· AS-289R Control Code List Rev.3

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·AS-289R Default Settings

When the unit is turned on, the parameters are set to the default values shown below unless it is in HEX dump print mode.

Function	Default setting
Line spacing	4 dots (0.5 mm)
Intercharacter space	1 dot
ANK character font setting	12×24 dot font
Kanji font setting	24×24 dot font
Enlargement/script settings	All cancelled
Height/width enlargement ratio	Height:1, Width:1
Divided print	Firmware v3 or later : automatic division Firmware v2 or v1 : 2 divisions

·AS-289R Control Code Details

CAN

[Name]	Clear data
[Code]	18H
[Function]	Clears the data in the print buffer

CR

[Name]	Carriage return
[Code]	0DH
[Function]	Starts printing one line, and feeds the paper by the amount of specified line spacing.
	When data is not available in the print buffer, the amount of feeding is 16 dots plus the specified line spacing.
	When loading data worth of multiple lines, no need to enter this code because of buffer-full printing function. (Printing automatically starts when a date worth of one line is input.)

DC4

[Name]	Cancel double-width printing
[Code]	14H
[Function]	Cancels the double-width printing applied by the following codes SO, ESC SO, ESC W1, FS SO. Same as ESC SI, ESC W0, and FS DC4.

LF

[Name]	Line feed
[Code]	0AH
[Function]	Feeds the paper by one line.
	The amount of feed is that of dots of font previously printed plus the line spacing.
	After being powered on, ANK 12x24 is printed, and then the amount of LF is 28 dots, or 24 dots + 4 dots (default value when the unit is turned on).
	If the line spacing is set to 8 dots, the amount of LF after double-height printing of Kanji (24x24) is 56 dots (7 mm).

SO

[Name]	Apply double-width printing
[Code]	0EH
[Function]	Prints subsequent data of alphanumeric characters, Kana, and Kanji at double width. Same as ESC SO, ESC W1, FS SO.

ESC 3

  [Name]   Specify line spacing
  [Code]   1BH 33H <n>
  [Function]   Specifies the amount of line spacing after printing.
                       Parameter and range: <n> ≦ FFH
                       It is set to 4 dots (0.5 mm) when the unit is turned on.
                       Same as ESC A

ESC @

  [Name]   Initialize
  [Code]   1BH 40H
  [Function]   Initializes the printer, and set all parameters to default
                       Clears the data in the print buffer

ESC A

  [Name]   Specify line spacing
  [Code]   1BH 41H <n>
  [Function]   Specifies the amount of line spacing
                       Parameter and range: <n> ≦ FFH
                       It is set to 4 dots (0.5 mm) when the unit is turned on
                       Same as ESC 3

ESC I

  [Name]   Specify print direction
  [Code]   1BH 49H <n>
  [Function]   Specifies print direction (Print from Top, Print from Bottom)
                       <n> =30H or 00H: Prints from the top
                       <n> =31H or 01H: Prints from the bottom
                       When the unit is turned on, it is set to Print from Top.

Pager feed direction

Print from the bottom   Print from the top

ESC J

   [Name]   Paper feed by specified amount

   [Code]   1BH 4AH <n>

   [Function]   Forward feeds paper by <n> dots

                        Parameter and range: $00H \leqq <n> \leqq FFH$

                        If data is available in the print buffer, feeds the paper by <n> dots after printing.

                        If data is not available in the print buffer, feeds the paper by <n> dots.

                        This code is ignored if <n> is set to 00H.

ESC L

   [Name]   Apply/cancel uppercase

   [Code]   1BH 4CH <n>

   [Function]   <n> =30H or 00H: Cancels capitalization (46 x 96 dots)

                        <n> =31H or 01H: Applies capitalization (48×96 dots)

                        The data of 30 to 39H ('0' to '9') and 41 to 5AH ('A' to 'Z') received after applying the capitalization is to be printed in uppercase font.

                        Prints 48 x 96 dots space when receiving data other than 30 to 39H and 41 to 5AH

                        When printing uppercase fonts, functions to enlarge printing font such as double-width printing are not available.

