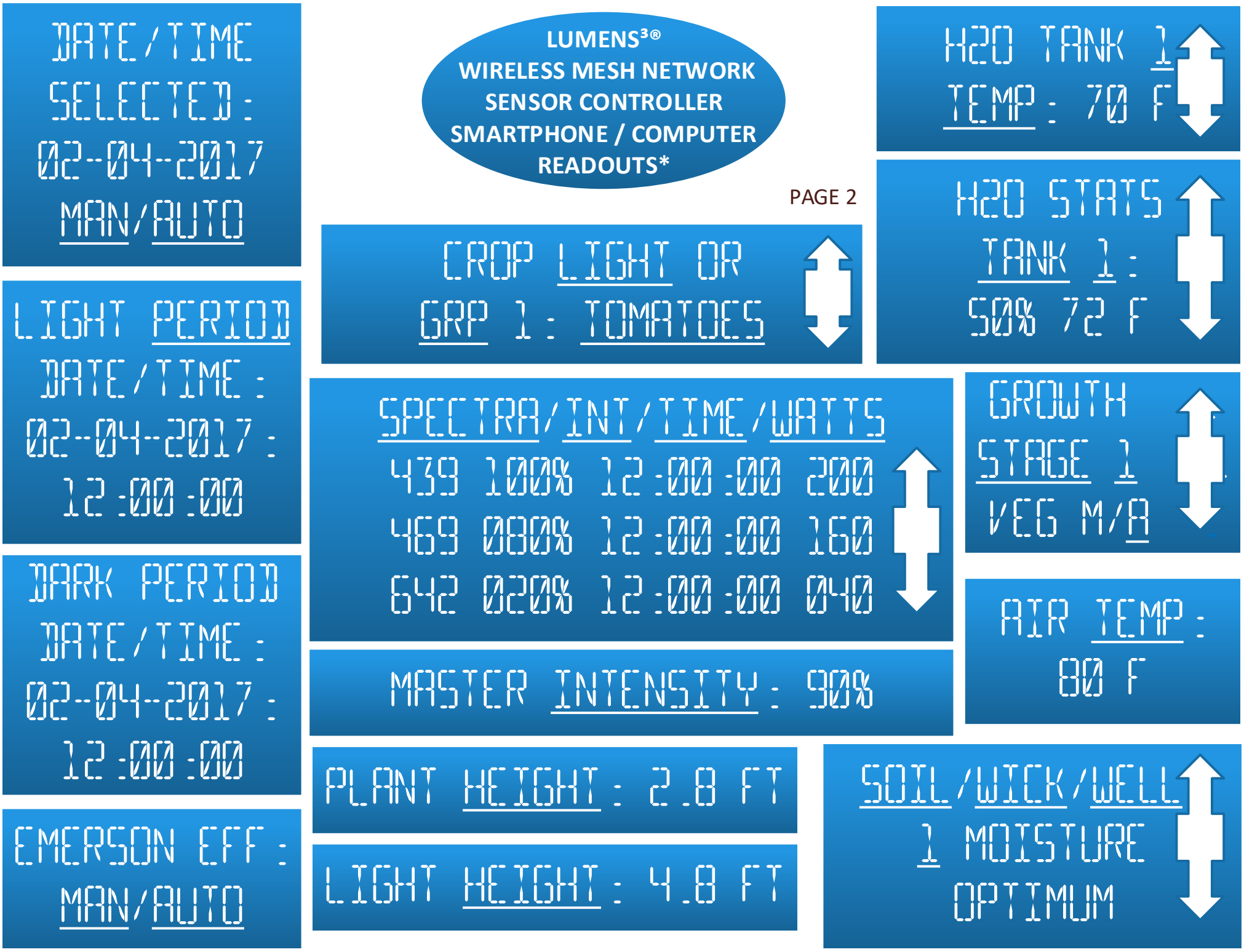

LUMENS³®
WIRELESS MESH NETWORK
SENSOR CONTROLLER
SMARTPHONE / COMPUTER
READOUTS*
PAGE 2
DATE/TIME
SELECTED:
02-04-2017
MAN/AUTO
LIGHT PERIOD
DATE/TIME:
02-04-2017:
12:00:00
DARK PERIOD
DATE/TIME:
02-04-2017:
12:00:00
EMERSON EFF:
MAN/AUTO
CROP LIGHT OR
GRP 1: TOMATOES
SPECTRA/INT/TIME/WATTS
439 1000% 12:000:000 2000
469 0800% 12:000:000 1600
642 0200% 12:000:000 0400
MASTER INTENSITY: 900%
PLANT HEIGHT: 2.8 FT
LIGHT HEIGHT: 4.8 FT
H2O TANK 1
TEMP: 70 F
H2O STATS
TANK 1:
50% 72 F
GROWTH
STAGE 1
VEG M/A
AIR TEMP:
80 F
SOIL/WICK/WELL
1 MOISTURE
OPTIMUM

