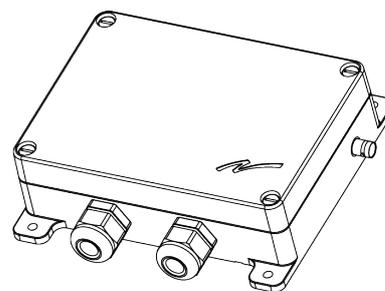
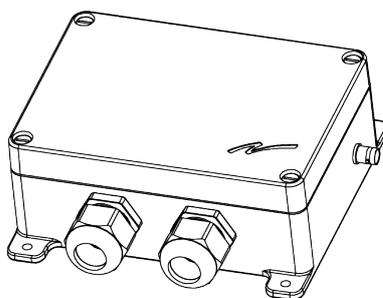


INSTALLATION INSTRUCTIONS

Receivers:

R4-01, R4-03, R4-26, R4-28,
R4-06, R4-08, R4-41, R4-43
R4-36, R4-38



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CHAPTER 1: INTRODUCTION

Thank you for purchasing a Tele Radio AB product



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

These Installation instructions have been published by Tele Radio AB and are not subject to any guarantees. The Installation instructions may be withdrawn or revised by Tele Radio AB at any time and without further notice.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 AB 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 AB 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 AB 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 AB remote control systems are installed.

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

Tele Radio AB products are covered by a warranty against material, construction, or manufacturing faults. See "Chapter 10: Warranty, service, repairs, and maintenance".

1.1 About this document

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

Tele Radio AB'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, and 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 AB.

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 Tiger TG2 systems

The Tiger TG2 product range is composed of transmitters and receivers intended for use together as a system in complex lifting applications such as cranes, OHT cranes and electric hoists or mobile applications.

1.2.1 ABOUT R4 RECEIVERS

R4 receivers have simplex communication with support for duplex. They are compatible with all T9, T11, T12, T14 and T15 transmitters within the same frequency range.

Overview of available models

- 433 MHz frequency range

	Casing type		Main board 12–24 V AC/DC, 48–230 V AC 7 relays	Expansion boards		Bus system CAN/ J1939
	High	Low		10-relay	ADIO (4 relays)	
R4-01	●	–	●	–	–	–
R4-06	●	–	●	●	–	–
R4-26	–	●	●	–	–	● (CANopen)
R4-36	●	–	●	–	●	–
R4-41	–	●	●	–	–	● (J1939)

● Standard – Not available

- 915 MHz frequency range

	Casing type		Main board 12–24 V AC/DC, 48–230 V AC 7 relays	Expansion boards		Bus system CAN/ J1939
	High	Low		10-relay	ADIO (4 relays)	
R4-03	●	–	●	–	–	–
R4-08	●	–	●	●	–	–
R4-28	–	●	●	–	–	● (CANopen)
R4-38	●	–	●	–	●	–
R4-43	–	●	●	–	–	● (J1939)

● Standard – Not available

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 AB 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.



To utilize the safety features of the system, use the stop relays in the safety circuitry of the object/ equipment to be controlled.



When the equipment controlled by the receiver's standard relays is connected via the stop relays, make sure that the maximum current through the stop relays is still within the specifications. Contact your representative for assistance.



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.
- Mount the receiver in a location where the LEDs are easily visible and the buttons 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: FUNCTIONAL SAFETY

NOTE: The information in this section applies only to the products operating in the 433 MHz and 915 MHz radio frequency ranges.

433 MHz	915 MHz
R4-01, R4-06, R4-26, R4-36, R4-41	R4-03, R4-08, R4-28, R4-38, R4-43

Safety functions

STOP FUNCTION

The safety-related stop function in the radio system complies with EN 61508 SIL3 and EN ISO 13849 PL_e. The stop relays on the receiver unit are controlled by the stop button on the transmitter unit. When the stop button is pressed, the stop relays interrupt the power to the safety-related application. The complete end user system, including the radio system, enters a safe state. The maximum response time for the stop function is 500 ms.

Installation

The two stop relays on the receiver unit shall be correctly installed to the end-user system requirements.

NOTE: The safety level of the stop function on the complete end-user system depends on other subsystem(s) and needs to be calculated by the manufacturer of the complete system.

Measures for probability of hardware failures

Transmitter stop function	
Probability of dangerous failure per hour	PFHd = 8.5 FITs (=λdu)
Fraction of total failure rate with dangerous and detected consequence	λ _{dd} = 357 FITs
Diagnostic coverage	DC = 98.3 %
Safe failure fraction	SFF = 99.1 %
Common cause failure	0 FIT
Level of hardware fault tolerance	HFT = 1
Proof test interval	10 years
Diagnostic test interval	Continuous

Receiver stop function	
Probability of dangerous failure per hour	PFHd = 30.1 FITs (=λdu)
Fraction of total failure rate with dangerous and detected consequence	λdd = 685.0 FITs
Diagnostic coverage	DC = 96.9 %
Safe failure fraction	SFF = 98.7 %
Common cause failure	8.0 FIT
Level of hardware fault tolerance	HFT = 1
Proof test interval	10 years
Diagnostic test interval	Continuous

CHAPTER 4: TECHNICAL DATA

4.1 Receiver specifications

4.1.1 433 MHz

	R4-01	R4-06	R4-36	R4-26	R4-41
Input power	12–24 V AC/DC, 48–230 V AC, 50–60 Hz, max. 2 A				
Number of stop relays	2 (potential free*, 16 A, 250 V AC) ¹				
Number of relays	7	17	11	7	7
	(potential free*, 10 A, 250 V AC)				
Relay functionality	Momentary, latching, interlocking		Analog	Momentary, latching, interlocking	
Number of digital inputs	2	10	5	2	2
Number of digital outputs	–	–	12	–	–
Number of transistor outputs	1				
Bus system	–	–	Analog	CANopen	CAN/ J1939
Connector	Cable gland M25 x 1.5			Cable gland M20 x 1.5	
Radio type	Low IF topology				
Radio frequency band	433.075–434.775 MHz				
Number of channels	69 (channels 1–69)				
Radio communication	Simplex (default), support for duplex				
Radio frequency output power	EIRP ² : < 10 dBm (10 mW)				
Max. number of registered transmitters	15				
Antenna	1 BNC connector for external antenna				
Safety level	EN 61508 SIL3 and EN ISO 13849 PLe (Stop function, see "Chapter 3: Functional safety")				
IP code	IP66				
Operating temperature	-20...+55 °C / -4...+130 °F				

¹Maximum load is indicated for resistive load only.

²Equivalent isotropic radiated power

	R4-01	R4-06	R4-36	R4-26	R4-41
Dimensions (LxWxH)	176 x 160 x 75 mm / 6.9 x 6.3 x 2.9 in			176 x 160 x 52 mm / 6.9 x 6.3 x 2 in	
Weight (typical)	800 g / 1.8 lbs	950 g / 2.1 lbs		800 g / 1.8 lbs	

4.1.2 915 MHz

	R4-03	R4-08	R4-38	R4-28	R4-43
Input power	12–24 V AC/DC, 48–230 V AC, 50–60 Hz, max. 2 A				
Number of stop relays	2 (potential free*, 16 A, 250 V AC)				
Number of relays	7	17	11	7	7
	(potential free*, 10 A, 250 V AC)				
Relay functionality	Momentary, latching, interlocking		Analog	Momentary, latching, interlocking	
Number of digital inputs	2	10	5	2	2
Number of digital outputs	–	–	12	–	–
Number of transistor outputs	1				
Bus system	–	–	Analog	CANopen	CAN/ J1939
Connector	Cable gland M25 x 1.5			Cable gland M20 x 1.5	
Radio type	Low IF topology				
Radio frequency band	903.0125–926.9875 MHz				
Number of frequency banks	15 (banks 1–15)				
Radio communication	Simplex (default), support for duplex				
Radio frequency output power	EIRP ¹ : < 0 dBm (1 mW)				
Max. number of registered transmitters	15				
Antenna	1 RP-SMA connector for external antenna				
Safety level	EN 61508 SIL3 and EN ISO 13849 PLe (Stop function, see "Chapter 3: Functional safety")				
IP code	IP66				

¹Equivalent isotropic radiated power

	R4-03	R4-08	R4-38	R4-28	R4-43
Operating temperature	-20...+55 °C / -4...+130 °F				
Dimensions (LxWxH)	176 x 160 x 75 mm / 6.9 x 6.3 x 2.9 in			176 x 160 x 53 mm / 6.9 x 6.3 x 2.1 in	
Weight (typical)	800 g / 1.8 lbs	950 g / 2.1 lbs		800 g / 1.8 lbs	

* Potential free means that a supply voltage is needed to get voltage out of a relay (e.g. via the included connection comb).

4.2 Current consumption

Input power	R4-01, R4-03, R4-26, R4-28, R4-41, R4-43		R4-06, R4-08		R4-36, R4-38	
	Min.*	Max.**	Min.*	Max.**	Min.*	Max.**
12 V AC	0.13 A	0.33 A	0.13 A	0.40 A	0.20 A	0.51 A
24 V AC	0.06 A	0.13 A	0.06 A	0.24 A	0.09 A	0.20 A
48 V AC	0.04 A	0.09 A	0.04 A	0.16 A	0.06 A	0.14 A
115 V AC	0.02 A	0.04 A	0.02 A	0.07 A	0.02 A	0.06 A
230 V AC	0.01 A	0.03 A	0.01 A	0.04 A	0.01 A	0.04 A
12 V DC	0.13 A	0.28 A	0.13 A	0.52 A	0.18 A	0.45 A
24 V DC	0.06 A	0.25 A	0.06 A	0.14 A	0.09 A	0.22 A

*Minimum current consumption = Receiver powered, no active relays, no radio session established.

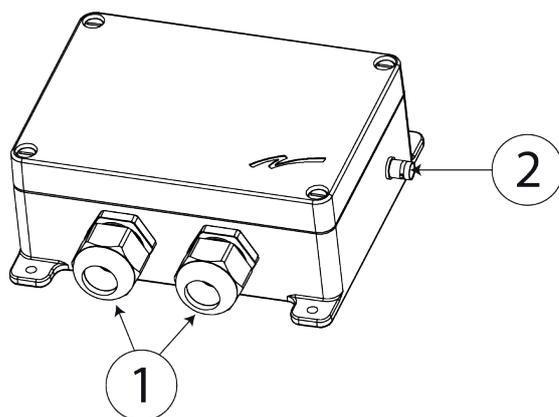
**Maximum current consumption = Receiver powered, all relays on the receiver active, radio session established.

