Operating Manual

EMGZ470A.W / EMGZ472A.W

EMGZ470A.W.D / EMGZ472A.W.D

Digital microprocessor controlled Tension Measuring Amplifier with integrated PROFIBUS interface

Operating Manual Version 2.3 04/2007 ff
Firmware Version from 1.04 08/2006
GSD Version 1.03 05/02

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

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

1 Safety Instructions

1.1 Warnings

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. This warning 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 important information about proper use. If not followed, malfunction can be the result.

1.2 List of Safety Instructions

⚠ The functionality of the Tension Measuring Amplifier is only guaranteed, if the application and component recommendations are followed. In case of other arrangement, heavy malfunction can be the result. Therefore, the installation instructions on the following pages must strictly be followed.

⚠ 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 strictly followed.

⚠ Inadequate earth ground connection may cause electric shocks to persons, malfunction of the total system or damage of the measuring amplifier! It is vital to ensure a good earth ground connection.

⚠ 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.

Table of Contents

2 Definitions

Offset: Correction value for compensation of the zero point difference. The offset adjustment ensured that a force of 0N will generate a signal of 0V exactly.

Gain: Amplification factor for the measuring signal. Use of proper value will set the measuring range of the sensor exactly corresponding to the signal output range.

Strain gauge: Electronic component that changes its resistance when it is extended. Strain gauges are used in the FMS force sensors to gather the feedback value.

3 System Components

The EMGZ470A.W/472A.W 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 EMGZ470A.W/472A.W

- EMGZ470A.W: For supplying one force sensor and amplifying the mV signal
- EMGZ472A.W: For supplying two force sensors and amplifying the mV signal
- EMGZ470A.W.D.W/472A.D.W: For supplying one or two double range force sensors and amplifying the mV signals
- With intergrated PROFIBUS interface for operation and parametrization
- Operates as PROFIBUS DP slave according to EN 50170
- *For wall mounting, set off of force sensor (EMGZ470A.W.W)*

PROFIBUS master computer

- For operation of the electronic unit EMGZ470A.W/472AW
- Operates as PROFIBUS DP master according to EN 50170
- Any master computer or PLC suitable

(Italic text indicates a variant or an option)

4 System Description

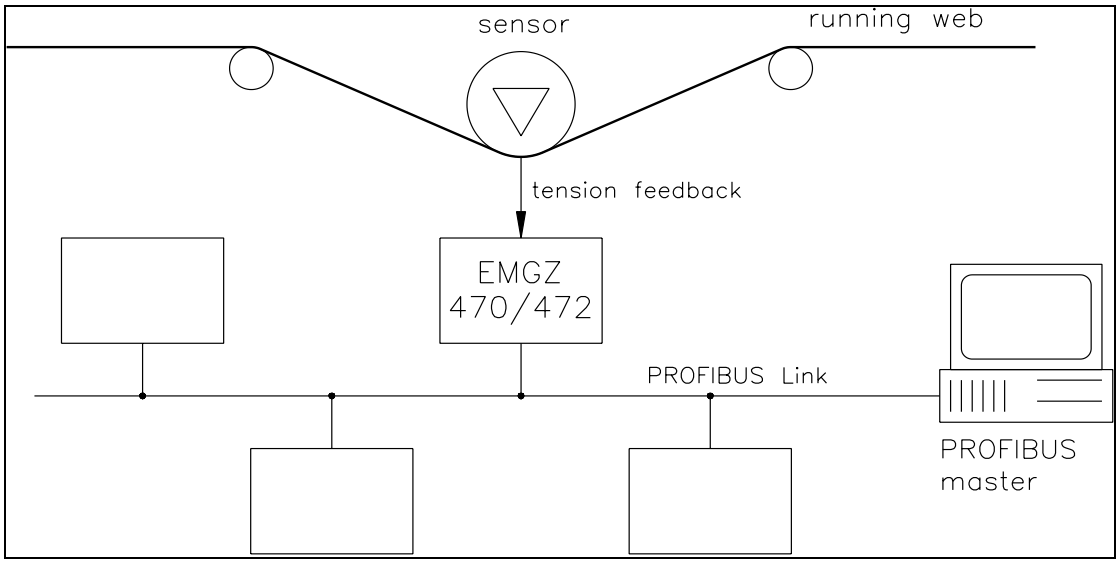

fig. 1: Basic structure EMGZ470A.W/472A.W Tension Measuring Amplifier E470001e

4.1 Functional Description

The force sensor measures the tension force in the material and transmits the value as a mV signal to the electronic unit. The electronic unit amplifies the mV signal depending on configuration. The resulting feedback value can be read by the PROFIBUS master. The application dependent calculations will be done by the PROFIBUS master.

4.2 Force Sensor

The force sensors use the flexion beam principle. The flexion is measured by strain gauges and transmitted to the electronic unit as mV signal. Power supply exerts influence to the strain gauges Wheatstone Bridge. The force sensors are therefore supplied from the electronic unit with a very accurate power supply.

4.3 Electronic Unit EMGZ470A.W/472A.W

Common

The electronic unit contains a microprocessor to handle all calculations and communications, the highly accurate sensor power supply and the signal amplifier for the measuring value. In addition, a PROFIBUS interface is integrated to the electronic unit.

The EMGZ470A.W.D /472A.W.D has the complete electronic unit twice to evaluate two measuring ranges.

EMGZ470A.W	for 1 force sensor
EMGZ472A.W	for 2 force sensors (sum signal)
EMGZ470A.W.D	for 1 double range force sensor
EMGZ472A.W.D	for 2 double range force sensors (1 sum signal per measuring range)

Strain gauge amplifier
The strain gauge amplifier provides the highly accurate 4V power supply. 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 calculates a standardized signal from the digitized measuring value, which is fed to the PROFIBUS interface.