ESC N

   [Name]   Apply/cancel double-height printing

   [Code]   1BH 4EH <n>

   [Function]   Applies/cancels double-height printing of alphanumeric characters, Kana and Kanji

                        <n> =30H or 00H: Cancels double-height printing

                        <n> =31H or 01H: Applies double-height printing

                        Same as ESC w

ESC SI

   [Name]   Cancel double-width printing

   [Code]   1BH 0FH

   [Function]   Cancels double-width printing applied by the codes SO, ESC SO, ESC W1, FS SO

                        Same as DC4, ESC W0, FS DC4

ESC SO

   [Name]   Apply double-width printing

   [Code]   1BH 0EH

   [Function]   Prints subsequent data of alphanumeric characters, Kana, and Kanji at double width.

                        Same as SO, ESC W1

ESC SP

   [Name]   Specify intercharacter space

   [Code]   1BH 20H <n>

   [Function]   Specifies space between characters by the number of dots.

                        <n> is amount of space specified by the number of dots, and shall be set to $00H \leqq <n> \leqq 08H$.

                        Set to 1 dot when the unit is turned on

                        Same as ESC <n>

ESC W

    [Name]   Apply/cancel double-width printing

    [Code]   1BH   57H <n>

    [Function]   Applies/cancels double-width printing of alphanumeric characters, Kana and Kanji

                              <n> =30H or 00H: Cancels double-width printing

                              (Same asDC4, ESC SI, ESC W0, FS DC4)

                              <n> =31H or 01H: Applies double-width printing

                              (Same as SO, ESC SO, ESC W1, FS SO)

ESC h

    [Name]   Specify ANK character font

    [Code]   1BH   68H <n>

    [Function]   Specifies dots of ANK characters font

                              <n> =30H or 00H: 8×16 dot font

                              <n> =31H or 01H: 12×24 dot font

                              <n> =32H or 02H: 16×16 dot font

                              <n> =33H or 03H: 24×24 dot font

                    24×24 dot font is set when the unit is turned on.

ESC l

    [Name]   Move print position

    [Code]   1BH 6CH <n>

    [Function]   Specifies the position to start printing the next character with the parameter <n> mm.

                              <n> is the distance between the head and the edge of the dot.

                              Parameter and range: 00H≦ <n> ≦2FH 47㎜. (Parameter out of this range will be ignored.)

                              Enter 14H when starting at the spot which is 20 mm away from the last dot.

                              Use this control code when horizontal print position is at or near the middle because you don't need to use code for space multiple times to move the position. Use this code also when you like to start printing at a certain position.

ESC s

    [Name]   Apply/cancel script

    [Code]   1BH 73H <n>

    [Function]   Applies and cancels superscript and subscript

                              <n> =30H or 00H: Cancels superscript and subscript

                              <n> =31H or 01H: Applies superscript

                              <n> =32H or 02H: Applies subscript

A^2: Superscript characters are printed in the upper position of the normal character space.

B_2: Subscript characters are printed in the lower position of the normal character space.

Size of script font is 8 x 9 dots only, and only the characters "0" to "9" can be printable. Therefore, the script applied data is between 30H to 39H, and other values are treated as space.

The print position varies depending on specified character font and double printing settings.
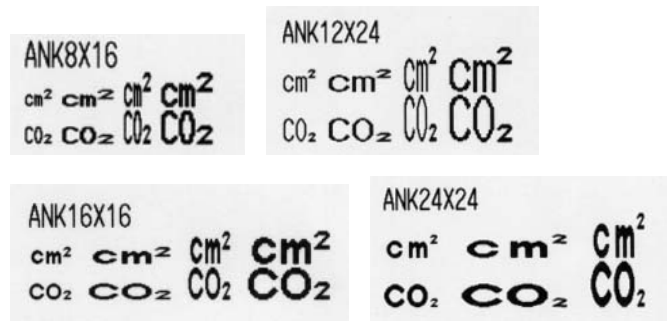
ESC <n>

  [Name]   Specify intercharacter space
  [Code]   1BH   <n>
  [Function]   Specifies space between characters by the number of dots.

<n> is amount of space specified by the number of dots, and shall be set to 00H≦ <n> ≦08H.