LUMENS³®
WIRELESS MESH NETWORK
SENSOR CONTROLLER
SMARTPHONE / COMPUTER
READOUTS*

O2 1 LEVEL :
OPTIMUM

CO2 1 LEVEL :
OPTIMUM

OZONE 1 LEVEL :
OPTIMUM

ALGAE
DETECT 1 :
NONE

MOLD--MILDEW
DETECT 1 :
NONE

BACTERIA
DETECT 1 :
NONE

NUTRIENT 1
LVL : OPTIMUM

VIT 1 LVL :
OPTIMUM

HORMONE 1
LVL : OPTIMUM

PH LVL 1 :
OPTIMUM

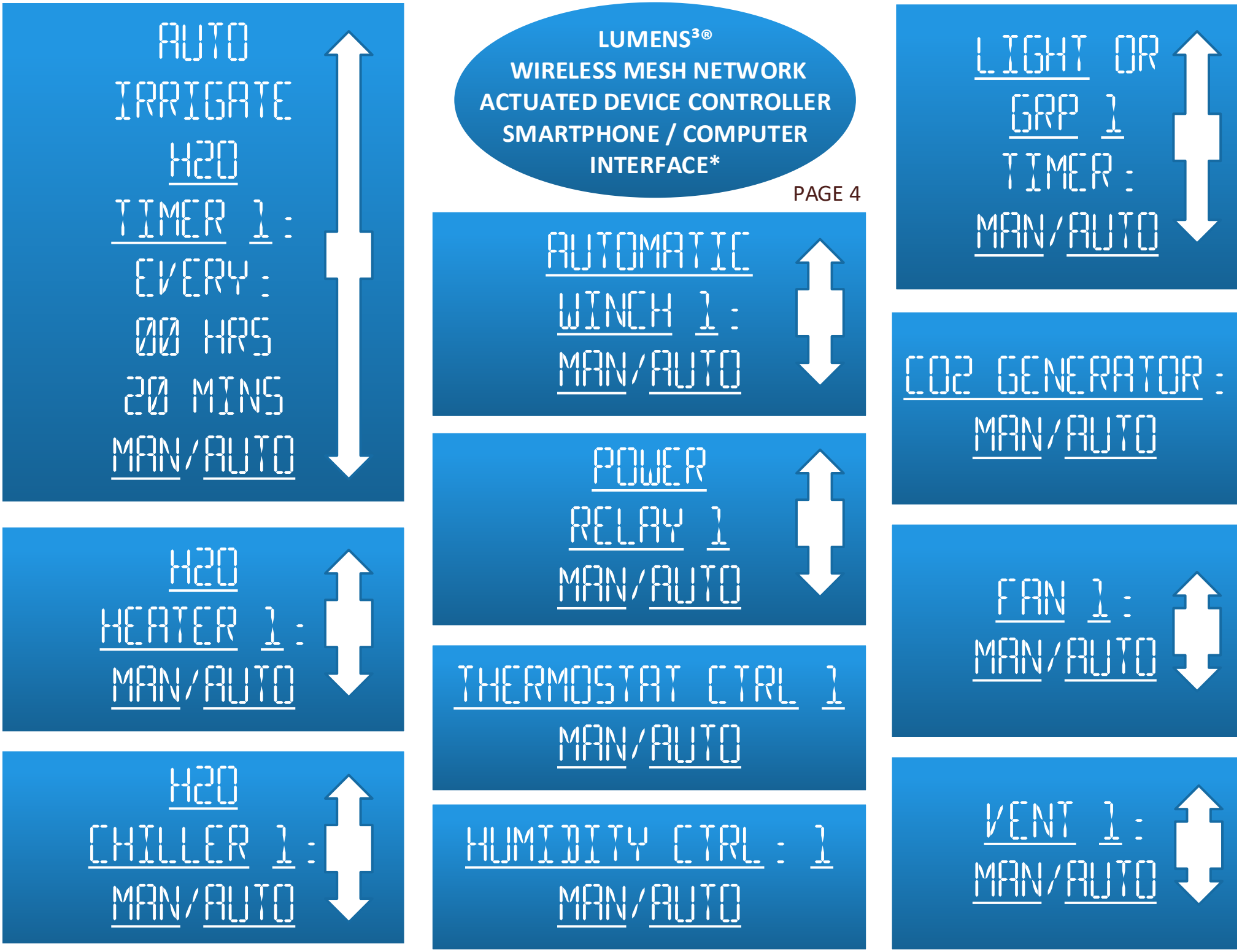
FIRE 1
ALERT : NONE

SMOKE 1
ALERT : NONE

MOTION 1
ALERT : NONE

OTHER SENS 1
MAN/AUTO/DIS

TIME LAPSE 1
SNAPSHOTS/VID
90 DAYS/E24


LUMENS³®
WIRELESS MESH NETWORK
ACTUATED DEVICE CONTROLLER
SMARTPHONE / COMPUTER
INTERFACE*
PAGE 4
AUTO
IRRIGATE
H2O
TIMER 1:
EVERY:
00 HRS
20 MINS
MAN/AUTO
H2O
HEATER 1:
MAN/AUTO
H2O
CHILLER 1:
MAN/AUTO
AUTOMATIC
WINCH 1:
MAN/AUTO
POWER
RELAY 1
MAN/AUTO
THERMOSTAT CTRL 1
MAN/AUTO
HUMIDITY CTRL: 1
MAN/AUTO
LIGHT OR
GRP 1
TIMER:
MAN/AUTO
CO2 GENERATOR:
MAN/AUTO
FAN 1:
MAN/AUTO
VENT 1:
MAN/AUTO

