

User Manual

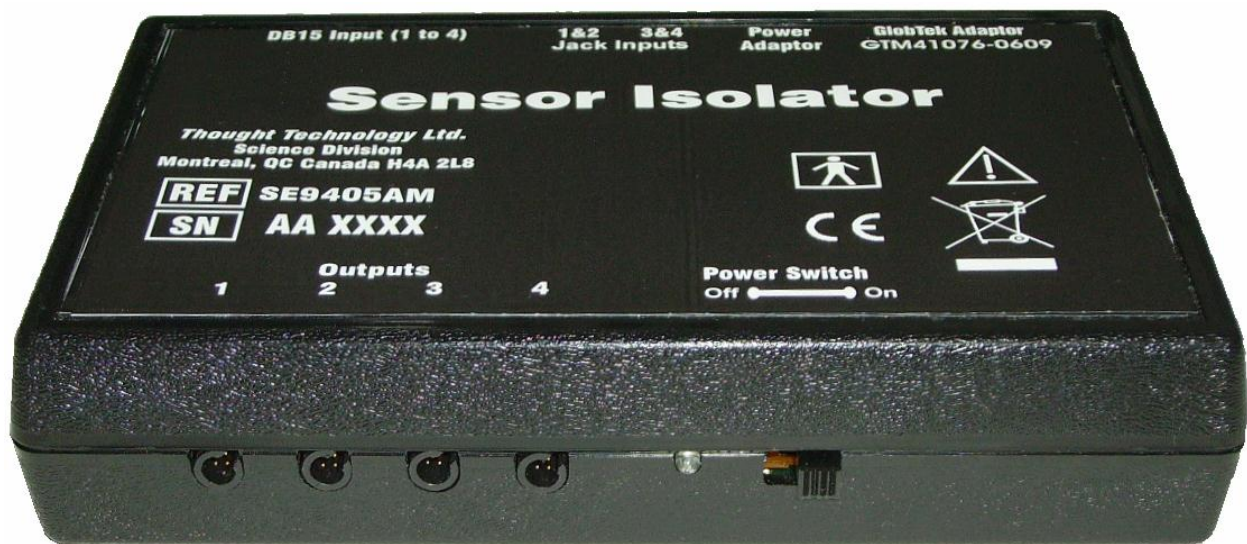
SENSOR ISOLATOR SE9405AM



Measure More
Sense Better

User Manual

Sensor Isolator SE9405AM



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IMPORTANT OPERATION INFORMATION



- Continuous operation
- Internally powered equipment



- Read Instruction Manual



- Explosion Hazard; Do not use in the presence of a flammable anesthetic mixture with air, or with Oxygen or Nitrous Oxide.
- Not to be immersed in water.
- All of the inputs are on the same circuits and the grounds are connected together. If connecting inputs to more than one signal source, ensure that no significant voltage exists between device grounds. Otherwise ground loop currents could flow through the Sensor Isolator, which could affect signal integrity or, in extreme cases, damage equipment.



- For Research Use Only. Not for use in diagnostic procedures.
- Intended to be used in basic scientific research for the purpose of knowledge generation
- To prevent voiding warranty by breaking connector pins, carefully align white guiding dot on sensor plug with slot on sensor input.
- Remove batteries when the device is not being used for an extended period of time. Please dispose of battery following local regulations.

NOTE

- No preventative inspections required; maintenance must be performed by qualified personnel.
- The supplier will make available, upon request, circuit diagrams, component parts lists and description or other information required for the repair of product by qualified personnel.
- This product conforms to standard EN-61010-1.

MAINTENANCE AND CALIBRATION

- Wipe with a clean cloth
- Factory testing and calibration ensure equipment accuracy and frequency response.

