

BT300 HVAC Drives



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

Description

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.
- BT300 Thin Film Capacitors do not require conditioning. Immediate drive replacement is possible.
- Standard Integration Protocols (BACnet, LON, Modbus)
- 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.
 - BACnet IP
 - BACnet MS/TP
 - Modbus TCP
 - Modbus RTU
 - Metasys N2

World-class Standard of Quality

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 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 CO2 emissions than heavier competitors' drives during shipping.

Product Numbers

Example Product Numbers	(1) (2)	B B	T T	3 3	0 0	0 0	- -	0 0	0 0	1 1	X 5	2 4	- -	0 1	1 2	X D	L
Model																	
BT300	VFD only																
Separator																	
HP																	
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																
Voltage																	
2	200 to 240																
4	380 to 480																
Separator																	
NEMA Enclosure																	
01	Type 1																
12	Type 12																
Type																	
X	Drive only																
D	Integral Disconnect Switch (available in Type 12 only)																
Options																	
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 10Vdc, 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	Modbus RTU, Modbus TCP; BACnet MSTP, BACnet IP; 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		
208V and 230V to 240V (3-Phase)	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
	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
380V to 480V (3-Phase)	BT300-00154-01X	BT300-00154-12X	BT300-00152-12D	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	BT300-00752-12D	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	BT300-075X4-12D	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 × DI/DO, each I/O can be individually programmable as input or output
- ☐ BT300-OPT-B2-V 2 × Relay output & Thermistor
- ☐ BT300-OPT-B4-V 1 × Analog Input, 2 × Analog Output (isolated)
- ☐ BT300-OPT-B5-V 3 × Relay Output
- ☐ BT300-OPT-B9-V 1 × Relay Output, 5 × DI (42 to 240 Vac)
- ☐ BT300-OPT-BH-V Passive Input Sensor Card
- ☐ BT300-OPT-BF-V 1 × AO, 1 × DO, 1 × RO

Door Mounting Kits:

- ☐ BT300-PANEL-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 to 3 HP; 480V to 5 HP
- ☐ SED2-BT300-C-4 SED2 208V to 4 HP; 480V to 7.5 HP
- ☐ SED2-BT300-C-5 SED2 208V to 10 HP; 480V to 20 HP
- ☐ SED2-BT300-DE-6 SED2 208V to 20 HP; 480V to 40 HP
- ☐ SED2-BT300-DE-7 SED2 208V to 40 HP; 480V to 60 HP
- ☐ SED2-BT300-F-7 SED2 480V to 75 HP
- ☐ SED2-BT300-F-8 SED2 208V to 60 HP; 480V to 125 HP

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

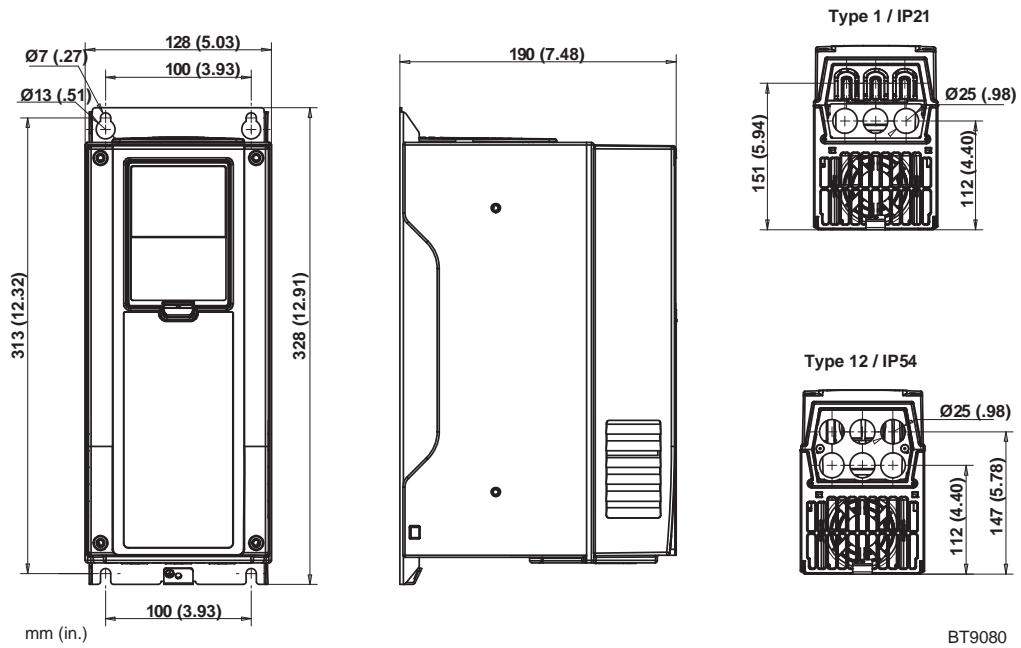


Figure 2. FS4, Wall-Mount.

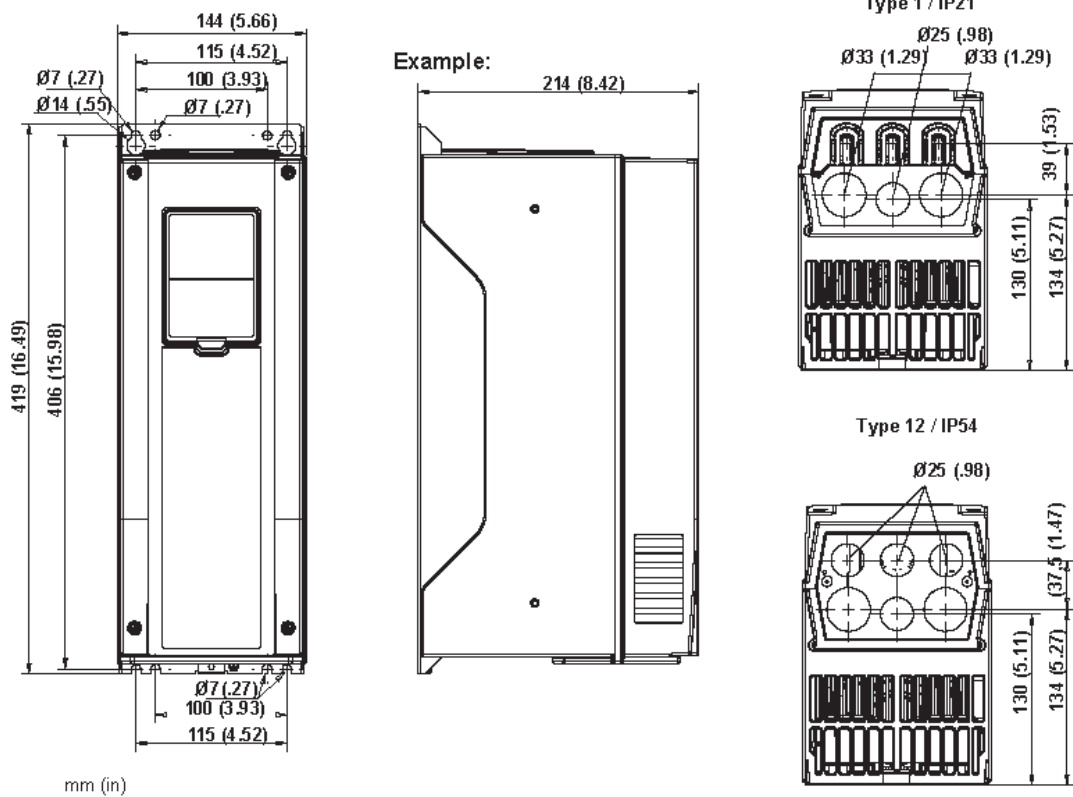


Figure 3. FS5, Wall-Mount.