LUMENS³®
WIRELESS MESH NETWORK
ACTUATED DEVICE CONTROLLER
SMARTPHONE / COMPUTER
INTERFACE*

OPERATING STATUS: 1 NORMAL

SUNRISE--SUNSET FUNCTIONALITY: MAN/AUTO

SEASONAL WAVELENGTH CTRL: MAN/AUTO

OZONE CONTROLLER: 1 MAN/AUTO

DOSAGE CONTROLLER 1: MAN/AUTO

LIGHT OR GRP 1 AVG DAILY ENERGY USE: 424 WATTS

ALERT CONTROLLER 1: MAN/AUTO

PH CONTROLLER: 1 MAN/AUTO

MIST 1 CTRL: MAN/AUTO

HUMIDITY 1 SET TO: 30%
CURRENT HUMIDITY: 30%

FIRE EXT CTRL 1: MAN/AUTO

LUMENS³®
WIRELESS MESH NETWORK
ACTUATED DEVICE CONTROLLER
SMARTPHONE / COMPUTER
INTERFACE*

PING BY LIGHT 1
PING BY GROUP 1

SHOW LIGHT LIST PER GROUP OR CROP TYPE
UPDATE SMARTPHONE OR COMPUTER SOFTWARE

UPDATE LIGHTING FIRMWARE
BY LIGHT 1
BY GROUP 1

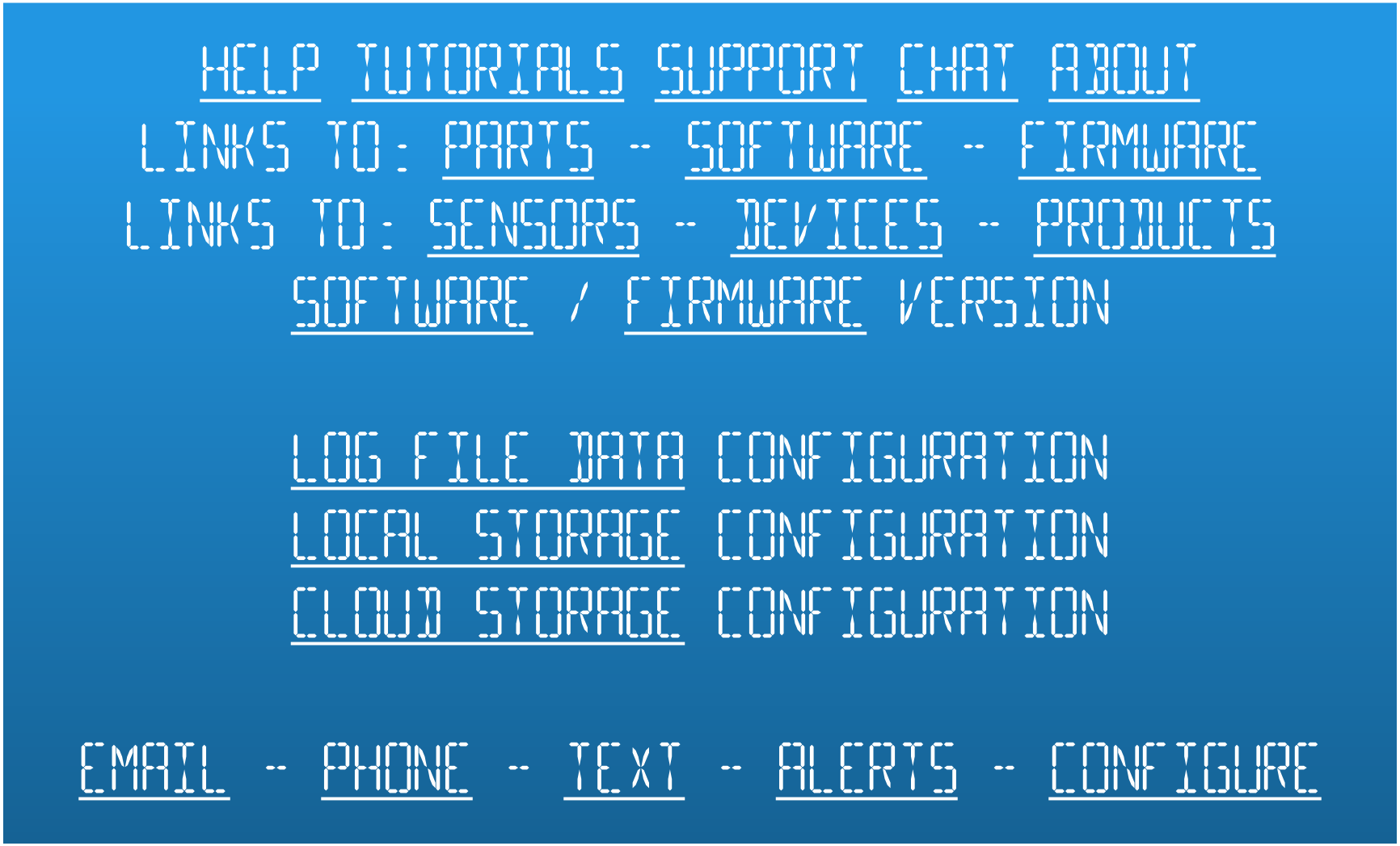
LUMENS³®
WIRELESS MESH NETWORK
ACTUATED DEVICE CONTROLLER
SMARTPHONE / COMPUTER
INTERFACE*

LOG FILES OF LIGHTS 1 OR CROPS 1
LOG FILES OF GROWTH STAGE 1
LOG FILES OF SENSORS 1 OR CAMERAS 1
LOG FILES OF ACTUATED DEVICES 1

LOG FILE DATA STORAGE & DATABASE MANAGEMENT
PARAMETERS & SETTINGS

PRINT DATA LOG FILE OR DATABASE REPORTS
PRINT MAINTENANCE ALERTS

LUMENS³® WIRELESS MESH NETWORK ACTUATED DEVICE CONTROLLER SMARTPHONE / COMPUTER INTERFACE*



*ACTUAL READOUTS, INTERFACES & FUNCTIONALITIES MAY DIFFER THAN THOSE SHOWN ABOVE. RELEASE 3.0.

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DESCRIPTION OF ADVANCED GROW LIGHTING, SENSING SYSTEMS & ACTUATED DEVICES MAIN SOFTWARE INTERFACE (PAGE REFERENCE: 1):

The MAIN SOFTWARE INTERFACE in PAGE REFERENCE 1 is structured to be the MAIN SOFTWARE INTERFACE or the PARENT SOFTWARE MENU/MODULE that interfaces with and leads to other menus and submenus or MODULES of the ADVANCED GROW LIGHTING, SENSING SYSTEMS & ACTUATED DEVICES SOFTWARE SYSTEM.

This MENU INTERFACE and the SOFTWARE of this OPERATING MANUAL is used to control any GROWING OPERATION, including all of a GROWING OPERATION'S SYSTEMS and SUBSYSTEMS from one integrated software interface. Now Growers can control every system and subsystem ranging from one light or crop to an unlimited amount of lights and crops to include all sensors, actuated devices, systems, subsystems, and equipment used by growers.

Please note that the SUBMENUS or ALTERNATE MENUS or MODULES shown in the following pages might appear differently and might have different functionalities than the ones depicted in this OPERATING MANUAL. Further releases of OPERATING MANUALS and or SOFTWARE or FIRMWARE may have different functionalities, interfaces, and readouts than the ones presented in this manual. This operating manual and the features presented are subject to change and availability.

