# GASTRON

# GASTRON

# GTD-3000TxW
## Instruction Manual

GAS DETECTOR
FUNC   PWR   TRB   RESET
GTD-3000Tx
MEAS. GAS
[ HCl ]
[ 0.0]PPM
SERIAL No.
DATE

# GASTRON

Read in detail for correct use.

# Gas & Flame Detection System

**GASTRON**

When abnormalities occur after purchasing the product, please contact the following address.

· Address : 23 Gunpo Advanced Industry 1-ro,
　　　　　　 Gunpo-si, Gyeonggi-do
· Tel 　　 : 031-490-0800
· Fax 　　 : 031-490-0801
· URL 　　 : www.gastron.com
· e-mail 　: info@gastron.com

## We sincerely thank you for purchasing the product of Gastron Co. Ltd.

Our Gastron Co.Ltd. is a company specialized in Gas detector and Gas Monitoring System, being recognized by many consumers due to the best quality and use convenience. We always enable you consumers to find desired products nearby and are ceaselessly studying and striving for development of Gas detectors satisfying customers. From now on, solve all anguishes concerning Gas detector with the products of Gastron Co. Ltd, We Gastron Co. will take a responsibility and give you satisfaction.

In the present instruction manual, operation method for Gas detector as well as simple methods for maintenance and repair, etc. are recorded If you read it in detail and keep it well, for reference when you have questions, then it will give you much help.

■ For accurate operation of Gas detector, check up and calibrate for more than once in every 6 months.
　( ＊ See No. 13 of KOSHA GUIDE : P-135-2013 / 8.3 paragraph on qualification and calibration)
■ For accurate operation of Gas detector, checkup and calibration with calibration gas before measurement is recommended.
■ When not calibrated, it may cause malfunction of the equipment due to problems resulting from Sensor aging.
■ When the present instrument should be dismantled, those with professional skills for Gas detector should conduct the operation.
■ For power supply cable, wire specifications should be determined by referring to the item of "Length of installed cable".
■ For the contents on checkup and calibration of Gas detector, please use our company's engineering department , e-mail, or web site.

The present product and the product manual can be changed without advance notice for performance improvement and use convenience of the product.

＊ KOSHA GUIDE : P-135/6-2018
　Calibration should be executed at the periods required by the manufacturer, and should be executed every quarter unless there are separate calibration periods.

**GTD-3000TxW
Instruction Manual**

Contents

Contents

www.gastron.com
04_05

GTD-3000TxW flammable gas detector has been developed to detect gas leaked from industrial sites and various flammable gases generated from factories, gas storages, and manufacturing processes that produce or use flammable gases and to prevent accidents in advance. GTD-3000TxW toxic gas detector is installed in areas with toxic gas leak hazards and continuously monitors gas leak. It displays measurements on built-in displays (OLED) of the detector, delivers alarm status with visible and audible signals using a warning light, and provides Analog 4~20 mA standard output signal. Also, for Analog 4~20 mA standard output, output signal transmission length between detector and receiver can be connected up to 2,500 m. (When Cable CVVS or CVVSB 1.5sq and higher is used.) GTD-3000TxW flammable gas detector must be used at a height below 1,000 m above sea level.

# 2. Configuration

Body of GTD-3000ExW is made of Aluminum alloy and the gas sensor module is made of stainless steel. It consists of a complete explosion-proof enclosure (Ex d IIC T6). This product can be installed in areas with combustible gas leak and explosion hazards. It has built-in display (LCD or OLED) on the detector to display gas leak status at installed site. Internal configuration consists of display part that indicates measurements, terminal part that output measurements (Analog 4~20 mA) externally, and a PCB board. External configuration consists of sensor that detects gas leak, cable inlet, and high-pressure explosion proof small warning light made of SUS materials. It uses magnet-bar outside the main body of detector enabling calibration from the outside of the detector, thus, maintenance is convenient.
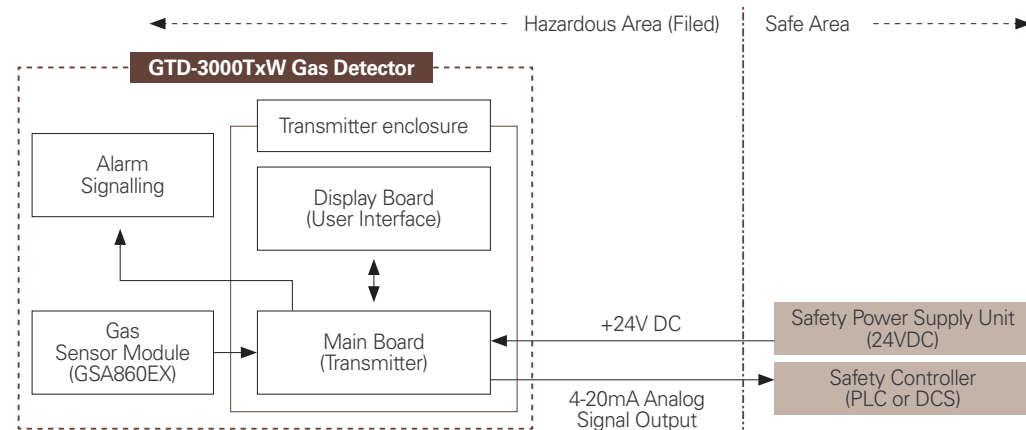
[Figure 1. GTD-3000ExW Overview]

## 3.1. Basic Specifications

| ITEMS | SPECIFICATION | |
|---|---|---|
| Measuring Type | Diffusion | |
| Measuring Value Display | - LCD or OLED Display<br>- Green, Red, Yellow LED<br>- Sound Output(95dB) | |
| Measuring Method | - Electro-Chemical Cell<br>- Heated-semiconductor Cell<br>- Photoionization detector(PID) | |
| Detectible Gas | Toxic Gas (Note1) | |
| Measuring Range | Capable to display 000.0 ~ 9999 (Note 1) | |
| Accuracy | ≤ ±3% / Full Range | |
| Zero Drift | ≤ 2% / Full Range | |
| Response Time | Depends on Sensor Module.<br>Refer to Sensor Specification or Contact in case for Special Gas. | |
| Approvals Classification | KCs: Ex d IIC T6,T5,T4 | |
| Basic Interface | Analog 4-20mA current interface | |
| HART Interface | HART REV7(Option) | |
| Option | HART Board | |
| | MODBUS RS485 Board | |
| Warranty | Transmitter | 2Year |
| | Sensor | 1Year |

※ Note1. Refer to the measured gas list for measured gases and their ranges. Contact us for special gas.

## 3.2. Mechanical Specifications

| ITEMS | SPECIFICATION | |
|---|---|---|
| Explosion Proof type | Explosion-Proof Enclosure | |
| Dimension | - Transmitter: 156(W) × 322(H) × 110(D) mm<br>- Lamp: 83.8(W) × 85(H) × 48(D) mm | |
| Weight including Sensor | App. 2.5kg | |
| Mounting type | Wall mount | |
| Mounting Holes | Ø 7 ±0.1 | |
| Cable inlet | 3/4" PF (1/2" or 3/4" NPT) | |
| Body material | Transmitter | aluminum alloy |
| | Sensor | Stainless Steel (STS316) |
| | Lamp Cover | PC |
| | Lamp Body | Stainless Steel (SUS304) |

GTD-3000TxW
Instruction Manual

3. Specification

4. Name and Description of Each Part

www.gastron.com
08_09

## 3.3. Electrical Specifications (Standard Type)

| ITEMS | SPECIFICATION | |
|---|---|---|
| Input Voltage(Standard) ※ Customer supplied PSU must meet requirements IEC1010-1 and CE Marking requirements. | Absolute min: Nominal: Absolute max: Ripple maximum allowed: | 18V 24V 31V 1V pk-pk |
| Wattage | Max. wattage: Max. current: | 5.5W @+24 VDC 230mA @+24 VDC |
| Analog output Current | 0-20 mA(500 ohms max load) All readings ± 0.2mA Measured-value signal: 4mA(Zero) to 20 mA(Full Scale) | |
| | Fault: 0-100% LEL: 100-109%LEL: Over 110% LEL: Maintenance: | 0mA 4mA - 20mA 20mA - 21.4mA 22mA 3mA |
| Analog output current ripple & noise max | ±20uA | |
| Relay contact | Alarm1, Alarm2, Fault Relay Rated 1.0 A @ 30VDC or 0.5 A @ 125 VAC | |
| Wiring requirement | Power | CVVS or CVVSB with shield |
| | Analog | CVVS or CVVSB with shield |
| | RS485 | STP(Shielded Twisted Pair) |
| Cable Connection Length | Analog | 2500m |
| | RS485 | 1000m |
| EMC Protection: | Complies with EN50270 | |

