



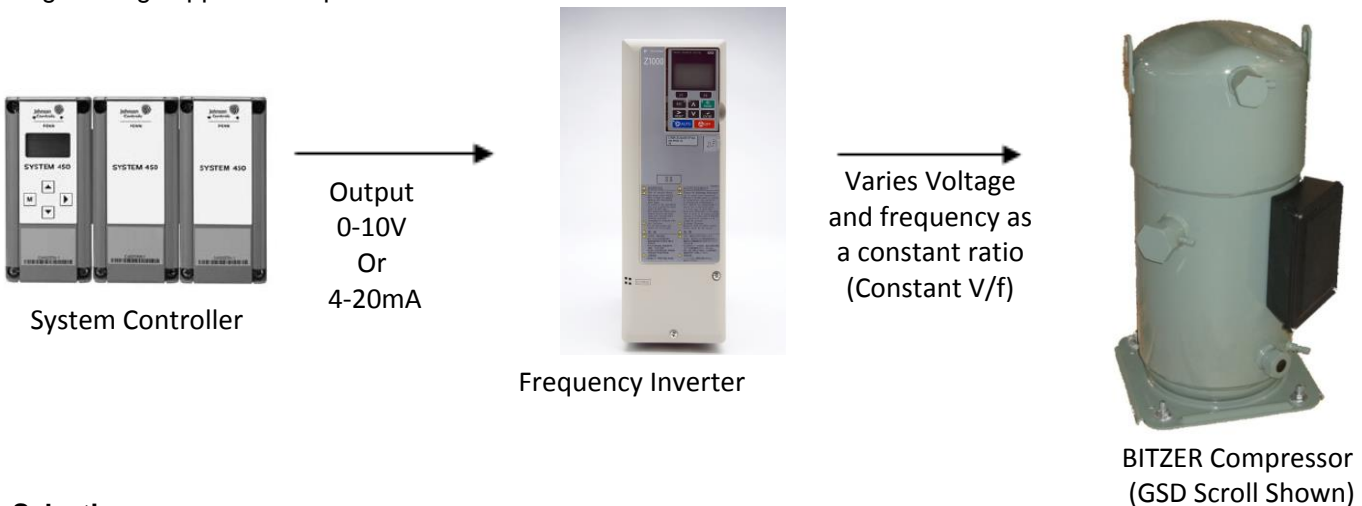
Technical Bulletin (TB-0040)

Frequency Inverter Controller Install & Setup

Version 6; April 2017

Overview

This document provides guidelines and information useful to a system manufacturer (OEM), installing technicians, and the end user. It provides basic recommendations for connections, initialization, and start-up of the frequency inverter operation. Each application should include review with and approval by, application engineering and with product engineering support as required.



Selection:

Consult application engineering to properly select the frequency inverter to go with your compressor and application. Please note power supply, compressor voltage, maximum and minimum speeds for the proper compressor & frequency inverter pairing.

Basic Wiring Connections:

- Verify incoming line voltage power supply to frequency inverter type
- Verify compressor Maximum Operating Amperage (MOA) is lower than the frequency inverter current output
- Connect incoming power supply L1, L2, L3 to the frequency inverter
- Connect compressor power supply T1, T2, T3 (or U1,V1,W1) from frequency inverter to compressor
 - Compressor must be wired across the line (see Terminal box drawing)
- Connect the programmable multi-functional inputs of terminal block 1
 - Default programming: S1 is run command, S4 is a fault reset, SN is +24V Source
- Connect fault outputs of terminal block 2.
 - MA is used for inverter fault, MB is used for no-fault (OK), MC is common.
- Connect drive signal to terminal block 3.
 - Default programming: A1 is used for 0-10V signal OR A2 is used for 4-20mA signal. AC is common.
- S2, S3, S5, S6, and S7 are available for programming as multi-functional digital outputs.
- M1-M2, M3-M4, and M5-M6 are also available in pairs as multi-functional relay outputs.