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DESCRIPTION OF WIRELESS MESH NETWORK SENSOR CONTROLLER SMARTPHONE READOUTS (PAGE REFERENCE: 2):

1) DATE/TIME SELECTED (MODULE 1):

This interface allows a user to select MANUAL or AUTOMATIC settings to select a date and time to view the history/log or the current status of all readouts and interfaces for a particular date and or time. It automatically changes the data in each display readout and interface to show the data of the date and or time selected. The MANUAL setting allows a user to select a DATE and or TIME, and the AUTOMATIC setting can be set to show the CURRENT DATE and or TIME and the related settings for CURRENT DATE and or TIME.

2) LIGHT PERIOD (MODULE 2):

This interface shows DATE and TIME "LIGHT PERIOD" data for the DATE and or TIME selected in MODULE 1. By selecting "PERIOD" the user is allowed to edit date and time periods. Time Periods are displayed in HOURS, MINUTES and SECONDS. A user can edit each time variable.

3) DARK PERIOD (MODULE 3):

This interface shows DATE and TIME "DARK PERIOD" data for the DATE and or TIME selected in MODULE 1.

4) EMERSON EFFECT (MODULE 4):

This interface allows the user to select the MANUAL setting to choose one or more wavelength spectra, that will deliver a precise Light Cocktail Recipe of specified singular or combined wavelengths to plants to enhance photosynthesis for different growth stages. A user can select from SEEDLING, VEGETATIVE, FLOWERING, and BUDDING stages, and can select wavelengths or spectral ranges desired for each growth stage. The settings available also allow a user to select dates and times that these wavelengths will be in effect. The AUTOMATIC mode further provides the wavelengths chosen for a particular growth stage.

5) CROP (MODULE 5):

This interface allows a user to select LIGHT or GROUP mode for every crop being grown by a user. If a user selects LIGHT, the interface shows what crop type is being grown under a particular LIGHT. A user can scroll through each LIGHT or GROUP by selecting one or the other and see what CROP type name is associated with each LIGHT or GROUP of LIGHTS. When choosing GROUP or LIGHT a user can further select the CROP NAME TYPE to assign the CROP name type for a particular LIGHT or LIGHT GROUP used by the grower.

6) SPECTRA/INT/TIME/WATTS (MODULE 6):

This interface allows a user to select the wavelength spectra desired for delivering different Light Cocktail Recipes for the DATES/TIMES selected in MODULE 1. It also displays the amount of time (shown in HRS, MINUTES, and SECONDS) desired to turn on each wavelength for a chosen LIGHT PERIOD shown in MODULE 2. This interface further allows a user to specify what intensity percentage of each wavelength will be delivered to plants. A user can further select SPECTRA, INTENSITY, or TIME and scroll through the list to select or edit the corresponding values desired. As the intensity of each wavelength is increased, the WATTAGE displayed is also increased.

7) MASTER INTENSITY (MODULE 7):

MODULE 7 allows a user to increase or lessen the intensity of all the wavelengths chosen in MODULE 6 while keeping the ratios of light intensities of each wavelength, with respect to one another, as specified in MODULE 6. By choosing INTENSITY a user can change the intensity setting.

8) PLANT HEIGHT (MODULE 8):

MODULE 8 displays the greatest height of the plants detected by the height sensor under each GROW LIGHT or it displays the average greatest height of plants for each GROUP OF LIGHTS chosen in MODULE 5.

9) LIGHT HEIGHT (MODULE 9):

MODULE 9 displays the height of the LUMINAIRE chosen in MODULE 5. By choosing HEIGHT a user can specify the HEIGHT BUFFER DISTANCE they would like to set the automatic winch to raise the LUMINAIRE above the GREATEST HEIGHT of plants displayed in MODULE 8. In this example, the HEIGHT BUFFER DISTANCE was set for 2 FEET. Submenus allow a user to manually or automatically raise or lower the LUMINAIRES via the winch as desired.

10) H2O TEMP (MODULE 10):

MODULE 10 allows a user to SELECT and EDIT the TEMPERATURE SETTINGS of each water delivery tank or water system by choosing TEMP. The user is further allowed to scroll through each water delivery tank or water system used by the grower and to set a different temperature for each of them if desired.

11) H2O STATS (MODULE 11):

MODULE 11 allows a user to scroll through water delivery tank and water system sensors to display the level of water and the temperatures of each tank or system. This data can then be used to adjust the automatic irrigation schedule of MODULE 30 as might be desired to provide more or less H2O to plants.

12) GROWTH STAGE (MODULE 12):

MODULE 12 allows a user to scroll through the list of LIGHTS and see what GROWTH STAGE each LIGHT is set to. By choosing "M" a user can MANUALLY ADJUST the GROWTH STAGE SETTING to a different GROWTH STAGE which automatically changes wavelengths and other settings required for each GROWTH STAGE. By choosing "A", the wavelength and other settings are automatically changed to the settings for a particular DATE and TIME chosen in the SEASONAL WAVELENGTH MODULE 43 on reference page 4.

13) AIR TEMP (MODULE 13):

MODULE 13 allows a user to get a reading on the ambient air temperature in a growing environment from an air temperature sensor. Selecting TEMP allows a user to change the thermostat setting as might be desired.

14) SOIL/WICK/WELL MOISTURE (MODULE 14):

MODULE 14 allows a user to SCROLL through SOIL/WICK/WELL MOISTURE sensors to see data sensor results related to moisture for each sensor. This data can then be used to adjust the automatic irrigation schedule of MODULE 30 as might be desired to provide more or less H2O to plants. A user can scroll and see data from SOIL, WICK, and WELL sensors separately by choosing the type of sensor.

DESCRIPTION OF WIRELESS MESH NETWORK SENSOR CONTROLLER SMARTPHONE READOUTS (PAGE REFERENCE: 3):

15) O2 LEVEL (MODULE 15):
MODULE 15 allows a user to see sensor reading data related to O2.

16) CO2 LEVEL (MODULE 16):
MODULE 16 allows a user to see sensor reading data related to CO2.

17) OZONE LEVEL (MODULE 17):
MODULE 17 allows a user to see sensor reading data related to OZONE.

