Operating Manual EMGZ611A...614A

Digital microprocessor controlled

Tension Measuring Amplifier

Version 1.35 01/2011 ff

Firmware Version: ab 2.01

Hardware Rev. D

This operation manual is also available in German, French and Italian..
Please contact your local representative.

Diese Bedienungsanleitung ist auch in Deutsch, Französisch und Italienisch erhältlich.
Bitte kontaktieren Sie die Vertretung im zuständigen Land.

Ce mode d'emploi est également disponible en Français, en Italien et en Anglais.
Veuillez contacter la représentation locale.

Queste manuale d'installazione è disponibile anche in lingua italiano, inglese e francese.
Vogliate cortesemente contattare la locale rappresentanza.

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1 Safety Instructions

1.1 Description conditions

High 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.

Risk of damage to machines

Caution

This symbol refers to risk of heavy mecanical damage. This warning has to be followed absolutely.

Notice 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 electronic unit 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 electrical equipment. They are not taken into consideration in 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.

⚠ The processor board is mounted to the housing cover. Improper handling may damage the fragile electronic equipment! Don't use rough tools such as screwdrivers or pliers! Operators handling the processor board must wear a well earthed bracelet in order to discharge static electricity.

2 Definitions

Offset: Correction value for compensation of the zero point difference. Thanks to the offset, it is ensured that a force of 0N will generate a signal of zero exactly.

Gain: Amplification factor for the measuring signal. Use of an appropriate value will adjust the force sensor signal to the tension feedback value exactly.

Strain gauge: Electronic component that will change its resistance while its length has changed. Strain gauges are used in the FMS force sensors for acquisition of the feedback value.

Subprint: Electronic extension module which can be plugged to the main board of the electronic unit if required. That way, the possibilities of the electronic unit can be extended easily.

3 System Components

An EMGZ611A...614A system consists of the following components (refer also to fig. 1):

Force sensors

- For mechanical/electrical conversion of the tension force
- Force measuring bearing
- *Force measuring roller*
- *Force measuring journal*
- *Force measuring bearing block*

Electronic unit EMGZ611A/612A/613A/614A

- For supplying the force sensors and amplifying of the mV signal
- 1...4 channels for 1...4 measuring points
- With operation panel for parametrization
- Digital inputs and outputs freely programmable
- LED's freely programmable
- With robust aluminium housing
- Supports connection of external feedback displays
- *Interface RS232*
- *Interface CAN-Bus, PROFIBUS, DeviceNet*

(Variant or option in italic text)

4 System Description

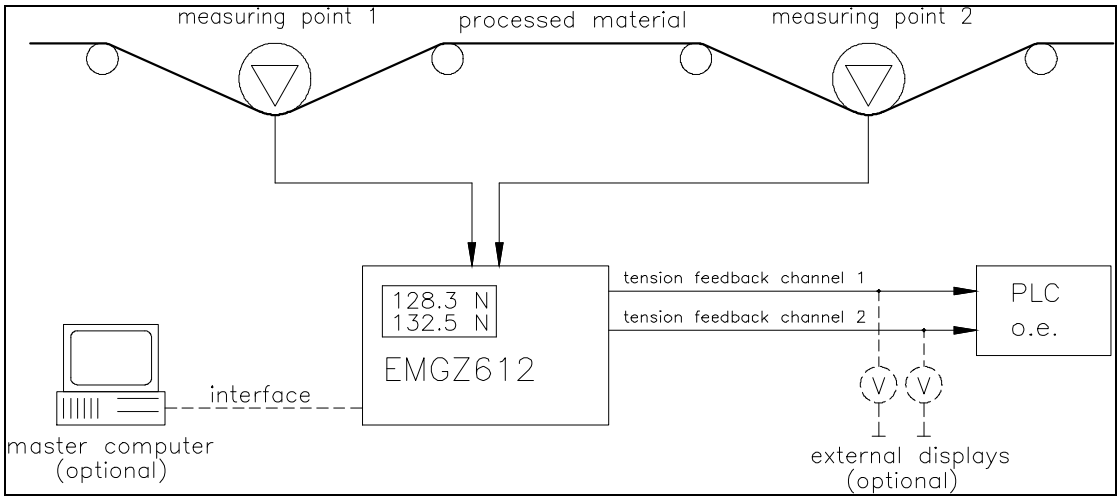


fig. 1: Basic structure shown with the EMGZ612A Double Channel Tension Measuring Amplifier E612001e

4.1 Functional Description

The force sensors of each measuring point measure the tension force in the material and transmit the measuring values as mV signals to the electronic units EMGZ611A...614A. The electronic unit amplifies the mV signals depending on configuration. The resulting feedback values are shown in the display in [N] (lbs if required) for each channel. In addition, the feedback values are provided at the analog outputs and various interfaces and can be evaluated by analog instruments, a PLC or equivalent devices.

4.2 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 wiring of the strain gauges, the measured value is depending also to the power supply. So, the force sensors are supplied from the electronic unit by a very accurate power supply.

4.3 Electronic Units EMGZ611A...614A

Common

The electronic unit is mounted to a robust aluminium housing. It contains a microprocessor to handle all calculations and communications, the highly accurate sensor power supply and the signal amplifiers for the measuring values of up to four measuring points. The electronic unit has no trimmers and only few Dip-switch, jumpers to keep most accurate long-time and temperature stability.

Operation

The large backlit display with 2x16 characters, 4 LED's and large keys guarantee simple operation. All information is in plain text with the following languages selectable: English, German, French and Italian. Most of the functions may be paramterized. The parametrization can be done via the keys or the interfaces. All inputs are fail-safe stored in an EEPROM.

Strain gauge amplifier

The strain gauge amplifier provides the highly accurate power supply (5VDC, or 10VDC) for 1 or 2 force sensors per channel. The force sensors can be wired using 4 wire circuit or 6 wire circuit. This allows accurate control of the bridge excitation even with very long cabling.
The power supply is equipped with current control. This allows to detect short circuit or cable break automatically and to output an error message if required.
A highly accurate, fixed difference amplifier rises the mV signal up to 10V. This signal will be fed to the A/D converter. The microprocessor then does all application specific calculations with the digitized measuring value (such as offset, gain, lowpass filter, limit switches, etc). The resulting feedback value is provided as both tension and current signal at the same time.
Using digital inputs, the amplifier can be switched easily between 2 different gain values (for ex. to process different operating conditions). There is no reconfiguration required to switch the gain values.
The strain gauge amplifier section written above is integrated separately for each channel to provide independent evaluation of each measuring point.

Type	Number of channels	Sensors per channel	Feedback signals
EMGZ611A	1	1 or 2	Sum A+B
EMGZ612A	2	1 or 2	Sum A+B
EMGZ613A	3	1 or 2	Sum A+B
EMGZ614A	4	1 or 2	Sum A+B

Interface

As an option, there are RS232, PROFIBUS, CAN-Bus or DeviceNet interfaces available.

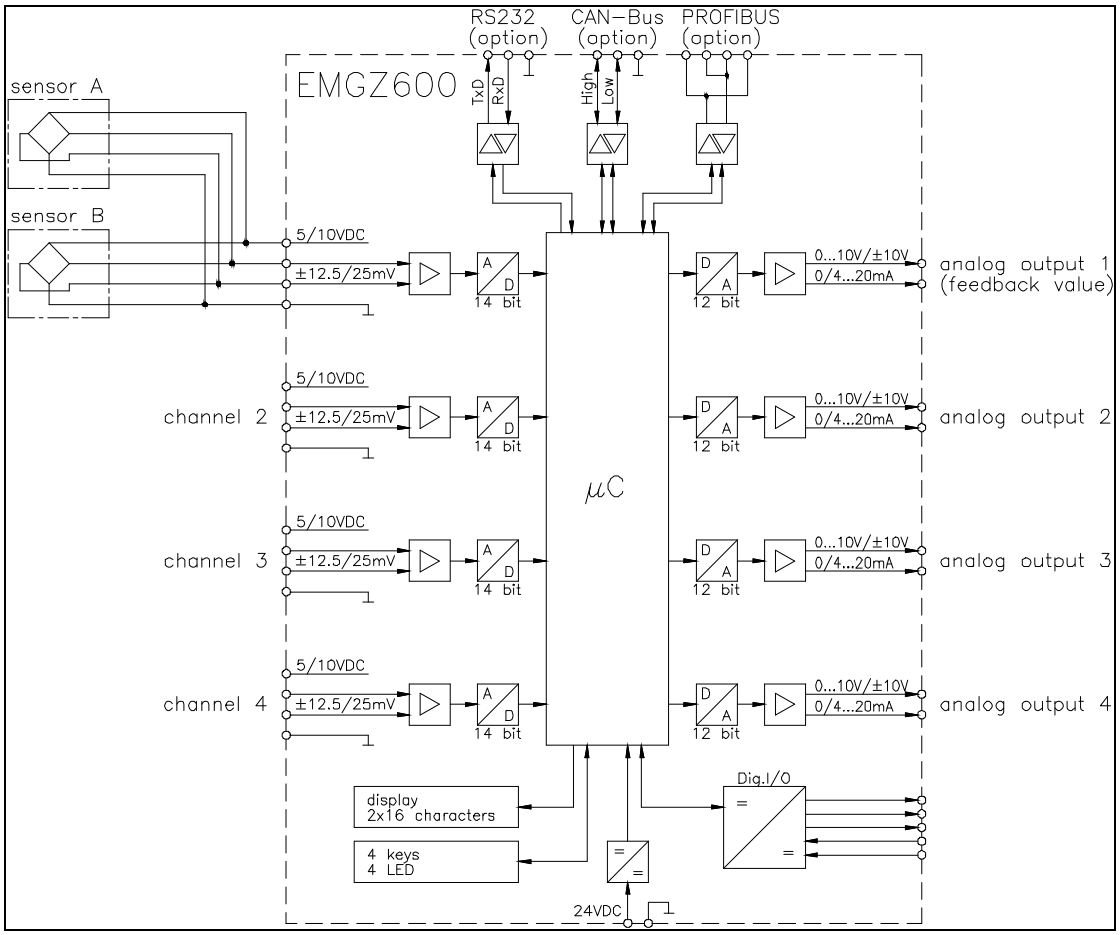


fig. 2: Block diagram of the electronic unit EMGZ614A E614001e

5 Quick Installation Guide

- Check all your requirements such as:
  – configuration of the analog outputs (signal level)?
  – gain switching required?
  – digital input / output assignment?
  – linking by interface etc.?

