# EH-TD05
# User Manual

v1.4

# Table of Contents

# Operation Mode

EH-TD05 may be used in default mode, without configuration. In that mode only system editors are available: Memory editor, Date/Time editor and Error editor.

After configuration, EH-TD05 can display application-specific pages and handle alarm events. System editors may be disabled.

EH-TD05

Configuration

Default operation

EH-TD05 View

pages
alarms

Hitachi PLC

System menu
- memory editor
- date/time editor
- error editor

Configured operation

Hitachi PLC

Active display pages
- display values
- edit values

Alarms
- show alarm event list
- cancel active events

System menu
- memory editor
- date/time editor
- error editor
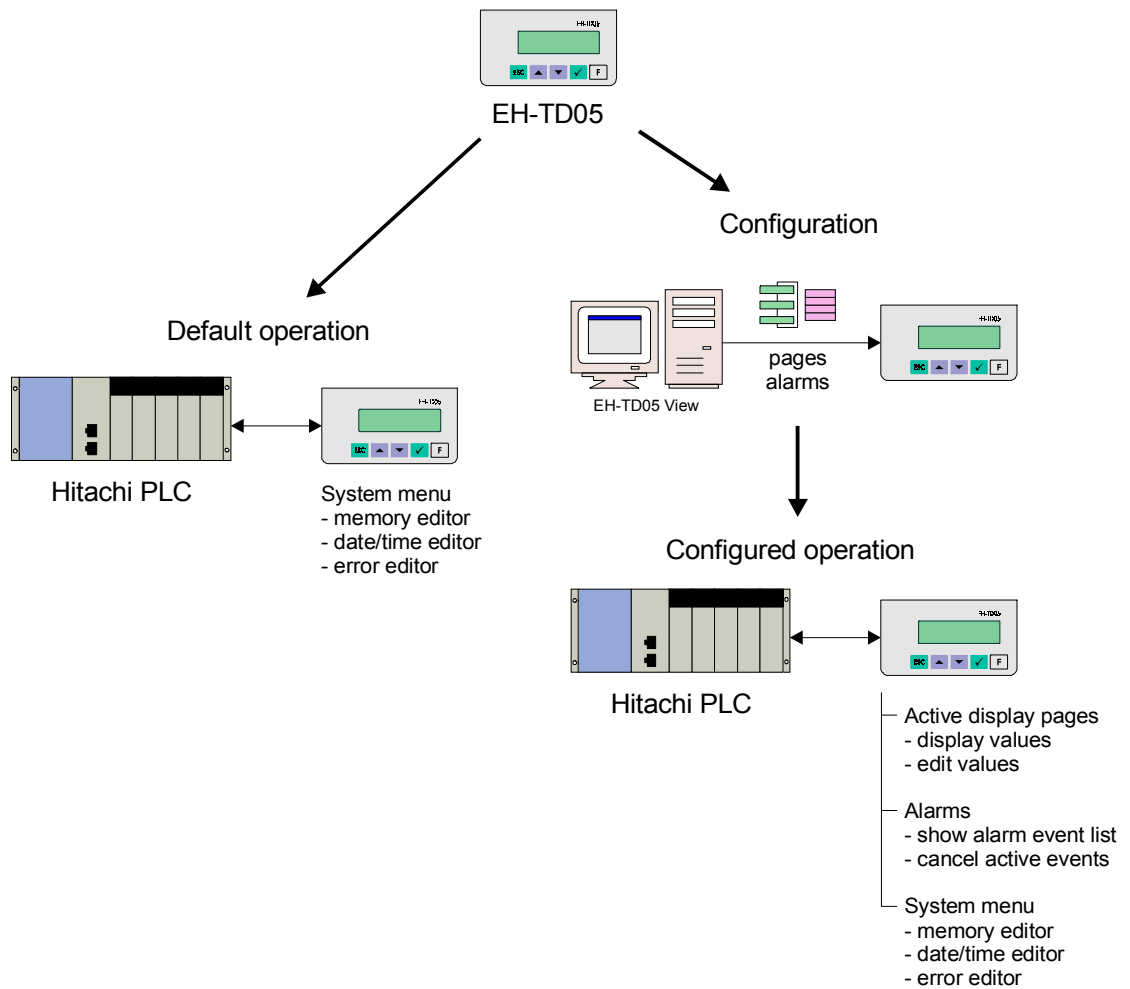
# Connecting

To connect EH-TD05 to PC, use communication adaptor and power supply adaptor. In normal operation, EH-TD05 uses power supply from the host PLC.

