B-Field Scanner Software S47

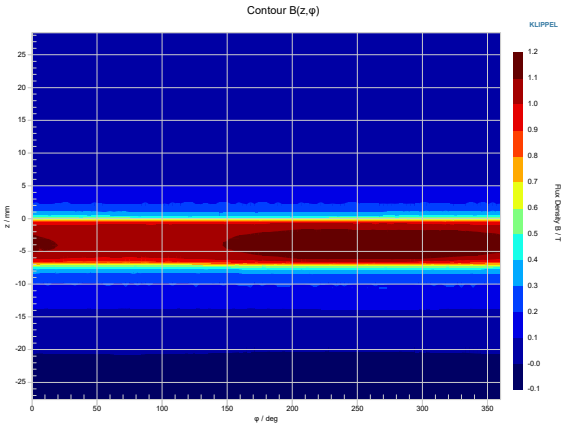
Software of the KLIPPEL R&D SYSTEM (Document Revision 1.5)

FEATURES

- Fully automated measurement process
- User friendly dedicated templates
- Uses Klippel dB-Lab and Robotics software

BENEFITS

- Dedicated to loudspeaker magnets
- Simple to use



contour plot of the measured magnetic flux density B(z, phi)

DESCRIPTION

The B-Field Scanner software controls the automatic data acquisition process and post processes the captured data.

Article number	2510-210

CONTENT

1 Requirements

1.1 Hardware

Product	Article	Spec
DA (hardware version 2.0 or higher)	2000-002	H1

1.2 Software

Product	Article	Spec
dB-Lab (version 210.450 or higher)	1000-110	F1, S12
Robotics (version 1.101 or higher)		
SciLab (version 5.4 or higher)		
DA firmware (ver. 4.0 or higher)	*could be updated by the customer*	

1.3 License

Product	Article	Spec
BFS Software Module	2510-210	S47
TRF Standard Module	1000-900	S7

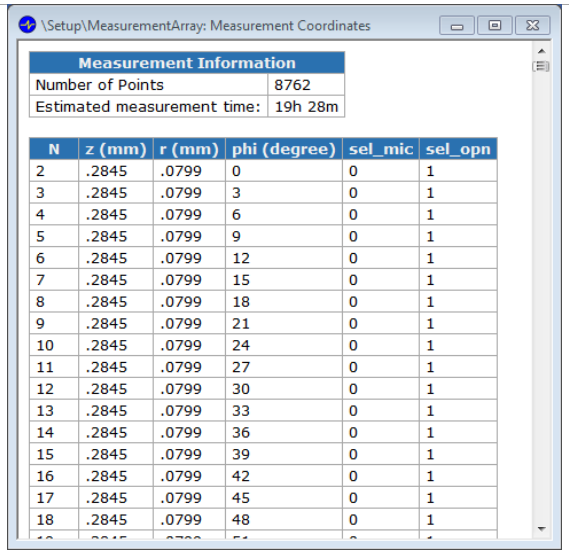
2 Automatic Measurement Process

2.1 Defining Scanning Grid

In the Measurement Array the user defines the Phi angle resolution, the Z height and resolution to be scanned.

The user defines a starting point for the scan as well as an origin for the coordinate system to view the measured data. The starting point is typically right above the back plate of the magnet, while the origin could be set to any point of the magnet that is useful as reference for the voice coil position (for example the upper edge of the magnetic gap).

Both points are set and stored in the Klippel Robotics software.



Measurement Information	
Number of Points	8762
Estimated measurement time:	19h 28m

N	z (mm)	r (mm)	phi (degree)	sel_mic	sel_opn
2	.2845	.0799	0	0	1
3	.2845	.0799	3	0	1
4	.2845	.0799	6	0	1
5	.2845	.0799	9	0	1
6	.2845	.0799	12	0	1
7	.2845	.0799	15	0	1
8	.2845	.0799	18	0	1
9	.2845	.0799	21	0	1
10	.2845	.0799	24	0	1
11	.2845	.0799	27	0	1
12	.2845	.0799	30	0	1
13	.2845	.0799	33	0	1
14	.2845	.0799	36	0	1
15	.2845	.0799	39	0	1
16	.2845	.0799	42	0	1
17	.2845	.0799	45	0	1
18	.2845	.0799	48	0	1

2.2 Scanning Process

The starting point is where the measurement will start. The measurement then proceeds clockwise in the gap according to the Phi resolution. Once a full turn is completed, the sensor moves upward one step according to the Z resolution. Another full turn counter-clockwise is made in the gap and so on until the value of Z height is reached. The last measurement point is far above the magnet at the upper end point of the Z-axis to measure the environmental magnetic field. This value will be removed by the post-processing automatically. This environmental field could also be measured manually for

example if the measurement process is stopped in between to have a look to the results before the whole scan is completed.

