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Appendix 1 – Keb Inverter Drives



Introduction

All KEB Drives used will be programmed with 8 different parameters sets that are selected by jumpering terminals located on the KEB drive terminal strip. This allows the same drive to work on 8 different applications. The tables below show which terminals to jumper to select the desired application.

The drives have also been programmed to be able to change special parameters from the operator control panel. The user must enter a password of **200** to change these parameters. The table at the end of this document gives a description of the parameters. Setting the password to 440 gives the user full access to the drive parameters. Please refer to the full drive manual located on **GEOMARTIN.COM** for changing parameters under the 440 password.

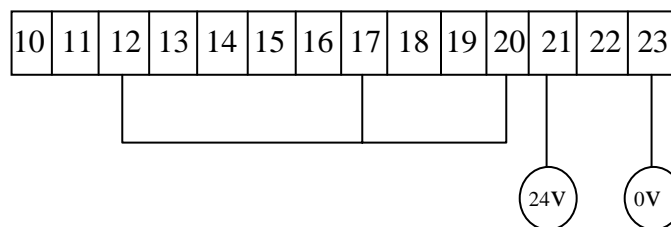
Warning damage to the drive and the motor can occur if parameters are set incorrectly. The Geo. M. Martin Company keeps a record of the drive parameters for each machine. If the drive or motor is damaged do to incorrect setting of drive parameters the warranty for the device will be void.

The drives are programmed with 8 different configurations, parameter sets 0 through 7. The parameter set selection is binary coded using 3 inputs on the drive. **Wiring these inputs to Terminal 20 turns them on and sets the appropriate bit high.** The table below shows the terminals used to select the parameter sets.

Inputs used to Select Parameter Set

BIT	TERMINAL #
0	17
1	12
2	13

Sample Terminal Jumpers for parameter set 3



Drive Parameter Sets

7.5 Hp Drive

7.5 HP DRIVE PARAMETER SET TABLE

Parameter Set	BIT 2 (Term. #13)	BIT 1 (Term. #12)	BIT 0 (Term. #17)	Application Description
0	0	0	0	7.5 Hp Stacker Belt Drive
1	0	0	1	3 Hp LayBoy Belt Drive
2	0	1	0	1 Hp Floor Conveyor Drive
3	0	1	1	¾ Hp Take Away Conveyor Drive
4	1	0	0	1 Hp BTS Drive
5	1	0	1	1 Hp Bundle Breaker Drive New
6	1	1	0	1 Hp QCR Drive
7	1	1	1	1 Hp Load Former Drive

Note:

1. The BTS Drive in this parameter set is for BTS on Scissor, BTS on Legs, and BTS on Air. It can not be used on the BTS MOBILE type of system.
2. The Bundle Breaker Drive parameter set is only for Bundle Breaker serial number 0020 and higher.

5 Hp Drive

5 HP DRIVE PARAMETER SET TABLE

Parameter Set	BIT 2 (Term. #13)	BIT 1 (Term. #12)	BIT 0 (Term. #17)	Application Description
0	0	0	0	5 Hp Stacker Belt Drive
1	0	0	1	3 Hp LayBoy Belt Drive
2	0	1	0	1 Hp Floor Conveyor Drive
3	0	1	1	¾ Hp Take Away Conveyor Drive
4	1	0	0	1 Hp BTS Drive
5	1	0	1	1 Hp Bundle Breaker Drive New
6	1	1	0	1 Hp QCR Drive
7	1	1	1	1 Hp Load Former Drive

Note:

1. The BTS Drive in this parameter set is for BTS on Scissor, BTS on Legs, and BTS on Air. It can not be used on the BTS MOBILE type of system.
2. The Bundle Breaker Drive parameter set is only for Bundle Breaker serial number 0020 and higher.

