Operating Manual

EMGZ309._.EIP

Tension Measuring Amplifier with EtherNET/IP Interface

Version	2.16 09/2020 NS
Firmware Version	V2.20EIP

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1 Safety Instructions

1.1 Description conditions

a) High danger of health injury or loss of life

Danger

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

b) Risk of damage of machines

Caution

This symbol refers to informations, that, if ignored, could cause heavy mecanical 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 Tension Measuring Amplifier is only guaranteed with the recommended application of the components. In case of other arrangement, heavy malfunction can be the result. Therefore, the 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 electronic unit! It is vital to ensure that proper earth connection is done.***

⚠ ***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 Product Description

2.1 Product Range

The tension measuring amplifier series EMGZ309 is available in two versions:

- EMGZ309._ with standard analogue outputs
- EMGZ309._.EIP with analogue outputs and integrated EtherNet/IP interface

Both versions are available in three different housing / mounting options:

- EMGZ309.R rail mount housing
- EMGZ309.S panel mount housing
- EMGZ309.W wall mount housing

For mechanical dimensions refer to **charter 10**.

2.2 Block Diagram

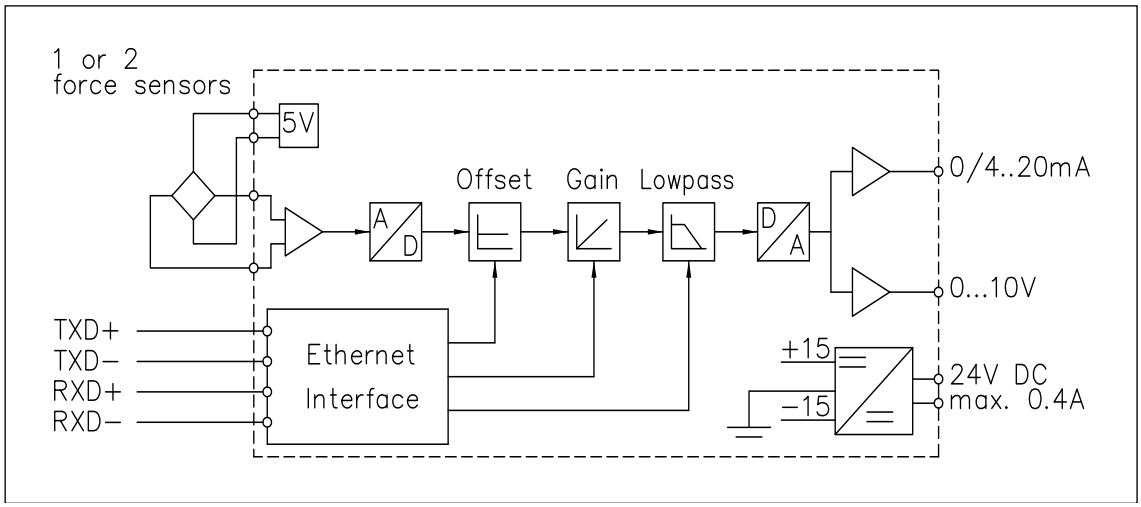


Fig. 1: Block diagram EMGZ309 Tension Measuring Amplifier E309011e

2.3 System Description EMGZ309

The digital tension measuring amplifiers EMGZ309 are suitable for tension measurement with all FMS force sensors. The amplifier can handle 1 or 2 force sensors. Three different analogue output modes can be selected (0...20mA, 4...20mA or 0...10 VDC). As a plug & play unit the setup through the operating panel is straightforward and quickly accomplished. Alternatively, more advanced users can access all the internal parameters through a laptop or local PC via a web browser. That allows a fine tuning of the amplifier even to the most demanding system requirements.

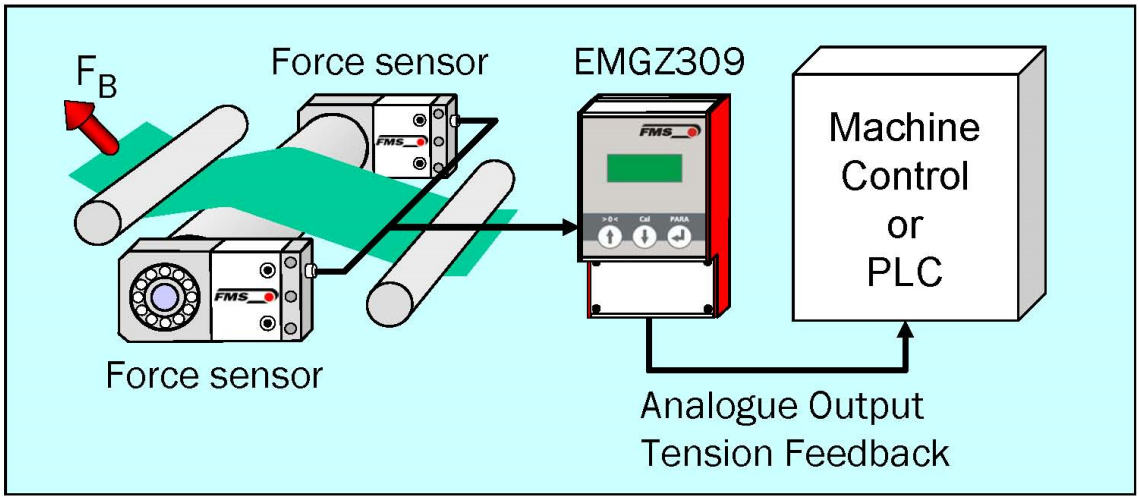


Fig. 2: System Configuration EMGZ309 Amplifier using the analogue output E309019e

2.4 System Description EMGZ309._.EIP

The amplifier EMGZ321._.EIP offers in addition to his standard features the possibility to be used as an EtherNet/IP device in a corresponding network. EtherNet/IP bases on the Ethernet TCP/IP and the UDP technology as well as on the CIP (Common Industrial Protocol). The amplifier can be embedded in a standard Ethernet infrastructure. The EMGZ309.EIP offers a EtherNET/IP data transfer rate with ≥ 2ms. It allows the measurement of web tension and its transmission over Ethernet to a controller in real time. Configuration of the amplifier takes place either over the EtherNet/IP, a web browser or over the operating panel.

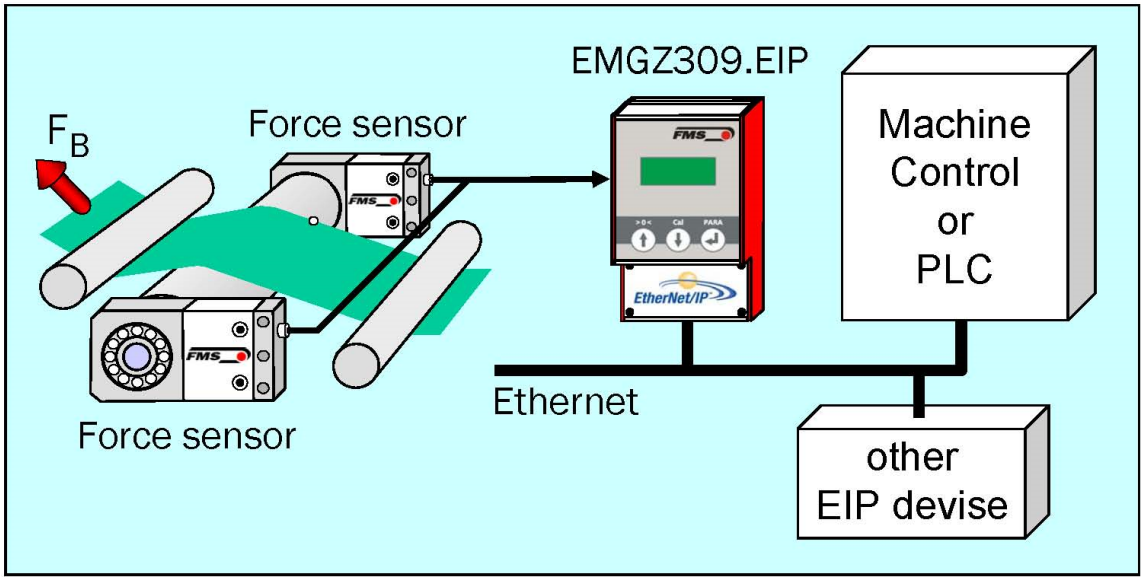


Fig. 3: System Configuration EMGZ309.EIP integrated in EtherNet network E309020e

3 Quick Installation Guide

In a Plug & Play configuration the set-up of the EMGZ309 and force sensor is limited to only the offset compensation and the calibration.

3.1 Preparations for Set-up

1. Read the Operation Manual of your force measuring sensors
2. Check your requirements such as:
   – Display unit of nominal force
   – additional output configuration 0...10V or 0/4... 20mA on display
3. Draw the wiring diagram for your configuration (ref. to **3.5** "Wiring the Amplifier")
4. If required, determine special parameters (ref. to **8.2** "Parameter List")

3.2 Installation Procedure

1. Mount your force maesuring sensors to the machine frame
2. Wire the Force Measuring Sensor(s) (ref. to **Fig. 4**)
3. Connect the amplifier to the power supply. The power supply voltage must be in the range 18 to 36V DC.
4. Perform offset compensation and calibration (ref. to **chapter 4.5** to **4.9**)
5. If required, do additional settings (ref. to **8**" Parameterization over Operating Panel")
6. Integration of amplifier in an Ethernet network and PLC (see **chapters 5.3** and **6**)

3.3 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 Tension Measuring Amplifier is only guaranteed with the recommended application of the components. In case of other arrangement, heavy malfunction can be the result. Therefore, the installation instructions on the following pages must be followed strictly.

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.

3.4 Mounting the Force Sensors

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

3.5 Wiring the Amplifier

One or two force sensors can be connected to the measuring amplifier. When using two force sensors, the sensors are internally connected in parallel. The output signal of the measuring amplifier will then correspond to the average value of the two sensors. The connection between force sensors and measuring amplifier has to be done using a 2x2x0.25mm² [AWG 23] shielded twisted-pair cable

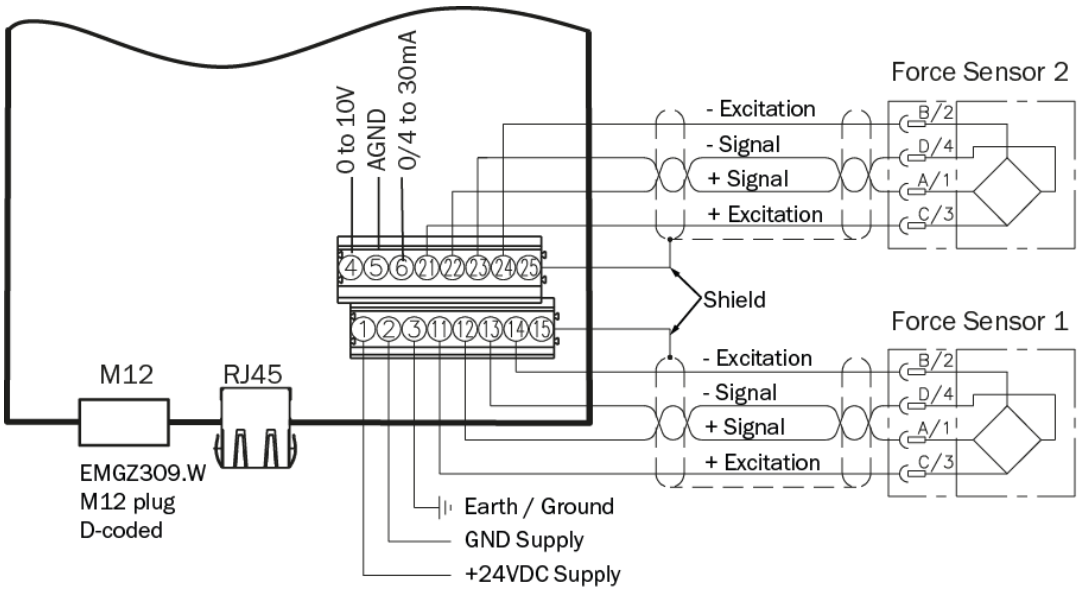


Fig. 4: Wiring Diagram EMGZ309.EIP EMGZ_309_BA_Manual.ai

Signal	Name	EIA T568B	Pin RJ45	Pin M12
TD+	Transmission Data +	WH/OG	1	1
TD-	Transmission Data -	OG	2	3
RD+	Receive Data +	WH/GN	3	2
RD-	Receive Data -	GN	6	4

Ethernet connectors EMGZ_309_BA_Manual.ai

Caution

Bad earth ground connection may cause electric shock to persons, malfunction of the total system or damage of the electronic unit! It is vital to ensure that proper earth connection is done. The cable must be installed separate from power lines

Note

The shield should be connected only to the electronic unit. On the force sensor side the shield should stay open.

