

Flue gas analyzer HT-1200N

Operating Manual



HODAKA
Saving energy

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1. Contents	1
2. Introduction	2
2.1 The flue gas analyzer HT-1200N	
2.2 Important instructions regarding the Operating Manual	
3. Safety Regulations	2
3.1 Safety Instructions	
3.2 Specific Safety Instructions	
4. Device illustrations	3
4.1 Perspectiv View	
4.2 Connection plate	
4.3 Lower part	
4.4 Keyboard	
5. Power supply	4
5.1 Prepare measurement	
5.2 Interface RS 232	
6. Operating	5
6.1 Switch ON the unit	
6.2 Gas measurement	
6.3 Last values	
6.4 Zero setting	
6.5 Extension menu	
6.5.1. Stored data	
6.5.1.1 View stored data	
6.5.1.2 Delete data	
6.5.1.3 Measurement HT-1200N to PC	
6.5.2 Device settings	
6.5.2.1 Date/ Time	
6.5.2.2 Parameter	
7. Calculation basis	12
7.1 Analysis and calculation	
8. Technical Specifications	13
9. Storage	14
9.1 Operating and storage temperature	
10. Guarantee	

2.Introduction

2.1 The flue gas analyzer HT-1200N

The Flue Gas analyzer HT-1200N is used for the following purposes:

- Precise control and adjustment measurement for gas and oil firings
- Inspection of gas firing locations
- Control of modern combustion boilers

2.2 Important Instructions regarding the Operating Manual

The operational manual is an important part of the scope of supply and assures not only the correct operation and use of the measuring device, but also the safety of the user and the environment.

Therefore, every user is obliged to read carefully the operation manual and to strictly observe all instructions regarding safety.

Additional instructions in other chapters are marked through **Caution** signs.

3.Safety Regulations

The following Safety instructions have to be strictly observed.

They are an essential and indispensable part of the user documentation.

Not observing can mean loss of warranty claims.

3.1 Safety Instruction

- The device HT-1200N is only to be used for its indicated purpose:

The measurement of flue gases, of combustion air and gas temperature.

3.2 Specific Safety Instructions

- The device is only to be used with the supplied AC adapter (HT1301) for power supply.

Should the battery catch fire due to an operating error or a technical defect, the fire should only be extinguished with the corresponding fire extinguishing equipment.

- The metal tube of the probe as well as any other metal parts / accessories are not to be used as electric conductors.

- The device is not to be used in and under water.

- The device is not to be placed near or directly at open fire or heat.

- The indicated range of temperature of the probe is not to be exceeded, as the probe, temperature sensory mechanism and sensor could be destroyed.

- Plugs of the electronic measuring device have to be avoided.

- **Caution:** Moisture, being evacuated out of the condensate trap can be slightly acidic.

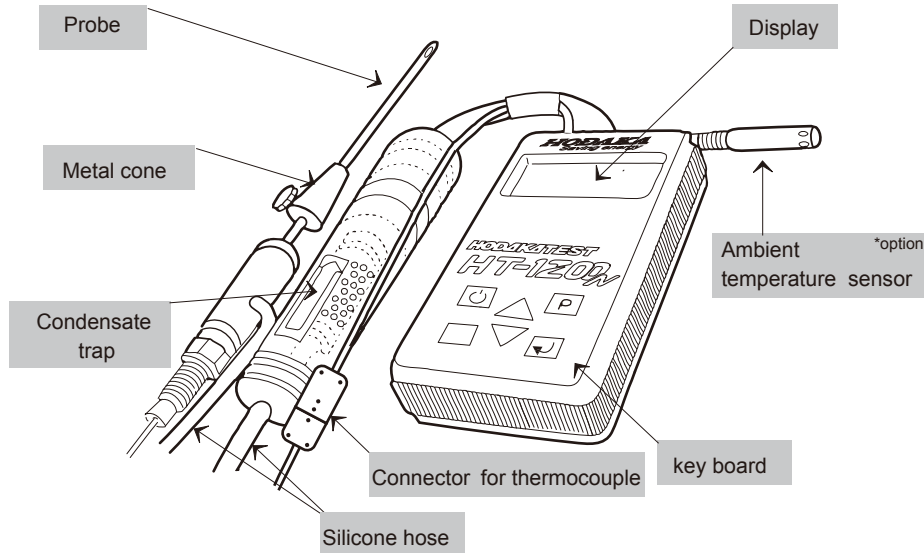
- In case of skin contact **IMMEDIATELY:** clean respective parts of the body! Avoid contact of eyes with liquid!

