

## BT300 HVAC Drives



Figure 1. BT300 HVAC Drive without and with Integral Disconnect.

### Description

Siemens Industry's BT300 is designed specifically for the demands of today's HVAC systems. Increased focus on energy efficiency of variable flow systems has increased the need for easy-to-use and highly reliable variable frequency drives that reduce the cost of installation and maintenance while maximizing energy savings.

The BT300 comes standard with unique and industry-leading features:

- Motor Switch Ride Through – during maintenance the motor maintenance switch can be opened and closed without stopping or tripping the drive
- Thin Film Capacitors – eliminate the need to condition or reform the capacitors before applying power
- View/Monitor nine parameters at one time – user selectable, users determine the parameters for their applications
- Smallest Type 12 footprint on the market – lower shipping cost and easy installation

### Designed for HVAC

HVAC demands are unique to other drive applications. The BT300 is singularly focused on the needs of HVAC variable flow systems:

- Built-in wizards for start-up and easy setup of advanced functions
  - PID Start-up Wizard
  - Multi-pump Wizard
  - Fire Mode Wizard
- Integrated harmonic filters reducing noise and interference eliminating the need for additional filters and reactors.
- Internal reactors equivalent to 5% input impedance.
- BT300 Thin Film Capacitors do not require conditioning. Immediate drive replacement is possible.
- Standard Integration Protocols (APOGEE® P1, BACnet, Modbus, LON (optional), Metasys N2)
- Two built-in PID controllers for fast and accurate process control
- Built-in fire mode controller
- Energy Savings with > 97.5% efficiency
- Optimized cooling fans
- UL Type 1 and Type 12 – Same Size
- 208V to 240V 1 HP to 125 HP
- 380V to 480V 1.5 HP to 250 HP
- Optional integrated drive disconnect
- Advanced I/O expansion capability built into the drive
- One common interface throughout all power ranges
- Intuitive graphical keypad with multilingual display.

## Ease of Use

The BT300 drives are easy to use, easy to understand and easy to program. This means installed cost and maintenance savings. Information you want for your specific operation:

- Built-in Help Menu – explains each parameter
- Built-in Maintenance Manual - shows possible causes and suggested remedies
- Nine user-selected values can be defined and monitored at one time – providing you with all the information you need at a glance
- Embedded Ethernet and RS-485 - No additional hardware or cost for Ethernet. Standard HVAC protocols out-of-the-box.
  - APOGEE P1
  - BACnet IP
  - BACnet MS/TP
  - Modbus RTU
  - Modbus TCP
  - Metasys N2

## World-class Standard of Quality

Siemens Industry's VFDs are designed to operate in all types of power situations or demanding environments. The BT300's reliability is a result of extensive testing from design to deployment. This testing includes highly accelerated stress testing in extreme temperatures, vibration, and humidity as well as current and voltage variations. Not only will the BT300 withstand most power situations and demanding environmental conditions, it will provide confidence and peace of mind knowing that it will not fail, ensuring a long, trouble-free installation.

## Investment Protection

The BT300 supports Siemens Industry's long-standing, industry-leading backward compatibility tradition. The BT300 HVAC Drive is backward compatible to SED2 installations. A migration kit to mount a BT300 Drive in place of an SED2 to support the existing conventional or electronic bypass fail is an ideal solution to moving your technology forward at the lowest possible cost. The SED2 to BT300 Migration Kits provide you with all the components necessary to mount your BT300 quickly and easily in various locations within your facility.

## Environmentally Responsible

The BT300 saves energy, is environmentally safe and RoHS Compliant. All BT300s are constructed with lead-free circuit boards and produce no hazardous waste. They use the latest technologies for insulated-gate bipolar transistors (IGBT) and power capacitors. The thin-film power capacitors do not contain toxic electrolytes; therefore, the BT300 capacitors will not dry out. There is no need to “wake up” or condition the capacitors before installing. Your BT300 is safe to connect even after years of storage.

The BT300 IGBT design results in lower heat losses and lower operating temperatures. It weighs 40% less than competitors' models decreasing the cost of shipping and allowing for easier installation. An average BT300 generates 68% to 125% fewer CO<sub>2</sub> emissions than heavier competitors' drives during shipping.

## Product Numbers

<b>Example Product Numbers</b>	(1)	<b>B T 3 0 0 - 0 0 1 X 2 - 0 1 X</b>
	(2)	<b>B T 3 0 0 - 0 0 1 5 4 - 1 2 D L</b>
<b>Model</b>	BT300	
	VFD only	
<b>Separator</b>		
<b>HP</b>	1, 1.5, 2, 3, 5, 7.5, 10, 15 20, 25, 30, 40, 50, 60, 75 100, 125, 150, 200, 250	
	X	No fraction HP
	5	1/2 HP
<b>Voltage</b>	200 to 240 380 to 480	
	2	200 to 240
	4	380 to 480
<b>Separator</b>		
<b>NEMA Enclosure</b>	Type 1 Type 12	
	01	Type 1
	12	Type 12
<b>Type</b>	Drive only Integral Disconnect Switch (available in Type 12 only)	
	X	Drive only
	D	Integral Disconnect Switch (available in Type 12 only)
<b>Options</b>	LON card installed	
	L	LON card installed

Example (1) = 1 HP, 208V Drive in Type 1 enclosure

(2) = 1.5 HP, 480V Drive in Type 12 enclosure with an integral disconnect switch and LON card.

