

TECHNICAL MANUAL

Electric cylinders

**SA10 SA15 SA25
SA50 SA70 SA100
SA200 SA300**

- Guide to the installation and maintenance





The production site

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Disclaimer

We checked the contents of this publication with the utmost care for the conformity with the associated product. However, we cannot exclude the discrepancies. The information contained in this publication are regularly controlled; the necessary corrections reported will be part of the subsequent publications.

The manufacturer reserves the right to make technical changes without prior notice.

All the indications provided are to be understood as technical data and not as warranted characteristics.

Are welcome comments and suggestions.

Important Notes



This manual is an integral part of the product.
The manual must be properly stored.



The user is required to read the manual and observe the instructions.



This manual and all documentation concerning the product must be made available to users.



Carefully read and follow all instructions relating to safety and the chapter "Before you begin - security related information".



This manual refers to the product "system electric cylinder" SA type composed of:
Press-Right instrument with card VIO10
Alfamatic electric cylinder
Schneider LXM32C servo drive



Must be respected even the indications given in the manual of the servo drive LXM32C.



The instrument *Press-Right* is not (and could not be) a safety device: the safety movement of the cylinder must be entrusted from external elements to it.



It is very important to use shielded cables where required. The terminal part of the shielded cables not covered by the shielding must be as short as possible



Always connect the container of the instrument to the ground conductor.

Unexpected Movement

The cylinder can perform unexpected movements due to wiring errors or setting, incorrect data or errors of other kinds.



- Realize the wiring respecting the precautionary measures in the field of electromagnetic compatibility.
- Do not enable the product without knowing the settings or data.
- Perform a meticulous control before running the system.

Failure to follow these precautions can result in serious injuries or death

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1 *Warranty*

The ALFAMATIC guarantees for all machines of its production to the free supply of all components, devices or instruments that have obvious defects of fabrication, within 12 months from the date of shipment.

Are excluded from the free supply shipment expenses, as well as the costs of intervention and travel of staff ALFAMATIC that may possibly be used.

2 *Receipt of the cylinder*

Containers, crates or boxes of packaging suitable for shipping must be verified before the opening to see any damage generated by transport. In the event of obvious damage, immediately notify the freight forwarder that has carried out the transport and the ALFAMATIC, the findings of the case. At the opening of the receptacles (packing, check again that no damage from transport has been suffered by the content. Check that the objects contained match for voice, words and amount the shipping documents. In case of damage or differences, immediately notify the freight forwarder that has carried out the transport and the ALFAMATIC, the findings of the case.

3 *Packaging*

The cylinders SA that are transported by road hauler are equipped with box of cardboard boxes or cardboard packaging palletized. The movement of the loading/unloading must be carried out with the aid of the forklift truck or transpallett. Verify that the container has not suffered any damage during transport such as to compromise the content. In the event please see paragraph 2 .

4 *Methodology of transport*

SA cylinders, due to their size and weight, cannot be moved by hand; lifting and transport equipment, cranes or forklifts are necessarily needed. The SA cylinder is designed for attachment by eyebolts. Hook the cylinder with a rope suitable for the weight of the cylinder equipped with a safety hook.

5 *Description and destination of use*



- The cylinders of SA series machines are designed to emit an axial force, by electric motor.
- The cylinders of SA series may not be used without the safety devices add-ons.
- The cylinder must be used only in areas not accessible by people during the operation.
- The destination of use of the machine is aimed at those processes where it is required the use of the force that develops by means of a movable member in the axial direction on the vertical axis with alternating movements ON-OFF.
- The destinations of use of the machine are the workings of marking, drawing, caulking, clinching and fittings in general.
- It is not allowed to use where the reaction point (the workpiece) is not placed on the central axis of the stem of the unit.
- It is not allowed the use of the SA cylinder, where the working tool applied to the movable member of the thrust unit cannot be properly centered on the axis of the body itself.
- It is not allowed the use of the SA cylinder for machining operations on products which, for their structural characteristics, can cause a result of breakage projections of fragments or chips.
- It is not allowed the use of the SA cylinder for machining operations on products

which, subjected to pressure, compression, cutting or deformation, can explode.

6 *Disclaimer*

The ALFAMATIC is believed raised from any liability for damage to the cylinder, to persons or things in the following cases:

- Improper use of the cylinder;
- Use of the cylinder by personnel not sufficiently trained;
- Use of the cylinder without respecting the specific regulations of the country of installation;
- Incorrect installation (in case not carried out under the supervision of staff ALFAMATIC);
- The use of energy sources improper or not adequate;
- Failure to comply with the requirements of periodic maintenance;
- Maintenance performed incorrectly by non-expert personnel, use of not original spare parts or unsuitable;
- Failure to comply with all or part of the instructions in this manual;
- Exceptional events;
- Modification of the original characteristics of the machine;
- Damage caused by molds, equipments, tools or equipment applied to the machine and is not supplied by ALFAMATIC.

7 Safety Rules



Attention: The head of the line and the operator of the machine must comply not only with the rules and the requirements specified below, but also comply with what is provided by the current legislation on the safety and health of workers at work. (D.P.R. 574 + 626)



Caution: Always follow the safety rules and instructions contained in this manual.



The ALFAMATIC disclaims any liability resulting from an incorrect use of the cylinder. The transport, UNLOADING AND THE CYLINDER MOUNTING must only be performed by authorized and specialized personnel.



The SUPPLY VOLTAGE must correspond to that request.



The ELECTRICAL SUPPLY AND EARTH GENERAL must conform to the standards in force. The D.P.R. 626 of 19-09-1994 and D.P.R. 547 - 1995

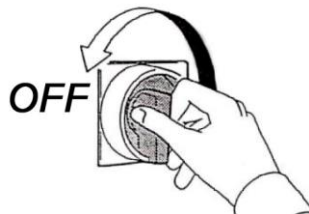


Periodically check that the various power cables are in perfect condition.



Caution Danger: Do not leave closer to the machine persons extraneous to work. Use, maintenance and repair of the machine are permitted only to authorized operators for the different operations. Such operators must be physically and intellectually suitable, not under the influence of alcohol, drugs or drugs.

Warning: When not used, the machine must be protected from drives voluntary or involuntary, by turning the main switch to position 0.



8 Maintenance Standards



All the operations of control, adjustment, maintenance, mounting molds or tools and lubrication should be performed with the MACHINE STOPPED, VOLTAGE EXCLUDED FROM THE GENERAL SWITCH opened and locked with a padlock.

Warnings: to be respected when carrying out operations on a machine:

- All the operations must be performed by specialized personnel under the guidance of a responsible.
- Apply a cartel of Maintenance in progress on the control panel.
- Exclude the voltage by opening the main switch and lock it with a padlock.
- Interventions on the electrical system, after making sure that you have removed the voltage, to provide a grounding and to tick any neighbouring parts under voltage.
- Do not leave closer to the machine persons extraneous to work.
- Not clean electrical components with water or other fluids.

Attention: In the operations of cleaning and washing of use with caution aggressive detergents, acids and lyes, etc.

Follow the instructions of the manufacturers of detergents. Use protective clothing (overalls, gloves, goggles, etc.)



Caution Danger: When the maintenance work participate more people before the restore operation, it is necessary that all are warned.



Caution Danger: Remove strangers and put the warning signs, when carrying out controls and operations with protective covers removed or opened or with other safeties excluded.

8.1 Testing after maintenance

At the end of maintenance operations, the responsible of the same must be carried out together the security manager a comprehensive testing of the functionality of the machine and all its safety devices. This test should be formalized by a written report, signed by the two leaders and preserved in the archives of the company. This test must be preceded by the removal of all the maintenance personnel and by verifying that they have been removed all any implements, rags, etc.

9 *List of risks*

9.1 Risks due to falling or ejected objects

The SA cylinder for its technical and functional characteristics does not present risks due to fall or ejection of pieces. It should be noted however that the destination of use in the different production fields, prevents the fact of being able to evaluate the characteristics of the parts or products processed.

Will therefore be the task of the user, take precautions against these residual risks.

9.2 Risks due to extreme temperatures

The SA cylinder for its technical and functional characteristics could generate high temperatures (90/100°C). The user is protected from contact by means of a suitable housing. However, given the vastness of the applicative fields, it cannot be excluded that the user uses for productions where are connected such risks (e.g. hot molding).

Must be the user to adopt the appropriate protections to avoid risks linked to production.

9.3 Risk of break-up during operation

The elements of the machine and the members connected to them (static or dynamic) are sized to resist the work and the effort of all the operations for which the machine was intended, provided it is made correct use as previously indicated.

In this manual are indicated the maintenance mode requests and the criteria for replacement parts subjected to wear.

The tools or molds or equipment connected to the drive unit must be sized in order to withstand the stresses to the force that the machine is capable of expressing.

9.4 Risks due to noise

The noise that generates the machine is caused by the movement of the internal mechanical elements and does not determine risk, but given the vastness of the fields of application cannot be excluded that the user uses for productions where are connected such risks.

Must be the user to adopt the appropriate protections to avoid risks related to the specific production.

9.5 Risks due to the electricity

The SA cylinder is supplied with electricity.

All the components to dangerous voltages is housed in a waterproof box provided with door lock switch.

The plant is built respecting the rules and regulations in force in the matter.

9.6 Risk of explosion

The SA cylinder for its technical and functional characteristics does not present a risk of explosion due to the machine itself.

The electric plants of the machine also precludes the use of the same in environments with explosive atmosphere or to carry out machining on explosive materials.

9.7 Risk of fire

For the technical and functional characteristics and the materials employed, the SA cylinder does not generate risks of fire.

10 Safety Instructions

This manual contains basic information for the protection of users and third persons from possible personal injury and/or to avoid the damaging of the equipment.

- Read this user manual carefully before you use the product in order to ensure the correct use in addition to the manuals relating to the equipment connected.
- Keep this manual in a safe place to be able to consult in the event of need.
- Observe the safety instructions in this manual and the product catalog to ensure the safety of personnel and equipment in addition to other relevant safety rules.
- Connect the cables in the correct way and does not make the connections when the electric power is turned on.
- Check the insulation of the wires and cables.
- Adopt appropriate measures against noise such as noise filters, if the product is incorporated into another system or device.
- Adopt adequate measures for shielding if the product will be used in the following conditions:
 - a) in the presence of noise generated by static electricity.
 - b) in the case of strong magnetic fields.
 - c) in the presence of radioactivity.
 - d) where are located the electrical lines.
- Do not use the product in the points in which they generate electrical spikes.
- Use a protection from voltage spikes when directly operate a load that generates a peak as for example a solenoid valve.
- Avoid the penetration of foreign bodies inside the product.
- Do not expose the product to vibrations or impacts.
- Use the product within the temperature range specified environment.
- Do not expose the product to thermal radiation.
- Do not clean the product with chemical substances such as benzene or solvents.



ATTENTION:

- Do not disassemble, modify or repair the product. Risk of injury or damage to the product.
- Do not use the product outside the specifications. Risk malfunction or damage to the equipment. Use the product only after confirming the specifications.
- Do not use the product in the presence of flammable gases, explosive or corrosive materials. Risk of fire, explosion or corrosion. This product is not explosion-proof.
- Before performing maintenance operations, be sure to: interrupting the power supply.

PRECAUTIONS:

- After maintenance, always perform the control of the system. Do not use the product in the case of errors. It is not guaranteed that the total safety if caused by an involuntary malfunction.
- Provide a ground to ensure proper operation and improve the resistance to electrical noise of the product.
- Follow the instructions below when handling the product. Failure to follow the instructions could result in damage to the product.
- Always anticipate around the product the space required for maintenance operations.
- Do not remove the labels from the product.
- Do not drop the product, strike it or exert excessive pressure on it.
- If not indicated otherwise, observe all the tightening torques.
- Do not bend, apply traction force or support heavy loads on the cables.

11 Instructions for Use

ATTENTION:



- Do not touch the motor when it is running. The temperature of the surface of the motor can reach 90/100°C depending on the operating conditions. This temperature may be reached even to the cylinder retainer if under load. Do not touch the motor when it is running in order to avoid burning yourself.
- In the event of abnormal heat, smoke, fire, etc. in the product immediately interrupt the power supply.
- immediately stop the operation in the case of unusual noises or vibrations found. In the case of unusual noises or vibrations found during operation, it is likely that the product has been installed in an improper manner. The failure to arrest of the product for the operations of inspection could cause serious damage.
- Do not touch the moving parts of the motor or the movable parts of the actuator when they are in function. Risk of serious injury.
- For installation, adjustment or maintenance and inspection on the product, actuation or equipment connected, be sure to interrupt the supply of each of these. Then lock it in such a way that only the person can reactivate the supply or adopt security measures such as the application of a cap safety fuse.

PRECAUTIONS:

- Keep the motor and cylinder united as they have been delivered for use. The product is set to certain parameters for shipping. If it is associated with a parameter of the different product, there may be a fault.
- If the operations are carried out by more than one person, agree on procedures, signals, measures and resolution of the abnormal conditions before starting the intervention.
- Furthermore, designate one person to supervising the work different from those engaged in the work itself.
- Test run at low speed, start the test at a preset speed after making sure there are no problems.

12 Installation



CAUTION: The cylinder, the servo drive and Press-Right instrument are configured, programmed and calibrated to operate all three together. NEVER INSERT an item in the chain that has not been specially programmed for that chain.

For the installation of the servo drive also refer to the manual of the servo drive LXM32C.

12.1 Qualifications required for staff

To carry out interventions on this product and for its use must be employed exclusively specialised personnel who have read this manual and all documentation concerning the product and who has understood the content. The specialized personnel, moreover, must have received a safety training appropriate to recognize and avoid any risks. The technical training, knowledge and experience of specialized personnel must be such as to be able to predict and recognize the dangers which may arise from the use of the product by changing settings and from the operation of the mechanical equipment and electrical and electronic systems of the plant as a whole. Specialists must be aware of all the regulations in force and the provisions and safety rules that must be observed in the case of carrying out interventions on the product.

12.2 Purpose of destination

This product is a drive for three-phase servomotors that, in accordance with the present Instruction is intended to be used in the industrial sector.

The product should not be used in environments subject to risk of explosion (Ex).

The current safety regulations, the operating conditions specified and technical data indicated must always be respected.

Before you use the product, it is necessary to carry out a risk assessment as regards the practical conditions of use. On the basis of the outcome of the check is necessary to implement the security measures that are needed.

Since the product is used within a more complex system, the safety of the persons involved in the operation **must be** ensured by integrated security systems in this system.

The appliances and electrical devices must be installed, used, serviced and repaired only by specialized personnel.