## 3.4. Environmental Specifications

| ITEMS | SPECIFICATION | |
|---|---|---|
| Operation Temperature | Transmitter | -20 to 60 ℃ |
| | Sensor | Refer to Sensor Specification |
| Storage Temperature | Transmitter | -20 to 60 ℃ |
| | Sensor | Refer to Sensor Specification |
| Operation Humidity | Transmitter | 5 to 99% RH (Non-condensing) |
| | Sensor | Refer to Sensor Specification |
| Pressure Range | | 90 to 110KPa |
| Max. air velocity | | 6m/s |

## 4.1. Components
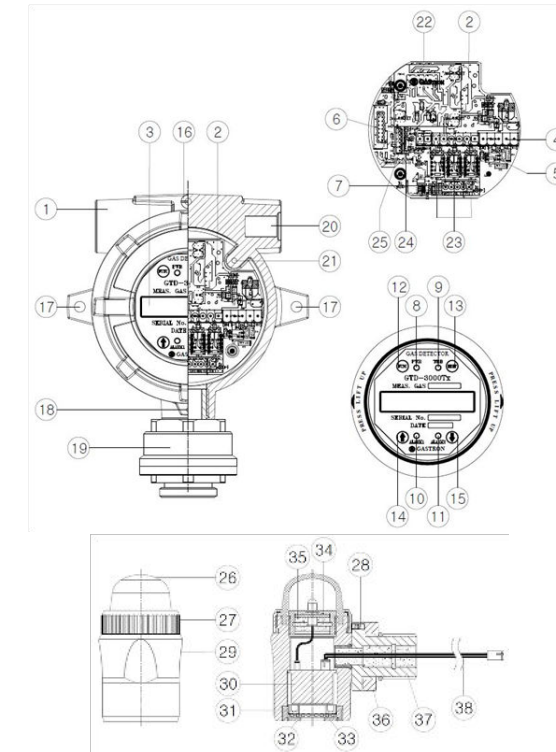


[Figure 2. GTD-3000TxW Components]

| NO | NAME | DESCRIPTIONS |
|---|---|---|
| 1 | Housing | Protects PCB Board built in Sensor and Housing from external environmental change and shock. |
| 2 | Main PCB | It amplifies output signal from the sensor and converts and send it into DC 4~20 mA standard output. Isolation RS-485 network signal and alarm relay contact signal are outputted. Also, it sends data for the display. |
| 3 | Display PCB | It displays data received from main PCB on LCD or OLED and displays the current event status with power lamp, alarm lamp, trouble lamp. |
| 4 | Power/Signal Terminal | CN1 consists DC18-24 V power supply and DC 4~20 mA standard output connection terminal (VISO, +24V, mA,-, ETH). |
| 5 | Alarm signal Terminal | CN10 is alarm signal connection terminal, which outputs trouble, alarm1, alarm2 relay contacts. |

GTD-3000TxW
Instruction Manual

4. Name and Description of Each Part

4. Name and Description of Each Part
www.gastron.com
10_11

| NO | NAME | DESCRIPTIONS |
|---|---|---|
| 6 | RS-485 signal terminal | CN6 is Isolation RS-485 network signal connection terminal (A, B). |
| 7 | Sensor terminal | CN1 is Sensor Connection Terminal. (RD, WH, BK, BE) |
| 8 | Power lamp | When power is turned on, it lights on. |
| 9 | Trouble lamp | It lights on when there is a fault in the circuit or sensor sensitivity, etc. |
| 10 | Alarm1 lamp | It lights on when gas leaks and it exceeds Alarm1 level. |
| 11 | Alarm2 lamp | It lights on when gas leaks and it exceeds Alarm2 level. |
| 12 | Function key | During parameter setting, it changes to program mode when it is contacted with magnet-bar for 2 sec or longer. (Program mode, Calibration mode, Test mode, etc.) Also, it is used to enter and set an arbitrary data. |
| 13 | Reset key | To cancel or return to the previous status during Parameter setting, use the Magnet Bar and touch once. (Each touch returns to the previous status by one unit. |
| 14 | ↑(Up) key | During conversion of mode or number, use the Magnet-Bar and touch once. Each touch converts or changes one level. (Converts to the next level) |
| 15 | ↓(Down) key | During conversion of mode or number, use the Magnet-Bar and touch once. Each touch converts or increases displayed value by one unit. (Converts to the previous level) |
| 16 | External earth | - It is an external ground for protection from external noise or strong electric field.<br>- Use a conductor that is 4 mm or longer when coupling ground line. |
| 17 | Mount hole | Hole to fix the gas detector on external wall or other installation sites. |
| 18 | Cover fixed screw(M4) | After assembling detector housing body and cover, they are fixed with hex lens bolt to prevent detachment by external shock. |
| 19 | Sensor thread | It is a mounting for gas sensor (detector). |
| 20 | Cable inlet | It is provided to supply power and inlet for measured output signal of the gas detector during installation work. As default, PF 3/4" is provided. |
| 21 | Internal earth | - It must be grounded to inside of detector for protection from external noise or strong electric field.<br>- Use a conductor that is 4 mm or longer when coupling ground line. |
| 22 | RS-485 Module /<br>HART Module (Option 사양) | It is a connector for Isolation Type RS-485 and HART network modules to communicate with PC or PLC. To run RS-485 network, network address must be configured. Default is 1. To run HART network, Polling-Address and Tag No., etc. must be configured. |
| 23 | Relay Contact Type Selection Jumper | It is constructed to select A or B contact.<br>When it is not in ENERGIZER MODE, it operates in A contact (Normal Open) mode or B contact (Normal Close) mode when Jumper is connected to a part marked as A silk or B silk, respectively. In contrast, when it is in ENERGIZER MODE, connecting Jumper to A operates in B contact mode and connecting Jumper to B operates in A contact mode. |
| 24 | Warning Light Connector | It is a connector connected when a warning light is used. (Option) |
| 25 | Program Connector | It is a connector for downloading the program for the product. |
| 26 | FRONT CASE | It is an explosion-proof case made of explosion-proof plastic and emits LED light externally through transparent window. |
| 27 | CASE RING | It serves as a cover to prevent deviation of front case. |
| 28 | SEXANGLE BOLT | It serves to prevent deviation after case ring assembly and is fixed by mood bolt. |

| NO | NAME | DESCRIPTIONS |
|---|---|---|
| 29 | CASE BODY | It is the main body that protects internal buzzer and other parts by body. |
| 30 | BUZZER | It receives signal upon an event of error and generates warning sound. |
| 31 | FIXED RING | It prevents deviation of sinter filter upon external shock. |
| 32 | FLAME ARRESTER | It blocks flow in of dust, debris, water, gas and delivers warning sound from the buzzer to outside. |
| 33 | ARREST CAP | It protects sinter filter from external shock. |
| 34 | LED COVER | It is a joint for LED PCB ASS'Y and covered with moulding. |
| 35 | LED PCB ASS'Y | It is a multi-color LED that displays status. |
| 36 | NUT | It serves to fix parts to the compliment part. |
| 37 | SHAFT BODY | It serves to fix parts to the compliment part. |
| 38 | CABLE WIRE | It supplies power and transmits data. |

[Table 1. GTD-3000TxW Components Description]

## 4.2. LAMP Function Description

■ GTL-100 runs by syncing with the detector and by the status of installed detector.

■ In normal status, green LED lights on and buzzer does not ring.

■ When Alarm-1 signal is received, red LED flickers in 1 sec interval and buzzer rings in 1 sec interval.

■ When Alarm-2 signal is received, red LED lights on and buzzer rings continuously.

■ When Trouble signal is received, yellow LED lights on and buzzer does not ring.

GTD-3000TxW
Instruction Manual

5. Installation

5. Installation

www.gastron.com
12_13

It is prohibited for an individual, other than an approved user or a technician responsible for installation and repair from the head office, to install a gas leak detector on site or open the cover of the installed gas leak detector and manipulate it. This may cause serious loss of life and property from fire, explosion, and etc. In addition, please check whether there is any remaining explosive gas or combustible material in the surroundings. Power must be turned off before performing work.

