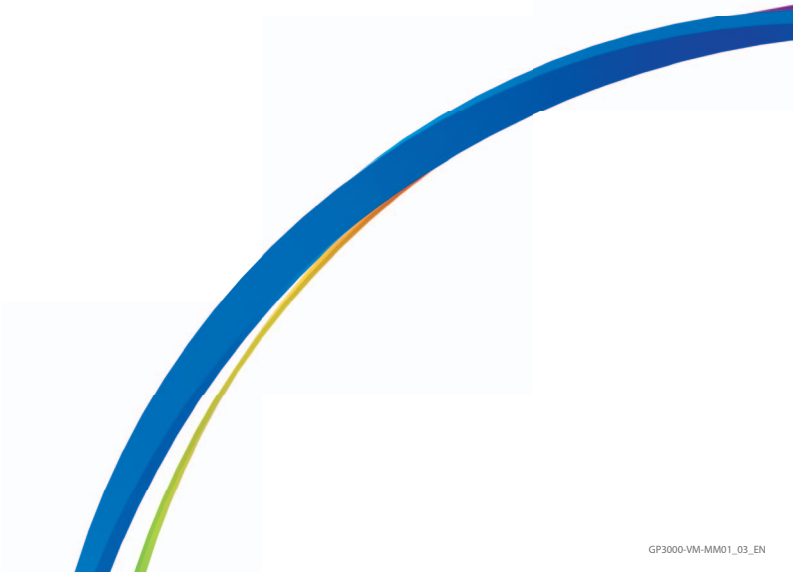
Pro-face
by Schneider Electric

GP3000 Series VM Unit
Hardware Manual



GP3000-VM-MM01_03_EN

Preface

Thank you for purchasing the GP3000 series VM Unit, “GP3000-VM01” (hereafter referred to as the “VM unit”).
This unit is intended for use with expansion unit interface of the Pro-face’s programmable operator interface (hereafter referred to as the “Display unit”), and as a video input or DVI input/output interface with any of the above mentioned Display units.
Before using the VM unit, please be sure to read this manual and other related manuals to fully understand all the settings and functions.

NOTICE

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PLEASE NOTICE
Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric or any of its affiliates or subsidiaries (hereinafter, referred to as Schneider Electric) for any consequences arising out of the use of this material.
A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

Essential Safety Precautions

All safety-related procedures stated in this document must be followed to operate the VM unit correctly and safely. Be sure to read this manual and any related documents thoroughly to understand the correct operation and functions of the VM unit.

Safety Icons

Throughout this manual, these icons provide essential safety information for VM unit operation procedures requiring special attention. These icons indicate the following levels of danger:

⚠ WARNING	Indicates situations where death, severe injury, or major equipment damage can occur.
⚠ CAUTION	Indicates situations where slight injury or minor equipment damage can occur.
⃠	Indicates actions or procedures that should NOT be performed.
❗	Indicates actions or procedures that MUST be performed to ensure correct unit operation.

⚠ WARNING

❗ Due to the possibility of an electrical shock, be sure to unplug the Display unit's power supply prior to installing the VM unit.

❗ Be sure to design your system so that a communication fault between Display unit and external device (PLC, etc.) will not cause equipment to malfunction. This is to prevent any possibility of injury or equipment damage.

⃠ Do not modify the VM unit. Doing so may cause a fire or an electric shock.

⚠ CAUTION

General Safety Precautions

⃠ Do not allow water, liquids, or metal particles to enter into the VM unit's case, otherwise it can cause a malfunction or electrical shock.

⃠ Avoid storing or operating the VM unit in locations where it will be exposed to direct sunlight, high temperature, excessive dust, or vibration.

⃠ Avoid storing or operating the VM unit in locations where large and sudden temperature changes can occur, possibly causing condensation.

⃠ Do not store or operate the VM unit where chemicals can evaporate, be present in the air and adhere to the unit.

⃠ Since the VM unit is a precision instrument, do not store or operate it in locations where strong physical contact or excessive vibration can occur.