4 Configuring the Amplifier

The amplifier EMGZ309._.EIP can be configured over the operation panel (**chapter 8**), over a PC (web interface, **chapter 9**) or over EtherNet/IP. The basic configuration is performed over the operation panel.

4.1 Power up the EMGZ 309._.EIP

1. Connect the first force sensor (see **Fig. 4** Wiring Diagram EMGZ309)
2. Check whether applying a force in measuring direction (in the direction of the red point) on the first sensor results in a positive output signal. If not, exchange the two signal wires of the corresponding force sensor (terminals 12/13).
3. If applicable, connect the second force sensor.
4. Check whether applying a force in measuring direction on the second sensor results in a positive output signal. If not, exchange the two signal wires of the corresponding force sensor in the terminal block (terminals 22/23)

4.2 Operating Panel

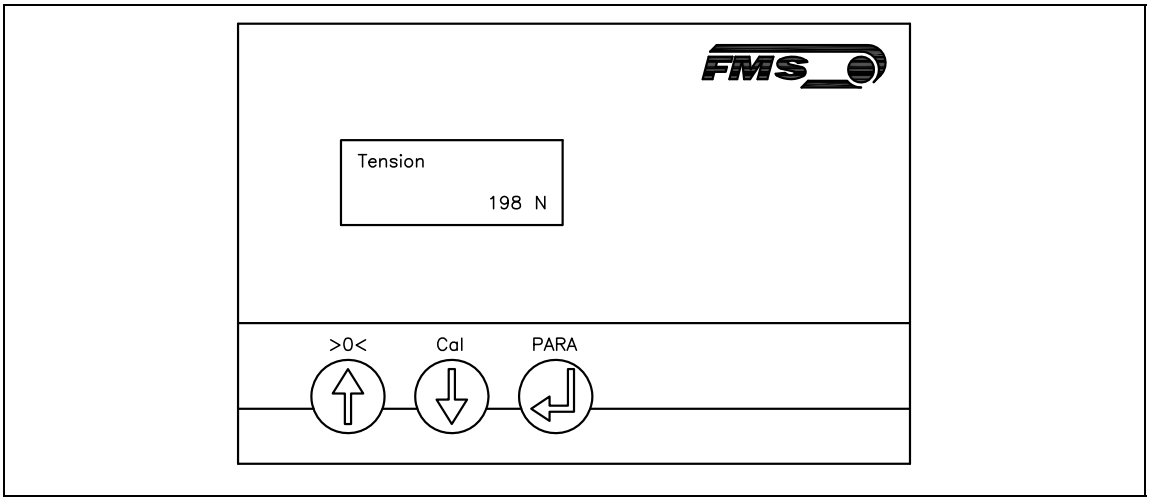


Fig. 5: Operating Panel EMGZ309.W.EIP E309007e

The keys on the operating panel have the following functions:

Key	Key Function
	Change the selections or increase / decrease the values
	Enter
>0< + PARA	Enter Offset Compensation Procedure. Press the two keys at the same time for longer then 3 sec.
Cal + PARA	Enter Calibration Procedure. Press the two keys at the same time for longer then 3 sec.
PARA	Enter the Parameter Setting Mode. Press the key at the same time for longer then 3 sec.

4.3 Change the Measuring Units

The default tension measuring units is N (Newton). The user can, however, select another unit before the calibration process. To select the units of measure, follow the steps below:

1. Hold the **PARA** key until the display changes to [**Dis. Filt**]
2. Scroll the menu by pressing the ⬇ key until the display shows [**Unit**]
3. Press the ↵ and the word [**Unit**] will start flashing indicating that the unit of measure can now be changed.
4. With every press of the ⬆ ⬇ keys the display will change from **N, kN**, then to **lb, g, kg**.
5. Stop at the desired unit and press the ↵ again to confirm the selection.
6. Press the **PARA** key for longer then 3 sec. to save the setting and return to the Operating State. Or if no action is taken after 30 seconds, the value will be stored in the system automatically.

4.4 Change the Device Mode

The EMGZ309 amplifiers have two Device Modes:

- **Display of Force Gauge**: Tension data are displayed in a force unit
- **Display of Voltage Gauge:** Tension data are displayed in Volt (V)

1. Go to Parameter Selection Mode (press **PARA** key longer than 3 sec).
2. Go to Parameter [**DevicMod**]
3. With the key ⬇ select desired Device Mode [**ForcGaug**] or [**VoltGaug**] and confirm selection with the key ↵.

> ☞ ***Note***
> ***Each change of the Device Mode requires a re-calibration of the system (see chapter 4.8).***

4.5 Offset Compensation

With the Offset Compensation you can compensate the roller weight. It is always performed before the calibration. The Force Measuring Sensor should not be loaded while the Offset Compensation is being done. There are two possible ways performing the offset compensation.

- **A)** Offset compensation over the operating panel (see **chapter 4.5**)
- **B)** Offset compensation via EtherNet or a Web Browser.
  For this method proceed to **chapter 9.1** (**Fig. 23**).

4.6 Offset Compensation over the Operating Panel

1. Make sure the measuring roller is unloaded.

2. Press the two keys **>0<** and **PARA** at the same time for longer then 3 seconds.
3. The display will show [**Offset Complete**] when the process is finished (see **Fig. 6** State diagram offset compensation).

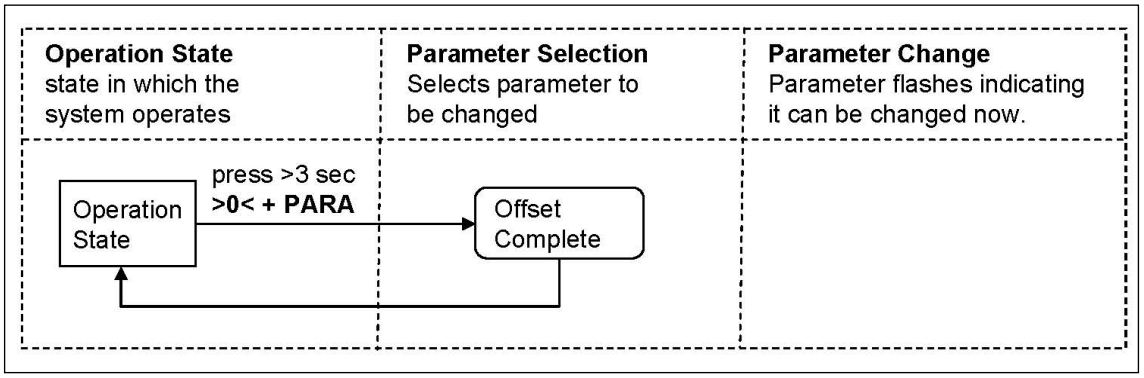


Fig. 6: State diagram offset compensation EMGZ309014e

4.7 Calibration

By calibrating (setting the Gain), amplifier and load cells are adjust so that the display gives the actual tension value. The method uses a defined weight (see **Fig. 7**). This method is the preferred one since it delivers the most accurate results.

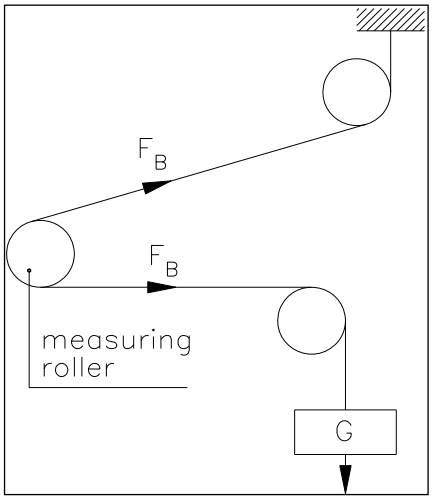


Fig. 7: Calibrating the measuring amplifierC431011e

Note

If the Device Mode is set to [VoltGaug], the force corresponding to the calibration weight must be input in Volt (V) in the following calibration procedure. The parameters System Force [SysForce] and Force at maximum output [F@OutMax] won't be requested (see also chapter 9.3, section B).

4.8 Calibration over the Operating Panel

1. Load a rope with a defined weight corresponding to your calibration force on the roller. The roller configuration must correspond to the real configuration in the machine (wrap angle, distance of the rollers etc.).

2. The calibration mode can be entered by pressing the two keys **Cal** and **PARA** at the same time for longer than 3 seconds. Display changes to
   The System Force [**SysForce**] determines the measuring capability of your measuring roller. E.g. if two 500 N sensors are installed in the measuring roller, enter 1000N. If only one 500N sensor is used, enter 500N (see **8.3** "Descriptions of Parameter", [**SysForce**]).

   SysForce
   1000.0 N

3. The parameter [**SysForce**] flashes indicating that the force can now be changed. Use ↑ ↓ keys to enter the system force.
4. Press the ↵ key to confirm your input. Display will change to
5. Enter the force corresponding to your calibration weight with the ↑ ↓ keys.
6. Press the ↵ key to confirm your input. Display will change to

   Calibra.
   1000.0 N

   F@OutMax
   1000.0 N

7. With the parameter [**F@OutMax**] the force corresponding to the maximum amplifier output (10V or 20mA) can be assigned (see **6.3** "Descriptions of Parameter", [F@MaxOut]). Enter the value with the ↑ ↓ keys.
8. Press the ↵ key to confirm your input. Display will change to
   The calibration procedure has been completed successfully.

