Index No. AD/6.0
Issued August 1997

Aerowave®

Hybrid AC/DC Constant Current Squarewave Arc Welding Power Source

ISO 9001 REGISTERED QUALITY SYSTEM

The Aerowave® AC/DC power source is the most exciting advancement in TIG (GTAW) since Squarewave™ and AC balance control. This premium AC and DC TIG power source *expands TIG welding capabilities* beyond common Squarewave machines, allowing the operator to control the arc as never before.

With the Aerowave power source, Miller introduces **total AC arc-shaping capabilities.** The Aerowave unit's AC waveform can be completely adjusted to:

- Increase the travel speed and improve the quality of any AC TIG welding application
- Stabilize the arc cone and reduce arc wandering for better performance on fillet welds and automated applications
- Control penetration and bead appearance to meet user's requirements

TRUE BLUE® 3 YR. WARRANTY

Processes

TIG (GTAW) Welding

Stick (SMAW) Welding

Description

CC | AC/DC | 3 Phase | 1 Phase

Features	Benefits
Advanced Squarewave arc	Stabilizes the arc on low power for improved weldability on aluminum. Continuous high frequency is NOT needed because of the advanced Squarewave arc.
Independent current control	Provides separate, independent amperage control of the Electrode Positive (EP) and Electrode Negative (EN) portions of an AC cycle.
Adjustable frequency (Hz)	40 – 400 Hz setting provides control for a focused arc resulting in better directional control and producing the desired arc/weld bead characteristics.
Balance control (%EN)	Extended balance control range of 30 – 90% EN allows precise cleaning control and prolonged tungsten life.
Lift-Arc for TIG arc starts	The Lift-Arc circuit allows TIG starting without the use of high frequency.
Dual digital meters	Large bright meters display both amp and volts for quick and easy viewing.
Three-phase or single-phase	Operating on three-phase primary power results in a lower primary current draw than single-phase machines require.
Line voltage compensation	Keeps the output of the power source constant regardless of fluctuations in input power.
Overload protection	Automatic thermal shutdown protects the unit from damage due to overheating.
Miller's True Blue® Warranty	3 years—parts and labor. Note: Original main power rectifier parts are warranted for 5 years.

Ordering Information

	Aerowave®	with Full Feature Module	Full Feature Module (Field installed)
200/230/460 V, 60 Hz*	**#903 329**	**#903 329-01-1**	**#042 889**
230/460/575 V, 60 Hz*	**#903 330**	**#903 330-01-1**	
380/415 V, 50 Hz	**#903 331**	**#903 331-01-1**	

**Operates on single-phase or three-phase power.*

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An Illinois Tool Works Company
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Web Site – www.MillerWelds.com

Miller® *The Power of Blue.*

Applications

- Aerospace Manufacturing
- Aluminum Fabrication
- Aircraft Maintenance
- Tube Mills
- Piping Systems
- Marine Components
- Mold and Die Repair
- Air Separation Systems
- Bicycle Manufacturing
- Automated Welding Components
- Engine Rebuilding/Modification
- Laboratory/Prototyping