**a) configuration**
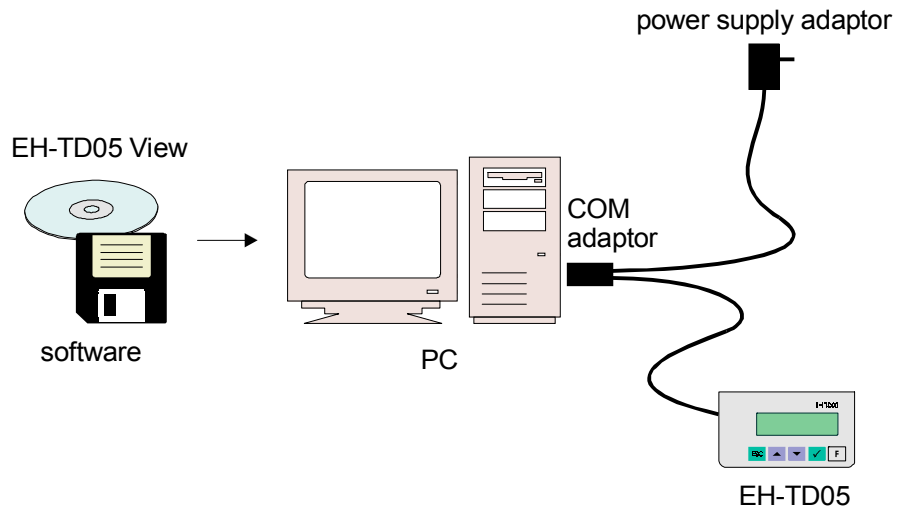


**b) operation**



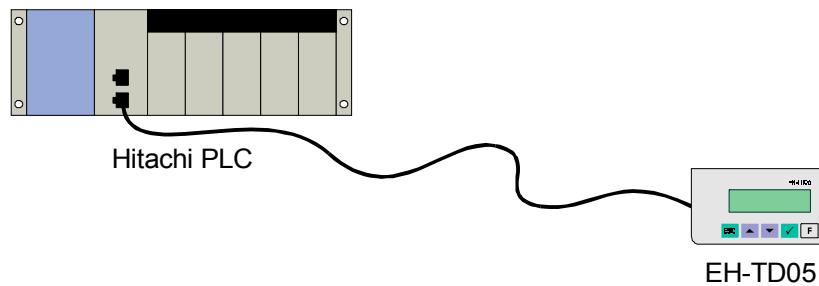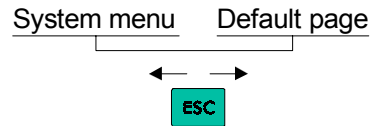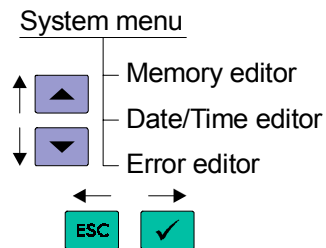Note: it is not possible to connect EH-TD05 to port 1 of EH-150, because power is not supplied by this port. To connect EH-TD05 to EH-150 please use port 2.

# System Menu

When EH-TD05 is connected, it displays first (default) active display page. To invoke system menu press ▣ key. To switch back to page view press ▣ again.
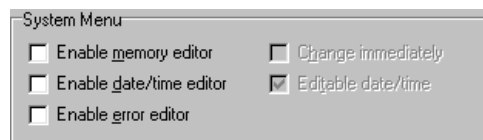
System menu offers three system editors:

In default operation mode all system editors are enabled.

Some applications, from security reasons, may have restricted PLC memory access. This may be done by disabling system editors.

To disable system editors, use configuration program. From the main menu select Options/Project Options and uncheck editor checkboxes.

## Memory Editor

Memory editor is used to display or edit content of PLC memory locations. Editor may be used even if PLC program is running.

To start Memory editor press ▣ (to invoke System menu), press ▼ (to select Memory editor) and press ✓ (to enter).
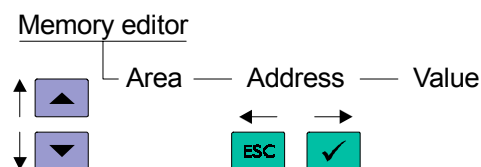
By using Memory editor, user may access following memory areas:

X, Y, R, L, M, T/C, CL, WX, WY, WR, WRF, WL, WM, TC

X, WX, T/C and TC are read-only, all others are read/write. WRF is the same area as WR, except that beginning address is F000, in order to quickly access Hitachi system areas.

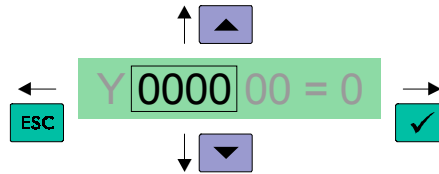Memory areas have different address range and word size. Some areas have two address fields. In that case, each field is edited separately.



To increase or decrease field value press ▲ and ▼. To advance to next field press ✓. To return to previous field press ESC.

# Date/Time Editor

Date/Time editor is used to set PLC real-time clock. If PLC does not have RTC, all fields will be zero. Date format is day.month.year.
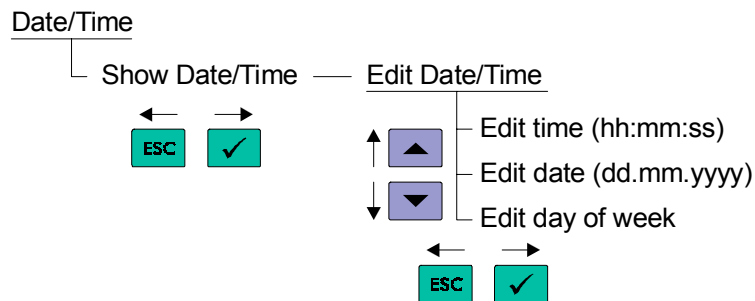


# Error Editor

Error editor is used to view and clear PLC system errors.



To clear an error press ✓ and then confirm clearing.

# Active Display Pages

## Description

**Display PLC Memory Location**

Main function of active display page is to show selected PLC memory locations.



