

Flue Gas Analyzer HT-1300N

Operating Manual



1. Contents	1
2. Introduction	2
2.1 The flue gas analyzer HT-1300N	
2.2 Important Instructions regarding the Operating Manual	
3. Safety Regulations	
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	4
5. Power supply	5
5.1 Prepare measurement	
5.2 Interface RS 232	
6. Operating	6
6.1 Switch ON the unit	
6.2 Gas measurement	7
6.3 Last values	8
6.4 Zero setting	9
6.5 Extension menu	
6.5.1 Stored data	
6.5.1.1 View stored data	
6.5.1.2 Delete data	10
6.5.1.3 Measurement HT-1300N to PC	11
6.5.2 Device settings	
6.5.2.1 Date/Time	12
6.5.2.2 Parameter	
6.5.3 CO-alarm	
7. Calculation basis	13
7.1 Analysis and calculation	
8. Technical specifications	14
9. Storage	15
9.1 Operating and storage temperature	
10. Guarantee	15

2. Introduction

2.1 The flue gas analyzer HT-1300N

The Flue Gas Analyzer HT-1300N 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 Instructions

- The device -1300N 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.
- Plunges 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!

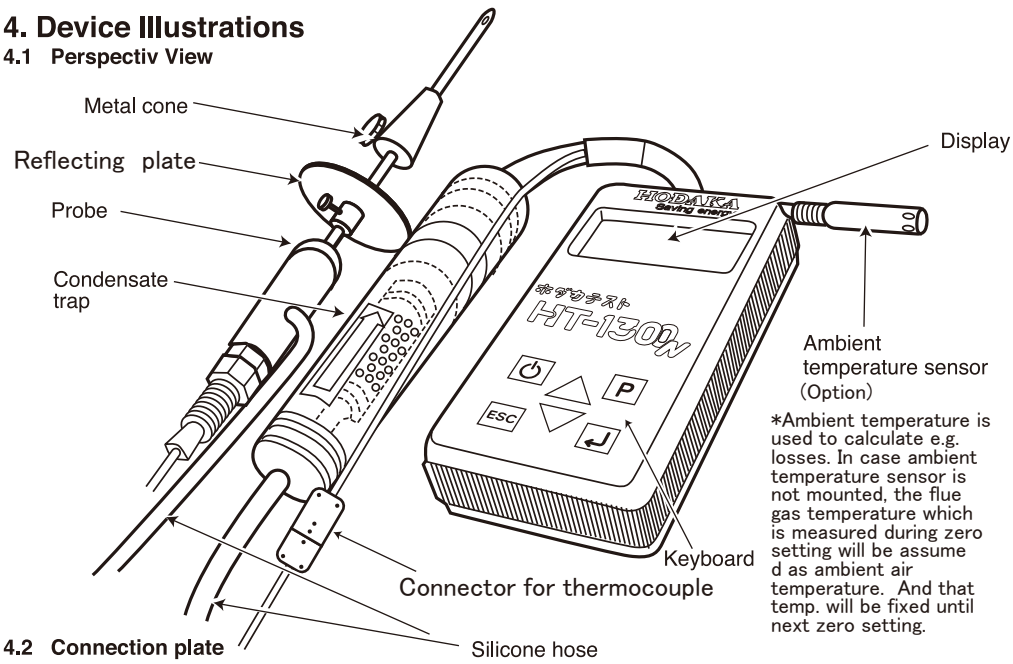
Avoid contact of eyes with liquid!

● **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.

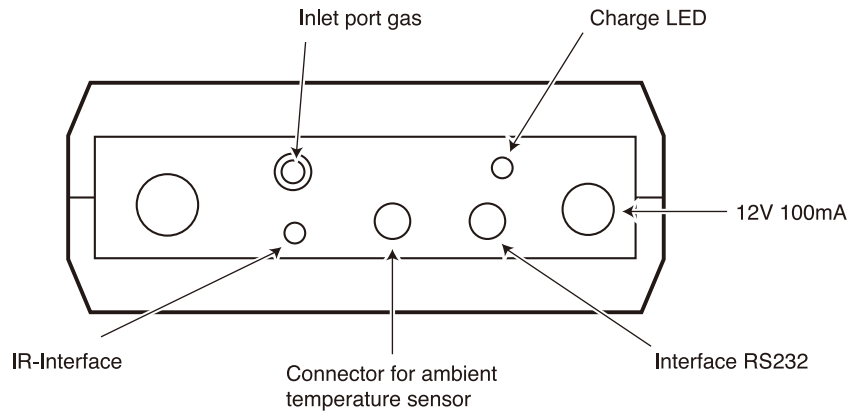
● The exhalations of alcoholic combinations (f. ex. attenuation, petrol, spirit, varnish···) may be damage the sensors of the analyzer. Therefore it' s forbidden to preserve or use these fluids near by the device.