## Frame Sizes and Power Ranges (BT300 Type 1 and Type 12)

Voltage	KW	0.75	1.1	1.5	2.2	4	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	
	HP	1	1.5	2	3	5	7.5	10	15	20	25	30	40	50	60	75	100	125	150	200	250	
208V	Frame Size	4				5			6		7			8			9					
480V			4				5			6			7			8		9				

# Specifications

**Table 1. Drive Specifications.**

Drive Specifications	Description
Input voltage and power ranges (3-phase)	208V to 240V -10% to +10% 1 HP to 125 HP (0.75 kW to 90 kW) 380V to 480V -10% to +10% 1.5 HP to 250 HP (1.1 kW to 160 kW)
Input frequency	45 Hz to 66 Hz
Output frequency	0 Hz to 320 Hz
Frequency resolution	0.01 Hz
Efficiency	>97.5%
Overload Capacity	1.1 x Nominal rated output current 110% for 1 minute/10 minutes
Switching Frequency	1.5K to 10K Hz; Automatic switching frequency de-rating in case of overheating
Short Circuit Withstand Rating	100,000 AIC
Frequency reference Analog Input	Resolution 0.01 Hz Resolution 0.1% (10-bit)
Field weakening point	8 to 320 Hz
Acceleration time	0.1 to 3000 seconds
Deceleration time	0.1 to 3000 seconds
Ambient Operating Temperature	-14° F (-10°C) no frost to 104°F (40°C) without de-rating and 131°F (55°C) with de-rating
Storage Temperature	-40°F (-40°C) to 158°F (70°C)
Relative Humidity	0 to 95% RH, non-condensing, non-corrosive
Air Quality	IEC 60068-2-60
Chemical Vapors	IEC 60721-3-3, unit in operation, class 3C3
Mechanical Particles	IEC 60721-3-3, unit in operation, class 3S2
Altitude	100% load capacity (no de-rating) up to 3,280 ft (1,000 m) 1% de-rating for each 328 ft (100 m) above 3,28 ft (1,000 m) Maximum altitude 14,763 ft (4,500 m)
Vibration	IEC 61800-5-1 and IEC 60068-2-6
Shock	IEC 61800-5-1 and IEC 60068-2-27
Enclosures	UL Type 1, UL Type 12
EMC Immunity	Fulfills IEC 61800-3, first and second environment
EMC Emissions	EN61800-3C2
Average Noise level (cooling fan) sound level in dB(A)	FS4: 65; FS5: 70; FS6 and FS7: 77 FR8: 86; FR9: 87
Agency Approvals	UL 508C; UL, cUL
Conformity	CE, RoHS compliant
Analog Inputs	2: voltage or current (0 to 10 Vdc, 0/4 to 20 mA)
Analog Output	1: selectable voltage or current
Digital Inputs	6: programmable and isolated
Relay Outputs	2: Form C 1: Normally Open
Auxiliary input voltage	24 Vdc +/- 10% 250 mA maximum
Auxiliary output voltage	24 Vdc +/- 10% 250 mA maximum, total of both outputs
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	3 programmable
Serial Interface	RS485 and Ethernet
Embedded Resident Protocols	APOGEE P1, BACnet IP; BACnet MS/TP, Modbus RTU, Modbus TCP, Metasys N2
Protection features	Under-voltage trip limit, Over-voltage trip limit, Ground fault protection, Mains supervision; Motor phase supervision; Over-current protection; Unit over-temperature protection; Motor overload protection; Motor stall protection; Motor underload protection; Short-circuit protection of +24V and +10V reference voltages.

# Specifications, Continued

Table 2. Output Ratings.

