SPX

1. ASSEMBLY INSTRUCCIONS

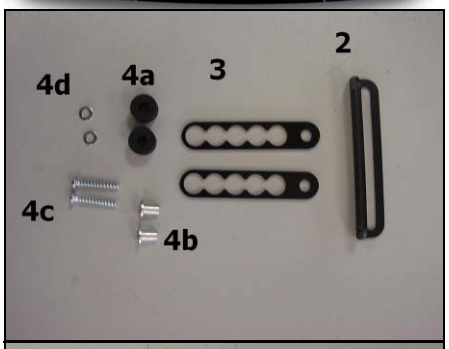
FACOMSA

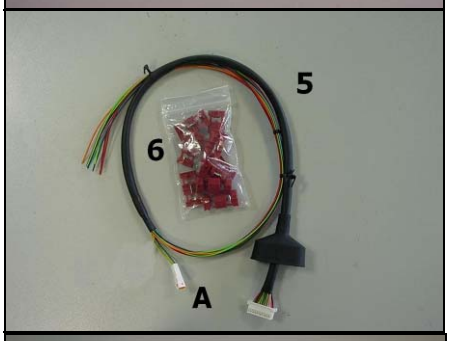
Real time partner

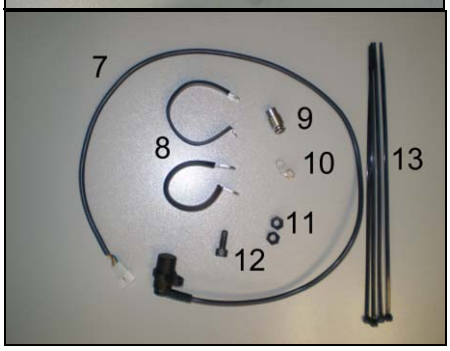
v1.1

MULTIFUNCTIONAL INSTRUMENT PANEL FOR "OFF ROAD" MOTORBIKES AC & DC

KIT COMPONENTS







1 SPX Instrument

Instrument Panel Bracket

2 Fixing Angle Bracket
3 Support brackets (2)
4 Fixing accessories:
   a. Rubber silentblocks (2)
   b. Bushes (2)
   c. Bolts (2)
   d. Washers (2)

Electrical Connections

5 Wiring harness
   A. Speed sensor connector
6 Scotch connectors (12)

Speed Sensor

7 Reed Speed Sensor
8 Sensor fixing (3)
9 Magnet pointer (To be fixed onto the Wheel spokes)
10 Magnet pointer (To be fixed onto the brake disk, suitable for quads)
11 Sensor fixing nuts (4) y Washers Grover (2)
12 Sensor fixing bolts (2)
13 Fixing clamps (4)

i) INSTRUMENT PANEL BRACKET


Figure 1. Fixing plates


Figure 2. Rubber pads and bushes Fitted onto the support brackets


Figure 3. Procedure for bolting the Instrument panel onto the support brackets


Figure 4. Instrument panel viewed from below

The first step for assembling the instrument to the bike involves removing its body kit, as well as disconnecting and removing the instrument panel to be replaced (if fitted).

Once completed, the new instrument panel can be installed.

Step 1:
Attach the support brackets (3) to the two bolts located at the front section of the steering column, either on top or underneath the bolt lugs. Make sure the support brackets are not fitted parallel to each other; they should feature an open angle to allow the instrument panel legs to fit properly (**See figure 1**).

Step 2:
Once the support brackets are in place, fit the rubber silentblocks (4a) onto the more suitable sections of the brackets to allow the instrument panel be fitted properly. We recommend at this point trying the instrument panel prior to securing the brackets in order to ensure that the instrument panel is square to the handlebar and can be comfortably viewed by the user while riding the bike.

Step 3:
Push the bushes (4b) inside the rubber pads (**See illustration 2**).

Step 4:
Fix the instrument panel (1) using the supplied bolts (4c). Insert the bolts from below and place the washers (4d) on the top section (**See figure 3**).

The completed assembly is shown in **figure 4**.

