FICEP – PLATE FABRICATING SYSTEM DIVISION

TIPO A31 Automatic CNC Drilling and Thermal Cutting System S/N. 32275

Operating Instructions

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Preface

This manual gives you the information you need to use and maintain your machine. The proper functioning and its life depend on the good maintenance and the attention during the use.

Before leaving the manufacturer plant this model has been subjected to an intensive test to assure the highest reliability; however you have to verify if during the transport the machine has undergone structural damages that can compromise its good functioning and its safety.

This manual has to be considered as an integral part of the machine and must follow it until the machine demolition.

This manual has to be kept with care in a place reachable by the machine and maintenance operators, who have to know the content, provided that it cannot substitute the experience and common sense of qualified and well-trained staff.

Keep the manual for future references!

In case of loss or damage, please ask Ficep S.p.A's After Sales Service a substitute copy.

Some details represented by the illustrations in this manual can be different from the ones of your machine; some components could have been removed to assure the illustration understanding.

In order to simplify the consultation, this manual has been divided into chapters.

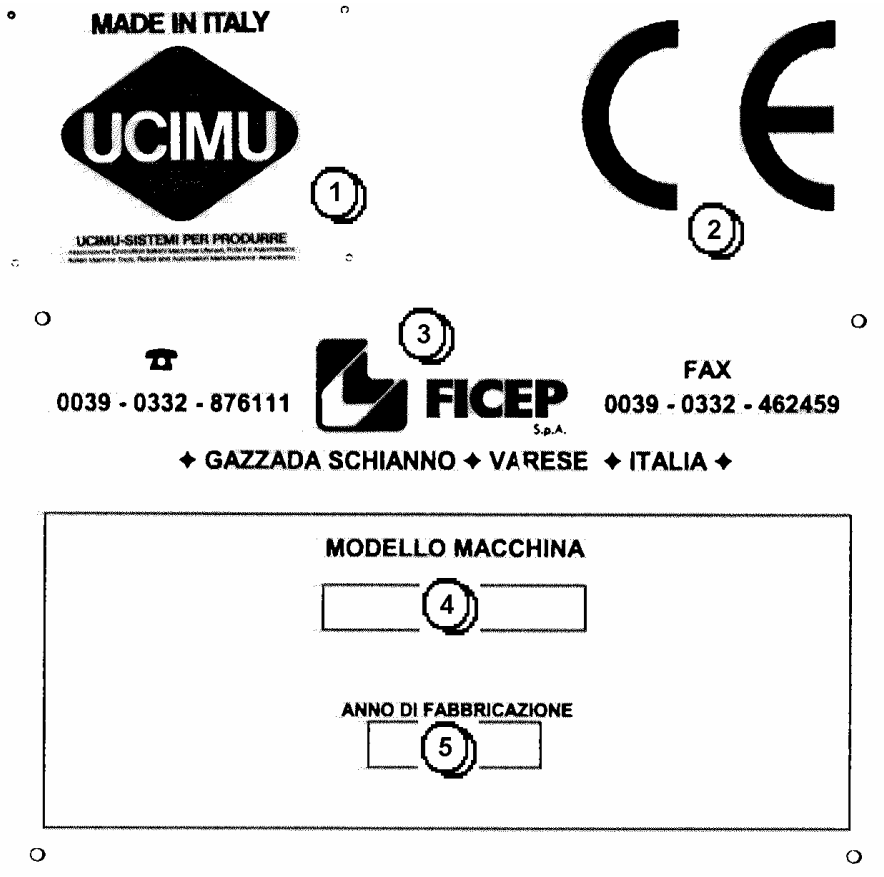
The manual reflects the technological development at the moment the machine is manufactured and could not be considered obsolete and incomplete only because it has been updated in a subsequent date. Ficep S.p.A. reserves the right to modify the production and the manual without being bound to update previous edition.

 READ CAREFULLY BEFORE USING THE MACHINE!!!

Instruction manual index

1 • GENERAL INFORMATION

1.1 Machine Plate



1 Logo UCIMU

2 Logo CE

3 Ficep S.p.A. address

4 MODEL MACHINE

5 FABRICATING YEAR

1.2 Technical Assistance

After Sales Service – Spare parts **direct fax 39-0332-873.661**

When the services of our Engineers for maintenance or repair purposes are required and/or when ordering spare and repair parts, make sure to provide us with the following information:

- Model, size and Serial Number of the machine as indicated in the machine plate as well as in the previous paragraph.
- If you intend to replace some of the machine components shown in the Tables enclosed in this Manual, please remember to specify **always** the Table number and the part reference.
- Correct name and address of Your Company, complete with the eventual different shipment address.
- Required type of shipment (should you fail to give us this instruction, **FICEP S.p.A.** reserves the right to ship the consignment by the most convenient way).

☞ **IMPORTANT**

The spare parts replacement has to be authorized by Ficep S.p.A. and made only by Ficep S.p.A. qualified technician.

Do not incorporate any modification or alteration to any part or portion of the machine, even of minor nature, without having first had the FICEP written authorization to do so.

Make sure to hold in your stock all the replacement parts recommended by FICEP.

Your machine must be operated and maintained by skilled and well trained operators, who must assist our Engineers to install and commission the machine at your site, if such a service has been purchased by you.

Your maintenance Engineer must be able to spot and locate in case of breakdowns, the portion of the system where the malfunction or failure occurred and the nature of the same, so that to have it promptly repaired and eliminated.

1.3 Use original components

Ficep decline all responsibility for damage caused to thing or people and/or the no production due to the use of components, equipment, spare parts, tools not original or, nevertheless, not authorized by Ficep Technical Office. Moreover, any manufacturer responsibility will decay as per a correct functioning guaranty as per safety aspects.

Please remember that the spare parts have clear and complete reference for their identification and purchase.

1.4 Predispositions at customer care

Before the machine and its attachment arrive the customer has to plan:

- ❖ Foundations and canalizations in accordance with the “foundations” drawing given by FICEP S.p.A.

☞ **IMPORTANT**

Machine foundations should be adequately modified, if so required, to suit the soil physical characteristics, taking into consideration possible bradyseism problems, undulation, muddy, bottom etc. We shall not accept any responsibility for foundations built on problematic soils.

- ❖ Flooring rough without holes or roughness, which could make difficult or dangerous the operator movements during all machine-working phases.
- ❖ Electric power supply system up to the main electric cabinet, which is dimensioned for installed power according to the rules EN 60204-1 and the laws and regulations in force in the country where the machine is installed, including:

Three-phase power knife switch with mechanical interlock, which allows isolating completely the machine from the system.

Mono-phase knife switch for lighting with mechanical interlock, which allows isolating completely the machine from the system.

Earthing cables.

- ❖ Compressed air system up to the connections point indicated on drawing “foundations”. The compressed air must be dry, filtered and oil less. A filtering group is provided into the machine.

- ❖ Necessary environmental lighting to locate commands, emergency push buttons and the main switch; the lighting has also to allow the visual control of the machine movements set up manually or programmed during all foreseen work phase.
- ❖ The suitable quality hydraulic oil to fill in the oleo-dynamic supply. The oil has to be seal into drums and fill through a filter in presence of our technician.

☞ **IMPORTANT**

Any foreign particles into the oleo-dynamic supply can cause irreparable damage to the system.

- ❖ The plasma exhausts suction system with smokes conveyor and connection to the external (option).
- ❖ All necessary hoses and gas reducers with gage indicators in order to supply the cutting gasses (oxycutting) with the right purity.
- ❖ All necessary hoses and gas reducers (first stages) with gage indicators in order to supply the plasma cutting gasses with the right purity, see attached Hypertherm manual (option).
- ❖ Environmental conditions according to paragraph “Proper use”.
- ❖ The customer has also to provide:

The correct lifting means following the lifting drawings.

The skilled personal qualified to unload and position the machine (at least 2 persons).

The skilled personal qualified to reassemble and connect the machine to the foreseen system (electric, pneumatic, oleo-dynamic, hydraulic and suction system) directed by Ficep installer technician.

The material needed to clean the machine.

The tools (keys, levers for the pipes and machinery assembly and others elements for the system connections).

1.5 Skilled people qualified to operate on the machine

Only the authorized and skilled person can operate on the machine; the same caution must be taken for maintenance. Do not permit to foreign people to draw near the machine during the functioning or the maintenance.

After receiving all the needed information, on the machine can work only the following person:

SAFETY RESPONSIBLE

The safety responsible is responsible of risk protection and prevention, according to the European Directive 89/391 CEE (work station safety).

The safety responsible will check up that all the people, who work with the machine, have received all instruction hold in this manual.

MACHINE OPERATOR

Operator skilled to use the machine (work cycle, adjustment, etc.).

He can make only the operation for him described on this manual.

You have to avoid that not skilled person uses the machine.

MECHANICAL MAINTENANCE PERSON

Skilled technician able to use the machine like the machine operator and also to use it with the protection closed down, to intervene on the mechanical parts for adjustment, maintenance and repair.

He is not skilled to intervene on the live electrical system.

The mechanical maintenance person must have a general experience on mechanics and a specified experience on this machine.

ELECTRICAL MAINTENANCE PERSON

Skilled technician able to use the machine like the machine operator and also to use it with the protection closed down, to intervene on the mechanical parts for adjustment, maintenance and repair.

He intervenes on the live electrical system, control equipments, etc.

The electrical maintenance person must have a general experience on electrical cabinets and a specified experience on this machine cabinet and electrical equipment.

MANUFACTURER

For the extraordinary maintenance and any other operation not foresee in this manual or assign to a different person from the above-mentioned, you have to contact FICEP S.p.A.

1.6 Specific terminology

As well as the practical and common terminology, the following specific terminology is used:

- EXPOSED PERSON: anyone partially or completely inside a dangerous area.
- DANGEROUS AREA: area inside the safety barriers where arm and axis moved; in this area, just the presence is a risk for the safety and health of the person itself.

 **ATTENTION**

For dangerous area, we mean any area where a person is exposed to a health and safety risk, even if now and then and for short time (e.g. when the machine is being maintenance for lubricating supply, when an electrical intervention is made, etc.).

- SAFETY CONDITION: only in this condition we can operate inside the dangerous area. We obtain this condition pushing the emergency push button, so those untimely movements are forbidden.
- SYSTEM: with this word we define the machine and the interlocked peripheral system that are interfaced; also the safety barriers are part of the system as they are interfaced with the CNC to give an emergency alarm.

- MACHINE ASSEMBLY: includes

All axes, the power supplies system and the control system (software and hardware).

Parts and devices that the group need to execute the set up cycles.

- SAFETY BARRIER: Safety barrier and/or device or method that forbid the access to a dangerous area.

  They can be of a mechanical type (fixed barrier) or of a photoelectric type.

  The access to a dangerous area causes an emergency stop of every machine movement and prevents the start until the restore of the safety conditions.

- OPERATOR: Person in charge and educated to control the machine correct functioning, to execute the ordinary maintenance, to clean the machine and the operating zone.

- SKILLED OPERATOR OR WELL-TRAINED PERSON: Person specialized, trained and skilled to extraordinary maintenance intervention or repair that request a particular knowledge of the machine, its functioning, the safety devices and how they intervene.

- PROGRAMMER: Skilled person appointed and trained to program the work cycles and prepare the pieces program.

- PROGRAM: Work instruction sequence that must be given to CNC to execute the foresee operation.

- AXIS: Positioning system in the different direction (positive and negative) that are used to correctly position tools and/or the work piece in different positions for various operations.

- JOG: Movement executed with only one axis selecting the manual work.

1.7 Proper use

The machine has been designed to carry out, using fixture and tool, only operation of:

- Drilling
- Oxycutting
- Marking (optional)
- Plasma cutting (optional)

of mild steel plate.

The machine is designed to use FICEP ORIGINAL TOOLS.

The area around the machine must:

❖ Have:

A temperature varying from **+5**°C to **+40**°C.

A relative humidity factor lower than 75% (peaks up to 95% are accepted occasionally only) (Based on VDE 0160 standards).

A max altitude (above sea level) 2000 mt

A storage temperature from 0 C to + 50°C

❖ Be:

A fully covered shop well protected against atmospheric agents.

Free from gas, dust, smoke and any other corrosive or inflammable particles or matters and in any case what else unsafe to personnel health and system integrity.

Free from flying flashes and/or corrosive metals.

☞ **IMPORTANT**

Following its specific characteristics any other use different from which above explained can't be foreseen.

A different use or the use of different material and/or tool is considered as **IMPROPER** and loses the guaranty and MANUFACTURER responsibility condition.

1.8 Lighting installation

The machine is foreseen to be installed in an ambient that must have at least 300 lux in the working zone.

1.9 Incorrect but foreseeable uses

During the machine design we have considered some reasonably foreseeable but mistaken behaviour which together with the forgetfulness and inobservance of all instruction described in this manual, can cause “incorrect uses” that must be forbidden:

1. The machine use in not proper ambient and not following the specified condition.
2. The use, planning and maintenance executed by not authorized and skilled person.
3. The use of not filtered and dehumidified compressed air.
4. The use of gas different from the requested type.
5. The use of a dry type suction filter system without the requested technical characteristics (option).
6. The machine use without protection barriers or with dangerous zone access safety interlocks by-passed or forced or excluded.

 **ATTENTION**

The dangerous zone access is admitted only for machine maintenance (subject to machine block with key extraction) and so it is permitted only to authorized person.

The safety devices must be reactivated and their functioning must be checked after each intervention.

7. All not specified in paragraph “Proper use”.
8. The use of raw material not corresponding to the machine technical data, see paragraph “Main Technical Specifications”.
9. The machine cleaning and ordinary maintenance not made.

1.10 Improper or not allowed use

The uses described in the previous paragraph are considered as “improper” so that lose all manufacturer responsibility as for what concerns the correct functioning guaranty so for safety manner.

1.11 Earthing system

It is essential, for operator safety and for machine good functioning, to take care of the connection of the terminal in the electric cabinet to the external protection conductor. Make sure, measuring it, that the earthing system isn't over the request limit of 0,25 Ohm and that the cables are dimensioned according to the rule EN 60204-1.

1.12 Residual risks

THE ELECTRIC SHOCK CAN KILL

Not touch live elements.

All protective covers and panels must be mounted before you gave tension to the machine.

1.13 Applied directives

The machine has been drawn and built according to the following directives (the version is the one in force at the machine delivery):

MACHINE SAFETY DIRECTIVE 2006/42/CE and following modifications

Low tension DIRECTIVE 2006/95/CEE

Electromagnetic compatibility DIRECTIVE 2004/108/CE

The machine complies with the applicable rules of the above mentioned directives, among which the most important are:

EN 60204-1, EN 60439-1:1999, EN ISO 13850, EN ISO 14121-1 , EN 12100-1,

EN 12100-2, EN 349/A1, EN ISO 13857, EN 894-1:1997 + A1:2008,

EN894-2:1997 + A1:2008, EN 50370-1:2005, EN 50370-2:2003.

1.14 Noise

Measure picked-up in the standard working position of the machine operator when the machine is operating: Leq db A 82

Ambient noise, machine not operating: Leq db A 55

Measurements above have been carried out according to the procedures given to meet the Standards in force.

Measuring operations have been carried out without the plasma cutting unit (optional).

ATTENTION!

The noise value above is referred to the machine emission and not to the operator exposition.

1.15 Vibration

If the machine is used in condition like wrote on this manual, the vibration couldn't make dangerous situation.

1.16 Scrapping

In case of scrapping all machine components must be dispose of in proper tips according to the law.

Recover the eventual exhaust oils and dispose of in the raising centre.

Before scrapping you have to separate plastic or gum part, electric and electronic material.

The part only makes of plastic, aluminium and steel can be recycled in the raising centre.

ATTENTION!

The exhaust oil must be given to the "Exhausted oils Association" through an authorized local authority.

2 • SAFETY INFORMATION

The machine has been designed and built according to the European Community Directive about safety.

To avoid accident, before program the machine or start maintenance operation, read, understand and follow all caution and instruction contained in this manual or wrote on the machine rating plate.

The safety rules, advices and the instructions contained in this manual are the most updated; all the same Ficep S.p.A. don't guarantee that the information are right and complete as for the Customer particular applications. Customer is compelled to use his own safety rules connected with his own application and he must consult the local safety authorities.

To identify the safety message put in this manual the following word and symbol were used:

 **DANGER**

This word has been used in the machine safety message and on the rating plates when the possibility to cause important lesion and even death is high if the danger cannot be avoided.

In this safety message the normal cautions to avoid danger are described. Ignoring those cautions can also cause important damage to the system.

 **ATTENTION**

This word has been used in manual safety message for danger that, if not avoided, can cause small or moderate lesion or damage.

The message can also been used only for danger that can cause damages to the machine and its components.

 **IMPORTANT**

This word is used to indicate cautions that you have to take to avoid operation that can shorten the machine or its components life.

2.1 General safety recommendations

The machine has safety devices designed to avoid accident. Nevertheless, it is important that the operators use the machine with the greatest attention and learn to not rely on these devices to grant their safety.

Before give tension

Make sure that the electrical cabinet doors are closed.

Make sure that the protection barriers are fixed.

Make sure that the working zone is without obstacle.

Before to start functioning

Make sure that all protections are operative.

Make sure that the system movements (controlled axes, punching, raw material loading and piece unloading devices and all automatic movements) work in safety.

Piece load and unload

Never try to stop an object in movement.

Always use the individual protection systems (gauntlets, shoes, clothes, glasses etc).

Execute the piece load and unload according to the working program.

At the end of the day

Switch off the machine following the correctly procedure.

Remove tension from the electrical cabinet.

Clean the operative and working zone.

When there is a problem

Stop immediately the machine pushing the EMERGENCY push button.

Inform the maintenance person to determine the corrective decisions that must be taken. Not switch on the machine before the defect causes would be recognised.

 **ATTENTION!**

In case of maintenance/repair, use only FICEP original parts.

2.2 Safety precautions

- The machine must be programmed and checked up only by skilled and well-trained person.
- Before use the machine, the machine operator must:

Have completely read the instruction manual and its attachment and followed the instruction course with the Ficep Technician.

Have understood the CNC keyboard key functions, identified the commands, the adjustments and the emergency push button positions.

- The operator must respect the general and accident prevention instructions contained in this manual and in the attachments.
- The dangerous area, that's to say the safety barrier internal area, must be never occupied by person not involved in the machine cycle programming and raw material or pieces loading and unloading; it is permit to stay in this area only to the machine operator and to the skilled person that work in safety condition.
- Before execute any operation internal to the safety barrier, clean the area taking away any object (pieces, tools, scraps, etc.) to avoid any danger of stumble and slip.
- When the machine is in maintenance, the electrical cabinet and motors area must be forbidden to the non-authorised person because the tension presence make this area dangerous. For maintenance, use only quality tools, reject used up or damaged, lower quality or improvised tools that can cause personal lesion during their use.
- After maintenance, clean the machine and the tools of any trail of oil or grease and make sure that there are not tools on the machine.
- Not remove, move or modify any installed repair, door, micro-switch or sensor having active or passive safety functioning.
- Not push any keys or switch with the hands wet.
- Stop the programming or the maintenance if there is illuminating or electrical power supply problems.

- Avoid to use the machine in psychophysical conditions altered by dizziness, alcohol and/or medicine taking; stop the work immediately when the attention fall under the normal level, so that the operator risk an accident.
- Not put tools or pieces on the machine and not forget them inside the movement device operative area.
- Always control that at the end of a maintenance intervention, there aren't cloths, screwdriver or other dangerous material for safety in the electrical cabinet or tanks.
- The adjustments, maintenance and checks reported in this instruction manual have to be made by the customer with skilled operator. The maintenance interventions not foreseen in this instruction manual have to be made by manufacturer-authorized person.
- Controls or surveys, of any kind, have to be made with gauged and approved instruments.
- Always take off power supply tension from the electric cabinet during electric, hydraulic, pneumatic or mechanic maintenance operations.
- Each year and after each maintenance/repair intervention, test again the safety device.

DANGER

Dangerous tensions are present in the following unit:

- Electrical cabinet
- Electrical motors
- Photoelectric cells
- Control panel
- Plasma cutting unit (option)

ATTENTION

Execution of works not foreseen in the instruction manual, or not authorized from the manufacturer or not performing the maintenance operations foreseen, will automatically release the manufacturer from any responsibility connected to the proper operation of the machine and to the safety aspects.

2.3 Connections

All connections, which have to be made by the customer, are described in paragraph "Customer responsibility preparations".

A skilled technician following the rule CEI 64-8 and IEC 204-1/92 must execute the power supply connection.

A separate main switch should be provided to connect and disconnect the machine from the main power supply. The switch must protect the line through a thermal and/or magnetic overload sensor with automatic differential switch and fuse.

Be sure of the earthing system efficiency at the feeder line outlet.

All these operations have to be carried out by skilled operator who must follow what requested.

Put an on-off valve between the pneumatic system and the machine power supply connection.

2.4 Electric and electronic controls

Foresee a three-phase electric supply line with an earthing cable, which reaches the connecting terminals inside the electrical cabinet.

Not draw the tension from point connected with welder or other machine, which could disturb the supply line.

IMPORTANT

The machine supply tension must respect what indicated on the electric equipment table.

The electric and electronic units must be located in a vibration-free area. A sufficient space must be provided all around these controls and units to allow free access to same for inspection and maintenance purposes, even with the doors open.

Cabinet and control stations must be properly sheltered to protect them against shocks, hits, etc.

ATTENTION:

Arc welding aren't allowed in the area near the machine during its functioning.

When executing arc welding, it is necessary to connect the ground cable of the current directly to the piece to be welded, as near as possible to the welding point.

The disregard of this rule may cause troubles and/or permanent damages to the electronic control equipment of the machine.

2.5 Hydraulic system

The machine is delivered without hydraulic oil following the material transport laws in force. It is essential that the customer make the first fill up with a Ficep technician using only the oil indicated on the hydraulic power unit table. The filling oil must also pass through a filter to be sure that any type of impurity could be introduced into the unit.

