



Instytut Katalizy i Fizykochemii Powierzchni
im. Jerzego Habera
Polskiej Akademii Nauk



Numer 6

Niwelator pola SC20

(data zakupu 18.05.2010; wartość zakupowa 92 890,80 zł)

Urządzenie służące do niwelacji pola elektromagnetycznego, w pomieszczeniach z mikroskopem SEM. System oparty na detektorze pola zmiennego AC i wolno zmiennego DC, wyposażony w tor elektroniki pozwalającej neutralizować bardzo szybkie zmiany pola w dużym zakresie.

Uwaga:

Urządzenie nie było używane od 2018 r.

cena wywoławcza 5 000 zł

PARAMETRY TECHNICZNE NIWELATORA POLA SC20/AC/DC (w języku angielskim)

SC20 Product Specification

COORDINATE SYSTEM X, Y, Z rectangular Cartesian **UNITS** Gauss, Tesla (switchable)

FIELD CANCELLING

1. SC20-AC Sensor(s)

Components cancelled X, Y, Z field components
Dynamic range (X & Y) 80 mG (8 μ T) pk-pk
Dynamic range (Z) 60 mG (6 μ T) pk-pk
Field reduction ratio 50 X (typical) at 50/60Hz
Bandwidth 0.5Hz - 5000Hz
Detector noise limit 2 μ G (0.2 nT) pk-pk

2. SC20-Wideband DC sensor(s)

Components cancelled X, Y, Z field components
Ambient DC field ± 2 G (± 200 μ T) max
Dynamic range (X & Y) ± 40 mG (± 4 μ T) incremental
Dynamic range (Z) ± 30 mG (± 3 μ T) incremental
Field reduction ratio 50 X (typical) at 50/60Hz (incremental)
200 X (typical) at DC (incremental)
Bandwidth DC - 2500 Hz
Noise and Drift DC drift/24 hours < 100 μ G (10 nT) after 2 hour warm-up
DC noise (0.0001- 0.01 Hz) 30 μ G (3 nT) pk-pk (typical)
Spot noise (at 50 Hz) 1 μ G/ $\sqrt{\text{Hz}}$ (0.1 nT/ $\sqrt{\text{Hz}}$)

FIELD MEASUREMENT

Types 1. Real time field

2. AC - true RMS amplitude

3. Incremental DC (with DC sensor)

Display

RMS & DC 3.5 digit LED panel meters

Sensor dynamic range > 20 mG pk-pk

Note: RMS & DC measurement ranges are limited by sensor pk-pk range

Meter range (reading) 0-19.99 mG (1.999 μ T) RMS

± 19.99 mG (1.999 μ T) DC

Accuracy

Note: sensors are calibrated with 50 Hz, 10mG RMS square wave field.

RMS ± 1.0 % of reading ± 20 μ G (2 nT)

Incremental DC ± 5.0 % of reading

Real time field monitor

Signals X, Y, Z, real time field

Scaling 1.0 V/mG

Range $>\pm 10$ Volts

Source resistance 10 kOhms

Connectors 3 X BNC

Bandwidth 5 Hz - 20 kHz (AC sensor)

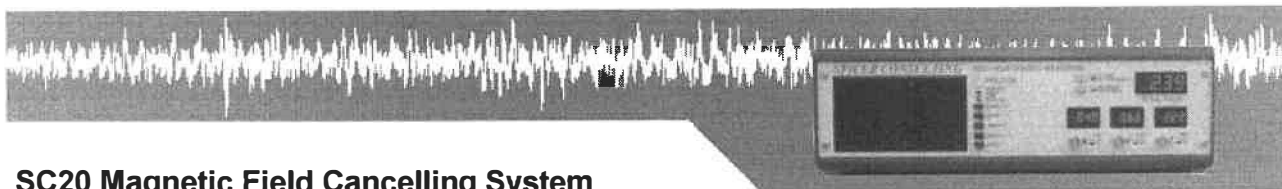
DC - 5 kHz (DC sensor)

Trip range adjustment

AC-RMS 0 - 2.0 mG (200 nT)

DC 0 - 5.0 mG (500 nT)

POWER 120/240 V 50/60 Hz, 100 VA

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SC20 Magnetic Field Cancelling System

Advanced Magnetic Field Cancelling Solutions

► **SC20 Product Description**

■ [SC20 Product Specification](#)

■ [SC22 Product Description](#)

■ [SC22 Product Specification](#)

SC20 Product Description

The SC20 is the latest magnetic field cancelling system from Spicer Consulting, introduced in 2004. The SC20 is the recommended system for cancelling DC fields, large fields and, as the SC-20FAST, the 9kHz fields generated by wafer transport robots in 300mm fabs.



