

## Telemetry System for Wire Tension Measurements in Cage and Tubular Type Stranders



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

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## **1** Content

1	CONTENT				
2	SAFETY INFORMATION	4			
	<ul> <li>2.1 Presentation of Safety Information</li></ul>	4 4 4 4			
3	PRODUCT INFORMATION	6			
	<ul> <li>Functional Description</li></ul>	6 6 7 8			
4	INSTALLATION AND ELECTRICAL CONNECTIONS	9			
	<ul> <li>4.1 Installation of Force Sensor for Core</li></ul>	9 11 12 12 12 13 14 15			
5	OPERATION AND DISPLAY	17			
	<ul> <li>5.1 Offset Compensation of the Force Sensors</li></ul>	18 19 20			
6	CONFIGURATION	21			
	<ul> <li>6.1 Quick Start</li> <li>6.2 System Parameters</li> <li>6.3 System Parameter Overview</li> </ul>	21 22 24			
7	PLC COMMUNICATIONS	26			
	<ul> <li>7.1 EMGZ482R.Modbus/TCP</li> <li>7.2 Reading data with a PLC that uses the Modbus RTU interface</li> <li>7.2.1 System Test Layout</li> <li>7.2.2 Force calculation</li> <li>7.3 System Setup</li> </ul>	26 27 27 28 28			
8	GATEWAY	30			
	<ul> <li>8.1 Electrical Connection</li> <li>8.2 Summary of Gateway Installation and Start-up</li> <li>8.3 RTM X42 Gateway Technical Data</li> <li>8.4 Data Exchange between RTM and PLC</li> <li>8.5 ANYBUS Gateway AB9001 Register</li> </ul>	30 31 31 31 38			
9	MAINTENANCE	41			
10	DIMENSIONS	42			
11	ERROR CAUSES AND TROUBLESHOOTING	43			
12	TECHNICAL DATA	44			
	12.1 EMGZ482T.Modbus Transmitter Module	44			



12.2	EMGZ482R.Modbus Receiver Module	44
12.3	EMGZ484T.Modbus Channel Extension Module	45
12.4	Certifications	45
12.5	Lloyd's Register Type Approval	46



## **2** Safety Information

All safety information, operating and installation regulations listed here ensure proper function of the device. Safe operation of the system requires compliance at all times. Noncompliance with the safety information or using the device outside of the specified performance data can endanger the safety and health of persons.

Work with respect to operation, maintenance, retrofit, repair, or setting the device described here must only be performed by expert personnel.

### 2.1 Presentation of Safety Information

2.1.1 Danger that Could Result in Minor or Moderate Injuries



Danger, warning, caution Type of danger and its source Possible consequences of nonobservance Measure for danger prevention

### 2.1.2 Note Regarding Proper Function



Note Note regarding proper operation Simplification of operation Ensuring function

## 2.2 General Safety Information



Flying parts

If the battery is not secured correctly, it can be ejected in the case of rotating machines.

Secure the battery using the knurled screws



Changes or modification to this device that have not been expressly approved by FMS AG, will result in the FCC approval for operation of this device being voided.



This device complies with the FCC Rules Part 15 as well as the RSS standards issued in Canada not requiring approval. Operation is

subject to the following two conditions:

- The device may not cause any harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation of the device

#### Information about radio frequency radiation



This device complies with the FCC limit values for an uncontrolled environment. This device should be installed and operated such that a minimum distance of 20 cm is maintained between radiation source and your body. This transmitter must not be operated near or in connection with another antenna or transmitter



The function of this system is only ensured with the components in the specified layout to one another. Otherwise, severe malfunctions may occur. Thus, the installation information on the following pages must be followed.



The local installation regulations ensure the safety of electrical systems. They are not considered in these operating instructions. However, they must be met.



Poor grounding can result in electric shocks for persons, malfunctions of the overall system or damage to the control electronics! Proper grounding must always be ensured.



It is of utmost importance to compensate for the centrifugal forces generated through the rotation of the strander. Non-compensated force-measuring rollers lead to faulty measurements.

![](_page_4_Picture_16.jpeg)

Electrical connections must be implemented by an expert.

![](_page_4_Picture_18.jpeg)

All system components are sensitive components that can be damaged in the case of improper installation! Installation must be performed by trained service personnel!

![](_page_5_Picture_1.jpeg)

## **3 Product Information**

### **3.1** Functional Description

The telemetry system RTM X42 uses force sensors for measuring the wire tension of strands and wires. It radio-transmits the measured values from the rotating to the static part of the machine. The telemetry system RTM X42 with its components is an integrated system. The individual components are optimally aligned to one another. Thanks to its modular and space-saving design, it can be ideally used in confined conditions of tubular type stranding machines, and cage type stranders with up to 42 spools. The machine efficiency is increased as well as the production yield during wire and cable production.

### 3.2 System Extensions to the RTM X42 Measuring System

RTM X42.CC Control Center – Master controller with pre-installed RTM Monitoring & Control Software

- Clear presentation of measured values
- Storage, printing of measured data, quality documentation for your customers
- Integrated solution with user-friendly interface
- Storage of recipes, fast setup/conversion to other products
- Wide database for analysis, sound statements regarding system performance as basis for process improvements

RTM X42.BC Brake control – Brake actuators on every spool carrier

- Integrated solution, fully automated control of the pull-off force
- For belt and rope type friction brakes, continuous production with highest quality
- Simple design, maintenance-free, robust, easy to retrofit, highest reliability
- Proven battery technology, ease of operation, long lifetime, highest efficiency

![](_page_6_Picture_1.jpeg)

## 3.3 Main Components

![](_page_6_Picture_3.jpeg)

Figure 1: RTM X42 main components

Main component designations				
ltem	Description			
1a to 1f	Telemetry system RTM X42			
<b>1</b> a	Force sensor(s), according to your specifications			
1b	Channel extension module(s)			
1c	Transmitter module			
1d	Receiver module			
1e	Force sensor (for core)			
1f	Dig. input for production length			
not shown	Battery for transmitter module and charger for battery			
not shown	Connection cable from force sensors to transmitter module resp. extension modules			
not shown	Patch cable for gateway or PLC connection			
not shown	Measuring amplifier for core			