PROFIBUS interface
The EMGZ470A.W/472A.W operates as PROFIBUS DP slave according to EN 50170. All settings and the entire communication is done by the integrated PROFIBUS interface.

4.4 Block Diagram

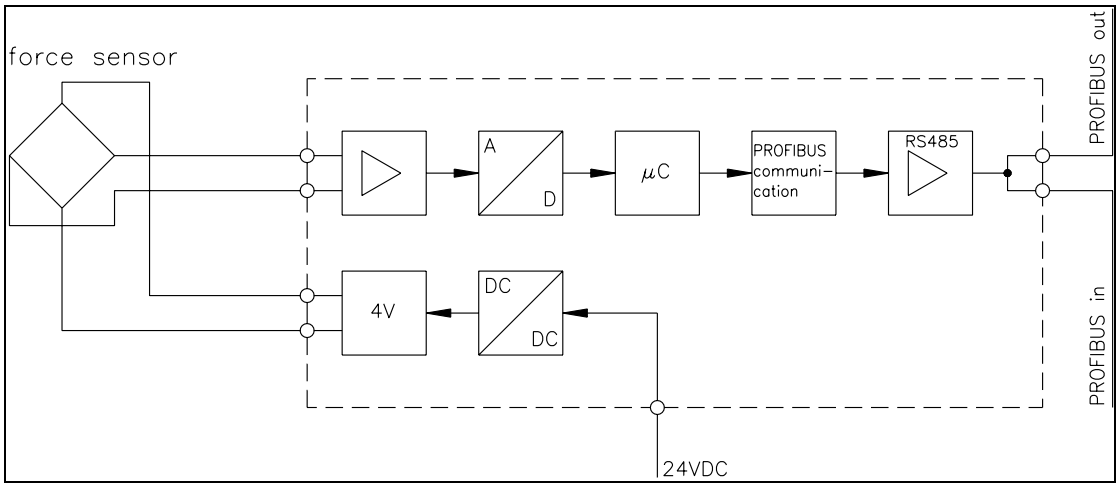

fig. 2 E470002e

5 Quick Installation Guide

- Check all your requirements such as: Configuration of the PROFIBUS interface (address number, data format, required PROFIBUS cycle time, termination) and calibration mode (ref. to „9. Calibrating the measuring amplifier“) etc..
- Draw your final wiring diagram according to the FMS recomendations (refer to „7.5 Wiring diagram)
- Install and wire all your components (refer to „7. Installation and wiring“)
- Make settings in the PROFIBUS master computer (DP master) (ref. to „8. PROFIBUS Interface Description“)
- Put measuring amplifier into operation and calibrate it by PROFIBUS (refer to „9. Calibrating the measuring amplifier“)
- Turn system on; proceed with a test run with low speed
- If required, activate additional application-specific functions of the PROFIBUS master computer (DP master)

Note

If a real-time control loop is implemented with the PROFIBUS, you must ensure that the application-specific PROFIBUS protocol is timewise short enough to provide sufficient control dynamics.

