New ATB Controller

HANpro 3000

(User Manual)

Hancess always effort for new concept technical.

In this User Manual

A user gets the information needed to use HanPRO 3000, a delicated CONTROLLER to provide a CTTS (Closed Transition Transfer Switching) function to ATB (Automatic Transfer Switches with Air Circuit Breaker Type). This manual consists of the following chapters

Chapter 1 is a summary to briefly explain about the basic structure of the controller and its usage.

Chapter 2 contains a brief explanation about how to set various operation parameters.

Chapter 3 includes detailed instructions of operating the controller.

Chapter 4 has the details on how to operate the controller and ATB.

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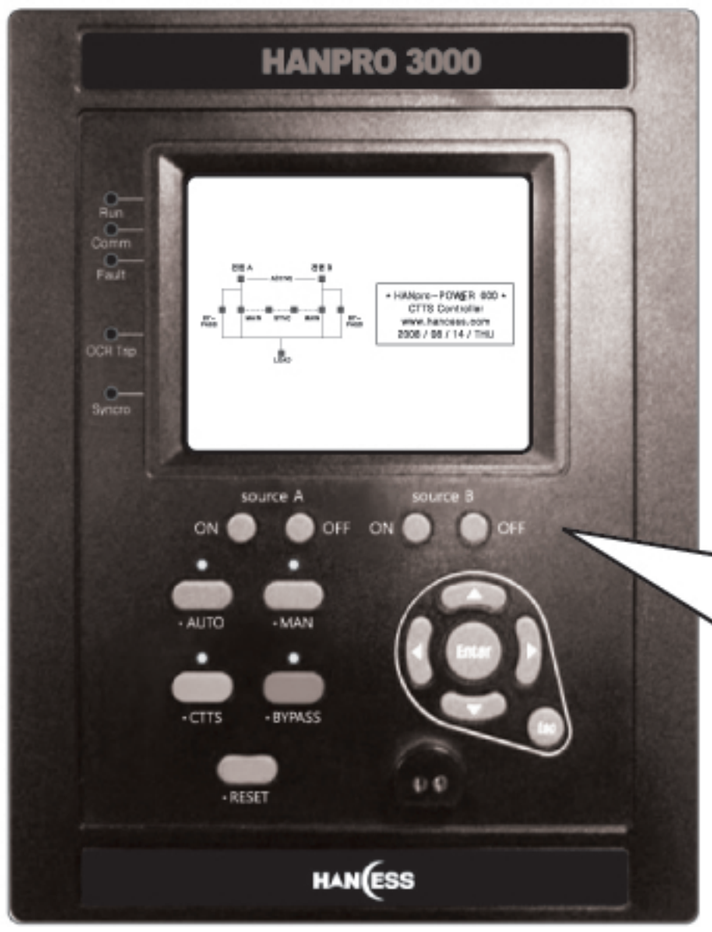
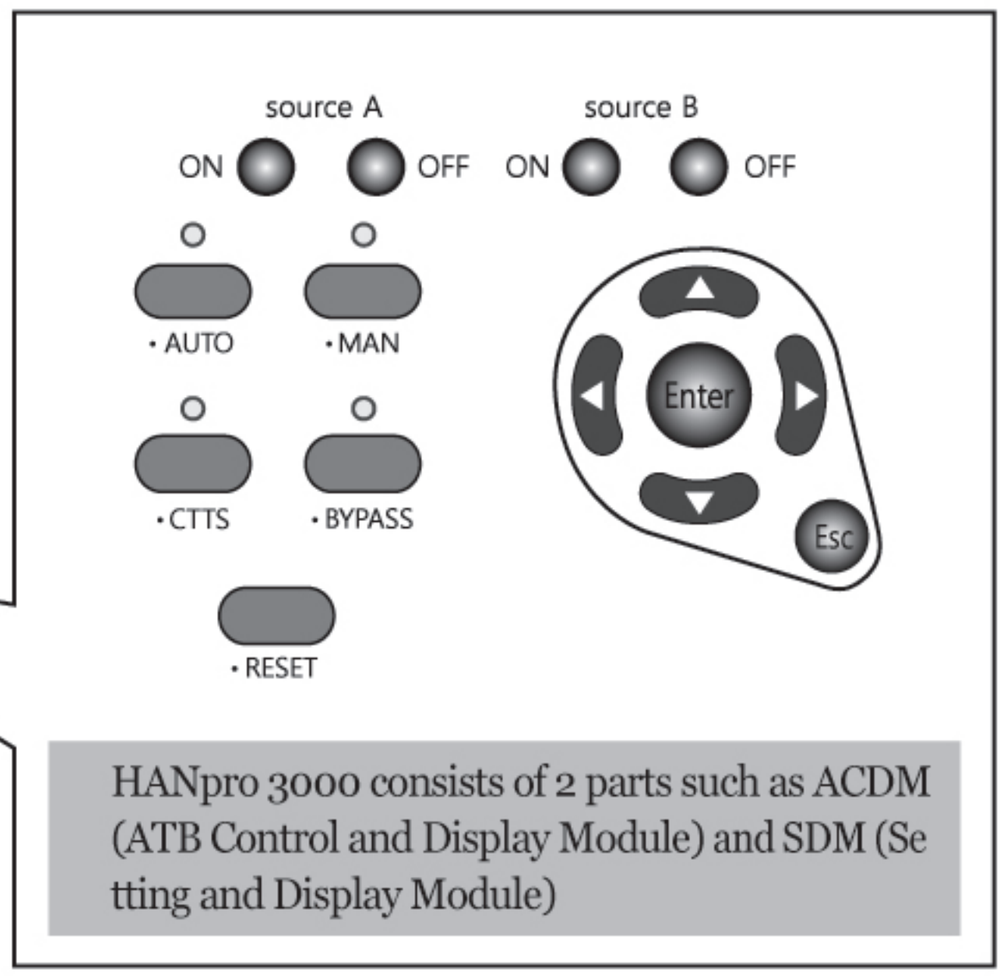
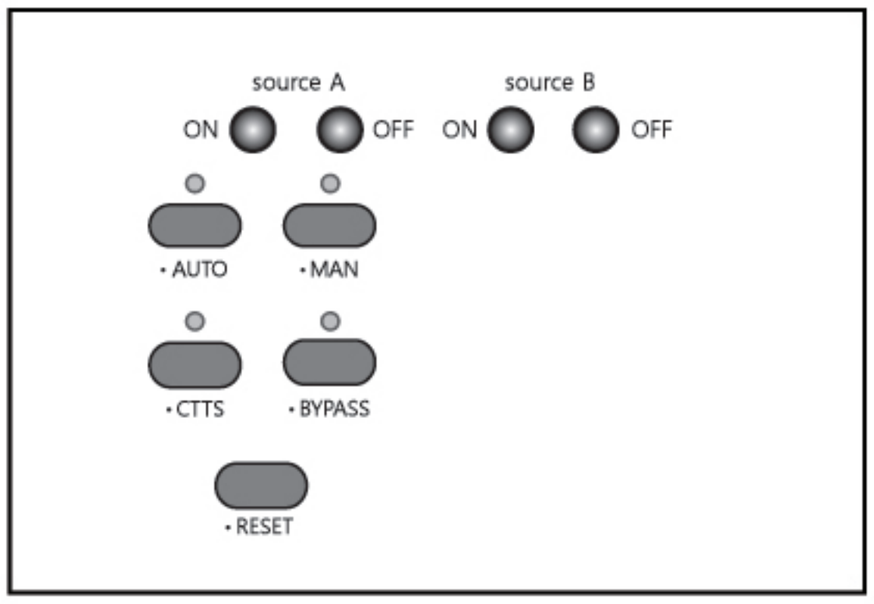
1. Summary





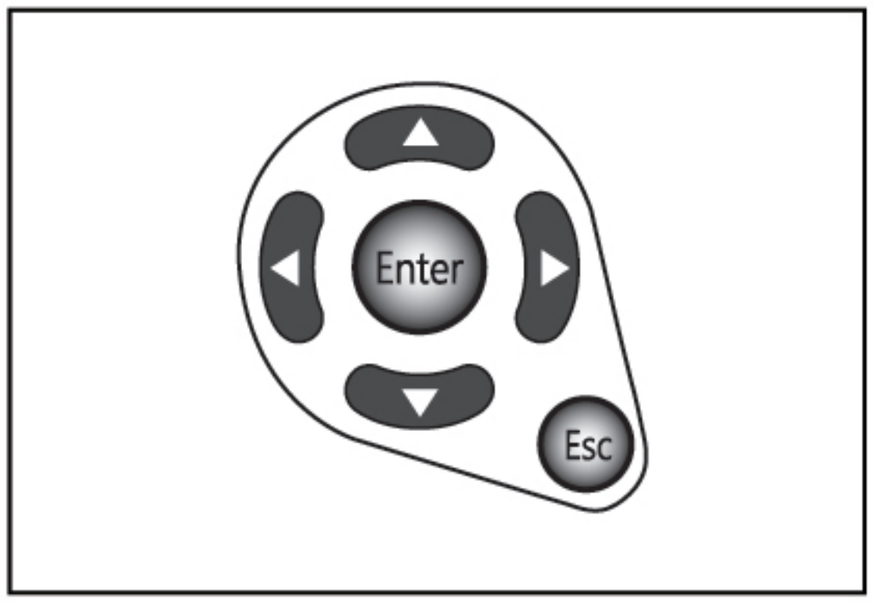
HANpro 3000 consists of 2 parts such as ACDM (ATB Control and Display Module) and SDM (Setting and Display Module)

