INSTRUCTION MANUAL

Hydrogen Sulphide Data Logger

GHS-8AT-EX

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IM15GHS8ATEXE5

Contents

1. Introduction

Dear Valued Customer,

Thank you for purchasing the Gastec model GHS-8AT-EX H2S data logger. The GHS-8AT-EX is a portable data logger which can log H2S concentrations over periods of time.
This instruction manual provides important warnings. Failure to comply with the instruction manual and warnings could result in property damage, serious bodily injury, and/or death. Carefully read and understand this manual before use.

This instrument is designed to be placed in areas with potential H2S pollution and to log changes in H2S concentration for long durations. The logged data can contribute to identifying the source and cause of pollution, and determining countermeasures to be taken against pollution.

This instruction manual should be retained for future reference.
The pictures in this instruction manual may be slightly different from the actual model you received.
Information contained in this manual is subject to change without notice.

In this manual, precaution symbols are used as defined below:

⚠WARNING	This means that failure to comply with this warning can cause property damage, serious bodily injury, and/or death.
⚠CAUTION	This means that dismissing this warning can cause property damage and/or minor or moderate bodily injury.
△NOTE	This indicates advice for proper use of this instrument.

⚠WARNING Explosion hazard

1. Do not replace batteries in a hazardous area.
2. Batteries are part of the Ex approval.
   Only the following types may be used:
   Alkaline batteries
   Panasonic LR6
   DURACELL MN1500
3. Do not replace gas sensor in a hazardous area.
4. Substitution of components may impair intrinsic safety
5. The instrument is designed for use within an ambient temperature range of 0℃ to +40℃.
6. In a hazardous area, do not connect with a computer for logging, setting, and downloading the logging data.
7. Opening or closing the external casing must only be done in an area known to be non-hazardous.
8. Use the external casing on measurement.
   Do not use the main unit without the external casing.

⚠WARNING

1. Preparation of calibration gas and span calibration shall be performed by trained, qualified, and authorized personnel in a well-ventilated area, wearing all required safety equipment. Properly discard of calibration gas in accordance with this Manual and all federal, state, and local statutes, ordinances, and regulations.
2. DO NOT inhale calibration gas.
3. Disassemble and repair this instrument only in accordance with the manufacturer's specific instructions in the Manual.
4. DO NOT modify or alter this instrument, its spare parts, or accessories.
5. Use only the manufacturer's authorized spare parts and accessories with this instrument. Repair or disassembly of this instrument in a manner inconsistent with the manufacturer's instructions in this Manual or use of unauthorized spare parts and/or accessories with this product voids the manufacturer's performance guarantees, specifications, and warranty and may lead to property damage, serious bodily injury, and/or death.
6. This instrument is to be only operated by and only repaired by trained, qualified, and authorized professional personnel.
7. This product is not safety equipment, is not intended to provide worker protection, and is not designed to provide an alarm in the event of a gas leak or elevated gas concentration. Use certified warning and safety instruments as well as personal protective equipment to ensure the safety and protection of the site and all personnel.
8. If an error message occurs, stop using the instrument and inspect the instrument to determine the cause of the error message.

⚠CAUTION

1. Avoid extreme high or low temperature, shock, or physical damage. If the instrument is dropped or damaged, inspect the instrument before use to ensure it is capable of being operated safely.
2. Avoid direct sunlight.
3. Avoid radio frequency interference (RFI), electromagnetic interference (EMI), and magnetism.
4. DO NOT expose the sensor to hydrogen sulfide (H2S) concentrations in excess of the sensor's full scale range, and do not expose the sensor to exhaust gas, cigarette or cigar smoke, or to the manufacturer specified interference gases or vapors. Exposing the H2S sensor to H2S concentrations in excess of the sensor's full scale range or to cigarette or cigar smoke, or to the known interferences can rapidly and significantly degrade the sensor's performance and life.

5. Avoid exposing this product to alkaline materials.
6. Before use, perform the following:
   (A) Inspect the instrument for damage and ensure it is in good working order.
   (B) Perform zeroing in accordance with the manufacturer's instructions.
   (C) Check the battery and remaining logging capacity.
7. Before opening the external case, clean the surface of the case and remove any moisture or foreign matter from the external case. The moisture or foreign matter, if not removed, may damage the internal components of the instrument or cause the instrument to malfunction.

1.2 Storage conditions

⚠CAUTION

1. If the instrument is not going to be used for a long period (one month or longer), remove the batteries and store the instrument in a cool, dry place away from the reach of children.
2. Store the instrument in an area where the temperature is in the range of 0 – 40 °C.
3. Avoid direct sunlight.
4. Avoid electromagnetic interference (EMI) and magnetism.
5. Store the instrument in an area where the Relative Humidity (RH) is in the range of 30% RH to 90% RH.
6. Avoid dust, sand, steam, and water splash.

1.3 Servicing and maintenance

⚠WARRNING

1. Battery replacement shall be done in safe atmosphere to prevent explosion hazard.
2. Periodic inspections and maintenance should be performed by trained, qualified, and authorized professional personnel.

⚠CAUTION

1. Switch the instrument off before battery replacement.
2. Switch the instrument off before sensor replacement to prevent damaging the sensor or circuit failure.
3. Calibrate the instrument periodically in accordance with the manufacturer's instructions.
4. After installation of a new sensor, wait twenty-four (24) hours for the sensor to stabilize before calibrating the sensor. The 24-hour period is necessary to allow the sensor to stabilize. The product does not need to be turned on for sensor stabilization. The battery supplies power to the sensor regardless of whether or not the instrument is turned on.

1.4 Disposal of sensor

⚠ NOTE

1. Dispose of sensor and batteries in accordance with all federal, state, and local statutes, ordinances, and regulations.

Precise H2S measurement	Controlled potential electrolysis sensor enables precise measurement.
Data logging	The instrument logs H2S concentrations continuously and stores the data to integrated memory. Dedicated software can graph the data to show the changes in concentration over a long term period.
Temperature logging	Temperature data can also be logged. Temperature data can be utilized for studying the relationship between the temperature and the H2S concentration.
Variety of sensors	Gastec offers five different hydrogen sulfide sensors. By changing the sensor, a wide range of concentrations can be logged precisely. The sensors are interchangeable modules and are selectable with ranges from 0 to 10 ppm, from 0 to 100 ppm, from 0 to 500 ppm, from 0 to 1000 ppm, and from 0 to 3000 ppm.
Splash proof IP66/67	Improved splash proof structure ensures performance of the instrument in direct spray of wastewater.
External casing	External casing can be removed from the main unit. This allows the main unit to be serviced cleanly and hygienically.
Endurance	Two AA batteries provide 90 days continuous operation. Under certain conditions such as temperature greater than 20℃ for a five minute interval, the pilot lamp will be disabled.
LCD	LCD indicates instantaneous concentration during data logging. Calibration can be done without connecting to a computer. The LCD displays the status of the instrument and environment. The display provides the H2S concentration, temperature, battery life, available data logging capacity, and time.
Pilot lamp	The operating status of the instrument can be seen in dark operating environments.

Operating switch	Simple operation to start data logging.
Auto sensor recognition	The instrument changes scale setting automatically when a new sensor with a different detection range is installed. However, span calibration must be performed after sensor replacement and prior to use.
Nonvolatile memory	Nonvolatile memory retains data when a battery is replaced or if a battery becomes fully discharged.
Calibration reminder	A calibration symbol is indicated on the display to remind you of the calibration schedule.
USB2.0 interface	Fast and reliable data transfer.

2. Unpacking the instrument

The shipping box should contain the following items. Account for each item before discarding the box.

	Description	Qty
1	GHS-8AT-EX Assembly	1
2	String, 5m	1
3	Screw lock stainless ring (oval)	2
4	Screw lock stainless ring (triangle)	1
5	Ball Allen driver	1
6	Screwdriver	1
7	H2S Sensor * in the range requested	1
8	AA Battery	2
9	Sensor filter*	6
10	Dedicated communication and data processing software(ANASYS)	1
11	USB cable (1m)	1
12	Instruction manual (GHS-8AT-EX and ANASYS)	1

*Sensor and sensor filter are already installed on shipment.

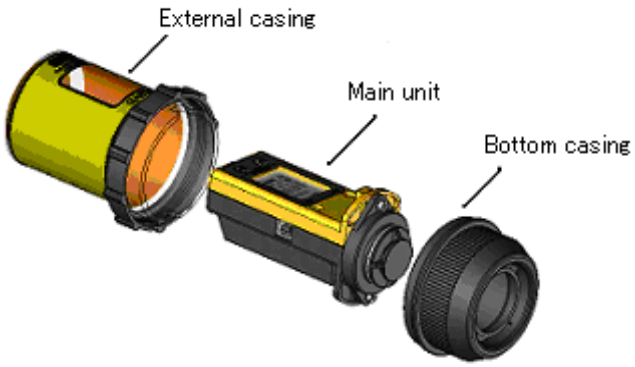
See page10 for pictures of the sensor.

See page 45 for sensor replacement.

3. Instrument overview

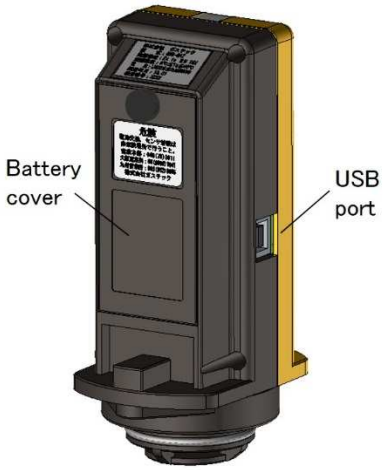
3.1 Part names - External casing and main unit

Front

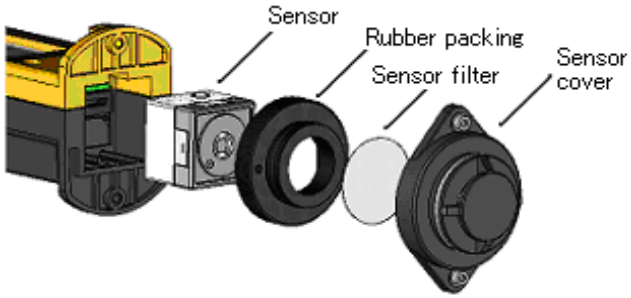


External casing and main unit

Front

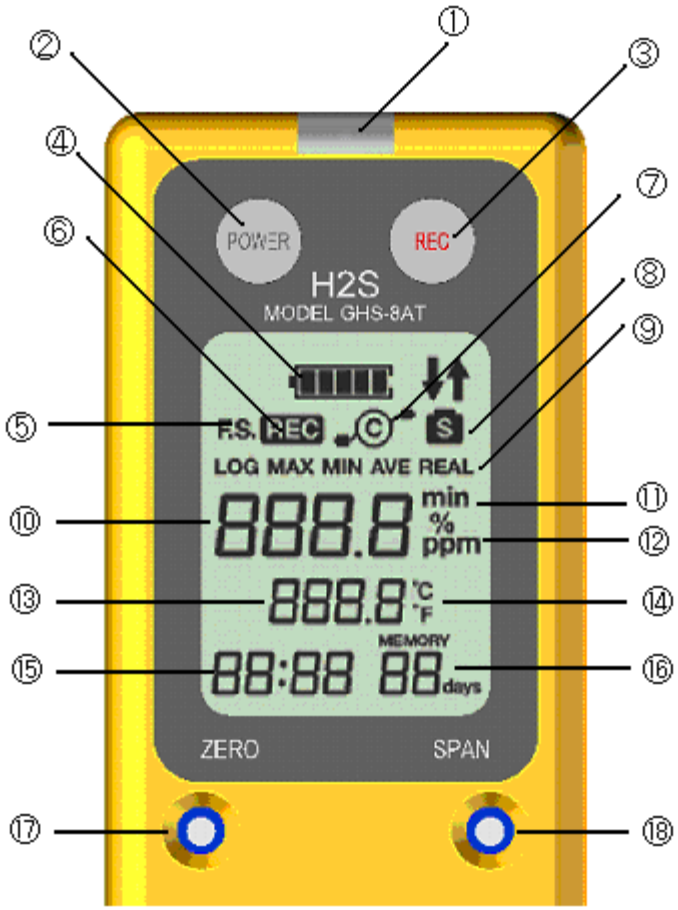


Back



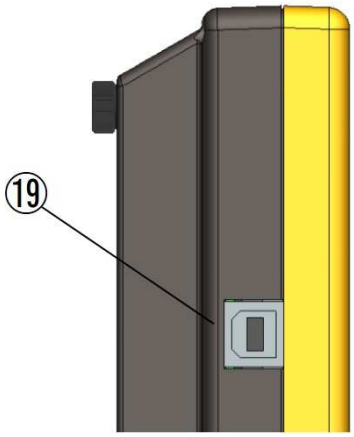
Sensor and sensor cover

3.2 Part names – LCD display and switches.



	Part name	Functions
1	Pilot lamp	Blinks when data logging
2	Power button	Turns the instrument On/Off
3	REC button	Start/stop data logging
4	Battery symbol	Shows battery status
5	Full scale symbol	Lights up when full scale is indicated.
6	Logging symbol	Lights up when data logging.
7	Communication symbol	Lights up when communicating with computer.
8	Calibration reminder	Lights up when the attached sensor needs calibration.
9	Logging setting symbol	Indicates data logging setting.
10	H2S concentration	Indicates H2S concentration. Also used for showing full scale of the sensor and logging time.