- Draw your final wiring diagram according to the wiring diagram (refer to „7.2 Wiring diagram“)

- Install and wire all your components (refer to „7. Installation and wiring“)

- Parametrize and calibrate the measuring amplifier for each channel (refer to „8. Operating“)

- Put system into operation; proceed a test run with low speed

- If required, do additional settings (refer to „8.4 Additional settings“)

6 Dimensions

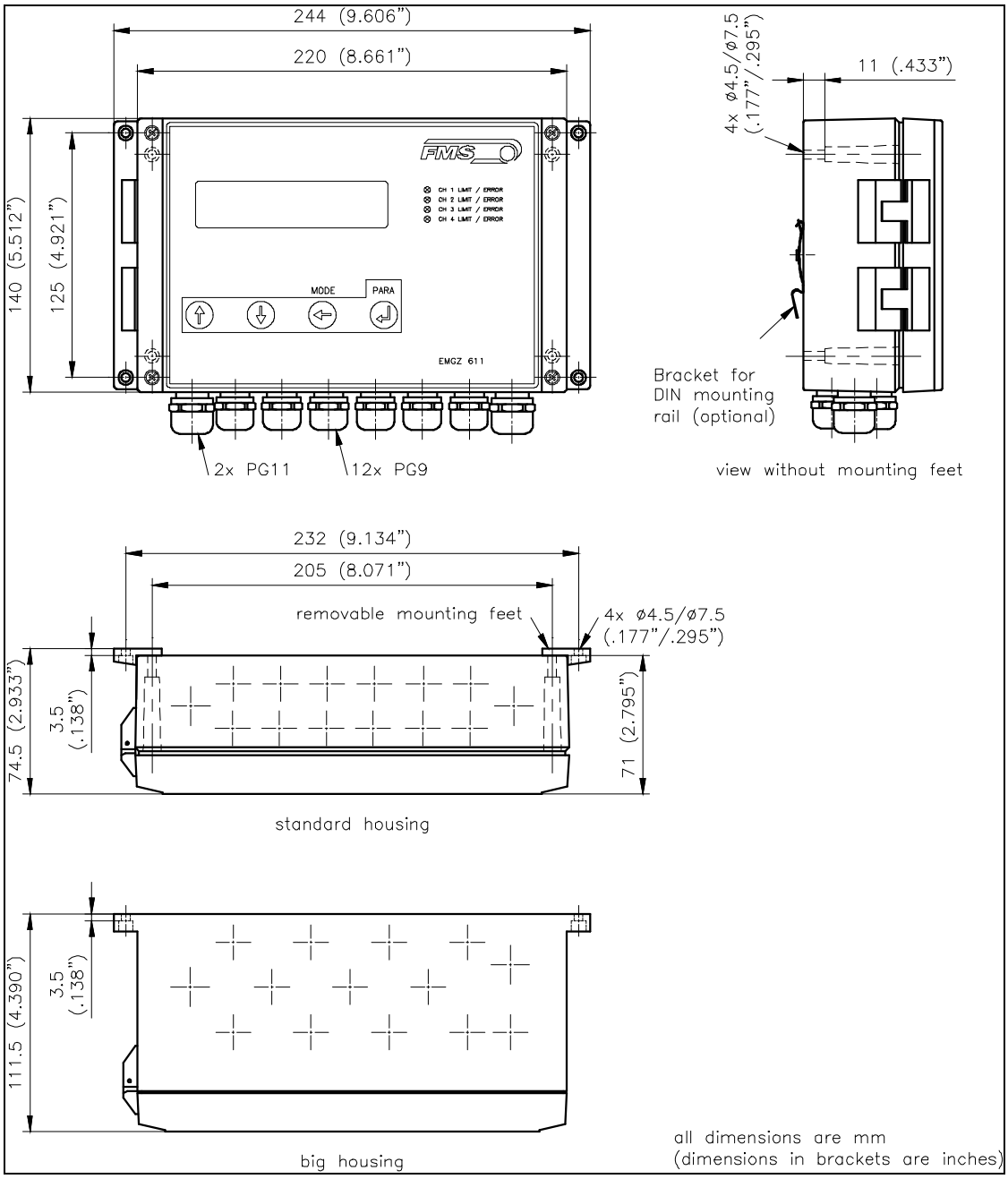


fig. 3: Dimensions E611002e

7 Installation and Wiring

Caution

Proper function of the electronic unit 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 electrical equipment. They are not taken into consideration in this operating manual. However, they have to be followed strictly.

Caution

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.

7.1 Mounting the Electronic Unit

The housing can be mounted in a control cabinet or directly beside the machine. All connections are led into the housing through glands and are connected to the plug-in screw terminals according to the wiring diagram (fig. 7).

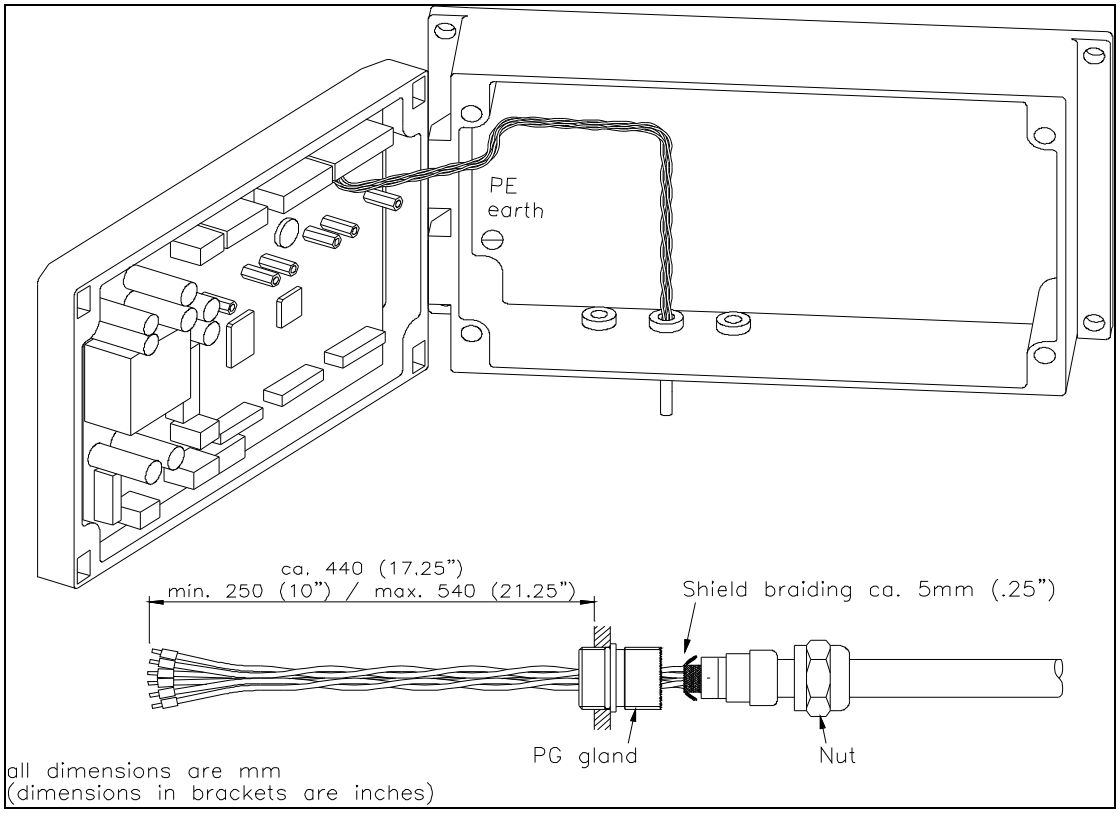


fig. 4: Wiring path inside the housing E600011e

Caution

The processor board is mounted to the housing cover. Improper handling may damage the fragile electronic equipment! Don't use rough tools such as screwdrivers or pliers! Touch processor board as little as possible! Touch earthed metal part to discharge static electricity before open the housing!