STORAGE

- Temperature -23C – +60C
- Humidity (non-condensing) 10% – 90%
- Atmospheric pressure 700 – 1060 KPa

TRANSPORTATION

- Temperature -23C – +60C
- Humidity (non-condensing) 10% – 90%
- Atmospheric pressure 700 – 1060 KPa
- Transport in original case

Table of Contents

ABOUT THE SENSOR ISOLATOR.....	1
PRODUCT OVERVIEW	ERROR! BOOKMARK NOT DEFINED.
FUNCTIONAL DESCRIPTION	2
SET-UP FOR SE9405AM SENSOR ISOLATOR	6
THOUGHT TECHNOLOGY SENSOR SPECIFICATIONS	9
PRODUCT NUMBERS	14
SE9405AM SENSOR ISOLATOR SPECIFICATIONS	15
SE9408 POWER ADAPTER SPECIFICATIONS.....	16
PLACING ORDERS.....	17
TECHNICAL SUPPORT	18
WARRANTY.....	19
RETURNING EQUIPMENT	20
REPAIR RETURN FORM	21

ABOUT THE SENSOR ISOLATOR

The Sensor Isolator is an interface device which provides electrical isolation (4.5kV, providing two means of protection). It allows Thought Technology sensors to be safely interfaced with analog inputs of line-powered systems, such as computers with DAC cards.

Visit Thought Technology Science Division website (www.thoughttechnology.com/sciencedivision/latest/index.html) for more information regarding Thought Technology's sensors (technical notes) and solutions with various third-part devices (application notes).

FUNCTIONAL DESCRIPTION

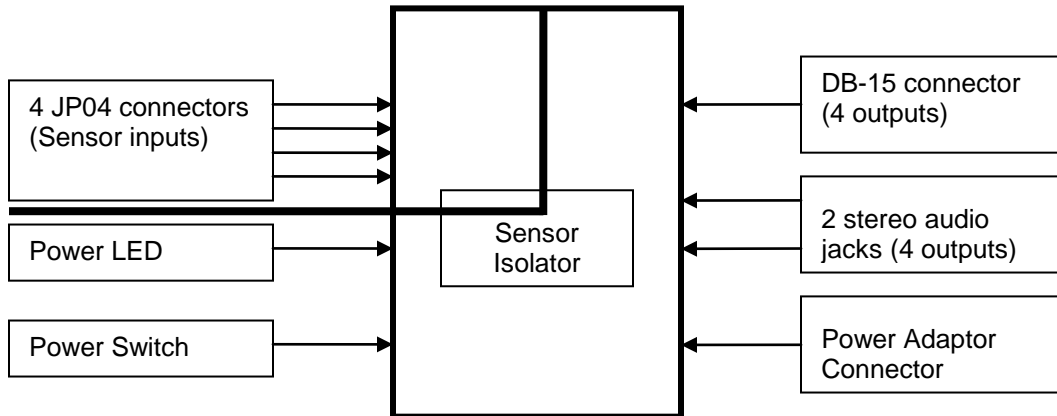
1 Overview

There are two parts of the Sensor Isolator circuit which are isolated from each other:

- the examinee-applied part
- the mains-connected part

Examinee-applied part

Mains-connected part



To operate the Sensor Isolator, each area requires a separate power source:

Client-applied area

- 9V battery (standard PP3)

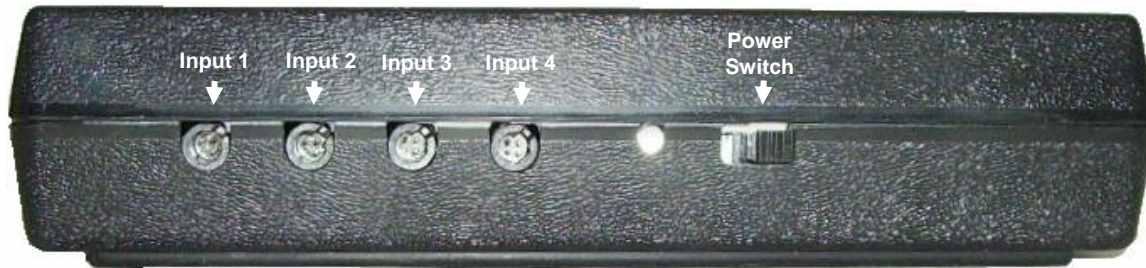
Mains-connected area (powered from either of the two inputs)

