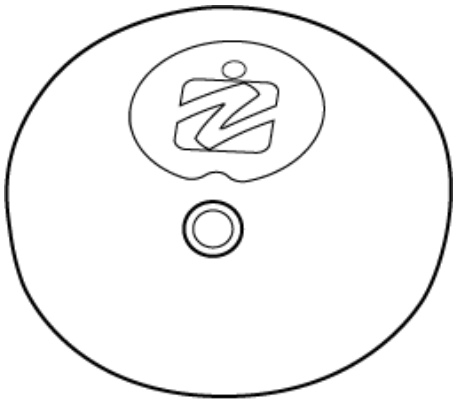
tele radio®
wireless solutions

safe smart strong

INSTALLATION INSTRUCTIONS

Receiver: R27-01



IM-PN-RX108-EN-v04
Language: English (original)

R27

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CONTENTS

CHAPTER 1: INTRODUCTION

Thank you for purchasing a Tele Radio product

READ ALL INSTRUCTIONS AND WARNINGS CAREFULLY BEFORE MOUNTING, INSTALLING, CONFIGURING AND OPERATING THE PRODUCTS.

These Installation instructions have been published by Tele Radio and are not subject to any guarantees. The Installation instructions may be withdrawn or revised by Tele Radio at any time and without further notice. Corrections and updates will be added to the latest version of the manual. Always download the Installation instructions from our website, www.tele-radio.com, for the latest available version. Keep the safety instructions for future reference.

IMPORTANT! These instructions are intended for installers and authorized service and distribution centers. The instructions containing information about the installation and configuration of the radio remote control unit on the machine are NOT intended to be passed on to the end user. Only information that is needed to operate the machine correctly by radio remote control may be passed on to the end user.

Tele Radio remote controls are often built into wider applications. This documentation is not intended to replace the determination of suitability or reliability of the product for specific user applications and should not be used for this purpose. It is the responsibility of any such users or integrators to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use. Tele Radio shall not be responsible or liable for misuse of the information contained herein.

Always refer to the applicable local regulations for installation and safety requirements relating to cranes, hoists, material handling applications, lifting equipment, industrial machinery, and/or mobile hydraulic applications using Tele Radio products, e.g.:

- applicable local and industrial standards and requirements,
- applicable occupational health and safety regulations,
- applicable safety rules and procedures for the factory where the equipment is being used,
- user and safety manuals or instructions of the manufacturer of the equipment where Tele Radio remote control systems are installed.

Tele Radio Installation instructions do not include or address the specific instructions and safety warnings of the end product manufacturer.

Tele Radio products are covered by a warranty against material, construction, or manufacturing faults. See "Chapter 8: Warranty, service, repairs, and maintenance".

1.1 About this document

Before installing or operating the product, read the corresponding documentation carefully.

Tele Radio's product range is composed of transmitters, receivers, and accessories intended for use together as a system.

These Installation instructions cover general safety issues, main technical specifications, standard installation, configuration and operating instructions, as well as general troubleshooting. Images shown in this document are for illustrative purposes only.

Please report any error or omission in this document, as well as any improvement or amendment suggestion to td@tele-radio.com.

1.1.1 COPYRIGHT

Information in this document is subject to change without notice. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, photographic, mechanical (including photocopying), recording or otherwise for any purpose other than the purchaser's personal use without the written permission of Tele Radio.

1.1.2 TERM AND SYMBOL DEFINITIONS

The capitalized terms and symbol used herein shall have the following meaning:

- WARNING: indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- CAUTION: indicates a hazardous situation which, if not avoided, will result in minor or moderate injury.
- IMPORTANT: is used for information that requires special consideration.
- NOTE: is used to address practices not related to physical injury.

This symbol is used to call attention to safety messages that would be assigned the signal words "WARNING" or "CAUTION".

1.2 About R27 receiver

R27 receivers have simplex communication and are intended for Modbus communication.

1.2.1 RS485 INTERFACE

The RS485 interface is used both for Modbus and for Trabus communication (Tele-Radio proprietary tools like Settings Manager and tools for flashing new firmware).

The first few seconds after startup the receiver will be in Trabus mode and Modbus will not be active. After approximately 10 seconds, the receiver will switch to Modbus and if it is set as Master it will start sending traffic in the RS485 bus.

NOTE: If a Tele-Radio tools is connected when the device is in Modbus mode, a break will set it back to Trabus mode, so basically Tele-Radio tools always work.

CHAPTER 2: SAFETY

2.1 Warnings & restrictions

Carefully read through the following safety instructions before proceeding with the installation, configuration, operation, or maintenance of the product. Failure to follow these warnings could result in death or serious injury.

This product must not be operated without having read and understood the Installation instructions and having received the appropriate training. The purchaser of this product has been instructed how to handle the system safely. The following information is intended for use as a complement to applicable local regulations and standards.

IMPORTANT! Tele Radio remote controls are often built into wider applications. These systems should be equipped with:

- **a wired emergency stop where necessary**
- **a brake**
- **an audible or visual warning signal**

2.1.1 INSTALLATION AND COMMISSIONING

IMPORTANT! Only licensed or qualified personnel should be permitted to install the product.

This radio system must not be used in areas where there is a risk of explosion.

Always switch off all electrical power from the equipment before installation procedure.

RISK OF UNINTENDED EQUIPMENT OPERATION
Only transmitters that are intended for use should be registered in the receiver.
Failure to follow these instructions could result in death, serious injury, or equipment damage.

RISK OF ELECTRIC SHOCK

The receiver must only be opened by qualified installers or authorized personnel.

Make sure the power supply is switched off before opening the receiver. Failure to follow these instructions could result in death, serious injury, or equipment damage.

- **The receiver must be securely attached and located where it will not be hit by e.g. any moving parts.**
- **Do not install the product in areas affected by strong vibrations**
- **Cable glands and vent plugs must face downwards to prevent water ingress.**
- **Ensure that the power supply is connected to the correct terminals.**
- **Ensure that flexible cords and cables are not damaged through friction or stress.**
- **Do not use damaged cables.**
- **Ensure cables and connectors do not hang loose.**

- The receiver is designed to withstand normal weather conditions but should be protected from extreme conditions.
- Install the receiver in a location where the LED is easily visible and the button accessible.
- Make sure to install available accessories inside or on the receiver before permanently installing the receiver. A permanent installation of the product must include fuse protection of the equipment and cables against short circuits.

2.1.2 OPERATION

This equipment is not suitable for use in locations where children are likely to be present.

Only qualified personnel should be permitted to access the transmitter and operate the equipment.

- **Make sure that the user satisfies the age requirements in your country for operating the equipment.**
- **Make sure that the user is not under the influence of drugs, alcohol and medications.**
- **Make sure that the user knows and follows operating and maintenance instructions as well as all applicable safety procedures and requirements.**

The user should:

- **Always test the transmitter stop button before operating it.This test should be done on each shift, without a load.**
- **Never use a transmitter if the stop button is mechanically damaged.Contact your supervisor or representative for service immediately.**
- **Never leave the transmitter unattended.**
- **Always switch the transmitter off when not in use. Store in a safe place.**
- **Keep a clear view of the work area at all times.**

2.1.3 MAINTENANCE

Before maintenance intervention on any remote controlled equipments:
- **always remove all electrical power from the equipment.**
- **always follow lockout procedures.**

- Keep the safety information for future reference. Always download the Installation instructions from our website, www.tele-radio.com, for the latest available version.

