

# graphic stand alone, self powered datalogger SA 32



The SA32 is intended to measure, handle, monitor and log record analogue signals. Designed with both flexibility and precision in mind, this system can be used in numerous applications such as:

- data collection in the field
- research or quality laboratories
- acquisition interface for calculator or computer
- process monitoring.

Different versions of the SA32 are available:

- With keypad and display
- With keypad, display and PCMCIA interface,
- Without keypad, display neither PCMCIA interface.

- Universal programmable inputs
- 600,000 counts display accuracy
- 1 $\mu$ V resolution
- Enhanced calculation & statistics functions
- Bulk storage memory
- PC software included

## functions

SA32 allows programming of 100 addresses, which can be defined to measure real channels (up to the system limit of 32 channels max) or virtual channels used to perform calculations/maths functions.

Each channel can be assigned a 4 character engineering units label, an 8 character mnemonic and the following functions:

- Monitoring  
4 alarm limits per channel, different for each channel. SA 32 is equipped with 2 output relays addressable to any limit.
- Maths functions  
Available as standard are the operators +, -, /, x, elevation to multiple powers, timer function(s), logic operators, square root, log decimal, absolute value and statistical functions min, max, average, standard deviation.
- Conditional functions  
Such as IF, THEN, DO allowing conditional modification of parameters and change

of scanning speed or of criteria for storage in memory.

**Scanning** .....  
Input channels are scanned by a CMOS logic circuit.

Scanning is organised in «tasks» or scanning procedures, defining what to scan (channels), how to scan (scanning start and stop, scanning rate), and how to process the results (mass storage, RS232 output). The user has access to 16 tasks, therefore 16 different scanning sub-groups.

**Programming** .....



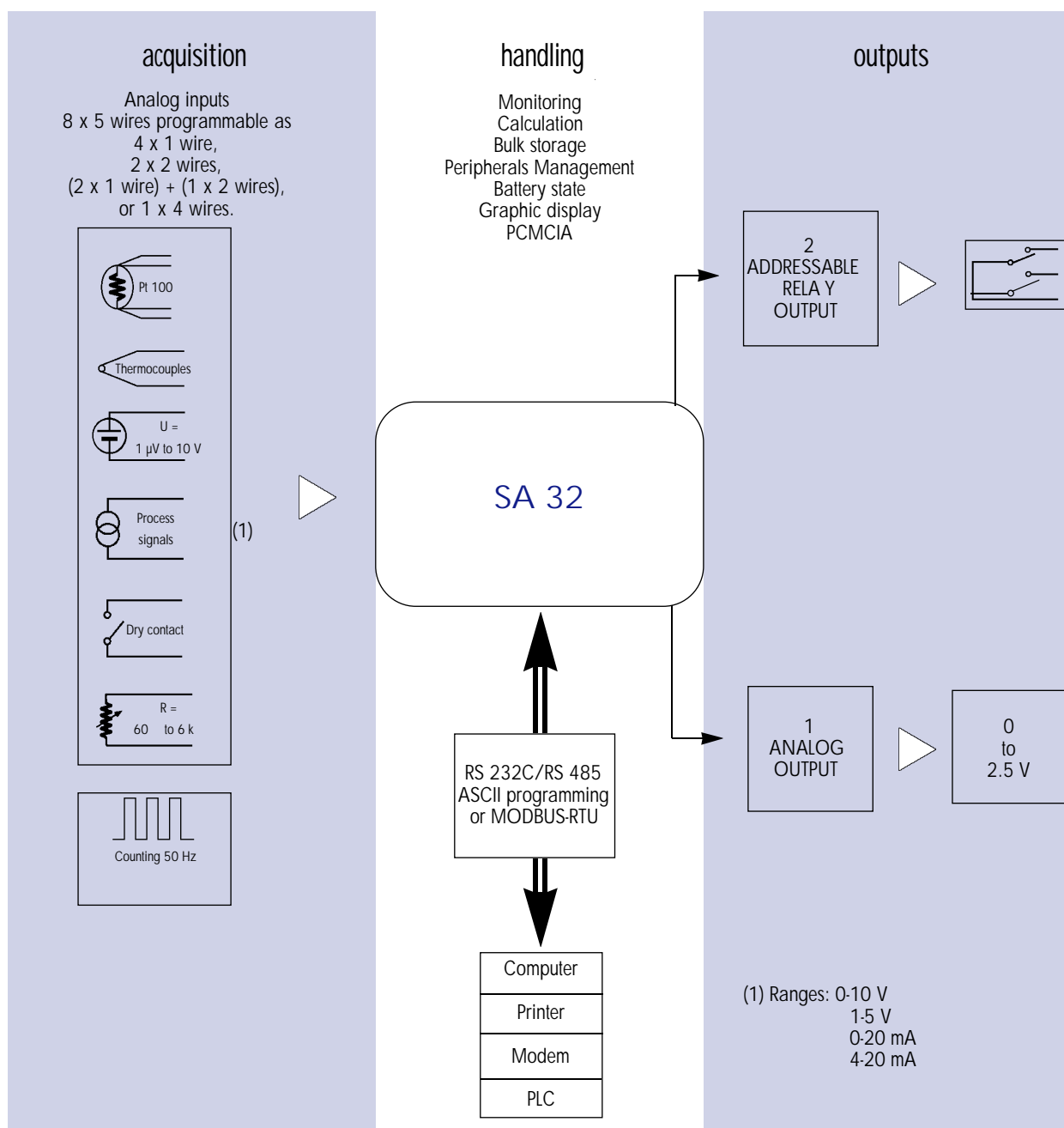
The logger is programmable entirely via the keyboard and help menu on screen,

