Flue gas analyzer HT-1200N

Operating Manual

HODAKA
Saving energy

1. Contents

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.

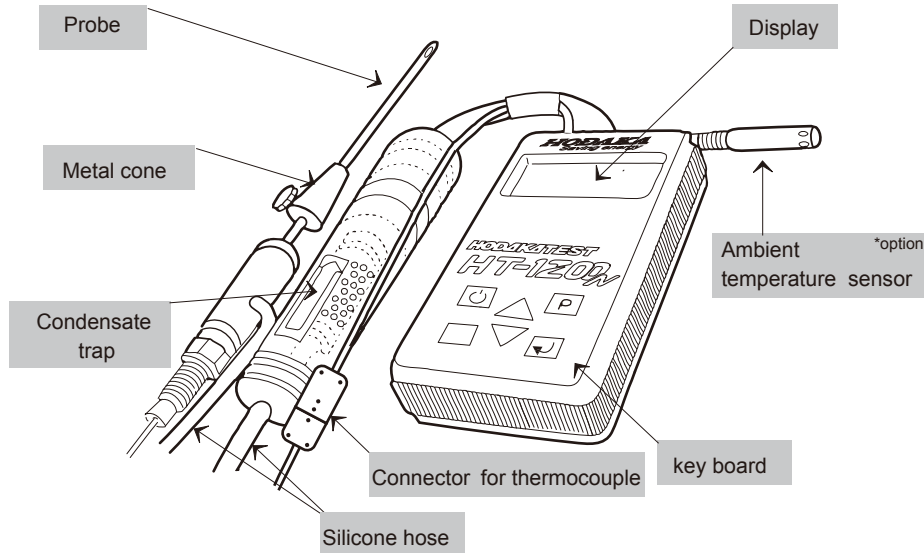● In case of skin contact **IMMEDIATELY**: clean respective parts of the body!
Avoid contact of eyes with liquid!

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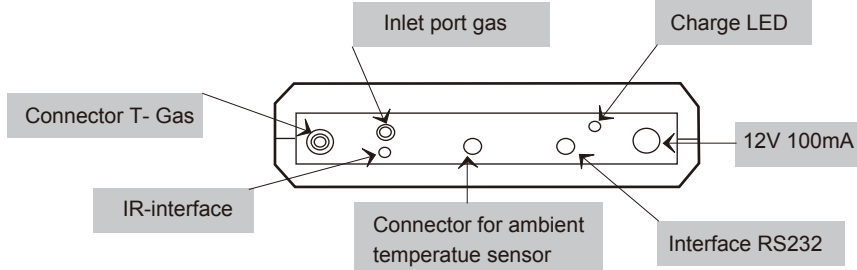
● The exhalations of alcoholic combinations(f.ex.attenuation, petrol, spirit, varnish.....) may be damage the sensor of the analyzer. Therefore it's forbidden to preserve or use these fluids near by the device.
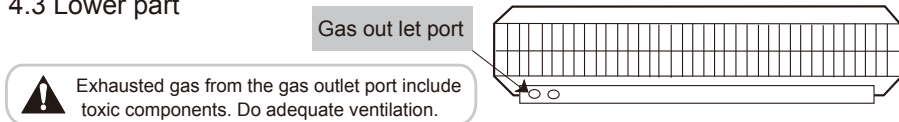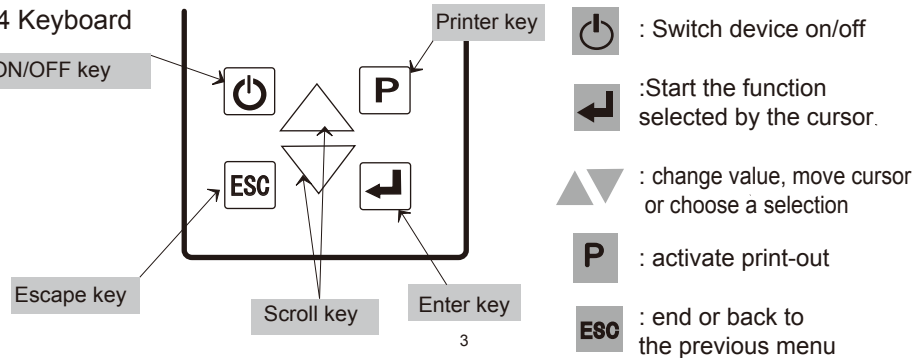
4.Device Illustrations

