



Operating Manual EMGZ321

Digital microprocessor controlled Double Channel Tension Measuring Amplifier

Version 2.20
Firmware Version V2.11

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(from S/N 11263xx)



This operation manual is also available in German.
Please contact your local FMS representative.

Diese Bedienungsanleitung ist auch in Deutsch erhältlich.
Bitte kontaktieren Sie Ihren nächstgelegenen FMS Vertreter.

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1 Safety Instructions

All safety related regulations, local codes and instructions that appear in the manual or on equipment must be observed to ensure personal safety and to prevent damage to the equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Do not stress the equipment over the specification limits neither during assembly nor operation. To do so can be potentially harmful to persons or equipment in the event of a fault to the equipment.

1.1 Description Conditions

a) Danger of health injury or loss of life



Danger

This symbol refers to high risk for persons to get health injury or loss life. It has to be followed strictly.

b) Risk of damage of machines



Caution

This symbol refers to information, that, if ignored, could cause heavy mechanical damage. This warning has to be followed absolutely.

c) Note for proper function



Note

This symbol refers to an important information about proper use. If not followed, malfunction can be the result.

1.2 List of Safety Instructions

- ⚠ Proper function of the FMS tension controllers is only guaranteed with the recommended application of the components. In case of other arrangement, heavy malfunction can be the result. Installation instructions on the following pages must be followed strictly.***

- ⚠ Local installation regulations are to preserve safety of electric equipment. They are not taken into consideration by this operating manual. However, they have to be followed strictly.***

- ⚠ Bad earth connection may cause electric shock to persons, malfunction of the total system or damage of the control unit. It is vital to ensure a proper earth ground connection.***

- ⚠ The processor board is mounted directly behind the operation panel. Improper handling of the electronic boards may cause damage to the fragile equipment. Don't use rough tools such as screwdrivers or pliers! Operators handling the electronic boards must wear a well earthed bracelet in order to discharge static electricity.***

2 System Description

2.1 Functional Description

The EMGZ321 is a double channel strain gauge amplifier for a single measuring point. The material tension can be measured on both sides of the measuring roller independently.

The 2 force sensors of the measuring point measure the tension force in the material and transmit the measuring value as a mV signal to the electronic unit EMGZ321. The electronic unit amplifies the mV signal of each force sensor independently. This signal will be fed to the A/D converter. The microprocessor does then all application specific calculations such as offset, gain, low-pass filter, limit switches, etc.

A sum value (A+B) and a difference value (|A-B|) are calculated from the force values of the sensors A and B. The resulting feedback values are shown in the display in [N] or the chosen unit. In addition, the feedback values are provided at the analogue outputs and can be evaluated by analogue instruments, a PLC or equivalent devices.

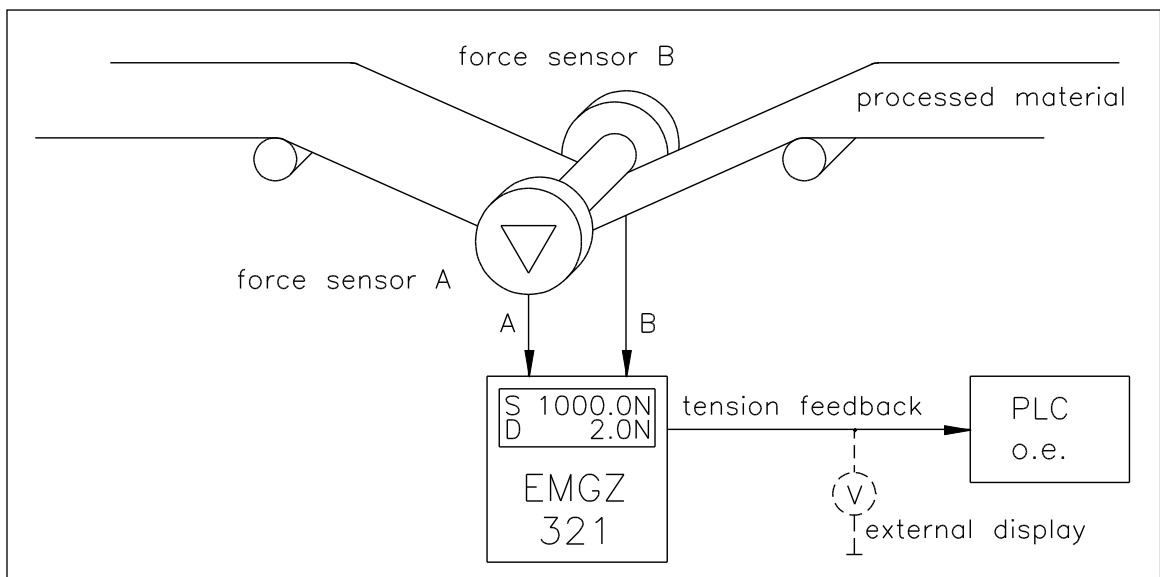


Fig. 1: Application example of EMGZ321

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2.2 EMGZ321 Amplifier and its Subunits

As a plug & play unit all functions of the EMGZ321 can be configured very easily via a user-friendly control panel and two lines LCD. Tension reference values and all other parameters and functions can be set with keys or remotely via a web browser. The amplifier is then either connected to a network or via a peer-to-peer configuration to a laptop or local PC. All parameters are stored in a non-volatile EEPROM memory.

Automatic offset compensation and calibration, digital signal filtering, function along with a lot of other features creates a very powerful tension monitoring system. The fundamental characteristics of the EMGZ321 remain its operation simplicity and reliability even under challenging operating conditions.

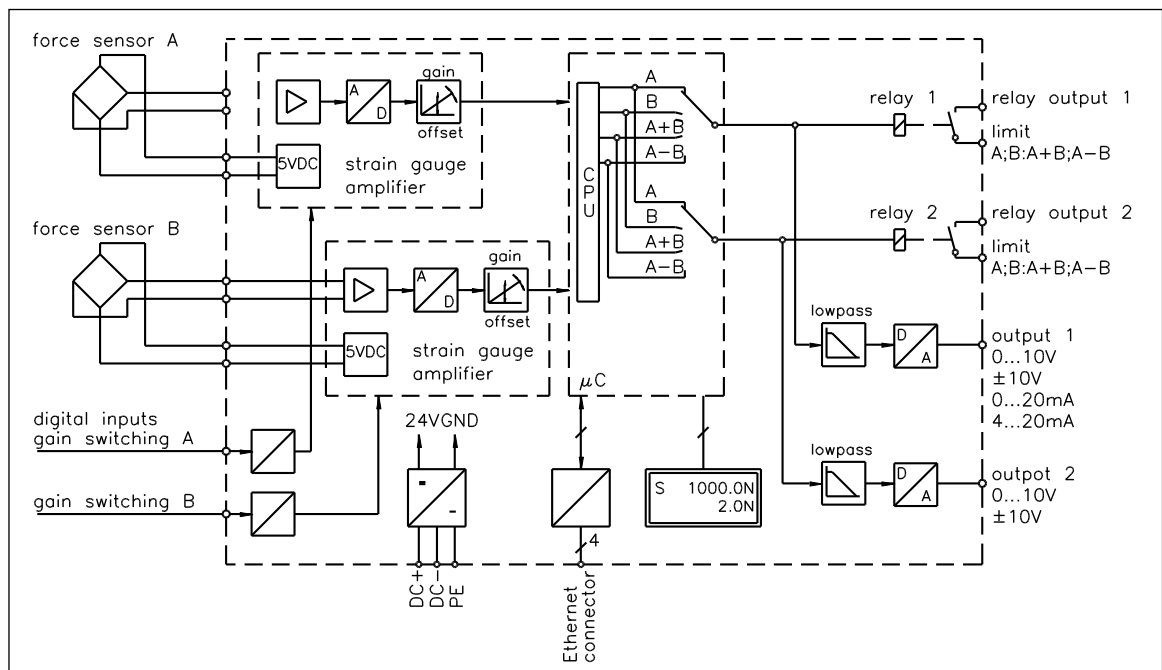


Fig. 2: Block diagram EMGZ321

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Display and Operation Panel

A dual-line LCD display with 8 characters each line and a well arranged control panel make the EMGZ321 very easy to set-up and operate. All parameters and functions are accessible through the wind rose key pad and three buttons.

Strain gauge amplifier

The built-in strain gauge amplifier delivers a highly accurate supply voltage (5VDC,) for 2 force sensors. The force sensors can be wired using a 4-wire circuitry. A highly accurate differential amplifier rises the mV sensor signal up to 10V.

Force Sensors

The force sensors are based on the flexion beam principle. The flexion is measured by strain gauges and transmitted to the electronic unit as mV signal. Due to the wheatstone bridge configuration of the strain gauges, the measured value is proportional to the power supply. EMGZ4321 provides a very accurate power supply for the wheatstone bridge.

Interface

The EMGZ321 can be embedded in an Ethernet network and the communication is via a web browser (Ethernet explorer 7 or higher)

2.3 EMG321 Sub Types

EMGZ321.R / .S / .W

The tension amplifier EMGZ321 series is available in three different housing options.

EMGZ321.R:	Rail mount housing
EMGZ321.S:	Panel mount housing

Detailed information about the mechanical dimensions refer to the outline drawings Fig. 30 to 32.

3 Quick Installation Guide

In a Plug & Play configuration the set-up of the EMGZ321 and force sensors is straight forward and limited to only the offset compensation and the calibration procedure.

3.1 Preparations for Set-up

1. Read the Operation Manual of your force measuring sensors and amplifier
2. Check your requirements such as:
 - Desired output configuration 0...10V, $\pm 10V$ or 0/4... 20mA
 - Display unit of nominal force
3. Draw the wiring diagram for your configuration (ref. to "3.5 Wiring the Amplifier")
4. If required, determine special parameters (ref. to "5.2 Parameterization for System Configuration")

3.2 Installation Procedure

1. Mount your force measuring roller to the machine frame.
2. Wire the force measuring sensors (ref. to "4.3 Wiring the Tension Monitoring System")
3. Connect the amplifier to the power supply.
4. The power supply voltage must be in the range 18 to 36V DC.
5. Perform offset compensation and calibration (ref. to paragraphs 4.1 to 4.4)
6. If required, do additional settings (ref. to "5.2 Parameterization for System Configuration")

4 Installation and Wiring



Caution

In order to improve the natural convection and keep the temperature of the amplifiers that are mounted in a cabinet, to a minimum, a distance of at least 15mm (0.6") between the devices must be kept.