or via RS232 interface with the assistance of LS32 DOS software supplied with the unit.

**Display** .....  
Backlit LCD give simultaneous display of 2 channels in either digital or graphical format (150 points definition) on a time base adjustable between 1 sec. to 1 min. It also permits recall of the storage memory in order to display recorded data in digital or graphic form.



## configuration •



## inputs •

### Input number

From 8 to 32 inputs are possible, depending on the type of connection (1, 2, 3 or 4 wires). A supplementary 4 wire input is available on the front panel.

These inputs are subdivided in 8 sub-groups of 5 wire. Each of the sub-groups has a common (isolated from the other sub-groups) and can be programmed

independently to perform different types of measurements:

- 4 x 1 wire (single wire)
- 2 x 2 wires (differential)
- 2 x 1 wire and 1 x 2 wire (2 single wire + 1 differential)
- 1 x 4 wires (4 wire measurement).

Note: for 3 wire measurement, it is necessary to make a strap on the connector.

Max admissible voltage between 2 channels is 50 V.

One pulse counting input is available, allowing to summarise pulses delivered by a dry contact.

Max. frequency: 50 Hz.

Minimum closing and opening duration: 10 msec.

## Sampling rates

Three sampling rates are programmable channel by channel. Sampling rate affects settling time and conversion rate, as the highest rate gives the least resolution and precision (multi-ramp converter).

Sampling rate	Integration time	Display capacity	Number of counts	UR (1)
7 m/s (2)	100 ms	± 780 000 p	390 000	2
20 m/s	20 ms	± 78 000 p	78 000	1
50 m/s	1 ms	± 7 800 p	7 800	1

(1) UR = units of representation (as per IEC 485: minimum gap between 2 successive values)

(2) At 7 meas/sec, 60 mV and 60 ranges are measured at 78 000 counts and 1 UR. Resistance and Pt 100 ranges in 3 wires are measured in 2 times. Sampling rates are half of those indicated above.

## Types of measurement

### DC voltage .....

Range (1)	Resolution			Accuracy at 7 m/s (2)		Accuracy at 20 m/s	
	7 m/s	20 m/s	50 m/s	90 days	1 year	90 days	1 year
60 mV	1 µV	1 µV	20 µV	0.01% + 4 µV	0.02% + 6 µV	0.01% + 4 µV	0.02% + 6 µV
600 mV	2 µV	10 µV	100 µV	0.01% + 8 µV	0.02% + 10 µV	0.01% + 20 µV	0.02% + 30 µV
6 V	20 µV	100 µV	1 mV	0.01% + 80 µV	0.02% + 0.1 mV	0.01% + 0.2 mV	0.02% + 0.3 mV
0 - 10 V	20 µV	100 µV	1 mV	0.01% + 80 µV	0.02% + 0.1 mV	0.01% + 0.2 mV	0.02% + 0.3 mV

(1) 30% of scale over-range permissible.

(2) Accuracy is given as ± (% of reading + n units) at 23 ± 1°C.

Reproducibility between 2 different channels is < 2 C (C being the accuracy expression constant on 90 days). For example for 60 mV range at 7 meas/sec, C = 4 µV.

