Preface

Thank you for purchasing The Digital Electronics Corporation's DIO unit (GLC100-ST41), hereafter referred to as the "DIO unit".

The DIO unit provides 16 digital input/output points, and is designed as an external input/output unit for use with a UL/c-UL(CSA) approved and CE marked GLC-100 Series Graphical Logic Controller.

This manual provides an overview of the DIO unit's features, as well as instructions for its attachment to the GLC and its use in a system.

Be sure to read this manual's contents thoroughly to familiarize yourself with the safe and correct use of this product.

This unit is designed for use with the following products.

GLC-100 Series	GLC100-LG41-24V, GLC100-SC41-24V

<Note>

1) It is forbidden to copy the contents of this manual, in whole or in part, except for the user's personal use, without the express permission of the Digital Electronics Corporation of Japan.
2) The information provided in this manual is subject to change without notice.
3) This manual has been written with care and attention to detail; however, should you find any errors or omissions, please contact Digital Electronics and inform them of your findings.
4) Please be aware that we are not responsible for any damages resulting from the use of our products, regardless of article 3 above.
5) This unit conforms to the CE marking and UL/c-UL(CSA) standards. Therefore, when this unit is attached to a GLC that does not meet these standards, this unit's conformance with these standards will be lost.

Table of Contents

Essential Safety Precautions

This manual includes procedures that must be followed to operate the DIO Unit and GLC correctly and safely. Be sure to read this manual and any related materials thoroughly to understand the correct operation and functions of the DIO Unit and GLC.

■ Symbol Meanings

To indicate the correct use of the DIO Unit and GLC, the following symbols are provided throughout this manual, to indicate operations or procedures requiring special attention. The following is an example of these symbols and their meanings:

⚠ Warning — Incorrect operation resulting from negligence of this instruction may cause death or serious injury.

⚠ Caution — Incorrect operation resulting from negligence of this instruction may cause injury or damage to equipment.

⚠ WARNINGS

- **Prior to attaching the DIO Unit, confirm that GLC's power is OFF. Otherwise, an electric shock can occur.**
- **NEVER attempt to modify or re-design the DIO Unit, since it can cause a fire or an electric shock.**
- **Do not use the DIO Unit in areas containing flammable gasses, since it could cause an explosion.**

■ To Prevent a DIO Unit Malfunction or Internal Damage:

- ***Be sure to use the DIO unit only within its designated operating termperature range. Operating the DIO unit outside of this range can lead to a breakdown or malfunction.***
- ***Be sure that water, liquids, or metal particles do not enter the DIO Unit, since it may cause the unit to malfunction, or can lead to an electric shock.***
- ***DO NOT store the DIO Unit in a place where it will be exposed to direct sunlight, high temperatures, excessive dust, or vibration.***
- ***The DIO Unit is a high precision piece of equipment. DO NOT subject it to excessive shocks.***
- ***DO NOT store the DIO Unit near chemicals, or where chemicals can come into contact with the unit.***

UL/c-UL(CSA) Approval

The GLC100-ST41 unit is a UL/c-UL listed product. (UL file No.E182139)

This unit conforms to the following standards:

UL508

Industrial Control Equipment

UL1604

For use with Electrical Equipment in Class I and II, Division 2 and Class III Hazardous (Classified) Locations in industrial control applications.

CAN/CSA-C22.2, Nos. 142 and 213-M1987

Standard for Safety of Information Technology Equipment, including Electrical Business Equipment

GLC100-ST41 (UL Registration Model: 0980017-03)

<Cautions>

Be sure that this unit is installed at least 100 mm away from any adjacent structures or equipment. If these requirements are not met, the heat generated by the unit's internal components may cause the unit to fail to meet UL/c-UL(CSA) standard requirements.

UL1604 Conditions of Acceptability and Handling Cautions:

1. Power, input and output (I/O) wiring must be in accordance with Class I, Division 2 wiring methods - Article 501- 4(b) of the National Electrical Code, NFPA 70 within the United States, and in accordance with Section 18-52 of the Canadian Electrical Code for units installed within Canada.
2. Suitable for use in Class I, Division 2, Groups A, B, C and D, Hazardous Locations.
3. WARNING: Explosion hazard - substitution of components may impair suitability for Class I, Division 2.
4. WARNING: Explosion hazard - when in hazardous locations, turn power OFF before replacing or wiring modules.
5. WARNING: Explosion hazard - do not disconnect equipment unless power has been switched OFF, or the area is known to be non-hazardous.

