



Operation Manual Flue Gas Analyzer NOVA H8

Read carefully before comissioning!



TÜV By Rg G 209
Certified according to
1st BImSchV

Notice

The products described in this manual are subject to continuous development and improvement and it is therefore acknowledged that this manual may contain errors or omissions. MRU encourage customer feedback and welcome any comments or suggestions relating to the product or documentation. These should be forwarded to the Customer Feedback Department at the address given below.

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This manual is intended as a guide to use the product.

MRU shall not be liable for any loss or damage whatsoever arising from the wrong comment / interpretation of informations from this manual or any mis-use come out of this manual.

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1 Introduction

1.1 The Flue Gas Analyzer NOVA H8

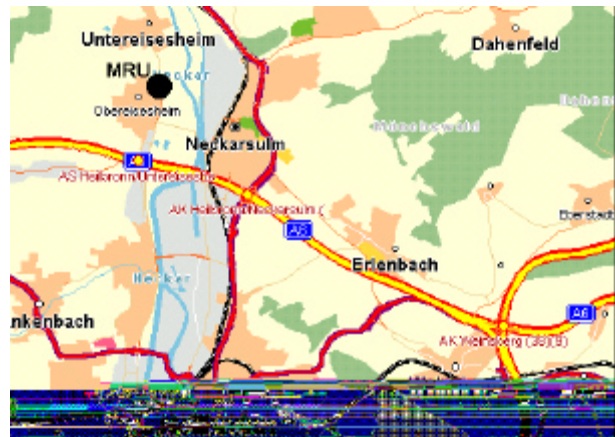
The Flue Gas Analyzer NOVA H8 is used for the following purposes :

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

1.2 The Company MRU GmbH

The NOVA H8 is manufactured by the company MRU GmbH in 74172 NSU-Obereisesheim, a middle-sized company, which is specialised in the research, production and sale of high-quality emission analysing systems since 1984. MRU produces standard series as well as custom-made analysers. Addresses and phone/fax numbers of the mother company are listed on the page “*Your contacts at MRU*” in the appendix.

Your way of getting to our company is shown on the following maps:



1.3 Important Instructions regarding the Operation 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 carefully read the operation manual and to strictly observe all instructions regarding safety.

The most important Safety instructions are summarised in chapter 2 (Safety Instructions). Additional instructions in other chapters are marked through **Caution** signs.

In chapter 3, the function of the measuring device is described. The operation itself with the corresponding instructions is shown in chapter 4.

2 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.

2.1 Safety Instructions

- The device NOVA H8 is only to be used for its indicated purpose : the measurement of smoke and flue gases, of combustion air and gas temperature as well as for differential pressure measurement.
- The devices leaving the works of MRU GmbH are tested according to the regulations **VDE 0411 (EN 61010)** as well as **DIN VDE 0701**
- The general basic principles for safety-relevant design of technical products according to **DIN 31000/ VDE 1000** and the respective **UVV = VBG 4** of the professional guilds for fine mechanics and electrical engineering are observed.
- The MRU GmbH assures that the device corresponds to the essential requirements of the legal regulations of the member states of the electro-magnetic compatibility (**89/336/EWG**) and to the low-voltage regulations (**73/23/EWG**).

2.2 Specific Safety Instructions

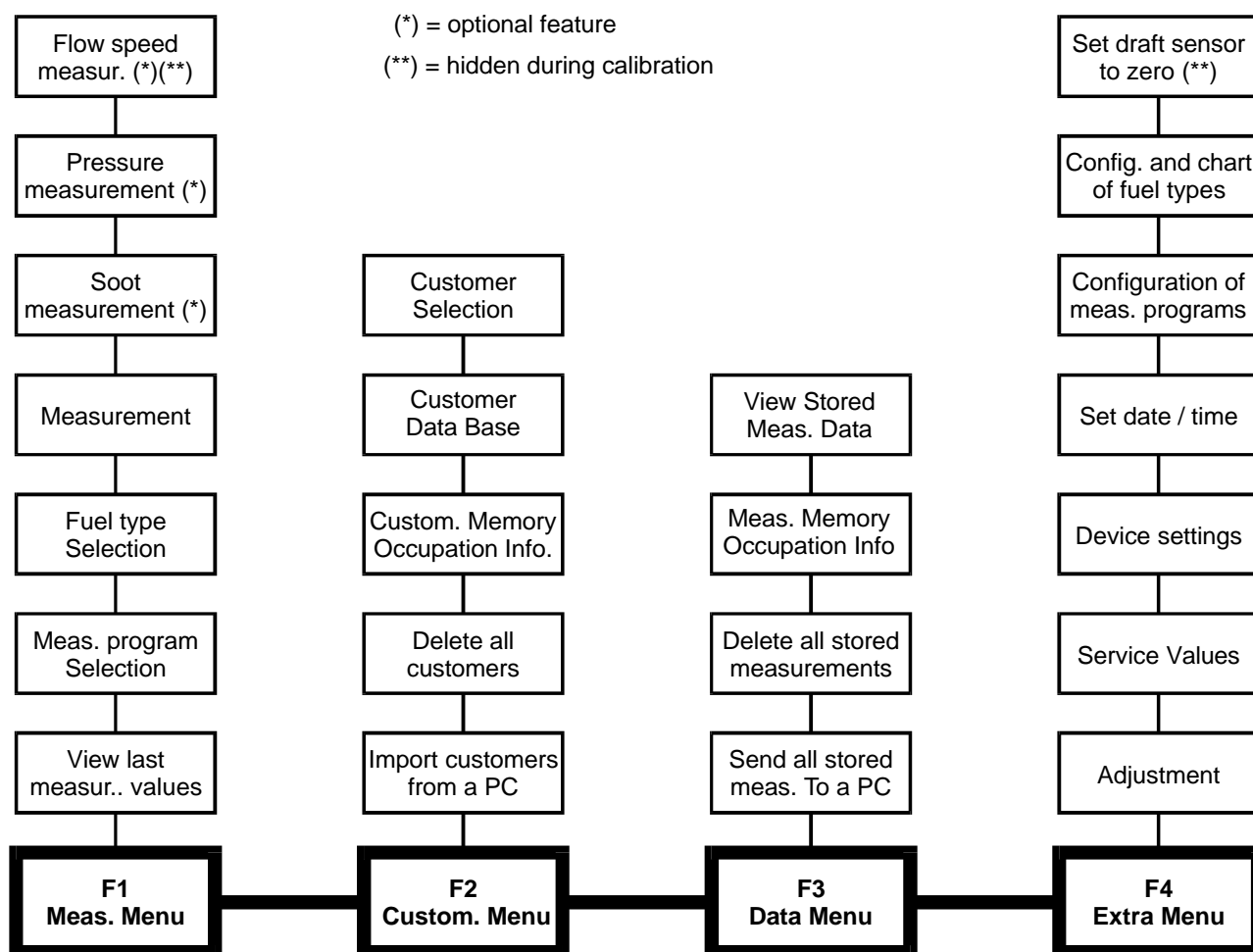
- The device is only to be used with the indicated power supply (230 V, 50 Hz). Should the battery catch fire due to an operating error or a technical defect, the fire should only be extinguished with the corresponding fire extinguishing equipment.
- The metal tube of the probe as well as any other metal 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 pumped out of the condensats trap can be slightly **acidic**.
- In case of skin contact **IMMEDIATELY:** clean respective parts of the body!
Avoid contact of eyes with liquid!
Please clean carefully all parts that were in contact with the condensats.
- **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.



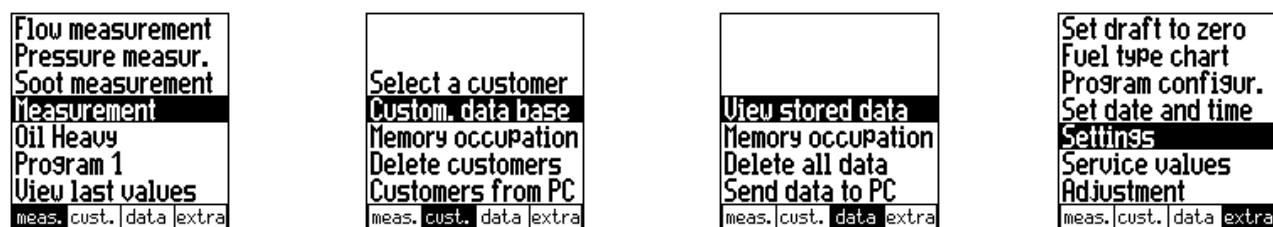
3 Functional Description

3.1 Main Menus of NOVA H8

The structure of this operational manual is based upon the structure of the main menus (see chapter 4.2 to 4.5).



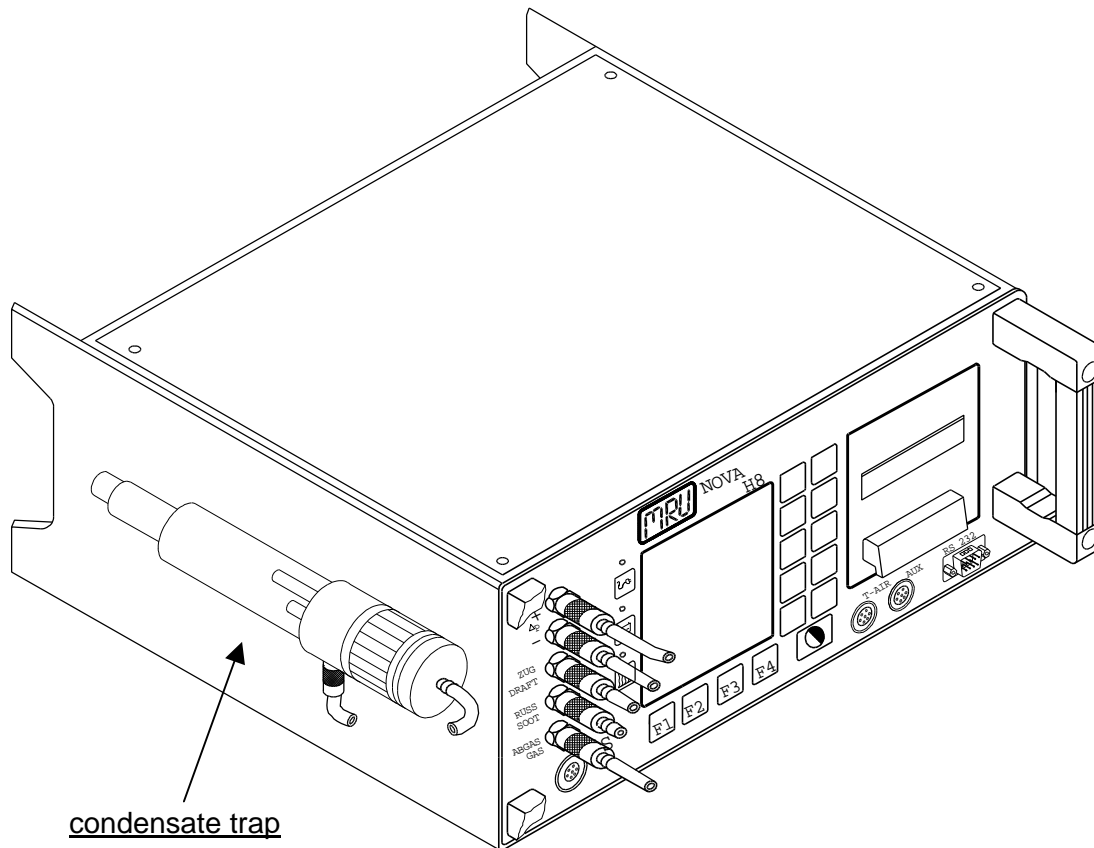
The display of the device shows always one of the four main menus :



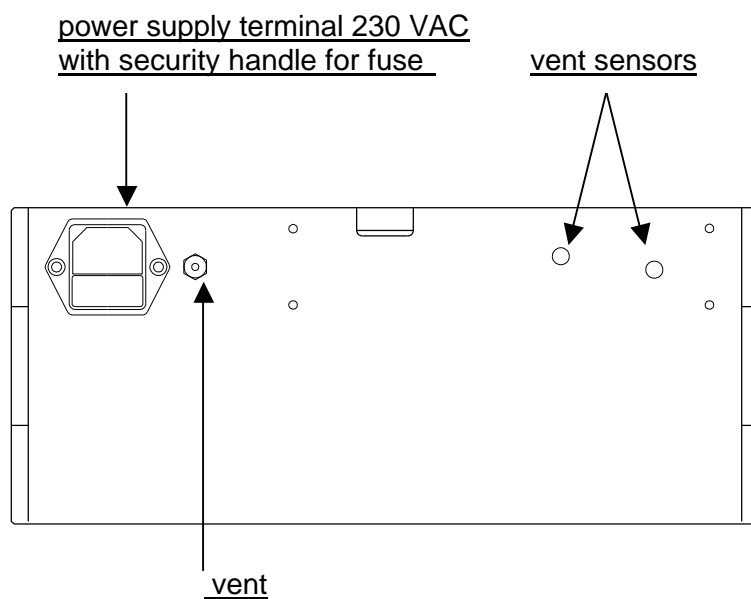
By means of the keys *F1*, *F2*, *F3* and *F4* the requested main menu can directly be selected.

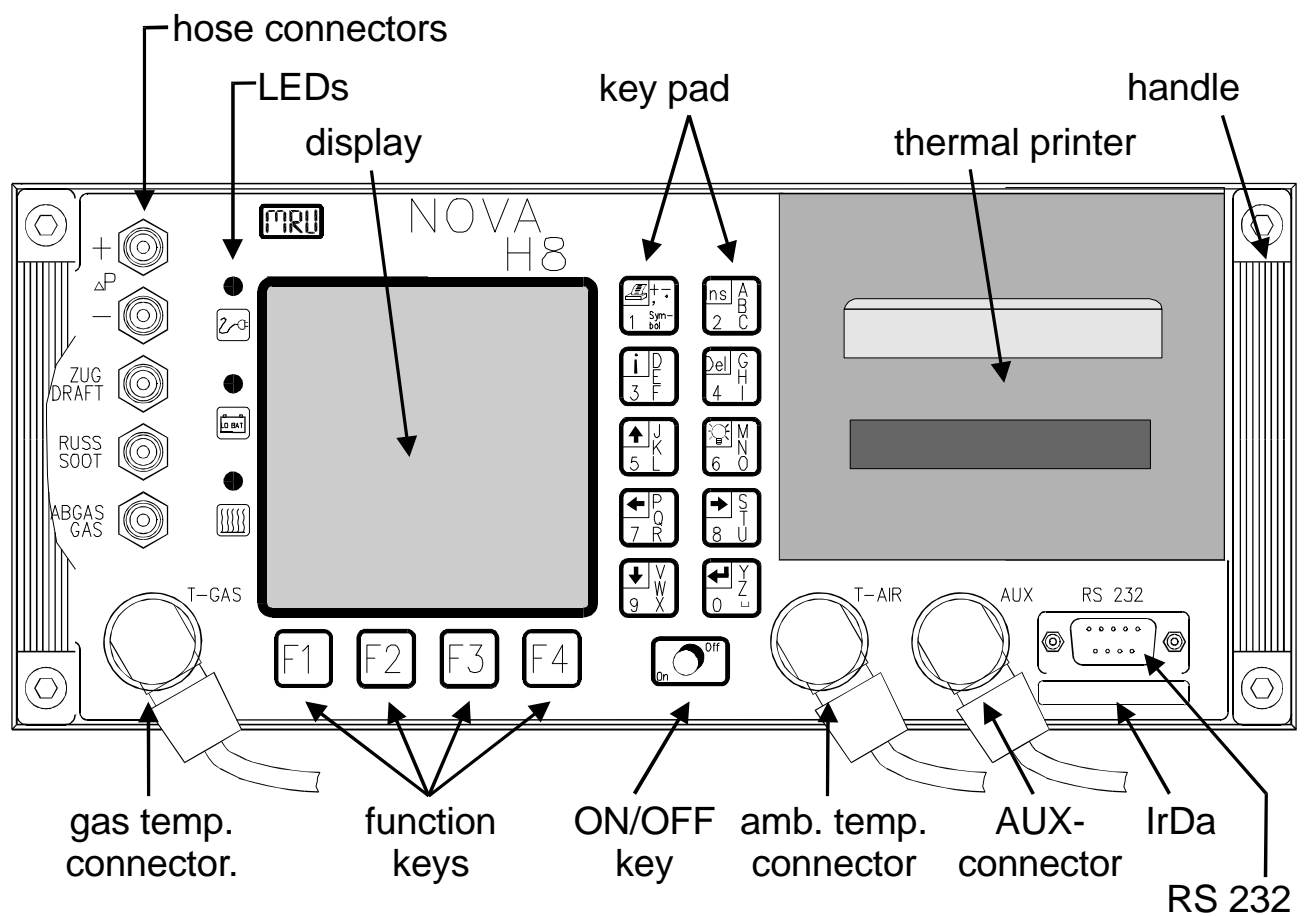
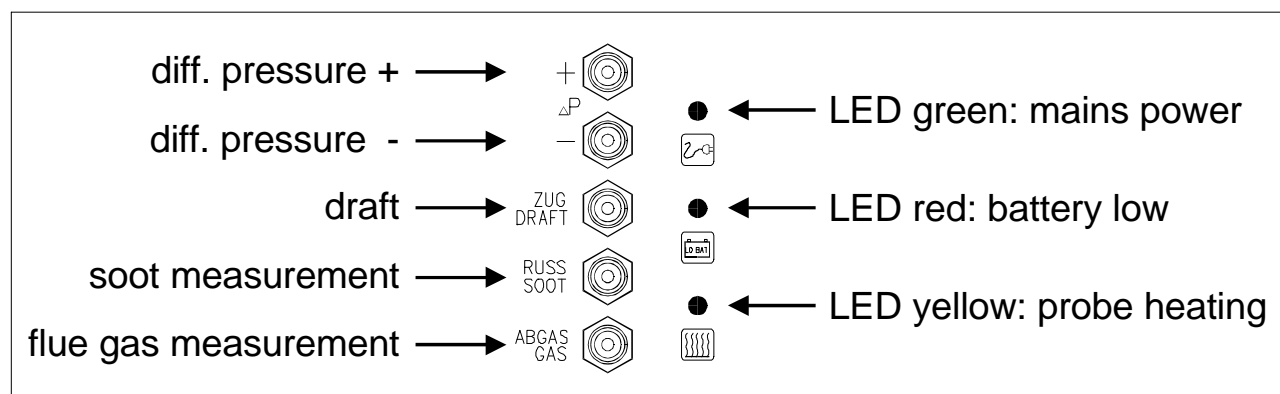
3.2 Device Illustrations