Input impedance > 1000 M

Input current < 5 nA (typical: 300 pA)

Serial mode rejection rate (60 mV range)

> 70 dB at 50 and 60 Hz at 7 meas/sec

> 70 dB at 50 Hz at 20 meas/sec.

Maximum common mode admissible voltage: 50 VDC or 50 VAC peak.

Common mode rejection rate (60 mV range)

> 120 dB DC and AC at 50 and 60 Hz at 7 meas/sec

> 120 dB DC and AC at 50 Hz and at 20 meas/sec.

Maximum admissible voltage between different channels: 50V DC or 50 V AC peak.

Temperature coefficient < 10% of accuracy/°C.

### Resistance.....

Range (1)	Resolution			Accuracy at 7 m/s (2)		Accuracy at 20 m/s (2)	
	7 m/s	20 m/s	50 m/s	90 days	1 year	90 days	1 year
60	1 m	1 m	10 m	0.02% + 4 m	0.025% + 6 m	0.02% + 4 m	0.025% + 6 m
600	2 m	10 m	100 m	0.02% + 8 m	0.025% + 10 m	0.03% + 20 m	0.025% + 30 m
3 000	20 m	100 m	1	0.02% + 80 m	0.025% + 0,1	0.03% + 0,2	0.025% + 0,3

(1) 30% of scale over-range permissible.

(2) Accuracy is given as ± (% of reading + n units) at 23 ± 1°C in 4-wire mode.

Accuracy is given in 3 wires/balanced configuration.  
In case of wire unbalance, accuracies

must be increased by the accuracy expression constant on 90 days plus line unbalance value.

Measuring current: 1mA  
Allowable line resistance 100 per wire.

### Temperature by Pt 100 .....

Scale	Resolution			Accuracy at 7 m/s (1)		Accuracy at 20 m/s (1)		Accuracy at 50 m/s (1)	
	7 m/s	20 m/s	50 m/s	90 days	1 year	90 days	1 year	90 days	1 year
- 220 to 850°C	0.01°C	0.1°C	1°C	0.02% + 0.1	0.025% + 0.1	0.02% + 0.12	0.025% + 0.15	0.03% + 0.6	0.04% + 0.6

(1) Accuracy is given as ±(% of reading + n °C) at 23°C ± 1°C in 4 wire mode.

Accuracy is given for 3 wires/balanced configuration. Accuracies must be increased by accuracy expression constant on 90 days.  
The sensor uncertainty must be taken into

account.  
Thermometric resistance 100 at 0°C as per IEC 761 (DIN 43760).  
Measuring current: 1mA.  
Allowable line resistance 100 per wire.

Reproducibility between 2 different channels < 2 C.  
Temperature coefficient < 0.003%/°C.

## Temperature with thermocouple

Cold junction compensation is performed by a platinum probe. When used with an internal reference junction, the errors should be increased by 0.5°C. With an external reference junction the errors should be increased by 0.1°C and by the error of the probe used.

Reproducibility between 2 different channels: < 2 °C (C being the accuracy expression constant over 90 days. For example, for type K thermocouple at 7 meas/sec, temperature below 100°C, C = 0.2°C).  
Input impedance: > 1000 M  
Input current: < 5 nA (typical 300 pA).  
Maximum admissible line resistance: 100 per wire.  
Temperature coefficient < 10% of accuracy/°C.

