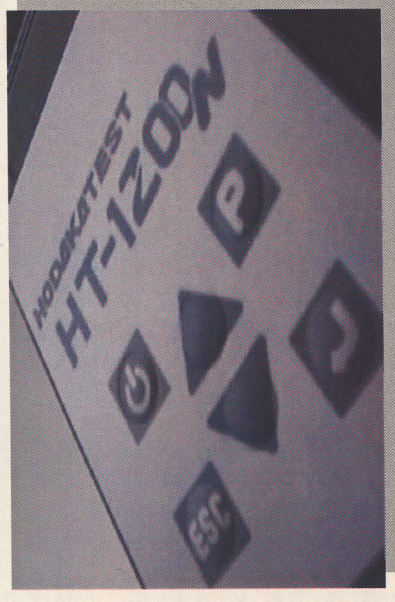


Fule gas analyzer HT-1200N

Operating Manual



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Saving energy

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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!

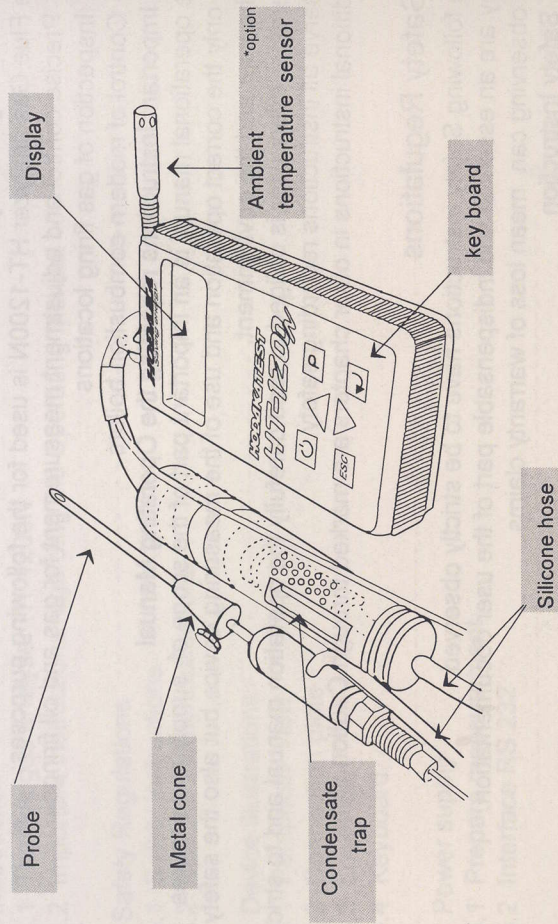
Avoid contact of eyes with liquid!

- **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.

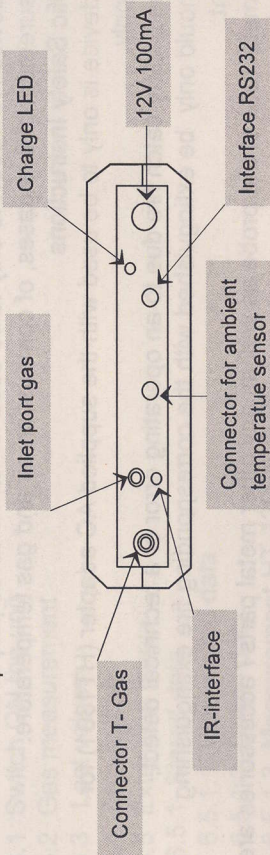
- The exhalations of alcoholic combinations (f.ex. attenuation, petrol, spirit, varnish.....) may be damage the sensor of the analyzer. Therefore it's forbidden to preserve or use these fluids near by the device.

