

NSK

Handy Terminal M-FHT31

User's Manual

NSK Ltd.

Document Number: Z20069-01

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1. Introduction


- This document is the user's manual of NSK Handy Terminal M-FHT31.
- Before operating the Handy Terminal for the first time, this manual should be read thoroughly. And furthermore, please read the user's manual of the Megatorque Motor System.


1.1. Note to Users

1.1.1. Note for Safety

- For your safety, you should read this manual thoroughly and understand the contents before operating the Handy Terminal.
- Following notice is added to each clause for safety precaution to get your attention.


 *Danger: Matters that may cause serious injuries if you don't follow the notes.*

 *Warning: Matters that may result in injuries if you don't follow the notes.*

 *Caution: Matters that may damage the equipment (machine) and/or the work attached to the Motor (jigs or end effector), or may cause malfunction of the Motor System, if you don't follow the notes.*

1.1.2. Operational Remark


- Please observe the following when operating the Handy Terminal or when troubleshooting of the System using the Handy Terminal.

 *Caution: Do not grab or pull only the cable when handling the Handy Terminal.*

◇ It may cause a breakdown of the Handy Terminal.

 *Caution: Do not disassemble or modify the Handy Terminal.*


◇ When disassembled or modified, it may cause trouble of the Handy Terminal or the Driver Unit.

 *Caution: Do not shake or drop the Handy Terminal.*

◇ It may cause breakdown of the Handy Terminal.

 *Caution: Never expose the Handy Terminal to water, oil, or corrosive gas.*

◇ It may lead to damage or trouble of the Handy Terminal

 *Caution: Turn off the main power of the Driver Unit when connecting or disconnecting the connector of the Handy Terminal (CN1).*

◇ If not, it may lead to abnormalities of RS-232C communication.

1.2. Interchangeability


- Setting and editing functions of the normal mode of the Handy Terminal M-FHT31 are the same as those of M-FHT01, M-FHT11 and M-FHT21 Handy Terminals.

2. Unpacking

2.1. Unpacking Check

- Make sure that you have received the following.

- 1) Handy Terminal M-FHT31
- 2) User's Manual

 *Caution: Confirm that the type number of Handy Terminal M-FHT31 is indicated on the nameplate as shown below.*


