

GA three-phase

→ GA3 three-phase

- For controlling three-phase loads
- Rating 10, 25, 45 A
- Output voltages to 660 Vrms
- Control voltage 4-32 V = or 90-280 V AC
- Peak voltage : 1200 V
- Back-to-back SCR output
- Input to output insulation voltage : 4000 Vrms
- Protected against overvoltages by RC filter and overvoltage limiter
- Zero voltage or instantaneous switching



Specifications

Type	Current	Input voltage	Switching	Code
Range GA3	10 A	4 - 32 V DC	Instantaneous	84 028 251
		4 - 32 V DC	Zero voltage	84 068 251
	25 A	4 - 32 V DC	Instantaneous	84 028 451
		90 - 280 V AC	Instantaneous	84 028 453
		4 - 32 V DC	Zero voltage	84 068 451
		90 - 280 V AC	Zero voltage	84 068 453
	45 A	4 - 32 V DC	Instantaneous	84 028 651
		90 - 280 V AC	Instantaneous	84 028 653
		4 - 32 V DC	Zero voltage	84 068 651
		90 - 280 V AC	Zero voltage	84 068 653

Accessories

	Code
Heatsink	26 532 762
DIN rail heatsinks	26 532 764
Heat transfer compound	18 373 112
Protective cover	26 532 796

General characteristics

Output characteristics

Voltage range V (rms) max	24-660
Peak voltage (1 min) V(peak)	1200
Minimum current mA(rms)	200
Max. 1-cycle surge A(peak)	10A : 160 25A : 270 45A : 450
Leakage current (mAeff)	10
I t (t = 10 ms) (A²s)	10A : 128 25A : 365 45A : 1000
On-state voltage drop at I _{max} and T = 25 °C V(peak)	1.6
Thermal resistance Junction to casing (°C / W)	10A : 0.25 25A : 0.25 45A : 0.2
Frequency (Hz)	47 → 63
Static (off-state) dv/dt (V/μs)	500
Response time (close) (ms)	10 ms max. (3-32 VDC) 20 ms max. (90-280 VAC)
Response time (open) (ms)	10 ms max. (3-32 VDC) 30 ms max. (90-280 VAC)

Inputs specifications

Max input current (mA)	10 (90-280 AC) 20 (4-32 DC)
Turn-off voltage (V)	10 AC (90-280 AC) 1 DC (4-32 DC)
Nominal resistance (kΩ)	1

Characteristics

Operating temperature (°C)	-20 → +80
Storage temperature (°C)	-40 to +100
Input to output insulation voltage V(rms)	4000
Breakdown voltage (T=25°C, 1 s) V(rms)	4000
Input/output capacitance (pF)	< 8
Insulation resistance	10 ⁴
Material housing	Self-extinguishing
Material baseplate	aluminium
Weight (g)	450

To order, see page 6

Basic principles of tachometers

General

Tachometers can be used to measure speeds (of linear or rotary movement), rates (per minute or per hour), or rates of flow (volumetric, etc.).

Pulses are fed to the tachometer at the frequency to be measured. A scale factor is applied to produce readings of the desired type (linear speeds, flow rates, etc.).

Crouzet/Syrelec tachometers operate on 2 different principles :

- 1 - The fixed time base principle, and
- 2 - The reciprocal principle

1 - Principle of the fixed time base tachometer

The tachometer totals the number of pulses received during a fixed period of time known as the time base. At the end of this period, a value for the frequency measured is shown on the display.

The time base can be set at the time of installation. It is calculated from the formula shown below, where :

- B : is the time base being calculated,
- N_d : is the number of pulses per revolution,
- N_t : is the number of revolutions per minute, and
- V : is the value that will appear on the display.

The time base is given by :

$$B = \frac{V \times 60}{N_t \times N_d}$$

Once the time base has been calculated, it is set by means of DIP switches (or changeover switches) situated on the unit.

As an example:

Assume a sensor emits 8 pulses per revolution. What you want to see on the display is a speed in revs per minute. The maximum this speed can be is 2000 rpm.

$$N_d = 8$$

$$N_t = 2000$$

$$V = N_t \text{ (since what you want displayed is a speed in rpm).}$$

$$B = \frac{2000 \times 60}{2000 \times 8} = 7,5 \text{ secondes}$$

Fixed time base tachometers are useful for high speeds but, if the accuracy obtained is to be good, it is essential for the number of pulses per revolution to be high.

