

Technical Newsletter from
ADOR WELDING LIMITED
Formerly Advani - Oerlikon Ltd.

WELDING INVERTERS - IMPROVING EFFICIENCY & REDUCING ENERGY COSTS

Introduction to inverter based welding equipment

In inverter welding equipment, utility input AC supply is first converted to DC by a bridge rectifier. This DC is filtered using choke and capacitor before it is switched (inverted) to high frequency square wave AC by insulated gate bipolar transistor (IGBT). This high frequency high voltage AC is converted to high frequency low voltage AC by a ferrite core transformer and subsequently to DC output by high frequency rectifier.

Multiple features available in inverter based welding equipment

The IGBTs in inverter based welding equipment are controlled by a micro controller so the electrical characteristics of welding power can be changed by software in real time. Use of this software allows implementation of features such as pulsing the welding current, variable ratios and current densities through a welding cycle (for process automation), variable frequencies as well as automatic spot

Product Update

CHAMP 253



Arc force adjustment on panel.

TIG Welding possible with Lift Arc technique

CHAMPTIG 303AD

welding; it will be very expensive to incorporate these features in a transformer based machine.

Advantages of inverter based welding equipment

Inverter based welding machines are lower in volume and weight than conventional equipment, saving space and allowing portability. They consume lower power and have higher efficiencies over wider supply voltage range.

Although they are small, compact and light weight they are robust and have higher reliability. The fast switching IGBT devices allow faster response time leading to superior welding performance.

How efficiencies and power savings are achieved in inverter based welding equipment

The ferrite core in the transformer referred above reduces current losses which results in lower idle current in supply windings. The transformer coils in inverters are smaller than coils in common transformers. This means less wire is used for core winding which in turn leads to fewer losses and greater efficiency.

The compact design and smaller size of inverter welding equipment means use of shorter cables and smaller components in the entire equipment leading to lower consumption and power losses and higher efficiencies. In turn, it is possible to use a smaller fan for cooling since inverters are designed for lower losses leading to lower power consumption for cooling.

Can inverters be used for all welding processes?

Inverter based welding equipment can be designed for all welding processes and are being used for manual metal arc welding(MMAW), gas tungsten arc welding or TIG welding (GTAW/ TIG), metal inert gas welding(MIG), submerged arc



Advanced inverter technology
optimized ARC performance

Intelligent protection: over/under
voltage, over current / temperature

**ADOR Institute of
Welding Technology**



**Certification Course for
Welding Inspector (QC-1)
7th-12th June 2010**

**Course for Quality Assurance
& Control of Welding (QA-1)
12th- 15th July 2010**

**Hands on training for
Welders / Operators**

**(SC - 1) & (QA - 2) The
Courses has been cancelled
for the month**

welding (SAW); Inverters can also be designed for power sources for cutting applications such as for plasma cutting. All modern process like Synergic Pulse MIG, Pulse TIG etc... are efficiently achieved with inverter based equipment.

Does Ador Welding Ltd. offer inverter based equipment?

Ador Welding Ltd. (AWL) offers inverter based welding and cutting equipment for all these applications in different current ranges. A brief description of available equipment is given in the following paragraphs.

Inverter based welding equipment for SMAW process:

For this process, equipment is available for electrode sizes of 2.5 to 6.3 mm with the welding current range between 150 A and 400A.

Low welding current capacity machines like 150A, 160A and 180A are available with single phase input supply. These machines are suitable for light duty fabrication and maintenance jobs. For this range and applications CHAMP 150, CHAMP 163 and CHAMP 180 are models offered by AWL.

250A and 400A rating machines are available with three phase input supply and are useful for medium and heavy duty work. For this range, CHAMP 253 is medium duty and CHAMP 250 and CHAMP 400 are heavy duty machines available from AWL.

CHAMP 400 is most suitable for pipe welding application where cellulosic electrodes are used for root pass welding.

For ship building and workshops where many welders are working simultaneously on one job with similar type of electrode, AWL offers a new multi operator model, CHAMP 4 x 403. From this single unit, 4 welding outputs, each of 400A are available simultaneously.

Visit AWL Stall No. 137 at
Automotive Engineering
Show 2010 during 14th - 17th
May, 2010 at Chennai Trade
Centre, Chennai.

Inverter based welding equipment for GTAW (TIG) process:

For Light Duty DC TIG application, CHAMPTIG 163 is suitable for welding current up to 160A. This equipment works on single phase input supply and is light weight and compact.

For Higher welding current requirements CHAMPTIG 303 is suitable for DC TIG applications. This is available with Water cooling unit for water cooled TIG torches. If the machine is going to be used for lower current requirement (less than 200A), then this equipment is available without water cooling unit and gas cooled TIG torch.

For Precise and thin metal TIG welding application, CHAMPTIG 303 AD is suitable, which is AC/DC pulse TIG welding equipment. This is suitable for various applications, including for Aluminum TIG welding application.