- **After measurement, vent the device with fresh air** and see to it that the probe is getting cold. As long as it is hot, the tube of the probe could burn persons or cause fire damages on inflammable underground.

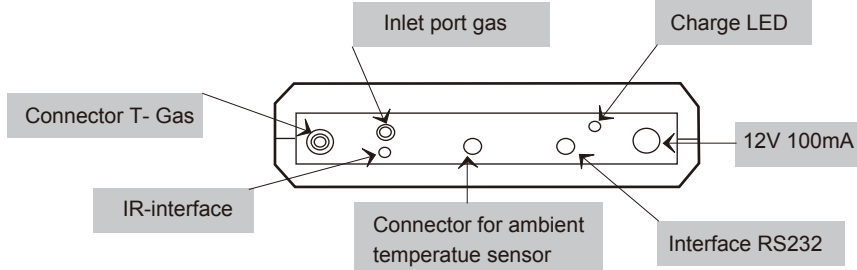
- The exhalations of alcoholic combinations (f.ex. attenuation, petrol, spirit, varnish.....) may damage the sensor of the analyzer. Therefore it's forbidden to preserve or use these fluids near by the device.

4. Device Illustrations

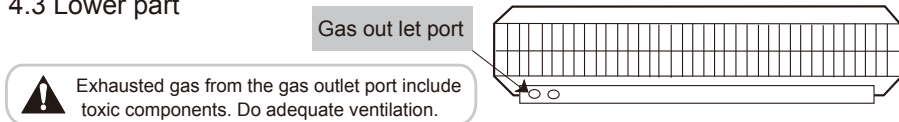
4.1 Perspective View



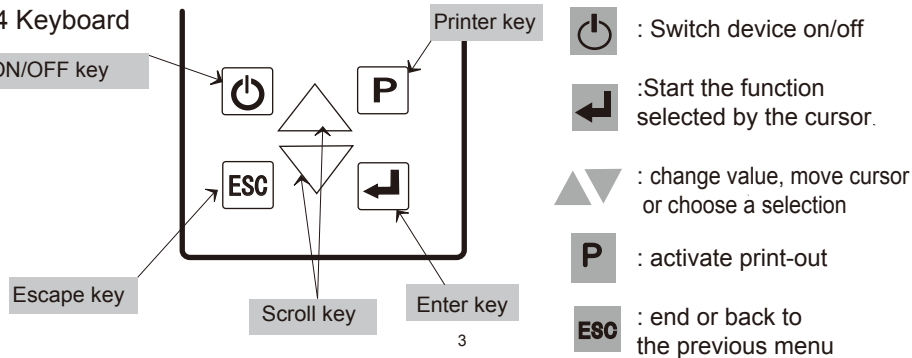
4.2 Connection plate



4.3 Lower part



4.4 Keyboard



5. Power supply

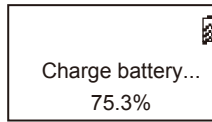
HT-1200N can be operated by:

1. HT-internal battery(standard scope of supply)
2. HT-battery charge (standard scope of supply) 100V / 12 Vdc / 100mA

Measurements from line power : Use the HT-1200N only with the HT power supply 100v / 12Vdc / 100mA

5.1 Prepare measurement

The HT-battery charger can be connected to the HT-1200N.



At the connection plate the charging-LED lights up.

On the display the current loading-state of the battery is displayed.

If the battery is fully charged, the HT-1200N changes to trickle charge and the LED blinks approx. every 16 seconds.

