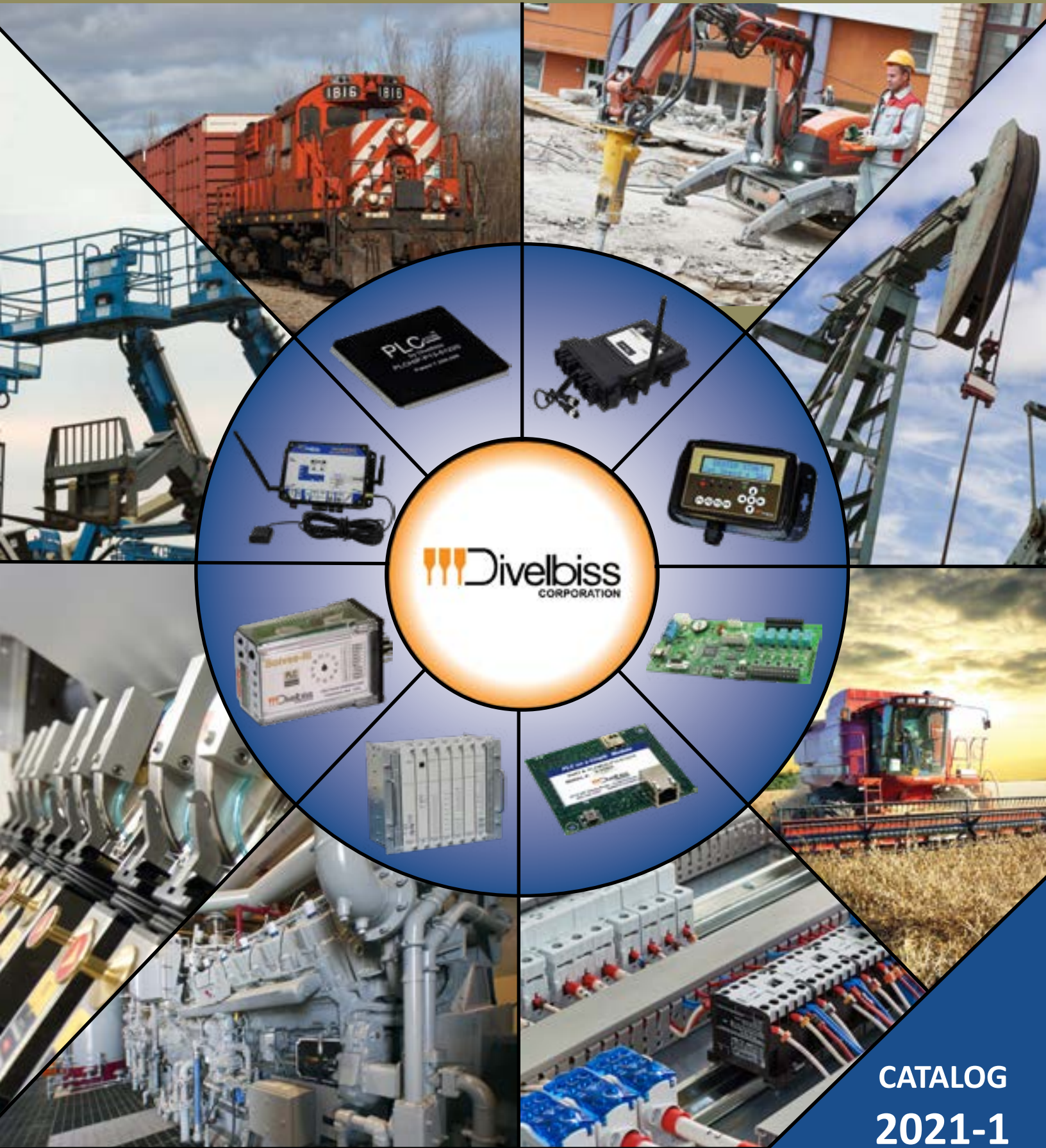


Programmable Controls ▶ PLCs ▶ IoT Solutions ▶ Custom Electronics & Controls



CATALOG
2021-1

CONTROL SOLUTIONS

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This Catalog Supersedes all previous catalogs and price lists.
Specifications Subject to Change without Notice

P-Series HEC Controller

Feature	HEC-P2000	HEC-P2001	HEC-P2010	HEC-P5000	HEC-P5010	HEC-P5100	HEC-P5110	HEC-P5200	HEC-P5210	HEC-P6000	HEC-P6010	HEC-P6100	HEC-P6110	HEC-P6200	HEC-P6210
Digital I/O															
QTY Digital Inputs 8-32VDC ¹	8	8	8	16	16	16	16	16	16	14	14	14	14	14	14
Digital Input Sink (SK), Source (SC) or Both (B) ²	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
QTY High Speed Counter Inputs (8-32VDC) ¹	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
QTY Quadrature Inputs (8-32VDC) ¹	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
QTY Digital Outputs 8-32VDC ³	8	8	8	16	16	16	16	16	16	14	14	14	14	14	14
Pulse Width Modulation Outputs ³	8	8	8	12	12	12	12	12	12	12	12	12	12	12	12
QTY Programmable Indicators	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2
Communications / Networking															
QTY RS232 Serial Ports	1	1	1	2 ⁵	2 ⁵			2 ⁵	2 ⁵	2 ⁵	2 ⁵			2 ⁵	2 ⁵
QTY RS485 Serial Ports (Qty)	1	1	1	2 ⁵	2 ⁵			2 ⁵	2 ⁵	2 ⁵	2 ⁵			2 ⁵	2 ⁵
CAN Ports	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2
SAE J1939 (Read/Write), NMEA 2000, OptiCAN	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Modbus Master / Slave	•	•	•	•	•			•	•	•	•			•	•
Modbus TCP		•		•	•			•	•	•	•			•	•
Ethernet Port				•	•						•	•			
Wi-Fi		•						•	•					•	•
Cellular Connectivity for Data			•		•		•		•		•		•		•
Analog I/O															
QTY Analog Inputs (12 bit) ⁶				2	2	2	2	2	2	4	4	4	4	4	4
QTY Analog Outputs (12 bit), 0-10VDC										2	2	2	2	2	2
Other Features															
GPS Location ⁴	•	•	•		•			•	•		•			•	•
Real Time Clock	•	•	•	•	•			•	•	•	•			•	•
Micro SD Card Support	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Input Power (VDC)	9-32	9-32	9-32	8-32	8-32	8-32	8-32	8-32	8-32	8-32	8-32	8-32	8-32	8-32	8-32
Temperature -40°C to 85°C	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

- Quantity of digital inputs shown is total. Quadrature and Counter function as standard digital input, counter input or quadrature.
- Digital Inputs support Sinking, Sourcing or both, but may be supported individually per input or as a group of inputs - See Controller Manual for details.
- Quantity of Digital Outputs shown is total. Operate standard on/off output. Some or all may be configured as PWM (included in total number of outputs).
- GPS Location via external HEC-GPS module that connects to one RS232 Serial Port.
- Serial Ports Quantity total is shown. Field configurable individually as RS232 or RS485.
- Analog inputs are individually field configurable for 0-5VDC, 0-10VDC or 0-20mA DC.

M-Series HEC Controller

Feature	HEC-1500-E-R	HEC-1504-E-R	HEC-2000-E-R	HEC-2004-E-R	HEC-4000-E-R	HEC-4004-E-R	HEC-4010-E-R	HEC-4014-E-R	HEC-4100-E-R	HEC-4104-E-R	HEC-4110-E-R	HEC-4114-E-R	HEC-4200-E-R	HEC-4204-E-R	HEC-4210-E-R	HEC-4214-E-R
Digital I/O																
QTY Digital Inputs 8-32VDC ¹	6	6	8	8	4	4	4	4	4	4	4	4	4	4	4	4
Digital Input Sink (SK), Source (SC) or Both (B) ²	SK, B	SK, B	SK	SK	SK	SK	SK	SK	SK	SK	SK	SK	SK	SK	SK	SK
QTY High Speed Counter Inputs (8-32VDC) ¹	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
QTY Digital Outputs 8-32VDC ³	6	6	8	8	6	6	6	6	6	6	6	6	6	6	6	6
Pulse Width Modulation Outputs ³	6	6	8	8	6	6	6	6	6	6	6	6	6	6	6	6
Digital Output / PWM Current Sensing					•	•	•	•	•	•	•	•	•	•	•	•
Digital Output Status Sensing	•	•	•	•												
QTY Programmable Indicators	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Communications / Networking																
QTY Field Configurable RS232 / RS422 / RS485 Serial Ports		1		1	1	1		1		1		1		1		1
CAN Ports	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2
SAE J1939 (Read), OptiCAN	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Modbus Slave		•		•	•	•		•		•		•		•		•
Analog I/O																
QTY Analog Inputs 0-5VDC (Resolution)							4 10-bit	4 10-bit			4 12-bit	4 12-bit			4 15-bit	4 15-bit
QTY Analog Inputs 0-20mADC (Resolution)					4 10-bit	4 10-bit			4 12-bit	4 12-bit			4 15-bit	4 15-bit		
QTY Analog Inputs, Field Selectable 0-5VDC, 0-10VDC or 0-20mADC (10 bit)	2	2														
Other Features																
Real Time Clock	•	•														
Input Power (VDC)	8-32	8-32	8-32	8-32	8-32	8-32	8-32	8-32	8-32	8-32	8-32	8-32	8-32	8-32	8-32	8-32
Temperature -25°C to 85°C		•		•		•		•		•		•		•		•
Temperature -40°C to 85°C	•		•		•		•		•		•		•		•	

- Quantity of digital inputs shown is total. Counters function as standard digital input or counter.
- Digital Inputs support Sinking, Sourcing or both, but may be supported individually per input or as a group of inputs - See Controller Manual for details.
- Quantity of Digital Outputs shown is total. Operate standard on/off output,. Some or all may be configured as PWM (included in total number of outputs).

HEC-HMI Controller

Feature	HEC-HMI-C2100-E-R	HEC-HMI-C2101-E-R	HEC-HMI-C2102-E-R	HEC-HMI-C2150-E-R	HEC-HMI-C2151-E-R	HEC-HMI-C2152-E-R	HEC-HMI-C4100-E-R	HEC-HMI-C4101-E-R	HEC-HMI-C4102-E-R	HEC-HMI-C4150-E-R	HEC-HMI-C4151-E-R	HEC-HMI-C4152-E-R	HEC-HMI-2-E-R	HEC-HMI-21-E-R	HEC-HMI-22-E-R	HEC-HMI-4-E-R	HEC-HMI-41-E-R	HEC-HMI-42-E-R
Digital I/O																		
QTY Digital Inputs 8-32VDC ¹	6	6	6	6	6	6	6	6	6	6	6	6						
Digital Input Sink (SK), Source (SC) or Both (B) ²	SK, B	SK, B	SK, B	SK, B	SK, B	SK, B	SK, B	SK, B	SK, B	SK, B	SK, B	SK, B						
QTY High Speed Counter Inputs (2.5-5VDC, 8-32VDC) ¹	2	2	2	2	2	2	2	2	2	2	2	2						
Quadrature Counter / Count Up or Down (A, B, Index)		1	1		1	1		1	1		1	1		1	1		1	1
QTY Solid-State / PWM Digital Outputs 8-32VDC	4	8	6	4	4	6	4	4	6	4	4	6		4	2		4	2
Output (PWM) Current Feedback	•	•	•	•	•	•	•	•	•	•	•	•						
QTY Relay Outputs	2	2	2	2	2	2	2	2	2	2	2	2						
QTY Programmable Indicators	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
QTY Programmable Buttons	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Communications / Networking																		
QTY Field Configurable RS232 / RS422 /RS485 Serial Ports	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CAN Ports	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SAE J1939 (Read), OptiCAN	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Modbus Slave	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Analog I/O																		
QTY Analog Inputs, Field Selectable 0-5VDC or 0-20mADC (Resolution)	2 10-bit			2 15-bit			2 10-bit			2 15-bit								
QTY Analog Inputs, Field Selectable 0-5VDC, 0-10VDC or 0-20mADC (Resolution)		1 10-bit	1 10-bit		1 15-bit	1 15-bit		1 10-bit	1 10-bit		1 15-bit	1 15-bit		1 10-bit	1 10-bit		1 10-bit	1 10-bit
QTY Thermocouple Inputs, Type K			2			2			2			2			2			2
QTY Analog Outputs, Field Configurable 0-10VDC or 0-20mADC (Resolution)			2 12-bit			2 12-bit			2 12-bit			2 12-bit			2 12-bit			2 12-bit
Other Features																		
2x16 or 4x20 Backlit LCD Display	2x16	2x16	2x16	2x16	2x16	2x16	4x20	4x20	4x20	4x20	4x20	4x20	2x16	2x16	2x16	4x20	4x20	4x20
Input Power (VDC)	8-32	8-32	8-32	8-32	8-32	8-32	8-32	8-32	8-32	8-32	8-32	8-32	8-32	8-32	8-32	8-32	8-32	8-32
Temperature -40°C to 85°C	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

1. Quantity of digital inputs shown is total. Counters function as standard digital input or counter.
 2. Digital Inputs support Sinking, Sourcing or both, but may be supported individually per input or as a group of inputs - See Controller Manual for details.

P-Series Open Board Controller								
Feature	VB-2000	VB-2100	VB-2120	VB-2200	ICM-BB-P13-30	ICM-BB-P13-31	ICM-BB-P13-40	ICM-BB-P13-41
Digital I/O								
QTY Digital Inputs (Voltage)	12 8-32VDC	12 8-32VDC	12 8-32VDC	12 8-32VDC	8 8-32VDC	8 8-32VDC	8 90-130VAC	8 90-130VAC
Digital Input Sink (SK), Source (SC) or Both (B) ¹	B	B	B	B	B	B	B	B
QTY High Speed Counter Inputs (8-32VDC) ¹	3	3	3	3				
QTY Digital Outputs (Voltage)	8 8-32VDC	8 8-32VDC	8 8-32VDC	8 8-32VDC	8 8-32VDC	8 8-32VDC	8 90-130VAC	8 90-130VAC
Digital Output Sink (SK), Source (SC) or Both (B) ⁴	SC	SC	SC	SC	SK	SK	B	B
Pulse Width Modulation Outputs ²	8	8	8	8				
QTY Programmable Indicators	2	2	2	2				
Expandable I/O	•	•	•	•	•	•	•	•
Communications / Networking								
QTY RS232 Serial Ports	1	1	1	1				
QTY RS485 Serial Ports	1	1	1	1				
CAN Ports	1	1	1	1	1	1	1	1
SAE J1939 (Read/Write), NMEA 2000, OptiCAN	•	•	•	•	•	•	•	•
Modbus Master / Slave	•	•	•	•				
Modbus TCP ³		•	•	•	•	•	•	•
Ethernet Port		•		•	•		•	
Wi-Fi (on-board or via Expansion Option)			•			•		•
Cellular Connectivity for Data Expansion Option	•	•	•	•	•	•	•	•
Analog I/O								
QTY Analog Inputs (12 bit), 0-5VDC / 0-10VDC / 0-20mADC (Field Configurable)	7	7	7	7	8	8	8	8
QTY Analog Outputs (10 bit), 0-10VDC / 0-20mADC (Field Configurable)	1	1	1	1				
QTY Analog Outputs (10 Bit) 0-5VDC / 0-10VDC (Field Selectable) ⁵					1	1	1	1
Thermocouple Input Expansion Options	•	•	•	•				
Other Features								
GPS Location Expansion Option	•	•	•	•	•	•	•	•
Keypad / LCD Display Expansion Options	•	•	•	•	•	•	•	•
Real Time Clock		•	•	•	•	•	•	•
Micro SD Card Support	•	•	•	•	•	•	•	•
Input Power (Voltage)	8-32VDC	8-32VDC	8-32VDC	8-32VDC	8-32VDC	8-32VDC	90-130VAC	90-130VAC
Temperature -40°C to 85°C	•	•	•	•	•	•	•	•

1. Digital Inputs support Sinking, Sourcing or both, but may be supported individually per input or as a group of inputs - See Controller Manual for details.
 2. Quantity of Digital Outputs shown is total. Operate standard on/off output. Some or all may be configured as PWM (included in total number of outputs).
 3. Modbus TCP is available when either Ethernet Enabled, Wi-Fi Enabled or Wi-Fi via Expansion Option.
 4. Digital Outputs support Sinking, Sourcing or both, but may be supported individually per input or as a group of inputs - See Controller Manual for details.
 5. Analog Output uses one Analog Input channel, reducing # of Analog inputs total by one.

M-Series Open Board Controller

Feature	VB-1000	ICM-MB-100	ICM-MB-110	ICM-EBB-100	ICM-EBB-200	ICM-EBB-300	ICM-EBB-400	ICM-EBB-500	ICM-EBB-600	ICM-EBB-700
Digital I/O										
QTY Digital Inputs (Voltage) ¹	12 8-32VDC	6 9-32VDC	6 9-32VDC	5 10-32VAC	5 10-32VAC	5 10-32VAC	5 10-32VAC	5 10-32VAC	5 10-32VAC	5 10-32VAC
Digital Input Sink (SK), Source (SC) or Both (B) ²	B	B	B	B	B	B	B	B	B	B
QTY High Speed Counter Inputs (Voltage) ¹	2 8-32VDC	1 9-32VDC	1 9-32VDC		1 8-32VDC	1 8-32VDC	1 8-32VDC	1 8-32VDC	1 8-32VDC	1 8-32VDC
QTY Solid-State Digital Outputs (Voltage) ³	8 8-32VDC									
QTY Relay Outputs (Voltage)		4	4	5	5	5	5	5	5	5
Pulse Width Modulation Outputs ³	8									
Digital I/O Expansion (Type)	4 Out (VBEX)						8 In / 8 Out (EBB IO)	8 In / 8 Out (HDIO)	8 In / 8 Out (EBB IO)	8 In / 8 Out (HDIO)
QTY Programmable Indicators	1	2	2							
Communications / Networking										
QTY Field Configurable RS232 Serial Ports	1									
QTY Field Install Serial Port (one of RS232, RS422 or RS485)									1	1
CAN Ports	2								1	1
SAE J1939 (Read), OptiCAN	•								•	•
Modbus Slave	•								•	•
Analog I/O										
QTY Analog Inputs 0-5VDC (10 Bit)		1	2							
QTY Analog Inputs, Field Selectable 0-5VDC, 0-10VDC or 0-20mADC (10 bit)	7									
Other Features										
Real Time Clock						•	•	•	•	•
Input Power (VDC)	8-32VDC	9-32VDC	9-32VDC	10VAC or 12VDC	10VAC or 12VDC	10VAC or 12VDC	10VAC or 12VDC	10VAC or 12VDC	10VAC or 12VDC	10VAC or 12VDC
Programmable LED Display / Push buttons			•							
Temperature 0°C to 60°C		•	•							
Temperature -40°C to 60°C				•	•	•	•	•	•	•
Temperature -40°C to 85°C	•									

- Quantity of digital inputs shown is total. Counters function as standard digital input or counter.
- Digital Inputs support Sinking, Sourcing or both, but may be supported individually per input or as a group of inputs - See Controller Manual for details.
- Quantity of Digital Outputs shown is total. Operate standard on/off output. Some or all may be configured as PWM (included in total number of outputs).

PCS Controller

Feature	PCS-100	PCS-101	PCS-102	PCS-110	PCS-111	PCS-112	PCS-120	PCS-121	PCS-122	PCS-130	PCS-131	PCS-132	PCS-200	PCS-201	PCS-202	PCS-210	PCS-211	PCS-212	PCS-220	PCS-221	PCS-222	PCS-230	PCS-231	PCS-232	
Digital I/O																									
MAX Inputs using High Density I/O (External I/O Cards), Sold Separately	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128
MAX Outputs using High Density I/O (External I/O Cards), Sold Separately	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128
QTY High Speed Counter Inputs 8-32VDC)													2	2	2	2	2	2	2	2	2	2	2	2	2
QTY PWM Outputs, 8-bit (16 bit) Resolution, Open Drain, 24VDC Max		2 (1)	2 (1)		2 (1)	2 (1)		2 (1)	2 (1)		2 (1)	2 (1)		2 (1)	2 (1)		2 (1)	2 (1)		2 (1)	2 (1)		2 (1)	2 (1)	
Synchronous Serial Interface Port (SSI)													•	•	•	•	•	•	•	•	•	•	•	•	•
Communications / Networking																									
Factory Installed RS232 Serial Port (1)				•	•	•										•	•	•							
Factory Installed RS422 Serial Port (1)							•	•	•										•	•	•				
Factory Installed RS485 Serial Port (1)										•	•	•											•	•	•
CAN Ports													2	2	2	2	2	2	2	2	2	2	2	2	2
SAE J1939 (Read), OptiCAN													•	•	•	•	•	•	•	•	•	•	•	•	•
Modbus Slave				•	•	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•
Analog I/O																									
QTY Analog Inputs, 0-5VDC, 10 Bit Resolution		6			6			6			6			6			6			6			6		
QTY Analog Inputs, 0-20mA, 10 Bit Resolution			6			6			6			6			6			6			6			6	
QTY Analog Outputs, 0-5VDC, 8-bit (16-bit) Resolution		4 (2)			4 (2)			4 (2)			4 (2)			4 (2)			4 (2)			4 (2)			4 (2)		
QTY Analog Outputs, 0-20mA 8-bit (16-bit) Resolution			4 (2)			4 (2)			4 (2)			4 (2)			4 (2)			4 (2)			4 (2)			4 (2)	
Other Features																									
Real Time Clock	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Input Power, 10VAC or 10-30VDC	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Temperature 0°C to 60°C	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Feature*	SOLVES-IT! Controller					
	SI-100	SI-101	SI-110	SI-200	SI-201	SI-210
Digital I/O						
QTY Dedicated Digital Inputs ¹ , 8-32VDC	4	4		4	4	
Dedicated Digital Inputs Sink (SK), Source (SC)	SC	SK		SC	SK	
QTY High Speed Counter Inputs ¹	1	1	1	1	1	1
QTY Dedicated Solid-State Digital Outputs, 8-32VDC	4	4	2	4	4	2
Dedicated Digital Outputs Sink (SK), Source (SC)	SC	SK	SC	SC	SK	SC
QTY Total of Multi-Function I/O (Operate as digital input or digital output each), Inputs (Sinking) / Outputs (Sourcing)			4 / 4			4 / 4
QTY Programmable Push Buttons				2	2	2
QTY Programmable Indicators	4	4	1	4	4	1
Analog I/O						
QTY Analog Inputs 0-10VDC (10 Bit)			1			1
QTY Analog Inputs, on-board Potentiometer			2			2
Other Features						
Real Time Clock				•	•	•
Input Power (Voltage)	8-32VDC	8-32VDC	8-32VDC	8-32VDC	8-32VDC	8-32VDC
4 Digit LED Display, Programmable				•	•	•
Temperature -40°C to 65°C	•	•		•	•	•

* Features are for Rev2.0 Hardware only.

1. Total Digital Inputs Shown. Counter is dual function as counter and digital input. When used as counter, reduces digital input count (or multi-function I/O) by 1.

- ▶ J1939 / NMEA 2000 / OptiCAN Networking
- ▶ Operating Temperature -40° to 80° C
- ▶ 12 Bit Analog Inputs & Outputs
- ▶ High Current Outputs with PWM Capability
- ▶ High Speed and Quadrature Counting
- ▶ Ethernet, Serial & CAN Communications
- ▶ Cellular^{1,2}, Wi-Fi² and GPS Options
- ▶ Quick Disconnect Field Connections
- ▶ Output Load Current Monitoring
- ▶ Micro SD Card Support
- ▶ Sealed and Ruggedized



HEC-P6010 Programmable Logic Controller

Overview:

HEC-P6000 Harsh Environment Series Controllers allow for programmable intelligence under less than ideal conditions. Features include a sealed, water-tight enclosure, analog and digital I/O, high speed counting, TCP/IP, CAN network and serial communications including Modbus, J1939 and NMEA 2000. Based on second generation PLC on a Chip™ technology, the controller is easy to apply and program using EZ Ladder Toolkit PC based software that supports ladder diagram, function block and structured text. The HEC-P6000 Series Controllers are suitable for direct mounting on machines and is an ideal choice for mobile, marine, agriculture, mining, oil, and gas in addition to most electro-hydraulic applications.

Ordering Information: (see Specifications for complete list of features per model)

Model	Description
HEC-P6000	P6000 Base Model Controller with 14 Inputs, 14 Outputs, Counter Inputs, 4 Analog Inputs, 2 Analog Outputs, Serial Ports, 2 CAN Ports, Real Time Clock and Ethernet
HEC-P6010	Base Model P6000 with Cellular Module and GPS Module Interface Port (GPS Sold Separately)
HEC-P6100	P6100 Base Model Controller Model with 14 Inputs, 14 Outputs, Counter Inputs, 4 Analog Inputs, 2 Analog Outputs and 2 CAN Ports (No Ethernet, Real Time Clock or Serial Ports).
HEC-P6110	Base Model P6100 with Cellular Module
HEC-P6200	P6200 Base Model Controller with 14 Inputs, 14 Outputs, Counter Inputs, 4 Analog Inputs, 2 Analog Outputs, Serial Ports, 2 CAN Ports, Real Time Clock, Wi-Fi and GPS Module Interface Port (GPS Sold Separately) (No Ethernet)
HEC-P6210	Base Model P6200 with Cellular Module, Wi-Fi and GPS Module Interface Port (GPS Sold Separately) (No Ethernet)
HEC-P5-GPS	HEC-P6010 / P6200 / P6210 Series External GPS Module

HEC-P6000 Series Controllers

The HEC-P6000 Series Controller’s on-board features include 14 digital inputs, 14 digital outputs (12 are PWM capable), 4 analog inputs that are field configurable for 0-5VDC, 0-10VDC or 0-20mA, two 0-10VDC analog outputs, digital output load current monitoring, communication ports (RS232, RS485, CAN, Ethernet, Wi-Fi² and Cellular^{1,2}), Real Time Clock, 3 high speed counting inputs (100KHz), quadrature inputs (A, B, Reset), micro-SD card socket and programmable LED indicators all in a sealed, robust package.