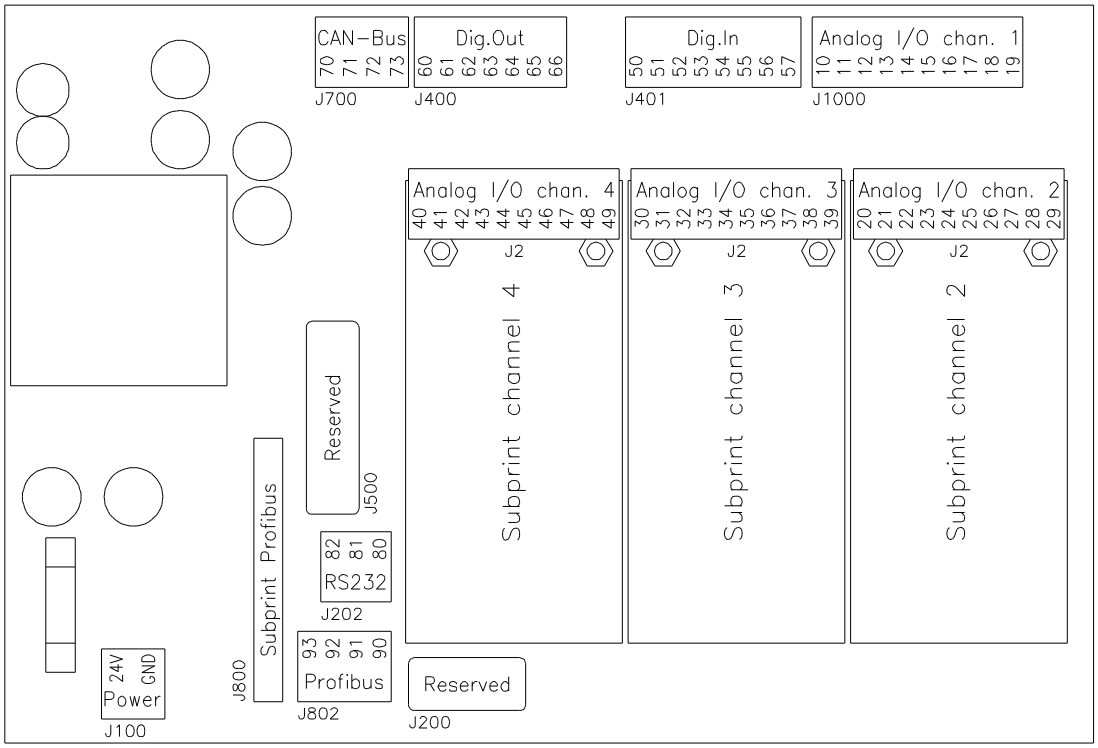


fig. 5: Screw terminal arrangement on the electronic unit E600012e

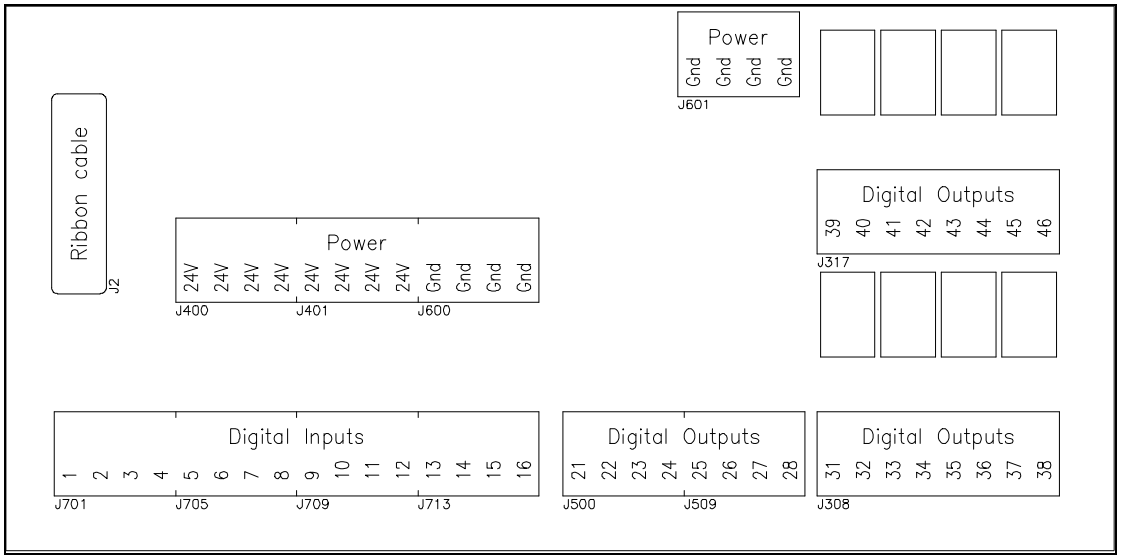


fig. 6: Screw terminal arrangement on the extension board (EMGZ613A/614A only) E600009e

7.2 Wiring Diagram

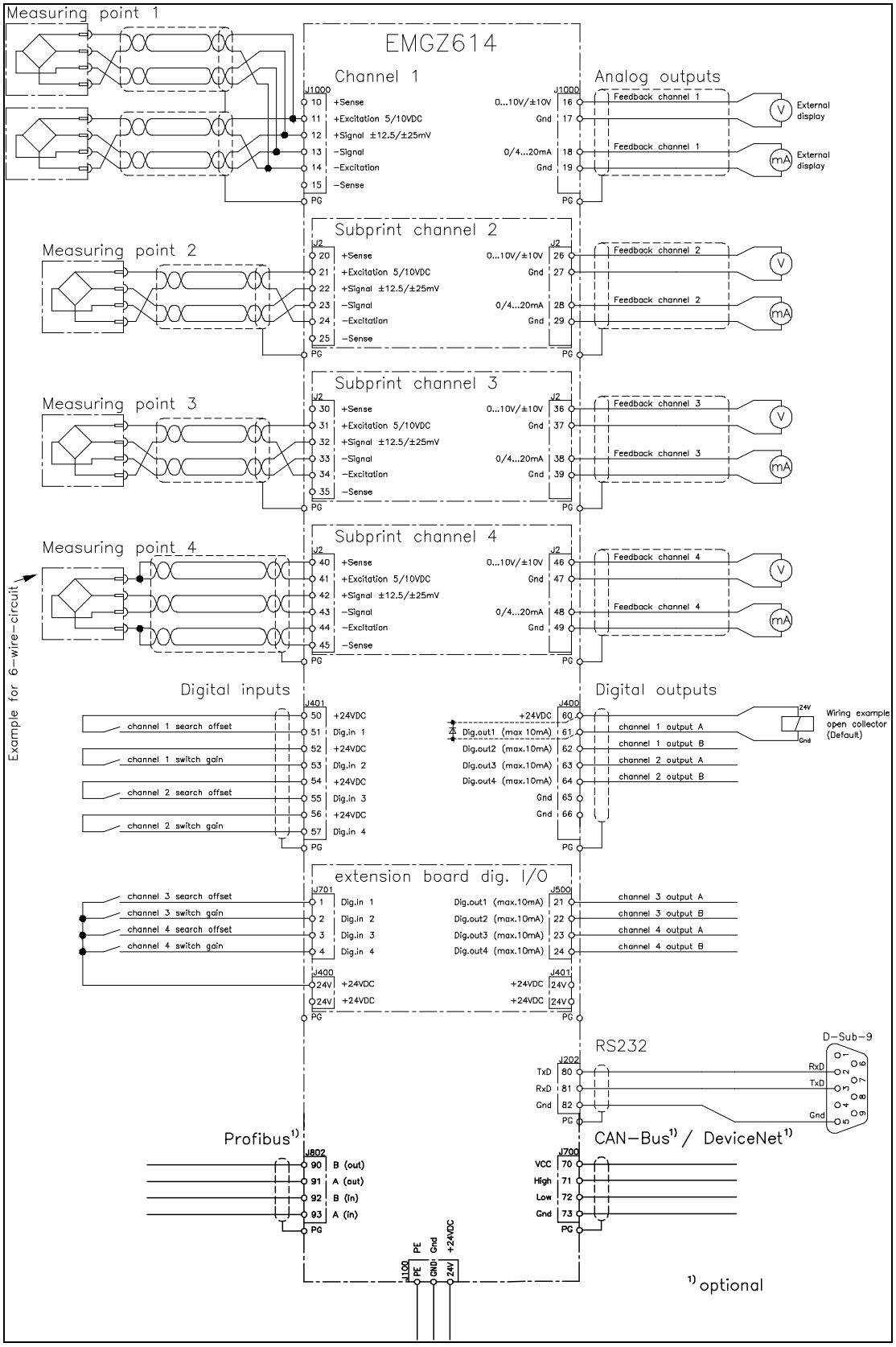


fig. 7: Wiring diagram EMGZ614A. The versions EMGZ611A...613A may vary in the number of sub-boards. E614014e

7.3 Mounting the Force Sensors

Mounting of the force sensors is done referring to the FMS Installation manual which is delivered together with the force sensors. The connection between the force sensors and the electronic unit is done using 2x2x0.75mm² [AWG 18] shielded twisted pair cable. (With cable length below 15m, 2x2x0.25 mm² [AWG 23] is also suitable.) The cable must be installed separate from power lines.
Wiring to the terminals of the electronic unit is done according to the wiring diagram (fig. 7). If two force sensors are used per measuring point, the cables are wired parallel (ref. to wiring diagram, channel 1).

Note

The force sensor signal consists of only a few mV and is therefore susceptible to external influences to the cable. To increase immunity to interfering use one pair of the twisted pair cable for +signal and –signal.

Note

Connecting the shield of the signal cable to the electronic unit *and* to the force sensor may cause ground circuits which may interfere the measuring signal massively. 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.

