Bruker BioSpin

Barcodes

for BRUKER Automation
User Manual

Version 004

think forward

NMR Spectroscopy

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Introduction 1

This guide provides information on using barcode labels for sample and tray identification with BRUKER automation, especially with the B-ACS Sample Changer and the Gilson Liquid Handler, e.g. which are necessary for the Bruker SampleTRACK™ system.

Disclaimer 1.1

Bruker automation should only be used for its intended purpose as described in the individual user manuals. Use of the automation for any purpose other than that for which it is intended is taken only at the users own risk and invalidates any and all manufacturer warranties.

Service or maintenance work on the automaton unit must be carried out by qualified personnel.

Only those persons schooled in the operation of the individual units should operate them.

Read this manual before using the automation. Pay particular attention to any safety related information

Safety Issues 1.2

Always stop the software and turn the power off any automation units, such as the Gilson Liquid Handler, before doing any adjustments or modifications. The Gilson unit, for example, utilizes a very sharp and powerful needle to inject samples which may move unexpectedly. This is particularly dangerous when using any hazardous substances.

Be sure to read the safety issues in each relevant automation device manual before operation them.

Safety Symbols Used within this Manual 1.3

Various information notices may be used in this manual. These notices highlight important information or warn the user of a potentially dangerous situation.

NOTICE!

Note: Indicates important information or helpful hints.

Contact for Technical Assistance *1.4*

For further technical assistance on barcodes and automation, please do not hesitate to contact your nearest BRUKER dealer or contact us directly at:

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Sample Changer 2

The Bruker Sample Changer can optionally be equipped with a barcode reading device for automatic sample identification. This optional barcode reading device reads the barcode collar on the glass tube and spinner:

Figure 2.1. A Sample in a Glass Tube with Spinner and Barcode Collar

Standard Barcodes 2.1

The standard barcode on white labels which are pasted onto the barcode collars (see ***Figure 2.2.***).

Figure 2.2. A Standard Barcode Collar P/N HZ4026

Label Size *2.1.1*

The barcode collars have a height of 20 mm and a diameter of 12 mm. Thus the label size must be at least 37.7 x 20 mm. We recommend using a barcode label size of 40 x 20 mm.

It is possible to use different barcode types on the labels. The following codes are currently supported:

1. Code EAN 13
2. Code 2-of-5 interleaved

The following sections present an overview of the two different barcode types.

Code EAN 13 *2.1.2*

The code EAN 13 can encode 12 numeric digits. The 13th character is a checksum.

The 12 digit number encodes the Experiment ID (2 digits), the Solvent ID (2 digits), the User ID (3 digits) and the Sample ID (5 digits) in the following way:

Table 2.1. EAN 13 Information Encoding

Digit	1	2	3	4	5	6	7	8	9	10	11	12	13
Info:	Exp. ID		Solv. ID		User ID			Sample ID					C*

* EAN 13 checksum

The Experiment ID, the Solvent ID and the User ID are equivalent to the corresponding numbers in the files on the spectrometer computer. The four different ID's in an EAN 13 barcode label can be reported separately by using the corresponding software command.

Figure 2.3. Example of an EAN 13 Barcode Label

Code 2-of-5 Interleaved *2.1.3*

All Sample Changer's currently in use can encode 2-of-5 interleaved barcode labels with 4 or 6 digits. The Sample ID is the only information encoded in the barcode. The ratio should be 2.5:1, which means that the thickness of a thick line is 2.5 times the thickness of a thin line.