 Table 1: Main Components

![](_page_7_Picture_1.jpeg)

## 3.4 Scope of Supply

#### Scope of supply:

Force sensors, model and size according to specification; transmitter module(s) with battery/ies and charger, channel extension module(s); receiver module(s); pre-fabricated connection cables, force sensor to channel extension module and/or to receiver module; pre-fabricated connection cables of the channel extension modules to transmitter module; RTM X42 system installation manual and operating instructions

#### **Options:**

Transmitter module with 24VDC power supply instead of battery

#### The following is not included in the scope of supply:

Pulleys, installation material; 24VDC power supply for receiver module, cable for power supply

#### Accessories:

Gateway; switch; patch cable for the connection of receiver module and gateway resp. PLC

![](_page_8_Picture_1.jpeg)

## **4** Installation and Electrical Connections

## 4.1 Installation of Force Sensor for Core

![](_page_8_Picture_4.jpeg)

Core measurement in static part of machine

The following information describes the installation of the core sensor when installed outside the rotating part of the machine

The red point should be aligned in the direction of the resulting force. Further installation information can be found in the installation manual of the force sensor.

![](_page_8_Figure_8.jpeg)

Figure 2: Force sensor alignment in static area

### 4.2 Installation of the Force Sensor in the Rotating Part of the Machine

In rotating applications, the force sensors are installed such that the centrifugal forces are compensated.

![](_page_8_Picture_12.jpeg)

#### Note

It is of utmost importance to compensate for the centrifugal forces generated through the rotation of the strander. Non-compensated force-measuring rollers lead to faulty measurements,

In the case of FMS force sensors of the RMGZ series, this is achieved by aligning the force sensor such that the measuring direction is exactly parallel to the axis of rotation of the strander. The red point of the force sensor points in the direction of the positive force component.

Correct alignment of the red point can be tested after offset compensation and calibration. If the display of an unloaded force sensor is always 0 N in all positions (e.g., in 12 o'clock or 6 o'clock position), the force measuring roller is aligned correctly.

![](_page_9_Picture_1.jpeg)

![](_page_9_Figure_2.jpeg)

Figure 3: Force sensor alignment, here RMGZ200

Parallel alignment

![](_page_9_Picture_5.jpeg)

The exact, parallel alignment of the measuring direction to the axis of rotation of the machine is decisive for achieving precise measured data.

Otherwise, measured value fluctuations occur during machine operation due to the high sensitivity of the FMS force sensors. These interfere with the assessment of the product quality later.

Due to irregularities in the installation surfaces, the alignment may have to be readjusted very precisely. Some FMS force sensors feature an integrated mechanism facilitating this fine adjustment. For force sensors without such features, we recommend the use of shims or thin metal strips.

# 4.3 Installation of the Electronics Components in the Rotating Part of the Machine

The transmitter module and the channel extension modules should be mounted as closely as possible to the axis of rotation of the strander. This reduces the influencing centrifugal forces.

During installation of the transmitter module, make sure that the centrifugal forces do not act in the direction of the fastening screws of the battery.

Make also sure that the transmission path to the receiver module is free from obstacles.

![](_page_10_Figure_6.jpeg)

Mount the receiver as high as possible.

Abbildung 4: Installation

![](_page_11_Picture_1.jpeg)

## **4.4 Electrical Connection**

### 4.4.1 EMGZ482T.Modbus Receiver Module (with battery)

The connection cables are pre-fabricated with respective connectors.

![](_page_11_Picture_5.jpeg)

#### Re-tighten connector periodically

Due to vibration on the machine, the connector can become loose. Re-tighten them regularly to avoid communication errors and malfunctions.

![](_page_11_Figure_8.jpeg)

Figure 5: EMGZ482T.Modbus electrical connection

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# 4.4.1 EMGZ482T.Modbus.24VDC Receiver Module (version without battery, with 24VDC power supply via slip rings on the strander)

The connections between the force measuring rollers and transmitter are realized using a 2x2x0.25 mm2 [AWG 23] cable with 2 shielded, twisted pairs of strands.

The cables have connectors on both sides to facilitate installation.

![](_page_12_Figure_5.jpeg)

Figure 6: EMGZ482T.Modbus.24VDC electrical connection

![](_page_12_Picture_7.jpeg)

Electrical noise and fluctuating voltage

Protect the power lines from electrical noise and ensure that all components are supplied with adequate, stable 24 (18 to 24) VDC to avoid communication errors and malfunctions.

![](_page_13_Picture_1.jpeg)

## 4.5 EMGZ484T.Modbus Channel Extension Module

					500 <sup>S3</sup>	
Pin	Bus & Power IN 5-p (m)	Bus & Power OUT 5 - p (m)	Force sen. 1 5-p (f)	Force sen. 2 5-p (f)	Force sen. 3 5-p (f)	Force sen. 4 5-p (f)
1	DC+ 5.0 V	DC+ 5.0 V	+3.0 VDC	+3.0 VDC	+3.0 VDC	+3.0 VDC
2	DC- GND	DC - GND	+ Signal	+ Signal	+ Signal	+ Signal
3	RS485 A	RS485 A	- Signal	- Signal	- Signal	- Signal
4	RS485 B	RS485 B	GND	GND	GND	GND
5	RS485 GND	RS485 GND	Shield	Shield	Shield	Shield

Figure 7: EMGZ484T.Modbus electrical connection

![](_page_13_Picture_5.jpeg)

**Bus Termination Plug** 

All Bus & Power Socket have to be connected. Otherwise errors in communcaiton may occure.

Always insert the included bus termination plug to last channel extension module in the row (out).