- If error messages are shown, it is very important to find out what caused them. Contact your representative for help.
- The functionality of the stop button should be tested at least after every 200 hours' use.
- If the stop button is mechanically damaged, do not use the transmitter. Contact your supervisor or representative for service immediately.
- Keep contacts and antennas clean.
- Wipe off dust using a clean, slightly damp cloth.
- Never use cleaning solutions.
- Check the encapsulation, foils and cable for damages. If the encapsulation or foil is damaged, moisture can cause serious damage to the electronics.

CHAPTER 3: TECHNICAL DATA

3.1 Receiver specifications

	R27-01
Power supply	12 … 24 VDC (-50% … +35%)
Radio frequency band	2405 – 2480 MHz
Frequency management	Direct Sequence Spread Spectrum (DSSS)
Number of channels	16 (channel 11–26)
Bus system/ com. protocols	RS485 (Modbus RTU)
Radio communication	Simplex
Radio frequency output power	EIRP[1]: < 10 dBm (10 mW)
Connector	M12 5-pin male
Cable length	~ 1.8 m / 5,9 ft
IP code	IP67
Operating temperature	-20…+55 °C / -4…+130 °F
Dimension	~ Ø62 x 37 mm / ~ Ø2.44 x 1.46 in
Weight (typical)	~ 137 g / 0.3 lbs

3.2 Current consumption

Input power	**R27-01**	
	Min.*	**Max.****
12 V DC	28 mA	35 mA
24 V DC	16 mA	20 mA

*Minimum current consumption = receiver powered, no radio session established.

**Maximum current consumption = receiver powered, radio session established.

3.3 System radio frequency

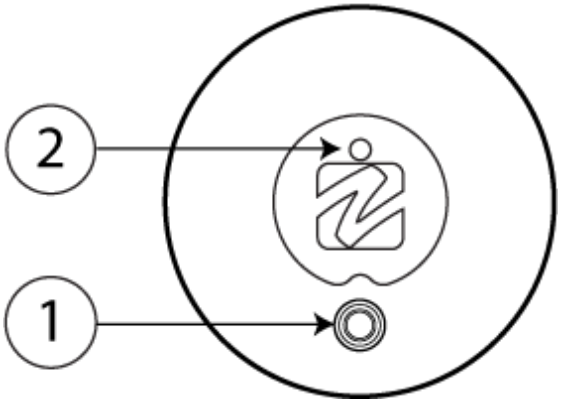
R27 receivers operate on the frequency band 2.4 GHz. The frequency band has been divided into 16 channels (11 to 26). Once the channel has been selected on the transmitter, the receivers and transmitter will automatically detect and switch to the same channel.

[1]Equivalent isotropic radiated power

CHAPTER 4: PRODUCT GENERAL DESCRIPTION

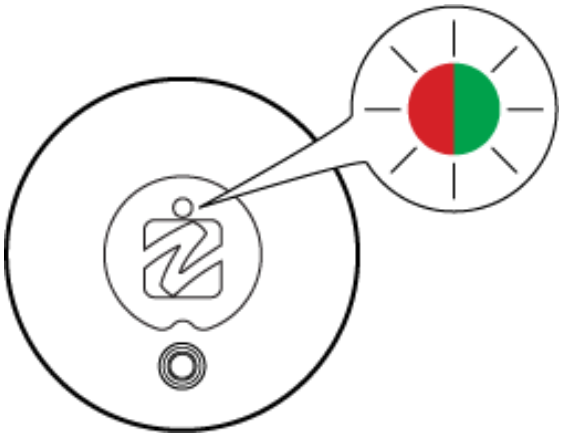
The pictures shown in this chapter are for illustrative purposes only.

4.1 Receiver description



1. Function button
2. Indication LED

4.1.1 LED INDICATOR



The receiver is equipped with one bi-color LED. This LED is used to give status and error indications about the receiver and operations (see "5.2 Indication of operation outcome").

Flashing type	Time LED is on	Time LED is off
Fast	200 ms	200 ms
Slow	700 ms	700 ms

4.1.2 CAP SENSOR BUTTON ACTIONS

The receiver is equipped with one **Cap sensor** button with two possible user interfaces allowing for different actions, e.g. accessing the **registry management mode** and enable the registration and erase functions.

Tapping actions

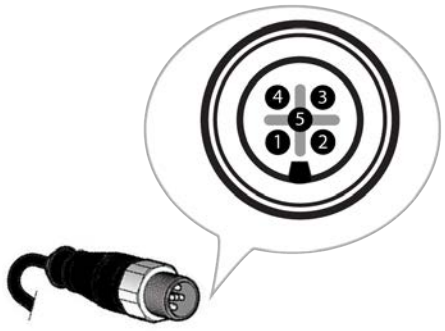
Tap the function button ...	**Action**
10 times within 10 s	Erase all registered transmitter IDs from the receiver. See "6.3 Erase all"

Touch and hold actions

Touch and hold the function button for ...	**LED indication**	**Action**
5 s < ... < 12 s	Red LED flashing slow	Enter **registry management mode**.
≥ 12 s	Red LED lit steady	Log out any logged in transmitter from the receiver.

4.1.3 M12 CONNECTOR

The M12 connector is used for communication, and also for programming/flashing the unit when connected to a D2-17[1].



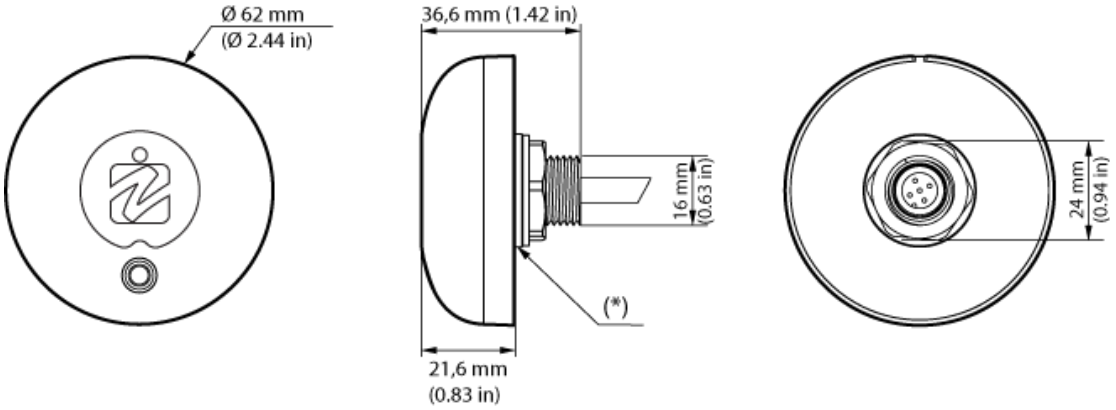
Male connector

Pin	Signal	Cable color[2]
1	RS485_SHLD	Shielding layer (no plastic skin)
2	V+ (from power supply)	Red
3	GND	Black
4	RS485B	White
5	RS485A	Blue

[1]Do not use a D2-11 module for programming/flashing the unit, it will brick the device. Contact your representative for assistance.

