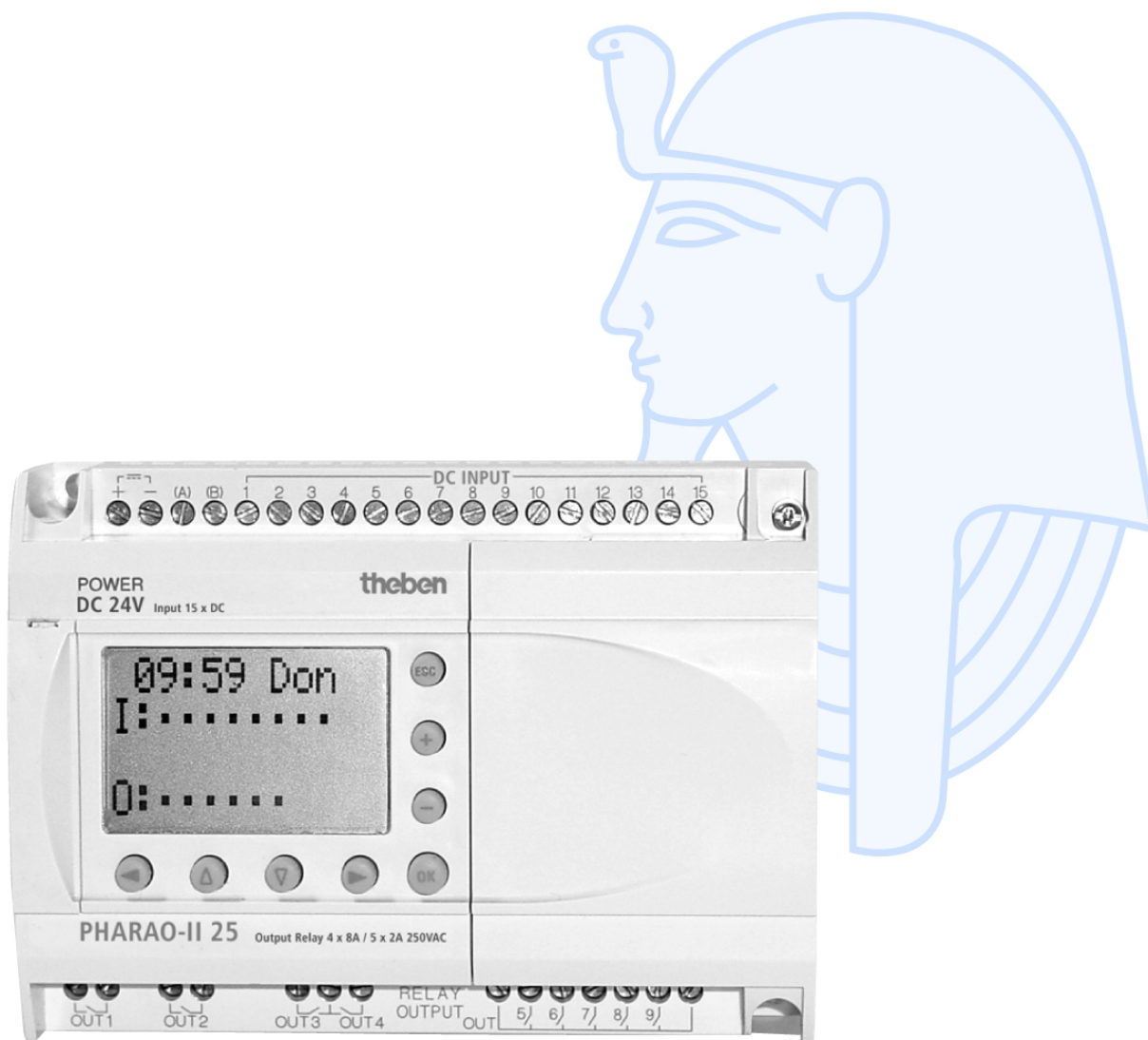


theben

SIMPLE APPLICATION CONTROLLER



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**PH-II Simple Application Controller
HARDWARE MANUAL
HARDWARE-HANDBUCH
MANUEL DU MATÉRIEL
MANUALE HARDWARE
MANUAL DE HARDWARE
MASKINVARUHANDBOK**

Foreword

- This manual contains text, diagrams and explanations which will guide the reader in the correct installation, safe use and operation of the PH-II series and should be read and understood before attempting to install or use the unit.
- If in doubt at any stage of the installation of the PH-II series always consult a professional electrical engineer who is qualified and trained to the local and national standards. If in doubt about the operation or use of the a series controller please consult the nearest Theben AG distributor.
- This manual is subject to change without notice.

PH-II Simple Application Controller

ENG

Hardware Manual

Manual number: 309 035

Manual revision: B

Date: 06/2002

Guidelines for the Safety of the User and Protection of equipment

This manual provides information for the use of the PH-II Series Controllers. The manual has been written to be used by trained and competent personnel. The definition of such a person or persons is as follows:

- a) Any engineer who is responsible for the planning, design and construction of automatic equipment using the product associated with this manual should be of a competent nature, trained and qualified to the local and national standards required to fulfill that role. These engineers should be fully aware of all aspects of safety with regards to automated equipment.
- b) Any commissioning or service engineer must be of a competent nature, trained and qualified to the local and national standards required to fulfill that job. These engineers should also be trained in the use and maintenance of the completed product. This includes being completely familiar with all associated documentation for the said product. All maintenance should be carried out in accordance with established safety practices.
- c) All operators of the completed equipment should be trained to use that product in a safe and coordinated manner in compliance to established safety practices. The operators should also be familiar with documentation which is connected with the actual operation of the completed equipment.

Note : The term 'completed equipment' refers to a third party constructed device which contains or uses the product associated with this manual.

Notes on the Symbols Used in this Manual

At various times through out this manual certain symbols will be used to highlight points of information which are intended to ensure the users personal safety and protect the integrity of equipment. Whenever any of the following symbols are encountered its associated note must be read and understood. Each of the symbols used will now be listed with a brief description of its meaning.

Hardware Warnings



- 1) Indicates that the identified danger **WILL** cause physical and property damage.



- 2) Indicates that the identified danger could **POSSIBLY** cause physical and property damage.



- 3) Indicates a point of further interest or further explanation.

Software Warnings



- 4) Indicates special care must be taken when using this element of software.



- 5) Indicates a special point which the user of the associate software element should be aware of.



- 6) Indicates a point of interest or further explanation.

- Under no circumstances will Theben AG be liable or responsible for any consequential damage that may arise as a result of the installation or use of this equipment.
- All examples and diagrams shown in this manual are intended only as an aid to understanding the text, not to guarantee operation. Theben AG will accept no responsibility for actual use of the product based on these illustrative examples.
- Owing to the very great variety in possible application of this equipment, you must satisfy yourself as to its suitability for your specific application.

Further Information Manual Lists

	Manual Name	Manual No.	Description
⊙	PH-II Hardware Manual (This manual)	309 035	This manual contains hardware explanations for wiring, installation and specification for PH-II Series controllers.
⊙	PH-II Programming Manual <English only>	–	This manual contains instruction explanations for the PH-II Series controllers.
○	PH-II Series Communication User's Manual <English only>	–	This manual contains explanations for the setup, messaging, diagnostics, bit assignments, etc for communications using the PH-II series controller.
□	PH-II Series Installation Manual	309 033	This manual contains hardware explanations of installation for PH-II Series controller.
□	PH-II 4EDA, PH-II 4ED, PH-II 4AR Installation Manual	309 032	This manual contains hardware explanations of installation for PH-II 4EDA, PH-II 4ED, PH-II 4AR extension module.
□	PH-II EEPROM Hardware Manual	309 031	This manual contains hardware explanations of installation for PH-II EEPROM.
□	PH-232 Kabel Hardware Manual	309 030	This manual contains hardware explanations of installation for PH-232 Kabel.
□	PH-II GSM Kabel Hardware Manual	309 034	This manual contains hardware explanations of installation for PH-II GSM Kabel.

- ⊙ Refer to these manuals.
- Refer to this manual if necessary.
- Refer to the content of these manuals if necessary though it is included in PH-II Hardware Manual.

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1. Introduction

The PH-II series can be easily used in all places where control is needed for the home, office, or factory. The controller outputs cycle ON/OFF to control electrical equipment per the Function Block program.

The explanation of the instructions and the operation of main unit can be found in PH-II Programming Manual. An explanation of the Pharao Software 2.0 programming software can be found in the PH Series Software Manual.

Applications

The PH-II series is designed to be used in automatic applications including those listed below.

- Automation of lights, air-conditioning, or watering systems
- The opening and shutting of gates
- Easy security systems
- Domestic animal and pet food distribution systems
- Control of stockyards and greenhouses

However, the PH-II series is not designed to be used in the following applications. Please contact a Theben AG distributor for more information.

- Applications where high reliabilities such as nuclear power control, railway facilities, airline facilities, vehicles, combustion equipment, and medical equipment are required.
- Applications in life critical situations.

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1.1 Special Features of the PH-II Series System

- 1) Display message and Function Block data
The PH-II series can display the state of operation and the alarm on the LCD display as a message. It can display the following contents by the using display function block. The value of displayed timers and counters can be changed in the RUN mode.
 - Total characters on LCD display: 12 characters × 4 lines
 - Display Items: Message, value (current or set) of timer and counter, analog values, etc
- 2) The programming in the personal computer is fast and easy
The programming software Pharao Software 2.0 for Windows can make and save programs. The programming can be done using a pictorial method in which lines are used to connect function blocks on a programming screen.
Direct programming using the PH-II controller front panel keys is also available.
- 3) LCD image send via GSM modem
The PH-II series is able to send the LCD image as an E-mail using a GSM modem. The user can monitor application status by accessing the diagnostic message sent as an E-mail via GSM modem
- 4) Supports computer link using dedicated protocol
The PH-II series supports computer link (dedicated protocol). User-specific application software using computer link (dedicated protocol) can change schedule data, parameters within Function Blocks and provide condition monitoring of the application.
- 5) Enhancement of clock function
The weekly timer and the calendar timer function have many switches that can be set and provide powerful time dependant control capabilities.
- 6) Analog input, 0 - 10V/0 - 500:
The DC input for the PH-II series can accept of 0 - 10V signals with a resolution of 0 - 500.
- 7) High speed counter, Max. 1kHz
The PH-II series has high speed counters (Max. 2 points) when using PH-II 4EDA (EI1, EI2).
- 8) High current output capability

Table 1.1: High Current Output Capability

Output Type		Capability
Relay	PH-II 14/15: O01 - 06 PH-II 24/25: O01 - 04	8A/Common
	PH-II 24/25: O05 - 09 PH-II 4AR: EO1 - EO4	2A/Point (4A/Common)
Transistor	PH-II 4AT: EO1 - EO4	1A/Point

- 9) Built-in EEPROM
The built in EEPROM eliminates the need for battery backed data.
- 10) Supports 6 languages:
The PH-II series supports 6 languages (English, German, French, Italian, Spanish, and Swedish). The displayed language can be selected in the TOP MENU.

1.2 Available Models

Table 1.2:Main Units

Model	Power Supply	Input		Output		Dimensions mm (inches)	MASS (Weight) kg (lbs)
		Type	Number	Type	Number		
PH-II 14	100 - 240V AC~	100 - 240V AC~	8	RELAY	6	124.6 x 90 x 52 (4.91 x 3.54 x 2.05)	0.30 ^{*1} (0.66)
PH-II 15	24V DC	24V DC Sink/Source	8	RELAY	6		
PH-II 24	100 - 240V AC~	100 - 240V AC~	15	RELAY	9		0.35 ^{*1} (0.77)
PH-II 25	24V DC	24V DC Sink/Source	15	RELAY	9		

*1 Without extension modules.