■ ACDM (ATB Control and Display Module)



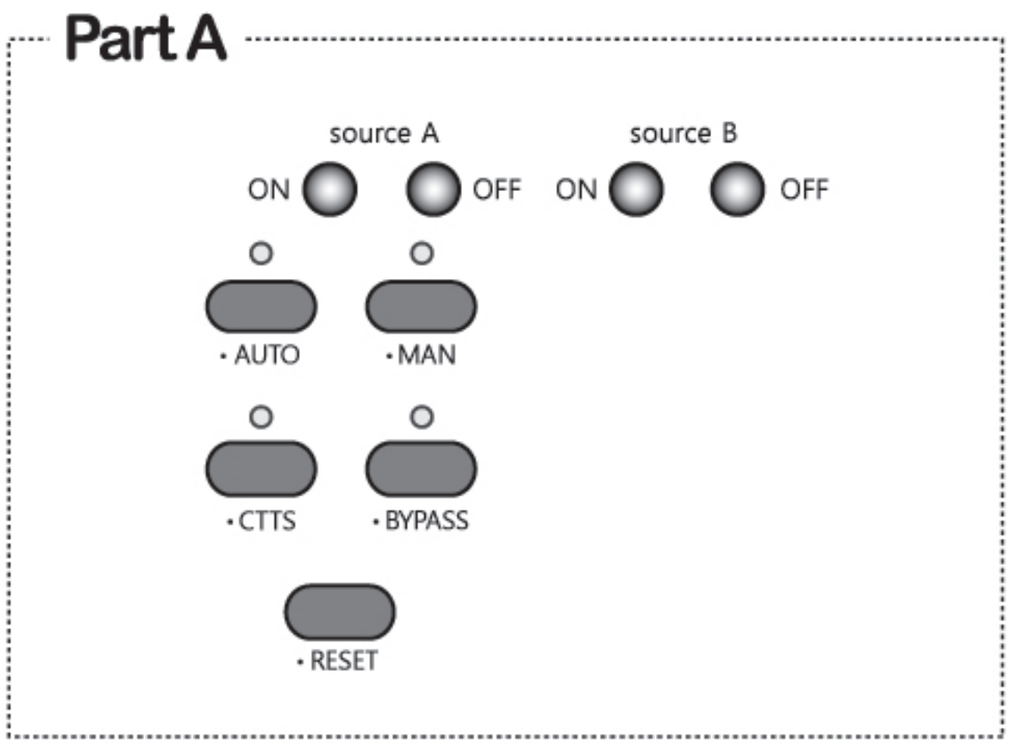
ACDM is the panel related to Instrument Operation, which has 8 keys on it. It displays the present status of the instrument and allows users to control each function, in relation with operating ATB. (The detailed explanation is provided in Chapter 3 and 4 respectively.)

■ SDM (Setting and Display Module)



SDM consists of 6 keys and a text-type LCD with its size of 4x20 inches. A user is able to monitor the operation status of ATB, as well as viewing and changing parameters. The screen displays 2 types of level. The start level provides the information of ATB (Automatic Transfer Breaker), and the set-up level is for setting the environment of the controller. In case of changing a few specific settings, a password is required.(Please refer to page 9, regarding password set-up.)

1-1 Display of Control Panel and its Keys



■ Control Keys and LED Display of ATB (Automatic Transfer Switch)

■ Key function

ON / OFF Key — This key is for controlling utilization of power source A and B. In case of automatic operation, no control is allowed by using this key. It works only when Manual key is chosen.

AUTO / MAN Key — This key is used to change the mode between automatic and manual operation. It functions only when at least one power source is activated.

BYPASS Key — This key is for controlling the transfer function of CTTS. It works only when Manual key is chosen.

CTTS Key — This key is for controlling Bypass function. It works only when Manual key is chosen.

■ LED Display

ACTIVE — It displays the status of power source A and B.

MAIN — It displays Main ATB is under operation.

BYPASS — It displays Bypass ATB is under operation.

SYNC — It displys whether synchronization between power source A and B is made.

LOAD — It displays the status of Load

Instrument Defect — It displays whether ATB is normally operated.

Power Problem — It displays abnormality with power source.

AUTO — It displays Auto function is used.

MAN — It displays Manual function is used.

CTTS — It displays CTTS is in transfer.

BYPASS — It displays Bypass function is used.

1-1 Display of Control Panel and its Keys

Part B

- LCD Display Part It shows the status of ATB operation and the set-up values of parameters and their changes.

Left - Right Key

This key allows of moving to other display screens of the same set-up level. (Please refer to Section 1 and 2.)

Enter/Save Settings key

This key allows of moving from the present level displayed on the screen to its sub-level. This key is also used to store the changed values of parameters.

Up-Down Key

This key is used for increasing or decreasing the setting values of parameters on the set-up level screen.

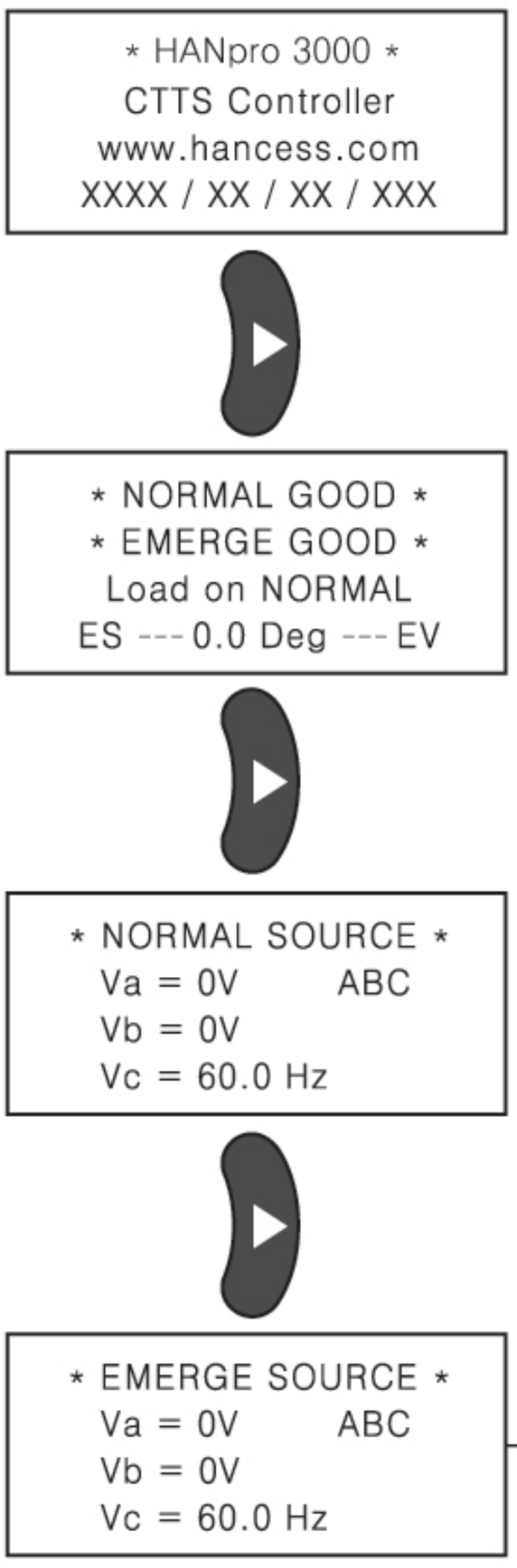
Esc key

This key is used either for disregarding any conversion or returning to the upper level. This key is also used to reset the disorder status of ATB on the main screen.

1-2 Summary of SDM Part

SDM enables a user to display the operation status of ATB on the LCD screen, as well as to confirm and change such operation parameters as the rated set-up and set-up of protection range. The display levels of SDM consist of 4 kinds of hierarchical ones such as the top- layer level displaying the status of ATB, 8 groups of the main set-up level, the level of detailed set-up groups included in each main set-up group, and the level of parameter set-up display/ change in each detailed set-up group. Among the screens of the same level, Left-Right key allows of moving from one group to another. Enter key must be chosen to move into sub-level, and Esc key, to move into upper level. When Enter key is pressed down, the screen changes into the initial one of sub-level of the group in question. In case Esc key is pushed down, the screen changes into the initial one of upper level of the group in question.