The impurities could damage the hydraulic components.

Check the oil level at regular intervals to make sure that the oil level is maintained. Never use scavenges oil or oil of different type, grade or make.

Never leave the reservoir taps open as chips, flash, dirt, etc. may get into it.

If it should be necessary to repair or re-weld the hydraulic pipes, make sure first to drain all the oil off. Thoroughly clean the hydraulic system with the appropriate solvent before the welding operation (see maintenance chapter).

2.6 Pneumatic system

The system pressure at the regulator inlet should never be lower than 6 bars even when the system is under maximum load.

The main supply line must be fitted with all the devices and means capable to eliminate accumulation of dangerous condensation and/or foreign matters.

2.7 Clothes and individual protection systems

The clothes of the operator or of the skilled technician, who execute the planning or the maintenance operation, must be in keeping with the safety essential requirement in force in his country as in directive CEE89/656 and 89/698 about the individual protection system use.

Avoid to wear large clothes, rings, watches, bracelets or chains and to start work with not bound long hair, which could catch and hinder the operator's movements becoming a danger source.

Internal to the safety barrier the operator must always wear overalls without turn-up or open pocket, anti-hazard shoes, rigid helmet and glasses.

In case of machine device maintenance, it is necessary the use of light gloves with rough finishing touch.

When you push button and you operate on the control panels to input the working parameters, you have not to use any type of gloves.

Use headset to protect hearing.

2.8 Precautions during handling and installation

DANGER!

During the machine unloading and handling operations, nobody can come into the operative zone.

Nobody is authorized to pass under the hanging load or to stop near it.

Do not put any body part on the load downstroke trajectory.

The lifting sling must be suitable to the hanging load, so they do not interfere with the machine parts.

Pay attention to the sling position so that the lifting occurs with the machine plane parallel to the soil.

2.9 Precautions at first start-up

Make sure that the exhaust suction system (option) is efficient.

Verify that there are no collision risks between the parts in movement.

2.10 Precautions during the setting up

These operations must be executed by **one skilled operator only**, who has to put the key switch to the set-up position, removes the key and takes it away to avoid that any other can put the machine functioning.

For the operations near a controlled device push the emergency push button (mushroom) and discharge the pressure inside the pneumatic and oleo-dynamic system before draw near the machine. During the controlled movements the operator has to control and intervene if a minimum doubt crosses his mind about the possible interferences between the movements device.

2.11 Precautions during the tools preparing

The tools have a total weight that allows to only one operator to move it by hand.

DANGER

Attention: the tool fall on the lower limbs can cause lesion. Execute this operation using both hands and the individual safety devices foreseen.

ATTENTION

When you prepare the tool you have to verify that the tool-holder/tool length is correct according to the material thickness to be used.

You have also to verify the type of lube-cooling to use in function of the tool.

2.12 Precautions during the material loading

These operations must be executed by **one skilled operator only**, who has to put the key switch to the set-up position, removes the key and takes it away to avoid that any other can put the machine functioning.

Clean carefully the operative zone before loading the material.

Never try to stop an object in movement.

Never use material with overall dimensions bigger than what indicated in paragraph “Main capacities and specifications”.

Pay attention to the loading in movement during the material manual loading. The material is put down on an in-feed conveyor or on an in-feed transfer table and has to be pushed against the zero reference. Never go up on the material. Not move the material at high speed because stop it could be difficult and dangerous.

During the automatic loading operation the operator, who starts up the loading, has to be sure that the material is correctly positioned and that there aren’t obstacles that could make it changing directions and fall out of the in-feed transfer table. He has to verify that nobody is inside the risk areas.

DANGER

Don’t stay in the area near to the loading zone during the material positioning.

2.13 Precautions during the working phase

According to these Standards and Regulations, **one operator only** is allowed into the machine area and he must always stand by the Control Console.

If he should move away from this area, he must either switch- off the line or set the key type isolator in setup position thus obviating the possibility of accidental handling or operation of the machine.

Avoid leaning against the machine or the control keyboard during the functioning cycle.

If an alarm is displayed, stop immediately the machine and, if the problem is an electrical, or pneumatic or oleo-dynamic one call the maintenance service.

Before start up the machine in automatic cycle, make sure that no tools or dimensional control instruments have been forgotten inside the working area.

If the machine stops during the automatic or semi-automatic functioning cycle, always verify the problem, which caused the stop, and try to resolve it; avoid starting up the cycle without having eliminated the stop causes.

 **ATTENTION**

Drilling unit: When the machine is executing working cycles with high rotation speed of the spindle (over 1500 rpm) it is forbidden to go directly to setup mode, as first it is necessary to press the stop cycle push button.

Remember that when photoelectric safety barriers are installed their interruption causes automatically the passage of the machine to setup mode. The same happens when opening the covers or doors of barriers.

2.14 Precautions in case of use of oxycutting unit

The precautions to be adopted are depending on the unit, which is working but are mainly bound at the use of oxycutting. All danger bound to this operation are reported below.

ATTENTION

During the machine working phases you have to wear a leather anti-spark apron and glasses to protect from infrared and 12 ISO 4850 rating ultraviolet rays.

DANGERS!

Not touch the material when the oxycutting is working.

Keep dry your clothes, gloves, shoes, the working zone and the machine itself.

Remove the finished pieces only when allow by CNC.

EYES AND SKIN BURNING RISK AS A RESULT OF OXYCUTTING UV EMISSIONS

Not watch directly the flame without protective glasses.

Wear glasses and the right body protection.

So, all staff working in an area of 5-meter ray from the torch must have long trousers and sleeves, gloves and protective mask.

NOISE CAN CAUSE DAMAGE TO THE HEARING

Wear proper protection.

The noise level given out by oxycutting during the material cut could be high. So we recommend that all staff working near the machine wear a hearing proper protection.

VAPOURS AND GAS COULD BE TOXIC

Keep your face away from vapours and smokes.

Make sure of the suction system correct functioning, which is dimensioned to remove all gas produced by the oxycutting functioning.

IT'S FORBIDDEN TO USE OR STORE SOLVENTS NEAR THE MACHINE:

Because some substances presents decompose creating poison gas.

METALLIC SMOKES

These are produced by the metal vaporization made by the oxycutting. Some metals could produce toxic smoke like beryllium, cadmium, lead, manganese, quicksilver and zinc.

THE HEAT, THE METAL SQUIRT AND THE SPARKS COULD CAUSE FIRES AND BURNINGS

Not put inflammable material near the machine.

Not have object (gas lighter, matches) or inflammable clothes.

Hold the combustible material at 10 meters distance.

Keep yourself at a safety distance from the torch when the torch is on.

Wear eyes and body proper protections. The plasma arc creates a hot zone around the cut; the contact with that zone can cause burning to the hand if they aren't correctly protected.

When operator removes just cut parts, he has to wear fireproof material and thermal low conductivity gloves.

The shroud and all others mechanical parts around the torch become very hot and you must not touch them without individual protection system.

 **ATTENTION!**

- Oxygen. Fire risk
- Ultraviolet radiations danger
- Incandescent sparks danger
- Dangerous temperature
- Burning danger
- You have to use protective gloves
- In this area the noise level can be high

2.15 Precautions in case of use plasma cutting unit (option)

The precautions to be adopted are depending on the unit, which is working but are mainly bound at the use of plasma arc. All danger bound to this operation are reported below.

Person with pacemaker has to make sure that it is not disturb by the electromagnetic field created by the plasma arc.

 **ATTENTION**

During the machine working phases you have to wear a leather anti-spark apron and glasses to protect from infrared and 12 ISO 4850 rating ultraviolet rays.

 **DANGERS!**

THE ELECTRIC SHOCK CAN KILL YOU

Not touch under tension elements.

Isolate you from the piece to be cut and the soil wearing insulating gloves, shoes and clothes.

Not touch the material when the plasma arc is working.

Keep dry your clothes, gloves, shoes, the working zone and the machine itself.

A no conductive tool must be use to remove by hand the finished pieces from the machine.

Remove the finished pieces only when allow by CNC.

Not use the plasma cut with high humidity or if the machine is wet.

EYES AND SKIN BURNING RISK AS A RESULT OF PLASMA ARC UV EMISSIONS

Not watch directly the arc without protective glasses.

Wear glasses and the right body protection.

The ultraviolet ray and the radiant energy reflected can cause burning (solar type).

So, all staff working in an area of 5-meter ray from the arc must have long trousers and sleeves, gloves and protective mask.

NOISE CAN CAUSE DAMAGE TO THE HEARING

Wear proper protection.

The noise level given out by plasma arc during the material cut could be high. So we recommend that all staff working near the machine wear a hearing proper protection.

VAPOURS AND GAS COULD BE TOXIC

Keep your face away from vapours and smokes.

Make sure of the suction system correct functioning, which is dimensioned to remove all gas produced by the plasma arc functioning.

The noxious gases listed below are produced during the plasma cut or could form in certain conditions:

Ozone

It is produced by the reaction between the ultraviolet radiation and the air oxygen.

Nitric oxide

It is present when nitrogen and oxygen pass through the electric arc.

Hydrochloric acid gas

This gas form when some substances present in the solvent vapours decompose themselves in presence of ultraviolet radiations.

This gas has a sweetish pungent smell: so if present, stop immediately to use plasma cutting system till you have removed the decomposition material.

IT'S FORBIDDEN TO USE OR STORE SOLVENTS NEAR THE MACHINE:

Because some substances presents decompose creating poison gas.

METALLIC SMOKES

These are produced by the metal vaporization made by the plasma arc. Some metals could produce toxic smoke like beryllium, cadmium, lead, manganese, quicksilver and zinc.

METALLIC DUST

It is formed by the metal vaporisation during the plasma cutting.

This dust is highly irritating but not toxic.

THE HEAT, THE METAL SQUIRT AND THE SPARKS COULD CAUSE FIRES AND BURNINGS

Not put inflammable material near the machine.

Not have object (gas lighter, matches) or inflammable clothes.

Hold the combustible material at 10 meters distance.

The pilot arc can cause burning. Keep yourself at a safety distance from the torch when the generator is on.

Wear eyes and body proper protections. The plasma arc creates a hot zone around the cut; the contact with that zone can cause burning to the hand if they aren't correctly protected.

When operator removes just cut parts, he has to wear fireproof material and thermal low conductivity gloves.

The shroud, the suction cone and all others mechanical parts around the torch become very hot and you must not touch them without individual protection system.

 **ATTENTION!**

- Ionogenic radiations
- Oxygen. Fire risk
- Ultraviolet radiations danger
- Incandescent sparks danger
- Dangerous temperature
- Burning danger
- In this area the noise level can be high
- Magnetic field
- Hot equipment
- You have to use protective gloves

2.16 Precautions during maintenance

Quite apart from the special cases (See chapter “Maintenance”) you have to follow the next rules:

- Put on the machine a poster with written “ATTENTION! MACHINE OUT OF USE”, which must be seen from each machine part.
- Put the machine in safety condition and take away the restoration key.
- Wear individual safety systems.
- Take off the machine and others components electrical power supply (remove the fuses uphill of the electrical cabinet). Before open the electrical cabinet door wait some seconds to allow the capacitor discharge.
- Take off the pneumatic supply and discharge the residual pressure in the circuit.
- Take off the oleo-dynamic supply and discharge the residual pressure in the circuit.
- Always use original spare parts.
- Not walk on the machine protection or loading and unloading systems.
- At the intervention end you have to restore the safety protection systems and test them.
- Write always a report on the intervention made and on the reasons, which has caused the intervention. These maintenance reports have to be filed and examine if the problems will occur again.

 **ATTENTION**

During the dust exhaust cleaning (option), the operator has to wear mask and protective glasses.

2.17 Precautions regarding the gear case oil and used fluids

Those are toxic element. You have to follow the supplier safety card.

2.18 Plates and safety

Plates with safety symbols and/or message are put on the machine.

In these pages we indicate the danger type.

 **ATTENTION!**

Make sure that all safety messages are readable.

Clean them using a cloth, water and soap. Do not use solvents, naphtha or petrol.

Replace the damaged plates asking them to Ficep.

If a plate is on a piece, which is replaced, make sure that the plate is put on the new one.

 **ATTENTION!**

You have to protect hearing

 **ATTENTION!**

It is forbidden to execute maintenance on moving parts

 **ATTENTION!**

Not remove the safety device and protection

2.19 Safety devices and components

- Emergency push button

  It stops immediately each axis movement and makes in safe the machine.

- Mobile repair opening

  The machine is provided with interlock repair protecting the dangerous area.

  The repair opening causes each machine movement to stop (set up condition).

- Electrical cabinet doors opening

  The opening of these repairs causes the electrical power supply loss inside the electrical cabinet and each machine movement stop (set up condition).

- Photoelectric barriers

  The beam interruption passing through it causes each machine movement stop (set up condition).

- Key switch

  This switch has three positions and needs the qualifying key to function. When the functioning mode has been selected, the key must be removed and given to the safety responsible. It permits to choose between three functioning mode:

  Set-up

  The set-up function makes the electronic circuits independently during the machine prearrangement. During the prearrangement, the machine operator must take away the key to grant that other person cannot move the switch on the work position.

  Work

  In this position all machine function are enabled.

  Locked

  In this position the machine stays in the operation mode previously selected. It is possible to go into “safer” modes or states, for example: from the automatic execution mode to the standby mode pressing the standby push-button.

2.20 Working zone protection and risk zone (active and passive safety devices)

In the “Barrier lay-out drawing” drawing are showed the risk zones that must be protected using enclosures, fixed repairs, or sensitive devices (photoelectric barriers).

The dimensions and type of these protections must respect the safety rules written at the chapter beginning and their positioning must avoid reaching the movement part.

- **Loading zone protection**

  The entire loading area must be suitably protected and absolutely inaccessible. No admittance is allowed both to the machine operator and to any other person when the machine is operating and the material is loaded.

  Doors or gates, fitted with limit switches to be connected to the emergency signals thus obviating any possibility for the machine to operate when the operator is within the loading zone, must be provided to allow the operator to get safely into the loading zone for material loading purpose.

- **Unloading zone protection**

  The entire unloading area must also be suitably protected and absolutely inaccessible. Both the machine operators and any other person must be prevented from entering into this zone when the machine is operating and processed parts are unloaded.

  Doors or gates, fitted with limit switches to be connected to the emergency signals thus obviating any possibility for the machine to operate when the operator is within the unloading zone, must be provided to allow the operator to get safely into the unloading zone for processed parts handling.

2.21 Very important

It is the machine User's responsibility, after installation of the machine, to provide additional protecting means to suit the machine location, the use of the equipment and of the auxiliary equipment.

FICEP’s Engineers do, however, stand ready to provide any suggestion and recommendation to this end, if so required.

☞ **IMPORTANT**

Make sure to hand over to the machine operating and maintenance Engineers copy of these STANDARDS.

3 • MACHINE FEATURES

3.1 Automatic CNC line for the processing of plate model

TIPO A31

Consisting of:

In-feed conveyor group with:

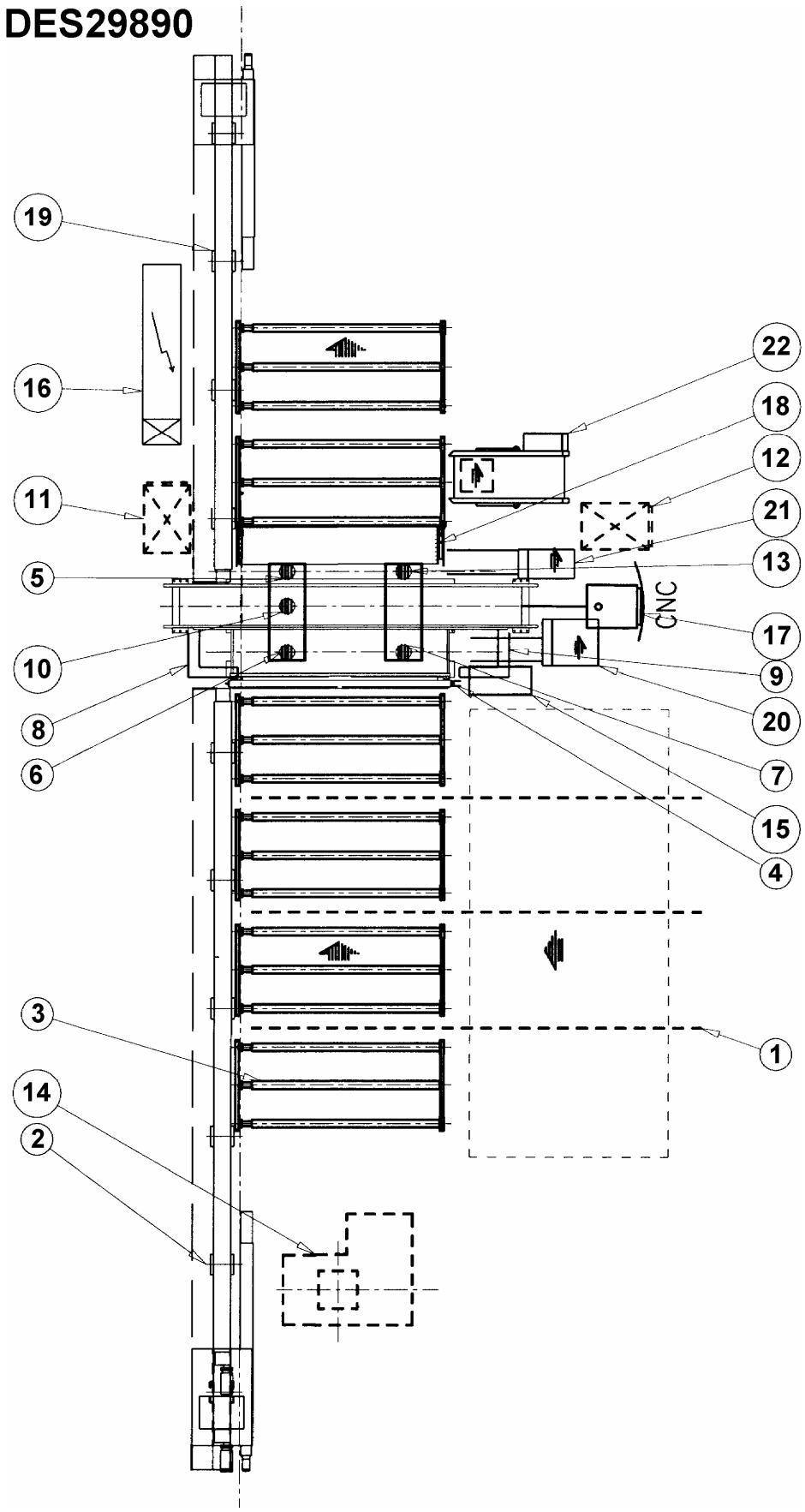
1. In-feed Transfer Table with Catches (option).
2. Carriage supporting structure with carriage/pincher
3. Idle rolls elements.
4. Drilling swarf cleaning device with brush.

Working Units Group complete with:

5. Fixed frame for drilling unit and first oxycutting torch.
6. Drilling unit.
7. Drilling unit (option).
8. Tool-change system for standard drilling unit (option)
9. Tool-change system for optional drilling unit (option).
10. Marking unit with 38 positions (option).
11. Plasma Cutting system for standard drilling unit (option).
12. Plasma Cutting system for optional drilling unit (option).
13. Oxycutting torch for optional drilling unit (option).
14. Smoke Intake System for thermal cutting unit (option).
15. Hydraulic Power Pack.
16. Electric Cabinet.
17. FICEP CNC Control Unit.

Out-feed conveyor group with:

18. Device to unload processed pieces (option).
19. Cart supporting structure with cart/pincher.
20. Swarf conveyor for the drilling unit (option).
21. Automatic conveyor for thermal cutting swarf (option)
22. Automatic conveyor for 500x500 mm pieces (option).


DES29890
19
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CNC
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2

3.2 Main Technical Specifications

Plate specifications on in-feed side		
Minimum width	mm	400
Maximum width	mm	3100
Minimum length	mm	2500
Maximum length	mm	9000
Work piece specifications on out-feed side		
Minimum length	mm	200
Minimum width	mm	150
Drilling capacities		
Vertical drill heads	n.	1
Spindles per vertical drill head	n.	1
Maximum hole diameter (steel R=52 kg/mm²)	mm	40 (50)
Maximum thickness that can be drilled	mm	130
Spindle rotation motor (a.c.)	kW	19
Spindle rotation speed with continuous adjustment from program	RPM	from 180 to 3000
Other specification		
Minimum plate thickness	mm	10
Maximum plate thickness	mm	130
Maximum positioning weight (mass)	Kg	10000
Linear weight of the large plate	Kg/m	750
Max vectorial traverse speed	m/min.	30
Max cross positioning speed	m/min.	30
Working level's height	mm	850

3.3 Machine description

3.3.1 In-feed Transfer Table with Catches (option)

Transfer table with catches to load plates (manual controlled) on the in-feed conveyor.

Configuration as per lay-out.

3.3.2 Carriage supporting structure with carriage/pincher

Pincher-holding carriage supporting structure (in-feed side) to handle plates. The carriage is equipped with a hydraulically controlled pincher suitable for the longitudinal CNC controlled positioning.

3.3.3 Idle rolls elements

Idle rolls elements roller way to translate the plate.

3.3.4 Drilling swarf cleaning device with brush

A device complete with brush for the drilling swarf removal from the upper part of the plate.

3.3.5 Fixed frame for drilling unit and first oxycutting torch

Main fixed frame with a cross-guide system for the positioning of vertical drill head and torch.

One torch for oxygen cutting, connected to the standard drill head, complete with ‘stand-off’ device and control panel for gas adjustment.

The torch positions itself vertically and transversally through ball screws and servo-motor, though working on the opposite side of the unit (exit side).

The unit includes also a duct designed to receive a smoke intake and filtering system (option). The duct is placed in the lower part of the torch working area.

