IODF INPUT/OUTPUT MULTI-FUNCTION EXPANSION MODULE KIT (PART NO. 9646)
INSTALLATION AND OPERATION INSTRUCTIONS

SAFETY WARNING! Please read carefully before proceeding.

This product must be installed and serviced by a qualified technician, electrician, or electrical maintenance person familiar with its operation and the hazards involved. Proper installation, which includes electrical connections, fusing or other current protection, and grounding, can reduce the chance of electrical shocks, and fires, in this product or products used with this product, such as electric motors, switches, coils, solenoids, and relays. Do not use this drive in an explosion-proof application. Eye protection must be worn and insulated adjustment tools must be used when working with drive under power. This product is constructed of materials (plastics, metals, carbon, silicon, etc.) which may be a potential hazard. Proper shielding, grounding, and filtering of this product can reduce the emission of radio frequency interference (RFI) which may adversely affect sensitive electronic equipment. It is the responsibility of the equipment manufacturer and individual installer to supply this Safety Warning to the ultimate end user of this product. (SW 8/2012)

The drive contains electronic Start/Stop circuits, which can be used to start and stop the drive. However, these circuits are never to be used as safety disconnects since they are not fail-safe. Use only the AC Line for this purpose.

Be sure to read and follow all instructions carefully. Fire and/or electrocution can result due to improper use of this product.

Items Included in this Kit: IODF Input/Output Multi-Function Expansion Module, Installation and Operating Instructions, Cover for Case A Drives, Cover for Case B Drives, Trimpot Adjustment Tool, and Warranty Card.

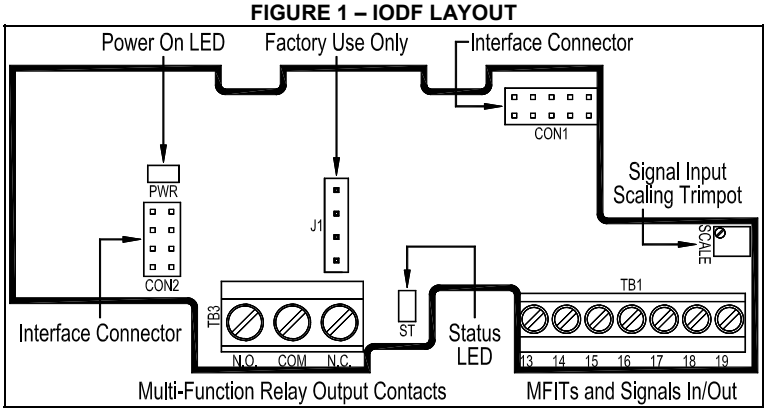
– THE DRIVE'S INSTALLATION AND OPERATION MANUAL MUST BE READ AND UNDERSTOOD BEFORE PROCEEDING –
– FOR ASSISTANCE, CONTACT OUR SALES DEPARTMENT –

WARNING! HIGH VOLTAGE! DISCONNECT AC LINE BEFORE INSTALLING THE IODF.

1 DESCRIPTION

The IODF is used on the KBDF Series Drives to provide additional input/output lines and increase the functionality of the standard inputs/outputs of the drive. An additional Multi-Function Relay is also provided. See Figure 1.

