Chapter 6 Programming Constants

A Group (Initialize):

A1 Group (Initialize)

A1-01: Access level

- Use constant A1-01 to select the user constant access level.
  This level determines which user constants can be changed and displayed.

Setting	Function
A1-01=0	This setting allows the “operation” and “initialize” to be changed or displayed. Use this setting to prevent user constant settings from being changed.
A1-01=1 (Initial setting)	This setting allows all user constants to be changed or displayed.

A1-02: Select Language

- Use constant A1-02 to select the language displayed by the Stackable Inverter. A value of 0 set English and values of others set other language.
- This user constant is not returned to factory setting when constants are initialized. It must be manually reset to factory setting.

Setting	Function
A1-02=0 (Initial setting)	English language
A1-02=1	Reserved, under development
A1-02=2	Reserved, under development
A1-02=3	Reserved, under development
A1-02=4	Reserved, under development
A1-02=5	Reserved, under development
A1-02=6	Reserved, under development

A1-03: Init Parameters

- Use constant A1-03 to initialize the user constants.
- When initialized, the user constants will return to their factory preset values. You should normally record the setting of any constants that are changed from factory presets.

Setting	Function
A1-03=0 (Initial setting)	Returns to initialize Display without initializing any user constants.
A1-03=1	Initializes the user constants to factory settings.

A1-04: Init Password 1

- This constant is reserved for the factory to test and set the functions.
- Users are not allowed to set this constant.

Lock the constants setting (A1-01=1)

1. Finish setting all the programmable parameters to desired values.
2. Change A1-01=0 (Operation only), factory setting is A1-01=1 (Constants set).
3. Go to A1-04 and press RUN/STOP key and UP key at the same time till A1-05 parameter occurs.
4. Enter the desired password (max. 4 digits)
5. Press UP key to leave A1-05
   Above procedure completes locking the constants setting and no more programming selection would appear. A1-01 would only display 0 (Operation only) and would not display 1 (Constants set).

Unlock the constants setting

1. Enter the password in A1-04 to be exactly the same as the one earlier set in A1-05
2. When the password in A1-04 matches the one earlier set in A1-05, the unlocking is completed. A1-01=1 (Constants set) would appear again for programming.

B Group (General):

B1 Group (Output Frequency)

B1-01: Output frequency

- B1-01 is used to set the output frequency at INVERTER AC output

Setting	Function
B1-01=0 (Initial setting)	50Hz at INVERTER AC output
B1-01=1	60Hz at INVERTER AC output

- B2-08: AC IN Frequency Range

Setting	Function
B2-08=0	When B1-01=0: Acceptable AC input frequency is 50Hz ±5Hz (45~55Hz)
	When B1-01=1: Acceptable AC input frequency is 60Hz ±5Hz (55~65Hz)
B2-08=1 (Initial setting)	Accept wide AC input frequency range between 45~65Hz

B2 Group (Auto Transfer Switch)

B2-01: AC IN Low Disconnect

- Use constant B2-01 to determine the AC IN voltage below which level the ATS (Auto Transfer Switch) will switch off.
- This voltage level will always lie below the AC IN Low Connect (B2-02) level. In fact, changing this level will also change the AC IN Low Connect (B2-02) level.

B2-02: AC IN Low Connect

- This setting forms a pair with AC IN Low Disconnect (B2-01). With this setting, one determines the AC IN low voltage at which level the ATS will switch on. This should lie above AC IN Low Disconnect (B2-01) level to prevent continuous switching off the ATS when the voltage is fluctuating around the level.
- In fact, the parameter which is changed is the difference between AC IN Low Disconnect (B2-01) and AC IN Low Connect (B2-02).
- The result of this is that when changing B2-01 level, this level (B2-02) also changes.

※ Note: B2-02 can be ignored for a short time when AC IN Waveform Check (B2-06) is

disabled (B2-06=0)

- When the AC IN voltage drops due to the increasing charge current, the AC CHARGER will take care that the voltage does not drop below this level.
- B2-02=B2-01+offset voltage
  For example: KI-1500SI-122, when B2-01=180V, B2-02=187V, offset voltage=7V (187-180), B2-02 will automatically go to 197V(190+7) after B2-01 is changed to 190V.

B2-03: AC IN High Connect

- This setting forms a pair with AC IN High Disconnect (B2-04). With this setting, one determines the AC IN high voltage at which level the ATS will switch on. This should lie below the AC IN High Disconnect (B2-04) level to prevent continuous switching of the ATS when the voltage is fluctuating around that level.
- In fact, the parameter which is changed is the difference between AC IN High Disconnect (B2-04) and AC IN High Connect (B2-03).
- The result of this is that when changing B2-04 level, this level (B2-03) also changes.
- B2-03=B2-04 – offset voltage
  For example: KI-1500SI-122, when B2-03=265V, B2-04=270V, offset voltage=5V (270-265), B2-03 will automatically go to 255V(260 – 5) after B2-04 is changed to 260V.

B2-04: AC IN High Disconnect

- Use constant B2-04 to determine the AC IN voltage above which level the ATS will switch off.
- This voltage level will always lie above the AC IN High Connect (B2-03) level. In fact, changing this level will also change the AC IN High Connect (B2-03) level.

B2-05: AC IN Current Limit

- Use constant B2-05 to set the set the specific maximum AC input current. This value is very important for both battery charger and inverter output power assist.
- When using constant B2-05, the values determine the actual AC current limit.

※Note: With Power Support enabled, there is a minimum value for the AC input current limit. Please see the note at Power Support (page 71).

B2-06: AC IN Waveform Check

- Use constant B2-06 to enable/disable the fast detection of input voltage wave shape.