## 5.1. Detachment of Housing Cover

■ 〈Warning - Do not open when electical current is flowing〉

■ Turn the slotted set screw (M4 x 1ea) fixing the cover part of main body 3~4 tuns counter clockwise (ccw) using a hex wrench (M2) then turn the cover of gas leak detector ccw to detach the cover. When the cover is detached, LCD appears.
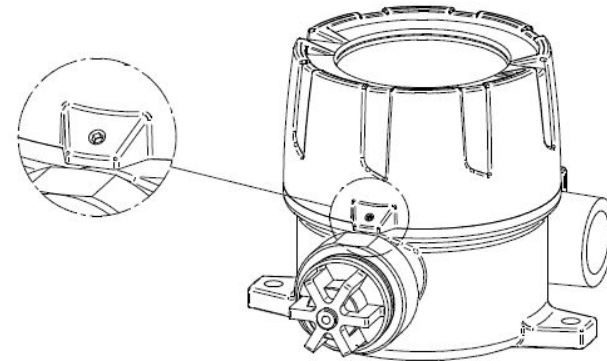
[Figure 3. Slotted Set Screw]

■ After detaching the cover, disassemble the display parts as below.
　① Push in left and right fixing rings located on front side of LCD at the same time.
　② While pushing, pull the display parts towards the front to detach from gas detector body.
　③ After detaching the display parts, the Main PCB is installed at the bottom part of the detector body.
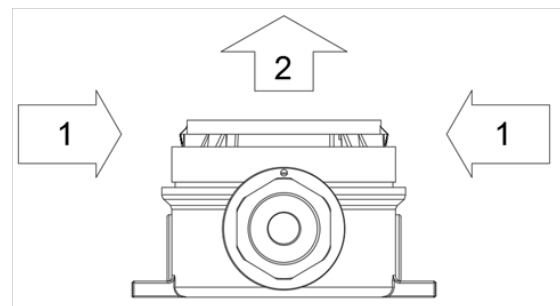
[Figure 4. Display Part Detaching Method]

## 5.2. Main PCB Configuration

■ After detaching the display parts, the Main PCB terminal layout appears as shown in the figure below.
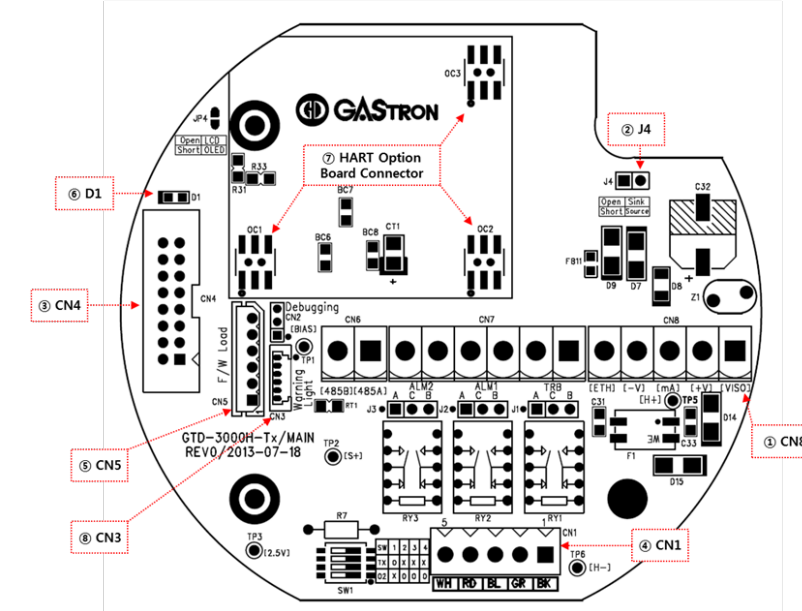
[Figure 5. Main PCB Terminal Layout]

| No | NAME | DESCRIPTION |
|---|---|---|
| 1 | CN8 | Power & Output Signal Terminal |
| 2 | J4 | 4~20mA Source / Sink 선택 점퍼(ON: Source Type, OFF: Sink Type) |
| 3 | CN4 | Display LCD Connector |
| 4 | CN1 | Sensor Connector |
| 5 | CN5 | Program download Connector |
| 6 | D1 | Status LED (Flashes in 1 sec interval during normal operation) |
| 7 | OC1, OC2, OC3 | HART Option Board Connector |
| 8 | CN3 | Warning light (GTL-100) Interface Connector |

[Table 2. Main PCB 주요 Part 설명]

■ Using OC1, OC2, and OC3 shown in the layout above, HART Option RS-485 MODBUS board can be attached. 3ØScrew holes located at top left of option board are used for fixing.

GTD-3000TxW
Instruction Manual

5. Installation

5. Installation

www.gastron.com
14_15

## 5.3. Power and 4-20mA Terminal Configuration

■ 〈Warning - Turn off power before connecting power terminal〉

■ After detaching the display part, there is a terminal block in the Main PCB as shown in the figure below. Holding it with hands and pulling towards ceiling detaches it from the Main PCB.

■ Loosen 5 terminal fixing screws located at top part of detached terminal block CN8 (VIS, +, mA, -, ETH) Connector by turning counter-clockwise using a Ⓔ driver. Connect DC 18~24 V power to +, and - then connect signal cable to mA. Tighten 5 terminal fixing screws clockwise so that terminal does not leave the track then insert Main PCB as the same condition before disassembly.
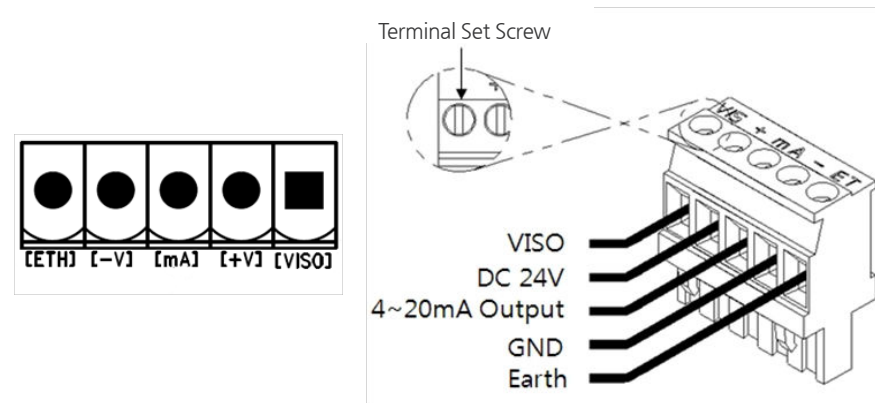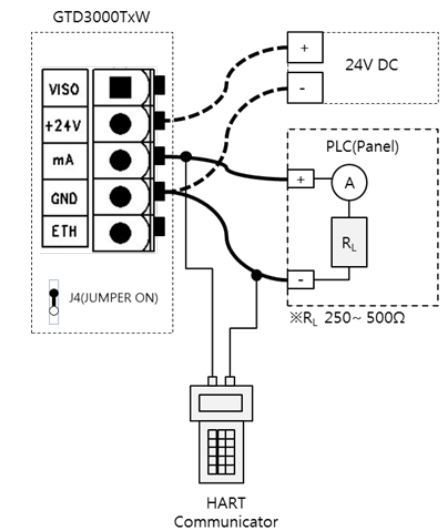


[Figure 6. CN8 Terminal Configuration]

| No | PCB Silk | PIN NAME | DESCRIPTION | |
|----|----------|----------|-------------|---|
| | | | 4~20mA Source Drive (J1 Jumper ON) | 4~20mA Sink Drive (J1 Jumper OFF) |
| 1 | VISO | VIS | N.C | 4~20mA Sink In(+) |
| 2 | +24V | + | +24V / POWER (+) | |
| 3 | mA | mA | 4~20mA Source Out | 4~20mA Sink Out(-) |
| 4 | GND | - | GND / POWER (-) | |
| 5 | ETH | ET | EARTH | |

[Table 3. CN8 Terminal Detailed Description]

■ Use CVVS or CVVSB 2.0sq↑ Shield Cable for terminal configuration.

■ To connect 4 Pin terminal from the existing old GTD-2000Tx model, connect terminals in reference to pin #2, which is +24V.

## 5.3.1. Wiring for 4~20mA Source Operation Type

■ Connect 4-20 mA signal terminal at PLC side to 'mA' of GTD-3000TxW. GND terminal is used in common with power. Then, turn on the J1 jumper.

■ HART Communicator can only be used in models using HART Option board.



[Figure 7. 4-20mA Source Configuration]

## 5.3.2. Wiring for 4~20mA Sink Operation Type

■ Connect (+) and (-) terminals for 4-20 mA sink output at PLC side to VISO terminal and 'mA' terminal, respectively. Then, turn off the J1 jumper.