CHAPTER 5: PRODUCT GENERAL DESCRIPTION

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

5.1 Receiver description

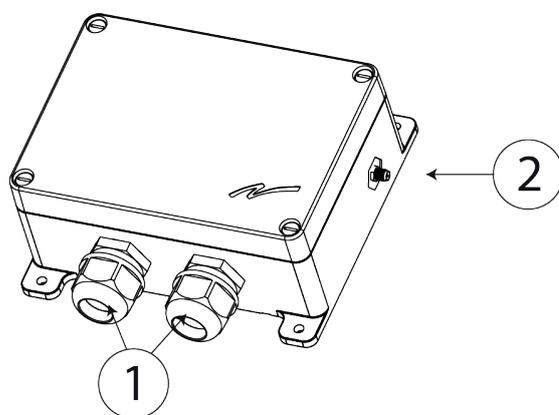
5.1.1 R4-01, R4-06, R4-36



1. Cable gland M25x1.5

2. BNC connector for external antenna*

5.1.2 R4-03, R4-08, R4-38

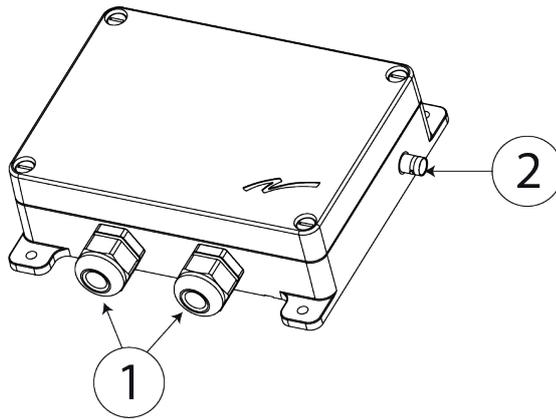


1. Cable gland M25x1.5

2. RP-SMA connector for external antenna*

*Antenna in option. Must be purchased separately.

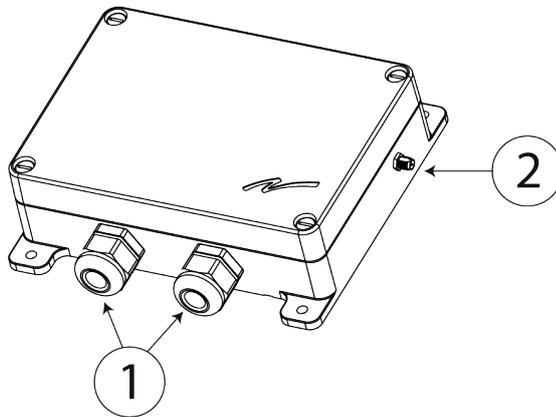
5.1.3 R4-26, R4-41



1. Cable gland M25x1.5

2. BNC connector for external antenna*

5.1.4 R4-28, R4-43



1. Cable gland M25x1.5

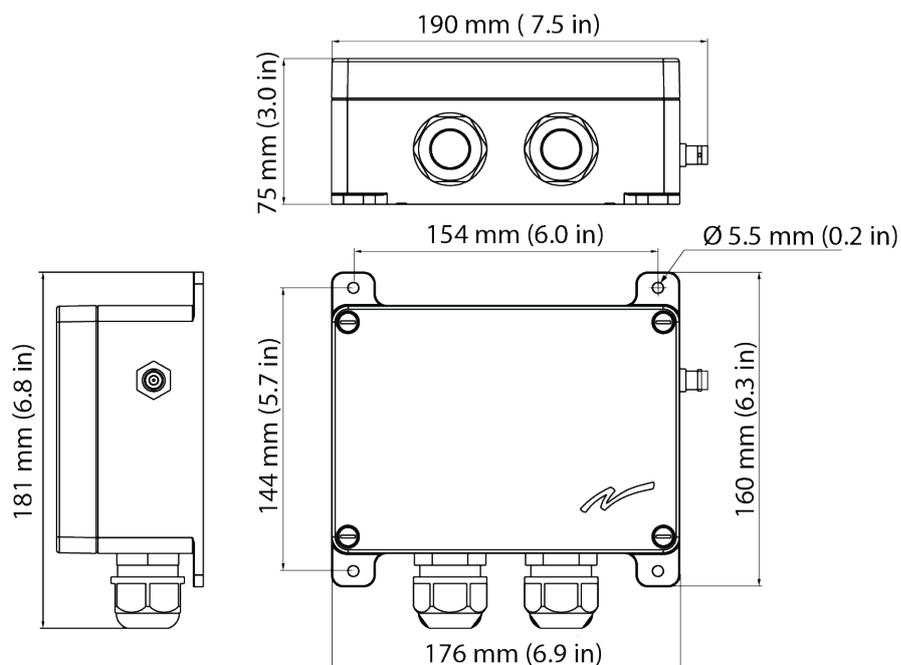
2. RP-SMA connector for external antenna*

*Antenna in option. Must be purchased separately.

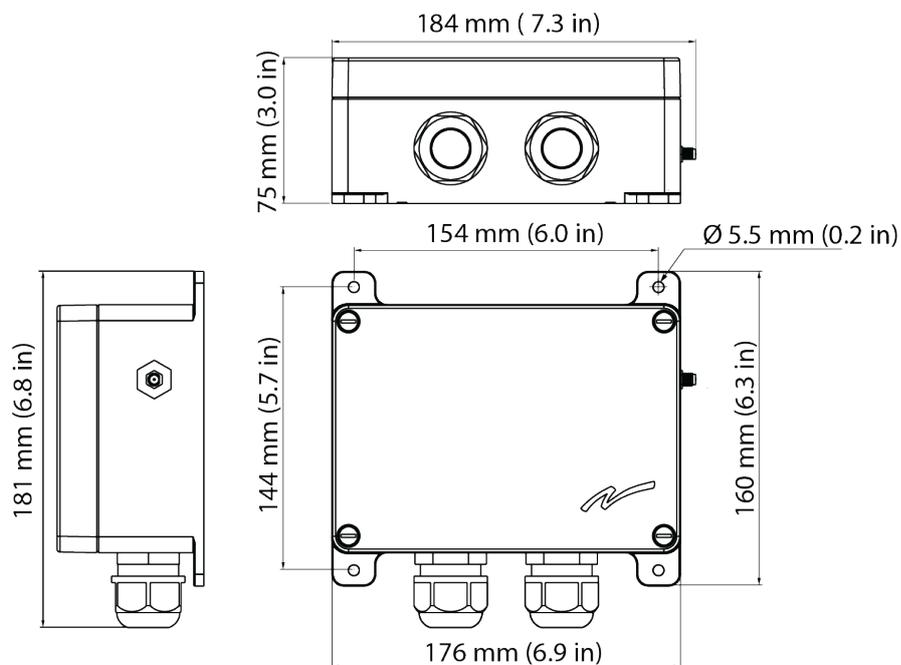
5.2 Mechanical installation

NOTE: For mounting on a wall or equipment, use 4 M5x30 mm screws or equivalent fastening method.

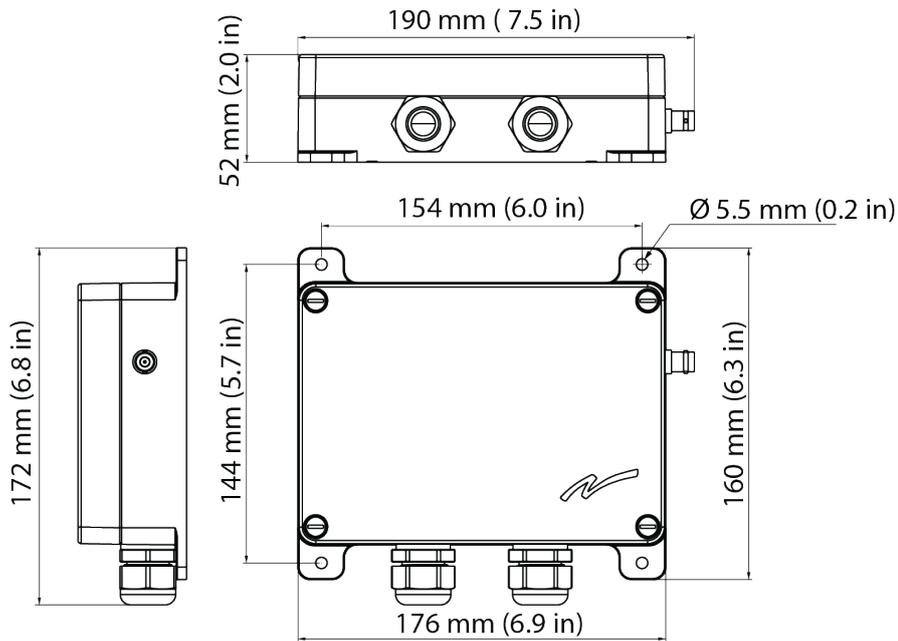
5.2.1 R4-01, R4-06, R4-36 (HIGH CASING, BNC CONNECTOR)



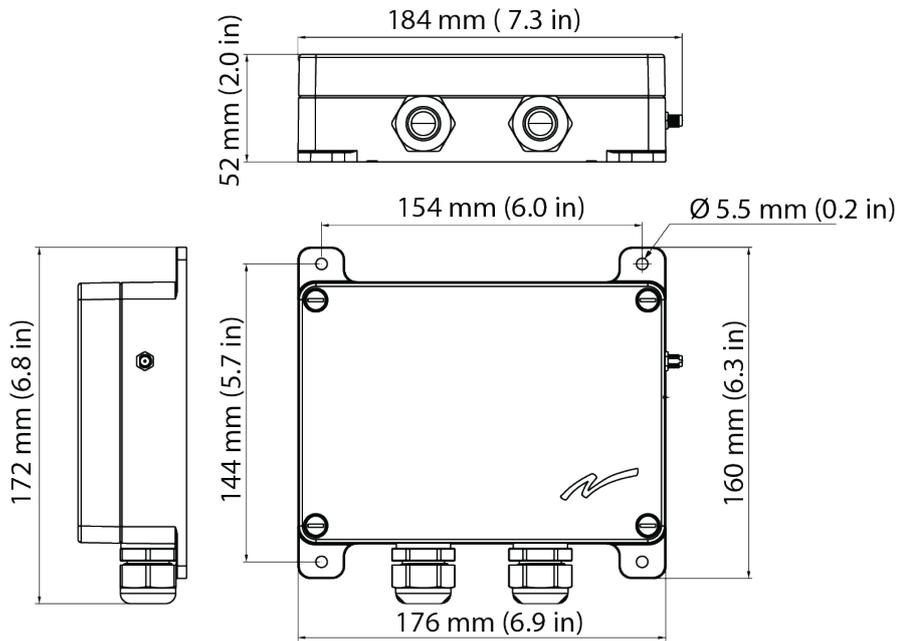
5.2.2 R4-03, R4-08, R4-38 (HIGH CASING, RP-SMA CONNECTOR)



5.2.3 R4-26, R4-41 (LOW CASING, BNC CONNECTOR)



5.2.4 R4-28, R4-43 (LOW CASING, RP-SMA CONNECTOR)



5.2.5 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.