18) ALGAE DETECT (MODULE 18):
MODULE 18 allows a user to see sensor reading data related to ALGAE. The module further allows a user to scroll through and see data for the full list of each ALGAE sensor attached to the system one at a time.

19) MOLD-MILDEW DETECT (MODULE 19):
MODULE 19 allows a user to see sensor reading data related to MOLD and MILDEW. The module further allows a user to scroll through and see data for the full list of each MOLD & MILDEW sensor attached to the system one at a time.

20) BACTERIA DETECT (MODULE 20):
MODULE 20 allows a user to see sensor reading data related to BACTERIA. The module further allows a user to scroll through and see data for the full list of each BACTERIA sensor attached to the system one at a time.

21) NUTRIENT LVL (MODULE 21):
MODULE 21 allows a user to see sensor reading data related to NUTRIENTS. The module further allows a user to scroll through and see data for the full list of each NUTRIENT sensor attached to the system one at a time.

22) VITAMIN LVL (MODULE 22):

MODULE 22 allows a user to see sensor reading data related to VITAMINS. The module further allows a user to scroll through and see data for the full list of each VITAMIN sensor attached to the system one at a time.

23) HORMONE LVL (MODULE 23):

MODULE 23 allows a user to see sensor reading data related to HORMONES. The module further allows a user to scroll through and see data for the full list of each HORMONE sensor attached to the system one at a time.

24) pH LVL (MODULE 24):

MODULE 24 allows a user to see sensor reading data related to pH. The module further allows a user to scroll through and see data for the full list of each pH sensor attached to the system one at a time.

25) FIRE ALERT (MODULE 25):

MODULE 25 allows a user to see sensor reading data related to FIRE. The module further allows a user to scroll through and see data for the full list of each FIRE sensor attached to the system one at a time. Fire Alerts, when activated, interface with smartphones to provide alerts to specified users, to activate fire alarm or sprinkling-extinguishing systems, & to call authorities automatically if desired.

26) SMOKE ALERT (MODULE 26):

MODULE 26 allows a user to see sensor reading data related to SMOKE. The module further allows a user to scroll through and see data for the full list of each SMOKE sensor attached to the system one at a time. Smoke Alerts, when activated, interface with smartphones to provide alerts to specified users, to activate fire alarm or sprinkler-extinguishing systems, & to call authorities automatically if desired.

27) MOTION ALERT (MODULE 27):

MODULE 27 allows a user to see sensor reading data related to MOTION. The module further allows a user to scroll through and see data for the full list of each MOTION sensor attached to the system one at a time. This is particularly useful for when no people are supposed to be present in a growing area, where an alert of motion may be useful for security purposes.

Further, a motion detection event can be optionally set to trigger logic that will actuate or turn on one or more cameras that are wirelessly attached to Advanced Grow Lighting & Sensing System Controller Mesh Network. Once one or more cameras are activated, the activated cameras can store recordings or snapshots taken from the Growing Operation and store them in LOG files that are stored locally on SMARTPHONES or on COMPUTERS or in storage online in the CLOUD that can be accessed later or be viewed LIVE through one or more SMARTPHONES or through COMPUTER SOFTWARE interfaces.

28) OTHER SENS (MODULE 28):
MODULE 28 allows a user to see sensor readings data related to OTHER SENSORS attached to the network and it further allows the user to adjust settings, alerts and controls related to each sensor. The module further allows a user to scroll through and see data for the full list of each OTHER SENSOR attached to the system one at a time.

29) TIME LAPSE SNAPSHOTS (MODULE 29):
MODULE 29 allows a user to select SNAPSHOTS and adjust the number of days, the frequency of photos that are taken, and to select what time the photos are taken and stored each day for TIME LAPSE recordings to keep a pictorial record of growing operations and growth progress. Photos can be used to determine growth results and the vitality of crops and their overall health as well. Further, a user can scroll through a list of cameras that are attached wirelessly to the network, or as might be taken from cameras built into the GROW LIGHTS to determine what PHOTOS were taken with each camera so CAMERAS can be paired with the CROPS and the exact LIGHTS associated with them. A LIVE mode can also be initiated where a user can select a camera from a scrollable list of cameras attached to the system remotely through a smart phone to view plants or areas are of interest in a grow operation. The word LAPSE can be selected to toggle between LIVE and LAPSE modes. In LIVE mode, one or more CAMERA FEEDS from selected CAMERAS can be viewed LIVE through SMARTPHONE and COMPUTER SOFTWARE INTERFACES. CAMERA RECORDINGS consisting of TIME LAPSE SNAPSHOTS and or VIDEO RECORDINGS can be stored as LOG FILES in the CLOUD or be stored LOCALLY on SMARTPHONES and COMPUTERS. The LOG file data from each CAMERA identifies the CAMERA ID that took the video feed or the snapshots and it further includes the associated CROPS that relate to each CAMERA. The LOG files can be sorted by date and time, and they can be deleted or kept as records that can be accessed at a later time. Functionality is included to enter what crops are associated with each CAMERA by accessing submenus that allow you to add or edit such data.

DESCRIPTION OF WIRELESS MESH NETWORK ACTUATED DEVICE CONTROLLER SMARTPHONE INTERFACES (PAGE REFERENCE: 4):

30) AUTO IRRIGATE H2O TIMER (MODULE 30):

MODULE 30 allows a user to change H2O irrigation frequency for the dates and times selected in MODULE 1 and to also select the time duration of each watering cycle by selecting "MAN" for MANUAL selection of the associated parameters. Selecting "AUTO" allows users to choose AUTOMATIC watering schedules defined by the MANUAL operation for the dates/times selected in MODULE 1 (reference page one).

31) H2O HEATER (MODULE 31):

MODULE 31 allows a user to scroll and select from one or more H2O HEATING SYSTEMS attached wirelessly to the network, and to MANUALLY adjust the date, time, and temperature desired for when the heating system is to be active. The AUTOMATIC setting allows the user to have the system control heating automatically to regulate the temperature of the water by warming up the H2O system when the water gets colder than the HEATING TEMPERATURE SETTING.

