

NERTAMATIC Series

Plasma & TIG automated applications



LINCOLN[®]
ELECTRIC

PLASMA & TIG DC PROCESS

Applications

This installation meets the highest quality standards for welding and productivity for industries as diverse as boiler-making using stainless steels, aeronautics using precious metals, chemical engineering, energy production, transformation and transport as well as prefabrication of gas and petrol pipelines etc.

Multipurpose welding installation

NERTAMATIC series welding installation enables the following processes to be used in automatic applications:

- DC TIG with smooth or pulsed current.
- DC plasma with smooth or pulsed current.

Plasma arc: high temperatures, a concentrated beam, better productivity.

PLASMA

Temperature °K

- 4 000 to 10 000
- 10 000 to 16 000
- 16 000 to 24 000
- ≥ 24 000

1 - plasma gas
2 - plasma arc
3 - protection gas
4 - key hole effect

PLASMA ARC - 150 A - 28 V

- The arc spreads very little on leaving the strongly cooled nozzle.
- The 10 000 °K to 16 000 °K temperature zone is transferred to the workpiece in concentrated beam.

4775-002

TIG

Temperature °K

- 4 000 to 10 000
- 10 000 to 16 000

A - protection gas
B - the free arc

THE FREE ARC (TIG) - 150 A - 14 V

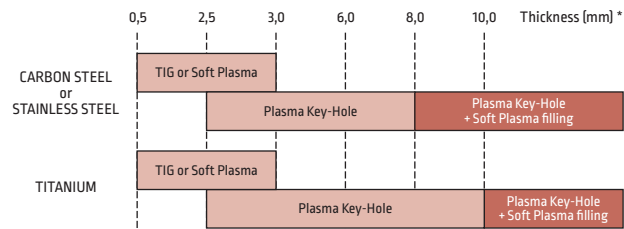
- The arc is conical in shape and a significant proportion of its energy is dissipated at its periphery.
- Also, the highest temperature zone is too close to the cathode and cannot be used.

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Plasma/TIG DC performance

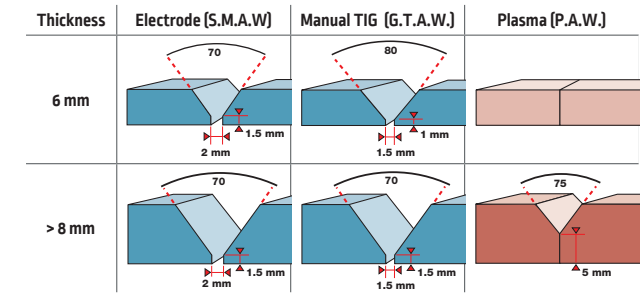
The Plasma process is the ideal extension of TIG for thicknesses greater than 3 mm. It ensures the same level of quality, higher performances and 100% penetration thanks to Key-Hole technology.

Single pass plasma Key hole performance



* Performance is reduced for vertical welding (2G & 3G) and small pipe diameter

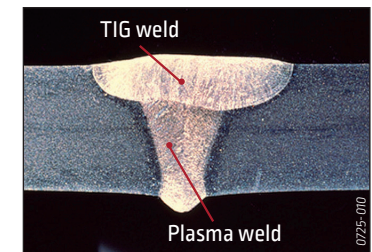
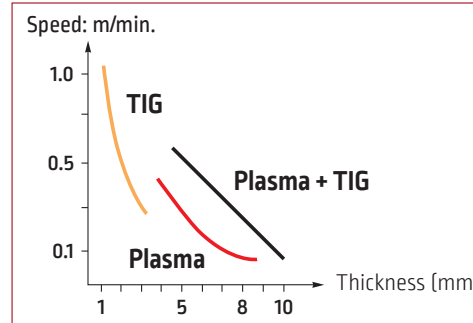
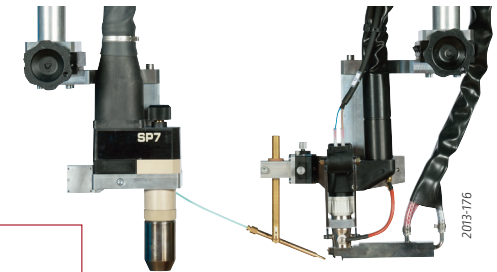
Preparation saving, stainless steel example



Improvement productivity with PLASMA + TIG Process

The Plasma + TIG process is specially designed for assembling panels for the prefabrication of vessels longer than 4 meters and carrying out circular welds for diameters greater than 2 meters. This process of using 2 torches in tandem gives a productivity gain of 30-50 % over a single-torch plasma installation.

