teletronic Rossendorf GmbH

HZDR innovation

Wire Mesh Sensor System

CAP200 Manual

Version 1.5

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Directory

1 Versions

This manual is valid for the CAP200 data acquisition program version 1.5.18.0

2 Introduction

The Wire-Mesh-Sensor-System CAP200 allows you to make flow measurements in one or two phase flows, like:

- Liquid- gas- flows,
- Two immiscible liquids or
- Liquids with additions of salts or ions.

In the cross section of the wire-mesh-sensor the distribution of the electrical conductivity with high sampling rates and in high spatial resolution is measured. Measure values derived from the Wire-Mesh-Sensor are:

- The volumetric phase fraction in a two phase flow (void fraction, steam fraction),
- the distribution of two immiscible liquids,
- the distribution of concentrations of salts or similar materials which influenced the electrical conductivity inside liquids,
- the classification of phase fractions averaged over the measure cross section,
- the validation of the degree of dispersion the discontinuous phase (bubble size distributions) and
- the velocity measurement (by using two sensors, one behind the other).

The Wire-Mesh Sensor-System is applicable in pipings with size greater than 20 mm. for example in bubble columns, test ranges and reactors at temperatures to 180 °C and a pressure to 7 Mpa. The minimum conductivity of the liquid phase which can be detected should amount to 0.01 µS/cm.

3 Prepare the equipment

3.1 Hardware checklist

The Wire Mesh Sensor System consists of:

- 1 CAP 200 Basic device

- 1 Power cable
- 8 transmitter units   8 transmitter connection cables   terminating resistor

- 8 receiver units   8 receiver connection cables

- 1 USB cable
- 1 CD

Additionally, you need a PC to utilize and control the CAP200 system.

3.2 PC system requirements

For the operation of the Wire-Mesh-Sensor-System the following PC system requirements are necessary:

- IBM PC/AT or 100% compatible PC

- with 1 GB RAM

- 2 GHz processor or higher

- Display 1280 x 1024 Pixel

- a free High-Speed (480 Mbit/s) USB 2.0 Port

- Operating System: Windows XP

- Recommended: a second HDD

3.3 System structure

The CAP200 system uses the following components:

- basic device
    -master card
    -slave cards
        -CF card
    -IO cards
    -power supplies
- transmitting modules
- receiving modules
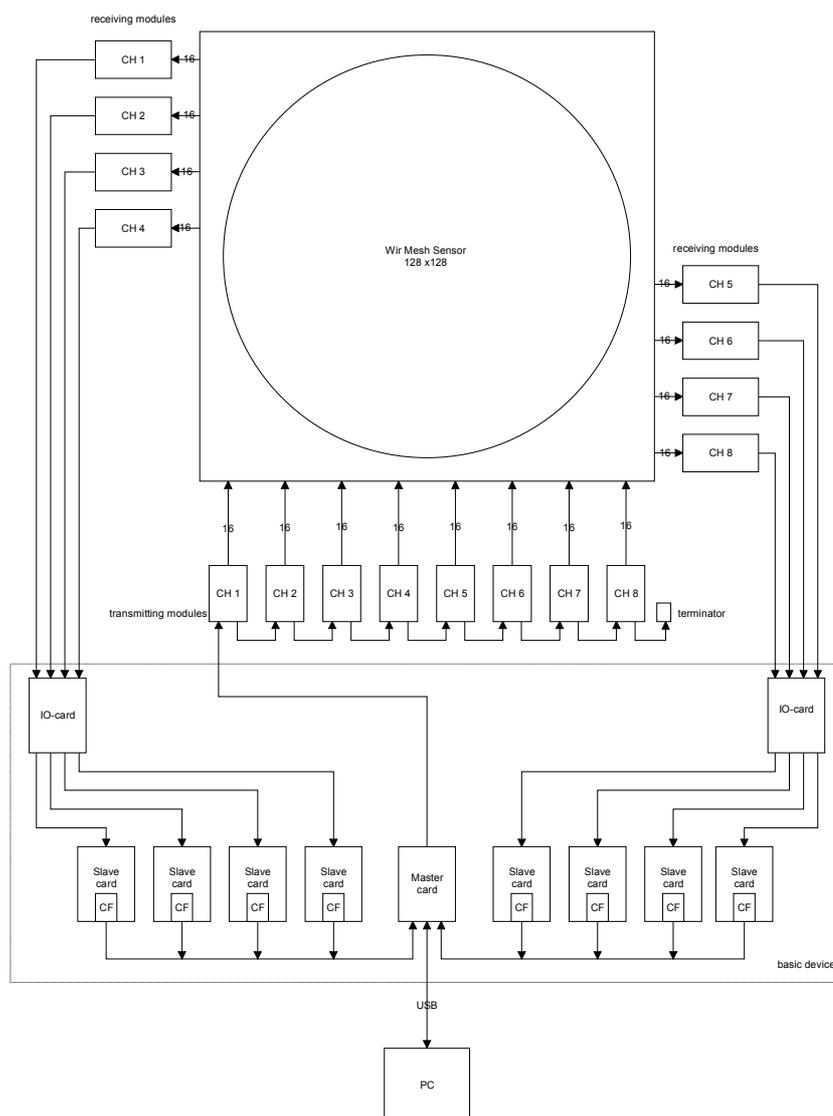
Image 3.1: WMS200 system structure

3.4 The components

3.4.1 Basic device

Image 3.2: WMS200 basic device

The basic device contains the following cards:
- 3x Power supply cards for +5.0V, -7.5V and +7,5 V
- 2x IO cards
- 8x Slave cards
- 1x Master card

Power Supply cards

	Each power card contains a switching power supply. The green LED should light during normal operation. If not maybe a fuse a is burned out. The right fuse parameters are printed inside the card.

IO card

	The IO card contains 4 sockets for the receiver modules. The sockets are named with A to D. The sockets on the left IO card used for receiver modules 1 to 4 and the right IO card for receivers 5 to 8.

Label	left IO card	right IO card
A	Receiver 4	Receiver 5
B	Receiver 3	Receiver 6
C	Receiver 2	Receiver 7
D	Receiver 1	Receiver 8

Slave card

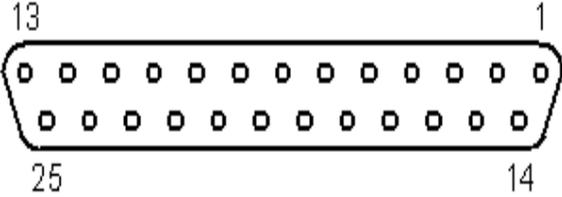|	The Slave card receives the data stream from the receivers and store the data on a compact flash card (CF-card). During normal operation it is not necessary to remove the CF-card. The CF-card data format is not readable by a third party card reader. The green LED is blinking if the card has no valid data received. Otherwise the green LED is lighting continuously. The yellow LED ligth up when the master card read data from this card. The red LED lights during a measurement.

Master card

	The master card controls the measurement and the communication with the PC over a USB connection. The red LED lights during a measurement. The yellow LED light up when the master card read data from a slave card. The green LED shows that the master card is ready. The Reset button resets the devise in the power up state. The 15 pin Sub-D socket is used to connect the first transmitting module by a cable with max. 3 Meters length. Please show section Trigger for description of the trigger sockets.