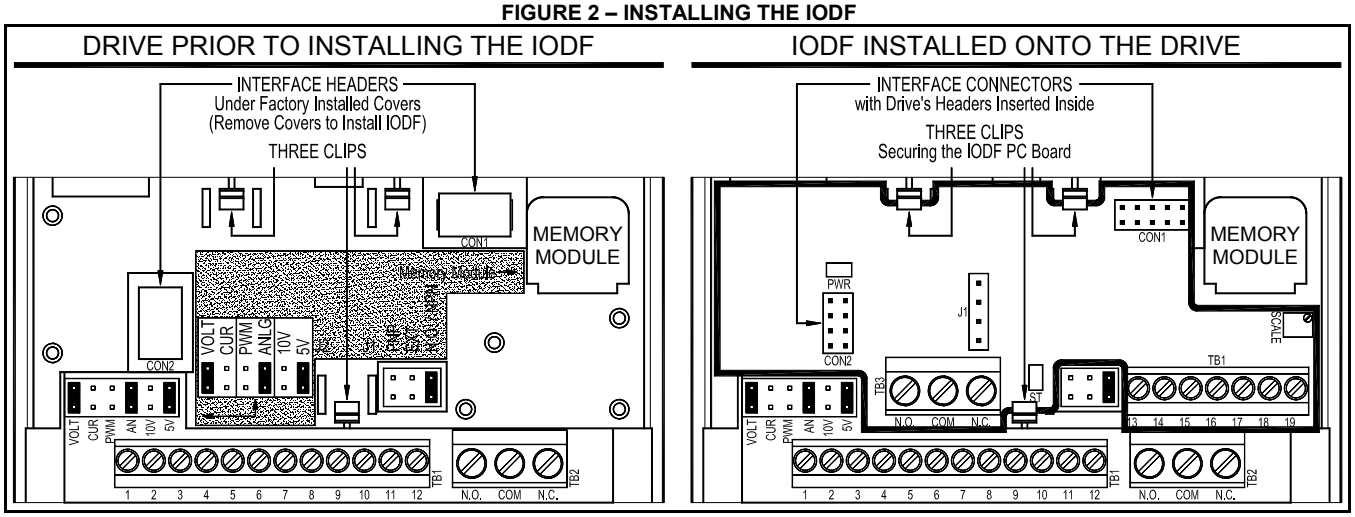
FIGURE 1 – IODF LAYOUT



2 INSTALLATION

The IODF easily mounts onto the drive. It is secured by the three clips on the drive. The two connectors on the IODF are used to interface with the drive. See Figure 2.

FIGURE 2 – INSTALLING THE IODF



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2.1 REMOVING THE DRIVE'S COVER:

Press on the both finger grips on both side corners of the cover until the retaining clips disengage from the drive and lift it up. This cover must be replaced with the new cover (supplied), as described in Section 5, on page 4.

2.2 REMOVING THE DRIVE'S INTERFACE HEADER COVERS:

Both covers must be removed off of headers CON1 and CON2, on the drive. These covers are no longer needed and may be discarded.

2.3 INSTALLING THE IODF

Align the IODF CON1 and CON2 over the corresponding headers on the drive. The IODF should easily drop down into the headers approximately 1/8" (3 mm) and the IODF PC board should rest on all three clips. To complete the installation of the IODF, press down firmly on the PC board near the top two clips and then on the shorter Terminal Block TB2 until the IODF is secured onto the drive with all three clips.

3 ELECTRICAL CONNECTIONS

Wire the control in accordance with the National Electrical Code requirements and other local codes that may apply to the application. See Figure 3, for connections to Terminal Blocks TB1 and TB3. See Table 1 for the terminal block wire and tightening torque specifications.

⚠ WARNING! HIGH VOLTAGE! Read Safety Warnings, on page 1, before using the drive. Disconnect the main power before making connections to the drive or the IODF. To avoid electric shock, be sure to properly ground the drive.

Application Note: To avoid erratic operation, do not bundle AC Line input and motor wires with each other. Also, do not bundle motor wires from multiple drives in the same conduit. Use shielded cables on all signal wiring over 12" (30 cm). The shield should be earth grounded on the drive side only.

