

IMPULSE[®]•T Replacement for MAC[™]•2000

Transition Guide



MAGNETEK
MATERIAL HANDLING

Part Number: 144-26164 R0

October 2015

©Copyright 2015 Magnetek Material Handling

Table of Contents

1	SERVICE CONTACT INFORMATION	3
2	PREFACE AND SAFETY	4
2.1	Product Safety Information.....	4
2.2	Product Warranty Information	4
2.3	DANGER, WARNING, CAUTION, and NOTE Statements.....	5
2.4	Product Specific Safety Information	5
3	INTRODUCTION	6
4	SPECIFICATIONS	6
5	INSTALLATION	7
5.1	IMPULSE•T System Components and External Devices	7
5.1.1	Optional Drive Components	7
5.1.2	As-Required Drive Components	7
5.1.3	Required External Devices.....	7
5.2	Connections	7
6	PARAMETER SETTINGS	11
7	STARUP PROCEDURE	11
8	DIMENSIONS AND CLEARANCE	12

1 SERVICE CONTACT INFORMATION

For questions regarding service or technical information contact:

1-866-MAG-SERV
(1-866-624-7378)

Magnetek Material Handling
N49 W13650 Campbell Drive
Menomonee Falls, WI 53051

Telephone: 800-288-8178

Website: www.magnetek.com
E-mail: mhcustomerservice@magnetek.com

Fax Numbers:

Main: 800-298-3503
Sales: 262-783-3510
Service: 262-783-3508

Magnetek, Inc. has additional satellite locations for Canada and the United States. For more information, please visit <http://www.magnetek.com>.

©2015 MAGNETEK

All rights reserved. This notice applies to all copyrighted materials included with this product, including, but not limited to, this manual and software embodied within the product. This manual is intended for the sole use of the person(s) to whom it was provided, and any unauthorized distribution of the manual or dispersal of its contents is strictly forbidden. This manual may not be reproduced in whole or in part by any means whatsoever without the expressed written permission of MAGNETEK.

2 PREFACE AND SAFETY

©2015 MAGNETEK

All rights reserved. This notice applies to all copyrighted materials included with this product, including, but not limited to, this manual. This manual is intended for the sole use of the persons to whom it was provided, and any unauthorized distribution of the manual or dispersal of its contents is strictly forbidden. This manual may not be reproduced in whole or in part by any means whatsoever without the expressed written permission of Magnetek.

2.1 Product Safety Information

Magnetek, Inc. (Magnetek) offers a broad range of radio remote control products, control products and adjustable frequency drives, industrial braking systems, and power delivery products for material handling applications. This manual has been prepared by Magnetek to provide information and recommendations for the installation, use, operation and service of Magnetek's material handling products and systems (Magnetek Products). Anyone who uses, operates, maintains, services, installs or owns Magnetek Products should know, understand and follow the instructions and safety recommendations in this manual for Magnetek Products.

The recommendations in this manual do not take precedence over any of the following requirements relating to cranes, hoists, lifting devices or other equipment which use or include Magnetek Products:

- Instructions, manuals, and safety warnings of the manufacturers of the equipment where the Magnetek Products are used,
- Plant safety rules and procedures of the employers and the owners of the facilities where the Magnetek Products are being used,
- Regulations issued by the Occupational Health and Safety Administration (OSHA),
- Applicable local, state, provincial, or federal codes, ordinances, standards and requirements, or
- Safety standards and practices for the industries in which Magnetek Products are used.

This manual does not include or address the specific instructions and safety warnings of these manufacturers or any of the other requirements listed above. It is the responsibility of the owners, users and operators of the Magnetek Products to know, understand and follow all of these requirements. It is the responsibility of the employer to make its employees aware of all of the above listed requirements and to make certain that all operators are properly trained.

No one should use Magnetek Products prior to becoming familiar with and being trained in these requirements and the instructions and safety recommendations for this manual.