3 Hp Drive

3 HP DRIVE PARAMETER SET TABLE

Parameter Set	BIT 2 (Term. #13)	BIT 1 (Term. #12)	BIT 0 (Term. #17)	Application Description
0	0	0	0	3 Hp LayBoy Belt Drive
1	0	0	1	1 Hp Load Former Drive
2	0	1	0	2 Hp Floor Conveyor Drive
3	0	1	1	¾ Hp Take Away Conveyor Drive
4	1	0	0	1 Hp BTS Drive
5	1	0	1	1 Hp Bundle Breaker Drive New
6	1	1	0	1 Hp QCR Drive
7	1	1	1	1 Hp BLC Drive

Note:

1. The BTS Drive in this parameter set is for BTS on Scissor, BTS on Legs, and BTS on Air. It can not be used on the BTS MOBILE type of system.
2. The Bundle Breaker Drive parameter set is only for Bundle Breaker serial number 0020 and higher.
3. For a 1/2 or 3/4 Hp BLC Drive use Parameter Set 7 and setup the motor data using the drive face plate.

1 Hp Drive

1 HP DRIVE PARAMETER SET TABLE

Parameter Set	BIT 2 (Term. #13)	BIT 1 (Term. #12)	BIT 0 (Term. #17)	Application Description
0	0	0	0	1 Hp Floor Conveyor Drive
1	0	0	1	¾ Hp Take Away Conveyor Drive
2	0	1	0	1 Hp BTS Drive
3	0	1	1	1 Hp Bundle Breaker Drive New
4	1	0	0	1 Hp QCR Drive
5	1	0	1	1 Hp BLC Drive
6	1	1	0	1 Hp Load Former Drive
7	1	1	1	1 Hp Bundle Breaker Drive Old

Note:

1. The BTS Drive in this parameter set is for BTS on Scissor, BTS on Legs, and BTS on Air. It can not be used on the BTS MOBILE type of system.
2. The Bundle Breaker Drive New parameter set is only for Bundle Breakers serial number 0020 and higher.
3. The Bundle Breaker Drive Old parameter set is only for Bundle Breakers serial number 0019 and lower.
4. For a 1/2 or 3/4 Hp BLC Drive use Parameter Set 7 and setup the motor data using the drive face plate

