

# RA20 Series

## USER'S MANUAL

### Overview:

**RA20** is a programmable unit based on microprocessor, made for marine applications.

It reads engine revolutions digitally and counts engine working hours.

RA20 is compatible with the more common signals and transducers:

- magnetic pick-up on crown wheel;
- PNP sensor / proximity switch (positive output);
- NPN sensor / proximity switch (negative output);
- alternator "W" contact.

Other features:

- revolutions readings **down to 1 RPM**;
- RPM adjustable value, display refreshing time (from 0.2 up to 25 secs), resolution (1 or 10 RPM);
- working hours adjustment;
- two User-adjustable overspeed alarm thresholds (A1 and A2);
- output relay pin (SPDT) to repeat buzzer signal ("Hold" mode) or alternatively, to repeat A1 alarm ("Hysteresis" mode, A2 excludes).

### Functioning:

After switching on, a "lamp-test" is executed.

Display shows actual revolutions and RPM LED stays on. Pressing **SEL** key once, display changes to working hours (HOUR LED on): thousands first (\_00.), and after few seconds, hundreds-tens-units (000).

Pressing **SEL** key again, display shows A1 alarm threshold, then A2 alarm threshold.

Quite apart from what display shows, after a couple of seconds RA20 comes back to RPM visualization automatically.

**TYPE** and **MODE** keys allow to change the display luminous intensity.

**SET** key works to shut off buzzer and switch off the internal relay if it's used to repeat buzzer signal.

#### In alarm condition:

"Hold" mode:

- alarm LED blinks;
  - buzzer is activated and internal relay acts (only if not excluded by **SEt2** options).
- SET** key switch off buzzer and internal relay, but alarm LED stays on as well as alarm condition persists.

"Hysteresis" mode:

- buzzer is activated;
- when A1 LED goes on, internal relay acts (A2 disabled).

Every new alarm condition will repeat the whole procedure.

If one or both alarm thresholds are not used, they have to be disabled moving up their value until **ESC** message appears in set-up mode.

RA20 has a display **luminous intensity regulation**. If luminous memory is on (see **Lu** code in **SEt1** table), after switching on display stays at previous intensity regulation. This is useful if RA20 works only at night.

### Keys :

<b>TYPE</b>	increase display luminosity / increase value in set-up mode;
<b>MODE</b>	decrease display luminosity / decrease value in set-up mode;
<b>SET</b>	switch off buzzer and internal relay / set-up accessing;
<b>SEL</b>	RPM - Hours swapping / next step in set-up mode.

### Set-up:

**Entering set-up:** press **SET** key for 10 seconds until buzzer produces a "beep" and **SEt1** message appears on display; release **SET** key. During set-up procedure, A and B LEDs blink.

**SEL** key allows to go ahead to next step. Value can be set by **TYPE** key (increase) and **MODE** key (decrease). **SEt1** table shows set-up codes.

Once all changes are made, **SEt1** message appears again: **exit from set-up and store in memory changes by pressing TYPE key.**

Instead of store, press **SET** key for 20 seconds until buzzer produces a "beep" and **SEt2** message appears on display; release **SET** key.

To move in second level set-up, use the same keys and procedures described above.

**Caution:** if no keys are pressed for more than one minute, RA20 will escape from set-up mode and **no changes** will be stored in memory.

### RPM calibration:

If number of pulses per revolution isn't known, **rP** in **SEt1** table is the right code to be set by a **precision revolutions counter**.

If relation is known, **rA** in **SEt1** table is the right code to be set. **rP** code has to be ignored.

If RA20 reads more than **9999** RPM, an **Err** message appears on display.

To leave from this situation, try to increase the **rA** code value in **SEt1** and then repeat the calibration.

**It's important to exit correctly from set-up to store in memory changes.**

### Oil Change

When the oil change counter elapses LED B1 blinks, the buzzer beeps and the siren output is activated.

After the oil has been changed it is necessary to manually reset the counter.

To reset the counter press **TYPE** and **MODE** for few seconds when viewing the oil change counter.

If this operation is performed when the oil change is signalled the signalling will stop.

### Particular function and signaling:

- Setting default datas: switch on panel keeping **SEL** key pressed.  
**WARNING : all previous informations will be lost forever.**
- SEt1 and SEt2 tables show default datas between square brackets.
- All LEDs blinking indicate a memory damage. Press **SET** key to visualize error code.