- 9VDC power adaptor
- 9VDC via DB-15 from external system

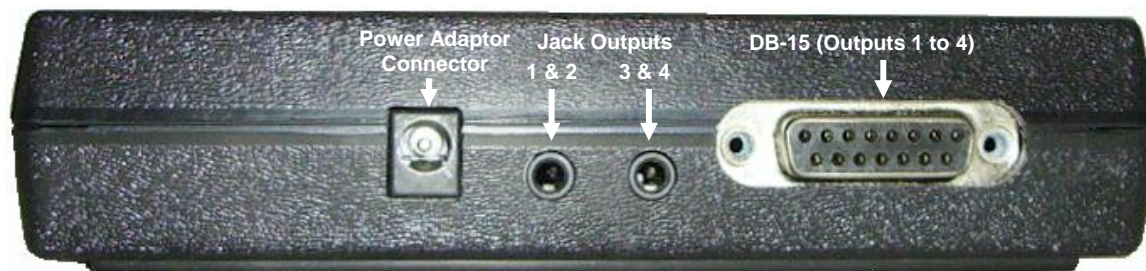


9VDC power adaptor

The Sensor Isolator has 4 inputs. These inputs can be connected to any Thought Technology sensors, such as, but not limited to, EMG, EKG or EEG sensors.



Front panel of examinee-applied area



Front panel of mains-connected area

The Sensor Isolator has 4 outputs. The output range is $2.8V \pm 1.5V$.

These outputs can be connected to a data acquisition system in two ways:

- via the two stereo jacks, or
- via the DB-15 connector (interface cable provided with the unit).

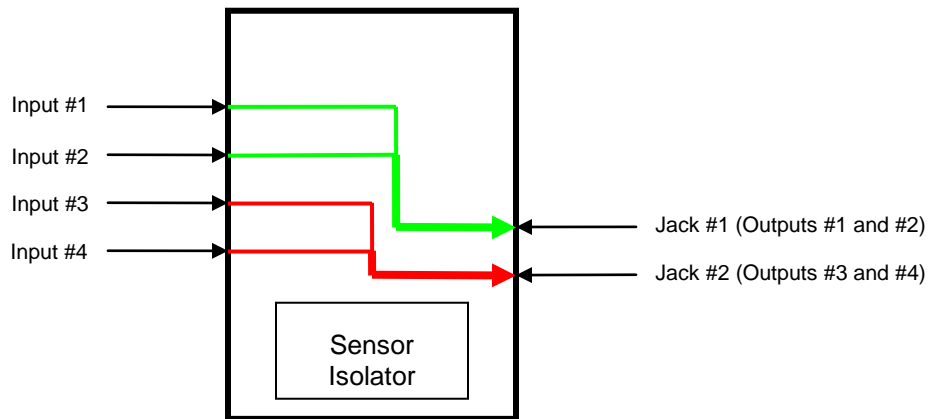
2 Outputs

All of the outputs are on the same circuits and the grounds are connected together :

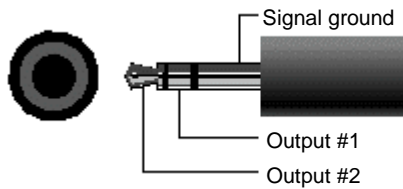
- If connecting several outputs to the same device, only one ground connection may be required.
- If connecting outputs to more than one device ensure that no significant voltage exists between device grounds. Otherwise ground loop currents could flow through the Sensor Isolator, which could affect signal integrity or, in extreme cases, damage equipment.

2.1 Jacks

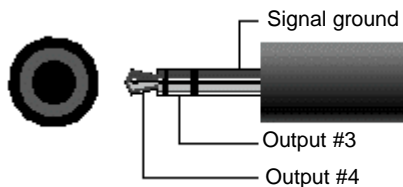
The jacks of the Sensor Isolator are 3.5mm stereo female mini-jacks.