2.2 Product Warranty Information

Magnetek, hereafter referred to as Company, assumes no responsibility for improper programming of a device (such as a drive or radio) by untrained personnel. A device should only be programmed by a trained technician who has read and understands the contents of the relevant manual(s). Improper programming of a device can lead to unexpected, undesirable, or unsafe operation or performance of the device. This may result in damage to equipment or personal injury. Company shall not be liable for economic loss, property damage, or other consequential damages or physical injury sustained by the purchaser or by any third party as a result of such programming. Company neither assumes nor authorizes any other person to assume for Company any other liability in connection with the sale or use of this product.

For information on Magnetek's product warranties by product type, please visit www.magnetek.com.

2.3 DANGER, WARNING, CAUTION, and NOTE Statements

Read and understand this manual before installing, operating, or servicing this product. Install the product according to this manual and local codes.

The following conventions indicate safety messages in this manual. Failure to heed these messages could cause fatal injury or damage products and related equipment and systems.



DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.



WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It may also be used to alert against unsafe practices.

NOTE: A NOTE statement is used to notify people of installation, operation, programming, or maintenance information that is important, but not hazard-related.

2.4 Product Specific Safety Information

Carefully review this instruction manual and adhere to all recommendations before operating the equipment described in this manual.

Installation, operation and maintenance should be in strict accordance with this manual, IMPULSE•T and MAC•2000 instruction manuals, national codes and good practice. Installation or operation not performed in strict accordance with these instructions will void the manufacturer's warranty.

The recommendations in this manual do not take precedence over any of the following requirements related to cranes, hoists, lifting devices or other material handling equipment which use or include Further information about safety and operation related to the IMPULSE•T Adjustable Frequency Controls can be found in the IMPULSE•T Instruction Manual, part number: 144-26158.



WARNING

Terminals on the IMPULSE•T drives and MAC•2000 controls are at line voltage. Shorting out or accidentally contacting any of the line voltage components of this control can cause personal injury and damage to the equipment. Do not attempt to make any wiring adjustments while power is applied to the MAC•2000!



Do not touch any circuitry components while the main AC power is on. In addition, you must wait until the red “CHARGE” LED is out before performing any service on the IMPULSE•T drive (as you look at the face of the circuitry, the “CHARGE” LED is located inside the left side of the drive). It may take as long as 10 minutes for the charge on the main DC bus capacitors to drop to a safe level.

3 INTRODUCTION

This manual provides instructions for the replacement of MAC™•2000 Motor Acceleration Controls with the IMPULSE®•T Adjustable Frequency Microdrive. The IMPULSE•T products provide the same features and benefits provided by the MAC•2000 products, including reduced starting torque, controlled acceleration, and low inrush current of motors. Moreover, the IMPULSE•T can provide a wide range of operating speeds and other advanced features (depending on drive configuration and user inputs).

The following procedures apply only to 230/480 VAC MAC•2000 controller installations connected to motors with rated currents not exceeding 8.8 full load amps (FLA) at 460 VAC or 12.0 full load amps (FLA) at 230 VAC. For any MAC™•2000 products operating at 575V levels, it is recommended that a Magnetek IMPULSE•G+/VG+ Series 4 is used. For applications which the rated motor current exceeds 8.8 FLA at 460 VAC or 12.0 FLA at 230 VAC, it is recommended that a Magnetek IMPULSE•G+ Mini or IMPULSE•G+/ VG+ Series 4 is used.

4 SPECIFICATIONS

Table 1: IMPULSE•T Drive Ratings**

Voltage Class	Specification	2006-T	2010-T	2012-T
230V	Rated output current (A)	6.0	9.6	12.0
	Capacity (kVA)	2.3	3.7	4.6

Voltage Class	Specification	4002-T	4004-T	4005-T	4009-T
460V	Rated output current (A)	2.1	4.1	5.4	8.8
	Capacity (kVA)	1.6	3.1	4.1	6.7

** For detailed product specifications, please refer to the IMPULSE•T Instruction manual Part Number: 144-26158.

5 INSTALLATION

- Always handle the IMPULSE•T by its base, never by the front cover.
- Mount the drive with a vertical orientation to keep the cooling as effective as possible.
- Always provide proper grounding methods.
- Install the drive in a location where it is free from extreme heat and cold, direct sunlight, rain, moisture, oil sprays/splashes, salt spray, dust, metallic particles, radioactive substances, combustibles, physical shock, and sources of electromagnetic interference (EMI).