⃠ Do not use paint thinner or organic solvents to clean the outside of the VM unit. Instead, soak a soft cloth in a diluted neutral detergent, wring it tightly and then wipe the unit's outside case.

Unit Disposal

❗ When the VM unit is disposed of, it should done so according to your country's regulations for similar types of industrial waste.

Usage Precautions

Video Input

- Image quality may vary depending on the display size selected.
- Use a standard signal (equivalent to ITU-R BT.624) as each video signal input. Using other types of signals can cause an incorrect display. Also, even if the input signal used conforms to the specified standard, the display may be incorrect, depending on signal quality.
- When inputting video signals such as search-and-playback or still-frame playback from VCR, problems such as incorrect display or image not being updated may arise.

DVI Input

- When using RGB signal input, a blue background may appear momentarily while the screen is adjusted or when a PC screen is switched. This phenomenon is normal and the VM unit is not malfunctioning.
- With some types of RGB signals, the displayed images or RGB output images may contain noise or may blur during the screen adjustment. It is possible that these problems cannot be adjusted completely, given the VM unit's available range of adjustment.

- When images without the supported resolution or refresh rate are input, a blue background screen will appear.
- Use a DVI cable with a connector of 16 mm (0.63 in) or less in thickness. Also, use a DVI 1.0-compliant cable.

DVI Output

- Depending on the display device connected with the VM output port, output may not be displayed correctly or adjusted. In this case, images may not be displayed in the screen.
- DVI of the VM unit is output at the resolution of the connected Display unit. It is impossible to select the output resolution of the VM unit.
- Use a DVI cable with a connector of 16 mm (0.63 in) or less in thickness. Also, use a DVI 1.0-compliant cable.

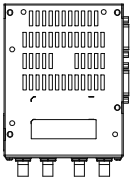
Information Symbols

This manual uses the following icons:

IMPORTANT	Indicates that failure to follow the instructions given with this icon may cause malfunctions of the VM unit or the disappearance of data.
NOTE	Contains additional or useful information on operations.
(1) (2)	Indicates procedure steps. Be sure to follow these procedures in the order they are written.
*	Indicates the description of footnote in the text.
SEE→	Indicates pages containing related information or related manuals.
GP-Pro EX	Indicates screen editing software by Pro-face.

Package Contents

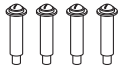
VM unit (1)



Hardware Manual <This Manual> (1)

Warning/Caution Information (1)

Fixing Screws (4)



This unit has been carefully packed, with special attention to quality. However, should you find anything damaged or missing, please contact customer support.

Inquiry / After-sales service

Do you have any questions or comments about this product?
Please access our website anytime if you need a help for the solution.

http://www.pro-face.com/trans/en/manual/1001.html

UL/c-UL Approval

The VM unit “GP3000-VM01” is a UL/c-UL product, listed on UL File No.E220851 and UL File No.E210412.

The VM unit “GP3000-VM01” is a UL/c-UL product, recognized on UL File No.E171486 and UL File No.E231702.*1

Product Model No.	UL/c-UL Registration Model No.
GP3000-VM01	3710008-01

The VM unit “GP3000-VM01” conforms to the following standards:

- UL508
  Standard for Industrial Control Equipment
- UL60950-1 *1
  Information Technology Equipment - Safety - Part 1:General requirements
- ANSI/ISA-12.12.01-2007 *1
  Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Division 1 and 2 Hazardous (classified) Locations.

1 Please check the revision level on your VM unit's product label. If “” marks the number “1” position for the revision, the product does not conform to the standards.

<Cautions>

Be aware of the following items when building the Display unit into an end-use product:

- Be sure that the unit is installed so that it is at least 100 mm away from any adjacent structures or devices. If these requirements are not met, the heat generated by the unit's internal components may cause the unit to fail to meet UL standard requirements.
- This unit is intended for use with GP3000 or GP4000 Series models that have a Video unit interface.

- Receivable signals are only from isolated secondary source.
- DVI/Video signal interface circuitry is not intended to be directly connected to a source greater than 30 volts and the available current greater than 5 mA.