![](_page_14_Picture_1.jpeg)

Indication	Indication LEDs				
LED	Description				
POWER Lights up green: Voltage supply is present					
	Not lit: power supply interruption for > 60 ms				
	Flashing green: regular power supply interruptions				
BUS	Lights up green: communication OK.				
	Not lit: communication interrupted for > 3 sec.				
	Flashing green: regular interruption of supply voltage (5 VDC from EMGZ482T) - all EMGZ484T flash synchronously				

Table 2: LEDs on EMGZ484T

### 4.5.1 EMGZ482R.Modbus Receiver Module

![](_page_14_Figure_5.jpeg)

Figure 8: EMGZ482R.Modbus electrical connection

![](_page_15_Picture_1.jpeg)

EMGZ482R.Modbus pin assignment						
Pin(s)	Description	Description				
1	24 VDC+					
2	24 VDC-					
3	PE					
10, 11	24 VDC output					
12	GND for 24 VDC					
13	Digital input for pro	Digital input for production length				
14	Analog input for fo	rce sensor core				
16, 26	Relay 1/1 - 1/2	Configurable relay outputs 1 to 4:				
17, 27	Relay 2/1 - 2/2	Tension value limits channel 1, 2; tension value				
18, 28	Relay 3/1 - 3/2	alarm, radio connection, battery state of charge,				
19, 29	Relay $4/1 - 4/2$ core tension value					

#### Table 3: EMGZ482R.Modbus pin assignment

The RTM X42 system has pre-configured relay outputs. The respective alarm output is activated if the assigned function condition occurs.

![](_page_15_Picture_5.jpeg)

#### Electrical noise and fluctuating voltage

Protect the power lines from electrical noise and ensure that all components are supplied with adequate, stable 24 (18 to 24) VDC to avoid communication errors and malfunctions.

![](_page_16_Picture_1.jpeg)

## **5 Operation and Display**

The EMGZ482R.Modbus receiver module features buttons and a display for the configuration.

The >0< and Cal buttons have no function.

System parameters can be adjusted via the operating panel

![](_page_16_Picture_6.jpeg)

Figure 9: Receiver module operation and display

Operation	Operation and Display				
ltem	Description				
1	LED				
2	Main operating panel with navigation buttons and confirmation button				
3	"PARA" button for access to the configuration				
4	Battery indicator in the EMGZ482T.Modbus transmitter module 5 bars – 100% charged 4 bars – 80% charged 3 bars – 60% charged 2 bars – 40% charged 1 bar – 20% charged, battery replacement recommended				
5	Visual indicator of the quality of the radio connection Full indicator – 100 % No indicator – 0 %				
6	Without function				

Table 4: Receiver module operation and display

![](_page_17_Picture_1.jpeg)

## **5.1 Offset Compensation of the Force Sensors**

Offset compensation is used to compensate for the weight of the pulley on the force sensor. The measuring system is practically "zeroed."

**Observe the following:** 

- The force sensor may only be loaded with the pulley (do not place a wire)
- Turn the lay-plate until the force sensor, for which the offset compensation is performed, is vertically over the axis of rotation (12 o'clock position)
- The force indicate due to the weight of the lay plate must be compensated in the PLC so that the outputted value is "0."

![](_page_17_Figure_8.jpeg)

Figure 10: Lay-plate alignment

For the offset compensation of the force sensor for the core observe the operating manual of the measuring amplifier connected to this force sensor.

## 5.2 Force Sensor Calibration

Calibration is used for matching the measuring amplifier with the force sensor. The socalled gain factor is determined. After calibration, the displayed force corresponds to the force effectively affecting the material. Two calibration methods are possible; one computational method and calibration with a defined weight force. The defined weightbased calibration method is simple and delivers more accurate results as it replicates the material profile and considers the actual circumstances in the machine.

![](_page_18_Figure_4.jpeg)

Figure 11: Application of a defined weight force to the force sensor

To adjust the gain, load the measuring roller with a cable with a defined weight attached to its end. The cable must correspond to the real material course in the machine (wrap angle, distances between the rollers, etc.). The displayed/determined digit value must now be assigned in the PLC to the weight force corresponding to the calibration weight.

For the calibration of the force sensor for the core observe the operating manual of the measuring amplifier connected to this force sensor.

![](_page_19_Picture_1.jpeg)

## 5.3 Charger

![](_page_19_Picture_3.jpeg)

Figure 12: Charger with battery

- Connect battery to charger
- The state of charge LED lights up red if the battery is discharged
- The safety circuit protects the batteries from overcharging.
- Charging is finished as soon as the battery pack reached its maximum charge capacity. The charging process takes 3-4 hours.
- The state of charge LED lights up green if the battery is charged
- The battery must be connected in the battery compartment of the EMGZ482T prior to start-up.
- If a battery is not needed for the moment, it may remain in the charger

![](_page_19_Picture_12.jpeg)

Flying parts

If the battery is not secured correctly, it can be ejected in the case of rotating machines.

Secure the battery using the knurled screws. Tighten the knurled screws sufficiently.

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## 6 Configuration

### 6.1 Quick Start

- Insert the battery into the EMGZ482T.Modbus transmitter module and secure with both knurled screws. The screws must be tightened sufficiently otherwise, the centrifugal forces caused by cage rotation could eject the battery.
  - Connect the 24VDC power supply of the machine if a version without battery is used
- Connect the EMGZ482R.Modbus receiver module and the gateway using a patch cable.
- Connect the gateway to the power supply (24 VDC)
- Connect the EMGZ482R.Modbus receiver module to the power supply (24 VDC)
- Switch on the power supply for both devices
- The radio connection of the RTM X42 system is established automatically. This can take approx. 5 to 10 seconds.
- After system start and establishment of the radio connection, the display in the receiver module, e.g., shows "Modbus V3.15". This describes the currently loaded firmware.
- The RTM X42 system is now ready and can be configured.

![](_page_21_Picture_1.jpeg)

## 6.2 System Parameters

## The system parameter group contains the general parameters that control the operation of the RTM X42 system, but do not influence the actual measurement.