- Jack #1 is connected to Output #1 and #2

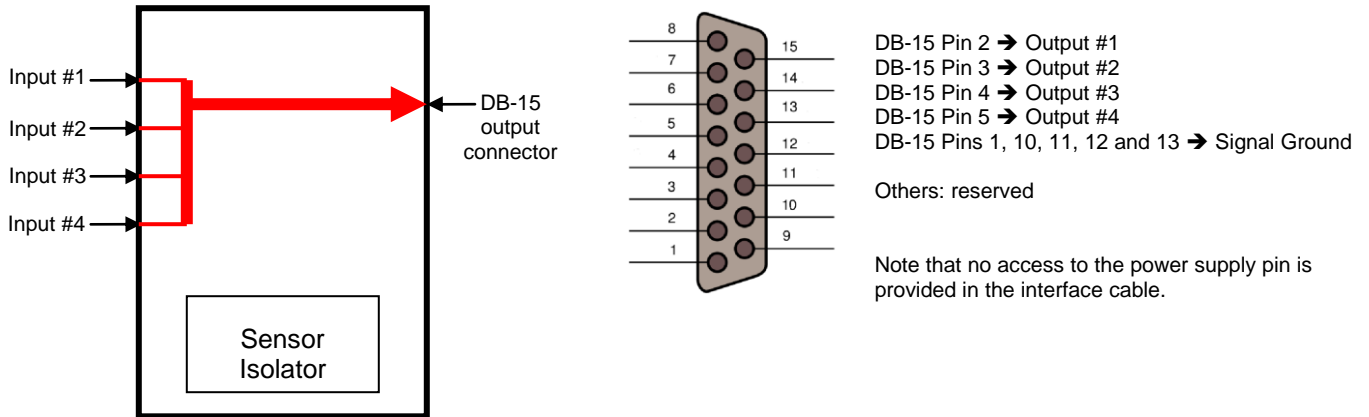


- Jack #2 is connected to Output #3 and #4



2.2 DB-15 connector

The DB-type output connector of the Sensor Isolator is a DB-15 female.



NOTE: each interfaced system will require its own cable. Therefore we provide only a cable with BNC connectors or the pigtail cable, which are the most common ones.



SA9409BNC BNC cable SA9409PGT Pigtail cable

The cable may look slightly different

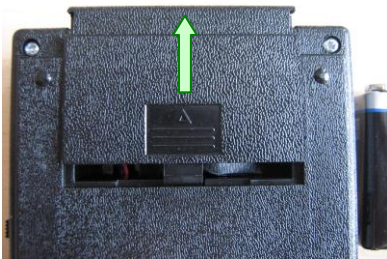
SET-UP FOR SE9405AM SENSOR ISOLATOR

1 Power

1.1 Powering the Examinee-Applied Area

The examinee-applied area is powered by a 9V battery.

Open the battery door on the back of the unit, by applying a gentle pressure and pushing it in the direction shown by the arrow:



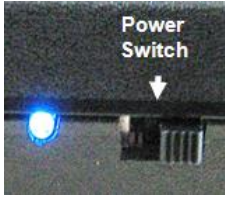
Pull the battery connector out and snap the battery onto it.



Place the battery in the battery compartment and close the battery door.



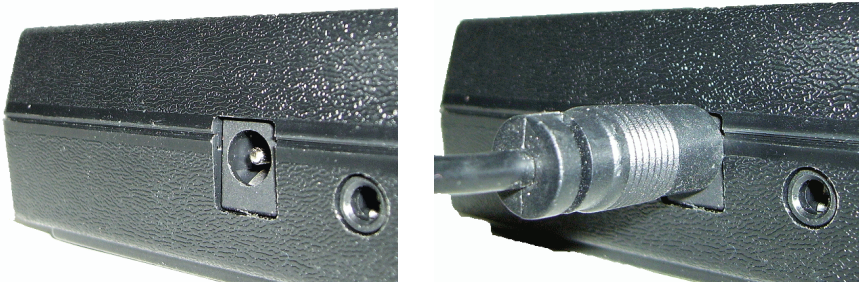
Power the examinee-applied area by sliding the power switch to the right:



1.2 Powering the Mains-Applied Area

The mains-applied area can be powered either by the provided power adaptor or by the interfaced system via the DB15 connector.

Connect the power cable to the power connector located on the mains-applied area front panel.