CE Marking

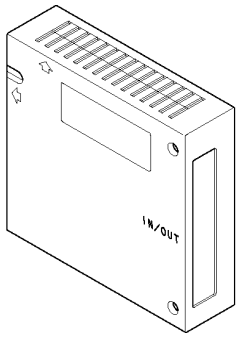
The GLC100-ST41 is a CE marked product that conforms to EMC directives EN55011 class A and EN50082-2.

If, however, the included Ferrite Core is not attached to this unit, this unit can be effected by surrounding electrical equipment. In this case, this unit cannot be considered as being CE marked.

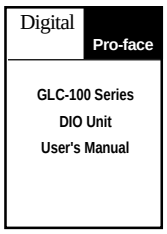
Package Contents

The DIO Unit's packing box contains the items listed below. Please check to confirm that all items shown below have been included.

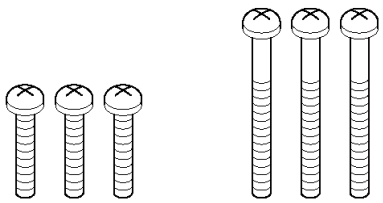
■ **DIO Unit (GLC100-ST41)**



■ **GLC-100 Series DIO Unit User's Manual (this manual)**



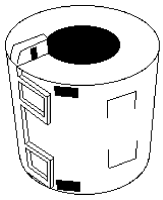
■ **Attachment Acrews (6)**



(Short Type- for use with a single DIO unit)

(Long Type - for use with 2 DIO units)

■ **Ferrite Core (1)**



(includes attachment strap)

This unit has been carefully packed, with special attention to quality. However, should you find anything damaged or missing, please contact your local GLC distributor immediately for prompt service.

Documentation Conventions

This manual uses the following symbols and terminology.

GLC100	Indicates the GLC-100 Series Unit.
***1**	Indicates useful or important supplemental information.
	Provides useful or important supplemental information.
	Refers to useful or important supplemental information.

Chapter 1 Introduction

1. DIO Unit Features
2. System Configuration
3. Network Configuration

This chapter describes the DIO Unit’s functions.

1.1 DIO Unit Features

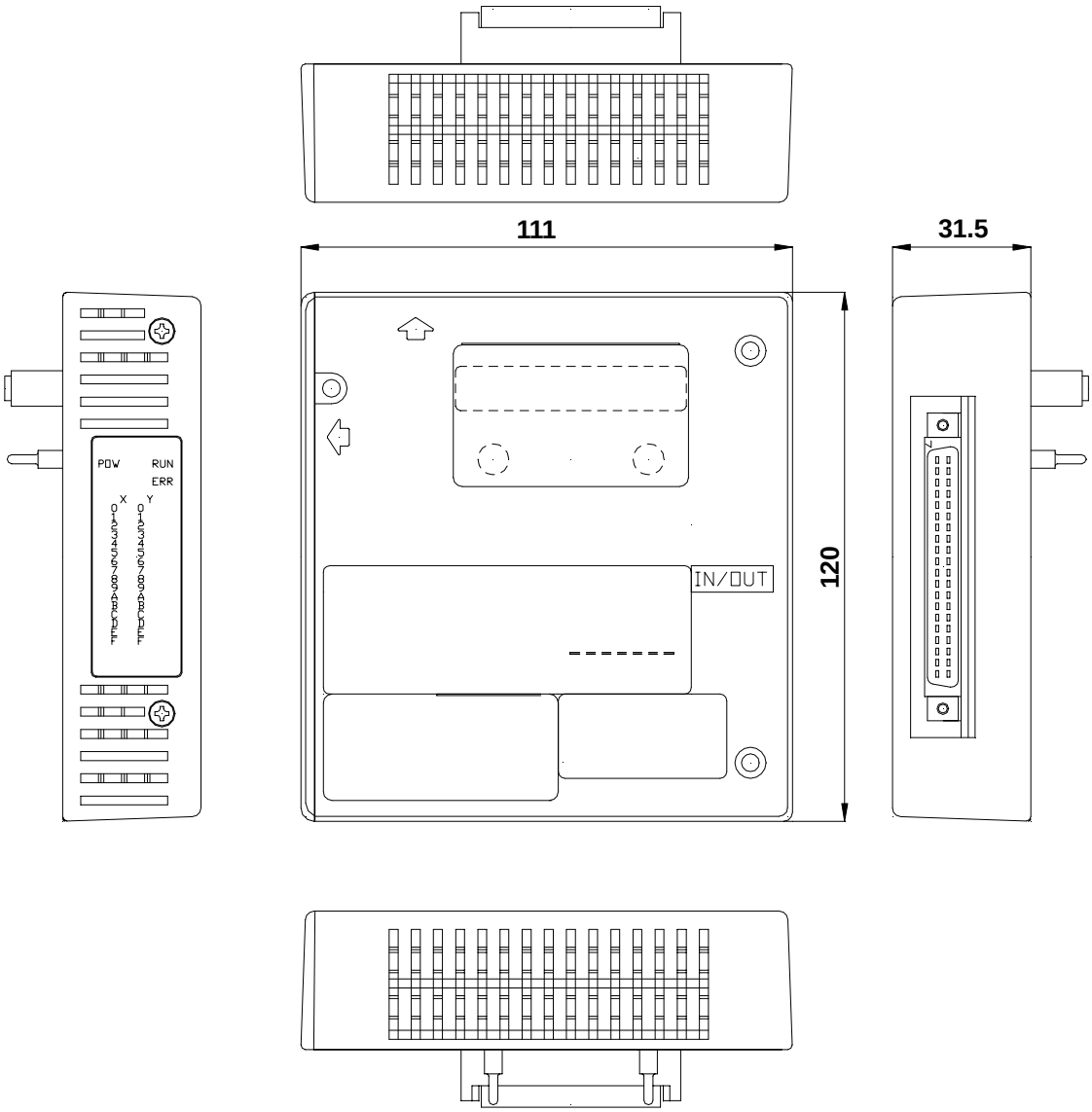
Digital's DIO Unit has the following special features.

