



ENTRON™

Controls, LLC.

MICROPROCESSOR BASED RESISTANCE WELDING CONTROLS

PRODUCT CATALOG and SPECIFICATIONS

Effective: 01/08

Supersedes: 09/07

ENTRON Controls, LLC.

601 High Tech Court

Greer, SC 29650

(864) 416-0190

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ENTRON™

Controls, LLC.

MICROPROCESSOR BASED CONTROLS

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Contact your ENTRON Controls
Representative or Your Local Resistance
Welding Equipment Source

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RWMA®
MEMBER

750017-0108



Resistance Welding Controls

Series Bulletin: User Discount Schedule

Date: April 2006 Supercedes: July 1996

DISCOUNT SCHEDULE

To be applied to published List Prices

- Resistance Welder Controls, Printed Circuit Board Assemblies and Control Sub-Assemblies:

	QUANTITY	DISCOUNT	MULTIPLIER
Class I Purchaser: Customer who purchases controls directly from welding machine manufacturers, their authorized agents or from ENTRON Controls, and assume the responsibility of installation of the control on a welding machine.	Any	Net	1

	QUANTITY	DISCOUNT	MULTIPLIER
2. Resistance Welder Control Maintenance and Spare Parts: Class I Purchaser:	Any	Net	1

- Prices and Discounts are subject to change without notice. In the event of a price increase, the previous price will be maintained for equipment on order and allowed to be shipped within 30 days of the effective date of the price increase. In the event of a price decrease, the lower price will be applied to any part of the open order not shipped. Equipment shipped and invoiced against any such order is not subject to the lower price.

- Minimum Billing: \$50.00
- Terms: Net 30 Days
- Freight Charges: F.O.B., Greer, SC



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Resistance Welding Controls

Series Bulletin: Warranty

Date: April 2006 Supercedes: May 2005

ENTRON LIMITED WARRANTY

Important: Please read carefully. Our warranty statement provides critical information regarding your ENTRON weld control and subsequent service policy.

ENTRON Controls, LLC., warrants that all ENTRON control panels, **EXCEPT** the silicon controlled rectifiers (SCRs), insulated gate bipolar transistors (IGBT's), SCR and IGBT assemblies, circuit breakers, and electro-mechanical contactors, are free of manufacturing defects for a period of **TWO YEARS** from the date of original purchase and, in the event of a manufacturing defect, ENTRON will repair or replace, at its discretion, the defective part without any cost for parts or labor.

All silicon controlled rectifiers, SCR assemblies, IGBT assemblies, circuit breakers, Inverter controls carry a one year warranty from the date of original purchase, and electro-mechanical contactors in ENTRON control panels are covered by a **limited warranty from the original manufacturer**. If these parts fail because of a manufacturing defect they will not be repaired or replaced by ENTRON, but will be returned by ENTRON to the original manufacturer in accordance with said manufacturer's warranty.

To obtain repairs or replacement under this warranty, the defective part may be returned, prepaid, to ENTRON Controls, LLC., 601 High Tech Court, Greer, South Carolina 29650. Please send your repair to the attention of "service" with a description of the problem you are experiencing, contact person and phone number.

EXCLUSIONS: This warranty does not cover damage by accident or misuse, unauthorized repair or modification to any control assembly by the customer.

Important Note: The warranty period is considered from the date of shipment and is tracked by a serial number code.

USE OF OUT OF WARRANTY REPAIR SERVICE: To obtain service for any printed circuit board assembly after two years from the date of purchase, send the assembly, prepaid, to ENTRON Controls, LLC., and ENTRON will repair the printed circuit board assembly and return it to you without further warranty. Additional service charges may be invoiced at time of shipment.

Thank you for using ENTRON Controls.

Your ENTRON Controls, LLC., representative is always available to assist you with your control or welding problems. Our sales representatives, Original Equipment Manufacturers, Dealers and Distributors are always supported by direct factory assistance. Do not hesitate to call for prompt, professional assistance – 864-416-0190. There is no charge for this assistance.



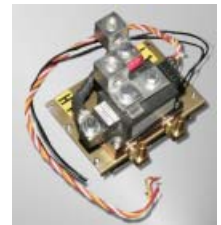
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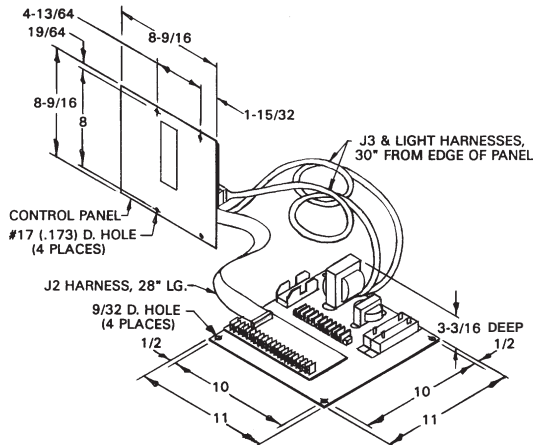
CABINET GUIDE



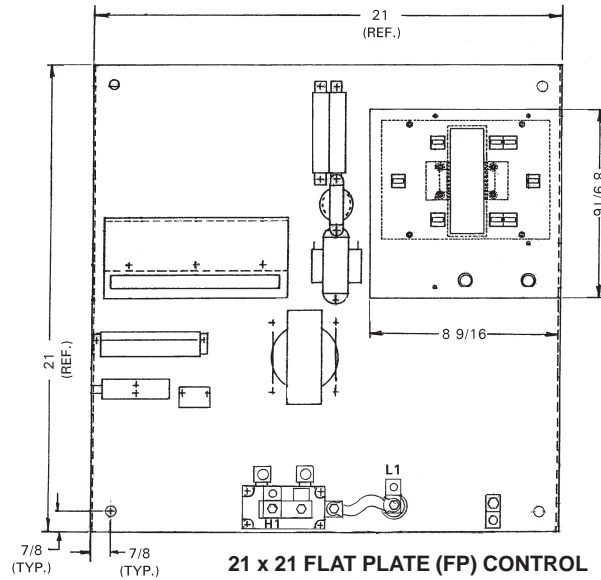
FLAT PLATE

CABINET TYPE	AVAILABLE CONTROL MODELS
FP	EN1000, EN1001, EN1500, EN2000
CASCADE FP	EN1000 CASCADE, EN1001 CASCADE
IMU	EN1000, EN1001

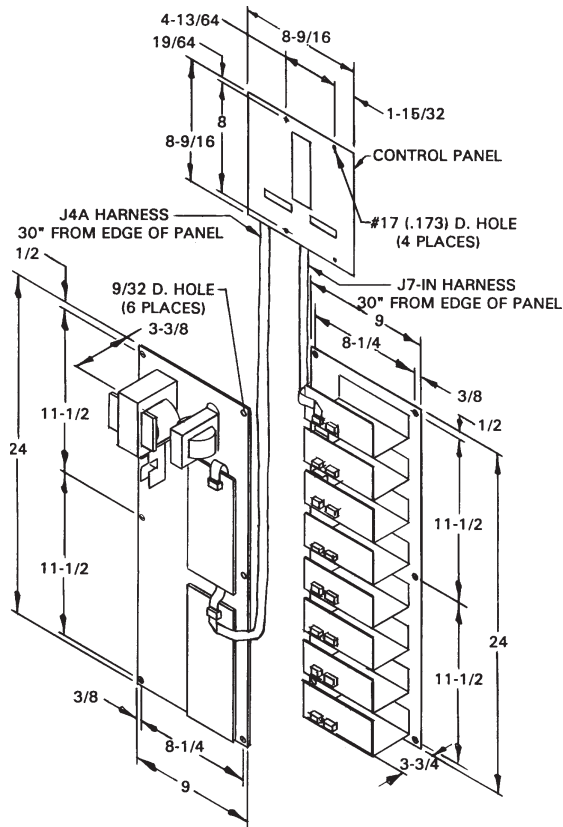
CONTACTOR SIZE	MAX. NO. OF CONTACTORS	CIRCUIT BREAKER
EXT. SCR	1	NOT AVAILABLE
EXT. SCR	UP TO 8	NOT AVAILABLE
EXT. SCR	1	NOT AVAILABLE



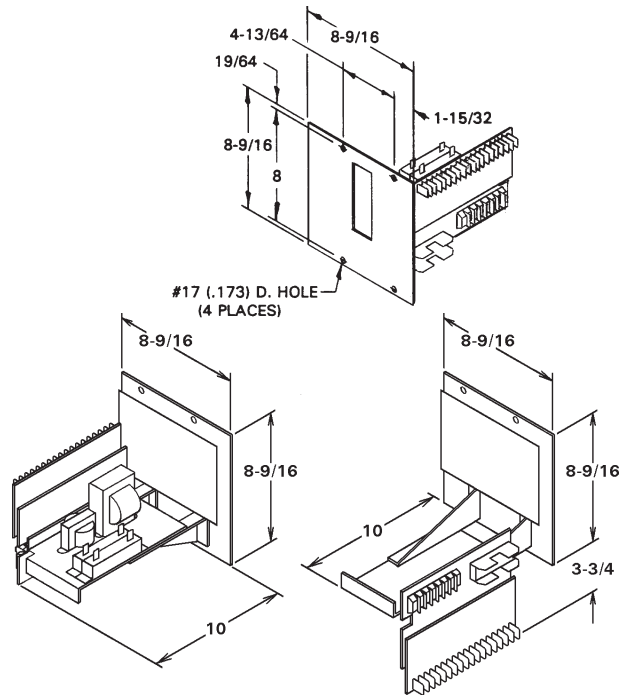
11 x 11 FLAT PLATE (FP) CONTROL



21 x 21 FLAT PLATE (FP) CONTROL



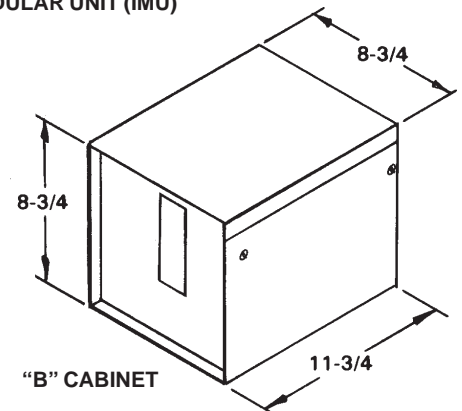
CASCADE FLAT PLATE CONTROL



INTEGRATED MODULAR UNIT (IMU)

“B” CABINET

AVAILABLE CONTROL MODELS	CONTACTOR SIZE	MAX. NO. OF CONTACTORS	CIRCUIT BREAKER
EN1000-B	150A	1	NOT AVAILABLE



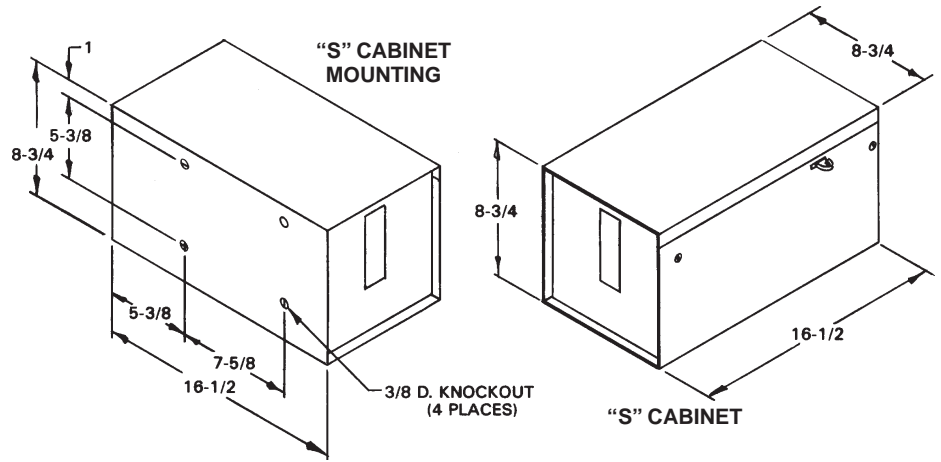
“B” CABINET

“S” CABINET

AVAILABLE CONTROL MODELS
EN1000, EN1001, EN2000

CONTACTOR SIZE	MAX. NO. OF CONTACTORS
EXT. IGN.	1
EXT. SCR	1
150A	1
300A	1
1200A	1

CIRCUIT BREAKER – NOT AVAILABLE

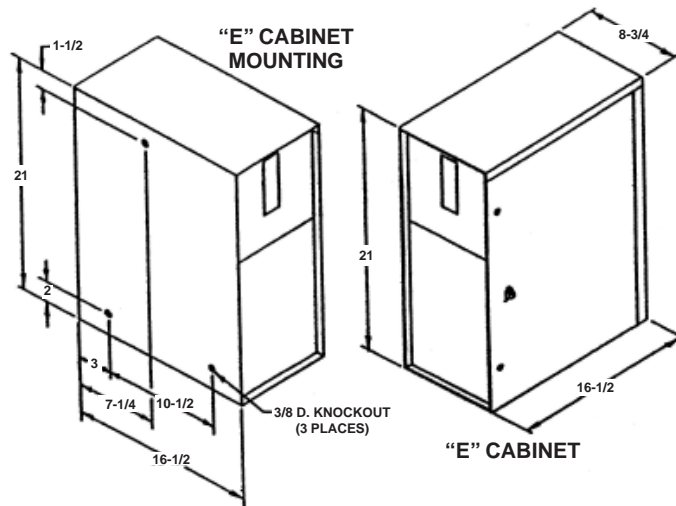


“E” CABINET

AVAILABLE CONTROL MODELS
EN1000, EN1001, EN2000

CONTACTOR SIZE	MAX. NO. OF CONTACTORS
EXT. IGN.	1
EXT. SCR	1
300A	1
1200A	1
1800A	1
2200A	1

CIRCUIT BREAKER – NOT AVAILABLE

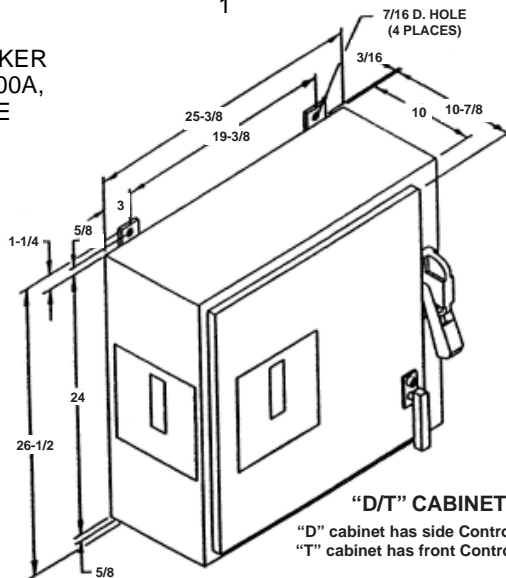


“D/T” CABINET

AVAILABLE CONTROL MODELS
EN1000, EN1001, EN2000, EN1003, EN1000 CASCADE

CONTACTOR SIZE	MAX. NO. OF CONTACTORS
EXT. IGN.	2
EXT. SCR	4
300A	3
1200A	3
1800A	1
2200A	1

CIRCUIT BREAKER
100, 200, OR 400A,
2 OR 3 POLE

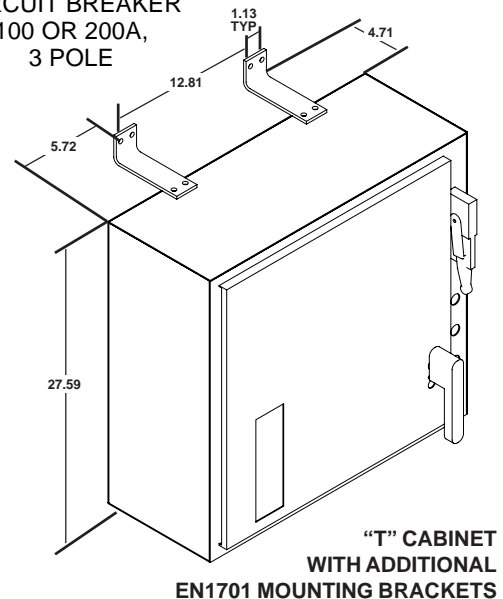


“T” CABINET

AVAILABLE CONTROL MODELS
EN1701

CONTACTOR SIZE	MAX. NO. OF CONTACTORS
300A	1
600A	1

CIRCUIT BREAKER
100 OR 200A,
3 POLE

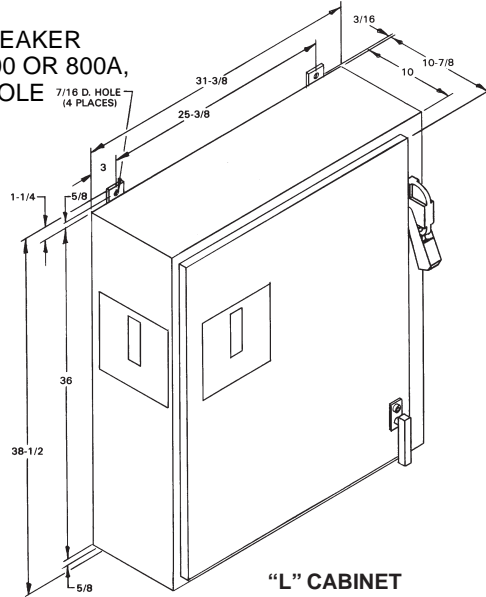


"L" CABINET

AVAILABLE CONTROL MODELS
 EN1000, EN1001, EN2000, EN1003, EN1000 CASCADE,
 MULTIPLE EN1000, MULTIPLE EN1001

CONTACTOR SIZE	MAX. NO. OF CONTACTORS
EXT. IGN.	6
EXT. SCR	8
300A	4
1200A	3
1800A	3
2200A	3

CIRCUIT BREAKER
 100, 200, 400, 600 OR 800A,
 2 OR 3 POLE



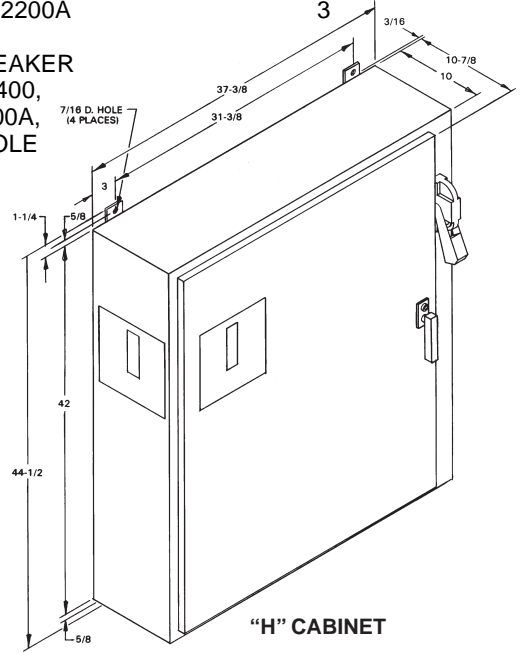
"L" CABINET

"H" CABINET

AVAILABLE CONTROL MODELS
 EN1000, EN1001, EN2000, EN1003, EN1000 CASCADE,
 MULTIPLE EN1000, MULTIPLE EN1001

CONTACTOR SIZE	MAX. NO. OF CONTACTORS
EXT. IGN.	8
300A	6
1200A	4
1800A	4
2200A	3

CIRCUIT BREAKER
 100, 200, 400,
 600 OR 800A,
 2 OR 3 POLE



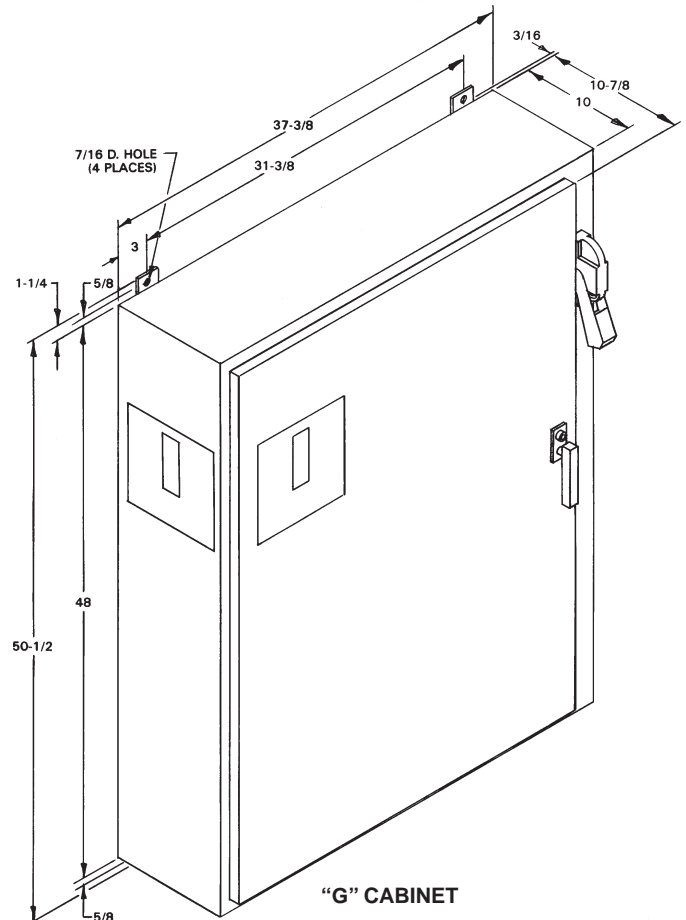
"H" CABINET

"G" CABINET

AVAILABLE CONTROL MODELS
 EN1000, EN1001, EN2000, EN1003, EN1000 CASCADE,
 MULTIPLE EN1000, MULTIPLE EN1001

CONTACTOR SIZE	MAX. NO. OF CONTACTORS
1200A	6
1800A	5
2200A	4

CIRCUIT BREAKER
 100, 200, 400,
 600 OR 800A,
 2 OR 3 POLE



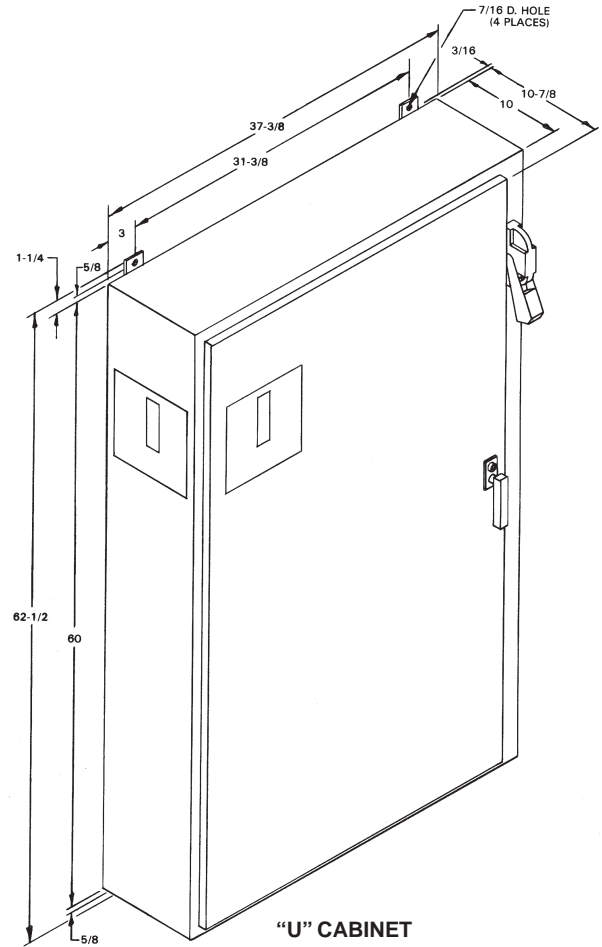
"G" CABINET

"U" CABINET

AVAILABLE CONTROL MODELS
 EN1000, EN1001, EN2000, EN1003, EN1000 CASCADE,
 MULTIPLE EN1000, MULTIPLE EN1001

CONTACTOR SIZE	MAX. NO. OF CONTACTORS
1200A	8
1800A	6
2200A	6

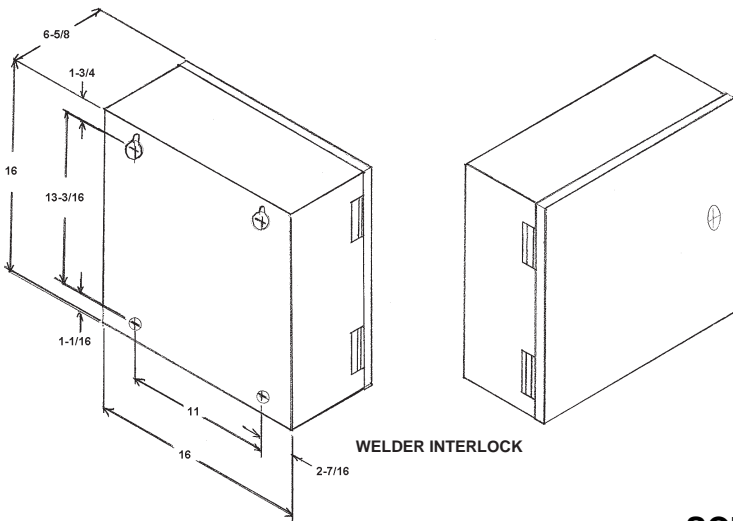
CIRCUIT BREAKER
 100, 200, 400,
 600 OR 800A,
 2 OR 3 POLE



"U" CABINET

WELDER INTERLOCK

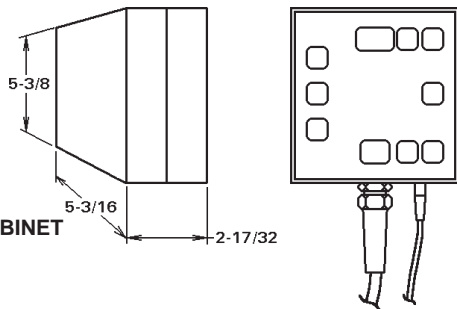
EN2WI-SS to EN8WI-SS



WELDER INTERLOCK

REMOTE TERMINAL CABINET (RT4jr.)

