Product Description

The P2 Series of Human-Machine Interfaces (HMIs) is the ideal solution for industrial applications that use operating and visualization terminals. The Series offers innovative and intuitive features, combining advanced graphics tools and a selection of highly functional characteristics. The product stands out for its engineering and design, with high-performance hardware and a superior, advanced graphics solution through FvDesigner software. All products in the Series are robust, reliable, and high-performance.

The series includes the P2043SA, P2070SA, and P2101SA models (models without Ethernet port) and the P2043NA, P2070NA, P2101NA, and P5150ZB models (models with Ethernet port). The HMIs were developed for all types of applications that require reliable process control and excellent graphics capabilities, even in compact formats. Their front is completely flat, ensuring a dust-free surface. The display is equipped with a long-lasting backlight, which requires no maintenance and also features TFT technology, allowing for brightness and high contrast adjustment. The smaller models offer a widescreen display, which results in 30% more usable area compared to previous versions. This feature expands the possibilities for applications with more complex screens, even on smaller terminals.

Main features:

- Open platform that allows you to improve the look and functionality of applications
- High-performance hardware
- 10/100 BASE-T Ethernet communication interface (P2043NA, P2070NA, P2101NA, and P5150ZB)
- RS-232, RS-422/485, and USB serial communication interfaces
- Long-lasting backlight
- TFT technology for brightness adjustment and high contrast
- Widescreen display with 30% larger usable area
- Solid features that develop and ensure user confidence
- Time optimization with intuitive and versatile editing tools
- Various templates for creating complex and customized applications quickly and easily
- Online and offline simulation, with or without the terminal, allows for reliable testing before going into the field
- Tropicalization / Conformal Coating
- Remote Access (VNC)

Purchase Data

P2043NA Components

The product package contains the following items:

- One P2043NA operating terminal
- Installation guide
- Panel mounting hardware
- Power connector

P2070NA Components

The product package contains the following items:

- One P2070NA operating terminal
- Installation guide
- Panel mounting hardware
- Power connector

P2101NA Components

The product package contains the following items:

- One P2102NA operating terminal
- Installation guide
- Panel mounting hardware
- Power connector

P2043SA Components

The product package contains the following items:

- One P2043SA operating terminal
- Installation guide
- Panel mounting hardware
- Power connector

P2070SA Components

The product package contains the following items:

- One P2070SA operating terminal
- Installation guide
- Panel mounting hardware
- Power connector

P2101SA Components

The product package contains the following items:

- One P2101SA operating terminal
- Installation guide
- Panel mounting hardware
- Power connector

P5150ZB Components

The product package contains the following items:

- One P5150ZB operating terminal
- Installation guide
- Panel mounting hardware
- Power connector

Doc. Code: CE157803 Rev. A

Product Codes

The following codes should be used to purchase the product:

Current code	Previous revision code	Description
P2043NA	**P2043NK**	P2043NA color operating terminal, graphic, touchscreen, 4.3" LCD-TFT display (with Ethernet)
P2070NA	**P2070NK**	P2070NA, color operating terminal, graphic, touchscreen, 7" LCD-TFT display (with Ethernet)
P2101NA	**P2102NK**	P2101NA, color operating terminal, graphic, touchscreen, 10.1" LCD-TFT display (with Ethernet))
P2043SA	**P2043SK**	P2043SA, color operating terminal, graphic, touchscreen, 4.3" LCD-TFT display (without Ethernet)
P2070SA	**P2070SK**	P2070SA, color operating terminal, graphic, touchscreen, 7" LCD-TFT display (without Ethernet)
P2101SA	**P2102SK**	P2101SA, color operating terminal, graphic, touchscreen, 10.1" LCD-TFT display (without Ethernet)
P5150ZB	**P5150NH**	P5150ZB, color operating terminal, graphic, touchscreen, 15" LCD-TFT display (without Ethernet)

ATTENTION:
As of April 2021, P2xxxxK codes have begun to be replaced by P2xxxxA codes.

Related Products

The following products must be purchased separately, when needed:

Code	Description
AMJG0808	RJ45-RJ45 cable (2 m)
AL-1754	CMDB9-CFDB9 communication cable (3 m)
AL-1766	RS-485 CFDB9-terminal block communication cable (3 m)
AL-1767	RS-485 CFDB9-terminal block communication cable (10 m)
AL-2306	RS-485 cable for MODBUS network
USBA-MINIB-180	P2 serial programming cable (MINI USB - USB) / 1.8 m
HEM-MPI	Expansion module for Siemens MPI communication

Notes:

AMJG0808: CAT5 Ethernet network cable with an RJ45 male connector on each end. Designed for various applications, ensuring quality communication between the devices that use them (2 meters).

AL-1754: This cable has one male DB9 serial connector and one female DB9 RS-232 connector. Used for RS-232 serial communication with the FBs line (3 meters).

AL-1766 and AL-1767: These cables have a female DB9 serial connector and terminals for communication between P2 series HMIs and products with standard RS-485 terminals (Nexto Xpress and NX3003 CPU), with AL-1766 being 3 meters long and AL-1767 being 10 meters long.

AL-2306: This cable is used for MODBUS networks via RS-485 (sold by the meter).

USBA-MINIB-180: This cable is used for programming P2 series HMIs via USB with FvDesigner software. The connection is made via the PC's USB port and the HMI's mini USB port (1.80 meters).

HEM-MPI: The expansion module must be used on the rear of the P2xxxxA HMI for communication with the Siemens controller via MPI driver.