3.4.2 Transmitting modules

 Image 3.3: CAP200 transmitting module 	The transmitting modules are connected as a daisy chain. The master activate a module by sending its module address over the serial bus. The module address is changeable by jumper inside the module. For normal operation no address change is necessary. See Transmit pulse timing for information about the transmitted pulse. **Image 3.4: CAP200 transmitting module output socked** **Caution! Hot surface.**

Pin no.:	Signal:	Pin no.:	Signal:
1	GND	14	GND
2	GND	15	GND
3	transmitting electrode 1	16	transmitting electrode 2
4	transmitting electrode 3	17	transmitting electrode 4
5	transmitting electrode 5	18	transmitting electrode 6
6	transmitting electrode 7	19	transmitting electrode 8
7	transmitting electrode 9	20	transmitting electrode 10
8	transmitting electrode 11	21	transmitting electrode 12
9	transmitting electrode 13	22	transmitting electrode 14
10	transmitting electrode 15	23	transmitting electrode 16
11	1-Wire® Bus	24	GND
12	GND	25	GND
13	GND		

Table 1: transmitting module output socket pinout

3.4.3 Receiving modules

Image 3.5: CAP200 receiving module

The receiver module contains the pre-amplifier , the main amplifier the ADC and a control unit. The gain is changeable by a digital potentiometer with 255 steps. Because of manufacture tolerances there are some differences in the gain factor between two electrodes possible.
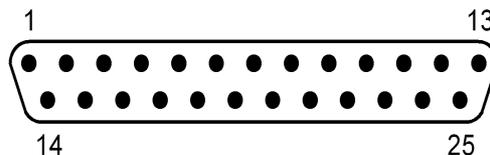

Image 3.6: CAP200 receiving module input plug

Caution! Hot surface.

Pin no.:	Signal:	Pin no.:	Signal:
1	GND	14	GND
2	GND	15	GND
3	1-Wire® Bus	16	receiving electrode 1
4	receiving electrode 2	17	receiving electrode 3
5	receiving electrode 4	18	receiving electrode 5
6	receiving electrode 6	19	receiving electrode 7
7	receiving electrode 8	20	receiving electrode 9
8	receiving electrode 10	21	receiving electrode 11
9	receiving electrode 12	22	receiving electrode 13
10	receiving electrode 14	23	receiving electrode 15
11	receiving electrode 16	24	GND
12	GND	25	GND
13	GND		

Table 2: receiving module input plug pinout

3.5 Cabling description

- Switch off the CAP200 basic device during change the hardware configuration!

- Note: The order of the receiving sockets are different for the left and the right IO-module.

- Connect the sensor to the CAP200 basic device. A sample for a 128 x 128 sensor is shown in the following image.

Image 3.7: Cabling plan for a 128 x 128 Sensor
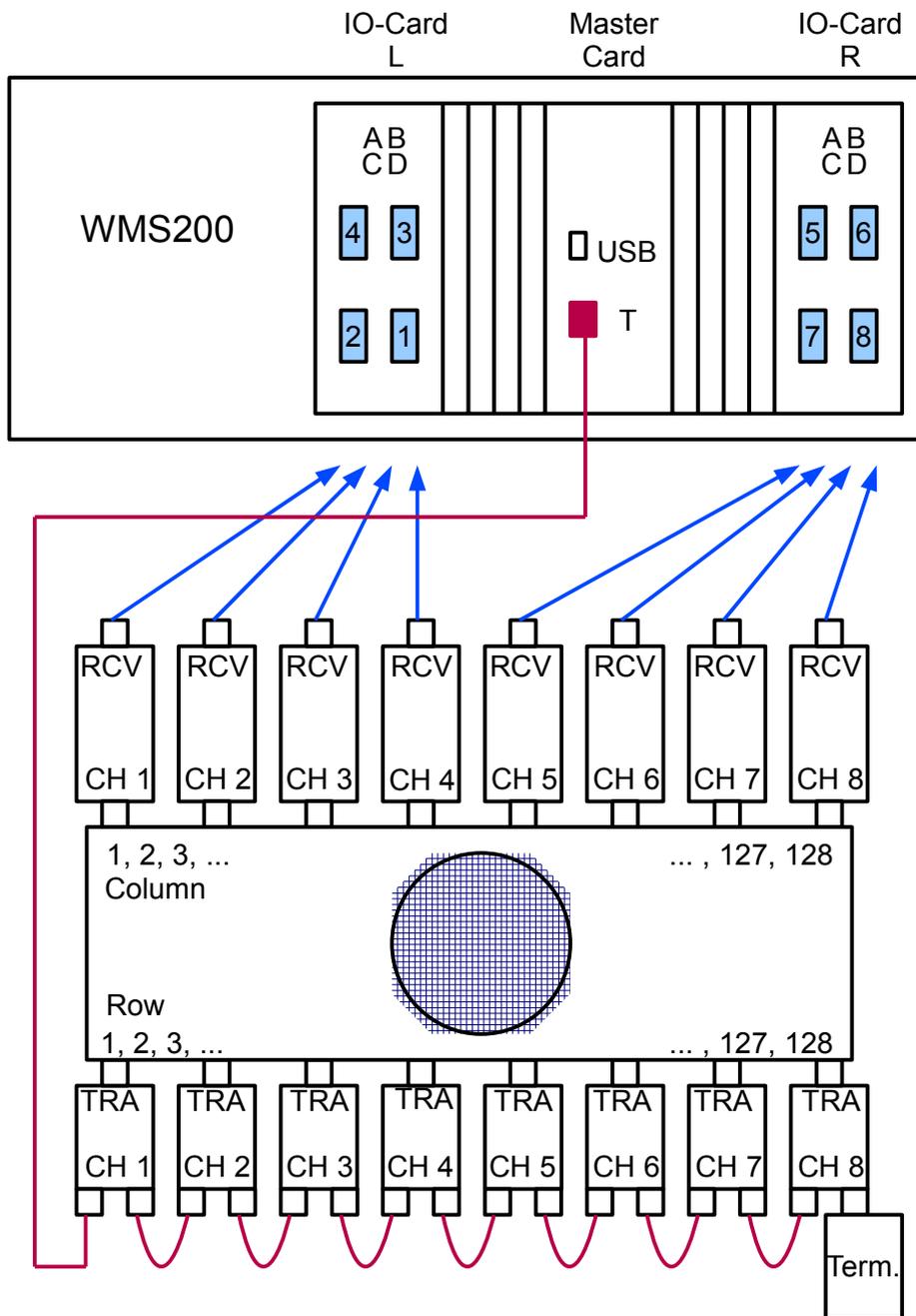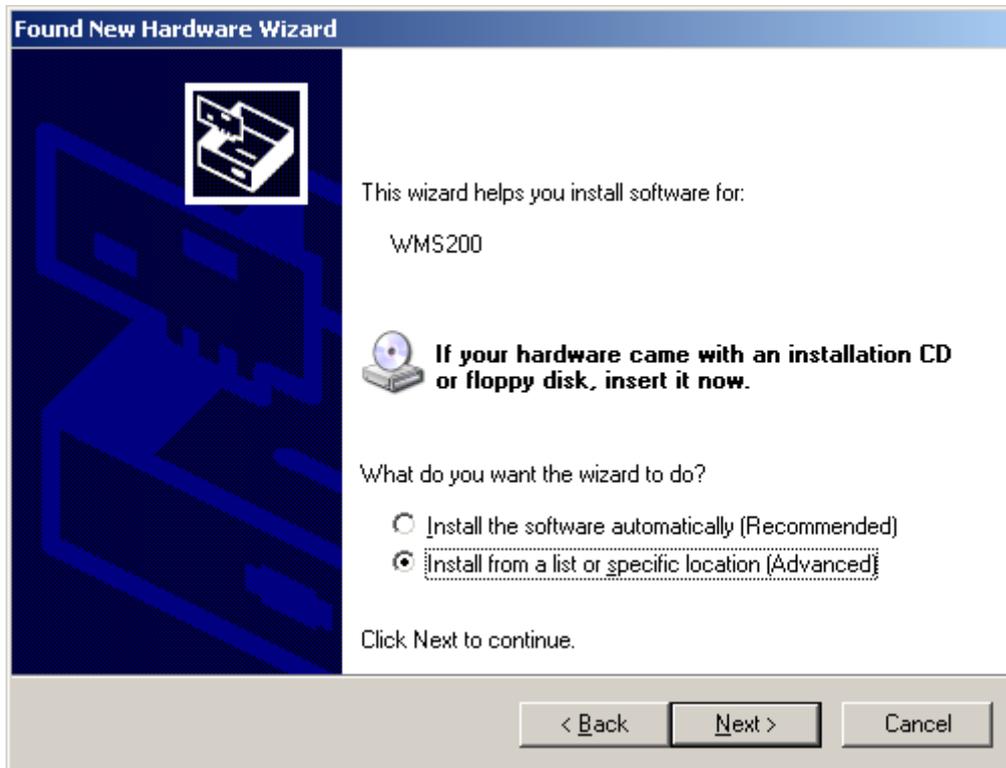
3.6 Installing the Software