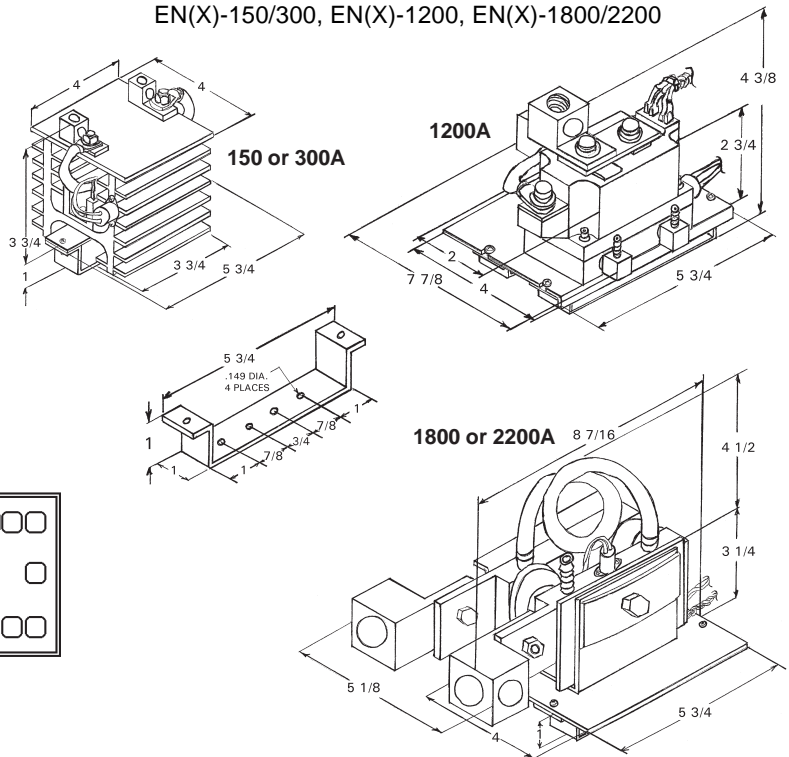
Used for remote, long distance mounting of Control Panel via RS485 for EN1000, EN1001 and EN2000 Controls



RT4jr. CABINET

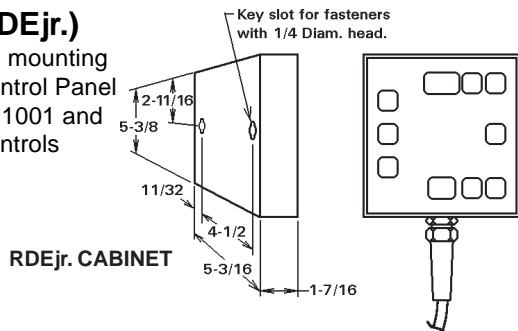
SCR CONTACTOR ASSEMBLIES

EN(X)-150/300, EN(X)-1200, EN(X)-1800/2200



REMOTE DATA ENTRY CABINET (RDEjr.)

Used for remote mounting (6 feet) of the Control Panel for EN1000, EN1001 and EN2000 Controls



RDEjr. CABINET

CAB.	TYPE OF CONTROL	CONTACTOR SIZE	MAX. NO. OF CONTACTORS	CIRCUIT BREAKER
FP	EN1000, EN1001, EN1500, EN2000	EXT. SCR	1	NOT AVAILABLE
FP	EN1000 CASCADE, EN1001 CASCADE	EXT. SCR	UP TO 8	NOT AVAILABLE
IMU	EN1000, EN1001	EXT. SCR	1	NOT AVAILABLE
B	EN1000-B	150A	1	NOT AVAILABLE
S	EN1000, EN1001, EN2000	EXT. IGN. EXT. SCR 150A 300A 1200A	1 1 1 1 1	NOT AVAILABLE
E	EN1000, EN1001, EN2000	EXT. IGN. EXT. SCR 300A 1200A 1800A 2200A	1 1 1 1 1 1	NOT AVAILABLE
D/T	EN1000, EN1001, EN2000, EN1003, EN1000 CASCADE	EXT. IGN. EXT. SCR 300A 1200A 1800A 2200A	2 4 3 3 1 1	100, 200, OR 400A, 2 OR 3 POLE
T	EN1701	300A 600A	1 1	100 OR 200A, 3 POLE
L	EN1000, EN1001, EN2000, EN1003, EN1000 CASCADE, MULTIPLE EN1000, AND MULTIPLE EN1001	EXT. IGN. EXT. SCR 300A 1200A 1800A 2200A	6 8 4 3 3 3	100, 200, 400, 600, OR 800A, 2 OR 3 POLE
H	EN1000, EN1001, EN2000, EN1003, EN1000 CASCADE, MULTIPLE EN1000, AND MULTIPLE EN1001	EXT. IGN. 300A 1200A 1800A 2200A	8 6 4 4 3	100, 200, 400, 600, OR 800A, 2 OR 3 POLE
G	EN1000, EN1001, EN2000, EN1003, EN1000 CASCADE, MULTIPLE EN1000, AND MULTIPLE EN1001	1200A 1800A 2200A	6 5 4	100, 200, 400, 600, OR 800A, 2 OR 3 POLE
U	EN1000, EN1001, EN2000, EN1003, EN1000 CASCADE, MULTIPLE EN1000, AND MULTIPLE EN1001	1200A 1800A 2200A	8 6 6	100, 200, 400, 600, OR 800A, 2 OR 3 POLE
—	WELDER INTERLOCK	N/A	N/A	N/A

THE REMOTE CABINET IS USED FOR REMOTE MOUNTING OF THE CONTROL PANEL FOR EN1000, EN1001 AND EN2000 CONTROLS.

SEE CATALOG FOR AVAILABILITY AND PRICE OF SPECIFIC CABINET/CONTACTOR/CONTROL CONFIGURATIONS.

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780054-0707

ENTRON™

Controls for Resistance Welding EN1000

Multiple Schedule/Multiple Sequence Controls



- **Simple to Program**
Push buttons and a short three-step procedure make easy work of programming any possible welding schedule.
- **New Design Reduces Cost**
Simplified design significantly reduces production costs which are passed on to you.
- **Quality Tested to Performance Extremes**
Each unit is tested to insure maximum performance at customary operating levels. The Entron resistance welding control has consistently offered an excellent performance history.
- **Application Flexibility**
Designed for use with single phase welding machines, rocker arm and press type welders, brazing and robotic equipment, and special machines.

Features

- Spot Sequence
- Pulsation Sequence
- Up & Down Slope
- Quench/Temper
- Forge Delay
- Multiple Weld/Multiple Current Sequence
- Preheat / Postheat
- External Schedule Select
- Process & Error Outputs
- Seam Sequence

Capabilities

- 50 Unique Schedules
- Chained & Successive Modes
- Repeat & Non Repeat
- Weld & Valve Control Relays
- 3 Valve Output
- Multiple Weld Programming
- Multiple Job Set-Ups
- Easily Programmed
- Program Only the Functions Required



Exclusive ENTRON two year warranty

Advantages

- **Design Simplicity**

Design simplicity is the key to our ability to manufacture the highest quality weld control with the best delivery, least maintenance, and lowest out of warranty service in the industry.

- **Field Expandable**

Entron can provide retrofit controls suitable for any manufacturer's controls of any age, type or sequence for installation in the field.

- **Vault Closing Door Mechanism**

D & T cabinet doors equipped with vault locking mechanism to ensure security.

- **Flexible Applications**

EN1000 Single Contactor Controls can be applied to spot welders, seam welders, special machines, or robotic equipment for welding materials of unequal thickness and coated materials.

- **Multiple Cabinet Options**

Available in D, T, E, S cabinet styles with front or side-mounted control panels.

- **Available Options**

Remote Data Entry
Program Lockout Switch
RS 232 Port Interface
Schedule Select
Valve Select (1 of 7) Option
RS485

D Cabinet



T Cabinet



S Cabinet



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780044-0406

ENTRON™

EN1000 Series Controls Multiple Schedule/Multiple Sequence Controls

Date: April 2006 Supersedes: August 2000

SPECIFICATIONS

Absolute Count: Push Button Data Entry with Display

Squeeze Count:	0 to 99 cyc, 50/60 Hz
Weld Count/Heat Count:	0 to 99 cyc, 50/60 Hz
Cool Count:	0 to 99 cyc, 50/60 Hz
Hold Count:	0 to 99 cyc, 50/60 Hz
Off Count:	0 to 99 cyc, 50/60 Hz
Weld Impulse Counter:	1 to 99 Impluses
Slope Control/Up and Down Slope:	0 to 99 cyc, 50/60 Hz
Digital Phase Shift Current Control, 10 to 99% in 1% current steps, all weld current functions	
It is NOT necessary to program functions NOT required, program only functions required	



Standard RWMA/NEMA Programmable Functions

Including the following as examples:

- Up Slope and Down Slope
- Quench/Temper
- Pulsation Sequence
- Multi-Weld Count/Multi-Current Select
- Pre-Heat/Post-Heat
- Forge Delay
- Seam Weld (Continuous and Intermittent)

4 Cycle Modes

- Non-Repeat: Single Schedule upon initiation
- Repeat: Single Schedule repeated with pilot circuit held closed
- Successive: Upon each initiation, unique successive schedules are automatically selected
- Chained: Multiple schedules can be linked to operate sequentially upon a single initiation

Additional Features

- Error Code/Fault Outputs
- 87° First Half Cycle Delayed Firing, Anti-Saturation Circuit
- Dynamic Automatic Power Factor Equalization
- Dynamic Automatic Voltage Compensation, $\pm 20\%$ of Nominal Line
- Emergency Stop Circuit
- Interlocking Pressure Switch Circuit
- Single Stage Pilot/2 Stage Pilot, Beat/Non-Beat Operation
- Operational Lights: Power On
Weld Current
- Indicator Lights for all functions on display panel
- Valve Transformer: 150VA 230/460-115V, E, D & T Cabinets
50VA 230/460-115V, S Cabinet
- 3 Valve outputs standard, all controls
Valve select 1 of 7, optional

Exclusive ENTRON two year warranty

EN1000 Series Controls

Multiple Schedule/Multiple Sequence Controls



The **EN1000 Series Control** is ideal for programming schedules for welding coated materials, aluminum, other non-ferrous metals, special alloys, multiple thickness of materials and many special part configurations.

- Store up to 50 **UNIQUE SCHEDULES**
 - Every parameter of each schedule individually accessible
 - Each schedule can store 11 distinct and totally different parameters
 - All schedules retained in memory with power off
 - It is **NOT NECESSARY** to program functions not required
- Four Cycle Modes can be programmed for complex welding schedules
- Select and Program up to 3 **VALVE CIRCUITS, STANDARD**
 - Independently selectable and programmable
- Single contactor circuitry
 - Process control outputs
- Additional Standard Features:
 - External Schedule Select
 - Contactor Failed Detection (Circuit breaker with shunt trip, optional)
- Control can be **INTERFACED** with external Programmable Logic Control (PLC); Advanced interfaces available

CABINET STYLE & DIMENSIONS				CONTACTOR STYLE & RATINGS			
STYLE	H	W	D	AIR COOLED	WATER COOLED		
FP	279 mm 11"	279 mm 11"			Please Contact Factory		
S	222 mm 8-3/4"	222 mm 8-3/4"	419 mm 16-1/2"	300A	1200A		
E	533 mm 21"	222 mm 8-3/4"	419 mm 16-1/2"	300A	1200A	1800A	2200A
D or T	610 mm 24"	645 mm 25-3/8"	254 mm 10"	300A	1200A	1800A	2200A

All SCR contactors complete with temperature limit switch.

Circuit Breakers available in D and T cabinets only. Consult factory for Circuit Breaker pricing. 100, 200 and 400 ampere Circuit Breakers are available in D and T cabinets with right hand, flange mounted operator installed within the cabinet. Consult factory for availability of 600 and 800 ampere Circuit Breakers.

See **COMPREHENSIVE PRICE LIST** for a complete list of Options, Circuit Breakers, Accessories and Special Features.

Contact your ENTRON Controls
Representative or Your Local Resistance
Welding Equipment Source

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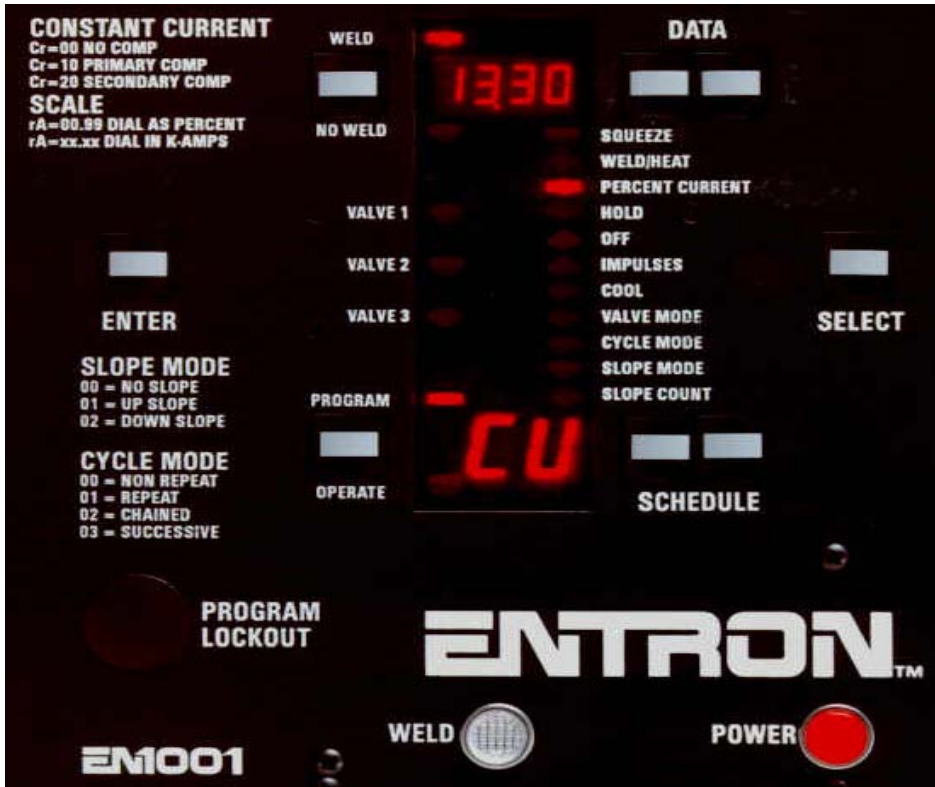
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ENTRON™

Controls for Resistance Welding EN1001

Constant Current/Multiple Sequence Controls



Features

- Spot Sequence
- Pulsation Sequence
- Seam Sequence
- Up & Down-Slope
- Chained & Successive Modes
- External Schedule Select
- Process & Error Outputs
- Five Programmable Stepper Counters
- 50 Schedules
- Repeat / Non Repeat
- 3 Valve Outputs
- Schedule to Schedule copy

Capabilities

- Extended Functions accessible via the Front Panel make Board-mounted dipswitches virtually obsolete
- Front Panel layout permits quick access to all needed parameters
- Program only functions required
- Multiple weld programs
- Multiple current sequence
- Pre-Heat / Post Heat
- Multiple job schedule storage
- Quench and Temper
- Flash / Butt Welding
- Diverse schedule capabilities provide maximum application versatility

Constant Current

Current Sensors:

Secondary Flexible Rogowski Coil or Primary Coil.

Secondary Flexible Rogowski Coil permits direct secondary kilo-Ampere programming and reading. Monitoring with High and Low limits.

Automatic Tap Up/Range Down or Tap Down/Range Up indicator.

Toggle function displays kilo-Ampere or Percent Current. Function helps avoid setups in very low or very high percent phase shifts.

All sensors permit Current Monitoring with High and Low limits.

Simple secondary range setting requires no setup. Secondary operating range of 2kA to 100kA.

Quick primary setup. Control learns and adapts to any machine size when primary sensing is used.

Welding Transformer ratio measurements not required for proper Constant Current Operation in percent mode with primary sensor.

Secondary ampere programming is available when a primary sensor is used and transformer ratio is provided.

Exclusive ENTRON two year warranty

**Expanded Capabilities
(Requires additional hardware)**

•**Schedule Select 49 [S49] Option.** Allows direct binary selection and initiation of any of 50 schedules in Spot Mode. Switch Weld Current on the fly to any of 50 currents in Seam Mode.

•**IPSC Options**
Integrated Pressure Control [IPC]. Weld Control stores an independent value of Pressure or Force in each of 50 Schedules. Associates Pressure with Squeeze time for concurrent valve actuation.

Integrated Pressure Sensing [IPS]. Weld Control stores an independent value of Pressure or Force in each of 50 Schedules. Associates sensed Pressure with Pressure Switch input for Pressure/Force level weld triggering.

Integrated Pressure Sense and Control [IPSC]. Weld control combines the previous two options into a full pressure control and monitoring system.

•**RS485 Communication.** Control can be networked along with 63 other units for remote programming and monitoring. Up to 32 Masters allow for grouping within a network. Up to 32 PC hosts allow for programming or statistical data collection or error monitoring.

•**RS232** provides Serial communication.

•**ENLINK for WINDOWS** Communication software provides PC and Laptop interface for remote programming and monitoring of EN1001 series controls. ENLINK for WINDOWS Communication software is included with RS485 option.

•**Memory Module [MM2]** is designed as a backup device for any EN1001 series control or as Copy/Download device for all Data from one Control to another.

•**Valve Select 1 of 7 [VS].** This option provides 7 additional decoded outputs from the 3 standard EN1001 series controls.

D Cabinet



E Cabinet



S Cabinet



Primary Coil (P5)



Rogowski Coil (S6)

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ENTRON™

EN1001 Series Controls Constant Current/Multiple Sequence Controls

Date: July 2007

Supersedes: April 2006

SPECIFICATIONS

Constant Current Operation

- Primary or Secondary Sensing with 2 Sensors available: Primary Coil or Secondary Coil
- Secondary Coil Calibrated for full range of operations from 2kA to 100kA requires no setup or learning
- Control achieves Compensation on Second weld cycle
- Compensation algorithms permit 1% accuracy
- Current readings available at end of weld; Percent phase shift reading available by the push of a button
- Intelligent error reporting associates weight of error versus weld time when using Hi/Lo windows
- Primary or Secondary Sensors permit users a choice for simple and accurate constant current operation
- Control is programmable in Percent Phase shift or kAmps
- Current Monitoring only mode, can monitor 1/2 cycle welds

Absolute Count: Push Button Data Entry with Display

- Squeeze Count: 0 to 99 cycles, 50/60 Hz
- Squeeze: Pressure/Force 00 to 99psi/0000 to 9999 Lbs.
- Trigger value 00 to 99psi/0000 to 9999 Lbs.
- Weld Count/Heat Count: 0 to 99 cycles, 50/60 Hz
- 5 Steppers each with 10 steps counting up to 9999 welds.
- Cool Count: 0 to 99 cycles, 50/60 Hz
- Hold Count: 0 to 99 cycles, 50/60 Hz
- Off Count: 0 to 99 cycles, 50/60 Hz
- Weld Impulse Counter: 1 to 99 cycles, 50/60 Hz
- Slope Control/Up and Down Slope: 0 to 99 cycles, 50/60 Hz

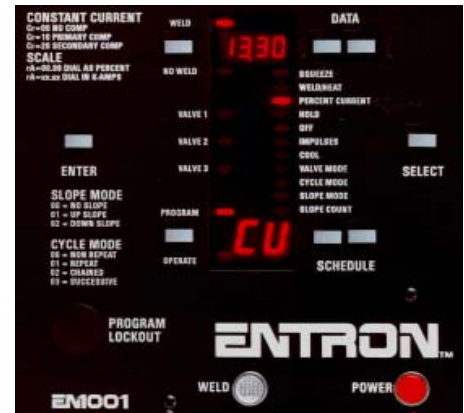
Current Programmability in KiloAmps/Percent up to 99.99kA/99% in 0.01kA/1% current steps.