Voltage (±10%)	Description			Output Rating	Output Rating	Rated Continuous Current	Frame Size
	UL Type 1	UL Type 12	UL Type 12 with Drive Disconnect	HP	kW		
<b>208V (3-Phase)</b>	BT300-001X2-01X	BT300-001X2-12X	BT300-001X2-12D	1.0	0.75	4.8	FS4
	BT300-00152-01X	BT300-00152-12X	BT300-00152-12D	1.5	1.1	6.7	FS4
	BT300-002X2-01X	BT300-002X2-12X	BT300-002X2-12D	2.0	1.5	8.0	FS4
	BT300-003X2-01X	BT300-003X2-12X	BT300-003X2-12D	3.0	2.2	11.0	FS4
	BT300-005X2-01X	BT300-005X2-12X	BT300-005X2-12D	5.0	3.0	18.0	FS5
	BT300-00752-01X	BT300-00752-12X	BT300-00752-12D	7.5	5.5	24.0	FS5
	BT300-010X2-01X	BT300-010X2-12X	BT300-010X2-12D	10.0	7.5	31.0	FS5
	BT300-015X2-01X	BT300-015X2-12X	BT300-015X2-12D	15.0	11.0	48.0	FS6
	BT300-020X2-01X	BT300-020X2-12X	BT300-020X2-12D	20.0	15.0	62.0	FS6
	BT300-025X2-01X	BT300-025X2-12X	BT300-025X2-12D	25.0	18.5	75.0	FS7
	BT300-030X2-01X	BT300-030X2-12X	BT300-030X2-12D	30.0	22.0	88.0	FS7
	BT300-040X2-01X	BT300-040X2-12X	BT300-040X2-12D	40.0	30.0	105.0	FS7
	BT300-050X2-01X	BT300-050X2-12X	—	50.0	37.0	140.0	FS8
	BT300-060X2-01X	BT300-060X2-12X	—	60.0	45.0	170.0	FS8
<b>230V (3-Phase)</b>	BT300-075X2-01X	BT300-075X2-12X	—	75.0	55.0	205.0	FS8
	BT300-100X2-01X	BT300-100X2-12X	—	100.0	75.0	261.0	FS9
	BT300-125X2-01X	BT300-125X2-12X	—	125.0	90.0	310.0	FS9
<b>380V to 480V (3-Phase)</b>	BT300-00154-01X	BT300-00154-12X	BT300-00154-12D	1.5	1.1	3.7	FS4
	BT300-002X4-01X	BT300-002X4-12X	BT300-002X4-12D	2.0	1.5	5.3	FS4
	BT300-003X4-01X	BT300-003X4-12X	BT300-003X4-12D	3.0	2.2	6.2	FS4
	BT300-005X4-01X	BT300-005X4-12X	BT300-005X4-12D	5.0	3.0	10.6	FS4
	BT300-00754-01X	BT300-00754-12X	BT300-00754-12D	7.5	5.5	13.2	FS4
	BT300-010X4-01X	BT300-010X4-12X	BT300-010X4-12D	10.0	7.5	16.0	FS5
	BT300-015X4-01X	BT300-015X4-12X	BT300-015X4-12D	15.0	11.0	23.0	FS5
	BT300-020X4-01X	BT300-020X4-12X	BT300-020X4-12D	20.0	15.0	31.0	FS5
	BT300-025X4-01X	BT300-025X4-12X	BT300-025X4-12D	25.0	18.5	38.0	FS6
	BT300-030X4-01X	BT300-030X4-12X	BT300-030X4-12D	30.0	22.0	46.0	FS6
	BT300-040X4-01X	BT300-040X4-12X	BT300-040X4-12D	40.0	30.0	61.0	FS6
	BT300-050X4-01X	BT300-050X4-12X	BT300-050X4-12D	50.0	37.0	72.0	FS7
	BT300-060X4-01X	BT300-060X4-12X	BT300-060X4-12D	60.0	45.0	87.0	FS7
	BT300-075X4-01X	BT300-075X4-12X	—	75.0	55.0	105.0	FS7
	BT300-100X4-01X	BT300-100X4-12X	—	100.0	75.0	140.0	FS8
	BT300-125X4-01X	BT300-125X4-12X	—	125.0	90.0	170.0	FS8
	BT300-150X4-01X	BT300-150X4-12X	—	150.0	110.0	205.0	FS8
	BT300-200X4-01X	BT300-200X4-12X	—	200.0	132.0	261.0	FS9
	BT300-250X4-01X	BT300-250X4-12X	—	250.0	160.0	310.0	FS9

## Accessories

### Flange Mounting Kits:

- BT300-FLG-FS4 Flange Mounting Kit for FS4
- BT300-FLG-FS5 Flange Mounting Kit for FS5
- BT300-FLG-FS6 Flange Mounting Kit for FS6
- BT300-FLG-FS7 Flange Mounting Kit for FS7

### Option Boards (all boards are varnished):

- BT300-OPT-B1-V 6 x DI/DO, each I/O can be individually programmable as input or output
- BT300-OPT-B2-V 2 x Relay output & Thermistor
- BT300-OPT-B4-V 1 x Analog Input, 2 x Analog Output (isolated)
- BT300-OPT-B5-V 3 x Relay Output
- BT300-OPT-B9-V 1 x Relay Output, 5 x DI (42 to 240 Vac)
- BT300-OPT-BH-V Passive Input Sensor Card
- BT300-OPT-BF-V 1 x AO, 1 x DO, 1 x RO

### Door Mounting Kits:

- BT300-PNL-N12 Door Panel Kit, drive side IP54 protected, cable length 9.8 ft (3 m)
- BT300-HHPANEL Hand Held Panel Kit

### LON Interface Option Board

- BT300-OPT-C4-V

### Miscellaneous Accessories:

- BT300-CABLE PC cable for PC Tool, USB to RS-485, cable length 9.8 ft (3 m)
- BT300-BATTERY Battery package for (5 pcs) for real time clock