- Insert the install CD.

- Connect the CAP200 Basic device to the PC over USB.

- Switch on the CAP200 Basic device.
  (Now, the USB device driver installation starts automatically.)

- Follow the instructions to install the USB device driver.

Choose the CD-ROM drive.
(Driver INF file and driver file are contained in the directory /USB_DRIVER.)

Afterwards please run the Setup.exe on CD to install the data acquisition software.
With the default settings the setup program creates a directory "C:\program files\Teletronic\Wire_Mesh_System_CAP200" which contains the program and configurations files. After the setup is finished you will find the program CAP200 in the WINDOWS start menu.
The directory contains also the program Dataconverter for data converting from WMS-Standard-File-Format to the Export-File-Format, the manual and the specification.

To remove the software from the PC please use the windows uninstall function. ("System/Software/[Install/Deinstall]").

4 CAP200 data acquisition program
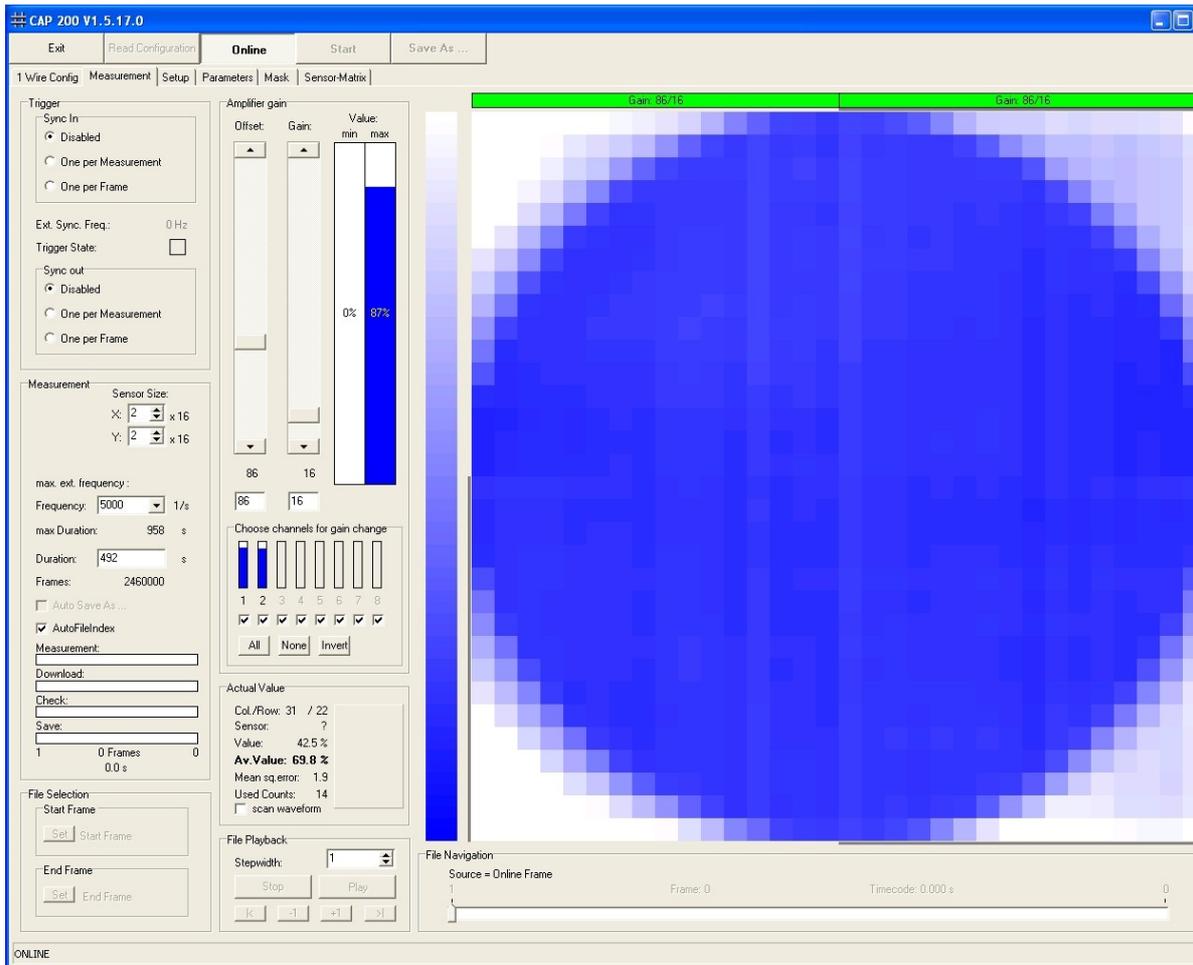

Image 4.1: CAP200 Main Screen

4.1 Controls

Main buttons:

"Exit":
The "Exit" button close the CAP200 data acquisition program.

"Read Configuration":
This button restarts the 1-Wire® bus configurations mode.

"Online":
Start and Stop the Online mode to test the actual settings for the pre-amplifier and the main-amplifier.

"Start" ("Start ..."):
This button starts the measurement. The predefined duration value terminates the measurement automatically. You can break the measurement any time by deactivating the Start button. The progress bars Measurement, Download and Check display the measurement status. If there are unsaved measurement data, the text on then button changes to "Start ...". In this case a "overwrite data" confirm window appears when you press the button.

"Save As":
With this button you choose the filename and store the data to the PC hard disk. You can increase the saving speed if you use different hard drives for the temp file and the measurement data file.

Tabsheets:

"1 Wire Config":
Contains the controls for the hardware configuration over the 1-Wire® bus.

"Measurement":
Contains the controls for measurement

"Setup":
Contains the controls and information about the CAP200 system.

"Parameters":
Here you can add some information for the measurement.

"Mask":
Contains the controls to mask some unused cross points.

4.2 Controls on Tabsheet "1 Wire Config"

The CAP200 System use the 1-Wire® bus to identify the connected devices.

The 1-Wire® bus use switch devices, ROM devices and PIO devices.