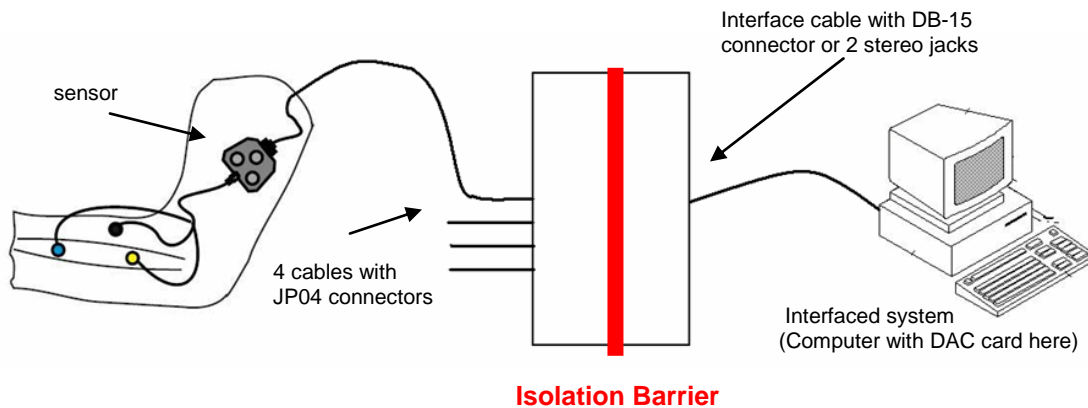


No switch needs to be turned on.

For powering via the DB15, please read the previous section regarding the DB15 connector.

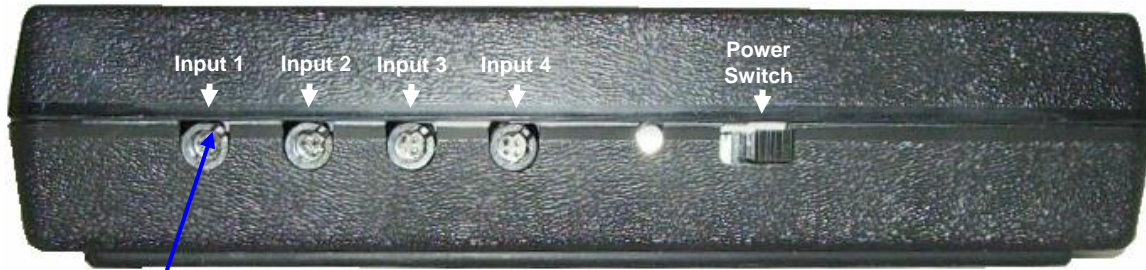
2 Cables

Here is an overview of the set-up.

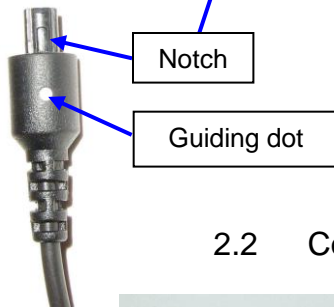


2.1 Connecting a Sensor Cable

When connecting a sensor to the Sensor Isolator, make sure to properly line up the guiding dot on the top of the plug with the notch in the device's input socket.



Front panel of examinee-applied area

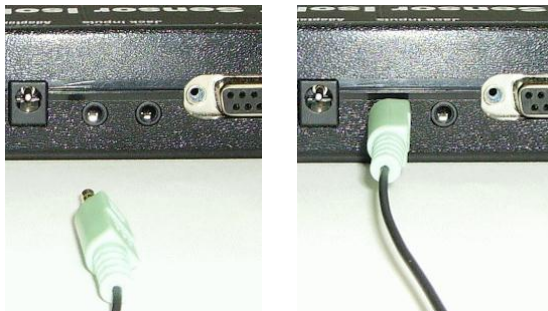


2.2 Connecting a DB-15 cable



The DB15 connector is located on the mains-applied area front panel.

2.3 Connecting an audio jack



The audio jacks are located on the mains-applied area front panel, between the power connector and the DB15 connector.

