

USER'S MANUAL

MP-4003

**20x2 Char by 5x7 font VFD
Customer Display System**

MP-4003 M2

MP-4003 VFD Customer Display System

USER'S MANUAL

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INTRODUCTION

This chapter gives you the information for MP-4003. It also outlines the System and Interface specifications.

The following sections are included:

- About This Manual
- System Specifications
- Interface Specifications
- Safety Precautions

Experienced users can skip to chapter 2 on page 2-1 for a Quick Start.

1-1. ABOUT THIS MANUAL

Thank you for purchasing our MP-4003 VFD Customer Display System. The MP-4003 is an updated system designed to be comparable with the highest performance of Point-of-Sale platforms. The MP-4003 provides faster processing speed, greater flexibility and can handle more commands than ever. This manual is designed to assist you how to install and set up the whole system. It contains six chapters. The user can refer the user's manual for configuration according to the following chapters:

Chapter 1 Introduction

This chapter introduces you to the background of this manual. It also includes illustration and the specification for the whole system. The final page of this chapter indicates some safety reminders on how to take care of your system.

Chapter 2 System Configuration

This chapter describes how to set jumpers and connectors for power control.

Chapter 3 Command Set

This chapter lists various command modes and explains command functions.

Chapter 4 Character Set

This chapter lists character types supported on the VFD system.

Chapter 5 Software Configuration

This chapter indicates you how to set up the VFD system through the software utility.

Appendix A System Diagrams

This chapter shows the exploded diagrams and part numbers of MP-4003 components.

1-2. SYSTEM SPECIFICATIONS

Features:

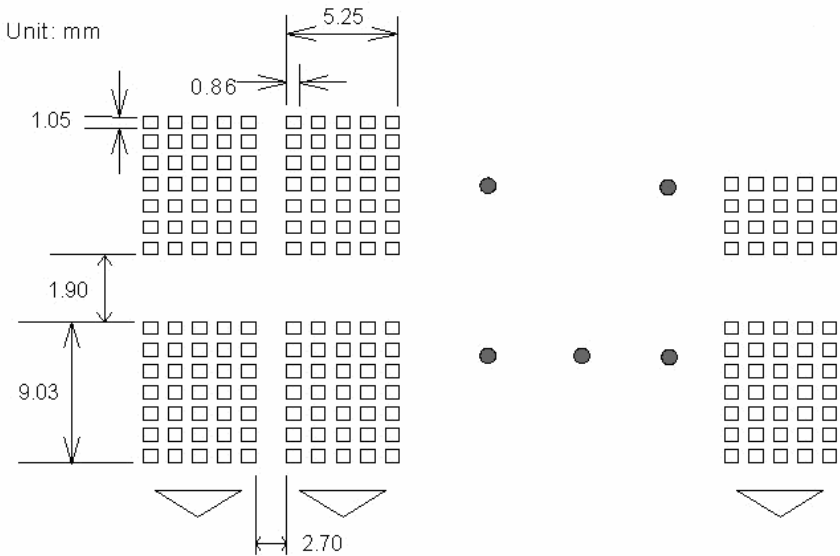
- High quality, excellent reliability, outstanding visibility and long life
- High quality vacuum fluorescent customer display - 20 columns x 2 lines by 5 x7 font
- High brightness and speedy display response - Easy to read
- Wide viewing angel - Vertical range 45 degree; Horizontal range at 270 degree
- Multiple language supported - Built-in 12 International fonts
- Wide temperature - -40°C to +85°C
- Adjustable pole - Easy to set up
- ESC/POS and 10 other commands supported
- OPOS / JPOS driver supported

GENERAL SPECIFICATION

Item	Sub-Item	Spec criteria Description
Display method	-	VFD display
Display pattern	-	20x2 Dot Matrix
Character	Format	5x7+Dp,com,descriptor
	Type	95 Alphanumeric, 12 sets of 12 characters each
	Size	5.25 mm(W) x 9.03 mm(H)
Dot Size (X * Y)	-	0.85 mm(X) x 1.05 mm(Y)
Brightness	-	350 ~700 cd/m ²
Number of Character	-	40 (20 columns x 2 lines)
Interface	RS232C	Baud Rate : 9600 / 19200 Bps
Command Mode	-	P4000,EPSON POS D101 (default), AEDEX, UTC/S, UTC/E, ADM788, DSP800, CD5220, EMAX, LOGIC CONTROL
Language Support	-	USA, France, Germany, UK, Denmark I, Sweden, Italy, Spain, Japan, Norway, Denmark II, Slavonic, Russia
Dimensions	Panel	217.3 mm (W)× 44.6 mm (D) × 63.4. mm (H)
	Adjustable pole	Max Length= 280.5mm ; Min Length=155.5mm
	Base	145.2 mm (W)× 90.0 mm (D) × 32.0 mm (H)
Weight(kg)	-	850 g
Power	Source	5/12 VDC
	Consumption	2.64 Watts
Safety	-	FCC Class A B, CE
Reliability	MTBF	30,000 hours
Environmental	Operating temperature	-20 to 70°C (85%RH max)
	Storage temperature	-40 to 80°C (90%RH max)
	Operating humidity	85% max, non-condensing
	Storage humidity	90% max, non-condensing
Emulation	-	OPOS / JPOS

TUBE DISPLAY

Customer Display	Vacuum Fluorescent Display
Display Pattern	5 x 7 Dot Matrix
Brightness	350~700 cd/m ²
Character Type	95 Alphanumeric & 32 International Characters
Character Size	5.25(W) x 9.03(H) mm
Character Number	40 (20 columns x 2 rows)
Character Pitch	Refer to below



ELECTRICITY

Central Control Unit	CPU: SM5964 ROM: 64K ROM RAM: 32K SRAM
Speed	CPU: 40 MHz
Connector	n/a
Power Source	DC +5V~12V
Power Consumption	Approx. 2.64 Watt

OVERALL DIMENSIONS

Dimension of Panel	87(H) x 220(W) x 50(D) mm
Dimension of Support One Support Two Support	n/a
Dimension of Base	n/a
Viewing Angle	n/a
Horizontal Rotation	n/a
Weight	170g

ENVIRONMENT

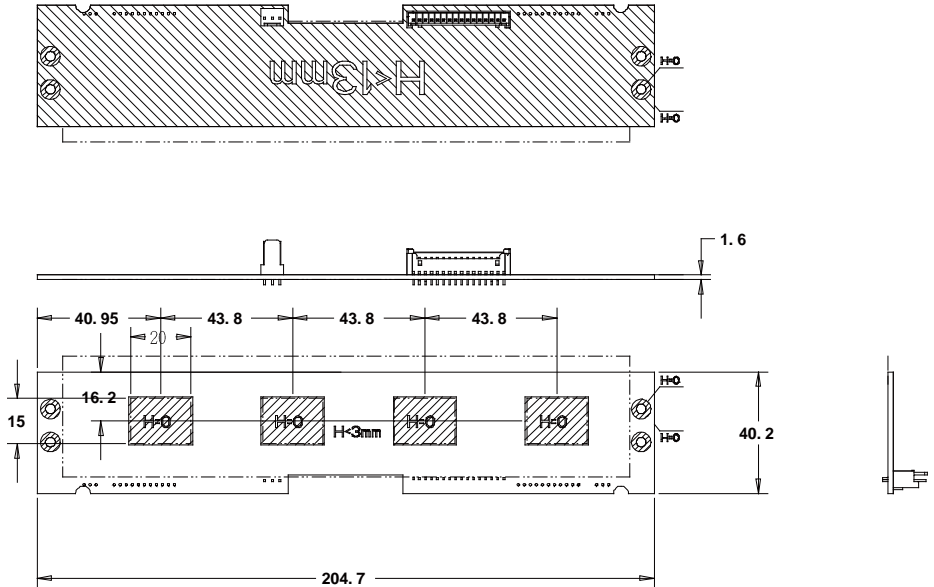
Operating Temperature	-20°C to +70°C
Storage Temperature	-40°C to +80°C
Relative Humidity	0% to 90% RH

DRIVER INTERFACE

Interface	RS-232
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USER SETTING

The default protocol is 9600bps, non-parity, 8 data bits, 1 stop bit and with DTR/DSR control.



Function Setting

No switch, all user setting is set up by Application Program (AP).

