MEASURING PROGRAM for ANALOG-MEASURING-CASE
with integreated Datenlogger

Operation manual

- Standart data rate of 1 second
- 1000 days long time logging
- 8 universal analog inputs
- 4 different measuring points

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CONTENTS

SYSTEM REQUIREMENTS

WINDOWS 98 und WINDOWS NT 4.0, WINDOWS 2000, XP

INSTALLATION.

Insert the CD-Rom in your computer.

The setup will start automaticly

If not, please start the setup manually by double click on setup.exe

Introduction and operating

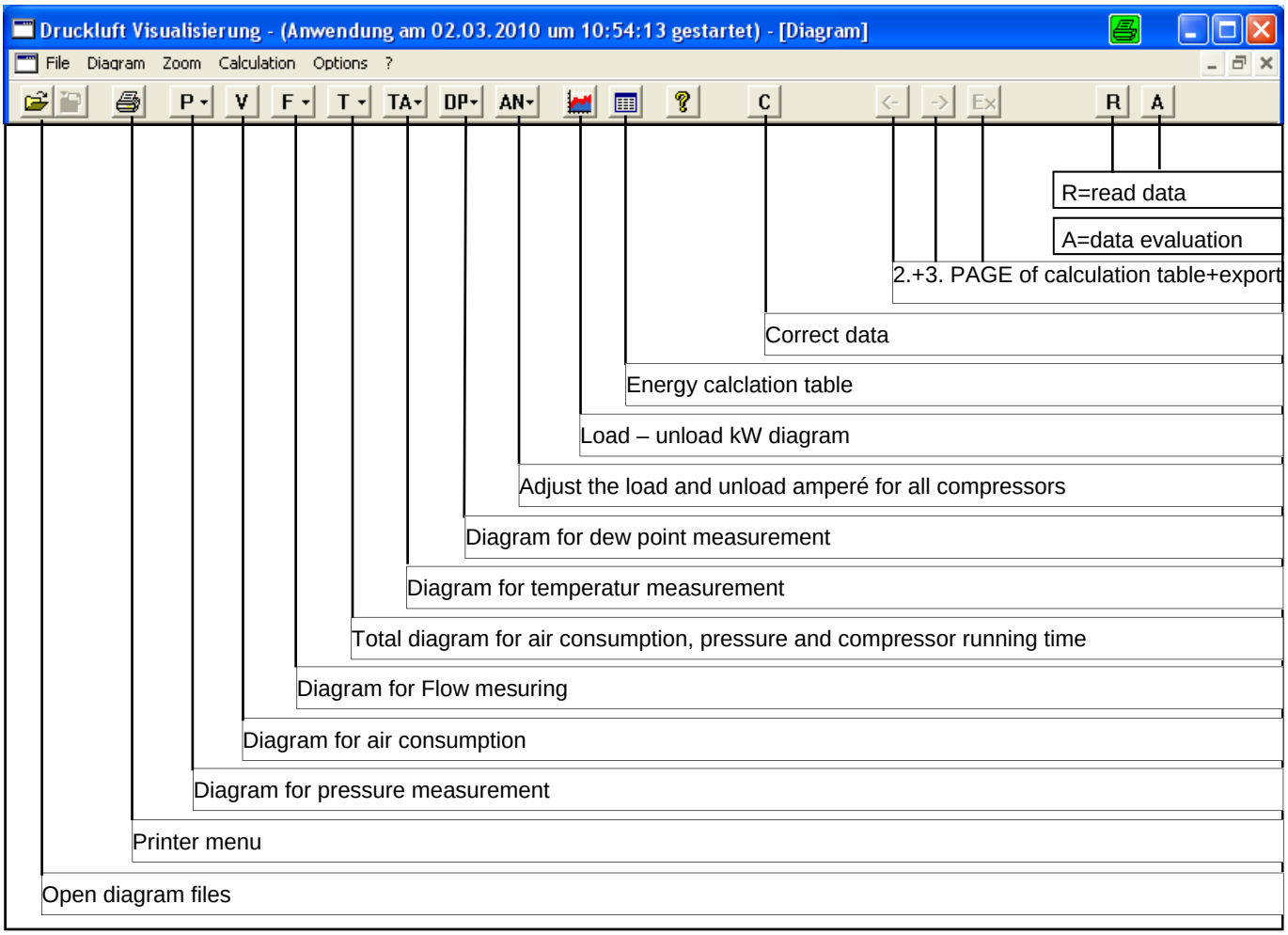
The compressed air measuring with this program contains the following measuring forms:

1. **Compressed air measuring with analog amperé clamp**

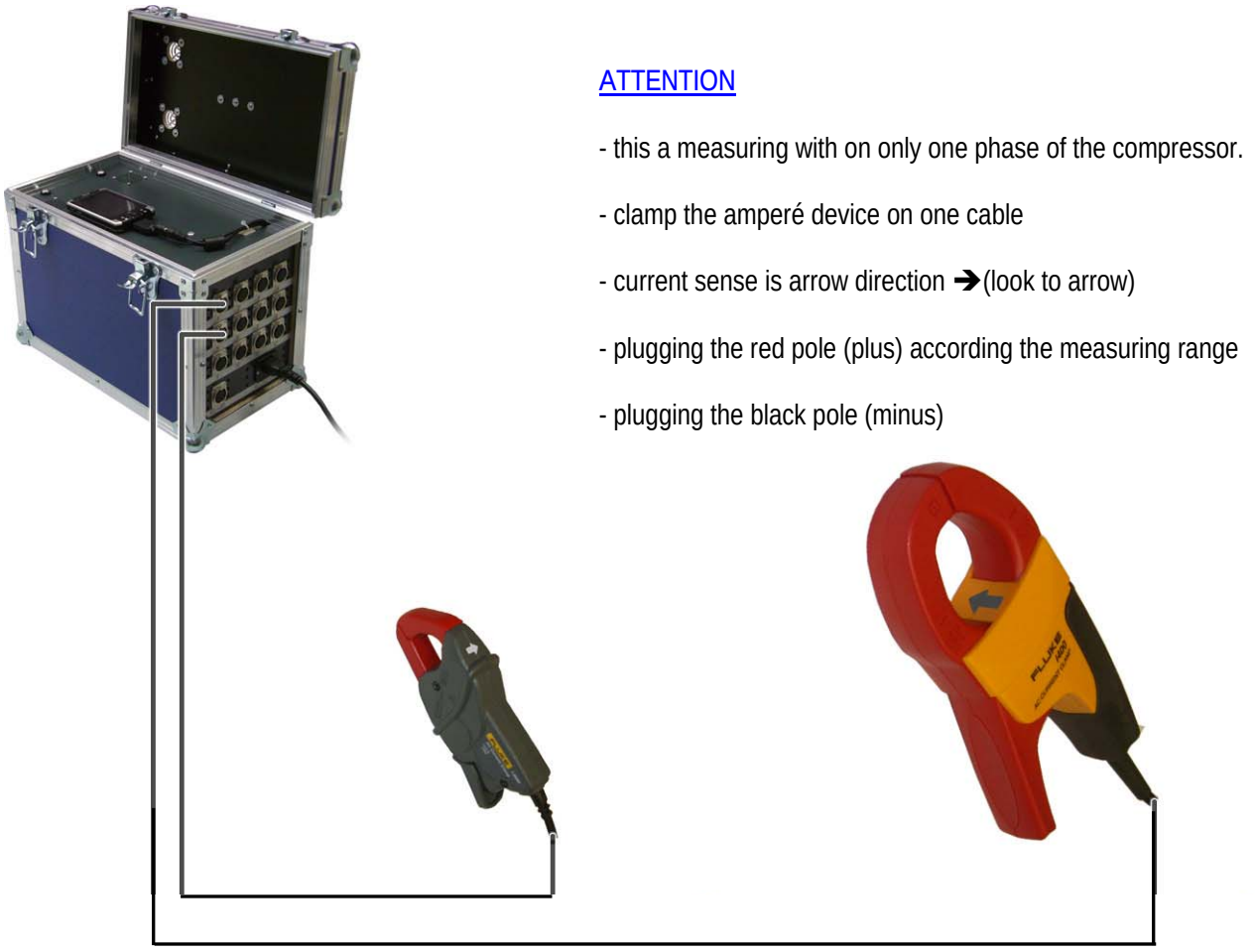
2. **measuring with different sensors:**
   - Pressure Transducer
   - Dew Point
   - Temperature
   - Flow
   - Power

The PC program makes the energy consumption for compressed air transparent.

The compressed air consumption in your compressed air station is documented and evaluated.
You receive a compressed air consumption graphic for a graphic reproduction for every day, compressor running time and an energy table.
The energy table lists the running time of your compressors for load and idle times and evaluates the compressed air costs in the respective national currency.
The produced compressed air crowd gets moreover single for every mpressor and in the sum pointed.
The operation explains herself by the badge marking of themselves



Amperé clamp connection for compressor measuring



ATTENTION

- this a measuring with on only one phase of the compressor.
- clamp the amperé device on one cable
- current sense is arrow direction ➔(look to arrow)
- plugging the red pole (plus) according the measuring range
- plugging the black pole (minus)

Current adapter:

The output of the current clamp is 4-20 mA and will be connected to the analog inputs of the measuring case

Examble:

Clamp type	Measuring range	Output signal	Max. Motor kW
200 A	0-200 A	0-200 mA	75 kW
400 A	0-400A	0-400 mA	160 kW
1200 A	0-1200 A	0-1200 mA	500 kW

Programming with the keys

Start measuring

```
MEASUREMENT   INACTIVE
27.02.2010    08:50:20

AE1 = 04,3  AE1 = 09,1
AE3 = 06,5  AE3 = 16,0
AE5 = 10,4  AE5 = 13,6
AE7 = 11,0  AE7 = 05,2
```

E

```
MEASUREMENT   INACTIVE
27.02.2010    08:50:20

START MEASUREMENT
EDIT MEASURING DATA
FORMAT SD CARD
PROGRAMMING
```

E

```
MEASUREMENT   INACTIVE
27.02.2010    08:50:20

   START MEASURING

NO
YES
```

E

```
MEASUREMENT   ACTIVE
27.02.2010    08:50:20

AE1 = 04,3  AE1 = 09,1
AE3 = 06,5  AE3 = 16,0
AE5 = 10,4  AE5 = 13,6
AE7 = 11,0  AE7 = 05,2
```

Edit measuring data

```
MEASUREMENT   INACTIVE
27.02.2010    08:50:20

AE1 = 04,3  AE1 = 09,1
AE3 = 06,5  AE3 = 16,0
AE5 = 10,4  AE5 = 13,6
AE7 = 11,0  AE7 = 05,2
```

E

```
MEASUREMENT   INACTIVE
27.02.2010    08:50:20

START MEASUREMENT
EDIT MEASURING DATA
FORMAT SD CARD
PROGRAMMING
```

E

```
MEASUREMENT   INACTIVE
27.02.2010    08:50:20

  EDIT MEASURING DATA

COPY MEASURING DATA
DELETE MEASURING DATA
VIEW MEASURING DATA
```

E

```
MEASUREMENT   INACTIVE
27.02.2010    08:50:20
  COPY MEASURING DATA
2010-02-27  2010-02-21
XXXX-XX-XX  XXXX-XX-XX
XXXX-XX-XX  XXXX-XX-XX
XXXX-XX-XX  XXXX-XX-XX
XXXX-XX-XX  XXXX-XX-XX
```

E

```
MEASUREMENT   INACTIVE
27.02.2010    08:50:20
  COPY MEASURING DATA
    2010-02-27.MES

  FOR ABORT PUSH KEY
       + AND -
```

E

```
MEASUREMENT   INACTIVE
27.02.2010    08:50:20
  COPY MEASURING DATA

   COPY READY !
```

delete measuring data

```
MEASUREMENT   INACTIVE
27.02.2010    08:50:20

AE1 = 04,3  AE1 = 09,1
AE3 = 06,5  AE3 = 16,0
AE5 = 10,4  AE5 = 13,6
AE7 = 11,0  AE7 = 05,2
```

E

```
MEASUREMENT   INACTIVE
27.02.2010    08:50:20

  EDIT MEASURING DATA

COPY MEASURING DATA
DELETE MEASURING DATA
VIEW MEASURING DATA
```

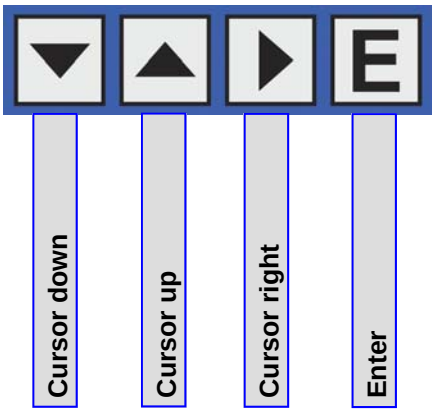
E

```
MEASUREMENT   INACTIVE
27.02.2010    08:50:20
DELETE MEASURING DATA
2010-02-27  2010-02-21
XXXX-XX-XX  XXXX-XX-XX
XXXX-XX-XX  XXXX-XX-XX
XXXX-XX-XX  XXXX-XX-XX
XXXX-XX-XX  XXXX-XX-XX
```

E

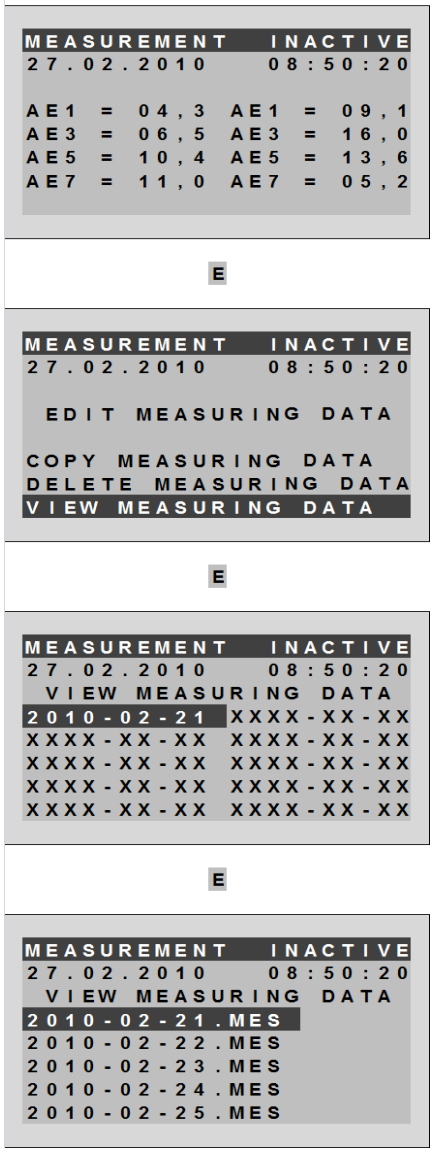
```
MEASUREMENT   INACTIVE
27.02.2010    08:50:20
DELETE MEASURING DATA

MEASURING DATA DELETE
```