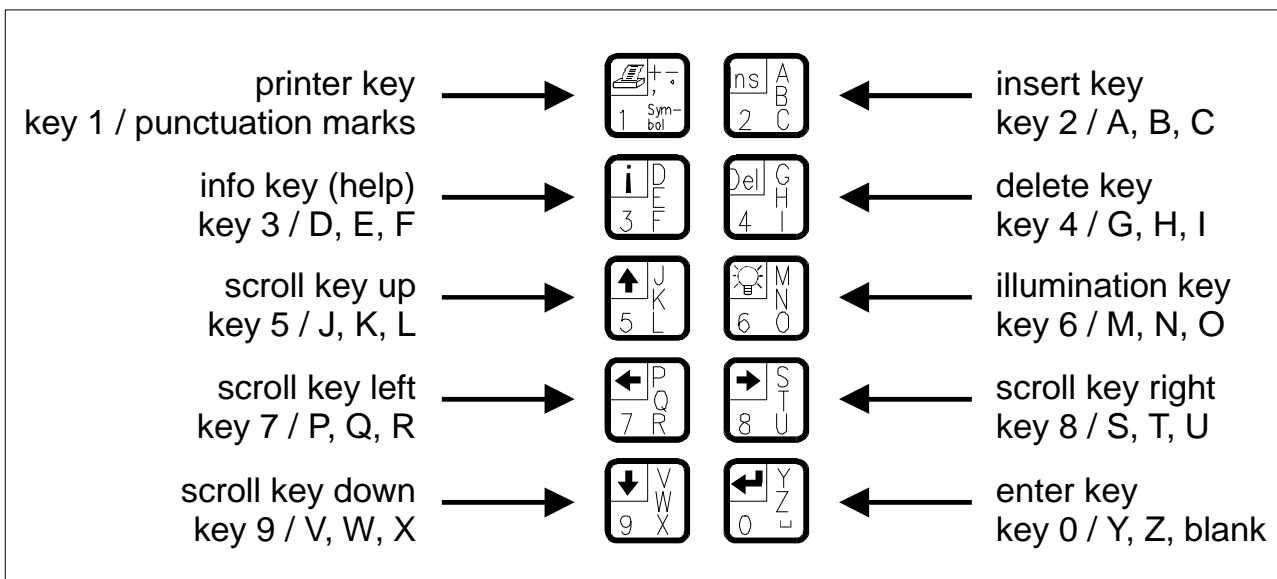
Perspective View



Rear View



Front View**Detail View : Tube connections and luminous diodes**

Detail View : Keyboard (10keys)**3.3 Operation of Device****3.3.1 The Keyboard**

The functional keys allow quick changes of device functions. The meaning of the functional keys is shown in the function row in the bottom of the display.

The main menus (see chapter 3.1) can be reached as follows:

| | | |
|--|---|--|
| | : | the Measurement Menu (see chapter 4.2) |
| | : | the Customer Menu (see chapter 4.3) |
| | : | the Data Menu (see chapter 4.4) |
| | : | the Extra Menu (see chapter 4.5) |

In other menus, the meaning of the functional keys differs and can be read in small texts in the function row in the bottom of the display.

| | | |
|---|---|--|
| | : | switch measuring device on respectively off, change to stand-by mode |
| | : | mostly : change value, sometimes move cursor |
| | : | mostly : move cursor, sometimes change value |
| | : | enter (confirmation and enter key) e. g. activate selected menu item |
| | : | start print (what will be printed depends on the context) |
| | : | switch on / off display illumination |
| | : | show operational instruction regarding the menu item |
| - | : | double-function 10-key keyboard for text input (see chapter 4.6) |

3.3.2 Power Supply

The NOVA H8 can be driven by:

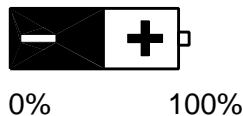
1. Internal battery MRU (standard scope of supply).
2. MRU mains power cable (standard scope of supply).

Measurements with mains power supply:

When driven by mains power supply of 85..240V / 50/ 60Hz, the device battery will be charged.

Measurements with battery operation (battery control):

During calibration : The battery symbol shows the approximate remaining capacity of the battery.



After calibration: **App. 20 minutes** before the battery is completely discharged, the red LED starts to flash (app. once a second).

When the battery is discharged, the following message appears:

“Battery discharged, device has to be connected to mains power supply”. If within one minute, the device will not be connected to the mains power supply, the device switches off.

4 Operation

4.1 Preparation for Measurement

Mains Power Operation NOVA H8

The MRU mains power supply cable is to be connected on the rear side of the device.
Please use a **mains power supply of 85...240V, 50/60 Hz.**

Battery Operation

Battery Capacity :

App. **8 hours** (max.) with temperature **of 20°C (without probe heating, without illumination, without printer)**. With lower temperature, capacity reduces.

Operating Temperature : (+5 °C to +45°C)


condensats Trap

- Mount condensats trap with filter laterally.
- Please check, if the condensats trap is **empty** and the filter is still **white**.
white = ready for operation dark = replacement necessary

Connections and Tightness

- Check all plugged and screwed connections regarding their tight and correct fit.
- Check tightness of all tubes, tube connections and condensats trap (from probe tip to gas connection on device)

4.1.1 Getting Started

Push **ON button** . The MRU logo is displayed. (Please see chapter **4.7** for more information regarding switching on / off and shortened restoring of the measurement readiness).

4.1.2 Calibration Phase

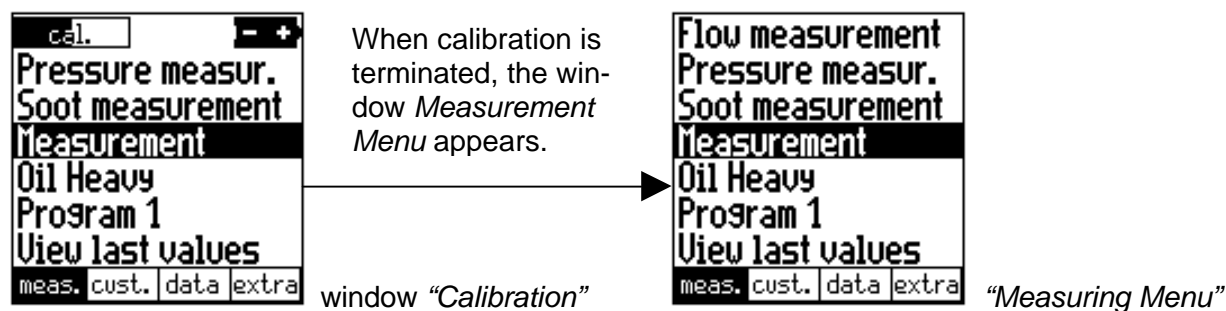
Shortly after switching on, the NOVA H8 shows:

Calibration!

The probe
must stay in
ambient air !

I. e. during calibration, contact between flue gas and probe has to be avoided !

Now the NOVA H8 turns to the window *Calibration*:



In the left upper corner a row is displayed, which shows the status of the calibration.

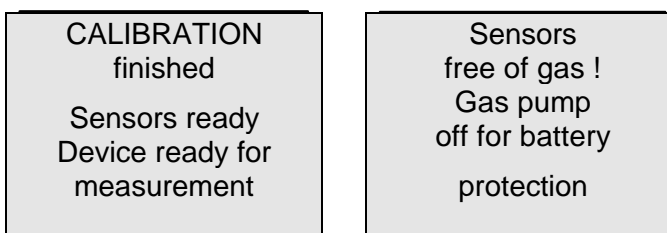
In the right upper corner the battery symbol is shown, which indicates the approximate remaining battery capacity.

Calibration is effected in the background for app. 2 minutes. During this period of time, flue gas measurement cannot be started. All other menu items can be selected.

You can use the calibration time in a reasonable way, e. g.:

- By preparing your measuring instruments
- By choosing the correct fuel type (see chapter 4.2.5)
- By selecting the desired measurement program (see chapter 4.2.6)
- By making a (differential) pressure measurement (see chapter 4.2.2.1)

When calibration is finished,
the measuring device shows:



Now the NOVA H8 is ready to effect flue gas measurements.

4.2 Measurements

4.2.1 Flow Measurement (Option)

The NOVA H8 is able to measure the flow speed in gas duct. For this, the following variables have to be measured:

- Dynamic pressure, with a Prandlt tube
- Static pressure, with the normal probe (fine draft)
- Gas temperature, with the normal probe
- Barometric pressure, with an additional sensor at the AUX input (or manual input)

The Prandlt tube and the probe should be in the gas duct at the same time, i. e. two ports should be there. If only one port is available, first the dynamic pressure should be measured with the Prandlt tube, the value should be kept, and then the probe should be connected in order to measure the other variables.

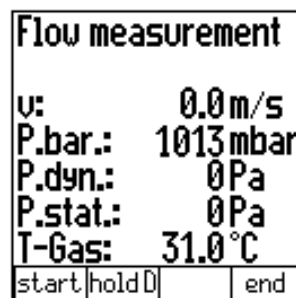
If you do not dispose of a barometric pressure transmitter for the AUX input, the value can also be determined in another way (call the weather office or with means of an external barometer) and be inputted manually.

Change to the *Measuring Menu* (see chapter 3.1 Main Menus of NOVA H8):



"Measuring Menu"

Move cursor with scroll keys in order to select menu item *Flow Measurement* and press Enter.



Window "Flow Measurement"



Only with manual input of barometric pressure: change item selected by cursor



Only with manual input of barometric pressure: move cursor



Start: start / stop measurement ("Stop" will then shown here)



Dyn.H: keep dynamic pressure: if only one port is available in the gas duct, the value of the dynamic pressure can be kept this way (see above). As soon as the value is fixed, a "h" will be added to "Pa".



End: back to the *Measuring Menu*

4.2.2 Pressure Measurement (Option)

In the menu Pressure Measurement four kinds of pressure (e. g. differential pressure, gas flow pressure etc.) and their corresponding denominations (max. 15 digits) can be entered manually. All four values will be saved with the other measuring values and / or printed. The pressure measurements can be effected before flue gas measurement as well as afterwards when saving the measuring values.

Please connect tubes to - (*blue*) and + (*yellow*).

4.2.2.1 Pressure Measurement during Flue Gas Measurement (continuous)

One of the four pressures can be measured equally during flue gas measurement. In the display and on the print, the denomination of the pressure selected with the black row in the window *Pressure Measurements* is used. The measuring device saves, which pressure is used for which kind of measurement and automatically chooses the same pressure for the same kind of measurement in the future.

In the measuring window only the first 7 digits of the selected pressure are shown for reasons of space. Therefore, it is recommended to choose the denominations of the four pressures in a way, that their first 7 digits can distinguish them.

4.2.2.2 Pressure Measurement before Flue Gas Measurement

Change to the *Measuring Menu* (see chapter 3.1 Main Menus of NOVA H8):



"Measuring Menu"

Move cursor with scroll keys in order to select menu item *Pressure Measurements* and press Enter.



Window
"Pressure Measurements"



Select via cursor the pressure, which should be measured next.



Start: start / stop pressure measurement ("Stop" will then be shown here)



Text: input window will be opened (see chapter 4.6) and denomination of the selected pressure can be modified (will be saved in device configurations)



Reset: reset of all four pressures to 0.00 mbar in a fast and easy way.



End: back to the *Measuring Menu* (pressure values will be saved).

If calibration is not yet finished, first the zero point is determined:

Zero Point Adjustment follows.

Are both pressure nozzles free of pressure?

Press Enter

Disconnect the tubes at - (blue) and + (yellow).

Then press Enter key:

Fine Draft Sensor

Zero Point

4.2.2.3 Pressure Measurement when saving the Measured Values

When saving measuring data, pressure measurements can equally be effected. With key F2 the window Pressure Measurements can be selected (as described in chapter 4.2.4.2 / 4.2.4.3) :

| Press. meas. mbar | |
|-------------------|-----------------|
| Pressure 1 | 1.50 |
| Pressure 2 | 0.00 |
| Pressure 3 | 0.00 |
| Pressure 4 | 0.00 |
| ΔP: 1.50 mbar | |
| start | cust. store end |

Window "Save Measuring Data / Pressure Measurements"

Pressure measurements can now be effected as described in 4.2.2.1. However, the two functions "Text" and "Reset" are not available here.



Select via cursor the pressure to be measured next.



Start: start / stop pressure measurement ("Stop" will then be shown here)



Customer: to the Customer Data (Four-Window-Row see chapter 4.2.4.3)



Save: end saving.



End: back to the Measuring Menu without saving

4.2.2.4 Pressure Values in Data Storage

In the window *Data View* (see chapter 4.4.1) a change between four windows is possible with key F2 (same as in window *Save Measuring Data*): *Customer Data*, *S&BT Data*, *Measuring Data* and *Pressure Measurement*

| Press. meas. mbar | |
|-------------------|----------------|
| Pressure 1 | 1.50 |
| Pressure 2 | 4.62 |
| Pressure 3 | 0.11 |
| Pressure 4 | -8.17 |
| find | cust. del. end |

Window "Data View / Pressure Meas."


4.2.2.5 Print Pressure Values

Printing the measured pressures has not to be activated or deactivated by print selection.

When starting the print in the windows *Measurement*, *Last Measured Values* or *Data View*, all measured (i. e. not equal 0,00 mbar) pressure values are printed together with the measured values.

However, the continuous differential pressure is activated respectively deactivated by print selection.

4.2.3 Soot Measurement (Option)

The probe heating works with **battery** and **mains power supply operation**. If probe heating is used with **battery operation**, the capacity of the battery is considerably reduced (see chapter 4.5.5). Before starting the soot measurement, the probe heating should be turned on for at least **3 minutes**, in order to avoid condensats on the soot paper. When the probe heating is on, the **yellow** LED above the "heating" symbol  on the left side of the display turns on.

Change to the *Measuring Menu* (see chapter 3.1 Main Menus of NOVA H8):

Move cursor with scroll keys in order to select menu item *Soot Measurement* and press Enter.