3.3.6 Drilling unit

One vertical monospindle drill head with the following specifications:

Spindle connection size ISO 45

The above head is supplied with:

- Positioning system to suit the gaugeline fitted with ball screw and servo motor controlled by CNC.
- Feeding system fitted with ball screw and servo motor controlled by CNC.
- Sensitive speed change unit ensuring rapid feed, drilling and rapid return of the drills. With this system, there is no need for adjusting cams, and it is also possible to use twist drills of different lengths.
- Device for pointing or marking operations, which can be performed with the drill fitted to the machine for drilling purposes, by simply changing the relevant function in the program.
- Internal / external coolant system pneumatically operated (the unit for pumping and filtering of the coolant liquid is not included).
- Automatic clamping system in the spindle area to ensure positive clamping of the workpiece.
- Device (optional) for automatic scribing operations through drilling unit. This device is supplied with a special tool and a self-adapting system, which is automatically adjusted according to the material deformation.

3.3.7 Drilling unit (option)

Second vertical monospindle drill head with the following specifications:

Spindle connection size	ISO	45
Maximum hole diameter at 52 Kg/mm² tensile strength	mm	40 (50)
Minimum centerline distance with respect to the standard drill head	mm	250
Spindle motor power	kW	19

The above head is supplied with:

- ❖ Positioning system to suit the gaugeline fitted with ball screw and servo motor controlled by CNC.
- ❖ Feeding system fitted with ball screw and servo motor controlled by CNC.
- ❖ Sensitive speed change unit ensuring rapid feed, drilling and rapid return of the drills. With this system, there is no need for adjusting cams, and it is also possible to use twist drills of different lengths.
- ❖ Device for pointing or marking operations, which can be performed with the drill fitted to the machine for drilling purposes, by simply changing the relevant function in the program.
- ❖ Internal / external coolant system pneumatically operated (the unit for pumping and filtering of the coolant liquid is not included).
- ❖ Automatic clamping system in the spindle area to ensure positive clamping of the workpiece.

3.3.8 Tool-change system for standard drilling unit (option)

Tool-change system for the standard drill head having the following specifications:

Connection	ISO	45
Tools to be inserted	n.	6

The insertion and removal of the tool, as well as the tool choice, are made automatically through the CNC.

3.3.9 Tool-change system for optional drilling unit (option)

Tool-change system for the optional drill head having the following specifications:

Connection	ISO	45
Tools to be inserted	n.	6

The insertion and removal of the tool, as well as the tool choice, are made automatically through the CNC.

3.3.10 Marking unit with 38 positions (option)

The marking unit is suitable to mark the upper side of the plate, and can reach its position using the Y axis.

The marking unit is fitted with a disk holder for characters whose rotation is CNC controlled by means of a servomotor.

The marking cycle is automatically selected from CNC and, longitudinally, it takes advantage of the X axis.

Marking stations	n. 38
Size of letter/number	mm 16 x 8
Marking strength (on every character)	kN 80
TYPE OF LETTER/NUMBER	A30492

3.3.11 Plasma cutting system for standard drilling unit (option)

Plasma-cutting system for large plates consisting of a torch installed on a special support connected to the standard drilling unit. The unit employs a HYPERTHERM device, with cooling system, and with vertical survey of the torch position, and can work together with various suction systems (option).

The vertical and cross positioning is controlled by the axes of the standard drilling unit.

Please refer to the attached manual.

3.3.12 Plasma Cutting system for optional drilling unit (option)

Plasma-cutting system for large plates consisting of a torch installed on a special support connected to the optional drilling unit. The unit employs a HYPERTHERM device, with cooling system, and with vertical survey of the torch position, and can work together with various suction systems (option).

The vertical and cross positioning is controlled by the axes of the optional drilling unit.

Please refer to the attached manual.

3.3.13 Oxycutting torch for optional drilling unit (option)

One torch for oxygen cutting, connected to the optional drill head, complete with ‘stand-off’ device and control panel for gas adjustment.

The torch positions itself vertically and transversally through ball screws and servo-motor, though working on the opposite side of the unit (exit side).

3.3.14 Smoke intake system for thermal cutting unit (option)

Suction group complete with filter for the lower area of the torch working position.

Please refer to the attached manual.

3.3.15 Hydraulic Power Pack

3.3.15.1 Hydraulic system

Working pressure	75 bars
Power pack tank capacity	60 litres
Heat exchanger	air/oil
Oil quantity required to fill the hydraulic circuitry	~160 litres

3.3.15.2 Pneumatic system

Working pressure:

Min. 5 bars

Max. 6 bars

3.3.16 Electric Cabinet

3.3.16.1 Electric system

Main A.C. supply line:

Type	three phase
Voltage	415 volt ± 10%
Cycles	50 Hz
Total power installed	80 kW
Connection specifications:	
No. and type of wires	three + ground

☞ **IMPORTANT**

For more detailed information, please refer to: Wiring diagram.

3.3.17 FICEP CNC Control Unit

The new generation control unit, with controlled axes, is based on a field bus CANopen technology.

The CNC is positioned in a mobile control panel to let the operator have a complete system overview.

All the input and output cards are connected to the bus and positioned, when possible, directly on the machine.

The CNC is equipped with:

- digital inputs (24V – optoinsulated)
- digital outputs (24V – protected transistors)

The control panel is an industrial PC containing the CNC and having the following specifications:

- 800 Mhz CPU with 256 MB RAM
- Colour video TFT 12.1''
- Keyboard panel and auxiliary pushbutton panel
- 10/100 RJ45 Ethernet port
- USB modem
- 1 additional USB port
- WINDOWS XP operative system
- Teleservice software

Programming

- Simplified data input (with tables and workpiece on-screen graphics)
- Absolute and incremental values
- Diameters programming
- Linear, matrix and flange patterns

Processing

- Automatic tool assignment
- Unit offset sum
- Values ordering

Execution

- Automatic cycle stop for "setup" modification, and on-screen indication of the tools to be changed.
- Possibility for the drill heads to operate in "multitasking" mode in their working areas (even with automatic tool changer).
- Automatic control to prevent any possible collision of the drills.
- Drilling parameters table.

All the indications are clearly displayed on the screen, and concern:

- Current program indication, with clear description of the program running at the moment
- CNC inside and outside alarms
- Registration of the date and time of the last 100 alarm messages
- Diagnostic messages to the operator

The machine allows also the use of:

Software Package (optional), specifically studied for nesting of the piece programs into the large plate after having imported them either from a CAD application or from suitable software packages.

3.3.18 Device to unload processed pieces (option)

Special tilting device with idle rolls for a frontal unloading (under out-feed table) of processed pieces having the following technical features:

Minimum piece dimension	mm	150 x 200
Maximum piece dimension	mm	500 x 500

3.3.19 Cart supporting structure with cart/pincher

A supporting structure (out-feed) for the auxiliary cart suitable for pieces up to 1500 mm of out-feed length (in standard version).

An auxiliary cart moves on the above mentioned structure: it is complete with a hydraulically controlled pincher and it is suitable to grant the plate position.

On the lateral side of the structure instead there is an idle roll element to support and transfer the plate during the processing.

3.3.20 Swarf conveyor for the drilling unit (option)

Swarf conveyor for the drilling unit provided with motor, to unload drilling swarf into a bin placed on the floor.

3.3.21 Automatic conveyor for thermal cutting swarf (option)

This automatic conveyor allows carrying away from the machine the swarf generated during thermal cutting operations.

3.3.22 Automatic conveyor for 500x500 mm pieces (option)

This automatic conveyor allows carrying away from the machine pieces having a maximum dimension of 500 x 500 mm in order to have a better unloading into a bin.

3.4 CNC controlled axes

Axes are CNC controlled:

- Longitudinal positioning — Axis AXX
- Cart pincher positioning — Axis APA
- Drilling, marking and cutting tools traverse positioning — Axis AXY
- Cutting tools vertical positioning — Axis AXZ
- Drilling unit forward — Axis AXC
- Drilling spindle positioning — Axis MDV
- Drilling unit traverse positioning — Axis AXW optional
- Drilling spindle positioning — Axis MDW optional
- Drilling unit forward — Axis AXD optional
- Cutting tools vertical positioning — Axis AXU optional
- Marking disk rotation — Axis ADM optional

3.4.1 Minimum programmable increment

Axis AXX +/- 0,1 mm

Axis AXY +/- 0,1 mm

Axis AXZ +/- 0,1 mm

Axis AXC +/- 0,1 mm

Positioning accuracy (*)

Within holes of the same group +/- 0,5 mm.

Within groups of holes positioned at L distance (L measured in metres)
+/- 0,5+(Lx0,06) mm

(*) The above accuracies do only apply to correctly adjusted machines fitted with sharp and correctly mounted tools.

Accuracies calculations do not include the "technological" deformation of material caused by the part heating during the cutting or punching process.

4 • TRANSPORT AND INSTALLATION

4.1 Overall dimensions

Please refer to the lay-out drawing.

4.2 Controls on receipt

a. When the machine arrives to your work, you have to oversee all parts, with the object to check that the machine hasn't undergone damage as a result of transport or weather condition (rust, etc.).

   If you find possible damages you have to inform the carrier, his insurance company and to send to the FICEP After-sales service (S.A.T.) a detailed report about the material condition, if possible with photos.

   When the Ficep technician arrives, you have to inform him about the machine-undergone damages.

b. Verify that what arrived is according to the shipment documents and to the supply contract-packing list.

   Put the shipment documents at disposal of Ficep technician so that he can start the system conformity formal check.

4.3 Lifting

The machine is dispatched and packaged following the contract conditions.

The packing list contains a detailed list of all sent material with the single weight and dimensions and has to correspond at what the customer has received.

DANGER!

During the machine elements lifting and handling, use always ropes and means with suitable dimensions.

Use always the anchor point foreseen by manufacturer.

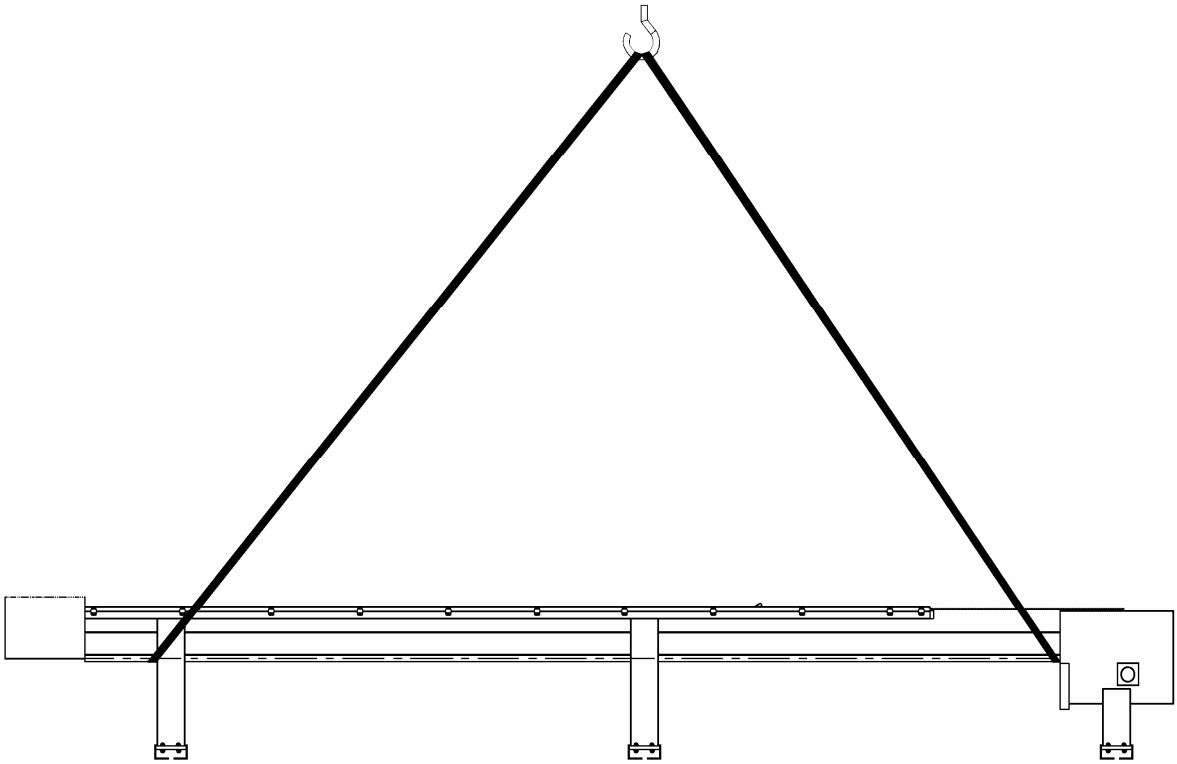
Never stop near hanging load.

Never stay on or under a hanging load.

For lifting refer to the "Equipment Handling Charts" and use ropes with lengths and lifting power as indicated.

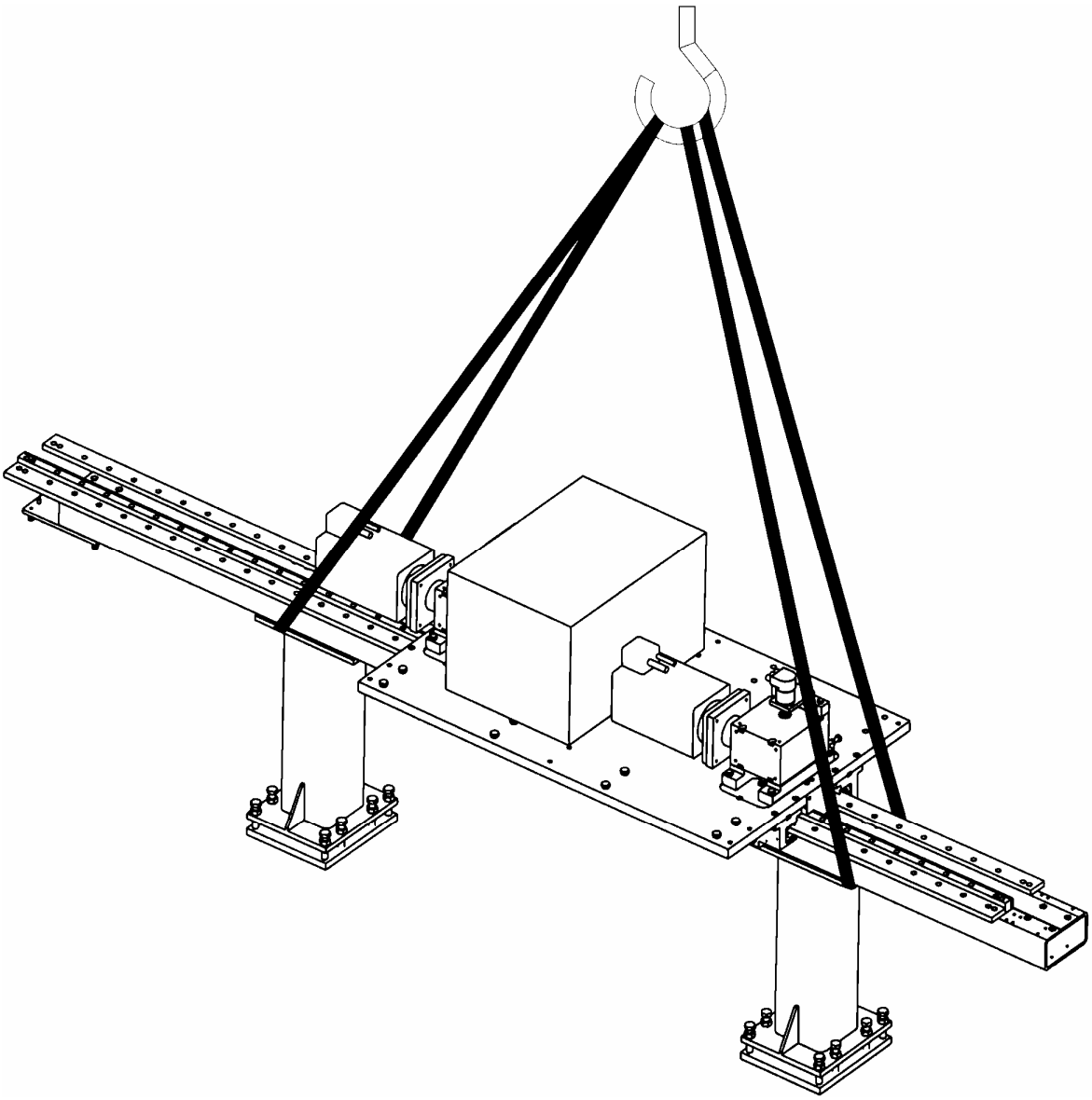
4.4 Equipment Handling Charts

4.4.1 In-feed Transfer Table with Catches (option)



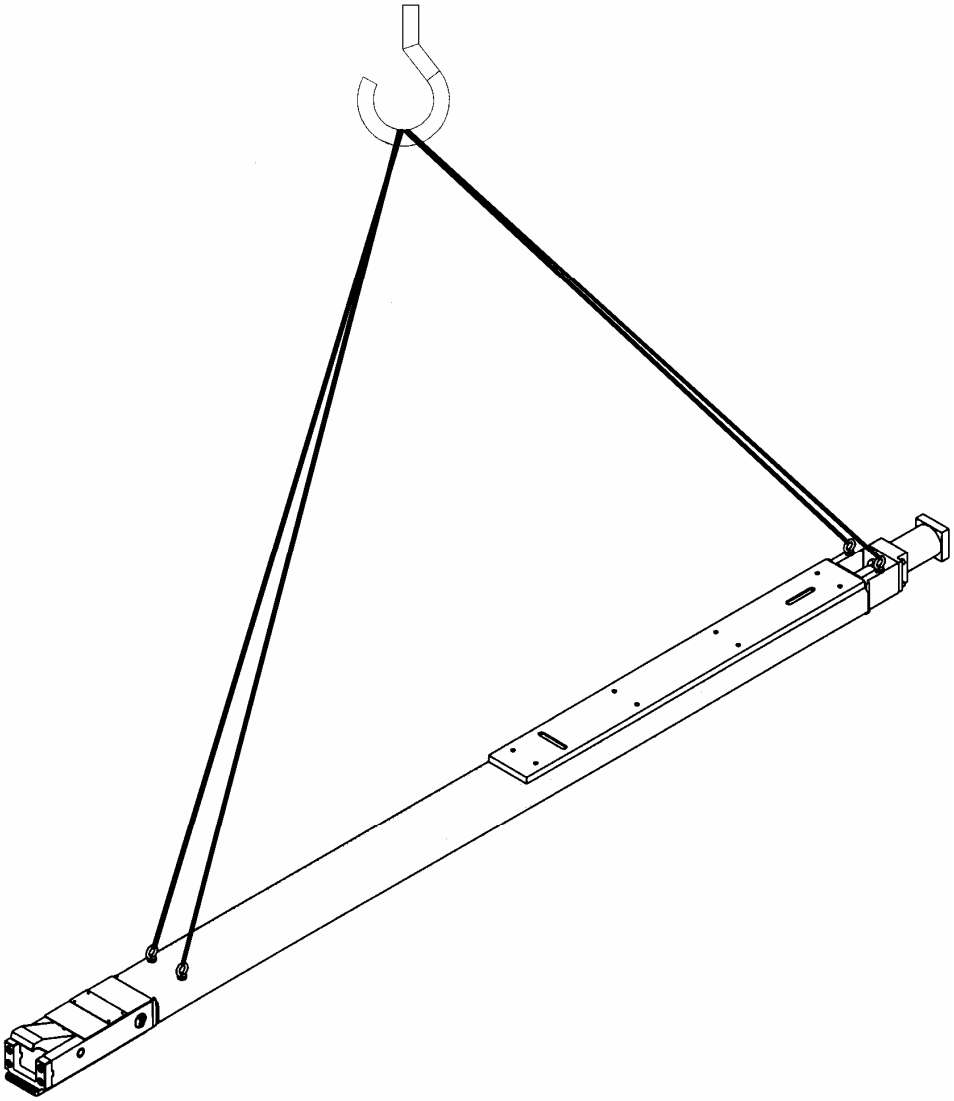
LIFTING	
Mass (weight):	800 KG
Lifting means:	Bridge crane
Type of sling:	Steel wire rope
Min. safety factor:	6: 1
Required personnel:	No. 2 persons

