Product Information

jetline engineering
An Illinois Tool Works Company

MODEL 9500
System Controller

- Closed-loop control
- All arc welding processes
- Controls 4 parameters
- 25 program memory
- Synergic TIG control
- Multi-pass capability

Introduction

Integrated welding systems rarely consist of just a welding power supply. Consequently, control of the welding sequence is only partially addressed using the type of sequence control normally available with welding power supplies. Even though some of these controllers are of a microprocessor design, they can only control the output of the welding power supply and are often limited to a specific weld process. An integrated welding system, in addition to controlling welding current, requires control of other parameters such as wire and travel speed and, in some cases, control of arc length through the control of arc voltage.

Description

The 9500 System Controller is a microprocessor based unit designed and built to provide economical, accurate control over the complete welding process. The unit will control all arc welding processes and, although primarily designed for systems utilizing Jetline equipment, can easily be used with other manufacturer's equipment and on other welding systems.

The control is compact and is capable of controlling up to four welding parameters using appropriate control modules which are individually available as optional equipment. The output level of each parameter is set using an integrated digital keypad and is displayed on a fluorescent display. The 9500 Controller includes sequence start and stop buttons as well as an emergency stop button.

An important advantage of the 9500 Controller, compared with more conventional units, is that it employs a menu system to create weld programs through the keypad. Actual values can be entered and are displayed. This permits the parameter levels to be pre-selected before welding starts. During welding, the display provides a readout of actual weld values.

Firmware

The 9500 Controller is of a microprocessor design, similar to a computer. In addition to the "hardware" which is the control itself, the operation of the unit is based upon "software". The operation of the 9500 Controller is controlled by a software program in the same way as a computer. The main difference is that the software is permanently loaded on two EPROM memory chips. The program is burned into the chip and cannot be changed by the user. The program and the chip are together known as "firmware".

To make the 9500 System Controller suitable for a number of different welding operations, Jetline has developed a series of firmware options. EPROMS, loaded with all the appropriate firmware, will be installed in the controller at the time of supply. If, however, it is required to add options or change the weld process at a later date, new EPROMS containing the new firmware can be supplied to retrofit the controller.

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9500 WELDING SYSTEM CONTROLLER

Features

Weld Process

The 9500 Controller produces analog output voltages which can be connected to most types of solid-state controlled equipment. The standard model is ideal for GTAW, both DC and AC currents and, with optional firmware, can be used to control plasma, GMAW or SAW systems.

Output Channels

The 9500 System Controller is designed to control up to four welding parameters simultaneously. Various combinations of parameters are available to suit the weld process being used. These can include welding current, arc voltage, wire and travel speed, gas flow and many others. In addition, the 9500 can switch two auxiliary devices (oscillators or slides) on and off.

Control Modules

Modules provide the necessary interface between the 9500 and the device to which it is connected. For control of motor speed (for a travel or wire feed channel), a "motor drive module" is used. This consists of a servo-amplifier which takes the analog voltage control signal from the 9500 and translates it into the correct motor speed. Motor control modules are available for different size and types of motors. Input voltage is 120 VAC, 50/60Hz (a transformer is needed for other supply voltages). To provide a reading of travel or wire feed speed, the drive motor must be fitted with a tach-generator. These are available from Jetline for retrofitting to existing motors (the motor should have an extended armature shaft to attach the tach-generator drive pulley).

To control the welding power supply, the 9500 connects to the remote current control receptacle. It is necessary to utilize a suitable cable and plug, these are available from Jetline for a wide variety of power supplies. To maintain accurate control and to provide a current reading on the 9500 display, a "current sensor module" is required. The welding ground cable is routed through this "Hall Effect" sensor to provide the necessary signal.

Control of gas can be achieved in two ways. The most common way is to use a solenoid to turn the gas on and off. A "gas solenoid module" is available to do this. For control of the actual gas flow rate, an alternative module can be supplied.

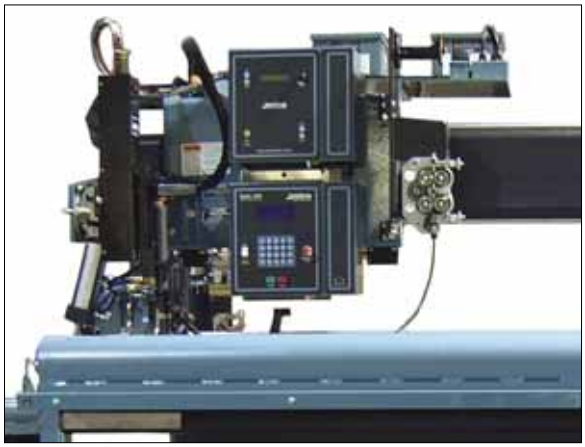
Closed Loop Control

When the 9500 Controller is used in a system where feedback of actual levels is possible, i.e. from a current sensor or tach-generator, closed loop control can be activated. This is an important feature to maintain precise control and consistency of all the welding parameters.