6 Dimensions

6.1 Dimensions of Offset Version (EMGZ470A.W)

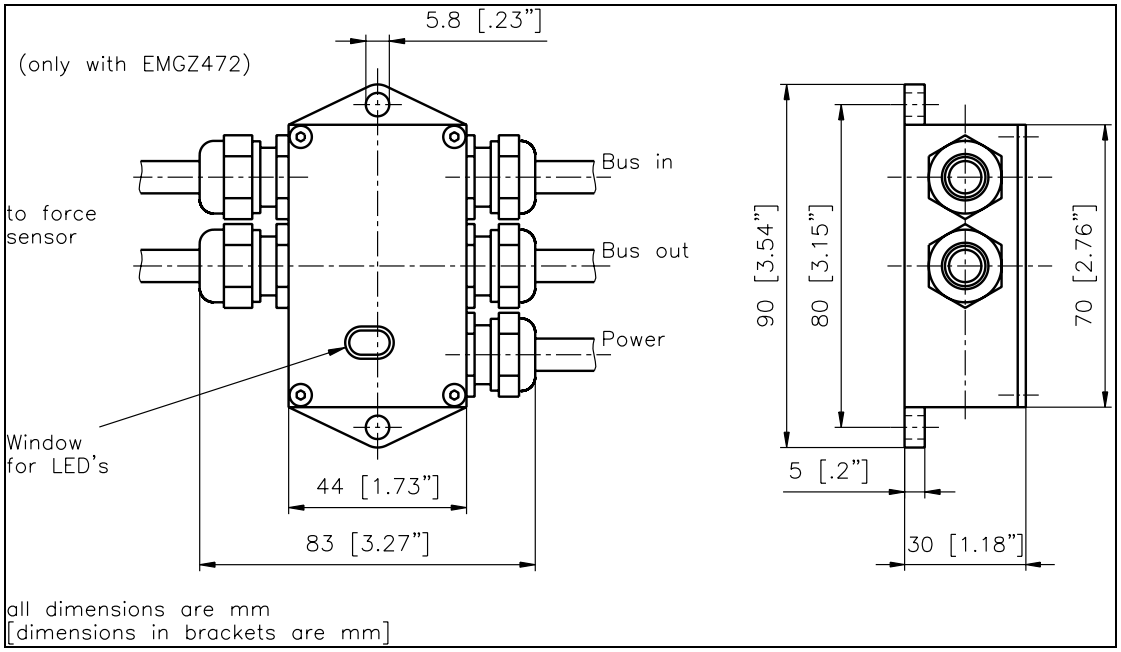

fig. 4: Outline drawing EMGZ470A.W / 472A.W E470004us

6.2 Dimensions Double-Channel Version (EMGZ470/472A.W.D)

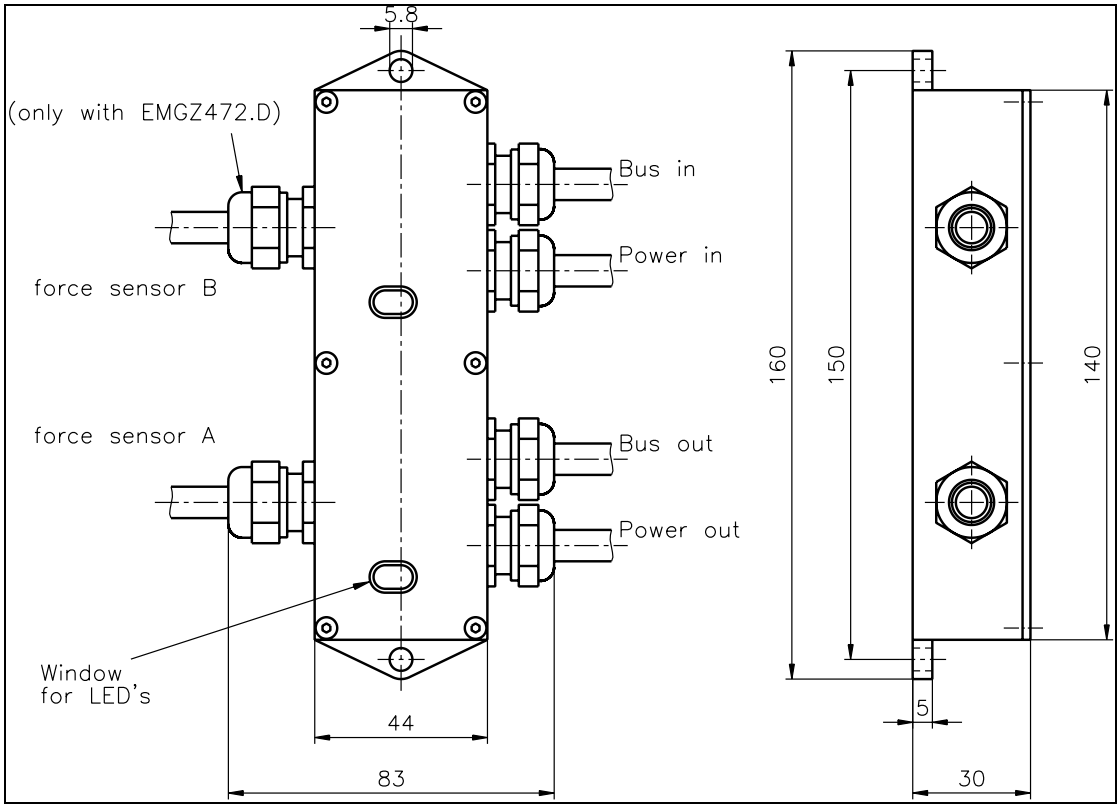

fig. 5: Outline drawing EMGZ470.D.W / 472.D.W E472001e

7 Installation and Wiring

Caution

The functionality of the Tension Measuring Amplifier is only guaranteed, if the application and components recommendations are followed. In case of other arrangements, heavy malfunction can be the result. Therefore, the 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 strictly followed.

7.1 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.

7.2 Mounting of the Measuring Amplifier

The measuring amplifier is mounted directly to the force sensor using the FMS standard plug (fig. 3). When using the offset version (EMGZ470A.W. / EMGZ472A.W) the housing is mounted to the machine frame close to the force sensor (fig. 4 and 5).

7.3 Wiring from Measuring Amplifier to Force Sensor

EMGZ470A.W / EMGZ472A.W

The cables are bared as shown in fig. 6 and then soldered to the terminals on the pc board according to wiring diagram (fig. 8 and 9).

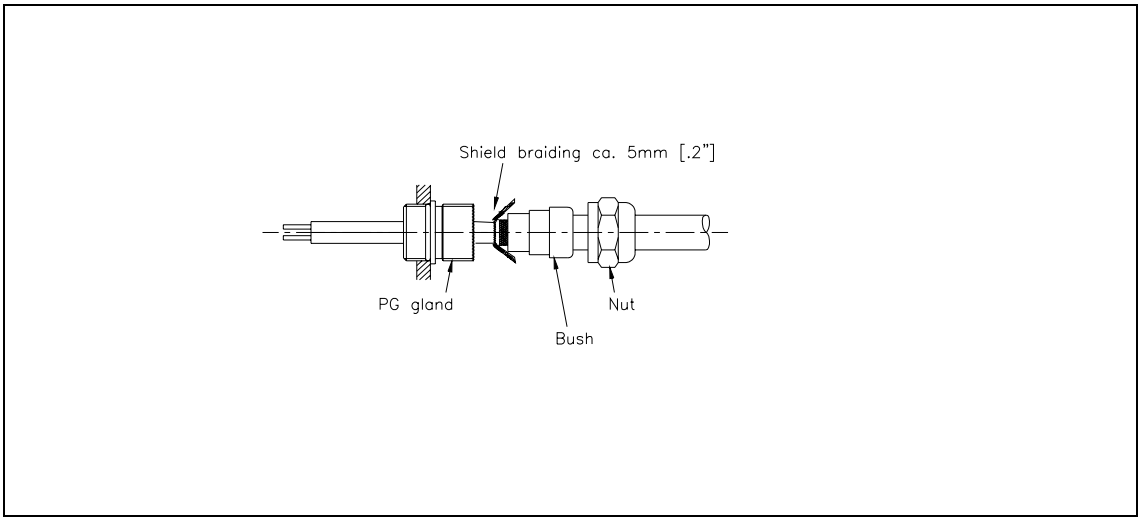

fig 6: Connecting the shield E470009e

Note

Modifications in the wiring by the customer are not recommended. The connection of the shield must be done as indicated in our wiring diagram. The shield should be connected only to the measuring amplifier. 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 result.