Table 1.3:Extension Modules

Model	Input		Output		MASS (Weight) kg (lbs)
	Type	Number	Type	Number	
PH-II 4ED	220 - 240V AC~	4	—	—	0.05 (0.11)
PH-II 4EDA	24V DC, Sink/ Source	4	—	—	
PH-II 4AR	—	—	RELAY	4	
PH-II 4AT	—	—	TRANSISTOR	4	

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1.3 Dimensions and Each Part Name

Figure 1.1: Each Part Name

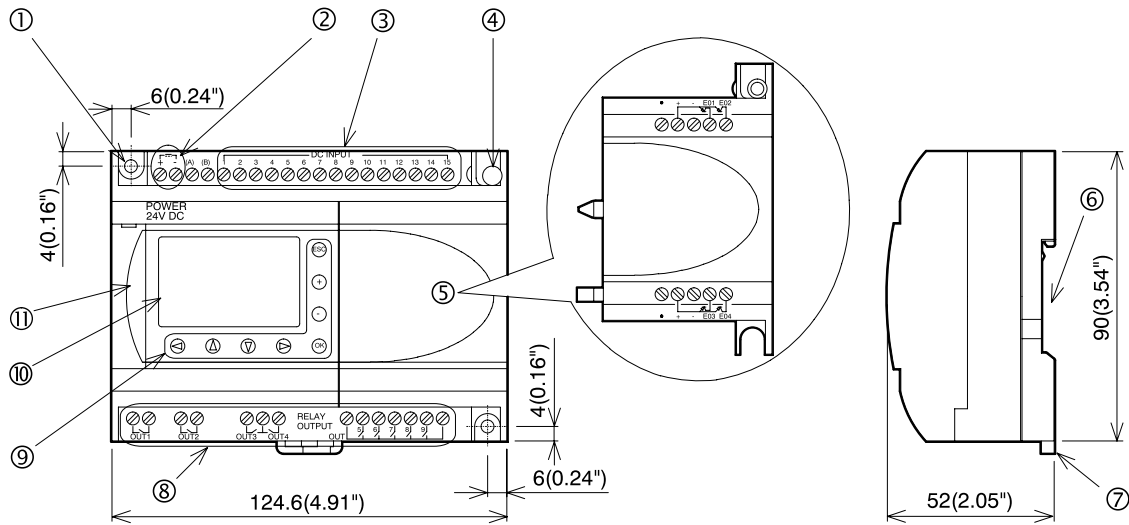
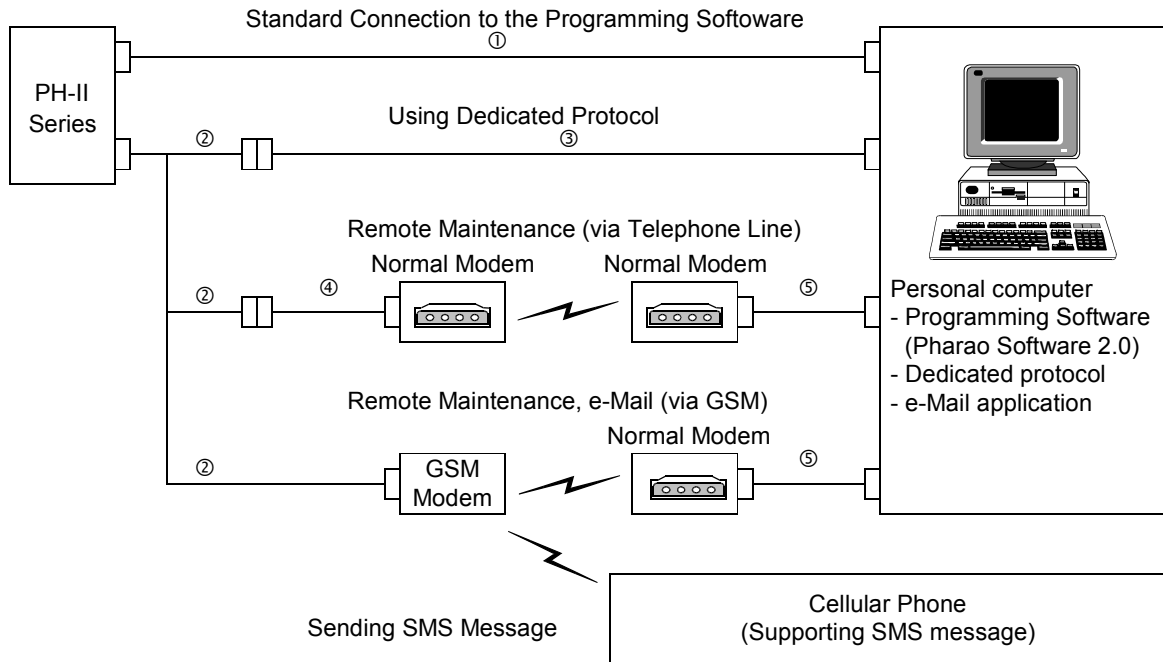


Table 1.4: Each Part Name

Ref.	Item Description
1	Mounting hole, $\phi 4.2$ mm
2	Power terminals
3	Input terminals
4	Mounting screw for the extension cover or extension module
5	Extension cover or extension module
6	Groove for DIN rail mounting (Width of DIN rail 35mm <DIN EN 50022>)
7	DIN-RAIL mounting clips
8	Output terminals
9	Operation keys
10	Liquid crystal display
11	Programming port cover

1.4 System Configuration

Figure 1.2: System Configuration



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Table 1.5: System Configuration

Item	Using Cable
1	PH-232 Kabel
2	PH-II GSM Kabel
3	PH Programmierkabel cross cable*1
4	PH Programmierkabel straight cable for the modem*1
5	PH Programmierkabel straight cable for the modem (specified by Modem manufacture)

*1 Further information can be found in chapter 8.

1.5 Applicable Programming Software

The PH-II series is supported by the programming software (Pharao Software 2.0 or later). Versions lower than V2.00, do not communicate with the PH-II series.

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2. Specifications

2.1 Power Supply Specification

Table 2.1: Power Supply Specifications

Description	Code	Specification
Power Supply	PH-II 14/24	100 - 240V AC~, +10% -15%, 50/60 Hz
	PH-II 15/25	24V DC, +20% -15%
Maximum Momentary Power Failure	PH-II 14/24	10ms
	PH-II 15/25	5ms
In-rush Current	PH-II 14/24, 240V AC~ (120V AC~)	≤ 6.5 A (3.5 A)
	PH-II 15/25, 24V DC	≤ 7.0 A
Maximum Power Consumption	PH-II 14, 264V AC~	5.5 W
	PH-II 15, 28.8V DC	7.5 W
	PH-II 24, 264V AC~	7.0 W
	PH-II 25, 28.8V DC	9.0 W
Typical Power Consumption (without Special Connection Modules)	PH-II 14, 240V AC~	I/O all On - 4.5 W; I/O all Off - 2.0 W
	PH-II 14, 120V AC~	I/O all On - 3.5 W; I/O all Off - 1.5 W
	PH-II 15, 24V DC	I/O all On - 4.0 W; I/O all Off - 1.0 W
	PH-II 24, 240V AC~	I/O all On - 5.5 W; I/O all Off - 2.5 W
	PH-II 24, 120V AC~	I/O all On - 4.5 W; I/O all Off - 2.0 W
	PH-II 25, 24V DC	I/O all On - 5.0 W; I/O all Off - 1.0 W

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2.2 Input Specification

Table 2.2: AC Input Specifications

Description	AC Input Specification		
	main unit		PH-II 4ED
	I01 - I08	I09 - I15	EI1 - EI4
Input Voltage	100 - 240V AC~, +10% -15%, 50/60 Hz		220 - 240V AC~, +10% -15%, 50/60 Hz
Input Current	0.13mA / 120V AC~*1 0.25mA / 240V AC~*1	0.15mA / 120V AC~*1 0.29mA / 240V AC~*1	7.5mA / 240V AC~ 50Hz 9.0mA / 240V AC~ 60Hz
Input Impedance	≥ 800 kΩ		32kΩ (50Hz) 27kΩ (60Hz)
OFF → ON/ ON → OFF	≥ 80V / ≤ 40V		≥ 160V / ≤ 40V
Response Time	OFF → ON	35-85ms, 120V AC~ 25-55ms, 240V AC~	15 - 40ms / 240V AC~
	ON → OFF	35-85ms, 120V AC~ 50-130ms, 240V AC~	
Isolation Circuit	None		Photocoupler
Operation Indication	Liquid Crystal Display		

*1 Current leakage from the sensors connected to the inputs might provide enough current to turn the controller On. Do not use two wire sensors

Table 2.3: DC Input Specifications

Description		Sink ("-" Common)	Source ("+" Common)
Input Voltage		24V DC +20% -15%	24V DC +20% -15%
Input Current	main unit	I01 - I08	6.0mA, 24V DC
		I09 - I15	5.5mA, 24V DC
	PH-II 4EDA	EI1 - EI4	5.4mA, 24V DC
OFF → ON/ ON → OFF	main unit	I01 - I15	Current: ≥ 4.7mA / ≤ 1.1 mA Voltage: ≤ 4V / ≥ 18V
	PH-II 4EDA	EI1 - EI4	Voltage: ≥ 18V / ≤ 4V Voltage: ≥ 18V / ≤ 4V
Response Time	main unit		10 - 20ms
	PH-II 4EDA*1		10 - 20ms
Isolation Circuit	main unit		None
	PH-II 4EDA		Photocoupler
Operation Indication		Liquid Crystal Display	

*1 EI1 and EI2 in PH-II 4EDA can be used as High Speed Counters.

When using the High Speed Counter function, the input response time is 0.5ms or less.

Table 2.4: Analog Input Specifications (Only PH-II 15/25 Type Unit)

Description	Analog Input Specification
Number of Input Points	8 (I01 - I08)
Analog Input Range	0 - 500
Resolution	9 bit, 20mV (10000/ 500mv)
Conversion Speed	8ms
Input Voltage	0 - 10V DC
Input Impedance	142k Ω \pm 5%
Overall Accuracy	\pm 5% (0.5V DC)
Offset/Gain	Offset Value = 0 at 0V DC Gain Value: 0 - 10V = 0 - 500 These default values can be changed in the OffsetGain FB
Temperature Drift	\pm 3 LSB

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2.3 Output Specification

Table 2.5: Relay Output Specifications

Description		Relay Specification
Switched Voltage		250V AC~ or less, 30V DC or less
Max. Resistive Load	PH-II 14/15 (O01 - O06)	8A/COM
	PH-II 24/25 (O01 - O04)	
	PH-II 24/25 (O05 - O09)	2A/point (4A/COM)
	PH-II 4AR (EO1 - EO4)	2A/point
Contact Life Cycle / Resistance Load	PH-II 14/15 (O01 - O06)	100,000 Cycles at 8 Amps / 240V AC~ or 24V DC
	PH-II 24/25 (O01 - O04)	
	PH-II 24/25 (O05 - O09)	100,000 Cycles at 2 Amps / 240V AC~ or 24V DC
	PH-II 4AR (EO1 - EO4)	
Minimum Load		50mW (10mA at 5V DC)
Max. Inductive Load	PH-II 14/15 (O01 - O06)	249 VA (1/3 hp) / 125V AC~, 373 VA (1/2 hp) / 250V AC~
	PH-II 24/25 (O01 - O04)	
	PH-II 24/25 (O05 - O09)	93 VA (1/8 hp) / 125V AC~, 93 VA (1/8 hp) / 250V AC~
	PH-II 4AR (EO1 - EO4)	
Response Time		≤ 10 ms
Operation Indication		Liquid Crystal Display
Isolation Circuit		By Relay