4.4.2 Carriage supporting structure with carriage



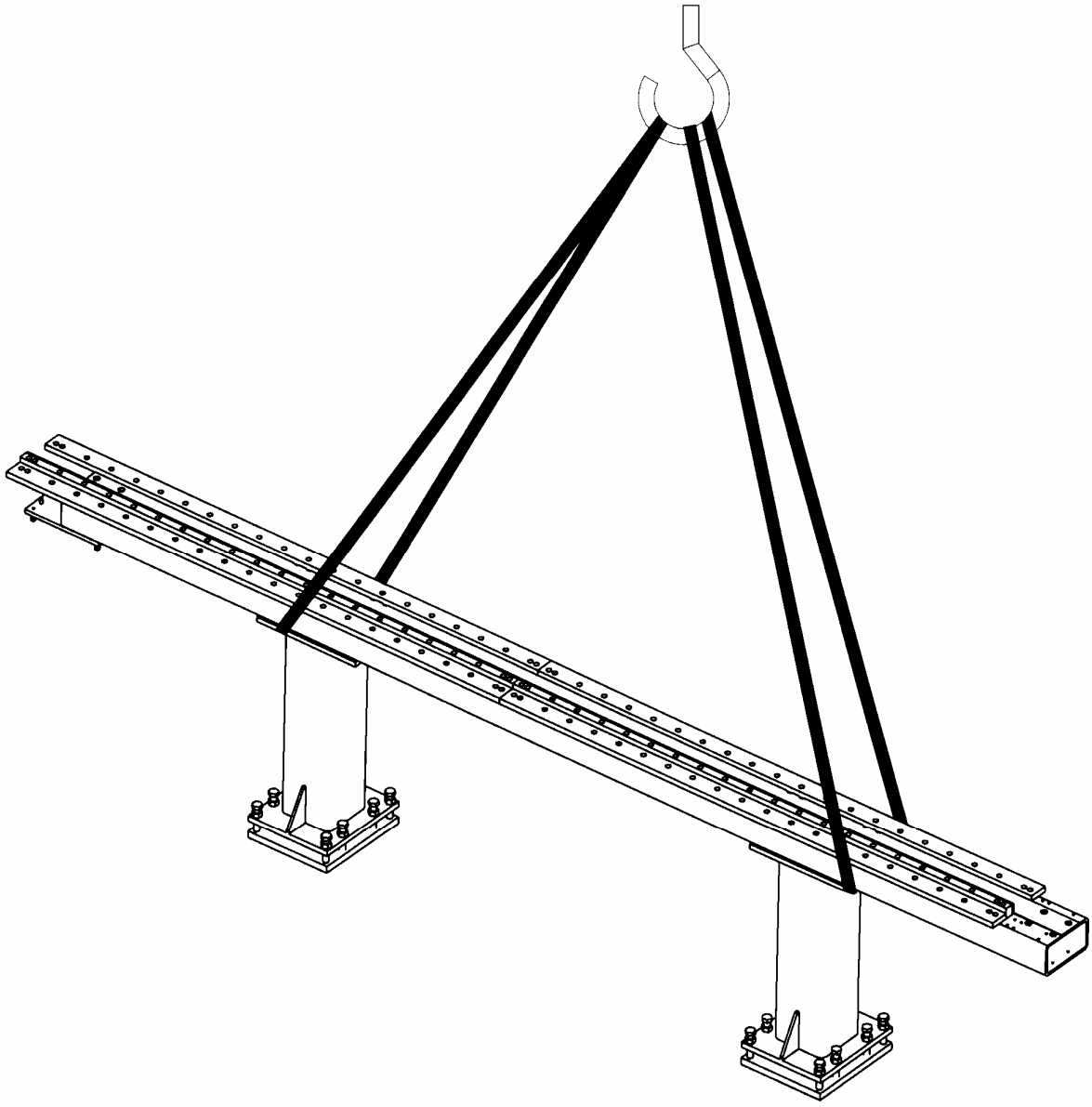
LIFTING	
Mass (weight):	2.500 KG
Lifting means:	Bridge crane
Type of sling:	Steel wire rope
Min. safety factor:	6: 1
Required personnel:	No. 2 persons

4.4.3 Pincher



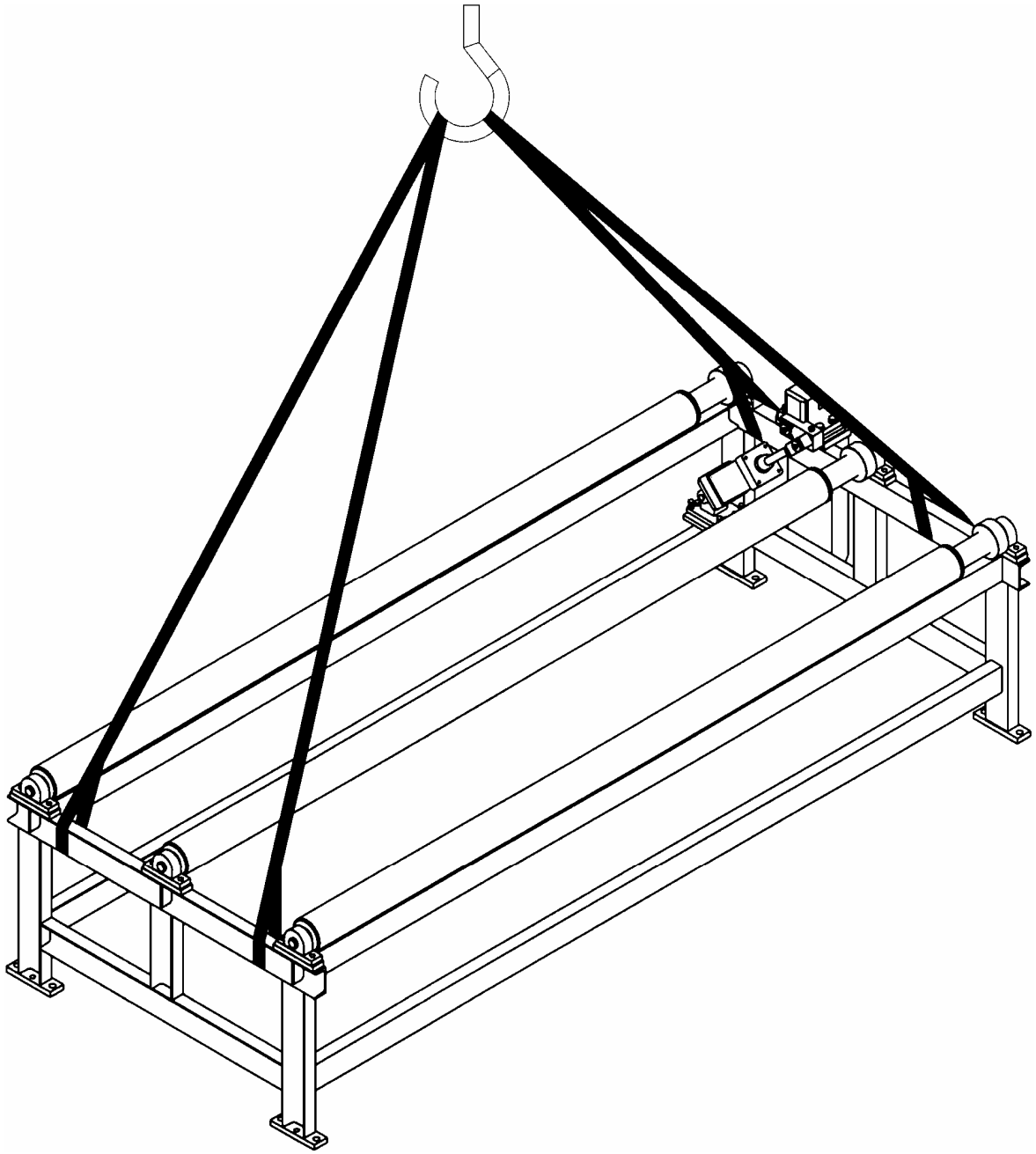
LIFTING	
Mass (weight):	350 KG
Lifting means:	Bridge crane
Type of sling:	Steel wire rope
Min. safety factor:	6: 1
Required personnel:	No. 2 persons

4.4.4 Carriage/Cart supporting structure



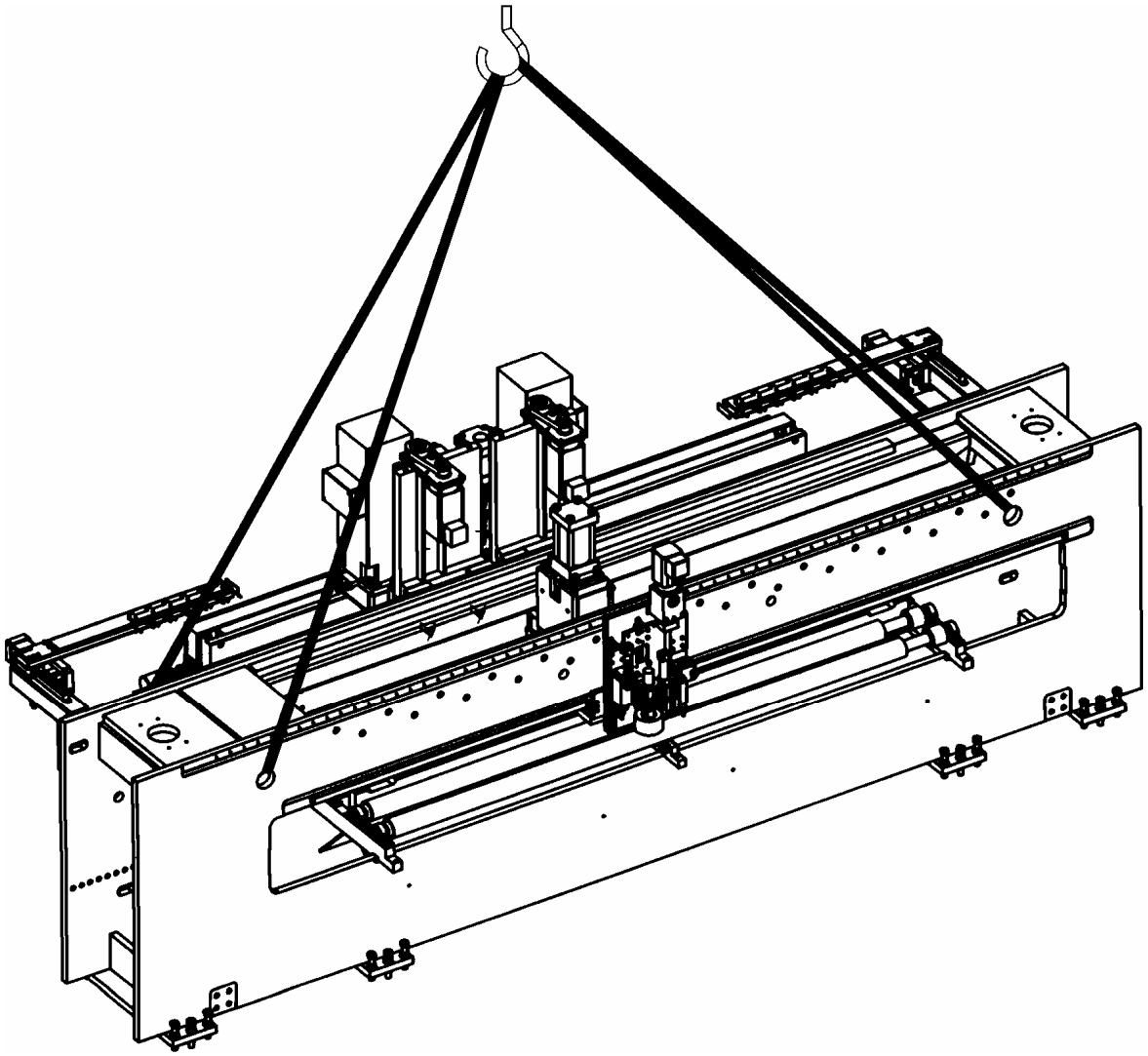
LIFTING	
Mass (weight):	500 KG
Lifting means:	Bridge crane
Type of sling:	Steel wire rope
Min. safety factor:	6: 1
Required personnel:	No. 2 persons

4.4.5 Idle rolls elements



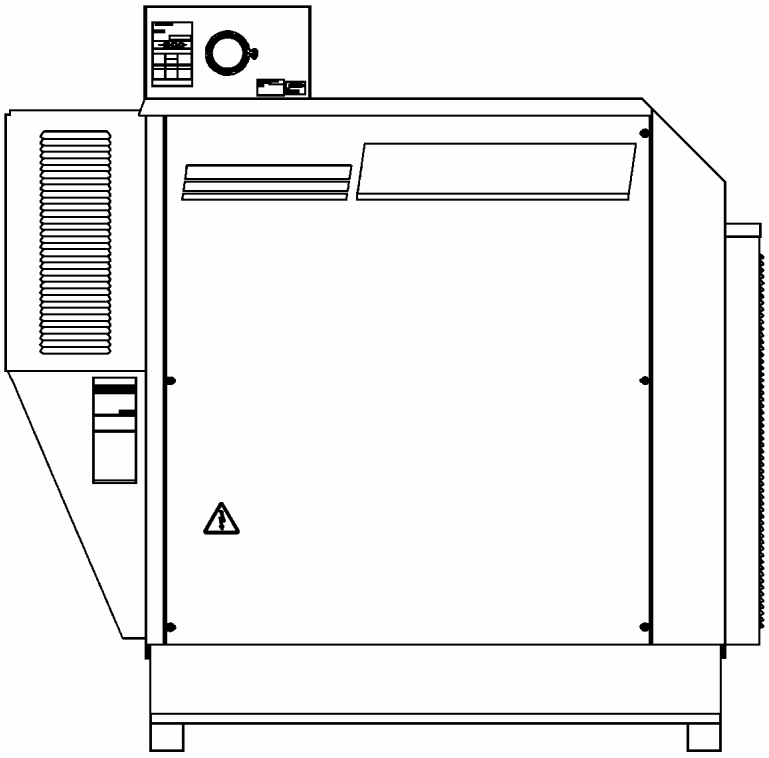
LIFTING	
Mass (weight):	800 KG
Lifting means:	Bridge crane
Type of sling:	Steel wire rope
Min. safety factor:	6: 1
Required personnel:	No. 2 persons

4.4.6 Working Units Group (bâti)



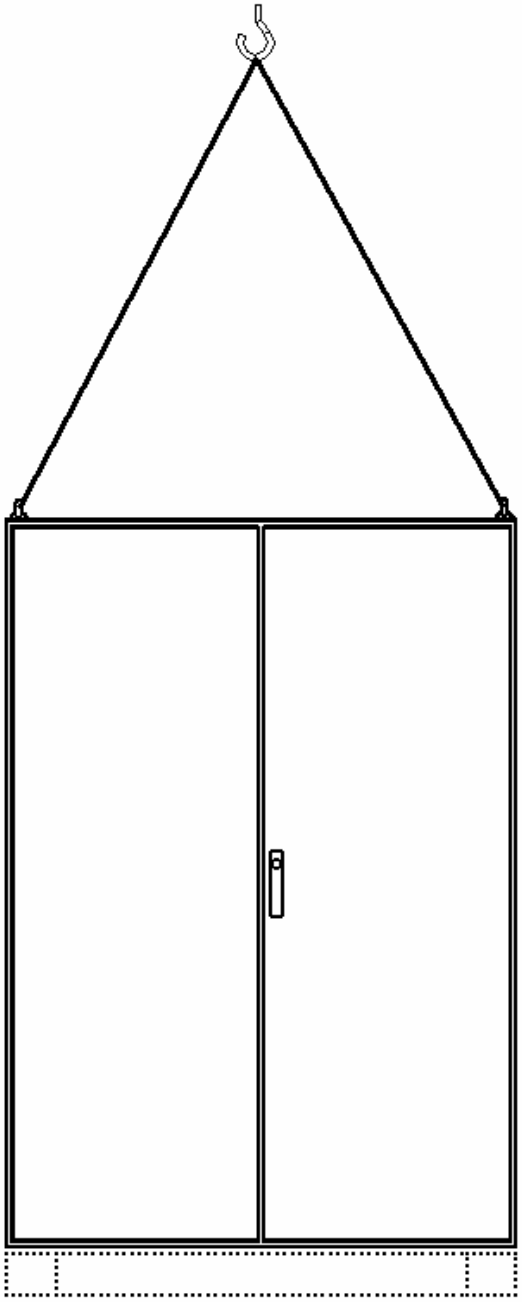
LIFTING	
Mass (weight):	14.000 KG
Lifting means:	Bridge crane
Type of sling:	Steel wire rope
Min. safety factor:	6: 1
Required personnel:	No. 2 persons

4.4.7 Plasma Cutting system (optional)



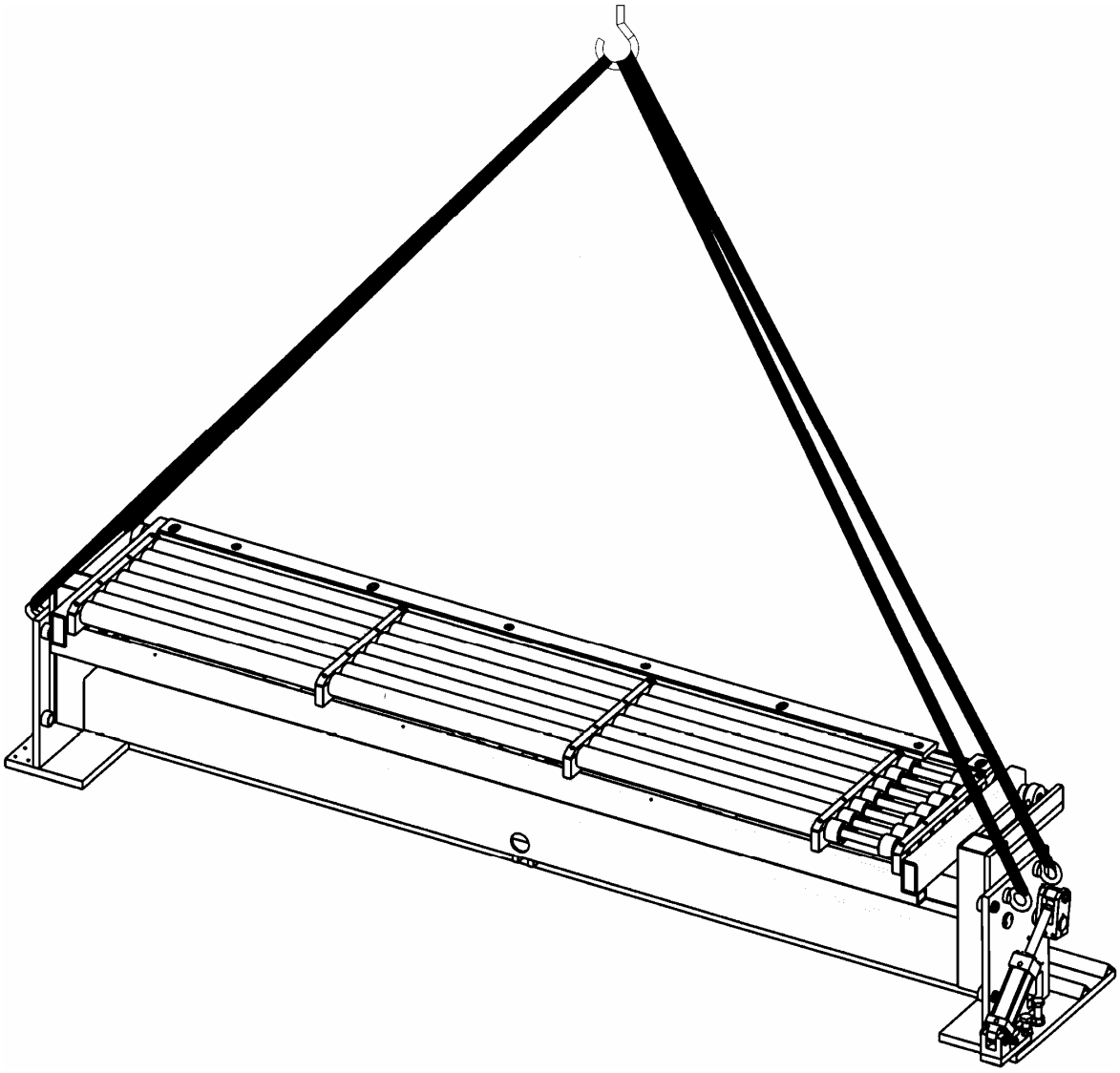
LIFTING	
HPR260 Mass (weight):	580 KG
HT2000 Mass (weight):	450 KG
HT4400 Mass (weight):	900 KG
Lifting means:	Fork lift truck
Type of sling:	
Min. safety factor:	6: 1
Required personnel:	No. 2 persons

4.4.8 Electric Cabinet



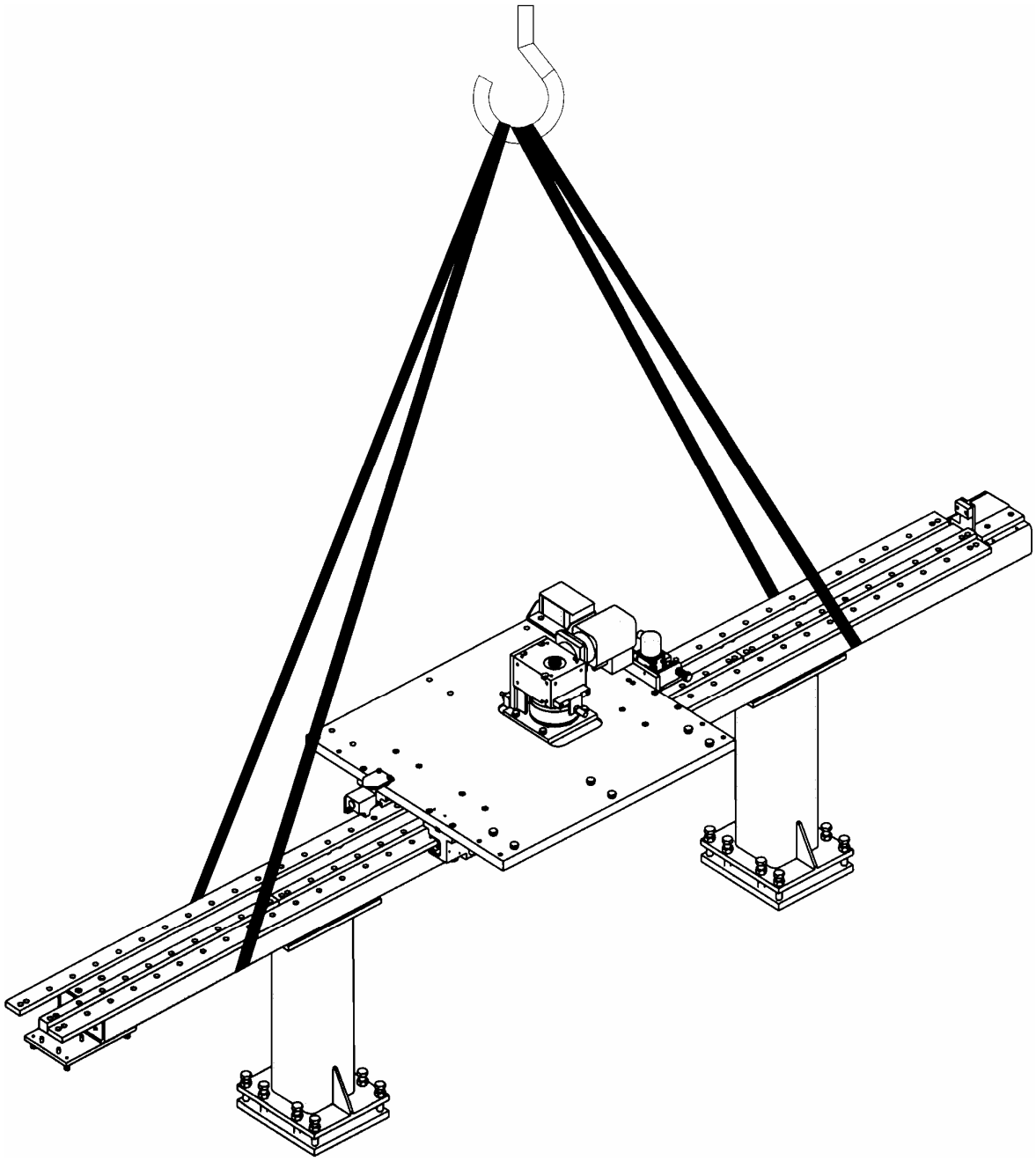
LIFTING	
Mass (weight):	1.200 KG
Lifting means:	Bridge crane
Type of sling:	Steel wire rope
Min. safety factor:	6: 1
Required personnel:	No. 2 persons

