Technical Information

TI 11B05B02-03E

GCRB Relay Box Installation Manual

Contents

TI 11B05B02-03E

2nd Edition Dec. 2006(YK)

Blank Page

Notice

● Regarding This Manual

1. This Manual should be passed on to the end user.
2. Read this manual carefully and fully understand how to operate this product before you start operation.
3. Yokogawa makes no warranty of any kind with regard to this material, but not limited to, implied warranties of merchantability for particular purpose.
4. All rights reserved. No part of this manual may be reproduced in any form without Yokogawa's written permission.
5. The contents of this manual are subject to change without prior notice.

● Regarding Protection, Safety, and Prohibition Against Unauthorized Modification.

1. For the protection and safe use of the product and the system controlled by it, be sure to follow the instructions on safety described in this manual when handling the product. In addition, if you handle the product in contradiction to these instructions, our company does not guarantee safety.
2. The following safety symbol marks are used on the product concerned or in this Manual :

A **WARNING** sign denotes a hazard. It calls attention to procedure, practice,condition or the like, which, if not correctly performed or adhered to, could result in injury or death of personnel.

A **CAUTION** sign denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product.

IMPORTANT:

Indicates that operating the hardware or software in this manner may damage it or lead to system failure.

NOTE:

Draws attention to information essential for understanding the operation and features.

Protective ground terminal:

In order to provide protection against electrical shock in case of a fault. This symbol indicates that the terminal must be connected to ground prior to operation of equipment.

⎓ **Direct Current**

3. If protection / safety circuits are to be used for the product or the system controlled by it, they should be installed outside of the product.
4. When you replace parts or consumables of the product, use those specified by our company.
5. Do not modify the product.

● Exemption from Responsibility

1. Yokogawa Electric Corporation does not make any warranties regarding the product except those mentioned in the WARRANTY that is provided separately.
2. Yokogawa Electric Corporation assumes no liability to any party for any loss or damage, direct or indirect, caused by the use or any unpredictable defect of the product.

Introduction

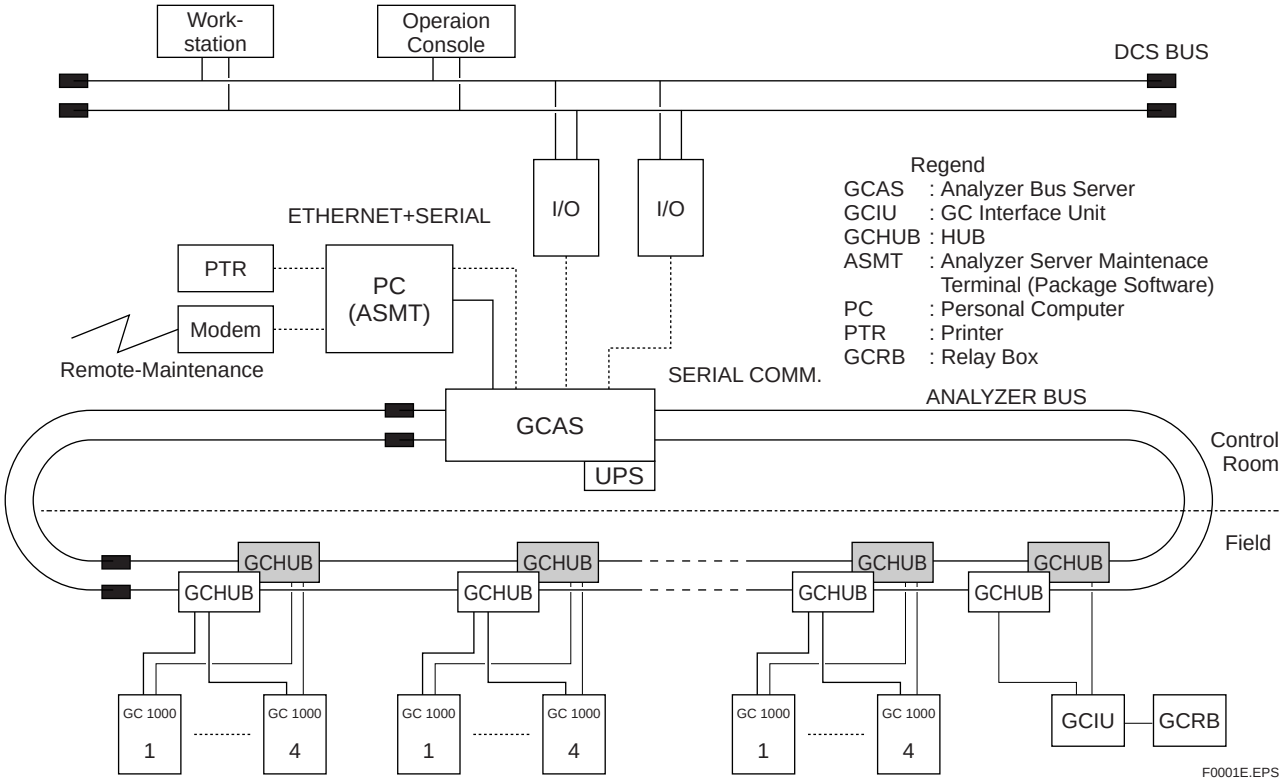
Thank you for purchasing the GCRB Relay Box.

