

QUICK REFERENCE GUIDE

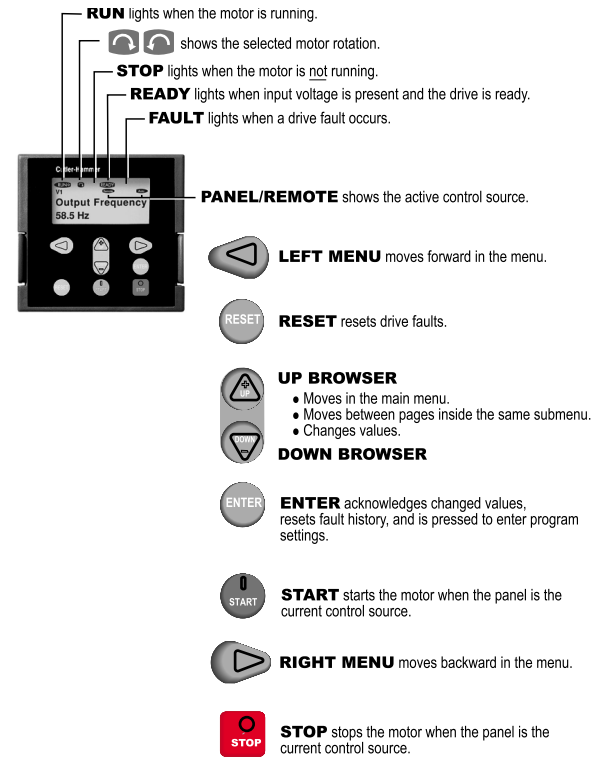
**Important:** This guide is intended to provide a quick reference to the SV9000's BASIC and STANDARD features for startup, programming and service. It does not replace the need to thoroughly read and understand the User Manual and SVReady™ Application Manual.

Shipped from the factory, the SV9000 drive has (7) SVReady Applications, with the drive's default set to **BASIC Application**. This guide is based on the use of the **BASIC** or **STANDARD Application** outlined in the User Manual and SVReady Application Manual.

For the **BASIC Application** – Control I/O signals are fixed and not programmable.  
For the **STANDARD Application** – DIA1-DIA3, Control I/O signals as well as output signals R01-R02 are programmable.

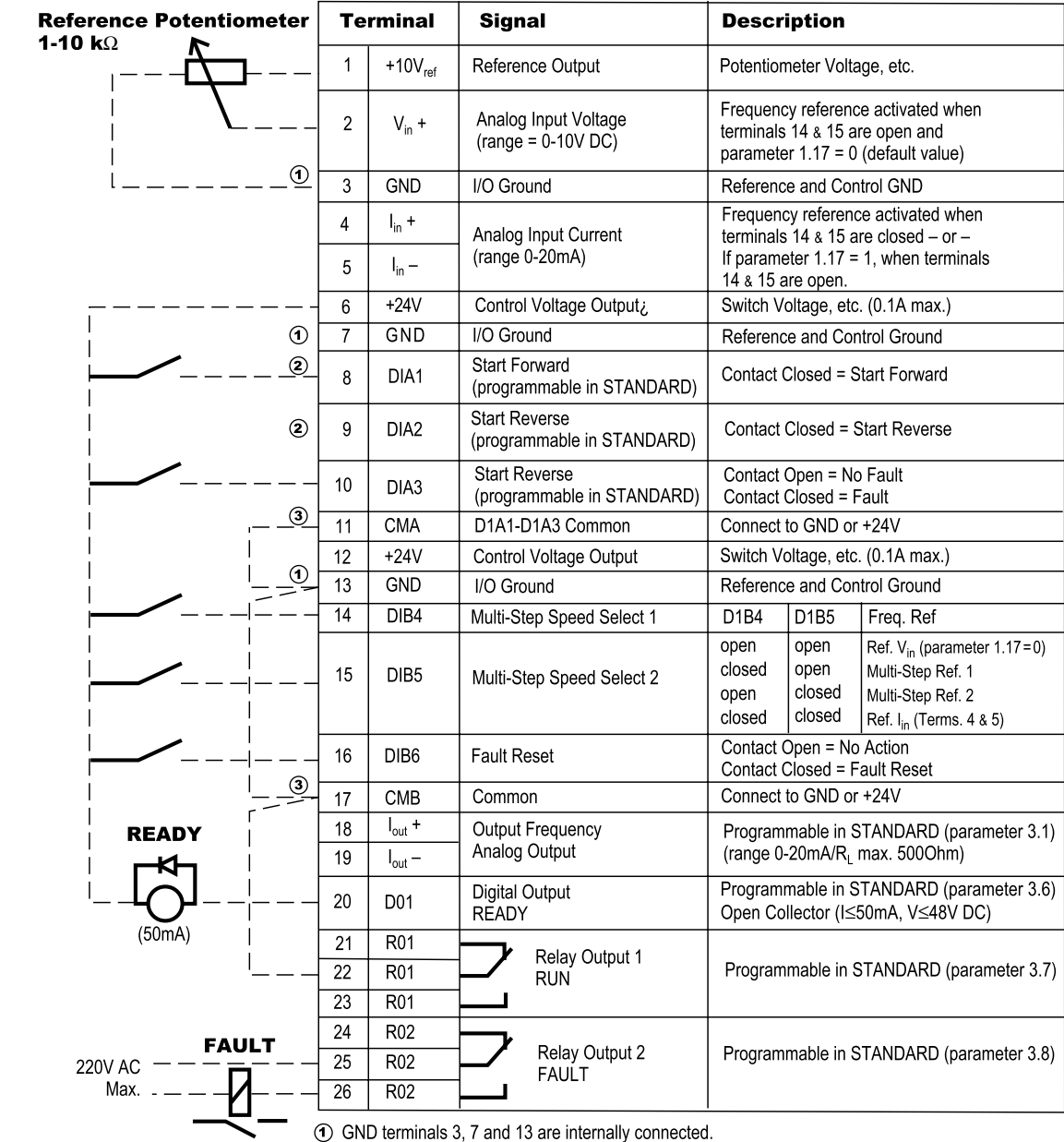
Other applications have different terminal block assignments and different parameter numbers or functions. These may be selected from System Parameter Group 0, parameter P0.1. Refer to the SV9000 User Manual for detailed information.

1 SVMulti-line™ CONTROL PANEL OPERATION



2 START-UP and I/O CONNECTIONS

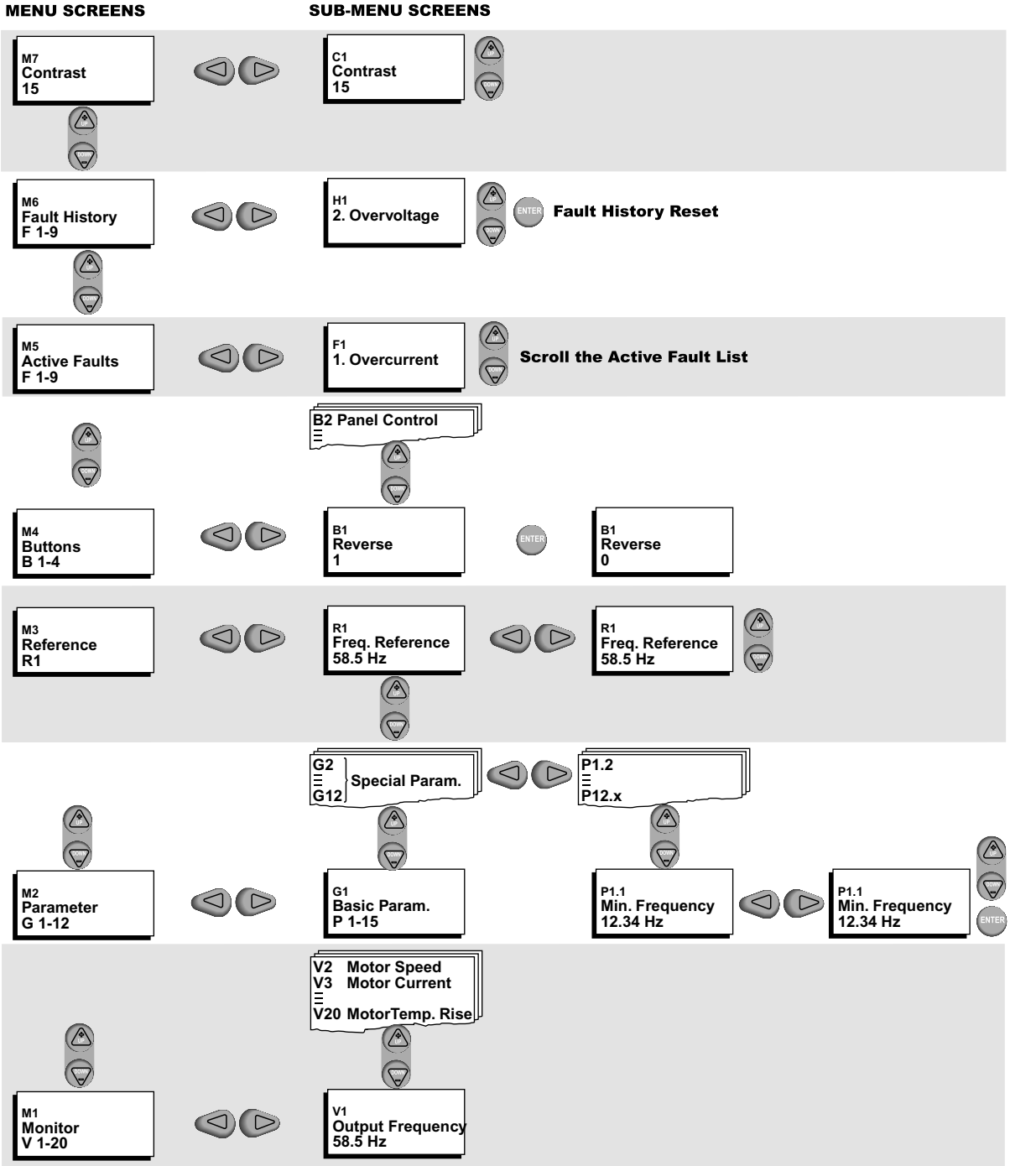
- Shipped from the factory, the SV9000 is set to run forward from a contact closure at input DIA1. To Run from a Keypad Setting, Press the **UP/DOWN BROWSER** button to go to application screen B2.
- Press the **ENTER** button to switch from remote control to panel control.
  - Press the **START** button to start the drive.
- Shipped from the factory, the SV9000 is set to run forward from a contact closure at input DIA1. To Run in reverse from a contact closure at input DIA2, Press the **RIGHT MENU** button until R1 starts to blink.
- Press the **UP BROWSER** button to the desired motor frequency.
  - Go to menu screen M1 and view the output motor frequency.



- ① GND terminals 3, 7 and 13 are internally connected.
- ② For the STANDARD Application, input signals at D1A1 and D1A2 are programmed as a pair using parameter 2.1.
- ③ Connect CMA/CMB inputs to either logic high or logic low depending upon your application. Refer to the SV9000 User Manual and SVReady Application Manual for additional information.