Caution

Proper function of the FMS tension amplifier is only guaranteed with the recommended application of the components. Other arrangements, can cause heavy malfunctions. Installation instructions on the following pages must strictly be followed.



Caution

Local installation regulations are to preserve safety of electric equipment. They are not taken into consideration by this operating manual. However, they have to be followed strictly.

4.1 Mounting the Force Measuring Roller

Mounting of the force sensors is done according to the FMS installation manual which is delivered together with the force sensors.

4.2 Mounting the EMGZ321

The EMGZ321 series is available in 3 different housing options. The respective mechanical dimensions of the different housings can be seen in paragraph 15.

4.3 Wiring the Tension Monitoring System

Use the original FMS cables to connect the system components together. The connection between the force sensors and the electronic unit is done with a 2x2x0.25 mm² [AWG 23] cable. The wiring diagrams show how the wiring to the terminals of the electronic unit is done.

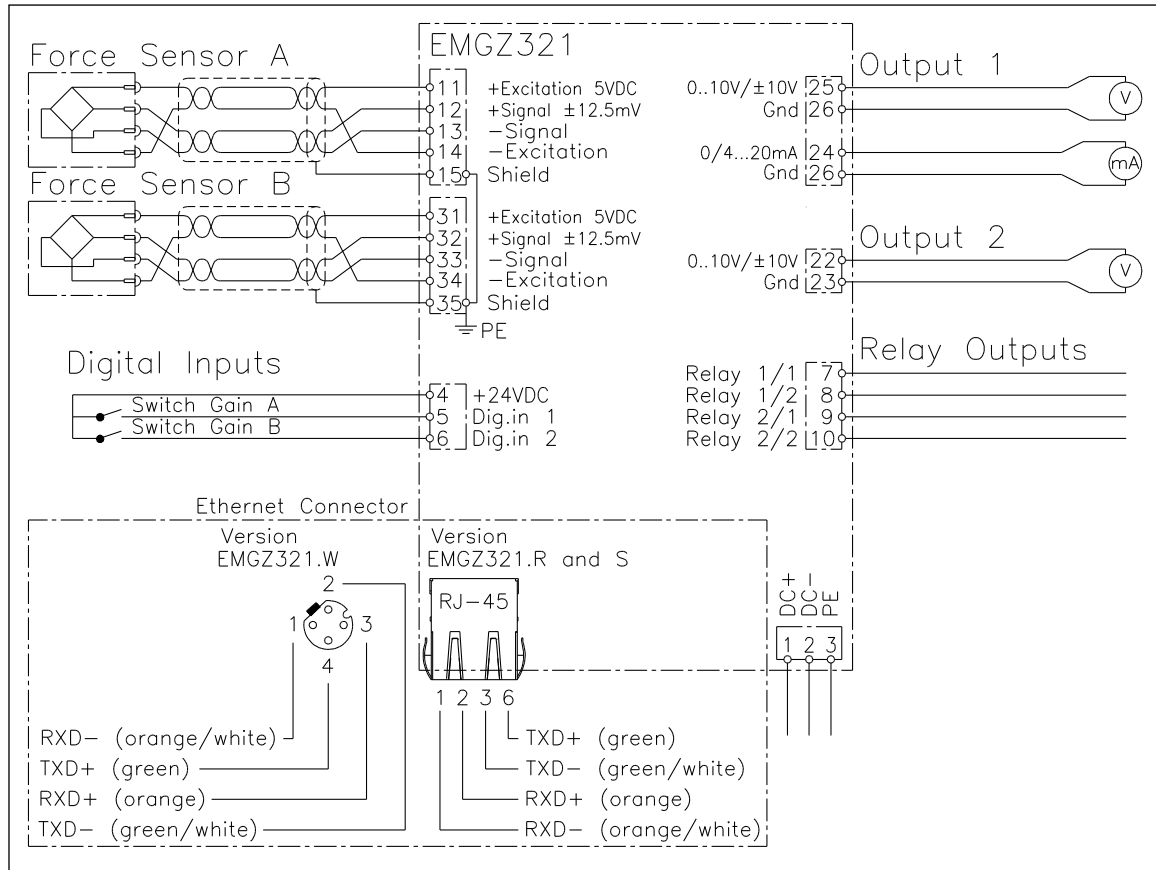


Fig. 3: Wiring diagram EMGZ321

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Caution

Bad earth connection may cause electric shock to persons, malfunction of the total system or damage of the control unit. It is vital to ensure that there is a proper and secure earth ground connection.

4.4 Screw Terminal Arrangement

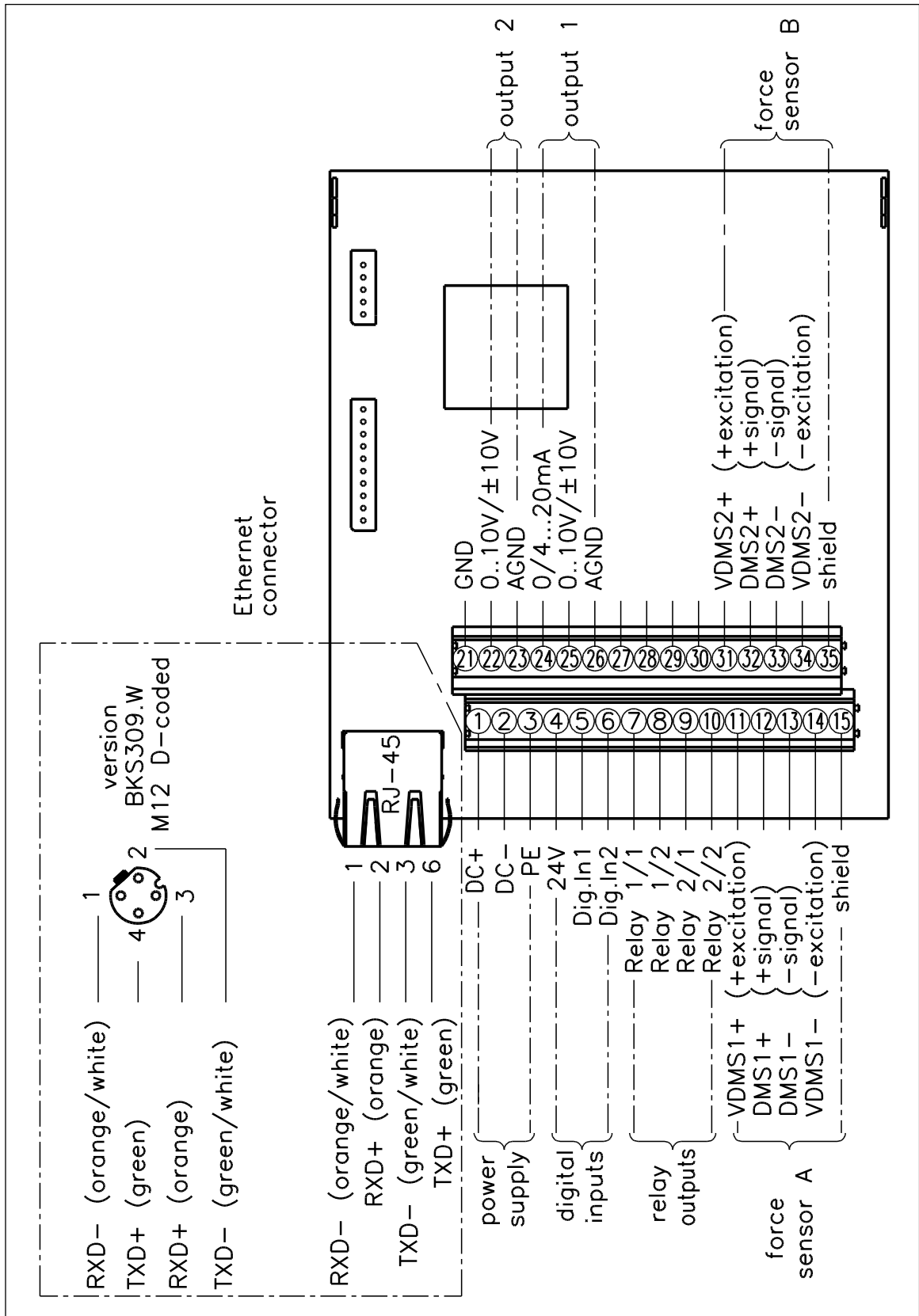


Fig. 4: Screw terminal arrangement on processor board

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4.5 Connection of the Cable Shield

Cable shields must be connected as indicated in the wiring diagram (see Fig. 3 and 4). The shield should be connected only to the amplifier side. On the force sensor side, the shield should stay open. Other arrangements may cause ground/earth loops which may interfere with the measuring signal. Malfunction can be the results. If a housing type with PG glands is used, one must pay heed to a proper connection of the shield. Skinning of the cable and shield handling are indicated in Fig. 5.

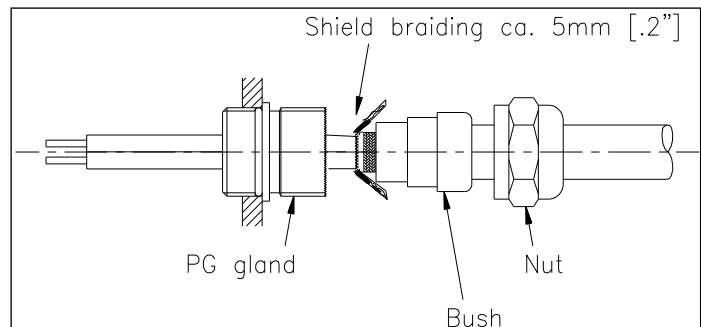


Fig. 5: Shield connection

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Note

Force sensors deliver a signal of a few mV and are therefore susceptible to external influences. To increase immunity to interfering use one twisted pair cable for +signal and -signal. This signal cables must be separated from power lines.

Note

Connecting the shield of the signal cable to the electronic unit and to the force sensor may cause ground loops which may interfere with the measuring signal. Malfunction can be the result. The shield should be connected only to the electronic unit. On the „force sensor side“, the shield should stay open.

4.6 Digital Inputs

The EMGZ321 controller provides 2 digital inputs for the special functions of switching between two different gain factors.