Specifications *(Subject to change without notice.)*

Heavy Industrial CC AC/DC 3 Phase 1 Phase

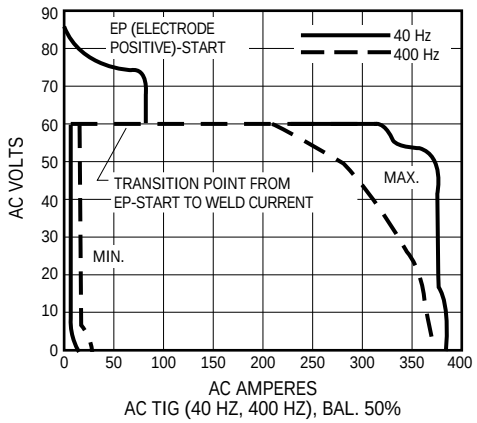
Input Power		Rated Output Amperes at 60% Duty Cycle	Welding Amperage Range	Max. Open-Circuit Voltage, DC only	Amps Input at AC Balanced Rated Load 200 V	230 V	380 V	415 V	460 V	575 V	KVA	KW	Dimensions	Weight Net	Weight Ship
200/230/460 V, 60 Hz	3-Phase	300 A at 32 VAC	1– 375	90	42	37	–	–	18	–	14.8	14	H: 35-1/2 in (910 mm)* W: 24 in (615 mm) D: 22-3/4 in (583 mm)	351 lb (158 kg)	386 lb (174 kg)
	1-Phase	200 A at 28 VAC			51	44	–	–	22	–	10.2	9			
230/460/575 V, 60 Hz	3-Phase	300 A at 32 VAC			–	37	–	–	18	15	14.8	14		351 lb (158 kg)	386 lb (174 kg)
	1-Phase	200 A at 28 VAC			–	44	–	–	22	18	10.2	9			
380/415 V, 50 Hz	3-Phase	300 A at 32 VAC			–	–	23	21	–	–	14.8	14		360 lb (162 kg)	395 lb (178 kg)

**With lift eye down.*

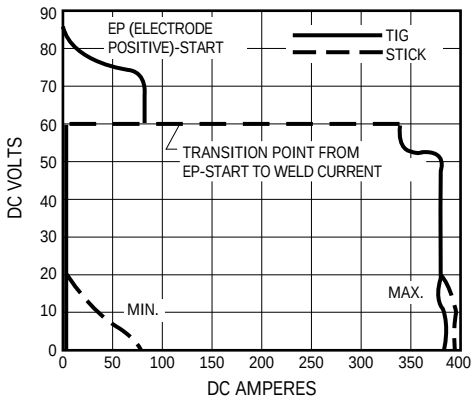
NRTL/C *Certified by Canadian Standards Association to both the Canadian and U.S. Standards. NEMA Class I rating.*