**Danger: Improper wiring can and will cause bodily harm as well as damage to the equipment.
Only suitably qualified technicians should install this equipment.**

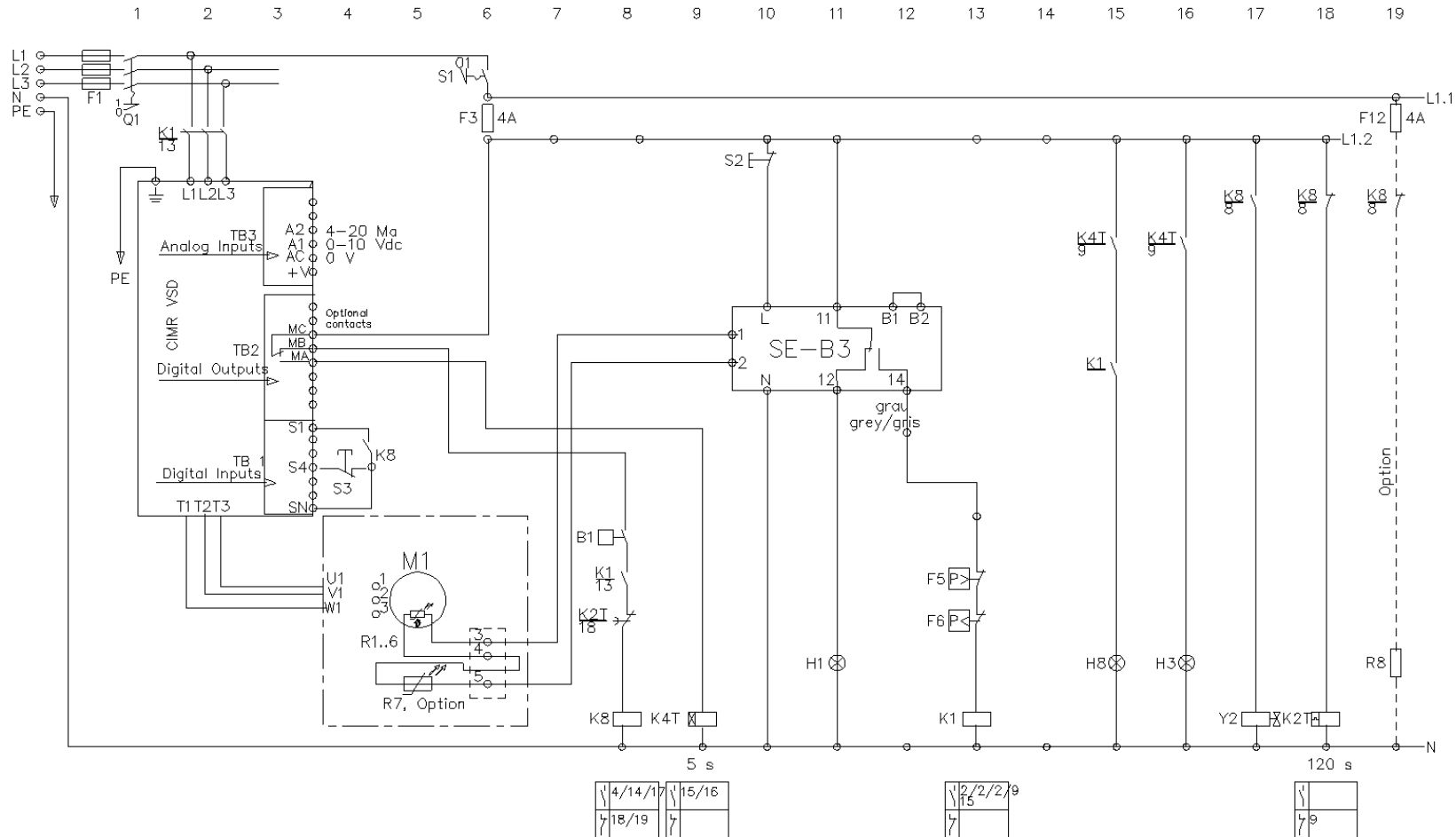
When installing the system be sure to follow good wiring practices and all applicable codes. Ensure that the mounting of the various components are secure and that the environment, such as extreme dampness, poor ventilation etc., will not cause system degradation.