13 Technical characteristics

| CARATTERISTICA | SA10 | SA15 | SA25 |
|--------------------------|---------------------------------|----------|----------|
| MAXIMUM FORCE | 10 kN | 15 kN | 25 kN |
| MAXIMUM SPEED | 250 mm/s | 220 mm/s | 140 mm/s |
| RESOLUTION | 0,01 mm | 0,01 mm | 0,01 mm |
| STANDARD STROKE | 300 mm | 300 mm | 300 mm |
| POWER | 3,3 kW | 3,3 kW | 3,3 kW |
| POWER SUPPLY | 400 V trifase 50 Hz | | |
| POWER SUPPLY LOGIC | 24 VDC 4 A | | |
| PRECISION MEASURED FORCE | 0,1 kN | 0,1 kN | 0,1 kN |
| ANTI-ROTATION PRECISION | 0,7 ° | 0,7 ° | 0,7 ° |
| WEIGHT | 45 kg | 45 kg | 45 kg |
| ROOM TEMPERATURE | 10...40 °C | | |
| RELATIVE AIR HUMIDITY | 90 % (not allowed condensation) | | |

| CARATTERISTICA | SA50 | SA70 | SA100 |
|--------------------------|---------------------------------|----------|----------|
| MAXIMUM FORCE | 50 kN | 70 kN | 100 kN |
| MAXIMUM SPEED | 250 mm/s | 180 mm/s | 100 mm/s |
| RESOLUTION | 0,01 mm | 0,01 mm | 0,01 mm |
| STANDARD STROKE | 250 mm | 250 mm | 250 mm |
| POWER | 5 kW | 5 kW | 5 kW |
| POWER SUPPLY | 400 V trifase 50 Hz | | |
| POWER SUPPLY LOGIC | 24 VDC 4 A | | |
| PRECISION MEASURED FORCE | 0,5 kN | 0,5 kN | 0,5 kN |
| ANTI-ROTATION PRECISION | 0,7 ° | 0,7 ° | 0,7 ° |
| WEIGHT | 74 kg | 74 kg | 74 kg |
| ROOM TEMPERATURE | 10...40 °C | | |
| RELATIVE AIR HUMIDITY | 90 % (not allowed condensation) | | |

| CARATTERISTICA | SA200 | SA300 | |
|--------------------------|---------------------------------|----------|--|
| MAXIMUM FORCE | 200 kN | 300 kN | |
| MAXIMUM SPEED | 150 mm/s | 100 mm/s | |
| RESOLUTION | 0,01 mm | 0,01 mm | |
| STANDARD STROKE | 420 mm | 420 mm | |
| POWER | 16 kW | 16 kW | |
| POWER SUPPLY | 400 V trifase 50 Hz | | |
| POWER SUPPLY LOGIC | 24 VDC 4 A | | |
| PRECISION MEASURED FORCE | 2 kN | 3 kN | |
| ANTI-ROTATION PRECISION | 0,7 ° | 0,7 ° | |
| WEIGHT | 330 kg | 330 kg | |
| ROOM TEMPERATURE | 10...40 °C | | |
| RELATIVE AIR HUMIDITY | 90 % (not allowed condensation) | | |

13.1 Characteristics of external precision force transducer

A high precision external force transducer can be used for force measurement.

When the external force transducer is present, in the instrument options it will be possible to select the internal or external transducer for each individual phase in the job.

The external force transducer has the following characteristics:



With the external force transducer, the tool mount has different dimensions from that of the cylinder without the external transducer.

Il trasduttore di forza esterno presenta le seguenti caratteristiche:

| | HPT1 | HPT2 | HPT4 |
|--|----------------|------------------------|-----------------------------------|
| Compatibility | SA10 SA15 SA25 | SA10 SA15 SA25 SA50 | SA10 SA15 SA25 SA50 SA70 SA100 |
| Maximum error | 4 N | 9 N | 14 N |
| Carico nominale in compressione | 1 kN | 2 kN | 4 kN |
| Maximum load in traction (Maximum tooling weight) | 100 N | 200 N | 500 N |
| Breaking load in traction | 4 kN | 10 kN | 25 kN |
| Resolution | 1 N | 2 N | 4 N |
| Diameter | 100 mm | 100 mm | 100 mm |

| | HPT10 | HPT20 | |
|--|-----------------------------------|-------------|--|
| Compatibility | SA10 SA15 SA25 SA50 SA70 SA100 | SA200 SA300 | |
| Maximum error | 25 N | 40 N | |
| Carico nominale in compressione | 10 kN | 20 kN | |
| Maximum load in traction (Maximum tooling weight) | 2 kN | 4 kN | |
| Breaking load in traction | 50 kN | 50 kN | |
| Resolution | 1 daN | 2 daN | |
| Diameter | 100 mm | 127 mm | |

14 Install the cylinder

Attention:

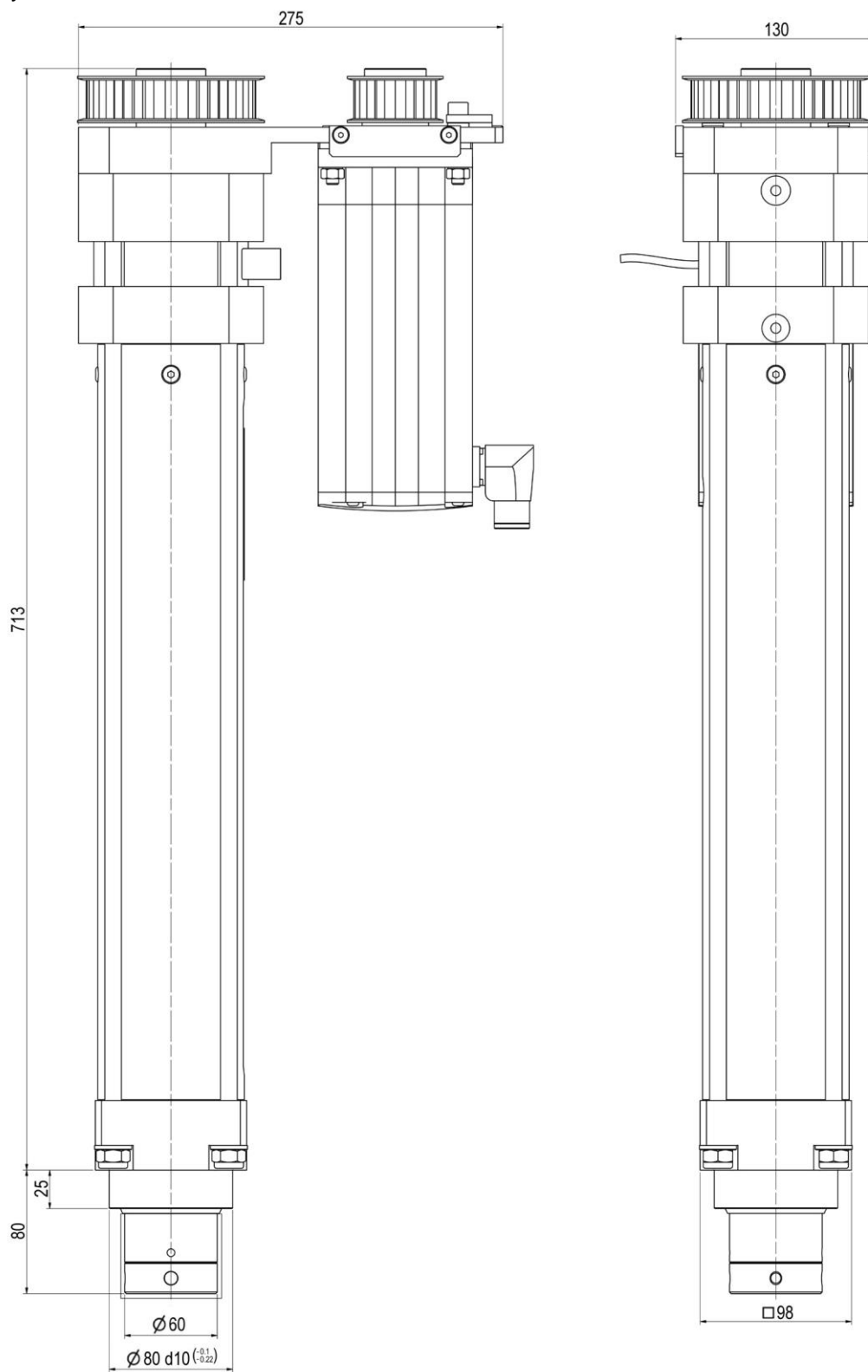
- Observe the tightening torque of the screws. If not otherwise indicated, tighten the bolts according to recommended torque for mounting product.
- Do not make any modifications to the product. The changes to the product can cause a loss of durability and product damage resulting in personal injury or damage to other equipment or machinery.
- If you are using external guides of the stem, connect the parts in such a way that there is no interference in any point of the race.
- Do not scratch or gouge the sliding parts of the unit by hitting them or gripping them with other objects. The components are manufactured with closer tolerances, so even a minimal deformation may cause a malfunction or a seizure.
- Do not use the product until it transpires that the apparatus can be operated correctly and safely. Following the assembly or repair, connect the power supply to the product and perform appropriate functional inspections to check the correct assembly.
- Do not apply strong impact or excessive moments during assembly to the load. If a force is exerted upper external to the allowable moment, you might check the loosening of the drive unit, the increase of the sliding resistance or other problems.
- Leave sufficient space for maintenance and inspection.