CP PARAMETER TABLE

CP #	Parameter	Address	Description	Read Only	Enter Required
0	Password Input	Ud.01 (0801h)	Password control level of access to drive parameters	NO	YES
1	Actual frequency display	Ru.03 (0203h)	Frequency the motor is running	YES	NO
2	Set frequency display	Ru.01 (0201h)	Frequency commanded to the drive	YES	NO
3	Inverter status	Ru.00 (0200h)	State of the inverter	YES	NO
4	Phase current	Ru.15 (020Fh)	Real time running current of the motor	YES	NO
5	Peak phase current	Ru.16 (0210h)	Peak running current of the motor	YES	NO
6	Actual load %	Ru.13 (020Dh)	100% means inverter is running at max current	YES	NO
7	Actual DC voltage	Ru.18 (0212h)	DC Bus Voltage	YES	NO
8	Output voltage	Ru.20 (0214h)	Output voltage to the motor	YES	NO
9	Minimal frequency	Op.06 (0306h)	Frequency motor will run when given 0 volt command signal or if Set point frequency is set below this value.	NO	NO
10	Maximal frequency	Op.10 (030Ah)	Frequency motor will run when given 10 volt command signal or set point frequency set above this value	NO	NO
11	Acceleration time	Op.28 (031Ch)	Time it take to accelerate the motor form 0 to 100 Hz.	NO	NO
12	Deceleration Time	Op.30 (031Eh)	Time it take to decelerate the motor form 100 to 0 Hz	NO	NO
13	S-curve accel time	Op.32 (0320h)	Smoothing Time for acceleration	NO	NO
14	S-curve decel time	Op.34 (0322h)	Smoothing Time for deceleration	NO	NO
15	Analog in 1 filter	An.01 (0A01h)	Filter for analog input	NO	YES
16	Analog in 1 gain	An.05 (0A05h)	Gain for analog input	NO	YES
17	Analog in 1 min level %	LE.04 (0d04h)	If analog input is less than this percent drive will not run LS display on screen	NO	NO
18	Reference frequency	Op.03 (0303h)	Reference frequency 0, terminal 10 low terminal 11 low	NO	NO
19	Set point 1 frequency	Op.21 (0315h)	Fixed frequency 1, terminal 10 high terminal 11 low	NO	NO
20	Set point 2 frequency	Op.22 (0316h)	Fixed frequency 2, terminal 10 low terminal 11 high	NO	NO
21	Set point 3 frequency	Op.23 (0317h)	Fixed frequency 3, terminal 10 high terminal 11 high	NO	NO
22	Speed control	Cs.00 (0F00h)	Type of speed control drive is using	NO	NO
23	Kp	Cs.06 (0F06h)	Proportional gain for sensor less vector speed control	NO	NO
24	Ki	Cs.09 (0F09h)	Integral gain for sensor less vector speed control	NO	NO
25	Torque boost %	Uf.01 (0501h)	Amount of torque boost for drive	NO	NO
26	Boost Configuration	Uf.16 (0510h)	Type of torque boost drive is using	NO	NO
27	Boost gain	Uf.17 (0511h)	Value of gain for torque boost	NO	NO
28	Motor FLA	Dr.00 (0600h)	Motor name plate FLA	NO	NO
29	Motor RPM	Dr.01 (0601h)	Motor name plate rpm	NO	NO
30	Motor volts	Dr.02 (0602h)	Motor name plate volts	NO	NO
31	Motor power factor	Dr.04 (0604h)	Motor name plate power factor or $\cos \zeta$ (phi)	NO	NO
32	Motor frequency	Dr.05 (0605h)	Motor name plate frequency	NO	NO
33	Motor terminal resistance	Dr.06 (0606h)	Average resistance between all three	NO	NO

Appendix – KEB Inverter Drives

			motor leads.		
34	Motor protection current	Dr.12 (060Ch)	Motor FLA * Service Factor	NO	NO
35	Reference source	Op.00 (0300h)	Where drive is receive its reference signal from	NO	YES
36	Rotation source	Op.01 (0301h)	Where the source input for rotation is coming from.	NO	YES

CP PARAMETER DESCRIPTIONS

CP 0 Password Input:

- a. 100: CP_ro - Parameters are read only.
- b. 200: CP_on – CP Parameters are changeable.
- c. 330: CP_SE – CP Parameters are changeable, identification according to the original parameter.
- d. 440: APPL – All parameters of the drive are accessible and changeable.

CP 1 Actual Frequency Display: Display of the actual output frequency of the drive.

CP 2 Set Frequency Display: Display of the actual commanded frequency.

CP 3 Inverter Status Display: Displays the state of the inverter.

CP 4 Phase Current: Displays the current being supplied to the motor.

CP 5 Peak Phase Current: Displays the peak current supplied to the motor.

CP 6 Actual Load %: Percentage of inverter's rated current being used.

CP 7 Actual DC bus voltage: Voltage on the DC bus of the Inverter.

CP 8 Output Voltage: Voltage the inverter is supplying to the motor.

CP 9 Minimal frequency: Minimum frequency the inverter will run at. If set frequency is less than this frequency the drive will run motor at min frequency.

CP 10 Maximal frequency: Max frequency the inverter will command the motor to run at.

CP 11 Acceleration Time: The time it takes to accelerate from 0 to 100 Hz. i.e. If it required to ramp from 10 to 60 Hz in .75 sec. The correct setting from the drive would be $100\text{Hz}/(60\text{Hz}-10\text{Hz}) \cdot .75 = 1.5 \text{ sec}$. Equation: $\text{AccTime} = \text{CP11} = 100/\text{delta_freq} \cdot \text{required_acceleration_time}$.

CP 12 Deceleration Time: This time it takes to decelerate from 100 Hz to 0 Hz.
 $\text{CP12} = 100/\text{delta_freq} \cdot \text{required_deceleration_time}$.

