

# Sefram 8440

**8440 SERIES : Thermal recorders with 270 mm paper width and up to 36 analogue channels.**

- Power/Energy Analysis
- Strain Gauge board



8440 : new design

- 6 to 36 analogue channels
- Universal input
- DC, AC+DC RMS voltage measurement
- Frequency, thermocouple and PT100 measurement
- Strain Gauge board (option)
- Energy / Power analysis
- 16 logical channels
- 16-bit resolution
- 1Mega sample/s sampling rate
- 100kHz bandwidth
- 270mm paper width
- 20 automatic measurements
- 12" TFT LCD screen
- 32Mword memory
- 80 Gb internal hard disk
- Go-No-Go mode
- Interfaces: USB, Ethernet, XGA
- IEC 1010 – Cat III 600V

## Highly flexible printing

The SEFRAM 8440 series built-in printer uses thermal recording paper with 270mm width. To suit your specific and various applications, you can configure and select all printing's parameters, like plotting mode (f(t) or text), paper speed (1mm/h to 200mm/s), number of traces or grid pattern.

For all channels, you can add annotations, specifying the date, the time, the paper speed, the channel names,... It makes your chart more complete and useful, and eases the analysis.

You can plot in real time and memorise simultaneously data and trigger information.

## The choice of analogue input

The 8440 series can be configured with 3 input boards :

- a universal isolated input board with 6 channels (AC and DC voltages with AC+DC RMS capability and temperature measurement)
- a 6 channels strain gauge board with 6 fully isolated channels
- a universal multiplexed board with 12 channels dedicated to temperature using thermocouples or PT100 resistor and DC voltages up to 50V.

With the new plug-in system for input boards, you can install your channel extension without factory return of the recorder.



## Covenient data stockage and off-line analysis

For long recording, the 8440 series provides direct acquisition onto the internal hard disk up to 100 kHz for 6 channels simultaneously.

Several USB ports are provided for external memory devices (USB memory,...)

The Ethernet interface will allow very fast and easy transfer of your records.

Flexpro© software (optional) offers many possibilities for off-line data analysis and report.

The SeframView software - provided with the recorder - displays graphs on your personal computer as well as export to a spreadsheet (Excel©) or word processor (Word©).

# Sefram 8440

## SPECIFICATIONS - UNIVERSAL INPUT BOARD

Channels :	6 per board
<b>VOLTAGE</b>	
Direct mode bandwidth :	100kHz
DC voltage ranges:	1mV to 1000 V
Max offset:	± 5 ranges ( except 1000V)
Accuracy:	± 0,1% ± 10 µV ± 0,2% offset
TRMS AC+DC :	200 mV to 500 V
Bandwidth (-3dB):	5Hz to 500Hz
Crest factor :	2,2

## FREQUENCY

Sensitivity	300mV rms min.
Duty cycle	10%
Frequency range	10Hz to 100kHz
Basic accuracy	0,2% of full scale
Maximum input voltage	± 500VDC or 440V AC (sine)

## TEMPERATURE

Sensor	Using environnement	Ranges
J	-20°C to 1200°C	20°C to 2000°C
K	-250°C to 1370°C	20°C to 2000°C
T	-200°C to 400°C	20°C to 500°C
S	-50°C to 1760°C	50°C to 2000°C
B	-200°C to 1820°C	50°C to 2000°C
E	-250°C to 1000°C	20°C to 1000°C
N	-250°C to 1300°C	20°C to 1000°C
W5	0 à 2320°C	50°C to 2000°C
Accuracy	Cold junction compensation : ±1,25°C	

## SAMPLING

Resolution	14 bits
Sampling rate	1M sample/sec per channel
Memory length	32M word in segments of up to 128 Blocks
Triggering	Positive edge, negative edge, on logical input, delay, Go No Go.
Pre trigger	-100% à +100%