7.4 Wiring of Power Supply and PROFIBUS Data Cable

Wiring of the power supply

The wiring of the power supply (24 VDC) to the terminals in the housing is covered in the wiring diagram.

Caution

Inadequate earth ground connections may cause electric shock to persons, malfunction of the total system or damage of the measuring amplifier! It is vital to ensure a good earth ground connection.

Caution

Improper handling of the amplifier unit may damage the fragile electronic circuitry. Don’t use rough tools such as screwdrivers or pliers! Handling in the electronic unit must always take place with the operator using well earthed antistatic bracelets. This will discharge static electricity of your body before touching the electronic unit!

Wiring of the PROFIBUS cables

The standardized PROFIBUS cable type A (STP 2x0.34^2) [AWG 22] has to be used for the PROFIBUS data cable. The cables are bared referring to fig. 7 and connected to the terminals according to the wiring diagram.

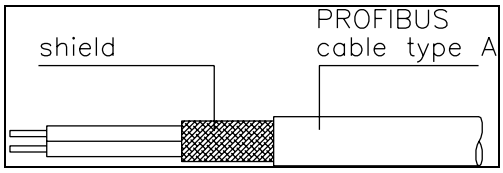

fig. 7: Preparation of the PROFIBUS cables E470010e

Caution

The shield of the PROFIBUS cable is only grounded if the shield is connected with the PG gland.

Termination
If both cables are connected (Bus-in and Bus-out), the two termination jumpers have to be removed (fig. 8 and 9).
If only one cable is connected (Bus-in), both termination jumpers have to be set (fig. 8 and 9).