 *Caution: Check for damage caused in transit.*



Figure 2-1: Nameplate of Handy Terminal

3. Function

3.1. Function of Handy Terminal

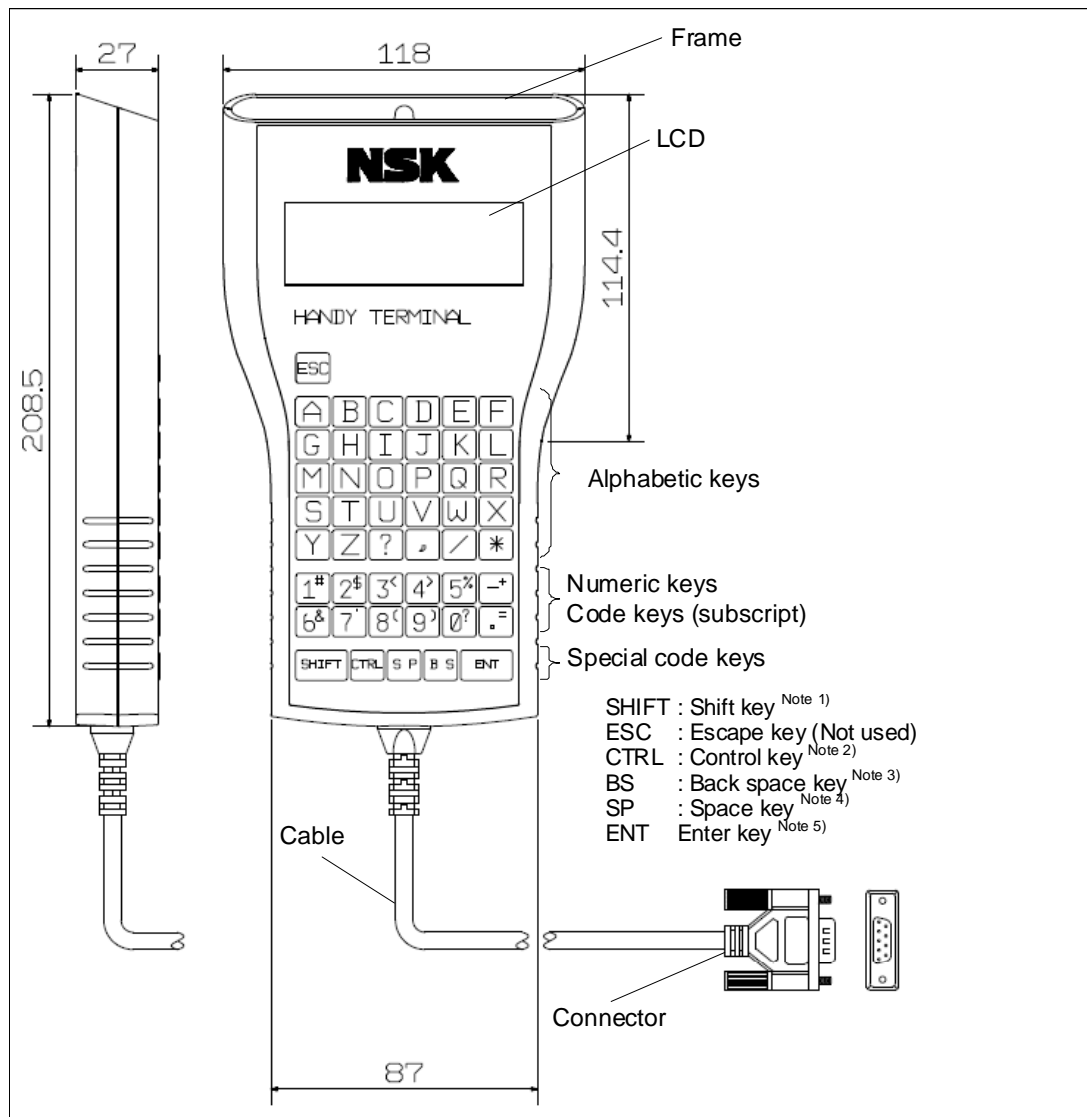
- Operations of the normal mode¹⁾ and the user mode²⁾ of the RS-232C communication interface can be done simply connecting the M-FHT31 Handy Terminal to the connector CN1 of several types of the Driver Unit. No setting such as the baud rate is required.

Note 1) Normal mode function: • Setting and monitoring commands and parameters, internal channel programming, and monitoring the Motor conditions

2) User mode function: • Memory function (Uploading, deleting and downloading parameter and program settings), and beeping function

3.2. Appearance and Function of Each Part

Figure 3-1



Note: 1) SHIFT: Press the code key while holding the SHIFT key. You may use the subscript of each code key.

2) CTRL: A specified alphabetic key becomes valid when pressing the CTRL key together.

3) BS: When correcting logged-in mistakes, press the BS key.