- The receiver must not be installed inside closed metal containers.
- Mount the receiver in a location where the LEDs are easily visible and the buttons on the receiver 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 6: BOARD DESCRIPTION

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

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.

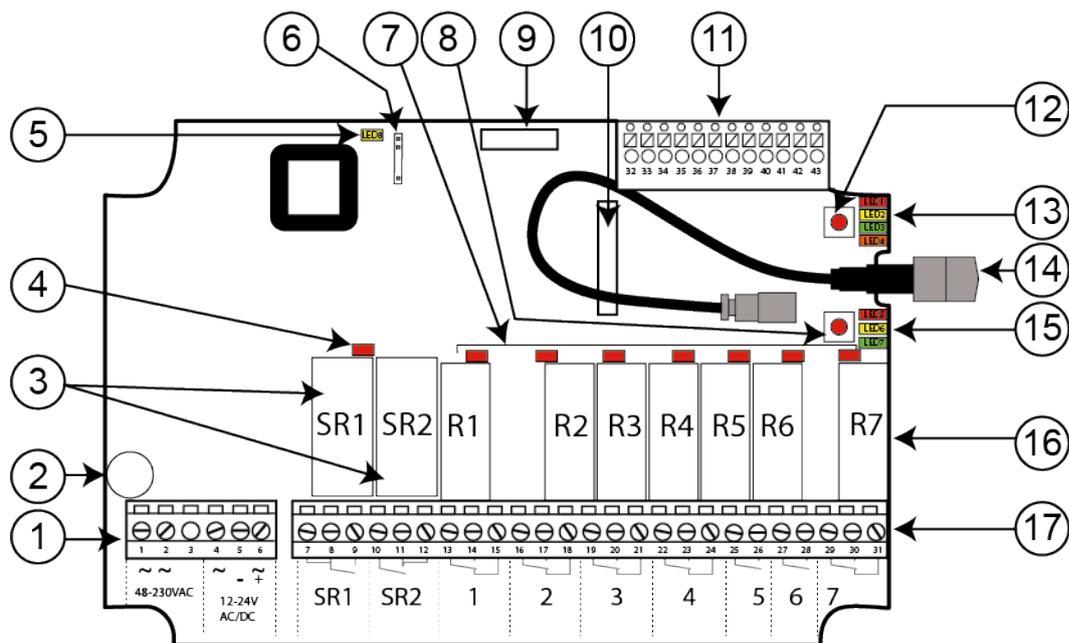
IMPORTANT! Only experienced electronic technicians should add and map expansion boards and inputs/outputs.

6.1 Base board

NOTE: This base board is integrated in all R4 models.

NOTE: **Applies to R4-26, R4-36, R4-41, R4-28, R4-38, R4-43, R4-40, R4-45**

If the base board is powered with 48-230 V AC/DC and used together with a CAN, or A/D IO expansion board, use double insulated cables on the high-voltage and relay terminal blocks.



- | | |
|--|---|
| 1. Terminal block for input power* | 12. Function button (Cancel) |
| 2. Obligatory fuse 2 A (slow) | 13. Function LEDs
(1 = red, 2 = yellow, 3 = green, 4 = orange) |
| 3. Stop relays SR1-2 | 14. Antenna connector |
| 4. LED indicator for stop relays SR1-2 | 15. Function LEDs
(5 = red, 6 = yellow, 7 = green) |
| 5. Power LED (yellow) | 16. Function relays R1-7 (1-4 and 7 = change-over, 5 and 6 = NO) |
| 6. TRABUS contact | 17. Terminal block for function relays R1-7* |
| 7. Relays LEDs (red) | |
| 8. Select button (OK) | |
| 9. Connector for expansion board | |
| 10. Radio module | |
| 11. Terminal block for mixed I/O | |

*For more information about cable requirements, see "6.1.2 Terminal block for stop and function relays on the base board".

6.1.1 TERMINAL BLOCK FOR INPUT POWER ON THE BASE BOARD

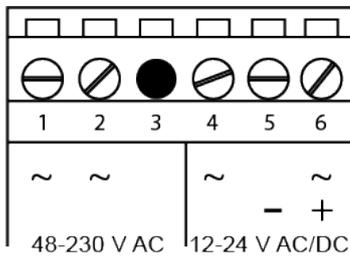


Risk for electric shock. Do not touch the terminal block when the receiver is powered up.

NOTE: If input voltage is higher than 60 V DC or 30 V AC r.m.s, use double insulation cables on the power supply terminal block.

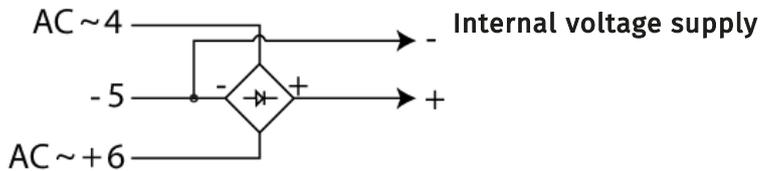
NOTE: Use AWG12-24 cables.

NOTE: If input voltage is higher than 60 V DC or 30 V AC r.m.s, use double insulation cables on the power supply terminal block.



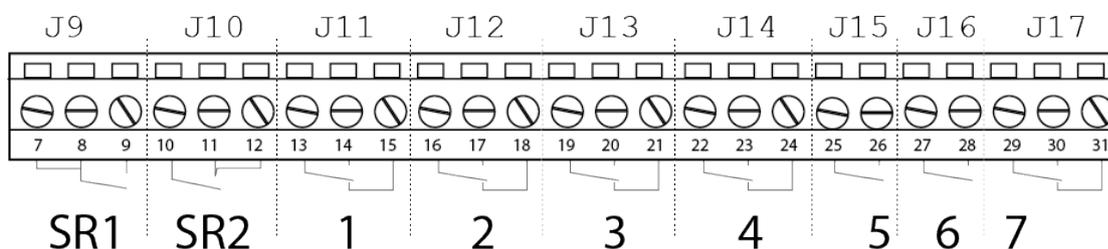
1. 48–230 V AC
2. 48–230 V AC
3. (not used)
4. ~ 12–24 V AC
5. Negative terminal, DC voltage*
6. ~+ 12–24 V AC/DC

*To use when digital inputs are connected to the receiver.



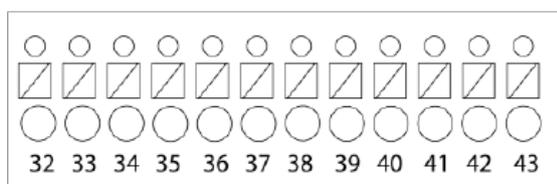
6.1.2 TERMINAL BLOCK FOR STOP AND FUNCTION RELAYS ON THE BASE BOARD

NOTE: If voltage on the function relay(s) is higher than 60 V DC or 30 V AC, use double insulation cables on the relay terminal block.



Terminal block	Pin number	Description	Contact
J9	7-9	Stop relay 1	CO-CO-NO
J10	10-12	Stop relay 2	NO-CO-CO
J11	13-15	Relay 1	CO-NO/NC
J12	16-18	Relay 2	CO-NO
J13	19-21	Relay 3	CO-NO/NC
J14	22-24	Relay 4	CO-NO/NC
J15	25-26	Relay 5	CO-NO
J16	27-28	Relay 6	CO-NO
J17	29-31	Relay 7	CO-NO/NC

6.1.3 TERMINAL BLOCK FOR MIXED I/O

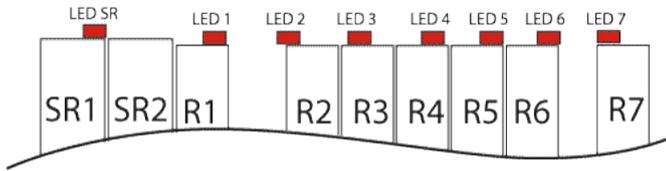


- | | | | |
|--------------|-----------------------|---------------|-------------|
| 32. +12 V DC | 35. GND | 38. DI 2 | 41. RS485A- |
| 33. +5 V DC | 36. DI 1 | 39. GND | 42. RS485B+ |
| 34. GND | 37. Transistor output | 40. +3.3 V DC | 43. GND |

6.1.4 LED INDICATORS ON THE BASE BOARD

NOTE: These LEDs are found in all R4 receiver models.

The base board has eight LEDs for relay status indication. The LED lights when the corresponding relay on the base board is activated.



LED SR = stop relays 1–2

LED 4 = relay 4

LED 1 = relay 1

LED 5 = relay 5

LED 2 = relay 2

LED 6 = relay 6

LED 3 = relay 3

LED 7 = relay 7

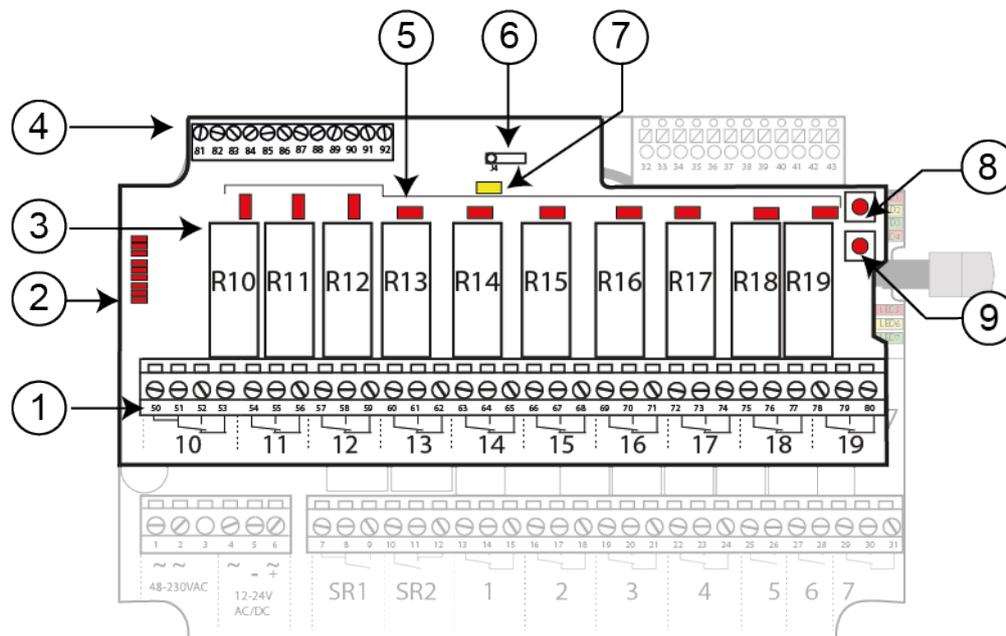
6.2 Expansion boards

Expansion boards can be used to increase the number of inputs/outputs and communication options. There are currently two expansion boards available for the R4 receivers.