Set to 1 dot when the unit is turned on

Same as ESC SP

ESC w

  [Name]   Apply/cancel double-height printing
  [Code]   1BH   77H   <n>
  [Function]   Applies/cancels double-height printing of alphanumeric characters, Kana and Kanji

<n> =30H or 00H: Cancels double-height printing

<n> =31H or 01H: Applies double-height printing

(Same as ESC N)

FS DC4

  [Name]   Cancel double-width printing
  [Code]   1CH 14H
  [Function]   Cancels double-width printing set by the codes SO, ESC SO, ESC W1, FS SO
                      Same as DC4, ESC SI, ESC W0

FS SO

  [Name]   Apply double-width printing
  [Code]   1CH 0EH
  [Function]   Prints subsequent data of alphanumeric characters, Kana, and Kanji at double width.
                      Same as SO, ESC SO, ESC W1

FS W

  [Name]   Apply/cancel quadruple size printing
  [Code]   1CH 57H <n>
  [Function]   Applies/cancels quadruple size printing of characters
                      <n> =30H or 00H: Cancels quadruple size printing of characters
                      <n> =31H or 01H: Applies quadruple size printing of characters

FS e

  [Name]   Specify height/width enlargement ratio
  [Code]   1CH 65H <n1> <n2>
  [Function]   Enlarges characters by a factor specified by <n1> and <n2>
                      <n1> is the factor for height.
                      Parameter and range: 31H≦ <n1> ≦34H, or 01H≦ <n1> ≦04H
                      <n2> is the factor for width.
                      Parameter and range: 31H≦ <n2> ≦34H, or 01H≦ <n2> ≦04H
                      If the parameters are out of range specified above, it is processed as 01H.
                      The parameter specified by this control code has priorities over that by other enlargement
                      control code.
                      When enlarged printing is executed by specifying double or more with this control code, other
                      enlargement controlee codes are ignored.
                      You need to set height/width enlargement ratio to 1 with this control code before you use
                      other enlargement control codes.
                      You can use other enlargement control codes only when the height/width enlargement ratio
                      is set to 1.
                      Default values for height/width are set to 1 when the unit is turned on.

FS *

[Name]	Register/print bit image graphics	
[Code]	1CH 2AH <m> <n1> <n2> <d1> ··· <dn>	
[Function]	Registers/prints bit image graphics	

1) <m> indicates operation mode.

m	Operation	Description
61H	Print	Prints bit image data, which is preloaded into the image buffer, in the area specified with <n1><n2>
62H	Register	Loads the image data for the lines specified with <n1><n2> into the image buffer
63H	Register Print	Loads the image data for the lines specified with <n1><n2> into the image buffer, and then prints the image data
64H	Print Register	Prints the image data for the lines specified with <n1><n2> line by line, and at the same time, loads the image data into the image buffer <n1> <n2>
65H	Print	Prints the image data for the lines specified with <n1><n2> line by line

2) <n1> <n2> specifies the number of lines to be printed in the vertical direction.

For 61H ≦ <m> ≦64H

1 ≦ <n1> <n2> ≦480

01H ≦ <n1> <n2> ≦01E0H

For <m> =65H

1 ≦ <n1> <n2> ≦65535

01H ≦ <n1> <n2> ≦FFFFH

If <n1> <n2> is set to 00, the following data is processed as ordinary data. If <n1> <n2> is out of range, the maximum value is used.

3) <d1> to <dn> indicate the image data to be loaded.

The number of data is calculated by multiplying the number of lines to be printed times the number of bites per line.

One line contains 48 bytes.

In case of <m> =61H, <d1> to <dn> are not needed.

bit							bit	
7	6	5	4	3	2	1	0	Bit definition: "1" means "print," and "0" means not print."

1	2		48	The first line
49	50		96	The second line
97	98		144	The third line
			48n	The nth line
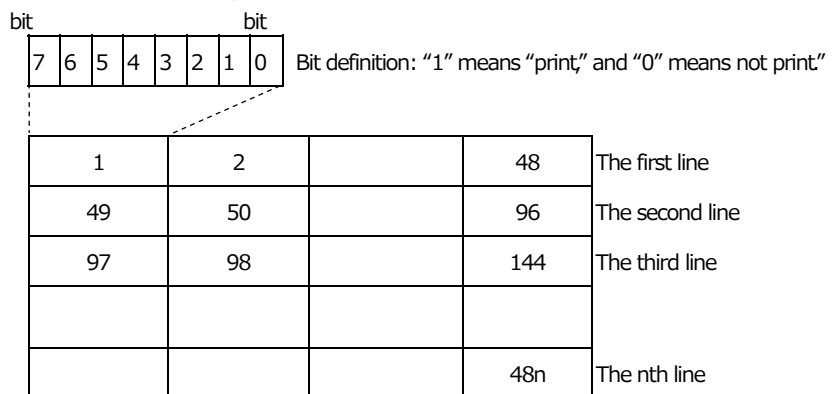
One line contains 48 bytes.