![](_page_21_Figure_4.jpeg)

Figure 13: System parameter 1

![](_page_22_Figure_0.jpeg)

![](_page_22_Figure_1.jpeg)

Figure 14: System parameter 2

FMS

![](_page_23_Picture_1.jpeg)

## 6.3 System Parameter Overview

System Par	ameters
Parameter	Description
Language	Language on the display of the operating panel
	Unit [-]
	Values German, English, Russian
	Default English
Inv.Sign	Inverts the signal of all force sensors
	Unit [-]
	Values Yes, No
	Default No
RTMX42	Modbus
	- Relay functions specified
	<ul> <li>R1: Radio connection OK</li> <li>R2: Radio connection lost</li> </ul>
	- R3: Battery OK
	- R4: Battery state of charge low
	ModbusPC
	- Selection when using RTM X42.CC Control Center
	- The operating panel is blocked, buttons are disabled
	Values Modbus, ModbusPC
	Default Modbus
FiltMode	Off:
	- Deactivated
	N-Linear:
	- Non-linear filter of second order
	Low pass
	- Filter of first order
	Unit [-]
	Values Off; N-Linear; Low pass
	Default Off

![](_page_24_Picture_1.jpeg)

System Par	System Parameters					
Parameter	Descriptio	Description				
Filt_Out	Frequenc	Frequency for N-Linear and Low pass filter				
	Unit Hz	Unit Hz				
	Min	0.1				
	Max	100				
	Default	10				
LANSpeed	Data rate	of LAN connection				
	Unit BPS					
	Min	10				
	Max	100				
	Default	100				
IP Addr.	IP addres is entered	s (static) of the EMGZ482R.Modbus receiver module. Address I in 4 blocks.				
	Unit [-]					
	Min	0				
	Max	255				
	Default	192.168.000.090				
Subnet	Address o	f subnet mask. Is entered in 4 blocks				
	Unit [-]					
	Min	0				
	Max	255				
	Default	255.255.255.0				
Gateway	eway Gateway IP address (static). Is entered in 4 blocks					
	Unit [-]					
	Min O					
	Max 255					
	Default	192.168.000.100				

 Table 5: System Parameter Overview

![](_page_25_Picture_1.jpeg)

## **7 PLC communications**

## 7.1 EMGZ482R.Modbus/TCP

The EMGZ482R.Modbus/TCP receiver is the central unit that gets the actual values from the EMGZ482T transmitter. These values can be accessed via the Modbus/TCP interface.

The RTM X42 Control Center (if this extension module is part of the system) has implemented the Modbus/TCP protocol and can access the data directly.

A PLC can access the actual values over the same interface. But as PLCs usually have not implemented the Modbus/TCP protocol, a Gateway is needed to translate the protocol to the one that the PLC uses. That could be PROFINET, Profibus, EtherNet/IP, or Modbus RTU, just to mention a few.

The following picture shows a typical data flow of the actual values.

![](_page_25_Figure_8.jpeg)

Figure 15: typical data flow

![](_page_26_Picture_2.jpeg)

As the above picture shows, the data path for the actual values split up into two paths. One to the RTM X42.CC Control Center and one to the PLC. Each of those devices reads the actual values independently from each other. Therefore, both of them must do their own calculation of the force. The PLC cannot retrieve the determined offset and gain values from the RTM X42.CC Control Center.

## 7.2 Reading data with a PLC that uses the Modbus RTU interface

### 7.2.1 System Test Layout

The following is an example of how the actual data can be read from a PLC by using a Modbus RTU Gateway. The test environment uses a USB to RS485 Converter and PC as a replacement for a PLC. With this configuration a simulation of the mainly available PLCs is provided to ensure proper functionality of the communication via the Gateway.

![](_page_26_Figure_7.jpeg)

Figure 16: data flow in test environment

![](_page_27_Picture_1.jpeg)

7.2.2 Force calculation Assumptions: Nominal force F<sub>Nom</sub>: 20 N Offset: 90 Gain: 17.2

Force = (Actual Raw Value – Offset) \* Gain  $*\frac{\text{Nominal Force}}{\text{Digits @ Nominal Force}}$ 

 $\mathbf{150.4} \ \mathbf{N} = (2669 - 90) * 17.2 * \frac{20 \text{ N}}{5898}$ 

### 7.3 System Setup

- Check or configure the IP-address of the EMGZ482R. The default IP-address is 192.168.0.90. Usually you don't have to change this address unless other devices have the same IP on the network.
- Check or configure the Anybus X-gateway Art# AB9005B. Usually, you don't have to do anything here because FMS has configured it already before delivery. The Gateway communicates with the EMGZ482R via IP192.168.0.90. If you want to change the configuration, enter the IP192.168.0.80 in a web browser. That opens the web interface of the Gateway.
- Connect all devices as shown in the picture above Except for the test environment which in only used for testing.
- Set up the communication characteristics for the RS485 port on the PLC as follows. Baud Rate: 19200 Parity: Even Stop bits: 1

🛞 Anybus'	Ar	nybus X-gatew	ay Modbus	-TCP - Modb	us-RTU			
OVERVIEW Home	Modbus-RTU configuration (Network 1). Configure the Network 1 side of the X-gateway. Enabling or disabling the mapping of the control/status word or the live list affects the process data size.							
CONFIGURATION								
Authentication	Global configuratio	an limite						
Modbus Client	Transactions: 1/64	VO mapped input data: 100/2	56 bytes VO mapped	output data: 0/256 bytes	VO mapped inpu	t bits: 0/1024 VO		
Modbus Servers	mapped output bits: 0	0/1024   Input data: 100/256 b	ytes   Output data: 0/2	256 bytes				
Modbus-RTU		Setting	]	Configure	d			
TOOLS		Device address		1				
X-gateway		Communication settings		19200e1	$\sim$			
Management		Mode		RTU (8 bits)	$\sim$			
Backup & Restore		Timeout		0				
Mapping Overview		When Modbus-TCP (Netwo	rk 2) error	Freeze data to master	$\sim$			
Transaction		VO mapped control/status v	word	Disabled	$\sim$			
Monitor		VO mapped live list		Disabled	$\sim$			
		Reserved bytes, read bit tra	ansactions	0				
		Reserved bytes, write bit to	ransactions	0				
			Cancel Save	e settings				
© 2011 HMS Industrial Networks - All rights reserved Support Connecting Devices <sup>TM</sup>								

Figure 17: web interface of Gateway

- Reading the data via Modbus protocol by using the function Read Input Register (0x04). The data array has an element size of 50 and the datatype for the actual values is a signed 16-bit value. The description of the other elements is documented in the next chapter ANYBUS Gateway AB9001 Register. See p. 38 ff.

