DIEBOLD NIXDORF

BA64

Customer Display

User Manual

We would like to know your opinion on this publication.

Please send us a copy of this page if you have any constructive criticism.
We would like to thank you in advance for your comments.

With kind regards,

Your opinion:

Diebold Nixdorf Pte Ltd
Research and Development
151 Lorong Chuan
New Tech Park #05-01A/B
Sinagpore 556741

Order No.: ***01750281000 E***

BA64

Customer Display

User Manual

Edition September 2018

Contents

About This Manual

This documentation is intended to help you to work with the customer display and to serve as a reference work. The detailed table of contents help you find the desired information quickly and easily.

Notes in the manual are marked by this symbol.

This symbol is used for warnings.

Introduction

The BA64 family of Line Displays is available in two display technologies, VFD and FSTN LCD, respectively called BA64-2 and BA64-G. The BA64-2 is 2 rows x 20 characters of 5x7 character matrix whereas the BA64-G is 4 rows x 30 characters of 8x16. With a bigger character matrix and the graphical nature of the display module, the BA64-G is capable of displaying Asian characters and characters with complex strokes.

There is an option of USB or powered COM connection to the POS terminal simply by using the respective cable options.

To support a variety of usage scenarios, the BA64 is offered with different mounting options. The desktop stand, pole mounting, and adapters for mounting to the BA9x or the iPOS plus Advanced are available in addition to a VESA compatible mounting pattern on the unit itself.

Features at a glance

- VFD and LCD version allow for worldwide application
- Character based display for international code pages
- Epson ESC POS command set support
- Unicode support
- JavaPOS 1.13 support
- Flexible mounting options thanks to VESA 20x50 mounting pattern
- Small footprint

Manufacturer´s Certification

The device complies with the requirements of the EEC directive 2014/30/EU with regard to ‘Electro-magnetic compatibility" and 2014/35/EU “Low Voltage Directive” and RoHS directive 2011/65/EU.

Therefore, you will find the CE mark on the device or packaging.

FCC-Class A Declaration

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Modifications not authorized by the manufacturer may void users authority to operate this device.

CAN ICES-003 (A)/NMB-3(A).

Supplier’s Declaration of Conformity

Product Description: Customer Display
Model: BA64

Party issuing Supplier’s Declaration of Conformity
Diebold Nixdorf Singapore PTE. LTD.
151 Lorong Chuan New Tech Park #05-01 A/B
Singapore 556741

Phone: +65 6747 3828

Responsible Party – U.S. Contact Information
Diebold Nixdorf
5995 Mayfair Road
N. Canton, OH 44720 / USA

Phone: +1 330 490 5049

FCC Compliance Statement (for products subject to Part 15)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

Care of BA64

Clean your customer display regularly with an appropriate surface cleaning product.
Make sure that the device is switched off and that no moisture is allowed to get into the inside of the device.

Recycling BA64

Environmental protection does not begin when the time has come to dispose of the BA64; it begins with the manufacturer. This product was designed according to our internal norm “Environmental conscious product design and development”.

The BA64 is manufactured without the use of CFC and CHC and is produced mainly from reusable components and materials.

The processed plastics can, for most part, be recycled. Even the precious metals can be recovered, thus saving energy and costly raw materials.

Please do not stick labels onto plastic case parts. This would help us to reuse components and material.

But there are still some parts that are not reusable. Diebold Nixdorf guarantees the environmentally safe disposal of these parts in a Recycling Center, which is certified pursuant to ISO 9001 and ISO 14001.

Please contact your competent branch office for information on how to return and reuse devices and disposable materials.

Warranty

Diebold Nixdorf guarantees generally a warranty engagement for 12 months beginning with the date of delivery. This warranty engagement covers all those damages which occur despite a normal use of the product.

Damages due to

- improper or insufficient maintenance,
- improper use of the product or unauthorized modifications of the product,
- inadequate location or surroundings

will not be covered by the warranty.

All parts of the product which are subject to wear and tear are not included in the warranty engagement. For detailed warranty arrangements please consult your contract documents.

Please order spare parts at the Diebold Nixdorf customer service.

Overview

Below, you will find reference pictures showing the BA64 in different mounting scenarios. Installation components, like e.g. the pole itself, are not part of the BA64 delivery.

The pictures might deviate in details from the product you received.

BA64 on a stand

BA64 on a pole

BA64 on a BA9x display

BA64 on a BEETLE iPOS system

Initial setup

This chapter provides you with the information you need to prepare for the installation of the system.

Unpacking and Checking the Delivery Unit

Unpack the parts and check to see whether the delivery matches the information on the delivery note. The delivery comprises the respective screen module. Mounting adapters can be ordered separately based on the intended installation scenario. Data cables, necessary for operation, can be ordered separately. If damage has occurred during shipping or if the package contents do not match the delivery note, immediately inform your Diebold Nixdorf sales outlet.
Transport the device only in its original packaging (to protect it against impact and shock).

Mounting options and connection cables

Different mounting options and connection cables are available to install the BA64 in the various installation scenarios.
Mounting options and cables have to be purchased separately from the main unit.

The list below shows an overview of the BA64 configuration components and their detailed content.

BA64 VFD display with silver housing consists of:

	1 x BA64 VFD display with silver housing
	4 x Torx Screw M4x6 with Black Zinc

BA64 VFD display with black housing consists of:

	1 x BA64 VFD display with black housing
	4 x Torx Screw M4x6 with Black Zinc

BA64 LCD display with silver housing consists of:

	1 x BA64 LCD display with silver housing
	4 x Torx Screw M4x6 with Black Zinc

BA64 LCD display with black housing consists of:

	1 x BA64 LCD with black housing
	4 x Torx Screw M4x6 with Black Zinc

Stand consists of:

	1 x Stand BA64 assembly

Pole mount adapter consists of:

	1 x Pole mount adapter BA64 assembly

BA9x dual display adapter for BA64 consists of:

	1 x Adapter Hinge
	1 x Bracket
	2 x Torx Pan Head Screw M3x10 Black Zinc

BEETLE iPOS plus dual display adapter for BA64 consists of:

	1 x Adapter Hinge
	1 x Bracket
	2 x Torx Pan Head Screw M3x10 Black Zinc

Connection cables:

You will need to use either one of these cables to connect the BA64 to the main system.

	RJ45 to USB connection cable
	RJ45 to RS232 connection cable

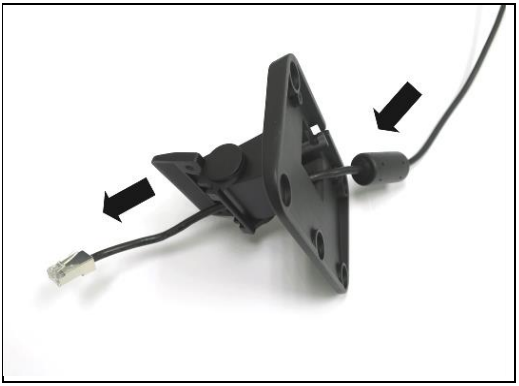
BA64 Installation

Installing the BA64 to a stand

You will need the following parts to install a BA64 to a stand:

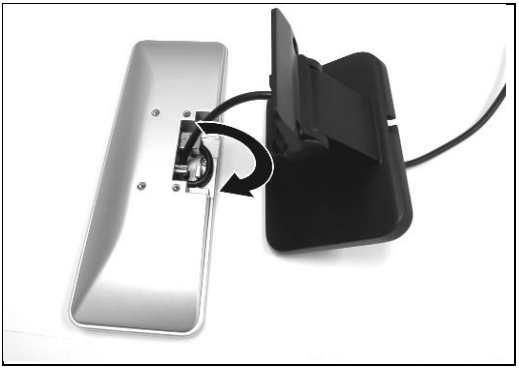
	1 x BA6A
	1 x Stand
	1 x Connection cable

Steps to install



1. Thread the end of the connection cable with RJ45 through the stand.

2. Connect the RJ45 connector to BA64.



3. Secure the cable in the strain relief at the back of BA64.

4. Secure BA64 to the stand with two M4x6 screws provided in the BA64.

5. Secure the cable in the strain relief at the base of the stand.

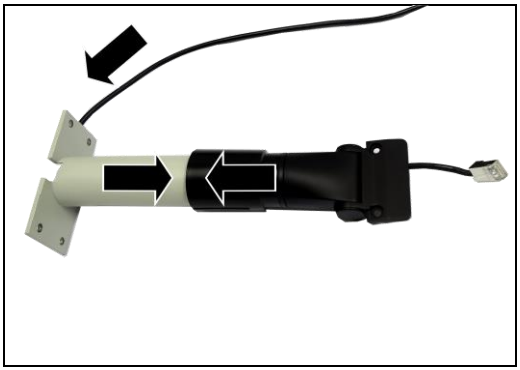
6. The installation is complete.

