

MUX.8/16

USER
MANUAL
VERSION B2



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Always keep this manual by your computer

January, 1988

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EC Declaration of compliance

Manufacturer : *Fancom B.V.*
Address : *Industrieterrein 34*
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hereby declares that the: **MUX.8/16**

satisfies the following standards or other standard document(s):

Emission characteristics were assessed according to standard NEN-EN 50081-1. The susceptibility was established in accordance with the requirements of the generic immunity standard NEN-EN 50082-1 and the surge immunity standard NEN-EN-IEC 61000-4-5 4kV common mode and 2kV differential mode. The low voltage guide according to NEN-EN-IEC 60950.

Satisfies the conditions set out in:

1. The Low Voltage Guideline (Directive 73/23/EEG, as last amended by the Directive 93/68/EEG).
2. The EMC Guideline (Directive 89/336/EEG, as last amended by the Directives 92/31/EEG and 93/68/EEG).

Place: *Panningen*

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APPENDIX 1: Menu overview


About this manual

This manual aims to supply the user with the information necessary for a step by step insight into the working and operation of the computer. Read this manual carefully chapter by chapter. After the manual has been read, data can be entered in the computer.

This manual has been written by Fancom for the computer user. An installation manual is also available for the installer.

If you have any questions regarding the computer, please do not hesitate to contact your Fancom dealer.

The following symbols are used in this manual:

 Suggestions, advice and notes with additional information.



Caution

The product could be damaged, if the procedures are not followed carefully.



Caution

Life threatening situation, if the procedures are not followed carefully.

1. Introduction

The MUX.8/16 computer is suitable for carrying out an identical measurement at maximum 16 different locations or a double measurement at maximum 8 different locations. For example, maximum 16 identical CO₂-measurements in mushroom growing rooms; maximum 16 identical O₂-measurements in tunnels or eight CO₂-measurements and O₂-measurements in fruit storage rooms.

With double measurement the same air sample is measured by two measuring transducers. For this the valve and hose system do not need to be carried out twice.

The MUX.8/16 computer can also be used to control based on these measurements. For example, for automatic switching on and off of a fan based on an O₂-measurement.

It is also possible to switch a relay at fixed times using time clocks.

2. Safety instructions and warnings

Read the safety instructions carefully before operating the system. The installation of the computer and trouble shooting must be carried out by an authorized technician/installer, according to the prevailing standards.



Caution

1. Check your computer regularly for correct functioning. It is an electronic apparatus and should therefore give an alert during any system failures. Fancom has done everything electronically possible to ensure that an alarm is given during any such failure. Unfortunately, this cannot be 100% guaranteed because not all circumstances are under Fancom's control.
2. Fancom takes no responsibility for any possible damage as a result of incorrect settings and a non- or partially functioning installation.
3. Ask your installer if the alarm contacts of each computer have been connected to a separate alarm system circuitry.
4. Check the computer regularly for possible damage. Any damage should directly be reported to your installer.



A damaged computer could be dangerous!

5. Do not use running water (high pressure cleaners) to clean your computer.



The computer is water resistant, not waterproof!

6. Important

Do not switch off the computer when houses are unoccupied; this is to protect the computer against condensation.

3. Working

3.1 The MUX.8/16 universal multiplexer

What is a multiplexer?

A multiplexer is an installation which is able to carry out identical measurements at different locations using one or two measuring transducers, for example a CO₂- and/or O₂-sensor. The air to be measured is connected to the multiplexer by a valve and hose system (see principle diagram).