   Calibra.
   Complete

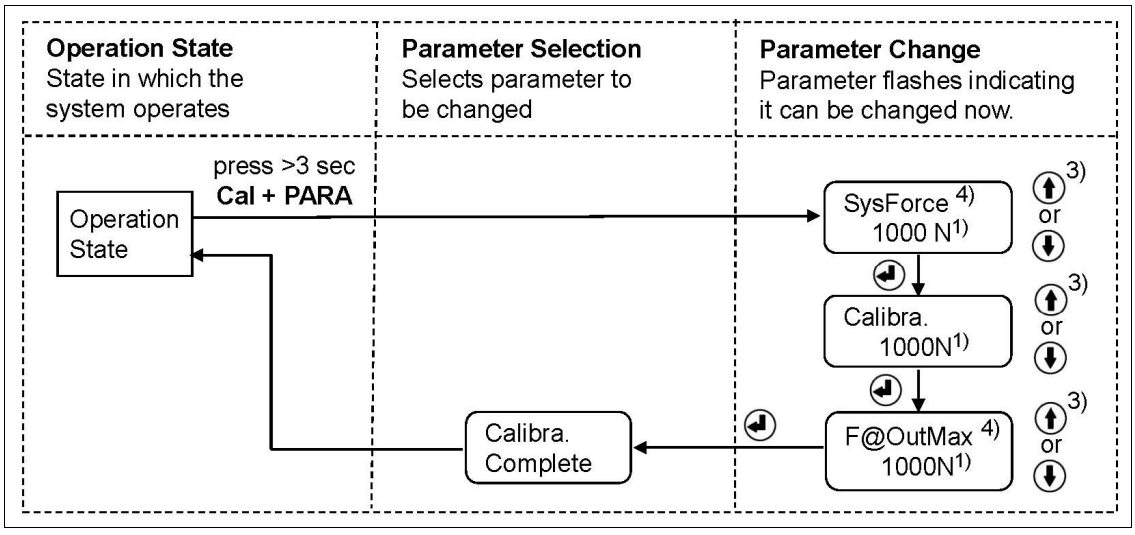


Fig. 8: State diagram calibration EMGZ309015e

1) The display shows the unit of measure that was previously selected.
3) Permanent key pressing expedites the changing speed.
4) If the Device Mode [**VoltGauge**] is set, these parameters are deactivated

5 Network Connection over EtherNet/IP

The amplifier EMGZ309._.EIP is able to communicate with other devices over an Ethernet network. CIP (Common Industrial Protocol) is used as the protocol for the data link. The amplifier acts as a so called “Producer” and the machine control (or PLC) as the “Consumer”.

5.1 EtherNet/IP Specification:

Physical layer: Ethernet IEEE 802.3.
Transport protocol: TCP/IP und UDP
Standard: CIP IEC 61158
Conformity: CPF 2 (Communication Profile Family 2) IEC 61784-1

5.2 Amplifier Functionality over EtherNet/IP

Basically all functions for configuration and calibration can be performed over EtherNet/IP. Furthermore, the measured tension values are cyclically propagated over the network and made available to the Consumer (PLC).

5.3 Integration of EMGZ309._.EIP in an Ethernet Network

In order to integrate the amplifier in an Ethernet network and enable data transfer over it following conditions must be fulfilled:

- ✔ An EMGZ309 amplifier with the option EtherNet/IP (EIP) must be used.
- ✔ The IP-Address must be assigned in the fix address block and must be unambiguously. It may only exist once in the network.
- ✔ The network mask must correspond with the used device configuration.

If these prerequisites are given, the controller will recognise the amplifier as an EtherNet/IP device in the network and be able to communicate with it. The interface information for EMGZ309._.EIP is defined in an EDS-file. The EDS file is only used as documentation and cannot be imported into RSLogix 5000.

EDS-files for EMGZ309._.EIP can be downloaded from the FMS webpage.

> ☞ ***Note***
>
> ***The device does not support the import of the EDS files. The import with development software e.g. RSLogix5000 will generate error messages.***
>
> ***Utilize “Messages” to change parameter values of the device. Details are explained in the sample file which is available for download on the FMS website.***

5.4 Configuration of the Amplifier via EtherNet/IP

EMGZ309._.EIP may, but need not be configured via EtherNet/IP. The Amplifier can be configured by means of a machine control unit. This unit is integrated in

the same network. The communication between machine control and amplifier is carried out with dedicated software (e.g. RSLogix5000 from Rockwell). Please refer to the operating manual of the controller.

There are three possibilities to configure the EMGZ309._.EIP. If the method over EtherNet/IP is used, the other two options (operation panel or web interface) are still possible but not meaningful. The EtherNet/IP method has then always priority and overwrites any other configurations set by the other two methods.

If the configuration over EtherNet/IP is selected then messages from the PLC to the EMGZ309 must be used.
How the messages are used is described in the example project.
The example project EMGZ309_EIP_Example_Project_Vx.xx is available for download on the FMS website.

> ***Note***
> ***The configuration of the amplifier via EtherNet/IP must be used as commissioning procedure. Continuously writing parameters on a cyclic base is not allowed and will lead to communication problems and reduced the lifetime of the device.***

5.5 Calibration over EtherNet/IP

Usually the calibration procedure for amplifier and load cells is carried out at the commissioning of the machine. The two commands *Offset* and *Calibration* are available for the calibration of the amplifier over EtherNet/IP. From case to case it is to consider whether a calibration via web interface or operation panel is more favourable. With difficult accessibility of the amplifier it might make sense to do the calibration over EtherNet/IP.

6 Integration in an Allen-Bradley PLC

Following chapters deal with the integration and operation of the EMGZ309._.EIP amplifier with an Allen-Bradley PLC. The project software RSLogix5000 from Allen-Bradley is required to program the PLC. Furthermore, it is assumed that a development system with PC and corresponding development software RSLogix from Rockwell Automation is available and the programmer is familiar with these tools..

6.1 Hardware Environment

The EMGZ309._.EIP must be connected to an Ethernet switch which in turn is in the same network as the PLC. Only in this way a communication between amplifier and PLC can take place. Several EMGZ309._.EIP amplifiers or other ErtherNet/IP devices can be connected to the same network.
.

6.2 IP Configuration

In an industrial environment the IP addresses are normally assigned fix to the EIP devices. This holds also for the EMGZ309._.EIP amplifier that needs a fix IP address in the network. The IP address configuration must take place before the amplifier is integrated in a network. This is done over the operation panel or over the web interface.
The procedures are described in the state diagrams **chapter 8 (Fig. 18; 19)** and **chapter 9 (Fig.31)**

6.3 Integration in a Project

Before starting the development system RSLogix5000 the PLC and amplifier need to be connected to the network and powered-up. Now a new project or an existing project can be opened in RSLogix5000. Search in the tree structure *Controller Organizer* for the listing **Ethernet** and make a right mouse click (see **Fig. 10**).

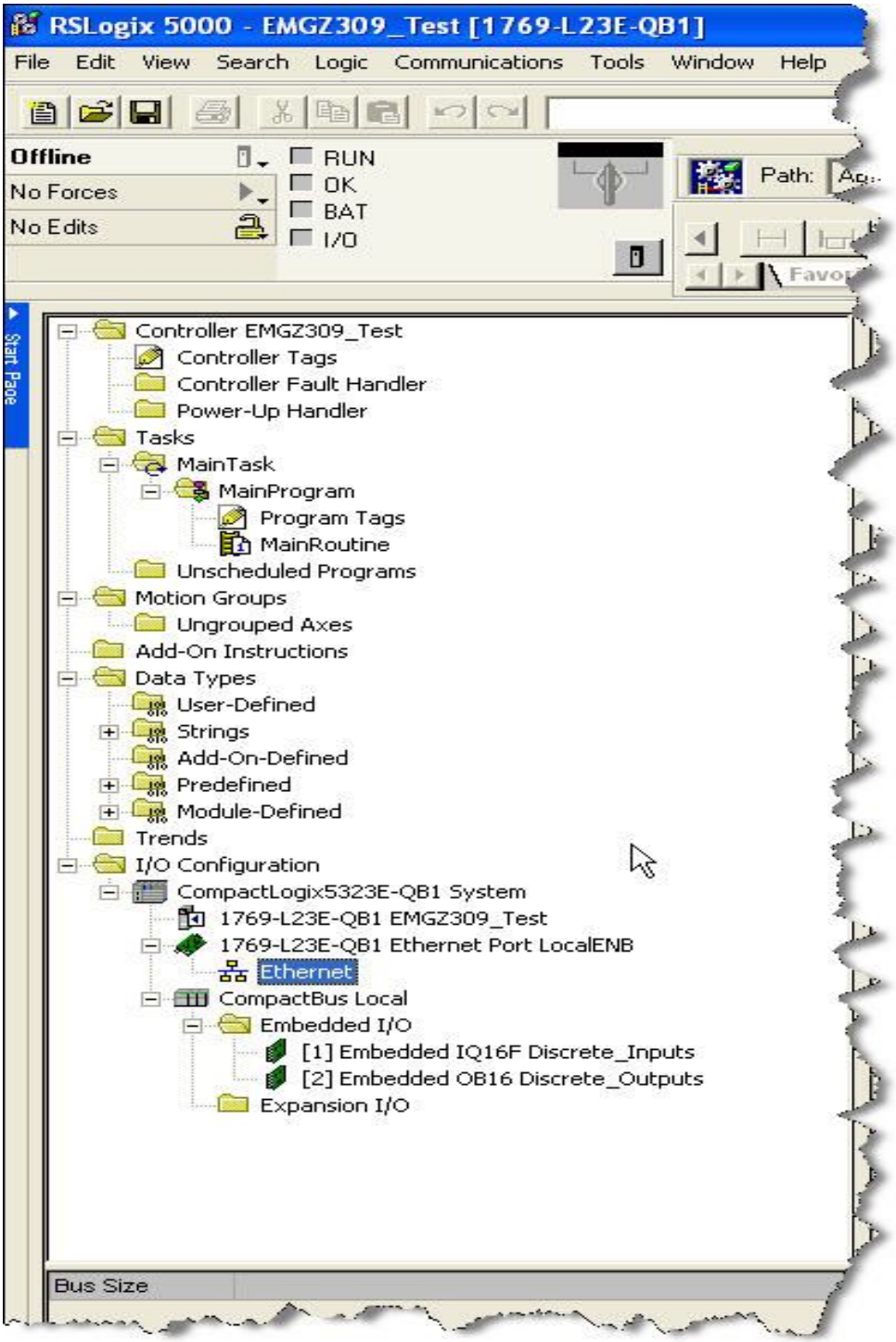


Fig. 10: Controller Organisation E309021

In this example CompactLogixL23E-QB1B is used. If a different hardware is used, one may find the listing ***Ethernet*** in another place. However, the principal approach is always the same. After a right mouse click on ***Ethernet*** a dialog window will open up. Left mouse click on ***New Module...***and a new window will open up (see **Fig.11**).

Open plus-sign [+] in front of ***Communications*** to see all the other listings.

Select ***ETHERNET-MODULE Generic Ethernet Module*** and confirm with **OK**.