EXPANSION BOARDS	Available slots on the base board
10-relay expansion board	1
CAN expansion board	1
Analog outputs expansion board	1

6.2.1 10-RELAY EXPANSION BOARD

NOTE: This relay expansion board is integrated in the following receiver models:
R4-06, TG-R4-08.



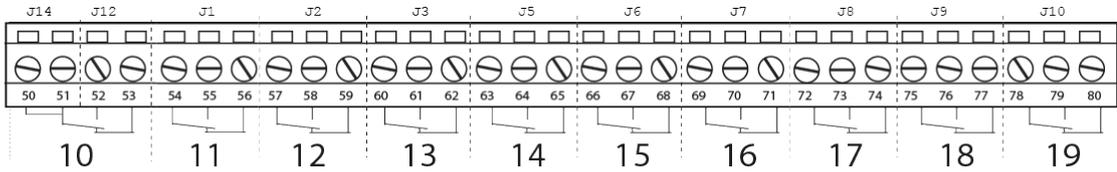
- | | |
|---|------------------------------------|
| 1. Terminal block for function relays R10-19* | 5. Relay LEDs 10-19 (red) |
| 2. LED indicators for stop relays and relays R1-7 on the base board** | 6. TRABUS contact |
| 3. Function relays R10-19 (change-over) | 7. Power LED (yellow) |
| 4. Terminal block for digital inputs | 8. Function button (Cancel) |
| | 9. Select button (OK) |

*For more information about cable requirements, see " Terminal block for function relays on the 10-relay expansion board".

**See " LED indicators on the 10-relay expansion board"

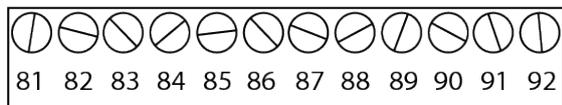
Terminal block for function relays on the 10-relay expansion board

NOTE: If voltage on the function relay(s) is higher than 60 V DC or 30 V AC, use double insulation cables on the relay terminal block.



Terminal block	Pin numbers	Relay number	Relay name	Contact
J14	50-51	10	Function relay 10	CO
J12	52-53			NO/NC
J1	54-56	11	Function relay 11	CO-NO/NC
J2	57-59	12	Function relay 12	CO-NO/NC
J3	60-62	13	Function relay 13	CO-NO/NC
J5	63-65	14	Function relay 14	CO-NO/NC
J6	66-68	15	Function relay 15	CO-NO/NC
J7	69-71	16	Function relay 16	CO-NO/NC
J8	72-74	17	Function relay 17	CO-NO/NC
J9	75-77	18	Function relay 18	CO-NO/NC
J10	78-80	19	Function relay 19	CO-NO/NC

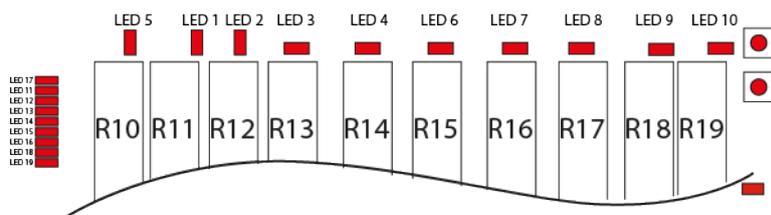
Terminal block for digital inputs on the 10-relay expansion board



81. GND	85. DI 3	89. DI 7
82. GND	86. DI 4	90. DI 8
83. GND	87. DI 5	91. DI 9
84. GND	88. DI 6	92. DI 10

LED indicators on the 10-relay expansion board

The expansion board has 10 LEDs for relay status indication (LEDs 1–10) and 9 LEDs (LEDs 11–19) for status indication of the stop relays and the function relays on the base board, hidden behind the expansion board. The LEDs light when the corresponding relays are activated.



- LED indicators for relays R10-19

LED 5 = relay 10	LED 6 = relay 15
LED 1 = relay 11	LED 7 = relay 16
LED 2 = relay 12	LED 8 = relay 17
LED 3 = relay 13	LED 9 = relay 18
LED 4 = relay 14	LED 10 = relay 19

- LED indicators for base board relays

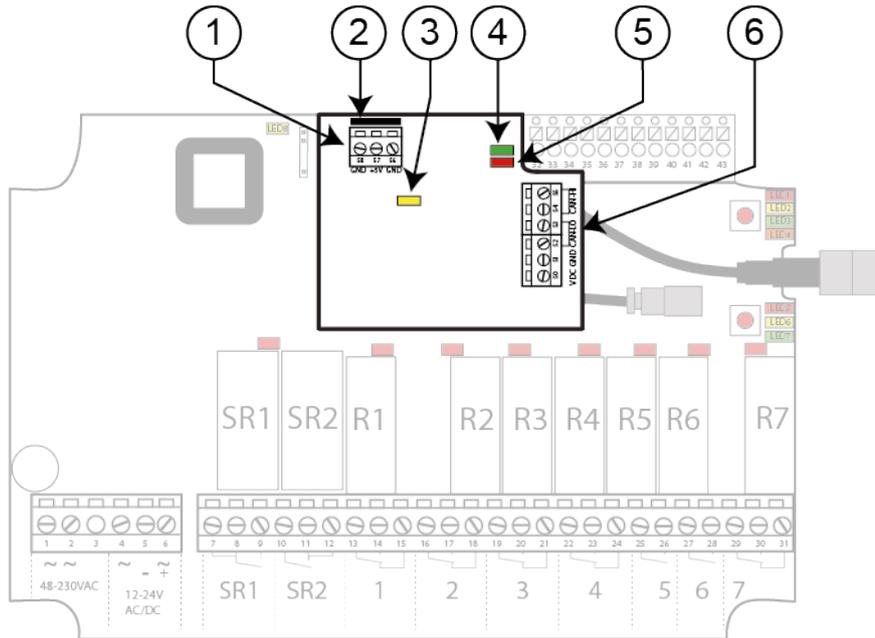
NOTE: These LEDs are found in the following receiver models: **R4-06, R4-08**

LEDs 11–19 provide feedback information about the stop relays (SR1–2) and the function relays R1–7 on the base board.

	LED number on the expansion board	Relay number on the base board
	LED 17	Relay 1
	LED 11	Relay 2
	LED 12	Relay 3
	LED 13	Relay 4
	LED 14	Relay 5
	LED 15	Relay 6
	LED 16	Relay 7
	LED 18	Not used
	LED 19	Stop relays SR1-2

6.2.2 CAN EXPANSION BOARD

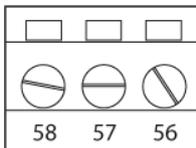
NOTE: This relay expansion board is integrated in the following receiver models:
R4-26, R4-28, R4-41, R4-43



- | | |
|---|-----------------------------------|
| 1. Terminal block for internal power supply | 4. CAN run LED |
| 2. TRABUS contact | 5. CAN error LED |
| 3. Power LED (yellow) | 6. Terminal block for CAN signals |

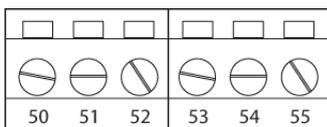
*Indicates +5V power supply to the secondary side of the CANopen expansion board.

Terminal block for internal power supply on CAN expansion board



- 56. GND
- 57. +5 V DC
- 58. GND

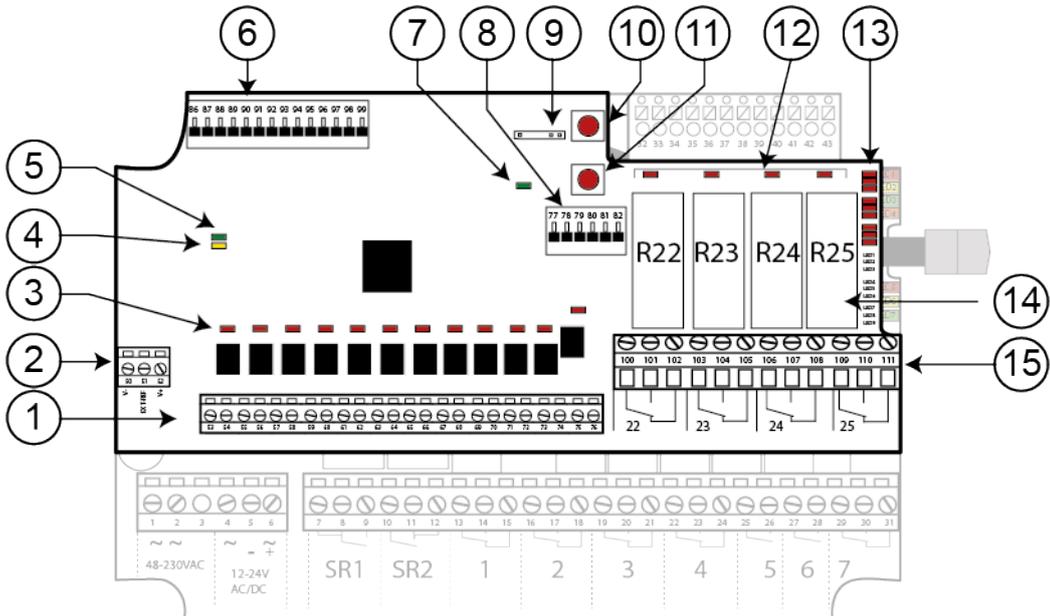
Terminal block for CAN signals on CAN expansion board



- | | |
|--------------------------------|--------------|
| 50. Supply voltage (5–24 V DC) | 53. CAN Low |
| 51. GND | 54. CAN High |
| 52. CAN Low | 55. CAN High |

6.2.3 ANALOG EXPANSION BOARD

NOTE: This relay expansion board is integrated in the following receiver models:
R4-36, R4-38



- | | |
|--|--|
| <ul style="list-style-type: none"> 1. Terminal block for digital outputs 2. Terminal block for external analog reference 3. LED indicators for the digital outputs (red) 4. LED indicator for the internal DC/DC converter (yellow) 5. LED indicator for the base board communication (green) 6. Terminal block for analog outputs 7. LED indicator for the communication with the base board (green) | <ul style="list-style-type: none"> 8. Terminal block for digital inputs 9. TRABUS contact 10. Function button (Cancel) 11. Select button (OK) 12. Relay LEDs 22–25 (red) 13. LED indicators for stop relays and relays 1–7 on the base board 14. Function relays R22–25 (change-over) 15. Terminal blocks for function relays R22–25 |
|--|--|

*See" LED indicators on the analog expansion board"

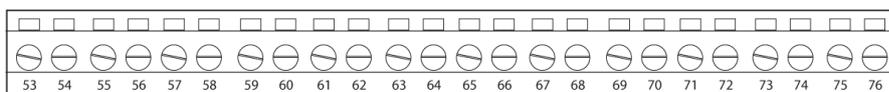
Terminal block for digital inputs on the analog expansion board



- | | |
|----------|---------|
| 77. DI 3 | 80. GND |
| 78. DI 4 | 81. GND |
| 79. DI 5 | 82. GND |

Terminal block for digital outputs on the analog expansion board

There are 12 digital outputs on the expansion board. Maximum input power is 50 V DC, 30 mA.