HEC-P6000 Series Controller Programming

The HEC-P6000 Series Controllers program using Divelbiss EZ Ladder Toolkit, a Ladder Diagram Development Platform that allows for programming in ladder diagram (LD), function block (FB) and structured text (ST). EZ Ladder software parallels the IEC-61131 standard and provides an easy to use interface.

After a ladder diagram program is developed, it can be downloaded to the controller via the programming port, Ethernet Port or Wi-Fi (model dependent). The program is stored on non-volatile FLASH memory and is automatically executed on power up.

J1939 / NMEA 2000 / OPTICAN Connectivity

The HEC-P6000 Series Controllers provide two Controller Area Network (CAN) ports that may be configured to communicate to other devices using J1939, NMEA 2000 and OptiCAN. The HEC-P6000 Series controllers allow for user-defined J1939 and NMEA 2000 messages.

When implemented in a J1939 system, PGNs and SPNs may be utilized from the built-in database. In addition, custom messaging allows the definition of custom PGNs and SPNs, whether broadcast or request. Address claim functionality is now fully supported with a user defined Name field, as is a user selectable bit-rate. When needed, BAM and CM messaging may also be utilized. With these tools, it is now possible to send or request any PGN/SPN or send/receive diagnostic messages DM1, DM2, or DM3.

HEC-P6000 Series Controller Specifications / Features			
Processor / Memory / Programming	HEC-P6000 / HEC-P6010	HEC-P6100 / HEC-P6110	HEC-P6200 / HEC-P6210
Processor / Memory / EEPROM	P-Series PLC on a Chip™ 32K RAM, 512K Flash / 3500 Bytes EEPROM 4Mbit Battery Backed SRAM (HEC=P6010)	P-Series PLC on a Chip™ 32K RAM, 512K Flash / 3500 Bytes EEPROM 4Mbit Battery Backed SRAM (HEC=P6110)	P-Series PLC on a Chip™ 32K RAM, 512K Flash / 3500 Bytes EEPROM 4Mbit Battery Backed SRAM
Retentive Memory (FRAM)	480 Bytes	480 Bytes	480 Bytes
Micro SD Card	Yes, Update Programs / Kernels Data-logging w/ EZ LADDER Version 1.2.1.0 or newer	Yes, Update Programs / Kernels Data-logging w/ EZ LADDER Version 1.2.1.0 or newer	Yes, Update Programs / Kernels Data-logging w/ EZ LADDER Version 1.2.1.0 or newer
Programming	Ladder Diagram / Structured Text / Function Block	Ladder Diagram / Structured Text / Function Block	Ladder Diagram / Structured Text / Function Block
Digital I/O			
Digital Inputs, 8-32VDC	Qty 14, Sink/Source (group of 5 / group of 3)	Qty 14, Sink/Source (group of 5 / group of 3)	Qty 14, Sink/Source (group of 5 / group of 3)
High Speed Counter / Timer Inputs, 8-32VDC ³	Qty 3, NPN/PNP, 100KHz Max.	Qty 3, NPN/PNP, 100KHz Max.	Qty 3, NPN/PNP, 100KHz Max.
Quadrature Inputs ³	Qty 3, Quadrature Inputs, A/B/Reset	Qty 3, Quadrature Inputs, A/B/Reset	Qty 3, Quadrature Inputs, A/B/Reset
Digital Outputs, 8-32VDC, On/Off only	Qty 2, Sourcing, 2 Amp with Derating Curve	Qty 2, Sourcing, 2 Amp with Derating Curve	Qty 2, Sourcing, 2 Amp with Derating Curve
Digital Outputs, 8-32VDC, PWM or On/Off	Qty 12, Sourcing, 2 Groups of 6, 2 Amp with Derating Curve	Qty 12, Sourcing, 2 Groups of 6, 2 Amp with Derating Curve	Qty 12, Sourcing, 2 Groups of 6, 2 Amp with Derating Curve
Digital Output / PWM Frequency	1.0 Hz to 1.0 KHz	1.0 Hz to 1.0 KHz	1.0 Hz to 1.0 KHz
Digital Output Current Monitoring (PWM channels)	4 Channels Current Feedback total	4 Channels Current Feedback total	4 Channels Current Feedback total
Indicator LEDs	2 Programmable, 1 Power, 1 Status	2 Programmable, 1 Power, 1 Status	2 Programmable, 1 Power, 1 Status
Programmable Switches	2, Dip, Internal	2, Dip, Internal	2, Dip, Internal
Analog I/O			
Analog Inputs (12 bit)	Qty 4, 0-5VDC / 0-10VDC / 0-20mADC	Qty 4, 0-5VDC / 0-10VDC / 0-20mADC	Qty 4, 0-5VDC / 0-10VDC / 0-20mADC
Analog Outputs (12 bit)	Qty 2, 0-10VDC	Qty 2, 0-10VDC	Qty 2, 0-10VDC
Communications			
Serial Ports	2 RS232/RS485 via M12 8 Pin 1 Programming via Deutsch 'A' Connector	1 Programming via Deutsch 'A' Connector	2 RS232/RS485 via M12 8 Pin 1 Programming via Deutsch 'A' Connector
CAN Ports	Qty 2 via Deutsch 'A' Connector	Qty 2 via Deutsch 'A' Connector	Qty 2 via Deutsch 'A' Connector
CAN Networks Supported	J1939, NMEA 2000, OptiCAN	J1939, NMEA 2000, OptiCAN	J1939, NMEA 2000, OptiCAN
Ethernet Port	Yes, via M12, 4 pin D-Coded	No	No
Modbus Networking	Serial - Modbus Master / Slave Ethernet Modbus TCP (Client/Server)	No	Serial - Modbus Master / Slave Modbus TCP (Client/Server)
Supports VersaCloud Wi-Fi Module ²	No	No	Yes
Supports VersaCloud via Ethernet ²	Yes	No	No
Supports VersaCloud Cellular ^{1,2}	No (HEC-P6000) Yes (HEC-P6010)	No (HEC-P6100) Yes (HEC-P6110)	No (HEC-P6200) Yes (HEC-P6210)
Supports External GPS Module	No (HEC-P6000) Yes (HEC-P6010)	No	Yes
Other			
Input Power	8-32VDC 60mA@24VDC with no communications enabled	8-32VDC 60mA@24VDC with no communications enabled	8-32VDC 60mA@24VDC with no communications enabled
Real Time Clock	MM/DD/YY, Day of Week, HR/MM/SS	No	MM/DD/YY, Day of Week, HR/MM/SS
Style / Mounting	Sealed Enclosure / Panel Mount	Sealed Enclosure / Panel Mount	Sealed Enclosure / Panel Mount
Connections	4 Deutsch DT Series (coded A,B,C,D) M12 Cable (8 pin)	4 Deutsch DT Series (coded A,B,C,D)	4 Deutsch DT Series (coded A,B,C,D) M12 Cable (8 pin)
Dimensions	6.3" x 7.92" x 2.15"	6.3" x 7.92" x 2.15"	6.3" x 7.92" x 2.15"
Operating Temperature	-40°C to +80°C	-40°C to +80°C	-40°C to +80°C

VersaCloud:

The HEC-P6000 Series supports VersaCloud M2M solutions for remote reporting and control via multiple communications avenues including Ethernet, Wi-Fi², GPS and Cellular^{1,2} data (model dependent). VersaCloud provides flexible communications and monitoring of on-factory-floor or remote equipment via VersaCloudM2M Cloud portals. Features include monitoring, control, software updates and more.

1: Cellular data provided by VersaCloud by Divelbiss

2: VersaCloud features require VersaCloud M2M Package with Cloud Portal. Additional charges apply to connected devices.

3: Counter & Quadrature Inputs are included in the quantity of digital inputs. Counter inputs may be used as counter or standard digital input. Quadrature inputs may be used as quadrature counter or standard digital input.

- ▶ J1939 / NMEA 2000 / OptiCAN Networking
- ▶ Operating Temperature -40° to 80° C
- ▶ 12 Bit Analog Inputs
- ▶ High Current Outputs with PWM Capability
- ▶ High Speed and Quadrature Counting
- ▶ Ethernet, Serial & CAN Communications
- ▶ Cellular^{1,2}, Wi-Fi² and GPS Options
- ▶ Quick Disconnect Field Connections
- ▶ Output Load Current Monitoring
- ▶ Micro SD Card Support
- ▶ Sealed and Ruggedized



HEC-P5010 Programmable Logic Controller

Overview:

HEC-P5000 Harsh Environment Series Controllers allow for programmable intelligence under less than ideal conditions. Features include a sealed, water-tight enclosure, analog and digital I/O, high speed counting, TCP/IP, CAN network and serial communications including Modbus, J1939 and NMEA 2000. Based on second generation PLC on a Chip™ technology, the controller is easy to apply and program using EZ Ladder Toolkit PC based software that supports ladder diagram, function block and structured text. The HEC-P5000 Series Controllers are suitable for direct mounting on machines and is an ideal choice for mobile, marine, agriculture, mining, oil, and gas in addition to most electro-hydraulic applications.

Ordering Information: (see Specifications for complete list of features per model)

Model	Description
HEC-P5000	P5000 Base Model Controller with 16 Inputs, 16 Outputs, Counter Inputs, Analog Inputs, Serial Ports, CAN Ports, Real Time Clock and Ethernet
HEC-P5010	Base Model P5000 with Cellular Module and GPS Module Interface Port (GPS Sold Separately)
HEC-P5100	P5100 Base Model Controller Model with 16 Inputs, 16 Outputs, Counter Inputs, Analog Inputs and CAN Ports (No Ethernet, Real Time Clock or Serial).
HEC-P5110	Base Model P5100 with Cellular Module
HEC-P5200	P5200 Base Model Controller with Wi-Fi and GPS Module Interface Port (GPS Sold Separately) (No Ethernet)
HEC-P5210	Base Model P5200 with Cellular Module, Wi-Fi and GPS Module Interface Port (GPS Sold Separately) (No Ethernet)
HEC-P5-GPS	HEC-P5010 / P5200 / P5210 Series External GPS Module

HEC-P5000 Series Controllers

The HEC-P5000 Series Controller’s on-board features include 16 digital inputs, 16 digital outputs (12 are PWM capable), 2 analog inputs that are field configurable for 0-5VDC, 0-10VDC or 0-20mA, output load current monitoring, communication ports (RS232, RS485, CAN, Ethernet, Wi-Fi² and Cellular^{1,2}), Real Time Clock, 3 high speed counting inputs (100KHz), quadrature inputs (A, B, Reset), micro-SD card socket and programmable LED indicators all in a sealed, robust package.

HEC-P5000 Series Controller Programming

The HEC-P5000 Series Controllers program using Divelbiss EZ Ladder Toolkit, a Ladder Diagram Development Platform that allows for programming in ladder diagram (LD), function block (FB) and structured text (ST). EZ Ladder software parallels the IEC-61131 standard and provides an easy to use interface.

After a ladder diagram program is developed, it can be downloaded to the controller via the programming port or Ethernet Port. The program is stored on non-volatile FLASH memory and is automatically executed on power up.

J1939 / NMEA 2000 / OPTICAN Connectivity

The HEC-P5000 Series Controllers provide two Controller Area Network (CAN) ports that may be configured to communicate to other devices using J1939, NMEA 2000 and OptiCAN. The HEC-P5000 Series controllers now allow for user-defined J1939 and NMEA 2000 messages.

When implemented in a J1939 system, PGNs and SPNs may be utilized from the built-in database. In addition, custom messaging allows the definition of custom PGNs and SPNs, whether broadcast or request. Address claim functionality is now fully supported with a user defined Name field, as is a user selectable bit-rate. When needed, BAM and CM messaging may also be utilized. With these tools, it is now possible to send or request any PGN/SPN or send/receive diagnostic messages DM1, DM2, or DM3.

HEC-P5000 Series Controller Specifications / Features			
Processor / Memory / Programming	HEC-P5000 / HEC-P5010	HEC-P5100 / HEC-P5110	HEC-P5200 / HEC-P5210
Processor / Memory / EEPROM	P-Series PLC on a Chip™ 32K RAM, 512K Flash / 3500 Bytes EEPROM	P-Series PLC on a Chip™ 32K RAM, 512K Flash / 3500 Bytes EEPROM	P-Series PLC on a Chip™ 32K RAM, 512K Flash / 3500 Bytes EEPROM
Retentive Memory (FRAM)	480 Bytes	480 Bytes	480 Bytes
Micro SD Card	Yes, Update Programs / Kernels Data-logging w/ EZ LADDER Version 1.2.1.0 or newer	Yes, Update Programs / Kernels Data-logging w/ EZ LADDER Version 1.2.1.0 or newer	Yes, Update Programs / Kernels Data-logging w/ EZ LADDER Version 1.2.1.0 or newer
Programming	Ladder Diagram / Structured Text / Function Block	Ladder Diagram / Structured Text / Function Block	Ladder Diagram / Structured Text / Function Block
Digital I/O			
Digital Inputs, 8-32VDC	Qty 16, Sink/Source in 2 Groups of 5	Qty 16, Sink/Source in 2 Groups of 5	Qty 16, Sink/Source in 2 Groups of 5
High Speed Counter / Timer Inputs, 8-32VDC ³	Qty 3, NPN/PNP, 100KHz Max.	Qty 3, NPN/PNP, 100KHz Max.	Qty 3, NPN/PNP, 100KHz Max.
Quadrature Inputs ³	Qty 3, Quadrature Inputs, A/B/Reset	Qty 3, Quadrature Inputs, A/B/Reset	Qty 3, Quadrature Inputs, A/B/Reset
Digital Outputs, 8-32VDC, On/Off only	Qty 4, Sourcing, 2 Amp with Derating Curve	Qty 4, Sourcing, 2 Amp with Derating Curve	Qty 4, Sourcing, 2 Amp with Derating Curve
Digital Outputs, 8-32VDC, PWM or On/Off	Qty 12, Sourcing, 2 Groups of 6, 2 Amp with Derating Curve	Qty 12, Sourcing, 2 Groups of 6, 2 Amp with Derating Curve	Qty 12, Sourcing, 2 Groups of 6, 2 Amp with Derating Curve
Digital Output / PWM Frequency	1.0 Hz to 1.0 KHz	1.0 Hz to 1.0 KHz	1.0 Hz to 1.0 KHz
Digital Output Current Monitoring (PWM channels)	6 Channels Current Feedback total	6 Channels Current Feedback total	6 Channels Current Feedback total
Indicator LEDs	2 Programmable, 1 Power, 1 Status	2 Programmable, 1 Power, 1 Status	2 Programmable, 1 Power, 1 Status
Analog I/O			
Analog Inputs (12 bit)	Qty 2, 0-5VDC / 0-10VDC / 0-20mADC	Qty 2, 0-5VDC / 0-10VDC / 0-20mADC	Qty 2, 0-5VDC / 0-10VDC / 0-20mADC
Communications			
Serial Ports	2 RS232/RS485 via M12 5 Pin (HEC-P5000) 2 RS232/RS485 via M12 8 Pin (HEC-P5010) 1 Programming via Deutsch 'A' Connector	1 Programming via Deutsch 'A' Connector	2 RS232/RS485 via M12 8 Pin 1 Programming via Deutsch 'A' Connector
CAN Ports	Qty 2 via Deutsch 'A' Connector	Qty 2 via Deutsch 'A' Connector	Qty 2 via Deutsch 'A' Connector
CAN Networks Supported	J1939, NMEA 2000, OptiCAN	J1939, NMEA 2000, OptiCAN	J1939, NMEA 2000, OptiCAN
Ethernet Port	Yes, via M12, 4 pin D-Coded	No	No
Modbus Networking	Serial - Modbus Master / Slave Ethernet Modbus TCP (Client/Server)	No	Serial - Modbus Master / Slave Modbus TCP (Client/Server)
Supports VersaCloud Wi-Fi Module ²	No	No	Yes
Supports VersaCloud via Ethernet ²	Yes	No	No
Supports VersaCloud Cellular ^{1,2}	No (HEC-P5000) Yes (HEC-P5010)	No (HEC-P5100) Yes (HEC-P5110)	No (HEC-P5200) Yes (HEC-P5210)
Supports External GPS Module	No (HEC-P5000) Yes (HEC-P5010)	No	Yes
Other			
Input Power	8-32VDC 85mA@12VDC with no communications enabled	8-32VDC 85mA@12VDC with no communications enabled	8-32VDC 85mA@12VDC with no communications enabled
Real Time Clock	M/M/DD/YY, Day of Week, HR/MM/SS	No	M/M/DD/YY, Day of Week, HR/MM/SS
Style / Mounting	Sealed Enclosure / Panel Mount	Sealed Enclosure / Panel Mount	Sealed Enclosure / Panel Mount
Dimensions	6.3" x 7.92" x 2.15"	6.3" x 7.92" x 2.15"	6.3" x 7.92" x 2.15"
Operating Temperature	-40°C to +80°C	-40°C to +80°C	-40°C to +80°C

VersaCloud:

The HEC-P5000 Series now supports VersaCloud M2M solutions for remote reporting and control via multiple communications avenues including Ethernet, Wi-Fi², GPS and Cellular^{1,2} data (model dependent). VersaCloud provides flexible communications and monitoring of on-factory-floor or remote equipment via Cloud portals. Features include monitoring, control, software updates and more.

1: Cellular data provided by VersaCloud by Divebiss

2: VersaCloud features require VersaCloud M2M Package with Cloud Portal. Additional charges apply to connected devices.

3. Counter Inputs

- ▶ J1939 / NMEA 2000 / OptiCAN Networking
- ▶ Operating Temperature -40° to 80° C
- ▶ SAE J1939, NMEA 2000
- ▶ High Current Outputs with PWM Capability
- ▶ High Speed and Quadrature Inputs
- ▶ Serial & CAN Communications
- ▶ Cellular¹, Wi-Fi¹ and GPS Options
- ▶ Quick Disconnect Field Connections
- ▶ Real Time Clock
- ▶ Micro SD Card Support
- ▶ Sealed and Ruggedized



HEC-P2001 Programmable Logic Controller

Overview:

HEC-P2000 Harsh Environment Series Controllers allow for programmable intelligence under less than ideal conditions. Features include a sealed, water-tight enclosure, digital I/O, high speed counting, TCP/IP, CAN network and serial communications including Modbus, J1939 and NMEA 2000. Based on second generation PLC on a Chip™ technology, the controller is easy to apply and program using EZ Ladder Toolkit PC based software that supports ladder diagram, function block and structured text. The HEC-P2000 Series Controllers are suitable for direct mounting on machines and is an ideal choice for mobile, marine, agriculture, mining, oil, and gas in addition to most electro-hydraulic applications. The HEC-P2000 Series Controllers offer powerful features in a robust and small footprint.

HEC-P2000 Series Controllers

The HEC-P2000 Series Controller’s on-board features include 8 digital inputs (sink/source configurable, 3 channels are high speed counter / quadrature to 100KHz), 8 digital outputs (all are PWM capable), communication ports (1 RS232, 1 RS485, CAN, , Wi-Fi¹ and Cellular¹), Real Time Clock, micro-SD card socket and programmable LED indicator all in a small, sealed, robust package.

HEC-P2000 Series Controller Programming

The HEC-P2000 Series Controllers program using Divebiss EZ Ladder Toolkit, a Ladder Diagram Development Platform that allows for programming in ladder diagram (LD), function block (FB) and structured text (ST). EZ Ladder software parallels the IEC-61131 standard and provides an easy to use interface.

After a ladder diagram program is developed, it can be downloaded to the controller via the programming port, or Wi-Fi (model depeent) or loaded from the microSD card socket. The program is stored on non-volatile FLASH memory and is automatically executed on power up.

SAE J1939 / NMEA 2000 / OPTICAN / CAN Connectivity

The HEC-P2000 Series Controllers provide one Controller Area Network (CAN) port that may be configured to communicate to other devices using SAEJ1939, NMEA 2000 and OptiCAN. The HEC-P2000 Series controllers allow for user-defined SAE J1939 and NMEA 2000 messages.

When implemented in a SAE J1939 system, PGNs and SPNs may be utilized from the built-in database. In addition, custom messaging allows the definition of custom PGNs and SPNs, whether broadcast or request. Address claim functionality is now fully supported with a user defined Name field, as is a user selectable bit-rate. When needed, BAM and CM messaging may also be utilized. With these tools, it is now possible to send or request any PGN/SPN or send/receive diagnostic messages DM1, DM2, or DM3. Additional raw CAN packet communications is supported via built-in Structured Text.

Wi-Fi, Cellular and Serial Communications

The HEC-P2000 Series Controllers supports 2 serial ports standard (1 RS232, 1 RS485). The HEC-GPS module is compatible with the serial ports connector and provides GPS (global positioning). The HEC-P2000 Series Controllers offer Wi-Fi¹ connectivity for Modbus TCP, Webserver and Cloud Portal Solutions and features an internal antenna with external antenna options available. The HEC-P2000 Series Controllers offer Cellular¹ data connectivity for Cloud Portal Solutions and features an external antenna.

Cloud Portal Solutions:

The HEC-P2000 Series supports standard protocols for remote reporting and control via multiple communications avenues including Wi-Fi¹, GPS and Cellular¹ data to Cloud Portals. Supported protocols include COAP and MQTT. Different Cloud Portal Solutions are available and are recommended based on number fo reporting devices, amount of data, frequency of data as well as cost considerations. Solutions can range from basic to completely custom.

Ordering Information: (see Specifications for complete list of features per model)

Model	Description
HEC-P2000	P2000 Base Model Controller with 8 Inputs, 8 Outputs, Counter Inputs, Serial Ports, CAN Port and Real Time Clock
HEC-P2001	P2000 Base Model Controller with 8 Inputs, 8 Outputs, Counter Inputs, Serial Ports, CAN Port, Real Time Clock and Wi-Fi
HEC-P2010	P2000 Base Model Controller with 8 Inputs, 8 Outputs, Counter Inputs, Serial Ports, CAN Port, Real Time Clock and Cellular Modem

HEC-P2000 Series Controller Specifications / Features			
Processor / Memory / Programming	HEC-P2000	HEC-P2001	HEC-P2010
Processor / Memory / EEPROM	P-Series PLC on a Chip™ 32K RAM, 256K Flash 3500 Bytes EEPROM	P-Series PLC on a Chip™ 32K RAM, 256K Flash 3500 Bytes EEPROM	P-Series PLC on a Chip™ 32K RAM, 256K Flash 3500 Bytes EEPROM
Retentive Memory (FRAM)	480 Bytes	480 Bytes	480 Bytes
Micro SD Card	Yes, Update Programs / Kernels Data-logging, Webserver	Yes, Update Programs / Kernels Data-logging, Webserver	Yes, Update Programs / Kernels Data-logging, Webserver
Programming	Ladder Diagram / Structured Text / Function Block	Ladder Diagram / Structured Text / Function Block	Ladder Diagram / Structured Text / Function Block
Digital I/O			
Digital Inputs, 8-32VDC	Qty 8, Sink/Source (group of 5) NPN/PNP Individual 3 inputs	Qty 8, Sink/Source (group of 5) NPN/PNP Individual 3 inputs	Qty 8, Sink/Source (group of 5) NPN/PNP Individual 3 inputs
High Speed Counter / Timer Inputs, 8-32VDC ²	Qty 3, NPN/PNP, 100KHz Max.	Qty 3, NPN/PNP, 100KHz Max.	Qty 3, NPN/PNP, 100KHz Max.
Quadrature Inputs ²	Qty 3, Quadrature Inputs, A/B/Reset 100KHz Max.	Qty 3, Quadrature Inputs, A/B/Reset 100KHz Max.	Qty 3, Quadrature Inputs, A/B/Reset 100KHz Max.
Digital Outputs, 8-32VDC, PWM or On/Off	Qty 8, Sourcing, 2 Groups of 6, 2 Amp with Derating Curve	Qty 8, Sourcing, 2 Groups of 6, 2 Amp with Derating Curve	Qty 8, Sourcing, 2 Groups of 6, 2 Amp with Derating Curve
Digital Output / PWM Frequency	1.0 Hz to 1.0 KHz	1.0 Hz to 1.0 KHz	1.0 Hz to 1.0 KHz
Indicator LEDs	1 Programmable, 1 Watchdog	1 Programmable, 1 Watchdog	1 Programmable, 1 Watchdog
Communications			
Serial Ports	1 RS232 / 1RS485 via M12 8 Pin 1 Programming via Deutsch 'A' Connector	1 RS232 / 1RS485 via M12 8 Pin 1 Programming via Deutsch 'A' Connector	1 RS232 / 1RS485 via M12 8 Pin 1 Programming via Deutsch 'A' Connector
CAN Port	Yes, via Deutsch 'A' Connector	Yes, via Deutsch 'A' Connector	Yes, via Deutsch 'A' Connector
CAN Networks Supported	SAE J1939, NMEA 2000, OptiCAN	SAE J1939, NMEA 2000, OptiCAN	SAE J1939, NMEA 2000, OptiCAN
Wi-Fi Connectivity	No	Yes, via Internal Wi-Fi Module Programming, Modbus TCP, Webserver & Cloud Portal Solutions	No
Modbus Networking	Serial - Modbus Master / Slave	Serial - Modbus Master / Slave Modbus TCP (Client/Server)	Serial - Modbus Master / Slave
Cellular Connectivity	No	No	Via Internal Cellular Modem Cloud Portal Solutions
Supports External GPS Module	Yes	Yes	Yes
Other			
Input Power	9-32VDC 30mA@24VDC with no I/O or communications enabled	9-32VDC 30mA@24VDC with no I/O or communications enable	9-32VDC 30mA@24VDC with no I/O or communications enable
Real Time Clock	MM/DD/YY, Day of Week, HR/MM/SS	MM/DD/YY, Day of Week, HR/MM/SS	MM/DD/YY, Day of Week, HR/MM/SS
Style / Mounting	Sealed Enclosure / Panel Mount	Sealed Enclosure / Panel Mount	Sealed Enclosure / Panel Mount
Connections	2 Deutsch DTM Series (coded A,B) M12 Cable (8 pin)	2 Deutsch DTM Series (coded A,B) M12 Cable (8 pin)	2 Deutsch DTM Series (coded A,B) M12 Cable (8 pin)
Dimensions	4.63" x 5.24" x 1.44"	4.63" x 5.24" x 1.44"	4.63" x 5.24" x 1.44"
Operating Temperature	-40°C to +80°C	-40°C to +80°C	-40°C to +80°C

1. Model Dependent Features

2. Counter & Quadrature Inputs are included in the quantity of digital inputs. Counter inputs may be used as counter or standard digital input. Quadrature inputs may be used as quadrature counter or standard digital input.