Standard RWMA/NEMA Programmable Functions

- Up Slope and Down Slope Stepper
- Quench and Temper Forge Delay
- Pulsation Sequence Pre-Heat/Post Heat
- Multi-Schedule Select End of sequence
- Seam Weld (Continuous and Intermittent) Air over oil
- Retraction

5 Cycle Modes

- Non-Repeat: Single Schedule upon initiation
- Repeat: Single Schedule repeated with pilot circuit held closed
- Successive: Upon each initiation, unique successive schedules are automatically selected
- Chained: Multiple schedules can be linked to operate sequentially upon a single initiation
- Paused Chain: Valves remain active after HOLD until Re-initiation to next schedule in sequence



Additional Features

- Error Code/Fault Outputs
- 87° First Half Cycle Delayed Firing,
- Anti-Saturation Circuit
- Anti Tie Down
- Temperature Limit Switch
- Dynamic Automatic Power Factor Equalization
- Dynamic Automatic Voltage Compensation, $\pm 20\%$ of Nominal Line
- Current Offset
- Emergency Stop Circuit
- Interlocking Pressure Switch Circuit
- Single Stage Pilot/2 Stage Pilot Beat/Non-Beat Operation
- Operational Lights: Power On Weld Voltage
- Indicator lights for all functions on display panel
- Valve Transformer: 150VA 230/460-115V, E, D & T Cabinets; 50VA 230/460-115V, S Cabinets
- 3 Valve Outputs standard, all controls except 1001B.

Options:

- Valve select 1 of 7
- S49, External Binary Schedule Select
- IPSC, Integrated Pressure Sense Control
- MM2, Memory Module
- RS485 with ENLINK or RS232
- Water Flow Switch
- Shunt Trip Disconnect
- Ground Fault Detection

Exclusive ENTRON two year warranty

EN1001 Series Controls

Constant Current/Multiple Sequence Controls

D Cabinet



E Cabinet



S Cabinet



The EN1001 Series Constant Current Control is ideal for programming schedules where changing conditions such as line voltage variation, size and shape of the secondary, or the introduction of ferrous material in the secondary are of concern and current compensation is desired.

- CONSTANT CURRENT with a 4 digit display in kAmps
- Store up to 50 UNIQUE SCHEDULES
- Schedules retained in memory with power off
- Three Valve Circuits, standard
- Single contactor Firing Circuit
- External Schedule Select allows remote binary selection of 4 schedules
- Five Programmable Steppers to extend tip life
- Current Offset allows quick manual current adjustments
- Control can be interfaced and initiated using a PLC (Programmable Logic Controller)
- Meets or exceeds RWMA/NEMA standards
- Secondary coil requires No Setup; Only range selection for constant current
- Primary sensor requires No Transformer Ratios
- Current monitor with Hi/Lo current limit windows

OPTIONS:

- RS485 implemented with 2 wire ENBUS using non-proprietary protocol; Controls can be networked through remote terminals (RT4jr.) or use PC compatible ENLINK software to download, store or edit weld control data
- RS232 Single point communications
- IPS, IPC, IPSC, Integrated Pressure Sense, Control or Sense and Control Program 50 Unique Pressures, or Trigger Levels
- MM2, Memory Module provides backup for all data of EN1001 Series Controls
- S49, External Binary Select, allows remote binary selection of any of 50 schedules
- Valve Select 1 of 7
- Shunt Trip Breaker
- Ground Fault Detection

CABINET STYLE & DIMENSIONS				CONTACTOR STYLE & RATINGS				
STYLE	H	W	D	AIR COOLED		WATER COOLED		
B	222 mm • 8-3/4"	222 mm • 8-3/4"	296 mm • 11-3/4"	150A	300A			
S	222 mm • 8-3/4"	222 mm • 8-3/4"	419 mm • 16-1/2"		300A			
E	533 mm • 21"	222 mm • 8-3/4"	419 mm • 16-1/2"		300A	1200A	1800A	2200A
D or T	610 mm • 24"	645 mm • 25-3/8"	254 mm • 10"		300A	1200A	1800A	2200A

All SCR contactors complete with temperature limit switch.

Consult factory for Circuit Breaker pricing. 100, 200 and 400 ampere Circuit Breakers are available in D & T cabinets with right-hand, flange mounted operator installed within the cabinet. Consult factory for availability of 600 and 800 ampere Circuit Breaker. See COMPREHENSIVE PRICE LIST for a complete list of Options, Circuit Breakers, Accessories and Special Features.

Contact your ENTRON Controls Representative or Your Local Resistance Welding Equipment Source

ENTRON

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ENTRON™

Controls for Resistance Welding

EN1721

Single Phase AC Constant Current Controls



Constant Current

- Control adjusts current output every half cycle.
- No setup necessary for constant current operation.
- When optional secondary coil is used, secondary amps are directly displayed.
- High, Low and Pre limits.
- Manual calibration via 2 set points for secondary coil.
- Pop-up current meter to assist programming.
- Auto secondary coil test.
- Results of last weld available immediately.

Features

- Spot, Pulsation or Seam Sequence
- RS232 Port
- Programmable options: Slope, Pre-Heat, Quench, Temper, Post Heat
- Linked Programs
- External Schedule Select
- Event & Error Outputs
- 64 Programs
- Repeat / Non Repeat
- Isolation Contactor Timer
- Single/Dual Gun
- Programming in phase angle, kA or %
- Measurement Log
- Dual Gun Stepper with Presets and Tip Dress Counter
- 24 VDC flexible I/O (14 in 12 out); some mappable between weld functions, events and simple I/O sequences
- Diverse schedule capabilities provide maximum application versatility
- I/O Sequencer
- 4-20 mA or 0-10 V analog inputs and outputs provided for pressure sensing and control
- Two 0-10V analog inputs (Sequencer)
- Program Select
- Retraction
- Dual-interval Welding Sequence

Options

- Detachable 4 x 20 LCD Program Pendant (RPP1) with data backup
- ENLINK 1721
- Ethernet port
- Primary and Secondary coils
- Program Lockout
- Operation Mode Switch (OMS) – Program Lockout & Weld/No Weld
- Pressure Sensors
- Proportional Valve
- Isolation Contactor
- GFI for portable guns
- Water Flow Switch

Exclusive ENTRON two year warranty

Expanded Capabilities
(Requires additional software and/or hardware)

TO PROGRAM, YOU WILL NEED:

Program Pendant (RPP1)

Detachable, hand-held pendant accesses all programmable variables and displays current and status.



- OR -

ENLINK 1721

Communication software provides PC interface for remote programming and monitoring of control.



TO MEASURE CURRENT IN AMPS, YOU WILL NEED:

Secondary Rogowski Coils

Available in 3", 6" or 12" diameters. Provides actual secondary amperage measurements.



- OR -

Coil as part of Weld Transformer.

OPTIONAL:

• **Ethernet Card**

Provides ability to network multiple controls using ENLINK 1721.

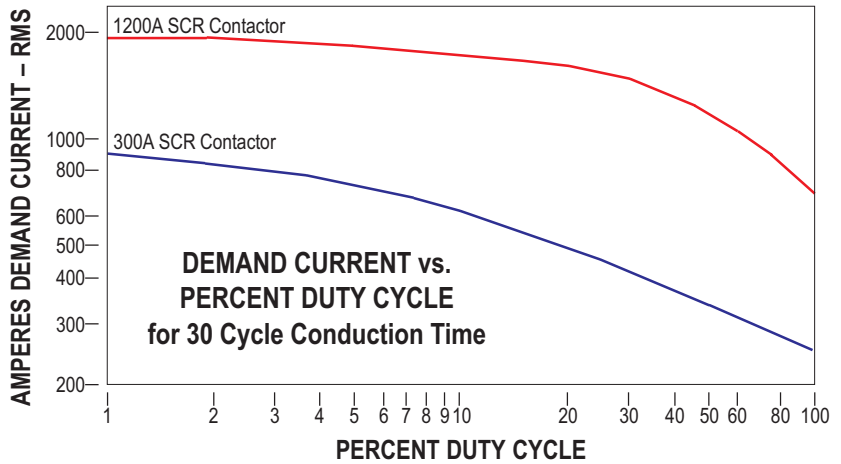


• **Pressure Sense and Control Hardware**

Using provided analog I/O, add differential sensors, single-ended sensors, or 1/2" and 1 1/4" port proportional controllers.



• **GFI for portable guns**



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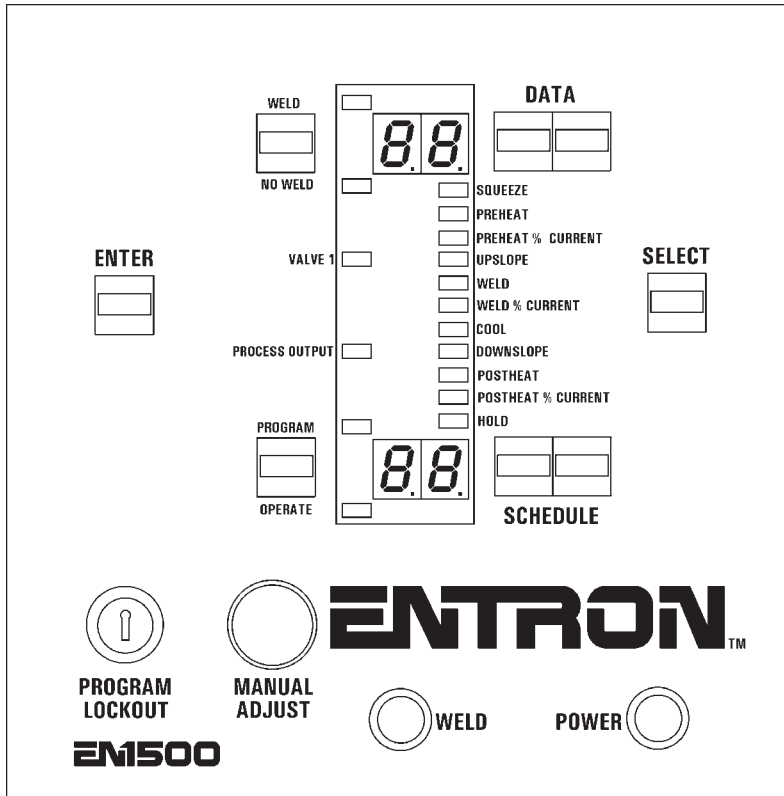


ENTRON™

Controls for Resistance Welding

EN1500

Seam Welding Controls



- **Simple to Program**

Push buttons and a three-step procedure make easy work of programming any welding schedule.

- **Two Year Warranty**

A two year warranty is offered on all ENTRON parts and assemblies. Expert phone support and application service are available at no cost.

- **Change Current “On the Fly”**

While welding, change current “on the fly” with Manual Current Adjust (optional).

- **Direct Replacement for EN500**

- **Unique Design**

Specifically designed for ALL types of seam welding, including roll spot.

Features

- Seam Sequence
- Preheat/Postheat
- Up/Down Slope
- Continuous/Intermittent
- Beat/Non-Beat Operation
- End of Sequence Output
- Hierarchical Initiation Structure
- Optional Manual Current Adjust

Capabilities

- 50 Unique Schedules
- Weld & Valve Control Relays
- One Valve Output
- Multiple Job Set-ups
- Easy to Program
- Program Only the Functions Required
- Spot/Roll Spot

Exclusive ENTRON two year warranty

EN1500 Series Controls

Seam Welding • Multiple Schedule/Multiple Sequence Controls

Date: February 2007 Supercedes: April 1998

SPECIFICATIONS

Absolute Count: Push Button Data Entry with Display

Squeeze Count:	0 to 99 cycles, 50/60 Hz
Preheat Count:	0 to 99 cycles, 50/60 Hz
Weld Count:	continuous seam or intermittent seam
Cool Count:	0 to 99 cycles, 50/60 Hz
Postheat Count:	0 to 99 cycles, 50/60 Hz
Hold Count:	0 to 99 cycles, 50/60 Hz
Slope control/Up and Down Slope:	0 to 99 cycles, 50/60 Hz
Digital Phase Shift Current Control, 10 to 99% in 1% current steps, all weld current functions	
It is NOT necessary to program functions NOT required, program only functions required	

Standard RWMA/NEMA Programmable Functions

Including the following as examples:

- Up Slope and Down Slope
- Seam Weld (Continuous or Intermittent)
- Multi-Weld Count/Multi-Current Select
- Pre-Heat/Post-Heat
- Priority heat select individual or switch on the fly
- Switch weld schedule on the fly upon limit switch input

Additional Features

- Error Code/Fault Outputs
- 87° First Half Cycle Delayed Firing, Anti-Saturation Circuit
- Dynamic Automatic Power Factor Equalization
- Dynamic Automatic Voltage Compensation, $\pm 20\%$ of Nominal Line
- Emergency Stop Circuit
- Interlocking Pressure Switch Circuit
- Single Stage Pilot/2 Stage Pilot Beat/Non-Beat Operation
- Operational Lights: Power On Weld Current
- Indicator Lights for all functions on display panel
- Valve Transformer: 50VA 230/460-150V
- Single Valve output standard, all controls
- (Optional) Change Current "On the Fly" (while welding) with Manual Current Adjust

The EN1500 Series Control is a microprocessor based resistance welding control. It has been designed specifically for Seam Welding applications. One outstanding feature of the EN1500 control is its ability to allow the operator concurrent adjustment of weld heat intensity during an initiated sequence (this feature is optional).

- Store up to 50 UNIQUE SCHEDULES
 - Every parameter of each schedule individually accessible
 - Each schedule can store 11 distinct and totally different parameters
 - All schedules retained in memory with power off
 - It is NOT NECESSARY to program functions not required
- Single contactor circuitry; Process control outputs
- Additional Standard Features:
 - Priority Heat Select
 - Contactors Failed Detection (Circuit breaker with shunt trip, optional)
- Control can be INTERFACED with external Programmable Logic Control (PLC); Advanced interfaces available
- Meets or exceeds RWMA/NEMA standards

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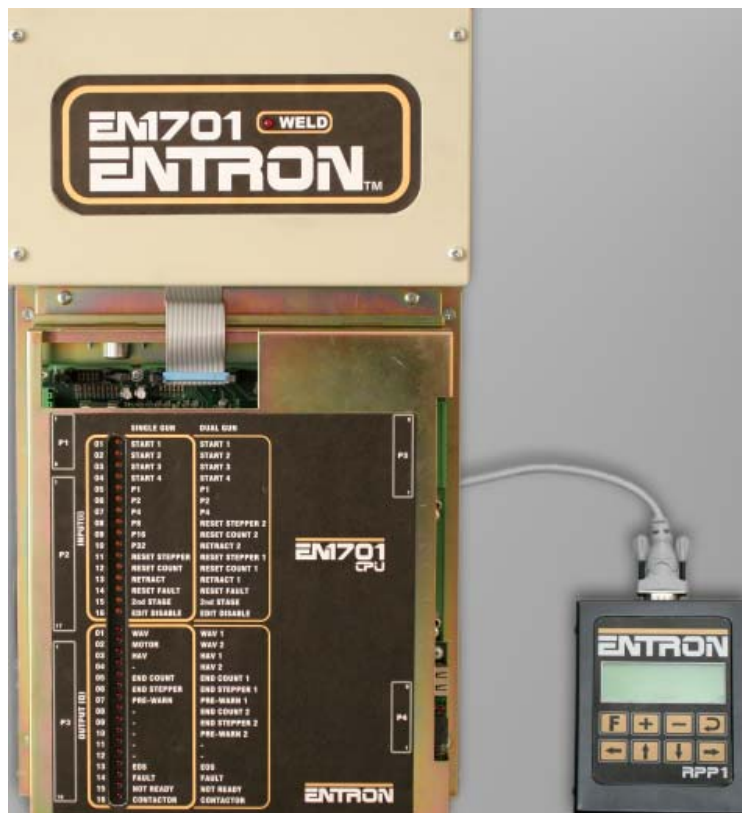
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ENTRON™

Controls for Resistance Welding

EN1701

Mid Frequency Inverter Constant Current Controls



Features

- Millisecond control of weld time
- Spot, Pulsation or Seam Sequence
- RS232 Port
- Programmable options: Slope, Preheat, Quench, Temper, Postheat
- Linked Programs
- External Schedule Select
- Event & Error Outputs
- 64 Programs
- Repeat / Non-Repeat
- Earth Leakage Detection with Shunt Trip Breaker
- Isolation Contactor Timer
- Single/Dual Gun
- Programming in phase angle, kA or %
- Measurement Log
- 24 VDC flexible I/O (19 in 16 out); some mapable between weld functions, events and simple I/O sequences
- Dual Gun Stepper with Presets and Tip Dress Counter
- Diverse schedule capabilities provide maximum application versatility
- I/O Sequencer
- 4-20 mA or 0-10 V analog inputs and outputs provided for pressure sensing and control
- Two 0-10V analog inputs (Sequencer)
- Program Select
- Retraction
- Dual-interval Welding Sequence

Constant Current

- Control adjusts current output every millisecond.
- No setup necessary for constant current operation.
- Compensation is still available without secondary coil.
- When optional secondary coil is used, secondary amps are directly displayed.
- Primary current sensors built in.
- High, Low and Pre limits.
- Manual calibration via 2 set points for secondary coil.
- Pop-up current meter to assist programming.
- Maximum primary Amp limit.
- Auto secondary coil test.
- Control uses a dual loop feedback system to optimize its performance in terms of both speed and accuracy.
- Results of last weld available immediately.

Options

- Detachable 4 x 20 LCD Program Pendant (RPP1) with data backup
- ENLINK 1701
- Ethernet port
- Secondary coils
- Program Lockout
- Operation Mode Switch (OMS) – Program Lockout & Weld/No Weld
- Pressure Sensors
- Proportional Valve
- Isolation Contactor
- GFI for portable guns
- Water Flow Switch

Expanded Capabilities (Requires additional software and/or hardware)

TO PROGRAM, YOU WILL NEED:

Program Pendant (RPP1)

Detachable, hand-held pendant accesses all programmable variables and displays current and status.



- OR -

ENLINK 1701

Communication software provides PC interface for remote programming and monitoring of control.



TO MEASURE CURRENT IN AMPS, YOU WILL NEED:

Secondary Rogowski Coils

Available in 3", 6" or 12" diameters. Provides actual secondary amperage measurements.



- OR -

Coil as part of Weld Transformer.

OPTIONAL:

• Ethernet Card

Provides ability to network multiple controls using ENLINK 1701.



• Pressure Sense and Control Hardware

Using provided analog I/O, add differential sensors, single-ended sensors, or 1/2" and 1 1/4" port proportional controllers.



• GFI for portable guns



T Cabinet
(24" x 24" x 10")

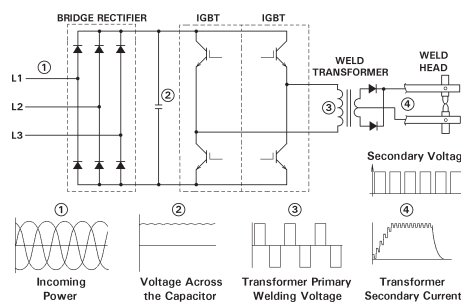
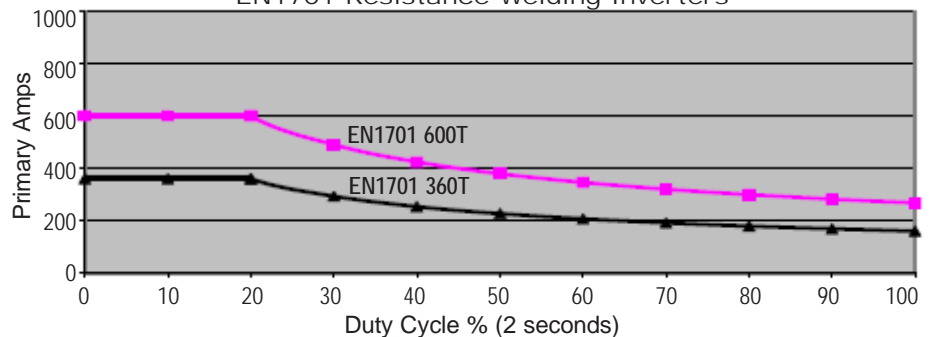


Specifications

	EN1701-360T	EN1701-600T
Maximum output power @ 20% duty	234 kVA	390 kVA
Maximum line input voltage	480 VAC @ 50/60 Hz	480 VAC @ 50/60 Hz
Maximum output current	360 A	600 A
Maximum continuous output current	161 A	268 A
Maximum line input current per phase	209 A	347 A
Continuous rms line current per phase @ 20% duty	93 A	155 A
Breaker (standard) *	100 Amp 3 pole *	200 Amp 3 pole *
Power factor	leading	leading
Regulation feedback	secondary or primary	secondary or primary
Current regulation accuracy	±2%	±2%
Current regulation repeatability	±1%	±1%
Inverter switching frequency	1 kHz	1 kHz
Maximum averaging time	2 seconds	2 seconds
Water flow rate	1 GPM	1 GPM
Maximum water inlet temperature	104° F (40° C)	104° F (40° C)
Transformers		
40 kVA	✓	
56 kVA 70:1	✓	✓
76 kVA 54:1	✓	✓
100 kVA 50:1		✓

* Control must be ordered with 3 pole shunt trip breaker.

EN1701 Resistance Welding Inverters



One year warranty offered on
EN1701 Series Controls

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Controls for Resistance Welding EN1003

Multiple Schedule/Multiple Sequence 3 Phase DC Controls



- ***Simple to Program***
Push buttons and a short three-step procedure make easy work of programming any possible welding schedule.
- ***New Design Reduces Cost***
Simplified design significantly reduces production costs. These savings are passed on to you.
- ***Quality Tested to Performance Extremes***
Each unit is tested to insure maximum performance at customary operating levels. The ENTRON resistance welding control has consistently offered an excellent performance history.
- ***Application Flexibility***
Transformers can be connected in an Inside Delta, Outside Delta, or “Y” configuration.

Features

- 3 SCR Contactors
- Spot Sequence
- Pulsation Sequence
- Up & Down Slope
- Quench/Temper
- Forge Delay
- Multiple Weld/Multiple Current Sequence
- Preheat/Postheat
- External Schedule Select
- Seam Sequence
- Brazing
- Flash Welding
- Retraction
- Squeeze Delay
- Stepper

Capabilities

- 50 Unique Schedules
- Chained & Successive Modes
- Repeat & Non-Repeat
- Weld & Valve Control Relays
- 3 Valve Outputs
- Multiple Weld Programming
- Multiple Job Set-Ups
- Easily Programmed
- Program Only the Functions Required

Exclusive ENTRON two year warranty

Advantages

- ***Design Simplicity***

Design simplicity is the key to our ability to manufacture the highest quality weld control, the best delivery, and the lowest service requirements in the industry.

- ***Field Expandable***

ENTRON can provide retrofit controls suitable for any manufacturer's controls, of any age, type or sequence, for field installation.

- ***Vault Door Locking Mechanism***

All cabinet doors equipped with a vault locking mechanism to insure security.

- ***Flexible Applications***

EN1003 controls can be applied to spot welders, seam welders, special machines, or robotic equipment for welding a full range of weldable materials.

- ***Multiple Cabinet Options***

Available in D, T, L and H cabinet styles with front or side-mounted control panels.