Following window opens up in which the *Name* ***EMGZ309_91***, the *Comm Format* ***Input Data - DINT*** and the *IP-Address* (eg. ***192.168.0.91***) need to be entered. On the Connection Parameters side the values *Input=**100*** with *Size **5***, *Output=**101 Size leave empty*** and *Configuration=**102*** with *Size **48*** must be entered. Confirm with **OK**

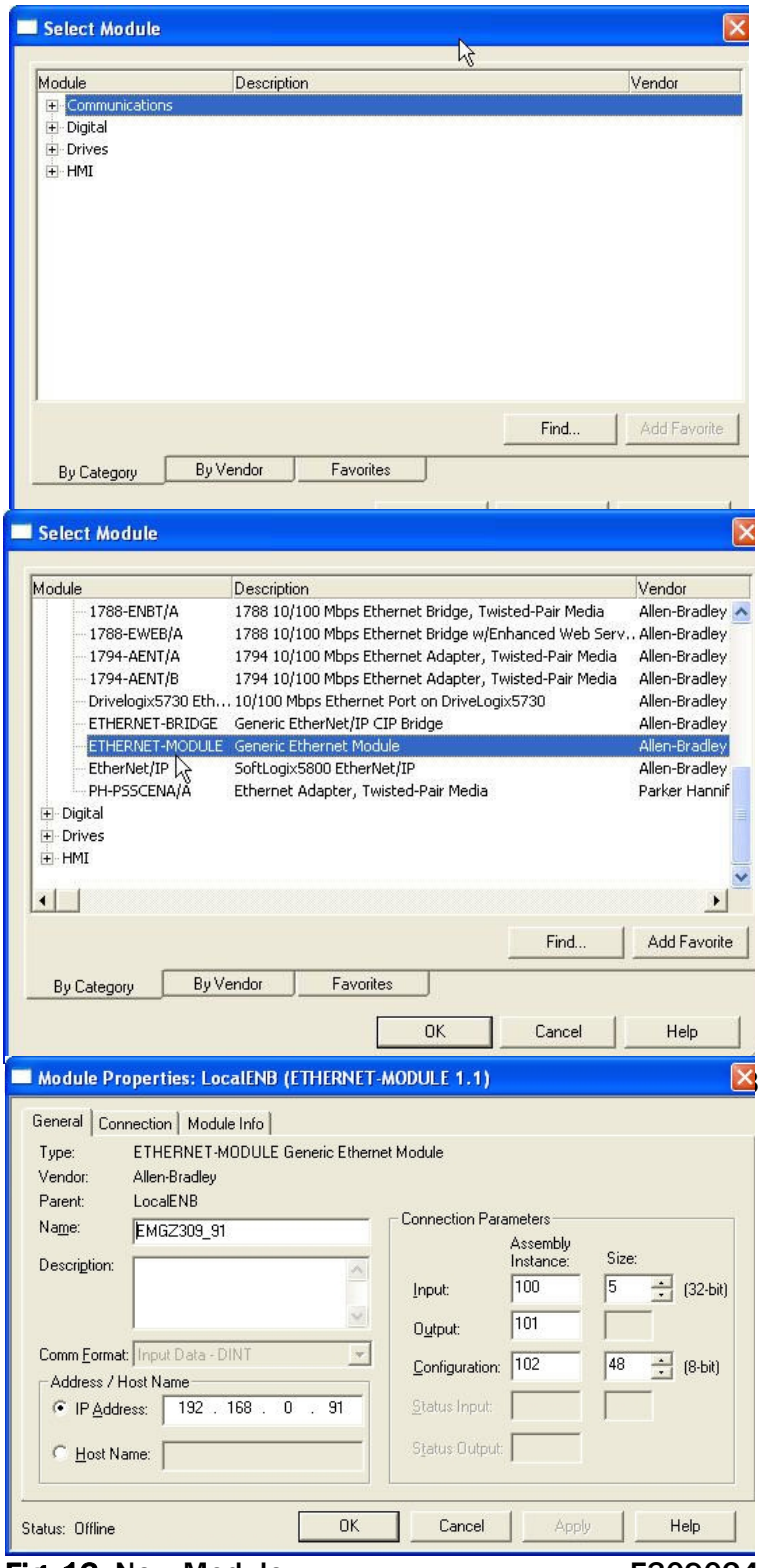


Fig. 13: New Module E309024

The dialog window (**Fig. 14**) will open up. Here, one can enter the cycle time. This determines how often the data will be propagated in the network. The minimal cycle time is 2 ms. Default setting is 10 ms. Basically, the cycle time must be set so that the maximum speed requirements of the system are fulfilled. A fast cycle time leads to more data traffic in the network. That can create communication bottlenecks. Especially when using several EMGZ309 amplifiers and other EIP devices in the same network a well-balanced data speed is important.

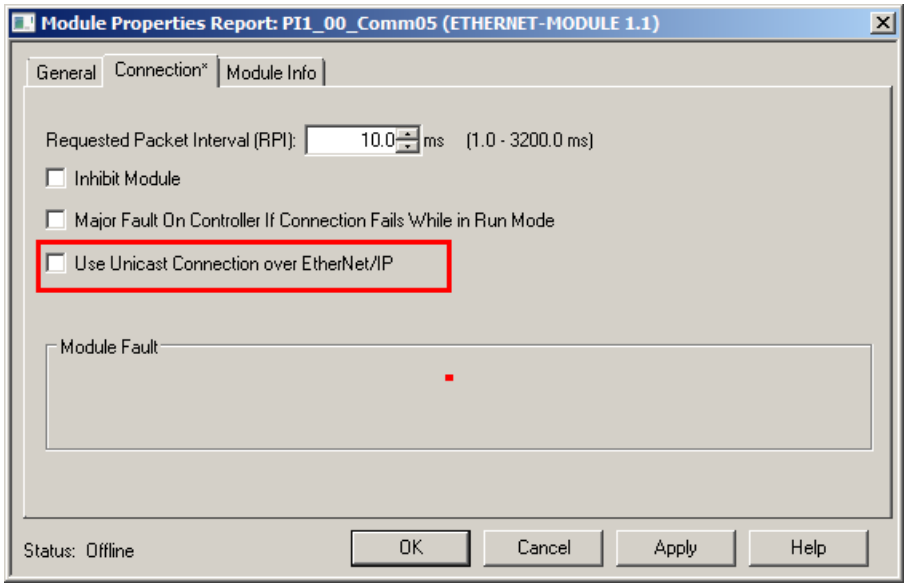


Fig. 14: **Module Properties**

Note

Untick the box „Use Unicast Connection over EtherNet/IP“. The use of this feature is not allowed as it will cause communication problems.

6.4 Access to the Tension Values

After the integration of the amplifier in the network the tension data are available in the global input tags of the controller and that in the defined cycle time. In our example the amplifier was named ***EMGZ309***. The tension values can therefore be found under the controller tags ***EMGZ309:I*** >> ***EMGZ309:I Data*** Index 0 to 3. Where the values are assigned to the indices as follows:

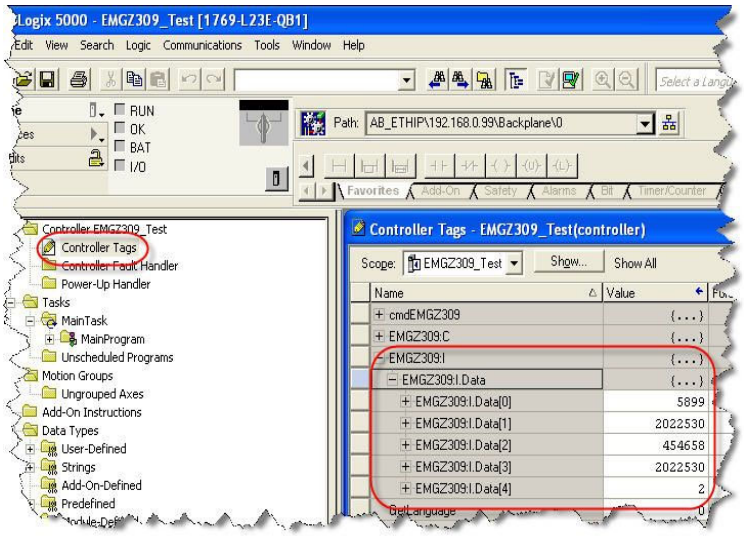


Fig. 15: RSLogix E309026

Index	***Value***
0	inActualValueInADC -> Raw digital actual value not filtered.
1	inActualValueInN -> That is the actual value in Newton. This value utilizes the output low pass filter.
2	inActualValueInLb -> That is the actual value in lb. This value utilizes the output low pass filter.
3	inActualValueInUnit -> That is the actual value in the configured unit. This value utilizes the output low pass filter.
4	inStatus -> That is the status of the actual value. Bit 0 set: mechanically overloaded; Bit 1 set: output underflow; Bit 2 set: output overflow

7 Operation

7.1 Operating the EMGZ309 via the operating panel

The EMGZ309 amplifier can go in 5 different states:

- **Operation State:** Amplifier operating
- **Display Selection:** Selection of force or output reading
- **Offset Compensation:** Automatic procedure to offset the roller weight
- **Calibration State:** Procedure to calculate the amplifier gain
- **Parameterisation State:** Set or change parameters

When using the front panel, the user can toggle between these modes by pressing a key or a combination of keys. **Fig. 16** provides an overview about the different Operation States and how to move from one state to the other.

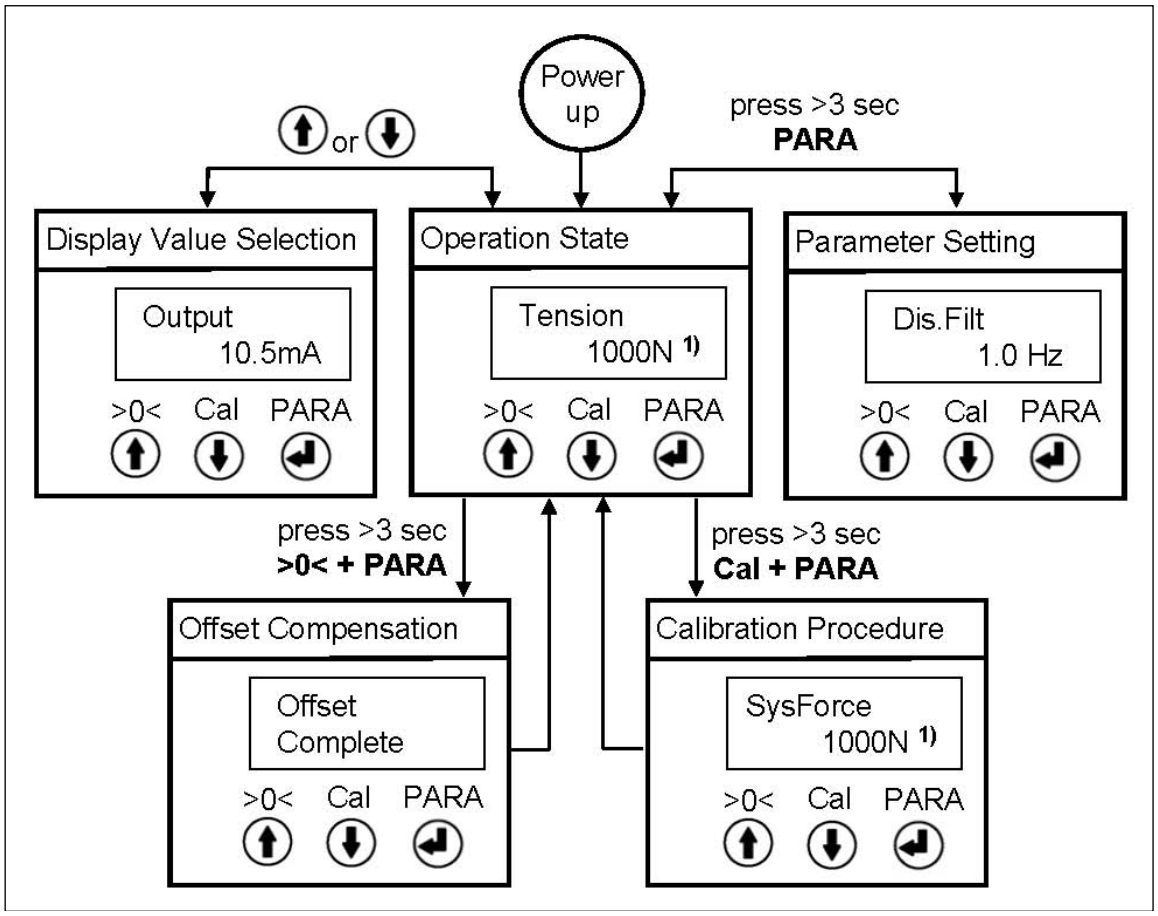


Fig. 16: Top-level view of operation control E309013e

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

7.2 Display Value Selection State

The EMGZ309 can display either a tension value or the amplifier output that is an electrical unit corresponding to the measured tension.
A) For tension display following unit can be selected: **N, kN, lb, g, kg**

B) The amplifier output can be displayed in **0...10VDC, 0...20mA** or **4...20mA**

7.3 Displaying of Overload, Over and Underflow

In the Operation State the EMGZ309 amplifier will indicate limit violations on the display depending on the chosen unit:

256) If a tension has been chosen, the reading on the display at overload will be:

Overload 1200.0 N

B) If the display was set to show the amplifier output, following messages will be displayed:

At overflow:	Out>Max 20.00 mA	or	Out>Max
At underflow:	Out<Min 0.00	or	Out<Min 0.00 V

Note

An overflow messages is caused by the maximum output value 10V or 20mA being overshot. An underflow message is caused by the minimum value 0V or 4mA being undershot. The parameter [F@OutMax] can influence the overflow messages. If the actual tension value overflows the value entered in [F@OutMax], an error message will be displayed.