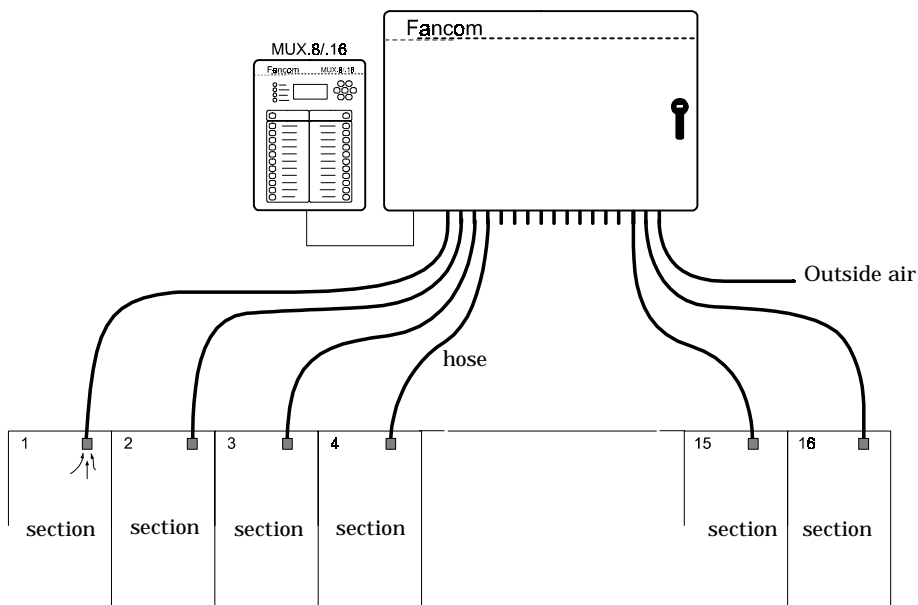


Fig. 1: Principle diagram

The computer can be used in two ways:

1. MEASURING ONLY

The MUX.8/.16 can be used to carry out a maximum of 16 identical measurements, for example, a CO₂-measurement in 16 growing rooms. It is also possible to carry out a maximum of eight double measurements, for example, CO₂-measurement and O₂- measurement in fruit storage rooms. The MUX.8/.16 can only transmit the measurement value to another Fancom computer via the network.

2. MEASURING AND CONTROLLING

MUX.8/.16 can be used to carry out a maximum of 8 measurements and the MUX.8/.16 can also be used as a "logger" or controller.

- MUX.8/.16 as logger
The logger continually puts the last measured signal per measuring point on to the analog output, until the next measurement takes place. This output signal can be directly connected to another computer.
- MUX.8/.16 as controller
The computer can control an air inlet or motor using the control output (0-10V output or relay). For example, a CO₂-control in a growing room or an O₂-control in a tunnel.

4. Operation

4.1 Front

In order to operate the computer it is necessary to know the functions of the various keys and indication lights. Fancom therefore divides the front into five parts (A, B, C, D and E).



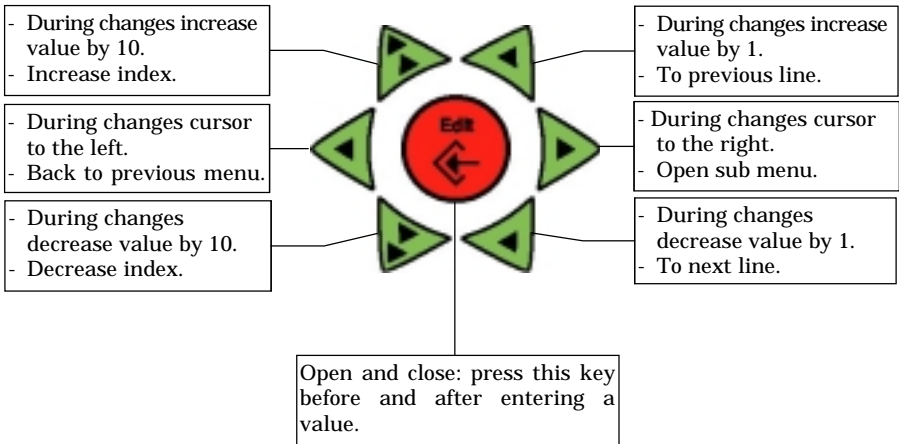
Fig. 2: Front MUX.8/.16

4.2 Display (A)

01:	950	05:	952
02:	949	06:	951
03:	948	07:	947
04:	946	08:	950

The front of the MUX.8/16 has an illuminated display. This display consists of four lines, each with 20 positions.

