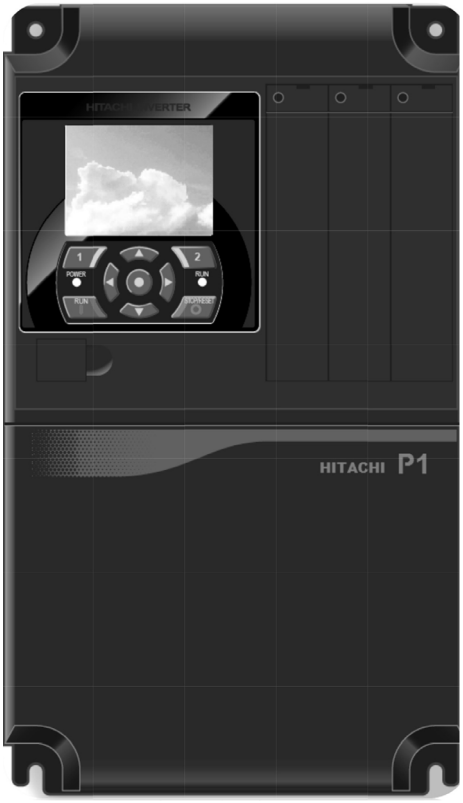
Detroit Hoist
Since 1905



Hitachi P1 Hoist

Basic Instruction Manual

DH Firmware V.19 – V.25

DETROIT HOIST AND CRANE LLC, CO.

6650 STERLING DRIVE NORTH
STERLING HEIGHTS MICHIGAN 48312

IMPORTANT!

This manual only applies to Hitachi P1 VFD's programmed with firmware version 19 to 25. Please verify the version by checking parameter db-02

Each Detroit Hoist comes equipped with Hitachi variable frequency drives to control each supplied motion and in most cases will not require any field adjustment. If adjustments or different configurations are required, use this manual to make those changes or contact *Detroit Hoist technical department 1 (800) 521-9126*.

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PUSHBUTTON VFD OPERATION EXPLANATION

Pushbutton Action	VFD Action				
	2-Speed	2-Speed Inf.Var	3-Speed	3-Speed Inf.Var	0-10V POT
Press to 1st step	Accelerates to 1st speed frequency.	Accelerates to 1st speed frequency.	Accelerates to 1st speed frequency.	Accelerates to 1st speed frequency.	Accelerates to 1st speed frequency or frequency determined by 0-10V reference
Press to 2nd step	Accelerates to 2nd speed frequency.	Accelerates to 2nd speed frequency.	Accelerates to 2nd speed frequency.	Maintains the speed frequency before the button was pushed to the 2nd step.	N/A
Press to 3rd step	N/A	N/A	Accelerates to 3rd speed frequency.	Accelerates to 3rd speed frequency.	N/A
Release to 2nd step	N/A	N/A	Decelerates 2nd speed frequency.	Maintains speed before the button was released to the 2nd step.	N/A
Release to 1st step	Decelerates to 1st speed frequency.	Maintains speed frequency before the button was released to the 1st Step.	Decelerates to 1st speed frequency.	Decelerates to 1st speed frequency.	N/A
Complete release from any step	Decelerates to 0Hz frequency and floats then sets motor brake	Decelerates to 0Hz frequency and floats then sets motor brake	Decelerates to 0Hz frequency and floats then sets motor brake	Decelerates to 0Hz frequency and floats then sets motor brake	Decelerates to 0Hz frequency and floats then sets motor brake

WIRING IN PUSHBUTTON CONTROLS

Please use the chart as a reference for connecting the pushbutton wires to the corresponding control terminals. Please refer to supplied electrical schematic for proper installation. Terminals may vary based on model.

2-Step & 3-Step Control Wiring

Pushbutton Wires	Control Terminals On Control Panel
Hoist Up Direction	HU
Hoist Down Direction	HD
Hoist 2nd Speed / 2nd Step	H2
Hoist 3rd Speed / 3rd Step	110vac to input 6 on interface card 24vdc to input 6 on VFD if no interface card
Micro Speed	Break HIC Input 4 (hoist interface card) or input 4 on hoist VFD.

Analog 0-10V Potentiometer

Controller	Control Terminals On Control Panel
Hoist Up Direction	HU
Hoist Down Direction	HD
Hoist Analog 10V Reference	Terminal H on Hoist VFD
Hoist Analog Ground Reference	Terminal L bottom row on Hoist VFD
Hoist Analog Input Reference	Terminal Ai1 on Hoist VFD
Cb-05	Start Rate Of Terminal Ai1
Cb-06	End Rate Of Terminal Ai1

CONFIGURING SPEED CONTROL METHODS

All Detroit Hoist controls come pre-configured for 2-Step speed control unless otherwise specified. Detroit Hoist controls are designed to be easily configured for 2-Step, 2-Step Infinitely Variable, 3-Step, 3-Step Infinitely Variable, and an External Potentiometer speed control methods. The following will guide you in changing the speed control methods.

Speed Control Methods	Changes To Make
2-Step	***Default From Factory*** Set VFD Parameter UE-18 = 0 Set VFD Parameter UE-16 = 0 Set VFD Parameter CA-06 = 00:NO
2-Step Infinitely Variable	Set VFD Parameter UE-18 = 01
3-Step	Set VFD Parameter CA-06 = 91 Set VFD Parameter UF-02 = 91
3-Step Infinitely Variable	Set VFD Parameter CA-06 = 91 Set VFD Parameter UF-02 = 91 Set VFD Parameter UE-18 = 01
Analog 0-10V	Set VFD Parameter UE-16 = 01

CONFIGURING SPEED PARAMETERS

Speeds	VFD Parameters
Micro 1st Speed	UE-10
Micro 2nd Speed	UE-15
1st Step / 1st Speed	UE-11
2nd Step / 2nd Speed	UE-12
3rd Step / 3 Speed	UE-13
Auto Speed	UE-14

Micro 1st Speed – This is the 1st speed / low speed frequency setting. This will be the 1st speed frequency as long as input 4 is off. *Note* – To use micro speed use a relay or switch to break the input 4 connection to the HIC (Hoist Interface Card) or the input 4 wire on the VFD.

Micro 2nd Speed – This is the 2nd speed / high speed frequency setting. This will be the 2nd speed frequency as long as input 4 is off.

1st Step / 1st Speed – This is the 1st speed / low speed frequency setting. This will be the 1st speed frequency as long as input 4 is on.

