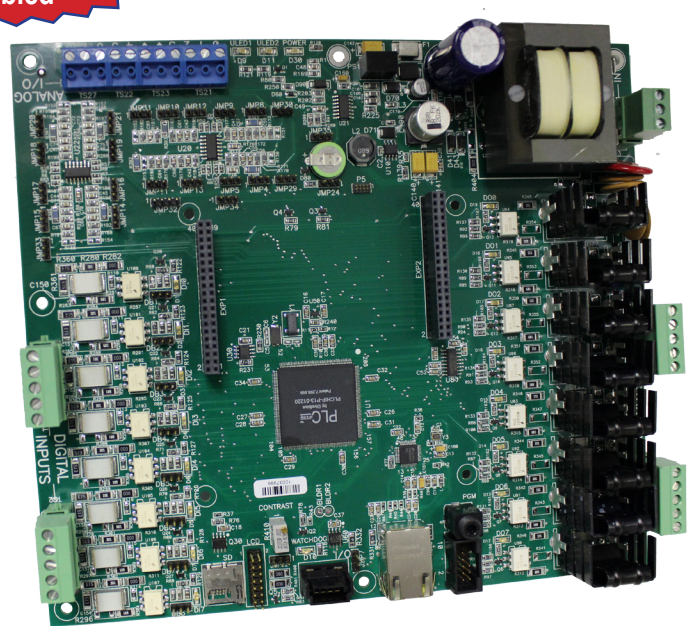
Divelbiss CORPORATION

P-SERIES BEAR BONES

Open-Board Controllers and Plug-in Options

NOW VersaCloud M2M Enabled

- AC / DC Power and I/O Models
- 8 Digital Inputs - Isolated
- 8 Digital Outputs - Isolated
- Expandable Digital I/O
- 12-bit Analog Inputs
- 10-bit Analog Output
- Visual Status Indicators (LED)
- Structured Text Support
- Quick Disconnect Field Connections
- Programs with EZ LADDER Toolkit
- Ethernet using Modbus TCP
- Real Time Clock
- LCD Display & Keypad Support
- -40°C to 80°C Operating Temperature
- SD Card Support
- Supports J1939, NMEA 2000 & OptiCAN



P-Series Bear Bones Controller

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Typical Applications Include:

- Material Handling
- Machine Control
- Remote Locations Monitoring & Control
- Engine Driven Pumps, Compressors & Generators

The P-Series Bear Bones consists of open-board Controllers, I/O Expanders and Specialty Expanders. The P-Series Bear Bones provides powerful control features that include analog and digital I/O, CAN network communication via OptiCAN, Ethernet Modbus TCP, LCD Display and Keypad. Based on the second generation of PLC on a Chip™, the controllers are easy to program using Divelbiss EZ LADDER Toolkit PC based software. The Controllers are available with AC or DC power and I/O.

The P-Series Bear Bones digital I/O capabilities may be expanded by the **P-Series Bear Bones Digital I/O Expanders**. Each I/O Expander provides another 8 digital inputs and 8 digital outputs and are available with AC or DC I/O. Up to 31 I/O Expanders may be connected and addressed to one P-Series Bear Bones controller.

The P-Series Bear Bones Controller's footprint is identical to the original Bear Bones making the P-Series Bear Bones controller a mechanical drop-in replacement. Being mechanically the same, the P-Series Bear Bones Controller allow for powerful and easy hardware upgrades to equipment using the original Bear Bones.

VersaCloud M2M Connectivity:

The P-Series Bear Bones controllers are now VersaCloud M2M enabled devices. VersaCloud M2M is a complete end-to-end remote monitoring and control solution. VersaCloud solutions provide the complete communications and control link from the controller via **Ethernet**, **Wi-Fi** or **cellular**[Note1] data directly to a VersaCloud M2M **Cloud** server. The device communication is controlled at the device(s) and is based on the needs of the application including the amounts and types of data, the frequency of communication and remote control options.

VersaCloud M2M solutions include the actual cloud portal. Users can view remote device data and optionally control over any device or internet connection via the cloud portal. The portal dashboards are customizable with drag and drop widgets. Additional features include the ability to trigger on events including SMS (text) messages and emails based on actual remote device data. For more detailed information, see our website at http://www.divelbiss.com

Programming the Controller:

The P-Series Bear Bones Controllers program in Ladder Diagram using Divelbiss EZ Ladder Toolkit, a Ladder Diagram Development Platform. EZ Ladder software parallels the IEC-61131 standard, provides an easy to use interface and supports ladder diagram, function block and structured text.

After a ladder diagram program is developed, it can be downloaded to the P-Series Bear Bones controller via the serial port or Ethernet Port. The program is stored on non-volatile FLASH memory and is automatically executed on power up. Once the download is complete, the controller is successfully programmed and begins executing the program. The P-Series Bear Bones Controllers supports the use of Structured Text.