TYPICAL WIRING DIAGRAM

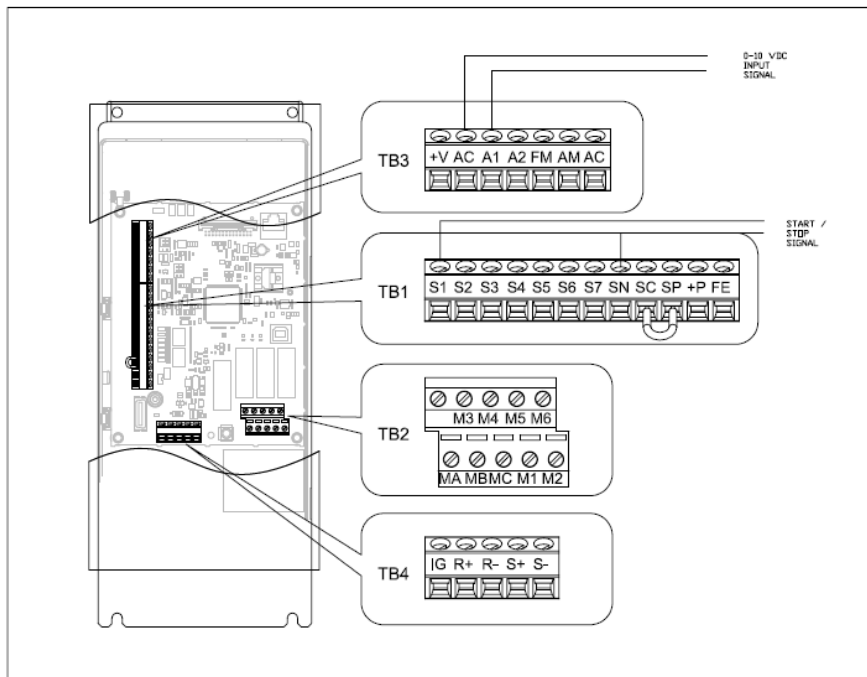
B1...Regulator compressor start/stop
 B3...Regulator for compressor speed
 F1...Main Fuse
 F2...Control circuit fuse
 F5...High pressure cut out
 F6...Low pressure cut out
 F12...Fuse of crankcase heater
 H1...Signal lamp "Over temp (motor and discharge)"
 H2...Signal lamp "Oil supply fault"

H3...Signal lamp "Main fault"
 H8...Signal lamp "F1 fault"
 K1...Main contactor
 K8...Auxiliary relay F1
 K2T...Time relay "pause time" 120s
 K4T...Time relay "Alarm delay" 5s at F1 start
 M1... Compressor
 N1...Frequency inverter
 Q1...Main switch

R1-6...PTC sensor in motor windings
 R7...Discharge gas temp sensor (option)
 R8...Crankcase heater (option)
 S1...Control switch
 S2...Fault reset "Overtemp (motor/discharge gas)"
 S3...Fault reset
 S4...Fault reset "F1 fault"
 Y2...solenoid valve "Liquid line"
 SE-B3...Compressor protection device



TERMINAL BOARD LOCATIONS



PROGRAMMING

The following sections provide guidance to the OEM for properly programming the inverter to be used with a system. YASKAWA assigns default values to the inverters that are common to various inverter applications. BITZER has already reviewed these parameters and made changes specific to utilizing BITZER compressors. The BITZER part number 843-****-A1 has these parameters pre-programmed. Not all parameters can be programmed in advance and this section makes recommendations on which parameters to change and / or review for possible adaptation to a specific wiring methodology. The parameters highlighted in yellow are the most critical.

Some parameters were selected to be “User Parameters”, (“A2-**) so they are easier to find and program. Many of these require adjustments depending on selection and application. Others are included because they are the most common parameters for the OEM to adjust to fit their common wiring and programming practice. Please note the user parameter No. begins with “A2”, however each of these parameters have an alternate number where they normally exist.