[2]Connector on the receiver.

4.2 Mechanical installation



4.2.1 INSTALLATION PRECAUTIONS

RISK OF ELECTRIC SHOCK
The receiver must only be opened by qualified installers or authorized personnel.
Make sure the power supply is switched off before opening the receiver.
Failure to follow these instructions could result in death, serious injury, or equipment damage.

IMPORTANT! Only authorized personnel should install the product.

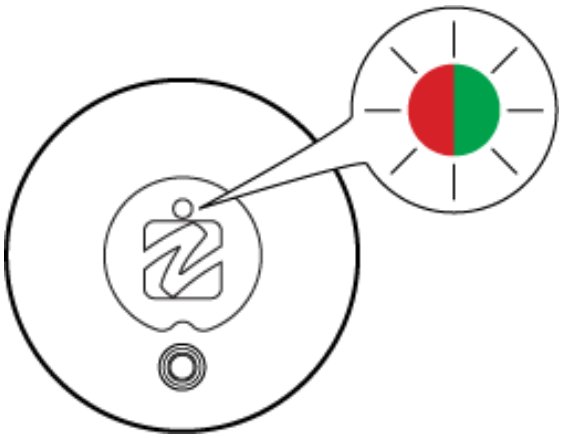
Only correct installation complies with the safety levels for the product.

- A permanent installation of the receiver must include fuses in order to protect the equipment and cables from short circuit.
- The receiver must be installed vertically, on a flat and rigid surface, with the cable at the bottom.

  NOTE: For mounting on a wall or equipment, use 4 M5x30 mm screws or equivalent fastening method.
- Install the receiver in a location where the LED is easily visible and the button accessible.
- Consider the wiring limitation and the radio communication limitation to choose the receiver location.
- Ensure no obstacle is impairing the radio communication performance between the receiver and the transmitter.
- The receiver must not be installed inside closed metal containers.

- Make sure any accessories inside or on the receiver are installed before permanently installing the receiver.
- Test the equipment before installing the receiver permanently.

CHAPTER 5: STATUS AND ERROR INDICATIONS



Receiver status and errors are indicated with the bi-color LED (indication LED).

5.1 Indication when in radio session

When the receiver is in session, the green LED flashes once, very briefly, for each packet received/sent.

5.2 Indication of operation outcome

Operation outcome ('Store success', 'Erase success' or failure) is indicated by the LED flashing according to following:

Designation	Description	LED color	Number of flashes	Type of flashes	Comments
'Store success'	A transmitter was successfully stored in the receiver.	Green	4	fast	The four flashes may look like three flashes if the LED was previously lit.
'Erase success'	A transmitter was successfully erased from the receiver.	Red/green alternatively	4	fast	The four flashes may look like three flashes if the LED was previously lit.
Failure	The procedure was not successful.	Red	7	fast	The seven flashes may look like six flashes if the LED was previously lit.

5.3 Fatal start-up error indication

NOTE: The orange and red colors on the LED are very similar.

There are two fatal errors implemented:

- no production data
- faulty function block configuration (settings for function blocks are inconsistent)

5.3.1 NO PRODUCTION DATA

The green LED flashes fast and the red LED is constantly lit, making it look like fast flashing between red and orange. Contact your representative for assistance.

5.3.2 FAULTY FUNCTION BLOCK CONFIGURATION

Both the green and red LED are constantly lit, making it look orange. Contact your representative for assistance.

CHAPTER 6: OPERATION

6.1 General information

6.1.1 RECEIVERS WITH LOGIN/LOGOUT FUNCTION ACTIVATED

To control a receiver, the transmitter must be registered and logged in to the receiver. If another transmitter is already logged in to the receiver, it must be logged out before a different transmitter can be logged in.

If no transmitter is logged in to the receiver, the first registered transmitter to be started will automatically log in to the receiver. Once a transmitter has been logged in, it will remain logged in until it is manually logged out.

More than one transmitter can be registered in the receiver, but only one transmitter can be logged in at a time.

6.1.2 RECEIVERS WITHOUT LOGIN/LOGOUT FUNCTION OR WITH LOGIN/LOGOUT FUNCTION INACTIVATED

To control a receiver, the transmitter must be registered in the receiver.

If no transmitter is controlling the receiver, the first registered transmitter to be started will automatically take control of the receiver. Switching the transmitter off will free the receiver and allow any other registered transmitter that is started to control the receiver.

More than one transmitter can be registered in the receiver, but only one transmitter can control the receiver at a time.

6.1.3 MULTIPLE TRANSMITTERS REGISTERED IN A SAME RECEIVER

If more than one transmitter is registered in the same receiver, it is recommended to select the same frequency channel on all transmitters.

6.2 Registry management mode

In this mode the receiver will register a transmitter-id, if it has not been previously stored, or erase it if it has already been stored[1].

When the receiver enters **registry management mode** it will remain in that mode for 10 seconds.

If no transmitter registration packets have been received within 10 s, the receiver will exit **registry management mode** and indicate failure.

6.2.1 ENTER REGISTRY MANAGEMENT MODE

RISK OF UNINTENDED EQUIPMENT OPERATION
Do not perform this action when the receiver is in a session with another transmitter. The radio communication may be interrupted or broken. Failure to follow these instructions could result in death, serious injury, or equipment damage.

1. Touch and hold the **Function** button for 5 s or until the LED starts flashing slow.
2. Release the **Function** button.
   *The receiver enters **registry management mode** (if it is not in an active radio session). It will remain in that mode for 10 seconds.*

[1]The settings “TX erase support” must have been activated in SM for the erase procedure to succeed.

6.2.2 REGISTER / ERASE PANTHER TRANSMITTERS IN THE RECEIVER

Register

IMPORTANT! For the registration procedure to be successful:

- **The transmitter must not have been previously registered in the receiver.**
- **The transmitter must send registration packets.**
- **The receiver must be in registry management mode.**

If transmitter registration packets are received and the transmitter is successfully stored, the receiver exits **registry management mode** and indicates 'Store success' (see "4.1.1 LED indicator").

If no transmitter registration packets have been received within 10 s, the receiver will exit **registry management mode** and indicate failure.

Erase

NOTE: Applies to Panther generation 1.

IMPORTANT! For the erase procedure to be successful:

- **The transmitter must have been previously registered in the receiver.**
- **The transmitter must send registration packets.** [1]
- **The receiver must be in registry management mode.**

If transmitter registration packets are received and the transmitter is successfully erased, the receiver exits **registry management mode** and indicates 'Erase success' (see "4.1.1 LED indicator"). If no transmitter registration packets have been received within 10 s, the receiver will exit **registry management mode** and indicate failure.

