CHAUVIN ARNOUX

C.A 1725
C.A 1727

Tachometers

Measure up

Thank you for purchasing a **C.A 1725** or **C.A 1727 Tachomater**.
To obtain the best service from your unit:
- **read** these operating instructions carefully,
- **comply** with the precautions for use.

⚠ WARNING, risk of DANGER! The operator must refer to these instructions whenever this danger symbol appears.

CE The CE marking certifies the product's compliance with the European Low Voltage Directive (2014/35/EU), Electromagnetic Compatibility Directive (2014/30/EU), and Restriction of Hazardous Substances Directive (RoHS, 2011/65/EU and 2015/863/EU).

The rubbish bin with a line through it indicates that, in the European Union, the product must undergo selective disposal in compliance with Directive WEEE 2012/19/EU. This equipment must not be treated as household waste.

PRECAUTIONS FOR USE

For measurements without mechanical contact
Before using the tachometer, check that the front sighting window is perfectly clean.
The minimum detection distance is 1cm; but take care to avoid the immediate vicinity of any moving part, which might be dangerous for the operator and for the device.

For measurements with mechanical contact:
Keep your hands as far as possible from the moving part.
Do not press too hard, since this might brake the moving part and result in an erroneous measurement.
For measurements on shaft ends, position the device as close as possible to the axis of the shaft.

For measurements using an external input:
The use of the external connector requires observance of the rules concerning the interconnection of counting devices and industrial interference.
Use shielded wires connected to an earth that is not exposed to the switching transients of power systems.

The received interference must not exceed the amplitude of the hysteresis fixed in the device (250mV).
The external input is limited to a common mode of not more than 50 V.

Attention:
The external sensor connector uses the same earth as the USB digital output

CONTENTS

1. START-UP

1.1. STATE AT DELIVERY

Tachometer C.A 1725
Delivered in its carrying case with:
- 1 FRB F connector,
- 1 9V battery,
- 1 set of 15 strips of retroreflecting film (length 0.1 m),
- 1 multilingual quick start guide.

Tachometer C.A 1727
Delivered in its carrying case with:
- 1 FRB F connector,
- 1 9V battery,
- 1 set of 15 strips of retroreflecting film (length 0.1 m),
- 1 USB A / USB B cord,
- 1 multilingual quick start guide.

1.2. ACCESSORIES

Mechanical accessories kit comprising:
- 1 mechanical adapter,
- 1 calibrated wheel,
- 1 conical end fitting,
- 1 cylindrical end fitting.

1 USB A / USB B cord (C.A 1727)

1.3. SPARES

End fittings (set of 3) comprising:
- calibrated wheel,
- 1 conical end fitting,
- 1 cylindrical end fitting.

9V battery

Retroreflecting film (15 0.1ms strips)

FRB F connector

For accessories and spare parts, visit our website:
www.chauvin-arnoux.com

1.4. INSERTING THE BATTERY

- Open the battery compartment, located on the back of the device.
- Unscrew the screw using a tool.
- Insert the battery in its place, taking care with the polarity.
- Put the battery compartment cover back in place; make sure that it is completely and correctly closed.
- Screw the screw back in.

2. PRESENTATION OF THE DEVICES

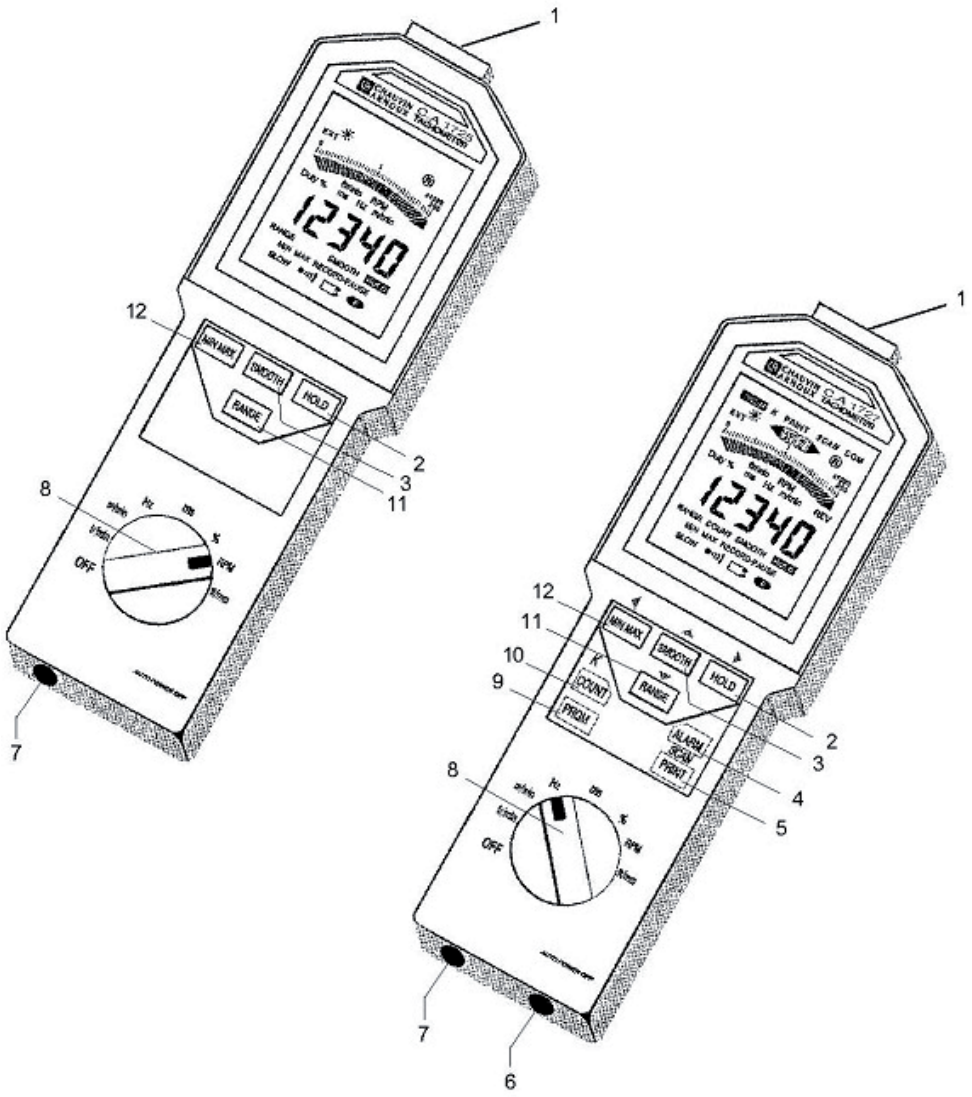
2.1. INTRODUCTION

C.A 1725 and C.A 1727 tachometers, specially designed for industrial applications, measure the speed of rotation of any moving part at a distance or by contact..