PLEASE NOTE:

If the motorbike does not feature any fixing point on top or underneath the steering column but has some that are forward facing (perpendicular to the handlebar), we World need to fit the angle bracket (2), and on top of it attach the two support brackets as described above..

ii) WIRING HARNESS

Figure 5. Connecting the wiring Harness to the instrument panel

Figure 6. Application of the electrical Insulating. Tape to the joint on the connector tap

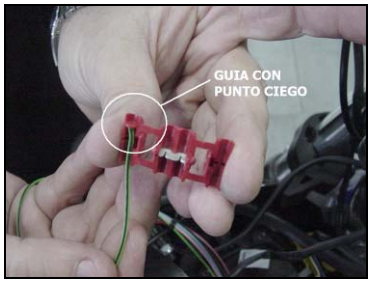


Figure 7. Placing the wire into the Scotch connector

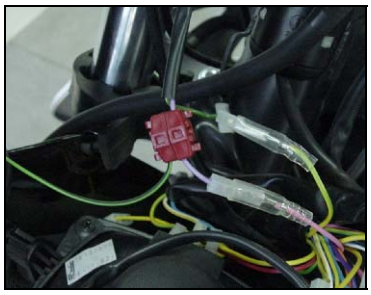


Figure 8. Scotch connector in place.

Special care must be taken when connecting the harness as the appropriate operation of the instrument panel relies completely on the way these connections are made.

A) Connecting the Instrument Panel

Put the connector from the wiring harness (5) into the instrument panel (1) socket. The connector will only fit one way. Please ensure that you are using the correct position to avoid damaging the parts. (**See figure 5**)

Once the instrument panel has been connected, cover the connector with its rubber cap and apply electrical insulating tape to the joint. This procedure will ensure that the connection is waterproof. (**See figure 6**)

B) Connecting the wiring

Connect the wire of the supplied harness (5) to the motorbike own wiring system. The connection should be carried out using Scotch connectors (6), so there is no need to peel and solder any wires. The colour coding is as follows:

RED	(+) Battery (Only for DC bikes)
BLACK	(-) Ground
PINK	(+) Ignition key
Connector A	Speed sensor
BLACK/GREEN	External joystick (opt.)[1]
YELLOW/GREEN	Ground external joystick (opt.)[1]
LIGHT BLUE	High Beam
GREEN/BLACK	Right side indicator
GREEN/YELLOW	Left side indicator
RED/BLACK	Temperature warning Light
GREEN	Neutral
ORANGE	Petrol reserve warning light
RED/WHITE	Oil pressure warning light

Connecting the Scotch connectors:

Scotch connectors have two slots: one is blanked at one end. That is precisely where we should be placing the wire from our installation kit, so that when the connector is closed, the wire stays perfectly isolated from the environment (**See figure 7**). Slide the appropriate wire from the motorbike own wiring system onto the other spot in the Scotch connector and close the connector using a pair of pliers. In the illustration shown as an example, we have connected our Green/Black wire, to the wire coming from the RH side indicator of the motorbike (lilac in this case) so that now goes towards the new instrument panel. (**See figure 8**)

[1] ***Note:*** *An external pushbutton can be connected by scotch connectors to the appropriate wiring of the instrument. The pushbutton can be fitted to the handlebar to handle the basic functions of the instrument. It is not included in the kit.*

Locate the ignition key live wire (DC INSTALATION):

The live wire can be easily located by measuring the voltage between the wire and a suitable ground using a Multimeter.

With the ignition key in the OFF, the voltage reading should be 0V. When the ignition is turned ON, the voltage will be 12V. (**See figure 10**)

DC Motorbikes (fitted with a battery)

Locate the battery live and ground wires:

Should the motorbike be fitted with a battery, it has to be uncovered and check the battery cables (connected to the + Terminal) and Ground (connected to the - Terminal), (**See figure 9**). Observing the colour code of these wires, we should locate them where they leave the motorbike own wiring harness towards the instrument panel. If in doubt, we recommend using a Multimeter to check continuity from the battery Terminal to the appropriate wire.

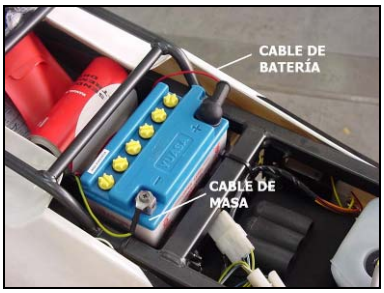


Figure 9. Locating the battery wires.

