MCH 1300

UNIVERSAL TACHOMETER FOR AGRICULTURAL MACHINES

INSTRUCTION MANUAL

EN

NR.21200MI
REV. 2

CE

This product complies with the EMC requirements as defined by Directives 2004/108/EC and subsequent amendments
and refers to the applied Standard EN ISO 14982

Manufacturer : MC Elettronica S.r.l.
Address : Via E. Fermi, 450/486
Fiesso Umbertiano (ROVIGO) - ITALY
Tel. +39 0425 754713 Fax +39 0425 741130
E-mail: mcstaff@mcelettronica.it
Internet: www.mcelettronica.it

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MC Elettronica S.r.l. *is not obliged to give notice of any further modifications of the product.*

The information given in this manual does not allow unauthorized personnel to tamper the product in any way.

The guarantee on the equipment will no longer be valid if tampering should be detected.

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1. Rules and general warning

1.1 Introduction

This manual gives all the specific information that you need for a proper use of the Tachometer.

After buying the instrument, read the manual carefully and refer to it any time you have doubts on how to use the equipment or when you have to carry out maintenance operations.

Keep the manual on the machine. If this is not possible, keep it ready to hand.

ALL RIGHTS RESERVED. THIS MANUAL IS INTENDED FOR CUSTOMERS ONLY. ANY OTHER USE IS FORBIDDEN.

1.2 Terms of guarantee

- SUBJECT OF THE GUARANTEE: the guarantee is applied to the product and to those parts which are marked with the serial number or any other identification number used by *MC elettronica;*

  HOW LONG THE GUARANTEE IS EFFECTIVE: *MC elettronica S.r.l.* guarantees the *Tachometer MCH 1300* for a period of **1 year** from the manufacturing date (printed on the identification label which is to be found on the rear side of the equipment) and accessories for a period of **1 year**. The guarantee covers the product and any repair carried out within the agreed terms.

  This guarantee does not apply in the event of:

  - accidental damage;
  - improper use;
  - modifications which haven't been agreed upon, improper installation (or setting);
  - damage caused when a non-*MC elettronica* equipment, which is mechanically or electrically connected to our instruments, breaks or does not function properly;
  - act of God (lightning, floods, fire or other causes which do not depend from *MC elettronica*).

  Repairs under guarantee, which must be carried out in the laboratories of our authorized centres, are entirely free of charge provided the equipment is directly transported to said laboratories or sent free port. Transport charges and risks are entirely borne by the Customer.

  The above-mentioned guarantee is valid unless otherwise stated between *MC elettronica* and the Customer.

Warning
Mc elettronica declines any liability for damages or direct or indirect charges, as a consequence of improper use or inability of the Customer to use the equipment separately and/or together with other instruments..

1.3 Service

Service is available in all the countries where the equipment is officially supplied by *MC elettronica* (during and after the guarantee period).

Any kind of operation that is to be carried out on the *Tachometer MCH 1300* must be done in accordance with the instructions stated in this manual or as agreed with *MC elettronica*.

If not, the relative terms of guarantee might become void.

2. General description

The universal Tachometer MCH 1300 can be installed on every type of agricultural machine.

With the MCH 1300 the operator can check the following data:

- RPM of primary propeller shaft or PTO;
- working hours;
- advancing speed;
- partial area worked;
- total area worked.

In order to carry out all the above said functions the Tachometer makes use of a capacitive sensor for the seed-level reading, which shall be installed in the product, tank , of a magnetic sensor, which shall be installed near the machine wheel in order to detect the machine speed, and of a further magnetic sensor (identical to the previous one), which shall be installed in correspondence of the PTO outlet or of another rotating member whose rotating speed shall be checked (RPM = revolutions per minute).

If the supplied magnets cannot be installed on the magnetic sensors (see paragraph 3.2.1 on page 9) such magnetic sensors can be substituted with inductive proximity sensors which are able to detect metal marks instead of magnets (see the paragraph 3.2.2 on page 11).