Tachometers provide many possibilities in addition to the usual functions:
- Direct reading of the measurement,
- Measurement of period, of frequency, of duty cycle, of linear speed,
- Measurement by external sensor,
- Special functions: smooth, range, hold, etc.
- Dual display: 100,000-point digital and bargraph.

The C.A 1727 can be parameterized and has a USB link; associated with its Tachograph specific software, it provides an extensive range of measurement, acquisition, processing, and data analysis possibilities.

2.2. DESCRIPTION



1 Optical sensor

2 HOLD key
- tore last digital value displayed.
- disable automatic stop.

► key (C.A 1727): for programming: shift the selection of the active digit or of the decimal point to the right.

3 SMOOTH key: smooth the measurements
▲ key (C.A 1727): for programming: increment the active digit.

4 ALARM key (C.A 1727)
- activate the audible and visual alarms.
- program the alarm thresholds.

5 PRINT key (C.A 1727): command recording of the measurements in memory.
SCAN key (C.A 1727): program the rate at which the measurements are recorded in memory.

6 USB connector (C.A 1727).

7 Connector for external input.

8 Rotary switch.

9 PRGM key (C.A 1727)
- programming.
- initialize the program memory.

10 COUNT key (C.A 1727): event counter.
K key (C.A 1727): program the scale factor (coefficient K).

11 RANGE key (C.A 1727):
- manual or automatic change of range.
- extend the measurement range at low frequency.

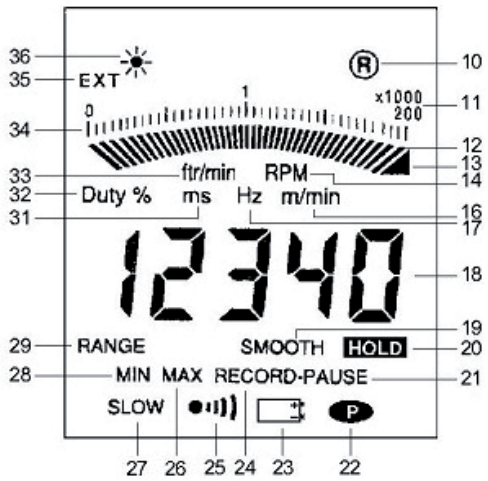
▼ key (C.A 1727): for programming: decrement the digit.

12 MIN MAX key (C.A 1727):
- record minima and maxima.
- disable the buzzer.

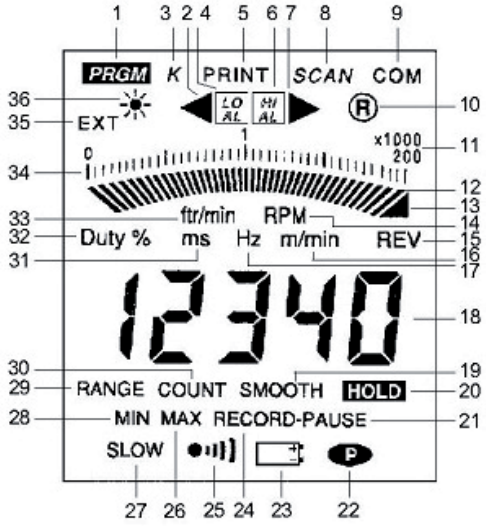
◄ key (C.A 1727): for programming : shift the selection of the active digit or of the decimal point to the left.

2.3. DISPLAY UNITS

C.A 1725



C.A 1727



1 Programming mode (C.A 1727).
2 Low threshold crossed (C.A 1727).
3 Full-scale coefficient K (C.A 1727).
4 Low threshold function (C.A 1727).
5 Memory write function (C.A 1727).
6 High threshold function (C.A 1727).
7 High threshold crossed (C.A 1727).
8 Rate of recording of measurements function (C.A 1727).
9 Transmission or reception in progress (C.A 1727).
10 Flashing indicator of operation of the infrared sensor.
11 Full-scale value of the bargraph (from 2 to 200 x 1000).
12 Analogue display by bargraph.
13 Arrows indicating overshoot of end of scale.
14 Speed of rotation - Revolutions per minute
15 Revolutions: count of number of revolutions (C.A 1727).
16 metres per minute: linear speed.
17 Hertz: frequency.
18 Digital display, 5 digits.
19 Measurements in smoothed values.
20 Frozen display of the last measurement.
21 Recording paused.
22 Device in permanent operation.
23 Battery charge indicator.
24 MIN/MAX recording.
25 Buzzer active indicator.
26 Reading of MAX memory.
27 Measurement range extended to 0.1 Hz.
28 Reading of MIN memory.
29 Disable automatic change of range.
30 Counting function (C.A 1727).
31 Millisecond: period.
32 Duty cycle.
33 ft/min: feet per minute - linear speed (in English).
tr/min: revolutions per minute - speed of rotation.
34 Graduated fixed scale.
35 Measurement by external connector.
36 Optical transmitter in action.

3. USE

3.1. CONTACT-FREE MEASUREMENTS

The contact-free measurement is made by the optical sensor built into the device. This sensor, placed in the front of the device, comprises a frequency-modulated infrared transmitter.

Before making any measurement, it is necessary to prepare the revolving target of which the speed is to be determined.
Check that the surface sighted is free of spurious reflections that might be counted in addition to the pulses from the reflecting adhesive. Proceed as follows: before applying the adhesive used to make the measurement, turn the target and check that when it is sighted the reading remains at ---. If not, it will be necessary to cover the entire surface of the target with a mat black medium.