	Part name	Functions
11	Logging interval unit	When logging interval is indicated on the display, “min” is indicated.
12	Concentration unit	Indicates concentration unit.
13	Temperature	Indicates instantaneous temperature.
14	Temperature unit	Indicates temperature unit.
15	Time	Indicates instantaneous time (HH:MM).
16	Remained data capacity (day)	Indicates remaining data logging duration in day(s). If the capacity is more than 100 days, indicates “99”.
17	Zeroing screw	Used for zeroing with a screw driver.
18	Span adjustment screw	Used for span adjustment with a screw driver.
19	USB port	Female USB port for computer connection.



4. Before initial use

The following procedures must be completed before initial use.

The signal from H2S sensor is reduced with time, environment conditions, and data logging conditions. Inspection and calibration are done before shipment however, sensor signal may be weaker upon receipt. Thus the following calibration procedure is imperative. Also, the same calibration must be done after sensor replacement. The instrument needs to be adjusted to a new sensor signal.

H2S gas is needed for span calibration. H2S is prepared by using a dedicated H2S generation kit and its concentration is measured by using a gas detector tube.

To convert the logged data to a graph or chart, the dedicated "ANASYS" software needs to be installed on your computer. Data is downloaded via USB 2.0 interface. Before connecting the instrument to your computer, install the device driver on the computer.

<Requisite materials>

Main unit

GHS-8AT-EX

Batteries (AA, accessory of this kit)

Ball allen driver (accessory of this kit), Screw driver (accessory of this kit)

H2S generation kit CK-11 (optional product)

Generation tube, Generation solution, Scrubber tube, Double bellow,
Gas sampling bag, Air pump, C size battery, Gas sampling pump,
Calibration fitting, and Connection tubing

Software

Computer (with USB 2.0 interface and CD-ROM drive)

USB connection cable, Software ANASYS (accessory of this kit)

To prepare calibration gas, the dedicated H2S gas generation kit is recommended. Calibration gas corresponding to the measuring range of your sensor should be used for measurement accuracy. Additionally, use an appropriate gas sampling bag, tubing, and the calibration fitting for the specified concentration range to prevent accidental errors possibly caused by adsorption of H2S. Correspondences of sensors to calibration materials are shown in the tables below.

● Table of corresponding sensor, H2S gas generation kit, and H2S gas generation refill.

Sensor	Sensor range	H2S gas generation kit Cat.No	H2S gas generation refill Cat.No
H2S-520E	0 - 10ppm	CK-11L-E	HSC-20L-E
H2S-521E	0 - 100ppm	CK-11-E	HSC-20-E
H2S-522E	0 - 500ppm	CK-11H-E	HSC-20H-E
H2S-523E	0 - 1000ppm	CK-11HH-E	HSC-20HH-E
H2S-524E	0 - 3000ppm		

● Table of corresponding sensor, quantity of generation tube required, and scrubber tube.

Sensor	Sensor range	Generation tube Cat.No	Qty of generation tube required	Scrubber tube Cat.No
H2S-520E	0 - 10ppm	HSC-21L	1	HSC-24
H2S-521E	0 - 100ppm	HSC-21	1	
H2S-522E	0 - 500ppm	HSC-21H	1	
H2S-523E	0 - 1000ppm	HSC-21HH	1	
H2S-524E	0 - 3000ppm		2	

●Table of corresponding sensor, detector tube, sampling bag, calibration fitting, and connecting tubing.

Sensor type	Sensor range	Detector tube Cat.No	Sampling bag, calibration fitting, connection tubing
H2S-520E	0 - 10ppm	4LK	Low range
H2S-521E	0 - 100ppm	4LL	Middle range
H2S-522E	0 - 500ppm	4HM	
H2S-523E	0 - 1000ppm	4H	High range
H2S-524E	0 - 3000ppm		

⚠ Caution

1. Prepare the corresponding sampling bag, calibration fitting and connection tube with respect to each of the concentration range as listed in the above table.
2. Use gas generation tubes specified for each sensor type.
3. If wrong gas generation tubes are used or incorrect procedures are taken, desired concentrations cannot be obtained. Carefully read instructions provided with the H2S gas generation kit.

4. Use gas detector tubes specified for each sensor type for the best accuracy.

4.1 Access the main unit

1	2
	
Unscrew the external casing.	Extract the main unit. Tip: Turn the bottom casing gently.

4.2 Installation of batteries

1	2
	
Undo the battery cover.	Install new batteries.

3	4
	
Fit in the guide tabs of the battery cover, tighten the screw.	Switch the instrument on and check that the battery symbol indicates full charge.

4.3 Calibration gas

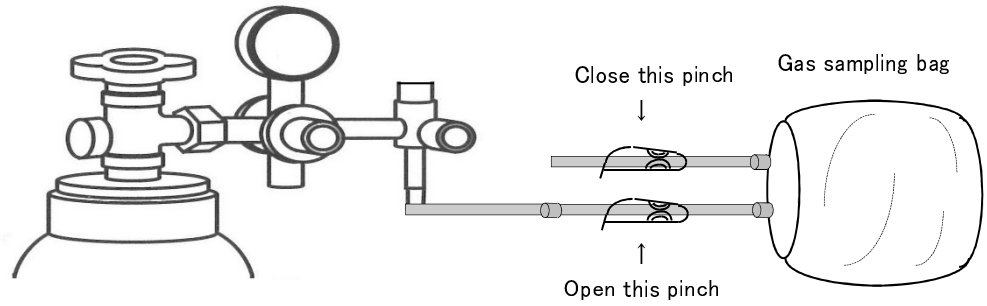
⚠ WARNING

1. Preparation of calibration gas and span calibration shall be performed in a well-ventilated area. Properly discard calibration gas following section 4.6 of this manual and all federal, state, and local laws and regulations. Do not inhale calibration gas.

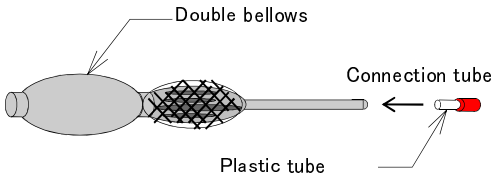
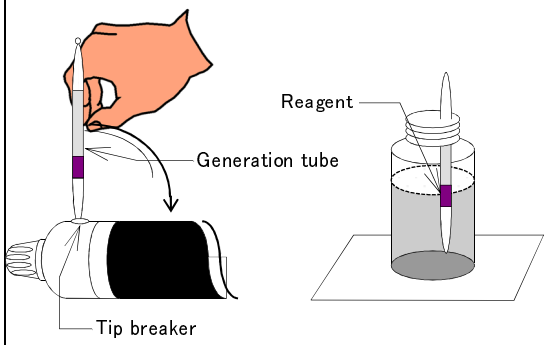
⚠ CAUTION

1. Read and understand instruction manuals provided by each product, accessory, or spare part prior to use.
2. Ensure that there is no leakage in the tubing, sampling bag, or tube connections before preparation of calibration gas.

4.3.1 In case of using a gas cylinder

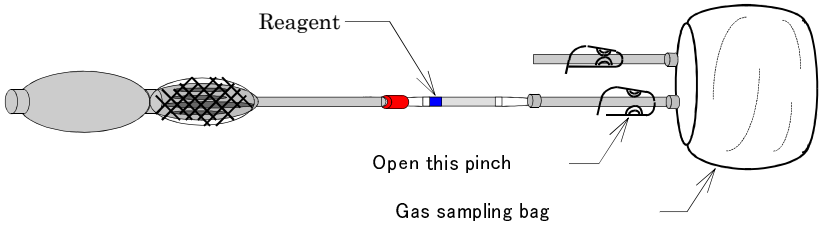
1

While keeping both pinches on the connecting tubes of the sampling bag closed, connect one of the connecting tubes with a gas cylinder. Open the pinch on the connecting tube which is connected with the gas cylinder and inject the calibration gas into the sampling bag.

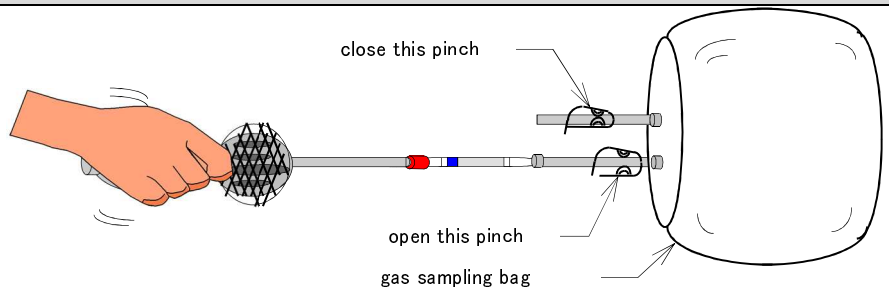
4.3.2 In case of using HSC20 series (H2S gas generation refill)

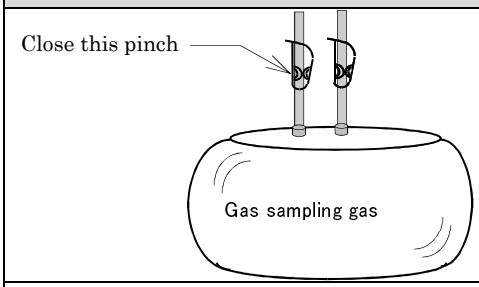
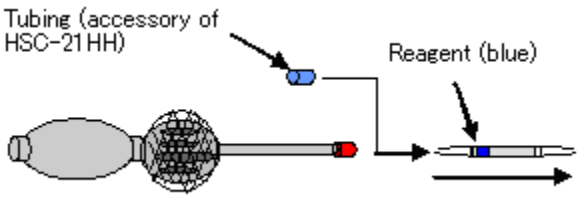
1	2
	
Connect the double bellows to the plastic tube. (If H2S generation kit CK-11 is used, this step is unnecessary.)	Break off both tips of an appropriate H2S generation tube with the tube tip breaker on the Gastec piston pump. Dip the end of the tube with the arrow on the tube into the H2S generation solution (Tap water). The end of the tube with the purple reagent layer should be in solution.

3

After the purple reagent turns blue, remove the tube and clean off the solution on the tube with a paper towel.

4

Connect the H2S generation tube end nearest the arrow and reagent layer to the connecting tube attached to the double bellows. Connect the other end of the generation tube to one of the connecting tubes of the sample bag. Open the pinch on this tube and wait for one minute. Close the pinch which is on the unconnected tube of the sample bag.

5

Pump the double bellows to fill the sampling bag.

6	7 (CK-11HH-E/only when HSC-21HH is used)
	
Close the pinch on the tube connected to the generation tube. Remove the generation tube from the sampling bag with the double bellows connected.	HSC-21HH(1000ppm, 3000ppm) emits H2S even after use. Immediately after disconnecting the generation tube, seal the end of the tube with the arrow (the end nearest the reagent layer) with the cover.

Now the calibration gas is in the bag and ready for use.

4.4 Measurement calibration gas concentration

(This procedure is not necessary when using a gas cylinder for the calibration)

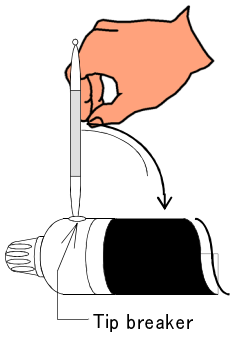
Measure the calibration gas concentration by the following method and note the concentration.