Switches to realize a tree bus structure.
ROMs contains information about the CAP200 module.
PIOs are used for simple IO operations like address or gain change.
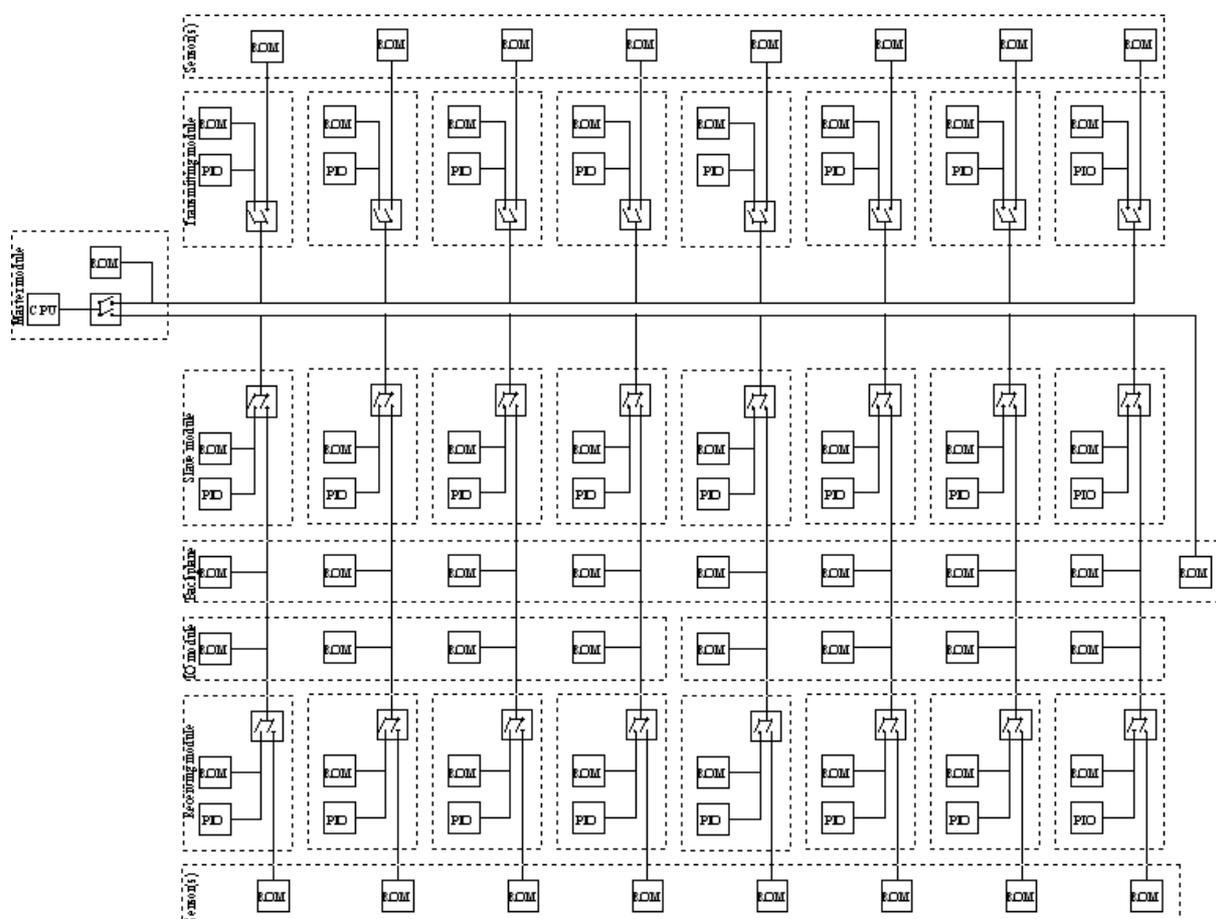
Image 4.2: CAP200 1-Wire® bus structure
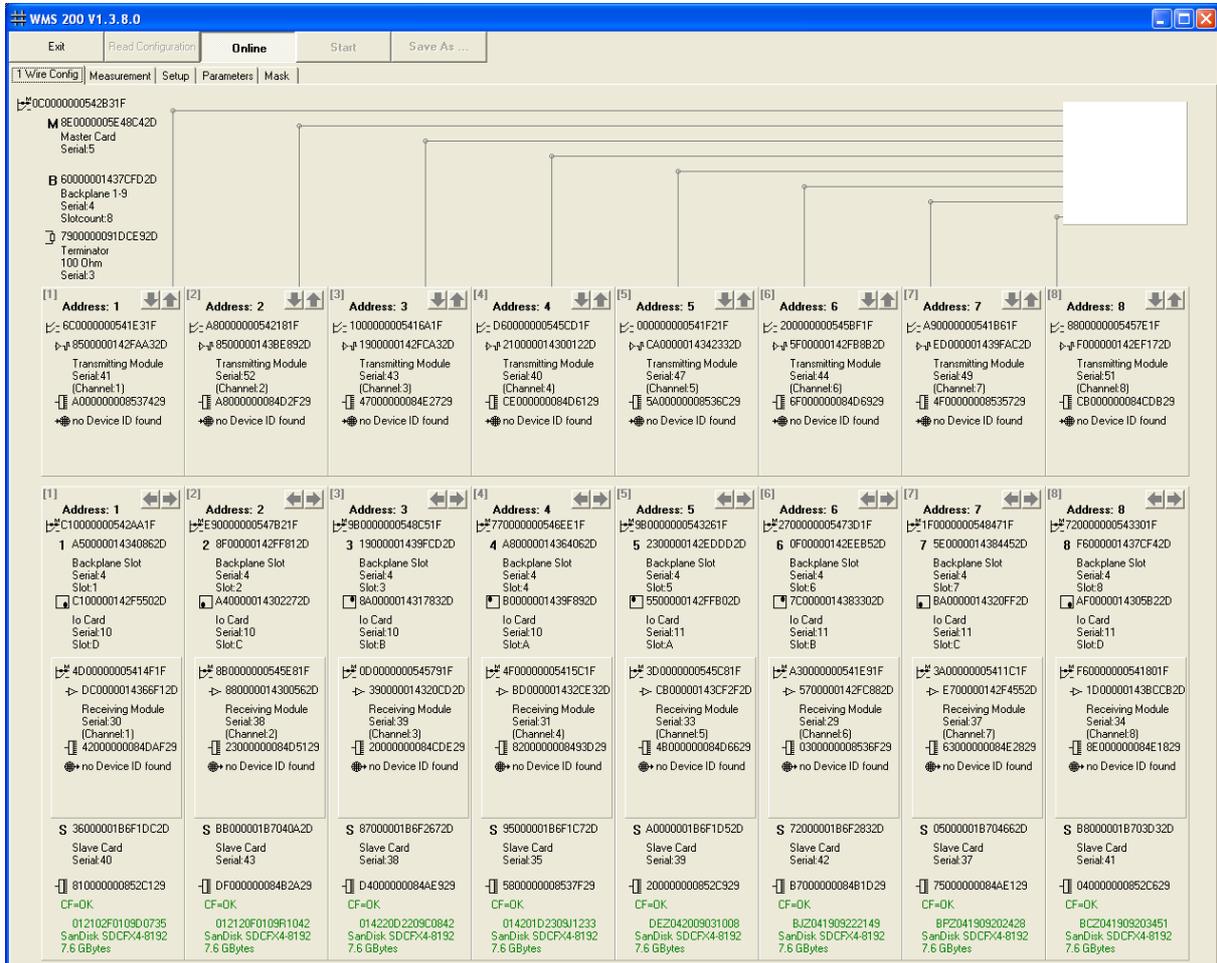
Image 4.3: CAP200 1-Wire® Config Screen

Buttons:

With the UP/DOWN button it is possible to change the vertical position (transmitting module address) of a transmitting module in the cross section view. The same address for several modules are possible. It is also possible to switch off a module or set to "any" address.

With the LEFT/RIGHT buttons it is possible to swap the horizontal position (slave module address) of two receiving modules in the cross section view.

