

# Performance Plus Preassembled Clutch/Brake Module

P-273-3  
819-0358

## Installation Instructions



*An Altra Industrial Motion Company*

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**⚠ WARNING** Failure to follow these instructions may result in product damage, equipment damage, and serious or fatal injury to personnel.

## Introduction

Performance Plus versions of Warner Electric Unimodules are completely assembled clutch/brake packages for out of box use. They are engineered for easy installation, while providing extra long life over standard units. Technically advanced ceramic friction material provides exceptional wear resistance and enhanced performance making Performance Plus Unimodule clutch/brakes ideal for high cycle rate applications.

Performance Plus clutch/brake combinations are offered in two configurations. The "1020" has a hub input and a male shaft output. The "2030" has a male shaft extension for both input and output. These two configurations are offered with various mounting accessories to make ceramic friction faced Performance Plus Unimodules adaptable to many power transmission systems.

This manual covers installation, wiring and troubleshooting of the ceramic faced models which are offered in clutch/brake sizes 50, 180 and 210.

Follow the installation instructions in this manual carefully to ensure safe, reliable operation. All stated or implied manufacturer warranties are voided if this product is not installed in accordance with these instructions.

**⚠ WARNING** Make sure all power is turned off to this equipment when installing, as injury (or even death) may result from contact with live wires or rotating shafts.


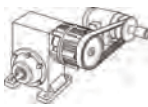
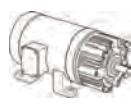

## Installation

**Note:** Before installing the unimodule to a motor or reducer, make certain that the UM size and NEMA frame dimensions match according to Table 1 below.

**Corresponding  
NEMA Frame Sizes**

UM Size	Old NEMA	New NEMA	Shaft Dia.	C-Face Pilot Dia.
50	56 C	48 Y	5/8"	4 1/2"
180	182 C	143 TC	7/8"	4 1/2"
	184 C	145 TC		
210	213 C	182 TC	1-1/8"	8 1/2"
	215 C	184 TC		

Install your specific modular combination according to the installation steps specified in the table. Use only those steps indicated for each combination.

For These UM Combinations	Use These Installation Steps:
 UniModule Clutch/Brake Between C-Face Motor and Reducer - 1020	1, 2, 3, 4, 7
 UniModule Clutch/Brake - 2030	4, 7
 Motor Mount UniModule Clutch-Brake on a C-Face Motor 1020-M	1, 2, 3, 6, 7
 Base Mounted UniModule Clutch-Brake - 2030-B	5, 7

**Note:** The equipment covered by this service manual must be installed in accordance with these instructions. Failure to do so may damage the equipment and void the warranty.

## Mounting to a Motor

### Step 1

**Note:** The 1020 Unimodule is furnished with a special hardened key. It is strongly recommended that this key be used with the motor shaft to avoid damage to the shaft and rotor hub.

**Note:** Size 210 Unimodules require an adapter ring to be mounted to the motor prior to mounting the 1020 Unimodule. Adapter and mounting hardware are provided with each Unimodule assembly.

**Note:** Before mounting, check the motor shaft for endplay. If the shaft can be moved axially .030" or more, excessive thrust may occur between the rotor and field. The motor should be replaced unless the endplay can be reduced.

**Note:** If the optional fan accessory is being used, it should be installed prior to mounting the Unimodule to a motor or reducer. Follow the instructions provided with the fan accessory.

Replace the existing motor shaft key with the hardened key provided with the unit. If necessary, prick punch the keyway of the motor shaft to keep the key from moving in the keyway. Slide the module assembly onto the motor shaft. (See Figure 1) Align the key in the motor shaft with the keyway in the rotor hub.

Do not use force. If the UniModule does not slide on freely, polish the motor shaft sufficiently to achieve a slip fit.



Figure 1

### Step 2

The housing is provided with vent holes which are normally placed in the down position. Rotate the assembly to where the vent holes are toward the bottom and insert the four long capscrews (provided) through the mounting holes in the housing and into the motor face. Tighten alternately and securely. (30 to 35 ft. lbs.)



Figure 2

### Step 3

The access hole for the Allen wrench to tighten the rotor setscrews is shown in Figure 3. Rotate the clutch rotor as necessary to insert the wrench into the setscrews. Tighten both screws alternately and securely. (40 to 45 in. lbs. for 180 size, 80 to 85 in. lbs. for 50 and 210 sizes.)