8 Parametrization via the operating panel

8.1 Reset to Default Parameter Set

Factory settings of your EMGZ309 amplifier can be re-set either over the parameter setting menu (see **8.3** "Description of Parameters") or as shown below:

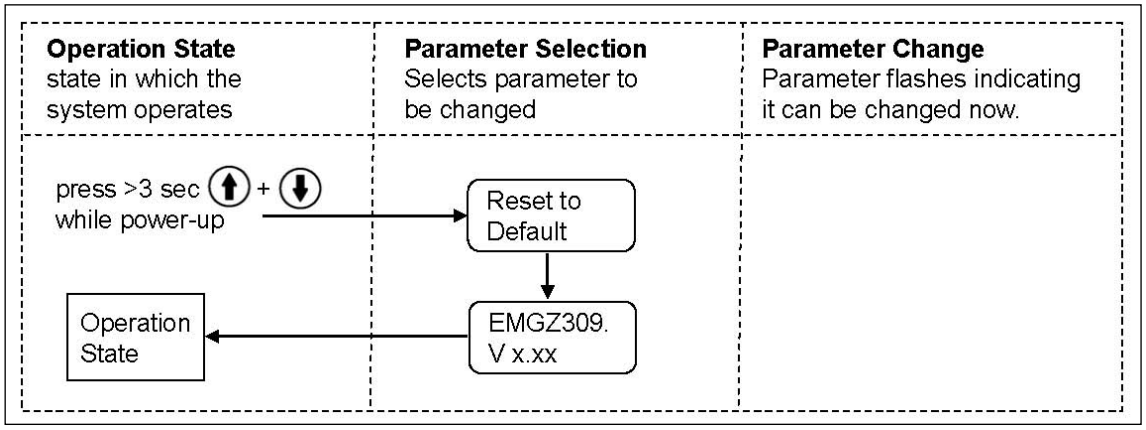


Fig. 20: Reset to Default Parameter Set E309018e

8.2 Parameter List

Parameter	Unit	Min	Max	Default	Remarks
Dis Filt.	[Hz]	0.1	10.0	1.0	
Out Filt.	[Hz]	0.1	200.0	10.0	
Unit 4)	[-]	N, kN, lb, g, kg.		N	
SysForce 4)	[N] 1)	1	100'000	1000	
F@OutMax 4)	[N] 1)	1	100'000	1000	
Curr.Out	mA	0...20 or 4...20		4...20	
Offset	[Digit]	–8000	8000	0	
Gain	[-]	0.100	20.000	1.000	
DevicMod	[-]	ForcGaug or VoltGaug		ForcGaug	Each parameter change requires re-calibration
Language	[-]	English or German		English	
Contrast	[%]	1	100	65	
Ethernet	[-]	On or Off		On	If *Off*, reduces power consumpt
IP Addr.	[-]	0	255	192 168 0 090	Address to be entered in 4 blocks

Subnet	[-]	0	255	255 255 255 0	Address to be entered in 4 blocks
Default	[-]	No, Yes		Yes	

1) The display shows the unit of measure that was previously selected.
4) If the Device Mode [**VoltGauge**] is set, these parameters are deactivated

8.3 Description of Parameters

Display Filter	**LCD:** *Dis.Filt*

Use: The display filter (lowpass) steadies the value shown in the display when there is a high fluctuation of the force values. The parameter *Dis.Filt* stores the cut off frequency of the filter. The lower the cut off frequency, the more sluggish the display will be. The display filter does not influence the output signal filter described in the parameter *Out.Filt* (see below).

Unit	Parameter Range		Selection	Default
	Min	Max		
Hz	0.1	10.0	-	1.0

Filter Amplifier Output	**LCD:** *Out.Filt*

Use: The EMGZ309 contains a lowpass filter to prevent noise overlaying to the output signal. This parameter stores the cut off frequency of the filter. The lower the cut off frequency, the more sluggish the output signal will be. The filter stabilizes the output signal in case of highly fluctuating force values. This filter is independent from the display filter (see above).

Unit	Parameter Range		Selection	Default
	Min	Max		
Hz	0.1	200.0	-	10.0

Unit of Measure	**LCD:** *Unit*

Use: This parameter determines the unit system used.

☞ ***Note:*** ***By changing the units to lb (pounds) the whole unit system will change from metric to imperial units.***

☞ ***If the Device Mode [VoltGauge] is set, this parameter is deactivated***

Unit	Parameter Range		Selection	Default
	Min	Max		
-	-	-	*N*	*N*

			kN *lb* *g* *kg*	

System Force	**LCD:** *SysForce*

Use: The System Force [*SysForce*] determines the measuring capability of your measuring roller. E.g. If two 500 N sensors are installed in your measuring roller, enter 1000N. If only one 500N sensor is used, enter 500N. If sensors with sheaves are used (e.g. RMGZ-Series), the nominal force value (in our example 500 N) must be entered.

☞ ***If the Device Mode [VoltGauge] is set, this parameter is deactivated***

Unit	Parameter Range		Selection	Default
	Min	Max		
N, kN, g, kg, lb [1)]	1	100'000	-	1000

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

Force at max. Amplifier Output	**LCD:** *F@OutMax*

Use: This parameter defines what force value (N, kN, lb, g, kg) corresponds to the maximum output of the amplifier (10V or 20mA).

☞ ***If the Device Mode [VoltGauge] is set, this parameter is deactivated***

Unit	Parameter Range		Selection	Default
	Min	Max		
N, kN, g, kg, lb [1)]	1	100'000	-	1000

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

Current Output Selection	**LCD:** *Curr.Out*

Use: This parameter selects the output signal of the amplifier..

Unit	Parameter Range		Selection	Default
	Min	Max		
-	-	-	*4..20mA* *0..20mA*	*4..20mA*

Offset Value	**LCD:** *Offset*

Use: The value determined with the adjustment procedure *Offset Compensation* is stored as a Digit value in the parameter *Offset*. The offset value is used to compensate the roller weight (see 4.4 “Offset Compensation”).

Unit	Parameter Range		Selection	Default
	Min	Max		
Digit	-8000	+8000	-	0

Gain of Amplifier	**LCD:** *Gain*

Use: This parameter stores the value determined with the Procedure *Calibration* (see 4.7 “Calibration over the Operating Panel”).

Unit	Parameter Range		Selection	Default
	Min	Max		
-	0.100	20.000	-	1.0

Device Mode	**LCD:** *DevicMod*

Use: The Device Mode determines the functionality of the amplifier. If **[VoltGaug]** is set, force values will be displayed only in Volt (V) or mA. Force units won’t be available.

☞ ***Each change of the Device Mode requires a re-calibration of the system (see chapter 4.8).***

Unit	Parameter Range		Selection	Default
	Min	Max		
-	-	-	ForcGaug VoltGaug	ForcGaug

Language	**LCD:** *Language*

Use: This parameter determines the displayed language. The user can choose between the two languages: English and German. The menu navigation in the web browser is always in English.

Unit	Parameter Range		Selection	Default
	Min	Max		
-	-	-	*English* *German*	*English*

LCD-Contrast	LCD: *Contrast.*

Use: The parameter **[Contrast]** changes the contrast of the LCD to achieve optimal readability.

Unit	Parameter Range		Selection	Default
	Min	Max		
%	1	100	-	65

Ethernet-Interface	LCD: *Ethernet*

Use: The Ethernet interface of EMGZ309 can be switched on and off with this parameter. The deactivation of this interface reduces the power consumption by 25% and lowers heat generation in the device considerably. FMS recommends to activated the Ethernet interface only when needed..

Unit	Parameter Range		Selection	Default
	Min	Max		
-	-	-	On Off	On

Ethernet IP Address	LCD: *IP Addr.*

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)

Unit	Parameter Range		Selection	Default
	Min	Max		
-	000.000 000.000	255.255. 255.255	-	192.168 000.090

Subnet Mask Address	LCD: *Subnet*

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 controller. The Subnet Mask must be entered in 4 separate blocks (Sub. Bl 1; Sub. Bl 2; Sub. Bl 3; and Sub. Bl 4).

Unit	Parameter Range		Selection	Default
	Min	Max		
-	000.000 000.000	255.255. 255.255	-	255.255. 255.000

Default Settings	**LCD:** *Default*

Use: This menu point is a command. It resets the parameters to the factory settings. If "*No*" is chosen, all parameters stay as set by the user. If *Yes* is chosen, the factory settings are reset.

Unit	Parameter Range		Selection	Default
	Min	Max		
-	-	-	*No* *Yes*	*No*

9 Parameter Setting via a PC

Fig 22 shows the EMGZ309.EIP configuration in a LAN (Local Area Network). The EMGZ309.EIP 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.