Installing the BA64 to a pole

You will need the following parts to install a BA64 to a pole:

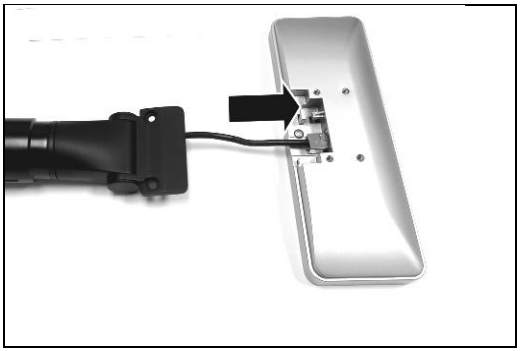
	1 x BA6A
	1 x Pole mount adapter
	1 x Connection cable

Steps to install

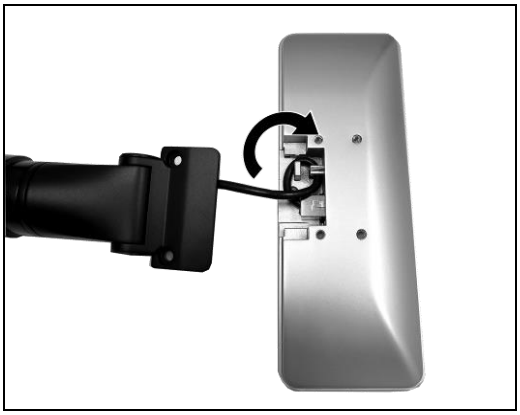


1. Thread the end of the connection cable with RJ45 through the pole and the pole mount adapter.

   Match the pole mount adapter and the pole[1] together.

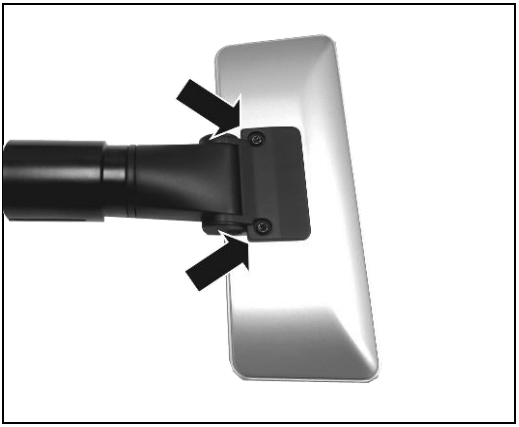


2. Connect the RJ45 connector to BA64.



3. Secure the cable in the strain relief provided in the BA64.

[1] The shown pole is for reference only and not part of the product delivery



4. Secure BA64 to the pole mount adapter with two M4x6 screws provided in the BA64.

5. Locate the screw hole on the pole[2].

   Use a M3 screw to secure the BA64 and pole mount adapter assembly to the pole.

   The installation is complete.

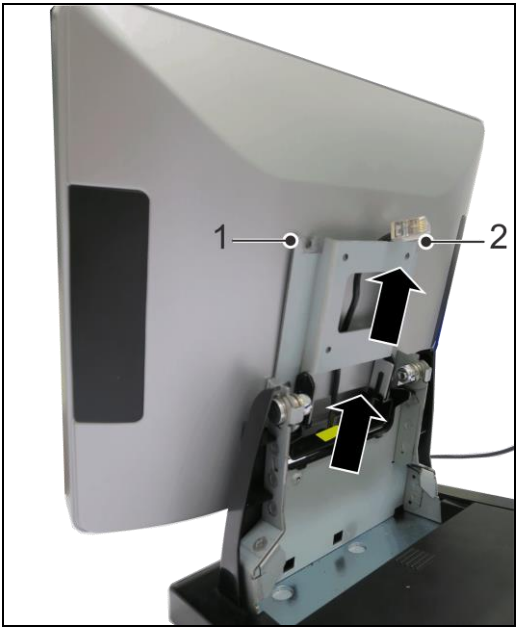
[2] The shown pole is for reference only and not part of the product delivery

Installing BA64 on BA9x display

You will need the following parts to install a BA64 on a BA9x display:

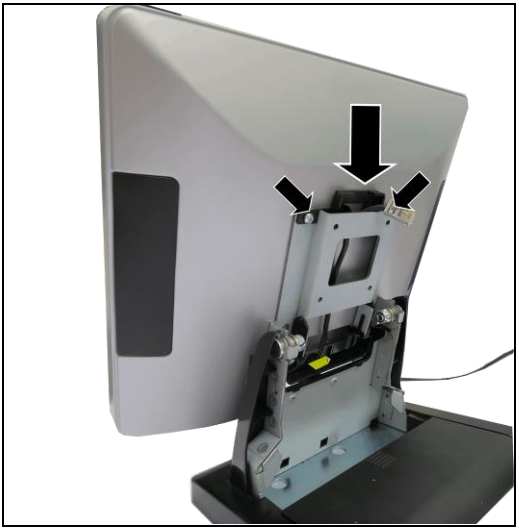
	1 x BA6A
	1 x BA9x dual display adapter for BA64
	1 x Connection cable

Steps to install

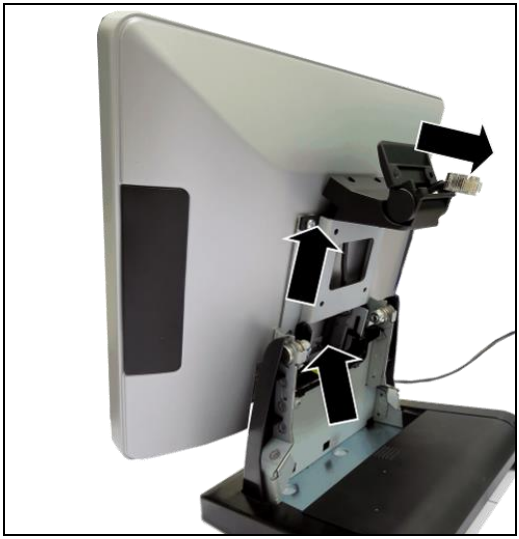


1. Remove all the covers from the stand of BA9x display and the two top screws (1) and (2) from the bracket.

   Thread the end of the connection cable with RJ45 through the stand.



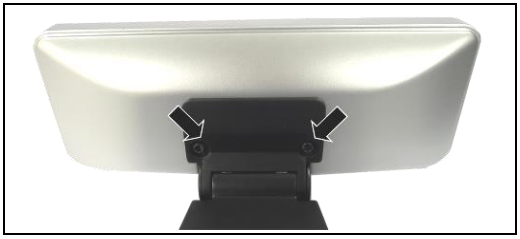
2. Slide in the bracket, fix back the two screws removed in step 1 and tighten to secure.



3. Thread the end of the connection cable with RJ45 through the adapter hinge.

   Connect the RJ45 connector to BA64.

4. Secure the cable in the strain relief provided in the BA64.



5. Secure BA64 to the hinge adapter with two M4x6 screws provided in the BA64.

6. Place the BA64 and hinge adapter assembly on the BA9x display

7. Secure the BA64 and hinge adapter assembly to the BA9x display with two M3x10 screws provided in the adapter kit.

   The installation is complete

Installing BA64 on BEETLE iPOS plus Advanced system

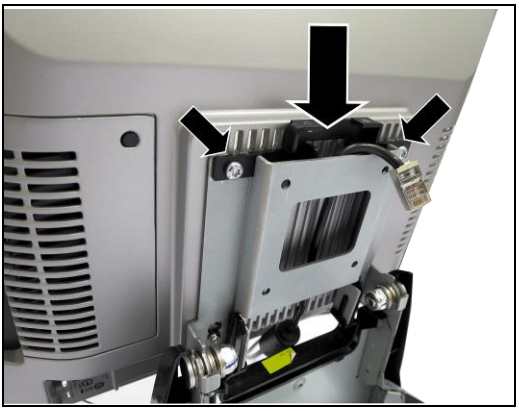
You will need the following parts to install a BA64 on a BA9x BEETLE iPOS plus Advanced system:

	1 x BA64
	1 x BEETLE iPOS plus Advanced dual display adapter for BA64
	1 x Connection cable

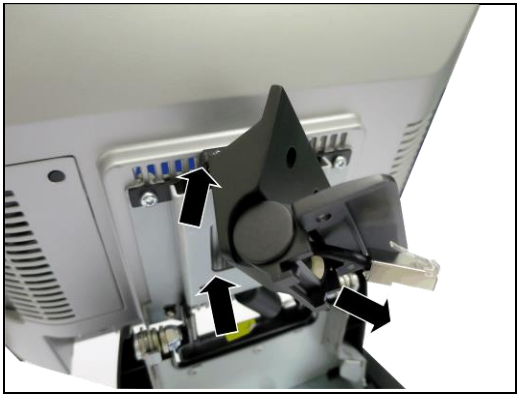
Steps to install

1. Remove all the covers from the stand of BEETLE iPOS plus Advanced system and the two top screws (1) and (2) from the bracket.