2nd Step / 2nd Speed – This is the 2nd speed / 2nd step frequency setting. This is also the high speed setting for 0-10V external POT

3rd Step / 3 Speed – This is the 3rd speed / 3rd step frequency setting.

Auto Speed – This is the Auto speed frequency setting. This is used in hoisting only. This is the speed in which the hoist VFD will allow when lifting a light load or empty hook. (Do not exceed 90HZ)

Note – Speed frequency parameters UE-10 thru UE-14 are represented as a whole number. See example below to understand how to set the speed parameters.

Example: 10.00 Hz / UE-10 = 1000

Example: 15.00 Hz / UE-11 = 1500

Example: 39.99 Hz / UE-12 = 3999

125% LOAD TESTING

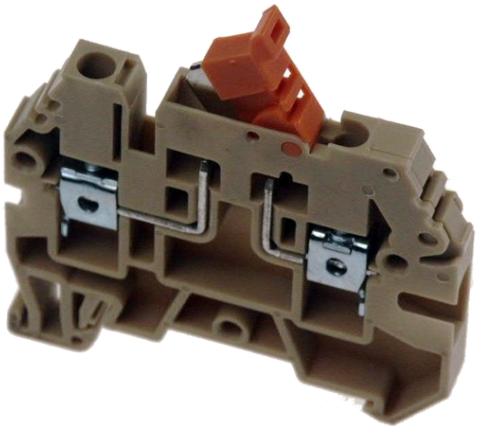
Each hoist is live load tested at 125% at the Detroit Hoist factory prior to shipment, to pass inspection. If additional field testing is required, please use the provided instructions to do so.

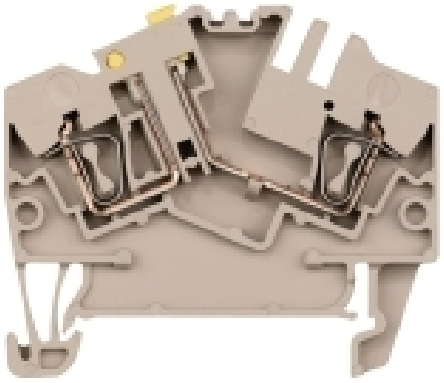
(Step 1) Locate over-weight bypass switch and open it (see images below for BPS switch example).

(Step 2) Proceed to lift 125% of rated capacity. Once the 125% load is off the ground test all motions to ensure proper movement.

(Step 3) If all motions had proper movement then go to step 4. If any of the motions did not move properly, please use the Manual Torque Boost parameters on the next page to increase the torque to attempt to move the load. If this is a closed loop application please contact Detroit Hoist for further assistance. If after adjusting the Manual Torque Boost parameters the load will still not move please contact Detroit Hoist for further assistance.

(Step 4) Remove the 125% load and close the over-weight bypass switch.





SETTING HOIST OVER-WEIGHT

(Step 1)	- On the Hoist VFD home screen displays the output current to the motor.
(Step 2)	- Locate the over-weight bypass switch located on the control panel (BPS) and open it. This will ignore any over-weight signal given by the hoist VFD to the over-weight circuit.
(Step 3)	- Lift 100% of the rated capacity in 1st speed and wait for the output current to become stable, note that value and add 2%.
(Step 4)	- Lift 100% of the rated load in 2nd speed and wait for the output current to become stable, note that value and add 2%.
(Step 5)	- On the Hoist VFD navigate to parameter CE106 which is the over-weight current setting for low speed and set the value to the value determined in step 3.
(Step 6)	- On the Hoist VFD navigate to parameter CE107 which is the over-weight current setting for high speed and set the value to the value determined in step 4.
(Step 7)	- Verify lifting 100% of the rated capacity in 1st and 2nd speed does not create an over-weight condition.
(Step 8)	- If the over-weight trips you will need to determine if the trip is in low or high speed and increment the value in the corresponding over-weight setting parameters. If the over-weight trips due to inrush current increment parameter CC-20 to delay the over-weight output signal.
(Step 9)	- After the over-weight setting have been successfully set close the over-weight bypass switch located on the control panel (BPS).

Over-Weight VFD Parameters	
Low Speed Over-Weight	CE106
High Speed Over-Weight	CE107

SETTING UPPER & LOWER OPERATIONAL ENCODER LIMITS

* Closed Loop Hoist Only *

The Hitachi P1 can use the encoder pulses for electronic upper and lower hook block limits. Detroit Hoist has made this a simple process by using knife disconnect switches. To set the upper and lower limits follow the steps below in order. Note: The process cannot be reversed or limits will not work properly.

Note: To disable the use of the electronic limits simply change parameter UE-33 = 0 and be sure to wire in a limit circuit. For assistance please contact Detroit Hoist for an updated electrical drawing.

1.) Open the PP knife disconnect to enter program mode. (Program Position Switch).

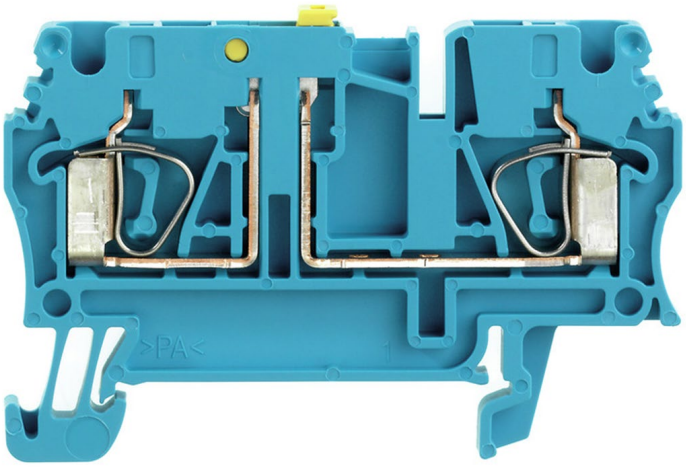
2.) Run hook block to desired upper limit.

3.) Simply open and then close the PR knife disconnect to clear the position counter memory. (Position Reset Switch) This is used as a momentary switch. (DO NOT LEAVE OPEN)

4.) Run hook block to desired lower limit.

5.) Close the PP knife disconnect once the motor brake has set to store the position data.

Use image below for reference of PP & PR switch.



MOTOR OVERLOAD PROTECTION

The Hitachi VFD's have built in solid state motor overload protection which reacts up to 150% of max output current of the VFD. Please ensure that this parameter is set correctly to the application provided by the VFD. This is not the over-weight protection parameter.

