

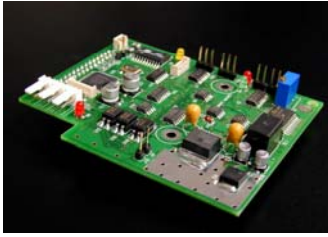
SMART MAGNET BOARD

USER MANUAL

E0 SMAG 000B

	<i>Manufacturing</i>	
Nom <i>Name</i>	FF	
Date	2007june28th	
Visa	FF	

1 SMART MAGNET FEATURES



Magnetization control of the electromagnet.

Sample detection by phase analysis of the coil signal. (without extra wires, 2 wires total)

Functions enabling to easily parameter the sample detection threshold.

Functions boosting the magnetization intensity are implemented to ease sample capture in case of automated mounting.

Notes:

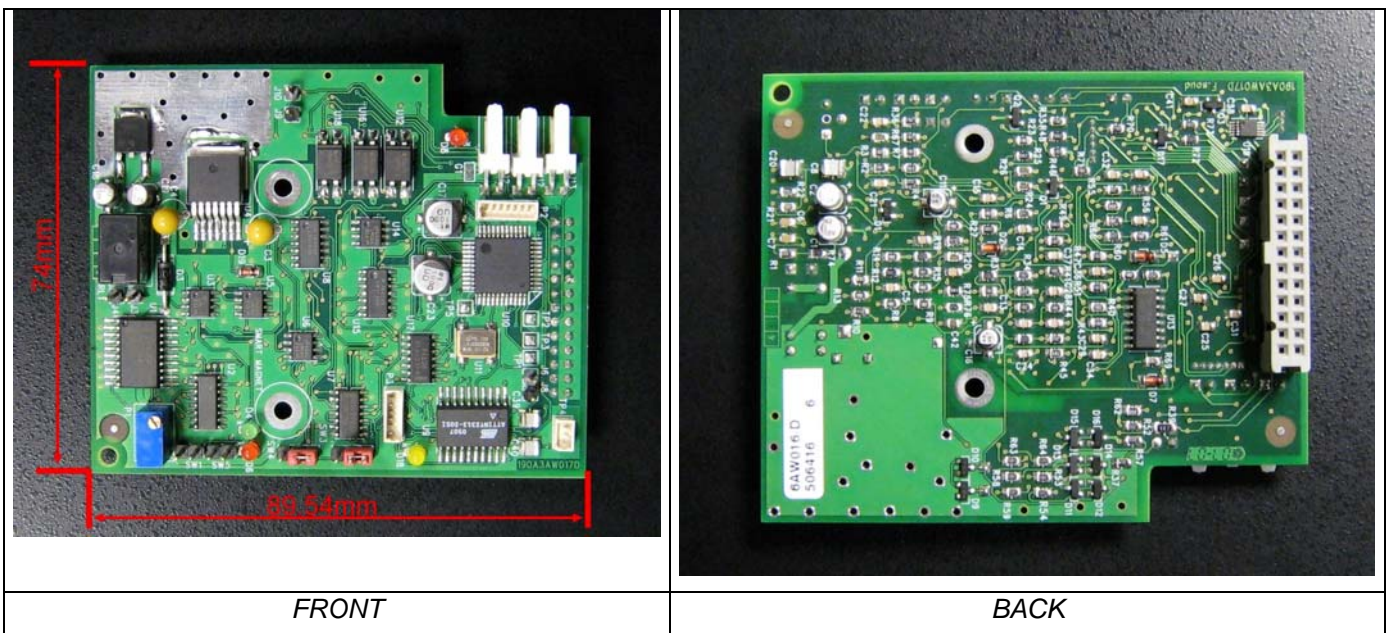
This system is designed to work in association with the smart magnet nozzle and SPINE sample holders.

2 BOARD INTEGRATION

This board is intended to be used with our specific electromagnet. See D1SMAG000A PINOUT.pdf for electrical integration of the board.

Scope of delivery: SM board, Demagnetization switch, Electromagnet.

External dimensions:



3 I/O DESCRIPTION

3.1 J11

Pin #	Signal name	Type
1	+12V	+12V
2	+5V	+5V
3	-12V	-12V
4	PGND	PGND
5	PGND	PGND
6	GND	GND
7	GND	GND
10	Coil+	To the electromagnet
11	Coil-	To the electromagnet
13	/Magnet-On1	IN
15	/Magnet-Is-On1	OUT
17	PB1Capteur	OUT2
19	PB2Capteur	OUT2
21	Sample-Is-Detected1	OUT
22	PGND	PGND
25	Sample-Is-Detected2	OUT
26	PGND	PGND

OUT: Active low, Reference to PGND, Open collector, V max: 34V, I max: 100mA

OUT2: Relay contact (see datasheet REL-12V-V23111-TYCO)

IN: Open collector, Active low, I max: 20mA (when low) voltage Low: <0.8V; High=12 Volts

Coil+ & Coil-

Electromagnet signals

/Magnet-On1

This input is used by the control system to drive the electromagnet.