4. Device Illustrations

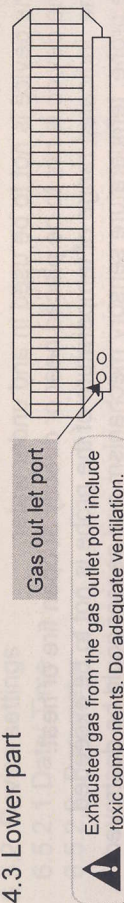
4.1 Perspective View



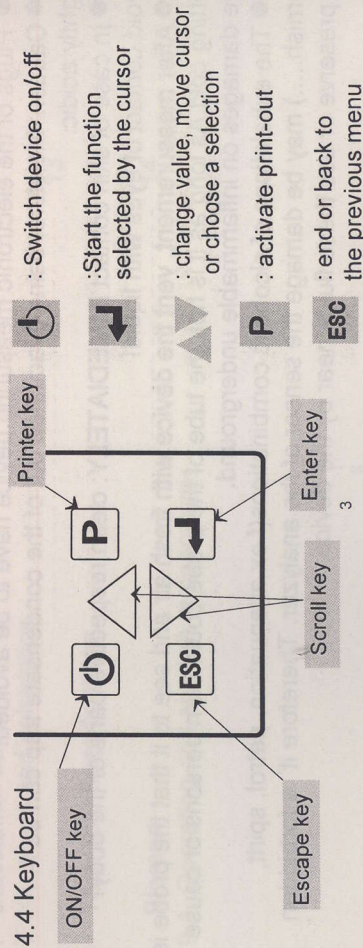
4.2 Connection plate



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).

Exchange filter



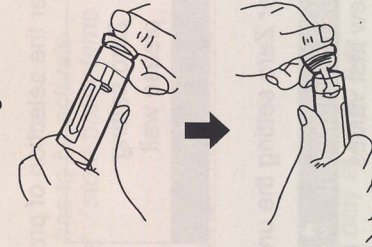
White=ready for operation
Dark=replacement is necessary

Exchange silica gel



Blue=ready for operation
Pink=replacement is necessary

Condensate cleaning



Remove the cover then clean the condensate in the trap

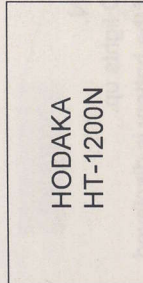
5.2 Interface RS 232

Switch off unit before connecting RS 232 cable to PC!

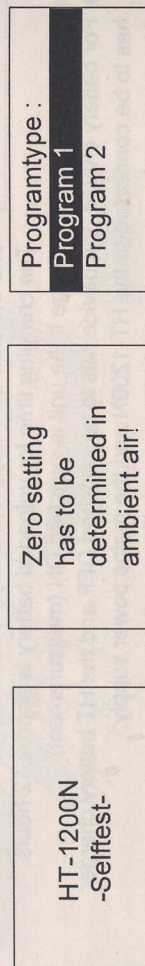
6. Operating

6.1 Switch ON the unit

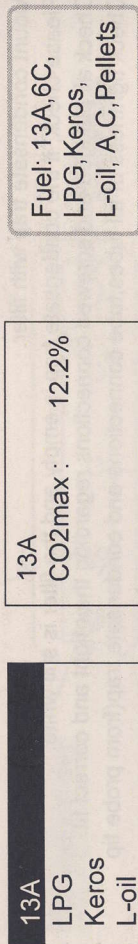
By pressing the  -key the HT-1200N will be switched ON.



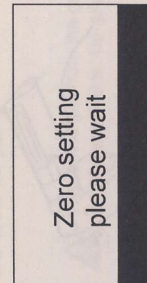
Selftest follows. Then the program type will be selected by the arrow keys  or 



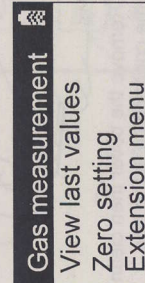
The selection of the fuel follows and the information window about parameters of the selected fuel.



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

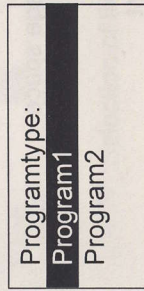
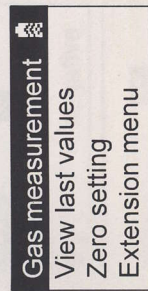


After Zero setting the unit entries the main menu.