4. Device Illustrations

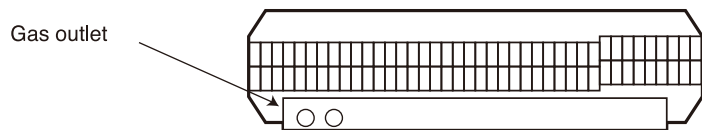
4.1 Perspectiv View



4.2 Connection plate

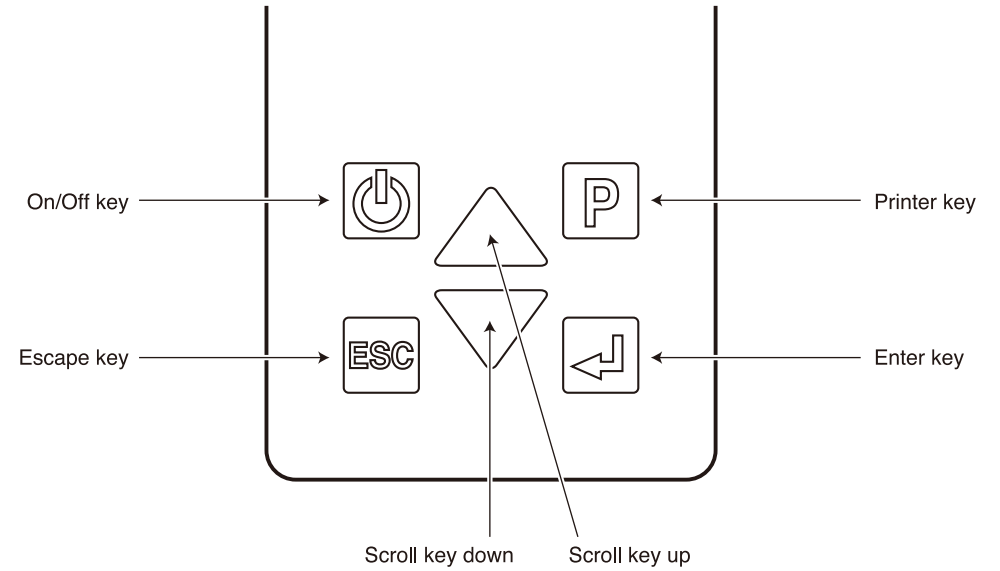


4.2 Lower part



Exhausted gas from the gas outlet port might include toxic components. Do adequate ventilation.

4.4 Keyboard



:switch device on/off



:start the function selected by the cursor



:change value, move cursor or choose a selection



:activate print-out



:end or back to the previous menu

5. Power supply

HT-1300N can be operated by:

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

Measurements from line power: Use the HT-1300N only with the HT power supply 100 V / 12Vdc / 100 mA

5.1 Prepare measurement

The HT-battery charger can be connected to the HT-1300N.

Charge battery . . .
75.3%

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-1300N 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-1300N 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

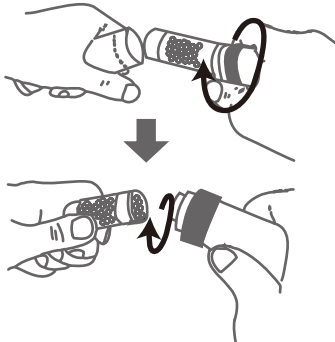
- Mount condensate trap with filter (Filter is above).
- Please check, if the condensate trap is empty and the filter is still **white**.
- Check all plugged and screwed connections regarding their tight and correct fit. Check tightness of all tubes, tube connections and condensate trap (from probe tip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

Exchange filter



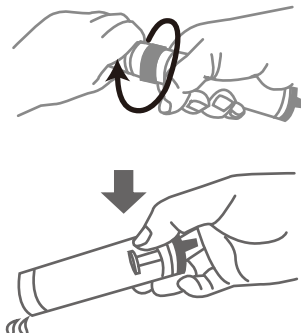
White = ready for operation.
Dark = replacement is necessary.