Setting	Function
B2-06=0 (Ignore)	● By disabling AC IN waveform check, AC IN Low Disconnect (B2-01) is ignored. When the load current is higher 1.5 times than AC In Current Limit (B2-05), this is used to prevent unnecessary switching to INVERTER due to voltage drop when a high load is connected.
B2-06=1 (Initial setting) (Active)	● This detection checks the wave shape, if it is not sinusoidal within certain limits, the AC input voltage is rejected. ● However, certain generator or very weak mains supply have an ill shaped sinusoidal output especially when the load suddenly changes. The fast detection will detect a failure in such a case. ● This will result in a slightly longer transfer time.

B2-07: Ground Relay

- Used to enable/disable the internal ground relay functionality. The ground relay is useful when an earth-leakage circuit-breaker is part of the installation.
- When ATS (Auto Transfer Switch) is open (INVERTER mode), the Neutral of the inverter is connected to “G” terminal.
- When ATS closes (AC IN is transferred to AC OUT), the Neutral is first disconnected from “G” terminal.

Setting	Function
B2-07=0	The internal ground relay is open with “G” terminal.
B2-07=1 (Initial setting)	The internal ground relay is closed with “G” terminal.

B2-08: AC IN Frequency Range

Refer to page 64 (B1-01)

B2-09: AC IN Dynamic Current Limit

- This setting is an expansion of the AC IN Current Limit (B2-05) mechanism.

Setting	Function
B2-09=0 (Initial setting)	● The AC current limit is specified by the AC IN Current Limit (B2-05) setting

B2-09=1	● The effective AC input current limit depends on the load history. When the load is lower than the AC IN Current Limit (B2-05), the effective AC input current limit is also lower but slightly above the load. ● When the load increase, the effective current limit also increases with a delay. The thought behind this is that when a generator is running at a low load, it can't switch to full load immediately and it needs some time to increase the power.

※ An example:

- We have a 2KVA generator.
  We adjust the AC IN Current Limit (B2-05) setting to 8A and we enable Power Assist (C1-05=1). We have no load connected and the batteries are fully charged. Therefore, no current from generator is drawn.
- At this moment, we connect a load of 7A to the Stackable Inverter with this setting (B2-09) disabled, the Stackable Inverter would not react because the load is below the AC IN Current Limit (B2-05) setting. The result is that the full load is connected to generator which will drop in voltage because it can't deliver that current instantly which could result in switching to INVERTER.
- If however we had this setting (Dynamic Current Limit) enabled, the effective AC input current limit would be far lower than 8A because the load was zero. So connecting a load of 7A will result in Stackable Inverter starting to power assist and no voltage drop is being examined on the AC OUT. The generator starts to supply the load and the effective AC input current limit will increase to 8A slowly. At the moment, the Stackable Inverter will stop Power Assist and the full load is on the generator.
- This is powerful option in combination with Power Assist but even without Power Assist, it can prevent unnecessary switching to INVERTER because the charge current will reduce when AC input current becomes higher than the effective AC input current limit.

B2-10: MODE4: Bat Lo?V ATS ON
B2-11: MODE4: Bat Lo?S ATS ON
B2-12: MODE4: Bat Hi?V ATSOFF
B2-13: MODE4: Bat Hi?S ATSOFF
B2-14: MODE3: Bat Lo?V ATS ON
B2-15: MODE3: Bat Lo?S ATS ON
B2-16: MODE3: Bat Hi?V ATSOFF
B2-17: MODE3: Bat Lo?S ATSOFF

- B2-10~B2-13 are used to set the condition of ATS to be ON/OFF in MODE4
- B2-14~B2-17 are used to set the condition of ATS to be ON/OFF in MODE3
- When Stackable Inverter is in either MODE4 or MODE3, INVERTER mode takes priority to supply voltage to AC OUT for load consumption. When AC IN power is ready, INVERTER is active and battery is about to be exhausted, ATS will be switched on to ensure AC OUT to continuously supply the load. At the moment, AC OUT will be supplied by AC IN power. At the same time, the battery can be charged by other renewable energy such as solar charger, wind charger or DC generator charger (MODE3) which is normally the solar house application in no need of AC CHARGER. The battery can be charged by AC IN (AC CHARGER) or other renewable energy such as solar charger, wind charger or DC generator charger (MODE4) which is normally the application requesting both AC charging and DC charging.
- When charging battery slowly reaches to certain level, this means battery will be fully charged soon and the ATS will be switched off for INVERTER to take over the ongoing supply to AC OUT for load.
- B2-10 and B2-11 are used to set ATS to be “ON” when the battery voltage is lower than B2-10 voltage value and longer than the second time set in B2-11 in MODE4. (INVERTER OFF+ATS ON+AC CHARGER ON)
- B2-12 and B2-13 are used to set ATS to be “OFF” when the battery voltage is higher than B2-12 voltage value and longer than the second time set in B2-13 in MODE4. (INVERTER ON+ATS OFF+AC CHARGER OFF)
- B2-14 and B2-15 are used to set ATS to be “ON” when the battery voltage is lower than B2-14 voltage value and longer than the second time set in B2-15 in MODE3. (ATS ON+INVERTER OFF+AC CHARGER ON)
- B2-16 and B2-17 are used to set ATS to be “OFF” when the battery voltage is higher than B2-16 voltage value and longer than the second time set in B2-17 in MODE3. (INVERTER ON+ATS OFF+ AC CHARGER OFF)

B2-18: MODE1: ACIN Current Lmt

- Use constant B2-18 to set the set the specific maximum AC input current in MODE 1. This value is very important for both battery charger and inverter output power assist.
- When using constant B2-18, the values determine the actual AC current limit.

B2-19: MODE2: ACIN Current Lmt

- Use constant B2-19 to set the set the specific maximum AC input current in MODE 2. This value is very important for both battery charger and inverter output power assist.
- When using constant B2-19, the values determine the actual AC current limit.