4.3 Keyboard (B)



4.4 Alarm and Index (C)





This key provides more information about an alarm during an alarm situation. The alarm can also be switched off here. The following values can be read out and/or set:

Table 1: Alarm values

Value	Situation	Explanation
0	<i>Alarm stand by</i>	There is no alarm.
1	<i>Alarm test</i>	Set alarm to 1 to test it; then reset alarm to stand by by entering the value 0.
5	<i>Alarm Cancelled</i>	There was an alarm, which has been cancelled. The computer switches off the alarm, but the alarm code remains visible.
6	<i>Silent alarm</i>	Alarm message shown on display only.
7	<i>Alarm temporarily off</i>	Set value to 7 to temporarily switch off the current alarm. When the alarm situation has been cancelled, this value will automatically become 0 again. Always check that the value has reverted to 0.
8, 9	<i>Alarm blocked</i>	Set the value to 8 or 9 to switch off the alarm entirely. Only do this when houses are unoccupied. Do not forget to reset value to 0
10	<i>Alarm</i>	The type of alarm is shown on the display.







If there is more data of the same type, use this key to go to a higher/lower value. Instead of the index key,  and  can also be used.

4.5 Function keys (D)

On the front of the computer are 22 function keys. The display provides more information about the subject corresponding to the function key. A light in the function key indicates which key has been selected.

4.6 Indication lights

The indication lights provide the user with information about the current situation.

-  Current measurement
-  Reference
-  Cleaning
-  Flow alarm

Current measurement This light is on when a measurement is taking place in one of the maximum 16 sections.


Reference This lamp is on when a reference measurement is active (for example, outside air).

Cleaning This light is on when the installation is being cleaned, for example, during the pumping of fresh air through the measuring installation. The valve for reference measurement is also open during this time. In addition, an extra contact is released. This contact can be used to drain a water separator, and/or switch off a pump, for example.

Flow alarm (optional) This light is on when the flow alarm is active. The flow alarm has a fixed delay time of 30 seconds. The flow alarm is blocked when the installation is being cleaned.

5. Function keys

In the following section Fancom will explain the use of the function keys. An example of what will appear on the display is also shown, followed by an explanation of the values which can be entered or read out.


 The word “section” is used by Fancom in this manual. This can be a growing room or tunnel in the mushroom sector, but also a storage bin in the storage sector.

Overview

01:	950	05:	952
02:	949	06:	951
03:	948	07:	947
04:	946	08:	950
09:	951	13:	946
10:	950	14:	947
11:	950	15:	947
12:	948	16:	952



The last measured values per measuring point are shown, for example, the measured CO₂-values in the 16 sections. These values can be both positive and negative values.

 If the MUX.8/.16 is used for double measurement, the first measurements in sections 1 thru 8 are displayed at measuring points 1 thru 8. The second measurements in sections 1 thru 8 are displayed at measuring points 9 thru 16.

Measurement 1 Measurement 8

>Meas. point	-01-
Meas. value	1600
Setpoint	1360
M.Extra	22.0
<hr/>	
>Output	-01-
Output value	65.0
Min. signal	10.0
Max. signal	90.0
Min. on (m:s)	0:00



The first line shows the measuring point, for example the number of the section for which the following values apply.

Meas. value The last measured value at the measuring point concerned.

Setpoint Enter the required value for measurement. The computer can also receive this required value via communication from another computer. No measurement will take place at measuring points where the setpoint is set to 0.

M. Extra The actual measured value (usually a temperature) on the analog input.

Output value The actual output value of the selected control. The MUX.8/.16 shows these values in percentages (0.0...100.0%). If the MUX.8/.16 is functioning as a controller, this figure is the output value. In the other case, this is the last (buffered) measurement in % of the entered measurement range.

Min. signal If the MUX.8/.16 is functioning as a controller, enter the minimum output signal here. For example, the minimum position of an air inlet (0-10V control, whereby 1V corresponds to 10%). When using proportional control, enter how much % of the time the relay should at least remain switched on.

- Max. signal** If the MUX.8/16 is functioning as a controller, enter the maximum output signal here. For example, the maximum position of an air inlet (0-10V control, whereby 7.5V corresponds to 75%). When using proportional control enter how much % of the time the relay should at most remain switched on.
- Min. on (m:s)** If time proportional control is used, enter the minimum on time here.