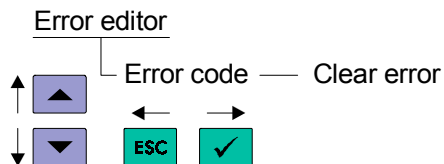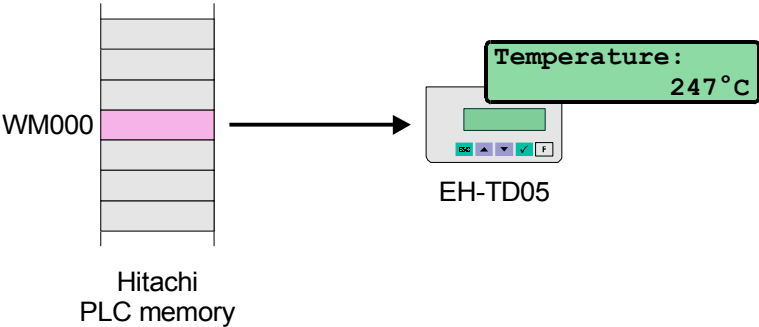Active display page can display any PLC memory location. Up to four locations may be displayed at one page. If selected memory address is invalid, "xxxx" is displayed instead. Even one invalid address will block all other locations.

To create new page press Add button. Edit Page dialog box will appear. Enable Value 1 checkbox and set field position and size. Enter PLC variable address.



To label displayed values enter short description in the Line 1 and Line 2 fields. Description text is showed "below" value fields, to make available more fields in the same line.



Memory location may be displayed as decimal number, hexadecimal number, BCD number or as list of strings. To display location as list, check Menu checkbox and enter menu items.



For values of 0, 1, 2 and 3, "off", "cooling", "heating" and "error" will be displayed. If content of memory location is out of range, numeric value will be displayed instead.

**Edit PLC Memory Location**

Active display page may also be used to change value of selected PLC memory location.



Hitachi
PLC memory
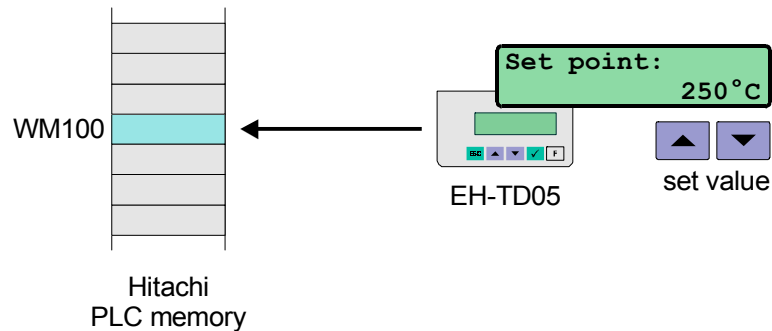
To create such page, enable Edit field, set field position and size, and enter corresponding PLC memory address.



To restrict edit range, check Limits checkbox and adjust lower and upper limit.

To send changed value to PLC immediately, before pressing ✔, check the Change immediately checkbox.

Only one edit field per page is possible. To edit two (or more) different locations two (or more) pages should be used.

Variable address of edit field may be left blank. Such variable is stored locally, and may be used for branching or password entering.

Together with edit field, active display page may also contain up to four value fields.

# Page Order

After connected, EH-TD05 will display first (default) page.

Page order is defined by the Edit Page dialog box. Next page denotes page which will be displayed after ✔ is pressed. Escape page denotes page which will be displayed after ESC is pressed.
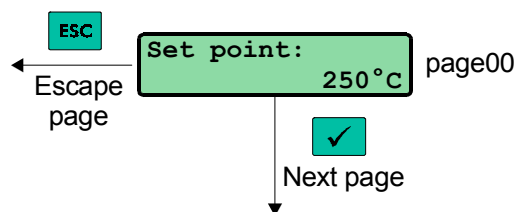


Default function of ESC is to invoke system menu. It is possible to select any other page, in order to build complex structure of pages.

The following example contains three pages displayed in sequence:

| Page: | Next page: |
|-------|-----------|
| page00 | page01 |
| page01 | page02 |
| page02 | page00 |

```
        ┌─────────────────────────────┐
        ▼
   ┌──────────────────┐
   │ Product type:    │        page00
   │        angle co  │
   └──────────────────┘
         │  ┌─┐
         ▼  │✓│
   ┌──────────────────┐
   │ Product count:   │        page01
   │           23472  │
   └──────────────────┘
         │  ┌─┐
         ▼  │✓│
   ┌──────────────────┐
   │ Defect count:    │        page02
   │              27  │
   └──────────────────┘
            ┌─┐
            │✓│
```
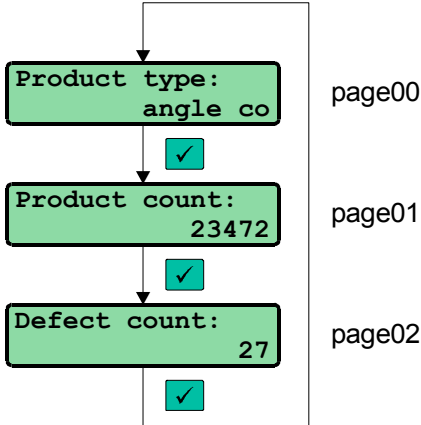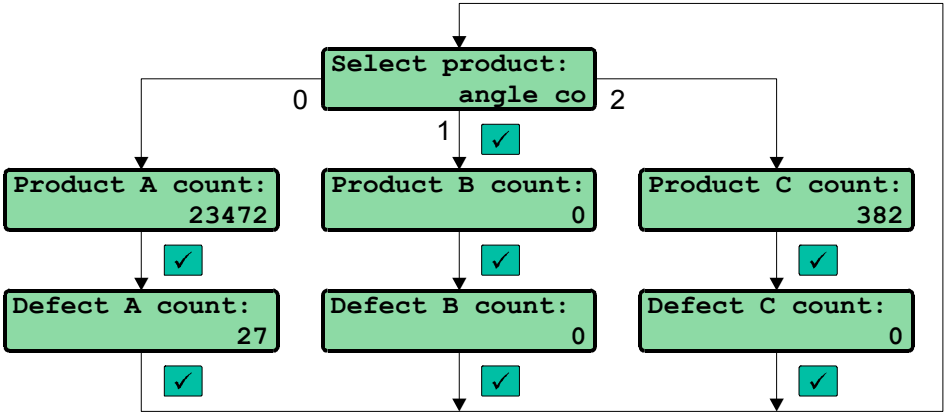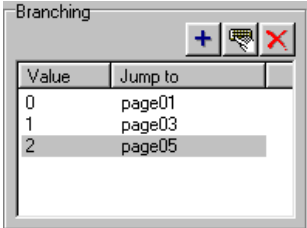
# Page Branching