Dimensions, Continued

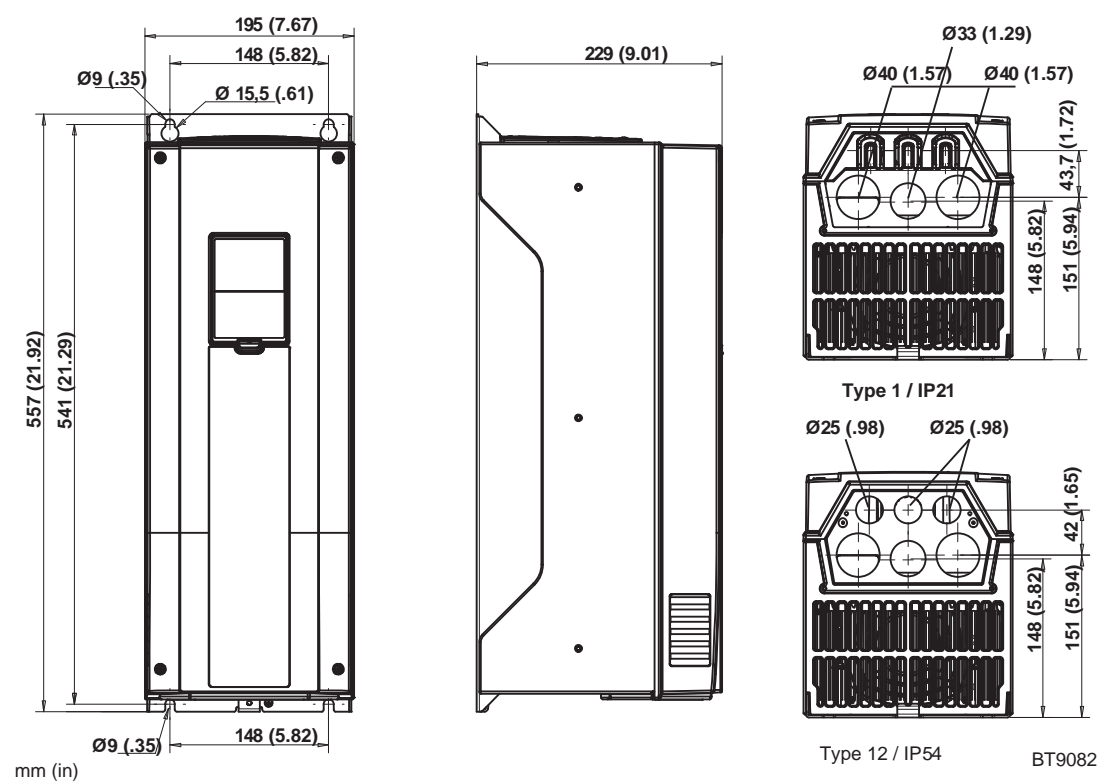


Figure 4. FS6, Wall-Mount.

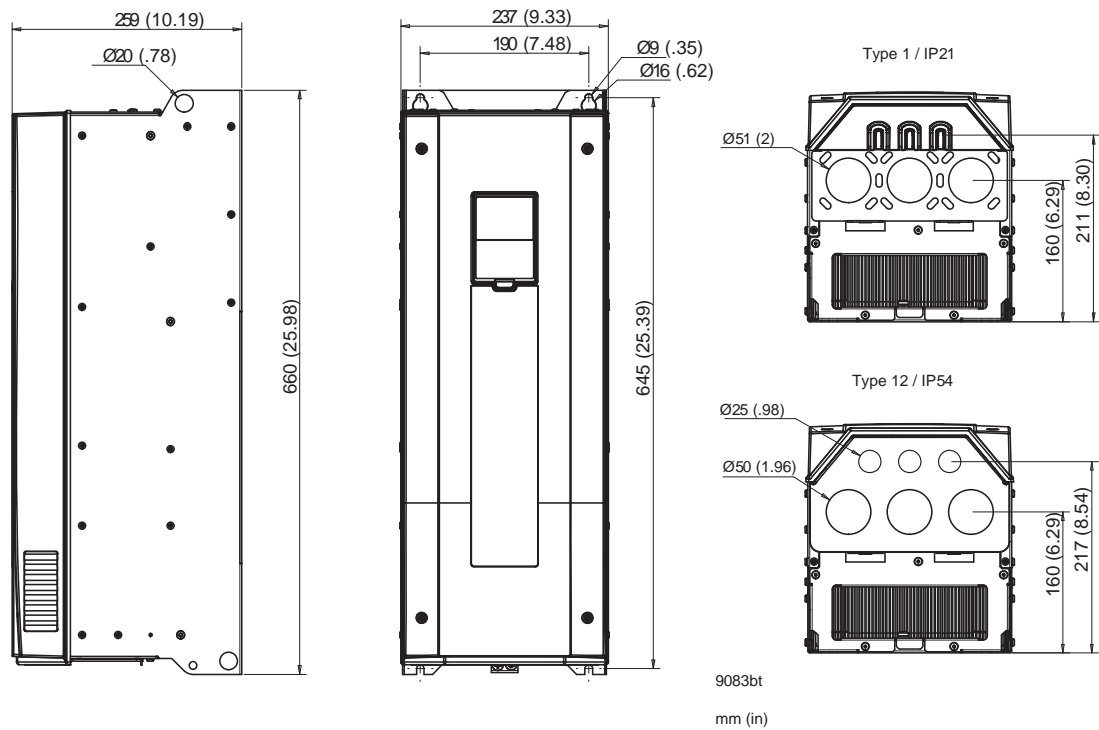


Figure 5. FS7, Wall-Mount.