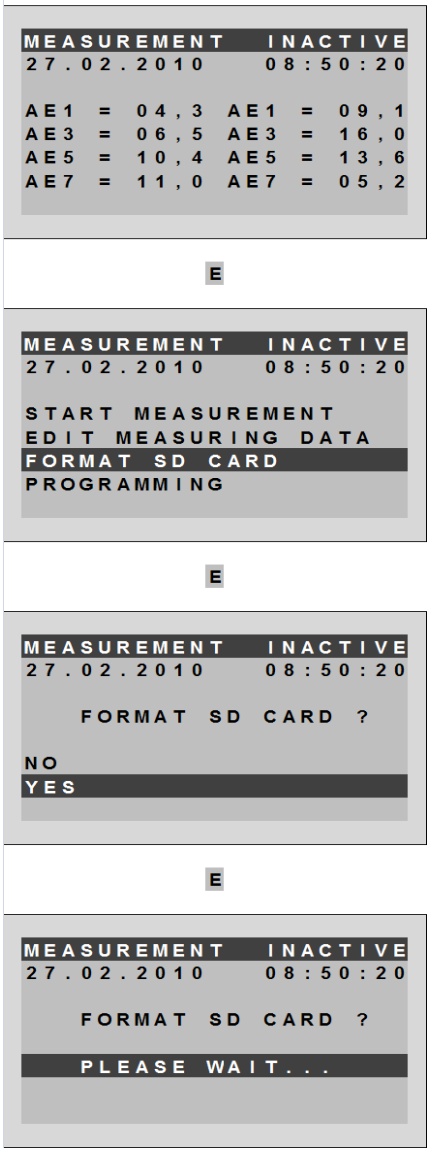


Programming with the keys

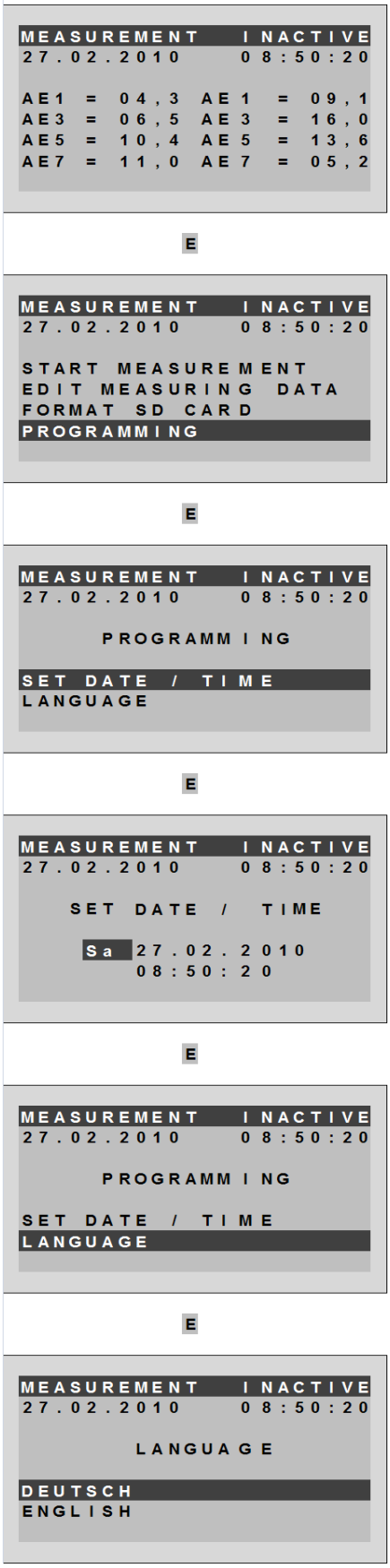
view measuring data



formate SD card



programming



- Start measuring (please look to start measuring
- Stop measuring: set cursor to „NO“ and press „Enter“
- Copy measuring data (please look to edti measuring data)
- Select measuring data with cursor
- Delet measuring data after „data copy“
- Programing of Time, Date and language
  (please look to programming)
- Formate SD-carte after every 5 measurings

Start measuring

Examble: measuring of following compressors and pressure

1. 2 Compressors with 12,5 m³/min capacity
2. 1 variable speed Kompressor with the capacity of 4-25,4 m³/min
3. Net pressure

Note the connected sensors to the data list together with the span of amperé mesurment.

In the example mentioned above was connected following equipment:

- Input 1+2 amperé clamp of 200 A
- Input 3 amperé clamp of 200 A 0-400 A
- Input 5 pressure sensor 0-16 bar

Before the measuring, please, please write down the attached components to the data list,

so that for the measuring analysis, the parameter settings and customer name are available.

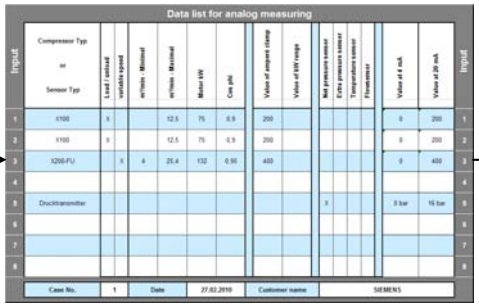
Data list for analog measuring

Input	Compressor Typ or Sensor Typ	Load / unload	variable speed	m³/min - Minimal	m³/min - Maximal	Motor kW	Cos phi	Value of amperé clamp	Value of kW range	Net pressure sensor	Extra pressure sensor	Temperature sensor	Flowsensor	Value at 4 mA	Value at 20 mA	Input
1	X100	X			12,5	75	0,9	200						0	200	1
2	X100	X			12,5	75	0,9	200						0	200	2
3	X200-FU		X	4	25,4	132	0,95	400						0	400	3
4																4
5	Drucktransmitter									X				0 bar	16 bar	5
6																6
7																7
8																8

Case No.	1	Date	27.02.2010	Customer name	SIEMENS

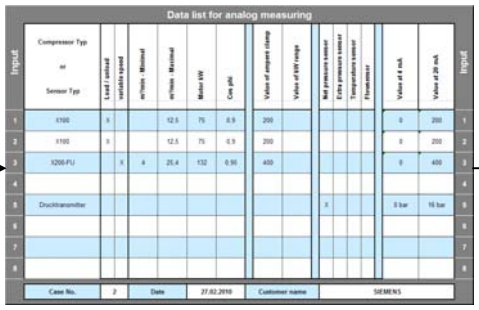
Read 4 different measuring points

Case 1



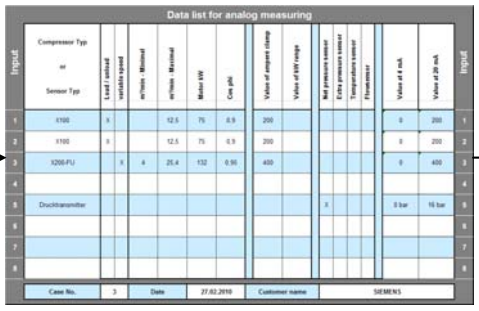
Datalist 1

Case 2



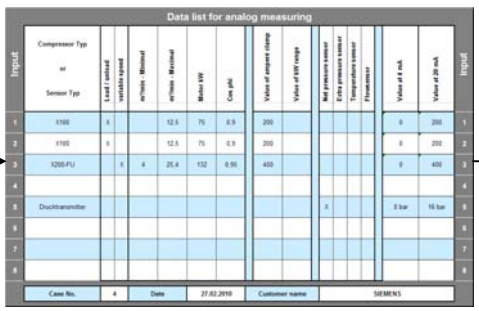
Datalist 2

Case 3



Datalist 3

Case 4

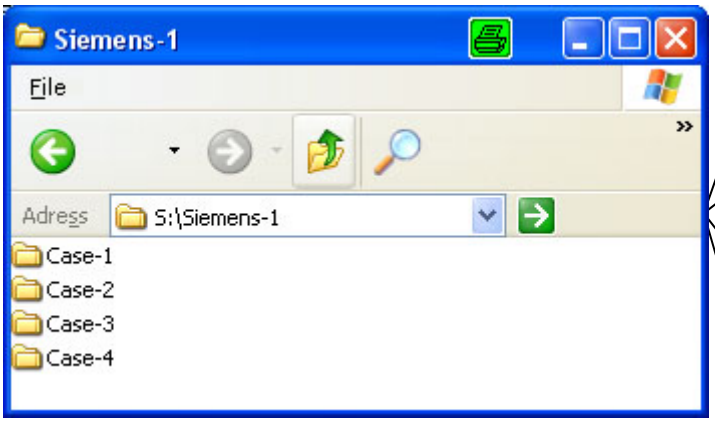


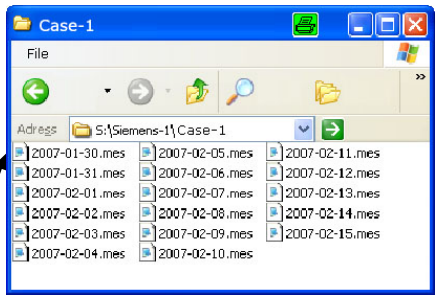
Datalist 4

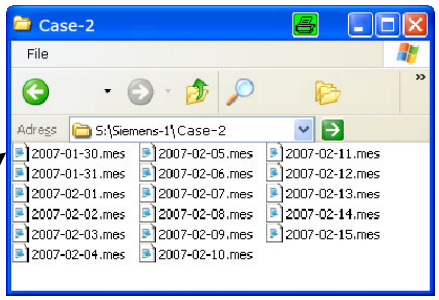
PC-Program to evaluate the measuring data

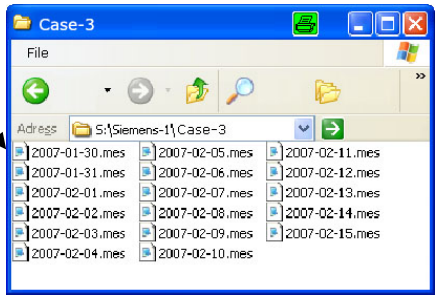
- 16 Compressor-chanels and - 16 Sensor-Chanels

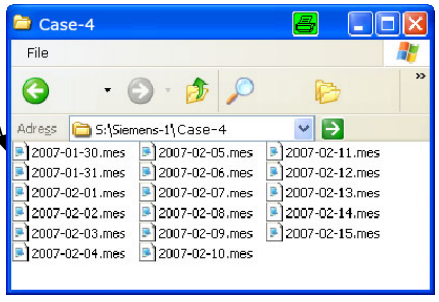
Create folder for measuring files











Step 1:

- Create new folder with customers name
- Create in customers folder for each measuring caes an new folder named Case-1, Case-2, Case-3, Case-4.

Step 2:

- Copy the files from Case-1 to the folder „Case-1“

Step 3:

- Copy the files from Case-2 to the folder „Case-2“

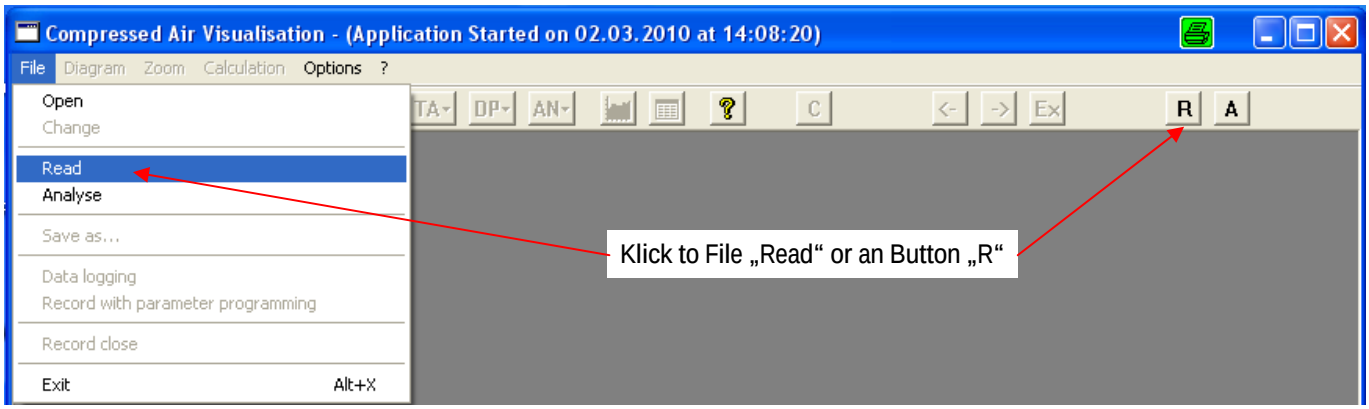
Step 4:

- Copy the files from Case-3 to the folder „Case-3“

Step 5:

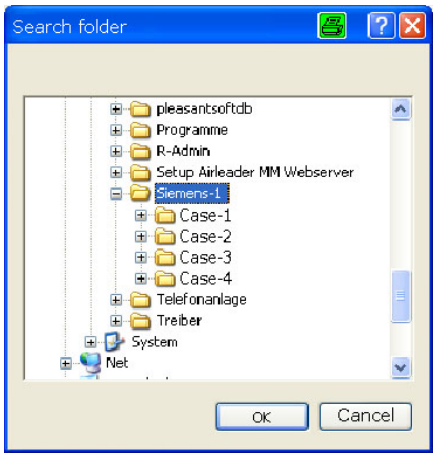
- Copy the files from Case-4 to the folder „Case-4“

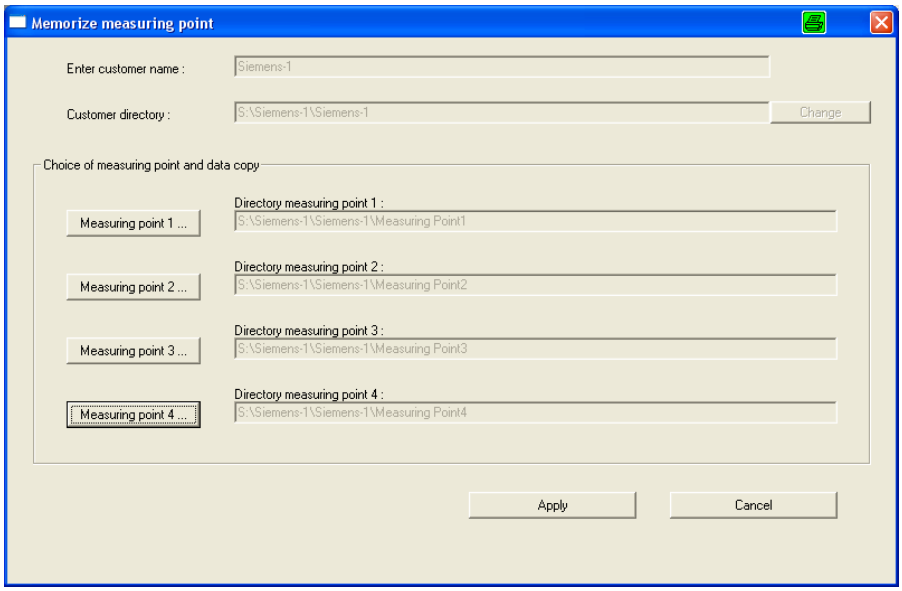
Read Data to the program



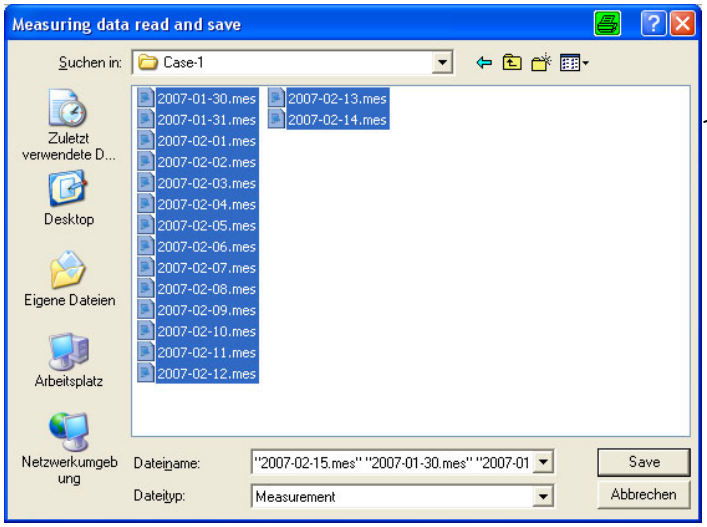
1. Select customers folder
Where the measuring data are stored