4.3 Controls on Tabsheet "Measurement"

"Trigger / Sync in / Disabled":
The "Trigger In" input on the master module is disabled.

"Trigger / Sync in / One per Measurement":
The measurement starts with a Sync pulse on the "Trigger In" input on the master module. See specification for parameters of the sync pulse.

"Trigger / Sync in / One per Frame":
Each frame starts with a Sync pulse on the "Trigger In" input on the master module. See specification for parameters of the sync pulse.

"Trigger / Sync out/ Disabled":
The "Trigger Out" output on the master module is disabled.

"Trigger / Sync out / One per Measurement":
A synchronize pulse on measurement start is provided on the "Trigger Out" output on the master module. See specification for parameters of the sync pulse.

"Trigger / Sync out / One per Frame":
A synchronize pulse for each frame is provided on the "Trigger Out" output on the master module. See specification for parameters of the sync pulse.

"Trigger / Check Trigger In":
Shows the state of the "Trigger In" input on the master module.
green = inactive
red   = active (measurement / frame starts)

"Measurement / Sensor Size / X":
Here you can reduce the sensor size in steps of 16 receiving electrodes (one receiving module). The maximum possible size is depend of the found receiving modules.

"Measurement / Sensor Size / Y":
Here you can reduce the sensor size in steps of 16 transmitting electrodes (one transmitting module). The maximum possible size is depend of the found transmitting modules.

"Measurement / Pulse width shot / long = 6.00 µs":
Increase the transmitting pulse length from 6 µs to 12 µs for configurations that need more response time. See WMS200 Specification for WMS200 transmitting pulse timing.

"Measurement / Frequency":
Here you can choose the measurement frame frequency. The possible frequencies are depend on the sensor size (used transmitting modules).

"Measurement / Duration":
Set the required measuring duration and press <ENTER> to update the value. The max. duration is depend on sensor size (used transmitting modules) and choosed measurement frame frequency. The max. duration is shown above this field.

"Measurement / Auto Save As...":
After the first save process you can choose the option "Auto Save As..." to save all following measurements automaticly. In this case the program adds a underline and a file number to the file name ("_0000"). This number is incremented automatically with every measurement.

"Measurement / AutoFileIndex":
If this option selected, the program adds a underline and a file number to the file name ("_0000"). This number is incremented automatically with every measurement.

Progress bars:

Measurement progress bar:
Shows the state of the measurement duration.

Download progress bar:
Shows the state of download the measurement data from the basic device CF cards to the PC over the USB connection.

Check progress bar:
Shows the state of measurement data check.
When the color change to yellow may by the data are incorrect and the measurement should be repeat.

Save progress bar:
Shows the progress of storing the data to PC hard disk. You can increase the saving speed if you use different hard drives for the temp file and the measurement data file.

Offset and Gain Adjustment:

The Offset and Gain sliders should be adjusted to achieve the highest possible contrast between the smallest and the largest electrical permittivity values used in the two phase flow experiment!

Offset
The Offset slider should be used to adjust the offset of the amplifiers for the specific experiments. For setting the offset value the sensor should be filled completely with the medium of lowest electrical permittivity used in the later experiments (e.g. air). Then put the Amplifier slider to maximum to get the maximum amplification for the low values. Afterwards the Offset should be adjusted to get readings right above zero level (ap. 5 %) for all crossing points inside the cross sectional area of the sensor.

Gain
After adjusting the Offset the sensor should be filled completely with the medium of the highest electrical permittivity used in the later experiments (e.g. water). After filling the sensor the gain should be lowered until all crossing points in the cross section show readings below 90%.

Now calibration data for the lowest and the highest electrical permittivity's should be acquired by filling the complete cross section with the specific fluids.

Amplifier offset and gain / Choose channels for change per module
Choose here the receiving modules which gain and offset you want change.

Amplifier gain / All
Set all receiving modules to accept a gain change.

Amplifier gain / None
Set none receiving modules to accept a gain change.

Amplifier gain / Invert
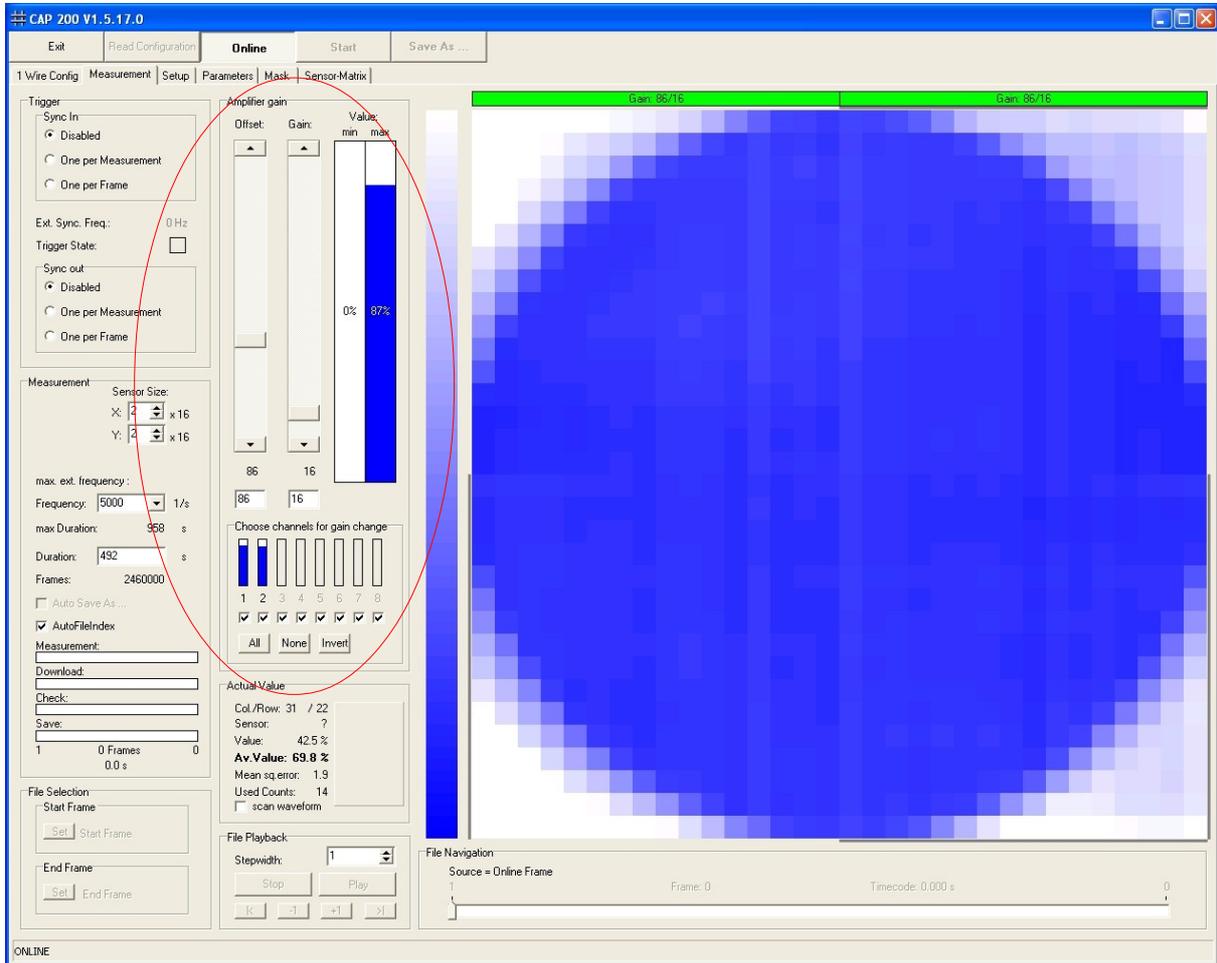Invert the chosen receiving modules to accept a gain change.