Common Accessories:

Model	Description
HEC-100	HEC 'A' Keyed Cable Assembly with 6ft. flying leads.
HEC-110	HEC 'B' Keyed Cable Assembly with 6ft. flying leads.
HEC-10	HEC 'A' Keyed Connector Kit with 'A' Connector and Crimp Pins (requires crimp tool).
HEC-20	HEC 'B' Keyed Connector Kit with 'A' Connector and Crimp Pins (requires crimp tool).
HEC-910	HEC DTM Connector 'A' Breakout Programming Cable (required Null Modem Cable)
126-102860	Null Modem Cable
HEC-GPS	HEC GPS Module for Serial Port, Puck Style with Magnetic Base

- ▶ SAE J1939 Connectivity
- ▶ Sealed from Environment
- ▶ RoHS Compliant
- ▶ No Secondary Enclosure Required
- ▶ Quick Disconnect Field Connections
- ▶ Programs using EZ LADDER Toolkit Software
- ▶ High Current Outputs with PWM
- ▶ Analog Inputs
- ▶ High Speed Counting
- ▶ Visual Status Indicator (Watchdog LED)
- ▶ Output Monitoring for Overloaded / Open Circuit



HEC-1500-E-R Programmable Logic Controller

HEC-1500-E-R Series Harsh Environment Controllers allows for programmable intelligence under less than ideal conditions. Features include a sealed, water-tight enclosure, analog and digital I/O, real-time clock, high speed counting, CAN network communication with SAEJ1939 and OptiCAN and serial ports for printing or Modbus Slave. Based on patented PLC on a Chip® technology, the controller is easy to apply and program using the EZ LADDER® Toolkit PC based software. The HEC-1500-E-R Series is suitable for direct mounting on machines and is an ideal choice for mobile applications.

Typical Applications Include:

- ▶ Mobile Equipment
- ▶ Material Handling
- ▶ Off Highway Equipment
- ▶ Spreader Controls
- ▶ Remote Locations Monitoring & Control
- ▶ Engine Driven Pumps, Compressors and Generators

HEC-1500 Series Controller Specifications		
Processor / Memory / Programming	HEC-1500-E-R	HEC-1504-E-R
Processor / Memory / EEPROM	M-Series PLC on a Chip, 12K RAM, 256K Flash, 2792 Bytes EEPROM	M-Series PLC on a Chip, 12K RAM, 256K Flash, 2792 Bytes EEPROM
Programming	Ladder Diagram / Function Block	Ladder Diagram / Function Block
Digital & Analog I/O		
Digital Inputs, 8-32VDC	6 Total, Qty 4, Sinking Qty 2 Selectable Sink or Source	6 Total, Qty 4, Sinking Qty 2 Selectable Sink or Source
High Speed Counters ¹	Qty 2, 40KHz Max., Count Up, Sinking or Sourcing Selectable	Qty 2, 40KHz Max., Count Up, Sinking or Sourcing Selectable
Digital Outputs, 8-32VDC, PWM or On/Off	Qty 6, Sourcing, 4 Amp Maximum (per output pair), PWM Frequency 1.436Hz to 1KHz, PWM Range 5-95%, Over-current protected. Output Voltage = Input Voltage.	Qty 6, Sourcing, 4 Amp Maximum (per output pair), PWM Frequency 1.436Hz to 1KHz, PWM Range 5-95%, Over-current protected. Output Voltage = Input Voltage.
Indicator LEDs	1 Programmable, 1 Watchdog	1 Programmable, 1 Watchdog
Analog Inputs	2 Channels, 10-bit Resolution, Field Selectable 0-5VDC, 0-10VDC or 0-20mADC	2 Channels, 10-bit Resolution, Field Selectable 0-5VDC, 0-10VDC or 0-20mADC
Communications		
Serial Ports	Programming via Deutsch 'A' Connector	Programming via Deutsch 'A' Connector 1 RS232 / RS485 / RS422 Configurable Serial Port via M8 4 Pin
Networking	1 CAN Port, SAE J1939 (Read Only), OptiCAN	1 CAN Port, SAE J1939 (Read Only), OptiCAN, Modbus Slave
Other		
Input Power	8-32VDC	8-32VDC
Real Time Clock	Time of Day, Day, Month, Year and Day of Week	Time of Day, Day, Month, Year and Day of Week
Style / Mounting	Sealed Enclosure / Panel Mount	Sealed Enclosure / Panel Mount
Connections	2 Deutsch DTM Series (coded A,B)	2 Deutsch DTM Series (coded A,B) M8 Cable (4 pin)
Dimensions	4.63" x 5.24" x 1.44"	4.63" x 5.24" x 1.44"

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Operating Temperature	-40°C to +80°C with Output Derating based on Temperature	-25°C to +80°C with Output Derating based on Temperature
RoHS	RoHS Compliant	RoHS Compliant

1. Counter Inputs are included in the quantity of digital inputs. Counter inputs may be used as counter or standard digital input.

The HEC-1500-E-R User Manual and EZ LADDER Toolkit can be downloaded from <http://www.divebiss.com>.

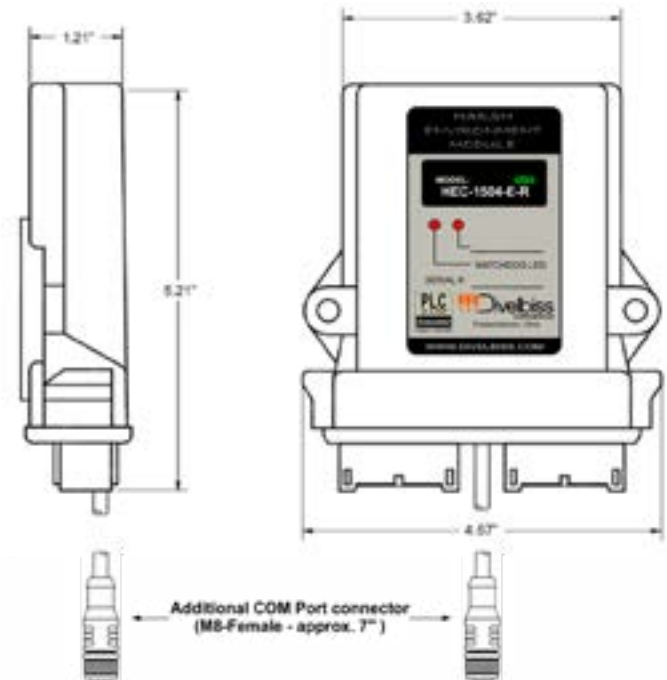
Ordering Information: (see Specifications for complete list of features per model)

Model #	Description
HEC-1500-E-R	Harsh Environment Controller with 6 DC inputs (2 configurable for High Speed Counter), 6 DC/PWM outputs, 2 configurable Analog Inputs, 1 CAN Network port for Optican or SAE J1939 connectivity.
HEC-1504-E-R	All HEC-1500 options plus additional configurable RS232/RS422/RS485 COM Port via M8 cable.

Optional Hardware Add-ons/Accessories:

Model #	Description
HEC-10 (Includes:)	"A" Keyed Connector Kit 1 DTM06-12SA 12 1062-20-0122 (16-20 AWG crimp sockets) 1 Wedge Lock
HEC-20 (Includes:)	"B" Keyed Connector Kit 1 DTM06-12SB 12 1062-20-0122 (16-20 AWG crimp sockets) 1 Wedge Lock
HEC-CRMPTL	Crimp Tool for HEC-10/20 Pins (DTT-20-0)
HEC-100	"A" Keyed (Gray) Cable assembly with 6ft. flying leads
HEC-110	"B" Keyed (Black) Cable assembly with 6ft. flying leads
HEC-910	Programming Breakout Cable, 9 pin D-sub connector for RS232/Null Modem Connection
126-102860	RS232 Null Modem Programming Cable
EZLDCD-01	EZ LADDER Toolkit Development Software on USB Flash Drive (Free with Controller Purchase)

Dimensions



Programming the Controller

The Harsh Environment Controller PLCs program in Ladder Diagram using the Divebiss EZ LADDER® Toolkit, a Ladder Diagram Development Platform. EZ LADDER software parallels the IEC-61131 standard and provides an easy to use interface.

After a ladder diagram program is developed, it can be downloaded to the HEC controller via the programming port (on the "A" connector). The program is stored on non-volatile FLASH memory and is automatically executed on power up. Once the download is complete, the HEC is successfully programmed and begins executing the program.

Refer to the EZ LADDER Toolkit's User 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.divebiss.com>.

Specifications are subject to change without notice.

- ▶ Four Digital Inputs / Two for High Speed Counting
- ▶ Six Digital Outputs / For Configurable as PWM
- ▶ PWM Resolution Selectable 8 or 16 Bit
- ▶ Output Current Sensing / Feedback
- ▶ SAE J1939 and OptiCAN Connectivity
- ▶ Sealed from Environment
- ▶ RoHS Compliant
- ▶ Quick Disconnect Field Connections
- ▶ Programs using EZ LADDER Toolkit Software
- ▶ Four Analog Inputs / 0-20mA or 0-5VDC
- ▶ Visual Status Indicator (Watchdog LED)
- ▶ Output Monitoring for Overloaded / Open Circuit



HEC-4000-E-R Programmable Logic Controller

HEC-4000-E-R Series Controllers allow for programmable intelligence under less than ideal conditions. Features include a sealed, water-tight enclosure, high speed counting, and CAN network communication with SAE J1939 and OptiCAN. Based on patented PLC on a Chip® technology, the controllers are easy to apply and program using the EZ LADDER® Toolkit PC based software. These Harsh Environment Controllers are suitable for direct mounting on machines and are an ideal choice for mobile applications.

Typical Applications Include:

- ▶ Mobile Equipment
- ▶ Agricultural Equipment
- ▶ Off Road Equipment
- ▶ Remote Locations Monitoring & Control
- ▶ Engine Driven Pumps, Compressors and Generators
- ▶ Proportional Valves

HEC-4000-E-R Series Controller Specifications	
Processor / Memory / Programming	
Processor / Memory / EEPROM	M-Series PLC on a Chip, 12K RAM, 256K Flash, 2792 Bytes EEPROM
Programming	Ladder Diagram / Function Block
Digital & Analog I/O	
Digital Inputs, 8-32VDC	4 Total, Sinking
High Speed Counters ¹	Qty 2, 40KHz Max., Count Up, Sinking
Digital Outputs, 8-32VDC, PWM or On/Off	Qty 6, Sourcing, 4 Amp Maximum (per output pair), 4 Selectable as PWM (8 or 16 bit), PWM Frequency 1.436Hz to 1KHz, PWM Range 5-95%, Over-current protected. Output Voltage = Input Voltage.
Output Current Sensing	PWM Channels provide internal analog current sensing variables for closed loop control
Indicator LEDs	1 Programmable, 1 Watchdog
Analog Inputs	4 Analog Inputs available - Model Dependent as 10-bit, 12-bit or 15-bit at 0-20mADC or 0-5VDC
Communications	
Serial Ports	Programming via Deutsch 'A' Connector 1 RS232 / RS485 / RS422 Configurable Serial Port via M8 4 Pin (Serial Port Models)
Networking	2 CAN Ports, SAE J1939 (Read Only), OptiCAN
Other	
Input Power	8-32VDC
Style / Mounting	Sealed Enclosure / Panel Mount
Connections	2 Deutsch DTM Series (coded A,B) M8 Cable (4 pin) (Serial Port Models)
Dimensions	4.63" x 5.24" x 1.44"
Operating Temperature	-40°C to +80°C with Output Derating based on Temperature (Non-Serial Port Models) -25°C to +80°C with Output Derating based on Temperature (Serial Port Models)
RoHS	RoHS Compliant

1. Counter Inputs are included in the quantity of digital inputs. Counter inputs may be used as counter or standard digital input.

Ordering Information: (see Specifications)

Model #	Description
ALL HEC-4xxx-E-R MODELS	Harsh Environment Controller with 4 DC inputs (2 configurable for High Speed Counter), 6 DC outputs (4 PWM), 4 Analog Inputs (see Analog Options table), 2 CAN Network port for Optican or SAE J1939 connectivity, Output Current Sensing.
ALL HEC-4xx4-E-R MODELS	All HEC-4xxx-E-R base model features plus additional configurable RS232/RS422/RS485 COM Port via M8 cable.

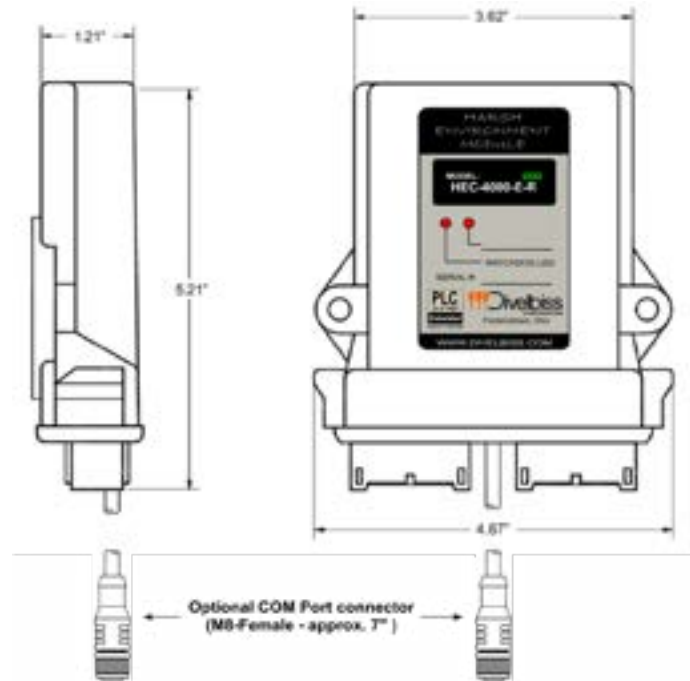
Analog Options:

Model #	Rating	Resolution	Min-Max Integer Values
HEC-400x-E-R	0-20mADC	10 bit	0 - 1023
HEC-401x-E-R	0-5VDC	10 bit	0 - 1023
HEC-410x-E-R	0-20mADC	12 bit	0 - 4095
HEC-411x-E-R	0-5VDC	12 bit	0 - 4095
HEC-420x-E-R	0-20mADC	15 bit	0 - 32767
HEC-421x-E-R	0-5VDC	15 bit	0 - 32767

Optional Hardware Add-ons/Accessories:

Model #	Description
HEC-10 (Includes:)	"A" Keyed Connector Kit 1 DTM06-12SA 12 1062-20-0122 (16-20 AWG crimp sockets) 1 Wedge Lock
HEC-20 (Includes:)	"B" Keyed Connector Kit 1 DTM06-12SB 12 1062-20-0122 (16-20 AWG crimp sockets) 1 Wedge Lock
HEC-CRMPTL	Crimp Tool for HEC-10/20 Pins (DTT-20-0)
HEC-100	"A" Keyed (Gray) Cable assembly with 6ft. flying leads
HEC-110	"B" Keyed (Black) Cable assembly with 6ft. flying leads
HEC-910	Programming Breakout Cable, 9 pin D-sub connector for RS232/Null Modem Connection
126-102860	RS232 Null Modem Programming Cable
EZLDCD-01	EZ LADDER Toolkit Development Software on USB Flash Drive (Free with Controller Purchase)

Dimensions



Programming the Controller

The Harsh Environment Controller PLCs program in Ladder Diagram using the Divebiss EZ LADDER® Toolkit, a Ladder Diagram Development Platform. EZ LADDER software parallels the IEC-61131 standard and provides an easy to use interface.

After a ladder diagram program is developed, it can be downloaded to the HEC controller via the programming port (on the "A" connector). The program is stored on non-volatile FLASH memory and is automatically executed on power up. Once the download is complete, the HEC is successfully programmed and begins executing the program.

Refer to the EZ LADDER Toolkit's User 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.divebiss.com>.

The HEC-4xxx-E-R User Manual and EZ LADDER Toolkit can be downloaded from <http://www.divebiss.com>.

Specifications are subject to change without notice.

- ▶ Eight Digital Inputs / Eight Digital Outputs
- ▶ SAE J1939 Connectivity
- ▶ Easy Mounting to Machine
- ▶ Quick Disconnect Field Connections
- ▶ Sealed from Environment
- ▶ No Secondary Enclosure Required
- ▶ Two High Speed Counters
- ▶ High Current Outputs with PWM
- ▶ Programs using EZ LADDER Toolkit Software
- ▶ Visual Status Indicator (Watchdog LED)
- ▶ Output Monitoring for Overloaded / Open Circuit



HEC-2000-E-R Programmable Logic Controller

HEC-2000 Series Controllers allow for programmable intelligence under less than ideal conditions. Features include a sealed, water-tight enclosure, high speed counting, and CAN network communication with J1939. Based on patented PLC on a Chip® technology, the controllers are easy to apply and program using the EZ LADDER® Toolkit PC based software. These Harsh Environment Controllers are suitable for direct mounting on machines and are an ideal choice for mobile applications.

Typical Applications Include:

- ▶ Mobile Equipment
- ▶ Material Handling
- ▶ Off Road Equipment
- ▶ Agricultural Equipment
- ▶ Remote Locations Monitoring & Control
- ▶ Engine Driven Pumps, Compressors and Generators

HEC-2000 Series Controller Specifications	
Processor / Memory / Programming	HEC-2000
Processor / Memory / EEPROM	M-Series PLC on a Chip, 12K RAM, 256K Flash, 2792 Bytes EEPROM
Programming	Ladder Diagram / Function Block
Digital I/O	
Digital Inputs, 8-32VDC	Qty 8, Sinking
High Speed Counter ¹	Qty 2, Sinking, 40KHz Max., Count Up
Digital Outputs, 8-32VDC, PWM or On/Off	Qty 8, Sourcing, 4 Amp Maximum (per output pair), PWM Frequency 1.436Hz to 1KHz, PWM Range 5-95%, Over-current protected. Output Voltage = Input Voltage.
Indicator LEDs	1 Programmable, 1 Watchdog
Communications	
Serial Ports	1 RS232 / RS485 / RS422 Configurable Serial Port via M8 4 Pin (HEC-2004 only) 1 Programming via Deutsch 'A' Connector
Networking	1 CAN Port, SAE J1939 (Read Only), OptiCAN, Modbus Slave (HEC-2004 only)
Other	
Input Power	8-32VDC
Style / Mounting	Sealed Enclosure / Panel Mount
Connections	2 Deutsch DTM Series (coded A,B) M8 Cable (4 pin) - HEC-2004 only
Dimensions	4.63" x 5.24" x 1.44"
Operating Temperature	-40°C to +80°C with Output Derating based on Temperature (HEC-2000) -25°C to +80°C with Output Derating based on Temperature (HEC-2004)
RoHS	RoHS Compliant

1. Counter Inputs are included in the quantity of digital inputs. Counter inputs may be used as counter or standard digital input.

The HEC-2000-E-R User Manual and EZ LADDER Toolkit can be downloaded from <http://www.divebiss.com>.

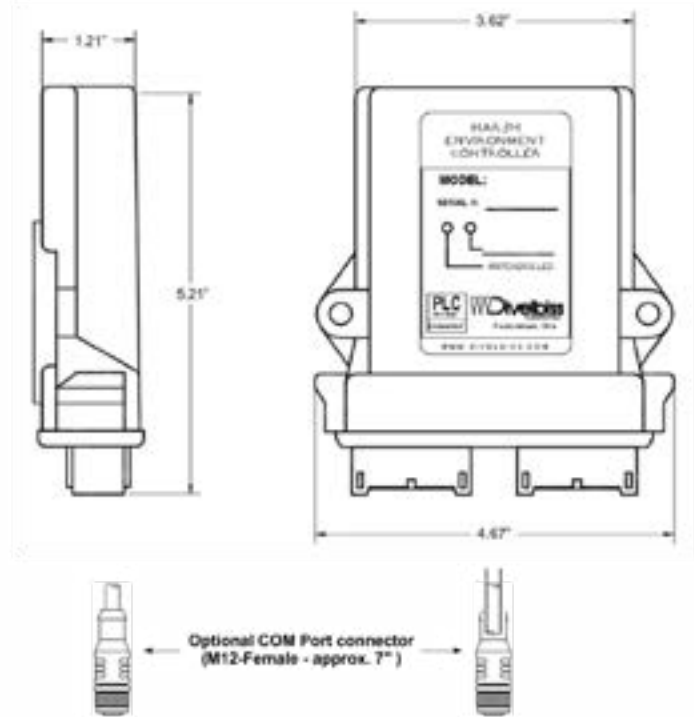
Ordering Information: (see Specifications for complete list of features per model)

Model #	Description
HEC-2000-E-R	Harsh Environment Controller with 8 DC inputs (2 configurable for High Speed Counter), 8 DC/PWM outputs, 1 CAN Network port for Optican or SAE J1939 connectivity.
HEC-2004-E-R	All HEC-2000-E-R options plus additional configurable RS232/RS422/RS485 COM Port via M8 cable.

Optional Hardware Add-ons/Accessories:

Model #	Description
HEC-10 (Includes:)	"A" Keyed Connector Kit 1 DTM06-12SA 12 1062-20-0122 (16-20 AWG crimp sockets) 1 Wedge Lock
HEC-20 (Includes:)	"B" Keyed Connector Kit 1 DTM06-12SB 12 1062-20-0122 (16-20 AWG crimp sockets) 1 Wedge Lock
HEC-CRMPTL	Crimp Tool for HEC-10/20 Pins (DTT-20-0)
HEC-100	"A" Keyed (Gray) Cable assembly with 6ft. flying leads
HEC-110	"B" Keyed (Black) Cable assembly with 6ft. flying leads
HEC-910	Programming Breakout Cable, 9 pin D-sub connector for RS232/Null Modem Connection
126-102860	RS232 Null Modem Programming Cable
EZLDCD-01	EZ LADDER Toolkit Development Software on USB Flash Drive

Dimensions



Programming the Controller

The Harsh Environment Controller PLCs program in Ladder Diagram using the Divebiss EZ LADDER® Toolkit, a Ladder Diagram Development Platform. EZ LADDER software parallels the IEC-61131 standard and provides an easy to use interface.

After a ladder diagram program is developed, it can be downloaded to the HEC controller via the programming port (on the "A" connector). The program is stored on non-volatile FLASH memory and is automatically executed on power up. Once the download is complete, the HEC is successfully programmed and begins executing the program.

Refer to the EZ LADDER Toolkit's User 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.divebiss.com>.

Specifications are subject to change without notice.

- ▶ Operating Temperature -40° to 80° C
- ▶ 2x16 or 4x20 Backlit LCD Display
- ▶ 9 Programmable Push Buttons
- ▶ 4 Programmable LED Indicators
- ▶ HMI Only or HMI / PLC Combined
- ▶ 2 High Speed Counters (250KHz)
- ▶ Digital and Analog I/O
- ▶ PWM Output Capability
- ▶ PWM Output Current Sensing / Feedback
- ▶ SAE J1939 and OptiCAN Connectivity
- ▶ Sealed Environment
- ▶ Programs using EZ LADDER Toolkit Software
- ▶ Visual Status Indicator (Power and Watchdog)



HEC-HMI-C2100-E-R Programmable Logic Controller

HEC-HMI Series HMI/Controllers allow for programmable HMI only or combined HMI and control intelligence under less than ideal conditions. Features include a sealed, water-tight enclosure, high speed counting, Digital I/O, Analog I/O and CAN network communication with SAE J1939 and OptiCAN. Based on patented PLC on a Chip® technology, the HEC-HMI is easy to apply and program using the EZ LADDER® Toolkit PC based software. The HEC-HMIs are suitable for direct mounting on machines and are an ideal choice for mobile applications.