When the target is correct, apply a reflecting adhesive tape on it, along the longest available radius. On small targets, the area covered by the adhesive tape must be less than 50% of the total area of the rotating part.

Start the target turning, aim the front of the device at it, and check that the measurement OK symbol flashes regularly.
The distance between the sensor and the target must be between 1 and 50cm.
The measurement angle of 30° (15° on either side of the perpendicular to the target) is convenient for aiming purposes.

During measurements of low speeds, very small movements of the device may make the measurement unstable: if this happens, we recommend placing the device on a stable support. There is a nut on the underside of the device for attachment to a tripod or similar support.

3.2. MEASUREMENT WITH CONTACT

The mechanical adapter and its 3 end fittings allow measurement by contact on a shaft end or on a surface in linear motion.
It is placed in front of the sighting window of the optical sensor and accepts one of the following 3 end fittings:

- An elastomer cone with a tip that can be used for shaft end measurements minimum diameter: 5mm).
- An elastomer cylinder that can be used for measurements on shafts with flat ends or shafts smaller than 5mm.
- An elastomer wheel for linear speed measurements (1 revolution of the wheel = 0.1m).

The end fitting must be pressed against the moving part just hard enough to drive it without slippage.
The adapter is attached to the front of the tachometer housing, in front of the sighting window. It automatically locks in position when pushed home.

Fitting
To attach the adapter, align the three lugs on the inside of the adapter with the three recesses of the sighting window of the housing and turn anticlockwise.

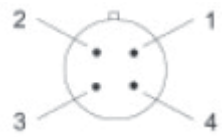
Removal
To remove it, pull the adapter outward until the locking tabs are clear, then turn clockwise.

3.3. MEASUREMENT WITH EXTERNAL INPUT

The device has a 4-contact connector that can be used to connect an external source of which you wish to measure the speed, the frequency, the period, the duty cycle, etc.
In order to inform the tachometer that the measurement is available on the external input, it is necessary to short-circuit contacts 1 and 4.
Operation using the external input is indicated on the display unit by the extinction of the transmission symbol ☀ and the display of **EXT**.

Wiring

Connector of the tachometer seen from contact side



1- earth
2- measurement input (± 20 VDC max.)
3- see below
4- to be short-circuited with contact no.1

Connecting 1 to contact 3 makes it possible to adapt the triggering threshold to the nature of the signals.

Contacts 1 and 3 not connected
For operation with 0 - 5 V TTL signals.
The triggering threshold is +1.1 V (at 1 kHz).
To avoid the problems due to noise often present in an industrial environment, the threshold has a hysteresis of 250 mV.

Contacts 1 and 3 connected
For operation with signals balanced with respect to earth.
This function allows direct measurement using a variable-reluctance magnetic sensor or the output of an alternator.
The triggering threshold is 300mV (at 1kHz), with a hysteresis of 250mV. The residual noise superimposed on the signal to be measured must be less than 250mV so as not to interfere with the measurement when the threshold is crossed.

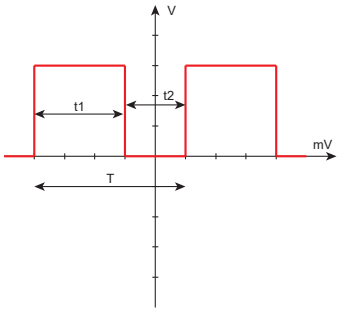
Attention:
The maximum voltage to input no. 2 must not exceed ± 20Vp. The earth of the external input connected is electrically connected to the earth of the USB digital output.

The external input must be used for the measurement of slow signals, from 0.1Hz. The table below sums up the characteristics of this input.

Measurement frequency range	from 1 Hz to 10 kHz from 0.1 Hz to 10 kHz in expanded range
Functions available	same as optical sensor
Accuracy	same as optical sensor
Input impedance	≥ 75 kΩ
Balanced signals mode Thresholds Hysteresis	 300 mV ± 80 mV at 1 kHz 600 mV ± 160 mV at 10 kHz 250 mV ± 80 mV
TTL signals mode Thresholds Hysteresis	 1,1 V ± 150 mV at 1 kHz 2,2 V ± 300 mV at 10 kHz 250 mV ± 80 mV
Maximum voltage	± 20 Vpeak
Acceptable overload (1 second)	250 Vrms

Example of DUTY CYCLE Measurement on EXTERNAL INPUT
When the external input is used, the FRB connector provided with the device must be connected to the source of the signal to be measured, then to the connector marked EXT.

Consider a signal like the one shown in the figure below:



Here, the frequency of the signals is given by the formula:

$$f = \frac{1}{T}$$

$T = 5 \times 1\ ms = 5\ ms$

$$\text{so } f = \frac{1}{5.10^{-3}} = 200\ Hz$$

The duty cycle is given by:

$$\text{Duty} = \frac{t1}{t1 + t2} \qquad \text{or, in \%, Duty \%} = \frac{t1}{t1 + t2} \times 100$$

Here, we have:

$$\text{Duty \%} = \frac{3}{3 + 2} \times 100 = 60\%$$

To make this measurement with the C.A 1725 or C.A 1727 tachometer, you must:

- Check the amplitude of the input signal to the device. This serves to determine what threshold must be set. Here, the amplitude is greater than +1.1 V, so contacts 1 and 3 of the FRB connector must not be interconnected.
- Switch the tachometer on by setting the rotary switch to “%”.
- The display unit indicates directly the result mentioned above.

If there is no reading on the display unit, check that the amplitude of the signal to be measured is above the triggering threshold.

4. OPERATION

4.1. MEASUREMENT UNITS

The table below indicates the display capacity for each function.

Function	Display
tr/mn or RPM	60.000 to 99999
m/mn (K = 0.1)	6.0000 to 99999
ft/mn (K = 0.328)	19.680 to 99999
Hz	1.0000 to 9999.9
Period (ms)	0.1000 to 999.99
Duty cycle %	0.1 to 99.9
Counter	0 to 99999

In a measurement extended to 0.1 Hz using the Ext input, the minimum values are divided by 10.