Table 2.6: Transistor Output Specifications (Source Type only) of PH-II 4AT

Description	Transistor Specification
Switched Voltage	5 - 24V DC (+20%, -5%)
Max. Resistive Load	1A / point (8 - 24V DC), 0.1A / point (5 - 8V DC)
Minimum Load	1.0mA
Max. Inductive Load	1A / 24V DC (24 W)
Response Time On/Off, Off/On (approx)	≤ 1 ms
Open Circuit Current Leakage	≤ 0.1mA / 24V DC
Operation Indication	Liquid Crystal Display
Isolation Circuit	Photocoupler

2.4 General Specification

Table 2.7: Environmental and Electrical Specifications

Description	Specification
Programming Method	Function Block
Program Capacity	200 Function Blocks or 5000 bytes
Program Storage	Built in EEPROM (no battery backup required) or optional EEPROM cassette (PH-II EEPROM)
Device Backup	20 Days at 25 °C / 77 °F (by capacitor)
RTC Backup	20 Days at 25 °C / 77 °F (by capacitor)
RTC Accuracy	5 s / day (25 °C / 77 °F)
Operating Temperature	Controller Hardware: (-25) - 55 °C / (-13) - 101 °F Controller Display: (-10) - 55 °C / 14 - 101 °F
Storage Temperature	(-30) - 70 °C / (-22) - 158 °F
Vibration Resistance - Direct Mounting	Conforms to IEC 68-2-6; 10-57Hz: 0.15mm Constant Amplitude 57-150Hz: 19.6m/s ² Acceleration Sweep Count for X,Y,Z: 10 times (80 minutes in each direction)
Vibration Resistance - DIN Rail mounting	Conforms to IEC 68-2-6; 10-57Hz: 0.075mm Constant Amplitude 57-150Hz: 9.8m/s ² Acceleration Sweep Count for X,Y,Z: 10 times (80 minutes in each direction)
Shock Resistance	Conforms to IEC 68-2-27: 147m/s ² Acceleration, Action Time: 11ms 3 times in each direction X,Y, and Z
Noise Immunity	1000Vpp, 1 μs, 30 - 100Hz, tested by noise simulator
Humidity	35 - 85% Relative Humidity, no condensation
Dielectric withstand voltage	3750V AC~ > 1min per IEC 60730-1 between the following points: Power/Input Terminals and Relay Output Terminals Relay Output Terminal and Relay Output Terminal All Terminals and the DIN 43880 Control box or equivalent
Insulation Resistance	7 MΩ at 500V DC per IEC60730-1 between the following points: Power/Input Terminals and Relay Output Terminals Relay Output Terminal and Relay Output Terminal All Terminals and the DIN 43880 Control box or equivalent
Type of Action	IEC 60730-1, Section 6.4.3 - Type 1C (Relay Output)
Type of Action	IEC 60730-1, Section 6.4.3 - Type 1Y (Transistor Output)
Software Class	IEC 60730-1, Section H6.18 - Class A
Purpose of Control	IEC 60730-1, Section 2.2 - Electrical Control
Construction of Control	IEC 60730-1, Section 6.15 - Incorporated Control
Whether the Control is electric	IEC 60730-1, Section H2.5.7 - Electronic Control
Safety Class	II
Pollution Degree	2
Grounding	None
Electrical Isolation	Reinforced primary/secondary insulation
Operation Ambience	To be free of corrosive gases. Dust should be minimal.
Protection	IP 20

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Table 2.7: Environmental and Electrical Specifications

Description	Specification
Temperature for the Ball Pressure Test	75 °C (167 °F)
EC Directive	EMC, LVD
Certifications	UL/cUL
Attestation of Conformity	TÜV PRODUCT SERVICE
Complies with	UL 508 IEC 60730-1 EN 61010-1 EN 50081-1 EN 50082-1 EN 61000-6-2
Liquid Crystal Display	Will display 4 lines of 12 characters per line, Program Run On/Off mode, Password Protection, Image Table, and Function Blocks during programming.

3. Installation

3.1 Installation Mounting Notes

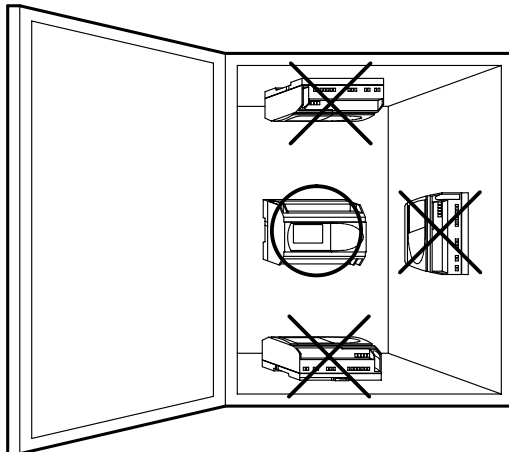


The PH-II Series' safe design means the user can install it almost anywhere but please take the following points into consideration.

- Do not install in areas with excessive or conductive dust, corrosive or flammable gas, moisture or rain, excessive heat, regular impact shocks or excessive vibration. Do not place in water or let water leak onto the controller.
- Do not allow debris to fall inside the unit during installation.
- Keep as far as possible from high-voltage cables and power equipment.
- The PH-II Series Controller must be installed in cabinets which are designed for the assembly of devices complying to DIN 43880 or in a control box

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Figure 3.1: Mounting Arrangement.



- Use size M4 screws when mounting by screw holes.
- The connectors must be covered to prevent injury from contact with "live" wires.
- Leave a minimum of 10mm of space for ventilation between the top and bottom edges of the PH-II Series Controller and the enclosure walls.
- Do not disassemble the PH-II Series controller.



Note

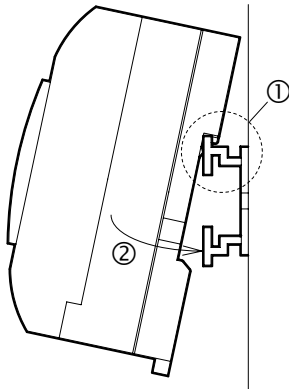
- Refer to chapter 6 when installing or removing the PH-II EEPROM.
- Refer to chapter 7 when installing or removing the PH-232 Kabel.
- Refer to chapter 8 when installing or removing the PH-II GSM Kabel.

3.2 DIN RAIL Mounting of Main Unit

Units can be snap mounted to 35mm DIN rail (DIN EN 50022). To release pull the spring loaded clips away from the rail and slide the unit off and up.

3.2.1 Installation

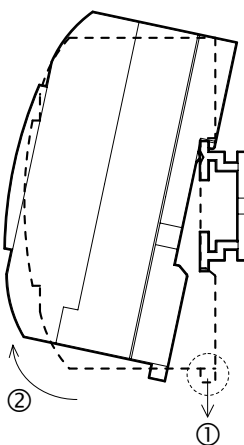
Figure 3.2: Installation



Align the upper side of the PH-II DIN rail mounting groove with the DIN rail (①) and push it onto the rail (②).

3.2.2 Remove

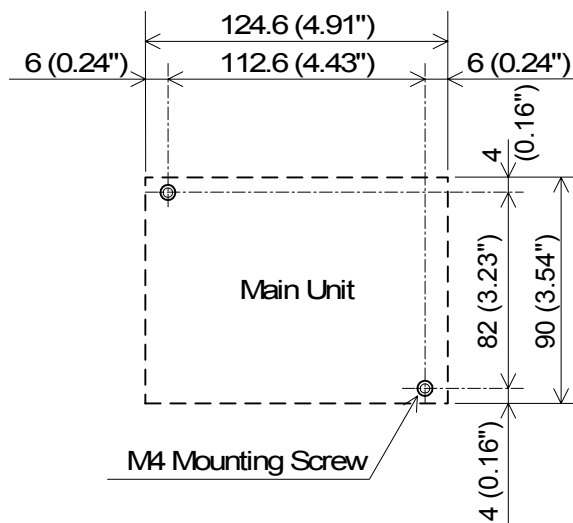
Figure 3.3: Remove



Pull the DIN rail hook (①) and remove the PH-II series main unit(②)

3.3 Direct Mounting of Main Unit

Figure 3.4: Direct Mounting

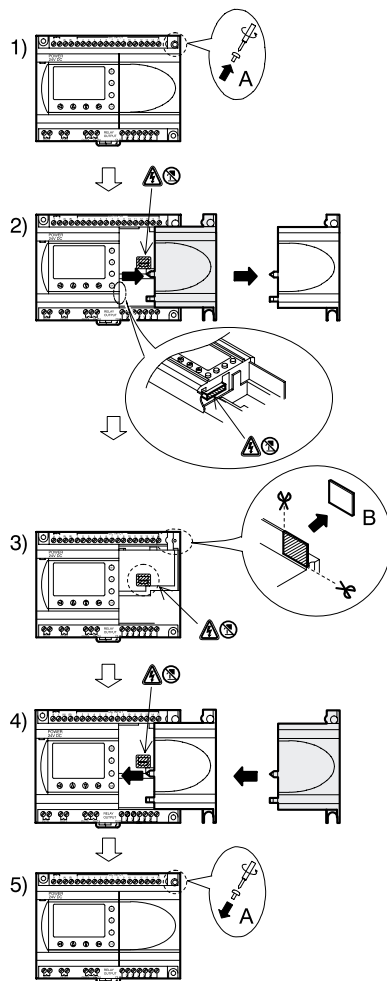


3.4 Install Extension Module



Caution

Disconnect all terminals from the power supply before removing the cover.

Figure 3.5: Installation

- 1) Release screw 'A' and keep.
- 2) Carefully remove the factory fitted expansion port cover.
- 3) Cut away section 'B' from the PH-II series controller main unit.
- 4) Attach the expansion module to the main unit.
- 5) Tighten screw 'A' to a torque of 0.4 Nm.

4. Wiring

4.1 Installation Wiring Notes



The wiring of PH-II Series has been designed to be safe and easy. A technician or engineer trained in the local and national electrical standards should perform all tasks associated with the electrical wiring of the PH-II Series controllers. Turn OFF the Power before performing any wiring operations.

- Input and output cables should not be run through the same multicore cable or share the same wire.
- Do not lay input/output cables near high voltage power cables.
- Input and output cable length must be than 30m (98' 5").

Allow for voltage drop and noise interference with input/output lines used over an extended distance. Please use wire that is properly sized for the current load.



The terminal will accept a 3 mm flathead screwdriver.

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4.2 Wire Size

Wire of the Inputs and Outputs using the following wire. Strip the wire to the following length (See Table 4.1 and Figure 4.1). Please unscrew the terminal to its widest position before inserting a wire. Insert the wire completely into the terminal to ensure that a proper connection can be made.

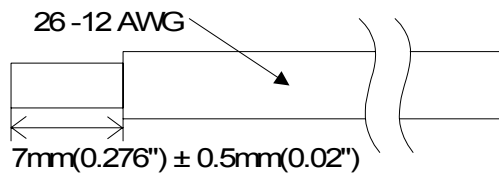
The terminals will accept a 3mm flathead screwdriver.

Table 4.1: Wire Size

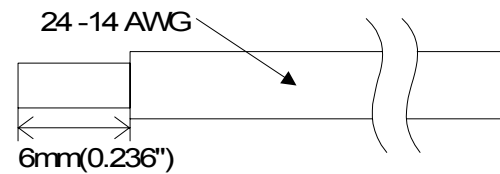
	Wire Size	Strip Wire Length
Main Unit	26 - 12 AWG (0.13 - 3.31mm ²)	7mm ± 0.5mm
Extension Module	24 - 14AWG (0.2 - 2.5mm ²)	6mm ± 0.5mm

Figure 4.1: Wire Size

Main unit



Extension module



Note

- To avoid damaging the wire, tighten to a torque of 0.5 - 0.6 Nm.
- Please do not use tin, solder, or any other substance on the stripped wire that might cause the wire strand to break.
 - Stranded cable:
Remove sheath, twist core wires, then connect cable (or use a crimp terminal).
 - Single cable:
Remove sheath, then connect cable.