Typical Applications Include:

- ▶ Mobile Equipment
- ▶ Batching Systems
- ▶ Proportional Valves
- ▶ Agricultural Equipment
- ▶ Remote Locations Monitoring & Control
- ▶ Material Handling / Movement
- ▶ Off Road Equipment
- ▶ Engine Driven Pumps, Compressors and Generators

HEC-HMI Series HMI/Controller Specifications	
Processor / Memory / Programming	
Processor / Memory / EEPROM	M-Series PLC on a Chip, 12K RAM, 256K Flash, 2792 Bytes EEPROM
Programming	Ladder Diagram / Function Block
Digital & Analog I/O	
Digital Inputs, 8-32VDC ²	6 Total, 4 are Sinking
High Speed Counters ^{1,2}	Qty 2, 250KHz Max., Count Up, Selectable as Sinking or Sourcing ,1 Additional Up/Down/Quadrature Counter via Internal Expansion
Digital Outputs ² , 8-32VDC, PWM or On/Off	6 Total Outputs - Qty 4, Sourcing, 4 Amp Maximum (per output pair), 4 Selectable as PWM (8 or 16 bit), PWM Frequency 1.436Hz to 1KHz, PWM Range 5-95%, Over-current protected. Output Voltage = Input Voltage. Qty 2, Relay SPST, 2A, Dry Contact 2 or 4 Additional Outputs (PWM) via Internal Expansion
Output Current Sensing	PWM Channels provide internal analog current sensing variables for closed loop control
Pushbuttons	Total of Nine (9), 5 as Directional Compass Configuration, 4 In-Line Labeled as Function Keys
Indicator LEDs	4 Programmable, 1 Watchdog, 1 Power
Analog Inputs / Outputs ²	2 Analog Inputs - Model Dependent as 10-bit or 15-bit. Field Configurable for at 0-20mADC or 0-5VDC, 1 Analog Input via Internal Expansion, up to 2 Analog Outputs via Internal Expansion, up to 2 Thermocouple (type K) Inputs via Internal Expansion
Beeper ²	1 User Programmable
Display	Backlit: 2 Line x 16 Large Character / 4 Line x 20 Standard Character (Model Dependent)
Communications	
Serial Ports	Programming Port, 1 RS232 / RS485 / RS422 Configurable Serial Port
Networking	1 CAN Port, SAE J1939 (Read Only), OptiCAN
Other	
Input Power	8-32VDC
Style / Mounting / Size	Sealed Enclosure / Panel Mount / 4.7" x 8.2" x 2.4"
Connections	Internal Connections using Terminal Blocks, via Enclosure Wire Gland
Operating Temperature	-40°C to +80°C with Output Derating based on Temperature
RoHS	RoHS Compliant

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1. Counter Inputs are included in the quantity of digital inputs. Counter inputs may be used as counter or standard digital input.
2. I/O and Analog Shown are for HMI/Controller Combined Models.

Ordering Information: (see Specifications and User Manual for details)

Model #	Description	Display	Analog In
HEC-HMI-2-E-R	HEC-HMI with CAN and Serial Port	2x16 Backlit LCD	N/A
HEC-HMI-21-E-R	HEC-HMI with CAN, Serial Port and Expansion Option 1 (1 Analog Input (0-5V, 0-10V or 0-20mA), 4 Digital Outputs (PWM), Quadrature Input	2x16 Backlit LCD	10-bit
HEC-HMI-22-E-R	HEC-HMI with CAN, Serial Port and Expansion Option 2 (1 Analog Input (0-5V, 0-10V or 0-20mA), 2 Digital Outputs (PWM), Quadrature Input, 2 Type K Thermocouple Inputs, 2 Analog Outputs (0-20mA or 0-10V)	2x16 Backlit LCD	10-bit
HEC-HMI-C2100-E-R	HEC-HMI Controller with I/O and Analog.	2x16 Backlit LCD	10-bit
HEC-HMI-C2101-E-R	HEC-HMI Controller with I/O, Analog and Expansion Option 1 (1 Analog Input (0-5V, 0-10V or 0-20mA), 4 Digital Outputs (PWM), Quadrature Input	2x16 Backlit LCD	10-bit
HEC-HMI-C2102-E-R	HEC-HMI Controller with I/O, Analog and Expansion Option 2 (1 Analog Input (0-5V, 0-10V or 0-20mA), 2 Digital Outputs (PWM), Quadrature Input, 2 Type K Thermocouple Inputs, 2 Analog Outputs (0-20mA or 0-10V)	2x16 Backlit LCD	10-bit
HEC-HMI-C2150-E-R	HEC-HMI Controller with I/O and Analog.	2x16 Backlit LCD	15-bit
HEC-HMI-C2151-E-R	HEC-HMI Controller with I/O, Analog and Expansion Option 1 (1 Analog Input (0-5V, 0-10V or 0-20mA), 4 Digital Outputs (PWM), Quadrature Input	2x16 Backlit LCD	15-bit
HEC-HMI-C2152-E-R	HEC-HMI Controller with I/O, Analog and Expansion Option 2 (1 Analog Input (0-5V, 0-10V or 0-20mA), 2 Digital Outputs (PWM), Quadrature Input, 2 Type K Thermocouple Inputs, 2 Analog Outputs (0-20mA or 0-10V)	2x16 Backlit LCD	15-bit
HEC-HMI-4-E-R	HEC-HMI with CAN and Serial Port	4x20 Backlit LCD	N/A
HEC-HMI-41-E-R	HEC-HMI with CAN, Serial Port and Expansion Option 1 (1 Analog Input (0-5V, 0-10V or 0-20mA), 4 Digital Outputs (PWM), Quadrature Input	4x20 Backlit LCD	10-bit
HEC-HMI-42-E-R	HEC-HMI with CAN, Serial Port and Expansion Option 2 (1 Analog Input (0-5V, 0-10V or 0-20mA), 2 Digital Outputs (PWM), Quadrature Input, 2 Type K Thermocouple Inputs, 2 Analog Outputs (0-20mA or 0-10V)	4x20 Backlit LCD	10-bit
HEC-HMI-C4100-E-R	HEC-HMI Controller with I/O and Analog.	4x20 Backlit LCD	10-bit
HEC-HMI-C4101-E-R	HEC-HMI Controller with I/O, Analog and Expansion Option 1 (1 Analog Input (0-5V, 0-10V or 0-20mA), 4 Digital Outputs (PWM), Quadrature Input	4x20 Backlit LCD	10-bit
HEC-HMI-C4102-E-R	HEC-HMI Controller with I/O, Analog and Expansion Option 2 (1 Analog Input (0-5V, 0-10V or 0-20mA), 2 Digital Outputs (PWM), Quadrature Input, 2 Type K Thermocouple Inputs, 2 Analog Outputs (0-20mA or 0-10V)	4x20 Backlit LCD	10-bit
HEC-HMI-C4150-E-R	HEC-HMI Controller with I/O and Analog.	4x20 Backlit LCD	15-bit
HEC-HMI-C4151-E-R	HEC-HMI Controller with I/O, Analog and Expansion Option 1 (1 Analog Input (0-5V, 0-10V or 0-20mA), 4 Digital Outputs (PWM), Quadrature Input	4x20 Backlit LCD	15-bit
HEC-HMI-C4152-E-R	HEC-HMI Controller with I/O, Analog and Expansion Option 2 (1 Analog Input (0-5V, 0-10V or 0-20mA), 2 Digital Outputs (PWM), Quadrature Input, 2 Type K Thermocouple Inputs, 2 Analog Outputs (0-20mA or 0-10V)	4x20 Backlit LCD	15-bit

Programming the Controller

The Harsh Environment Controller HMIs program in Ladder Diagram using the Divebiss EZ LADDER® Toolkit, a Ladder Diagram Development Platform. EZ LADDER software parallels the IEC-61131 standard and provides an easy to use interface.

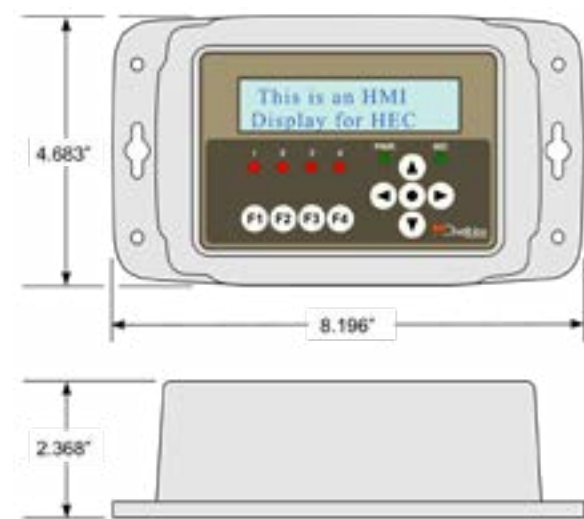
After a ladder diagram program is developed, it can be downloaded to the HEC-HMI controller via the programming port. The program is stored on non-volatile FLASH memory and is automatically executed on power up. Once the download is complete, the HEC is successfully programmed and begins executing the program.

Refer to the EZ LADDER Toolkit's User Manual for more detail on creating ladder diagram programs, connecting to targets and downloading the program to targets.

Optional Hardware Add-ons/Accessories:

Model #	Description
SI-PGM	Serial Programming Cable
EZLDCD-01	EZ LADDER Toolkit Development Software on USB Flash Drive (Free with Controller Purchase)

Dimensions



The HEC-HMI User Manual and EZ LADDER Toolkit can be downloaded from <http://www.divebiss.com>.

Specifications are subject to change without notice.

- ▶ Communicates to Cloud via Function Block / Structured Text
- ▶ Modbus Master/Slave, Modbus TCP over Wi-Fi
- ▶ SAE J1939 / NMEA 2000 via CAN
- ▶ Cellular^{1,2}, Wi-Fi and GPS Options
- ▶ 2 RS232 Serial Ports
- ▶ 1 CAN Ports - Isolated NMEA Compliant
- ▶ 1 Digital Input - 9-32VDC
- ▶ 1 Digital Output - Sourcing 9-32VDC, 2 Amps
- ▶ 2 Analog Inputs (0-5VDC/0-10VDC/0-20mADC)
- ▶ Battery & Input Voltage Monitoring
- ▶ Real Time Clock
- ▶ Micro Size SD Card Support
- ▶ 1 Programmable LED Indicator
- ▶ 9-32VDC Powered
- ▶ -40° to +80° C Operating Temperature Range



HEC-Gateway

Overview:

The HEC-Gateway is a limited I/O VersaCloud M2M enabled interface device that operates as a communications gateway between virtually any type of equipment and the VersaCloud M2M Cloud. The HEC-Gateway provides communications to equipment using a variety of communications ports and buses including Wi-Fi (Modbus TCP), Serial Ports (RS232) using Modbus Master/Slave or custom drivers, and CAN ports (SAE J1939, NMEA 2000, OptiCAN). The HEC-Gateway also supports GPS using the HEC-P5-GPS receiver, allowing for mapping location. The HEC-Gateway provides limited I/O including one digital input, 1 sourcing digital output and 2 configurable analog inputs.

HEC-Gateway communicates to the VersaCloud M2M Cloud via Cellular^{1,2}, or Wi-Fi² (model dependent) providing the ability to monitor equipment and process remotely, control equipment and adjust process parameters remotely and to collect operational and status information for data analysis and reporting.

HEC-Gateway Programming

The HEC-Gateway is based on the P-Series PLC on a Chip™. The PLC on a Chip™ provides powerful functionality with ease of programming. Divebiss EZ Ladder Toolkit is a Ladder Diagram Development Platform that allows for programming in ladder diagram (LD), function block (FB) and structured text (ST). EZ Ladder software parallels the IEC-61131 standard and provides an easy to use interface.

After a ladder diagram program is developed, it can be downloaded to the HEC-Gateway via the programming port (serial) or Wi-Fi. The program is stored on non-volatile FLASH memory and is automatically executed on power up.

HEC-Gateway Communication Ports

The HEC-Gateway is designed to communicate with equipment and devices using a variety of communication ports and buses.

Programming Port

The HEC-Gateway has one programming serial port (RS232). This port is used to configure and program the HEC-Gateway and requires the HEC-910 programming break-out cable. Common to all models.

Serial Ports

The HEC-Gateway has two RS232 serial ports. Each supports Modbus Master and Slave. Other communications are possible using custom drivers with Structured Text. Common to all models.

CAN Ports

The HEC-Gateway has one Isolated and NMEA Compliant CAN port with multiple jumper configurations for power sourcing options. The CAN port supports SAE J1939, NMEA 2000 and Divebiss OptiCAN. Common to all models.

Wi-Fi

The HEC-Gateway supports Wi-Fi (model dependent). Wi-Fi supports communications using Modbus TCP and VersaCloud connectivity. Wi-Fi can also serve as an optional programming port for the HEC-Gateway. Model Dependent.

Cellular

The HEC-Gateway (model dependent) supports VersaCloud cellular^{1,2} data communications to VersaCloud cloud and portals. Data sent and received is based on the HEC-Gateway programming. Model dependent.

GPS

The HEC-Gateway supports an external GPS receiver (HEC-P5-GPS, sold separately) and can be used to receive current GPS data. Common to all models (uses one serial port).

HEC-Gateway I/O

The HEC-Gateway includes minimal on-board analog and digital I/O (common to all models).

Digital Input

The HEC-Gateway has one 9-32VDC Digital Input that can function as an standard on/off digital input or as a high speed counter input (up to 100KHz). On-Board debounce circuitry is software controlled. The input can be configured as NPN or PNP.

Digital Output

The HEC-Gateway has one sourcing Digital Output that can drive up to 2 Amp loads. The output voltage is sourced from the HEC-Gateway's input voltage.

Analog Inputs

The HEC-Gateway has two field wired analog inputs that may be individually configured for 0-5VDC, 0-10VDC or 0-20mADC. Additionally, the input voltage and battery voltage may be monitored using internal analog inputs.

Ordering Information:

Model	Description
HEC-GW-C-W	HEC-Gateway with Wi-Fi Connectivity and Cellular ^{1,2} Data Modem
HEC-GW-C-X	HEC-Gateway with Cellular ^{1,2} Data Modem
HEC-GW-X-W	HEC-Gateway with Wi-Fi Connectivity
HEC-GW-X-X	HEC-Gateway common features but no Wi-Fi Connectivity or Cellular ^{1,2} Data Modem

HEC-Gateway Specifications / Features	
	All Models
Processor / Memory / Programming	
Processor / Memory / EEPROM	P-Series PLC on a Chip™ - 32K RAM, 512K Flash / 3500 Bytes EEPROM / 512K Battery Backed S-RAM
Retentive Memory (FRAM)	480 Bytes
Micro SD Card	Yes, Update Programs / Kernels, Data-logging
Programming	Ladder Diagram / Structured Text / Function Block
User Interface	
LED Indicators	Qty 1 Programmable, Power x 1 / Status x 1
Communications	
Serial Ports / Serial Networking	2 Serial Ports - RS232 (Modbus Master / Slave), 1 Programming Port
CAN Ports / CAN Networks Supported	1 CAN Port (1 NMEA Compliant, Isolated), SAE J1939, NMEA 2000, OptiCAN
GPS Option	Compatible with HEC-P5-GPS Receiver (uses one serial port).
Wi-Fi Connectivity	Model Dependent, Modbus TCP, VersaCloud M2M Communications, Programming Port
Cellular Data Modem	Model Dependent, VersaCloud M2M Communications
Analog / Digital I/O	
Digital Input	Qty 1, 9-32VDC, NPN or PNP Operation, On/Off or High Speed Counter up to 100KHz
Digital Output	Qty 1, Sourcing (same as input voltage), 2 Amps
Field Wired Analog Inputs	Qty 2, Individually configurable 0-5VDC, 0-10VDC or 0-20mADC, 12 Bit
Internal Analog Inputs	Qty 2, Voltage Monitors for Battery and Input Power
Other	
Input Power	9-32VDC
Real Time Clock	Month, Day, Year, Day of Week, Hour, Minute, Second
Dimensions	5.24"L x 4.63" W x 1.43"H (Excludes antennas)
Operating Temperature	-40°C to +80°C

1: Cellular data provided by VersaCloud by Divebiss

2: VersaCloud features require VersaCloud M2M Package with Cloud Portal. Additional charges apply to connected devices.

- ▶ Easy to Program with Ladder Diagram and Structured Text.
- ▶ Communicates to Cloud via Function Block
- ▶ 5 Programmable LED Indicators
- ▶ Operating Temperature -40° to 80° C
- ▶ Modbus Master/Slave
- ▶ Modbus TCP over Ethernet / WI-FI
- ▶ SAE J1939 via CAN
- ▶ NMEA 2000 via CAN
- ▶ Cellular^{1,2}, Wi-Fi and GPS Options
- ▶ 2 Serial Ports (RS232/RS485)
- ▶ 2 CAN Ports - 1 Isolated NMEA Compliant
- ▶ Full Size SD Card Support
- ▶ Optional GPS
- ▶ 9-32VDC Powered



VersaGateway

Overview:

The VersaGateway is a VersaCloud M2M enabled interface device that operates as a communications gateway between virtually any type of equipment and the VersaCloud M2M Cloud. The VersaGateway provides communications to equipment using a variety of communications ports and buses including wired Ethernet (Modbus TCP), WI-FI (Modbus TCP), Serial Ports (RS232/RS485) using Modbus Master/Slave or custom drivers, and CAN ports (SAE J1939, NMEA 2000, OptiCAN). The VersaGateway also supports GPS allowing for mapping location.

VersaGateway communicates to the VersaCloud M2M Cloud via Ethernet, Cellular^{1,2}, or Wi-Fi² (model dependent) providing the ability to monitor equipment and process remotely, control equipment and adjust process parameters remotely and to collect operational and status information for data analysis and reporting.

VersaGateway Programming

The VersaGateway is based on the P-Series PLC on a Chip™. The PLC on a Chip™ provides powerful functionality with ease of programming. Divebiss EZ Ladder Toolkit is a Ladder Diagram Development Platform that allows for programming in ladder diagram (LD), function block (FB) and structured text (ST). EZ Ladder software parallels the IEC-61131 standard and provides an easy to use interface.

After a ladder diagram program is developed, it can be downloaded to the controller via the programming port (serial) or Ethernet Port. The program is stored on non-volatile FLASH memory and is automatically executed on power up.

VersaGateway Communication Ports

The VersaGateway is designed to communicate with equipment and devices using a variety of communication ports and buses.

Programming Port

The VersaGateway has one programming serial port (RS232). This port is used to configure and program the VersaGateway.

Serial Ports

The VersaGateway has two serial ports that are each configurable for RS232 or RS485. Each supports Modbus Master and Slave. Other communications are possible using custom drivers with Structured Text.

CAN Ports

The VersaGateway has two CAN ports. One port is Isolated and NMEA Compliant with multiple jumper configurations for power sourcing options. Each supports SAE J1939, NMEA 2000 and Divebiss OptiCAN.

Ethernet Port

The VersaGateway has one Ethernet port (model dependent). This port supports communications using Modbus TCP, VersaCloud connectivity and can also serve as an optional programming port for the VersaGateway.

Wi-Fi

The VersaGateway supports Wi-Fi (model dependent). Wi-Fi supports communications using Modbus TCP and VersaCloud connectivity. Wi-Fi can also serve as an optional programming port for the VersaGateway.

Cellular

The VersaGateway (model dependent) supports VersaCloud cellular^{1,2} data communications to VersaCloud cloud and portals. Data sent and received is based on the VersaGateway programming.

GPS

The VersaGateway (model dependent) supports an external GPS antenna and can be used to receive current GPS data.

Ordering Information:

Model	Description
VCG-E-C-G	VersaGateway with Ethernet Port, Cellular ^{1,2} Data Modem and GPS
VCG-E-C-X	VersaGateway with Ethernet Port and Cellular ^{1,2} Data Modem
VCG-E-X-G	VersaGateway with Ethernet Port and GPS
VCG-E-X-X	VersaGateway with Ethernet Port
VCG-W-C-G	VersaGateway with Wi-Fi, Cellular ^{1,2} Data Modem and GPS
VCG-W-C-X	VersaGateway with Wi-Fi, and Cellular ^{1,2} Data Modem
VCG-W-X-G	VersaGateway with Wi-Fi, and GPS
VCG-W-X-X	VersaGateway with Wi-Fi

VersaGateway Specifications / Features - All Models	
	All Models
Processor / Memory / Programming	
Processor / Memory / EEPROM	P-Series PLC on a Chip™ - 32K RAM, 512K Flash / 3500 Bytes EEPROM / 512K Battery Backed S-RAM
Retentive Memory (FRAM)	480 Bytes
Full size SD Card	Yes, Update Programs / Kernels, Data-logging
Programming	Ladder Diagram / Structured Text / Function Block
User Interface	
LED Indicators	Qty 5 Programmable, Power x 1 / Status x 1
Communications	
Serial Ports / Serial Networking	2 Serial Ports - Configurable RS232 / RS485 (Modbus Master / Slave), 1 Programming Port
CAN Ports / CAN Networks Supported	2 CAN Ports (1 NMEA Compliant, Isolated), SAE J1939, NMEA 2000, OptiCAN
Other	
Input Power	9-32VDC
Real Time Clock	Month, Day, Year, Day of Week, Hour, Minute, Second
Dimensions	7.3"L x 4.8" W x 1.3"H (Excludes antennas)
Operating Temperature	-40°C to +80°C

VersaGateway Specifications / Features - Model Specific								
	VCG-E-C-G	VCG-E-C-X	VCG-E-X-G	VCG-E-X-X	VCG-W-C-G	VCG-W-C-X	VCG-W-X-G	VCG-W-X-X
Communications								
Wi-Fi (VersaCloud ² / Modbus TCP)					■	■	■	■
Ethernet (VersaCloud ² / Modbus TCP)	■	■	■	■				
VersaCloud Cellular ^{1,2}	■	■			■	■		
GPS	■		■		■		■	

1: Cellular data provided by VersaCloud by Divelbiss

2: VersaCloud features require VersaCloud M2M Package with Cloud Portal. Additional charges apply to connected devices.

- ▶ Operating Temperature -40° to 80° C
- ▶ Digital Inputs / Digital Outputs
- ▶ PWM Output Capability
- ▶ Analog Inputs / Analog Outputs
- ▶ High Speed Counter Inputs (100KHz)
- ▶ Ethernet, Serial & CAN Communications
- ▶ Cellular^{1,2}, Wi-Fi² and GPS Options
- ▶ LCD Display / Keypad / HMI Ports
- ▶ Expandable I/O including Thermocouple Inputs
- ▶ SAE J1939 / NMEA 2000 / OptiCAN Networking
- ▶ Micro SD Card Support
- ▶ Din Rail / Subplate Mount



VB-2000 Programmable Logic Controller

Overview:

The Versatile Base 2000 (VB-2XXX) Series solves today's tough control issues with all the advanced features needed in one product family. The VB-2000 Series includes multiple models of Programmable Logic Controllers, plug-in expansion with Digital I/O, Analog I/O and VersaCloud M2M remote control / reporting via Ethernet, Cellular^{1,2}, Wi-Fi². Additionally, the VB-2000 also supports HMI Interfaces (LCD Display and Keypad) to allow operators to set parameters and identify alarms and faults. With an operating temperature of -40°C to 80°C, the VB-2000 Series is able to control in almost any temperature environment.

The VB-2000 Series Programmable Logic Controllers are based on the P-Series PLC on a Chip™. The PLC on a Chip™ provides powerful functionality with ease of programming using EZ LADDER Toolkit which supports ladder diagram and Structured Text.

The VB-2000 Series provides solutions for counting, batching, on-off control, proportional valve control and many others while providing communications options for data collecting including an RS232 Serial Port, an RS485 Serial Port, CAN Port Wi-Fi connectivity and Ethernet Port. The VB-2000 Series controllers support Modbus Master, Modbus Slave and Modbus TCP. Custom communications drivers may be written using structured text. The VB-2XXX Controller supports SAE J1939, NMEA 2000 and OptiCAN CAN networking.

VersaCloud:

The VB-2000 Series now supports VersaCloud M2M solutions for remote reporting and control via multiple communications avenues including Ethernet, Wi-Fi², GPS and Cellular^{1,2} data. Ethernet and Wi-Fi² options are model dependent. Cellular and GPS options available as an expansion module.

I/O Expansion & HMI Options:

Additional model plug-in, stack-mount expanders for the controllers provide additional digital and analog I/O such as digital outputs and thermocouple inputs. For user interaction, the VB-2000 Series supports the VBDSP-XX expanders which provide user interaction through LCD displays and programmable push-buttons. Like the controller, all the expanders including the VBDSP-XX User Interface are rated for the -40°C to 80°C operating temperature. Panel mounting kits and keypad overlays are available. Refer to the **VB-2000 Series HMIs and Plug-in Expanders Brochure** for more details on plug-in I/O, plug-in VersaCloud Modules and HMIs.

Other HMIs may be connected to the VB-2000 Series by utilizing the on-board serial ports (RS232, RS485), CAN port or the Ethernet Port. Modbus Master, Modbus Slave and Modbus TCP are supported as well as the ability for custom drivers to interface to nearly any HMI using structured text.

Ordering Information:

Model	Description
VB-2000	Versatile Base Controller without Ethernet or Real Time Clock, with VBDSP port.
VB-2100	Versatile Base Controller Ethernet / Real Time Clock and VBDSP port.
VB-2120	Versatile Base Controller with Wi-Fi (no Ethernet), Real Time Clock and VBDSP port.
VB-2200	Versatile Base Controller Ethernet / Real Time Clock and standard Display / Keypad Port

Ordering Information for HMI (VBDSP-XX) and Plug-in Expanders (VB2X-XXX), refer to the **VB-2000 Series HMIs and Plug-in Expanders Brochure**

VB-2000 Series Controllers

The VB-2000 Series Controllers on-board features include 12 sinking or sourcing digital inputs, 8 PWM capable sourcing digital outputs, 7 analog inputs that are field configurable for 0-5VDC, 0-10VDC or 0-20mA, 1 analog output that is field configurable for 0-10VDC or 0-20mADC, communication ports (RS232, RS422, CAN and Ethernet), Real Time Clock, 3 high speed counting inputs (100KHz), micro-SD card socket, programmable LED indicators and LCD / Keypad ports.

The VB-2000 Series controllers are din rail mount but may be mounted to a subplate using other hardware by removing the din rail feet. The controller peripherals are wired via pluggable terminal blocks.

VB-2000 Series Controller Programming

The VB-2000 Series Controllers program using Divebiss EZ Ladder Toolkit, a Ladder Diagram Development Platform that allows for programming in ladder diagram (LD), function block (FB) and structured text (ST). EZ Ladder software parallels the IEC-61131 standard and provides an easy to use interface.