### SED2 to BT300 Migration Kits (Converts your SED2 bypass into a BT300 bypass)

- SED2-BT300-AB-4 SED2 208V, 0.5 to 3 HP; 480V, 0.5 to 5 HP
- SED2-BT300-C-4 480V, 7.5 HP
- SED2-BT300-C-5 SED2 208V, 5 to 10 HP; 480V 10 to 20 HP
- SED2-BT300-D-6 SED2 208V, 15 to 20 HP; 480V, 25 to 40 HP
- SED2-BT300-D-7 SED2 208V, 25 HP
- SED2-BT300-E-7 SED2 208V, 30 HP 480V, 50 to 60 HP
- SED2-BT300-F-7 SED2 208V, 40 HP SED2 480V, 75 HP
- SED2-BT300-F-8 SED2 208V, 50 to 60 HP; 480V, 100 to 125 HP
- SED2-BT300-C-R SED2 FSC to BT300 Remote Mount
- SED2-BT300-DE-R SED2 FSD and FSE to BT300 Remote Mount

## Dimensions

Table 3. Overall Dimensions for BT300 Type 1 and Type 12 in Inches (Millimeters).

Frame Size	Height	Width	Depth (without Disconnect)	Depth (with Disconnect)	Weight lb (kg)
FS4	12.9 (328)	5.0 (128)	7.5 (190)	10.6 (270)	13.0 (6)
FS5	16.5 (419)	5.7 (144)	8.4 (214)	11.6 (294)	22.0 (10)
FS6	21.9 (557)	7.7 (195)	9.0 (229)	11.9 (302)	44.0 (20)
FS7	26.0 (660)	9.3 (237)	10.2 (259)	13.1 (332)	83.0 (37.5)
FS8	38.0 (966)	11.4 (290)	13.5 (343)	N/A	145.5 (66)
FS9	45.3 (1150)	18.9 (480)	14.4 (365)	N/A	238.0 (108)

# Dimensions, Continued

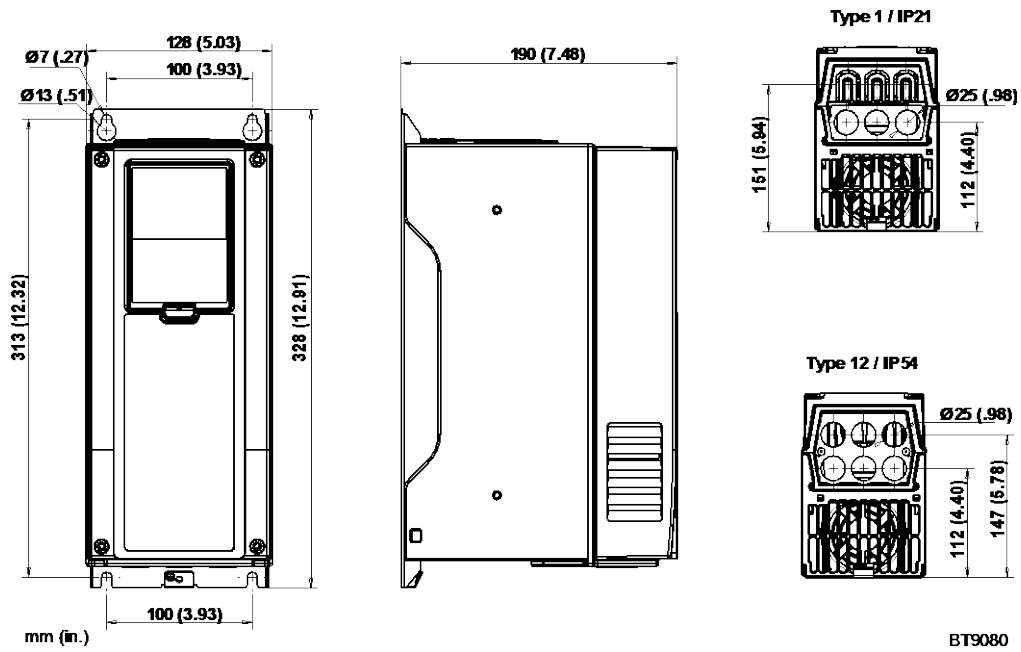


Figure 2. Siemens Drive Dimensions, FS4, Wall-Mount.