Dimensions, Continued

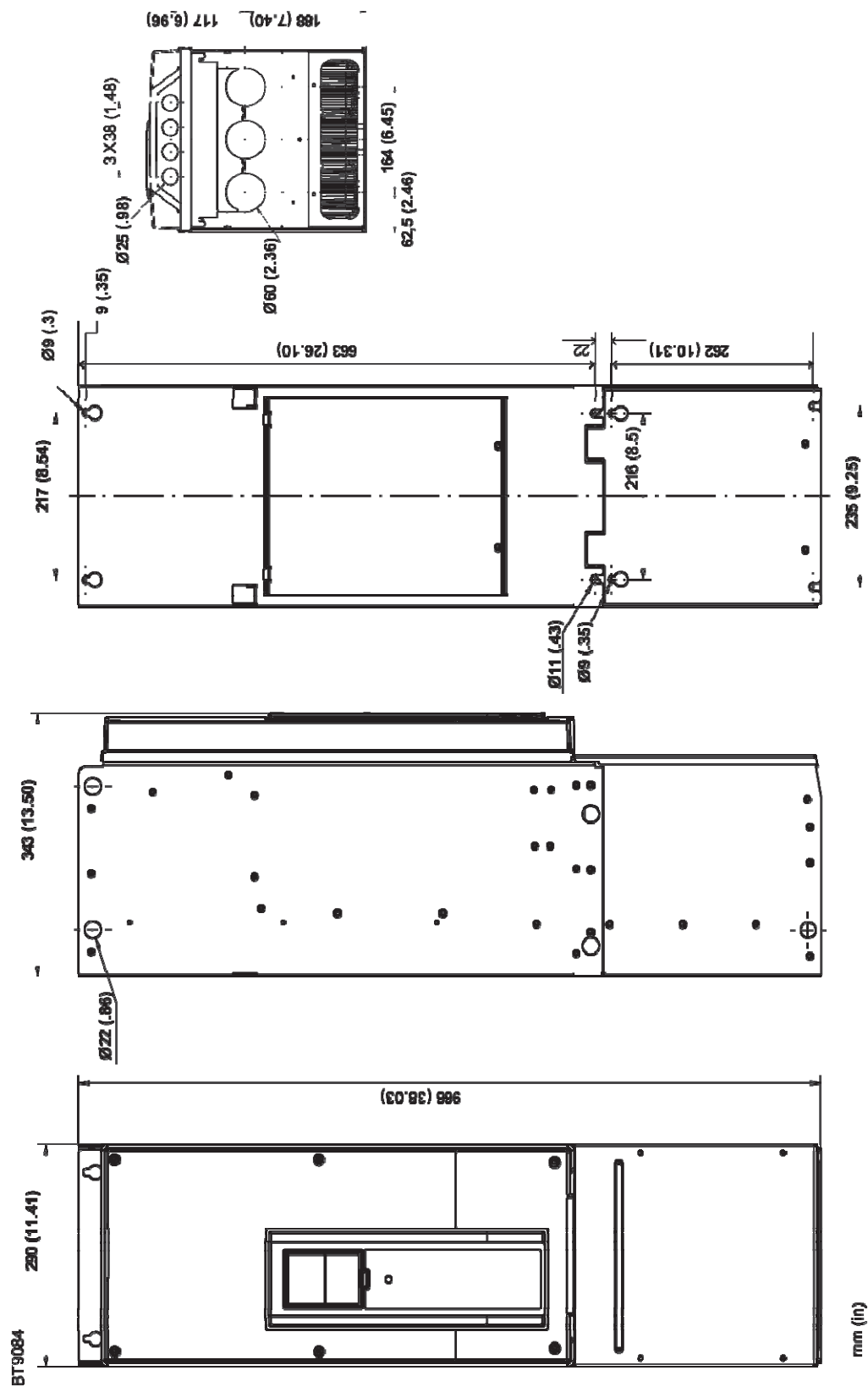


Figure 6. FS8.

Dimensions, Continued

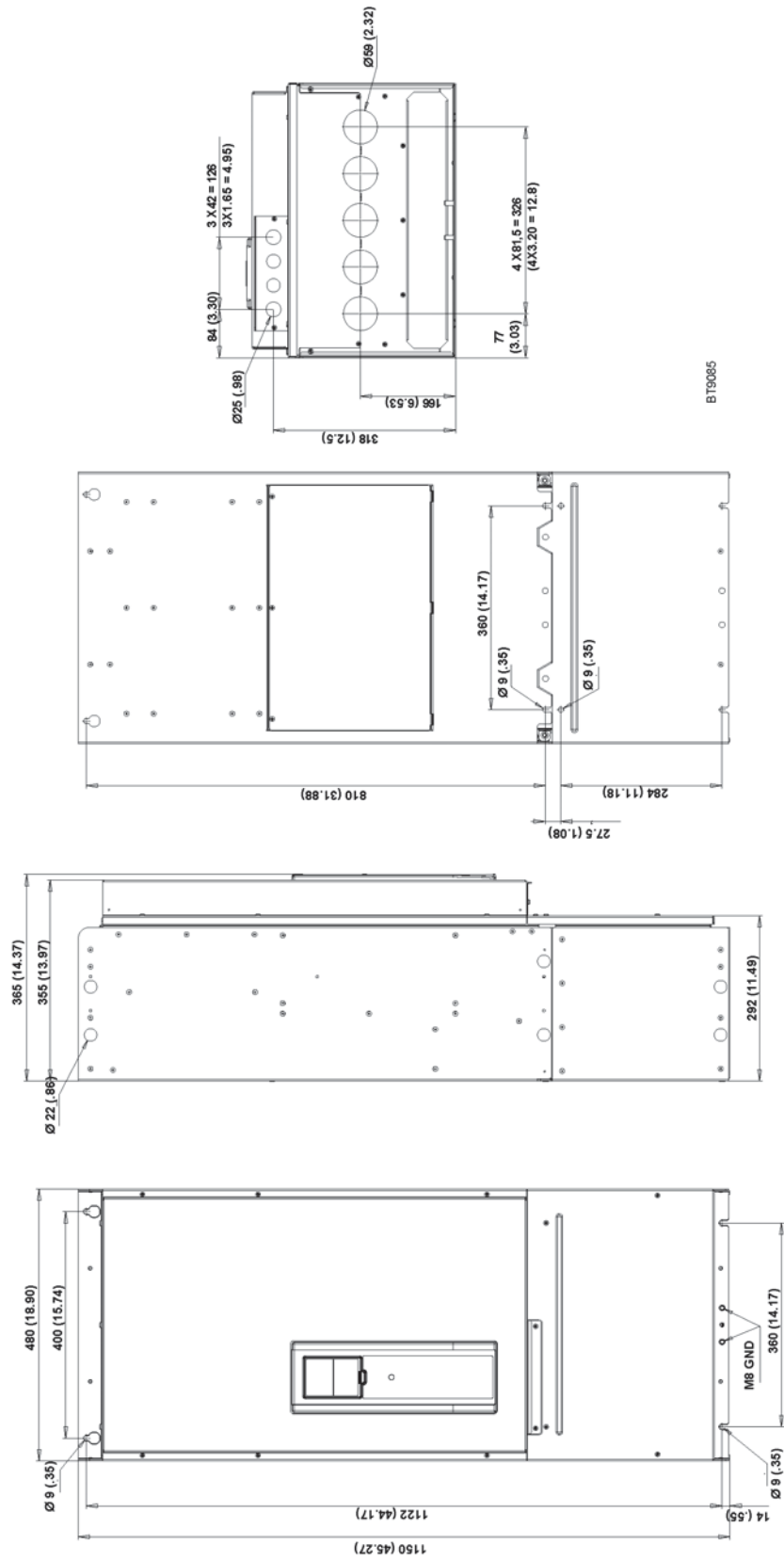
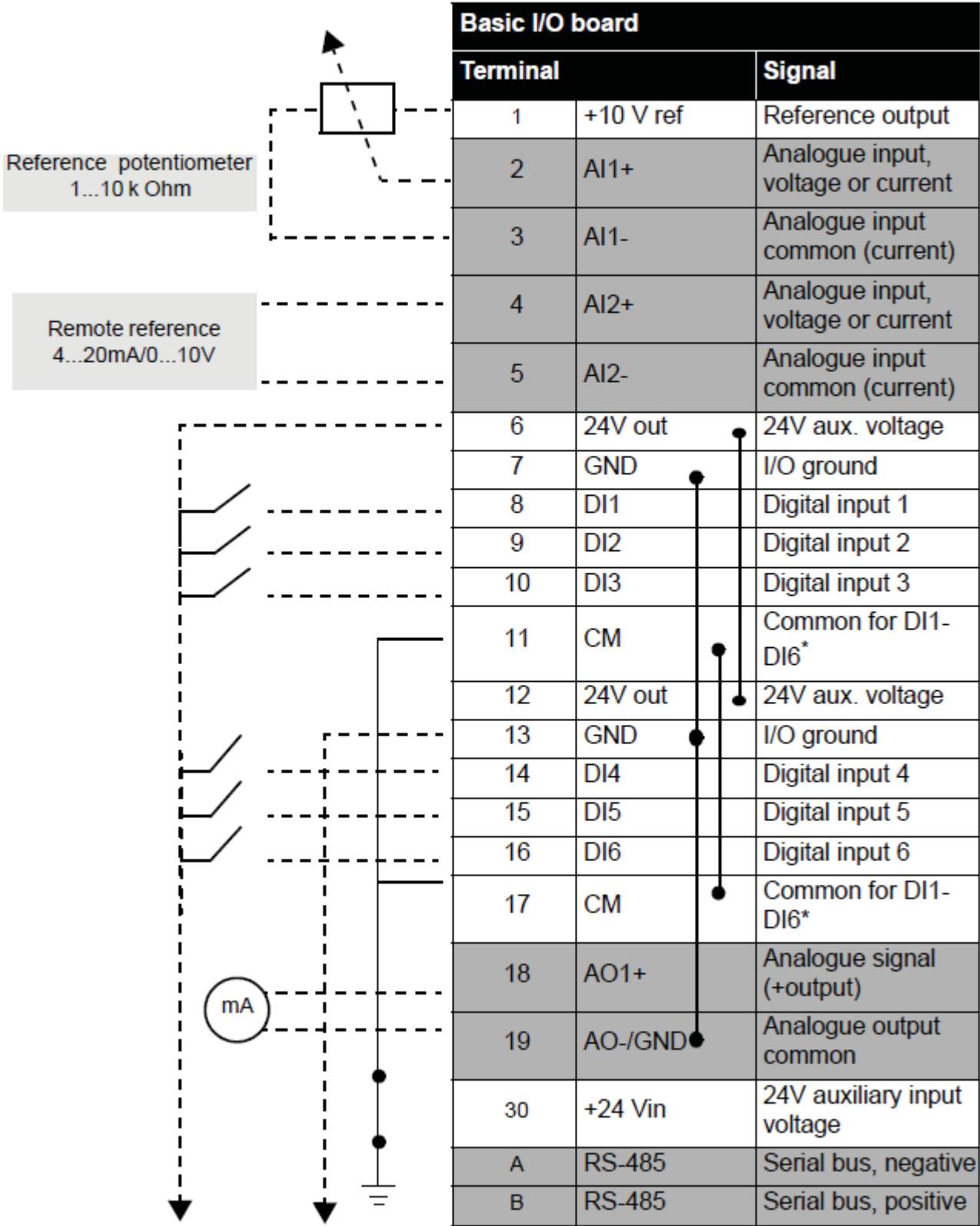


Figure 7. FS9.