   Thread the end of the connection cable with RJ45 through the stand.

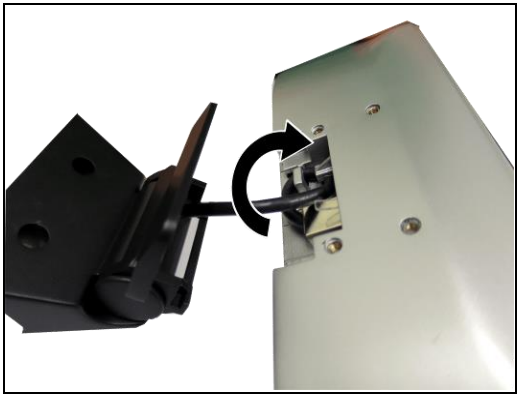


2. Slide in the bracket, fix back the two screws removed in step 1 and tighten to secure.



3. Thread the end of the connection cable with RJ45 through the adapter hinge.

   Connect the RJ45 connector to BA64.



4. Secure the cable in the strain relief provided in the BA64.

5. Secure BA64 to the hinge adapter with two M4x6 screws provided in the BA64

6. Place the BA64 and hinge adapter assembly on the BEETLE iPOS plus Advanced system.

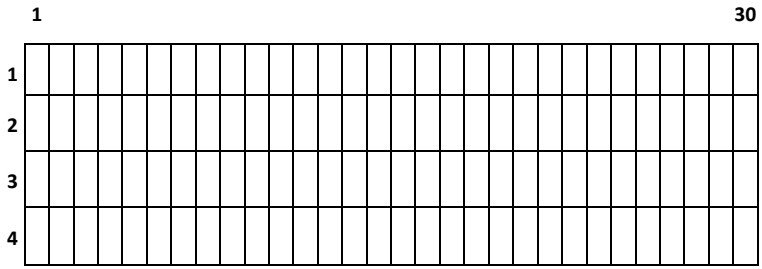
7. Secure the BA64 and hinge adapter assembly to the BEETLE iPOS plus Advanced system with two M3x10 screws provided in the adapter kit.

   The installation is complete

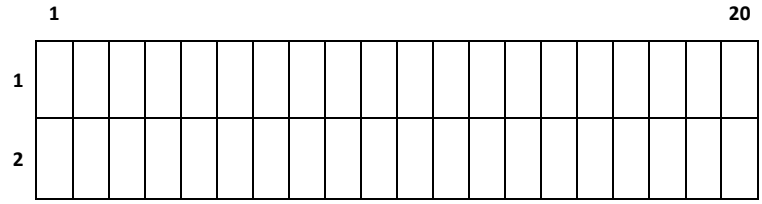
Display Characteristics

Screen Coordinates

BA64-G is a graphical display of 240 x 64 resolution, the screen is divided into 4 rows and 30 columns to form a basic cell size of 8 pixels width and 16 pixels tall



BA64-2 is a text display of 2 rows by 20 characters, each character has a resolution of 5 pixels width and 7 pixels height.



The origin of the coordinate system is at the top-right corner of the screen as shown above.

Cursor Behaviour

Cursor position depends on the writing system is left-to-right or right-to-left. In left to right writing system the cursor, represented by a black vertical bar, is on the left of the basic cell. In the example below, cursor position is at row 1 column 5. As characters are displayed the cursor moves towards the right, the movement is one or two cells depending on the width of the character.

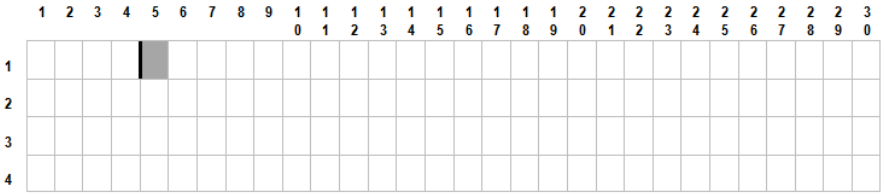


Figure 4: Cursor of a Left-to-Right writing system

And in a right-to-left writing system the cursor is on the right side of the basic cell. As characters are displayed the cursor moves towards the left, the movement is one or two cells depending on the width of the character. An example of right-to-left writing system is the Arabic characters. The origin of the screen coordinate system depends on the Character Encoding/Decoding Mode, if in ASCII, the origin is at the top-right corner and if Unicode Mode is on the top-left corner.

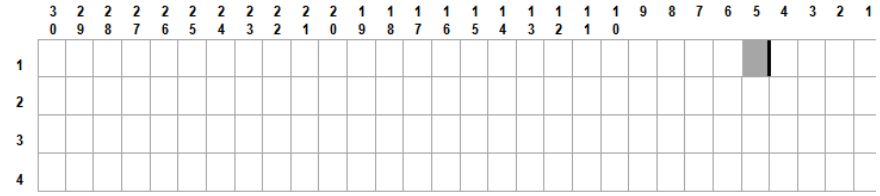


Figure 5: Cursor of a Right-to-Left writing system (ASCII Mode)

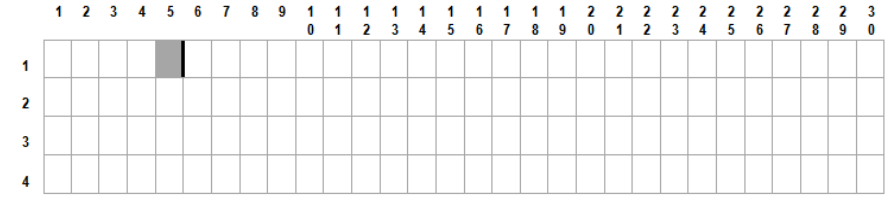


Figure 6: Cursor of a Right-to-left writing system (Unicode Mode)

Display Commands

Control Characters and ESC Sequences

The table below is a summary of the Diebold Nixdorf's control characters and escape sequences supported by the BA64-2 and BA64-G.

Command	Description	BA64-2	BA64-G
BS	Backspace	✓	✓
LF	Line Feed	✓	✓
CR	Carriage Return	✓	✓
ESC [0 K	Delete To End of Line	✓	✓
ESC [2 J	Clear Screen	✓	✓
ESC [<y> ; <x> H	Set Cursor Position	✓	✓
ESC R <n>	Set Country Code	✓	✓
ESC [<n> ; <m> Z	Set Character Size	X	✓
ESC [<n> B	Set Character Resolution	X	✓
ESC [<n> l	Set Line Mode	X	✓
ESC [0 c	Call display identification	✓	✓
ESC [1 c	Character Set Identification	✓	✓
ESC [2 c	Firmware Identification	✓	✓
ESC [<n> ; <m> S	Set baud rate for serial interface	✓	✓
ESC [<y> ; <x> D <w> <d>	Dump User-defined image to display	X	✓
ESC [<m> T	Set Watchdog of cable monitor	X	✓

Command	Description	BA64-2	BA64-G
ESC [<n> L	Load User Logo and Set Display monitor	X	✓
ESC [<h> ; <m> T	Set Clock	X	✓
ESC [<n> P	Switch ON/OFF backlight	X	✓
ESC [<n> E	Set Display Mode	✓	✓
ESC [E	Read Current Display Mode	✓	✓
ESC [<n> u	Set Character encoding/decoding Mode	✓	✓
ESC [u	Read Character encoding/decoding Mode	✓	✓
ESC [0 ?	Execute self-test	✓	✓

Legends:

✓ Supported

X Not Supported

Backspace

Code	Hexadecimal
BS	08

Description:

This command moves the cursor one position to the left. If there is a character in the position to which the cursor moves, it is not deleted. This command is ignored if the cursor is already at the first position of the row.

Notes:

1. For BA64-2, the cursor remains at the same position if it reaches the first column of the row.

2. For BA64-G when in BA63G Compatible Mode, the behavior of this command is as follow: Move the cursor one column to the left. If cursor is currently on the column 1 and row 1 it remains at the current position, however, if cursor is currently not on row 1, move to the last column of the row above. The movement of the cursor by the backspace control character is not affected by the current Character Resolution/Size, the cursor always move the distance of one basic cell width or height.