FIGURE 3 – CONNECTION DIAGRAM

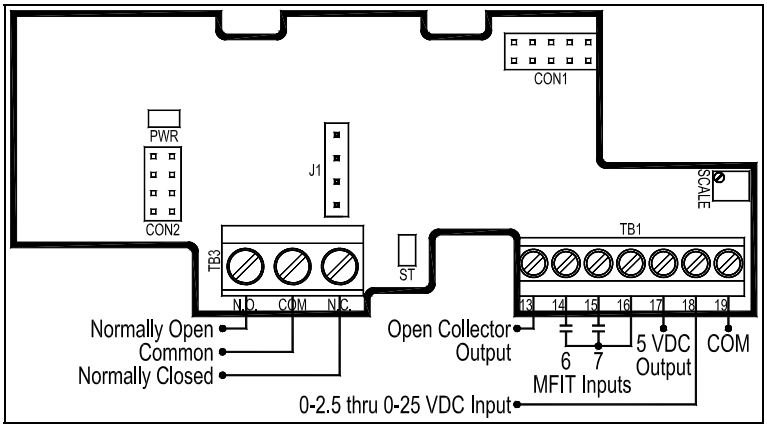


TABLE 1 – TERMINAL BLOCK WIRE AND TIGHTENING TORQUE SPECIFICATIONS

Description	Location	Maximum Wire Size (Cu)		Recommended Tightening Torque	
		AWG	mm^2	lbs-in	kg-cm
MFITs and Signals In/Out	TB1	16	1.31	1.7	1.9
Multi-Function Output Relay	TB3	16	1.31	2.6	2.9

3.1 MULTI-FUNCTION INPUT TERMINALS

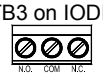
MFIT 6 is factory programmed for Up Frequency Command (Function 7.05 set to "0003"). MFIT 7 is factory programmed for Down Frequency Command (Function 7.06 set to "0004"). When the MFIT 6 contact is closed, the drive's frequency will increase. When the MFIT 7 contact is closed the drive's frequency will decrease. Also see Section 8.4.2.3, on page 34 of the manual. MFIT 6 and MFIT 7 can be changed from their factory settings of Up Frequency Command and Down Frequency Command by reprogramming Functions 7.06 and 7.07, as shown in Table 2, on page 3. Also see Tables 3 and 4, on page 3.

Free-Running Operation: When the Up Contact is closed, the drive output frequency will increase for the duration of the contact closure. When the Up Contact is opened, the drive output frequency will stop increasing. When the Down Contact is closed, the drive output frequency will decrease for the duration of the contact closure. When the Down Contact is opened, the drive output frequency will stop decreasing.

Incremental Operation: For each activation of the Up Contact, the drive output frequency will increase incrementally, equal to the frequency set by Function 7.15 (factory set to 1.00 Hz). For each activation of the Down Contact, the drive output frequency will decrease incrementally, equal to the frequency set by Function 7.15 (factory set to 1.00 Hz).

Note: In Incremental Operation, if the Up or Down Contact is maintained for longer than 2 seconds, the drive output frequency will "free run" up or down in increments set by Function 7.15, for the duration of the contact closure. The rate of change is equal to the Accel/Decel settings in Function Nos. 3.03 and 3.04. When the contact is opened, the drive output frequency will stop changing.

TABLE 2 – IODF INPUT AND OUTPUT CONNECTIONS

Terminal Block	No.	Description	Specifications
(TB1 on IODF)  13 14 15 16 17 18 19	13	Open Collector Output	NPN
	14	MFIT 6	N.O. Contacts or NPN / PNP Transistors, 7 Preset Frequencies, Up Frequency Command, Down Frequency Command, Accel/Decel #2, Forward / Stop Command, Reverse / Stop Command, External Fault (N.O. Contact), Reset, N.O. Start (2-Wire or 3-Wire Start/Stop), N.C. Stop (3-Wire Start/Stop), External Fault (N.C. Contact)
	15	MFIT 7	
	16	Common[1]	—
	17	Power Supply	+5 Volts DC at 1 mA Max.
	18	Analog Input #2	0-2.5 thru 0-25 Volts DC
	19	Common[1]	—
(TB3 on IODF)  N.O. COM N.C.	N.O.	Normally Open	Run, Fault, Target Frequency (5.03 ± 5.04), Frequency Threshold Level (> 5.03 – 5.04), Frequency Threshold Level (< 5.03 + 5.04), I^2t or I•t Fault, Load Loss (See 5.05), External Fault
	COM	Relay Common[2]	
	N.C.	Normally Closed	

Notes: 1. Common Terminals 16 and 19 are internally wired together. These terminals are also internally wired to Terminals 4 and 11 on the drive. **2.** Relay Common is not internally wired to Common Terminals 14 and 16 (or Common Terminals 4 and 11 on the drive).

