

Technical Notes for 2D QR Code

This document applies to the QR Code implementation of Practical Automation Plus series FGL printers. "QR Code" is a registered trademark of DENSO WAVE.

FGL Command to generate the Bar code:

<QR#,#,#,#>{barcode text}

All of the QR bar code command parameters are optional. If omitted, default values will be used. If parameters are skipped, but any of the following parameters are specified, the comma place holder is required. The QR command and the barcode text is all that is required. For example the command <QR>{Practical Automation} will create a QR code for the text "Practical Automation" using all default values.

The parameters which can be specified are:

Parameter	Range	Default Value
Point Size	3 to 16	6
APPLY tilde	0 to 1	0
Encode Mode	0 to 2	0
Error Correction Level	0 to 3	0
{Barcode text}	ASCII text to be encoded	none

Parameter Notes:

Point Size – This parameter specifies the number of dots square of a QR Code data element. This will affect the size of the image. Note also that 203dpi dots are larger than 300dpi dots, thus a similarly coded QR Code on a 203dpi printer will print larger than the same code sequence on a 300dpi printer. This parameter is used in lieu of the FGL HW command to control the size of the QR Code.

Apply Tilde - When Apply Tilde is set to 1, the tilde (~) may be used to encode non-printable ASCII characters in the barcode text data. When this function is active, the format ~ddd is used to encode special characters, where 'ddd' is the 3-digit decimal code for the character to be encoded (range: 0..255). The default for this feature is off (0).

Examples of characters which might be encoded this way are: TAB (~009), CR (~013) GS(~029), and RS(~030).

Encode Mode - The size of the QR Code symbol could be reduced or the number of encodeable characters increased if certain assumptions can be made regarding the data. Valid values are:

- 0 for Byte data (default)
- 1 for Alpha-Numeric data
- 2 for Numeric data only

Error Correction - The level of Reed Solomon error correction level placed in the symbol. More error correction creates symbol that can withstand more damage. Error correction levels are specified in the QR Code specification. The level of error correction affects the data capacity of a given size bar code as the portion of available data bits dedicated to error correction changes. Valid values are:

EC Selector	QR EC Level	Error Recovery Capacity
0	M	15%
1	L	7%
2	H	30%
3	Q	25%

Examples:

The example below will print an 8 point QR barcode. The <HW2,2> command will **not** affect the barcode, but will affect other text. The barcode will appear on the ticket at dot location 100,150 without rotation.

```
<NR><HW2,2><RC450,150><F11>This is a QR text test<RC100,150><QR8>{This is a QR barcode test}<p>
```

The example below will use all default values. It will print a 6 point QR barcode. It will print at the current X,Y coordinates in the current rotation mode.

```
<QR>{The quick brown fox jumped over the lazy dog}<p>
```

QR Code Versions - <QRV2> through <QRV7>

The version of the QR Code defines the size and data carrying capacity of a QR Code. This, along with the EC level and Encode Mode determines how many characters can be encoded. Note that if more characters are supplied than the selected version can handle, rather than render an invalid code, the next larger version will be used.

The FGL46 specification requires support for QRV2 and QRV7. The Plus series printers allow the intermediate sizes as well.

The number of characters which can be encoded with the default Error Correction and Encode mode is:

Version	2	3	4	5	6	7
Characters	26	42	62	84	106	122

Example:

The following example will print a Version 2 bar code for the first QR Code command. Since the second Version 2 QR Code command has more characters than can be encoded at the current Version and EC level, the Plus series printer will encode it as a Version 3 rather than fail.

The 2 Version 7 codes will print normally.

```
<QRV2>  
<RC20,100><F11>Ver 2  
<RC100,100><QR6>{This is a QR Barcode test.}  
<RC300,100><QR6>{http://www.practicalautomation.com}  
<QRV7>  
<RC20,600><F11>Ver 7  
<RC100,600><QR4>{This is a QR Barcode test.}  
<RC300,600><QR4>{http://www.practicalautomation.com}  
<p>
```