Line Feed

Code	Hexadecimal
LF	0A

Description:

This command moves the cursor one row down; the column position of the cursor remains unchanged. If the cursor is on the last row the screen scrolls up a row and the position of the cursor remains unchanged.

Notes:

1. For BA64-G when in BA63G Compatible Mode, the behavior of this command is as follow: Increment the row number by 1 if the current Character Resolution/Size is normal height or increment by 2 if it is double height. If the new cursor position ends up on the last row (row 4) and if current Character Resolution/Size is double height, scroll up one row, the final cursor position shall be on row 3.

Carriage Return

Code	Hexadecimal
CR	0D

Description:

This command moves the cursor to the beginning of the row in which it is currently positioned. This command is ignored if the cursor is already at the beginning of the row.

Notes:

None

Delete To End of Line

Code	Hexadecimal
ESC '[' '0' 'K'	1B 5B 30 4B

Description:

This command deletes the characters from the cursor, including the cursor position to the end of the row. The position of the cursor remains unchanged.

Notes:

1. For BA64-G when in BA63G Compatible Mode, it deletes the current row starting from the current cursor position regardless of the current settings for Character Resolution/Size or Line Mode.

Clear Screen

Code	Hexadecimal
ESC '[' '2' 'J'	1B 5B 32 4A

Description:

This command clears all content on the screen. The cursor position remains unchanged.

Notes:

None

Set Cursor Position

Code	Hexadecimal
ESC '[' <*y*> ';' <*x*> 'H'	1B 5B <*y*> 3B <*x*> 48

Description:

This command positions the cursor to specified basic cell position. The cursor is not visible. Parameter <y> and <x> are 1 and 2 ASCII decimal numbers respectively. If <y> or <x> is 0, it is interpreted as 1, and if they

are greater than the maximum column or row it is interpreted as the maximum. If <y>, <x> and the ';' in between are omitted, the cursor is located at home position, i.e. coordinate (1, 1).

Cursor coordinate of BA64-G always refer to the basic cell regardless of the current Character Resolution/Size or Line Mode.

Notes:

1. Default position of cursor is (1, 1).
2. For BA64-2, valid ranges of value are 1 to 2 for *<y>* and 1 to 20 for *<x>*.
3. For BA64-G when in BA63G Compatible Mode, the behavior of this command is as follow: If Line Mode is 1 (2-line mode), meaning 2-line mode, the physical row number is calculated using the equation, row = y * 2 – 1. Therefore in 2-line mode, cursor position is row 1 if <y> is 1, and is row 3 if <y> is 2.

Set Country Code

Code	Hexadecimal
ESC 'R' <*n*>	1B 52 <*n*>

where <*n*> is a hexadecimal byte value that represents the country code. The supported country codes are listed below:

Country Code	Code page	Character Set
00	-	USA
01	-	France
02	-	Germany
03	-	Great Britain
04	-	Denmark 1
05	-	Sweden
06	-	Italy
07	-	Spain
08	-	Japan
09	-	Norway
0A	-	Denmark 2
0B	-	Spain 2
0C	-	Latin-America
30	437	Standard
31	850	Latin 1
32	852	Latin 2
33	857	Latin 5/Turkey
34	858	Latin 1
35	866	Latin/Cyrillic
36	737	Latin/Greek 2

Country Code	Code page	Character Set
37	862	Latin/Hebrew
38	IBM813	Latin/Greek 2
39	775	Baltic Rim
3A	855	Cyrillic
3B	860	Portuguese
3C	861	Icelandic
3E	863	French/Canada
40	865	Nordic
41	869	Greek 2
42	1250	Latin 2 Central Europe
44	1251	Cyrillic Slavic
45	1252	Latin 1 ANSI
46	1253	Greek
47	1254	Latin 5 Turkish
48	1255	Hebrew
49	1257	Baltic Rim
4A	1258	Vietnamese
63	897	Katakana

The following country codes are applicable to BA64-G only.

Country Code	Code page	Character Set
43	1256	Arabic
80	932	Shift JIS
90	936	GB Jianti
92	950	BIG 5
93	950	BIG5+HKCS
A0	949	Korean
B0	874	Thai 4-level (8x19)
B1	874	Thai 4-level (12x32)

Description:

This command set the specific character set for the respective country code defined by parameter <*n*> as shown above.

Notes:

1. <*n*> is a hexadecimal byte.
2. The default is USA character set (*n = 0*)
3. This command is not supported in UTF-8 and UTF-16 modes.

Select Character Size

Code	Hexadecimal
ESC '[' <*n*> ';' <*m*> 'Z'	1B 5B <*n*> 3B <*m*> 5A

Description:

This command selects the size of character. After sending this command, all subsequent characters sent will be displayed in the selected width and height. The parameter <*n*> and <*m*> are one ASCII decimal number each and are used to specify the width and height of characters respectively. Currently, the valid values of <*n*> and <*m*> are:

n	m	Double Byte Characters (W×H)	Single Byte Characters (W×H)
1	1	16 × 16	8 × 16
1	2	16 × 32	8 × 32
2	1	32 x 16	16 x 16
2	2	32 × 32	16 × 32

The width of single byte character is half of the width of double byte character. When displaying double height character, a line feed command moves the cursor 2 lines down instead of 1 line. In this case, if the movement positions the cursor out of the screen, the screen scrolls the whole screen 2 lines up and with the cursor remaining at the same location.

Notes:

1. Applicable to BA64-G only.
2. The default value of both <*n*> and <*m*> are 1.

Select Character Resolution

Code	Hexadecimal
ESC '[' <*n*> 'B'	1B 5B <*n*> 42

Description:

This command selects the resolution of character. After sending this command, all characters sent will be displayed in the selected resolution. The parameter n is one ASCII decimal number and is used to specify the width and height of a character in terms of pixel. The valid values of n are:

N	Double Byte Characters (W×H)	Single Byte Characters (W×H)
0	16 × 16	8 × 16
1	16 × 32	8 × 32
2	32 × 32	16 × 32

The width of single byte character is half of the width of double byte character. When displaying double height character (i.e. n=1 or 2), a line feed command moves the cursor 2 lines down instead of 1 line. In this case, if the movement positions the cursor out of the screen, the device scrolls the whole screen 2 lines up and with the cursor remaining at the same location.

Notes:

1. Applicable to BA64-G only.
2. When in BA63G Compatible Mode, the displayable characters following this command will be displayed from the current cursor position at the specified character resolution. And a line feed control character moves the cursor down by two rows if selected Character Resolution is double-height.
3. The default value of <*n*> is 0.

Dump User Defined Picture to Screen

Code	Hexadecimal
ESC '[' <*x*> ';' <*y*> 'D' <*w*> <*h*> <*data*>	1B 5B <*x*> 3B <*y*> 44 <w> <*h*> <*data*>

where:

<*y*> & <*x*> are ASCII coded decimal for the coordinates of the origin of the image.

<*w*> is a byte value for the width of the image in byte (group of 8 pixels)

<*h*> is a byte value for the height of the image in pixel.

Description:

This command dumps a user supplied image onto the display screen. The screen is organized into 64-pixel lines (y-axis) each lines has 30 bytes where the 8 bits of each byte is mapped to a pixel, the leftmost pixel is the most significant bit of the byte. The bytes in the <*data*> block are arranged sequentially by rows starting with from the upper left corner of the image.

Below is a graphical representation of the screen where the values each box is the coordinate of a group of 8 pixels mapped horizontally. The valid range of <*x*> is 1 to 30, and <*y*> is 1 to 64.

1;1	1;2	1;3	....	....	....	1;29	1;30
2;1	2;2	2;3	....	....	....	2;29	2;30
:	:	:				:	:
:	:	:				:	:
8;1	8;2	8;2					
:	:	:				:	:
64;1	64;2	64;3	....	....	....		64;30

Each byte in the y-coordinate consists of 8 bits each representing a pixel and oriented vertically where the LSB is mapped to the top of the group of 8 pixels.

Notes:

1. The height of the image must be a multiple of 8 pixels.
2. Applicable to BA64-G only.

Set Clock

Code	Hexadecimal
ESC '[' <*h*> ';' <*m*> 'T'	1B 5B <*h*> 3B <*m*> 54

Description:

This command is used to initialize the clock. Parameter <*h*> and <*m*> are one or two ASCII code decimal number Once this command is executed, the screen will display current time which is updated every one minute. It will also display a picture of the WN BEETLE with a pair of eyes that move every one second. This will continue until any command or character is sent to the display.