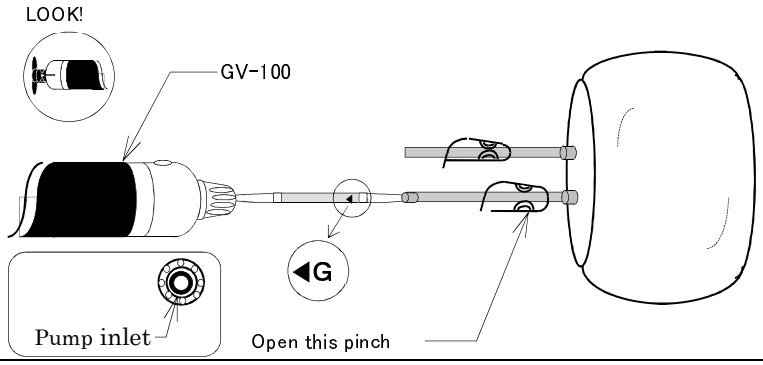
⚠ WARNING

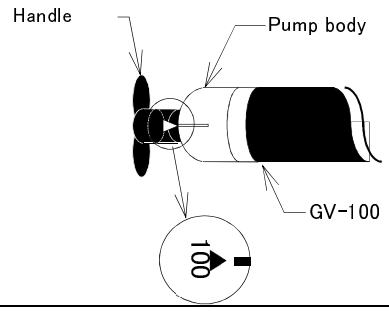
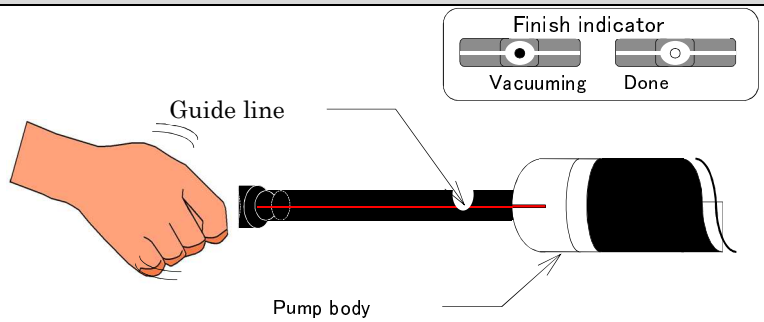
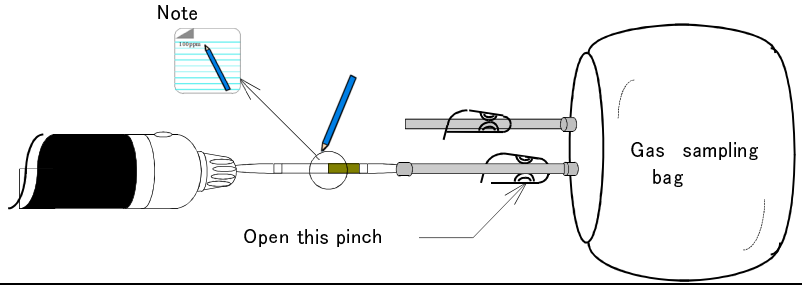
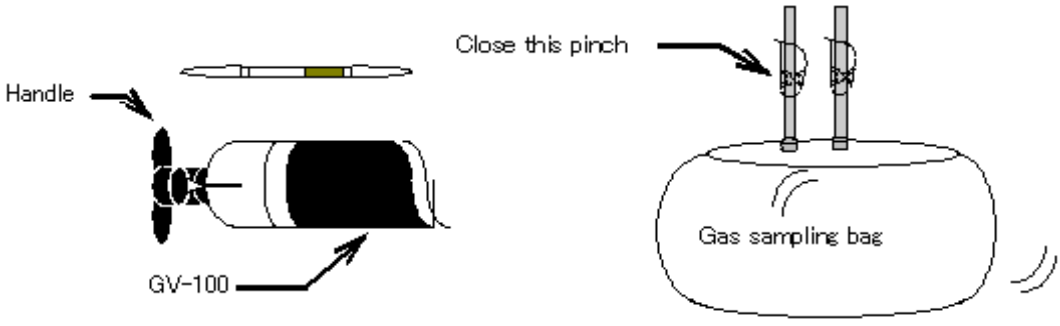
1. Preparation of calibration gas and span calibration shall be undertaken in a well-ventilated area. Properly discard calibration gas following section 4.6 of the manual. Do not inhale calibration gas.

⚠ CAUTION

1. Read the instruction manuals provided with gas sampling pump GV-100 and H2S gas generation kit CK-11, and perform daily inspections to maintain accuracy.
2. H2S gas is unstable. If it is left in the bag over 30 minutes, the concentration will be changed. Perform span calibration as soon as possible after calibration gas is ready.

1

Break off both tips of an H2S detector tube in the pump tube tip breaker.

2

Make certain the pump handle is all the way in (see figure 4 on page 18). Insert the tube into the pump inlet with arrow G➤ on the tube pointing toward the pump and connect the other end of the detector tube to the connection tube of the bag. Open the pinch of the connection tube that is connected to the detector tube.

3

Align the guide marks on the pump body and handle.
4

Pull the handle all the way out until it locks. Confirm the completion of the sampling by the finish indicator in the handle.
5

Mark the interface of the stained-to-unstained reagent and read the scale. Note the concentration.
6

Close the pinch of the connection tube that is connected to the detector tube. Remove the detector tube from the pump and tubing. Return the handle to the original position.

4.5 Zeroing and Span calibration

The sensor signal changes with time and environmental conditions. This is corrected by a known concentration of gas to the instrument and adjusting the sensor output to indicate the correct gas concentration. Span calibration is to be performed before initial use and periodically.

Perform span calibration when;

- Before initial use
- 30 calendar days after last calibration
- Sensor is exposed to H2S concentrations equal to or that exceed the sensor's full scale range.
- After sensor replacement

⚠ WARNING

1. Preparation of calibration gas and span calibration shall be undertaken in a well-ventilated area. Properly discard calibration gas following section 4.6 of this manual and following all federal, state, and local laws and regulations. Do not inhale calibration gas.

⚠ CAUTION

1. Ensure the filter is clean and not damaged before calibration. If the filter is dirty or damaged, replace the filter in accordance with section "7.4.Filter replacement" of this manual.
2. Ensure that there is no leakage or damage in the tubing, sampling bag, or aspiration pump before calibration.
3. When a new sensor is installed, wait 24 hours for the sensor to stabilize before calibration. The instrument does not need to be turned on for sensor stabilization. Instrument batteries supply power to the sensor automatically.

Requisite materials

① GHS-8AT-EX
② H2S gas generation kit CK-11 (optional)
③ Screw driver

<Part names and functions of aspiration pump AP-10>

Aspiration pump Model AP-10 is a component of CK-11 H2S generation kit series. (optional)

Part names and functions

① Power button
Turns the pump on and off.

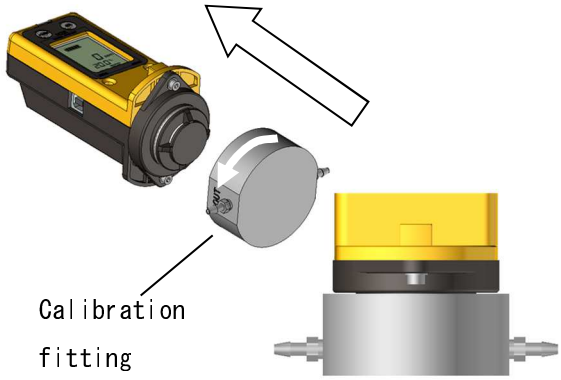
② LED
Normal operation : Green lamp lights up.
Pump failure : Red lamp lights up.
Low battery : Green lamp blinks for 3 seconds when switching the pump on.
Flat battery : Green lamp blinks

③ Inlet : IN
Aspirates air through this inlet.

④ Outlet : OUT
Discharges air through this outlet.

⑤ Battery cover
When replacing battery, slide the cover to open/close battery chamber.
(Install C size battery in battery chamber.)

1



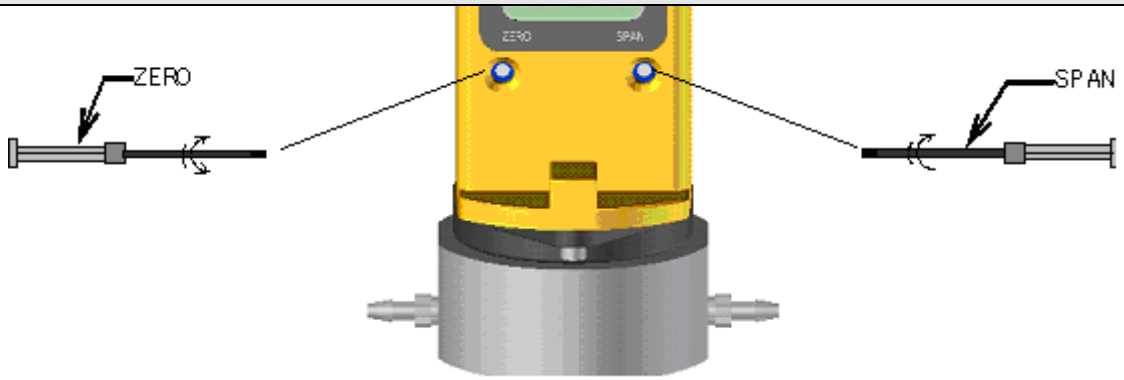
Mount the main unit on the calibration fitting. Ensure the main unit is mounted firmly.
Tip: Turn the fitting gently when pushing the fitting on.

Although the directions of inlet and outlet of the calibration fitting are not important, connecting IN side on the observer's right as illustrated is recommended to prevent incorrect connection. The following procedures are described by this direction.

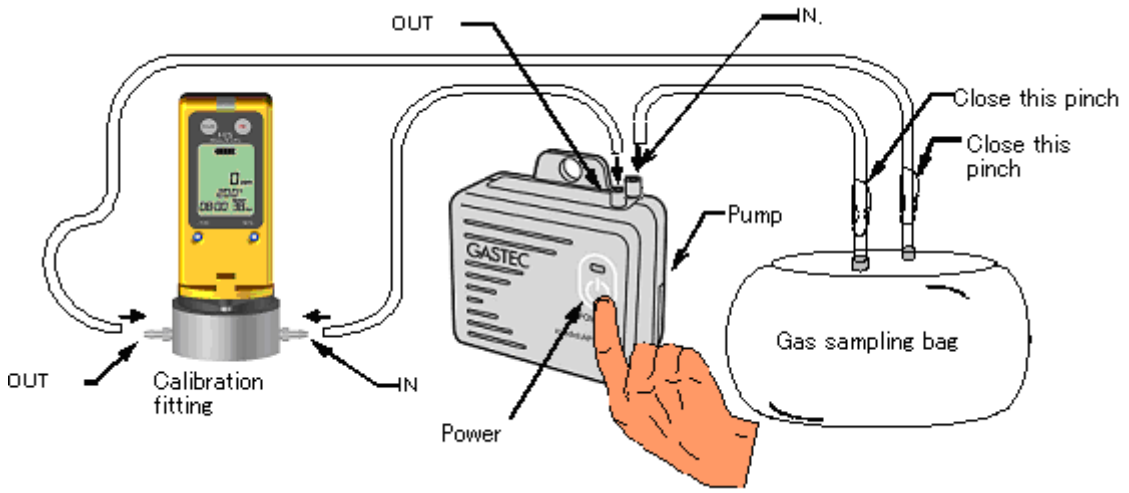
IN and OUT are indicated on the fitting.