2. Enter Customers name
3. Select the folder to store the measuring data
4. the same for measuring point 2-4

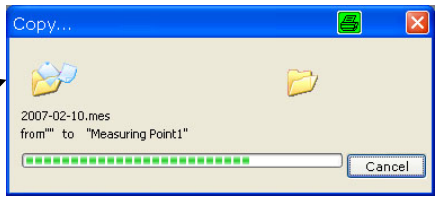




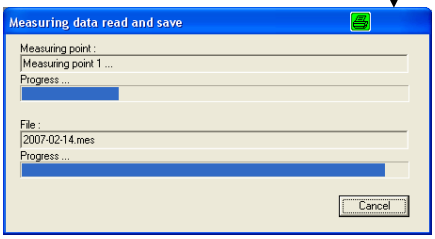
5. Messdaten markieren
Und auf speichern klicken



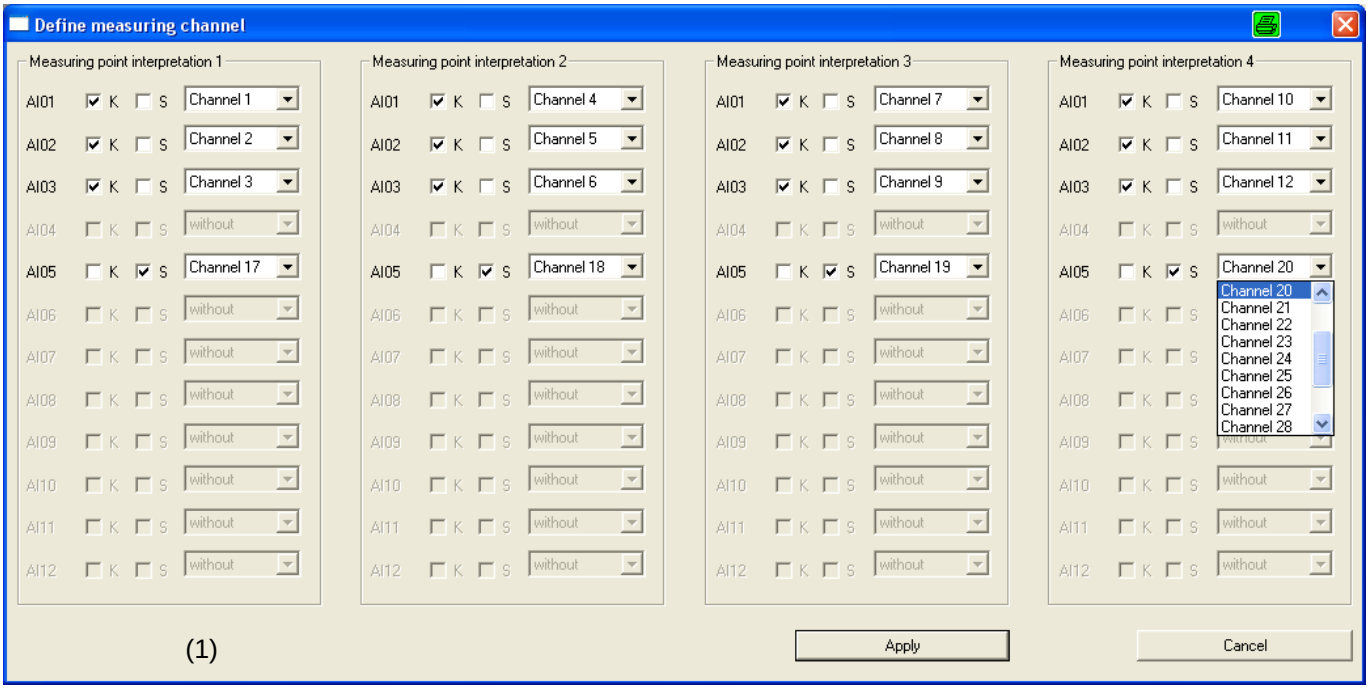
Copy measuring data



Measuring data will be read
after klick to „Apply



Define measuring chanels



(1)

Define measuring chanels

- Chanel 1-16 = Compressor chanels (only)
- Chanel 17-32 = Chanels for sensor with 4-20 mA output. Examble: pressure transducers, Flow sensors, temperature sensors, dewpoint sensors, kW-measuring devices, Amperé-measuring devices. e.g.

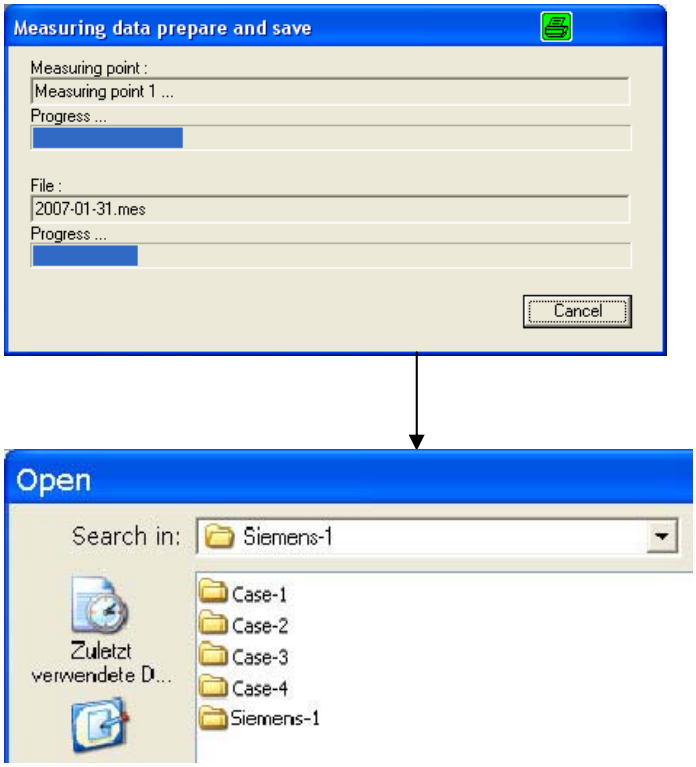
- Mark „K“ for compressors
- Mark „S“ for sensors

See configuration in configuration mask (1)

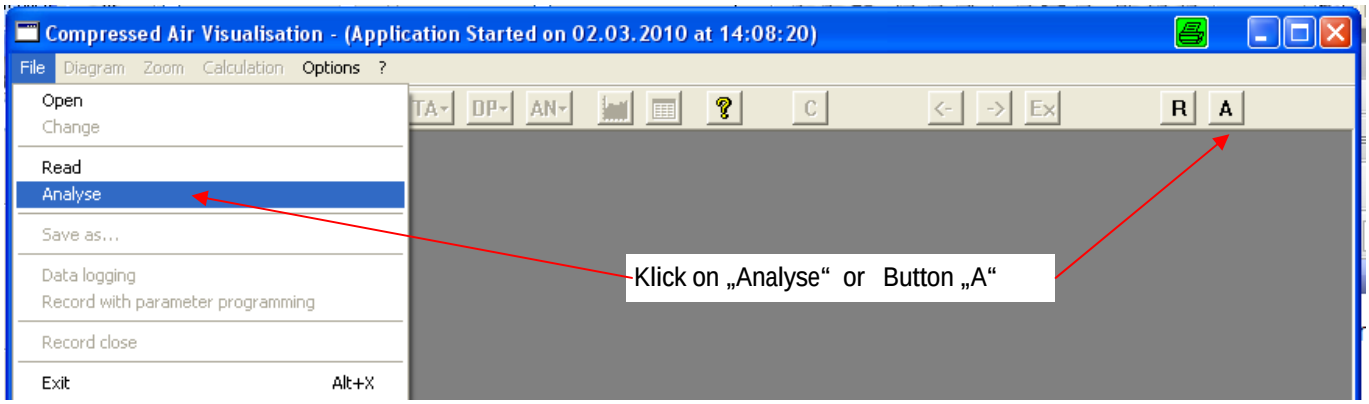
- 12 compressors in 4 different compressor stations
- 4 pressure sensors (each in one station)

Datenübernahme

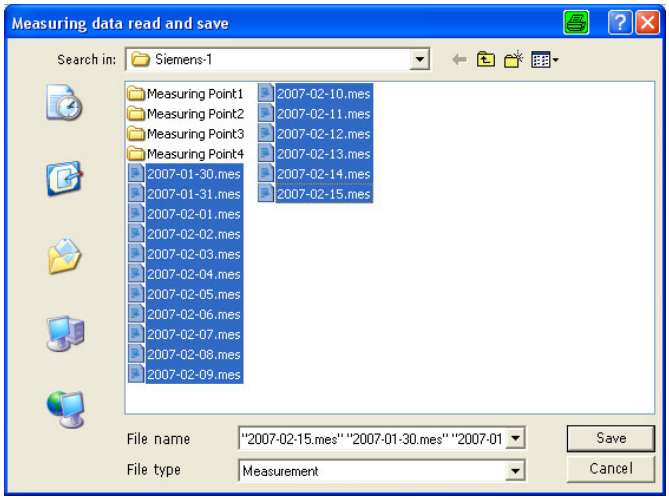
Durch klicken auf den Button „übernehmen“ werden die Daten der einzelnen Stationen zusammengerechnet und im zuvor erstellten Verzeichnis abgelegt.