3 SCREEN DISPLAYS

Use the **LEFT** and **RIGHT MENU** buttons to enter the desired menu, then the **UP** and **DOWN BROWSER** button to access the desired item.



4 FAULT and WARNING INDICATIONS

If the drive faults, the **FAULT** indicator lights and screen M5 will display one of the following faults. If more than one fault has occurred, the **UP/DOWN BROWSER** button can be used to view the active faults.

- Once a fault has been cleared, to restart the drive and clear an active fault, press the **RIGHT MENU** button, then the **START** button. The readout will return to the same display it had before the drive tripped.
- To view the drive's fault history, go to menu screen M6 and use the **MENU** button to access the first fault, then the **BROWSER** button to view any additional stored faults. Pressing the **ENTER** button for 2-3 seconds will reset the fault history list.

FAULT CODE	POSSIBLE CAUSE
F1	Overcurrent Output current has 400% of base rating. Check for sudden load increase, input motor lead short and/or motor failure.
F2	Overvoltage DC Bus voltage has exceeded 135% of supply voltage (parameter 1.14). Deceleration time may be too fast and/or utility has high overvoltage spikes.
F3	Ground Fault Total motor phase current does not equal zero. Check for motor or drive output lead insulation failure.
F4	Inverter Fault Faulty gate driver or IGBT bridge operation. Check for external electrical interference or drive component failure.
F5	Charging Switch Charging switch not closed when START command received. Check for external electrical interference or drive switch failure.
F9	Undervoltage DC Bus Voltage has dropped below 65% of supply voltage (parameter 1.14)
F10	Input Line Supervision Input line loss of one or more drive input phases.
F11	Output Phase Supervision Output phase current loss.
F12	Brake Chopper Supervision Brake resistor not installed – Brake resistor failure or brake chopper failure.
F13	Drive Undertemperature Drive heatsink temperature below –10°C.
F14	Drive Overtemperature Drive heatsink temperature above 75°C for Standard units, or 80°C for Compact NEMA 1 units.
F15	Motor Stalled Motor stall protection circuit has tripped.
F16	Motor Overtemperature Drive motor temperature monitor function has determined that the motor is overtemperature. Check motor load.
F17	Motor Underload Motor underload condition has been sensed.
F18	Analog Input Hardware Fault Drive control board component failure.
F19	Option Board Identification Drive option board identification read failure.
F20	10V Voltage Reference Drive control or option board +10V reference short.
F21	24V Supply Drive control or option board +24V supply source short.
F22	EEPROM Checksum Fault Default parameters have not been reset after FAULT Reset.
F23	Fault Check for external electrical interference or drive component failure.
F25	Microprocessor Watchdog Check for external electrical interference or drive component failure.
F26	Panel Communication Fault Communication connection between drive keypad panel and the drive has failed.
F29	Thermistor Protection I/O expander board thermistor input has detected a motor overtemperature.
F36	Analog Input I <sub>IN</sub> < 4mA (signal range selected = 4-20mA) Analog current input I <sub>IN</sub> < 4mA. Check signal current level and analog input wiring.
F41	External Fault External digital input fault.

- When a drive warning occurs, one of the following warning codes and description is displayed. Warnings do not disable drive functions and do not have to be cleared.

WARNING CODE	ACTION
A15	Motor Stalled Motor Stall Protection - Check Motor.
A16	Motor Overtemperature Motor Thermal Protection - Decrease Motor Loading.
A17	Motor Underload Check Motor Loading.
A24	Fault History Values, MWh Counters or Operating Day/Hour Counters Have been Changed No Action Can Be Taken.
A28	A Selected Application Change has Failed Re-Enter the Application Change.
A30	Unbalanced Phase Current Contact Cutler-Hammer Adjustable Frequency Drives Technical Information and Support.
A45	SV9000 Overtemperature SV9000 Operating Temperature has exceeded 70°C - Check for Restricted Air Flow and/or Dirty or Blocked Drive Cooling Fins.
A46	Analog Input Reference Analog Input Reference I <sub>IN</sub> + (Term. 5) <4mA - Check the Input Current Loop.
A47	External Warning Check the External Fault Circuit or Device.

Shaded WARNINGS will be displayed within the **BASIC** or **STANDARD Application**. The remaining warnings will be displayed if programmed in the **STANDARD Application**.

Cutler-Hammer

Milwaukee, Wisconsin U.S.A.

5 BASIC and STANDARD PROGRAMMING PARAMETERS

PARAMETER NO. & NAME	RANGE & DESCRIPTION	DEFAULT	SET TO
BASIC PARAMETERS			
1.1	Minimum Frequency 0-Parameter 1.2	0.0 Hz	
1.2	Maximum Frequency Parameter 1.1 – 120/500 Hz①	60.0 Hz	
1.3	Acceleration Time 1 0.1-3000.0 sec. – $\Delta t$ between Parameters 1.1 – 1.2	3.0 sec.	
1.4	Deceleration Time 1 0.1-3000.0 sec. – $\Delta t$ between Parameters 1.2 – 1.1	3.0 sec.	
1.5	Multi-Step Speed Reference 1 Parameters 1.1 – 1.2	10.0 Hz	
1.6	Multi-Step Speed Reference 2 Parameters 1.1 – 1.2	60.0 Hz	
1.7	Current Limit 0.1 – 2.5 × I <sub>NSV9</sub> – Where I <sub>NSV9</sub> = Output Amp Limit of the Drive	1.5 × I <sub>NSV9</sub>	
1.8	V/Hz Ratio Selection 0 = Linear 1 = Squared 2 = Programmable	0	
1.9	V/Hz Optimization 0 = None 1 = Auto Torque Boost	0	
1.10	Nominal Motor Nameplate Voltage 180-690V	2 = 230V 4 = 380V 5 = 480V 6 = 575V	
1.11	Nominal F.L. Motor Nameplate Frequency 30-500 Hz – Sets the Value of Parameter 6.1	60 Hz	
1.12	Nominal F.L. Motor Nameplate Speed 1-20000 RPM	1720 RPM②	
1.13	Nominal F.L. Motor Nameplate Current 0.1-25 × I <sub>NSV9</sub> – Where I <sub>NSV9</sub> = Drive Current Rating	2.5 × I <sub>NSV9</sub>	
1.14	Supply Voltage 2 = 208-240V 4 = 380-440V 5 = 380-500V 6 = 525-690V	2 = 230V 4 = 380V 5 = 480V 6 = 575V	
1.15	Parameter Conceal 0 = All Parameter Groups Visible 1 = Only Group 1 Visible	0	
1.16	Parameter Value Lock 0 = All Parameters Can Be Changed 1 = No Parameter Can Be Chnaged	0	
1.17	Basic Frequency Reference Selection 0 = Analog Volt Ref. from Terms. 2-3 1 = Analog Amp Ref. from Terms. 4-5 2 = Ref. from Control Panel	0	
1.18	Analog Input (I <sub>IN</sub> ) Range 0 = 0-20mA Input from Terms. 4-5 1 = 4-20mA Input from Terms. 4-5	0	
INPUT SIGNAL PARAMETERS			
2.1	START/STOP Logic Selection D1A1 0 = Start Forward 1 = Start/Stop 2 = Start/Stop 3 = Start Pulse D1A2 0 = Start Reverse 1 = Reverse 2 = Run Enable 3 = Stop Pulse	0	
2.2	DIA3 Function (terminal 10) 0 = Not Used 1 = Ext. Fault Closing Contact 2 = Ext. Fault Opening Contact 3 = Run Enable 4 = Accel/Decel Time Select 5 = Reverse if Parameter 2.1 = 3	1	
2.3	Reference Offset for Analog Current Input 0 = 0-20mA 1 = 4-20mA	0	
2.4	Reference Scaling – Minimum Value 0-Parameter 2.5 – Selects the Frequency that Corresponds to the Min. Ref. Signal	0 Hz	
2.5	Reference Scaling – Maximum Frequency Value (Set by Parameter 1.2) 0-f <sub>max</sub> – Selects the Frequency that Corresponds to the Max. Ref. Signal – No Scaling If = 0 – Parameter 1.2 If > 0	0 Hz	
2.6	Reference Invert 0 = No Inversion 1 = Reference Inverted	0	
2.7	Reference Filter Time 0.00-10.00 sec. – 0.00 = No Filtering	0.10 sec.	

Indicates that the parameter may only be changed when the drive is stopped.

- If parameter 1.2 > motor synchronous speed, check motor and drive system compatibility.
- 1710 RPM = default value for (4) pole motor.

Only shaded parameters and parameter settings are accessible with the **BASIC Application**. With the exception of parameter 1.18, all parameters and parameter settings are accessible with the **STANDARD Application**.

PARAMETER NO. & NAME	RANGE & DESCRIPTION	DEFAULT	SET TO
OUTPUT & SUPERVISION PARAMETERS			
3.1	Analog Output Function 0 = Not Used – 100% Scale 1 = O/P Freq. 0 – Parameter 1.2 2 = Motor Speed 0 – Max. Speed 3 = O/P Current 0 – 2.0 × I <sub>NSV9</sub> 4 = Motor Torque 0 – 2 × T <sub>RMot</sub> 5 = Motor Power 0 – 2 × P <sub>RMot</sub> 6 = Motor Volt. 0 – 100% × V <sub>RMot</sub> 7 = DC Bus Volt. 0 – 1000V		1
3.2	Analog Output Filter Time 0.00-10.00 sec. – 0.00 = No Filtering	1.00 sec.	
3.3	Analog Output Inversion 0 = No Inversion 1 = Analog Output Inverted	0	
3.4	Analog Output Minimum 0 = 0mA 1 = 4mA	0	
3.5	Analog Output Scale 10-1000%	100%	
3.6	Digital Output Function 0 = Not Used 1 = Ready 2 = Run 3 = Fault③ 4 = Fault Inverted③ 5 = SV9000 Overheat Warning 6 = External Fault or Warning③ 7 = Reference Fault or Warning 8 = Warning③ 9 = Reversed 10 = Multi-Step Speed Selected 11 = At Speed 12 = Motor Regulator Activated 13 = Output Freq. Limit Supervision 14 = Control from I/O Terminal	1	
3.7	Relay Output 1 Function – Same as Parameter 3.6 –	2	
3.8	Relay Output 2 Function – Same as Parameter 3.6 –	3	
3.9	Output Frequency Limit Supervision Function 0 = No Supervision 1 = Low Limit Supervision 2 = High Limit Supervision	0	
3.10	Output Frequency Limit Supervision Value 0-Parameter 1.2	0.0 Hz	
3.11	I/O Expander Board Analog Output Function 0-7 – Same as Parameter 3.1	3	
3.12	I/O Expander Board Analog Output Scale 10-1000% – Same as Parameter 3.5	100%	
DRIVE CONTROL PARAMETERS			
4.1	Accel/Decel Ramp 1 Shape 0.0-10.0 sec. 0.0 = Linear > 0.0 = S-Curve Accel/Decel Time	0.0 sec.	
4.2	Accel/Decel Ramp 2 Shape 0.0-10.0 sec. 0.0 = Linear > 0.0 = S-Curve Accel/Decel Time	0.0 sec.	
4.3	Acceleration Time 2 0.1-3000.0 sec.	10.0 sec.	
4.4	Deceleration Time 2 0.1-3000.0 sec.	10.0 sec.	
4.5	Brake Chopper 0 = Brake Chopper Not in Use 1 = Brake Chopper in Use 2 = External Brake Chopper	0	
4.6	START Function 0 = Ramp 1 = Flying Start	0	
4.7	STOP Function 0 = Coast 1 = Ramp	0	
4.8	DC Braking Current 0.15 A – 1.5 × I <sub>NSV9</sub> A – Where I <sub>NSV9</sub> = Output Amp Limit of the Drive	0.5 × I <sub>NSV9</sub> A	
4.9	DC Braking Time at STOP 0.00-250.00 sec. – 0.00 = No Braking	0.00 sec.	
PROHIBIT FREQUENCY PARAMETERS			
5.1	Prohibit Frequency Range Low Limit f <sub>min</sub> – Parameter 1.2 – Where f <sub>min</sub> = Parameter 1.1	0.0 Hz	
5.2	Prohibit Frequency Range High Limit Parameters 1.1 – 1.2 – 0.0 = No Skip Frequency Range	0.0 Hz	
MOTOR CONTROL PARAMETERS			
6.1	Motor Control Mode 0 = Frequency Control 1 = Speed Control	0	
6.2	Switching Frequency 1.0-16.0 kHz – HP Dependent – Refer to Derating Curves in User Manual	10/3.6 kHz	
6.3	Field Weakening Point 30-500 Hz	Parameter 1.11	
6.4	Voltage at Field Weakening Point 15 – 200% × V <sub>RMot</sub> – Where V <sub>RMot</sub> is Output Voltage from the Drive to the Motor	100% × V <sub>RMot</sub>	