On/Off function:
If this function is not overridden when the device is switched on (see below), the device is switched off automatically if one of the following has not occurred during the last 5 minutes:
- Press of a key,
- Or change of setting of the rotary switch,
- Or interrogation of the digital output.

Before switching off automatically, the tachometer emits an audible beep.

Special functions:
The following special functions are obtained when a key is kept pressed when the device is switched on:

Key	Function
No key pressed	Switched on for 5 minutes
HOLD	Switched on for an indefinite duration, P appears on the display unit
MIN/MAX	Switched on without buzzer, the symbol does therefore not appear
PRGM	Initialization of all values contained in the program memory. The display unit indicates „Init“
RANGE	Measurement down to 0.1Hz, SLOW lights on the display unit.

4.2. MIN/MAX RECORDING

The recording function can be used to store the minimum and maximum values of the measurements.
Pressing the MIN /MAX key switches the device into recording mode. The RECORD and P symbols are displayed. The automatic switching off function is disabled.

MIN value
Initially, the value store is OL (OVER LOAD). When the key is pressed, the value displayed is stored in the MIN register.
Whenever a value below the value storedd in the register is measured, it is transferred to the MIN register and 1kHz audible beep is emitted.

MAX value
The value stored at the start is zero. A measured value greater than the value stored in the register leads to an update.
Each time the content of the MAX memory is modified, a 2 kHz audible beep is emitted.

Reading of the MIN/MAX memories
The values contained in the MIN and MAX registers can be displayed by successive presses on MIN /MAX key.
The circular display indicates in turn the MAX, the MIN and the current measurement value.
Recording continues during the reading; the bargraph indicates the instantaneous measurement.
NB: if the “SMOOTH” function is activated, the MAX and MIN are determined from the smoothed values.

Stopping the MIN/MAX recording function
The recording function is stopped either by a long press on the MIN MAX key or by turning the switch.

Remark : The MIN/MAX functions is not available in counting mode.

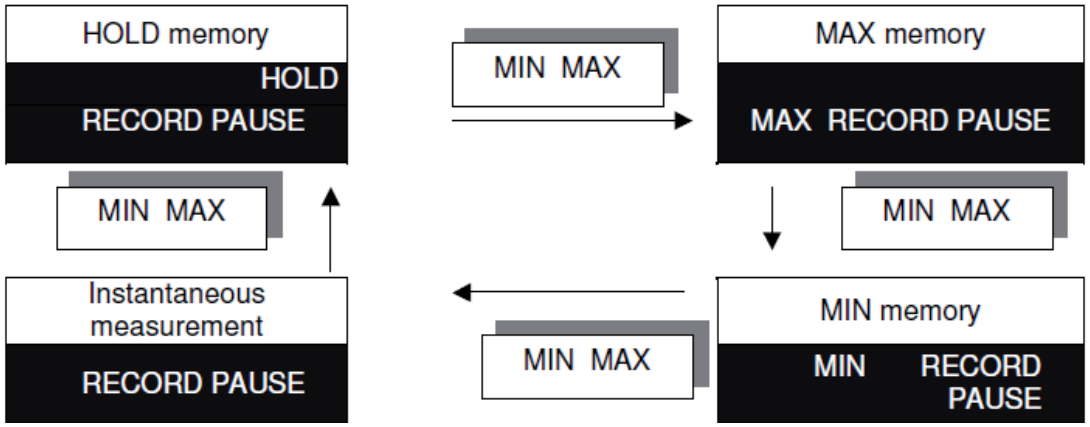
4.3. HOLD OF THE DIGITAL VALUE ON THE DISPLAY

By a brief press on the HOLD key (when not in programming mode).
Pressing HOLD freezes the digital display on the last measurement displayed; the bargraph continues to indicate the instantaneous measurement value. The display indicates HOLD. Pressing the HOLD key again restores the display of the instantaneous measurements, and HOLD disappears from the display unit.

HOLD in the „MIN/MAX“ recording mode
When the HOLD key is pressed while RECORD is displayed:
- The HOLD and PAUSE symbols are displayed.
- Recording stops and the values contained in the MIN and MAX memories are the last values before HOLD.
- The digital display unit indicates the last measurement value, or else the MIN or MAX value if the device was reading them back.
- The bargraph continues to indicate the current measurement.

Pressing the HOLD key again causes the recording of the MIN and of the MAX to resume:
- The HOLD and PAUSE symbols remain displayed.
- The display unit indicates the measurement in progress or the content of the MIN/MAX memory being read back.
- The device is once again in MIN/MAX mode, but the memories have not been reset and they contain the MIN and MAX values present before the HOLD.

When the HOLD and RECORD - PAUSE symbols are displayed, it is always possible to display, in a circular manner, the values in the memories and the instantaneous measurement value, by brief presses on the MIN MAX key.



The bargraph always indicates the current measurement value.
Whatever display is in progress :
- A brief press on the HOLD key restores recording without resetting the memories.
- A long press on the MIN MAX key stops recording.

Application:
When the tachometer is used in a place where it is difficult or impossible to read the display unit, the HOLD function can be used in conjunction with MIN/MAX recording to store the minimum and maximum values reached.

4.4. SMOOTHING OF THE MEASUREMENT

Pressing the SMOOTH key starts the smoothing of the measurement (SMOOTH displayed). The digital value indicated is then the sliding average of the last 10 measurements (approximately 5 seconds). The bargraph always indicates the instantaneous measurement.
In MIN/MAX recording, if the SMOOTH symbol is displayed, the values recorded are the smoothed values.
Activating or deactivating the SMOOTH mode during MIN/MAX recording cancels the MIN and MAX values already stored.

Remark: The SMOOTH function has no effect on the counting function.