4.4.9 Device to unload processed pieces (option)



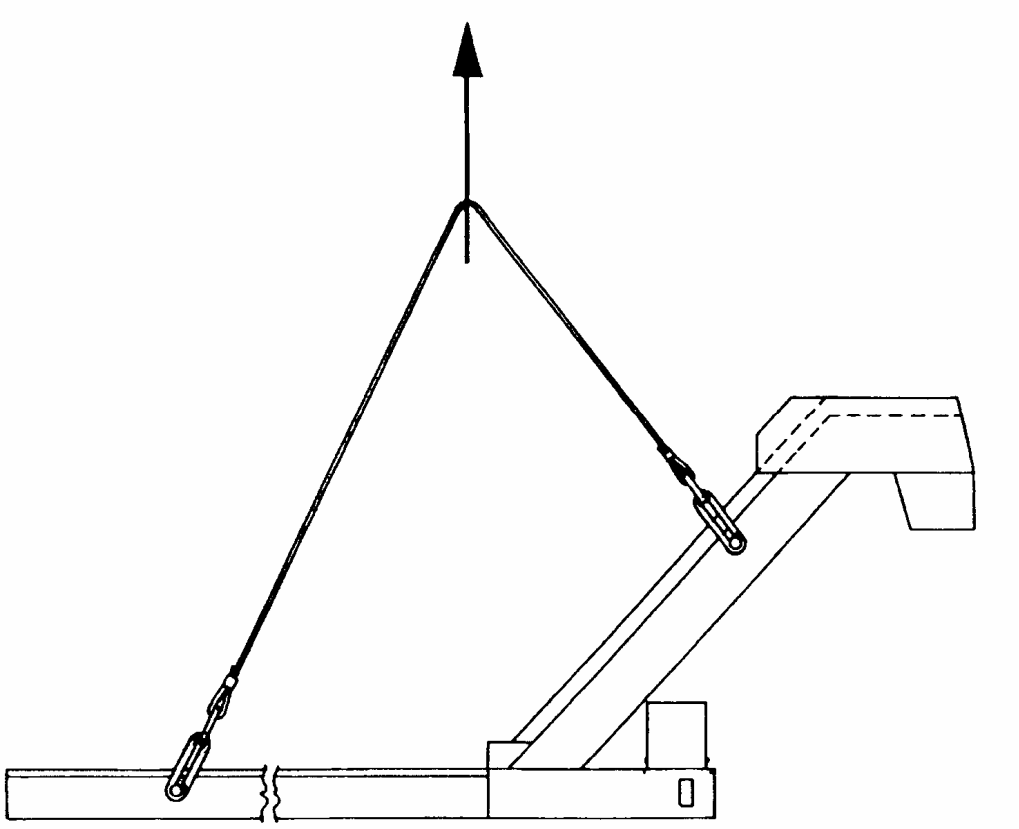
LIFTING	
Mass (weight):	1.900 KG
Lifting means:	Bridge crane
Type of sling:	Steel wire rope
Min. safety factor:	6: 1
Required personnel:	No. 2 persons

4.4.10 Cart supporting structure



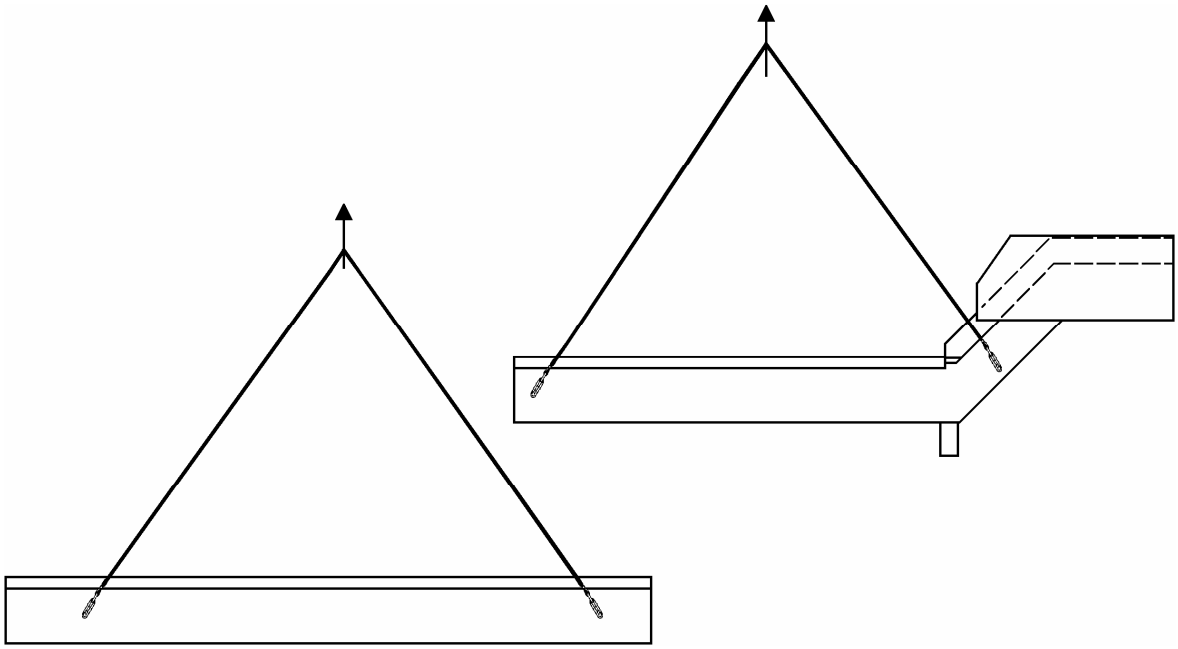
LIFTING	
Mass (weight):	1.300 KG
Lifting means:	Bridge crane
Type of sling:	Steel wire rope
Min. safety factor:	6: 1
Required personnel:	No. 2 persons

4.4.11 Swarf conveyor for the drilling unit (option)



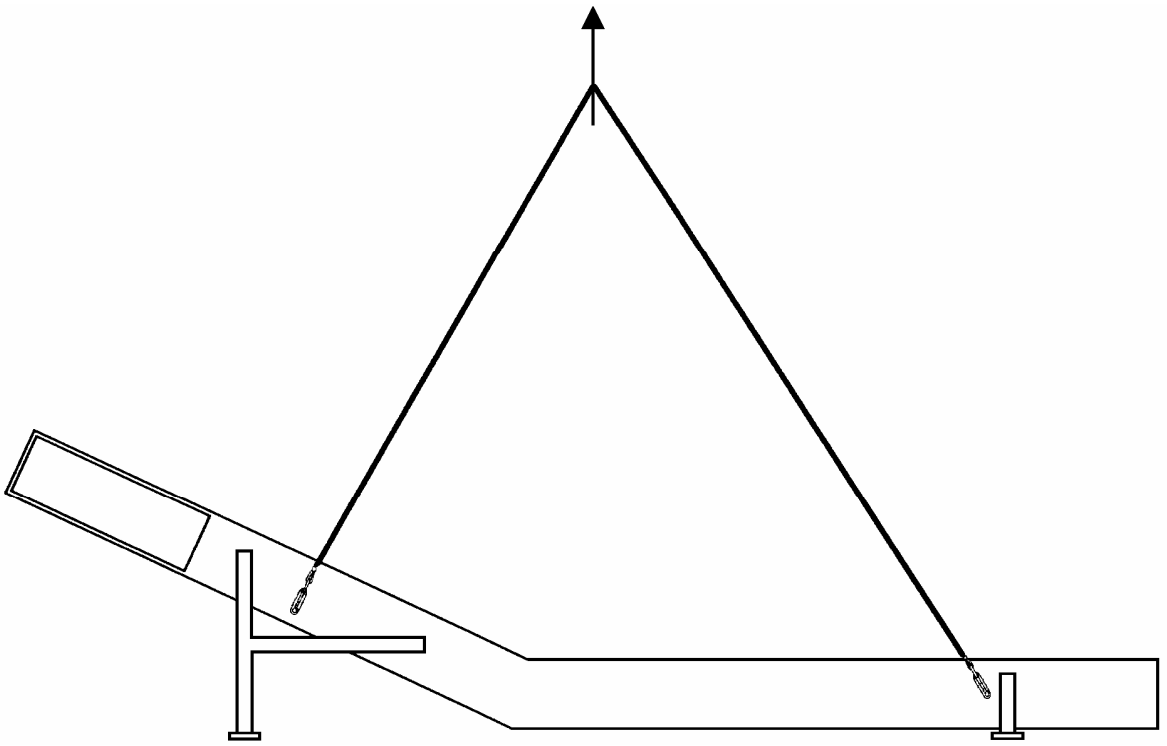
LIFTING	
Mass (weight):	600 KG
Lifting means:	Bridge crane
Type of sling:	Steel wire rope
Min. safety factor:	6: 1
Required personnel:	No. 2 persons

4.4.12 Automatic conveyor for thermal cutting swarf (option)



LIFTING	
Mass (weight):	1000 KG
Lifting means:	Bridge crane
Type of sling:	Steel wire rope
Min. safety factor:	6: 1
Required personnel:	No. 2 persons

4.4.13 Automatic conveyor for 500x500 mm pieces (option)



LIFTING	
Mass (weight):	1100 KG
Lifting means:	Bridge crane
Type of sling:	Steel wire rope
Min. safety factor:	6: 1
Required personnel:	No. 2 persons

4.5 Assembly and installation

ATTENTION

The machine assembly and installation are carried out by Ficep S.p.A. qualified and well-trained technician.

The customer before the machine and Ficep Technician arrival has to prearrange what shown in the “Lay-out” and “Foundation” drawing and in the paragraph “Predispositions at customer care”.

4.6 Rigging

Verify with the specific water level that the machine is perfectly on plane.

Otherwise operate on the adjusting feet.

Once carried out the regulation block the feet by the specific lock nuts.

5 • START-UP

5.1 Introduction

The machine setup covers the information regarding all the operations and adjustments to be carried out by the operator to set the machine in the best operational condition.

It is important that your Programming Engineer be familiar with all the setup sequences, as described in this Part of the Manual, thus making it possible to identify the program data necessary to process a part.

The machine setup cycle has been divided into the following phases:

- Machine SETUP

  It covers all the adjustments and operations common to any part processing to be performed by the operator to insure a correct operation and performance of the machine.

- Machine operations SETUP

  It covers all the logic sequences to be followed by the Production and Programming Division People in preparing all the documentation to be delivered to the Workshop.

☞ **IMPORTANT**

DURING THE OPERATIONS SETUP PROCEDURE, the operator should rotate the 3_positions key type selecting switch, located on the push button station, to SETUP position to prevent that none of the controls may accidentally be operated and to insure operator's maximum safeguard.

ALL THE OPERATIVE MODALITIES OF THE ABOVE SELECTING SWITCH ARE SPECIFIED IN CHAPTER “CONTROLS DESCRIPTION” OF THIS MANUAL.

WE STRONGLY RECOMMEND HAVING ALL SETUP OPERATIONS CARRIED OUT BY THE MACHINE OPERATOR.

(See “Safety information” chapter)

5.2 Machine setup operations

5.2.1 Machine start-up

The machine is normally started up in the following two cases:

- ❖ After a long period of inoperation or after a normal or special servicing or maintenance. In this case, we shall call it MACHINE START-UP.
- ❖ At the beginning of a working shift or after the machine remained inoperative for reasons other than maintenance or servicing. In this case, we shall call it RESTARTING OF THE MACHINE.

5.2.2 Machine start-up

We suggest that both the machine operator and your servicing Engineer be in attendance at the machine start-up thus carrying out the following checks:

- ❖ all the parts that have been serviced and maintained are fitted back home (connectors, wires to terminal boards, electronic parts, etc.) especially when the following circuits are involved:

Pick-up cables of the D.C. motors speedometer dynamos.

Motors power connection.

Connectors for CNC pick-up units.

- ❖ Make sure that there is no tool or service spanners left in a position that may affect the correct operation of the machine.
- ❖ Oil, in the hydraulic power unit, must reach the correct level.
- ❖ The electric and pneumatic systems and equipment are correctly connected to the shop supply lines. Also, make sure that the air pressure and the voltage are correct.
- ❖ The earth circuits are properly connected to all points requiring it.
- ❖ Protecting fuses for the main and single circuits have the correct rating and setting and are properly positioned in their seats.

IMPORTANT

Should you feel that a portion of the machine is not operating correctly, you may start the machine by disconnecting the problemed portion; ex.: the carriage axis and the positioning axes.

This is attained by means of the appropriate switches.

ATTENTION!

It is extremely important that the above operations are carried out by skilled and well trained personnel as high voltage is available on some electronic equipment.

5.2.3 Drives and electrical checks

After the general inspections are carried out, the Servicing and Maintenance Engineer must make sure of the following:

- Persons other than the machine operator and the service Engineer are not in the machine area or in the vicinity of the electrical equipment.
- The main automatic breaker input voltage has:

A correct nominal value with a maximum deviation of +/- 10%.

Symmetrical phases.

- Make sure that the different safety switches and breakers provided on the cabinet doors are in resetting position; in fact, since the cabinet doors are open it would be impossible to connect the circuits.
- Close the main automatic breaker.
- Make sure that the power supply to the CNC is correct (especially when it comes from a privileged line and is independent from the power cabinet supply lines).
- Switch on the hydraulic equipment by depressing in alternation (JOG) the appropriate push buttons; make sure that the hydraulic power unit motor is rotating in the correct direction, as per arrows provided on the motor.
- Switch on the auxiliary circuits and make sure to disconnect them right away should one of the D.C. controlled axes move; should this condition occur, recheck the dynamo cables, the power supply to the panels and observe if one of the alarm lights positioned on the driving panel has gone **ON**.

In the event that no abnormal conditions are observed, switch-off the main breaker, close all CNC and cabinet doors and make sure that the safety limit switches provided on the doors are correctly positioned.

5.2.4 Restarting of the machine

The machine operator alone is able to restart the equipment.

c. Make sure to check the following:

- ❖ The compressed air in the pneumatic system line has a pressure of at least 6 bars.
- ❖ The oil in the hydraulic power unit is at the correct level.
- ❖ All the CNC and cabinet doors are closed.

d. Apply power:

- ❖ Switch on the main automatic breaker, positioned in the cabinet, by means of the appropriate external handle; the light in the respective push buttons provided on the control pulpit will go **ON**.
- ❖ Switch on the auxiliaries by means of the appropriate push button (if they fail to switch on, check if one of the emergency push buttons remained activated; if not have your Service Engineer check the equipment).
- ❖ Verify that no messages or alarm are displayed.

If all the above sequences are correct, you may consider the restarting cycle as completed and as such you may pass to the next operations.

5.3 Operation set - up

5.3.1 Operation setup by means of the CNC

Every time you change the program (CANONIC PROGRAM), make sure to perform all the machine SETUP operations depending upon the plate and the type of work to be carried out. It is clear that the above SETUP operations must comply with the information coming from the Production and Programming Departments.

The information passed over to the workshop by the Production and Programming Departments are dependent upon the type of organization or automation available, which may vary from shop to shop.

Nevertheless, machine specific information is displayed by the CNC in the SETUP table.

(See “Programming Manual”)

5.3.2 Typical SETUP sequence by means of the CNC

In this Chapter we shall describe a typical operational sequence to be performed by the operator to SETUP the machine every time a new CANONIC PROGRAM is processed.

We shall call CANONIC PROGRAM the program performed on raw profiles, which involves the processing of different pieces.

For every CANONIC PROGRAM the operator will normally have a display listing all the necessary parameters for the SETUP operations (see “programming manual”).

MAKE SURE to have the hydraulic power unit ON, the CNC active and the zeroing cycle processed when performing the following operations.

During all SETUP sequences, make sure to have the 3-positions key selector to SETUP position so as to insure safe working conditions and the activation of all SETUP selectors.

5.4 Machine SETUP sequence

After the machine operator has received from the Programming and Production Departments the following main information:

a. Type of profile to be processed.

b. Type of program to be used.

c. Drilling, milling, tapping etc. specifications complete with ideal working parameters.

d. Oxycutting specifications referring to the material type and thickness.

e. For Plasma Cutting Unit setup, please refer to the attached Hypertherm Instruction Manual (optional).

At this stage the operator may proceed with the machine setup cycle as follows:

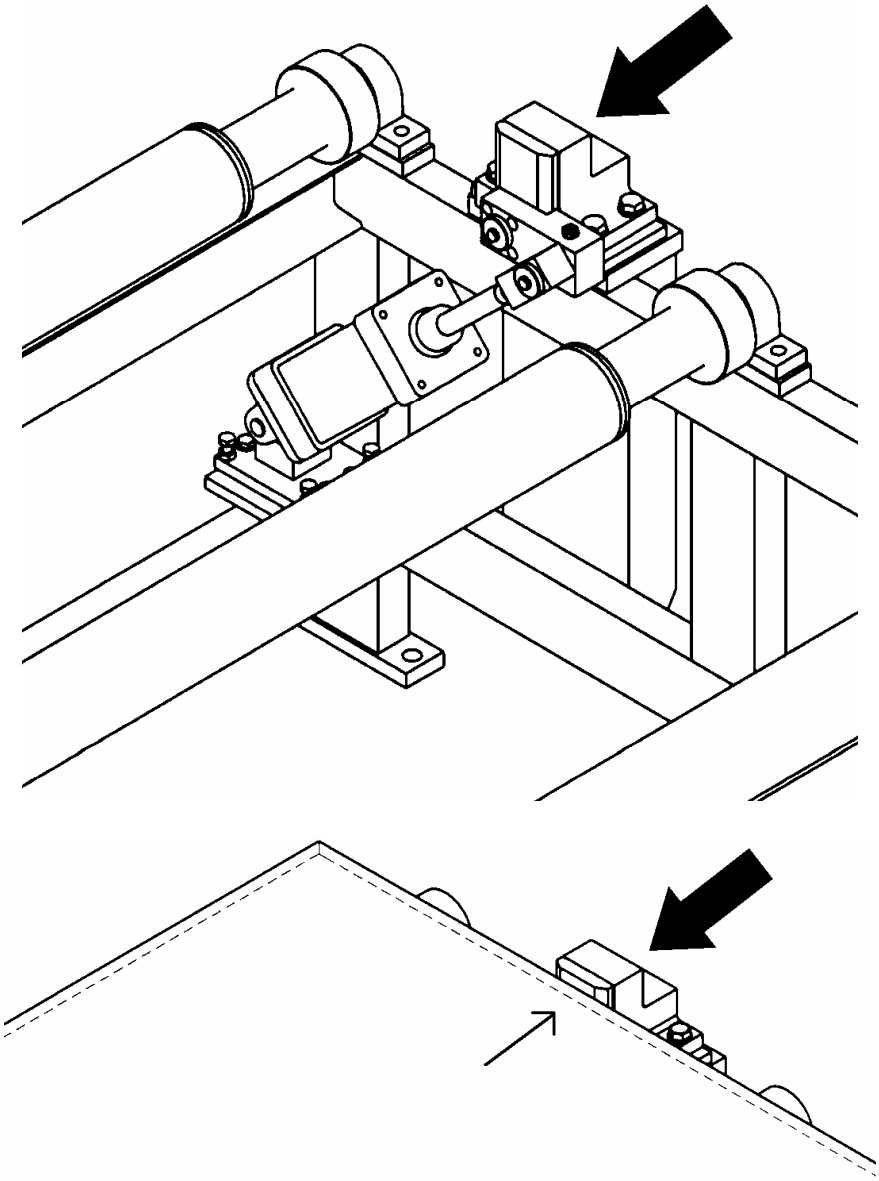
- Complete the ISO45 adapter with the necessary drills and check theirs lengths to prevent possible collisions.
- Fit the drilling tools change device (optional) with the different tools previously prepared.
- Verify the presence of all needed marking characters (option).
- Verify the suitability of the plasma torch nozzle (option).
- Verify the suitability of the oxycutting nozzle.
- Set the flame in the correct way (for oxy-cutting only).

5.4.1 Raw plate loading

It is necessary to position the plate on the in-feed conveyor or on the in-feed transfer table (Option) using a bridge crane and lifting device (strings, hooks, magnets, etc.).

☞ **IMPORTANT**

The plate has to reach the retractable fixed references placed on the in-feed conveyor (➔).



5.4.2 Set up, regulation and inspections operations for oxycutting unit

5.4.2.1 Type of nozzles - PROPANE (Standard supply)

Nozzles to be fitted to the thermal cutting torch are the standard ones on sale and used for similar operations in the structural steel works.