B2-20: MODE3: ACIN Current Lmt

- Use constant B2-20 to set the set the specific maximum AC input current in MODE 3. This value is very important for both battery charger and inverter output power assist.
- When using constant B2-20, the values determine the actual AC current limit.

B2-21: MODE4: ACIN Current Lmt

- Use constant B2-21 to set the set the specific maximum AC input current in MODE 4. This value is very important for both battery charger and inverter output power assist.
- When using constant B2-21, the values determine the actual AC current limit.

B3 Group (Parallel System)

B3-01: Number of Slaves

- A parallel system is built with 1 master and up to 4 slaves with this setting, one can specify the number of slaves in system. This setting has only to be done in the master. It is not required to specify the number of slaves. The system will work just fine without this setting being specified.
- This setting is added for convenience of the end-user when the AC IN power is larger than the total of B2-05* the number of the Stackable Inverter (Master + Slaves) when B3-01=0. The only effect of this setting is on the scaling of AC IN Current Limit (B2-05). If B3-01=0, one must divide the available AC current by the number of Stackable Inverter (Master + Slaves) and set the limit accordingly. So an example of setting the B2-05=10A in a parallel system with 3 Stackable Inverter would result in a limit of 3*10A=30A
- If however in this system the number of slaves is set 2 (B3-01=2), then the division is done internally and setting the AC IN Current Limit to 10A (B2-05=10) will result in 10A for the whole system and shared by the Master and Slaves. This system is often applied when the AC IN power is limited such as the generator of limited small capacity.

B4 Group (2-3 Phase)

B4-01: 2-3 Phase Connection

- All the Stackable Inverter in a multi-phase system must have 2-3 phase enabled. Use this setting to perform this.
- If more Stackable Inverter per phase are connected in parallel, then only the masters of parallel system must have 2-3 phase enabled.

Setting	Function
B4-01=0 (Initial setting)	2-3 Phase connection disabled.
B4-01=1	2-3 Phase connection enabled.

B4-02: 2-3 Phase Master

- In a multi-phase system, there is always one (and only one) master. The Stackable Inverter for other phases are called followers.
- Use this setting to designate one of the Stackable Inverters is master. If this parameter is set (B4-02=0), the Stackable Inverter is a follower.

Setting	Function
B4-02=0 (Initial setting)	2-3 Phase connection system is called Follower
B4-02=1	2-3 Phase connection system is called Master

B4-03: 2-3 Phase Type

- Use constant B4-03 to determine the kind of multi-phase required.

Setting	Function
B4-03=0 (Initial setting)	3 Phase type: Three Stackable Inverteres are required. Output is 3-phase with 120 ° phase shift.
B4-03=1	Split Phase 180 ° Type: Two Stackable Inverteres are required. Output is 2-phase with phase 180 ° shift
B4-03=2	Two Leg 3 Phase 120 ° Type: Two Stackable Inverteres are required. Output is 2-phase of a normal 3-phase system so two phases with 120 ° phase shift.

C Group (INVERTER):
C1 Group (INVERTER)

C1-01: INVERTER Output Voltage

- Use constant C1-01 to change the RMS output voltage of the INVERTER.

C1-02: Bat Low ?V Shut-down

- With this setting, one can determine the battery voltage at which level the INVERTER will switch off. This can be useful to prevent drawing too much current from an exhausted battery.
- This voltage level will always lie below the Bat Low ? V Restart (C1-03) level. In fact, changing this level will also change the Bat Low ? V Restart (C1-03) level.
- C1-03=C1-02+offset voltage
  For example: KI-1500SI-122, when C1-02=9.3V, C1-03=10.9V, offset voltage=1.6V (10.9-9.3), C1-03 will automatically go to 11.6V(10.0+1.6) after C1-02 is changed to 10.0V.

C1-03: Battery Low ? V Restart

- This setting forms a pair with Bat Low ? V Shut-down (C1-02). With this setting, one determines the battery voltage at which level the INVERTER will switch on.
- In fact, the parameter which is changed is the difference between Bat Low ? V Shut-down (C1-02) and Bat Low ? V Restart (C1-03). The result of this is that when changing the Bat Low ? V Shut-down (C1-02) level, this level also changes.

C1-05: Power Assist Select

- Using this constant C1-05, the Power Assist feature can be enabled or disabled. Use Power Assist to prevent an external circuit breaker to trip when the load on the Stackable Inverter is too high.
- If the load exceeds the AC IN Current Limit (B2-05), the Stackable Inverter will start inverting and will provide the extra current needed.

※ Note: When Power Assist is enabled. C1-05=1 (Initial setting), there is a minimum AC input current limit of approximate 2-3 Amps. Setting a lower limit (B2-05) than this minimum value will result in the minimum limit. (Note: In a parallel system, this limits per Stackable Inverter!)

Setting	Function
C1-05=0	Power Assist Function is disabled.
C1-05=1 (Initial setting)	Power Assist Function is enabled.