![](_page_29_Picture_1.jpeg)

## 8 Gateway

A gateway from Anybus is available as accessory item from FMS. In the following, the configuration of a Modbus TCP - Profibus DP gateway is explained as example.

### 8.1 Electrical Connection

![](_page_29_Figure_5.jpeg)

![](_page_29_Figure_6.jpeg)

Pin no 1

Modbus-TCP Connector:

(Front)

Bottom View

Description

![](_page_29_Figure_8.jpeg)

Figure 18: Gateway electrical connection

![](_page_30_Picture_1.jpeg)

## 8.2 Summary of Gateway Installation and Start-up

- Mount gateway on DIN rail
- Connect gateway to Profibus network
- Connect MODBUS TCP network to Profibus network
- Switch on the excitation voltage (24VDC)
- Download the ANYBUS IPconfig tool on the PC.

https://www.anybus.com/products/gateway-index/ethernet-fieldbus-to-control-system

Here you must select the correct gateway and click on READ MORE. On the following page, click on SUPPORT PAGES, which leads to a list of possible downloads.

- Connect PC using a MODBUS batch cable module via the RJ-45 connector
- Use ANYBUS IPconfig tool to identify the IP address of the module in the network (use MODBUS-TCP address, visible at the bottom in the module)
- Input IP address in the web browser and connect with the web interface of the gateway.
- Configure module using the "web configuration" pages.
- Integrate Gateway GSD file in the Profibus configuration tool (download GSD file from upper link)
- Configure and start the Profibus network.

### 8.3 RTM X42 Gateway Technical Data

Gateway Technical Data			
Property	Description		
Power supply	24VDC (-15% to 20%)		
Current consumption	Max 300mA @ 24V; typical 150mA @ 24V		
Ambient temperature	Max. 70°C [158°F] @ 225mA and 24V		
Grounding (PE):	Internal connection to PE via DIN rail, if no DIN rail possible, then via power plug		

Table 6: Gateway Technical Data

### 8.4 Data Exchange between RTM and PLC

The configuration between the RTM X42 system and the gateway is configured by FMS. The system can be restored using a configuration file as needed. This file is available via the FMS Service department.

The following configuration instructions of the gateway module are only required if the application operates in a different IP address range than pre-configured by FMS.

![](_page_31_Picture_1.jpeg)

![](_page_31_Picture_2.jpeg)

Table 7: Install Anybus IPconfig from CD (provided with the gateway).

8	Anybus IPc	onfig					
Γ	Lip.	/ Lew	L cur	DUCD	Massian	Turne	MAC
	0.0.0.0	0.0.0.0	0.0.0.0	On	1.03.1	Anybus X-gateway	00-30-11-06-D6-A5
					S	ettings Scar	n Exit

Table 8: Start Anybus IPconfig program. It is possible to search for the listed gateway again using the Scan button. Double-clicking on the listed line opens the configuration window.

( Configure: 00-3	0-11-06-D6-A5	×
Ethernet configurat	tion	
Subnet mask:	255 . 255 . 255 . 0	C On
Default gateway:	192 . 168 . 0 . 1	•• 00
Primary DNS:		
Secondary DNS:		
Hostname:		
Password:		Change password
New password:		
		Set Cancel

Table 9: Set the IP accordingly and switch off DHCP.

List of IP addresses:

Gateway:	192.168.0.100	(static)
RTM X42:	192.168.0.090	(static)

![](_page_32_Picture_1.jpeg)

() Anybus'	Anybus X-	gateway Modbus-TC	P - PROFIE	BUS DP-V1	
OVERVIEW	Anybus X-gateway configurati	on and status web pages. Welcome t	o the configuration in	terface of the Anybus X	-gateway.
Home	Use the left side menu to navigate X-gateway Management page "Ne	. Changes to the configuration do not take twork 1' represents the controlling netwo	effect until the X-ga	iteway is restarted from t eway acts as a server 3	the letwork 2'
CONFIGURATION	represents the controlled network	, where the X-gateway acts as a client.	in, mining and it gas		
Authentication					_
Modbus Client	la la	entification	Dent 4:	hernet link status	
Modbus Servers	Firmware version:	1 03	Speed:		
PROFIBUS DP-V1	Serial number:	A016D429	Duplex:		
TOOLS	MAC ID:	00:30:11:06:D6:A5	Port 2:		
Y. nateway	Uptime:	0 days, 0h:0m:35s	Speed:	100 Mbps	
Management	CPU Load:	7% (auto updated every 5s)	Duplex:	Full Duplex	
Backup & Restore	Оро	ration Mode	Etho	ernet link statistics	
Manning Overview	PROFIBUS DP-V1 (Network 1):	No VO data exchanged	In pkts:	63 Errors:	0
Transaction	Modbus-TCP (Network 2):	Idle	Out pkts:	57 Errors:	0
Monitor					
	1				
	al Networks All rights recorded			Connectio	a Devices I
	st Networks - All fights reserved			Connectin	d nevices.

Figure 19: The website of the RTM X42 gateway can be accessed using a web browser and the following IP address: 192.168.0.100.

