SIEMENS

Submittal Sheet
Document No. 154-051
August 20, 2004

SED2 Variable Frequency Drives with Electronic (E) Bypass Options

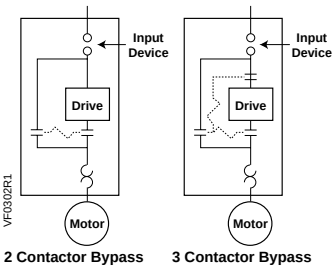
Description

The E-Bypass Options are companion packages for the family of SED2 Variable Frequency Drives (VFDs).

For information on the family of SED2 VFDs, see the *SED2 Variable Frequency Drives Submittal Sheet* (154-042).

E-Bypass Features

- Enhanced visual interface for improved monitoring and diagnostics
- E- Bypass guarantees continuous operation even if SED2 fails
- Electronic touch-sensitive keypad
- Standard built-in networking compatibility
- Service mode isolates drive from the control scheme
- Six relay outputs for indication of operation
- Fourteen LEDs indicate monitoring and operation
- Six digital inputs
- Remote start via networking
- Contactors electrically and mechanically interlocked.
- 2-Contactor: Output & Bypass
- Overload protection in bypass mode
- 3-Contactor (optional): Input, Output, & Bypass. 3-Contactor features provide:
  - Drive test function
  - Complete electrical isolation of drive
- Input Device
  - Disconnect
  - Fused disconnect (optional)
  - Circuit breaker (optional)
  - All doors are interlocked and padlockable



- Reactor Options
  - Line reactor mounted in bypass option enclosure
  - Line reactor (in NEMA 1 enclosure) supplied separately
  - Load reactor mounted in bypass option enclosure
  - Load reactor (in NEMA 1 enclosure) supplied separately

E-Bypass Control Features

- Auto Bypass
  - Relay logic allows user to send the motor to bypass mode based on the drive's programmable relay.
  - The drive's programmable relay, typically set to fault, can be set up for applications that run full speed for an extended period of time.
- Enable Input
  - Generally used for safety tie-ins; the motor will not operate the drive or bypass when open.
- Common Remote Start/Stop
  - Common remote start/stop can be used in both drive and bypass mode.
- Essential Services Mode
  - Also used for smoke purge; the motor goes to bypass regardless of the selected mode.
  - No call to stop will have an effect, including open safety or stop commands.
  - Only turning the power off or opening this contact will stop the motor.

E-Bypass – Door Mounted Control Devices

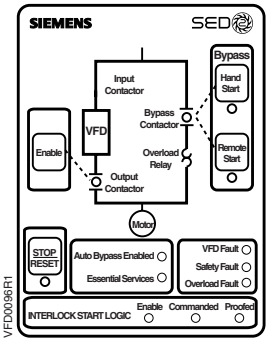


Figure 1.
2-Contactor Unit Keypad.

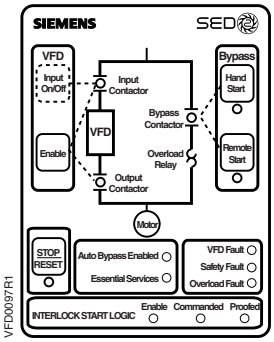


Figure 2.
3-Contactor Unit Keypad.

Product Numbers

The following example shows: VBE340.F120X = SED2 with E-Bypass, 480V, 40 hp, fused disconnect, NEMA 1, 2 contactors, and no reactors.

Your Product Number:	V	B	E									X
Example Product Number:	V	B	E	3	4	0	.	F	1	2	0	X

Model:
VB - VFD with Bypass

Series
E- Electronic Bypass

Voltage:
1 = 208V
2 = 230 to 240V
3 = 380 to 480V
4 = 500 to 600V

HP Rating:
0.5, 0.7, 1.0, 1.5, 2.0, 3.0, 4.0, 5.0, 7.5, 10., 15., 20., 25., 30., 40., 50., 60., 75., 100, 125

Disconnect:
B = Circuit Breaker
D = Disconnect
F = Fused Disconnect

NEMA:
1 = NEMA Type 1

Contactors
2 = 2 Contactors
3 = 3 Contactors

Reactor
0 = None
3 = Line Reactor *
L = Load Reactor *

Filter
X No Filter

Options
HA1 = High Amp rating

*Only one reactor type can be installed in the bypass enclosure. If both are required, a separate enclosed reactor is required.

NOTE: HA1 option is a bypass package rated to 178 amps at 480 Vac. Though it does not meet NEC for 150 hp at 180 amps, the package will control a high percentage of 150 hp motors.