## SEt1 table:

Code	Description	[default]
rP	Lettura dei giri (per regolazione con contagiri di riferimento)	
rA	Pulses per single revolution	[10.00]
Hr	Workinghours (1 step = 10 hours)	[00.00]
HoiL	time left to maintenance or oil change	
toiL	time interval between every maintenance	[0000]
Lu	0 = luminosity memory off 1 = luminosity memory on	[0000]
A1	first overspeed alarm threshold – move up to ESC to exclude	[ESC]
A2	second overspeed alarm threshold – move up to ESC to exclude	[ESC]
tCH	display refreshing time (from 0.2 to 25 secs)	[00.80]
riS	0 = 10 revolutions resolution 1 = 1 revolution resolution	[0001]
LrP *	0 = normal mode: min. 200 RPM required 1 = low mode: revolutions reading starting from 1 RPM	[0000]
CorE	0 = working hours counter actives when engine works only 1 = working hours counter always actives	[0000]
oA1	0 = output on alarm thresholds A1 disabled 1 = output on alarm thresholds A1 enabled	[0001]
oA2	0 = output on alarm thresholds A2 disabled 1 = output on alarm thresholds A2 enabled	[0001]
SEt1	Press <b>TYPE</b> key to exit set-up and store in memory changes	

\* if set to 1, rA code value **can't** be more than "10.00".

While RPM are less than 100, display shows a **decimal** also.

Note: display refreshing slow down depending on time passed between one pulse and another, with a 90 secs max waiting time.

## SEt2 table:

Code	Description	[default]
ti	0 = Hold mode A1 and A2 alarms – Slope +	[0]
	1 = Hold mode A1 and A2 alarms – Slope -	
	2 = Hysteresis A1 alarm – Slope + (A2 alarm disabled)	
	3 = Hysteresis A2 alarm – Slope - (A2 alarm disabled)	
bu	0 = buzzer enabled	
	1 = buzzer disabled	[1]
iSt1	A1 threshold hysteresis [RPM]	[20]
iSt2	A2 threshold hysteresis [RPM]	[20]

rit1	A1 alarm intervention time-delay (seconds)	[1]
rit2	A2 alarm intervention time-delay (seconds)	[1]
SEt2	Press <b>TYPE</b> key to exit set-up and store in memory changes.	

## Technical specifications:

Power supply	12/24 V d.c. (from 10 to 30 Volt d.c.)
Power consumption	Is < 200 mA @ 12V; Is < 100 mA @ 24V
Working temperature	-5 / 60 °C
Range of measure	from 1 up to 50,000 RPM
Accuracy	< 1 @ 6,000 RPM (rA value set to 1, SEt1 table)
Resolution	1 or 10 RPM, depending on riS value, SEt1 table
Max input frequency	5 KHz for PNP and NPN - 10 KHz for "W" contact 20 KHz for magnetic pick-up
Alarms	User-adjustable A1 and A2 alarm thresholds, LEDs signalings, buzzer, buzzer repeating or A1 alarm repeating (A2 disabled).
Relay Output	SPDT I <sub>max</sub> = 2A res. / V <sub>max</sub> = 50 V
Alarms Outputs (RA22 only)	SPDT I <sub>max</sub> = 2A res. / V <sub>max</sub> = 50 V for every single threshold
RPM calibration	From 00.01 to 39.99 (1 step = 0.01) From 40 to 500 (1 step = 1)
Plastic box	DIN 43700 - 48.0 x 96.0 mm Total length: 120.0 mm
Cutting edge	44.0 x 91.0 mm

## Wiring diagram:

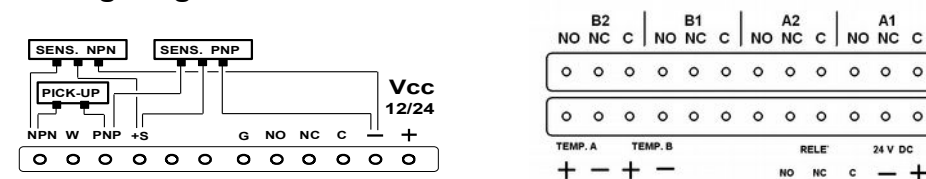


Diagram notes:

- NPN, PNP, W are inputs for related signals or transducers.
- Magnetic pick-up has to be connected to NPN and PNP pins.
- +S amplified transducers power supply (20 mA max).
- NC, NO and C indicates internal relay contacts.
- G is RA20 internal ground (not for User purpose).