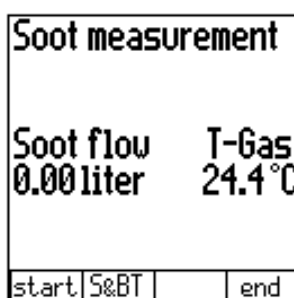


"Measuring Menu"





The NOVA H8 reminds you regarding the necessary steps with the following message:

Please
insert
soot paper
and
connect
soot hose.

Now the window *Soot Measurement* opens:



Window "Soot Measurement"

-  **F1** *Start*: start / manually stop soot measurement ("Stop" will then be shown here)
-  **F2** *S&BT*: input of the soot data, of the oil derivative and boiler temperature (see chapter 4.2.3.1).
-   **F4** *End*: back to the Measuring Menu

After activating **F1=Start**, the soot pump starts to work. The gas flow is measured continuously and when reaching a volume of 1,63 litres, the soot pumps switches off automatically. This should happen within one minute.

Make three measurements and move soot paper after each measurement.

Remove soot paper from the slot of the probe handle. For determination of soot number, please compare the blackening of the soot paper to the supplied soot number comparison scale.

4.2.3.1 Input of Boiler Temperature, Soot Values and Oil Derivative

This chapter is also important, if your device does not contain the option *Soot Measurement*, as you can nevertheless insert, save and print soot data.

They're a different way of getting to this window:

- Press key F2=S&BT in window *Soot Measurement* (see above chapter 4.2.3).
- Press key F2=S&BT in the window *Save / Customer Data* (see chapter 4.2.4.2).
- Press printer key in the window *Measurements* (see chapter 4.2.4) and the selected fuel is oil.

| | |
|-----------------|------|
| Prg.: Program 1 | |
| T-Boil.: | 65°C |
| Soot #1: | 2.0 |
| Soot #2: | 2.5 |
| Soot #3: | 3.0 |
| Oil : | neg |
| meas. store end | |

Window „Soot and Boiler temperature (S&BT)“



Move cursor



Change value of the selected field



Meas.: to the measuring values (Four-Window-Row see chapter 4.2.4.3)



Save: save momentary measuring values (see chapter 4.2.4.2)



End: back to the *Measuring Menu* (values are not saved)



: Print momentary measuring values

4.2.4 Flue Gas Measurement

Change to the Measuring Menu (see chapter 3.1 Main Menus of NOVA H8):

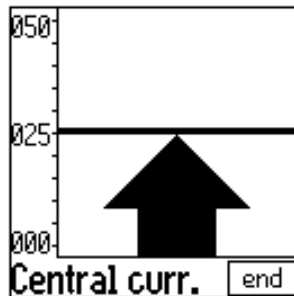
Move cursor with scroll keys in order to select menu item *Soot Measurement* and press Enter.



"Measuring Menu"

Now the NOVA H8 asks you to effect a central current search:

(The search can be switched off in settings (see chapter 4.5.5))



Window

Central current search

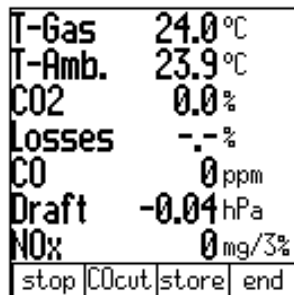


End: end (respectively skip) flow search and go on with measurement

Positioning of the probe in the flow :

Slowly pass the cross section of the gas duct with the probe. The maximum gas temperature is found, when the probe tip is at the horizontal line and no more signal is audible. As soon as the maximum gas temperature is left, the arrow tip leaves the horizontal line and a signal is audible within certain time intervals. The further the maximal gas temperature is left, the shorter is the interval of the signal. As soon as the flow is found, please fix the probe with the cone in this position.

The window "Measurement" can be adjusted individually (see chapter 4.5.3), .e. g.:



Window "Measurement"



Change of the visible page (see chapter 4.5.3).



Stop/Start: stop respectively start measurement (*Start* will be shown here)



COcut: modify CO cut-off limit temporarily (see chapter 4.2.4.1 and 4.5.3)



Save: to the Save Menu (see chapter 4.2.4.2)



End: end measurement, back to the *Measuring Menu*



: Print momentary measuring values

4.2.4.1 Temporary Change of CO cut-off Limit

Press F2=CO Cutoff in the window *Measurement* (see chapter 4.2.4), the following window appears :

| | | | |
|-----------------------------|-------|--|-----|
| CO cut-off at: Program 1 | | | |
| 2000 ppm | | | |
| set 0 | stand | | end |

Window "CO Cutoff"



Adjustment of the value in 100ppm steps from 0 ppm to 4000 ppm. The adjusted value determines the CO cut-off limit. If the value reaches this limit, the second pump is activated in order to vent with fresh air and the CO sensor will be cut off from the gas line by a valve. If the limit value falls short by 20 % during venting, measuring gas is newly admitted to the CO sensor.



set 0: Set cut-off limit to 0, CO sensor is cut off from the gas line by a valve, then back to the measurement.



stand.: Adjust standard limit value, which is allocated to the momentary measurement program (see chapter 4.5.3), then back to measurement



End: back to measurement

4.2.4.2 Save Measurement

If a measurement is to be saved, it has to be allocated to a customer, Thus, you have three possibilities :

- select an existent customer by paging or searching (see chapter 4.2.4.4)
- new entry of a customer (see chapter 4.2.4.4)
- the device generates a customer (only with empty customer list), the customer number then is: <#0000001>.

By pressing F3=Save in the window *Measurement* (see chapter 4.2.4), the following window appears:

| | | | |
|---|------|-------|-----|
| Customer: 0123456 Mr. Miller Carpenter Market street 5 47892 Newport 02531-4578 | | | |
| choic | S&BT | store | end |

Window

"Save / Customer Data"






Paging backward / forward in the customer list (only in the window *Save / Customer Data*)



Choice: to Customer Search and Customer New Entry (see chapter 4.2.4.4)

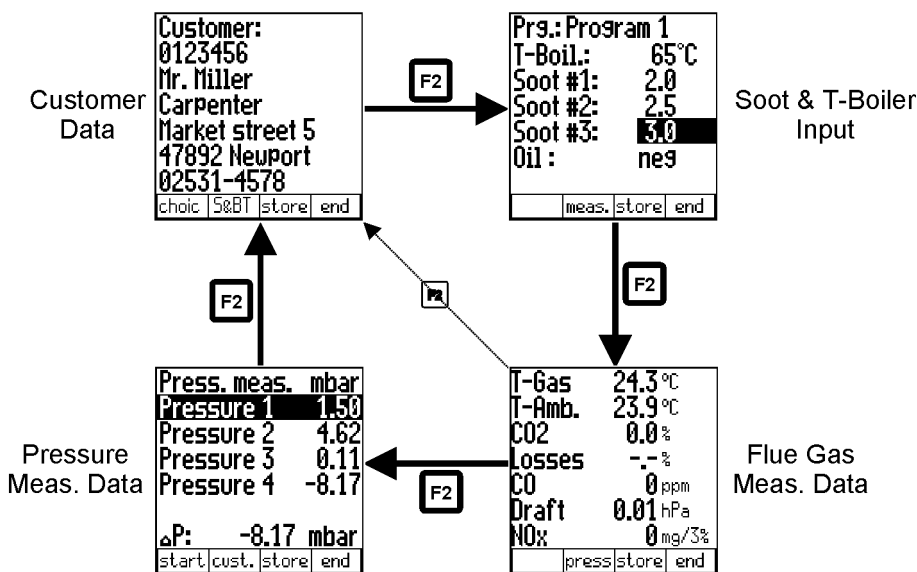


S&BT: to the window *S&BT Input* (see chapter 4.2.3.1, Four-Window-Row see chapter 4.2.4.3).

| | | |
|---|-----------|---|
|  | F3 | <i>Store</i> : all measuring values will be saved and allocated to the selected customer. A message " <i>measuring values saved</i> ", follows, then the window " <i>Data View</i> " opens (see chapter 4.4.1). |
|  | F4 | <i>End</i> : back to the <i>Measuring Menu</i> without saving |
|  | | Print measuring values |

4.2.4.3 Four-Window-Row when Saving

If saving has been started with key F3=store in the window *Measurement* (see chapter 4.2.4), you can change between the following 4 windows with the F2 key before ending the saving process :



Note :

The window *Pressure Measuring Data* will not be shown, if your device does not have the *Pressure Measuring* option.

The row is then limited to a Three-Window-Row.

In all four windows, saving can be terminated with F3 and / or printing can be started with the printer key. The particular possibilities in these four windows are:

- *Customer Data*:
Paging, search, new entry in list of customers for coordination to a customer
- *Soot and Boiler temperature Input*:
Input of the soot numbers, of the oil derivative and the boiler temperature (see chapter 4.2.3.1)
- *Flue Gas Measuring Data* :
Paging of the measuring indication (see chapter 4.2.4 and 4.5.3)
- *Pressure Measuring Data* :
View and effect pressure measurements (see chapter 4.2.2.3)

4.2.4.4 Customer Search and Customer New Entry when Saving

During the saving process, the list of customers can be paged via scroll keys. However, this method can be slightly laborious, if a large list of customers is existent. Therefore, the device itself can also search the requested customer.






Furthermore, it is possible to enter a new customer during the saving process without changing into the Customer Administration.

When pressing key F1=*choice* in the window *Save / Customer Data* (see chapter 4.2.4.2), the following window appears:

| Search customer | |
|--|-------|
| C.no. : | 123 |
| Pos1 : | - - - |
| Rest : | - - - |
| <div> <div>find</div> <div>edit</div> <div>new</div> <div>end</div> </div> | |

Window

“Save / Search/Create customer”

| | |
|---|---|
|  | Move cursor (for more details see chapter 4.3.1) |
|  | <i>Find</i> : effect search (for more details see chapter 4.3.1) |
|  | <i>Edit</i> : adjust working mask (for more details see chapter 4.3.1) |
|  | <i>New</i> : enter new customer (for more details see chapter 4.3.2.1) |
|  | <i>End</i> : back to the window <i>Save / Customer Data</i> without searching |

4.2.4.5 Temporary Buffer

The NOVA H8 gives the possibility to set the momentary values into a temporary buffer during effecting and continuing the measurement. Later on, the values can be brought back from the temporary buffer to the measuring window in order to print them out or / and to save them.

Operation:

In order to set the measuring values into the temporary buffer, please press during measurement this key:



The device gives a short audible signal and continues with the measurement. In the right lower corner of the display a twinkling “M” is shown for “Memory”:

| | |
|---|-----------|
| T-Gas | 24.0 °C |
| T-Amb. | 23.9 °C |
| CO2 | 0.0 % |
| NOx | 0 mg/3% |
| CO | 0 ppm |
| Draft | -0.04 hPa |
| Losses | -.- % M |
| <div> <div>stop</div> <div>COcut</div> <div>store</div> <div>end</div> </div> | |

Measuring window with twinkling “M” (values in temporary buffer)

In order to bring the values back from the temporary buffer to the measuring window, please press in the measuring window this key:



The device gives a short audible signal and loads the values of the temporary buffer into the measuring window. The “M” disappears. Now it is possible to print and save as usual.

4.2.4.6 Chimney Draft respectively Fine Draft Measurement

The Chimney Draft Measurement is created as continuous measurement. I. e. the draft is measured, indicated and printed in the same time as the flue gas values.

The gas sampling probe is equipped with a double tube. Connect the black tube to the draft connection (green).

The Chimney Draft Measurement is subject to a minimal temperature drift. After 2 – 3 hours of continuous measurement (i. e. measurement without new zero point adjustment or calibration) the indicated chimney draft value can slightly, but increasingly drift away!

Zero Point Adjustment :

During calibration, the NOVA H8 automatically determines the zero point of the draft sensor. After 2 – 3 hours, a new zero point determination may be necessary.

Procedure :

- disconnect the fine-draft-tube (black) from the draft connection (green) of the device.
- press key on / off. The NOVA H8 now changes to the stand-by mode. Press now key F1=draft 0, the device determines the zero point and changes back into operation mode.
- alternatively the zero point adjustment can be provoked in the upper row "zero point draft" in the Extra Menu.
- Reconnect the fine-draft-tube (black) to the fine-draft-tube-connection (green).

4.2.5 Fuel Selection

Change to the *Measuring Menu* (see chapter 3.1 Main Menus of NOVA H8):



"Measuring Menu"

Move cursor with scroll keys in order to select menu item *Fuel Selection* and press Enter.

| | |
|---------------|--------|
| Fuel type | CO2max |
| Oil light | 15.3% |
| Oil Heavy | 15.8% |
| Nat.gas heav | 11.7% |
| Nat.gas light | 12.2% |
| Nat.gas H blo | 11.7% |
| Coal gas blo | 10.0% |
| info | end |

window "Fuel Selection"



change the momentary fuel (up and down, also scroll list)



info: view parameter of the momentary fuel



end: back to the *Measuring Menu*, the selected fuel is now activated

The fuels offered for selection correspond to those, which have been activated in the fuel pre-selection (see chapter 4.5.2).

Hint:

If in the *Measuring Menu* the cursor is moved to row "Fuel Selection", the fuel can be selected in a faster way via scroll keys left / right (instead of enter key).

A list of fuel types in Germany and other countries can be found in the **Appendix** (chapter 13.3).

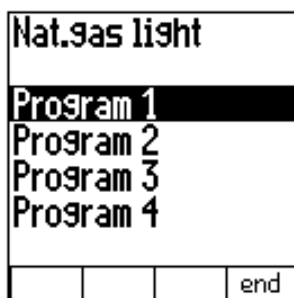
4.2.6 Measurement Program Selection

Change to the *Measuring Menu* (see chapter 3.1 Main Menus of NOVA H8):



"Measuring Menu"

Move cursor with scroll keys in order to select menu item *Measurement Program Selection* and press Enter.



Window
"Measurement Program Selection"



change of the momentary measurement program



end: back to the *Measuring Menu*, the selected measurement program is now activated

In the first row, the current fuel type is shown.

Hint:

If in the *Measuring Menu* the cursor is moved to row "Measurement Program Selection", the measurement can be selected in a faster way via scroll keys left / right (instead of enter key).

4.2.7 View Last Values

Change to the *Measuring Menu* (see chapter 3.1 Main Menus of NOVA H8):

Move cursor with scroll keys in order to select menu item *View Last Values* and press Enter.



"Measuring Menu"

The window *Measurement* is now reached without starting the measurement. I. e. last measured values can be reviewed, saved and / or printed. Operations see chapter **4.2.4**.

Above key F1, **Start** is now shown instead of *Stop*. When pressing this key, the measurement is started the same way as if it would have been started via the menu item *Measurement*.

4.3 Customer Administration

The storage organisation inside the NOVA H8 is created in a way, that in order to mark a saved measurement, a so-called customer must be existent, to whom the measurement can be allocated. The NOVA H8 disposes of customer storage of 300 (optional 3000) customers.

A customer data block consists of:

| Field name | Field size | Note | Input |
|-------------|------------|----------------------------|---------------|
| Customer #. | 15 | Identifying # | Necessary |
| Pos.1 | 15 | e. g. customer name | not necessary |
| Pos.2 | 15 | e. g. 2 nd name | not necessary |
| Pos.3 | 15 | e. g. street | not necessary |
| Pos.4 | 15 | e. g. ZIP code / city | not necessary |
| Pos.5 | 15 | e. g. phone # | not necessary |

An unlimited number of measuring data blocks (only limited by the size of the storage) can be saved under one customer. When saving the measuring data, the corresponding customer has to be selected.

Hint:

If generally, the customer administration is not used, but data should nevertheless be saved, a customer should be created (see chapter 4.3.2.1), inserting one blank in the corresponding customer number. In the future, the device saves all measuring data blocks without visible customer number and co-ordinates them to the pseudo customer.