4.1 Perspective View

Probe

Display

Metal cone

Ambient temperature sensor *option

Condensate trap

Connector for thermocouple

key board

Silicone hose

4.2 Connection plate

Inlet port gas

Charge LED

Connector T- Gas

12V 100mA

IR-interface

Connector for ambient temperatue sensor

Interface RS232

4.3 Lower part

Gas out let port

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

4.4 Keyboard

Printer key

ON/OFF key

Escape key

Scroll key

Enter key

⏻ : Switch device on/off

↵ :Start the function selected by the cursor.

▲▼ : change value, move cursor or choose a selection

P : activate print-out

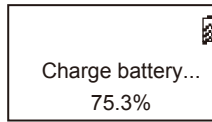ESC : end or back to the previous menu

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.

Charge battery...
75.3%

At the connection plate the chargeing-LED lights up.
On the display the current loading-state of the battery is displayed.
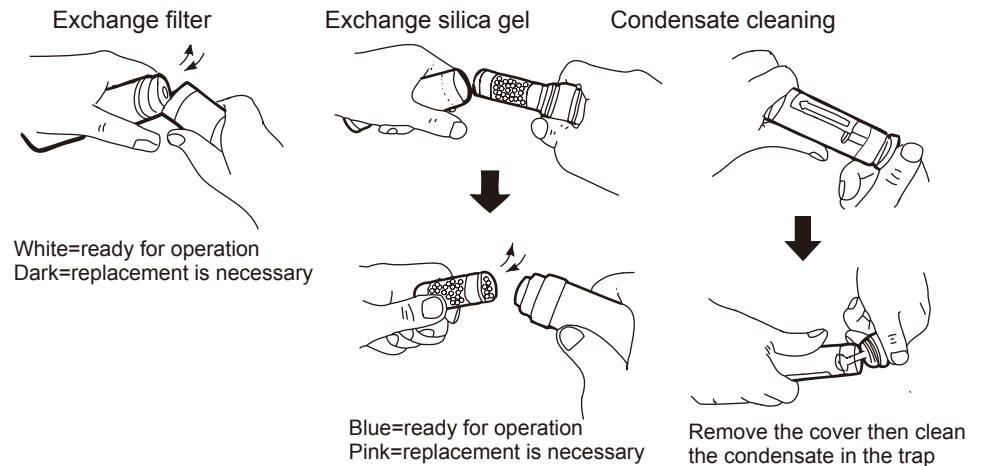If the battey is fully charged, the HT-1200N changes to trickle charge and the LED blinks approx. every 16 seconds.
The charging time for unloaded battery is approx.12 hours.

● 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℃ to 45 ℃)

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).

Exchange filter   Exchange silica gel   Condensate cleaning

White=ready for operation
Dark=replacement is necessary

Blue=ready for operation
Pink=replacement is necessary

Remove the cover then clean the condensate in the trap
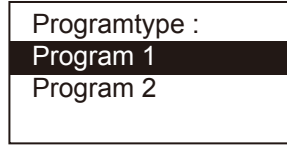
5.2 Interface RS 232
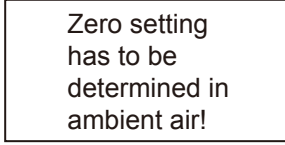Switch off unit before connecting RS 232 cable to PC!