Performance Data

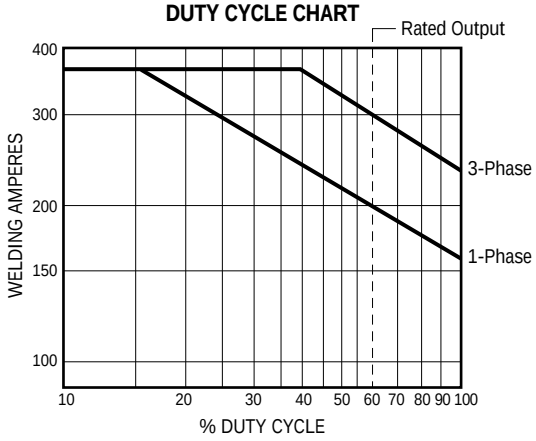
VOLT/AMP CURVE, AC MODE



VOLT/AMP CURVE, DC MODE

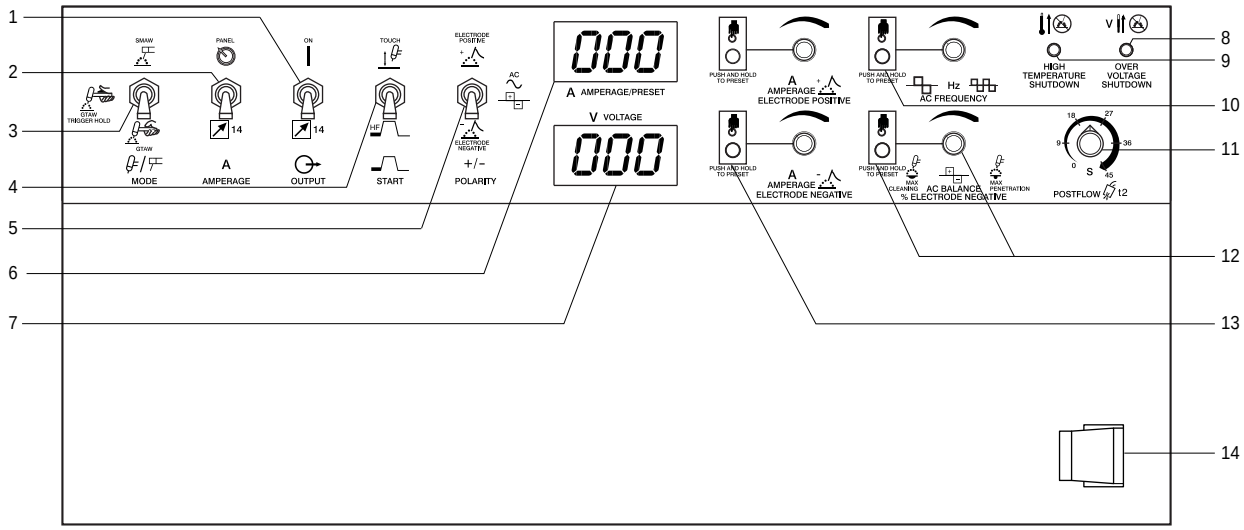


DUTY CYCLE CHART



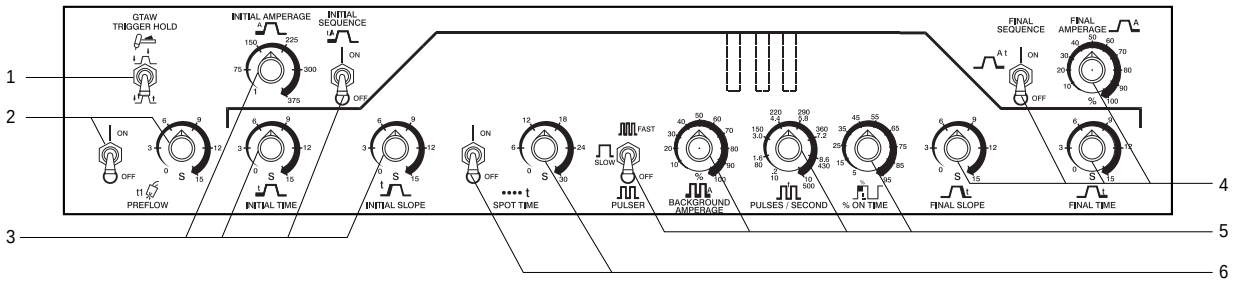
Miller

Control Panel



Controls

1. Output Switch
2. Amperage Switch
3. Mode Switch
4. Start Switch
5. Polarity Switch
6. Amperage/Preset Meter
7. Voltmeter
8. Over Voltage Shutdown Light
9. High Temperature Shutdown Light
10. AC Frequency Controls
11. Postflow Time Control
12. AC Balance Controls
13. Amperage Adjustment Controls
14. Power On/Off Switch

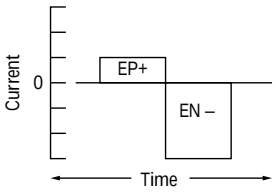
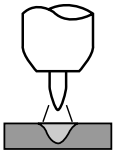
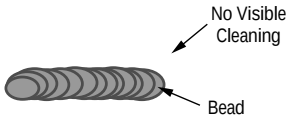
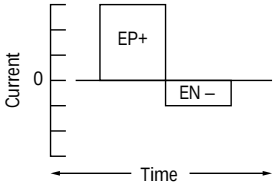
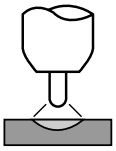
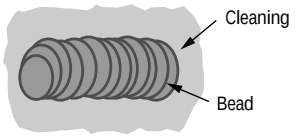
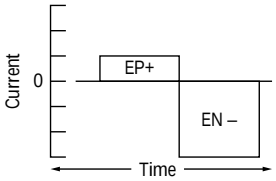
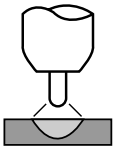
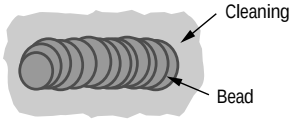
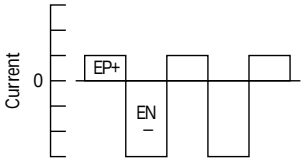
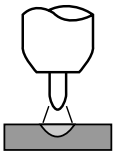
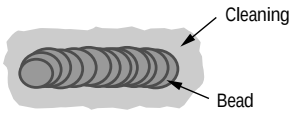
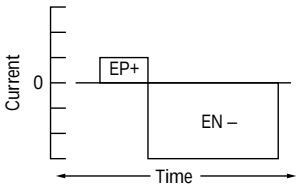
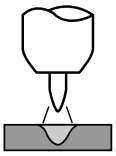
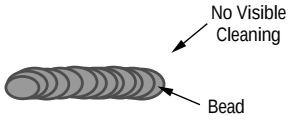
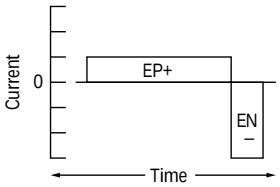
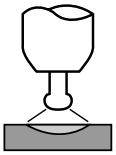
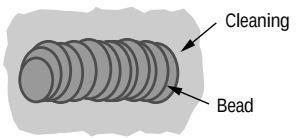


