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################################################################################
#### Variables held in the settings dictionary (gv.sd in Python code, "sd" in Node-red), default values shown ###
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from controller values (cvalues):
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name          default    Description
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en            1          enabled (boolean, system operation)
mm            0          manual mode (boolean)
rbt           0          reboot (boolean)
rd            0          rain delay (hours)
rstrt         0          restart software  (boolean)

from options:
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alr           0          active-low relay (boolean for use with relay boards connected through shift registers)
htip          "::"       IP address to bind to for the HTTP server
htp           80         port to bind to for the HTTP server
idd           0          individual run durations, used in schedule programs (boolean)
loc           ""         location, (for e.g. weather plugin) - not used by core program
mas           0          master station number (index + 1)
mtoff         0          master off delay (seconds)
mton          0          master on delay (seconds)
nbrd          1          number of boards (includes base unit and expansion octets/boards)
nopts         14         Number of options to be displayed on Options page
passphrase               "12d4e6fc471fbe073df5a0678fcffb9f75b12161e4e3f6d1e1bd81ffb22163bf",
                         SHA256 hash of passphrase. default (opendoor) shown.
pigpio        0          use pigpio library if it is installed (boolean)
rdst          0          rain delay stop time (Unix time stamp)
rs            0          rain sensed (boolean), Stops all irrigation except stations set to ignore rain.
rst           1          Rain sensor type (normally open = 1 (default), or normally closed = 0)
sdt           0          station delay time (seconds)
seq           1          sequential or concurrent operation (boolean)
snlen         32         max length of station names on stations page
tf            1          time format (24 hour clock = 1, 12 hour clock = 0)
upas          0          use passphrase (boolean)
urs           0          use rain sensor (boolean)
wl            100        water level (global percent adjustment of watering time)
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for scheduling:
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bsy          0              program busy (boolean, scheduling program is currently running)
ir           [0]            ignore rain bytes, each byte contains bits per board (bit flags) for stations to ignore
                            rain delay and rain sensor
iw           [0]            ignore water level, each byte contains bits per board (bit flags) for stations to ignore
                            water level (both general scaling and plugin adjustments)
mo           [0]            master operation, each byte contains bits per board (bit flags) for stations with master
                            set. Length = number of boards
nprogs       0              number of scheduling programs, can be calculated from length of program array (gv.pd)
nst          8              number of stations
rsn          0              Stop all stations. Stops any running stations and clears the run schedule.
tz_offset    varies         local device time offset from UTC in seconds.

for logging:
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lg           1              enable logging of scheduling runs (boolean), enabled: 1, disabled: 0
lr           100            limit number of log records to keep, 0 = no limit

UI related:
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lang         "default"      Language to be used for text in the UI.
name         "SIP"          configurable name for system. can be used to help manage multiple controllers
show         [255]          controls if stations appear in the UI, list of bytes (bit flags), each byte contains bits
                            per board
theme        "original"     files used to style the UI
tu           "C"            Temperature unit that appears in the page footer ("C" or "F")

############################################################################
#### other gv attributes ("gv"), Items showing e.g [S] return a list: ####
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Read + write:
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gv.bsy                      SIP is busy, stations are running
gv.lrun      [4]            last run, used to add data to log file (list: [station index, program number, duration,
                            end time]). Length = 4
gv.node_runs                Dictionary of stations being controlled by node-red.
gv.now                      Current time as seconds since the epoch, in UTC. Updated once per second.
gv.pd        [P]            program data - loaded from file at startup (list of dicts). Length = number of programs.
gv.pluginStn                Used to display plugin data next to station time countdown on home page timeline.
gv.pnames    [P]            program names - list of strings. length = numbr of programs
gv.pon                      program on (Holds program number of currently running scheduling program)
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gv.ps          [S]        program schedule used for UI display (list of 2 element lists i.e. [program number,
                          duration]). Length = number of stations
gv.rovals      [S]        run once values - list of duration times in seconds for a run once program (list,
                          length = number of stations not counting master)
gv.rs          [S]        run schedule (list [scheduled start time, scheduled stop time, duration, program
                          number]). Length = number of stations
gv.sbits       [8]        station bits, used to display stations that are on in UI, list of bytes (bitmasks),
                          one byte per board. Length = number of boards + 1.
# gv.scount W?            station count, used in set station to track running stations with master association
gv.snames      [S]        station names, list read from snames.json in data folder. Length = number of stations
gv.srvals      [S]        shift register values, used to turn zones on or off (list of one byte per station, 1 =
                          turn on, 0 = turn off). Length = number of stations
gv.tz_offset              time zone offset of local device from UTC.
gv.use_pigpio             set to 1 if pigpio library is installed (boolean).
gv.use_gpio_pins          Controls SIP's use of GPIO pins, default = True, Set = False to disable.


Read only (status info):
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gv.cputemp                CPU temperature from internal sensor.
gv.day_ord                Day of year as int (ordinal)
gv.now                    current time as timestamp, updated once per second at top of timing loop
gv.nowt                   current time as struct time, updated once per second at top of timing loop
gv.output_srvals [S]      shift register values, used to turn zones on or off (list of one byte per station,
                          1 = turn on, 0 = turn off)
gv.output_srvals_lock     a mutex used whenever gv.output_srvals must be accessed atomically
gv.plugin_data            dictionary (index by plugin root web prefix) to hold plugin data.
gv.plugin_menu    [M]     list to hold a 2 element list for each plugin to be added to menu on home page (['menu
                          text', 'url'])
# gv.ver_str              software rev number (string)
gv.ver_date               date of release (string)


#########################
#### Blinker signals ####
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Notifications broadcast by SIP
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alarm                     A signal that can be used in a plugin to indicate a problem (not used by SIP core)
new_day                   indicates that a new day has started (sent on software start and just after midnight)
loggedin                  someone has just logged in
option_change             a setting on the Options page has been changed
program_change            a scheduling program has been edited
program_deleted           a scheduling program has been deleted
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program_toggled        a scheduling program has been enabled or disabled
rain_changed           indicates that a rain sensor has changed
rain_delay_change      manual rain delay has been set or ended (check sd["rd"])
rebooted               the hardware has been rebooted
restarted              SIP software has restarted
restarting             SIP software is re-starting
running_program_change scheduling program has started or stopped (check gv.pon)
station_completed      a station run has ended
station_names          station names have been changed
stations_scheduled     a program is started (Scheduled or "run now"), or station is manually started (check
                       gv.srvals for stations set to run))
value_change           a controller value has changed (see controller values above)
zone_change            GPIO pins are activated according to gv.srvals
```