



COMPANY WITH  
QUALITY SYSTEM  
CERTIFIED BY DNV GL  
= ISO 9001:2015 =



## SERVO3M USER AND MAINTENANCE MANUAL

### **Manual purpose**

This manual has been designed by the manufacturer to provide the necessary information regarding the SERVO unit to those who are authorized to carry out safely its installation, maintenance, removal and disposal. All the necessary information for the buyers and planners can be found in the sales documentation. In addition to adopting good technical construction methods, the information should be read carefully and strictly applied. Inobservance of this information could cause risks for the health and safety of people and equipment damage. This information, provided by the manufacturer in the original language (Italian) is also available in other languages to satisfy legislative and/or commercial needs. A responsible person must keep this manual in an ideal place in good conditions so that it is always available for consultation. In case this manual is lost or deteriorates, a replacement should be requested directly from the manufacturer indicating the product part number. This manual reflects the features of the instrument at the time of input on the market: however the manufacturer reserves the right to make changes, add or improve the manual without giving any reason to hold the present manual inadequate.

### **Identification of the equipment**

The identification plate is applied on the instrument.

To find out the identification code of the instrument, consult the sales documentation.

### **Environmental conditions**

Temperature setting: min 0°C – max + 50°C.

It is forbidden to use the instrument other than its specific use and in potentially explosive conditions or where anti-explosive elements are necessary.

### **Storage**

Here below are some references to be followed for the storage of the device.

Avoid environments with excessive humidity and those exposed to harsh weather (avoid open areas). Avoid putting the instrument directly on the ground. Store the instrument in its original packing.

### **Conformity declaration and EC marking**

The instrument answers to the following Communitarian Directives:

2014/30/EU Electromagnetic compatibility, 2011/65/EU RoHS

### **Maintenance**

The instrument does not need a particular maintenance except cleaning to be done only with a soft cloth dampened with ethyl alcohol or water. Do not use hydrocarbon solvents (petrol, thinners, etc.): the using of these products could affect the proper functioning of the instrument.

Repairs should be done only and exclusively at the FIAMA technical assistance centre.

### **Assistance request procedure**

For any kind of technical assistance request, contact the sales department of the Manufacturer directly indicating the information given on the identification plate, the number of hours used and the type of defect.

### **Manufacturer's responsibility**

The manufacturer declines any responsibility in case of:

- Using the instrument contrary to the national safety and accident-prevention laws.
- Incorrect installation, inobservance or incorrectly followed procedures provided in the present manual.
- Defective electrical power supply.
- Modifications or tampering.
- Operations carried out by untrained or unqualified staff.

The safety of the instrument also depends on the strict observance of the procedures indicated in the manual: always operate the instrument in its functioning capacity and carry out a careful routine maintenance.

- All phases of inspection and maintenance must be done by qualified staff.
- The configurations detailed in the manual are the only ones permitted.
- Do not try to use it anyway contrary to the indications provided.
- The instructions in this manual do not substitute but fulfill the obligations of the current legislation regarding the safety laws.