4.3 Power Supply



- When wiring AC supplies the “Live” cable should be connected to the “L” terminal and the “Neutral” cable should be connected to the “N” terminal. Do NOT connect the “Live” wire to the “N” terminal, the user might receive a dangerous shock on powerup.
- When wiring DC supplies the “positive” cable should be connected to the “+” terminal and the negative cable should be connected to the “-” terminal. On no account should the power supply terminals be connected to any other terminal on the unit. DC Power Supply units should be capable of providing 4 Amperes of current to the controller.

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Figure 4.2: Recommended Power Input Wiring Diagram

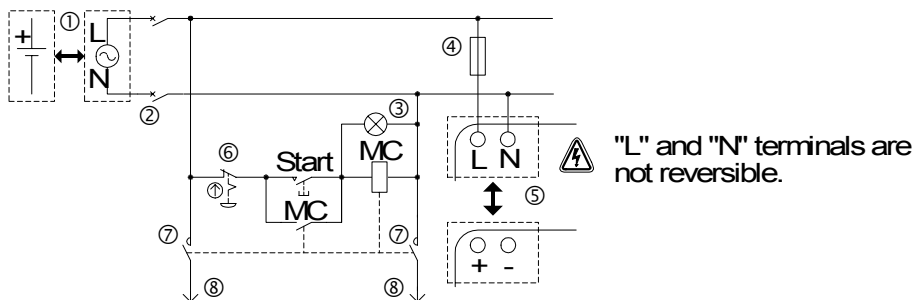


Table 4.2: Recommended Power Wiring

Ref.	Item Description
1	Power supply PH-II 14/24: 100-240V AC, 50/60Hz PH-II 15/25: 24V DC
2	Circuit isolation device
3	Power ON pilot indicator
4	Circuit protection device - Limit to 1.0A
5	PH-II main unit
6	Emergency stop
7	Magnetic switch contact
8	Power supply for loads

4.4 AC Power Supply and Input Wiring

4.4.1 AC Power Supply and Input Wiring

Figure 4.3: AC Power Supply and Input Wiring Diagram

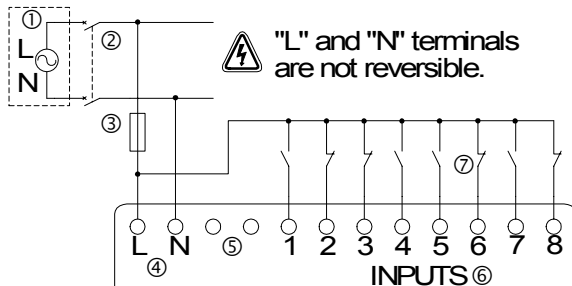


Table 4.3: AC Power Supply and Input Wiring

Ref.	Item Description
1	AC power supply, 100 - 240V AC~, 50/60Hz
2	Circuit isolation device
3	Circuit protection device - Limit to 1.0 Amp
4	AC power terminals
5	Unused terminals
6	Input terminals
7	Digital input switches

4.4.2 PH-II 4ED Input Wiring

Figure 4.4: PH-II 4ED Input Wiring Diagram

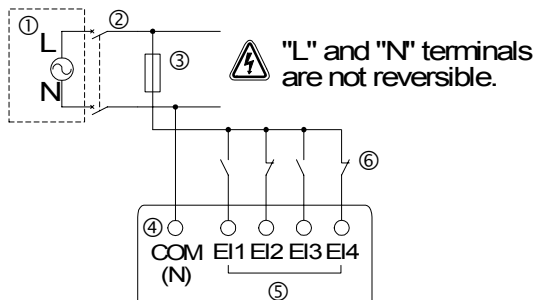


Table 4.4: AC Power Supply and Input Wiring

Ref.	Item Description
1	AC power supply, 220 - 240V AC~, 50 / 60Hz
2	Circuit isolation device
3	Circuit protection device - Limit to 1.0 Amps
4	COM (N) terminal
5	Input terminals
6	Digital input switches

4.5 DC Power Supply and Input Wiring

4.5.1 DC Power Supply and Source (“+” Common) Input Wiring Diagram

Figure 4.5: DC Power Supply and Source (“+” Common) Input Wiring Diagram

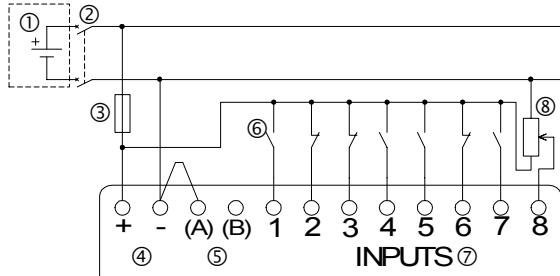


Table 4.5: DC Power Supply and Source (“+” Common) Input Wiring

Ref.	Item Description
1	DC power supply, 24V DC
2	Circuit isolation device
3	Circuit protection device - Limit to 1.0A
4	DC power terminals
5	Sink/Source input wiring terminals
6	Sensor input switches
7	Input terminals
8	Analog input

4.5.2 PH-II 4EDA Source (“+” Common) Input Wiring Diagram

Figure 4.6: PH-II 4EDA Source (“+” Common) Input Wiring Diagram

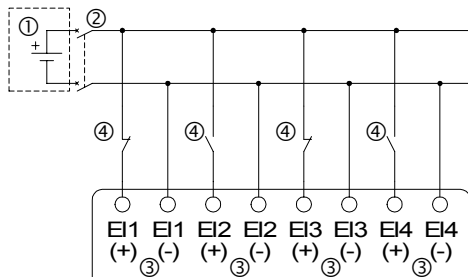


Table 4.6: DC Power Supply and Source (“+” Common) Input Wiring

Ref.	Item Description
1	DC power supply, 24V DC
2	Circuit isolation device
3	Input terminals
4	Sensor input switches



Note

Each input terminal (EI1 ~ EI4) can be used as either Source input or Sink input.

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4.5.3 DC Power Supply and Sink ("- Common) Input Wiring Diagram

Figure 4.7: DC Power Supply and Sink ("- Common) Input Wiring Diagram

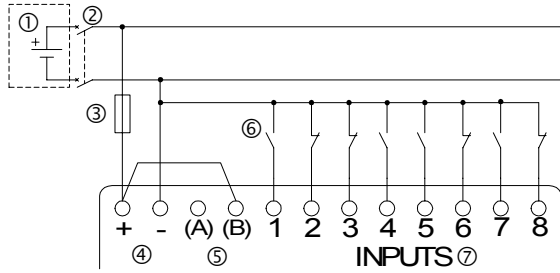


Table 4.7: DC Power Supply and Sink ("- Common) Input Wiring

Ref.	Item Description
1	DC power supply, 24V DC
2	Circuit isolation device
3	Circuit protection device - Limit to 1.0 Amps
4	DC power terminals
5	Sink/Source input wiring terminals
6	Sensor input switches
7	Input terminals

4.5.4 PH-II 4EDA Sink ("- Common) Input Wiring Diagram

Figure 4.8: PH-II 4EDA Sink ("- Common) Input Wiring Diagram

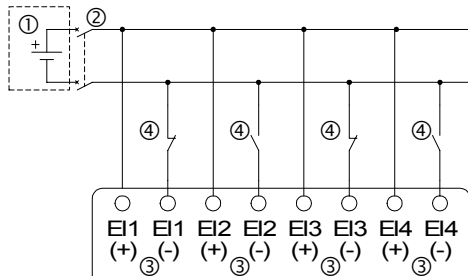


Table 4.8: DC Power Supply and Sink ("- Common) Input Wiring

Ref.	Item Description
1	DC power supply, 24V DC
2	Circuit isolation device
3	Input terminals
4	Sensor input switches



Note

Each input terminal (E1 ~ E4) can be used as either Source input or Sink input.

4.6 Output Relay and Transistor Wiring

4.6.1 Relay Output Wiring Diagram main unit (AC and/or DC)

Figure 4.9: Relay Output Wiring Diagram main unit (AC and/or DC)

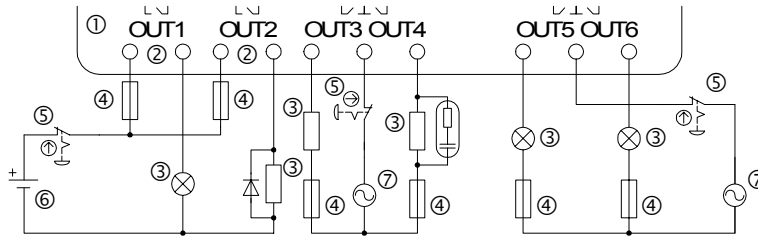


Table 4.9: Relay Output Wiring main unit (AC and/or DC)

Ref.	Item Description
1	PH-II main unit
2	Mutually exclusive outputs
3	Output devices
4	Circuit protection device (See Table 4.10)
5	Emergency stop
6	DC power supply
7	AC power supply

Table 4.10: Relay Output Circuit Protection Table

Model	Number of Output	Max. Resistive Load	Circuit Protection (Fuse)
PH-II 14/15	O01~O06	8A/common	≤ 10A / Circuit
PH-II 24/25	O01~O04		≤ 10A / Circuit
	O05~O09	2A/point (4A/common)	≤ 3A / Circuit

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4.6.2 Relay Output Wiring Diagram PH-II 4AR (AC and/or DC)

Figure 4.10: Relay Output Wiring Diagram PH-II 4AR (AC and/or DC)

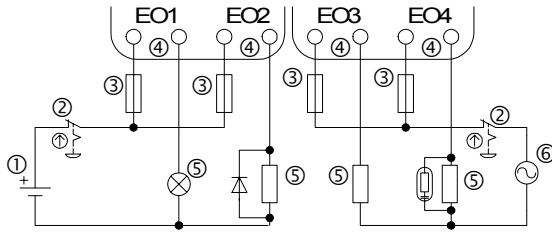


Table 4.11: Relay Output Wiring PH-II 4AR (AC and/or DC)

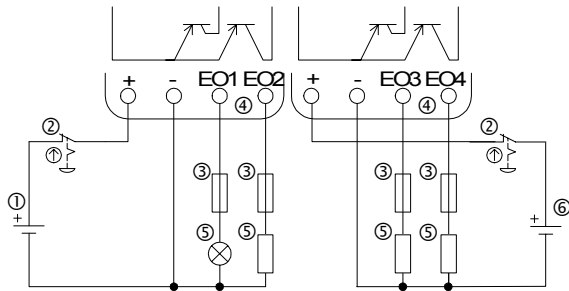
Ref.	Item Description
1	DC power supply
2	Emergency stop
3	Circuit protection device (Fuse: ≤ 3A)
4	Mutually exclusive outputs
5	Output devices
6	AC power supply

Table 4.12: Relay Output Circuit Protection Table

Model	Number of Output	Max. Resistive Load	Circuit Protection (Fuse)
PH-II 4AR	EO1~EO4	2A/common	≤ 3A / Circuit

4.6.3 Transistor Output (Source or “+” Common Only) Wiring Diagram PH-II 4AT

Figure 4.11: Transistor Output (Source/ “+” Common Only) Wiring Diagram PH-II 4AT



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Table 4.13: Transistor Output Wiring

Ref.	Item Description
1	DC Power Supply: 24V DC
2	Emergency Stop
3	Circuit Protection Device - See Table 4.14 for Specifications
4	Power Supply Terminal
5	Output Devices
6	DC Power Supply: 12V DC

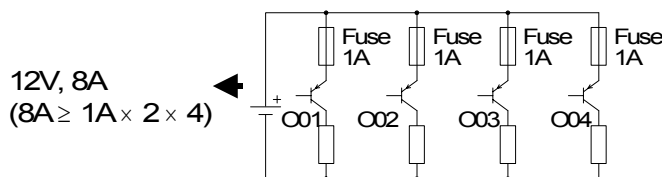
Table 4.14: Transistor Output Circuit Protection Table

Circuit Voltage	Circuit Protection (Fuse)
5V DC	≤ 0.3A/Circuit
12V DC	≤ 2.0A/Circuit* ¹
24V DC	≤ 2.0A/Circuit* ¹



*1 Power Source capacity ≥ Fuse size × 2

Figure 4.12: Example Fuse Size Calculation



Note

Table 4.15: Output Terminal Notes

Volt	Output Terminal Notes
5	Each circuit can contain from one output terminal up to every output terminal.
12-24	Each circuit can contain from one output terminal up to every output terminal.
5,12,24	Using any combination of 5 Volt, 12 Volt, and 24 Volt outputs can be accomplished on the same PH-II Series Controller if separate circuits are used for each voltage level.