This manual describes the technical information to install the GCRB.

Please read the respective cautions (General Precautions and Cautions of using explosion-protection instruments) before installing the GCRB.

> **WARNING**
>
> This instrument must be installed by expert engineer or skilled personnel.The procedures described this manual are not permitted for operators.

● System Configuration



Analyzer bus system: Used to connect analyzers based on gas chromatograph in the field to a network. The system has a total redundant configuration for safety.

GCAS (Analyzer Server): The monitor/control center for the entire network. It also saves necessary data automatically. Moreover it joints with DCS for serial communication and digital output, etc.

ASMT (Analyzer Server Maintenance Terminal): When this package software is installed on an ordinary personal computer, the computer acts as a human interface dedicated to this system.
The operator can thus operate gas chromatograph in the field from the computer via GCAS.

GCIU (Interface Unit): The information of the field sensor except GC is input as the analog data and can be monitor on ASMT and DCS by the analyzer bus.

GCHUB: The device which diverge the network is called HUB. One HUB can connect four gas chromatographs or GCIU. HUB also can be used for the divergence the line.

UPS (Uninterruptible Power Supply unit):
This is the unit to protect the harddisk drive in GCAS from the accidental power down.

GCRB (Relay Box): Safety device for GCIU (type of protection “n”).

● Documents Related to the Analyzer Bus System

■ GCIU

(1) GCIU Interface Unit nstallation Manual (TI 11B05B02-02E)

(2) GCIU GC Interface Unit (IM 11B5B2-01E)

(3) Analyzer Bus System (GS 11B5A1-01E)

(4) GC1000 Analyzer Bus System (TI 11B5A1-03E)

■ Operation Data

Operationg equipment is supplied with the operation manuals in the delivered package and contain the following.

● Instrument specifications
● General connection diagram

■ Related products

(1) ASMT Analyzer Server Maintenance Terminal Operation Guide (IM 11B5A1-01E)

(2) Analyzer Server User’s Manual (IM 11B5B1-01E)

(3) Hub GCHUB Installation Manual (TI 11B5C1-01E)

(4) GCMT Gas Chromatograph Maintenance Terminal Software Package Operation Guide (IM 11B3G1-02E)

(5) Capture It! Manual (IM 11B3G1-02E)

● Is the System Ready?

Before reading this manual, the following preparations must have been completed.

● The system must be unpacked and installed in the correct place.
● The wiring for the power supply and others must be completed.

Please read the following General Precautions, before installing and using the GCIU.

● General Precautions

⚠ **CAUTION:**

(1) **Take great care when carrying and installing (wiring) the GCRB. The GCRB must be carried and installed very carefully (including wiring) by more than one person (at least two people are recommended).**

(2) **Use the GCRB within the range of your purchase specifications.**
Yokogawa assumes no responsibility for problems resulting from use by the customer outside the purchase specifications.

(3) **Since the GCRB is precision instrument, take care when handling not to jolt of knock them.**

(4) If the GCRB needs to be modified or repaired, please contact your nearest Yokogawa representative. Yokogawa assumes no responsibility for results where the customer or any third party has attempted to modify or repair these products.

IMPORTANT

(1) Read the attached instruction manual before operating the GCRB

(2) The instruments must be installed and operated according to the instruction manual, approved drawings, and operation data.

