Plasma welding

Microplasma, soft-plasma/plasma brazing, plasma keyhole

Fronius

PERFECT WELDING

Welding with the gas pedal right down

GENERAL REMARKS

Faster, thriftier, better-looking

The plasma process is basically very similar to the TIG process but has a number of critical advantages. These make it an interesting alternative to laser welding where tough quality demands have to be met, especially on sheets and other components with a sheet thickness of up to 8 mm (0.31 in.).

In plasma welding, the arc is constricted by a cooled gas nozzle. The powerfully bunched arc that results does away with the need for time-consuming weld preparation work such as V- or U-type joint preparation. This saves as much as 30 % of the filler metal. In turn, the higher welding speed – around 20 % faster in soft-plasma welding, for example – saves time and costs at the same time as ensuring deeper penetration. Also, being enveloped in plasma gas, the tungsten electrode has a much longer service life.

Brand-new welding possibilities

The PlasmaModule 10 is your passport to the world of digital plasma welding.

This attachment for digital gas regulation and control of the pilot arc works on a modular basis with any digital Fronius TIG power source, and is the key to obtaining very high welding speeds, spatter-free welding and minimal weldment distortion. A whole extra, modularly designed welding system, then. With all that this entails: from the cooling unit right the way through to data management. For manual, mechanized or automated utilizations. Just as you wish.

We’ve got it all together

SYSTEM

Keeping the focus on the big picture

At Fronius, every welding process is looked upon as a system, right from the outset. This is the only way of ensuring that all the components (each of them of top quality, of course) are designed for mutual compatibility and work together perfectly. A plasma welding set-up essentially consists of four components: a digital TIG power source with a cooling unit, the PlasmaModule 10 and a plasma welding torch. The exact system configuration can be individually combined.

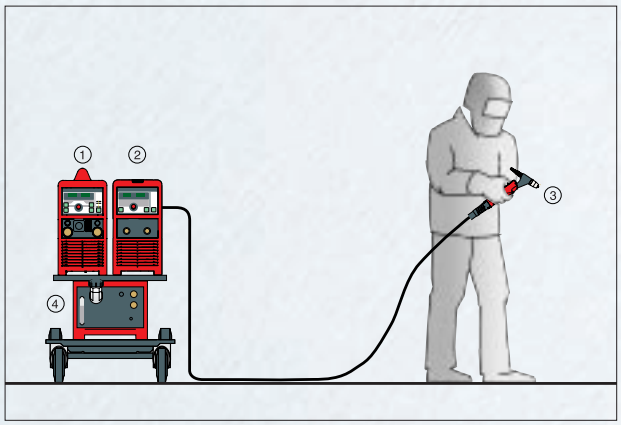
1. Digital TIG power source

The ideal basic units for plasma welding are the fully digitized MagicWave and TransTig TIG welding power sources, from 0.5 to 500 A. With these TIG welding systems, you can set up your plasma system whenever needed.

2. PlasmaModule 10

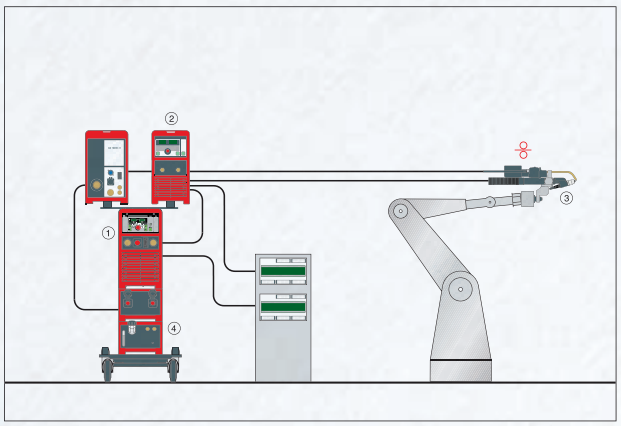
This retrofittable attachment exactly regulates the plasma gas flow-rate between 0.2 l/min (6.76 fl.oz./min) and 10.0 l/min (2.64 gal./min). In this way, any welding result can be optimally reproduced. In addition, the PlasmaModule 10 handles digital controlling of the pilot arc in the 3 - 30 A power range.