Input State	Definition
Low level	The electromagnet is not magnetized
High level	The electromagnet is magnetized

Notes: the /Magnet-On2 input should be at a low level, see /Magnet-On2 description.

/Magnet-Is-On1

This output checks the coil supply voltage.

Output State	Definition
Low level	The electromagnet is magnetized
Open collector	The electromagnet is not magnetized

Sample-Is-Detected1 = Sample-Is-Detected 2

These outputs indicate that a sample cap is detected on the electromagnet.

SW3	Output State	Definition
1-2-3	Low level	A sample is not detected
	Open collector	A sample is detected
1-2-3	Low level	A sample is detected
	Open collector	A sample is not detected

PB1Capteur = PB2 Capteur

This output signals a problem with the coil integrity. A problem is detected if the signal is low.

Output State	Definition
Open contact	Coil integrity is compromised
Closed contact	Coil integrity is not compromised

3.2 **J2**

Pin #	Signal name	Type
1	/Magnet-Is-On2	OUT
2	GND	GND

OUT: Active low, Reference to PGND, Open collector, V max: 34V, I max: 100mA

/Magnet-Is-On2 = /Magnet-Is-On1

This output checks the coil supply voltage.

Input State	Definition
Low level	The electromagnet is magnetized
Open collector	The electromagnet is not magnetized

3.3 **J12**

A switch may be connected to this connector and used to demagnetize the electromagnet. This is useful for manual removal of a sample.

Pin #	Signal name	Type
1	/Magnet-On2	IN
2	GND	GND

Connected to a normally closed push-button which can withstand the following: V max: 12V, I max: 20mA

/Magnet-On2

This input is designed to be driven by a manual switch allowing demagnetization of the electromagnet in case of manual sample removing.

Input State	Definition
Low level	The electromagnet is magnetized
High level	The electromagnet is not magnetized

Note: the /Magnet-On1 input should be at a low level.

/Magnet-On1	Low	Low	High	High
/Magnet-On2	Low	Low	Low	High
	Magnetized	Demagnetized	Demagnetized	Demagnetized

3.4 **TP4**

This connector is used for RS-232 type connection to a PC. This can be used to read and write the sample detection threshold.

Pin #	Signal name	Type
1	Tx_SM	OUT3
2	Rx_SM	IN2
3	GND	

Port parameters:

Bits per second 19600 Bauds
 Data Bits 8 Bits
 Parity None
 Stop Bits 1 Bits

3.5 LEDS

LED#	Color	Indication
D8	Red	Supply +12V
D6	Red	Supply +5V
D18	Yellow	Processor active
D4	Green	Sample detection

4 MAGNETIZATION SCHEME

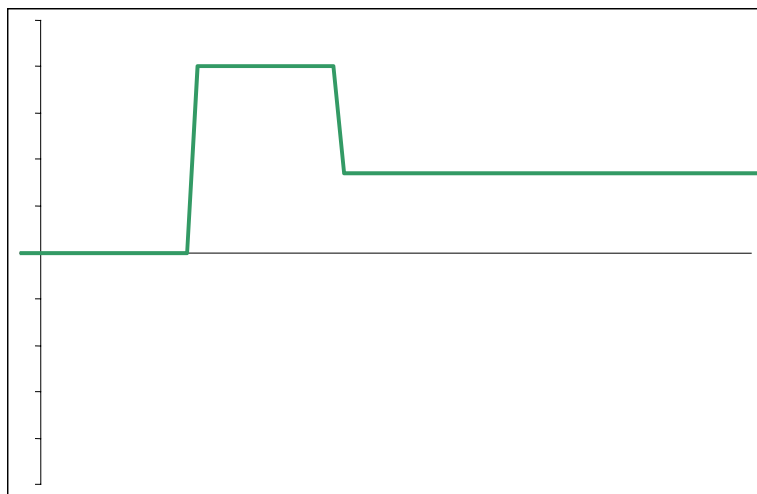
Magnetization of the electromagnet is done along a given pattern designed to enhance sample capture/ removal.