5.1 IMPULSE•T System Components and External Devices

5.1.1 Optional Drive Components

- 120 VAC Interface Card (Part Number T-IF-120VAC)
- 24 VAC Interface Card (Part Number T-IF-24VAC)
- 48 VAC Interface Card (Part Number T-IF-48VAC)

5.1.2 As-Required Drive Components

- AC reactor – line or load
- DC bus reactor
- External dynamic braking resistor(s)

5.1.3 Required External Devices

- Motor
- User input device (pendant, relay contacts, PLC, etc.)
- External circuit protection devices (fuses or circuit breakers). See “Suggested Circuit Protection Specifications and Wire Size” in Table 3-2 of the IMPULSE•T Instruction manual.
- R-C surge suppression devices on contactor coils.

5.2 Connections

The existing MAC•2000 controls can be implemented in both single speed and two speed applications, as illustrated by the wiring diagrams shown in Figure 1 and Figure 2, respectively. The IMPULSE•T drive can provide a wide range of operating speeds without the use of line/load contactors and motor overload devices, as shown in Figure 3. The following procedure outlines the steps necessary to replace the MAC•2000 controller with an IMPULSE•T drive:

1. Verify that all power has been removed from the circuit and that the system is isolated from the power mains in accordance with safety lockout/tagout procedures.
2. Select and install the proper branch circuit protection device for the new IMPULSE•T (circuit breakers or slow-blow class “CC” or “CCMR” fuses, as listed in Table 3-2 in the IMPULSE•T manual).

3. Remove the MAC•2000 controller as well as the existing reversing contactor. The IMPULSE•T drive includes built-in motor overload protection; therefore, the existing motor overload protection devices may also be removed.
4. Connect the incoming three-phase AC source to terminals R/L1, S/L2, and T/L3. An optional input (line) reactor may also be incorporated into the circuit.
5. Connect the motor leads to terminals U/T1, V/T2, and W/T3. An optional output (load) reactor may also be incorporated into the circuit.
6. Adhere to proper drive and motor grounding practices.
7. Several techniques can be utilized to properly control the drive:
 - a. A relay, pendant, PLC etc. capable of providing 24VAC, 48VAC, or 120VAC outputs can be connected to terminals X2, S1, and S2 of the respective optional interface card as shown in Figure 4. Part numbers are listed on page 7 of this manual.
 - b. A set of contacts (relay, pendant, etc.) can be connected to the SC (Signal Common), S1 (Forward Input), and S2 (Reverse Input) terminals as shown in Figure 5 if an external power supply is not available.
8. If a brake is in use, it is recommended to install separate branch circuit protection. A contactor with a coil voltage rating of 120/230 VAC should be installed between the three phase branch circuit protection device and the brake coil. The contactor coil should be fitted with an R-C or MOV surge suppression device.