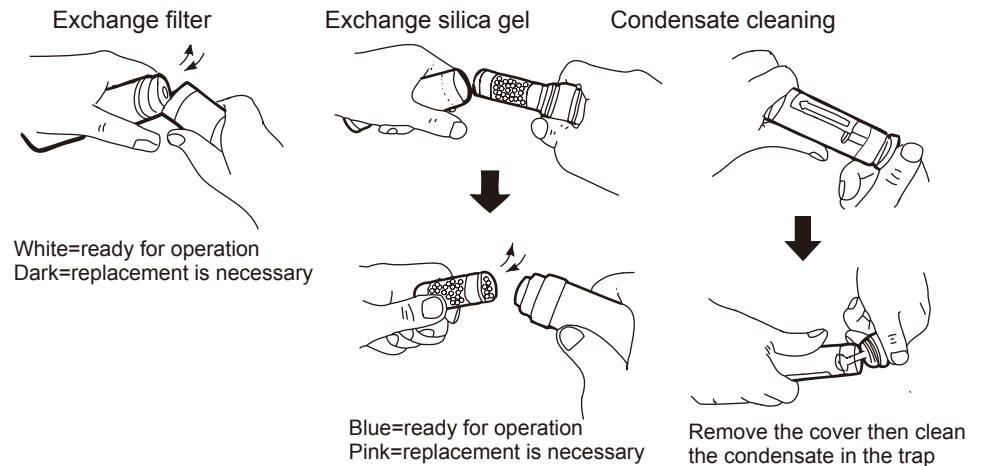
The charging time for unloaded battery is approx. 12 hours.

- Attention: No battery charge if the unit is switched ON.(measurement)
- For battery charge, the device has to be switched OFF and the HT battery charger has to be connected to the HT-1200N and the mains power supply.
- Also in case of non-use charge battery once in the month.

Operating temperature (0°C to 45 °C)

Condensate trap

- Mount condensate trap with filter.
- Please check, if the condensate trap is empty and the filter is still white.
- Check all plugged and screwed connections regarding their tight and correct fit. Check tightness of all tubes, tube connections and condensate trap(from probe tip to gas connection on device).



5.2 Interface RS 232


Switch off unit before connecting RS 232 cable to PC!

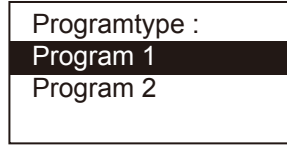
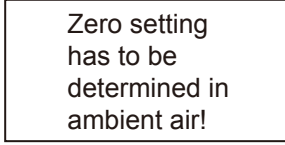
6. Operating

6.1 Switch ON the unit

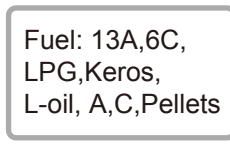
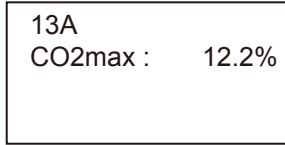
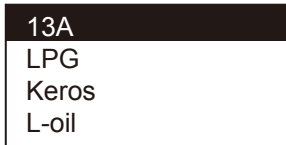
By pressing the  -key the HT-1200N will be switched ON.



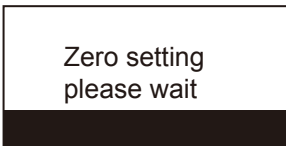
Selftest follows. Then the program type will be selected by the arrow keys  or 



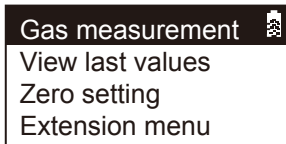
The selection of the fuel follows and the information window about parameters of the selected fuel.



After the selection of program type and fuel the zero setting follows.

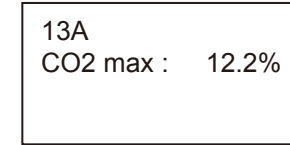
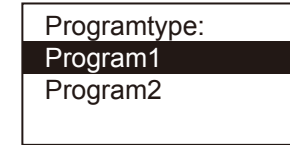
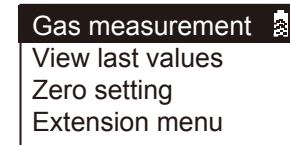





After Zero setting the unit enters the main menu.






The residual battery capacity is displayed in the right corner of the LCD.


6.2 Gas measurement



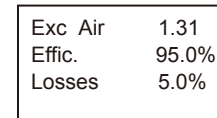
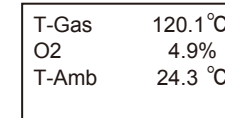
 or  : Select the program type
 : Confirmation of the selection
ESC : Back to the main menu

 or  : Select the fuel
 : Confirmation of the selection

The stored parameters of fuel are displayed.