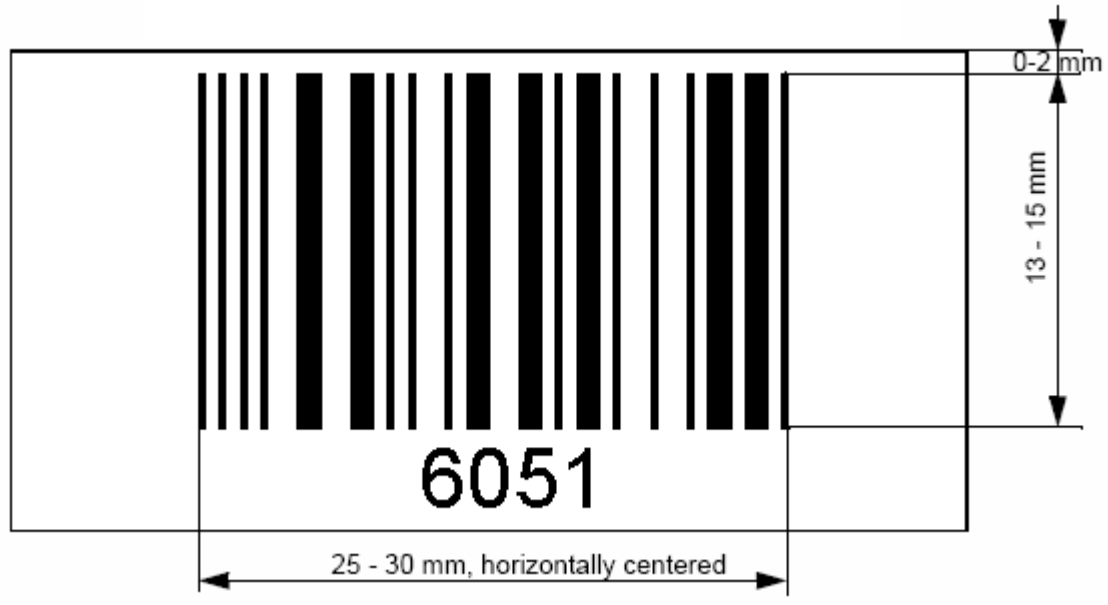


Figure 2.4. Example of a Standard 2-of-5 Interleaved Label

In the near future you will also be able to encode 2-of-5 interleaved barcode labels with up to 16 digits (a future Firmware release will enable this).

In any case be sure to use a good quality printer and use only white paper. Tests with other colored paper have shown, for example, that a 16-digit-barcode can only be read if the rotating speed of the motor is decreased (silver label paper was used for the tests). However, decreasing rotation speed creates a new problem in that 4- or 6-digit standard barcodes can no longer be read!

NOTICE!

For good barcode reading the line thickness of the barcode, rotation speed of the barcode collar, and the print contrast between lines and gaps (corresponding with the paper quality and color) must be coordinated.

Figure 2.5. Example of a 16 Digit 2-of-5 Interleaved Label

Vertical Barcodes *2.2*

This type of barcode collar can only be used when you have sample changer Firmware version 20040128 build 14, in combination with the new B-ACS electronics and the Vertical Barcode Reader Kit:

Vertical Barcode Reader Kit B-ACS-60:P/N H9781

Vertical Barcode Reader Kit B-ACS-120:P/N H10112

Figure 2.6. Barcode Collar with Vertical Barcode

The barcode collars are available in sets of 100 pieces (P/N H10113), please specify the starting number when you place your order.

Gilson Liquid Handler

3

This chapter provides information on the barcodes and barcode labels used in the Gilson system.

Label Size 3.1

The Gilson system is designed to work with barcode labels with a size of 70 mm x 35 mm, e.g. No. 3422 from the firm Zweckform.

General Barcode Information 3.2

Each label which is glued on a rack or well plate must contain two barcodes:

- The upper barcode should contain the Matrix ID;
- The lower barcode should contain the Matrix Type.

Notice:

1. The term „Matrix“ is the generic term used for racks and well plates. Therefore, Rack Type and Well Plate Type are both Matrix Types, and likewise, Rack ID and Well Plate ID are both Matrix ID´s.
2. If a TECAN preparation robot should also read the Well Plate ID, it must be placed on free space on the well plate labels in the lower part of the label as shown in ***"Example of the Matrix ID and Matrix Type on a Well Plate Label" on page 14***).

NOTICE!

It is recommended that you also print the barcode information as human-readable text on the labels.

Barcode type code 128 is used for all barcodes. Other barcode types are ignored by the barcode reader due to its initialization sequence.

Figure 3.1. Example of the Matrix ID and Matrix Type on a Well Plate Label

Matrix ID *3.3*

The Matrix ID is a user specific, unique ID which may contain a three-character company name, followed by a serial number, and optionally by the analytical method divided by a hash - character (#).