Inverter based welding equipment for multi processes (GMAW, SMAW, TIG and self shielded FCAW):

This equipment can deliver both constant current (CC) and constant voltage (CV) characteristics. Hence this equipment is suitable for multi processes like GMAW, SMAW as well as for TIG application with external HF TIG control unit. All these machines are with digital controllers.

CHAMP MULTI 400 welding outfit is useful for SMAW, GMAW processes and also can be used for TIG process with external HF TIG control unit. In GMAW mode of operation, one can select auto mode to work in single point controlled synergic operation.

CHAMP MULTI 400 (SSPW) is most suitable for cross country pipe welding application, where SMAW and self shielded flux cored semiautomatic welding processes is used. This unit has capability to weld in both processes.

Inverter based welding payload options:

CHAMP MULTI 2 x 400 (SSPW) and CHAMP MULTI 4 x 400 (SSPW) are two payload options available for cross country pipeline applications. Each payload option has separate power source and wire feeder. This payload can work on Diesel Generating sets with capacity of 30KVA and 62.5 KVA for 2 and 4 welders respectively.

Inverter based air plasma cutting equipment:

CHAMPCUT 8 is a single phase plasma cutting equipment, which has 8 mm metal cutting capacity. This has a built in air compressor. This light weight (16 kg) cutting equipment is suitable for light duty cutting work.

CHAMPCUT 25 is a heavy duty cutting equipment and can cut maximum 25 mm thick metal.

Inverter based welding equipment for SAW Process and for gouging applications:

MAESTRO 1000(I) is a 1000A SAW welding outfit which can be for continuous (100% Duty cycle) SAW welding application @1000A.as well as for Gouging Application in Constant Current (CC) mode.

Quality and reliability of AWL Inverter based welding equipment:

During development of this equipment, the reliability is ensured by testing the equipment at various environmental tests, conducted in Environmental test room.

The Equipments are manufactured on a special separate line where semiconductor components handling is carried in antistatic area to protect the Semiconductors from Electrostatic Discharge (ESD) .This ensures the reliability of power components. Inspection at each stage of critical assembly and at final stage ensures the quality of the product.

Range of inverter based equipment available from AWL:

The complete range of AWL inverter based welding, cutting and gouging equipment is detailed below. Please click on the model type to know more about the same.

Welding Process	ADOR Model	Maximum Welding current	Features
Single Phase MMA welding rectifier	CHAMP 150	150 A	Suitable up to 3.2 mm Electrode. Suitable for light duty fabrication and maintenance jobs.
	CHAMP 163	160 A	Suitable up to 3.2 mm Electrode. Suitable for light duty fabrication and maintenance jobs.
	CHAMP 180	180 A	Suitable up to 4 mm Electrode. Suitable for light duty fabrication and maintenance jobs.
Three Phase MMA welding rectifiers	CHAMP 253	250 A	Suitable upto 5 mm electrode. Portable and compact. Suitable for Light duty application.
	CHAMP 400	400 A	Heavy duty MMA rectifier. Suitable for pipe welding application.
	CHAMP 4 x 403	4 x 400A	Four Operator MMA welding PAYLOAD.
Single phase DC TIG welding outfit	CHAMPTIG 163	160 A	HF based arc ignition. Light weight and

			compact (7 kg).
Three phase DC TIG welding outfit	<u>CHAMPTIG 303</u>	300 A	HF based arc ignition. Single unit with Water cooling unit for water cooled TIG torch.
Three phase AC/DC Pulse TIG welding outfit	<u>CHAMPTIG 300AD</u>	300A	Suitable for AC and DC TIG welding application. Separate water cooling unit for water cooled TIG torch.
	<u>CHAMPTIG 303AD</u>	300A	Suitable for AC and DC TIG welding application. Single unit with water cooling unit for water cooled TIG torch.
Three Phase MULTI Process (GMAW/SMAW) welding outfit	<u>CHAMP MULTI 400</u>	400A	Suitable for both GMAW and SMAW process. TIG process possible with external HF unit. Synergic operation in MIG/MAG mode.
	<u>CHAMPMULTI 400 (SSPW)</u>	400A	Suitable for both Self Shielded Flux core Wire welding and SMAW welding particularly for pipe welding application
	<u>CHAMPMULTI 2 x 400 (SSPW) & CHAMP MULTI 4 x 400 (SSPW)</u>	2 x 400 A 4 x 400 A	Multi operator Welding Payload option available in two and four operators. Suitable to operate with Diesel Generator Set.
Single Phase Air Plasma Cutting outfit	<u>CHAMPCUT 8</u>	25A	8 mm Cutting capacity. Built in Air

			compressor. Light weight and portable
Three Phase Air plasma cutting outfit	CHAMPCUT 25	100A	25 mm cutting capacity. Compact and light weight
SAW Welding Outfit	MAESTRO 1000 (I)	1000A	Suitable for both Gouging as well as for SAW process. Heavy duty with 100% duty cycle @ 1000A.

Please contact us at cmo@adorians.com for more details on this subject and for help in selecting the right consumables for these applications.



Project Engineering Solutions



ADOR Institute of Welding Technology



Welding & Cutting Solutions



Centre for Engineering Excellence



WELDERS TO THE NATION
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