Top-layer level displaying the status of ATB



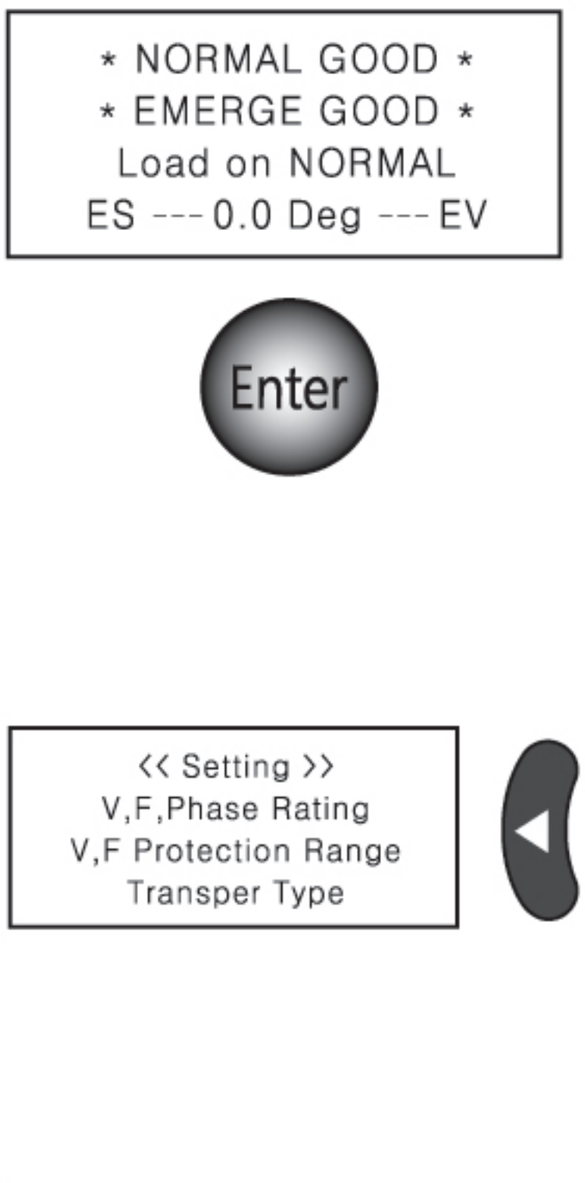
When SDM is granted with power, a name of controller and present time is displayed on the panel. A user may identify the operation status of ATB by pushing down Left-Right key. The operation status of ATB comprises such display screens as general status, normal source status and emergency source status. Left-Right key is used to move to and fro among these screens.

The screen of general status shows the status of normal and emergency power sources in 1st and 2nd lines and the type of power source connected to the load in 3rd line. In 4th line, it shows not only any change of the status occurred to ATB but also the gap of electrical phase angle between normal and emergency power sources during CTTS operation.

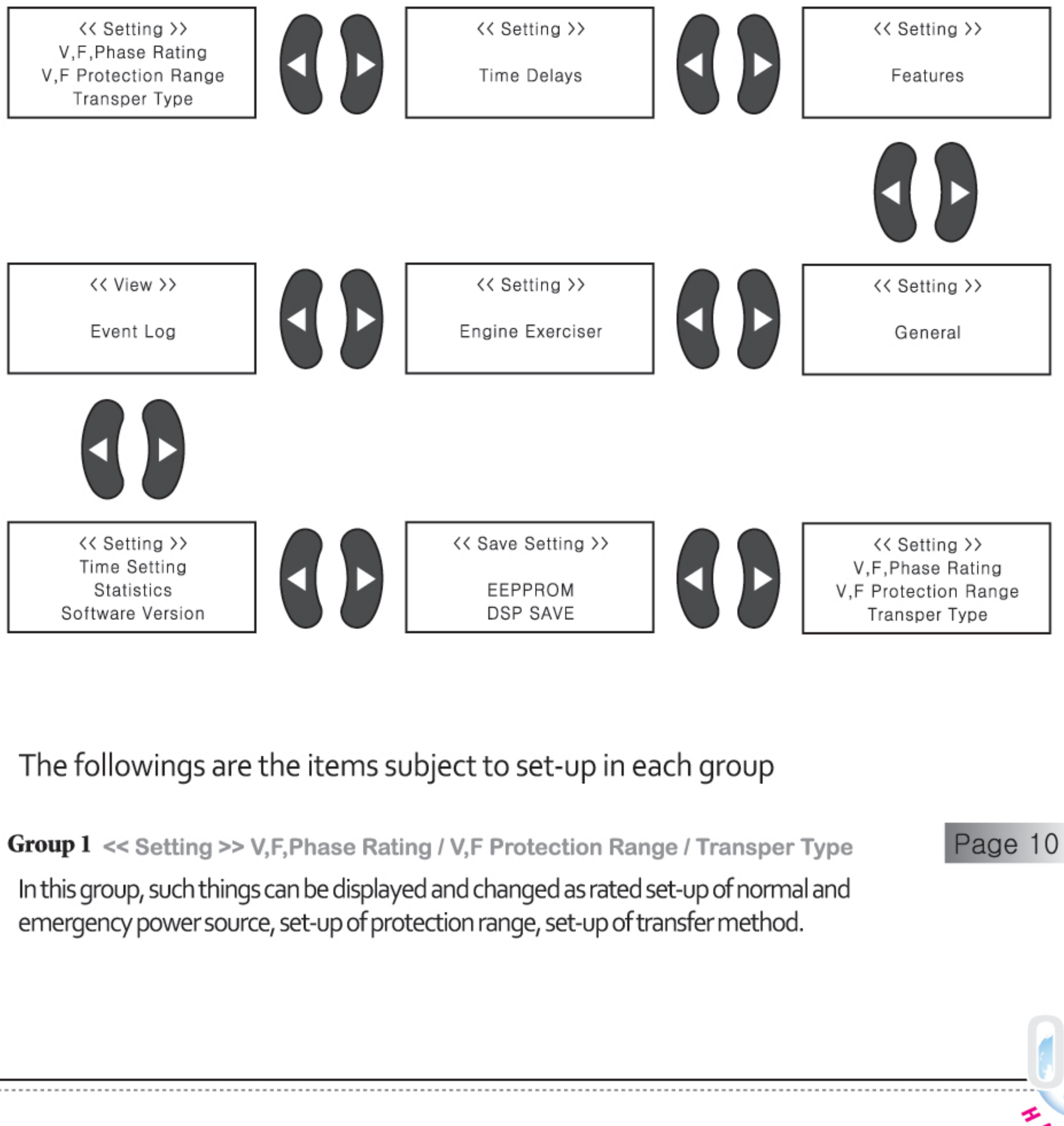
The screen of normal source status represents A-phase voltage of normal power source in 2nd line, and at the same time it indicates the direction of phase rotation, if power source originates from 3-phase electric power. The letters in 3rd line shows B phase voltage, and the ones in 4th line exhibits C phase voltage and its frequency.

The screen of emergency source status represents A-phase voltage of emergency source in 2nd line, and it exhibits the direction of phase rotation, if power source originates from 3-phase generation. The letters in 3rd line shows B phase voltage, and the ones in 4th line exhibits C phase voltage and its frequency.

- Main Set-up Level



Main Set-up Level consists of 8 main set-up groups. A press of Enter key in the top-layer level leads to this screen.
8 main set-up groups are as follows. In order to view and change set-up parameters, a user must push down Enter key in the set-up group in question. The full explanation about viewing and changing the detailed set-up parameters is provided in the next chapter.
A press of Enter key in any set-up group of Main Set-up Level leads to the display screen of general status of top-layer level



The followings are the items subject to set-up in each group

Group 1 << Setting >> V,F,Phase Rating / V,F Protection Range / Transper Type

In this group, such things can be displayed and changed as rated set-up of normal and emergency power source, set-up of protection range, set-up of transfer method.

Group 2 << Setting >> Time Delays

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In this group, such time delay can be set related both to synchronous transfer (CTTS) and asynchronous transfer (DTTS).

Group 3 << Setting >> Features

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In this group, such things can be set as synchronous detection, phase rotation method, execution of asynchronous transfer in case of a failure of synchronous transfer.

Group 4 << Setting >> General

Page 13

In this group, such settings can be made as basic settings upon product issuance, a language used, communication speed, event log resetting, password.

Group 5 << Setting >> Engine Exerciser

Page 14

In this group, such settings can be made as display of present time, On/Off control for 2 units of generator.

Group 6 << View >> Event Log

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In this group, the operation status of ATB can be recorded into the storage memory of 128 event logs, along with the information of year, month, date and time when an event took place. Those are identified in this group.

Group 7 << Service >> Time Setting / Statistics / Software Version

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In this group, such settings are included as present time, number of transfer, number of transfer due to disorder, number of days in operation, total hours of input by power source, reset function.

Group 8 << Save Settings >> EEPPROM / DSP SAVE

Page 17

In this group, the changed value of a particular parameter is stored in a read-only EEPROM, and a user can decide whether to apply the set-up change to the main program.

2. Set-up

2-1 How to Change Set-up

Set-up changing

A. A user has to display on the screen what he/she wants to change. (Page 1-2)

B. A press of Enter key leads to the screen on which there is a cursor in the beginning of first line.
(If a password is requested, please refer to the below.)

C. After changing numerical figures or letters by using Up-Down key, a user has to press down Enter/Save Settings key to store them and go to next step.

D. C process is repeated until the requirements are fully provided.

TIP >>>>> If there is a cursor on a screen, it means SDM is awaiting an input. Esc key is used to finish editing.