NOTICE!

The Matrix ID is the first part of the search string for order files for this matrix.

Example: When the label with the Matrix ID „XYZ000001#NMR“ (which represents company XYZ´s first NMR experiment) is glued on a well plate, all order files which start with the string „XYZ000001#NMR“ (e.g. XYZ000001#NMR#A1, XYZ000001#NMR#A2 etc.) are associated with this well plate.

Matrix Type *3.4*

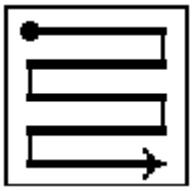
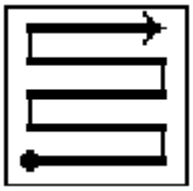
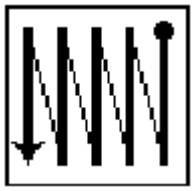
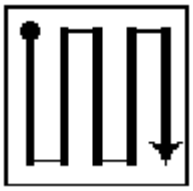
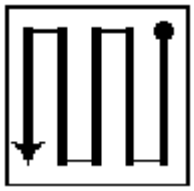
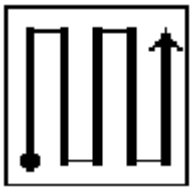
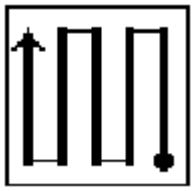
General *3.4.1*

The Matrix Type is a string in a specific format which contains information about the geometry of the rack.

The first 5 characters of the string are a code representing the rack type used, followed by a hash character (#), e.g. 209 # for a rack code 209 or WH12# for a well plate having positions from A to H and from 1 to 12.

The Matrix Type code is followed by one character representing the arrangement, which is the counting order used in the rack or well plate. These are encoded as follows:

Table 3.1. Encoding of Arrangement and Working Order

	Upper Left (ul)	**Upper Right (ur)**	**Lower Left (ll)**	**Lower Right (lr)**
Horizontal Stacked (hs)	ulhs =Code 0 	urhs =Code 1 	llhs =Code 2 	lrhs =Code 3 
Horizontal Folded (hf)	ulhf =Code 4 	urhf =Code 5 	llhf =Code 6 	lrhf =Code 7 
Vertical Stacked (vs)	ulvs =Code 8 	urvs =Code 9 	llvs =Code A 	lrvs =Code B 
Vertical Folded (vf)	ulvf =Code C 	urvf =Code D 	llvf =Code E 	lrvf =Code F 

Matrix Types Used for BEST 3.4.2

Table 3.2. List of Matrix Types for BEST

Description	Usable Sample Racks/Well Plates	Matrix Type Barcode	Default Barcode	Part of Default Label Set
Gilson Rack	200	200#*code X*	200#8	No
Gilson Rack	201	201#*code X*	201#8	No
Gilson Rack	202	202#*code X*	202#8	No
Gilson Rack	203	203#*code X*	203#8	No
Gilson Rack	205	205#8 (new) 205#wplt (old)	205#8	Yes
Gilson Rack	209	209#*code X*	209#8	Yes
Gilson Rack	209B	209B#8	209B#8	Yes
Gilson Wash Rack	211	211#8 (new) 211#wash (old)	211#8	Yes
Gilson Rack	216	216#*code X*	216#8	Yes
Gilson Wash Rack	304B	304B#8 (new) 304B#wash (old)	304B#0	Yes
Gilson Wash Rack	306B	306B#8 (new) 306B#wash (old)	306B#0	Yes
Cooling Rack	526B	526B#*code X*	526B#8	Yes
Cooling Rack	853B (new) 770 (old)	853B#*code X*	853B#8	Yes
Cooling Rack	854B (new) 668 (old)	854B#8 (new) 854B#wplt (old)	854B#8	Yes
Deep Well Plate (old)	WH12	WH12#A	WH12#A	No
Deep Well Plate 1 ml round	WH12	WH12@DR#A	WH12@DR#A	Yes
Deep Well Plate 2 ml square	WH12	WH12@DS#A	WH12@DS#A	Yes
Microplate 384 (Deep)	WP24	WP24#A	WP24#A	No
Code X: This means that all arrangements of the codes are possible (see also ***Table 3.1.***). Both old and new barcode matrix types are understood.				