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

7.5 Wiring Diagram

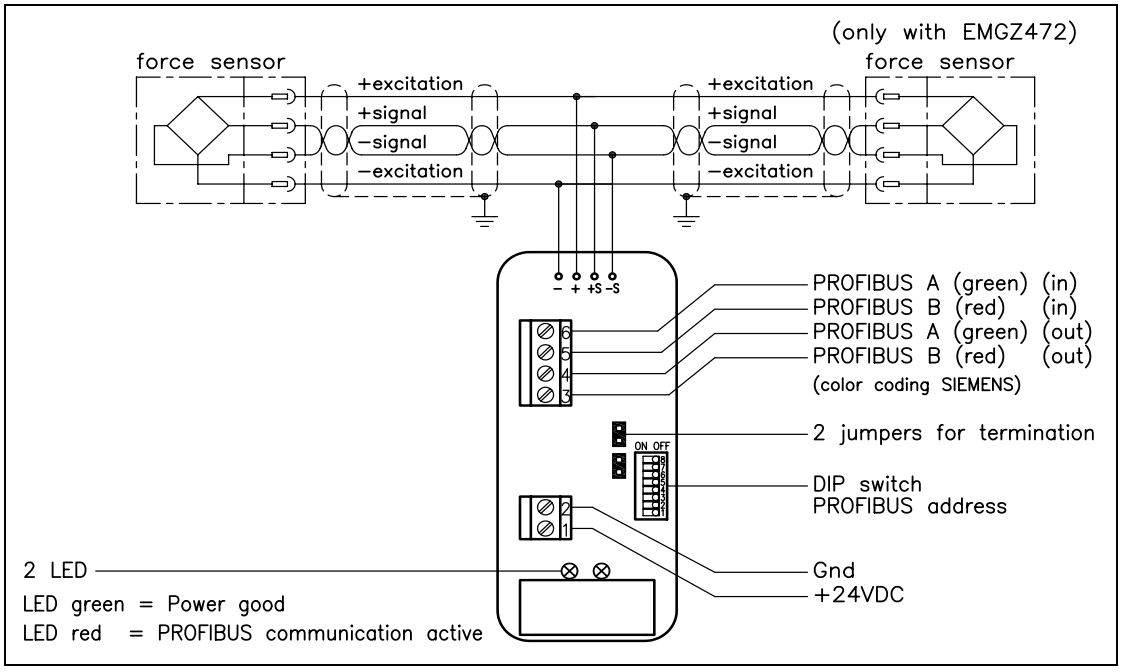

fig. 8: Wiring diagram EMGZ470A.W/472A.W E470006e

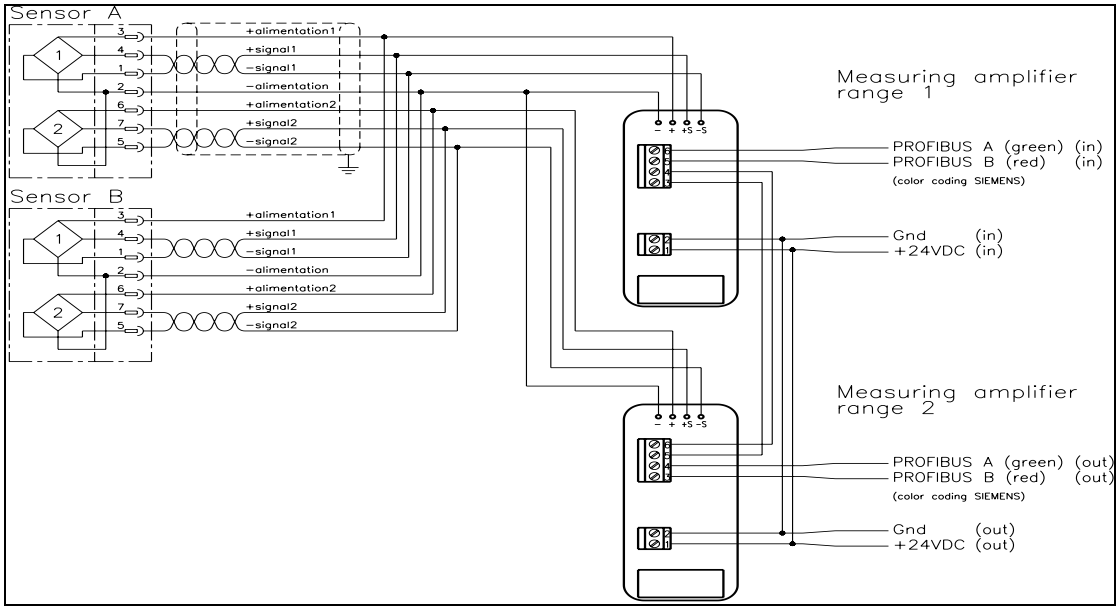

fig. 9: Wiring diagram EMGZ470A.W.D/472A.D E472002e

7.6 Setting the PROFIBUS Address

The measuring amplifier requires a unique PROFIBUS address which distinguish the device definitely in the whole PROFIBUS network. No other PROFIBUS device in the same network may use the same address. The address has to be between 0...125.

The PROFIBUS address is set with the DIP switch (fig. 9). Please refer to the table below for the setting. After switching the measuring amplifier off and on, the new address becomes valid.

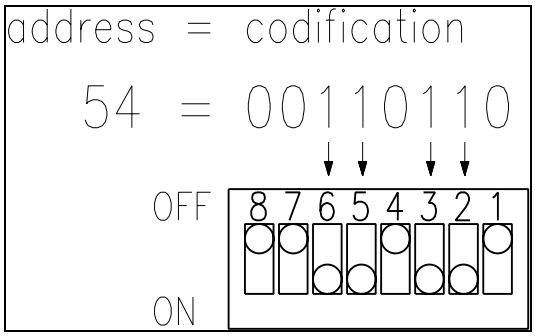

fig. 10: Codification of the PROFIBUS address (Example with address 54)

E470007e

Adr	DIP switch
0	0000 0000
1	0000 0001
2	0000 0010
3	0000 0011
4	0000 0100
5	0000 0101
6	0000 0110
7	0000 0111
8	0000 1000
9	0000 1001
10	0000 1010
11	0000 1011
12	0000 1100
13	0000 1101
14	0000 1110
15	0000 1111
16	0001 0000
17	0001 0001
18	0001 0010
19	0001 0011
20	0001 0100
21	0001 0101
22	0001 0110
23	0001 0111
24	0001 1000

Adr	DIP switch
25	0001 1001
26	0001 1010
27	0001 1011
28	0001 1100
29	0001 1101
30	0001 1110
31	0001 1111
32	0010 0000
33	0010 0001
34	0010 0010
35	0010 0011
36	0010 0100
37	0010 0101
38	0010 0110
39	0010 0111
40	0010 1000
41	0010 1001
42	0010 1010
43	0010 1011
44	0010 1100
45	0010 1101
46	0010 1110
47	0010 1111
48	0011 0000
49	0011 0001

Adr	DIP switch
50	0011 0010
51	0011 0011
52	0011 0100
53	0011 0101
54	0011 0110
55	0011 0111
56	0011 1000
57	0011 1001
58	0011 1010
59	0011 1011
60	0011 1100
61	0011 1101
62	0011 1110
63	0011 1111
64	0100 0000
65	0100 0001
66	0100 0010
67	0100 0011
68	0100 0100
69	0100 0101
70	0100 0110
71	0100 0111
72	0100 1000
73	0100 1001
74	0100 1010

Adr	DIP switch
75	0100 1011
76	0100 1100
77	0100 1101
78	0100 1110
79	0100 1111
80	0101 0000
81	0101 0001
82	0101 0010
83	0101 0011
84	0101 0100
85	0101 0101
86	0101 0110
87	0101 0111
88	0101 1000
89	0101 1001
90	0101 1010
91	0101 1011
92	0101 1100
93	0101 1101
94	0101 1110
95	0101 1111
96	0110 0000
97	0110 0001
98	0110 0010
99	0110 0011

Adr	DIP switch
100	0110 0100
101	0110 0101
102	0110 0110
103	0110 0111
104	0110 1000
105	0110 1001
106	0110 1010
107	0110 1011
108	0110 1100
109	0110 1101
110	0110 1110
111	0110 1111
112	0111 0000
113	0111 0001
114	0111 0010
115	0111 0011
116	0111 0100
117	0111 0101
118	0111 0110
119	0111 0111
120	0111 1000
121	0111 1001
122	0111 1010
123	0111 1011
124	0111 1100
125	0111 1101

8 PROFIBUS Interface Description

8.1 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 EMGZ470A.W / 472A.W measuring amplifier can be taken from the following internet address:

http://www.fms-technology.com/gsd

The GSD file can also be supplied on a **CD-ROM** on request. In this case please contact FMS customer service.

Read the GSD file into the PROFIBUS DP master

How to read in the GSD file into the control system (DP master) depends 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 set-up problems may occur. Version numbers of firmware and GSD file are indicated on the cover page of this operating manual.

8.2 EMGZ470A.W/472A.W DP Slave Functional Description

The measuring amplifier EMGZ470A.W/472A supports 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.

8.3 Initial Parameters

Initialisation parameters are sent from the control system to the measuring amplifier when the initialisation process is started. Normally this parameter set has been pre-programmed with fixed values for a given machine.

The first bytes in the parameter telegram are specified in the EN 50170 standard. An user segment of 6 bytes is defined for the measuring amplifier.