- Equipped with isolated 16 point photo-coupler input and isolated 16 point transistor output.
- Photo-coupler provides isolation of input and ouput signals for input and ouput circuits. This protects the unit's internal circuits from external voltage surges.
- Easy to read LEDs provide status check of I/O signals.

1.2 External Dimensions

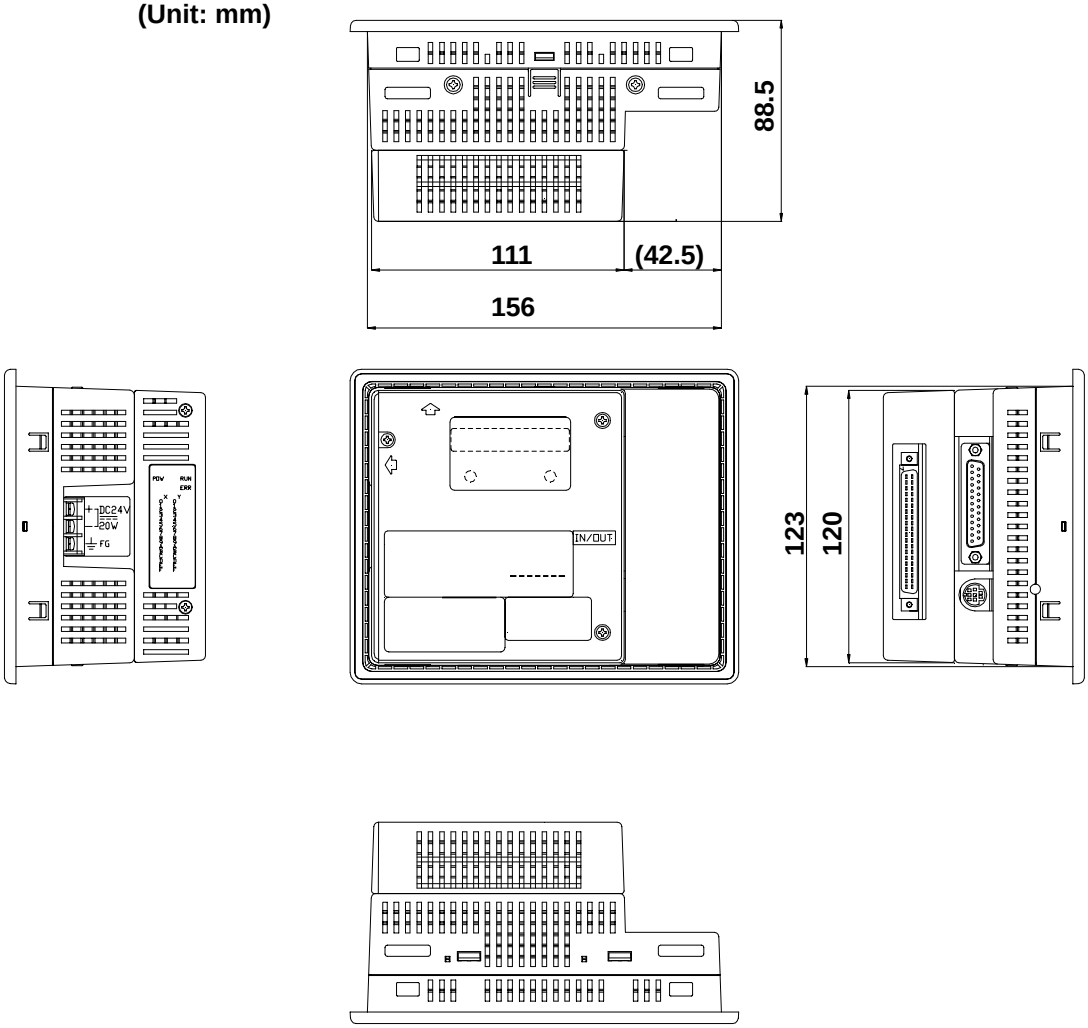
The DIO Unit's external dimensions are as follows:

(Unit: mm)

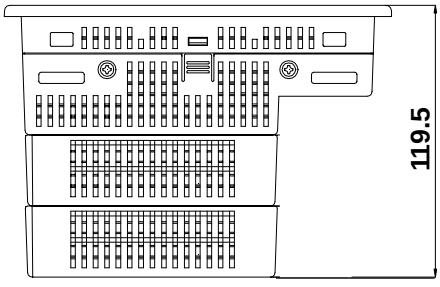


The following diagrams show the DIO Unit attached to the GLC-100:

(Unit: mm)

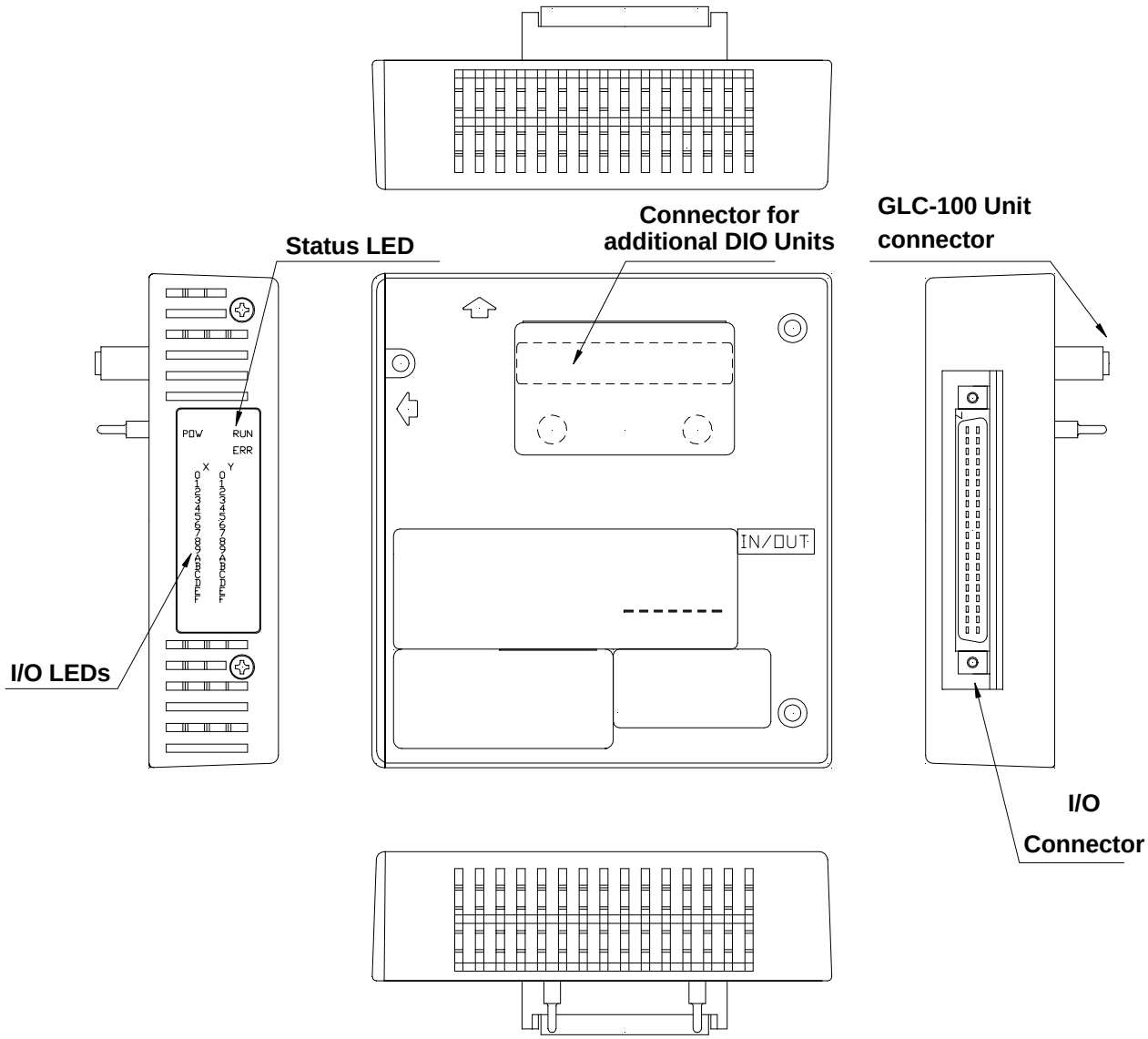


The following diagram shows two DIO Units attached to the GLC-100:



Side View

1.3 Component Names and Functions



Chapter 2 Specifications

1. DIO Unit Specifications
2. Performance Specifications
3. Input/Output Circuits
4. Input/Output Interface

2.1 DIO Unit Specifications

2.1.1 General Specifications

	GLC100-LG/SC41-24V + GLC100-ST41	GLC100-ST41
Rated Voltage	DC24V	
Power Consumption	DC20.4V to DC27.6V	
Power Consumption	20W (Max.)	+5V at 0.25A or less
Voltage Endurance	AC1000V 10mA for 1 minute (between charging and FG terminals)	
Insulation Resistance	DC500V 20MΩ or higher (between charging and FG terminals)	

2.1.2 Environmental Specifications

	GLC100-LG/SC41-24V + GLC100-ST41
Ambient Operating Temperature	0 °C to 50 °C
Ambient Storage Temperature	-20°C to 60 °C
Operating Humidity	20%RH to 85%RH (no condensation)
Vibration Endurance	10Hz to 25Hz applied in X, Y, and Z directions for 30 minutes each - 19.6m/s^2
Noise Immunity (via noise simulator)	Noise voltage: 1000 Vp-p Pulse length: 1μs Arise time: 1 ns
Operating Atmosphere	Must be free of corrosive gasses
Grounding *1	100Ω or less grounding resistance

***1** *Or your country's applicable standard.*

2.1.3 External Specifications

	GLC100-LG/SC41-24V + GLC100-ST41	GLC100-ST41
External Dimensions	170mm (W) x 138mm (H) x 88.2mm (D)	110.9mm (W) x 119.4mm (H) x 31.2mm (D)
Weight	1250g or less	350g or less
Attachment Method	Mounted in a solid enclosure	Attached to back of GLC-100
Cooling Method	Natural Air Circulation	

2.2 Performance Specifications

		GLC100-ST41
DISPLAY ELEMENT		**LED**
STATUS	POW (GREEN)	+5V POWER
	RUN (GREEN)	PROGRAM RUN
	ERR (RED)	DURING ERROR*1
INPUT-LED	X0 (RED) : X15 (RED)	DIN0 : DIN15
OUTPUT-LED	Y0 (RED) : Y15 (RED)	DOUT0 : DOUT15