Notes:

1. The clock will keep the time until the next set clock command or system power down.
2. Applicable to BA64-G only.

Set Watch Dog of Cable Monitor

Code	Hexadecimal
ESC ’[‘ <*m*> ’T’	1B 5B <*m*> 54

Description:

This command defines time period of cable monitor. There is a cable monitor that monitors the signal on the RS-232 and USB line. If nothing appears on the cable for certain duration, the monitor will turn on the clock automatically. Cable monitor can be disabled by setting mm to 0.

Notes:
1. The default value of <*m*> is 0.
2. Applicable to BA64-G only.

Load User Logo and Set Display Monitor

Code	Hexadecimal
ESC ’[‘ <*n*> ’L’ <*data*>	1B 5B <*n*> 4C <*data*>

Description:

This command loads a user defined logo that is to be displayed on the screen. The bitmap bytes of the logo must follow immediately after the command. The number of bytes must 240 (width in pixel) by 8 (height in byte) which fill the whole screen. The most significant bit of a data byte represents the left pixel. The bitmap data are sent from left to right, line by line. The user defined logo will be displayed automatically after the cable idle for a certain period, parameter <n> specifies this period in minute. It will not appear if <*n*> is set to 0.

If the time periods of display clock and display user logo are the same, clock will never be displayed.

Notes:
1. The default value of *n* is 0.
2. Applicable to BA64-G only.

Turn Display On And Off

Code	Hexadecimal
ESC '[' <*n*> 'P'	1B 5B <*n*> 50

where

n = 0 means OFF *(default)*

= 1 means ON

Description:

This command turns off or on the display illumination. When the display is turned on, the device will turn on the illumination automatically whenever it receives command or character from the communication cable.

Notes:

1. The default status of display is on (*n = 1*).
2. Applicable to BA64-G only.

Select Line Mode

Code	Hexadecimal
ESC '[' <*n*> 'l'	1B 5B <*n*> 49

Description:

This command selects the cursor positioning as either 4-line mode or 2-line mode. <*n*> is a ASCII coded decimal number where,

n = 0 means 4-line mode.

= 1 means 2-line mode

Notes:

1. Applicable to BA64-G only.
2. The default value of n is 0.
3. When in BA63G Compatible Mode, set Line Mode only affect the Set Cursor Position command, please read Set Cursor Position command for the details. Note, however, that the screen area of the BA64-G is still divided into 4 rows regardless of the Line Mode.

Display Identification

Code	Hexadecimal
ESC'['0''c'	1B 5B 30 63

Description:

This command returns the display characteristics.

Response:

Code	Hexadecimal
ESC [? *<p1>;<p2>;<p3>;<p4>;<p5>* c	1B 5B 3F *p1* 3B p2 3B *p3* 3B *p4* 3B *p5* 63

where:

		BA64-2	BA64-G
p1	Type of display	2 = VFD	3 = LCD
p2	Firmware version	One or more ASCII coded decimal number	
p3	Character set	Two ASCII coded alphanumeric characters of the currently selected country code. If country code is not defined for the current codepage *p3* shall be empty	
p4	Number of rows	2	2, 3 or 4
p5	Column/line	20	30

Notes:

1. This command is not supported in USB mode.
2. For BA64-2, when Compatibility Mode is set to "3", the response is as follow

ESC [? 2 ; *<p2>* ; 2 ;4 ; 20 c	1B 5B 3F 32 3B **xx xx** 3B 32 3B 34 3B 32 30 63

where, *<p2>* is two ASCII numeric character representing the major version of the firmware

Character Set Identification

Code	Hexadecimal
ESC ’[‘ ’1’ ’c’	1B 5B 31 63

Description:

This command returns the country code of the external character sets currently installed.

Response:

Code	Hexadecimal
ESC [? <*cp1*>;<*cc1*>;<*cp2*>;<*cc2*> … ; <c*pn*>;<*ccn*> c	1B 5B 3F c*p1* 3B *cc1* 3B … 3B c*pn* 3B *ccn* 63

Where *cp1*, *cp2*, … and *cc1*, *cc2*, … are the code pages and country codes respectively.

Notes:

1. This command is not supported in USB mode.

Firmware Identification

Code	Hexadecimal
ESC ’[‘ ’2’ ’c’	1B 5B 32 63

Description:

This command returns the boot and main firmware versions numbers.

Response:

Code	Hexadecimal
ESC [? <*p1*> <*p2*>;<*p3*> <*p4*> c	1B 5B 3F *p1 p2* 3B *p3 p4* 63

Where,

p1, *p2* are the boot firmware version and subversion number.

p3, *p4* are the main firmware version and subversion number.

Notes:

1. This command is not supported in USB mode.

Set Compatibility Mode

Code	Hexadecimal
ESC '[' <*n*> 'E'	1B 5B <*n*> 45

n is a ASCII coded decimal number defined as follow:

n	**Display Mode**
1	Set BA63G or BA63 Compatible mode *(default)*
2	Set ESC/POS Compatible mode
3	Set BA63 Compatible mode with RS232 Legacy support

Description:

This command is to switch to the selected compatible mode. Sending this command will change the setting and save to flash (non-volatile).

Notes:

1. Compatibility Mode <*n*> = 3 is only applicable for BA64-2 that is operating in RS232 mode

Read Current Compatibility Mode

Code	Hexadecimal
ESC ’[‘ ’E’	1B 5B 45

Description:

This command returns the current compatibility mode. The response format is as shown below.

Response:

Code	Hexadecimal
ESC [<*n*> E	1B 5B <*n*> 45

n is a ASCII coded decimal number.

n	**Display Mode**
1	BA63G or BA63 Compatible mode
2	ESC/POS Compatible mode
3	BA63 Compatible mode with RS232 Legacy support

Notes:

3. This command is not supported in USB mode.

Set baud rate for serial port

Code	Hexadecimal
ESC [<*n*> ; <*m*> S	1B 5B <*n*> 3B <*m*> 53

Description:

This command is applicable to RS232C interface only.

n	Baud Rate
01	110 bps
02	300 bps
03	600 bps
04	1200 bps
05	2400 bps
06	4800 bps
07	9600 bps (default)
08	14400 bps
09	19200 bps
0A	38400 bps
0B	56000 bps
0C	57600 bps
0D	115200 bps

Bit	Control Byte
1..0	11 = 8-bit data (fixed)
2	0 = 1 stop bit (default) 1 = 2 stop bits
3	0 = Disable parity 1 = Enable parity (default)
5..4	00 = Odd parity (default) 01 = Even parity 10 = Forced '1' stick parity 11 = Forced '0' stick parity
7..6	Fixed at 00

Notes:

1. This command is not applicable in Unicode mode, use the alternate command.

Set baud rate for serial port (alternate command) new

Code	Hexadecimal
ESC [<*b*>;<*d*>;<*p*>;<s> s	1B 5B <*b*> 3B <*d*> 3B <*p*> 3B <*s*> 73

Description:

This is an alternate command to set the serial communication settings. The parameters are ASCII coded decimal values or alphabetical character.

	Parameter	Values
b	Baud rate	9600 to 115200
d	Data Length	7 or 8
p	Parity	0 = none 1 = Odd 2 = Even
s	Stop bit	1 or 2

Notes:

1. This command is not applicable in USB mode.

Set Character Encode/Decode Mode

Code	Hexadecimal
ESC '[' <*n*> 'u'	1B 5B <*n*> 75

n is a ASCII coded decimal number defined as follow:

1	**Display Mode**
0	Set ASCII Encode/Decode mode
1	Set UTF-8 Encode/Decode Mode
2	Set UTF-16 Encode/Decode Mode

Description:

An encode/decode mode change reset the display

Notes:

Read Character Encode/Decode Mode

Code	Hexadecimal
ESC ’[’ ’u’	1B 5B 75

Description:

This command returns the current compatibility mode. The response format is as shown below.

Response:

Code	Hexadecimal
ESC [<*n*> u	1B 5B <*n*> 75

n is a ASCII coded decimal number.

n	**Display Mode**
0	ASCII Encode/Decode mode
1	UTF-8 Encode/Decode Mode
2	UTF-16 Encode/Decode Mode

Notes:

1. This command is not supported in USB mode.

Start Self-test

Code	Hexadecimal
ESC [0 ?	1B 5B 30 3F

Description:

Start self-test in an endless loop. The self-test stops and return to normal operation when the device received any data.

Restore Configuration Data to Factory Default

Code	Hexadecimal
ESC + 0 w	1B 2B 30 77

Description:

This command restores the configuration command to factory default.

Notes:
None

ESC/POS Command

The BA64-2 and BA64-G respectively supports a reduced command set of the ESC/POS command supported by EPSON's DM-D110 and DM-D500.

Please refer to EPSON Application Programming Guide for detail description of the commands.

Supported Commands

The table below list the supported commands.