4.5. MANUAL CHOICE OF RANGE

When the device is switched on, or during a change of function, the device automatically selects the most appropriate measurement range. Each function has 4 or 5 ranges, except for the duty cycle function (2 ranges).
In automatic operation, the digital display unit has a display capacity of 20,000 points and the possible full-scale values of the bargraph are 2, 20, 200, 2000, 20,000, and 200,000.
In the automatic mode, the digital display unit switches to a higher range when 20,000 points is reached.
A first brief press (<2 s) on the RANGE key freezes the current measurement range. RANGE appears on the display unit. The digital indicator then has a display capacity of 100,000 points.
Each new press on the RANGE key switches both displays (bargraph and digital) to the next higher range. From the highest range (20,000) the RANGE key switches the device to the 2 range.
To exit from the manual range change mode, press the RANGE key for more than 2 seconds.

Remark: If the measurement value exceeds the display capacity, the display unit indicates OL and the range overshoot arrow appears to the right of the bargraph.

4.6. COUNTING (C.A 1727)

Press the COUNT key to switch the device into the event counting mode. COUNT appears on the display unit and the measurement units are changed (see table below).

Measurements mode	COUNT mode
tr / min	tr (revolution)
m / min	m (metre)
RPM	REV (revolution)
ft / min	ft (foot)
Hz	/
ms	/
Duty %	/

The Hz, ms, and % symbols disappear. There is no longer a measurement unit displayed; the device simply counts the number of pulses received.
A press on the HOLD key stops the counting. A second press causes the counting that was paused to resume.
When 99,999 events are reached, the display changes to OL.

To exit from the counting mode, simply press the COUNT key again. The counter is reset by 2 successive presses on the COUNT key.

Remarks:
- As standard, the device counts metres or feet, with a measurement resolution equal to the circumference of the end fitting used, 0.1m or 0.328ft. This resolution can be changed by changing the value of K.
- In the counting mode, the recording, change of range, and smoothing functions are not available.

4.7. RECORDING OF MEASUREMENT (C.A 1727)

The PRINT key can be used to record the value displayed.

- **PRINT with HOLD :**
  The record will be the last value displayed, preceded by HOLD.
- **PRINT with MIN/MAX recording:**
  When the device is in recording mode (RECORD, MIN or MAX on the screen), the PRINT command records the MIN, the MAX and the current measurement.
- **PRINT with record MIN MAX + HOLD:**
  In this mode (RECORD - PAUSE and HOLD symbols displayed), the PRINT command records the following four parameters:
  - The HOLD value
  - The value contained in the MIN register
  - The value contained in the MAX register
  - The current measurement value.
- **PRINT with SMOOTH**
  The value recorded is then the smoothed value, when this function is displayed (SMOOTH).
  For the entire duration of recording of the information, the PRINT and COM symbols are displayed. When the Scanning function is programmed (see “Recording Interval”), pressing the PRINT key starts the measurement recording cycle according to the interval programmed. The SCAN symbol is displayed and remains displayed for the entire duration of the scanning operation.

PRINT and COM are displayed each time data are transmitted to the memory.

A second press on the PRINT key interrupts the scanning; the last data are transmitted and the SCAN, PRINT, and COM symbols go off.

Further presses on the PRINT key alternately start and stop the function.

4.8. ALARMS (C.A 1727)

When thresholds have been programmed, a brief press on the ALARM key activates detection of the croosing of these thresholds by the measurement.
The LO AL or HI AL symbol is displayed, or both, according to the type of threshold programmed.
The operation of the device is summed up in the table below.

Digital measurement > low threshold (LO AL)	No action
Digital measurement < high threshold (HI AL)	No action
Digital measurement < low threshold (LO AL)	Continuous buzzer at 1 kHz Display of LO AL
Digital measurement > high threshold (HI AL)	Continuous buzzer at 4 kHz Display of HI AL
If the value of LO AL is greater than the value of HI AL, this operation is reversed. The buzzer is triggered (at 2 kHz) in the central zone between the HI AL and LO AL values.	

If no threshold value has been programmed, an audible beep is emitted when the ALARM key is pressed and the command is not accepted.
To stop the Alarm function, press the ALARM key again.

4.9. PROGRAMMING (C.A 1727)

The device lets you program four values to define:
- a low alarm threshold (LO AL).
- a high alarm threshold (HI AL).
- a multiplier coefficient (K).
- a recording interval (SCAN).

A press on the PRGM key switches the C.A 1727 into programming mode; PRGM is displayed. In the programming mode, the C.A 1727 no longer makes measurements; the bargraph is off, the optical transmitter is off.
The functions of the keys become those indicated in yellow above each key.

Functions of the keys in measurement mode	Functions of the keys in programming mode
MIN/MAX	◄ Shift left
HOLD	►Shift right
SMOOTH	▲ Increment active digit
RANGE	▼ Decrement active digit
PRINT	SCAN Program scanning
ALARM	ALARM Program threshold
COUNT	K Program coefficient K

Procedure
The explanations below describe the procedure to follow to program the various memories of the C.A 1727. These stages are common to all functions: scanning, thresholds, and coefficient K.
The “Alarm thresholds” to “Recording interval” paragraphs describe the features specific to each function. Before switching the C.A 1727 to programming mode, you must choose, on the rotary switch, the function of which you wish to program the values.

Pressing the PRGM key displays the PRGM symbol, switches off the bargraph, and displays “-----”. The second stage is choosing the function to be programmed, by pressing the: SCAN, K or ALARM key.

The digital display unit then indicates the value contained in the memory, or “-----” if nothing has yet been programmed (when programming for the first time, or if the last programming disabled this function). At the same time, the left-hand digit (or dash) flashes.

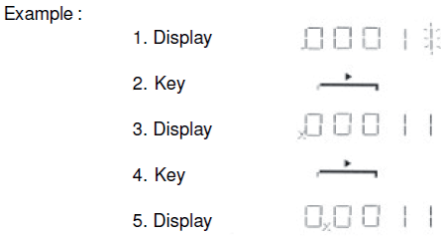
Programming is on 100,000 points (0 to 99,999), and there are 5 possible positions of the decimal point for the alarm thresholds (the decimal point is fixed for K and the SCAN interval has no decimal point).

A value is entered in memory as follows:
- writing of all digits of the desired value, without taking account of the decimal point.
- positioning of the decimal point.