For example, when the bit image for 320 lines is loaded, the values of <n1> <n2> are 01H and 40H respectively since Hexadecimal of 320 is 0140H.

Total bytes for <d1> to <dn> is 320×48=15360bytes.

4) Control of Print from Top, Print from Bottom

   If <m> is 61H to 63H, control of Print from top, Print from bottom is valid same as characters.

   If <m> is 64H, input date is printed and registered in the order of input.
   Control of Print from top, Print from bottom is not valid.

   If <m> is 65H, input date is just printed in the order of input.
   Control of Print from top, Print from bottom is not valid。

5) Note that following matters when use with <m> =65H:

   Printing speed depends on the interval of data transfer.

   For example, if the transfer speed is 1 ms interval, it takes 48 ms to transfer 1 line worth of data, which results in 2.6 mm/s (21 dot lines /s)

   Print density may depend on printing speed.

[Caution]

When intermittently printing, or repeating print/halt, restarting the motor may not enable smooth print due to backrush of the gears and elasticity of the rubber rollers, resulting in character blurring and unwanted white lines.

For example, when printing image every 30 seconds, the previous print and next one may not be precisely aligned. To avoid such problems, print continuously as much as possible and avoid intermittent printing.

DC2 F

    [Name]   Specify divided print

    [Code]   12H 46H <n>

    [Function]   Controls the printing head by dividing into some sections

Parameter and range: 31H≦ <n> ≦36H or 01H≦ <n> ≦06H

If the value is out of range specified above, it is set to default value same as when the unit is turned on.

<n> =31H or 01H: Applies current to the entire print head

When specifying 2 to 6 divisions, you can control on and off of print head by the specified number of divisions.

Initial number of division is 2 when the unit is turned on.

Firmware v3 or later

Parameter and range : 30H≦ <n> ≦36H or 00H≦ <n> ≦06H

<n> =30H or 00H : automatic division

Initial number of division is 0 when the unit is turned on.

DC2 S

    [Name]   Specify Kanji font

    [Code]   12H 53H <n>

    [Function]   Specifies dot font of Kanji

<n> =30H or 00H: Set to 24×24 dots

<n> =31H or 01H: Set to 16×16 dots

It is set to 24×24 dots when the unit is turned on.

GS h

[Name]	Specifying barcode height
[Code]	1DH 68H <n>
[Function]	Specifies the height of barcode with <n> dots

$00H \leqq$ <n> $\leqq 60H$ (96 dots, 12 mm)

00H: Not printing barcode

If <n> exceeds 60H, it is processed as <n> is 60H.

When the unit is turned on, it is set to 10 mm (80 dots, 50H).

GS k

[Name]	Print barcode
[Code]	1DH 6BH <n> <d1> <d2> ··· <dn> NULL
[Function]	Specifies type of barcode and prints the barcode

1) Specify type of barcode with <n>.

<n>		Type
30H	00H	UPC-A
31H	01H	
32H	02H	JAN13
33H	03H	JAN8
34H	04H	CODE39
35H	05H	ITF
36H	06H	CODABAR(NW7)

Print operation doesn't start unless <n> is 31H, 01H or values listed in the table above.

2) Use <d> to specify the data to be printed.

Type	Number of data	Check digit
UPC-A	11 digits: d1 to d11	Yes
JAN13	12 digits: d1 to d12	Yes
JAN8	7 digits: d1 to d7	Yes
CODE39	Variable: d1 to d20	Yes
ITF	Variable: d1 to d20	No
CODABAR	Variable: d1 to d20	No

For CODE39:
   Enter only the data to be printed into d1 to d20.
   No need to enter '*' of Strat/Stop bit.

For CODABAR:
   Specify d1 to d20 in the order of Start bit, data to be printed, and Stop bit.
   Start bit ('a' 'b' 'c' 'd')
   Stop bit ('t' 'n' '*' 'e')

For ITF:
   Make sure that the number of lines to be printed is even.

