"The Right Control For Your Application."
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Preliminary DIVF Isolation Board Installation Instructions

Introduction:

Thank you for purchasing the DIVF Isolation Board (P/N 9568). KB Electronics, Inc. is committed to provide total customer satisfaction by producing high quality products that have been manufactured to the highest standards and techniques in the industry. The DIVF is engineered with state-of-the-art surface mount technology (SMT) incorporating complex and advanced circuitry in a relatively small and user friendly package, making it convenient to operate and easy to install.

The DIVF Isolation Board is an isolated digital communication interface for the KBVF family of controls. The KBVF will be able to communicate to Drive-Link through this device through the use of a computer via a DB-9 serial cable connected to a serial port. The KBVF can also be used in a MODBUS in the two-wire RS-485 modes with this device.

Installation Instructions:

See Figure 1, on page 2, for complete assembly instructions.

Wiring the DIVF Isolation Board to the KBVF:

Before wiring the DIVF Isolation Board to the KBVF, disconnect all power to the KBVF and wait until "PWR" and "ST" LEDs are no longer illuminated. **WARNING: HIGH VOLTAGE IS PRESENT WHILE LEDs ARE ILLUMINATED.**

Connect the ribbon cable between the socket on the KBVF and the socket on the DIVF Isolation Board.

Mounting the DIVF Isolation Board onto the KBVF:

The DIVF Isolation Board comes ready to install with two 6-32 X ½" screws to mount the DIVF Isolation Board onto the KBVF. The screws are a combination head type which allow the use of a readily available #1 or #2 phillips or slotted head screw driver.

After the connector has been attached to the KBVF, align the DIVF Isolation Board mounting holes with the tapped holes on the KBVF heat sink and insert the screws through the DIVF Isolation Board mounting holes. Using a screwdriver, fasten both screws until the DIVF Isolation Board is secured to the KBVF. Do not over tighten screws or damage may result to the cover.

Connections to the DIVF Isolation Board:

See Figure 2, on page 2, for diagrams showing connections to the DIVF Isolation Board.

There are two different types of interface available through the DIVF Isolation Board. Each type will be discussed below, along with various possible connections and jumper considerations.

RS-232 Connection:

DB-9 Serial Cable:

The DB-9 serial cable connects the computer serial communications port to the DIVF Isolation Board. This is the only RS-232 connection. Connect a DB-9 serial cable from a computer to CON3 of the DIVF Isolation Board.

Jumpers:

Two jumpers can effect the operation of the DIVF Isolation Board in this mode. J4 controls whether the idle receive voltage is positive or negative. J5 controls whether the idle transmit voltage is either negative or ground. Factory settings for both J4 and J5 are NEG.

Two-Wire RS-485 Connection:

RJ-11 Jack:

The R-J11 jack can connect a KBVF via the DIVF Isolation Board to an RS-485 Network. CON2 is the RJ11 jack.

Five-Position Terminal Block:

The five-position terminal block, TB1, can be used similarly to the RJ-11 jack.

Jumpers:

Three jumpers can effect the operation of the DIVF Isolation Board in this mode. J1 is used to select the tristate method for the RS-485 driver. The factory default setting for J1 is SW. J2 and J3 determine open line termination. The factory defaults for both J2 and J3 are OFF.

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General Performance Specifications:

Baud Rate	9600
Data Bits	8
Stop Bits	1
Parity	Even
LED Indicators	Power, Transmit, Receive
Supported Formats	RS-232, 2-wire RS-485
Operating Temperature	0 - 45 °C