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5. Terminal Layout

Figure 5.1: PH-II 14, AC Input, Relay Output

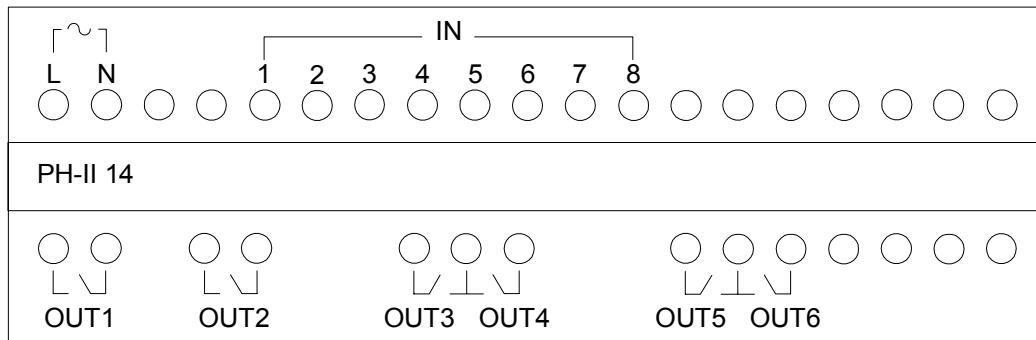


Figure 5.2: PH-II 15, DC Input, Relay Output

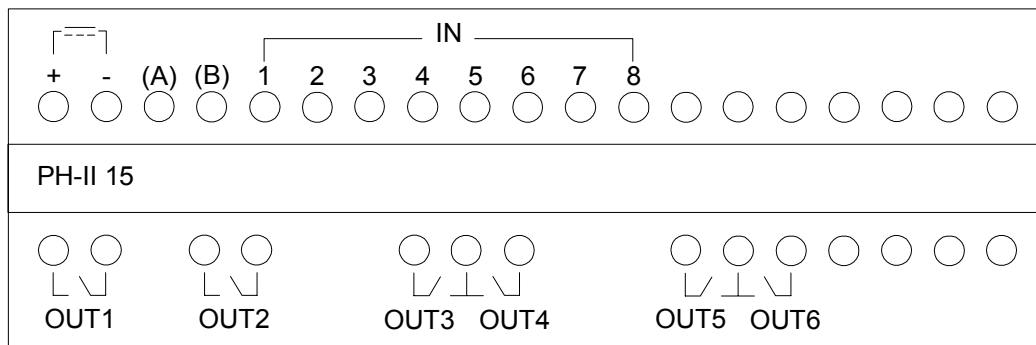


Figure 5.3: PH-II 24, AC Input, Relay Output

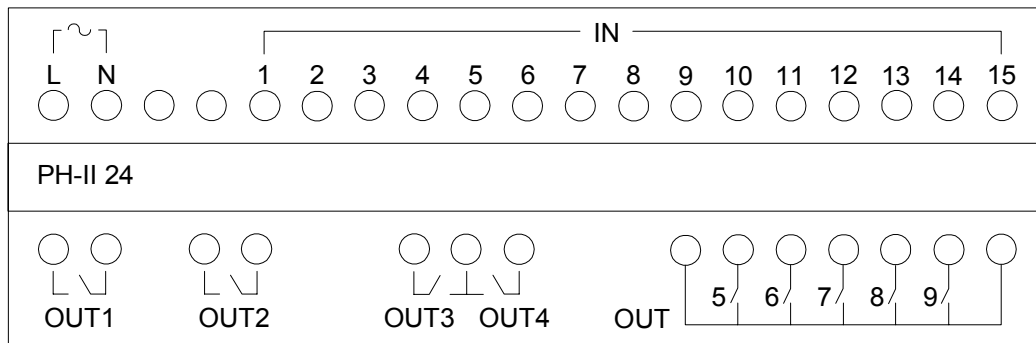
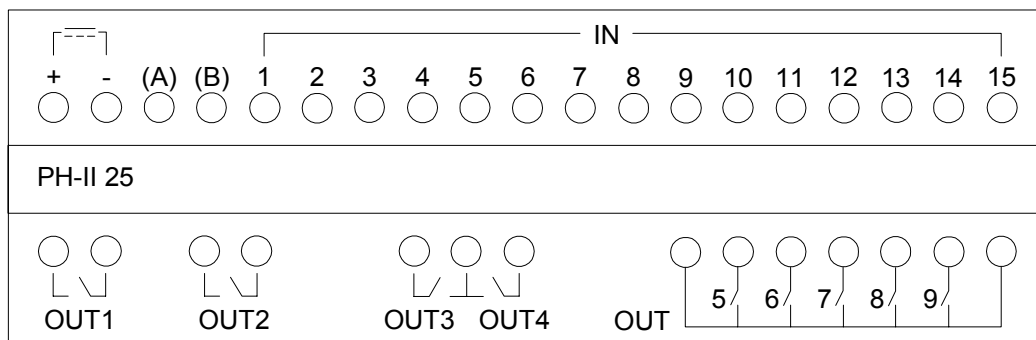


Figure 5.4: PH-II 25, DC Input, Relay Output



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Figure 5.5: PH-II 4ED, 220 - 240V AC Input

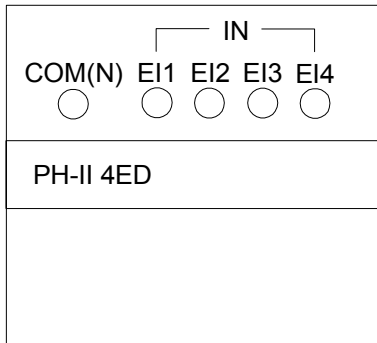


Figure 5.6: PH-II 4EDA, DC Input

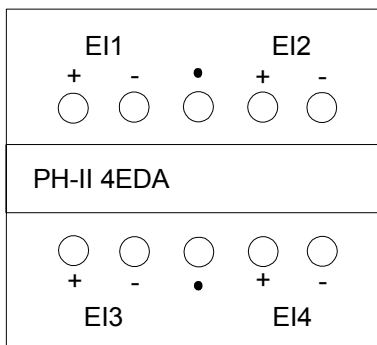


Figure 5.7: PH-II 4AR, Relay Output

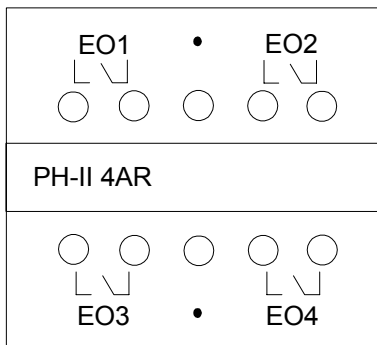
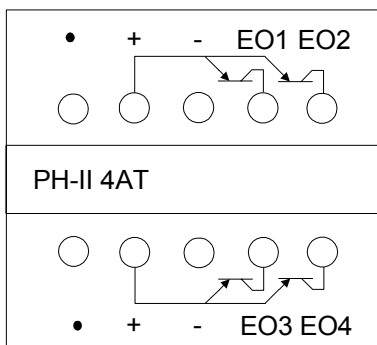


Figure 5.8: PH-II 4AT, Transistor Output



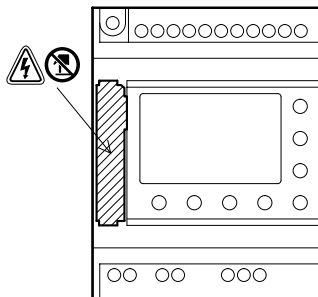
6. PH-II EEPROM

The PH-II EEPROM memory cassette is for use only with the PH-II series controller (Model: PH-II**).



Caution

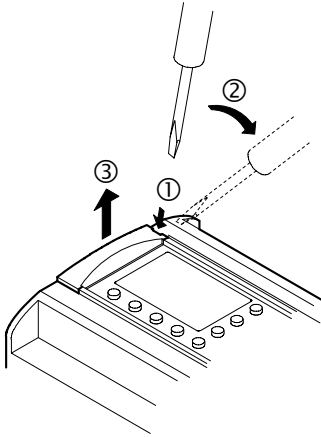
- Persons trained in the local and national electrical standards must replace the memory cassette.
- Turn off the power supply when installing or removing the memory cassette.
- Replace the cover after removing the memory cassette.
- When installing the connector cover or the memory cassette of PH-II series, be careful not to pinch your finger.
- DO NOT touch the following part when removing the cover or memory cassette.



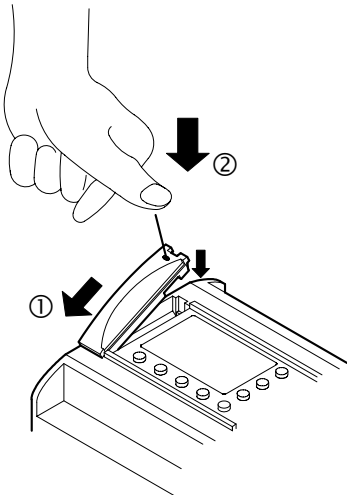
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6.1 Installation

- 1) Remove the cover or the memory cassette



- 2) Install on the cover or the memory cassette



7. PH-232 Kabel

7.1 Introduction

The PH-232 Kabel is a PH Programmierkabel used to connect an PH series controller (PH, PH-II) and a personal computer that is running the programming software (Pharao Software 2.0).

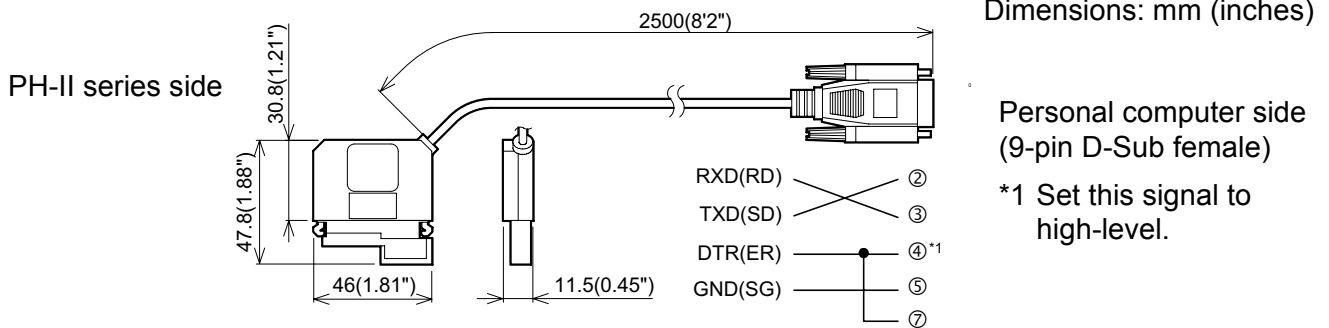
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Note

- PH Programmierkabel cannot be used for any other applications.
- PH Programmierkabel rises about 40mm (1.57") above the top panel when connecting to an PH-II series controller.