Byte	Use	Value	Meaning
0	Initial parameter	0 1	(Remain Offset unchanged) Find Offset
1	User Gain Reference, High Byte	0 ≠ 0	(Remain Gain unchanged) Calibrate Gain: Tell the measuring amplifier the force value which corresponds to the actual load.
2	User Gain Reference, Low Byte		
3	Lowpass filter	0 ≠ 0	Filter OFF Filter ON (ref. to „9.5 Configuring the Lowpass Filter“)

Byte 0 (Find Offset) has priority against Byte 1 + 2 (Calibrate Gain).

8.4 Configuration

The configuration defines the amount of process data (byte and word) that is sent during the cyclic communication from the control system to the measuring amplifier and from the measuring amplifier to the control system. Normally a fixed value is set with the programming tool of the control system.
To ensure maximum flexibility, several modules (telegram structure) can be chosen. In a single measuring amplifier only one module can be set active at a time. The terminology and structure of the modules base on the profiles described in the variable speed drives section of the PROFIBUS user organization.

Module 1: Full control
3 bytes are transmitted from the control system to the measuring amplifier and vice versa in each data cycle.

	Byte 0	Byte 1	Byte 2
Request telegram (Master → Slave)	Control byte **(STB)**	Main reference value **Higher Byte**	Main reference value **Lower Byte**
Response telegram (Slave → Master)	Status Byte **Status**	Main feedback value **Higher Byte**	Main feedback value **Lower Byte**

Module 2: Feedback value with status
The control system sends periodically an empty telegram. The measuring amplifier answers with the actual feedback value and with a status byte which indicates the quality of the feedback value. This configuration can be used after offset and gain adjustment has been completed. It can only be used if no process parameters of the measuring amplifier are read or modified, or if the controller is not running the evaluation the feedback value.

	Byte 0	Byte 1	Byte 2
Request telegram (Master → Slave)	empty		
Response telegram (Slave → Master)	Status Byte **Status**	Main feedback value **Higher Byte**	Main feedback value **Lower Byte**

Module 2a: Feedback value with status
It's identical with module 2 but the length of the response telegram is 4 Byte. The higher status byte is not used and therefore contains all 0.

	Byte 0	Byte 1	Byte 2	Byte 3
Request telegram (Master → Slave)	empty			
Response telegram (Slave → Master)	00000000 **Higher Byte**	Status Byte **Lower Byte**	Main feedback value **Higher Byte**	Main feedback value **Lower Byte**

8.5 Process Data

The amount of process data specified in the configuration is transmitted periodically. It is distinguished between value, main feedback value, control byte and status byte.

Control byte (STB)
The control byte transmits the required command to the measuring amplifier. (Module 1 only)

Master → Slave

STB	HSW

Bit # 7.....0

Value	Meaning	Remarks
00h	Default	Normal operating mode
09h	Read Device Type	
21h 23h 25h	Read User Offset Write User Offset Find User Offset	 HSW = User Offset to be written Measuring value will be set to zero
29h 2Bh 2Dh	Read User Gain Write User Gain Calibrate User Gain	 HSW = User Gain to be written HSW = Force value which corresponds to the actual material tension
F9h	Read Firmware Version	

Main reference value (HSW)
The main reference value transmits the actual parameter value. (Module 1 only)

Master → Slave

STB	**HSW**

Bit # 15.....0

The main reference value is a 16 bit word (range ±32767). The high byte is transmitted before the low byte.
We recommend to set Offset and Gain such that loading the sensor at nominal force will result in a feedback value of 10000 (default). (ref. to „9. Calibrating the measuring amplifier“)

Status byte (Status)
The status byte indicates the status of the measuring amplifier.

Slave → Master

Status	HIW

Bit # 7.....0

Value	Meaning	Remarks
00h	Ok	Acquiring of measuring value ok
02h	Overflow	The allowed measuring range is exceeded
04h	Error	An error appeared during acquiring of the measuring value
06h	Overload	The sensor power source is overload
09h	Read Device Type	EMGZ470: HIW = 1 resp. EMGZ472: HIW = 2
21h	User Offset read	HIW = User Offset read
23h	User Offset written	HIW = User-Offset written
25h	User Offset found	HIW = User Offset found
29h	User Gain read	HIW = User Gain read
2Bh	User Gain written	HIW = User Gain written
2Dh	User Gain calibrated	HIW = User Gain calculated
F9h	Firmware Version	HIW = main version (high byte) + sub version (low byte)

Main actual value (HIW)
The main feedback value transmits the actual measuring value.

Slave → Master

Status	**HIW**

Bit # 15.....0

The main feedback value is a 16 bit word (range ±32767) which transmits the processed measuring value of the measuring amplifier. The high byte is transmitted before the low byte

9 Calibrating the Measuring Amplifier

To get correct measuring values, offset and gain have to be determinate when putting the device into operation. There are several methods for this task:

Method	Use with	Advantage
Simulating method calibration within the PLC	Module 1+2	No settings required for the measuring amplifier
Simulating method calibration using initial parameters	Module 1+2	Can be done without programming
Simulating method calibration using control byte	Module 1	Highest flexibility
Mathematical method	Module 1	Less accurate than simulating method

9.1 Simulating Method, Calibration within the PLC

The following instructions are referring to a setup and calibration inside the machine. The material tension will be simulated by a weight (fig. 10).
Offset and Gain calibration is done in the PLC or the master computer.

