 DANFYSIK	Item: Magnetic Measurements	Magnet No.: 16653 and 16654
DWG No.:	Customer: Århus Universitet	Order No.: 502446

Description of magnetic measurement

A set of three strip line probes shall be used to measure the magnetic strength (peak integrated field) as well as the integrated field uniformity within the good field region.

The strip line probes shall be mounted on a line in the magnet center plane. The strip lines shall be placed at $x = -15$ mm, 0 mm and +15 mm. The probes are 570mm long and thus cover the full magnet length.

The probes are 1.52 mm wide and have 50 Ω impedance and must be terminated accordingly.

The magnet is measured using a 4 channel scope. The kick strength is found from the center probe. Homogeneity is found from the two outer probes.

Case 1: 332 A, 40 kHz.

The voltage across the stripline shall be logged during a burst. The voltage shall be integrated over one quarter period, i.e. over 6.25 μ s when ramping from 0 A to 332 A. Note that the scope will only see half of the induced voltage.

The expected integrated voltage is calculated below

Magnetic length, nominal	L	0.3	m
Magnetic field, nominal	B	0.0167	T
Integrated field	BL	0.00501	Tm
Stripline width	w	0.0015	m
Peak flux through stripline	$\phi = BLw$	0.000007515	Wb
Scan frequency	f	40000	Hz
Ramp time	$dT = 1/4f$	0.00000625	s
Peak voltage	$U = d\phi/dT/2$	6.6012	V
Integrated voltage (1/4 period)	$U \cdot dT$	0.000003758	Vs

The integrated magnetic field may be calculated as $Bl = \frac{1}{w} \int_0^{dT} U dt$.

Criteria:

- Integrated magnetic field within +/- 1% of nominal value. The current amplitude may be adjusted to achieve the specified kick strength.
- Homogeneity within 10%.

Result summary

Cas e	f	Curren t, nomin al	Integrated field, nominal	Current, actual	X	Integrated field, actual	Homogeneity	Passed / failed
	kHz	A	Tm	A	mm	Tm	%	
1	40	332	0.005010	332	-15	0.00567	0.0%.	Passed
					0	0.00567		
					15	0.00567		
2	40	23	0.000346	23	-15	0.00040	1.7%.	Passed
					0	0.00039		
					15	0.00040		
3	10	332	0.005010	332	-15	0.00520	0.7%.	Passed
					0	0.00520		
					15	0.00517		
4	10	23	0.000346	23	-15	0.00043	0.8%.	Passed
					0	0.00043		
					15	0.00042		

Equipment:


3 pcs 50Ohm Strip Line probes
 2 pcs Support for Magnetic Measurement, drwg TBD
 1 pcs Oscilloscope w. integrating math module
 BNC cables

Production Control:

Sign:

Project Engineer:

Sign:

 DANFYSIK	Item: Magnetic Measurements	Magnet No.: 16653 and 16654
DWG No.:	Customer: Arhus Universitet	Order No.: 502446

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Ramp time	$dT = 1/4f$	0.00000625	s
Peak voltage	$U = d\phi/dT/2$	6.6012	V
Integrated voltage (1/4 period)	$U*dT$	0.000003758	Vs

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- Integrated magnetic field within +/- 1% of nominal value. The current amplitude may be adjusted to achieve the specified kick strength.
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	kHz	A	Tm	A	mm	Tm	%	
1	40	332	0.005010	332	-15	0.00561	0.4 %	Passed
					0	0.00563		
					15	0.00561		
2	40	23	0.000346	23	-15	0.00041	0.2 %	Passed
					0	0.00041		
					15	0.00041		
3	10	332	0.005010	332	-15	0.00534	1.4 %	Passed
					0	0.00529		
					15	0.00536		
4	10	23	0.000346	23	-15	0.00040	0.8 %	Passed
					0	0.00041		
					15	0.00040		

Equipment:

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 1 pcs Oscilloscope w. integrating math module
 BNC cables

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