Hoisting applications – bC110 = 125% hoist Motor FLA

ENCODER INPUTS & PARAMETERS

* Closed Loop Hoist Only *

The Hitachi P1 VFD's have a built in high speed encoder input located under the front cover. The supply voltage for the encoder is 24vdc. Please ensure that your encoder is rated for 24vdc. Be sure to terminate the encoder shield with 0vdc to act as a noise drain.

Terminal A = Encoder Signal A

Terminal B = Encoder Signal B

Terminal COM = Encoder 24vdc

Terminal CM1 = Encoder 0vdc & Shield

Speeds	VFD Parameters
Encoder PPR	CA-81 (512 - 1024)
Encoder Pulse Position Selection	CA-82 00 = Phase A Lead 01 = Phase B Lead

ACCELERATION & DECELERATION PARAMETERS

Standard Accel & Decel Functions	VFD Parameter
Acceleration Time (1)	AC120
Deceleration Time (1)	AC122

The Hitachi VFD's features two-stage acceleration and deceleration ramps. This gives flexibility in the profile shape while running in the infinite variable method. This feature allows you to have more control in the accel and decel while transitioning your frequency. You can specify the frequency transition point, the point at which the standard acceleration (AC120) or deceleration (AC122) changes to the second acceleration (AC124) or deceleration (AC126).

Use the table below to configure the 2-Stage Accel & Decel feature.

2-Stage Accel & Decel Function	VFD Parameter
Acceleration Time (2)	AC124
Deceleration Time (2)	AC126
Select method to switch to accel / decel (2) profile	AC115 = 00 will require the use of CA-06 = 031 AC115 = 01 will use transition frequency AC115 = 02 will change when direction is reversed
Accel (1) to Accel (2) frequency transition	AC115
Decel (1) to Decel (2) frequency transition	AC116

LOAD FLOAT

* Closed Loop Hoist Only *

Load float makes use of the encoder feedback to hold the load at zero speed without setting the motor brake. This allows for extremely precise movement of a load as well as eliminating motor brake wear by always setting the motor brake at zero speed.

Once the motor brake has been released and directional commands have been completely released the VFD will decelerate to zero speed and float the load for the set amount time in parameter UE-29. If a directional command is given before the load float timer has expired the load float timer will reset once the directional commands are released again.

Once the timer has expired the VFD will close the motor brake and start the End of Run Motor Brake Check. The load float timer is adjustable please use the example below to set the desired float time.

Example: 2.00 seconds / UE-29 = 200

MOTOR BRAKE WAIT DELAY

In some cases a motor brake may react faster or slower when given the release or set command. To ensure the motor doesn't not run through the brake or prematurely slip during the End of Run Brake check the Motor Brake Delay parameter UE-28 has been introduced.

This delay will allow for the motor brake to fully release before accepting a frequency command as well as allowing the motor brake to fully set before starting the End of Run Motor Brake Check. Please use the example below to adjust the motor brake delay time.

Example: 0.3 seconds / UE-28 = 30

START OF RUN MOTOR CHECK

* Closed Loop Hoist Only *

The Start of Run Motor Check is designed to check the motor torque at the beginning of each lift. On a power up cycle the VFD will test the motor at the default torque test value. Once the first check has successfully completed the VFD will check the motor at the torque required for the suspended load. If no load is suspended the VFD will check the motor torque at the minimum torque check value.

During the Start of Run Motor Check the VFD will check to make sure the motor has produced sufficient torque before releasing the motor brake.

If the motor fails to generate sufficient torque during the Start of Run Motor Check the VFD will trip with an E51 error. Please contact Detroit Hoist technical department 1 (800) 521-9126.

Note – Once the Start of Run Motor Check is complete the motor brake will release and if there is a light load or no load suspended the hoist may rotate slightly in the up direction due to a buildup of torque, this is normal.

Function	VFD Parameter
Enable Feature	UE-30 (0 = disabled / 1 = enabled)
Default Torque Check Value	UE-31
Motor Torque Check Time	UE-32

Example: 1.00 seconds / UE-32 = 100

END OF RUN MOTOR BRAKE CHECK

* Closed Loop Hoist Only *

Brake Torque Proving

The End of Run Motor Check will check for motor brake slip at the end of each lift cycle. Once the load float timer has expired the VFD will lockout the directional commands. The VFD will then set the motor brake and wait until the Motor Brake Delay timer has expired. Once the Motor Brake Delay timer has expired the VFD will start controllably reducing the motor torque to 0%. While the VFD is controllably reducing the motor torque the VFD is checking for movement from the motor encoder.

If movement is detected during the End of Run Motor Brake Check the VFD will restore full torque to the motor and will turn on the fault condition signal from output relay 16A. The forward direction and high speed commands will be locked out, and only the reverse direction will be enabled. The VFD will wait until a reverse command is given and then will proceed to lower the load in low speed while the reverse command is on. If the reverse command is removed the VFD will start the End of Run Motor Brake Check again.

Once the load is safely on the ground and the End of Run Motor Brake Check passes then the VFD will restore all directional and speed commands and turn off the fault condition signal output relay 16A.

Function	VFD Parameter
Enable Feature	UE-34 (0 = disabled / 1 = enabled)
Motor Brake Slip Max Allowable Pulse Count	UE-35 (Please Contact Detroit Hoist)

AUTO SPEED

The Auto Speed feature will automatically increase the high speed frequency to the frequency value of UE-14 when the forward driving torque % or current at the high speed frequency is less than the Auto Speed output torque % threshold set in UE-21. The output current must not exceed the motor FLA and or the VFD FLA while in Auto Speed and the output torque must not exceed 150%. (Warning do not set the Auto Speed frequency above 90.0 Hz) Normal setting for UE-21 is 40

Use the table below to configure the Auto Speed feature for closed loop. (Without load brake)

Function	VFD Parameter
Enable Feature / Auto Speed Output Torque Threshold	UE-21 (0 = disabled) UE-21 > 0 = The Auto Speed torque threshold %
Auto Speed Frequency	UE-14

Note – UE-14 & UE-21 are represented as a whole number, see example below to understand how to set the parameters.