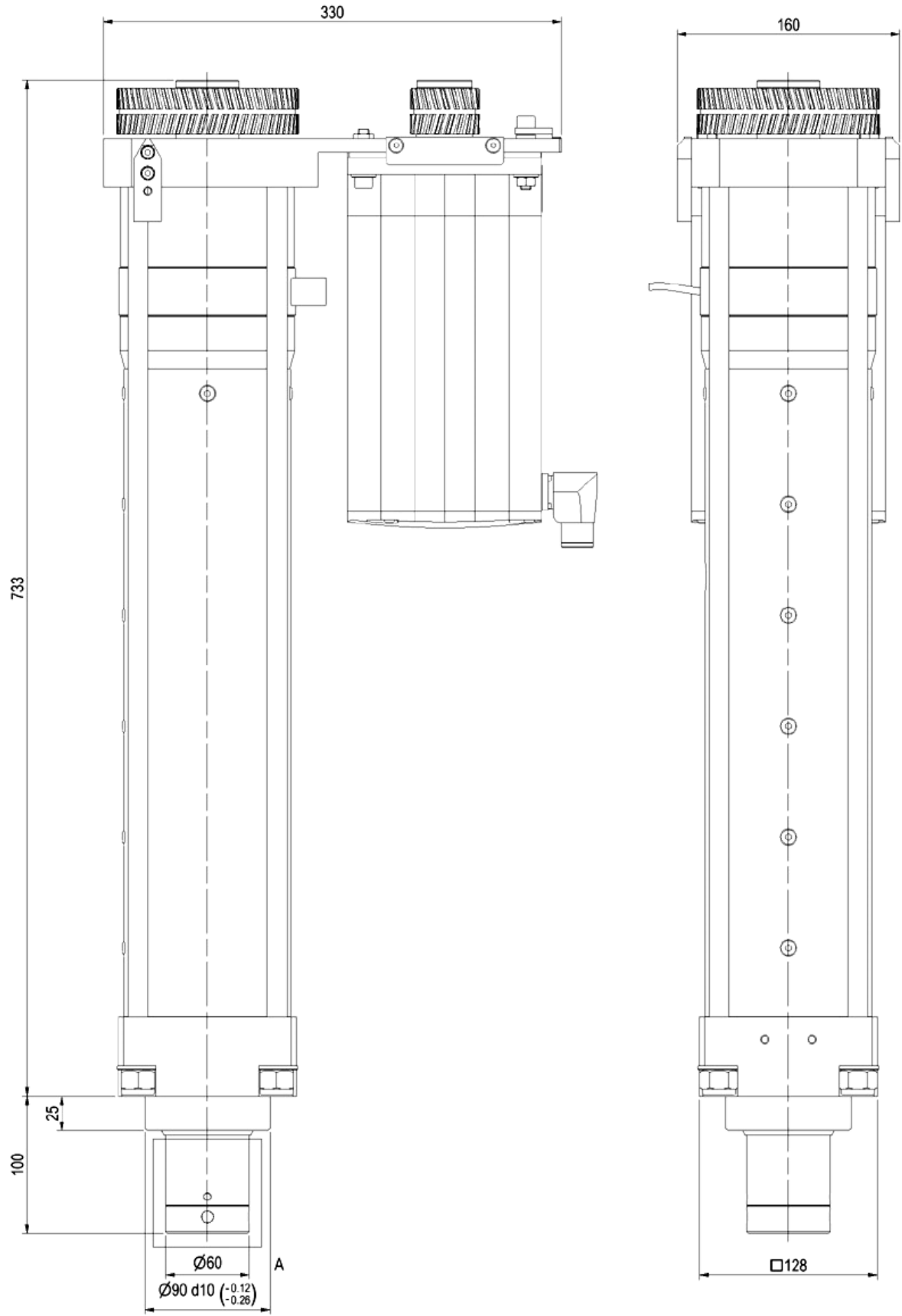
SA50, SA70, SA100

14.1 Size of cylinder

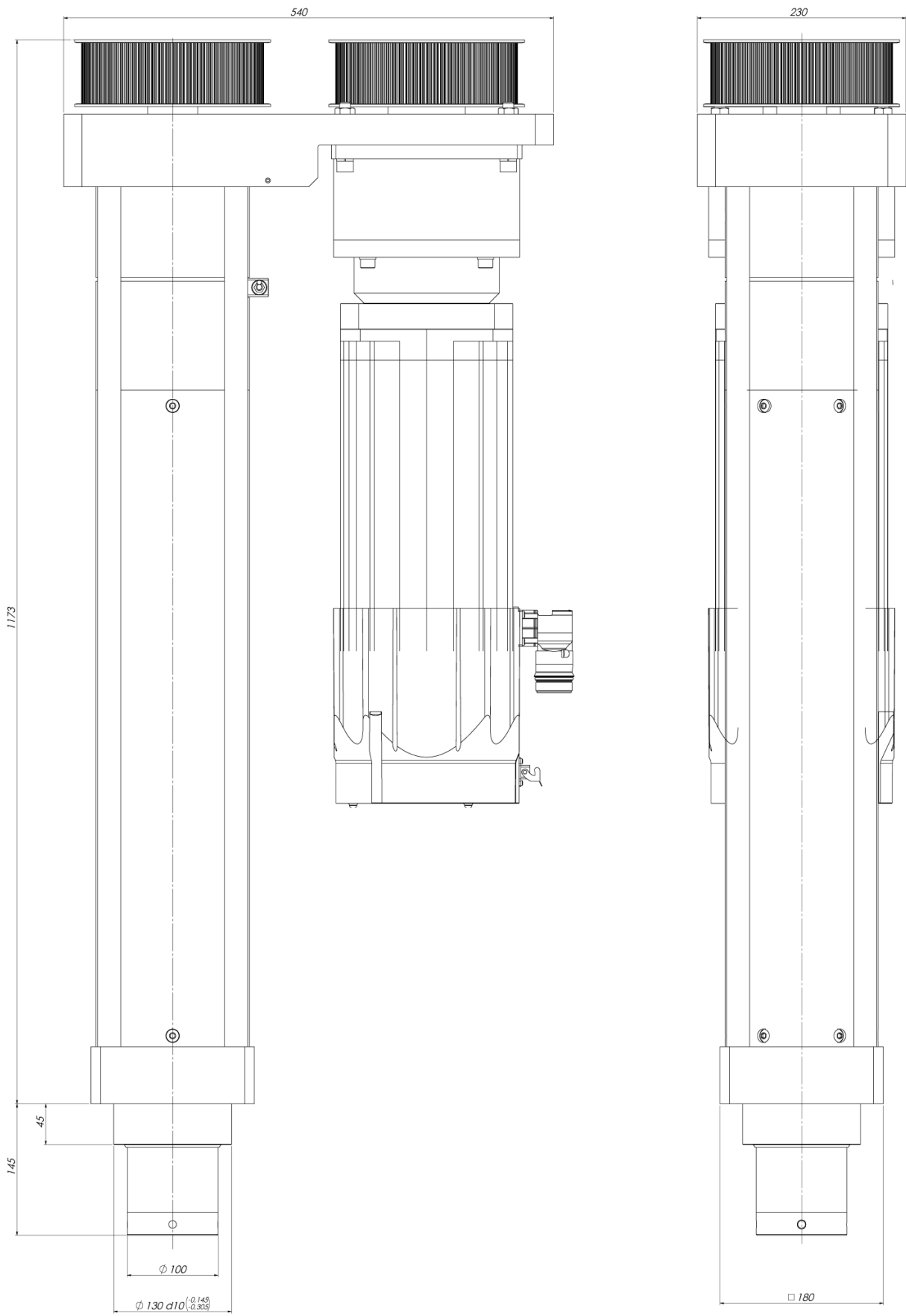
Cylinder SA10, SA25 stroke 300:



Cylinder SA50, SA70, SA100 stroke 250:

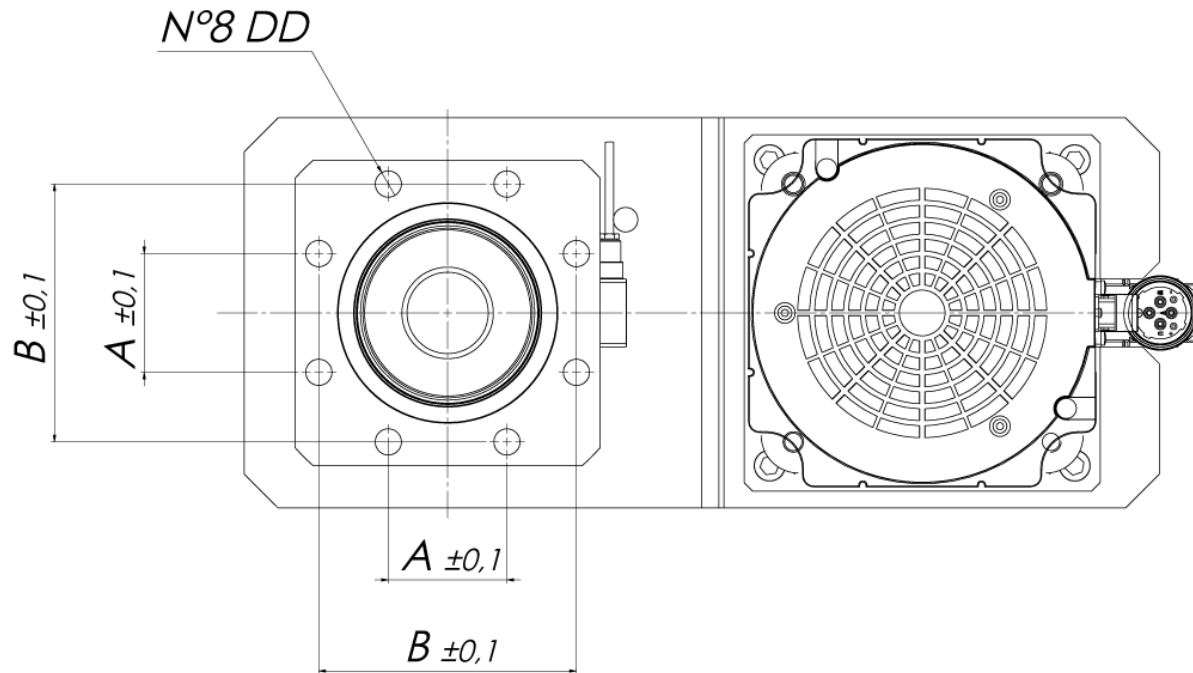


Cylinder SA200, SA300 stroke 420:



14.2 Methodology for fixing

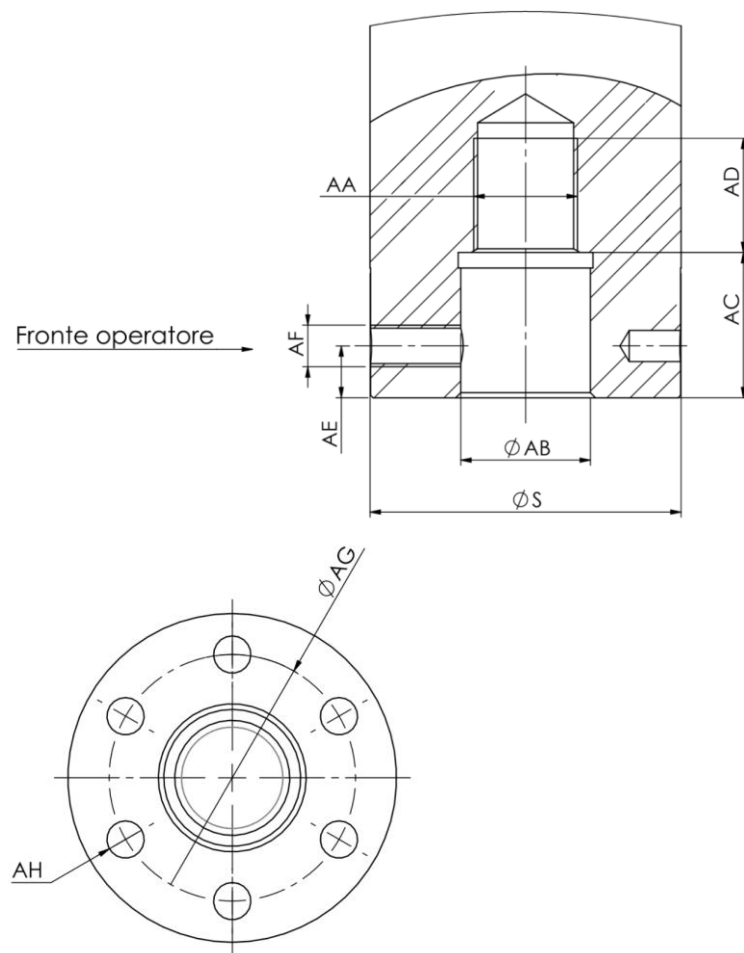
The cylinder must be secured with eight screws as shown in the figure:



| CHARACTERISTIC | SA10 SA15 SA25 | SA50 SA70 SA100 | SA200 | SA300 |
|----------------------------|-------------------|--------------------|-----------|-----------|
| Type DD | M8 x 1.25 | M12 x 1.75 | M18 x 2.5 | M18 x 2.5 |
| Strength class DD | 12.9 | 12.9 | 12.9 | 12.9 |
| Minimum screw-in depth DD | 25 mm | 30 mm | 30 mm | 30 mm |
| Screw tightening torque DD | 33 Nm | 100 Nm | 300 Nm | 350 Nm |
| A | 37 mm | 40 mm | 70 mm | 70 mm |
| B | 86 mm | 108 mm | 152 mm | 152 mm |

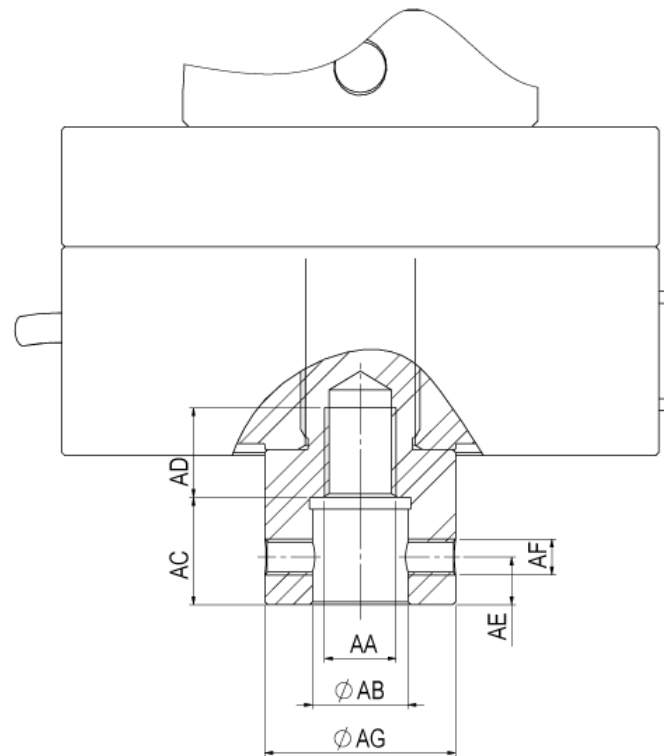
15 Tooling

The size of the head of the stem:



| CHARACTERISTIC | SA10 SA15 SA25 | SA50 SA70 SA100 | SA200 SA300 |
|--------------------|-------------------|--------------------|-------------|
| AA | M16 x 1.5 | M20 x 1.5 | M50 x 2 |
| AB [mm] | Ø 20 H8 | Ø 25 H8 | Ø 54 H8 |
| AC [mm] | 22 | 28 | 35 |
| AD [mm] | 18 | 22 | 30 |
| AE [mm] | 10 | 10 | 12 |
| AF | 1 x M8 | 1 x M8 | 1 x M10 |
| AG [mm] | Ø 45 ± 0.1 | Ø 45 ± 0.1 | Ø 77 ± 0.1 |
| AH | 6 x M8 | 6 x M8 | 6 x M10 |
| AH profondità [mm] | 12 | 12 | 15 |
| S [mm] | Ø 60 | Ø 60 | Ø 100 |

Rod connection dimensions with external force transducer:



| EXTERNAL LOAD CELL | SA10 SA15 SA25 | SA50 SA70 SA100 | |
|--------------------|------------------------|------------------------|--|
| AA | M12 x 1.5 | M20 x 1.5 | |
| AB [mm] | Ø 16 H8 | Ø 25 H8 | |
| AC [mm] | 18 | 28 | |
| AD [mm] | 15 | 22 | |
| AE [mm] | 8 | 12 | |
| AF | 1 x M6 Not oriented | 1 x M6 Not oriented | |
| AG [mm] | Ø 32 | Ø 60 | |

| HIGH PRECISION TRANSDUCER | HPT1 HPT2 HPT4 HPT10 | HPT20 | |
|---------------------------|-------------------------|-------------------------|--|
| AA | M12 x 1.5 | M20 x 1.5 | |
| AB [mm] | Ø 16 H8 | Ø 25 H8 | |
| AC [mm] | 18 | 28 | |
| AD [mm] | 15 | 22 | |
| AE [mm] | 8 | 15 | |
| AF | 2 x M6 Not oriented | 2 x M10 Not oriented | |
| AG [mm] | Ø 32 | Ø 60 | |

16 Electrical installation

The product is made specifically for the industrial sector and can only work with fixed connection.

Power Characteristics servo drive for cylinders SA10 and SA25:

| | |
|----------------|---------------------|
| Type | LXM32C D30 N4 |
| Rated Voltage | 400 VAC Three Phase |
| Inrush Current | 19 A |
| Rated Power | 3 kW |

Power Characteristics servo drive for cylinders SA50, SA70 and SA100:

| | |
|----------------|---------------------|
| Type | LXM32C D72 N4 |
| Rated Voltage | 400 VAC Three Phase |
| Inrush Current | 57° |
| Rated Power | 7 kW |

Power Characteristics servo drive for cylinders SA200 and SA300:

| | |
|----------------|---------------------|
| Type | LXM32M C10 N4 |
| Rated Voltage | 400 VAC Three Phase |
| Inrush Current | 100 A |
| Rated Power | 11 kW |

Features 24V supply (servo drive and instrument):

| | |
|------------------|-----------------|
| Supply Voltage | 24 VDC \pm 5% |
| Current absorbed | 2.5 A |

16.1 STO signal characteristics

The following characteristics are given by the servo drive manufacturer.

The safety function can be achieved by controlling the STO signals of the servo drive.

The safety function should be used and checked at regular intervals.

The interval depends on the risk analysis of the whole system.

The minimum interval is 1 year (intensive use according to IEC 61508).

Refer to the following STO safety function data for the maintenance schedule and safety calculations:

| | | |
|--|--------------|--------------------------|
| Duration of the safety function STO (IEC 61508) 1) | Years | 20 |
| SFF (IEC 61508) Safe Failure Fraction | % | 90 |
| HFT (IEC 61508) Hardware Fault Tolerance Subsystem Type A | | 1 |
| SIL IEC 61508 IEC 62061 | | SIL3 SILCL3 |
| PFH (IEC 61508) Probability of Dangerous Hard-ware Failure per Hour | 1/h (FIT) | $1 \cdot 10^{-9}$ (1) |
| PL (ISO 13849-1) Performance Level | | e (category 3) |
| Mean Time to Failure (ISO 13849-1) Mean Time to Dangerous Failure | Anni | >100 |
| DC (ISO 13849-1) Diagnostic Coverage | % | 90 |

16.2 Components to wiring

The system *Alfamatic SA* supplied is composed of three main components and from all connection cables that are not part of the normal board machine.

The controller (PLC) is connected to the instrument *Press-Right* and controls the operation through inputs and outputs.

Material list:



Control instrument *Press-Right*



Servo Drive LXM32C



Electric cylinder SA type



Engine cable. The length normally provided is 5 m. In the standard configuration you can reach up to 15 m.



Encoder cable. The length normally provided is 5 m. In the standard configuration you can reach up to 15 m.