Exchange silica gel



Blue = ready for operation.
Pink = replacement is necessary.

Condensate cleaning



Remove the cover then clean the condensate in the trap.

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-1300N will be switched ON.

HODAKA
HT-1300N

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

HT-1300N
-Selftest-

Zero setting
has to be
determined in
ambient air!

Programtype :
Program1
Program2

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

13A
6C
LPG
Keros

13A
CO2max : 12.2%
COmax : 4000ppm
O2Ref : 0 ↓ ↑

(Fuel:13A,6C,
LPG,Keros,
L-oil,A,C,
Pellet)

The O2 ref. is variable
by means of or .

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

Zero setting
please wait

After zero setting the unit enters the main menu.

Gas measurement
View last values
Zero setting
Extension menu

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

O2 20.9%
CO 0ppm
CO/O2 ---ppm
CO2 0.0%

During the measurement, press : Pump off (Temp. measurement will be continued)
During the pump off, press : Pump in (Gas measurement starts again)

During the pump on, press 2times : Back to the main menu.
During the pump off, press 1time : Back to the main menu.

Switch off the unit:

Back to the main menu.

Turn off the unit.

6.2 Gas measurement

Gas measurement
View last values
Zero setting
Extension menu

Programtype :
Program1
Program2

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

13A
6C
LPG
Keros

▲ or ▼ : Select the fuel
 ↵ : Confirmation of the selection

13A
CO2max : 12.2%
COmax : 4000ppm
O2Ref : 0 ↓ ↑

The stored parameters of fuel are displayed.
 The O2 ref. is variable by means of ▲ or ▼ .

↵ : Start measurement

▲ or ▼ : Scroll the measuring values (page1 to page 4)

T-Gas 120.1°C	T-Amb 24.3°C	ExcAir 1.31	CO/O2 175mg
O2 4.9%	CO/0% 164ppm	Losses 5.0%	O2 4.9%
CO 125ppm	CO/O2 175mg	Effic. 95.0%	CO 125ppm
CO2 10.8%	CO/m3 156mg	Dewpnt. 72°C	CO2 10.8%

↵ : 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)

T-Boiler/Soot
T-Boiler 95°C

▲ 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 mask soot number and derivate is valid only at oil as fuel.

Soot1 : 2
Soot2 : 3
Soot3 : 1
oily negative

▲ 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
 ↵ : Storage
 ESC : Back to main menu

The last selected storage space is selected.

Store measurement
Cust.1
10.01.'03 08 : 11
P1

▲ or ▼ : Selection of storage place
 ↵ : Storage
 ESC : 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 heard

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

▲ or ▼ : Move cursor
 ↵ or ESC : 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	T-Amb 24.3°C	ExcAir 1.31	CO/O2 175mg
O2 4.9%	CO/0% 164ppm	Losses 5.0%	O2 4.9%
CO 125ppm	CO/O2 175mg	Effic. 95.0%	CO 125ppm
CO2 10.8%	CO/m3 156mg	Dewpnt. 72°C	CO2 10.8%

▲ or ▼ : Scroll the measuring values (page1 to page 4)

↵ : Draft measuring or input of T-boiler and soot numbers

ESC : Back to the main menu

T-Boiler/Soot
T-Boiler 95°C

▲ or ▼ : Input of T-boiler (5°C steps)
 ESC : Back to the menu "View last values"

After confirmation by means of the ↵ the input of soot numbers and derivate follows with ▲ or ▼

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

▲ or ▼ : Input soot number in 1 steps
 ⏴ or ⏵ : Line transfer
 ⏪ (in line 1): Back to input T-Boiler
 ⏩ (in line 4): Storage

Print
 Store
 Abort

P :Print-out
 ⏴ :Storage
 ⏪ :Back to main menu

▲ or ▼ : Selection of the storage place for the last values.