The "plasma" arc penetrates the butt-jointed panels. The "TIG" arc equipped with filler metal, electromagnetic arc oscillation and a gas trailing shield produces a perfect surface finish which can often be left without any further treatment.



TIG AC PROCESS

Applications

This installation meets the highest quality standards for aluminium applications, industries as diverse as storage tanks, food industry, transport, structures and ship building.

Multipurpose welding installation

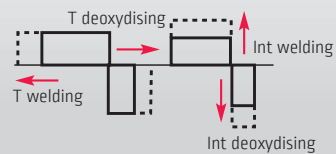
NERTAMATIC series welding installation enables with an AC module option to allow AC TIG variable polarity.

Variable AC TIG polarity

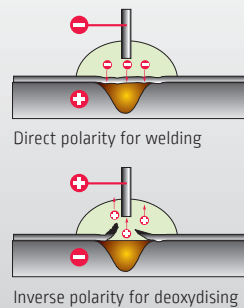
The flexibility of variable polarity lies in the total independence of the welding and deoxydising parameters. This means it is possible to optimise the welding and deoxydising phases independently.

This results in better control of the weld pool and better weld bead appearance. The alternations improve weld bead compactness as aluminium, and its alloys, are prone to inclusions (Al_2O_3) and blisters (H_2).

Variable polarity: parameter independence



Electronic deoxydising



DC TIG helium

This process can also be used to weld aluminium with the advantage that, for thicknesses up to 8 mm, it needs only one pass with no preparation.

Operations to be carried out:

- Mechanical oxide loger.
- Mechanical support using a backing bar is required for the weld pool.

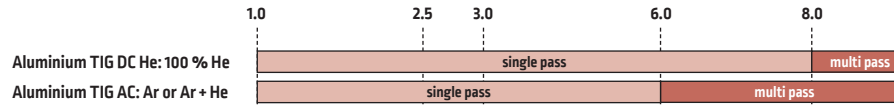
Current application:

longitudinal on seamer bench.

Aluminium TIG performance

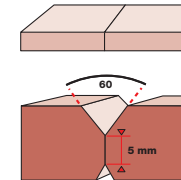
Single pass TIG performance

Maximum thickness which can be welded, flat* with butt-jointed surfaces, in one pass with 100 % penetration:



* Performance is reduced for vertical welding (2G & 3G) limits according aluminium nuances.

Preparation



Variable AC TIG polarity, weld bead comparison

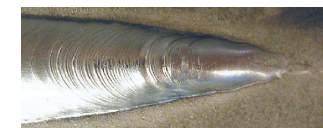
Pulsed at low frequency



Smooth weld



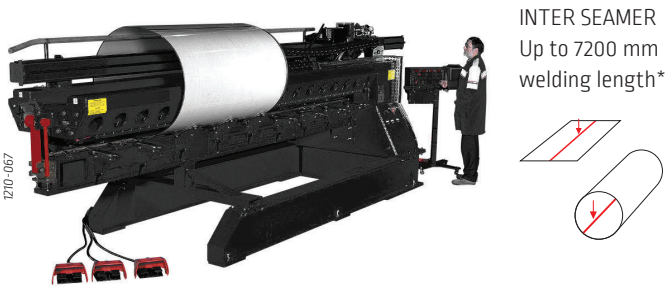
Excellent weld finishing



BOILER MAKER typical solutions

Manufacture of all types of product, transforming the metal sheet, performing longitudinal and circular welding for the petrochemical, agriculture/food processing, aeronautical industries etc.