Indicates that the parameter may only be changed when the drive is stopped.

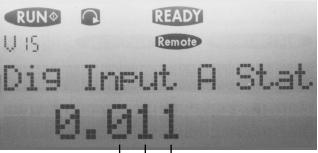
PARAMETER NO. & NAME	RANGE & DESCRIPTION	DEFAULT	SET TO
6.5	V/Hz Curve Mid-Point Frequency 0.0-f <sub>max</sub> – Where F <sub>max</sub> = Parameter 1.2	0.0 Hz	
6.6	V/Hz Curve Mid-Point Voltage 0.00 – 100.00% × V <sub>RMot</sub> – Where V <sub>RMot</sub> is Output Voltage from the Drive to the Motor	0.00% × V <sub>RMot</sub>	
6.7	Output Voltage at Zero Frequency 0.00 – 100.00% × V <sub>RMot</sub> – Where V <sub>RMot</sub> is Output Voltage from the Drive to the Motor	0.00% × V <sub>RMot</sub>	
6.8	Overvoltage Controller 0 = Controller is Off 1 = Controller is On	1	
6.9	Undervoltage Controller 0 = Controller is Off 1 = Controller is On	1	
PROTECTION PARAMETERS③			
7.1	Response to Reference FAULT 0 = No Action 1 = Warning 2 = FAULT – Stop Set by Parameter 4.7 3 = FAULT – Coast Stop	0	
7.2	Response to External FAULT 0 = No Action 1 = Warning 2 = FAULT – Stop Set by Parameter 4.7 3 = FAULT – Coast Stop	2	
7.3	Phase Supervision of the Motor 0 = No Action 2 = FAULT	2	
7.4	Ground Fault Protection 0 = No Action 2 = FAULT	2	
7.5	Motor Thermal Protection 0 = No Action 1 = Warning 2 = FAULT	2	
7.6	Stall Protection 0 = No Action 1 = Warning 2 = FAULT	1	
AUTORESTART PARAMETERS			
8.1	Auto Restart – Number of Tries 0-10	0	
8.2	Auto Restart – Multi-Attempt Maximum Trial Time 1-6000 sec.	30 sec.	
8.3	Auto Restart – START Function 0 = Ramp 1 = Flying Start	0	

③ In the **STANDARD Application**, Protection Parameters may be programmed to provide either a fault or a warning.

6 MONITORING and PROGRAMMING

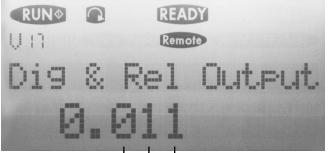
The SV9000 Multi-line Control Panel provides two additional functions for indication and control.

The first function monitors the status of the input and output digital devices. The status of these devices may be seen by accessing the Monitor Menu and viewing screen **V15**, **V16** or **V17**.



**SCREEN V15**  
0 = open  
1 = closed

Input                      Terminal  
DIA1 closed                      8  
DIA2 closed                      9  
DIA3 open                      10



**SCREEN V17**  
0 = open  
1 = closed

Input                      Terminal  
Digital output closed                      20  
(sinking current)  
Relay 1 closed                      21  
Relay 2 open                      24

The second function provides the ability to program the **ENTER** button to perform a different function for the Programmable Pushbutton Menu, M4.

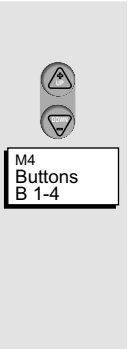
There are four functions available for the **ENTER** button, but only for the M4 menu. The **ENTER** button reverts to its normal function in all other menus.

BUTTON	FUNCTION	FEEDBACK	
		WHEN = 0	WHEN = 1
B1	Reverse Changes the motor's direction of rotation only when the Keypad Panel is the active control source.	Forward ①	Reverse ①
B2	Active Control Source Selects between I/O terminals and Keypad Panel.	I/O Terminal Control	Keypad Panel Control
B3	Operating Hours and Trip Counter Reset Resets the operating hours trip counter.	No Reset	Resets the Operating Hours
B4	MWh Trip Counter Reset Resets the MWh trip counter.	No Reset	Resets the MWh Trip Counter

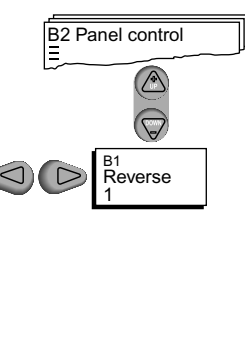
① The status indicator flashes while the command is being carried out.

When the **ENTER** button is pressed, the displayed parameter blinks to indicate that a change is being made. When the change is complete, the blinking stops and the new setting will be used.

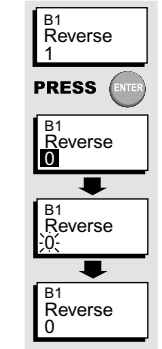
**MENU SCREEN**



**SUB-MENU SCREEN**



**CHANGE VALUE**



**7 For more information on Cutler-Hammer Products . . .** call 1-800-525-2000, or visit our web site at [www.cutlerhammer.eaton.com](http://www.cutlerhammer.eaton.com).