(3) **Do not hesitate to ask Yokogawa to modify or repair the instrument. Yokogawa assumes no responsibility for defects resulting from modification or repair by the customer or unauthorized manufactures.**

(4) **Wiring works**
When performing wiring, always using the flameproof packing adapter.

(5) **Maintenance and Repair**
The instrument modification or parts replacement by other than authorized representative of Yokogawa Electric Corporation is prohibited.

Cautions

● CAUTIONS OF USING EXPLOSION-PROTECTION INSTRUMENTS

The GCRB is designed to protect against explosion. When GCRB is used in a hazardous area, observe the following precautions.

(1) Kinds of explosion protection

CENELEC (ATEXdirective) : ⟨Ex⟩Group II, Category 3G, EExnC IIC T6

(2) Installation site and environment

The GCRB specifications allow it to be used in hazardous areas as defined by Zone 2.

(3) Wiring works

When performing wiring, always use the flame-proof packing adapter.

(4) Do not open when energized.

(5) Maintenance and checks

If any of the following damage occurs, inform a Yokogawa sales representative or the Yokogawa sales division

1. If the exterior of the enclosures are damaged
2. If packings are cracked or conspicuously deformed

(6) Operation

⚠ **Warning:**

* GCRB shall not be opened unless the area is known to be nonhazardous, or unless all devices within have been de-energized.

<CENELEC>

* Only trained persons may use this instrument in a hazardous location.
* Do not open when energized.

Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

(7) Maintenance and Repair

* The instrument modification or parts replacement by other than authorized representative of Yokogawa Electric Corporation is prohibited and will void the approval of CENELEC certification.

1. OVERVIEW

GCRB is used with GCIU certified CENELEC (ATEX directive).

GCRB has relays to cut off energy intruding to the pressurized enclosure (electronic section) of GCIU through I/O signal from outside. These relays are activated by supply of DC electric resource from the pressurized enclosure (electronic section) of GCIU. So that when safety device 1 of GCIU turns off power supply to the pressurized enclosure (electronic section) of GCIU, DC power supply to the relays in GCRB is also turned off. Then, the energy from outside into GCIU is cut off.

1.1 Description and Ratings

Power supply:	12 V DC
Power consumption:	Max. 10 W
Operating ambient conditions:	-10 to 50 ºC, 95%R.H. or less
Storage conditions:	-40 to 85 ºC, No moisture condensation
Weight:	Approximately 14 kg
Installation location:	Well-ventilated place indoors, free of vibration, direct sunlight, and reflected light and heat
Explosion protection:	CENELEC (ATEX Directive) ⟨Ex⟩ Group II, Category 3G, EEx nC IIC T6
Signal Input / Output:	30 V DC, 500 mA max. 86 points

1.2 MS Code

Table 1.1

Model	Basic Code	Option Code	Description
GCRB	.....	.....	Relay Box
-	-N	.....	Always -N
-	N	.....	Always N
-	N	.....	Always N