7.1.1 External Dimensions



7.2 Connected to PH-232 Kabel



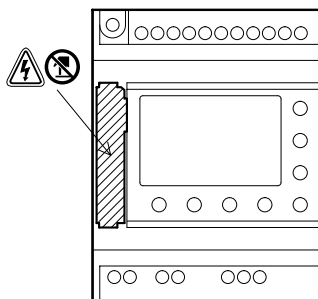
Remove cover and memory cassette

- Be careful of personal safety when removing the PH-II cover.

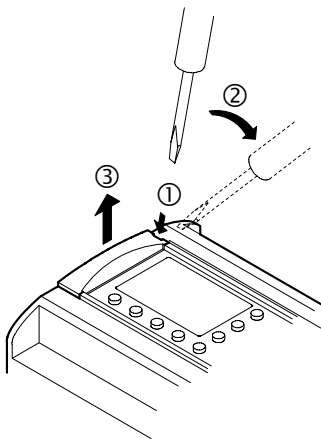


Caution

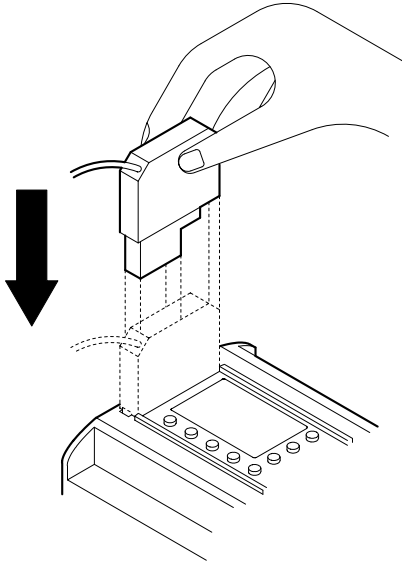
- Turn off the power supply when you install or detach the PH-232 Kabel.
- Install the cover or the memory cassette after removing the PH-232 Kabel.
- When installing the connector cover or the memory cassette of PH-II series, be careful not to pinch your finger.
- Please hold the protective case when detaching the cable. DO NOT pull on the cord.
- DO NOT touch the following part when removing the cover, memory cassette or this cable.



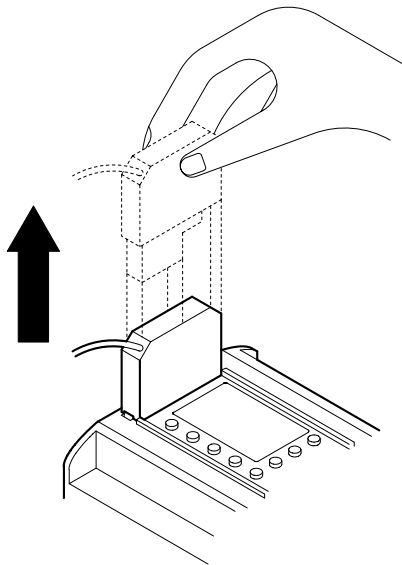
1) Removing the cover or the memory cassette



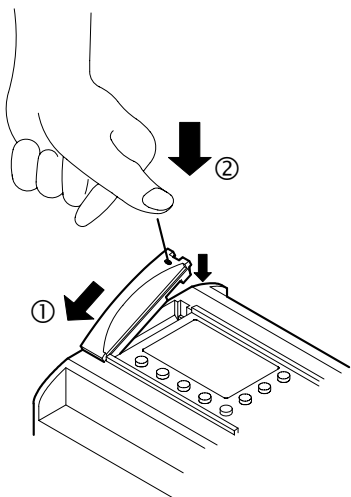
2) Connecting the PH-232 Kabel



3) Removing the PH-232 Kabel



4) Installing on the cover or the memory cassette



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8. PH-II GSM Kabel

8.1 Introduction

The PH-II GSM Kabel can be used to connect PH-II Series Controllers to a normal or GSM modem. The PH-II GSM Kabel can transfer Short Message Service (SMS) data to a GSM modem for transmission to mobile phones and mail addresses or can facilitate remote monitoring functions and program transfers via normal modems. RS-232C communication to a personal computer can also be accomplished if an adaptor or cable is used.

Further information can be found in the PH-II Programming Manual and PH Software Manual.



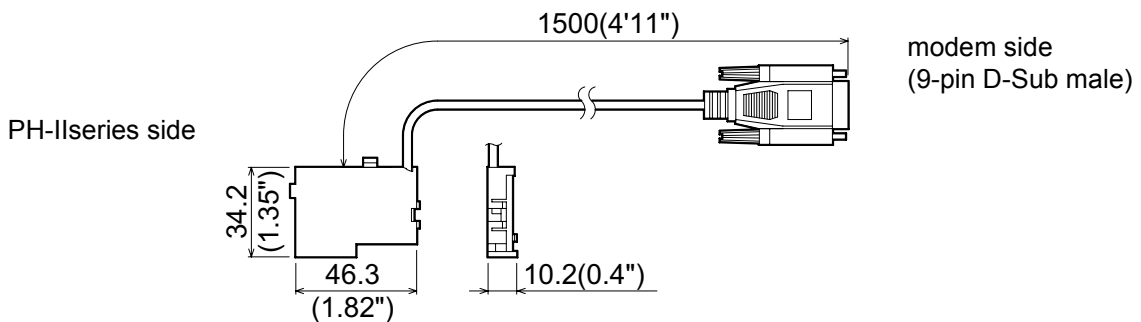
Note

- This cable cannot be used for any other applications.
- This cable does not attach to the PH Series Controller (Model: PH-II**).
- Simultaneous communication through both ports of the PH-II Series Controllers may result in a damaged program or a malfunction in the controller.

8.1.1 External Dimensions

Figure 8.1: External Dimensions

Dimensions: mm (inches)



8.1.2 System Configuration with using PH-II GSM Kabel

Figure 8.2: System Configuration with PH-II GSM Kabel

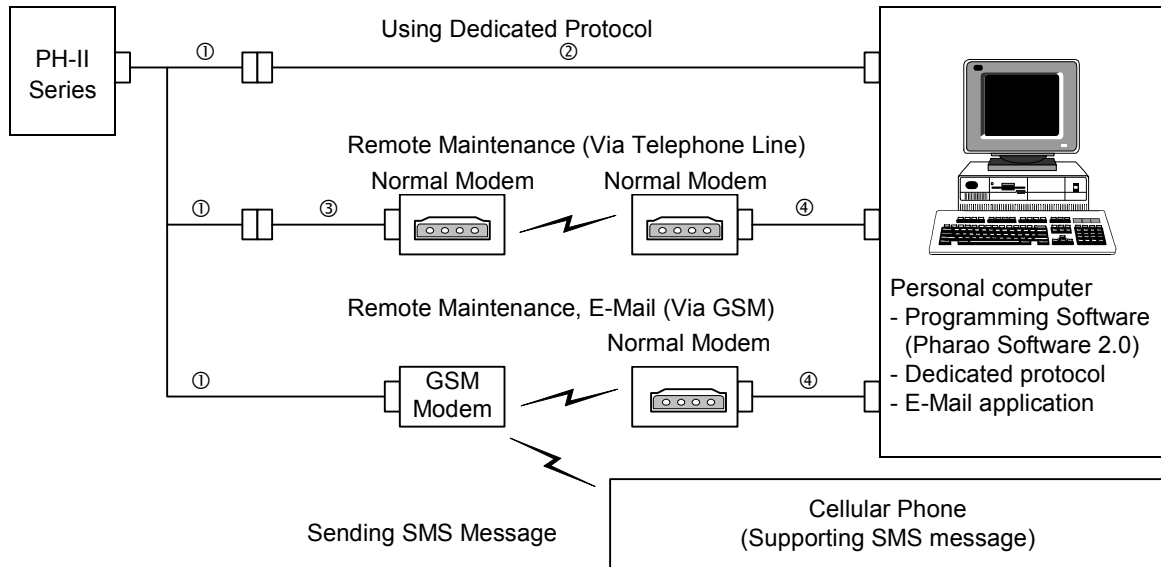
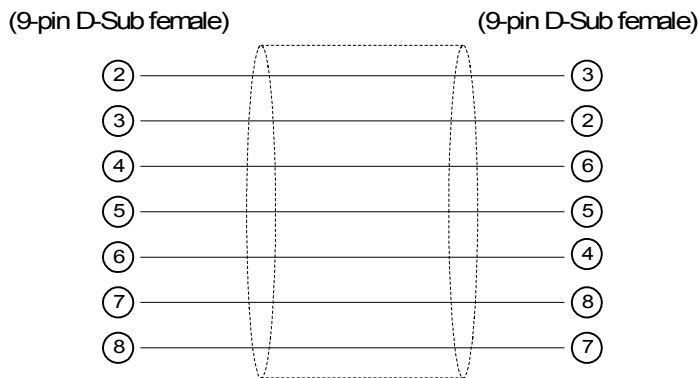


Table 8.1: System Configuration with PH-II GSM Kabel

Item	Using Cable
1	PH-II GSM Kabel
2	PH Programmierkabel cross cable (See Figure 8.3)
3	PH Programmierkabel straight cable for the modem (See Figure 8.5)
4	PH Programmierkabel straight cable for the modem (specified by modem manufacturer)

Figure 8.3: PH Programmierkabel Cross Cable Reference



Note

The 4 and 7 signals must be set to high-level on the personal computer side. If these signals are not set, it will not communicate to PH-II series.

8.2 Installation

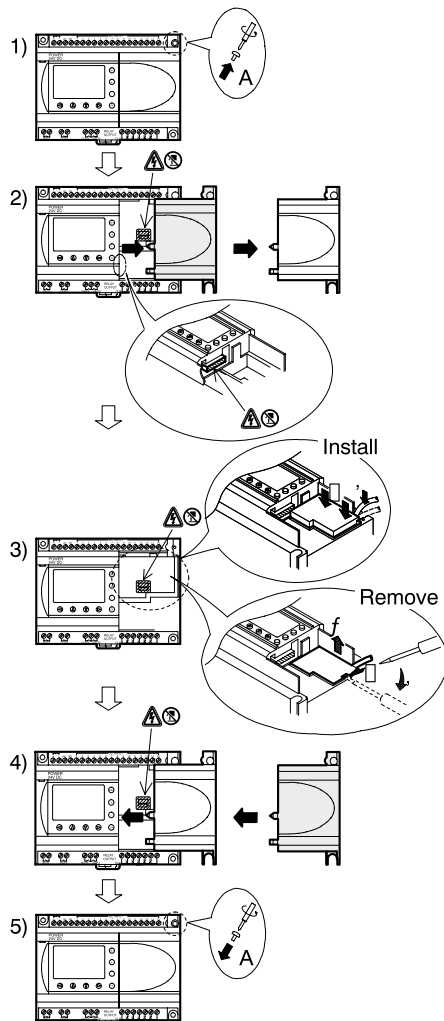
When installing PH-II GSM Kabel refer to Figure 8.4.



Caution

- Persons trained in the local and national electrical standards must install or remove the PH-II GSM Kabel.
- Turn off the power supply when installing or removing the PH-II GSM Kabel.
- Put the cover back on after either installing or removing the PH-II GSM Kabel.
- Under no circumstances will Theben AG be liable or responsible for any consequential damage that may arise as a result of the installation or use of this equipment.
- Do not pull on the cord, otherwise the cable may be damaged.
- When communicating to PH-II series via GSM modem, the power supply for both units must be turned ON at the same time. If they are not started up at same time, the PH-II series will not communicate via GSM modem.
- Disconnect all terminals from the power supply before removing the cover.