6.3 Erase all

1. Quickly tap the **Function** button 10 times within 10 seconds.
   All registered transmitter IDs have been erased from the receiver.

[1] Panther transmitter with menu option are not yet available.

CHAPTER 7: REGISTRATION VIA MODBUS

There is a register to control if registration via radio shall be activated: `96 "Registration mode control register"`. If "0" is written in this register, the device will exit registration mode via radio. If any other number ≥ 1 is written, the device will enter registration mode via radio for 10 seconds.

When reading register 96, it will return "0" if the receiver is not in registration mode and "`0xffff`" if the receiver is in registration mode. It is also possible to write the transmiter-id (**TX-id**) directly via the Modbus interface to the register database. This is done with register `97 "Registration control register"`.

7.1 To edit registration data (registered transmitters) via Modbus

1. Write "0" in register 97.
   This will copy the registered transmitters from the persistent storage to the Modbus registers.

2. Edit the **transmitter-id** Modbus registers (**TX-id**, register 98 to 129) with the hexadecimal values of the transmitter-ids that shall be stored in the persistent database.

   NOTE: Writing **TX-id** "0" is the same as erasing a registration.

3. Edit the **transmitter-type** Modbus registers (**TX-type**, register 130 to 145) with the decimal value corresponding to the correct transmitter type.

   NOTE: To find out the **TX-type**, make a registration of the transmitter via radio and read out the **TX-type**[1]. Transmitters of the same model (T19 or whatever transmitter it is) all have the same **TX-type**.

4. Write "1" in register 97.
   This will copy the Modbus registration registers to the persistent storage. The device will reset when this is done.

[1]Either in SM6 or in the Modbus interface (after performing step 1).

NOTE: Reading register 97 will return:
"1" if a previous "copy" operation from the Modbus **TX-registry** registers to the persistent storage was executed and successful.
"0" if no copy operation has taken place or if it was unsuccessful.
It takes a few seconds after the device has reset until it will respond to Modbus requests.

Example when editing registers for transmitter registration

A T19 (TX-type) with serial number 123456 (**TX-id**) shall be stored in registration slot 0.

The decimal value of the **TX-type** T19 is 129.

The hexadecimal value of the **TX-id** 123456 is `0x0001e240`, where `0x0001` is the most significant 16 bits and `0xe240` is the least significant 16 bits.

1. Write "0" in register 97.
2. Check the flag `LITTLE_ENDIAN_WORD_ORDER_ON_32_BIT_REGS`

   If this flag is not set (default)
   3. Write `0x0001` in register 98 and `0xe240` in register 99

   If this flag is set[1]
   3. Write `0xe240` in register 98 and `0x0001` in register 99

4. Write "129" (decimal value of the **TX-type** for T19) in register 130.
5. Write "1" in register 97.

[1]For more details, see "A.2.1 Endianess"

CHAPTER 8: WARRANTY, SERVICE, REPAIRS, AND MAINTENANCE

Tele Radio products are covered by a warranty against material, construction and manufacturing faults. During the warranty period, Tele Radio may replace the product or faulty parts. Work under warranty must be performed by Tele Radio or by an authorized service center specified by Tele Radio.

The following are **not** covered by the warranty:

- Faults resulting from normal wear and tear
- Parts of a consumable nature
- Products that have been subject to unauthorized modifications
- Faults resulting from incorrect installation and use
- Damp and water damage

Maintenance

- Repairs and maintenance must be performed by qualified personnel
- Only use spare parts from Tele Radio
- Contact your representative for service or any other assistance
- Keep the product in a clean, dry place
- Keep contacts and antennas clean
- Wipe off dust using a slightly damp, clean cloth

  NOTE: Never use cleaning solutions or high-pressure washer.

CHAPTER 9: REGULATORY INFORMATION

9.1 Europe

Applies to: **R27-01**

9.1.1 CE MARKING

Hereby, Tele-Radio i Lysekil AB, declares that the product(s) listed above is/are in compliance with the Radio Equipment Directive 2014/53/EU.

The latest version of the complete EU Declaration of Conformity is available at the following website: www.tele-radio.com.

9.1.2 WEEE DIRECTIVE

This symbol means that inoperative electrical and electronic products must not be mixed with household waste. The European Union has implemented a collection and recycling system for which producers are responsible. For proper treatment, recovery and recycling, please take this product to a designated collection point.

Tele Radio strives to minimize the use of hazardous materials, promotes reuse and recycling, and reduces emissions to air, soil and water. When a commercially viable alternative is available, Tele Radio strives to restrict or eliminate substances and materials that pose an environmental, health or safety risk.

9.2 North America

Applies to: **R27-01**

9.2.1 FCC STATEMENT

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential

installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

To satisfy FCC RF exposure requirements, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during device operation. To ensure compliance, operations at closer than this distance is not recommended.

9.2.2 IC STATEMENT

This product complies with Industry Canada's licence-exempt RSSs. Operation is subject to the following two conditions:

(1) This device may not cause interference; and

(2) This device must accept any interference, including interference that may cause undesired operation of device.

Le présent appareil est conforme aux CNR d’Industrie Canada applicables aux appareils radio exempts de licence. L’exploitation est autorisée aux deux conditions suivantes :

1) l’appareil ne doit pas produire de brouillage;

2) l’appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d’en compromettre le fonctionnement.

This radio transmitter has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Gain of antenna: 3.0 dBi max.

Type of antenna: 50 ohm, Omni-directional

Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous ayant le gain admissible maximal et l'impédance requise pour chaque type d'antenne indiqué. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

Gain d'antenne: 3.0 dBi maximum

Type d'antenne: 50 ohm, omnidirectionnel

To satisfy IC RF exposure requirements, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during device operation. To ensure compliance, operation at closer than this distance is not recommended.

Afin d'assurer la conformité aux exigences de la IC en matière d'exposition aux RF, une distance de séparation d'au moins 20 cm doit être maintenue entre l'antenne de cet appareil et toute personne à proximité pendant le fonctionnement de l'appareil. Pour assurer le respect de ces exigences, il n'est pas recommandé d'utiliser l'appareil à une distance inférieure à celle-ci.

9.2.3 FCC/IC LABELS

The radio module in this product is labeled with its own FCC ID and IC numbers. The FCC ID and IC numbers are not visible when the radio module is installed inside another device. Therefore, the outside of the device into which the module is installed must also display a label referring to the enclosed radio module. The final end device must be labeled in a visible area with the following:

“Contains FCC ID: ONFC1807A

“Contains IC: 4807A-C1807A

The FCC and IC numbers are found on the product label.

ANNEX A: MODBUS SPECIFICATION FOR R27 (IN ENGLISH)

NOTE: For receiver using Software version from **SW14-25v04 or higher**.

Version: v05

A.1 Introduction

This document describes the Modbus RTU specification for R27 systems.

The device supports both slave and master.

A.2 General

The R27 receiver Modbus interface operates according to Modbus standard.

The following Modbus function codes are supported in slave mode.