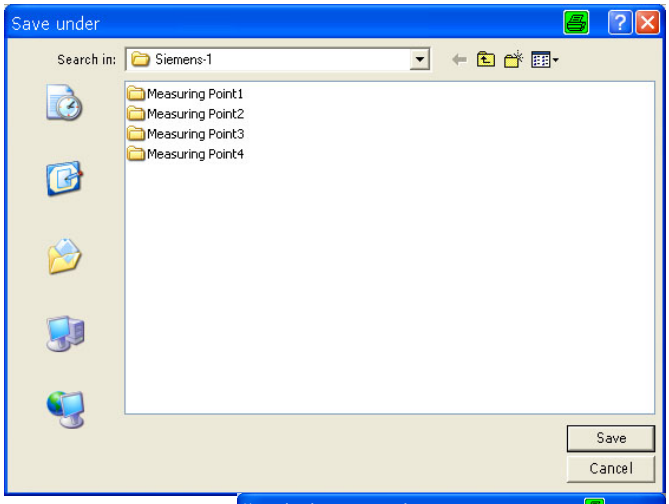
Evaluation data



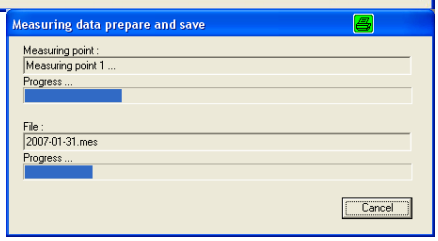
mark the files „mes“

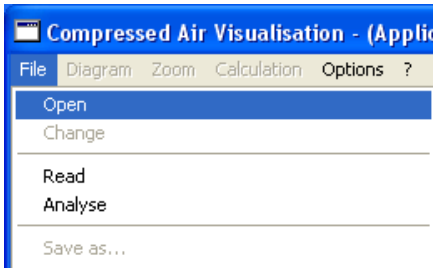


Klick to „save“



The measuring data will be calculated together saved under the customers folder

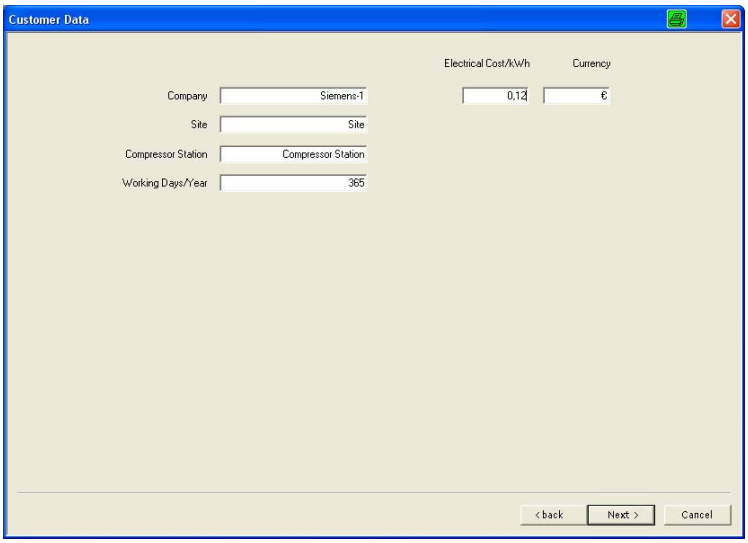




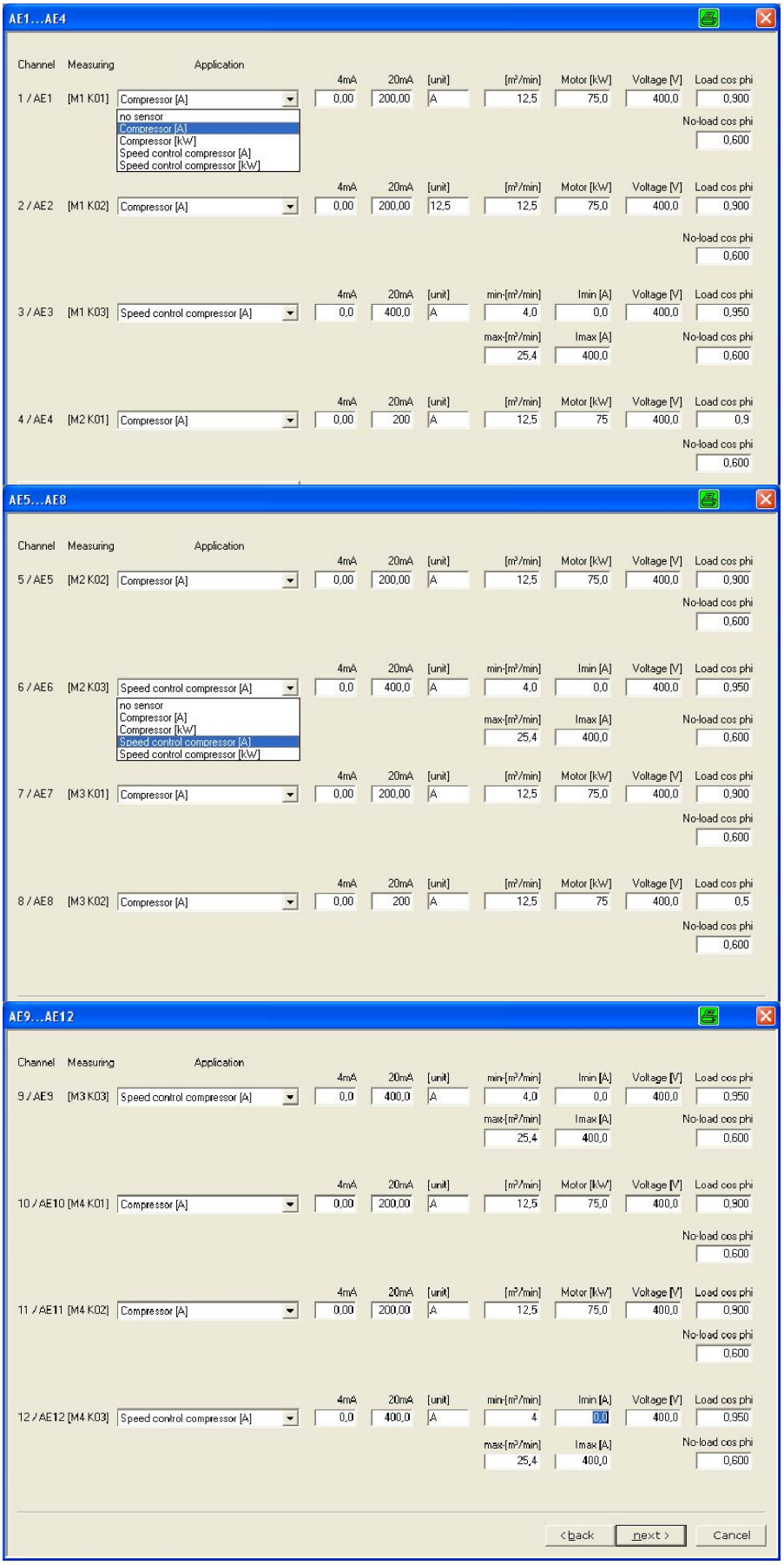
Klick to File „open“

Set data of:

- Company name
- Site
- Name of compressor station
- Working Days/Year Tage/Jahr
- Electrical Cost/kWh



Define compressor chanels



Measuring point 1 (M1) compressors

- Compressor 1+2 - load/unload measuring device 200 A clamp 12,5 m³/min, 75 kW Motor cos phi of load/unload
- Compressor 3 variable speed measuring device 400 A clamp 4-25,4 m³/min, 132 kW Motorcos phi of load/unload

Measuring point 2 (M2) compressors

- Compressor 1+2 - load/unload measuring device 200 A clamp 12,5 m³/min, 75 kW Motor cos phi of load/unload
- Compressor 3 variable speed measuring device 400 A clamp 4-25,4 m³/min, 132 kW Motorcos phi of load/unload

Measuring point 3 (M3) compressors

- Compressor 1+2 - load/unload measuring device 200 A clamp 12,5 m³/min, 75 kW Motor cos phi of load/unload
- Compressor 3 variable speed measuring device 400 A clamp 4-25,4 m³/min, 132 kW Motorcos phi of load/unload

Measuring point 4 (M4) compressors

- Compressor 1+2 - load/unload measuring device 200 A clamp 12,5 m³/min, 75 kW Motor cos phi of load/unload
- Compressor 3 variable speed measuring device 400 A clamp 4-25,4 m³/min, 132 kW Motorcos phi of load/unload
-

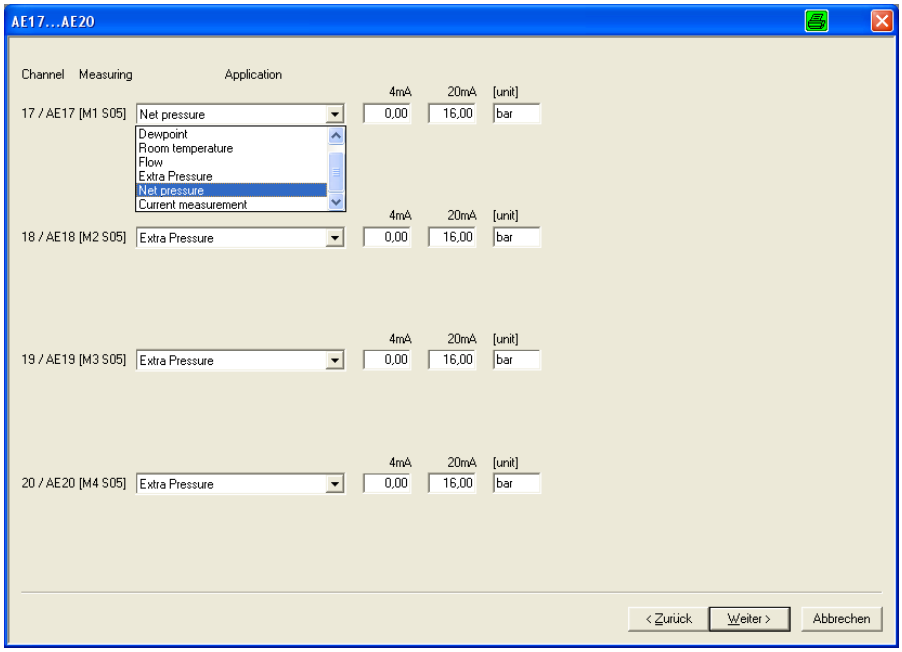
Define analog sensor chanels

Sensor measuring point 1 (M1)
- chanel 17 Net pressure

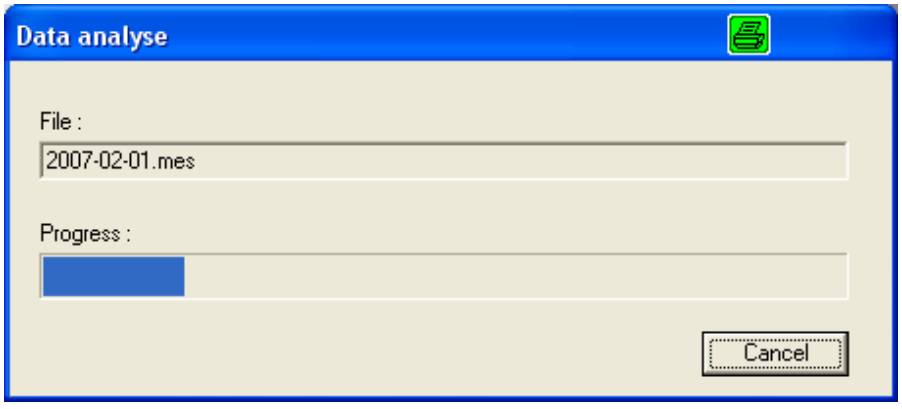
Sensor measuring point 2 (M2)
- chanel 18 extra pressure

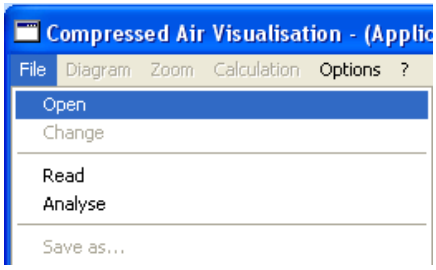
Sensor measuring point 3 (M3)
- chanel 19 extra pressure

Sensor measuring point 4 (M4)
- chanel 20 extra pressure

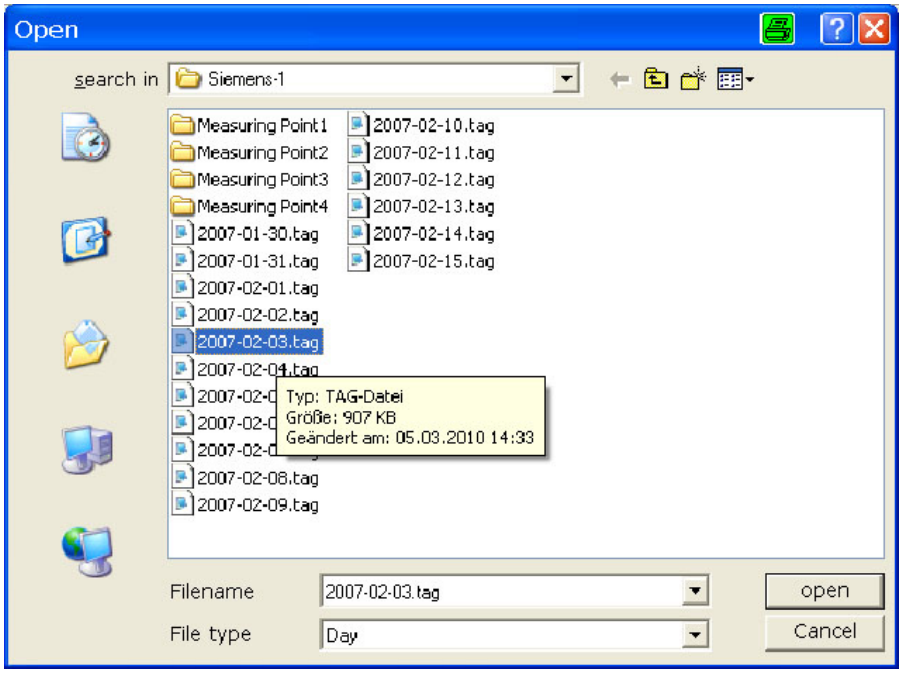


After push OK the data will be calculated and stored in customers folder.





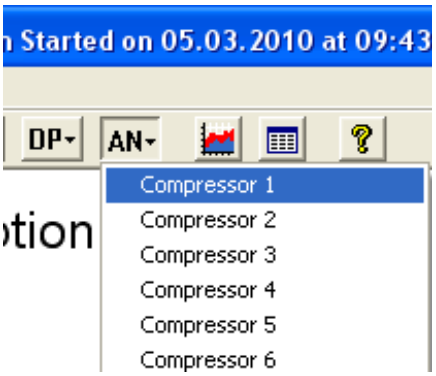
To select evaluated measuring data klick on File „open“ and select a day -Klick on button open

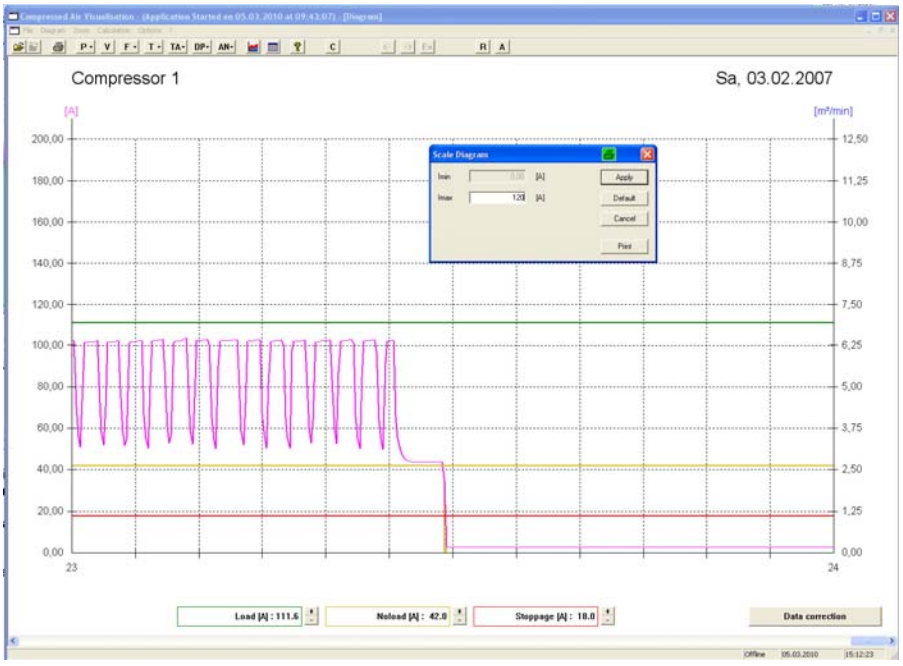


Compressor amperé settings of load and unload

With this cnfiguration the program will separate the load and unload time
And calculate the air flow, based on compressor load time

1. click on button „AN“
2. select compressor 1
3. set zoom to 1 h



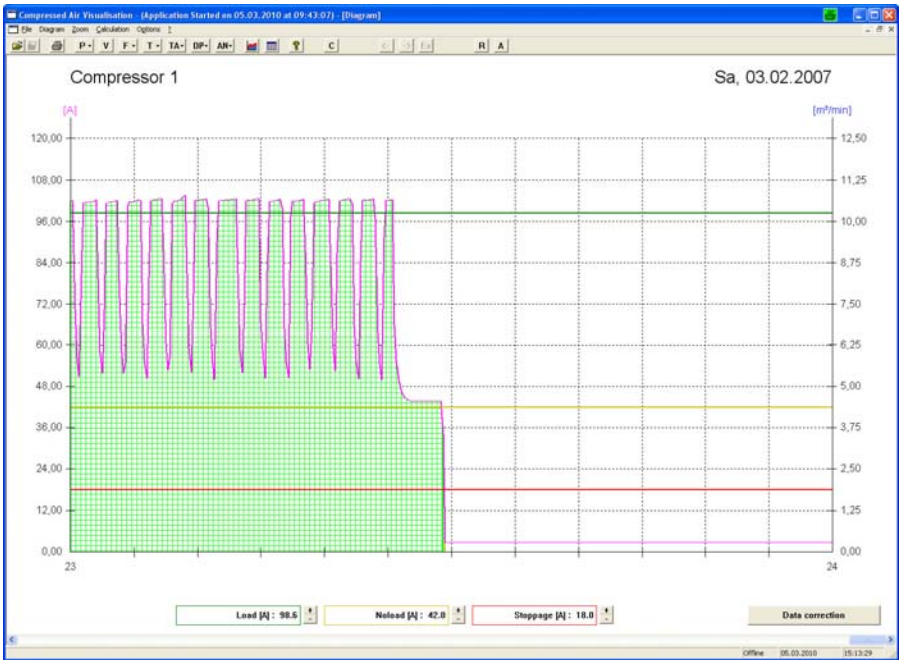


Scaling compressor diagram

- Set mouse arrow in diagram
- Klick right
- Scaling flow (m^3/min
- Click button „apply“