Image 4.4: Offset and gain adjustment

4.3.1 Cross section view

Actual Value:
Shows the column / row and the corresponding entry value under the mouse pointer in percent.

Above the cross section view the adjusted pre and main gain are displayed. The color of the box shows the state of the receiving module.

Gain: 2/2

Received data from this module are valid.

Gain: 16/26

Received data from this module are valid, but the adjusted gain is different from the first module .

Gain: 2/2

Received data from this module are invalid, because the adjusted gain are unknown. Reset the gain for this module to get valid data.

Gain: 2/2

Received data are invalid, because no module is connected.

Gain: 2/3

Received data are invalid, because there are a error in the data frame.

Display a measurement value table

If you hold down the left mouse key, you can create a frame. A window appear which contains a table with the measurement values insight this frame. In the View menu you can select the format of the displayed values.

File Playback
Use this buttons to show the recorded measurement data.

File selection
Here you can select a part of the recorded measurement data for save to the PC hard disc.

File navigation
Shows the actual frame number , time code and source.

4.4 Controls on Tabsheet "Setup"

Tempfiles / Choose
Here you can change the path of the temporary files. The data recording program software stores the data from each slave card CF-Card in a different temp file. During the save process the temporary files a merged into one measurement file. You can increase the saving speed if you use different hard drives for the temp file and the measurement data file.

Debug / Save Debug report
Create a debug report as a text file.

Setup / Systeminfo / Update:
The system info shows the versions numbers of the system components firmware.

With the update function it is possible to write firmware into the WMS200 system components. We will inform you, if a firmware update for your WMS200 system is available and recommended. The firmware update contains a firmware update guide.

Do not use the update function without the appropriate update guide!

Temperature
The temperature of the transmitters and receivers is shown in the Systeminfo frame (values) and in the Temperature frame (chart).

The temperature of the transmitters and receivers should not rise above 60°C.

The temperature of the transmitters and receivers should be constant while measuring.

4.5 Controls on Tabsheet "Parameters"

On the Tab "Parameters" you can define additional parameters that are stored with each measurement file in a file with extension *.INF.

File parameter / ADD   Creates a new parameter line.

File parameter / DEL   Deletes the selected line.

File parameter / UP   moves the selected line up.

File parameter / DOWN   moves the selected line down.

Through click on the left column the type of a parameter can be changed.
 "I"   means incremental. A number in the text field of the parameter will increased by one by each store process (i. e. for file index).
 "C"   means clear. This parameter text is deleted with each store process. Thereby is prevented that inadvertently parameters for the next measurement are taken over.

An empty type field points on a normal parameter, whose text is transferred to each new file.

4.6 Controls on Tabsheet "Mask"

Contains the controls to mask some unused cross points.

Mask / Clear   Clear the mask / makes all points visible

Mask / Paste   Paste the mask from the clipboard as a Bitmap.
(Black pixel = point visible / white pixel = point invisible)

Mask / Copy   Copy the mask to the clipboard as a Bitmap

Mask / Invert   Invert the mask

Mask / Load ...   Load the mask from a mask file or a Windows bitmap file.

Mask / Save As ...   Save the mask to a mask file or a Windows bitmap file.

Auto Mask   Creates a mask from the actual frame.

1. Fill the sensor with water
2. Measure some frames with the online mode
3. Choose the threshold
4. Edit the mask with then mouse or in a image editor program.

5 Measuring

- Switch on the WMS200 basic device.

- Start the WMS200 Software.

  At first, the 1-Wire® Config Screen appears. Now, the software configurates the WMS200 components. This takes several seconds - you have to do nothing.

  After the system configuration, the WMS200 main screen is displayed.

- Activate the Online button.

- Change the "Measurement / Sensor Size / X" sensor size if necessary.

- Change pre and main gain. The max. Value should be less than 90%. **(Note: 100% represents the ADC value 4079 (not 4095)!)**

- Create / load a mask

- Select a trigger mode

- Change Pulse width short/long, frequency and measurement duration.

- Deactivate the Online button and press the Start button.

- The predefined Duration value terminates the measurement automatically. You can break the measurement any time by deactivating the Start button.

- The progress bars Measurement, Download and Check display the measurement status.

- Check the measurement data by play back the File or scroll to the desired frame.

- Select the interesting part of the measurement file by scrolling to the desired start / end frame and press the Start Frame / Set and End Frame / Set Button.

- Update the Parameters

- Press the Save As ... button to save the measurement data.

- Activate Auto Save As ... to save all following measurements automaticly by adding a index number to the filename.