Reference measurement

```
>Reference meas.
Meas. value 1      380
Meas. value 2      210
Current meas.      1
>Reference meas.
Manual              NO
```

- Meas. value 1** The last reference value measured by the first transducer, for example, the CO₂-content of the outside air.
- Meas. value 2** The last reference value measured by the second transducer, for example, the O₂-content of the outside air.
- Current meas.** The section currently being multiplexed (0 = reference measurement).
- Manual** Manual start of reference measurement (during the set measuring time). Any active measuring cycle will be interrupted. After the reference measurement has been carried out the MUX.8/16 will re-continue with the interrupted measuring cycle. During manual reference measurement the computer will continually update measured values 1 and 2.



Time/Outside conditions

- 1 Time clock
- 2 Time
- 3 Outside conditions

1. Time clocks

The time clocks have a special application within the MUX.8/.16. There are 8 time clocks. These can be used to start an irrigation installation or a compost turner, for example. In order to set a time clock, four settings have to be made:

Start time First starting time for the time clock.

Run time Time during which the time clock must remain switched on.

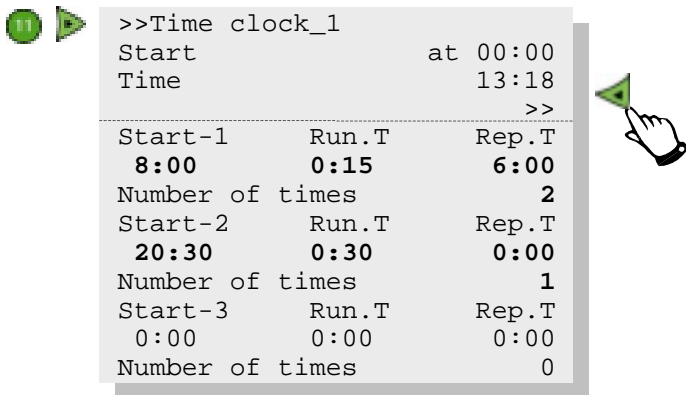
Repeat time Time after which the same clock controls must be repeated.

Number of times Number of times the computer must repeat this action daily.

Example: Irrigation should take place at the following times:

- from 8:00 until 8:15;
- from 14:00 until 14:15;
- from 20:30 until 21:00

Enter the following values:



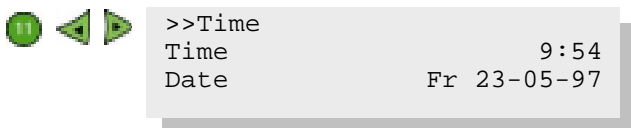
The screenshot shows a terminal window with a green play button icon on the left. The text in the terminal is as follows:

```
>>Time clock_1
Start          at 00:00
Time          13:18
----->>
Start-1      Run.T      Rep.T
 8:00        0:15        6:00
Number of times      2
Start-2      Run.T      Rep.T
20:30       0:30        0:00
Number of times      1
Start-3      Run.T      Rep.T
0:00        0:00        0:00
Number of times      0
```

A hand cursor icon is pointing to the right side of the terminal window.

As soon as these values have been confirmed, the time at which the computer will start the irrigation installation for the first time will be seen at *Start* (in the example above at 14:00 hours). During irrigation, the message *Started* will be seen instead of *Start*.

2. Time



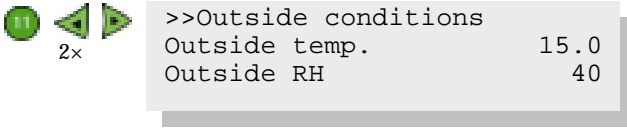
The screenshot shows a terminal window with a green play button icon on the left. The text in the terminal is as follows:

```
>>Time
Time          9:54
Date          Fr 23-05-97
```

Time The system's time. This time continues running, even if the power fails briefly. This time should be changed manually when switching over from summer to winter time and back.

Date The system's date.