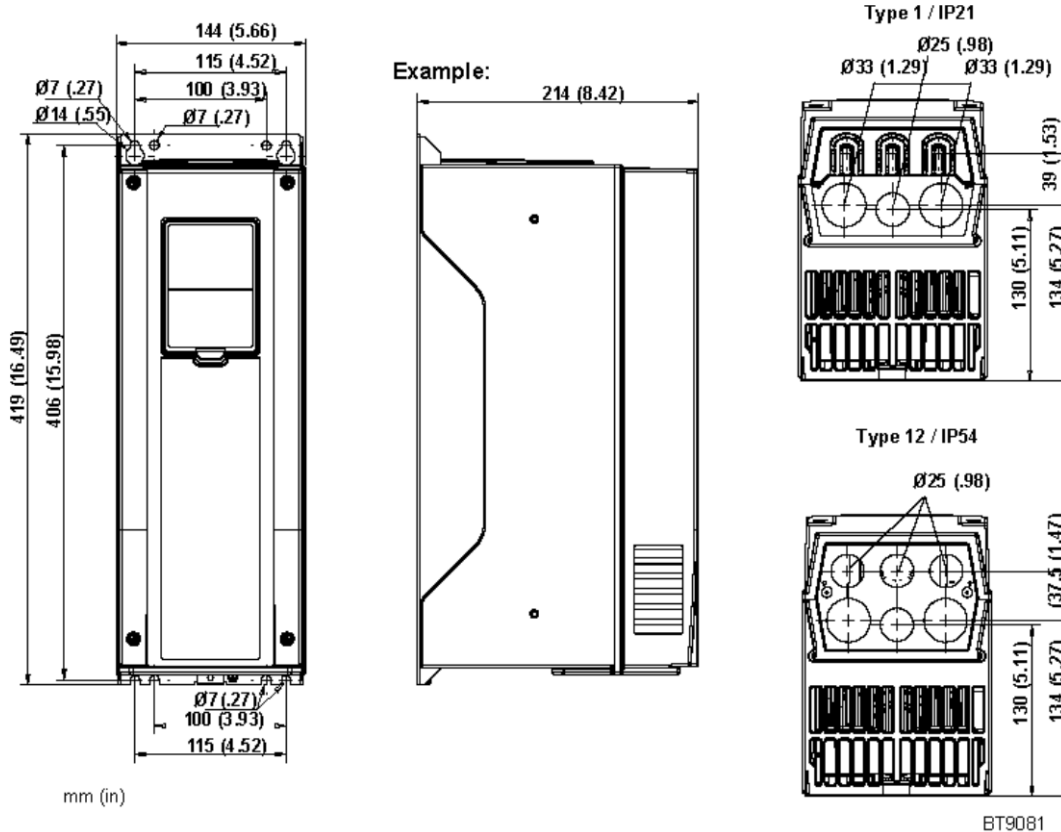


Figure 3. Siemens Drive Dimensions, FS5, Wall-Mount.

# Dimensions, Continued

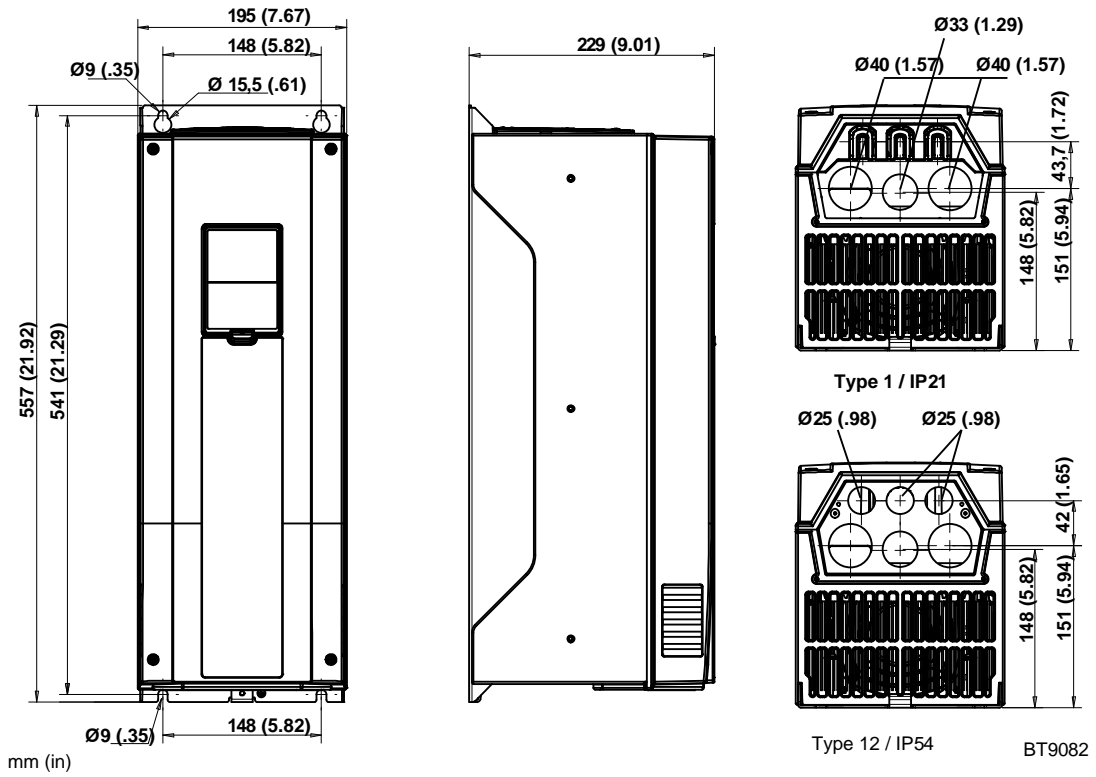


Figure 4. Siemens Drive Dimensions, FS6, Wall-Mount.