After a ladder diagram program is developed, it can be downloaded to the controller via the serial port or Ethernet Port. The program is stored on non-volatile FLASH memory and is automatically executed on power up.

VB-2000 Series Controller Specifications / Features				
Processor / Memory / Programming	VB-2000	VB-2100	VB-2120	VB-2200
Processor / Memory / EEPROM	P-Series PLC on a Chip™ 32K RAM, 512K Flash / 3500 Bytes EEPROM	P-Series PLC on a Chip™ 32K RAM, 512K Flash / 3500 Bytes EEPROM	P-Series PLC on a Chip™ 32K RAM, 512K Flash / 3500 Bytes EEPROM	P-Series PLC on a Chip™ 32K RAM, 512K Flash / 3500 Bytes EEPROM
Retentive Memory (FRAM)	480 Bytes	480 Bytes	480 Bytes	480 Bytes
Micro SD Card	Yes, Update Programs / Kernels Data-logging using Structured Text	Yes, Update Programs / Kernels Data-logging using Structured Text	Yes, Update Programs / Kernels Data-logging using Structured Text	Yes, Update Programs / Kernels Data-logging using Structured Text
Programming	Ladder Diagram / Structured Text / Function Block	Ladder Diagram / Structured Text / Function Block	Ladder Diagram / Structured Text / Function Block	Ladder Diagram / Structured Text / Function Block
Digital I/O				
Digital Inputs, 8-32VDC	Qty 12, Sink/Source in Groups of 6	Qty 12, Sink/Source in Groups of 6	Qty 12, Sink/Source in Groups of 6	Qty 12, Sink/Source in Groups of 6
High Speed Counter / Timer Inputs, 8-32VDC	Qty 3, NPN/PNP, 100KHz Max.	Qty 3, NPN/PNP, 100KHz Max.	Qty 3, NPN/PNP, 100KHz Max.	Qty 3, NPN/PNP, 100KHz Max.
Digital Outputs, 8-32VDC, PWM or On/Off	Qty 8, Sourcing, Groups of 4	Qty 8, Sourcing, Groups of 4	Qty 8, Sourcing, Groups of 4	Qty 8, Sourcing, Groups of 4
Digital Output / PWM Frequency	1.0 Hz to 1.0 KHz	1.0 Hz to 1.0 KHz	1.0 Hz to 1.0 KHz	1.0 Hz to 1.0 KHz
I/O Expandable	Using VB2X Plug-in Expanders	Using VB2X Plug-in Expanders	Using VB2X Plug-in Expanders	Using VB2X Plug-in Expanders
Analog I/O				
Analog Inputs (12 bit)	Qty 7, 0-5VDC / 0-10VDC / 0-20mADC	Qty 7, 0-5VDC / 0-10VDC / 0-20mADC	Qty 7, 0-5VDC / 0-10VDC / 0-20mADC	Qty 7, 0-5VDC / 0-10VDC / 0-20mADC
Analog Outputs (10 bit) (800Ω max load)	Qty 1, 0-10VDC / 0-20mADC	Qty 1, 0-10VDC / 0-20mADC	Qty 1, 0-10VDC / 0-20mADC	Qty 1, 0-10VDC / 0-20mADC
Thermocouple Inputs	Using VB2X Plug-in Expanders	Using VB2X Plug-in Expanders	Using VB2X Plug-in Expanders	Using VB2X Plug-in Expanders
User Interface				
Programmable LED Indicators	Qty 2	Qty 2	Qty 2	Qty 2
Status LED Indicators	Watchdog x 1 / Status x 1	Watchdog x 1 / Status x 1	Watchdog x 1 / Status x 1	Watchdog x 1 / Status x 1
LCD Display (Display Port)	Yes, Using VBDSPP-XX Expander Board	Yes, Using VBDSPP-XX Expander Board	Yes, Using VBDSPP-XX Expander Board	Yes, Standard LCD Display
Keypad (Keypad Port)	Yes, Using VBDSPP-XX Expander Board	Yes, Using VBDSPP-XX Expander Board	Yes, Using VBDSPP-XX Expander Board	Yes, Up to 20 buttons (4x5 matrix)
Communications				
Serial Ports	1 RS232, 1 RS485, 1 Programming	1 RS232, 1 RS485, 1 Programming	1 RS232, 1 RS485, 1 Programming	1 RS232, 1 RS485, 1 Programming
CAN Ports	Qty 1, 3M Link Connector	Qty 1, 3M Link Connector	Qty 1, 3M Link Connector	Qty 1, 3M Link Connector
CAN Networks Supported	SAE J1939, NMEA 2000, OptiCAN	SAE J1939, NMEA 2000, OptiCAN	SAE J1939, NMEA 2000, OptiCAN	SAE J1939, NMEA 2000, OptiCAN
Ethernet Port & VersaCloud via Ethernet ²	No	Yes, RJ-45 Connection	No	Yes, RJ-45 Connection
Modbus Networking	Serial - Modbus Master / Slave	Modbus Master / Slave / Modbus TCP via Ethernet	Modbus Master / Slave / Modbus TCP via Wi-Fi	Modbus Master / Slave / Modbus TCP via Ethernet
Wi-Fi Connectivity & VersaCloud via Wi-Fi ²	No	No	Yes	No
Supports VersaCloud Cellular ^{1,2} and GPS	Using optional VB2X-X-X Plug-in Expanders	Using optional VB2X-X-X Plug-in Expanders	Using optional VB2X-X-X Plug-in Expanders	Using optional VB2X-X-X Plug-in Expanders
Other				
Input Power	8-32VDC (75mA @ 12VDC)	8-32VDC (75mA @ 12VDC)	8-32VDC (75mA @ 12VDC)	8-32VDC (75mA @ 12VDC)
Real Time Clock	None	MM/DD/YY, Day of Week, HR/MM/SS	MM/DD/YY, Day of Week, HR/MM/SS	MM/DD/YY, Day of Week, HR/MM/SS
Style / Mounting	Open Board / Din Rail / Subplate	Open Board / Din Rail / Subplate	Open Board / Din Rail / Subplate	Open Board / Din Rail / Subplate
Dimensions	10"L x 5" W x 2.25"H	10"L x 5" W x 2.25"H	10"L x 5" W x 2.25"H	10"L x 5" W x 2.25"H
Operating Temperature	-40°C to +80°C	-40°C to +80°C	-40°C to +80°C	-40°C to +80°C

1: Cellular data provided by VersaCloud by Divebiss

2: VersaCloud features require VersaCloud M2M Package with Cloud Portal. Additional charges apply to connected devices.

Versatile Base (VB-2000 Series) Overview:

The Versatile Base 2000 (VB-2XXX) Series solves today's tough control issues with all the advanced features needed in one product family. The VB-2000 Series includes multiple models on Programmable Logic Controllers, Digital I/O, Analog I/O and VersaCloud M2M-IoT Expansion capabilities including thermocouple inputs, digital inputs, analog outputs, cellular, GPS and an HMI Interface (LCD Display and Keypad) to allow operators to set parameters and identify alarms and faults. With an operating temperature of -40°C to 80°C, the VB-2000 Series is able to control in almost any temperature environment.

VB-2000 Series Plug-in Digital and Analog I/O Expanders

- ▶ Operating Temperature -40°C to 80° C
- ▶ Thermocouple Inputs
- ▶ Analog Outputs
- ▶ Digital Outputs / PWM Output Capability
- ▶ Plug-in / Board Mounted



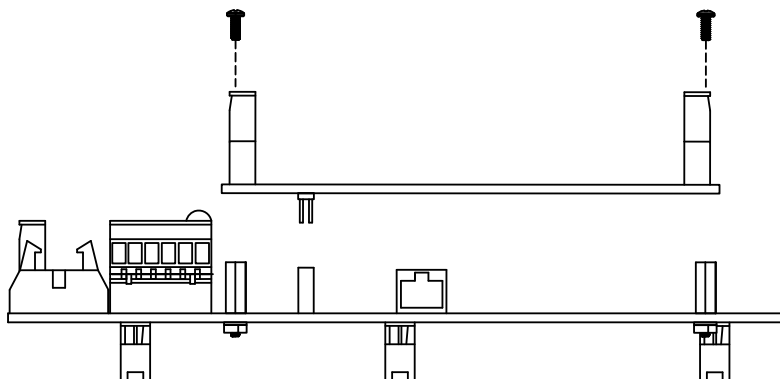
VB2X-4TCDOTAO Expander Top View

VB-2000 Series Plug-in Digital / Analog I/O Expanders

The VB-2000 Series Controllers features may be expanded by installing plug-in expanders (VB2X-XXXX). These plug expanders provide special purpose analog inputs such as thermocouples, analog outputs or additional digital I/O. The expanders stack-mount and plug directly into the VB-2000 Series controller using its EXP port. Once installed, the expander may be added to the ladder diagram project and then it may be utilized in the ladder diagram.

VB2X-XXXX Series Analog / Digital I/O Plug-in Expanders Specifications / Features			
FEATURES	MODELS		
Digital I/O	VB2X-4K	VB2X-4K4DOT	VB2X-4TCDOTAO
Digital Outputs, 8-32VDC, PWM or On/Off	None	Qty 4, Sourcing, Groups of 4	Qty 4, Sourcing, Groups of 4, 1 Amp Max Each.
Digital Output / PWM Frequency	None	1.0 Hz to 1.0 KHz	1.0 Hz to 1.0 KHz
Analog I/O			
Thermocouple Inputs	Qty 4, Type K	Qty 4, Type K	Qty 4, Individually Configured as Types B, E, J, K, N, R, S, T
Analog Outputs	None	None	Qty 4, Individually Configured & Calibrated as 0-10VDC or 4-20mADC
Other			
Style / Mounting	Plug-in / Stack- Mount	Plug-in / Stack- Mount	Plug-in / Stack- Mount
Dimensions	6.4"L x 2.9" W x 1.35"H	6.4"L x 2.9" W x 1.35"H	6.4"L x 2.9" W x 1.35"H
Operating Temperature	-40°C to +80°C	-40°C to +80°C	-40°C to +80°C
Power Source for Devices	None	None	5VDC, 200mADC Max for Sensors

Mounting:



Versatile Base Plug-in VersaCloud M2M Expanders

- ▶ Operating Temperature -40° to 80° C
- ▶ VersaCloud Cellular Data Modem^{1,2}
- ▶ GPS Option
- ▶ Plug-in / Board Mounted
- ▶ Reduced Data Usage (Low Overhead Protocol)



VB-2000 Series Plug-in VersaCloud M2M-IoT Expanders

The VB-2000 Series Controller features may be expanded by installing plug-in expanders (VB2X-XXXX). These plug expanders provide special communications options using VersaCloud M2M-IoT including Cellular connectivity^{1,2} and GPS. The expanders stack-mount and plug directly into the VB-2000 Series controller using its EXP port. Once installed, the expander may be added to the ladder diagram project and then utilized in the ladder diagram.

VersaCloud M2M-IoT communications features on the plug-in expanders such as Cellular and GPS can be combined with communications features on the VB-2XXX Controllers such as Ethernet and Wi-Fi to provide a versatile and powerful remote monitoring, control and data collection solution.

A Versatile Base (VB-2000 Series) controller including plug-in expansion options communicate to VersaCloud M2M-IoT solutions via Ethernet, Cellular^{1,2}, or Wi-Fi² (model dependent) providing the ability to monitor equipment and process remotely, control equipment and adjust process parameters remotely and to collect operational and status information for data analysis and reporting.

VersaCloud M2M-IoT solutions are customizable and allow for access to remote equipment or processes from nearly any internet enabled device such as a computer, tablet or smartphone.

VB2X-XXXX Series VersaCloud M2M-IoT Connectivity Plug-in Expanders Specifications / Features			
FEATURES	MODELS		
	VB2X-C-G	VB2X-X-G	VB2X-C-X
Cellular Data Modem ^{1,2}	■		■
GPS (Global Positioning)	■	■	
Style / Mounting	Plug-in / Stack- Mount	Plug-in / Stack- Mount	Plug-in / Stack- Mount
Dimensions	6.35"L x 2.95" W x .6"H	6.35"L x 2.95" W x .6"H	6.35"L x 2.95" W x .6"H
Operating Temperature	-40°C to +80°C	-40°C to +80°C	-40°C to +80°C

1: Cellular data provided by VersaCloud by Divelbiss

2: VersaCloud M2M-IoT solutions require individual accounts with Microsoft Azure, IoT Central or other platform. Devices, connections and dash boards must be added and configured per application prior to use. Additional charges from per account may apply based on application.

Versatile Base Overview:

The Versatile Base 2000 (VB-2XXX) Series solves today's tough control issues with all the advanced features needed in one product family. The VB-2000 Series includes multiple models on Programmable Logic Controllers, Digital I/O, Analog I/O and VersaCloud M2M Expansion capabilities including thermocouple inputs, Cellular, GPS and an HMI Interface (LCD Display and Keypad) to allow operators to set parameters and identify alarms and faults. With an operating temperature of -40°C to 80°C, the VB-2000 Series is able to control in almost any temperature environment.

Versatile Base HMI (VBDSP-XX)

- ▶ Operating Temperature -40° to 80° C
- ▶ Programmable LED Indicators
- ▶ Up to 20 Programmable Buttons
- ▶ Backlit LCD Display
- ▶ 2x16 Lrg. Char. / 4-20 Std. Char. Display Options
- ▶ Automatic Display (built-in) Heater Control
- ▶ Heater Disable Switch
- ▶ Programmable Beeper
- ▶ Panel Mount
- ▶ Optional Panel Kits with Overlay / Faceplate



VBDSP-01 Expander Front View

VB-2000 Series LCD Display / Keypad Expanders

The VBDSP-XX connects to the VB-2XXX controller's on-board Display port (20 pin) and Keypad port (10 pin) These VBDSP-XX user interface expanders are open-board and are designed to mount through the rear of a panel door. The VBDSP-XX provides multiple configurations of LCD display sizes and number of buttons based on model.

With the OEM in mind, the VBDSP-XX, as an open-board solution is designed to mount directly in a panel door (through the door) and is to be sealed by an overlay on the door front. Panel components and kits may be purchased that include the faceplate and generic overlay. This construction provides the OEM or user with the opportunity to provide a custom text / logo to the front of the panel.

Divelbiss can provide the faceplate, generic overlay or a custom overlay or help you design one with your logo and specific button labeling. Autocad drawings are available for download for the panel cut-outs required to use the VBDSP-XX.

Additional features including up to 3 programmable LED indicators and a programmable buzzer are also standard on the VBDSP-XX user interface expander.

VBDSP-XX User Interface Expanders Specifications, Features & Models			
FEATURE	MODELS		
	VBDSP-01	VBDSP-02	VBDSP-03
LCD Size	2 Row, 16 Columns, 3/8" Character Height	4 Row, 20 Columns, Std Character Height	2 Row, 16 Columns, 3/8" Character Height
Heater	Built-in / Automatic / Manual Disable	Built-in / Automatic / Manual Disable	Built-in / Automatic / Manual Disable
# of Buttons	20, 4 Row, 5 Column	20, 4 Row, 5 Column	6, 2 Row, 3 Column
Functionality	Numeric, Programmable Button Monitoring	Numeric, Programmable Button Monitoring	Programmable Button Monitoring
User Programmable LED Indicators	3	3	2
User Programmable Buzzer / Beeper	Yes	Yes	Yes
Style / Mounting	Open Board, Panel Mount from Rear	Open Board, Panel Mount from Rear	Open Board, Panel Mount from Rear
Dimensions	7.3"W x 6.4"L x 1.7"H	7.3"W x 6.4"L x 1.7"H	7.3"W x 6.4"L x 1.7"H
Operating Temperature	-40°C to +80°C ¹	-40°C to +80°C ¹	-40°C to +80°C ¹
1. -40C requires minimum of 20VDC Input Power to VBDSP-XX			

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Versatile Base HMI Faceplate Kits & Overlays

- ▶ Easy Mounting for VBDSP-XX HMI's
- ▶ Direct Panel Mounting with Cut-out
- ▶ Sealed by Gasket
- ▶ All Mounting Hardware Included in Kits
- ▶ Custom Overlays Available

VB-2000 Series Plug-in VBDSP Faceplate Kits

The VB-2000 Series HMI options (VBDSP-XX) provide powerful display, keypad and auditory feedback options over wide temperature ranges. The VBDSP-XX is designed with the OEM in mind allowing for custom mounting and custom overlay with your specific terminology, naming and logo.



VBDSP-FPKIT-02 with VBDSP-02 Front View

For prototyping purposes or low volume applications, Divelbiss offers faceplate kits designed to work specifically with the VBDSP-XX and provide a sealed mounting solution. The faceplate in the kit comes with the overlay factory installed. The VBDSP-XX mounts to the back side of the faceplate using the provided mounting hardware. The entire faceplate assembly with the installed VBDSP-XX is then installed in a panel. The panel will require a cut-out to accept the faceplate assembly.

The faceplate kit includes the faceplate, installed overlay, all mounting hardware for the VBDSP-XX and the finished faceplate assembly mounting in the panel and a sealing gasket.

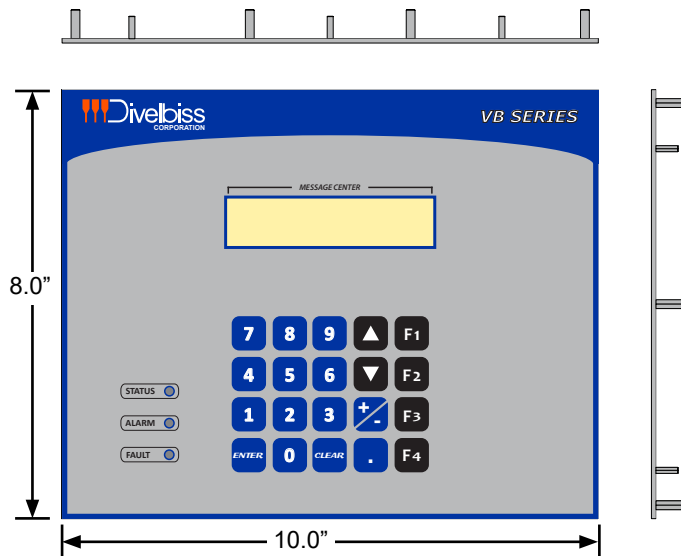
VB-2000 Series Plug-in VBDSP Overlays

The VB-2000 Series HMI options (VBDSP-XX) kit overlays may be purchased as separate items for installation on a panel without the requirement of the faceplate.

Overlays may be ordered for the VBDSP-XX with customized text, graphics colors and logos to meet your exact needs.

VBDSP-XX Faceplates & Accessories	
Part #	Description
VBDSP-FPKIT-01	VBDSP-01 HMI Front Panel Kit with Generic Overlay, Sheet metal Faceplate and Gasket. Includes all mounting hardware.
VBDSP-FPKIT-02	VBDSP-02 HMI Front Panel Kit with Generic Overlay, Sheet metal Faceplate and Gasket. Includes all mounting hardware.
999-108727	Generic Overlay for VBDSP-01 (2x16 display)
999-108728	Generic Overlay for VBDSP-02 (4x20 display)

Mechanical Build & Dimensions:



Included Items:	
Qty	Description
8	#6 Lock Washer
10	#8 Lock Washer
8	#6 Flat Washer
8	6-32 Screw 1/4"
10	8-32 Nut
10	#8 Flat Washer
1	Gasket
1	Faceplate with Overlay
1	Assembly Drawing

- ▶ 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

2013010.3

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	■	■	■	■

	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)	■	■	■	■
Programs 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 Divebiss

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)

- ▶ AC / DC I/O Models
- ▶ 8 Digital Inputs - Isolated
- ▶ 8 Digital Outputs - Isolated
- ▶ Expandable Digital I/O - Daisy Chain
- ▶ Addressable
- ▶ Visual Status Indicators (LED)
- ▶ Quick Disconnect Field Connections
- ▶ Logic Powered from Controller
- ▶ Uses OptiCAN Protocol
- ▶ -40°C to 80°C Operating Temperature



P-Series Bear Bones Digital I/O Expander

The plug-in P-Series Bear Bones I/O Expanders allow for digital I/O expansion of P-Series Bear Bones Controllers (and other Divelbiss PLCs/Controllers). 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 controller.

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

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

The P-Series Bear Bones Digital I/O Expander's 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/OA, I/OB) on the P-Series Bear Bones I/O Expanders.

The P-Series Bear Bones Digital I/O Expander I/O status and control registers in OptiCAN are pre-assigned and need only be accessed by any OptiCAN controller.

The CAN Network Ports (I/OA, I/OB) is the OptiCAN port for all P-Series Bear Bones I/O Expanders. These connection ports connect directly to the P-Series Bear Bones I/O port using the provided cable. Up to 31 P-Series Bear Bones Digital I/O Expanders can be connected to a single P-Series Bear Bones Controller (or other OptiCAN enabled PLC/controller) by the daisy chaining method of plugging the first expander into the controller and each subsequent I/O expander into the previous I/O expander.

Digital Inputs:

There are 8 digital inputs standard on the P-Series Bear Bones Digital I/O Expanders. 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 Digital I/O Expanders. All outputs will operate from 8-32VDC 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. Each group of 4 outputs may be wired individually as sinking or sourcing. All the digital outputs operate as digital outputs (Off / On operation).

Models:

MODEL	DESCRIPTION
ICM-IO-C21	P-Series Bear Bones I/O Expander with 90-130VAC I/O
ICM-IO-C24	P-Series Bear Bones I/O Expander with 8-32VDC I/O

Specifications:

P-Series Bear Bones Digital I/O Expanders		
	ICM-IO-C24	ICM-IO-C21
CAN Ports	1 Port, 4 Pin 3M Link (Used for I/O Expanders)	1 Port, 4 Pin 3M Link (Used for I/O Expanders)
Networking	OptiCAN (CAN)	OptiCAN (CAN)
Digital Inputs	Qty 8. 8-32VDC, Sink/Source in groups of four. Optically Isolated	Qty 8. 90-130VAC, Sink/Source in groups of 4 Optically Isolated
Digital Outputs	Qty 8. 8-32VDC, Sink in groups of four. 2 Amps per point. Optically Isolated.	Qty 8. 90-130VAC, Sink/Source in groups of four. 2 Amps per point. Optically Isolated.
LED Indicators	Input (8), Output (8), Power, Watchdog	Input (8), Output (8), Power, Watchdog
Input Power	8-32VDC / 13mA @ 24VDC Input from Controller (no loads). Supplied by I/O cable.	8-32VDC / 13mA @ 24VDC Input from Controller (no loads). Supplied by I/O cable.
Expandable	I/OA, I/OB Accepts additional P-Series Bear Bones Digital I/O Expanders via Daisy Chain method	I/OA, I/OB Accepts additional P-Series Bear Bones Digital I/O Expanders via Daisy Chain method
Operating Temperature	-40°C to +80°C	-40°C to +80°C
Programming Language	Pre-Programmed and Assigned OptiCAN registers - no programming required on I/O Expander	Pre-Programmed and Assigned OptiCAN registers - no programming required on I/O Expander
Mounting	Standoffs and screws.	Standoffs and screws.
Size	9.0" x 5.4" x 1.5"	9.0" x 5.4" x 1.5"

- ▶ Single Board Construction
- ▶ Low Mounting Profile
- ▶ SAE J1939 / OptiCAN Connectivity
- ▶ Analog Inputs - Field Selectable
- ▶ Serial Ports - Modbus Slave
- ▶ Thermocouple Inputs
- ▶ High Speed Counter (100KHz)
- ▶ -40° to 80°C Operating Temperature
- ▶ Supports Custom Expansion
- ▶ Programs in Ladder Diagram / Function Block



VB-1000 Controller with VBEX-4K4DOT

The Versatile Base controller (VB-1000) is designed for cost-effective control by providing powerful features in an open-board format including Digital and Analog I/O, High Speed Counting, Pulse Width Modulation (PWM) Outputs, and communications including SAE J1939, OptiCAN, and Modbus Slave.

The Versatile Base controllers are ideal for many small to medium OEM system control and monitor requirements. In addition to the on-board functionality, a connector allows for I/O expansion via the PLC on a Chip's SPI port. This expansion capability is what makes the control so versatile as an OEM solution. Expanding the control to include additional functionality such as thermocouple input, quadrature counting, D/A and A/D conversion, motor and fan drive, real time clock, and much more can be done quickly - with minimal NRE cost - as only the smaller expansion board requires engineering design. The result is a quick to market, affordable, application specific solution.