T01.eps

1.3 Block Diagram

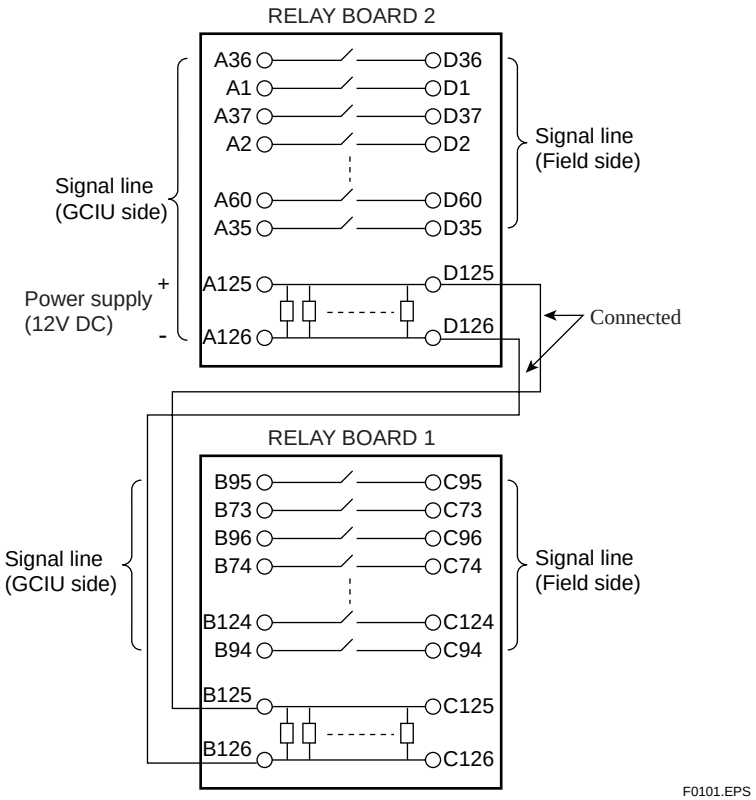


Figure 1.1

1.4 External Dimensions

Unit : mm

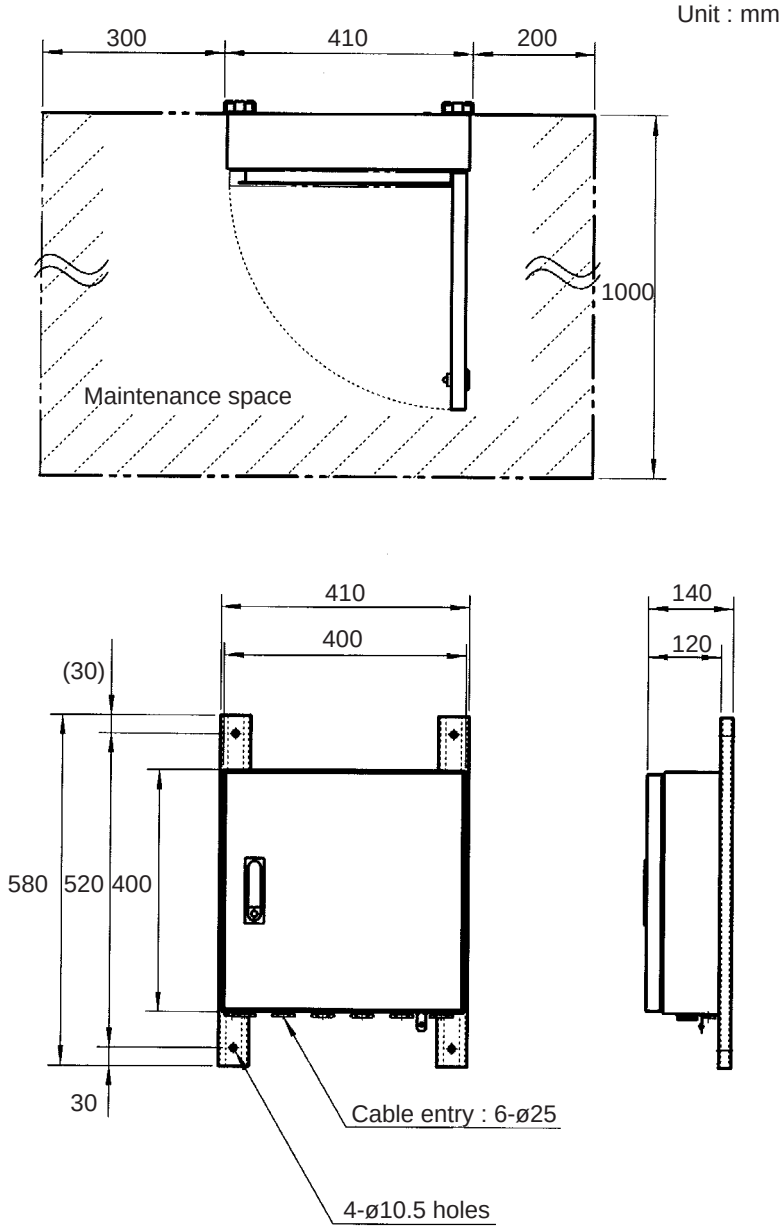


Figure 1.2

1.5 Standard Performance

EMC standard

Emission

Complying Standard : EN55011 Group 1 Class A
EN61326 Class A
C-tick

Test item: Electromagnetic radiation disturbance
Frequency range: 30 MHz - 1 GHz
Basic standard: Class A CISPR16-1 and CISPR16-2