Movement cable. The length normally provided is 5 m. In the standard configuration you can reach up to 15 m.



Communication cable. The length normally provided is 5 m. In the standard configuration you can reach up to 15 m.



Position reading cable. The length normally provided is 5 m. In the standard configuration you can reach up to 15 m.

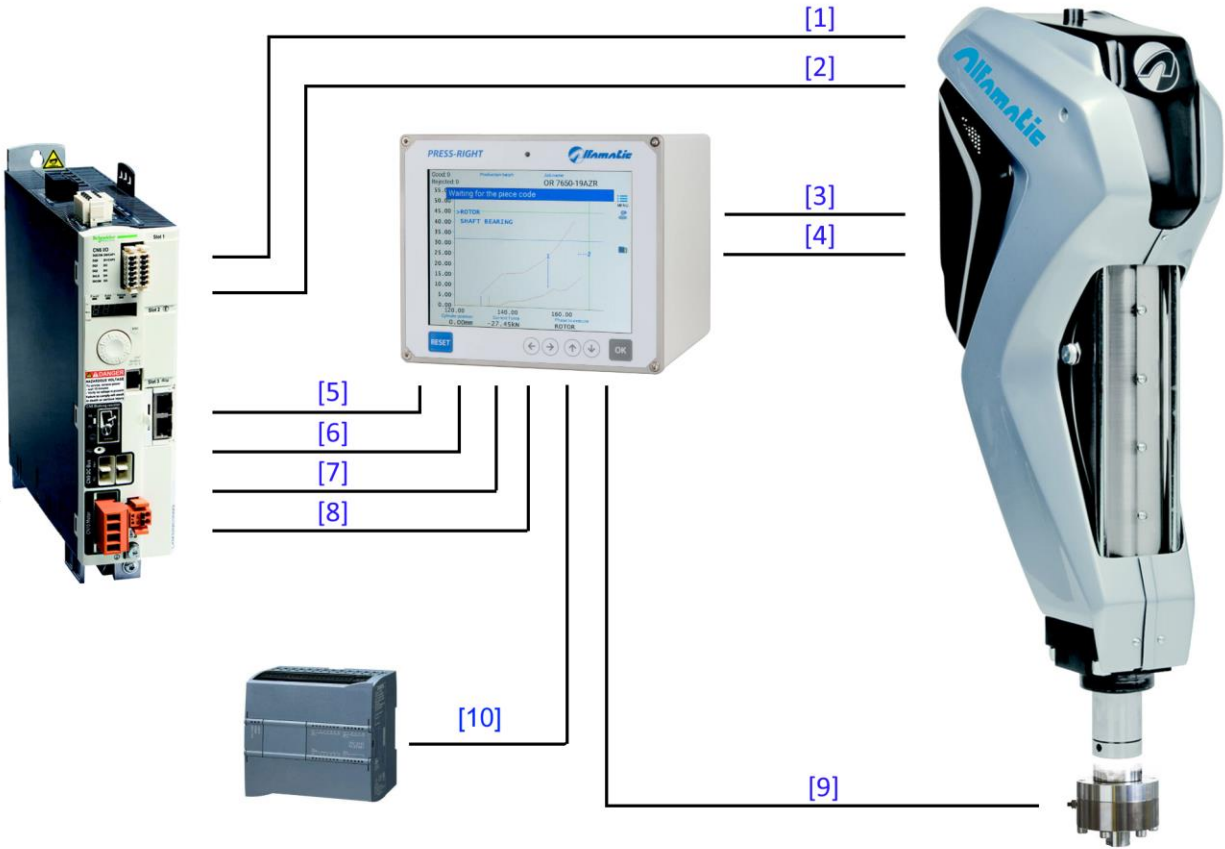


Temperature sensor cable. The length normally provided is 3 m, maximum length is 5 m.



Load cell cable. The length normally provided is 3 m, maximum length is 5 m.

The three components are mutually connected as shown in the following scheme:



| | Funzione | Press-Right | Servo Drive | Cylinder |
|--------------------------|-----------------------------------|--------------|-------------|----------------------|
| <input type="checkbox"/> | 1 Absolute Encoder | | CN3 | Motor |
| <input type="checkbox"/> | 2 Motor cable | | CN10 CN11 | Motor |
| <input type="checkbox"/> | 3 Force Transducer | X11 | | CN22 |
| <input type="checkbox"/> | 4 Temperature Sensor | X15 | | CN21 |
| <input type="checkbox"/> | 5 Communication | X15 | CN7 | |
| <input type="checkbox"/> | 6 Managing movement | X16 | CN5 | |
| <input type="checkbox"/> | 7 Position | X18 | CN4 | |
| <input type="checkbox"/> | 8 Command I/O signals | X3 X4 | CN6 | |
| <input type="checkbox"/> | 9 External force transducer cable | X22 | | LoadCell2 (optional) |
| <input type="checkbox"/> | 10 PLC I/O or Field Bus | X3 X4 or LAN | | |

The external force transducer is optional. Wire connector X22 like connector X11.

17 *Pre-assembled option*

To facilitate installation, Alfamatic can provide:

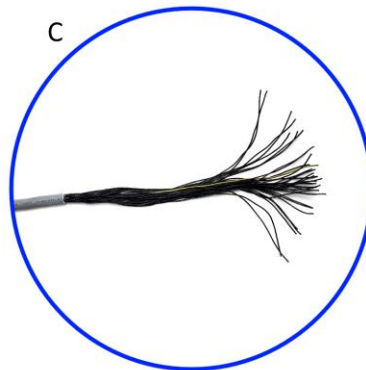
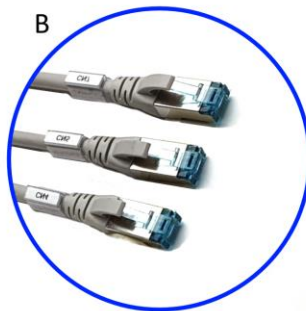
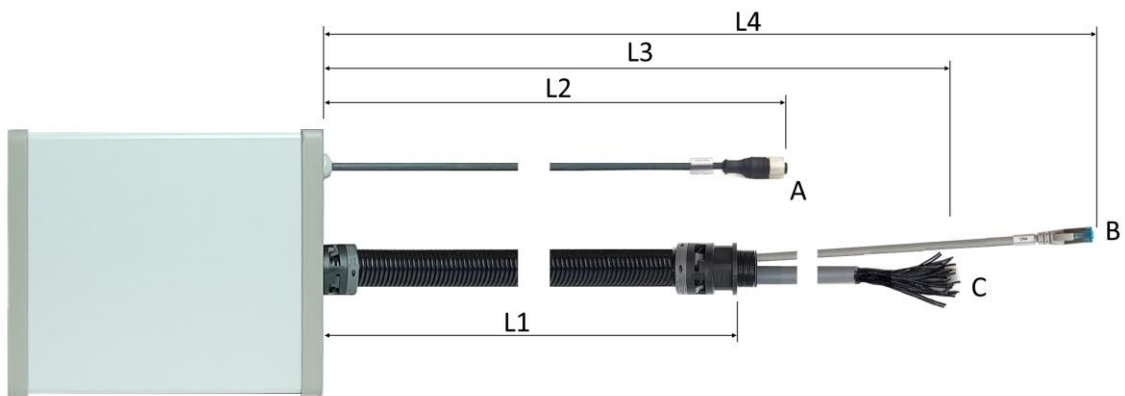
- 1) Press-Right pre-wired.
- 2) Press-Right with support arm.
- 3) Pre-assembled on-board electrical panel.

17.1 Press-Right pre-wired

The Press-Right instrument can be supplied wired.



| 2.5 m version | 12 m version |
|---------------|--------------|
| L1 = 2.5 m | L1 = 12 m |
| L2 = 2.8 m | L2 = 4.6 m |
| L3 = 1.4 m | L3 = 1.4 m |
| L4 = 1.9 m | L4 = 1.9 m |



- A: connectors to cylinder CN21 and CN22
- B: connectors to servo drive CN4, CN5 and CN7
- C: multi-core cable digital inputs and outputs

Multi-core cable digital inputs and outputs in the version **without** PROFINET or Ethernet/IP:

| Numero filo | Funzione | Morsetto | Servozionamento |
|-------------|---------------|-------------|------------------------------------|
| 1 | +24 Vin | Main switch | |
| 2 | 0 Vin | Main switch | |
| 3 | Input 00 | X3.1 | |
| 4 | Input 01 | X3.3 | |
| 5 | Input 02 | X3.5 | |
| 6 | Input 03 | X3.6 | |
| 7 | Input 04 | X3.7 | |
| 8 | Input 05 | X3.8 | |
| 9 | Input 06 | X3.9 | |
| 10 | Input 07 | X3.10 | CN6 DQ0 |
| 11 | Input 08 | X3.2 | CN6 DQ1 |
| 12 | Input 09 | X3.4 | CN6 DQ2 |
| 13 | Input 10 | X17.7 | |
| 14 | Input 11 | X17.8 | |
| 15 | Input 12 | X17.9 | |
| 16 | Input 13 | X17.10 | |
| 17 | Input 14 | X17.11 | |
| 18 | Output 00 | X4.1 | |
| 19 | Output 01 | X4.3 | |
| 20 | Output 02 | X4.5 | |
| 21 | Output 03 | X4.6 | |
| 22 | Output 04 | X4.7 | |
| 23 | Output 05 | X4.8 | CN6 DI3 |
| 24 | Output 06 | X4.9 | CN6 DI4 |
| 25 | Output 07 | X4.10 | CN6 DI5 |
| 26 | Output 08 | X4.4 | |
| 27 | Output 09 | X17.1 | |
| 28 | Output 10 | X17.2 | |
| 29 | Output 11 | X17.3 | |
| 30 | Output 12 | X17.4 | |
| 31 | Output 13 | X17.5 | |
| 32 | Output 14 | X17.6 | |
| 33 | Service +24 V | X3.12 | DO NOT connect to the power supply |
| 34 | Service 0 V | X3.11 | DO NOT connect to the power supply |
| 35 | | | |
| 36 | | | |
| G/Y | PE | | |

Multi-core cable digital inputs and outputs in the version **with** PROFINET or Ethernet/IP:

| Numero filo | Funzione | Morsetto | Servozionamento |
|-------------|---------------|-------------|------------------------------------|
| 1 | +24 Vin | Main switch | |
| 2 | 0 Vin | Main switch | |
| 3 | Input 00 | X3.1 | |
| 4 | Input 01 | X3.3 | |
| 5 | Input 02 | X3.5 | |
| 6 | Input 03 | X3.6 | |
| 7 | Input 04 | X3.7 | |
| 8 | Input 05 | X3.8 | |
| 9 | Input 06 | X3.9 | |
| 10 | Input 07 | X3.10 | CN6 DQ0 |
| 11 | Input 08 | X3.2 | CN6 DQ1 |
| 12 | Input 09 | X3.4 | CN6 DQ2 |
| 13 | Output 00 | X4.1 | |
| 14 | Output 01 | X4.3 | |
| 15 | Output 02 | X4.5 | |
| 16 | Output 03 | X4.6 | |
| 17 | Output 04 | X4.7 | |
| 18 | Output 05 | X4.8 | CN6 DI3 |
| 19 | Output 06 | X4.9 | CN6 DI4 |
| 20 | Output 07 | X4.10 | CN6 DI5 |
| 21 | Non usare | X4.4 | |
| 22 | Service +24 V | X3.12 | DO NOT connect to the power supply |
| 23 | Service 0 V | X3.11 | DO NOT connect to the power supply |
| G/Y | PE | | |

17.2 Press-Right with support arm

The Press-Right instrument can be supplied with support arm:

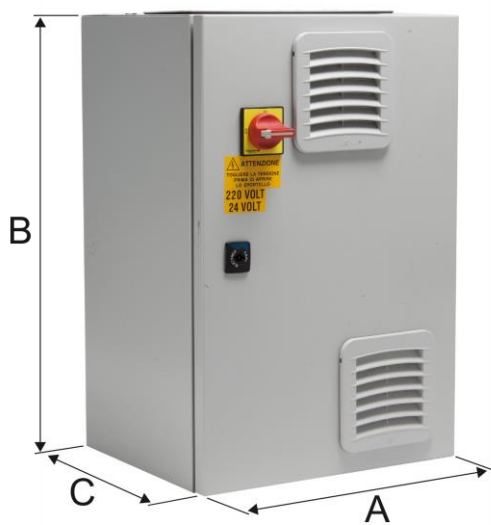


The support arm can be rotated.

17.3 Pre-assembled electrical panel

Alfamatic can provide an electrical panel pre-wired that contains:

- Servo Drive
- Main switch with lock door
- Magnetothermal circuit breakers for protection
- Redundant contactors on power supply
- Cooling System
- Terminal block for connection to the main switchboard
- Size electric box



SA10 SA15 SA25 SA50 SA70 SA100
SA200 SA300

A = 400 mm
A = 800 mm

B = 600 mm
B = 600 mm

C = 320 mm
C = 320 mm

Inside the electrical box

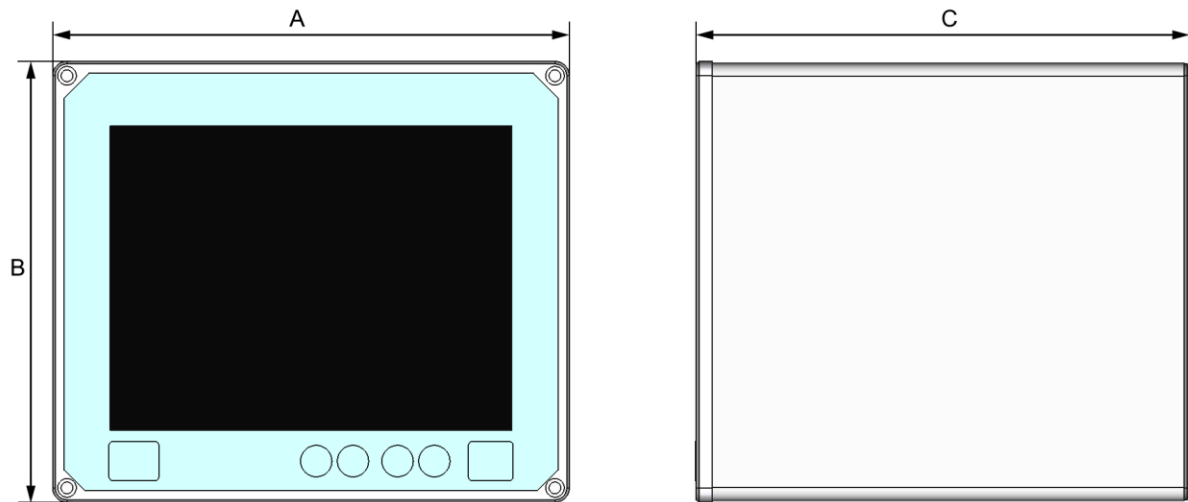


18 Instrument size Press-Right

The Press-Right instrument is supplied in a sturdy metal case which can be attached to an articulated arm.