(1) Baud Rate Select

Function Description	Baud Rate (bps)
	9600
	19200

(2) Command Type Select

Function Description	Software Defined
Command Type	Hex Code
EPSON POS D101	00
P4000	01
ADM788	02
LOGIC CONTEOL	03
UTC/S	04
UTC/E	05
DSP800	06
CD5220	07
EMAX	08
AEDEX	09

(3) International Character Set

Function Description	
International Character Set (Code 20H-7FH)	Code Table (Code 80H-FFH)
U.S.A.	PC-437 (USA) (Standard European)
FRANCE	PC-850 (Multilingual)
GERMANY	PC-850 (Multilingual)
U.K.	PC-850 (Multilingual)
DENMARK I	PC-850 (Multilingual)
SWEDEN	PC-850 (Multilingual)
ITALY	PC-850 (Multilingual)
SPAIN	PC-850 (Multilingual)
JAPAN	Katakana
NORWAY	PC-865 (Nordic)
DENMARK II	PC-850 (Multilingual)
SLAVONIC/RUSSIAN	PC-437 (USA) (Standard European)

1-3. INTERFACE SPECIFICATIONS

Data Transmission Method : DTR/DSR Control
Handshaking : Asynchronous Serial
Default Protocol : 9600/19200 bps, non-parity, 8 data bits, 1 stop bit

Communication Protocol

(1) Receive Data

The DTR signal is as follows:

[HIGH]	This indicates that the display isn't ready to receive data. It depends on the following conditions: The period from when the power is turned on to when the printer first becomes ready to receive data. When the remaining space in the receiving buffer becomes 128 bytes or less. When the DTR signal of the printer is HIGH when the printer is selected using the command.
[LOW]	This indicates that the display is ready to receive data. It depends on the following conditions: When the print first becomes ready to receive data after power-on. When the remaining space in the receiving buffer becomes 128 bytes or more. When the DTR signal of the printer is LOW when the printer is selected using the command.

(2) Transmit Data

After confirming the DSR is LOW, data is transmitted to printer.

(3) Connector for Host Computer

PIN Assignment

Pin No.	Signal	I/O	Description
1	NC		No Connection
2	TXD-	OUTPUT	Transmit Data
3	RXD	INPUT	Receive Data
4	DSR	INPUT	Data Set Ready
5	GND		Power GND
6	DTR	OUTPUT	Data Terminal Ready
7	CTS		Clear to Send
8	RTS		Request to Send
9	By Selection		N.C. or +5V~+12V

1-4. SAFETY PRECAUTIONS

Follow the safety reminders on how to protect your system from damages properly; thus, helping you extend the life cycle of the system.

1. Check the Line Voltage

- a. The operating voltage for the power supply should cover the range of 100VAC-240VAC, otherwise the system may be damaged.

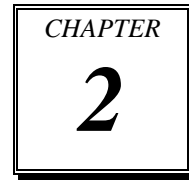
2. Environmental Conditions

- a. Avoid extremely hot or cold places to install MP-4003.
- b. Avoid exposure to sunlight for a long period of time (for example in a closed car in summer time. Also avoid the system from any heating device.). Or do not use MP-4003 when it's been left outdoors in a cold winter day.
- c. Bear in mind that the operating ambient temperature is from 5°C up to +35°C.
- d. Avoid moving the system rapidly from a hot place to a cold place or vice versa because condensation may come from inside of the system.
- e. Place MP-4003 against strong vibrations, which may cause hard disk failure.
- f. Do not place the system too close to any radio-active device. Radio-active device may cause interference.

3. Good Care

- a. When the outside of the case is stained, remove the stain with neutral washing agent with a dry cloth.
- b. Never use strong agents such as benzene and thinner to clean the system.
- c. If heavy stains are present, moisten a cloth with diluted neutral washing agent or with alcohol and then wipe thoroughly with a dry cloth.
- d. If dust has been accumulated on the outside, remove it by using a special made vacuum cleaner for computers.

SYSTEM CONFIGURATION



Helpful information that describes the jumper & connector settings.

The following sections are included:

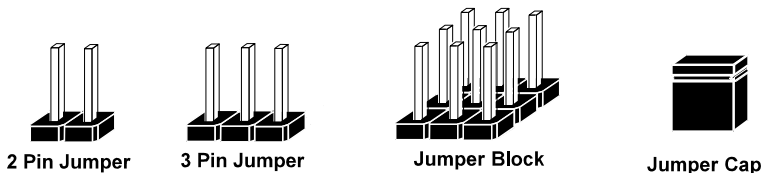
- Power Switch Jumper
- Internal Power Switch
- External Power Switch

2-1. HOW TO SET THE JUMPERS

You can configure your board by setting the jumpers. Jumper consists of two or three metal pins with a plastic base mounted on the card, and by using a small plastic "cap", Also known as the jumper cap (with a metal contact inside), you are able to connect the pins. So you can set-up your hardware configuration by "opening" or "closing" pins.

The jumper can be combined into sets that called jumper blocks. When the jumpers are all in the block, you have to put them together to set up the hardware configuration. The figure below shows how this looks like.

JUMPERS AND CAPS

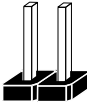


If a jumper has three pins for example, labelled PIN1, PIN2, and PIN3. You can connect PIN1 & PIN2 to create one setting and shorting. You can either connect PIN2 & PIN3 to create another setting. The same jumper diagrams are applied all through this manual. The figure below shows what the manual diagrams look and what they represent.

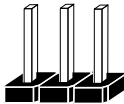
JUMPER DIAGRAMS



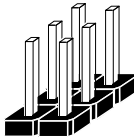
Jumper Cap looks like this



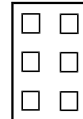
2 pin Jumper looks like this



3 pin Jumper looks like this



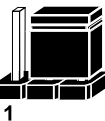
Jumper Block looks like this



JUMPER SETTINGS



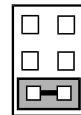
2 pin Jumper closed(enabled)
looks like this



3 pin Jumper
2-3 pin closed(enabled)
looks like this





Jumper Block
1-2 pin closed(enabled)
looks like this



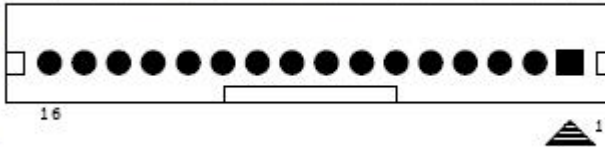
2-2. POWER SWITCH JUMPER

JP12V_SEL1: Power Switch Jumper.
The selections are as follows:

SELECTION	JUMPER SETTINGS	JUMPER ILLUSTRATION
OFF	1-2	 JP12V_SEL1
ON (default)	2-3	 JP12V_SEL1

2-3. INTERNAL/ EXTERNAL POWER SWITCH

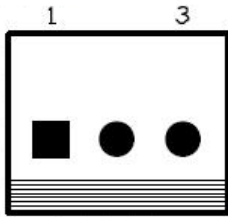
CN1: Internal Power Switch.



The pin assignments are as follows:

PIN	ASSIGNMENT
1	GND
2	TX_VFD
3	RX_VFD
4	DTR_VFD
5	DSR_VFD
6	RTS_VFD
7	CTS_VFD
8	VCC_12V_IN
9	NC
10	NC
11	NC
12	NC
13	NC
14	NC
15	NC
16	NC

CN2: External Power Switch.



The pin assignments are as follows:

PIN	ASSIGNMENT
1 and 3	Power ON
None	Power OFF

COMMAND SET

CHAPTER

3

Helpful information that describes the command modes.

The following sections are included:

- P4000 Command Mode
- EPSON Command Mode
- UTC Standard Command Mode
- UTC Enhance Command Mode
- AEDEX Command Mode
- ADM788 Command Mode
- DSP800 Command Mode
- CD5220 Command Mode
- EMAX Command Mode
- LOGIC Command Mode

3-1. P4000 COMMAND MODE

Command	Hex	Function Description
HT	09	Move cursor right
BS	08	Move cursor left
CR	0D	Move cursor to left-most position
ECS @	1B 40	Initialize display
ESC U	1B 55	Select upper row as current row
ESC D	1B 44	Select lower row as current row
ESC C r c	1B 43 r c	Move cursor to specified position r=U(0x55), upper row ; r=D(0x44), lower row $1 \leq c \leq 20$ (column number)
ESC A n	1B 41 n	Sets customer display disable or enable n=D, Disable ; n=E, Enable
ESC R n	1B 52 n	Set international font sets *
ESC % n	1B 25 n	Set font pattern n=0, selected ; n=1, canceled
ESC & s n m [p]	1B 26 s m n data	Define user font pattern n=code for first character m=code for last character data=7 bytes required for each character
ESC E r n	1B 45 r n	Set special effect or display mode of a specified row(*2)

*** International Font Set**

n (Hex)	Font Set
00h	U.S.A.
01h	FRANCE
02h	GERMANY
03h	UK
04h	DENMARK_I
05h	SWEDEN
06h	ITALY
07h	SPAIN
08h	JAPAN
09h	NORWAY
0Ah	DENMARK_II
0Bh	RUSSIA
0Ch	SLAVONIC
0Dh	TURKISH

(*2) Use “ESC E r n”, command to set the value (Hex) of the r, n parameter

r		n	Special functions
58h	All rows	30h	Shift mode
55h	Upper row	31h	Rotation mode (only all rows)
44h	Lower row	32h	Blink mode (only all rows)
		33h	Clear current row and switch to shift mode
		34h	Overwrite mode
		35h	Vertical mode