System example: microplasma



System components	1. TransTig 800
	2. PlasmaModule 10
	3. PTW 500
	4. FK 4000-R cooling unit
Handling mode	Manual & mechanized
Sheet thicknesses	From 0.1 mm (0.004 in.)
Welding amperage range	0.5 - 80 A

System example: soft-plasma/plasma brazing



System components	1. MagicWave/TransTig 2200/2500/3000
	2. PlasmaModule 10
	3. Robacta PTW 1500
	4. FK 2500 FC cooling unit
Handling mode	Manual & mechanized
Sheet thicknesses	Up to 3 mm (0.12 in.)
Welding amperage range	3 - 300 A

Manual microplasma welding for sheet thicknesses from 0.1 mm (0.004 in.) upward.

3. Plasma welding torch

Here there are models for both manual and robot applications. On the manual torch, the handle-shell is ergonomically shaped, making for precision torch guidance. The robot welding torch is flexibly mounted directly on the robot, in up to four positions. The tool centre point (TCP) is absolutely fixed and is the same as on TIG robot welding torches of identical construction.

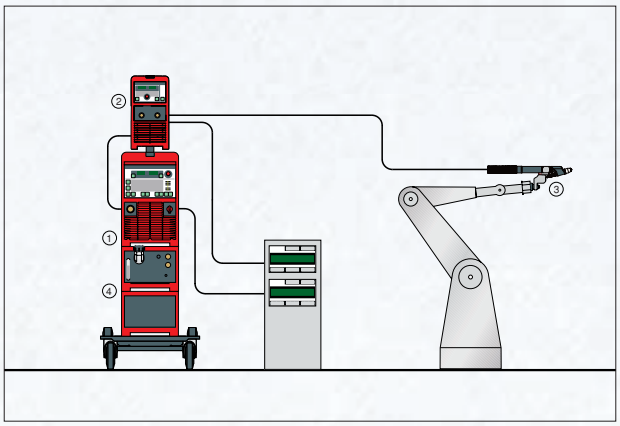
4. Cooling unit

Robust and reliable, the cooling unit is tailored to fit into the modular concept of the welding system as a whole. It ensures optimum water cooling of the welding torch.

Coupled TIG and plasma welding

Because of its similarity with the TIG process and the modular design of the Fronius system components, there are advantages for the entire welding system. The most important of these is that there is one power source for both welding processes. Also, the cold-wire infeeds are exactly the same for both TIG and plasma welding. There is a uniform push-pull system that can be used for either process. It's the same with the TCP: because the torch geometries are identical, the tool centre point remains the same when the torch is changed, and no new settings are needed.

System example: plasma-keyhole



System components	1. MagicWave/TransTig 4000/5000
	2. PlasmaModule 10
	3. Robacta PTW 3500
	4. FK 9000-R cooling unit
Handling mode	Mechanized
Sheet thicknesses	Up to 8 mm (0.31 in.)
Welding amperage range	3 - 500 A

FACTS

- one retrofittable attachment for two complete welding systems
- powerfully bunched, highly concentrated plasma arc
- deeper penetration, yet only minimal weldment distortion
- higher welding speeds (up to 20 % faster)
- no weld-seam preparation, up to 30 % less filler metal needed
- completely spatter and pore-free

An absolute bundle of energy

PROCESS

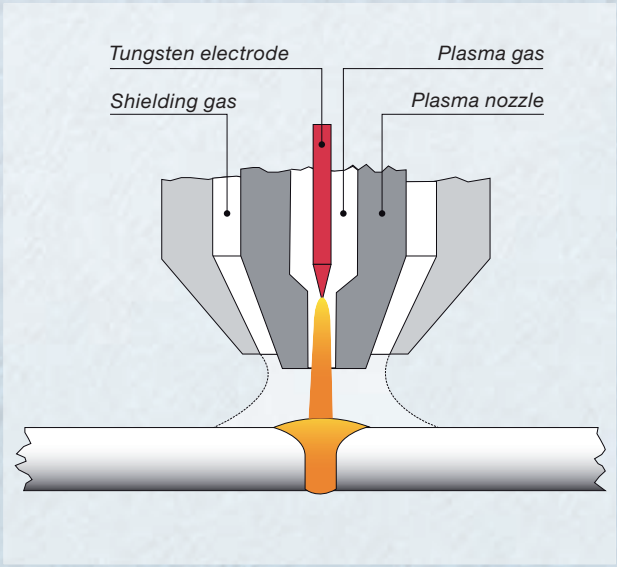
Concentrated on high-performance results

Plasma welding is similar to TIG welding. The difference is that in plasma welding, the arc is sharply constricted by a cooled gas nozzle through which a flow of plasma gas is directed. The shielding gas flows through the outside gas nozzle, providing optimum gas-shielding to the weld-seam.