C1-06: Power Assist Level

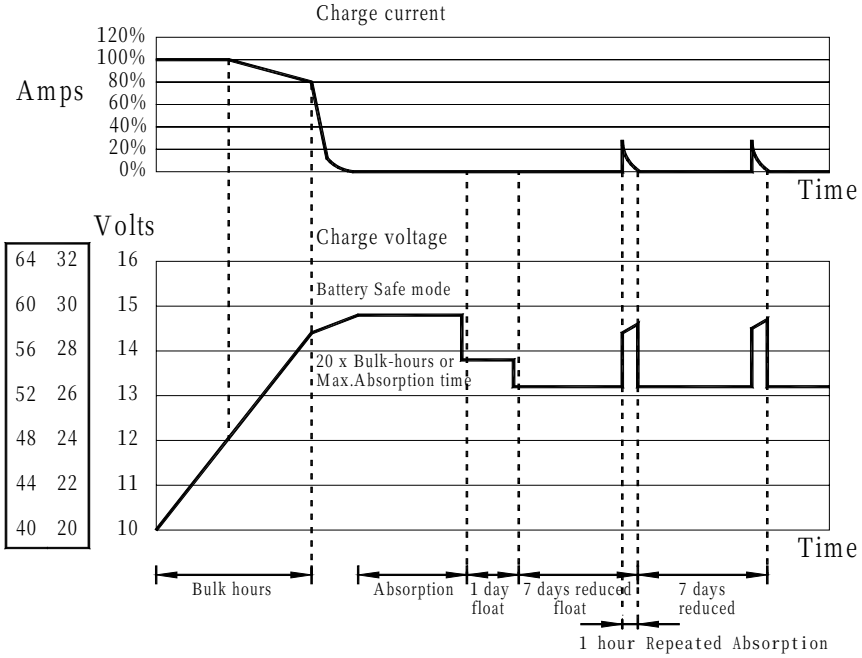
- This setting is a special setting for power assist mode when the Stackable Inverter is charging and due to a sudden load, the AC IN current exceeds the AC IN Current Limit (B2-05), the Stackable Inverter will switch to power assist mode (when C1-05=1)
- At that moment, the current need is unknown. The Stackable Inverter makes an assumption of the magnitude of this current. This assumption is equal to AC IN Current Limit (B2-05) multiplied by this Power Assist Level (C1-06). The default factor is two.
- This will prevent the circuit breaker from tripping because current provided by the INVERTER minus the current drawn by the load is always lower than the rating of the circuit breaker. This happens, of course, when the AC IN Current Limit (B2-05) is correctly adjusted to the circuit breaker.
- If for instance in a generator application, the circuit breaker has a higher value than the AC IN Current Limit (B2-05)(Normal load of generator is lower than maximum peak load) and one knows that the load which is switched on always draws a certain current, one can consider to increase this factor (C1-06) to achieve better results with sudden load changes.

D Group (AC CHARGER):
D1 Group (Charger)

D1-02: Charge Curve

Setting	Function
D1-02=1	Fixed
D1-02=2	Adaptive
D1-02=3 (Initial setting)	Adaptive + Battery safe

- The Fixed (D1-02=1) charge curve will have a fixed Absorption Time (D1-06).
- The Adaptive (D1-02=2) and Adaptive +Battery safe (D1-02=3) curve derive the Absorption time from the Bulk time. The maximum Absorption time of these charge curves is determined by Absorption Time (D1-06) setting.
- The Adaptive + Battery safe (D1-02=3) curve has a special regulation in the absorption phase. The absorption phase will start when the battery voltage reaches 14.4V(for 12V batteries) regardless of the specified Absorption Voltage (D1-03). During the absorption phase, the voltage will increase with a fixed ramp until the voltage reaches the absorption voltage or the calculated absorption time is over in the latter case, the absorption phase will end before the absorption voltage is reached.



D1-03: Absorption Voltage

- Use this setting to specify the absorption voltage.

D1-04: Repeated Absorption Time

- Use this setting to specify the duration of the repeated absorption “pulses”.

D1-05: Repeated Absorption Interval

- Use this setting to specify the interval between repeated absorptions.

D1-06: Maximum Absorption Time

- If the Charge Curve is fixed (D1-02=1), then this setting is used to determine the absorption time.
- In all other cases, this setting determines the maximum absorption time.

D1-07: Float Voltage

- Use this setting to specify the float voltage.

D1-08: Charge Current

- Use this setting to specify the current with which the battery is charged in the bulk phase.

※ Note: The actual charge current depends on other conditions also. Therefore, under certain circumstances, it is possible that the actual charge current is lower than this setting. This can, among others, be due to:

- A low AC IN Current Limit (B2-05) in combination with a high load.
- A high environmental temperature
- A too high ripple voltage due to improper cabling.

D1-09: Stop After 10Hr Bulk

- This is a safety setting. When the bulk phase lasts more than 10 hours, this can be indication that a battery cell is damaged.
- The absorption voltage (or the 14.4V for battery when Battery Safe (D1-02=3) mode is used) will never be reached in that case and the other cells will be over-charged resulting in the

production of an explosive gas.

- Therefore, the charger is disabled if the bulk phase lasts more than 10 hours.
- This setting can be disabled because it does not always indicate a problem when the bulk phase lasts very long. The charge current can be very low due to limited AC input current and/or AC loads. Also, DC loads can “steal away” part of the charge current. In that case, the bulk phase will need more time to complete and this setting must be disabled.

※ Note: When this setting is disabled, there is no safety check against over-charging.

Setting	Function
D1-09=0	Stop After 10Hr Bulk setting is disabled
D1-09=1 (Initial setting)	Stop After 10Hr Bulk setting is enabled

D1-10: Equalize Mode Select (Storage Mode Select)

- This setting is used for enabling/disabling the Equalize Mode.
- In this mode, the voltage setpoint is 13.2V (for 12V battery). If Equalize mode is disabled, then the normal float voltage will be used.

Setting	Function
D1-10=0	Equalize mode is disabled
D1-10=1 (Initial setting)	Equalize mode is enabled

E Group (Auxiliary Relay):
E1 Group (Setting Aux-Relay 1 ON Condition)

E1-01: LOAD Higher than ? Amps
E1-02: LOAD Higher for ? sec

- Use these settings to switch the Aux-Relay 1 ON. When the actual AC OUT load is above a certain value (E1-01) for a certain time (E1-02).
- The corresponding Aux-Relay 1 OFF condition is
  E2-01: Load Lower than ? Amps and
  E2-02: Load Lower for ? sec.