3. How to install the system

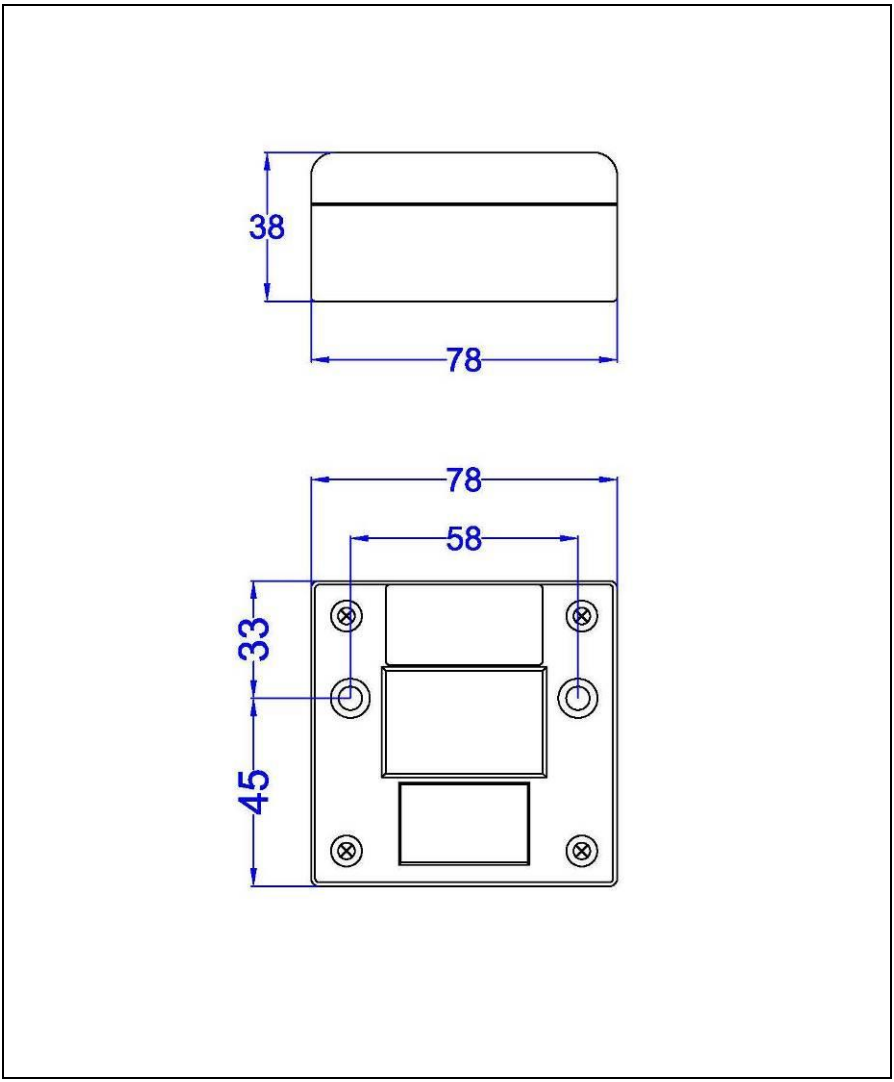


Figure 1. Overall dimensions

3.1 How to assemble the Tachometer

To assemble the Tachometer operate as follows:

- Clean a flat and smooth surface inside the vehicle cab with a specific detergent and apply the adhesive velcro **(B)**.
- You can now attach the speed indicator by making it coincide with the Velcro on the back **(A)**.

N.B.: We recommend to install the Tachometer opposite the operator in order to facilitate its usage during the working cycle.

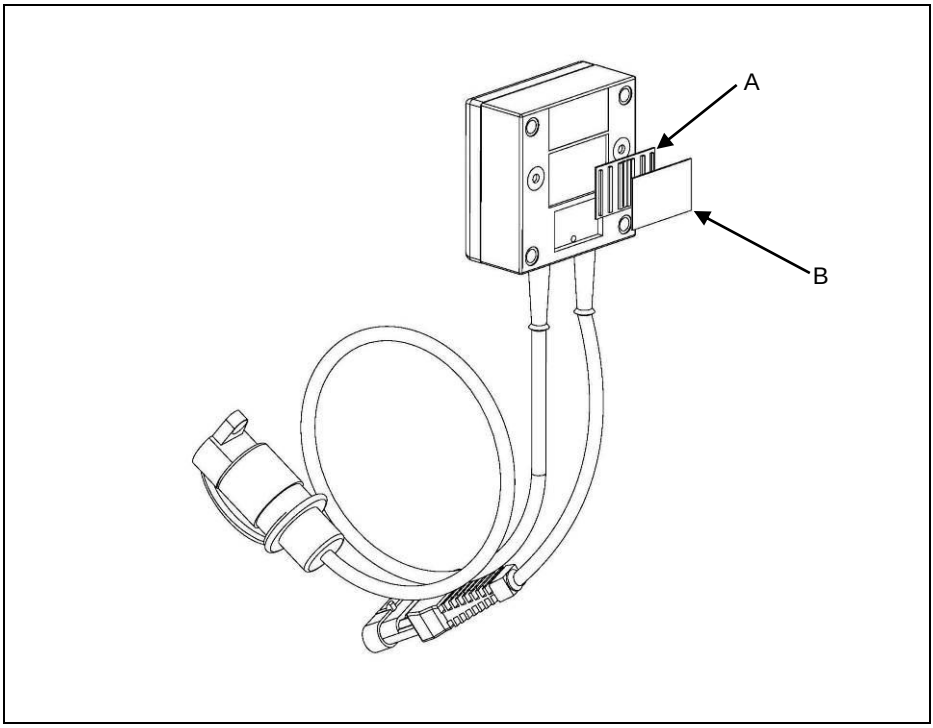


Figure 2. How to install the Tachometer.

NOTE: The Tachometer MCH 1300 can be connected indifferently on each of the 4 cables provided for: order the cable according to the functions to be checked (see table Plate 3).

3.2 Installazione dei sensori

The Tachometer MCH 1300 can be equipped with 3 types of sensors:

- Magnetic sensor D.12 (code 1987): one is for speed reading and the other is for the revolutions-per-minute reading of the power takeoff (or of another rotating member of the machine); this sensor detects the presence of a supplied magnet D. 20 code 50 (supplied);
- Capacitive sensor D.18 (code 2025) for seed-level reading in the seed tank; this sensor detect the presence of very small granular products;
- Inductive sensor D.12 (code 3717): this can be used as an option to the magnetic sensor code 1987; the inductive sensor detects the presence of a metal mark (optional).

3.2.1 How to install the magnetic sensor D.12 cod. 1987

For a proper functioning of the magnetic sensors the sensor head should be positioned in front of the magnet D.20 cod. 50 and the distance between the sensor and the magnet adjusted to about 4 ÷ 6 mm (Figure 3 – see <**A**>).
Fasten the sensor to a metal support (not supplied) by means of a bolt and a lock nut.

Warning
The detector cable should be covered with a rubber sheath.

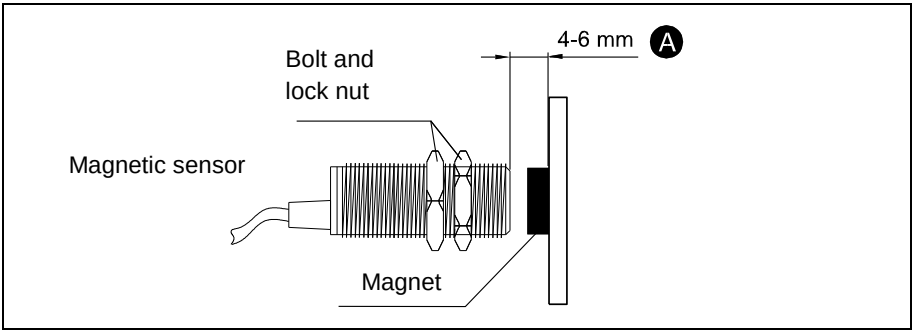


Figure 3. Typical installation of the magnetic sensor D.12 cod. 1987.

The following pictures show typical installations of the magnetic sensors for detecting speed (Figure 4) and revolutions / minute of PTO (Figure 5).