Immunity

Complying Standard : EN61326 Class A

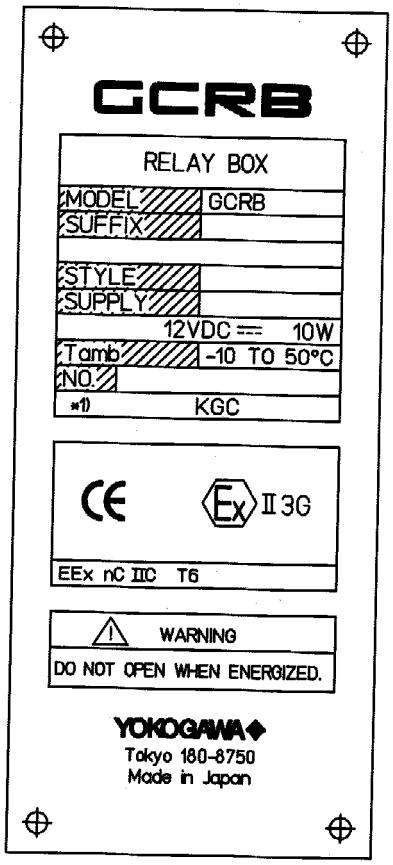
No.	Test Item	Test specification	Basic Standard	Preformance Criteria*
1	Electrostatic discharge	4kV(contact) 8kV(air)	IEC 61000-4-2	A
2	Ratio-frequency electromagnetic field Amplitude modulated	80 to 1000MHz 1.4 to 2GHz 10V/m (unmodulated) 80% AM (1kHz)	IEC 61000-4-3	A
3	Fast transients common mode	2kV 5/50 Tr/Th ns 5kHz REP.	IEC 61000-4-4	A
4	Surge	Input power supply and power supply network 1kV (Line to Line) 2kV (Line to Ground) I/O signal/control 1kV (Line to Ground)	IEC 61000-4-5	A
5	Radio-frequency common mode Amplitude modulated	0.15 to 80MHz 3V (unmodulated) 80% AM (1kHz) Source impedance 150Ω	IEC 61000-4-6	A

* See Note 1

Note: Definition of perf ormance Criterion A

- The rela y doesn't operate faulit y .

1.6 Data Plate



MODEL SUFFIX	: Specified model code.
STYLE	: Specified style code.
Tamb	: Ambient temperature.
KGC	: JOB number.
CE	: CE-Marking
Ex II 3G	: Group II, Category2, Gas atmosphere.
EEx nC IIC T6	: Type of protection and temperature class.
YOKOGAWA◆ Tokyo 180-8750 Made in Japan	: Name and address of manufacturer.
*1)	: The year of production. (For example : 2001.8)

Blank Page

2. INSTALLATION AND WIRING

If GCRB is to be installed in a hazardous location, do the wiring according to the applicable explosion-proof requirements.

2.1 Installation

(1) Installation Site

Install the GCRB where the following conditions are met :

(a) Specified environment conditions (atmospheric gases) are satisfied if used in a hazardous area.

(b) Less vibration.

(c) Not subject to rainfall or direct sunlight.

(d) No corrosibe gas or few dust.

(2) Unpacking

The model GCRB weights about 14kg. Unpacking it near the instlallation site.

Handle it carefully so that it does not fall.

(3) Installation

To securel y install the GCRB on a wall, use a n ut and a bolt f or eac h hole .

2.2 Wiring

2.2.1 General Cautions on Wiring

CAUTION

- Lay the signal wiring and electrical wiring inseparate conduit pipes or duct, respectively.
- Make independent grounding having a grounding resistance of 100 Ω or less.

NOTE

In the case of locking the door, please use the attached key.

CAUTION

Be sure to lock the door after opening the door.

2.2.2 Kinds of Wiring

The following kinds of wiring are required for GCRB.

The wiring required varies with the specification.

(A) Gounding circuit

(B) Signal lines (GCIU side)

(C) Signal lines (Field side)

2.2.3 Recommended Cables

(A) Gounding circuit: 2.0mm^2

(B) Signal lines (GCIU side): 0.75mm^2 to 1.5mm^2 , 10m or less
Cable shield is required
(The shield of signal lines (GCIU side) should be connected to the grounding terminal inside the GCIU.)