Example1: 40% Torque / UE-21 = 40 (Do not set this value above 50)

Example2: 90.00 Hz / UE-14 = 9000 (Do not set this value above 9000)

Use the table below to configure the Auto Speed feature open loop. (With load brake)

Function	VFD Parameter
Enable Feature / Auto Speed Output Torque Threshold	UE-21 (0 = disabled) UE-21 > 0 = The Auto Speed current threshold %
Auto Speed Frequency	UE-14

Note – UE-14 & UE-21 are represented as a whole number, see example below to understand how to set the parameters.

Example1: 45% of FLA / UE-21 = 450 (Do not set this value above 450)

Example2: 90.00 Hz / UE-14 = 9000 (Do not set this value above 9000

MONITOR DIGITAL INPUTS

The Hitachi VFD's have a monitor function that will display the status of the 24vdc digital inputs 1 thru 9 & A, B. Unlike the WJ200 the P1 has a GUI screen and supports up to (3) monitors on the main screen. By default, the digital input monitor should be located on the bottom of the main screen on power up. If the main screen does not show the digital input monitor, you can view it by navigating to the monitor parameter dA-51.

The P1's digital input monitor will display each input using a **L** or **H** that represents LOW or HIGH. The inputs on the monitor read right to left corresponding with digital inputs 1 thru 9 & A, B.

L will indicate the input is LOW which is off / not active.

H will indicate the input is HIGH which is on / active.

Hitachi P1 Digital Input Monitor parameter = dA-51

The image below is a reference image to the P1 digital input monitor. This example shows digital input 5 is the only active digital input. Again, the screen reads right to left, digital input 1 is the 1st line from the right.

Left Picture – Main screen with output frequency monitor, output current monitor, input terminal monitor.

Right Picture – The scroll menu for the monitor parameter group with dA-51 highlighted.

DEFAULT HOME SCREEN

DA SCROLL MENU MONITORS

MONITOR PARAMETERS

Monitor	Parameter	Brief Description
Output Frequency	dA-01	The commanded output frequency.
Output Current	dA-02	Displays the output current to the motor.
Actual Rotation Direction	dA-03	Output rotation direction (f = forward / r = reverse)
Encoder Detected Speed	dA-08	Displays the detected speed from the encoder
Output Torque	dA-17	Displays the output torque to the motor.
Current Position	dA-20	Displays the current position in pulses based on the encoder and position of 0 being the upper limit when encoder limits are in use.
Accumulated Output Power kWh	dA-36	Displays the accumulated output in kilowatt hours.
DC-BUS Voltage	dA-40	DC-BUS voltage.
Dynamic Braking Usage %	dA-41	Displays the current dynamic braking usages in percentage.
Digital Inputs	dA-51	Displays the digital input terminal status. L = OFF / H = ON Terminals 1 thru 9, A & B right to left on display
Digital Outputs and Relays	dA-54	Displays the digital outputs and relays status. L = OFF / H = ON
Analog Input Monitor Ai1	dA-61	Displays the value of the analog input.
Analog Input Monitor Ai2	dA-62	Displays the value of the analog input.
DH Program #	db-02	Displays the internal program version number.
EZCOM Communication Status	db-08	9999 = disconnected
Local VFD Command Instruction	db-10	Displays the local VFD's internal program command instruction number.
Brake Slip Detection Pulse Count	db-16	Displays the number of pulses detected during the brake slip detection test.
Cooling Fin Temp	dC-15	Displays the temperature of the cooling fins in Celsius.
Accumulation Number of Starts	dC-20	1-65535 cycles
Accumulated RUN Time	dC-22	1-1000000 hours
Accumulated Power-ON Time	dC-24	1-1000000 hours

TROUBLESHOOTING E51 FAULT

WHAT IS AN E51 FAULT - An E51 fault is a motor torque proving fault. The motor responded with less than the anticipated motor current.

HOW IS AN E51 FAULT DETERMINED – When the VFD is operating in closed loop vector control only (AA121 = 10) at the start of a lift cycle the VFD applies a calculated output torque to the motor and allows a specific amount of time UE-32 for the motor to respond with the motor current. If the motor responds with less than the anticipated output current based on the torque to required current calculation, then a motor torque proving fault is determined to have occurred.

- If this fault is occurring at random it might be caused due to a high load or overload. If a high load or overload occurs it can sometimes set a value in which the VFD & motor would need to prove a value higher than allowed. Check to make sure the motor brake circuit is not dropping out randomly. Check to see if the encoder signal in unstable by using dA-08 detected speed monitor, this value while run should be close to the set-frequency value. The allowable tolerance for dA-08 is + / - 1.5hz from the commanded frequency.

- Check the physical condition of the motor brake pads and springs and make sure the VFD is not driving through the motor brake during the test. Driving through the motor brake will cause the VFD to reduce the output torque to maintain the set-frequency of 0 Hz.

- Check that the motor brake air gap is within the required spec for that brake. Try adjusting it to the smallest air gap allowed in the brake spec.

- Check that the motor connections are secure both at the VFD output terminals and at the motor junction box terminals.

- Check to see if the motor Io constant Hb116 was changed to a larger value than what's on the motor nameplate. Please not in some cases this value in the drive may be lower due to service factor or duty cycle ratings.

- Make sure all loads are removed from the hook block and switch the VFD to an open loop control mode and see if the hoist works properly and the output current isn't high and running smoothly. This will help determine if an IGBT output from the VFD is bad.

- Check parameter UE-68 and UE-69 should have a value of 1500 – 2000.

- Check parameter UE-32 should have a value around 250 – 400.

- Check parameter bA103 = 0.00 and bA101 = 00: Disabled.

- Check parameter bA110 = 07: Keypad.

- Contact Detroit Hoist for further assistance.

TROUBLESHOOTING E52 FAULT

WHAT IS AN E52 FAULT - An E52 fault is a speed deviation fault. The encoder detected speed deviated from the output commanded set-frequency.

HOW IS AN E52 FAULT DETERMINED – When the VFD is operating in closed loop vector control only (AA121 = 10) the VFD is constantly comparing the detected frequency from the encoder to the commanded frequency while running. If the detected frequency from the encoder deviates outside of the allowable value bb-83 for the allowable time bb-84 then a speed deviation is determined to have occurred.

