Wire-Mesh-System

WMS200

Specification

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content

1 Introduction

The Wire-Mesh-Sensor-System WMS200 is designed to make flow measurements in one or two phase flows. The conductivity of the liquid phase which can be detected should amount 0.5 to 1000 µS/cm. The exact possible conductivity range is depending from the sensor geometry (wire length, wire diameter).
Most parameters are changeable by the manufacturer.

2 System setup

The WMS200 system uses the following components:

- basic device
  - master card
  - slave cards
  - CF card
  - IO cards
  - power supplies
- transmitting modules
- receiving modules
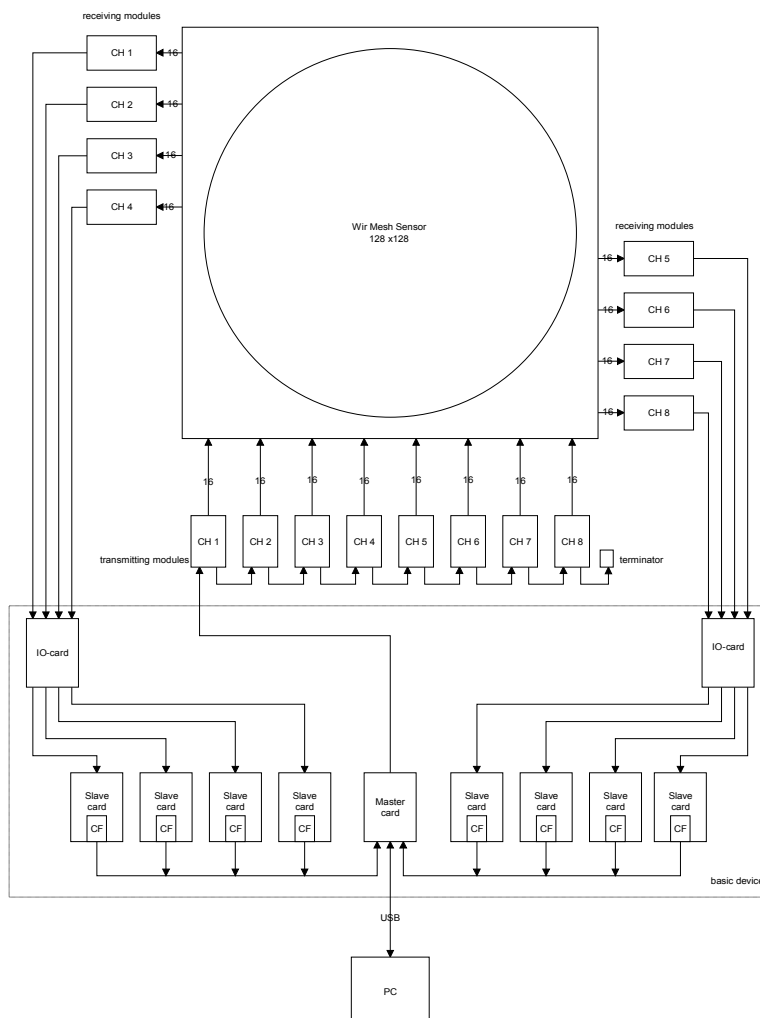
2.1 System Structure

Image 1: WMS200 system structure

Different system configurations are possible e.g.:

- 1 x Sensor with dimension 128 x 128 electrodes
- 2 x Sensors with dimension 64x 64 electrodes
- 4 x Sensors with dimension 32 x 32 electrodes

2.2 The components

-Basic device

Image 2: WMS200 basic device

Specification:

max. connectable transmitting modules:	8
max. connectable receiving modules:	8
max. integrable slave cards (one needed for each receiving module):	8
memory per slave module:	8 GBytes
Power:	110-240 V
	50-60 Hz
	max. 200VA
PC interface:	USB 2.0
ext. trigger input (Physical):	isolated RS 485 3V
ext. trigger output (Physical):	RS 485 3V
size:	515 x 300 x 165 mm
weight:	11 kg