To overcome this drawback, Crouzet Automation can supply reciprocal tachometers. These need only a single pulse per revolution and are able to measure both high and low speeds.

2 - Principle of the reciprocal tachometer

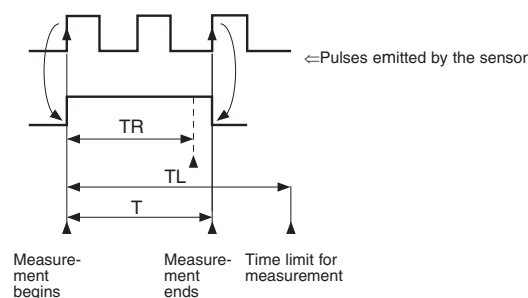
This tachometer measures the intervals between n count pulses (the period) and then performs the calculation

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

to obtain a frequency.

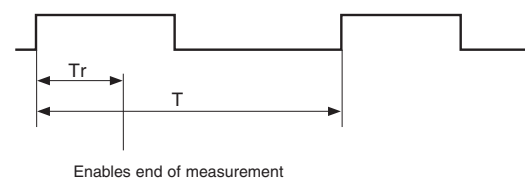
The parameters which govern this tachometer are the following :

- the sampling time (T_r)
- the time limit for measurement (T_L)



Measurement ends at the rising edge of the first pulse after T_r . If no pulse is received after T, the system waits until the time limit T_L and then shows zero on the display.

If the frequency of the signal is low, conditions are as shown below :



The interval between 2 rising edges is very much longer than T_r .

The tachometer displays 0 until time T, at which it displays the new value.

Preselection and multifunction up/down counters 48x48

- CP4 : back-lit LCD display
- CP4 Red illuminated display

Physical details and protection		Inputs specifications	
Immunity from micro power cuts	Version 10 to 30 V DC : 10 ms Version 20 to 55 V AC : 10 ms Version 80 to 260 V AC : 10 ms	2 counting inputs IN1, IN2	•
Relative humidity (no condensation)	95 %	Input modes	4142 - 4341
Altitude	0 - 2000 m	UP, DN, CUMUL, DIR, IND PHASE,	4142 - 4342
Insulation (IEC 664-1)	2.5 kΩ	PHASE x 2	4144 - 4344
Standards	Conforming to IEC 1000.4.2 : Level 3 Conforming to IEC 1000.4.3 : Level 3 Conforming to IEC 1000.4.4 : Level 3 Conforming to IEC 1000.4.6 : Level 3 Conforming to EN 55022/11 group 1 : Class A	PHASE x 4	4192 - 4392
Vibration resistance in 3 axes acc. to IEC 68-2-6	10 - 55 Hz / 0.35 mm	Input by contact, voltage or solid state device for 3-wire and 2-wire detection using external resistor (NPN or PNP if present)	•
Material	Self-extinguishing	Low level	0 → 1 V DC
Connection by screw terminals	•	High level	4 → 30 V DC
Tightening capacity	2 x 1.5 mm ²	Impedance	10 KΩ
Mounting Front panel, by clip	•	Counting speed	
Front panel protection	IP 54	Counter	5 kHz or 30 Hz 2.5 kHz PH4
Front panel watertight seal	•	Counting speed - Multifunction	
Temperatures limits use (°C)	0 → +55	Counter UP, DOWN, DIR	7.5 kHz
Temperature limits stored (°C)	-25 → +70	Counter non simultaneous IND, CUMUL (IN1 & IN2 non simultaneous)	7.5 kHz
Weight (g)	200	Counter IND, CUMUL (IN1 & IN2 simultaneous)	4.0 kHz
Outputs solid state characteristics		Counter / Tachometer PH, PH2	5.0 kHz
Type NPN open collector	•	Counter / Tachometer PH, PH2 (except in Batch mode)	4.0 kHz
Maximum current	100 mA	Counter PH4	2.5 kHz
Maximum voltage	40 V DC	Tachometer UP, DOWN, DIR	9.0 kHz
Voltage drop	< 1.5 V	Tachometer IND, CUMUL (IN1 IN2 non simultaneous)	9.0 kHz
Response time	< 250 μs	Tachometer IND, CUMUL (IN1 IN2 simultaneous)	5.0 kHz
Outputs Relay characteristics		Tachometer PH4	4.0 kHz
Current rating	2 A	Reset	
Maximum voltage	250 V AC	Reset to zero or to preset	From front panel : if not protected in programming phase Electrical : by contact, voltage or solid state device (NPN or PNP if present)
Max contact rating (resistive) - AC1	500 VA	Minimum pulse time	5 ms
Rated current	10 mA	Low level	0 → 1 V DC
Response time	< 10 ms	High level	4 → 30 V DC
Mechanical life (operations)	3 x 10 ⁶	Impedance	10 KΩ
Permitted number of operations at 2 A AC1	1 x 10 ⁵	Option to protect against reset from front panel	•
Output modes : maintained or pulsed	t = 0.1 s to 9.9 s for types 4192 and 4392 t = 500 ms for other types	Scale factor (each input pulse is multiplied by this figure)	00.001 → 99.999
Single shot or repetitive (immediate auto reset)	•	Decimal point selectable for ease of reading	xxxxx, xxxxx.x, xxx.xx, xx.xxx,
Supply (min/max values)	10 → 30 V DC 20 → 55 V AC 80 → 260 V AC	Sensor supply Version AC	12 V DC / 100 mA
Maximum consumption - Version DC	4 W	Sensor supply Version DC	Un - 2 V / 100 mA
Maximum consumption - Version AC	10 VA	Programming and current value backed up via EEPROM memory	•
Operating characteristics			
Functions	Preselection up/down counter Multifunction : counters, "Batch" counters, tachometers and chronometers		
Number of presets	1 or 2		
Back-lit LCD or red illuminated display	Current value : 5 digits Preset : 5 digits		
Height of digits	Current value : 8 mm Preset : 4 mm		
Display details	-9999 - + 99 999		
Simultaneous readout of count value and preset	•		