Figure 1
Installation Diagram

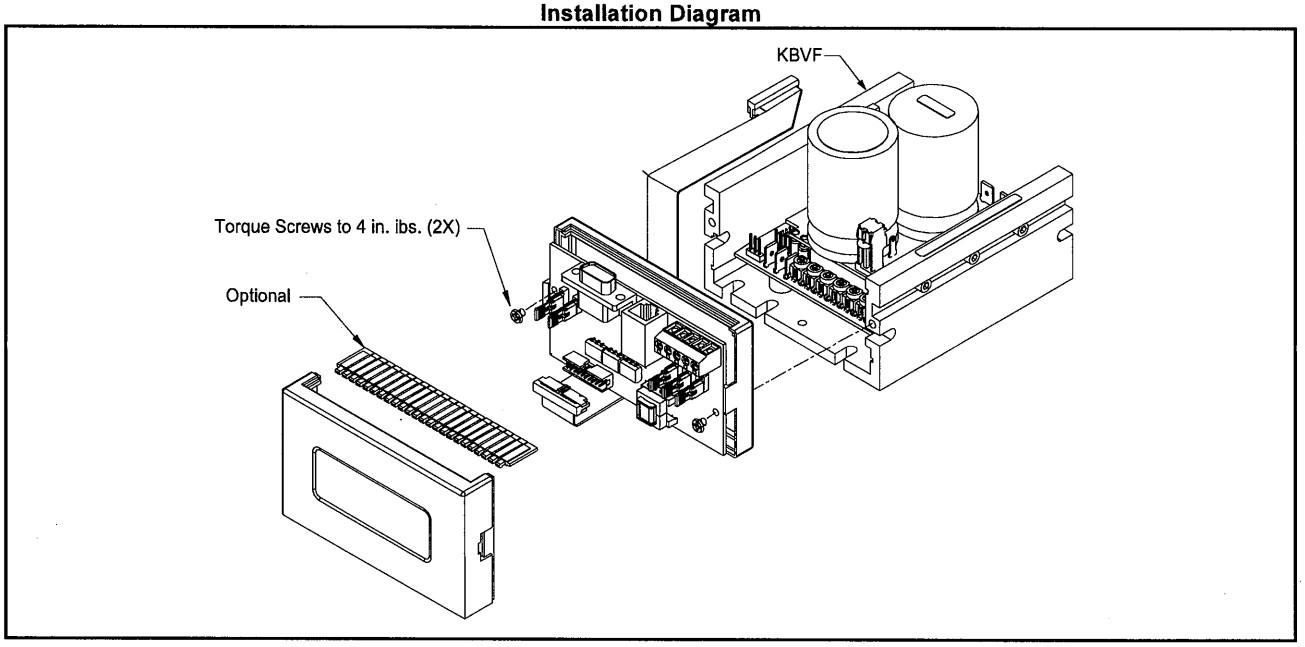
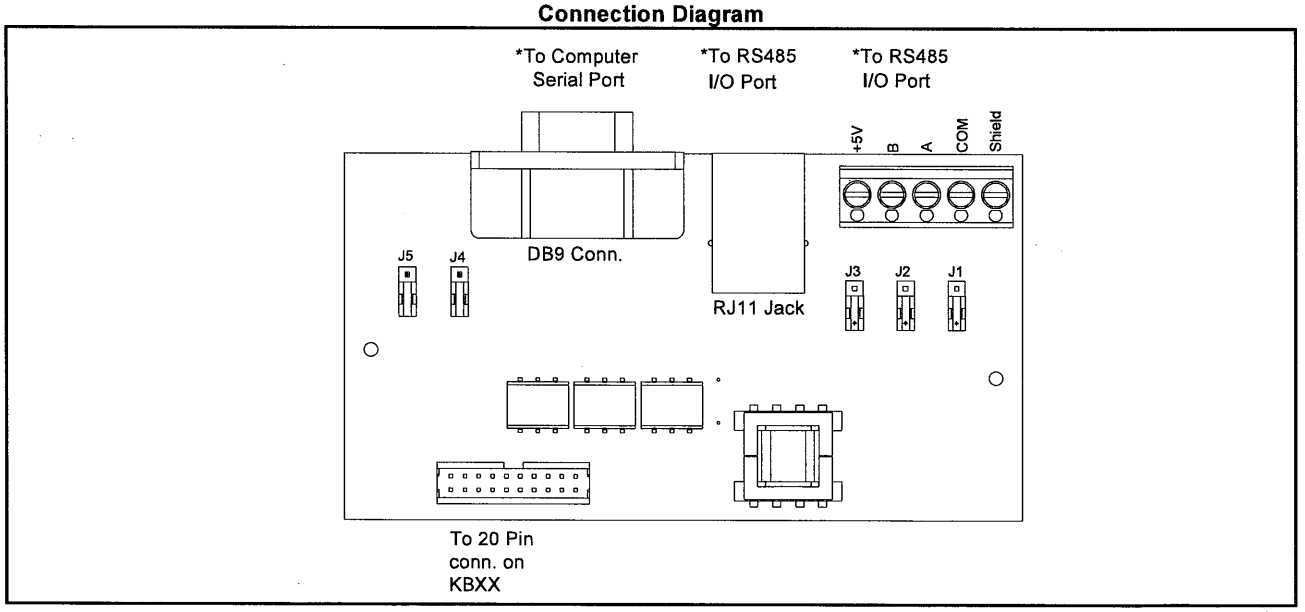