Figure 3

## Step 4 – Mounting to a Reducer

The output side of a Unimodule may be mounted directly to a reducer.

- A. Align the output shaft and key of the Unimodule with the corresponding shaft hole and keyway of the reducer. Slide the assembly together, matching the pilot diameter on the Unimodule with a pilot diameter on the reducer.
- B. Bolt the Unimodule to the reducer flange. The four (4) bolts required (3/8 - 16 UNC-2A) are normally furnished with the reducer. (18 to 22 ft. lbs. for 50 and 180 sizes, 40 to 45 lbs. for 210 size.)

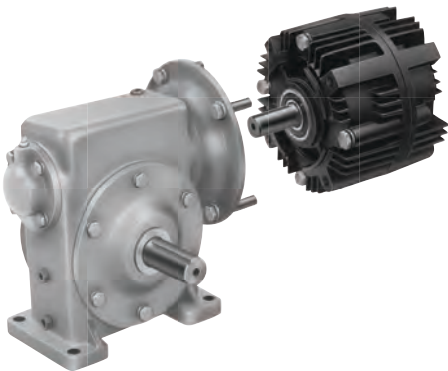


Figure 4

## Step 5 – Installing the Base Mount

Unimodule 2030 can be base-mounted (Fig. 5).



Figure 5

- A. Mount each Unimodule so that the base is located below the ventilation holes. A pilot diameter on the end of each Unimodule mates with pilot diameters on the base.

- B. Secure the base to the Unimodule with the four (4) bolts provided. (18 to 22 ft. lbs. for 50 and 180 sizes, 40 to 45 ft. lbs. for 210 size.)

## Step 6 – Installing the Motor Mount (M)

- A. Motor Mount (M) can be installed to the output end of the Unimodule to provide a foot mounting for the complete assembly of Unimodule and motor.

### Size 50 and 180

- A. Remove the two (2) long hex head bolts from the side of the Unimodule toward the ventilation holes.
- B. Mount the Unimodule on the Motor Mount so that the base of the Motor Mount is underneath the Unimodule and motor (Figure 6). A pilot diameter on the Unimodule mates with a pilot diameter on the Motor Mount.
- C. Secure the Motor Mount in place with two (2) longer mounting bolts (30 to 35 ft. lbs.) and the two shorter bolts (18 to 22 ft. lbs.) all provided in the kit.

### Size 210

- A. Mount the Unimodule on the Motor Mount so that the base of the Motor Mount is underneath the Unimodule and motor (Figure 6). A pilot diameter on the Unimodule mates with a pilot diameter on the Motor Mount.
- B. Secure the Motor Mount to the Unimodule with three (3) bolts provided. (40 to 45 ft. lbs.)



Figure 6

## Step 7 – Electrical Connections

**⚠ WARNING** To avoid injury (or even death), always make certain all power is off before at tempting to install or service this control or any electrical equipment.

The Unimodule is provided with one conduit connection hole, threaded for standard 1/2" conduit connectors. Both the clutch and the brake lead wires are brought out through this opening. The conduit box accessory kit, P/N 5370-101-042, provides two conduit connection holes for standard 1/2" conduit connectors.

The clutch and brake coils operate on DC voltage. Warner Electric offers a full line of AC voltage powered controls to meet the needs of almost every clutch/brake application. The service and installation instructions included with each Warner Electric control show the proper electrical connections.

Please refer to Figure 7 for the proper Unimodule electrical connections. **Clutch leads are identified with a white insulator sleeve. Brake leads have a black insulator sleeve.**

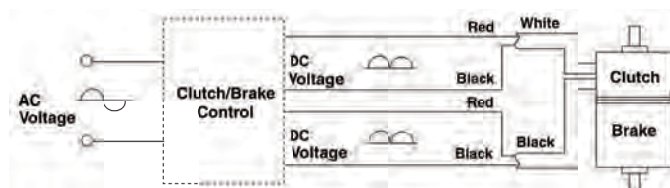


Figure 7

After wiring, your Performance Plus Unimodule is now ready to operate. If your clutch/brake control has torque control, the torque adjust potentiometer(s) should be set for rapid and complete load take up. Excessive slippage of the brake or clutch can cause overheating and premature wear. See the following pages for technical, operating and service information.