D Cabinet



L Cabinet



Unique to ENTRON. All EN1003 3 Phase DC Controls in L & H Cabinets feature provisions for field installation or change of circuit breakers.

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ENTRON™

EN1003 Series Controls

Multiple Schedule/Multiple Sequence 3 Phase DC Controls

Date: April 2006

Supersedes: July 2004

SPECIFICATIONS

Absolute Count: Push Button Data Entry with Display

Squeeze Count:	0 to 99 cyc, 50/60 Hz
Weld Count/Heat Count:	0 to 99 cyc, 50/60 Hz
Cool Count:	0 to 99 cyc, 50/60 Hz
Hold Count:	0 to 99 cyc, 50/60 Hz
Off Count:	0 to 99 cyc, 50/60 Hz
Weld Impulse Counter:	1 to 99 Impluses
Slope Control/Up and Down Slope:	0 to 99 cyc, 50/60 Hz
Digital Phase Shift Current Control, 10 to 99% in 1% current steps, all weld current functions	
It is NOT necessary to program functions NOT required, program only functions required	

Standard RWMA/NEMA Programmable Functions

Including the following as examples:

- Up Slope and Down Slope
- Quench/Temper
- Pulsation Sequence
- Multi-Weld Count/Multi-Current Select
- Pre-Heat/Post-Heat
- Forge Delay
- Seam Weld (Continuous and Intermittent)

4 Cycle Modes

- Non-Repeat: Single Schedule upon initiation
- Repeat: Single Schedule repeated with pilot circuit held closed
- Successive: Upon each initiation, unique successive schedules are automatically selected
- Chained: Multiple schedules can be linked to operate sequentially upon a single initiation

Additional Features

- Error Code/Fault Outputs
- 87° First Half Cycle Delayed Firing, Anti-Saturation Circuit
- Selectable 50/60 Hz. operation
- Dynamic Automatic Voltage Compensation, $\pm 20\%$ of Nominal Line
- Emergency Stop Circuit
- Interlocking Pressure Switch Circuit
- Single Stage Pilot/2 Stage Pilot, Beat/Non-Beat Operation
- Operational Lights: 3) Power On
3) Weld Current
- Indicator Lights for all functions on display panel
- Indicator LEDs for pilot inputs and diagnostics
- Valve Transformer: 150VA 230/460-115V, All Cabinets
- 3 Valve outputs standard, all controls
- Weld Stepper



Exclusive ENTRON two year warranty

EN1003 Series Controls

Multiple Schedule/Multiple Sequence 3 Phase DC Controls



EN1003

Style L Cabinet

914 mm x 797 mm x 254 mm

36" x 31-3/8" x 10"

The **EN1003 Series Control** is ideal for machines that require either large secondary currents or, by design, have high power losses caused by ferrous metals in the throat of the welder, such as parts of the machine and/or welded parts.

- Store up to 50 **UNIQUE SCHEDULES**
 - Every parameter of each schedule individually accessible
 - Each schedule can store 11 distinct and totally different parameters
 - All schedules retained in memory with power off
 - It is **NOT NECESSARY** to program functions not required
- Four Cycle Modes can be programmed for complex welding schedules
- Select and Program up to 3 **VALVE CIRCUITS, STANDARD**
 - Independently selectable and programmable
 - Process control outputs • External Schedule Select •
 - Anti-Tiedown Initiations • Forge Delay • Versatile Weld Stepper •
- Control can be **INTERFACED** with external Programmable Logic Control (PLC); Advanced interfaces available
- Selected Heat used **SIMULTANEOUSLY** on 3 Contactor Outputs.
- Transformers can be connected in an outside delta, inside delta, or "Y" configurations.
- Optional Functions:
 - Program Lockout Switch • Schedule Select • RS232 Port Interface •
 - Remote Date Entry • Valve Select (One of Seven) Option •

CABINET STYLE & DIMENSIONS				CONTACTOR STYLE & RATINGS			
STYLE	H	W	D	AIR COOLED	WATER COOLED		
D or T	610 mm 24"	645 mm 25-3/8"	254 mm 10"	Firing Circuit or 300 A	1200A		
LS or LF	914 mm 36"	797 mm 31-3/8"	254 mm 10"	Firing Circuit or 300A	1200A	1800A	
HS or HF	1067 mm 42"	949 mm 37-3/8"	254 mm 10"	300A	1200A	1800A	2200A

All SCR contactors complete with temperature limit switch.

Circuit Breakers available in L and H cabinets only. Consult factory for Circuit Breaker pricing. 100, 200 and 400 ampere Circuit Breakers are available in L and H cabinets with right hand, flange mounted operator installed within the cabinet. Consult factory for availability of 600 and 800 ampere Circuit Breakers.

See **COMPREHENSIVE PRICE LIST** for a complete list of Options, Circuit Breakers, Accessories and Special Features.

Contact your ENTRON Controls
Representative or Your Local Resistance
Welding Equipment Source

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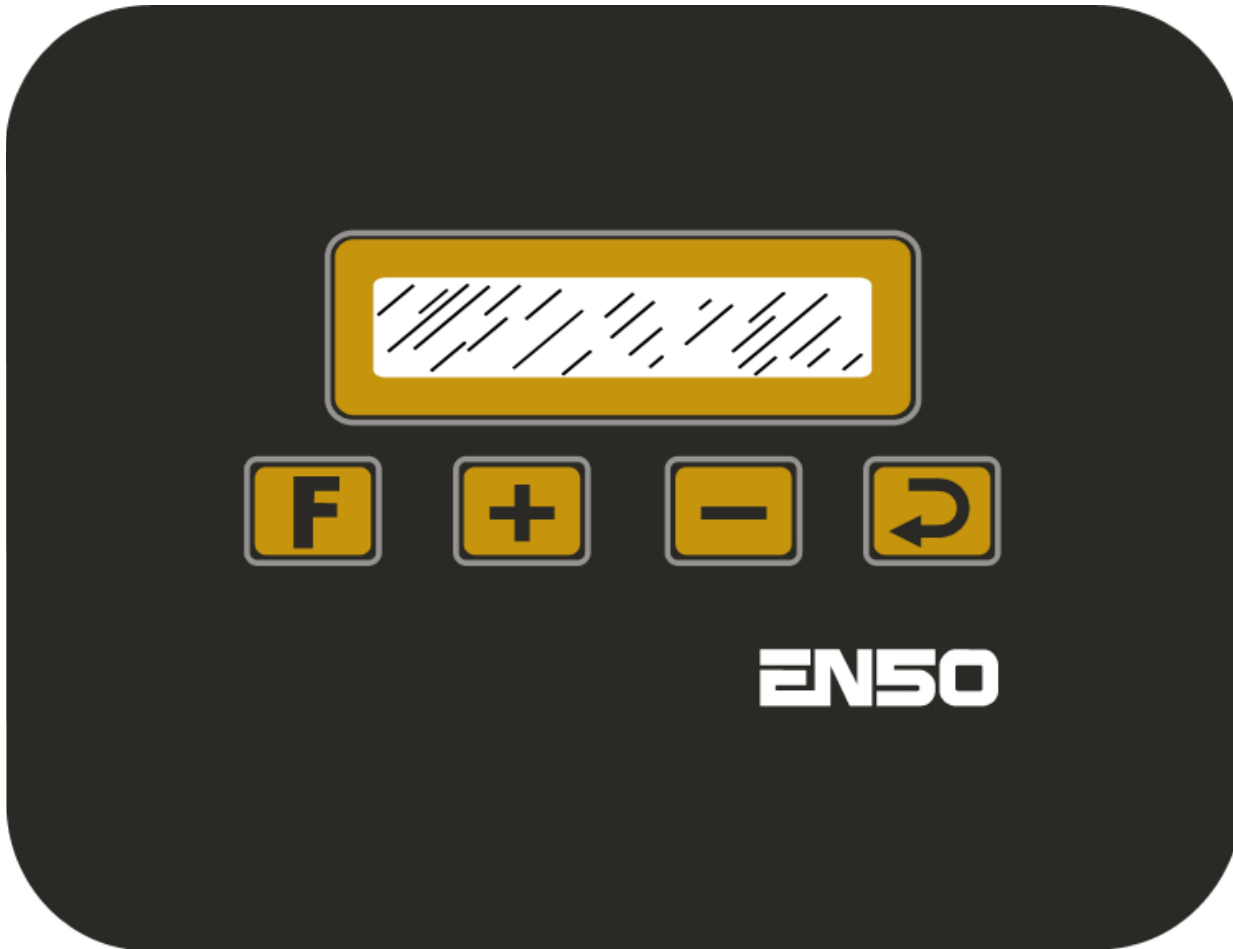
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Controls for Resistance Welding

EN50

Basic Weld Timer & Components



Actual Size

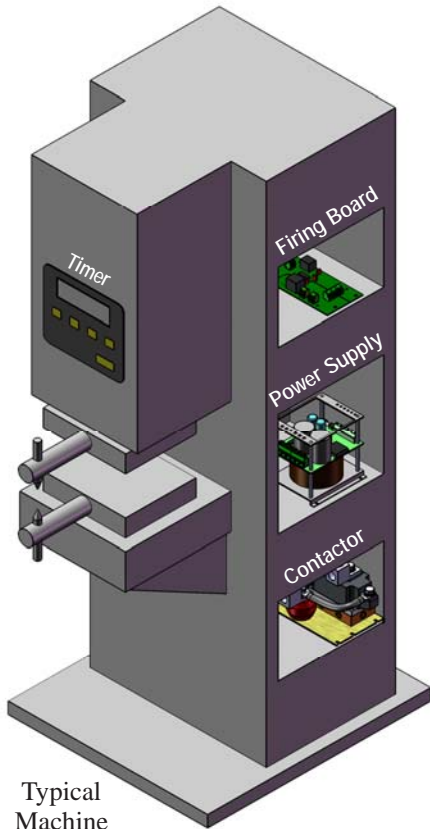
- *Timer for use with Remote Contactor*
- *Compact Unit Provides Basic Control and Programming Features*
- *Versatile*
- *Simple to Install and Use*
- *Available with 300 and 1200 Amp Contactors*
- *Provided in Kit Form*

Features

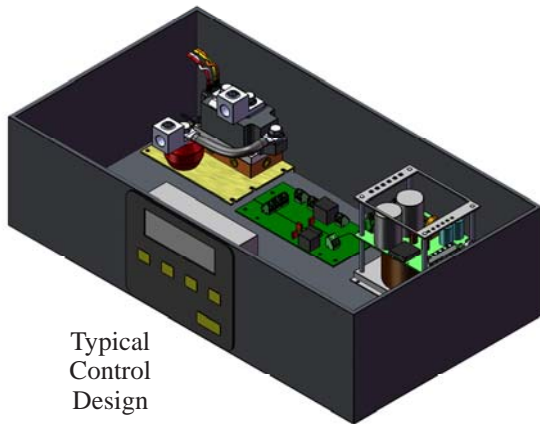
- Multiple Weld/Multiple Current
- Up to 8 user-defined schedules
- Internal or external schedule selection
- Retraction option with maintained or momentary inputs
- 4 inputs and 4 outputs
- Seam and Roll-Spot
- Squeeze Delay
- Pulsation
- Upslope
- 2 weld intervals for Preheat/Postheat
- Counter with optional lock-out for electrode maintenance
- 2 stage foot switch
- Interlock output
- Can be used for coated materials
- Half Cycle
- Repeat and Non-Repeat
- Valve Control Relay
- Easily programmed

Exclusive ENTRON two year warranty

COMPONENT ORDERING INFORMATION



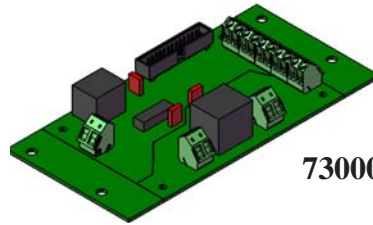
Typical
Machine
Design



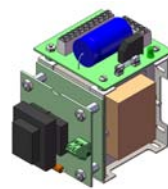
Typical
Control
Design



Timer
730006-001

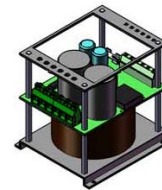


Firing Board
730006-002
730006-003 with 24-120VAC Valve Buffer



730006-009 with
SYNC 480 Volt

730006-010 with
SYNC 240 Volt



24 VDC Power Supply

730006-004 with
SYNC Universal
Voltage



EN(X)-300



EN(X)-1200

Contactors

730006-005 – 300A
730006-006 – 1200A



Accessory Kit

730006-007

Kit to assist system integrators with implementing EN50 Series designs. Includes precautionary labeling, fuses and hardware to mount the EN50 Timer, Firing Board, Power Supply and Contactors.



**EN50 DEMO
Control**
730006-008

ENTRON™

ENTRON Controls, LLC.
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Greer, SC 29650
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FAX (864) 416-0195
www.entroncontrols.com
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EN50 Basic Weld Timer & Components Specifications

Date: January 2008

Supersedes: November 2007

SPECIFICATIONS

Welding Parameters x 8

Squeeze Delay:	0 to 99 cycles
Squeeze:	0 to 99 cycles
Upslope:	0 to 99 cycles
Weld1:	0 to 99 cycles
Heat1:	0 to 99%
Cool1:	0 to 99 cycles
Weld2:	1 to 99 cycles
Heat2:	0 to 99%
Pulses:	1 to 9
Cool2:	0 to 99 cycles
Hold:	0 to 99 cycles
Off:	0 to 99 cycles
Mode:	Non-Repeat/Repeat

Counter (Configuration Types 03, 05, 06, 07 and 10 only)

Actual count:	0 to 9999
End count:	0 to 9999
At end of count:	Stop/Continue

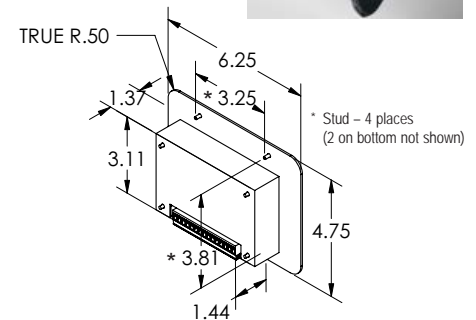
Configuration

Type	Mode	Operation	Schedules
00	Spot	Simple spot welding with no other functions	8
01	Spot with 2 Stage Foot Switch	Spot welding with 2 Stage Foot Switch	
02	Spot with Retraction	Spot welding with an input and output for controlling gun position	4
03	Spot with Counter	Spot welding with an output that activates when count is reached	4
04	Spot with 2 Stage Foot Switch & Retraction	A combination of types 01 and 02	2
05	Spot with Counter & Retraction	A combination of types 02 and 03	2
06	Spot with 2 Stage Foot Switch & Counter	A combination of types 01 and 03	2
07	Spot with 2 Stage Foot Switch, Retraction & Counter	A combination of types 01, 02 and 03	1
08	Spot with Half Cycle	Spot welding using only one half cycle weld duration	8
09	Spot with Half Cycle & 2 Stage Foot Switch	A combination of types 08 and 01	4
10	Spot with Half Cycle & Counter	A combination of types 08 and 03	4
11	Roll-Spot	Spot welding with an output to operate motor-driven welding wheels during Off time between sequences	8
12	Seam	Uses seam wheels, motor drive and continuous or modulated current to provide seam weld	8

All Types **except 05** have Interlock output to be used with ENTRON Welder Interlocks

Timer

730006-001



Configuration (cont.)

Retraction:	None, Maintained, Maintained Inverted, Momentary, Momentary Inverted
Frequency:	60/50 Hz

Environmental

Operating Temperature:	32° to 122° F
Storage Temperature:	-13° to 158° F
Operating Humidity:	up to 80% (relative)
Storage Humidity:	10% to 90%

Dimensions of Timer (only)

Height:	4.75"
Width:	6.25"
Depth:	1.25" + .75" for connector
Weight:	1.5 lbs.

Power Requirements

Voltage:	24 VDC
Line frequency:	50/60 Hz
Current:	< 500 mA (all outputs off)

I/O Ratings

Inputs:	< 10 mA @ 24 VDC
Outputs:	≤ 500 mA @ 24 VDC
WELD OUT:	5 kHz; 1:10 mark/space; first pulse 24 V; subsequent pulses > 15 V

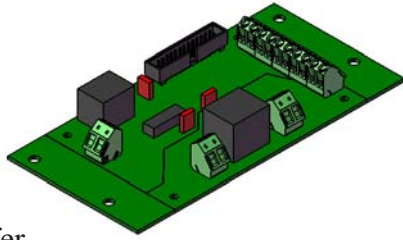
EN50

Basic Weld Timer & Components

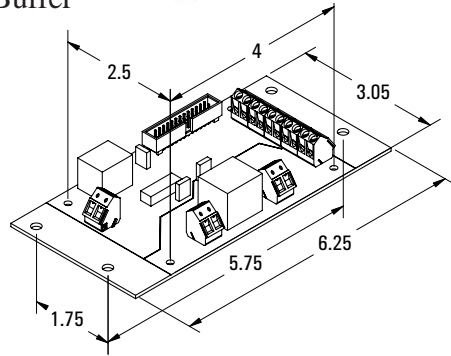
The EN50 Basic Weld Timer is a compact, robust unit which, when combined with these components, provides basic control for resistance welding. Offering reliability which ensues from simplicity, programming of control is quick and easy.

Firing Board

730006-002 or
730006-003 with
24-120VAC Valve Buffer



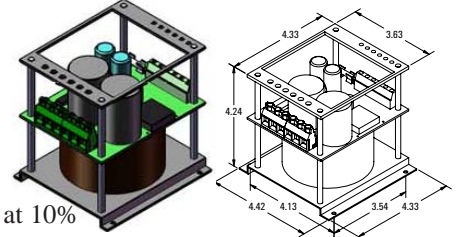
Rated for 580 VAC
isolation
2V 200 mA each gate
output
Valve Output 24-120
VAC at 1A



24 VDC Power Supply

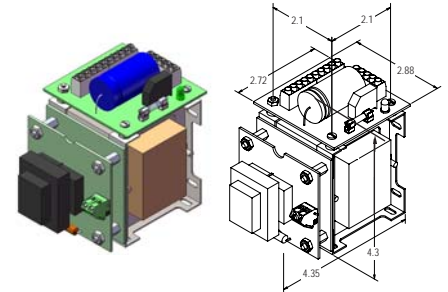
730006-004 with
SYNC Universal
Voltage

190-580 VAC in
24 VDC 2A out
Sync output 24 VAC at 10%

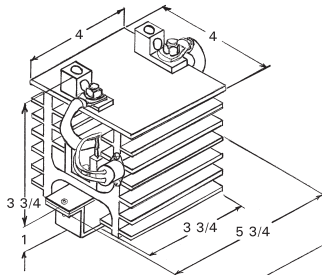


730006-009 with
SYNC 480 Volt
340-540 VAC in

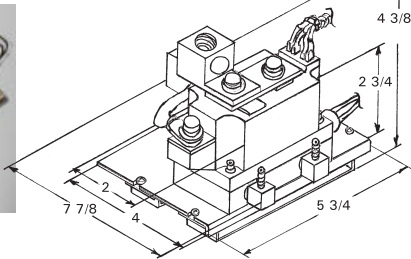
730006-010 with
SYNC 240 Volt
180-273 VAC in



730006-005
EN(X)-300

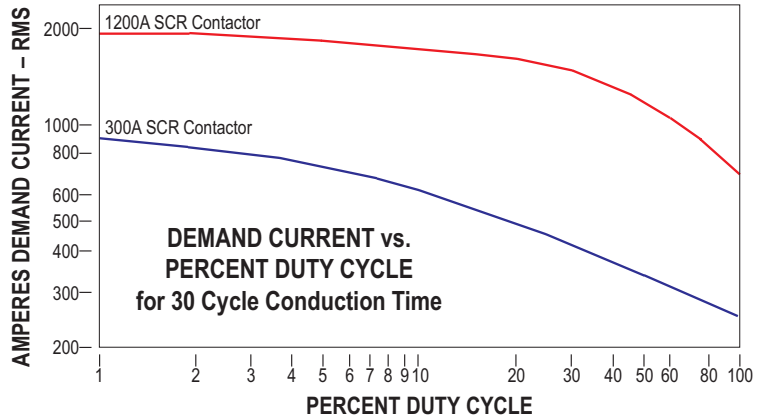


730006-006
EN(X)-1200



Contactors

All SCR Contactors complete with temperature limit switch and rated for use at 575 VAC.



Accessory Kit

730006-007

Kit to assist system integrators with implementing EN50 Series designs. Includes precautionary labeling, fuses and hardware to mount the EN50 Timer, Firing Board, Power Supply and Contactors.



Contact your ENTRON Controls
Representative or Your Local Resistance
Welding Equipment Source

**EN50 DEMO
Control
730006-008**



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ENTRON™

Controls for Resistance Welding EN2000

Dual Schedule/Dual Sequence S2H Controls



- *Simple to Program*
- *Direct Reading Digital Data Display*
- *Simplified Design*
- *Quality Tested to Performance Extremes*
Each unit is tested to its maximum capability to assure performance at customary operating levels. ENTRON is the only resistance welding controls with the excellent performance history.
- *Dedicated Dual Schedule/ Dual Sequence Controls*
Designed for use with single phase welding machines, rocker arm, press type welders, robotic equipment, and special machines.

Features

- Spot Sequence
- Dual Weld/Dual Current Sequence
- External Schedule Select
- Error Outputs
- LED Status Indicators
- All Functions Displayed Simultaneously

Capabilities

- Two Schedules
- Repeat & Non-Repeat
- Weld & Valve Control Relays
- One Valve Output
- Dual Weld Programming
- Easily Programmed



E Cabinet

Exclusive ENTRON two year warranty

Advantages

- **Design Simplicity**

Design simplicity is the key to our ability to manufacture the highest quality weld control with the best delivery, least maintenance, and lowest out-of-warranty service in the industry.

- **Field Expandable**

ENTRON can provide retrofit controls suitable for any manufacturer's controls of any age, type or sequence for installation in the field.

- **Vault Closing Door Mechanism**

D & T cabinet doors equipped with vault locking mechanism to ensure security.

- **Applications**

EN2000 Single Contactor Controls can be applied to spot welders, special machines, or robotic equipment for welding.

- **Multiple Cabinet Options**

Available in D & T cabinet styles with front or side-mounted control panels.

D Cabinet



T Cabinet



S Cabinet



Unique to ENTIRON. All EN2000 Single Contactor Control in D or T cabinets feature provisions for field installation or change of circuit breakers.