<ANSI/ISA-12.12.01-2007 - Compliance and Handling Cautions>

- Suitable for use in Class I, Division 2, Groups A, B, C and D Hazardous Locations, or Non-Hazardous Locations.
- WARNING: Explosion hazard - substitution of components may impair suitability for Class I, Division 2.
- WARNING: Explosion hazard - when in hazardous locations, turn off power before replacing or wiring modules.
- WARNING: Explosion hazard - do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.

CE Marking

The VM unit “GP3000-VM01” is a CE marked product that conforms to EMC directives, EN55011 Class A and EN61000-6-2.

Table of Contents

Chapter 1 Overview

1.1 Operating the VM Unit

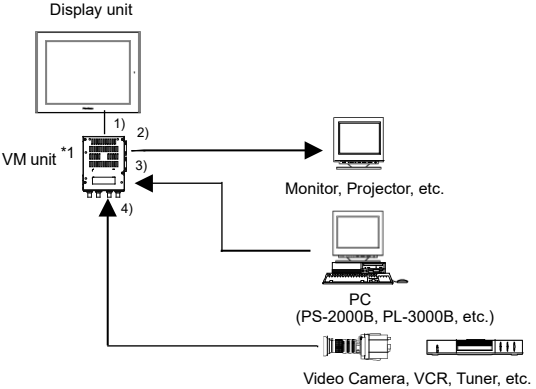
The VM unit features the following functions:

- Up to four images can be shown from five source inputs: four external video camera (VIDEO IN) inputs and one PC (DVI IN) input.
- The display unit video image can be captured and then saved on the external storage such as CF Card/SD Card in JPEG format; the images saved on the external storage in JPEG format can also be displayed on the Display unit screen.
- One output for Display unit video images (DVI OUT) enables the Display unit screen to be displayed on a monitor.

1.2 System Configuration

1.2.1 Connection Configuration Diagram

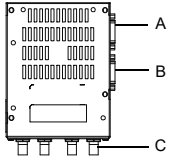
An example of connections for the entire VM system is illustrated below.



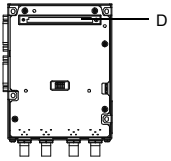
1) VM BUS	Connect with the Video unit interface on the rear face of the Display unit.
2) DVI OUT	Connect with a DVI cable (optional or commercially available)
3) DVI IN	Connect with a DVI cable (optional or commercially available)
4) VIDEO IN (0 to 3)	Connect with a video cable

*1 The expansion unit cannot be installed in the Expansion Unit Interface (EXT1) if the VM unit is installed in AGP-35*0T.

1.3 Part Names and Functions



Front



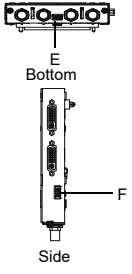
Rear

A. DVI OUT
Connector for outputting DVI-I signal.

B. DVI IN
Connector for inputting DVI-I signal.

C. VIDEO IN
Connector for inputting video Images. Images from four systems can be input.

D. Connecting port for Display unit
Connector for connecting with the Video unit interface of Display unit.



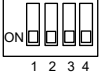
E. SW1

Add 75Ω of termination resistance to the VIDEO IN connector. (Default: ON)
When using a daisy chain connection, switch ON the termination connector.

Switch	Function	Setting
1	Termination for VIDEO IN0	ON: Termination added OFF: No termination added
2	Termination for VIDEO IN1	ON: Termination added OFF: No termination added
3	Termination for VIDEO IN2	ON: Termination added OFF: No termination added
4	Termination for VIDEO IN3	ON: Termination added OFF: No termination added

F. SW2

Switch for selecting a connector connected to DVI IN port. Switch ON when connecting to DVI-D or DVI-I; OFF to DVI-A (Analog RGB).