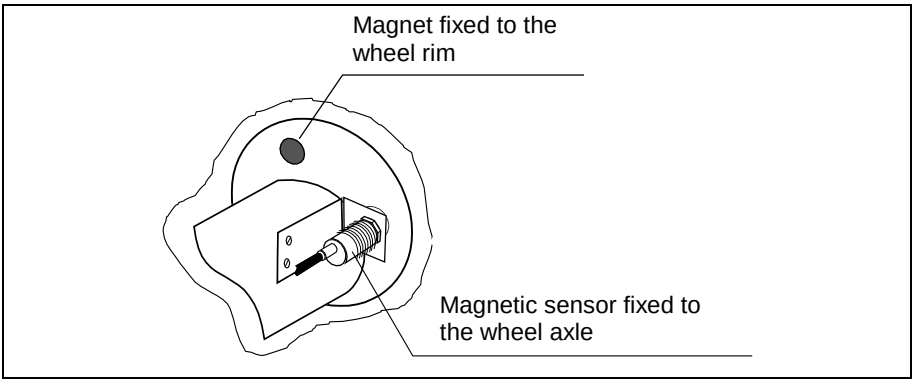


Figure 4. Example of installation of the magnetic sensor D.12 cod.1987 for detecting speed.

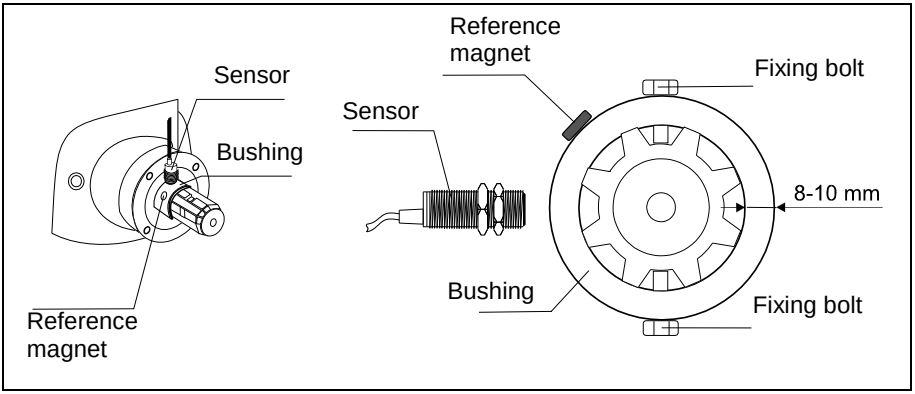


Figure 5. Example of installation of magnetic sensor D.12 cod.1987 for detecting PTO speed.

3.2.2 How to install the inductive sensor D.12 cod. 3717 (optional)

The inductive sensor, code 3717, can be installed as an option to the magnetic sensor, code 1987, in case the mark magnet D.20, code 50, cannot be easily installed. In fact this inductive sensor is capable to detect any metal mark, but the distance between the sensor and the metal mark shall be of about 1÷2 mm (Figure 6 - rif.<**A**>).

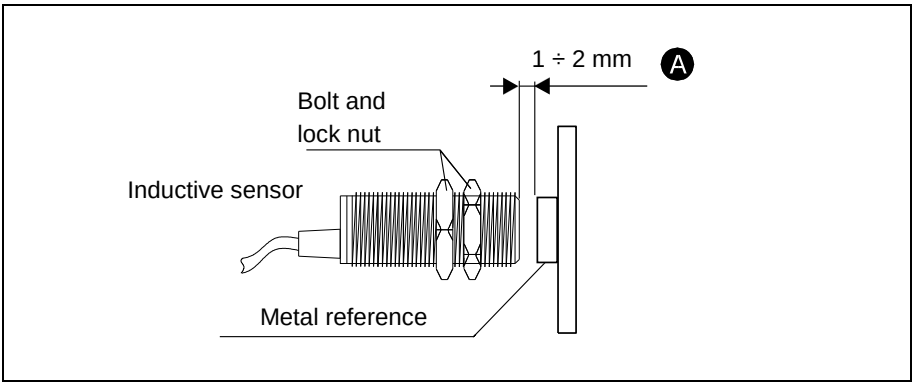


Figure 6. Typical installation of the inductive sensor D.12 cod. 3717.

The following pictures show typical installations of the inductive sensors for detecting speed (Figure 7) and revolutions / minute of PTO (Figure 8).

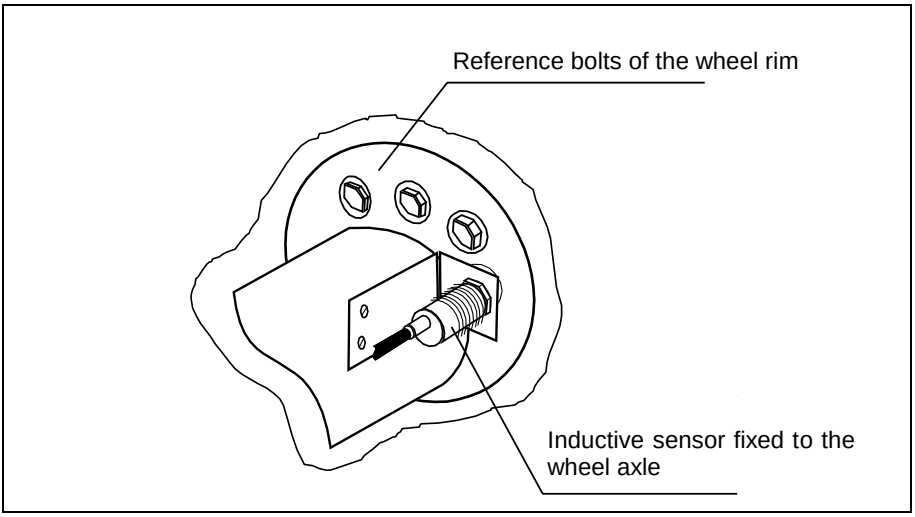


Figure 7. Installation of the inductive sensor D.12 cod. 3717 for detecting speed.