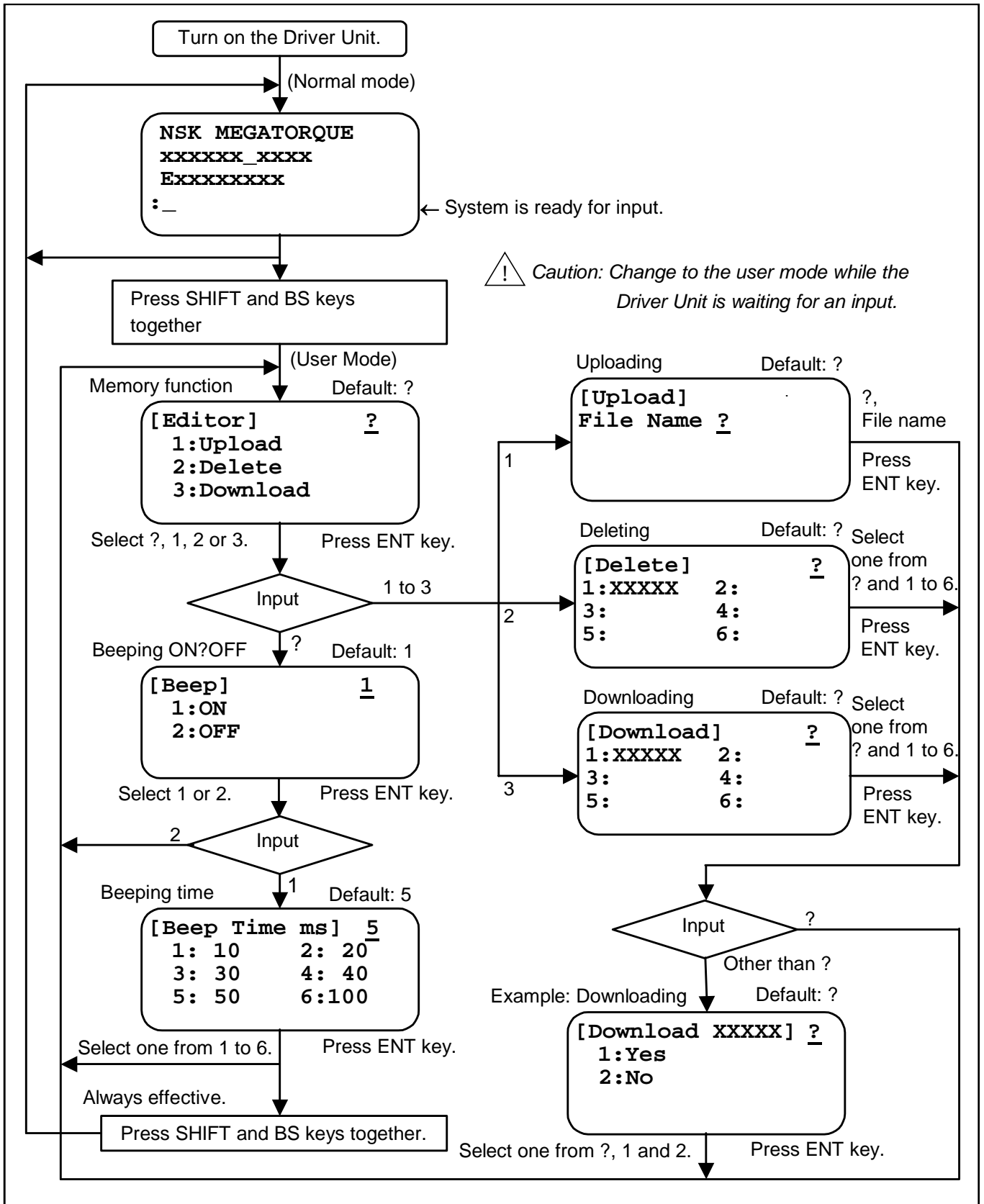
4) SP: Press the SP key to put a space between characters.

5) ENT: Press the ENT key at the end of the command or the parameter setting.

3.3. Change State

- The figure below shows the change state of normal mode and user mode of the Handy Terminal.

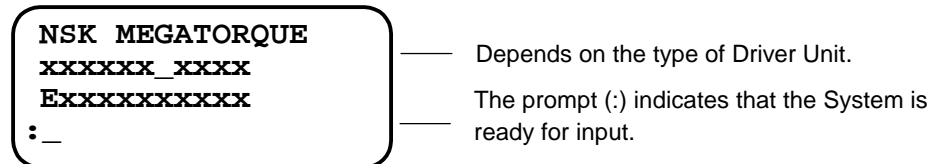
Figure 3-2




4. Normal Mode Function

4.1. Power on


- Connect the Handy Terminal to the CN1 connector of Driver Unit, and then turn on the power of Driver Unit. The message shown below appears on the display of Handy Terminal. The contents of message differ with Driver Unit type.
- When the Driver Unit completes its internal initialization, the prompt appears on the bottom line of message indicating that the Driver Unit is ready for an input. Though the prompt depends on the type of Driver Unit, colon (:), sharp (#), A colon (A:), and B colon (B:) are used.




 *Caution: Be sure to turn off the power of the Driver Unit when connecting or disconnecting the connector CN1 of Handy Terminal. Otherwise, it leads to breakdown or error of the RS-232C serial communication.*

4.2. Setting and Monitoring Parameter


- You can set parameters, and monitor these settings through the RS-232C communication.
 - * For details of the RS-232C communication command, please refer to the section of [RS-232C Communication] and [Glossary of Command and Parameter] on the user's manuals of Motor System or Driver Unit.

 *Caution: Before turn off the power of Driver Unit after parameter setting, be sure the prompt, indicating the System is ready for an input, is on the display. Otherwise, an alarm for memory error may occur when the power is turned on next time.*

 *Caution: Two ways to read out the parameter setting, TS command and inputting question mark "?", are available. We recommend using the TS command to avoid erroneous inputs.*

4.3. Programming

- You can program for Programmable Indexer operation through the RS-232C communication.
 - * For details of the RS-232C communication, please refer to the sections of [Programming] and [Glossary of Command and Parameter] of the user's manual of Motor System or that of corresponding Driver Unit.