Switch	Function	Setting
1	Switch screen display for DVI input	ON: Digital OFF: Analog
2	Reserved (constantly ON)	-
3	Reserved (constantly ON)	-
4	Reserved (constantly ON)	-

1.4 Accessories

■ Cables

Product Name	Model No.	Description
DVI-D Cable	FP-DV01-50 FP-DV01-100*1	Digital Visual Interface cable used to send image signals from the host to the Display unit. DVI1.0 compliant (DVI-D 24-pin plug). (5 m or 10 m)
DVI-I - RGB Conversion Cable	CA7-CBLCVRGB-01	A cable converting DVI-A to RGB

*1 Only when the VM unit is connected with PS-2000B or PL-3000B (Revision B or later), FP-DV01-100 can be used.

- When using the FP-DV01-100 with the PS-2000B, be sure to turn the PS-2000B's internal DIP switch 4 ON (display resolution for FP-DV01-100 is 1024 x 768 (XGA) only) When using the FP-DV01-50, turn this DIP switch OFF.
- When using the FP-DV01-100 with the PL-3000B, be sure to set the PL-3000B's internal DIP switch 5 to the ● mark side. It is recommended that the resolution of PL-3000B be adjusted to the full display resolution of the Display unit. When using the FP-DV01-50, set this DIP switch to the opposite side of the ● mark.

1.5 Software

The GP-Pro EX connectable Display unit and VM unit depends on the GP-Pro EX versions.

Refer to the “GP-Pro EX Reference Manual” included in each version for the details on the connectable Display unit and VM unit, and the display settings for the input image window.

You can download the manual from our website at
http://www.pro-face.com/trans/en/manual/1001.html

Chapter 2 Specifications

2.1 General Specifications

2.1.1 Electrical

Items		Specifications
Power Supply	Rated Voltage	DC5V ± 5% (supplied by the Display unit)
	Power Consumption	DC5V 1.3A (max.)
Voltage Endurance		DC type Display unit: AC1000V 20mA for 1 minute (between charging and FG terminals) AC type Display unit: AC1500V 20mA for 1 minute (between charging and FG terminals)
Insulation Resistance		DC500V 10MΩ (min) (between charging and FG terminals)

2.1.2 Environmental

Items		Specifications
Physical	Surrounding Air Temperature	0 to 50°C
	Storage Temperature	-20 to +60°C
	Ambient Humidity	10 to 90% RH (Wet bulb temperature: 39°C max. - no condensation.)
	Storage Humidity	10 to 90%RH (Wet bulb temperature: 39°C max. - no condensation.)
	Dust	0.1mg/m^3 and below (non-conductive levels)
	Pollution Degree	For use in Pollution Degree 2 environment
	Atmosphere	Free of corrosive gases
	Air Pressure Vibration Resistance (altitude range)	800 to 1114hPa (2000 meters above sea-level maximum)

Items		Specifications
Mechanical	Vibration Resistance	IEC61131-2 compliant 5 to 9Hz single-amplitude 3.5mm [0.14 in] 9 to 150Hz constant-accelerated velocity 9.8m/s^2 X,Y,Z directions for 10 cycles (100 minutes)
	Concussion Resistance	IEC61131-2 compliant (147m/s^2 X, Y, Z directions for 3 times)
Electrical	Noise Immunity	Noise Voltage: 1000V$_{p-p}$ (Display unit: DC type) 1500V$_{p-p}$ (Display unit: AC type) Pulse Duration: 1µs Rise Time: 1ns (via noise simulator)
	Electrostatic Discharge Immunity	Contact Electrical Discharge 6kV (complies with IEC61000-4-2 Level 3)

2.1.3 Structural

Items		Specifications
Installation	Installation method	Screw fixing
	Cooling Method	Natural air circulation
	Weight	Approx. 600 g [1.3 lb] or less
	External Dimensions	W110 mm [4.33 in] x H144 mm [5.67 in] x D27 mm [1.06 in] (excluding projection and connector part)

2.2 Performance Specifications

2.2.1 Video Input Signal Specifications (VIDEO IN0 to 3)

Items	Specification Value
Input Signal	NTSC or PAL compliant*1
Input Amplitude	1V_{p-p}, Terminal Resistance: 75Ω
Maximum Transmission Distance	Max. 10m is recommended.
Display Colors	262,144Colors
Resolution	See Video Signal input Screen Mode. (SEE→) *Video Signal Input Screen Mode (page16)*
No. of Interface	4
Connector (Main Unit)	75Ω BNC (Receptacle)

*1 NTSC and PAL systems cannot be applied at the same time.