**For Engineering Services . . .** call 1-800-498-2678.

**For Cutler-Hammer Adjustable Drives technical information and support . . .** call 1-800-322-4986.

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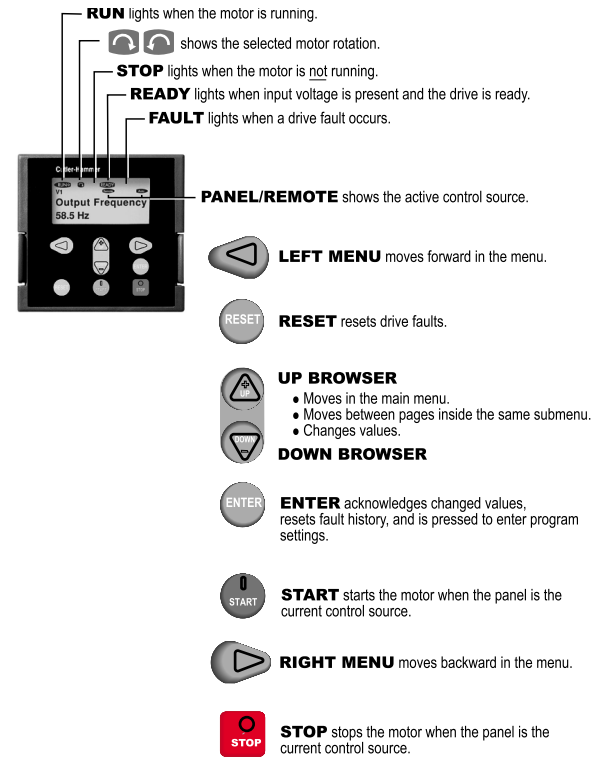
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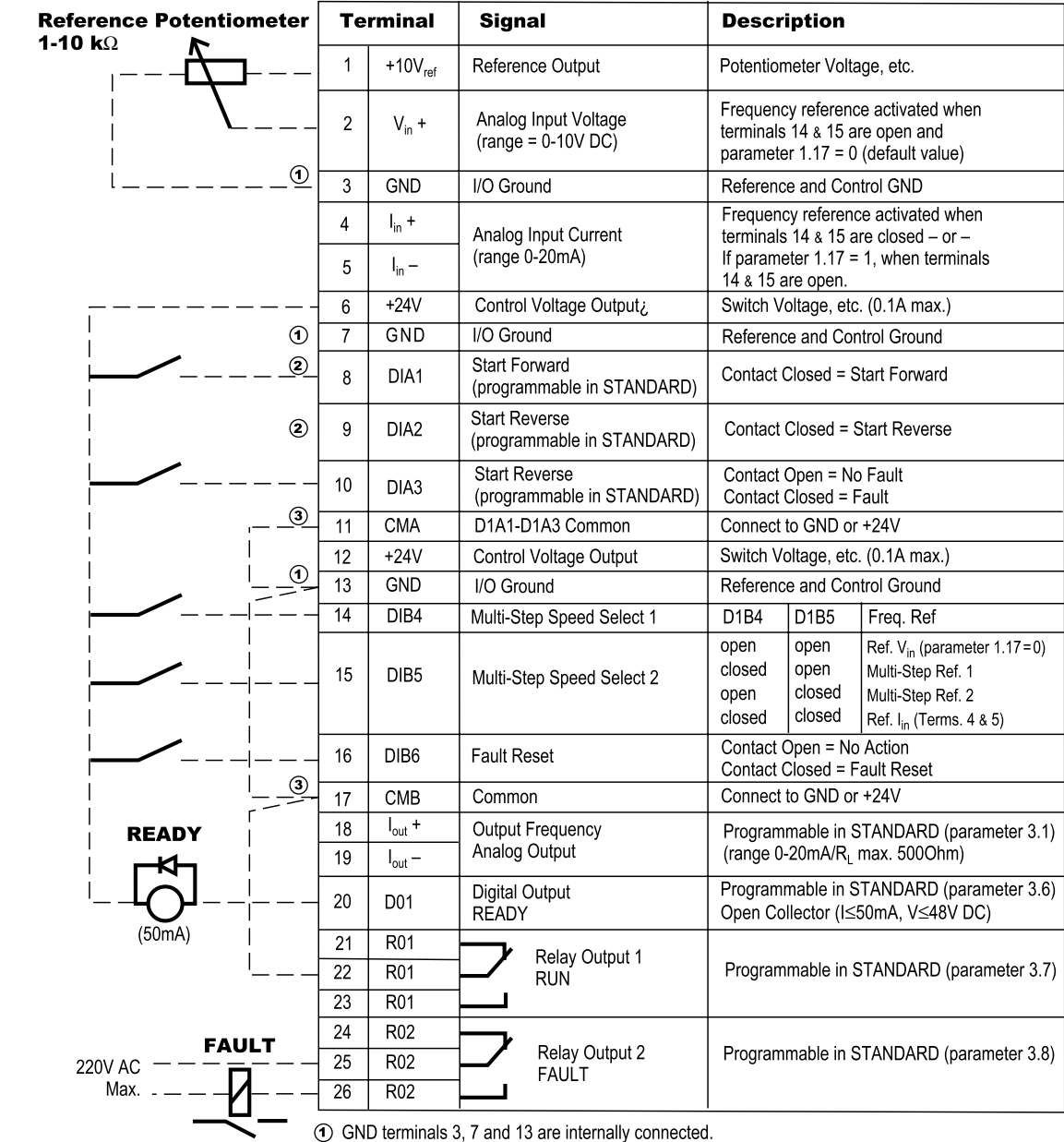
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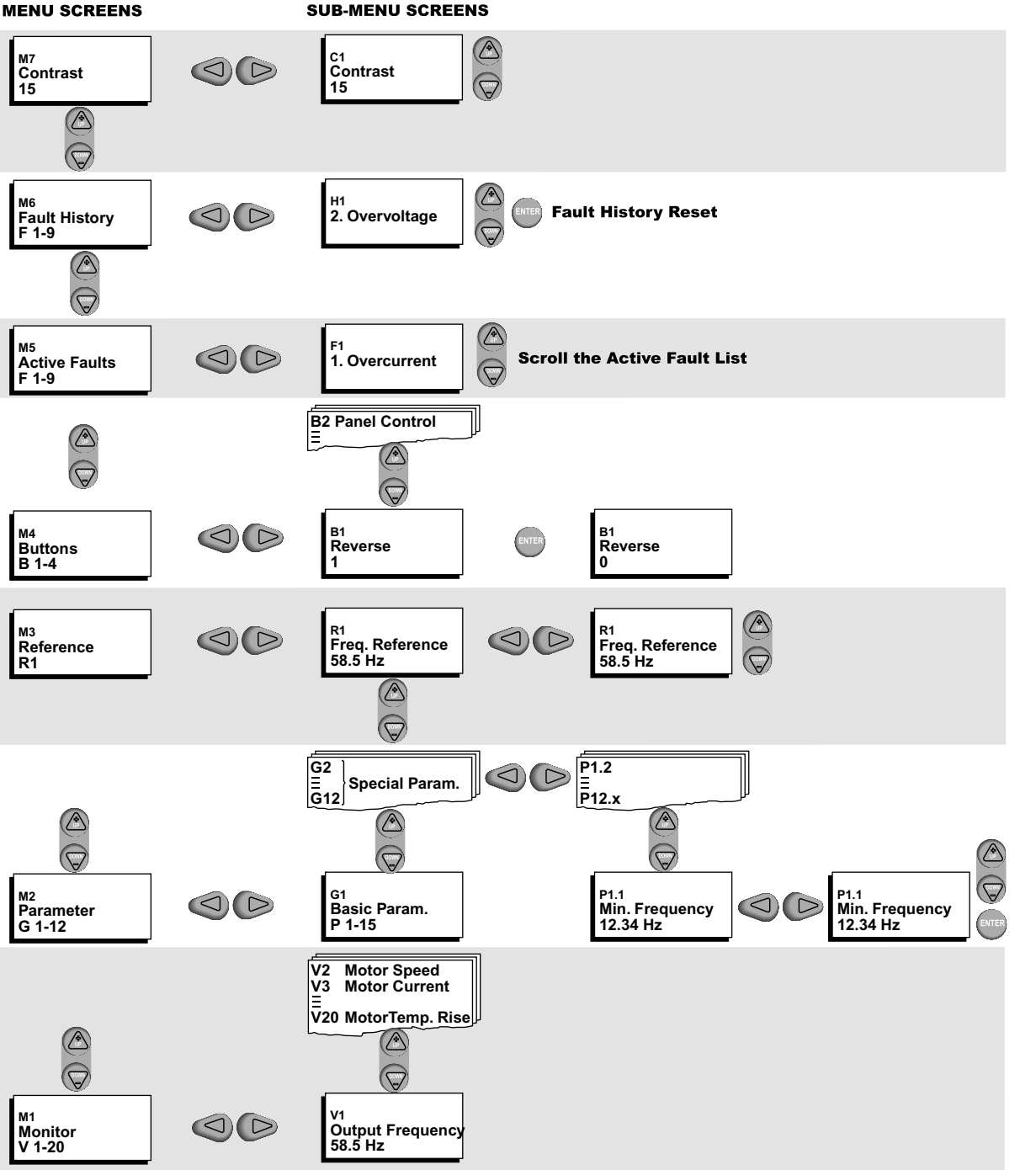
- Shipped from the factory, the SV9000 is set to run forward from a contact closure at input DIA2. To Run from a Keypad Setting:
- Press the **UP/DOWN BROWSER** button to go to application screen B2.
  - Press the **ENTER** button to switch from remote control to panel control.
  - Press the **START** button to start the drive.
- Shipped from the factory, the SV9000 is set to run forward from a contact closure at input DIA2. To Run in reverse from a contact closure at input DIA1:
- Press the **RIGHT MENU** button until R1 starts to blink.
  - Press the **UP BROWSER** button to the desired motor frequency.
  - Go to menu screen M1 and view the output motor frequency.



- ① GND terminals 3, 7 and 13 are internally connected.
- ② For the STANDARD Application, input signals at D1A1 and D1A2 are programmed as a pair using parameter 2.1.
- ③ Connect CMA/CMB inputs to either logic high or logic low depending upon your application. Refer to the SV9000 User Manual and SVReady Application Manual for additional information.

3 SCREEN DISPLAYS

Use the **LEFT** and **RIGHT MENU** buttons to enter the desired menu, then the **UP** and **DOWN BROWSER** button to access the desired item.





4 FAULT and WARNING INDICATIONS

If the drive faults, the **FAULT** indicator lights and screen M5 will display one of the following faults. If more than one fault has occurred, the **UP/DOWN BROWSER** button can be used to view the active faults.

- Once a fault has been cleared, to restart the drive and clear an active fault, press the **RIGHT MENU** button, then the **START** button. The readout will return to the same display it had before the drive tripped.
- To view the drive's fault history, go to menu screen M6 and use the **MENU** button to access the first fault, then the **BROWSER** button to view any additional stored faults. Pressing the **ENTER** button for 2-3 seconds will reset the fault history list.

FAULT CODE	POSSIBLE CAUSE
<b>F1</b>	Overcurrent Output current has 400% of base rating. Check for sudden load increase, input motor lead short and/or motor failure.
<b>F2</b>	Overvoltage DC Bus voltage has exceeded 135% of supply voltage (parameter 1.14). Deceleration time may be too fast and/or utility has high overvoltage spikes.
<b>F3</b>	Ground Fault Total motor phase current does not equal zero. Check for motor or drive output lead insulation failure.
<b>F4</b>	Inverter Fault Faulty gate driver or IGBT bridge operation. Check for external electrical interference or drive component failure.
<b>F5</b>	Charging Switch Charging switch not closed when START command received. Check for external electrical interference or drive switch failure.
<b>F9</b>	Undervoltage DC Bus Voltage has dropped below 65% of supply voltage (parameter 1.14)
<b>F10</b>	Input Line Supervision Input line loss of one or more drive input phases.
<b>F11</b>	Output Phase Supervision Output phase current loss.
<b>F12</b>	Brake Chopper Supervision Brake resistor not installed – Brake resistor failure or brake chopper failure.
<b>F13</b>	Drive Undertemperature Drive heatsink temperature below –10°C.
<b>F14</b>	Drive Overtemperature Drive heatsink temperature above 75°C for Standard units, or 80°C for Compact NEMA 1 units.
<b>F15</b>	Motor Stalled Motor stall protection circuit has tripped.
<b>F16</b>	Motor Overtemperature Drive motor temperature monitor function has determined that the motor is overtemperature. Check motor load.
<b>F17</b>	Motor Underload Motor underload condition has been sensed.
<b>F18</b>	Analog Input Hardware Fault Drive control board component failure.
<b>F19</b>	Option Board Identification Drive option board identification read failure.
<b>F20</b>	10V Voltage Reference Drive control or option board +10V reference short.
<b>F21</b>	24V Supply Drive control or option board +24V supply source short.
<b>F22</b>	EEPROM Checksum Fault Default parameters have not been reset after FAULT Reset.
<b>F23</b>	Fault Check for external electrical interference or drive component failure.
<b>F25</b>	Microprocessor Watchdog Check for external electrical interference or drive component failure.
<b>F26</b>	Panel Communication Fault Communication connection between drive keypad panel and the drive has failed.
<b>F29</b>	Thermistor Protection I/O expander board thermistor input has detected a motor overtemperature.
<b>F36</b>	Analog Input I <sub>IN</sub> < 4mA (signal range selected = 4-20mA) Analog current input I <sub>IN</sub> < 4mA. Check signal current level and analog input wiring.
<b>F41</b>	External Fault External digital input fault.

- When a drive warning occurs, one of the following warning codes and description is displayed. Warnings do not disable drive functions and do not have to be cleared.

WARNING CODE	ACTION
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<b>A17</b>	Motor Underload Check Motor Loading.
<b>A24</b>	Fault History Values, MWh Counters or Operating Day/Hour Counters Have been Changed No Action Can Be Taken.
<b>A28</b>	A Selected Application Change has Failed Re-Enter the Application Change.
<b>A30</b>	Unbalanced Phase Current Contact Cutler-Hammer Adjustable Frequency Drives Technical Information and Support.
<b>A45</b>	SV9000 Overtemperature SV9000 Operating Temperature has exceeded 70°C - Check for Restricted Air Flow and/or Dirty or Blocked Drive Cooling Fins.
<b>A46</b>	Analog Input Reference Analog Input Reference I <sub>IN</sub> + (Term. 5) <4mA - Check the Input Current Loop.
<b>A47</b>	External Warning Check the External Fault Circuit or Device.

Shaded WARNINGS will be displayed within the **BASIC** or **STANDARD Application**. The remaining warnings will be displayed if programmed in the **STANDARD Application**.

Cutler-Hammer

Milwaukee, Wisconsin U.S.A.