The digital inputs are level triggered. A threshold change activates the gain switch:

- In sensor A from gain factor 1 to gain factor 2
- In sensor b from gain factor 1 to gain factor 2

Signal Name	Terminal #	Sensor	Threshold low	Threshold high
Dig. In 1	5	A	Gain factor 1	Gain factor 2
Dig. In 2	6	B	Gain factor 1	Gain factor 2

4.7 Relays Outputs

The EMGZ321 amplifier provides 2 programmable relay outputs. The outputs are software controlled. Electrically they are potential-free. Each relay output can individually be configured to check violations of force limits. The outputs are configured in the “Relay Parameter Group”.

Following functions can be assigned to each output:

- Indicate if force limit of sensor A has been violated
- Indicate if force limit of sensor B has been violated
- Indicate if the sum of the forces of sensor A+B has been violated
- Indicate if the absolute value of difference $|A-B|$ has been violated

For more details about the functions refer to paragraph 7.7 “Description Relay Parameter Group”.

Hardware access via screw terminals (see Fig. 3 and 4)

Signal Name	Terminal #
Relay 1/1	7
Relay 1/2	8
Relay 2/1	9
Relay 2/2	10

5 Configuring the System

After having mounted and wired the tension controller on the machine, the system can now be configured to the specific requirements of the application.

5.1 Accuracy of the display

No decimal values are displayed for the actual value.

The exception is the unit kN. Here, one decimal place is displayed as long as the value is below 1'000 kN. Above this, the decimal place is omitted.

If the resolution is too low, e.g. in N, you can switch to the display in g.

5.2 Description of the Operating Panel

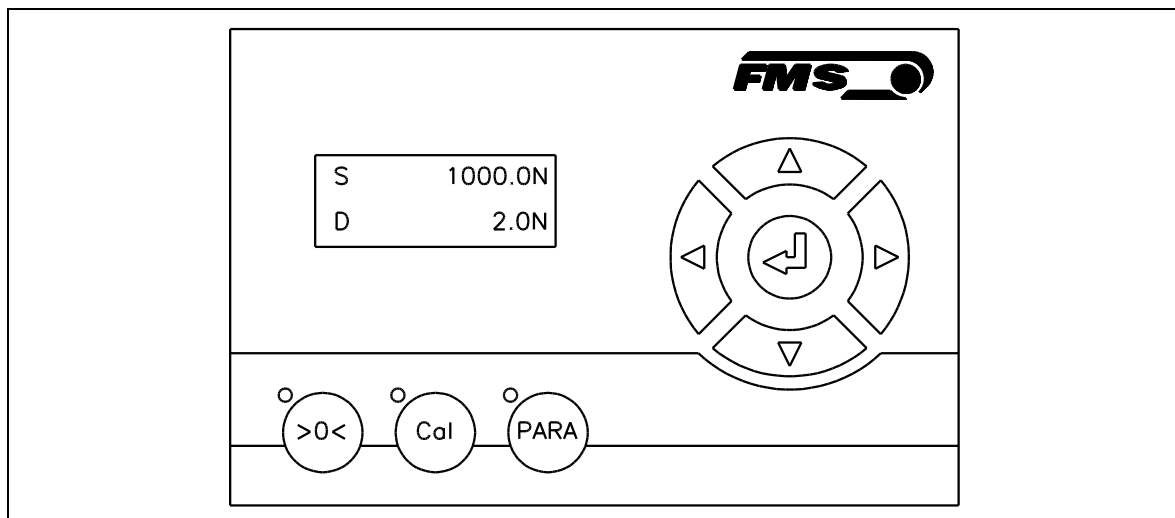


Fig. 6: View of the Operating Panel EMGZ309.W

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The keys on the operating panel have the following functions:

Key	Key function during operation
	Enter Offset Compensation Procedure
	Enter Calibration Procedure
	To enter the Parameter Setting Mode, press the key for longer than 3 sec. The LED will light and the first parameter group will appear on the LCD display indicating that you entered the mode. The State Diagrams (Fig. 12 to 29) in paragraph 7 "Parameter Setting over the Front Panel" will help you to navigate in the parameter setting mode.
	Enter
	Changes the parameter selection.
	Increases the parameter values. Pressing the button increases continuously the parameter value.

	Decreases the parameter values. Pressing the button reduces continuously the parameter value.
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Fig. 7: Functions of the operation panel keys

5.3 Preparations for System Configuration


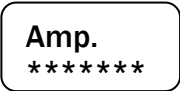


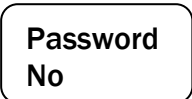





In order to facilitate the configuration of the tension monitoring system it is advisable to adapt some basic system parameters to the specific requirement of the application.

1. Adopt password
2. Set the language on the display
3. Set measuring unit

Above features are changed in the 7.8 "System Parameter Group". Please refer to Fig. 17 to 19 to visualise the following parameter changing procedures:


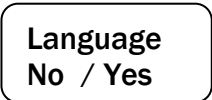





A) Adopt Password

The password cannot be changed. It is always **3231**. However, it can be adopted or disabled. If adopted, the system will request the password for every parameter change. If you wish to adopt the password, follow the following instructions:

1. Hold the  key for longer than 3 sec. until you enter the Parametrisation State.
2. The display shows  Scroll the menu by pressing the  key until you are in the parameter group "System".
3. Press . The display shows .
4. Press again . The display starts flashing indicating that you can now change the parameter with the  or  keys.
5. To confirm your change by pressing the Enter key .
6. Press the  key twice, if you want to return to the Operation State. If you desire to change the language, continue with the steps below.


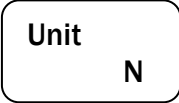





B) Change Language

The default setting for the language is English.

1. Press  to select the Parameter *Language* .
2. Press again . The display starts flashing indicating that you can now change the parameter with the  or  keys.
3. To confirm your change by pressing the Enter key .
4. Press the  key twice, if you want to return to the Operation State. If you desire to change the measuring unit, continue with the steps below.

C) Change the Measuring Units

The default tension measuring unit is N (Newton). The user can, however, select another unit before the system is calibrated..

1. Press  to select the Parameter *Unit*. 
2. Press again . The display starts flashing indicating that you can now change the unit parameter with the  or  keys.
3. To confirm your change by pressing the Enter key .
4. Press the  key twice to return to the Operation State.

6 Operation

6.1 Operating the EMGZ321 over the Front Panel

The dual channel amplifier EMGZ321 can go in 5 different states:

- **Operation State:** Amplifier operating
- **Display Selection:** Selection of force values that are displayed
- **Offset Compensation:** Automatic procedure to offset the roller weight
- **Calibration State:** Procedure to calculate the amplifier gain
- **Parametrisation State:** Set or change parameters

The user can toggle between the different states by pressing a key on the front panel. Fig. 8 provides an overview about the different Operation States and how to move from one state to the other.

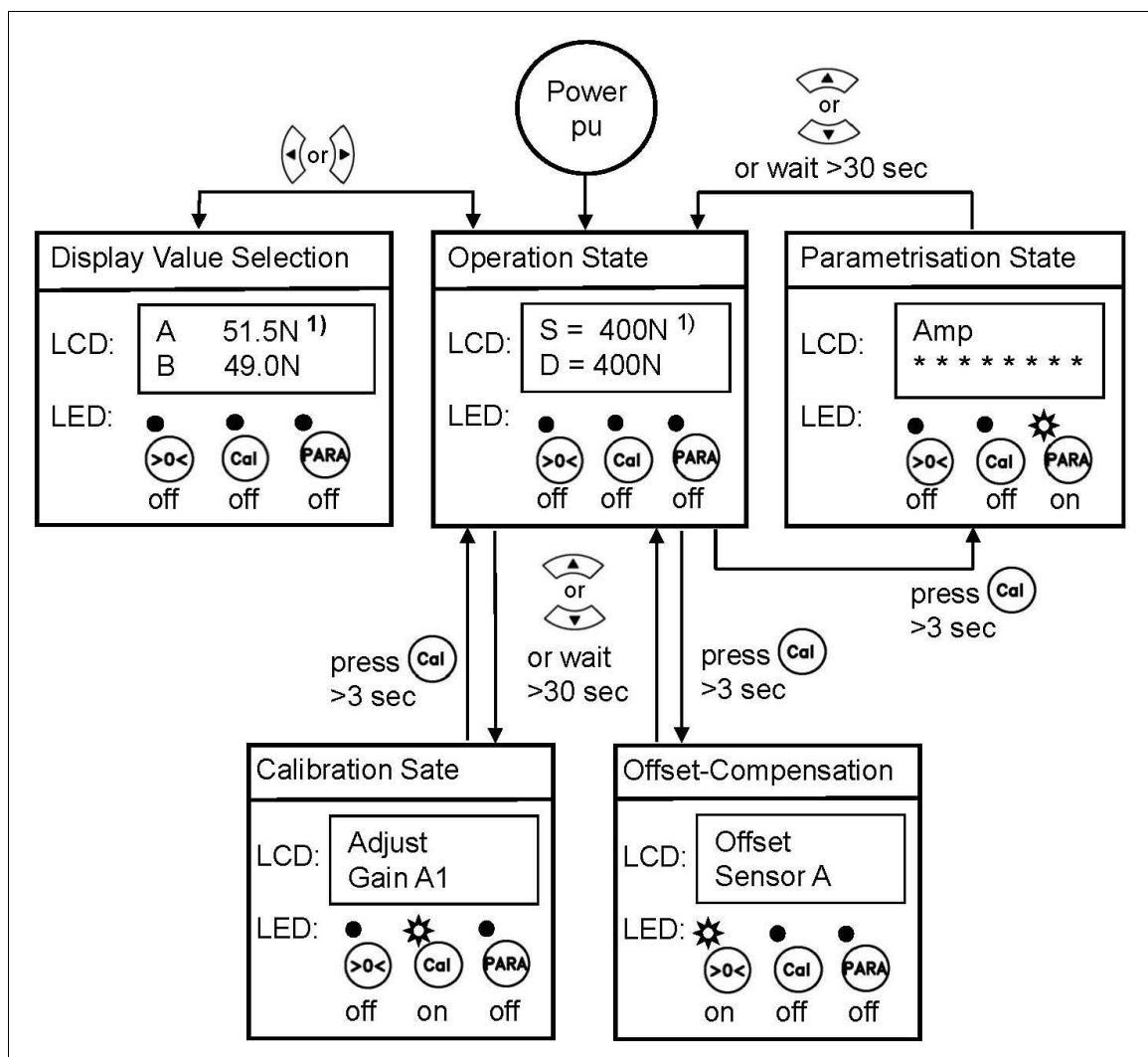


Fig. 8: Top-level view of operation control

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6.2 Display Value Selection State

There are several options to display force values the individual channels. The user can choose between 4 display forms:

S = Sum of sensor A+B or **A** = Force on sensor A
D = Difference of sensor |A-B| or **B** = Force on sensor B

6.3 Offset Compensation Procedure

With the Offset Compensation one can compensate the roller weight. This procedure is always performed before the calibration. The force measuring roller should not be loaded while the Offset Compensation is being done. Continue with following steps:

1. Press the key for longer than 3 sec. until you enter the Calibration State.
2. The display shows
3. Press to start the offset compensation for channel A. After pressing the key this procedure will be executed automatically.
4. The display will indicate
5. Select with key sensor B and repeat step 2 and 3 to do the offset compensation in sensor A.
6. Press the key to return to the Operation State.