4.1 Magnetization

Activated by:

Sequence1: **/Magnet-On1**: Inactive>Active & **/Magnet-On2**: Active

Sequence2: **/Magnet-On1**: Active & **/Magnet-On2**: Inactive>Active



Magnetization profile

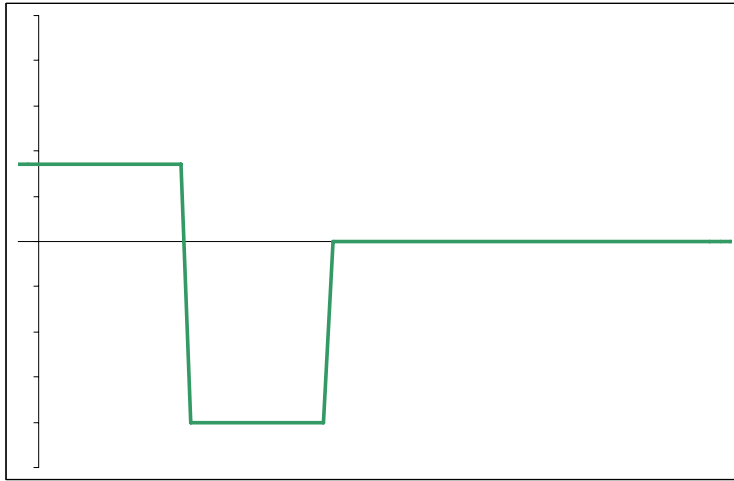
In case of magnetization, a boost supply is applied to the electromagnet with a duration of 960ms. This intends to enhance sample capture efficiency. Once this boost period over, the magnetization remains at a stationary high level.

4.2 Demagnetization

Activated by:

Sequence1: **/Magnet-On1**: Active>Inactive & **/Magnet-On2**: Active

Sequence2: **/Magnet-On1**: Active & **/Magnet-On2**: Active>Inactive



Demagnetization profile

In case of demagnetization, a boost negative supply is applied to the electromagnet with a duration of 540ms. This intends to enhance sample removal efficiency. Once this boost period over, the magnetization remains at a stationary low level.

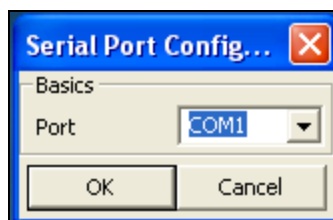
5 CONFIGURATION

Sample detection efficiency is linked to a detection threshold. This threshold is set in factory to fit the electromagnet provided with the board. In case the electromagnet is exchanged or if a decrease in detection efficiency is observed, this threshold can be easily configured.

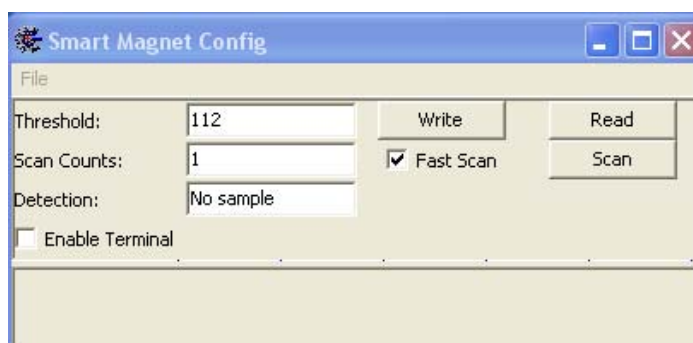
5.1 Install

Unzip the application SMGT_dist.zip. Connect the PC to Smart Magnet using a COM port.

5.2 Run SM2.exe



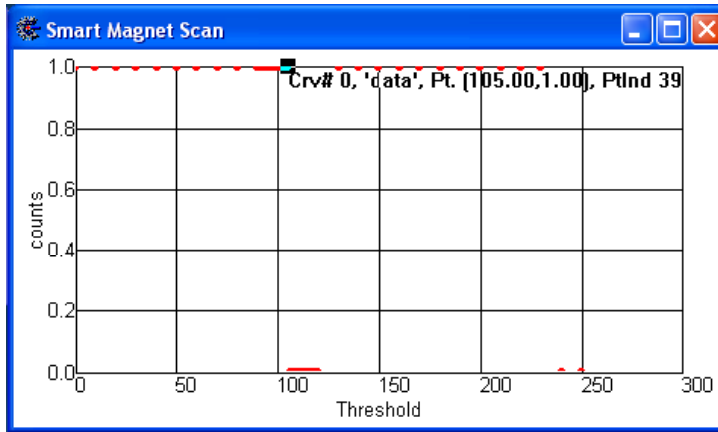
Choose the appropriate communication port.



Interface description:

- Threshold: Threshold value
- Scan counts: Scan resolution
- Detection : Sample detection indicator
- Read : read the detection threshold
- Write : write the detection threshold
- Scan : launch the automated scan.

Make sure the electromagnet is magnetized during the all procedure.



Step1: No sample on the electromagnet

Launch the scan.

The threshold at which high to low position occur should be noted. (105 in this example).

Step2: A sample on the electromagnet

Launch the scan.

The threshold at which high to low position occur should be again noted. (119 in this example).

Step3 Detection threshold definition

The detection range is defined by the difference between the 2 thresholds found ($119 - 105 = 14$ in our example). The detection threshold should be defined in the middle of this detection range. (112 in our example).

Step4 Enter the detection threshold

Enter the detection threshold value in the Detection field.

Press Write (the value is transferred to the board)

Step5 Verification

Place and remove a sample and check the detection field changes accordingly. Similarly, the D4 green LED on the board should switch.