6 Signal Monitor
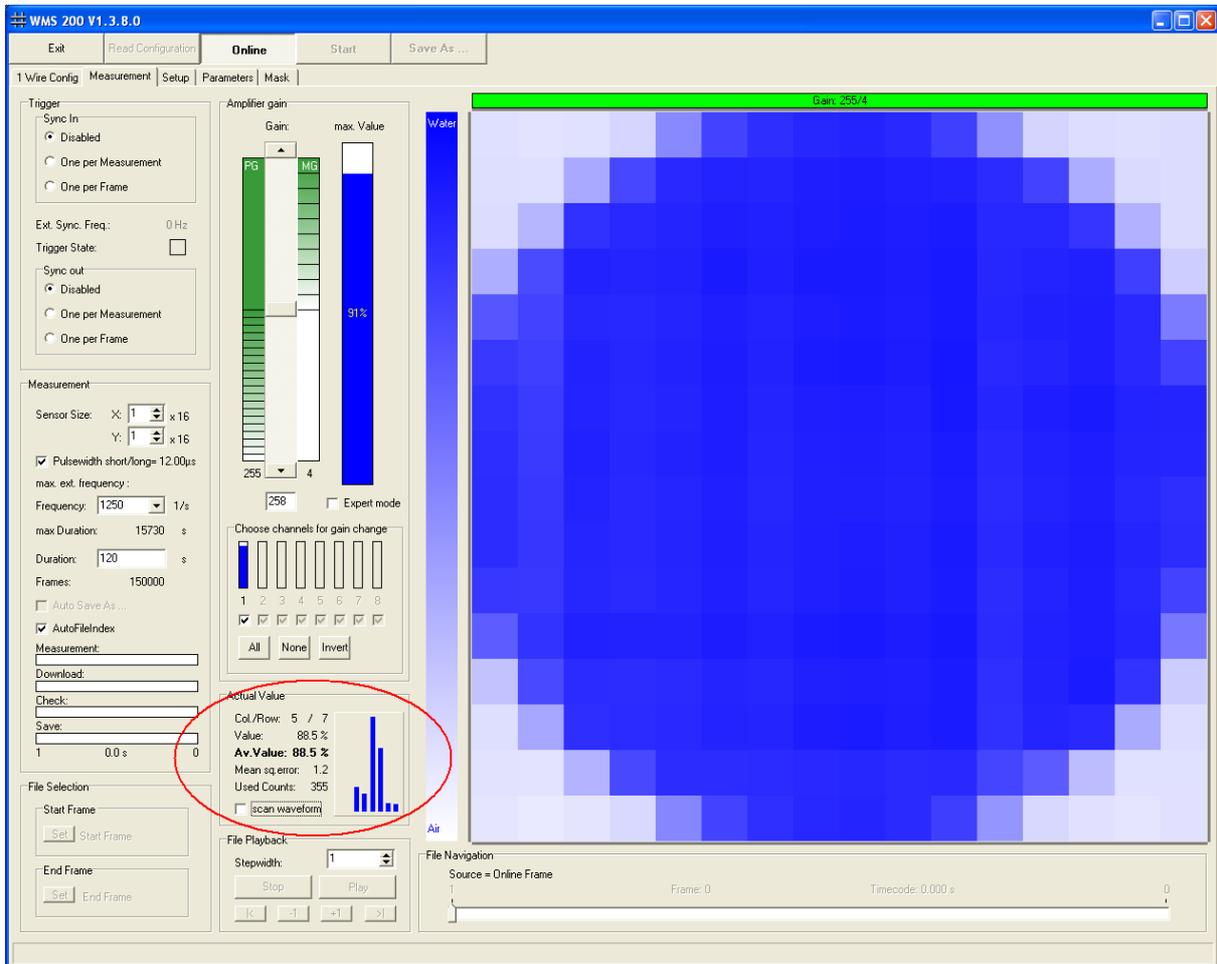
Image 6.1: Signal Monitor

The Signal Monitor is a function of the WMS200 data acquisition program to inspect the signal quality. The Signal monitor is available in the "Online"-Mode and the "File Playback"-Mode

To display the measurement value histogram for a grid point, position the mouse pointer over the grid point in the cross section view.
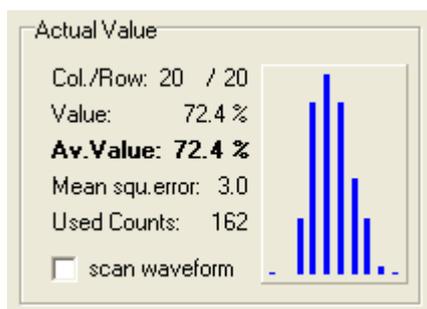
The following parameters are calculated:

Parameter:	Description:
Col./Row.:	column / row of the grid point
Value:	current value [%]
Av.Value:	average [%]
Mean squ. error:	mean square error
Used counts:	number of measurement values used to calculate average and mean square error

7 Triggering

The "Trigger" sockets provide an input to synchronize the WMS200 system with other measurement equipment. See WMS200 specification for electrical parameters.

Trigger In socket: A pulse on this socket starts the measurement if the "Sync In / One per measurement" option is selected.

A pulse on this socket measure the next frame if the "Sync In / One per frame" option is selected.

Note: If "Sync In / One per frame" selected enter the used ext. frequency. Make sure the frequency is lower or equal the displayed max. ext. frequency.

Trigger Out socked: Outputs a pulse during the measure is running, if the "Sync Out / One per measurement" option is selected.

Trigger Out socked: Outputs a pulse for each frame, if the "Sync Out / One per frame" option is selected.

The button "**Trigger / Check Trigger In**" Shows the state of the "Trigger In" input on the master module (green = inactive / red = active (measurement / frame starts).

8 File format

8.1 Standard file format

The 12 bit measurement values are packed in 32 bits of long integer words (DWORDS). The 16 values (each 12 bits) of a row are packed in 6 following DWORDS.

Each 12 bit measure value is shared in three parts, the highest 4 bits(H), the middle 4 bits(M) and lowest 4 bits (L). This parts are placed in a file like the following scheme:

DWORD offset in file	32 Bit DWORD in the measurement file (Bit No.)							
	31..28	27..24	23..20	19..16	15..12	11..8	7..4	3..0
0	C10R1H	C10R1M	C10R1L	C9R1L	C2R1H	C2R1M	C2R1L	C1R1L
1	C11R1H	C11R1M	C11R1L	C9R1M	C3R1H	C3R1M	C3R1L	C1R1M
2	C12R1H	C12R1M	C12R1L	C9R1H	C4R1H	C4R1M	C4R1L	C1R1H
3	C14R1H	C14R1M	C14R1L	C13R1L	C6R1H	C6R1M	C6R1L	C5R1L
4	C15R1H	C15R1M	C15R1L	C13R1M	C7R1H	C7R1M	C7R1L	C5R1M
5	C16R1H	C16R1M	C16R1L	C13R1H	C8R1H	C8R1M	C8R1L	C5R1H
6	C26R1H	C26R1M	C26R1L	C25R1L	C18R1H	C18R1M	C18R1L	C17R1L
7	C27R1H	C27R1M	C27R1L	C25R1M	C19R1H	C19R1M	C19R1L	C17R1M
8	C28R1H	C28R1M	C28R1L	C25R1H	C20R1H	C20R1M	C20R1L	C17R1H
9	C30R1H	C30R1M	C30R1L	C29R1L	C22R1H	C22R1M	C22R1L	C21R1L
10	C31R1H	C31R1M	C31R1L	C29R1M	C23R1H	C23R1M	C23R1L	C21R1M
11	C32R1H	C32R1M	C32R1L	C29R1H	C24R1H	C24R1M	C24R1L	C21R1H
12	C10R2H	C10R2M	C10R2L	C9R2L	C2R2H	C2R2M	C2R2L	C1R2L
13	C11R2H	C11R2M	C11R2L	C9R2M	C3R2H	C3R2M	C3R2L	C1R2M
14	C12R2H	C12R2M	C12R2L	C9R2H	C4R2H	C4R2M	C4R2L	C1R2H
15	C14R2H	C14R2M	C14R2L	C13R2L	C6R2H	C6R2M	C6R2L	C5R2L
16	C15R2H	C15R2M	C15R2L	C13R2M	C7R2H	C7R2M	C7R2L	C5R2M

Table 3: format of the measurement files

Cxx = column xx is the column number
Ryy = row yy is the row number
H   = highest 4 bits
M   = middle 4 bits
L   = lowest 4 bits

The following Pascal code decode a frame. The packet data are in the array "daten[0..(framecount-1)*DWORDperFrame]".

```
i:=frame*DWORDperFrame;                                    //calculate the offset to the frame to be decoded
for y:=0 to ymax-1 do begin                                //run from 0 to sensor row count -1
  for xn:=0 to (modulecount-1) do begin                    //run for each module (i.e. 2 for 32 receivers)
    x:=xn*16;                                               //offset for module
    aframe[x+0,y]:=(daten[i+0] and $F) or ((daten[i+1] and $F) shl 4 ) or ((daten[i+2] and $F) shl 8);
    aframe[x+1,y]:=(daten[i+0] shr 4) and $FFF;
    aframe[x+2,y]:=(daten[i+1] shr 4) and $FFF;
    aframe[x+3,y]:=(daten[i+2] shr 4) and $FFF;
    aframe[x+4,y]:=(daten[i+3] and $F) or ((daten[i+4] and $F) shl 4) or ((daten[i+5] and $F) shl 8);
    aframe[x+5,y]:=(daten[i+3] shr 4) and $FFF;
    aframe[x+6,y]:=(daten[i+4] shr 4) and $FFF;
    aframe[x+7,y]:=(daten[i+5] shr 4) and $FFF;
    aframe[x+8,y]:=((daten[i+0] shr 16) and $F) or ((daten[i+1] shr 12) and $F0) or ((daten[i+2] shr 8) and $F00);
    aframe[x+9,y]:=(daten[i+0] shr 20) and $FFF;
    aframe[x+10,y]:=(daten[i+1] shr 20) and $FFF;
    aframe[x+11,y]:=(daten[i+2] shr 20) and $FFF;
    aframe[x+12,y]:=((daten[i+3] shr 16) and $F)+((daten[i+4] shr 12) and $F0) or ((daten[i+5] shr 8) and $F00);
    aframe[x+13,y]:=(daten[i+3] shr 20) and $FFF;
    aframe[x+14,y]:=(daten[i+4] shr 20) and $FFF;
    aframe[x+15,y]:=(daten[i+5] shr 20) and $FFF;
    inc(i,6);                                               //next 6 DWORDS
  end;
end;
```

Now the array frame[0..xmax,0..ymax] contains the uncompressed values.