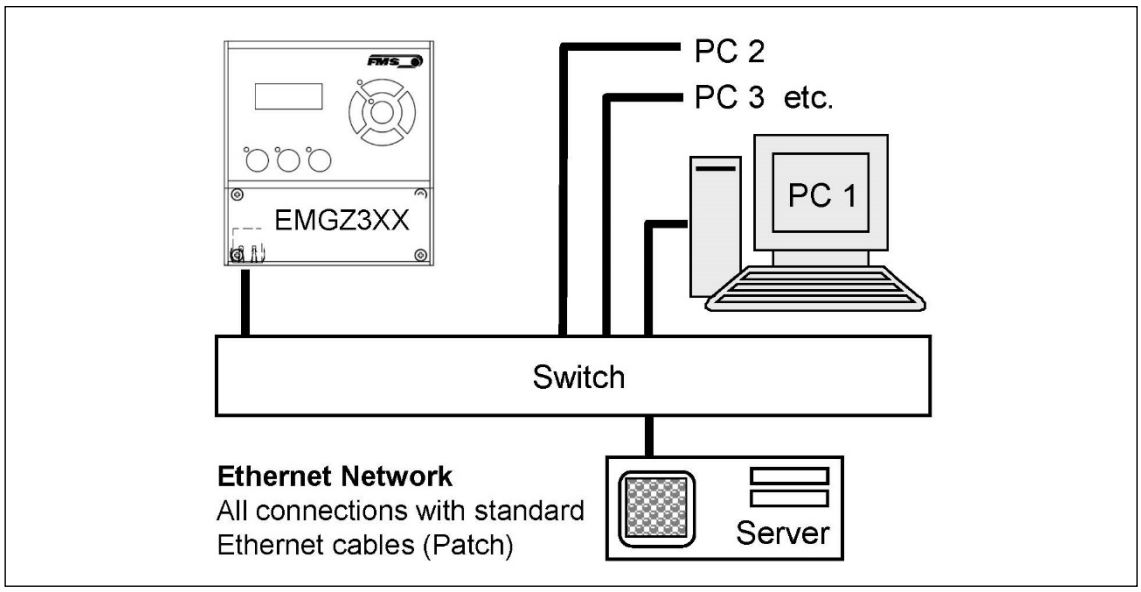


Fig. 22: EMG309 embedded in a LAN EMGZ309001e

The parameter setting can be carried out with a desktop- or laptop computer via a peer-to-peer connection (see **chapter 9.4**)

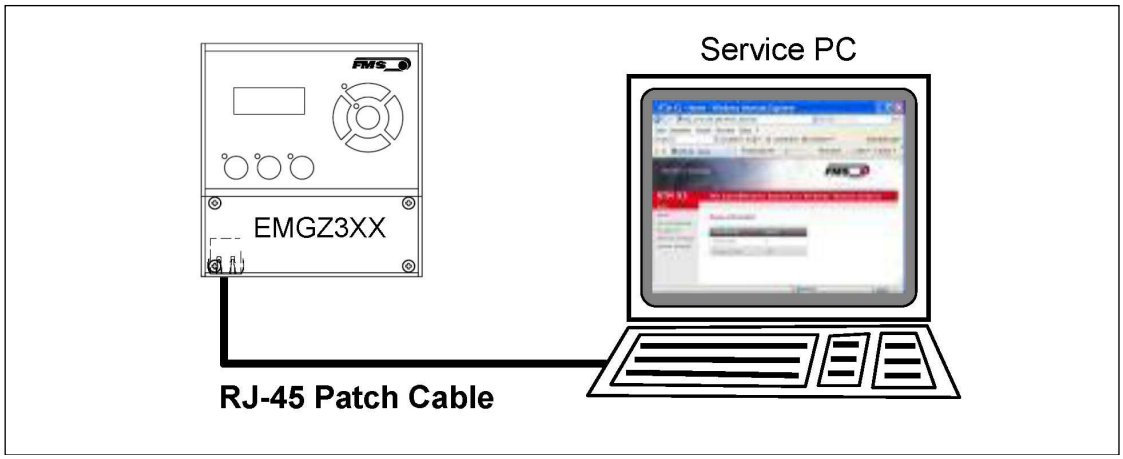


Fig. 23: Connection EMG309.EIP – PC via RJ-45 cable. E309002e

9.1 Parameterization in an Ethernet Network via Web Browser

First of all it must be certain that the EMGZ309 uses an IP address in a static block (not assigned by the server). For the integration of an EMGZ309 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://192.168.000.0901. After establishing the link, screen **Fig. 24** will open up.

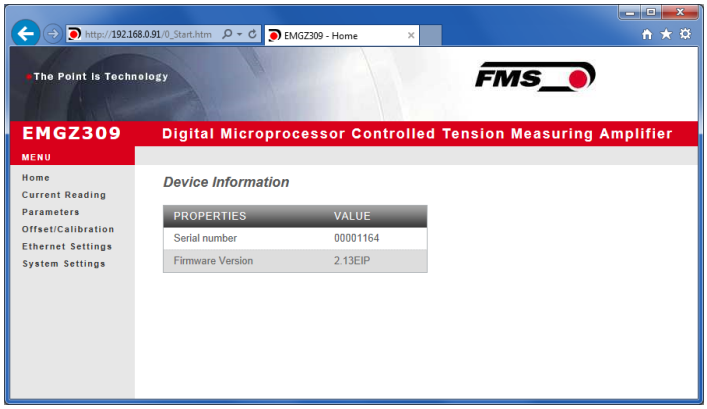


Fig. 24: Home Page with Serial number and device information E309_Home-EIP

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

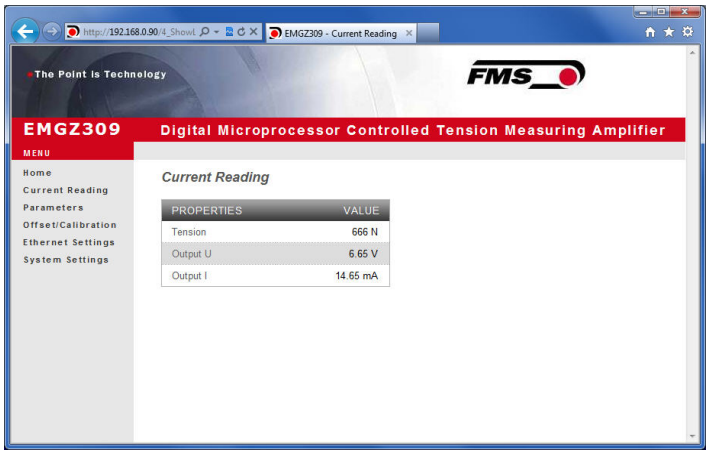


Fig. 25: Current Reading for Device Mode Force Gauge Current Reading Force

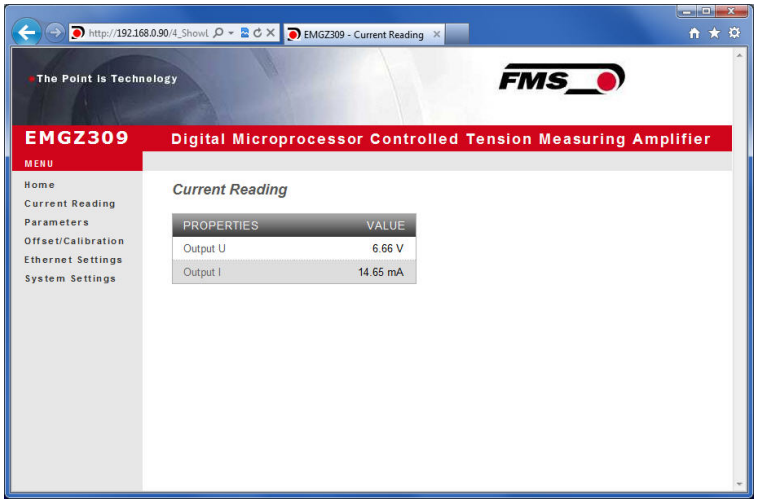


Fig. 26: Current Reading for Device Mode Volt Gauge Current Reading Volt

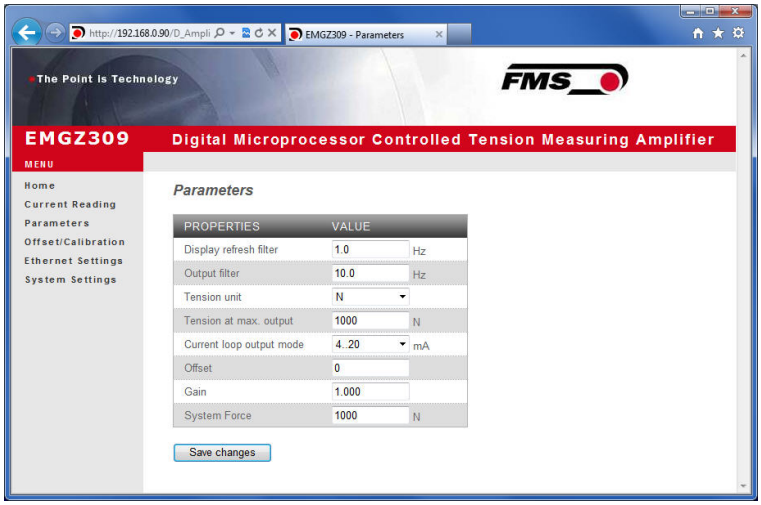


Fig. 27: Parameter list for Device Mode Force Gauge Parameters-Force

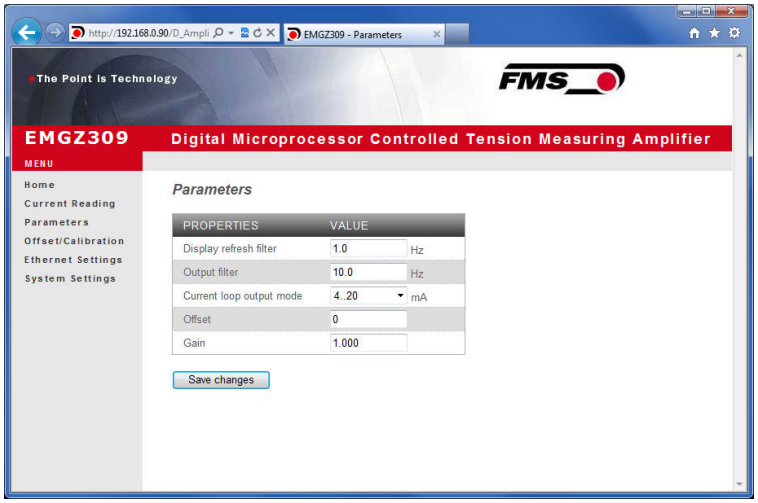


Fig. 28: Parameter list for Device Mode Volt Gauge Parameters-Volt

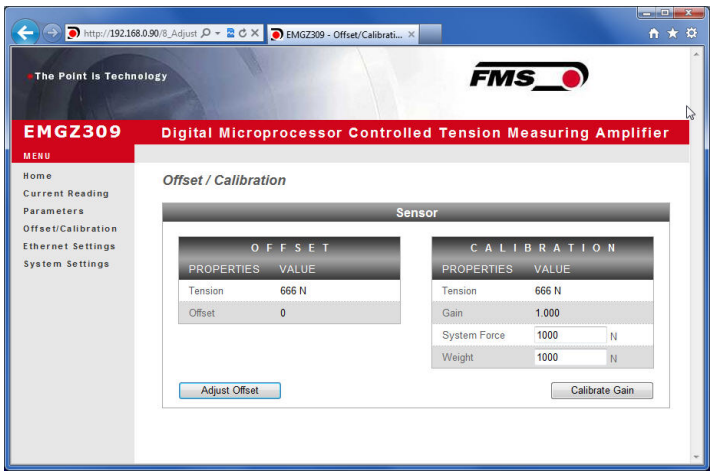


Fig. 29: Offset compensation and calibration for Device Mode Force Gauge Offset-Calibration-Force

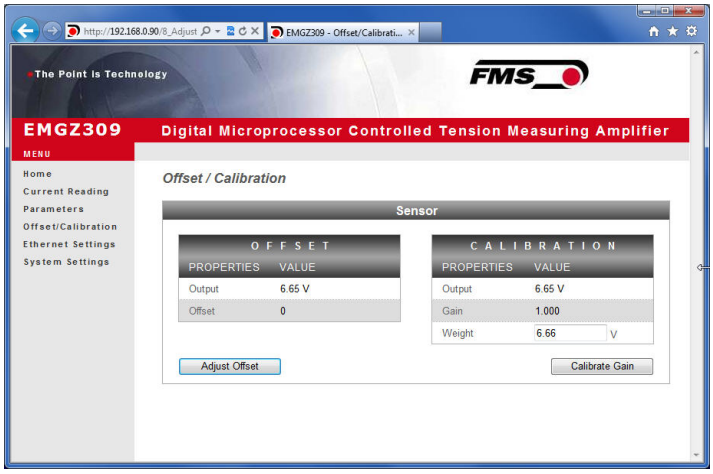


Fig. 30: Offset compensation and calibration for Device Mode Volt Gauge Offset-Calibration-Volt

9.2 Offsetkompensation via the web browser

1. Make sure the measuring roller is unloaded
2. On the web page “Offset / Calibration” (**Fig. 29** or **30**) klick the field “Adjust Offset”.
3. The field “Tension” or „Output“ in the Offset box and in the Calibration box changes to 0.
4. With that the offset compensation procedure is completed.