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ENTRON™

EN2000 Series Controls Dual Schedule/Dual Sequence S2H Controls

Date: April 2006 Supercedes: March 2001

SPECIFICATIONS

Absolute Count: Push Button Data Entry with Simultaneous Digital Display

Squeeze Count:	0 to 99 cyc, 50/60 Hz
Weld Count:	0 to 99 cyc, 50/60 Hz
Hold Count:	0 to 99 cyc, 50/60 Hz
Off Count:	0 to 99 cyc, 50/60 Hz

Digital Phase Shift Current Control, 10 to 99% in 1% current steps,
all weld current functions

Dual Weld Count/Dual Percent Current Adjust –
Front Panel and External Select

Non-Repeat: Single Schedule upon initiation

Repeat: Single Schedule repeated with pilot circuit held closed

Additional Features

87° First Half Cycle Delayed Firing, Anti-Saturation Circuit

Dynamic Automatic Power Factor Equalization

Dynamic Automatic Voltage Compensation, $\pm 20\%$ of Nominal Line

Emergency Stop Circuit

Interlocking Pressure Switch Circuit

Single Stage Pilot/2 Stage Pilot

Indicator Lights for all functions on display panel

Valve Transformer: 150VA 230/460-115V, E, D & T Cabinets
50VA 230/460-115V, S Cabinets

One Valve output standard, all controls



E Cabinet

Exclusive ENTRON two year warranty

EN2000 Series Controls

Dual Schedule/Dual Sequence S2H Controls

D Cabinet



S Cabinet



T Cabinet



The EN2000 Series Control is ideal for programming schedules for most welding applications for ferrous and some non-ferrous metals, multiple thickness of materials and special part configurations.

- Store Two Schedules
Every parameter of each schedule individually accessible
Each schedule can store 5 distinct and totally different parameters
All schedules retained in memory with power off
- Single contactor circuit
Single valve circuit
Contactor failed detection
- Control can be INTERFACED with external Programmable Logic Control (PLC)

CABINET STYLE & DIMENSIONS				CONTACTOR STYLE & RATINGS			
STYLE	H	W	D	AIR COOLED	WATER COOLED		
FP	279 mm 11"	279 mm 11"		Please Contact Factory			
S	222 mm 8-3/4"	222 mm 8-3/4"	419 mm 16-1/2"	150A/ 300A	1200A		
E	533 mm 21"	222 mm 8-3/4"	419 mm 16-1/2"	300A	1200A	1800A	2200A
D or T	610 mm 24"	645 mm 25-3/8"	254 mm 10"	300A	1200A	1800A	2200A

All SCR contactors complete with temperature limit switch, except 150 ampere contactors.

Circuit Breakers available in D and T cabinets only. Consult factory for Circuit Breaker pricing. 100, 200 and 400 ampere

Circuit Breakers are available in D and T cabinets with right hand, flange mounted operator installed within the cabinet.

Consult factory for availability of 600 ampere Circuit Breakers.

See COMPREHENSIVE PRICE LIST for a complete list of Options, Circuit Breakers, Accessories and Special Features.

Contact your ENTRON Controls
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Welding Equipment Source

ENTRON™

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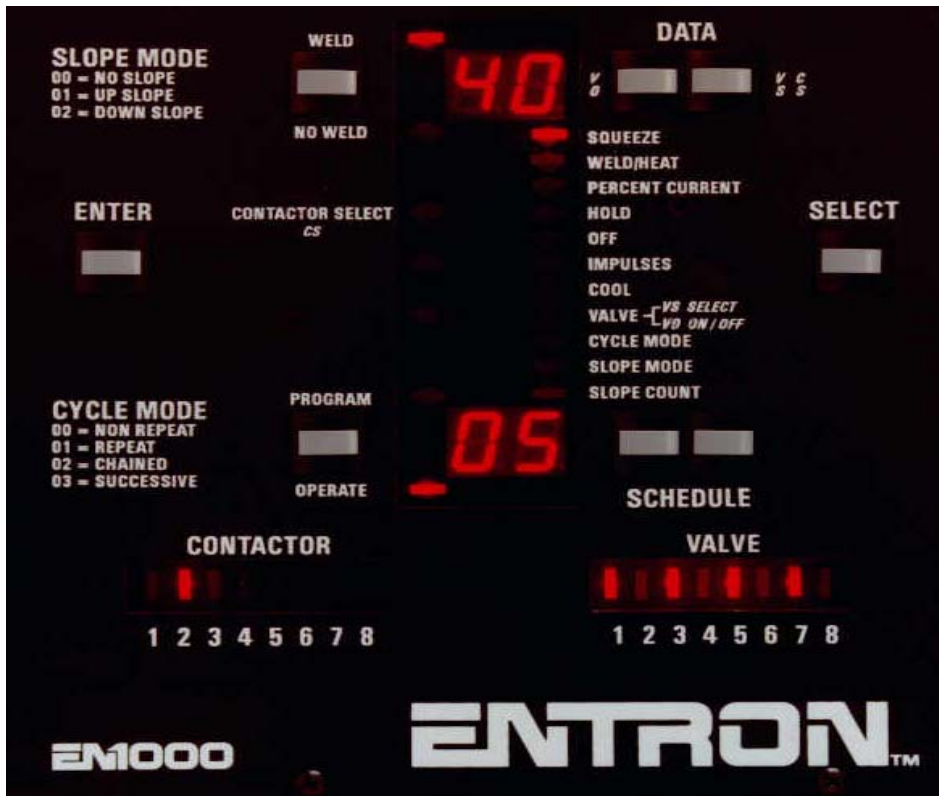
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ENTRON™

Controls for Resistance Welding

EN1000

Cascade/Multi-Valve Controls



- **Functional Flexibility**
Performs both Cascade and Multi-Valve operations. Store as many as 13 parameters in each of 100 unique schedules.
- **Simple to Program**
Push buttons and a short three-step procedure make easy work of programming any possible welding schedule.
- **New Design Reduces Cost**
Simplified design significantly reduces production costs which are passed on to you.
- **Quality Tested to Performance Extremes**
Each unit is tested to its maximum capability to assure performance at customary operating levels. ENTRON – the only resistance welding controls with the excellent performance history.

Features

- Spot Sequence
- Pulsation Sequence
- Up & Down Slope
- Quench/Temper
- Forge Delay
- Multiple Weld/Multiple Current Sequence
- Preheat/Postheat
- External Schedule Select
- Process & Error Outputs
- Seam Sequence

Capabilities

- 100 Unique Schedules
- Chained & Successive Modes
- Repeat & Non-Repeat
- Weld & Valve Control Relays
- 8/16 Valve Output Available
- Multiple Weld Programming
- Multiple Job Set-Ups
- Easily Programmed
- Program Only the Functions Required
- Up to 8 SCRs



Exclusive ENTRON two year warranty

Advantages

- ***Design Simplicity***

Design simplicity is the key to our ability to manufacture the highest quality weld control with the best delivery, least maintenance, and lowest out-of-warranty service in the industry.

- ***Field Expandable***

ENTRON can provide retrofit controls suitable for any manufacturer's controls of any age, type or sequence for installation in the field.

- ***Vault Closing Door Mechanism***

All cabinet doors equipped with vault locking mechanism to ensure security.

- ***Flexible Applications***

EN1000 Cascade/Multi-Valve Controls can be applied to mat welders, pass-through welders, special machines, robotic equipment for welding materials of unequal thickness and coated materials.

- ***Multiple Cabinet Options***

Available in D, T, L, H, G, U cabinet styles with front or side-mounted control panels.



T Cabinet



D Cabinet



UF Cabinet



US Cabinet



Unique to ENTRON. All EN1000 Cascade/Multi-Valve Controls and cabinets feature provisions for field installation or change of circuit breakers.

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ENTRON™

EN1000 Series Cascade/Multi-Valve Controls Multiple Schedule/Multiple Sequence Controls

Date: April 2006 Supercedes: October 2001

SPECIFICATIONS

Absolute Count: Push Button Data Entry with Display

Squeeze Count:	0 to 99 cyc, 50/60 Hz
Weld Count/Heat Count:	0 to 99 cyc, 50/60 Hz
Cool Count:	0 to 99 cyc, 50/60 Hz
Hold Count:	0 to 99 cyc, 50/60 Hz
Off Count:	0 to 99 cyc, 50/60 Hz
Weld Impulse Counter:	1 to 99 Impluses
Slope Control/Up and Down Slope:	0 to 99 cyc, 50/60 Hz
Digital Phase Shift Current Control, 10 to 99% in 1% current steps, all weld current functions	
It is NOT necessary to program functions NOT required, program only functions required	

Standard RWMA/NEMA Programmable Functions

Including the following as examples:

- Up Slope and Down Slope
- Quench/Temper
- Pulsation Sequence
- Multi-Weld Count/Multi-Current Select
- Pre-Heat/Post-Heat
- Forge Delay

4 Cycle Modes

- Non-Repeat: Single Schedule upon initiation
- Repeat: Single Schedule repeated with pilot circuit held closed
- Successive: Upon each initiation, unique successive schedules are automatically selected
- Chained: Multiple schedules can be linked to operate sequentially upon a single initiation

Additional Features

- Error Code/Fault Outputs
- 87° First Half Cycle Delayed Firing, Anti-Saturation Circuit
- Dynamic Automatic Power Factor Equalization
- Dynamic Automatic Voltage Compensation, $\pm 20\%$ of Nominal Line
- Emergency Stop Circuit
- Interlocking Pressure Switch Circuit
- Single Stage Pilot/2 Stage Pilot, Beat/Non-Beat Operation
- Indicator Lights: Weld Contactor Output Position Indicators
Valve Output Position Indicators
- Indicator Lights for all functions on display panel
- Valve Transformer: 150VA 230/460-115V, Standard
- Order 1 - 8 contactors; 8 Valve outputs standard, all controls



Exclusive ENTRON two year warranty

EN1000 Series Cascade/Multi-Valve Controls

Multiple Schedule/Multiple Sequence Controls



The EN1000 Cascade/Multi-Valve Series Control is ideal for programming schedules for single or multiple transformer resistance welding machines with multiple valve operations.

- Store up to 100 UNIQUE SCHEDULES
 - Every parameter of each schedule individually accessible
 - Each schedule can store 13 distinct and totally different parameters
 - All schedules retained in memory with power off
 - It is NOT NECESSARY to program functions not required
- Four Cycle Modes can be programmed for complex welding schedules
- Select and Program up to 8 VALVE CIRCUITS, STANDARD
 - Independently selectable and programmable
- Control can be configured with 1 to 8 CONTACTORS, independently selectable and programmable
- Process Control Outputs
- Additional Standard Features:
 - External Schedule Select
 - Contactor Failed Detection (Circuit breaker with shunt trip, optional)
- Control can be INTERFACED with external Programmable Logic Control (PLC); Advanced interfaces available

CABINET STYLE & DIMENSIONS				CONTACTOR STYLE & RATINGS			
STYLE	H	W	D	AIR COOLED	WATER COOLED		
D or T	610 mm 24"	645 mm 25-3/8"	254 mm 10"	Firing Circuit or 300A	1200A		
LS or LF	914 mm 36"	794 mm 31-3/8"	254 mm 10"	Firing Circuit or 300A	1200A	1800A	
HS or HF	1067 mm 42"	949 mm 37-3/8"	254 mm 10"	Firing Circuit or 300A	1200A	1800A	2200A
GS or GF	1219 mm 48"	949 mm 37-3/8"	254 mm 10"		1200A	1800A	2200A
US or UF	1524 mm 60"	949 mm 37-3/8"	254 mm 10"		1200A	1800A	2200A

- Vault Closing Door Mechanism Standard on all enclosures.
- Water barrier between contactors and electronic components in L, H, G, and U Cabinets.
- All SCR contactors complete with temperature limit switch.

See COMPREHENSIVE PRICE LIST for a complete list of Options, Circuit Breakers, Accessories and Special Features.

Contact your ENTRON Controls Representative or Your Local Resistance Welding Equipment Source

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 e-mail: info@entroncontrols.com



ENTRON™

Controls for Resistance Welding Multiple EN1000 Single Cabinet Controls



Features

- Spot Sequence
- Pulsation Sequence
- Up & Down Slope
- Quench/Temper
- Forge Delay
- Multiple Weld/Multiple Current Sequence
- Preheat/Postheat
- External Schedule Select
- Seam Sequence
- Brazing
- Flash Welding
- Retraction
- Squeeze Delay
- Stepper

Capabilities

- 50 Unique Schedules
- Chained & Successive Modes
- Repeat & Non-Repeat
- Weld & Valve Control Relays
- 3 Valve Outputs
- Multiple Weld Programming
- Multiple Job Set-Ups
- Easily Programmed
- Program Only the Functions Required

- ***Simple to Program***
Push buttons and a short three-step procedure make easy work of programming any possible welding schedule.
- ***New Design Reduces Cost***
Simplified design significantly reduces production costs. These savings are passed on to you.
- ***Quality Tested to Performance Extremes***
Each unit is tested to insure maximum performance at customary operating levels. The ENTRON resistance welding control has consistently offered an excellent performance history.
- ***Application Flexibility***
Designed to control several welders from a central location, the controls can be configured to fire individually, in a cascade sequence, in an LDC mode, or any combination thereof. Each control position is a FULLY FUNCTIONAL EN1000 Single Contactor Control, each with 3 valve outputs.

Exclusive ENTRON two year warranty

Advantages

- ***Design Simplicity***

Design simplicity is the key to our ability to manufacture the highest quality weld control, the best delivery, and the lowest service requirements in the industry.

- ***Field Expandable***

ENTRON can provide retrofit controls suitable for any manufacturer's controls, of any age, type or sequence, for field installation.

- ***Vault Door Locking Mechanism***

All cabinet doors equipped with a vault locking mechanism to insure security.

- ***Flexible Applications***

EN1000 controls can be applied to spot welders, seam welders, special machines, or robotic equipment for welding a full range of weldable materials.

- ***Multiple Cabinet Options***

Available in L, H, G and U cabinet styles with front or side-mounted control panels.



EN1000 UF Cabinet

*Unique to **ENTRON**. All Multiple EN1000 Controls in H, G & U Cabinets feature provisions for field installation or change of circuit breakers.*

ENTRON™

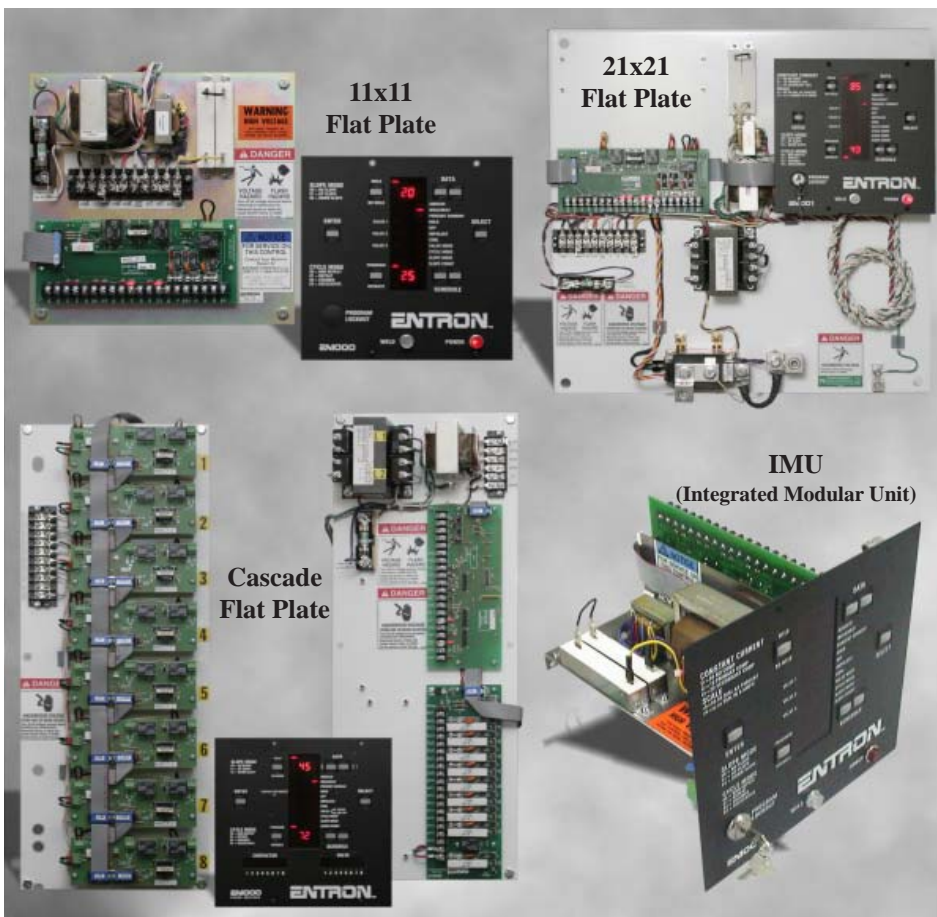
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FLAT PLATE CONTROLS



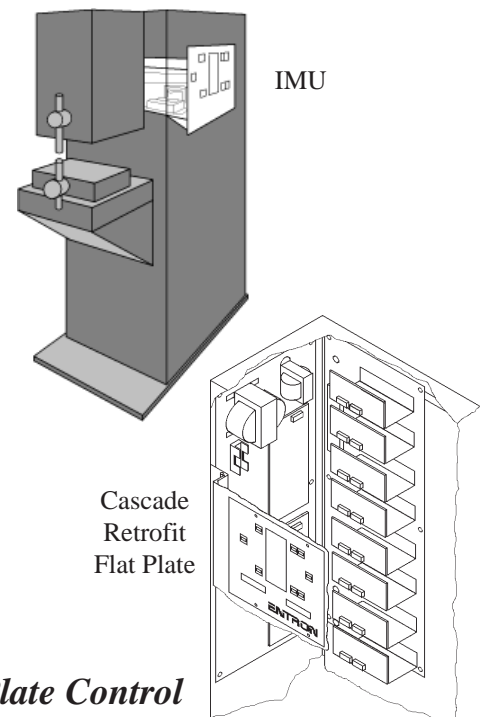
- *Use in Retrofit, New, or Custom Designs*
- *Keeps Shipping Costs Economical* – Use in situations where shipping weight is a factor.
- *Customize Designs to Match Existing Systems*
- *Low Cost*
- *Easily Serviced*
- *Multiple Options Available*
- *No Need to Replace Primary Wiring, Disconnect, and SCRs*
- *Replaces “Works in a Drawer” Chassis in Older European Machines*
- *Include Weld Control as Part of Machine Cabinet*

Features

- Standard ENTRON product in component form
- Various ENTRON models available
- Four basic design choices
- Use to retrofit older ENTRON controls to current technology
- Use to retrofit competitor’s controls to current ENTRON technology; complete with special hardware and precautionary labeling

Capabilities

- Multiple configurations allow integration into various machine types and styles
- Single contactor controls
- Multiple contactor controls
- Cascade Flat Plate designed to ease retrofit of older ENTRON controls
- Fires certain special SCR assemblies with integrated pulse transformer



SCR Contactors available at discount when ordered with Flat Plate Control

Exclusive ENTRON two year warranty

Available Models

- EN1000
- EN1000 Cascade
- EN1001
- EN1001 Cascade
- EN1500
- EN2000

Options

- Primary Coil
– P2, P5, P10



- Secondary Coil
– S6, S10

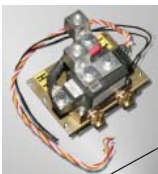
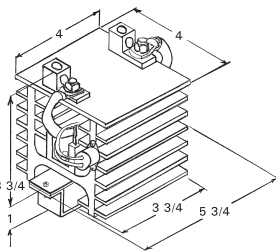


- RS232/485
- Pressure Control System (IPSC)
- Schedule Select (S49 or S99)
- Remote Data Entry (RDEjr.)
- Remote Terminal (RT4jr.)
- Memory Modules (MM2 or MM8)
- DC Valves
- Valve Select 1 of 7
- Terminal Strip Skip (TSS)
- Spanish Dial Plate Overlays

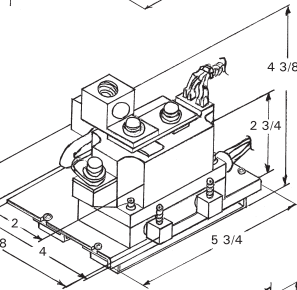
Available SCR Contactor Assemblies For External Mounting



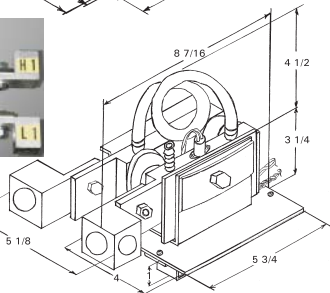
EN(X)-150 or
EN(X)-300



EN(X)-1200

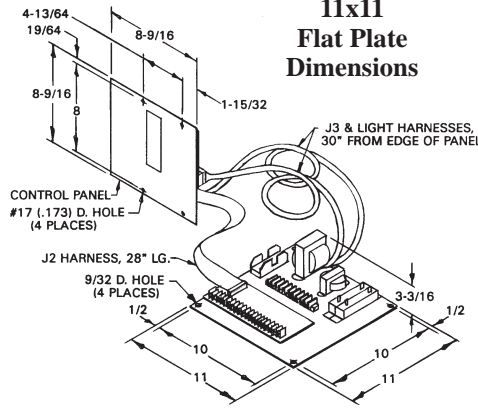


EN(X)-1800
or EN(X)-2200

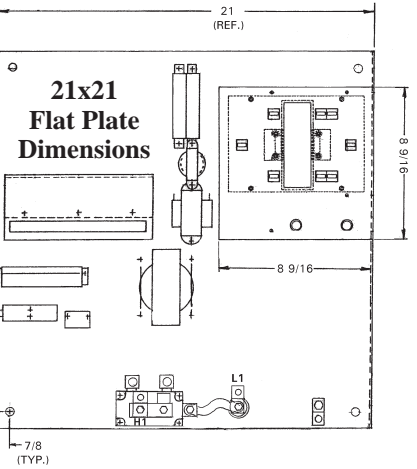
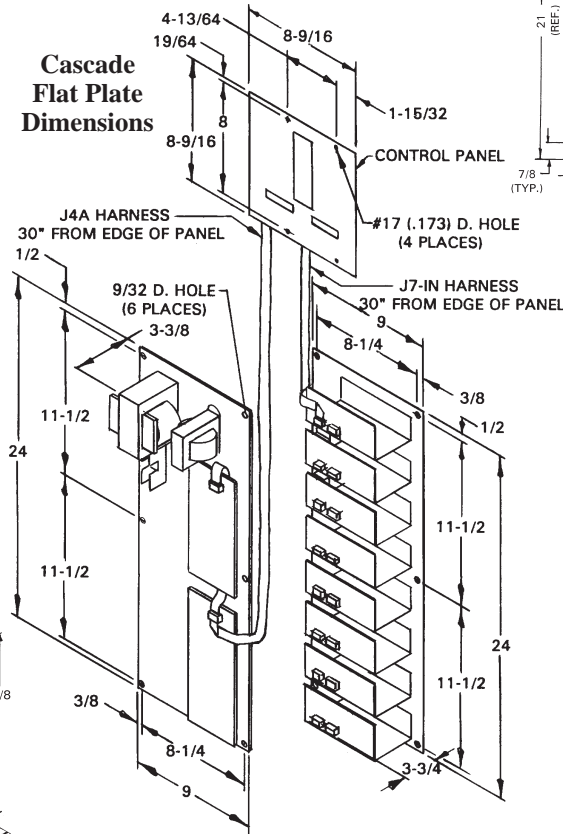