The SC20 Magnetic Field Cancelling System. Click on the image above to open a window with an interactive tour.

The SC20 has been designed to be largely backwards compatible with the SC12. The systems use the same operating principle and installations as described on the SC12 Product Description page. The SC20 is plug compatible with the SC12 field cancelling cables to enable easy upgrade of SC12 installations to the SC20. The SC20 control unit is not plug compatible with the SC12 magnetic field sensors.

The SC20 case is larger than the SC12 enabling more powerful amplifiers, more cancelling range and easier rack mounting. It will install into a standard 19inch rack 3U space with the rack mount brackets fitted. The SC20 output amplifiers provide 60% more cancelling

range than the SC12 and they will withstand an output short circuit or full scale overload indefinitely without degradation. (The SC12 amplifiers are protected with thermal fuses which may degrade if subjected to long term overload.)

The front panel display has been simplified and upgraded to display the magnetic field amplitude of all three field axes continuously as well as the magnitude of the total field vector. The display units are switchable between milligauss and microtesla and the display can be AC-RMS or Incremental DC when the SC20 wideband sensor is used. The BNC connectors for monitoring the realtime field with a scope have been moved to the front panel for easier access.

To further enhance the "set and forget" performance, the set up controls which affect cancelling have been located behind a secure drop down front panel. This is to prevent tampering or accidental adjustment of the controls in unattended installations.

The system can provide AC or DC cancelling depending on the sensors installed. It recognises the sensors used and selects the internal filters to use. The sensor mixer function (an add-on box with the SC12) is built into the SC20 and becomes active when two sensors are plugged in.

The SC20 includes a system interface enabling the SC20 monitor to be connected, allowing remote monitoring of the SC20 status and measured field levels.

Meter range (reading)	0-19.99 mG (1.999 μ T) RMS $\pm$ 19.99 mG (1.999 μ T) DC
Accuracy	
Note:	sensors are calibrated with 50 Hz, 10mG RMS square wave field.
RMS	$\pm$ 1.0 % of reading $\pm$ 20 μ G (2 nT)
Incremental DC	$\pm$ 5.0 % of reading
Real time field monitor	
Signals	X, Y, Z, real time field
Scaling	1.0 V/mG
Range	$>\pm$ 10 Volts
Source resistance	10 kOhms
Connectors	3 X BNC
Bandwidth	5 Hz - 20 kHz (AC sensor) DC - 5 kHz (DC sensor)
Trip range adjustment	
AC-RMS	0 - 2.0 mG (200 nT)
DC	0 - 5.0 mG (500 nT)
POWER	120/240 V 50/60 Hz, 100 VA

Magnetic Field Cancelling Systems

Protecting your Investment in Electron Beam Technology

The SC20



The SC22

Today's high performance electron beam tools are very sensitive to changing ambient magnetic fields. The fields move the beam causing loss of resolution and measurement accuracy. Fields which exceed the tool manufacturer's environmental specification are common, created by nearby machinery and equipment as well as by external sources. Operation in such fields prevents the tools from reaching their full performance.

The Spicer Consulting Field Cancelling systems stabilise the ambient magnetic field to restore the resolution and accuracy of the electron beam tool.

Spicer Consulting's field cancelling systems are recognised by equipment manufacturers and leading users as the simplest and most effective way to resolve problems associated with magnetic interference, enabling greater flexibility in the siting of SEMs, TEMs and FIBs and allowing them to perform to their full potential.