Line name

- green = load ampere
- yellow = un-load amperé
- red = not running amperé

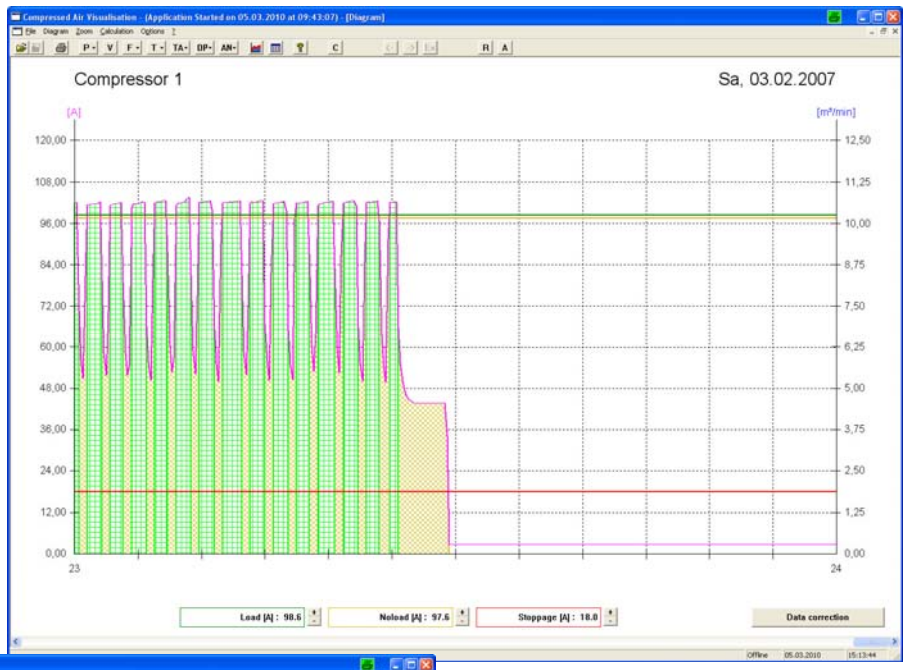


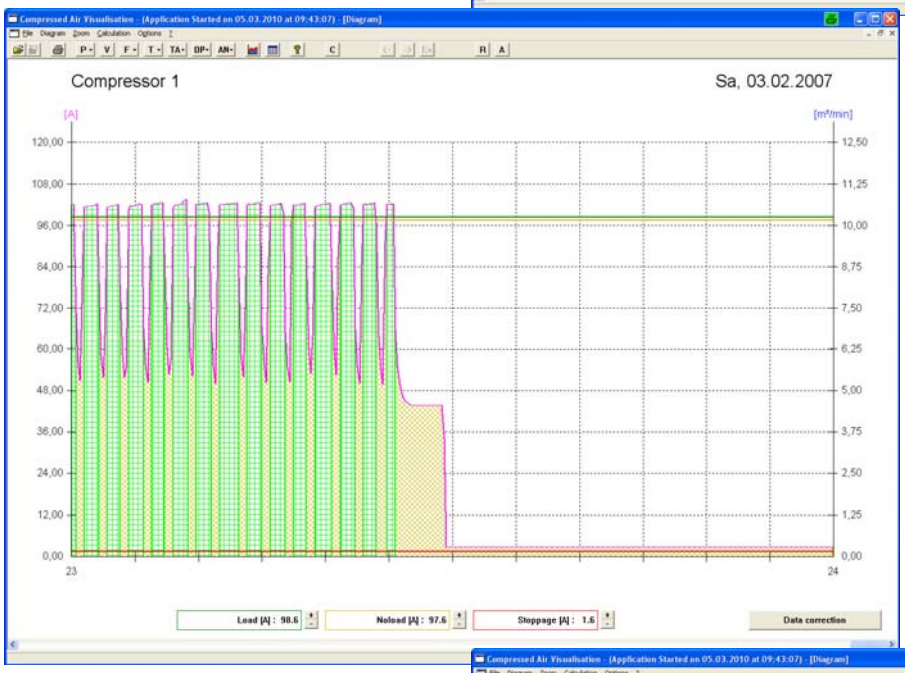
Setting for loadkW

- Set green line with your mouse to the beginning load phasis
- If pressure goes higher amperé will encrease

Setting unload kW

- Set the yellow line with the mouse arrow to beginning unload phasis. Best directly below the green line.
- The unload kW will be calculate propotioatelly to the yellow field



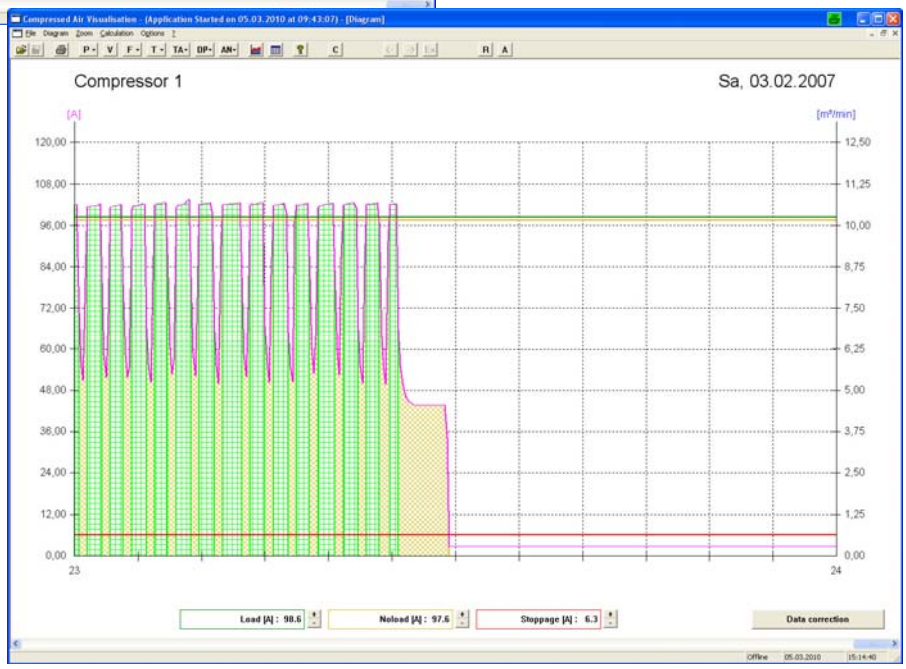


Current of not running compressor

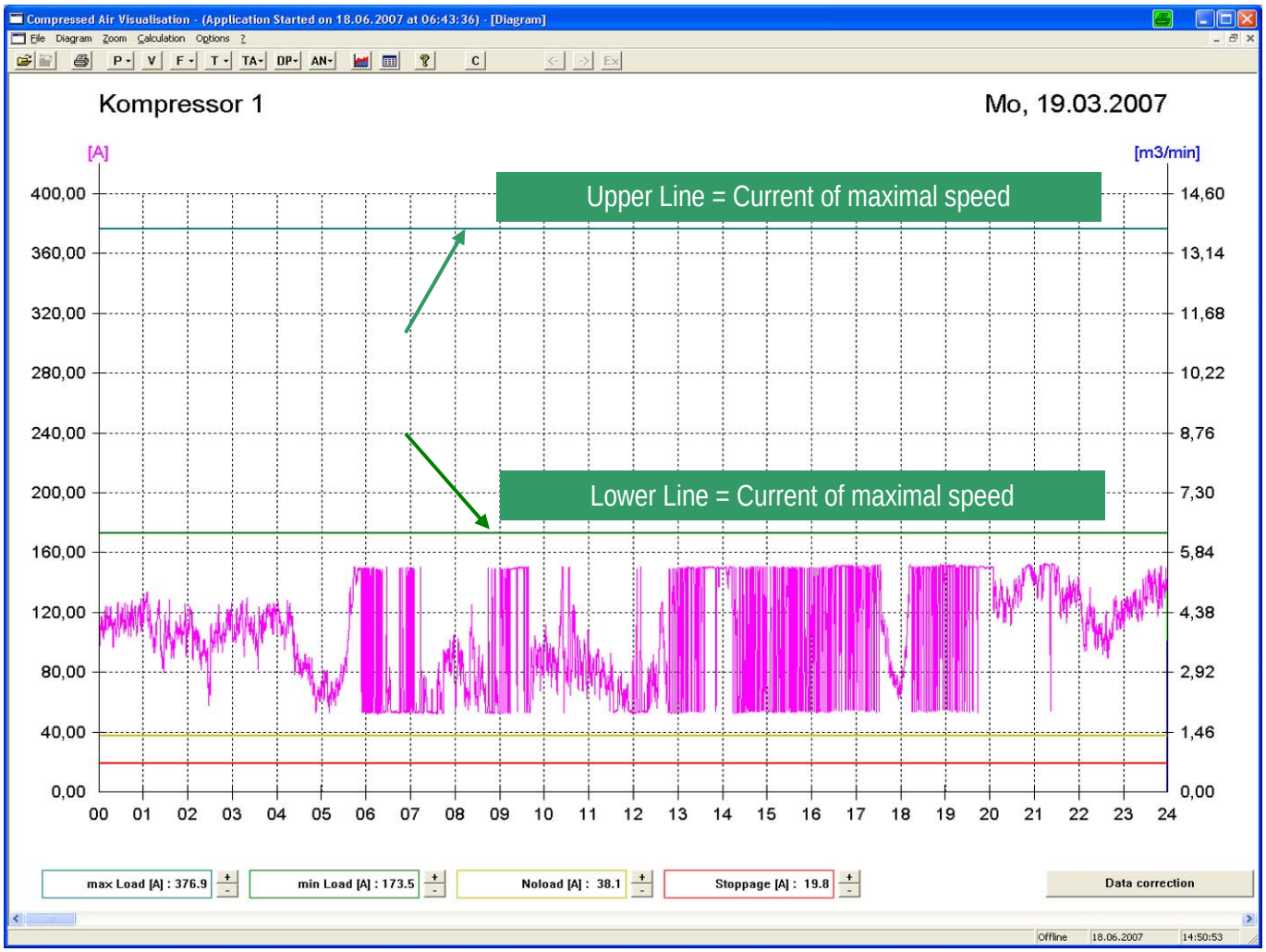
- If amperé clamp was connected to the cable who supply the compressor controller it will show some current..
- This is not the current of unload. This is the current of the compressor controller.

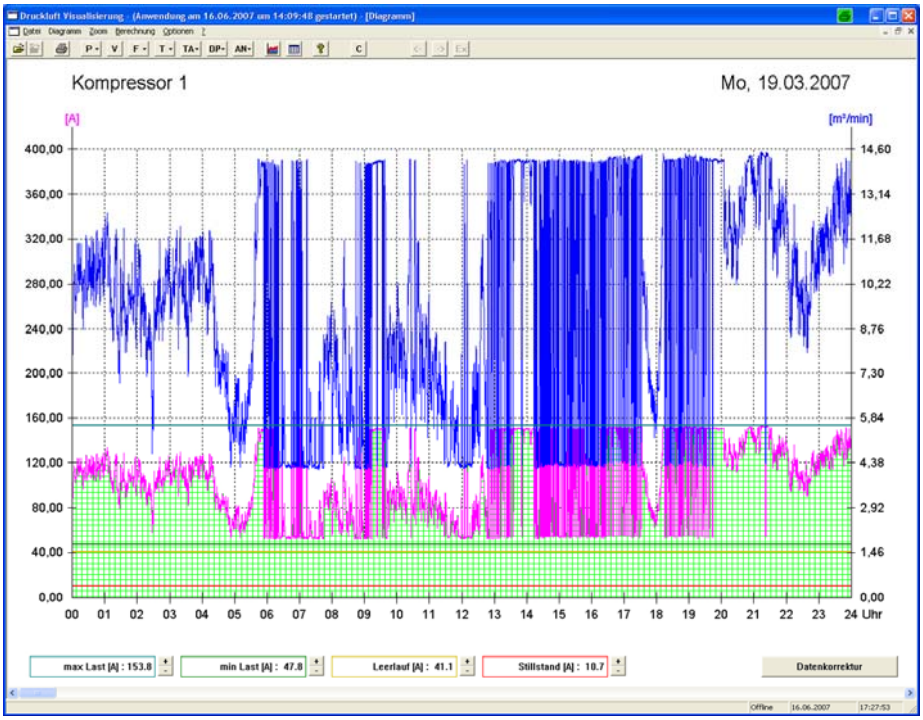
Current of Compressor controller

- To disable this current of the compressor controller set the mouse arrow to the red line make the setting of current higher that it shows the current line of the compressor controller



Configuration varaiable speed compressors



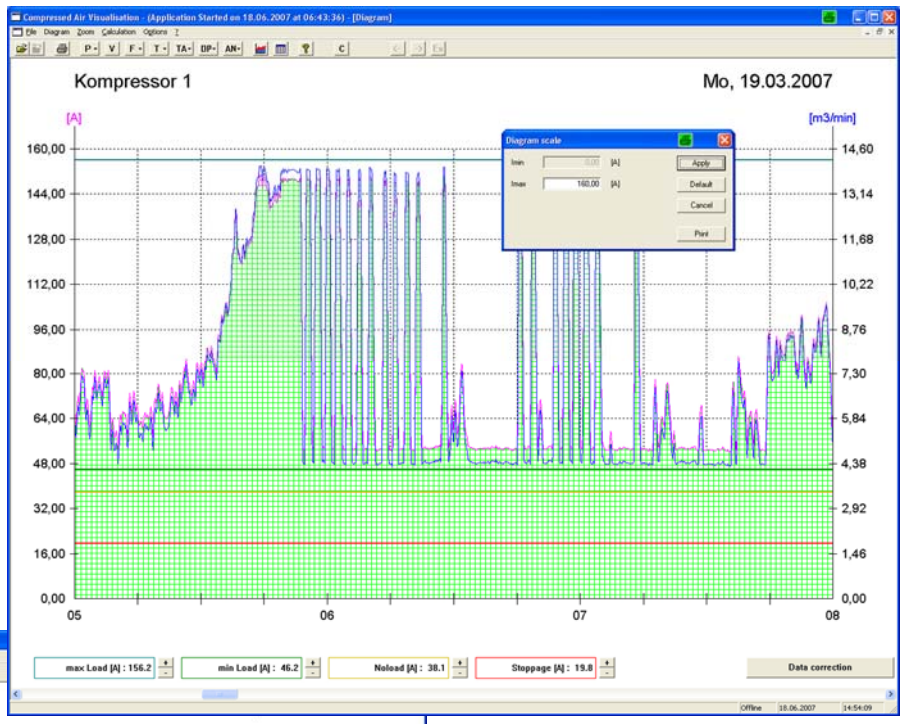


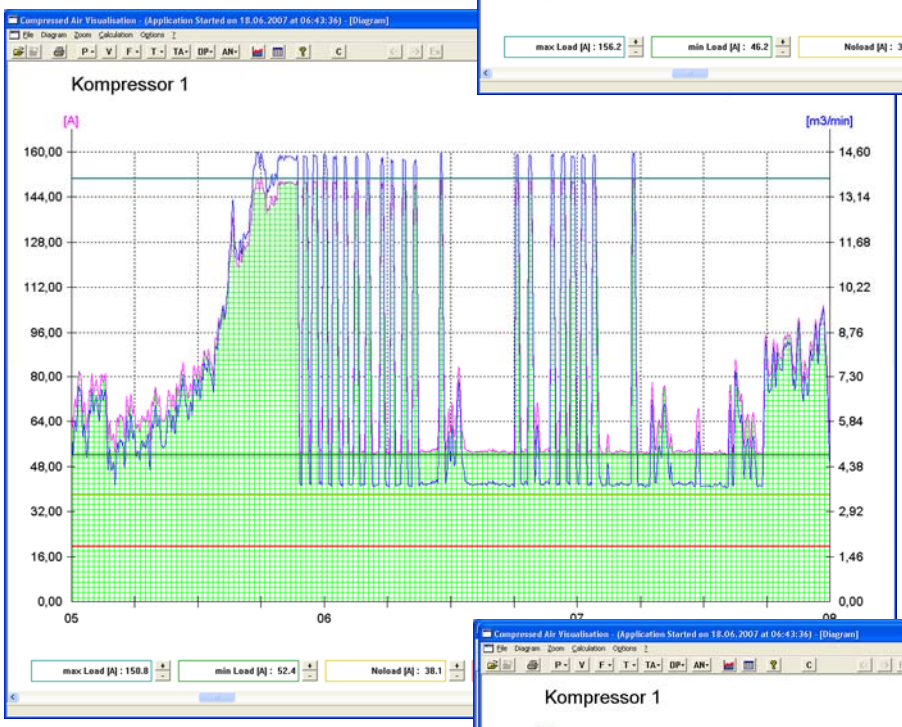
Scaling the current line

- Pull the upper green line to the maximum amperé
- Pull the lower green line to the lowest amperé
- The yellow line must be adjusted if the regulated compressor has the function idle running.
- The red line must be adjusted if the regulated compressor shows current in not running position.