 *Caution: When programming, put the Motor in stationary state (servo-off).*

4.4. Monitors

- Various monitoring can be done via the RS-232C communication.
 - * For details of the RS-232C communication, please refer to the section of [Monitoring via RS-232C] and [Glossary of Command and Parameter] of the user's manual of Motor System or the Driver Unit.

5. User Mode Function

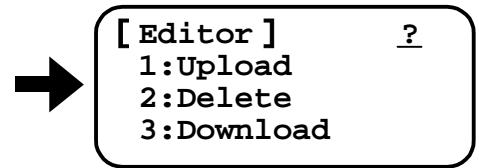
5.1. User Mode

- Memory functions (Upload, delete, and download) and beeping functions (Beeping ON/OFF and beeping time) are available in the user mode.
- The following describe the procedures to change state from the normal mode to the user mode.


(1) Confirm that the prompt (:) is displayed on the Handy Terminal.



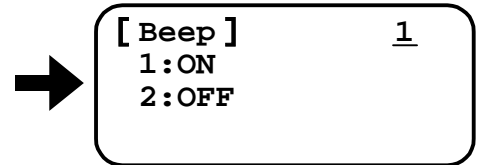
(2) Press the SHFT and the BS keys simultaneously for three seconds.



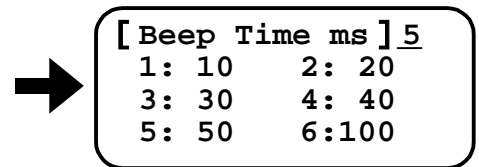
The display changes as shown above. This represents that the mode is changed to the user mode.

 **Caution:** Be sure that the display shows the prompt (:) that indicates the System is ready for an input.

(3) When the prompt (?) is on the input field, press the ENT key to change to the state of [Beep ON/OFF]. The message shown below appears.



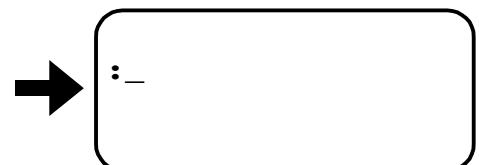
(4) Press the ENT key to change state to [Beeping time] when 1 is on the input field.




(5) The display returns to the state of process (2) above by pressing the ENT key when one of the numbers of 1 to 6 is on the input field.

- The following show the procedure to change the state to the normal mode from the user mode.

(1) Press the SHIFT key and the BS key simultaneously.




The prompt (:) appears on the display. The prompt depends on the type of Driver Unit.

 **Caution:** Confirm that an operation of the user mode is completed when changing to the normal mode.

5.2. Memory Function

- The memory function is available for the Driver Units that can read out all parameters and programs in a lump by TS0 or TC/AI command. The function includes (1) uploading (Driver Unit to Handy Terminal), (2) deleting (Handy Terminal), and (3) downloading (Handy Terminal to Driver Unit).

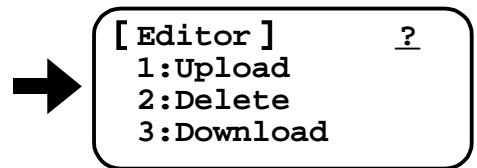
* For details of TS0 and TC/AI commands, refer to sections of [Glossary of Command and Parameter] and [Appendix] of the user's manual of the Motor System or the Driver Unit.

 **Caution:** Alarm for <<Irregular Driver Error>> occurs if a Driver Unit is not compatible with the memory function.

5.2.1. Uploading

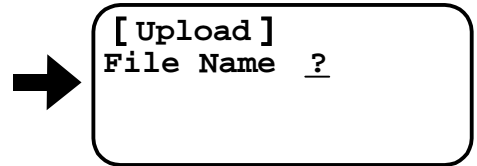
- All parameter settings and all programs in the internal channels, that are stored in the Driver Unit, can be transferred into the Handy Terminal.

(1) Press the SHIFT and the BS keys simultaneously for three seconds.

