



# **KISAE Inverter & Charger IC122055**

## **Details of the new software versions**

**("r4.0" and "u4.1" or "u4.2") in units with S/N equal or higher than KT1909.....)**

**Preliminary**



# New version of KISAE Inverter & Charger IC122055

## Scope of this document

To show the new settings and operational differences between this new software version and the previous ones of the KISAE inverter and charger model # IC122055. This is an addendum to the first version of the owner's manual.

## Introduction

The KISAE IC122055 with serial number starting with KT1909..... have software version numbers "r4.0" and "u4.1" or "u4.2" (for the remote and the main unit respectively) with new settings in relations to previous versions.

In that sense, the following is pointed out:

- As per the several previous versions, in the 6 seconds initialization period (just after turning the unit on), no LED light indicator goes on and the display should show "888" briefly (for about 0.2 sec), then the software code version number of the remote (display) panel, and finally the one of the main unit (in this case "r4.0" and "u4.1" or "u4.2"). In the first version of the unit (mostly with S/N starting with KT13..... or lower) during that 6 sec. period, the display showed only "888" with both LED lights "Status" and "Display" on with solid amber and green color respectively
- In the first version of the unit, the fans remained running continuously in Bypass mode, for cooling both the charger and the transfer switch relays. Contrarily, in the last two or three versions (including this), the transfer switch relays and the temperature thresholds (for the fan's activation) have been changed, so the fans start running only when necessary to avoid unnecessary noise conditions and to extend the lifespan (bearings) of the fans. Additionally, there is a new setting "FA0" (only in "r1.6" and "u2.5" or higher) to keep the fan running continuously and quietly at low speed while derating the charging current setting in an effort to avoid triggering the over-temperature shutdown alarm. See the setting table below for more details about the "FAn" parameters.
- As per the several previous versions, the flashing green condition of the Status LED light, used to indicate "battery charging in progress", has been eliminated, since it can be known with the "Ch9 ("Chg") message on the display
- From the versions "r1.6" and "2.5", there has been the new settings "In3" and "In4" in the Inverter "In" parameter.
  - In the In3 setting, the built-in transfer switch is disabled and the unit supplies AC-Output power always from the inverter, despite having external AC-Input power present. The charger function remains enabled. This mode is very stressful for the unit, so it is not suggested, except for very specific applications (see next table)
  - The "In4" setting is similar to the "In1" one, with the possibility of turning the AC-Output Off and On manually through the "Power" push-button even in bypass mode
- In this new version ("r4.0", "u4.1" or "u4.2") there are two additional new settings named "In5" and "In6" representing two different approaches for what is called the "Manual Backup" feature.

It consists to prevent passing to Inverter (battery) mode automatically during an AC-Input power outage or disconnection, but only manually when the user decides to use the batteries for backing up, and just by pressing the Power pushbutton.

The typical application of the Manual Backup function enabled, is keeping the unit in Bypass (e.g. for charging the battery and/or feeding some no critical AC loads that do not necessarily require power backup) when the user leaves the site (i.e. boat, RV, cabin) for a while (e.g. several hours) and does not want to get the possible bad surprise of finding the battery depleted when returning, due to an unexpected power outage (blackout) during her/his absence.

Before these new "In5" and "In6" Manual Backup settings was available, the only way to do so was by changing the "In" parameter setting from/to "In0" any time the user return-to/leave the site respectively, which may be troublesome and tedious.

Also with these In5 and In6 settings, when the unit is in Bypass mode (i.e. having the AC-Input power available) the Xfer-switch and the built-in charger always work, so passing through the AC-Input power to the AC output ports and charging/maintaining the battery.