Password

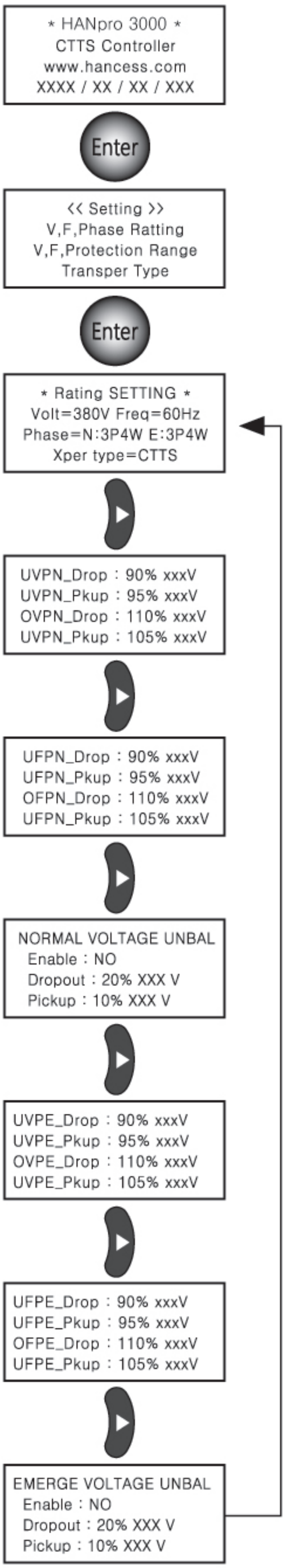
TIP >>>>> The password set upon factory issuance is oooo. When Enter Password is displayed on the screen, a user should input the existing password.

Password modification

1. When Change Password is displayed, a user has to change the numerical figures one by one by using Up-Down key. (Left-Right key for moving left or right) When changing 4 figures is finished, then Enter/Save Settings key has to be pushed down.

2. After inputting a previous password, a user has to push down Enter/Save Settings key. If the password is not identical, the sign of Password Error /Try Again is displayed on the screen.

3. When the sign of Now new Password / Saving Now is displayed, this process ends.



2-2 Inspection and Change of Rated Power Sorce and Protection range

SDM enables a user to view and change the parameters such as the rated values of two power sources, protection range, transfer method, by using the keypad installed.

1. In the initial screen, a user pushes down Enter key to move to the screen of set-up level.
2. A user pushes down Enter key to move to the screen of Rating Setting.
3. By pushing down Left-Right Key, a user is able to move to the screen for setting power source and frequency desired.

The detailed explanation for each set-up is given below.

7 menus for setting power source and frequency

(The last menu gets back to the first one in rotation.)

Rate Setting

This screen displays the rated voltage, frequency, phase number, transfer method in ATB. In this screen, no change is allowed for each rated value of parameter. In order to change these rated values, a user must reset the controller and download them to the implementation program. In case of transfer method, it is changeable during operation.

Normal Source UVP and OVP

This screen displays the parameter values of pickup and dropout in relation with the set-up of low and high voltage protection range of normal power source. It displays them as the percentage value of the rated voltage and the effective value of the converted voltage. In order to change each parameter value, a user has to push down Enter key.

Normal Source UFP and OFP

This screen displays the parameter values of pickup and dropout in relation with the set-up of protection range between low and high frequency of normal power source. It displays them as a percentage value of the rated frequency and an effective value of the converted frequency. In order to change each parameter value, a user has to push down Enter key.

Normal Voltage Unbalance

This screen is adoptable in case that the phase number of normal power source is made up of the type of either 3 phase 3 wires or 3 phase 4 wires. It works only when any imbalance in 3 phase power source takes place.

Emerge Source UVP and OVP

This screen displays the parameter values of pickup and dropout in relation with the set-up of protection range between low and high voltage of emergency power source. It displays them as a percentage value of the rated voltage and an effective value of the converted voltage. In order to change each parameter value, a user has to push down Enter key.

Emerge Source UFP and OFP

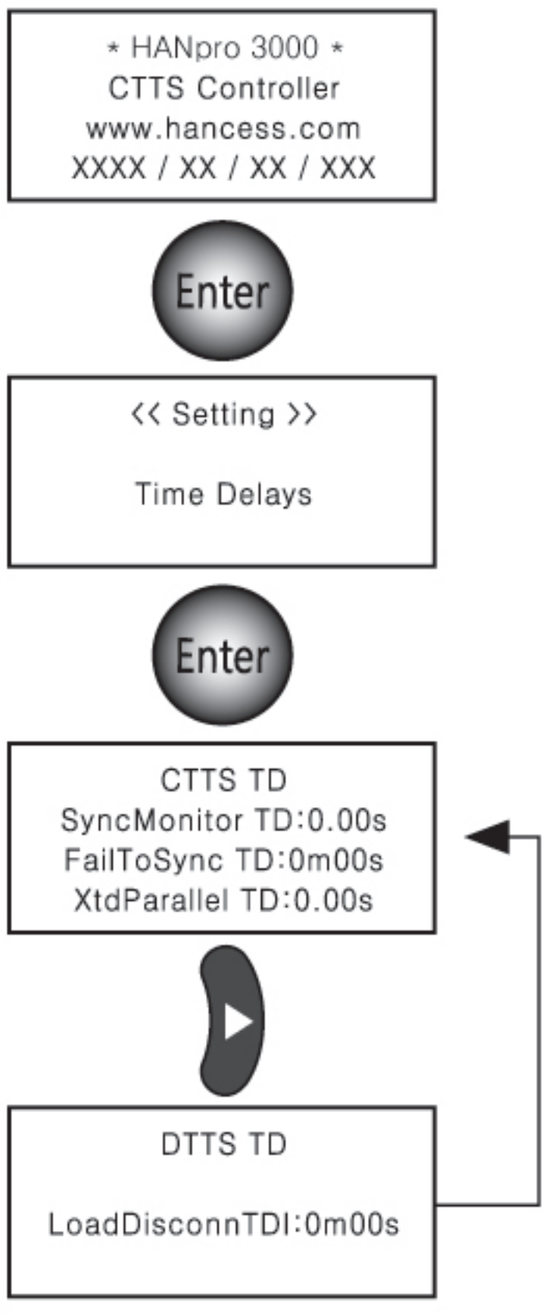
This screen displays the parameter values of pickup and dropout in relation with the set-up of protection range between low and high frequency of emergency power source. It displays them as a percentage value of the rated frequency and an effective value of the converted frequency. In order to change each parameter values, user has to push down Enter key.

Emerge Voltage Unbalance

This screen is adoptable in case that the phase number of emergency power source is made up of the type of either 3 phase 3 wires or 3 phase 4 wires. It works only when any imbalance of 3 phase power source takes place.

2-3 Set-up of Time Delay

SDM enables a user to set 3 kinds of time delay for CTTS and view and change the parameters like the load separation time for DTTS, by using the keypad installed.



1. In the initial screen, a user pushes down Enter key to move to the screen of set-up level.
2. A user pushes down Left-Right key to move to the screen of Time Delay Setting.
3. By pushing down Enter key, a user moves to the menu of time delay.
4. By pushing down Left-Right key, a user is able to display on the screen the set-up result of time delay desired.

The detailed explanation for each set-up is given below.

2 menus for setting time delay

(The last menu gets back to the first one in rotation.)

CTTS TD

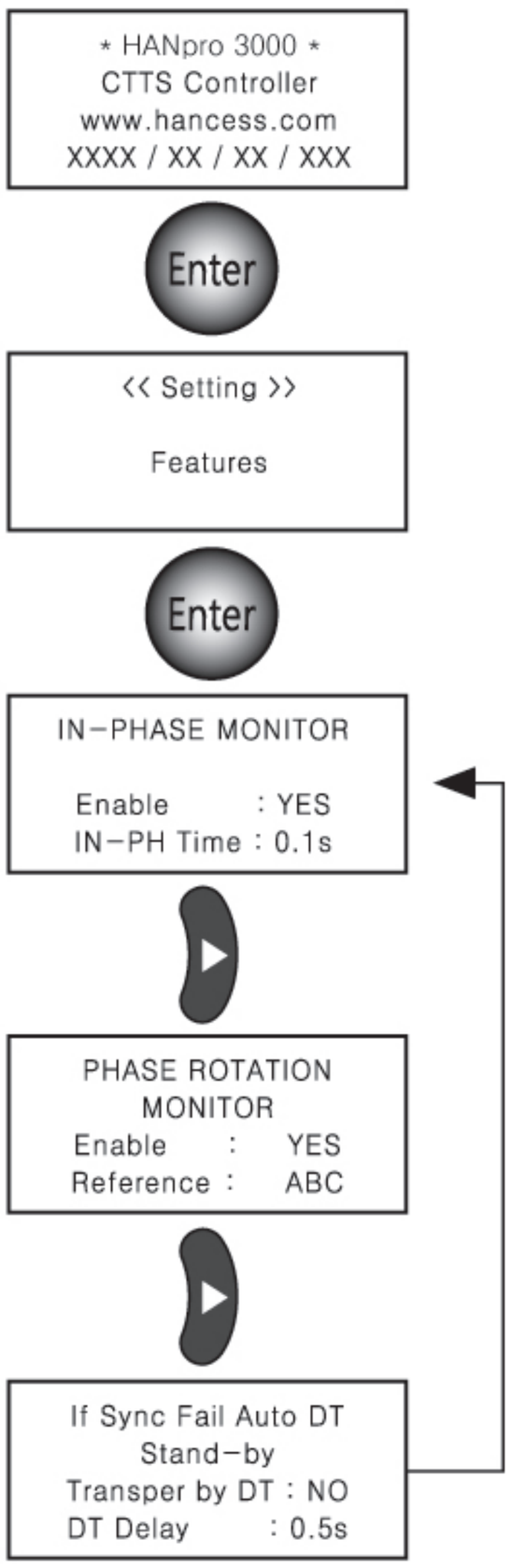
In this screen, a user is able to view such information as the time of synchronous maintenance upon CTTS transfer, the time of synchronous failure, the time of parallel operation of both power sources. In order to change each time delay parameter, a user has to push down Enter Key.