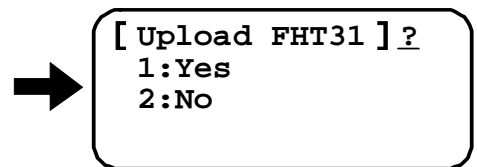
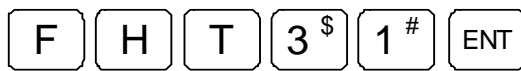



The display changes as shown above, which describes that completes changing state to the user mode.

(2) Input the keys in the order of 1 and ENT. The display changes as shown below.

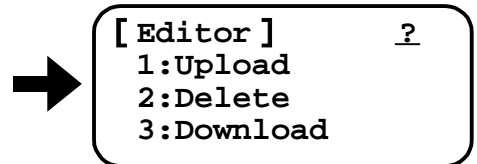


(3) Input the keys in the order of F, H, T, 3, 1 and ENT to specify the file name FHT31.






 **Caution:** A file name may consist of seven letters, excluding special codes. The display returns to the state of (2) above if the file name is duplicated.

(4) Input the keys in the order of 1 and ENT for execution.



The upload was successful if the display changes as shown above after scrolling the all received data.

(5) If you do not execute uploading, press the keys in the order of 2 and ENT in the state (4) above, the display changes to the procedure (1) above.

-  *Caution: The display returns to the state of (1) above when the ENT key is input while the prompt (?) is on the input field.*
-  *Caution: We recommend writing the all settings of parameter and program down in the parameter/program list, which is provided with the user's manual.*
-  *Caution: When the number of unloading files exceeds six, an alarm <<Memory File Full>> occurs, while an alarm << Memory Size Over>> occurs if the volume of unloading data exceeds the memory capacity.*

5.2.2. Deleting

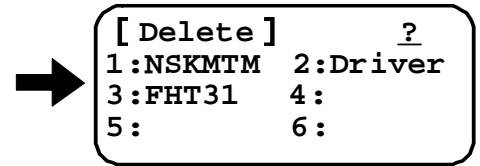
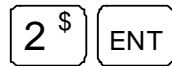
- You may delete the all data of parameter settings and the all programs of internal channels stored in the Handy Terminal by a file basis.

(1) Press the SHIFT key and the BS key simultaneously for three seconds.



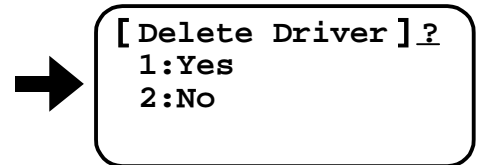
The display changes as shown above, thus completes changing to the user mode.

(2) Input the keys in the order of 2 and ENT.



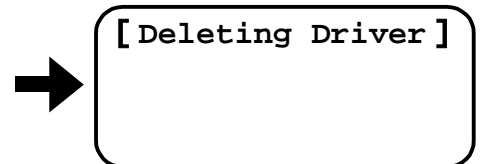
The display changes as shown above.

(3) Press the keys in the order of 2 and ENT when deleting the Driver Unit file.

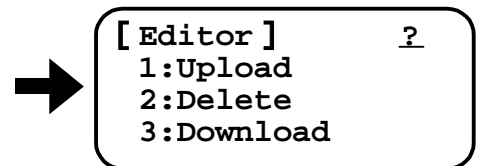


The display changes as shown above.

(4) Press the key 1 and then the ENT key for the execution.



The display changes as shown above, and then to the display below.

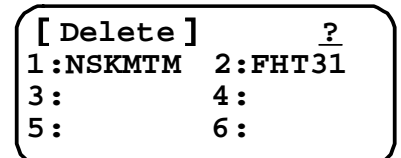


This completes to delete the Driver Unit file.

(5) Press the key of 2 and then the ENT key in the procedure (4). The display returns to the procedure (1) above.


Caution: The display returns to the procedure (1) when the ENT key is pressed while the prompt (?) is on the input field.

Caution: After deleting a file, rest of the files fill up in front of clumn in the display.



5.2.3. Downloading

- You may download all the data of parameter settings and programs of internal channels, which are stored in the Handy Terminal, to the Driver Unit by a file basis.

 **Caution:** The settings of the following parameter among the all settings stored in the Handy Terminal won't be downloaded to the Driver Unit; RR, FR, AO, PA, OL, RC, RO, MT, RI, ZP, ZV and MM.

- (1) Press the SHIFT and the BS keys simultaneously for three seconds when the prompt (:) is on the display.