Command	Description	Hexadecimal	DM-D110	DM-D500
BS	Backspace	08	O	O
HT	Horizontal Tab	09	O	O
LF	Move cursor down	0A	O	O
US LF	Mover cursor up	1F 0A	O	O
HOM	Move cursor to home position	0B	O	O
CR	Move cursor to left-most position	0D	O	O
US CR	Move cursor to right-most position	1F 0D	O	O
US B	Move cursor to bottom position	1F 42	O	O
US $	Move cursor to the specified position	1F 24 <*n*> <*m*>	O	O
CLR	Clear display screen	0C	O	O
CAN	Clear cursor line	18	O	O
ESC @	Initialize display	1B 40	O	O
ESC R	Select an international character set	1B 52 <*n*>	O	O

Command	Description	Hexadecimal	DM-D110	DM-D500
ESC t	Select character code table	1B 74 <*n*>	O	O
US MD1	Select overwrite mode	1F 01	O	O
US MD2	Select vertical scroll mode	1F 02	O	O
US MD3	Select horizontal scroll mode	1F 03	O	O
US (B	Transmit display information	1F 28 42 <*pL*> <*pH*> <*a*> <*n*>		O
US (G	Select character style	1F 28 47 <*pL*> <*pH*> <*fn*>		O

Unsupported Commands

The following table list the commands not supported by BA64-2 and BA64-G. These unsupported commands are parsed and discarded.

Command	Description	Hexadecimal	DM-D110	DM-D500
ESC =	Select peripheral device	1B 3D <*n*>	O	0
ESC %	Select/cancel user-defined character set	1B 25 <*n*>	O	0
ESC &	Define user-defined characters	1B 26 <*y*> <*c1*> <*c2*> ….	O	0
ESC ?	Cancel user-defined characters	1B 3F <*n*>	O	0
ESC W	Set/cancel window range	1B 57 <*n*> <*m*> <*x1*> <*y1*> <*x2*> <*y2*>	O	0
US C	Turn cursor display on/off	1F 43	O	0
US E	Turn display screen blank interval	1F 45 <n>	O	0
US T	Set and display counter time	1F 54 <n> <m>	O	0
US U	Display counter time	1F 55	O	0
US X	Set brightness	1F 58 <n>	O	0
US r	Select/cancel reverse characters	1F 72 <n>	O	0
US v	Set status confirmation for DTR signal	1F 76 <n>	O	0
US @	Execute self-test	1F 40	O	0
US :	Start/end macro definition	1F 3A	O	0

Command	Description	Hexadecimal	DM-D110	DM-D500
US ^	Execute macro	1F 5E <n> <m>	O	0
US .	Display period	1F 2E <n>		0
US ,	Display comma	1F 2C <n>		0
US ;	Display semicolon	1F 2B <n>		0
US #	Turn annunciator on/off	1F 23 <m> <n>		0
US (A	Select display	1F 28 41	O	0
US (C	Edit NV user memory	1F 28 43		0
US (E	User select commands	1F 28 45	O	0
US (D	Select window control	1F 28 44		0
US (F	Display bit image	1F 28 46		0
US (H	Set display layout	1F 28 48		0

USB Command

The chapter describes the USB command format and the commands that BA64 supports.

Command Format

Command

Byte#	Name	Number of bytes	Description
1	Command byte 1	1	
2	Command byte 2	1	
3 to n	Data / Pad bytes		

Response

Byte#	Name	Number of bytes	Description
1	Response Length	1	
2	Status byte 1	1	
3	Status byte 2	1	
4	Status byte 3	1	
5 to n	Data / Pad bytes		

Write Data

Command:	02h, 00h, <Data Count>, <Data>
	Data Count: 1-byte value representing bytes count of the following data (w/o Data Count byte)
	Data: Control characters, ESC sequence and displayable characters encoded in the current encoding mode.
Response:	04h, <Status byte 1>, <Status byte 2>, <Status byte 3>

Description:

Data can be Escape sequences, control characters or data to be displayed. Data can be broken up and send in several frames. Maximum report length is 32 bytes.

Request Status

Command:	00h, 20h
Response:	04h, <Status byte 1>, <Status byte 2>, <Status byte 3>

Description:

This command returns is status the display.

Reset

Command:	00h, 40h
Response:	none

Description:

This command cause software reset of the device.

Read Display Identification

Command:	21h, 00h
Response:	<count>, <Status byte 1>, <Status byte 2>, <Status byte 3>, <Pn1> ; <Pn2> ; <Pn3> ; <Pn4> ; <Pn5> ; <Pn6> ; <Pn7>
	count: 1-byte value representing bytes count of the following data (w/o “count” byte)
	Pn1: type of Display
	Pn2: current code page
	Pn3: country code
	Pn4: number of lines
	Pn5: columns per line
	Pn6: code page loaded in space page
	Pn7: serial number

Pn1 to Pn7 are string encoded in the current encoding mode, either in ASCII, UTF-8 or UTF-16.

Description:

This command is used to get display identification from the device.

Read Character Set Identification

Command:	21h, 01h
Response:	<count>, <Status byte 1>, <Status byte 2>, <Status byte 3>, <cp1> ; <cc1> ; <cp2> ; <cc2> ; … ; <cpn> ; <ccn>
	count: 1-byte value representing bytes count of the following data (w/o “count” byte)
	cp1: codepage 1 cc1: country code 1 : : : cpn: codepage *n* ccn: country code *n*

cp1 .. cpn: code page 1 to n are 4-digit string encoded in the current encoding mode.

cc1 .. ccn: country code 1 to n are 2-digit string encoded in the current encoding mode.

Description:

This command returns the currently loaded codepages and the corresponding country codes.

Read Firmware Identification

Command:	21h, 02h
Response:	<count>, <Status byte 1>, <Status byte 2>, <Status byte 3>, <BL version> ; <Main version>
	count: 1-byte value representing bytes count of the following data (w/o “count” byte)
	BL version: Bootloader version – 2-byte value, BCD coded
	Main version: Main firmware version – 2-byte value, BCD coded

Description:

This command returns the bootloader and main firmware version numbers.

Read Display Compatibility Mode

Command:	21h, 03h	
Response:	<count>, <Status byte 1>, <Status byte 2>, <Status byte 3>, <mode>	
	count:	1-byte value representing bytes count of the following data (w/o “count” byte)
	mode:	Display Compatibility mode – 1 numeric character 1 = BA63G or BA63 2 = ESC/POS

Description:

This command returns the current Compatibility mode setting.

Read Character Encode/Decode

Command:	21h, 04h	
Response:	<count>, <Status byte 1>, <Status byte 2>, <Status byte 3>, <mode>	
	count:	1-byte value representing bytes count of the following data (w/o “count” byte)
	mode:	Display encoding/decoding mode – 1 numeric character 0 = ASCII 1 = UTF-8 2 = UTF-16

Description:

This command returns the current encoding/decoding mode.

Request Self-Test

Command:	00h, 10h
Response:	04h, “Status byte 1”, “Status byte 2”, “Status byte 3”

Description:

This command starts a self-test of the display. The response will be sent at the end of the test.

Restore Factory Default

Command:	FBh, 00h
Response:	04h, “Status byte 1”, “Status byte 2”, “Status byte 3”

Status Bytes Definitions

Status Byte 1:	Bit 0	Flash download is in progress
	Bit 1…3	Error status 000 – No error 001 – Device received unexpected command 010 – File is not valid 011 – Device is unable to write to memory 100 – Device is unable to read from memory 101 – Programmed memory failed verification 110 – Vendor-specific error 111 – Unknown error
	Bit 4	Reserved (have to be zero)
	Bit 5	Hardware error
	Bit 6	Command not executed
	Bit 7	Device not ready to receive command
Status Byte 2:	Bit 0	Command complete
	Bit 1	Flash download is in progress
	Bit 2…4	Firmware Upgrading Status
	Bit 5	Next *Segment* pending note1
	Bit 6	Operation error
	Bit 7	Undefined command
Status Byte 3:	Bit 7...0	Reserved (all zero)

Notes:
Bit 5 of Status Byte 2 when set indicates that there is another *Segment* following this. A zero for this bit means that there is no subsequent segment. As the byte-count is a byte value, when the amount of data exceed the 255 (0xFF) it has to be broken up into two or more *Segment*. A *Segment* is a block of data that starts with the byte-count and the 3 status bytes followed by the data. The Host software will have to combine the data from each segment to form a complete data transfer.

Middleware

User has the option of using Diebold Nixdorf's provided JavaPOS 1.13, VirtualCOM driver or directly programming the device.