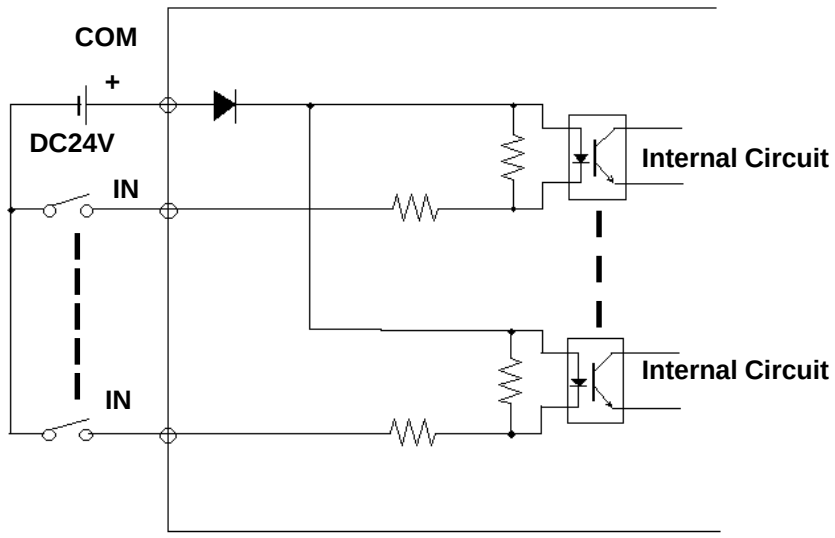
***1** When the Pro-Control Runtime causes a Stop Alarm, this LED will light, and if the alarm occurs continuously, this LED will flash.*

2.3 Input/Output Circuits

■ Input Specifications

Rated Voltage	DC24V
Maximum Allowable Voltage	DC26.4V
Rated Current	5mA (24V)
Input Resistance	4.7kΩ
Operation Range	ON Voltage: 21V or more OFF Voltage: 7V or less
Input Delay Time	OFF to ON: 10ms or less ON to OFF: 10ms or less
Common Lines	1
Common Line Allocation	16 points/common line
External Connection	40 Pin Connector (Used with Output section)
Input Points	16
Input Signal Display	LED lights when each point turns ON (logical side)
Status Display Element	None
Isolation Method	Photocoupler Isolation
External Power Supply	For Signal: DC24V
Internal Power Consumption	DC5V : 250mA or less (When all points are ON - including output circuits)