## Electrical Coil Data

		Clutch	Brake	Clutch	Brake	Clutch	Brake
Voltage-D.C.		90	90	24	24	6	6
Resistance	UM-50-C	452	452	31.8	26.8	1.86	1.77
(OHMS)	UM-180-C	392	309	26.7	22.8	1.80	1.54
	UM-210-C	248	222	17.9	15.4	1.22	1.04
Amperes	UM-50-C	.199	.233	.755	.894	3.23	3.39
	UM-180-C	.230	.291	.896	1.05	3.30	3.90
	UM-210-C	.363	.405	1.34	1.56	4.90	5.78
WATTS	UM-50-C	18	21	18	21	19	20
	UM-180-C	21	26	21.5	25	20	23
	UM-210-C	33	36	32	37	30	35
Build Up	UM-50-C	52	53	52	53	52	53
(Milli.)	UM-180-C	72	75	72	75	72	70
	UM-210-C	120	100	120	100	110	100
Decay	UM-50-C	6.2	5.0	6.2	5.0	6.5	5.0
(Milli.)	UM-180-C	12	10	12	10	12	10
	UM-210-C	20	10	20	10	20	10

## Mechanical Data

	UM-50	UM-180	UM-210
Static Torque - lb. ft.	16	30	95
Maximum Speed - rpm	3600	3600	3600
Average Weight-lbs.			
1020	10	13.2	30.6/31
2030	13	16.5	41.3/42
Inertia – WR (lb. ft. <sup>2</sup> )			
Output	.017	.041	.231
Input	.020	.046	.188

Note: All Data Nominal

## Overhung Load Data

Overhung load data is provided in this manual for the design engineer concerned with specific requirements in this area. The maximum allowable overhung load which can be applied to the shaft of an Electro-Module may be determined from the accompanying chart.

Electro-Module Size	Overhung Load*	
	Distance Load is Applied from Housing Face "A" Inches	Maximum Load Rating "R" Lbs.
UM-50-C	1" - Center of Shaft	177
	2" - End of Shaft	123
	3"	95
UM-180-C	1" - Center of Shaft	192
	2" - End of Shaft	134
	3"	104
UM-210-C	1-3/8" - Center of Shaft	386
	2-3/4" - End of Shaft	271
	4-1/8"	208

\* Based on 10,000 Hour Life at 3600 RPM.

The minimum pitch diameter pulley or sprocket that can be used, for satisfactory bearing life, is determined from the formula:

$$\text{Min. P.D.} = \frac{2 T K}{R}$$

T - Torque (in.lbs.). This is the torque actually being transmitted, not necessarily the maximum torque capacity of the Electro-Module.

$$\text{Torque} = \frac{63025 \times \text{HP}}{\text{RPM}}$$

K - The safety factor for the tension in the type of drive.

Use: 1 for chain and sprocket  
1 for timing belt  
2 for V-belt  
3 for flat belt

R - Radial load allowable (values at various distance from the housing face are given in the chart).

**Example:** What is the minimum V-belt pulley that can be applied to the center of the shaft of an EM-50 module. The torque requirements is 112 in. lbs.

$$\text{Min. P.D.} = \frac{2 \times 112 \times 2}{224} = 2" \text{ minimum P.D. pulley}$$

## Burnishing

The ceramic faced friction surfaces of these Unimodules are pre-burnished and performance tested at the factory to ensure consistent "out of box" performance. Therefore, no "wearing in," or burnishing, is required. Full rated performance should be achieved after running for a few cycles, usually fewer than 50.

## Maintenance

### Wear Pattern

Wear grooves appear on the friction surfaces. This is a normal wear condition, and does not impair functioning of the unit. Never machine the friction surfaces to remove grooves or score marks resulting from normal wear.

### Heat

Excessive heat and high operating temperatures can cause premature bearing failure. Units, therefore, should be ventilated as efficiently as possible, especially if the application requires fast, repetitive cycle operation.

### Foreign Materials

When units are used near gear boxes or transmissions requiring frequent lubrication, means must be provided to protect the friction surfaces from oil and grease to prevent serious torque loss.

## Troubleshooting

With the motor at rest and locked out, check the following:

- A. With power off to the clutch and brake, spin the output shaft by hand. It should turn with only the light drag of the preloaded armatures.
- B. If a brake or clutch slips or loses torque completely, the initial check should be the input voltage to the magnet or field as follows:

**90-Volt:** Connect a DC voltmeter with a range of 0-100 volt directly across the magnet or field terminals. With the power on and the torque control potentiometer turned up, a normal reading is 90 volts, although 85 to 95 is satisfactory. The reading should drop as the potentiometer control is adjusted counterclockwise.