The JavaPOS 1.13 is available for both Windows and Linux, the logical names for the two versions of BA64 are:

Device	Logical Name
BA64-2	WN_BA64-2_USB WN_BA64-2_COM
BA64-G	WN_BA64-G_USB WN_BA64-G_COM

If user prefer COM interface for ease of programming but the host system has lack of powered COM port, use the VirtualCOM driver to virtualize the BA64 with as USB interface as a COM device.

Firmware Updates

Firmware can be downloaded with a Diebold Nixdorf provided console application called, DFUPROG for USB interface. If not already installed, execute the Installer to install the DFU device driver.
For details on installation and handling of the DFUPROG, please consult the respective user manual.

Supported Codepages

The supported code pages for the BA64-2 and BA64-G are listed in the table below:

Code page	Description	BA64-2	BA64-G	note
437	MSDOS Latin US	5x7	8x16	1
737	MSDOS Greek	5x7	8x16	1
757	MSDOS Balti Rim			1
813	Greek (ISO 8859-7)	5x7	8x16	1
850	MSDOS Latin 1	5x7	8x16	1
852	MSDOS Latin 2	5x7	8x16	1
855	MSDOS Cyrillic			1
857	MSDOS Turkish	5x7	8x16	1
858	OEM	5x7	8x16	1
861	MSDOS Icelandic			1
862	MSDOS Hebrew	5x7	8x16	1
863	MSDOS French Canada			1
864	Arabic			1
865	MSDOS Nordic			1
866	MSDOS Cyrillic CIS 1	5x7	8x16	1
869	MSDOS Greek 2			1
874	MSDOS Thai	-	8x16	2
874	MSDOS Thai	-	12x32	3
897	Katakana SBCS IBM	5x7	8x16	1

Code page	Description	BA64-2	BA64-G	note
932	Windows Shift-JIS	-	16x16	1
936	Windows Simplified Chinese	-	16x16	1
949	Windows Korean	-	16x16	1
950	Windows BIG5	-	16x16	1
950	Windows BIG5 + HKCS	-	16x16	1
1250	Windows Latin 2 (Central Europe)			1
1251	Windows Cyrillic (Slavic)			1
1252	Windows Latin 1 (ANSI)			1
1253	Windows Greek			1
1254	Windows Latin 5 (Turkish)			1
1255	Windows Hebrews			1
1256	Windows Arabic	-	16x16	1
1257	Windows Baltic Rim			1

notes:

1. Basic cell size for BA64-2 and BA64-G are 5x7 and 8x16 respectively,
2. Basic cell size for Thai with 8x16 font is 8x22.
3. Basic cell size for Thai with 12x32 font is 12x32.

With a Diebold Nixdorf provided FontUtil tool selected characters of a code page can be modified and re-loaded to the device.

Technical Data

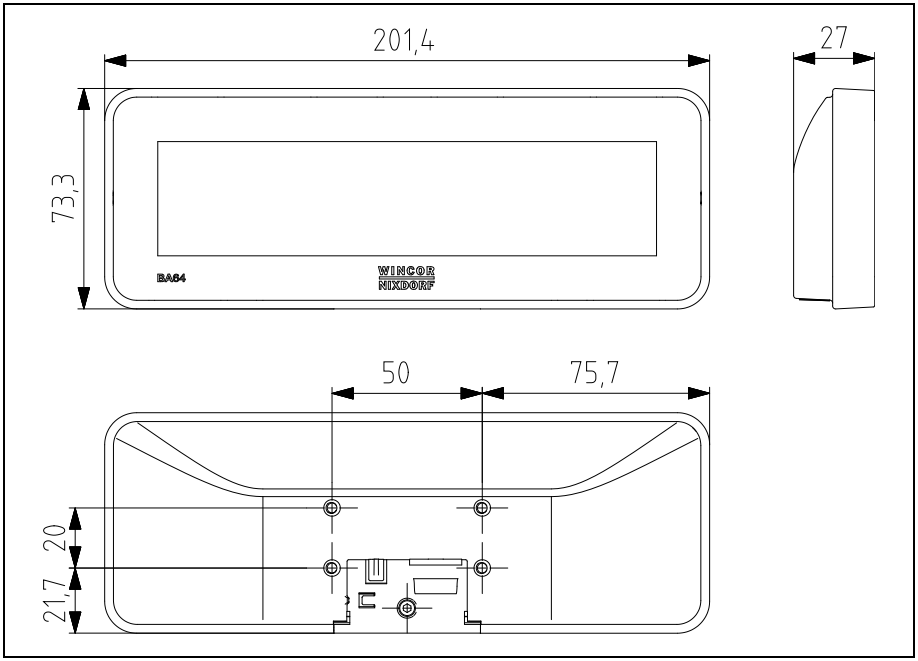
Model	BA64-2	BA64-G
Display Technology	Vacuum Florescent Display	FSTN, Negative White LED backlight
Characteristics	2 rows x 20 characters Basic cell matrix: 5x7 6.2 x 9.5mm	4 rows x 30 characters Basic cell matrix: 8x16 Double height/width
Viewing angle: left/right	68/68 degree	40/40 degree
top/bottom	68/68 degree	40/30 degree
Contrast (nominal)	800	40
Character resolutions	SBCS: 5x7	SBCS: 8x16 DBCS: 16x16
Host Interface	USB2.0 & RS232	
Character Coding	Supports ASCII, UTF-8 and UTF-16	
Ratings: USB RS232	5V +/-5%, 0.5A 12V +/-10%, 0.3A	5V +/- 5%, 0.2A 12V +/- 10%, 0.1A
Data rate: USB RS232	12Mbps Up to 115.2K, CTS/RTS flow control	
Supported Codepages	Windows & MS-DOS code pages	Windows, MS-DOS and DBCS code pages
Upgradeability	Firmware and code pages are upgradeable	
Compatibility	Backward compatible to BA63 or BA63G. Switchable to ESC/POS compatible mode.	
Middleware	JavaPOS 1.13/OPOS UDM, VirtualCOM driver	
Supported OS	Windows XP, 7 & 8.1 and Linux	
Operating Environment	0 to 40 degree C 5% to 85% RH	
Certifications	CE Class B and FCC Class A	
Dimensions (WxHxD)	201.4 mm x 73.4 mm x 27 mm	
Weight	243 g	216 g

Dimensions

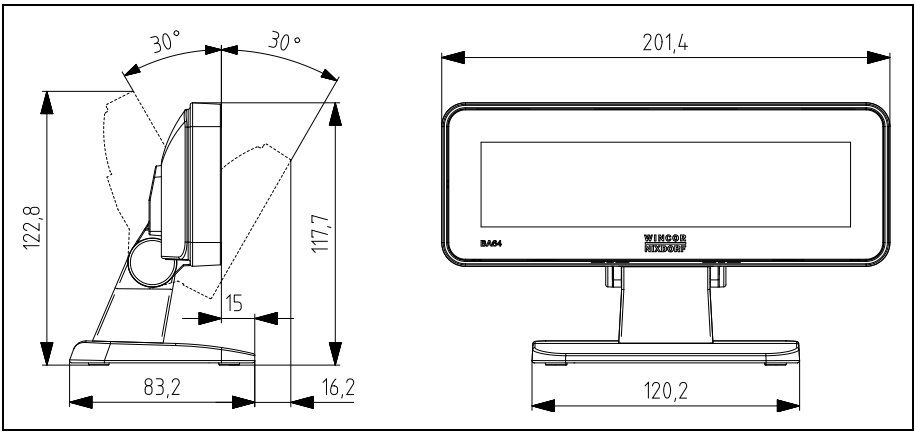
Please refer to the following drawings for dimensions of the different options.

All dimensions are specified in millimetres. The reference drawings are not drawn to scale.