Figure 2
Connection Diagram



KBVF 2G MODBUS RTU PROTOCOL

1. Communications Settings

- 9600bps, 8, E,1

2. Message Format

Function Code	Function Description	Command		Response	
		Min Bytes	Max Bytes	Min Bytes	Max Bytes
03h	Read Registers	8	8	7	7
06h	Write Registers	8	8	8	8
11h	Report Slave ID	3	3	12	12

Command: Read 03h		
Slave Address		01h
Function Code		03h
Address	High	00h
	Low	01h
Quantity	High	00h
	Low	01h
CRC-16	High	
	Low	

Normal Response		
Salve address		01h
Function Code		03h
Byte Count		01h
Data	High	00h
	Low	02h
CRC-16	High	
	Low	

Exception Response		
Slave Address		01h
Function code		83h
Error Code		02h
CRC-16	High	C0h
	Low	CDh

Command: Write 06h		
Slave Address		01h
Function Code		06h
Address	High	00h
	Low	01h
Data	High	00h
	Low	01h
CRC-16	High	
	Low	

Normal Response		
Slave Address		01h
Function Code		06h
Address	High	00h
	Low	01h
Data	High	00h
	Low	01h
CRC-16	High	
	Low	

Exception Response		
Slave Address		01h
Function code		86h
Error Code		02h
CRC-16	High	C3h
	Low	D9h

Command: Read Slave ID 11h		
Slave Address		01h
Function code		11h
CRC-16	High	
	Low	

Normal Response		
Slave Address		01h
Function Code		11h
Byte Count		6
Slave ID		
Run Indicator Status		00 = Stop FF = Run
CPU Version	High	
	Low	
Drive Status		
Fault Recovery Mode		
Reset Count		
CRC-16	High	
	Low	

Exception Response		
Slave Address		01h
Function code		91h
Error Code		02h
CRC-16	High	C3h
	Low	D9h

KBVF 2G MODBUS RTU PROTOCOL

3. Registers

Function Group No.	Description
0-	Drive Operating Mode
1-	Start/Stop and Frequency control Modes
2-	Manual/Automatic Restart Modes
3-	Operating Parameters.
4-	Digital Display Operation Mode
5-	Multifunction Input Terminals (MFIT)
6-	Frequency Setting for Keypad, Jog, and Preset Speeds using (MFIT)
7-	Analog Input Signal Operation
8-	Multifunction Output Relays and Output Signal Operation
9-	Drive and Motor Protection Modes
10-	Volts/Hz Operation Mode
11-	PID Operation Mode
12-	PID "Limits" and "Out of Range" Mode
13-	Communication Mode
14-	Motor Output Tune Characteristics
15-	Drive Status and Function Reset

0- Drive Operation Mode

Register No.	Function Code No.	Description	Range/Code	Factory Setting

1- Start/Stop and Frequency Control Modes

Register No.	Function Code No.	Description	Range/Code	Factory Setting
0100h	1-00	Run/Stop-Forward/Reverse Control[2]	0000: External Run/Stop Control 0001: Communication	0000
0101h	1-01	Run/Stop-Forward/Reverse Operation Mode with External Contacts[2]	0000: Forward-Stop-Reverse (F-S-R) 0001: 3-Wire Start/Stop	0000
0102h	1-02	Start Method[2]	0000: Normal Start 0001: Spin-Start	0001
0103h	1-03	Stop Method[2]	0000: Regen/Brake-to-Stop 0001: Coast-to-Stop	0000
0104h	1-04	Frequency Control Mode	0000: External Analog Signal Input or Remote Potentiometer (P2 input) 0001: Keypad/Communications	0000