- Check the encoder shaft collar is tight on the shaft and the encoder tether is secure.
- If the encoder was replaced in the field be sure to check for correct encoder signal phasing. Try switching sig A with sig B.
- If the fault is occurring at start you will need to determine if the encoder is working. To do this remove the encoder from the motor shaft and navigate to VFD parameter dA-20 the current position monitor. With the encoder in your hand rotate the encoder shaft and see if the pulse count is changing either counting up or counting down. You can also navigate to VFD parameter dA-08 and rotate the encoder shaft and see if there is any frequency being detected.
- If a load is stuck in the air, you can change the VFD control mode to open loop SLV AA121 = 08 for the purpose of lowering the load. DO NOT keep using the hoist in open loop mode if it is a closed loop hoist since the safety protections will be disabled.
- If this fault is occurring at random check to make sure the motor brake circuit is not dropping out randomly. Check to see if the encoder signal in unstable by using dA-08 detected speed monitor, this value while run should be close to the set-frequency value. The allowable tolerance for dA-08 is + / - 1.5hz from the commanded frequency.
- Contact Detroit Hoist for further assistance.

TROUBLESHOOTING E53 FAULT

WHAT IS AN E53 FAULT - An E53 fault is a over-torque fault.

HOW IS AN E53 FAULT DETERMINED – When the VFD is operating in a control mode of (AA121 = 8, 9, or 10) the VFD will use the torque monitor to determine if the output torque becomes greater than the values in over-torque level parameters CE120 – CE123. If the output torque becomes greater than the over-torque levels, then an E53 over-torque fault is determined to occur.

- Check the encoder shaft collar is tight on the shaft and the encoder tether is secure.
- Check output torque monitor dA-17 without weight suspended from the hook and see if the torque is abnormally high, this might point to an issue with the output of the VFD or the motor.
- Check to see if the motor brake is releasing correctly.
- Check the over-torque levels in parameters CE120 – CE123, the normal values are 205% unless changed in the field. Make sure they are not set lower than the required torque during driving (be sure to include the torque spike during acceleration).
- If the fault is occurring at start you will need to determine if the encoder is working. To do this remove the encoder from the motor shaft and navigate to VFD parameter dA-20 the current position monitor. With the encoder in your hand rotate the encoder shaft and see if the pulse count is changing either counting up or counting down. You can also navigate to VFD parameter dA-08 and rotate the encoder shaft and see if there is any frequency being detected.
- If a load is stuck in the air, you can change the VFD control mode to open loop SLV AA121 = 08 for the purpose of lowering the load. DO NOT keep using the hoist in open loop mode if it is a closed loop hoist since the safety protections will be disabled.
- If this fault is occurring at random check to make sure the motor brake circuit is not dropping out randomly. Check to see if the encoder signal in unstable by using dA-08 detected speed monitor, this value while run should be close to the set-frequency value. The allowable tolerance for dA-08 is + / - 1.5hz from the commanded frequency.
- Contact Detroit Hoist for further assistance.

TROUBLESHOOTING E001 / E005 / E039 FAULTS

WHAT IS AN E001, E005, and E039 FAULT – The 3 faults are all over-current type faults.

- If operating in closed loop AA121 = 10 then check the encoder shaft collar is tight on the shaft and the encoder tether is secure.
- When the thermal protection begins, [E005] motor electronic thermal error occurs.
- Irrespective of the thermal setting of the motor, the inverter electronic thermal protection works independently to protect the inverter.
- When the current grows rapidly, [E001] excessive current error could occur before [E005] motor electronic thermal error.
- Even if the electronic thermal level is set high, the electronic thermal for inverter works separately at frequency decreased from 5Hz and 80% at 0Hz.
- Check to see if the motor brake is releasing correctly.
- Check if parameter bC110 value is set to lower than the over-weight value or less than 125% of the motor FLA.
- Check for binding or obstructions preventing the drive train from rotating.
- If a load brake is present, check to see if the load brake is releasing and operating correctly.
- Check motor wiring.
- Contact Detroit Hoist for further assistance.

TROUBLESHOOTING E006 FAULT

WHAT IS AN E006 FAULT – An E006 fault is a dynamic braking overuse fault. This means the dynamic braking usage ratio was exceeded or met.

- If the status of the fault was while at STOP then this typically points to the input power to the VFD increased for a long enough period of time and the braking chopper was trying to reduce the dc-bus voltage level. Check the incoming power for spikes or if large machinery is starting up causing sags and spikes. If this is the case, then try adding a line reactor in front of the main power of the crane.
- If the status of the fault was during RUN and the hoist has a load brake, then the load brake needs to be serviced. The VFD's dynamic braking allowable usage will be set to 3% to detect when the load brake has excess wear and needs to be serviced.
- If the status of the fault was during RUN and the hoist is operating in closed loop AA121 = 10 then the dynamic braking allowable usage ratio may not be set properly, contact Detroit Hoist for assistance in correcting this issue.
- Contact Detroit Hoist for further assistance.

TROUBLESHOOTING E007 FAULT

WHAT IS AN E007 FAULT – An E007 fault is a dc-bus over-voltage fault.

- Check the dynamic braking resistor circuit. Check that the resistor is connected to the correct terminals RB & P+. Check if the resistor is open using a multimeter.
- If the deceleration time is too short, try increasing the deceleration time.
- If the resistor ohm value might be the incorrect value and a new resistor with a lower ohm value may be required.
- If a regenerative unit is used, then check that the regenerative unit is online and functioning correctly and not in a fault status. Also check if the regenerative is going offline due to power imbalance or noise.
- If the status of the fault was while at STOP then this typically points to the input power spiking. Check the incoming power for spikes or if large machinery is starting up causing sags and spikes. If this is the case, then try adding a line reactor in front of the main power of the crane.
- Contact Detroit Hoist for further assistance.

TROUBLESHOOTING E014 / E030 FAULT

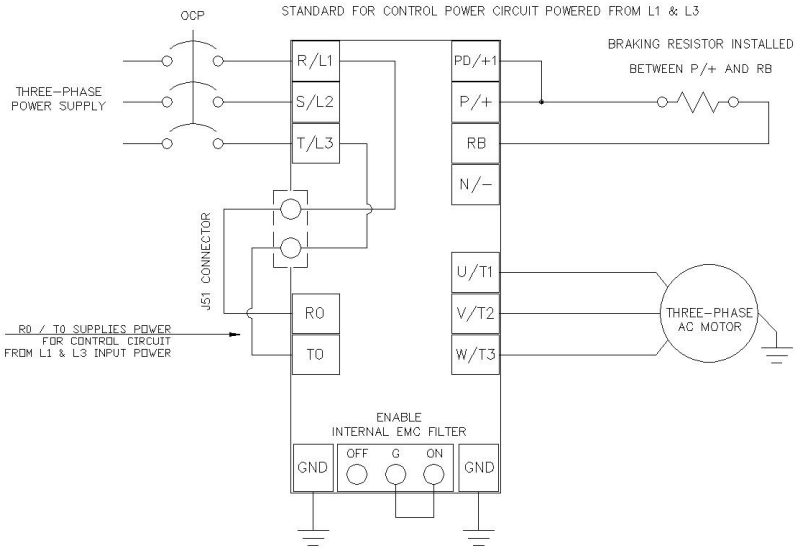
WHAT IS AN E014 and E030 FAULT – An E014 and E030 fault are both referenced as ground faults.