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Figure 8.4: Installation

- 1) Release screw 'A' and keep.
- 2) Carefully remove the factory fitted PH-II expansion port cover or special module cover.
- 3) Install the PH-II GSM Kabel into the cavity, carefully placing the cable in the channel located on the input terminal side.
- 4) Attach the PH-II cover or expansion module taking care that there is no interference with the PH-II GSM Kabel.
- 5) Tighten screw 'A' to a torque of 0.4 Nm.

8.3 Remote Maintenance with a Modem

Further information of the modem setup procedures can be found in the PH-II Programming Manual. The programming software (Pharao Software 2.0) provides the easiest method to setup the modem.

8.3.1 Recommended Modems

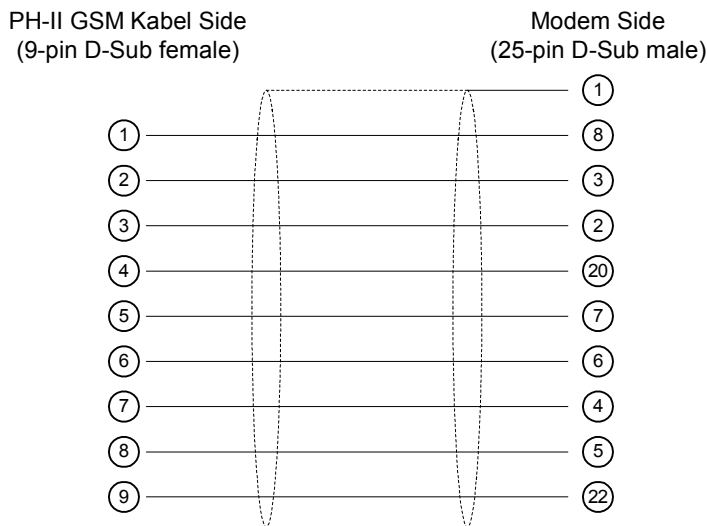
The following modems have been successfully tested.

Table 8.2: Tested Modems

Maker name	Model name	Modem command (AT command)
3com	SP560V-P	ATE0Q1&B1&D0H0&I0&R1&S0S0=2S15=8&W
OMRON	ME3314	ATE0S0=2Q1&D0S15=8&R1&H0&W
AIWA	PV-AF3360	ATE0S0=2Q1&D0&M5\Q0\J0&W
Siemens	M20T	ATE0S0=2&S0;+IFC=0,0;+CMEE=1;+IPR=9600&W

8.3.2 PH Programmierkabel Straight Cable Between Modem and PH-II GSM Kabel

Figure 8.5: PH Programmierkabel Straight Cable Reference Between a Modem and PH-II GSM Kabel



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8.3.3 Modem Setting

1) Setting of personal computer side

Install the file for the setting of the attachment in the modem.

2) Setting of PH-II series side

The modem on the PH-II series side is set by the ModemInit command of the main unit.

a) About the modem command (AT command)

Use the AT command to initialize the modem. Confirm details of the AT command in the manual of the modem to be used. AT commands have been prepared for select modems in the table 8.4 (normal modem) and 8.5 (GSM modem) below.

Table 8.3: Tested Modems

Maker name	Model name	Modem command (AT command)
3com	SP560V-P	ATE0Q1&B1&D0H0&I0&R1&S0S0=2S15=8&W
OMRON	ME3314	ATE0S0=2Q1&D0S15=8&R1&H0&W
AIWA	PV-AF3360	ATE0S0=2Q1&D0&M5\Q0\J0&W
Siemens	M20T	ATE0S0=2&S0;+IFC=0,0;+CMEE=1;+IPR=9600&W

Further information on the method to initialize a modem can be found in the PH-II Programming Manual.

When modems not listed in the table above are used, set the AT command to meet the following requirements.

Table 8.4: AT Command for Modem (Normal Modem)

Setting Item	Set content	Example Setting		
		SP560V-P	ME3314	PV-AF3360
Setting of command echo	None	E0	E0	E0
Call frequency of auto-answering	Twice	S0=2	S0=2	S0=2
Displayed result code	None	Q1	Q1	Q1
DTR control	Always on	&D0	&D0	&D0
DSR control	Always on	&S0		
Communicate mode	V.42bis mode	S15=8	S15=8	&M5
Speed of terminal fixed dimension	Fixed	&B1	\J0	
Terminal flow control scheme	None	~&R1	\Q0	
Flow control of transmission data	None	&H0	&H0	-
Flow control of received data (software)	None	&I0		
Flow control of received data (RTS control)	None	&R1		
Writing in nonvolatile memory	Write in the nonvolatile memory.	&W	&W	&W

Table 8.5: AT Command for GSM Modem

Setting Item	Set content	Example Setting
		M20T
Enable command echo	Echo mode OFF	E0
Set number of ring before automatically answering the call	Enable automatic answering on the ring twice	S0=2
Set circuit data set ready (DSR) function mode	DSR always ON	&S0
Set TE-TA local data flow control	<ul style="list-style-type: none"> Specifies the method which will be used by TE when data is received from TA: None Specifies the method which will be used by TA when data is received from TE: None 	+IFC=0,0
Report mobile equipment error	Enable result code and use numeric value	+CMEE=1
Set fixed local rate	Baud Rate: 9600 bps	+IPR=9600
Set circuit data carrier detect (DCD) function mode ^{*1}	DCD line is ON only in the presence of Data Carrier	&C1
Select bearer service type ^{*1}	9600 bps (V.32), asynchronous modem, non-transparent	+CBST=7,0,1
Store current parameter to use defined profile	The user profile is stored in non-volatile memory	&W

*1 In Siemens M20T case, these settings are not necessary because they are default settings. If using other GSM Modem, maybe these settings are necessary.

b) Timing to initialize the modem during system startup

In the PH-II series, there is a function to delay the transmission of the modem command (AT command) to initialize the modem from the main unit at start up. The delay can range from 0 - 10 seconds. This command can be useful to ensure the AT command is correctly transmitted when the PH-II series start up is faster than the modem start up.

Further information for the modem operation can be found in the PH-II Programming Manual and the PH Software Manual.

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9. Key, System Bit and Function Block Lists

9.1 Key Lists

The following table is the keys to use operation in the Menu and user program. Further information can be found in PH-II Programming Manual.

Table 9.1: Operation Key Lists

Key Name	Key Number	Description
OK	K01	Acceptance of data entry, menu options, program choices
ESC	K02	Cancel current operation, move to higher screen or menu
+	K03	Connect function blocks, move to higher numbered blocks, increment values
-	K04	Disconnect function blocks, move to lower numbered blocks, decrement values
▲	K05	Scroll to higher number numbered items (keys, FB, Inputs, Outputs, etc.)
▼	K06	Scroll to lower numbered items (keys, FB, Inputs, Outputs, etc.)
▶	K07	Move to the right on the LCD display, FB program or Jump command
◀	K08	Move to the left on the LCD display, FB program or Jump command

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9.2 System Bit Lists

There is the system bit controlled by system and the control bit to control from user program.

9.2.1 System Bit Lists

Table 9.2: System Bit Lists

System Bit	Description
M01	Always "ON"
M02	Always "OFF"
M03	Alternate - 0.5 seconds "ON", 0.5 seconds "OFF"
M04	"ON" when Real Time Clock data error occurs
M05	"ON" when Summer time schedule is activated
M06	ON when turn Stop mode turns to Run mode in the PH-II Series. The ON signal acts as a pulse output and then turns OFF.
M07	OFF when turn Stop mode turns to Run mode in the PH-II Series. The OFF signal acts as a pulse output and then turns ON.
M08	Reserved
M09	Reserved
M10	"ON" when CD (DCD) signal is turned ON (receiving CD signal from modem)
M11	"ON" when it is possible to access the GSM network.
M12	"ON" when the PH-II series is accessed via GSM.

9.2.2 Control Bit Lists

Table 9.3: Control Bits

Control Bit	Description
N01 ^{*1}	ON: The back light is "OFF" in LCD. OFF: The back light is controlled by the "Light Time" setting in Menu.
N02 ^{*1}	ON: The back light is "ON" in LCD. OFF: The back light is controlled by the "Light Time" setting in Menu.
N03	ON: The user screen is controlled by the setting of "Display Manager" with Pharaoh Software 2.0. OFF: The user screen is controlled by user program.

*1 When both N01 and N02 are ON and hence the back light is "ON" because N02 is given the priority.

9.3 Function Block Lists

Further information for function blocks can be found in the PH-II Series Programming Manual.

Table 9.4: Function Block Lists

Function Block		Memory Consumption (Byte)	Description
Name	Symbol		
AND	AND	19	Output ON when all Inputs are ON, Unused inputs considered ON
OR	OR	19	Output ON when at least one input ON, Unused inputs considered OFF
NOT	NOT	10	Inverts a signal; changes an OFF to an ON and vice versa
XOR	XOR	13	Exclusive OR; Output ON when only One of Two Inputs is ON
NAND	NAND	19	Not AND; Output OFF only when all Inputs ON, Unused inputs considered ON
NOR	NOR	19	Not OR; Output OFF when at least one Input is ON, Unused inputs considered OFF
Boolean	BL	*1	Logic equation using AND, OR, XOR, NOT
Set/Reset	SR	14	Latch a relay in SET or RESET position, give Set or Reset priority
Pulse	PL	10	Send a Pulse on the Rising, Falling, or both Edges
Alternate	AL	13	Output alternates turning ON or OFF with each input pulse
Delay	DL	19	Delay a signal on the Rising, Falling, or both Edges
One Shot	OS	17	Send a single pulse; Time or Input signal based, Reset pin available
Flicker	FL	19	Send a pulse train; ON/OFF times, repetitions, duration, or continuous operation
Time Switch	TS	*2	Use the RTC to turn output ON/OFF; Calendar or weekly schedule
Time Switch Maintenance	TSm	*2	Use the RTC to turn output ON/OFF; Calendar or weekly schedule The schedule can be changed with "Setup TS" in the Top menu.
Counter	CN	16	Count upwards on pulses, can reset at a signal
Up/Down Counter	UD	22	Count upward or downward, Set a Preset Value for the Output to come ON
Compare	CP	17	Compare two values for <, >, =, <=, >=, <> (Analog, Direct Set, or FB values)
Offset Gain	OG	22	Manipulate Analog Values; $y = A/B * x + C$; Set High and Low Limit Values
Display	DP	*3	Display User Screen (messages or data) on the LCD display
Zone Compare	ZC	20	Compare a value to a range of values (Analog, Direct Set, or FB values)
Schmitt trigger	ST	19	Turn an Input ON at the High Value and OFF at the Low Value (or vice versa)
Hour Meter	HM	19	Records the accumulated time a signal has been ON

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Table 9.4: Function Block Lists

Function Block		Memory Consumption (Byte)	Description
Name	Symbol		
Speed Detect	SPD	25	The signal input frequency (On/Off) is measured for a set length of time. The frequency is compared to a value range and the Output is turned ON/OFF according to the result.
Pulse Width Modulation	PWM	16	A continuous pulse train is output when this function block is driven. The characteristics of the pulse are defined as; Pulse duty (Direct set, Analog, FB values), cycle time.
Retentive Alternate	RAL	13	Output alternates turning ON or OFF with each input pulse. The last output status is kept when the power supply is cycled OFF and ON. However, last output status is lost when the PH-II series is placed in the Stop mode.
Addition	ADD	20	$y = A + B$
Subtraction	SUB	20	$y = A - B$
Multiplication	MUL	20	$y = A \times B$
Division	DIV	20	$A \div B = q, r$ (quotient and remainder)
Calculation	CAL	*4	Equation using +, -, ×, ÷, % and the selected data.
Shift	SFT	19	Shift operation; When "SFT" signal is input, last "I" signal status is output. When using 8 bit shift operation, "Shift" function block should be continued 8 times.
GSM SMS	SMS	*5	The contents of an LCD screen is sent as an SMS message.
Random One Shot	ROS	19	The random length single pulse is output.
Delayed One Shot	DOS	20	After a delay time, send a single pulse
Delayed Alternate	DAL	16	After a delay time, output alternates turning ON or OFF with each input pulse
Retentive Set/Reset	RSR	14	Latch a relay in SET or RESET position, give Set or Reset priority. The last output status is kept when the power supply is cycled OFF and ON. However, last output status is lost when the PH-II series is placed in the Stop mode.
Control Display	CDP	*6	Control which Display screen appears on the LCD. This function block can only be set in the Pharaoh Software 2.0. When control bit N04 is ON, it possible to control the displayed User Screen.
Connect	_B	10	This CONNECT function block is an internal FB used to show the memory used by the system bits and the operation keys. No function block appears on screen or shows as being used in the "Memory Configuration Usage" dialog box, the purpose is only to calculate the memory that is used by the bits listed above.