Preselection and multifunction up/down counters 48x48

→ CP4 : back-lit LCD display

- Presets and scale factor easy to alter
- Large back-lit LCD display or red illuminated display
- Simultaneous display of current value and preset
- Safeguarded : good resistance to interference
- Backed up on EEPROM memory
- Slide-out electronics for easy maintenance

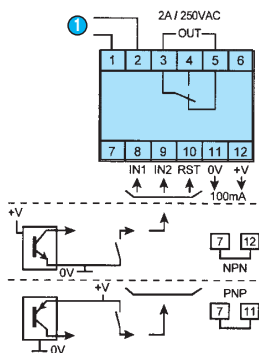


Specifications

Type	Time base	Counting input modes	Designation	Output	Voltages	Code
4141-1 preset	-	UP, DN, PH	Up/down counter	1 contact and 1 solid state	10 to 30 VDC 20 to 55 VAC 80 to 260 VAC	87 618 012 87 618 014 87 618 018
				1 changeover relay	10 to 30 VDC 20 to 55 VAC 80 to 260 VAC	87 618 042 87 618 044 87 618 048
4142-2 preset	-	UP, DN, PH	Up/down counters	2 solid states	10 to 30 V 20 to 55 VAC 80 to 260 VAC	87 618 062 87 618 064 87 618 068
				2 contacts	10 to 30 VDC 20 to 55 VAC 80 to 260 VAC	87 618 022 87 618 024 87 618 028
4144-2 preset	-	DIR, IND, CUMUL, PH	Up/down counters	2 solid states	10 to 30 VDC 20 to 55 VAC 80 to 260 VAC	87 618 072 87 618 074 87 618 078
				2 contacts	10 to 30 VDC 20 to 55 VAC 80 to 260 VAC	87 618 032 87 618 034 87 618 038
4192-2 preset	99h59min - 99min59s - 99.99s -24h	UP, DN, IND, CUMUL, DIR, PH, PH2, PH4	Multifunctions : Counters - "Batch" counters - tachometers and chronometers	NO, 2 solid states NO, 2 contacts	10 to 30 VDC 20 to 55 VDC 80 to 260 VDC 10 to 30 VDC 20 to 55 VDC 80 to 60 VDC	87 618 262 87 618 264 87 618 268 87 618 222 87 618 224 87 618 228