■ HART Communicator can only be used in models using HART Option board
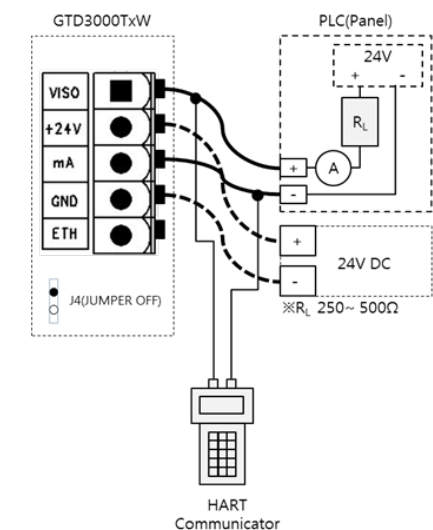


[Figure 8. 4-20mA Sink Configuration]

**GTD-3000TxW**
**Instruction Manual**

# 5. Installation

# 5. Installation

www.gastron.com
16_17

### 5.3.3. Wiring for 4~20mA 3Wire Sink Operation Type

■ Connect (+) and (-) terminals for 4-20 mA sink output at PLC side to VISO terminal and power (24V DC) (-) terminal, respectively. Connect 'mA'terminal of GTD-3000Tx to 'GND' terminal. Then, turn off the J1 jumper.



[Figure 9. 4-20mA 3Wire Sink Configuration]
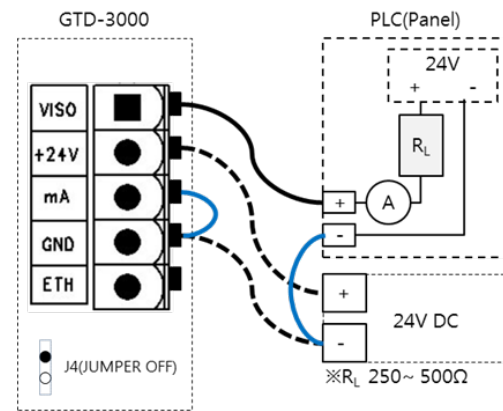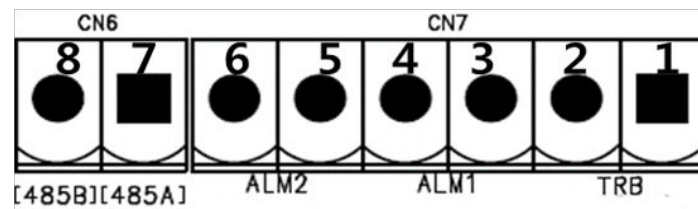
### 5.4. Relay and Network Terminal Configuration

### 5.4.1. Terminal Configuration



[Figure 10. Relay and RS485 Terminal]

| TER. NO. | PIN NO. | Terminal Name | Description |
|---|---|---|---|
| CN7 | 1 | TRB OUT | Trouble RELAY OUTPUT Terminal. Output mode is decided by J2 Jumper setting. |
| | 2 | TRB COM | TROUBLE RELAY COMMON Terminal |
| | 3 | AL1 OUT | ALARM1 RELAY OUTPUT Terminal. Output mode is decided by J3 Jumper setting. |
| | 4 | AL1 COM | ALARM1 RELAY COMMON Terminal |
| | 5 | AL2 OUT | ALARM2 RELAY OUTPUT Terminal. Output mode is decided by J4 Jumper setting. |
| | 6 | AL2 COM | ALARM2 RELAY COMMON Terminal |
| CN6 | 7 | RS485 A | RS485 A Terminal |
| | 8 | RS485 B | RS485 B Terminal |

[Table 4. Relay & RS485 Terminal Description]

### 5.4.2. Relay Mode Configuration
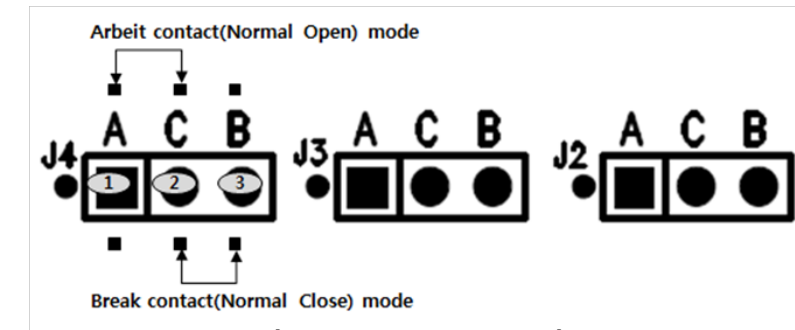


[Figure 11. Relay Mode Setting]

■ Relay of GTD-3000 operates in 2 types of method; Normal open and Normal close. The Jumper is constructed to configure relay operation method at the Main PCB and operating setting is as follows.

| TER. NO. | PIN NO. | Terminal Name | MODE Setting |
|---|---|---|---|
| CN10 | 1 | TRB OUT | J2 A-C Connection: A Contact ( Normal Open ) |
| | 2 | TRB COM | J2 B-C Connection: B Contact ( Normal Close ) |
| | 3 | AL1 OUT | J3 A-C Connection: A Contact ( Normal Open ) |
| | 4 | AL1 COM | J3 B-C Connection: B Contact ( Normal Close ) |
| | 5 | AL2 OUT | J4 A-C Connection: A Contact ( Normal Open ) |
| | 6 | AL2 COM | J4 B-C Connection: B Contact ( Normal Close ) |

[Table 5. Relay Mode Setting]

### 5.4.3. RS485 MODBUS Setting

■ MODBUS of GTC-3000TxW is optional and is connects to the receiver as shown below.

| TER. NO. | PIN NO. | Terminal Name | Receiver Terminal Name | Notes |
|---|---|---|---|---|
| CN9 | 7 | 485A | 'TRXD+' or 'A' or 'P' | |
| | 8 | 485B | 'TRXD- or 'B' or 'N' | |

[Table 6. RS485 Terminal Description]

GTD-3000TxW
Instruction Manual

5. Installation

6. Detector Operation Flow

www.gastron.com
18_19

## 5.5. Installation Cable Length

■ The maximum length between GTD-3000TxW and power supply is decided by wire specification.
■ Max. Installation Length = VMAXDROP ÷ IMAX ÷ WIRER/m ÷ 2
　·VMAXDROP: Maximum Power Loop Voltage Drop (=Power Supply voltage
　　- min operating voltage)
　·IMAX : Max. Current of GTD-3000TxW
　·WIRER/m: The resistance of the wire (ohms/meter value available in wire manufacturer's specification data sheet)
■ Example of installation lengths using 24 V power supply and 16 AWG is as follows.
　·GTD-3000TxW minimum operating voltage = 18 Vdc
　·VMAXDROP = 24 - 18 = 6V
　·IMAX = 0.23A(230mA)
　·6 / 0.23 / 0.01318 / 2 = 989.641m = 990m
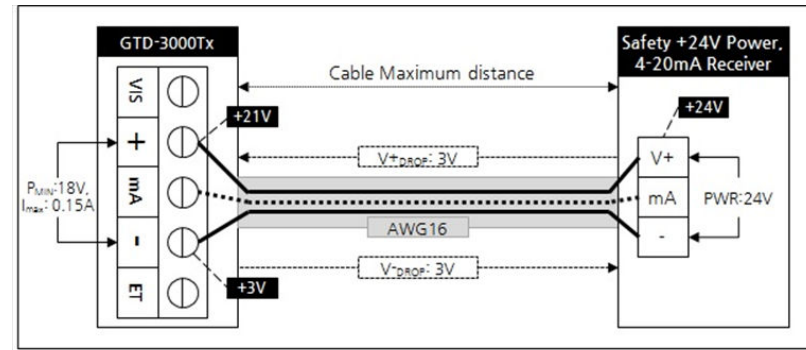


[Figure 12. Calculation of GTD-3000TxW Installation Cable Length]

■ Power cable installation for each cable type is as shown in the table below.

| AWG | mm² | COPPER RESISTANCE(ohms/m) | METERS |
|---|---|---|---|
| 12 | 3.31 | 0.00521 | 2504 |
| 14 | 2.08 | 0.00828 | 1575 |
| 16 | 1.31 | 0.01318 | 990 |
| 18 | 0.82 | 0.02095 | 623 |
| 20 | 0.518 | 0.0333 | 623 |

[Table 7. GTD- 3000TxW Power Cable Installation Length]

## 6.1. Initial Operation Status (Power On)

■ After wiring to power terminal at the top of Main PCB board then supply power, the following contents are displayed on LCD. Approx. 30 m of stabilization of time is needed from the initial supply of operation power and it starts to operate normally after sufficient stabilization.

| | |
|---|---|
| GTD-3000<br>[Ver X.XX] | - When the power turns on, model name is displayed on the first row and firmware version of the detector is displayed on the second row of LCD. |
| ** SELFTEST **<br>[>>>>>> 0179] | - Self test is performed for 3 min (30 min for O2 set-up), '>' symbol in the second row shows the progres |

## 6.2. Measuring Mode

■ After power on, when there is no error from "SELF TEST", it automatically enters Measuring Mode.