※ Note: If setting E1-02=0 sec (Initial setting). Then the E1-01 is ignored.
※ Note: If setting E2-02=0 sec (Initial setting). Then the E2-01 is ignored.

E1-03: Udc Lower than ? Voltage
E1-04: Udc Lower for ? sec

- Use these settings to switch the Aux-Relay 1 ON. When battery voltage becomes lower than a certain limit (E1-03) for a certain time (E1-04).

※ Note: If E1-04=0 sec (Initial setting), then E1-03 is ignored.

E1-05: Udc Higher than ? Voltage
E1-06: Udc Higher for ? sec

- Use these settings to switch the Aux-Relay 1 ON when battery voltage becomes higher than a certain limit (E1-05) for a certain time (E1-06).

※ Note: If E1-06=0 sec (Initial setting), then E1-05 is ignored.

E1-07: Not Charge for ? sec

- Use this setting to switch on the Aux-Relay 1 when the AC CHARGER is not charging for a certain time (E1-07).
- Normally used for generating an alarm situation.

E1-08: Fan ON for ? sec

- This will switch the Aux-Relay 1 ON when the internal fan switches on. This can be used together with the E2-08: Fan OFF for ? sec setting to drive an external fan.

E1-09: When bulk protection is activated.

- This will set the Aux-Relay1 ON when the “bulk protection” (D1-09=1) is activated. This condition will remain valid as long as the AC CHARGER is disabled due to that safety mechanism. One can use this setting to generate an alarm.

E1-10: System Fault Occurs

- This will switch on the Aux-Relay 1 when the Stackable Inverter switches off due to an internal alarm situation.

E1-11: Temp. Alarm Select (When E1-12=0, ignore this setting)
E1-12: Temp. Alarm for ? sec

- If you want to switch on the Aux-Relay 1 when there is a over temperature alarm, this setting (E1-11) can be used to choose between pre-alarm or normal alarm.
- As with other Aux-Relay 1 settings, a delay value (E1-12) must be specified also. This can be done with Delay value for set Aux-Relay 1 ON when over temperature alarm (E1-12) setting.

E1-13: Low Batt. Alarm Select (When E1-14=0, ignore this setting)
E1-14: Low Batt. Alarm for ? sec

- If you want to switch on the Aux-Relay 1 when there is a low battery alarm, this setting (E1-13) can be used to choose between pre-alarm or normal alarm.
- As with other Aux-Relay 1 settings, a delay value (E1-14) must be specified also. This can be done with Delay value for set Aux-relay 1 ON when low battery alarm (E1-14) setting.

E1-15: OverLoad Alarm Select (When E1-16=0, ignore this setting)
E1-16: OverLoad Alarm for ? sec

- If you want to switch on the Aux-Relay 1 when there is a overLoad alarm, this setting (E1-15) can be used to choose between pre-alarm or normal alarm.
- As with other Aux-Relay 1 setting, a delay value (E1-16) must be specified also. This can be done with Delay value for set Aux-Relay 1 ON when overload alarm (E1-16) setting.

E1-17: Udc Ripple Alarm Select (When E1-18=0, ignore this setting)
E1-18: OverLoad Alarm for ? sec

- If you want to switch on the Aux-Relay 1 when there is a battery voltage ripple alarm. This setting (E1-17) can be used to choose between pre-alarm or normal alarm.
- As with other Aux-Relay 2, setting a delay value (E1-18) must be specified also. This can be done with Delay value for set Aux-Relay 1 ON when battery voltage ripple alarm (E1-18) setting.

E2 Group (Setting Aux-Relay 1 OFF Condition)

E2-01: Load Lower than ? Amps
E2-02: Load Lower for ? sec

- Use these settings to switch Aux-Relay 1 OFF. When the actual AC OUT Load is below a certain value (E2-01) for a certain time (E2-02).
- The corresponding Aux-Relay ON condition is
  E1-01: Load Higher than ? Amps and
  E1-02: Load Higher for ? sec.

※ Note: If setting E2-02 (E1-02)=0 sec (Initial setting), then the E2-01 (E1-01) is ignored.

E2-03: Udc Lower than ? Voltage
E2-04: Udc Lower for ? sec

- Use these settings to switch off the Aux-Relay 1 when battery voltage becomes lower than a certain limit (E2-03) for a certain time (E2-04)

※ Note: If E2-04=0 sec (Initial Setting), then E2-03 is ignored.

E2-05: Udc Higher than ? Voltage
E2-06: Udc Higher for ? sec

- Use these settings to switch off the Aux-Relay 1 when battery voltage becomes higher than a certain limit (E2-05) for a certain time (E2-06)

※ Note: If E2-06=0 sec (Initial setting), then E2-05 is ignored.

E2-07: Charging for ? sec

- This setting switches the Aux-Relay 1 OFF when the AC CHARGER started for a certain time (E2-07). This can be useful when the Aux-Relay 1 is for instance used a low battery alarm.
- Use the Set Udc Lower than ? Voltage (E1-03) setting to start the alarm and use this setting (E2-07) to stop it.

※ Note: As along as the battery voltage is lower than the specified limit (E1-03), the alarm will be active.

E2-08: Fan OFF for ? sec

- This will switch the Aux-Relay 1 OFF when the internal fan switches off. This can be used together with the E1-08: Fan ON for ? sec setting to drive an external fan.

E2-09: Charge finished for ? Min (When E2-09=0, ignore this setting)

- This condition becomes active when the charge bulk phase is finished for a certain time (E2-09).
- For the charge curve, take a look at for instance the Charge Current (D1-08) setting.
- This is useful when the Aux-Relay 1 is used to start a generator. Once started, one might want to keep the generator on until the batteries are more or less charged.