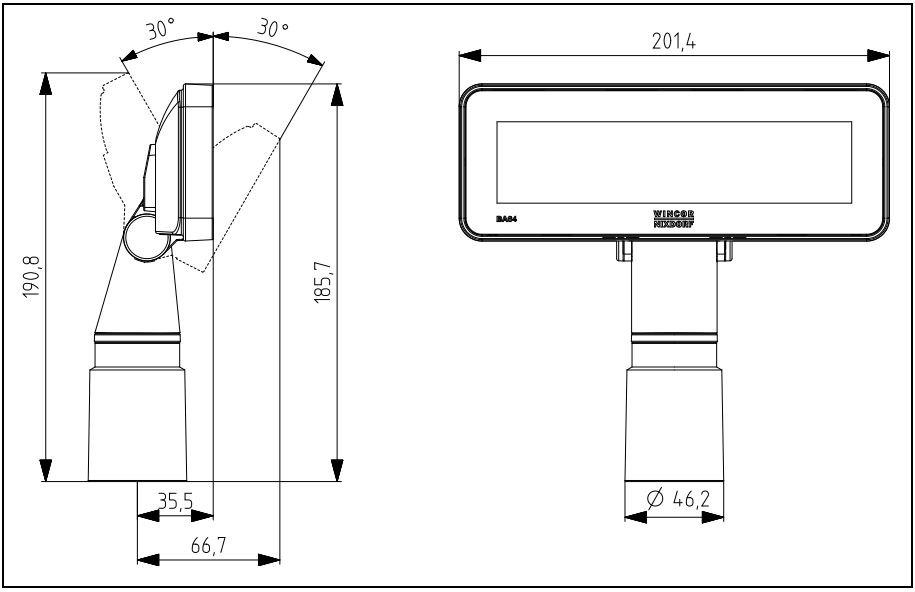
BA64



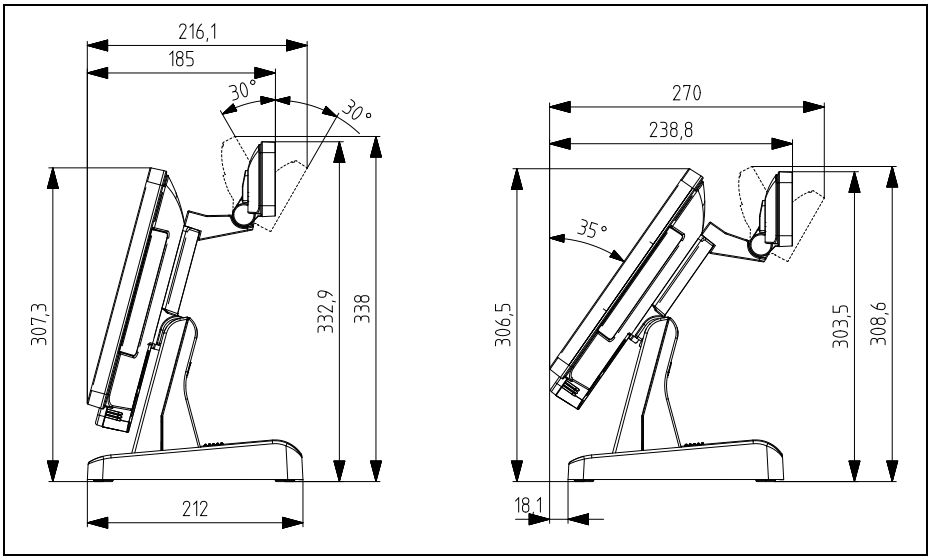
BA64 installed on a stand



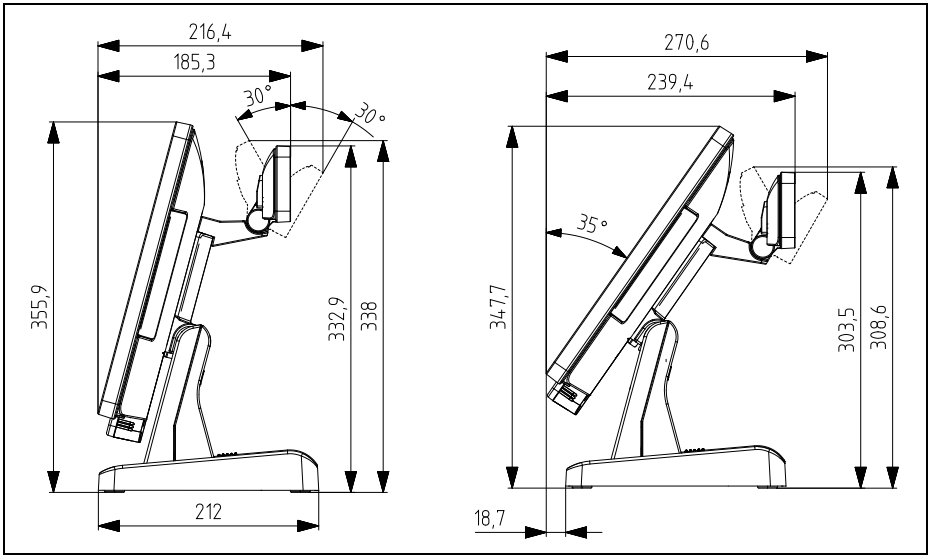
BA64 installed on a pole



BA64 installed on a BA92 display



BA64 installed on a BA93 display



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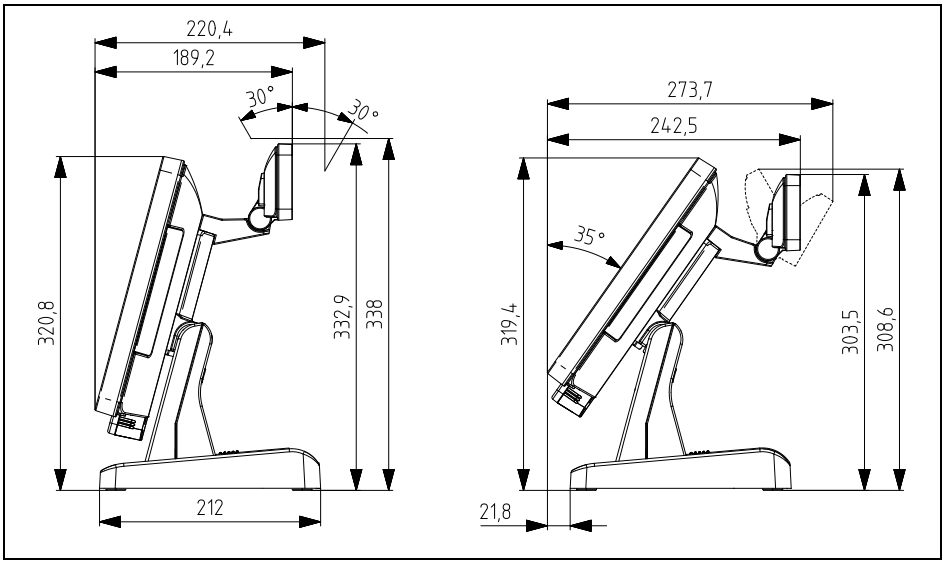
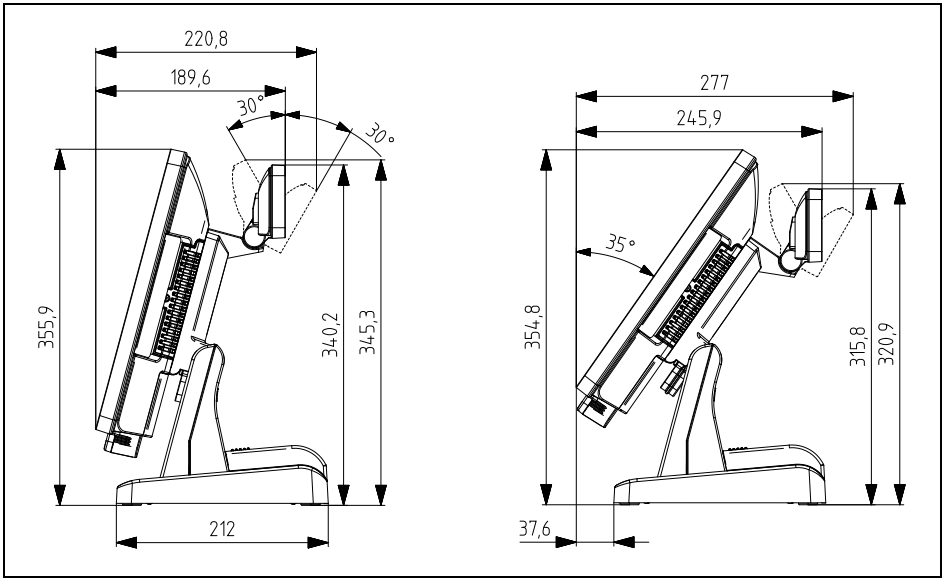


BA64 installed on a BEETLE iPOS system



Abbreviation Index

CE	European Symbol of Conformity
CFC	Chlorofluorocarbon
CHC	Chlorinated hydrocarbon
COM	Communication port
CTS	Clear To send
DBCS	Double-Byte Character Set
FCC	Federal Communications Commission
FSTN	Film Compensated Super Twisted Nematic
ISO	International Organization for Standardization
LCD	Liquid Crystal Display
LED	Light Emitting Diode
OPOS	OLE (Object Linking and Embedding) for Retail POS
OS	Operating System
POS	Point-of-Sale
RH	Relative Humidity
RTS	Request To Send
SBCS	Single-Byte Character Set
UDM	Universal Data Model
USB	Universal Serial Bus
UTF	Unicode Transformation Format
VESA	Video Electronics Standards Association
VFD	Vacuum Fluorescent Display

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