32) H2O CHILLER (MODULE 32):

MODULE 32 allows a user to scroll and select from one or more H2O CHILLING SYSTEMS attached wirelessly to the network, and to MANUALLY adjust the date, time, and temperature desired for when the chilling system is to be active. The AUTOMATIC setting allows the user to have the system control chilling automatically to regulate the temperature of the water by chilling the H2O system when the water gets hotter than the CHILLING TEMPERATURE SETTING.

33) AUTOMATIC WINCH (MODULE 33):

MODULE 33 allows a user to MANUALLY select the HEIGHT settings shown in MODULE 9 to raise the GROW LIGHT LUMINAIRES the specified BUFFER DISTANCE shown in MODULE 9 to keep LUMINAIRES above the PLANT HEIGHT shown in MODULE 8 as might be desired. ONCE set, the AUTO Setting allows the GROW LIGHT LUMINAIRES to automatically activate the winch to keep their distance according to the BUFFER DISTANCE chosen by the MANUAL SETTING to keep the LUMINAIRE at the set BUFFER DISTANCE away from the top of the highest plants detected by PLANT HEIGHT SENSORS. Further, a user can scroll through the entire list of automatic winch systems attached to the LUMINAIRES and set them individually.

34) POWER RELAY (MODULE 34):

MODULE 34 allows a user to scroll through a list of one or more POWER RELAY CONTROL SYSTEMS and set them to operate as desired by editing the settings to work with the date and time function selected in MODULE 1. The POWER RELAY module allows users to plug in various different systems and subsystems that are used in Growing Operations into the POWER RELAY MODULES to actuate and control them by turning them on or off according to desired settings chosen that can be edited.

35) THERMOSTAT CTRL (MODULE 35):

MODULE 35 allows users to MANUALLY set the thermostat by choosing the "MAN" setting to edit the settings to control ambient air temperature and humidity. This option requires a user to connect a wirelessly attachable thermostat to the network that is further connected to heating, humidifier, and dehumidifier systems.

36) HUMIDITY CONTROL (MODULE 36):

MODULE 35 allows users to MANUALLY set the humidifier by choosing the "MAN" setting to edit the settings to control ambient humidity. This option requires a user to connect a wirelessly attachable humidifier control to the network that is further connected to humidifier, and dehumidifier systems.

37) LIGHT OR GRP TIMER (MODULE 37):

MODULE 37 allows a user to select a LIGHT TIMER or a GROUP of LIGHT TIMERS one at a time by scrolling through a list of attached TIMERS and it allows a user to set the date and time periods for a LIGHT PERIOD shown in MODULE 2.

38) CO2 GENERATOR (MODULE 38):

MODULE 38 allows a user to edit the date and time functions selected in MODULE 1 that will control and turn the CO2 Generator on or off.

39) FAN (MODULE 39):

MODULE 39 allows a user to edit the date and time functions selected in MODULE 1 that will control the speed and turn a FAN on or off. Further, a user can scroll through a list of network connected FANS and it will allow the user to edit the settings of each FAN independently. The AUTO feature allows the chosen FANS to run at the chosen SETTINGS AUTOMATICALLY ACCORDING to DATE/TIME SETTINGS CHOSEN IN MODULE 1.

40) VENT (MODULE 40):

MODULE 40 allows a user to edit the date and time functions selected in MODULE 1 that will control and turn a VENT on or off. Further, a user can scroll through a list of network connected VENTS and it will allow the user to edit the settings of each VENT independently. The AUTO feature allows the chosen VENTS to open or close at the chosen SETTINGS AUTOMATICALLY ACCORDING to DATE/TIME SETTINGS CHOSEN IN MODULE 1.

DESCRIPTION OF WIRELESS MESH NETWORK ACTUATED DEVICE CONTROLLER SMARTPHONE INTERFACES (PAGE REFERENCE: 5):

41) OPERATING STATUS (MODULE 41):

MODULE 41 allows a user to view the OPERATING STATUS of an entire Grow Operation including all malfunction alerts from sensors and actuated devices. It lets users view if all systems are functioning properly. If there is a problem, the user can select "STATUS" and view detailed display data as to what the malfunction or alert is about. The alert is designed to alert users for malfunctions and it is a troubleshooting guide to replace failing circuits in specific lighting systems that might be failing. The system also tells users when to replace circuits or LED modules before a malfunction occurs under a certain maintenance schedule to keep a system running optimally. If a unit needs maintenance, the system PINGS the failing LIGHT unit to FLASH a RED LED INDICATOR on the LIGHT or it may flash the LEDs on the LIGHT to help staff pinpoint which LIGHT(S) in the grow operation need(s) maintenance attention. See PING MODULE 52 for further details.

42) SUNRISE-SUNSET FUNCTIONALITY (MODULE 42):

MODULE 42 allows a user to MANUALLY SET or EDIT SUNRISE-SUNSET wavelength and intensity levels to mimic natural sunrise and sunset wavelengths and intensities to gently awaken plants into full photosynthesis mode and to gently put them to sleep to induce a DARK CYCLE when a LIGHT PERIOD is over. Different SUNRISE AND SUNSET settings can be chosen for each DATE and TIME chosen in MODULE 1 to mimic seasonal changes, intensities, wavelengths and associated dates and times for each daily time setting to adjust each variable desired.

43) SEASONAL WAVELENGTH CTRL (MODULE 43):

MODULE 43 allows a user to select a desired wavelength or a group of wavelengths desired to mimic seasonal GROWTH STAGES selected in MODULE 14.

This SEASONAL WAVELENGTH CONTROL MODULE uses wavelength data selected in MODULE 6 for the DATES AND TIMES of LIGHT PERIODS selected in MODULE 2 and it assigns the wavelength data, the dates and times to the GROWTH STAGE selected in MODULE 14.

44) OZONE CONTROLLER (MODULE 44):
MODULE 44 allows a user to select desired OZONE Generation Levels by running and controlling an OZONE Generator for a specified time chosen in the editable settings for a particular data and time chosen in MODULE 1.