• 192.168.0.100/tool/fi	w.html ☆ ♥ ♂   🛂 ▼ Gc ₽   🏫
🛞 Anybus'	Anybus X-gateway Modbus-TCP - PROFIBUS DP-V1
OVERVIEW Home CONFIGURATION Authentication	Configuration backup and restore. The backup functionally enables the possibility to save the configuration file currently used by the X-gateways. The configuration file does not contain configuration changes not yet applied to the X-gateway if there are pending changes, restart fire, Z-gateway before making a backup. Restoring a configuration from file will replace the currently used configuration with a previously saved configuration.
Modbus Client Modbus Servers PROFIBUS DP-V1	Backup configuration to computer: A configuration file will be backed up to your local computer;
TOOLS X-gateway Management	Backup
Backup & Restore Mapping Overview Transaction Monitor	Resore comparation from compare: Choose a configuration file to restore by clicking the trowse file button, selecting the file to restore, then click on the Restore button :
	Fite Browse
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Figure 20: If a configuration file is available, it can be loaded under "Backup & Restore."

![](_page_32_Figure_6.jpeg)

Figure 21: Set the IP address, subnet mask, router IP address, and DHCP accordingly under "Modbus Client." These are the settings of the RTM X42 gateway

![](_page_33_Picture_1.jpeg)

Firefox • Anybus X-gateway	+	X
€ @ 192.168.0.100/conf/	nodelist.html 🏠 🗟 C 🖉 🚷 - Gc 🖉 🏠 🕇	•
() Anybus'	Anybus X-gateway Modbus-TCP - PROFIBUS DP-V1	
OVERVIEW Home CONFIGURATION Authentication Modbus Client	Modbus server configuration (Network 2). Add, edit or detet Modbus connections for Network 2. On each connection several transactions towards a Modbus server can be set up. Press 204 and we server button to add a new concetto, then edit to set server properties and finally cick the Transactions link to set up transactions to call Modbus functions on the server. The global limit is of transactions and a la not possible to map more process data than the X-global variable variables. Clobal configuration limits.	
Modbus Servers PROFIBUS DP-V1 TOOLS X-gateway	Alias         IP address         Port         Protocol         Transactions         III           No servers configured, click button to add a server.         Add new server         Add new server         III         IIII         IIIII         IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	
Management Backup & Restore Mapping Overview		
Transaction Monitor		
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Figure 22: The settings for the Modbus communication from the RTM X42 gateway to the RTM X42 are defined under "Modbus Servers." To do so, click on the "Add new server" field.

Firefox 🔻											X
Anybus X-gateway	+										
	'nodelist.html						_☆ ⊽ (	e 🛃	- Gc 🔎	俞	
() Anybus'	Anybu	us X-gat	eway	Modbus	-TCP - PR	OFIB	US DF	P-V1			
OVERVIEW	The X-gateway needs to X-gateway or cancel ch	be restarted for anges.	r configurat	ion changes to	take effect. Go to X-	gateway	Managem	ent page	to restart	the	
CONFIGURATION	Modbus server confi transactions towards a	guration (Netw Modbus server (	ork 2). Ad	ld, edit or delet up. Press 'Add	e Modbus connection new server' button t	s for Net add a n	work 2. On e w connecti	each conn on, then e	ection se dit it to se	veral t	
Authentication Modbus Client	is 64 transactions and it	is not possible t	o map more	process data	ansactions to call Mo than the X-gateway	dbus fun can handl	ctions on the	e server. I	ne global	limit	
Modbus Servers PROFIBUS DP-V1	Global configuration Transactions: 0/64 Inp	limits. ut process data:	0/244 byte:	s Output proce	ess data: 0/244 bytes	Total pr	ocess data:	0/368 byte	es		
TOOLS	Alias	IP address	Port	Protocol	Transactions	C dia	Delete	T			
X-gateway Management	New_Server	0.0.0.0	502	Add ne	w server	can	Delete	Trans	sactions		
Backup & Restore											
Transaction	-										
Monitor	]										
	al Networks - All rights reser	ved						Connect	ing Devic	es™	

Figure 23: A new server connection is inserted. Changes become only effective after a restart. Click on "Edit"

![](_page_33_Figure_6.jpeg)

Figure 24: Enter the alias name (RTM\_X42) and server address (192.168.0.90) and clock on OK.

![](_page_34_Picture_1.jpeg)

Firefox *	4	-								-
• 3 192.168.0.100/conf/	nodelist.html						☆▽	୯ 🛃 - ରେ 🔎	俞	E
() Anybus'	Any	bus X-gat	teway	y Modbu	s-TCP - PR	OFII	BUS DI	P-V1		
OVERVIEW	The X-gateway need X-gateway or cance	ds to be restarted fo I changes.	or configu	iration changes t	o take effect. Go to X-g	jatewa	iy Managerr	nent page to restart	the	
CONFIGURATION Authentication Modbus Client	Modbus server co transactions toward server properties ar is 64 transactions ar	onfiguration (Net) Is a Modbus server nd finally click the T nd it is not possible	work 2). can be s ransactio to map m	Add, edit or dele et up. Press 'Add ns' link to set up ore process data	te Modbus connections I new server' button to transactions to call Moo than the X-gateway c	add a i add a i Ibus fu an hani	etwork 2. On new connect nctions on th dle.	each connection se ion, then edit it to se e server. The global	veral t limit	
Modbus Servers PROFIBUS DP-V1	Global configurati Transactions: 0/64	on limits. Input process data	: 0/244 by	ytes   Output proc	ess data: 0/244 bytes	Total p	rocess data:	0/368 bytes		
TOOLS	Alias	IP address	Port	Protocol	Transactions					
X-gateway Management	RTM_X42	192.168.0.90	502	TCP Add n	0 ew server	Edit	Delete	Transactions		
Backup & Restore										
Mapping Overview										
Transaction Monitor										
© 2011 HMS Industria	I Networks - All rights n	eserved						Connecting Devic	ies™	

Figure 25: Next, click on "Transactions"

![](_page_34_Picture_4.jpeg)

Figure 26: Insert a new communication transaction using the "Add new transaction" button.

![](_page_34_Picture_6.jpeg)

Figure 27: Edit this new transaction using "Edit".