■ Video Signal Input Screen Mode

Signal System	Horizontal Resolution	Vertical Resolution	Horizontal Sync. (kHz)	Vertical Sync. (Hz)
NTSC	640	480	15.734	59.9
PAL	768*1	576*1	15.625	50

*1 For AGP-3500, AGP-3550, and GP-4521T, a portion of an image will not be displayed.

2.2.2 DVI-I Input (DVI IN)

Items	Specifications	Remarks
Signal System	VESA standard Analog RGB, separated (When use DVI-A analog RGB cable) TMDS standard Digital RGB (When use DVI-D cable)	-
Maximum Transmission Distance	5m or less is recommended (10m when connected to a PS-2000B unit or PL-3000B unit with DVI-D cable*1)	Varies depending on the performance of the PC connected.
Display Colors	262,144Colors	-
Resolution	See PC Signal input Screen Mode. (SEE→) ■*PC Signal Input Screen Mode (page18)*	-
Color Signal	0.7V_{p-p}, Positive polarity (TYP) Input range: 0.5 to 1.0V_{p-p}, Positive polarity (When use DVI-A analog RGB cable)	75Ω termination resistor
Horizontal Sync.	TTL level, positive true / negative true	Signal polarity is determined automatically.
Vertical Sync.	TTL level, positive true / negative true	Signal polarity is determined automatically.
No. of Interface	1	-
Connector (Main Unit)	DVI-I 29-pin (Socket)	-

*1 The PS-2000B or PL-3000B unit settings need to be changed.

■ PC Signal Input Screen Mode

Mode	Horizontal Resolution	Vertical Resolution	H. Sync. (kHz)	V. Sync. (Hz)	Dot Clock (MHz)
VGA	640	480	31.469	59.940	25.175
	640	480	37.861	72.809	31.500
	640	480	37.500	75.000	31.500
	640	480	43.269	85.008	36.000
SVGA	800	600	35.156	56.250	36.000
	800	600	37.879	60.317	40.000
	800	600	48.077	72.188	50.000
	800	600	46.875	75.000	49.500
	800	600	53.674	85.061	56.250
XGA	1024	768	48.363	60.004	65.000
	1024	768	56.476	70.069	75.000
	1024	768	60.023	75.029	78.750

NOTE

Inputting the signal, the frequency of which deviates by more than ±5% from the frequency listed above, may result in distortion of pictures.

2.2.3 DVI-I Output (DVI OUT)

Items	Specifications	Remarks
Signal System	VESA standard Analog RGB, separated (When use DVI-A analog RGB cable) TMDS standard Digital RGB (When use DVI-D cable)	-
Maximum Transmission Distance	10m or less is recommended	Varies with the performance of the PC connected.
Display Colors	262,144Colors	-
Color Signal	$0.7V_{p-p}$, Positive polarity (TYP) (When use DVI-A analog RGB cable)	75Ω termination resistance
Resolution	See PC Signal output Screen Mode. (SEE→) ■ *PC Signal Output Screen Mode (page20)*	-
No. of Interface	1	-
Connector (Main Unit)	DVI-I 29-pin (Socket)	-

■ PC Signal Output Screen Mode

The PC signal output screen mode varies depending on the Display unit.