DTTS TD

This screen displays the time span consumed in separating loads from power source upon DTTS transfer. In order to change this time delay parameter, a user has to push down Enter Key.

2-4 Set-up of Functions

SDM enables a user to view and change such special functions as whether to use synchronous check function, whether to display phase rotation, and whether to execute automatic time delayed load transfer (DTTS) upon failure of synchronous transfer, by using the keypad installed.



1.In the initial screen, a user pushes down Enter key to move to the screen of set-up level.
2. A user pushes down Right key to move to the screen of Time Delay Setting.
3. A user pushes down Right key to move to the menu screen of Features Setting.
4. By pushing down Enter key, a user is able to move to the level of view and change.
5. By pushing down Left-Right key, a user is able to display on the screen the set-up result desired.

The detailed explanation for each set-up is given below.

3 menus for setting features

(The last menu gets back to the first one in rotation.)

IN-PHASE MONITOR

This item is for setting whether to change the function of synchronous check into Enable, and a user may change its value by Up-down Key. IN-PH Time indicates the time to maintain a synchronous status by which synchronous transfer is available upon using CTTS function. Its value may be changed in the section of Time Delay Setting.

PHASE ROTATION MONITOR

In case of using 3 phase power source, this indicates the direction of phase rotation. This function is fixed as Enable upon factory issuance. Reference can be changed into either ABC or RST by using Up-Down key.

If Sync Fail Auto DT

This item is for setting whether to use the method of time delayed load transfer (DTTS) when a user finds that the synchronization between both power sources is not in harmony. Its value can be changed by using Up-Down key. In case of YES, DTTS method is used, and in case of NO, it stops synchronous transfer and returns to standby position.

2-5 Set-up of Application Environments

SDM enables a user to view and change such application environments as whether to change the present set-up into the one designated at the time of factory issuance, a language used, communication speed and address, whether to use the function of Event Logging, and password set-up, by using the keypad installed.

1. In the initial screen, a user pushes down Enter key to move to the screen of set-up level.
2. A user pushes down Right key to move to the screen of Time Delay Setting.
3. A user pushes down Right key to move to the menu screen of Features Setting.
4. A user pushes down Right key to move to the menu screen of General Setting.
5. By pushing down Enter key, a user changes the screen to the one of the level to view and change parameters.
6. By pushing down Left-Right key, a user is able to move to the screen in which a user can set the application environments desired.

The detailed explanation for each set-up is given below.

5 menus for setting application environment

(The last menu gets back to the first one in rotation.)

Default to Factory Settings

This screen shows erasing main set-ups and converting into the default value of factory settings.

Menu Language

This screen shows the status of language used. The basic language is English.

Serial Communication

This screen shows modulation rate of communication port and address set-up.

Event Logging

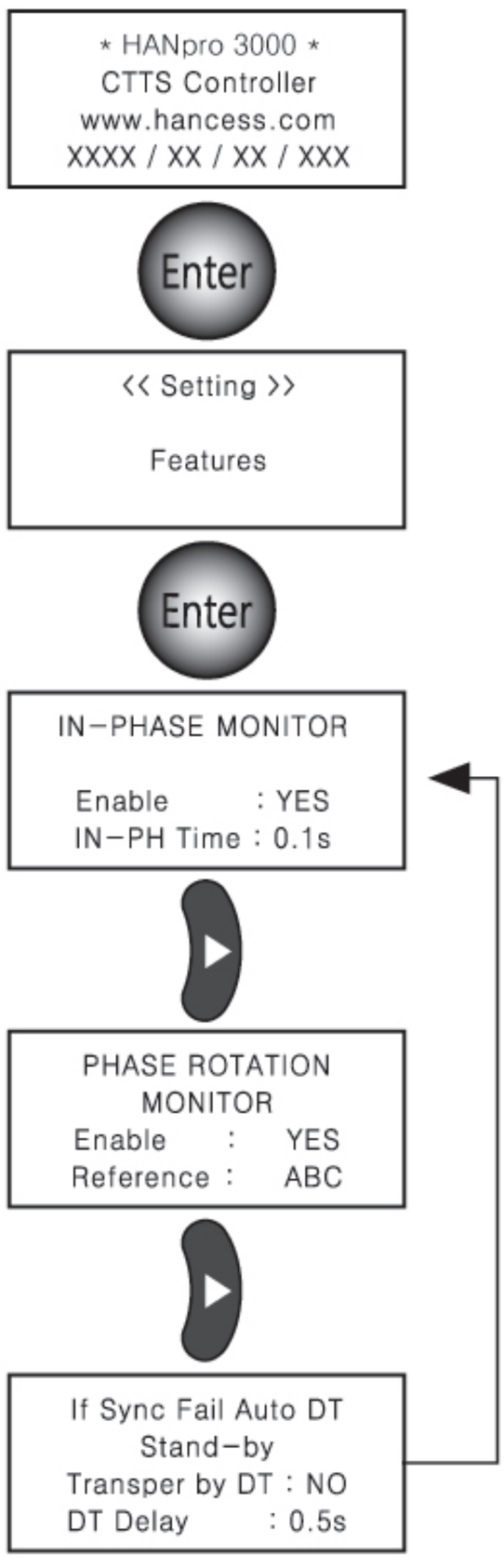
This screen is for setting whether to store an event which takes place during ATB operation. Up to 128 events can be stored. When YES is chosen in the item of Clear Event and Enter key is pushed down, all the events stored are erased, and thus a user can store new 128 events.

Change Password

This screen is for changing password.

2-6 Set-up of Engine Exerciser

SDM enables a user to set two Engine Exercisers to On/Off and view the set-up value, by using the keypad installed.



1. In the initial screen, a user pushes down Enter key to move to the screen of set-up level.
2. A user pushes down Right key to move to the screen of Time Delay Setting.
3. A user pushes down Right key to move to the menu screen of Features Setting.
4. A user pushes down Right key to move to the menu screen of General Setting.
5. A user pushes down Right key to move to the menu screen of Engine Exerciser Setting.
6. By pushing down Enter key, a user changes the screen to the one of the level to view and change parameters.
7. By pushing down Left-Right key, a user is able to move to the screen in which a user can set the engine exerciser desired.

The detailed explanation for each set-up is given below.

3 menus for setting Engine Exerciser

(The last menu gets back to the first one in rotation.)

Present Date/Time

In this screen, a user is able to identify the date and time recognized by CM. If they are different from the real time, it can be changed in the section of Time Setting.

P1~2 Engine Control

This screen shows setting the routine of 2 units of the independent Engine Exercisers such as P1 and P2.

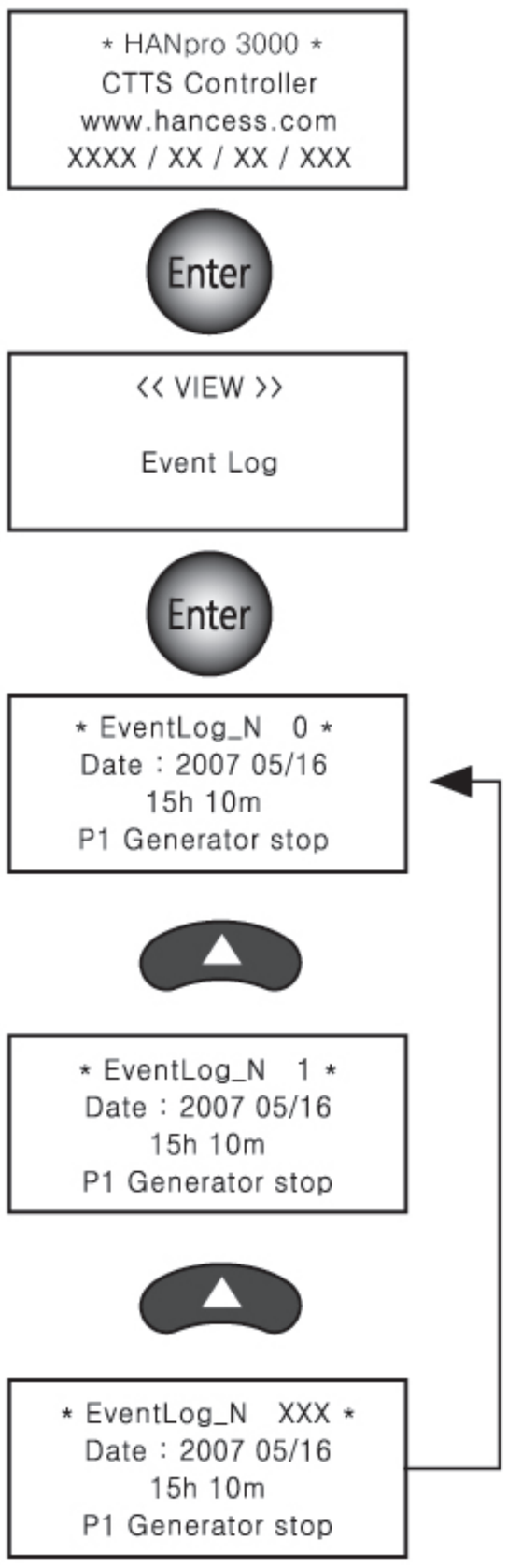
ON : Up Key

OFF : Down Key

RUN TIME : It shows the time a generator is operated.