Typical Applications Include:

- ▶ Mobile Equipment
- ▶ Furnace Control
- ▶ Access Control
- ▶ Proportional Valve Control
- ▶ Hydraulic Equipment
- ▶ Pump Control
- ▶ Engine Control
- ▶ Refrigeration Control

VB-1000 Controller Specifications / Features <small>(Refer to the product Manual / Data Sheet for more detailed specifications)</small>	
Processor / Memory / Programming	VB-1000 Controller
Processor / Memory / EEPROM / Retentive	M-Series PLC on a Chip™, 256K 12K Bytes RAM, 256K Flash / 2792 Bytes EEPROM, 100 Bytes Retentive
Programming	Ladder Diagram / Function Block
Digital I/O	
Digital Inputs, 8-32VDC	Qty 12, Sink/Source in groups of 6, Optically Isolated with LED Indicators
High Speed Counters 8-32VDC	Qty 2, Count Up, 100KHz Max., Sinking or Sourcing Selectable
Digital Outputs, 8-32VDC - On/Off, PWM	Qty 8 Solid-State Sourcing, with LED Indicators, Rated 4A per output pair Max. (Derated based on Temperature) Organized as 2 groups of 4 with Individual Source Terminals (Power) PWM Frequency 1.436Hz to 1KHz, PWM Range 5-95%, Over-current protected.
Analog I/O	
Field Analog Inputs	Qty 7, 10 bit resolution, Configurable as 0-20mADC, 0-5VDC or 0-10VDC
Non-Field Analog Inputs	Analog Input for Input Power Monitor - on board
User Interface	
Status LED Indicators	Watchdog LED, 1 Programmable LED
Communications	
Serial Ports	1 Programming, RS232, 1 RS232 Serial Port - Modbus Slave
CAN Port	2 CAN Ports, SAE J1939 (Read only), OptiCAN
Other	
Input Power	8-32VDC, Typical input current 45mA@12VDC (no I/O or loads)
Style / Mounting	Open Board / Subplate
Dimensions	8.3 L x 4.27" W x 1.0" H
Operating Temperature	-40°C to +80°C (Outputs Derated based on Temperature)

Ordering Information: (See Specifications)

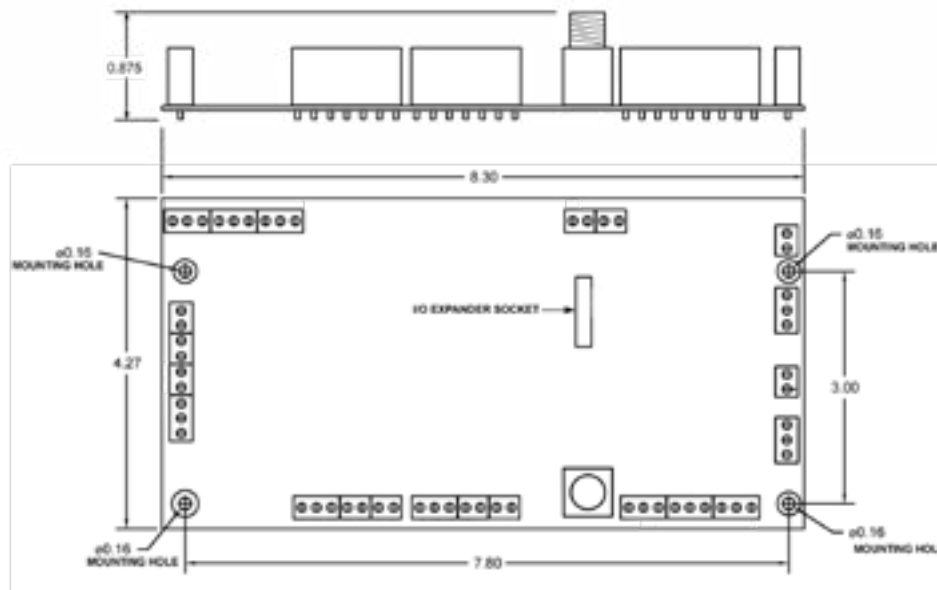
Model	Description
VB-1000	VB-1000 Controller with Digital I/O, Analog I/O and Communications
VBEX-4K	VB-1000 Expansion board with 4 Type K Thermocouple Inputs. Stack Mounts to top of VB-1000 Controller.
VBEX-4K4DOT	VB-1000 Expansion board with 4 Type K Thermocouple Inputs and 4 Additional Digital Outputs. Stack Mounts to top of VB-1000 Controller.

Programming the Controller

The VB-1000 Series PLCs program in Ladder Diagram using the Divebiss EZ LADDER® Toolkit, a Ladder Diagram Development Platform. EZ LADDER software parallels the IEC-61131 standard and provides an easy to use interface.

After a ladder diagram program is developed, it can be downloaded to the VB-1000 via the programming port. The program is stored on non-volatile FLASH memory and is automatically executed on power up. Once the download is complete, the VB-1000 is successfully programmed and begins executing the program.

Refer to the EZ LADDER Toolkit's User Manual for more detail on creating ladder diagram programs, connecting to targets and downloading the program to targets.



VB-1000 Expansion Details:

Model #	Description	Detailed Specifications
VBEX-4K	4 Type K Thermocouple Input Expander	4 Type K Thermocouple Inputs, 2 Bit Resolution Range: 0°C to 1023°C Accuracy: 0.25°C per bit, +/- 7.75°C or better based on actual measured temperature
VBEX-4K4DOT	4 Type K Thermocouple Input Expander with 4 Digital Outputs (On/Off operation)	4 Type K Thermocouple Inputs, 2 Bit Resolution Range: 0°C to 1023°C Accuracy: 0.25°C per bit, +/- 7.75°C or better based on actual measured temperature Qty 4 Solid-State Sourcing, with LED Indicators Rated 4A per output pair Max. (Derated based on Temperature) Individual Source Terminal (8-32VDC)

The VB-1000 User Manual and EZ LADDER Toolkit can be downloaded from <http://www.divebiss.com>.

Specifications are subject to change without notice.

- ▶ Full Featured
- ▶ Single Board Construction
- ▶ Low Mounting Profile
- ▶ Fully Industrialized
- ▶ Relay Outputs
- ▶ SAE J1939 / OptiCAN Connectivity
- ▶ Modbus Slave Supported
- ▶ High Speed Counter (100KHz)
- ▶ Programs in Ladder Diagram / Function Block



ICM-EBB-700 Programmable Logic Controller

Overview:

The Enhanced Baby Bear series of programmable logic controllers offers dimensions and mounting identical to the original Baby Bear product while adding expanded features and versatility. Based on patented PLC on a Chip™ technology, the controller is easy to apply and program using the EZ LADDER Toolkit PC based software. The base control board offers 5 inputs and 5 outputs with maximum expansion capability to 120 in and 120 out using standard expander modules.

The Enhanced Baby Bear controllers are ideal for small system control and monitor applications, particularly in instances where panel space is limited. The low profile allows side as well as back-panel mounting in standard NEMA enclosures.

Typical Applications Include:

- ▶ Machine Control
- ▶ Water Lift Stations
- ▶ Elevator Control
- ▶ Compressor Control
- ▶ Label Machines
- ▶ Motor Control
- ▶ Engine Control
- ▶ Screen Printers
- ▶ Valve Control
- ▶ Conveyor Systems
- ▶ Pump Control

Enhanced Baby Bear Controller Specifications / Features (Refer to the product Manual / Data Sheet for more detailed specifications)		
Processor / Memory / Programming	128K Flash Models	256K Flash Models
Processor / Memory / EEPROM	M-Series PLC on a Chip™, 128K 8KBytes RAM, 128K Flash / 1768 Bytes EEPROM	M-Series PLC on a Chip™, 256K 12K Bytes RAM, 256K Flash / 2792 Bytes EEPROM
Retentive Memory	100 Bytes	100 Bytes
Programming	Ladder Diagram / Function Block	Ladder Diagram / Function Block
Digital I/O		
Digital Inputs, 10-30VAC/VDC	Qty 5, Sink/Source, Optically Isolated with LED Indicators	Qty 5, Sink/Source, Optically Isolated with LED Indicators
High Speed Counter (12VDC Nominal)	Qty 1, Count Up, 100KHz Max., Optically Isolated (Model Dependent)	Qty 1, Count Up, 100KHz Max., Optically Isolated
Digital Outputs	Qty 5, Relay, with LED Indicators, Dry Contact 1/8 HP, 125VAC / 250VAC 5A@30VDC / 250VAC Resistive	Qty 5, Relay, with LED Indicators, Dry Contact 1/8 HP, 125VAC / 250VAC 5A@30VDC / 250VAC Resistive
I/O Expansion	Expandable using EBB I/O or High Density I/O (Model Dependent)	Expandable using EBB I/O or High Density I/O (Model Dependent)
User Interface		
Status LED Indicators	Watchdog LED, Power LED	Watchdog LED, Power LED
Communications		
Serial Ports	1 Programming, RS232	1 Programming, RS232 Optional (sold separately) Serial Module RS232, RS422, RS485, Modbus Slave
CAN Port	None	SAE J1939 (Read Only), OptiCAN
Other		
Input Power	10VAC or 12VDC	10VAC or 12VDC
Output Power to I/O Expansion	5VDC: +5VDC +/- 5%, 360mADC Maximum +V: 12VDC +/- 15%, 600mADC Maximum	5VDC: +5VDC +/- 5%, 360mADC Maximum +V: 12VDC +/- 15%, 600mADC Maximum
Real Time Clock	Yes, Month, Day, Year, Day of Week, Hour Minute, Seconds, (Model Dependent)	Yes, Month, Day, Year, Day of Week, Hour Minute, Seconds
Style / Mounting	Open Board / Subplate	Open Board / Subplate
Dimensions	8.75" L x 4.00" W x 1.04" H	8.75" L x 4.00" W x 1.04" H
Operating Temperature	-40°C to +60°C	-40°C to +60°C

Ordering Information: (See Specifications)

Model	Flash Memory	On-board I/O	I/O Expansion Type	CAN Port	Real Time Clock	Counter Input	Optional COM Port
ICM-EBB-100	128K	5 Inputs 10-32VAC / VDC 5 Relay Outputs	None	No	No	No	None
ICM-EBB-200	128K	5 Inputs 10-32VAC / VDC 5 Relay Outputs	None	No	No	Yes	None
ICM-EBB-300	128K	5 Inputs 10-32VAC / VDC 5 Relay Outputs	None	No	Yes	Yes	None
ICM-EBB-400	128K	5 Inputs 10-32VAC / VDC 5 Relay Outputs	Qty 1: ICM-EBB-IO-54RE-P 8 DC Inputs / 8 Relay Outputs	No	Yes	Yes	None
ICM-EBB-500	128K	5 Inputs 10-32VAC / VDC 5 Relay Outputs	Qty: Multiple, High Density I/O Various Configurations / Voltages up to 120 Inputs / 120 Outputs	No	Yes	Yes	None
ICM-EBB-600	256K	5 Inputs 10-32VAC / VDC 5 Relay Outputs	Qty 1: ICM-EBB-IO-54RE-P 8 DC Inputs / 8 Relay Outputs	Yes	Yes	Yes	RS232 / RS485 / RS422 Module (Sold Separately)
ICM-EBB-700	256K	5 Inputs 10-32VAC / VDC 5 Relay Outputs	Qty: Multiple, High Density I/O Various Configurations / Voltages up to 120 Inputs / 120 Outputs	Yes	Yes	Yes	RS232 / RS485 / RS422 Module (Sold Separately)

Programming the Controller

The Enhanced Baby Bear Series PLCs program in Ladder Diagram using the Divebiss EZ LADDER® Toolkit, a Ladder Diagram Development Platform. EZ LADDER software parallels the IEC-61131 standard and provides an easy to use interface.

After a ladder diagram program is developed, it can be downloaded to the Enhanced Baby Bear via the programming port. The program is stored on non-volatile FLASH memory and is automatically executed on power up. Once the download is complete, the Enhanced Baby Bear is successfully programmed and begins executing the program.

Refer to the EZ LADDER Toolkit's User Manual for more detail on creating ladder diagram programs, connecting to targets and downloading the program to targets.

Optional Hardware Add-ons/Accessories:

Model #	Description
126-102860	Null Modem Programming Cable
ICM-EBB-RS232	RS232 Serial Port Module for 2nd COM port
ICM-EBB-RS422	RS422 Serial Port Module for 2nd COM port
ICM-EBB-RS485	RS485 Serial Port Module for 2nd COM port
109-101153	Transformer, 115VAC Primary / 10VAC Secondary
109-100924	Transformer, 230VAC Primary / 10VAC Secondary
ICM-EBB-IO-54RE-P	Stackable I/O Expander, 8 DC Inputs / 8 Relay Outputs
ICM-HDIO-XXP	High Density I/O Expanders (Various Models Available)
EZLDCD-01	EZ LADDER Toolkit Development Software on USB Flash Drive (Free with Controller Purchase)

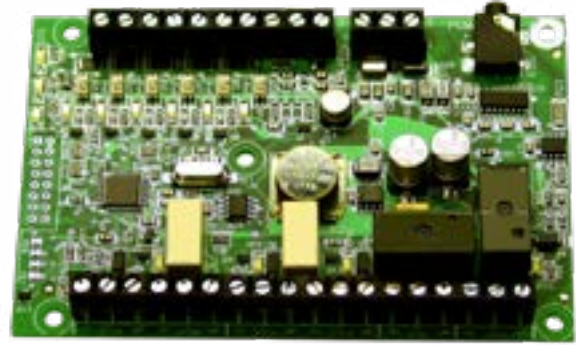
Mechanical Dimensions:



The Enhanced Baby Bear User Manual and EZ LADDER Toolkit can be downloaded from <http://www.divebiss.com>.

Specifications are subject to change without notice.

- ▶ Open PCB Construction
- ▶ Small Footprint
- ▶ Fully Industrialized
- ▶ 6 Digital Inputs
- ▶ Analog Inputs
- ▶ 4 Dry Contact Relay Outputs
- ▶ LED I/O Status Indicators
- ▶ High Speed Counter
- ▶ Programs in Ladder Diagram / Function Block



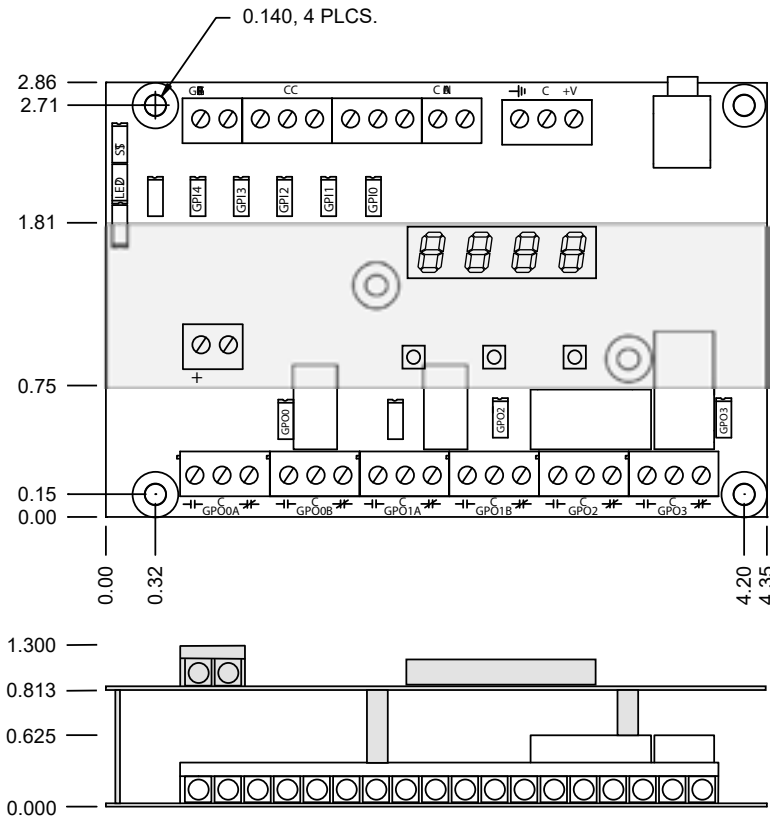
ICM-MB-100 Programmable Logic Controller

Overview:

The ICM-MB-100, Micro Bear is the latest edition to the 'Bear' Family of products. The ICM-MB-100 in the tradition of the original Bear Bones, is an open-board controller with powerful features and can be quickly adapted to many applications. Designed to be used in place of small, application specific microprocessor based control boards, the Micro Bear controllers offer the advantage of programmability using EZ LADDER Toolkit. The Micro Bear includes digital inputs, relay outputs and analog inputs standard. Model dependent features include push buttons, 4 digit display and an additional analog input. An optional DIN rail mounting option is available.

Ordering Information: (See Specifications)

Model	Description
ICM-MB-100	Micro Bear with Digital Inputs and Relay Outputs, Subplate Mount.
ICM-MB-110	Micro Bear with Digital Inputs, Relay Outputs, LED Display, and Push Buttons. Subplate Mount.



NOTE: Additional components for MB-110 (See image below) shown with grey shading in dimensional drawing to left.



ICM-MB-110

Micro Bear Controller Specifications / Features		
Specifications / Features	ICM-MB-100	ICM-MB-110
Processor / Memory / EEPROM	M-Series PLC on a Chip™ 512 Bytes RAM, 64K Flash / 406 Bytes EEPROM	M-Series PLC on a Chip™ 512 Bytes RAM, 64K Flash / 406 Bytes EEPROM
Retentive Memory	100 Bytes	100 Bytes
Programming	Ladder Diagram / Function Block	Ladder Diagram / Function Block
Digital I/O		
Digital Inputs ¹ , 9-32VDC	Qty 6, Sink/Source in Groups of 3	Qty 6, Sink/Source in Groups of 3
High Speed Counter (9-32VDC)	Qty 1, Uses Digital Input GPIO, Count Up, 25KHz Max.	Qty 1, Uses Digital Input GPIO, Count Up, 25KHz Max.
Digital Outputs	Total Qty 4 Qty 2, DPDT, 2A@30VDC, .5A@125VAC, .25A@250VAC, Dry Contacts Qty 2, Form C, 5A@30VDC, 5A@125VAC, 5A@250VAC Relay Output Common Terminals may be jumpered on-board to +VDC/Common	Total Qty 4 Qty 2, DPDT, 2A@30VDC, .5A@125VAC, .25A@250VAC, Dry Contacts Qty 2, Form C, 5A@30VDC, 5A@125VAC, 5A@250VAC Relay Output Common Terminals may be jumpered on-board to +VDC/Common
Analog I/O		
Analog Inputs (10 bit)	Qty 1, 0-5VDC Single Ended	Qty 2, 0-5VDC Single Ended
User Interface		
Programmable LED Indicators	Qty 2	Qty 5
Status LED Indicators	Status (STS) x 1	Status (STS) x 1
LED Display	None	4 Digit, 7 Segment LED Display w/ Decimal Pt., Programmable
Push Buttons	None	3 Push Buttons, Programmable
Communications		
Serial Ports	1 Programming, RS232	1 Programming, RS232
Other		
Input Power	9-32VDC (105mA @ 24VDC)	9-32VDC (105mA @ 24VDC)
Style / Mounting	Open Board / Din Rail / Subplate (with Mtg Kit)	Open Board / Din Rail / Subplate (with Mtg Kit)
Dimensions	4.35" L x 2.86" W x .75"H	4.35" L x 2.86" W x .1.3"H
Operating Temperature	0°C to +60°C	0°C to +60°C

1: Total Digital Inputs. Counter Input uses GPIO and reduces total number to 5.

Programming the Controller

The Micro Bear controllers program in Ladder Diagram using the Divebiss EZ LADDER® Toolkit, a Ladder Diagram Development Platform. EZ LADDER software parallels the IEC-61131 standard and provides an easy to use interface.

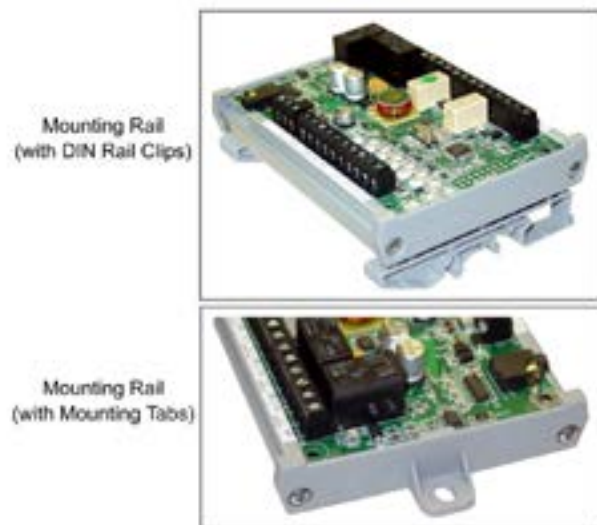
After a ladder diagram program is developed, it can be downloaded to the Micro Bear via the programming port. The program is stored on non-volatile FLASH memory and is automatically executed on power up. Once the download is complete, the Micro Bear is successfully programmed and begins executing the program.

Refer to the EZ LADDER Toolkit's User Manual for more detail on creating ladder diagram programs, connecting to targets and downloading the program to targets.

Optional Hardware Add-ons/Accessories:

Model #	Description
SI-PGM	Serial Programming Cable
MB-HP-01	DIN Rail Mounting Kit
MB-HP-02	Mounting Kit with Plastic Mounting Tabs
MB-HP-03	Male/Female Standoffs Mounting Kit
EZLDCD-01	EZ LADDER Toolkit Development Software on USB Flash Drive (Free with Controller Purchase)

Alternative Mounting Hardware



The Micro Bear User Manual and EZ LADDER Toolkit can be downloaded from <http://www.divebiss.com>.

Specifications are subject to change without notice.

- ▶ Supports up to 128 Digital Inputs / 128 Digital Outputs
- ▶ Analog Inputs
- ▶ Analog Outputs
- ▶ 2 PWM Output Channels
- ▶ Synchronous Serial Interface (SSI) Port
- ▶ 2 CAN Network Ports
- ▶ SAE J1939 Connectivity
- ▶ Modbus Slave Supported
- ▶ Serial Port (RS232 / RS422 / RS485)
- ▶ 2 High Speed Counters
- ▶ Programs in Ladder Diagram / Function Block
- ▶ DIN Standard Rail Mounting



Overview:

Designed for speed, the PCS series of programmable logic controllers replaces the High Density Bear Bones product while adding expanded features and versatility. These features include analog I/O capability, expanded communication ability via a CAN network with J1939 support, Synchronous Serial Interface (SSI), truly high speed counting, and broad frequency range Pulse Width Modulation (PWM) outputs. Based on the patented PLC on a Chip® technology, the controller is easy to apply and program using the EZ LADDER Toolkit PC based software.

The PCS controllers are ideal for small system control and monitor applications, particularly in instances where higher speeds or positioning accuracy is required. The SSI port allows direct reading of absolute encoder outputs for increased operating speed.

PCS Controller Specifications / Features		
Specifications / Features	PCS-1XX	PCX-2XX
Processor / Memory / EEPROM	M-Series PLC on a Chip™ 12K RAM, 256K Flash / 2792 Bytes EEPROM	
Retentive Memory	100 Bytes	
Programming	Ladder Diagram / Function Block	
Digital I/O		
Digital Inputs	None on Unit, Up to 128 Digital Inputs using High Density I/O Expander Cards, Various I/O Types and Ranges Available	
High Speed Counters	None	Qty 2, Count Up, 100KHz Max.
Digital Outputs	None on Unit, Up to 128 Digital Outputs using High Density I/O Expander Cards, Various I/O Types and Ranges Available	
Pulse Width Modulation Outputs (PWM)	1 Channel, 16 bit resolution or 2 Channels, 8 bit resolution, Open Collector Output, 1.436Hz to 47.058KHz (Model Dependent)	
Synchronous Serial Interface (SSI)	None	Graycode SSI Interface
Analog I/O		
Analog Inputs	6 Channels, 0-5VDC or 0-20mADC, 10 Bit Resolution (Model Dependent)	
Analog Outputs	4 Channels, 0-5VDC or 0-20mADC, 8 Bit Resolution or 2 Channels, 0-5VDC or 0-20mADC, 16 Bit Resolution (Model Dependent)	
User Interface		
Status LED Indicators	Input Power, Watchdog	
Communications		
Serial Ports	1 Programming, RS232, 1 Optional RS232, RS422 or RS485 Port - Modbus Slave	
CAN Ports	None	Qty 2, SAE J1939 (read only), OptiCAN
Other		
Real Time Clock	Month, Day, Year, Day of Week, Hour, Minute, Second	
Input Power	10VAC or 10-30VDC	
I/O Expander Power (HDIO)	with 10VAC Input Power, +VA (approx 12VDC) @.5A Max, 5VDC @.5A Max with DC Input Power, +VA (=+DC Input) @.5A Max, 5VDC @.5A Max	
Style / Mounting	Plastic Enclosure / Din Rail or Open Board / Din Rail	
Dimensions	6.4" L x 3.54" W x .24"H	
Operating Temperature	0°C to +60°C	

Models / Ordering Guide:

PCS - A B C

A	BASE SYSTEM OPTIONS
1	256K PLC on a Chip™ Processor, High Density I/O Interface and Real Time Clock
2	256K PLC on a Chip™ Processor, High Density I/O Interface, Real Time Clock, 2 CAN Ports, SSI Port, 2 High Speed Counter Inputs

B	MULTI-PURPOSE SERIAL PORT OPTIONS
0	No Serial Port Installed
1	RS232 Serial Port Installed
2	RS422 Serial Port Installed
3	RS485 Serial Port Installed

C	ANALOG I/O OPTIONS
0	No Analog I/O Installed
1	6 Analog Inputs rated 0-5VDC, 4 Analog Outputs rated 0-5VDC and 2 PWM Outputs
2	6 Analog Inputs rated 0-20mA, 4 Analog Outputs rated 0-20mA and 2 PWM Outputs

Example Part Numbers: PCS-100, PCS-201, PCS-112

Optional Hardware Add-ons/Accessories:

Model #	Description
126-102860	Null Modem Cable
109-101153	Transformer, 115V Primary, 10V Secondary
109-100924	Transformer, 230V Primary, 10V Secondary
ICM-HDIO-XXP	High Density I/O (Various Models Available)
EZLDCD-01	EZ LADDER Toolkit Development Software on USB Flash Drive (Free with Controller Purchase)

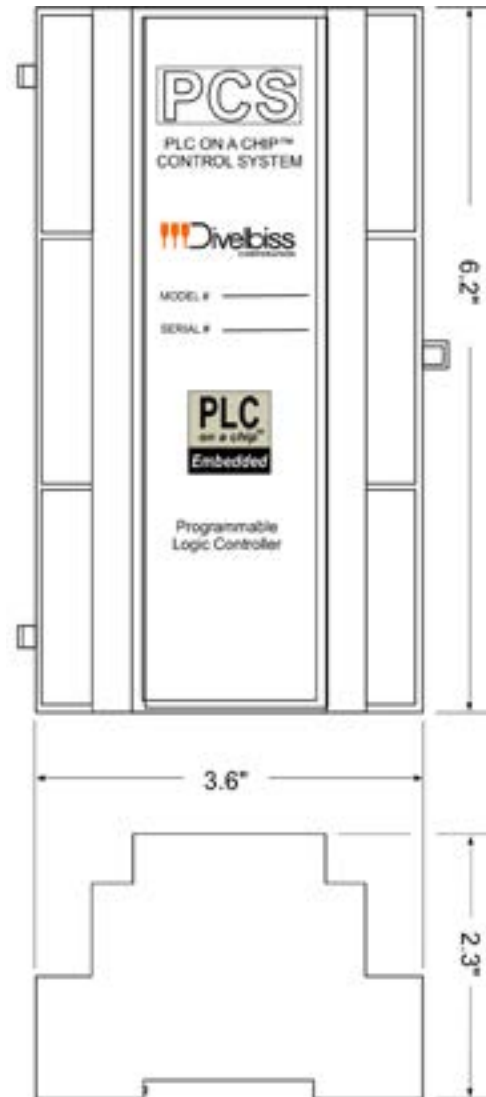
Programming the Controller

The PCS controllers program in Ladder Diagram using the Divebiss EZ LADDER® Toolkit, a Ladder Diagram Development Platform. EZ LADDER software parallels the IEC-61131 standard and provides an easy to use interface.