## BANDWIDTH

Analog input bandwidth (-3dB)	range ≥ 1V: 100kHz range 50mV-1V : 50kHz range < 50mV : 20kHz min
Programmable digital filters	10Hz, 100Hz, 1kHz, 10kHz
Input impedance (DC)	>25MΩ for range <1V 1MΩ for upper ranges
Input capacitance	150pF typ.
Maximum input voltage	between one channel and the frame ground ± 500V between 2 terminals of one channel ± 500V
Isolation between frame ground and channel	>100MΩ at 500VDC

## GENERAL SPECIFICATIONS

### LOGIC INPUT

Channels	16
TTL - Max voltage	24V
Available functions	triggering acquisition on alarm triggering on logical words acquisition in memory mode 4, 8, 16 channels paper trace
Sensor supply	12 V DC
Alarms	3 (2 TTL , 1 relay)

### RECORDING AND TRACES

Paper width	270 mm
Paper speed	direct mode : 1mm/h up to 200 mm/s mixed mode: 1mm/h up to 50 mm/s memory transcription: 10mm/s max quick advance : 100 mm/s external control : 50 mm/s text mode : from 1 line/s to 1line /hour
Resolution and accuracy	Y axis: 8 dots per mm X axis: 16 dots per mm up to 50 mm/s and 8 dots for higher speed XY mode: 8 dots per mm Accuracy in relation to graticule: 0,01% 5 pre-programmed graticules
Graticule	

## STRAIN GAUGE BOARD (SEE DETAILED SPECIFICATION PAGE 10)

Channels	6 isolated channels
Strain Measurement	Full bridge, half-bridge
Voltage	1mV to 50V
Sampling rate	100ks/s
Resolution	16 bit
Filters	analogue and digital

## POWER/ENERGY ANALYSIS

See detailed specifications page 11

## SPECIFICATIONS - MULTIPLEXED BOARD

Channels :	12 per board
<b>VOLTAGE</b>	
DC voltage ranges:	1mV to 50 V
Max offset:	± 5 ranges
Accuracy:	± 0,1% ± 10µV ± 0,1% offset
TRMS AC+DC :	200mV to 50V.
Bandwidth (-3dB):	5Hz to 100Hz
Crest factor :	2,2

## TEMPERATURE

Sensor	Using environnement	Ranges
PT100 (2,3,4 Fils)	-200°C to 850°C	20°C to 1000°C
J	-20°C to 1200°C	20°C to 2000°C
K	-250°C to 1370°C	20°C to 2000°C
T	-200°C à 400°C	20°C to 500°C
S	-50°C to 1760°C	50°C to 2000°C
B	-200°C to 1820°C	50°C to 2000°C
E	-250°C to 1000°C	20°C to 1000°C
N	-250°C to 1300°C	20°C to 1000°C
W5	0 to 2320°C	50°C to 2000°C
Accuracy	Cold junction compensation: ±1,25°C	

## SAMPLING

Resolution	16 Bits
Sampling rate	200µs maxi.
Memory length	32M word in segments of up to 128 Blocks
Triggering	Positive edge, negative edge, on logical input, delay, Go No Go.
Pre trigger	-100% à +100%

## BANDWIDTH

Analog input bandwidth (-3dB)	1kHz à -3dB
Programmable digital filters	0,1Hz, 1Hz, 10Hz, 100Hz
Input impedance (DC)	2 MΩ calibres >5V 10MΩ for other ranges
Input capacitance	150pF
Maximum input voltage	between one channel and the frame ground ± 50V between 2 terminals of one channel ± 50V all input are differential, non isolated
Common mode voltage (Imax.)	± 5V for ranges < 5V ± 50V for ranges > 5V

## GENERAL SPECIFICATIONS

### DISPLAY

Display	TFT LCD coloured screen 12 inches f(t) and XY functions Zoom, cursors, dV, dT and zoom between cursors
Calculation functions :	y=ax+b , y=x/x'+b, y=avx+b+c, y=ax²+b, y=(log x)+b, y=ae <sup>(x-b)+c</sup> +, -, X, / between channels
Automatic measurements	20 automatic measurements ( F, T, Vpp, Tm...)