2- Manual/Automatic Restart Mode

Register No.	Function Code No.	Description	Range/Code	Factory Setting
0200h	2-00	Restart for AC Power Loss[2]	0000: Manual 0001: Automatic	0001
0201h	2-01	Number of Auto Restart Attempts (I^2t and Overvoltage) [2]	0 – 10,11	11
0202h	2-02	Auto Restart Delay Time for I^2T Fault (Seconds) [2]	0.0 – 600.0	0

KBVF 2G MODBUS RTU PROTOCOL

3- Operating Parameters

Register No.	Function Code No.	Description	Range/Code	Factory Setting
0300h	3-00	Operating Parameters Update[1,2]	0000: Trimpots and Jumpers 0001: Keypad/Communications	0000
0301h	3-01	Upper Frequency Limit (Hz)	1.0 - 240	60
0302h	3-02	Lower Frequency Limit (Hz)	0.0 – 240	0
0303h	3-03	Acceleration Time (Seconds)	0.3 - 180	5.0
0304h	3-04	Deceleration Time (Seconds)	0.3- 180	5.0
0305h	3-05	Dc Injection Start Frequency (Hz)	0 – 240	0
0306h	3-06	Dc Injection Brake Level (%)	0.0 - 30	8
0307h	3-07	Dc Injection Brake Time (Seconds)	0 – 25.5	0
0308h	3-08	Slip Compensation (%)	0 – 10	5
0309h	3-09	DC Holding Torque in Stop Mode (%)[2]	0.0 – 30	7

4- Digital Display Operation Mode

Register No.	Function Code No.	Description	Range/Code	Factory Setting

5- Multifunction Input Terminals (MFIT)

Register No.	Function Code No.	Description	Range/Code	Factory Setting
0500h	5-00	Multifunction Input Terminal 1 (J2 - X2) [2]	0000: Disable Multifunction Input 0001: Enable Preset Speed 0002: Jog 0003: Run/Stop 0004: Forward/Reverse Command	0000
0501h	5-01	Multifunction Input Terminal 2 (J1 - 50) [2]	0000: Disable Multifunction Input 0001: Enable Preset Speed 0002: Jog 0003: Run/Stop 0004: Forward/Reverse Command	0000

6- Frequency setting for Keypad, Jog, and Preset Speeds Using (MFIT)

Register No.	Function Code No.	Description	Range/Code	Factory Setting
0600h	6-00	Keypad Frequency (Hz)	0.0 - 240	5.00
0601h	6-01	Jog Frequency (Hz)	0.0 – 240	2.00
0602h	6-02	Preset Speed #1 (Hz)	0.0 – 240	5.00
0603h	6-03	Preset Speed #2 (Hz)	0.0 – 240	10.00
0604h	6-04	Preset Speed #3 (Hz)	0.0 – 240	20.00

7- Analog Input Signal Operation

Register No.	Function Code No.	Description	Range/Code	Factory Setting

KBVF 2G MODBUS RTU PROTOCOL

8- Multifunction Output Relays and Output Signal Operation

Register No.	Function Code No.	Description	Range/Code	Factory Setting
0800h	8-00	Output Relay (SIVF-R)	0000: Run/Fault 0001: Set Frequency (8-01 ± 8-02) 0002: Frequency Reached (Target Frequency) (Set Frequency ± 8-02)	0000
0801h	8-01	Frequency Reached (Hz) (See 8-00)	0.0 – 240	0.0
0802h	8-02	Frequency Reached Bandwidth (± Hz)	0.0 – 30	0.0

9- Drive and Motor Protection Modes

Register No.	Function Code No.	Description	Range/Code	Factory Setting
0900h	9-00	Current Limit	63 – 188	160
0901h	9-01	Deceleration Extension	0000: Enable 0001: Disable	0000

10- Volts/Hz Operation Mode

Register No.	Function Code No.	Description	Range/Code	Factory Setting
0A00h	10-00	Volts/Hz Pattern[2]	0000: 60Hz Motors 0001: 50Hz Motors 0002: Custom Volts/Hz Pattern	0000
0A01h	10-01	Volts/Hz Modification (Torque Boost) (%)	0 – 28	6
0A02h	10-02	Base Frequency (Hz)[2]	50 – 240	60
0A03h	10-03	Maximum Voltage Ratio (%)[2]	0 – 100	100