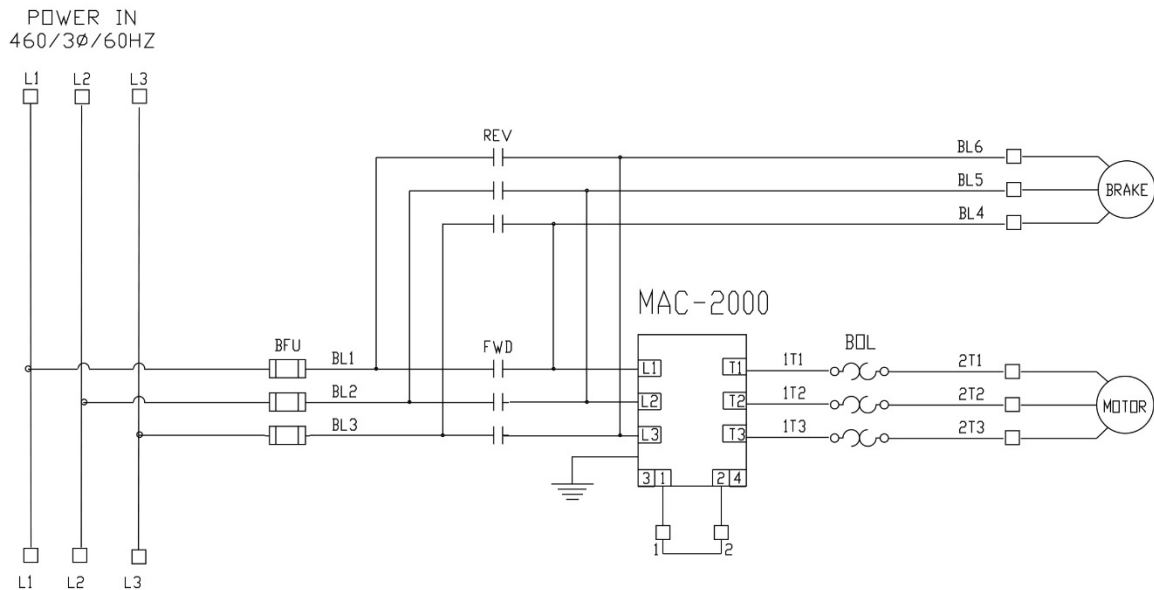


Figure 1: Wiring Diagram – Single Speed Application with MAC•2000

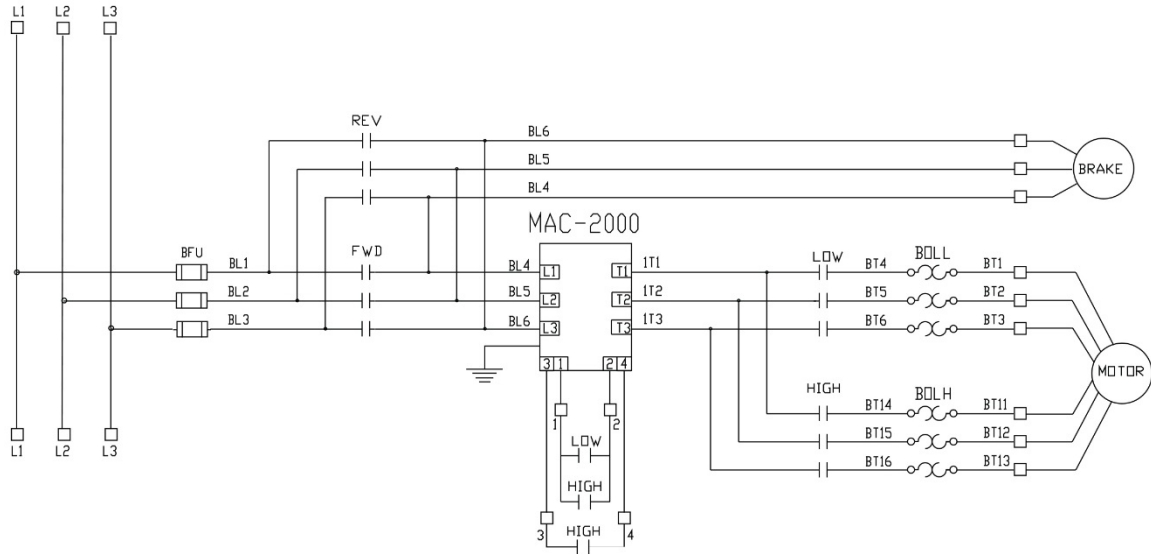


Figure 2: Wiring Diagram – Two Speed Application with MAC•2000