- | | | |
|---------------------|---------------------|---------------------|
| 53. DO 10 | 61. DO 14 | 69. DO 18 |
| 54. DO 10 reference | 62. DO 14 reference | 70. DO 18 reference |
| 55. DO 11 | 63. DO 15 | 71. DO 19 |
| 56. DO 11 reference | 64. DO 15 reference | 72. DO 19 reference |
| 57. DO 12 | 65. DO 16 | 73. DO 20 |
| 58. DO 12 reference | 66. DO 16 reference | 74. DO 20 reference |
| 59. DO 13 | 67. DO 17 | 75. DO 21 |
| 60. DO 13 reference | 68. DO 17 reference | 76. DO 21 reference |

Terminal block for analog outputs on the analog expansion board

NOTE: Possible values of the analog outputs (AO): voltage output

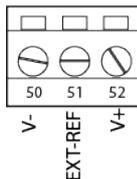
- 0–10 V DC
- -10...+10 V DC
- 25%-75% or 10%-90% output



86 –92. GND/Analog reference output (for 0...+10V and -10...+10 V output connection)
 Half input voltage/Analog reference output (for 25%-75% or 10%-90% output connection)

93. AO 1	95. AO 3	97. AO 5	99. AO 7
94. AO 2	96. AO 4	98. AO 6	

Terminal block for external analog reference on the analog expansion board



How to connect to the terminal block depends on the receiver configuration. Contact your representative for assistance.

Voltage on AO	Internal DC/DC converter		Terminal connections
	On	Off	
0...+10 V	●		50. Leave unconnected 51. Leave unconnected 52. Leave unconnected
		●	50. Negative supply voltage 51. Leave unconnected 52. Positive supply voltage
-10...+10 V	●		50. Leave unconnected 51. External reference* 52. Leave unconnected <div style="border: 1px solid black; padding: 2px; width: fit-content;">NOTE: External supply voltage shall not be connected. Guaranteed output range is -5...+5 V.</div>
		● ¹	50. Negative supply voltage 51. External reference* 52. Positive supply voltage <div style="border: 1px solid black; padding: 2px; width: fit-content;">NOTE: External supply voltage of 22–35 V DC is required to achieve full -10...+10V output.</div>
			* Analog output reference will follow this voltage. Input impedance is 235 kΩ. If unconnected, the analog output reference will be in the middle of the external supply voltage. If asymmetrical reference is required, connect reference voltage to 51.

¹My new footnote

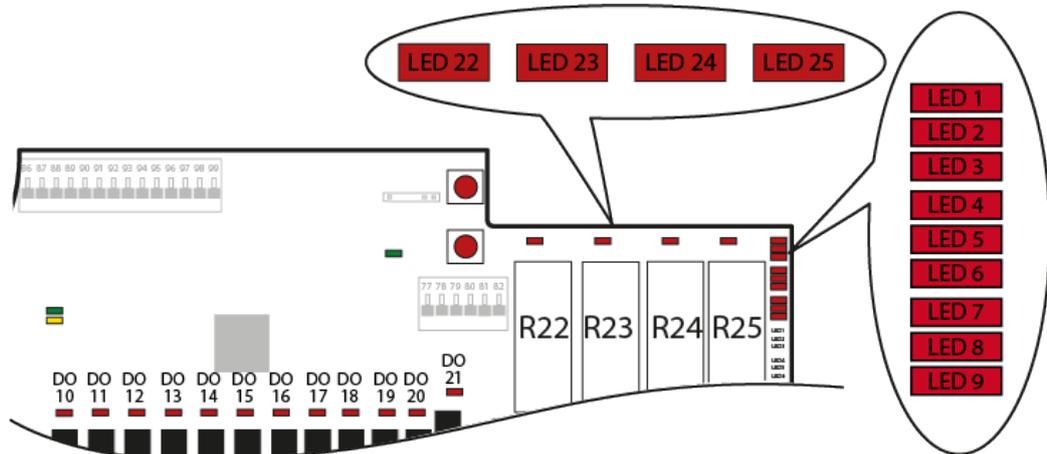
Voltage on AO	Internal DC/DC converter		Terminal connections
	On	Off	
25–75 % or 10–90 % of the supply voltage**		●***	50. Negative supply voltage 51. Leave unconnected 52. Positive supply voltage

** Depending on the configuration of the receiver, the output voltage measured between the reference output and analogue output is -25% to +25% of the power supply voltage, or -40% to +40% of the supply voltage. If the output is measured against the negative supply, the output is 25% to 75% or 10% to 90%.

*** DC/DC converter is always OFF, as the power supply is measured to give relative output voltage.

LED indicators on the analog expansion board

The expansion board has 12 LEDs for digital outputs DO10–21, four LEDs for relay status indication (LEDs 22–25) and nine LEDs (LED 1–9) for status indication of the stop relays and the function relays on the base board, hidden behind the expansion board. The LEDs light when the corresponding relays are activated.



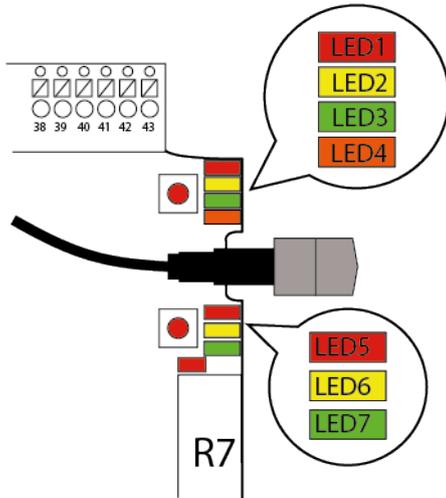
- **LED indicators for base board relays**

NOTE: These LEDs are found in the following receiver models: **R4-36, R4-38**

LEDs 1–9 provide feedback about the stop relays (SR1–2) and the function relays R1–7 on the base board

	LED number on the expansion board	Relay number on the base board
	LED 1	Relay 1
	LED 2	Relay 2
	LED 3	Relay 3
	LED 4	Relay 4
	LED 5	Relay 5
	LED 6	Relay 6
	LED 7	Relay 7
	LED 8	Not used
	LED 9	Stop relays 1–2

CHAPTER 7: STATUS AND ERROR INDICATIONS



7.1 Function LEDs indication in normal operation

LED	Color	Off	On	Flashing	Indicates
1	Red	○			No transmitter is registered.
			●		One or more transmitters are registered.
2	Yellow	○			No transmitter is logged in.
			●		One transmitter is logged in.
3	Green		●		Receiving valid RS485 data.
4	Orange	○			SIL conformity (settings in the safety CPUs are conform with SIL3).
			●		SIL error (settings in the safety CPUs are not conform with SIL3).
5	Red	○			Automatic frequency control processing. Signal is not locked on the transmitter.
			●		Automatic frequency control fine-tuned. Signal is locked on the transmitter.
				●	The receiver is scanning frequency
6	Yellow		●		Receiving valid sync word.
7	Green		●		Receiving valid radio packet.

7.2 CANopen run status

NOTE: Applies to receiver models: **R4-26, R4-28, R4-41, R4-43**

Colour	On	Flickering together with Error LED	Single flash	Blinking
Green	Operational state	LSS	Stopped state	Pre-operational state

CANopen communication states	Description
Operational	State for process data transmission.
LSS	LSS services in progress
Stopped	Except for node guarding or heartbeat messages, a node cannot transmit or receive any other messages in this state.
Pre-operational	State for the configuration of CANopen devices. PDO communication is not possible in this state.

7.3 CANopen error status

Colour	On	Flickering together with Error LED	Single flash	Blinking	Triple flash
Red	Bus off	LSS	Warning limit reached	Error control event	Sync error

CANopen error states	Problem description
Bus off	CAN controller is in bus off.
LSS	LSS services in progress.
Warning limit reached	At least one of the error counters in the CAN controller has reached or exceeded its warning level (e.g. too many error frames).
Error control event	A guard event or a heartbeat event has occurred.
Sync error	The sync message has not been received within the configured communication cycle time.

7.4 Fatal error indications and error code messages

Fatal errors are indicated by function LEDs 1–7, which are all flashing at the same time. Each fatal error is identified by a code indicated by relay LEDs 1–5 (or by LEDs 17, 11–14 on the relay expansion board). Contact your representative for assistance.

●: LED is lit. ○: LED is off.

Relay LED ¹ /LED ²					Description
Relay LED1/ LED17 (red)	Relay LED2/ LED11 (red)	Relay LED3/ LED12 (red)	Relay LED4/ LED13 (red)	Relay LED5/ LED14 (red)	
●	○	○	○	○	Invalid/ missing production data in the CPUs
○	●	○	○	○	Incompatible software in the CPUs
●	●	○	○	○	Bad settings data
○	○	●	○	○	No reply from CPU1 or CPU2
●	○	●	○	○	Receiver in test mode (no error)
○	●	●	○	○	Initialization of the radio module failed
●	●	●	○	○	Incompatible expansion board*
○	○	○	●	○	No CAN expansion board found**
●	○	○	●	○	SIL error reported from CPU1 or CPU2
○	●	○	●	○	Incompatible radio module
●	●	○	●	○	LML fatal error
○	○	●	●	○	Missing or bad binDat
●	○	●	●	○	No binDat ID in binDat
○	●	●	●	○	Wrong target software ID in binDat

¹On the base board and the analog exp. board.