Product Features

General Features

	P2043NA	P2043SA	P2070NA	P2070SA	P2101NA	P2101SA	P5150ZB
Screen size	4,3"		7"		10,1”		15”
Screen resolution	480x272 pixels		800x480 pixels		1024x600 pixels		1024x768 pixels
Display	LCD-TFT						
Screen colors	16,7M						16,2M
Backlight type	LED						
Backlight lifetime	20,000 h						50,000 h
Touchscreen	Resistive						
Flash memory	128 MB						256 MB
RAM memory	128 MB						256 MB
Real-time clock	Yes						
Serial port – COM1	RS-232						
Serial port – COM2	RS-422 / RS-485						-
Serial port – COM3	-				RS-485		RS-422 / RS-485
Serial port – COM4	-						RS-485
USB 2.0 port	1 Host, 1 Device Mini-USB						
10/100 Base-T Ethernet port	Yes	No	Yes	No	Yes	No	Yes
Front panel (WxHxD)	128 x 102 x 36,4 mm		201 x 147 x 38,1 mm		271,5 x 213,5 x 44,6 mm		357 x 283 x 52,5 mm
Panel cutout dimensions (WxH)	118,5 x 92,5 mm		191,5 x 137,5 mm		259,5 x 201,5 mm		348 x 274 mm
Supply voltage	10,5 – 28 Vdc		24 Vdc ± 20%		10,5 – 28 Vdc		14 - 32 Vdc
Maximum power dissipation	6 W	5,5W	7,5 W	7 W	8 W	7,5 W	20 W
Internal fuse	IP65						
Front protection	Yes						
Rear protection IP20	0 to 50 °C						
Operating temperature	-20 to 60 °C						
Storage temperature	10 to 90% (40°C non-condensing)						
Relative humidity	235 g	215 g	570 g	550 g	1300 g	1280 g	3165 g
Certifications	CE, UL						

	P2043NA	P2043SA	P2070NA	P2070SA	P2101NA	P2101SA	P5150ZB
PLC option (rear)	Yes, one CPU 14MB	No	Yes, at most one CPU 24MB + 2 expansion modules		Yes, at most one CPU 24MB + 4 expansion modules		Yes, at most one CPU 24MB + 5 expansion modules

Tropicalization / Conformal Coating

Many industrial environments have substances in the air that are aggressive to printed circuit boards, such as chemical components, sea air, and humidity.

In the tropicalization (conformal coating) process, a thin layer of non-conductive material is applied to the printed circuit board to protect it against corrosion, external temperatures, sea air, humidity, among others.

Software Features

	P2043NA	P2043SA	P2070NA	P2070SA	P2101NA	P2101SA	P5150ZB
Ladder visualization	No		Yes				
USB application download	Yes						
Project password protection	Yes						
Trend graphs	Yes						
Script	Yes						
Remote Access (VNC)	Yes						
Audit Trail	No						Yes
Items in a recipe	Máx 2000						

Note:

Acesso Remoto (VNC): This feature is available starting with FvDesigner version 1.5.97.
P5150ZB: Model available starting with FvDesigner version 1.5.101.

Communication Drivers

The table below lists the communication drivers available in the FvDesigner software. Models with an Ethernet interface allow more than one protocol to be run simultaneously.

Manufacturer	Series/Protocolo	
Altus	FACON	Serial
		TCP
		UDP
	MODBUS RTU/TCP	Serial
		Ethernet
Allen-Bradley	CompactLogix	Ethernet
	MicroLogix	Ethernet
		Serial
	SLC	Ethernet
		Serial
Barcode Reader	Serial	
	USB	
Beckhoff	Twincat	Ethernet
Delta	AH500	
	DVP	

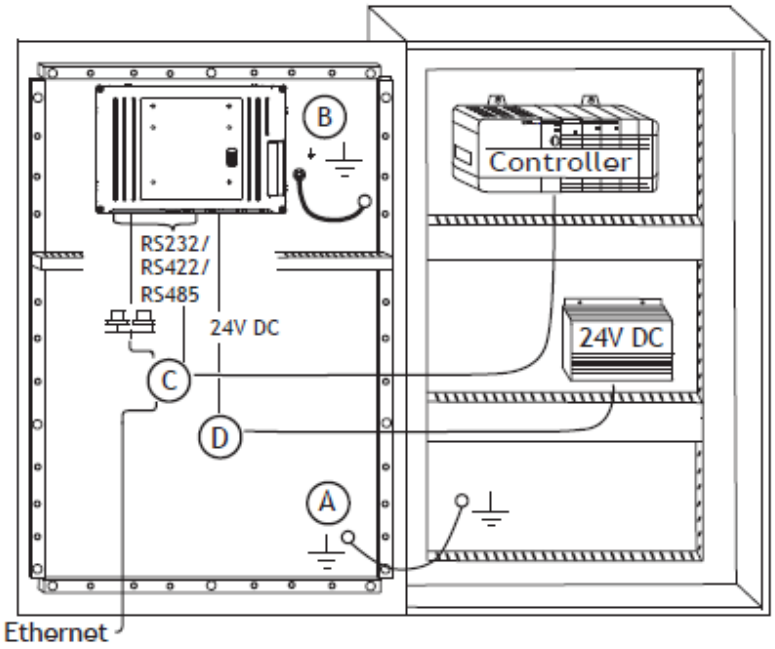
Hitachi	EHV	Serial
		Ethernet
Keyence	KV-L21V/3000/5000/5500	Serial
	KV-3000/5000/5500/7500	Ethernet
Koyo	Direct	Serial
Modbus	Master	RTU
		ASCII
		TCP
Mitsubishi	FX-2N	Serial
	FX-2N 485BD module	Serial
	FX-3U/3G	Serial
		Serial
	FX-3U/3G Adapter module	Ethernet (ASCII/Binary)
	FX-5U	Serial
	FX-5U	Ethernet (ASCII/Binary)
	Q Series Serial Communication(Link Port)	Serial (3C-format1/4)
Mitsubishi	Q/L Series Ethernet	Ethernet (ASCII/Binary)
	Q Series CPU Direct (CPU Port)	Serial
Omron	CP (FINS)	Serial
	CP1L (FINS)	Serial
	CP1L (FINS/TCP)	Ethernet
	CS/CJ (FINS)	Serial
	CS/CJ (FINS/TCP)	Ethernet
	CPM (HOSTLINK)	Serial
	Omron Ethernet	Ethernet
	NJ (FINS/TCP)	Ethernet
	NX/NJ (FINS/UDP)	Ethernet
	NX1 (Ethernet IP)	Ethernet
Panasonic	FP	Serial
		Ethernet
Schneider	Modbus RTU/TCP	
Siemens	S7-200 SMART	Serial
		ISO TCP
	S7-200 (PPI: 1-to-1)	Serial
	S7-1200	Ethernet
	S7-300 MPI *	Serial
	S7-1500	Ethernet
	LOGO	Ethernet
Taie	FY	Taie
	FY	RTU
User-Defined Protocol	Binary/ASCII	
Vigor	VH Series	Serial
	VS Series	Serial
Xinje	XC Series	Serial
	XD Series	Serial
Yaskawa	Extended MEMOBUS	
	MP Series Extension	Ethernet
Yudian	Yudian AIBUS	Serial

Note:

Siemens S7-300 MPI: This communication driver is only available on P2xxxxA models, requiring the addition of the HEM-MPI accessory, which is inserted into the rear of the HMI (as is done with expansion modules).