### STORAGE

Setup backup :	16 named in RAM, unlimited on the hard disk
Internal hard disk	80 Gb.
Interfaces	4 USB ports, VGA, Ethernet

### MISCELLANEAUS

Power supply	85VAC to 264 VAC, 47Hz to 63 Hz
Max. consumption :	60W (non plotting), 230W max.
Dimensions & weight	384 x 445 x 195 , 11 kg
Operating temperature range	0°C to 40°C
Storage temperature range :	-20°C to 60°C
Max. RH	80% (without condensation)
Warranty period	2 years
Safety	IEC1010 CAT III , 600V

## Complete software

- SEFRAM VIEW displays graphs on your computer as well as export to a spreadsheet or word processor.
- SEFRAM PILOT allows the remote setup and control of the recorder.
- FLEXPRO™ software (option) : powerfull software with more than 100 analysis functions.

# Strain Gauge board

## for DAS1400 and 8440

- 6 isolated channels
- Full bridge and half bridge
- Input : 1mV to 50V
- Sampling rate : 100ks/s
- Resolution : 16 bit
- Analogue and digital filters
- Temperature measurement



strain gauge board

### Capabilities

Channels	6 (fully isolated)
Measurements	Strain gauge, voltage, thermocouple and current with optional external shunt
Input	differential, fully isolated
Input impedance	2 MΩ for ranges < 1 Volt 1 MΩ for ranges ≥ 1 Volt
Maximum input voltage <small>(Between one input and ground, or between ground and mechanical chassis)</small>	200V DC
Input voltage	± 50V
Isolation <small>(between channels and mechanical chassis)</small>	>100 MΩ under 500V
Input connectors	Fast plug-in / plug-out, 6 contacts per channel
<i>All accuracies are given with 1Hz filter</i>	
<b>Voltage measurement</b>	
Maximum range	50 V
Lowest range	1 mV
Maximum offset	±50V limited at ± 5 ranges
Accuracy	± 0.1% of full scale ± 10µV ± 0.1% of offset
Resolution	16 bit
Offset drift	100ppm/°C ±1 µV/°C
Sampling rate	100kHz (or 10µs)
Noise	<30µV without filter
<b>Strain Gauge measurements</b>	
The unit is µSTR (micro strain) - 2000µSTR = 1 mV/V	
Bridge	Full bridge (4 and 6 wires), half bridge
Automatic balancing range	±25000 µSTR
Bridge supply voltages	2V and 5V (symetrical ±1V and ±2.5V)
Gauge rate	2 (ajustable between 1.8 and 2.2)
Maximum range	50 000 µSTR
Minimum range	1000 µSTR
Maximum offset	±50000µSTR
Accuracy	± 0.1% of full scale ± 5µSTR ± 0.1% of offset
Resolution	16 bit
Sampling rate	100kHz (or 10µs)
Offset drift	100ppm/°C ±1 µV/°C
<b>Bandwidth</b>	
3 dB bandwidth	>18 KHz
Analogue filter (low pass 60dB/decade)	1KHz, 100Hz, 10Hz
Low pass (digital)	1 Hz, 0.1 Hz, 0.01 Hz, 0.001 Hz

### Temperature measurement

Cold junction compensation for J,K,T,S,N,E,W5 thermocouples : ± 1.25 °C

Sensor	Maximum possible range	Range
COUPLE J	-210°C to 1200 °C	20 °C to 2000 °C
COUPLE K	-250°C to 1370 °C	20 °C to 2000 °C
COUPLE T	-200°C to 400 °C	20 °C to 500 °C
COUPLE S	-50°C to 1760 °C	50 °C to 2000 °C
COUPLE B	200°C to 1820 °C	50 °C to 2000 °C
COUPLE E	-250°C to 1000 °C	20 °C to 1000 °C
COUPLE N	-250°C to 1300 °C	20 °C to 1000 °C
COUPLE W5	0°C to 2320 °C	50 °C to 2000 °C