The nozzle (HARRIS make) that we suggest have the following characteristics:

TIP TYPE	CUTTING THICKNESS (mm)	SPEED (mm)/Min	OXYGEN PREHEATING PRESSURE (bar)		OXYGEN CUTTING PRESSURE (bar)	GAS PRESSURE (bar)
			min.	max.		
00 VVC	9-12.5	450-630	0.7	2.5	5.0	0.015 ÷ 0.20
0 VVC	12.5-20	400-600	0.7	2.5	6.0	0.015 ÷ 0.20
0½ VVC	20-35	360-550	0.7	2.5	7.0	0.015 ÷ 0.20
1 VVC	35-60	220-480	0.7	2.5	7.0	0.015 ÷ 0.20
1 ½ VVC	60-75	200-310	0.7	2.5	6.5	0.015 ÷ 0.20
2 VVC	75-100	190-280	0.7	2.5	6.5	0.015 ÷ 0.20
2 VVC	100-130	180-240	0.7	2.5	7.0	0.015 ÷ 0.20

☞ **IMPORTANT**

A correct cut is achieved by correctly setting the following parameters:

- ❖ Cutting speed
- ❖ Oxygen and gas pressure

in accordance with the selected type of nozzle established by the material thickness as shown in the HARRIS chart.

Above parameters can, of course, be modified in accordance with the machine Users specific experience in the field.

5.4.2.2 Type of nozzles – ACETYLENE (Optional supply)

Nozzles to be fitted to the thermal cutting torch are the standard ones on sale and used for similar operations in the structural steel works.

The nozzle (HARRIS make) that we suggest have the following characteristics:

TIP TYPE	CUTTING THICKNESS (mm)	SPEED (mm)/Min	OXYGEN PREHEATING PRESSURE (bar)		OXYGEN CUTTING PRESSURE (bar)	GAS PRESSURE (bar)
			MIN.	MAX.		
2 VAX	8 - 15	600	0.7	2.0	5.0	0.015 ÷ 0.20
3 VAX	15 - 35	550	0.7	2.2	7.0	0.015 ÷ 0.20
4 VAX	35 - 75	450	0.7	2.2	7.0	0.015 ÷ 0.20
5 VAX	75 - 130	300	0.7	2.5	7.0	0.015 ÷ 0.20

☞ **IMPORTANT**

A correct cut is achieved by correctly setting the following parameters:

- ❖ Cutting speed
- ❖ Oxygen and gas pressure

in accordance with the selected type of nozzle established by the material thickness as shown in the HARRIS chart.

Above parameters can, of course, be modified in accordance with the machine Users specific experience in the field.

☞ **IMPORTANT**

BACK-FIRE RISK

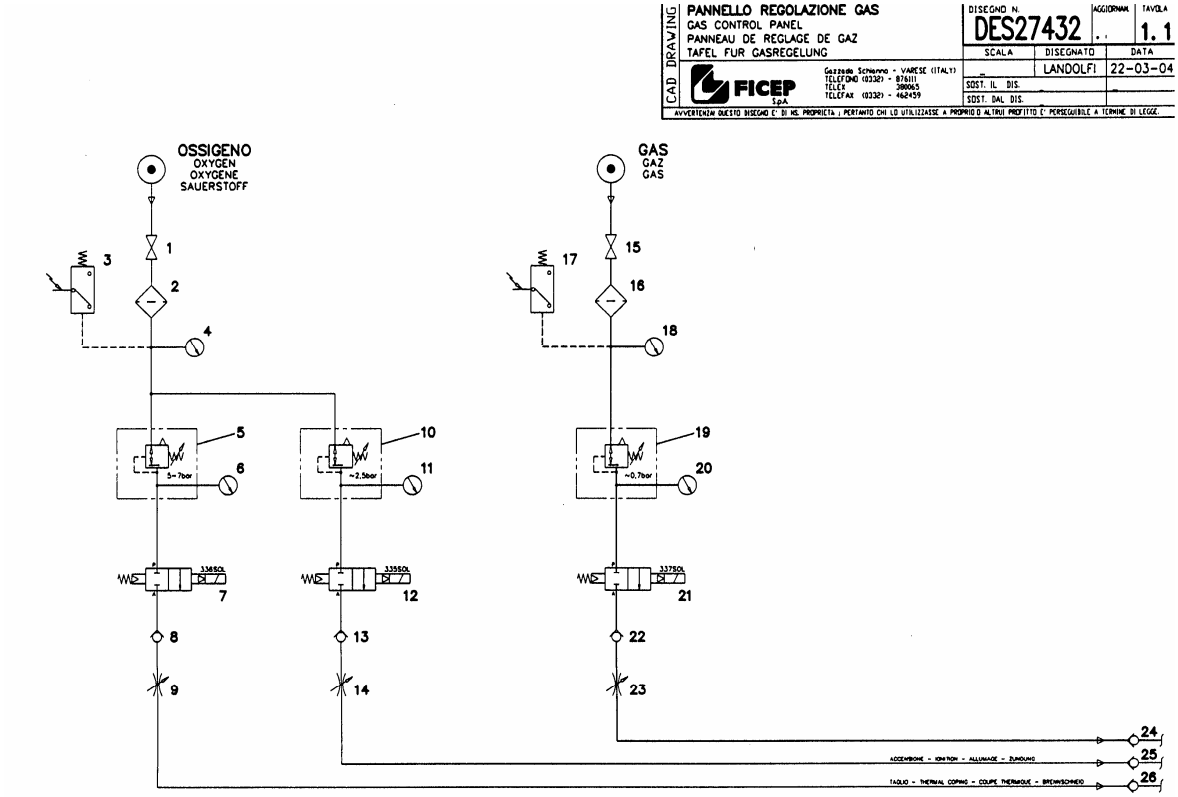
The acetylene torch is quite different from the propane one. Therefore it is necessary that Customer informs Ficep S.p.A. about the type of gas he intends to use.

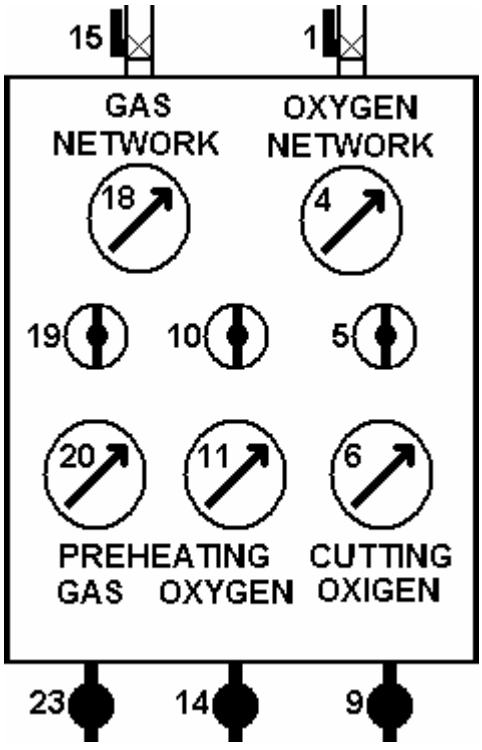
The acetylene torch supplied by Ficep S.p.A. (as an optional item) is of the "**low pressure**" type.

NOTE:

It is **NOT ALLOWED TO USE** acetylene torches of the "high pressure" type on our machinery, which performances in any case are less accurate than the low pressure ones.

5.4.2.3 Description and operation of the flame control panel (See DES.27432)





Pos.	Description
1	Ball type valve, oxygen closing on the entry line.
2	Filter on oxygen line.
3	Pressure switch on oxygen line.
4	Manometer for oxygen pressure switch rating.
5	Pressure reducing valve with relevant manometer (Position 6) to control the oxygen pressure during the cutting operation.
7	Solenoid valve to control the oxygen line for cutting.
8	Extinction valve on the oxygen cutting line. It ensures the maximum protection against backflow and it prevents possible fires thanks to a sintered filter incorporated.
9	Oxygen flame control valve during the cutting operation.
10	Pressure reducing valve with relevant manometer (Position 11) to control the oxygen pressure during the pre-heating operation.
12	Solenoid valve to control the oxygen line for pre-heating.
13	Extinction valve on the oxygen pre-heating line. It ensures the maximum protection against backflow and it prevents possible fires thanks to a sintered filter incorporated.
14	Oxygen flame control valve during the pre-heating operation.
15	Ball type valve and gas closing on the entry line.
16	Filter on gas line.
17	Pressure switch on gas line.
18	Manometer for gas pressure switch rating.
19	Pressure reducing valve with relevant manometer (Position 20) to control the gas pressure during the operation.
21	Solenoid valve to control the gas line.
22	Extinction valve on the gas line. It ensures the maximum protection against backflow and it prevents possible fires thanks to a sintered filter incorporated.
23	Gas flame control valve.

5.4.2.4 Flame ignition

Open the oxygen and gas cocks.

Open the cocks of the lines being used.

PREMISE:

The torch must be in DISENGAGED position which can be manually controlled by the stop cycle push button.

Flame ignition can take place in the following MODES:

AUTOMATIC

MANUAL

5.4.2.5 Automatic ignition

The program commands the axis torch in disengaged position

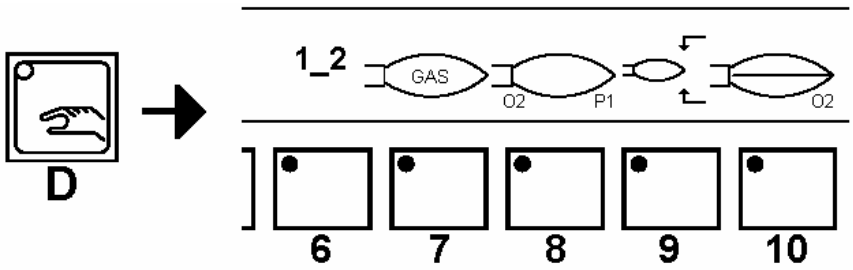
The program commands the flame ignition through the piezoelectric candle.

5.4.2.6 Manual ignition

First select from the CNC the executive MODE EC/ES and then act on the machine push button station:

PREMISE:

The torch must be in DISENGAGED position which can be manually controlled by the stop cycle push button.



a. Select the oxycutting torch pressing the push button (6). If there is one only oxycutting torch in the system, the push-button is not enabled.

b. Press the push button MANUAL (D) (ON = LED lighted)

c. Press the push button (7) for the GAS flow.

d. Press the push button (8/10) for the oxygen flow with the P1 and/or P2 line under pressure (It energizes the pre-heating and/or cut solenoid valves respectively).

e. Press the push button (9) to command the ignition with piezoelectric.

☞ **IMPORTANT**

The gas pressure control can be made only with the flame ignited.

(13) Oxygen Pressure regulators and the relevant reading manometer.

(19) Gas pressure regulators and the relevant reading manometer.

Normally the oxygen (cut) adjustment varies from 5 to 7 BAR; the gas adjustment pressure varies from 0.4 to 0.7 BAR.

The flame adjustment is made by acting on the control valve, i.e.:

OXYGEN LINE

CUT - CONTROL VALVE (9)

PRE-HEATING - CONTROL VALVE (14)

GAS LINE

CONTROL VALVE (23)

The best cutting results are achieved when the flame is SOFT and it does not whistle.

Furthermore, it should not be too hot (too much gas) as it would melt too much material during the preheating, nor too cold as the preheating time should be increased with cutting results not always acceptable.

A correct flame during the preheating must form a STAR when contacting the material, melt just a small quantity of material, and originate small sparks all around the part to be cut.

A good flame must have a beam shape, be even and smooth; the blue flame close to the nozzle must also be even and smooth.

5.4.2.7 Test of the oxy-cutting flame

When the flame is ignited, depress the push button (10), on the machine push button station to energize the solenoid valve, intervention of the cutting flame is conditioned by the consensus of the pressure gauges (3/17). The cutting flame must be shorter than the preheating flame but always even and smooth.

5.4.2.8 Flame extinction

In manual mode the flame extinction is obtained by pressing the stop push button which restores the gas and oxygen flow solenoid valves.

5.4.2.9 Inspections and regulations for a good cutting quality

The thermal cutting (torch) is based on the material preheating until it reaches its combustion temperature and then fast burns it by means of an oxygen jet (cut).

This does basically involve a chemical process. In fact, it originates a chemical reaction among the oxygen and the ferrous materials when heated at a temperature ranging between 760 and 870° C. Only the metal which is in direct contact with the oxygen jet is "CUT".

The "cut" so produced consists of two parallel and evenly smooth walls/surfaces. When the various parameters in the cutting process are not set in the BEST MODE, the results achieved are sometime unsatisfactory.

We are showing here below a few examples of cut performed CORRECTLY and INCORRECTLY, as well as the comments on the results obtained.

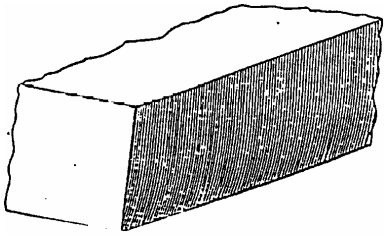


Figure 1 shows a CORRECT cut. The cutting area is orthogonal and the marks are normal, even and almost vertical. This result is VERY GOOD; the cut surface does not require any further process. Cut obtained under the BEST WORKING PARAMETERS.

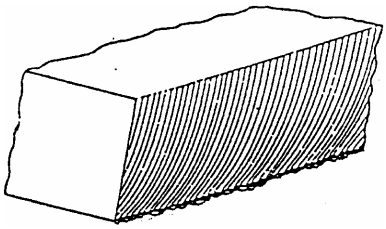


Figure 2 shows a cut performed at a too high speed. This is evidenced by the marks degree on the cut surface.

The cut surface looks smooth but also undulated. It needs minor maintenance before the next working operations are performed.

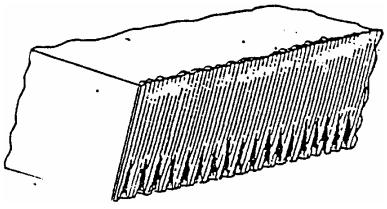


Figure 3 shows a cut performed at a too slow working speed. This has caused melted scraps to stick resulting at the end of the cut into slots = uneven surface.

The cut cannot be accepted and needs further operations.

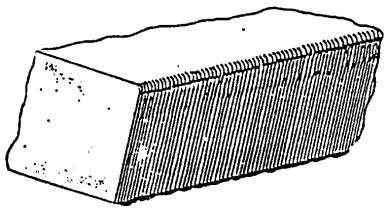


Figure 4 shows a cut performed with the torch positioned too far from the plate. In fact, an excessive melting was produced when the flame entered the material. Furthermore, a thin layer of slag can be seen up to approx half the cut, some scales can also be evident at the exit of the cut itself. Scales must be removed before the next processes are performed.

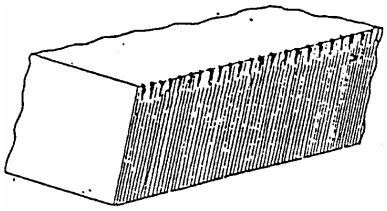


Figure 5 shows a cut performed with the torch positioned too near to the plate. A portion of the preheating flame cone has melted the inside of the upper cutting portion. The cut presents a rough surface, with small grooves and bags along approx a quarter of its length. The cutting result is unacceptable, it needs further operations.

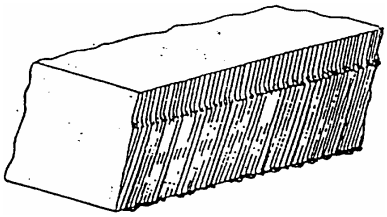


Figure 6 shows a cut with an excessive gas pressure. A too high oxygen pressure prevents the gas to exit the torch originating an excessive turbulence with the result that the cut obtained is distorted and undersized.

A further operation is required.

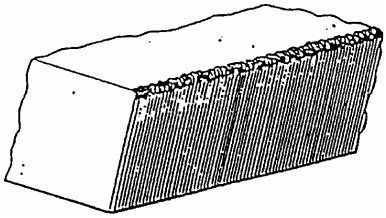


Figure 7 shows a cut performed with a too hot preheating flame. The top portion of the cut is melted and small metal particles are stuck on the edge.

A further operation is required.

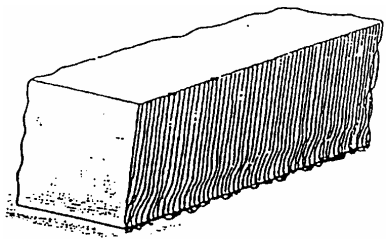


Figure 8 shows a cut performed with a dirty nozzle. The cutting flow looses its force and the result is an irregular surface.

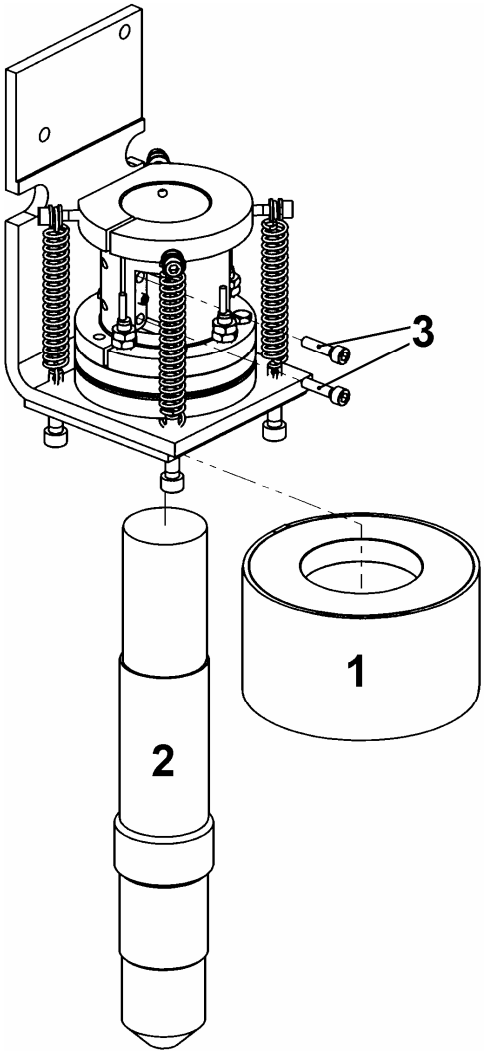
A further operation is required.

5.4.3 Plasma torch extraction (option)

Turn the machine in SET-UP condition.

To take away the torch you have to proceed as follow:

- Extract and remove the protection anti-flash (1).
- Release the torch (2) acting on the locking screws (3).
- Extract the torch.



ATTENTION

For torch preparation and further information please refer to the attached Hypertherm manual.

5.4.4 In-feed Transfer Table with Catches SETUP (option)

The in-feed transfer table does not need of any particular adjustment.

5.4.5 Marking Unit SET-UP (option)

The marking force regulation happens changing the marking time (CNC parameters).

We suggest you to perform a manual marking cycle from the control board to verify if the marking deep is correct.

5.4.5.1 Marking characters replacement

- Loosen the characters locking dowel and remove the characters.
- Fit the new characters and tighten the dowel again.

5.4.6 Drilling Unit setup

The drilling machine does not need of any particular adjustment.

Adjustments, referred to the drilling head stroke and feed-rate, are CNC controlled.

The different spindle rotation speeds are given by an A.C. motor connected to an Inverter drive.

5.4.6.1 Adjustment of the spindle advance speed

Three spindle speeds are normally selected during a drilling cycle:

- Rapid advance (AR)
- Feed Rate (AL)
- Rapid Return (RR)

On special applications and especially when jogging or intermittent advance is involved, the spindle speeds may have different characteristics.

Change from one speed to another is determined, during a normal cycle, by the electronic adaptive device.

The above device enables to automatically change from rapid advance to drilling speed (feed-rate) as the drill contacts the material and then change to rapid return as the drill has completed the hole drilling operation.

With this electronic adaptive device the limit switches and therefore their adjustment are no longer required.

The preset rapid advance and return do not normally require any adjustment by the operator.

The feed rate can be adjusted by CNC.

5.4.7 Drilling tool change device (optional)

Tool selection and tool entry and exit operations are automatically CNC controlled (refer to programming chapter).

5.4.8 Plasma cutting unit setup (options)

The plasma cutting system does not need of any particular adjustment.

The vertical and traverse positioning is controlled by the axes of the CNC.

For further information, please refer to Hypertherm instruction manual.

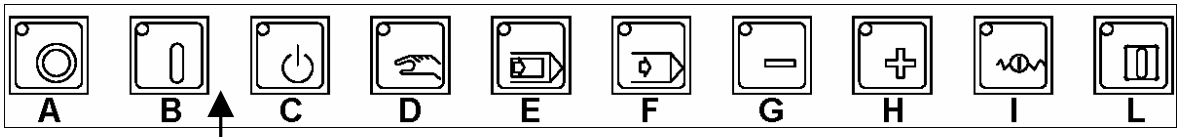
☞ **IMPORTANT!!**

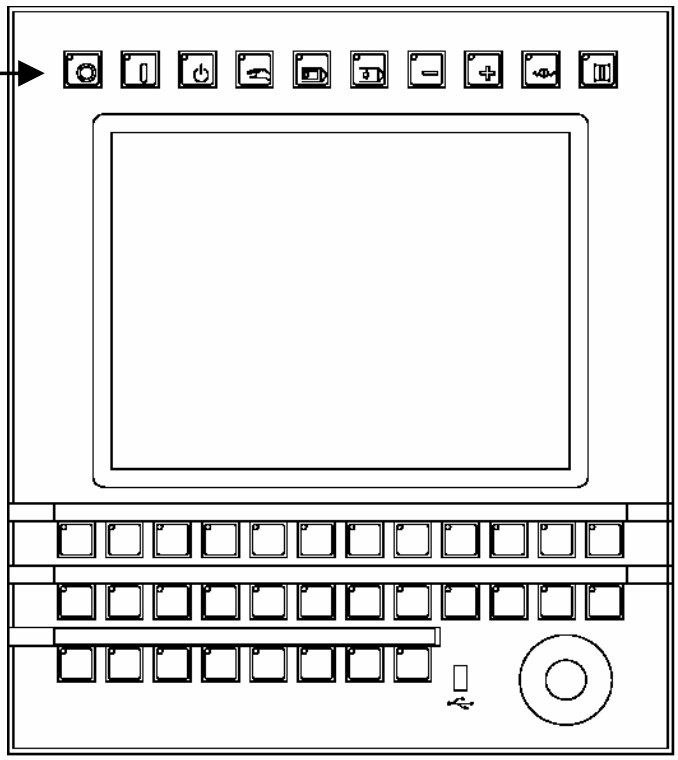
The best performance of the entire system is obtained by correctly performing all the operations and the setup sequences. The operator must be well trained and thoroughly familiar with the machine and its operations. It is also a MUST that all moving parts be cleaned and lubricated.