Scaling diagram

- Set mouse arrow in the diagram
- click right
- Set the max amperé to 160A
- Click on apply



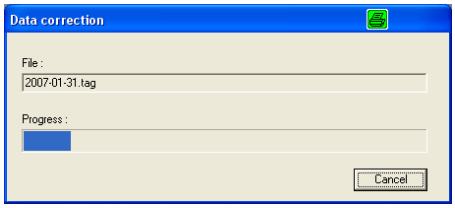


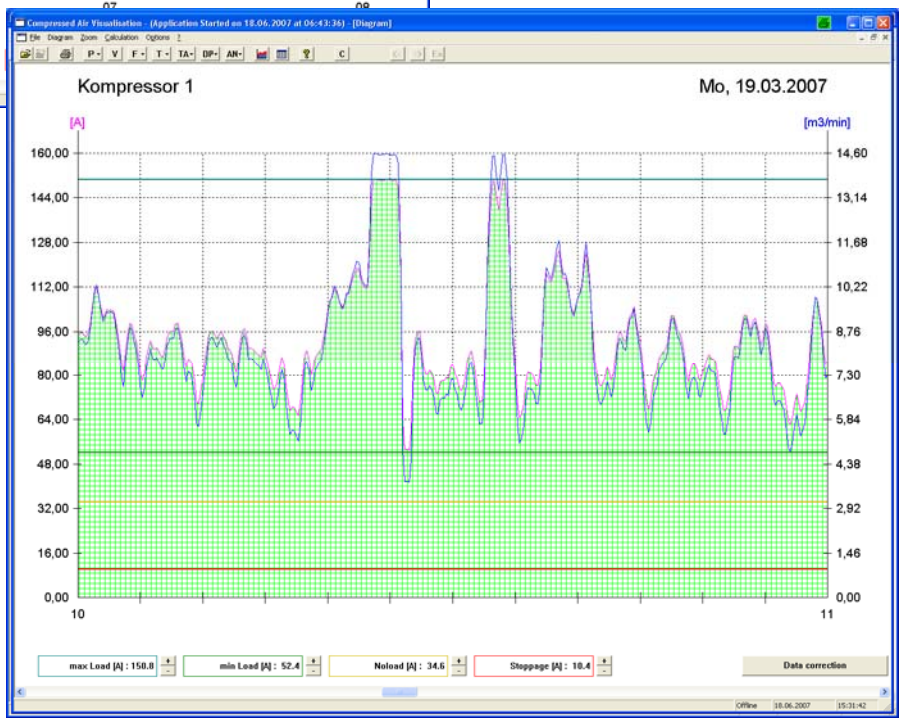
Exactly amperé scaling

- Pull the upper green line exactly to the maximum amperé
- Pull the lower green line exactly to the lowest amperé
- Controll the settings over the time of the whole day.

Zooming Diagramm

- Zoom to 1 hour fo controlling the Amperé setting.
- After controlling press the button „Data correction“
- The data of all selected files will be calculated with the settings of the compressor.

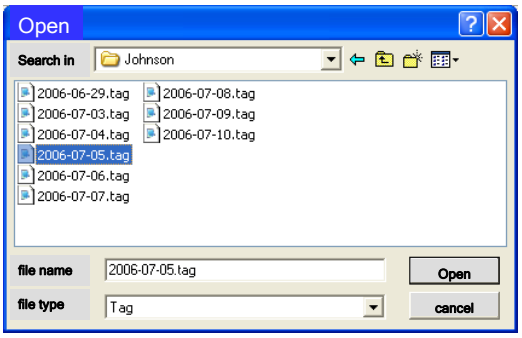




Scalling the pressure Diagram

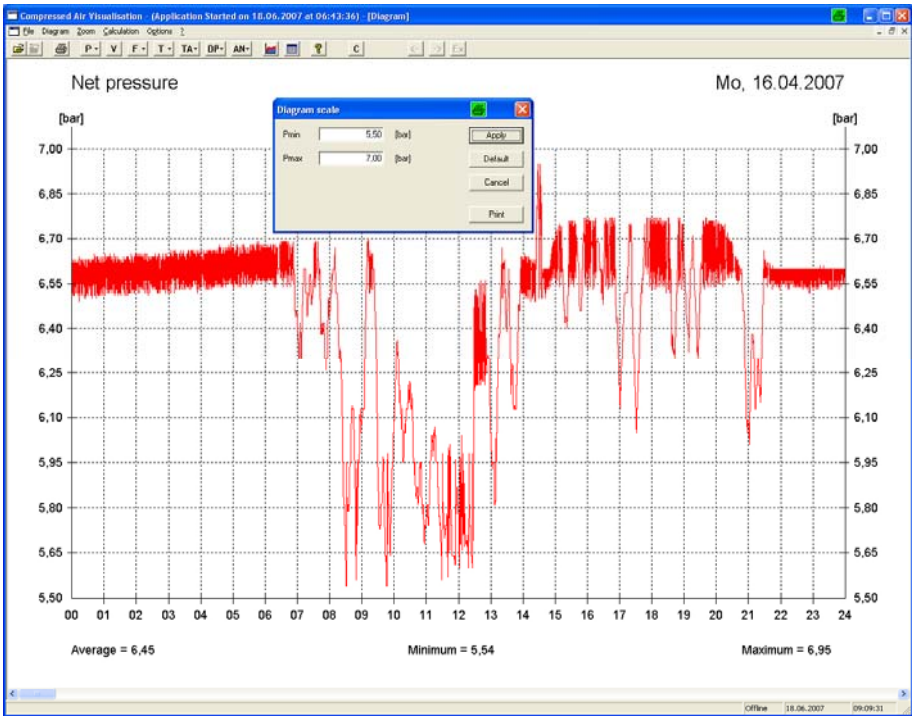
1. <u>open measuring data</u>

- klick on „file“ - than „open“
- open the file of one day
- klick on the button P (pressure diagramm)



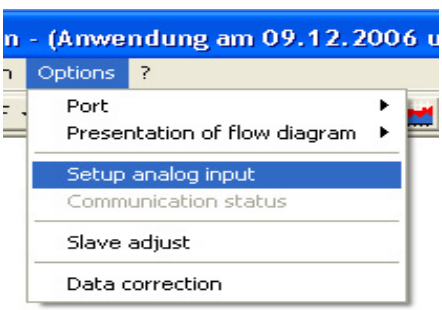
2. <u>scaling pressure diagramm</u>

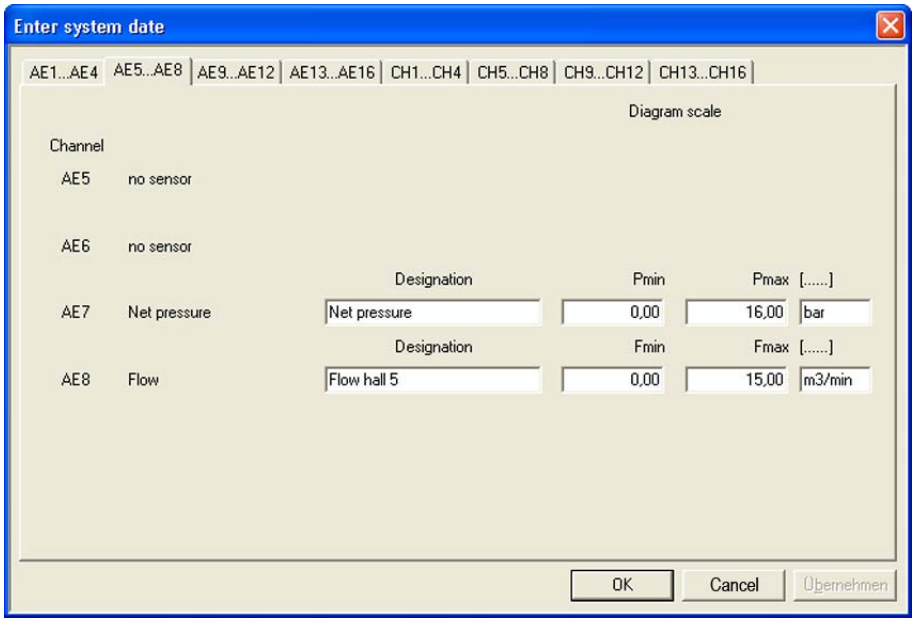
- Klick on Button „P“
- Open diagram pressure
- Set mouse arrow in diagram
- Klick right
- Scaling Pmin
- Scaling Pmax
- Click button „apply“



3. <u>definate scale of diagram</u>

- Klick on „Option“
- „Setup analog input“
- Change name of analog input 7 to „net pressure“



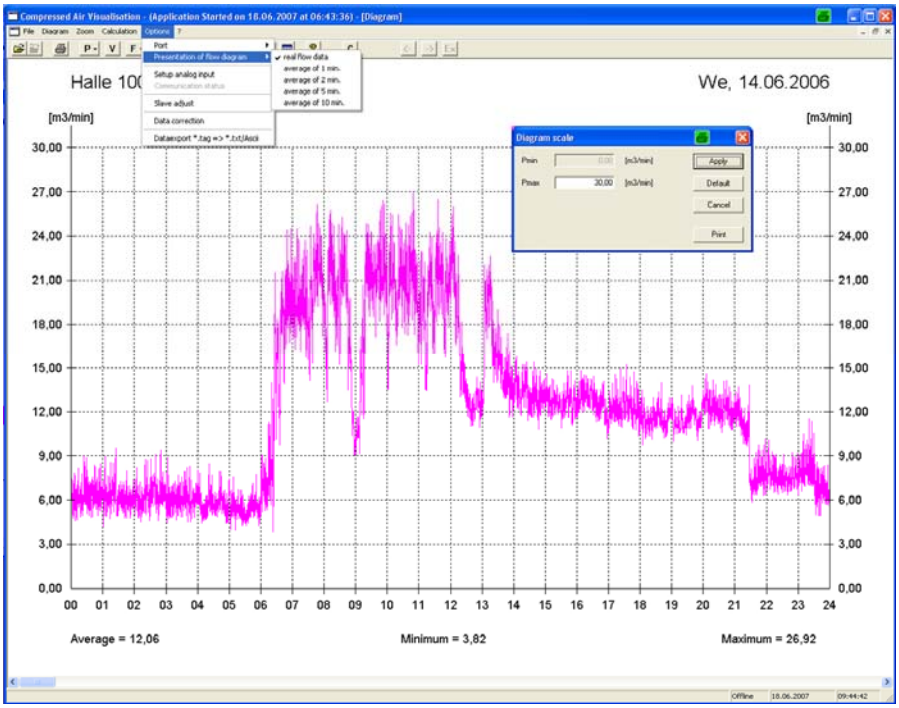


Scaling the Flow diagram

In diesen Masken kann die Benennung der angeschlossen Kompressoren und Analogsensoren, sowie die Skalierung der Diagramme vorgenommen werden

1. scaling <u>flow diagram</u>

- Open flow diagram
- Set mouse arrow in diagram
- Klick right
- Scaling flow (m³/min
- Click button „apply“

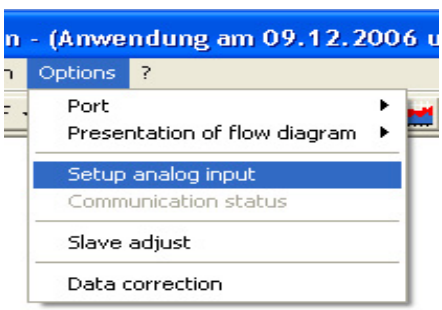


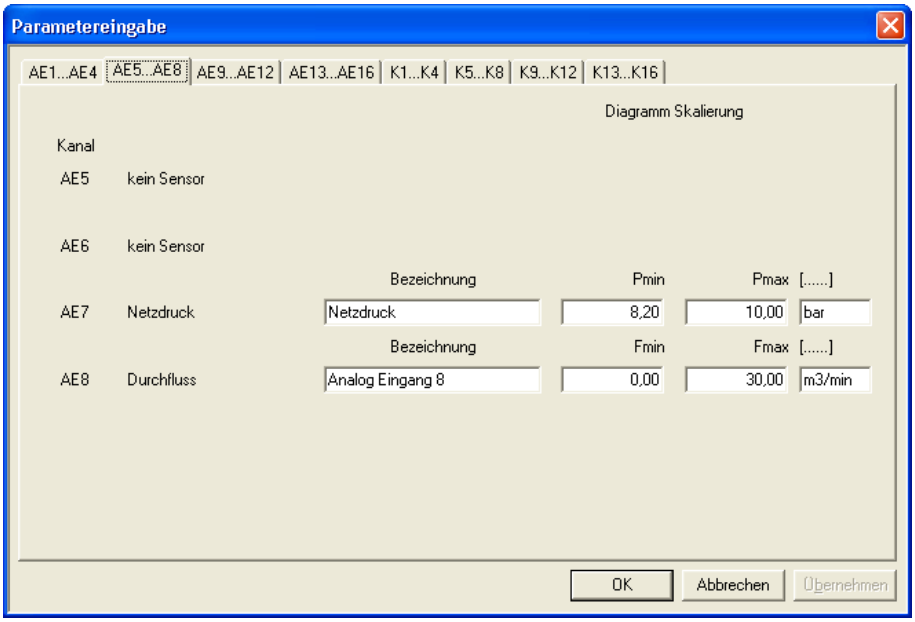
2. scaling flow diagram

- Klick on „OPTION“
- „presentation of flow diagram“
- Select the different averages like „real flow data,“ than 1, 2, 5, 10 minutes