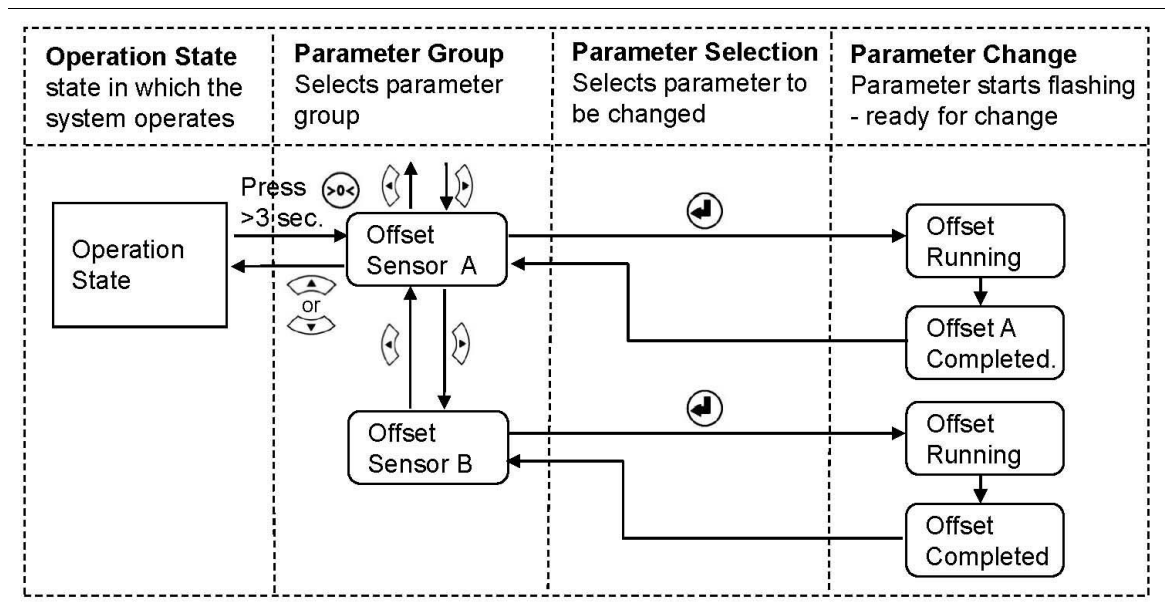


Fig. 9: State diagram offset compensation

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6.4 Calibration Methods

The Calibrating procedure (setting the Gain), adjusts the controller and load cells so that the display gives you the actual tension value. The method uses a defined weight. FMS recommends using the method with the weight (see Fig. 10) since it delivers the most accurate results.

To set the Gain, load a rope with a defined weight on the measuring roller. The roller configuration must correspond to the real material path in the machine (wrap angle, distances between the rollers etc.).

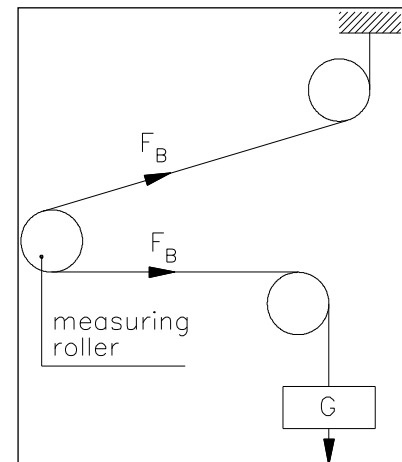


Fig. 10: Calibrating the measuring amplifier

6.5 Calibration Procedure:

The Calibration Procedure calculates the value for the amplifier gain. The procedure requests inputs such as the system force and the force corresponding to the calibration weight. The here determined values are stored in the parameter *Gain* and *NomForce* in the Amplifier Parameter Group. Refer also to Fig. 11 “State diagram calibration procedure”.

1. Press the key for longer than 3 sec. until you enter the Calibration State.

The display will show:

Adjust
Gain A1

2. Load the rope with the defined calibration weight as close as possible to the roller side you want to calibrate first (e.g. left side). The path of the rope must correspond to the real configuration in the machine (wrap angle, distance of the rollers etc.).
3. Press to enter the nominal force of the force sensor. The force is indicated on the label of the installed force sensor.

4. The display will indicate

NomForceA
1000.0 N

5. Change the force value with the or keys. Enter the force that has been installed in this side of the measuring roller.

6. Press to start the first gain factor calculation for sensor A. The display will show: Calibra.
980.7
7. Enter the force that corresponds to your calibration weight with the or keys.
8. Press to store Gain A1. The display will show Calibra.
Compleet Adjust
Gain A1
9. Select with key sensor B (e. g. right side of the roller) and repeat step 2 to 9 to perform the gain calculation in channel B.
10. If you wish to store a second gain factor set (e.g. for a different force measuring roller or for another wrap angle), select with key "Gain A2" and repeat the procedure above for the new roller configuration.
11. Press the key to return to the Operation State.

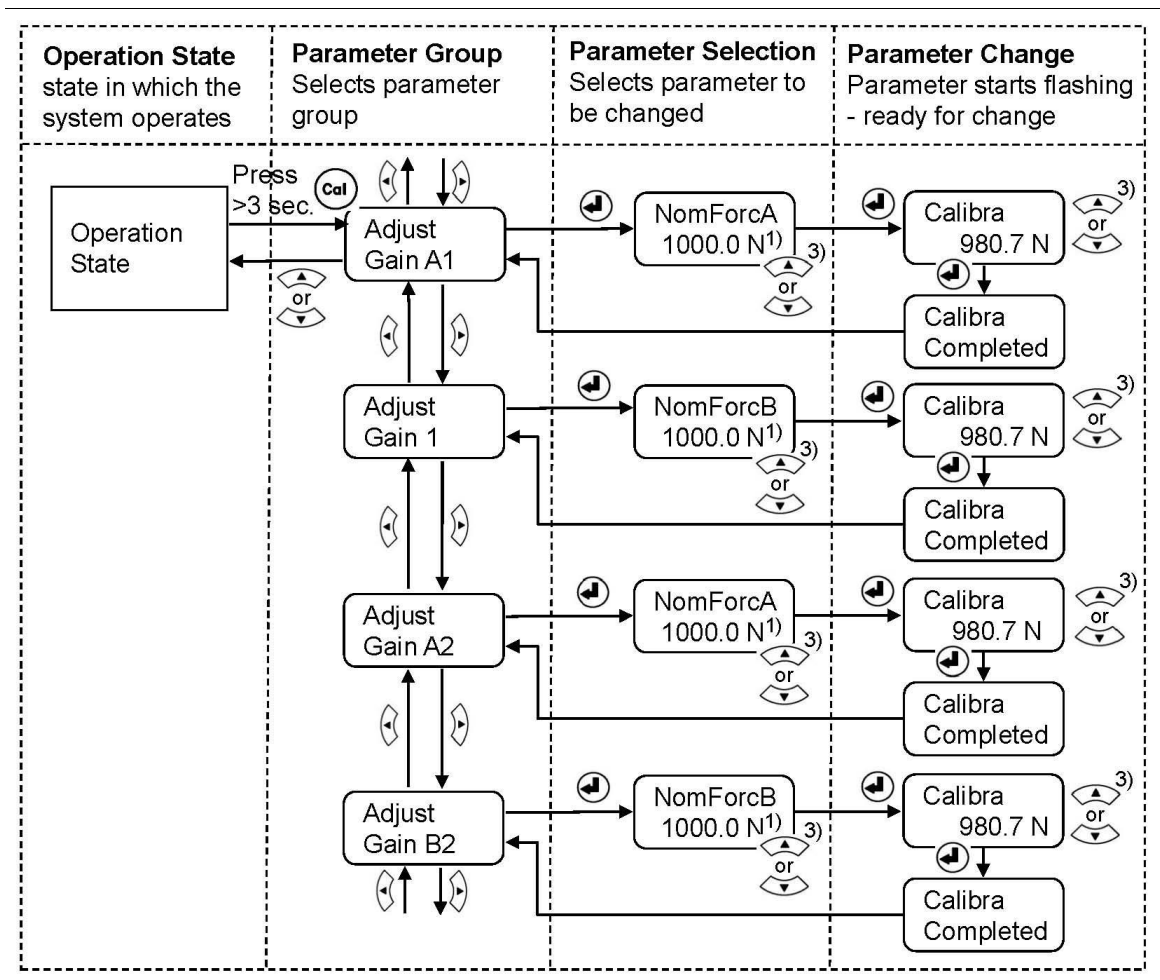


Fig. 11: State diagram calibration procedure

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1) The display shows the unit of measure that was previously selected
 3) Permanent key pressing expedites the changing speed of the value.

7 Parameter Setting over the Front Panel

7.1 Basic Instructions for Parameter Setting

The force amplifier EMGZ321 can be configured via its parameters. Moreover, several adjustment procedures can be activated to capture or calculate application relevant values. Parameters and all other settings are stored in the parameter list. This list is organised in 4 parameter groups. In detail these are:

- Amplifier Parameter Group
- Outputs Parameter Group
- Relay Outputs Parameter Group
- System Parameter Group

The workflow in the Parametrisation State has three basic operator modi:

- Parameter Group Selection
- Parameter Selection within the group
- Parameter Change or Setting

Parameter setting can be performed via the front panel or via a web browser.