The differences between both settings are as follow (see more details in the following table):

- In “In5”, the inverter always remains off after an AC-Input power outage (i.e. having no automatic battery back-up function), requiring to be turned on manually by pushing the Power button once when having no AC-Input power.
- In “In6”, the user can enable and disable the automatic battery back-up function by turning the display (and so the inverter function) on and off at any time (i.e. either in Bypass or in Inverter mode), by pushing the Power button once. The display on/off indicates the Manual Backup is enabled/disabled respectively.
- The “In1” continues being the factory default setting for the “In” parameter. However, the battery type default is AGM (“Ag” = “A9”) now, other than Flooded (“FLo”).
- As soon as a valid AC voltage (within the operating voltage range) is detected at the AC-Input port, the unit cannot be turned Off by pushing the Power button, so to allow the charger to work. In the case of the “In4” setting, only the AC-Output ports can be turned off, but the build-in charger continues working.  
To turn the unit completely Off, the AC-Input power has to be disconnected (to force passing to Inverter mode), and then you can turn it Off by pushing the Power button.
- The unit always turns on (if it was Off) anytime the AC-Input power is detected (connected). It always applies to the charger but not necessarily to the AC-Output ports when having the “In4” setting, which may have a memorized Off condition for them.
- In the “In3” setting, the flashing amber condition of the Status LED light, to indicate “Bypass mode will occur soon,” remains even after the Bypass mode is activated by the Xfer-switch relay. The typical Status light on green to indicate Bypass condition does not apply in this “In3” setting.
- When in Inverter (= Battery) mode with “In0” setting, the “Status” LED remains off (as per immediate previous versions) other than solid-amber, to indicate that the Inverter stage is disabled and to save a little battery SoC.
- In previous versions of the unit, the settings (particularly of the “In” parameter) eventually may change (most of the time to “In0”) by the unit itself under certain conditions (e.g. electrostatic, electrical noise induced in the RJ12 cable, etc.). In this last version of the unit, a handshaking mechanism was implemented in the communication protocol between the remote panel and the main unit, in an effort to avoid that.

## Understanding the Unit Settings

In the following table, the rows with a gray color background correspond to the new settings that have been added in the new software version “r4.0” and “u4.1” or “u4.2”.

Inverter Settings	
In0	The inverter is disabled and will not provide backup function when utility power is not available. The unit works in bypass mode only, for charging the battery and passing through the external AC-Input power to the loads. Use this mode when charging the battery bank is the priority or when the backup function is not desired for a while (for more details, see the “Unit Operation” section in the manual)
In1	The unit will provide backup function as soon as the external AC-Input power is not available, and cannot be turned Off in Bypass mode by pushing the Power button. This is the factory default setting.
In2	The inverter stage is set to standby mode with the power save mode ON to reduce the current consumption from the battery (from 0.9A– 1A typically, to 0.2A) when having no-AC loads connected / turned-on. The unit will provide backup function as soon as the external AC-Input power is not available <u>AND</u> the load connected to the output is equal or more than 10W. Then, the AC-Output ports go off when the AC power is less 8W (there is a 2W hysteresis here). Anytime the AC-Output ports are off in Inverter mode, the unit will turn on briefly (for a few msec.) every 3-sec. to check the power consumption to decide to turn on or not the AC-Output ports. Under this pulsed condition, it is not possible to reset the GFCI outlet in the front panel when it tripped, unless it receives a continuous AC-Output voltage from the inside by either forcing Bypass mode and/or changing the “In2” setting.
In3 Do not use it. (Reserved for very specific applications)	The built-in transfer switch is disabled and the unit will supply AC-Output power always from the inverter, despite having external AC-Input power present. Therefore, while the unit is working, its inverter stage never gets a rest. Use this mode for very specific applications with loads sensitive to the brief AC power interruption of the transfer switch commutation (when passing in between Bypass and Battery mode) and/or to the external AC-Input power quality (volts/frequency variation range and/or waveform). The total load power has to be limited to allow some margin for charging the battery. This mode is <b>NOT</b> recommended except for very specific applications (i.e. instrumentation & control).
In4	The inverter is set to standby mode. The unit will provide backup function when external AC-Input power is not available. The AC-Output can <u>always</u> be turned Off and On manually using the “Power” push-button even in bypass mode. When in Bypass, the charger function remains always enabled; however, for a complete shutdown (including the light indicators, display, and the charger), you have to first disconnect the external AC-Input power (do to force Inverter mode) and then push the Power button. When the AC-Output is manually turned off with this setting, the condition remains memorized, even after a blackout and blackout-recovery at the AC-Input port. This is done to be consequent with the last power On/Off action the user did manually on purpose.