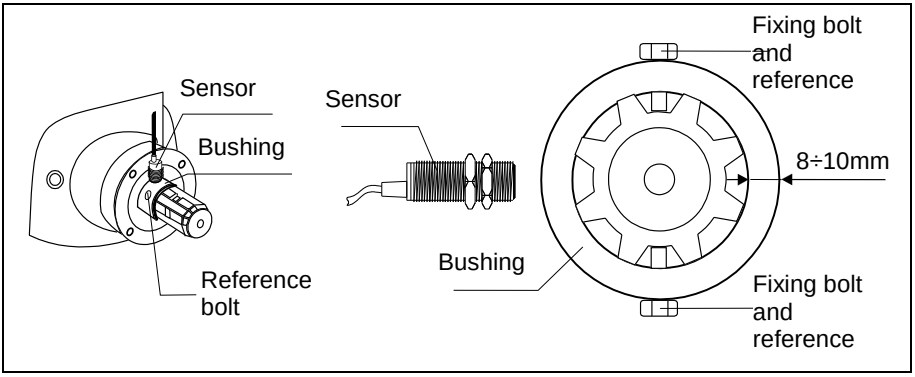


Figure 8. Example of installation of the inductive sensor D.12 cod. 3717 for detecting PTO speed.

3.2.3 Installation of seed level capacitive sensor D.18 cod. 2025

The seed level capacitive sensor should be positioned so to verify when the level of product in the tank decreases and goes below the reserve limit. The capacitive sensor can be installed inside the seed tank Figure 9 - example 1) by means of a clamping bracket (not supplied) or it can be directly fixed on the tank frame Figure 9 - example 2) and fastened with a bolt and a lock nut. The red part of the capacitive sensor MUST touch the product: so, by positioning the sensor head in correspondence of the reserve limit, when the sensor is covered by the product (see <**1**> examples 1 and 2 Figure 9) DOES NOT SEND the alarm signal, but if the sensor head, while working, remains uncovered (see <**2**> examples 1 and 2 Figure 9) the corresponding red LED will be activated (see <**C**> a pag.14) together with the alarm signal.

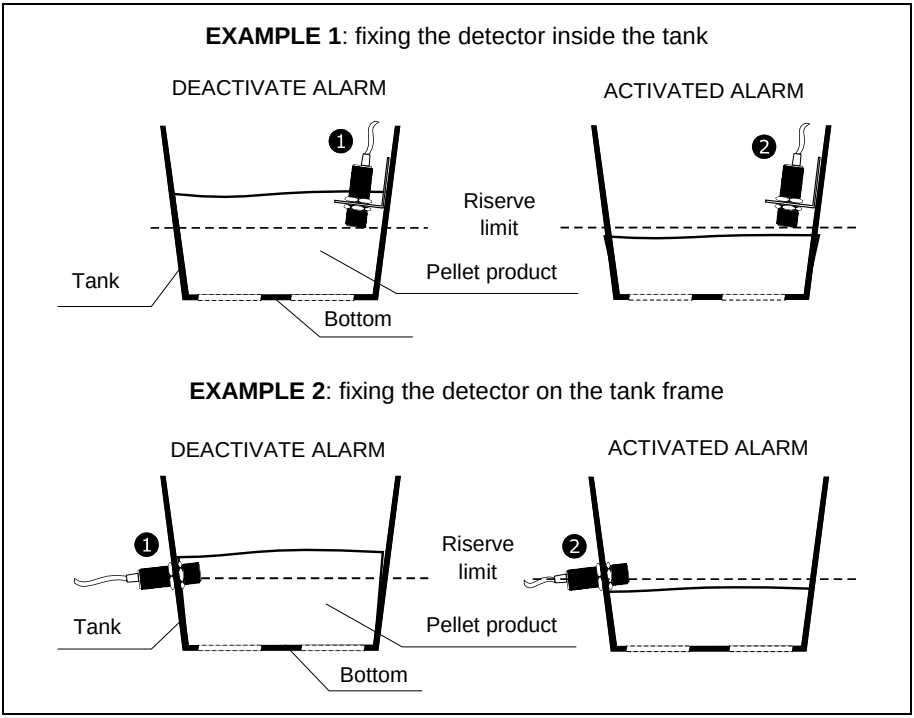


Figure 9. Example of installation of the seed level capacitive sensor cod. 2025.

3.3 Front view

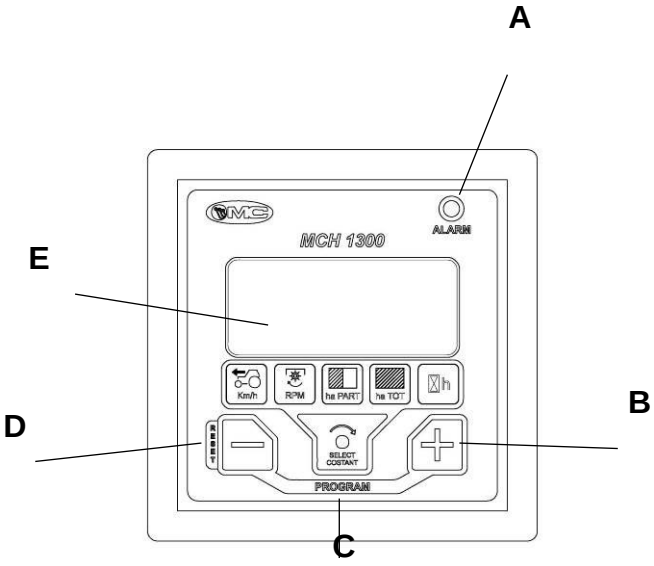
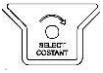


Figure 10. Front view.