-Transmitting modules

Image 3: WMS200 transmitting module

Specification:

max. connectable transmitting electrodes:	16
per Jumper selectable address range:	1-8
transmit pulse voltage:	± 3 V
max. transmit pulse current (±3V):	~±70 mA
max. cable length from basic devise to the 1. module	3.0 Meters
max. cable length between the modules	1.5 Meters
size:	90 x 68 x 27 mm
weight:	150 g

The transmitting module should be connected direct to the sensor. A mechanical support should provided by the user.

-Receiving modules

Image 4: WMS200 receiving module

Specification:

max. connectable transmitting electrodes:	16
pre gain steps:	255
main gain steps: (gain range independent for each module)	255
max. input current: by min. gain: by max. gain:	1mA 300nA
ADC resolution:	12 Bit ADC count 0..4079 4080..4095 reserved
max. cable length from basic device to module	3 Meters
size:	130 x 68 x 27 mm
weight:	250 g

Determined by the system the difference between the channels increase for higher gain values. For a correct scaling a calibration for every crosspoint is necessary. The receiving module should be connected direct to the sensor. A mechanical support should provided by the user.
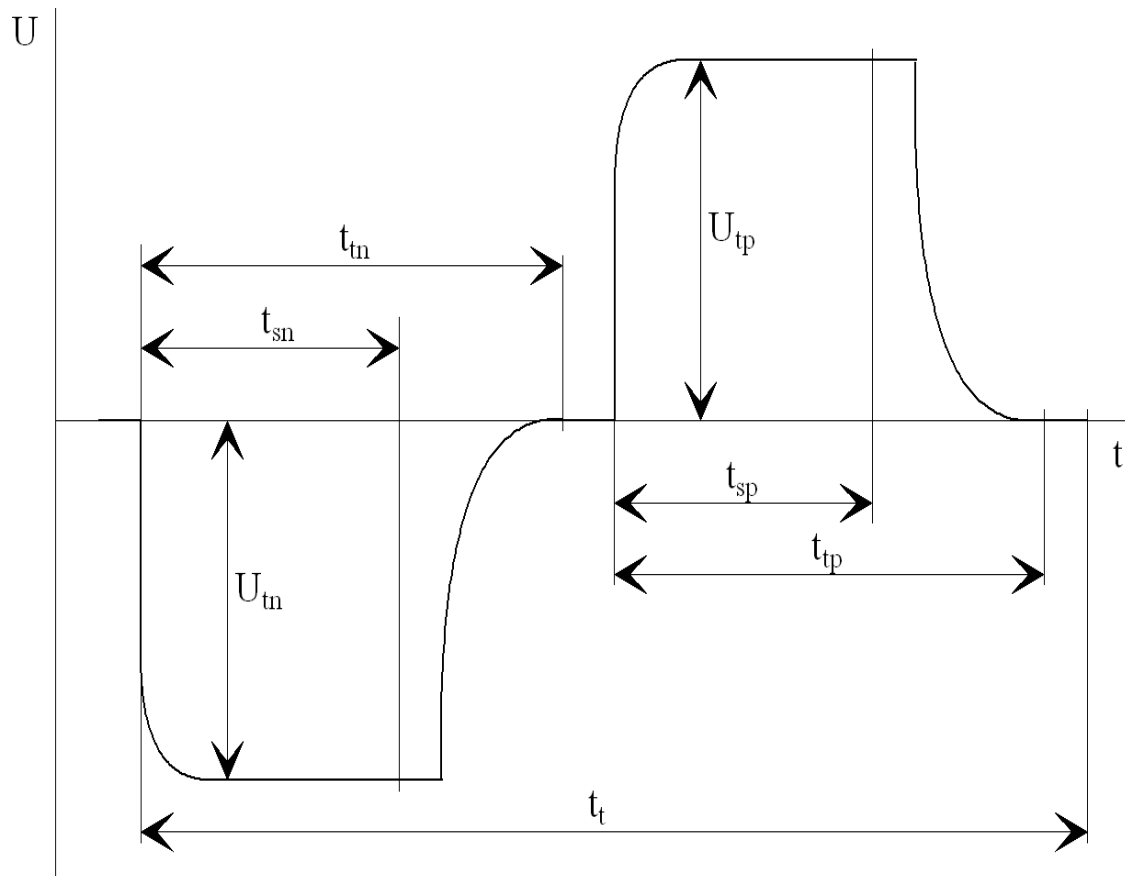
2.3 Transmit pulse timing