2-7 Event Log Viewing

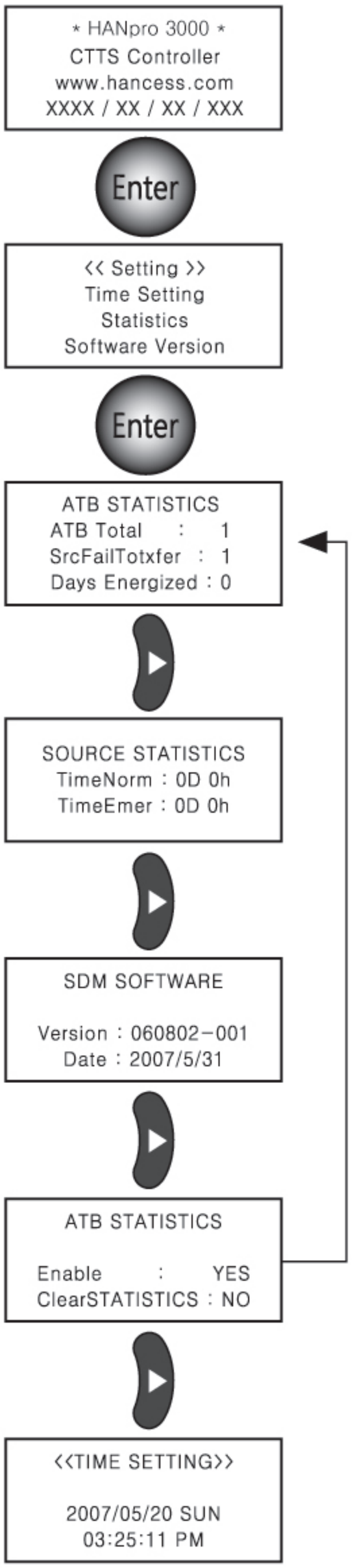
SDM enables a user to view 128 events stored, by using the keypad installed.



1. In the initial screen, a user pushes down Enter key to move to the screen of set-up level.
2. A user pushes down Right key to move to the screen of Time Delay Setting.
3. A user pushes down Right key to move to the menu screen of Features Setting.
4. A user pushes down Right key to move to the menu screen of General Setting.
5. A user pushes down Right key to move to the menu screen of Engine Exerciser Setting.
6. A user pushes down Right key to move to the menu screen of View Event Log Setting.
7. By pushing down Enter key, a user moves to the screen in which the first event is stored.
8. By pushing down Up-Down key, a user is able to verify the events stored and their occurrence time in terms of year, month, date and time.

2-8 Additional Functions

SDM enables a user to view such additional functions as the cumulative total of transfer and its reset, the cumulative total of power source grant, software version, and time setting , and change their parameters, by using the keypad installed.



1. In the initial screen, a user pushes down Enter key to move to the screen of set-up level.
2. A user pushes down Right key 6 times to move to the service menu screen.
3. By pushing down Enter key, a user changes the screen to the one of the level to view and change set-up.
4. By pushing down Left-Right key, a user is able to display on the screen the additional functions desired.

The detailed explanation for each set-up is given below.

4 menus for service

(The last menu gets back to the first one in rotation.)

ATB Statistics

In this screen, a user can view such information as the total number of ATB transfer, the total number of transfer due to abnormal power source, the total number of days in operation after installation. These values are not allowed to change.

Source Statistics

This screen displays the cumulative time that both normal power source and emergency power source are granted. These values are not allowed to change.

SDCM Software

This screen displays the version of operation software of CM.

ATB Statistics

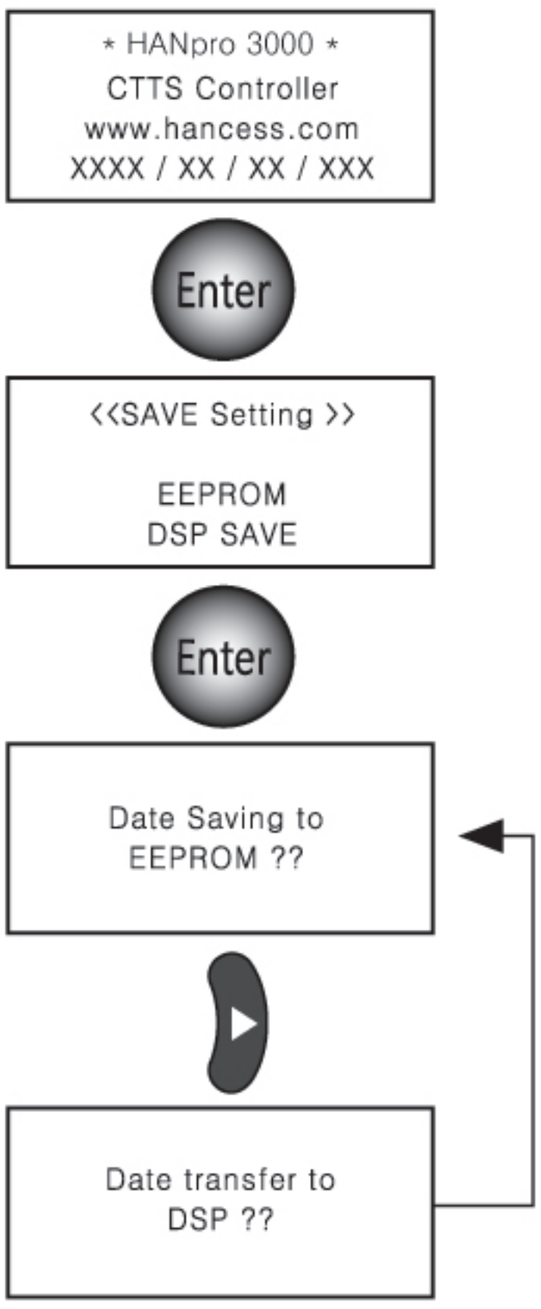
In this screen, a user can use the function of the aggregate in ATB. In order to reset the stored values, a user has to use Up-Down key and identify a password.

Time setting

This screen shows setting real time of CM.

2-9 Set-up of Storage

SDM enables a user to store the changed values of each parameter in a non-volatile memory (EEPROM) and change the stored parameter values during operation, by using the keypad installed. In case SDM is under operation, the rated values are not allowed to change.



1. In the initial screen, a user pushes down Enter key to move to the screen of set-up level.
2. A user pushes down Left-Right key to move to the screen of Save Setting.
3. By pushing down Enter key, a user changes the screen to the one of the level to view and change set-up.
4. By pushing down Left-Right key, a user is able to display on the screen the set-up of service desired.

The summary for each set-up is given below.