TABLE 3 – IODF MULTI-FUNCTION INPUT TERMINAL, FUNCTION, AND FACTORY CODE ASSIGNMENT

Multi-Function Input Terminal*	6	7
Number On Terminal Block	14	15
Function	7.05	7.06
Factory Code Setting	0003	0004
Code Description	Up Frequency Command	Down Frequency Command

*Each Multi-Function Input Terminal is controlled by a specific Function. Although factory set to a specific code, they can also be reprogrammed to any code "0000" – "0012" listed in Table 2, above. Also see Function Group 7, on page 60, in the manual.

3.2 MULTI-FUNCTION OUTPUT RELAY

The connections for the Multi-Function Output Relay are located on Terminal Block TB3. The Multi-Function Output Relay is factory programmed to function as a "Run" Relay (Function 5.01 set to "0000"). When the drive is put into the Run Mode, the relay contacts will change state (the Normally Open (N.O.) contact will close and the Normally Closed (N.C.) contact will open). See Table 4.

TABLE 4 – IODF MULTI-FUNCTION OUTPUT RELAY "RUN" AND "FAULT" OPERATING MODES

Drive Operating Condition	"Run" Relay Mode (Function 5.00 Set to "0000")		"Fault" Relay Mode (Function 5.00 Set to "0001")	
	N.O. Contact	N.C. Contact	N.O. Contact	N.C. Contact
Power Off	Open	Closed	Open	Closed
Power On (Stop Mode)	Open	Closed	Closed	Open
Run Mode	Closed	Open	closed	Open
All Faults	Open	Closed	Open	Closed

Other Programmable Functions of the Multi-Function Output Relay (Function 5.01)

Code	Description
0000:	Run
0001:	Fault
0002:	Target Frequency (Function 5.03 ± Function 5.04)
0003:	Frequency Threshold Level (>Function 5.03 – Function 5.04)
0004:	Frequency Threshold Level (<Function 5.03 + Function 5.04)
0005:	I^2t or I•t Fault
0006:	Load Loss (See Function 5.05)
0007:	External Fault

3.3 ANALOG INPUT

Connect the 0-2.5 thru 0-25 Volt DC signal input to Terminal "18" and the common to Terminal "19". Connect the Start (Jumper) to Terminal "9" (on the drive's TB1), which is factory set for N.O. Start ("0010"), and to either common Terminal "4" or "11"(on the drive's TB1).

3.4 SCALE TRIMPOT

If the input Signal is higher than 5 Volts DC, use the SCALE Trimpot to attenuate it. Apply the maximum signal input and set the drive for full speed output and observe the display. Rotate the SCALE Trimpot counter clockwise until the drive output frequency begins to drop. Then, rotate the SCALE Trimpot clockwise until the display returns to the maximum output frequency.

Set the signal Slope and Type and adjust the Gain, Offset, and Response Time as desired. See Section 8.4.2.1, on page 30 of the manual.

4 DIAGNOSTIC LEDs

The two LEDs provide indication of operational status of the IODF. See Figure 1, on page 1, for the location of the PWR (Power On) and ST (Status) LEDs.

PWR (Power On) LED: When power is applied to the drive, the PWR LED will illuminate green.

ST (Status) LED: During normal operation, the ST LED is not illuminated. If the IODF experiences a communication error, the ST LED will flash red. If the ST LED flashes, disconnect power to the drive and recheck that the IODF is properly installed. If, after checking the installation of the IODF, the ST LED flashes again, contact our Sales Department.

5 INSTALLING THE NEW COVER

After installing and wiring the IODF, it is necessary to install the new cover (supplied). For Case A drives, use the small cover and for Case B drives, use the large cover. Insert the cover's tab into the slot on the drive and then gently press down on the cover until it snaps into place and is secured onto the drive.

END OF INSTALLATION INSTRUCTIONS