Electrical Installation

The electrical installation is performed by connecting the 24 Vdc power supply and connecting to the controller.



A - Ensure that the operating terminal and the controller have the same electrical grounding.

B - Use an M5 screw and at least 2.5 mm² wire to ground the terminal. There is a grounding screw in the metal box of the terminal.

C - Use only shielded cables. Separate communication and power cables from high voltage cables.

D - Before powering the operating terminal, check that there is no moisture condensation on it.

ATTENTION:
Different or unconnected grounding may cause communication errors.

ATTENTION:
Install the communication cable away from power drive wiring to avoid communication interference.

ATTENTION:
Check the voltage and polarity of the power supply. Voltages outside the specified limits may cause irreversible damage and are not covered by warranty.

Pinout of Communication Ports

ATTENTION:
Cables are available for connection to Altus products, as listed in the Related Items section.

CAUTION:
Incorrect connections may cause damage not covered by the equipment warranty.

Communication Ports - P2043NA / P2043SA Models

Pin	Serial port, 9-pin male connector (DB9)		
	COM1 (RS-232)	COM2 (RS-422)	COM2 (RS-485)
1	-	TX+	DATA+
2	RX	-	-
3	TX	-	-
4	-	RX+	-
5	GND	GND	GND
6	-	TX-	DATA-
7	-	-	-
8	-	-	-
9	-	RX-	-

Communication Ports - P2070NA / P2070SA / P2101NA / P2101SA Models

Pin	Serial port, 9-pin male connector (DB9)		
	COM1 (RS-232)	COM2 (RS-422)	COM2 (RS-485)
1	-	TX+	DATA+
2	RX	-	-
3	TX	-	-
4	-	RX+	-
5	GND	GND	GND
6	-	TX-	DATA-
7	RTS	-	-
8	CTS	-	-
9	-	RX-	-

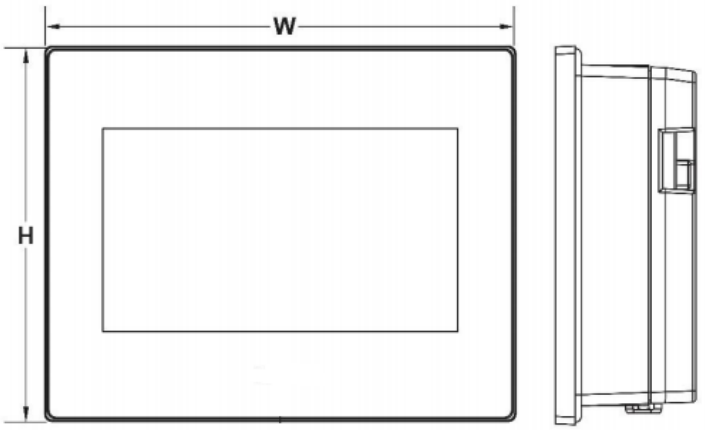
Communication Ports - P5150ZB Model

Pin	DB9 Male Connector	7-pin plug-in terminal		
	COM1 (RS-232)	COM3 (RS-422)	COM3 (RS-485)	COM4 (RS-485)
1	-	-	-	DATA+
2	RX	-	-	DATA-
3	TX	GND	GND	GND
4	-	RX+	-	-
5	GND	RX-	-	-
6	-	TX+	DATA+	-
7	RTS	TX-	DATA-	-
8	CTS	-	-	-
9	-	-	-	-

Physical Dimensions

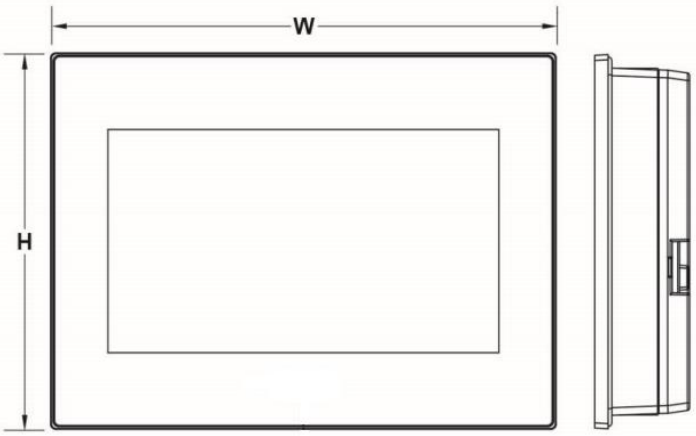
The dimensions of the operating terminals are shown in mm.