9.3 Calibration via the web browser

A) For Devise Mode Force Gauge

1. Load a rope with a defined weight corresponding to your calibration force on the roller. The roller configuration must correspond to the real configuration in the machine (wrap angle, distance of the rollers etc.).
2. The System Force **[SysForce]** determines the measuring capability of your measuring roller. E.g. if you use two 500 N sensors in your measuring roller, enter 1000N (see **chapter 8.3** “Descriptions of Parameter”, **[SysForce]**).
3. Enter the **[SysForce]** in the corresponding box by overwriting the default or previous value.
4. Enter the force corresponding to your calibration weight in the box “Weight”
5. Click on the box “Calibrate Gain” to start the calibration procedure.
6. The Gain value will be calculated, indicated in the box “Gain” and stored in the parameter **[Gain]**. The calibration procedure has been completed successfully.

B) For Devise Mode Volt Gauge

1. Load a rope with a defined weight corresponding to your calibration force on the roller. The roller configuration must correspond to the real configuration in the machine (wrap angle, distance of the rollers etc.).
2. Enter the force corresponding to your calibration weight in Volt (V) in the field “Weight”.

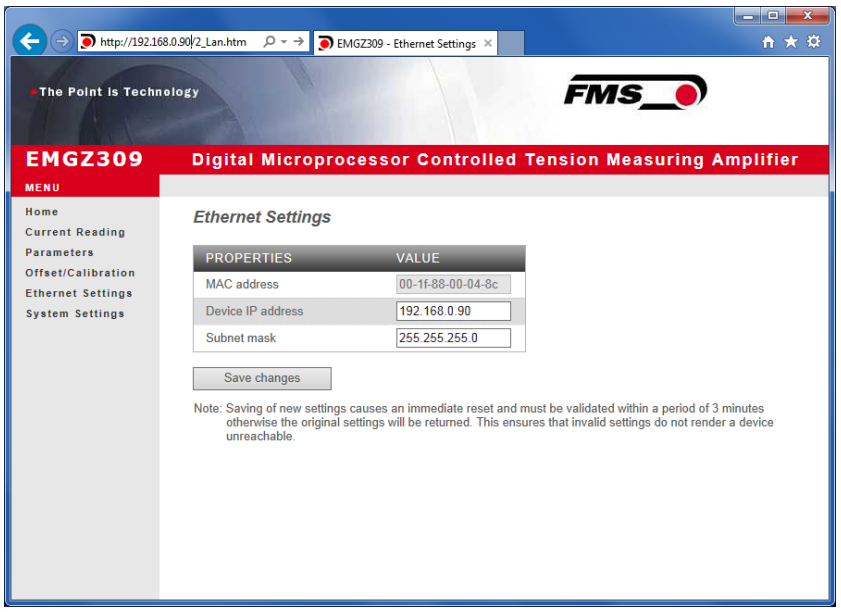


Fig. 31: Ethernet-Settings Ethernet Settings

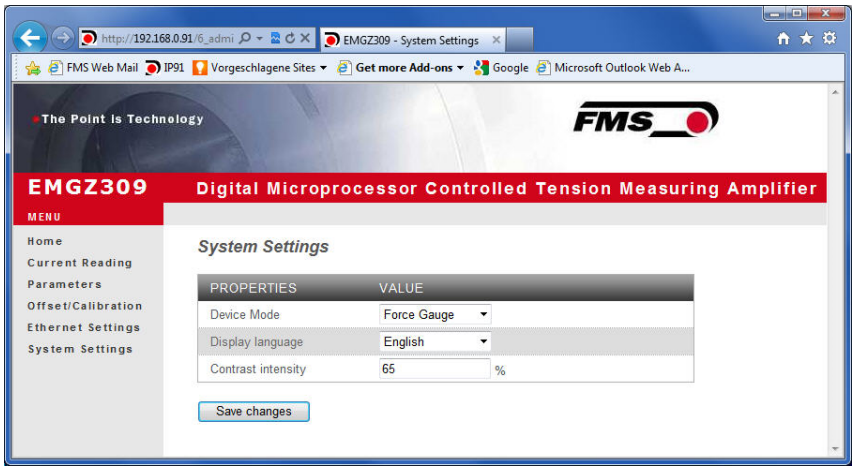


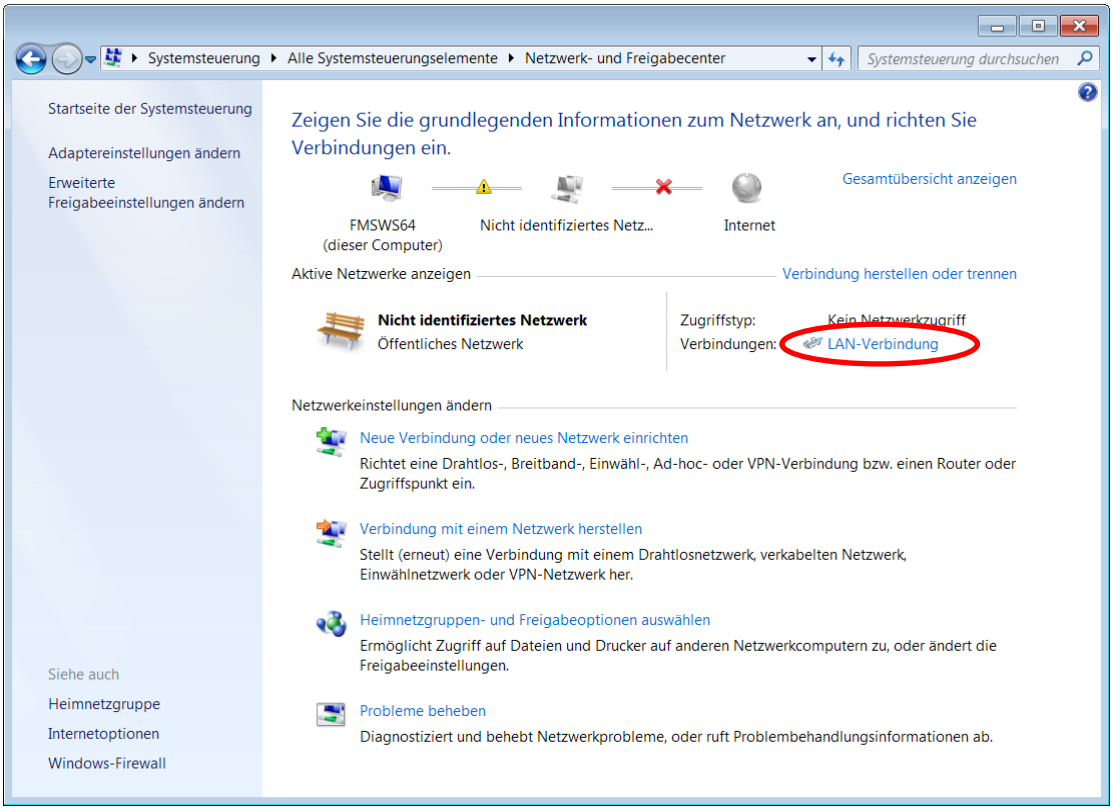
Fig. 32: System-Settings System

9.4 Connecting the EMGZ309 Amplifier with a PC (Peer-to-Peer)

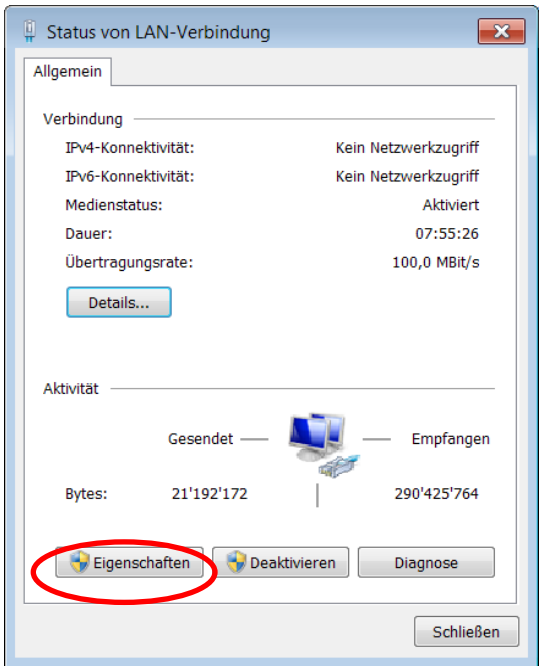
The parameter setting can also be carried out with a desktop or laptop computer directly connected to the EMGZ309.EIP. In this case, the PC is connected via a Peer-to-Peer connection to the amplifier. This chapter describes the procedure for setting up a computer to communicate with EMGZ309.EIP.

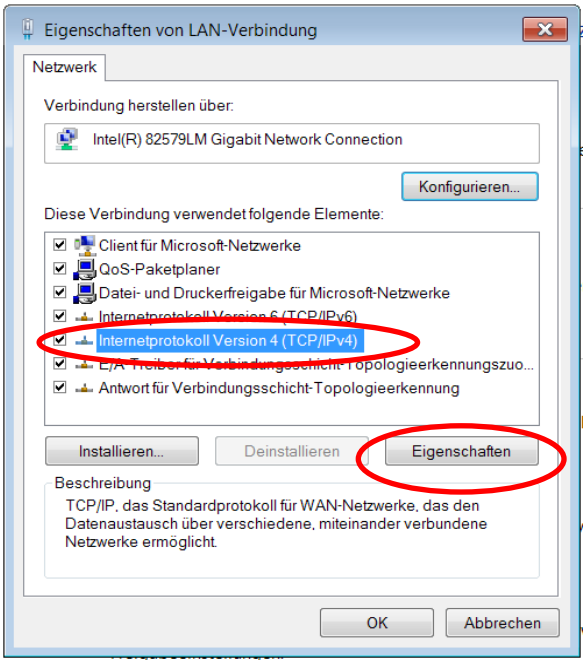
Setup for OS Window 7:

1. Connect PC and EMGZ309.EIP with a “RJ-45 patch cable”
2. Power-up PC and EMGZ309.EIP
3. In order to recognize the EMGZ309.EIP 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.

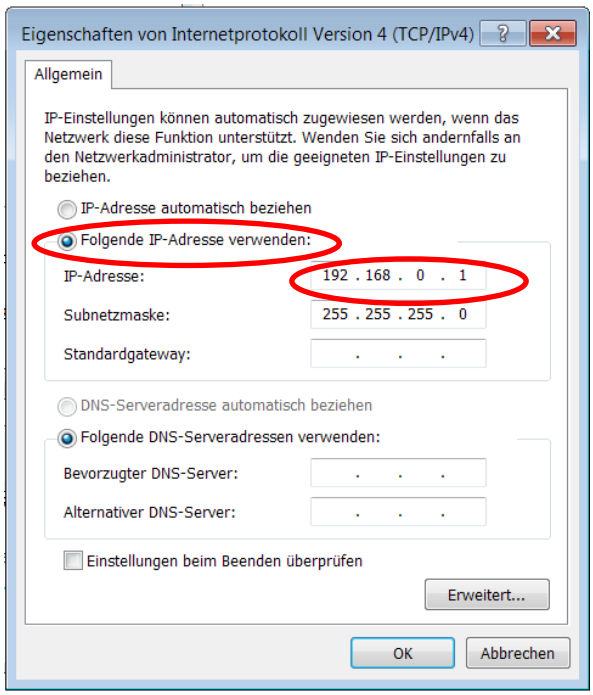


6. **Double click on “Local Area Network”. The dialog box “Status of LAN connection” will open up.**





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 EMGZ309.EIP 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.24** 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 EMGZ309 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).