OUT IN

2

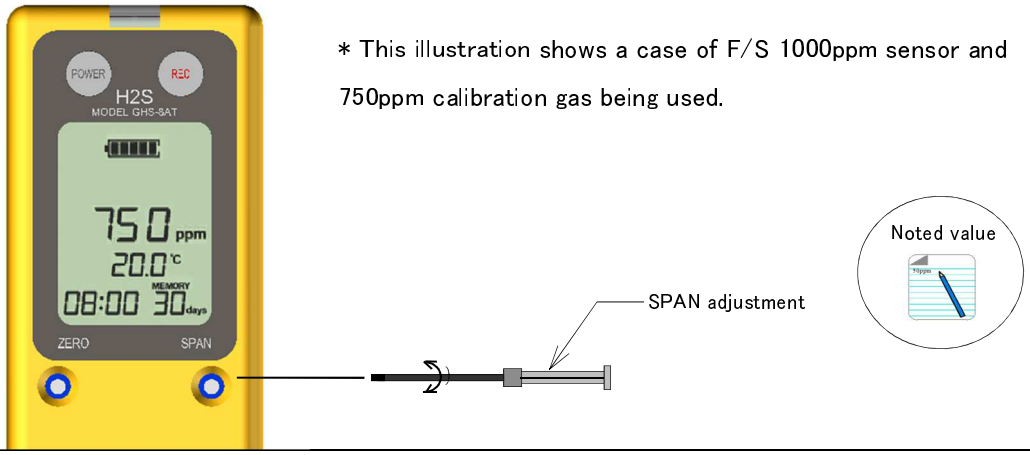


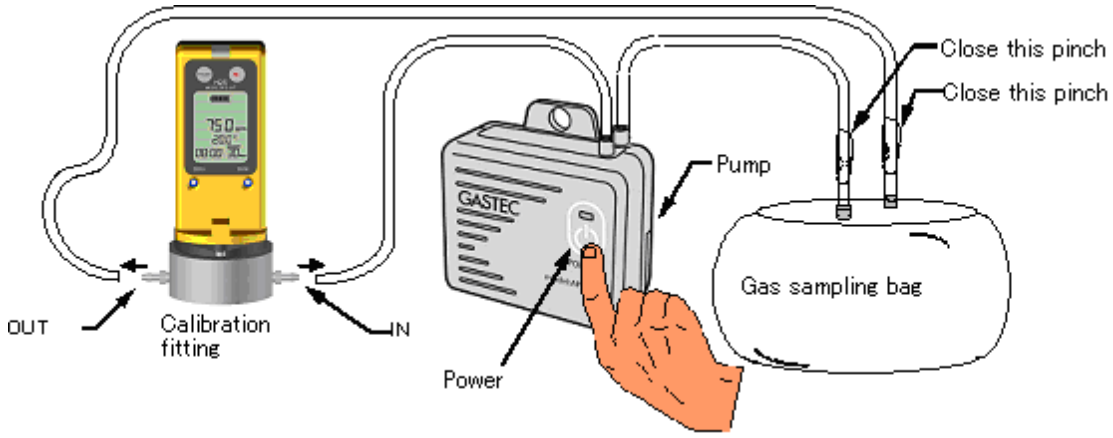
Perform zeroing by using a screw driver. Turn the span adjustment screw clockwise more than four turns. Turn the zeroing screw to indicate 0ppm on the display.

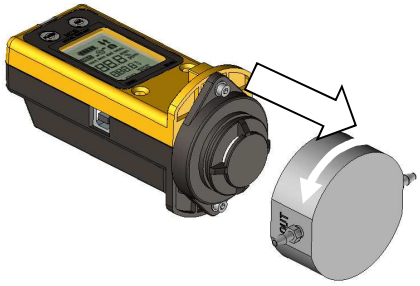
3

①Connect one tube of the bag to IN of the AP-10. ②Connect IN of the fitting to OUT of the AP-10 with a connection tube. ③Connect the other tube of the bag to OUT of the fitting. *** Do not open the pinches until the above procedures are completed.** ④Open the pinches, switch the pump on.

By the above operation, H2S gas is sent to the fitting and the sensor starts detection.

*** For accurate calibration, circulate the gas for 10 minutes.**

4

After 10 minutes, turn the span adjustment screw to adjust the value on the display to the noted concentration value.

5

①Switch off the AP-10. Shut both pinches. ②Remove the connection tubes from calibration fitting.

6

Remove the fitting from the main unit.

4.6 Discarding the calibration gas

(If H2S scrubber tube HSC-24 is used)

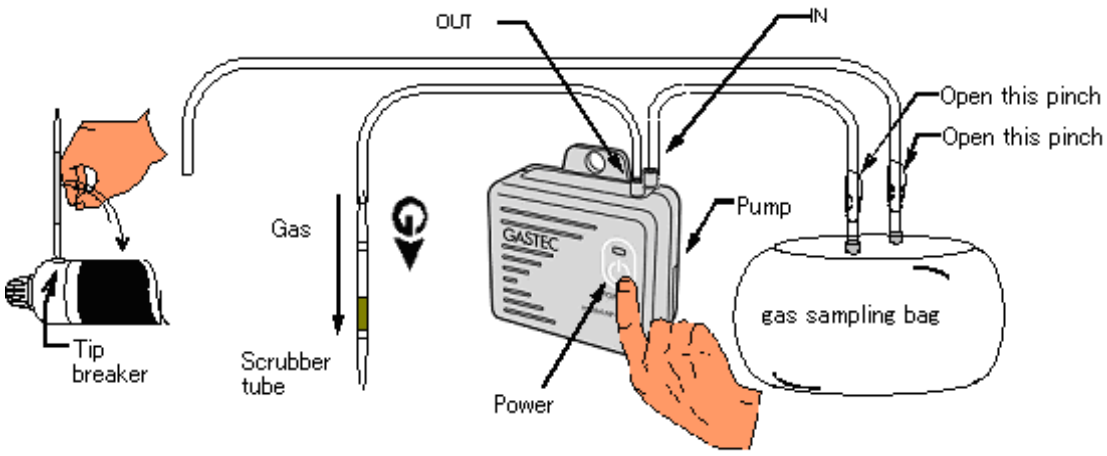
When discarding the used calibration gas, connect an H2S gas scrubber tube to the bag to trap H2S gas in the scrubber tube.

⚠WARNING

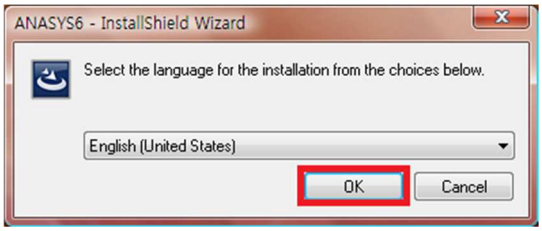
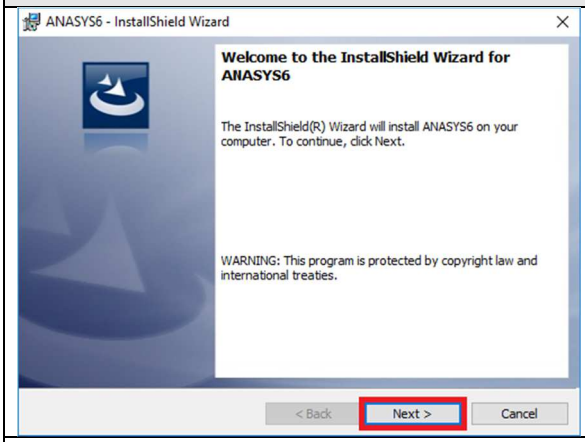
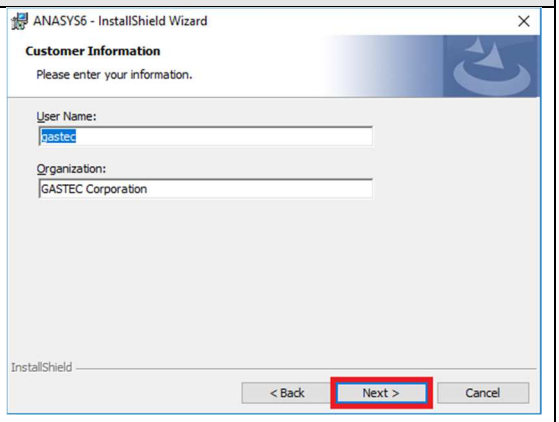
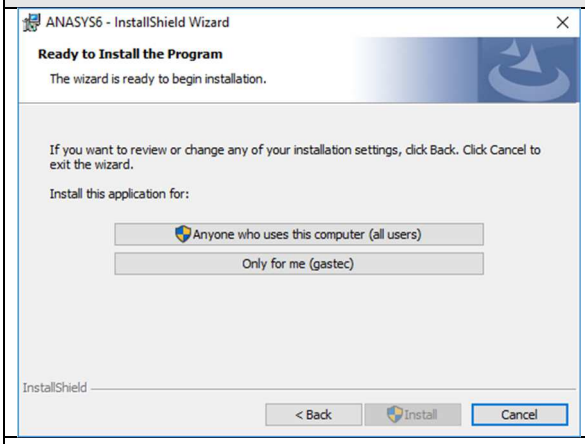
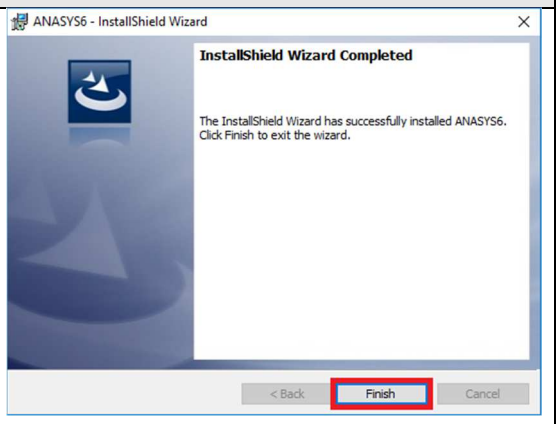
1. Lead scrubber tube discharge gas to an exhaust air duct or other appropriate disposal device to discharge it. Do not inhale calibration gas or scrubber tube discharge gas.

⚠CAUTION

1. Carefully read and understand instructions of HSC-24.

1

① Break off both tips of a scrubber tube with the tip breaker in the gas sampling pump GV-100. ②Connect the scrubber tube to OUT of the aspiration pump AP-10 with the arrow on the tube pointing as illustrated. ③Open the pinch of the tube connected to IN of AP-10, switch the AP-10 on. ④H2S gas will be trapped in the scrubber tube. If the colour stain of scrubber tube rises up to 4/5 of the whole layer, replace the scrubber tube with a new one. ⑤Pump out the calibration gas to empty the bag.

4.7 Installation of dedicated software (ANASYS)

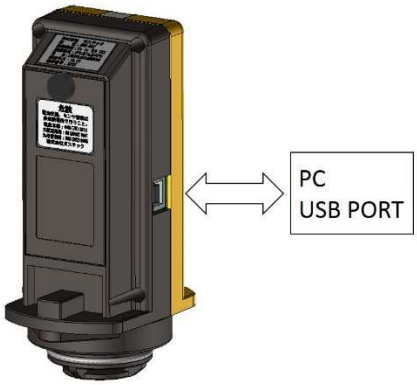
1	2
	
Double click on SETUP.EXE in the CD.	Select the language and click OK button.
3	**4**
	
Install wizard will be launched. Click on “Next”.	Enter user information and click on “Next”.
5	**6**
	
Click on “Anyone who uses this computer” or “Only for me” to start installation.	Click on “Finish” to finish installation procedure.

4.8 Installation of device driver

This instrument can communicate with a computer via USB 2.0 interface. To establish communication, the device driver must be installed on the computer.

⚠ CAUTION

1. Check the battery level before connecting the instrument to the computer (should be one cell or more). If the battery is too low, the instrument may not work properly or logged data may be damaged.
2. To prevent malfunction, in communication, please don't touch the sensor cover mounting screws

1	2
	
Unscrew the external casing.	Extract the main unit. Tip: Turn the bottom casing gently.
3	**4**
	
Switch the instrument on and check the battery level is one or more. If the battery level is not enough, replace the batteries.	Connect the main unit to a computer with a USB cable.

TIP: If the instrument is connected via a USB hub, the instrument may be not recognized by the computer.