6.4 Zero setting

Gas measurement
 View last values
 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 values
 Zero setting
 Extension menu

▲ or ▼ : Select the function

Stored data
 Device settings
 Service
 Set CO alarm

Stored data
 Device settings
 Service
 Set CO alarm

Stored data
 Device settings
 Service
 Set CO alarm

Stored data
 Device settings
 Service
 Set CO alarm

⏴ : Start the function

6.5.1 Stored data

6.5.1.1 View stored data

Stored data
 Device settings
 Service
 Set CO alarm

View stored data
 Delete data
 Measurment.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 it is indicated which measurements are set aside for the selected customer. This case program 1.

▲ or ▼ : Scroll the stored values (page1 to page 4)

P :Print-out

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

T-Amb 24.3°C
 CO/0% 164ppm
 CO/O2 175mg
 CO/m3 156mg

ExcAir 1.31
 Losses 5.0%
 Effic. 95.0%
 Dewpnt. 72°C

CO/O2 175mg
 O2 4.9%
 CO 125ppm
 CO2 10.8%

6.5.1.2 Delete data

View stored data
 Delete data
 Measurment.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-1300N to PC

View stored data
Delete data
Measur.HT=>PC

▲ or ▼:Select the function
⏏:Start the function

1
Measurements
available
to transmit

⏏:Number of data 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 CO 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.'03 10:51:10

⏏:The time stored in the HT-1300N and the date is displayed.

Date Time
13.01.'03 10:51:10
▲
▼

⏏:Activate cursor and placing through repeated pressing about the digit to be changed
▲ or ▼: Change value
ESC: Back to the menu "Device settings"

6.5.2.2 Parameter

Set time and data
Parameter
Service menu

▲ or ▼:Select the function
⏏:Start the function

LCD-Contrast
Contrast 29%
▲
▼

Window :
Page 4
▲
▼

Current language :
English
▲
▼

Print/store
boiler temp.? Yes
▲
▼

Print/store
soot number? Yes
▲
▼

▲ or ▼:Change value / Language / Setting
⏏:Back to the menu "Parameter"

6.5.3 CO-alarm

Stored data
Device settings
Service
Set CO alarm

⏏:Set CO alarm

CO warn limits ppm
Program1 2000
Program2 2000

▲ or ▼: change CO threshold values
⏏:Confirmation CO alarm
ESC: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
O2	[%]
Air temperature	[°C]
Flue gas temperature	[°C]
CO	[ppm]

Via the microprocessor the following is calculated (standard and optional):

More continuously calculated measuring items	Unit
CO2	[%]
Efficiency	[%]
Losses	[%]
Excess Air	-
CO value in reference to 0% rest O2 (not diluted)	[ppm]
CO value in reference to O2 reference value dep. on fuel	[ppm]
Dew point	[°C]

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

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

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

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

$$\text{CO/O}_2 = \frac{20.9 - \text{O}_2 \text{ reference \%}}{20.9 - \text{O}_2 \text{ in the flue gas}} \times \text{CO}$$

$$\text{Dew point} = \frac{4077.9}{16.7241 - \ln \left(1.1 + \frac{100}{1 + \frac{\text{fw}}{\text{CO}_2}} \right)} - 236.67$$

	GO Nm ³	AO Nm ³	Calp kcal/Nm ³ or kg	CO ₂ Max	fw
13A	12.04	10.95	9940 kcal/Nm ³	12.2	57
6C	4.89	4.08	4050 kcal/Nm ³	13.1	77
LPG	25.9	23.9	22350 kcal/Nm ³	13.8	77
Keros	12.15	11.37	10570 kcal/kg	15.1	111
L-Oil	11.9	11.15	10280 kcal/kg	15.4	111
A	11.37	10.68	10160 kcal/kg	15.8	111
C	10.88	10.25	9750 kcal/kg	16	111
Pellet	4.63	4.63	4200 kcal/kg	20.3	0

GO: Theoretical flue gas volume
AO: Theoretical air volume
Calp: Lower calorific value

CO₂Max: CO₂Max value of each fuel
fw: humidity mark

*In case measure sulfur-rich flue gas, actual dew point might differ from calculated dew point.