Writing of a number without a decimal point:
When the dashes are displayed, pressing a horizontal shift key replaces the dashes by zeros, by the value previously recorded, or by the extreme value possible compatible with the function. The value of the active digit (flashing) is incremented or decremented by pressing the ▲ or ▼ key, respectively. Increasing a digit from 9 to 0 automatically increments the digit (or digits) to the left of it, while decreasing a digit from 0 to 9 automatically decrements the digit (or digits) to the left of it.

If during the incrementation or decrementation operations the maximum display capacity is exceeded, the display unit reverts to displaying five dashes.
The◄ and ► keys are used to shift the active digit (flashing), the one to be programmed, to the left or to the right, respectively.
When the left-hand digit is active, pressing the ◄ key causes the appearance of the five dashes or of the value previously recorded in memory.
Validation is effected by pressing the PRGM key or another programming key (e.g. SCAN).
Validating "-----" stops and cancels all programming.

Positioning of the decimal point:
To activate the decimal point, you must press the ► key until the right-hand digit flashes. Pressing the ► key again activates the shifting of the decimal point. The ◄ and ► or key can then be pressed to set the decimal point to desired position.



When the decimal point is located on the left or right side of the display unit, pressing the◄ or ► key, respectively, causes the appearance of „-----".

To return the decimal point to the display unit, simply press the ◄ or ► key, depending on whether the decimal point exited on the left or right, respectively. Because there are five possible positions of the decimal point, the resolution of the programming may be finer than the resolution of the measurement. When this is the case, the crossing of the alarm thresholds is still determined according to the true measurement resolution.
To exit from the programming mode, and to validate:
- Either press the PRGM key. You leave the programming mode and PRGM goes off.
- Or switch to another programming function by pressing ALARM, K or SCAN key.
- Or turn the switch to any other position except "OFF". The device then returns to measurement mode (switching to "OFF" disables validation and entails the loss of the current values; the values previously recorded remain valid).

The information contained in memory is read back in the same way as it is programmed, except that the ◄, ►, ▲ and ▼ keys must not be used.

Alarm thresholds
Two thresholds can be set. To program these values, press the ALARM key when in programming mode.
A first press on the ALARM key results in the display LO AL of and lets you program the low threshold.
A second press on the ALARM key validates the low threshold (LO AL), displays and lets you program the high threshold (HI AL).

When a threshold is programmed and the ALARM function is activated, the corresponding symbol appears on the display in measurement mode and the measured value is compared to this value at all times. An overshoot of the threshold results in the display of the corresponding symbol and activates the buzzer (see the use of this function in the "ALARM" section).
When one or both alarm thresholds have been programmed and activated, it or they appear on the bargraph in reverse video (with respect to the measurement): black if the deviation is below the threshold, white if the deviation is above the alarm threshold,

flashing (4 Hz) if the measurement is equal to the threshold value.

Coefficient K
Coefficient K is a multiplier applied to the raw measurement value in order to obtain a display that can be used as is.
Examples:

- Programming of a gearbox ratio. This makes it possible to display, directly, the output speed of a reduction gear while measuring the input speed.
- Flow measurements. A flow meter delivers one pulse every 2 m³. Setting a coefficient of K = 2 makes the reading in Hz equal to the flow rate in m3 per second. The COUNT function delivers, in addition, the total volume that has flowed through the pipe.

Pressing the K key in the PRGM mode lets you program the value of coefficient K.
When a coefficient other than the initial value has been programmed, the symbol K appears on the display unit in the measurement mode. The digital display and the bargraph then both apply multiplier coefficient K.

The K symbol can be made to disappear only by reprogramming the original value of coefficient K (see the table below).
The programming of K is limited to values between 99.999 and 0.010. No other values are accepted.

Measurement	Counting	Original K
K in tr/mn	K in revolutions	1
K in m/min	K in m	0.1
K in RPM	K in REV	1
K in ft/min	K in ft	0.328
K in kHz, ms, %	K in pulse count	1

Programming a coefficient K does not change the maximum measurement and display limits (0.1 to 10,000Hz and 0 to 99,999 points). The table below indicates the frequency limits as a function of the programmed value of coefficient K (it is assumed that the external input connector is used). Beyond these limits, the display indicates “OL” for an overshoot and “-----” for an undershoot.

Measurement unit		Programmed coefficient K	
		0.01	99.999
Hz	MAX input frequency giving a MAX display of	9999.9 Hz 99999 ct	1000 Hz 99999 ct
	MIN input frequency giving a MIN display of	0.1 Hz 0.0010 ct	0.1 Hz 9999 ct
tr/min or RPM	MAX input frequency giving a MAX display of	10.000 Hz 6000.0 ct	16.666 Hz 99999 ct
m/min	MIN input frequency giving a MIN display of	0.1 Hz 0.0600 ct	0.1 Hz 59999 ct

Measurement unit		Programmed coefficient K	
		0.033	32.81
ft/min	MAX input frequency giving a MAX display of	10000 Hz 19800 ct	50.8 Hz 99999 ct
1 ft = 0.3048 cm 1 m = 3.281 ft	MIN input frequency giving a MIN display of	0.1 Hz 0.1980 ct	0.1 Hz 196.86 ct

Recording interval
The scanning function is used to make measurements at a preset rhythm and automatically record the results. It is possible to store up to 4000 points.
This function is programmed by pressing the SCAN key in PRGM mode. The SCAN symbol is displayed.
The value programmed is the number of seconds between two successive records. The limits are 10 seconds minimum and 99,999 seconds maximum (approximately 27 hours).
In measurement mode, recording is started (stopped) by pressing the PRINT key; the display of the PRINT and SCAN symbols confirms that recording is in progress (see “RECORDING”).
If the recording interval exceeds five minutes, the optical transmitter of the device is switched off between measurement (☼ symbol off on the display unit), then switched back on 2 seconds before the next measurement.
The automatic stop function of the C.A 1727 is disabled for the duration of the scanning function. The Ⓟ symbol is displayed.