THOUGHT TECHNOLOGY SENSOR SPECIFICATIONS

EEG Sensor (T9305M)



Size (approx.)	37mm x 37mm x 12mm (1.45" x 1.45" x 0.45")
Weight (approx.)	25g (1oz)
Input impedance	10GΩ in parallel with 10pF
Signal input range	0 – 200μV
Sensitivity	<0.1μVRMS
CMRR	>130dB
Channel bandwidth	2Hz – 1kHz
Accuracy	±0.3μVRMS, ±5% of reading @10°C to 40°C

EEG-Z3 Sensor (T7680)



Input impedance	Differential: 100GΩ paralleled with 270pF Common-mode: 100GΩ paralleled with 200pF
Signal input range	0 – 200μV
Noise	< 0.5 μVRMS
CMRR	>100dB
excluding CM signal active cancellation	> 40dB @10-120Hz
CM active cancellation effect	≤ 1%, ±0.3μVRMS
Accuracy	±100mV
Electrode offset tolerance (Slow AC and DC modes)	
Bandwidth	
lower cutoff, 3dB EP/.01Hz mode	0.01 Hz
lower cutoff, 3dB, EEG mode	1.5 Hz
upper 3dB (all modes)	1600KHz

MyoScan EMG Sensor (T9503M/)



Size (approx.)	37mm x 37mm x 12mm (1.45" x 1.45" x 0.45")
Weight	15g (0.5 oz)
Input impedance	≥10GΩ in parallel with 10pF
Input range	0 – 2000μVRMS
Sensitivity	<0.1μVRMS
CMRR	>130dB
Channel bandwidth	10Hz – 1kHz
Signal output range	0 – 1.0VRMS
Input / output gain	500
Supply voltage	7.26V (± 0.02V)
Current consumption	0.7mA (± 0.25mA)
Accuracy	±0.3μVRMS ±4% of reading @25°C to 30°C

MyoScan-Pro EMG Sensor (T9401M-60 or T9401M-50)



Size (Approx.)	37mm x 37mm x 15mm (1.45" x 1.45" x 0.60")
Weight	25g (1 oz)
Input Impedance	10GΩ in parallel with 10pF
Input Range	0 – 400μVRMS, 0 – 1600μVRMS
Sensitivity	<0.1μVRMS
CMRR	>180dB (-60 and -50)
Bandwidth	>130dB over the 20-500 Hz band
Accuracy	20Hz – 500Hz ±5%, ±0.3μVRMS



EKG Sensor (T9306M/T9307M)

Length (approx.)	152cm (60")
Weight	10g (0.33oz)
Temperature range	10°C - 45°C (50°F – 115°F)
Accuracy	±1.0°C (±1.8°F) 20°C – 40°C (68°F – 104°F)



EKG Receiver for Polar (SA9330)

Dimensions	25mm x 23mm x 11mm
Weight	15g
Wireless Reception Range	80cm (2.5 feet) typical, 105cm (3.5 feet) maximum
Output Waveform	Digital pulses 15mS
Operating temperature	10°C-40°C
Current Consumption, maximum	1.5mA



HR/BVP Sensor (SA9308M)

Length (approx.)	20mm x 34mm x 10mm (0.72" x 1.33" x 0.41")
Weight	20g (0.66 oz)
Input range	Unit less quantity displayed as 0% – 100%
Accuracy	±5%



Respiration Sensor (SA9311M)

Size (approx.)	132cm (52" long)
Weight	30g (1.0 oz)
Range	30% – 65%



Skin Conductance Sensor (SA9309M)

Size without electrode leads (approx.)	3.5 cm (1.4")
Size with electrode leads (approx.)	15 cm (6.0")
Cable length (approx.)	127 cm (50")
Weight (approx.)	25 g (1 oz)
Signal input range	0 – 30.0 μS
Accuracy	±5% and ±0.2 μS



Temperature Sensor (SA9310M)

Length (approx.)	152cm (60")
Weight	10g (0.33oz)
Temperature range	10°C - 45°C (50°F - 115°F)
Accuracy	±1.0°C (±1.8°F) 20°C - 40°C (68°F - 104°F)



Goniometer Adapter (T9545)

Size (approx.)	370mm x 370mm x 100mm (1.45" x 1.45" x 0.44")
Weight (approx.)	15g (0.5 oz)
Input Impedance	>1MΩ
Signal Input Range	-180° - +180° (±5° degrees of movement)
Signal Output Range	2.200 - 3.400V
Supply Voltage	7.26VDC
Current Consumption	<4mA @ 7.26 VDC
Accuracy	±5%



Bend Sensor Adapter (T9550)