SHIFT BS

→ [Editor] ?
1:Upload
2:Delete
3:Download

The display changes as shown above, thus changing to the user mode completes.

- (2) Press the keys in the order of 3 and ENT.

3 < ENT

→ [Download] ?
1:NSKMTM 2:FHT31
3: 4:
5: 6:

The display changes as shown above.

- (3) When the file of FHT31 is to be downloaded, enter the keys in the order of 2, that is the number of the FHT31 file, and ENT.

2 \$ ENT

→ [Download FHT31] ?
1:Yes
2:No

The display changes as shown above.


- (4) Press the keys in the order of 1 and ENT for execution.

1 # ENT


→ [Editor] ?
1:Upload
2:Delete
3:Download

The display changes as shown above after scrolling all downloaded data, and thus the downloading completes.

- (5) If you do not download the file, press the keys in the order of 2 and ENT in the state of (4) above. The display returns to the state (1) above.

 **Caution:** The display returns to the state (1) above when the ENT key is pressed while the prompt (?) is on the input field.

 **Caution:** If the Driver Unit is not compatible with the downloading function, an alarm << Driver Compare Error >> occurs.

 **Caution:** The Motor is forcibly got in servo-off state after downloading. The System returns to normal state when the power of the Driver Unit is turned on again.

5.3. Beeping

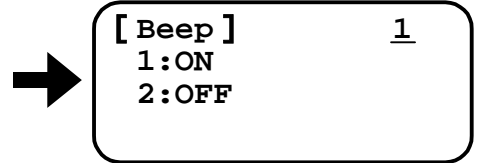
- The beeping function is to set on or off a beep sound when the keys are pressed and to set the beeping time length.

- (1) Press the SHIFT key and the BS key simultaneously when the prompt (:) is on the display, indicating that the System is ready for an input.



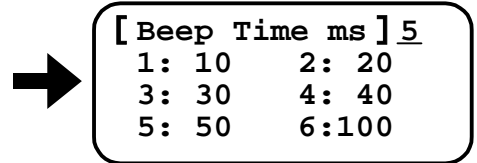
The display changes as shown above.

- (2) Input the ENT key when the prompt (?) is on the input field. The display goes to the setting state of the beeping function.



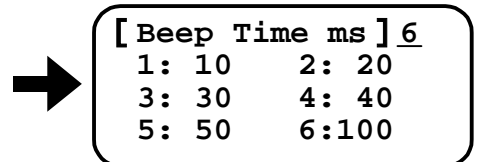
The display changes as shown above.

- (3) The display changes to the setting state of beeping time when the ENT key is pressed while the number 1 is on the input field.

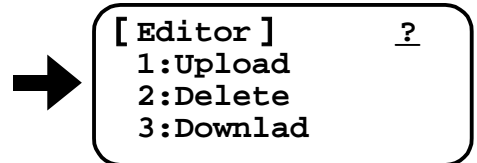
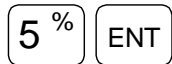


The display changes as shown above.

- (4) Select one of the keys from 1 to 6, and a beep will sound as specified.



- (5) Press the keys in the order of 1 and ENT to set the beeping time to 50 ms.



The display changes as shown above, thus completes setting beeping time.

- (5) If the beeping function is not necessary, press the keys in the order of 2 and ENT at the state of (3) above. This changes the display to the state of (1). Pressing keys will not sound a beep thereafter.

6. Alarm

6.1. Identifying and Resetting Alarm

- This section describes the alarms of the Handy Terminal and way of their resetting.

Table 6-1

Alarm identification	Meaning of alarm	Resetting
<<EEPROM Error>>	Checking error occurs in the EEROM.	<ul style="list-style-type: none"> • Turn on the power again. • Refer to [7. Troubleshooting].
<<EEPROM Timeout>>	Time-out occurs in the EEPROM.	
<<Memory Check Error>>	Stored data is broken.	
<<Response Error>>	Over-run occurs in the RS-232C communication.	
<<Communication Error>>	Time-out occurs in the RS-232C communication.	
<<Memory File Full>> : _	The number of uploading files has exceeded six.	<ul style="list-style-type: none"> • Press the ENT key and then select (2: Delete) to delete unnecessary files. Refer to the section [5.2.2. Deletion].
<<Memory Size Over>> : _	The volume of uploading data has exceeded the memory capacity.	
<<Irregular Driver Error>> : _	The Driving Unit is not compatible with uploading and downloading functions	<ul style="list-style-type: none"> • Press the ENT key and refer to the section [5.2. Memory Function].
<<Driver Compare Error>> : _	The Driver Unit is not compatible with downloading function.	