The front panel allows the user to display all the working phase data. The panel displays the following functions:

REF.	DESCRIPTION
A.	Seed reserve signaling alarm LED
B.	Programming key for increasing (+) parameters
C.	Key for selecting parameter (displayed in a cyclic way)
D.	Programming key for decreasing (-) parameters or resetting total and partial area counters (RESET)
E.	4-digit back-lighted LCD dimension Display

3.3.1 Keyboard

KEY	FUNCTION
	Programming key “+”. By pressing the key together with key for <3> seconds it allows the operator to enter the programming phase (see chapter 5 on pag. 18). During the programming phase, it allows the operator to increase the value of the parameter to be programmed (by pressing and holding the key, the variation of the values will be more quickly).
	Multifunction key: • Programming key “–“; By pressing the key together with key for <3> seconds it allows the operator to enter the programming phase (see chapter. 5 on pag. 18). During the programming phase, it allows the operator to decrease the value of the parameter to be programmed (by pressing and holding the key, the variation of the values will be more quickly). • RESET key: While not during the programming phase, by pressing the key it is possible to reset one by one total area, partial area and working hours counters. ***N.B.: it is possible to reset the desired counter only when the corresponding value is displayed!***
	By pressing this key, it is possible to display cyclically the working figures in connection with the parameter “P” (see chapter 5 on pag. 18); if this parameter is programmed to <1>, the cyclic displaying will be the following: **1** Advancing speed (Km / h); **2** PTO speed (revolutions / minute); **3** Partial area (only when speed is detected); **4** Total area (only when speed is detected); **5** Working hours.

3.4 Back view

The following elements are present on the rear side of the Tachometer MCH 1300:

A. ID plate reporting all the most important data
B. Inserts M5
C. Fixing Velcro DUAL LOCK 3M

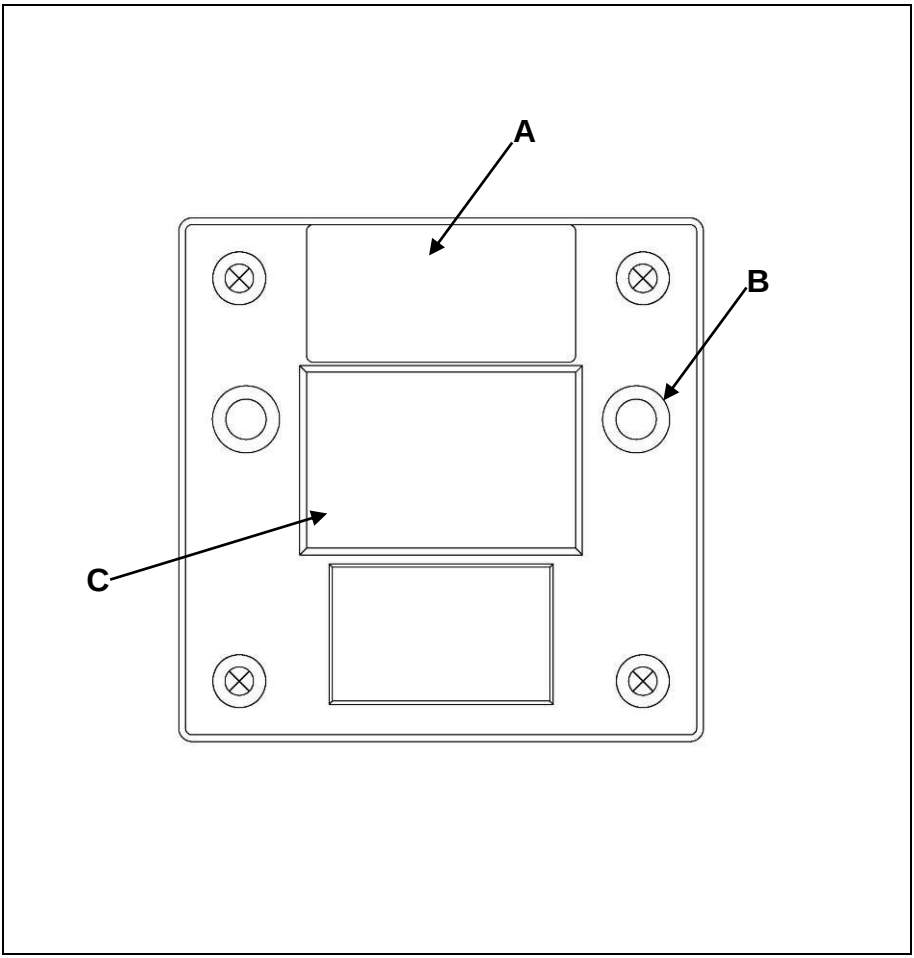


Figure 11. Back view.

4. Accessories

Table 4-1. Accessories		
CODE	**DESCRIPTION**	
1987	Magnetic sensor D.12	cable L= 2000 mm
50	Round magnet D.20	
3717	Inductive sensor D. 12	cable L= 2000 mm
2025	Capacitive sensor D.18	cable L= 2000 mm
1983	Cable MCH 1300 – (1 input: rev./min.)	L= 2000 mm
1984	Cable MCM 1300 – (2 inputs: speed + rev./ min.)	L= 2000 mm
2388	Cable MCM 1300 – (2 inputs: speed + seed reserve alarm)	L= 2000 mm
1985	Cable MCM 1300 – (3 inputs: speed + rev./ min. + seed reserve alarm)	L= 2000 mm

5. Programming

Press and keys simultaneously for <3> seconds until parameter “C” is displayed:

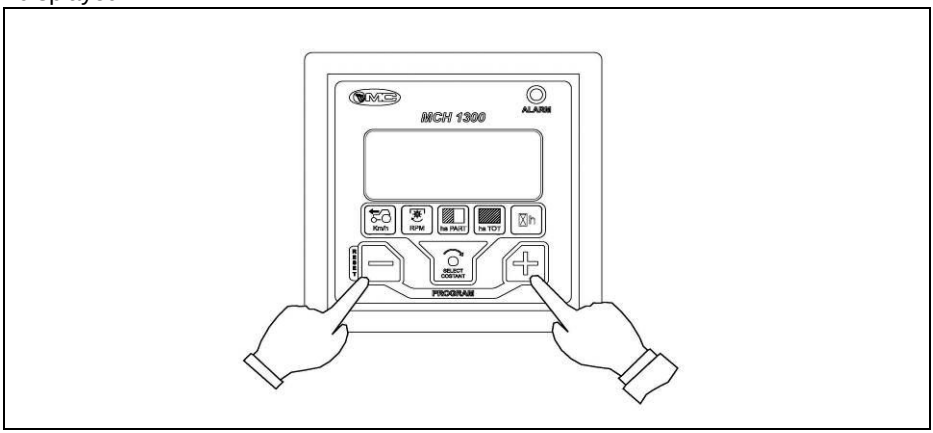


Figure 12. Programming.