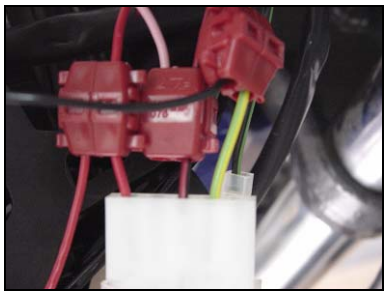


Figure 10. Scotch connector joining.
The Battery Live, Ignition Key and Ground wires (from left to right respectively)

iii) SPEED SENSOR

Figure 11. Fitting the bracket around not inverted fork.

Figure 12. Fitting the bracket around inverted fork.

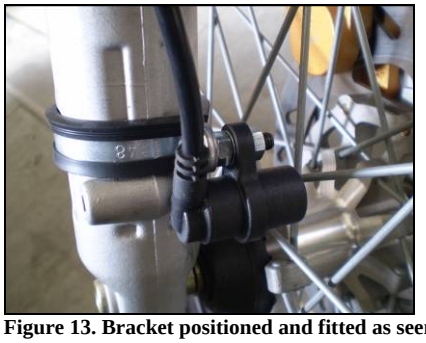


Figure 13. Bracket positioned and fitted as seen from the opposite side of the wheel.

Figure 14. Position of the magnet assembly and speed sensor.

In this third stage of the assembly, we shall install the Reed speed sensor. This component will send to the electronic instrument panel the signal originated in each complete turn of the wheel.

Step 1:

The task is to attach the speed sensor bracket (8) around one of the front wheel fork. Fit the bracket according **figure 11 y 12** depending on the type of fork (inverted or not inverted). This must be securely attached and so that the hole of the same one remains perpendicular to the wheel.

Step 2:

Next, the bracket is fitted with a screw, a nut and a grover washer. The speed sensor is placed fixing it with 2 nuts and grover washers. (**figure 13**)

Step 3:

Attach the magnet (12) and the holder (11) to one of the wheel spokes. Firstly, the speed sensor must be aligned and fix all the assembly with the washer (10) and the screw (9) **(See figure 14).** When fitted properly, the magnet must be facing the center of the magnetic pick-up.

CAUTION:

The maximum gap between the speed sensor and the magnet must not exceed 5 mm. **A greater gap might reduce the capacity of the sensor to detect the magnetic field of the magnet.**

Step 4:

Secure the speed sensor wiring along the fork with two cable ties (13). We recommend that you place one cable tie close to the magnetic pick-up and the other on the upper section of the fork. In addition, you should allow for some slack on the wiring between the two cables ties in order to compensate for the upward/downward movement of the suspension (**See figure 15**).

The cable ties must properly secure the sleeve of the speed sensor to stop it from moving during the suspension cycles and catching into the tyre.

Step 5:

We can now connect the wire end of the speed sensor to the connector A of our wiring harness (**See figure 16**)

Figure 15. Position of the cable ties on the speed sensor.

Figure 16. Final connection of the Reed Speed Sensor.

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2. PROGRAMMING THE INSTRUMENT PANEL

PROGRAMMING THE INSTRUMENT PANEL

The instrument can be configured to work in metric units (kilometres) or imperial units (miles). You can also enter the development wheel vehicle specific user for the proper functioning of the instrument.

i) Calculating the Wheel rolling circumference

Shown next are examples of Wheel rolling distances for different models of tyres. If your tyre is not shown in the tables, we shall have to measure the tyre rolling using the following procedure:

- Make a mark on the tyre and in the ground where there is contact between the tyre and the ground.
- Mounted on the vehicle and move up to around the tyre until the tyre mark is back along the ground.
- To do another mark in the ground coinciding with the mark of the tyre.
- Measure the distance between the marks on the ground in millimetres.

ii) Tables showing the main rolling circumference

SCOOTER TYRES		
Tyre size		Rolling Circumference (mm)
8 inches	3,00-8	1140
	3,50-8	1220
10 inches	80/90-10	1190
	2,75-10	1244
	90/90-10	1244
	3,00-10	1316
	3,50-10	1364
	4,00-10	1436
	120/90-10	1405
	130/90-10	1459
12 inches	100/90-12	1450
	110/100-12	1569
	120/80-12	1485
	130/70-12	1456
13 inches	110/90-13	1595
	130/60-13	1468
	150/70-13	1631
14 inches	120/80-14	1654