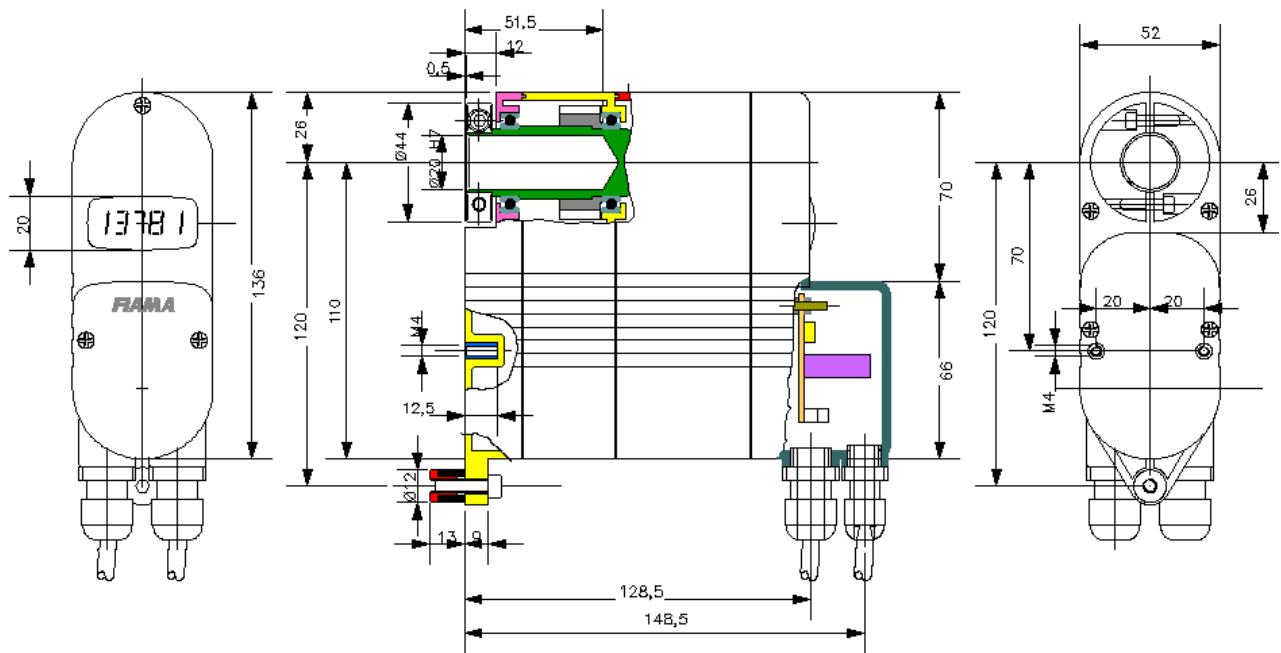
## Description

The SERVO.M positioning unit comprises a DC geared motor with microprocessor control of the drive gear and an incremental position transducer (encoder) or absolute position transducer (precision potentiometer) connected to the output shaft with interface for field bus and display with 5 digits. It creates, in a single compact device, a complete system for axis control axis where the position to reach is communicated by bus and a PID type controller is present. The **SERVO.M-E** version has a position transducer with an incremental optical encoder, while the **SERVO.M-P** version has a precision potentiometer.

The SERVO.M unit has a hollow shaft output to enable a simple installation and a versatile use, even with pre-existing manual motion machines that must be automated. Therefore it is suitable for a large number of applications on machinery within industries such as printing, packaging, woodworking, marble, plastic, etc. A simple linking and lay out are guaranteed by a supervisor (PC, PLC), the system interfaces with a bus-field to control the positioning and enable the modifications of the control parameters (present value, speed, state).

The communication protocol can be MODBUS RTU, CANopen, PROFIBUS DP.

For electrical connection, the power-supply cable and the communications cables are separate: the standard version of the SERVO.3M has 3 cable glands for input and output (2x PG9, 1x PG7); an M12-T connector is available as option for power instead of the PG7 cable gland.



## Installation

Before installing the instrument, read the following warnings:

- Connect the instrument strictly following the instructions of the manual.
- Carry out the connections using the correct wires within the limits of the tension and power supply as indicated in the technical data.
- The instrument does not have an ON/OFF switch, hence it comes on when connected to the power supply. For safety reasons, the equipment connected permanently to the power supply requires a bi-phase selector switch which should be within easy reach of the operator.
- If the instrument is connected to any apparatus not isolated electrically, carry out an earth connection to avoid it being connected directly through the structure of the machine.
- It is the responsibility of the user to check, before using, the correct settings of the parameters of the instrument to avoid damage to persons or equipment.
- The instrument cannot function in a dangerous environment (inflammable or explosive). It can be connected to elements that operate in the same atmosphere only through appropriate interfaces, according to the current safety regulations.
- Avoid dust, humidity, corrosive gases, heat sources.

### Power supply

- a) Before connecting the unit, check that the power supply tension is within the permitted limits and that it corresponds to the one indicated on the tag.
- b) Carry out the electrical connections with the instrument disconnected.
- c) For the power line to instruments and sensors, a power supply line separate from that of the power is required : it is necessary to use an isolating transformer.
- d) The power line should provide a device that separates the set fuses of the instruments and should not be used to regulate relays, contactors, etc.
- e) If the network tension is very disordered (ex. from the change-over of the power units, motors, inverters, welders, etc.), use the appropriate filters of the network.
- f) If an earth connection is needed, ensure that the plant has an adequate grounding system: tension between neutral and earth <1V and the resistance <6 Ohm.