Display unit	Output Resolution	H. Sync. (kHz)	V. Sync. (Hz)	Dot Clock (MHz)	Polarity
AGP-3500T AGP-3550T	640 x 480	30.69	58.45	24.58	H. Sync.: Negative V. Sync.: Negative
GP-4521T		31.44	59.89	27.67	
AGP-3510T AGP-3560T AGP-36*0T	800 x 600	35.90	57.15	36.86	H. Sync.: Positive V. Sync.: Positive
GP-4621T		39.30	59.01	41.50	
AGP-3750T	1024 x 768	58.47	73.73	73.73	H. Sync.: Negative V. Sync.: Negative

2.2.4 Interface Specificatios

■ Video Input Interface

BNC connector for video signal input

<Cable Side>

Recommended Connector	BNC-P-3DV-SA (Hirose Electric Co., Ltd.)
Recommended Cable	3C-2V Coaxial Cable

■ DVI-I Input/Output Interface

DVI-I connector for DVI-I Input/Output

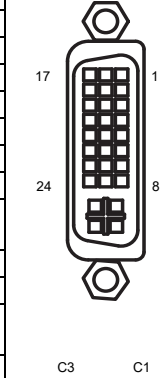
<Cable Side>

Recommended Cables	FP-DV01-50 (by Pro-face) FP-DV01-100 (by Pro-face) CA7-CBLCVRGB-01 (by Pro-face)

NOTE

For more information about Recommended Cables, please refer to [1.4 Accessories (page13)].

◆DVI-I connector Pin Assignments

Pin No.	Signal Name	Condition	Pin Assignment
1	RX2-	T.M.D.S. Data2-	
2	RX2+	T.M.D.S.Data2+	
3	GND	T.M.D.S. Data2/4 Shield	
4	NC	No connection	
5	NC	No connection	
6	DDCSCL	DDC Clock	
7	DDCSDA	DDC Data	
8	VSYNC	Analog Vsync	
9	RX1-	T.M.D.S. Data1-	
10	RX1+	T.M.D.S. Data1+	
11	GND	T.M.D.S. Data1/3 Shield	
12	NC	No connection	
13	NC	No connection	
14	+5V_DVI	+5V Power Supply for DDC	
15	GND	Ground	
16	HPD	Hot Plug Detect	
17	RX0-	T.M.D.S. Data0-	
18	RX0+	T.M.D.S. Data0+	
19	GND	T.M.D.S. Data0/5 Shield	
20	NC	No connection	
21	NC	No connection	
22	GND	T.M.D.S. Clock Shield	
23	RXC+	T.M.D.S. Clock+	
24	RXC-	T.M.D.S. Clock-	
C1	RIN	Analog R	
C2	GIN	Analog G	
C3	BIN	Analog B	
C4	HSYNC	Analog Hsync	
C5	GND	Analog Ground	