- Insert material or a rope loosely to the machine.
- The offset corresponds to the actually transmitted main feedback value (HIW):

$$offset = HIW$$

- Load material or rope with a defined weight (fig. 10)
- The gain factor is now calculated from the actually transmitted main feedback value (HIW):

$$gain = \frac{F_{Calib} \cdot 10000}{F_{Nominal} \cdot (HIW - offset)}$$

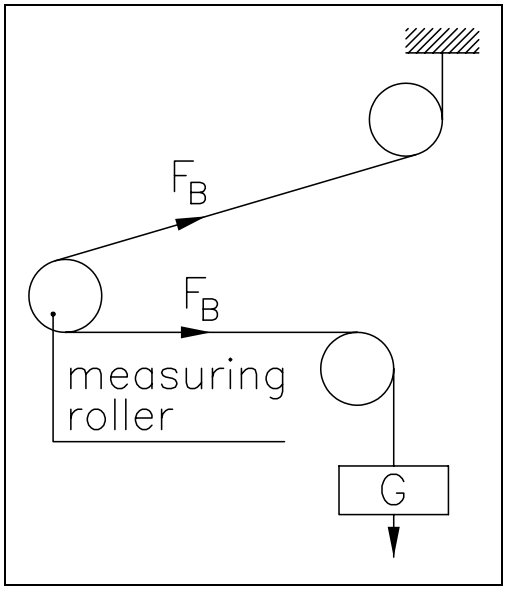

fig. 10: Calibrating the measuring amplifier C431011e

- The determined values for gain and offset are used by the control system to calculate the actual material tension in [N] from the main feedback value:

$$F_{Beff} = gain \cdot \frac{F_{Nominal}}{10000} \cdot (HIW - offset)$$

Definition of symbols:

F_{Calib}	applied calibration load [N or lbs] (refer to fig. 11)
$F_{Nominal}$	nominal force of sensor [N or lbs]
F_{Beff}	actual material tension [N or lbs]
HIW	main feedback value

9.2 Simulating Method, Calibration using Initial Parameters

The following instructions are referring to a setup and calibration inside the machine. The material tension will be simulated by a weight (fig. 10).
Offset and Gain calibration is done in the measuring amplifier using the initial parameter (ref. also to „8.3 Initial Parameter“).

- Insert material or a rope loosely to the machine.
- Set initial parameter byte 0 to „1“. The measuring amplifier calculates automatically the new offset value.
- Reset initial parameter byte 0 to „0“.
- Load material or rope with a defined weight (fig. 10)
- Set initial parameter byte 1+2 to a measuring value corresponding to the applied weight (ref. to „8.3 Initial Parameter“). The measuring amplifier calculates automatically the new gain value.
- Reset initial parameter byte 1+2 to „0“.
- Offset and Gain are now fail safe stored in the measuring amplifier.

Note

The main feedback value (HIW) must also be capable to indicate correctly overload values. Therefore the calibration must be done in a way that the HIW range (±32767) is not fully exhausted at nominal load. We recommend to set Offset and Gain so that loading the sensor at nominal force will give a feedback value of 10000.

9.3 Simulating Method, Calibration using Control Byte (Module 1 only)

The following instructions refer to a setup and calibration inside the machine. The material tension will be simulated by a weight (fig. 10).
Offset and Gain calibration is done in the measuring amplifier using the control byte and the main reference value (module 1 only; ref. also to „8.5 Process Data“).

- Insert material or a rope loosely to the machine.
- Set control byte of a request telegram to „25h“. The measuring amplifier calculates automatically the new offset value. The new offset value is transmitted in the corresponding response telegram (ref. to „8.5 Process Data“).
- Load material or rope with a defined weight (fig. 10)
- Enter control byte of a request telegram to „2Dh“ and the main reference value (HSW) to a measuring value corresponding to the applied weight (ref. to „8.3 Initial Parameter“). The measuring amplifier calculates automatically the new gain value. The new gain value is transmitted in the corresponding response telegram (ref. to „8.5 Process Data“).
- Offset and Gain are now fail safe stored in the measuring amplifier.
- If required, you can switch now to module 2 (feedback with status) (ref. to „8.4 Configuration“).

9.4 Mathematical Method (Module 1 only)

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. In addition the actual mounting conditions, which usually deviate from the ideal world, can seldom taken into account.

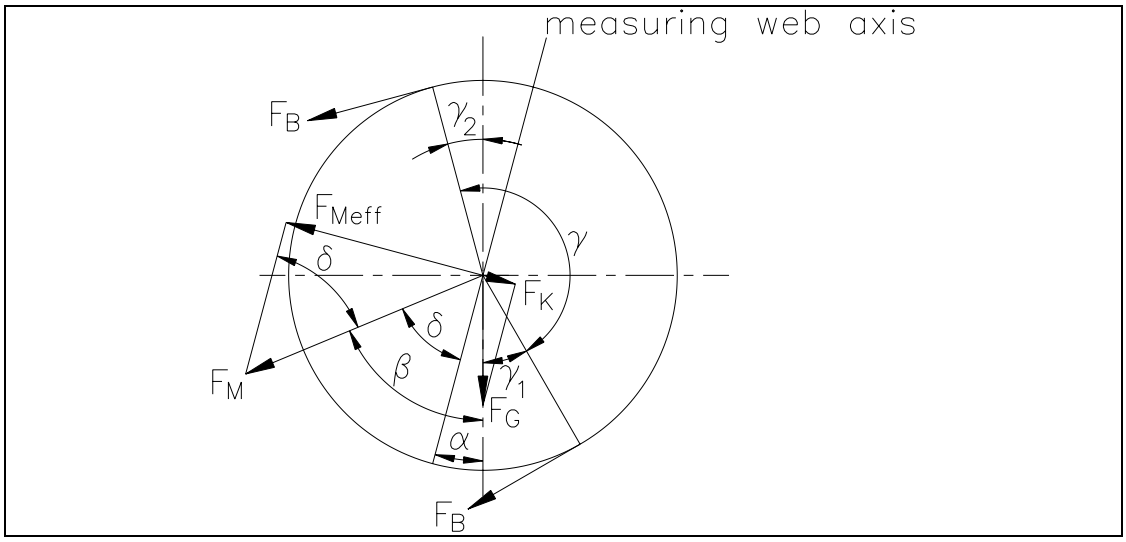

fig. 11: Force vectors in the FMS force measuring bearing C431012e

- Offset adjustment has to be done as described under „Simulating method, calibration using control byte“.
- The Gain value will be calculated by the following formula:

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

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		

- Enter control byte of a request telegram to „2Bh“ and the main reference value (HSW) to the calculated gain value (ref. to „8.5 Process Data“). The measuring amplifier stores the gain value. The new gain value is transmitted in the corresponding response telegram (ref. to „8.5 Process Data“).
- Offset and Gain are now fail safe stored in the measuring amplifier.