P2043NA and P2043SA Operation Terminals



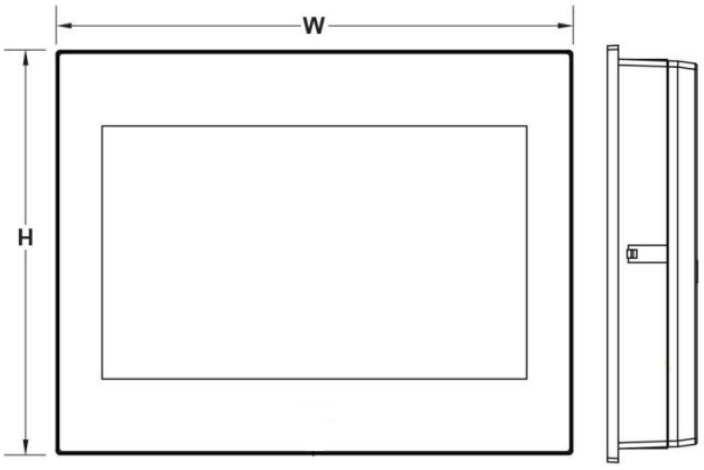
W	128.0 mm
H	102.0 mm
D	36.4 mm

P2070NA and P2070SA Operation Terminals



W	201.0 mm
H	147.0 mm
D	38.1 mm

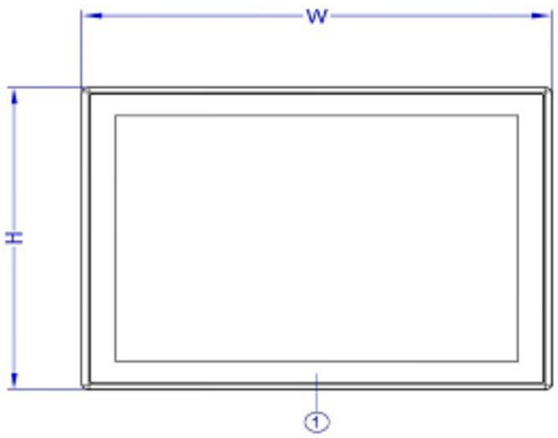
P2101NA and P2101SA Operation Terminals



W	271.5 mm
H	213.5 mm
D	44.6 mm

Doc. Code: CE157803 Rev. A

P5150ZB Operation Terminal



W	357.0 mm
H	283.0 mm
D	52.5 mm

Mechanical Assembly

To install the P2 Series operating terminals, the electrical cabinet panel must be of sufficient thickness for the chosen operating terminal model.

The spacing around each operating terminal must be respected.

CPUs

The HB1-XXMBJ25-D24S CPUs must be used in conjunction with the P2 series of HMIs and are intended for small and medium-sized automation, with models featuring 14 or 24 digital I/O points incorporated into the CPU. In addition, RS-232 and RS-485 communication ports are available for program loading and communication with HMIs and supervisory software.

Its main features are:

- High speed and performance
- Modular architecture
- Connection of up to 2 communication ports (RS-232 and RS-485)
- I/O points integrated in the CPU
- WinProladder: free, intuitive, and user-friendly programming software (see FBs Series technical documentation)

Product Code

The following codes should be used to purchase the product:

Code	Description
HB1-14MBJ25-D24S	UCP 8 ED, 6 SD transistor PNP, RS-232 and RS-485, 24 Vdc
HB1-24MBJ25-D24S	UCP 14 ED, 10 SD transistor PNP, RS-232 and RS-485, 24 Vdc

Related Products

Code	Name
FBs-232P0-9F-150	RS-232 CMDB9F programming cable (1.5 m)
FBs-U2C-MD-180	RS-232 programming cable (USB) / 1.8 m
FBS-USB-232M9	Universal USB-Serial converter cable / 2 m
AL-2306	RS-485 cable for MODBUS network

Note:

FBs-232P0-9F-150 and FBs-U2C-MD-180 are used to program P2 series CPUs via USB/RS-232 using WinProladder software. The connection is made via the PC's COM/USB port to port 0 of the CPU. In addition, P2 Series HMIs have a pass-through function, which allows the CPU to be programmed via the HMI communication interface (e.g., Ethernet)

FBS-USB-232M9: is used as a universal converter from USB interface to RS-232 interface.

AL-2306: is used for MODBUS network via RS-485.

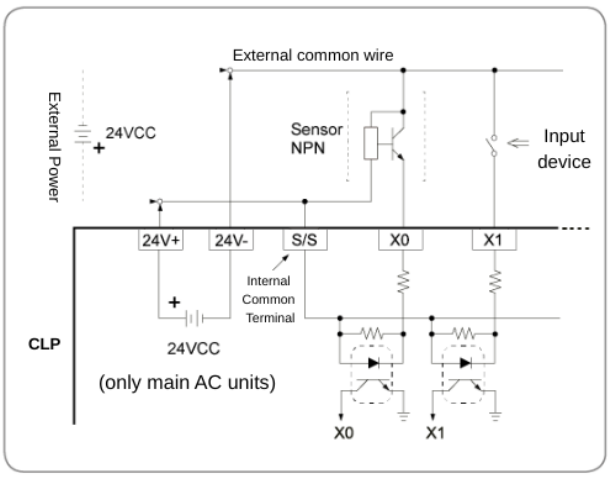
Features

General Features

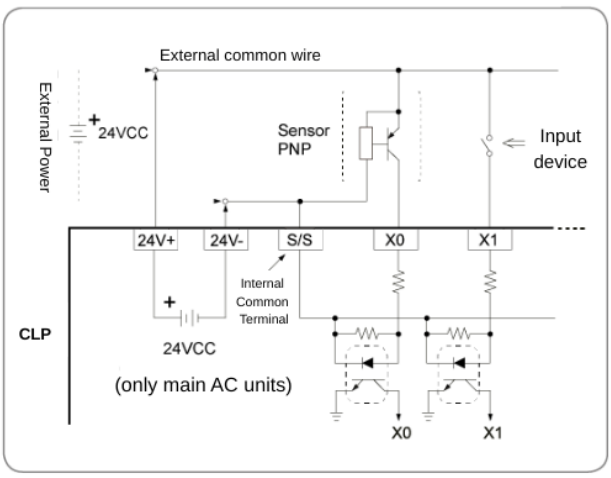
	HB1-14MBJ25-D24S	HB1-24MBJ25-D24S
Designation	CPU 8 ED, 6 SD transistor PNP, RS-232, 110-240 Vac	CPU 14 ED, 10 SD transistor PNP, RS-232, 110-240 Vac
Communication	RS232, RS485, port for HMI	RS232, RS485, port for HMI
Digital Inputs	8 points 24Vdc (4 points 50kHz, 4 points 5kHz)	14 points 24Vdc (8 points 50kHz, 6 points 5kHz)
Digital Outputs	6 PNP transistor output points (2 points 50kHz)	10 PNP transistor output points (4 points 50kHz)
Maximum Input Current	4,5mA	4,5mA
Maximum Fast Input Current	7,6mA	7,6mA
Maximum Output Current	0,5A	0,5A
Maximum Fast Output Current	0,3/0,1 A (M4T/J)	0,3/0,1 A (M4T/J)
Sink/Source Selection	Selection by connection method (internal S/S common and external common connected)	
Operating Voltage	5-30VDC	
Leakage Voltage	< 0.1mA/30VDC	
Output Isolation Method	Optical isolation, 500VAC, 1 min	
Real-Time Clock (RTC)	Yes	Yes
Detachable Terminal Block	Yes	Yes
Maximum Number of Modules	1–2 modules on the left, right side expandable up to 128 I/O points*	1–2 modules on the left, right side expandable up to 128 I/O points*
Dimensions (W x H x D)	60 X 110 X 30mm	90 X 110 X 30 mm
Weight with Packaging	150 g	200 g
Weight without Packaging	100 g	200 g

* Respecting physical limitations

24VCC single-ended SINK input wiring



24VCC single-ended SOURCE input wiring



Expansion Modules

Altus offers a selection of Expansion Modules that can be used in conjunction with the P2 series of HMIs. The available products are listed below:

Product	Description	Position
B1-6ADS	Module 6 EA voltage/current	Right
B1-L2DAS	Module 2 SA voltage/current	Left

B1-6ADS

This is one of the analog input modules for use with HB1 CPUs and P2 series HMIs. It provides 6 A/D input channels with an effective resolution of 12 bits. Based on different jumper settings, it is capable of measuring current or voltage signal variations. The reading value is represented in 12 bits. To filter field noise imposed on the signal, it also provides a sample input averaging function.