2 menus for storage

EEPROM

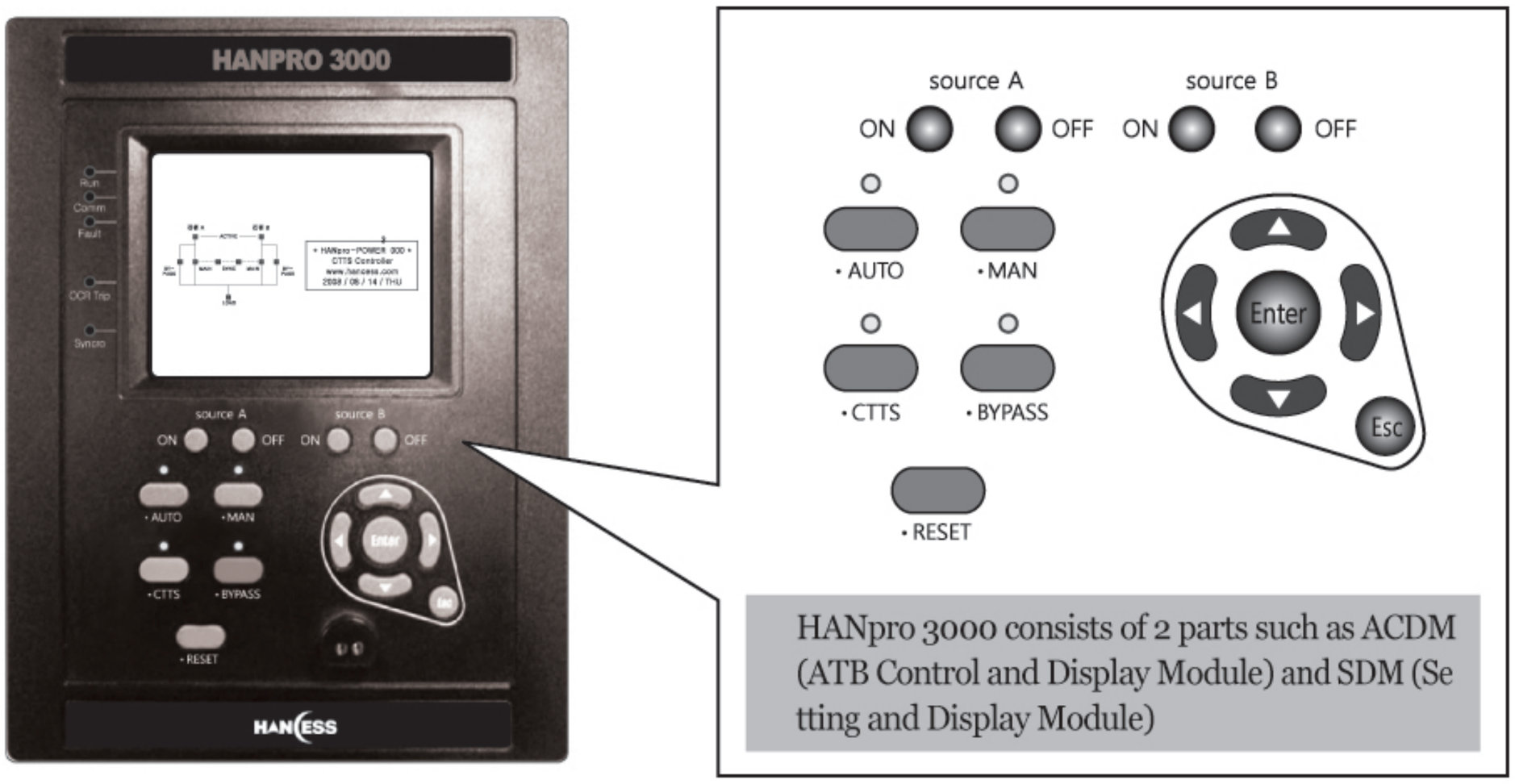
It stores the changed parameter values permanently.

DSP SAVE

This function is for saving the values in DSP memory. When power source is on, the setting values are stored, and when off, the changed parameter values disappear away.

3. Controller Operation

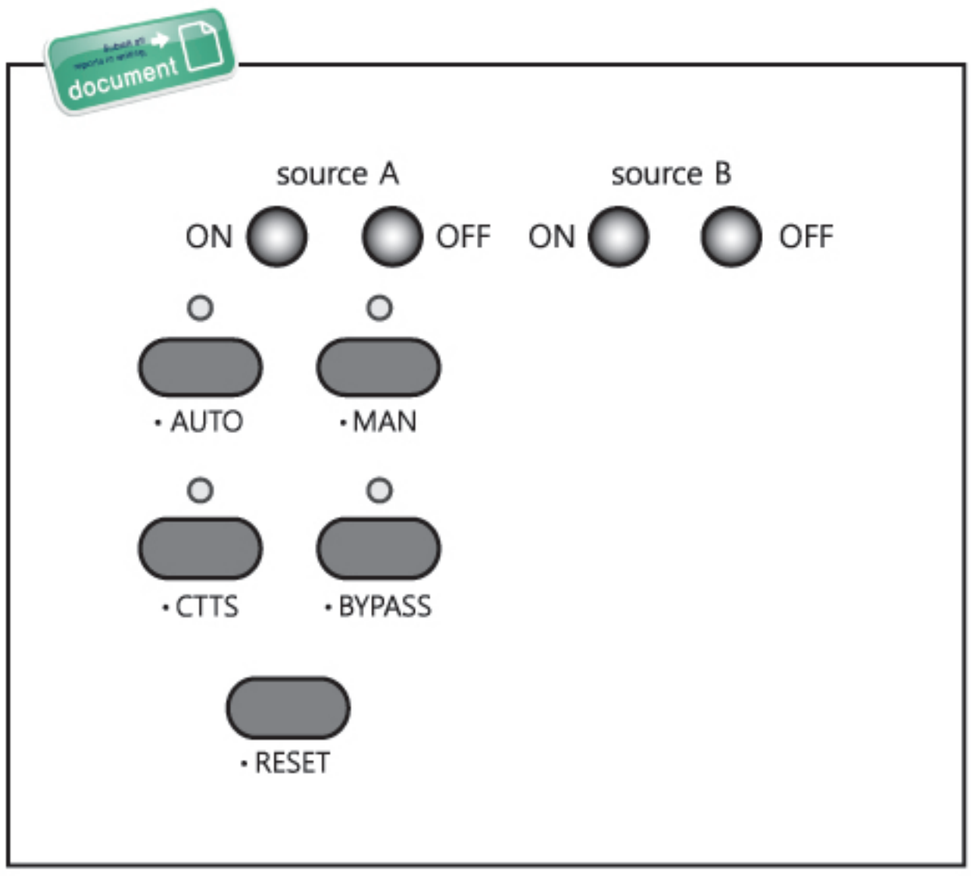
After installing HanPRO 3000 in a proper way, which consists of ATB and Controller, a user supplies HanPRO 3000 with electric power. (110 V DC)
When HanPRO 3000 is granted power supply, the red-color LED lamp located on the switch (MAN) which means MANUAL, is turned on, and the red-color LED lamp situated in ACTIVE mark of the activated power source is turned on. If the synchronization is made between power source A and B in the status of activation in both, then 2 green-color SYNC LED lamps are turned on concurrently.
In the other hand, if there is any closed connection point among the connection points of either MAIN ATB or BY-PASS ATB, the LED lamp with the mark in question and the LED lamp for LOAD are turned on. The following figure shows LED lighting status when the electric power originated from KEPCO is activated and supplied to loads in the mode of automatic operation.



< Figure > The status of power source A's activation and its supply to load.

The concrete usage of ACDM and SDM is described In the next section.

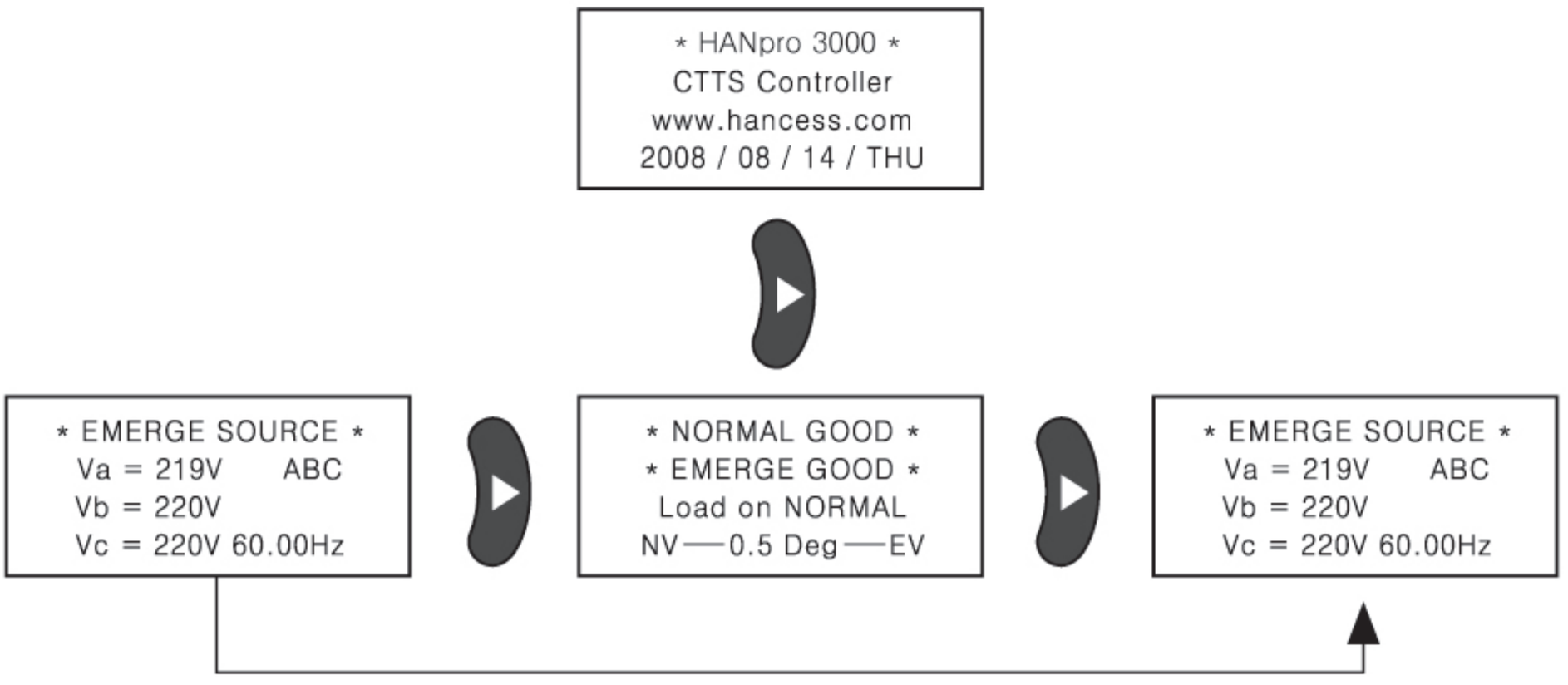
3-1 ACDM Operation



ACDM consists of 15 status-marking LED lamps and 8 On/Off switches, as shown in left side.
Power source A indicates normal power (Supplied from KEPCO), and power source B, emergency power (Generator).
ACTIVE shows the status that power source is granted within the range of UVP PKUP, a low voltage protection range and the range of OVP DROP, an over-voltage protection range. SYNC means the synchronization of both power sources is in harmony. MAIN and BY-PASS represent ATB in operation. Instrument Defect displays a switching command has not been performed during ATB operation.