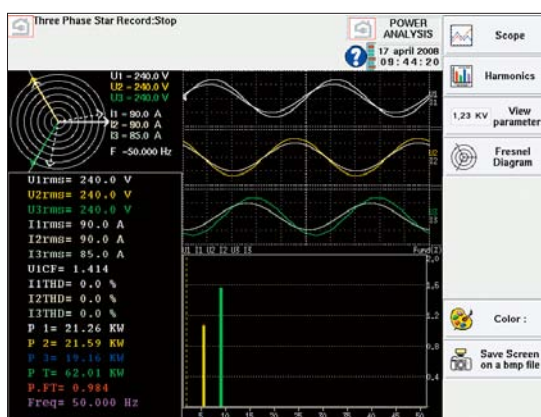
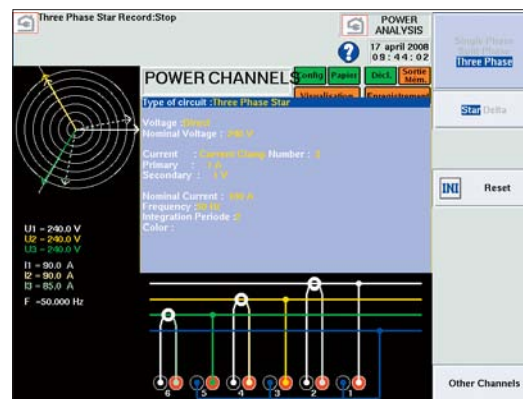
To order  
984402500

*This optional board can be added to your DAS1400 or 8440 without factory return. Your recorder must have an updated firmware. The firmware update is free of charge from our website. If assistance is needed, please contact our technical support.*

# Energy / Power Analysis

## for DAS600 / DAS1400 and 8440

- Single phase, dual phases, three phases networks
- Fresnel Diagram
- Oscilloscope mode
- Harmonics up to rank 50
- Memorization of harmonics
- Calculated values : mean value, RMS value, peak value, crest factor, THD, DF, active power, apparent power, reactive power, power factor ( $\cos \Phi$ ).



## New applications for your recorder

The new Power /Energy analysis function allows new applications for your SEFRAM recorder. Graphical display will ease the diagnostic and trouble shooting of your electrical networks: you will save time and energy !

This feature can be added by upgrading the embedded software. The new software release is free of charge and can be downloaded from our website. Please contact our technical support if assistance is needed.

## Performance and simplicity to suit numerous applications.

These graphical recorders are simple to configure and easy to use. The 8210 & 8211 two channel models feature single function per key, rapid acquisition and display on the graphic screen (8211), recall of the zero position,... For portable applications, either model can be supplied with a carrying case and protective cover. Also available as rack



- 2 synchronised universal input channels
- Colour pen plotting
- Selectable paper speed or external clock control
- Adjustable trace offset
- Selectable noise filters
- RS 232 Interface
- Portable or rack mounting

### SEFRAM 8211 features :

- Portable or rack mounting
- XY Mode
- Transient Signal capture
- Parameter printout
- Alarms (2 relays)
- Back lit display

SEFRAM	8210	8211
Channels	2 synchronised	
Voltage Inputs	1 mV to 100 V (0.25% FS $\pm 10 \mu V$ )	
Current Inputs	with shunts*	
Temperature	thermocouples (J, K, T, S, B, E, N, W5) and Pt 100 sensors	
Resolution	12 bits	
Resolution	-	2 x 7 keywords
Bandwidth	5 Hz	
Input Impedance	> 25 M $\Omega$ (range $\leq 2V$ ) / 2 $\Omega$ (range > 2V)	
Transient Sampling Period	-	50 $\mu s$ $\Delta$ 1s
Filters	0,02/ 0,07/ 0,25 /0,5 /1Hz	
Paper width	250 mm	
Paper Speed	1cm/h à 5cm/s + horloge externe	
Pen Speed	1,5 m/s maxi	
f(t) and XY Modes	-	yes
Digital plotting	-	yes
Interface	RS 232	
Power supply	85 à 264 VAC	
Dimensions & weight	450 (L) X 220 (P) X 150 (H) mm ; 5 kg	
Warranty	1 year	

Supplied with a paper roll, two pens, a power cord and a user's manual  
Add value to your recorder by using our accessories.