Image 5: transmit pulse timing parameters

U_{tp} = Transmitting voltage of the positive half wave

U_{tn} = Transmitting voltage of the negative half wave

t_{tp} = Transmitting pulse length of the positive half wave

t_{tn} = Transmitting pulse length of the negative half wave

t_{t} = Transmitting pulse length

t_{sp} = ADC sample point for the positive value

t_{sn} = ADC sample point for the negative value

Long or short transmitting pulse length is selectable

	Pulse length short	Pulse length long	Unit
t_{tp}	~2,2	~4,5	µs
t_{tn}	~2,2	~4,5	µs
t_t	~6,0	~12,0	µs
t_{sp}	~2,2	~4,1	µs
t_{sn}	~2,2	~4,1	µs

Table 1: WMS200 transmitting pulse timing

	Transmitting voltage	Unit
U_{tp}	+3,0 (+0.5 to +4.0 changeable by the manufacturer)	V
U_{tn}	-3,0 (-0.5 to -4.0 changeable by the manufacturer)	V

Table 2: WMS200 transmitting voltage

The stored measurement value is the difference between the negative value and the positive value!

3 Configuration:

Possible configuration sample for short transmit pulse length:

Sensors:	Resolution:	max. meas. Frequency / Hz:	max. meas. duration / sec.:	remark
1	128x128	1250	1966	
2	64x64	1250	1966	
2	64x64	2500	1966	only there is enough space between the sensors*
4	32x32	1250	1966	
4	32x32	5000	1966	only there is enough space between the sensors*
8	16x16	10000	1966	
8	16x16	10000	1966	only there is enough space between the sensors*

Table 3: WMS200 configuration sample for short transmit pulse

Possible configuration sample for long transmit pulse length:

Sensors:	Resolution:	max. meas. Frequency / Hz:	max. meas. duration / sec.:	remark
1	128x128	625	3932	
2	64x64	625	3932	
2	64x64	1250	3932	only there is enough space between the sensors*
4	32x32	625	3932	
4	32x32	2500	3932	only there is enough space between the sensors*
8	16x16	5000	3932	
8	16x16	5000	3932	only there is enough space between the sensors*

Table 4: WMS200 configuration sample for long transmit pulse

* Else there is a interconnect between the two transmitters.

4 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 / Windows 7 (32 Bit)

- Recommended: a second HDD

5 Ext. trigger

Trigger In

$U_{TriggerIn1}$ R_{VE} 3   1 I_{COIL} R_{VI} 3 IN-   OUT 6

$U_{TriggerIn2}$ 2   2 Z_{COIL}

IN+

NVE IL610-1E

LEMO EGB.0B.302.CLL [key B: 2 keys]
(matching plug: LEMO FGB.0B.302.CLAD42)