4.10. PROCESSING OF THE DATA ON A PC (C.A 1727)

4.10.1. FUNCTIONS

TACHOGRAPH software can be used for two-way management of the data contained in the C.A 1727.
It allows the acquisition, processing, and analysis of the measurements made by the C.A 1727 tachometer, and the transfer of results files to the hard disc of a PC. It can be used to translate them into a format compatible with EXCEL, to allow the end user to perform any desired digital processing of the results. It allows the transfer and display of the programming parameters of the device. Digital processing of the results, such as calculation of the mean value, of the integral (position), or of the derivative (acceleration), and the corresponding display in graph form are included in the TACHOGRAPH software.

4.10.2. OBTAIN THE TACHOGRAPH SOFTWARE

You can download the latest version from our web site:
www.chauvin-arnoux.com

Search for the name of your instrument.
Once on the page, you will everything at the bottom of the **Support** tag.
Download the zip file and unzip it.

4.10.3. INSTALLING TACHOGRAPH

To install the software, run the **set-up.exe** file, then follow the on-screen instructions

You must have administrator privileges on your PC to install the TACHOGRAPH software.
Do not connect the instrument to the PC until the software and the driver have been installed.

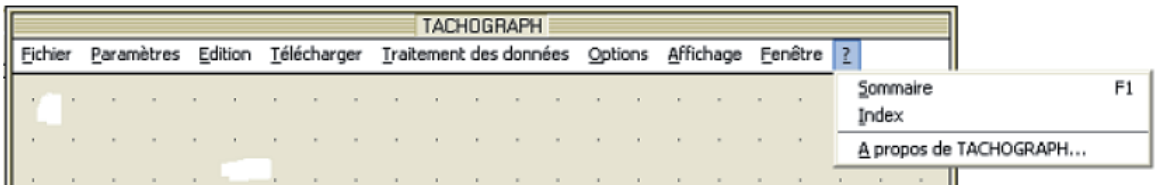
Connect the device to your PC using the USB cable supplied.
Switch on the device by turning the rotary switch to a measurement position and wait for your PC to detect it.

4.10.4. USING TACHOGRAPH

The editing functions available in the graph window are: addition of Min + text1, addition of Max + text2, rename the graph.
The display functions available for each graph are: parameterizing of the scale, of the colours, addition of the grid (reticule), of two cursors, of a key with display of the delta between the cursors, of the Zoom + and - function.
The parameterizing functions for the start of acquisition are: arameterizing of the Scan or rate of reading of the measurement, of the recording thresholds, of the alarms.

Example of menu on the screen of the PC:
The File menu

The help menu (?)



5. TECHNICAL CHARACTERISTICS

5.1. REFERENCE CONDITIONS

Quantities of influence	Reference values
Temperature	23 ± 3 °C
Relative humidity	45 to 75 % HR
Supply voltage	9 ± 0.5 V
Electric field	< 1 V/m
Magnetic field	< 40 A/m
Target for the optical sensor	matte target (one that produces no measurement in rotation without reflecting adhesive).
Signal on external socket	standardized 0 - 5V TTL signal

5.2. CHARACTERISTICS OF THE DEVICES

RPM function

Measurement range * (rpm)	6.000 - 9.9999	10.000 - 99.999	100.00 - 999.99	1000.0 - 9999.9	10000 - 99999
Resolution (rpm)	0.0006	0.006	0.06	0.6	6
Intrinsic uncertainty	1.10^{-4} of reading ± 6 ct				
Measurement time (s)	7 ≤ t < 11	1 ≤ t < 7	0,5 ≤ t < 1	< 0,5	
Stability	± 6 ct				

*: from 6 to 60rpm: usable only with the external input. Use up to 10,000rpm with the mechanical adapter.

Hz function

Measurement range * (Hz)	0.1000 - 9.9999	10.000 - 99.999	100.00 - 999.99	1000.0 - 9999.9
Resolution (Hz)	0.0004	0.004	0.04	0.4
Intrinsic uncertainty	4.10^{-5} of reading ± 4 ct			
Measurement time (s)	0,5 ≤ t < 11	< 0,5		
Stability	± 4 ct			

*: from 0,1 to 1 kHz: usable only with the external input.

Linear speed function
Mechanical adapter with wheel 3.1813 cm in diameter giving K = 0.1 for m/min and K = 0.328 for ft/min.

Measurement range * (m/min)	0.6000 - 9.9999	10.000 - 99.999	100.00 - 999.99	1000.0 - 9999.9	10000 - 59999
Measurement range (ft/min)	1.9680 - 9.9999	10.000 - 99.999	100.00 - 999.99	1000.0 - 9999.9	10000 - 59999
Resolution (m/min and ft/min)	0.0006	0.006	0.06	0.6	6
Intrinsic uncertainty (without sensor)	1.10^{-4} of reading ± 1 resolution step in m/min 3.10^{-4} of reading ± 1 resolution step in ft/min				
Measurement time (s)	1,1 ≤ t < 11	0,5 ≤ t < 1,1	t < 0,5		
Stability	± 1 resolution step				

*: from 0.6 to 6m/min and above 999.99m/min (from 1.968 to 19.680ft/min and above 3200ft/min), usable only with the external input.

Intrinsic uncertainty of the sensor: 3.10^{-3}

Period meter function

Measurement range (ms)	9999.9 * - 1000.0	999.99 - 100.00	99.999 - 10.000	9.9999 - 0.1000
Resolution (ms)	0.3	0.03	0.003	0.0005
Intrinsic uncertainty	1.10^{-4} of reading ± 5 ct			
Measurement time (s)	1,5 ≤ t < 11	1 ≤ t < 1,5	1,5 ≤ t < 11	1,5 ≤ t < 11
Stability	± 1 resolution step			

*: from 100.0 to 9999.9 ms: usable only with the external input. Up to 10,000 rpm with the mechanical adapter.