5 BASIC and STANDARD PROGRAMMING PARAMETERS

PARAMETER NO. & NAME	RANGE & DESCRIPTION	DEFAULT	SET TO
<b>BASIC PARAMETERS</b>			
<b>1.1</b> Minimum Frequency	0-Parameter 1.2	0.0 Hz	
<b>1.2</b> Maximum Frequency	Parameter 1.1 – 120/500 Hz①	60.0 Hz	
<b>1.3</b> Acceleration Time 1	0.1-3000.0 sec. – $\Delta t$ between Parameters 1.1 – 1.2	3.0 sec.	
<b>1.4</b> Deceleration Time 1	0.1-3000.0 sec. – $\Delta t$ between Parameters 1.2 – 1.1	3.0 sec.	
<b>1.5</b> Multi-Step Speed Reference 1	Parameters 1.1 – 1.2	10.0 Hz	
<b>1.6</b> Multi-Step Speed Reference 2	Parameters 1.1 – 1.2	60.0 Hz	
<b>1.7</b> Current Limit	0.1 – $2.5 \times I_{nSV9}$ – Where $I_{nSV9}$ = Output Amp Limit of the Drive	$1.5 \times I_{nSV9}$	
<b>1.8</b> V/Hz Ratio Selection	0 = Linear 1 = Squared 2 = Programmable	0	
<b>1.9</b> V/Hz Optimization	0 = None 1 = Auto Torque Boost	0	
<b>1.10</b> Nominal Motor Nameplate Voltage	180-690V	2 = 230V 4 = 380V 5 = 480V 6 = 575V	
<b>1.11</b> Nominal F.L. Motor Nameplate Frequency	30-500 Hz – Sets the Value of Parameter 6.1	60 Hz	
<b>1.12</b> Nominal F.L. Motor Nameplate Speed	1-20000 RPM	1720 RPM②	
<b>1.13</b> Nominal F.L. Motor Nameplate Current	0.1-25 $\times I_{nSV9}$ – Where $I_{nSV9}$ = Drive Current Rating	$2.5 \times I_{nSV9}$	
<b>1.14</b> Supply Voltage	2 = 208-240V 4 = 380-440V 5 = 380-500V 6 = 525-690V	2 = 230V 4 = 380V 5 = 480V 6 = 575V	
<b>1.15</b> Parameter Conceal	0 = All Parameter Groups Visible 1 = Only Group 1 Visible	0	
<b>1.16</b> Parameter Value Lock	0 = All Parameters Can Be Changed 1 = No Parameter Can Be Chnaged	0	
<b>1.17</b> Basic Frequency Reference Selection	0 = Analog Volt Ref. from Terms. 2-3 1 = Analog Amp Ref. from Terms. 4-5 2 = Ref. from Control Panel	0	
<b>1.18</b> Analog Input (I <sub>IN</sub> ) Range	0 = 0-20mA Input from Terms. 4-5 1 = 4-20mA Input from Terms. 4-5	0	
<b>INPUT SIGNAL PARAMETERS</b>			
<b>2.1</b> START/STOP Logic Selection	D1A1 0 = Start Forward 1 = Start/Stop 2 = Start/Stop 3 = Start Pulse D1A2 0 = Start Reverse 1 = Reverse 2 = Run Enable 3 = Stop Pulse	0	
<b>2.2</b> DIA3 Function (terminal 10)	0 = Not Used 1 = Ext. Fault Closing Contact 2 = Ext. Fault Opening Contact 3 = Run Enable 4 = Accel/Decel Time Select 5 = Reverse if Parameter 2.1 = 3	1	
<b>2.3</b> Reference Offset for Analog Current Input	0 = 0-20mA 1 = 4-20mA	0	
<b>2.4</b> Reference Scaling – Minimum Value	0-Parameter 2.5 – Selects the Frequency that Corresponds to the Min. Ref. Signal	0 Hz	
<b>2.5</b> Reference Scaling – Maximum Frequency Value (Set by Parameter 1.2)	0-f <sub>max</sub> – Selects the Frequency that Corresponds to the Max. Ref. Signal – No Scaling If = 0 – Parameter 1.2 If > 0	0 Hz	
<b>2.6</b> Reference Invert	0 = No Inversion 1 = Reference Inverted	0	
<b>2.7</b> Reference Filter Time	0.00-10.00 sec. – 0.00 = No Filtering	0.10 sec.	

Indicates that the parameter may only be changed when the drive is stopped.

- If parameter 1.2 > motor synchronous speed, check motor and drive system compatibility.
- 1710 RPM = default value for (4) pole motor.

Only shaded parameters and parameter settings are accessible with the **BASIC Application**. With the exception of parameter 1.18, all parameters and parameter settings are accessible with the **STANDARD Application**.

PARAMETER NO. & NAME	RANGE & DESCRIPTION	DEFAULT	SET TO
<b>OUTPUT &amp; SUPERVISION PARAMETERS</b>			
<b>3.1</b> Analog Output Function	0 = Not Used – 100% Scale 1 = O/P Freq. 0 – Parameter 1.2 2 = Motor Speed 0 – Max. Speed 3 = O/P Current 0 – $2.0 \times I_{nSV9}$ 4 = Motor Torque 0 – $2 \times T_{nMot}$ 5 = Motor Power 0 – $2 \times P_{nMot}$ 6 = Motor Volt. 0 – 100% $\times V_{nMot}$ 7 = DC Bus Volt. 0 – 1000V		1
<b>3.2</b> Analog Output Filter Time	0.00-10.00 sec. – 0.00 = No Filtering	1.00 sec.	
<b>3.3</b> Analog Output Inversion	0 = No Inversion 1 = Analog Output Inverted	0	
<b>3.4</b> Analog Output Minimum	0 = 0mA 1 = 4mA	0	
<b>3.5</b> Analog Output Scale	10-1000%	100%	
<b>3.6</b> Digital Output Function	0 = Not Used 1 = Ready 2 = Run 3 = Fault③ 4 = Fault Inverted③ 5 = SV9000 Overheat Warning 6 = External Fault or Warning③ 7 = Reference Fault or Warning 8 = Warning③ 9 = Reversed 10 = Multi-Step Speed Selected 11 = At Speed 12 = Motor Regulator Activated 13 = Output Freq. Limit Supervision 14 = Control from I/O Terminal		1
<b>3.7</b> Relay Output 1 Function	– Same as Parameter 3.6 –	2	
<b>3.8</b> Relay Output 2 Function	– Same as Parameter 3.6 –	3	
<b>3.9</b> Output Frequency Limit Supervision Function	0 = No Supervision 1 = Low Limit Supervision 2 = High Limit Supervision	0	
<b>3.10</b> Output Frequency Limit Supervision Value	0-Parameter 1.2	0.0 Hz	
<b>3.11</b> I/O Expander Board Analog Output Function	0-7 – Same as Parameter 3.1	3	
<b>3.12</b> I/O Expander Board Analog Output Scale	10-1000% – Same as Parameter 3.5	100%	
<b>DRIVE CONTROL PARAMETERS</b>			
<b>4.1</b> Accel/Decel Ramp 1 Shape	0.0-10.0 sec. 0.0 = Linear > 0.0 = S-Curve Accel/Decel Time	0.0 sec.	
<b>4.2</b> Accel/Decel Ramp 2 Shape	0.0-10.0 sec. 0.0 = Linear > 0.0 = S-Curve Accel/Decel Time	0.0 sec.	
<b>4.3</b> Acceleration Time 2	0.1-3000.0 sec.	10.0 sec.	
<b>4.4</b> Deceleration Time 2	0.1-3000.0 sec.	10.0 sec.	
<b>4.5</b> Brake Chopper	0 = Brake Chopper Not in Use 1 = Brake Chopper in Use 2 = External Brake Chopper	0	
<b>4.6</b> START Function	0 = Ramp 1 = Flying Start	0	
<b>4.7</b> STOP Function	0 = Coast 1 = Ramp	0	
<b>4.8</b> DC Braking Current	0.15 A – $1.5 \times I_{nSV9}$ A – Where $I_{nSV9}$ = Output Amp Limit of the Drive	$0.5 \times I_{nSV9}$ A	
<b>4.9</b> DC Braking Time at STOP	0.00-250.00 sec. – 0.00 = No Braking	0.00 sec.	
<b>PROHIBIT FREQUENCY PARAMETERS</b>			
<b>5.1</b> Prohibit Frequency Range Low Limit	f <sub>min</sub> – Parameter 1.2 – Where f <sub>min</sub> = Parameter 1.1	0.0 Hz	
<b>5.2</b> Prohibit Frequency Range High Limit	Parameters 1.1 – 1.2 – 0.0 = No Skip Frequency Range	0.0 Hz	
<b>MOTOR CONTROL PARAMETERS</b>			
<b>6.1</b> Motor Control Mode	0 = Frequency Control 1 = Speed Control	0	
<b>6.2</b> Switching Frequency	1.0-16.0 kHz – HP Dependent – Refer to Derating Curves in User Manual	10/3.6 kHz	
<b>6.3</b> Field Weakening Point	30-500 Hz	Parameter 1.11	
<b>6.4</b> Voltage at Field Weakening Point	15 – 200% $\times V_{nMot}$ – Where $V_{nMot}$ is Output Voltage from the Drive to the Motor	100% $\times V_{nMot}$	

Indicates that the parameter may only be changed when the drive is stopped.

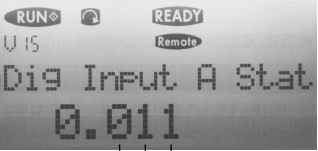
PARAMETER NO. & NAME	RANGE & DESCRIPTION	DEFAULT	SET TO
<b>6.5</b> V/Hz Curve Mid-Point Frequency	0.0-f <sub>max</sub> – Where $F_{max}$ = Parameter 1.2	0.0 Hz	
<b>6.6</b> V/Hz Curve Mid-Point Voltage	0.00 – 100.00% $\times V_{nMot}$ – Where $V_{nMot}$ is Output Voltage from the Drive to the Motor	0.00% $\times V_{nMot}$	
<b>6.7</b> Output Voltage at Zero Frequency	0.00 – 100.00% $\times V_{nMot}$ – Where $V_{nMot}$ is Output Voltage from the Drive to the Motor	0.00% $\times V_{nMot}$	
<b>6.8</b> Overvoltage Controller	0 = Controller is Off 1 = Controller is On	1	
<b>6.9</b> Undervoltage Controller	0 = Controller is Off 1 = Controller is On	1	
<b>PROTECTION PARAMETERS③</b>			
<b>7.1</b> Response to Reference FAULT	0 = No Action 1 = Warning 2 = FAULT – Stop Set by Parameter 4.7 3 = FAULT – Coast Stop	0	
<b>7.2</b> Response to External FAULT	0 = No Action 1 = Warning 2 = FAULT – Stop Set by Parameter 4.7 3 = FAULT – Coast Stop	2	
<b>7.3</b> Phase Supervision of the Motor	0 = No Action 2 = FAULT	2	
<b>7.4</b> Ground Fault Protection	0 = No Action 2 = FAULT	2	
<b>7.5</b> Motor Thermal Protection	0 = No Action 1 = Warning 2 = FAULT	2	
<b>7.6</b> Stall Protection	0 = No Action 1 = Warning 2 = FAULT	1	
<b>AUTORESTART PARAMETERS</b>			
<b>8.1</b> Auto Restart – Number of Tries	0-10	0	
<b>8.2</b> Auto Restart – Multi-Attempt Maximum Trial Time	1-6000 sec.	30 sec.	
<b>8.3</b> Auto Restart – START Function	0 = Ramp 1 = Flying Start	0	

③ In the **STANDARD Application**, Protection Parameters may be programmed to provide either a fault or a warning.