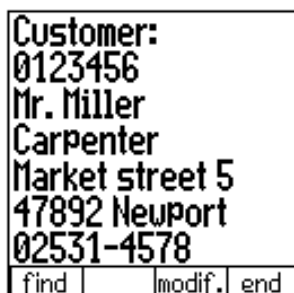
4.3.1 Customer Selection / Customer Search

Change to the Customer Menu (see chapter 3.1 Main Menus of NOVA H8):









"Customer Menu"

Move cursor with scroll keys in order to select menu item *Customer Selection* and press Enter:



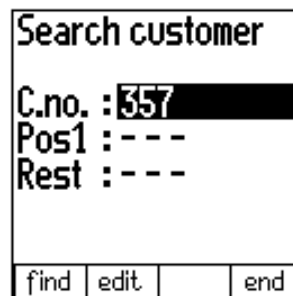
Window "Customer Selection" with an exemplary customer

| | |
|---|--|
|   | Move one customer forward / backward in the list |
|  | <i>Find</i> : open window <i>Customer Search</i> (see below) |
|  | <i>Modif.</i> : change to the window Customer data base (see chapter 4.3.2) |
|   | <i>End</i> : quit window, the customer selected last is now intended for saving measurements |

Customer Search

The list of customers can be paged via scroll keys. However, this method can be slightly laborious, if a large list of customers is existent. Therefore, the device itself can also search the requested customer.







By pressing key F1=*find* in the window *Customer Selection* (see above) the following window appears:



Window "Search Customer"

The search for the customer can be effected in different data fields, depending on the data of the customer, which is known:

- C.no. search by the customer number
- Pos1: search by pos. 1 (e. g. customer name)
- Rest: search by pos. 2-5 (e. g. address or phone)

| | |
|---|--|
|   | Move cursor, the selected field determines, in which data fields the customer should be searched |
|  | <i>Find</i> : effect search in the selected data field with the inserted search mask (more details see below). The previous window will be opened. If the search is successful, the found customer will be shown there, if not the note "search not successful" appears. |
|  | <i>Edit</i> : open text input (see chapter 4.6) in order to modify the selected search mask |
|   | <i>End</i> : quit window without effecting a search |

Explications and Examples of a Search

The devices looks for customers in the complete customer list, which contains the inserted search mask in the selected data field. Majuscule and minuscule writing will be ignored during the searching process.

Here some search examples, which would find the exemplary customer on the left side:

| | | | |
|-----------------|--|--------|-----|
| Customer: | | | |
| 0123456 | | | |
| Mr. Miller | | | |
| Carpenter | | | |
| Market street 5 | | | |
| 47892 Newport | | | |
| 02531-4578 | | | |
| find | | modif. | end |

C.no.: 123
C.no.: 6
Pos1: Mr.
Pos1: Mille
Rest: 92
Rest: Newport

Here some search examples, which would not find the exemplary customer on the left side:

| | | | |
|-----------------|--|--------|-----|
| Customer: | | | |
| 0123456 | | | |
| Mr. Miller | | | |
| Carpenter | | | |
| Market street 5 | | | |
| 47892 Newport | | | |
| 02531-4578 | | | |
| find | | modif. | end |

| | |
|----------------|---|
| C.no.: 567 | (number does not contain "567") |
| C.no.: 4578 | ("4578" is contained, but not in customer number) |
| Pos1: MrMiller | (there is a point between "Mr" and "Miller") |
| Rest: 92-4578 | (contained, but not in one line) |

Hint:

If after an effected search, you would like to keep on searching (i. e. in the same data field with the same search mask), please press key F1 twice.

4.3.2 Customer Data Base

Change to the Customer Menu
(see chapter **3.1 Main Menus
of NOVA H8**):

Select a customer
Custom. data base
Memory occupation
Delete customers
Customers from PC
meas. cust. data extra

“Customer Menu”

Move cursor with scroll keys in order to select menu item *Customer Data Base* and press Enter:

| | | | |
|-------------------|--------|------|-----|
| Custom. data base | | | |
| 0123456 | | | |
| Mr. Miller | | | |
| Carpenter | | | |
| Market street 5 | | | |
| 47892 Newport | | | |
| 02531-4578 | | | |
| new | modif. | del. | end |

Window “*Customer Data Base*”
with an exemplary customer





move one customer forward / backward in the list



new: customer new entry (see chapter 4.3.2.1)



modif.: modify the selected customer (see chapter 4.3.2.2)

| | |
|---|--|
|  | <i>del.</i> : delete the selected customer (see chapter 4.3.2.3) |
|  | <i>end</i> : quit window, the customer selected last is now intended for saving measurements |

4.3.2.1 Customer New Entry

Press key *F1=new* in the window *Customer Data Base* (see above chapter 4.3.2), the device demands the input of the customer number of the new customer. The window *Input of Text* (see chapter 4.6) will be opened. Please type the customer number.

If you cancel the input or do not insert digits, the new customer will not be entered.






After input of the customer number, the customer will be stored in the data base. Now it is possible – if requested – to fill in the address fields of the new customer. How to do this will be shown in the following chapter 4.3.2.2.

4.3.2.2 Customer Modifications

By pressing key *F2=modify* in the window *Customer Data Base* (see above chapter 4.3.2) the following window appears:

| | | | |
|-----------------|--|--|-----|
| Modify customer | | | |
| 0123456 | | | |
| Mr. Miller | | | |
| Carpenter | | | |
| Market street 5 | | | |
| 47892 Newport | | | |
| 02531-4578 | | | |
| edit | | | end |

Window "Customer Modification" with an exemplary customer



| | | |
|---|---|--|
|  |  | move cursor in order to select another data field |
|  | | <i>edit</i> : open Input of Text (see chapter 4.6) in order to modify the selected data field |
|  |  | <i>end</i> : quit window, the modifications will be saved, the modified customer is now intended for saving measurements |

4.3.2.3 Customer Deletion

By pressing key *F3=delete* in the window *Customer Data Base* (see above chapter 4.3.2) the following window appears :

| | | | |
|-------------------|--|--|------|
| You are deleting | | | |
| the customer no. | | | |
| 0123456 | | | |
| including all its | | | |
| measuring data ! | | | |
| Are you certain ? | | | |
| yes | | | esc. |

Window "Customer Deletion" with an exemplary customer number

| | |
|---|--|
|  | yes: the selected customer and all allocated measurements will be deleted from the storage. Afterwards back to the window <i>Customer Data Base</i> . |
|  | <i>esc.</i> : back to the window <i>Customer Data Base</i> without deletion. |

4.3.3 Customer Memory Occupation

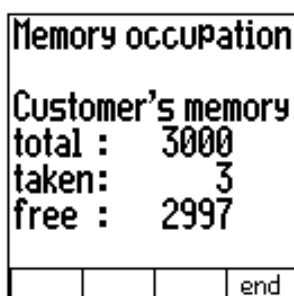
In the window “Storage Information”, the number of all, the occupied and free customer storage blocks will be indicated.

Change to the Customer Menu
(see chapter 3.1 Main Menus
of NOVA H8):



“Customer Menu”

Move cursor with scroll keys in
order to select menu item
Memory occupation and press
Enter:



Window

“Customer Memory Occupation”

F4 *end: back to the Customer Menu*

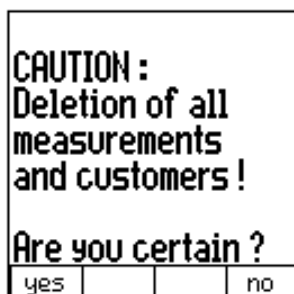
4.3.4 Deletion of all Saved Customers

Change to the *Customer Menu*
(see chapter 3.1 Main Menus
of NOVA H8):



“Customer Menu”

Move cursor with scroll keys in
order to select menu item *De-
lete Customers* and press
Enter:



Window “Delete All Customers”

F1 *yes: all saved customers and all measuring data will be deleted.*

F4 *no: back to the Customer Menu without deletion.*

4.3.5 Transmission of Customers from the PC

Via the RS232 or infrared interface (IrDa) the NOVA H8 is able to receive customer numbers including addresses from a PC. For this, the necessary PC software (e. g. *MRU Wingraph*) has to be installed.

The necessary connection between the MRU measuring device and the PC or handheld PC has to be effected **before** transmission and is not to be disconnected during transmission:

- RS232: connect data transmission cable to the RS232 interface of the PC and the NOVA H8 (**only when devices are switched off!**).
- IrDa: adjust infrared windows of both devices towards each other

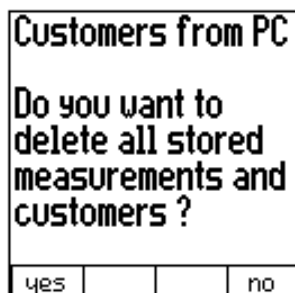
Change to the Customer Menu (see chapter 3.1 Main Menus of NOVA H8):

Move cursor with scroll keys in order to select menu item *Customers from PC* and press Enter.

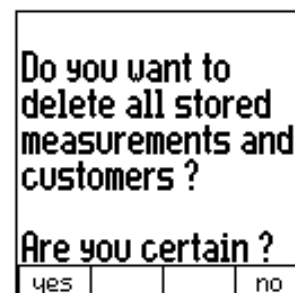


"Customer Menu"

Now the device asks you, if the already saved customers should be deleted or if the received customers should be added to the customer database:



If the first question is answered with yes, a second question will follow for reasons of Safety:



F1

Yes: **all saved customers and all measuring data** will be **deleted**. The received customers form the new customer list.

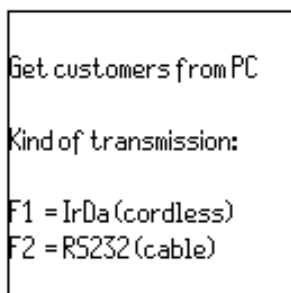
F4



No: no deletion, the received customers will be added to the customer list

If the customers number is already assigned the existing customer will be make topical with the new name / address and the potential measuring data remains allocated.

Now you will have to decide, which interface should be used for transmission:



Window *Interface Selection*

- F1** *IrDa*: data will be received via infrared interface (cordless)
- F2** *RS232*: data will be received via RS232 interface (cable)

Either F1 or F2 has to be pressed.

If F1=*IrDa* (cordless) has been selected, another decision has to be made:

The speed of IrDa transmission has to be selected, as different PC programs use different speeds:

```
Get customers from PC

IrDa transmission
speed selection

F1 = 9600 Baud (Peditas)
F2 = 1200 Baud (others)
```

Window

IrDa transmission speed selection

- F1** *9600 Baud*: data will be expected with 9600 baud (MRU-Peditas for Windows CE)
- F2** *1200 Baud*: data will be expected with 1200 baud (other programs)

Either F1 or F2 has to be pressed.

Now the NOVA H8 waits for customer data at the selected interface and speed and shows this with the following window:

```
Customers from PC

Waiting for data...

[ ] [ ] [ ] [ esc.]
```

Window *Wait for Customer Data*

Now the data transmission at the PC can be started.

After transmission, the NOVA H8 informs you, if the transmission was successful.

Transmission can be interrupted at any time with key F4=esc..

4.4 Data Administration

The NOVA H8 disposes of measuring data storage of 300 (optional 3000) measurements. A measurement has to be allocated to a customer when saving. Several measurements can be allocated to one single customer. In the measuring data storage measurements of one customer are listed directly one after the other, as measurements are arranged with respect to the customer.

When the measuring data storage is full, no more measurement can be saved without previously deleting the storage or parts of it.

A measuring data block (i. e. a saved measurement) consists of:

- Date and time of the measurement
- Customer number and address
- Values of the flue gas measurement (incl. AUX)
- Values of the soot measurement
- Values of the differential pressure measurement(s)

4.4.1 View Stored Data

Change to the Data Menu (see chapter 3.1 Main Menus of NOVA H8):



"Data Menu"

Move cursor with scroll keys in order to select menu item *Customers from PC* and press Enter:



Window

*View Stored Data,
Subview Customer*



In subview *Customer*: page one measurement forward / backward
in subview *Measuring Data*: change measurement page (see chapter 4.5.3)



Find: search a measurement regarding customer number (see chapter 4.4.1.1)



S&BT: go to subview *Soot & Boiler temp.* (See 4-window-row in chapter 4.4.1.2)



Del.: delete the selected measurement (see chapter 4.4.1.3)



End: quit window, back to the Data Menu



: Print selected measurement

4.4.1.1 Data Search

In the window *View Stored Data* (see chapter 4.4.1) all saved measurements can be paged via scroll keys. However, this method can be slightly laborious, if a large number of measurements is existent. Therefore, the device itself can also search the requested measurement.

By pressing key *F1=find* in the window *View Stored Data* (see chapter 4.4.1), the following window opens:

| | | | |
|--------------------|------|--|-----|
| Search meas. data | | | |
| Input customer no. | | | |
| 0123 | | | |
| | | | |
| find | edit | | end |

Window "Data Search"

- F1** *Find*: effect search in the selected data field with the inserted search mask. The previous window will be opened. If the search is successful, the found customer will be shown, if not, the note "search not successful" appears.
- F2** *Edit*: open text input (see chapter 4.6) in order to modify the selected search mask
- F4** *End*: quit window without effecting a search

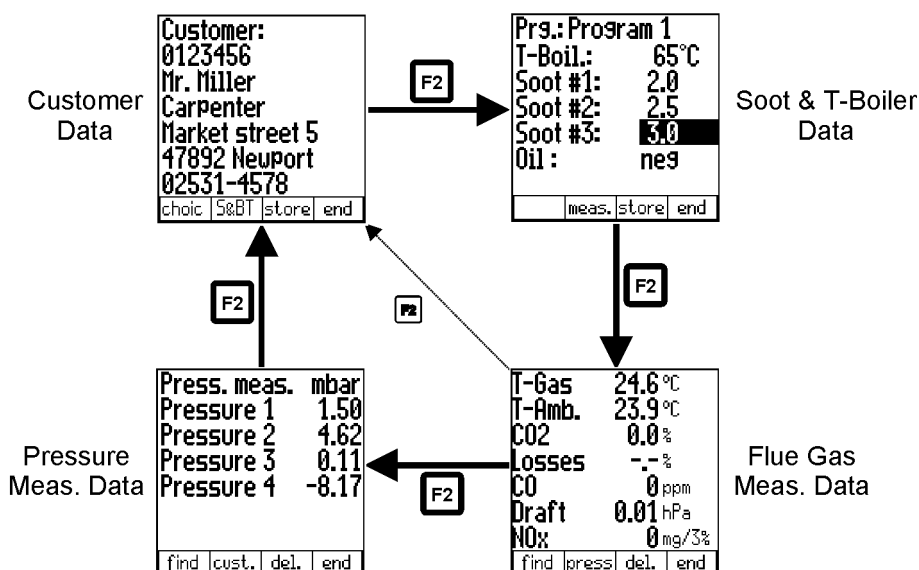
It is not necessary that the search mask contain the complete customer number. Measurements will be searched in which the inputted search-string is contained in the allocated customer number. Majuscule and minuscule writing will be ignored.

Hint:

If after an effected search, you would like to keep on searching (i. e. in the same data field with the same search mask), please press key *F1* twice.

4.4.1.2 Four views of a Measuring Data Block

The four views in the window *View Stored Data* (see chapter 4.4.1) shows the following:



Note:

The window *Pressure Measuring Data* will not be shown, if your device does not have the *Pressure Measuring* option.

The row is then limited to a 3-window-row.


4.4.1.3 Deletion of a Measuring Data Block

By pressing key *F3=delete* in the window *View Stored Data* (see chapter 4.4.1), the following window opens:

| | | | |
|---|--|--|----|
| CAUTION : You are deleting the selected data block ! | | | |
| Are you certain ? | | | |
| yes | | | no |

Window

Delete Measuring Data Block

- F1** Yes: the selected measuring data block will be deleted. The customer data and other measurements of the same customer will be maintained. Then, the window *View Stored Data* opens again.
- F4**  No: back to the window *View Stored Data* without deletion.

4.4.2 Measurement Memory Occupation

In the window *Measurement Memory Occupation* the number of all, the occupied and free measurement data storage blocks will be indicated.

Change to the Data Menu (see chapter 3.1 Main Menus of NOVA H8):

| | | | |
|-------------------|-------|------|-------|
| View stored data | | | |
| Memory occupation | | | |
| Delete all data | | | |
| Send data to PC | | | |
| meas. | cust. | data | extra |

"Data Menu"

Move cursor with scroll keys in order to select menu item *Memory Occupation* and press Enter:

| | | | |
|-------------------|------|--|-----|
| Memory occupation | | | |
| Measurem. memory | | | |
| total : | 3000 | | |
| used : | 3 | | |
| free : | 2997 | | |
| | | | end |

Window

*Measurement Data
Memory Occupation*

- F4**  End: back to the *Data Menu*

4.4.3 Deletion of all Saved Measuring Data Blocks

Change to the Data Menu (see chapter 3.1 Main Menus of NOVA H8):



"Data Menu"

Move cursor with scroll keys in order to select menu item *Delete All Data* and press Enter:



Window "Delete All Data"

- F1 Yes: all saved measurements will be deleted. The customer data will be maintained. Then the *Data Menu* opens again.
- F4 No: back to the *Data Menu* without deletion.