Function	Subfunction
FC_READ_HOLDING_REGISTER	
FC_READ_INPUT_REGISTER	
FC_WRITE_REGISTER	
FC_WRITE_MULTIPLE_REGISTER	
FC_READWRITE_MULTIPLE_REGISTERS	

Function	Subfunction
FC_DIAG_DIAGNOSTIC :	DIAG_SUB_FC_RETURN_QUERY_DATA
	DIAG_SUB_FC_RESTART_COMMUNICATIONS_OPTION
	DIAG_SUB_FC_FORCE_LISTEN_ONLY_MODE
	DIAG_SUB_FC_CLEAR_OVERRUN_COUNTER_AND_FLAG
	DIAG_SUB_FC_CLEAR_COUNTERS_AND_DIAGNOSTIC_REGISTER
	DIAG_SUB_FC_RETURN_BUS_MESSAGE_COUNT
	DIAG_SUB_FC_RETURN_BUS_COMMUNICATION_ERROR_COUNT
	DIAG_SUB_FC_RETURN_BUS_EXCEPTION_ERROR_COUNT
	DIAG_SUB_FC_RETURN_SLAVE_MESSAGE_COUNT
	DIAG_SUB_FC_RETURN_SLAVE_NO_RESPONSE_COUNT
	DIAG_SUB_FC_RETURN_BUS_CHARACTER_OVERRUN_COUNT

A.2.1 ENDIANESS

All Modbus registers are big-endian, according to the Modbus standard. However when two registers are actually one 32-bit register, the standard does not specify whether the most significant 16 bits will be in the register with lowest address number or the least significant 16 bits will be in the register with lowest address number.

By default, the most significant 16 bits are in the register with lowest address number, making it “look like” big endian.

This can be changed with a global setting affecting all Modbus “32-bit registers” (two 16-bit registers that are actually one 32-bit register). If the flag `LITTLE_ENDIAN_WORD_ORDER_ON_32_BIT_REGS` is set, the least significant 16 bits will be in the register with lowest address number.

A.2.2 SERIAL LINE PARAMETERS IN SLAVE MODE

Default Modbus communication parameters

NOTE: Only for slave mode.

Baud rate:	9600
Serial line mode:	8 bits, even parity, 1 stop bit
Modbus slave adress:	1

These parameters can be changed via the serial port, in the register "Modbus communication parameters via Modbus" (see "A.4 Modbus register map in slave mode").

A.3 Modbus register types

Type	Description
REG_TYPE_16BIT	An ordinary 16-bit Modbus register
REG_TYPE_32BIT_1ST_REG	The lowest address/register number, of two registers that should be read together and interpreted as one 32-bit register.
REG_TYPE_32BIT_2ND_REG	The highest address/register number, of two registers that should be read together and interpreted as one 32-bit register.
REG_TYPE_8BIT	A register that is only 8 bits. When read, the same value will be read in both bytes of the 16 bits Modbus register. When written, the first byte (most significant bits) are ignored.
REG_TYPE_CTRL	This is a register that has some kind of impact/action when written to. See register 96 and 97 above.

A.4 Modbus register map in slave mode

Abbreviations:

RO: Read only;

RW: Read, write.

Modbus address	Description	Reg type	Access
0	Alive counter (changes when device is running)	REG_TYPE_16BIT	RO

A.4.1 RADIO DIAGNOSTICS COUNTERS

Modbus address	Description		Reg type	Access
1	Total packets	Part 1	REG_TYPE_32BIT_1ST_REG	RO
2		Part 2	REG_TYPE_32BIT_2ND_REG	RO
3	Received packets	Part 1	REG_TYPE_32BIT_1ST_REG	RO
4		Part 2	REG_TYPE_32BIT_2ND_REG	RO
5	Dropped packets	Part 1	REG_TYPE_32BIT_1ST_REG	RO
6		Part 2	REG_TYPE_32BIT_2ND_REG	RO

A.4.2 TX MAIN (TX-ID OF TRANSMITTER IN SESSION)

NOTE: 0 if no session is ongoing.

Modbus address	Description		Reg type	Access
7	Main TX-id	Part 1	REG_TYPE_32BIT_1ST_REG	RO
8		Part 2	REG_TYPE_32BIT_2ND_REG	RO

A.4.3 RADIO FLAGS

Modbus address	Description	Reg type	Access
9	Radio flags Bit 00: RAW_LINK Bit 01: ACTIVE_LINK Bit 02: SESSION Bit 03: SHORT_LINK Bit 04: ZERO_LINK Bit 05: START_PHASE Bit 06: KILL_PHASE Bit 07: ACTIVE_STOP Bit 08: PASSIVE_STOP Bit 09: CM_ACT_LINK Bit 10: BAD_BATTERY Bit 11: LOGOUT Bit 12–15: Reserved	REG_TYPE_16BIT	RO

A.4.4 RSSI

Modbus address	Description	Reg type	Access
10	Raw RSSI	REG_TYPE_8BIT	RO
11	Low pass filtered RSSI	REG_TYPE_8BIT	RO

A.4.5 DATA FROM TX

Modbus address	Description		Reg type	Access
12	Load select		REG_TYPE_16BIT	RO
13	Buttons	Part 1	REG_TYPE_32BIT_1ST_REG	RO
14		Part 2	REG_TYPE_32BIT_2ND_REG	RO
15	Buttons, both steps		REG_TYPE_16BIT	RO

A.4.6 DATA FROM PN GEN2 PROTOCOL (RESERVED)

Modbus address	Description		Reg type	Access
16	Main inputs	Value[0]	REG_TYPE_16BIT	RO
17		Value[0]	REG_TYPE_16BIT	RO
18		Value[1]	REG_TYPE_16BIT	RO
19		Value[1]	REG_TYPE_16BIT	RO
20		Value[2]	REG_TYPE_16BIT	RO
21		Value[2]	REG_TYPE_16BIT	RO
22		Value[3]	REG_TYPE_16BIT	RO
23		Value[3]	REG_TYPE_16BIT	RO
24	Feedback for other RX RX-slot 0	[0-1]	REG_TYPE_16BIT	RO
25		[2-3]	REG_TYPE_16BIT	RO
26		[4-5]	REG_TYPE_16BIT	RO
27		[6-7]	REG_TYPE_16BIT	RO
28		[8-9]	REG_TYPE_16BIT	RO
29		[10-11]	REG_TYPE_16BIT	RO
30		[12-13]	REG_TYPE_16BIT	RO
31		[14-15]	REG_TYPE_16BIT	RO
32	Feedback for other RX RX-slot 1	[0-1]	REG_TYPE_16BIT	RO
33		[2-3]	REG_TYPE_16BIT	RO
34		[4-5]	REG_TYPE_16BIT	RO
35		[6-7]	REG_TYPE_16BIT	RO
36		[8-9]	REG_TYPE_16BIT	RO
37		[10-11]	REG_TYPE_16BIT	RO
38		[12-13]	REG_TYPE_16BIT	RO
39		[14-15]	REG_TYPE_16BIT	RO
40	Feedback for other RX RX-slot 2	[0-1]	REG_TYPE_16BIT	RO
41		[2-3]	REG_TYPE_16BIT	RO
42		[4-5]	REG_TYPE_16BIT	RO
43		[6-7]	REG_TYPE_16BIT	RO
44		[8-9]	REG_TYPE_16BIT	RO
45		[10-11]	REG_TYPE_16BIT	RO
46		[12-13]	REG_TYPE_16BIT	RO
47		[14-15]	REG_TYPE_16BIT	RO