Matrix Types Used for PrepGilsonST 3.4.3

The default label set in the following table is available under P/N H10144.

Table 3.3. Matrix Types Used for PrepGilsonST

Description	Part Number	Matrix Type Barcode (variant 1)	Matrix Type Barcode (variant 2)	Part of Default Label Set
Gilson Rack		200#8	200@200#8	No
Gilson Rack		201#8		No
Gilson Rack		202#8	202@202#8	No
Gilson Rack		203#8	203@203#8	No
Gilson Wash Rack Type 211*	HZ13020	211#8		Yes
Gilson Rack Type 205*	HZ07615	205#8		Yes
Ritter Deep Well Plates 1 ml*	68964	WH12@DR#A	WH12@WHDR#A	Yes
Ritter Deep Well Plates 2 ml*	68966	WH12@DS#A	WH12@WHDS#A	Yes
Gilson Well Plate		WP24#A	WP24@WP24D#A	No
1 mm Application Rack		205MI#8		Yes
Microplate (1 mm)		WH12@1MM#A		Yes
Microplate (1.7 mm)		WH12@1.7MM#A		Yes
Microplate (3 mm)		WH12@3MM#A		Yes
Microplate (5 mm)		WH12@5MM#A		Yes
Gilson Rack 209 Cpl.*	HZ06605	209#8	209@209#8	Yes
Gilson Rack 209B Cpl.*	HZ08524	209B#8	209B@209B#8	Yes
Gilson Rack 216 Cpl.*	AH0322 Var. 3	216#8	216@216#8	Yes
Cooling Rack Type 526B*	AH0322 Var. 11	526#8	526B@209B#8	Yes
Cooling Rack Type 853B*	AH0322 Var. 12	853B#8	853B@209#8	Yes
Cooling Rack Type 854B*	AH0322 Var. 10	854B#8	668#8	Yes
Gilson Wash Rack Type 304B*	H9697	304B#0		Yes

Table 3.3. Matrix Types Used for PrepGilsonST

Description	Part Number	Matrix Type Barcode (variant 1)	Matrix Type Barcode (variant 2)	Part of Default Label Set
Gilson Wash Rack Type 306B*	H9698	306B#0		Yes
MATCH Tube Rack* - with 2 tube blocks 1.0 mm - with 2 tube blocks 1.7 mm - with 2 tube blocks 2.0 mm - with 2 tube blocks 2.5 mm - with 2 tube blocks 3.0 mm - with 2 tube blocks 4.0 mm - with 2 tube blocks 4.25 mm - with 2 tube blocks 5.0 mm	 HZ12271 HZ12275 HZ12279 HZ12239 HZ12246 HZ12284 HZ12288 HZ12288	348B#8 WD6@1.0MM#8 WD6@1.7MM#8 WD6@2.0MM#8 WD6@2.5MM#8 WD6@3.0MM#8 WD6@4.0MM#8 WD6@4.25MM#8 WD6@5.0MM#8		Yes

Table 3.4. List of Rack Names for Barcode Types

Rack/Well Plate Type on Barcode (...#...)	Name in Gilson Database and Preparation Program
No barcode heightener	1 series 200 heightener
200	Code 200
201	Code 201
202	Code 202
203	Code 203
205	Code 205
205MI	Code 205MI
209 209@209	Code 209
209B 209B@209B	Code 209B
211	Code 211
216	Code 216
304B	Code 304B
306B	Code 306B
348B	Code 348B
526B 526B@209B	Special 526B
853B 853B@209	Code 853B Peltier (2 ml Vials)
854B 668	Code 854B Peltier (Deep)
WH12@DR	Microplate (Deep)
WH12@DR	Microplate (Deep Squared)
WH12@1MM	Microplate (1MM)
WH12@1.7MM	Microplate (1.7MM)
WH12@3MM	Microplate (3MM)
WH12@5MM	Microplate (5MM)
WP24	Microplate 384 (Deep)
WD6	NMR Tube Block MATCH

Barcode Positioning *3.5*

It is necessary to always place the barcodes in the correct position on the label to ensure correct barcode reading:

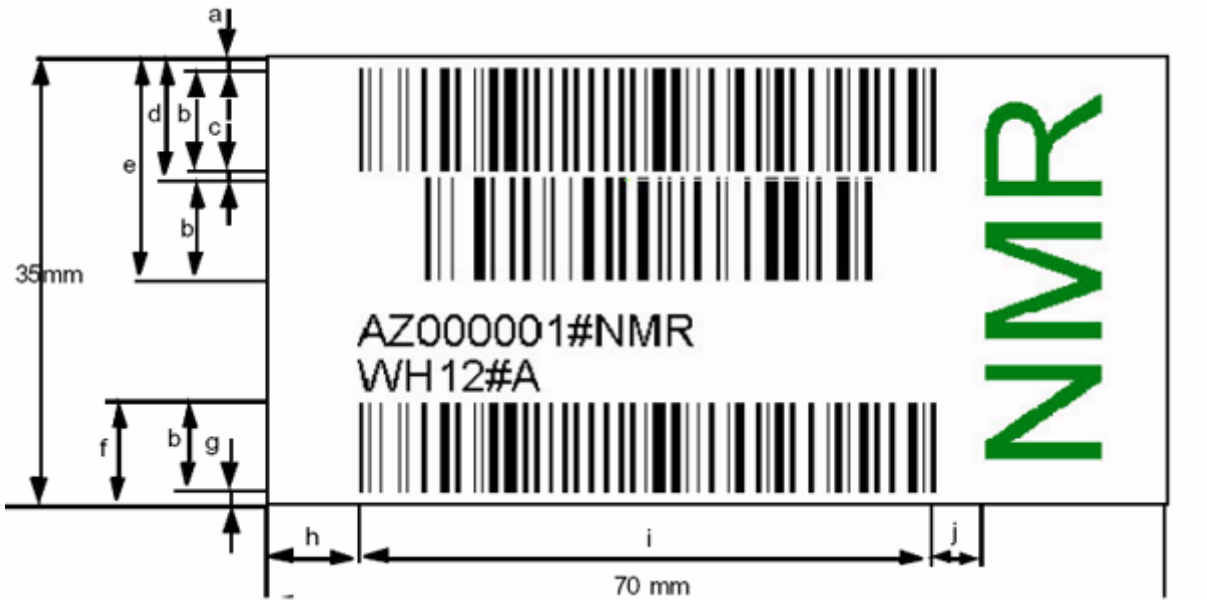


Figure 3.2. Barcode Positions on the Barcode Label

Table 3.5. Maximum Barcode Dimensions

Variable	Min	Best	Max
a	0 mm	1mm	2 mm
b	7 mm	8 mm	10 mm
c	0.5 mm		
d	8.5 mm	9.5 mm	10.5 mm
e	16.5 mm	17.5 mm	
f	9 mm	10 mm	
g	0 mm	2 mm	3 mm
h	5 mm	7 mm	15 mm
i*		6 chars. 35 mm 8 chars. 40 mm 10 chars. = 45 mm	45 mm
j	5 mm		

* *Calculation of characters: If you have numbers with 6 digits or more (together in only 1 number, which is not interrupted by a letter), the pairs of numbers are counted as 1 character. At the end of summation, add 2 more characters. For example in* ***Figure 3.2.*** *there are 3 pairs of digits + „AZ“ + “#NMR“ + 2 characters = 11 characters*

Other important specifications

1. Module width: 8 - 15 mils (0.2 mm - 0.381 mm)
2. Print Contrast Ratio: PCS > 70%
3. Number of characters: max. 12
4. Colors: black code on white background
5. Code Type: code 128

When you paste the labels on the racks be sure to align the edges of the metal plate at the front of the rack. Precise positioning here avoids barcode reading errors.

When you paste the labels on the well plates, be sure to place them on the lower edge of the well plate feet as shown in ***Figure 3.3.***

Figure 3.3. Position of a Barcode Label on a Well Plate

Figure 3.4. Example of a Label for Rack Type 205

Figure 3.5. Example of a Well Plate Label

Figure 3.6. Example of a Label for Rack Type 209

Figure 3.7. Example of a Label for Rack Type 216

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