8 Operating

8.1 View of the Operating Panel

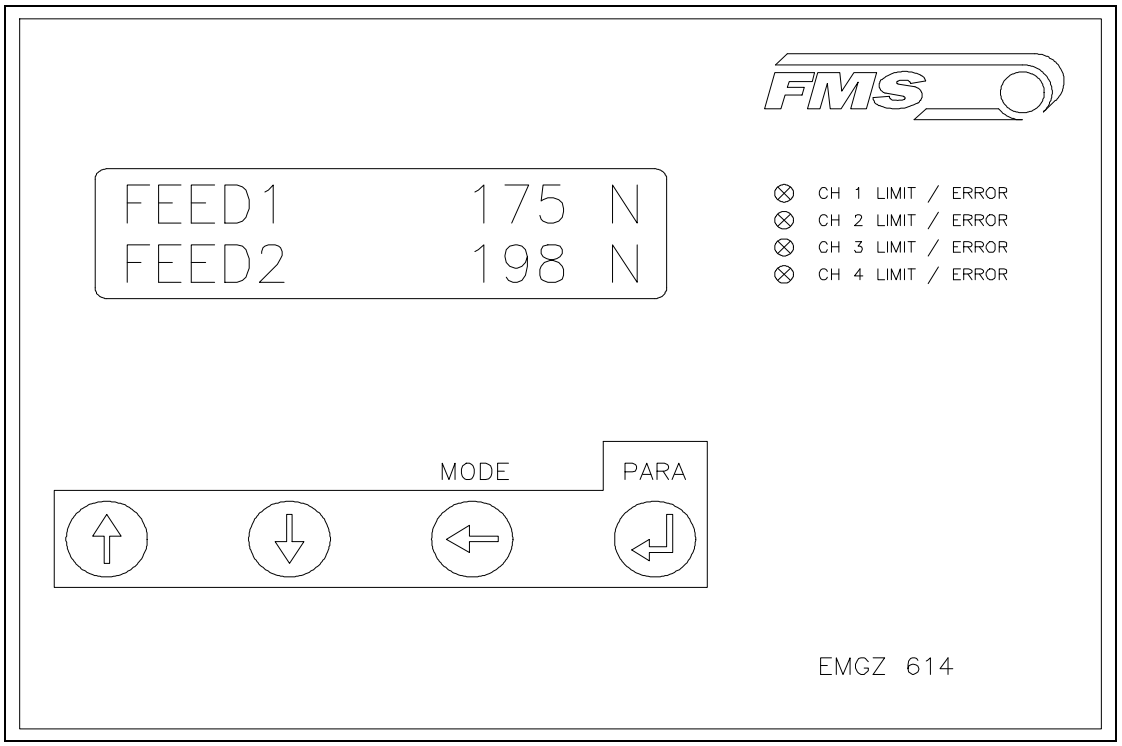


fig. 8: Operating panel EMGZ611A...614A E614013e

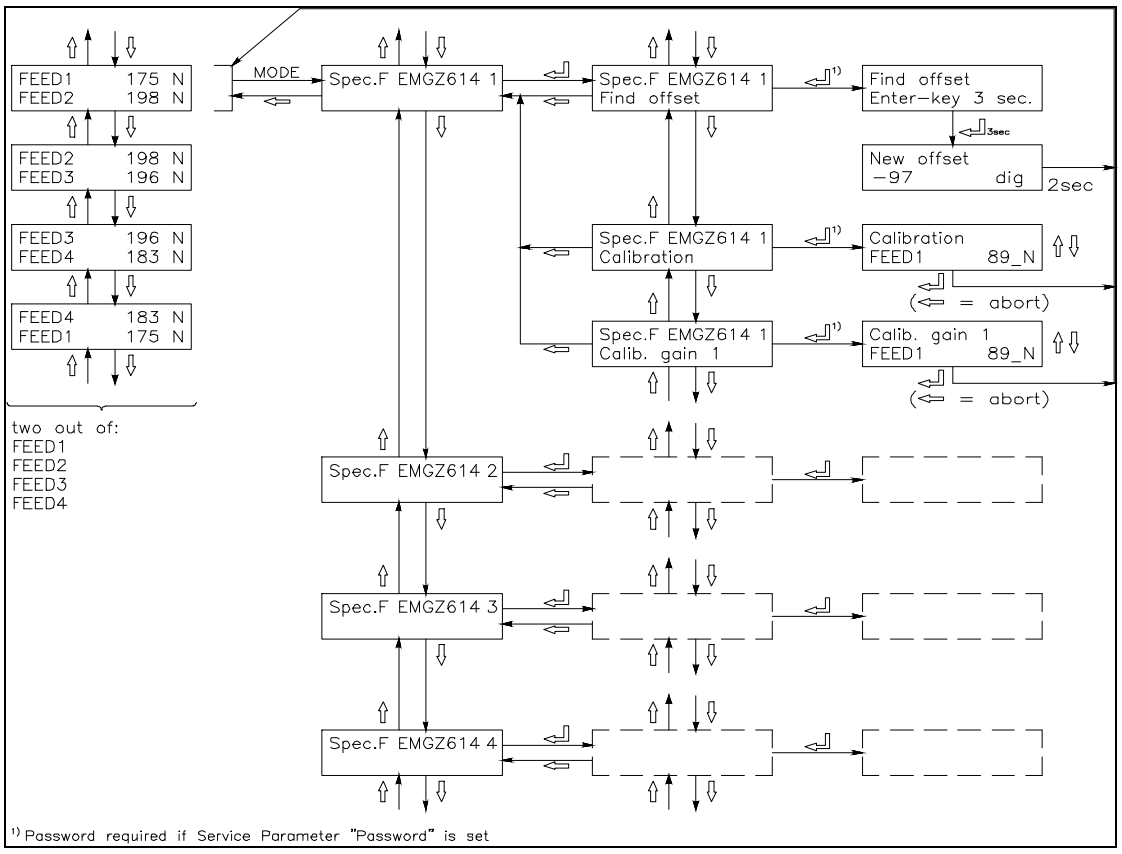


fig. 9: Main operating menu EMGZ614A E614010e

8.2 Configuring the Electronic Unit

Prior to the first calibration, the following settings must be done for each channel (ref. to „9. Parametrization“):

Global parameters	
Language	Required display language
Measuring system	Metric (default) or US standard

Channel parameters	
Force of sensor	Ref. to nameplate of the force sensor
Unit of sensor	Ref. to nameplate of the force sensor
Sensitivity	FMS force sensors = 1.8mV/V (default)
1 or 2 sensors	1 or 2 per channel
Scale output	Which tension feedback refers to 10V resp. 20mA?
Config. output	*0-10V and 0...20mA* (default) or *0-10V and 4...20mA* or *-10V...+10V* *Notice: With a tension signal 0...10V, tension and current output are active at the same time.*

Jumpers for the analog outputs (ref. also to „14. Technical Reference“)	
Channels 1 / 2 / 3 / 4	0...10V (Default) or ±10V, corresponding to parameter *Config. output*

Note

Wrong setting of the parameters may cause malfunction of the electronic unit!
Setting of the parameters must be done carefully prior to setting into operation!

8.3 Calibrating the Measuring Amplifier

The calibration is done for each channel separately. It can be calibrated using the „simulating method“ or the „mathematical method“:

Simulating Method (recommended)
The following instructions are referring to a setup and calibration on-site. The material tension will be simulated by a weight (fig. 10).

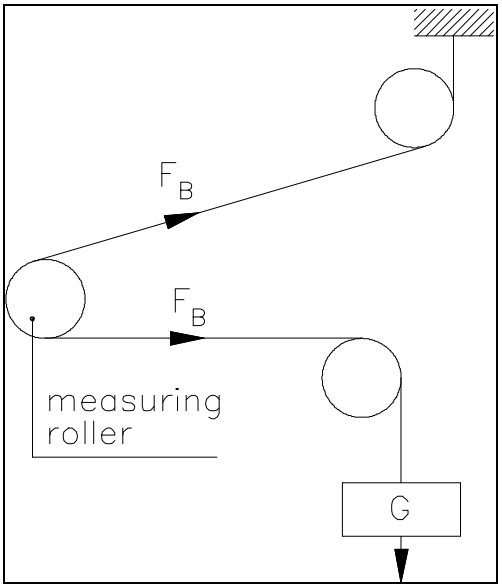


fig. 10: Calibrating the measuring amplifier C431011e

Check force sensors

- Connect the first force sensor (ref. to wiring diagram).
- Check if a positive value is displayed when loading the sensor in measuring direction. If not, exchange terminals *+signal* and *–signal* on the measuring amplifier.
- If used, connect the second force sensor.
- Check if a positive value is displayed when loading the sensor in measuring direction. If not, exchange terminals *+signal* and *–signal* on the measuring amplifier.

Find offset

- Insert material or a rope loosely to the machine.
- Press MODE key. Search and select the module *Spec.F EMGZ614 1*[1)] and the special function *Find offset* with the ↑ ↓ ↵ keys (fig. 9).
- Find offset by pressing the ↵ key for 3 seconds (fig. 9). The electronic unit calculates automatically the new offset value. The display will return to the main operating menu.

(The offset may also be determined alternatively with the digital input *Find Offset*; refer to wiring diagram.)