### Gear motor assembly

Two M4 screws can be applied to the two M4x12 brass inserts: this is necessary in case the servo motor must make many maneuvers or is used continuously.

The diameter Ø20 millimeter (50mm deep) hollow shaft is applied to the driving shaft of the machine.

Ensure that the hollow shaft is perpendicular to the support base.

Lock the hollow shaft onto the machine shaft using the M4 screw on the clamping ring.

Note: The gear motor does not have parts that need maintenance or oiling.



If necessary, protect the unit from: dust, water, collisions, extreme temperatures.  
Manually turn the shaft of the reducer using the clamping ring (tightened on the hollow shaft) only if necessary.  
Do not exceed permitted torque.  
Do not dismantle or open the unit, particularly the part of the reducer.  
Do not pierce/modify the container or the hollow shaft.

**POTENTIOMETRIC VERSION** Before assembling the SERVO, it is fundamental to place the shaft of the machine and the shaft of the SERVO in the correct position, for example half way or towards the end, in a way that there is correlation between the position of the SERVO and that of the machine. To do that, the motion of the hollow shaft of the SERVO should be serially commanded by the control unit (PLC, PC, etc): do not rotate the shaft by hand.

The calculation of the number of turns that the hollow shaft has to complete to achieve the total motion of the machine is determined by multiplying the reduction ratio of the reducer of the potentiometer by the number of turns of the potentiometer itself (total reduction ratio = R).

In case that the maximum number of allowed rotations by the shaft is exceeded, a mechanical clutch intervenes to safeguard the potentiometer transducer.

**Note: the SERVO is provided with the hollow shaft and the potentiometer positioned half way.**

### ELECTRICAL CONNECTION

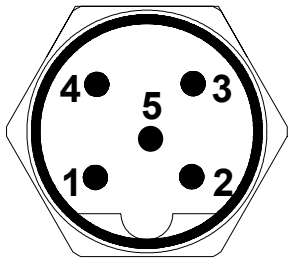


Disconnect from power supply before connecting/disconnecting the equipment/machinery.  
The connecting cables must be kept separate from the power lines or from electromagnetic interference sources.  
Pay careful attention to the electrical connections: any failure caused by a faulty connection will render the guarantee null and void.  
The power supply must be in the permitted range, a higher range could damage the equipment.

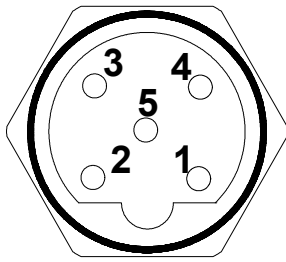
Remove the 3 closing screws of the cover to access the terminal box.

Carry out the connections according to the following figure:

### PROFIBUS VERSION



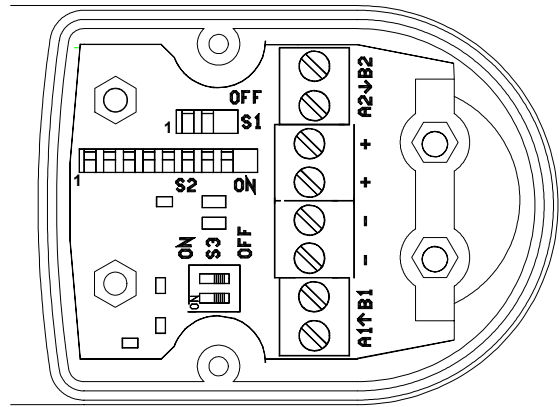
MALE



FEMALE

**M12x1 PROFIBUS**

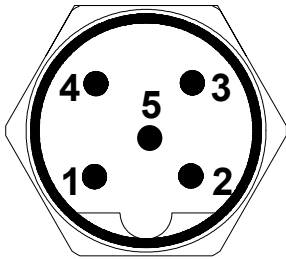
- 1 = not connected
- 2 = PROFIBUS A
- 3 = not connected
- 4 = PROFIBUS B