**24 Volt:** Use a DC voltmeter with a range of 0-30 volts or more. A normal reading is approximately 22-26 volts, depending on the power supply.



**6-Volt:** Use a DC voltmeter of approximately 0-15 volt range. A normal reading is from 5.5 to 6.5 volts.

The above checks normally are sufficient. Further checks may be made as follows: connect a low range ammeter in series with one magnet lead. Correct amperage readings for each coil voltage and unit size are found on page 5. These readings are taken with the power on and the potentiometer control in the maximum position.

Ohmmeter checks should be made with the power off and the circuit open. (To be certain, disconnect one lead to the magnet.) Compare resistance to the data on page 5.

If the above checks indicate that the proper voltage and current is being supplied to the coil, mechanical parts should be checked to assure that they are in good operating condition and properly installed.

## Ordering Information

Unit Model	Voltage	Part Number
UM-50-1020-C	6	5370-273-077
UM-50-1020-C	24	5370-273-078
UM-50-1020-C	90	5370-273-079
UM-50-2030-C	6	5370-273-085
UM-50-2030-C	24	5370-273-086
UM-50-2030-C	90	5370-273-087
UM-180-1020-C	6	5370-273-073
UM-180-1020-C	24	5370-273-074
UM-180-1020-C	90	5370-273-075
UM-180-2030-C	6	5370-273-081
UM-180-2030-C	24	5370-273-082
UM-180-2030-C	90	5370-273-083
UM-210-1020-C	6	5371-273-035
UM-210-1020-C	24	5371-273-036
UM-210-1020-C	90	5371-273-037
UM-210-2030-C	6	5371-273-039
UM-210-2030-C	24	5371-273-040
UM-210-2030-C	90	5371-273-041

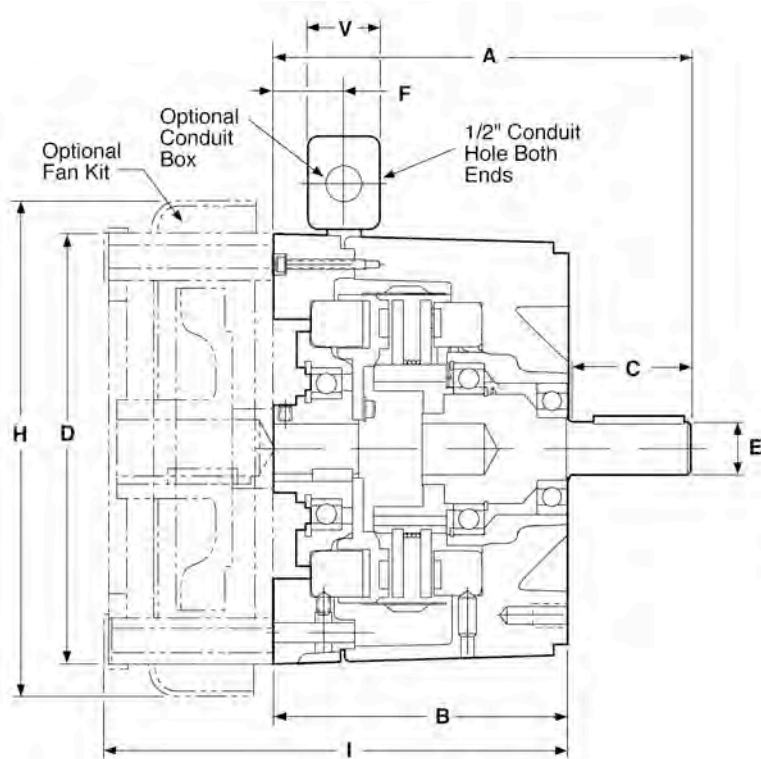
## Repair and Replacement

Performance Plus Unimodules will provide reliable and consistent performance throughout the exceptionally long life of the friction facings. Their long life results from the exceptional wear resistance of the ceramic material. The low wear rate also results in a longer burnish time to "mate" the friction surfaces. Alignment of the friction surfaces of both clutch and brake are also very critical. Therefore, these units are not field serviceable. All repair work must be done by the Factory where alignment and burnishing can be closely monitored.

Please note that units with damage to the non-wearing components, such as housings and shafts, are not repairable. The factory will evaluate returns and determine if they can be repaired.