Wiring Diagrams

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



Wiring Diagrams, Continued

Table 5. Control I/O Terminal Signals on Relay Board 1 and Connection Example.

From Standard I/O board		Relay board 1		Signal	Default
From term. #6 or 12	From term. #13	Terminal			
		21 RO1/1 NC		Relay output 1	RUN
		22 RO1/2 CM			
		23 RO1/3 NO			
		24 RO2/1 NC		Relay output 2	FAULT
		25 RO2/2 CM			
		26 RO2/3 NO			
		32 RO3/1 CM		Relay output 3	READY
		33 RO3/2 NO			

Table 6. Control I/O Terminal Signals on Relay Board 2 and Connection Example.

From Standard I/O board		Relay board 2		Signal	Default
From term. #12	From term. #13	Terminal			
		21 RO1/1 NC		Relay output 1	RUN
		22 RO1/2 CM			
		23 RO1/3 NO			
		24 RO2/1 NC		Relay output 2	FAULT
		25 RO2/2 CM			
		26 RO2/3 NO			
		28 TI1+		Thermistor input	
		29 TI1-			

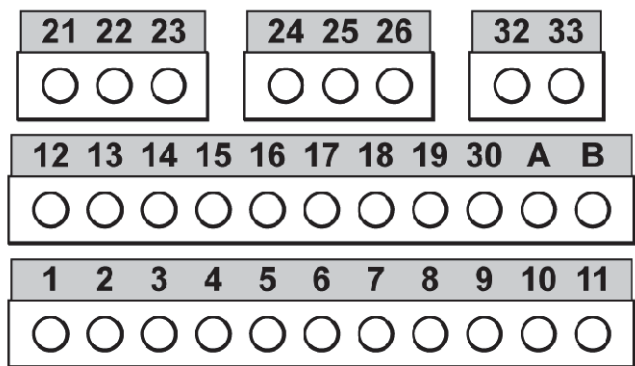


Figure 8. Basic Control Terminals.

PXC Compact Series



Figure 1. PXC Compact Series Controllers
(PXC-24 and PXC-36 shown.)

Description

The PXC Compact Series (Programmable Controller–Compact) is a high-performance Direct Digital Control (DDC) supervisory equipment controller, which is an integral part of the APOGEE® Automation System.

The PXC Compact Series offers integrated I/O based on state-of-the-art TX-I/O™ Technology, which provides superior flexibility of point and signal types, and makes it an optimal solution for Air Handling Unit (AHU) control. The PXC Compact operates stand-alone or networked to perform complex control, monitoring, and energy management functions without relying on a higher-level processor.

The PXC Compact Series communicates with other field panels or workstations on a peer-to-peer Automation Level Network (ALN) and supports the following communication options:

- Ethernet TCP/IP
- P2 RS-485

The PXC Compact is available with 16, 24, or 36 point terminations. Selected models in the Compact Series provide the following options:

- Support for FLN devices.
- An extended temperature range for the control of rooftop devices.
- Support for Island Bus, which uses TX I/O modules to expand the number of point terminations.

Features

- DIN rail mounted device with removable terminal blocks simplifies installation and servicing.
- Proven program sequences to match equipment control applications.
- Built-in energy management applications and DDC programs for complete facility management.
- Comprehensive alarm management, historical data trend collection, operator control, and monitoring functions.
- Sophisticated Adaptive Control, a closed loop control algorithm that auto-adjusts to compensate for load/seasonal changes.
- Message control for terminals, printers, pagers, and workstations.
- Highly configurable I/O using Siemens state-of-the-art TX-I/O™ Technology.
- HMI RS-232 port, which provides laptop connectivity for local operation and engineering.
- Extended battery backup of Real Time Clock.
- Persistent database backup and restore within the controller.
- Optional HOA (Hand/Off/Auto) module for swappable and configurable HOA capability.

- Optional extended temperature range for rooftop installation.
- Optional peer-to-peer communications over industry-standard 10Base-T/100Base-TX Ethernet networks.
- Optional support for FLN devices.
- Optional support for P1 Wireless FLN.
- Optional operation as a P1 FLN device with default applications.
- Optional support for Virtual AEM.
- PXM10T and PXM10S support: Optional LCD Local user interface with HOA (Hand-off-auto) capability and point commanding and monitoring features.

The Compact Series

In addition to building and system management functions, the Compact Series includes several styles of controllers that flexibly meet application needs.

PXC-16

The PXC-16 provides control of 16 points, including 8 software-configurable universal points.

Point count includes: 3 Universal Input (UI), 5 Universal I/O (U), 2 Digital Input (DI), 3 Analog Output (AOV), and 3 Digital Output (DO).

PXC-24

The PXC-24 provides control of 24 points, including 16 software-configurable universal points.

Point count includes: 3 Universal Input (UI), 9 Universal I/O (U), 4 Super Universal I/O (X), 3 Analog Output (AOV), 5 Digital Output (DO).

PXC-36

The PXC-36 provides control of 36 local points, including 24 software-configurable universal points.

Point count includes: 18 Universal I/O (U), 6 Super Universal I/O (X), 4 Digital Input (DI), and 8 Digital Output (DO).

The PXC-36 offers the flexibility of expanding the total point count through a self-forming island bus. With the addition of a TX-I/O Power Supply, up to 4 TX-I/O modules can be supported. For more information, see the *TX-I/O Product Range Technical Specification Sheet* (149-476).

Available Options

The following options are available to match the application:

Ethernet or RS-485 ALN

Support for APOGEE P2 ALN through TCP/IP or RS-485 networks.

FLN Support

- The PXC-24 "F32" models support up to 32 P1 FLN devices when the ALN is connected to TCP/IP.
- The PXC-24 "F" models with an FLN license support up to 32 P1 FLN devices when the ALN is connected to TCP/IP.
- The PXC-36 with an FLN license supports up to 96 P1 FLN devices when the ALN is connected to RS-485 or TCP/IP.
- A Wireless FLN may also be used to replace the traditional P1 FLN cabling with wireless communication links that form a wireless mesh network. Additional hardware is required to implement the Wireless FLN.

For more information about FLN support, contact your local Siemens Industry representative.

P1 FLN Operation

The PXC-16 and PXC-24 can be configured as a programmable P1 FLN device. In the P1 FLN mode, the PXC Compact functions as an equipment controller with customized programming and default applications.

Virtual AEM Support

The Virtual AEM license allows the PXC Compact to connect an RS-485 APOGEE Automation Level Network or individual field panels to a P2 Ethernet network without additional hardware.

Extended Temperature Operation

The "R" models of the PXC Compact Series support extended temperature operation, allowing for rooftop installations.

Field Panel GO

The PXC-36 supports Field Panel GO.

The Field Panel GO license provides a Web-based user interface for your APOGEE® Building Automation System. It is an ideal solution for small or remote facilities with field panels on an Ethernet Automation Level Network (ALN).