9.5 Configuring the Lowpass Filter

The measuring amplifier contains a lowpass filter. This filter suppresses faulty signal variations that may be caused by unbalanced rollers, vibrations of the machine, or similar instances. Signal variations that are faster than the cut-off frequency of the filter are suppressed. The lower the cut-off frequency, the more sluggish the output signal will be.
A filter of 1st or 2nd order can be used. The 2nd order filter has a better selectivity than a filter of 1st order.
The lowpass filter is configured by setting the cut-off frequency and its filter order. You determine the setting value in the table below and send it to the measuring amplifier using the initial parameters, byte 3 (ref. to „8.3 Initial parameters“).

Lowpass filter cut-off frequency	**Setting value for filter of 1st order**	**Setting value for filter of 2nd order**
(Filter OFF)	00h	00h
1 Hz	43h	C3h
2 Hz	44h	C4h
5 Hz	45h	C5h
10 Hz	46h	C6h
20 Hz	47h	C7h
50 Hz	48h	C8h
100 Hz	49h	C9h

Note

If the cut-off frequency is set too low, the output signal will become sluggish. In such a case it could happen that the feedback value is no longer suitable for control loop applications. The best trade off for the cut-off frequency must be found taking the control loop limitations.

10 Trouble Shooting

Error	Cause	Corrective action
Status Byte (Status) 02h = OVERFLOW: The sensor gives a signal too big (> ±9.92mV)	Force sensor wrong connected / cabling defect	Correct sensor cabling
	Force sensor defect	Replace force sensor
Status Byte (Status) 04h = ERROR	A general error has appeared while measuring	– Turn machine off and back on. – If the problem persists, check wiring to the force sensor. – If the wiring is ok and the problem persists, contact FMS customer service.
Status Byte (Status) 06h = OVERLOAD: The sensor power supply is overload	Cabling defect (short cut)	Correct sensor cabling, replace cable if necessary
	Force sensor defect	Replace force sensor
	EMGZ470A.W: More than 1 force sensor connected	There can be only 1 force sensor connected to the EMGZ470A.W
Feedback value is > 0 even though material is loosely	Offset badly calculated	Proceed for offset adjustment again (refer to „8.6 Calibrating the measuring amplifier“)
Feedback value doesn’t correspond with the effective material tension	Gain badly calculated	Proceed for measuring amplifier calibration again (refer to „8.6 Calibrating the…)
Measuring amplifier does not respond by PROFIBUS (red LED lights)	DIP switch and station address (setting in the PROFIBUS DP master) don’t match	Verify / correct DIP switch and station address
	Application in PLC / master computer reads from a wrong I/O address of the PROFIBUS DP master	Detect correct I/O address of the PROFIBUS DP master and set it in your application
	Program error; the answer given by the measuring amplifier is badly evaluated	Correct program of the control system
Measuring amplifier does not respond by PROFIBUS (red LED doesn’t light)	Wrong address set	Set slave address to correct value (refer to „7.6 Setting the PROFIBUS address“) or modify the program
	PROFIBUS data cable badly terminated	Terminate data cable correctly; check position of the jumpers (refer to „7.4 Wiring of power supply and …)
	PROFIBUS wires (A and B) reversed	Reverse PROFIBUS wires (A and B) in the terminal block
	Power supply not correct	Check / correct power supply. The green LED must light (fig. 6)
	Electronic unit defect	Contact FMS customer service

11 Technical Data EMGZ470A.W/472A.W

Connection of force sensors	EMGZ 470A.W: 1 force sensor of 350Ω EMGZ 472A.W: 2 force sensors of 350Ω EMGZ 470A.W.D: 1 force sensor of 2x350Ω EMGZ 472A.W.D: 2 force sensors of 2x350Ω
Excitation of sensors	4VDC
Input signal voltage	0...7.2mV (max. 9.92mV)
Resolution A/D converter	±2048 Digit (12 Bit)
Measuring error	<0.05% FS
Cycle time	2ms
Operation	entirely by PROFIBUS
Feedback value	integer ±10000
Limit value monitoring	to be developed – ask FMS customer service
PROFIBUS protocol	PROFIBUS DP slave according to EN 50170
PROFIBUS data transfer rate	up to 12Mbaud
PROFIBUS address	set by DIP switch (0...125)
PROFIBUS operating modes	Full control, Feedback with status
Connection (Bus in, Bus out, Power)	3 cables ø8...10mm [.3“... .4“] led through PG glands to 6 screw terminals
Required cables	PROFIBUS cable type A, STP 2x0.34^2 [AWG 22]
Power supply	18...36VDC / 0.1A
Temperature range	–10...60°C [14...140°F]
Protection class	IP67

FMS Force Measuring Systems AG
Aspstrasse 6
8154 Oberglatt (Switzerland)
Tel. +41 44 852 80 80
Fax +41 44 850 60 06
info@fms-technology.com
www.fms-technology.com

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

FMS USA, Inc.
2155 Stonington Ave. 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. +44 1386 871023
Fax +44 1386 871021
fmsuk@fms-technology.com