Full Feature Module (Optional)
#042 889 Field

1. TIG (GTAW) Trigger Hold Switch
2. Preflow Time Controls
3. Initial Sequence Controls
4. Final Sequence Controls
5. Pulser Controls
6. Spot Time Controls

Unique AC Arc Shaping

The Aerowave power source allows the operator to shape the arc and control the weld bead in ways that were never available before! Separately or in any combination, the user can adjust current control, frequency (Hz), and balance control to achieve the desired depth of penetration and bead characteristics for each application.

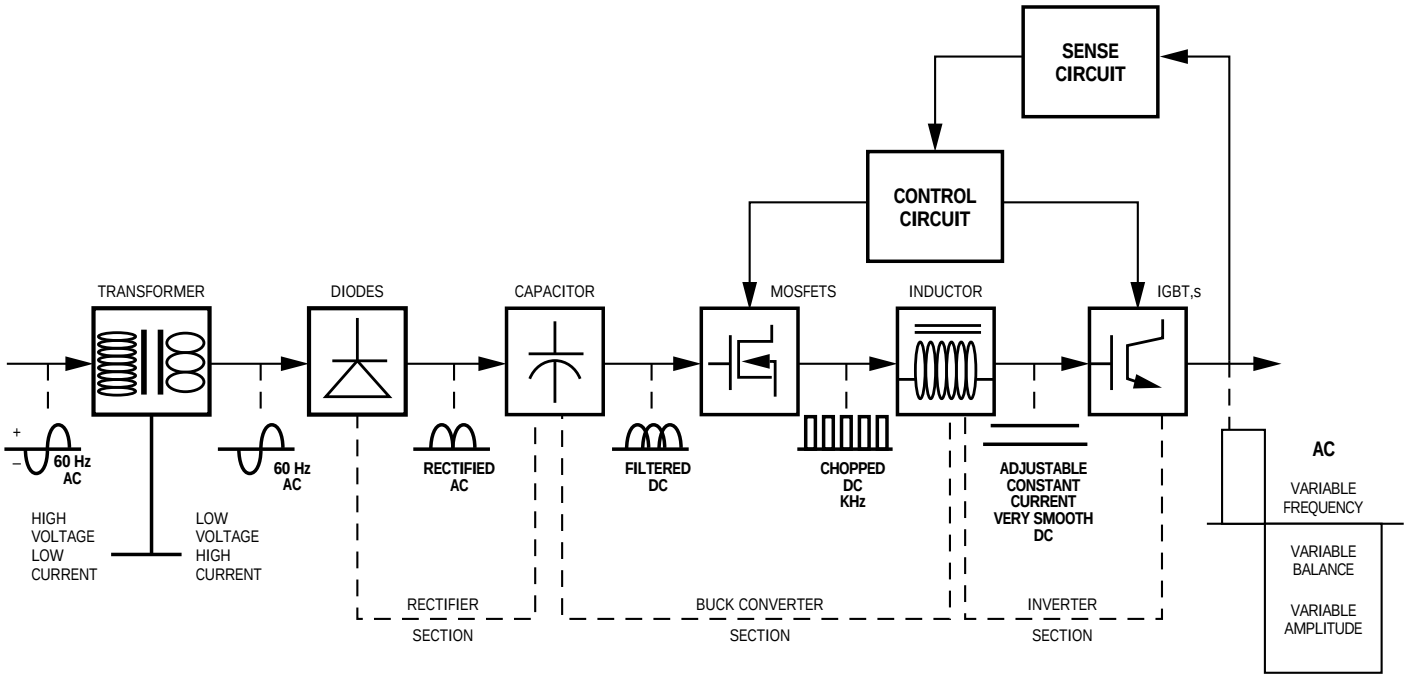
Feature	Waveform	Effect on Bead	Effect on Appearance
Independent Current Control (Asymmetric) Provides separate, independent amperage control of the Electrode Positive (EP) and Electrode Negative (EN) portions of an AC cycle. For example, when welding aluminum the amount of EP can be adjusted to a lower level than the EN, allowing more energy to be directed into the workpiece and providing faster travel speeds and deeper penetration. *Note: In a symmetric waveform, EN and EP have the same values for both current and time, so each half of the wave looks identical. If the values for current and time are not exactly the same, the waveform is then asymmetric.*		 More current in EN than EP: Deeper penetration and faster travel speeds	 Narrow bead, with no visible cleaning
		 More current in EP than EN: Shallower penetration	 Wider bead and cleaning action
Adjustable Frequency (Hz) The AC frequency, or Hz (also referred to as the cycles per second), is the number of complete EP to EN alternations that occur in a one second period of time. The Aerowave power source can be adjusted from 40 to 400 Hz, which in turn affects the arc cone (arc plasma width). For welding thick aluminum, a low frequency allows maximum welding energy to be transferred, and a wider weldment will result. This is ideal for build-up work. As the frequency is increased, the arc cone becomes more narrow and the arc pressure increases. This has a tendency to stabilize the arc and reduce arc wandering, providing ideal conditions for fillet welds and automated applications.	 40 cycles per second (shown asymmetric)	 Lower frequency: Wider bead, good penetration – ideal for buildup work	 Wider bead and cleaning action