The Parametrisation State can only be accessed from the “Operation State”. The EMGZ321 displays only the parameters that are relevant for a used application (see Fig. 8)

7.2 Amplifier Parameter Group

With the two procedures 6.3 “Offset Compensation” and 6.5 “Calibration Procedure” the application specific parameter are determinate and the system calibrated. These parameters are stored in the Amplifier Parameter Group.

7.3 Description of Amplifier Parameters

Offset A		LCD: <i>Offset A</i>		
Offset B		LCD: <i>Offset B</i>		
Use:		With the Offset Compensation procedure you can automatically compensate the roller weight. It is always performed before the calibration procedure. The value for offsetting the roller weight is stored in the parameter <i>Offset</i> in the parameter group Amplifier.		
Unit	Parameter Range		Selection	Default
	Min	Max		
Digit	-8000	+8000	-	0

Nominal Force Sensor A		LCD: <i>NomForcA</i>		
Nominal Force Sensor B		LCD: <i>NomForcB</i>		
Use: This parameter stores the nominal force of your force measuring roller. The nominal force is printed on the label of each force sensor. Enter the forces that have been installed in the measuring roller individually for sensor A and sensor B.				
Unit	Parameter Range		Selection	Default
	Min	Max		
N, kN, g, kg, lb ¹⁾	1.0	100'0000.0	-	1000.0

¹⁾ The display shows the unit of measure that was previously selected

7.4 Outputs Parameter Group

In the Outputs Parameter Group all settings regarding the amplifier outputs, output modes and filter can be entered.

7.5 Description of Output Parameters

Output value 1		LCD: <i>Output 1</i>		
Output value 2		LCD: <i>Output 2</i>		
Use: This parameter determines the signal that will be outputted to the analogue outputs and displayed on the LCD. The user can select the sum or the difference of force sensor A and B or each sensor individually. With the later choice e.g. the force on the left and right side of the roller can individually be monitored.				
Unit	Parameter Range		Selection	Default
	Min	Max		
-	-	-	Ten. A-B Ten. A+B Ten. A Ten. B	Output 1= Ten. A-B Output 2= Ten. A+B

Output Mode Selection			LCD: <i>Out1Mode</i>	
Use: This parameter selects the output mode. The analogue output 1 can be set to work as a voltage or as a current output.				
Unit	Parameter Range		Selection	Default
	Min	Max		
-	-	-	0..10V 0..20mA 4..20mA +/- 10V	+/-10V

Output Mode Selection			LCD: <i>Out2Mode</i>	
Use: This parameter selects the output mode.				
Unit	Parameter Range		Selection	Default
	Min	Max		
-	-	-	0..10V +/- 10V	0..10V

Output Tension			LCD: <i>Out1 Ten</i> LCD: <i>Out2 Ten</i>	
Use: This parameter determines the tension value at the maximum output.				
Unit	Parameter Range		Selection	Default
	Min	Max		
N ¹⁾	0.1	100'000.0	-	1000.0

Filter			LCD: <i>Out1Filt</i> LCD: <i>Out2Filt</i>	
Use: The amplifier provides an upstream low-pass filter to prevent noise and interferences being overlaid to the output signal. This parameter determines the cut off frequency of the filter. The lower the cut off frequency, the more sluggish the output signal will be.				
Unit	Parameter Range		Selection	Default
	Min	Max		
Hz	0.1	200.0	-	10

7.6 Relay Parameter Group

Each relay output can individually be configured to check violations of force limits (see 4.7 “Relay Outputs”).

7.7 Description of Relay Parameters

Relay Output 1		LCD: Relay 1		
Relay Output 1		LCD: Relay 2		
<p>Use: Each relay output can individually be configured to check violations of force limits (see also “4.7 Relay Outputs”). If a violation is detected an event can be initiated (e.g. activate a flash light or alarm horn). A relay function can only be assigned once to a relay output. If a function is being used the function will not appear on the parameter selection.</p>				
Unit	Parameter Range		Selection	Default
	Min	Max		
-	-	-	Chk A Chk B Chk A+B Chk IA-BI Disabled	Relay Output 1= Chk A+B Relay Output 2= Chk IA-BI

Chk A

Check and indicate if force limit of sensor A has been violated.

Chk B

Check and indicate if force limit of sensor B has been violated.

Chk A+B

Check and indicate if the sum of the forces of sensors (A+B) has been violated.

Chk |A-B|

Check and indicate if the difference of the forces of sensors (IA-BI) has been violated.

Disabled

Disable the relay output.

Limit Condition Relay Output 1		LCD: <i>LimCond1</i> ⁴⁾		
Limit Condition Relay Output 2		LCD: <i>LimCond</i> ⁴⁾		
<p>Use: The <i>LimCond1</i> determines whether the relay output must be activated when over-shooting (> <i>Limit</i>) or under-shooting (< <i>Limit</i>) the value stored in the Parameter <i>Limit 1</i>. Analogously this holds for <i>LimCond2</i>.</p>				
Unit	Parameter Range		Selection	Default
	Min	Max		
-	-	-	< Limit > Limit	LimCond 1= < Limit LimCond 2= > Limit

Limit 1		LCD: <i>Limit 1</i> ⁴⁾		
Limit 2		LCD: <i>Limit 2</i> ⁴⁾		
<p>Use: The relay output will be activated, if the threshold value stored in this parameter <i>Limit 1</i> is exceeded or falls below the value (dependent from the setting in parameter <i>LimCond</i>). Analogously this holds for <i>Limit 2</i></p>				
Unit	Parameter Range		Selection	Default
	Min	Max		
N ¹⁾	0.1	200'000.0	-	100.0

- 1) The display shows the unit of measure that was previously selected
- 4) This parameter is only displayed, if the function check "Limit 1" or "Limit 2" have been assigned to Relay 1 respectively Relay 2.
- 5) A relay function can only be assigned once to a relay output. If a function is being used the function will not appear on the parameter selection.

7.8 System Parameter Group


The System Parameter Group contains basic parameters that determine the general characteristics of the amplifier but that don't influence its performance.

7.9 Description System Parameters

Password			LCD: <i>Password</i>	
Use: The controller can be protected from unauthorised access by means of password. If <i>Password</i> yes is chosen, the system will request the password to change parameters and other setting. The password itself can't been changed. It is always 3231 .				
Unit	Parameter Range		Selection	Default
	Min	Max		
-	-	-	No Yes	No

Language			LCD: <i>Language</i>	
Use: This parameter determines the displayed language. The user can choose between two languages. If <i>English</i> is chosen, the display shows all texts in English. The web browser is always in English. If <i>German</i> is chosen, the display shows all texts in German.				
Unit	Parameter Range		Selection	Default
	Min	Max		
-	-	-	English German	English

LCD-Contrast			LCD: <i>Contrast</i> .	
Use: The parameter [Contrast] changes the contrast of the LCD to achieve optimal readability.				
Unit	Parameter Range		Selection	Default
	Min	Max		
%	1	100	-	65

Unit of Measure			LCD: <i>Unit</i>	
<p>Use: This parameter determines the unit used in the system.</p> <p> Note: By changing the units to <i>lb</i> the whole unit system will change from metric to imperial units.</p>				
Unit	Parameter Range		Selection	Default
	Min	Max		
-	-	-	N kN g kg lb	N

Display Filter			LCD: <i>Dis.Filt</i>	
<p>Use: The amplifier provides a lowpass filter to prevent noise disturbing the LSD or to steady high fluctuation of the force values on the display. The parameter <i>Dis.Filt</i> stores the cut off frequency of the filter. The lower the cut off frequency, the more sluggish the display will be. A correctly tuned filter will steady the value shown in the display.</p>				
Unit	Parameter Range		Selection	Default
	Min	Max		
Hz	0.1	10.0	-	1.0

Ethernet IP Address			LCD: <i>IP Addr.</i>	
<p>Use: The parameter assigns an IP address to the amplifier. This enables the user to communicate via a web browser with the amplifier that is imbedded in a network. The IP address must be entered in 4 separate blocks (IP Bl. 1; IP Bl. 2; IP Bl. 3; and IP Bl. 4)</p>				
Unit	Parameter Range		Selection	Default
	Min	Max		
-	000.000 000.000	255.255. 255.255	-	192.168. 000.090



Subnet Mask Address			LCD: <i>Subnet</i>	
Use: The parameter assigns the Subnet Mask of the amplifier in the Ethernet network. This enables the user to communicate via a web browser with the amplifier. The Subnet Mask must be entered in 4 separate blocks (Sub. BI 1; Sub. BI 2; Sub. BI 3; and Sub. BI 4).				
Unit	Parameter Range		Selection	Default
	Min	Max		
-	000.000	255.255.	-	255.255.
	000.000	255.255		255.000

LAN Speed			LCD: <i>LANSpeed</i>	
Use: <i>LANSpeed</i> determines the data speed of the tension controller to communicate with the receiver (Switch, Hub or PC).				
Unit	Parameter Range		Selection	Default
	Min	Max		
MBPS	-	-	100	100
	-	-	10	

Default Settings			LCD: <i>Default</i>	
Use: This menu point is a command. It resets the parameters to the factory settings. If <i>Not Set</i> is chosen, all parameters stay as set by the user. If <i>Yes</i> is chosen, the default parameters are loaded.				
Unit	Parameter Range		Selection	Default
	Min	Max		
-	-	-	Not set	Not set
	-	-	Yes	

System Information			LCD: System Info	
Use: The <i>System Info</i> parameter contains all relevant device information to identify the product. It is used for service purpose. Please make sure that you have this information ready when you call the FMS service department.				
Unit	Parameter Range		Selection	Remarks
	Min	Max		
-	-	-	Device Version SerialNo	Type number of device. Software version used in this device. FMS unique serial number.

7.10 Reset to Default Parameters

Factory settings of your EMGZ321 tension controller can be re-established either over the parameter setting menu (see 7.8 “System Parameter Group”) or by holding the two keys  and  at the same time while the controller is powered on.