Find gain

- Load material or rope with a defined weight (fig. 10)
- Press MODE key. Search and select the module *Spec.F EMGZ614 1*[1)] and the special function *Calibration* with the ↑ ↓ ↵ keys (fig. 9).
- Set the force referring to the applied weight into the display with the ↑ ↓ keys and confirm with ↵ key (fig. 9). The electronic unit calculates automatically the new gain value. The display will return to the main operating menu.

EMGZ612A...EMGZ614A

The calibration of the measuring amplifier written above applies to module 1. It must be done also for module 2...4. For that purpose use the special functions from module
*Spec.F EMGZ614 **2** / Spec.F EMGZ614 **3** / Spec.F EMGZ614 **4*** (ref. to fig. 9).

1) Depending on the electronic unit used the modules are named as follows:
   Spec.F EMGZ611 n / Spec.F EMGZ612 n / Spec.F EMGZ613 n / Spec.F EMGZ614 n

Mathematical method

If the material tension cannot be simulated, calibration has to be done by calculation. This way of calibrating is less accurate because the exact angles are often unknown and the effective mounting conditions, which usually deviate from the ideal, are not taken into account.

- Offset adjustment is done as written under „Simulating method“.
- The Gain value will be calculated by the following formula and then inputted in the parameter *Gain* (refer to „9.5 Description of the parameters EMGZ611A...614A“).

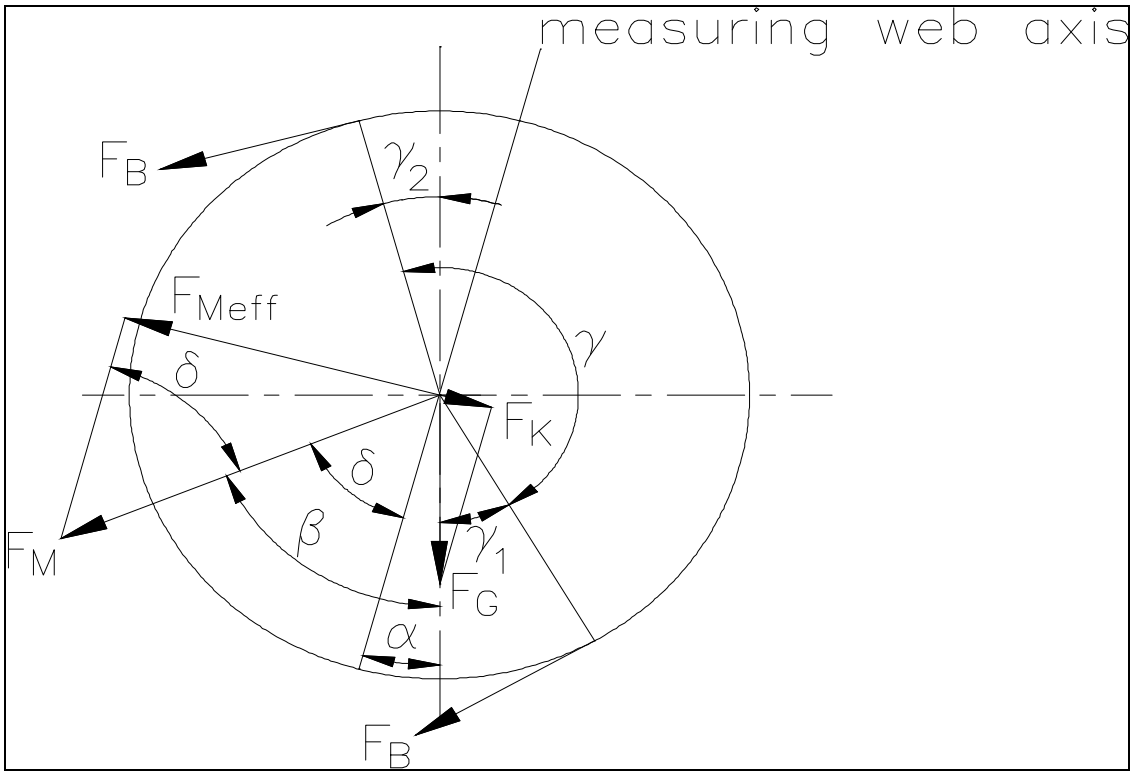


fig. 11: Force vectors in the FMS force measuring bearing C431012e

$$GainFeedback = \frac{1}{\sin\delta \cdot \sin(\gamma/2) \cdot n}$$

Definition of symbols:

α	angle between vertical and measuring web axis	F_B	material tension
β	angle between vertical and F_M	F_G	roller weight
γ	wrap angle of material	F_M	measuring force resulting from F_B
γ_1	entry angle of material	F_{Meff}	effective measuring force
γ_2	exit angle of material	n	number of force sensors
δ	Angle between measuring web axis and F_M		

8.4 Additional Settings

Setting the lowpass filters

The measuring amplifier provides 1 lowpass filter for the display and 1 lowpass filter for the output signal of each channel. They are used to prevent noise which is added to the signals.

The lowpass filters are configured by setting its cut off frequency to an appropriate value. The cut off frequency is set in the parameters *Lowpass display* or *Lowpass output* (ref. to „9. Parametrization“). Signal variations which are faster than the cut off frequency are then suppressed. The lower the cut off frequency, the more sluggish the display value resp. the output signal will be.

> **Note**
>
> If the cut off frequency is set to a value too low, the output signal will become sluggish. It may be that the feedback value is no longer suitable for control loop applications. You have to pay attention that the cut off frequency is set to a suitable value.

Setting the limit switches

The measuring amplifier provides a min and a max limit switch per channel. The threshold values may be set freely using the channel parameters *Min. limit / Max. limit* (ref. to „9.5 Description of the parameters EMGZ611A...614A“). If the electronic unit detects exceeding of the values set, it can switch on an LED and / or a dig. output.

A LED is provided for each channel (ref. to fig. 8). The LED shows the referring limit switch if parameter *Config. of LED* is set to *Min* or *Max*.

Two digital outputs are provided for each channel (ref. to wiring diagram). The digital outputs are actuated with the limit switches if the parameters *Config.Dig.Out.A* or *Config.Dig.Out.B* are set to *Min* or *Max* accordingly. Tapping of the limit switches is done according to the wiring diagram.

Gain switching

If a measuring point is operated with varying measuring conditions (i.e. different material paths), the gain value of each channel may be switched between two values depending on the material path. The additional gain value must be calibrated also during setup with the special function *Calib. Gain 1*. The procedure is identical as with *Calibration* (ref. to „8.3 Calibrating the Measuring Amplifier“).

Switching is done with the digital input „Switch Gain“ (ref. to parameter *Gain 1*). Wiring of the dig. input is done according to the wiring diagram.