$U_{TriggerIn1}$

$U_{TriggerIn2}$

frame start / measurement start
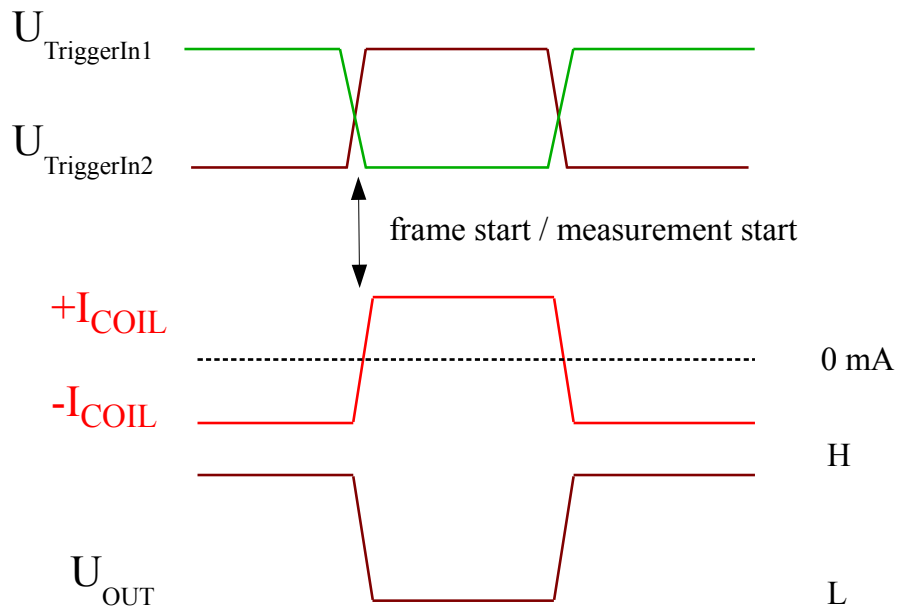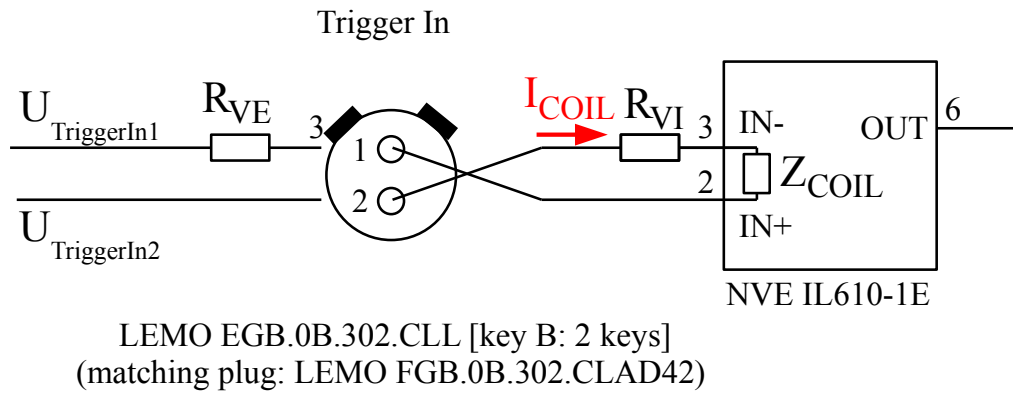
$+I_{COIL}$

0 mA

$-I_{COIL}$

H

U_{OUT}

L

Image 6: WMS200 Trigger In connection

The IL610 is a current mode device. Changes in current flow into the input coil result in logic state changes at the output. Details are described in NVE Spec IL600 Series, Rev.P, February 2008 and NVE Application Bulletin AB-10, February 2008.

In the WMS200 device, the maximum current through the coil is $I_{COILmax}$.

The internal resistor R_{VI} is calculated for a voltage range $\left|U_{SYNC1} - U_{SYNC2}\right|$ from 3V to 5V.

If $\left|U_{TriggerIn1} - U_{TriggerIn2}\right| > 5{,}3\,V$ it is to be used a external resistor RVE.