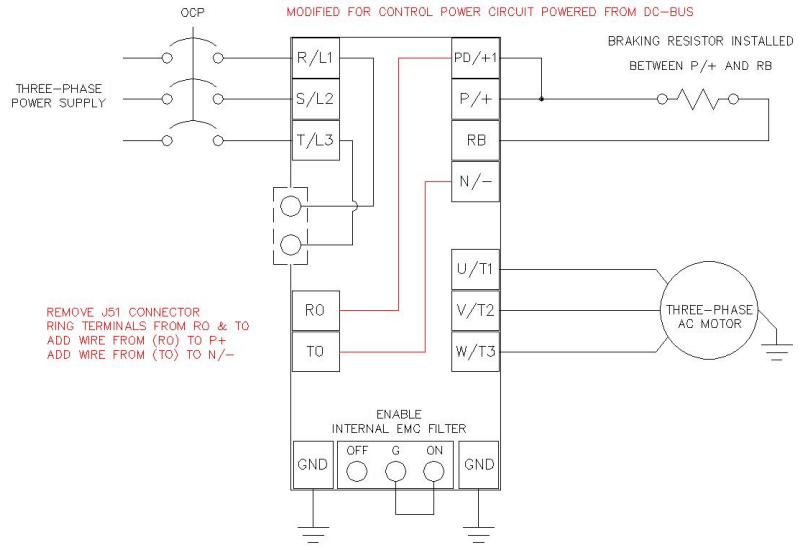
- Check the output conductors for short to ground. Try disconnecting the motor leads from the VFD side and see if the fault no longer persists.
- Test the motor with a megger for insulation break down or for corona discharge insulation damage.
- Check the motor for high moisture contamination.
- Contact Detroit Hoist for further assistance.

TROUBLESHOOTING E016 FAULT

WHAT IS AN E016 FAULT – An E016 fault is an instantaneous power failure fault. When the power is removed and restored within a very short period the VFD will detect that as an instantaneous power failure and will fault to protect the VFD and motor.

- Check the incoming power for sags or if large machinery is starting up causing sags and spikes. If this is the case, then try adding a line reactor in front of the main power of the crane.
- Check if the mainline or power supply disconnect / switch / contactor is functioning correctly.
- If the problem is based on sags, then changing the control circuit power supply from the incoming AC lines to tapping the dc-bus may reduce the chance of an E016 fault, see image below modified red circuit as reference to changing the circuit.
- Contact Detroit Hoist for further assistance.





TROUBLESHOOTING BLANK SCREEN / DISPLAY

If the VFD's screen / display is blank it usually means the internal 24v power supply is shorted or damaged. In most cases if a connected circuit is causing the short, disconnecting that circuit will restore 24v power to the screen / display.

- Check for power on the VFD's L1 and L3 input power terminals.
- Disconnect the encoder wires from the VFD's main body control circuit terminals A, B, COM, CM1.
- Disconnect all wires from the VFD's main body control circuit terminals related to 24v, (COM, P24, P-, P+, CM2)
- Contact Detroit Hoist for further assistance.

TEMPORARILY SWITCHING FROM CLOSED LOOP TO OPEN LOOP

In the case of an encoder failure, it might be required to switch from closed loop to open loop in order to lower a load.

DO NOT continue to operate the hoist in open loop mode unless for troubleshooting purposes without a load suspended.

Operating a closed loop hoist in open loop mode other than for the purpose of troubleshooting without a load suspended or lowering a load is **HIGHLY DISCOURAGED** since all safety features will be disabled. If an E51 fault was occurring, **DO NOT** switch to open loop mode with a load suspended or the load may fall, use other means to remove suspended load.

To switch from closed loop to open loop change parameter AA121 = 08 SLV for high torque output and power cycle the VFD.

No other parameters are required to be changed. All safety functions will be bypassed automatically, and the encoder limit functions will be ignored. The brake release circuit will be switched over to the open loop brake control using brake release and set frequencies.

Function	Parameters	Value
VFD Control Mode	AA121	10: Closed Loop Vector
		08: Open Loop SLV
IMPORTANT! – If an E51 fault was occurring, DO NOT switch to open loop mode with a load suspended or the load may fall, use other means to remove suspended load.		

FAULT / ERROR CODES DESCRIPTION

Fault / Error Code	Description
E001	Over-current error
E005 / E039	Electronic thermal overload error (motor current > bC110)
E006	Dynamic braking resistor over used error
E007	DC-Bus over-voltage error
E008 / E011	Memory error / CPU error
E009	Undervoltage error
E010	Built-in current detector error
E012	External trip error (digital input configured for Ext)
E013	USP error This error occurs if an operation command has been input to the inverter when the power supply is turned ON. Operation command detection is carried out for 1 second after the power supply is turned ON. (When USP function is selected.)
E014	Ground fault error
E015	Incoming voltage error (input power supply is too high)
E016	Instantaneous power failure error
E019	Temperature detector error
E020	Temperature error Cooling fan rotation speed reduction error
E021	Temperature error
E024	Input open-phase error When [bb-65] input phase loss selection is set to 01, and when a missing phase is detected in input line, the inverter turns OFF its output.
E030	IGBT error (ground fault to motor or on output of VFD)
E034	Output open-phase error When the output phase loss selection [bb-66] is set to 01, when a loose connection or disconnection of output line, disconnection inside the motor, etc. is detected, the inverter turns OFF its output. Detection of phase loss state is executed in the section between 5Hz to 100Hz.
E035	Thermistor error
E036	Brake error
E038	Low-speed range overload error

E039	Electronic thermal overload error (motor current > bC110)
E040	Operator keypad communication error
E041	RS485 / EZCOM communication error When CF-05 = 0 or 1
E042	RTC error
E043 / E044 / E045	Internal Program illegal instruction error
E050	Brake Slip Detection error
E051	Motor Torque Proving error
E052	Speed Deviation error
E053	Over-Torque error
E054	Shock-Load Detected
E060 – E069	Option card slot 1 connection error
E070 – E079	Option card slot 2 connection error
E080 – E089	Option card slot 3 connection error
E090 – E096	STO path error / FS option error
E100	Encoder disconnection error when using P1-FB option card
E104	Position control range error The encoder position data exceeded (268435455 | -268435455) pulses
E105	Speed deviation error
E106	Position deviation error When using the hook position syncing the follower VFD's position deviated over the value in parameter bb-86 for the amount of time in parameter bb-87
E107	Over-speed error
E112	P1-FB option card connection error

VIEW FAULT HISTORY

To view the fault history, use the step chart below.