To the indicated depth it is necessary to add the bulk of the grommets and cables of at least 55mm.

The dimensions in this case are the following:



A = 197 mm

B = 166 mm

C = 190 mm

18.1 Operation of the instrument

The Alfamatic cylinder has an absolute encoder, for this it is not necessary to perform the movements for the search of the zero position after turning on the system.

Each cycle of operation may have a waiting position (rest position) which is reached at the end of the same.

The Press-Right, uses digital inputs and outputs for various commands necessary to the operation.

The function of each input and each output is configurable.

The instrument change operation as a function of the configuration of the inputs and outputs. If you are not configured inputs for a certain function, this function and all the menus involved will not be available.

The start command cycle is given by activating the input IMPULSIVE START. If there are multiple inputs configured as IMPULSIVE START, must be activated all at the same time (no safety two-hand control).

Attention: The start command is handled by the software of the instrument and is not in any way be used as a safety device.

If you configured an input to perform the return to the zero position or wait (START TO ZERO or START RETURN) the start command will always perform the pressing cycle independently from the position in which it is located. On the contrary, when the cylinder will be beyond the waiting position, the first start command will return the cylinder back to the waiting position.

Three inputs and three outputs of the instrument which is necessary for the control of the servo drive must be connected to the corresponding signals of the servo drive and configured in the following manner:

| Function | Configuring Press-Right | Servo Drive |
|--------------------------|----------------------------|-------------|
| No alarms | Input DRIVER NO FAULT | Output DQ0 |
| Servo drive active | Input DRIVER ACTIVATE | Output DQ1 |
| In position | Input DRIVER IN POSITION | Output DQ2 |
| Enabling the servo drive | Output DRIVE ENABLE | Input DI3 |
| Reset of the servo drive | Output RESET OUTPUT | Input DI4 |
| Precision movement | Output HIGH PRECISION MODE | Input DI5 |

In the pressing cycles when the cylinder starts the return, is activated the output GOOD if the piece is ok or the output REJECTED if the piece is not ok. These outputs will be deactivated when will be given the start to a new pressing cycle. When a workpiece is rejected, you have to resets the instrument with the RESET input or with the blue key of the instrument. Note that output rejected is intermittent until the reset occurred. If the RESET input is always active the output REJECTED will never be intermittent. If you turn off the blue key via the instrument options and lacks a reset input will be given the automatic resetting after a waste cycle.

The reset command is necessary after a rejected piece or when there is an alarm (active fault). To reset an alarm is necessary to the passage of the RESET signal from low to high. Note: resetting alarms is always possible by pressing the blue button on the instrument even if it has been disabled in the options.

When the cylinder is stopped and at zero (absolute position read less than 1mm) is activated the output configured as ZERO POSITION.

The alarms (FAULT) can be generated from the servo drive or from the instrument (example a collision during a movement).

When the cylinder is stationary in the waiting position (or more back this) is activated the output REST POSITION.

When the cylinder moves, is activated the OUTPUT PRESS/MOVING.

If there is an error in the system is activated the FAULT output.

The output READY is active if the instrument is ready to execute the cycle. It is deactivated if it is not ready for any reason. When the cycle starts is deactivated the output READY and remains low until it is removed the START signal. If you enable the option to hold data saving the output ready remains low until the data are not saved.

The input SAFETY OK, if present, must always be active during the displacements. This input is normally used to indicate that the area in front of the cylinder is free. Attention: The Input SAFETY OK is managed by the software of the instrument and is not in any way be used as a safety device.

18.2 External controller (PLC) information.

The Press-Right is supplied with ModbusTCP protocol as standard but can be requested with PROFINET or EthernetIP interface.

If you wish to control the cylinder via digital input and output signals, you can connect the PLC signals to the free ports of terminal blocks X3 X4 and X17. The PLC must be PNP positive logic. The instrument inputs are opto-isolated from the instrument control electronics. The outputs are isolated and power, so no separation relays are needed between Press-Right and PLC. A minimum of one output (IMPULSIVE START) and three PLC inputs (REST POSITION, GOOD, REJECTED 1) are recommended.

18.3 List of types of input and output signals

Each input can have one of the following functions:

| Name | Function |
|--------------------|--|
| JOB SELECTOR | These inputs are used to select a job. The number of the selected job is indicated by the binary combination of these inputs (see Errore. L'origine riferimento non è stata trovata.). |
| PHASE SELECTOR | These inputs are used to select from outside the phase of work |
| RED basket 1 | The sensor for the containers of the normal scrap |
| RED basket 2 | The sensor for the containers of scraps offer |
| RESET | Reinstating the instrument after a scrap and reset alarms |
| ENABLE # | See Errore. L'origine riferimento non è stata trovata. |
| TEST SIGNAL # | See Errore. L'origine riferimento non è stata trovata. |
| IMPULSIVE START | The request for the start of a new cycle button (it is possible to use two for controlling contemporaneity) |
| NO alarm | The signal of the machine not in emergency (emergency button not active) |
| SAFETY OK | The signal of the machine safely (guards closed and clear area) |
| END PIECE | Signal processing end piece. If you used when you activate the instrument counts the piece and, if must save curves. |
| START RETURN | Return command to the waiting position |
| START TO ZERO | Return command to zero |
| Drivers NO FAULT | The driver is not in alarm (connect directly to the servo drive) |
| ACTIVATE DRIVER | Active Driver (connect directly to the servo drive) |
| DRIVER IN POSITION | Position Reached (connect directly to the servo drive) |


Functions not reported should not be selected with electric cylinders.

Each output can have one of the following functions:

| Name | Function |
|---------------------|---|
| GOOD | Signal good part. Active after the return of the cylinder until the next start. |
| REJECTED 1 | Signal piece standard deviation |
| REJECTED 2 | Signal piece special waste. |
| MOVING | Active after the start if the instrument is ready and off to the reaching of the value of the stop. |
| DOOR | Closing control mobile port |
| BUZZER | Control of horn |
| TEST OUTPUT | Activation signal for the TEST SIGNAL 1 See Errore. L'origine riferimento non è stata trovata. |
| CONTACT | Contact signal of the workpiece and the departure of the power phase |
| CHECK POINT OUT # | Output activated at a programmable share (maximum 3 outputs) |
| PHASE 0 bits | Active when working the phase 2 and 4 |
| PHASE 1 bits | Active when working the phase 3 and 4 |
| JOB TYPE | The signal can be activated via the job options |
| COMPLETED | Move completed |
| READY | Instrument ready |
| OPEN GREEN BOX | Command for opening the basket of good parts |
| START SAFETY RELAY | START command/RESET safety module |
| FAULT | Problem or malfunction |
| REST POSITION | The cylinder to the waiting position |
| ZERO POSITION | Cylinder fully back |
| RESET output | Reset fault of the servo drive (connect directly to the servo drive) |
| ENABLE DRIVER | Enabling the servo drive (connect directly to the servo drive) |
| HIGH PRECISION MODE | Active Mode for precise Positioning (connect directly to the servo drive) |

Functions not reported should not be selected with electric cylinders.

18.4 Connecting an external reset

When a reject is detected, the instrument goes into lockout preventing further parts from being run. To unlock the instrument, the reset button  on the keypad must be pressed. You can connect an external reset signal, which can be a button, a key, or a sensor. If you enable the **Disable button for reset rejected** option from the **TOOLS > CONFIGURE > GENERAL OPTIONS** menu, rejected reset will only be possible by external reset.

To disable the reset request completely, you must have no inputs configured as RESET and enable the **Disable button for reset rejected** option from the **TOOLS > SETUP > GENERAL OPTIONS** menu.

18.5 Additional controls

Up to six additional controls can be connected to the *Press-Right*.

Three of these are used as press start consents, the other three are used to determine the good or rejected outcome of the job or as other start consents.

The first three are called ENABLE, the other three are called TEST SIGNAL. You can assign a name to each additional control.

You can determine in each job whether or not to use the additional controls.

The TEST SIGNAL 1 control can also be associated with an output signal that is useful for activating the control.

To use the additional controls, you must configure the instrument by indicating to which inputs the signals are connected.

After the inputs have been configured, an identifying name can be assigned to each.

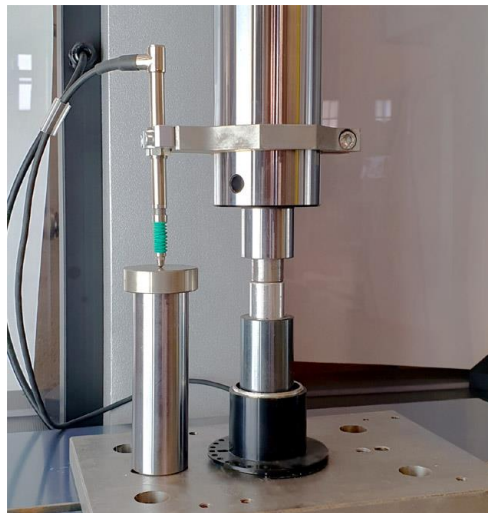
Enable signals are checked when the START signal is activated: if an enable signal is missing, the instrument displays the message no enable signal with the relevant name. If an enable signal is missing during the cycle, no error is reported.

Test signals determine good or reject outcome: if a test signal is missing the part is rejected.

18.6 Additional precision probe

A touch probe can be connected to the Press-Right to perform very precise dimension measurements. The touch probe can be used to control the precise stopping of the cylinder or for precise control of the final work measurement.

The touch probe is controlled in real time during displacement so that the cylinder speed can be continuously corrected and the desired position can be reached in a single movement.



Thanks to this touch probe, it is also possible to measure the position relative to a reference point on the workpiece.

When, in a work step, external touch probe control is activated, the press will use the cylinder position for rapid movements, while using the touch probe position value for curve registration.

The position value of the touch probe can be reset upon contact with the workpiece. This function allows the realization of very small movements of high precision as, for example, is required in stamping operations.

Characteristics of the precision touch probe input:

| Name | Function |
|-------------------------|-----------------------------------|
| Accuracy of measurement | 0.1% of useful probe stroke |
| Measurement resolution | 0.025% of the usable probe stroke |

The additional touch probe must be connected to the instrument terminal block for additional transducer called X12.

19 Instrument wiring

19.1 Precautions for wiring

Attention:

Do not adjust, install nor change the wires before he stopped the supply of the product.

Risk of electric shock, malfunctions and damage.

- Do not remove the cables.
- Use only the cables specified.
- Do not connect or disconnect wires, cables or connectors when the power is turned on.

Precautions:

- Connect the connectors correctly and safely.
- Adopt adequate anti-noise measures. The electrical noise in a signal line may cause a malfunction. As a countermeasure, separate cables of high voltages from those of low voltage and shorten the length of the wiring, etc.
- Keep separate the power cables from the other cables. The product might operate in a defective way due to the interference of the noise level and voltage spikes from electric cables and high voltage toward the signal line.
- Make sure that the actuator does not get stuck in the cables during the movement.
- Operate the product with all wires and cables make sure.
- Avoid net bending of the cables at the points in which they are inserted in the product.
- Avoid twisting, bend, turn the cable or apply external forces. Risk of electric shock, broken wires, bad contact or loss of control of the product.
- Before use, secure in position the motor cables that come out of the actuator. The motor cables and the cylinder are not of the robotic type and can be damaged during the displacements.

19.2 Internal Cards

The *Press-Right* is composed of two electronic cards:

Front (PR1MB) mounts the display, keyboard and the main CPU.

Input and output (VIO) on this tab are connected to the input signals in output and the transducers.

All cards are of our production, and may be changed according to your specific needs.

19.2.1 Wiring the instrument

Attention: This information applies only to the card VIO10. Check that the card to be hardwired is precisely of this type.

The wiring of the instrument rests at different removable terminal blocks numbered (X3, X4, X5 ...). Each terminal of each terminal block is numbered. The seventh clamp terminal strip X5 will be called X5.7. The numbering of the terminal blocks is also shown on the card itself.

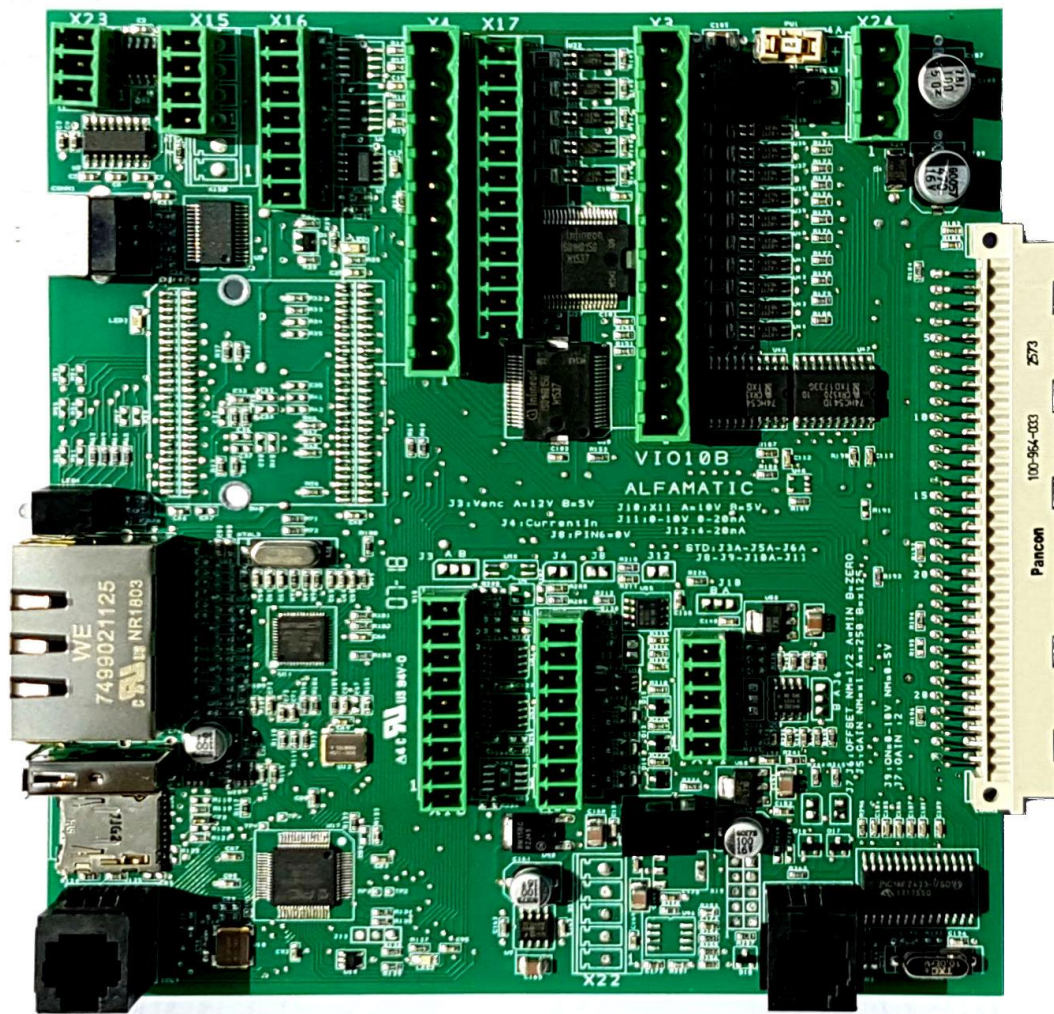


Figure 1

Terminal block instrument supply (X24)