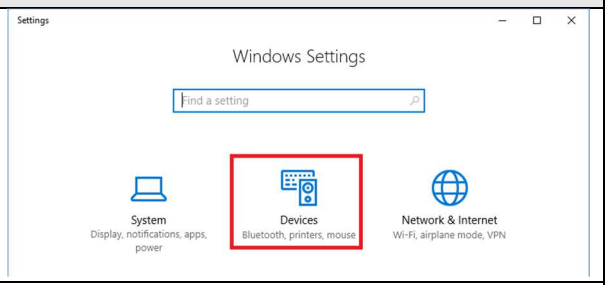
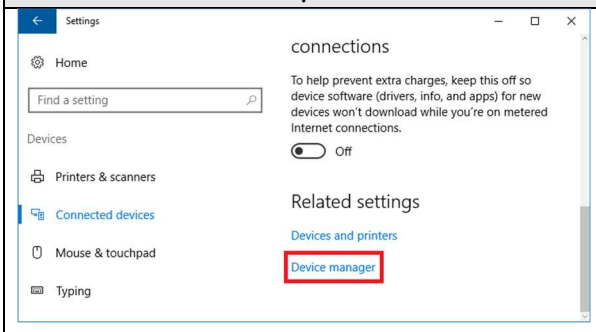
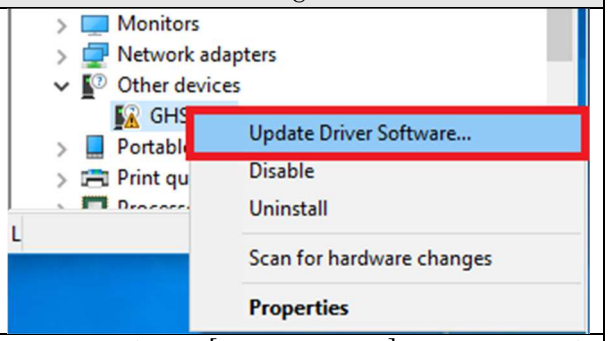
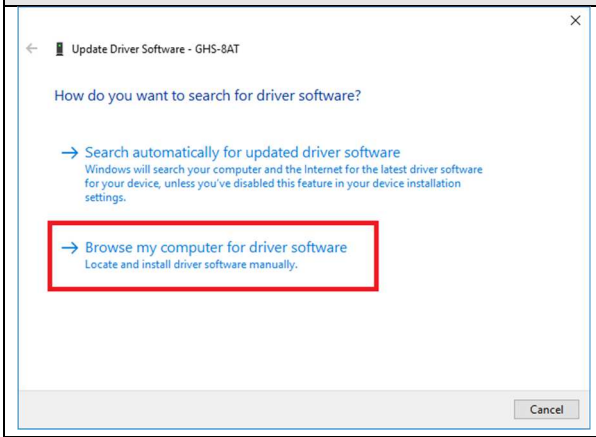
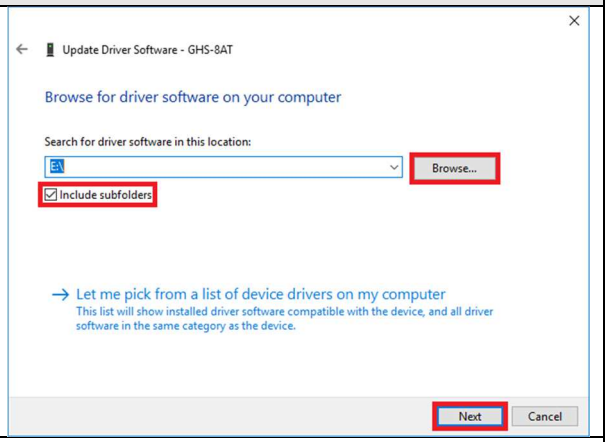
Windows 7, 8, 8.1

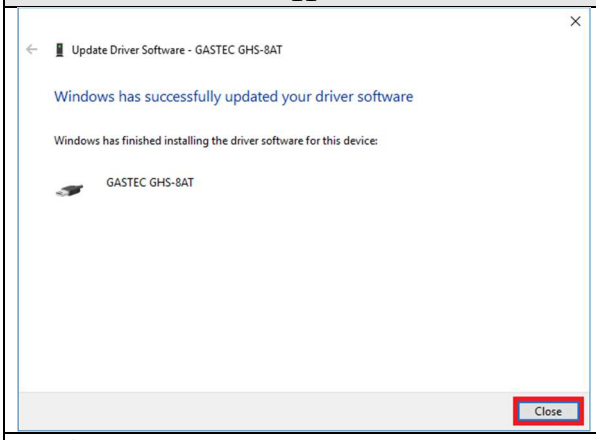
■In the case of online.

Windows Update will install the driver software automatically.

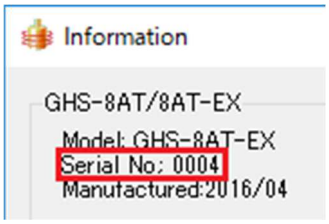
■If the installation failed, or if offline.

The driver can be installed using the CD-ROM.

5	6
	
Start up the computer, and insert the CD-ROM.	Open the Settings and click on [Devices].
7	**8**
	
Click on [Device Manager].	Right-click the [GHS-8AT-EX] and then click on [Update Driver Software...]
9	**10**
	
Click on [Browse my computer for driver software].	Click on "Browse" and select the drive into which you have inserted the CD-ROM. Always, check the box to include subfolders. Click on "Next".

11	12
	
Click on "Close" to complete the installation procedure.	When the installation is successfully done, the communication symbol lights up on the display.

Verify the communication status on ANASYS. Launch ANASYS and click on “Communication” and then “Information”. Check if the serial number indicated on the top of the instrument body corresponds to the serial number shown in the information window.



5. Operation

5.1 Logging setting

The logging interval and other instrument settings can be configured from the computer.

■ Logging interval

The logging interval is selectable from 1, 5, 10, 15, 30, and 60 minutes. The maximum logging duration is 31 days by 1 minute intervals, 153 days by 5 minute intervals. Choose appropriate configuration in accordance with your application and the remaining memory capacity.

■ Log type

The LCD displays H2S concentrations every 2 seconds while data is logging. The preferable type of data can be selected at the time of recording.

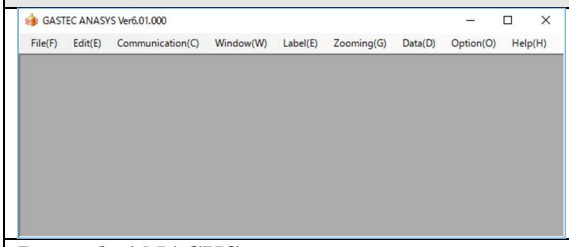
Below is the list of log types.

Log type	
(REAL)	Instant value of logging interval.
(AVE)	Average value of logging interval
(MAX)	Peak value for the logging interval.
(MIN)	Minimum value for the logging interval.

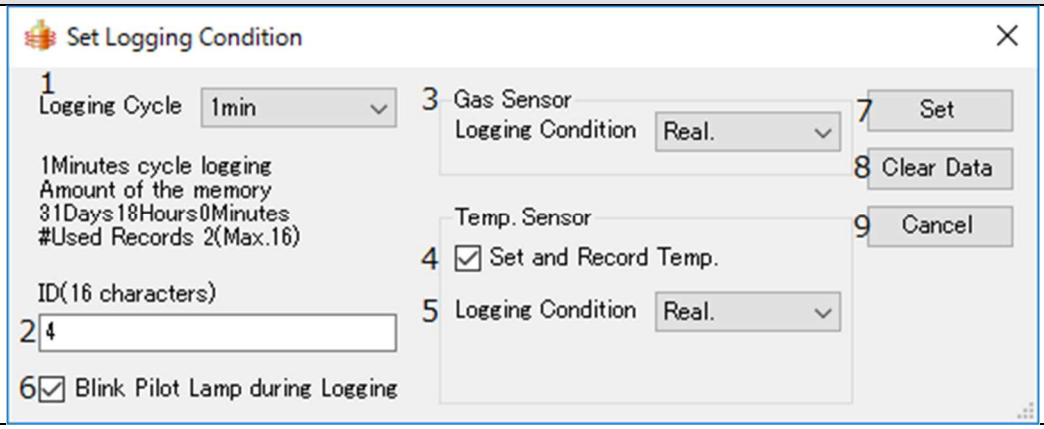
Likewise, the temperature logging data type can be selected. The temperature logging can also be disabled.

⚠CAUTION

1. Duration of data logging may be limited by battery level. Be sure there is a full battery level displayed for long-term data logging.
2. Even if the temperature logging is disabled, H2S concentration data logging capacity is not increased.

1	2
	
Unscrew the external casing.	Extract the main unit. Tip: Turn the bottom casing gently.
3	4
	
Connect the main unit to a computer with a USB cable.	The communication symbol will light up.
5	
	
Launch ANASYS. Click on “Communication”, “Set Logging Condition”.	

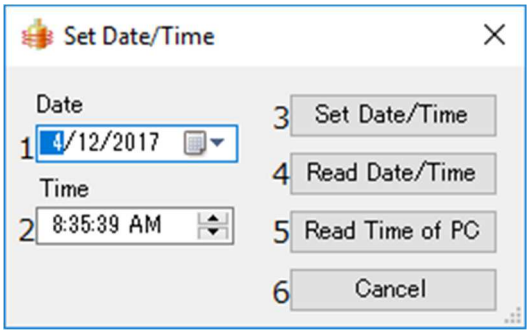
6



Logging configuration dialog box will appear. Set logging interval and log type. Click on "Set" to save the configuration. Click on "Clear Data" to **DELETE ALL LOGGED DATA**.

①	Logging interval	Select a logging interval from the pull-down menu.
②	ID	Give an identification name to the instrument. Up to 16 characters can be accepted. (8 characters if 2 byte character is used)
③	H2S log type	Select a log type of H2S from the pull-down menu.
④	Temperature logging	Check the box to log temperature data. To disable the temperature logging, uncheck the box.
⑤	Temperature log type	Select a log type of temperature from the pull-down menu.
⑥	Enable pilot lamp.	Enable/Disable the pilot lamp.
⑦	Set	Save the configuration to the instrument.
⑧	Clear Data	If clicked, **ALL LOGGED DATA WILL BE DELETED.**
⑨	Cancel	Close the dialog box without saving..

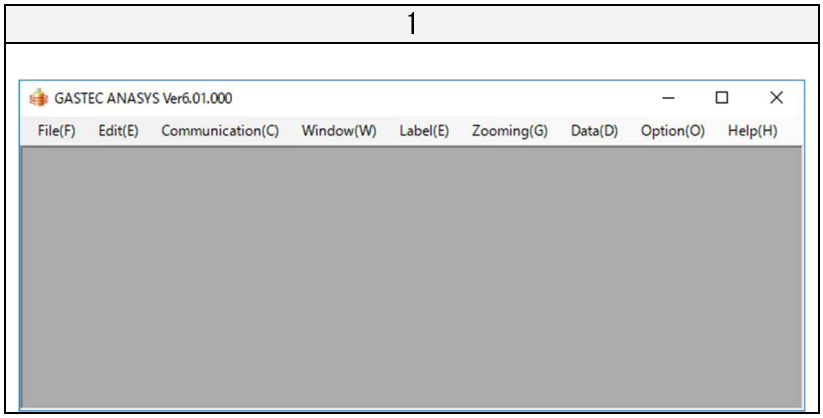
5.2 Setting date and time of the instrument.



Click on [Communication] and [Set Date/Time]. The dialog box will appear.

①Date	Click on the down-arrow button and select the date from the calendar.
② Time	Adjust time. Click and highlight hour, minute, and second. Enter digits or use the up-down arrows to adjust the value.
③Set Date/Time	Save the date and time to the instrument.
④Get the instrument time	Display the date and time of the instrument.
⑤Get PC time	Display the date and time of the computer. This date and time can be saved to the instrument by clicking “Set Date/Time”.
⑥Cancel	Exit without saving the settings.

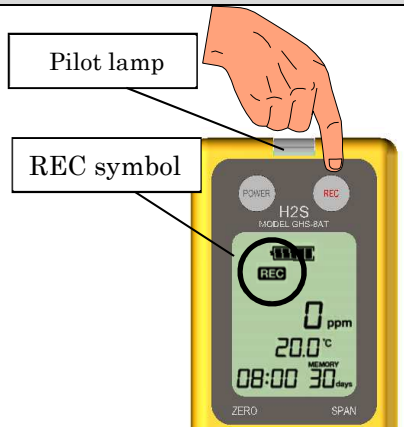
5.3 Quit ANASYS



Click the close button at the upper-right corner of the window. Disconnect the instrument from the PC.