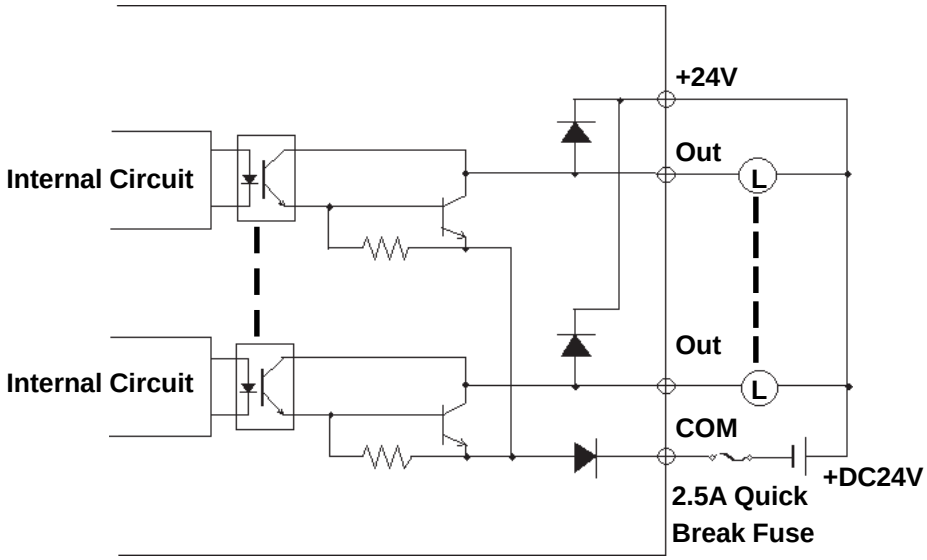
■ Input Circuit



■ Output Specifications

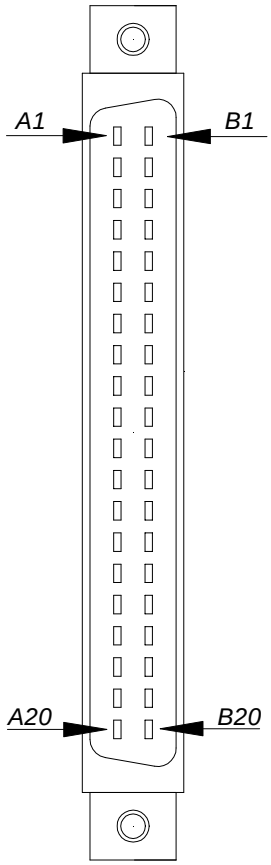
Rated Voltage	DC24V
Rated Voltage Range	DC24V ±10%
Output Method	Sink Output
Maximum Load Voltage	0.2A/point 1.6A/Common
Output Voltage Drop	3.2V or less
Output Delay Time	OFF to ON: 2ms or less ON to OFF: 2ms or less
Voltage Leakage (when OFF)	0.4mA or less
Type of Output	Transistor Output
Common Lines	1
Common Design	16 points/common line
External Connection	40 pin connector (used also for Input)
Output Protection Type	Output is unprotected
Internal Fuse	None
Surge Control Circuit	Diode
Output Points	16
Output Signal Display	LED lights when each point turns ON (logical side)
Status Display Element	None
Isolation Method	Photocoupler Isolation
External Power Supply	DC24V
Internal Power Consumption	DC5V : 250mA or less (When all points are ON - including output circuits)

■ Output Circuit



2.4 Input/Output Interface

■ Input/Output Interface Specifications

Pin	Signal Name	Pin	Signal Name	Front Face View
A1	COM(DOUT)	**B1**	COM(24V:DIN)	
A2	COM(DOUT)	**B2**	DC24V(DOUT)	
A3	NC	**B3**	NC	
A4	NC	**B4**	NC	
A5	DOUT15	**B5**	DIN15	
A6	DOUT14	**B6**	DIN14	
A7	DOUT13	**B7**	DIN13	
A8	DOUT12	**B8**	DIN12	