The electronics of the instrument and the transducers are supplied with 24VDC via the terminal connector with three poles X24.

| Name | Function | Terminal |
|--------|-----------------------|----------|
| 0VDC | Negative supply | X24.1 |
| PE | Ground | X24.2 |
| +24VDC | Positive power supply | X24.3 |

Terminal block inputs (X3 and X17)

The inputs are optoisolated and compatible with signals to clean contact or with PNP transistor output 24VDC.

| Name | Terminal | Default | Servo driver |
|---------------|----------|------------------------------------|--------------|
| Input 0 | X3.1 | IMPULSIVE START | |
| Input 8 | X3.2 | DRIVER ACTIVATE | CN6.23 DQ1 |
| Input 1 | X3.3 | RESET | |
| Input 9 | X3.4 | DRIVER IN POSITION | CN6.24 DQ2 |
| Input 2 | X3.5 | | |
| Input 3 | X3.6 | | |
| Input 4 | X3.7 | | |
| Input 5 | X3.8 | | |
| Input 6 | X3.9 | | |
| Input 7 | X3.10 | DRIVER NO FAULT | CN6.22 DQ0 |
| Service 0 V | X3.11 | DO NOT connect to the power supply | |
| Service +24 V | X3.12 | DO NOT connect to the power supply | |

| Name | Terminal | Default |
|-------------|----------|---------|
| Input 10 | X17.7 | |
| Input 11 | X17.8 | |
| Input 12 | X17.9 | |
| Input 13 | X17.10 | |
| Input 14 | X17.11 | |
| Service 0 V | X17.12 | |

Terminal block outputs (X4 and X17)

Outputs for consumers to 24VDC. For inductive loads, such as valves and the relay coils, it is necessary to install a diode in parallel for eliminating overvoltages.

| Name | Terminal | Default | Servo driver |
|------------|----------|-----------------------|--------------|
| Output 0 | X4.1 | GOOD | |
| Service 0V | X4.2 | | |
| Output 1 | X4.3 | REJECTED 1 | |
| Output 8 | X4.4 | | |
| Output 2 | X4.5 | REST POSITION | |
| Output 3 | X4.6 | | |
| Output 4 | X4.7 | | |
| Output 5 | X4.8 | DRIVER ENABLE | CN6.34 DI3 |
| Output 6 | X4.9 | DRIVER RESET | CN6.35 DI4 |
| Output 7 | X4.10 | DRIVER HIGH PRECISION | CN6.36 DI5 |

Note: the entire terminal strip X17 and the output 8 of X4 are optional.

| Name | Terminal | Default |
|-----------|----------|---------|
| Output 9 | X17.1 | |
| Output 10 | X17.2 | |
| Output 11 | X17.3 | |
| Output 12 | X17.4 | |
| Output 13 | X17.5 | |
| Output 14 | X 17.6 | |

Terminal block additional transducer (X12)

To the terminal block of the additional transducer can be connected an incremental encoder, a potentiometer or a transducer with analogue output. This additional transducer can be used for stopping the cylinder or may be checked to determine if the piece is good.

Using a position transducer of precision, it is possible to make the shutdown of the cylinder of precision.

On this terminal block it is possible to pick up also the power supply for the transducer. For the encoder is provided with a supply voltage of 12VDC (J3A*) or 5VDC (J3B). For the potentiometer is provided with a supply voltage of high precision to 10VDC.

| Name | Terminal | Description |
|--------|----------|---|
| | X12.1 | Do not connect |
| | X12.2 | Do not connect |
| | X12.3 | Do not connect |
| +Vdc | X12.4 | Power B: 12V with J3A or 5V with J3B |
| 0VDC | X12.5 | Ground |
| AIN- | X12.6 | Negative analog input (for convenience can be grounded with J8) |
| +10VDC | X12.7 | Power supply: 10V |
| AIN+ | X12.8 | Positive Analog Input |

Electrical characteristics terminal X12.4 with J3A*

| | |
|------------------------|----------------------|
| Output Voltage | 12V \pm 10% |
| Output current ongoing | 200mA |
| Protections | Current, Temperature |

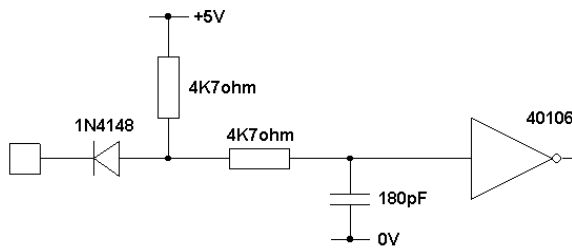
Electrical characteristics terminal X12.4 with J3B

| | |
|------------------------|----------------------|
| Output Voltage | 5V \pm 10% |
| Output current ongoing | 200mA |
| Protections | Current, Temperature |

Electrical characteristics terminal X12.7

| | |
|------------------------|----------------------|
| Output Voltage | 10V |
| Output current ongoing | 10mA |
| Protections | Current, Temperature |

The input circuit terminals X12.1, X12.2 and X12.3



Selection Type analog input X12

Input 0-10V
 Input 0-5V
 Input 0-20 mA
 Input 4-20mA
 * *Default*

| J4 | J9 | J11 | J12 |
|-----|-----|-----|-----|
| OUT | IN | IN | OUT |
| OUT | OUT | IN | OUT |
| IN | IN | IN | OUT |
| IN | IN | OUT | IN |

Terminal block load cell (X11)

Input for load cell resistive bridge with a sensitivity of 2 mV/V or 4mV/V or input differential analog 0-10V or 0-5V. On this terminal block is present also the food of the transducer.

| Name | Terminal | Description | Gefran TU | AEP TC4 |
|------|----------|------------------------------|-----------|---------|
| IN+ | X11.1 | Positive input | Yellow | Yellow |
| IN- | X11.2 | Negative input | Red | White |
| 0V | X11.3 | Shield of the shielded cable | Shield | Shield |
| 0V | X11.4 | Power ground | Green | Black |
| +Vdc | X11.5 | J10A=10V J10B=5V | White | Red |

Electrical characteristics terminal X11.5 voltage 10V

Output Voltage 10V $\pm 10\%$
 Output current ongoing 60mA
 Protections Current, Temperature

Electrical characteristics terminal X11.5 voltage 5V

Output Voltage 5V $\pm 10\%$
 Output current ongoing 100mA
 Protections Current, Temperature

Selection Type analog input X11

Load cell 2mV/V 10V for operation in compression *
 Load cell 2mV/V 10V compression and traction
 Load cell 2mV/V 5V compression and traction
 Input 0-10V
 Input 0-5V
 * *Default*

| J5 | J6 | J7 | J10 |
|-----|-----|-----|-----|
| IN | IN | OUT | IN |
| B | OUT | OUT | IN |
| IN | OUT | OUT | B |
| OUT | B | IN | IN |
| OUT | B | OUT | B |

Terminal block serial port RS485 (X15)

The serial RS485 is used for communication with the servo drive.

| Name | Terminal | Description |
|-------|----------|---|
| A+245 | X15.1 | Signal A+ of the RS485 interface toward CN7 Servo |
| B-245 | X15.2 | Signal B- of the RS485 interface toward CN7 Servo |
| 0V | X15.3 | Serial reference to CN7 Servo |
| 0V | X15.4 | Shield |

Terminal block motor control (X16)

This terminal block carries the control signals for the servo drive.

| Name | Terminal | Description |
|------|----------|-------------------------------------|
| CLK+ | X16.1 | The signal clock + toward CN5 Servo |
| CLK- | X16.2 | The signal clock - toward CN5 Servo |
| DIR+ | X16.3 | Direction signal + toward CN5 Servo |
| DIR- | X16.4 | Direction signal - toward CN5 Servo |
| ANA1 | X16.5 | Analog output 1 |
| ANA2 | X16.6 | Analog output 2 |
| 0V | X16.7 | Reference voltage signals |

Terminal block motor position (X18)

This terminal block receives signals PTO of the servo drive.

| Name | Terminal | Description | Servo Drive CN4 |
|--------|----------|-------------------|-----------------|
| 0V | X18.1 | Reference voltage | Brown |
| | X18.2 | Do not connect | Do not connect |
| | X18.3 | Do not connect | Do not connect |
| ENC_A- | X18.4 | Phase A- | Orange |
| ENC_A+ | X18.5 | Phase A+ | Orange/White |
| ENC_B+ | X18.6 | Phase B+ | Blue |
| ENC_B- | X18.7 | Phase B- | Blue/White |
| | X18.8 | Do not connect | Do not connect |
| | X18.9 | Shield | Shield |

Terminal block serial port RS232 (X23)

This terminal block is present if one or more RFID antennas are provided.

| Name | Terminal | Description |
|--------|----------|---------------------------|
| 0V | X23.1 | Reference |
| 485 A+ | X15.2 | RS485 interface signal A+ |
| 485 B- | X15.3 | RS485 interface signal B- |

19.2.2 Options

The card VIO10 can be supplied with special features optional:

Option for more load cells

It is possible to have as an option the possibility to connect to the instrument other load cells for simultaneous control of curves. In this case there will be multiple blocks of a five-pole type identical to X11.

RS485 port option

It is possible to have an RS485 port for connecting RFID antennas. In this case, the X23 connector will be present.

20 Instructions for mounting the Press-Right



Always disconnect the instrument from the power supply before opening it.

Open the Press-Right by unscrewing the four screws located in the corners of the front panel.

Remove internal cards of a few centimetres. Then unclip the tabs from the front panel.

Remove all cards from the container and remove groups of terminal blocks.

To secure the instrument it is possible to drill the container on the sides or above or below in a central position (first remove all cards).

Fit the grommets and plugs. To install a grommet larger, it is possible to enlarge the rear holes.

Thread the cables in the grommets and begin the wiring.

It is very important that the end part of the cable of the load cell is not covered by the shielding is the shortest possible.

Finished the wiring insert tabs.

Finally enter the groups of terminal blocks paying attention to the correct direction.

Attention to the cables that must not be crushed on the bottom of the instrument.

21 Transducers Calibration

The cylinder is supplied already calibrated. In the case of replacement of the cell or alteration of the values of the force measured for example by the variation of the weight of the tool you must resort to a new calibration. In general, must be inserted the new offset and gain values.

We must be very careful as regards the position transducer because the motor is provided with an absolute encoder. Replacing the belt or disassembly of the motor requires the manufacturer assistance penalty irreversible damage to the mechanics of the machine.

21.1 Calibration force transducer

For the calibration of the force transducer must use a load cell sample connected to the relative display to which you can refer.

Obviously, the load cell sample must be capable of withstanding the maximum strength provided the cylinder.

The values to be calibrated are offset and gain.

The offset is the value that the Press-Right display without corrections when the cell is not present any load. Depends on the tolerance of the amplification chain and by the weight of the equipment installed on the load cell. Calibrate this value allows to reset the value of the force displayed by the Press-Right.

The gain is instead the multiplication factor of the electric signal supplied by the load cell and allows you to display the correct value of force.

Attention: an incorrect calibration of the force transducer can compromise the integrity of the cylinder itself. The system is supplied calibrated. These values must not be altered inappropriately: you could put at risk the integrity of the cylinder.

21.1.1 Calibration procedure

Note: For Calibration must know the password of calibration.

1. Reset the *offset* using the following procedure:
 - a) Put the press in rest conditions
 - b) Go to the menu | Accessories | Diagnosis | calibration force
 - c) Temporarily insert zero as offset value
 - d) Read the value of the force transducer that appears at the top and insert it as an offset
 - e) Check that the measurement of the force is approximately zero
2. Correct the *gain* with the following procedure:
 - a) Place the load cell sample under the cylinder
 - b) Get off in manual until they touch and then to compress the sample cell up to a value of approximately $\frac{3}{4}$ of the maximum force of the cylinder.
 - c) Store the two force values displayed by the Press-Right and by the instrument sample at the same instant.
 - d) Calculate the correction coefficient with the following formula: $COEFF = (\text{value displayed by the instrument sample}) / (\text{value displayed by the Press-Right})$
 - e) Go to the menu | Accessories | Diagnosis | calibration force
 - f) Multiply the gain value for the coefficient just calculated,
 - g) Check that the value displayed by the Press-Right coincides with that of the instrument sample

21.2 Analogue input

The *Press-Right* has an Analog Input 0-10V with analog-digital converter 12bit.

The **offset** is the digital value that is subtracted from the value output from the analog-to-digital converter.