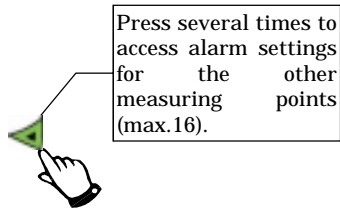
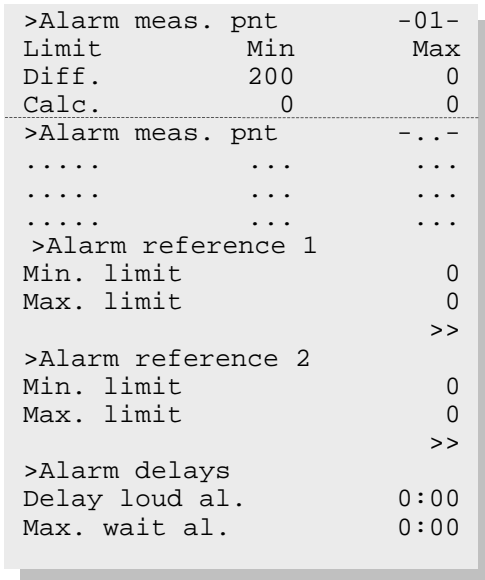
3. Outside conditions



Outside temp. The actual outside temperature in °C/°F.

Outside RH The actual humidity content of the outside air in %.

Alarm settings



Alarm meas. pnt. Enter the difference alarms per measuring point.
1 ... 16 The computer calculates the alarm limits as follows:

Calculated Min. = Setpoint - Min. difference

Calculated Max. = Setpoint + Max. difference



If the minimum and maximum differences are set to 0, the calculated value will also be 0. The alarm limit concerned will have no influence on the determination of an alarm.

☞ If the MUX.8/.16 is used for double measurement (*Type MUX = DOUBLE*), the difference alarm settings for the first measurements in sections 1 thru 8 are entered at alarm measuring points 1 thru 8. For the second measurements these alarm settings in sections 1 thru 8 are entered at alarm measuring points 9 thru 16.

Alarm reference Enter the absolute limit values for reference
1 and 2 measurements. If the value 0 is entered here 0, the
Min. limit alarm limit concerned will have no influence on the
Max. limit determination of an alarm.

Delay loud al. The loud alarm can be delayed for the above
 mentioned alarms. The flow alarm has a fixed delay
 time of 30 seconds. The computer blocks the flow
 alarm when the installation is being cleaned.
 This is to prevent unnecessary alarms when the
 pump is off during cleaning. If the flow speed is too
 low, the flow alarm indication light on the front will
 flash.

Max. wait al. The MUX.8/.16 can only give an alarm after the
 measured value has been within the (calculated)
 minimum and maximum alarm values once, or,
 when the measured value is still too low or too high
 after the maximum wait time alarm has elapsed.




 Measurement 9  Measurement 16

```
>Meas. point      -09-
Meas. value       1600
Setpoint          1360
```

The first line shows the measuring point, for example, the number of the section to which the following values apply.

Meas. value The last measured value at this measuring point.



Setpoint Enter the required value for measurement. The computer can also receive this required value via communication from another computer. If the setpoint is 0, no measurement will take place at this measuring point.


 If the MUX.8/.16 is used for double measurement, *Measured value* displays the second measurements in sections 1 thru 8 at menu options  thru . The same applies for *Setpoint*.

 Extra measurements

M. Extra -01-	160.0
M. Extra -02-	200.0
M. Extra -03-	0.0
M. Extra -04-	0.0
M. Extra -05-	0.0
M. Extra -06-	0.0
M. Extra -07-	0.0
M. Extra -08-	0.0




The measured values of analog inputs 1 thru 8 are shown. These are usually temperature measurements, which can be used with the first eight multiplexed values. These measured values can also be found under function keys  thru .

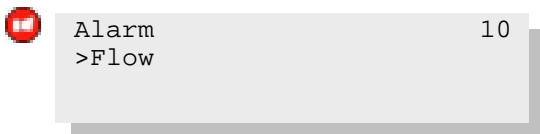
 System

The installer settings are found under this option. These settings have been made by the installer during the installation of the system. These may only be changed at a later date by the installer, if necessary.


6. Alarms

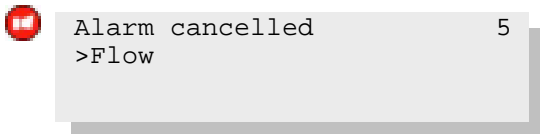
6.1 Switching off the alarm

The alarm key () flashes during an alarm. By pressing this key more information about the alarm can be obtained. For example, the following will appear on the display:




A screenshot of a terminal display. On the left side, there is a red square icon with a white alarm symbol. To its right, the text "Alarm" is displayed on the first line, and ">Flow" is displayed on the second line. On the far right of the first line, the number "10" is shown. The entire text is contained within a light gray rectangular box with a subtle drop shadow.