6 MONITORING and PROGRAMMING

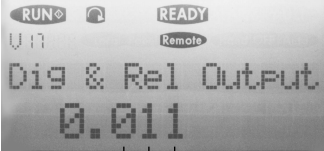
The SV9000 Multi-line Control Panel provides two additional functions for indication and control.

The first function monitors the status of the input and output digital devices. The status of these devices may be seen by accessing the Monitor Menu and viewing screen **V15**, **V16** or **V17**.



**SCREEN V15**  
0 = open  
1 = closed

Input Terminal  
DIA1 closed 8  
DIA2 closed 9  
DIA3 open 10



**SCREEN V17**  
0 = open  
1 = closed

Input Terminal  
Digital output closed 20  
(sinking current)  
Relay 1 closed 21  
Relay 2 open 24

The second function provides the ability to program the **ENTER** button to perform a different function for the Programmable Pushbutton Menu, M4.

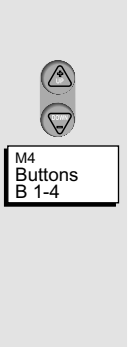
There are four functions available for the **ENTER** button, but only for the M4 menu. The **ENTER** button reverts to its normal function in all other menus.

BUTTON	FUNCTION	FEEDBACK	
		WHEN = 0	WHEN = 1
<b>B1</b> Reverse	Changes the motor's direction of rotation only when the Keypad Panel is the active control source.	Forward ①	Reverse ①
<b>B2</b> Active Control Source	Selects between I/O terminals and Keypad Panel.	I/O Terminal Control	Keypad Panel Control
<b>B3</b> Operating Hours and Trip Counter Reset	Resets the operating hours trip counter.	No Reset	Resets the Operating Hours
<b>B4</b> MWh Trip Counter Reset	Resets the MWh trip counter.	No Reset	Resets the MWh Trip Counter

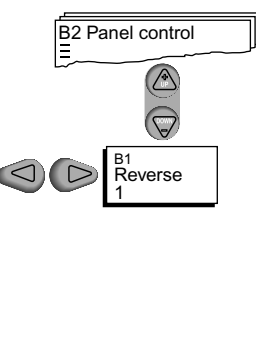
① The status indicator flashes while the command is being carried out.

When the **ENTER** button is pressed, the displayed parameter blinks to indicate that a change is being made. When the change is complete, the blinking stops and the new setting will be used.

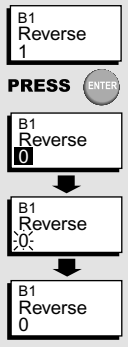
**MENU SCREEN**



**SUB-MENU SCREEN**



**CHANGE VALUE**



**7 For more information on Cutler-Hammer Products . . .** call 1-800-525-2000, or visit our web site at [www.cutlerhammer.eaton.com](http://www.cutlerhammer.eaton.com).

**For Engineering Services . . .** call 1-800-498-2678.

**For Cutler-Hammer Adjustable Drives technical information and support . . .** call 1-800-322-4986.

QUICK REFERENCE GUIDE

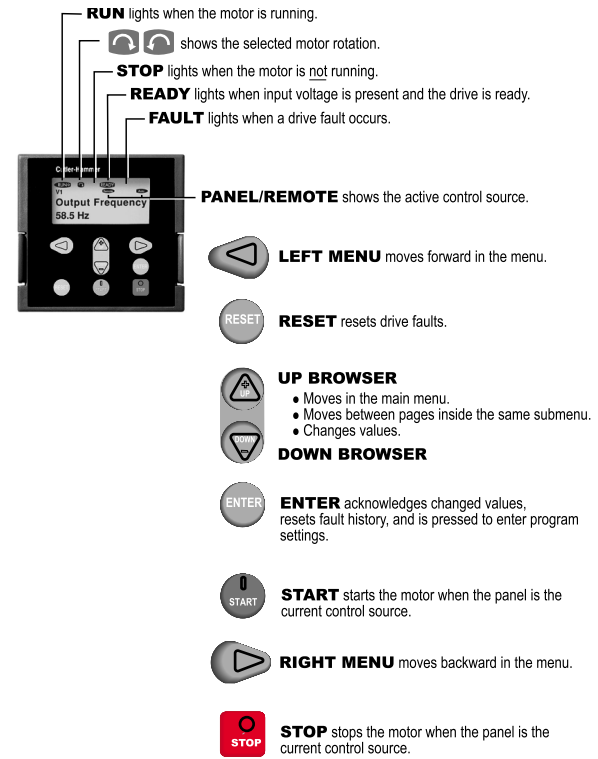
**Important:** This guide is intended to provide a quick reference to the SV9000's BASIC and STANDARD features for startup, programming and service. It does not replace the need to thoroughly read and understand the User Manual and SVReady™ Application Manual.

Shipped from the factory, the SV9000 drive has (7) SVReady Applications, with the drive's default set to **BASIC Application**. This guide is based on the use of the **BASIC** or **STANDARD Application** outlined in the User Manual and SVReady Application Manual.

For the **BASIC Application** – Control I/O signals are fixed and not programmable.  
For the **STANDARD Application** – DIA1-DIA3, Control I/O signals as well as output signals R01-R02 are programmable.

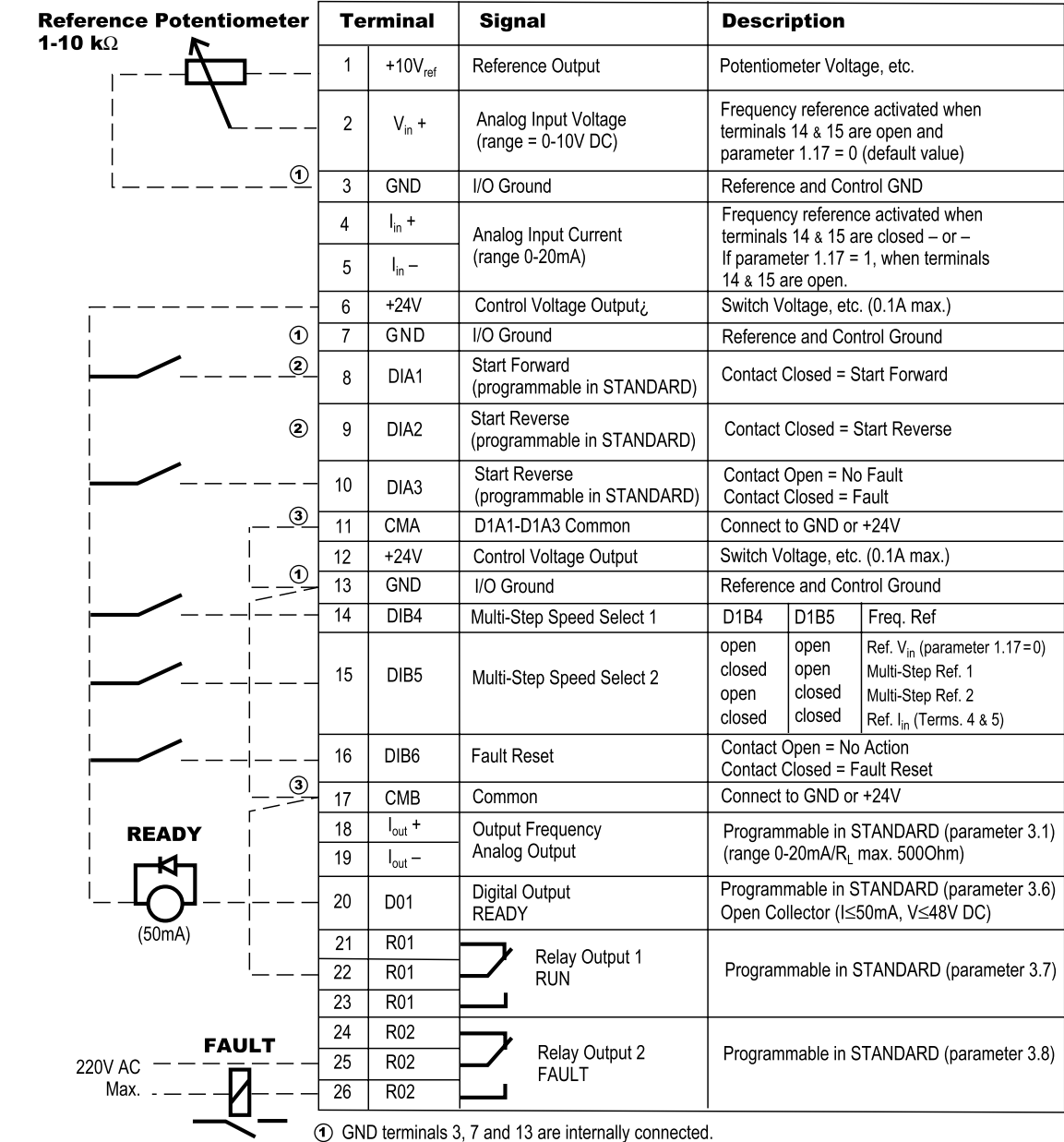
Other applications have different terminal block assignments and different parameter numbers or functions. These may be selected from System Parameter Group 0, parameter P0.1. Refer to the SV9000 User Manual for detailed information.