The concentrated arc results in maximum energy focalization, leading to a deep-penetration effect in the workpiece that can only be matched by a laser beam. Also, the welding speed is as much as 20 % faster than in mechanized TIG welding. The welcome consequences of this technology, and the most striking differences to the TIG process, are: no weld-seam preparation, less filler metal, and higher availability of wearing parts.

In the plasma process, the credit for these welding properties goes to the plasma itself. It forms a gas consisting of both positive charge carriers (ions) and negative ones (electrons). In order for plasma to form, very high temperatures of up to 25,000° C (45,000° F) are needed. Thanks to the bunching of the arc, however, the thermal input is so precisely targeted that considerably less weldment distortion occurs than in TIG welding. The many advantages of plasma welding make it the ideal process for applications where stringent quality demands are made of the weld-seam. Such as for absolute freedom from porosity, perfect seam appearance and zero spatter.

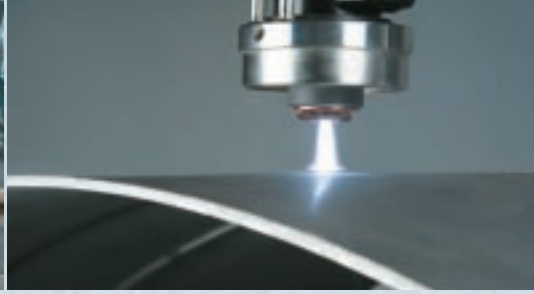
Combined with TIG welding systems from Fronius, the new PlasmaModule 10 offers an alternative to laser welding.



The plasma gas constricts the arc in the plasma nozzle. The resulting advantages are plain to see: a stable arc and deep weld penetration.

A flange-to-tube joint being soft-plasma welded

Automated plasma-keyhole welding of a longitudinal seam



Plasma-keyhole in use for tank construction

UTILIZATION

Plasma welding keeps its promises

The main arguments for deploying a plasma welding system are always the top-quality results which it reliably delivers, and its higher welding-speeds. This is true of all chrome-nickel materials, coated and uncoated steels, titanium and all nickel-based materials. Plasma welding is an interesting alternative for sheets of up to 8 mm in thickness. Not surprisingly, then, it has many and varied areas of use in the automotive vendor industry, for pipeline and tank construction, in mechanical engineering and structural steelwork, for rail vehicles and rolling stock, and in shipbuilding.

ECONOMY

A thoroughly efficient business

Just the modular appliance concept on its own, with its synergies from the TIG system, is enough to make plasma welding a highly cost-effective process. And then come the welding properties themselves, which permit more efficient working: no weld-seam preparation, up to 20 % higher welding speed, no weldment distortion and as much as 30 % less filler metal. What is more, the wearing parts have a much longer service life as the tungsten electrode, for example, is enveloped in plasma gas.

SAFETY

On a safe footing

On all Fronius appliances and system components, safety is an absolute and fundamental precondition. The bedrock, in fact. This is why all the protective measures, protection symbols and service offerings are just a matter of course, that we only mention here for the sake of completion: S mark, CE Mark and IP 23.

TECHNICAL DATA

PlasmaModule 10

Mains voltage	230 V (+15 %/-20 %)
Pilot current range	3 - 30 A
Plasma-gas flow-rate	0.2 - 10.0l/min 6.76 fl.oz./min - 2.64 gal./min
Welding current at 10 min/40°C	100 % d.c. 30 A
Weight	14.2 kg / 31.2 lb
Dimensions LxWxH	505 x 180 x 344 mm 19.9 x 7.1 x 13.6 in.

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