To make complex page structures, page branching is available. To enable branching, open Edit Page dialog box and enter page destinations.

```
┌─Branching──────────────────┐
│              + ▧ ✕         │
│ ┌──────┬──────────────┐    │
│ │Value │ Jump to      │    │
│ ├──────┼──────────────┤    │
│ │0     │ page01       │    │
│ │1     │ page03       │    │
│ │2     │ page05       │    │
│ │      │              │    │
│ └──────┴──────────────┘    │
└────────────────────────────┘
```

```
                        ┌───────────────────────────────────┐
                        ▼
              ┌──────────────────┐
              │ Select product:  │
           0 ─│        angle co  │─ 2
              └──────────────────┘
                  1  ┌─┐
                     │✓│
   ┌──────────────────┐   ┌──────────────────┐   ┌──────────────────┐
   │ Product A count: │   │ Product B count: │   │ Product C count: │
   │          23472   │   │              0   │   │            382   │
   └──────────────────┘   └──────────────────┘   └──────────────────┘
        │  ┌─┐                  │  ┌─┐                  │  ┌─┐
        ▼  │✓│                  ▼  │✓│                  ▼  │✓│
   ┌──────────────────┐   ┌──────────────────┐   ┌──────────────────┐
   │ Defect A count:  │   │ Defect B count:  │   │ Defect C count:  │
   │             27   │   │              0   │   │              0   │
   └──────────────────┘   └──────────────────┘   └──────────────────┘
           ┌─┐                    ┌─┐                    ┌─┐
           │✓│                    │✓│                    │✓│
```
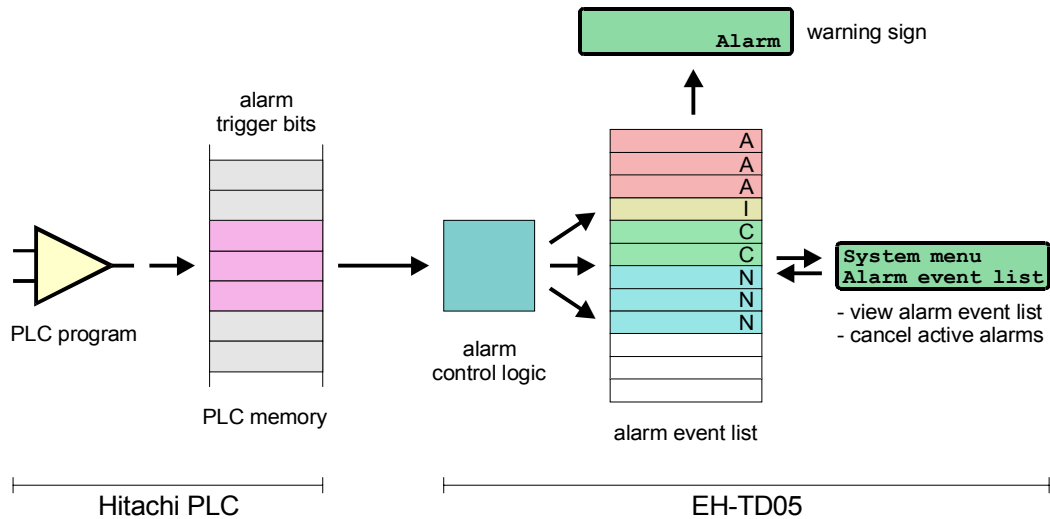
Branching feature allows creation of password protected pages.