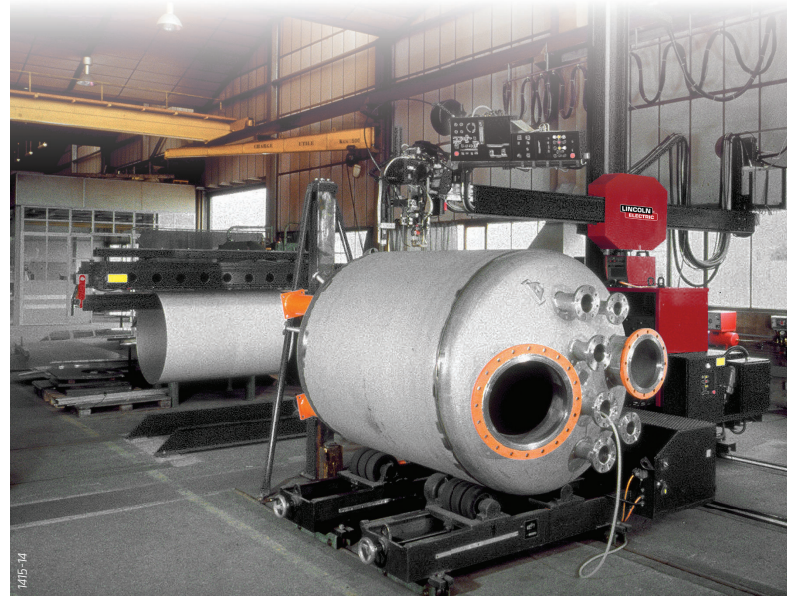
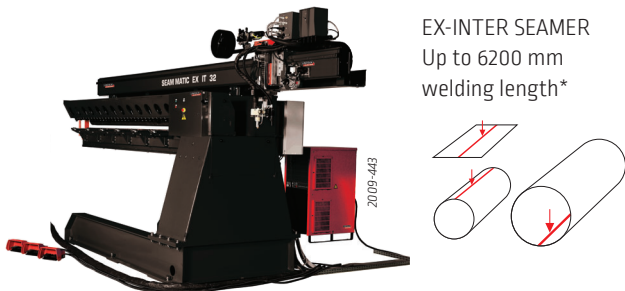
Longitudinal welding on seamer bench up to 10 mm thickness



**EXTER SEAMER
Up to 4200 mm welding length***



**EX-INTER SEAMER
Up to 6200 mm welding length***



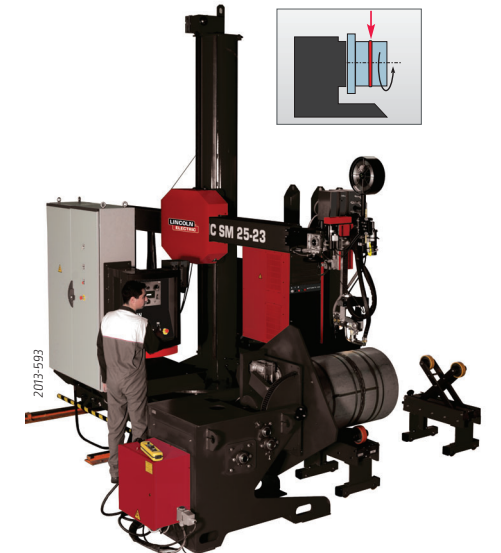
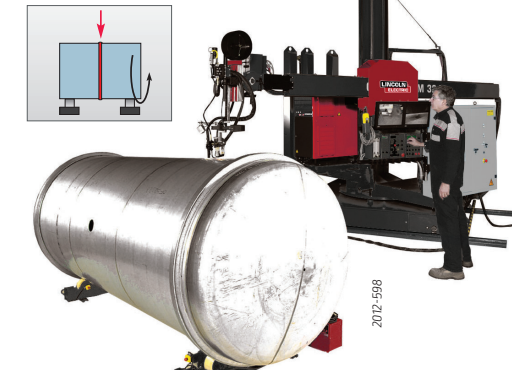
Typical boiler maker work shop



* Other dimensions on request



Circular welding with column and boom on rotator or positioner



Elliptical welding with column and boom on rotator

VERTICAL TANK

Use of plasma or TIG processes for vertical welding of stainless steel, noble metals, steels or aluminium. Manufacture of storage equipment for agriculture/food processing, petrochemical industries.