(C) Signal lines (Field side): 0.75mm^2 to 1.5mm^2 , 1000m or less
Cable shield is required
(The shield of signal lines (Field side) should be connected to the grounding terminal inside the GCIU.)

Note : Use “MKKDSN” Series terminals (manufactured by Phoenix Contact K. K.) for the Signal lines (B), (C).
For these wiring connections, use AI series crimp-on terminals also manufactured by the company. Four types of crimp-on terminals are used to meet wire diameters (see the table below).
Please peel off the cover of wire by 5mm if you do not use the terminal and contact with the terminal. 5mm is the manufacturer’s recommendation values.

Table 2.1

Wire Diameter	Outside Diameter	Terminal Type
0.75mm^2	Less than 2.8mm^2	AI 0.75-6GY
1.0mm^2	Less than 3.0mm^2	AI 1-6RD
1.5mm^2	Less than 3.4mm^2	AI 1.5-6BK

T0201.EPS

2.2.4 Precautions on Wiring

<CENELEC>

> **WARNING**
>
> - All wiring shall comply with local installation requirements and local electrical code.
> - The cable entry devises shall be of a certified flameproof type that meet or exceed IP54, suitable for the conditions of use.

2.2.5 Grounding Wire Termination and Signal Cable Shield

(1) termination

Use solderless lugs for Grounding Wire and Signal Cable shields (See Figure 2.1).

(2) Solderless (crimp-on) lug specifications

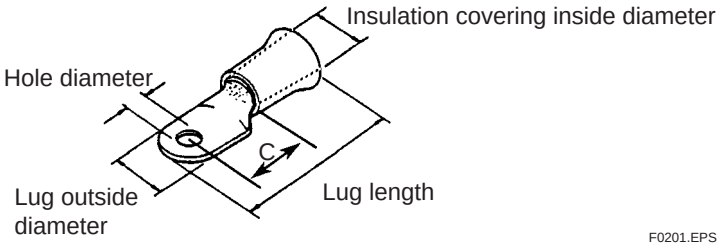
The solderless lug to use must have the dimensions given in Table 2.2 according to the nominal cross sectional area of the power cable for which the lug is to be used.

Table 2.2 Solderless Lug Dimensions

Nominal cross sectional area	Screw used (mm)	Hole diameter (mm)	Lug outside diameter (mm)	Lug length (mm)	Insulation covering inside diameter (mm)	Remarks (Note) (Example of applicable solderless lug)
1.25mm^2	4	4.3 or more	8.7 or less	About 21	5.8 or less	AMP 170781-1 JST V1.25-4
2.0mm^2	4	4.3 or more	8.7 or less	About 21	5.8 or less	AMP 170782-1 JST V2-4

T0202.EPS

Note :
AMP: Japan AMP Co., Ltd.
JST: JST Co., Ltd. (Insulators 0.8 mm^2 or more in size are optionally available.)



F0201.EPS

Figure 2.1 Solderless Lug

<CENELEC>

> **WARNING**
>
> The cable entry devices and the blanking elements shall be of a certified flameproof type that meet or exceed IP54, suitable for the conditions of use and correctly installed.
> For external earthing or bonding connection a cable lug shall be used so that the conductor is secured against loosening and twisting and that contact pressure is permanently maintained.