9 Parametrisation

9.1 State Diagram Parametrisation

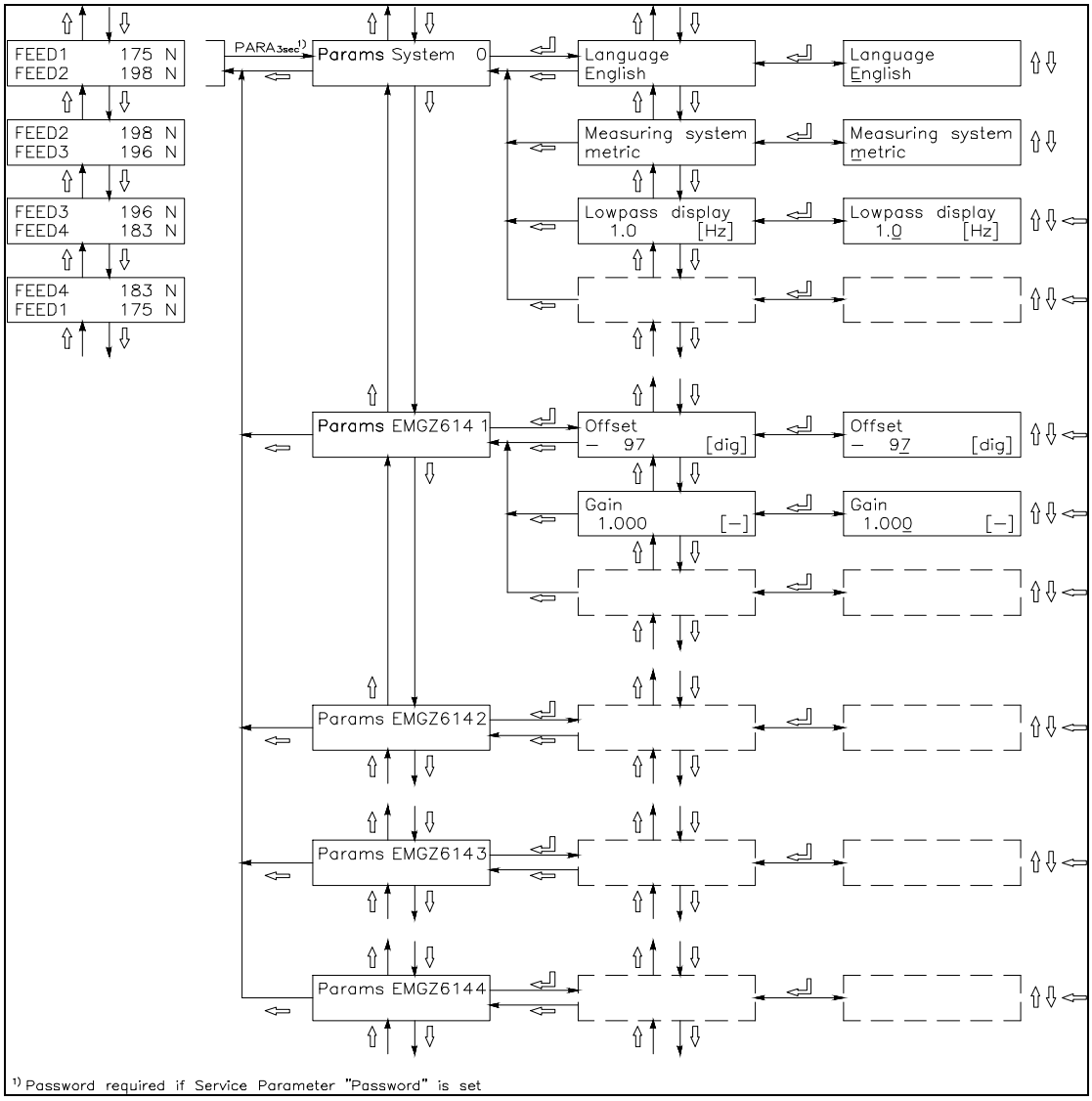


fig. 12: Parametrization EMGZ614A **E614011e**

The parameters are split into the modules *system parameters* and parameters *EMGZ614 1*[1)] to *EMGZ614 4*[1)]. The parameter changing mode is activated by pressing the PARA ↵ key for 3 seconds. The required module is then searched with the ↑ ↓ keys and selected with the PARA ↵ key (fig. 12). Each module has its own parameter set. Generally, the parameters are settable using the keys as follows:

☐	choose and enter
☐ ☐	switch the selections or increase / decrease numeric values, as well as change the sign
↵	change the decimal (while inputting a numeric value) or abort setting

[1)] Depending on the electronic unit used the modules are named as follows: *Spec.F EMGZ611 n / Spec.F EMGZ612 n / Spec.F EMGZ613 n / Spec.F EMGZ614 n*

9.2 List of the System Parameters

Parameter	Unit	Min	Max	Default	Selected
Language	English, French, Italian, German				
Measuring System	Metric, US standard			Metric	
Lowpass display	[Hz]	0.1	10.0	1.0	
Identifier	[-]	0	255	0	
Baud rate	2400, 4800, 9600, 19200			9600	

9.3 List of the Parameters EMGZ611A...614A

Parameter	Unit	Min	Max	Default	Selected
Offset	[Digit]	–8000	8000	0	
Gain	[-]	0.100	9.000	1.000	
Gain 1	[-]	0.100	9.000	1.000	
Force of sensor	[N, kN, cN]	1	9999	1000	
Unit of sensor	N, kN, cN			N	
Sensitivity	[mV/V]	0.1	5.0	1.8	
1 or 2 sensors	[-]	1	2	1	
Min. limit	1)	2)		0	
Max. limit	1)	2)		1000	
Config. of LED	Min., Max., Error, Okay			Error	
Config. Dig.Out.A	*(same as config. of LED)*			Min	
Config. Dig.Out.B	*(same as config. of LED)*			Max	
Lowpass output	[Hz]	0.1	200.0	10.0	
Scale output	1)	2)		1000	
Config. output	0–10V and 0...20mA, 0–10V and 4...20mA, –10V...+10V			0–10V and 0...20mA	

1) [N, cN, kN] if measuring system = metric
[lb, clb, klb] if measuring system = US standard

2) A force value can be input. The value consists of 4 digits. The
position of the decimal point depends on the parameter *Force of sensor*

9.4 Description of the System Parameters

The parameter changing mode is activated by pressing the PARA ↵ key for 3 seconds. By pressing the PARA ↵ key again, the system parameters are selected (ref. also to fig. 12).

Language

Use: This parameter stores the display language.

Range: English, French, Italian, German

Measuring system

Use: This parameter indicates the measuring system to be used. If it is set to *metric*, all force values are shown as [N, cN, kN]. If it is set to *US standard*, all force values are shown as [lb, clb, klb].

Range: Metric, US standard **Default:** Metric

Lowpass display

Use: The electronic unit provides a lowpass filter to prevent noise which is added to the integrated display. This parameter stores the cut off frequency. The lower the cut off frequency, the more sluggish the output signal will be. Due to this filter, the value shown in the display will be much more stable in the case of high fluctuations of the force value.
The lowpass display filter is independent to the other filters.

Range:	0.1 to	10.0	**Default:**	1.0
Increment:	0.1		**Unit:**	[Hz]

Identifier

Use: This parameter stores the ident number of the device when linked to PROFIBUS, CAN-Bus resp. DeviceNet.

Range:	0 to	255	**Default:**	0
Increment:	1		**Unit:**	[-]

Baud rate

Use: This parameter stores the speed of the serial interface (RS232). The other settings are fixed: 8 data bits, even parity, 1 stop bit („8 e 1“).

Range:	2400, 4800, 9600, 19200	**Default:**	9600
		Unit:	[Baud]

9.5 Description of the Parameters EMGZ611A...614A

The parameter changing mode is activated by pressing the PARA ↵ key for 3 seconds. The required module is then searched with the ↑ ↓ keys and selected with the PARA ↵ key (ref. also to fig. 12).

Offset

Use: This parameter stores the value determined with special function *Find offset* in [Digit]. It is not necessary to note this parameter because a new offset adjustment is done very easy; also when changing the whole electronic unit.
The offset can also be inputted manually with the ↑ ↓ ← keys.

Range:	–8000	to	8000	**Default:**	0
Increment:	1			**Unit:**	[Digit]

Gain

Use: This parameter stores the value determined with special function *Calibration*, or you must input a value calculated using the formulas written under „8.3 Calibrating the measuring amplifier“ if the material tension cannot be simulated.

Range:	0.100	to	9.000	**Default:**	1.000
Increment:	0.001			**Unit:**	[-]

Gain 1

Use: Identical with *Gain* but the value stored here was determined by special function *Calibration gain 1*. The value stored here is used if the digital input „switch gain“ is activated (ref. to wiring diagram).

Range:	0.100	to	9.000	**Default:**	1.000
Increment:	0.001			**Unit:**	[-]

Force of sensor

Use: This parameter stores the nominal force of the sensor. It is printed to the nameplate of the force sensor.

Range:	1	to	9999	**Default:**	1000
Increment:	1			**Unit:**	[N, kN, cN]

Unit of sensor

Use: This parameter stores the measuring unit of the sensor. It is printed to the nameplate of the force sensor.

Range:	N, kN, cN	**Default:**	N

Sensitivity

Use: This parameter stores the sensitivity of the force sensor, that means how much signal per volt excitation the sensor will give when loaded with nominal force. Standard for FMS force sensors is 1.8mV/V.

Range: 0.1 to 5.0 **Default:** 1.8

Increment: 0.1 **Unit:** [mV/V]

1 or 2 sensors

Use: This parameter stores wether the measuring roller is beared by one or two force sensors.

Range: 1 to 2 **Default:** 1

Increment: 1 **Unit:** [-]

Min. limit

Use: The event „Min. limit passed under“ will be performed if the tension feedback passes under the threshold value stored here. If the parameter contains a zero value, limit switch monitoring is inactive.

Range: A force value can be input. The value consists of 4 digits. The position of the decimal point depends on the parameter *Force of sensor.*

Default: 0 **Unit:** [N, kN, cN] or [lb, klb, clb]

Note: The event can be shown using a LED (ref. to parameter *Config. of LED*) or fed to the digital outputs (ref. to parameters *Config. Dig.Out.A* and *Config. Dig.Out.B*) or read using an interface (ref. to the „interfaces“ chapter).

Max. limit

Use: The event „Max. limit passed over“ will be performed if the tension feedback passes over the threshold value stored here. All other function is identical with *Min. limit*.

Config. of LED

Use: This parameterdefines which event will activate the LED on the operating panel.

Range: Min., Max., Error, Okay **Default:** Error

Config. Dig.Out.A

Use: This parameter defines which event will activate the digital output A. The digital output is operated as „open collector“ output (ref. to wiring diagram).

Range: Min., Max., Error, Okay **Default:** Error

Config. Dig.Out.B

Use: This parameter defines which event will activate the digital output B. The digital output is operated as „open collector“ output (ref. to wiring diagram).

Range: Min., Max., Error, Okay **Default:** Error

Lowpass output

Use: Each channel provides a lowpass filter to prevent noise which is added to the output signal. This parameter stores the cut off frequency. The lower the cut off frequency, the more sluggish the output signal on the terminals will be (ref. to wiring diagram). Due to this filter, the output signal will be much more stable in the case of high fluctuations of the force value.

Range: 0.1 to 200.0
Default: 10.0

Increment: 0.1 **Unit:** [Hz]

Scale output

Use: This parameter stores which tension feedback value will give the maximum signal (10V resp. 20mA) at the output.

Range: A force value can be input. The value consists of 4 digits. The position of the decimal point depends on the parameter *Force of sensor.*

Default: -

Unit: [N, kN, cN] or [lb, klb, clb]

Configuration output

Use: This parameter configures the analog output signal.