E2-10: Aux-Relay 1 not ON for ? minutes (When E2-10=0, ignore this setting)

- If one does not need special off condition, one can use this setting and the Aux-Relay 1 will switch off automatically when there has been no ON condition for a certain time (E2-10).

E2-11: AC IN loss for ? sec (When E2-11=0, ignore this setting)

- This setting will switch off Aux-Relay1 if the RMS value of AC IN voltage is too low for a certain time (E2-11).
- This AC level is determined by the AC IN Low Disconnect (B2-01) setting.
- Use this setting (E2-11) to disable re-starting of a generator which is switched off by hand when the Aux-Relay 1 is used to generate a start signal for that generator.

E2-12: No Temp. Alarm Select (When E2-13=0, ignore this setting)
E2-13: No Temp. Alarm for ? sec

- If you want to switch off the Aux-Relay 1 when there is no over temperature alarm, this setting (E2-12) can be used to choose between pre-alarm or normal alarm.
- As with other Aux-Relay 1 setting, a delay value must be specified also. This can be done with the Delay value for set Aux-Relay 1 OFF when No Overtemperature Alarm (E2-13) setting.

E2-14: No Low Batt. Alarm Select (When E2-15=0, ignore this setting)
E2-15: No Low Batt Alarm for ? sec

- If you want to switch off the Aux-Relay 1 when there is no low battery alarm, this setting (E2-14) can be used to choose between pre-alarm or normal alarm.
- As with other Aux-Relay 1 setting, a delay must be specified also. This can be done with the Delay value for set Aux-Relay 1 OFF when No Low Battery Alarm (E2-15) setting.

E2-16: No OverLoad Alarm Select (When E2-17=0, ignore this setting)
E2-17: No OverLoad Alarm for ? sec

- If you want to switch off the Aux-Relay 1 when there is no OverLoad alarm, this setting (E2-16) can be used to choose between pre-alarm or normal alarm.
- As with other Aux-Relay 1 setting, a delay must be specified also. This can be done with the Delay value for set Aux-Relay 1 OFF when No OverLoad Alarm (E2-17) setting.

E2-18: No Udc Ripple Alarm Select (When E2-19=0, ignore this setting)
E2-19: No Udc Ripple Alarm for ? sec

- If you want to switch off the Aux-Relay 1 when there is no battery voltage ripple alarm, this setting (E2-18) can be used to choose between pre-alarm or normal alarm.
- As with other Aux-Relay 1 setting, a delay must be specified also. This can be done with the Delay value for set Aux-Relay 1 OFF when No Battery voltage Ripple Alarm (E2-19) setting.

E3 Group (Setting Aux-Relay 2 ON Condition)
E4 Group (Setting Aux-Relay 2 OFF Condition)
E5 Group (Setting Aux-Relay 3 ON Condition)
E6 Group (Setting Aux-Relay 3 OFF Condition)

※ Note: The functions and the settings of E3, E4, E5 and E6 Groups are exactly the same as those of E1 and E2 Group so please refer to above E1 and E2 Group description and setting for E3, E4, E5 and E6 Groups.

E7 Group (Aux-Relay 1 Option)

E7-01: Aux-Relay 1 Usage Select

Setting	Function
E7-01=0 (Initial setting)	Auxiliary Relay 1 is not allowed to be active (Idle).
E7-01=1	Auxiliary Relay 1 is allowed to be active.

E7-02: Aux-Relay 1 Invert Select

Setting	Function
E7-02=0 (Initial setting)	Auxiliary Relay 1 is normal.
E7-02=1	Auxiliary Relay 1 is Invert switch and that is ON becomes off and OFF becomes ON.

- This is used to invert the Aux-Relay 1 So ON becomes OFF and OFF becomes ON. In the program, the labels are adapted to reflect this inversion.

E7-03: Aux1 not Switch Off Time (Aux-Relay 1 do not switch off with certain period)

- Use constant E7-03 to determine the minimum ON time.
- The Aux-Relay 1 will not be switched off within the time specified here measured from the moment that all on condition are inactive.

※ Note: OFF conditions with a delay of 0 minute, ignore this setting.

E8 Group (Aux-Relay 2 Option)

E9 Group (Aux-Relay 3 Option)

※ The functions and the settings of E8 and E9 Groups are exactly the same as those of E7 Group so please refer to above E7 Group description and setting for E8 and E9 Groups.

O Group (Operator):
O1 Group (Monitor Select)

O1-01: Power ON LCD Monitor Select

- After power of the Stackable Inverter is on, the monitor selections will be showed on LCD Display, U1-05 Battery Voltage is the initial display shown.
- All the constants in U1 Group can be programmed (U1-01~U-26).

O1-02: Key Idle Detect Time

- Use constant O1-02 to set the idle time when the keyboard is not operated and once any key is pressed, the display will return to the LCD monitor selection value set in constant O1-01.
- Initial Setting=180 sec, setting range: 10~600 sec.

O2 Group (Key Selections)

O2-01: Key Pressed Beep Select

Setting	Function
O2-01=0	When keys are pressed, beep sound will not be heard.
O2-01=1 (Initial setting)	When keys are pressed, beep sound will be heard.

O2-02: Elapsed Time Reset

- Use constant O2-02 to reset elapsed time.

O2-03: Elapsed Time Select

Setting	Function
O2-03=0 (Initial setting)	The elapsed time started to be counted after power is on.
O2-03=1	The elapsed time started to be counted after RUN.

O2-04: Stackable Inverter Model

- This is the model number to be displayed.

O2-06: MODE Key Hold Time

- Use constant O2-06 to set the time it takes to press MODE key to transfer from one of fours modes to another mode. (This has to be done in STOP mode)
- Initial setting=5 sec, setting range: 2~10 sec.