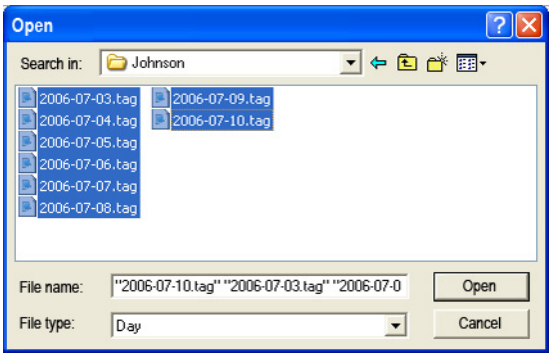
3. <u>definate scale of diagram</u>

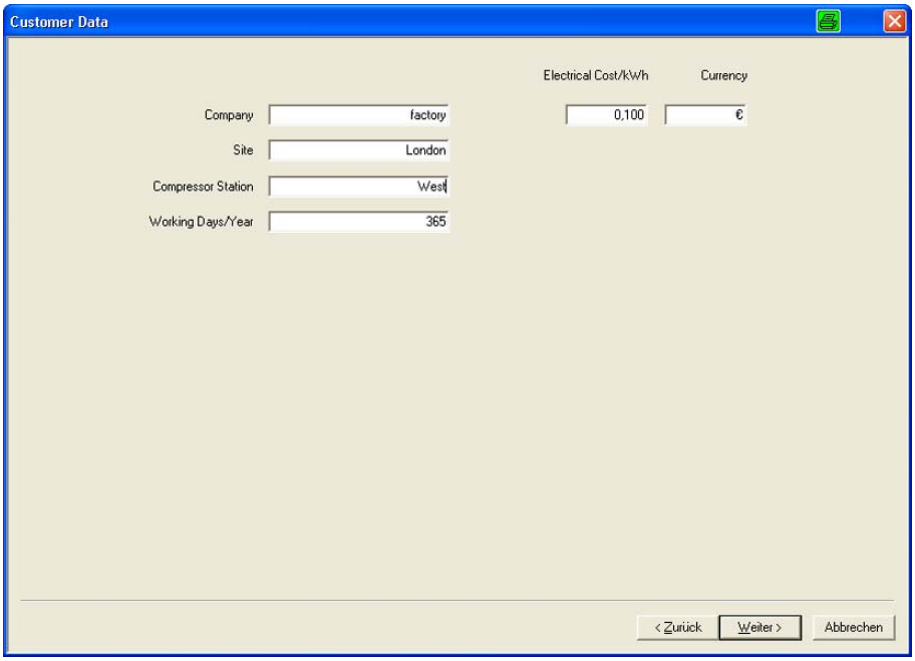
- Klick on „Option“
- „Setup analog input“
- Change name of analog input 8 to „flow measuring“





Evalating the data





Data evaluation

- Mark the days for evaluation
-
- Selecting by up to 7 days the diagram show the days in different colors for each day.
- Selecting more that 7 day the diagramm will show only the average of all days together
-

Tabular evaluation

1st Table „compressor data“

the readings of the compressors are reported as

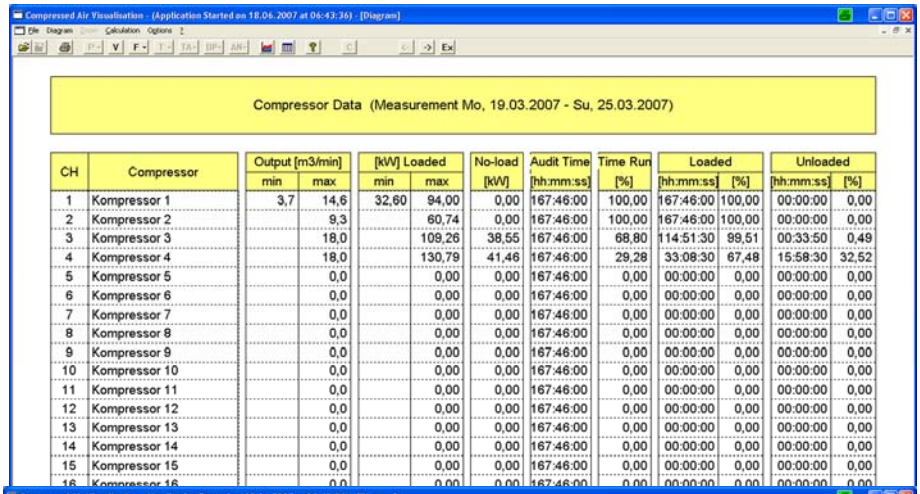
- m³/min
- load / unload kW
- Measuring duration complete
- Running times in %
- Load –and unload time

2nd Table „measure data“

the individual readings are displayed here

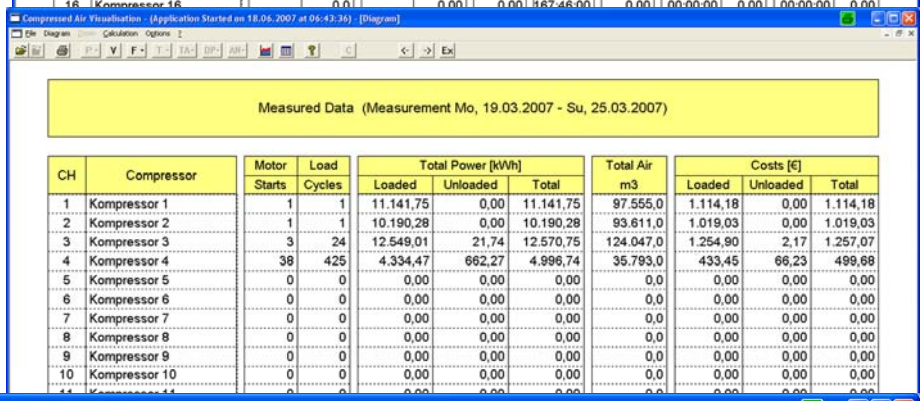
- Motor starts
- Load cycles
- Load, -unload and total kWh
- Produced compressed air in m³
- Cost calculation for:
  - Last
  - Leerlauf
  - Gesamt

  in the given currency



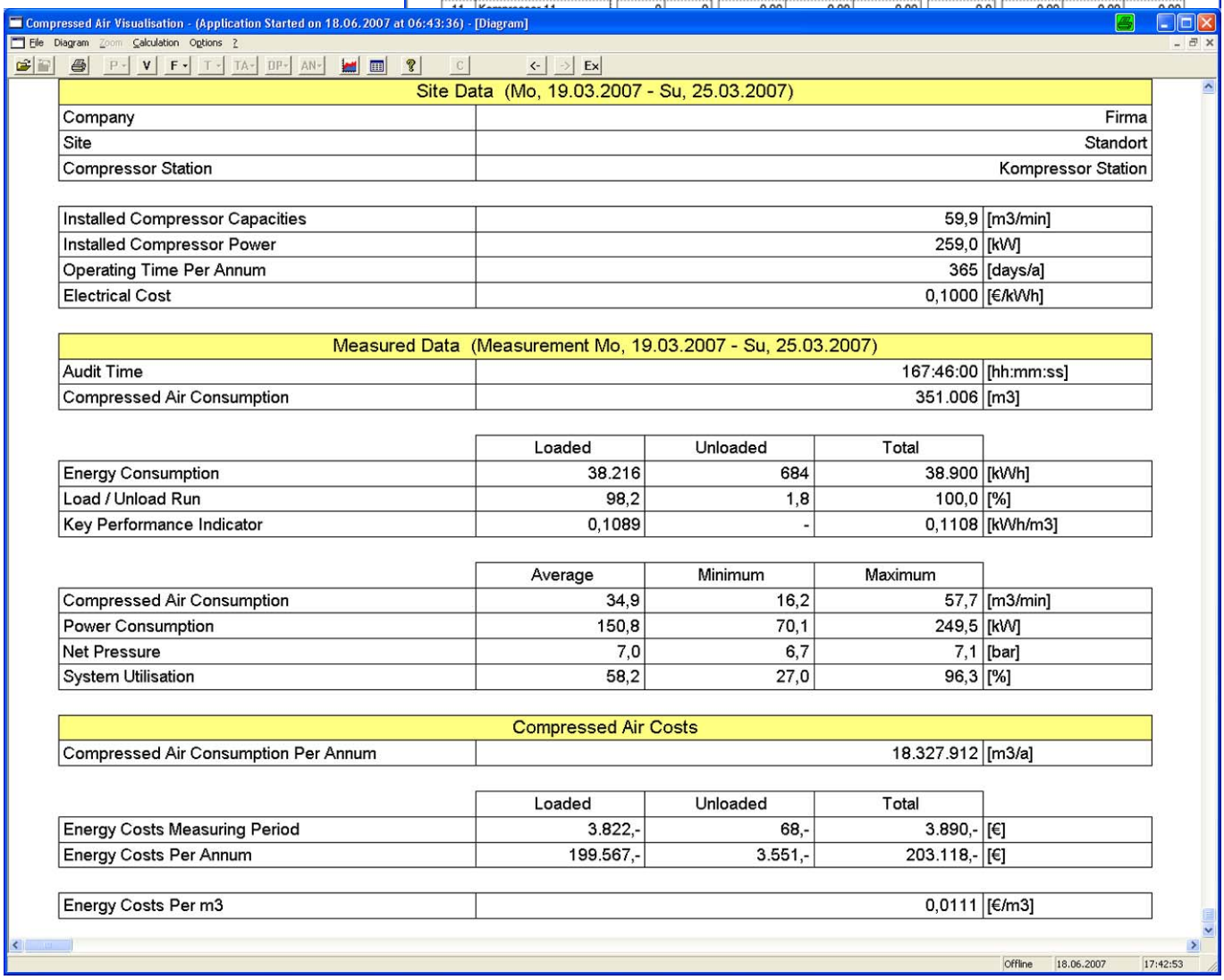
Compressor Data (Measurement Mo, 19.03.2007 - Su, 25.03.2007)

CH	Compressor	Output [m3/min]		[kW] Loaded		No-load	Audit Time	Time Run	Loaded		Unloaded	
		min	max	min	max	[kW]	[hh:mm:ss]	[%]	[hh:mm:ss]	[%]	[hh:mm:ss]	[%]
1	Kompressor 1	3,7	14,6	32,60	94,00	0,00	167:46:00	100,00	167:46:00	100,00	00:00:00	0,00
2	Kompressor 2		9,3		60,74	0,00	167:46:00	100,00	167:46:00	100,00	00:00:00	0,00
3	Kompressor 3		18,0		109,26	38,55	167:46:00	68,80	114:51:30	99,51	00:33:50	0,49
4	Kompressor 4		18,0		130,79	41,46	167:46:00	29,28	33:08:30	67,48	15:58:30	32,52
5	Kompressor 5		0,0		0,00	0,00	167:46:00	0,00	00:00:00	0,00	00:00:00	0,00
6	Kompressor 6		0,0		0,00	0,00	167:46:00	0,00	00:00:00	0,00	00:00:00	0,00
7	Kompressor 7		0,0		0,00	0,00	167:46:00	0,00	00:00:00	0,00	00:00:00	0,00
8	Kompressor 8		0,0		0,00	0,00	167:46:00	0,00	00:00:00	0,00	00:00:00	0,00
9	Kompressor 9		0,0		0,00	0,00	167:46:00	0,00	00:00:00	0,00	00:00:00	0,00
10	Kompressor 10		0,0		0,00	0,00	167:46:00	0,00	00:00:00	0,00	00:00:00	0,00
11	Kompressor 11		0,0		0,00	0,00	167:46:00	0,00	00:00:00	0,00	00:00:00	0,00
12	Kompressor 12		0,0		0,00	0,00	167:46:00	0,00	00:00:00	0,00	00:00:00	0,00
13	Kompressor 13		0,0		0,00	0,00	167:46:00	0,00	00:00:00	0,00	00:00:00	0,00
14	Kompressor 14		0,0		0,00	0,00	167:46:00	0,00	00:00:00	0,00	00:00:00	0,00
15	Kompressor 15		0,0		0,00	0,00	167:46:00	0,00	00:00:00	0,00	00:00:00	0,00
16	Kompressor 16		0,0		0,00	0,00	167:46:00	0,00	00:00:00	0,00	00:00:00	0,00



Measured Data (Measurement Mo, 19.03.2007 - Su, 25.03.2007)

CH	Compressor	Motor	Load	Total Power [kWh]			Total Air	Costs [€]		
		Starts	Cycles	Loaded	Unloaded	Total	m3	Loaded	Unloaded	Total
1	Kompressor 1	1	1	11.141,75	0,00	11.141,75	97.555,0	1.114,18	0,00	1.114,18
2	Kompressor 2	1	1	10.190,28	0,00	10.190,28	93.611,0	1.019,03	0,00	1.019,03
3	Kompressor 3	3	24	12.549,01	21,74	12.570,75	124.047,0	1.254,90	2,17	1.257,07
4	Kompressor 4	38	425	4.334,47	662,27	4.996,74	35.793,0	433,45	66,23	499,68
5	Kompressor 5	0	0	0,00	0,00	0,00	0,0	0,00	0,00	0,00
6	Kompressor 6	0	0	0,00	0,00	0,00	0,0	0,00	0,00	0,00
7	Kompressor 7	0	0	0,00	0,00	0,00	0,0	0,00	0,00	0,00
8	Kompressor 8	0	0	0,00	0,00	0,00	0,0	0,00	0,00	0,00
9	Kompressor 9	0	0	0,00	0,00	0,00	0,0	0,00	0,00	0,00
10	Kompressor 10	0	0	0,00	0,00	0,00	0,0	0,00	0,00	0,00
11	Kompressor 11	0	0	0,00	0,00	0,00	0,0	0,00	0,00	0,00



Compressed Air Visualisation - (Application Started on 18.06.2007 at 06:43:36) - [Diagram]

File Diagram Zoom Calculation Options ?