General Features

	B1-6ADS
Input Points	6
Output Points	-
Resolution	12 bits
Accuracy	±1%
Conversion Time	Updated with every scan
Isolation	None
Dimensions (W x H x D)	35 x 90 x 32mm

Features Voltage Input Mode

	B1-6ADS
Signal Range	-10 to 10V -5 to 5V 0 to 10V 0 to 5V
Maximum Resolution	1,22mV
Maximum Input Signal	±12V
Input Impedance	63,2Ω

Features Current Input Mode

	B1-6ADS
Signal Range	-20 to 20mA -10 to 10mA 0 to 20mA 0 to 10mA
Maximum Resolution	2,44µA
Maximum Input Signal	±24mA
Input Impedance	250Ω

Jumper Configuration

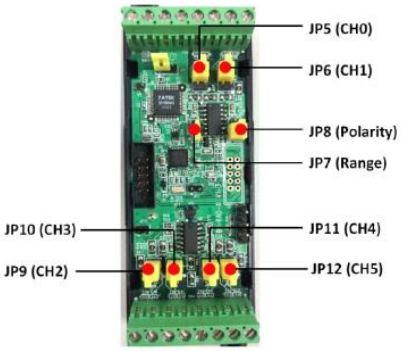
There are two input data formats that can be selected, which are bipolar and unipolar. The input value range is 0~4095 for the unipolar format, while the bipolar range is -2048~2047. The two extreme values of each range correspond to the minimum and maximum input signal. For example, when selecting the signal type -10V~+10V, for a 10V input signal, the

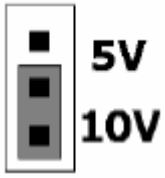
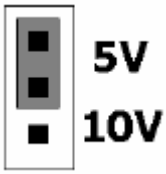
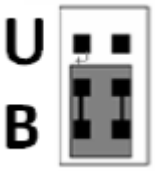
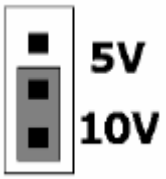
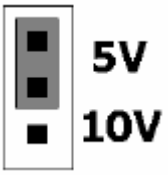
input value is 4095 for the unipolar format, while for the bipolar format it is 2047. Normally, the input code format setting is consistent with the input signal type (bipolar coded for bipolar input signal, unipolar coded for unipolar input signal). Only when using FUN32 for offset conversion should the bipolar code be set for unipolar input signal (see FUN32 description). The code format for all input channels is configured by the same JP1 jumper. The location and configuration of the JP1 jumper are described below:

Code Format	Value Range	JP1 Configuration
Bipolar	-2048~+2047	
Unipolar	0~+4095	

Input Signal Type Configuration

The configuration of each channel can be set individually, while the range and polarity settings share the same jumpers. All jumper locations for input signal type configuration are shown below:



Signal Type	Polarity Setting (JP8)	Range Setting (JP7)
0~10V or 0~20mA		
0~5V or 0~10mA		
-10V~10V or -20~20mA		
-5V~5V or -10mA~10mA		

Signal Type	CH0(JP5) CH1(JP6)/ CH2(JP9)/ CH3(JP10)/ CH4(JP11)/ CH5(JP12)
Current	
Tension	

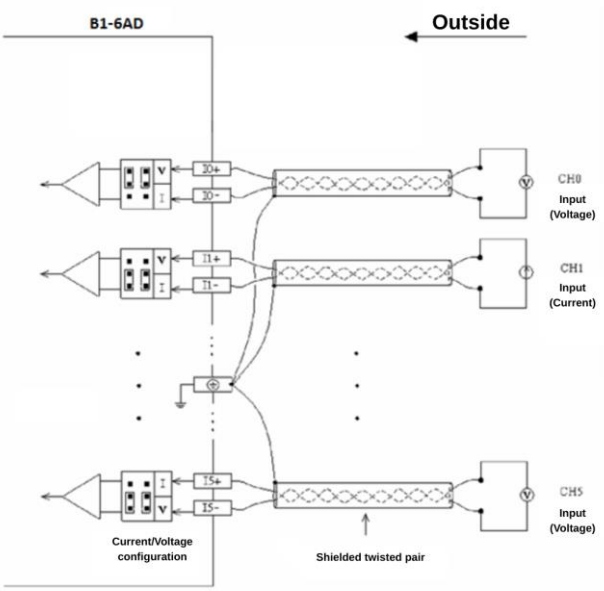
CH0~CH5 share jumpers JP7 and JP8, so all channels must be of the same type, which is one of the four types listed in the table above. Only the current/voltage configuration can be chosen arbitrarily.