3-2. EPSON COMMAND MODE

Command	Hex	Function Description
HT	09	Move cursor right
BS	08	Move cursor left
US LF	1F 0A	Move cursor up
LF	0A	Move cursor down
US CR	1F 0D	Move cursor to right-most position
CR	0D	Move cursor to left-most position
HOM	0B	Move cursor to home position
US B	1F 42	Move cursor to bottom position
US \$ x y	1F 24 x y	Move cursor to specified position $1 \leq x(\text{column}) \leq 20$; $1 \leq y(\text{row}) \leq 2$
US C n	1F 43 n	Select/cancel cursor display n=0, canceled ; n=1, selected
CLR	0C	Clear display screen
CAN	18	Clear cursor line
US X n	1F 58 n	Brightness adjustment $1 \leq n \leq 4$
US E n	1F 45 n	Blink display screen $0 \leq n \leq 255$ (n*50msec) ON / (n*50msec)OFF n= 0, blinking is canceled n=255, display is turned off
ESC @	1B 40	Initialize display
ESC t n	1B 74 n	Select the character code table $0h \leq n \leq 12h$ (Please refer to <i>Chapter 4 Character Set.</i>)
ESC R n	1B 52 n	Select international character set *

Command	Hex	Function Description
US r n	1F 72 n	Select/cancel reverse character n=0, canceled ; n=1, selected
US MD1	1F 01	Specify overwrite mode
US MD2	1F 02	Specify vertical scroll mode
US MD3	1F 03	Specify horizontal scroll mode
US . n	1F 2E n	Specify period display n= display character code
US , n	1F 2C n	Specify comma display n= display character code
US ; n	1F 3B n	Specify semicolon (period+comma) display n= display character code
US # n m	1F 23 n m	Specify display annunciator, turn the annunciator at "m" column on or off • n = 0,1 (Off, On) • $0 \leq m \leq 20$
ESC & s n m [a(p1..p7)] (m-n+1)	1B 26 s n m [a](m-n+1)	Define download characters s=1 ; $32 \leq n \leq m \leq 126$; a=7 (= pattern1..pattern7)
ESC ? n	1B 3F n	Cancel user-defined characters $32 \leq n \leq 126$ (n=character code)
ESC % n	1B 25 n	Select/cancel download character set n=0, canceled ; n=1, selected
ESC W n s (x1 y1 x2 y2)	1B 57 n s (x1 y1 x2 y2)	Specify/cancel the window range n=1,2,3,4 (four windows) ; s=0,1 (disable, enable) $1 \leq x1 \leq x2 \leq 20$ (column) ; $1 \leq y1 \leq y2 \leq 2$ (row)
US @	1F 40	Execute self-test
US T h m	1F 54 h m	Display time :0 $\leq h \leq 23$; $0 \leq m \leq 59$
US U	1F 55	Display of time counter

*** International Font Set**

n (Hex)	Font Set
00h	U.S.A.
01h	FRANCE
02h	GERMANY
03h	UK
04h	DENMARK_I
05h	SWEDEN
06h	ITALY
07h	SPAIN
08h	JAPAN
09h	NORWAY
0Ah	DENMARK_II
0Bh	RUSSIA
0Ch	SLAVONIC
0Dh	TURKISH

*** Character Code Set Table**

n (Hex)	Font Set
00h	CP437
01h	CP865
02h	CP850
03h	KATAKANA
04h	CP857
05h	CP737
06h	CP852
07h	CP858
08h	CP860
09h	CP862
0Ah	CP863
0Bh	CP866
0Ch	CP1250

n (Hex)	Font Set
0Dh	CP1251
0Eh	CP1252
0Fh	CP1253
10h	CP1254
11h	CP1255
12h	CP1257

3-3. UTC STANDARD COMMAND MODE

Command	Hex	Function Description
BS	08	Back space
HT	09	Horizontal tab
LF	0A	Line feed
CR	0D	Carriage return
DC0 p	10 p	Move cursor to specified position, $0 \leq p \leq 39$
DC1	11	Over write display mode
DC2	12	Vertical scroll mode
DC3	13	Cursor on
DC4	14	Cursor off
ESC d	1B 64	Change to UTC enhanced mode
US	1F	Clear display

Row Character Position Chart (Decimal)

Row1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Row2	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39

Row Character Position Chart (Hex)

Row1	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	10	11	12	13
Row2	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F	20	21	22	23	24	25	26	27

3-4. UTC ENHANCE COMMAND MODE

Command	Hex	Function Description
ESC u A..CR	1B 75 41 [data x 20] 0D	Upper line display
ESC u B..CR	1B 75 42 [data x 20] 0D	Bottom line display
ESC u D..CR	1B 75 44 [data x 20] 0D	Upper line message scroll continuously
ESC u E..CR	1B 75 45 hh mm 0D	Set and display the time in 24-hour format $0 \leq h$ $m \leq 9$
ESC u E CR	1B 75 45 0D	Display the time in 24-hour format
ESC u F..CR	1B 75 46 [data x 20] 0D	Upper line message scroll once pass
ESC u 1..CR	1B 75 49 [data x 40] 0D	Two line display
ESC RS..CR	1B 0F 0D	Change to UTC standard mode

3-5. AEDEX COMMAND MODE

Command	Hex	Function Description
! # 1..CR	21 23 31 [data x 20] 0D	Upper line display
! # 2..CR	21 23 32 [data x 20] 0D	Bottom line display
! # 4..CR	21 23 34 [data x 20] 0D	Upper line message scroll continuously
! # 5..CR	21 23 35 hh mm 0D	Set and display the time in 24-hour format $0 \leq h$ $m \leq 9$
! # 5 CR	21 23 35 0D	Display the time in 24-hour format
! # 6..CR	21 23 36 [data x 20] 0D	Upper line message scroll once pass
! # 9..CR	21 23 39 [data x 40] 0D	Two line display

3-6. ADM788 COMMAND MODE

Command	Hex	Function Description
CLR	0C	Clear display
CR	0D	Carriage return
SLE1	0E	Clear up line and move cursor to upper line left most end
SLE2	0F	Clear low line and move cursor to lower line left most end
DC1	11 n	Set line blinking n=1, upper line n=2, lower line
DC2	12 n	Clear line blinking n=1, upper line n=2, lower line

3-7. DSP800 COMMAND MODE

Command	Hex	Function Description
EOT SOH I n ETB	04 01 49 n 17	Select international character set
EOT SOH P n ETB	04 01 50 n 17	Move cursor to specified position $49 \leq n \leq 88$
EOT SOH C n m ETB	04 01 43 n m 17	Clear display range from n position to m position and move cursor to n position $49 \leq n \leq m \leq 88$
EOT SOH S n ETB	04 01 53 n 17	Save the current displaying data (40 characters) to n'th layer for demo display $1 \leq n \leq 3$ (n specify the layer 1, 2, or 3)
EOT SOH D n m ETB	04 01 44 n m 17	Display the saved data $1 \leq n \leq 3$ (n specify the layer 1, 2, or 3) "m" can be ignored
EOT SOH A n ETB	04 01 41 n 17	Brightness adjustment $1 \leq n \leq 4$
EOT SOH % ETB	04 01 25 17	Initialize display

*** International Font Set**

n (Hex)	International Font Set
30h	U.S.A.
31h	FRANCE
32h	GERMANY
33h	U.K.
34h	DENMARK I
35h	SWEDEN
36h	ITALY
37h	SPAIN
38h	JAPAN
39h	NORWAY
3Ah	DENMARK II
3Bh	RUSSIA
3Ch	SLAVONIC
3Dh	TURKISH

3-8. CD5220 Command Mode

Command	Hex	Function Description
ESC DC1	1B 11	Overwrite mode
ESC DC2	1B 12	Vertical scroll mode
ESC DC3	1B 13	Horizontal scroll mode
ESC Q A CR	1B 51 41 [N]20 0D	Set string display mode, write string to upper line
ESC Q B CR	1B 51 42 [N]20 0D	Set string display mode, write string to lower line
ESC Q D CR	1B 51 44 [N]m20 0D	Upper line message scroll continuously m<20
ESC [D	1B 5B 44	Move cursor left
BS	08	Move cursor left
ESC [C	1B 5B 43	Move cursor right
HT	09	Move cursor right
ESC [A	1B 5B 41	Move cursor up
ESC [B	1B 5B 42	Move cursor down
LF	0A	Move cursor down
ESD [H	1B 5B 48	Move cursor to home position
HOM	0B	Move cursor to home position
ESC [L	1B 5B 4C	Move cursor to left-most position
CR	0D	Move cursor to left-most position
ESC [R	1B 5B 52	Move cursor to right-most position
ESC [K	1B 5B 4B	Move cursor to bottom position
ESC I x y	1B 6C x y	Move cursor to specified position 1 ≤ x ≤ 20 (column) ; y=1,2 (row)
ESC @	1B 40	Initialize display
ESC W s x1 x2 y	1B 57 s x1 x2 y	Enable or disable the window range at horizontal scroll mode s=0,1 (disable, enable) 1 ≤ x1 ≤ x2 ≤ 20 (column) ; y=1,2 (row)