Length	~152cm (60")
Weight	~10g
Bend Sensor Type	Variable resistive
Sensor Resistive Range:	5KΩ - 400KΩ (native Infiniti modes)
Output Voltage Transfer Function:	$V_{out} = [RBs + 243K\Omega / (RBs + 992K\Omega)] * V_s$ Vs where RBs = Resistance of Bend sensor in KΩ and Vs = Sensor supply voltage
Current Consumption	< 1mA @ 7.26V nominal
Supply Voltage	7.26VDC
Resistance to Voltage Accuracy	± 1%



InclinoTrac/Dual-InclinoTrac (T7650/ T7655)

Dimensions	32mm x 18mm x 71mm
Weight	26g
Range	± 180°
Accuracy (operated in vertically-oriented plane)	≤ 1.0° (standalone mode)
	≤ 2.0° (dual mode, angle difference)
Output gain	4.44mV / degree inclination
Output voltage span	2.200 ± 0.8V
Power supply	7.26V
Current consumption, maximum	9.5 mA (standalone mode)
	19.0 mA (dual mode)
Link cable	RJ-11, 2 pairs, reversed (this is not a standard telephone cable)

Force Sensor Adapter (SA9540)



Sensor Resistive Range	1K Ω - 1.4M Ω (native Infiniti modes)
Output Voltage Transfer Function	$V_{out} = [301K\Omega / (R_{fs} + 575K\Omega)] * V_s$ where R_{fs} is the resistance of force sensor in K Ω
Supply Voltage	(V_s) = 7.26V
Current Consumption	< 1mA @ 7.26V nominal
Resistance to Voltage Accuracy	$\pm 1\%$
Length	~152cm (60")
Weight	~10g

ForceTrac (T7600)



Dimensions	93mm x 63mm x 25mm
Weight	94g
Input range (force)	0–100 lbf
Safe overload	250 lbf
Accuracy	$\pm (0.1\text{lbf} + 5\% \text{ of reading})$
Zero-level output	2.048V
Full scale output swing	1V at 100 lbs load
Power supply	7.26V

Algometer Attachment:

Dimensions	69mm x 11mm (diameter)
Weight	14g
Material	Aluminum

Flat Tester Attachment:

Dimensions	9mm x 42mm (diameter)
Weight	39g
Material	Neoprene

Curved Tester Attachment:

Dimensions	19mm x 42mm (diameter)
Weight	52g
Material	Neoprene

TT-INFRA Sensor (SA2500)



Size (approx.)	368mm x 391mm x 145mm (1.45" x 1.54" x 0.57")
Weight	12.5g (0.44oz)
Temperature range	19.80°C – 40.21°C (67.64°F – 104.38°F)
Absolute accuracy	$\pm 0.5^\circ\text{C}$ ($\pm 0.9^\circ\text{F}$)
Ambient operating temperature (for paired relative accuracy)	21°C – 25°C (69.80°F - 77°F)
Paired relative accuracy	$\pm 0.25^\circ\text{C}$ ($\pm 0.45^\circ\text{F}$)
Measurement resolution	0.02°C ($\pm 0.036^\circ\text{F}$)



Passive InfraRed (pIR) Sensor (T2600)

Length (approx.)	152cm (60")
Size (approx.)	368mm x 391mm x 145mm (1.45" x 1.54" x 0.57")
Weight	12.5g (0.44oz)
Temperature range	19.80°C – 40.21°C (67.64°F – 104.38°F)
Absolute accuracy	±0.5°C (±0.9°F)
Measurement resolution	0.02°C (±0.036°F)

PRODUCT NUMBERS

ST9405AM – Sensor Isolator, which includes the following items:



- SE9405AM – Sensor Isolator hardware



- SE9408 – Power Adaptor



SA9409BNC SA9409PGT
BNC cable Pigtail cable

The cable provided may look slightly different

- SA9409BNC or SA9409PGT

NOTE: each interfaced system will require its own cable. Therefore we provide only a cable with BNC connectors or the pigtail cable, which are the most common ones.