Typical Specifications

SED2 E-Bypass Options shall send the motor to bypass mode based on an easily accessible door-mounted selector or based on user's desired conditions. LED indication of operational state shall be provided. The bypass mode shall provide overload protection. Contactors shall be electrically and mechanically interlocked. An essential services mode shall send the motor to bypass regardless of the selected mode. When in safety modes it should provide indication of return state. It should indicate interlock sequence state during transition. Visually indicate faults for VFD safety/overload.

Dimensions

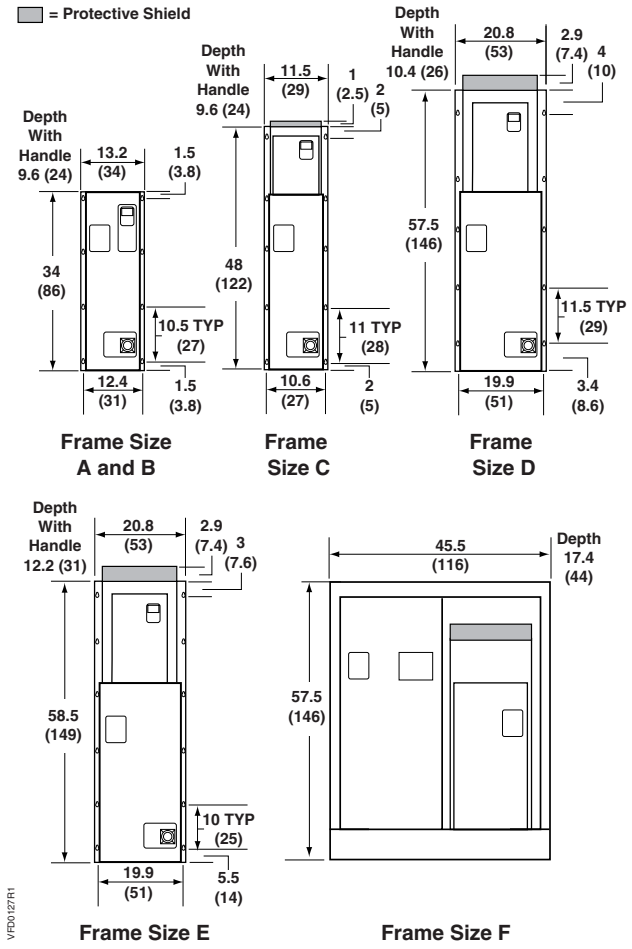


Figure 3. Dimensions in Inches (Centimeters).

Table 1. Approximate Weights.

Frame Size	Weight lb (kg)
A	45 (20)
B	55 (25)
C	75 (34)
D	150 (68)
E	180 (82)
F	470 (213)

NOTE: Exact weight will be affected by actual hp/voltage and selected power options.

Table 2. Bypass Frame Sizes and Power Ranges.

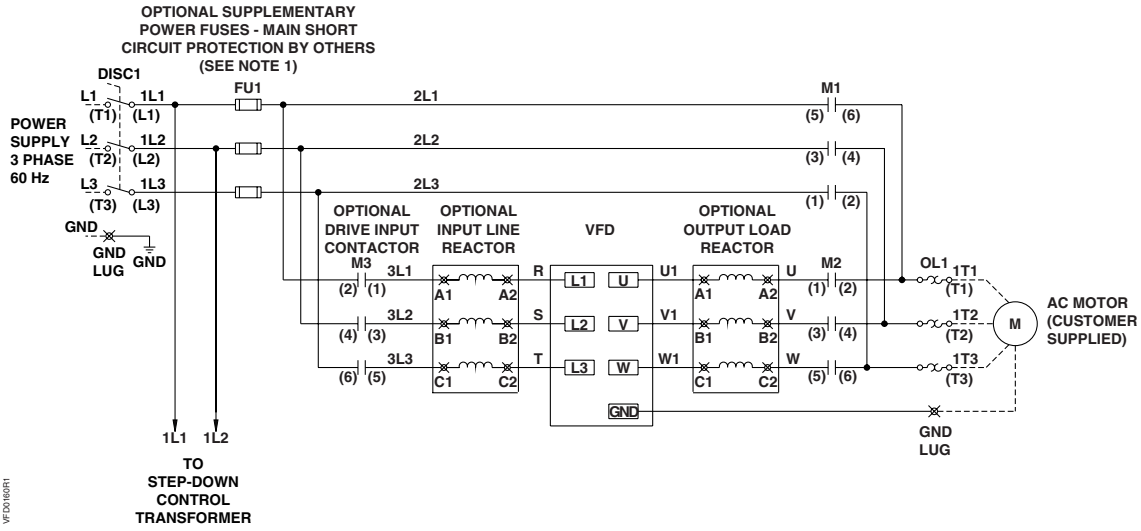
HP	kW	208/230V	480V	575V
.5	.37	A	A	C
.75	.55			
1	.75			
1.5	1.1	B	B	
2	1.5			
3	2.2			
5	4	C	C	
7.5	5.5			
10	7.5			
15	11	D	D	D
20	15			
25	18.5			
30	22	E		
40	30	F	E	E
50	37			
60	45			
75	55	N/A	F	F
100	75			
125	90			
HA1	–			N/A