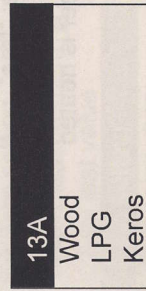


The residual battery capacity is displayed in the right corner of the LCD.

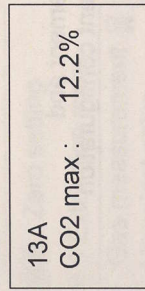
6.2 Gas measurement



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



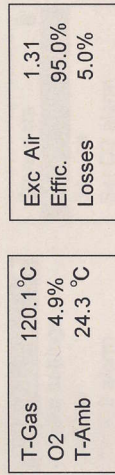
 or  : Select the fuel
 : Confirmation of the selection



The stored parameters of fuel are displayed.

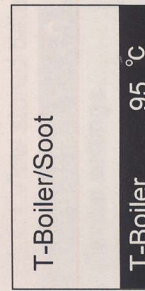
 : Start measurement

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



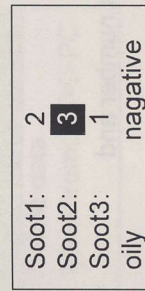
 : Input T-Boiler

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

: Print-out
 : Strage
 : 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

: 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 : 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

: Back to the main menu

T-Boiler / soot	95 °C
-----------------	-------

▲ or ▼ : Input of T-boiler (5°Csteps)

: 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 : Line transfer
 (in line 1): Back to input T-Boiler
 (in line 4): Storage

: Print
 : Store
 : Abort

: Print-out
 : Storage
 : 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
 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 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	
Measurem. 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	
measurment 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 alarm

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 (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

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

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

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

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 $\pm 1^\circ\text{C}$ Measurement=100°C~: less than $\pm 1\%$ of measured value Resolution 0.1°C
	Temperature (Pt2000 Ω)	Measurement range 0~100°C Accuracy Less than $\pm 1^\circ\text{C}$ Resolution 0.1°C
	CO ₂	0~CO ₂ Max%
Calculated values		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 100V ϕ m 50 Hz Max.8hours in a row	
Dimension	80 X 150 X 35 mm	
Weight	Main unit approx. 0.35kg	
Standard equipment	Built in	Pump, Interface for PC (RS232C) Data logger (possible to store 100 data), interface for printer
	Accessories	Battery, gas sampling hose, condensate trap, carrying case,software
Probe, select HT-1229Dor HT-1312	Description	
	*Standard probe	Art. No. HT-1229D insertion max.180mm, without temp. sensor HT-1312 insertion max. 140mm, 0~650°C
Optional items	Probes for flue gas	
	HT-1238D Lshape probe, insertion max.80mm, without temp. sensor HT-1379D Lshape probe, insertion max.80mm, 0~650°C HT-1235D Long probe, insertion max.650mm, without Tempe. sensor HT-1342D high temp. probe, insertion max.135mm, 0~950°C HT-1111D high temp. long probe, insertion max. 660mm, 0~950°C HT-1251 $\phi 3 \times 130\text{L}$, 0~950°C, for air/liquid HT-1252 $\phi 1.5 \times 130\text{L}$, 0~950°C, for air/liquid HT-1253 $\phi 3 \times 130\text{L}$, 0~400°C, for air/liquid/food, centric top HT-1254 130L, 0~400°C, for surface /rifts/ air/liquid HT-1255 $\phi 4 \times 130\text{L}$, 0~650°C, for surface /air/liquid HT-1256 $\phi 40$, 0~450°C, magnetic probe for surface HT-1257 0~180°C, Pliers probe for plates, tube HT-1321 0~100°C, for air	
	Ambient temp. Pt2000 Ω Adapter Hard case Measurement software Infrared printer Roll paper for Infrared printer	
		HT-1318 AC100~240V HT-1315 Aluminum, dimension : 350 X 460 X 155 weight : 2.9kg HT-2094 Online View 2000 (Windows 95/98/2000/XP) HT-1610 Printing-max.6000 lines HT-1636 5 rolls

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.)