Step	Instruction
1	Power on the VFD.
2	Press the left arrow button 2 times to view the fault history list.
3	Use the up and down arrow buttons to scroll through the fault history list and use the center dot button to select the fault and view information as in date / time / fault / status / output current / dc-buss / ext.
4	Press the right arrow button 2 times to return to the main view or keep pressing it until you reach the view you desire.

Check Error History!

Trip History "Total Count Monitor"

Q

- I want to check trip history.

!

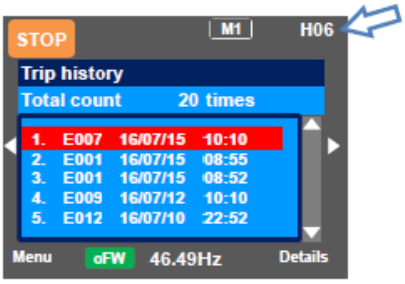
- To display time in trip history, you need to configure clock settings.
- To use the clock function, you need an optional battery that is separately sold.

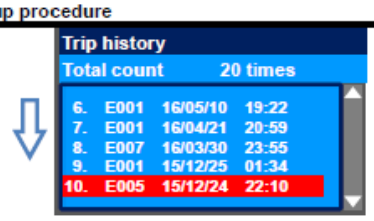
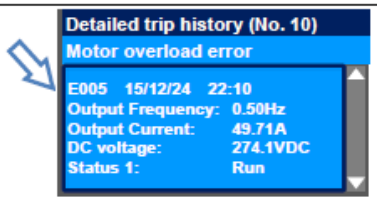
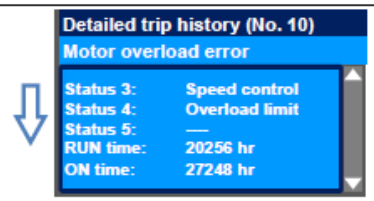
▼

- On the screen that is displayed upon power-on, using the right and left (◁▷) keys, navigate to "H06".

A

- The trip history screen "Total monitor" shows details of the errors that have occurred and the total number of times trip occurred.
- For details of errors, see "Chapter 18 Tips/FAQ/Troubleshooting".



Set-up procedure	Action
	5.1.1 Using the up and down (Λ∇) keys, select history information you want to check. To 5.1.2
	5.1.2 Press the SEL(O) key to show details of the selected history information. To 5.1.3
	5.1.3 Using the up and down (Λ∇) keys, you can check details. Press the F1(1) key to return to the monitor.

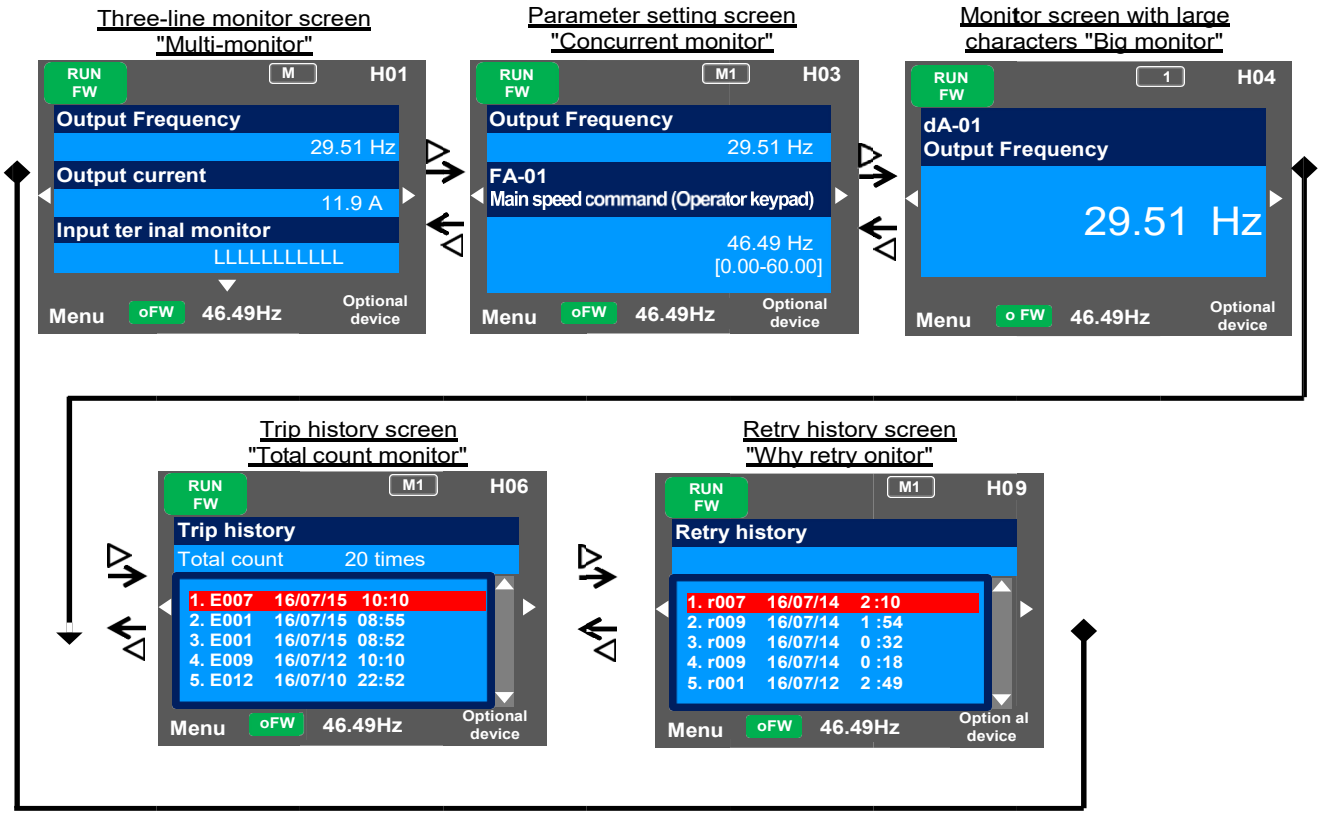
CLEARING FAULT HISTORY

To clear the fault history, use the step chart below.