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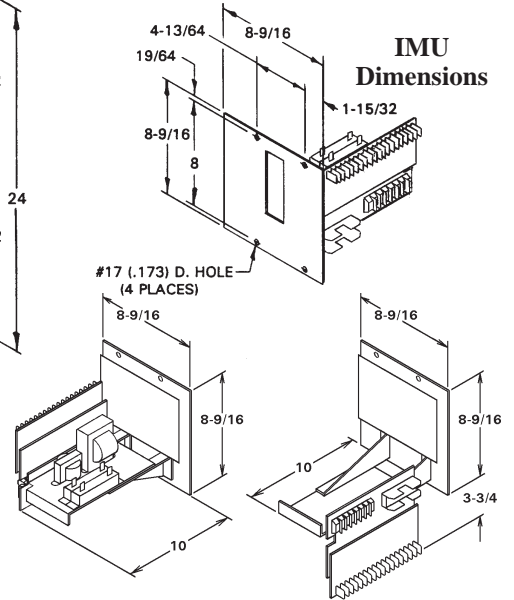
11x11 Flat Plate Dimensions



Cascade Flat Plate Dimensions



IMU Dimensions



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ENTRON™

EN1000 Series Bench Controls

Multiple Schedule/Multiple Sequence Controls

Date: May 2006

Supersedes: April 2002

SPECIFICATIONS

Absolute Count: Push Button Data Entry with Display

Squeeze Count:	0 to 99 cyc, 50/60 Hz
Weld Count/Heat Count:	0 to 99 cyc, 50/60 Hz
Cool Count:	0 to 99 cyc, 50/60 Hz
Hold Count:	0 to 99 cyc, 50/60 Hz
Off Count:	0 to 99 cyc, 50/60 Hz
Weld Impulse Counter:	1 to 99 Impluses
Slope Control/Up and Down Slope:	0 to 99 cyc, 50/60 Hz
Digital Phase Shift Current Control, 10 to 99% in 1% current steps, all weld current functions	
It is NOT necessary to program functions NOT required, program only functions required	

Standard RWMA/NEMA Programmable Functions

Including the following as examples:

- Up Slope and Down Slope
- Quench/Temper
- Pulsation Sequence
- Multi-Weld Count/Multi-Current Select
- Pre-Heat/Post-Heat
- Seam Weld (Continuous and Intermittent)

4 Cycle Modes

- Non-Repeat: Single Schedule upon initiation
- Repeat: Single Schedule repeated with pilot circuit held closed
- Successive: Upon each initiation, unique successive schedules are automatically selected
- Chained: Multiple schedules can be linked to operate sequentially upon a single initiation

Additional Features

- Error Code/Fault Outputs
- 87° First Half Cycle Delayed Firing, Anti-Saturation Circuit
- Dynamic Automatic Power Factor Equalization
- Dynamic Automatic Voltage Compensation, $\pm 20\%$ of Nominal Line
- Single 1/2 Cycle Weld Selection
- Polarity Reverse Switch
- Single Stage Pilot/2 Stage Pilot, Beat/Non-Beat Operation
- Operational Lights: Power On
Weld Current
- Indicator lights for all functions on display panel
- Single Valve Output Standard: 115V or 230V (Without Transformer)
- Weld – No-Weld Switch
- Voltage: 230/460, 50/60 Hz (115, 380, 575V, Optional)



Exclusive ENTRON two year warranty

EN1000 Series Bench Controls

Multiple Schedule/Multiple Sequence Controls



EN1000

Style "B" Cabinet

222 mm x 222 mm x 296 mm

8-3/4" x 8-3/4" x 11-3/4"

The **EN1000 Series Bench Control** is ideal for programming schedules for welding coated materials, aluminum, other non-ferrous metals, special alloys, multiple thickness of materials and many special part configurations.

- Store up to 50 **UNIQUE SCHEDULES**
 - Every parameter of each schedule individually accessible
 - Each schedule can store 11 distinct and totally different parameters
 - All schedules retained in memory with power off
 - It is **NOT NECESSARY** to program functions not required
- Four Cycle Modes can be programmed for complex welding schedules
- Single valve output circuitry
- Single contactor circuitry
 - Process control outputs
- Additional Standard Features:
 - External Schedule Select
 - Contactor Failed Detection
- Control can be **INTERFACED** with external Programmable Logic Control (PLC); Advanced interfaces available

Contact your ENTRON Controls
Representative, or Your Local Resistance
Welding Equipment Source

ENTRON™

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e-mail: info@entroncontrols.com

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ENTRON™

Controls for Resistance Welding EN2130

Bench Controls with Valve Output



- ***Simple to Program***

Using the familiar and intuitive EN2000 platform, push-buttons and a three-step procedure make easy work of programming any welding schedule.

- ***Direct Reading Digital Data Display***

- ***Simplified Design***

- ***Direct Replacement for EN130***

- ***Two Year Warranty***

A two year warranty is offered on all ENTRON parts and assemblies. Expert phone support and application service are available at no cost.

Features

- Spot Sequence
- Dual Weld/Dual Current
- LED Status Indicators
- All Functions Displayed Simultaneously
- Compact, Lightweight Air Cooled Cabinet
- Available with both 150 and 300A Air Cooled Contactors
- Optional Manual Current Adjust

Capabilities

- Two Schedules
- Weld & Valve Control Relays
- One Valve Output
- Dual Weld Programming
- Easily Programmed
- Programmable for 1/2 Cycle Operation and Polarity Reverse
 - 1/2 Cycle Positive Initiation
 - 1/2 Cycle Negative Initiation
- Program Only the Functions Required

- ***Half Cycle Mode with Polarity Reverse***

- ***Dedicated Dual Schedule/ Dual Sequence Controls***

Designed for use with single phase welding machines, rocker arm, press type welders, robotic equipment, bench welders, stitch welders, machines with small heads and special machines.

Exclusive ENTRON two year warranty

EN2130 Series Controls

Bench with Valve Output • Dual Schedule/Dual Sequence BS2HX Controls

Date: May 2006

Supersedes: New

SPECIFICATIONS

Absolute Count: Push Button Data Entry with Display

Squeeze Count:	0 to 99 cyc, 50/60 Hz
Weld Count:	0 to 99 cyc, 50/60 Hz
Hold Count:	0 to 99 cyc, 50/60 Hz
Digital Phase Shift Current Control, 10 to 99% in 1% current steps	
It is NOT necessary to program functions NOT required, program only functions required	

Additional Features

- Microprocessor-based Circuitry
- Spot Sequence
- Dual Weld/Dual Current
- LED Status Indicators
- All Functions Displayed Simultaneously
- Compact, Lightweight Air Cooled Cabinet
- Available with both 150 and 300A Air Cooled Contactors
- Error Code/Fault Outputs
- 87° First Half Cycle Delayed Firing, Anti-Saturation Circuit
- Dynamic Automatic Power Factor Equalization
- Dynamic Automatic Voltage Compensation, $\pm 20\%$ of Nominal Line
- Emergency Stop Circuit
- Interlocking Pressure Switch Circuit
- Single Valve output standard (without transformer)
- Manual Current Adjust (optional)



EN2130
Style "B" Cabinet
222mm x 222mm x 296mm
8-3/4" x 8-3/4" x 11-3/4"

The EN2130 Series Control is a microprocessor based resistance welding control. This control is equipped with dual schedule, dual heat, with positive or negative $\frac{1}{2}$ cycle feature.

Initiation of two different weld schedules (Squeeze, Weld, Hold, and Percent of Current) are available on separate initiation inputs.

- Store 2 UNIQUE SCHEDULES
Both schedules retained in memory with power off
- Allows a choice of either Positive or Negative $\frac{1}{2}$ cycle firing
- Single valve output circuitry
- Control can be INTERFACED with external Programmable Logic Control (PLC)

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ENTRON™

Controls for Resistance Welding EN2150

Bench Controls without Valve



Features

- Spot Sequence
- Dual Weld/Dual Current
- LED Status Indicators
- All Functions Displayed Simultaneously
- Compact, Lightweight Air Cooled Cabinet
- Available with both 150 and 300A Air Cooled Contactors
- Optional Manual Current Adjust

Capabilities

- Two Schedules
- Weld Control Relays
- End of Sequence Output
- Dual Weld Programming
- Easily Programmed
- Programmable for 1/2 Cycle Operation and Polarity Reverse
 - 1/2 Cycle Positive Initiation
 - 1/2 Cycle Negative Initiation
 - Alternate 1/2 Cycle Program
- Program Only the Functions Required

- ***Simple to Program***

Using the familiar and intuitive EN2000 platform, push-buttons and a three-step procedure make easy work of programming any welding schedule.

- ***Direct Reading Digital Data Display***

- ***Simplified Design***

- ***Direct Replacement for EN150***

- ***Two Year Warranty***

A two year warranty is offered on all ENTRON parts and assemblies. Expert phone support and application service are available at no cost.

- ***Half Cycle Mode with Alternate Polarity and Polarity Reverse***

- ***Dedicated Dual Schedule/ Dual Sequence Controls***

Designed for use with single phase welding machines, robotic equipment, bench welders, tweezer welders, stitch welders, machines with small heads and special machines.

Exclusive ENTRON two year warranty

EN2150 Series Controls

Bench without Valve • Dual Schedule/Dual Sequence BS1HX Controls

Date: May 2006

Supersedes: New

SPECIFICATIONS

Absolute Count: Push Button Data Entry with Display

Squeeze Count: 0 to 99 cyc, 50/60 Hz
Weld Count: 0 to 99 cyc, 50/60 Hz
Hold Count: 0 to 99 cyc, 50/60 Hz
Digital Phase Shift Current Control, 10 to 99% in 1% current steps
It is NOT necessary to program functions NOT required, program only functions required

Additional Features

Microprocessor-based Circuitry
Spot Sequence
Dual Weld/Dual Current
LED Status Indicators
All Functions Displayed Simultaneously
Compact, Lightweight Air Cooled Cabinet
Available with both 150 and 300A Air Cooled Contactors
Error Code/Fault Outputs
87° First Half Cycle Delayed Firing, Anti-Saturation Circuit
Dynamic Automatic Power Factor Equalization
Dynamic Automatic Voltage Compensation, $\pm 20\%$ of Nominal Line
Emergency Stop Circuit
Interlocking Pressure Switch Circuit
Single Valve output standard (without transformer)
Manual Current Adjust (optional)



EN2150
Style "B" Cabinet
222mm x 222mm x 296mm
8-3/4" x 8-3/4" x 11-3/4"

The EN2150 Series Control is a microprocessor based resistance welding control. This control is equipped with dual schedule, dual heat, with positive or negative $\frac{1}{2}$ cycle feature.

Initiation of two different weld schedules (Squeeze, Weld, Hold, and Percent of Current) are available on separate initiation inputs.

- Store 2 UNIQUE SCHEDULES
Both schedules retained in memory with power off
- Allows a choice of either Positive or Negative $\frac{1}{2}$ cycle firing

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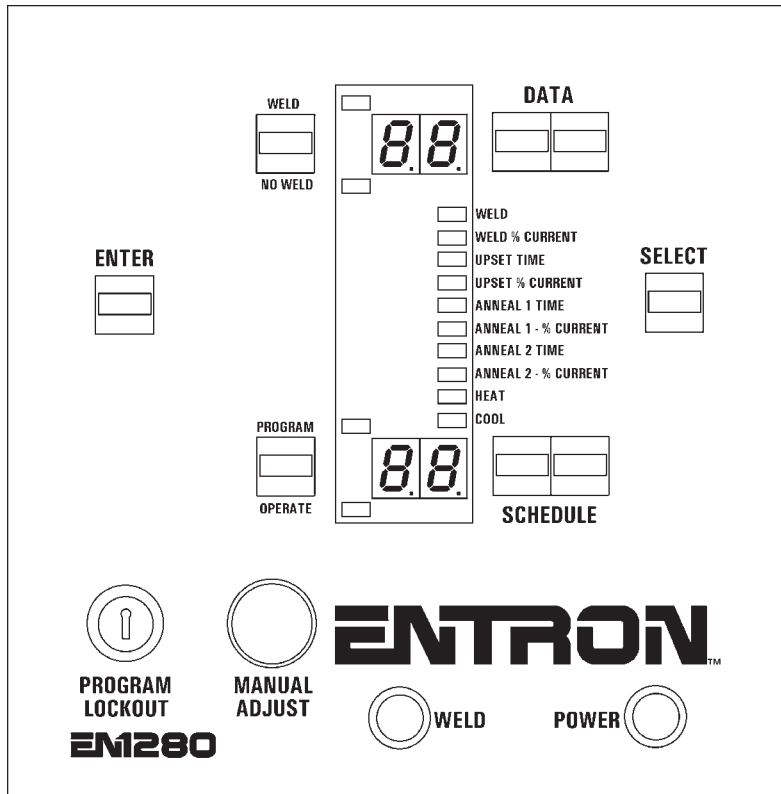
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ENTRON™

Controls for Resistance Welding

EN1280

Flash/Anneal Welding Controls



- ***New Design Reduces Cost***
Simplified design significantly reduces production costs which are passed on to you.

- ***Replaces ENA150 & ENA300***

Provides the same functionality as the ENA150 and ENA300 controls.

- ***Designed Specifically for Flash/Annealing Applications***

- ***Simple to Program***

Push buttons and a three-step procedure make easy work of programming any welding schedule.

- ***Direct Reading Digital Data Display***

- ***Two Year Warranty***

A two year warranty is offered on all ENTRON parts and assemblies. Expert phone support and application service are available at no cost.

Features

- 50 Unique Weld Schedules
- Standard with 150 and 300A Air Cooled Contactors
- Error Code Display
- Compact, Lightweight Air Cooled Cabinet
- Flash Weld Sequence Initiation
- Individual Upset Time and Upset Percent Current
- Anneal Initiation Input
- Power and Weld Indication Lamps
- Single Phase Operation
- Dynamic Automatic Power Factor Equalization
- External Emergency Stop Inputs
- Manual Current Adjustment
- Optional Program Lockout Switch

Capabilities

- Easy to Install and Operate
- Program Only Necessary Parameters
- Unique Annealing Sequence

Exclusive ENTRON two year warranty

EN1280 Series Controls

Flash/Anneal • Multiple Schedule/Multiple Sequence Controls

Date: February 2007 Supercedes: November 2001

SPECIFICATIONS

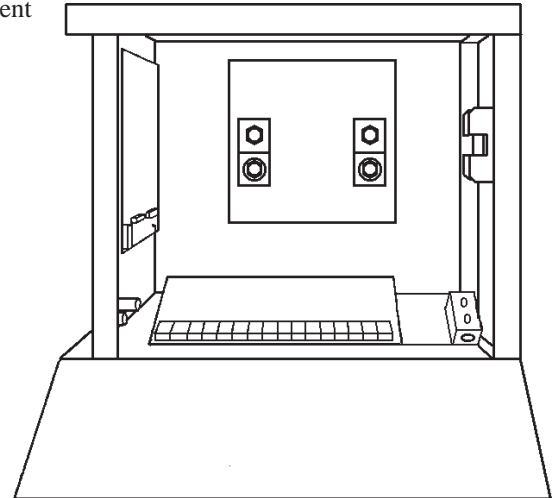
Absolute Count: Push Button Data Entry with Display

Weld Time:	Beat Operation (Initiation – FS3 to GND)
Upset Time:	0 to 99 cycles (Initiation – FS3 to GND)
Anneal 1 and Anneal 2 Time:	1 to 99 seconds (Initiation – FS7 to GND)
Anneal 1 and Anneal 2:	Beat Operation (Initiation – FS7 to GND)
Heat Count:	0 to 5 cycles (Impulses are based on Anneal Time)
Cool Count:	0 to 5 cycles (Impulses are based on Anneal Time)
Digital Phase Shift Current Control, 10 to 99% in 1% current steps, all weld current functions	

It is NOT necessary to program functions NOT required, program only functions required

Additional Features

- Individual Upset Time and Upset Percent Current
- Flash Weld Sequence Initiation
- Anneal Initiation Input
- Error Code/Fault Outputs
- 87° First Half Cycle Delayed Firing, Anti-Saturation Circuit
- Dynamic Automatic Power Factor Equalization
- Dynamic Automatic Voltage Compensation, $\pm 20\%$ of Nominal Line
- Emergency Stop Circuit
- Single Stage Pilot Beat/Non-Beat Operation
- Operational Lights: Power On & Weld Current
- Indicator Lights for all Functions on Display Panel
- Available with both 150 and 300A Air Cooled Contactors, with Temperature Limit Switch standard
- Manual Current Adjustment allows full range of current adjustment made in Anneal 1 and Anneal 2 or during weld time



Style "B" Cabinet
222mm x 222mm x 296mm
8-3/4" x 8-3/4" x 11-3/4"

The EN1280 Series Control is a microprocessor based resistance welding control. This control has been designed specifically for Flash Welding, Upset Welding, and Anneal applications. The EN1280 can store weld sequence parameters in each of 50 unique schedules. Weld schedule parameters are held in non-volatile memory for storage. The EN1280 control is simple to program and operate.

- Store up to 50 UNIQUE SCHEDULES
 - Every parameter of each schedule individually accessible
 - Each schedule can store 11 distinct and totally different parameters
 - All schedules retained in memory with power off
 - It is NOT NECESSARY to program functions not required
- Single contactor circuitry; Process control outputs
- Additional Standard Features:
 - Contactors Failed Detection
 - Power & Weld Indication Lamps
- Control can be INTERFACED with external Programmable Logic Control (PLC); Advanced interfaces available
- Meets or exceeds RWMA/NEMA standards

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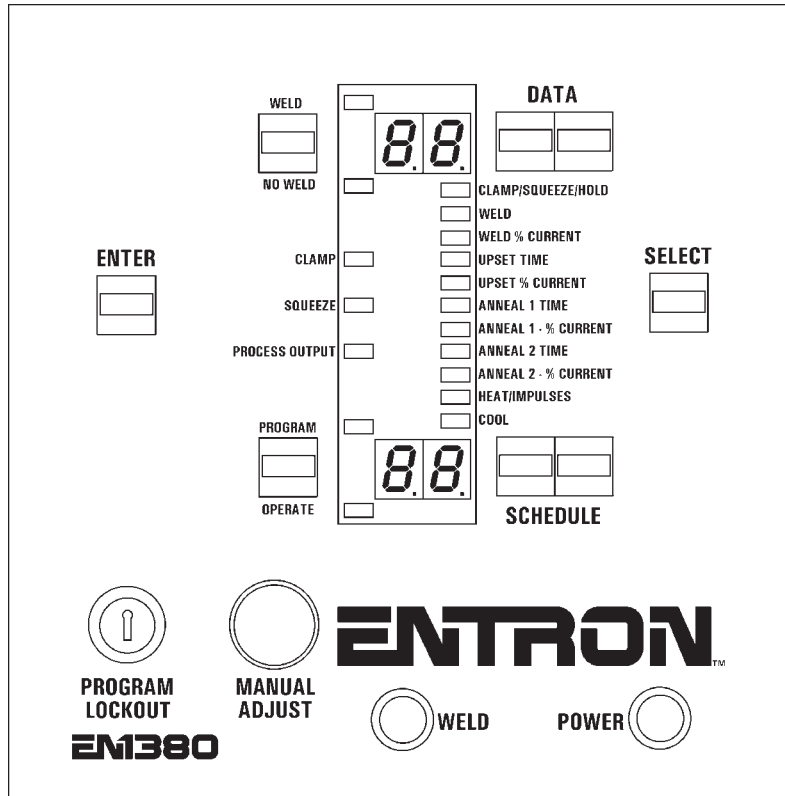
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Controls for Resistance Welding EN1380

Butt or Flash Weld Controls with Anneal Sequence



- **Specific Applications**
Designed specifically as a dedicated microprocessor Butt or Flash Welding Control with associated Anneal Sequences.
- **Dedicated Initiations for Welding and Annealing**
- **Optional Manual Adjust of Current during Anneal Sequences**

- **Simple to Program**
Push buttons and a three-step procedure make easy work of programming any welding schedule.

- **Two Year Warranty**
A two year warranty is offered on all ENTRON parts and assemblies. Expert phone support and application service are available at no cost.

Features

- Available with Air and Water Cooled Contactors
- Flash Weld Sequence Initiation
- Anneal Sequence Initiation
- External Emergency Stop
- Uses familiar front panel Flash/Butt Weld terminology
- Power and Weld Indication Lamps
- Automatic Voltage Compensation
- One Schedule stores both Weld and Anneal sequences
- Dedicated Clamp, Squeeze, and Process Output Valves
- Optional Program Lockout Switch

Capabilities

- Program only necessary parameters
- Ideal for retrofit applications
- Accomplish difficult Upset welds with flexible Upset sequences
- Stores 50 Unique Weld Schedules
- Beat/Anneal 2 Heat sequences with Pulsation
- Butt Welding with Pulsation
- Configuration available for various Single Phase Operating Voltages
- Dynamic Automatic Power Factor Equalization
- Provides same functionality as older ENTRON models EN280, ENA150, ENA300 and EN380 Flash/Butt and Annealing Controls

Exclusive ENTRON two year warranty

EN1380 Series Controls

Butt or Flash Weld with Anneal Sequence • Multiple Schedule/Multiple Sequence Controls

Date: February 2007 Supercedes: November 2001

SPECIFICATIONS

Absolute Count: Push Button Data Entry with Display

Clamp/Squeeze/Hold:	0 to 99 cycles, 50/60 Hz
Weld (Beat mode):	01 (Beat Operation)
Weld (Time mode):	02 to 99 cycles (Non-Beat Operation)
Weld Percent:	0 to 99%
Upset Time:	0 to 99 cycles, 50/60 Hz
Upset Percent:	0 to 99%
Anneal 1 (Beat mode):	00
Anneal 1 (Non-Beat mode):	1 to 99 seconds
Anneal 2:	0 to 99 seconds
Anneal 2 Percent:	0 to 99%
Heat Count:	0 to 99 cycles, 50/60 Hz
Cool Count:	0 to 99 cycles, 50/60 Hz

Digital Phase Shift Current Control, 10 to 99% in 1% current steps, all weld/upset/anneal current functions
It is NOT necessary to program functions NOT required, program only functions required

Additional Features

87° First Half Cycle Delayed Firing, Anti-Saturation Circuit	Error Code/Fault Outputs
Dynamic Automatic Power Factor Equalization	Emergency Stop Circuit
Dynamic Automatic Voltage Compensation, $\pm 20\%$ of Nominal Line	Interlocking Pressure Switch Circuit
Valve Transformer: 150VA 230/460-115V in "E", "D" & "T" Cabinets	Flash Weld Sequence Initiation
50VA 230/460-115V in "S" Cabinet	Anneal Sequence Initiation
Single Valve output standard on all controls	Dedicated Clamp and Squeeze Output Valves
Available with Air Cooled or Water Cooled Contactors	Operational Lights: Power On & Weld Current
All SCR contactors complete with Temperature Limit Switch	Indicator Lights for all Functions on Display Panel
Manual Current Adjustment (optional) allows full range of current adjustment during weld sequence	

The EN1380 Series Control is a microprocessor based resistance welding control. This control has been designed specifically for Flash Welding or Butt Welding with Upset and Annealing sequences. One outstanding feature (optional) of the EN1380 control is its ability to allow the operator concurrent adjustment during an initiated sequence (during Anneal time). Pilot initiation connections are dedicated for independent sequencing of Weld and Anneal sequences.