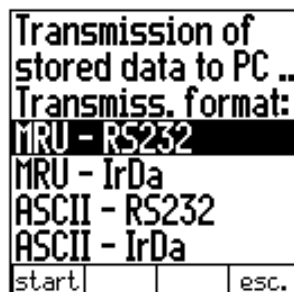
4.4.4 Transmission of Measuring Data to PC

Change to the Data Menu (see chapter 3.1 Main Menus of NOVA H8):



"Data Menu"

Move cursor with scroll keys in order to select menu item *Send Data to PC* and press Enter:



Window
Send Data to PC

- Move cursor in order to select the requested data transmission mode.
- F1 *Start:* data transmission will be started
- F4 *Esc:* back to the *Data Menu* without data transmission

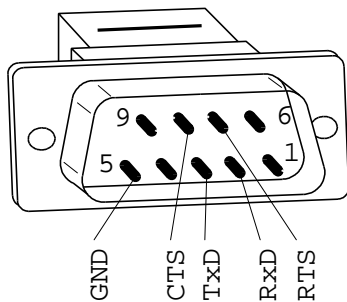
Selection of Transmission Mode:

- **MRU format:**
The MRU format is a binary format, which can be received by the MRU programs *MRU-Wingraph*, *MRU-Pedias* or *MRU-OnlineView*.
- **ASCII format:**
The ASCII format is a text format, which can be received by the special programs for chimney-sweepers.
- **RS232:**
The data will be transferred by cable via the RS232 interface.
- **IrDa**
The data will be transferred cordless via the infrared interface.

Procedure:

- The data transmission cable is **not to be** connected when the measuring device and the PC are on!
- Connect data transmission cable to the RS232 interface.
- The necessary connections at the MRU measuring device as well as at the PC have to be effected **before** transmission.
- The necessary PC software (e. g. MRU Wingraph) has to be installed and ready for reception.
- Press now key F1=*start*
- The NOVA H8 sends all saved measurements via the cable respectively via the infrared interface to your PC program. If data transmission has successfully been effected, the NOVA H8 gives the following message: "*Data successfully transferred to PC*". If the PC is not ready, the NOVA H8 gives the message: "*PC not ready*".

Transmission modalities and pin assignment of the 9-pin SUB-D plug for RS 232:



| | | | |
|---------|------------------------|-----------|------|
| 2 = RxD | input signal | baud rate | 9600 |
| 3 = TxD | output signal | parity | none |
| 5 = GND | mass | data bits | 8 |
| 7 = RTS | ready for transmission | stop bits | 1 |
| 8 = CTS | ready for receipt | handshake | none |

4.5 EXTRA / Device Configurations

With delivery, the NOVA H8 disposes of standard pre-adjusted software, which should cover your needs in the most cases. However, the configuration is highly flexible and individually adjustable.

If you would like to modify different configurations, we recommend doing this in a reasonable way. The better the configuration modification is planned, the lesser corrective action must be taken and the easier you are able to work with the device.

Take advantage of the possibility to individually adjust measurement programs, measuring indications, printing outputs and self-selection fuel in a way, that all of your needs in practice are covered. Then less correction regarding the configurations has to be effected.

After modifying the configurations, the device should be turned off for a short time, so that the modifications are saved and usable when turning on again.

4.5.1 Set Draft to Zero

Change to the EXTRA Menu (see chapter **3.1 Main Menus of NOVA H8**):

Move cursor with scroll keys in order to select menu item *Set Draft to Zero* and press Enter.



"Extra Menu"

The NOVA H8 now asks you to release all pressure from the outlet side. Therefore, the fine draft tube (black) has to be disconnected from the fine draft tube connection (green), then press Enter.

Now a new zero point will be determined and saved.

See also chapter **4.2.4.6** and **4.7**.

4.5.2 Fuel Type Chart / Self Definable Fuel Types / Fuel Type Pre-Selection

Change to the EXTRA Menu
(see chapter 3.1 Main Menus
of NOVA H8):



"Extra Menu"

Move cursor with scroll keys in
order to select menu item *Fuel
Type Chart* and press Enter:

| Fuel type | CO2max |
|----------------------|--------|
| *Oil light | 15.3% |
| *Oil Heavy | 15.8% |
| *Nat.gas hea | 11.7% |
| *Nat.gas ligh | 12.2% |
| *Nat.gas H bl | 11.7% |
| Nat.gas L bl | 12.2% |
| + / - self O2ref end | |

Window

Fuel Type Chart



Select fuel type, also scroll up / down the fuel chart (more fuels are available than visible on one window)



Same as F1: add or remove selected fuel to the pre-selected fuel types (selected = '*')



+ / -: Add or remove selected fuel to the pre-selected fuel types (selected = '*')



Self: to the window *Self Definable Fuel Types* (see below)



O2ref: change O₂ reference value of the selected fuel type



end: back to the *Extra Menu*

Here, the customer can effect a fuel type pre-selection. The needed fuel types are selected and the superfluous ones are left out. In the *Measuring Menu*, section *Fuel Type*, only the **pre-selected fuel types** will appear.

Self Definable Fuel Types

Here, four fuels can be adjusted individually. The name as well as all parameters (CO₂max, O₂ reference value and the calculation parameters A1 and B) is adjustable. As the other fuel types, they can be pre-selected or left out.

| Definable fuels | | | |
|-----------------|------|-------|-----|
| Ind. fuel A | | | |
| Ind. fuel B | | | |
| Ind. fuel C | | | |
| Calibr. Gas | | | |
| modif. | info | + / - | end |










Window

*Self Definable
Fuel Types*

| | |
|------------------|-------|
| Co.: Ind. fuel B | |
| Pr.: Program 1 | |
| CO2max : | 13.0% |
| A1 : | 0.40 |
| B : | 0.009 |
| O2ref : | 3% |
| edit | end |

Window

*Modify Self Definable
Fuel Type*

| | |
|---|---|
|   | Move cursor in order to select a fuel type |
|   | Same as F3: add or remove selected fuel to the pre-selected fuel types (selected = '*') |
|  | <i>Modif.:</i> modify fuel type parameters (see right illustration) |
|  | <i>Info:</i> parameters of the fuel will be shown |
|  | + / -: add or remove selected fuel to the pre-selected fuel types (selected = '*') |
|   | <i>End:</i> back to the window <i>Fuel Type Chart</i> |

In the right illustration *Modify Self Definable Fuel Type* as usual with the scroll keys, the cursor can be moved and the values can be modified, with F1, the text input can be started and with F4 the window will be closed.

4.5.3 Configure Measurement Programs (name, CO-limit, printout, indication)

Change to the EXTRA Menu
(see chapter 3.1 Main Menus
of NOVA H8):

| |
|--------------------------|
| Set draft to zero |
| Fuel type chart |
| Program configur. |
| Set date and time |
| Settings |
| Service values |
| Adjustment |
| meas. cust. data extra |










"Extra Menu"

Move cursor with scroll keys in
order to select menu item *Pro-
gram Configuration* and press
Enter:

| Measurem. Program | CO- thresh. (ppm) |
|----------------------|-------------------------|
| Program 1 | 2000 |
| Program 2 | 4000 |
| Program 3 | 4000 |
| Program 4 | 4000 |
| edit | print indic. end |

Window

Program Configuration

| | |
|---|---|
|   | Select measurement program |
|   | Change CO cut-off limit of the selected measurement program |
|  | <i>Edit:</i> change name of the measurement program (Input of Text see chapter 4.6) |
|  | <i>Print:</i> print adjustment of the selected measurement program (see below) |
|  | <i>indic.:</i> adjustment of the measuring indication of the selected measurement program (see below) |
|   | <i>End:</i> back to the <i>Extra Menu</i> |

Adjustment of the Measuring Indication

For every measurement program it is possible to adjust, which values should be visible in the measuring window during measurement. Each measurement program disposes of 6 pages à 7 lines, which can be adjusted individually. During measurement, pages can be paged forward and backward.

By pressing key F3=*indic.* in the window *Program Configuration*, the measuring indication can be adjusted.

The following illustrations are examples for an adjustment of the measuring indication. In the lower left corner of the window, the actual measurement program and page number (1...6) are shown:

| | |
|-------------|-------|
| T-Gas | °C |
| T-Amb. | °C |
| CO2 | % |
| Losses | % |
| CO | ppm |
| Draft | hPa |
| NOx | mg/3% |
| 1/Program 1 | end |

| | |
|-------------|------|
| O2 | % |
| Eff. | % |
| λ | |
| Pressur | mbar |
| CO | ppm |
| NOx | ppm |
| NO | ppm |
| 2/Program 1 | end |

| | |
|-------------|-------|
| T-Gas | °C |
| T-Amb. | °C |
| λ | |
| CO2 | % |
| CO | ppm0% |
| Draft | hPa |
| Losses | % |
| 1/Program 3 | end |

Examples for "Adjustment of Measuring Indication"



Move selection rows (in the first and last row, the page will be turned)



Change measuring value to be indicated at the selected position



end: back to the window *Program Configuration*

1st Hint:

There is no problem in indicating one measuring value one several pages. If e. g. T-Gas should always be visible, it can be indicated e. g. on every page in the first line.

2nd Hint:

If a page only consists of blank lines, it will not be visible when paging during measurement. If e. g. not more than 2 pages are needed, this way it can be avoided to page through 6 pages.

Print Adjustment

It is possible to adjust for each measurement program, which values should be indicated on the print output.

When pressing key F2 in the window *Program Configuration*, the print output of the selected measurement program can be adjusted and the following window will be reached :










| | |
|------------|-----|
| * T-Gas | °C |
| * T-Amb. | °C |
| * Dewpoint | °C |
| * O2 | % |
| * CO2 | % |
| * Losses | % |
| * Eff. | % |
| +/- | all |
| none | end |

| | |
|----------|-------|
| * Losses | % |
| * Eff. | % |
| * CO | ppm |
| * CO | ppm0% |
| CO | mg/3% |
| CO | mg/m3 |
| * CO | mgkWh |
| +/- | all |
| none | end |

| | |
|-----------|-------|
| CO | mg/m3 |
| * CO | mgkWh |
| CO | mg/MJ |
| * λ | |
| * Draft | hPa |
| * Vorlauf | °C |
| * NO | ppm |
| +/- | all |
| none | end |

Examples for window "Print Adjustment"

Measuring values to be printed are marked with '*'. The list of measuring data can contain more than 40 rows (depending on the existing device options) and cannot be shown in one window, not even with basic equipment.

| | | |
|---|---|--|
|  |  | Move selection rows (in the first and last row, the page will be turned) |
|  |  | Same as F1: activate / deactivate print of the selected measuring value |
|  | | + / -: Activate / deactivate print of the selected measuring value |
|  | | All: activate all measuring values |
|  | | None: deactivate all measuring values. (Empty printout) |
|  |  | End: back to the window <i>Program Configuration</i> |

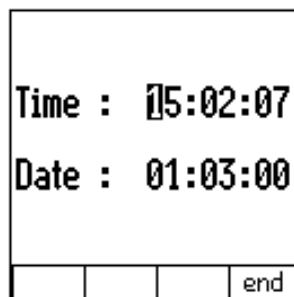
4.5.4 Set Date and Time

Change to the EXTRA Menu
(see chapter 3.1 Main Menus
of NOVA H8):









"Extra Menu"

Move cursor with scroll keys in
order to select menu item
Set Date and Time
and press Enter:



Window
Set Date and Time

| | | |
|---|---|------------------------------------|
|  |  | Change digit selected by cursor |
|  |  | Move cursor |
|  |  | end: back to the <i>Extra Menu</i> |

It is never possible (not even during adjustment process) to insert a time, which does not exist.

Example:

Month is 03 and should be modified to 10. It is not possible to increase 0 to 1 while the 3 are still there, as a month 13 does not exist. First, 3 have to be decreased to 0, then 0 increased to 1.

4.5.5 Settings

Change to the EXTRA Menu
(see chapter 3.1 Main Menus
of NOVA H8):



"Extra Menu"

Move cursor with scroll keys in
order to select menu item
Settings
and press Enter:



Window
Settings



Select a device setting to be modified



Modify selected device setting (see chart below)



Aux.: to adjust the AUX input (see chapter 5.4)



End: back to the *Extra Menu*

| Position | Possible Adjustments | Meaning |
|-----------------|----------------------------------|--|
| Speaker | ON / OFF | Audible sound when pressing a key |
| Contrast | 0 % - 100 %. (in paces of 5%) | Display contrast, 50 % are normal with a temperature of 20°C and depending on the individual sensation of the operator |
| Probe heating | OIL, MAINS, ON or OFF | Explanation see chart below |
| Helping hints | ON / OFF | Explanation see below |
| Central current | ON / OFF | Search of central current before measurement |

Explanation of the setting *Helping Hints*:

There are a couple of messages which are generated automatically by the analyser and which help a beginner, but which may annoy an experienced user.

An experienced user can switch off such messages by setting this parameter to OFF.

A few examples for such messages:

| | | | | |
|---|--------------------------|---|-----------------------------|---|
| Calibration has to be done in fresh air | Please insert soot paper | Draft zero point follows, are the nibbles free of pressure? | Measurement started/stopped | Sensors free of gas, gas pump was stopped |
|---|--------------------------|---|-----------------------------|---|

| Probe heating | Meaning |
|---------------|---|
| OIL | Probe heating is turned on, when fuel oil is selected (for reasons of battery protection, return question if no mains power cable is connected, see below) |
| MAINS | Probe heating is always on, when mains power cable is connected. During battery operation, it is switched on, when fuel oil is selected (for reasons of battery protection return question see below) |
| ON | Probe heating is always on (for reasons of battery protection, return question if no mains power cable is connected, see below) |
| OFF | Probe heating is always off |

If because of the adjustment and the selected fuel the probe heating should be put into service, but the mains power cable is not connected, the device asks, if the probe heating should be turned on during battery operation:

Caution:
Using probe heating
without mains cable
reduces highly the
battery endurance!

F1 = probe heating on
F2 = probe heating off

Return question, if probe heating
should be activated with
battery operation

F1=probe heating on: probe heating will be switched on, **battery capacity will be reduced!**

F2=probe heating off: probe heating stays off, although it is needed

Hint:

Generally, the probe heating is needed for soot measurement, so only if fuel oil EL/S is selected. Therefore, we recommend the use of a mains power cable and the adjustment OIL for soot measurement. If you forgot to connect the cable, the NOVA H8 will remind you.

4.5.6 Service Values

If a device malfunction should occur (e. g. message during calibration: " O₂ sensor not OK"), the malfunction can mostly be localised in the Service Window. The analogous values (= not calculated raw values) of all sensors will be displayed.

Please contact our after-sales service in case of a fault information (address / phone number see chapter 13.1). In order to localise the default, our technicians may ask you same service values.

Change to the EXTRA Menu
(see chapter 3.1 Main Menus
of NOVA H8):



"Extra Menu"

Move cursor with scroll keys in order to select menu item *Service Values* and press Enter:

| | |
|---------|----------|
| O2 | 455.28mV |
| CO | 1.13mV |
| H2 | -2.17mV |
| --- | 0.00mV |
| NO | 0.58mV |
| KTV AUX | +++++mV |
| TH AUX | +++++mV |
| soot | purge |
| gas p. | end |

Window

Service Values



Move rows (in the first and last row, the list will be moved = scroll)



Soot: soot pump on / off (switches off automatically after 2 minutes)



Purge: purge pump on / off (switches off automatically after 1-2 seconds)



Gas p.: gas pump on / off



End: back to the *Extra Menu*



Print Service Values, serial number, and production date and software version.


4.5.7 Adjustment

The Adjustment Menu is protected against use of non-authorised persons by a PIN code.

If by accident, the PIN code login has been started, just press Enter to return to the *Extra Menu*.


4.5.8 Illumination

Illumination On / Off :

By pressing key , the background illumination of the display can be turned on and off.