MOTORBIKE TYRES		
Tyre size		Rolling Circumference (mm)
16 inches	100/90-16	1771
	110/90-16	1825
	120/80-16	1807
	130/70-16	1777
	130/90-16	1934
	140/90-16	1988
	150/80-16	1952
17 inches	100/80-17	1787
	110/70-17	1769
	110/80-17	1836
	120/60-17	1739
	120/65-17	1775
	120/70-17	1811
	130/70-17	1854
18 inches	90/90-18	1870
	100/80-18	1864
	100/90-18	1924
	110/80-18	1912
	110/90-18	1979
	120/70-18	1888
	120/90-18	2033
19 inches	90/90-19	1947
	100/90-19	2001
	120/90-19	2110
21 inches	80/90-21	2046

CROSS BIKE TYRES		
Tyre size		Rolling Circumference (mm)
14 inches	60/110-14	1473
17 inches	70/100-17	1727
19 inches	2,50-19	1970
	70/100-19	1880
20 inches	90/100-20	2078
21 inches	80/100-21	2094
	90/90-21	2100

QUADS		
Tyre size		Rolling Circumference (mm)
9 inches	25x12-9	2002
10 inches	20x11-10	1603
	21x7-10	1691
	22x8-10	1763
	22x11-10	1755
	25x12-10	1994
11 inches	24x9-11	1914
12 inches	24x8-12	1930
	25x8-12	2010
	25x10-12	2010

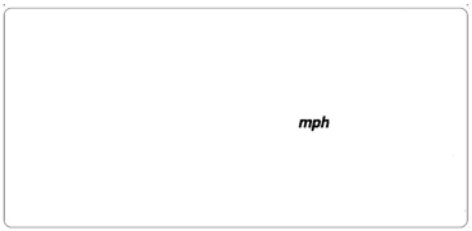
QUADS – LOW PROFILE TYRES		
Tyre size		Rolling Circumference (mm)
7 inches	18x7-7	1436
8 inches	20x7-8	1507
	20x9-8	1595
	22x11-8	1736
9 inches	21x8-9	1683
10 inches	21x7-10	1683
	22x8-10	1763
11 inches	23x8-11	1842

iii) Introducing the rolling circumference value into the instrument panel

In order to program the instrument panel using the rolling distance value from our tyre, proceed as follows :

Step 1: Start programming mode
(Model AC): Start the motorbike keeping the joystick pressed upwards.
(Model DC): Connect the key keeping the joystick pressed upwards.

Step 2: Measurements units
The programming menu will show on the display the units of measure configured in the instrument (km/h o mph).



Press the joystick upwards or downwards to change the measurements units.
Press the joystick sideways to validate and to go to the following step.

Step 3: Rolling circumference
There appears on the display the rolling circumference of the wheel configured in the instrument together with the letters "rc" (rolling circumference):

Use the joystick to enter the new value of wheel rolling circumference:

Moving the joystick upwards: The value of the digit is increased
Moving the joystick downwards: The value of the digit is decreased
Moving the joystick sideways: The digit changes. When the last digit is reached, go to the next step.

Step 4: Pulses per turn
It appears on the display the number of pulses per turn configured that generates the speed sensor. Since the sensor only generates 1 pulse per turn with 1 magnet, you should enter value 1:

To validate and to exit the programming menu, move the joystick sideways.

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3. OPERATION AND SPECIFICATIONS OF THE INSTRUMENT PANEL

SPECIFICATIONS AND OPERATING INSTRUCTIONS

This instrument panel includes all the functions a professional biker would require. In addition, it features a new set of functions such as:

- Easy selection of functions via a “joystick”.
- Two trip odometers capable of counting forwards and backwards.

Battery Powered (DC model):

- In put voltage: 10 to 16 V
- Electrical consumption: 30 mA (with all warning lights off).
- Quiescent Current: < 500 μA

AC Powered (AC model):

- In put voltage: 12 to 18 Vrms.

In order to keep the clock working when the motorbike is switched off, a 3V, CR2450 battery has been included within the unit. The battery should last at least one year.

Speed Sensor:

The kit includes one Reed type speed sensor and 2 different types of magnets.

Speedometer:

- 0 to 299 km/h or from 0 to 299 mph.