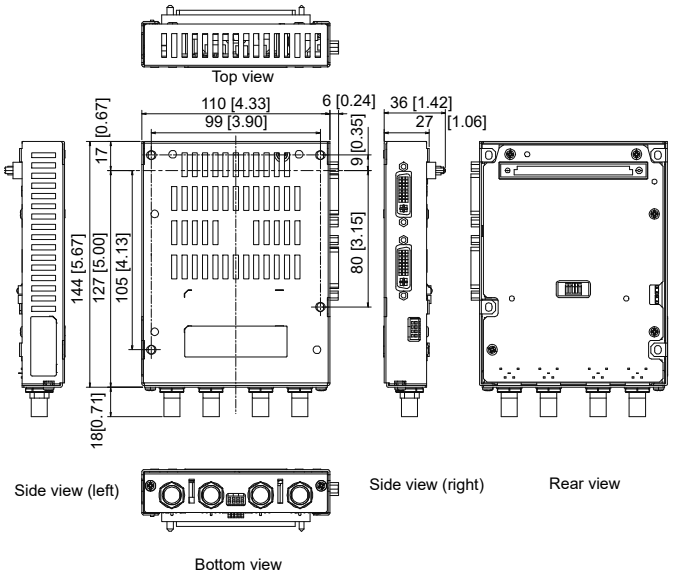
IMPORTANT

- Connect the cables before starting up the PC and the Display unit. To prevent possible equipment malfunction, do not disconnect the cable while the equipment is turned ON.
- If a cable other than the specified DVI-D cable is used, the product performance cannot be guaranteed against possible noise or signal degradation.
- Only when the VM unit is connected with PS-2000B or PL-3000B (Revision B or later), FP-DV01-100 can be used.
  - When using the FP-DV01-100 with the PS-2000B, be sure to turn the PS-2000B's internal DIP switch 4 ON (display resolution for FP-DV01-100 is 1024 × 768 (XGA) only). When using the FP-DV01-50, turn this DIP switch OFF.
  - When using the FP-DV01-100 with the PL-3000B, be sure to set the PL-3000B's internal DIP switch 5 to the ● mark side. It is recommended that the resolution of PL-3000B be adjusted to the full display resolution of the Display unit. When using the FP-DV01-50, set this DIP switch to the opposite side of the ● mark.

2.3 External View and Dimensions

2.3.1 External View

Unit: mm [in]

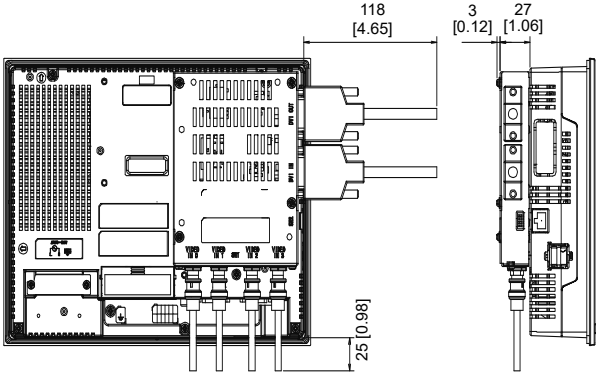


NOTE

- Refer to the hardware manual of the Display unit you use to see the dimensions of the Display unit (except GP3000 Series) attached the VM unit.

2.3.2 GP-3500 Series External View with the VM Unit

Unit: mm [in]



NOTE

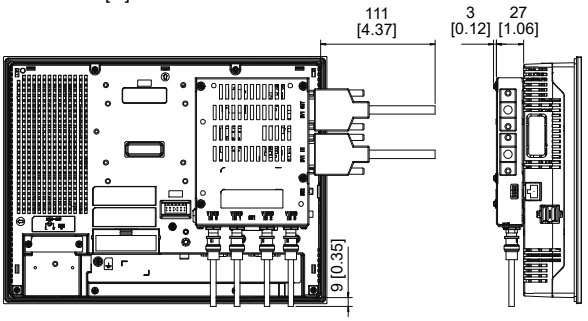
- When you design the system, be sure to consider the cable material and the lead-out direction so that no excessive force is applied to the connector.

IMPORTANT

- All the above values are designed in case of cable bending. The dimensions given here are representative values depending on the type of connection cable used. Therefore, they are all intended for reference only.
- Be sure to design your system so that after the Display unit is installed there is sufficient space for the VM unit's connectors and cable routing.
- When installing or removing the Display unit while its connectors attached, be sure not to damage any of the connectors.

2.3.3 GP-3600 Series External View with the VM Unit

Unit: mm [in]



NOTE

- When you design the system, be sure to consider the cable material and the lead-out direction so that no excessive force is applied to the connector.

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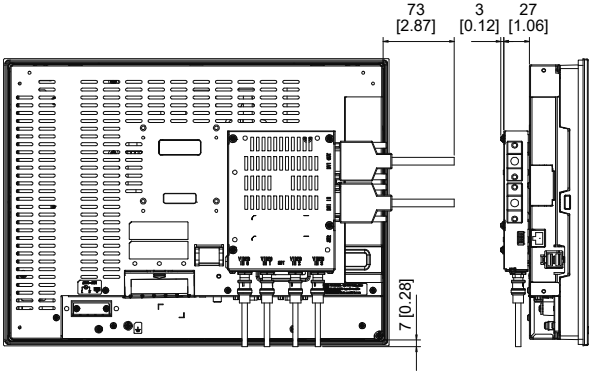
2.3.4 GP-3700 Series External View with the VM Unit

Unit: mm [in]



NOTE

- When you design the system, be sure to consider the cable material and the lead-out direction so that no excessive force is applied to the connector.