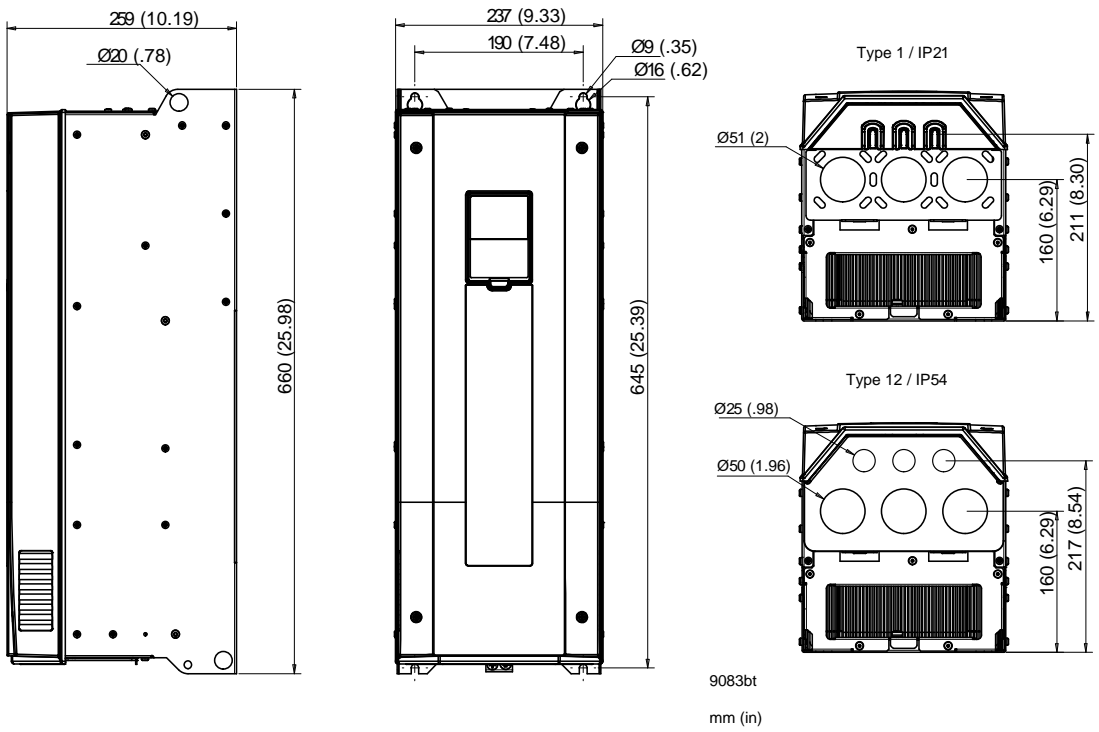


Figure 5. Siemens Drive Dimensions, FS7, Wall-Mount.