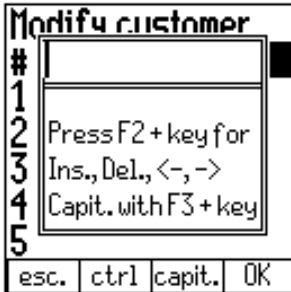
Automatic Off:

As soon as the **battery symbol starts flashing**, the illumination is switched off (for reasons of battery protection).

The display illumination can be re-activated by pressing key .

4.6 Input of Text

A number of texts and denominations can be inputted in the NOVA H8 (e. g. the names of the self definable fuel types, customer numbers, names of pressures). When starting the input, the following window always appears:



Window "Input of Text"

The procedure of text input resemble to this of most mobile phones. It may be that you already know this procedure. Someone who does not may need a little bit of practice in order to input quickly.

0 - 9: If the same key is pressed several times in short intervals, the list of characters will be gone through in a cyclic way. As soon as another key is pressed or no key is pressed within 3 seconds, the character selected last will be taken (see also detail view keyboard in chapter 3.2).

F1

Esc.: cancel, input will not be taken

F2

Ctrl: pressed together with the following special keys:

- with "Ins" (Insert): a blank will be inserted
- with "Del" (Delete): character selected by cursor will be deleted
- with scroll key left / right: cursor will be moved to the left / right

F3

Capit: pressed together with key 0-9: Input of a majuscule character

F4

OK: end text input, input would be saved

After the input of text, you will get back to the window, where you started the text input. If the input was not cancelled with F1=esc., the new text will be shown at the corresponding place now.

4.7 Standby Mode

In the Standby Mode, the device needs less power and can be put into service again at once, i. e. without the necessity of a new calibration.


If during the change to the Standby Mode, the NOVA H8 notes a too high gas concentration within the measuring cells, it first purges the sensors. “CO *purge*” will be displayed. The NOVA H8 should **not** be turned off by pressing again the ON / OFF key before the purge is finished.

The NOVA H8 switches to the Standby Mode with the following situations:

- Pressing ON / OFF key during operation
- Not pressing any key within the 4 minutes after calibration
- Not pressing any key within 20 minutes (exception: during measurement)



Window "Standby Mode"


- F1** *Draft:* the NOVA H8 determines a new draft zero point and switches back to the operation mode (see also chapter **4.2.4.6** and **4.5.1**).
- F4** *On:* the NOVA H8 switches back to the operation mode (if more than 5 minutes of standby mode, first a new draft zero point is determined).
-  **ON/OFF:** the device saves its configuration and switches off.

4.8 Switch NOVA H8 On / Off

Switching on

Press key  ON/OFF.

Switching off

Pressing key  ON/OFF, for further details please see previous chapter **4.7**.

4.9 Printing Procedure

The printing procedure can be started in the windows *Measurement*, *View Last Values*, *Save Measurement*, *View Stored Data* or *Service*.



: Press printer key in the momentary window

When operated with mains power supply or when the battery is completely charged, the display illumination stays on. If this is not the case, the **display illumination temporarily switches off** (for protective reasons). If the display illumination is needed, it can be switched on again during the print.

Note:

The number of prints can be determined by pressing the printer key (e. g. pressing printer key twice = 2 prints).

Print data e. g.:

```

Customer: _ _ _ _ _
-
*****
* M R U      N O V A  H 8 *
*           300 000      *
*****
15:02:99                      09:07

Nat. gas light                12,2 %
Program 2

T-Gas                        137.3 °C
T-Air                        18.7 °C
Dew point                    15.4 °C
O2                            12.0 %
CO2                           7.0 %
Losses                       15.2 %
Eff.                         84.8 %
CO                             0 ppm
CO                             0 ppm0%
Excess air                    12.1
Draft                         - 0.20 hPa

                        MRU GmbH
                        Fuchshalde 8
                        74172 Obereisesheim
                        Tel. 07132/9962-0
                        Fax. 07132/9962-20

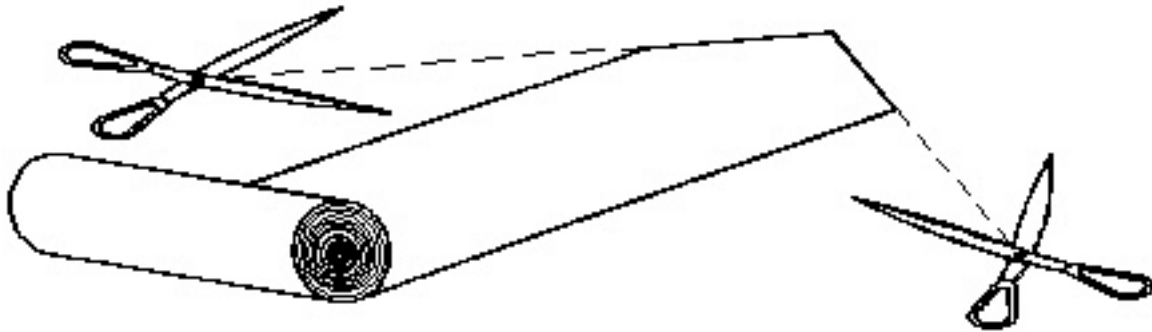
```

Your company address can be saved upon request.

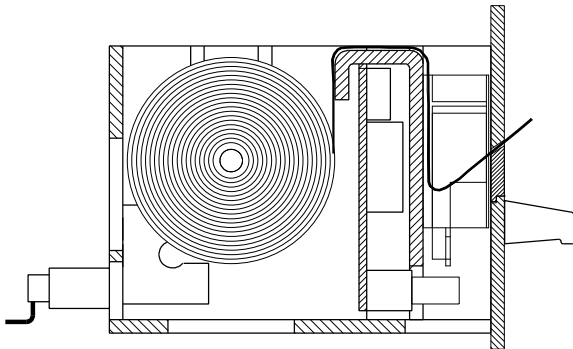
4.9.1 Paper Feed:

Insert paper roll:

- Cut the paper clearly (see drawing). Do not use crumpled paper with creased paper ends. Avoid any obstruction of the printing mechanism.



- Insert paper roll (see drawing).



End of paper roll :

is indicated by a red or black stripe on the right / left side of the paper. **(App. 0,5 m of thermo paper remaining)**

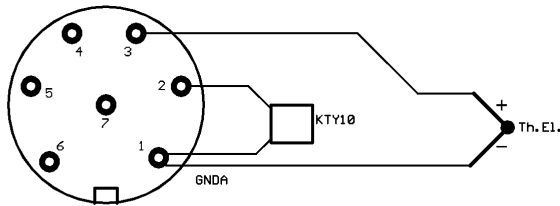
Please see to it that printing is only started with enough paper inserted. Printing without paper reduces lifetime of your printer!

5 AUX Input

The NOVA H8 disposes of an AUX input terminal, which allows the connection of different measuring transformers. During measurement, the connected signal will be controlled, calculated, saved and printed in a parallel way to the other measuring values. The denomination and unit of the measuring value can be determined individually.

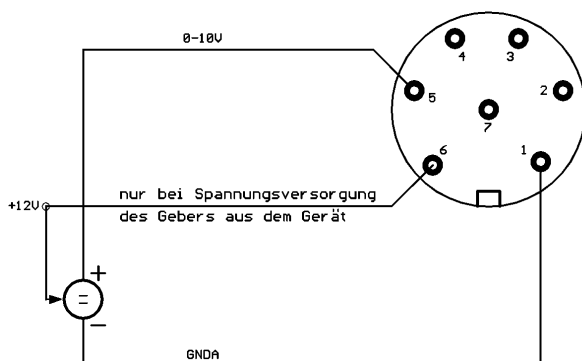
The different input signals can be selected:

5.1 Connection Thermo Couple



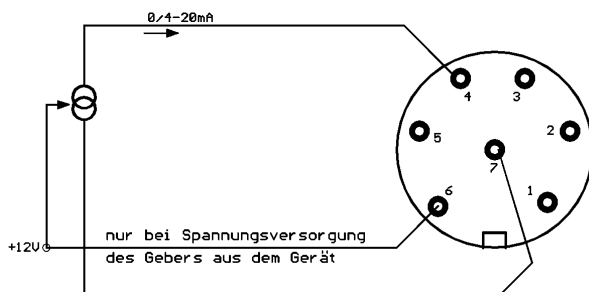
Pin assignment thermo couple at AUX plug (soldering side)

5.2 Connection Sensor with 0-10 V (or 0-5V) signal



Pin assignment 0-10V signal at AUX plug (soldering side)

5.3 Connection Sensor with 4-20 mA signal



Pin assignment 4-20mA signal at AUX plug (soldering side)

5.4 Adjustment of the AUX Input

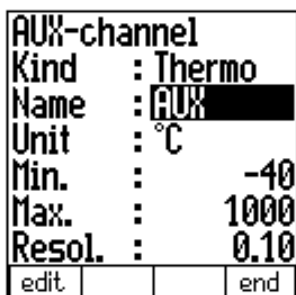
Change to the EXTRA Menu (see chapter 3.1 Main Menus of NOVA H8):







Move cursor with scroll keys in order to select menu item *Adjustments* and press Enter:



By pressing key F1=*aux.*, the following window appears (e. g. for temperature measurement):



-  Selection of the different positions (Kind, Name, Unit, Min., Max.)
-  Modify selected position (Kind, Min., Max.)
-  *Edit*: modification of the text input (see chapter 4.6) of the selected position (Name, Unit)
-  *End*: quit window, save input, back to window *Adjustments*

Explanation of the positions to be adjusted

| Position | Explanation |
|-----------------|---|
| Kind | <p>Thermo: A connected thermo couple will be read (see illustration chapter 5.1). The positions Unit, Min. and Max. Are pre-set by the device. Now it is possible to measure a temperature from -40 °C to +1000 °C.</p> <p>4...20mA: A connected 4-20mA-signal sensor will be read (see illustration chapter 5.3).</p> <p>0...10V: A connected 0-10V-signal sensor will be read (see illustration chapter 5.2).</p> <p>OFF: No signal of the AUX input will be read.</p> |
| Name | <p>Name of the measuring item With means of key F1=<i>edit</i>, the name of the measuring item to appear in the measuring window and on the print can be inputted (e. g. "T-suppl.")</p> |
| Unit | <p>Name of the measuring unit (only with 0..10V or 4..20mA) With means of key F1=<i>edit</i>, the name of the measuring unit to appear in the measuring window and on the print can be inputted (e. g. "°F")</p> |
| Min. | <p>Lower measuring range limit (only with 0..10V or 4..20mA) Please indicate here, which measured result corresponds to the lowest signal (0 V or 4 mA).</p> |
| Max. | <p>Upper measuring range limit (only 0..10V or 4..20mA) Please indicate here, which measured result corresponds to the highest signal (10 V or 20 mA).</p> |
| Resolut. | Fineness of measurement (only indication, will be calculated by the device) |

Examples for the resolution calculated by the device

| Difference "Max. - Min." | "Resolution" | Ex. "Min." | Ex. "Max." |
|--------------------------|--------------|------------|------------|
| <= 100 (1 - 100) | 0.01 | 0 | 100 |
| <= 1000 (101 - 1000) | 0.1 | 500 | 1500 |
| <= 10000 (1001 - 10000) | 1.0 | -5000 | +5000 |
| > 10000 (10001 - 100000) | 10.0 | -5000 | +5001 |

6 Device Heating

The NOVA H8 disposes of an internal device heating, which heats the inside of the device.

The device heating needs an external power supply:

- Connection of the mains power cable to 85...240V AC/ 50Hz (with 220V- mains power supply, heating only works, when device is on)
- Connection to the machine's mains (12V DC) of a vehicle (cigarette lighter) with a corresponding adapter cable (option).

Both ways of external voltage supply allow an adjustment of the internal temperature of the device in order to avoid overheating.

The device heating accomplishes two jobs:

- Quick adjustment of the operational temperature (> 5 °C) in winter time, if the device was stored in cold ambience for a longer time (for more details, see chapter 6.1).
- Avoids formation of condensate inside the device (for more details, see chapter 6.2).

6.1 Adjustment of Operational Temperature

If the inside temperature of the device is lower than +5°C when switching it on, it should be heated before being able to make measurements:

Although the display is temperature compensated, it can be black with temperature below zero inside the device. Therefore, in this case, also fluorescent diodes and speakers are used for your information.

If the mains power cable is connected, the following window appears:

The device beeps in short intervals, in order to communicate its operational condition also in an audible way.

The device heating works. As soon as a temperature of +10°C is reached, the device automatically reboots and starts with the calibration.



If no mains power cable is connected, the following window appears:

The device beeps in short intervals, in order to communicate its operational condition also in an audible way.

The green fluorescent diode (green) flashes, in order to indicate the need of a mains power cable.



If the device is connected to the vehicle's mains, the device heating works and the temperature will increase.

6.2 Prevention of condensats inside the Device

Combustion of hydrocarbons provokes formation of water, which is contained in hot flue gas. As soon as the flue gas cools down, water condensats and becomes liquid.

The flue gas will be cooled down to the ambient temperature from the probe and especially in the condensats trap during transport. Therefore, it concentrates in the condensats trap.

After passing the condensats trap, the flue gas still contains water. If the inside temperature of the device would keep on decreasing, also the gas parts of the measuring device (tubes, pumps, sensors) would collect water.

The device heating makes sure, that the inside temperature of the device is least as high as the flue gas temperature. This means, that the flue gas temperature cannot keep on decreasing.

The inside temperature of the NOVA H8 is adjusted to app. 27 °C.

We recommend, especially in wintertime, when the device may have been stored in a cold place, to connect the mains power cable to make the device heating work.

Attention:

Also when operated with mains power cable – so with device heating –the condensats trap of the NOVA H8 has to be emptied and checked in regular intervals!

7 Calculation Basis

7.1 Analysis and Calculation

| Continuously measured items | Unit | Standard | Option |
|--------------------------------------|--------------|----------|--------|
| O ₂ | [%] | X | |
| Air temperature (thermo couple) | [°C] | X | |
| Flue gas temperature (thermo couple) | [°C] | X | |
| CO | [ppm] | X | |
| Fine draft | [hPa] | X | |
| Differential pressure | [mbar] | | X |
| NO | [ppm] | | X |
| AUX | User defined | X | |

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

| Continuous transformation to CO and NO | CO | NO | NO _x |
|--|----|----|-----------------|
| [ppm] (calculated from NO) | | | X |
| [ppm] in reference to 0% rest O ₂ (not diluted) | X | X | X |
| [ppm] in reference to 14% rest CO ₂ | | X | |
| [mg/m ³] | X | X | X |
| [mg] in reference to O ₂ reference value dep. on fuel | X | X | X |
| [mg/kWh] | X | X | X |
| [mg / MJ] | X | X | X |

| More continuously calculated measuring items | Unit |
|--|------|
| CO ₂ | [%] |
| Efficiency | [%] |
| Losses | [%] |
| Excess air | - |
| Dew point | [°C] |

The calculation of the efficiency (eff.) and the losses is effected according to the Siegert formula.

| Not continuously measured items | Unit | Option |
|--|---------|--------|
| Soot measurement | [litre] | X |
| 4 individually nameable differential pressures | [mbar] | X |
| Flow speed | [m/s] | X |

8 Technical Specifications

Standard Equipm. : - Continuous measurement of O₂, CO, flue gas temp., air temp., draft

- continuous measurement via AUX input of :
 1. Temperature (NiCrNi sensitive element) or
 2. Standard signal 0...10V or 0...5V
 3. Standard signal 4-20mA
- calculation of CO₂, excess air, losses. etc.
- CO cut off via solenoid valve and purge via pump
- integrated thermo printer 60 mm with paper roll
- serial data transmission via RS232 interface or infrared (IrDa)
- gas sampling probe , Ø 8 mm, length 300 mm
- removable probe tube with inner tube and connector
- 2,7 m gas sampling and fine draft tube, with temperature adjustment (NiCrNi)
- short combustion air sensitive element
- condensate trap with filter (star filter)
- robust aluminium framed case with additional compartments

Indication : 8-row display, (65 mm x 65 mm), illuminated

Power Supply :

| | |
|---------------|------------------------|
| power input | max. 100VA |
| mains voltage | 85....240 V / 50/60 Hz |
| mains fuse | 2A slow to blow |