In5	Manual Backup, to prevent passing to Inverter (Battery) mode automatically, but only manually when the user wants and by just pressing the Power push-button (other than changing the settings to and from the "In0"). The inverter always remains off after an AC-Input power outage, requiring to be turned on manually by pushing the Power button once, when having no AC-Input power. After an AC-Input power recovery, it takes about 20 sec for the transfer switch to activate the Bypass (=Pass-thru) mode and for the charger to start working. During that 20 sec, waiting period the unit flashes the Status light on amber color to indicate that it will pass to Bypass mode soon. Once in Bypass mode, the Status light goes on solid green. Then, if the external AC-Input power is disconnected/blackout, the AC-Output ports shut down immediately and the display remains On showing the battery voltage for 30 sec. before going completely off, unless you push the Power button to accelerate that completely-off condition before the 30 sec. timeout happens.
In6	The Manual Backup function can be either enabled or disabled, turning the display and so the inverter function either On or Off respectively, by pushing the Power button once any time and in whatever operating mode (i.e. either in Bypass or in Inverter). In other words, anytime the display is on showing the normal messages (in either Bypass or Inverter mode), the inverter stage function is enabled. Contrarily, having the display Off (in either Bypass or Inverter mode), the inverter stage function is disabled. However, once in Bypass (= Pass-thru) mode both, the charger and the AC-Output ports, are always activated despite having the display either On or Off. If the latter, the Status light indicator remains on solid-green as the <u>only way</u> to differentiate when the unit is completely Off because the charging messages (CH9, bUL, AbS, FUL) are not displayed even though the charger is working. After an AC-Input power recovery, the charger always starts working <u>immediately</u> . However, the activation of the transfer switch and so the Bypass (Pass-thru) function will happen either immediately or after 20 sec. according to the following conditions: <ul style="list-style-type: none"> <li>o <u>Immediately</u>: if the Manual Backup status was disabled (so with the display Off) when the AC-Input recovery happens.</li> <li>o <u>After 20 sec</u>: if the Manual Backup status was enabled (so with the display On) when the AC-Input recovery happens.</li> </ul> During this 20-sec waiting period, the status display goes flashing amber to indicate that the unit will pass to Bypass soon (meantime the AC-Output is supplied by the Inverter stage). After the 20 sec timeout, the Xfer-switch and so the Bypass mode is finally activated and the Status light changes to solid-green. The last Manual Backup status (either enabled or disabled) with the corresponding one of the display (either On or Off respectively) remains memorized after eventual subsequent AC-Input connections and disconnections events.
<i>Note: Always in bypass mode, the unit cannot completely turn off (i.e. charger and AC-Output through the Xfer-switch) manually through the "Power" button. To do so, first, disconnect the external AC-Input power (to force the pass to Inverter mode) and then, press the power button. The unit always turns on (if it was Off) anytime the AC-Input power is detected (connected). It always applies to the charger but not necessarily to the AC-Output ports when having the "In4" setting, which may have a memorized Off condition for them.</i>	
<i>Notes about using either the In5 or In6:</i>	
<ul style="list-style-type: none"> <li>o If you want to use the Manual Backup function always, or most of the time, without preventing the display to show the charging messages, use the "In5" setting.</li> <li>o If you want the flexibility for easily enabling and disabling the Manual Backup function many times, and see its corresponding status by looking at the display from a distance (to check if it is On or Off and so the function enabled or not), use the "In6" setting despite having no charging messages when the function is disabled. Anyway, in the case of having the Manual Backup function disabled in "In6", you always can push the power button once to see those messages and push it once again to return to the display off condition ( and so the function disabled) again.</li> </ul>	
<b>Charger Current Setting</b>	
5A – 55A	Bulk / Termination current (to decide passing from the Absorption to the Floating stage): 5A/1.5A, 15A/3A, 35A/4A, 55A/6A
<b>Battery Type and Voltage Setting (Bulk max./Absorption/Float)</b>	
Ag (A9)	AGM: 14.3V / 14.3V / 13.4V (factory default)
gEL	GEL: 14.2V / 14.2V / 13.8V
LI1	Lithium 1 14.2V / 14.2V / 13.8V
LI2	Lithium 2 14.3V / 14.3V / 13.8V
LI3	Lithium 3 14.4V / 14.4V / 13.8V
LI4	Lithium 4 14.6V / 14.6V / 13.8V
FI	Fixed: 13.5 Vdc fixed voltage (power supply mode continuously on CH1 and CH2&CH3 disabled)
FLo	Flooded: 14.4V / 14.4V / 13.5V
<b>Battery Under Voltage Setting</b>	
SdL	Battery under-voltage setting is set to LOW (used for normal operation and maximum battery voltage operating range) Under voltage alarm: 11.0 Vdc Under voltage shutdown: 10.5 Vdc Under voltage alarm recovery: 11.3 Vdc Under voltage shutdown recovery: 12.0 Vdc
SdH	Battery under-voltage setting is set to HIGH (to keep enough cranking battery energy when using an engine battery) Under voltage alarm: 12.1 Vdc Under voltage shutdown: 11.8 Vdc Under voltage alarm recovery: 12.3 Vdc Under voltage shutdown recovery: 12.6 Vdc
<b>Alarm Setting</b>	
AL0	The fault and warning audible alarm (buzzer) is disabled. The potential errors on the display will not be audible.
AL1	Audible alarm (buzzer) will sound when fault or warning occurs.
<b>Maximum AC-Input Power Current Draw Setting</b>	
<b>IC122055</b>	
<b>AC Load Current</b>	
<b>Charger Current</b>	
Cb1	Set the maximum current draw from AC-Input power to 15A. The maximum current draw from the unit is set to match with the external AC-Input power circuit breaker rating, in an effort to avoid tripping it during the bypass mode. Battery charging current will automatically reduce when there is a high demand for AC load during the bypass mode (this feature is called "Power Sharing")
	>11Aac 5 Adc
	>6Aac and <11Aac 15 Adc
	>1Aac and <6Aac 35 Adc
	<1Aac 55 Adc
Cb2	Same as above. Set the maximum current draw from AC-Input power is 20A
	>16Aac 5 Adc
	>11Aac and <16Aac 15 Adc
	>6Aac and <11Aac 35 Adc
	<6Aac 55 Adc