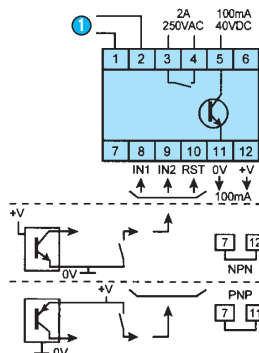
Connections

87 618 042 87 618 142
87 618 044 87 618 144
87 618 048 87 618 148



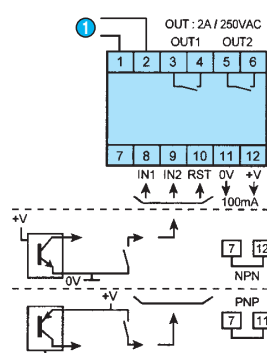
① Supply

87 618 012 87 618 112
87 618 014 87 618 114
87 618 018 87 618 118



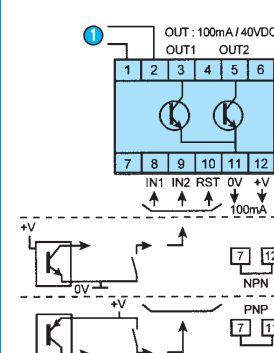
① Supply

87 618 022 87 618 122
87 618 024 87 618 124
87 618 028 87 618 128



① Supply

87 618 062 87 618 162
87 618 064 87 618 164
87 618 068 87 618 168



① Supply

Preselection and multifunction up/down counters 48x48

→ CP4 Red illuminated display

- Presets and scale factor easy to alter
- Large back-lit LCD display or red illuminated display
- Simultaneous display of current value and preset
- Safeguarded : good resistance to interference
- Backed up on EEPROM memory
- Slide-out electronics for easy maintenance

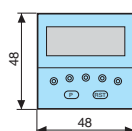
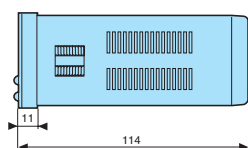


Specifications

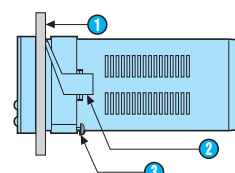
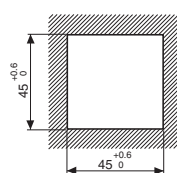
Type	Time base	Counting input modes	Designation	Output	Voltages	Code
4341-1 preset	-	UP, DN, PH	Up/down counter	NO, 1 contact and 1 solid state	10 to 30 VDC	87 618 112
					20 to 55 VAC	87 618 114
					80 to 260 VAC	87 618 118
				1 changeover relay	10 to 30 VDC	87 618 142
					20 to 55 VAC	87 618 144
4342-2 preset	-	UP, DN, PH	Up/down counters	NO, 2 solid states	80 to 260 VAC	87 618 148
					10 to 30 VDC	87 618 162
					20 to 55 VAC	87 618 164
				NO, 2 contacts	80 to 260 VAC	87 618 168
					10 to 30 VDC	87 618 122
4344-2 preset	-	DIR, IND, CUMUL, PH	Up/down counters	NO, 2 solid states	20 to 55 VAC	87 618 124
					80 to 260 VAC	87 618 128
					10 to 30 VDC	87 618 172
				NO, 2 contacts	20 to 55 VAC	87 618 174
					80 to 260 VAC	87 618 178
4392-2 preset	99h59min - 99min59s - 99.99s - 24h	UP, DN, IND, CUMUL, DIR , PH, PH2, PH4	Multifunctions : Counters - "Batch" counters - Totalizers - Tachometers - Chronometers	NO, 2 solid states	10 to 30 VDC	87 618 132
					20 to 55 VAC	87 618 134
					80 to 260 VAC	87 618 138
					10 to 30 VDC	87 618 362
					20 to 55 VAC	87 618 364
					80 to 260 VAC	87 618 368
					10 to 30 VDC	87 618 322
					20 to 55 VAC	87 618 324
					80 to 260 VAC	87 618 328