Vertical welding

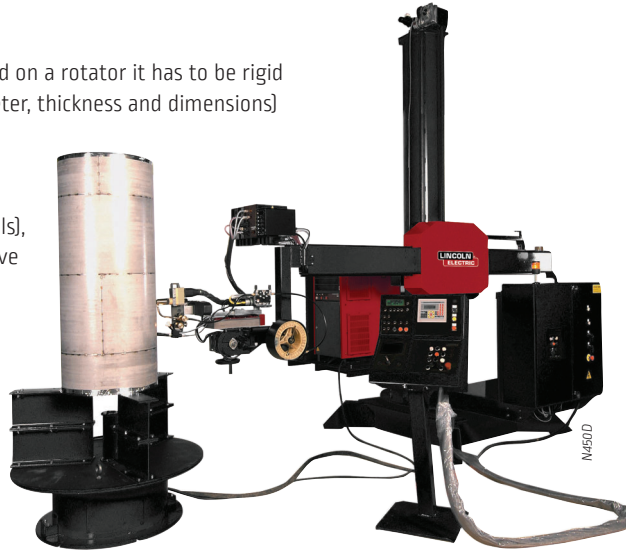
In order for a workpiece to be welded on a rotator it has to be rigid enough (relationship between diameter, thickness and dimensions) to ensure satisfactory stability while welding takes place.

For cases where rigidity is not sufficient, or costly (vessel sizing tools), difficult or even impossible to improve because of the large variety of parts used, Lincoln Electric has produced equipment enabling welding to be carried out «in the vertical axis» where the workpiece is rotated using a horizontal turntable and the torch remains static in the horizontal welding position.

This allows very large dimension workpieces to be produced without the use of complex tools.



2000-160



Standard turntable 5 to 30 T
Up to 4500 mm diameter



2000-003



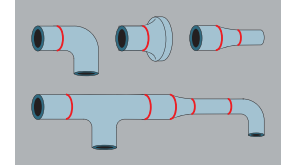
2000-169

PIPING WORK

Prefabrication of pipe work is carried out upstream of installation. It enables sub-assemblies to be prepared and welded from basic components (pipes, flanges, elbows etc..) in the workshop.

It is used in a variety of industrial sectors:

- shipbuilding and off-shore platforms
- refineries and power stations
- chemical and agriculture/ food processing plants
- gas expansion and distribution stations



2000-343

The materials used are as follows:

- carbon steels
- stainless steel
- noble metals and titanium.

Plasma welding is suitable for prefabricating pipe work of diameter greater than 1.5 inch. Parts with smaller diameters can be TIG welded using the same equipment.



2000-008

Example of welding times, assemblies are pre-tacked using manual TIG.

Exterior tube Ø	Thickness of wall in mm	Type of steel	Joint preparation	Time taken for plasma welding not counting positioning of assemblies	Time taken for same operation carried out manually
60	2.9	carbon		2 min (2 consecutive passes)	15 min
133	3.8	carbon		4 min (2 consecutive passes)	24 min
406	9.52	carbon		14 min (2 consecutive passes)	24 min
114	8	AISI 304		4.15 min (2 consecutive passes)	38 min
170	3.2	AISI 304		2 min (1 pass)	55 min



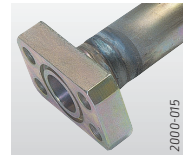
2005-204



4775-010



4775-011



2000-015

PLASMA & TIG INSTALLATION

Multipurpose installation able to perform Plasma or TIG, DC or pulsed, TIG AC variable polarity.

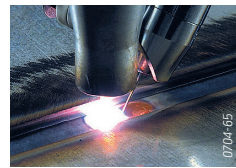
Management of all welding functions such as:

- Current
- Wire
- Welding speed
- Voltage (AVC)
- Gases

WIRE FEED

It is often necessary to feed the melting bath with metal during the operation in order to prevent the seam from showing hollows, to supply soft steels with deoxidizing elements, for successive seams.