Table 3. Bypass Output Current Ratings (Amps) — Per NEC Motor Tables.

HP	.5	.75	1	1.5	2	3	5	7.5	10	15	20	25	30	40	50	60	75	100	125	HA1
208V	2.3	3.0	3.9	5.5	7.4	10.4	16.7	22	28	42	54	68	80	104	130	154	–	–	–	–
230V	2.2	3.0	3.9	5.5	6.8	9.6	15.2	22	28	42	54	68	80	104	130	154	–	–	–	–
460V	1.1	1.6	2.1	3.0	3.4	4.8	7.6	11	14	21	27	34	40	52	65	77	96	124	156	178
575V	.9	1.3	1.4	2.1	2.7	3.9	6.1	9	11	17	22	27	32	41	52	62	77	99	125	–

NOTE: Drives are current rated devices. Verify that the listed ratings are ≥ the motor full load current rating.

Wiring Diagrams



NOTES:

1. Branch circuit protection to be provided by installer, per UL508A, if not provided with drive.
2. For bypass operation, modify these drive parameters: P0702[0] and P0702[1] = 3, P0748 = Digital Out 1 Reverse (−−−¬).
3. Control and communication wiring should be 300V UL minimum.
4. Communication wiring should be run with maximum separation possible from all other wiring.
5. Essential service mode operates the motor full speed (bypass) with no protection for the motor or system.
6. Ensure that automatic bypass will not damage the system before activating.
7. See *Siemens Publication No. 125-3208* for proper fuse and wire sizes.
8. See *Siemens Publication No. 125-3201* for SED2 input/output control signal wiring details.

Figure 4. Electronic Bypass Option Power Wiring Schematic.

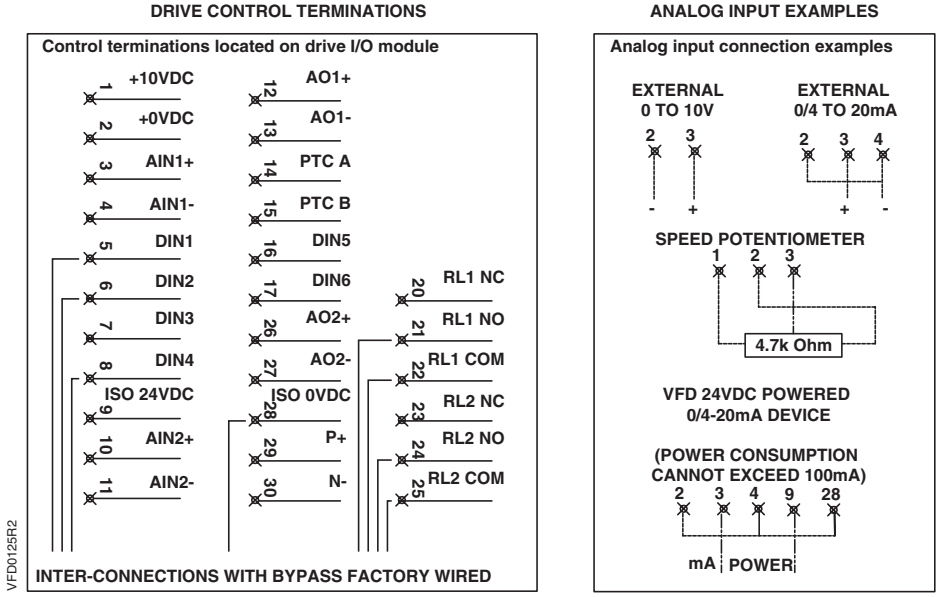


Figure 5. Drive Terminations.