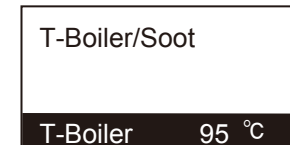
 : Start measurement



 or  : Scroll the measuring values (page 1 and page 2)






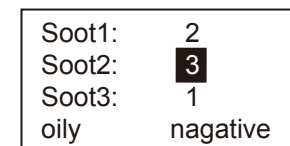
 : Input T-Boiler





The functions "Input of T-Boiler" and "Input Soot number" has to be activate in the Extension Menu / Device settings / Parameter / Print / store boiler temp and print / store soot number! (see chapter)



 or  : Input Boiler temperature in 5 °C steps
ESC : Back to measurement

 : Input of T-boiler and Soot number by means of  or 
 Note: the input soon munber and drivate is valid only at oil as fuel.



 or  : Input soot number in 1 steps
 : Line transfer
ESC (in line 1) : Back to input T-Boiler
 (in line 4) : Storage

Print	
Store	
Abort	

P :Print-out
 :Strage
ES0 :Back to main menu

The last selected strage space is selected.

Store measurement
Cust.1
10.01.06 08:11
P1

or :Selection of storage space
 :Storage
ES0 :Back to measurement

If the selected storage place is free, the display announce: "free"
 Adjustment of the measurement variables:
 Press and for 3 seconds simultaneous, until beeper is heated

T-Gas	120.1°C
O2	4.9%
CO	125ppm
CO2	10.8%

or :Move cursor
 or **ES0** :Change fuel
 and :Back to measurement and leave measurement configuration

6.3 Last values

Gas measurement	
View last values	
Zero setting	
Extension menu	

:View last values

T-Gas	120.1°C
O2	4.9%
T-Amb	24.3°C

Exc Air	1.31
Effic.	95.0%
Losses	5.0%

or :Scroll the measuring values (page 1 and 2)
 :Draft measuring or input of T-boiler and soot numbers
ES0 :Back to the main menu

T-Boiler / soot	
T-Boiler	95 °C

or : Input of T-boiler (5°Csteps)
ES0 :Back to the menu " View last values"

After confirmation by means of the the input of soot number and derivate follows with or

Soot 1:	2
Soot 2:	3
Soot 3:	1
oily	negative

or :Input soot number in 1 steps
 or **ES0** :Line transfer
ES0 (in line 1):Back to input T-Boiler
 (in line 4):Storage

Print	
Store	
Abort	

P :Print-out
 :Storage
ES0 :Back to main menu

or :Selection of the strage place for the last values.

6.4 Zero setting

Gas measurement	
View last value	
Zero setting	
Extension menu	

Zero setting
Please wait

Zero setting has be determined in ambient air!

:Zero setting

6.5 Extension menu

Gas measurement	
View last value	
Zero setting	
Extension menu	

or :Select the function

Store data	
Device settings	
Service	
Set O2 alarm	

Store data	
Device settings	
Service	
Set O2 alarm	

Store data	
Device settings	
Service	
Set O2 alarm	

Store data	
Device settings	
Service	
Set O2 alarm	

: Start the function

6.5.1 Stored data

6.5.1.1 View stored date

Stored data	
Device settings	
Service	
Set O2 alarm	

View stored data	
Delete data	
Measurem. HT=> PC	

or : Select the function
 : Start the function

Memory info
 occupied : 1
 available : 99
 Total : 100

▲ or ▼ : Selection of storage

⏏ : Confirmation

The storage places marked with * are occupied

Cust. 1 *
 Cust. 2
 Cust. 3
 Cust. 4

▲ or ▼ : Select customer

⏏ : Activate storage place

In the last display line is indicated which measurements are set aside for the selected customer. This case program 1.

▲ or ▼ : Scroll the stored values (page 1 and page 2)

T-Gas	120.1	Exc Air	1.31
O2	4.9%	Effic.	95.0%
T-Amb	24.3	Losses	5.0%

6.5.1.2 Delete data

View last values
 Delete data
 Measur. HT=>PC

▲ or ▼ : Select the function

⏏ : Start the function

Memory info
 occupied : 1
 available : 99
 Total : 100

Current use of storage

Delete data?
 No
 Yes

▲ or ▼ : Select the function

⏏ : Start the function

Delete stored measurement
 Single delete
 Delete All

▲ or ▼ : Select the function

⏏ : Start the function

Cust. 1 *
 Cust. 2
 Cust. 3
 Cust. 4

▲ or ▼ : Select the function

⏏ : Start the function

Data bloc
 was delete...