# Dimensions, Continued

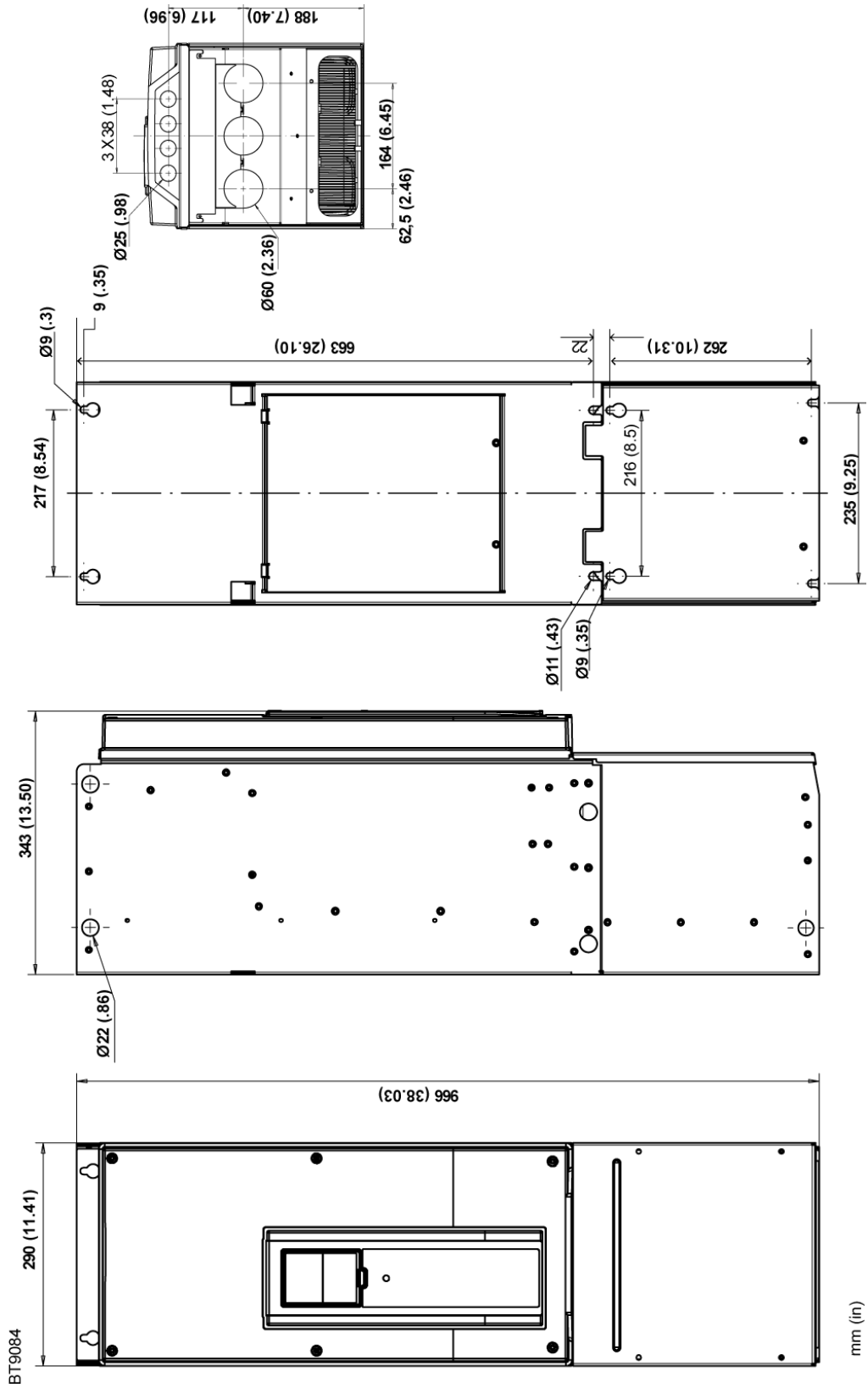


Figure 6. Siemens Drive Dimensions, FS8.