CSA Certification: a list of the safety certificates for the Spicer Consulting magnetic field cancelling systems can be found on the [CSA website](#)

- Continuous field cancelling
- Continuous field monitoring
- Set and forget operation
- AC field cancelling
- Wideband DC field cancelling
- 50 x field improvement (typical)
- Dynamic, 100 μ s response
- Accurate field measurement
- Interface for computer monitoring

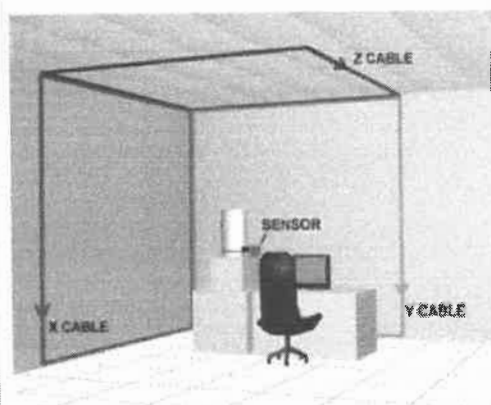
► Magnetic Field Cancelling

- [SC20 Description](#)
- [SC20 Specification](#)

- [SC22 Description](#)
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- [SC20FAST](#)
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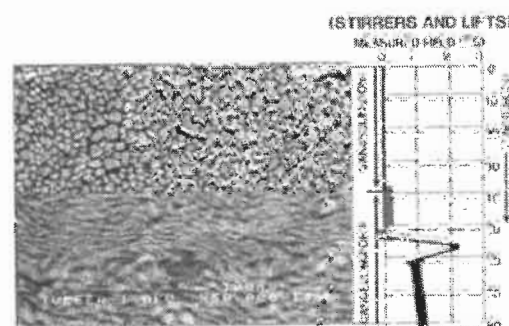
Typical SEM Installation

The Spicer Consulting Magnetic Field Cancelling Systems comprise a Magnetic Field Control Unit, AC or DC Magnetic Field Sensors and three multicore cables which are installed in the room where the field is to be cancelled.

The Control Unit power amplifiers drive currents through the cables to create a field which is the opposite sign to the changes in the ambient field. The magnetic field sensors measure the resulting field and real time negative feedback reduces the ambient field by the loop gain of the system.

The systems are dynamic, automatically responding to field changes within 100 μ s.

Magnetic Field Cancelling



BEAM 1keV MAG 50,000 X WORKING DIST 14mm
STIRRERS ON LIFTS MOVING

DC cancelling of the field from magnetic stirrers and lifts



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18 Jun 2009



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Protecting your Investment in Electron Beam Technology

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■ [SC20 remote monitor](#)

■ [SC20FAST](#)

■ [Wideband DC Sensor](#)

► [Frequently Asked Questions](#)

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Frequently Asked Questions

1. Q. How much maintenance is required?
A. *None.*
2. Q. Do you have to retune the systems if the field levels change?
A. *No. They automatically react to changes in field level.*
3. Q. How quickly do they react to changes in field?
A. *They react in 100 microseconds. But note that the meters on the front panels (which have no effect on cancelling) are not fast enough to show this.*
4. Q. How are the cables installed?
A. *Room size cables are attached to the wall by tie-wrap anchors or plastic molding. In a few cases they are installed under the floor or above the ceiling.*
5. Q. How large are the cables?
A. *A room size installation can be up to 5 m by 5 m across, by 3 m high.*

Cable Type	Cable Diameter	Cable Length			Size of Connecting Plug (number of pins on D-type connector)
		X	Y	Z	
SC12 Room	6.7 mm	16 m	16 m	20 m	15
SC20 Room	8.5 mm	16 m	16 m	20 m	25

6. Q. Do I need a Helmholtz frame?
A. *Not usually. Helmholtz cables are inconvenient for the user and no better than room size cables for cancelling beam movement. They are typically used for OEM installations when other cable arrangements are not suitable.*
7. Q. Can I install one system to cancel fields in a room with multiple tools?
A. *A separate system is required for each tool.*
8. Q. Can I install two systems side by side?
A. *Yes, but precautions are needed. Call to discuss.*
9. Q. If I install a system on one tool, do I need one on the next door tool?
A. *Sometimes. It depends on the individual circumstances.*
10. Q. Do the trip levels affect cancelling?
A. *No. They only affect the level at which the Field OK light goes out and the trip indicators come on.*
11. Q. Can the systems cancel the effect of lifts (elevators)?
A. *Yes, using the wideband DC sensor.*
12. Q. How many systems have been sold?
A. *Over 600 SC12 systems were sold in the years 1996 to 2002.*
13. Q. What is happening to the SC12?
A. *The SC12 is becoming obsolete and will be replaced by the SC22. Plans are to cease production of the SC12 by the end of 2008 (or earlier if our parts stock is used up).*