The name of the parameter to be programmed starts blinking on the left side of the display;

press key to increase the value or key to decrease the value of the parameter.

To store the desired value and pass to the next parameter to be programmed, press , key for about 1 second, until the name and value of the next parameter is displayed.

To quit programming of all parameters, press key many times.

The following table shows the parameters that can be programmed:

PARAMETER	PROGRAMMING
C	How to set the parameter for advancing speed in Km/h (optional): Enter the number of impulses x 100 linear metres coming from the proximity sensor. (1 reference = 1 impulse) **Setting field** : 20 ÷ 999 **step** : 1 **default** : 200
05.00 (N.B.: for space reasons on the display, only the reading of this parameter is shown)	Working width in metres (necessary for counting total and partial area worked). **Setting field** : 0,10÷40,00 **step** : 0,01 **default** : 5.00
i	Number of pulses that the PTO speed sensor (or another rotating member sensor) gets for each revolution; in the example on page 12, it is 1.0 (only one mark per revolution) while in the example on page 11, it is 2 (that is two marks per revolution). **Setting field** : 1,0÷20,0 **step** : 0,1 **default** : 2.0
P	It is the first parameter shown (each time the Tachometer is turned on, this reading is automatically shown) : 1 = Advancing speed (Km/h); 2 = Rotating speed of PTO o any other rotating organ (rev./ min.); 3 = Partial area (hectares); 4 = Total area (hectares); 5 = Working hours. **Setting field** : 1÷5 **step** : 1 **default** : 1

PARAMETER	PROGRAMMING
H	Counting of working hours: • by entering <1> counting starts from the switching on of the Tachometer; • by entering <2> counting is effected only when speed (Km / h) is detected; • by entering <3> counting is effected only when impulses from the sensor for rotating speed of PTO (or any other rotating organ) are detected. **Setting field** : 1÷3 **step** : 1 **default** : 1
A	Selection for the calculating method of the area to be sown and enabling of the buzzer for the seed-level acoustic alarm: • by entering <1> the seed- level acoustic alarm is disabled and the calculation of the partial or total area is only linked to the motion speed (N.B.: if harness code 2065 or code 1984 is used then programme <1> shall be selected) ; • by entering <2> the seed-level acoustic alarm is disabled; it is now possible to use a sensor which automatically stops the calculation of the area although the speed motion is in progress: this particular use is only available upon request – for more information please contact your dealer; • by entering <3> the seed-level acoustic alarm is enabled and the calculation of the partial or total area is only linked to the motion speed (N.B.: if harness code 2388 or code 1985 is used the programme <3> shall be selected. N.B.: (only for Tachometer code 2026): the acoustic alarm will go off uninterruptedly for about <3> seconds, then it will go off every <5> seconds and the alarm will last for about <2> seconds. **Setting field** : 1÷3 **step** : 1 **default** : 1

5.1 Pratical example for calculating the “C” parameter to be programmed

As anticipated previously, in the “C” parameter you have to program the number of impulses the proximity sensor has to send to the Tachometer every 100 linear meters the machine works. Therefore, you must calculate how many reference points will pass in front of the sensor every 100 linear meters. In this example we assume that the proximity sensor is of magnetic type cod. 1987 and is assembled so as to sense a magnet fixed to one of the wheel bolts (see Figure 4 on pag. 10):

- place the machine on a flat ground and mark clearly (with a piece of chalk, for instance) the outer side of the tire in the exact place where it touches the ground (Figure 13 – ref. <**A**>);
- take as your reference on the ground a point that corresponds to the mark you made on the tire (starting point) and move the machine slowly forward until the wheel has made an exact number of rotations, for our example let’s say 30, then stop the machine (end point); to obtain highest precision of setting you’ll need to go at least 50 meters;
- measure the distance from the starting point to the end point;
- let’s assume the distance you measured is 60 meters: 60 meters divided by 30 rotations gives 2 meters as the measure of each rotation of the wheel;
- dividing 100 meters (reference distance for parameter “C”) by 2 meters (wheel circumference) the result is that the machine wheel makes 50 rotations in 100 meters;
- now you only have to multiply the number of **rotations the wheel makes in 100 meters** (according to our calculation, 50) by the number of reference points the sensor detects at each rotation of the wheel (according to our example, 1 bolt): the result is the number of references/impulses that are detected per 100 linear meters (according to our example: 50 x 1 = 50). Insert this value for the “C”-parameter programming;
- If instead of the magnetic sensor D.12 cod. 1987 the inductive sensor D.12 cod. 3717 is used, assembled so as to sense the wheel bolts (Figure 7 pag.12), and the bolts to be sensed are for instance 4, the procedure to be followed is the same as before, but the final counting would be 50 X 4 = 200 and the value for the “C”-parameter programming would be 200.

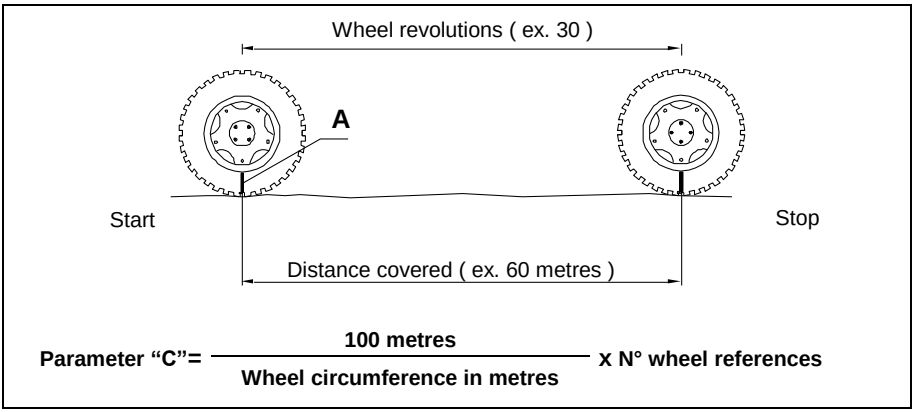


Figure 13. Practical example for calculating the "C" parameter.