CP 13 S-Curve Accel Time: This value must be less than CP11 & CP12. It is the time it takes to reach the acceleration defined by the time set in CP11 or CP12. It is used to reduce the jerk of the motor.

CP 14 S-Curve Decel Time: This value must be less than CP11 & CP12. It is the time it takes to reach the deceleration defined by the time set in CP11 or CP12. It is used to reduce the jerk of the motor.

CP 15 Analog In Ch1 Filter: Changing this value changes the amount of filtering performed.

- a. 0 = no averaging (updating time 1 ms)
- b. 1 = averaging over 2 values (updating time 2 ms)
- c. 2 = averaging over 4 values (updating time 4 ms)
- d. 3 = averaging over 8 values (updating time 8 ms)
- e. 4 = averaging over 4 values (updating time 16 ms)

CP 16 Analog In Ch1 gain: Command = actual analog input * gain. Until max is reached.

CP 17 Analog In Ch1 Min Level %: If the percentage of the analog input is less than this value the inverter will take this as a zero signal.

CP 18 Reference Frequency: If none of the speed selection bits are set the drive will run at this frequency. Terminal 10 and 11 at zero volts.

CP 19 Set Point 1 Frequency: If terminal 10 has 24 volts applied to it and terminal 11 has 0 volts the drive will run at this frequency.

CP 20 Set Point 2 Frequency: If terminal 10 has 0 volts applied to it and terminal 11 has 24 volts the drive will run at this frequency.

CP 21 Set Point 3 Frequency: If terminal 10 has 24 volts applied to it and terminal 12 has 24 volts the drive will run at this frequency.

- CP 22 Speed Control:** Type of speed control used by the inverter.
- 0 = Speed control off
 - 2 = Speed control on.
 - 34 = Slip limitation and Speed Control.
- CP 23 KP:** The proportional component of the speed controller.
- CP 24 KI:** The integral component of the speed controller.
- CP 25 Torque Boost %:** Give motor extra voltage at low frequencies to increase torque.
- CP 26 Boost Configuration:** Type of torque compensation used by the inverter.
- 0 = Torque compensation off.
 - 1 = Torque compensation for motoric and generative.
 - 2 = Torque compensation only for motoric no generative.
 - 3 = Torque compensation motoric and overcompensation in generative operation.
- CP 27 Boost Gain:** Gain for the torque compensation
- CP 28 Motor FLA:** Motor name plate full load amperage.
- CP 29 Motor RPM:** Motor rated speed in rpms.
- CP 30 Motor Volts:** Motor rated voltage.
- CP 31 Motor Power Factor:** Motor name plate power factor also known as cos phi. If a value is not give use the following formula to calculate it.
- CP 32 Motor Frequency:** Motor name plate frequency.
- CP 33 Motor Terminal Resistance:** To calculate this value measure the resistance between all three legs of the disconnected motor and take the average of these values.
- CP 34 Motor Protection Current:** This value should be set to motor FLA * Service Factor. It is use to protect the motor from over heating.
- CP 35 Reference Source:** Where the inverter is getting is reference signal from.
- 0 = analog input channel 1
 - 1 = analog input channel 2
 - 2 = digital input through set point speed in absolute values
 - 3 = digital input through set point speed in % values
- CP 36 Rotation Source:** Where the inverter gets its rotation direction from.
- 2 = Terminal strip forward/reverse, negative set points are set to 0.
 - 3 = Terminal strip forward/reverse, negative set points are treated the same as positive.
 - 4 = Terminal strip run/stop and forward/reverse negative set points are set to 0
 - 5 = Terminal strip run/stop and forward/reverse negative set points same as positive.
 - 6 = Analog Reference with LS. Direction determined by sign of analog value. 0 gives LS
 - 7 = Analog Reference with LS. Direction determined by sign of analog value.

For more detailed information on drive parameters see KEB drive application manual at geomartin.com

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