- Store up to 50 UNIQUE SCHEDULES
 - Every parameter of each schedule individually accessible
 - Each schedule can store 11 distinct and totally different parameters
 - All schedules retained in memory with power off
 - It is NOT NECESSARY to program functions not required
- Additional Standard Features:
 - Priority Heat Select
 - Contactors Failed Detection (Circuit breaker with shunt trip—optional)
- Control can be INTERFACED with external Programmable Logic Control (PLC);
Advanced interfaces available
- Dedicated Clamp and Squeeze Output Valves
- Meets or exceeds RWMA/NEMA standards

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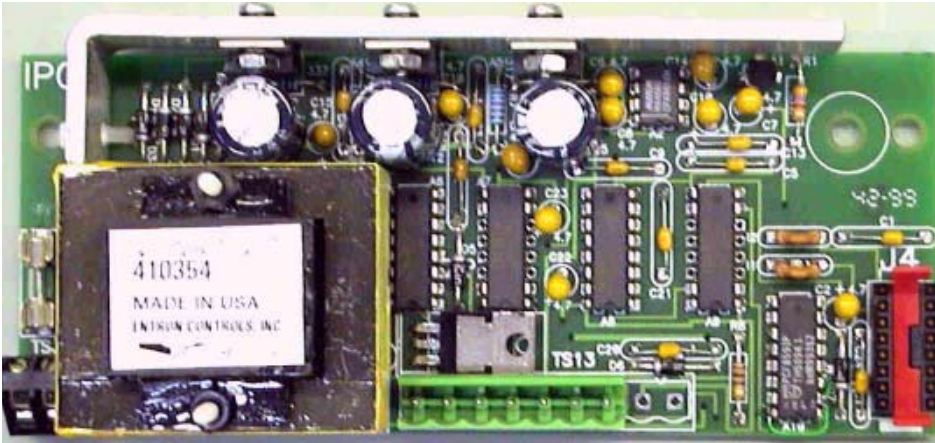
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ENTRON™

INTEGRATED PRESSURE SENSE CONTROL SYSTEM Provides Accurate Pressure Sense and/or Pressure Control



Integrated Pressure Sense Control System is an optional system which may be included with EN1000 Series Controls. IPSC System is designed for any application that requires automatic selection of preprogrammed pressure or automatic switching between different pressure settings for any schedule.

Three options:

- IPSC – Pressure Sense & Control
- IPS – Pressure Sense only
- IPC – Pressure Control only

Two programmable triggers

for IPSC and IPS options:

- on rising edge
- on falling edge

Three programmable modes

for any of three options:

- Pressure in [PSI] – input and/or output from 00 to 99 [PSI]
- Force in [lb] – input and/or output from 0000 to 9999 [lb]
- Current in [mA] – Standard Industrial input and/or output from 04.00 – 20.00 [mA]

Features

- Ideal for Multi-Valve/Multi-Pressure/Multi-Schedule systems and Forging operation.
- Integrated with EN1000 Series Controls – program/change pressure parameters for any schedule through Weld Control Front Panel.
- Independent pressure settings per each of the 50 or 100 schedules.
- Current loop design provides noise immunity for reliable operation.
- Digital circuitry provides highly accurate and repeatable pressure settings and selections.
- Repeatable digital accuracy eliminates need for operator adjustment or calibration.

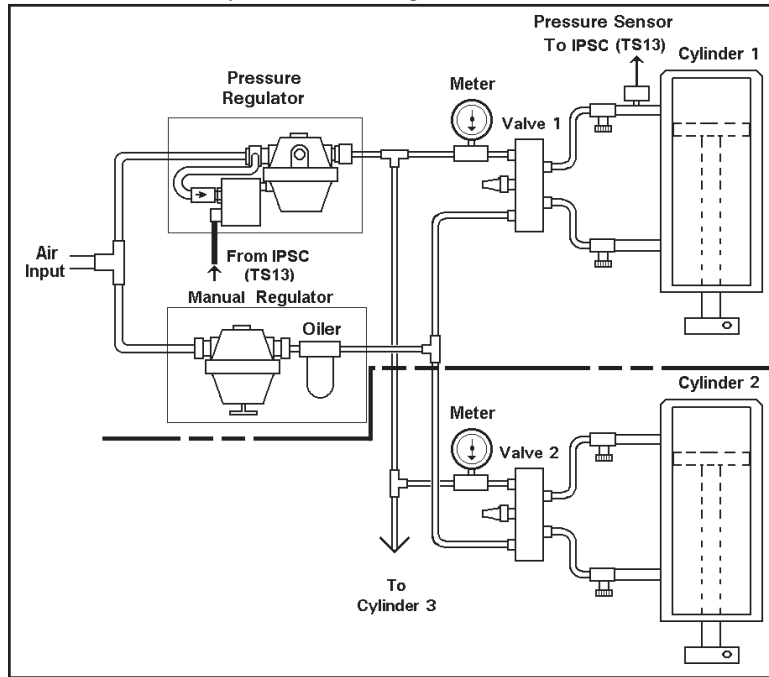
Advantages

- Precise regulation produces better weld quality.
- Set and control desired programmed pressure, regardless of line pressure variation.
- Provides accurate on-line Pressure Regulation and Sense.
- Control and sense Pressure in [PSA] or Force in [lb] or Current in [mA] with the same hardware.

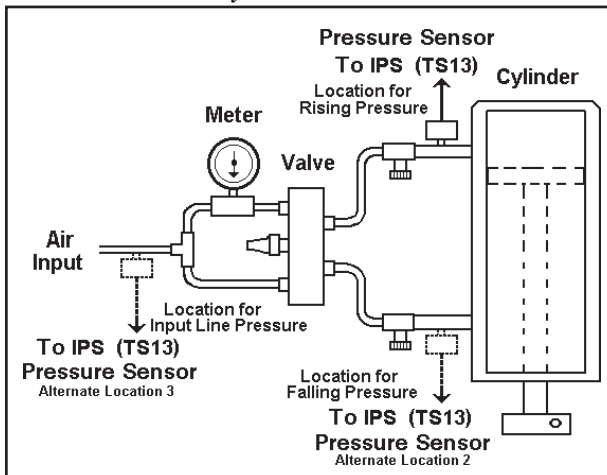
INTEGRATED PRESSURE SENSE CONTROL SYSTEM

Provides Accurate Pressure Sense and/or Pressure Control

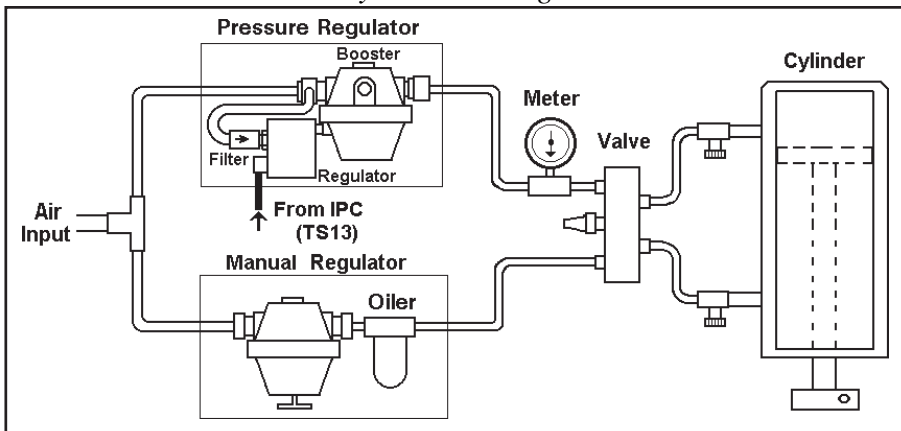
IPSC System with Regulator and Sensor



IPS System with Sensor



IPC System with Regulator



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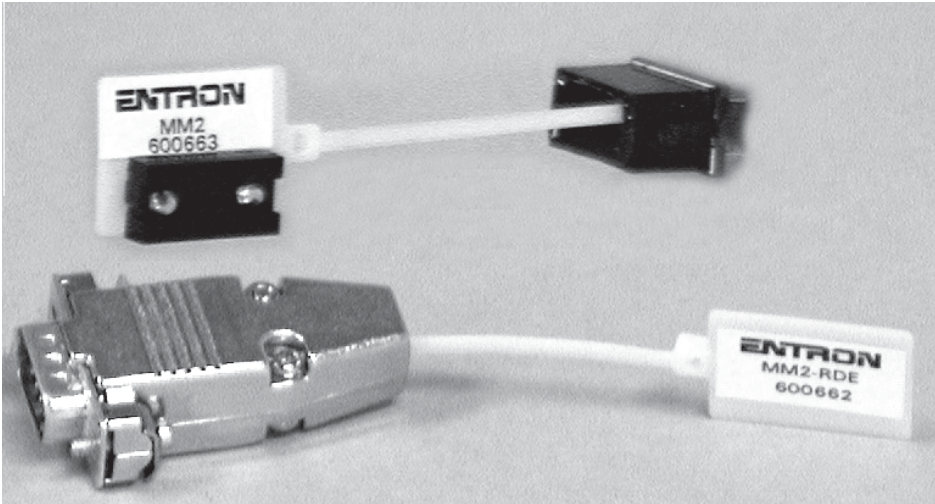
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ENTRON™

MM2/MM8 MEMORY MODULE

Provides Backup for all Data of EN1000 Series Controls



MM2 and MM8 Memory Modules are designed as backup devices for any EN1000 Series Control or to copy/download all data from one control to another.

MM2 may be used with any EN1000 or EN1001 Single Function Control.

MM8 is designed for use with any EN1000 or EN1001 Cascade Control.

Two versions:

- **MM2-RDE/MM8-RDE** for controls with RDE option
- **MM2/MM8** for all other controls

Features

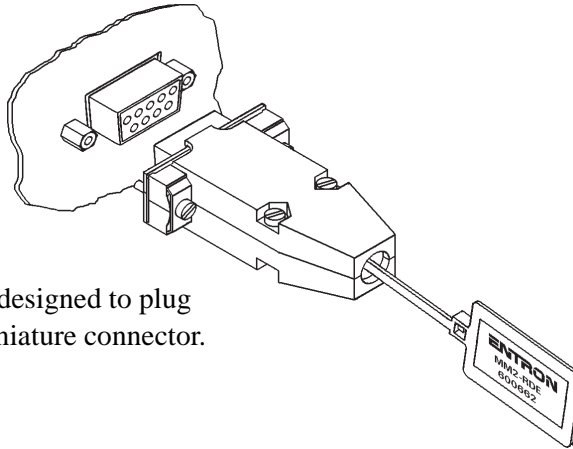
- Ideal for long-term storage and backup of all Schedule and Extended Functions data.
- Very fast backup operation with Checksum Error detection.
- Easy-to-use Front Panel push button on the control will copy or store all data from the control to the Memory Module.
- Easy-to-use Front Panel push button on the control will download or restore all data from Memory Module to the control.
- Automatically stores or restores all programmable Schedule and Extended Functions data. Copies all data from one control to another.
- The Marker Tag is provided to record date, Machine Identification information, and other necessary details.
- The 16 pin socket is provided on the Marker Tag to protect the pins of the MM2/MM8 device when it is not plugged into the Control Board.
- MM2/MM8 devices are based on EEPROM memory chip which does not need battery for memory retention.

Advantages

- Reduces Weld Control programming time in critical areas.
- Spare Control Boards can be reprogrammed quickly by simply downloading backed-up data from Memory Module unit.
- Used to store and restore different job schedules by using one or more Memory Modules and simply cloning all programmed data.
- Very useful tool for controls where multiple schedules and multiple valves are used. All data may be copied to another machine for operation duplication.

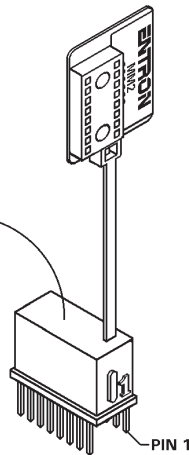
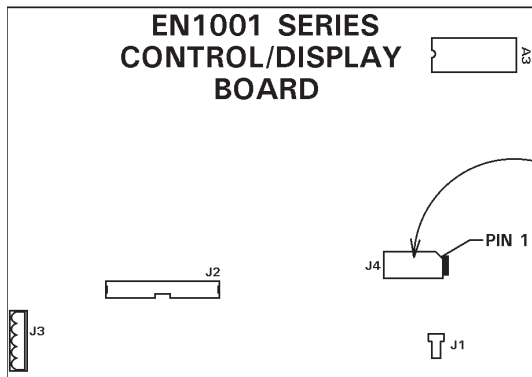
MM2/MM8 MEMORY MODULE

Provides Backup for all Data of EN1000 Series Controls

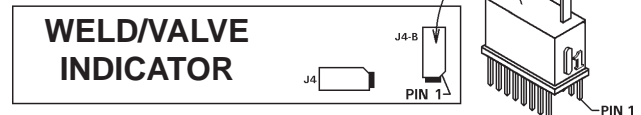


The MM2-RDE/MM8-RDE is designed to plug into an external 9 pin D-Subminiature connector.

The MM2 is designed to plug directly into the internal J4 connector on the Control Board.



The MM8 plugs into the J4-B connector on the Weld/Valve Indicator LED Board.



Required Equipment and Firmware:

MM2 EN1000 or EN1001 Single Function Control with PROM firmware version 619016-001**R** or later

MM8 EN1000 Cascade Control with Program Board version 410321 and PROM firmware version 619011-002**A** or later

EN1001 Cascade Control with Program Board 410363 and PROM firmware version 619044-001**B** or later

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NETWORKING COMPONENTS

ENTRON Weld Control Options and Accessories

EN1000 SERIES

Weld Controls With RS485 can communicate with RT4jrs or ENLINK or USER programmed PLCs to upload, download, store, retrieve and monitor weld schedules.



RT4jr.

REMOTE TERMINAL RS485 can communicate with weld control groups to program weld control parameters at convenient locations.



ENLINK

Windows Based Software and Personal Computers running ENLINK with RS232/RS485 converters may be used as master devices to communicate with EN1000 Series Controls to upload, download, store, retrieve, monitor and backup weld schedules.



S485/U485

RS232 to RS485 OPTION/
USB to RS485 OPTION
Interfaces from RS232 or USB to RS485 are provided for simple interface to USER provided PCs or PLCs.



485

RS485 OPTION is available to retrofit EN1000 Series Weld Controls allowing use of existing weld controls on ENBUS.



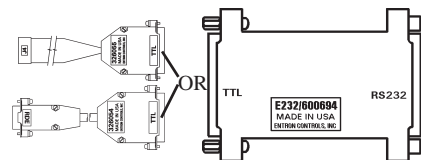
Plugs and Cable

Plugs and Cable and components to complete the ENBUS network are available.



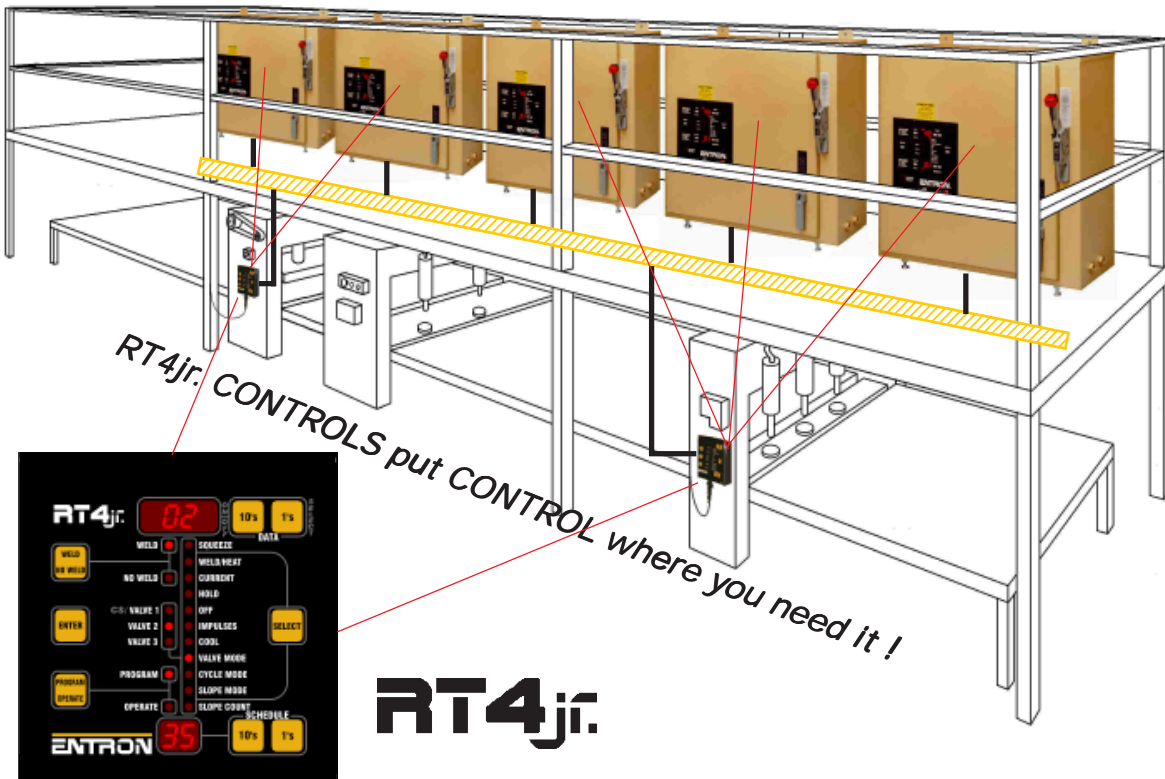
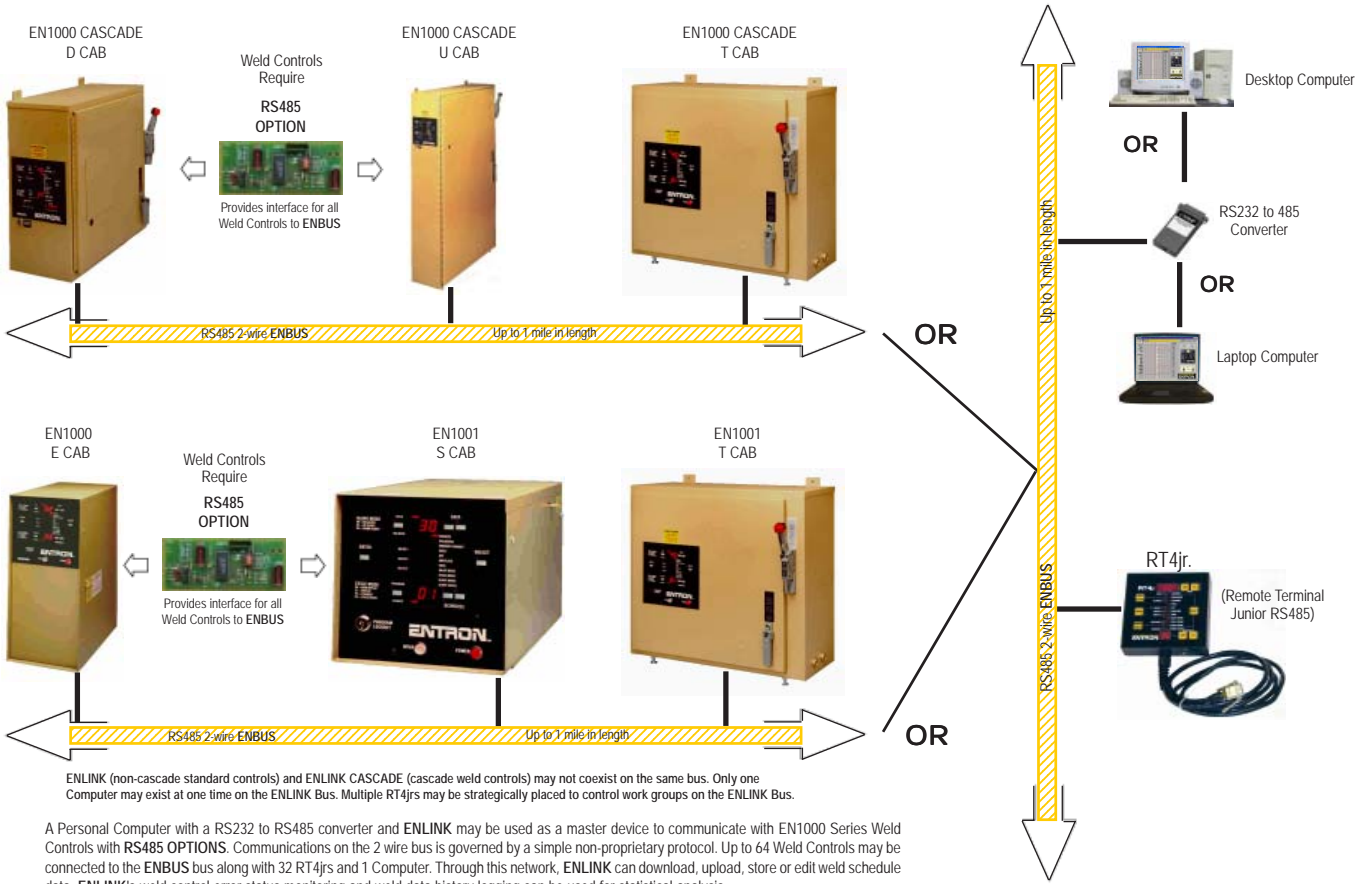
E232

E232 is used to simply connect weld controls through J4 or RDE Jacks to computers with RS232. Used with one weld control at a time to upload and download schedules using ENLINK.



ENLINK

LET SIMPLE NETWORKING PUT CONTROL WHERE YOU NEED IT !



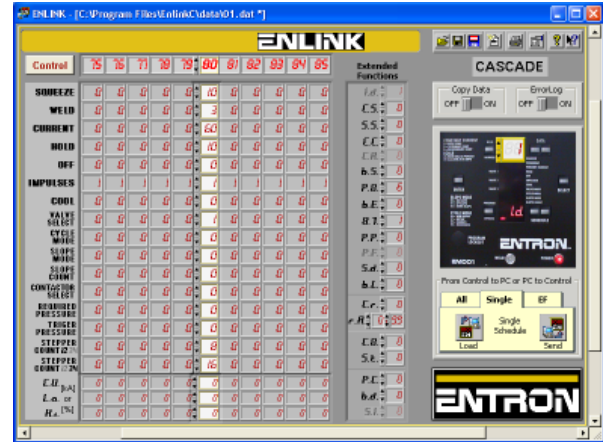
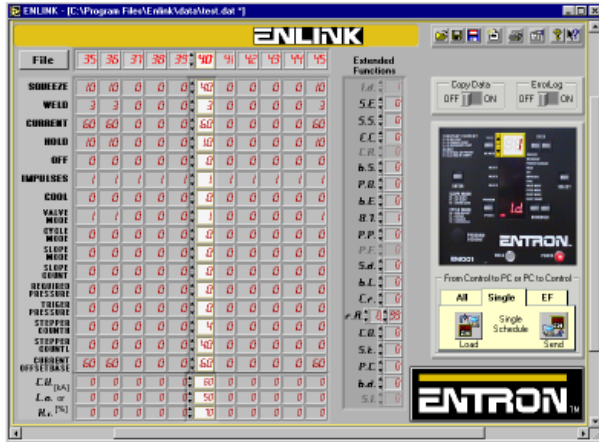
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ENTRON™

ENLINK and ENLINK CASCADE

Provides PC Interface for Remote Programming and Monitoring of EN1000 Series Controls



A PC or Laptop with RS232/RS485 converter and ENLINK for Windows may be used as a master device to communicate with EN1000 Series Controls.