| | |
|---|---|
| [ COMB.]<br>[    0]%LEL<br><br>* [ COMB.]<br>〈   0]%LEL<br><br>[ COMB.]*A01<br>[    0]%LEL | - It runs as below when it is normal and in gas measuring mode.<br>- Gas name is displayed on the first row and the current measurement and unit is displayed on the second row.<br>※ During HART network, '*' is displayed on the left of the first row.<br>※ ENG. When the mode is on, '〈' is displayed on the left of the second row.<br>※ During 485 network, '*' is displayed on the right of the first row. |
| [ COMB.]<br>[  OVER]%LEL | - When gas measurement larger than 10% of set high scale value, "OVER" displays in 1 sec interval.<br>- At this time, 4~20 mA runs as 22 mA. |
| [ COMB.]<br>[ UNDER]%LEL | - When gas measurement smaller than -10%, "UNDER" displays in 1 sec interval and 4~20 mA runs at 2 mA.<br>※ The following function only runs when UNDER is on. |
| [FAULT 08]<br>SENSOR HUNTING | - When trouble occurs in the device, it displays fault number and message.<br>- At this time, 4~20 mA runs at 0 mA. (2 mA when HART is used.)<br>- Fault #-8 on the left is a mode that is displayed when there is repeated hunting error from the sensor. |

**GTD-3000TxW**
**Instruction Manual**

**6. Detector Operation Flow**

**6. Detector Operation Flow**

www.gastron.com
20_21

## 6.3. Operation Flow

■ After power on, it passes self-diagnostic process then enters Measuring Mode. Here, by operating front keys, you can go to internal System Mode.

■ Timeout for Level1 and Level2 are 10 s. It is set to 1 h for Level2 Calibration and Test Mode.

■ When "RESET" key contacts at Program Mode Screen, it returns to Measuring Mode. When "RESET" key contacts at each Program Setting Screen, it returns to the parent step.
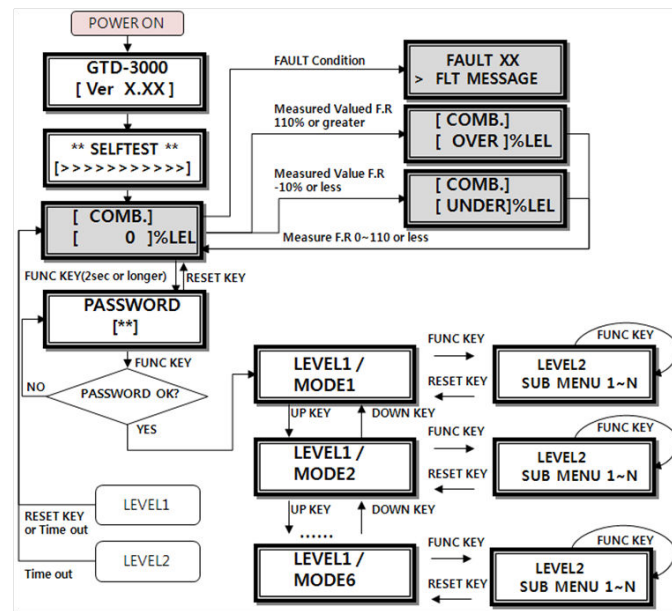


[Figure 13. GTD-3000TxW Mode Configuration]

■ Operation keys for detector system mode are defined as below.

| ITEM | NAME | DESCRIPTION |
|---|---|---|
| FUNC | Function key | Detector Mode Setting Entry Function (Insert Magnetic-bar for 2 sec or longer in measuring mode) Level2 next stage entry function and setting value saving function |
| RESET | Reset key | Move to the previous stage from the level entered. |
| ↑ | Up key | Next level mode that is configured in LEVEL1 and Change in Level2 setting Plus |
| ↓ | Down key | Next level mode that is configured in LEVEL1 and Change in Level2 setting Minus |

[Table 8. Operation Key Description]

## 6.4. Menu Configuration Table

| LEVEL1 | LEVEL2 | | DEFAULT |
|---|---|---|---|
| | NAME | PARAMETER | |
| PROGRAMMABLE MODE | GAS TYPE | [DEFINE/USERG.] | DEFINE |
| | GAS SELECT | Factory Set | COMB. |
| | UNIT SELECT | %/%LEL/PPM/PPB | %LEL |
| | DECIMAL POINT | 0.100/1.00/10.0/100 | 100 |
| | HIGH SCALE | 1~9999 | 100 |
| | PASSWORD | 00~99 | 00 |
| CALIBRATION MODE | CALIBRATION [ZERO] | ZERO CALIBRATION [NO, YES] | [NO] |
| | | ZERO GAS [ 0] | |
| | | ZERO PROCESSING [SUCCESS / FAIL] | |
| | | CALIBRATION DATA [ 0 / FAIL] | |
| | CALIBRATION [SPAN] | SPAN CALIBRATION [NO, YES] | [NO] |
| | | SPAN GAS VALUE [ 0] | |
| | | SPAN SET VALUE [50 / FAIL] | 50 |
| | | SPAN PROCESSING [SUCCESS / FAIL ] | |
| | | CALIBRATION DATA [ 0] | |
| ALARM PROGRAM MODE | ALARM OPERATING | [AUTO/MANUAL] | AUTO |
| | ALARM RELAY TYPE | DE-ENERGIZED/ENERGIZED | DE-ENERGIZED |
| | FAULT RELAY TYPE | DE-ENERGIZED/ENERGIZED | DE-ENERGIZED |
| | ALARM1 TYPE SEL. (ALARM1 TYPE SELECT) | [INCREASE/ DECREASE] | INCREASE |
| | ALARM1 LEVEL ADJ (ALARM1 LEVEL ADJUST) | [ 1~Full Scale] | 20 |
| | ALARM1 DEAD BAND | [ 0.0~ Full Scale의 10% ] | 0.0 |
| | ALARM1 TIME SET | [0~60] SEC | 1 |
| | ALARM1 RELAY CTL (ALARM1 RELAY CONTROL) | [ON / OFF] | ON |

| LEVEL1 | LEVEL2 | | DEFAULT |
|---|---|---|---|
| | NAME | PARAMETER | |
| ALARM PROGRAM MODE | ALARM2 TYPE SEL. (ALARM2 TYPE SELECT) | [INCREASE/ DECREASE] | INCREASE |
| | ALARM2 LEVEL ADJ (ALARM2 LEVEL ADJUST) | [ 1~Full Scale] | 40 |
| | ALARM2 DEAD BAND | [ 0.0~ Full Scale의 10% ] %FS | 0.0 |
| | ALARM2 TIME SET | [0~60] SEC | 1 |
| | ALARM2 RELAY CTL (ALARM2 RELAY CONTROL) | [ON / OFF] | ON |
| SENSOR MODE | FACTORY Mode | | |
| MAINTENANCE MODE | FACTORY Mode | | |
| 485 MODBUS MODE | FACTORY Mode | | |
| DEVICE MODE | FACTORY Mode | | |
| VERSION MODE | FACTORY Mode | | |
| TEST MODE | FACTORY Mode | | |
| SYSTEM MODE | FACTORY Mode | | |

[Table 9. Menu Configuration Table]

## 7.1. PROGRAM MODE

| PASSWORD [**] | - Contacting "FUNC" key with the Magnet-bar for 2 s or longer in Measuring Mode enters Password mode. <br> - After setting Password using "↑" or "↓" key, contact "FUNC" key. |
|---|---|
| PROGRMAMMABLE MODE | - If password is correct, it enters Program mode. <br> - By contacting "↑" or "↓" key, mode changes in defined order. <br> (PROGRAMMABLE->CALIABRATION->ALARM->SENSOR ->MAINTENANCE->485 MODBUS->DEVICE-> VERSION->TEST->SYSTEM) |
| GAS TYPE [ DEFINE ] | - Mode that sets gas name type and contacting "↑" or "↓"key changes gas type. (DEFIN. / USERG.) <br> - DEFINE is selected when a built-in gas name is used. USERG. Is selected to define the gas name directly by a user. <br> - When a desired gas type is displayed, contact "FUNC" key to set the gas name and enter Program Mode. |
| GAS SELECT [ COMB. ] | - Mode that sets gas name name and contacting "↑" or "↓"key changes gas name. <br> - When gas type is set to DEFIN., built-in gas names can be selected for use. When it is set to USER, the user shall set gas name using 6 character for use. Characters allowed for use are number, capital Alphabet, space, and period. When position is moved by setting characters, a cursor in black box shape appears as shown in the figure on left. |
| USER GAS [■   ] | |
| UNIT SELECT [   %LEL  ] | - Mode that sets gas measuring unit and contacting "↑" or "↓" key changes gas measuring unit. ( % / %LEL / PPM / PPB ). <br> - When a desired gas measuring unit is displayed, contact "FUNC" key to set the unit and enter Program Mode. |
| DECIMAL POINT [   100  ] | - Mode that changes decimal place and contacting "↑" or "↓" key changes decimal place. (0.100/1.00/10.0/100) <br> - When a desired decimal place is displayed, contact "FUNC" key to set the decimal place and enter the next Program Mode. |
| HIGH SCALE [   100  ] | - Mode that sets high scale value that should be displayed for full range. Contacting "↑" or "↓" key increases or decreases the scale value. ( 1 ~ 9999 ) <br> - When a desired high scale is displayed, contact "FUNC" key to set the high scale value and enter the next Program Mode. |
| PASSWORD [00] | - It is password setting mode. This password is checked when entering Program Mode. <br> - Default is set to "00". <br> - Set using "↑" or "↓" key then contact "FUNC" key to set the password and enter the next Program Mode. |

GTD-3000TxW
Instruction Manual

7. System Mode

7. System Mode

www.gastron.com
24_25

## 7.2. CALIBRATION MODE

■ Due to characteristics of the gas detector, minimum 30 min of stabilization time is required and maintenance condition may change depending on site condition.