IMPORTANT

- All the above values are designed in case of cable bending. The dimensions given here are representative values depending on the type of connection cable used. Therefore, they are all intended for reference only.
- Be sure to design your system so that after the Display unit is installed there is sufficient space for the VM unit's connectors and cable routing.
- When installing or removing the Display unit while its connectors attached, be sure not to damage any of the connectors.

Chapter 3 Installation

3.1 Installing the VM Unit

⚠ WARNING

To prevent an electric shock, before installation be sure to check that the Display unit's power cord is not plugged in to a power supply.

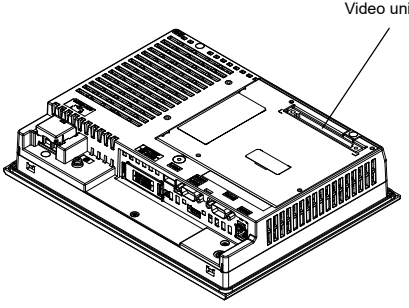
IMPORTANT

- The Expansion Unit Interface 1 (EXT1) cannot be installed in the expansion unit when the VM unit is installed in the AGP-35*0T.

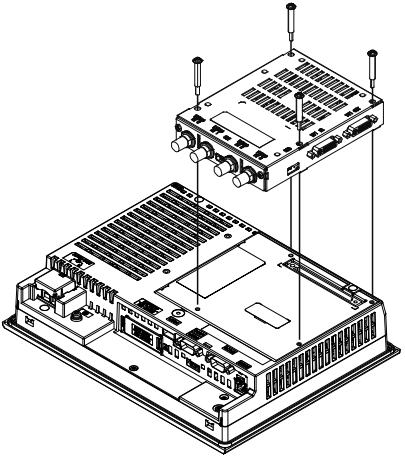
The following figure describes how to install the VM unit into an GP-4521T.

(1) Disconnect the power cable from the Display unit and place the Display unit's face down on a flat horizontal surface.

(2) Insert the Display unit connector for the VM unit into the Video unit interface on the rear face of the Display unit.



(3) Fix the VM unit with the four screws supplied with the VM unit.
(Tightening torque: 0.5 to 0.6 N•m)



IMPORTANT

- Because of the attaching screws' structure, there may be a gap between the screw heads and the VM unit even when the VM unit is securely fixed. Tightening the screws with too much force can damage their heads. Use the designated torque to tighten the screws.

3.2 Wiring for Video and DVI Input

3.2.1 Video Cable Connection

(1) Make sure that power is not supplied to the Display unit and the video cameras.

(2) Connect the BNC cable with the VIDEO IN. Turn the connector of the BNC cable to lock it in place.

IMPORTANT

- Connect the cables before starting up the video cameras and the Display unit. To prevent a possible equipment malfunction, do not disconnect the cables while the equipment is turned ON.

3.2.2 DVI Cable Connection

(1) Make sure that power is not supplied to the Display unit and the personal computer.

(2) Connect the DVI connector with the DVI IN port or DVI OUT port. Tighten the screws to secure the connector.

IMPORTANT

- Connect the cable before starting up the PC and the Display unit. To prevent a possible equipment malfunction, do not disconnect the cable while the equipment is turned ON.
- Use a DVI cable with a connector of 16 mm (0.63 in) or less in thickness. If the thickness is more than 16 mm (0.63 in), it will interferes with the Display unit, and therefore cannot be connected.
- When connecting a DVI cable with the VM unit, plug it correctly in either DVI IN or DVI OUT port.

Chapter 4 Setup

4.1 Video Window Adjustment

The Display unit allows the user to adjust the position, screen and color of the image input into the VIDEO IN port.
Please refer to “GP-Pro EX Reference Manual”.

4.2 DVI-I Display Adjustment

When the image input into the DVI IN port is DVI-A (analog RGB), the Display unit‘s position, screen and color can be adjusted in Display unit.
Please refer to “GP-Pro EX Reference Manual”.