7. Troubleshooting

7.1. Identifying Problem

- If any problem does occur, follow the items on the Table 7-1 to check the periphery.
- When reporting the problem to the manufacturer, please inform us the situation based on the items in the Table 7-1.

Table 7-1

No.	Check item	Note
1	Connection with the CN1 connector.	Check if the Handy Terminal is properly connected to the CN1 connector of the Driver Unit.
2	Voltage to the CN1	Check if the voltage of CN1 connector of the Driver Unit is 5 VDC ($\pm 5\%$). (Voltage between the pin No. 6 [SG] and the pin No. 8 [+ 5 V])
3	Recurrence of problem	–
4	Occurrence at the special operation	At what condition does the problem occur? <ul style="list-style-type: none">• Does it occur under special control command operation?• Does it occur when special ancillary is in operation?
5	Alarm identification	Check the identification of alarm on the display. (Refer to [6.1. Identifying and Resetting Alarm].)

8. Specifications

8.1. Handy Terminal M-FHT31

- This section describes the specifications of Handy Terminal M-FHT31.

Table 8-1

Item	Model	M-FHT31
Power voltage		5 VDC \pm 5%
Power consumption		200 mW
Ambient temperature		0 to 50°C
Ambient humidity		35 to 85% (no condensation)
Operating condition		Free from corrosive gas
Storing temperature		-10 to 65°C
Storing humidity		Indoor condition (no condensation)
Display		20 letters \times 4 lines (LCD)
Keyboard		Numeral/Code keys: 12
		Alphabetic keys: 30
		Special code keys: 6
		Automatic repeat: none
RS-232C communication		Baud rate: 9 600 bps
		Data bit: 8
		Stop bit: 2 bit
		Start bit: 1 bit
		Parity check: none
Data transfer		ASCII code
Memory capacity		32 K byte
Memory backup		EEPROM (replacing a battery: not required)
I/F connector		D-sub 9 pins (male)
Pin number and signal name		1: RXD, 2: RTS, 3: TXD 4: DTR, 5: DSR, 6: SG 7: CTS, 8: +5V, 9: FG
Cable length		Approximately 3 meters
Outer dimension (W \times D \times H)		118 \times 208.5 \times 27 mm
Mass		Approximately 300 g (excludes the cable)

9 . Warranty

9.1. Warranty Period and Coverage

9.1.1. Warranty Period

- The warranty period is one year from the date of delivery.

9.1.2. Limited Warranty

- The items to be warranted shall be the supplied products by NSK Ltd.
 - ◇ We will not repair a failed M-FHT31 Handy Terminal because the total cost for analysis, repair and final inspection exceeds the product cost.

9.1.3. Immunities

- The product is not warranted in one of the following causes even within the warranty period.
 - ◇ Failure of the unit due to installation and operation not in accordance with the instruction manual specified by the supplier.
 - ◇ Failure of the unit due to improper handling and use, modification and careless handling by the user.
 - ◇ Failure of the unit due to the causes other than those attributable to the supplier.
 - ◇ Failure of the unit due to modification or repair that is conducted by a person (persons) or a party (parties) other than the supplier.
 - ◇ Other types of failure due to natural disasters and accidents (causes not attributable to the responsibility of the supplier).
- Damage induced by failure of the supplied unit is not covered. The coverage is only applicable to the supplied product.

9.1.4. Service Fee

- NSK Ltd. reserves the right to charge a user to the service such as dispatch of engineers.
- Startup, maintenance and adjusting of the unit under the supervision of our engineer(s) are the paid service even if it is to be provided during the warranty period.
- Service fee shall be billed to the customer according to the rules on the paid service.

9.1.5. Special-purpose Applications

This product is intended for general industrial applications and is not designed or manufactured for use under dangerous conditions.

Contact NSK before using this product for any special-purpose applications, including nuclear power equipment and systems or aerospace , medical , and safety devices.

While this product is manufactured under strict quality controls, NSK recommends that an appropriate safety device be installed when used with equipment that could cause serious accidents or damage in the event of product failure.

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**Handy Terminal M-FHT31
User's Manual**

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October 10 2014

1st Edition

NSK Ltd.



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