5.2 Automatic calibration of the "C" parameter

The automatic calibration of the "C" parameter is carried out by covering an established distance of 100 meters and following the listed routine:

- enter the programming phase (see chapter 5, "Programming" on page 18) and display parameter "C";
- press and keys simultaneously to start counting; "C - 0" will be displayed;
- cover the distance of 100 metres: impulses counting will be displayed (1..2..3..4..);
- after covering the 100 metres press key to stop counting. The impulses are automatically programmed in parameter "C"; after that the next parameter to be programmed (working width) is displayed; if it is not necessary to program other parameters, press key many times to quit programming.

N.B.: we recommend to carry out the operation at least twice. Check that the value is always the same ± 1 impulse.

5.3 How to check magnetic sensor cod. 1987 (or inductive cod. 3717) for functioning

Checking sensors for functioning simply consists in checking electric connections between sensors, cables and Tachometer MCH 1300:

- switch on the Tachometer and wait for the execution of the initial testing;
- if you want to check the sensor mounted to detect the advancing speed, press key to select the advancing speed; " 0.0 " will appear on the right side of the display;
- if the sensor for detecting speed is of magnetic type (cod. 1987), pass over the sensor head repeatedly using the supplied magnet; if instead the sensor is of inductive type (cod. 3717), pass over the sensor head repeatedly using a screwdriver or other metal mass: if the Tachometer displays the speed (even if it is not constant) it means that the sensor is properly connected;

- if you want to check the sensor mounted to detect the rotating speed of PTO o any other rotating organ, press key to select RPM (rev./min.); "0" will appear on the right side of the display;
- if the sensor for detecting RPM is of magnetic type (cod. 1987), pass over the sensor head repeatedly and quickly using the supplied magnet; if instead the sensor is of inductive type (cod. 3717), pass over the sensor head repeatedly and quickly using a screwdriver or other metal mass: if the Tachometer displays the number of rev./min. (even if it is not constant) it means that the sensor is properly connected.

5.4 How to check capacitive sensor cod. 2025 for functioning (if present)

Check the functioning of the capacitive sensor as follows:

- switch on the Tachometer and wait for the execution of the initial testing;
- make sure parameter <A> is programmed with <3> (see chapter 5 "Programming" on pag. 18);
- if the red head of the sensor is completely free, the Red Led will be lighted up (see <C> on pag.14) with a delay of <3> seconds and, (only for the Tachometer code 2026) the acoustic alarm will go off uninterruptedly for <3> seconds, then it will go off every <5> seconds with a duration of <2> seconds;
- by covering the sensor with a hand, the acoustic alarm shall be disabled within <2> seconds (only for Tachometer code 2026) and the red led (see <C> on pag.14) shall go out.

6. Functioning

After programming the work parameters (see chapter 5 “Programming” on pag. 18), follow the instructions listed below:

- Turn the Tachometer on (supply power see Figure 11 on pag. 16). The Tachometer will carry out for <2> seconds a short test, all the sections on the display will be turned on and (only for the tachometer code 2026) the acoustic alarm will be started;
- After the initial test the Tachometer will show on the display the programmed parameter in <P> (see Chapter 5 “Programming” on pag. 18);
- If the capacitive sensor, code 2025, is present (and the Tachometer is properly programmed) and the seed level is lower than seed reserve level (see paragraph 3.2.3 on pag. 13) the red led will light up (rif. <C> on pag.14) and the acoustic alarm will go off uninterruptedly for <3> seconds, and afterwards it will go off every <5> seconds for <2> seconds. Fill up the tank;
- Start the work procedure; while functioning the display shows one at a time the reading of the parameter to be checked. In order to select the parameter desired press the following key . The parameters are selected cyclically, according to lay-out quoted on the following page :

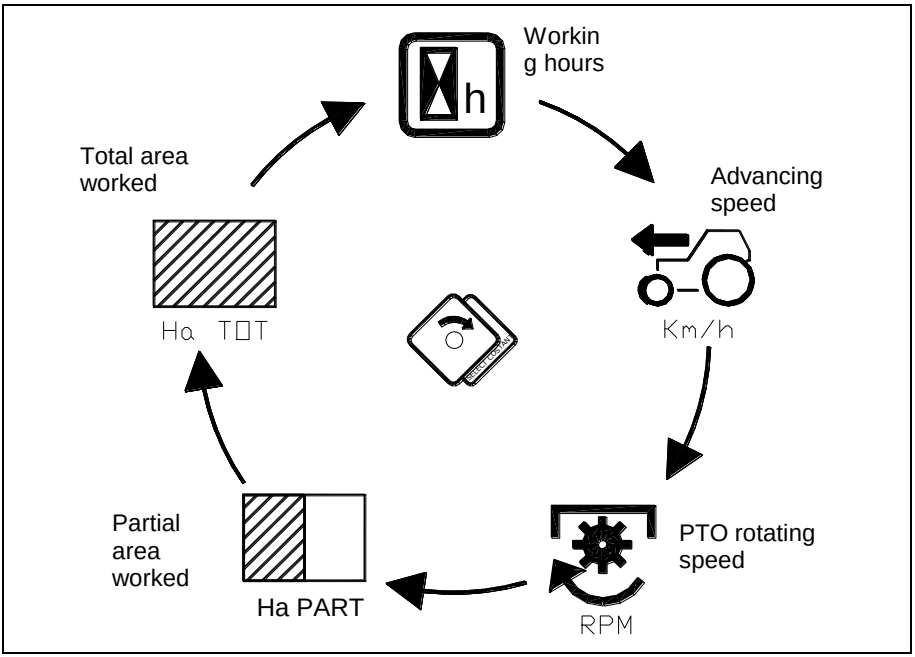


Figure 14. How to select / display working parameters.