Grounding circuit

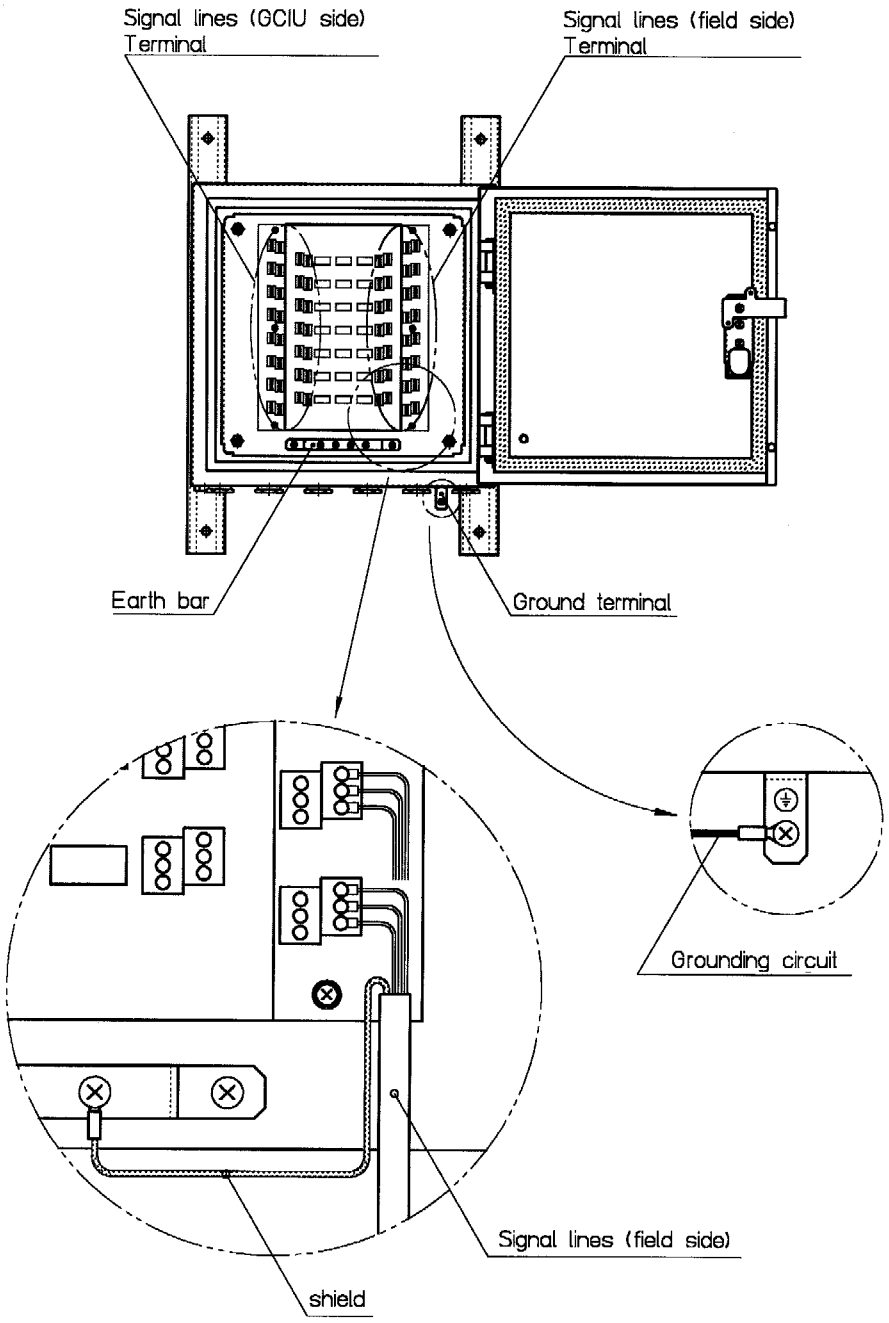


Figure 2.2

> **⚠ CAUTION**
>
> - For protective grounding of terminal connector-type devices, connect to the ⏚ terminal.

2.2.7 Signal Lines

Refer to Figure 2.2.