Range: 0–10V and 0...20mA, and 0–10V and 4...20mA, –10V...+10V **Default:** 0–10V 0...20mA

Note (only for subprint Rev. C)

Jumper Settings and Parametrisation (Configuration output) have to coincide

9.6 Service Mode

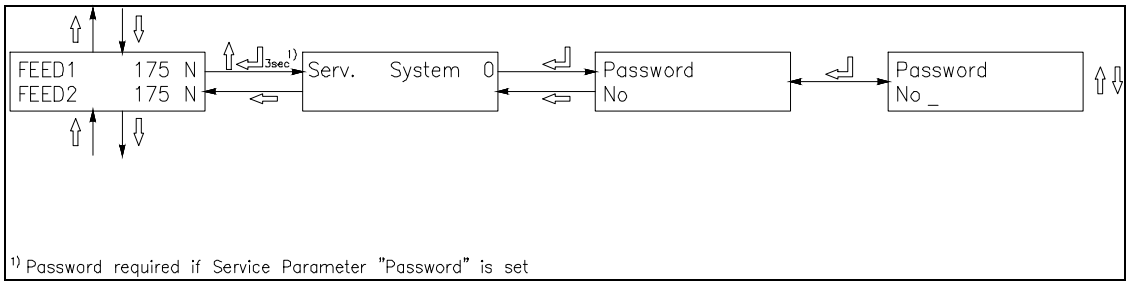


fig. 13 State diagram service mode E614012e

The service mode contains internally used values. These need usually no modification. However they could be helpful while trouble shooting. Each function module has its own set of service parameters.

Note

Bad setting of the service mode parameters may result in heavy malfunctions! Therefore, these settings should be made by specially trained personnel only!

The service mode is activated by pressing the ↑ and ↵ keys for 3 seconds. Generally the service mode parameters can be modified the same way as the other parameters.

Password			
Use:	This parameter defines if a password is required to access the parameters and several special functions. This allows enhanced security against modifications. The password is „3231“.		
Range:	No, Yes	**Default:**	No

10 Serial Interface (RS232)

(Optional)

11 PROFIBUS Interface Hardware Description

11.1 Wiring of the PROFIBUS Data Cable

Wiring of the PROFIBUS cables

The standardized PROFIBUS cable type A (STP 2x0.34[2]) [AWG] has to be used for the PROFIBUS data cable. The cables are bared referring to fig. 4 and connected to the terminals according to the wiring diagramm.
The shield is connected with the bracket to the shoulder inside the housing.

Caution

The shield of the PROFIBUS cable is only grounded if the bracket inside the housing clamps directly to the shield If the bracked clamps to the plastic mantle, no grounding is done! Therefore the plastic mantle has to be fixed only with the PG gland (referring to fig. 4)

Termination

If both cables are connected (Bus in and Bus out), if has to be ensured that the two termination dip switches are in off position. If only one cable is connected (Bus in), both termination dip switches have to be set in on position.

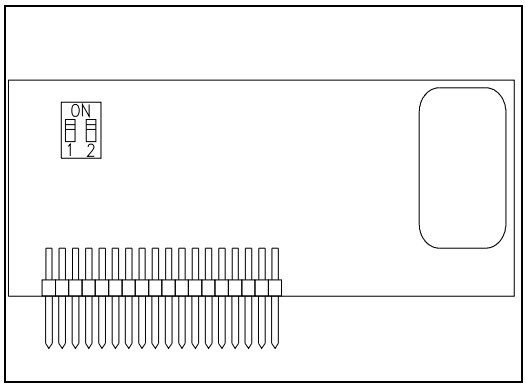


fig 14: Profibus board E621009

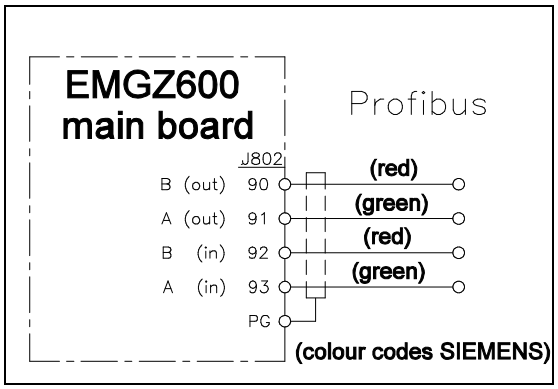


fig.15: Setting Profibus E621012e

Note

The PROFIBUS network has to be terminated properly. Otherwise the installation cannot be set into operation. It has to be ensured that only the last device of the PROFIBUS chain is terminated.

11.2 Setting the PROFIBUS Address

The measuring amplifier requires a unique PROFIBUS address which indicates it definitely in the whole PROFIBUS network. Therefore no other PROFIBUS device in the network may use the same address. The address has to be between 2...125.

The PROFIBUS address is set with the system parameter *Identifier*. (See 14.4 Description of the system parameters). After switching the measuring amplifier off and on, the new address is valid.

12 PROFIBUS Interface Description

12.1 GSD File

The PROFIBUS DP Master has to know which devices are connected to the PROFIBUS network. For this purpose the GSD file is required. The GSD file for the EMGZ600A-series measuring amplifier can be taken fron the following internet address:
http://www.fms-technology.com/gsd
The GSD file can also be supplied on a floppy disk on request. In this case please contact FMS customer service.

Read in the GSD file into the PROFIBUS DP Master

How to read in the GSD file into the control system (DP Master) is depending on the used control system. For further information, refer to the documentation of the control system.

Note

The GSD-file version must match with the firmware version of the measuring amplifier. Otherwise there may be problems while setup. Version numbers of firmware and GSD file are printed to the cover page of this opeating manual.

12.2 EMGZ611A/612A/630A DP Slave Functional Description

The measuring amplifiers of the EMGZ600A.P-series support a PROFIBUS link which operates according to the PROFIBUS DP protocol according to EN 50170. Hereby the measuring amplifier operates as DP slave and the control system as DP Master. Several parameters have to be set and met by the control system.

12.3 Initial Parameters

Initial parameters are sent from the control system to the measuring amplifier once while initialization. They are normally set to a fixed value for a machine with the programming tool of the control system.
The first bytes of the parameter telegram are specified in the EN 50170 standard. An user segment of 4 bytes is defined manufacturer-specific for the measuring amplifier.

Byte	Use	Value	Meaning
0	initial parameter	0	(not used)
1		0	(not used)
2		0	(not used)
3		0	(not used)

12.4 Configuration

The configuration defines how many process data (byte and word) are sent during the cyclic communication from the control system to the measuring amplifier and from the measuring amplifier to the control system. To ensure maximum flexibility using the measuring amplifier, there are different modules supplied. in a single measuring amplifier only one module can be set active at a time.

Module 1: Basic telegram

4 bytes (2 words) are transmitted from the control system to the measuring amplifier and also 4 bytes (2 word) from the measuring amplifier to the control system in each data cycle.

	Byte 0	Byte 1	Byte 2	Byte 3
request telegram (master → slave)	function code	Channel number	empty	empty
response telegram (slave → master)	function code or error FFh	channel number	data (high byte)	data (low byte) or error code

Module 2: Reserved

Module 3: Basic telegram and 4 word operation value

The measuring amplifier responses with 4 bytes of the basic telegram and the 4 words.

	Byte 0	Byte 1	Byte 2	Byte 3
request telegram (master → slave)	function code	channel number	empty	empty
response telegram (slave → master)	function code	channel number	data (high byte)	data (low byte) or error code

Word 0	Word 1	Word 2	Word 3
Feedback (HB)/(LB)	Reference (HB)/(LB)	Controller Error (HB)/(LB)	Output (HB)/(LB)

Modul 4: Reserved

12.5 Function Code

Master → Slave

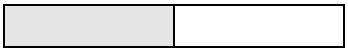
Function Values:

Value	Meaning	Remarks
01h	Feedback	feedback tension controller
07h	A/D-value (gross value)	A/D-value tension controller

The tension controller transmits the response with the response telegram.

12.6 Error Code

Master → Slave



Byte 0	Byte 3	Meaning
FFh	01h	invalid function code
FFh	02h	invalid channel number

13 Interface CAN-Bus

(Optional)

14 Technical Reference

14.1 Additional Setting Elements

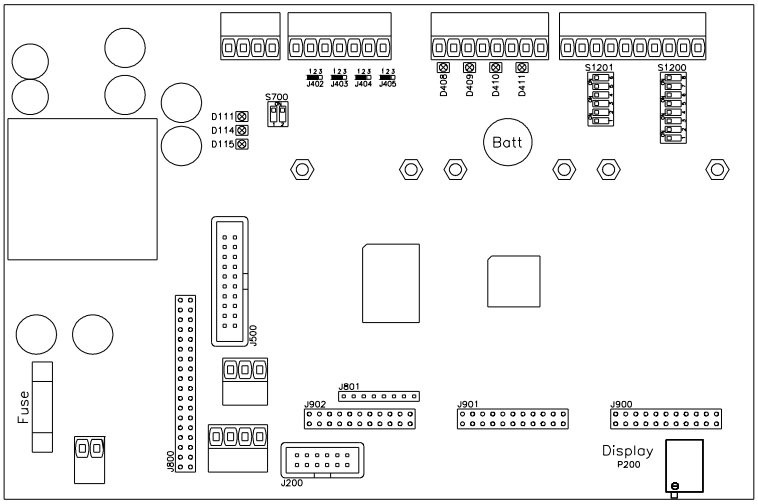


fig. 16 View of main board K600028e

Element	Function
D111	Status LED power supply: VCC ok
D114	Status LED power supply: +15VDC ok
D115	Status LED power supply: –15VDC ok
D408	Status LED dig. input 1
D409	Status LED dig. input 2
D410	Status LED dig. input 3
D411	Status LED dig. input 4
J200	(Reserved)
J402...405	Solder bridges for dig. output 1...4 (open collector)
J500	Add-on board for dig. I/O
J800	Socket subprint PROFIBUS
J801	(Reserved)
J900	Socket subprint channel 2
J901	Socket subprint channel 3
J902	Socket subprint channel 4
P200	LCD display contrast
S700	CAN Bus termination
S1200	Dip-switch (sensor exitation, sensor signal, 4-wire or 6-wire circuit)
S1201	Dip-switch (sensor exitation, sensor signal, 4-wire or 6-wire circuit)
Battery	Buffer battery for the internal clock
Fuse	Fuse of the power supply, 1A / 250V (fast blow)