Dimensions

CP4



Panel cut-out



- 1 Panel thickness 1 to 10 mm
- 2 Fixing clip
- 3 Positioning screw

Preselection and Multifunction up/down counters 72x72

→ CP7 : Back lit display

→ CP7 : red illuminated display

Physical details and protection	
Immunity from micro power cuts	Version 10 to 30 V DC : 10 ms Version 20 to 55 V AC : 10 ms Version 80 to 260 V AC : 10 ms
Relative humidity (no condensation)	95 %
Altitude	0 - 2000 m
Insulation (IEC-664-1)	2.5 kV
Standards	Conforming to IEC 1000.4.2 : Level 3 Conforming to IEC 1000.4.3 : Level 3 Conforming to IEC 1000.4.4 : Level 3 Conforming to IEC 1000.4.6 : Level 3 Conforming to EN 55022/11 group 1 : Class A
Vibration resistance in 3 axes acc. to IEC 68-2-6	10 - 55 Hz / 0.35 mm
Material	Self-extinguishing
Connection by screw terminals	•
Terminal capacity	2 x 1.5 mm ²
Mounting Front panel, by clip	•
Front panel protection	IP 54
Front panel watertight seal	•
Temperatures limits use (°C)	0 → +55
Temperature limits stored (°C)	-25 → +70
Weight (g)	290
Outputs solid state characteristics	
Type NPN open collector	•
Maximum current	100 mA
Maximum voltage	40 V DC
Voltage drop	< 1.5 V
Response time	< 250 µs
Relay output characteristics	
1 or 2 changeover relays	•
Current rating	2 A
Maximum voltage	250 V AC
Max contact rating (resistive) - AC1	500 VA
Rated current	100 mA
Response time	< 10 ms
Mechanical life (operations)	3 x 10 ⁷
Electrical life under I max. resistive AC 1	1 x 10 ⁵
Output modes : maintained or pulsed (fixed pulse duration)	t = 0.9 s to 9.9 s for types 7192 and 7392 t = 500 ms for other types
Single shot or repetitive (immediate auto reset)	•
Supply (min/max values)	10 → 30 V DC 20 → 55 V AC 80 → 260 V AC
Maximum consumption - Version DC	< 5 W
Maximum consumption - Version AC	< 13 VA
Operating characteristics	
Functions	Preselection up/down counter Multifunction : counters, "Batch" counters, tachometers and chronometers
Number of presets	1 or 2
Back-lit LCD or red illuminated display	Current value : 6 digits Preset : 6 digits
Height of digits	Current value : 10 mm Preset : 6 mm
Display details	-9999 - + 99 999

Inputs specifications	
2 counting inputs IN1, IN2	•
1 inhibit input	•
Input modes	•
UP, DN, CUMUL, DIR, IND PHASE, PHASE x 2	
PHASE x 4	
Contact, voltage or solid state (NPN/PNP by changeover switch)	•
Low level	0 → 1 V DC
High level	4 → 30 V DC
Impedance	10 kΩ
Counting speed	
Counter	5 kHz (2.5 kHz in phase 4) 30 Hz in debounce mode
Counting speed - Multifunction	
Counter UP, DOWN, DIR	7.5 kHz
Counter non simultaneous IND, CUMUL (IN1 & IN2 non simultaneous)	7.5 kHz
Counter IND, CUMUL (IN1 & IN2 simultaneous)	4.0 kHz
Counter / Tachometer PH, PH2	5.0 kHz
Counter /Tachometer PH, PH2 (except in Batch mode)	4.0 kHz
Counter PH4	2.5 kHz
Tachometer UP, DOWN, DIR	9.0 kHz
Tachometer IND, CUMUL (IN1 IN2 non simultaneous)	9.0 kHz
Tachometer IND, CUMUL (IN1 IN2 simultaneous)	5.0 kHz
Tachometer PH4	4.0 kHz
Totalizer UP, DOWN, DIR	6.0 kHz
Totalizer IND, CUMUL (IN1 & IN2 non simultaneous)	6.0 kHz
Totalizer IND, CUMUL (IN1 & IN2 simultaneous)	3.0 kHz
Totalizer PH, PH2	3.5 kHz
Totalizer PH4	1.5 kHz
Reset	
Reset to zero or to preset	From front panel : if not protected in programming phase Electrical : by contact, voltage or solid state device (NPN or PNP if present)
Minimum pulse time	5 ms
Low level	0 → 1 V DC
High level	4 → 30 V DC
Impedance	10 kΩ
Option to protect against reset from front panel	•
Scale factor (each input pulse is multiplied by this figure)	00.0001 → 99.9999
Decimal point selectable for ease of reading	xxxxxx, xxxxx.x, xxxx.xx, xxx.xxx, xx.xxxx
Sensor supply Version AC	12 V DC / 100 mA
Sensor supply Version DC	Un - 2V / 100 mA
Programming and current value backed up via EEPROM memory	•

Preselection and Multifunction up/down counters 72x72

→ CP7 : Back lit display

- Presets and scale factor easy to alter
- Large back-lit LCD display or red illuminated display
- Simultaneous display of current value and preset
- Safeguarded : good resistance to interference
- Backed up on EEPROM memory
- Slide-out electronics for easy maintenance