### 7.2.1. Zero Calibration

| PASSWORD<br>[**] | - Contacting "FUNC" key with the Magnet-bar for 2 s or longer in Measuring Mode enters Password mode.<br>- After setting Password using "↑" or "↓" key, contact "FUNC" key. |
|---|---|
| CALIBRATION<br>MODE | - Contact "↑" or "↓" key to select "Calibration Mode".<br>- Contact "FUNC" key when "CALIBRATION MODE" is displayed to enter Calibration Mode.<br>- Contact "RESET" key to return to Measuring Mode. |
| CALIBRATION<br>[ZERO] | - When "CALIBRATION MODE" is displayed, contacting "FUNC" key selects Zero Calibration.<br>- Contact "↑" or "↓" key to achieve [ZERO] then contact "FUNC" key to enter Zero Calibration. |
| ZERO CALIBRATION<br>[YES] | - Contact "↑" or "↓" key to achieve [YES] then contact "FUNC" key to perform Zero Calibration. |
| ZERO GAS<br>[    0] | - Using a calibration tool, inject clean air or 100% nitrogen into the sensor at a flow rate of 500 mL/min for 1 min. Contact "FUNC" key when measurement is stabilized to automatically perform Zero  Calibration. |
| ZERO PROCESSING<br>SUCCESS 〉〉〉〉 | - When zero calibration is successful, "ZERO SUCCESS" is displayed for 2 sec on LCD display then it changes to "CALIBRATION DATA" Mode.<br>- When zero calibration is not successful, "ZERO FAIL" is displayed for 2 sec and it changes to "CALIBRATION DATA" Mode.<br>- ZERO FAIL occurs when sensor input value exceeds 70% of total ADC input range. |
| ZERO PROCESSING<br>FAIL   〉〉〉〉 | |
| CALIBRATION DATA<br>[    0] | - It is a mode to display measurement after calibration and checks whether calibration is successful after performing auto calibration.<br>- When it failed, it displays "FAIL" and the current measurement in 1 sec interval.<br>- Contact "RESET" key to return to "Calibration mode". |

### 7.2.2. Span Calibration

| CALIBRATION<br>MODE | - Contact "↑" or "↓" key to select "Calibration Mode".<br>- Contact "FUNC" key when "CALIBRATION MODE" is displayed to enter Calibration Mode.<br>- Contact "RESET" key to return to Measuring Mode. |
|---|---|
| CALIBRATION<br>[SPAN] | - Contact "↑" or "↓" key to achieve [SPAN] then contact "FUNC" key to enter Span Calibration mode. |
| SPAN CALIBRATION<br>[YES] | - Contact "↑" or "↓" key to achieve [YES] then contact "FUNC" key to perform Span Calibration. |
| SPAN GAS VALUE<br>[    O ]<br><br>[    0]<br>〈   O ] | - Using a calibration tool, inject the standard gas to the sensor at a flow rate of 500 mL/min for 90 sec. After the measurement is stabilized, contact "FUNC" key to enter the next mode.<br>- When Hold function in Maintenance Mode is on, the current maximum SPAN gas value is held and displayed in the first row.<br>- The current measurement is displayed in the second row. |
| SPAN SET VALUE<br>[    5O ] | - It is a mode to set standard gas value. When there is no "Fail" message, contact "↑" or "↓" key to set a value.<br>- When the inject standard gas value is abnormal, it displays Fail message. Fail message is as follows. Fail message and span set value are displayed alternatively. |
| CALIBRATION DATA | ① "LOW FAIL" occurs when the difference between injected gas value and zero calibration value is below 1%.<br>② "HIGH FAIL" occurs when injected gas value is above 95% of total ADC input range. |
| CALIBRATION DATA<br>CAL HIGH ERROR | - "RING FAIL" occurs when injected gas value runs in the current set span value, it exceeds 95% of ADC input range. The above FAIL messages are automatically released if the status is normal after adjusting SPAN value. |
| SPAN PROCESSING<br>SUCCESS 〉〉〉〉 | - After completing the standard gas value setting, contacting "FUNC" key automatically runs Span Calibration. When it succeeds, "SPAN PROCESSING SUCCESS" is displayed on LCD display for 2 sec then it changes to "CALIBRATION DATA" Mode.<br>- When span calibration is not successful, "SPAN PROCESSING FAIL" is displayed for 2 sec and it changes to "Calibration Data Mode". |
| SPAN PROCESSING<br>FAIL   〉〉〉〉 | |
| CALIBRATION DATA<br>[    0] | - It is a mode to display measurement after calibration and checks whether calibration is successful after performing auto calibration.<br>- Contact "RESET" key to return to "Calibration mode". |

GTD-3000TxW
Instruction Manual

7. System Mode

7. System Mode

www.gastron.com
26_27

## 7.3. ALARM MODE

| | |
|---|---|
| **PASSWORD**<br>**[**]** | - Contacting "FUNC" key with the Magnet-bar for 2 s or longer in Measuring Mode enters Password mode.<br>- After setting Password using "↑" or "↓" key, contact "FUNC" key. |
| **ALARM PROGRAM MODE** | - Contact "↑" or "↓" key to select "Alarm Program Mode".<br>- Contact "FUNC" key when "ALARM PROGRAM MODE" is displayed to enter Alarm setting mode.<br>- Contact "RESET" key to return to Measuring Mode. |
| **ALARM OPERATING [ AUTO ]** | - It is a mode that sets reset method after an event of alarm. Contacting "↑" or "↓" key changes between "AUTO" and "MANUAL".<br>- "AUTO" mode automatically resets the alarm. "MANUAL" mode resets the alarm only when Reset key is pressed. |
| **ALARM OPERATING [ MANUAL]** | |
| **ALARM RELAY TYPE DE-ENERGIZED** | - It is a mode that sets Reset method after an event of Alarm. Contacting "↑" or "↓" key changes between "DE-ENERGIZED" and "ENERGIZED".<br>- "DE-ENERGIZED" deactivates energizer mode and "ENERGIZED" activates energizer mode. |
| **FAULT RELAY TYPE DE-ENERGIZED** | - It is a mode that sets Reset method after an event of FAULT. Contacting "↑" or "↓" key changes between "DE-ENERGIZED" and "ENERGIZED".<br>- "DE-ENERGIZED" deactivates energizer mode and "ENERGIZED" activates energizer mode. |
| **ALARM1 TYPE SEL. [INCREASE ]** | - It is a mode that sets operational direction of Alarm1. Contact "↑" or "↓" key to display "INCREASE" or "DECREASE".<br>- "INCREASE" mode runs when the value is at Alarm1 threshold or higher. "DECREASE" mode runs when the value is at Alarm 1 threshold or lower. |
| **ALARM1 TYPE SEL. [DECREASE ]** | |
| **ALARM1 LEVEL ADJ [ 20]** | - It is a mode that sets Alarm1 level threshold. Contact "↑" or "↓" key to increase or decrease Alarm1 level, respectively.<br>- When a desired alarm 1 threshold is displayed, contact "FUNC" key to set it and enter the next item. |
| **ALARM1 DEAD BAND [ 0.0]%FS** | - It is a mode that sets operation range of Alarm1. Contact "↑" or "↓" key to increase or decrease the value, respectively.<br>- When Alarm1 is in "INCREASE" mode, it runs at Alarm1 threshold + Dead band and is released at Alarm1 threshold - Dead band.<br>- When a desired value is displayed, contact "FUNC" key to set the dead band value and enter the next Alarm Program Mode |
| **ALARM1 TIME SET [ 1] SEC** | - It is a mode that sets Alarm1 dwell time. Contact "↑" or "↓" key to increase or decrease the value, respectively.<br>- Displayed number is in sec and in a range from 0 to 60. When a desired value is displayed, contact "FUNC" key to set the alarm dwell time and enter the next Alarm Program mode. |