Power Problem means that power source is out of protection range designated for low voltage, over-voltage, low frequency and high frequency respectively. LOAD presents power is supplied to the present loads.
At the lower part of the panel, the On/Off switches of both power source A (Supplied from KEPCO) and power source B (Generator)의 ON/OFF are situated, and there are the switches and LED lamps and LED lamps indicating AUTO MODE operation, MANUAL MODE operation, CTTS operation and BY-PASS operation respectively
Concerning the detailed operation method, please refer to Chapter 4 Technology of Instrument Operation.

3-2 SDM Operation



When the controller is granted power supply, the initial discriminative screen is displayed on the LCD panel.
The press of ESC Key or Left-Right Key leads to the status display screen. Once such a screen is displayed, it rotates by order and the initial discriminative screen does not appear itself any more.
The status display screen comprises 3 kinds of screen such as the screen for general judgment, the status display screens for normal power source and emergency power source. Out of this general judgment screen, a user is able to make a general judgment for the present electricity status received.
The screen of general judgment shows the quality information of two power sources, the kind of power source with specific loads, and further the phase difference between both power sources, which is shown in the shape of electrical angle, in case those two sources are concurrently granted with good quality.
In the screen to display the status of normal power source, it shows the effective values of each phase (RMS) in relation with normal 3 phase power source, along with direction of phase rotation and its frequency information. In this screen, a user is able to verify the quality status of normal power source.
In the screen to display the status of emergency power source, it shows the effective values of each phase (RMS) in relation with emergency 3 phase power source, along with direction of phase rotation and its frequency information. In this screen, a user is able to verify the quality status of emergency power source.

4. Technology of Instrument Operation

HanPROPower3000, which is used to operate this ATB, provides 2 kinds of operation mode such as automatic operation and manual operation. With ATB, a user is able to execute CTTS and BY-PASS operation only in the mode of manual operation. In case of performing a generator test or an ATB transfer test under non-blackout, a user must choose the mode of manual operation.

Usually, the automatic operation mode is chosen. If any problem happens with normal power source (supplied by KEPCO), this device automatically transfers load to emergency power source (Generator).

4-1 Automatic Operation Mode

When the switch for automatic operation (Auto Mode) is pressed down after power source is granted, the automatic-operation-marked LED lamp is turned on, to indicate the device enters into the automatic operation mode.

■ Sequence of automatic load transfer in case of failure of normal power source,

In the mode of automatic operation, the controller monitors the real-time quality of power source, that is, voltage (including imbalance of 3 phase electricity), frequency, and direction of phase rotation. If any disorder is detected, it automatically does load transfer into emergency power source (Generator).

■ Protection Range of Power Source

The following table shows protection range of power source (normal and emergency power source).

■ Table: Set-up range of protecting power source and default values

Descrition	Settings	Default Setting % of nominal	Adjustment Range increments of 1%	Display Screen (see next page)
Volttage Protection NV EV	Under Volttage Drop out	85%	70 to 98%	NV UVP DROP
	Under Volttage Pick up	90%	85 to 100%	NV UVP PKUP
	Over Volttage Drop out	110%	102 to 115%	NV UVP DROP
	Over Volttage Pick up	103%	102 to 115%	NV UVP PKUP
	Unbalance Enable	YES	YES or NO	NORMAL VOLTTAGE UNBAL Enable
	Unbalance Drop out	20%	5 to 20%	NV UNBAL PKUP
	Unbalance Pick up	10%	3 to 18%	NV UNBAL DROP PKUP
Frequency Protection NV EV	Under Frequency Drop out	90%	85 to 98%	NV UFP DROP
	Under Frequency Pick up	95%	90 to 100%	NV UFP PKUP
	Over Frequency Drop out	104%	102 to 110%	NV OFP DROP
	Over Frequency Pick up	101%	102 to 110%	NV OFP PKUP

In the other hand, when the On button of power source B (emergency power source) is pushed down in the status that the switch of normal power source of MAIN ATB is on and power is supplied to loads, load transfer is made through such procedures as the switch of normal power source is off, and the ATB switch of emergency power source is on after DTTS time delay (0~30 minutes, Varying at the basis of each second). To the contrary, in case that the On button of power source A (normal power source) is pushed down at the time when the ATB switch of emergency power source is on, load re-transfer is made through such procedures as the switch of emergency power source is off and the ATB switch of normal power source is on after DTTS time delay (0~30 minutes, Varying at the basis of each second).

CTTS (Closed Transition Transfer Switching) Method

The controller provides the function of momentary parallel operation between emergency and normal power sources by transiently making both ATB switches on for the purpose of supplying non-blackout power to loads at the time of regular ATB or generator operation tests When the button of CTTS switch is pushed down in the status of manual operation after operating a generator, the controller makes the CTTS-marked LED lamp turned on, and makes both power sources work in parallel during the set point of parallel maintenance time (0~1 second, Varying at the basis of each 10 ms), provided that the synchronous conditions of both emergency and normal power sources (Voltage gap: within 5% of rated voltage, Phase difference: Below 5° of electric angle, Frequency: Below 0.2Hz, Direction of phase rotation: The direction should be same.) has been continuously satisfied at above the set point of the synchronous maintenance time (0~3 seconds, Varying at the basis of each 100 ms), and then executes CTTS operation to transfer loads. In this case, if synchronization still is not in harmony after passing the time to maintain synchronous discord (0~5 minutes, Varying at the basis of each second), then the controller makes the CTTS-marking LED lamp turned off and finishes CTTS operation mode.

BYPASS Operation

In case it needs a repair owing to either ATB operation test or disorder of main ATB, the controller provides Bypass operation function.

When Bypass switch is pressed down in the status of manual operation, the controller makes the LED lamp marked as Bypass turned on and enters into Bypass operation mode. So to speak, the controller makes the switch of Bypass ATB turned on, which is connected to the same power source with the main ATB in operation that is connected to the present load. After 400 ms, the controller makes the switch of Bypass ATB turned off and realizes the transfer without blackout.

When the operation comes back to Main Operation Mode after finishing repair or checkup, the same procedure is repeated for the transfer without blackout.

Hancess will do its best for customer satisfaction

Thank you.

■ Generator Activation Signal (Optional)

The voltage from the normal power falls down below the set point of NV-UVP DROP (Variable between 70~80%), time delay (0~60 minutes, Set point varying on the basis of each second) start to work in order to make momentary blackout void and null. If the disorder still lasts even after such time delay, the controller makes emergency generator start operation by outputting a signal.

■ Load Transfer

When the voltage and frequency of emergency generator exceeds over EV-UVP PKUP set point of the rated voltage (Variable between 85~100%) and EV-UFP PKUP set point of the rated voltage (Variable between 85~100%), ATB's load switch from normal power source is open and the load switch from emergency generator has a short-circuit after DTTS time delay (0~6 minutes, Set point varying on the basis of each second), and power is supplied to load. In this case, during the time to maintain emergency power (0~5 minutes, Set point varying on the basis of each second) after the emergency generator is connected to load, the controller awaits until the output of generator is stabilized, without checking the quality of output power produced from the generator.

■ Return to Commercial Power Source

When the voltage and frequency of normal power source (Supplied by KEPCO) recovers at more than NV-UVP PKUP set point of the rated voltage (Variable between 85~100%) and NV-UFP PKUP set point of the rated frequency (Variable between 85~100%), ATB's load switch from emergency generator is open after E->N time (The time consumed to prevent power source from being destabilized in the early stage of return, 0~30 minutes, Set point varying on the basis of each second) elapses, and the load switch from normal power source (Supplied by KEPCO) has a short-circuit after DTTS time delay (0~6 minutes, Set point varying on the basis of each second), and power is supplied to loads again. In this case, the time to make momentary blackout void and null is applied, too.
When engine cooling time passes, the engine stops operation after such a signal is removed.

4-2 Manual Operation Mode

When initial power supply is granted in the controller, the controller is set at the status of manual operation and main ATB operation. In case either non-blackout transfer is needed owing to a generator test, or load transfer is made via By-pass ATB due to the disorder of main ATB, manual operation is selected.

■ ATB ON/OFF

The On button of power source A is pushed down which is situated in ACDM part in front of the controller, the switch of normal power source of the main ATB is on and as a result, electric power is supplied to load. If the Off button is pushed down, the same switch is off, and power supply is stopped. The On/Off buttons of power source B has the same functions in regard of emergency power source.