Modbus address	Description		Reg type	Access
48	Feedback for other RX RX-slot 3	[0-1]	REG_TYPE_16BIT	RO
49		[2-3]	REG_TYPE_16BIT	RO
50		[4-5]	REG_TYPE_16BIT	RO
51		[6-7]	REG_TYPE_16BIT	RO
52		[8-9]	REG_TYPE_16BIT	RO
53		[10-11]	REG_TYPE_16BIT	RO
54		[12-13]	REG_TYPE_16BIT	RO
55		[14-15]	REG_TYPE_16BIT	RO
56	Feedback for other RX RX-slot 4	[0-1]	REG_TYPE_16BIT	RO
57		[2-3]	REG_TYPE_16BIT	RO
58		[4-5]	REG_TYPE_16BIT	RO
59		[6-7]	REG_TYPE_16BIT	RO
60		[8-9]	REG_TYPE_16BIT	RO
61		[10-11]	REG_TYPE_16BIT	RO
62		[12-13]	REG_TYPE_16BIT	RO
63		[14-15]	REG_TYPE_16BIT	RO
64	Feedback for other RX RX-slot 5	[0-1]	REG_TYPE_16BIT	RO
65		[2-3]	REG_TYPE_16BIT	RO
66		[4-5]	REG_TYPE_16BIT	RO
67		[6-7]	REG_TYPE_16BIT	RO
68		[8-9]	REG_TYPE_16BIT	RO
69		[10-11]	REG_TYPE_16BIT	RO
70		[12-13]	REG_TYPE_16BIT	RO
71		[14-15]	REG_TYPE_16BIT	RO
72	Feedback for other RX RX-slot 6	[0-1]	REG_TYPE_16BIT	RO
73		[2-3]	REG_TYPE_16BIT	RO
74		[4-5]	REG_TYPE_16BIT	RO
75		[6-7]	REG_TYPE_16BIT	RO
76		[8-9]	REG_TYPE_16BIT	RO
77		[10-11]	REG_TYPE_16BIT	RO
78		[12-13]	REG_TYPE_16BIT	RO
79		[14-15]	REG_TYPE_16BIT	RO

Modbus address	Description		Reg type	Access
80	Feedback for other RX RX-slot 7	[0-1]	REG_TYPE_16BIT	RO
81		[2-3]	REG_TYPE_16BIT	RO
82		[4-5]	REG_TYPE_16BIT	RO
83		[6-7]	REG_TYPE_16BIT	RO
84		[8-9]	REG_TYPE_16BIT	RO
85		[10-11]	REG_TYPE_16BIT	RO
86		[12-13]	REG_TYPE_16BIT	RO
87		[14-15]	REG_TYPE_16BIT	RO
88	Feedback for this RX	[0-1]	REG_TYPE_16BIT	RW
89		[2-3]	REG_TYPE_16BIT	RW
90		[4-5]	REG_TYPE_16BIT	RW
91		[6-7]	REG_TYPE_16BIT	RW
92		[8-9]	REG_TYPE_16BIT	RW
93		[10-11]	REG_TYPE_16BIT	RW
94		[12-13]	REG_TYPE_16BIT	RW
95		[14-15]	REG_TYPE_16BIT	RW

A.4.7 REGISTRATION MODE VIA MODBUS

Modbus address	Description		Reg type	Access
96	Control register	Registration mode control register	REG_TYPE_CTRL	RW

A.4.8 REGISTRATION VIA MODBUS

Modbus address	Description		Reg type	Access
97	Control register	Registration control register	REG_TYPE_CTRL	RW

Modbus address	Description		Reg type	Access
98	TX-id registers	Registration TX-id entry slot 0	REG_TYPE_32BIT_1ST_REG	RW
99		Registration TX-id entry slot 0	REG_TYPE_32BIT_2ND_REG	RW
100		Registration TX-id entry slot 1	REG_TYPE_32BIT_1ST_REG	RW
101		Registration TX-id entry slot 1	REG_TYPE_32BIT_2ND_REG	RW
102		Registration TX-id entry slot 2	REG_TYPE_32BIT_1ST_REG	RW
103		Registration TX-id entry slot 2	REG_TYPE_32BIT_2ND_REG	RW
104		Registration TX-id entry slot 3	REG_TYPE_32BIT_1ST_REG	RW
105		Registration TX-id entry slot 3	REG_TYPE_32BIT_2ND_REG	RW
106		Registration TX-id entry slot 4	REG_TYPE_32BIT_1ST_REG	RW
107		Registration TX-id entry slot 4	REG_TYPE_32BIT_2ND_REG	RW
108		Registration TX-id entry slot 5	REG_TYPE_32BIT_1ST_REG	RW
109		Registration TX-id entry slot 5	REG_TYPE_32BIT_2ND_REG	RW
110		Registration TX-id entry slot 6	REG_TYPE_32BIT_1ST_REG	RW
111		Registration TX-id entry slot 6	REG_TYPE_32BIT_2ND_REG	RW
112		Registration TX-id entry slot 7	REG_TYPE_32BIT_1ST_REG	RW
113		Registration TX-id entry slot 7	REG_TYPE_32BIT_2ND_REG	RW
114		Registration TX-id entry slot 8	REG_TYPE_32BIT_1ST_REG	RW
115		Registration TX-id entry slot 8	REG_TYPE_32BIT_2ND_REG	RW
116		Registration TX-id entry slot 9	REG_TYPE_32BIT_1ST_REG	RW
117		Registration TX-id entry slot 9	REG_TYPE_32BIT_2ND_REG	RW
118		Registration TX-id entry slot 10	REG_TYPE_32BIT_1ST_REG	RW
119		Registration TX-id entry slot 10	REG_TYPE_32BIT_2ND_REG	RW
120		Registration TX-id entry slot 11	REG_TYPE_32BIT_1ST_REG	RW
121		Registration TX-id entry slot 11	REG_TYPE_32BIT_2ND_REG	RW
122		Registration TX-id entry slot 12	REG_TYPE_32BIT_1ST_REG	RW
123		Registration TX-id entry slot 12	REG_TYPE_32BIT_2ND_REG	RW
124		Registration TX-id entry slot 13	REG_TYPE_32BIT_1ST_REG	RW
125		Registration TX-id entry slot 13	REG_TYPE_32BIT_2ND_REG	RW
126		Registration TX-id entry slot 14	REG_TYPE_32BIT_1ST_REG	RW
127		Registration TX-id entry slot 14	REG_TYPE_32BIT_2ND_REG	RW
128		Registration TX-id entry slot 15	REG_TYPE_32BIT_1ST_REG	RW
129		Registration TX-id entry slot 15	REG_TYPE_32BIT_2ND_REG	RW