Hardware

The PXC Compact Series consists of the following major components:

- Input/Output Points
- Power Supply
- Controller Processor

Input/Output Points

- The PXC Compact input/output points perform A/D or D/A conversion, signal processing, point command output, and communication with the controller processor. The terminal blocks are removable for easy termination of field wiring.
- The Universal and Super Universal points leverage TX-I/O™ Technology from Siemens Industry to configure an extensive variety of point types.
- Universal Input (UI) and Universal Input/Output (U) points are software-selectable to be:
 - 0-10V input
 - 4-20 mA input
 - Digital Input
 - Pulse Accumulator inputs
 - 1K Ni RTD @ 32°F (Siemens, Johnson Controls, DIN Standard)
 - 1K Pt RTD (375 or 385 alpha) @ 32°F
 - 10K NTC Thermistor (Type 2 and Type 3) @ 77°F
 - 100K NTC Thermistor (Type 2) @ 77°F
 - 0-10V Analog Output (Universal Input/Output (U) points only)
- Super Universal (X) points (PXC-24 and PXC-36 only) are software-selectable to be:
 - 0-10V input
 - 4-20 mA input
 - Digital Input
 - Pulse Accumulator inputs
 - 1K Ni RTD @ 32°F (Siemens, Johnson Controls, DIN Standard)
 - 1K Pt RTD (375 or 385 alpha) @ 32°F
 - 10K NTC Thermistor (Type 2 and Type 3) @ 77°F
 - 100K NTC Thermistor (Type 2) @ 77°F
 - 0-10V Analog Output
 - 4-20 mA Analog Output
 - Digital Output (using external relay)
- Dedicated Digital Input (DI) points (PXC-16 and PXC-36 only) are dry contact status sensing.

- Digital Output (DO) points are 110/220V 4 Amp (resistive) Form C relays; LEDs indicate the status of each point.
- All PXC Compact Series models support 0-10 Vdc Voltage Analog Output circuits.
- On PXC-24 and PXC-36 models, the Super Universal circuits may be defined as 4-20 mA current AO.

Power Supply

- The 24 volt DC power supply provides regulated power to the input/output points and active sensors. The power supply is internal to the PXC Compact housing, eliminating the need for external power supply and simplifying installation and troubleshooting.
- The power supply works with the processor to ensure smooth power up and power down sequences for the equipment controlled by the I/O points, even through brownout conditions.

Controller Processor

- The PXC Compact Series includes a microprocessor-based multi-tasking platform for program execution and communications with the I/O points and with other PXC Compacts and field panels over the ALN.
- A Human Machine Interface (HMI) port, with a quick-connect phone jack (RJ-45), uses RS-232 protocol to support operator devices (such as a local user interface or simple CRT terminal), and a phone modem for dial-in service capability.
- A USB Device port supports a generic serial interface for an HMI or Tool connection.
- The program and database information stored in the PXC Compact RAM memory is battery-backed. This eliminates the need for time-consuming program and database re-entry in the event of an extended power failure.
- The firmware, which includes the operating system, is stored in non-volatile flash ROM memory; this enables firmware upgrades in the field.
- Brownout protection and power recovery circuitry protect the controller board from power fluctuations.
- LEDs provide instant visual indication of overall operation, network communication, and low battery warning.

Programmable Control with Application Flexibility

The PXC Compact Series of high performance controllers provides complete flexibility, which allows the owner to customize each controller with the exact program for the application.

The control program for each PXC Compact is customized to exactly match the application. Proven Powers Process Control Language (PPCL), a text-based programming structure like BASIC, provides direct digital control and energy management sequences to precisely control equipment and optimize energy usage.

Global Information Access

The HMI port supports operator devices, such as a local user interface or simple CRT terminal, and a phone modem for dial-in service capability. Devices connected to the operator terminal port gain global information access.

Multiple Operator Access

Multiple operators can access the network simultaneously. Multiple operator access ensures that alarms are reported to an alarm printer while an operator accesses information from a local terminal. When using the Ethernet TCP/IP ALN option, multiple operators may also access the controller through concurrent Telnet sessions and/or local operator terminal ports.

Menu Prompted, English Language Operator Interface

The PXC Compact field panel includes a simple, yet powerful, menu-driven English Language Operator Interface that provides, among other things:

- Point monitoring and display
- Point commanding
- Historical trend collection and display for multiple points
- Event scheduling
- Program editing and modification via Powers Process Control Language (PPCL)
- Alarm reporting and acknowledgment
- Continual display of dynamic information

Built-in Direct Digital Control Routines

The PXC Compact provides stand-alone Direct Digital Control (DDC) to deliver precise HVAC control and comprehensive information about system operation. The controller receives information from sensors in the building, processes the information, and directly controls the equipment. The following functions are available:

- Adaptive Control, an auto-adjusting closed loop control algorithm, which provides more efficient, adaptive, robust, fast, and stable control than the traditional PID control algorithm. It is superior in terms of response time and holding steady state, and at minimizing error, oscillations, and actuator repositioning.
- Closed Loop Proportional, Integral and Derivative (PID) control.
- Logical sequencing.
- Alarm detection and reporting.
- Reset schedules.

Built-in Energy Management Applications

The following applications are programmed in the PXC Compact Series and require simple parameter input for implementation:

- Automatic Daylight Saving Time switchover
- Calendar-based scheduling
- Duty cycling
- Economizer control
- Equipment scheduling, optimization and sequencing
- Event scheduling
- Holiday scheduling
- Night setback control
- Peak Demand Limiting (PDL)
- Start-Stop Time Optimization (SSTO)
- Temperature-compensated duty cycling
- Temporary schedule override

Specifications

Dimensions (L × W × D)

PXC-16 and PXC-24	10.7 in. × 5.9 in. × 2.45 in. (272 mm × 150 mm × 62 mm)
PXC-36	11.5 in. × 5.9 in. × 3.0 in. (293 mm × 150 mm × 77 mm)

Processor, Battery, and Memory

Processor and Clock Speed	<i>PXC-16 and PXC-24:</i> Motorola MPC852T, 100 MHz <i>PXC-36:</i> Motorola MPC885, 133 MHz
Memory	<i>PXC-16 and PXC-24:</i> 24 MB (16 MB SDRAM, 8 MB Flash ROM) <i>PXC-36:</i> 80 MB (64 MB SDRAM, 16 MB Flash ROM)
Battery backup of Synchronous Dynamic (SD) RAM (field replaceable)	<i>Non-rooftop Models:</i> 60 days (accumulated), AA (LR6) 1.5 Volt Alkaline (non-rechargeable) <i>Rooftop (Extended Temperature) Models:</i> 90 days (accumulated), AA (LR6) 3.6 Volt Lithium (non-rechargeable)
Battery backup of Real Time Clock	<i>Non-rooftop Models:</i> 10 years <i>Rooftop (Extended Temperature) Models:</i> 18 months

Communication

A/D Resolution (analog in)	16 bits
D/A Resolution (analog out)	10 bits
Ethernet/IP Automation Level Network (ALN)	10Base-T or 100Base-TX compliant
RS-485 Automation Level Network (ALN)	1200 bps to 115.2 Kbps
RS-485 P1 Field Level Network (FLN) <i>on selected models, license required</i>	4800 bps to 38.4 Kbps
Human-Machine Interface (HMI)	RS-232 compliant, 1200 bps to 115.2 Kbps
USB Device port (for non-smoke control applications only)	Standard 1.1 and 2.0 USB device port, Type B female connector.
USB Host port <i>on selected models</i> (for ancillary smoke control applications only)	Standard 1.1 and 2.0 USB host port, Type A female connector.