Type	Resolution			Range	Accuracy at 7 and 20 m/s (1)	
	7 m/s	20 m/s	50 m/s		90 days	1 year
K	0.5°C	0.5°C	1°C	- 250°C to - 200 °C	0.01% + 1 °C	0.02% + 1.4°C
	0.2°C	0.2°C	1°C	- 200°C to - 100 °C	0.01% + 0.4 °C	0.02% + 0.5°C
	0.1°C	0.1°C	1°C	- 100°C to +1370°C	0.01% + 0.2 °C	0.02% + 0.3°C
T	0.5°C	0.5°C	1°C	- 250°C to - 200 °C	0.01% + 0.8 °C	0.02% + 1 °C
	0.2°C	0.2°C	1°C	- 200°C to - 100 °C	0.01% + 0.4 °C	0.02% + 0.5°C
	0.1°C	0.1°C	1°C	- 100°C to + 400 °C	0.01% + 0.2 °C	0.02% + 0.3°C
J	0.2°C	0.2°C	1°C	- 210°C to - 120 °C	0.01% + 0.3 °C	0.02% + 0.4°C
	0.1°C	0.1°C	1°C	- 120°C to +1100°C	0.01% + 0.2 °C	0.02% + 0.3°C
S	1 °C	1 °C	1°C	- 50°C to + 120°C	0.01% + 1.2 °C	0.02% + 1.7°C
	1 °C	1 °C	1°C	+ 120°C to +1768°C	0.01% + 0.7 °C	0.02% + 1 °C
B	1 °C	1 °C	1°C	+ 400°C to + 900 °C	0.01% + 1.5 °C	0.02% + 2 °C
	1 °C	1 °C	1°C	+ 900°C to +1820°C	0.01% + 0.8 °C	0.02% + 1 °C
N	1 °C	1 °C	1°C	- 250°C to - 200°C	0.01% + 1.5 °C	0.02% + 2 °C
	0.2°C	0.2°C	1°C	- 200°C to - 120°C	0.01% + 0.6 °C	0.02% + 0.9°C
	0.1°C	0.1°C	1°C	- 120°C to +1300°C	0.01% + 0.3 °C	0.02% + 0.4°C

(1) Accuracy is given as ± (% of reading + n°C) at 23 ±1°C when using a reference junction at 0°C.

## Contact

Dry contact (potential free).

Measuring current 1mA.

Level 0: line resistance Ro > 100 k

Level 1: line resistance R1 < 1 k

Process current ranges 0-20 mA and 4-20 mA

These measurements are performed using external 50 shunts.

## outputs

### Dry relay outputs

SA32 is equipped with 2 output relays each of which has a common and one working contact on the rear terminal block.

Interrupt capability with resistive load: 48 V or 1A or 30 W.

Life expectancy 5 x 10<sup>5</sup> operations.

These relays are operated from various stimuli, such as:

- specific alarm threshold,
- conditional processing,
- or via RS232 interface.

### Analogue output

SA32 has an analogue output 0 to 2.55 V, galvanically isolated from the inputs.

Analogue output resolution is 256 counts. Accuracy is ± 10 mV for a resolution of 10 mV.

Minimum admissible load resistance 2.5 k

This analogue output allows retransmission of any of the 100 addressable channels.

## communications interface

The communication interface is programmable either standard RS 232C or with MODBUS RTU protocol.

It is accessed on a 9-pin female SUB D connector.

The logger can handle directly one printer, one VT100 compatible VDU, one cal-

culator programmed in MODBUS RTU protocol, it can also communicate directly with a PLC or supervisory PC.

All programming instructions can be sent to the logger via the interface.

Speed: 9600 bauds in standard RS 232C or protocol MODBUS RTU.

Character format: 8 bit, no parity, 1 stop bit.

MODBUS RTU is a registered trademark of AEG Modicon Inc

## general specification

**Display** .....  
Retro-lit graphic screen (240 x 64 pixels),  
display of 2 channels simultaneously in  
numeric or graphic form.

**Operating Conditions** .....  
Reference temperature:  $23 \pm 1^\circ\text{C}$ .  
Relative humidity (RH): 45 - 75%.

Nominal ambient range: 0 -  $50^\circ\text{C}$ , 20 -  
75% RH.

**Supply** .....  
Mains 110 to 240 V  $\pm 10\%$ , 50 to  
400 Hz.  
Rechargeable battery incorporated.

**Presentation** .....  
Dimensions: 225 x 88 x 310mm; weight  
3 kg.  
ABS case for bench use.  
Rack mounting option.

## software

An utilities library for PC compatible com-  
puters is available under Windows® 3.11  
to NT in English and French. These utilities  
simplify the use of the equipment as well  
as widening its scope.