Modbus address	Description		Reg type	Access
130	TX-type	Registration TX-type entry slot 0	REG_TYPE_8BIT	RW
131		Registration TX-type entry slot 1	REG_TYPE_8BIT	RW
132		Registration TX-type entry slot 2	REG_TYPE_8BIT	RW
133		Registration TX-type entry slot 3	REG_TYPE_8BIT	RW
134		Registration TX-type entry slot 4	REG_TYPE_8BIT	RW
135		Registration TX-type entry slot 5	REG_TYPE_8BIT	RW
136		Registration TX-type entry slot 6	REG_TYPE_8BIT	RW
137		Registration TX-type entry slot 7	REG_TYPE_8BIT	RW
138		Registration TX-type entry slot 8	REG_TYPE_8BIT	RW
139		Registration TX-type entry slot 9	REG_TYPE_8BIT	RW
140		Registration TX-type entry slot 10	REG_TYPE_8BIT	RW
141		Registration TX-type entry slot 11	REG_TYPE_8BIT	RW
142		Registration TX-type entry slot 12	REG_TYPE_8BIT	RW
143		Registration TX-type entry slot 13	REG_TYPE_8BIT	RW
144		Registration TX-type entry slot 14	REG_TYPE_8BIT	RW
145		Registration TX-type entry slot 15	REG_TYPE_8BIT	RW

A.4.9 MODBUS OUTPUT REGISTERS FROM FUNCTION BLOCKS

Modbus address	Description		Reg type	Access
146	mbOutArray	value[0]	REG_TYPE_32BIT_1ST_REG	RO
147		value[0]	REG_TYPE_32BIT_2ND_REG	RO
148		value[1]	REG_TYPE_32BIT_1ST_REG	RO
149		value[1]	REG_TYPE_32BIT_2ND_REG	RO
150		value[2]	REG_TYPE_32BIT_1ST_REG	RO
151		value[2]	REG_TYPE_32BIT_2ND_REG	RO
152		value[3]	REG_TYPE_32BIT_1ST_REG	RO
153		value[3]	REG_TYPE_32BIT_2ND_REG	RO
154		value[4]	REG_TYPE_32BIT_1ST_REG	RO
155		value[4]	REG_TYPE_32BIT_2ND_REG	RO
156		value[5]	REG_TYPE_32BIT_1ST_REG	RO
157		value[5]	REG_TYPE_32BIT_2ND_REG	RO
158		value[6]	REG_TYPE_32BIT_1ST_REG	RO
159		value[6]	REG_TYPE_32BIT_2ND_REG	RO
160		value[7]	REG_TYPE_32BIT_1ST_REG	RO
161		value[7]	REG_TYPE_32BIT_2ND_REG	RO
162		value[8]	REG_TYPE_32BIT_1ST_REG	RO
163		value[8]	REG_TYPE_32BIT_2ND_REG	RO
164		value[9]	REG_TYPE_32BIT_1ST_REG	RO
165		value[9]	REG_TYPE_32BIT_2ND_REG	RO
166		value[10]	REG_TYPE_32BIT_1ST_REG	RO
167		value[10]	REG_TYPE_32BIT_2ND_REG	RO
168		value[11]	REG_TYPE_32BIT_1ST_REG	RO
169		value[11]	REG_TYPE_32BIT_2ND_REG	RO
170		value[12]	REG_TYPE_32BIT_1ST_REG	RO
171		value[12]	REG_TYPE_32BIT_2ND_REG	RO
172		value[13]	REG_TYPE_32BIT_1ST_REG	RO
173		value[13]	REG_TYPE_32BIT_2ND_REG	RO
174		value[14]	REG_TYPE_32BIT_1ST_REG	RO
175		value[14]	REG_TYPE_32BIT_2ND_REG	RO
176		value[15]	REG_TYPE_32BIT_1ST_REG	RO
177		value[15]	REG_TYPE_32BIT_2ND_REG	RO

Modbus address	Description		Reg type	Access
178	mbOutArray	value[16]	REG_TYPE_32BIT_1ST_REG	RO
179		value[16]	REG_TYPE_32BIT_2ND_REG	RO
180		value[17]	REG_TYPE_32BIT_1ST_REG	RO
181		value[17]	REG_TYPE_32BIT_2ND_REG	RO
182		value[18]	REG_TYPE_32BIT_1ST_REG	RO
183		value[18]	REG_TYPE_32BIT_2ND_REG	RO
184		value[19]	REG_TYPE_32BIT_1ST_REG	RO
185		value[19]	REG_TYPE_32BIT_2ND_REG	RO
186		value[20]	REG_TYPE_32BIT_1ST_REG	RO
187		value[20]	REG_TYPE_32BIT_2ND_REG	RO
188		value[21]	REG_TYPE_32BIT_1ST_REG	RO
189		value[21]	REG_TYPE_32BIT_2ND_REG	RO
190		value[22]	REG_TYPE_32BIT_1ST_REG	RO
191		value[22]	REG_TYPE_32BIT_2ND_REG	RO
192		value[23]	REG_TYPE_32BIT_1ST_REG	RO
193		value[23]	REG_TYPE_32BIT_2ND_REG	RO
194		value[24]	REG_TYPE_32BIT_1ST_REG	RO
195		value[24]	REG_TYPE_32BIT_2ND_REG	RO
196		value[25]	REG_TYPE_32BIT_1ST_REG	RO
197		value[25]	REG_TYPE_32BIT_2ND_REG	RO
198		value[26]	REG_TYPE_32BIT_1ST_REG	RO
199		value[26]	REG_TYPE_32BIT_2ND_REG	RO

Modbus address	Description		Reg type	Access
200	mbOutArray	value[27]	REG_TYPE_32BIT_1ST_REG	RO
201		value[27]	REG_TYPE_32BIT_2ND_REG	RO
202		value[28]	REG_TYPE_32BIT_1ST_REG	RO
203		value[28]	REG_TYPE_32BIT_2ND_REG	RO
204		value[29]	REG_TYPE_32BIT_1ST_REG	RO
205		value[29]	REG_TYPE_32BIT_2ND_REG	RO
206		value[30]	REG_TYPE_32BIT_1ST_REG	RO
207		value[30]	REG_TYPE_32BIT_2ND_REG	RO
208		value[31]	REG_TYPE_32BIT_1ST_REG	RO
209		value[31]	REG_TYPE_32BIT_2ND_REG	RO
210		value[32]	REG_TYPE_32BIT_1ST_REG	RO
211		value[32]	REG_TYPE_32BIT_2ND_REG	RO
212		value[33]	REG_TYPE_32BIT_1ST_REG	RO
213		value[33]	REG_TYPE_32BIT_2ND_REG	RO
214		value[34]	REG_TYPE_32BIT_1ST_REG	RO
215		value[34]	REG_TYPE_32BIT_2ND_REG	RO
216		value[35]	REG_TYPE_32BIT_1ST_REG	RO
217		value[35]	REG_TYPE_32BIT_2ND_REG	RO
218		value[36]	REG_TYPE_32BIT_1ST_REG	RO
219		value[36]	REG_TYPE_32BIT_2ND_REG	RO
220		value[37]	REG_TYPE_32BIT_1ST_REG	RO
221		value[37]	REG_TYPE_32BIT_2ND_REG	RO
222		value[38]	REG_TYPE_32BIT_1ST_REG	RO
223		value[38]	REG_TYPE_32BIT_2ND_REG	RO
224		value[39]	REG_TYPE_32BIT_1ST_REG	RO
225		value[39]	REG_TYPE_32BIT_2ND_REG	RO