²On the relay expansion board .

Relay LED ¹ /LED ²					Description
Relay LED1/ LED17 (red)	Relay LED2/ LED11 (red)	Relay LED3/ LED12 (red)	Relay LED4/ LED13 (red)	Relay LED5/ LED14 (red)	
●	●	●	●	○	Wrong target software version in binDat
○	○	○	○	●	Wrong cclml version in binDat
●	○	○	○	●	Buffer is full

* R4-06, R4-08 models only.

** R4-26, R4-28, R4-41, R4-43 models only.

¹On the base board and the analog exp. board.

²On the relay expansion board .

7.5 Show digital input status on the transmitter

NOTE: This function requires duplex communication to be activated. Contact your representative for assistance.

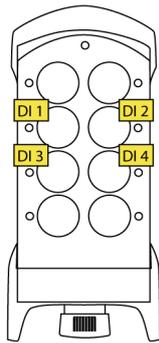
NOTE: Only with push button transmitters (T9, T11, T14, T15).

The status of the receiver's digital inputs can be indicated by the LEDs on the transmitter. Up to eight of the receiver's digital inputs can be mapped to transmitter LEDs 3–10, and depending on the transmitter, the number of digital inputs displayed can vary from two to eight.

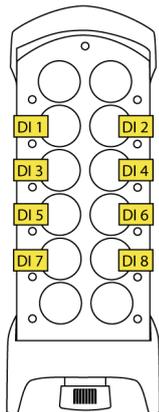
7.5.1 SUITABLE TRANSMITTERS

NOTE: The digital inputs displayed on the transmitter always correspond to those of the first receiver that has been logged in to. For other settings of the digital inputs indication on the transmitter, contact your representative for assistance.

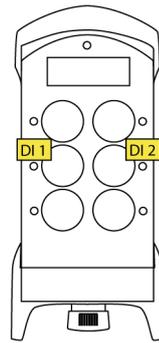
T9-01, T9-11



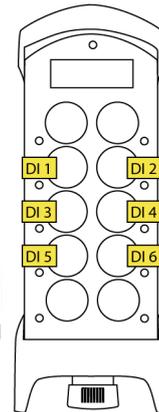
T11-05, T11-15



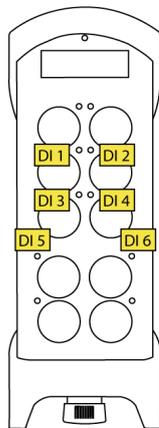
T9-02, T9-12



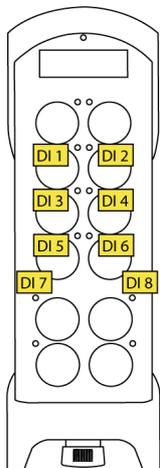
T11-01, T11-14



T14-07, T14-08



T15-07, T15-08



NOTE: T12 transmitters do not have LED indication for the receiver's digital inputs.

7.5.2 MAP DIGITAL INPUTS TO TRANSMITTER LEDS

To map a digital input to a LED on the transmitter, connect the digital input to GND (see "6.1.3 Terminal block for mixed I/O", " Terminal block for digital inputs on the 10-relay expansion board ", " Terminal block for digital inputs on the analog expansion board"). The corresponding LED will light when the digital input is activated.

NOTE: $LED_{\text{number}} = DI_{\text{number}} + 2$

Ex. R4-06:

If pin 84 is connected to pin 85, LED 5 will light on the transmitter when DI 3 is activated.

84 = GND

85 = DI 3

CHAPTER 8: OPERATION

8.1 General information

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.

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

8.2 Relay functions

The receiver is set to momentary relay function by default. The relay remains active while a button is pressed on the transmitter. When the button is released the relay deactivates. Setting a relay to latching means that the relay becomes active when a button is pressed and remains active until the button is pressed again.

CHAPTER 9: CONFIGURATION MENU

All configuration settings require access to the receiver circuit board(s).



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.

1. Remove the front cover of the receiver. Use a screwdriver to remove the screws.
2. Power the receiver up.
3. The power LED lights (yellow).
4. Proceed with the configuration instructions of your choice.

9.1 Menu mode

The different menus are identified by function LEDs 1–5 (see "6.1 Base board").

To select the different menus, press the **Function** button a predefined number of times according to the following table. Press the **Select** button to enter.

●: LED is lit. ○: LED is off.

Menu	To select the menu, press the Function button...	Function LEDs light				
		LED 1 (red)	LED 2 (yellow)	LED 3 (green)	LED 4 (orange)	LED 5 (red)
Register/ erase transmitters	once	●	○	○	○	○
Show settings	2 times	○	●	○	○	○
Not used	–	○	○	●	○	○
Show/ change Operating mode*	4 times	○	○	○	●	○
Show/Change latching/ momentary functions	5 times	○	○	○	○	●

9.2 Register a transmitter



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 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.

NOTE: For the registration procedure to be successful, the receiver must be powered up.

1. Set the transmitter in registration mode (see relevant transmitter installation instructions).
2. Press the **Function** button.
Function LED 1 flashes (red). Red lit relay LEDs 1–7 show the number of transmitters already registered in the receiver¹.
3. Press the **Select** button.
*All relay LEDs light red. The receiver will remain in registration mode for 1 minute.
Once the receiver has found the transmitter, Function LED 1 and all the receiver relay LEDs will flash.*
4. Press the **Select** button again.
*Function LEDs 1–7 flash 3 times (multicolor). All relay LEDs go off. All function LEDs light for approximately 1 second.
The transmitter is now registered in the receiver.
The transmitter turns off.*

If not successfully completed, the top LED lights red and the buzzer emits a beep. The transmitter turns off. Go back to step 1 and try again.

¹Or LEDs 17, 11–16 on the relay expansion board). Example: relay LED 1 = 1 registered transmitter, relay LED 2 = 2 registered transmitters, etc.

9.3 Show settings

1. Press the receiver **Function** button twice.
Function LED 2 lights (yellow).
2. Press the **Select** button.
Function LED 2 flashes (yellow). Relay LEDs 1–7 (or LEDs 17, 11–16 on the relay expansion board) indicate the current settings according to the following table:

Relay LED ¹ / LED ²	Color	Off	On	Indicates
Relay LED 1 / LED 17	red	○		Frequency scan off (fixed frequency)
			●	Frequency scanning on
Relay LED 2 / LED 11	red	○		Standard xApp
			●	Non standard xApp
Relay LED 3 / LED 12	red	○		Configuration ID not enabled
			●	Configuration ID enabled
Relay LED 4 / LED 13	red	○		Default settings in safety CPUs (conform with SIL3)
			●	Non-default settings in safety CPUs (not conform with SIL3)
Relay LED 5 / LED 14	red	○		Enabled for changes via SM
			●	Locked for changes via SM
Relay LED 6 / LED 15	red	○		Software has been officially released
			●	Preliminary software

After approximately 10 seconds, the receiver will automatically exit "Show Settings" mode and return to normal operation.

¹On the base board and the analog exp. board.

²On the relay expansion board .

9.4 Operating modes

NOTE: Operating modes can be selected on the following receiver models: **R4-01, R4-03, R4-06, R4-08**

NOTE: Operating modes 0 and 255 are reserved for specific customer applications. Contact your representative for assistance.

Operating modes are designed for the base board and the relay expansion board only. The **Operating mode** is indicated by the relay LEDs 1–7 (or LEDs 17, 11–16 on the relay expansion board).

9.4.1 SELECT AN OPERATING 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.



Ensure that the stop relays are deactivated before proceeding with the following instructions; LED SR/ LED 9 must be Off.

1. Press the **Function** button 4 times.

*Function LED 4 flashes fast (orange). Relay LEDs 1–7 (or LEDs 17, 11–16 on the relay expansion board) indicate the selected **Operating mode** according to the following table.*

Relay LED 1 ¹ / LED 17 ²	Relay LED 2 / LED 11	Relay LED 3 / LED 12	Relay LED 4 / LED 13	Relay LED 5 / LED 14	Relay LED 6 / LED 15	Relay LED 7 / LED 16	Operating mode
○	○	○	○	○	○	○	0 ³
●	○	○	○	○	○	○	1 (default)

¹On the base board and the analog exp. board.

²On the relay expansion board .

³Operating mode reserved for specific customer applications. Contact your representative for assistance.

Relay LED 1 ¹ / LED 17 ²	Relay LED 2 / LED 11	Relay LED 3 / LED 12	Relay LED 4 / LED 13	Relay LED 5 / LED 14	Relay LED 6 / LED 15	Relay LED 7 / LED 16	Operating mode
○	●	○	○	○	○	○	2
●	●	○	○	○	○	○	3
○	○	●	○	○	○	○	4
●	○	●	○	○	○	○	5
○	●	●	○	○	○	○	6
●	●	●	○	○	○	○	7
●	●	●	●	●	●	●	255 ³

2. Press the **Select** button to enter setting mode.
Function LED 4 flashes slow (orange).
3. Press the **Function** button once to move to the next **Operating mode** (repeat until the LED combination corresponds to the desired **Operating mode**).
4. Press the **Select** button to confirm the new **Operating mode**.
All function LEDs light briefly.
The receiver returns to normal operation.