Site Data (Mo, 19.03.2007 - Su, 25.03.2007)

Company	Firma
Site	Standort
Compressor Station	Kompressor Station

Installed Compressor Capacities	59,9	[m3/min]
Installed Compressor Power	259,0	[kW]
Operating Time Per Annum	365	[days/a]
Electrical Cost	0,1000	[€/kWh]

Measured Data (Measurement Mo, 19.03.2007 - Su, 25.03.2007)

Audit Time	167:46:00	[hh:mm:ss]
Compressed Air Consumption	351.006	[m3]

	Loaded	Unloaded	Total	
Energy Consumption	38.216	684	38.900	[kWh]
Load / Unload Run	98,2	1,8	100,0	[%]
Key Performance Indicator	0,1089	-	0,1108	[kWh/m3]

	Average	Minimum	Maximum	
Compressed Air Consumption	34,9	16,2	57,7	[m3/min]
Power Consumption	150,8	70,1	249,5	[kW]
Net Pressure	7,0	6,7	7,1	[bar]
System Utilisation	58,2	27,0	96,3	[%]

Compressed Air Costs

Compressed Air Consumption Per Annum	18.327.912	[m3/a]

	Loaded	Unloaded	Total	
Energy Costs Measuring Period	3.822,-	68,-	3.890,-	[€]
Energy Costs Per Annum	199.567,-	3.551,-	203.118,-	[€]

Energy Costs Per m3	0,0111	[€/m3]

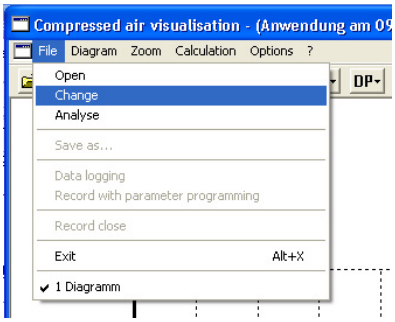
Offline 18.06.2007 17:42:53

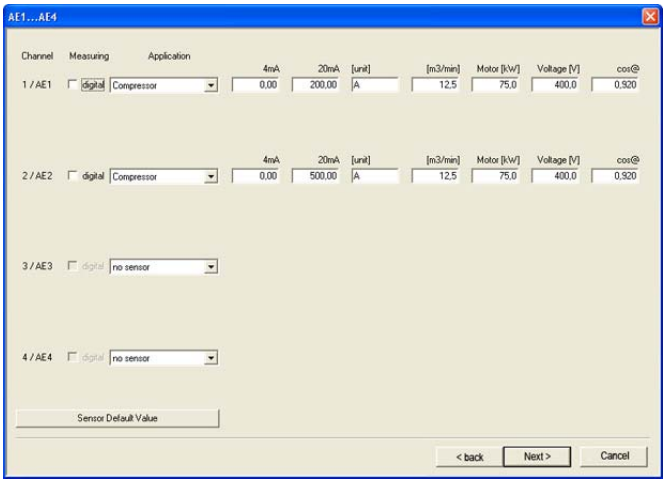
Changing the average of compressed air consumption diagram

If compressor go not more than 2-4 cycles per hour in on load mode
it is possible to change the calculation time of compressed air diagram

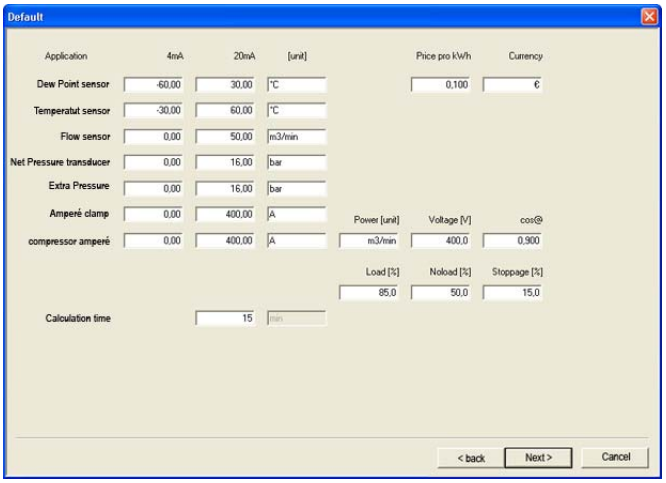
This Mask shows also the default settings of different sensors

1. Click on „FILE - change
2. than klick on „Sensor Default value
3. set calculation time to auf 60 min
4. klick than on NEXT than OK
5. correct data with klick on button „C“

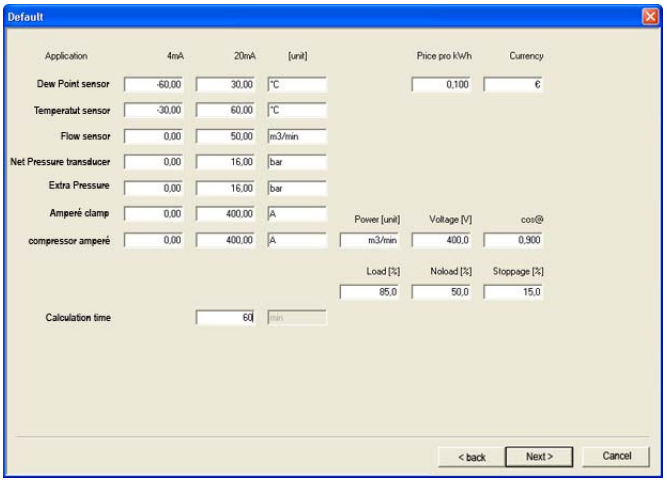




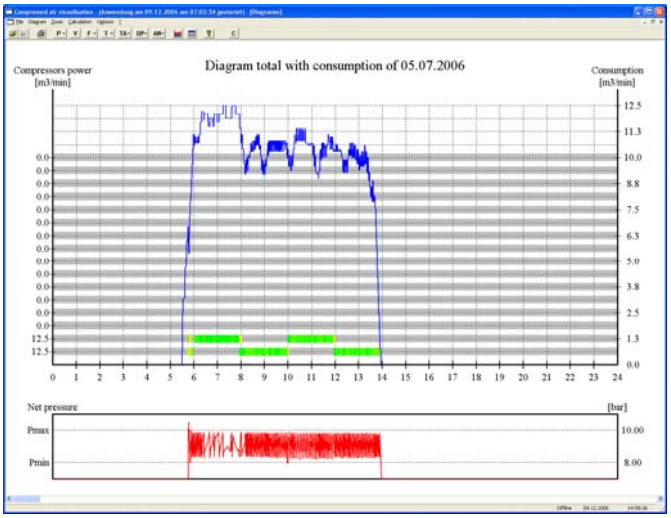
Mask bevor changing



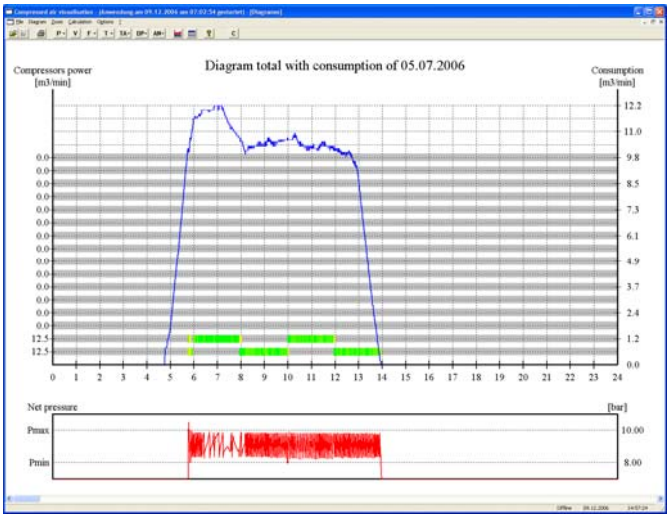
Mask after changing



Total diagram bevor changing



Total diagram after changing

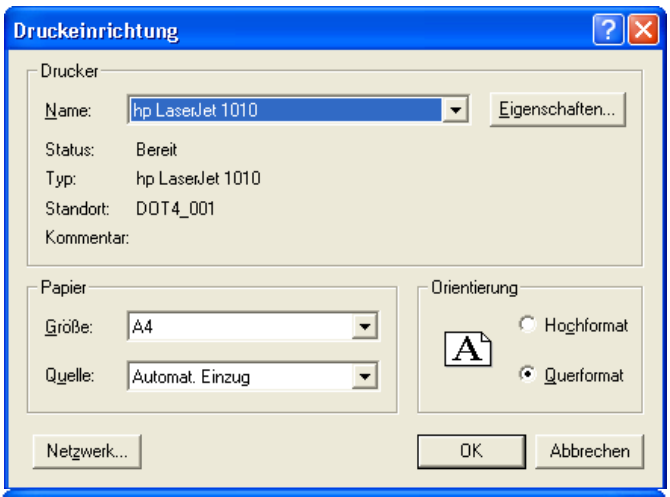


Setup printer

SETUP PRINTER

Klick with mouse on **diagram printer setup**

Select your previous printer

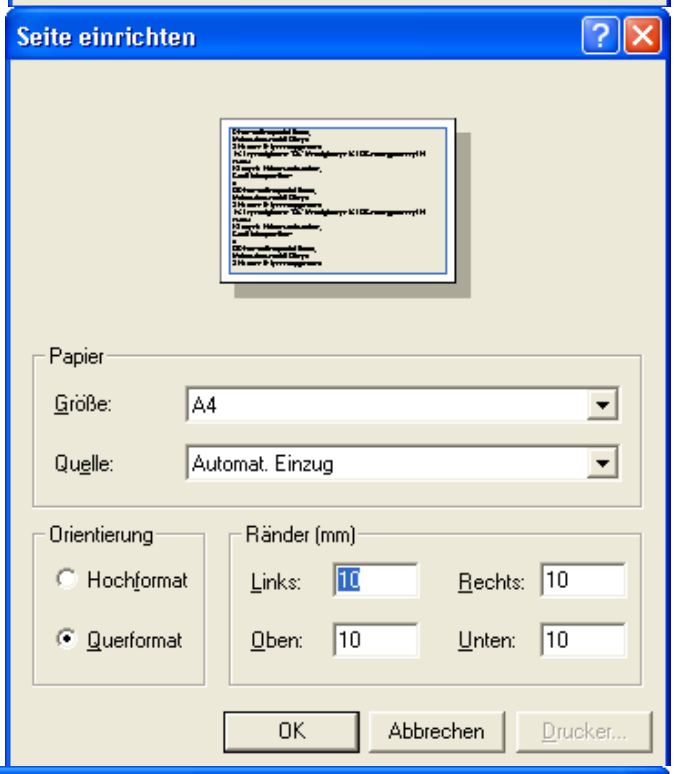


PAGE SETUP

Klick with mouse on **diagram page setup**

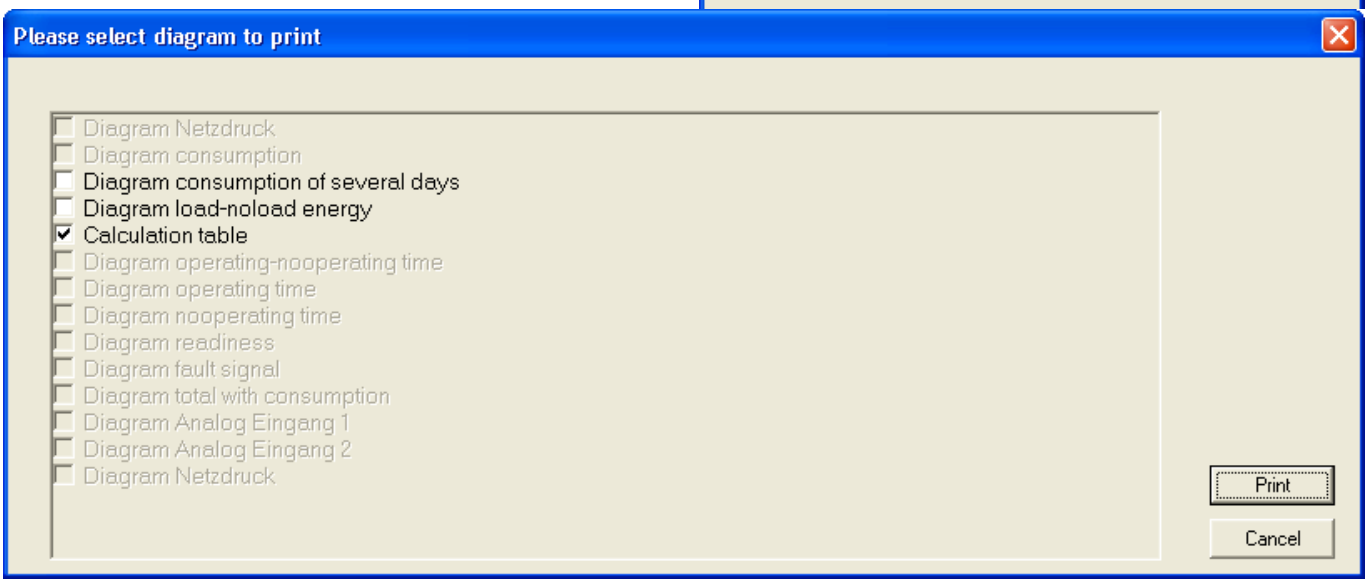
Set the edge of the page to 10 mm

Default is 25 mm

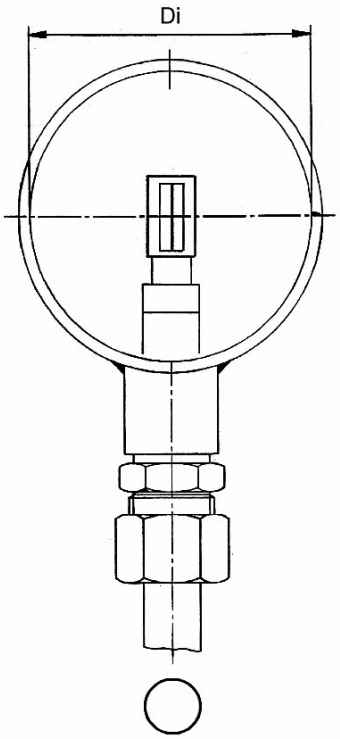


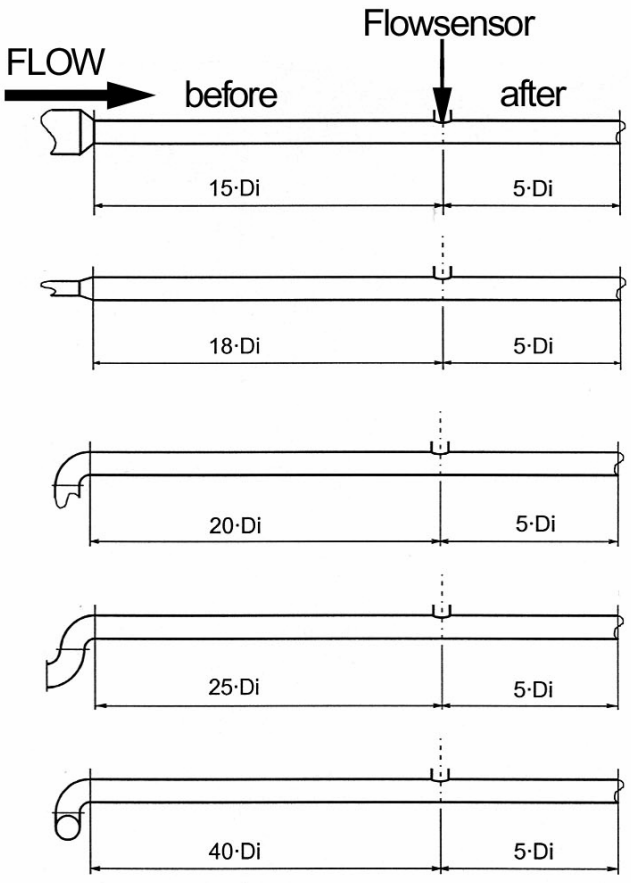
PRINT DIAGRAMS

Klick on printer and mark the diagrams for printing



Mounting the Flow Sensor





Datenliste für die Analog-Messung

Eingang	Kompressor Typ oder Sensor Typ	Last / Leerlauf	geregelt	m³/min - Minimal	m³/min - Maximal	Motor kW	Cos phi	Amperé - Zangenwert	kW Messung Wert	Netzdrucksensor	Extra Drucksensor	Temperatur Sensor	Flowsensor	Wert bei 4 mA	Wert bei 20 mA	Eingang
1																1
2																2
3																3
4																4
5																5
6																6
7																7
8																8

Messkoffer Nr.		Datum		Kunden Name	