Operational Temp. : +5°C to +45°C

Storage Temp. : -20°C to +50°C

Temperature Measuring

Range of the Probe: 650°C, max. 800°C

Measuring Ranges:

| | |
|--|--|
| oxygen (O ₂)..... | 0 - 21,0% vol |
| carbon monoxide (CO)..... | 0 - 10000 ppm (H ₂ compensated) |
| | continuous operat. max 7500 ppm |
| carbon dioxide (CO ₂)..... | 0 - 20% (calculated) |
| nitrogen monoxide (NO)..... | 0 - 2000 ppm (optional) |
| combustion air temperature..... | 0 - 150°C |
| gas temperature..... | 0 - 650°C |
| fine draft..... | -100,00 hPa to +100,00 hPa |
| differential pressure..... | -100 mbar to + 100 mbar |
| efficiency / ETA..... | 0% - 99,9% |
| losses..... | -20% - 100% |
| excess air..... | is calculated |

Accuracy:

| | |
|---|---------------------------------------|
| oxygen (O ₂)..... | ± 0,2 % absolute |
| carbon monoxide (CO)..... | ± 10 ppm or ± 5% of measuring value |
| carbon dioxide (CO ₂)..... | ± 0,3 % absolute |
| nitrogen monoxide (NO)..... | ± 10 ppm or ± 5 % of measuring value |
| temperature..... | ± 1°C for T < 50°C; |
| | ± 2°C for T < 125°C; |
| | ± 3°C for T < 250°C; |
| | ± 4°C for T > 250°C; |
| fine draft / differential pressure..... | ± 0,03hPa or ± 5 % of measuring value |

| | | |
|--------------------|---|-----------------------------|
| Resolution: | oxygen (O ₂)..... | 0,1 % |
| | carbon monoxide (CO)..... | 1 ppm |
| | carbon dioxide (CO ₂)..... | 0,1 % |
| | nitrogen monoxide (NO)..... | 1 ppm |
| | temperature..... | 0,1°C |
| | fine draft..... | 0,01 hPa |
| | differential pressure..... | 0,5 Pa |
| Sensors: | oxygen (O ₂)..... | electrochemical cell |
| | carbon monoxide (CO)..... | electrochemical cell |
| | nitrogen monoxide (NO)..... | electrochemical cell |
| | temperature..... | NiCrNi thermo element |
| | fine draft / differential pressure..... | piezoelectric sensor device |

Special Equipment:

- Continuous measurement of NO.
- Measurement of differential pressure (4 x individually nameable)
- Measurement of the dynamic pressure with means of the Prandtl tube and measurement of the flow speed and the flue gas volume
- Probe handle heating (also with batter operation, but restriction of operation time to 0,5h))
- Soot measurement (also with battery operation)
- Bar-code reader
- Infrared data transmission
- Continuous transmission in MRU format during measurement
- Simultaneous fine draft measurement
- System test with determination of pump output and tightness

| | | |
|----------------------|-----------|-----------------------|
| Data Storage: | Standard: | 300 memory locations |
| | Option: | 3000 memory locations |

| | |
|-----------------|--|
| Printer: | - incorporated thermo printer |
| | - thermo print paper, paper width: 58 mm, paper length: 15 m |
| | - number of prints depending on the print adjustment |
| | (app. 125 prints). |

| | |
|--------------|----------------------------|
| Case: | robust plastic case, black |
|--------------|----------------------------|

| | |
|--------------------|---|
| Dimensions: | width x length x height: 265 x 260 x 125 mm |
|--------------------|---|

| | |
|----------------------------------|-------------|
| Weight (without access.): | app. 5,5 Kg |
|----------------------------------|-------------|

| | |
|---------------------------|-------|
| Protective System: | IP 21 |
|---------------------------|-------|

9 Storage

9.1 Operational and Storage Temperature

Operational temperature: 5°C to 45°C

The device is equipped with a device heating.



It is driven:

- **Via mains power supply 85...240V AC/ 50Hz**
- **Via adapter cable (option) to the cigarette lighter of a vehicle**

After switching it on, the device is **not ready for measurement** with temperatures **below +5°C**, but will be heated internally by the device heating.

This is indicated with a double audible tone every 2 seconds as well as with a display indication until a device temperature of app. +15°C is reached.

If no mains power supply is available, the device indicates this with an audible tone every second as well as with a display indication

Storage Temperature: -20°C to +50°C.

Long-term non-operation and storage:

1. Charge battery every 4 weeks at the mains power supply
2. Store in a dry place



If the above-mentioned points should not be respected, the **NOVA H8** can be damaged by a **total discharge of the battery** and by **oxidation inside the device**.

10 Errors

10.1 Error Diagnosis regarding the Measuring Device

| 1. Effect | 2. Error Indication | 3. Cause | 4. Solution |
|---|---|---|--|
| Device cannot be switched off by pressing the OFF key. | | Device does not react on any key. | Press F1 and F4 simultaneously! EMERGENCY OFF |
| Inside of the device is too cold, device not ready for operation. | Display indication: "Device too cold" or Audible sound every 5 sec. | e. g. device was stored at a cold place during winter. | Put the device to a warm room and connect it to the mains. Device heating switches on |
| Measuring values are not correct | | Sensors already get in touch with the gas during calibration. | Vent device with fresh air and re-start! |
| No measurement possible | | Device cannot be switched on or does not react after being switched on. Battery discharge. | Connect the device to the mains in order to charge the battery. |
| Measurement without exact temperature values. | Temperature indication: - - - , - °C | Thermo element defective, balancing network interrupted or not connected | Call our after-sales service. Remove probe from the gas duct and condensats from the probe tube |
| Wrong measuring values. | Measuring range exceeded: Value O ₂ too high, Values CO and CO ₂ too low. | Connection probe – device not correct. Leakage at probe / tube / condensats trap, pump does not suck correctly. | Effect tightness test! By visual control of probe, tubes, condensats trap, leaking parts could be found. |
| No measurement possible | Display indication "close probe" | Probe tube too hot. Probe is not fixed respectively screwed correctly. | Let probe tube cool down, respectively fix probe tight, measurement is possible now. |
| Wrong measuring values | Gas temperature is too hot or alternates | Probe is not plugged in correctly, defective cable in the probe line, formation of condensats at the probe tip. | Check probe plug respectively probe line regarding damages (loose connection), remove condensats from the probe tip. |

10.2 Error Diagnosis regarding the condensats Trap

| 1. Effect | 2. Cause | 3. Solution |
|--|--------------------------------------|---|
| Dirt and / or humidity inside the device No filter effect Sensor failure | Fine filters are wet and / or dirty. | Check filters more often Renew them if necessary (white = O.K. Brown-black = renewal) |

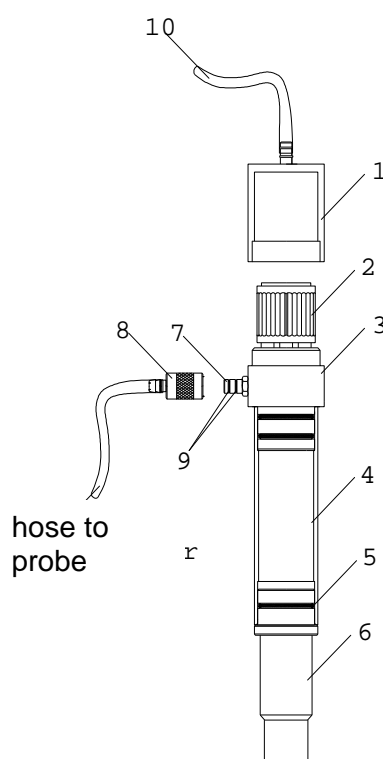
| | | |
|------------------------|--|---|
| Pump failure. | | |
| Wrong measuring values | Cover, intermediary unit, Plexiglas tube and locking piece are not tightly fixed respectively screwed. | Check tightness with every filter change. |

11 Maintenance and After-Sales Service

11.1 Cleaning and Maintenance

- Occasionally: cleaning of the probe and the probe tube.
- After each measurement: remove gas-sampling tube from the measuring device in order to dry it.
- Grease connector in order to keep the O-rings supple.
- Charge battery **every 4 weeks** at the mains power supply in case of long-term non-operation.
- Clean and dry or change dirty and wet filters.

Illustration 1



| Pos | Denomination | Ordering Number |
|-----|--------------------------------------|----------------------|
| 1 | Condensats cover with adapter nipple | 51322 54442 |
| 2 | Fine filter | 11150 |
| 2 | Star filter (alternatively) | 11165 |
| 3 | Intermediary unit | 51223 |
| 4 | Plexiglas tube / emptying part | 51317 |
| 5 | Sealing ring | See spare parts list |
| 6 | Seal plug | 51359 |
| 7 | Tube nipple 2,5 | 50615 |
| 8 | Tube bushing Ad=10x25 | 50010 |
| 9 | O-Ring 8 x 1,5 (2x) | 52312 |
| 10 | Tube 3x2 | 11250 |

The construction of the condensats trap requires a determined flow direction (see **illustration**).



With opposite flow direction, the condensats separation does not work correctly, which can lead to a breakdown of the device.

11.2 Self Diagnosis

The **NOVA H8** is equipped with a self-diagnosis program.

All internal functions are monitored and displayed if necessary.

Switch on device: **all values are checked**

Error message: In the "Menu" e. g. "*NO sensor not OK / device not ready for measurement*" is displayed. Measuring device can be activated in all menus except for menu "*Measurement*" (measurement cannot be started).

Service program: In case of an error message, change to the **Extra Menu** and select **Service**. The mV values of e. g. the sensors, the flue gas temperature sensitive element etc. are displayed. Afterwards, the mV values are indicated, which restrict the "OK" **range**:

1. Sensors: (to fresh air)

O₂ sensor: +200 mV to + 500 mV

CO sensor: -13 mV to + 25 mV

Caution:

The transverse sensitivity of H₂ is calculated to 1/8, i. e.

1/8 of the H₂ value in mV is subtracted from the CO value in mV, the result are the mV values of the CO sensor for assessment.

Transverse sensitivity of H₂: -35mV to + 48 mV

NO sensor : (optional) -13mV to +25mV

2. The AUX terminal can individually be assigned with sensitive elements, we only indicate here the upper and lower limit in the good range:

| value in mV | denomination (1 AUX possible) |
|------------------|--|
| -500mV to +500mV | KTY AUX: (KTY sensor, AUX terminal) |
| -500mV to +500mV | Th AUX: (thermo element, AUX terminal) |
| -500mV to +500mV | mA AUX: (power input, AUX terminal) |
| -500mV to +500mV | V AUX: (voltage input AUX terminal) |

3. Battery according to state of charge:

| | |
|---|-------------------------|
| Battery fully charged | >3000mV = 13 Volt |
| Warning limit (the battery symbol on the display starts flashing) | app. 2560mV = 11,1 Volt |
| Cut off limit of the device, protection against total discharge | app. 2420mV = 10,5 Volt |

4. Temperatures:

TH Gas: (thermo element gas) -500mV to +500mV with room temperature: app. 0mV

KTY Gas: (reference temperature gas) -500mV to +500mV with room temperature: app. 200mV

TH Air: (thermo element air) -500mV to +500mV with room temperature: app. 0mV

KTY Air: (reference temperature air) -500mV to +500mV with room temperature: app. 200mV

KTY Sensor (temperature of sensor): 0 to 5000mV room temperature: app. 2000mV

(**Appendix 1:** chart in mV regarding temperature in °C)

5. Fine draft

Draft: -500mV to 500mV not pressurised:
-20 mV to + 20mV

6. Bias-Voltage

Bias: (indication of bias voltage) +2750mV to + 3250mV

If the above mentioned values are exceeding the allocated ranges, a defect is present.

If no sensitive elements are connected, the corresponding fields in the service print are marked with

- - - - (negative service value) or with + + + + (positive service value).

Appendix 1:**T-Sensor**

| AD [mV] | 163 | 170 | 177 | 185 | 192 | 200 | 208 | 216 | 225 | 233 | 242 |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| T [°C] | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |

Scroll service data:



Activate printer with:



print of the current service data, device number, EPROM version number

Note:

The number of prints can be determined by pressing the printer key (e. g. pressing printer key twice = 2 prints).

Quit service program:

get back to Extra Menu with key .

11.3 Service Maintenance Plan

A check of NOVA H8 at our Service Department is necessary:

- after **1000 working hours** or
- if the **last check** of the NOVA H8 was effected **11 months ago**.

As soon as this period is exceeded, NOVA H8 displays several times after switching on:



This message disappears by pressing the ENTER key

A complete check at our Service Department includes function control and calibration respectively cleaning of the following components:

- a) sensors O₂ – CO, if integrated NO .
- b) pumps
- c) internal / external tubes
- d) battery
- e) printer
- f) fine draft
- g) electronics:
 1. CPU-printed circuit board
 2. mains supply PCB
 3. front panel display
 4. time and date
 5. temperature entries
- h) gas sampling probe
- i) filter box / condensats trap

Expenditure of repairs higher than EUR 250,00 net:

- Cost estimate will be sent by fax or mail. Only upon receipt of your written agreement, repair will be done.

Expenditure of repairs lower than EUR 250,00 net:

- **No** information will be sent, only if it has been required on your repair order.

Replacement of wearing parts:

- If a replacement of wearing parts, which are more expensive than EUR 2,50 as well as if test gas is necessary, it will be invoiced.
- For repairs, please return your device only in packing **protecting the environment**.

11.4 Spare Parts, Accessories and Wearing Parts.

Expansions - Expansion Prices - Options:

| | |
|-------|--|
| 56083 | Expansion with NO sensor |
| 56070 | printer NOVA H8 (with case) complete |
| 51531 | connection cable to PC (length 3 m) |
| 51560 | multihole probe with 3 m tube line complete |
| 55498 | slip-on type multihole probe for probe Firebird |
| 55186 | combustion air sensitive element with solenoid fixing, cable 3 m |
| 55406 | room temperature sensitive element (short) complete |
| 55185 | combustion air sensitive element in tube shape (300mm)+ cable 2,5m |
| 53054 | probe handle, slewable (diameter 10 mm) |
| 55866 | differential pressure measurement +/- 100mbar |
| 55861 | integrated / automatic soot measurement incl. soot probe |
| 56109 | bar-code scanner |
| 56113 | radio clock |
| 56110 | measuring data storage for 3000 memory locations |
| 56114 | infrared data transmission interface (IRDA) |
| 56111 | print of customer-specific graphs |

Accessories - Replacement – Wearing Parts

| | |
|-------|--|
| 11165 | star filter |
| 56065 | printer roll 58 mm / length app. 25 m |
| 56115 | service and cleaning kit NOVA H8 |
| 11700 | soot paper (1 bag = 200 pieces) |
| 11701 | soot comparison scale |
| 50970 | check hole adhesives, aluminium (1 sheet = 16 pieces) |
| 11303 | battery 12V / 2,2 P |
| 53134 | mains power cable, spiralled (4 m) for 85...230VAC/ 50Hz |
| 54903 | O ₂ sensor |
| 54905 | CO sensor |
| 54904 | NO sensor |
| 53176 | fine draft sensor |
| 55810 | leather bag NOVA H8 |
| 55865 | gas sampling probe NOVA H8 with probe tube 300 mm, diameter 10 mm, cone, internal tube, diameter 4 mm, NiCrNi thermo couple, probe tube screwable, temperature balancing network, length 2,7 m, with connection plug |
| 53381 | replacement cone, diameter 10 mm |
| 11250 | silicone tube 3 x 2 mm transparent 1,0 m |
| 11252 | silicone tube 3 x 2 mm black 1,0 m |
| 53936 | connection plug (single) 7-pin |

| | |
|-------|--|
| 54392 | temperature sensor KTY10-62 |
| 11644 | multihole probe (individual) |
| 11250 | silicone tube to multihole probe, 1,0 m |
| 50121 | solenoid fixing for sensitive element, complete |
| 13270 | solenoid flat grab / male thread |
| 50002 | balls, N° 403, black |
| 52458 | retainer for room sensitive element |
| 53122 | gas pump type 3003 |
| 54151 | venting pump type 2002 |
| 53072 | condensats trap (completely with filter) |
| | condensats cap with nipple 11365 / 54442 / 52312 |
| 51317 | perspex tube (emptying part) |
| 51359 | seal plug, black |
| 13240 | O-Ring 6 x 1 mm |
| 13271 | O-Ring 20 x 1,5 mm |
| 13246 | O-Ring 20 x 2 mm |
| 13244 | O-Ring 22 x 2 mm |
| 51517 | O-Ring 32 x 1,5 mm |
| 50735 | tube nipple + bushing |
| 50010 | tube bushing |
| 50607 | double nipple |
| 54981 | display NOVA H8 |

11.5 Repair Slip

Servicing stations
Address:

.....
.....
.....