	Characteristics
Carbon & stainless steel, Titanium wires	Ø 0.8 / 1.0 / 1.2 mm
Aluminium wires	Ø 1.2 / 1.6 mm
Max wire speed	6 m/min



HOT WIRE

Productivity improvement by increasing the deposition rate

Hot filler wire enables 2.5 to 3 kg of metal to be deposited per hour for filling bevels using multiple passes or for quality hard-surfacing.

Hot wire is performed by additional power source to the wire feeding system delivering 60 to 120 A.

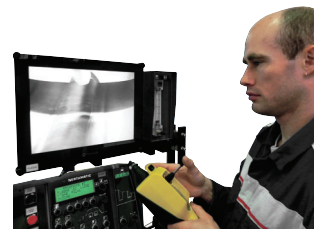
AVC SYSTEM

A constant distance between the torch and the workpiece is a key of quality to ensure a constant penetration and bead width. The Arc Voltage Control (AVC) keeps this constant distance by automatic regulation of the arc voltage: function fully integrated into the Lincoln Electric system composed of an electrical vertical slide travel 200 mm.

VIDEO CAMERA

The TIG/plasma video system VISIOARC VA2 can be easily integrated.

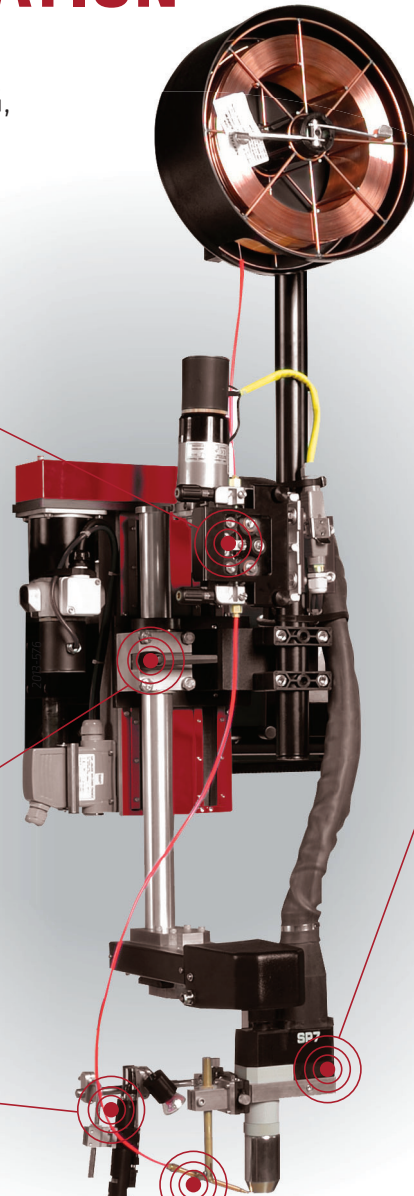
It uses a greatly enlarged image which enables the precise position of the welding torch. The operator can then work at remote distance of the welding head; working easier and improving the quality of the welding operations.



System with large color screen 15", miniaturised camera and additional lighting

WIRE PLACEMENT

2 micro-slides allow a precise impact of the wire into the molten pool. Manual or electrical option.



GAS MANAGEMENT

All gases are controlled by the welding installation with flowmeter excepted the plasma gas which is driven by a digital valve in order to fine tune the keyhole process.

COOLING UNIT

The FRIJET 300W cooling unit is compact with coolant constant supply, in closed circuit, used to cool down torches.



2014-396

	Cooler unit
Primary supply	230 V / 1 ph / 50-60 Hz
Nominal water flow rate	0.26 m³/h
Nominal water pressure	5.5 bars

POWER SOURCE

The power source NERTAMATIC 450 Plus centralises the global management of the welding cycle. An optional AC module can be integrated to control the current by variable polarity for aluminium welding.



2003-562

	NERTAMATIC 450+
Primary power supply	230 V - 400 V - 415 V - 440 V - 50/60 Hz
Duty cycle	450 A @ 100%
Processes	Plasma/TIG

TORCHES

Water cooled torches high performance to ensure quality and stability of the process and its equipments. Torches equipped with quick connection system for easy change and maintenance.

SP7:

- This torch is the reference in the market, for soft and key hole plasma welding.
- 450 A at 100%.
- Standard electrode simple to replace and self-aligning.
- Cold massive nozzle ensuring long life time.