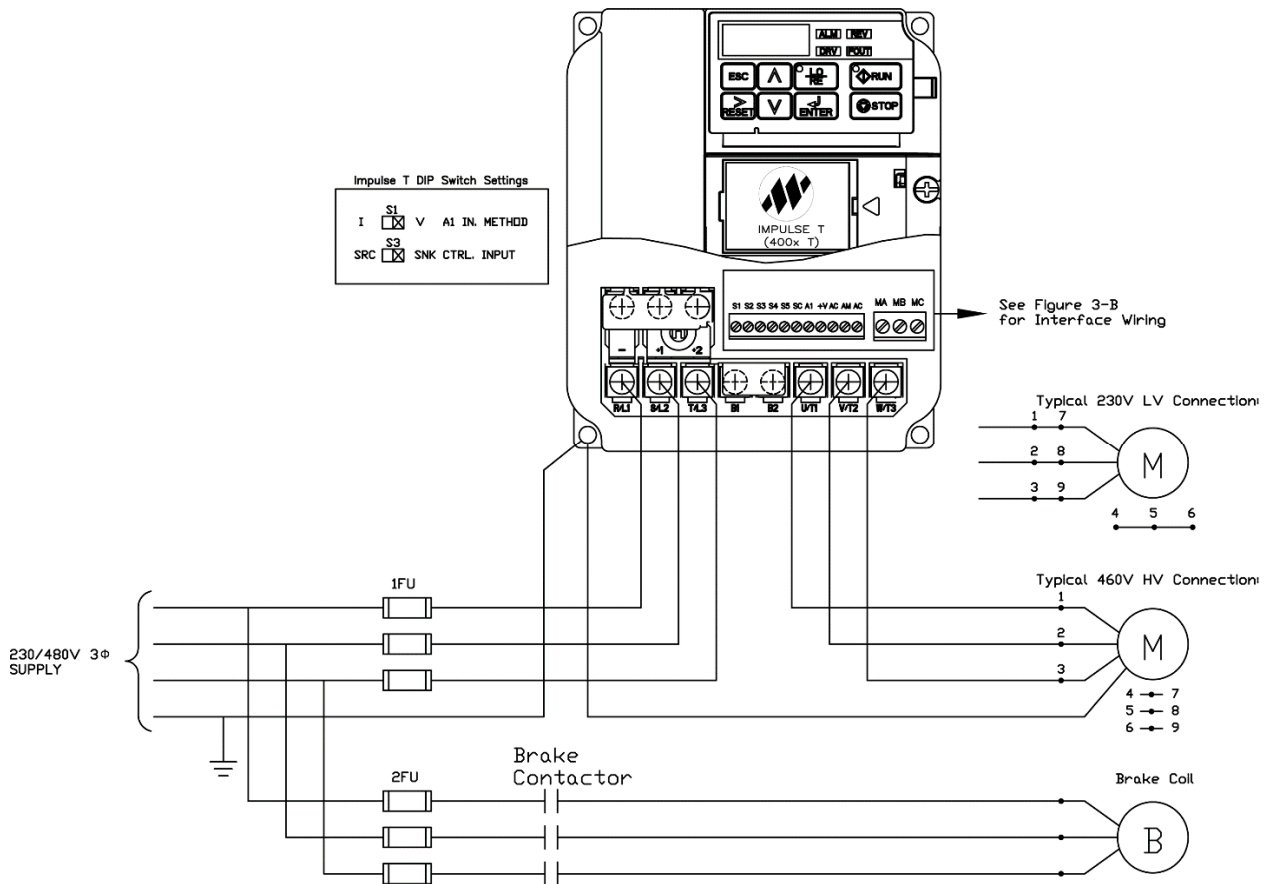


Figure 3: Wiring Diagram – IMPULSE•T Power Connections

IMPULSE T Control Circuit Interface Using External Power Supply for User Inputs:

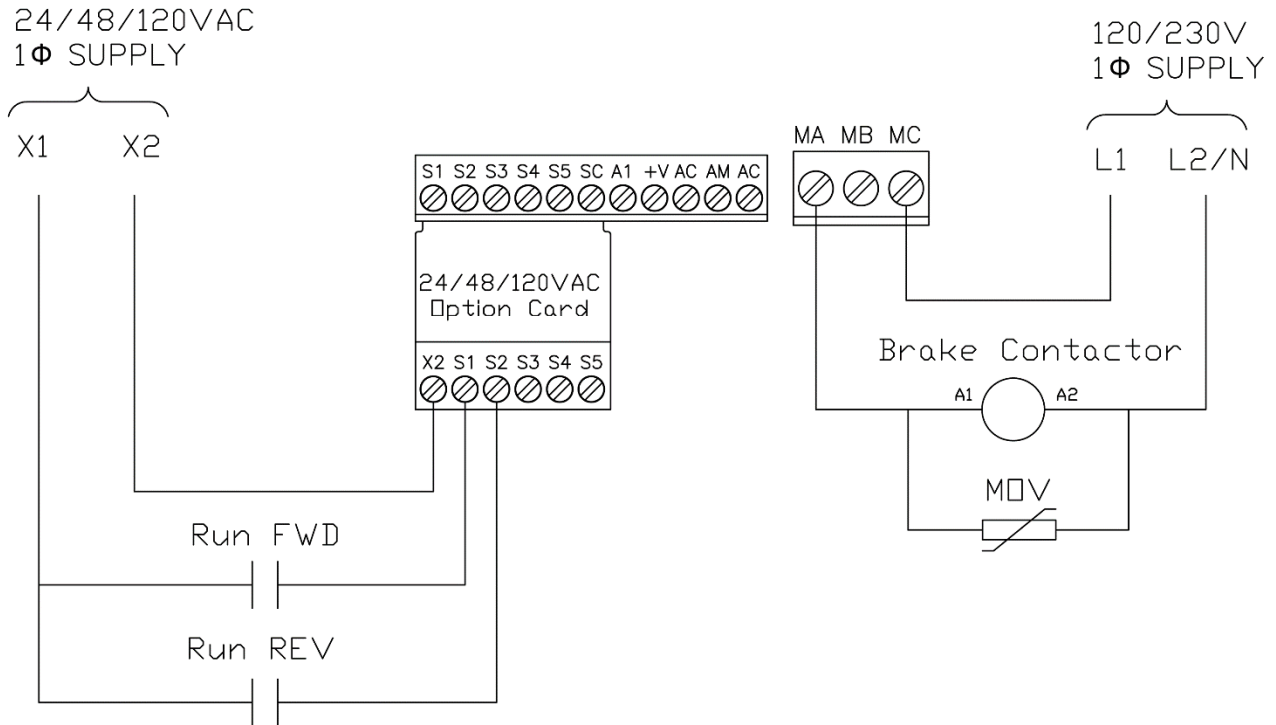


Figure 4: Wiring Diagram – IMPULSE•T Control Connections with Option Card

IMPULSE T Control Circuit Interface Using Internal Power Supply for User Inputs:

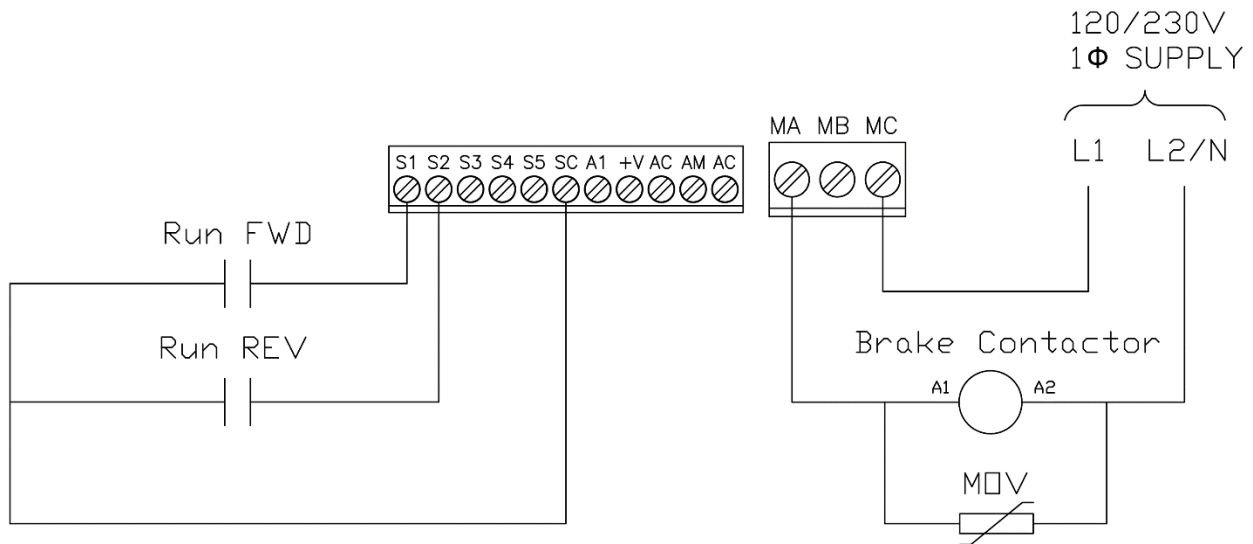


Figure 5: Wiring Diagram – IMPULSE•T Control Connections using the Drive's Internal 24VDC Power Supply

6 PARAMETER SETTINGS

- Review all electrical connections for correct and secure terminations BEFORE applying power to the motor-drive system.
- Apply power to the drive and ensure proper input voltages by performing the associated circuit measurements.
- The following parameter settings should be modified in the configuration settings of the new IMPULSE•T drive before running the motor. It is recommended that the user become familiar with complete details of settings and configuration parameters that are listed in the IMPULSE•T Instruction manual.

Table 2: Parameter Settings

Parameter Code	Name	New Value	Units	Function	Access Level
A1-01	Parameter Access Level	2	--	Advanced Level	0/Adv
B1-01	Frequency Reference 1	60	Hz	Set the Speed of Min. Speed / Speed 1	Adv
B5-01	Accel Time	0.0 .. 25.5	s	Motor acceleration	Adv
B5-02	Decel Time	0.0 .. 25.5	s	Motor deceleration	Adv
E1-01	Input Voltage	230V: 155 .. 255 460V: 310 .. 510	V	Sets Input Voltage	Adv
E2-01	Motor Rated FLA	0.12 .. 19.2	A	Motor-rated current full load amps	Adv

7 STARUP PROCEDURE

1. Run the motor in the forward direction and verify the motor is rotating in the proper direction. If the motor is not rotating in the proper direction, set the "Change Motor Rotation" parameter in B3-04 from a value of 0 to a value of 1. Return to the run mode and test the motor in the forward direction to verify its rotation has changed.
2. Test the motor in the reverse direction.
3. In any direction, adjust the acceleration time (B5-01) and deceleration time (B5-02) until the desired motion profile is achieved.

8 DIMENSIONS AND CLEARANCE

Table 3: Ratings and Dimensions

Voltage	Model	W	H	D	W1	H1	d	Wt. in Lbs.	Total heat Loss (W)**
Dimensions in Inches									
230V	2006-T	2.7	5.0	5.0	2.2	4.6	M4	2.4	44.7
	2010-T	4.3	5.0	5.1	3.8	4.6	M4	3.8	77.5
	2012-T	4.3	5.0	5.4	3.8	4.6	M4	3.8	91.7
460V	4002-T	4.3	5.0	3.9	3.8	4.6	M4	2.7	32.4
	4004-T	4.3	5.0	5.4	3.8	4.6	M4	3.8	47.3
	4005-T	4.3	5.0	6.1	3.8	4.6	M4	3.8	66.3
	4009-T	4.3	5.0	6.1	3.8	4.6	M4	3.8	95.1

NOTE: Applications such as high duty cycles in conjunction with high ambient temperatures or other unique environmental conditions can impact drive ratings. Please consult factory. Due to ongoing improvements, data is subject to change without notice.