Repair Slip

Date:

Name of device:

MRU serial N°:

Customer's address
(stamp)

.....
.....
.....

Please mark: permanent malfunction ☒ malfunction temporarily ☐

☐ complete device check

☐ check and repair of the following items:

☐ O₂-sensor

☐ NO_x-sensor

☐ NO₂-sensor

☐ SO₂-sensor

☐ CO-sensor

☐

☐ Chimney draft

☐ ambient air measurement

☐ gas temperature measurement

☐ Soot measurement

☐ pump capacity

☐ battery capacity

☐ printer

☐

☐

☐ retrofit following options :

☐ printer

☐ memory

☐ solid-fuel

☐ NO_x

☐

☐

☐ Other works to be effected:

.....
.....
.....
.....
.....

Cost estimate desired no ☐ yes ☐

(Expenditure of repairs higher than EUR 250,00 net, cost estimate will be sent general.)

Date:

Signature:

Stamp

Fuchshalde 8
D 74172 Neckarsulm - Obereisesheim

Tel. +49 (71 32) 99 62-0
Fax +49 (71 32) 99 62-20

Internet: <http://www.mru.de>
E-mail: info@mru.de

12 Packing and Removal

12.1 Return of Packing

Packing decree dated July 12, 1991

Should the local waste disposal establishment not accept the MRU packing material, there is of course the possibility to give it back to our works or operational staff.

However, please understand, that the transport costs resulting from the return cannot be at our cost.

12.2 Return of Hazardous Waste

- Disposal-return-guarantee -

MRU is engaged to take back all delivered parts of hazardous waste, which cannot be disposed "in a normal way".

The return has to be effected free of charge for our company. Hazardous parts are e. g. sensors.

13 Appendix

13.1 Addresses „Your Contacts to MRU“

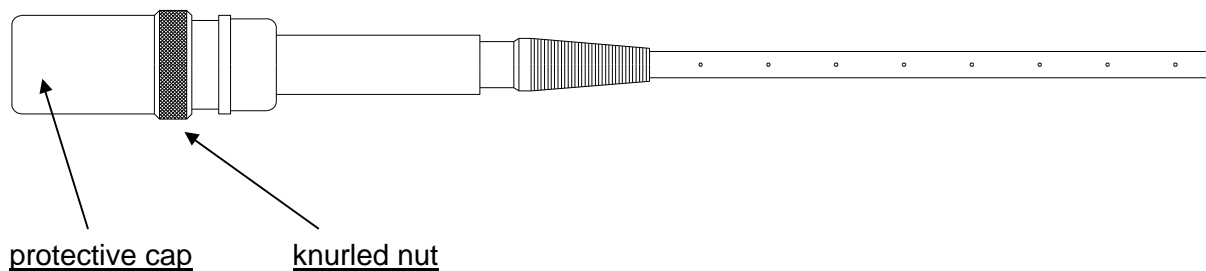
| | |
|------------------|--|
| | manufacturer |
| Address: | M R U Messgeräte für Rauchgase und Umweltschutz GmbH Fuchshalde 8 D-74172 Neckarsulm-Obereisesheim |
| Tel.: | +49 7132 - 9962-0 |
| Fax: | +49 7132 - 9962-20 |
| Service-Hotline: | +49 7132 - 9962-59 |
| E-Mail: | info@mru.de |
| Web-Site: | http://www.mru.de |
| Mail Address: | P. O. Box 2736 D-74017 Heilbronn |
| Express Station: | Heilbronn main station self collect |

13.2 Accessory Multihole Probe

13.2.1 Multihole Probe Cap

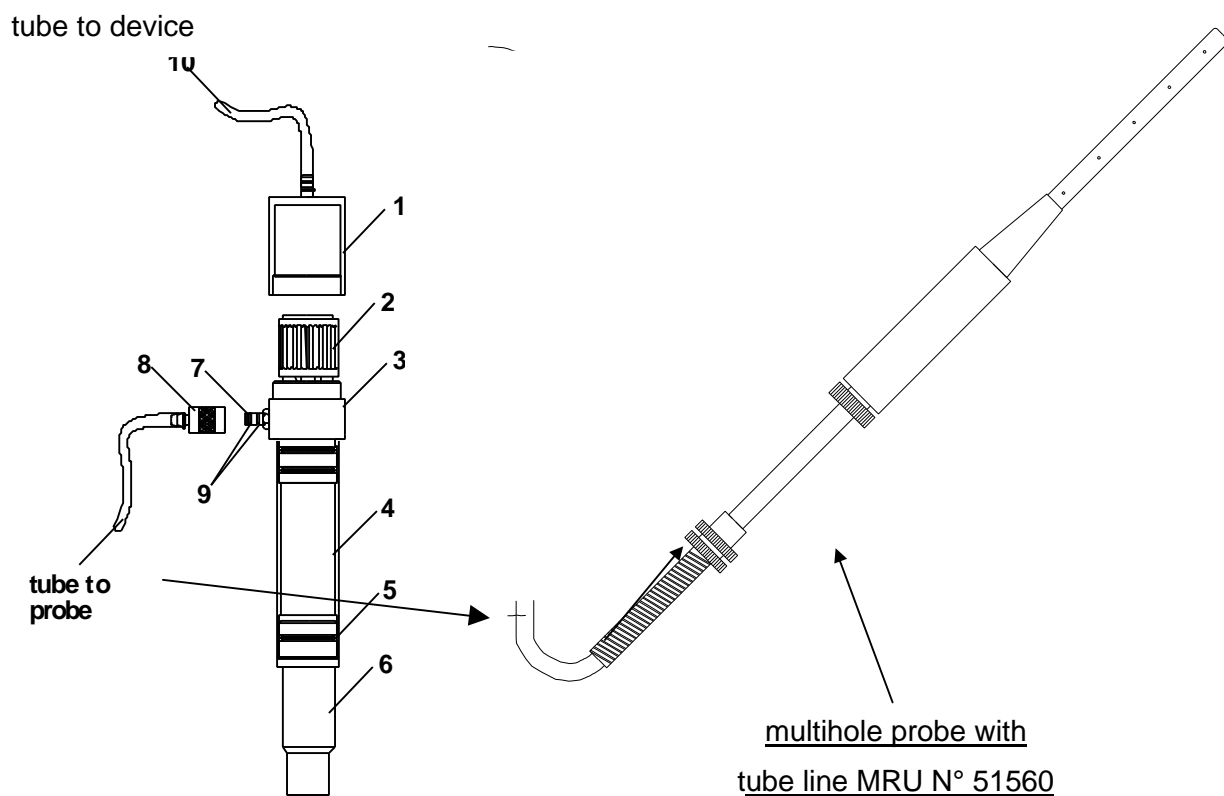
Mounting of the multihole probe cap MRU 55498:

1. Unscrew the knurled nut at the probe tube; remove probe tube from probe handle.
2. Unscrew the protective cap of the multihole probe cap.
3. Fit the multihole probe cap in the probe handle and screw with the knurled nut.



13.2.2 Multihole Probe with Tube

Connect the tube of the multihole probe according to illustration.



13.3 Lists of Fuel Types

A1 = corrective factor based upon fuel

B = corrective factor

| Fuel | CO ₂ max | A1 | B |
|-----------------|---------------------|------|-------|
| Germany | | | |
| Butan | 14,1 % | 0,45 | 0,007 |
| Erdgas E (H) | 12,1 % | 0,37 | 0,009 |
| Erdgas LL (L) | 11,8 % | 0,37 | 0,009 |
| Flüssiggas P | 13,7 % | 0,42 | 0,008 |
| Heizöl EL | 15,4 % | 0,50 | 0,007 |
| Heizöl S | 15,9 % | 0,50 | 0,007 |
| Holz | 20,3 % | 0,60 | 0,009 |
| Kohle | 19,1 % | 0,59 | 0,009 |
| Kokereigas | 10,8 % | 0,29 | 0,011 |
| Propan | 13,7 % | 0,43 | 0,007 |
| Stadtgas | 11,7 % | 0,35 | 0,011 |
| Braunkohle | 19,4 % | 0,39 | 0,009 |
| | | | |
| Austria | | | |
| Heizöl EL | 15,3 % | 0,52 | 0,007 |
| Heizöl L | 15,8 % | 0,53 | 0,007 |
| Heizöl M+S | 16,1 % | 0,54 | 0,007 |
| Erdgas H | 11,9 % | 0,39 | 0,009 |
| Erdgas H Gebl. | 11,9 % | 0,41 | 0,009 |
| Propangas g31 | 13,7 % | 0,45 | 0,007 |
| Prop.g31 Gebl. | 13,7 % | 0,47 | 0,007 |
| Butan | 14,1 % | 0,45 | 0,007 |
| Zechenkoks | 20,6 % | 0,74 | 0,001 |
| Holz trocken | 19,4 % | 0,60 | 0,009 |
| | | | |
| Belgium | | | |
| Algerise | 12,0 % | 0,37 | 0,009 |
| Antracite Koke | 18,1 % | 0,64 | 0,009 |
| Butaan | 14,1 % | 0,45 | 0,007 |
| Coke | 18,8 % | 0,64 | 0,009 |
| Droog Hout | 19,4 % | 0,60 | 0,009 |
| Extra Zw. Stook | 15,9 % | 0,50 | 0,007 |
| Cokesgas | 10,1 % | 0,35 | 0,011 |
| Lichte Stook | 15,4 % | 0,50 | 0,007 |

| | | | |
|----------------------|--------------------------|-----------|----------|
| Propaan | 13,8 % | 0,47 | 0,011 |
| Vette Kolen | 17,6 % | 0,59 | 0,009 |
| Noordzee Gas | 12,1 % | 0,37 | 0,009 |
| Van Slochteren | 11,9 % | 0,37 | 0,009 |
| Zware Stook | 15,7 % | 0,50 | 0,007 |
| | | | |
| Czechia | | | |
| Topny Olej | 15,4 % | 0,50 | 0,007 |
| Zemni Plyn | 11,8 % | 0,37 | 0,009 |
| G20 | 12,1 % | 0,37 | 0,009 |
| Svitiplyn | 12,8 % | 0,35 | 0,011 |
| Propan-butan | 13,8 % | 0,42 | 0,008 |
| Propan | 13,7 % | 0,43 | 0,007 |
| Uhli | 19,1 % | 0,59 | 0,009 |
| Suche Drevo | 20,5 % | 0,60 | 0,009 |
| | | | |
| France | | | |
| Gasoil | 15,3 % | 0,50 | 0,007 |
| Fioul lourd | 15,7 % | 0,50 | 0,007 |
| Extra lourd | 15,9 % | 0,50 | 0,007 |
| Gaz Nat. Slocht. | 11,9 % | 0,37 | 0,009 |
| Gaz Nat. MD.Nord | 12,1 % | 0,37 | 0,009 |
| Gaz Nat. Algeri. | 12,0 % | 0,37 | 0,009 |
| Propane | 13,8 % | 0,47 | 0,011 |
| Butane | 14,1 % | 0,45 | 0,007 |
| Gaz de Coke | 10,1 % | 0,35 | 0,011 |
| Charbon Anthra. | 18,1 % | 0,64 | 0,009 |
| Charbon gras | 17,6 % | 0,59 | 0,009 |
| Coke | 18,8 % | 0,64 | 0,009 |
| Bois sec. | 19,4 % | 0,60 | 0,009 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| Fuel | CO₂max | A1 | B |
| Great Britain | | | |

| | | | |
|--------------------|--------|------|-------|
| Oil light | 15,3 % | 0,50 | 0,007 |
| Oil heavy | 15,8 % | 0,50 | 0,007 |
| Nat Gas Heavy | 11,7 % | 0,37 | 0,009 |
| Nat Gas Light | 12,2 % | 0,37 | 0,009 |
| Nat Gas H Blow | 11,7 % | 0,37 | 0,009 |
| Nat Gas L Blow | 12,2 % | 0,37 | 0,009 |
| Coal Gas / Blow | 10,0 % | 0,35 | 0,011 |
| Coal | 19,1 % | 0,59 | 0,009 |
| Wood dry | 19,4 % | 0,60 | 0,009 |
| | | | |
| Italy | | | |
| Gasolio | 15,1 % | 0,50 | 0,007 |
| Nafta 3,5 | 15,6 % | 0,53 | 0,007 |
| Nafta ATZ / BTZ | 15,8 % | 0,54 | 0,007 |
| Metano G20 | 11,7 % | 0,38 | 0,010 |
| GPL | 13,9 % | 0,42 | 0,008 |
| Propano G31 | 13,7 % | 0,44 | 0,009 |
| Biogas | 16,9 % | 0,35 | 0,009 |
| Gas Citta | 7,6 % | 0,39 | 0,009 |
| Gas Naturale | 11,7 % | 0,38 | 0,010 |
| Olio combust. | 15,7 % | 0,52 | 0,007 |
| Legna asciutta | 19,4 % | 0,60 | 0,009 |
| | | | |
| Netherlands | | | |
| Aardgas 26 | 11,7 % | 0,34 | 0,008 |
| Aardgas 27 | 11,6 % | 0,34 | 0,008 |
| Aardgas | 11,5 % | 0,34 | 0,008 |
| Aardgas+CO2 | 12,5 % | 0,34 | 0,008 |
| Propan | 13,8 % | 0,47 | 0,011 |
| Butaan | 14,1 % | 0,45 | 0,007 |
| Olie licht | 15,3 % | 0,50 | 0,007 |
| Olie zwaar | 15,7 % | 0,50 | 0,007 |
| Olie ex. Zwaar | 15,9 % | 0,50 | 0,007 |
| | | | |
| Norway | | | |
| FYR.OLJE LETT | 15,4 % | 0,50 | 0,007 |
| Nat.Gass L | 11,8 % | 0,37 | 0,009 |
| Nat.Gass H | 12,1 % | 0,37 | 0,009 |
| FYR.OLJE Tung | 15,9 % | 0,50 | 0,007 |
| Kullgass | 10,8 % | 0,29 | 0,011 |
| L P Gass | 13,7 % | 0,42 | 0,008 |
| KULL | 19,1 % | 0,59 | 0,009 |

| | | | |
|-------------------------|--------|------|-------|
| VED TOERR | 20,5 % | 0,60 | 0,009 |
| | | | |
| Poland | | | |
| Olej opalowy | 15,4 % | 0,50 | 0,007 |
| gaz ziem. 35 | 11,8 % | 0,37 | 0,009 |
| gaz ziem. 50 | 12,1 % | 0,37 | 0,009 |
| gaz miejski | 11,7 % | 0,35 | 0,011 |
| gaz koksow. | 10,8 % | 0,29 | 0,011 |
| gaz plynny | 13,7 % | 0,42 | 0,008 |
| wegniel | 19,1 % | 0,59 | 0,009 |
| 5drewno suche | 20,5 % | 0,60 | 0,009 |
| | | | |
| Slovak./Slovenia | | | |
| Olje EL | 15,4 % | 0,50 | 0,007 |
| Zem. Plin | 11,8 % | 0,37 | 0,009 |
| Zem. Plin H | 12,1 % | 0,37 | 0,009 |
| Mestni plin | 11,7 % | 0,35 | 0,011 |
| Koks. Plin | 10,8 % | 0,29 | 0,011 |
| Tekoci plin | 13,7 % | 0,42 | 0,008 |
| Premog | 19,1 % | 0,59 | 0,009 |
| Les-suh | 20,5 % | 0,60 | 0,009 |
| | | | |
| USA | | | |
| Oil light no2 | 15,7 % | 0,49 | 0,020 |
| Oil light no6 | 16,7 % | 0,48 | 0,020 |
| Natural gas | 11,7 % | 0,40 | 0,045 |
| Coke oven gas | 10,8 % | 0,35 | 0,020 |
| Blast furn gas | 25,5 % | 0,81 | 0,020 |
| Propane | 13,8 % | 0,44 | 0,020 |
| Butane | 14,3 % | 0,45 | 0,020 |
| Coal | 19,2 % | 0,50 | 0,015 |
| Wood dry | 19,4 % | 0,60 | 0,020 |
| Manufact. Gas | 10,0 % | 0,35 | 0,020 |