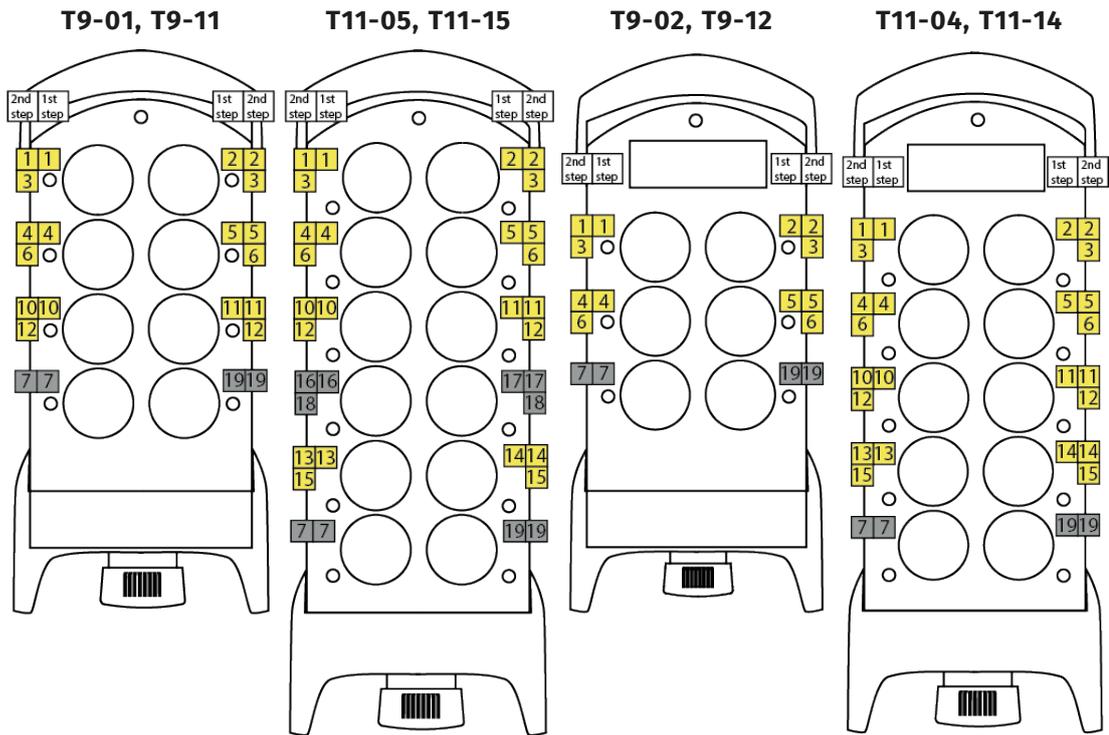
*Example: relay LED 2 is lit, which means **Operating mode 2** is selected. Pressing the **Function** button once will change to **Operating mode 3**, LED 1+2 light. To go to Operating mode 4, press the **Function** button one more time, LED 1+2 go off and LED 3 lights.*

¹On the base board and the analog exp. board.

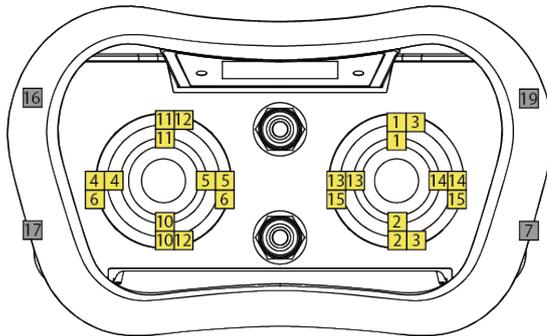
²On the relay expansion board .

³Operating mode reserved for specific customer applications only. Contact your representative for assistance.

9.4.2 OPERATING MODE 1



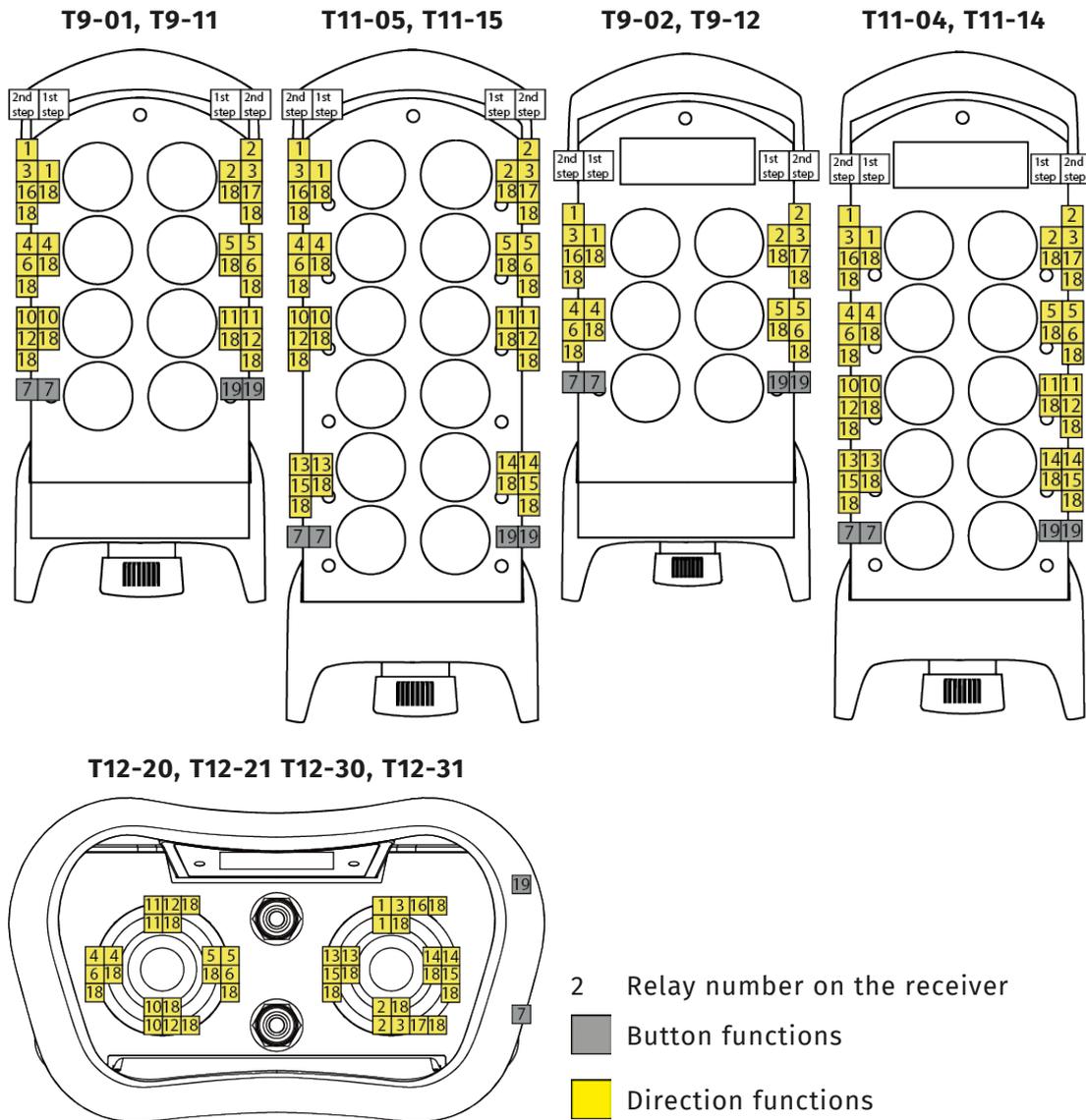
T12-20, T12-21 T12-30, T12-31



- 2 Relay number on the receiver
- Button functions
- Direction functions

Transistor output (buzzer)	Transistor output activates together with relay 7
Load select relays	-
Programmable relay functions	Relay 7, 19 can be set to latching
Interlocking	Button transmitters – interlocking between direction functions horizontally aligned Joystick transmitters – interlocking between positive and negative side of each joystick axis
Zero position check	Active for all functions

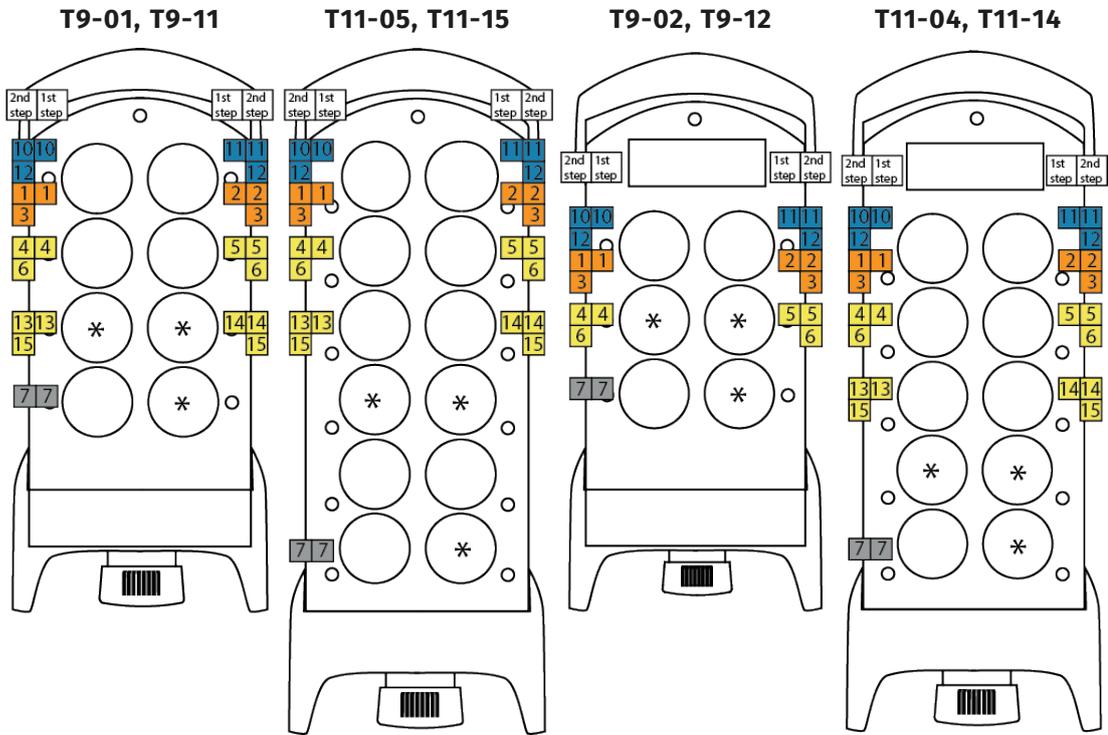
9.4.3 OPERATING MODE 2



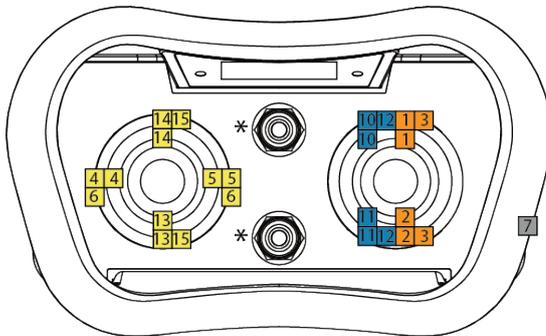
Transistor output (buzzer)	Transistor output activates together with relay 7
Load select relays	–
Programmable relay functions	Relay 7, 19 can be set to latching
Interlocking	Button transmitters – interlocking between direction functions horizontally aligned Joystick transmitters – interlocking between positive and negative side of each joystick axis
Zero position check	Active for all functions

9.4.4 OPERATING MODE 3

NOTE: This Operating mode supports **Load select mode**. See transmitter installation instructions for available **Load select modes**.