** Heat loss data for a carrier frequency of 2.0 kHz

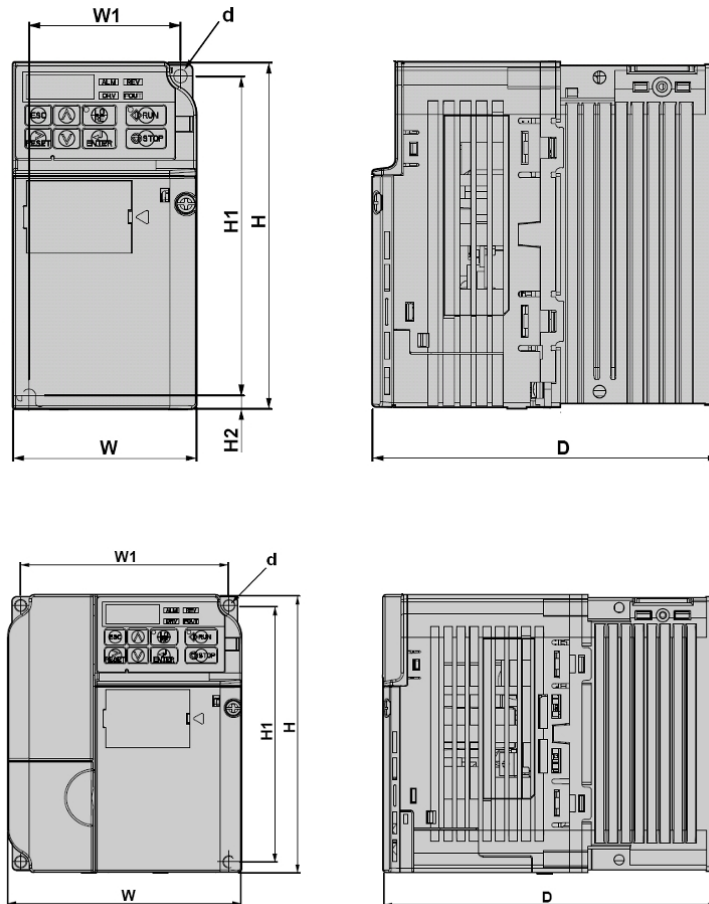


Figure 6: IMPULSE•T Layout and Dimensions

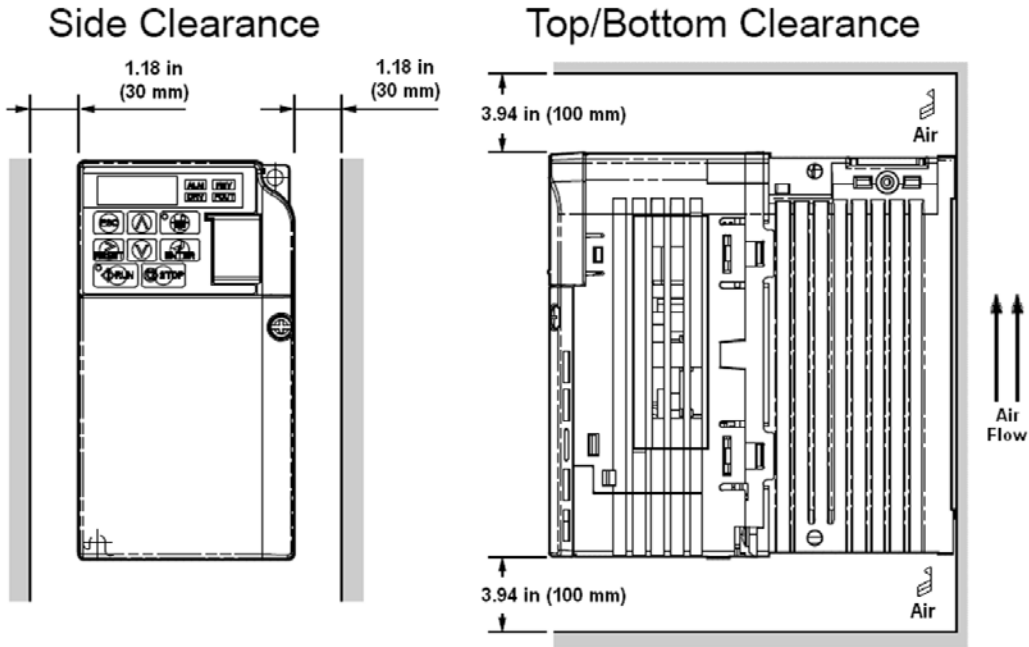


Figure 7: IMPULSE•T Standard Installation Clearances