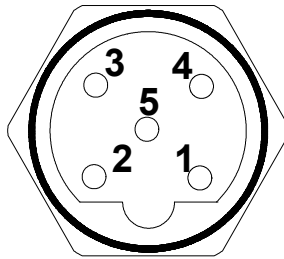
B1÷B2 – PROFIBUS B line

A1÷A2 = PROFIBUS A line

### MODBUS VERSION



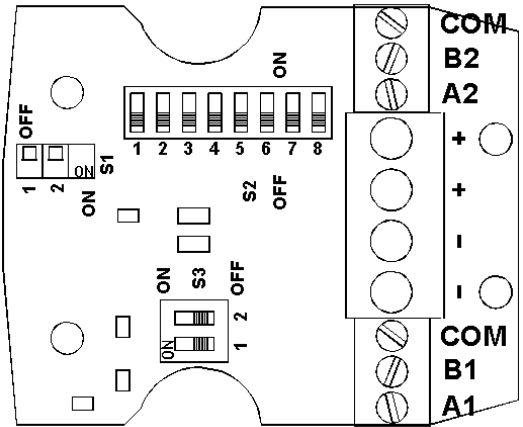
MALE



FEMALE

**M12x1 PROFIBUS**

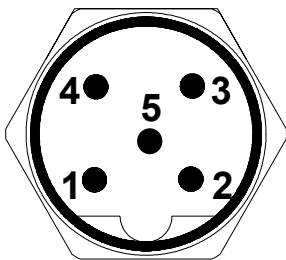
- 1 = not connected
- 2 = – RS485
- 3 = not connected
- 4 = + RS485



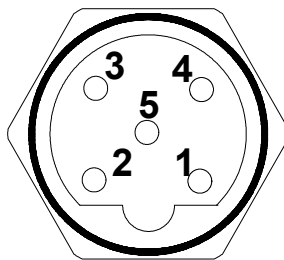
B1÷B2 = + RS485

A1÷A2 = - RS485

### CANopen VERSION



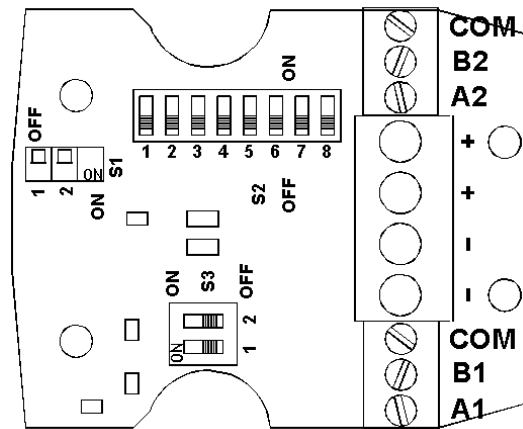
MALE



FEMALE

**M12x1 CANOPEN CONNECTOR**

- 1 not connected
- 2 not connected
- 3 = CAN\_GND
- 4 = CAN\_H
- 5 = CAN\_L



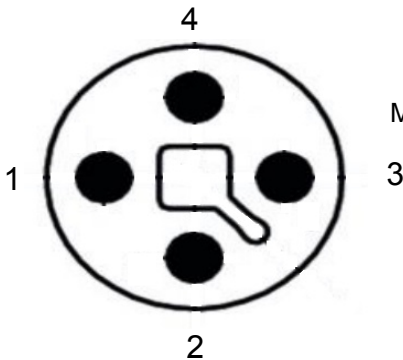
B1÷B2 = CAN\_L

A1÷A2 = CAN\_H

COM = CAN\_GND

**POWER SUPPLY +24VDC****Power supply terminal board**

TERMINAL BOARD	CONNECTION
+	24V power supply
-	GND power supply

**Power connector**

M12-T male as viewed externally with exit shaft directed downwards

M12T PIN CONNECTOR	WIRE COLOR	CONNECTION
1	BROWN	+24V POWER SUPPLY
2	WHITE	NOT CONNECTED
3	BLUE	GND POWER SUPPLY
4	BLACK	NOT CONNECTED

**SETTINGS OF ADDRESS AND BAUD RATE**

Before setting SERVO it is necessary to set the address and baud rate of device using dip-switch S1 and S2 as showed in the following table according to the model of SERVO used.

If the SERVO is the last node of net, set at ON the dip-switch S3 (both switches 1 and 2 at ON).