	 400 cycles per second (shown asymmetric)	 Higher frequency: Narrower bead for fillet welds and automated applications	 Narrower bead and cleaning action
Balance Control (% EN) This control is similar to the balance control on conventional squarewave machines. But whereas conventional squarewave machines are limited to 68% EN, the Aerowave power source can be adjusted from 30% to 90% EN. Use the balance control in combination with the Independent Current Control for an even greater effect on EN.	 (shown asymmetric)	 More time in EN part of cycle: Deeper penetration and faster travel speeds	 Narrow bead, with no visible cleaning
	 (shown asymmetric)	 More time in EP part of cycle: Shallower penetration	 Wider bead and cleaning action

Note: All forms of AC create audible arc noise. Many asymmetric AC combinations, while greatly improving desired weld performance, create noise that may be objectionable to some persons. Hearing protection is always recommended.

Hybrid Technology: How It Works

The Aerowave power source offers an exciting combination of several electrical control technologies, providing a highly reliable state-of-the-art TIG (GTAW)/Stick (SMAW) unit.

As the block diagram below shows, when high-voltage, low-current AC is drawn into the power source, it is immediately transformed to a low-voltage, high-current AC. The power is then rectified to DC, filtered, and converted to a very-high-frequency chopped DC. When the chopped DC enters the inductor, it is smoothed to almost straight-line "battery-quality" DC. The control circuitry makes the DC fully adjustable. This is the point where the actual DC welding current is drawn from. If welding in AC, the DC is "inverted" into an asymmetric AC through the IGBTs, providing complete independent control of the EN and EP components of an alternating cycle. The sense circuit monitors the output and maintains precise, consistent control.



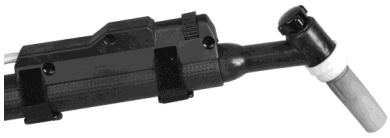
Block Diagram AC/DC Inverter Hybrid

Accessories

No. 17 Running Gear #004 563
Three 8 in (230 mm) rubber-tired wheels with towing handle and rack. Rack accommodates two cylinders or one cylinder plus a Watermate™ coolant system.