5.4 Start data logging

1	
	After completing the data logging configuration, switch off the instrument by holding the POWER button for 3 seconds, then switch it on again. All segments should light up for 2 seconds. Soon after activation, the display will show the version of software, sensor range (full-scale), logging interval, log type, and number of available records. Check if these settings and the number of available records are appropriate to your application before data logging.
Display transition 1 Version of software	
	Software version will be displayed.
Display transition 2 Sensor range	
	Sensor range will be displayed.

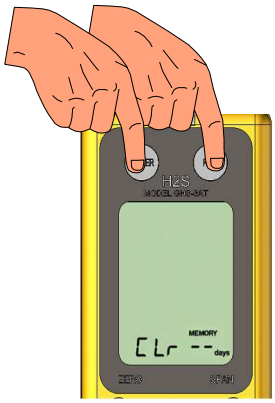
Display transition 3 Logging settings	
	Logging interval and log type will be displayed.
Display transition 4 Available Record	
	The number of available records will be displayed. *The maximum number of available records is 16. If 16 records are saved in the instrument, then FULL will be displayed.
Start data logging	
	Press REC to start logging. The REC symbol will be displayed. If the pilot lamp is enabled, it will start blinking. (By default the pilot lamp is enabled.) △NOTE If the REC symbol is not displayed, data logging is not started even though gas concentration will be displayed.

⚠ NOTE

1. Do not replace batteries during data logging. Stop the data logging and switch the instrument off when battery replacement is needed.
2. If there is no available data capacity or 16 records are saved to the instrument, the instrument will not start data logging. In this case, download or delete the data before data logging.

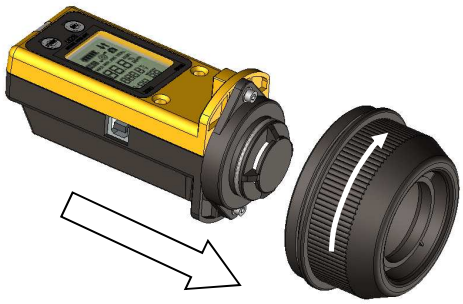
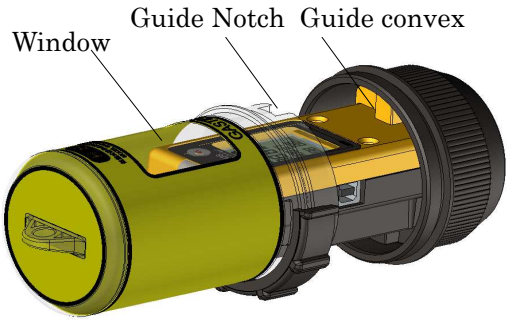
Delete logging data without computer communication

Switch off the instrument and then switch it on with pressing the REC button at the same time. Then, keep holding the REC button and release the power button only.



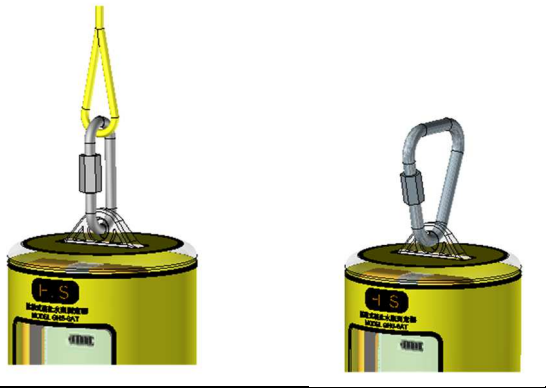
When the data is deleted successfully, LCD will indicate the message as shown on the left. After the message appears on the display, release the REC button.

5.5 Installation of the instrument

1	2
	
Attach the bottom casing to the main unit.	Set the guide convex of the bottom case to the notch of the external cover with the window facing on the display. Screw in the bottom casing firmly.

⚠CAUTION

1. Screw in the external casing firmly until the gap between the casings is closed completely. Otherwise H2S may penetrate inside of the casings and damage the main unit.
2. If the casing is screwed slantwise, unscrew the casing and screw it again. If the sealing is not tight enough, H2S may penetrate into the instrument and damage the main unit.

3


Example of screw lock and string use.

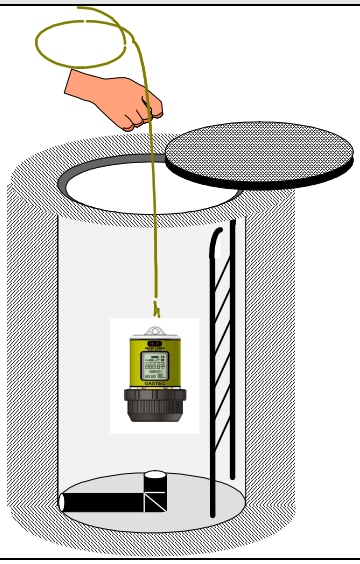
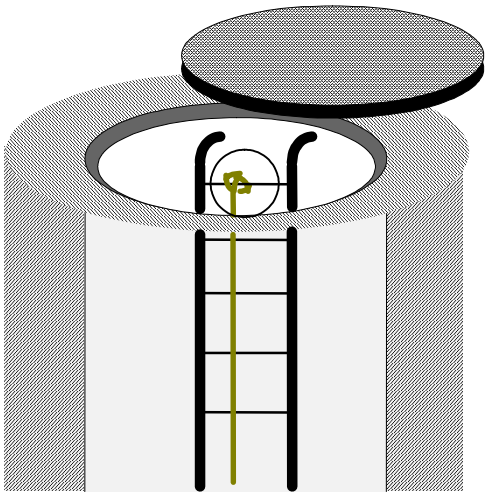
5.6 Site installation

⚠WARNING

1. Ensure the battery replacement is carried out in a non-hazardous area only.
2. Periodical inspections and maintenance should be performed by qualified personnel.

⚠CAUTION

1. Before use, perform zeroing, check the battery level and remaining logging capacity.
2. Do not install the instrument in a location with the potential for submerging the instrument. If the sensor filter is blocked, the instrument cannot sense H2S.
3. Measure the H2S concentration prior to installation and select an appropriate sensor.

1	2
	
Using the string and screw lock, slowly position the instrument as close to the H2S source as possible.	Tie the string to something stable such as a ladder step.

6. Downloading logging data

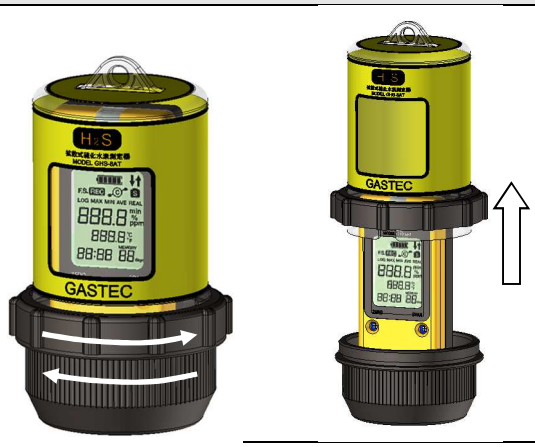
Retrieve the instrument from the site and download the logged data.

6.1 Strip the main unit

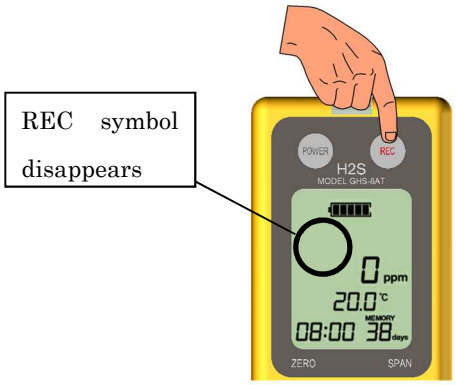
External casing and bottom casing are washable.

⚠CAUTION

1. Do not use detergent or solvent to wash the external casing and bottom casing.
2. Do not use a brush or anything that can scratch the casings for cleaning. Use soft fabric or a sponge.
3. Clean off any moisture on the surface of the external casing before opening. Moisture may cause malfunction to the main unit.

1	2
	
Unscrew the external casing.	Extract the main unit. Tip: Turn the bottom casing gently.

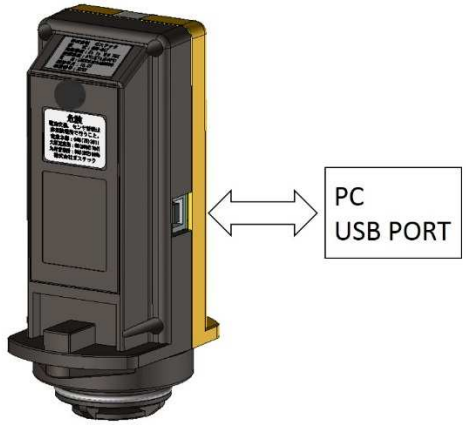
6.2 Stop data logging

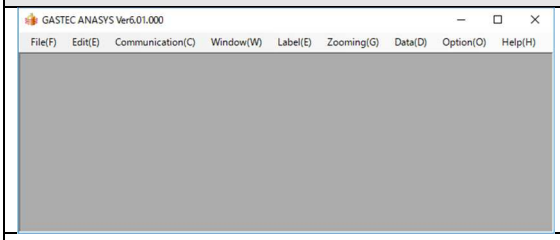
1


Hold the REC button for 3 seconds. The REC symbol will disappear. (If the instrument is connected to a computer with the REC symbol on, data logging will stop automatically.)

6.3 Downloading logging data

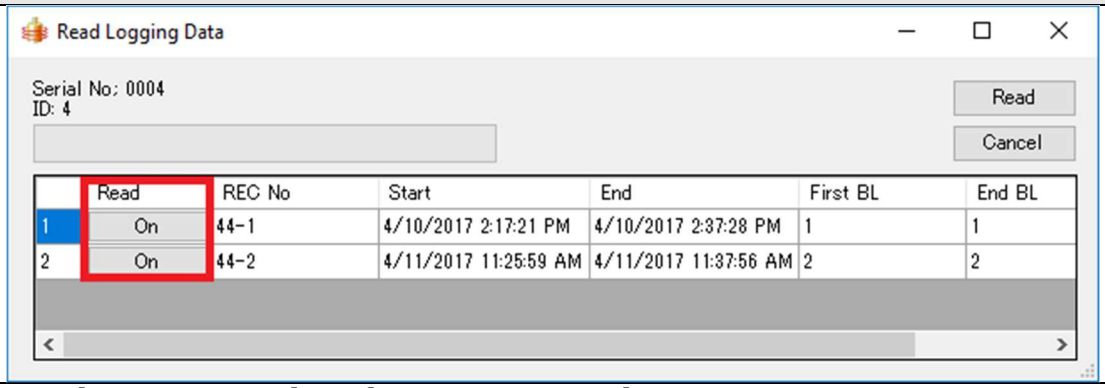
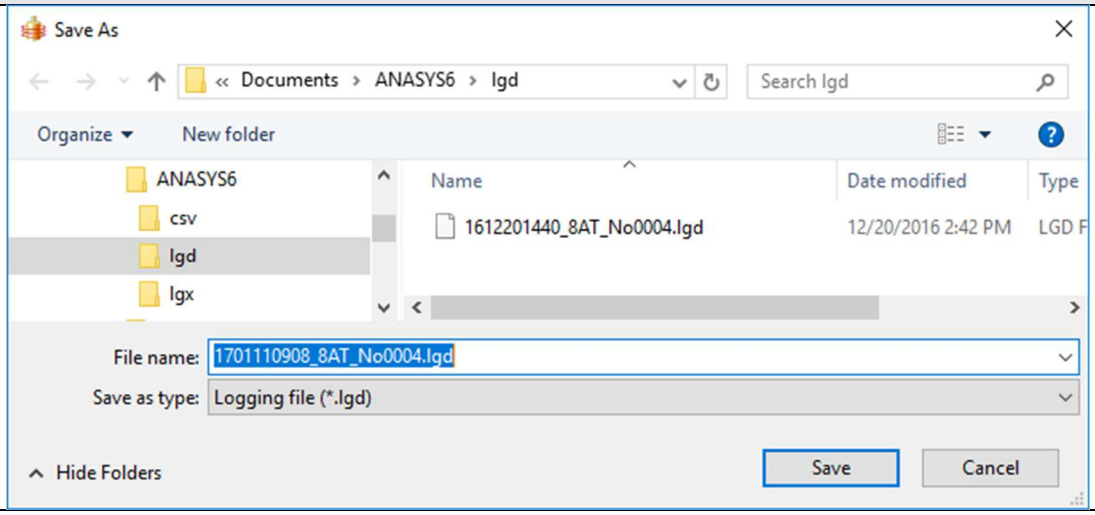
Before downloading the data, install ANASYS and device driver to the computer.