| | |
|---|---|
| **ALARM1 RELAY CTL [ ON]** | - It is a mode that sets whether to contact relay contact during Alarm1 operation. Contact "↑" or "↓" key to change the display between "ON" or "OFF".<br>- In ON mode, relay runs during Alarm1 operation. In OFF mode, relay do not run during Alarm1 operation. |
| **ALARM2 TYPE SEL. [INCREASE ]** | - It is a mode that sets operational direction of Alarm2. Contact "↑" or "↓" key to display "INCREASE" or "DECREASE".<br>- "INCREASE" mode operates when the value is equal or larger than set alarm threshold. "DECREASE" mode operates when the value is equal or less than set alarm threshold. |
| **ALARM2 TYPE SEL. [DECREASE ]** | |
| **ALARM2 LEVEL ADJ [ 40 ]** | - It is a mode that sets Alarm2 level. Contact "↑" or "↓" key to increase or decrease Alarm2 level, respectively.<br>- When a desired alarm 2 threshold is displayed, press "FUNC" KEY to set it and enter the next Alarm Program mode. |
| **ALARM2 DEAD BAND [ 0.0 ]%FS** | - It is a mode that sets operational direction of Alarm2. Contact "↑" or "↓" key to increase or decrease the value, respectively.<br>- When Alarm2 is in "INCREASE" mode, it runs at Alarm1 threshold + Dead band and is released at Alarm2 threshold - Dead band.<br>- When a desired value is displayed, contact "FUNC" key to set the dead band value and enter the next Alarm Program Mode |
| **ALARM2 TIME SET [ 1] SEC** | - It is a mode that sets Alarm2 dwell time. Contact "↑" or "↓" key to increase or decrease the value, respectively.<br>- Displayed number is in sec and in a range from 0 to 60. When a desired value is displayed, contact "FUNC" key to set the alarm dwell time and enter the next Alarm Program mode. |
| **ALARM2 RELAY CTL [ ON]** | - It is a mode that sets whether to contact relay contact during Alarm2 operation. Contact "↑" or "↓" key to change the display between "ON" or "OFF".<br>- In ON mode, relay runs during Alarm2 operation. In OFF mode, relay do not run during Alarm2 operation. |

GTD-3000TxW
Instruction Manual

8. Troubleshooting

9. Interface Configuration

www.gastron.com
28_29

## 8.1. Fault List

| FAULT MESSAGE | DESCRIPTION & CONDITION | 발생원인 |
|---|---|---|
| [FAULT-02]<br>"SENSOR HIGH" | Sensor output is above ADC max. value. | Defective sensor module or transmitter board ADC |
| [FAULT-03]<br>"SENSOR LOW" | Sensor output is below ADC min. value. | Defective sensor module or transmitter board ADC |
| [FAULT-04]<br>"EEPROM ERROR" | Defective Transmitter EEPROM Checksum | Defective Transmitter Board EEPROM |
| [FAULT-05]<br>"+24V LOW" | It occurs when 24 V main input power is inputed with voltage below 10 V. | Input power below 10V or defective Transmitter ADC |
| [FAULT-06]<br>"ADC FAIL" | Defective Transmitter ADC | Defective Transmitter ADC |
| [FAULT-07]<br>"H/W REVISION" | H/W Version Error | Defective MPU inside Transmitter |
| [FAULT-08]<br>"SENSOR HUNTING" | When there is repeated hunting error in gas measurement | sensor output status may be poor or check for input power noise. |

[Table 10. Fault List]

## 8.2. Recovery List

| No | CAUSE | SOLUTION |
|---|---|---|
| 1 | Defective Sensor Module | Change Sensor |
| 2 | Defective Transmitter Board ADC | Change Transmitter Board |
| 3 | Defective Transmitter Board EEPROM | 1) Perform Factory Initialization then correct parameter and re-calibrate<br>2) Change sensor unit when the same problem occurs again |
| 4 | Defective MPU inside Transmitter | Change Transmitter Main Board |
| 5 | Poor Sensor Output Status | Change Sensor |
| 6 | Check Input Power Noise | Check External Input Voltage Noise Status |

[Table 11. Recovery List]
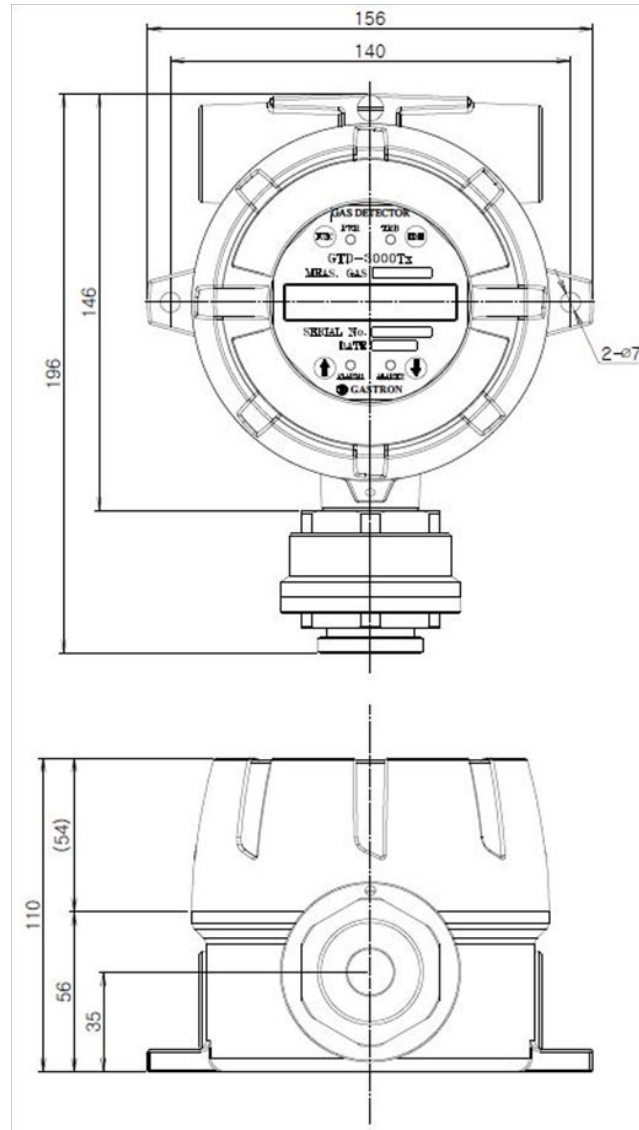
## 9.1. MODBUS RS485

### 9.1.1. Interface setting

- Data Format: RTU
- Baud rate: 9600 bps
- Data bits: 8bits
- Stop bit: 1bits
- Parity: Even
- For details, please go to www. modbus.org