It is highly recommended the system manufacturer review the complete YASKAWA user manual, as ultimately all decisions regarding the parameters and adapting the inverter into the system, belongs to the system manufacturer. If changing a parameter not on the list below, it is recommended to consult BITZER Application Engineering.

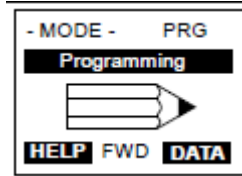
VERIFICATION


It is the responsibility of the installer and start-up technicians to verify frequency inverter settings upon start-up. The inverter will have pre-set initial default settings for general operation. It will be the installer’s responsibility to review the following points to the job application.

The use of a frequency inverter increases the chances of the compressor pulsations finding resonance vibrations. Piping vibrations must be checked throughout the speed range of the compressor when commissioning each individual system. *This can be achieved by manually ramping the inverter through each frequency step from the lowest HZ to maximum speed 1 Hz at a time. If any vibration occurs, utilization of “Jump Frequency” (Parameters A2-06 and A2-07 (aka. d1-03 and d1-04)) enables skipping this frequency.*

Power up Unit and Initialize the Frequency Inverter

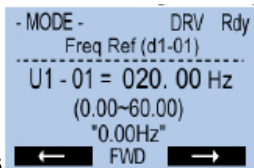
Press “Down” arrow key  until Programming Mode Screen appears



Press “Enter”  to go into the basic setup menu.




Use the up and down arrows  to scroll to each of the parameters.



Use the left and right arrows  to change values.

For changing the first line of data, the first digit A1-** can be changed by using the up or down arrow to change the digit. Use the right arrow to change the second digit, A2-** etc. until the parameter you want to change is reached.

To save the change to a parameters or values, you must press “Enter” .

After all parameters have been verified / modified and set, return the HOA keypad back to the HOME screen by pressing

“ESC” .

Use the “AUTO”  mode to initiate the controller.

The controller should now display the home screen and show “drive ready” until it receives the input signal and the control signal closes.

CAUTION / DANGER

After the power has been turned OFF, wait at least five minutes until the charge indicator extinguishes completely before touching any wiring, circuit boards or components.

DANGER - If motor rotation is not correct, power down the drive, wait five minutes and swap 2 motor leads at the drive output terminals. (Also B1-14 Phase order selection)

MAIN PARAMETERS

When A1-01 is set to 1, only the A2 menu will be visible/changeable thru the keypad. The parameters in A2 have an additional Main location but have been added to the A2 menu, (first menu), so they can be readily accessible.

<u>A2 Address</u>	<u>Main Address</u>	<u>Name</u>	<u>Default Value</u>	<u>Information</u>
A1 Initialization				
	A1-00	Language	0	0: English; 3: Spanish, 5: French
	A1-01	Access Level Selection	1	0: Only A1-01 and A1-04; 1: A2; 2: All parameters
	A1-04	Password	0	When A1-04 match A1-05, access is granted to A2 parameters
	A1-05	Password Set	0	Consult YASKAWA Manual for setting password.
A2 User Parameters				
B1: Operating Modes (Optional Settings)				
A2-01	B1-01	Frequency Reference for AUTO Mode	1	1: Terminals (Analog Input Terminals 0:HOA keypad; 2:BACnet or MEMOBUS/Modbus Comm.
A2-02	B1-02	Run Command Selection for AUTO Mode	1	1: Control Circuit Terminals 2:BACnet or MEMOBUS/Modbus Comm.
A2-03	B1-11	Drive Delay Time Setting	0 sec	After run command, the drive will wait this long before starting.
B4: Timer Functions (Optional Setting)				
A2-04	B4-01	Timer Function On-Delay Time	0.0 sec	Sets the on-delay time for an output (H2-X) set to 12. Output is triggered by input (H1-X) set to 18.
A2-05	B4-02	Timer Function Off-Delay Time	0.0 sec	Sets the off-delay time for an output (H2-X) set to 12. Output is triggered by input (H1-X) set to 18.
D3: Skip Frequencies: Must be verified after system start up that no resonance vibrations exist at certain frequencies).				
A2-06	D3-01	Jump Frequency 1	0.0 Hz	Frequency to skip over; commonly used if resonance found.
A2-07	D3-04	Jump Frequency Width	1.0 Hz	The width of the frequency in A2-06 (d3-01) to skip over. (example 2 Hz: skips 37-39Hz if d3-01 is 38Hz)
E1: V/f Pattern: Input the voltage and max frequency.				
A2-08	E1-01	Input Voltage Setting	460 or 208 V	This must be set to the nominal power supply voltage.
A2-09	E1-04	Maximum Output Frequency	60.0 Hz	Normally, 60 Hz. Consult AE for over speeding options.
D2: Frequency Lower Limit (Lower limit is percentage of maximum frequency)				
A2-10	D2-02	Frequency Reference Lower Limit	75%	Min frequency divided by Max freq (e.g. 45 / 60 = 75)