## Dimensions

### 1020-C Unimodules



Size	A	B	C	D	E	F	G	H	I
50	6.750	4.844	1.813	6.750	.625	.937	2.203	7.687	7.274
180	6.828	4.844	1.812	6.750	.875	.937	2.203	7.687	7.274
210	*9.391	*6.422	2.500	9.250	1.125	*1.125	2.203	10.187	9.297

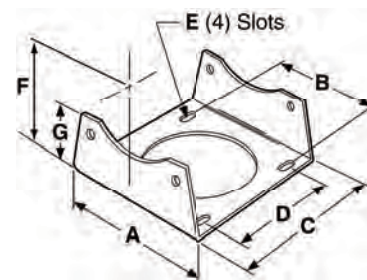
\*Dimension includes the .500 thick adapter required for C face mounting to a motor.

All dimensions are nominal, unless otherwise noted.

## Base Motor Mount

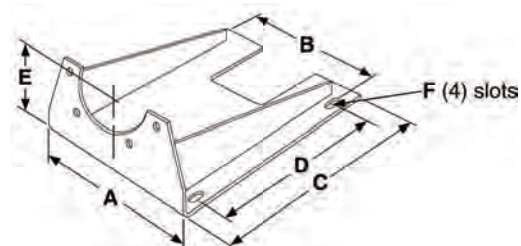
### Base (B):

Size	A	B	C	D	E	F	G	Part No.
UM-50-B	6.000	5.000	5.672	4.000	.750 x .406	3.500	2.000	5370-101-004
UM-180-B	6.625	5.000	5.672	4.000	.750 x .406	4.500	3.000	5370-101-002
UM-210-B	9.000	7.750	8.203	6.000	.750 x .531	5.250	3.385	5371-101-001



### Motor Mount (M):

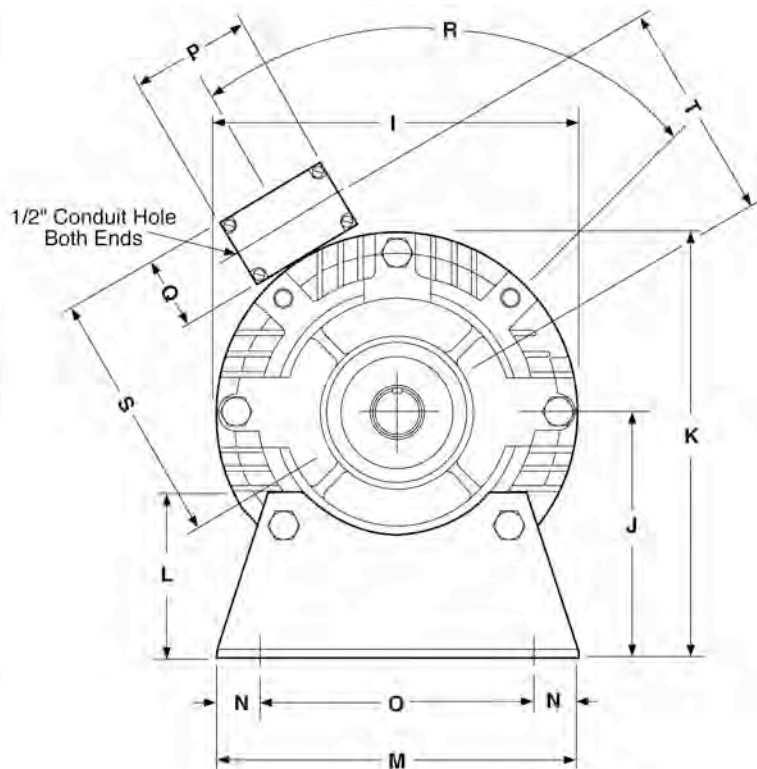
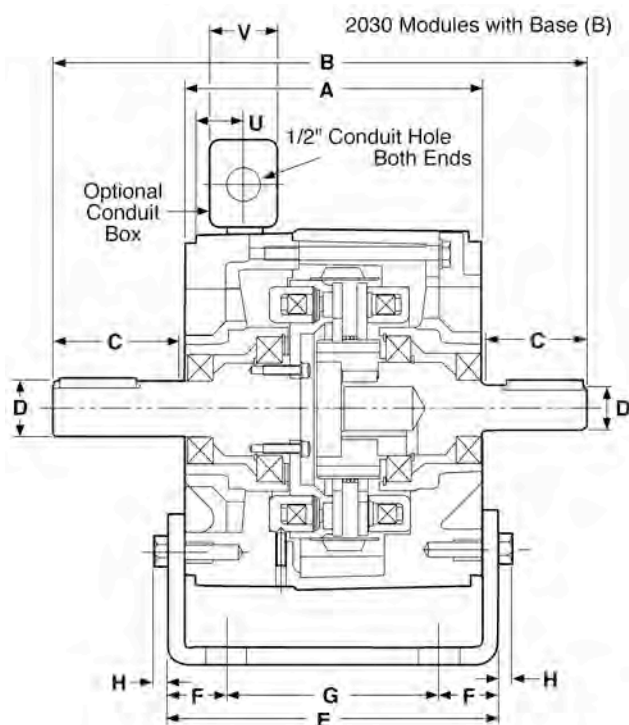
Size	A	B	C	D	E	F	Part No.
UM-50-M	3.500	9.250	8.250	8.000	11.000	.796 x .406	5370-101-004
UM-180-M	4.500	9.250	8.250	8.000	11.000	.796 x .406	5370-101-012
UM-210-M	5.250	11.500	10.500	9.000	12.000	.750 x .406	5371-101-012