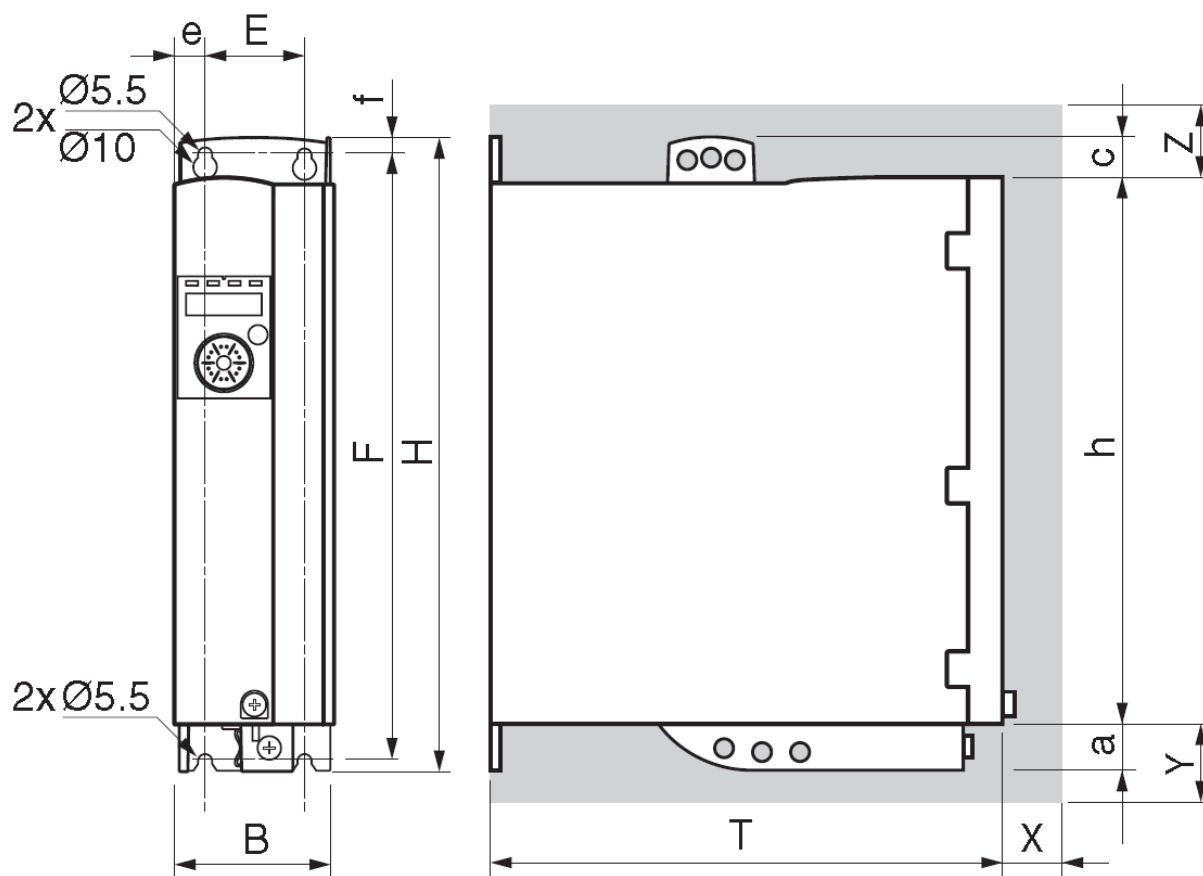
The **gain** is the multiplication factor which regulates the elevation value displayed.

The theoretical value of the gain to obtain hundredths of a millimeter is derived from the following formula:

$$\text{Gain} = (\text{nominal stroke in mm}) / 40.96$$

This input is used with the presence of an external probe for a more precise measurement of the altitude.

22 Installing the servo drive



Servo Drive for cylinders SA10, SA15 and SA25:

| | | | |
|----------|----------|----------|----------|
| B=68 mm | e=13 mm | a=20 mm | X>60 mm |
| T=225 mm | E=42 mm | h=230 mm | Y>100 mm |
| H=270 mm | F=258 mm | c=20 mm | Z>100 mm |
| | f=7,5 mm | | |

Weight = 2,6 kg

Cooling with blower 60 mm.

Servo Drive for cylinders SA50, SA70 and SA100:

| | | | |
|----------|----------|----------|----------|
| B=108 mm | e=13 mm | a=24 mm | X>60 mm |
| T=225 mm | E=82 mm | h=230 mm | Y>100 mm |
| H=274 mm | F=258 mm | c=20 mm | Z>100 mm |
| | f=7,5 mm | | |

Weight = 4,7 kg

Cooling with blower 80 mm.

Servoazionamento per cilindri SA200 e SA300:

| | | | |
|----------|----------|----------|----------|
| B=180 mm | E=140 mm | a=5 mm | X>60 mm |
| T=240 mm | F=371 mm | h=360 mm | Y>100 mm |
| H=385 mm | f=6 mm | c=20 mm | Z>100 mm |

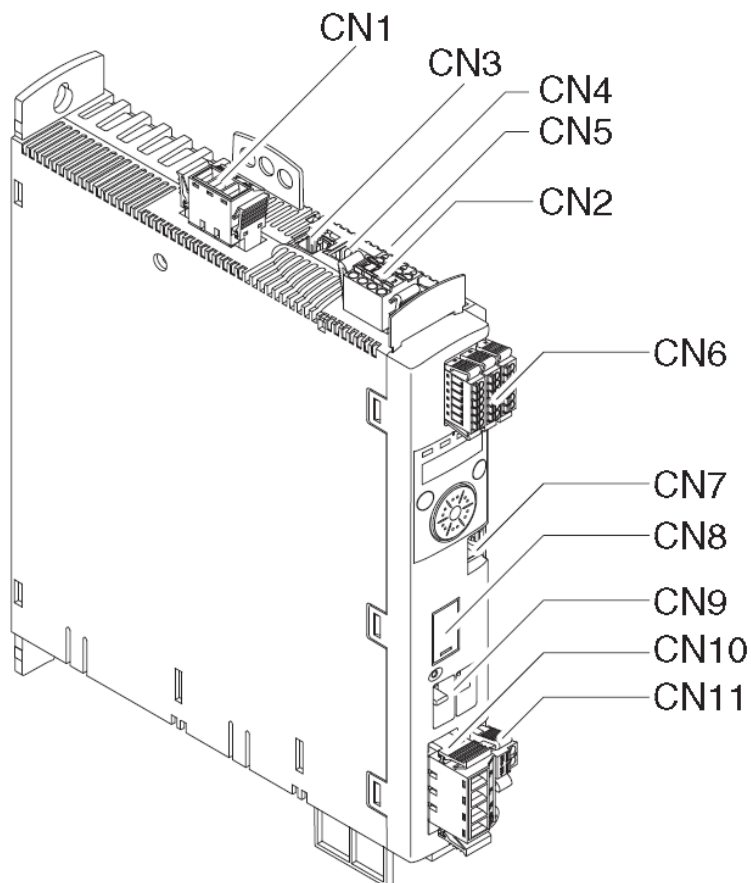
Weight = 8,8 kg

Cooling with blower 80mm.

22.1 Wiring Servo Driver LXM32C

Attention: This information applies only to the servo drive type LXM32C.

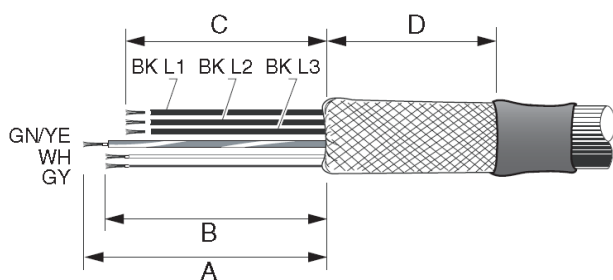
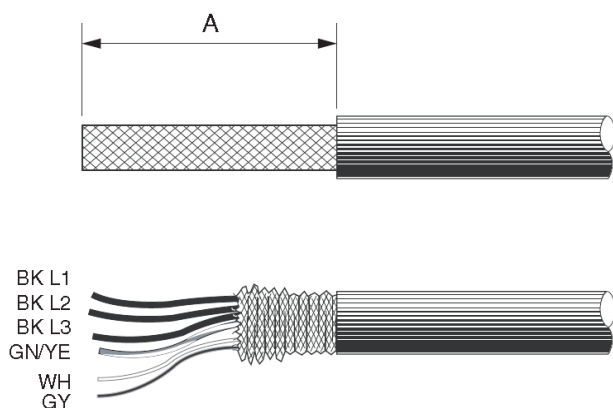
The wiring of the servo drive rests at different terminal blocks and connectors.



Engine bornier (CN10 CN11)

Direct connection to the engine.

| Name | Function | Terminal |
|------|----------------------|--------------------------|
| U | Engine Phase 1 | Black L1 (BK) |
| V | Engine Phase 2 | Black L2 (BK) |
| W | Engine Phase 3 | Black L3 (BK) |
| PE | Protection | Green/Yellow (GN/YE) |
| BR+ | Brake power supply + | White (if black: Wire 5) |
| BR- | Brake power supply - | Gray (if black: Wire 6) |



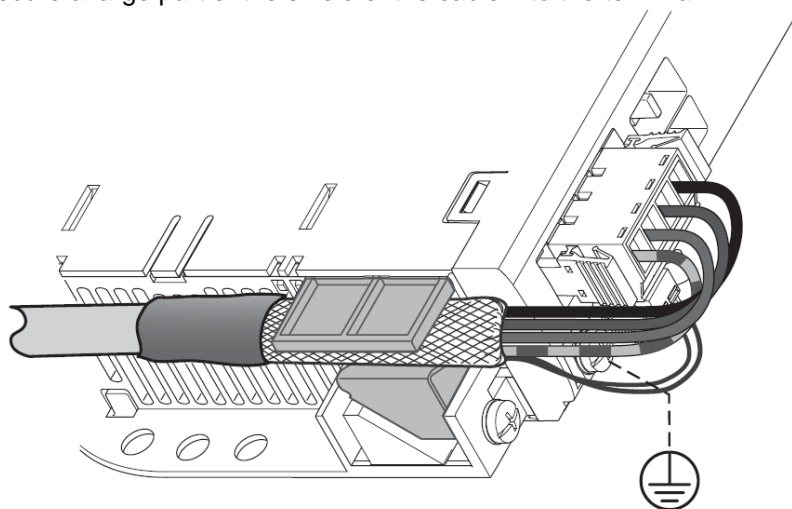
A=140mm

B=135mm

C=130mm

D=50mm

Secure a large part of the shield of the cable into the terminal:



Power Junction Block final stage servo drive three phase (CN1)

Use a protection conductor with a minimum section of 10 mm² (6 AWG) or two protective conductors of a cross section equal to that of the power supply conductors of the power terminals.

| Name | Function |
|------|------------|
| PE | Protection |
| L1 | Line 1 |
| L2 | Line 2 |
| L3 | Line 3 |

Bornier position transducer motor (CN3)

Direct connection to the engine.

To disconnect the cable does not pull without pressing the release tab.

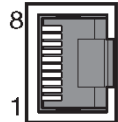
Terminal block control signals (CN4)

Direct connection to the instrument.

Use a shielded cable twisted-pair.

| Name | Function | Pin |
|------|---------------|-----|
| SA + | Channel A+ | 1 |
| SA- | Channel A- | 2 |
| SB+ | Channel B+ | 4 |
| SB- | Channel B- | 5 |
| 0VDC | Earth signals | 8 |

Pinout RJ connector mounted on the servo drive viewed from outside:



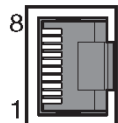
Terminal block control signals (CN5)

Direct connection to the instrument.

Use a shielded cable twisted-pair.

| Name | Function | Pin |
|------|------------------|-----|
| CLK+ | The signal clock | 1 |
| CLK- | The signal clock | 2 |
| DIR+ | Direction Signal | 4 |
| DIR- | Direction Signal | 5 |

Pinout RJ connector mounted on the servo drive viewed from outside:



Power Junction Block and STO (CN2)

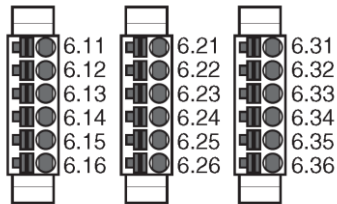
Terminal block 4 poles with double contacts:

| Name | Function | Pin |
|--------|---------------------------------------|--------|
| STO_A | Disabling the final stage (channel A) | 1 or 5 |
| STO_B | Disabling the final stage (channel B) | 2 or 6 |
| +24VDC | Positive power supply | 3 or 7 |
| 0VDC | Negative supply | 4 or 8 |

Bornier inputs and outputs (CN6)

Three Terminal 6 poles:

| Name | Function | Pin |
|---------|-------------------------------------|-----|
| AI1+ | Temperature Sensor | 11 |
| AI1- | Reference input TO1 | 12 |
| AI2+ | Do not use | 13 |
| AI2- | Reference input TO2 | 14 |
| SHLD | Sock shielded cable analogue inputs | 15 |
| DI0VDC | Negative inputs | 16 |
| DQ24Vdc | Positive outputs | 21 |
| DQ0 | DRIVER NO FAULT | 22 |
| DQ1 | DRIVER ACTIVATE | 23 |
| DQ2 | DRIVER IN POSITION | 24 |
| DQ3 | Do not use | 25 |
| DQ4 | Do not use | 26 |
| DI0 | Do not use | 31 |
| DI1 | Do not use | 32 |
| DI2 | Do not use | 33 |
| DI3 | DRIVER ENABLE | 34 |
| DI4 | DRIVER RESET | 35 |
| DI5 | DRIVER HIGH PRECISION | 36 |



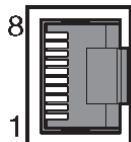
Bornier RS485 (CN7)

Direct connection to the instrument.

Use a shielded cable twisted-pair.

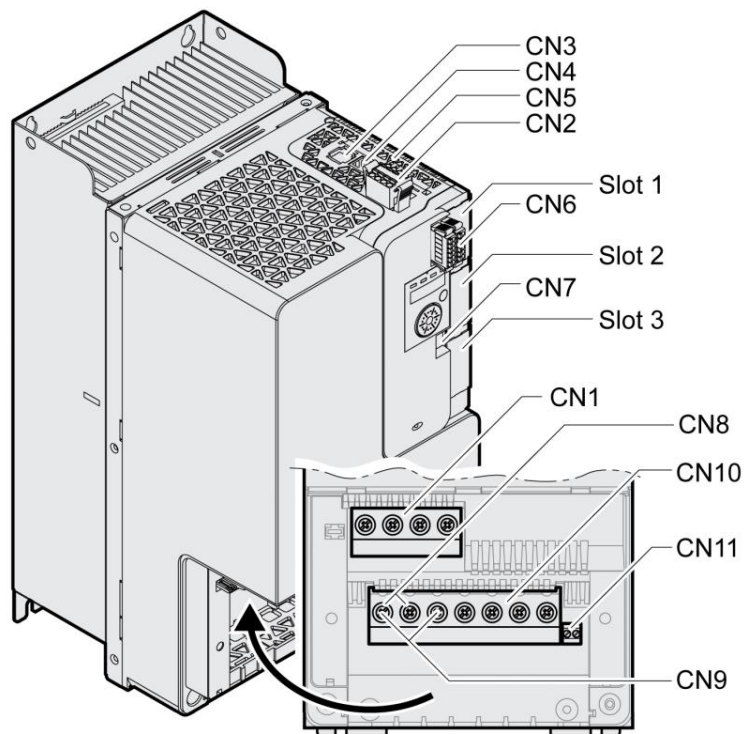
| Name | Function | Pin |
|------|---------------|-----|
| D1 | Signal + | 4 |
| D0 | Signal - | 5 |
| 0VDC | Earth signals | 8 |

Pinout RJ connector CN7 mounted on the servo drive viewed from outside:



22.2 Wiring Servo Driver LXM32M

Please note: This information refers only to the servo drive type LXM32M.
The servo drive wiring relies on several terminal blocks and connectors.