ENLINK allows data programming, copying and downloading all schedules' data. ENLINK can perform error status monitoring and gather weld data history for use in statistical analysis.

Any PC or Laptop with RS232/RS485 converter may be connected to the 2-wire RS485 network through a daisy chain topology from Control to Control, with a customer wired J485-J485 cable.

Features

- ENLINK is a Windows 98/2000/XP based program designed with LabVIEW interface.
- Communication on the RS485 network defined with non proprietary ENBUS Protocol.
- Up to 64 Controls may be connected on the same two-wire RS485 network up to one mile in length.
- A Laptop or other device with RS485 interface may be connected on the same two-wire RS485 network.
- Up to 32 Remote Terminals (RT4jrs) may be connected on the same two-wire RS485 network.

- Remote Data Programming.
- Error Status Monitoring for all or any subset of the Controls organized in working groups.
- Store necessary data in database for statistics.
- Operational with EN1000, EN1000 Cascade, EN1001, EN1001 Cascade Series Controls.

ENLINK is used with EN1000 and EN1001 Series Controls.

ENLINK CASCADE is used with EN1000 Cascade and EN1001 Cascade Series Controls.

Advantages

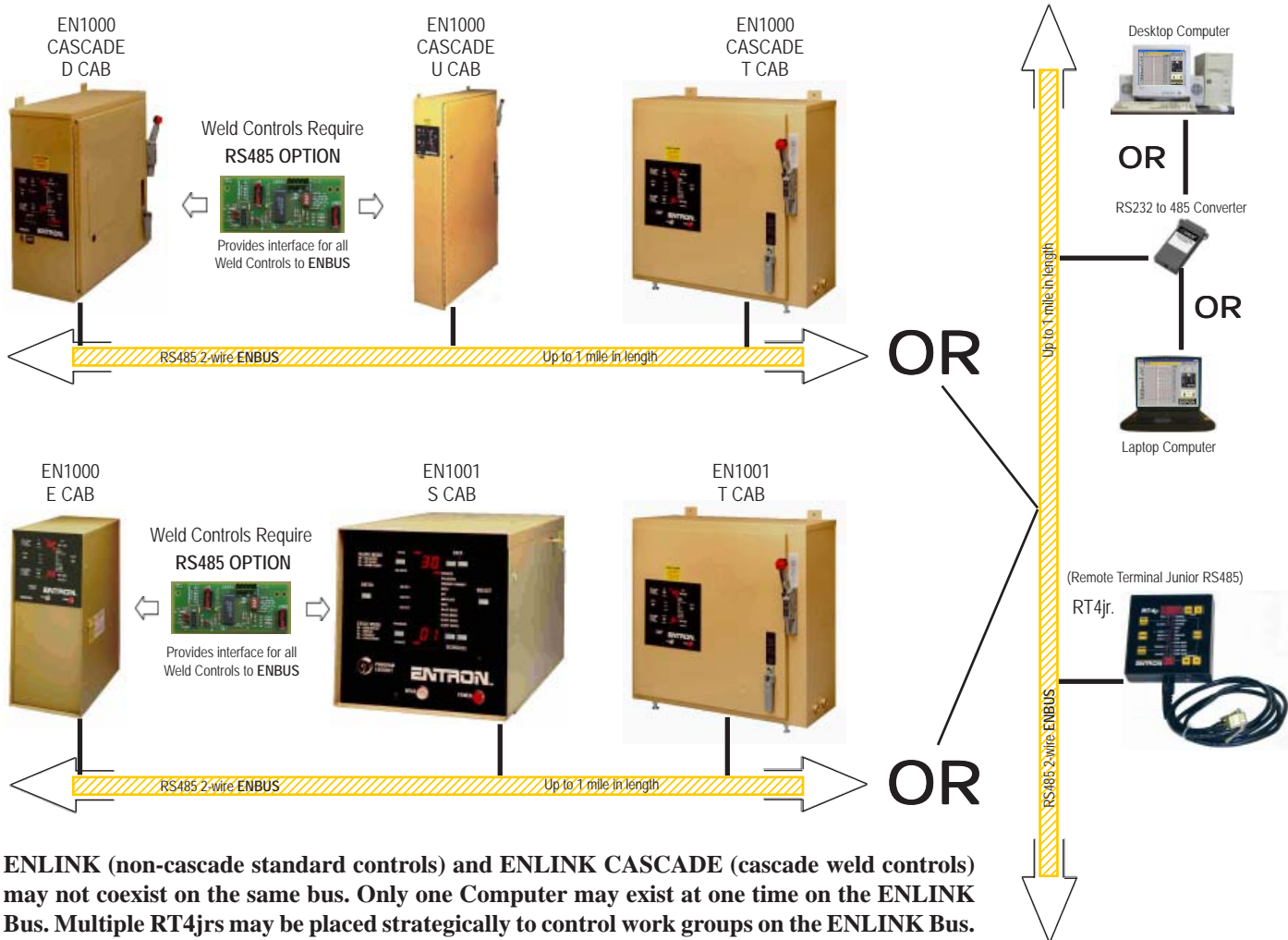
- Recognizable ENTRON Front Panel with the same functionality as EN1000 series Controls.
- May be used for remote programming many Controls from one location.
- Working Groups may be defined for easier monitoring error status on Controls.
- Allows storage of all data and weld parameters of Weld Controls for statistical analysis.
- OPEN ENBUS Protocol allows connection to RT4jr., or Computer or other device with RS485 interface. Customer software may interface directly with weld control.

Exclusive ENTRON two year warranty

ENTRON™

ENLINK and ENLINK CASCADE

Provides PC Interface for Remote Programming and Monitoring of EN1000 Series Controls



ENLINK (non-cascade standard controls) and ENLINK CASCADE (cascade weld controls) may not coexist on the same bus. Only one Computer may exist at one time on the ENLINK Bus. Multiple RT4jrs may be placed strategically to control work groups on the ENLINK Bus.

- See Instruction Manual **700171** for more information about RT4jr. and RS485 communication.
- Computers and RS485/RS232 converters may be customer provided.

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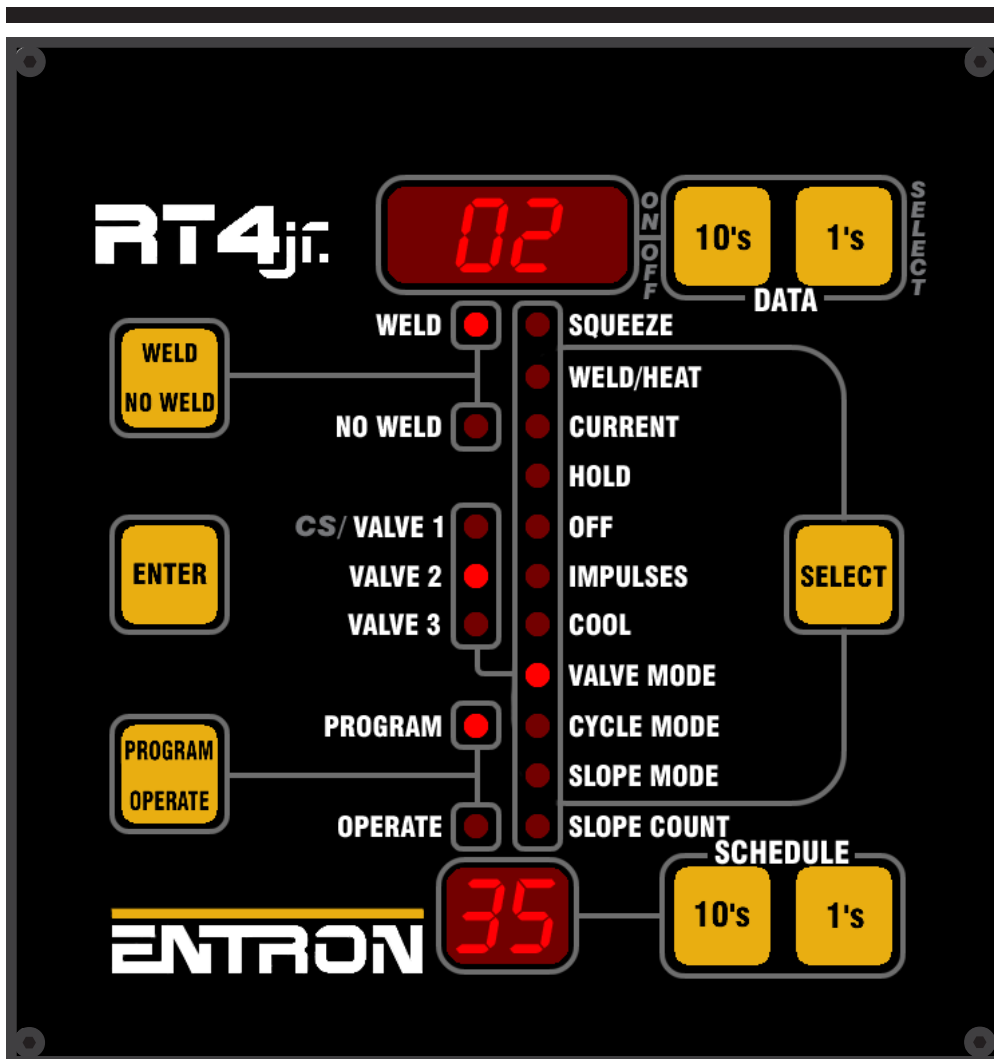
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ENTRON™

RT4jr. – REMOTE TERMINAL



(Actual size)

- *Monitors from 1 to 64 Controls*
- *Long-Distance (up to 1 mile) Programming of Control Parameters*
- *Work Group Error Monitoring*
- *Work Group Current Monitoring*
- *Simple 2-wire 485 Interface*
- *Field Installable*
- *Complete with 25' of cable and two field-installable 9 pin D-subminiature connectors*
- *Laptop not needed to monitor or program*

Features

- Compact size
- Hand-held or machine mountable
- Distance from control up to 1 mile
- Remote data entry
- Scan work group (subset) of 64 controls for errors
- Use when RDEjr. pendant cable length is too short for application
- Has its own programmable PIN# which overrides control PIN# when used

Requirements

- 485 Option on Weld Controls
- 2-wire network between components of network
- 24 VDC power

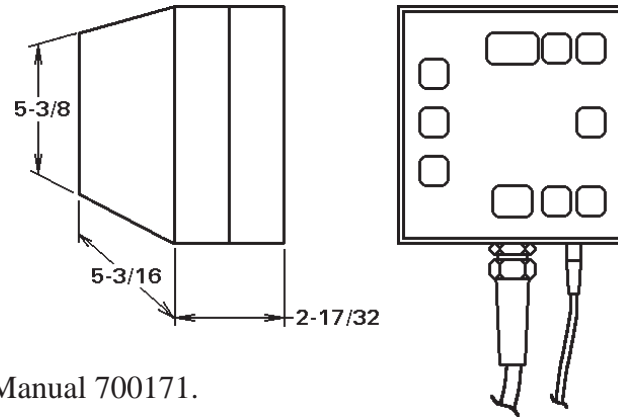


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Available Models

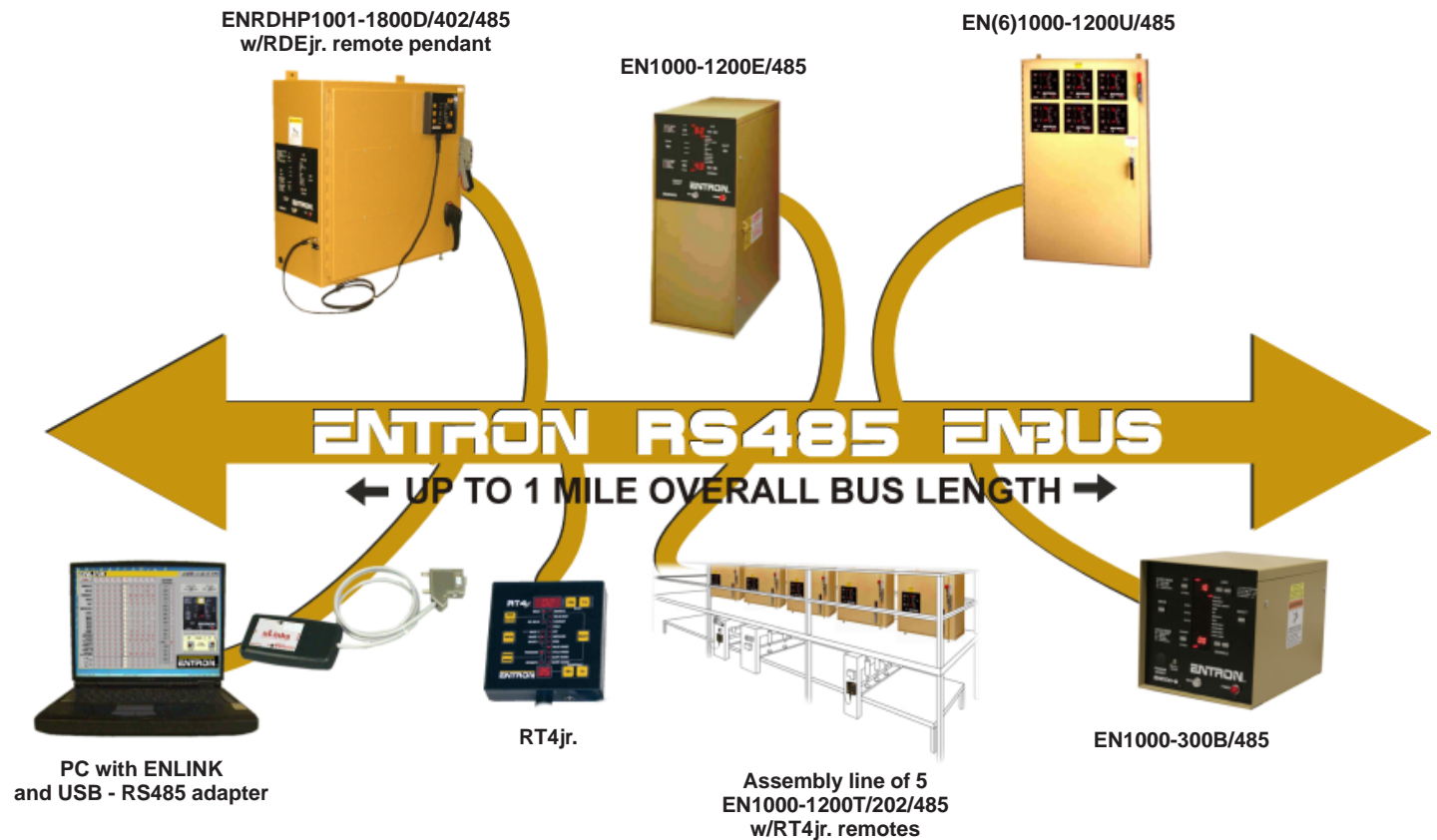
- EN1000
- EN1001
- EN1000 Cascade
- EN1001 Cascade

RT4jr. dimensions



For more technical information, see Instruction Manual 700171.

RT4jr. is part of a complete networking system



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ENTRON™

WELDER INTERLOCK Reduces Power Requirements



- *Reduction of Peak Demand Costs*
- *Eliminate Simultaneous Welding of Multiple Machines*
- *Simple to Use*
- *New Design Reduces Cost*
- *Quality Tested to Performance Extremes*
- *Application Flexibility*
- *Designed to Reduce Scan/Cycle Time when used with EN1000 and EN1001 Series Controls*

Features

- Operating Voltage – 120, 240, 380, 480, 575
- Interlocks 2 to 8 controls in one cabinet.
- Field expandable; i.e. order as a 4 Welder Interlock, expand to 8 as needed.
- Can be cascaded to interlock any number of controls.
- Solid state and mechanical relays available in various combinations.

Capabilities

- Interlock welding machines so only one weld control can weld at a time.
- When used with ENTRON Controls, Squeeze and Hold can be removed from cycle time.
- Can also be used to sequence multiple controls on one machine in single or 3-phase cascade.
- Field or factory customizable for interface to most any weld control with pressure switch input and valve output.



Exclusive ENTRON two year warranty

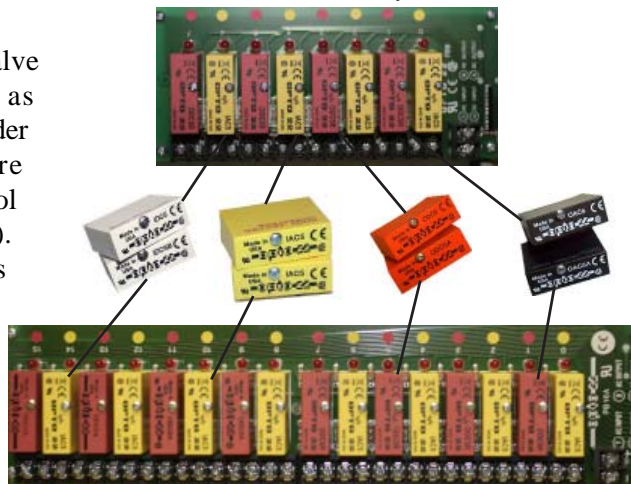
Advantages

- *Reduction of Peak Demand Costs*
- *Design Simplicity*
- *Field Expandable*
- *NEMA Type 1 Cabinet*
- *Flexible Applications*
- *No Programming Required*
- *Solid State Relays Provide Long Life*

INPUT/OUTPUT RELAY OPTIONS

Welder Interlock uses valve output of weld control as request to weld (CRI). Welder Interlock uses pressure switch input of weld control as a grant to weld (CRO). Standard Interlock comes with **Option K** relays (mechanical contact CRO) installed unless a different option is specified. Choose relays from chart for other combinations as requirements dictate. See Instruction Manual 700200 for more details.

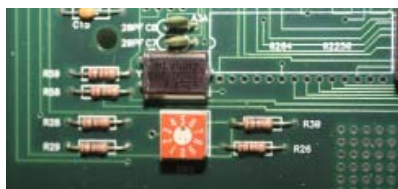
2-4 Welder Interlock Relay Rack Board



2-8 Welder Interlock Relay Rack Board

PRIORITY SELECTION

Allows one welder to have priority over all others. Uses a rotary switch to set priority.

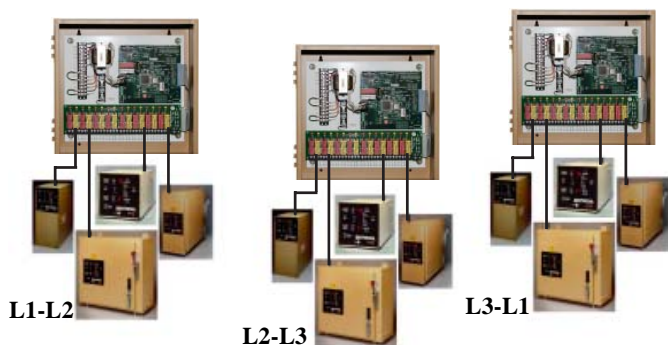


OPTION	CRI			CRO		
	VALVE INPUT VOLTAGE	P/N	COLOR	PS OUTPUT VOLTAGE	P/N	COLOR
A	90-140 VAC	314028	Yellow	3-60 VDC	314025	Red
B	90-140 VAC	314028	Yellow	24-280 VAC	314024	Black
C	180-280 VAC	314027	Yellow	3-60 VDC	314025	Red
D	180-280 VAC	314027	Yellow	24-280 VAC	314024	Black
E	12-32 VAC / 4-32 VDC	314026	White	3-60 VDC	314025	Red
F	12-32 VAC / 4-32 VDC	314026	White	24-280 VAC	314024	Black
G	12-32 VAC / 4-32 VDC	314026	White	3-200 VDC	314032	Red
H	90-140 VAC	314028	Yellow	3-200 VDC	314032	Red
J	180-280 VAC	314027	Yellow	3-200 VDC	314032	Red
K	90-140 VAC	314028	Yellow	0-120 VDC, 0.5A*	314052	Red
L	180-280 VAC	314027	Yellow	0-120 VDC, 0.5A*	314052	Red
M	12-32 VAC / 4-32 VDC	314026	White	0-120 VDC, 0.5A*	314052	Red

* mechanical contact

USING WELDER INTERLOCKS IN 3-PHASE SYSTEMS

When more controls are to be interlocked in 3-phase systems, the system can be configured using three groups of welding controls. It is not necessary for three Welder Interlocks to be interconnected, although it is possible.



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WA1 Weld Analyzer



- *Easy to Use*
- *Easily Legible in All Lighting Conditions*
- *Positive Keypad Action*
- *Suitable for Various Applications*
- *Reads Waveforms from 50 Hz upwards*
- *Traceable Accuracy*
- *Data Archiving*
- *Small and Lightweight allowing for Easy Portability*

Features

- Intuitive, flexible interface
- LCD 128 x 64 pixels FSTN with yellow/green backlight
- Embossed disc tactile keypad with antiglare display window
- Auto power-off
- Large choice of coils
- AC or MFDC operation
- NAMAS calibration certification
- PC/printer connection
- Includes 6" flexible coil, batteries and carrying case

Options

- Flexible coil – 3" or 12" diameter with 6.5' lead
- Battery charger & NiMH batteries

One Year Warranty

WA1 Weld Analyzer Specifications

The Weld Analyzer offers the engineering professional the facilities to analyze, fault-find and improve process quality on today's sophisticated welding control systems. Full NAMAS traceability gives you the confidence in your processes that your customers demand.



Power Source: 3 AA batteries
Display: 128 x 64 pixels FSTN transfective with yellow/green backlight
Current Range: 2.00 to 60.00 kA
Current Duration: 9999 cycles (AC)
 199.9 seconds (DC)

Monitored Parameters:

Current

peak RMS
 average RMS
 lowest RMS
 accuracy +/- 2% of full scale
 measures and displays values for each + and - 1/2 cycle

Time

total weld time
 any pulse time
 number of pulses
 accuracy +/- 0

Conduction Angle

average conduction angle
 conduction angle of every sample
 accuracy ± 4°

Position

position of monitored parameter in weld pulse train

Programmable Parameters:

AC

frequency
 blanking
 weld capture

DC

current threshold
 blanking
 weld capture

RS232 Communications: 19200 baud/8 data bits/no-parity/1 stop bit

Dimensions: 3-3/8" w x 1-1/8" d x 6-3/4" h; 1 lb. including batteries



Display Examples

Display	AC	DC
Data		
Detail		
Setup		

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