# Dimensions, Continued

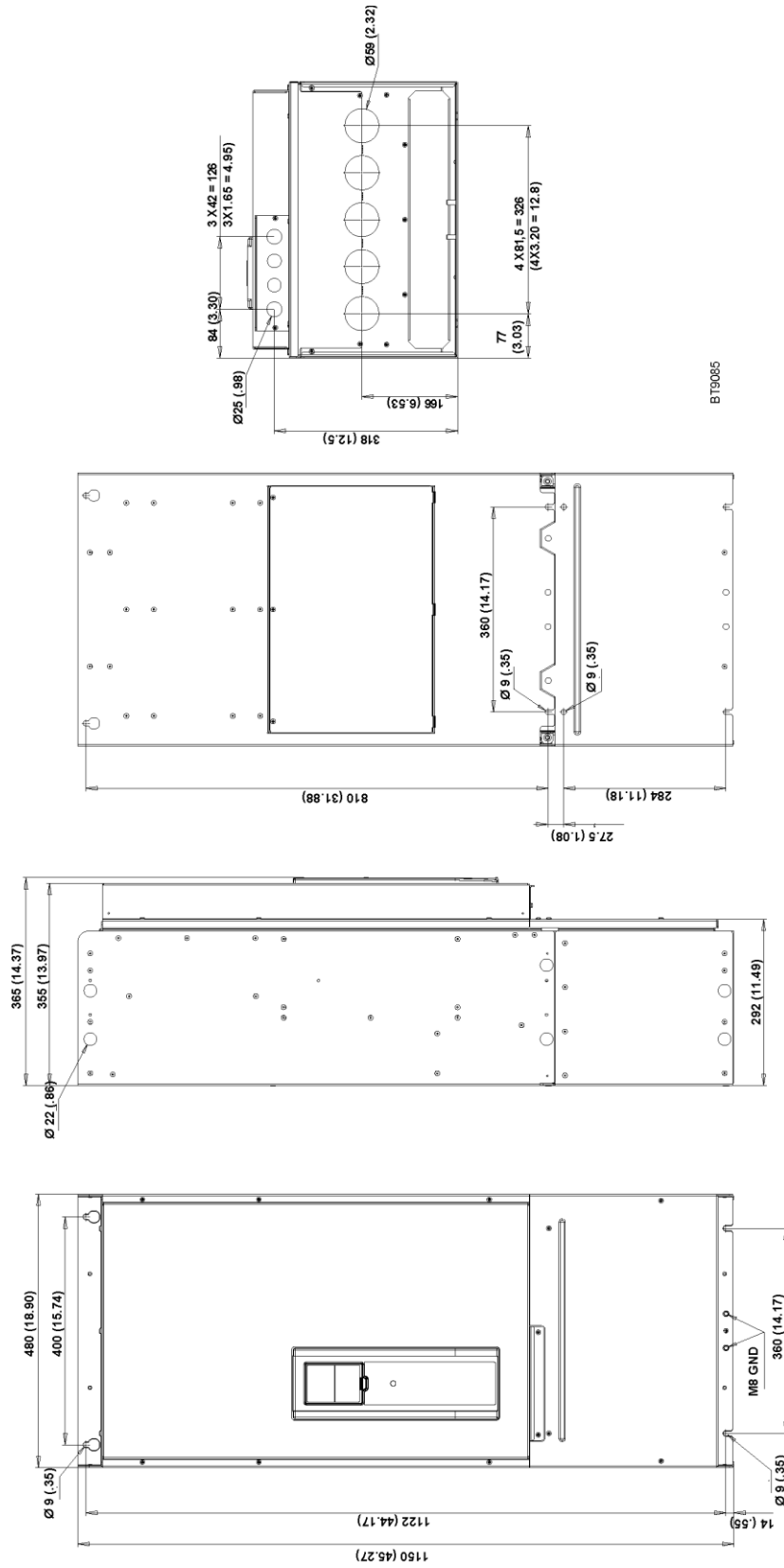
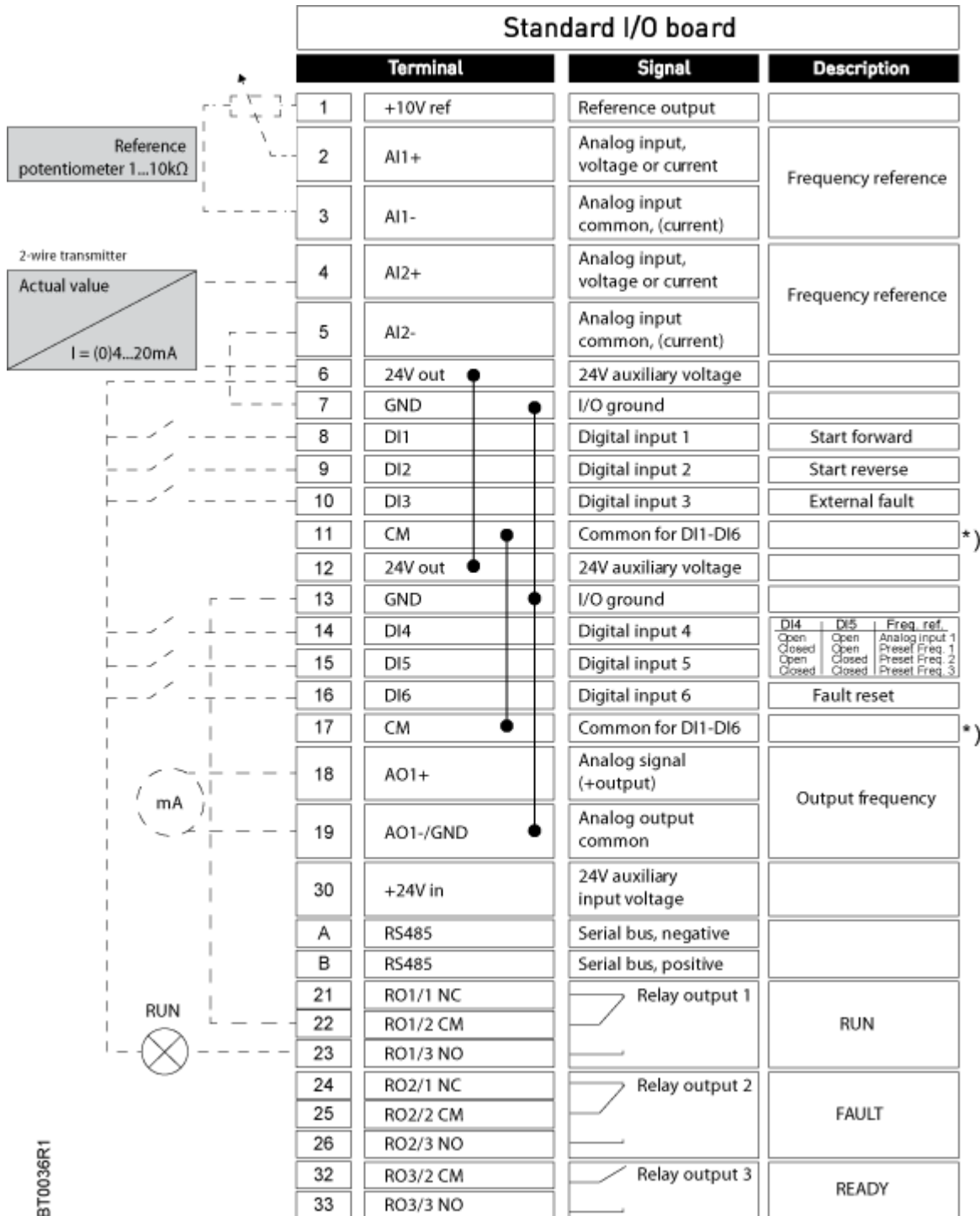


Figure 7. Siemens Drive Dimensions, FS9.

# Wiring Diagrams

Table 4. Control I/O Terminal Signals on Basic IO Board and Connection Example.



\* Digital inputs can be isolated from ground.

Table 5. Order Worksheet.

Item	Quantity	Designation	Part Number	Description			
				Voltage	HP	Enclosure	Frame Size

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