7.11 Complete Parameter List

Amplifier Parameter Group							
	Parameter	LCD	Unit	Min	Max	Selection	Default
Sensor A	Offset A	Offset A	Digit	-8000	+8000	-	0
	Nominal force A	NomForcA	N ¹⁾	1.0	100'000. 0	-	1000.0
	Gain of amp. A	Gain A1	-	0.100	20.000	-	1.000
	Gain of amp. A	Gain A2	-	0.100	20.000	-	1.000
Sensor B	Offset B	Offset B	Digit	-8000	+8000	-	0
	Nominal force B	NomForcB	N ¹⁾	1.0	100'000. 0	-	1000.0
	Gain of amp. B	Gain B1	-	0.100	20.000	-	1.000
	Gain of amp. B	Gain B2	-	0.100	20.000	-	1.000

Output Parameter Group							
	Parameter	LCD	Unit	Min	Max	Selection	Default
Output 1	Output value 1	Output 1	-	-	-	Ten. A-B Ten. A+B Ten. A Ten. B	Ten. A-B
	Output 1 Display Mode	Out1Mode	-	-	-	0..10V 0..20mA 4..20mA +/- 10V	+/- 10V
	Max. Tension at Output 1	Out1 Ten	N ¹⁾	0.1	100'000. 0	-	1000.0
	Lowpass filter for Output 1	Out1Filt	Hz	0.100	20.000	-	1.000
Output 2	Output value 2	Output 2	-	-	-	Ten. A-B Ten. A+B Ten. A Ten. B	Ten. A+B
	Output 2 Display Mode	Out2Mode	-	-	-	0..10V +/- 10V	0..10V
	Max. Tension at Output 2	Out2 Ten	N ¹⁾	0.100	20.000	-	1.000
	Lowpass filter for Output 2	Out2Filt	Hz	0.100	20.000	-	1.000

¹⁾ The display shows the unit of measure that was previously selected

Relay Parameter Group							
	Parameter	LCD	Unit	Min	Max	Selection ⁵⁾	Default
Relay 1	Assignment of Relay 1 function	Relay 1	-	-	-	Chk A Chk B Chk A+B Chk IA-BI Disable	Chk A+B
	Limit condition check Relay 1	LimCond1 ⁴⁾	-	-	-	< Limit > Limit	< Limit
	Limit value R1	Limit 1	N ¹⁾	0.1	200'000. 0	-	100.0
Relay 2	Assignment of Relay 2 function	Relay 2	-	-	-	Chk A Chk B Chk A+B Chk IA-BI Disable	Chk IA+BI
	Limit condition check Relay 2	LimCond2 ⁴⁾	-	-	-	< Limit > Limit	> Limit
	Limit value R2	Limit 2	N ¹⁾	0.1	200'000. 0	-	100.0

- 1) The display shows the unit of measure that was previously selected
- 4) This parameter is only displayed, if the function check "Limit 1" or "Limit 2" have been assigned to Relay 1 respectively Relay 2.
- 5) A relay function can only be assigned once to a relay output. If a function is being used the function will not appear on the parameter selection.

System Parameter Group						
Parameter	LCD	Unit	Min	Max	Selection	Default
Password protection	Password	-	-	-	Yes No	No
Language on LCD	Language	-	-	-	English German	English
Unit of Measure	Unit	-	-	-	N kN g kg lb	N
Contrast	Contrast	%	1	100	-	65
Display Filter	Dis.Filt	Hz	0.1	10.0	-	1.0
Ethernet IP Address	IP Addr.	-	000.000. 000.000	255.255. 255.255	-	192.168. 000.090
Subnet Mask Address	Subnet	-	000.000. 000.000	255.255. 255.255	-	255.255. 255.000
LAN Speed	LANSpeed	MBPS			10 100	100
Default Settings	Default	-	-	-	Not set Yes	Not set
System Information	System Info	-	-	-	-	-

System Information			
Parameter	LCD	Example	Remarks
Device Code	Device EMGZ321	EMGZ321	Customer specific versions will be coded with an additional character at the basic type number.
Software Version	Version V1.00	V1.00	Software version used in this device
Serial Number	SerialNo 00000532	00000532	Every FMS product has his unique serial number.

8 Parameter Setting via a PC

The EMGZ321 force measuring amplifier can be embedded in an Ethernet network and the parameter setting can be done over this network by means of a web browser (Internet Explorer 7). The devices have a static IP-address that can be set over the user interface. The IP-address is not automatically assigned over DHCP.

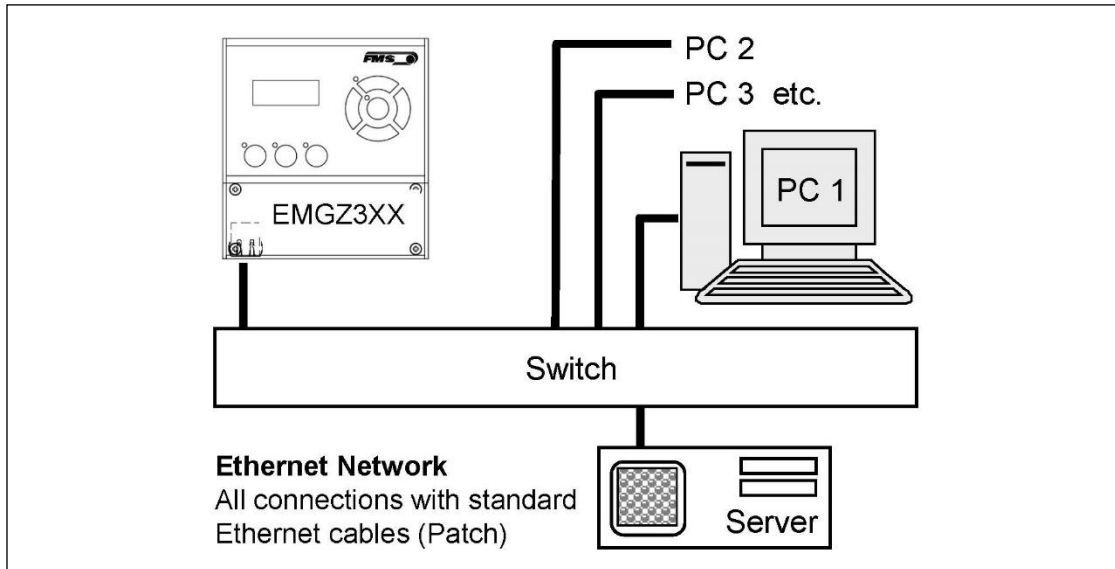


Fig. 26: EMG321configuration in a LAN (Local Area Network).

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The parameter setting can be carried out with a desktop- or laptop computer via a peer-to-peer connection (see **chapter 9.2**)

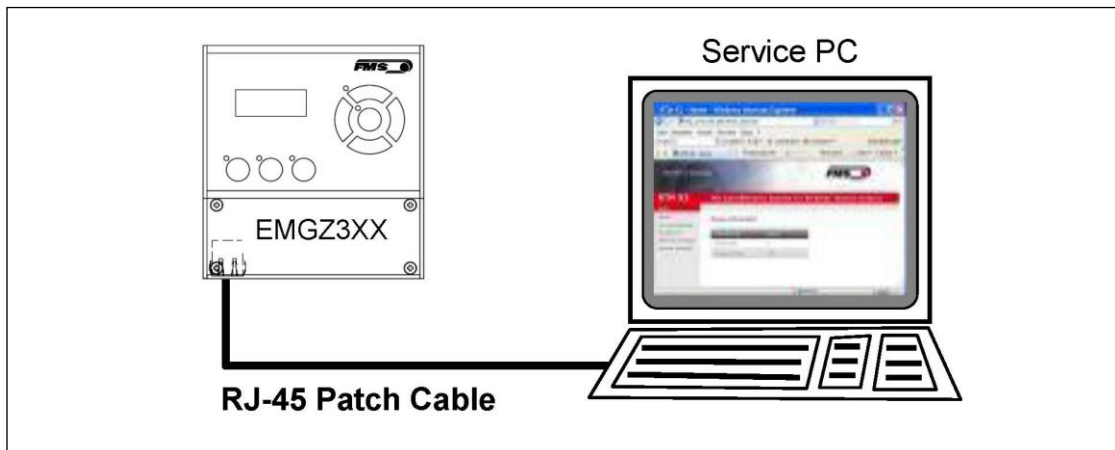


Fig. 27: Connection EMG321-PC via RJ-45 cable.

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8.1 Parameterisation in an Ethernet Network via Web Browser

When embedding the EMGZ321 in an Ethernet network it must be certain that the EMGZ321 uses an IP address in a static block (not assigned by the server). For the integration of an EMGZ321 amplifier in your Ethernet network please contact your IT system administrator.

Once the amplifier was integrated in the network you can address the device e.g. with <http://192.168.000.090> . After establishing the link, the screen Fig. 23 will open up.

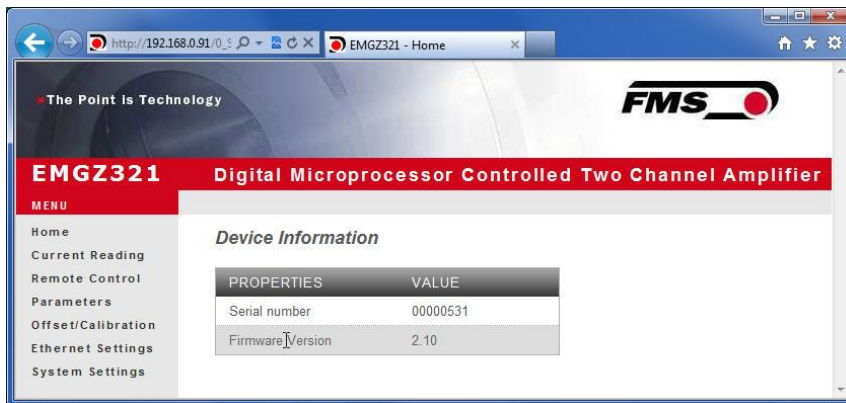


Fig. 23: Serial number and device information

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With the menu on the left side of the screen you can navigate through the web page.