![](_page_35_Picture_1.jpeg)

bus A gatemay	+	1							
192.168.0.100/conf/r	node.html#editbox-tra	insaction			७ र 😋 🚼 - छ 🔎 🧌				
🛞 Anybus'	Anyb	us X-gate	way Modbus-TCF	P - PROFIBUS	DP-V1				
OVERVIEW	The X-gateway needs X-gateway or cancel of	he X-gateway needs to be restarted for configuration changes to take effect. Go to X-gateway Management page to restart the -gateway or cancel changes.							
Home	Transactions config	uration. Add, edit of	r delete transactions used for a c	connections on this page. (	On each connection several				
Authentication	transactions towards	a Modbus server ca The clobal limit is 64	be set up. Press 'Add transaction transaction and it is not possible.	on' button to add a new tra	nsaction, then edit it to set				
Modbus Client	a anotación proportido.	The global line is en			and are gate may can handle.				
Modbus Servers	Global configuration	limits							
PROFIBUS DP-V1	Transactions: 1/64 M	inimum allowed scar	time: 10   Input process data: 2/2	44 bytes   Output process	data: 0/244 bytes Total				
TOOLS	process data: 2/368 by	/tes							
X-gateway	Alias		IP address	Port	Protocol				
Management	# Eunct	Z	an time Timeout IIID Addre	502 Data Type Element	TCP te Denietere				
Backup & Restore	New Trans 3	BBEWLE	250 5000 255 1	uint16 1	1 Edit Delete				
Mapping Overview		Hovering mouse ove	r an element where the cursor sh	hows a question mark disp	lays help.				
Transaction Monitor		В	ack to server list Add no	ew transaction					
	-Add/edit transactio	n							
			General transaction se	ettings					
	Alias	ALL_DATA	Function code	4-Read Input Registe	rs 💌				
	Timeout (ms)	5000	Data encoding	Byte Big Endian, Wor	d Little Endian 💌				
	Scan time (ms)	10	Unit Id	255					
	Read settings								
		1	Data type	uint16					
	Starting address			60					
	Starting address Elements	50	Registers	0					

Figure 28: Enter the data respectively and confirm with OK

![](_page_35_Figure_4.jpeg)

Figure 29: Here, all wire tension data (50 registers) are retrieved with a cycle time of 10ms from the RTM X42 device and transferred to the RTM X42 gateway. The MODBUS register contains the data mapping information.

![](_page_36_Picture_1.jpeg)

![](_page_36_Picture_2.jpeg)

Figure 30: The changes must still be saved with "Apply" under "X-gateway Management."

![](_page_36_Picture_4.jpeg)

Figure 31: The RTM X42 gateway is restarted after confirming with the OK button

![](_page_37_Picture_1.jpeg)

![](_page_37_Picture_2.jpeg)

Figure 32: The configuration can be saved in a file under "Backup & Restore"

![](_page_37_Picture_4.jpeg)

Figure 33: The current data is visible under "Transaction Monitor"

### 8.5 ANYBUS Gateway AB9001 Register

The RTM X42 system provides a bit stream with the raw cable tension data of 42 channels every 10 ms. The tension values of the "Core" measuring channel are transmitted on register 47.

Notes on gateway configuration

- Read and write the MSB first: Example 0x12345678
- MODBUS offset 0: 0x1234
- MODBUS offset 1: 0x5678

![](_page_38_Picture_1.jpeg)

ANYBUS	ANYBUS Gateway AB9001 input register							
Offset	Туре	Length	Name	Description				
1	INT16	1	Channel 1	Raw date in digits (ADC value)				
2	INT16	1	Channel 2	5898 digits= nominal force				
3	INT16	1	Channel 3	= 5.4mV analog DMS input				
4	INT16	1	Channel 4					
5	INT16	1	Channel 5					
6	INT16	1	Channel 6					
7	INT16	1	Channel 7					
8	INT16	1	Channel 8					
9	INT16	1	Channel 9					
10	INT16	1	Channel 10					
11	INT16	1	Channel 11					
12	INT16	1	Channel 12					
13	INT16	1	Channel 13					
14	INT16	1	Channel 14					
15	INT16	1	Channel 15					
16	INT16	1	Channel 16					
17	INT16	1	Channel 17					
18	INT16	1	Channel 18					
19	INT16	1	Channel 19					
20	INT16	1	Channel 20					
21	INT16	1	Channel 21					
22	INT16	1	Channel 22					
23	INT16	1	Channel 23					
24	INT16	1	Channel 24					
25	INT16	1	Channel 25					
26	INT16	1	Channel 26					
27	INT16	1	Channel 27					
28	INT16	1	Channel 28					
29	INT16	1	Channel 29					
30	INT16	1	Channel 30					
31	INT16	1	Channel 31					

![](_page_39_Picture_1.jpeg)

ANYBUS	ANYBUS Gateway AB9001 input register						
Offset	Туре	Length	Name	Description			
32	INT16	1	Channel 32	Raw date in digits (ADC value)			
33	INT16	1	Channel 33	5898 digits= nominal force			
34	INT16	1	Channel 34	= 5.4mV analog DMS input			
35	INT16	1	Channel 35				
36	INT16	1	Channel 36				
37	INT16	1	Channel 37				
38	INT16	1	Channel 38				
39	INT16	1	Channel 39				
40	INT16	1	Channel 40				
41	INT16	1	Channel 41				
42	INT16	1	Channel 42				
43	UINT32	2	Counter (time)	Time counter 10 ms after restart			
45	UINT32	2	Counter (pulse)	Pulse counter after restart			
			(production length)				
47	UINT16	1	Analog input	Raw date in digits (ADC value)			
			(core)	0 to 8192 digits= 0 to 10V			
48	INT16	1	Battery pack	Raw date in digits (ADC value)			
				2530 digits = 100%			
				2380 digits = 80%			
				2200 digits = 60%			
				1860 digits = 40%			
				1420 digits = 20%			
				< -2000 digits= 24V excitation			
49	UINT16	1	STATUS	BIT0= relay 1, status 1 = set			
				BIT1= relay 2, status 1 = set			
				BIT2= relay 3, status 1 = set			
				BIT3= relay 4, status 1 = set			
50	UINT16	1	Installed channels	Number of valid channels			

Table 10: Gateway input register

![](_page_40_Picture_1.jpeg)

## 9 Maintenance

The force sensors are maintenance-free. If repairs are necessary, we recommend contacting FMS Customer Service and sending the affected components for revision to FMS.