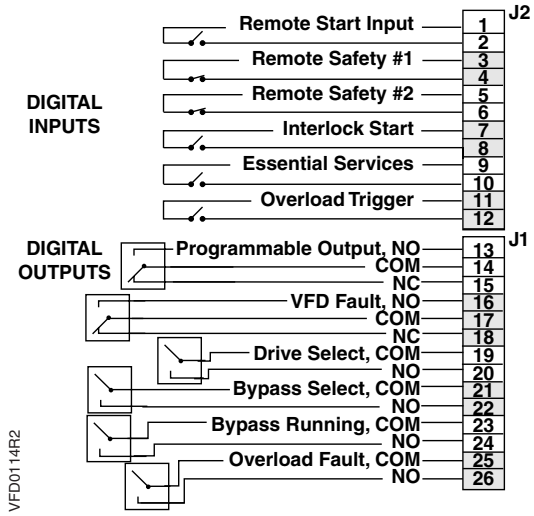


Figure 6. Controller Board Digital Inputs and Outputs.

Table 4. Electronic Bypass Specifications.

Specifications	Description
Input Voltage (3-phase)	208V, 3 AC±10%. 1/2 hp to 60 hp (2.3 amps to 154 amps)
	230V, 3 AC±10%. 1/2 hp to 60 hp (2.3 amps to 154 amps)
	460V, 3 AC ±10%. 1/2 hp to 125 hp (1.2 amps to 178 amps)
	575V, 3 AC ±10%. 1 hp to 125 hp (2.3 amps to 125 amps)
Digital Inputs	Six Digital Inputs as follows: • Remote start input • Remote safety 1 • Remote safety 2 • Interlock start • Essential services • Overload trigger Inputs require a contact closure capable of providing a low impedance path at currents less than 20 mA.
Relay/Digital Outputs	Six Relay/Digital Outputs as follows: • VFD fault • Programmable output • Drive select • Bypass select • Running on bypass • Overload fault Each relay has a maximum rating of 2A at 120V ac.
Temperature	Operating: 14°F to 104°F (-10°C to 40°C)
	Storage: –40°F to 158°F (–40°C to 70°C)
Humidity	0 to 95% rh, non-condensing

NOTE: For technical specifications on the SED2 VFD, see the *SED2 VFD Startup, Operation, and Maintenance Manual*, (125-3201).

Table 5. Drive Specifications.

Drive Specifications	Description	
Input voltage and power ranges (3-phase), amps	200V to 240V, 3 ac ± 10%. 1/2 hp to 60 hp (2.3 amps to 154 amps)	
	380V to 480V, 3 ac ± 10%. 1/2 hp to 125 hp (1.2 amps to 178 amps)	
	500V to 600V, 3 ac ± 10%. 1 hp to 125 hp (2.3 amps to 125 amps)	
Input frequency	47 Hz to 63 Hz	
Output frequency	0 Hz to 150 Hz	
Power factor	≥0.9	
VFD degree of efficiency	96% to 97%	
Switch-on current	Less than nominal input current	
Auxiliary supply 24V	Glavanically separated, unregulated auxiliary supply (18V to 32V) 100 mA	
Overload capacity	110% for 60 seconds	
Control method	Linear, parabolic and programmable V/f; and flux current control low-power mode	
PWM frequency	2k Hz to 16k Hz (adjustable in 2k Hz increments)	
Fixed frequencies	15 programmable	
Skip frequency bands	4 programmable	
Setpoint resolution	0.01 Hz digital	
	0.01 Hz serial	
	10 bit analog	
Digital inputs (sink/source)	6: fully programmable and scalable isolated digital inputs, switchable	
Analog inputs	2: 0 to 10 Vdc, 0/4 to 20 mA, can also be configured as digital inputs or Ni 1000 input	
Relay outputs	2: configurable 30 Vdc/5A (resistive), 250 Vac/2A (inductive)	
Analog outputs	2: programmable (0/4 mA to 20 mA or 0 Vdc to 10 Vdc)	
Serial interface	RS-485 transmission rate: Up to 38.4k baud Protocols: Siemens Building Technologies, Inc., P1 and Johnson, N2	
Protection level	IP20: NEMA Type 1 with protective shield and gland plate installed	
	IP54: NEMA Type 12 (400V and 500V series only)	
Temperature ranges	Operating: 14°F to 104°F (–10°C to 40°C)	
	Storage: –40°F to 158°F (–40°C to 70°C)	
Humidity	95% rh, non-condensing	
Operational altitudes	Up to 3280 ft (1000 m) above sea level without derating	
Protection features	• Under-voltage • Over-voltage • Overload • Ground fault • Short circuit	• Stall prevention • Locked motor • Motor overtemperature I2 t, PTC • Over-temperature • Parameter PIN protection
Standards	UL, cUL	

Table 6. Order Worksheet.

Item	Qty.	Designation	Part Number	Description

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