(1) GCIU side

Table 2.3

Terminal No.	Signal	Terminal No.	Signal	Terminal No.	Signal
A1 (NO)	Digital output (System alarm)	A43 (NO)	Digital output (Enclosure pressure drop alarm)	B85 (NO)	Digital output 1
A2 (NC)		A44 (NC)		B86 (NC)	
A3 (COM)		A45 (COM)		B87 (COM)	
A4 (NO)	Digital output 2	A46 (NO)	Digital output 3	B88 (NO)	Digital output 4
A5 (NC)		A47 (NC)		B89 (NC)	
A6 (COM)		A48 (COM)		B90 (COM)	
A7 (NO)	Digital output 5	A49 (NO)	Digital output 6	B91 (NO)	Digital output 7
A8 (NC)		A50 (NC)		B92 (NC)	
A9 (COM)		A51 (COM)		B93 (COM)	
A10 (NO)	Digital output 8	A52 (NO)	Digital output 9	B94 (NO)	Digital output 10
A11 (NC)		A53 (NC)		B95 (NC)	
A12 (COM)		A54 (COM)		B96 (COM)	
A13 (NO)	Digital output 11	A55 (NO)	Digital output 12	B97 (NO)	Digital output 13
A14 (NC)		A56 (NC)		B98 (NC)	
A15 (COM)		A57 (COM)		B99 (COM)	
A16 (NO)	Digital output 14	A58 (NO)	Digital output 15	B100 (NO)	Digital output 16
A17 (NC)		A59 (NC)		B101 (NC)	
A18 (COM)		A60 (COM)		B102 (COM)	
A31 (+)	Analog input 2	B73 (+)	Analog input 3	B113 (+)	Analog input 1
A32 (-)		B74 (-)		B114 (-)	
A33 (+)	Analog input 5	B75 (+)	Analog input 6	B115 (+)	Analog input 4
A34 (-)		B76 (-)		B116 (-)	
A35 (+)	Analog input 8	B77 (+)	Analog input 9	B117 (+)	Analog input 7
A36 (-)		B78 (-)		B118 (-)	
A37 (+)	Analog input 11	B79 (+)	Analog input 12	B119 (+)	Analog input 10
A38 (-)		B80 (-)		B120 (-)	
A39 (+)	Analog input 14	B81 (+)	Analog input 15	B121 (+)	Analog input 13
A40 (-)		B82 (-)		B122 (-)	
				B123 (+)	Analog input 16
				B124 (-)	
				A125,B125 (+)	Power supply
				A126,B126 (-)	

T0203.EPS

(2) Field side

Table 2.4

Terminal No.	Signal	Terminal No.	Signal	Terminal No.	Signal
D1 (NO)	Digital output (System alarm)	D43 (NO)	Digital output (Enclosure pressure drop alarm)	C85 (NO)	Digital output 1
D2 (NC)		D44 (NC)		C86 (NC)	
D3 (COM)		D45 (COM)		C87 (COM)	
D4 (NO)	Digital output 2	D46 (NO)	Digital output 3	C88 (NO)	Digital output 4
D5 (NC)		D47 (NC)		C89 (NC)	
D6 (COM)		D48 (COM)		C90 (COM)	
D7 (NO)	Digital output 5	D49 (NO)	Digital output 6	C91 (NO)	Digital output 7
D8 (NC)		D50 (NC)		C92 (NC)	
D9 (COM)		D51 (COM)		C93 (COM)	
D10 (NO)	Digital output 8	D52 (NO)	Digital output 9	C94 (NO)	Digital output 10
D11 (NC)		D53 (NC)		C95 (NC)	
D12 (COM)		D54 (COM)		C96 (COM)	
D13 (NO)	Digital output 11	D55 (NO)	Digital output 12	C97 (NO)	Digital output 13
D14 (NC)		D56 (NC)		C98 (NC)	
D15 (COM)		D57 (COM)		C99 (COM)	
D16 (NO)	Digital output 14	D58 (NO)	Digital output 15	C100 (NO)	Digital output 16
D17 (NC)		D59 (NC)		C101 (NC)	
D18 (COM)		D60 (COM)		C102 (COM)	
D31 (+)	Analog input 2	C73 (+)	Analog input 3	C113 (+)	Analog input 1
D32 (-)		C74 (-)		C114 (-)	
D33 (+)	Analog input 5	C75 (+)	Analog input 6	C115 (+)	Analog input 4
D34 (-)		C76 (-)		C116 (-)	
D35 (+)	Analog input 8	C77 (+)	Analog input 9	C117 (+)	Analog input 7
D36 (-)		C78 (-)		C118 (-)	
D37 (+)	Analog input 11	C79 (+)	Analog input 12	C119 (+)	Analog input 10
D38 (-)		C80 (-)		C120 (-)	
D39 (+)	Analog input 14	C81 (+)	Analog input 15	C121 (+)	Analog input 13
D40 (-)		C82 (-)		C122 (-)	
				C123 (+)	Analog input 16
				C124 (-)	
				D125,C125 (+)	Power supply
				D126,C126 (-)	

T0204.EPS

2.2.7 Terminal connection of shielded signal cables for CENELEC

The shield of a signal line (Field side) to be connected to the GCRB should be connected to the earth bar inside the GCRB.

◆ Revision Record

● Manual No. : TI 11B05B02-03E
● Title : GCRB Relay Box Installation Manual

Mar. 2002 / 1st Edition
Newly published

Dec. 2006 / 2nd Edition
Section 1.5: Safety regulation is updated accordingly.

Blank Page