A.4.10 MODBUS COMMUNICATION PARAMETERS VIA MODBUS

Modbus address	Description		Reg type	Access
226	Setting Modbus communication parameters	**Baudrate:** **Bits 0–2:** 0: 9600 1: 19200 2: 38400 3: 57600 4: 115200 **Serial line mode:** **Bits 3–4:** 0 (0x00)[1]: 8 bits, even parity, 1 stop bit 1 (0x08)[2]: 8 bits, odd parity, 1 stop bit 2 (0x10)[3]: 8 bits, no parity, 2 stops bit **Bit 5–7: Reserved**	REG_TYPE_CTRL	RW

Most significant byte is the Modbus slave address, values 1-247 are allowed.

Most significant byte								Least significant byte							
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Modbus slave address								**Reserved**			**Serial line mode**		**Baudrate**		

The new parameters will take effect after next reset or power cycle of the device.

NOTE: The device may reset in other situations than power cycle or explicit reset e.g. if a transmitter is registered over radio interface.

Example 1

Setting the parameters to 115200 baud, 8N2 (8 bits, no parity, 2 stops bit), and slave address to 9: `0x0914`

[1]Both bits to zero

[2]First bit (=bit 3) to one (=1)

[3]Second bit (=bit 4) to one (=1)

	Most significant byte								**Least significant byte**							
	Modbus slave address								**Reserved**			**Serial**		**Baudrate**		
Integer value	**"9"**								**–**			**"2" (2^d bit to 1)**		**"4"**		
Bit nr	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Value bin	0	0	0	0	**1**	0	0	**1**	0	0	0	**1**	0	**1**	0	0
Value hex	0x09								0x14							

A.4.11 DEVICE RESET

Modbus address	**Description**		**Reg type**	**Access**
227	Device reset	Write any value to this address and the device will reset after the reply is sent to the Modbus master.	REG_TYPE_CTRL	RW

A.5 Modbus Master

There are two central concepts when operating as master:

- Transaction
- Modbus Condition Variable

A.5.1 TRANSACTION

The communication as Modbus Master is built up by transactions. Each transaction is a read or write operation to a specific slave and to a specific address in that slave. There can be several transactions to the same slave, on different registers.

Each transaction can have specific conditions, and the transaction will only take place if those conditions are met, for example transactions which only take place when the slave has not replied to any Modbus operations since the R27 Master booted up. In that case, the slave is considered to be “not connected”. This condition can be used to write configuration to the slave at start-up, so that it will not be needed again once the slave has acknowledged the write operation.

If the slave is lost or does not reply anymore, it is also considered as “not connected”, and transactions that have the condition “not connected” will be executed again.

There can be several “not connected” conditions, and if so, all of them must be successfully completed before the slave is considered connected.

NOTE: R27 supports up to 40 individually configurable transactions[1]. Each transaction can be sent to any slave and support the function codes according to "A.5.3 Supported Functions ".

A.5.2 MODBUS CONDITION VARIABLE

In addition to the condition “connected”/”not connected” there is also another concept called Modbus Condition Variable.

This variable is written from the function blocks, and is 16 bits wide. Each bit in the variable can be used as a condition to do a specific transaction. There is one Modbus Condition Variable per R27.

The conditions that will actually be reflected in this Modbus Condition Variable is very dynamic as it depends on how the function blocks set and reset those bits. For instance, one can have transactions which are executed only when a specific button is pressed on a button transmitter.

The Modbus Condition Variable can be combined with the “connected”/”not connected” state of the slave.

A.5.3 SUPPORTED FUNCTIONS

In limited Modbus master mode, R27 supports the following function codes.

Function code	Description	Function code[2]
READ_COILS_1	Read coils	1
READ_HOLDING_REGISTERS_3	Read holding register	3
READ_INPUT_REGISTERS_4	Read input register	4
WRITE_SINGLE_COIL_5	Write single coil	5
WRITE_REGISTER_6	Write register	6
WRITE_MULTIPLE_COILS_15	Write Multiple Coil	15
WRITE_MULTIPLE_REGISTERS_16	Write multiple registers	16

When a transaction should take place (i.e. when the R27 Modbus master should send the message) is configurable in numerous ways (e.g. at start-up, when a button on the TX is pushed etc.).

[1]If there are two slaves, there can be 20 transactions for each slave (or any other combination not exceeding 40, eg.10 transactions for one slave and 30 transactions for the other slave).

[2]According to Modbus standard.

ANNEX B: INDEX

M

N

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P

R

S

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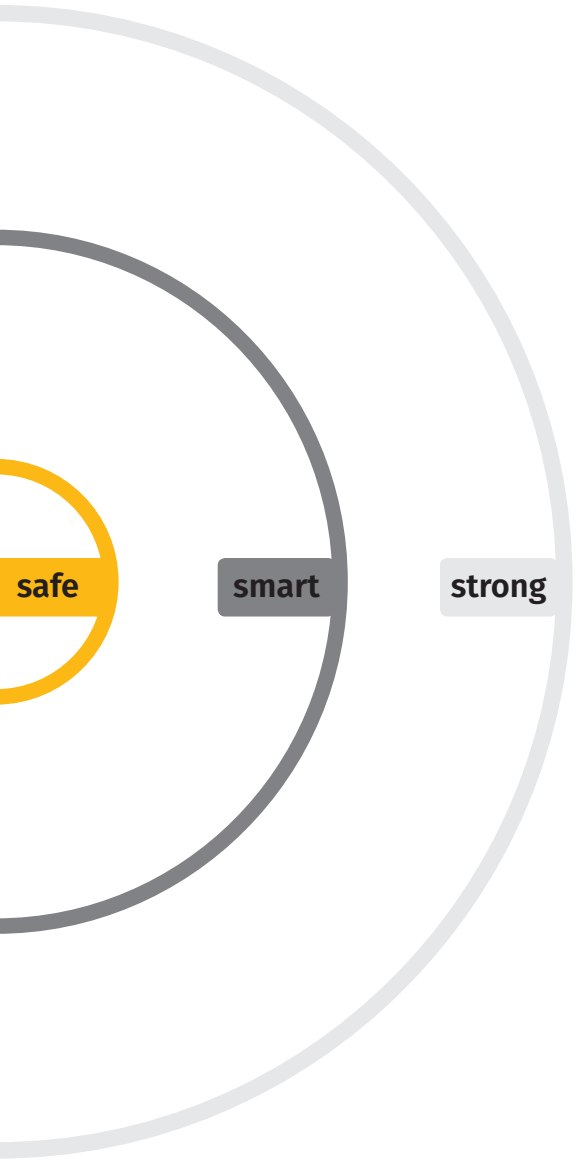

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