14.2 Setting Elements on the Extension Board

(EMGZ613A / EMGZ614A only)

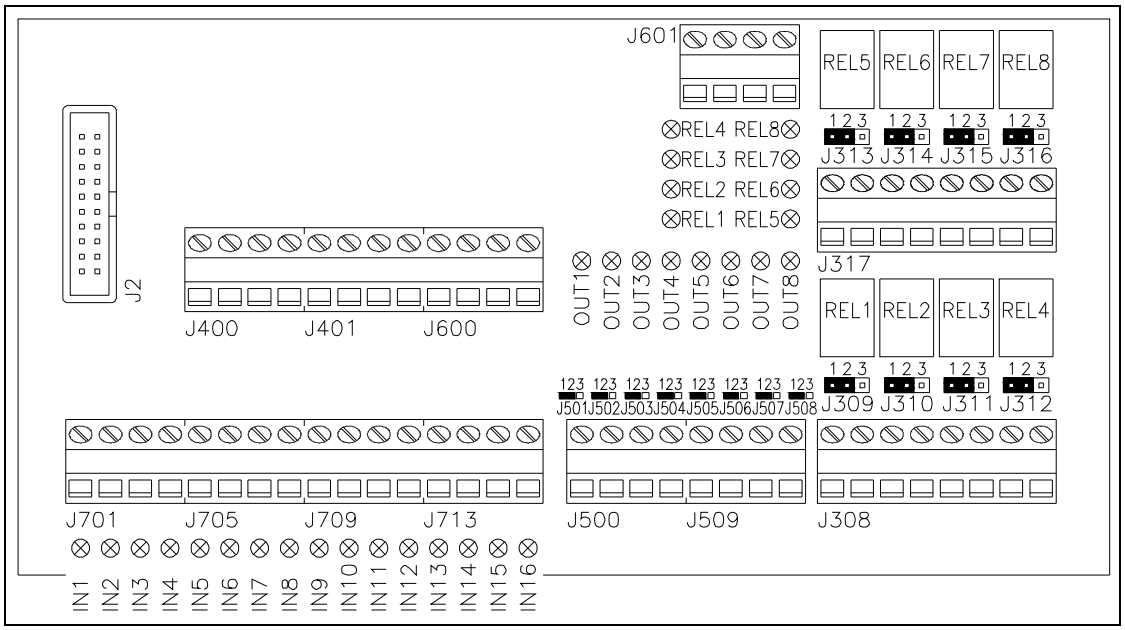


fig. 17 View of extension board C600002

Element	Function
IN1...16	Status LED dig. input 1...16
OUT1...8	Status LED dig. output 1...8 (open collector)
REL1...8	Status LED and relay dig. output 9...16
J308 / J317	Terminal for dig. output 9...16 (relay)
J309...316	Jumper for dig. output 9...16 (relay)
J400 / 401	8 x Terminal +24VDC
J500 / J509	Terminal for dig. output 1...8 (open collector)
J501...508	Solder bridges for dig. output 1...8 (open collector)
J600 / 601	8 x Terminal Gnd
J701...713	Terminal for dig. input 1...16
J2	Ribbon cable to processor board

Setting of the relay contacts (jumper)

Jumper	Relay operates as „make contact“ (Default)	Relay operates as „break contact“
J309...316	1-2	2-3

14.3 Technical Data

Number of measuring points	1...4 (depending on device type)
Connection of force sensors	1 or 2 parallel wired force sensors of 350Ω for each channel
Excitation of force sensors	5VDC (default), or 10VDC (with automatic current control)
Input signal voltage	0...9mV (max. 12.5mV) or 0...18mV (max. 25mV) (depending on force sensor excitation)
Resolution A/D converter	±8192 Digit (14 Bit)
Measuring error	<0.05% FS
Cycle time	2ms
Operation	4 keys, 4 LED's, LCD display 2x16 characters (8mm height)
Analog output channel 1...4	0...10V (default) / ±10V and 0...20mA (default) / 4...20mA (12 Bit)
Digital output 1...4 (freely programmable)	Open collector, max. 10mA, galvanically isolated, with recovery diode
Digital input 1...4	24VDC, galvanically isolated (signal must be on for min. 100ms)
Interface RS232	Optional
Interface PROFIBUS	PROFIBUS DP (EN50170), optional
Interface CAN-Bus	Optional
Interface DeviceNet	Optional
Power supply	24VDC (18...36VDC) / 10W (max. 1A)
Temperature range	0...45°C (32...113°F)
Weight	1.5kg (3.35lbs)

15 Trouble Shooting

If the electronic unit detects an error, a digital output and / or an LED on the operating panel is activated if the dig. output or the LED is parametrized to *Error* (ref. to parameters *Config. of LED / Config. Dig.Out.A / Config. Dig.Out.B*).
If the dig. output resp. the LED is parametrized to *Ok*, the dig. output and / or the LED is turned off. In addition, the error state can be read by the interface.

Error	Cause	Corrective action
Display shows not determinable	A function can't be performed at that time (i.e. wiring error)	Check wiring, parametrization and overall system shape
Feedback value of channel n is > 0 even though material is loose	Offset badly adjusted	Proceed again for offset adjustment of channel n
	Current output is set to 4...20mA	Adjust channel parameter *config. output* if a signal 0...20mA is required
Feedback value of channel n is not stable even though material tension doesn't change	Cut off frequency of the filters set too high	Adjust cut off frequency (ref. to „8.4 Additional Settings“)
	Grounding (PE) not connected	Connect grounding (PE)
	Electrical interference on the cable to the force sensor	Check connection of the shield. Use one twisted pair for +signal and –signal (ref. to „7.3 Mounting the force sensors“)
Feedback value of channel n does not correspond with the	Gain badly adjusted	Proceed again for sensor calibration of channel n
	If gain switching is used: Wrong gain value used	Switch the dig. input used for gain switching
	Output signal wrong scaled	Set channel parameter *scale output* to an appropriate value
Gain of channel n cannot be switched	Wiring error	Correct wiring, ref. to wiring diagram
	Second gain value not calibrated	Proceed calibration for second gain value
Limit switches of channel n do not work	Limit values wrong parametrized	Set parameter *Min. limit / Max. limit* to an appropriate value
	The dig. outputs used are wrong parametrized	Set parameters *Config.Dig.Out.A / Config.Dig.Out.B* to *Min. limit / Max.*

		limit
Dig. outputs do not work	Wiring error	Check wiring of the dig. outputs (open collector, ref. to wiring diagram)
C.n Overcurrent	Excitation of channel n detects overcurrent (short circuit)	Check force sensors and wiring of channel n
C.n Cable break	Excitation of channel n detects cable break	Check force sensors and wiring of channel n
C.n HW error	Hardware of channel n defect	Contact FMS customer service
	Subprint of channel n is not detected	Check if subprints are seated correctly (ref. to „14.1 Additional Setting Elements“) Contact FMS customer service
Subprint missing contact FMS AG	One or more subprints are missing or are not detected	Check if subprints are seated correctly (ref. to „14.1 Additional Setting Elements“) Contact FMS customer service
System Error contact FMS AG	Electronic unit defect	Contact FMS customer service
No message on the display	Display contrast setting is bad	Set display potentiometer P200 correctly (ref. to „15.1 Additional Setting Elements“)
	Fuse blown	Replace fuse (ref. to „15.1 Additional Setting Elements“)
	Power supply not correct	Check status LED’s of the power supply (D111...D115, ref. to „15.1 Additional Setting Elements“) Check / correct power supply
	Electronic unit defect	Check status LED’s of the power supply (D111...D115, ref. to „15.1 Additional Setting Elements“) Contact FMS customer service
While power failure, no error message is provided	Dig. output is parametrized to *Error*	Parametrize dig. output to *Ok* and invert signal input of the following evaluating device
Electronic unit does not answer to interface commands	Interface not yet supported	Contact FMS customer service

FMS Force Measuring Systems AG
Aspstrasse 6
8154 Oberglatt (Switzerland)
Tel. 0041 1 852 80 80
Fax 0041 1 850 60 06
info@fms-technology.com
www.fms-technology.com

FMS USA, Inc.
2155 Stonington Avenue Suite 119
Hoffman Estates,, IL 60169 (USA)
Tel. +1 847 519 4400
Fax +1 847 519 4401
fmsusa@fms-technology.com

FMS (UK)
Highfield, Atch Lench Road
Church Lench
Evesham WR11 4UG (Great Britain)
Tel. 01386 871023
Fax 01386 871021
fmsuk@fms-technology.com

FMS Italy
Via Baranzate 67
20026 Novate Milanese
Phone +39 02 39487035
Fax +39 02 39487035
fmsit@fms-technology.com