![](_page_41_Picture_1.jpeg)

## **10** Dimensions

![](_page_41_Figure_3.jpeg)

Figure 34: Dimensions of the EMGZ482R.Modbus receiver module

![](_page_41_Figure_5.jpeg)

![](_page_41_Figure_6.jpeg)

![](_page_41_Figure_7.jpeg)

Figure 36: Dimensions of the EMGZ484T.Modbus channel extension module

![](_page_42_Picture_1.jpeg)

## **11** Error Causes and Troubleshooting

Troubleshooting						
Message	Cause	Remedy				
"Radio link lost"	Radio connection to the EMGZ482T is interrupted.	Check battery in the EMGZ482T (battery empty or not inserted?).				
	(Metal) objects interfere with the transmission	Remove antennas from the interference range.				
	path	Install the receiver and transmitter in a way that they "see" each other.				
"Channel X >min. limit" "Core >min. limit"	The faulty channel is active, however not connected to a force sensor.	Connect force sensor to the respective connector of the EMGZ482T or EMGZ484T.				
"Modbus Error"	MODBUS connection faulty.	Contact FMS Service Center.				
Very small force amplitudes to PLC.	Calibrated incorrectly	Repeat calibration				
Changed parameters cannot be saved in the web browser	Change procedures was not completed correctly	The change must be confirmed with "Save parameters" and "OK" after parameter inputs				
Frequent losses of communication between modules on the machine	Loose connectors	Re-tighten connectors periodically				

![](_page_43_Picture_1.jpeg)

## **12** Technical Data

### 12.1 EMGZ482T.Modbus Transmitter Module

EMGZ482T.MODBUS	
Number of measuring points	2 channels for 2 force sensors
Measuring inaccuracy	<0.05% F <sub>System</sub>
Sensor excitation	3.0 VDC, max. 20mA, highly stable
Power supply	3.7V battery Li Ion (20Ah) or
	24VDC via slip rings (18 to 36VDC /10W max. 0.5A)
Variants	EMGZ482T.MODBUS.24V
	for 24V supply via slip rings
Radio interface	2.44 GHz
A/D converter resolution	±8192 digit (14 bit)
Analog inputs 1 and 2	1 strain gauge force sensor @ 350 $\Omega$
	(0 to 5.4 mV, max. 7.4 mV)
Temperature range	0 to 50°C [32 to 122°F]
Protection class	IP52
Weight	0.52 kg [1.15 lbs] (without battery)

Table 11: Transmitter module technical data

### 12.2 EMGZ482R.Modbus Receiver Module

EMGZ482R.MODBUS	
Display	LCD 2x 8 characters (5mm)
	2 LED bar indicators, graphical force presentation
	Battery state of charge or power supply
Propagation delay	≤10ms
Control interface	Ethernet via web browser (Internet Explorer 7 or higher)
Radio interface	2.44 GHz
Relay outputs	4 relay contacts DC: 24V/0.5A/12W; AC:
(alarms)	24V/0.5A/62.12VA
Power supply	24VDC (18 to 36VDC) / 10W (max. 0.5A)
Digital input	5 to 24 VDC

![](_page_44_Picture_1.jpeg)

EMGZ482R.MODBUS	
(tachometer impulses for production length)	Cycle time: ≥ 10ms,
	Max. frequency: ≤ 100 Hz
	5 ms
	Conditions: 5ms on / 5ms off $-1$ $5ms$
Analog input	0 to 10 VDC; min. 1.2k $\Omega$ (for core)
Temperature range	0 to 50°C [32 to 122°F]
Protection class	IP52
Weight	0.65 kg [1.43 lbs]

 Table 12: Receiver module technical data

### **12.3 EMGZ484T.Modbus Channel Extension Module**

EMGZ484T.MODBUS	
Number of measuring points	4 channels for 4 force sensors
Measuring inaccuracy	<0.05% FS
Sensor excitation	3.0 VDC, max. 20mA, highly stable
Power supply	24 VDC supply via bus & power cable
	from EMGZ482T.MODBUS
A/D converter resolution	±8192 digit (14 bit)
Analog inputs 1 to 4	1 strain gauge force sensor each @ 350 $\Omega$
	(0 to 5.4 mV, max. 7.4 mV)
Temperature range	0 to 50°C [32 to 122°F]
Protection class	IP52
Weight	0.45 kg [1.0 lbs]

Table 13: Channel extension module technical data

## **12.4 Certifications**

Certified tests (copy of certificates provided upon request)	
RTM X42.BC	5.3 Radio Certification ETSI
Magnitude of Test (Coverage)	Article 3.2 of Directive 1999/5/EC (R &TTE Directive)
Certification	ETSI EN 300 440-2 V1.5.1 (2009-03); ETSI EN 300 440-1 V1.3.1 (2009-03)
RTM X42	FCC Certification USA, Canada

![](_page_45_Picture_1.jpeg)

Magnitude of Test (Coverage)	Class A digital device, pursuant to Part 15 of the FCC Rules
Certification	FCC Registration #: 0020311882
RTM X42	CAB Radio Certification for Japan
Magnitude of Test (Coverage)	Low power data communi. FXD; Art. 38 - 24, Paragraph 1 of radio law
Certification	Article 2, Clause 1 Item 19, Certification ID #: 202WWSM10126721

 Table 14: Radio Certification

## **12.5** Lloyd's Register Type Approval

Certificate available upon request.

![](_page_46_Picture_1.jpeg)

![](_page_47_Picture_1.jpeg)

![](_page_47_Picture_2.jpeg)

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