Options:

- Gas trailing shield to protect welds in sensitive metals.

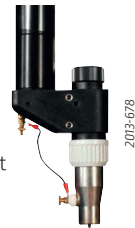


MEC4:

- For TIG welding
- 500 A at 100%.
- Standard electrode easy to replace.
- Twin HF ignition for better arc striking.

Options:

- Gas trailing shield to protect welds in sensitive metals
- Magnetic arc oscillation.

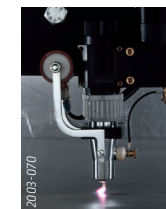


2003-678

OCILLARC PLUS For TIG process

Arc deviation

This technique is used to electrically deflect the TIG arc forward in the welding axis, increasing the speed by 30 to 50% for thicknesses of less than 2 mm.



2003-070

Arc oscillation

Arc oscillation is used to deposit metal over areas up to 15 mm wide to fill bevels or reconstitute surface coating.





2003-069


CONTROL PANEL

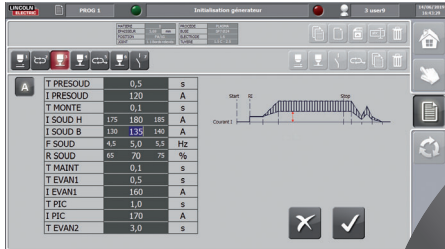
Two different systems to manage the Plasma/TIG process are available.

According to the typology of machine, the number of parameters to control, the monitoring and the traceability requirements.

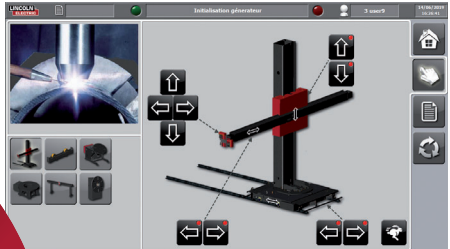
	PILOT ADVANCE	
		
Typology of machine	<ul style="list-style-type: none"> ■ Stand alone process for retrofit or integrators ■ Simple machine with 1 analog axis 	<ul style="list-style-type: none"> ■ Machine management including process with unlimited digital axis
HMI type	<ul style="list-style-type: none"> ■ LCD display + quick access buttons ■ 99 programs 	<ul style="list-style-type: none"> ■ 19" user friendly touch screen ■ Unlimited programs
User management	<ul style="list-style-type: none"> ■ General lock 	<ul style="list-style-type: none"> ■ User profiles management
Traceability & reports	<ul style="list-style-type: none"> ■ Program edition 	<ul style="list-style-type: none"> ■ Program edition & WPS ■ Production monitoring ■ Welding ticket ■ Process control ■ Welding records

PILOT ADVANCE *WELDING ACTIVITY UNDER CONTROL*







Clear display of welding cycle and related parameters



Graphic display of the machine and welding head









A suite of welding traceability and supervision embedded or off-line with Pilot Cockpit software



Quick access and display of welding functions

PILOT COCKPIT *EXPLORE YOUR WELDING DATA*

EDITION	TRACEABILITY	SUPERVISION
 <p>Export Programs into Excel format</p>	 <p>Quick summary report after each bead</p>	 <p>Track all events of your daily job</p>
 <p>Export WPS into Excel format</p>	 <p>Record complete welding parameters</p>	 <p>Alarms extract for maintenance analysis</p>

CUSTOMER ASSISTANCE POLICY

The business of Lincoln Electric is manufacturing and selling high quality welding equipment, consumables, and cutting equipment. Our challenge is to meet the needs of our customers and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric for information or advice about their use of our products. Our employees respond to inquiries to the best of their ability based on information provided to them by the customers and the knowledge they may have concerning the application. Our employees, however, are not in a position to verify the information provided or to evaluate the engineering requirements for the particular weldment. Accordingly, Lincoln Electric does not warrant or guarantee or assume any liability with respect to such information or advice. Moreover, the provision of such information or advice does not create, expand, or alter any warranty on our products. Any express or implied warranty that might arise from the information or advice, including any implied warranty of merchantability or any warranty of fitness for any customers' particular purpose is specifically disclaimed.

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