With selection of "ALL" the complete memory is deleted

6.5.1.3 Measurement HT-1200N to PC

View stored data
 Delete data
 measur HT =>PC

▲ or ▼ : Select the function

⏏ : Start the function

1
 Measurements
 available
 to transmit

⏏ : Number of date to be transmitted

Transmission
 to the PC?
 Continue
 Abort

Activate PC-program for transmission

Delete data?
 NO
 Yes

After occurred data transfer appears:
 Memories delete No or Yes

6.5.2 Device settings

Stored data
 Device settings
 Service
 Set O2 alarm

▲ or ▼ : Select the function

⏏ : Start the function

Set time and data
 Parameter
 Service menu

Set time and data
 Parameter
 Service menu

Set time and data
 Parameter
 Service menu

6.5.2.1 Date / Time

Date	Time
13.01.06	10:51:10

:The time stored in the HT-1200N and the date is displayed.

Date	Time
13.01.06	10:51:10

:Activate cursor and placing through repeated pressing about the digit to be changed

:Change value

:Back to the menu "Device settings"

6.5.2.2 Parameter

Set time and date	
Parameter	
Service menu	

:Select the function

:Start the function

LCD Contrast	
contrast	29%

Window:	
Page	2

Current language:	
English	

Print / store	
boiler temp.?	Yes

Print / store	
soot number?	Yes

:Change value / Language / Setting

:Back to the menu "Parameter"

6.5.3 O₂ aralm

Stored data	
Device settings	
Service	
Set O₂ alarm	

:Set O₂ alarm

O ₂ warn limits ppm	
Program1	10.0
Program2	5.0

:change O₂ threshold values

:Confirmation O₂ alarm

:Back to "Extension menu"

In the gas measurement a warning appears if the threshold value is exceeded.

7. Calculation basis

7.1 Analysis and calculation

Continuously measured items	Unit
O ₂	[%]
Temperature (Kthermocouple) *	[°C]
Temperature (Pt 2000Ω) *	[°C]

* Option

Calculated measuring items	Unit
CO ₂	[%]
Efficiency **	[%]
Losses **	[%]
Excess Air	-

** calculated by ambient air temperature and flue gas temperature

$$\text{Excess Air } (\lambda) = \frac{20.9}{20.9 - \text{O}_2 \text{ in the flue gas}}$$

$$\text{Losses} = \frac{(\text{GO} + (\lambda - 1) \times \text{AO}) \times 0.33 \times (\text{Flue gas temp. (T)} - \text{ambient temp. (t)}) \times 100}{\text{Calp}}$$

$$\text{Efficiency} = 100 - \text{Losses}$$

$$\text{CO}_2 = \frac{\text{CO}_2 \text{Max.} \times (20.9 - \text{O}_2 \text{ in the flue gas})}{20.9}$$

	GO Nm ³	AO Nm ³	Calp kcal/Nm ³ or kg	CO ₂ Max
13A	12.04	10.95	9940 Kcal/kg	12.2
6C	4.89	4.08	4050 Kcal/Nm ³	13.1
LPG	25.90	23.90	22350 Kcal/Nm ³	13.8
Keros	12.15	11.37	10570 Kcal/Nm ³	15.1
L-oil	11.90	11.15	10280 Kcal/kg	15.4
A	11.37	10.68	10160 Kcal/kg	15.8
C	10.88	10.25	9750 Kcal/kg	16.0
Pellets	4.63	4.63	4200 Kcal/kg	20.3

GO: Theoretical flue gas volume CO₂Max: CO₂max volume

AO: Theoretical air volume Calp: Lower calorific volume

Fuel data might slightly differ depend on location, therefore calculated data also might have difference.