After a ladder diagram program is developed, it can be downloaded to the PCS controller via the programming port. The program is stored on non-volatile FLASH memory and is automatically executed on power up. Once the download is complete, the PCS is successfully programmed and begins executing the program.

Refer to the EZ LADDER Toolkit's User Manual for more detail on creating ladder diagram programs, connecting to targets and downloading the program to targets.

Dimensions:



The PCS Controller User Manual and EZ LADDER Toolkit can be downloaded from <http://www.divebiss.com>.

Specifications are subject to change without notice.

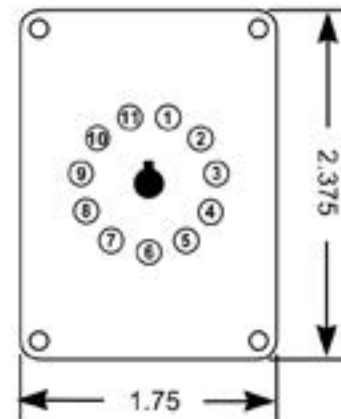
- ▶ Full Featured
- ▶ Small Footprint
- ▶ Fully Industrialized
- ▶ Digital I/O
- ▶ 7 Segment LED, Push Buttons Available
- ▶ LED Status Indicators
- ▶ Analog Input Available
- ▶ High Speed Counter
- ▶ Real Time Clock Available
- ▶ 11-pin Plug-in Construction
- ▶ Programs in Ladder Diagram / Function Block



SI-200
Plug-in PLC

The Solves-It! Series of programmable logic controllers provide a new solution where a small, yet versatile logic controller is required. Based on patented PLC on a Chip® technology, the Solves-It! is easy to apply and program using the PC based EZ LADDER Toolkit software. Basic units feature digital I/O and/or a 10VDC differential analog input. Enhanced units add two programmable push buttons, a real time clock with battery back-up, and a four digit numeric display.

The Solves-It! controllers are ideal for small system control and monitor applications, particularly in instances where panel space is limited. Solves-It! mounts in any standard 11-pin octal base and requires only 1.75" of DIN rail space in the panel.



Typical Applications Include:

- ▶ Machine Control
- ▶ Compressor Control
- ▶ Engine Control
- ▶ Conveyor Systems
- ▶ Water Lift Stations
- ▶ Label Machines
- ▶ Screen Printers
- ▶ Pump Control
- ▶ Elevator Control
- ▶ Motor Control
- ▶ Valve Control

Ordering Information: (See Specifications*)

Model	Description
SI-100	Solves-It! with 4 Sourcing Inputs, 4 Sourcing Outputs (500mA* Max), 8-32VDC*
SI-101	Solves-It! with 4 Sinking Inputs, 4 Sinking Outputs (500mA* Max), 8-32VDC*
SI-110	Solves-It! Analog with 4 Dual Function I/O (Input or Output), 2 Dedicated Outputs (I/O operate Sinking as Inputs, Sourcing as Outputs), 1 Analog Input, 2 Potentiometers
SI-200	Solves-It! with 4 Sourcing Inputs, 4 Sourcing Outputs (500mA* Max), 8-32VDC*, 4 Digit Numeric Display, 2 Push Buttons, Real Time Clock
SI-201	Solves-It! with 4 Sinking Inputs, 4 Sinking Outputs (500mA* Max), 8-32VDC*, 4 Digit Numeric Display, 2 Push Buttons, Real Time Clock
SI-210	Solves-It! Analog with 4 Dual Function I/O (Input or Output), 2 Dedicated Outputs (I/O operate Sinking as Inputs, Sourcing as Outputs), 1 Analog Input, 2 Potentiometers, 4 Digit Numeric Display, 2 Push Buttons, Real Time Clock

* Rev 2.0 Hardware. Shown. Rev 1.0 hardware has different features/specifications, refer to the Rev 1.0 and Rev 2.0 Manuals for details.

Solves-It! PLC Specifications* / Features (Rev 2.0 Hardware Shown, refer to Manuals for Rev 1.0 Hardware Specs)						
Feature / Specification	SI-100	SI-101	SI-110	SI-200	SI-201	SI-210
Processor / Memory / EEPROM	M-Series PLC on a Chip™, 512 Bytes RAM, 64K Flash / 128 Bytes EEPROM					
Retentive Memory	None			90 Bytes		
Programming	Ladder Diagram / Function Block					
Digital I/O						
Digital Inputs ¹²	Qty 4, 8-32VDC, Sourcing	Qty 4, 8-32VDC, Sinking	4 Multi-Function I/O operate as Digital Input or Digital Output (program selected). As Inputs - Sinking, 8-32VDC	Qty 4, 8-32VDC, Sourcing	Qty 4, 8-32VDC, Sinking	4 Multi-Function I/O operate as Digital Input or Digital Output (program selected). As Inputs - Sinking, 8-32VDC
High Speed Counter	Qty 1, Uses Digital Input GPI1, Count Up, 25KHz Max. 8-32VDC Sourcing	Qty 1, Uses Digital Input GPI1, Count Up, 25KHz Max. 8-32VDC Sinking	Qty 1, Uses Digital Input GPIO3, Count Up, 25KHz Max. 8-32VDC Sinking	Qty 1, Uses Digital Input GPI1, Count Up, 25KHz Max. 8-32VDC Sourcing	Qty 1, Uses Digital Input GPI1, Count Up, 25KHz Max. 8-32VDC Sinking	Qty 1, Uses Digital Input GPIO3, Count Up, 25KHz Max. 8-32VDC Sinking
Digital Outputs ²	Total Qty 4, Sourcing, Solid-State, 8-32VDC, 500mA Max Per Point. Output Voltage = Input Voltage	Total Qty 4, Sinking, Solid-State, 8-32VDC, 500mA Max Per Point. Output Voltage = Input Voltage	Total of 6 possible. 2 Dedicated Outputs 4 Multi-Function I/O operate as Digital Input or Digital Output (program selected). As (All) Outputs - Sourcing, 8-32VDC, Solid-State, 500mA Max Per Point. Output Voltage = Input Voltage	Total Qty 4, Sourcing, Solid-State, 8-32VDC, 500mA Max Per Point. Output Voltage = Input Voltage	Total Qty 4, Sinking, Solid-State, 8-32VDC, 500mA Max Per Point. Output Voltage = Input Voltage	Total of 6 possible. 2 Dedicated Outputs 4 Multi-Function I/O operate as Digital Input or Digital Output (program selected). As (All) Outputs - Sourcing, 8-32VDC, Solid-State, 500mA Max Per Point. Output Voltage = Input Voltage
Analog I/O						
Analog Inputs	None	None	1 External 0-10VDC, 2 Internal Potentiometer	None	None	1 External 0-10VDC, 2 Internal Potentiometer
User Interface						
Programmable LED Indicators	Qty 4	Qty 4	Qty 1	Qty 4	Qty 4	Qty 1
Status LED Indicators	Status x 1	Status x 1	Status x 1, GPO5	Status x 1	Status x 1	Status x 1, GPO5
LED Display	None	None	None	4 Digit, Numeric LED Display, Programmable	4 Digit, Numeric LED Display, Programmable	4 Digit, Numeric LED Display, Programmable
Push Buttons	None	None	None	2, Programmable	2, Programmable	2, Programmable
Communications						
Serial Ports	1 Programming, RS232	1 Programming, RS232	1 Programming, RS232	1 Programming, RS232	1 Programming, RS232	1 Programming, RS232
Other						
Input Power	8-32VDC	8-32VDC	8-32VDC	8-32VDC	8-32VDC	8-32VDC
Real Time Clock	None	None	None	Yes, Time of Day, Day, Month, Year, Day of Week	Yes, Time of Day, Day, Month, Year, Day of Week	Yes, Time of Day, Day, Month, Year, Day of Week
Style / Mounting	Plastic Housing, Plugs into 11 Pin Octal Socket	Plastic Housing, Plugs into 11 Pin Octal Socket	Plastic Housing, Plugs into 11 Pin Octal Socket	Plastic Housing, Plugs into 11 Pin Octal Socket	Plastic Housing, Plugs into 11 Pin Octal Socket	Plastic Housing, Plugs into 11 Pin Octal Socket
Dimensions	1.75" L x 2.4" W x 4.2" H	1.75" L x 2.4" W x 4.2" H	1.75" L x 2.4" W x 4.2" H	1.75" L x 2.4" W x 4.2" H	1.75" L x 2.4" W x 4.2" H	1.75" L x 2.4" W x 4.2" H
Operating Temperature	-40°C to +65°C	-40°C to +65°C	-40°C to +65°C	-40°C to +65°C	-40°C to +65°C	-40°C to +65°C

1: Total Digital Inputs. Counter Input uses GPIx input and reduces total number.

2: Multi-function I/O operate as either digital inputs or digital outputs. Total number of multi-function I/O is 4. I/O only operates as one or the other.

Optional Hardware Add-ons/Accessories:

Model #	Description
SI-PGM	Serial Programming Cable
115-105328	DIN / Panel mount screw 11-pin terminal socket.
EZLDCD-01	EZ LADDER Toolkit Development Software on USB Flash Drive (Free with Controller Purchase)
SK-100	Starter Kit with Solves-It! SI-100, Programming Cable & Socket
SK-101	Starter Kit with Solves-It! SI-101, Programming Cable & Socket
SK-110	Starter Kit with Solves-It! SI-110, Programming Cable & Socket
SK-200	Starter Kit with Solves-It! SI-200, Programming Cable & Socket
SK-201	Starter Kit with Solves-It! SI-201, Programming Cable & Socket
SK-210	Starter Kit with Solves-It! SI-210, Programming Cable & Socket
SI-DEMO-01	Solves-It! Trainer / Simulator for SI-100, SI-200
SI-DEMO-02	Solves-It! Trainer / Simulator for SI-110, SI-210

Programming the Controller

The Solves-It! Plug-in PLCs program in Ladder Diagram using the Divebiss EZ LADDER® Toolkit, a Ladder Diagram Development Platform. EZ LADDER software parallels the IEC-61131 standard and provides an easy to use interface.

After a ladder diagram program is developed, it can be downloaded to the Solves-It! via the programming port. The program is stored on non-volatile FLASH memory and is automatically executed on power up. Once the download is complete, the Solves-It! is successfully programmed and begins executing the program.

Refer to the EZ LADDER Toolkit's User Manual for more detail on creating ladder diagram programs, connecting to targets and downloading the program to targets.

All Solves-It! User Manuals and the EZ LADDER Toolkit can be downloaded from <http://www.divebiss.com>.

Specifications are subject to change without notice.

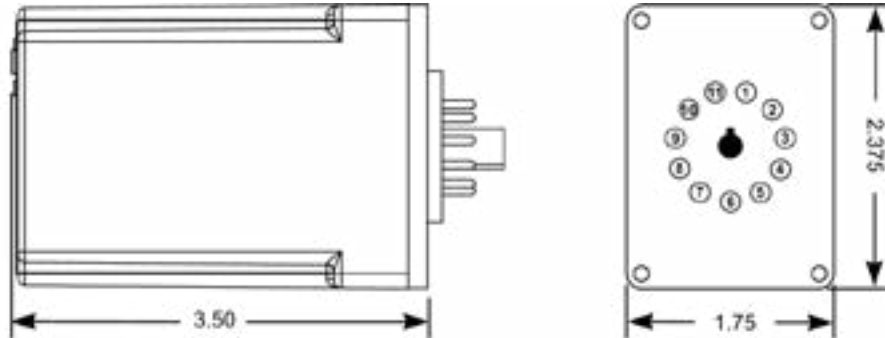
- ▶ Pre-Programmed Solutions
- ▶ Programmable Settings
- ▶ Field Configurable
- ▶ LED Trip Indicators
- ▶ 10-32VDC Operating Voltage
- ▶ Programs in Ladder Diagram / Function Block
- ▶ Source Programming Available for Customizing Solution



The Divelbiss APPMOD series of controllers are pre-programmed solutions for common monitoring and control issues. The basic modules are based on standard PLC technology so they provide the advantage of PLC functionality in addition to pre-programming. Each module has the capability of being applied “as is”, or modified by the designer utilizing the Divelbiss EZ LADDER® Toolkit programming software to provide an application specific solution.

The Divelbiss Application Modules are intended to provide “out of the box” solutions for short run or prototype control problems. Since each unit is in fact a pre-programmed PLC, production quantity cost efficiencies are easily achieved by purchasing the equivalent PLC without the program pre-loaded.

Dimensions & Package:



Models & Features:

Tachometer

SI-APPMOD-Tachometer	The module reads the open collector input from a Hall Effect or other sensor into a high speed counter. Typically, the input is sensing the speed of a 60 tooth gear. Speed is shown on a 4-digit numeric display. Four programmable set points trigger outputs when they are reached or exceeded.
----------------------	--

Counting

SI-APPMOD-Multicount	The module has three outputs with programmable set points triggered by a single input. Each of the outputs has an input which allows them to be reset manually. Set point range is 1 through 9,999. The set points are programmed by means of a simple menu.
----------------------	--

Time Metering

SI-APPMOD-HourMeter	The Hour Meter module consists of two independent clock based totalizers which provide outputs when the set points are reached. Maximum time displayed is 9,999 hours - at which point the display “rolls over” to zero and an LED indicator light begins flashing to alert the user that time displayed has wrapped around.
---------------------	--

Load Alternating

SI-APPMOD-2PumpAlternate	The 2PumpAlternate Module automatically alternates between two pumps when a “High Level” input is received. The module provides inputs for Low Level, High Level, and Overflow as well as outputs for both pumps. Additionally, two alarms are available. One if both pumps exceed a time preset and a second for Overflow.
--------------------------	---

SI-APPMOD-3PumpAlternate	The 3PumpAlternate Module automatically alternates three pumps when a “High Level” input is received. The module provides inputs for Low Level, High Level, and Overflow as well as outputs for the pumps. Additionally, two alarms are available. One if all three pumps have exceeded a time preset and a second for Overflow.
--------------------------	--

Timing

SI-APPMOD-Times4	The Times4 module provides four independent timing channels. Each of the four channels is configurable for ON or OFF delay timing with a range setting of 0.1 to 300 seconds. Timer selection and set point programming is accomplished by means of a simple menu system.
------------------	---

Analog Ranging

SI-APPMOD-Deadband	The Deadband Module accepts a 0-10 VDC input. The input signal is compared to a set point programmed with a potentiometer plus or minus a tolerance established by a second potentiometer. The programmable tolerance can be within a range of 0-5% of the set point. Three outputs indicate above, within, or below the dead band.
--------------------	---

SI-APPMOD-RangeCompare	The RangeCompare Module accepts a 0-10 VDC input which is compared to a pair of potentiometer settings. Those settings establish the acceptable range for the input signal. The Module provides three digital outputs - In Range, Above Range, and Below Range.
------------------------	---

Optional Hardware Add-ons/Accessories:

Model #	Description
SI-PGM	Serial Programming Cable
115-105328	DIN / Panel mount screw 11-pin terminal socket.
EZLDCD-01	EZ LADDER Toolkit Development Software on USB Flash Drive (Free with Controller Purchase)
SI-APPMOD-PGMKIT	Program Kit with SI-PGM cable and EZLDCD-01 Software

All APPMOD User Manuals, Programs and the EZ LADDER Toolkit can be downloaded from <http://www.divebiss.com>.

Specifications are subject to change without notice.

- ▶ Full Featured Industrial PLC
- ▶ Pluggable Module Construction
- ▶ Programs with EZ LADDER® Software
- ▶ No Low Level Programming Required
- ▶ Easy to Embed
- ▶ Quick to Market Solutions
- ▶ Ladder Diagram with Structured Text
- ▶ Modbus Master / Slave / Modbus TCP
- ▶ Ethernet Port and Cellular Connectivity*
- ▶ Large Number of I/O and Features
- ▶ CAN and Serial Ports
- ▶ SD Card Support
- ▶ SAE J1939, NMEA 2000, OptiCAN CAN Networking



PLCMOD-P13-512210

Designed to provide embedded intelligence in OEM products, the P-Series PLC on a Chip® Modules are a cost effective programmable logic controllers packaged in pluggable circuit board modules. All I/O and integrated functions are pre-assigned for use within the Divelbiss EZ Ladder® PC based, industrial ladder diagram software. The full featured P-Series PLC on a Chip Modules and EZ Ladder combination provides for solutions that are both versatile and easy to implement.

The full PLC functionality of a PLC on a Chip® Module can be accessed by integrating it with interface circuitry for digital I/O, analog I/O, serial, CAN and other communications; as well as other supported interface circuitry for I²C and SPI bus. The PLC on a Chip® crystal, real time clock, power-on reset, Ethernet and SD card features are installed on module.

Divelbiss Development Kits include a library of pre-designed, drop-in circuitry for I/O, power supply, communications and other supporting components. The library provides all information required to implement P-Series PLC on a Chip® Modules and the peripheral circuitry, including PCB layout requirements, standard part numbers and more

Divelbiss also offers a cost-effective Design Program using PLC on a Chip® technology for instances when PCB design project time or expertise is not available. The Divelbiss Engineering team can develop a custom solution using PLC on a Chip® or PLC on a Chip® Modules to your exact needs.

Structured Text Programming and Custom Function Blocks

P-Series PLC on a Chip® Module provides the ability for custom functions and function blocks using built-in Structured Text support. These custom functions and function blocks are ideal when customized functionality is needed or when customized communications drivers are required.

Advantages of a PLC on a Chip® Solution

- ▶ Adds Intelligence by Embedding the PLC
- ▶ Low Integration Cost
- ▶ Reduces Product Development Time & Costs
- ▶ Full Factory Support
- ▶ Pre-designed Circuits Library
- ▶ No Low Level Programming
- ▶ Easy to Integrate
- ▶ 2 Models based # of I/O and features
- ▶ Rapid Design Program Available
- ▶ Protects Intellectual Property



PLCMOD-P13-512210

PLC on a CHIP® Part Numbers

Part Number	Description
PLCMOD-P10-512210	PLC on a Chip Module (P10 Version), 130 Pins. See Specifications for Features details.
PLCMOD-P13-512210	PLC on a Chip Module (P13 Version), 180 Pins. See Specifications for Features details.

Specifications		
System Capacity	PLCMOD-P13-512210	PLCMOD-P10-512210
Flash Memory	256K Bytes Ladder Program Storage	256K Bytes Ladder Program Storage
EEPROM Memory	3500 Bytes (Internal PLC on a Chip)	3500 Bytes (Internal PLC on a Chip)
RAM Memory	32K Bytes Program Execution & Variables	32K Bytes Program Execution & Variables
Power Supply	3.3VDC	3.3VDC
# of Pins	3 Dual Row Connectors, 60 Pins each (180 pins total)	3 Dual Row Connectors, 2 x 60, 1 x 10 Pins each (130 pins total)
Temperature Range	-40°C to 85°C	-40°C to 85°C
Retentive Memory	Yes, Using Internal EEPROM or on Module FRAM Device	Yes, Using Internal EEPROM or on Module FRAM Device
Communications**		
Programming Port	1 TTL Programming Port (via Dual Row Connectors)	1 TTL Programming Port (via Dual Row Connectors)
General Purpose Serial Ports	4 TTL Ports, 1 Supports Handshaking	4 TTL Ports, 1 Supports Handshaking
ASCII / RTU Communications	Yes	Yes
Modbus Master / Modbus Slave Serial	Yes	Yes
Serial Ports Baud Rate	up to 115.2K Bps	up to 115.2K Bps
CAN Ports	Yes, 2 TTL Ports	Yes, 2 TTL Ports
CAN Port Protocols	SAE J1939, NMEA 2000, OptiCAN	SAE J1939, NMEA 2000, OptiCAN
Ethernet Port	On Module, RJ 45 Connections	On Module, RJ 45 Connections
Modbus TCP	Yes	Yes
SD Card Support	On Module micro SD Socket	On Module micro SD Socket
Webserver	Yes, via SD Card Storage	Yes, via SD Card Storage
Cellular Modem	Yes (Supported Cellular Modem via Ports & I/O)	Yes (Supported Cellular Modem via Ports & I/O)
Input / Output**		
SPI Serial Interface Port	2, TTL Level	2, TTL Level
I ² C Ports	3 TTL Level, 1 Mbit/s Data Rate (1 used on module)	3 TTL Level, 1 Mbit/s Data Rate (1 used on module)
Analog Inputs	8 Channels, 0 to 3.3VDC Input, 12 Bit	8 Channels, 0 to 3.3VDC Input, 12 Bit
Analog Outputs	1 Channel, 0-3.3VDC Output, 10 Bit	1 Channel, 0-3.3VDC Output, 10 Bit
PWM Outputs	12 Channels (TTL), 32 Bit	3 Channels (TTL), 32 Bit
Counter / Timer Inputs	3 Inputs (TTL), 32 Bit	2 Inputs (TTL), 32 Bit
Quadrature Inputs	1 Quadrature input (TTL), A, B, Index	1 Quadrature input (TTL), A, B, Index
LCD Port	Supports LCD Display (TTL) (HD44780 Compatible) (4 Rows / 40 Columns)	Supports LCD Display (TTL) (HD44780 Compatible) (4 Rows / 40 Columns)
Keypad Port	Supports Keypad Matrix of 5 Columns / 4 Rows (TTL)	Supports Keypad Matrix of 5 Columns / 4 Rows (TTL)
Digital I/O	Up to 143 TTL Digital I/O Points	Up to 88 TTL Digital I/O Points
Real Time Clock	Yes, requires Off Module Battery	Yes, requires Off Module Battery
Programming		
Program Language	Ladder Diagram, Function Block and Structured Text using EZ LADDER®	Ladder Diagram, Function Block and Structured Text using EZ LADDER®
Function Blocks	Yes, Standard and Custom using Structured Text	Yes, Standard and Custom using Structured Text
Structured Text	Yes, Built-in EZ LADDER® Editor	Yes, Built-in EZ LADDER® Editor
Scan Time	Variable based on Features installed and Program Size	Variable based on Features installed and Program Size
Error Checking	Yes, during program compilation or verification	Yes, during program compilation or verification
Real Time Monitoring	Yes, via Programming Port / Ethernet	Yes, via Programming Port / Ethernet
Text Notes	Yes, Placeable and sizable text boxes for notes	Yes, Placeable and sizable text boxes for notes
# of Instructions / Function Blocks	> 110	> 110

* Using on Module Features and supported Cellular Data Module

** Feature quantities shown are maximum total (up to). Multiple feature pin functions are shared. See the PLC on a Chip Module Data Sheet for details.

- ▶ Full Featured Industrial PLC
- ▶ Fully Integrated Single IC Construction
- ▶ Programs with EZ LADDER® Software
- ▶ No Low Level Programming Required
- ▶ Easy to Embed
- ▶ Quick to Market Solutions
- ▶ Ladder Diagram with Structured Text
- ▶ Modbus Master / Slave / Modbus TCP
- ▶ Ethernet Port, Wi-Fi and Cellular Connectivity
- ▶ Large Number of I/O and Features
- ▶ CAN and Serial Ports
- ▶ SD Card Support
- ▶ SAE J1939, NMEA 2000, OptiCAN CAN Networking



Designed to provide embedded intelligence in OEM products, the P10 and P13 P-Series PLC on a Chip® models are cost-effective programmable logic controllers packaged as single integrated circuits. All I/O and integrated functions are pre-assigned for use within the Divelbiss EZ LADDER® Toolkit PC based, industrial ladder diagram software. The full featured P-Series PLC on a Chip controller and EZ LADDER combination provides for solutions that are both versatile and easy to implement.

The full PLC functionality of the PLC on a Chip can be accessed by integrating it with interface circuitry for digital I/O, analog I/O, serial, CAN and Ethernet Communications; as well as other supported interface circuitry for I²C and SPI bus.

Divelbiss Development Kits include a library of pre-designed, drop-in circuitry for I/O, power supply, communications and other supporting components. The library provides all information required to implement P-Series PLC on a Chip® integrated circuits and the peripheral circuitry, including PCB layout requirements, standard part numbers, and more.

Divelbiss also offers a cost-effective Design Program using PLC on a Chip® technology for instances when PCB design project time or expertise is not available. The Divelbiss Engineering team can develop a custom solution using PLC on a Chip® to your exact needs.