6.Operating

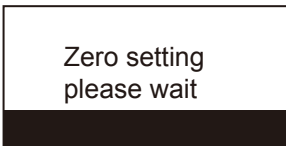### 6.1 Switch ON the unit
By pressing the ⏻ -key the HT-1200N will be switched ON.

```
HODAKA
HT-1200N
```

Selftest follws. Then the program type will be selected by the arrow keys ▲ or ▼

```
HT-1200N
-Selftest-
```

```
Zero setting
has to be
determined in
ambient air!
```

```
Programtype :
Program 1
Program 2
```

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

```
13A
LPG
Keros
L-oil
```

```
13A
CO2max :    12.2%
```

```
Fuel: 13A,6C,
LPG,Keros,
L-oil, A,C,Pellets
```
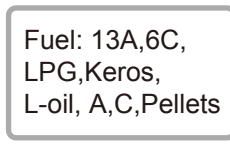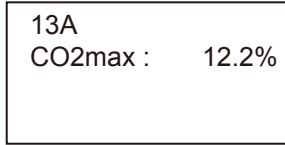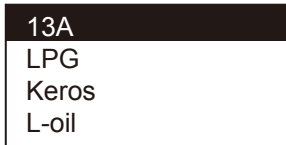
After the selection of program type and fuel the zero setting follows.
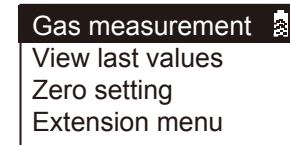
```
Zero setting
please wait
```

After Zero setting the unit entries the main menu.

```
Gas measurement    ▤
View last values
Zero setting
Extension menu
```
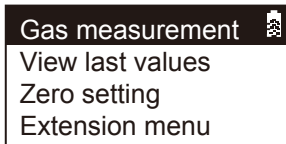
The residual battery capacity is displayed in the right corner of the LCD.

6.2 Gas measurement

```
Gas measurement    ▤
View last values
Zero setting
Extension menu
```

```
Programtype:
Program1
Program2
```
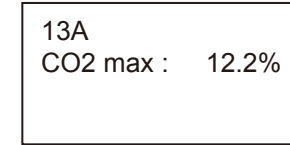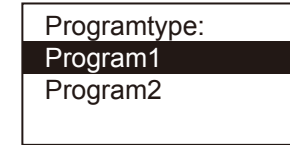
▲ or ▼ :Select the program type
↵ :Confirmation of the selection
ESC :Back to the main menu

```
13A
Wood
LPG
Keros
```

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

```
13A
CO2 max :    12.2%
```

The stored parameters of fuel are displayed.

↵ :Start measurement

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

```
T-Gas      120.1 °C
O2          4.9%
T-Amb      24.3 °C
```

```
Exc  Air     1.31
Effic.       95.0%
Losses       5.0%
```
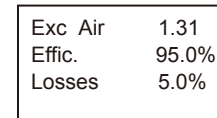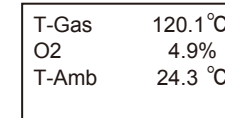
↵ :Input T-Boiler

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
```
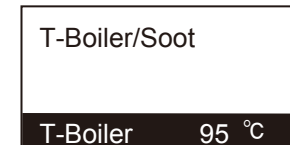
▲ or ▼ :Input Boiler temperature in 5 °C steps
ESC :Back to measument

↵ :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.

```
Soot1:     2
Soot2:     3
Soot3:     1
oily     nagative
```
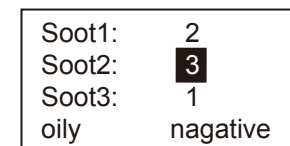
▲ or ▼ : Input soot number in 1 steps
↵ :Line transfer
ESC (in line 1) : Back to input T-Boiler
↵ (in line 4) :Storage

```
Print      🖨
Store      ↵
Abort      ESC
```

P :Print-out

↵ :Strage

ESC :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

ESC :Back to measurement

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

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

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

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

ESC :Back to the main menu

```
T-Boiler / soot



T-Boiler       95 ℃
```

▲ or ▼ : Input of T-boiler (5℃ steps)

ESC :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 **ESC** :Line transfer

ESC (in line 1):Back to input T-Boiler

↵ (in line 4):Storage

```
Print      🖨
Store      ↵
Abort      ESC
```

P :Print-out

↵ :Storage

ESC :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         🔋        Store data         🔋        Store data         🔋        Store data         🔋
Device settings             Device settings             Device settings             Device settings
Service                     Service                     Service                     Service
Set O2 alarm                Set O2 alarm                Set O2 alarm                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
```
```
Cust. 1         *
Cust. 2
Cust. 3
Cust. 4
```

▲ or ▼   : Selection of storage

◀┘ :Confirmation

The storage places marked with * are occupied

▲ 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
O2        4.9%
T-Amb    24.3
```
```
Exc  Air    1.31
Effic.     95.0%
Losses      5.0%
```

6.5.1.2 Delate data

```
View last values    ▤
Delate data
Measurem. HT=>PC
```

▲ or ▼ : Select the function

◀┘ : Start the function

```
Memory info
occupied :        1
available :      99
Total :         100
```

Current use of storage

```
Deleate data?