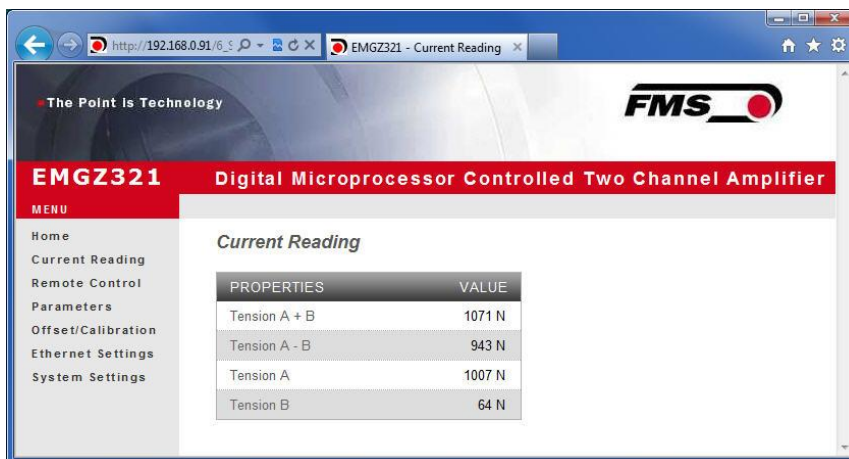


Fig. 24: Current reading of tension on the output

Current reading



Fig. 25: Remote Control Screen to operate the EMGZ321 via Ethernet Remote Cont

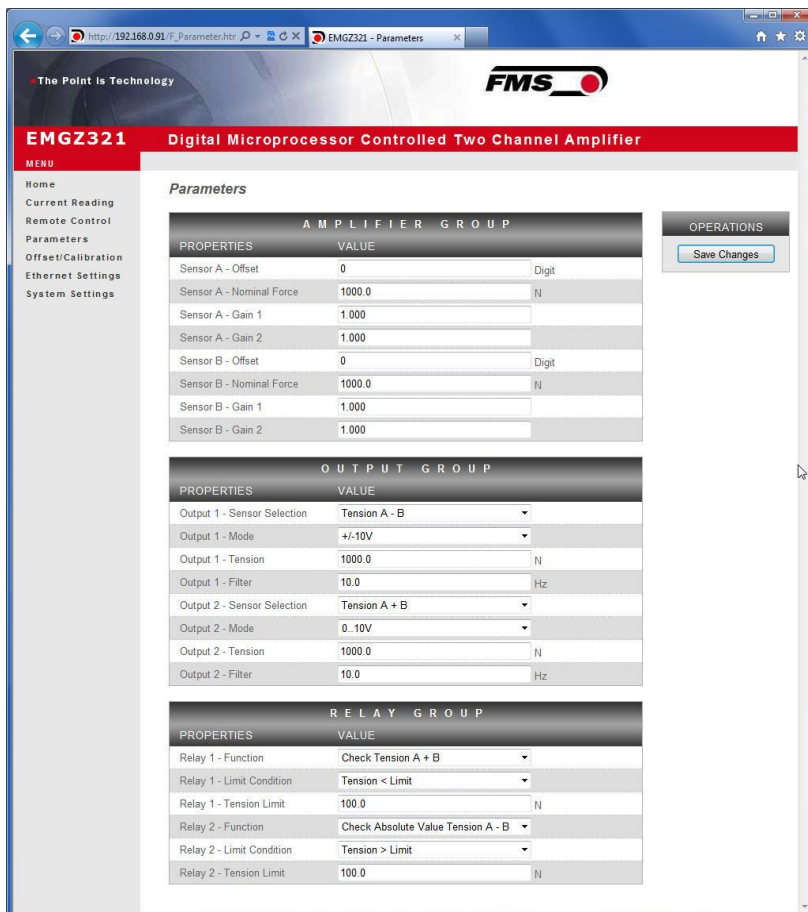


Fig. 26: Parameter setting Screen Parameters

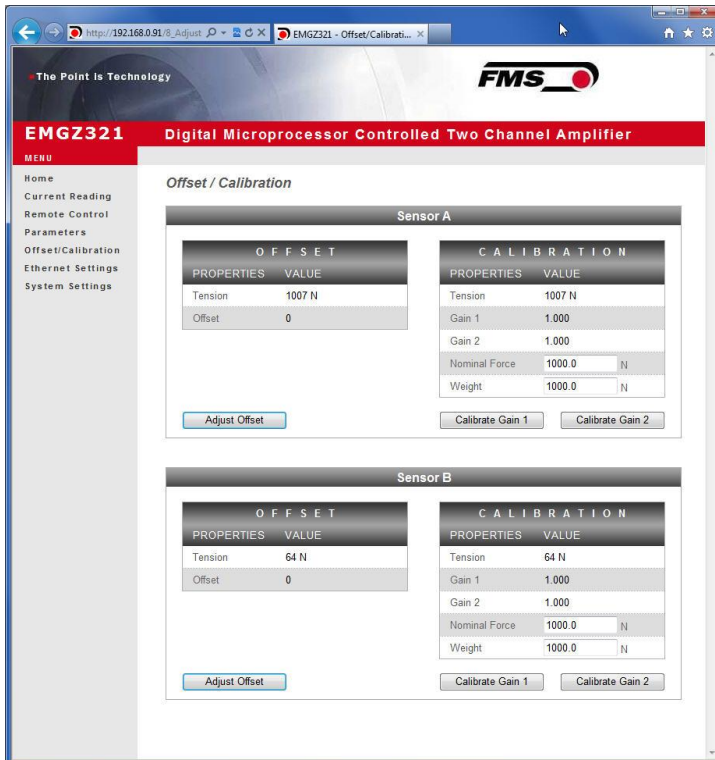


Fig. 27: Offset Compensation and Calibration via web browser

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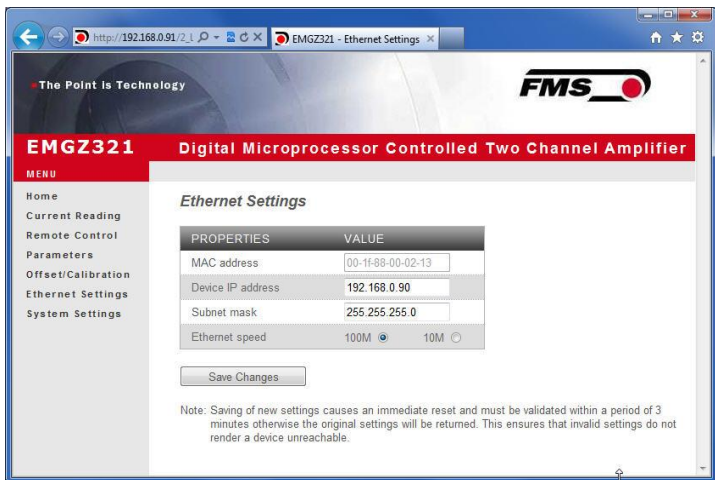


Fig. 28: Ethernet settings

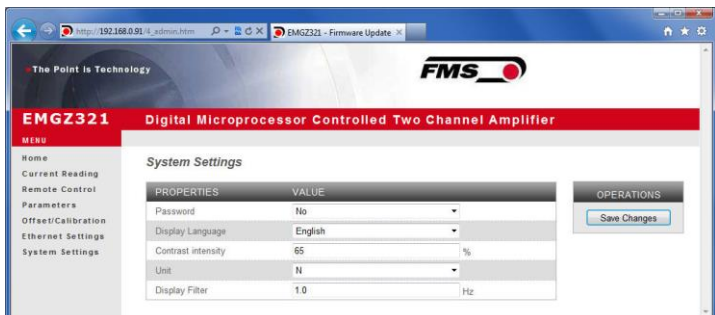


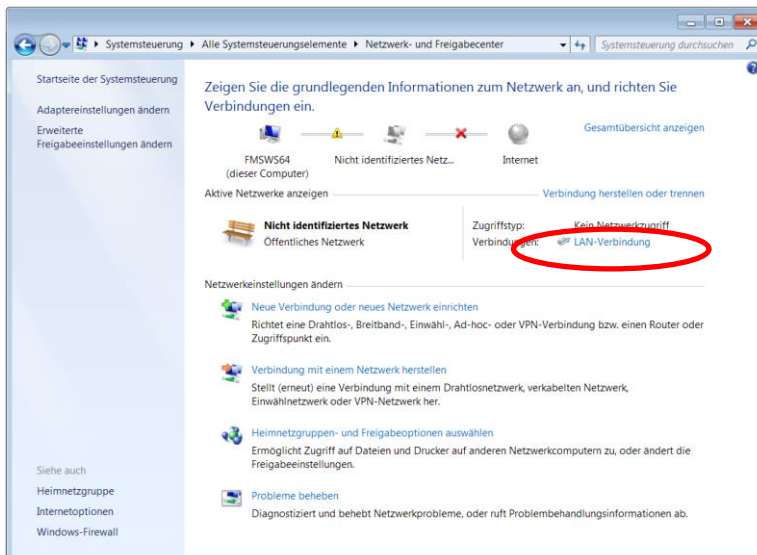
Fig. 29: System settings

8.2 Connecting the EMGZ321 Amplifier with a PC (Peer-to-Peer)

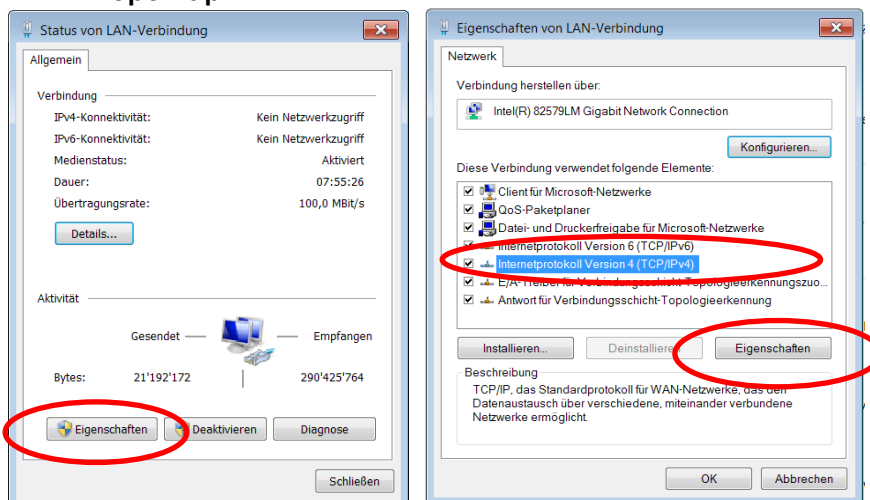
The parameter setting can also be carried out with a desktop or laptop computer directly connected to the EMGZ321. In this case, the PC is connected via a Peer-to-Peer connection to the amplifier. This chapter describes the procedure for setting up a computer to communicate with EMGZ321.

Setup for OS Window 7:

1. Connect PC and EMGZ321 with a “RJ-45 patch cable”
2. Power-up PC and EMGZ321
3. In order to recognize the EMGZ321 amplifier your PC must be configured with a static IP-address. Click on the Windows button (lower left-hand corner).
4. Click on Control Panel
5. Double click on Network ... Center.