In the following example, number 1234 activate protected pages. Without password, pages 07 and 08 will be unreachable.
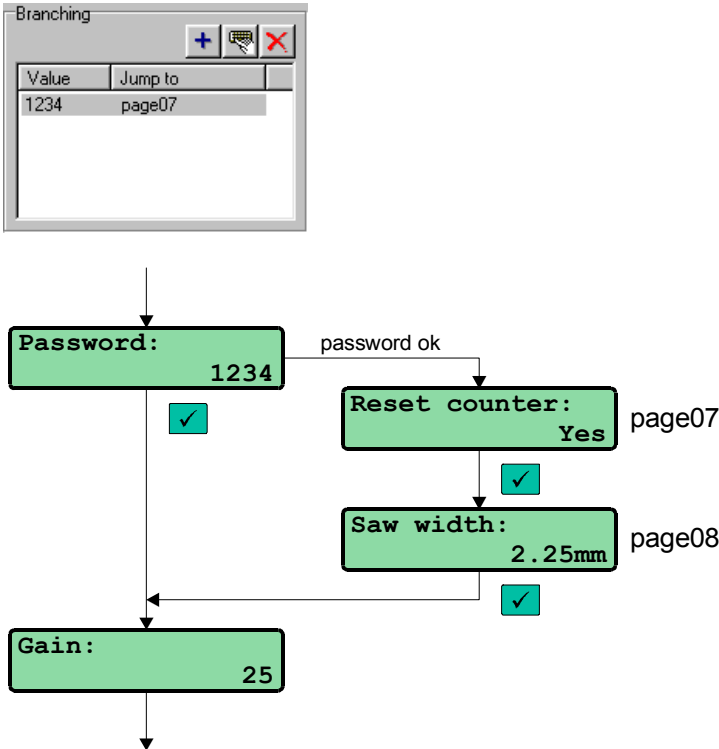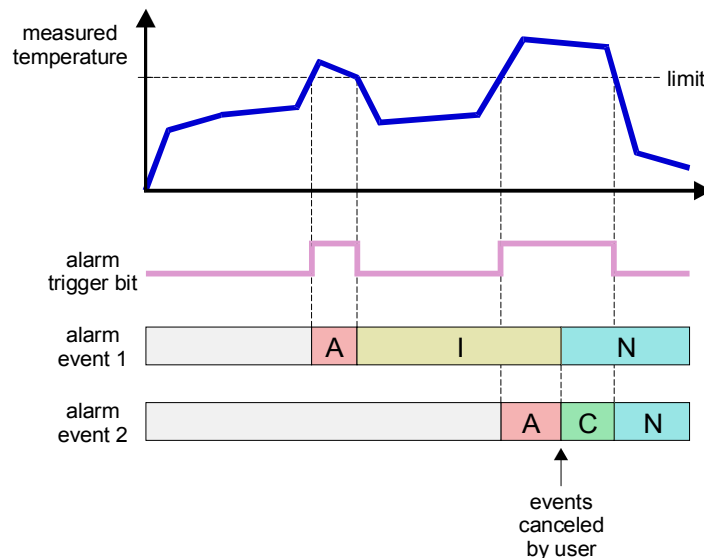
# Alarms

EH-TD05 alarm control logic create and maintain list of alarm events. Just a few lines of PLC code is necessary to detect alarm condition and rise alarm trigger bits.



The function of PLC program is to set and reset alarm trigger bits, depending of alarm condition. When alarm condition is true, alarm trigger bit should be 1. When condition is false, alarm trigger bit should be 0. No additional programming is required.

EH-TD05 alarm control logic may handle up to 16 alarm trigger bits, i.e. 16 different alarms are available.

In the following example, Hitachi PLC controls heating process. Alarm is activated if measured temperature exceeds given limit.



Rising edge of alarm trigger bit creates a new alarm event. Each event contains:

- event number
- alarm trigger bit
- alarm caption
- date and time when alarm occurred
- event status

Event number is ordinal number of event in the event list.
Alarm trigger bit and alarm caption identify alarm source.
Event status indicates current event status.

The following chart shows possible status transitions:
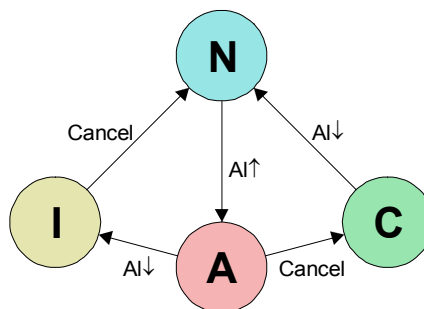


Event states are:

A       event active
C       event canceled, but alarm trigger bit is still active
I       alarm trigger bit not active, but event is still pending
N       alarm canceled and inactive

Actions that change event states are:

AI↑     alarm trigger bit changed from 0 to 1
AI↓     alarm trigger bit changed from 1 to 0
C       event canceled by user

To display alarm event list, start System menu and select Alarm event list. Each alarm event is displayed in the following format:
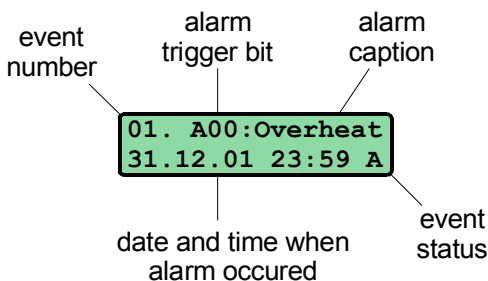


To cancel currently displayed event press ✔.

If alarm event list contains at least one active alarm ("A"), blinking "Alarm" message is displayed in the bottom right display corner. If there are no active alarms, but alarm event list contains at least one idle event ("I"), "Alarm" message is displayed but it does not blink.



If the alarm message overlaps one or more value fields, fields will not be displayed until alarm is canceled.

Alarm event list may contain up to 16 events. If more events arise, 16 most recent events are stored. Alarm event list is not erased by power supply failure.

To define location of alarm trigger bits open Options/Project Options dialog box and enter Alarm bits address. It is convenient to use WM memory space to allocate alarm trigger bits, in order to make individual bits accessible as bit locations.
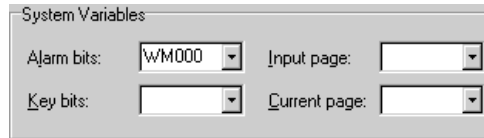


Polling time of alarm trigger bits is about 200ms, therefore a very short event may not be registered. Event also may be missed if trigger bit is activated and deactivated while system menu is active.