3) The codes

Type	Available codes
UPC-A JAN13 JAN8 ITF	'0' to '9'
CODE39	'0' to '9', 'A' to 'Z', 'SP' '$"%"+"-"·"/'
CODABAR	'0' to '9', '-"$":"/"."+'

Makes sure the data stream ends with a NUll code (00H).
Example: JAN8 1DH 6BH 33H 31H 32H 33H 34H 35H 36H 37H 00H

4) Feeds the paper by the amount specified by the line spacing.

5) The maximum height of the barcode is 12 mm if print it once. Use the following procedure if you need to print higher barcode.
You can also print ordinary characters right and left to the barcode.
The example shown on the right was printed with procedure described below.
  a) Enter "CODABAR" and print.
  b) Specify the line spacing to "0" and print the barcode data.
  c) Print barcode data
  d) Specify the line spacing to the original value, and print "規格" "OK/NG" and barcode.
  Note 1: Use the code ESC+l (Move print position) to set the position of the barcode.
  Note 2: Need to specify the height (10 mm is used for the example) and size of the barcode before printing the barcode.
  Note 3: When printing a barcode and some characters on a same line, some portion of the barcode may be printed slightly lighter.

GS w

[Name]	Barcode, Barcode size
[Code]	1DH 77H <n1> <n2>
[Function]	Specifies the width of narrow bars with <n1>, and that of wide bars with <n2>.

Specify both <n1> and <n2> in the following range.
01H≦ <n> ≦18H (24 dots, 3 mm)
00H is processed as 01H, 19H and higher are processed as 18H.
When the unit is turned on, <n1> and <n2> are set to 02H and 05H respectively.
For UPC-A, JAN13, and JAN8, only <n1> is used. But, make sure to enter <n2> as well.

[Caution] Specify the bar size according to the performance of the barcode readers. Depending on the number of the barcodes and size of bars, not all barcodes may be printed on a paper.

GS x

[Name]	Print 2D barcode (QR Code)
[Code]	1DH 78H <n1> <n2> <d1> <d2> ⋯ <dn>
[Function]	Prints QR Code

1) <n1> specifies the level of error correction.

Correction level (recovery level)	<n1>
L (7%)	4CH
M (15%)	4DH
Q (25%)	51H
H (30%)	48H

The values other than listed above is processed as level "M."

2) <n2> specifies the number of data.
The allowable number of data depends on the error correction level.

Correction level	<n2> : Maximum number of data
L	154 (9AH)
M	122 (7AH)
Q	86 (56H)
H	64 (40H)

In case of values exceeding the maximum value or 00H, such value is regarded invalid, and the following data is processed as ordinary data.

3) <d> specifies the data to be printed.
00H≦ <d> ≦FFH
It is allowed to include data for Kanji defined by Shift JIS Code, and one Kanji character is counted as two bytes.
Example: Error correction level "L," data to be printed "ｶﾞ電子"

1DH 78H 4CH 08H 83H 69H 83H 5FH 93H 64H 8EH 71H

4) Feeds the paper by the amount of line spacing after printing the QR Code.
QR Codes need 8 dots or more margin (space) of its top/bottom/left/right ends.
Make such space by entering space code on the left/right of the code, and use CR code to make space top/bottom of the code.

5) It is possible to print multiple QR Codes and other characters.

If the printed area of a QR Code starting from a specified print position that exceeds the maximum print width, the QR Code is printed in the following data.

6) QR Code specification

Symbol size	Model 2
Configuration of a cell	4 print dots
Cell size	0.25 mm × 0.25 mm
Total size	Varies depending on error correction level and amount of data
Loading the image	In binary mode

[Caution]   The QR Code many not properly scanned due to the performance of the reader or other circumstances such as dirt on the paper on which the QR Code is printed.
QR Code is registered trademark of DENSO WAVE INCORPORATED.

ESC $ <n>

  [Name]   Specify character code

  [Code]   1BH 24H <n>

  [Function]   Specifies character code of alphanumeric character, Kanji, Kana and Kanji.

                          <n> =30H or 00H: UTF8

                          <n> =31H or 01H: ShiftJIS

                          ＊Firmware V2 or later

GS y <n>

  [Name]   Apply/cancel Enlarged printing of 2D barcode

  [Code]   1DH 79H　<n>

  [Function]   Specifies enlarged printing of 2D barcode.

                          <n> =30H or 00H: 100%

                          <n> =31H or 01H: 150%

                          ＊Firmware V2 or later