1	2
	
Connect the main unit to the computer with a USB cable.	The communication symbol will light up.

3

Launch ANASYS.

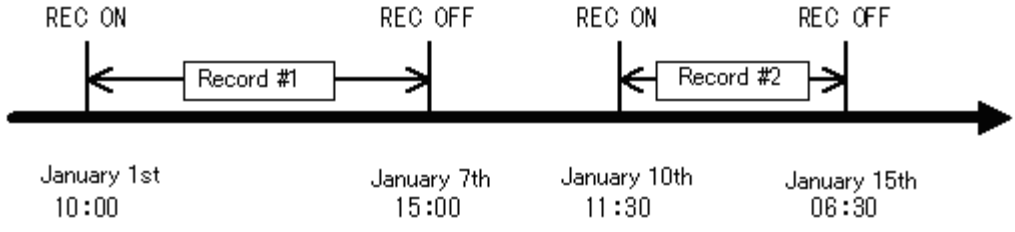
⚠ CAUTION

1. To prevent malfunction, in communication, please don't touch the sensor cover mounting screws.

4
 Click [Communication] and [Read Logging Data] [Read Logging Data] Dialog box will appear. To download all the data, click [Download]. All records are shown in the table at the bottom of the dialog box. If you wish to download a selected record, click on [On] or [Off] in the [Read] column to select.
5
 Name and save the record.

Records

Logged data is composed of the date and time, logged concentrations, and temperatures. This continuous data is bundled as one record by every logging session. Up to 16 records can be saved to the instrument. Be sure to check the number of records saved in the instrument before starting/stopping the data logging.



A record is terminated when;

・Data logging is stopped by pressing the REC button.

・Data logging is automatically stopped due to a low battery.

・Data logging is automatically stopped when the instrument is connected to a computer.

・Data logging is automatically stopped due to running out of the memory.

When data logging is automatically stopped, a status message will be recorded.

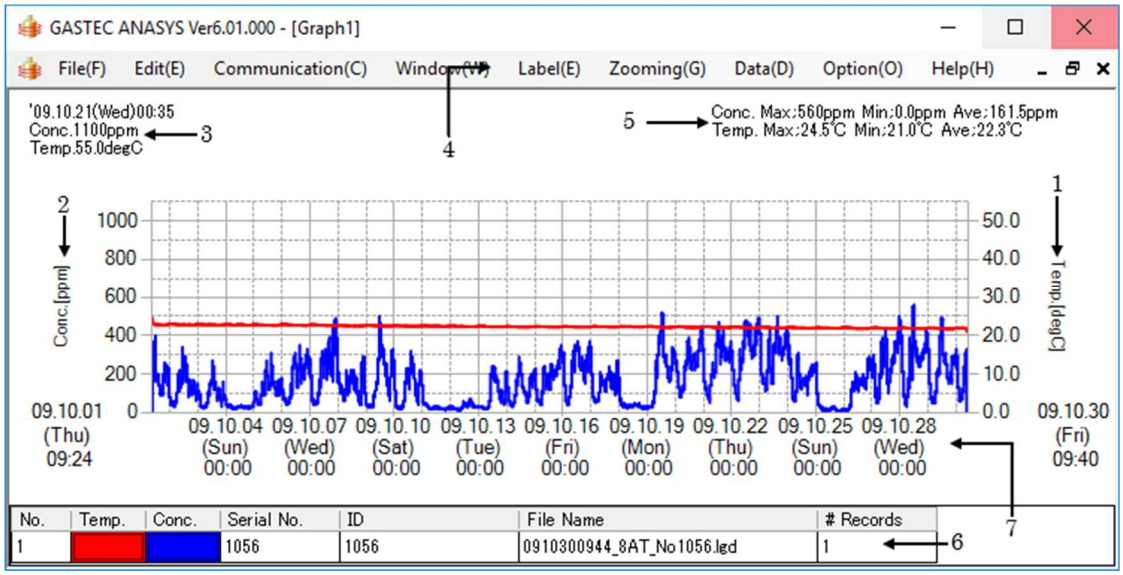
Example: Data example when the record is terminated due to a low battery.

Data No.	Date	Conc. [ppm]	Temp. [degC]
258	2008/06/05 15:04	125	24.5
259	2008/06/05 15:04	120	24.6
260	2008/06/05 15:05	Low battery	-

If the record is terminated by connecting to a PC, [Connected PC] will be recorded.

If the record is terminated due to insufficient memory, [Data Full] will be recorded.

A sample graph is shown below with explanation. For the details of data analysis, refer to the instruction manual of ANASYS.



1 Temperature scale	Shows temperature value. The range is configurable.
2 Concentration scale	Shows concentration value. The range is configurable.
3 Cursor pointing value	Shows values of temperature, time, and concentration where the cursor is pointing.
4 Menu bar	Supplies the list of functions as a menu bar.
5 Max, Min, and Ave	Shows peak, minimum, and average values of the graph. When more than one graph is drawn in the window, maximum, minimum, and average values of the all graphs are shown.
6 Graph properties	Shows properties of the graph. Colour and thickness of the line can be configured.
7 Time scale	Shows time. The range is configurable.

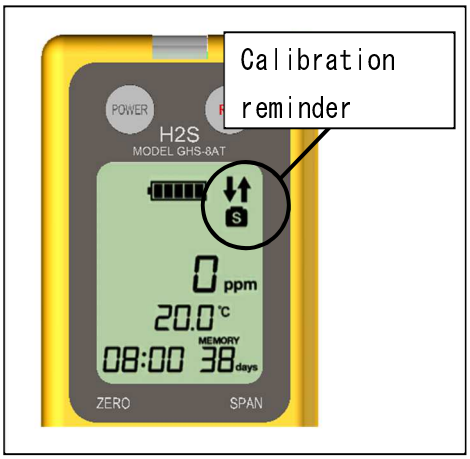
7. Service and maintenance

Periodic inspection, calibration, and maintenance of the instrument must be performed.

7.1 Zeroing and span calibration

Zeroing and span calibration are needed as the sensor signal changes with time and environmental conditions. Span calibration is the application of a known concentration of a known gas to the instrument and adjustment of span signal to indicate the correct concentration.

This instrument features the calibration reminder. After one month from the span calibration, the calibration reminder will be displayed. When the calibration symbol is indicated, span calibration is recommended to maintain accuracy.



Refer to sections 4.3 to 4.5 for zeroing and span calibration procedures.

After span calibration, record the calibration date of the instrument. The calibration reminder will appear on the next calibration date. Refer to the instruction manual of ANASYS for further details. The calibration reminder will disappear when a new calibration date is set from ANASYS.

7.2 Battery replacement

Typical battery life is 3 months when the temperature is greater than or equal to 20℃, 5 minutes logging interval, and the pilot lamp is disabled. From the battery symbol on the display, refer to an approximate remaining battery life as shown in the table below.

Battery symbol	Remaining life (typical)
4 cells	2 months
3 cells	1 month
2 cells	2 weeks
1 cell	1 week

Remaining battery life may be shorter than the above table, depending on environmental conditions. Battery replacement well in advance is

recommended.

For further details, refer to 4.1 and 4.2.

⚠CAUTION

1. Switch the instrument off when battery replacement to avoid malfunctions.

7.3 Sensor replacement

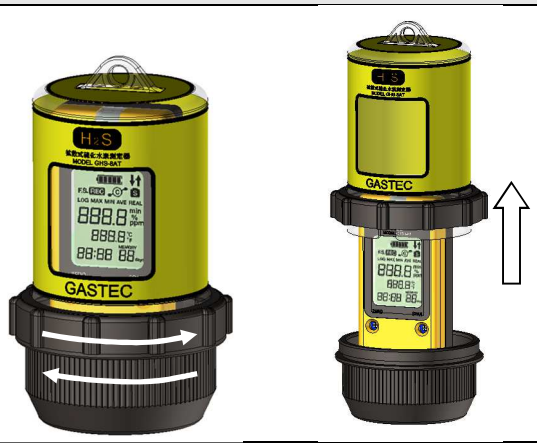
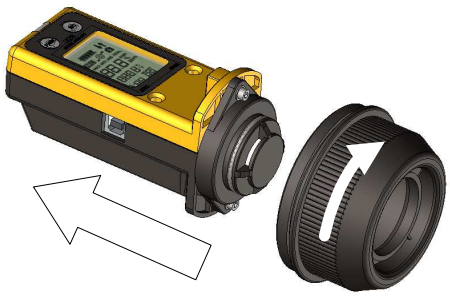
Periodical sensor replacement is recommended. Typical sensor life is one year from purchase date. If the sensor is used beyond its capability, the sensor life possibly becomes shorter than specification.

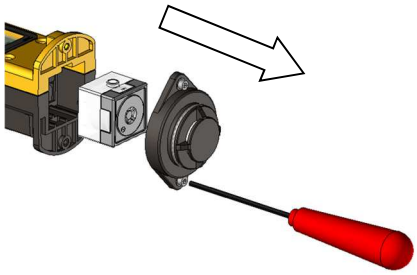
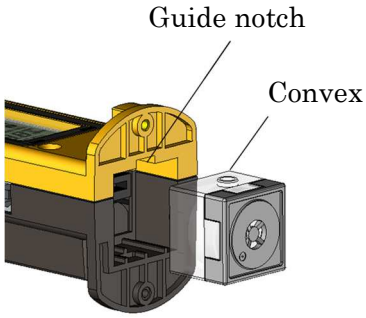
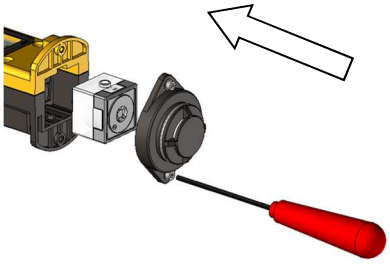
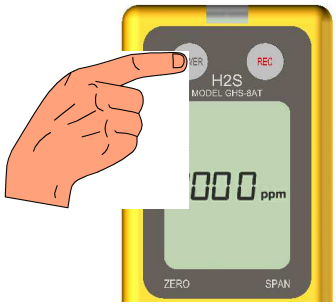
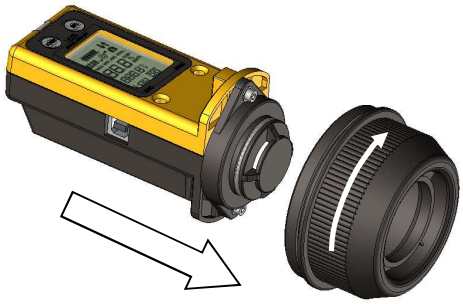
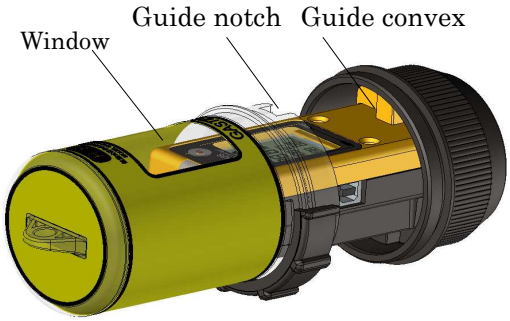
If any of the following events should occur, replace the sensor.

- Zero is not stable in fresh air.
- Zeroing cannot be performed
- Sensor signal is too weak to calibrate it.

⚠ CAUTION

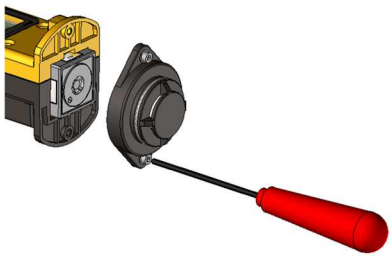
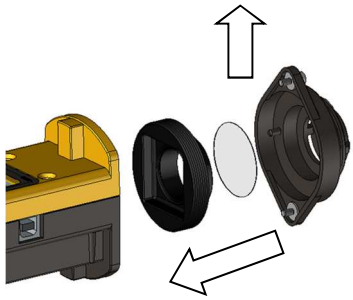
1. Switch off the instrument before sensor replacement. Otherwise sensor or electric circuit may be damaged.