Command	Hex	Function Description
CLR	0C	Clear display screen, and clear string mode
CAN	18	Clear cursor line, and clear string mode
ESC * n	1B 2A n	Brightness adjustment $1 \leq n \leq 4$
ESC & s n m [a(p1..p7)] (m-n+1)	1B 26 s n m [a] (m-n+1)	Define download characters s=1 ; $32 \leq n \leq m \leq 126$; a=7 (p1..p7 = pattern1..pattern7)
ESC ? n	1B 3F n	Delete download characters $32 \leq n \leq 126$ (n=character code)
ESC % n	1B 25 n	Select / cancel download character set. n=0, canceled ; n=1, selected
ESC _ n	1B 5F n	Set cursor ON/OFF n=0,1 (Off,On)
ESC f n	1B 66 n	Select international fonts set *
ESC c n	1B 63 n	Select fonts, ASCII code or JIS code *

*** International Font Set**

n (Hex)	Font Set
41h	U.S.A.
47h	GERMANY
49h	ITALY
4Ah	JAPAN
55h	U.K.
46h	FRANCE
53h	SPAIN
4Eh	NORWAY
57h	SWEDEN
44h	DENMARK I
45h	DENMARK II
4Ch	SLAVONIC
52h	RUSSIA

*** Code Selection**

n (Decimal)	International Code
41h	Compliance with ASCII code
4Ah	Compliance with JIS code
52h	Compliance with RUSSIA code
4Ch	Compliance with SLAVONIC code

3-9. EMAX COMMAND MODE

Command	Hex	Function Description
ESC DC1	1B 11	Overwrite mode
ESC DC2	1B 12	Vertical scroll mode
ESC DC3	1B 13	Horizontal scroll mode
ESC [D	1B 5B 44	Move cursor left
BS	08	Move cursor left
ESC [C	1B 5B 43	Move cursor right
HT	09	Move cursor right
ESC [A	1B 5B 41	Move cursor up
ESC [B	1B 5B 42	Move cursor down
ESD [H	1B 5B 48	Move cursor to home position
HOM	0B	Move cursor to home position
ESC [L	1B 5B 4C	Move cursor to left-most position
CR	0D	Move cursor to left-most position
ESC [R	1B 5B 52	Move cursor to right-most position
ESC [K	1B 5B 4B	Move cursor to bottom position
ESC I x y	1B 6C x y	Move cursor to specified position $1 \leq x \leq 20$ (column) ; $y=1,2$ (row)
ESC @	1B 40	Initialize display
CLR	0C	Clear display screen, and clear string mode
CAN	18	Clear cursor line, and clear string mode
ESC * n	1B 2A n	Brightness adjustment $1 \leq n \leq 4$
ESC _ n	1B 5F n	Set cursor ON/OFF $n=0,1$ (Off, On)
ESC f n	1B 66 n	Select international fonts set *
ESC c n	1B 63 n	Select fonts, ASCII code or JIS code *

*** International Font Set**

n (Hex)	Font Set
41h	U.S.A.
47h	GERMANY
49h	ITALY
4Ah	JAPAN
55h	U.K.
46h	FRANCE
53h	SPAIN
4Eh	NORWAY
57h	SWEDEN
44h	DENMARK I
45h	DENMARK II
4Ch	SLAVONIC
52h	RUSSIA

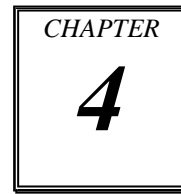
*** Code Selection**

n (Decimal)	International Code
41h	Compliance with ASCII code
4Ah	Compliance with JIS code

3-10. LOGIC COMMAND MODE

Command	Hex	Function Description
^Q	11	Overwrite mode
^R	12	Vertical mode
^I	09	Horizontal tab
^H	08	Back space
^J	0A	Line feed
^M	0D	Carriage return
^S	13	Cursor on
^T	14	Cursor off
^P	10	Digital select e.g. 10 00 MSD of top row 10 13 LSD of top row 10 14 MSD of bottom row 10 27 LSD of bottom row
^_	1F	Reset
^D n	04 n	Brightness mode 04 FF – 100% Brightness mode 04 60 – 60% Brightness mode 04 40 – 40% Brightness mode 04 20 – 20% Brightness mode

CHARACTER CODE TABLE



This chapter shows tables of character codes.

Note: All the tables only show the character configurations. They do not show the actual print pattern.

The following sections are included:

- U.S.A. Standard Character Set: 20h~7Eh
- International Character Selection
- Code Page

4-1. U.S.A. STANDARD CHARACTER SET: 20H~7EH

	_0	_1	_2	_3	_4	_5	_6	_7	_8	_9	_A	_B	_C	_D	_E	_F
2_		!	"	#	\$	%	&	'	()	*	+	,	-	.	/
3_	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
4_	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5_	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
6_	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
7_	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	




4-2. INTERNATIONAL CHARACTER SELECTION

No.	International	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
0	U.S.A.	#	\$	@	[ \ \]	^	`	{ | }	~				
1	FRANCE	#	\$	à	°	Ç	§	^	`	é	ù	è	¨
2	GERMANY	#	\$	§	Ä	Ö	Ü	^	`	ä	ö	è	β
3	U.K.	£	\$	@	[ \ \]	^	`	{ | }	~				
4	DENMARK I	#	\$	@	Æ	Φ	Â	^	`	æ	ø	â	~
5	SWEDEN	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
6	ITALY	#	\$	@	°	\	é	^	ù	à	ò	è	ì
7	SPAIN	¤	\$	@	í	Ñ	¿	^	`	¨	ñ	}	~
8	JAPAN	#	\$	@	[ ¥ ]	^	`	{ | }	~				
9	NORWAY	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
10	DENMARK II	#	\$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
11	SLAVONIC	#	\$	@	[ \ \]	^	`	{ | }	~				

No.	International	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
12	RUSSIA	#	\$	@	[	\	\]	^	`	{	|	}	~
13	TURKISH	#	\$	@	[	\	\]	^	`	{	|	}	~

4-3. CODE PAGE

4-3-1. CP-437

	_0	_1	_2	_3	_4	_5	_6	_7	_8	_9	_A	_B	_C	_D	_E	_F			
8_	Ç	ü	é	â	ä	à	å	ç	ê	ë	è	ï	î	ì	Ä	Å			
9_	É	æ	Æ	ô	ö	ò	û	ù	ÿ	Ö	Ü	ø	£	¥	Pls	f			
A_	á	í	ó	ú	ñ	Ñ	ª	º	¿	¬	½	¼	¡	«	»				
B_				|	┌	┐	└	┘	┌	┐	└	┘	┌	┐	└	┘			
C_	L	⊥	⊤	┌	┐	└	┘	┌	┐	└	┘	┌	┐	└	┘	┌	┐	└	┘
D_	⊥	⊤	⊥	⊤	⊥	⊤	⊥	⊤	⊥	⊤	⊥	⊤	⊥	⊤	⊥	⊤	⊥	⊤	⊥
E_	α	β	Γ	π	Σ	σ	μ	τ	Φ	Θ	Ω	δ	∞	φ	ε	∩			
F_	≡	±	≥	≤	∫	∫	÷	≈	°	.	.	√	n	2	■				








4-3-2. Japanese Katakana

	_0	_1	_2	_3	_4	_5	_6	_7	_8	_9	_A	_B	_C	_D	_E	_F
8_	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
9_	■	■	■	■	■	■	■	→	←	↑	↓	×	÷	±	≤	≥
A_		・	「	」	、	・	ヲ	ア	イ	ウ	エ	オ	ヤ	ユ	ヨ	ツ
B_	-	ア	イ	ウ	エ	オ	カ	キ	ク	ケ	コ	サ	ツ	ス	セ	ソ
C_	タ	チ	ツ	テ	ト	ナ	ニ	ヌ	ネ	ノ	ハ	ヒ	フ	ヘ	ホ	マ
D_	ミ	ム	メ	モ	ヤ	ユ	ヨ	ラ	リ	ル	レ	ロ	ワ	ン	“	°
E_	□	■	■	○	●	◇	◆	◆	▶	◀	▲	▼	《	》	½	¼
F_	日	月	水	火	木	金	土	年	円	分	人	大	中	小	〒	℃

4-3-3. CP-850

	_0	_1	_2	_3	_4	_5	_6	_7	_8	_9	_A	_B	_C	_D	_E	_F
8_	Ç	ü	é	â	ä	à	å	ç	ê	ë	è	ï	î	ì	Ä	Å
9_	É	æ	Æ	ô	ö	ò	û	ù	ÿ	Ö	Ü	ø	£	Ø	×	f
A_	á	í	ó	ú	ñ	Ñ	ª	º	¿	®	¬	½	¼	¡	«	»
B_	☒	☒	☒	|	†	Á	Â	À	©	¶	¶	¶	¶	¢	¥	¬
C_	L	⊥	T	†	—	†	ã	Ã	ℒ	℞	≡	¶	¶	=	¶	α
D_	ð	Ð	Ê	Ë	È	ı	í	î	ï	↓	Γ	■	■	ı	ì	■
E_	Ó	ß	Ô	Ò	õ	Õ	μ	þ	ƒ	Ú	Û	Ù	ý	Ý	-	'
F_		±	=	¾	¶	§	÷	,	°	¨	.	1	3	2	■	