- Practical example: if the display shows the advancing speed and the users wish to display the total area worked, they shall press the following key for three times, going from the advancing speed to the revolutions per minute, then going from the revolutions per minute to the partial area worked and finally from the partial area to the total area worked;
- The reading on the display shows what parameter appears, e.g. : if the machine is not running and the display shows “1.2” (only one figure follows the point) this means that the display is showing the working hours (that is 1.2 worked hours). As a rule, the users can figure out the parameter shown by observing how many figures follow the point – see the following table.

No decimal point, whole number	Ex.: 250	Rev. / min. (RPM)
One figure after the decimal point	Ex.: 6.1	Working hours (h). **N.B.:** the users can figure them out also because the reading on the display does not change when the machine is not running. The reading does NOT change to “0.0”
		Advancing speed (Km/h) **N.B.:** the users can figure it out also because the reading on the display changes to “0.0” when the machine is not running.
Two figures after the decimal point	Ex.: 2.30	Partial area worked (Ha PART) **N.B.:** the users can figure it out also because by pressing the key , is cyclically shown after the revolutions per minute which do not have any decimal point
		Total area worked (Ha TOT)

- To reset counters (partial area, total area, working hours), select the parameter desired (key) and, while this parameter is shown on the display, press the following key: (RESET) until the parameter is cleared.

N.B.: to reset counters is necessary to hold key (RESET) pressed for about <3> seconds, therefore for safety reasons it is advisable to carry out such operation WITH THE MACHINE STOPPED.

7. Maintenance

This chapter gives instructions on how to carry out ordinary and extraordinary maintenance.

Ordinary maintenance refers to those operations which must be carried out periodically. As they do not require specific skills, they can be carried out by the users (operators etc.).

Extraordinary maintenance refers to unforeseeable operations due to mechanic or electric failures. They require specific technical skills, so they must be exclusively carried out by qualified personnel (maintenance personnel etc.).

7.1 Ordinary maintenance

Ordinary maintenance consists in cleaning the Tachometer.

Clean the instrument with a wet cloth and mild detergent to avoid erasing the serigraphs on the panel.

Warning

- *Do not use pressure water jets.*
- *Do not use abrasive products, solvents or alcohol.*
- Do not press on the keyboard with pointed or hard objects in order to avoid damaging the polyester film, thus endangering the impermeability of the keyboard.

7.1.1 How to protect the main connector

In case of an extended use of the Tachometer it is advisable to disconnect the main signal connector from the harness. It is advisable to insulate both the connectors (of the Tachometer and of the Harness) by using a Nylon protection.

If the connectors of the Tachometer and of the harness are NOT disconnected no protection is needed.

7.2 Extraordinary maintenance

Warning

Extraordinary maintenance must be carried out by authorized personnel only.

8. Operating anomalies

In the event of problems with functioning, carry out these simple controls to check if repairs are needed.

If the problem still remains after carrying out the suggested controls, consult your local dealer or contact *MC elettronica* Technical Service.

ANOMALY	CAUSE	REMEDY
The Tachometer does not switch on	The supply cable is disconnected or blocked	Check the supply cable
The Tachometer display doesn't show any advancing speed but remains at "0.0", or displays a speed which is not constant (with changes greater than 0.2 Km/h)	a. Sensor cable cut off or unplugged connector b. Sensor calibration distance too high c. The head of the detector is damaged	a. Restore the connection b. Adjust the calibration distance. c. Replace the sensor
The display doesn't show any rotating speed of PTO or of any other rotating organ	a. Sensor cable cut off or unplugged connector b. Sensor calibration distance too high c. The head of the detector is damaged	a. Restore the connection b. Adjust the calibration distance. c. Replace the sensor
The red alarm LED does not switch on	a. Capacitive sensor cable cut off or unplugged connector	a. Restore the connection
	b. Check that parameter "A" is programmed with <3> c. The red head of the sensor is damaged	b. Program parameter "A" with <3>, see chapter 5 on pag. 18 c. Replace the sensor

ANOMALY	CAUSE	REMEDY
The red alarm LED is permanently on	a. Short circuit within the capacitive sensor cable	a. Restore the connection
	b. The red head of the sensor is damaged	b. Replace the sensor

9. Technical data

9.1 Technical data Tachometer MCH 1300 cod. 00MON-MCH1300

Supply voltage	: 10 ÷ 16 VDC
Max current absorbed 16 VDC	: 250 mA
Operating Characteristics	
Protection degree	: IP 65
Mechanic Vibration resistance	: 2 G
Operating Conditions	
Environment temperature	: -20°C ÷ +75°C
Weather conditions	: Relative moisture 90%
Transport and Storing	
Temperature	: -25°C ÷ +85°C

9.1.1 Magnetic sensor D.12 cod. 1987

Supply voltage	: 10 ÷ 16 VDC
Output signal	: Contact toward the mass
Max. operating frequency	: 1000 Hz
Operating temperature	: - 25°C ÷ +85°C
Max. intervention distance	: 10mm (with magnet D.20 cod. 50)
Protection degree	: IP 67

9.1.2 Inductive sensor D.12 cod. 3717 (optional)

Supply voltage	: 10 ÷ 16 VDC
Output signal	: NPN – NO Contact toward the mass
Max. operating frequency	: 1000 Hz
Operating temperature	: - 25°C ÷ +85°C
Max. intervention distance	: D.12 = 3mm
Protection degree	: IP 67

9.1.3 Capacitive sensor D.18 cod. 2025

Supply voltage	: 10 ÷ 30 VDC
Output signal	: NPN NO Contact toward the mass
Max. operating frequency	: 1000 Hz
Operating temperature	: - 25°C ÷ +70°C
Max. intervention distance	: in contact with the granular product
Protection degree	: IP 67

9.1.4 Wiring cod. 1983, 1984, 1985, 2388

Main connector	: AMP 5-way Superseal IP 45
Secondary connectors	: AMP 3-way Superseal IP 67
Operating temperature	: -20°C ÷ +70°C

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