45) DOSAGE CONTROLLER (MODULE 45):
MODULE 45 allows a user to select and edit desired DOSING PARAMETERS for one or more DOSERS attached to the network. These parameters can be edited by selecting "MAN" to MANUALLY edit the frequency of dosing, the amount of dosing, and the dates and time for each dosing for every DOSAGE SYSTEM in the network. DOSAGE SYSTEMS include but are not limited to the DOSAGE SYSTEMS DATA displayed and depicted in MODULES 21-24, namely NUTRIENT, VITAMIN, HORMONE, pH and other DOSERS. Their settings can be independently scrolled through and be displayed and edited as desired.

46) LIGHT OR GRP AVG DAILY ENERGY USE (MODULE 46):
MODULE 46 allows a user to view AVERAGE ENERGY CONSUMPTION in WATTS for each LIGHT PERIOD selected in MODULE 2 by allowing a user SCROLL and view AVERAGE ENERGY CONSUMPTION for each LIGHT or for each GROUP of LIGHTS in the specified LIGHT PERIOD chosen in MODULE 2. DARK PERIOD ENERGY CONSUMPTION for dates and times displayed in MODULE 3 can also be viewed in the same fashion. This MODULE also displays the total wattage use of all wavelength wattages displayed in MODULE 6.

47) ALERT CONTROLLER (MODULE 47):
MODULE 47 allows a user to specify what notifications and alerts are of interest to the user by selecting "MAN" to MANUALLY choose the desired notifications and alerts that will be sent to smart phones, computers, and to authorities if desired.

48) pH CONTROLLER (MODULE 48):
MODULE 48 allows a user to select and edit desired DOSING PARAMETERS for one or more DOSERS attached to the network that would be used to affect pH levels.

These parameters can be edited by selecting “MAN” to MANUALLY edit the frequency of dosing, the amount of dosing, and the dates and time for each dosing for every DOSAGE SYSTEM in the network. The AUTO setting can be used to automatically adjust pH for a given crop type depicted in MODULE 5. The DOSAGE SYSTEMS that affect pH can be independently scrolled through and be displayed and edited as desired.

49) MIST CONTROL (MODULE 49):

MODULE 49 allows a user to MANUALLY edit the settings that control the frequency of MISTING, the amount of MISTING, and the dates and times of MISTING for MISTERS used to keep plant leaves and or roots moist or wet during watering cycles respectively.

50) HUMIDITY (MODULE 50):

MODULE 50 allows a user to set the HUMIDITY LEVEL desired. It also displays the current humidity detected by sensors placed in the Growing Environment.

51) FIRE EXT CTRL (MODULE 51):

MODULE 51 allows a user to MANUALLY select what happens when a FIRE is detected such as turning on fire alarms, sprinklers and fire extinguishing systems. It also allows a user to set AUTOMATIC functionality to provide an ALERT to SMARTPHONES of specified users and to authorities that are connected to the mesh network in the event of fire and or smoke detection.

DESCRIPTION OF WIRELESS MESH NETWORK ACTUATED DEVICE CONTROLLER SMARTPHONE INTERFACES (PAGE REFERENCE: 6):

52) PING MODULE w/DISPLAY & WIRELESS UPDATE CAPABILITY (MODULE 52):

MODULE 52 allows a user to activate one or more COLOR CODED LED INDICATORS on LIGHTS or on a GROUP of LIGHTS chosen through the SMART PHONE INTERFACE. As an example, a user might want to activate LIGHT GREEN LED INDICATORS on all GROW LIGHTS that are set to the SEEDLING GROWTH STAGE, and or activate DARK GREEN LED INDICATORS on all GROW LIGHTS that are set to the VEGETATIVE GROWTH STAGE and or activate ORANGE LED INDICATORS on all GROW LIGHTS that are set to the FLOWERING GROWTH STAGE, and or activate RED LED INDICATORS on all GROW LIGHTS that are set to the BUDDING GROWTH STAGE.

The LED Indicators that change COLOR can either be a separate LIGHT MODULE that is attached to each LIGHT, or the main GROW LIGHT LED PANELS can be made to change COLOR. This would make it easier for growing operations to direct staff to treat and care for the plants differently according to their GROWTH STAGE. Users can PING LIGHTS individually and or in GROUPS for various different purposes as users might desire. A LED DISPLAY on each GROW LIGHT further identifies each GROW LIGHT with it's own ID. This ID is also used in modules to identify a chosen LIGHT or a list is provided of IDs to identify a GROUP of LIGHTS for various monitoring and control operations. Further, a user can update firmware and software through this interface by choosing "UPDATE" to update SMARTPHONE OR COMPUTER software & lighting firmware. Lighting firmware and software updates can be updated wirelessly when connected to the network.

DESCRIPTION OF WIRELESS MESH NETWORK ACTUATED DEVICE CONTROLLER SMARTPHONE INTERFACES (PAGE REFERENCE: 7):

53) LOG FILES OF LIGHTS, SENSORS & CAMERAS; DATA STORAGE MANAGEMENT; PARAMETERS & SETTINGS; PRINT DATA LOG REPORTS; PRINT MAINTENANCE ALERTS; (MODULE 53):

Module 53 allows a user to sort LOG FILE DATA and recordings stored from one or more LIGHTS, CROPS, GROWTH STAGES, SENSORS, CAMERAS & ACTUATED DEVICES.

LIGHT LOG FILES identify data associated with each LIGHT;

CROP LOG FILES identify data associated with each CROP;

GROWTH STAGE LOG FILES identify data associated with each GROWTH STAGE, namely SEEDLING, VEGETATIVE, FLOWERING, BUDDING and or other custom defined GROWTH STAGES.

SENSOR LOG FILES identify data associated with each SENSOR to include SENSOR READINGS, and date and time for each reading.