A9	DOUT11	**B9**	DIN11	
A10	DOUT10	**B10**	DIN10	
A11	DOUT9	**B11**	DIN9	
A12	DOUT8	**B12**	DIN8	
A13	DOUT7	**B13**	DIN7	
A14	DOUT6	**B14**	DIN6	
A15	DOUT5	**B15**	DIN5	
A16	DOUT4	**B16**	DIN4	
A17	DOUT3	**B17**	DIN3	
A18	DOUT2	**B18**	DIN2	
A19	DOUT1	**B19**	DIN1	
A20	DOUT0	**B20**	DIN0	

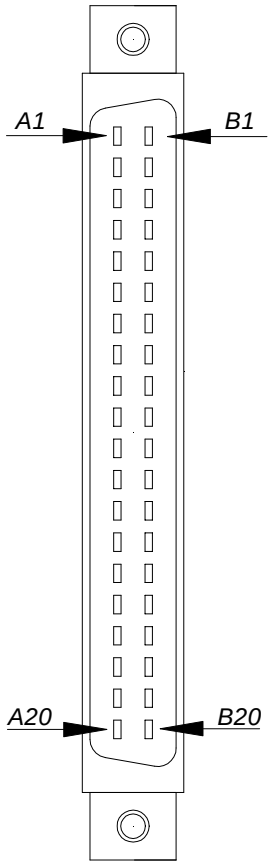
■ Recommended Connectors/Connector Covers

Connection Method	Recommended Connectors (Made by Fujitsu Takamisawa Component Ltd.)
Solder Type	FCN-361J040-AU (Connector) FCN-360C040-B (Cover)
Crimp Type	FCN-363J040 (Connector) FCN-363J-AU/S (Connector) FCN-360C040-B (Cover)
Connected Type	FCN-367J040-AU/F (Connector)

Memo

2.4 Input/Output Interface

■ Input/Output Interface Specifications

Pin	Signal Name	Pin	Signal Name	Front Face View
A1	COM(DOUT)	**B1**	COM(24V:DIN)	
A2	COM(DOUT)	**B2**	DC24V(DOUT)	
A3	NC	**B3**	NC	
A4	NC	**B4**	NC	
A5	DOUT15	**B5**	DIN15	
A6	DOUT14	**B6**	DIN14	
A7	DOUT13	**B7**	DIN13	
A8	DOUT12	**B8**	DIN12	
A9	DOUT11	**B9**	DIN11	
A10	DOUT10	**B10**	DIN10	
A11	DOUT9	**B11**	DIN9	
A12	DOUT8	**B12**	DIN8	
A13	DOUT7	**B13**	DIN7	
A14	DOUT6	**B14**	DIN6	
A15	DOUT5	**B15**	DIN5	
A16	DOUT4	**B16**	DIN4	
A17	DOUT3	**B17**	DIN3	
A18	DOUT2	**B18**	DIN2	
A19	DOUT1	**B19**	DIN1	
A20	DOUT0	**B20**	DIN0	