4-3-4. CP-857

	_0	_1	_2	_3	_4	_5	_6	_7	_8	_9	_A	_B	_C	_D	_E	_F
8_	Ç	ü	é	â	ä	à	å	ç	ê	ë	è	ï	î	ı	Ä	Å
9_	É	æ	Æ	ô	ö	ò	û	ù	ı	Ö	Ü	ø	£	Ø	Ş	ş
A_	á	í	ó	ú	ñ	Ñ	Ğ	ğ	ı	®	¬	½	¼	ı	«	»
B_				|	┌	Á	Â	À	©	¶	||	⌋	⌌	¢	¥	¬
C_	L	⊥	T	┌	-	†	ã	Ã	ℒ	℞	≡	⌋	⌌	=	≠	α
D_	o	a	Ê	Ë	È	€	í	î	ï	┌	└			ı	ì	
E_	Ó	ß	Ô	Ò	õ	Õ	μ	x	Ú	Û	Ù	ı	ÿ	-	'	
F_		±		¾	¶	§	÷	˘	°	¨	.	1	3	2		

4-3-5. CP-865

	_0	_1	_2	_3	_4	_5	_6	_7	_8	_9	_A	_B	_C	_D	_E	_F
8_	Ç	ü	é	â	ä	à	å	ç	ê	ë	è	ï	î	ì	Ä	Å
9_	É	æ	Æ	ô	ö	ò	û	ù	ÿ	Ö	Ü	ø	£	Ø	Þ	ƒ
A_	á	í	ó	ú	ñ	Ñ	ª	º	¿	¬	½	¼	¡	«	»	
B_	⌘	⌘	⌘	|	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	
C_	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	
D_	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	■	■	■	■	■	
E_	α	β	Γ	π	Σ	σ	μ	τ	Φ	Θ	Ω	δ	∞	φ	ε	∩
F_	≡	±	≥	≤	|	|	÷	≈	°	.	.	√	n	2	■	

4-3-6. CP-737

	_0	_1	_2	_3	_4	_5	_6	_7	_8	_9	_A	_B	_C	_D	_E	_F
8_	A	B	Γ	Δ	E	Z	H	Θ	I	K	Λ	M	N	Ξ	O	Π
9_	P	Σ	T	Υ	Φ	X	Ψ	Ω	α	β	γ	δ	ε	ζ	η	θ
A_	ι	κ	λ	μ	ν	ξ	ο	π	ρ	σ	ς	τ	υ	φ	χ	ψ
B_				|	┆	≡	≡	π	≡	≡	||	π	≡	≡	≡	γ
C_	L	⊥	T	┆	—	┆	≡	≡	≡	≡	≡	≡	≡	≡	≡	≡
D_	≡	≡	π	≡	≡	F	π	≡	≡	J	γ	■	■	■	■	■
E_	ω	ά	έ	ή	ϊ	ί	ό	ύ	ϋ	ώ	Α	Ε	Η	Ι	Ο	Υ
F_	Ω	±	≥	≤	ï	ÿ	÷	≈	°	·	·	√	n	2	■	




4-3-7. CP-852

	_0	_1	_2	_3	_4	_5	_6	_7	_8	_9	_A	_B	_C	_D	_E	_F
8_	Ç	ü	é	â	ä	û	ć	ç	ł	ë	Õ	ó	î	Ž	Ä	Ć
9_	É	Í	í	ô	ö	Ł	ł	Ś	ś	Ö	Ü	ř	ř	ł	×	č
A_	á	í	ó	ú	Ą	ą	Ż	ż	Ę	ę	¬	ż	Č	§	«	»
B_	⋯	⋮	⋱	|	┌	Á	Â	Ě	Ş	||	||	⌈	⌋	Ž	ž	⌋
C_	L	⊥	⊥	┌	┐	Ǻ	ǻ	ℒ	ℓ	⊥	⊥	⌈	⌋	=	⊥	⊥
D_	ď	Đ	Ď	Ě	d'	Ň	í	î	ě	⌋	⌋	■	■	⌋	Ů	■
E_	Ó	ß	Ô	Ń	ń	ň	Š	š	Ř	Ú	ř	Ů	ý	Ý	ł	'
F_		"	'	˘	˘	§	÷	,	°	¨	·	ú	Ř	ř	■	




4-3-8. CP-858

	_0	_1	_2	_3	_4	_5	_6	_7	_8	_9	_A	_B	_C	_D	_E	_F
8_	Ç	ü	é	â	ä	à	å	ç	ê	ë	è	ï	î	ı	Ä	Å
9_	É	æ	Æ	ô	ö	ò	û	ù	ı	Ö	Ü	ø	£	Ø	Ş	ş
A_	á	í	ó	ú	ñ	Ñ	Ğ	ğ	ı	®	¬	½	¼	ı	«	»
B_	⌘	⌘	⌘	|	┘	Á	Â	À	©	⌘	||	⌘	⌘	¢	¥	⌘
C_	L	⊥	T	┘	-	+	ã	Ã	ℒ	℞	≡	⌘	⌘	=	⌘	α
D_	o	a	Ê	Ë	È	€	í	î	ï	┘	⌘	■	■	:	ì	■
E_	Ó	ß	Ô	Ò	õ	Õ	μ	þ	Þ	Ú	Û	Ù	ì	ÿ	-	'
F_		±		¾	¶	§	÷	„	°	“	•	1	3	2		■




4-3-9. CP-860

	_0	_1	_2	_3	_4	_5	_6	_7	_8	_9	_A	_B	_C	_D	_E	_F
8_	Ç	ü	é	â	ã	à	Á	ç	ê	Ê	è	í	Ô	ì	Ã	Â
9_	É	À	È	ô	õ	ò	Ú	ù	ì	Õ	Ü	¢	£	Ù	Þ	Ó
A_	á	í	ó	ú	ñ	Ñ	ª	º	¿	Ò	¬	½	¼	¡	«	»
B_				|	†	‡	§	¶	·	¸	¹	º	»	¼	½	¾
C_	ℓ	⊥	⊥	†	+	‡	§	¶	·	¸	¹	º	»	¼	½	¾
D_	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥
E_	α	β	Γ	π	Σ	σ	μ	τ	Φ	Θ	Ω	δ	∞	φ	ε	∩
F_	≡	±	≥	≤	|	|	÷	≈	°	.	.	√	n	2	■	




4-3-10. CP-862

	_0	_1	_2	_3	_4	_5	_6	_7	_8	_9	_A	_B	_C	_D	_E	_F
8_	κ	υ	λ	τ	η	ι	ζ	π	υ	ι	γ	κ	λ	μ	ν	ι
9_	ν	ο	υ	ϣ	ϥ	ϣ	ϣ	ϣ	ϣ	ϣ	ϣ	ϣ	ϣ	ϣ	ϣ	ϣ
A_	á	í	ó	ú	ñ	Ñ	ª	º	¿	¬	½	¼	ı	«	œ	
B_				|	†	‡	§	¶	·	¸	¹	º	»	¼	½	¾
C_	ℓ	⊥	⊥	†	+	‡	§	¶	·	¸	¹	º	»	¼	½	¾
D_	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥
E_	α	β	Γ	π	Σ	σ	μ	τ	Φ	Θ	Ω	δ	∞	φ	ε	∩
F_	≡	±	≥	≤	|	|	÷	≈	°	.	.	√	n	²	■	

4-3-11. CP-863

	_0	_1	_2	_3	_4	_5	_6	_7	_8	_9	_A	_B	_C	_D	_E	_F
8_	Ç	ü	é	â	Â	à	¶	ç	ê	ë	è	ï	î	=	À	§
9_	É	È	Ê	ô	Ë	ï	û	ù	æ	Ô	Ü	ø	£	Ù	Û	f
A_	ı	´	ó	ú	¨	,	³	-	î	ƒ	¬	½	¼	¾	«	»
B_				|	†	‡	‖	π	ƒ	‡	||	¶	‖	‡	‡	‡
C_	L	⊥	⊥	†	-	†	‡	‖	⊥	¶	‖	¶	‡	=	‡	±
D_	⊥	¶	π	⊥	⊥	F	π	‡	‡	⊥	Γ	■	■	■	■	■
E_	α	β	Γ	π	Σ	σ	μ	τ	Φ	Θ	Ω	δ	∞	φ	ε	∩
F_	≡	±	≥	≤	|	|	÷	≈	°	.	.	√	n	2	■	

4-3-12. CP-866

	_0	_1	_2	_3	_4	_5	_6	_7	_8	_9	_A	_B	_C	_D	_E	_F
8_	А	Б	В	Г	Д	Е	Ж	З	И	Й	К	Л	М	Н	О	П
9_	Р	С	Т	У	Ф	Х	Ц	Ч	Ш	Щ	Ъ	Ы	Ь	Э	Ю	Я
A_	а	б	в	г	д	е	ж	з	и	й	к	л	м	н	о	п
B_				|	┌	┐	└	┘	┌	┐	└	┘	┌	┐	└	┘
C_	⌒	⊥	⊓	┌	┐	└	┘	┌	┐	└	┘	┌	┐	└	┘	┌
D_	⌒	⊥	⊓	┌	┐	└	┘	┌	┐	└	┘	┌	┐	└	┘	┌
E_	р	с	т	у	ф	х	ц	ч	ш	щ	ъ	ы	ь	э	ю	я
F_	Ё	ё	Є	е	Ї	ї	Ў	ў	°	·	·	√	№	¤	■	