The closed loop control maintains the accuracy and consistency of the welding process by checking the actual level of each of the welding parameters and comparing it with the preset (desired) level. Any change from the preset level is detected and the output signal changed to correct the drift. The closed loop action is so fast that the 9500 corrects the welding parameters before you realize they are drifting.

Applications

The 9500 Controller can be used for many different applications. The standard model is complete with firmware for the control of the GTAW process. It includes all the features necessary for the control of a GTAW seam welder and controls the welding power supply, arc length control, cold wire feeder and travel carriage. It replaces most of the front panel controls, switches and potentiometers which so often can be difficult and confusing for the operator.



When ordered and supplied with standard firmware, the 9500 Controller permits all four channels to be programmed. A weld program can be made during which the welding current can be programmed for initial current, upslope, weld current, taper, downslope and final current levels. The weld can be time based or the weld length can be controlled by an external signal, a limit switch or an encoder. The operator can start downslope at any time, if required.

Arc voltage, travel speed and wire feed speed levels can be set as well as start and stop delay times. Pre- and post-flow gas times can also be programmed.

During welding, the operator can adjust any of the welding parameter levels to suit the part being welded. The amount of adjustment the operator can make is limited by the figure chosen when setting up the system configuration for the particular application. Adjustment limits can be set independently for each of the four parameters so that the operator can make larger changes in the less critical parameters.

The unit has the ability to store programs (or weld schedules). The system is designed to store 25 programs, easily identifiable by part number. Any schedule can be easily called up by the operator for welding. During programming of the weld schedule, any existing program can be copied. After copying, any required changes can be made. This provides a quick and easy way of reproducing schedules for various materials or thicknesses.

Options

When ordering a 9500 system, it is necessary to consider both the hardware and the firmware.

The 9500 needs various modules to allow it to be connected with, and to control, the system hardware. These modules are chosen according to the application and the equipment to which the 9500 is being interfaced. They include current transducers, gas solenoids and flow controls, and motor control modules. Contact Jetline for more detailed information.

It is also important to review the application and decide which firmware options are desirable to provide the best control of the system. Jetline will burn any combination of the following firmware options into the EPROM memory chip.

Pulse Control

With this option, the control of current pulsing becomes a part of the weld program. The firmware permits the pulse frequency, peak and background current levels, and percentage peak time to be set. Pulse frequencies up to 300 Hz can be set for suitable power supplies.

Enhanced Function Control

Standard firmware permits only the welding current to be sloped or tapered during the weld program. The enhanced control option allows all four parameters to be dynamically changed as the weld proceeds.

- For Plasma keyhole welding, gas taper or downslope may be required.
- For hot wire welding, the wire speed may need to be ramped up for better weld starts.
- For GMAW, wire feed and voltage may need to be varied to give better run-in and crater fill. Simpler power supplies and feeders can be used.

Multi-Pass Control

Many applications exist where more than one pass is required to fill the weld joint. It is a distinct advantage if these passes can be pre-programmed and the weld allowed to proceed automatically. The optionally available multi-pass firmware permits up to 25 multi-pass schedules to be created and stored in memory. Each multi-pass program can include up to 25 passes.

Each pass can be a complete weld sequence with arc initiation, upslope, downslope, and final weld sequence. The system can be set to move the part after the arc is extinguished to allow the start of the second pass to be separated from the end of the first. This would be suitable for overlay welding. This gives the operator the opportunity to check torch position before starting the next pass.

For some applications it is better to maintain the arc between passes. The 9500 Controller has the ability to link programs together. When programs are linked, the transition time from one pass to the next can be defined. During this transition time, all four welding parameters slope from the existing level to the level set for the next pass. The final pass automatically calls up and uses the downslope and final sequence set for that pass.

Synergic TIG

This unique feature brings a new dimension of control to the welding process. Many of you are familiar with the use of "Synergic MIG" and are probably aware that it allows more than one parameter to be automatically changed simply by changing the wire feed speed.

Synergism: Interaction of discrete properties such that the total effect is greater than the sum of the individual effects.

On all conventional GTAW systems, when the operator increases the welding current, the tungsten electrode moves closer to the work and may dive into the weld pool. An adjustment must then be made to the arc voltage. It may also be necessary to increase the wire feed speed to suit the increased welding current. Making these adjustments independently is difficult and does not create a smooth arc condition.