■ Recommended Connectors/Connector Covers

Connection Method	Recommended Connectors (Made by Fujitsu Takamisawa Component Ltd.)
Solder Type	FCN-361J040-AU (Connector) FCN-360C040-B (Cover)
Crimp Type	FCN-363J040 (Connector) FCN-363J-AU/S (Connector) FCN-360C040-B (Cover)
Connected Type	FCN-367J040-AU/F (Connector)

Chapter 3 Installation

1. Installing the DIO Unit
2. Attaching the Ferrite Core

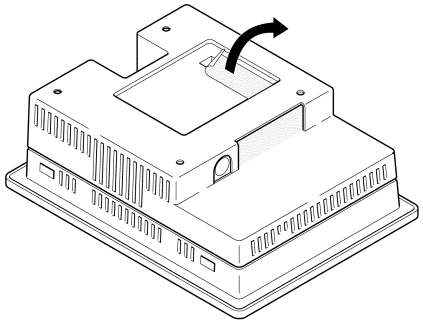
3.1 Installing the DIO Unit

⚠ WARNING

Prior to installing the DIO Unit, be sure to check that the GLC's power is OFF. Otherwise, it can cause an electric shock.

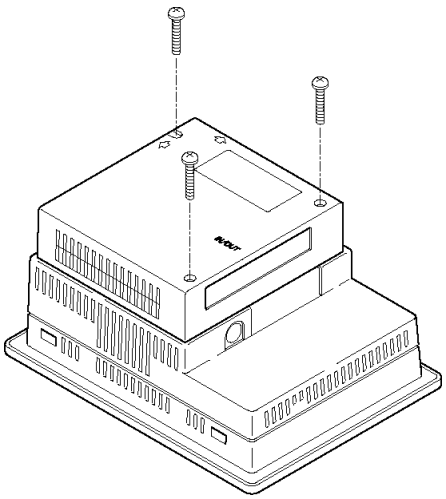
① Peel off the GLC-100 unit's expansion connector seal.

Note: Prior to attaching the DIO Unit to the GLC, be sure to connect the GLC's power cord to the GLC unit. The power cord cannot be attached to the GLC after the DIO Unit is installed.



GLC-100 Unit

② Secure the DIO Unit in place with its three (3) attachment screws (see figure). A torque of only 0.5 to 0.6 N•m is needed.



GLC-100 Unit

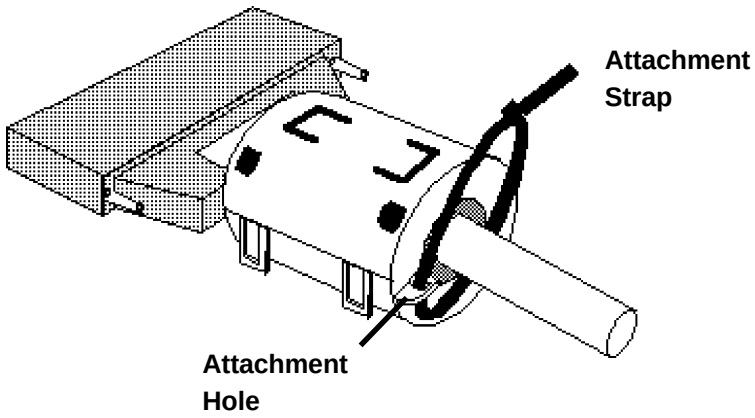
When attaching 2 DIO units to the GLC-100:

- **Remove the expansion connector's seal from the top face of the first DIO unit. This seal is found next to the word "EXT".**
- **In this case, be sure to use the long type attachment screws to attach the DIO units to the GLC.**

3.2 Attaching the Ferrite Core

To reduce the amount of unwanted electromagnetic noise, use the following procedures to attach a Ferrite Core to the DIO unit's connector cable.

1) Place the Ferrite Core on the DIO unit's connection cable as shown in the diagram and secure it in place using its attachment strap. The attachment strap should be threaded through the Ferrite Core's attachment hole.



2) Confirm that the Ferrite Core is held close to the connector cover, as shown below, and then tighten the attachment strap. Any remaining strap material should be cut off.