Cb3	Same as above. Set the maximum current draw from AC-Input power is 30A	
	>26Aac	5 Adc
	>21Aac and <26Aac	15 Adc
	>16Aac and <21Aac	35 Adc
	<16Aac	55 Adc
Fan Operation Setting		
FA0	<p>It allows the <u>continuous</u> activation of the fans at low (silent) speed (since the unit starts) and only in <u>Bypass</u> mode. If the maximum temperature threshold is reached, the over-temperature shutdown is triggered. If so, once the temperature drops to a certain level, the unit can be manually turned on again by pushing the “Power” button.</p> <p>The charging current is de-rated to reduce the chance of getting a high-temperature shutdown.</p> <p>We suggest using this setting when <u>silent operation</u> is required; for example when sleeping and having the unit in/close to the same room in Bypass (Charging) mode). This setting may represent more stress for the unit.</p> <p>In Inverter mode (with no AC-Input power) the fans operate normally as per the “FA1” setting.</p>	
FA1	<p>In this setting, the fans are activated only when needed (as per the internal temperature sensed). There is no fans slow-speed (they run at full speed when activated). This is the <u>factory default</u> setting.</p>	
<u>Note: Except for FA0, the temperature thresholds for start/stop running the fans at full speed are ~60°C(140°F) /~50°C (122°F) respectively</u>		
Factory Default Setting		
Fd	Shortcut to all the manufacturing default settings (55A, In1, AL1, SdL, Ag, Cb3, FA1)	