\* optional

For protection during transportation or storage, we recommend the use of the rigid shock-resistant transport case.



Design and manufacturing center in Saint-Etienne / France

## Technical support

Our technical support team will provide all necessary information for getting the best performance from our products.

**Please contact us : +33 4 77 59 36 97**

**E-mail : support@sefram.fr**

## Product updates

Software revisions can be downloaded free from our website. Do not hesitate to visit it frequently to check for available updates. **www.sefram.fr**

## Product service

Our service department can provide the best support for your products: periodic maintenance, product upgrades and repair.

**Please do not hesitate to contact us for :**

- periodic maintenance
- warranty extension
- traceable calibration reports
- spare parts
- repair

## ACCESSORIES FOR RECORDER

### DIFFERENTIAL PROBES KITS

**ELD.1052** 700 V Kit, 3 phases

*Contains : 3 probes (GE.8100); 3 BNC/Ban. adapters; 3 test leads ; 3 power supplies and a carrying pouch*

**ELD.1053** 1500 V Kit, 3 phases

*Contains : 3 probes (GE.8115); 3 adapters BNC/Ban.; 3 test leads; 3 power supplies and a carrying pouch*

**ELD.1054** 700 V Kit, 1 phase

*Contains : 1 probe (GE.8100); 1 adapter BNC/Ban.; 1 test lead; 1 power supply and a carrying pouch*

**ELD.1055** 1500 V Kit, 1 phase

*Contains : 1 probe (GE.8115); 1 adapter BNC/Ban.; 1 test lead; 1 power supply and a carrying pouch*

### CURRENT CLAMPS

**SP 201** Current clamp (200 AAC, 10 mV/1A,  $\varnothing$  15 mm)

**SP 221** Current clamp (100 AAC, 100 mV/1A,  $\varnothing$  15 mm)

**SP 230** Current clamp (1200 AAC, 10 mV/1A,  $\varnothing$  50 mm)

**SP 261** Current clamp (1200 AAC+DC, 1 mV/1A,  $\varnothing$  50 mm)

**SP 270** Current clamp (2000 AAC, 1 mV/1A,  $\varnothing$  70 mm)

### CONNECTION KITS

**ELD.1060** 6 channels connection Kit

*Contains : 12 Test leads/stack. ban. plugs with retractable sleeve (2 m), 12 mini-clip leads and a carrying pouch*

**ELD.1061** Universal 6 channels connection Kit

*Contains: 12 Test leads/ Ban./Ban. (2 m), 12 mini-clip leads, 12 flexible Grabbers, 12 Alligator clips and a carrying pouch*

**ELD.1062** 12 channels low voltage connection Kit

*Contains : 12 mini-clip leads (one end open) and a carrying pouch*

**ELD.1063** Coaxial Kit

*Contains : 6 cables BNC/ 2 x ban.-(50  $\Omega$ -2 m) and a carrying pouch*

**ELD.1057** Connection Kit for Power and Energy Analysis

*Contains : 10 test leads/ stack. ban. plugs (3 m); 1 test lead/ stack. ban. plugs. (25 cm); 5 Alligator clips.; 4 Maxigrabbers; 2 Test tips and a carrying pouch*

### SHUNTS

**910007100** 0,01 $\Omega$ , 1%, 10 Amax., safety banana plugs

**910007200** 0,01 $\Omega$ , 1%, 3 Amax., safety banana plugs

**989007000** 50 $\Omega$ , 0,5% 50 Amax., safety banana plugs

**207030301** 0,01 $\Omega$ , 0,5%, 30 Amax., screw terminals

**207030500** 0,01 $\Omega$ , 0,5%, 50 Amax., screw terminals

**989006000** 1 $\Omega$ , 0,5%, 0,5 Amax., safety banana plugs



### For assistance and ordering



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