**IMPORTANT:** during this phase it is advisable to pay close attention to not damage the dip-switch and the electronic components on the board. It is strictly forbidden to take off the card of its case.

Assemble the wiring clip jumper to assure the continuity of shield mostly for the Profibus cables.

**Setting of device address and serial communication speed – MODBUS protocol**

The setting of baud rate is made by the dip-switch **S1** (set in factory at **19200**) and that of the address with dip-switch **S2** (set in factory at **1**). Valid addresses are from 1 to 247.

By changing of address or baud rate is necessary to switch off and turn on the Servo.

<b>S1</b>		<b>BAUD RATE</b>
1	2	
OFF	OFF	2400
ON	OFF	4800
OFF	ON	9600
ON	ON	19200

<b>S2</b>								<b>ADDRESS</b>
1	2	3	4	5	6	7	8	
ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	1
OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	2
ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	3
OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	4
etc.....								etc.....

**Setting of device address – PROFIBUS protocol**

The setting of address is made by dip-switch **S2** (set at factory at **1**). Valid addresses from 1 to 127. The speed is measured automatically.

<b>S2</b>								
1	2	3	4	5	6	7	8	
ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	1
OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	2
ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	3
OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	4
etc.....								etc.....

**Setting of device address – CANopen protocol**

The setting of address is made by dip-switch 1-7 of **S2**. Valid addresses from 1 to 127.

The setting of baud rate is made by the dip-switch 8 of **S2** and the 2 dip-switch of **S1**.

By changing of address or baud rate is necessary to switch off and turn on the Servo.

<b>S2</b>								<b>INDIRIZZO</b>
1	2	3	4	5	6	7	8	
ON	OFF	OFF	OFF	OFF	OFF	OFF	-	1
OFF	ON	OFF	OFF	OFF	OFF	OFF	-	2
ON	ON	OFF	OFF	OFF	OFF	OFF	-	3
OFF	OFF	ON	OFF	OFF	OFF	OFF	-	4
ecc.....								ecc.....

<b>S2</b>	<b>S1</b>		<b>BAUD RATE (Kbaud)</b>
8	1	2	
OFF	OFF	OFF	1000
OFF	ON	OFF	1000
OFF	OFF	ON	800
OFF	ON	ON	500
ON	OFF	OFF	250
ON	ON	OFF	125
ON	OFF	ON	50
ON	ON	ON	20

**Technical characteristics**

Motor	permanent magnet DC power, 70W (150W max)
Power supply	24VDC $\pm$ 20%, 2,5A (6,5A max)
Hollow shaft	$\varnothing$ 20mm H7, depth 50mm
Gear motor reduction ratio	50/1 max 115RPM (8Nm @ 70RPM non continuous) 75/1 max 75RPM (12Nm @ 45RPM non continuous)
Encoder ( <b>SERVO E</b> )	incremental optical encoder on output shaft
Resolution	1000 impulses/turn
Potentiometer ( <b>SERVO P</b> )	Precision potentiometer transducer
Resolution	16000 points
Number of turns/ linearity	340°/1% - 3 turns /0,25% - 5 turns /0,25% - 10 turns /0,15%
Potentiometer reducer reductions	1/1; 3,3/1; 10/1; 24/1; 30/1; 90/1, others on request
Electrical connection	4 poles terminal board supply, 4 poles terminal board field-bus, max 1,5mm <sup>2</sup>
Connections	1x PG7 cable gland for supply (cable $\varnothing$ 3 - 6mm) or 1x optional M12-T connector for power supply 2x PG9 cable glands for field-bus (cable $\varnothing$ 5 - 8mm)
Weight	1100g
Protection level	IP54
Working temperature	0-60°C
Humidity	10-85%
Directive: 2014/30/EU Electromagnetic compatibility, 2011/65/EU RoHS	

**Manufacturer**

All communications to the manufacturer should be addressed to:  
 FIAMA s.r.l., Via G. Di Vittorio, 5/A - 43016 San Pancrazio (Parma) - Italy  
 Tel. +39 0521.672.341 - Fax. +39 0521.672.537 – e-mail: info@fiama.it - www.fiama.it

**FIAMA srl is not responsible for any damage to persons or things caused by tampering and improper use and in any case that is not compatible with the features of the instrument.**