8. Technical specifications

Flue gas analyzer ホダカテスト® HT-1300N					
Measurement	O ₂	Measurement range	0~20.9 vol.%		
		Accuracy	Less than ± 0.2 vol.%		
		Resolution	0.1%		
	CO (with H ₂ compensation)	Response	with in 10 sec.		
		Measurement range	0~10000ppm		
		Accuracy	Measurement = 0~200 ppm : less than ±10ppm Measurement = 200ppm~ : less than ±5% of measured value		
	Combustion air temp.	Resolution	1ppm		
		Response	with in 40 sec.		
		Measurement range	0 ~ 650°C 0 ~ 1100°C... (depend on probes)		
	Ambient air temp.	Accuracy	±1°C or ±1% reading(0 ~ 650°C) ± 2 % reading (650.1 ~ 1100°C)		
		Resolution	0.1°C (0 ~ 999.9°C) 1°C(1000 ~ 1100°C)		
		Measurement range	0~100°C		
Calculated values	Accuracy	Less than ±1°C			
	Resolution	0.1°C			
	CO ₂	0~CO ₂ Max%			
	O ₂ / CO (O ₂ =0%)	0~Calculated value ppm			
	O ₂ / CO (O ₂ =?)	0~Calculated value ppm			
	Excess air	1.0~50.0			
	Losses	0~100%			
	Efficiency	0~100%			
	Dewpoint	0~100°C			
	Fuel	13A, 6C, LPG, Kerosine, Light oil, Heavy oil, Heavy A, Heavy C, Pellet			
Sensor	O ₂	Electrochemical sensor			
	CO (with H ₂ compensation)	Electrochemical sensor			
	Combustion air temp.	K thermocouple			
	Ambient air temp.	Pt 2000 Ω			
	Operating and storage temperature	Operating: 0°C ~ +45°C	Storage: +20°C ~ +60°C		
Display	Dot matrix				
Data store	100data				
Power supply	International NiCad battery 6V and line power (AC100~240V 50/60Hz DC12V 2700mA) min 8hours with full charged battery				
Dimension	80×150×35mm				
Weight	Main unit approx. 0.36Kg				
Standard equipment	Built in	Pump, Interface for PC (RS232)			
		Data logger (possible to store 100 data), interface for printer			
	Accessories	Battery charger, gas sampling probe, ambient air temp. sensor, reflecting plate, carrying case, software			
		Description	Art. No.		
	*Sampling probe with K thermocouple	HT-1006	L=180mm φ5 0~650°C		
Optional items	Probes for flue gas				
		HT-1001A	Sampling probe	L=300mm φ6 0~650°C	
		HT-1006L	L-shape probe	L=120mm φ6 0~650°C	
	Probe handle				
	Probe handle	HT-7201A	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-1251a	φ3×130L, 0~950°C, for air /liquid	
			HT-1252a	φ1.5×130L, 0~950°C, for air /liquid	
			HT-1253a	φ3×130L, 0~400°C, for air /liquid/foods, centric top	
			HT-1254a	130L, 0~400°C, for surface/ripts/air /liquid	
			HT-1255a	φ4×130L, 0~650°C, for surface/ripts/air /liquid	
			HT-1256a	0~450°C, magnetic probe for surface	
	HT-1257a	0~180°C, Pliers probe for plates, tube			
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 X1, AA battery x 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° C to 45° C

Storage temperature: -20° C 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 contact to HODAKA CO., LTD. (TEL +81-(0)6-6922-5501 / E-mail: info@hodaka-inc.co.jp)

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 misuse of this instrument.

HODAKA CO., LTD.

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

TEL: +81-(0)6-6922-5501

FAX: +81-(0)6-6923-1617

Traceability certification can be issued at HODAKA. (Additional cost will be required)

HODAKA CO., LTD

1-6-17 Takadono, Asahi-ku, Osaka 533-31 Japan

tel +81-6-6922-5501 fax +81-6-6922-5895

e - mail ; info@hodaka-inc.co.jp

UPL ; <http://www.hodaka-inc.co.jp>