When Alarm bits location is properly defined EH-TD05 system menu will automatically contain new item Alarm event list. Please ensure that at least one display page has Escape page set to [system menu].

To define alarm caption strings open Edit/Alarm List dialog box.
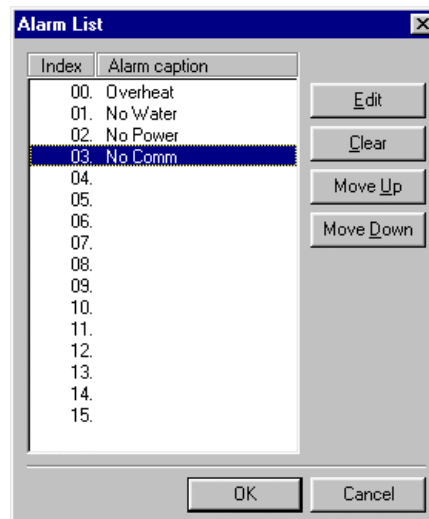


Index column corresponds to alarm trigger bit position. Maximum caption length is 8 characters.

# Project Options

Project Options dialog box contains settings unique for each project.
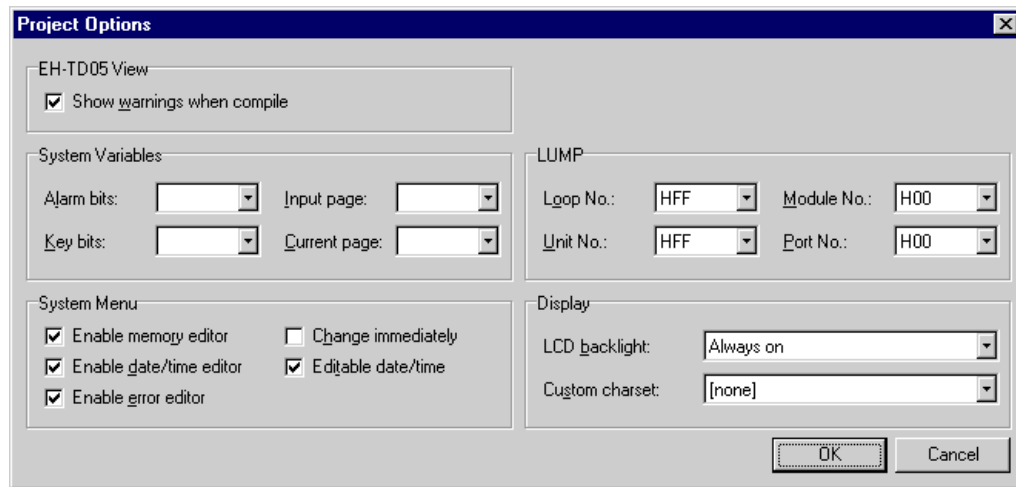


## EH-TD05 View

If option Show warnings when compile is activated, EH-TD05 View will notify about suspicious project elements, such as invalid caption string or page pointer.

The error checking is not perfect, so even if project indicate no errors, it may contain addresses not recognized by the applied Hitachi CPU, or other run-time errors.

## System Variables

System variables are locations in PLC memory used for specific purpose. To set system variable address open Options/Project Options dialog box.

Each address field may be left blank. In that case, the corresponding variable will not be used.

**Alarm Bits**

Size: word
Direction: write only

Location in PLC memory which contains 16 alarm trigger bits. To read more about alarms please open Alarms section.

**Key Bits**

Size: word
Direction: read only

To obtain current state of operator panel keys PLC should read this location. Each key is represented by corresponding bit:
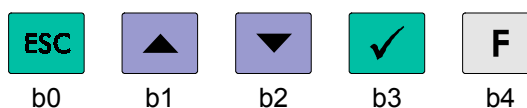


For example, if key F is pressed, location Key bits will contain value 16.

To access keys as bit locations, it is convenient to locate Key bits in WM memory area.

**Input Page**

Size: word
Direction: write only

By writing to this location, PLC program can display any display page.

**Current Page**

Size: word
Direction: read only

Contains number of currently displayed page.

# LUMP

Hitachi network address (link, unit, module, port).

# System Menu

Enable/disable system editors. For more details about system editors refer to System Menu section.

# Display

LCD backlight option is used to control behavior of EH-TD05 backlight. Backlight options are:

- Always on
- Power saver (backlight automatically turns off 30 sec after pressing a key)
- Always off

Power saver and Always off modes can be used when power consumption is important. This may be the case when several current consuming modules (e.g. Link module) are connected to Hitachi CPU.

For power consumption specification refer to Technical Specifications section.

Custom charset is used to select user-defined character set. For more details refer to Custom Charset section.

# Character Set



To enter characters not supported by your keyboard, use the backslash symbol followed by one, two or three-digit decimal character code. This may be used in page text, menu entry and alarm caption.

Example:
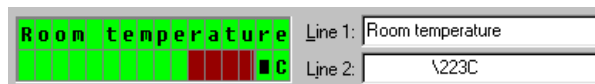


To enter symbol "°" (degrees centigrade) user should enter "\223" ("°" = DF hex = 223 dec). Edit Page dialog box shows a small black rectangle, but EH-TD05 will display the actual symbol.