O2-07: RUN/STOP Key Hold Time

- Use constant O2-07 to set the time it takes to press RUN/STOP key to activate its function.
- Initial setting=2 sec, setting range: 2~10 sec.

O2-08: Power ON Auto Run Select

- Use constant O2-08 to select to auto run manually or automatically.

Setting	Function
O2-08=0	Auto Run is active when pressing Run/STOP key
O2-08=1 (Initial setting)	Auto Run is active when the power is on.

O2-09: LCD Display Idle Time Set

- When O2-09=0, Display Idle Function is disabled.
- Use constant O2-09 to set the idle time when the keypad is not operated and all the LCD Display and LED Indicators of the Stackable Inverter entering the idle mode which only RUN/STOP indicator is active.
- Once any key on the panel is pressed, it will return to the display before Idle status.
- Initial setting=10 min, setting range: 0~60 min.

U Group (Monitor):
U1 Group (Monitor)

U1-01: AC IN Voltage

- Use U1-01 to monitor the current voltage value of AC IN power in unit of 0.1V.

U1-02: AC IN Current

- Use U1-02 to monitor the current value of AC IN power in unit of 0.1A.

U1-03: AC OUT Voltage

- Use constant U1-03 to monitor AC OUT voltage value in unit of 0.1V.

U1-04: AC OUT Current

- Use constant U1-04 to monitor AC OUT current value in unit of 0.1A .

U1-05: Battery Voltage

- Use constant U1-05 to monitor the battery voltage in unit of 0.1V.

U1-06: Battery Ripple Voltage

- Use constant U1-06 to monitor the battery ripple voltage in unit of 0.1V.

U1-07: Battery Current

- Use constant U1-07 to monitor battery current value in unit of 0.1A.

U1-08: Control Mode

- Use constant U1-08 to monitor the current control mode (MODE 1, MODE 2, MODE 3 or MODE 4)

U1-09: Operation Status

- There are 12 digits to account for each operation status. Please see NOTE 1 in Chapter 5.

U1-10: Aux-Relay Status

- Use constant U1-10 to monitor the ON/OFF status of 3 sets of Aux-Relay (RY1, RY2, RY3). Please see NOTE 2 in Chapter 5.

U1-11: Elapsed Time

- Use constant U1-11 to monitor the elapsed time after power ON (O2-03=0) or after RUN (O2-03=1) in unit of 1 hour.

U1-12: Battery Temperature Sensor

- Use constant U1-12 to monitor the temperature that has been detected by Battery Temperature Sensor (BTS-3) in unit of 1℃.

U1-13: CPU ID1

- Use constant U1-13 to check the software version 1.

U1-14: CPU ID2

- Use constant U1-14 to check the software version 2.

U1-15: Solar Charger Status

- Use constant U1-15 to monitor solar charger status after solar module is connected to the extension port (Port C).

U1-16: Solar Supply Current

- Use constant U1-16 to monitor the solar supply current value in unit of 0.1A.

U1-17: Solar Supply Power

- Use constant U1-17 to monitor the solar supply power value in unit of 1W.

U1-18: Solar Amp-Hours

- Use constant U1-18 to monitor solar Amp-Hours value in unit of 1AH.

U1-19: Solar Total Amp-Hours

- Use constant U1-19 to monitor solar total Amp-Hours value in unit of 1AH.

U2 Group (Fault Trace)

U2-01: Current Fault

- Use constant U2-01 to monitor the current fault that results in “Stackable Inverter” stopping operating.

U2-02: Last Fault

- Use constant U2-02 to monitor the last fault that has been recorded.

U2-03: AC IN Voltage

- Use constant U2-03 to monitor the AC input voltage value in unit of 0.1V when the current fault occurs.

U2-04: AC IN Current

- Use constant U2-04 to monitor the AC input current value in unit of 0.1A when the current fault occurs.

U2-05: AC OUT Voltage

- Use constant U2-05 to monitor the AC output voltage value in unit of 0.1V when the current fault occurs.

U2-06: AC OUT Current

- Use constant U2-06 to monitor the AC output current value in unit of 0.1A when the current fault occurs.

U2-07: Battery Voltage

- Use constant U2-07 to monitor the battery voltage value in unit of 0.1V when the current fault occurs.

U2-08: Battery Ripple Volt

- Use constant U2-08 to monitor the battery ripple voltage in unit of 0.1V when the current fault occurs.

U2-09: Battery Current

- Use constant U2-09 to monitor the battery current value in unit of 0.1A when the current fault occurs.

U2-10: Control Mode

- Use constant U2-10 to monitor what the control mode (MODE 1, MODE 2, MODE 3 or MODE 4) is when the current fault occurs.

U2-11: Operation Status

- Use constant U2-11 to monitor 12 digits which account for each operation status when the current fault occurs. Please see NOTE 1 in Chapter 5.

U2-12: Aux-Relay Status

- Use constant U2-12 to monitor the ON/OFF status of 3 sets of Aux-Relay (RY1, RY2, RY3) when the current fault occurs. Please see NOTE 2 in Chapter 5.

U2-13: Elapsed Time

- Use constant U2-13 to monitor the elapsed time after power ON (O2-03=0) or after RUN (O2-03=1) in unit of 1 hour when the current fault occurs.

U2-14: Solar Charger Status

- Use constant U2-14 to monitor solar charger status when the current fault occurs. This constant is only visible when extension port is connected to solar module.

U2-15: Solar Charge Current

- Use constant U2-15 to monitor the solar charge current value in unit of 0.1A when the current fault occurs.

U2-16: Solar Supply Power

- Use constant U2-16 to monitor the solar supply power value in unit of 1W when the current fault occurs.

U2-17: Solar Amp-Hours

- Use constant U2-17 to monitor solar Amp-Hours value in unit of 1AH when the current fault occurs.