3 Results

3.1 Results of the Post Processing

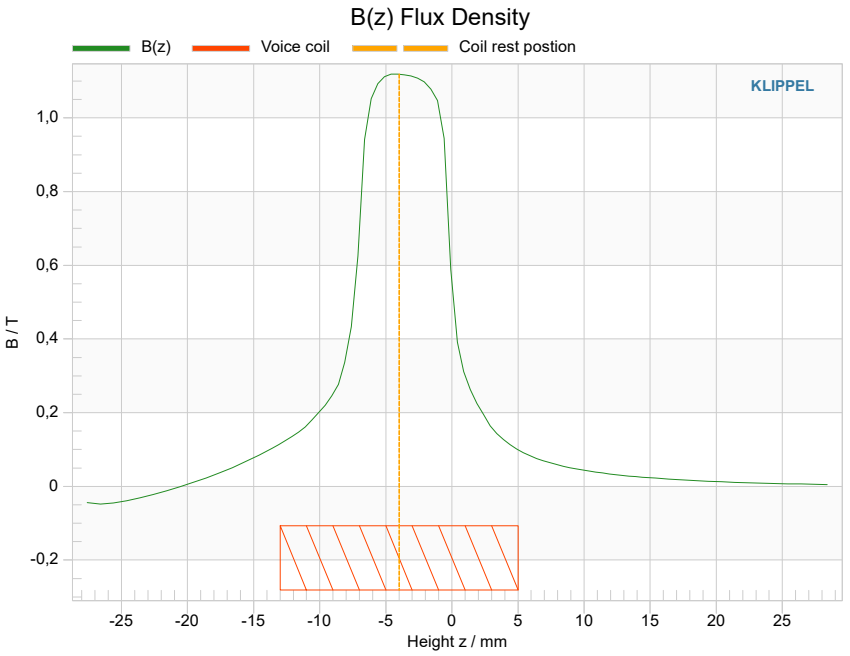
Result Windows

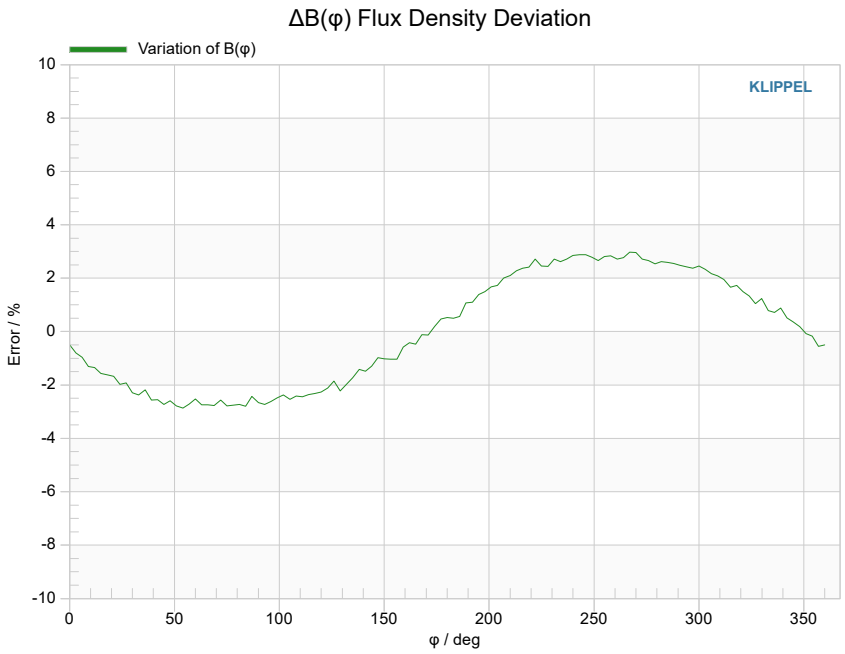
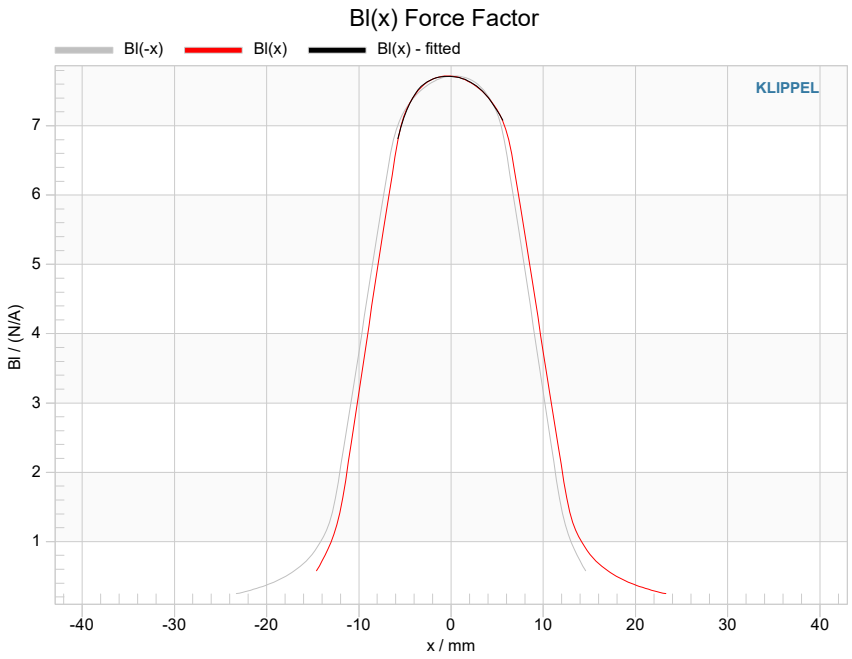
A results summary for each unit is presented in the Result Variables window.

Results:

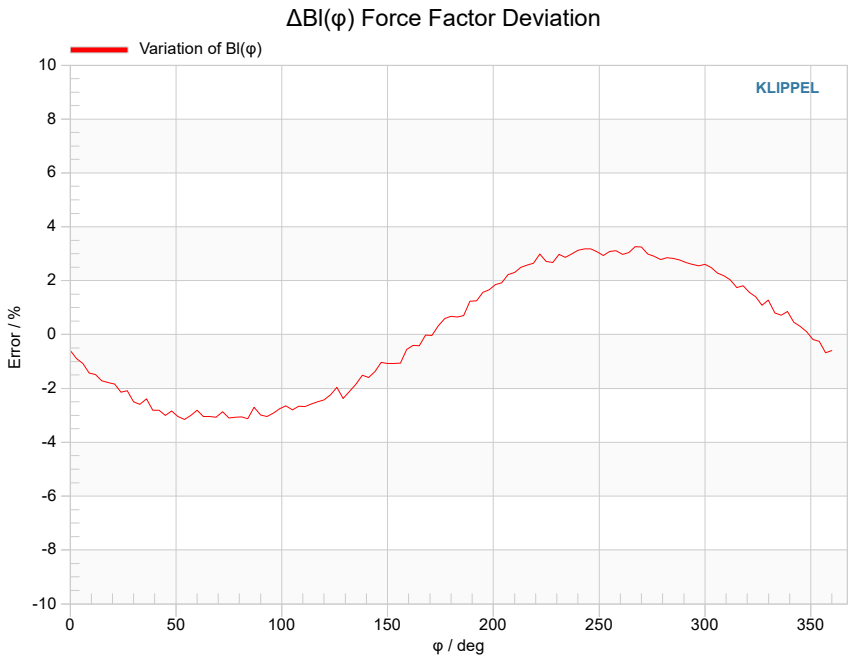
Parameters	Symbol	Value	Unit
Voice Coil Parameters			
Wire Diameter	d	.3157895	mm
Height	h	18	mm
Radius	r	19.675	mm
Layers	N	2	-
Turns	W	57	-
Voice Coil Rest Position		-4	mm
Measurement Results			
Maximum Magnetic Flux	$B_{max}(z)$	1.11925	T
Maximum Force Faktor	$Bl_{max}(x)$	7.7199	N/A
Position of Maximum Force Factor	x @ $Bl_{max}(x)$	- .3894737	mm
Minimum Magnetic Flux	$B_{min}(z)$	- .04813	T
Minimum Force Faktor	$Bl_{min}(x)$	.2472	N/A
Position of Minimum Force Factor	x @ $Bl_{min}(x)$	23.294737	mm
Maximum Flux Error	$\|B_{err,max}(\varphi)\|$	2.9692	%
Maximum Force Factor Error	$\|Bl_{err,max}(z,\varphi)\|$	3.2626	%