Codes 0..7 are reserved for custom characters.

# Custom Charset

If characters not included in standard LCD character set are needed (e.g. national characters), it is possible to create custom characters. Up to 8 characters may be defined.

To create a custom character set, open Tools/Edit Custom Characters and press New. Each character is defined in 5x8 dot matrix. In order to preserve line spacing the bottom row is usually empty.
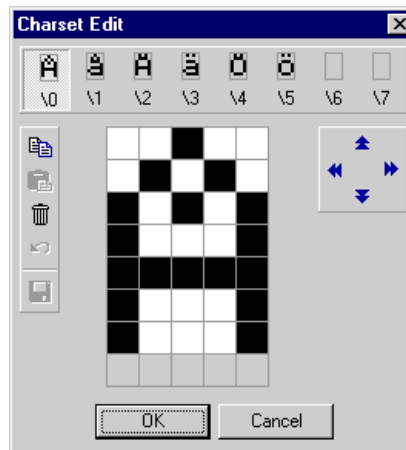


Available commands are:

| | | |
|---|---|---|
| Copy | Copy current character to clipboard. |
| Paste | Paste character from clipboard. |
| Erase | Erase current character. |
| Undo | Undo last operation. |
| Save | Save entire charset to disk. |
| Shift | Shift current character. |
| Select | Select character. |

Each character set is stored in separate file, located in folder EH-TD05 View\Charsets. Charset is saved as 64x8 2-color uncompressed bitmap (.bmp), so any external bitmap-editing program may be used to create a new charset.

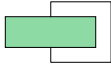To assign defined character set to current project open Tools/Project Options and select Custom Characters.



To use defined characters type backslash and character code (0..7).

# Examples

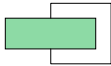To open an example select <span style="color:red">File</span>/<span style="color:red">Open</span>, open <span style="color:red">Examples</span> directory and choose example
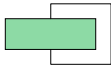
**1. Show One**
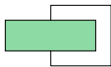
Show one memory location.

**2. Edit One**

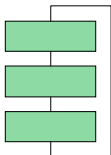Edit value of one memory location.

**3. Show Four**

Show four memory locations in one page.
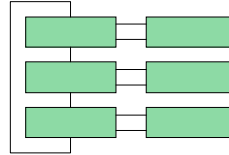
**4. Edit Menu**

Edit memory location as menu.
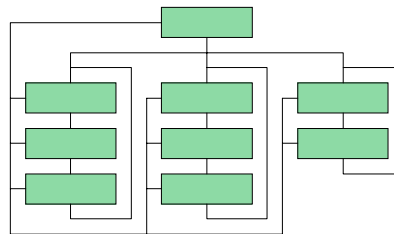
**5. Show Multi**

Show 3 memory locations with 3 consecutive pages.
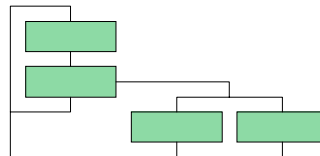
**6. Edit Multi**

Show 3 memory locations with 3 consecutive pages. For each location allow edit on demand.
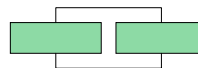
**7. Branching**

Multiple pages organized in tree-like structure.

**8. Password**

Allows editing two parameters, but only after correct password is entered. Passwords are 10 and 12.