SE9405AM SENSOR ISOLATOR SPECIFICATIONS

Size	5.7 x 3.6 x 1.2 in (14.5 x 9 x 3 cm)
Weight	180g
Isolation Voltage	4.5kVrms
Voltage Input Range	2.8V ± 1.5V
Bandwidth	0 – 1kHz
Voltage Output Range, normal	2.8V ± 1.5V
Voltage Output Range (possible)	0 – 9V (connected device should tolerate this range)
Input impedance	1.81MΩ
Output impedance	110Ω
Accuracy	Gain: ±0.1% Offset <1mV
Noise	<100μV RMS
Temperature range (operating)	10 - 40 °C
Crosstalk	< -90dB or better
Power supply	Isolated area Examinee-applied part: 9V Alkaline battery (6LR61) Battery Life: 10 hours typical Low battery threshold: 7.25V
	Mains-connected part: 9V AC adapter

SE9408 POWER ADAPTER SPECIFICATIONS

GlobTek GTM41076-0609	6 Watts, Wall Plug-In, Switchmode Power Supply, Medical, Class II
Input Voltage:	100-240 VAC
Input Current:	< 0.5 A RMS MAX
Input Frequency:	47 - 63 Hz
Output Voltage:	9V
Output Current:	0 - 0.66A
Output Power (Rated):	0 - 6W
Safety Approvals:	UL60601-1, CUL to 22.2 No. 601.1-M90, INNOVA BAUART to EN60601-1, CE CLASS II, PSE to J60601-1, CB REPORT, CTICK to AS/NZ 60601-1, CCC
ROHS:	Complies with EU 2002/95/EC and CHINA SJ/T 11363-2006
Operating Temperature:	0°C to 40° C
Storage Temperature:	-40°C to 80° C
Humidity:	0% to 90% Relative Humidity

PLACING ORDERS

Outside USA

Tel: 1-514-489-8251

Fax: 1-514-489-8255

In USA Toll-Free

Tel: 1-800-361-3651

E-Mail: mail@thoughttechnology.com

Or contact your local authorized distributor.

TECHNICAL SUPPORT

Outside USA

Tel: 1-514-489-8251

Fax: 1-514-489-8255

In USA Toll-Free

Tel: 1-800-361-3651

E-Mail: techsupport@thoughttechnology.com

Or contact your local authorized distributor.

WARRANTY

The Sensor Isolator is guaranteed to be free from defects in material and workmanship for 1 year from the date of purchase.

In the unlikely event that repairs are necessary, contact Thought Technology Ltd. to receive a Return Authorization number. Then send the unit back by a traceable method. Thought Technology will not be responsible for items not received. We will repair or replace your unit(s) that is still under warranty free of charge.

This warranty does not apply to damage incurred through accident, alteration, or abuse.

This warranty does not cover damage to the Infiniti encoder or the Sensor Isolator caused by obvious mechanical mistreatment of the system.

RETURNING EQUIPMENT

Before returning the equipment, please contact our service department and get an authorization number (RA number).



Canada and International +1 514 489-8251



USA 1-800-361- 3651



service@thoughttechnology.com

Then fill in the return form (the form can be found at the end of the manual). You must provide a detailed description of the problem you are experiencing, and your telephone/fax number and e-mail.

The unit(s) must be sent **postage prepaid** and **insured**, with proof of purchase to one of the addresses below.

All customs and duties charges will be billed to the customer if incurred by sending the unit to the **wrong** address.

In the USA, ship insured to:

Thought Technology Ltd.
Cimetra LLC
8396 State Route 9
West Chazy, New York
12992 USA

In Canada, ship insured to:

Thought Technology Ltd.
8205 Montreal/ Toronto Blvd. Suite 223
Montreal West, Quebec
Canada H4X 1N1

For international:

- Package must be marked with "Broker: Livingston International – 133461"

- Ship insured to:

Thought Technology Ltd.
8205 Montreal/ Toronto Blvd. Suite 223
Montreal West, Quebec
Canada H4X 1N1

REPAIR RETURN FORM

Be sure to contact us for authorization before returning any equipment!

Remove this sheet and include with returned unit(s).

Include copy of original invoice and return to the address in the Returning Equipment section.

Name _____

Company _____

Address _____

Phone No. _____

Fax No. _____

Date Purchased _____

From Whom _____

Model Name _____

Serial Number _____

Problem _____