Specifications

Type	Time base	Counting input modes	Designation	Output	Voltages	Code
7141- 1 preset	-	UP, DN, IND, CUMUL, DIR, PH, PH2, PH4	Up/down counters	1 changeover relay + 1 solid state relay	10 to 30 VDC 20 to 55 VAC 80 to 260 VAC	87 619 012 87 619 014 87 619 018
7142-2 preset	-	UP, DN, IND, CUMUL, DIR, PH, PH2, PH4	Up/down counters	2 changeover relays + 2 solid states	10 to 30 VDC 20 to 55 VAC 80 to 260 VAC	87 619 022 87 619 024 87 619 028
7192-2 preset	99h59min - 99min59s - 99.99s - 24h - 999.99h - 999.99min	UP, DN, IND, CUMUL, DIR, PH, PH2, PH4	Multifunctions : Counters - "Batch" counters - Tachometers and chronometers - Totalizers	2 changeover relays + 2 solid states	10 to 30 VDC 20 to 55 VAC 80 to 260 VAC	87 619 222 87 619 224 87 619 228

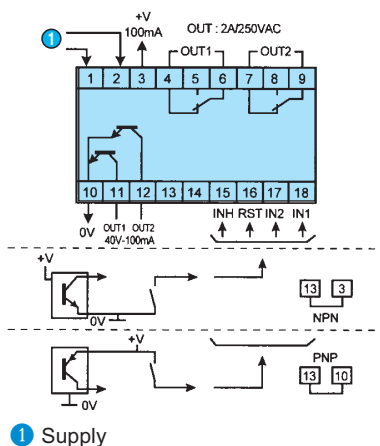
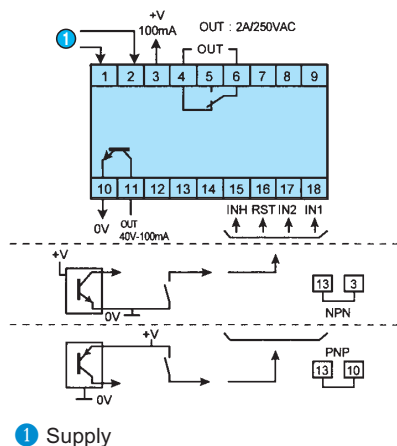
Connections

87 619 012
87 619 014
87 619 018

87 619 112
87 619 114
87 619 118

87 619 022
87 619 024
87 619 028

87 619 122
87 619 124
87 619 128



Preselection and Multifunction up/down counters 72x72

→ CP7 : red illuminated display

- Presets and scale factor easy to alter
- Large back-lit LCD display or red illuminated display
- Simultaneous display of current value and preset
- Safeguarded : good resistance to interference
- Backed up on EEPROM memory
- Slide-out electronics for easy maintenance

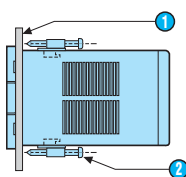
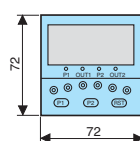
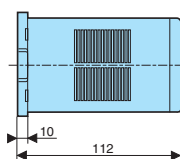


Specifications

Type	Time base	Counting input modes	Designation	Output	Voltages	Code
7341-1 preset	-	UP, DN, IND, CUMUL, DIR, PH, PH2, PH4	Up/down counter	1 changeover relay + 1 solid state	10 to 30 VDC	87 619 112
					20 to 55 VAC	87 619 114
					80 to 260 VAC	87 619 118
7342-2 preset	-	UP, DN, IND, CUMUL, DIR, PH, PH2, PH4	Up/down counter	2 changeover relays + 2 solid states	10 to 30 VDC	87 619 122
					20 to 55 VAC	87 619 124
					80 to 55 VAC	87 619 128
7392-2 preset	99h59min - 99min59s - 99.99s - 24h - 999.99h - 999.99 min	UP, DN, IND, CUMUL, DIR, PH, PH2, PH4	Multifunctions : Counters - "Batch" counters - Totalizers - Tachometers - Chronometers	2 changeover relays + 2 solid states	10 to 30 VDC	87 619 322
					20 to 55 VAC	87 619 324
					80 to 260 VAC	87 619 328

Dimensions

CP7



- ① Panel thickness
- ② Screw

Panel cut-out