4-3-13. CP-1250

	_0	_1	_2	_3	_4	_5	_6	_7	_8	_9	_A	_B	_C	_D	_E	_F
8_	€	,	„	…	†	‡		‰	Š	‹	Ś	Ť	Ž	Ž		
9_	‘	’	“	”	•	–	—		™	š	›	ś	ť	ž	ž	
A_	˘	˘	Ł	ł	Ą	ą	§	¨	©	Ş	«	¬		®	Ž	
B_	°	±	¸	ł	´	µ	¶	·	¸	ą	ş	»	Ł	”	ł	ž
C_	Ř	Á	Â	Ă	Ä	Í	Ć	Ç	Č	É	Ę	Ë	Ě	Í	Î	Ď
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4-3-14. CP-1251

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E_	а	б	в	г	д	е	ж	з	и	й	к	л	м	н	о	п
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4-3-15. CP-1252

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4-3-16. CP-1253

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4-3-17. CP-1254

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D_	Ğ	Ñ	Ò	Ó	Ô	Õ	Ö	×	Ø	Ù	Ú	Û	Ü	ı	Ş	ß
E_	à	á	â	ã	ä	å	æ	ç	è	é	ê	ë	ì	í	î	ï
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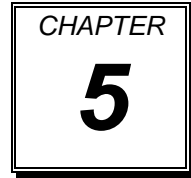
4-3-18. CP-1255

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4-3-19. CP-1257

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SOFTWARE CONFIGURATION



Helpful information that describes the settings for the VFD customer display.

The following sections are included:

- Utility Installation
- Establish Connection
- Change Mode Setting
- Customize Welcome Message
- Set User-Defined Character
- Test Display By Command Mode
- F/W Update

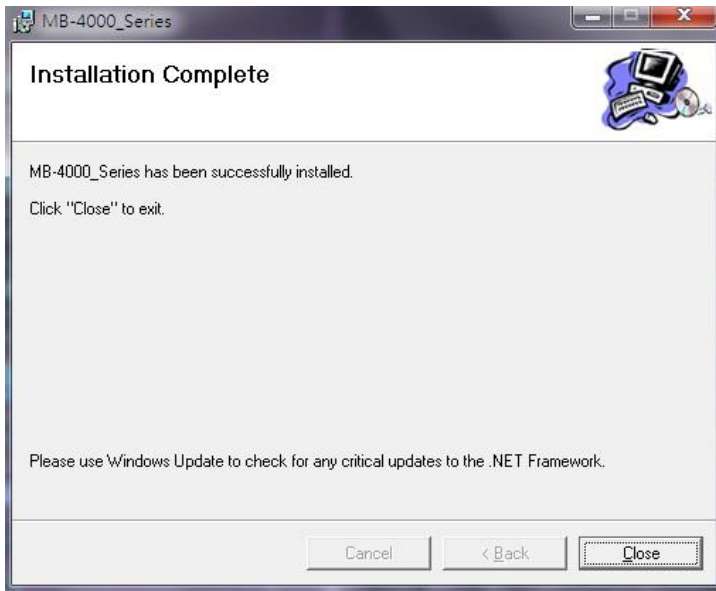
5-1. UTILITY INSTALLATION

Follow the steps below to test the data communication between the display and software utility.

1. Click the “MB-4000_Series” to execute the installation.
2. Follow the step-by-step instruction to finish the installation.



3. After the utility installation is completed, click “Close” to complete the installation.



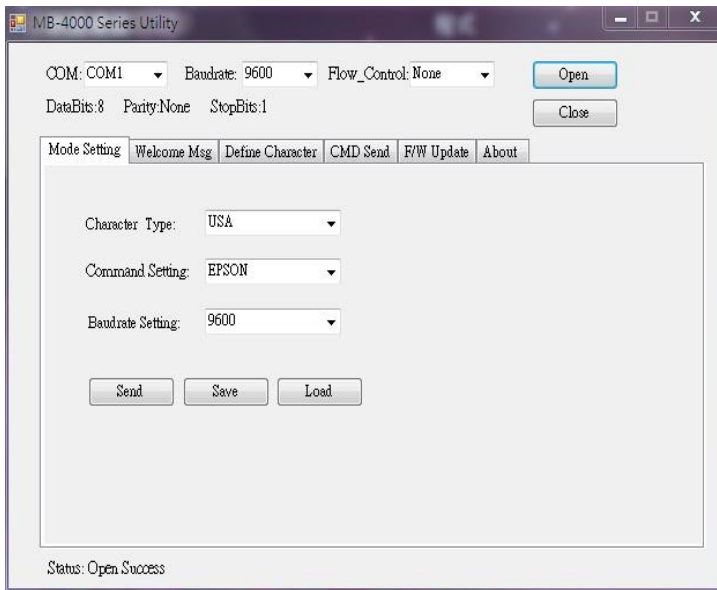
4. A shortcut of the software utility is created on the desktop by default.

Note: This utility requires .NET Framework 2.0 or above version and 30MB storage.

5-2. ESTABLISH CONNECTION

Follow the steps below to test the data communication between the display and software utility.

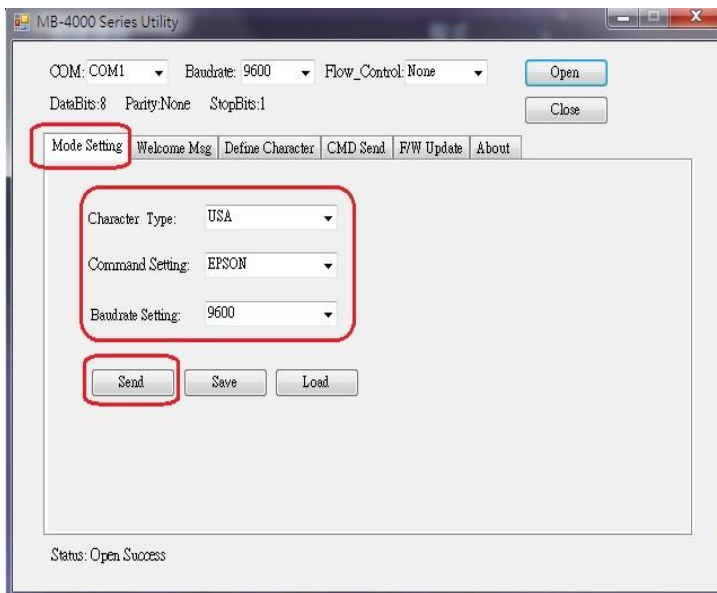
1. Run “MB-4000.exe” or click the shortcut on the desktop.
2. Tap [Open] to test the connection between the display and utility. If the COM port is opened successfully, the message “Open Success” will be displayed at the bottom of the utility window.



5-3. CHANGE MODE SETTING

Follow the steps below to change the character settings on the display.

1. From the “Mode Setting” tab, select the desired Character Type, Command Mode, and Baud Rate from each drop-down list.
2. Tap [Send] to download the character settings to the display.



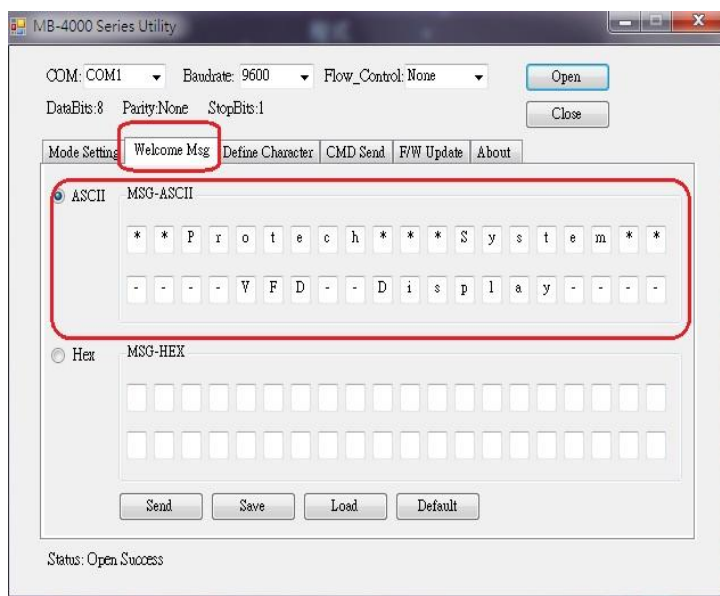
5-4. CUSTOMIZE WELCOME MESSAGE

Follow the steps below to change the welcome messages that you want it to show on the VFD customer display.

1. From the [Welcome Msg] tab, input the desired welcome message.
You may type characters from keyboard (0x20h ~ 0x7Fh).

※ The maximum length for Welcome Message line1 and line2 are 20 characters each. Therefore, a total of 40 characters can be displayed.