SENSOR PARAMETER DATA can be edited to adjust how DEVICES attached to the LIGHTS, the NETWORK and or CONTROLLERS can be ACTUATED or CONTROLLED by allowing a user to set sensor thresholds that will actuate or control or turn said DEVICES on or off depending on the SENSOR PARAMETERS AND SETTINGS set by the user. For example, a motion sensor may trigger one or more cameras and start a snapshot or video recording to create a an automatically generated log file with a log date and time and or it may alert a user's smartphone to feed them a live view of what the cameras are seeing when motion is detected. SENSORS are identified by their type and ID and by the data associated with them that each sensor is designed to provide.

CAMERA LOG FILES contain still snapshots or video recordings, the time and date of each snapshot and recording, the crops associated with each snapshot and recording and one or more CAMERAS and their IDs that recorded the snapshots or video. By selecting CAMERAS a user can go to a submenu to choose to view recorded LOG FILES of snapshots or video, or they can choose a LIVE MODE to view LIVE FEEDS from each camera and record if desired.

Further, a user can SELECT PARAMETERS & SETTINGS to adjust the frequency and the dates and times of how often SENSOR READINGS or CAMERA SNAPSHOTS and VIDEO streams are recorded. A user can also edit PARAMETERS & SETTINGS to adjust SENSOR AND ACTUATED DEVICE PARAMETERS and to set thresholds of when a sensor is activated, and what occurs to control ACTUATED DEVICES when a certain sensor threshold is met. ACTUATED DEVICES LOG FILES identify each ACTUATED DEVICE, they display the settings associated with each ACTUATED DEVICE and they allow a user the capability to further edit or change the OPERATING PARAMETERS of the ACTUATED DEVICES chosen. A user can select "MANAGEMENT" to manage LOG FILE DATA STORAGE and the DATABASE, including LOG FILE REPORTS or DATABASE REPORTS that contains data related to LIGHTS, CROPS, GROWTH STAGE, SENSORS, CAMERAS, and ACTUATED DEVICES and their displayable and editable settings and readouts, including dates and times for each log file event and report. By selecting MANAGEMENT, LOG FILE DATA and the DATABASE of information can be sorted by GROW LIGHT IDs, CROP TYPE, GROWTH STAGES, SENSOR IDs, SENSOR TYPES, CAMERAS, ACTUATED DEVICES, DATE & TIME. The GROW LIGHT ID is also included in LOG FILE REPORTS. Further functionality is included so a user can SELECT to PRINT one or more LOG FILES/REPORTS, MAINTENANCE ALERTS, and DATA SUMMARIES. By selecting MANAGEMENT, a user can also add, delete, edit and or save LIGHTS, CROPS, GROWTH STAGES, SENSORS, CAMERAS & ACTUATED DEVICES to the database, to log files, to alerts, and to log file & database reports.

DESCRIPTION OF WIRELESS MESH NETWORK ACTUATED DEVICE CONTROLLER SMARTPHONE INTERFACES (PAGE REFERENCE: 8):

54) HELP, TUTORIALS, SUPPORT, CHAT, LINKS, VERSION, ABOUT, LOG FILES, STORAGE, EMAIL, PHONE, TEXT ALERTS (MODULE 54):

MODULE 54 allows a user to select “HELP”, “TUTORIALS”, “SUPPORT”, “CHAT” functions, and to select “ABOUT” to view information about the software and firmware versions and information. A user can also select links to view “PARTS” for replacement parts, “SOFTWARE” to view available software options and updates for smartphones, computers, tablets, and other computer devices, and “FIRMWARE” to view available firmware options to update controllers, lighting systems, sensor systems, and actuated devices. A user can also view what SOFTWARE or FIRMWARE VERSIONS are currently installed.

Furthermore, LOG FILE DATA, LOCAL STORAGE, and CLOUD STORAGE can be CONFIGURED in this module. In addition, EMAIL, PHONE, and TEXT alerts can be configured in this module.

NOTICE:

Please note that some modules in this Operating Manual have a SCROLLABLE feature. Each SCROLLING feature allows a user to SCROLL through a list of sensors or actuated devices that are attached to the MESH NETWORK that pertain to each MODULE that shows a SCROLL BAR feature.

In addition, all modules and interfaces are menu based and may have one or more submenus or parent menus and links that allow the user to navigate between modules or screens (which are not shown in this Operating Manual). Users can use Software Navigational Features (not shown in this Operating Manual), to select or define further options and features, to enter data, to edit data, to save data, to view data, reports, alerts, tutorials, help files, to get support, to see operating status, to view maintenance alerts, to click on links to view parts lists, to view and or download software updates, to edit parameters and settings, to delete or view log file and database data, to go to previous screens, to go to sub-menus or other modules, to exit from a module or from the program, to cancel an operation, and or to allow a user to control lighting systems, sensor systems, actuated devices, and other grow systems, equipment and subsystems, manually, automatically, and or to set and configure different functional operating aspects of Uriel's Advanced Grow Lighting, Sensing Systems, & Actuated Devices as desired.

Please further note that the features and functionalities presented in this Operating Manual require the purchase of one or more chips or firmware modules/updates to activate the features presented. Additionally, the systems and subsystems presented in this document that work with Uriel's Advanced Grow Lighting & Sensing System Controllers need to be purchased separately and are subject to engineering changes and availability.

The choice of actual sensors and particular monitoring features are factory configurable and are subject to options chosen when ordering our systems. Sensor Systems and Actuated Devices can be purchased separately, however the main Advanced Grow Lighting & Sensing System and Actuated Device controllers must be purchased and be configured with the chips and firmware/software modules that a user intends to use to activate and use the various systems and subsystems that would be attached and used with Uriel's Wireless Mesh Network Interface.

Some Sensors and Actuated Devices that are controlled and or that are monitored through the interfaces and custom readouts listed in this Operating Manual and that might be listed in Uriel's present and future Order Forms may not be applicable to certain growers. Other Sensors and Actuated Devices not listed may also be desired by particular users.

Uriel will post any new Sensor Systems and Actuated Devices along with Software/Firmware Updates and Developments on its website once they are made available. New features, software, firmware, sensor systems and actuated devices may become available to users of Uriel's Systems for purchase at an extra cost. Updates to software and firmware may also require a separate further purchase. Such systems and upgrades are subject to engineering changes and availability.