The factory default settings for the B1-6ADS module are:

Input code format – Bipolar (-2048~+2047)
Input signal type and range – Bipolar (-10V~+10V)

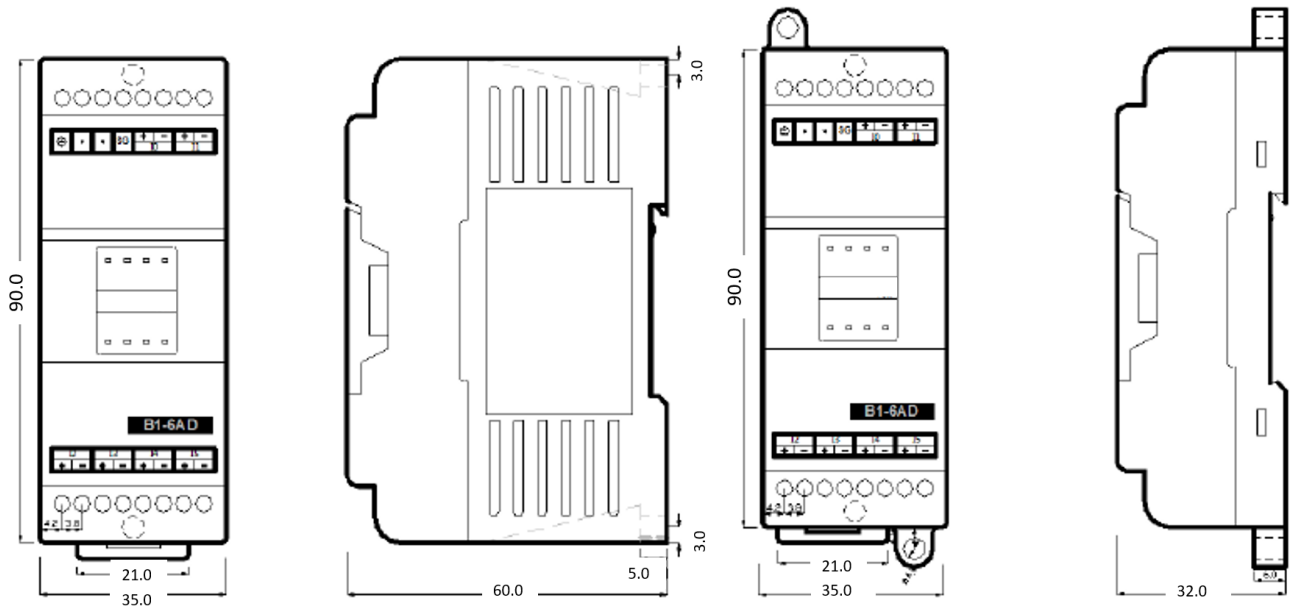
Wiring Diagram

The Wiring Diagram for the B1-6ADS module is shown in the image below:



Physical Dimensions

The physical dimensions of the B1-6ADS module are shown in the image below:



B1-L2DAS

This is one of the analog output modules in the P2 series of HMIs. It provides 2 channels of 12-bit analog output (encoded in 14 bits).

Technical Specifications

	B1-L2DAS
Entry Points	-
Exit Points	2
Resolution	12 bits
Accuracy	±1%
Conversion Time	Updated with every scan

Features Voltage Output Mode

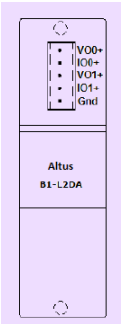
	B1-L2DAS
Signal range	0 to 10V
Maximum resolution	2,44mV
Load impedance	2k to 1M Ω

Features Current Output Mode

	B1-L2DAS
Signal range	0 to 20mA
Maximum resolution	4,88µA
Load impedance	0 to 500Ω

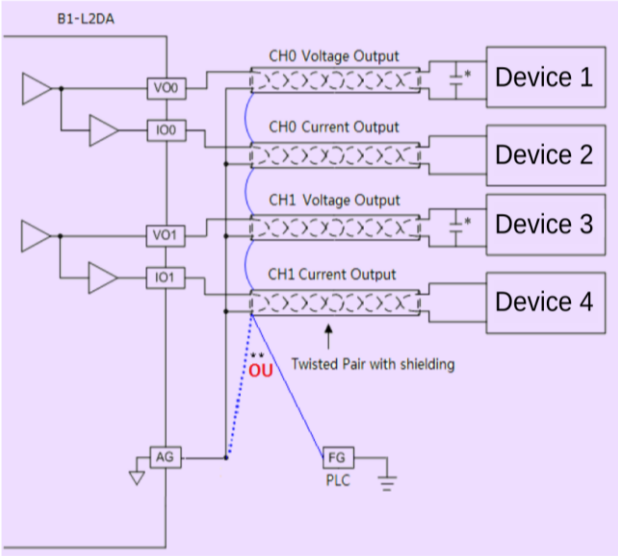
Pinning

The pinout for module B1-L2DAS is shown in the image below:



Wiring Diagram

The Wiring Diagram for the B1-L2DAS module is shown in the image below:

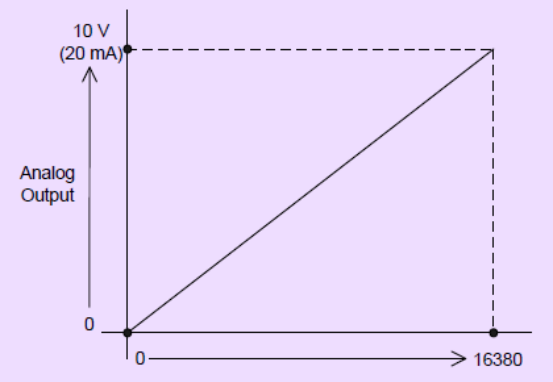


*Installation suggestion: 0.1 ~ 0.47 uF capacitor (for noise filtering). Not mandatory.

**If you prefer to have the shielded twisted pair connected to ground, we suggest you connect the PLC's FG. If it is not possible to connect the PLC's FG, connect to the module's AG.

Characteristics Chart – Value Range x Output Voltage

The graph below shows the relationship between the range of values and the output voltage:

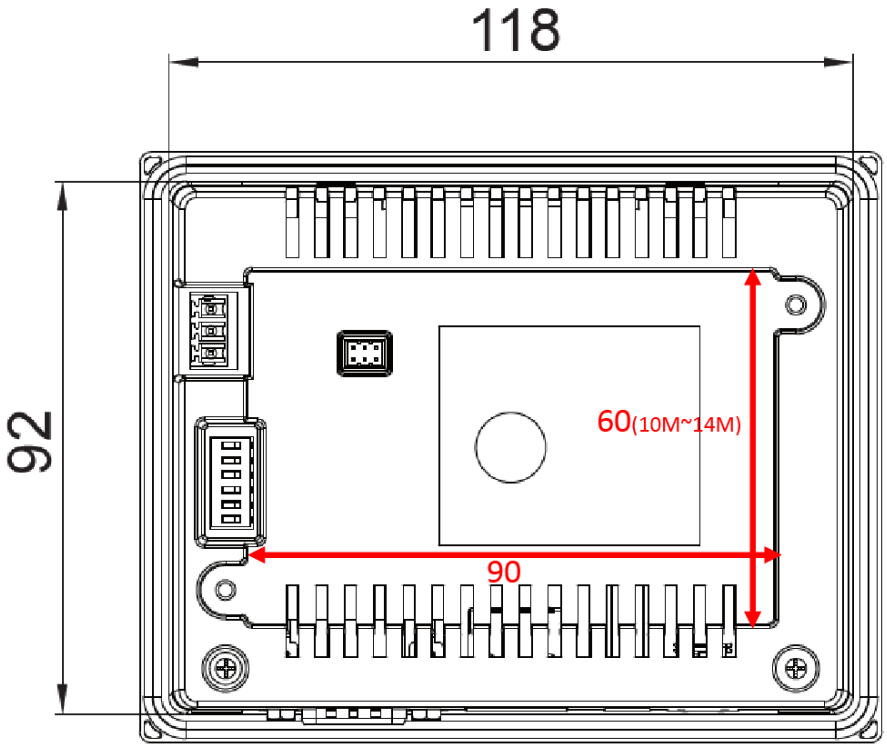


Registrar Allocation Map

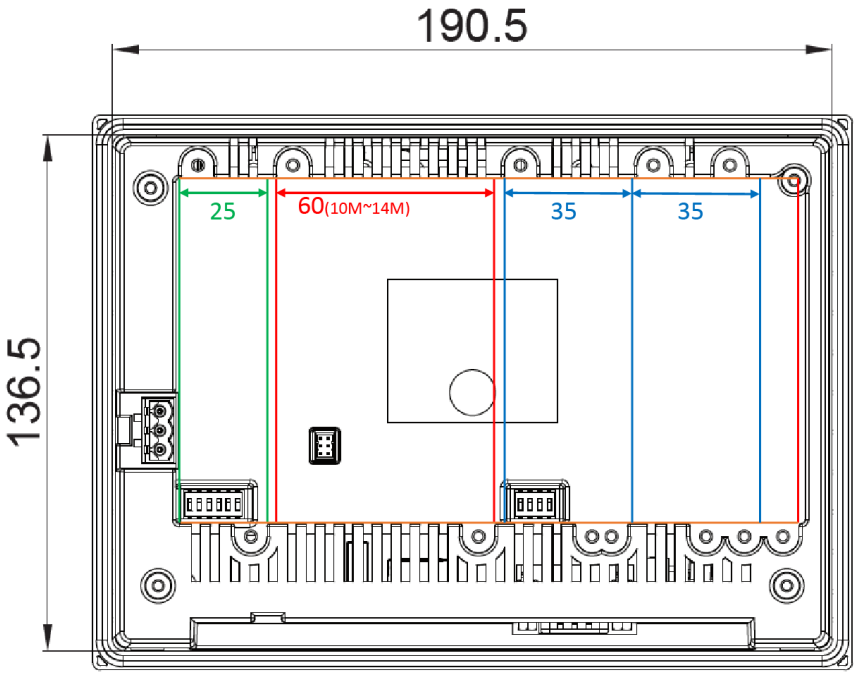
Channel No.		Mapped Register
Analog Output	CH0	D4076 (0 ~ 16383)
	CH1	D4077 (0 ~ 16383)

Connection options

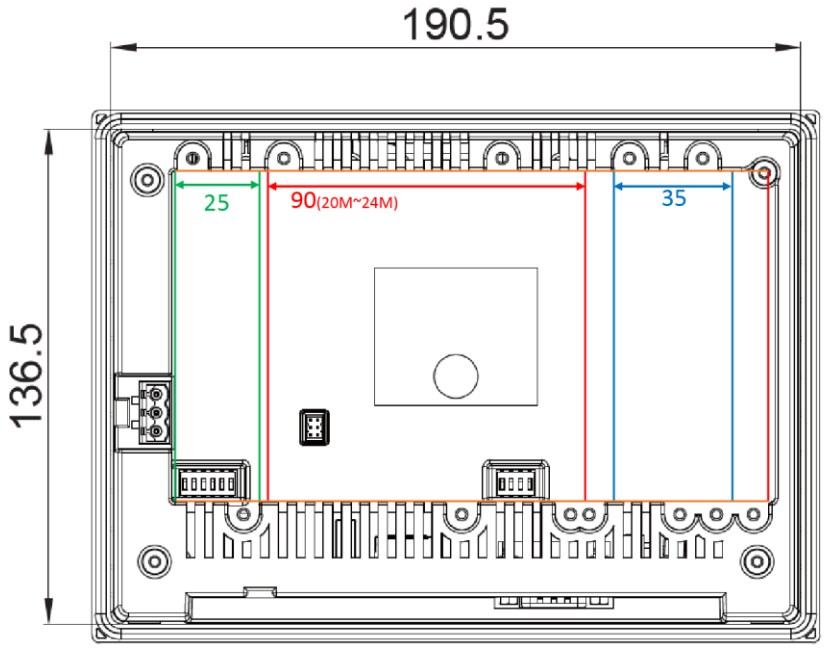
4.3 Inches



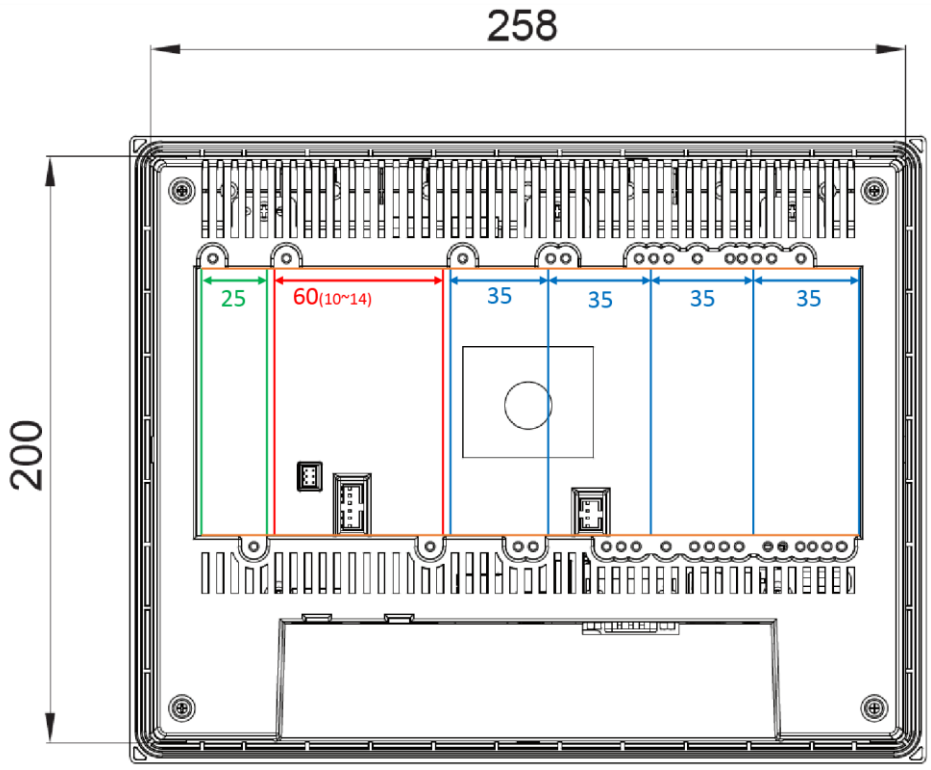
7 Inches (option 1)