		MAX (E1-04)*	MIN	D2-02
Scrolls	GSD 8	60	35	58%
	GSD 8 (ext.)	75*	35	47%
	GSD 6 (DV2 Only)	60	35	58%
	GSD 6 (ext.) (DV2 Only)	75*	35	47%
Recips	2 Cyl & 6 Cyl.	60	30	50%
	2 Cyl & 6 Cyl. (ext.)	70*	30	43%
	4 Cyl w/ Pump	60	25	42%
	4 Cyl w/ Pump (ext.)	70*	25	36%
Screws	All Screws	60	25	42%
	CSH (ext.)	60	20*	33%
	HS/OS'53/64 (ext.)	75*	20	27%
	HS/OS'74/85 (ext.)	67*	20	30%

*Extended Application (Consult AE)

MAIN PARAMETERS (CONT'D)

E2: Motor Parameters: Please set the MOA and verify the motor number of poles are correct for the compressor.				
A2-11	E2-01	Motor Rated Current [M]	Drive dependent	Set this to the Compressor MOA
A2-12	E2-04	Number of Motor Poles	2	Screw and Scroll compressor = 2, Recips = 4.
Digital Inputs: S1 is nearly always used as the run command input. S4 is typically used for a fault reset. Please see the YASKAWA manual for complete list of functions and descriptions for other inputs. Common uses include timers, external fault signal, etc.				
A2-13	H1-01	Terminal S1 Function Selection	40	Default: Forward run command
A2-14	H1-02	Terminal S2 Function Selection	0F	Set unused terminals to F.
A2-15	H1-03	Terminal S3 Function Selection	0F	Set unused terminals to F.
A2-16	H1-04	Terminal S4 Function Selection	14	Default: Fault reset
A2-17	H1-05	Terminal S5 Function Selection	0F	Set unused terminals to F.
A2-18	H1-06	Terminal S6 Function Selection	0F	Set unused terminals to F.
A2-19	H1-07	Terminal S7 Function Selection	0F	Set unused terminals to F.
Digital Outputs: Please see the YASKAWA manual for complete list of functions and descriptions. Common uses include compressor run proof, indicator lights, etc.				
A2-20	H2-01	Terminal M1-M2 Function Selection (relay)	000E	Closed: Fault
A2-21	H2-02	Terminal M3-M4 Function Selection (relay)	0000	Closed: During run
A2-22	H2-03	Terminal M5-M6 Function Selection (relay)	000A	Closed: Run command source
HOA Keypad Displays: These settings allow different displays to be viewed while unit is running. Please see the YASKAWA manual for complete list of available displays.				
A2-23	O1-01	Drive Mode Unit Monitor Selection	106	Output Voltage Reference
A2-24	O1-06	User Monitor Selection Mode	0	Allows user to select 01-07 and 01-08 to be seen
A2-25	O1-07	Second Line Monitor Selection	102	Output frequency
A2-26	O1-08	Third Line Monitor Selection	103	Output current
A2-27	S5-07	HAND Key Function Selection (HOA Keypad)	0	1: Enabled 0: Disabled