8.2 File format of the parameter file

The parameter file is structured like a WINDOWS INI-file. It contains different sections, which begin with a keyword included into square brackets. The sections contain the different parameters of the measurement, the sequence of the sections and the parameters in the sections.

Same of this parameters are:

[Program]

DataType=WMS	Type of the measuring data file
Version=2.0.0	Version of the measuring software
Datafileversion=2.0	Version of the measuring file
Datafilesubversion=0	Subversion of the measuring file

[Sensor]

Count=1	Count of sensors
Width=128	Sensor width
Height=128	Sensor height

[File]

FileName=d:\...\Test_0002.mes	name of the measurement data file
InfFileName=d:\...\Test_0002.inf	name of this file
Width=128	Sensor Width
Height=128	Sensor Height
StartTime=30.06.2008 14:56:31	Measurement start time
StopTime=30.06.2008 14:57:23	Measurement stop time
Frequency=1250	frequency
Pulswidth=6	transmitting pulse with
Frames=62500	measured frame count
FrameStart=2	first stored frame
FrameEnd=62501	last stored frame
ReveiverModulePreGain1=2	module pre gain
ReveiverModuleMainGain1=2	module main gain

[Params]

Section "Params" freely selectable info parameters

PARAMCOUNT=6   Number of following parameters
NAME1=File-Index   Name of the parameter (Namex),
                                x=[1.. PARAMCOUNT]
TEXT1=8   Text of the parameter
AUTOCLEAR1=I   Type of the parameter:

                                I = increment -- > the text is an Integer: the value is
                                increased by 1 when storing (for automatic index
                                creation)

                                C = CLEAR -- > the text of the parameter is deleted
                                when storing (for parameters with each
                                measurement to change e.g. rate of air)

                                " " (empty) -- > parameter text is preserved and
                                becomes into each file to store

NAME2=Velocity water
TEXT2 = AUTOCLEAR2=C
NAME2=Velocity air

[Mask]
Line0=000011111111...   Mask for each sensor row
                                0 = crosspoint invisible
                                1 = crosspoint visible

[Config]   contains the a description of the hardware
                                configuration

8.3 Data export file format

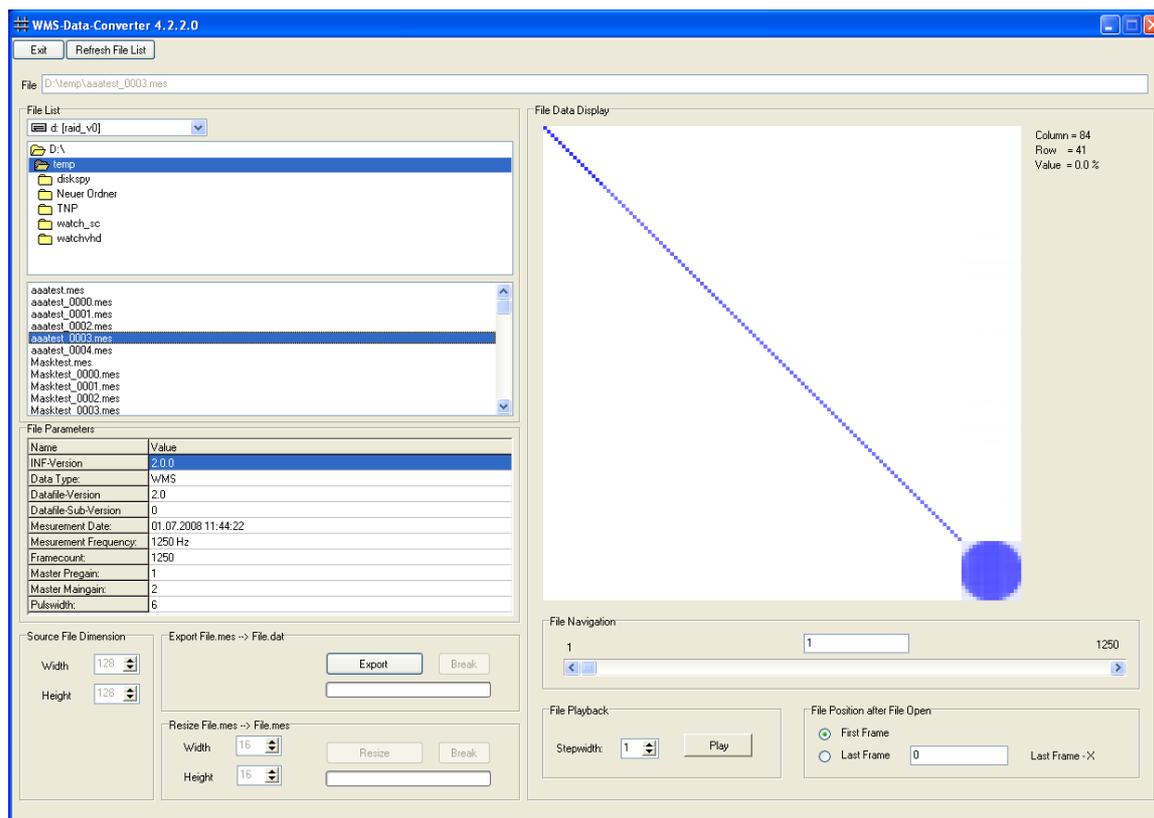You can convert the data in raw data with the program WMS Dataconverter

Image 8.1: Program Dataconverter

In this case the data are written as 16-Bit words, beginning with the Row and Column 1. To export a file open the program WMS Dataconverter select the directory with the data files, select a file and press the "Export" button.

The export data file has the following structure (valid for 32x32):

File offset	data word
0	Column 1 / Row 1 / Frame 1
1	Column 2 / Row 1 / Frame 1
2	Column 3 / Row 1 / Frame 1
...	
31	Column 32 / Row 1 / Frame 1
32	Column 1 / Row 2 / Frame 1
33	Column 2 / Row 2 / Frame 1
...	
511	Column 32 / Row 32 / Frame 1
512	Column 1 / Row 1 / Frame 2
513	Column 2 / Row 1 / Frame 2
...	

! By using the program Dataconverter the files are 30% larger.

9 Contact

We wish you much success while working with our equipment.

For questions and suggestions we are at your disposal at any time.

9.1 Manufacturer

teletronic Rossendorf GmbH
Bautzner Landstrasse 45
D-01454 Radeberg Grosserkmannsdorf/Rossendorf
Phone.:   +49-(0)351-2695-290
Fax: +49-(0)351-2695-390
E-Mail: mail@teletronic.net

The teletronic Rossendorf GmbH is registered under the company registration number HRB 18870 at the Amtsgericht [chamber of commerce] in Dresden, Germany.

9.2 Distribution and Support

HZDR Innovation GmbH
Bautzner Landstrasse 400
01328 Dresden
Telephone: +49-(0)351-440091-0
Telefax: +49-(0)351-4400091-199
E-Mail: contact@hzdr-innovation.de

The HZDRI Innovation GmbH is registered under the company registration number HRB 30595 at the Amtsgericht [chamber of commerce] in Dresden, Germany.

The system is designed for the specifications shown in the manual. For the usage of the system outside of this specification the HZDR Innovation GmbH and the Teletronic Rossendorf GmbH assumes no liability.