## Dimensions

### 2030 – C Unimodules with Base (B):



Size	A	B	C	D	E	F	G	H
50	5.719	9.516	1.813	.625	5.672	.844	4.000	.344
			Min					
180	5.719	9.656	1.890	.875	5.672	.844	4.000	.344
			Min					
210	7.719	12.969	2.500	1.125	8.203	1.094	6.000	.437
			Min					

Size	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
50	6.688	3.500	6.844	2.000	6.000	.500	5.000	3.125	2.188	75°	5.531	4.438	1.125	2.203
180	6.688	4.500	7.844	3.000	6.625	.500	5.000	3.125	2.188	75°	5.531	4.438	1.125	2.203
210	9.688	5.250	9.906	3.375	9.000	.625	7.750	3.125	2.188	70°	6.859	5.766	1.625	2.203

All dimensions are nominal unless otherwise noted.

# Warranty

Warner Electric LLC warrants that it will repair or replace (whichever it deems advisable) any product manufactured and sold by it which proves to be defective in material or workmanship within a period of one (1) year from the date of original purchase for consumer, commercial or industrial use.

This warranty extends only to the original purchaser and is not transferable or assignable without Warner Electric LLC's prior consent.

Warranty service can be obtained in the U.S.A. by returning any defective product, transportation charges prepaid, to the appropriate Warner Electric LLC factory. Additional warranty information may be obtained by writing the Customer Satisfaction Department, Warner Electric LLC, 449 Gardner Street, South Beloit, Illinois 61080, or by calling 815-389-3771.

A purchase receipt or other proof of original purchase will be required before warranty service is rendered. If found defective under the terms of this warranty, repair or replacement will be made, without charge, together with a refund for transportation costs. If found not to be defective, you will be notified and, with your consent, the item will be repaired or replaced and returned to you at your expense.

This warranty covers normal use and does not cover damage or defect which results from alteration, accident, neglect, or improper installation, operation, or maintenance.

Some states do not allow limitation on how long an implied warranty lasts, so the above limitation may not apply to you.

Warner Electric LLC's obligation under this warranty is limited to the repair or replacement of the defective product and in no event shall Warner Electric LLC be liable for consequential, indirect, or incidental damages of any kind incurred by reason of the manufacture, sale or use of any defective product. Warner Electric LLC neither assumes nor authorizes any other person to give any other warranty or to assume any other obligation or liability on its behalf.

WITH RESPECT TO CONSUMER USE OF THE PRODUCT, ANY IMPLIED WARRANTIES WHICH THE CONSUMER MAY HAVE ARE LIMITED IN DURATION TO ONE YEAR FROM THE DATE OF ORIGINAL CONSUMER PURCHASE. WITH RESPECT TO COMMERCIAL AND INDUSTRIAL USES OF THE PRODUCT, THE FOREGOING WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES, WHETHER EXPRESSED OR IMPLIED BY OPERATION OF LAW OR OTHERWISE, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

## **Changes in Dimensions and Specifications**

All dimensions and specifications shown in Warner Electric catalogs are subject to change without notice. Weights do not include weight of boxing for shipment. Certified prints will be furnished without charge on request to Warner Electric.



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