Structured Text Programming and Custom Function Blocks

P-Series PLC on a Chips® provides the ability for custom functions and function blocks using built-in Structured Text support. These custom functions and function blocks are ideal when customized functionality is needed or when customized communications drivers are required.

Advantages of a PLC on a Chip® Solution

- ▶ Adds Intelligence by Embedding the PLC
- ▶ Low Integration Cost
- ▶ Reduces Product Development Time & Costs
- ▶ Full Factory Support
- ▶ Pre-designed Circuits Library
- ▶ No Low Level Programming
- ▶ Easy to Integrate
- ▶ 2 Models based on Package Size, I/O and Features
- ▶ Rapid Design Program Available
- ▶ Protects Intellectual Property

PLC on a CHIP® Part Numbers

Part Number	Description
PLCHIP-P10-51220	PLC on a Chip Integrated Circuit (P10 Version), LQFP144 Package. See Specifications for Features details. Shipped in Trays of 60.
PLCHIP-P10-51220X1	PLC on a Chip Integrated Circuit (P10 Version), LQFP144 Package. See Specifications for Features details. Shipped as Single Piece.
PLCHIP-P10-51220X5	PLC on a Chip Integrated Circuit (P10 Version), LQFP144 Package. See Specifications for Features details. Shipped as 5 Pack.
PLCHIP-P10-51220X10	PLC on a Chip Integrated Circuit (P10 Version), LQFP144 Package. See Specifications for Features details. Shipped as 10 Pack.
PLCHIP-P13-51220	PLC on a Chip Integrated Circuit (P13 Version), LQFP208 Package. See Specifications for Features details. Shipped in Trays of 36.

PLC on a CHIP® Part Numbers - Continued

Part Number	Description
PLCHIP-P13-51220X1	PLC on a Chip Integrated Circuit (P13 Version), LQFP208 Package. See Specifications for Features details. Shipped as Single Piece.
PLCHIP-P13-51220X5	PLC on a Chip Integrated Circuit (P13 Version), LQFP208 Package. See Specifications for Features details. Shipped as 5 Pack.
PLCHIP-P13-51220X10	PLC on a Chip Integrated Circuit (P13 Version), LQFP208 Package. See Specifications for Features details. Shipped as 10 Pack.

Specifications		
System Capacity	PLCHIP-P13-51220	PLCHIP-P10-51220
Flash Memory	256K Bytes Ladder Program Storage	256K Bytes Ladder Program Storage
EEPROM Memory	3500 Bytes (Internal PLC on a Chip)	3500 Bytes (Internal PLC on a Chip)
RAM Memory	32K Bytes Program Execution & Variables	32K Bytes Program Execution & Variables
Power Supply	3.3VDC	3.3VDC
Package Type	LQFP208 Package IC	LQFP144 Package IC
Temperature Range	-40°C to 85°C	-40°C to 85°C
Retentive Memory	Yes, Using Internal EEPROM or External FRAM Device	Yes, Using Internal EEPROM or External FRAM Device
Communications		
Programming Port	1 TTL Programming Port	1 TTL Programming Port
General Purpose Serial Ports	4 TTL Ports, 1 Supports Handshaking	4 TTL Ports, 1 Supports Handshaking
ASCII / RTU Communications	Yes	Yes
Modbus Master / Modbus Slave Serial	Yes	Yes
Serial Ports Baud Rate	up to 115.2K Bps	up to 115.2K Bps
CAN Ports	Yes, 2 TTL Ports	Yes, 2 TTL Ports
CAN Port Protocols	SAE J1939, NMEA 2000, OptiCAN	SAE J1939, NMEA 2000, OptiCAN
Ethernet Port	1 TTL Port, Supports Multi-Port Switch Physicals	1 TTL Port, Supports Multi-Port Switch Physicals
Modbus TCP	Yes	Yes
SD Card Support	1 SD Card Interface - requires socket	1 SD Card Interface - requires socket
Webserver	Yes, via SD Card Storage	Yes, via SD Card Storage
Cellular Modem	Yes (Supported Cellular Modem via Ports & I/O)	Yes (Supported Cellular Modem via Ports & I/O)
Wi-Fi, Bluetooth	Yes (Supported Wi-Fi Module via Ports & I/O)	Yes (Supported Wi-Fi Module via Ports & I/O)
Input / Output*		
SPI Serial Interface Port	2, TTL Level	2, TTL Level
I ² C Ports	3 TTL Level, 1 Mbit/s Data Rate	3 TTL Level, 1 Mbit/s Data Rate
Analog Inputs	8 Channels, 0 to 3.3VDC Input, 12 Bit	8 Channels, 0 to 3.3VDC Input, 12 Bit
Analog Outputs	1 Channel, 0-3.3VDC Output, 10 Bit	1 Channel, 0-3.3VDC Output, 10 Bit
PWM Outputs	12 Channels (TTL), 32 Bit	3 Channels (TTL), 32 Bit
Counter / Timer Inputs	3 Inputs (TTL), 32 Bit	2 Inputs (TTL), 32 Bit
Quadrature Inputs	1 Quadrature input (TTL), A, B, Index	1 Quadrature input (TTL), A, B, Index
LCD Port	Supports LCD Display (TTL) (HD44780 Compatible) (4 Rows / 40 Columns)	Supports LCD Display (TTL) (HD44780 Compatible) (4 Rows / 40 Columns)
Keypad Port	Supports Keypad Matrix of 5 Columns / 4 Rows (TTL)	Supports Keypad Matrix of 5 Columns / 4 Rows (TTL)
Digital I/O	Up to 164 TTL Digital I/O Points	Up to 106 TTL Digital I/O Points
Programming		
Program Language	Ladder Diagram, Function Block and Structured Text using EZ LADDER®	Ladder Diagram, Function Block and Structured Text using EZ LADDER®
Function Blocks	Yes, Standard and Custom using Structured Text	Yes, Standard and Custom using Structured Text
Structured Text	Yes, Built-in EZ LADDER® Editor	Yes, Built-in EZ LADDER® Editor
Scan Time	Variable based on Features installed and Program Size	Variable based on Features installed and Program Size
Error Checking	Yes, during program compilation or verification	Yes, during program compilation or verification
Real Time Monitoring	Yes, via Programming Port / Ethernet	Yes, via Programming Port / Ethernet
Text Notes	Yes, Placeable and sizable text boxes for notes	Yes, Placeable and sizable text boxes for notes
# of Instructions / Function Blocks	> 110	> 110

* Feature Quantities shown are Maximum total (up to). Multiple feature pin functions are shared. See the P10 or P13 PLC on a Chip Data Sheet for details.

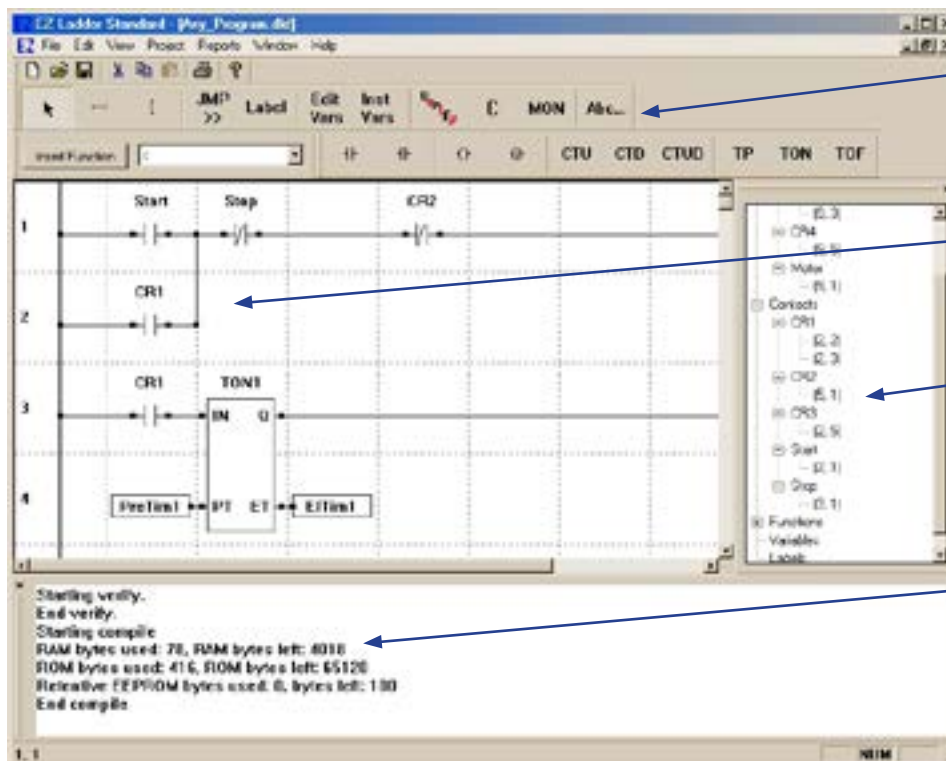
- ▶ Programs PLC on a Chip™ Based Products
- ▶ Parallels the IEC61131-3 Standard
- ▶ Ladder Diagram, Function Block and Structured Text
- ▶ RS232 / Ethernet / Wi-Fi Programming Interface
- ▶ Modbus Master / Slave / TCP Supported
- ▶ J1939, NMEA 2000 & OptiCAN Support
- ▶ Password Protection Levels and Options
- ▶ Real Time Monitoring
- ▶ Debugging Tools
- ▶ Printable Reports



The Divebiss EZ LADDER® Toolkit software is a powerful and easy-to-use Windows® based programming platform used to create the ladder diagram programs for any PLC on a Chip® based controller or product. When coupled with the PLC on a Chip Development Kit it provides a full featured design and proof-of-concept capability at very reasonable cost.

Production tooling is easier since any programs developed are “transportable” for use with the final product. Code libraries are easily created to allow for simple “cut and paste” reuse of previously designed circuit elements. All elements are cross referenced making it easy to locate all instances of an element used in multiple rungs of the program ladder.

For all P-Series PLC on a Chip based products, EZ LADDER now supports additional features such as Modbus Master, SD Card Support, Expanded I/O, Structured Text and Cloud Portal Communications. With structured text, EZ LADDER provides the ability to create and use custom functions and function blocks that allow for customized functionality including customer communications interfaces.



Tool Bars:
Easy to use shortcut buttons for object placement, drawing links and variable insertion.

Ladder Diagram Workspace:
Power rails with numbered rungs.

Cross Reference Window:
Quick reference for contacts, coils, functions and variables used in the displayed ladder.

Output Window:
Displays status, memory use and any errors encountered during the Compile or Verify process.

The EZ LADDER Toolkit User Manual and EZ LADDER Toolkit can be downloaded from <http://www.divebiss.com>.

Specifications are subject to change without notice.

The EZ LADDER Toolkit software has many built-in features to help make the task of programming easier. **Figure 1** shows the errors for missing links around the coil of CR1. Errors are reported in both the VERIFY and COMPILE modes. Pinpointing the error location saves time for the programmer

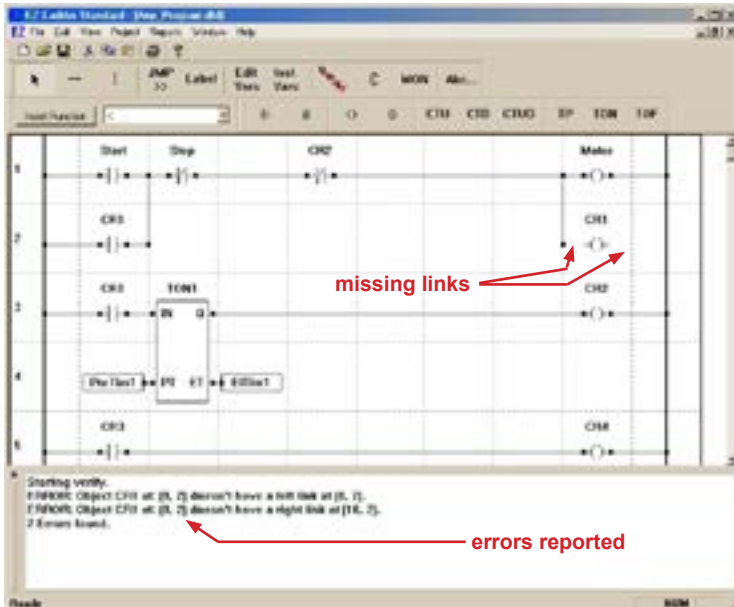


Figure 1

Once corrected, VERIFY and COMPILE go smoothly. See **Figure 2**.

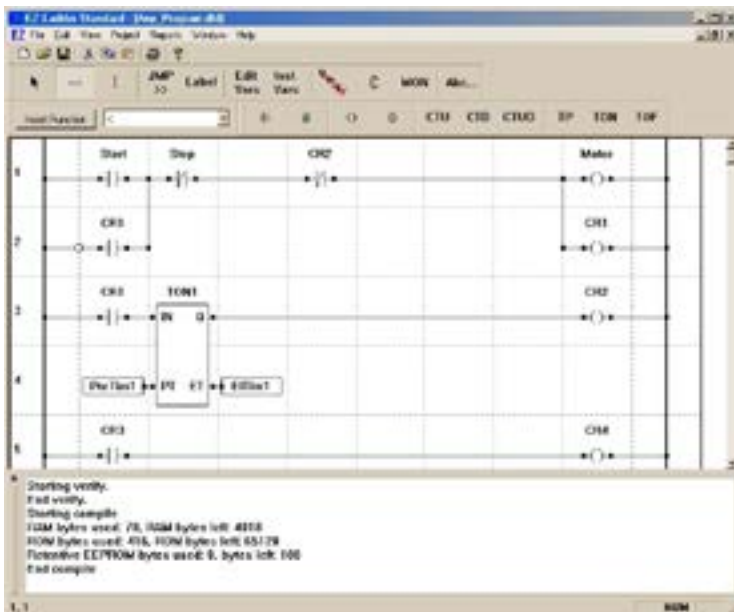


Figure 2



The EZ LADDER “HINT” feature is available in both the EDIT and MONITOR program modes.

See **Figure 4** for the example

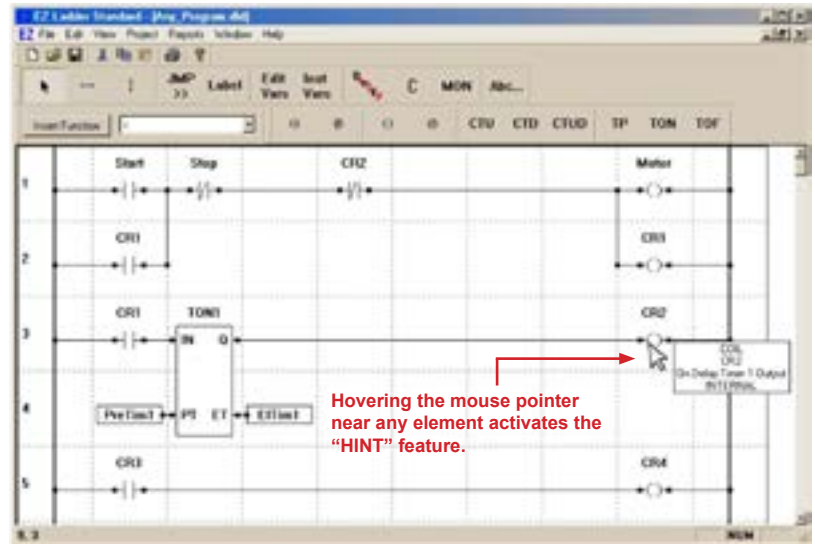


Figure 4

In the MONITOR program mode, the elements turn **red** when there is power flow. They are **blue** when power flow is removed. This feature is illustrated in **Figure 5** below.

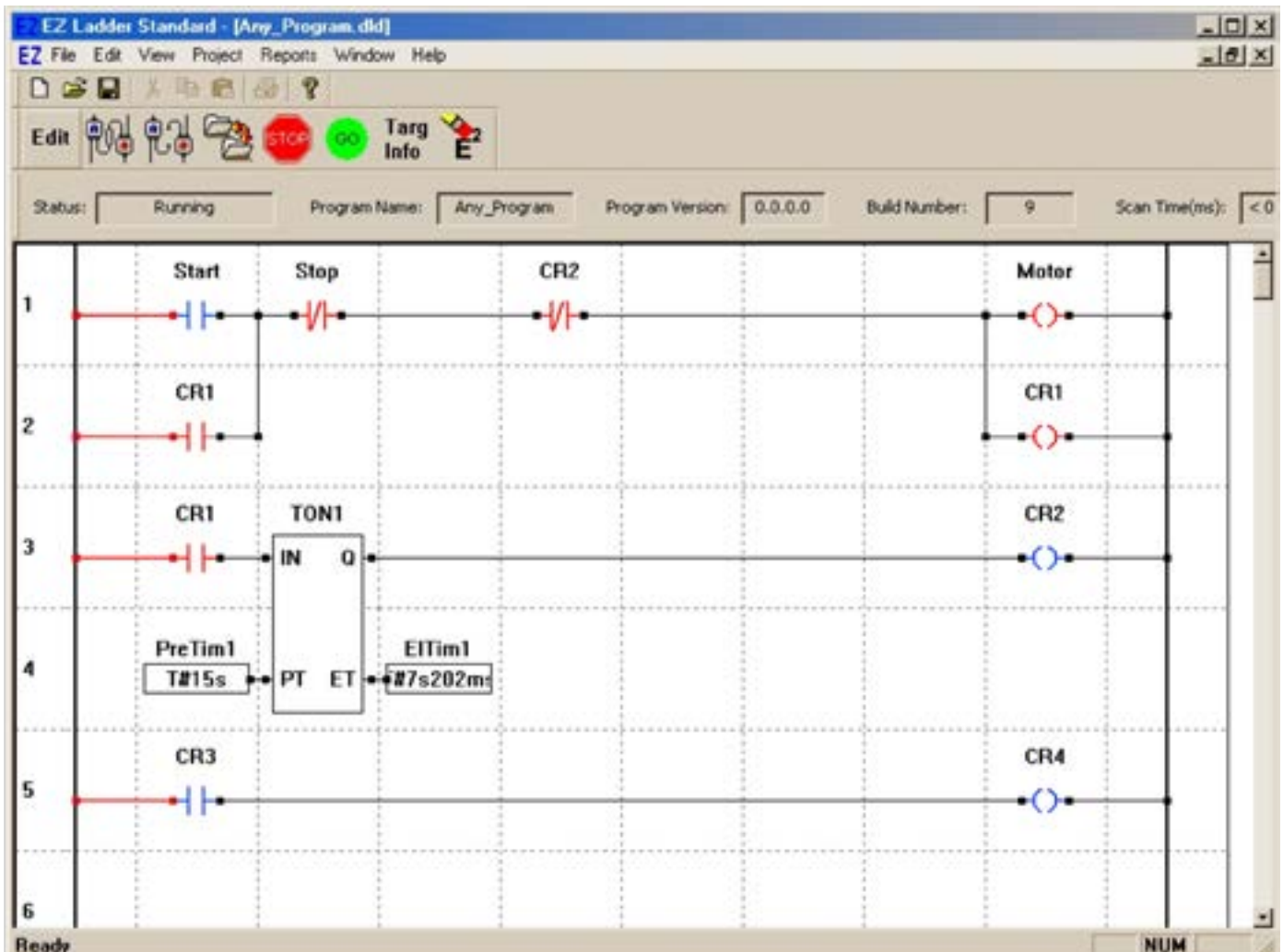


Figure 5

Common to All PLC on a Chip based Products

Less than Less than or equal Not equal Equal Greater Greater of equal Absolute value	Add Bitwise AND Average Bit Pack Bit Unpack Convert to BOOLEAN Compare	Count Down Count Up Count Up/Down Divide Drum Sequencer Falling edge detect Hysteresis	Convert to Integer Latching coil Limit Moving Average Max Min Modulo	Multiply Multiplexer Bitwise NOT Rising edge detect Convert to Real Rotate Left Rotate Right	Reset/Set Rst dominant Select Bitwise OR Shift Left Shift Right Set/Reset w/ set dominant Subtract	Convert to Timer Time delay OFF Time delay ON Pulse Timer Unlatching coil Bitwise XOR
--	--	--	--	--	--	--

M-Series PLC on a Chip based Products

	M-Series PLC on a Chip based Products																									
Controller																										
Function	ICM-EBB-100	ICM-EBB-200	ICM-EBB-300 / 400 / 500	ICM-EBB-600 / 700	PCS-1XX	PCS-2XX	MB-100	MB-110	HEC-150X-E-R	HEC-200X-E-R	HEC-4XXX-E-R	HEC-HMI-XXXXX-E-R	SI-100 / 101	SI-110	SI-200 / 201	SI-210	PLCHIP-M2-12800	PLCHIP-M2-25600	PLCHIP-M2-25620	PLCMOD-M2-128000	PLCMOD-M2-128010	PLCMOD-M2-256000	PLCMOD-M2-256010	PLCMOD-M2-256200	PLCMOD-M2-256210	
Counter-Timer	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Counter LS7366												•														
EEPROM Read	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
EEPROM Write	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Gray Code SSI						•												•	•			•	•	•	•	
Get Current Date			•	•	•	•			•								•	•	•	•		•	•	•	•	
Get Current Time			•	•	•	•			•								•	•	•	•		•	•	•	•	
High Speed Timer	•	•	•	•	•	•			•	•	•	•					•	•	•	•	•	•	•	•	•	
Keypad																		•	•			•	•	•	•	
Display Clear (LCD / LED)									•			•					•	•	•	•		•	•	•	•	
Display Print (LCD / LED)									•			•					•	•	•	•		•	•	•	•	
PID					•	•			•	•	•	•						•	•	•		•	•	•	•	
PWM					•	•			•	•	•	•						•	•			•	•	•	•	
Set PWM Frequency					•	•			•	•	•	•						•	•			•	•	•	•	
Serial Print				•	•	•			•	•	•	•						•	•			•	•	•	•	
Set Current Date			•	•	•	•			•								•	•	•	•		•	•	•	•	
Set Current Time			•	•	•	•			•								•	•	•	•		•	•	•	•	
Specialty Features																										
Modbus Slave				•	•	•			•	•	•	•						•	•			•	•	•	•	
SPI Slave																		•	•			•	•	•	•	
OptiCAN						•			•	•	•	•						•	•			•	•	•	•	
J1939 Get SPN				•		•			•	•	•	•						•	•			•	•	•	•	

P-Series PLC on a Chip based Products																	
Controller \ Function	HEC-P2000 / HEC-P2010	HEC-P5000 / HEC-P5010	HEC-P5100 / HEC-P5110	HEC-P5200 / HEC-P5210	HEC-P6000 / HEC-P6010	HEC-P6100 / HEC-P6110	HEC-P6200 / HEC-P6210	HEC-GW-X-X / C-X	HEC-GW-X-W / C-W	ICM-BB-P13-XX	VB-2000	VB-2100 / 2120 / 2200	VCG-X-X-X	PLCHIP-P10-51220	PLCHIP-P13-51220	PLCMOD-P10-512210	PLCMOD-P13-512210
Ceiling	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Cosine / Arc Cosine	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Counter LS7366														•	•	•	
EEPROM Read / Write	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Exponentiation	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Floor	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Get Current Date / Time	•	•		•	•	•	•	•	•	•		•	•	•	•	•	
Jump	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Keypad										•	•	•	•	•	•	•	
Label	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Logarithm	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Display Clear (LCD/LED)												•	•	•	•	•	
Display Print(LCD/LED)										•	•	•	•	•	•	•	
Natural Exponential	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Natural Logarithm	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
PID	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
PWM	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Quadrature Read Cntr	•	•	•	•	•	•	•							•	•	•	
Quadrature Velocity Cntr	•	•	•	•	•	•	•							•	•	•	
Quadrature Compare Cntr	•	•	•	•	•	•	•							•	•	•	
Random / Seed	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Sine / Arc Sine	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Set PWM Freq.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Serial Print	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	
Set Current Date / Time	•	•		•	•	•	•	•	•	•		•	•	•	•	•	
Square Root	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Tangent / Arc Tangent	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
TimerCounter	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
UART Set Property	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	
Specialty Features																	
Modbus Master / Slave	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	
SPI Master (Structured Txt)														•	•	•	
Structured Text	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
SD Card Support	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Modbus TCP	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	
OptiCAN	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
SAE J1939 TX/RX	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
NMEA 2000	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Cloud Portals	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	

BRANDING AND CUSTOMIZING OFF-THE-SHELF CONTROL PRODUCTS

The Divelbiss DCPM (Divelbiss Corporation Product Modification) program provides the ability for you to modify off-the-shelf control solutions to fit your needs. These modifications can be from Branding (changing overlay artwork, logo and colors) to circuit modifications to better fit your I/O, communications or other needs.

When implemented, the program assigns a DCPM (or other part number) to the product. This unique part number identifies that this product is sold to you. Sales and support inquiries regarding this part number are sent to you.



DCPM Branded and Packaged Controller

CUSTOM ELECTRONICS AND PRODUCT DESIGN



**Custom Controller based on
PLC on a Chip™**

Divelbiss Corporation offers complete electronics design services. Should a branding or DCPM modification not fit, our design team can develop your control solution using a vast library of technology including our patented PLC on a Chip™. Divelbiss has been designing custom electronic solutions for over 40 years. Our engineers work with you each step of the way, from concept to specifications development to finalized product. Custom solutions often provide the best fit from technology and actual needs versus cost. Additionally, as a custom product, you control all sales, support and residual income from it.

As Divelbiss offers electronics manufacturing we have the ability to supply your custom electronics solution from design to production.

ELECTRONICS MANUFACTURING

Divelbiss offers full product manufacturing services. We offer SMT and through-hole, sub-assembly and turn-key product manufacturing. We offer environmental coating, potting and many other services. Our manufacturing services allows us to be a one-stop location for all your manufacturing needs. Divelbiss Corporation is a UL508A panel shop.