Electrical

Power Requirements	24 Vac ±20% input @ 50/60 Hz
Power Consumption (Maximum)	<i>PXC-16:</i> 18 VA @ 24 Vac <i>PXC-24:</i> 20 VA @ 24 Vac <i>PXC-36:</i> 35 VA @ 24 Vac

AC Power and Digital Outputs	NEC Class 1 Power Limited
Communication and all other I/O	NEC Class 2
Digital Input	Contact Closure Sensing Dry Contact/Potential Free inputs only Does not support counter inputs
Digital Output	Class 1 Relay
Analog Output	0 to 10 Vdc
Universal Input (UI) and Universal Input/Output (U)	Analog Input Voltage (0-10 Vdc) Current (4-20 mA) 1K Ni RTD @ 32°F 1K Pt RTD (375 or 385 alpha) @ 32°F 10K NTC Type 2 or Type 3 Thermistor @ 77°F 100K NTC Type 2 Thermistor @ 77°F Digital Input Pulse Accumulator Contact Closure Sensing Dry Contact/Potential Free inputs only Supports counter inputs up to 20 Hz Analog Output (Universal Input/Output (U) points only) Voltage (0-10 Vdc)
Super Universal (X)	Analog Input Voltage (0-10 Vdc) Current (4-20 mA) 1K Ni RTD @ 32°F 1K Pt RTD (375 or 385 alpha) @ 32°F 10K NTC Type 2 or Type 3 Thermistor @ 77°F 100K NTC Type 2 Thermistor @ 77°F Digital Input Pulse Accumulator Contact Closure Sensing Dry Contact/Potential Free inputs only Supports counter inputs up to 20 Hz Analog Output Voltage (0-10 Vdc) Current (4-20 mA) Digital Output (requires an external relay) 0 to 24 Vdc, 22 mA max.

Operating Environment

Ambient operating temperature	32°F to 122°F (0°C to 50°C)
Ambient operating temperature with rooftop (extended temperature) option	-40°F to 158°F (-40°C to 70°C)
Relative Humidity	<i>PXC-16 and PXC-24:</i> 5% to 95%, non-condensing <i>PXC-36:</i> 5% to 95%, non-condensing

Mounting Surface

PXC-16 and PXC-24: Direct equipment mount, building wall, or structural member
PXC-36: Building wall or a secure structure

Agency Listings

UL

UL864 UUKL (except rooftop models)
UL864 UUKL7 (except rooftop models)
CAN/ULC-S527-M8 (except rooftop models)
UL916 PAZX (all models)
UL916 PAZX7 (all models)

Agency Compliance

FCC Compliance
Australian EMC Framework
European EMC Directive (CE)
European Low Voltage Directive (LVD)

OSHPD Seismic Certification

Product meets OSHPD Special Seismic Preapproval certification (OSH-0217-10) under California Building Code 2010 (CBC2010) and International Building Code 2009 (IBC2009) when installed within the following Siemens enclosure part numbers: PXA-ENC18, PXA-ENC19, or PXA-ENC34.

Ordering Information**PXC Compact Series**

Product Number	Description
PXC16.2-P.A	PXC Compact, 16 point, RS-485 ALN
PXC16.2-PE.A	PXC Compact, 16 point, Ethernet/IP ALN
PXC24.2-P.A	PXC Compact, 24 point, RS-485 ALN
PXC24.2-PE.A	PXC Compact, 24 point, Ethernet/IP ALN
PXC24.2-PR.A	PXC Compact, 24 point, RS-485 ALN, rooftop option
PXC24.2-PER.A	PXC Compact, 24 point, Ethernet/IP ALN, rooftop option
PXC24.2-PEF.A	PXC Compact, 24 point, Ethernet/IP or RS-485 ALN. P1 FLN or Remote Ethernet/IP (Virtual AEM) option.
PXC24.2-PEF32.A	PXC Compact, 24 point, Ethernet/IP or RS-485 ALN. P1 FLN enabled
PXC24.2-PERF.A	PXC Compact, 24 point, Ethernet/IP or RS-485 ALN, rooftop option. P1 FLN or Remote Ethernet/IP (Virtual AEM) option.
PXC36-PE.A	PXC Compact, 36 point, Ethernet/IP or RS-485 ALN.
PXC36-PEF.A	PXC Compact, 36 point, Ethernet/IP or RS-485 ALN, Island Bus, P1 FLN.

Optional Licenses

Product Number	Description
LSM-FLN	License to enable FLN support on PXC-16 or PXC-24 “F” models
LSM-VAEM	License to enable Virtual AEM support when the ALN is connected to RS-485
LSM-FLN36.A	License to enable FLN support on model PXC36-PE.A
LSM-FPGO	License to enable Field Panel GO on models PXC36-PE.A and PXC36-PEF.A
LSM-IB36.A	License to enable the Island Bus on model PXC36-PE.A
LSM-36.A	License to enable both FLN and Island Bus support on model PXC36-PE.A

Accessories

Product Number	Description
PXM10S	Controller mounted Operator Display module with point monitor and optional blue backlight
PXM10T	Controller mounted Operator Display module
PXA8-M	8-switch HOA (UL864)
PXA16-M	16-switch HOA (UL864)
PXA16-MR	16-switch HOA (extended temp, UL 916) with HMI cable
PXA-HMI.CABLEP5	Serial cable required for HOA or PXM10T/S connection to non-rooftop variants of the 16-point and 24-point Compact Series (pack of 5)
TXA1.LLT-P100	Labels for HOA and TX-I/O Modules, pack of 100, letter format

Service Boxes and Enclosures

Product Number	Description
PXA-SB115V192VA	PX Series Service Box —115V, 24 Vac, 50/60 Hz, 192 VA
PXA-SB115V384VA	PX Series Service Box— 115V, 24 Vac, 50/60 Hz, 384 VA
PXA-SB230V192VA	PX Series Service Box— 230V, 24 Vac, 50/60 Hz, 192 VA
PXA-SB230V384VA	PX Series Service Box —230V, 24 Vac, 50/60 Hz, 384 VA
PXA-ENC18	18" Enclosure (Utility Cabinet) (UL Listed NEMA Type 1 Enclosure)
PXA-ENC19	19" Enclosure (UL Listed NEMA Type 1 Enclosure)
PXA-ENC34	34" Enclosure (UL Listed NEMA Type 1 Enclosure)

Documentation

Product Number	Description
553-104	PXC Compact Series Owner's Manual
125-1896	Powers Process Control Language (PPCL) User's Manual



ALARMS & INDICATION

Suggested Manufacturer:
Kele Solutions or approved equal.

ALARM HORN SC-SERIES

DESCRIPTION

The **SC Series Alarm Horns** provide an audible tone when an electric signal is applied. They can be used in applications when an audible alarm is needed to indicate that immediate attention is required.

SPECIFICATIONS

Supply Voltage	
SC110	30-120 VAC/VDC
SC628	6-28 VDC
SC628A, AN	6-28 VAC/VDC
Current Rating	
SC100	6-21 mA
SC628	3-18 mA
SC628AN	4-30 mA
SC628A	6-23 mA
Horn Loudness	Medium, 68-80 dB (AN model Loud, 80-95 dB)
Tone	Continuous
Panel Cutout	Panel, cutout 1.13" (2.87 cm)
Weight	0.1 lb (0.05 Kg)
Approvals	UL recognized component File# S1290
Warranty	1 year

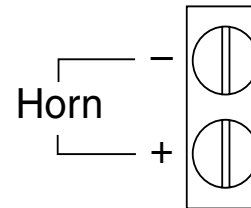
ORDERING INFORMATION

MODEL	DESCRIPTION
SC110	Alarm horn, 120 VAC
SC628	Alarm horn, 24 VDC
SC628A	Alarm horn, 24 VAC/VDC
SC628AN	Alarm horn, 24 VAC/VDC



WIRING

SC Horn



DESCRIPTION

The **Model STB** and **STB-H** wall-mounted strobes provide a bright, eye-catching warning light for any alarm application. The **STB-H** features a distinct audible signal.