Three-phase servo drive output stage power terminal block (CN1)

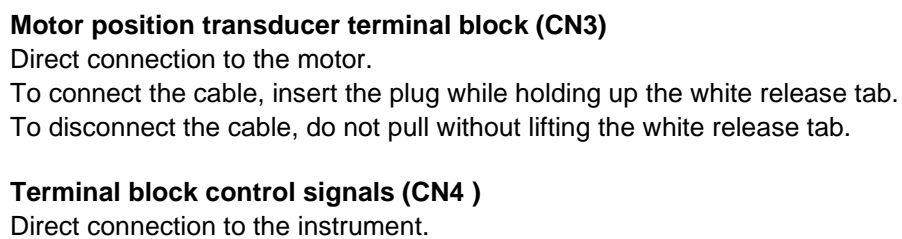
Use a protective conductor with a minimum cross section of 10 mm² (AWG 6) or two protective conductors with the same cross section as the power conductors of the power terminals.

| Nome | Funzione |
|------|------------|
| PE | Protection |
| L1 | Line 1 |
| L2 | Line 2 |
| L3 | Line 3 |

Motor terminal block (CN10 CN11)

Direct connection to the motor.

| Name | Function | Morsetto |
|------|------------|-----------------------|
| U | Phase 1 | Black L1 (BK) |
| V | Phase 2 | Black L2 (BK) |
| W | Phase 3 | Black L3 (BK) |
| PE | Protection | Green/yellow (GN/YE) |
| BR+ | Brake + | WHITE (filo 5) |
| BR- | Brake - | BLACK (filo 6) |



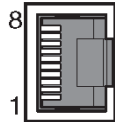
Terminal block control signals (CN4)

Direct connection to the instrument.

Use a shielded cable twisted-pair.

| Name | Function | Pin |
|------|---------------|-----|
| SA + | Channel A+ | 1 |
| SA- | Channel A- | 2 |
| SB+ | Channel B+ | 4 |
| SB- | Channel B- | 5 |
| 0VDC | Earth signals | 8 |

Pinout RJ connector mounted on the servo drive viewed from outside:



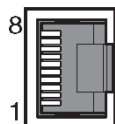
Terminal block control signals (CN5)

Direct connection to the instrument.

Use a shielded cable twisted-pair.

| Name | Function | Pin |
|------|------------------|-----|
| CLK+ | The signal clock | 1 |
| CLK- | The signal clock | 2 |
| DIR+ | Direction Signal | 4 |
| DIR- | Direction Signal | 5 |

Pinout RJ connector mounted on the servo drive viewed from outside:



Power supply and STO terminal block (CN2)

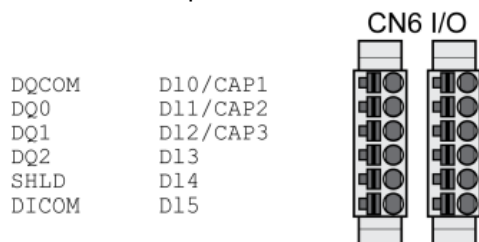
Three inputs of the Press-Right, three outputs of the Press-Right and the power supply (DICOM and DQCOM) must be connected to this terminal block

4-pole terminal block with double contacts:

| Name | Function | Pin |
|--------|---------------------------------------|--------|
| STO_A | Disabling the final stage (channel A) | 1 or 5 |
| STO_B | Disabling the final stage (channel B) | 2 or 6 |
| +24VDC | Positive power supply | 3 or 7 |
| 0VDC | Negative supply | 4 or 8 |

LXM32M input and output terminal block (CN6)

Consists of two 6-pole terminal blocks:



22.3 Cylinder Wiring

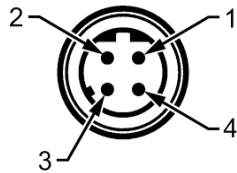
Temperature Sensor (CN21)

The temperature sensor must be connected to the servo drive. Must be supplied with a voltage of 24VDC used for the power supply of logic of the servo drive. The signal of the temperature sensor must be connected to the analog input AI1 of connector C6. See the connection diagram at the end of this manual.

Use a standard cable for Sensors with M12 connector.

| Name | Function | Pin | Instrument |
|--------|----------------------|--------------|------------|
| +24VDC | Power Supply | 1 (brown BN) | X3.12 |
| NU | Do not connect | 2 (white WH) | X15.1 |
| 0VDC | Earth signals | 3 (blue BU) | X3.11 |
| OUT | Signal + | 4 (black Bk) | X15.2 |
| MFAN | Motor Fan (optional) | 5 (gray GY) | X4.7 |

Pinout M12 connector mounted on the cylinder as viewed from the outside:



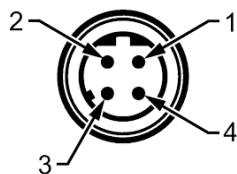
Force sensor (CN22)

The force sensor is to be connected to the instrument.

Use a shielded cable with a five-pin M12 connector.

| Name | Function | Pin | Instrument |
|--------|--------------|--------------|------------|
| +24VDC | Power Supply | 1 (brown BN) | X11.5 |
| S+ | Signal + | 2 (white WH) | X11.2 |
| 0VDC | Power Supply | 3 (blue BU) | X11.4 |
| S- | Signal - | 4 (black Bk) | X11.1 |
| SCH | Scheld | 5 | X11.3 |

Pinout M12 connector mounted on the cylinder as viewed from the outside:



23 Maintenance cylinders of SA Series

Every 100,000 Cycles or anyway once a year it is necessary to perform the lubrication of the screw. Every five times that is carried out the lubrication of the screw or in any case every two years it is necessary to perform the lubrication of the bearings.

23.1 Screw Lubrication

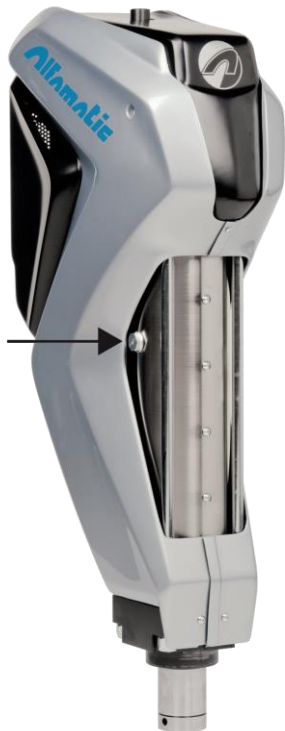
The lubrication of the screw is to fill grease the cage of the rollers. To do this there is a passage hole that allows access to the cage inside the cylinder.



Insufficient lubrication causes a fast deterioration of the screw and an overheating by itself.

Procedure:

- 1) lower the cylinder in the manual to the share of the greasing
- 2) remove the current general machine
- 3) Remove the plug shown in figure



- 4) Fit the greasing pump
- 5) activate the pump to add approximately 20 cm³ of grease
- 6) Disconnect the grease fitting
- 7) close the plug

1.1 Lubrication of the bearings

Lubrication of the bearings is performed by injecting grease in the two top holes of greasing. Insufficient lubrication entails the overheating of the bearings and the breaking of the same.

Procedure:

- 1) remove the current general machine
- 2) Remove the plugs indicated in fig.



- 4) Fit the grease gun to the first hole
- 5) Operate the pump about 4 times
- 6) Disconnect the grease fitting and repeat for the second hole
- 7) Close the plugs

1.2 Material for greasing

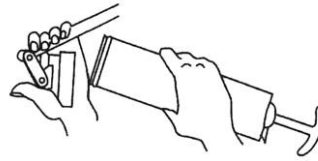
Greasing pump available on request:



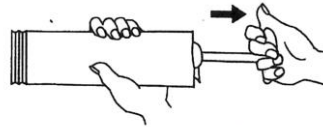
The grease to be used is the following: THERMOPLEX 2 TML

Pump filling:

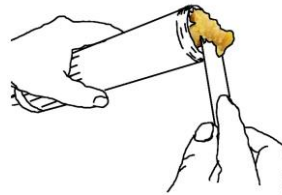
1) Unscrew the cover of the head from the cylinder



2) Pull the handle of the piston



3) Introduce the fat with a spatula



4) Close the cylinder by screwing the cover

5) Unclip the lock of the rear handle and download the residual air via the bleed valve present on the cover

1.3 Mounting Procedure motor and belt

The cylinder Alfamatic uses an absolute encoder therefore if you unmount the engine or the belt is necessary to follow the following installation procedure.

Follow **absolutely** all of the following steps. Errors in assembly can cause breakage of the cylinder.

Secure the engine to the cylinder without fit the belt

Connect the cables and turn on the machine

Move in manual to position 0.00 mm

Turn the machine off

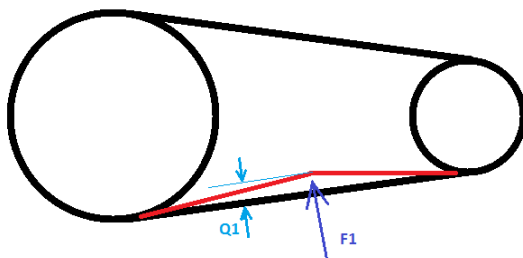
Remove all equipment from the cylinder rod.

Rotate by hand the pulley mounted on the shaft of the cylinder to bring it all the way back (fully retracted). Attention that nothing outside prevents the movement of the stem of the cylinder.

Found the point of everything on fall of 10 mm (corresponding to two revolutions accurate pulley).

Install the belt without turning the pulleys. The pulley of the engine cannot turn because it is locked by the brake. The pulley of the cylinder must be held by hand.

1.3.1 Belt Tension



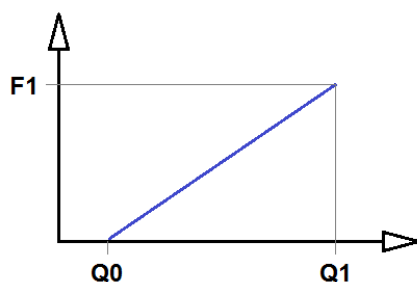
The following table summarizes the values for the tensioning of the belt for each cylinder of the SA series:

| Type | Q1 | F1 |
|-------|--------|------|
| SA10 | 2.3 Mm | 15 N |
| SA25 | 2.3 Mm | 17 N |
| SA50 | 2.0 Mm | 60 N |
| SA70 | 2.4 Mm | 60 N |
| SA100 | 2.6 Mm | 60 N |

1.4 Duration

The duration of the screw depends greatly on the strength of the thrust required and a good service. It is therefore very important to keep well lubricated screw. Insufficient lubrication is manifested in the increase of the temperature of the screw (and in the duration of the same).

The wear of the screw depends on the force applied thereby. The wear is negligible in the movements to empty.



The curve graph force-displacement used for calculations
(Typical curve in piantaggi)

This table shows the stroke that can travel along the cylinder in the work stretch Q1-Q0 in a typical interference-uniform.

Cylinder SA100, SA70, SA50

| Type | Load F1 | Life Q1-Q0 |
|-----------------|---------|--------------------|
| SA100 SA70 SA50 | 10 kN | 37×10^6 m |
| SA100 SA70 SA50 | 30 kN | 13×10^5 m |
| SA100 SA70 SA50 | 50 kN | 30×10^4 m |
| SA100 SA70 | 70 kN | 11×10^4 m |
| SA100 | 100 kN | 37×10^3 m |

Cylinder SA10, SA25

| Type | Load F1 | Life Q1-Q0 |
|-----------|---------|--------------------|
| SA10 SA25 | 5 kN | 10×10^7 m |
| SA10 SA25 | 10 kN | 13×10^6 m |
| SA25 | 20 kN | 16×10^5 m |
| SA25 | 25 kN | 79×10^4 m |

More information can be found in document SKF 4351 EN

Examples:

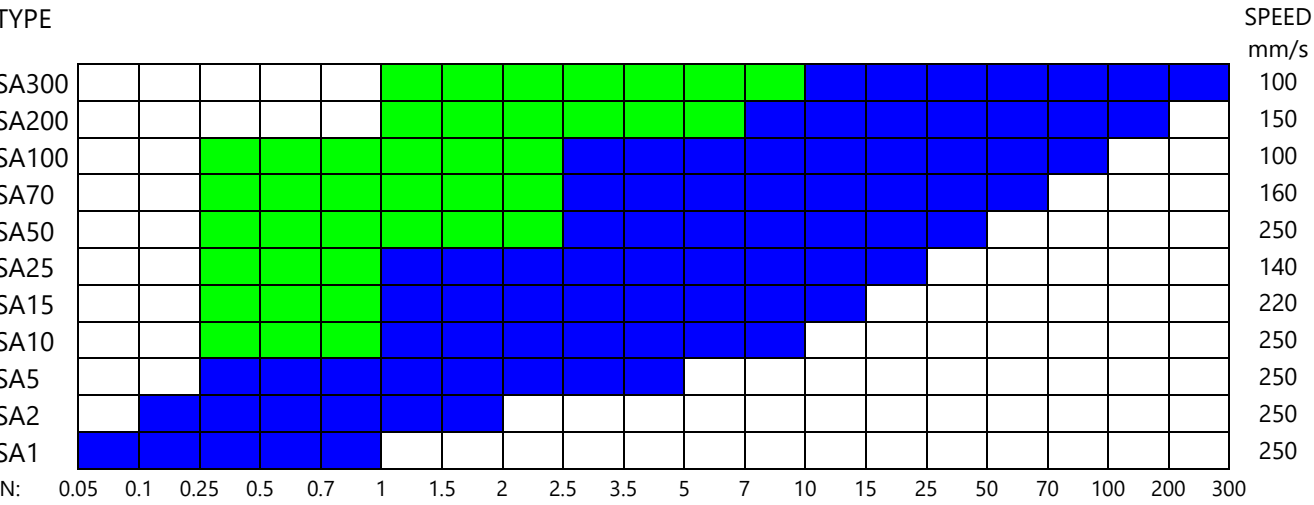
Cylinder SA100 that plant a bearing height 20mm and that requires a maximum force of 70 kN has a minimum life calculated 5,5 million piantaggi.

Cylinder SA50 that plant a bearing Height 5mm and that requires a maximum force of 30 kN has a minimum life calculated 260 million piantaggi.

2 The Alfamatic range

Alfamatic has a different catalog electric cylinders to cover a broad spectrum of requests. The following graph shows the operating range of the various models in blue with the force transducer

inside the cylinder. In green the additional measurement field with the use of the optional external force transducer



3 Electrical diagram of Example