10 Dimensions

The EMGZ309 series is available in three different housing options. The mechanical dimensions can be seen in the following pages.

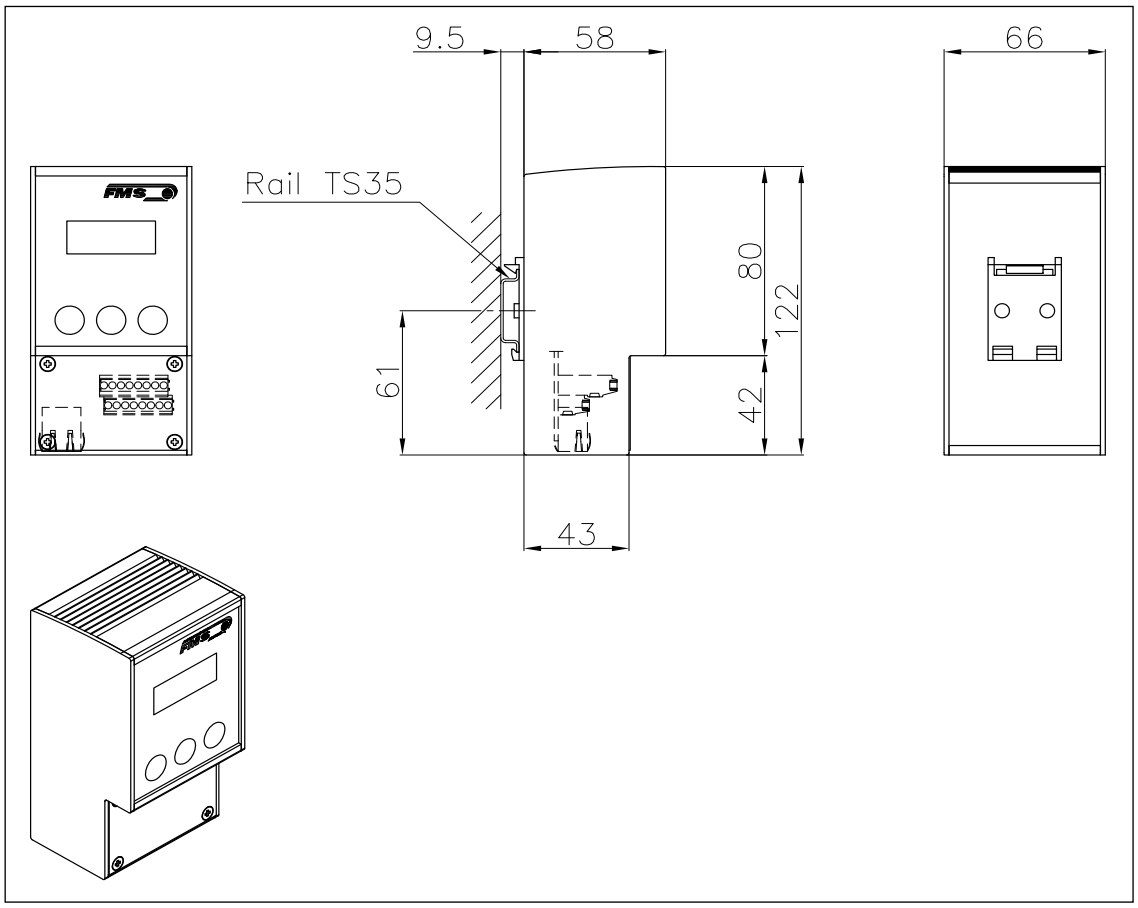


Fig. 33: Outline Drawing EMGZ309.R rail mount housing E309006e
Ethernet connection: RJ-45 connector

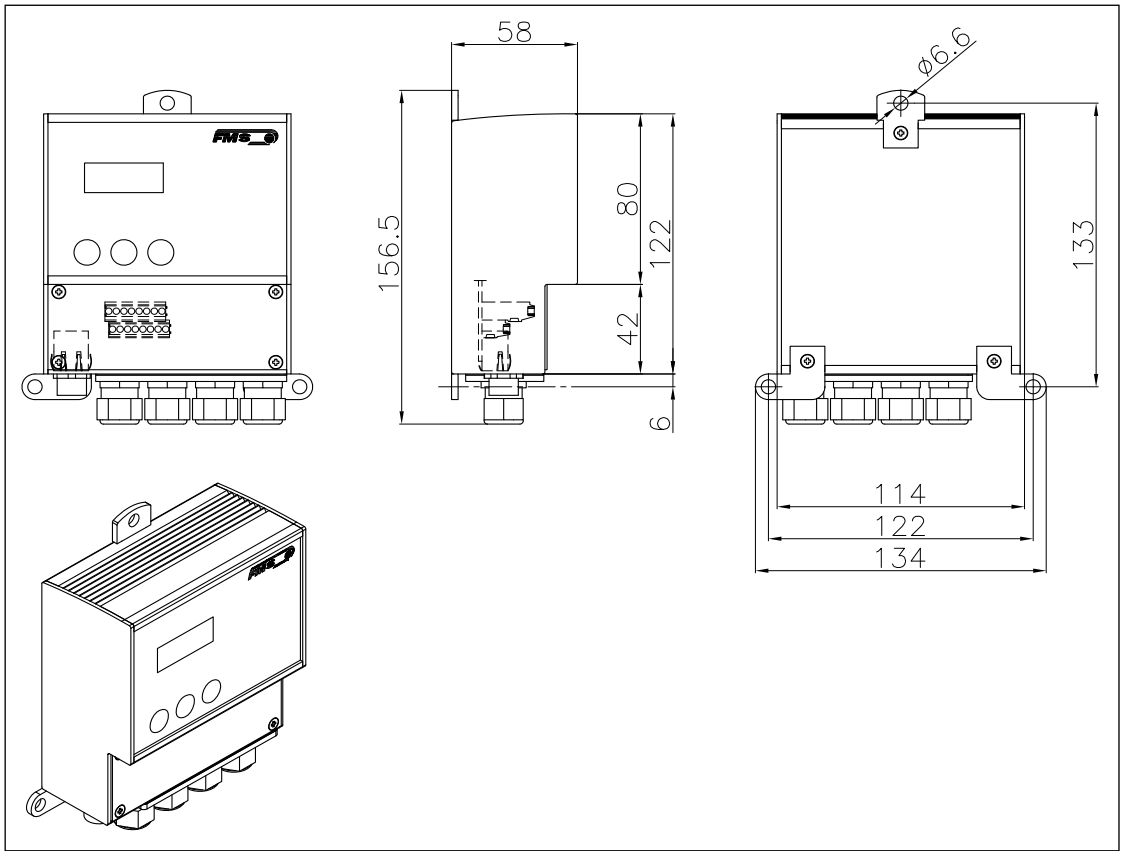


Fig. 34: Outline Drawing EMGZ309.W wall mount housing E309004
Ethernet connection: M12 4-pole D-coded

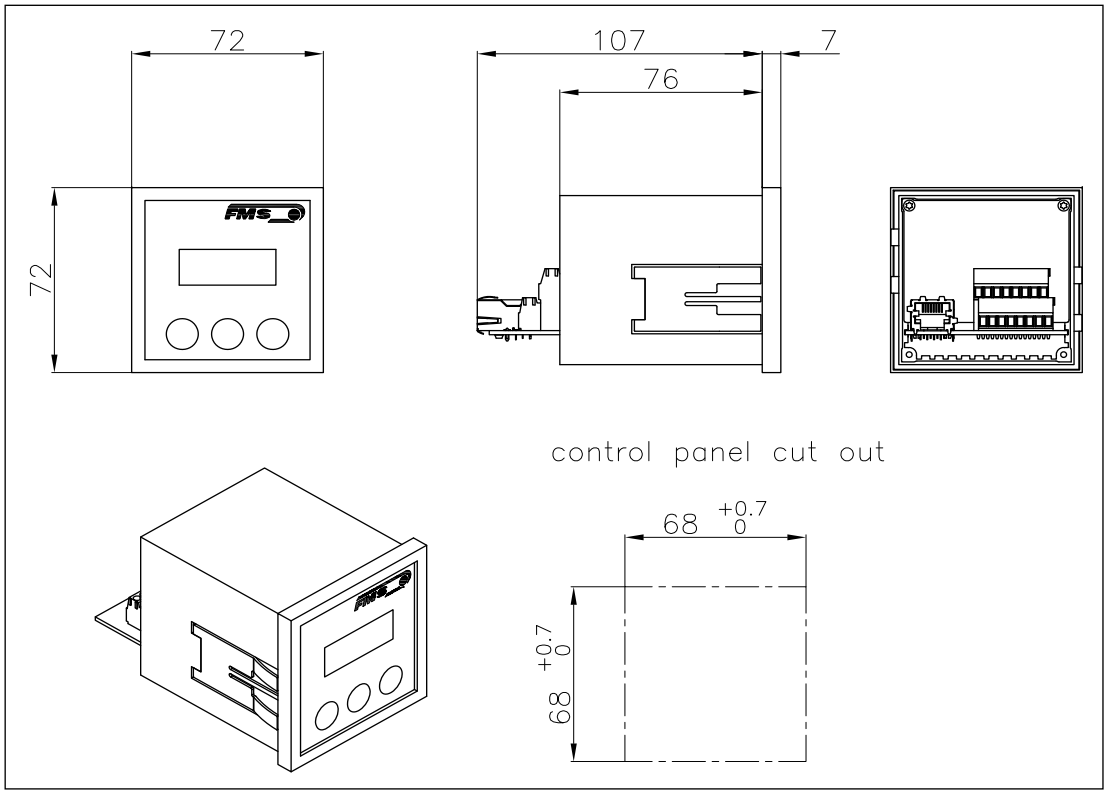


Fig. 35: Outline Drawing EMGZ309.S panel mount housing (RJ-45) E309005e

11 Technical Specification

Sensor excitation	5VDC max. 60mA (high voltage stability)
Temperature drift offset	< 0.01% / K [0.006% / °F]
Linearity error	< 0.1%
Processor cycle time	1ms
Min. EtherNET/IP cycle time	2ms
Operation /Parameter Setting	3 keys and LCD 2x8 characters (size 8mm)
Interface (optional)	EtherNet/IP-Bus Standard: CIP über IEE 802.3
Tension output	0...10V min. 1.2kΩ
Current output	0/4...20mA max. 500Ω
Power supply	24VDC (18...36VDC) max. 0.3A
Power consumption	max. 6.0W
Temperature range	–10...+60°C [14...140°F]
Protection class	EMGZ309R and S: IP50; EMGZ309W: IP65
Weight	EMGZ309R: 0.38kg [0.84 lbs]; EMGZ309S: 0.2kg [0.44 lbs]; EMGZ309W: 0.67kg [1.48 lbs]

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