## Understanding the Display Functions:



Status LED	Display LED	Display	Function/Status
Green (solid)	Off	"FUL"	Battery charging in progress and in the "FLOATING" stage, with the battery fully charged. The unit is already in Bypass Mode (In0, In1, In2, In4), or in Battery Mode soon-to-be in Bypass Mode within 20 sec. (In4), or AC-Input power present without bypass (In3)
Green (flashing) <b>First version only</b> <sup>①</sup>	Off	"Ch9" ("Chg")	Battery charging in progress; shown alternately every second with "bUL" or "AbS"
		"bUL"	Bypass Mode. Battery charging in progress and in the "BULK" stage.
		"Ab5" ("AbS")	Bypass Mode. Battery charging in progress and in the "ABSORPTION" stage.
Green (solid)	Off	"Ch9" ("Chg")	Battery charging in progress; shown alternately every second with "bUL" or "AbS"
		"bUL"	Battery charging in progress and in the "BULK" stage. The unit is already in Bypass Mode (In0, In1, In2, In4), or in Battery Mode soon-to-be in Bypass Mode <sup>②</sup> (In4), or AC-Input power present without bypass (In3).
		"Ab5" ("AbS")	Battery charging in progress and in the "ABSORPTION" stage. The unit is already in Bypass Mode (In0, In1, In2, In4), or in Battery Mode soon-to-be in Bypass Mode <sup>②</sup> (In4), or AC-Input power present without bypass (In3).
Amber (solid)	Green	"12.5"	Battery Mode, the inverter is running (except in In0 setting <sup>③</sup> ), the display shows battery voltage in DC volts (12.5V as shown)
Amber (flashing or solid)	Amber	"0.80"	Battery Mode, the inverter is running, the display shows output power in kW (800W as shown). You need to press the "Select" button for this reading
Amber (flashing)	Whatever		Battery Mode soon-to-be in Bypass Mode. AC Input power detected, the charger starts working and the AC output will switch to Bypass mode within 20 seconds.
Red (solid)	Off	E01-E12	The unit has shut down. The display shows error code (See error code reference table in the owner's manual)
Whatever except red, each time the "Select" ✓ button is pressed before its 5sec timeout	Green	"12.5"	Battery voltage in DC volts (12.5V as shown)
	Amber	"0.80"	Output power in kW (800W as shown). For example "1.2" means 1200W
	Off	5A,15A,35A,55A In0.....In6 AL0, AL1 SdL,SdH AG, gEL,L11...L14,Fi,FLo Cb1,Cb2,Cb3 FA0, FA1	"Cu" Bulk Charging Current setting "In" Inverter mode setting. In5-In6 only in S/N $\geq$ KT1811.....("r4.0", "u4.1" or "u4.2") "AL" Alarm beeping Off/On setting "Sd" Shutdown trigger voltage Low/High setting "bAt" Battery type (Flooded/AGM/GEL/Fixed voltage). "9EL" means GEL "Cb" Circuit Breaker 15A/20A/30A setting "FAn" Fan operating mode setting (IC122055 with S/N KT15..... only)

① Status LED flashing green, applies only to previous software versions before "r1.5", "u.2.4"

② Within a 20-sec waiting period as per the Amber Flashing condition on the Status LED light

③ When in "Inverter" (= "Battery") mode with the "In0" setting, the "Status" LED remains solid-amber/off in the first/new software versions respectively, for about 20 sec. before the unit shuts down completely to save battery state of charge.

Diagram of the Setting Procedure: (the new setting sub-menus are indicated with a gray color background)