FEATURES

- Wall mounted with 4" square or double-gang box
- Integral alarm horn (91 db)
- 24 VDC powered
- 15/75 candela strobe intensity
- Meets requirements of ADA4.28.3
- UL listed
- Xenon strobe for constant flash rate
- Strobe and horn powered separately if desired
- Jumper-selectable, continuous or temporal tone

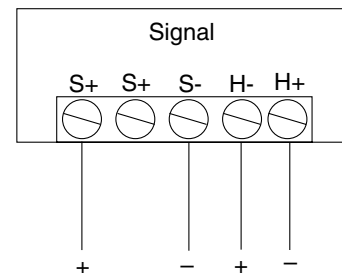
SPECIFICATIONS

Supply Voltage	20-31 VDC (24 VDC nominal)
Current Rating	
STB	80 mA at 24 VDC
STB-H	136 mA at 24 VAC
Strobe Frequency	1 Hz
Horn Loudness	104 dB max
Strobe Intensity	15 (off-center) candela 75 (on-center) candela
Operating Temperature	32° to 120°F (0° to 49°C)
Dimensions	4.5"H x 4.56"W x 2.25"D (11.43 x 11.58 x 5.72 cm)
Weight	
STB	1.0 lb (0.45 Kg)
STBH	1.1 lb (0.5 Kg)
Approvals	UL Listed File S3406
Warranty	3 years

WALL-MOUNTED STROBE STB, STB-H



WIRING



Note: Switch 1, 2 off

ORDERING INFORMATION

MODEL	DESCRIPTION
STB	Wall-mounted strobe
STB-H	Wall-mounted strobe with horn

Suggested Manufacturer:
Dwyer or approved equal.

Industrial Pressure Transmitter

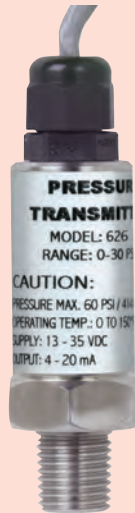
Complete Offering of Ranges, Connections and Outputs

Series

626

&

628



General Purpose Housing (-GH)



General Purpose Housing (-GH) with DIN C



626 with LED Display (CH housing only)



Conduit Housing (-CH)

*

The **Series 626 Pressure Transmitters** possess a highly precise 0.25% full scale accuracy piezo-resistive sensor contained in a compact, rugged, NEMA 4X (IP66) stainless steel general purpose housing or cast aluminum conduit housing.

The **Series 628 Pressure Transmitters** are ideal for OEMs with 1% full scale accuracy sensors. The transmitter is also available in the general purpose stainless steel housing and the cast aluminum conduit housing.

The corrosion resistant 316L stainless steel wetted parts allow the Series 626 and 628 transmitters to measure the pressure in a multitude of processes from hydraulic oils to chemicals. The Series 626 and 628 are available in ranges of vacuum, compound to 5000 psi with a variety of optional outputs, process connections and electrical terminations to allow you to select the right transmitter for your application.

APPLICATIONS

- Compressors
- Pumping systems
- Irrigation equipment
- Hydraulic
- Industrial process monitoring

FEATURES

- Metal conduit housing option
- Robust 316 SS oil filled sensor
- Compact design

SPECIFICATIONS

Service: Compatible gases and liquids.

Wetted Materials: Type 316L SS.

Accuracy:

- 626: 0.25% F.S.;
- : 0.20% RSS;
- 628: 1.0% F.S.;
- : 0.5% RSS;
- 626 Absolute Ranges: 0.5% F.S.;
- : 0.30% RSS.

(Includes linearity, hysteresis, and repeatability.)

Temperature Limit: 0 to 200°F (-18 to 93°C).

Compensated Temperature Range: 0 to 175°F (-18 to 79°C).

Thermal Effect: $\pm 0.02\%$ FS/°F (includes zero and span).

Pressure Limits: See table.

Power Requirements: 10-30 VDC (for 4-20 mA, 0-5, 1-5, 1-6 VDC outputs); 13-30 VDC (for 0-10, 2-10 VDC outputs); 5 VDC ± 0.5 VDC (for 0.5-4.5 VDC ratio-metric output).

Output Signal: 4-20 mA, 0-5 VDC, 1-5 VDC, 0-10 VDC, or 0.5-4.5 VDC.

Response Time: 50 ms.

Loop Resistance: 0-1000 Ohms max. $R_{max} = 50 (V_{ps} - 10)$ Ohms (4-20 mA output), 5K Ohms (0-5, 1-5, 1-6, 0-10, 2-10, 0.5-4.5 VDC output).

Stability: 1.0% FS/year (Typ.).

Current Consumption: 38 mA maximum (for 4-20 mA output); 10 mA maximum (for 0-5, 1-5, 1-6, 0-10, 2-10, 0.5-4.5 VDC output); 140 mA maximum (for all 626/628/629-CH with optional LED).

Electrical Connections: Conduit Housing (-CH): terminal block, 1/2" female NPT conduit; General Purpose Housing (-GH): cable DIN EN 175801-803-C.

Process Connection: 1/4" male or female NPT and BSPT.

Enclosure Rating: NEMA 4X (IP66).

Mounting Orientation: Mount in any position.

Weight: 10 oz (283 g).

Agency Approvals: CE.

Pressure Limits

Range Number	Pressure Range	Maximum Pressure (psig)	Over Pressure (psig)	Range Number	Pressure Range (psig)	Maximum Pressure (psig)	Over Pressure (psig)
00	0-15 psia	30	45	12	0-200	400	1000
30	15-0 psia	30	45	13	0-300	600	1500
06	0-5 psig	10	50	14	0-500	1000	2500
07	0-15 psig	30	150	15	0-1000	2000	5000
08	0-30 psig	60	300	16	0-1500	3000	5000
09	0-50 psig	100	300	18	0-3000	6000	7500
10	0-100 psig	200	500	19	0-5000	7500	10000
11	0-150	300	750	26	0-8000	10000	12000

Ordering Chart

Accuracy	626							0.25% Full-Scale Accuracy
	628							1.0% Full-Scale Accuracy
Range		-00						0-15 psia
		-01						0-30 psia
		-02						0-50 psia
		-03						0-100 psia
		-04						0-200 psia
		-05						0-300 psia
		-06						0-5 psi
		-07						0-15 psi
		-08						0-30 psi
		-09						0-50 psi
		-10						0-100 psi
		-11						0-150 psi
		-12						0-200 psi
		-13						0-300 psi
		-14						0-500 psi
		-22						0-600 psi
		-15						0-1000 psi
		-16						0-1500 psi
		-18						0-3000 psi
		-19						0-5000 psi
		-26						0-8000 psi
		-67						0-0.5 bar
		-71						0-2.5 bar
		-75						0-10 bar
		-81						0-40 bar
Housing		-CH						Conduit Housing
		-GH						General Purpose Housing
Process Connection			-P1					1/4" male NPT
			-P2					1/4" female NPT
			-P3					1/4" male BSPT
			-P5					1/4" female SAE with Refrigerant Valve Depressor ①
			-P9					1/2" male NPT ①
Electrical Connection			-E1					Cable Gland with 3' of Prewired Cable
			-E3					Cable Gland with 9' of Prewired Cable
			-E4					DIN EN 175801-803-L ①
			-E5					1/2" female NPT Conduit ②
			-E6					M-12 4 Pin Connector
Signal Output				-S1				4-20 mA
				-S2				1-5 VDC
				-S4				0-5 VDC
				-S5				0-10 VDC
				-S7				0.5-4.5 VDC ①
Options					-AT			Aluminum Tag
					-NIST			NIST Traceable Certificate
					-LED			Bright Red LED display ②③

① Available with -GH Housing only

② Available with -CH Housing only

③ LED option is not NEMA 4X (IP66)

④ Power Requirement: 5 VDC ±10%

Suggested Manufacturer:
Kele Solutions or approved equal.