1 SVMulti-line™ CONTROL PANEL OPERATION



2 START-UP and I/O CONNECTIONS

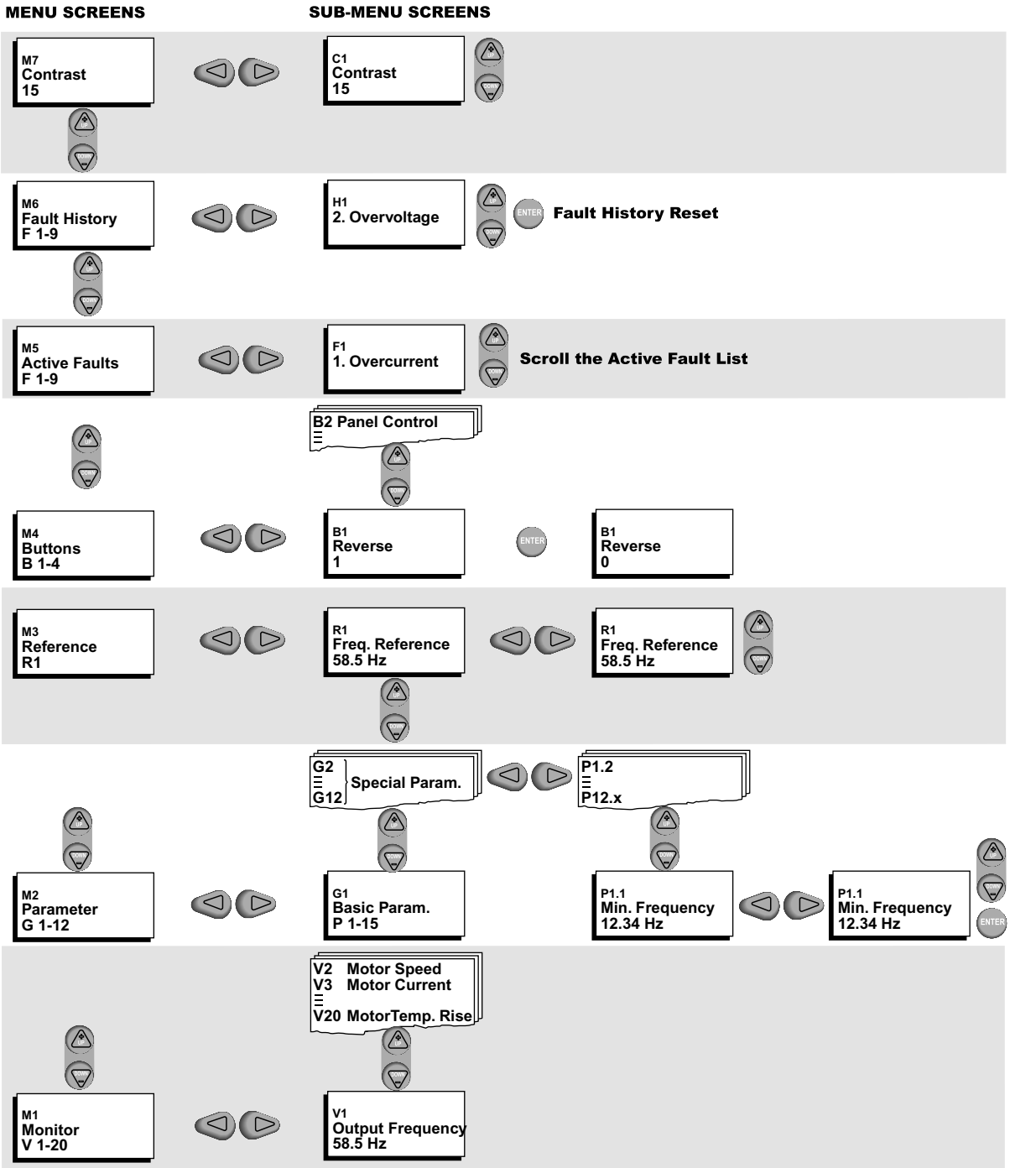
- Shipped from the factory, the SV9000 is set to run forward from a contact closure at input DIA2. To Run from a Keypad Setting, Press the **UP/DOWN BROWSER** button to go to application screen B2.
- Press the **ENTER** button to switch from remote control to panel control.
  - Press the **START** button to start the drive.
- Shipped from the factory, the SV9000 is set to run forward from a contact closure at input DIA2. To Run in reverse from a contact closure at input DIA3, Press the **RIGHT MENU** button until R1 starts to blink.
- Press the **UP BROWSER** button to the desired motor frequency.
  - Go to menu screen M1 and view the output motor frequency.



- ① GND terminals 3, 7 and 13 are internally connected.
- ② For the STANDARD Application, input signals at D1A1 and D1A2 are programmed as a pair using parameter 2.1.
- ③ Connect CMA/CMB inputs to either logic high or logic low depending upon your application. Refer to the SV9000 User Manual and SVReady Application Manual for additional information.

3 SCREEN DISPLAYS

Use the **LEFT** and **RIGHT MENU** buttons to enter the desired menu, then the **UP** and **DOWN BROWSER** button to access the desired item.





4 FAULT and WARNING INDICATIONS

If the drive faults, the **FAULT** indicator lights and screen M5 will display one of the following faults. If more than one fault has occurred, the **UP/DOWN BROWSER** button can be used to view the active faults.

- Once a fault has been cleared, to restart the drive and clear an active fault, press the **RIGHT MENU** button, then the **START** button. The readout will return to the same display it had before the drive tripped.
- To view the drive's fault history, go to menu screen M6 and use the **MENU** button to access the first fault, then the **BROWSER** button to view any additional stored faults. Pressing the **ENTER** button for 2-3 seconds will reset the fault history list.

FAULT CODE	POSSIBLE CAUSE
<b>F1</b>	Overcurrent Output current has 400% of base rating. Check for sudden load increase, input motor lead short and/or motor failure.
<b>F2</b>	Overvoltage DC Bus voltage has exceeded 135% of supply voltage (parameter 1.14). Deceleration time may be too fast and/or utility has high overvoltage spikes.
<b>F3</b>	Ground Fault Total motor phase current does not equal zero. Check for motor or drive output lead insulation failure.
<b>F4</b>	Inverter Fault Faulty gate driver or IGBT bridge operation. Check for external electrical interference or drive component failure.
<b>F5</b>	Charging Switch Charging switch not closed when START command received. Check for external electrical interference or drive switch failure.
<b>F9</b>	Undervoltage DC Bus Voltage has dropped below 65% of supply voltage (parameter 1.14)
<b>F10</b>	Input Line Supervision Input line loss of one or more drive input phases.
<b>F11</b>	Output Phase Supervision Output phase current loss.
<b>F12</b>	Brake Chopper Supervision Brake resistor not installed – Brake resistor failure or brake chopper failure.
<b>F13</b>	Drive Undertemperature Drive heatsink temperature below –10°C.
<b>F14</b>	Drive Overtemperature Drive heatsink temperature above 75°C for Standard units, or 80°C for Compact NEMA 1 units.
<b>F15</b>	Motor Stalled Motor stall protection circuit has tripped.
<b>F16</b>	Motor Overtemperature Drive motor temperature monitor function has determined that the motor is overtemperature. Check motor load.
<b>F17</b>	Motor Underload Motor underload condition has been sensed.
<b>F18</b>	Analog Input Hardware Fault Drive control board component failure.
<b>F19</b>	Option Board Identification Drive option board identification read failure.
<b>F20</b>	10V Voltage Reference Drive control or option board +10V reference short.
<b>F21</b>	24V Supply Drive control or option board +24V supply source short.
<b>F22</b>	EEPROM Checksum Fault Default parameters have not been reset after FAULT Reset.
<b>F23</b>	Fault Check for external electrical interference or drive component failure.
<b>F25</b>	Microprocessor Watchdog Check for external electrical interference or drive component failure.
<b>F26</b>	Panel Communication Fault Communication connection between drive keypad panel and the drive has failed.
<b>F29</b>	Thermistor Protection I/O expander board thermistor input has detected a motor overtemperature.
<b>F36</b>	Analog Input I <sub>IN</sub> < 4mA (signal range selected = 4-20mA) Analog current input I <sub>IN</sub> < 4mA. Check signal current level and analog input wiring.
<b>F41</b>	External Fault External digital input fault.

- When a drive warning occurs, one of the following warning codes and description is displayed. Warnings do not disable drive functions and do not have to be cleared.

WARNING CODE	ACTION
<b>A15</b>	Motor Stalled Motor Stall Protection - Check Motor.
<b>A16</b>	Motor Overtemperature Motor Thermal Protection - Decrease Motor Loading.
<b>A17</b>	Motor Underload Check Motor Loading.
<b>A24</b>	Fault History Values, MWh Counters or Operating Day/Hour Counters Have been Changed No Action Can Be Taken.
<b>A28</b>	A Selected Application Change has Failed Re-Enter the Application Change.
<b>A30</b>	Unbalanced Phase Current Contact Cutler-Hammer Adjustable Frequency Drives Technical Information and Support.
<b>A45</b>	SV9000 Overtemperature SV9000 Operating Temperature has exceeded 70°C - Check for Restricted Air Flow and/or Dirty or Blocked Drive Cooling Fins.
<b>A46</b>	Analog Input Reference Analog Input Reference I <sub>IN</sub> + (Term. 5) <4mA - Check the Input Current Loop.
<b>A47</b>	External Warning Check the External Fault Circuit or Device.

Shaded WARNINGS will be displayed within the **BASIC** or **STANDARD Application**. The remaining warnings will be displayed if programmed in the **STANDARD Application**.

Cutler-Hammer

Milwaukee, Wisconsin U.S.A.

5 BASIC and STANDARD PROGRAMMING PARAMETERS

PARAMETER NO. & NAME	RANGE & DESCRIPTION	DEFAULT	SET TO
<b>BASIC PARAMETERS</b>			
<b>1.1</b>	Minimum Frequency 0-Parameter 1.2	0.0 Hz	
<b>1.2</b>	Maximum Frequency Parameter 1.1 – 120/500 Hz①	60.0 Hz	
<b>1.3</b>	Acceleration Time 1 0.1-3000.0 sec. – $\Delta t$ between Parameters 1.1 – 1.2	3.0 sec.	
<b>1.4</b>	Deceleration Time 1 0.1-3000.0 sec. – $\Delta t$ between Parameters 1.2 – 1.1	3.0 sec.	
<b>1.5</b>	Multi-Step Speed Reference 1 Parameters 1.1 – 1.2	10.0 Hz	
<b>1.6</b>	Multi-Step Speed Reference 2 Parameters 1.1 – 1.2	60.0 Hz	
<b>1.7</b>	Current Limit 0.1 – 2.5 × I <sub>NSV9</sub> – Where I <sub>NSV9</sub> = Output Amp Limit of the Drive	1.5 × I <sub>NSV9</sub>	
<b>1.8</b>	V/Hz Ratio Selection 0 = Linear 1 = Squared 2 = Programmable	0	
<b>1.9</b>	V/Hz Optimization 0 = None 1 = Auto Torque Boost	0	
<b>1.10</b>	Nominal Motor Nameplate Voltage 180-690V	2 = 230V 4 = 380V 5 = 480V 6 = 575V	
<b>1.11</b>	Nominal F.L. Motor Nameplate Frequency 30-500 Hz – Sets the Value of Parameter 6.1	60 Hz	
<b>1.12</b>	Nominal F.L. Motor Nameplate Speed 1-20000 RPM	1720 RPM②	
<b>1.13</b>	Nominal F.L. Motor Nameplate Current 0.1-25 × I <sub>NSV9</sub> – Where I <sub>NSV9</sub> = Drive Current Rating	2.5 × I <sub>NSV9</sub>	
<b>1.14</b>	Supply Voltage 2 = 208-240V 4 = 380-440V 5 = 380-500V 6 = 525-690V	2 = 230V 4 = 380V 5 = 480V 6 = 575V	
<b>1.15</b>	Parameter Conceal 0 = All Parameter Groups Visible 1 = Only Group 1 Visible	0	
<b>1.16</b>	Parameter Value Lock 0 = All Parameters Can Be Changed 1 = No Parameter Can Be Chnaged	0	
<b>1.17</b>	Basic Frequency Reference Selection 0 = Analog Volt Ref. from Terms. 2-3 1 = Analog Amp Ref. from Terms. 4-5 2 = Ref. from Control Panel	0	
<b>1.18</b>	Analog Input (I <sub>IN</sub> ) Range 0 = 0-20mA Input from Terms. 4-5 1 = 4-20mA Input from Terms. 4-5	0	
<b>INPUT SIGNAL PARAMETERS</b>			
<b>2.1</b>	START/STOP Logic Selection D1A1 0 = Start Forward 1 = Start/Stop 2 = Start/Stop 3 = Start Pulse D1A2 0 = Start Reverse 1 = Reverse 2 = Run Enable 3 = Stop Pulse	0	
<b>2.2</b>	DIA3 Function (terminal 10) 0 = Not Used 1 = Ext. Fault Closing Contact 2 = Ext. Fault Opening Contact 3 = Run Enable 4 = Accel/Decel Time Select 5 = Reverse if Parameter 2.1 = 3	1	
<b>2.3</b>	Reference Offset for Analog Current Input 0 = 0-20mA 1 = 4-20mA	0	
<b>2.4</b>	Reference Scaling – Minimum Value 0-Parameter 2.5 – Selects the Frequency that Corresponds to the Min. Ref. Signal	0 Hz	
<b>2.5</b>	Reference Scaling – Maximum Frequency Value (Set by Parameter 1.2) 0-f <sub>max</sub> – Selects the Frequency that Corresponds to the Max. Ref. Signal – No Scaling If = 0 – Parameter 1.2 If > 0	0 Hz	
<b>2.6</b>	Reference Invert 0 = No Inversion 1 = Reference Inverted	0	
<b>2.7</b>	Reference Filter Time 0.00-10.00 sec. – 0.00 = No Filtering	0.10 sec.	