"Synergic TIG" eliminates these problems. It allows you to define a relationship between all your welding variables. When the operator uses the control to synergically increase or decrease the weld, all the parameters will change smoothly and in harmony with each other to create a smooth transition from one weld level to the next.

PC Communication/PC Edit

With PC Communication option software, single and multi-pass weld programs can be created on the 9500 Controller and then downloaded through the serial port to a nearby shop computer or a notebook computer for storage as a library of weld programs. Future retrieval is then available, one at a time as needed. In this way, a virtually unlimited number of programs can be created and saved. Saving the program to a PC will allow the operator to save additional program details with each program.

With the PC Edit software option, weld programs can be created and edited on the host computer and then be retrieved by the 9500 Controller through the serial port, one at a time as needed. And, with this software, a print format of the weld programs can be generated.

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Surface Speed Indication

This option permits the diameter of the part being welded to be recorded in the weld program. When programming, the travel speed can then be entered as a direct surface speed in in/min or cm/min. During welding, the indicated speed will also be the surface speed.

Encoder Control

For some applications, especially where the weld length is critical, it is desirable to control weld length using the input from an encoder. This firmware facility permits the actual length of the weld segment of the program to be entered as a length. For linear welding this would be a distance and for circumferential welding this could be in degrees of angular rotation. This is a useful capability for applications with large varieties of part lengths.

Upload/Download Facility

This firmware option provides the ability to make copies of programs and configuration data. It allows the contents of the system's memory, weld program data, configuration and calibration data, to be copied to a memory card which is held in the memory pendant. As the 9500 Controller can hold up to 25 weld programs, this facility permits "blocks" of 25 programs to be recorded, hence there is no limit to the number of programs which can be used with the system.

(Note: A memory pendant and memory cards are required to be used with this facility, these are available as optional items).

Data Print Facility

This facility provides a means of making a permanent record of the data stored in the 9500 Controller. With a suitable printer connected to the 9500 through the serial port, a printout can be made of weld programs as well as configuration data. The facility is suitable for single or multi-pass applications.

Bar Code Input

Mistakes can be made if the operator calls up the wrong program number. This can be avoided by identifying the part to be welded using a bar code. This firmware facility (using the optionally available scanner), scans a bar code marked on the part and automatically recalls the correct weld schedule. This facility can be used to communicate with a PLC and other similar devices.

Specifications

Processor:	Intel 80C196KC, 20Mhz
Keypad:	20 Key, membrane style
Display:	4 x 20 Vacuum fluorescent
Channels:	Four
Outputs:	0 to 10 Volts DC analog 4 Digital per channel
Inputs:	0 to 100 Volts DC analog 4 Digital per channel
Closed Loop:	Integrated as standard
Memory:	Stores 25 weld programs
(Optional):	Stores 25 multi-pass schedules
Input:	120/240V 1 phase, 50/60Hz

Dimensions

Height:	12 inches (300 mm)
Width:	10 inches (250 mm)
Depth:	6 inches (160 mm)
Weight:	20 lbs (9 kg)

Ordering Information

Hardware

9500	9500 System Controller
9500-VP	Vanity Panel (covers Amphenols)
9500-VPS	Vanity Panel with Serial Port
9500-TACH	Tach-Generator Kit (Std. motors)
9500-LSLW	Limit Switch Kit (Longitudinal)
9500-LSCW	Limit Switch Kit (Circumferential)
9500-MEMPD	Memory Pendant (Up-Download)
9500-MEMCARD	Memory Card
9500-PRINTER	Matrix Printer (Serial Connection)
9500F-XXX	Cable to Power Supply (Model XXX)
9500F-ALC	Cable to Arc Length Control
9500F-MAG8000	Cable to Mag Arc Oscillator
CSM-2-1000	Current Sensor Module (DC only)
CSM-2-AC	AC RMS Current Sensing Facility
GSM-1	Gas Solenoid Module
MCM-1	Motor Control Module (1/8 HP)
MCM-3	Motor Control Module (Precision)

Firmware

9500-FW-BC	Bar Code Input
9500-FW-DP	Data Print Facility
9500-FW-EC	Encoder Control
9500-FW-EF	Enhanced Function Control
9500-FW-MP	Multi-Pass Control
9500-FW-MPSER-PC	9500 to PC Communication
9500-FW-PC-EDIT	PC Edit Software
9500-FW-PC	Pulse Control
9500-FW-SS	Surface Speed Indication
9500-FW-ST	Synergic TIG Control
9500-FW-UD	Upload/Download Control

See Jetline price list for complete ordering information

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