LED indicators:

Function	***Colour indicator***	***Colour wiring***	***ON when the connector Terminal is connected to :.***
Side indicators	Green LED	GREEN/BLACK GREEN/YELLOW	Live +
High Beam	Blue LED	LIGHT BLUE	Live +
Fuel Reserve	Yellow LED	ORANGE	Ground -
Oil Pressure warning	Red LED	RED/WHITE	Ground -
Temperature warning	Red LED	RED/BLACK	**Switch or NTC sensor to ground**
Neutral	Icon on display and Green LED	GREEN	Ground -

Warning lights:

Display backlight: Red, via LEDs

"Joystick":

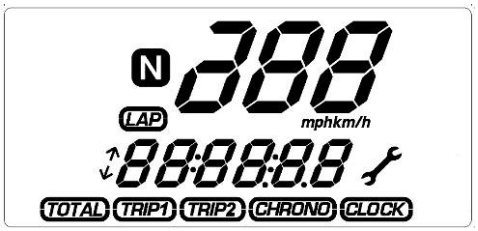
Instead of using a set of buttons, the joystick offers a user-friendly and simple way to select functions and adjust parameters.

It is also possible to fit an external joystick on the handlebar, connecting it with 2 Scotch connectors on the cables 10 and 11 (BLACK/GREEN and YELLOW/GREEN). Using the external joystick function can be changed and cleared the partial odometers (TRIP).

FUNCTIONS:

The display has two lines providing digital information. The top line shows the speed and some messages (e. g. The LAP number). The bottom line shows the value of the selected function.

The bottom section shows all available functions (except LAP, which is a sub-function of the chronometer). The selected function Hill be surrounded by a border. The illustration on the left shows the section with all the function available on the display, whereas the illustration on the right shows the value for the selected trip odometer, "Trip 1".



Selecting a function:

The "joystick" offers a user-friendly and simple way to skip between functions:

- A sharp push to the right selects the next function to the right. Alter "CLOCK", the selection will move back to "TOTAL".
- A sharp push to the left selects the next function to the left. After "TOTAL", the selection will move back to "CLOCK".

Adjusting a value:

In order to modify the value of a function, just use the “joystick” and follow these simple rules (please note that the value of the “TOTAL” function cannot be modified):

- To reset a value to zero: Press the “joystick” downwards (hold down for over a second).
- To modify a value: Move the “joystick” upwards (hold it for over a second) to enter to adjusting mode.

Accessing the configuration mode:

The selected digit will flash; the first digit will be the one furthermost to the right. Moving the joystick upwards or downwards will increase or decrease the digit accordingly. If Joystick is upwards or downwards maintained, the digit changes continuously. Moving joystick towards the left the following digit is selected. It is possible to return to a digit turning right.

Once the more to the left digit has been selected, the following movement towards the left finishes the adjustment mode. Same happens to a movement to the right when the digit of the right end is selected

Description of the functions:

1. Odometer (“TOTAL”).

- 6 digits. From 0 to 999999 km or miles, with suppression of zero to the left
- The odometer value is stored in a permanent memory

2. Partial odometers “TRIP 1” & “TRIP 2”

- Partial Odometers. From 0 to 999.99 km or miles, with suppression of zero to the left. The partial odometers can be put to zero by the user and can increase or decrease.
- To increase: put to zero the accountant (joystick down, long pulsation) to count kilometres increasing
- To decrease: put to zero the accountant (“joystick” down, long pulsation) and then adjust any value different from 0.
- If it is modified without being the accountant to 0, the counting direction stays.
- Depending on increasing (Up) or decreasing (Down) counting, two arrows show the direction:

- The partial odometers are stored in a permanent memory.
- For the adjustment process see “Adjusting a value” above.