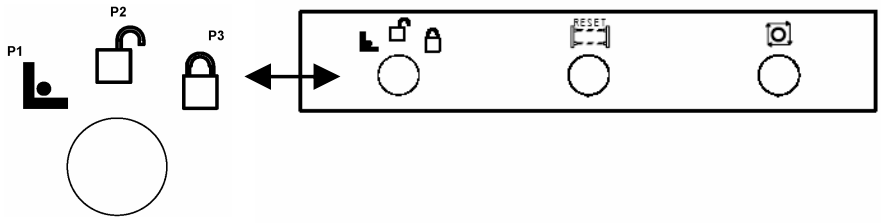
6 • CONTROLS DESCRIPTION

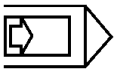
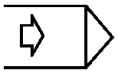
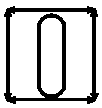
6.1 Control panel

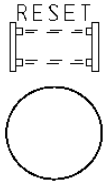
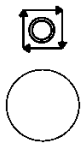
6.1.1 Main push button station



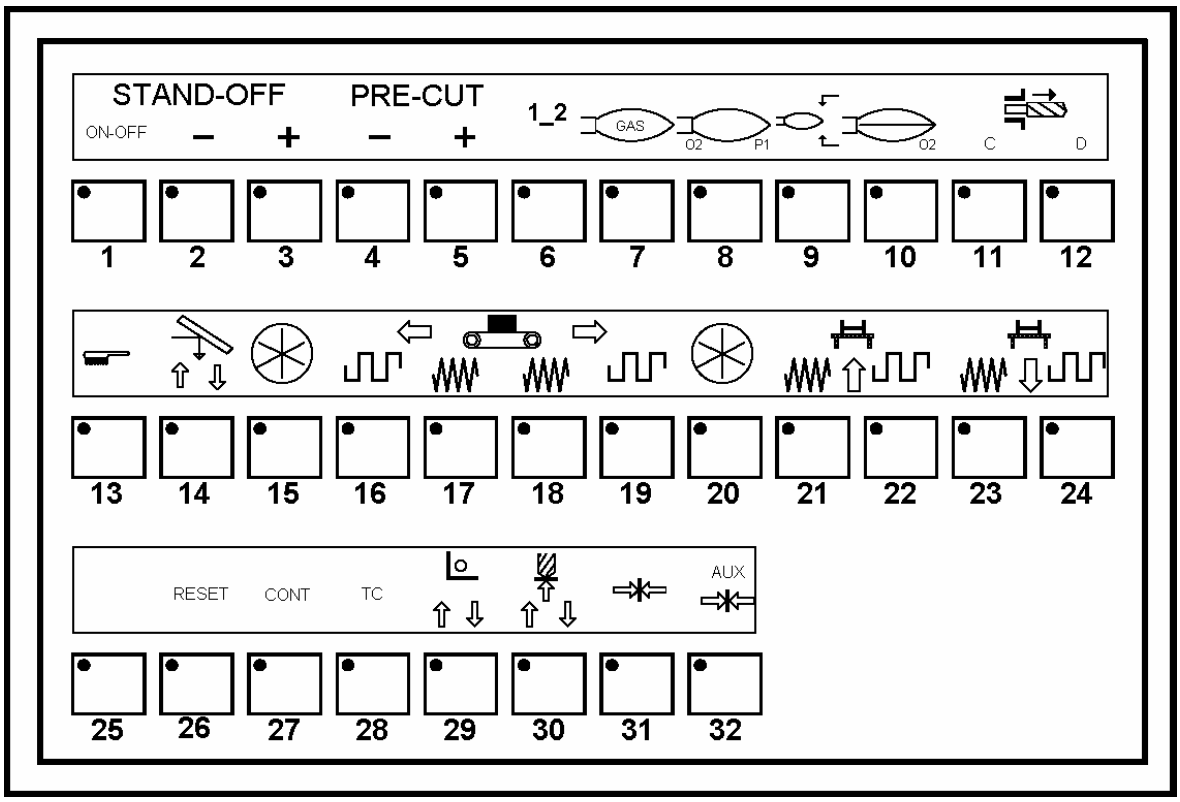


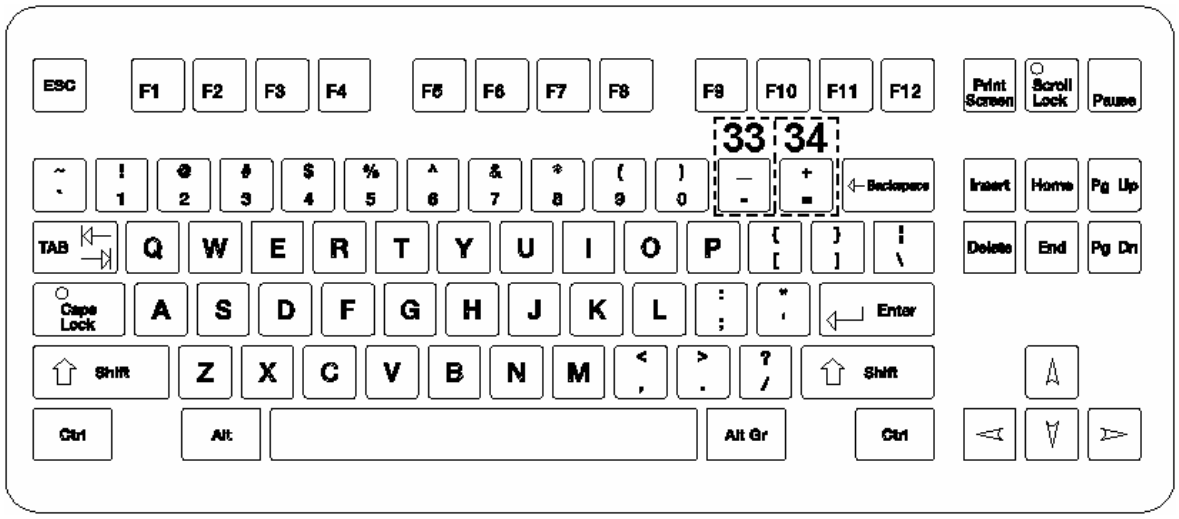


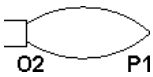
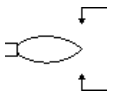
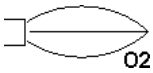
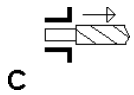
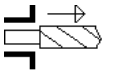
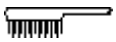
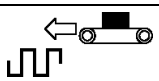
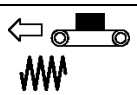
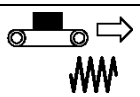
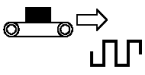
Ref.	Image	Description
A		STOP: machine switch off.
B		START-UP: machine start-up.
C		STAND BY: It enables to close down the command machine functions keeping motors and drives in tension and pneumatic and oleo-dynamic circuit in pressure.
D		MANUAL: it enables the manual command execution after selecting the JOG mode and the axis to move.
E		SINGLE EXECUTION: It enables to execute one program line at a time.
F		CONTINUOUS EXECUTION: It enables to execute the program in continuous.
G		- : It enables to move the axis in a direction if JOG mode is activated.
H		+ : It enables to move the axis in a direction if JOG mode is activated.
I		HOLD: It stops the movement at the end of the axis command and if the machine is cutting switches the torch off.
L		START: It starts the cycle, only if you have pushed E or F button before.
KEY P1		Set-up position. It forces the machine into set-up mode. The passing through of the photoelectric barrier (if present) causes the same effect. The set-up mode is similar to the standby mode but it is safer because it is not possible to go into the execution mode acting on the CNC control station without a voluntary act from operator: either the photoelectric barrier reset or the return of the key type selector switch to position 2. Furthermore in the set-up mode, besides the software safeties, the machine is interlocked even from the electric point of view and a fault of the CNC cannot cause the unexpected movement of an axis.

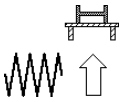
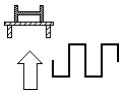
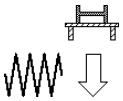
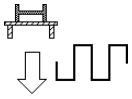
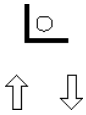
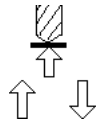
Ref.	Image	Description
KEY P2		Position of operation mode unlocked. No restriction is given to keyboard push-buttons operation.
KEY P3		Position of operative mode locked. In this position the machine stays in the operation mode previously selected. It is possible to go into “safer” modes or states, for example: from the automatic execution mode to the standby mode pressing the standby push-button.
PHOTOELECTRIC BARRIER RESET ILLUMINATED BLUE PUSH-BUTTON (if present)		It is placed on the control panel and is used to reset the safety device for photoelectric barrier control; it causes the passage from the set-up mode to standby mode.
END CYCLE		The activation causes the fast return and rotation stop of the operating spindle.
EMERGENCY STOP PUSH-BUTTON WITH MECHANICAL RESET		It is always active in all machine states or modes and in whichever of their phases. It causes the safe stop of all the machine movements and of the hydraulic power pack; all the CNC outputs are set to zero. The machine is set in the state of machine standstill after an emergency stop (this is the same state in which stays the machine at power up). The difference between the auxiliaries off state and this one is that the servomotors drives are not fed (supply side) and to restore operations it is necessary to reset the safety module for the emergency stop pressing the relevant push-button.
EMERGENCY RESET ILLUMINATED BLUE PUSH-BUTTON		It is placed on the electrical cabinet and resets the auxiliaries off state after an emergency stop or at the first power up.

6.2 Auxiliary push button station and alphanumeric keyboard

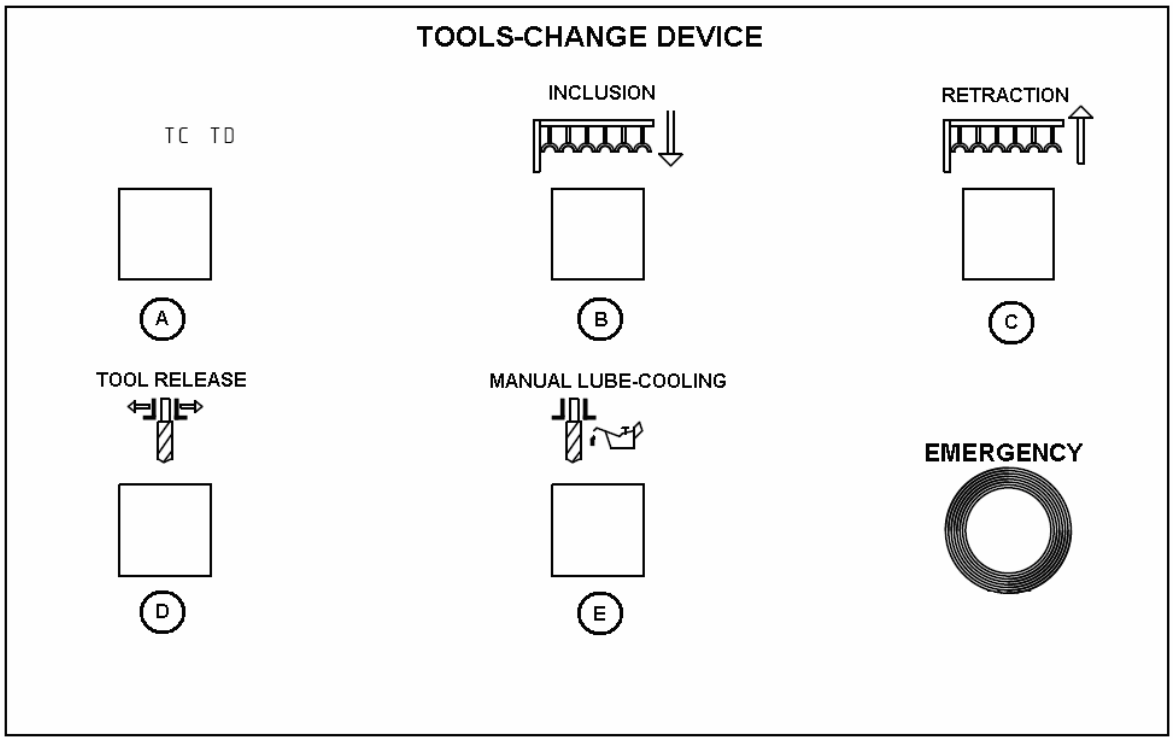




Num.	Image	Description
1	STAND - OFF ON-OFF	It deactivates the control of the plasma arc tension.
2	STAND - OFF −	It commands the manual downstroke of the oxycutting torch during cutting.
3	STAND - OFF +	It commands the manual upstroke of the oxycutting torch during cutting.
4	PRE - CUT −	It decreases the oxycutting pre-heating time.
5	PRE - CUT +	It increases the oxycutting pre-heating time.
6	1 _ 2	It selects the oxycutting torch.
7		It starts the gas flow.
8		It starts the pre-heating oxygen flow.
9		It lights the piezoelectric.
10		It starts the cut oxygen flow.
11		It stores the C drilling tool into the tool-change device of the C drilling unit.
12		It stores the D drilling tool into the tool-change device of the D drilling unit.
13		It makes the manual brush rotate and downstroke.
14		It opens/closes the tilting device to unload the processed pieces. ON = device in high position (closed).
15		Push button for transfer tables reservation.
16		Push button for fast forward of roller way.
17		Push button for slow forward of roller way.
18		Push button for slow backward of roller way.
19		Push button for fast backward of roller way.

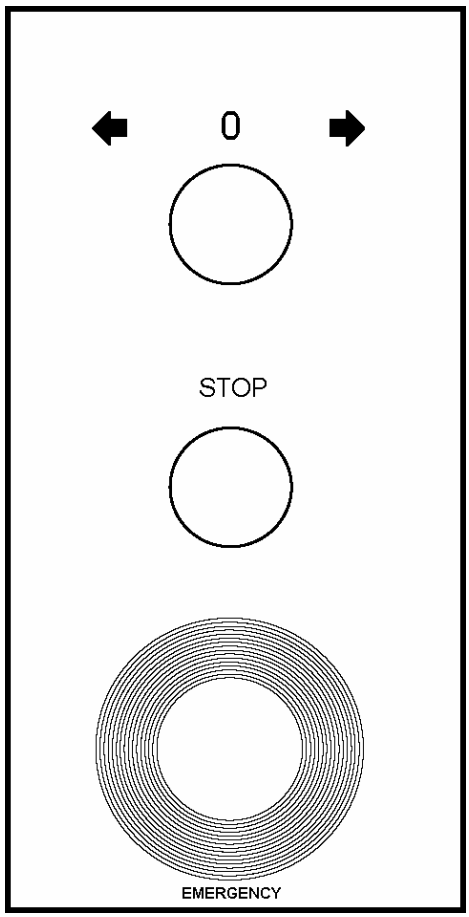
Num.	Image	Description
20		Push button for transfer tables reservation.
21		Push button for slow forward of transfer table with catches.
22		Push button for fast forward of transfer table with catches.
23		Push button for slow backward of transfer table with catches.
24		Push button for fast backward of transfer table catches.
25		Not used.
26	RESET	RESET: It enables to restart the program execution after eliminating any alarm cause.
27	CONT	CONT: It enables to restart after a programmed stop or to continue even if there is alarm not dangerous for machine functioning and safety.
28	TC	TC: Not used.
29		It makes the zero reference upstroke/downstroke for the plate loading.
30		It makes the drilling counteracting device upstroke or downstroke.
31		It opens/closes the pincher of the carriage.
32	AUX 	It opens/closes the pincher of the cart.
33		Decrease the axis speed. Incremental values program.
34		Increase the axis speed. Incremental values program.

6.2.1 Auxiliary push button station for the drilling tools change device (option)



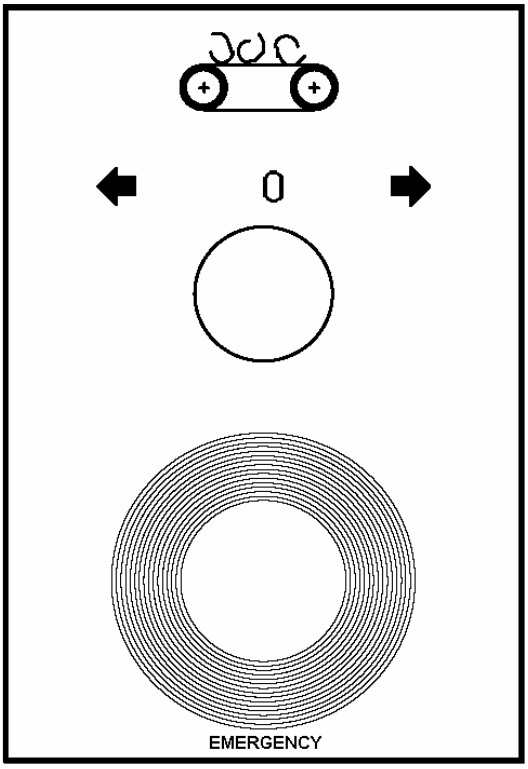
Ref.	Description
A	Selection of the C/D drilling tool change device.
B	Tool change device inclusion.
C	Tool change device exclusion.
D	Tool releasing.
E	Manual lube-cooling.

6.2.2 Auxiliary push button station for short pieces conveyor (options)



Ref.	Description
←	Conveyor anticlockwise rotation.
0	Conveyor not running.
→	Conveyor clockwise rotation.
STOP	Stop of short pieces unloading

6.2.3 Auxiliary push button station for conveyors (options)



Ref.	Description
←	Conveyor anticlockwise rotation.
0	Conveyor not running.
→	Conveyor clockwise rotation.

7 • MAINTENANCE

7.1 Hydraulic system SETUP

A good, safe and economical operation of the Hydraulic System is very much dependent upon the fluid quality used.

The fluid does not only meet the purpose of correctly transmitting the energy (pressure) but it is also responsible for a fool-proof lubrication of all moving parts, located inside the hydraulic components, under any operational and load conditions.

A good quality fluid should not affect the packings nor should it produce any foam formation.

It must also be age-resistant; have an adequate anti-corrosive factor and easily withstand the viscosity variations under different temperatures.

Generally, the best worldwide known fluids for Hydraulic Systems are the MINERAL OILS which are available under the denomination of "HYDRAULIC OILS".

The fluid recommended by us is the HYDRUS 32 produced by I.P. or equivalent oils, as per table in the next page.

7.1.1 Chart listing types and qualities of oil equivalent

DENOMINATION	PRODUCED BY
OSO 32	AGIP
API - CIS 32	API
ENERGOL HLPZ32	B.P.
HYSPINA WS32	CASTROL
MECHANIS MLSP32	CHEVRON
ELFOLNA 32	ELF
NUTOH 32	ESSO
HYDRAN 32	FINA
MOBIL DTE24	MOBIL
HAYDN 32	Q8
TELLUS OIL 32	SHELL
AZOLLAZ S32	TOTAL

7.1.2 How to select the hydraulic oil

At this stage, it is quite clear that the utmost importance is attached to the type of oil to be used in any hydraulic system and to its inspection at regular intervals.

This is the reason why we have given you, in the previous page a list of hydraulic oils equivalent to the fluids recommended and used by ourselves.

7.1.3 How to fill up the reservoir

After you have made sure that the oil you have available does strictly comply with our recommendations and that possible water infiltration did not deteriorated it, clean all the oil inlets and nozzles accurately.

Pour the oil into the reservoir through a pump with filter at 50 μm.

Fill the reservoir till the max level and write down the type of oil and date of filling.

Never add oils of different type and quality. In the event you intend to change the type and quality of oil, make sure to drain off all the oil from the system.

7.1.4 Hydraulic oil replacement

Make sure to comply with all the suggestions and recommendations given by us: inspect thoroughly the reservoir and keep the oil at the max level, and however replace ALL the oil in the system every 2000 hours of operations.

7.1.5 Maintenance to be performed during oil replacement

After all the oil is removed from the reservoir and from the hydraulic system, it is recommended to:

- Thoroughly clean the reservoir and remove all the sediments that may have accumulated within the same.
- Remove the suction filter located inside the reservoir and the one outside the hydraulic power unit if any; clean them thoroughly or replace them, if necessary.
- Inspect the air filter in the filling tap; it must be absolutely clean and the net or wire gauze must be in perfect working condition so that to obviate the possibility for foreign particles to get into the reservoir.

We suggest filtering the oil, either when a partial or total filling is required, especially in the event of previously opened cans.

7.1.6 How to bleed the air from the circuit

Before starting-up the machine, bleed all the air that might have entered the circuit and make sure that there is no leaking from the serviced points.

Open all the bleeding taps and valves, if any, or loosen all the couplings and fittings provided at the top of the system.

If you observe that there is no more foam into the reservoir that there is no abnormal noise in the system and that the working units pistons are operating efficiently and uniformly, you may rest assured that the air bleeding cycle is completed.

At this stage, pour the oil till reaching the max level.

An additional air bleeding cycle is required after the system has reached the max temperature, as air formation is produced by the rising temperature.

7.1.7 Filters and their maintenance

Suction, loading and line filters are very important items as they meet the twofold purpose of protecting the hydraulic components and of assuring their correct operation.

Except at the initial start-up phase, the immersed filter must be inspected every time you replace the oil whereas the external filters (if any) must be inspected once every month.

7.1.8 Pumps

The hydraulic pumps are the most vital parts of the hydraulic system.

This is the reason why we attach special importance to these components.