2. Tap [Send] to download the Welcome Message to the display.

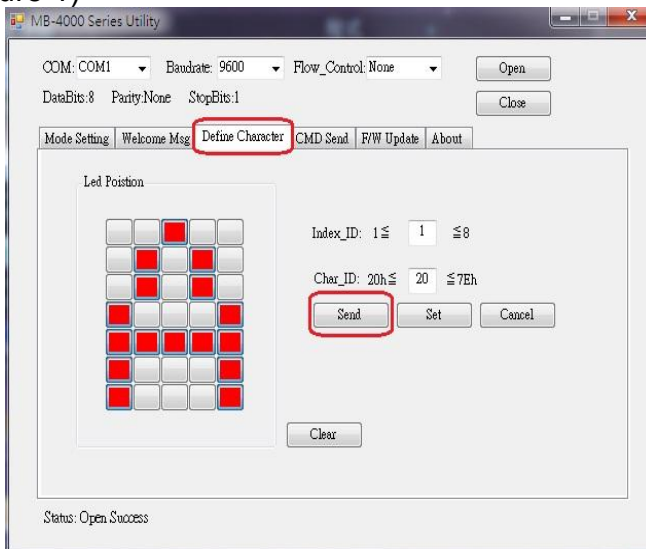


5-5. SET USER-DEFINED CHARACTER

Follow the steps below to create the user-defined character (only allowed for EPSON mode).

1. From the [Define Character] tab, click or unclick the square box(es) on the 5x7 LED Position matrix table to build a symbol or character. The user-defined character in the picture below shows "A".
2. Set the value of Index ID from 1 to 8 to define the location of the character you created. See Figure 1 below:

(Figure 1)



※ The number of the user-defined characters is up to 8 at the maximum.

3. Set the value of Character ID from 20h to 7Eh to identify the created character.
4. After the character is defined, tap [Send] to save the character for the display.

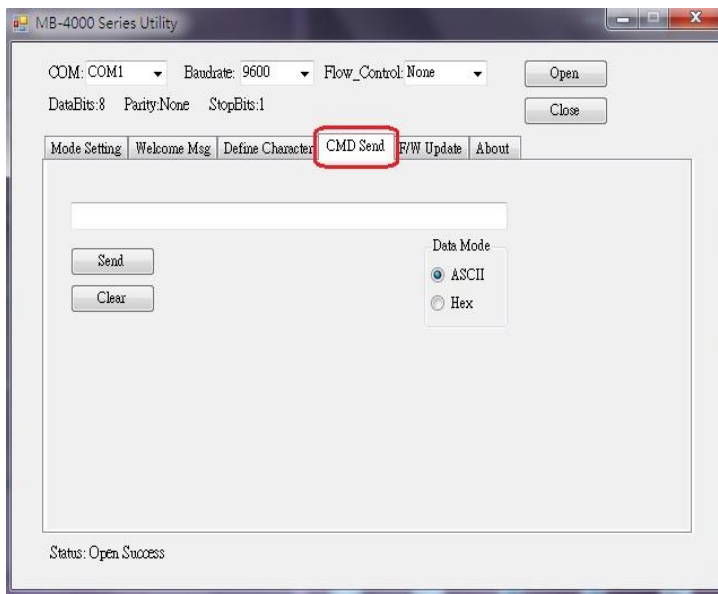
5-6. TEST THE DISPLAY BY COMMAND MODE

Follow the steps below to test the display by command mode.

You can input the desired command into the entry box based on the data mode selected.

※ Please refer to Utility Manual for command reference.

1. From the [CMD Send] tab, select Data Mode (ASCII or Hex), and then tap [Send] to view the result on the display.



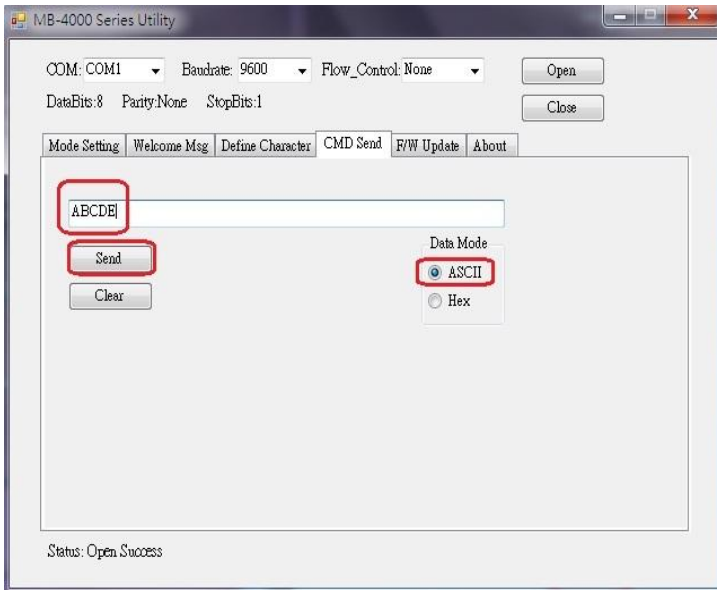
※ Data mode selection

Data Mode	Description
ASCII (Text)	Input any text you want to show on the display. E.g. Input “ABCDE” and then tap [Send] to view “ABCDE” on the display. (Figure 2) All the characters listed in Table 1 ASCII Table can be entered and shown on the display. Note that the special characters other than those listed in Table 1 can be entered, but cannot be shown on the display.
Hex	Input any command in hex you want to execute on the display. E.g. After you define “20” as the ID value for “A” character in Figure 1, select “Hex” data mode, input “20” from EPSON command mode, and tap [Send] to view the character “A” on the display. (Figure 3)

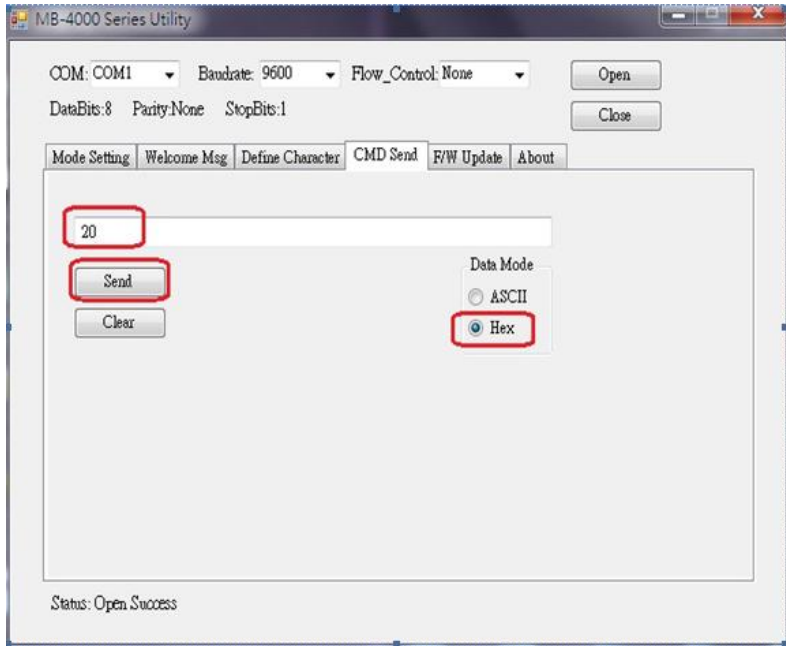
(Table.1 ASCII Table)

	0	1	2	3	4	5	6	7
0			space	0	@	P	`	p
1			!	1	A	Q	a	q
2			"	2	B	R	b	r
3			#	3	C	S	c	s
4			\$	4	D	T	d	t
5			%	5	E	U	e	u
6			&	6	F	V	f	v
7			'	7	G	W	g	w
8			(	8	H	X	h	x
9			)	9	I	Y	i	y
A			*	:	J	Z	j	z
B			+	;	K	[	k	{
C			,	<	L	\	l	|
D			-	=	M	]	m	}
E			.	>	N	^	n	~
F			/	?	O	_	o	

(Figure. 2)

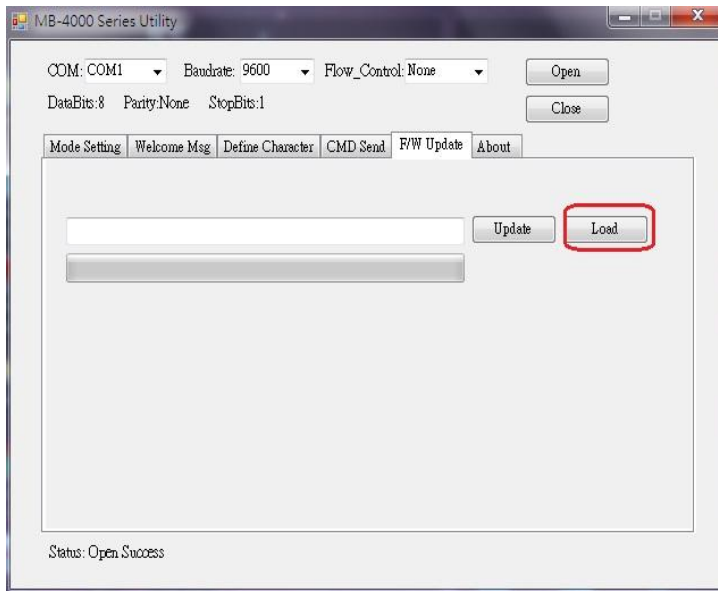


(Figure. 3)