3. CHRONOMETER (“CHRONO”):

- The screen has two different formats:
  - a) mm : ss . dd minutes up to 59, seconds and tenth of second until a maximum of 59:59:99
  - b) hh : mm . ss hours up to 99, minutes and seconds until a maximum of 99:59:59

Chronometer operation mode:

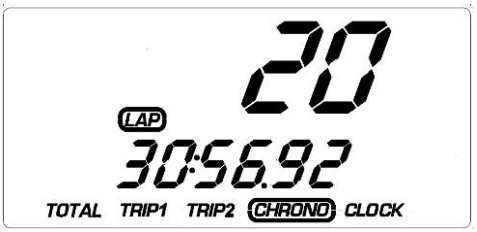
	JOYSTICK			
Chrono state	**↑ short pulse**	**↑ long pulse [2s]**	**↓ short pulse**	**↓ long pulse [2s]**
Stopped CHRONO and no stored LAP	-	-	Beginning CHRONO	CHRONO restored
Stopped CHRONO and stored LAPs	-	It shows LAPs	Reset CHRONO	CHRONO and LAPS restored
CHRONO working	CHRONO stopped	CHRONO stopped	Stored LAP, reset CHRONO	Stored LAP, reset CHRONO
Shown LAPS	Following LAP	Following LAP	Previous LAP	Previous LAP
Leave LAPS: Joystick → o ←				

Up to 24 values can be stored.
If more that 24 values are stored, first values are overwritten.

- Partial values checking (LAPs):

When the vehicle is stopped but the engine is on, with function "CHRONO" selected and the chronometer stopped, push joystick upwards (long pulse). The screen shows "LAP", instead of speed the number of the LAP is shown and the line of the chronometer shows the memorised value.

Each pulsation of "joystick" (long pulse) upwards increases the number of the LAP.



· Exiting the LAP function: press joystick towards right or left.
If the motorbike starts moving, the function will be cancelled.

- Resetting the chronometer to zero:

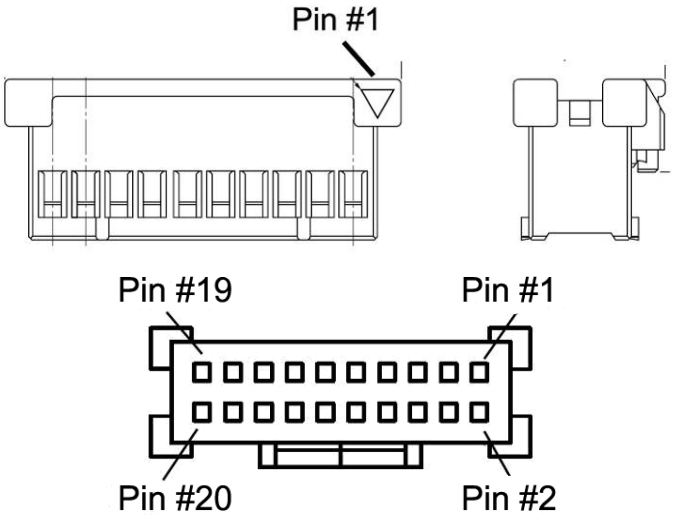
To reset the chronometer and all memorised values to zero, keep the joystick" pressed downwards for at least 1 second.

4. CLOCK.

- The clock has two digits to indicate the hours, two flashing dots, and two digits to indicate the minutes.
- Time adjustment: see "Adjusting a value" above. The clock can only be set when the motorbike is standstill with the engine running.

- DC model: the hour is lost when the battery of the motorcycle is disconnected.
- AC model: the hour is lost when the internal battery of the instrument is run out or changed.

Connector:



Aerial connector, female receptacle: JST XADRP-20V
Female terminals: JST SXA-01T-P0.6 (0.5 mm^2 a 0.22mm^2)

Connections:

# pin	Signal	Cable colour
1	Battery	Red
2	Mass	Black
3	Key or AC supply	Pink
4	Speed sensor ground	Yellow/Blue - A Connector
5	-	
6	Speed sensor output	Yellow/Blue - A Connector
7	-	
8	-	
9	-	
10	External ground push button (opt.)	Black/Green
11	External push button (opt.)	Yellow/Green
12	High beam	Light blue
13	Left indicator	Green/Black
14	Right indicator	Green/Yellow
15	Temperature	Red/Black
16	-	
17	Neutral	Green
18	Reserve	Orange
19	-	
20	Oil	Red/White

NOTE: The instrument is waterproof and dustproof, so the aerial connector must be protected with the rubber cap.

FACOMSA-FABRICACIÓN DE COMPONENTES PARA MOTOCICLETAS S.A.
C/Segrià nº 2
Polígon Industrial El Pla
LLIÇÀ DE VALL (SPAIN)
E-mail: info@facomsa.com
Web Oficial: http://www.facomsa.com

You can send your questions or suggestions via e-mail or visit our website.

FACOMSA Technical Team

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