Duty cycle function

Measurement range (%)	9999.9 * - 1000.0	999.99 - 100.00	99.999 - 10.000
Resolution (%)	0.1		1
Intrinsic uncertainty	0.1% of full scale from 0.2 to 50 Hz 0.2% of full scale from 50 to 125 Hz		1% of full scale
Frequency range (Hz)	0.2 to 125	1 to 125	125 to 500
Measurement time (s)	0,5 ≤ t < 6	0,5 ≤ t < 1,5	0,5 < t
Stability	± 1 resolution step		± 1 ct

*: usable only with the external input

Event counter function

Measurement range	from 0 to 99999 events
Counting frequency range	from 1 Hz to 10 kHz from 0.1 Hz to 10 kHz with external input in expanded range
Intrinsic uncertainty	± 1 event

5.3. CHARACTERISTICS OF THE OPTICAL SENSOR

Measurement conditions

- Reflecting area: from 10 to 90% of the area of the target.
- Surface of the target: in the absence of the reflecting adhesive, the device must not be able to make a measurement.
- Measurement distance: from 1 to 50cm. The maximum distance is valid for a reflecting adhesive tape having an area of at least 10 cm².
- Measurement angle: ± 15° from the perpendicular to the reflecting surface.

Variation in the range of use

Quantity of influence	Limit of the range of application	Quantity influenced	Typical variation	Max. variation
Ambient temperature	-10 to + 70°C	Any quantity measured	± 30 ppm	± 50 ppm
Humidity	10 to 90% HR without condensation	Any quantity measured	$< 1.10^{-5}$	not significant
Power supply	7 to 10 V	Any quantity measured		not significant

Optical sensor

Transmission wavelength: 890 nm.
Luminous power transmitted: depends on sighting distance:

- at 1 cm => 0,5 mW/cm²
- at 50 cm => 2 mW/cm .

Minimum luminous power received: 10 µW/cm².
Ratio of reflecting area to target area: > 5%.
Detection distance: from 1 to 50 cm.
Sighting angle from the perpendicular to the target: 0 ±15°.

5.4. CHARACTERISTICS OF THE ADAPTER AND ITS FITTINGS

Mechanical adapter

End fittings: elastomer, Shore hardness 80
Pressure exerted on the moving part: between 2 and 40 N.
Maximum speed: 10,000 rpm.
Life: approximately 1,000 hours at 3,000 rpm at a pressure of 20 N.

Conical end fitting accessory

This end fitting is used for a measurement by contact on the shaft end of a system in rotation.
It is an elastomer cone (max. diameter 15 mm) that fits onto the output shaft of the adapter, with quick locking.
Minimum measurement shaft diameter: 5 mm.

Cylindrical end fitting accessory

This end fitting is used for a measurement by contact on the shaft end of a system in rotation.
It is an elastomer cylinder that fits onto the output shaft of the adapter, with quick locking.
It is used to measure the speeds of shafts larger than 5mm in diameter or having flat ends.

End fitting accessory with wheel

This end fitting is used to measure a linear speed by direct contact with the moving part.
It is a rigid elastomer wheel that fits onto the output shaft of the adapter, with quick locking.
Diameter of the wheel: 30.183 mm.
Circumference of the wheel: 10 cm ± 0.1 mm.

5.5. POWER SUPPLY

The instrument is powered by 6LF22 or equivalent 9V alkaline battery.

Average battery life:

- 250 5-minute measurements with optical sensor.
- 600 5-minute measurements with external input.

5.6. ENVIRONMENTAL CONDITIONS

Use indoors or outdoors.

Range of use	0 to +55°C and 0% to 90% RH without condensation
Storage range (without battery)	-20 to +70°C and 0% to 90% RH without condensation
Degree of pollution	2

5.7. CHARACTERISTICS OF CONSTRUCTION

Dimensions (L x D x H)	210 x 72 x 47 mm
Mass	approximately 250 g
Protection class	IP 51 according to IEC 60529

5.8. CONFORMITY TO INTERNATIONAL STANDARDS

Electrical safety as per IEC/EN 61010-2-030.

5.9. ELECTROMAGNETIC COMPATIBILITY

The instrument is compliant with standard IEC/EN 61326-1.

6. MAINTENANCE

Except for the battery, the instrument contains no parts that can be replaced by personnel who have not been specially trained and accredited. Any unauthorized repair or replacement of a part by an “equivalent” may gravely impair safety.

6.1. CLEANING

Disconnect the unit completely and turn the rotary switch to OFF.

Use a soft cloth, dampened with soapy water. Rinse with a damp cloth and dry rapidly with a dry cloth or forced air. Do not use alcohol, solvents, or hydrocarbons.

A dirty sighting window can severely impair the sighting characteristics, making any measurement impossible or unstable.

The use of alcohol or of another solvent to clean the mechanical kit might irreversibly damage the mechanical adapter by degrading its lubrication.

6.2. REPLACEMENT OF THE BATTERY

When the battery symbol appears on the display unit, the battery must be replaced.

- Set the switch to “OFF”.
- Open the battery compartment, located on the back of the device.
- Unscrew the screw using a tool.
- Remove the battery and insert a new one in its place, taking care with the polarity. Use a 6LF22 or similar alkaline battery.
- Close the cover of the compartment and tighten the screw.

Spent batteries must not be treated as ordinary household waste. Take them to the appropriate recycling collection point.

Storage
For extended periods of non-use, we recommend removing the battery from the device and storing it separately.

7. WARRANTY

Except as otherwise stated, our warranty is valid for **24 months** starting from the date on which the equipment was sold. The extract from our General Conditions of Sale is available on our website.
www.group.chauvin-arnoux.com/en/general-terms-of-sale

The warranty does not apply in the following cases:

- inappropriate use of the equipment or use with incompatible equipment;
- modifications made to the equipment without the explicit permission of the manufacturer's technical staff;
- work done on the device by a person not approved by the manufacturer;
- adaptation to a particular application not anticipated in the definition of the equipment or not indicated in the user manual;
- damage caused by shocks, falls, or floods.

FRANCE
Chauvin Arnoux
12-16 rue Sarah Bernhardt
92600 Asnières-sur-Seine
Tél : +33 1 44 85 44 85
info@chauvin-arnoux.com
www.chauvin-arnoux.com

INTERNATIONAL
Chauvin Arnoux
Tél : +33 1 44 85 44 38
export@chauvin-arnoux.fr

Our international contacts
www.chauvin-arnoux.com/contacts

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