Parameters	MIN NOM MAX	Units	Comment
Z_{COIL}	85	Ohm	NVE Spec IL600 Series, Rev.P, February 2008
R_{VI}	180	Ohm	WMS200-internal resistor
$I_{COILmax}$	20	mA	
R_{VE}	to calculate	Ohm	$R_{VE} > \dfrac{\left|U_{SYNC1} - U_{SYNC2}\right|}{I_{COILmax}} - (Z_{COIL} + R_{VI})$
I_{COIL}	11	mA	$\left|U_{SYNC1} - U_{SYNC2}\right| = 3\,V\ ;\ R_{VE} = 0\,Ohm$
I_{COIL}	18	mA	$\left|U_{SYNC1} - U_{SYNC2}\right| = 5\,V\ ;\ R_{VE} = 0\,Ohm$

Transmitting electrodes	max. ext. Frequency Pulse length short	max. ext. Frequency Pulse length long
16	9200	4600
32	4750	2375
48	3150	1575
64	2400	1200
80	1900	950
96	1550	775
112	1250	625
128	1200	600

Table 5: WMS200 max. frequencies for ext. triggering

Trigger Out

$V_{CC} = 3.3V$

Z | 4 | $U_{TriggerOut1}$ | 1

Y | 6 | | 2

$U_{TriggerOut2}$

MAXIM MAX3295

LEMO EGG.0B.302.CLL [key G: 1 key]
(matching plug: LEMO FGG.0B.302:CLAD42)

$U_{TriggerOut1}$ ≈3 V

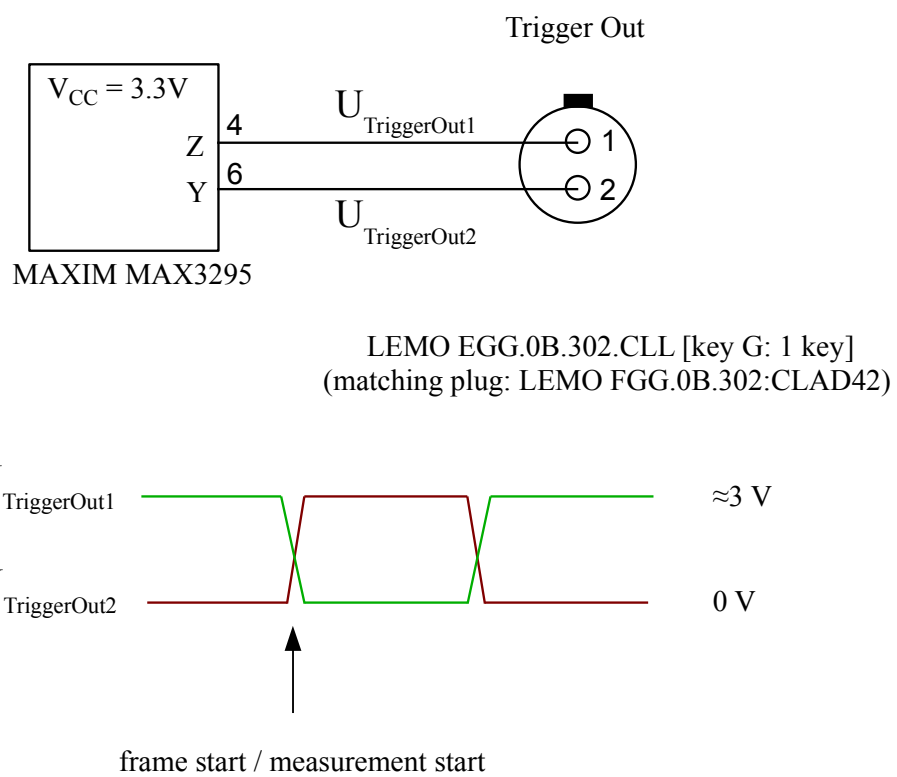$U_{TriggerOut2}$ 0 V

frame start / measurement start

Image 7: WMS200 Trigger Out connection

6   Contact

We wish you much success while working with our equipment.

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

6.1 Manufacturer

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

6.2 Distribution and Support

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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.