Alarm 10 indicates that there is an alarm situation. This alarm can be switched off by changing the value 10 into 7 (Press  2×). The computer will switch off the alarm. The alarm message remains visible as long as the cause of the alarm remains present. As soon as the alarm situation has been cancelled, the message will disappear and the alarm value will change into 0.



A screenshot of a terminal display. On the left side, there is a red square icon with a white alarm symbol. To its right, the text "Alarm cancelled" is displayed on the first line, and ">Flow" is displayed on the second line. On the far right of the first line, the number "5" is shown. The entire text is contained within a light gray rectangular box with a subtle drop shadow.

Alarm 5 shows that there was an alarm situation which has already been cancelled. The computer has switched off the alarm itself. The alarm message can still be seen on the second line, making it possible to see what has happened. By pressing  2×, the computer will reset the alarm to 0 (stand by).

The example above shows that there is a flow alarm. In this case, control the flow.

6.2 Alarm messages and their meaning

Table 2: Overview alarm messages



No	Alarm	Explanation
11	Measuring point no. 01	The computer gives an alarm as soon as measurement 1 is outside the calculated alarm limits for longer than the set delay time.
12	Measuring point no. 02	See alarm 11, for measuring point 2.
13	Measuring point no. 03	See alarm 11, for measuring point 3.
14	Measuring point no. 04	See alarm 11, for measuring point 4.
15	Measuring point no. 05	See alarm 11, for measuring point 5.
16	Measuring point no. 06	See alarm 11, for measuring point 6.
17	Measuring point no. 07	See alarm 11, for measuring point 7.
18	Measuring point no. 08	See alarm 11, for measuring point 8.
19	Measuring point no. 09	See alarm 11, for measuring point 9.
20	Measuring point no. 10	See alarm 11, for measuring point 10.
21	Measuring point no. 11	See alarm 11, for measuring point 11.
22	Measuring point no. 12	See alarm 11, for measuring point 12.
23	Measuring point no. 13	See alarm 11, for measuring point 13.
24	Measuring point no. 14	See alarm 11, for measuring point 14.
25	Measuring point no. 15	See alarm 11, for measuring point 15.
26	Measuring point no. 16	See alarm 11, for measuring point 16.
27	Reference measurement 1	See alarm 11, for the reference measurement
28	Reference measurement 2	See alarm 11, for the reference measurement
29	Flow	The computer will give an alarm if the flow speed is too low for longer than 30 seconds.

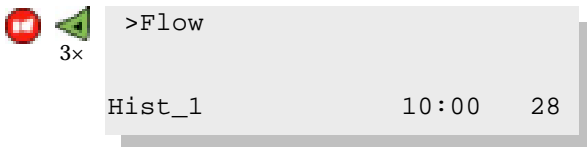
No.	Alarm	Explanation
31	No net. comm. 01	The measured value of measuring point 1 is transmitted via network communication. The computer will give an alarm if there has been no communication possible with an end station for a long period of time. No more measurements will take place at measuring point 1.
32	No netw. comm. 02	See alarm 31, for measuring point 2.
33	No netw. comm. 03	See alarm 31, for measuring point 3.
34	No netw. comm. 04	See alarm 31, for measuring point 4.
35	No netw. comm. 05	See alarm 31, for measuring point 5.
36	No netw. comm. 06	See alarm 31, for measuring point 6.
37	No netw. comm. 07	See alarm 31, for measuring point 7.
38	No netw. comm. 08	See alarm 31, for measuring point 8.
39	No netw. comm. 09	See alarm 31, for measuring point 9.
40	No netw. comm. 10	See alarm 31, for measuring point 10.
41	No netw. comm. 11	See alarm 31, for measuring point 11.
42	No netw. comm. 12	See alarm 31, for measuring point 12.
43	No netw. comm. 13	See alarm 31, for measuring point 13.
44	No netw. comm. 14	See alarm 31, for measuring point 14.
45	No netw. comm. 15	See alarm 31, for measuring point 15.
46	No netw. comm. 16	See alarm 31, for measuring point 16.
47	Comm. I/O-module 1	There has been no communication possible with the connected IRM.16 for a long period of time.