11- PID Operation Mode

Register No.	Function Code No.	Description	Range/Code	Factory Setting

12- PID "Limits" and "Out of Range" Mode

Register No.	Function Code No.	Description	Range/Code	Factory Setting

13- Communication Mode

Register No.	Function Code No.	Description	Range/Code	Factory Setting
0D00	13-00	Assigned Communication Station Number	1 - 247	30
0D01	13-01	Communications Watchdog Timer	0000: Disabled 0001: Enabled	0000
0D02	13-02	Watchdog Timeout Value	0.5 – 2.0	0.5

14- Motor Output Tune Characteristics

Register No.	Function Code No.	Description	Range/Code	Factory Setting

KBVF 2G MODBUS RTU PROTOCOL

15- Drive Status and Function Reset

Register No.	Function Code No.	Description	Range/Code	Factory Setting
0F00h	15-00	Drive Horsepower code[3]		
0F01h	15-01	Software Version[3]		
0F02h	15-02	Fault Log - 1		
0F03h	15-03	Fault Log - 2		
0F04h	15-04	Fault Log - 3		
0F05h	15-05	Reset Drive to Factory Settings	1101: Factory Defaults with Trimpots and jumpers (F3-00 = 0000) 1110: 50 Hz Operation (F3-00 = 0001) 1111: 60 Hz Operation (F3-00 = 0001)	0000

16- OEM Defined Functions

Register No.	Function Code No.	Description	Range/Code	Factory Setting
1000h	16-00	Undefined		
1001h	16-01	Undefined		
1002h	16-02	Undefined		
1003h	16-03	Undefined		
1004h	16-04	Undefined		
1005h	16-05	Undefined		
1006h	16-06	Undefined		
1007h	16-07	Undefined		
1008h	16-08	Undefined		
1009h	16-09	Undefined		

17 – Operational and Monitor Registers

Register No.	Function Code No.	Description	Bit	Range/Code	Factory Setting
1100h	-	Operational Command	0	0: Stop 1: Run	-
			1	0: Forward 1: Reverse	
			2	0: N/A 1: Fault Reset	
			3	0: Jog Command Disabled 1: Jog Command Enabled	
			4	0: N/A 1: Preset Speed 1	
			5	0: N/A 1: Preset Speed 2	
			6	0: N/A 1: Preset Speed 3	
			7	Not Used	
			8 - 15	Not Used	
1101h	-	Drive Status	0	0: Stop 1: Run	-
			1	0: Forward 1: Reverse	
			2	0: Normal 1: Fault	
			3	Not Used	
			4	Not Used	
			5	Not Used	
			6	Not Used	
			7	Not Used	
			8 - 15	Not Used	

KBVF 2G MODBUS RTU PROTOCOL

			Code		
1102h		Drive Status Description	00	Normal Operation	-
			01	Short Circuit	
			02	Current Limit	
			03	Current Limit Trip	
			04	Under Voltage Trip	
			05	Recovered Under Voltage Trip	
			06	Over Voltage Trip	
			07	Recovered Over Voltage Trip	
			08	Stop Mode	
			09	Flash Error	
1103h	-	Communications Error Count			-
1104h	-	Motor Voltage			-
1105h	-	Motor current			-
1106h	-	Bus Voltage			-
1107h	-	Motor Frequency			-
					-

Notes: 1. Setting Function 3-00 to 0001 disables the Local trimpots, A/M, X1/X2, and 50/60Hz jumpers. Setting Function 3-00 to 0000 enables the Local trimpots and jumpers and disables the associated Function numbers from updating the drive (Disabled Functions: 2-00,2-01,2-02, 3-01,3-03,3-04, 3-08, 9-00, 9-01, 10-00, 10-02, and 10-03). **2.** Write enabled only when the drive is in STOP mode. **3.** Read Only

4. Error Codes

Communications Error Codes

Code	Description	
01	Illegal Function code Error	The Slave Does not support the Function code in the received command.
		The specified function cannot be updated while the Drive is in RUN mode.
		Attempted to WRITE to a READ ONLY function.
		Attempted to Read or Write a function value while the Drive is in an Undervoltage mode.
02	Illegal AddressError	The data address received is not an allowable address for the Drive.
03	Illegal Data Value	The Data received is not within the Min/Max of the selected function.