During the system start-up cycle, it is strongly recommended to perform the following checks:

- The hydraulic oil must comply strictly with our recommendations.
- Suction taps are opened.
- Filters are perfectly clean.
- Oil temperature is not below 10 °C.
- The system is in discharging condition, if so required.
- Motor rotation direction is correct.

Should any of the above conditions fail to exist; the oil will be prevented from circulating, especially during the initial start-up, as the lubrication is taken care of by the hydraulic fluid.

You may, in this case, face with bad jammings, resulting into damage to the pump.

If this will be the case, force the hydraulic fluid (the same fluid as used in the circuit) into the pump frame and manually rotate the pump for a few revolutions. At this stage, start the motor by jogging so as to prevent that it exceeds the half of the expected speed; check the pump priming.

When this condition exists, bring the motor to the full speed.

7.1.9 Adjustment of the safety valve

The safety valve, referred to as relief valve as well, is a very important item in the hydraulic system. Its adjustment is carried out during the test.

In fact, it is capable to release the entire pump load thus insuring a safe and trouble-free operation of the system.

7.1.10 Inspections to be carried out during the first hours of operation

Check the oil level with the utmost care and make sure there is no leakage.

Check the fluid temperature: it must not exceed 45° to 50° C.

After the first 50 hours of operation, check the filters cartridges.

After the first 100 hours of operation, check the oil and make sure it is water-free and that no alterations occurred to the oil due to aging or oxidation.

7.1.11 Oil maintenance

All the checks and inspections indicated in the preceding pages must be repeated at regular intervals (normally once every two months).

The inspection of the temperature may indicate deterioration and alteration conditions.

In fact, the temperature should never exceed 50°C, for if so the system can be badly damaged.

Inspect the oil level as often as possible; replace the oil after 1800 to 2000 hours of operation.

Inspect the filters clogging indicators weekly and the lubrication of all moving parts.

7.2 Short break of the system

No special attention is required when the system is left inoperative for a short period of time, normally shorter than two months.

7.3 Long break of the system

When the system is left inoperative for a long period of time, make sure to operate it at regular intervals, for a few minutes, to provide an adequate lubrication to all the system components.

If this operation does not result into a proper lubrication of the components and if the break has been very long, we suggest draining off the hydraulic oil and replacing it with an anti-corrosive fluid.

The cylinders rods should be completely retracted, otherwise apply anti-corrosive products on them.

7.4 Re-start

We recommend bleeding the air after a short break.

However, if the break has been long, the system must be thoroughly cleaned outside; before re-starting the system with the old fluid, make sure to inspect it; replace it if it has deteriorated or altered.

In any case, check the oil level in the reservoir.

If the system has been filled up with anti-corrosive oil, have it circulate at low pressure by operating the cylinders.

Afterwards, clean the reservoir again, replace the filters and restart the system with the new hydraulic oil. Make sure to comply with all the suggestions and recommendations given by us for new hydraulic systems.

7.5 Overhaul

After the system has been in operation for a certain period of time, it is essential to perform a complete overhaul of the pumps and the motors.

The overhaul must be carried out as often as recommended by the hydraulic system manufacturers or based on the user's direct experience, depending upon the operational conditions.

In any case, it is desirable to replace the packing and rings.

We suggest holding spare motors, pumps, cylinders and valves all the times.

The last recommendation to follow, when in maintenance operations, is the one to disconnect often the threaded or flanged connections which compose the hydraulic system.

When threads are involved it is suggested to apply a good product not oil-soluble before their reconnection.

7.5.1 Flanges, piping and fittings connection

As previously recommended, make sure to use well known products only such as TEFLON or LOCTITE, which must be applied to the external threads only; some threads, at the end of these pipes or fittings, must be left clean to prevent that the product gets into the piping during the reconnection cycle and therefore into the system, resulting into malfunctions of the hydraulic system components.

In the event of flange type connection, make sure that the O-RING is perfectly fitted into its seat and, if replaced, is identical to the previous one.

We suggest cleaning accurately the packings, rings and their seats before refitting the packings.

7.6 Suggestions in the event of malfunctions

Normally, the sources of malfunctions can be removed by a skilled operator who, in the majority of the cases, is able to restore the system perfect conditions without the use of special tooling; in fact, the malfunction diagnosis is detected and signalled by the system itself.

7.6.1 Visual inspection

We strongly recommend to visually inspecting the hydraulic system at regular intervals to prevent possible malfunctions.

Look for signs of leakage: for wet parts or pipes, for oil spots and low oil level in the tank.

Check the oil level in the reservoir at regular intervals and inspect the fluid condition.

Should the oil look milky it means that it is water or air saturated.

If so, a malfunction will soon occur to the system.

Continue the visual inspection by checking the piping, where the oil and that flows, and the flexibles and make sure these are not worn out their seal is in efficient condition.

Look for bent or crushed pipes; in fact, bottlenecks will produce restrictions for the oil flow with consequent damage to the pump, when a pump fed pipe is involved.

7.6.2 Sound inspection

It is extremely important to listen to the sounds and noises produced by the system when in operation and separate the normal sounds from the abnormal ones.

The normal sounds are smooth whereas the abnormal ones are dry and striking.

Locate the source of these sounds and remove it by operating the devices or components originating the hits and strikes.

7.6.3 Inspection of the oil temperature

Normally, the oil temperature does not exceed 45° C. At this temperature, every part or component of the hydraulic system is well operating.

If there is a part or component which exceeds the above temperature inspect it by means of a thermometer. Should the temperature be around 60° C locate the source of the temperature rise immediately; do not overlook to consider the ambient temperature.

If the system is supplied with heat-exchanger, inspect it right away and make sure of its perfect and efficient operation and performance.

The inoperation of the heat-exchangers can be originated by a problemed thermostat; if the heat-exchanger is of the air/oil type its inoperation is produced by the inoperation of the fan whereas if it is of water/oil type the problem is originated by the closing of the water circulating solenoid valve or by lack of water.

If the heat exchangers are operative, check the line valve.

In fact, this valve is provided to set the oil, which is pumped but not used, in free discharging condition.

If this valve does not operate and remains closed, the oil not used by the system is discharged by the relief valve at the max pressure and not in free discharging condition.

If this problem should occur, the oil will overheat rapidly.

7.6.4 Conclusions

Should any of the malfunctions described in the preceding pages occur, make sure to service the system immediately or contact FICEP's service people.

Within the following pages we are giving you a list of suggestions and recommendations so that to assist you in getting familiar with your machine and service and maintain it promptly.

7.6.5 Excessive noise

From the drive:

- Incorrect alignment between motor and pump.
- Couplings not sufficiently tightened.
- Problemed motor.

From the pump:

- Insufficient suction due to clogged filters or closed taps.
- Motor rotation speed too high.
- Excessive pressure.
- Pump seal packing broken or damaged.
- Incorrect rotation direction.
- Air in the inlet line due to oil level too low in the reservoir.

From the piping:

- Fittings insufficiently tightened.
- Air in the circuit.

From the solenoid valves:

- Excessive clearance (due to wear) between cursor and seat.
- Electromagnet weak due to voltage drops or damaged electromagnet.

From the motor:

- Mechanical vibrations due to wear or damages.
- Misalignment with the pump.
- Motor poorly secured to the base.

From the reservoir:

- Oil level too low.
- Accumulation of foam due to malfunctions in the system.

7.6.6 Weak pressure in the system

The insufficient suction is due to clogged filters, possible obstructions in the pipes or excessive viscosity of the oil.

Safety valves held open by impurity, damages or wear.

Defective pilot circuitry or problemed relief valves (adjusting pins or their seats scored/jammed).

Excessive leakage due to oil viscosity too low caused by an excessive temperature in the system.

7.6.7 Overheating

Of the pump:

- ❖ Worn or damaged bearings.
- ❖ Oil viscosity too low.
- ❖ Continuous leakage from a relief valve.

Of the hydraulic oil:

- ❖ Excessive pressure in the system due to loss of adjustment of the relief valve.
- ❖ Heat exchanger motor problemed.
- ❖ Heat exchanger damaged or clogged; the oil does therefore by-pass through the safety valve.

7.6.8 Water hammering in the circuit piping

- ❖ Directional valves operating too fast.
- ❖ Pipes and flexibles incorrectly secured.

7.6.9 Activation of the thermal relays protecting the hydraulic power unit motor

- ❖ Supply line voltage incorrect or fluctuating.
- ❖ Motor started with pump under load, high pressure solenoid valve energized or jammed.
- ❖ High Pressure cycle lasting too long.

7.6.10 Low or nil delivery

- Low power of the motor due to wear or voltage drops.
- Insufficient suction due to:

Excessive viscosity.

Closed taps.

Obstructed piping.

Clogged filters.

- Pump orifices misconnected, pump rotating to incorrect direction, broken spring in the safety valve.
- Insufficient adjustment of delivery.

7.6.11 Insufficient speed of the working units

- Delivery limiter too tight.
- Pump inoperative.
- Leakage from piston rings or jammed pistons.
- Working cycles set too close.

7.6.12 Pressure and delivery fluctuations

- Air in the circuit (bleed the air).
- Delivery adjusting valve set too high (higher than necessary).
- Safety valve unsteady.

7.7 Pneumatic system

The pneumatic system is of extremely simple design.

Nevertheless, your attention is called to a few fundamentals.

The supply line must be large enough to insure the system max efficiency, especially when the air compressor is located far away from the machine.

The environmental conditions are responsible for a fool-proof operation and performance of the pneumatic system.

Make sure to be thoroughly familiar with your pneumatic system, with the operation of its components and with the compulsory adjustments and servicing sequences.

7.7.1 Supply line

The shop compressed air must reach the pneumatic system inlet assembly, located on the power unit, free from water or condensate.

Should this condition fail to exist, the pneumatic components, such as solenoid valves, pressure adjusting valves, etc., will be heavily affected.

The inlet unit, located at the machine system entry side, consists of a filter, of a lubricator and of a pressure adjusting valve complete with a pressure gauge.

The purpose of the filter is to eliminate the water and the impurities existing in the pneumatic system, you are therefore required to check and clean the filter accurately at regular intervals.

The air must be dry and oil less.

The pressure adjusting valve is provided to keep the pressure at the preset rating.

Adjustment of this valve is attained by means of the adjusting screw provided underneath the adjusting valve itself.

The actual value of the pressure in the system is read on the pressure gauge.

Make sure to adjust the line pressure switch to pressure not lower than 6 bars; a lower pressure will result into incorrect operation of the system.

7.7.2 Maintenance of the pneumatic components

Normally, it is not required to remove the valves from their seats when servicing and maintaining the system.

The seal packings (O-RINGS) and the springs only may require to be replaced.

We suggest checking the energizing and locking units at regular intervals for wear.

7.7.3 Periodical cleaning operations

Foreign matters and sludge may accumulate into the valves internal ducts and holes, under specific working conditions, resulting into a slow and abnormal operation of the valves.

It is therefore recommended to clean the valves thoroughly at regular intervals.

The sludge accumulation in the F.R.L. filter is, sometimes, produced by problemed packings within the air compressor which allow the oil to get into the compression chamber.

A hot chamber may produce an alteration of the oil characteristics.

7.7.4 Solenoids

Keep the relays contacts absolutely clean.

Dirty contacts may originate problems in the power supply producing humidity and heat of the solenoid coating.

No problem is expected from the solenoids when operated under normal temperature and humidity.

An excessive humidity, condensate or heat into the solenoid cover may affect the coil operating life.

Special attention is required to prevent that the solenoid valves be subject to the above conditions.

If the ambient temperature exceeds 50° C or the humidity is too high, make sure to use appropriate solenoid valves.

7.7.5 Maintenance of the "FRL"

Remove the filtering element at regular intervals and wash it with Kerosene. After the washing, blow compressed air on it.

Keep the transparent cups perfectly clean to insure a visual check of same.

7.7.6 Suggestions

We are listing here below the most important fundamentals for a perfect and fool-proof operation of the system.

Keep the inlet FRL unit in the best operational condition.

Make sure to have a sufficiently large supply line available (at least as large as our coupling).

Comply with the minimum and maximum pressure values.

Comply with the minimum and maximum temperature values.

Remove any obstructions in the discharge or delivery lines.

7.7.7 Re-starting of the system after a period of inoperation

When the system is left inoperative for a certain time, some problems may be faced with when it is restarted.

In fact, impurities, condensate and other matters circulating into the system, may accumulate within the components affecting the proper operation and/or travel of the running parts.

Should the above condition occur, let the air flow into these parts thus cleaning them or alternatively remove the clogged elements, clean and refit them.

7.7.8 Lube-cooling of the drill (optional)

The machine is supplied with a device which distributes vaporised air/oil to the drill external or internal.

7.8 Routine maintenance interventions

A good and correct preventive maintenance and the correct lubrication will grant the good performance of the machine in the long term. Regular cleaning is one of the most important factors in a preventive maintenance.

In the following table are resumed the routine maintenance interventions to be scheduled on the line, according to the machine configuration.

Interventions frequency has been calculated in working days of system operation.

Code	Intervention description	**Frequency** (system working days)	**Notes**
	Cleaning		
P1	Calamine removal from the in-feed transfer table chains.	20	
P2	Cleaning of carriage/cart sliding guides.	20	
P3	Cleaning of pincher jaws.	2	
P4	Cleaning of: photocells, reflectors, proximity transducers, limit switches.	2	
P5	Cleaning of drilling chips and/or punching scraps, or oxycutting/plasma swarfs in the working unit area.	1	
P6	Cleaning of oxycutting/plasma dusts from the working unit area and from pincher/cart support.		
P7	Cleaning of plasma cutting swarfs from copper bars and from the unloading table. Manually remove swarfs from the top.	1	
P8	Cleaning of plasma cutting swarfs conveyor operator side by opening the covering case.	1	
P9	Empty bin collector for filter/suction system dusts.	1	
P10	Cleaning of drilling chips conveyor, punching scraps conveyor, thermal cutting swarfs conveyor and small pieces	20	

Code	Intervention description	Frequency (system working days)	Notes
	conveyor.		
P11	Clean all tools and parts of the machine.	1	
P12	Remove tools from drilling head/punching head before shutting down the machine.	1	
P13	Check and clean the area of automatic pieces unloading.	7	
P14	Thoroughly clean dust from the electrical components of the CNC, from the electric cabinet and from the plasma generator using a vacuum cleaner.	30	
P15	Thoroughly clean the heat-exchanger of the hydraulic power pack and of the thermal cutting generator by using a vacuum cleaner.	30	
	Lubrication		
L1	Lubrication of in-feed transfer table gearing chains.	30	
L2	Check of oil level in the in-feed transfer table gearbox (and topping up if necessary).	120	
L3	Manual lubrication (on appropriate points) of rolls conveyor in-feed transfer table.	60	
L4	Manual lubrication (on appropriate points) of the carriage guides.	120	
L5	Check lubricant level into the reservoir of the lubricating group for drilling tools.	1	
	Controls, tightening, adjustments		
C1	Check of oil level in the hydraulic power unit.	20	

Code	Intervention description	**Frequency** (system working days)	**Notes**
C2	Check of lubrication system integrity, grease arrival points and tightening of the inlet pipes.	120	
C3	Tightening control of cams, proximity transducers, limit switches, connectors, and terminals.	60	
C4	Control of pipes tightening and check of wear of flexibles on fluid systems.	60	
C5	Check deionised water level of plasma cutting system.	1	
C6	Check that the nozzle is perfectly locked on the thermal cutting torch and that it is perfectly fixed on its support.	1	
C7	Verify that there is no condensate in the cup of the pressure reduction regulator. In case there is, verify correct functioning of the dryer.	1	
C8	Inspect the machine in order to identify possible leaks (oil, air, water, gas) or damaged parts and, if necessary, ask for maintenance intervation.	1	
C9	Check that air filters of the electric cabinet and of the operator console are efficient.	1	
C10	Check that the conditioning units work properly and verify that the condensate exhaust pipe is not bridged and that it is well connected.	1	
C11	Check pressures and flow of plasma cutting gas.	7	
C12	Check belt tension of all conveyors.	7	

Code	Intervention description	Frequency (system working days)	Notes
C13	Check that the ground led of the plasma cutting system and its connections are ok.	30	

7.8.1 Lubricants

	Oil		Grease*
IP	MELLANA OIL 150	IP	ATHESIA GREASE EP 2
SHELL	OMALA OIL 150	SHELL	ALVANIA GREASE EP 2

* for the points to be greased

ATTENTION

The spindle does not need any lubrication intervention. The initial lubrication allows an average life of the grease and consequently of the roller bearings of about 15000 hours of functioning.

Nevertheless, if it is necessary to lubricate the roller bearings, we suggest to use a **specific grease** (ex. KLUBER NBU 15) which requires small quantities thus assuring a good lubrication.

7.9 Oxy-cutting unit maintenance

- All fittings, hoses and solenoid valves must be properly tightened to prevent a possible leakage of gas and / or oxygen.
- The feed pipes must be free from dangerous bottlenecks.
- Look for cut, crushed or burnt pipes that will produce restrictions in the flow thus preventing good quality cuts.
- Should the pipes be damaged NEVER repair them by using bonded joints, etc.
- NEVER use oil and grease as if they come into contact with the oxygen, they may originate fires, burnings, etc.

7.9.1 Cutting torch

We normally use the "HARRIS 198_2FT" torch.

It is recommended that the torch frame, the fitting and the solenoid valves be in the best operational conditions. Make sure that there is no gas leakage.

Should the torch be faulty, please return it to the manufacturer for the necessary repairs work.

7.9.2 Connections

Pipes must be free from crushing, burnings, cuts, bottlenecks etc. and all fittings be properly tightened.

7.9.3 Regulators

The regulators/gauges have the purpose to bring the gas pressure to the required value.

The oxygen and gas pressure delivered to the torch is shown by the manometer.

The manometer needle must indicate ZERO before the pressure is applied.

Faulty or incorrectly adjusted regulators prevent to achieve cuts of satisfactory quality.

Should the manometer needle remain blocked at a certain position or it is not able to detect the pressure setting, have it immediately repaired or replaced.

7.9.4 Nozzles

Please strictly comply with the Manufacturers instructions to ensure a correct use and a long life of the nozzle.

Thoroughly clean the nozzle at regular intervals to prevent its wear and do not fail to place it in the appropriate case after the use.

☞ **IMPORTANT:**

The cutting scraps bin has to be frequently verified and therefore it is necessary to empty and clean it to avoid possible deformation of the bin structure

7.10 Important information on the fumes intake and filtering system (option)

The dust collector is designed to collect fumes produced by Plasma- or Oxy- cutting when processing steel plates which are not zinc-plated and not pre-painted. It is not designed for applications with combustible materials (for example: aluminium, magnesium, zinc, and titanium dust; paper, wood or cigarettes) as a potential danger of fire and/or dust explosion risk is involved.

It is therefore necessary to keep the area around the dust collection system clean as well as the hood and collecting ducts, by inspecting daily no obstructions on grids or foreign materials or leaks of hydraulic fluid are noticed.

Compressed air used in back pressure for cartridges cleaning operations must be dry and oil free.

It is in any case necessary to comply with all the safety recommendations set out in the enclosed filtering system installation and maintenance instruction manual and to comply with all the relevant National and Local rules for Fire prevention and/or similar codes.

7.11 Plasma-cutting unit maintenance (option)

Please refer to the Hypertherm Instruction Manual.

8 • DISASSEMBLY

8.1 Precautions to be taken

- Put the machine in safety condition.
- Wear individual safety systems.
- Take off the system and others components electrical power supply (remove the fuses uphill of the electrical cabinet). Before open the electrical cabinet door wait some seconds to allow the capacitor discharge.
- Take off the pneumatic supply and discharge the residual pressure in the circuit.
- Take off the oleo-dynamic supply and discharge the residual pressure in the circuit.

ATTENTION

Make reference also to the chapter “Safety information”.

8.2 Machine disassembly

The disassembly of the components of the line has to be executed as follow (reference schema DES 29890), according to the actual machine configuration:

- Disassembly of all safety barriers of the system.
- Disassembly of the in-feed transfer table (ref. 1) according to the lifting instruction described in the “Equipment Handling Charts”.
- Disassembly of the in-feed and out-feed idle rolls elements (ref. 3) according to the lifting instruction described in the “Equipment Handling Charts”.
- Disassembly of the device to unload processed pieces (ref. 18) according to the lifting instruction described in the “Equipment Handling Charts”.
- Move the plasma cutting system generator (ref. 11-12) according to the lifting instruction described in the “Equipment Handling Charts”.
- Move the smoke intake system for thermal cutting unit (ref. 14) according to the lifting instruction described in the relevant attached manual.
- Move the electric cabinet (ref. 16) according to the lifting instruction described in the “Equipment Handling Charts” after having disconnected all the relevant cables.

- Disassembly of the swarf conveyor for the drilling unit (ref. 20) according to the lifting instruction described in the “Equipment Handling Charts”.
- Disassembly of the automatic conveyor for thermal cutting swarf (ref. 21) according to the lifting instruction described in the “Equipment Handling Charts”.
- Disassembly of the carriage supporting structure with carriage/pincher (ref. 2) according to the lifting instruction described in the “Equipment Handling Charts”.
- Disassembly of the cart supporting structure with cart/pincher (ref. 19) according to the lifting instruction described in the “Equipment Handling Charts”.
- Disassembly of the automatic conveyor for 500x500 mm pieces (ref. 22) according to the lifting instruction described in the “Equipment Handling Charts”.
- Disassembly of the fixed frame for drilling unit and first oxycutting torch (ref. 5) complete with drilling units (ref. 6/7), tool-change devices (ref. 8/9), marking unit with 38 positions (ref. 10), oxycutting torch optional (ref. 13), drilling swarf cleaning device with brush (ref. 4), CNC control unit (ref. 17) and Hydraulic power pack (ref. 15) according to the lifting instruction described in the “Equipment Handling Charts”.

☞ **IMPORTANT**

Make reference also to the paragraph “Scrapping”.