     No
     Yes
```

▲ or ▼ : Select the function

◀┘   : Start the function

```
Deleate 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
measurem 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

ESC :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

O2 warn limits ppm
Program1 10.0
Program2 5.0

▲▼ :change O2 threshold values

⏎ :Confirmation O2 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
O_2	[%]
Temperature (K thermocouple) *	[°C]
Temperature (Pt 2000 Ω) *	[°C]

＊Option

Calculated measuring items	Unit
CO_2	[%]
Efficiency **	[%]
Losses **	[%]
Excess Air	-

＊＊calcurated by ambient air temperature and flue gas temperature

$$\text{Excess Air }(\lambda) = \frac{20.9}{20.9 - O_2 \text{ in the flue gas}}$$

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

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

$$CO_2 = \frac{CO_2\text{Max.} \times (20.9 - O_2 \text{ in the flue gas})}{20.9}$$

	GO Nm^3	AO Nm^3	Calp $kcal/Nm^3$ or kg	CO_2Max
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 Kacl/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, therefor calculated data also might have difference.

8.Technical Specifications

Flue gas analyzer ホダカテスト® HT-1200N			
Measurement	O₂	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℃（depend of probe)
		Accuracy	Measurement=0～100℃: less than ±1℃
			Measurement=100℃～: less than ±1% of measured value
		Resolution	0.1℃
	Temperature (Pt2000Ω)	Measurement range	0～100℃
		Accuracy	Less than ±1℃
		Resolution	0.1℃
Calculated values*	CO₂		0～CO₂Max%
	Excess air		1.0～50.0
	Losses		0～100%（Only with Kthermocouple and Pt 2000Ω)
	Efficiency		0～100%（Only with Kthermocouple and Pt 2000 Ω)
Fuel			13A, 6C, LPG, Kerosene, L-oil, A.C, Pellets
Sensor	O₂		Electrochemical sensor
	Combustion temp.		K thermocouple
	Ambient temp.		Pt 2000 Ω
Operating and storage temperature			Operating : 0℃～+45℃　Storage : -20℃～+60℃
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
Probe: select HT-1229Dor HT-1312	Accessories		Battery, gas sampling probe, carrying case,softcase

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℃	

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℃
		HT-1111D	High temp. long probe	L=700mm φ6	0～950℃
		HT-1342D	High temp. probe	L=175mm φ6	0～950℃
		HT-1238D	L-shape probe	L=120mm φ6	w/o tempe. sensor
		HT-1379D	L-shape probe	L=120mm φ6	0～650℃

Probe handle			
Probe handle	HT-7201G	with hose/condensate trap	

Probe tube（for probe handle HT-7201G)			
Probe tube（with flue gase 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℃, for air /liquid	
	HT-1252	φ1.5×130L, 0～950℃, for air /liquid	
	HT-1253	φ3×130L, 0～400℃, for air /liquid/foods,centric top	
	HT-1254	130L, 0～400℃, for surface/rifts/air /liquid	
	HT-1255	φ4×130L, 0～650℃, for surface/rifts/air /liquid	
	HT-1256	0～450℃, magnetic probe for surface	
	HT-1257	0～180℃, Pliers probe for plates, tube	

Option	Description	Art. No.	
	Air temp. sensor	HT-1382	0～100℃、for air temp.
	Ambient air temp. sensor	HT-1321	0～100℃
	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 , AAbattery 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 amd storage temperature

Operating temperature　0 to 45℃
Storage temperature　 -20 to 60℃

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
TEL: +81-(0)6-6922-5501
FAX: +81-(0)6-6923-1617

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