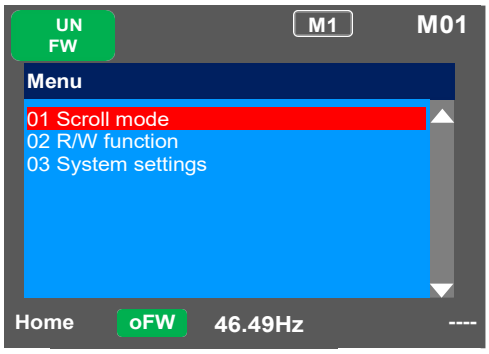
Step	Instruction
1	Power on the VFD.
2	Press the #1 button one time to view the menu screen.
3	Use the arrow buttons to highlight “SCROLL MODE” and press the center dot button to enter the “SCROLL MENU”.
4	Use the arrow buttons to scroll down to “U:Set-up, PDN” and press the center dot to enter the “U parameter group”.
5	Press the #2 button once to change from the ‘UA’ group to the “Ub” group.
6	Use the arrow buttons to highlight parameter “Ub-01 Initialize Mode” and press the center dot to enter the “Ub-01” parameter.
7	Use the arrow buttons to highlight the value “1 TRIP” and then press the #2 button to save the value. The screen will automatically return to the “Ub” parameter listing.
8	Use the down arrow button to navigate and highlight parameter “Ub-05 Initialize” and press the center dot button to enter the “Ub-05” parameter.
9	Use the arrow button to highlight “1 Initialize” and then press the #2 button to save the value. The VFD will clear the trip history.
8	You can use the #1 button to return to the main screen by pressing it 3 times or just cycle power.

Operator Keypad Screen

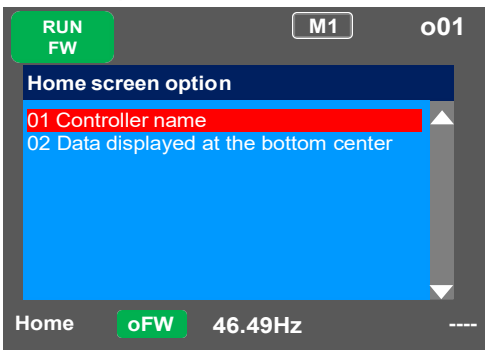
- Types of main monitor screen



- Menu screen



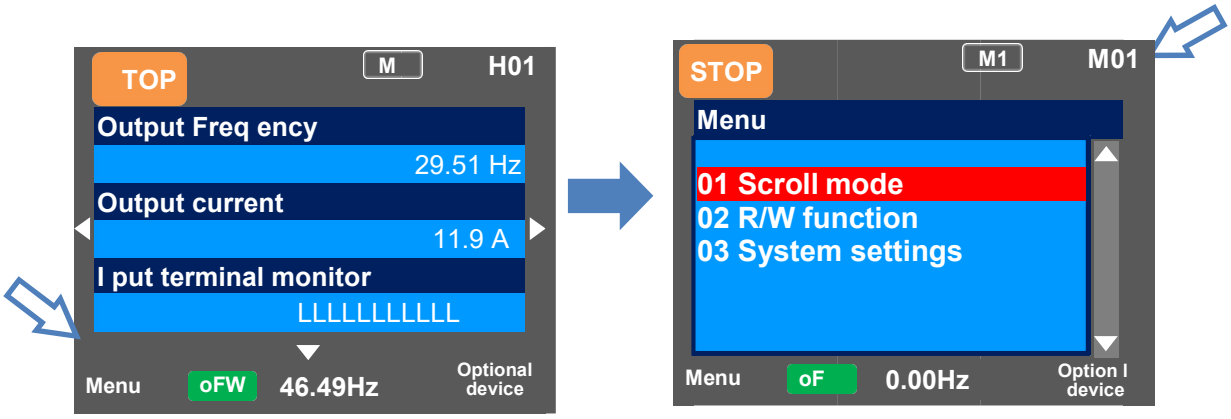
- Home screen option



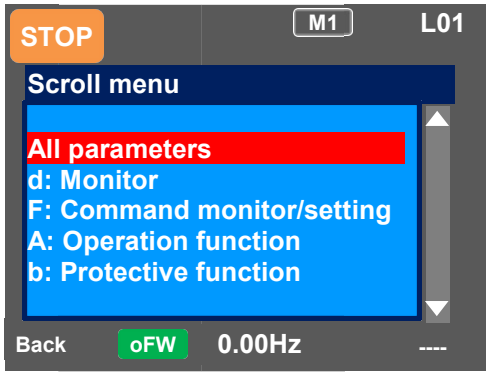
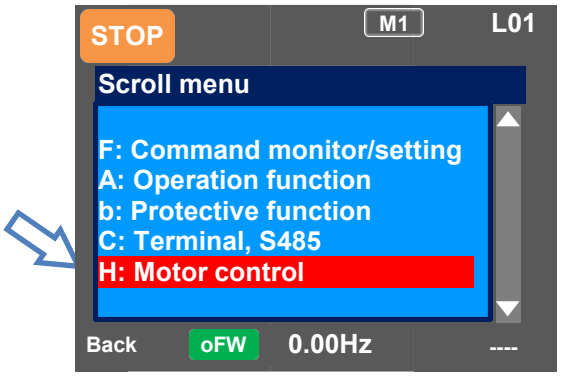
- You can switch between the main screen and menu screen using the F1(1) key.

- You can navigate to the home screen option from the main screen by using the F2(2) key. To return to the home screen, press F1(1) key.

Scroll Mode



Scroll menu - Parameter selection screen

Set-up procedure	Action
	3.1 Choose the croll mode on the system settings screen (M01) and press the SEL(O) key to show the scroll menu (L01). To 3.2.
	3.2 Choose a group you want to browse using the up and down ΔV) keys, and then press the SEL(O) key to move to the parameter list dis lay. For example, select "H: Motor control". Example: In the example shown below, the Hb group, which is a basic parameter of induction motor, is checked, and a parameter is changed. To 3.3.