Indicates that the parameter may only be changed when the drive is stopped.

- If parameter 1.2 > motor synchronous speed, check motor and drive system compatibility.
- 1710 RPM = default value for (4) pole motor.

Only shaded parameters and parameter settings are accessible with the **BASIC Application**. With the exception of parameter 1.18, all parameters and parameter settings are accessible with the **STANDARD Application**.

PARAMETER NO. & NAME	RANGE & DESCRIPTION	DEFAULT	SET TO
<b>OUTPUT &amp; SUPERVISION PARAMETERS</b>			
<b>3.1</b>	Analog Output Function 0 = Not Used – 100% Scale 1 = O/P Freq. 0 – Parameter 1.2 2 = Motor Speed 0 – Max. Speed 3 = O/P Current 0 – 2.0 × I <sub>NSV9</sub> 4 = Motor Torque 0 – 2 × T <sub>RMot</sub> 5 = Motor Power 0 – 2 × P <sub>RMot</sub> 6 = Motor Volt. 0 – 100% × V <sub>RMot</sub> 7 = DC Bus Volt. 0 – 1000V		1
<b>3.2</b>	Analog Output Filter Time 0.00-10.00 sec. – 0.00 = No Filtering	1.00 sec.	
<b>3.3</b>	Analog Output Inversion 0 = No Inversion 1 = Analog Output Inverted	0	
<b>3.4</b>	Analog Output Minimum 0 = 0mA 1 = 4mA	0	
<b>3.5</b>	Analog Output Scale 10-1000%	100%	
<b>3.6</b>	Digital Output Function 0 = Not Used 1 = Ready 2 = Run 3 = Fault③ 4 = Fault Inverted③ 5 = SV9000 Overheat Warning 6 = External Fault or Warning③ 7 = Reference Fault or Warning 8 = Warning③ 9 = Reversed 10 = Multi-Step Speed Selected 11 = At Speed 12 = Motor Regulator Activated 13 = Output Freq. Limit Supervision 14 = Control from I/O Terminal	1	
<b>3.7</b>	Relay Output 1 Function – Same as Parameter 3.6 –	2	
<b>3.8</b>	Relay Output 2 Function – Same as Parameter 3.6 –	3	
<b>3.9</b>	Output Frequency Limit Supervision Function 0 = No Supervision 1 = Low Limit Supervision 2 = High Limit Supervision	0	
<b>3.10</b>	Output Frequency Limit Supervision Value 0-Parameter 1.2	0.0 Hz	
<b>3.11</b>	I/O Expander Board Analog Output Function 0-7 – Same as Parameter 3.1	3	
<b>3.12</b>	I/O Expander Board Analog Output Scale 10-1000% – Same as Parameter 3.5	100%	
<b>DRIVE CONTROL PARAMETERS</b>			
<b>4.1</b>	Accel/Decel Ramp 1 Shape 0.0-10.0 sec. 0.0 = Linear > 0.0 = S-Curve Accel/Decel Time	0.0 sec.	
<b>4.2</b>	Accel/Decel Ramp 2 Shape 0.0-10.0 sec. 0.0 = Linear > 0.0 = S-Curve Accel/Decel Time	0.0 sec.	
<b>4.3</b>	Acceleration Time 2 0.1-3000.0 sec.	10.0 sec.	
<b>4.4</b>	Deceleration Time 2 0.1-3000.0 sec.	10.0 sec.	
<b>4.5</b>	Brake Chopper 0 = Brake Chopper Not in Use 1 = Brake Chopper in Use 2 = External Brake Chopper	0	
<b>4.6</b>	START Function 0 = Ramp 1 = Flying Start	0	
<b>4.7</b>	STOP Function 0 = Coast 1 = Ramp	0	
<b>4.8</b>	DC Braking Current 0.15 A – 1.5 × I <sub>NSV9</sub> A – Where I <sub>NSV9</sub> = Output Amp Limit of the Drive	0.5 × I <sub>NSV9</sub> A	
<b>4.9</b>	DC Braking Time at STOP 0.00-250.00 sec. – 0.00 = No Braking	0.00 sec.	
<b>PROHIBIT FREQUENCY PARAMETERS</b>			
<b>5.1</b>	Prohibit Frequency Range Low Limit f <sub>min</sub> – Parameter 1.2 – Where f <sub>min</sub> = Parameter 1.1	0.0 Hz	
<b>5.2</b>	Prohibit Frequency Range High Limit Parameters 1.1 – 1.2 – 0.0 = No Skip Frequency Range	0.0 Hz	
<b>MOTOR CONTROL PARAMETERS</b>			
<b>6.1</b>	Motor Control Mode 0 = Frequency Control 1 = Speed Control	0	
<b>6.2</b>	Switching Frequency 1.0-16.0 kHz – HP Dependent – Refer to Derating Curves in User Manual	10/3.6 kHz	
<b>6.3</b>	Field Weakening Point 30-500 Hz	Parameter 1.11	
<b>6.4</b>	Voltage at Field Weakening Point 15 – 200% × V <sub>RMot</sub> – Where V <sub>RMot</sub> is Output Voltage from the Drive to the Motor	100% × V <sub>RMot</sub>	

Indicates that the parameter may only be changed when the drive is stopped.

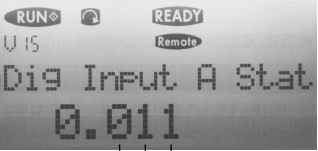
PARAMETER NO. & NAME	RANGE & DESCRIPTION	DEFAULT	SET TO
<b>6.5</b>	V/Hz Curve Mid-Point Frequency 0.0-f <sub>max</sub> – Where F <sub>max</sub> = Parameter 1.2	0.0 Hz	
<b>6.6</b>	V/Hz Curve Mid-Point Voltage 0.00 – 100.00% × V <sub>RMot</sub> – Where V <sub>RMot</sub> is Output Voltage from the Drive to the Motor	0.00% × V <sub>RMot</sub>	
<b>6.7</b>	Output Voltage at Zero Frequency 0.00 – 100.00% × V <sub>RMot</sub> – Where V <sub>RMot</sub> is Output Voltage from the Drive to the Motor	0.00% × V <sub>RMot</sub>	
<b>6.8</b>	Overvoltage Controller 0 = Controller is Off 1 = Controller is On	1	
<b>6.9</b>	Undervoltage Controller 0 = Controller is Off 1 = Controller is On	1	
<b>PROTECTION PARAMETERS③</b>			
<b>7.1</b>	Response to Reference FAULT 0 = No Action 1 = Warning 2 = FAULT – Stop Set by Parameter 4.7 3 = FAULT – Coast Stop	0	
<b>7.2</b>	Response to External FAULT 0 = No Action 1 = Warning 2 = FAULT – Stop Set by Parameter 4.7 3 = FAULT – Coast Stop	2	
<b>7.3</b>	Phase Supervision of the Motor 0 = No Action 2 = FAULT	2	
<b>7.4</b>	Ground Fault Protection 0 = No Action 2 = FAULT	2	
<b>7.5</b>	Motor Thermal Protection 0 = No Action 1 = Warning 2 = FAULT	2	
<b>7.6</b>	Stall Protection 0 = No Action 1 = Warning 2 = FAULT	1	
<b>AUTORESTART PARAMETERS</b>			
<b>8.1</b>	Auto Restart – Number of Tries 0-10	0	
<b>8.2</b>	Auto Restart – Multi-Attempt Maximum Trial Time 1-6000 sec.	30 sec.	
<b>8.3</b>	Auto Restart – START Function 0 = Ramp 1 = Flying Start	0	

③ In the **STANDARD Application**, Protection Parameters may be programmed to provide either a fault or a warning.

6 MONITORING and PROGRAMMING

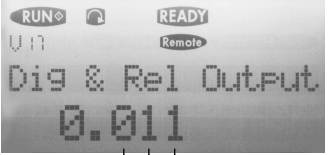
The SV9000 Multi-line Control Panel provides two additional functions for indication and control.

The first function monitors the status of the input and output digital devices. The status of these devices may be seen by accessing the Monitor Menu and viewing screen **V15**, **V16** or **V17**.



**SCREEN V15**  
0 = open  
1 = closed

Input                      Terminal  
DIA1 closed                      8  
DIA2 closed                      9  
DIA3 open                        10



**SCREEN V17**  
0 = open  
1 = closed

Input                      Terminal  
Digital output closed                      20  
(sinking current)  
Relay 1 closed                              21  
Relay 2 open                                24

The second function provides the ability to program the **ENTER** button to perform a different function for the Programmable Pushbutton Menu, M4.

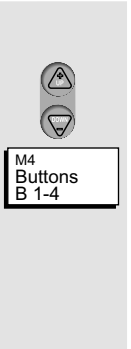
There are four functions available for the **ENTER** button, but only for the M4 menu. The **ENTER** button reverts to its normal function in all other menus.

BUTTON	FUNCTION	FEEDBACK	
		WHEN = 0	WHEN = 1
<b>B1</b>	Reverse Changes the motor's direction of rotation only when the Keypad Panel is the active control source.	Forward ①	Reverse ①
<b>B2</b>	Active Control Source Selects between I/O terminals and Keypad Panel.	I/O Terminal Control	Keypad Panel Control
<b>B3</b>	Operating Hours and Trip Counter Reset Resets the operating hours trip counter.	No Reset	Resets the Operating Hours
<b>B4</b>	MWh Trip Counter Reset Resets the MWh trip counter.	No Reset	Resets the MWh Trip Counter

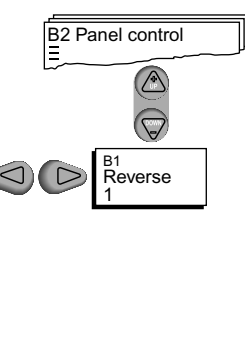
① The status indicator flashes while the command is being carried out.

When the **ENTER** button is pressed, the displayed parameter blinks to indicate that a change is being made. When the change is complete, the blinking stops and the new setting will be used.

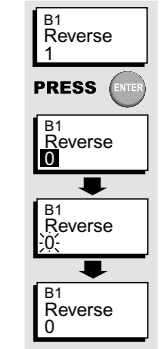
**MENU SCREEN**



**SUB-MENU SCREEN**



**CHANGE VALUE**



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