Table 9.4: Function Block Lists

Function Block		Memory Consumption (Byte)	Description
Name	Symbol		
System Outputs	Out	10	Control external device through relays and transistors.

*1 Number of bytes used = $19 + 1 \times$ (Characters in equation)

*2 Number of bytes used = $8 + 4 \times$ (Number of time switches)

*3 Number of bytes used is decided by the displayed item.

Table 9.5: Displayed Item and number of bytes used

Displayed Item		Number of bytes, PH-II Series
Characters		$16 + 1 \times$ (Each character displayed)
Analog, FB value	Value	17
	Graph	23
Time, Date		14
Time Switch		17

*4 Number of bytes used = $30 + 1 \times$ (Characters in equation)

*5 Number of bytes used = $12 + 1 \times$ (Characters in E-Mail address)

*6 Number of bytes used = $32 + 3 \times$ (Number of screen)

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10. Diagnostics



Caution

- Do not touch the terminal while energized. This might cause an equipment malfunction or an electric shock.



Caution

- Supply correctly rated power.
When a power supply different from the ratings is supplied, this product might be damaged or cause a fire.
- Connect “L (Live)” of the power supply to “L terminal” in the main unit, and connect “N (Neutral)” to “N terminal” in the main unit correctly when wiring the AC power supply. Faulty wiring will cause an electrical shock, damage to the controller, or a fire.
- Connect the “L (Live)” wire of the power supply to the input terminal of the AC unit.
- Connect the “+” of the power supply connect to the “+ terminal” in the main unit, and connect the “-” of the power supply to the “- terminal” when wiring the DC unit. Faulty wiring will cause an electrical shock, damage to the controller, or a fire.



Notes on use

- The PH-II Series controller must be used with either the memory cassette, communication cable, or connector cover installed. Otherwise, the exposed socket can cause damage to the controller or an electric shock to the operator.
- Use the expansion module or the connector cover while power is supplied to the PH-II series controller.
Improper equipment installation can cause damage to the controller or an electric shock.

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10.1 Input Status Error

Place the PH-II controller in the Stop mode. Cycle the power to the equipment connected to the input terminals and check if the input status is displayed correctly. If it is not correctly displayed, check the points below.

Further information about the status display can be found in the PH-II Programming Manual.



Notes on use

Do not connect a wire with a soldered end to an PH-II series terminal due to poor contact and the possibility of the wire shearing.

- 1) Check the wiring for the power supply and the inputs.
- 2) Check if the equipment used for the inputs corresponds to the specification in section 2.3 in this manual.

10.2 Output Status Error

Place the PH-II controller in the Stop mode. Force the outputs ON/OFF and check the operation of the outputs. Check that the program is written to perform per the desired results. Further information can be found about the force ON/OFF operation in the PH-II Programming Manual.



Notes on use

Perform the forced ON/OFF operations only after thoroughly checking that it is safe to do so. Damage to the machine or controller or a safety issue could arise if the forced ON/OFF is performed inappropriately.

If proper precautions are not taken, damage to the equipment or machine failure may occur.

- 1) Check the wiring for the power supply and the outputs.
- 2) Check if the equipment used for the outputs corresponds to the specification in section 4.4 in this manual.

10.3 TOP MENU is not Displayed

The menu key should be operated to access the Top Menu. Push the keys "OK" and "ESC" at the same time. If the menu call key is not set, use either the programming software to the Stop mode or do the forced stop operation.

The Top Menu cannot be accessed from the keys. However, by cycling the power supply and pressing the "OK + ESC" keys simultaneously during the power up, the Top Menu will appear.



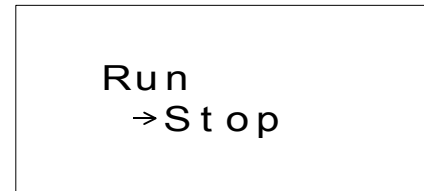
Caution

Perform the forced stop operation only after thoroughly checking that it is safe to do so. Damage to the machine or controller or a safety issue could arise if the forced ON/OFF is performed inappropriately. If proper precautions are not taken, damage to the equipment or machine failure may occur.

Forced Stop Operation

- 1) Turn the PH-II series power supply off.
- 2) Turn the power ON again while pushing the "OK" and "ESC" keys simultaneously.
The screen at right is displayed.

The option to place the controller in Stop mode will be available for approximately five seconds. Press the "OK" key to enter the Stop Mode. If no key is pressed, the controller will default back into the Run mode.



- 3) Push "ESC" key.
The "Top Menu" shown at right is displayed.



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10.4 Cannot enter Run Mode

When the PH-II series will not switch to Run mode, check the following.

- 1) The message "Input Error" or "Output Error" is displayed on the screen.
The program included in the memory cassette has more points of input and/or output than is allowed in the controller body.
 - a) When making the program with the programming software.
The content of the program and the model are checked with the programming software. Write the program to the PH-II series controller and do not use a memory cassette.
 - b) When making the program with the PH-II series front panel keys.
Remove the memory cassette, and make the program again.
 - c) Install the memory cassette in the PH-II series of 24 point type.
 - d) Write the program in an PH-II series of the same type in which the program will be used.
- 2) The program data has an error.
When the program cannot be displayed with "ProgEdit" in "TopMenu", it is possible that the program data was damaged. Switch from "TopMenu" to the Run mode after deleting the program.
 - a) The program again and switch to Run mode.
 - b) Consult a Theben AG distributor when unable to switch to the RUN mode.

10.5 Incorrect Clock Data

Confirm the following item.

- 1) The time data is lost.
When approximately 20 days or more (25 °C) have passed since power was supplied to the PH-II series, the time data is lost. In this case, the time data should be set.
Further information about setting the time data can be found in the PH-II Programming Manual.
- 2) There are keep advancement by the time data and keep a delay.
The accuracy of the time data is ± 5 seconds a day. Use the time correction function when the time data error increases.
Further information about setting the time correction function can be found in the PH-II Programming Manual.

10.6 The "?" appears on the Display

The "?" mark is displayed when an unacceptable key is pressed according to the screen data. Confirm the acceptable options and press the appropriate key.



10.7 Cannot Use an Operation Key

Check the movement of the operation keys according to the following procedures when the PH-II series will not accept a key operation. If the steps outlined in instructions (1) - (5) below can be performed, the keys are operating properly. Please check if the key(s) are used in the program.

- 1) Place the controller in the Stop mode. Consult a Theben AG distributor when the Stop mode cannot be entered.



Caution

Perform the forced stop operation only after thoroughly checking that it is safe to do so. Damage to the machine or controller or a safety issue could arise if the forced ON/OFF is performed inappropriately. If proper precautions are not taken, damage to the equipment or machine failure may occur.

Forced Stop Operation

- a) Turn the PH-II series power supply off.
- b) Turn the power ON again while pushing the “OK” and “ESC” keys at same time.
The screen at right is displayed for 5 seconds.
The option to place the controller in Stop mode will be available for approximately five seconds. Press the “OK” key to enter the Stop Mode. If no key is pressed, the controller will default back into the Run mode.
- c) Push the “ESC” key.
The “Top Menu” shown at right is displayed.

```
Run
->Stop
```

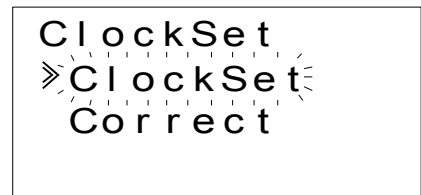
```
TopMenu
»Run
Setup TS
ProgEdit
```

- 2) Scroll through the Top Menu with “▲” key or “▼” key.
Consult a Theben AG distributor when you cannot scroll.
- 3) Move the cursor to “ClockSet” with “▲” key or “▼” key, and push the “OK” key twice.
The “ClockSet” screen at right is displayed.
Consult a Theben AG distributor when it is not displayed.

```
ClockSet
mm/dd/yyyy
09/06/2001
13:55 Thu
```

- 4) Try to change the month/year data using the “◀” key, “▶” key, “+” key and “-” key.
Consult a Theben AG distributor when editing is not possible.

- 5) Push the “ESC” key.
The screen at right is displayed and the operation of (4) is invalidated.
Consult a Theben AG distributor when the correct screen is not displayed.



10.8 Incorrect LCD display

Check the following items.

- 1) The character is displayed in reverse and the entire screen is black.
Consult a Theben AG distributor when the above error occurs. The PH-II controller display has been damaged.
- 2) An Unexpected Display Configuration is Shown
When the display does not appear as expected, please check the following points in the program.
 - a) Adjust the position where each display function begins. Two separate displays might have an overlapping display area that causes the undesired result.
 - b) The character fails to display
 - Check if the input pin to the Display Function Block is On.
 - Check whether there is a conflict with another display.

10.9 Memory Cassette Is Not Working Correctly

Check the following items when the memory cassette is not recognized or the cassette transfer functions are not functional.



Notes on use

- Use the memory cassette, the telecommunication cable, or the connector cover while power is supplied to the PH-II series controller.
Improper equipment installation can cause damage to the controller or an electric shock.
- 1) The memory cassette must be installed correctly, refer to section 6.1 for the proper installation procedure.
 - 2) The message “ProtectSW Error” is displayed.
The data protection (ProtectSW) is set.
Refer to the PH Programming Manual for the procedure to unlock this setting.
 - 3) The message “Password Error” is displayed.
The password is set. Try again after disabling the password.
Refer to the PH Programming Manual for the procedure to delete the password.
- The “ProgClear” option can delete the password, program, and all Top Menu settings. The controller will return to the factory default settings.
Refer to PH Programming Manual for the procedure to use the “ProgClear” operation.

10.10 Cannot Communicate with Pharao Software 2.0

Check the following items.



Notes on use

Use the memory cassette and the communication cable or the connector cover while installed without fail.

It causes the electric shock and the breakdown.

- 1) Check cable (PH-232 Kabel) connection.
Refer to section 7.2 for the connection method.
- 2) Check the power supply supplied to the PH-II series.
Refer to section 4 for the wiring for the power supply.
Moreover, refer to section 2.2 for the specification of the power supply.
- 3) Check whether the COM port of the personal computer which has connected a setup and cable (PH-232 Kabel) of the "communication port" set up by programming software is in agreement. Match it when not matching. Match it.
- 4) When it is remotely maintained with a modem
 - a) Check whether a setup of the modem by the side of PH-II series is correct.
Refer to PH-II programming manual and section 7.3 for the setting of the modem connected to the PH-II series side.
 - b) Check the connection of cable made by customer.
For the connection of cable, refer to section 7.3.2.
 - c) Check the setting of the modem on the programming software side.
Check whether the disk for a setup of modem attachment is installed correctly.

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