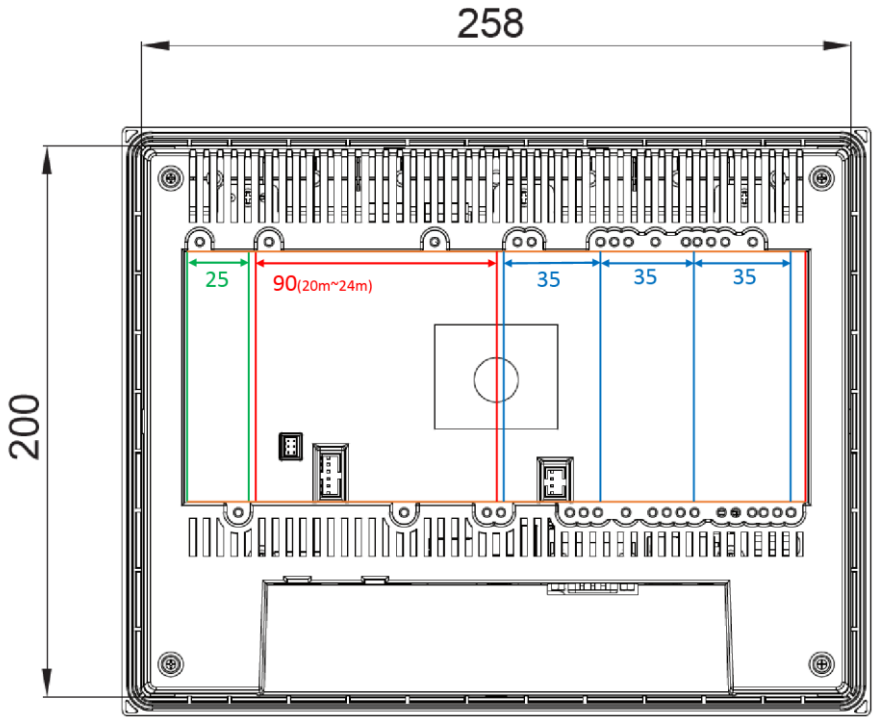
7 Inches (option 2)



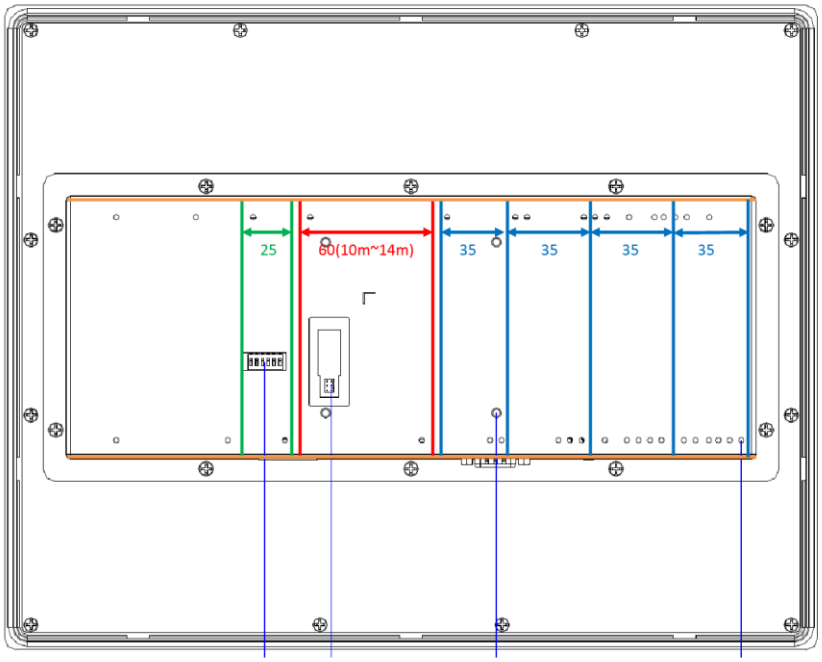
10 Inches (Option 1)



10 Inches (Option 2)



15 Inches



Programming

General Features

The P2 series operation terminals are programmed using the FvDesigner software available on the Altus website. The tool has new features, provides a wide range of objects and functions, with a simulator, and allows the user to develop their application without the need to communicate with the terminal during programming. HB1 CPUs must be configured using WinProladder software (see technical documentation for the FBs Series), bearing in mind that using the pass-through function makes it possible to access the CPU via the HMI communication interface.

Note: This software is not included with the operating terminal and is supplied separately.

FvDesigner: System Requirements

Supported Operating Systems:

- Windows XP
- Windows 7 (32 and 64 bits)
- Windows 8 (32 and 64 bits)
- Windows 10 (32 and 64 bits)

Connection for Programming

Programming can be done via the Ethernet port or Mini-USB. However, the Ethernet port is recommended due to its programming speed.

The Ethernet port has standard pinout, the same as personal computers. The NX92xx or AMJG0808 cable should be used. For USB programming, a standard USB to Mini-USB cable (USBA-MINIB-180) should be used

Maintenance

Altus recommends that all connections to the operating terminals be checked and that dust and any dirt located in the operating terminal compartment be removed at least every 6 months.