**9. Alarms**
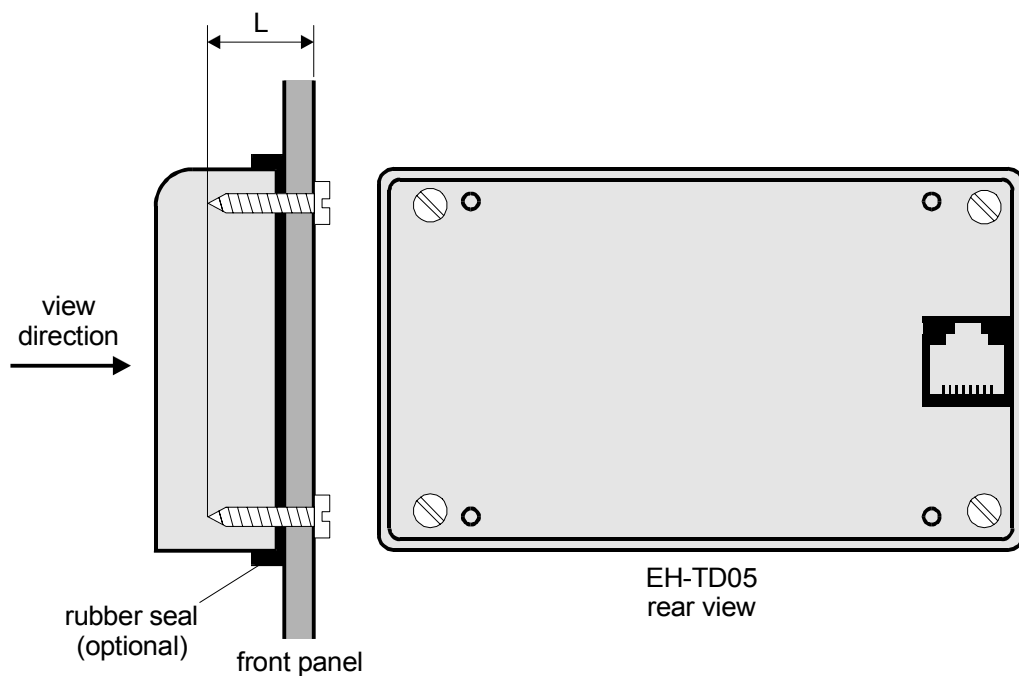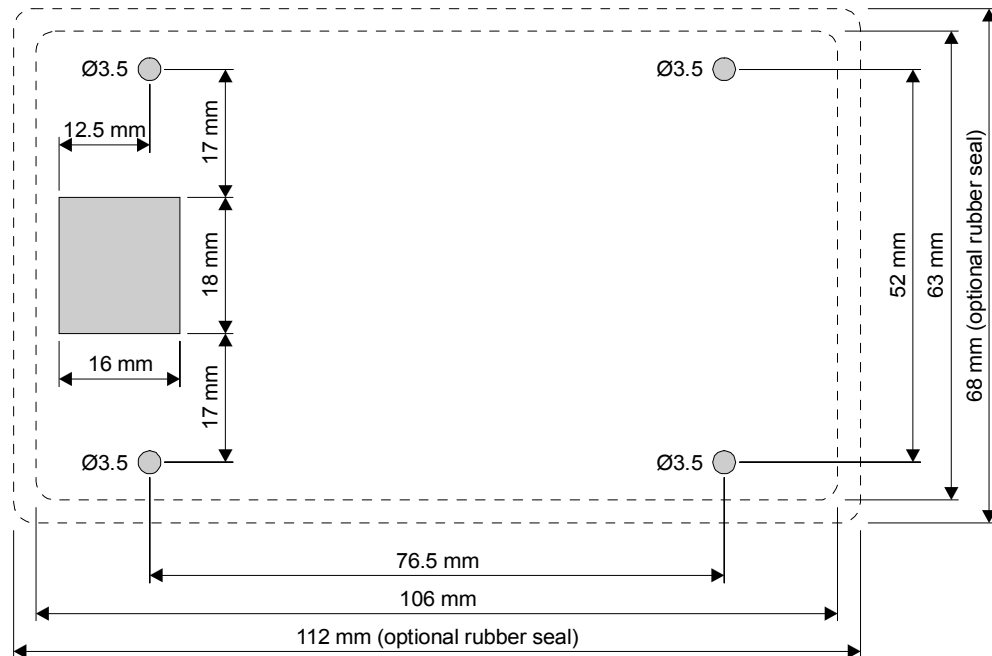
Two pages and two alarms. Each page have edit field, addressed to alarm trigger bits.

Ideal for exploring alarm control logic.

# Mounting

The EH-TD05 has to be mounted on a panel. Prior to mounting, screw holes and connector opening should be drilled.
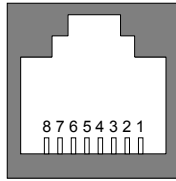
Drill template (front view):





L = (control panel thickness + 9mm) ± 4mm

For mounting at control panel use self-tapping screws 3 x L.

# Connections

EH-TD05 communication port specification:



1. GND 5. Rx
2. +5V 6. Tx
3. N.C. 7. DR
4. N.C. 8. RS

(looking into port)

Communication cable RJ45-RJ45 (micro-EH and EH-150)

| EH-TD05 | | micro-EH | |
|---|---|---|---|
| pin | signal | pin | signal |
| 1 | GND | 1 | SG1 |
| 2 | +5V | 2 | VCC |
| 3 | N.C. | 3 | DTR1 |
| 4 | N.C. | 4 | CD1 |
| 5 | Rx | 5 | SD1 |
| 6 | Tx | 6 | RD1 |
| 7 | DR | 7 | DR1 |
| 8 | RS | 8 | RS1 |

Communication cable RJ45-DB15 (H-250 series)

| EH-TD05 | | H-250 | |
|---|---|---|---|
| pin | signal | pin | signal |
| 1 | GND | 9-10 | SG |
| 2 | +5V | 11-12 | RV5 |
| 3 | N.C. | - | - |
| 4 | N.C. | - | - |
| 5 | Rx | 2 | SD |
| 6 | Tx | 3 | RD |
| 7 | DR | 7 | DR |
| 8 | RS | 4 | RS |

# Technical Specifications

| | |
|---|---|
| Nonvolatile memory: | serial EEPROM |
| EEPROM size: | 8K |
| Number of pages available: | 48 |
| Communication speed: | 19200/4800bps, automatic selection |
| Cable length: | 5m max. |
| | |
| Alarm trigger bits: | 16 |
| Size of alarm event list: | 16 |
| Alarm caption length: | 8 chars |
| | |
| Max. menu items: | 5 |
| Max. menu item length: | 8 chars |
| | |
| Display: | LCD with backlight |
| Characters: | 2x16 |
| Character size: | 3x5mm |
| | |
| Power supply: | 5VDC |
| Power consumption: | 120mA (LCD backlight on) |
| | 40mA (LCD backlight off) |
| | |
| Operating temperature: | 0..50°C |
| Humidity: | 85% rh non-condensing |
| | |
| Index of protection: | IP54 (with rubber seal) |
| | IP40 (without rubber seal) |
| Dimensions: | 112x68mm (with rubber seal) |
| | 106x63mm (without rubber seal) |

# Compatibility

EH-TD05 supports the following Hitachi CPU's:

- EH-150 (port 2 only)
- micro-EH
- H-250/252B/C
- H-302/702/1002/2002/4010

The following CPU's are NOT supported:

- H-20/40/28/64
- H-200
- H-300/700/2000