SMD-LPI4

3-1/2 DIGIT LARGE
BLACK/RED/GREEN/AMBER DISPLAY
MODEL LPI-4

DESCRIPTION

The **Model LPI-4** loop-powered indicator features a large 1" (2.54 cm) 3-1/2 digit display. It is designed to display any 4-20 mA signal in desired scale. The **Model LPI-4** is powered directly from the 4-20 mA signal loop, so there is no need for a power supply for the black digit model. It is also available in a 24 VDC powered version with red, green, or amber digits.

FEATURES

- Indication of 4-20 mA signal in desired scale
- 3-1/2 digit LCD display
- Large, easy-to-read digits
- Available in either black, red, green, or amber digits
- Precalibrated for desired range
- Snap-in panel mount with retainer
- Negative range indicator
- Includes weather-resistant seal
- Optional jumper-selectable display units °F, °C, %, PSI

APPLICATIONS

- Temperature
- Humidity
- Pressure
- Kilowatt demand
- Gallons per minute
- Voltage/current

LPI-4



LPI-4G



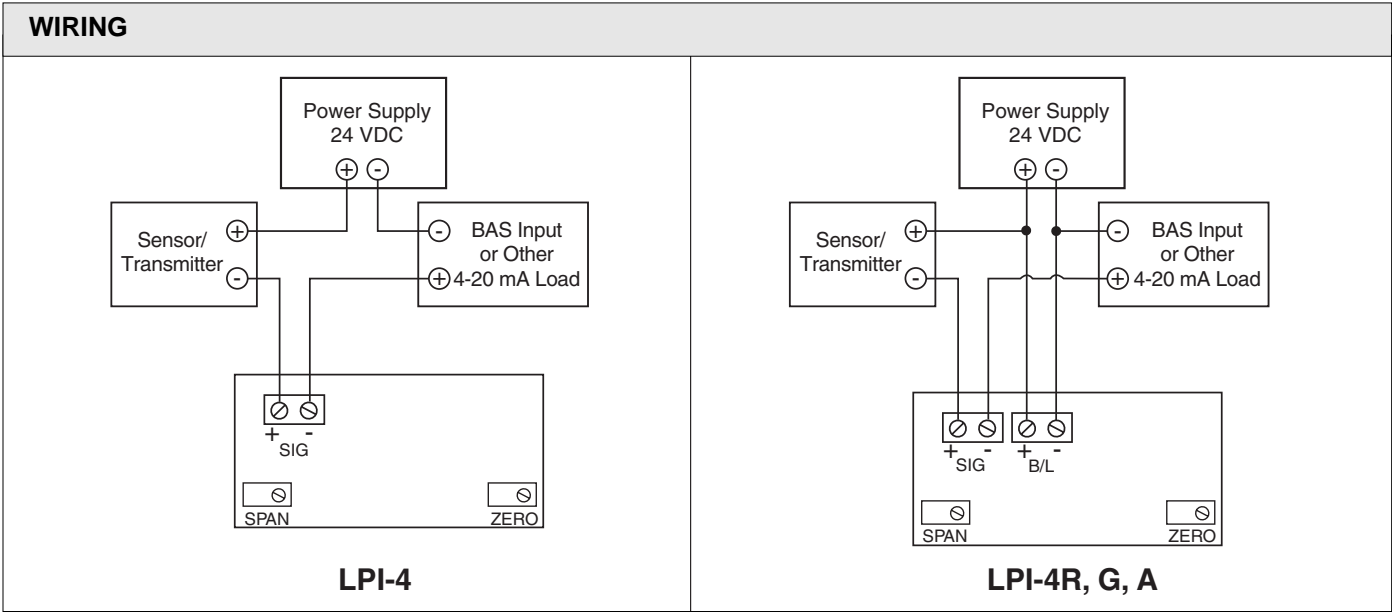
LPI-4R



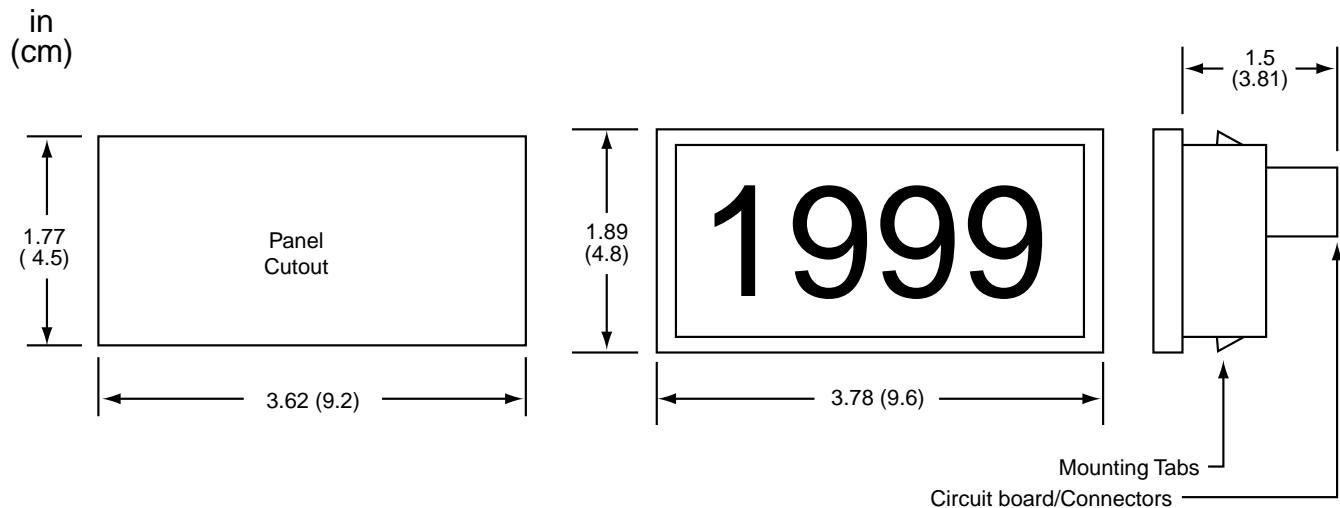
LPI-4A



SPECIFICATIONS			
Signal	4-20 mA	Range	-1999 to +1999
Power		Accuracy	±0.05% of scale +1 digit
Black	Loop powered	Ambient	32° to 122°F (0° to 50°C)
Red/Green/Amber	24 VDC, 35 mA max		95% noncondensing
Impedance	300Ω	Cutout required	1.77" x 3.62" (4.5 x 9.2 cm)
Digit count	3-1/2 digits (1999 max)	Dimensions	3.78"W x 1.89"H (9.6 x 4.8 cm)
Digit size	1" (2.54 cm)	Depth	1.5" (3.81 cm)
Decimal point	3 positions or none (1.0.0.0)	Weight	4 oz (113g)



PANEL MOUNTING INFORMATION



RECALIBRATION INFORMATION

Decimal Point Jumpers

Decimal Jumper Selection

J4	=	1000
J5	=	1.000
J6	=	10.00
J7	=	100.0

Engineering Unit Display



No Jumper = No Unit Display

Calibration Jumpers

If offset (zero) is 0 or
offset (zero) is > 0 and
gain (span) ÷ offset (zero) > 5



If offset (zero) is > 0 and
gain (span) ÷ offset (zero) < 5



Final Adjustment Set Up

1. Apply 4.00 mA, and adjust the ZERO pot for the desired low numeric display.
2. Apply 20.00 mA, and adjust the SPAN pot for the desired maximum numeric display.
3. Repeat steps 1 and 2 until both desired high and low readings are obtained (4-5 passes typical).

ORDERING INFORMATION

LPI-4	3-1/2 Digit Black Panel Display
LPI-4R	3-1/2 Digit Red Panel Display
LPI-4G	3-1/2 Digit Green Panel Display
LPI-4A	3-1/2 Digit Amber Panel Display

Specify scale, range, and decimal location when ordering.

Aluminum engineering units plate will be provided upon request at no charge (2.00" x 0.75" tag with 0.125" letters).
Available plates are % RH, AMPS, DEG C., DEG F., GPM, x10 GPM, KW, KWH, PSIG, and "W.C.