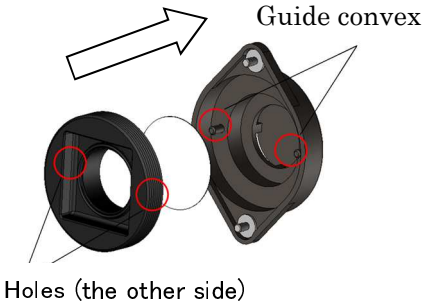
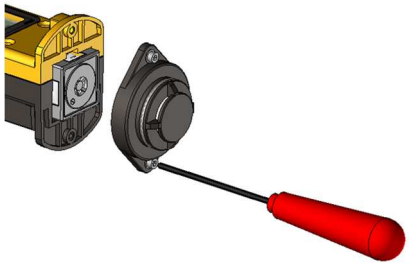
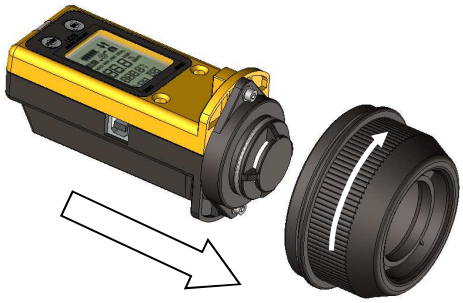
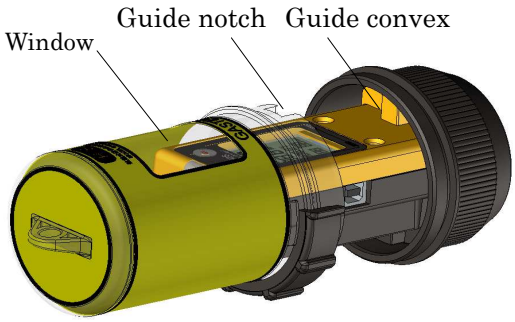
1	2
	
Unscrew the external casing.	Extract the main unit. Tip: Turn the bottom casing gently.

3	4
	
Undo the cover mounting screws using the ball Allen driver. Alternately loosen the screws little by little.	Set the convex of the sensor body to the guide notch of the main unit. Insert the sensor into the main body until it clicks.
5	6
	
Tighten the screws alternately little by little to fasten the cover.	Switch the instrument on and the sensor range will be shown on the display.
7	8
	
Fix the bottom casing on the main unit.	Set the guide convex of the bottom case to the notch of the external cover with the window facing on the display. Screw in the bottom casing firmly.

7.4 Replacing sensor filter

Inspect and replace the sensor filter periodically. An unclean or damaged filter may impair the sensitivity.

1	2
	
Unscrew the external casing.	Extract the main unit. Tips: Turn the bottom casing gently.
3	4
	
Undo the cover mounting screws using the ball Allen driver. Alternately loosen the screws little by little.	Remove the rubber packing and take out the filter.

5	6
	
Tuck a new sensor filter between the sensor cover and rubber packing aligning the guide convex in the holes.	Tighten the screws alternately little by little to fasten the cover.
7	8
	
Fix the bottom casing on the main unit.	Set the guide convex of the bottom case to the notch of the external cover with the window facing on the display. Screw in the bottom casing firmly.

8. Specifications

8.1 Main unit

Model No.	GHS-8AT-EX				
Application	Hydrogen Sulphide				
H2S Sensor	Controlled potential electrolysis sensor				
Sampling method	Diffusion				
Sensor range	0 - 10.0ppm	0 - 100ppm	0 - 500ppm	0 - 1000ppm	0 - 3000ppm
Sensor code	H2S-520E	H2S-521E	H2S-522E	H2S-523E	H2S-524E
Accuracy *1	±5%of F.S.	±5%of F.S.	±5%of F.S.	±5%of F.S.	±5%of F.S.
Increments	0.1ppm	1ppm	1ppm	10ppm	25ppm
Temperature measuring range	0℃ - 40℃				
Temperature sensor	CMOS Temperature sensor				
Temperature accuracy	±3℃				
Display	LCD Display (concentration, temperature, time, battery life, remained data capacity in days)				
Log type	Selectable from instant, average, peak, minimum				
Operating temperature and humidity ranges	Temperature: 0 - 40℃ Humidity: 30 - 95%RH (Non-condensing)				
Power supply	2 x AA Alkaline batteries. Only the following types may be used: LR6(Panasonic) MN1500(DURACELL)				
Battery life	3 months *2				
Battery for memory backup and clock	1 x Lithium battery Typical battery life: 5 years *3				
Clock error	±10 seconds/day (25℃)				
Data logging capacity	45960 points *4				
Logging interval	1 minute, 5 minutes, 10 minuets, 15 minuets, 30 minuets, 60 minuets				
Communication interface	USB2.0				
Dimensions	89 x 148mm (approx.)				
Weight	390g (approx.)				
Standard accessories	H2S sensor, String (5m), Screw lock stainless ring catch (oval, triangle), Ball Allen driver, Screw driver, AA battery (2), sensor filter (6), Dedicated software ANASYS (CD), USB cable (1m), Instruction manual				

As a result of Gastec's commitment to continued improvement, specifications are subject to change without notice.

*1 Calibrated accuracy

*2 >20℃, logging interval 5 minutes, pilot lamp disabled.

*3 Without Alkaline batteries. If Alkaline batteries are installed, battery life will be longer because power is supplied from Alkaline batteries.

*4 31 days by logging interval of 1 minute.

8.2 EU Directive

ATEX: 2014/34/EU
EMC:2014/30/EU
RoHS:2011/65/EU

8.3 Standards

ATEX:
EN60079-0:2012 + A11:2013
EN60079-11:2012

IEC Ex
IEC60079-0:2011
IEC60079-11:2011

EMC
EN50270:2015
EN55032:2015,EN55024:2010

RoHS
EN50581:2012

8.4 Marking

9. Troubleshooting

Trouble	Possible cause	Actions to be taken
Error message “S. Err” appears on the display.	No sensor is installed	Install the sensor. Refer to 7.3
Cannot turn on the instrument	Flat battery or batteries are set wrongly.	Install batteries. Refer to section 4.2
Batteries have life span shorter than battery life shown in section 7.2	If pilot lamp is enabled or temperature is low, battery life become shorter.	Replace the batteries.
Sensor signal is too weak to calibrate.	Filthy sensor filter	Replace the sensor filter. Refer to section 7.4
	Aspiration pump failure	Refer error messages of AP-10 to the following page.
	Wrong tubing connection	Check tubing connection. Refer to section 4.5.
	Pinch on the connection tubing is closed.	Check and open/close the pinch following the instructions. Refer to section 4.5.
	Sensor is dead.	Replace the sensor.
Does not indicate 0 in fresh air	Sensor signal will be changed by time degradation or environmental conditions.	Perform zeroing. Refer to section 4.5.
Pilot lamp does not blinks when data logging	Pilot lamp is disabled.	Enable the pilot lamp. Refer to section 5.1.
Time is not indicated on the display.	Invalid value is set to the date and clock system.	Connect the instrument to computer to set the clock.

Error messages of AP-10

Trouble	Possible cause	Actions to be taken
Green lamp blinks for 3 seconds. (pump works good)	Low battery. The pump will stop soon.	Replace the batteries.
Green light blinks. Pump does not work.	Flat battery.	
Red lamp lights up. Pump does not work.	Pump failure.	Contact the distributor.
Cannot turn on the pump and LED does not light.	If no battery is installed.	Install the battery and switch the AP-10 on.
	If battery is installed.	Contact the distributor.

USB connection troubles

Possible causes	Actions to be taken
Using USB hub	Connect USB cable directly to the computer.
USB driver cannot be installed	Try again with the latest device driver.
Connection failure of USB cable	Replace the USB cable.
Contact failure of USB port.	Use other USB port of the computer.

Installing device driver is required again after installation procedure.

Possible cause	Action to be taken
Other USB port is used	Device driver needs to be installed with respect to each USB port. Use the USB port which driver is already installed or install the driver again.
Cannot install device driver	Try again with the latest device driver.

Time indication is wrong even after setting up the clock system.

Possible cause	Actions to be taken
Low memory back up battery	Typical life of the battery for memory backup and clock is 5 years. Contact the distributor.

10. Options and Supplies

10.1 Supplies

Description	Product code	Quantity
H2S sensor　0 - 10ppm	H2S-520E	1
H2S sensor　0 - 100ppm	H2S-521E	1
H2S sensor　0 - 500ppm	H2S-522E	1
H2S sensor　0 - 1000ppm	H2S-523E	1
H2S sensor　0 - 3000ppm	H2S-524E	1
H2S gas generation refill 0 – 10 ppm	**HSC-20L-E**	10 Gas detector tubes 10 Gas generation tubes (HSC-20HH is 8 tubes) Paper towel
H2S gas generation refill 0 – 100 ppm	**HSC-20-E**	
H2S gas generation refill 0 – 500 ppm	**HSC-20H-E**	
H2S gas generation refill 0 – 1000 ppm 0 – 3000 ppm	**HSC-20HH-E**	
H2S scrubber tube	HSC-24	10
Sensor filter	GHS8AT-41	6

*H2S gas generation kit does not contain H2S scrubber tubes.

10.2 Options

Description	Product code	Quantity
H2S gas generation kit	See the corresponding table below	1
Pendant equipment	GHS7A12	1 set string x 1 Screw lock stainless rings x 2
Screw lock stainless ring (oval)	GHS7A18	2
Screw lock stainless ring (triangle)	GHS8AT-81	1
External casing	GHS8ATEX-81	1
Bottom casing	GHS8AT-84	1
Calibration fitting	CK11-60	1
Gas sampling bag	CK11-82	1
Calibration kit (GHS-8AT-EX)	CK-AP	1 set Calibration fitting ×1 Gas sampling bag ×1 Pump　AP-10 ×1

●Table of corresponding sensor, H2S gas generation kit, and H2S gas generation refill.

Sensor	Sensor range	H2S gas generation kit Cat.No	H2S gas generation refill Cat.No
H2S-520E	0 - 10ppm	CK-11L-E	HSC-20L-E
H2S-521E	0 - 100ppm	CK-11-E	HSC-20-E
H2S-522E	0 - 500ppm	CK-11H-E	HSC-20H-E
H2S-523E	0 - 1000ppm	CK-11HH-E	HSC-20HH-E
H2S-524E	0 - 3000ppm		

EU DECLARATION OF CONFORMITY (No.GDOC1001-1)

1. Apparatus model/Product:

   GHS-8AT-EX / Hydrogen Sulphide Data Logger

2. Name and address of the manufacturer:

   GASTEC CORPORATION

   8-8-6 Fukayanaka, Ayase-City, Kanagawa 252-1195, Japan

3. This declaration of conformity is issued under the sole responsibility of the manufacturer

4. Object of the declaration:

   GHS-8AT-EX / Hydrogen Sulphide Data Logger

Marking

Ⅱ 2G Ex ia Ⅱ B T3 Gb CE

5. The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

   2014/34/EU(ATEX Directive) , 2014/30/EU (EMC Directive),2011/65/EU(RoHS Directive)

6. References to the relevant harmonised standards used, including the date of the standard, or references to the other technical specifications, including the date of the specification, in relation to which conformity is declared:

   ATEX Directive : EN60079-0:2012+A11:2013 , EN60079-11:2012

   EMC Directive : EN50270:2015 , EN55032:2015 , EN55024:2010

   RoHS Directive : EN50581:2012

7. Notified Body involved:

   ATEX EU-Type Examination

   Notified Body and Number: DEKRA Certification B.V. 0344

   Address: Meander 1051, 6825 MJ Arnhem, The Netherlands

   Certificate Number : DEKRA 14ATEX0135

   ATEX Production Quality Assurance

   Notified Body and Number : DEKRA Certification B.V. 0344

   Address: Meander 1051, 6825 MJ Arnhem, The Netherlands

   Notification Number : DEKRA 13ATEXQ0219

8. Additional information:

   -

Signed for and on behalf of: **GASTEC CORPORATION**

(place and date of issue): **Ayase-City, Kanagawa,Japan 28,Aug , 2017**

(name, function)(signature): **YUICHIRO KAIFUKU Director of Quality Assurance**

Yuichiro Kaifuku

17I/MP