### Operation and storage program LS32W

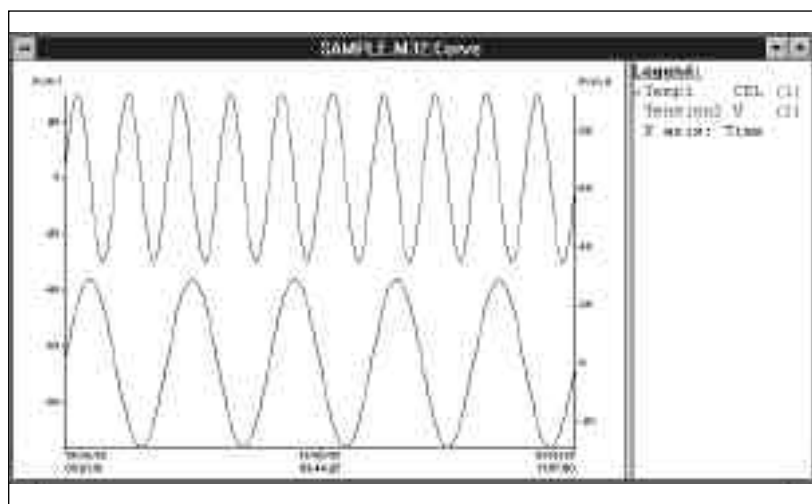
This routine enables the logger to be pro-  
grammed from a computer; it is presented  
in the form of a scrolling menu with win-  
dows with the operator being guided  
through the options by a question and  
answer system.

LS32W also authorises the transfer of in-  
formation stored in the logger to a PC.  
The file created can then be converted  
with the utilities to a format compatible  
with spreadsheets (e.g. Lotus, Excel ...) or  
to a graphical representation of trends.  
Communication between logger and PC  
can be performed by modem.

### LS 32W programming screen

The Menu guides the operator right through the defining  
options e.g.

- sensor type
- conversion formulae
- alarm limits.



### Graphics screen

LS 32W allows transfer of information stored in the memory  
of the logger into the computer; a back-up file is created and  
can be recalled for later work.

In the standard version, the user has access to graphic repre-  
sentation in the form of a curve vs time or as correlation  
between channels.

It is possible to define up to 30 simultaneous channels (these  
are distinguished by different colours with associated  
mnemonics) and 2 separate scales.

Results produced can be printed on compatible printers (Epson  
or IBM, HP Deskjet 500, 560C).

**Real time display and telemonitoring** ....  
Many Dos and Windows® software allow  
real time data display as graphs, bar-  
graphs and numeric tables. It is also possi-  
ble to create datafiles and to use them for  
later processing.

**File structure** .....  
Files created by LS32W software are of  
binary type - various sort options are  
offered (sub-files extracting certain chan-  
nels, by marker position, by choosing  
channels in alarm state etc...) The sub file(s) can be directly converted

before being imported into the usual  
spreadsheets Lotus, Excel, D-Base, Sym-  
phony etc.)

## version

PC memory card version .....  
This version allows data storage as well as configuration saving and loading.

SA32 data loggers with keypad and display can be equipped with a PCMCIA interface allowing data storage on static RAM or ATA memory cards (PCMCIA type 2).

These cards allow the configuration and result files to be loaded or saved.

Being PC compatible these files can be processed on every computer equipped with a PCMCIA interface and LS32 or LTC32W software. In the same way, every configuration files created on a computer can be saved on the card and downloaded in the logger.

The number of files created by the user is not limited, but the data logger can only handle 16 result files simultaneously.

Note: if the PC has not got a PCMCIA interface, the card can be read either via SA32 or via an external PCMCIA drive connected to the parallel interface.

One measurement takes 6 bytes.  
A 10 Mbytes card can store 1 650 000 measurements.

## ordering instructions

Datalogger with keypad, display and with 14 000 data memory	SA 32 C09
Datalogger with keypad, display and 64 000 data memory	SA 32 C58
Datalogger without keypad and display and with 14 000 data memory	SA 32 A09
Datalogger without keypad and display and with 64 000 data memory	SA 32 A58
Datalogger with PCMCIA interface	SA32XXXP

Accessories .....	
PC RS485 board	AN5891
PC RS232/RS485 interface	ATC022
Transport case	AN 6901
Clipsable connector	ER 48358-000
Connector 4 pins	ER 48345-004
Shunt	ER 44007-024
Panel mounting kit	AN 5883
Rack mounting kit	AN 5884
RS232 (9-25 pins) for printer	AN 5876
Serial printer (40 columns)	ATC 001
Set of ten paper rolls for ATC001	ATC 002
Attenuator	ATC 005
PCMCIA drive	ATC012
ATA PCMCIA card 2 Mb	ATC013
ATA PCMCIA card 7 Mb	ATC014
ATA PCMCIA card 15 Mb	ATC015
Static RAM PCMCIA card 1 Mb	ATC016
Windows programming software	LS32W
Windows software	LW1
DLL library	LTC001
Labview driver	LTC003
Other software	On request
Calibration certificate or other documentation	On request



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