Refer to the EZ Ladder User's Manual for more detail on creating ladder diagram programs, connecting to targets and downloading the program to targets. The manual can be downloaded from our website: http://www.divelbiss.com The Programming port requires a programming cable, part number SI-PGM (sold separately).

Digital Inputs:

There are 8 digital inputs standard on the P-Series Bear Bones controllers. All inputs will operate from 8-32VDC or 90-130VAC (model dependent) and are divided into 2 groups of 4 inputs. All inputs support sinking and sourcing per input group based on wiring configuration. The digital inputs are accessed in the ladder program by the use of contacts and boolean variables.

Digital Outputs:

There are 8 digital outputs standard on the P-Series Bear Bones controllers. All outputs will operate from 8-32VDC or 90-130VAC (model dependent) and can sink or source (AC Models) or sink (DC Models) up to 2 Amps each. These 8 digital outputs are divided into 2 groups of 4. All the digital outputs operate as digital outputs (Off / On operation).

Ethernet:

An Ethernet port is available on supported P-Series Bear Bones models. The Ethernet port is accessible via an industry standard RJ45 connection and auto detects the cable type. The P-Series Bear Bones controller's Ethernet port may be used as a programming port, it may be configured and used as a Modbus Master or Modbus Slave (Modbus TCP) and supports connections via VersaCloud M2M. This port may be field configured with multiple options and supports fixed as well as dynamic IP addressing (DHCP).

SD Memory:

An industry standard Micro SD memory card may be installed on the P-Series Bear Bones controllers. A Micro SD plug-in socket is standard to each controller. This card can be used for installing or updating ladder programs or controller kernel files and may be used for data logging.

I/O Port - CAN Network Communications / I/O Expansion:

The P-Series Bear Bones controllers' CAN Ports support Divelbiss OptiCAN. Divelbiss OptiCAN is a proprietary register based CAN network that allows controllers, I/O modules and HMI devices to communicate to each other. OptiCAN utilizes the on-board CAN network port (I/O) on the P-Series Bear Bones controllers.

OptiCAN supports up to 64 devices and each device supports up to 256 network registers. Register transmission may be based on time or triggered by an event. The OptiCAN network provides function blocks for controlling the network and network status.

The CAN Network Port (I/O) is the expansion port for all P-Series Bear Bones I/O Expanders. Expanders connected to the I/O port utilize the OptiCAN network communications. This port supports up to 31 I/O Expanders and can accept a total of 64 devices.

The on-board I/O-CAN Network port supports J1939 and NMEA 2000 networking. Refer to the P-Series EZ LADDER Toolkit Manual for details on using and implementing these networks.

Real Time Clock:

The P-Series Bear Bones controllers allow for the use of real time in the user programs with the inclusion of a real time clock. The on-board real time clock allows the user and user program to read and set the current date and time as required by the application. The real time clock supports the month, day, year and day of week for date functions and hour, minute and seconds for time functions. The real time clock is maintained by an internal lithium battery and is enabled internally by a jumper.

FRAM Retentive Memory / EEPROM Memory:

The P-Series Bear Bones controllers utilize FRAM technology for retentive variables in the user program. Variables declared as retentive, are automatically stored into the FRAM memory when a loss of power is detected and then reloaded automatically when power is restored. In addition to retentive variables, other variables in the user program may be stored into and recalled as needed from FRAM memory by using the EEPROM_READ and EEPROM_WRITE function blocks. The P-Series Bear Bones controllers provide a total of 480 bytes of FRAM that may be divided into retentive variable storage and EEPROM type storage using EZ LADDER Toolkit.

In addition to FRAM, the PLC on a Chip™ also supports internal EEPROM memory that may be utilized in the ladder diagram by the EEPROM_READ and EEPROM_WRITE function blocks.

Plug-In Expansion:

In addition to Digital I/O expansion, the P-Series Bear Bones allows additional expansion via on-board EXP connections. A variety of Expansion options are available that support features such as legacy timer (ICM-PUI-01) and advanced features including VersaCloud M2M communications options (Wi-Fi[Note 5] and Cellular).

Models & Ordering Information:

CONTROLLER MODELS	DESCRIPTION
ICM-BB-P13-30	P-Series Bear Bones Controller with all features , 8-32VDC Input Power and I/O. VersaCloud Enabled via Ethernet on main controller[Note 2]
ICM-BB-P13-40	P-Series Bear Bones Controller with all features, 90-130VAC Input Power and I/O. VersaCloud Enabled via Ethernet on main controller[Note 2]
ICM-BB-P13-31	P-Series Bear Bones Controller with all features except Ethernet, 8-32VDC Input Power and I/O. VersaCloud function only using Plug-in Expansion[Note 2]
ICM-BB-P13-41	P-Series Bear Bones Controller with all features except Ethernet, 90-130VAC Input Power and I/O. VersaCloud function only using Plug-in Expansion[Note 2]
PLUG-IN EXPANDER MODELS	**DESCRIPTION**
ICM-PUI-01	Specialty Expander, Operates as the original ICM-TM-01, TM-02 or TM-03
ICM-BBP13EXP-C-X-X	P-Series Bear Bones VersaCloud M2M Expander with 512K Battery Backed S-RAM, Cellular
ICM-BBP13EXP-X-W-X	P-Series Bear Bones VersaCloud M2M Expander with 512K Battery Backed S-RAM, Wi-Fi[Note 5]
ICM-BBP13EXP-X-X-G	P-Series Bear Bones VersaCloud M2M Expander with 512K Battery Backed S-RAM, GPS
ICM-BBP13EXP-C-X-G	P-Series Bear Bones VersaCloud M2M Expander with 512K Battery Backed S-RAM, Cellular and GPS
ICM-BBP13EXP-X-W-G	P-Series Bear Bones VersaCloud M2M Expander with 512K Battery Backed S-RAM, Wi-Fi[Note 5] and GPS
ICM-BBP13EXP-C-W-X	P-Series Bear Bones VersaCloud M2M Expander with 512K Battery Backed S-RAM, Cellular and Wi-Fi[Note 5]
ICM-BBP13EXP-C-W-G	P-Series Bear Bones VersaCloud M2M Expander with 512K Battery Backed S-RAM, Cellular, Wi-Fi[Note 5] and GPS

Controllers Specifications:

	ICM-BB-P13-30	ICM-BB-P13-31	ICM-BB-P13-40	ICM-BB-P13-41
Memory				
512K Flash Total / > 229K Available to User	■	■	■	■
3500 Bytes EEPROM	■	■	■	■
32K Bytes RAM	■	■	■	■
Micro SD Card Socket	■	■	■	■

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	ICM-BB-P13-30	ICM-BB-P13-31	ICM-BB-P13-40	ICM-BB-P13-41
Ports & Networking				
1 Programming Port (Uses SI-PGM cable)	■	■	■	■
1 Ethernet Port (RJ45)	■		■	
1 CAN Port, 4 Pin 3M Link (Used for Digital I/O Expansion)	■	■	■	■
CAN Networks: SAE J1939, NMEA 2000, OptiCAN	■	■	■	■
Modbus Networking: Modbus TCP	■		■	
Digital I/O				
8 Digital Inputs, 8-32VDC, Optically Isolated	■	■		
8 Digital Inputs, 90-130VAC, Optically Isolated			■	■
Inputs SK = Sink, SC = Source, E = Sink or Source	E	E	E	E
8 Digital Outputs, 8-32VDC, Optically Isolated, 2A / point	■	■		
8 Digital Outputs, 90-130VAC, Optically Isolated, 2A / point			■	■
Outputs SK = Sink, SC = Source, E = Sink or Source	SK	SK	E	E
Analog I/O				
Analog Inputs: Qty 8 Note 3: (0-5VDC, 0-10VDC or 0-20mADC), Jumper Configured, 12 Bit Resolution	■	■	■	■
Analog Outputs: Qty 1 Note 4 (0-5VDC or 0-10VDC), Jumper Configured 10 Bit Resolution	■	■	■	■
Other Features				
Real Time Clock (Time, Month, Day, Year, Day of Week)	■	■	■	■
LCD Display Port (1-4 Rows, 8-40 Columns)	■	■	■	■
Keypad Port (4 Row x 5 Columns max)	■	■	■	■
Progams in Ladder Diagram, Function Block and Structured Text using EZ LADDER Toolkit	■	■	■	■
LEDs: Power, Watchdog	■	■	■	■
Expansion				
Digital I/O - Accepts P-Series Bear Bones I/O Expanders with 8 Inputs / 8 Outputs each (maximum 31 Expanders)	■	■	■	■
Specialty Plug-in Expanders with Legacy Timer Support, Wi-Fi Note 2, Cellular Note 2 and GPS Note 2	■	■	■	■
Power, Mechanical and Environmental				
Input Power: 8-32VDC / 44mA@24VDC (no loads). On-board polyfuse protection (DC Supply)	■	■		
Input Power: 90-130VAC / 27mA @ 120VAC Input (no loads). On-board polyfuse protection (DC supply), field replaceable glass fuse (AC Input Power).			■	■
Operating Temperature: -40°C to +80°C	■	■	■	■
Dimensions: 9.0” x 8.0” x 1.5” (no plug-in expansion installed)	■	■	■	■
Mounting: Standoffs and screws.	■	■	■	■

Note 1: Cellular data provided by VersaCloud by Divelbiss
Note 2: VersaCloud features require VersaCloud M2M Package with Cloud Portal. Additional charges apply to connected devices.
Note 3: Qty 8 if not using Analog Output
Note 4: Uses 1 Analog Input
Note 5: Wi-Fi equipped expanders are not compatible with P-Series Bear Bones controllers with Ethernet. Compatible only with non-Ethernet models (ICM-BB-P13-31/ICM-BB-P13-41)

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