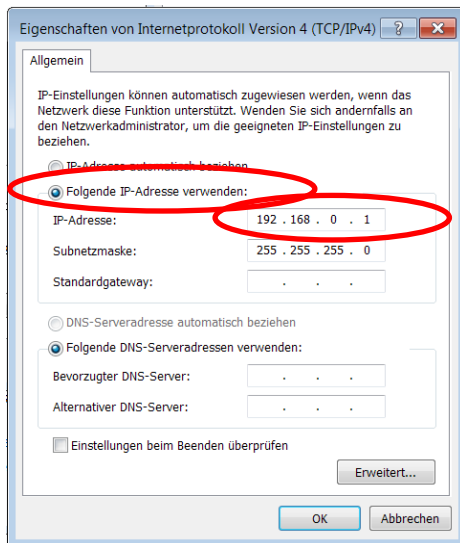


6. Double click on “Local Area Network”. The dialog box “Status of LAN connection” will open up.



7. Click on Properties
8. On the next dialog box select the network adapter that is used for the connection. In our case “Internet protocol version 4 (TCP/IP)”

9. Click on Properties. The following dialog box “Internet protocol Version 4 (TCP/IPv4) Properties” will appear.



10. Select the radio button “Use the following IP address:”
11. Enter the IP address for the computer that could be 192.168.0.1
12. In the Subnet mask, enter 255 255 255 000, as shown above.
13. Click the “OK” button.
14. Close all windows

The computer is now ready to communicate with the EMGZ321 amplifier:

1. Open Microsoft Internet Explorer or Mizilla Firefox.
2. The default IP address for the EMGZ321 is **192.168.000.090** as long as it was not changed over the operating penal. Enter the IP address e.g. with <http://192.168.000.090> in the address bar and hit the Enter key. The screen “Device information” **Fig.29** will open up.
3. Then proceed as described in chapter 9.1 "Parameterization in a Network Using a Web Browser".
4. If a different IP address and subnet mask is configured at the EMGZ321 make sure that the computer is setup appropriate.
5. Once you return to your office, don't forget to reconfigure your PC to “Automatic assignment of the IP-address” (see last dialog box).

9 Mechanical Dimensions

The EMGZ321 series is available in three different housing options. The mechanical dimensions can be seen in the following pages.

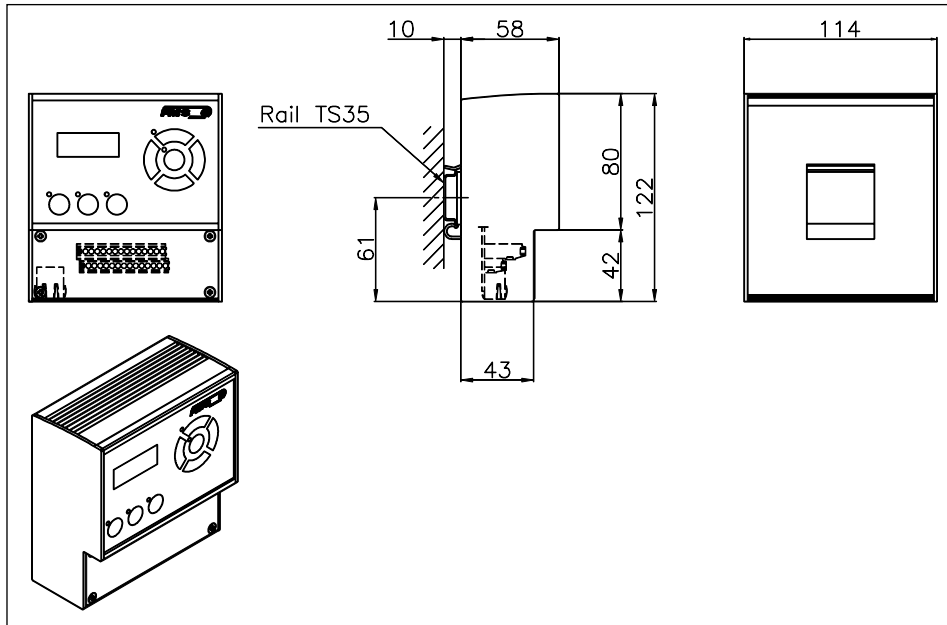


Fig. 30: Outline Drawing for EMGZ321.R rail mount housing
Ethernet connection: RJ-45 connector

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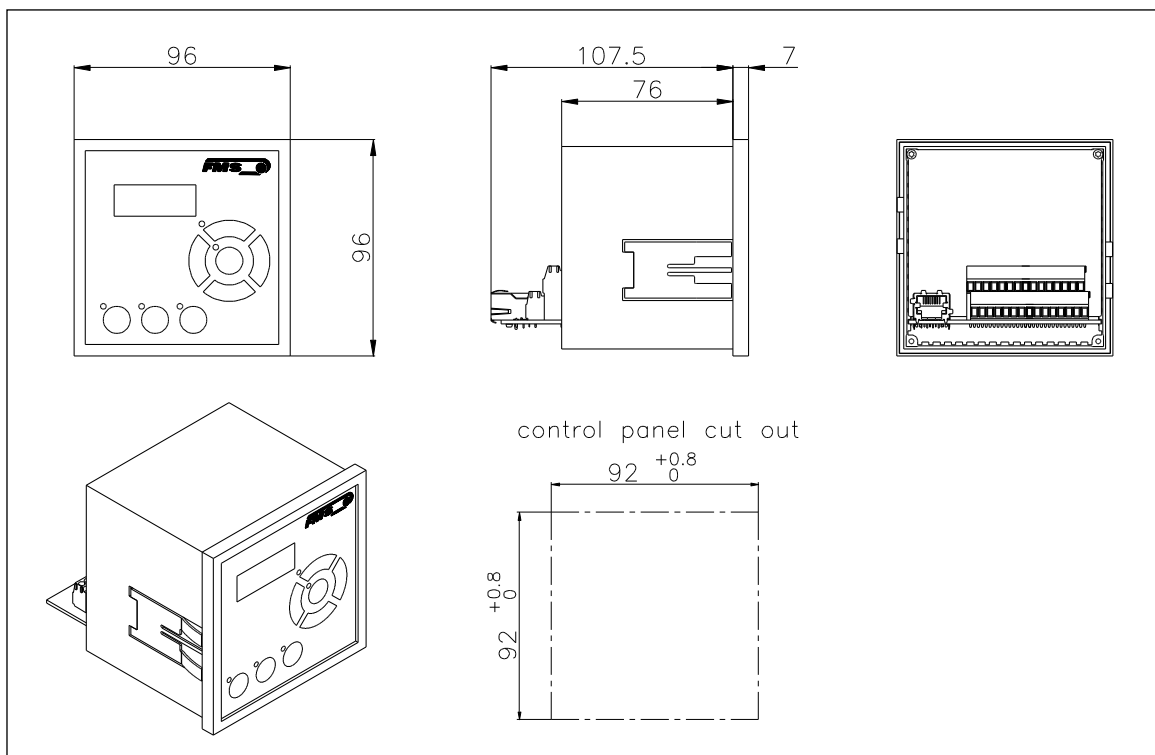


Fig. 31: Outline Drawing for EMGZ321.S panel mount housing (RJ-45)

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10 Trouble Shooting

Error	Cause	Corrective action
Output value off – it is far from the expected value	Offset badly adjusted	Proceed again for offset compensation procedure.
	Wrong nominal force entered. Forgotten to enter the force of sensor A or B.	Proceed to 6.5 “Calibration Procedure” and enter the correct value. E.g. if you have a roller with two 250N sensors, enter 250 for sensor A and 250N for sensor B.
	Wrong Gain value determine	Repeat calibration procedure as described in paragraph 6.5.
	If gain switching is used, possibly wrong gain chosen	Switch the dig. input used for gain switching (see paragraph 4.6)
Sensor A or B shows >>0.1 even though material is loose	Current output is set to 4...20mA	Set the correct output mode in the Output Parameter Group, if a signal 0...20mA is required
Output value of sensor A or B is jittery	Cut off frequency of the filters set too high	Adjust cut off frequency (ref. to „7.4 Outputs Parameter Group“)
Output value of sensor A or B is not stable	Grounding problem. (PE) badly connected	Check ground wire and able shield for proper contact.
	Electrical interference on the cable to the force sensor	Check connection of the shield. Use one twisted pair for +signal and –signal.
Relay outputs behave different as expected	Limit values wrongly parametrised.	Check the parameter <i>LimCond</i> and <i>Limit 1</i> and <i>2</i> for plausibility. Set parameter to appropriate values.
Display is dark and the amplifier does not respond to key commands.	No supply voltage	Check your wiring (ref. to paragraphs 4.3 and 4.4).
Amplifier does not respond to key commands.	Electronic boards or key foil defective.	Contact service department of FMS

11 Technical Specification

11.1 Technical Data

Number of Channel	2 Channel for 2 sensors
Sensor Supply	5 VDC, max. 60mA, high stability
Input signal range	0...9mV (max. 12.5mV)
Resolution A/D converter	±8192 Digit (14 Bit)
Measuring error	<0.05% FS
Processor cycle time	1ms
Tension output	0...10V ; ±10V; min. 1.2kΩ
Current output	0/4...20mA max. 500Ω
Operation	3 buttons, 5 buttons wind rose, LCD-display 2x8 characters (size 8mm)
Interfaces	Ethernet via web browser (Ethernet explorer 7 or higher)
Power supply	24VDC (18...36VDC) / 10W (max. 0.5A)
Temperature range	-10...60 °C (14...140 °F)
Protection class	EMGZ321.R and S: IP50 EMGZ321.W: IP65
Weight	EMGZ321.R: 0.57kg [1.26 lbs]; EMGZ321.S: 0.40kg [0.88 lbs]; EMGZ321.W: 0.72kg [1.59 lbs]

11.2 Input / Output Configuration

EMGZ321 Series Input / Output Configuration	
Analogue input 1	1 sensor with strain gauges @ 350 Ω (0...9 mV, max. 12.5 mV)
Analogue input 2	1 sensor with strain gauges @ 350 Ω (0...9 mV, max. 12.5 mV)
Analogue output 1	0...10 VDC; ±10VDC; 0/4...20mA)
Analogue output 2	0...10VDC, ±10VDC;
Digital Inputs	2 inputs @ 24 VDC galvanically isolated
Relay outputs	2 outputs (DC: 220V/2A/60W; AC:250V/2A/62.5VA)



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