U2-18: Solar Total Amp-Hours

- Use constant U2-18 to monitor solar total Amp-Hours value in unit of 1AH when the current fault occurs.

U2-26: Battery Temperature Sensor

- Use constant U2-26 to monitor the current temperature that has been detected by Battery Temperature Sensor (BTS-3) in unit of 1℃ when the current fault occurs.

U3 Group (Fault History)

U3-01: Last Fault

- Use constant U3-01 to monitor the latest fault stored in the software.

U3-02: Fault Message 2

- Use constant U3-02 to monitor the most recent second fault stored in the software.

U3-03: Fault Message 3

- Use constant U3-03 to monitor the most recent third fault stored in the software.

U3-04: Fault Message 4

- Use constant U3-04 to monitor the most recent fourth fault stored in the software.

U3-05: Elapsed Time 1

- Use constant U3-05 to monitor the elapsed time before the latest fault occurs.

U3-06: Elapsed Time 2

- Use constant U3-06 to monitor the elapsed time before the most recent second fault occurs.

U3-07: Elapsed Time 3

- Use constant U3-07 to monitor the elapsed time before the most recent third fault occurs.

U3-08: Elapsed Time 4

- Use constant U3-08 to monitor the elapsed time before the most recent fourth fault occurs.

Chapter 7 Trouble Shooting Table

- Proceed as follows for a quick detection of common faults.
- DC loads must be disconnected from the batteries and the AC loads must be disconnected from the INVERTER before the INVERTER and/or battery charger (AC CHARGER) is tested.
- Consult your dealer if the fault cannot be resolved.

Problem or Error message	Cause	Solution
The “Stackable Inverter” fails to operate when power on.	The battery voltage is too high or too low.	Ensure that the battery voltage is within the correct value range.
‘Udc-UV’ Battery under volt ‘ ’: blink	The battery voltage is low.	Charge the battery or check the battery connections.
Udc-UV Battery under volt	The “Stackable Inverter” cuts out because the battery voltage is too low.	Charge the battery or check the battery connections.
‘OL’ Inverter OverLoad ‘ ’: blink	The load on the inverter of “Stackable Inverter” is higher than the normal load.	Reduce the load.
OL Inverter OverLoad	The INVERTER of “Stackable Inverter” cuts out due to excessive load.	Reduce the load.
‘OH’ Heatsink Max Temp. ‘ ’: blink	The ambient temperature is too high, or the load is excessive.	Place the “Stackable Inverter” in a cool and well-ventilated room, or reduce the load.

OH Heatsink Max Temp.	The ambient temperature is too high, or the load is excessive.	Place the “Stackable Inverter” in a cool and well-ventilated room, or reduce the load.
‘Udc-ripple’ Volt Ripple Exceeds ‘ ’: blink	Voltage ripple on the DC input exceeds 1.25Vrms	Check the battery cables and terminals. Check the battery capacity; increase it if necessary.
Udc-ripple Volt Ripple Exceeds	The INVERTER of “Stackable Inverter” cuts out as a result of excessive voltage ripple on the DC input	Install batteries with a higher capacity. Use shorter and/or thicker battery cables and reset the Stackable Inverter (Power OFF and ON again).
‘Udc-OV’ Battery over voltage. ‘ ’: blink	Battery charger is not in normal charging status to cause battery voltage too high.	Replace the “Stackable Inverter”.
Udc-OV Battery over voltage.	Incorrect battery voltage connection (12V system but connected to 24V battery)	Recheck if the Stackable Inverter and the battery voltage is matched.
‘Idc-OC’ Over current. ‘ ’: blink	The actual charge current is 1.5 times larger than the set current value (D1-08) when AC CHARGER is operating.	Stop the Charge mode of the “Stackable Inverter”.
Idc-OC Over current.		Repair or replace the “Stackable Inverter”.

‘Bat-NG’ Battery Fault ‘ ’: blink Bat-NG Battery Fault	The charging time of AC CHARGER has been over 10 hours and remains in Bulk Charge mode. (D1-09=1) shows the battery is at fault.	Replace the battery banks.
The charger is not functioning	The AC IN voltage or frequency is out of range.	Ensure that the AC IN voltage is within the range 220V system: 180VAC~260VAC 110V system: 90VAC~130VAC And that the frequency matches the setting.
	“Stackable Inverter” internal circuit breaker has tripped.	Reset the internal circuit breaker.
The battery is not being charged fully.	Incorrect charging current.	Set the charging current at between (0.1~0.2) ㄨ battery capacity.
	A defective battery connection.	Check the battery terminals.
	The absorption voltage has been set an incorrect value.	Adjust the absorption voltage to the correct value.
	The float voltage has been set to an incorrect value.	Adjust the float voltage to the correct value.
	The internal DC fuse is defective	“Stackable Inverter” is damaged.
The battery is overcharged.	The absorption voltage has been set to an incorrect value.	Adjust the absorption voltage to the correct value.
	The float voltage has been set to an incorrect value.	Adjust the float voltage to the correct value.

The battery is overcharged.	The battery is too small.	Reduce the charging current or use a battery with a higher capacity.
	A defective battery.	Replace the battery.
	The battery is too hot.	Connect a Battery Temperature Sensor (BTS-3)
Battery charge current drop to 0 A when the absorption voltage is reached.	Battery over temperature (> 50℃)	1. Allow battery to cool down. 2. Place battery in a cool environment. 3. Check for shorted cells.
	Battery Temperature Sensor (BTS-3) is faulty	1. Unplug Battery Temperature Sensor (BTS-3) from "Stackable Inverter" and power off the "Stackable Inverter" then wait 5 seconds and power on again. 2. If the "Stackable Inverter" AC CHARGE normally, the BTS-3 is faulty and needs to be replaced.