6.3 Alarm history


The computer keeps an alarm history. It registers the 10 most recent alarm messages.

Method

1. Press .
2. Press  3x. The following will appear on the display:




The alarm code and the time at which it was given is shown. An explanation of the alarm code is given in section 6.2.

3. Press  to view the previous alarm (Hist_2).



In this way the last ten alarms (thru Hist_10) with the corresponding times of measurement can be read out. *Hist_.. 0:00 255* indicates a day division. An alarm that appears after this line was given the previous day.

6.4 System alarms





The computer tests a number of functions which concern the functioning of the computer itself. If the computer discovers a fault, it will indicate the corresponding number on the display. The letter E will precede this number.

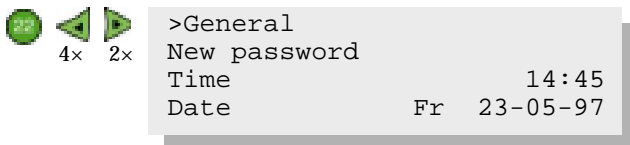
-  Always warn your installer if a system alarm occurs (see appendix installer manual).





7. Password

Function key  *System* is always protected by a password. By setting a personal password (different to the standard password) all settings can be protected against unauthorized changes. The password is a combination of maximum 5 function keys. Until a personal password has been set, this is function key .

Changing the password


1. Press  *System*.
2. Enter the password and confirm using .
3. Press  4x, then  2x. The following will appear on the display:



4. Press .
5. Enter the existing password ("old") and press .
6. Enter the new password and press .
7. Enter the new password once more and press .

The computer will accept the new password after it has been entered correctly twice. Do not forget the new password; without it, accessing the computer will be impossible.

Using the password

If the password has been changed (no longer ) and a setting is changed, the computer will ask for the password. It will remember the password for several minutes. This avoids the necessity of entering the new password for every change.

APPENDIX 1: Menu overview

```

1 01: ...          05: ...
   02: ...          06: ...
   03: ...          07: ...
   04: ...          08: ...
   09: ...          13: ...
  10: ...          14: ...
  11: ...          15: ...
  12: ...          16: ...
  
```

```

2 thru 09 >Meas. point      -*
   Meas. value      ...
   Setpoint         ...
   M.Extra          ...
   >Output          -*
   Output value     ...
   Min. signal      ...
   Max. signal      ...
   Min. on (m:s)   ...
  
```

```

10 >Reference meas.
   Meas. value 1   ...
   Meas. value 2   ...
   Current meas.   ..
   >Reference meas.
   Manual          ...
  
```

```

11 1 Time clock
   2 Time
   3 Outside conditions
  
```

```

12 >Alarm meas. pnt.  -**-
   Limit           Min   Max
   Diff.           ....
   Calc.           ....
   >Alarm reference 1
   Min. limit      ....
   Max. limit      ....
   >>
   >Alarm reference 2
   Min. limit      ....
   Max. limit      ....
   >>
   >Alarm delays
   Delay loud al.  ....
   Max. wait al.  ....
  
```

```

13 thru 20 >Meas. point      -***-
   Meas. value      ...
   Setpoint         ...
  
```


```

21 M. Extra -01- .....
   M. Extra -02- .....
   M. Extra -03- .....
   M. Extra -04- .....
   M. Extra -05- .....
   M. Extra -06- .....
   M. Extra -07- .....
   M. Extra -08- .....
  
```

22 See installer manual

```

>>Time clock_*
  Start                               at ...
  Time                                ...
  >>
  Start-1      Run.T      Rep.T
  .....       .....     .....
  Number of times      ..
  Start-2      Run.T      Rep.T
  .....       .....     .....
  Number of times      ..
  Start-3      Run.T      Rep.T
  .....       .....     .....
  Number of times      ..
  >>Time
  Time                                ...
  Date                                ..-.-.-
  >>>Outside conditions
  Outside temp.                       ...
  Outside RH                            ..
  
```

- * 1 ... 8
- ** Use  to select measuring points 1 thru 16.
- *** 9 ... 16