Remote Controls and Switches

RFCS-14 Foot Control #043 554
Heavy-duty foot current and contactor control. Includes 20 ft (6 m) cord and 14-pin plug.



RCC-14 Remote Contactor and Current Control #151 086
Rotary-motion fingertip control. Fastens to TIG torch using two Velcro strips. Includes 28 ft (8.5 m) cord and plug.

RMLS-14 Contactor Switch #129 337
Momentary- and maintained-contact rocker switch for contactor control. Push forward for maintained contact and back for momentary contact. Includes 20 ft (6 m) cord and 14-pin plug.

Extension Cords for 14-Pin Remote Controls
#122 973 25 ft (7.6 m)
#122 974 50 ft (15.2 m)
#122 975 75 ft (22.9 m)

Water Coolant Systems

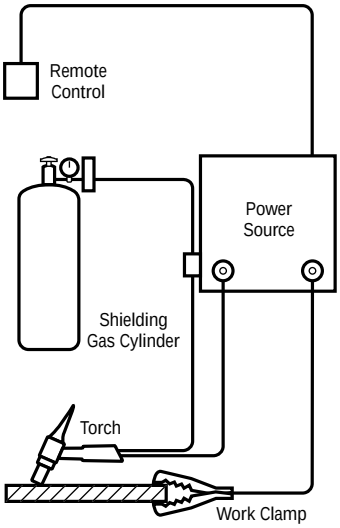
For use with water-cooled guns. For detailed information on Coolant Systems, refer to Literature Index No. AY/7.2.

Coolmate™ 3	**#043 007**	115 VAC
Coolmate™ 3	**#043 008**	230 VAC
Watermate™ 1A	**#042 495**	115 VAC
Coolmate™ 4	**#042 288**	115 VAC

Low Conductivity Antifreeze/Coolant #174 599
Its primary use is TIG (high frequency) applications, but can also be used in MIG systems where aluminum is not in the water path. Its formula minimizes “leakage” of high-frequency current.

Notes

System Checklist and Quotation Sheet



TIG (GTAW) Basic Equipment

Note: Coolant system required for water-cooled applications.

Power Source and Options	Stock No.	Description	Qty.	Price
Aerowave	**#903 329** **#903 330** **#903 331**	200/230/460 V, 60 Hz 230/460/575 V, 60 Hz 380/415 V, 50 Hz		
No. 17 Running Gear	**#004 563**			
Full Feature Module (Optional)	**#042 889**	Field installed		
Aerowave w/Full Feature Module	**#903 329-01-1** **#903 330-01-1** **#903 331-01-1**	200/230/460 V, 60 Hz 230/460/575 V, 60 Hz 380/415 V, 50 Hz		
No. 17 Running Gear	**#004 563**			
Remote Controls				
RFCS-14	**#043 554**	Foot control		
RCC-14	**#151 086**	Fingertip control		
RMLS-14	**#129 337**	Momentary- and maintained-contact switch		
Extension Cords	**#122 973** **#122 974** **#122 975**	25 ft (7.6 m) 50 ft (15.2 m) 75 ft (22.9 m)		
(Other)				
Coolant Systems **(not required for gas-/air-cooled systems)**				
Coolmate 4	**#042 288**	115 VAC		
Coolmate 3	**#043 007**	115 VAC		
Coolmate 3	**#043 008**	230 VAC		
Watermate 1A	**#042 495**	115 VAC Fits well into cylinder rack on running gear		
Coolant System Hoses				
Miller Coolant	**#174 599**	For freezing and boiling protection (1 gal)		
(Other)				
Miscellaneous				
TIG Torch				
Gas Regulator				
Gas Hoses				
TIG Power Cable Adapter				
Primary Power Cable				
Primary Power Plug				
Secondary/Welding Cables				
Extension Cords				
Gas Cylinder		Rent/Purchase		
Tungsten				
Filler Metal				
Labor and Installation				
Delivery Charges				
(Other)				
Date:		**Total Quoted Price:**		

Distributed by:

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The Power of Blue.

Litho in USA