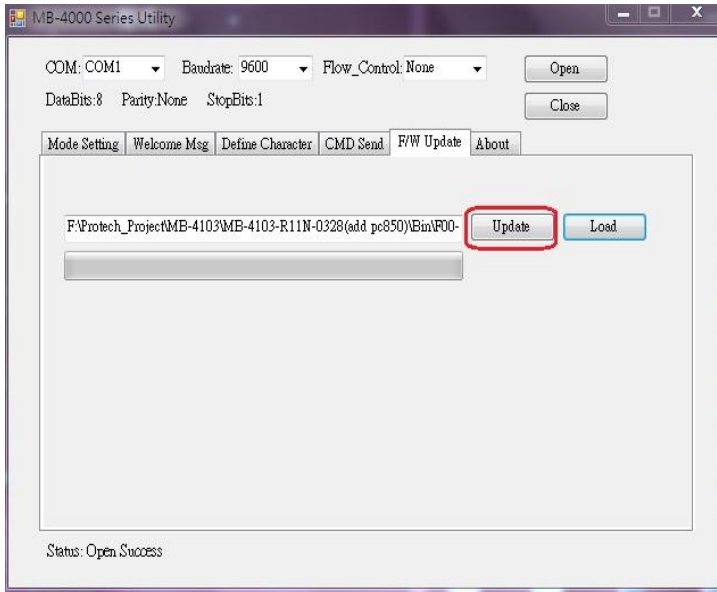
5-7. F/W UPDATE

1. Tap the [F/W Update] tab and tap [Load]. See the picture below:

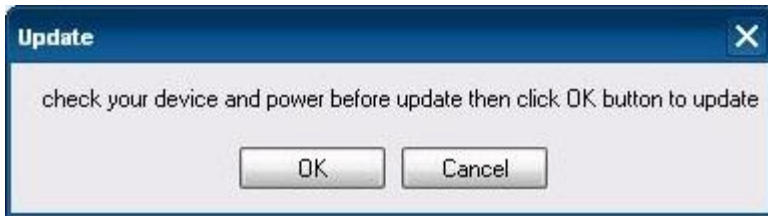


2. Browse for the location of the firmware Bin File that you want to load.

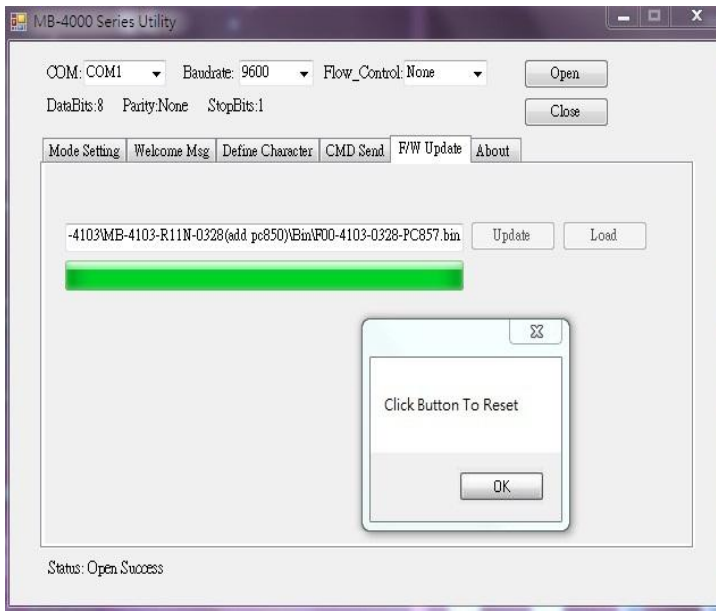
3. Tap [Update].



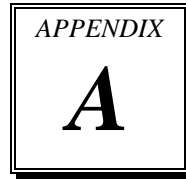
4. Before the Update process can be performed, the system will ask you to check the status of your device and power. Tap [OK] to start updating the VFD.



5. After the update is completed, tap [OK] to reset the VFD.



SYSTEM ASSEMBLY

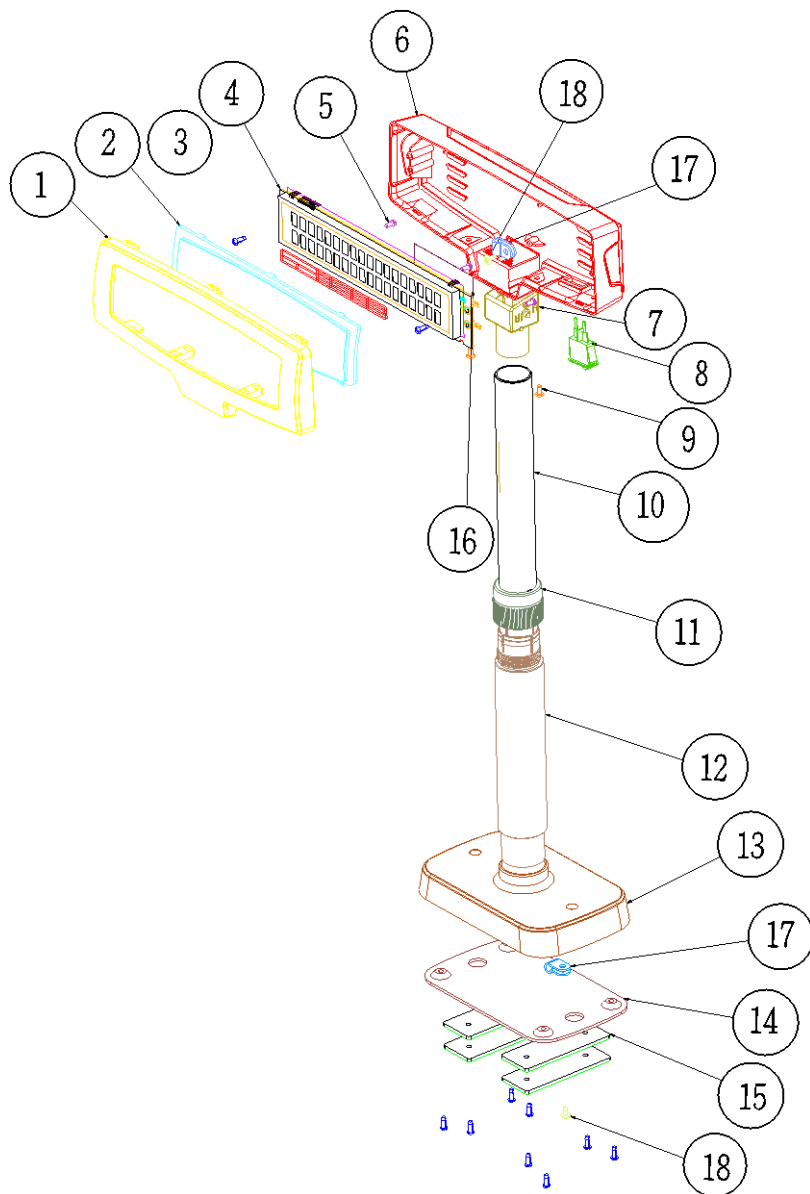


This appendix contains exploded diagrams and accessories information of the system.

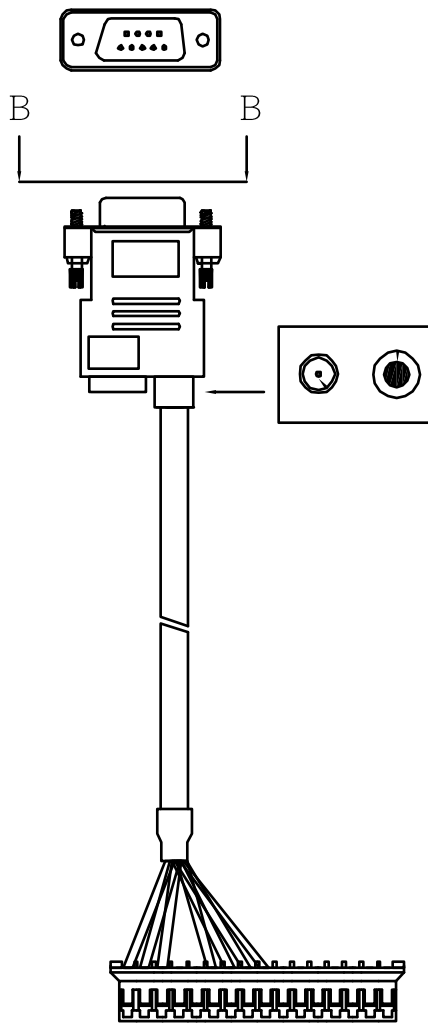
The following sections are included:

- Exploded Diagram for Whole System
- Exploded Diagram for Cable Plug D-Sub
- Exploded Diagram for Cable Plug R-J45

EXPLODED DIAGRAM FOR WHOLE SYSTEM



EXPLODED DIAGRAM FOR CABLE PLUG D-SUB



EXPLODED DIAGRAM FOR CABLE PLUG RJ45