### 9.1.2. MODBUS RS485 Address map

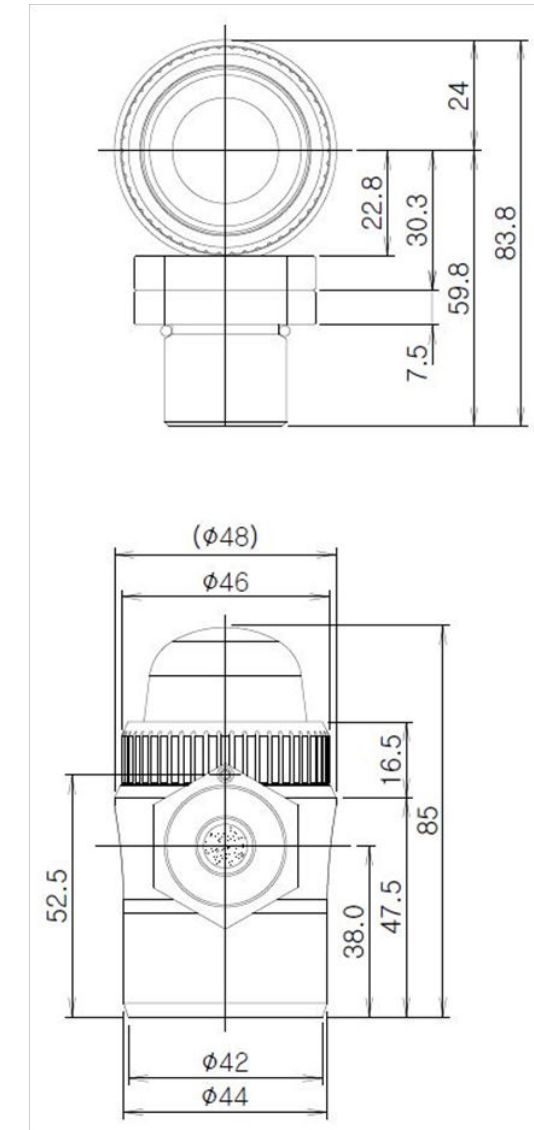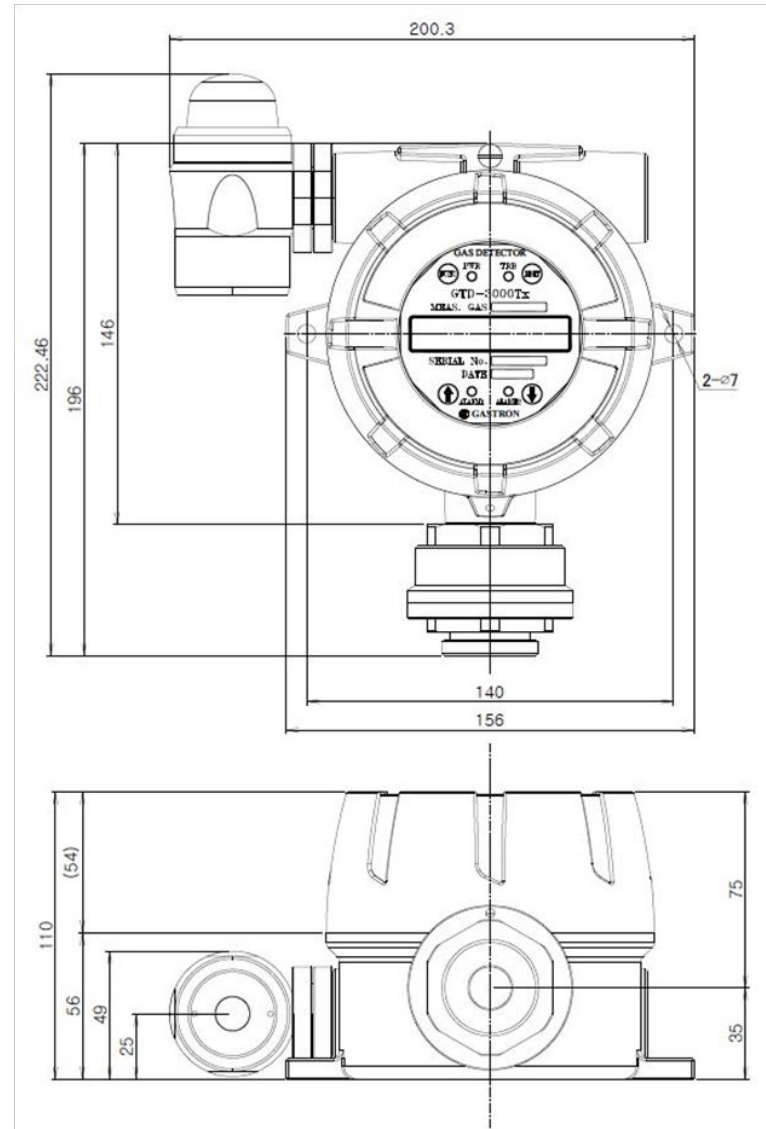| TYPE | ADDRESS | BITS | DESCRIPTION |
|---|---|---|---|
| Measured Gas Concentration | 30001 | BIT15~0 | Gas Measurement (Integer/Decimal point is not considered) |
| High Scale Setting | 30002 | BIT15~0 | High Scale Setting (Integer/Decimal point is not considered) |
| Alarm 1 Setting | 30003 | BIT15~0 | Alarm 1 Setting (Integer/Decimal point is not considered) |
| Alarm 2 Setting | 30004 | BIT15~0 | Alarm 2 Setting (Integer/Decimal point is not considered) |
| Gas detector status value | 10000 | BIT0 | Alarm 1 Active Status |
| | | BIT1 | Alarm 2 Active Status |
| | | BIT2 | Fault Active Status |
| | | BIT3 | Maintenance Mode Status |
| | | BIT4 | Test Mode Status |
| | | BIT5 | Calibration Mode Status |
| | | BIT6 | Reserved |
| | | BIT7 | Toggle Bit (Bit reversal in 2 sec interval) |
| External Test | 3 | BIT0~7 | Gas Detector Test Mode Setting |
| External Reset | 2 | BIT0~7 | Exit Gas Detector Test Mode |

[Table 12. RS485 MODBUS Address 구성]

GTD-3000TxW
Instruction Manual

10. Drawings and Dimensions

10. Drawings and Dimensions

www.gastron.com
30_31

## 10.1. Standard Type



[Figure 14. GTD-3000TxW Standard Type Drawing]

## 10.2. Warning Light GTL-100



[Figure 15. GTL-100 Drawing]

GTD-3000TxW
Instruction Manual

10. Drawings and Dimensions

11. Precautions before Installation

www.gastron.com
32_33

## 10.3. When Connecting Warning Light



[Figure 16. GTD-3000TxW Warning Light Connection Drawing]

## 11.1. Selecting a Place for Installation (Occupational Health & Safety Act Data)

A gas leak detector alarm shall be installed in the following places.
■ Around chemical equipment and accessories that have concerns of gas leak. This includes compressors, valves, reactors, pipe joints, etc. installed inside and outside of a building that handle combustible and toxic materials.
■ Places that are easier for gases to stay such as areas around manufacturing facilities with ignition sources like heating furnace, etc,
■ Areas around equipment for filling combustible and toxic materials.
■ Substations, panel rooms, control rooms, and etc. located within explosive area.
■ Other areas that are easier for gases to stay.

## 11.2. Selecting a Site for Installation (High-Pressure Gas Safety Control Act Data)

■ Gas detector of gas leak detector alarm must be installed as close to the areas with concerns of gas leakage as possible. However, for areas where direct gas leakage is not expected but are easier for leaked gas to stay, the detector must be installed at the point 1 of the following.
■ Gas leak detector alarm installed outside a building shall be installed at points where gas is likely to stay in consideration to wind direction, wind speed, specific gravity of gas, etc.
■ Gas leak detector alarm installed inside a building shall be installed near the floor when the specific gravity of gas is heavier than air and near ventilation of ceiling when it is lighter than air.
■ Alarm for gas leak detector alarm must be installed at sites where the gas detector is installed and workers are present.
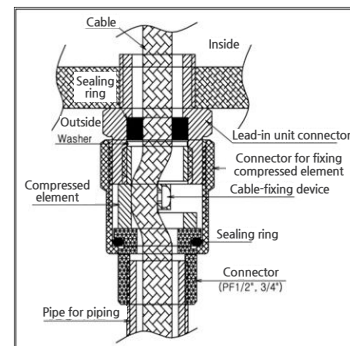
## 11.3. Precautions during Installation

Avoid areas with electrical barriers such as rain water, etc. It is recommended to be installed in areas that are easier to work in since regular maintenance is needed. Avoid areas with vibration or shock since they can affect output values. Sensor part must be installed towards the direction of gravity.
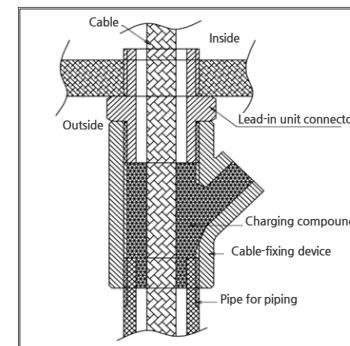
■ This equipment has explosion-proof construction for internal pressure and belongs to GROUP II for gas and vapor in general work sites and chemical plants. It can be used in ZONE 1 (ONE) and ZONE 2 (TWO) hazardous sites.
■ Allowable temperature is 85 C or below, which corresponds to T6.
■ Surrounding temperature shall be in a range of -20 to 60 °C (For the main unit and sensor, refer to each sensor manual.)
■ Installation Height: 1,000 M below sea level

GTD-3000TxW
Instruction Manual

**11. Precautions before Installation**

**12. Revision History**

www.gastron.com
34_35

■ Relative Humidity: 5% ~ 99% (Non-condensing)

■ Installation Site: Indoor and Outdoor

■ Explosion Ignition Group for Target Gas or Vapor: Ex d IIC T6

■ During wiring work, use explosion-proof cable gland at cable inlet or tightly seal cable conduit during metal cable wiring construction to prevent spread of flames in case of explosion or movement of gas, etc. through the cable conduit within 50 mm. All materials including materials used for sealing of unused inlets must have safety certificates!

■ When connecting the equipment with cable, screw thread must be tightened 5 threads or more.

■ Work in conditions satisfying other [Standards for Selection, Installation, and Maintenance, etc. of Explosion-proof Electric Machine and Equipment Wiring, etc. at Work Site]



[Figure 17. High-Pressure Packing Type]



[Figure 18. Y Sealing Compound]

| VERSION | CONTENTS | DATE |
|---|---|---|
| 0.1 | * Manual Initial Revision | 2017. 09. 29 |
| 0.2 | * Correct typos and typographical errors | 2019. 11. 19 |