8. Technical Specifications

Flue gas analyzer ホダカテスト® HT-1200N				
Measurement	O ₂	Measurement range	0~20.9 vol.%	
		Accuracy	Less than ±0.2 vol.%	
		Resolution	0.1 vol.%	
		Response	With in 10 sec.	
	Temperature (K thermocouple)	Measurement range	0~950°C (depend of probe)	
		Accuracy	Measurement=0~100°C: less than ±1°C Measurement=100°C~: less than ±1% of measured value	
		Resolution	0.1°C	
	Temperature (Pt2000 Ω)	Measurement range	0~100°C	
		Accuracy	Less than ±1°C	
Resolution		0.1°C		
Calculated values*	CO ₂	0~CO ₂ Max%		
	Excess air	1.0~50.0		
	Losses	0~100% (Only with Kthermocouple and Pt 2000 Ω)		
	Efficiency	0~100% (Only with Kthermocouple and Pt 2000 Ω)		
Fuel	13A, 6C, LPG, Kerosene, L-oil, A.C, Pellets			
Sensor	O ₂	Electrochemical sensor		
	Combustion temp.	K thermocouple		
	Ambient temp.	Pt 2000 Ω		
Operating and storage temperature	Operating : 0°C~+45°C Storage : -20°C~+60°C			
Display	Dot matrix			
Data store	100 data			
Power supply	International NiCad battery 6V and line power (AC 100~240V 50/60 Hz DC12V 270mA) Max.8hours in a row			
Dimension	80 × 150 × 35 mm			
Weight	Main unit approx. 0.35kg			
Standard equipment	Built in	Pump, Interface for PC (RS232) Data logger (possible to store 100 data), interface for printer		
	Accessories	Battery, gas sampling probe, carrying case, softcase		
Probe: select HT-1229D or HT-1312	Description		Art. No.	
	*Sampling probe	HT-1229	insertion max.180mm, without temp. sensor	
	*Sampling probe with K thermocouple	HT-1312	insertion max. 140mm, 0~650°C	
Optional items	Probes for flue gas	HT-1235D	Long probe L=690mm φ6 w/o tempe. sensor	
		HT-1001G	Sampling probe L=300mm φ6 0~650°C	
		HT-1111D	High temp. long probe L=700mm φ6 0~950°C	
		HT-1342D	High temp. probe L=175mm φ6 0~950°C	
		HT-1238D	L-shape probe L=120mm φ6 w/o tempe. sensor	
		HT-1379D	L-shape probe L=120mm φ6 0~650°C	
	Probe handle			
	Probe handle	HT-7201G	with hose/condensate trap	
	Probe tube (for probe handle HT-7201G)			
	Probe tube (with flue gas temp. sensor)	HT-7231	L=180mm φ5	
		HT-7232	L=750mm φ6	
		HT-7233	L=750mm φ8	
	Probes for temperature K thermocouple	HT-1251	φ3 × 130L, 0~950°C, for air /liquid	
		HT-1252	φ1.5 × 130L, 0~950°C, for air /liquid	
		HT-1253	φ3 × 130L, 0~400°C, for air /liquid/foods, centric top	
		HT-1254	130L, 0~400°C, for surface/riffts/air /liquid	
		HT-1255	φ4 × 130L, 0~650°C, for surface/riffts/air /liquid	
		HT-1256	0~450°C, magnetic probe for surface	
		HT-1257	0~180°C, Pliers probe for plates, tube	

Option	Description	Art. No.	
	Air temp. sensor	HT-1382	0~100°C, for air temp.
	Ambient air temp. sensor	HT-1321	0~100°C
	Battery charger	HT-1318	AC100~240V
	Hard case	HT-1315	Aluminum, dimentino: 350 × 460 × 155 weight: 2.9kg
	Measurement software	HT-2094	Online View 2000(OS Windows XP/7) with RS232cable
	Measurement software	HT-2084	Online View 2000(OS Windows XP/7) with RS232cable, USBcable
	Infrared printer	HT-1610	with roll paper × 1, AA battery × 4
	Roll paper for infrared printer	HT-1636	5rolls

* Fuel data might slightly differ depend on location, therefor calculated data also might have difference.

9. Storage

9.1 Operating and storage temperature

Operating temperature 0 to 45°C

Storage temperature -20 to 60°C

Long term non-operating and storage:

- 1, charge battery every 3 weeks at the line power
- 2, store in a dry place

Recommendation :

Discharge battery before charging (turn power on of unit and wait until auto shut-down before charging.)

10. Guarantee

Guarantee period : 12months from date of dispatch.

Guarantee: During guarantee period, if your instrument brakes down although correct usage based on this user manual, we will repair it by free of charge.

In case you have trouble, firstly please contact to HODAKA CO., LTD. (+81-(0)6-6922-5501), then send your instrument to HODAKA CO., LTD. International transportation cost is not include in guarantee.

HODAKA CO., LTD shall not be liable for any loss or damage whatever arising from content errors or any mis-use of this instrument.

HODAKA CO., LTD.

1-6-17 Asahiku Takadono Osaka Japan 535-0031

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Traceability certification can be issued at HODAKA.

(Additional cost will be required)