Magnetic flux density B(z) with voice coil position and height Z referenced the origin set in the Klippel Robotics. Adjusting the coil rest position referenced to the origin is possible in the post-processing.

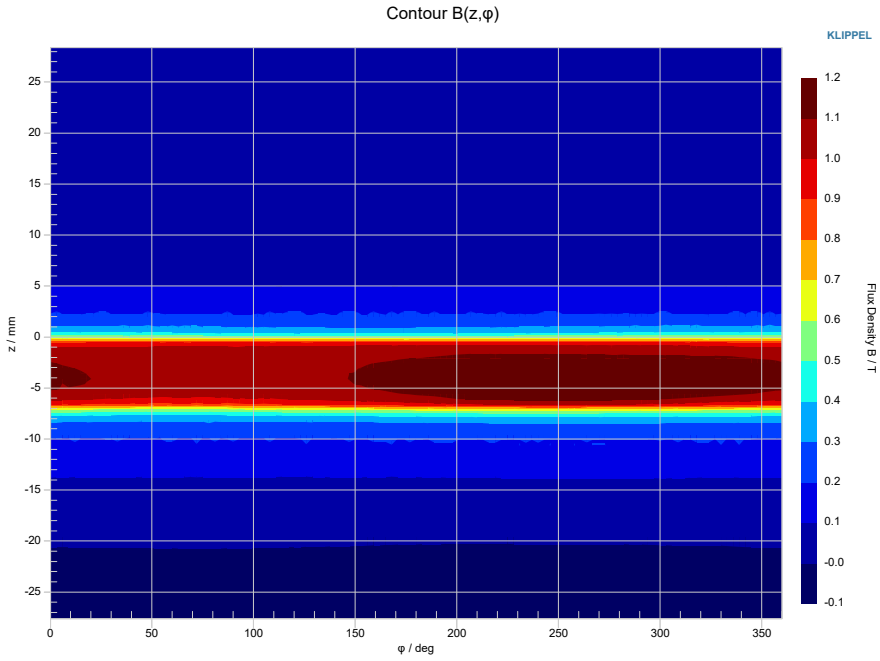


Critical information giving the variation of the flux density over the full circle.	
Using the imported voice coil dimensions, the resulting Bl(x) curve is calculated and compared to dynamic measurement results.	

The force factor variation can also be calculated and displayed for different voice coil positions by adjusting the voice coil position parameter in the post processing.



The contour plot of the Magnetic flux density B(z, phi) over the height Z and angle Phi displays nicely the field distribution and indicates asymmetries.



4 Limits

Parameter	Symbol	Min	Typ	Max	Unit
DUT					
Maximal Diameter	D			76	cm
Height	H			24.5	cm
Mass	M			70	kg
SCANNING HARDWARE					
Sensor	Non-contact hall effect BFS Sensor. See BFS Sensor spec A11				
Scanning Grid	Polar coordinate system (φ, r, z)				
Vertical sensor position (corresponds with height of DUT)	z	0		245	mm
Free space between stands (corresponds with Diameter of the DUT)	d			760	mm
Horizontal Shift (radius of circular area scanned)	r	0		300	mm
Angle of turn table	φ	0		360	°
Error in z position	Δz		10	30	µm
Error in r position	Δr		10	30	µm
Error in φ position	Δφ		0.2	0.5	°
Recommended workspace width	w	85			cm
Recommended workspace depth	d	55	80		cm
Recommended workspace height	h	125			cm
SCANNING GRID					
Increments of height z	Dz	0.02	1		mm
Increments in angle φ	Dφ	0.03	4.5	360	°

Find explanations for symbols at:

http://www.klippel.de/know-how/literature.html

Last updated: February 13, 2023