T12-20, T12-21 T12-30, T12-31

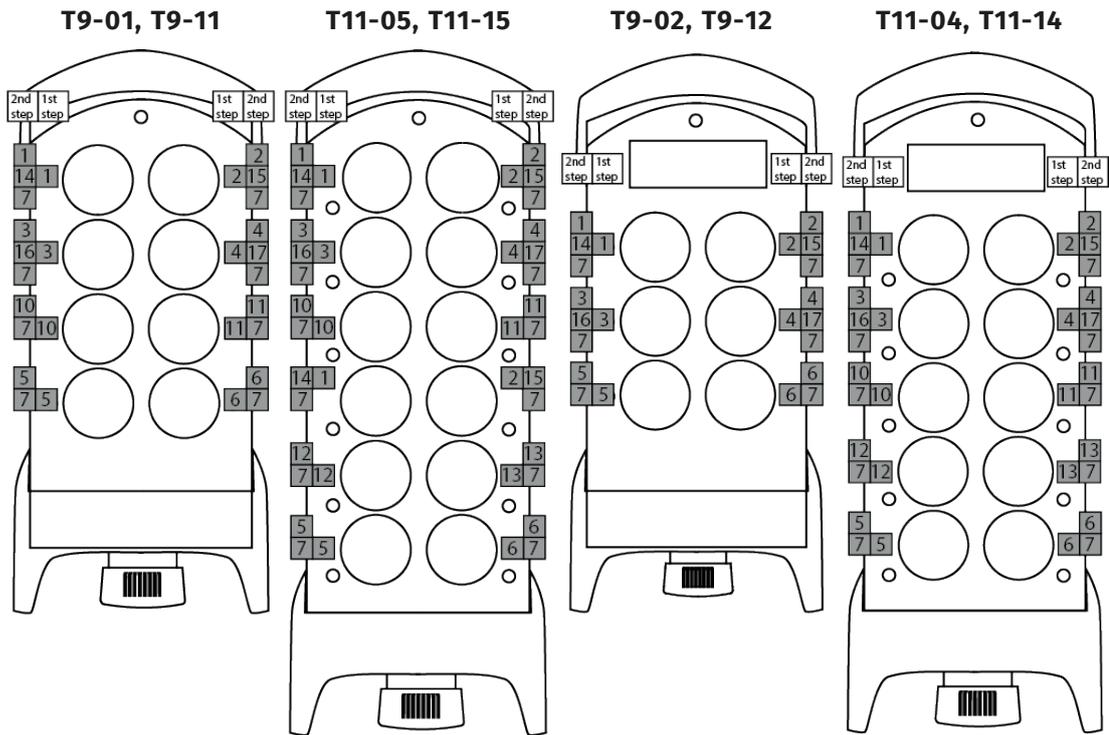


- 2 Relay number on the receiver
- Button functions
- Direction functions
- Load select A + direction functions
- Load select B + direction functions
- * Depending on the Load select mode selected on the transmitter.

Transistor output (buzzer)	Transistor output activates together with relay 7
Load select relays	Load A: Relay 16 Load B: Relay 17 Load C: Relay 18 Load D: Relay 19
Programmable relay functions	Relay 7 can be set to latching

Interlocking	Button transmitters – interlocking between direction functions horizontally aligned Joystick transmitters – interlocking between positive and negative side of each joystick axis
Zero position check	Active for all functions

9.4.5 OPERATING MODE 4



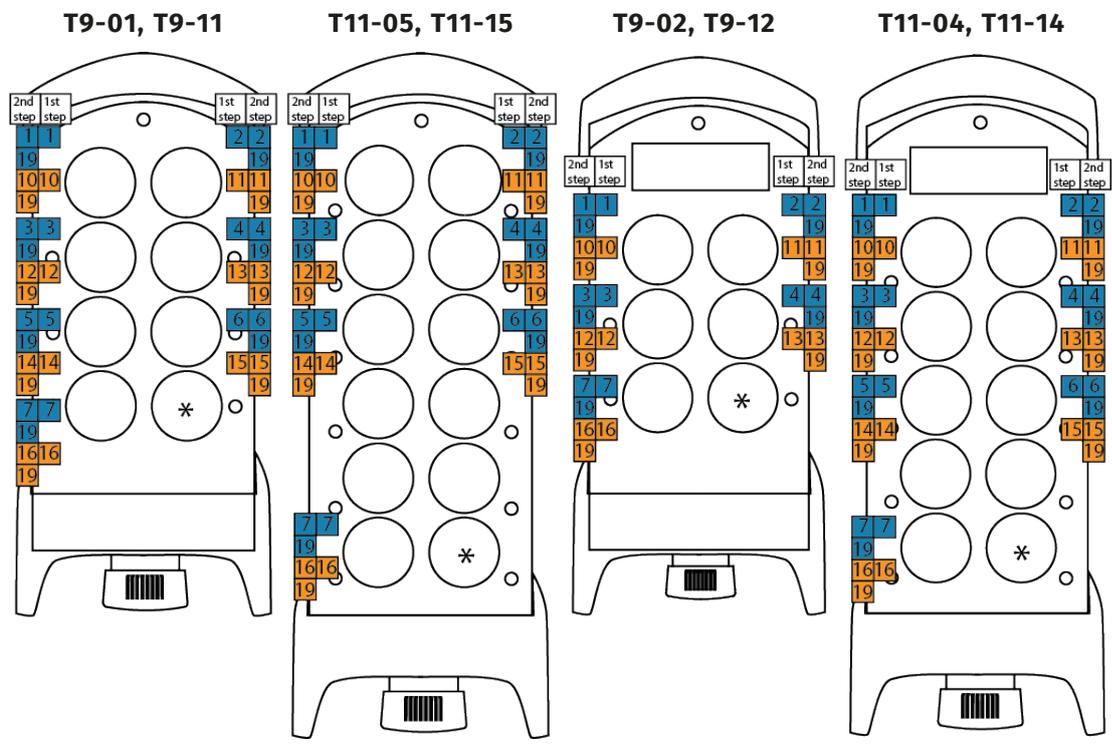
2 Relay number on the receiver

■ Button functions

Transistor output (buzzer)	–
Load select relays	–
Programmable relay functions	Relay 1–19 can be set to latching
Interlocking	–
Zero position check	Active for all functions

9.4.6 OPERATING MODE 5

NOTE: This Operating mode supports **Load select mode**. See transmitter installation instructions for available **Load select modes**.

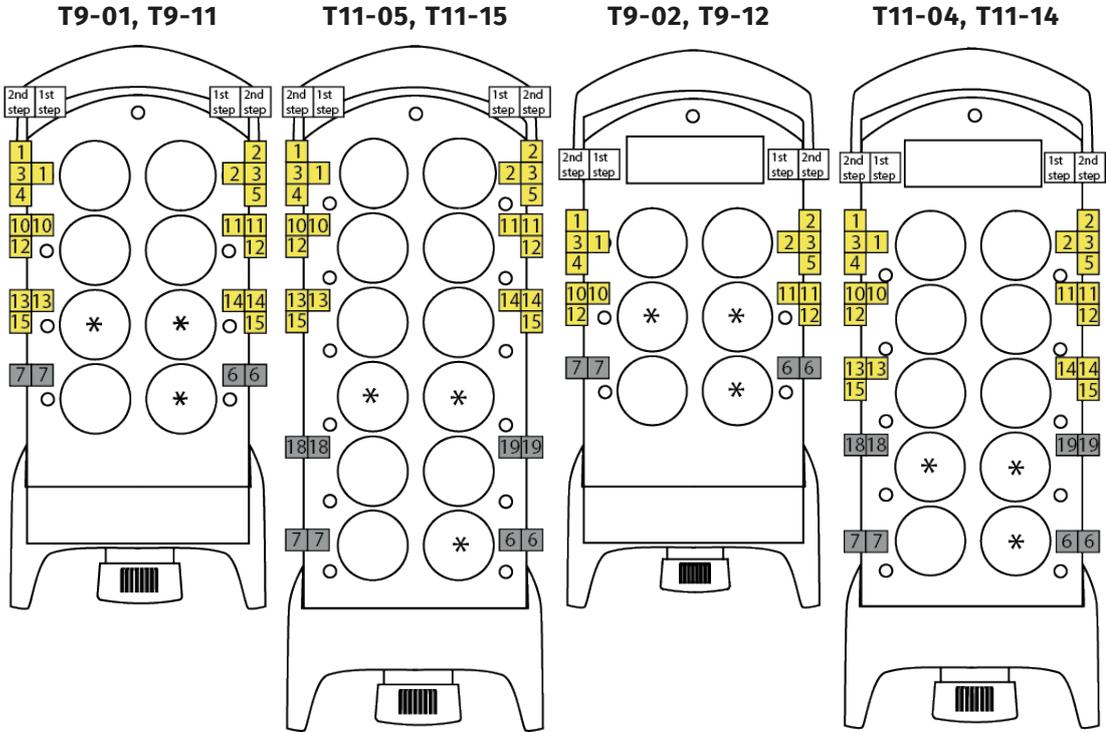


- 2 Relay number on the receiver
- Button function – Load select A (relay 17 for indication)
- Button function – Load select B (relay 18 for indication)
- * Depending on the Load select mode selected on the transmitter.

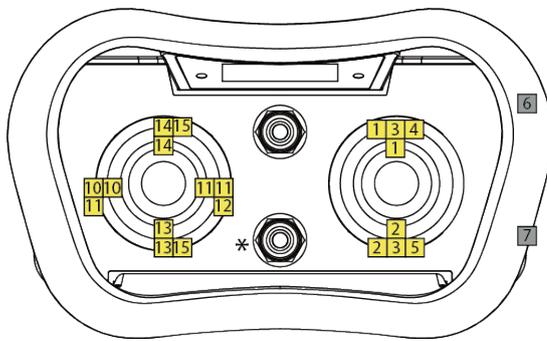
Transistor output (buzzer)	–
Load select relays	Load A: Relay 17 Load B: Relay 18
Programmable relay functions	Relay 1–19 can be set to latching
Interlocking	–
Zero position check	Active for all functions

9.4.7 OPERATING MODE 6

NOTE: This Operating mode supports **Load select mode**. See transmitter installation instructions for available **Load select modes**.



T12-20, T12-21 T12-30, T12-31

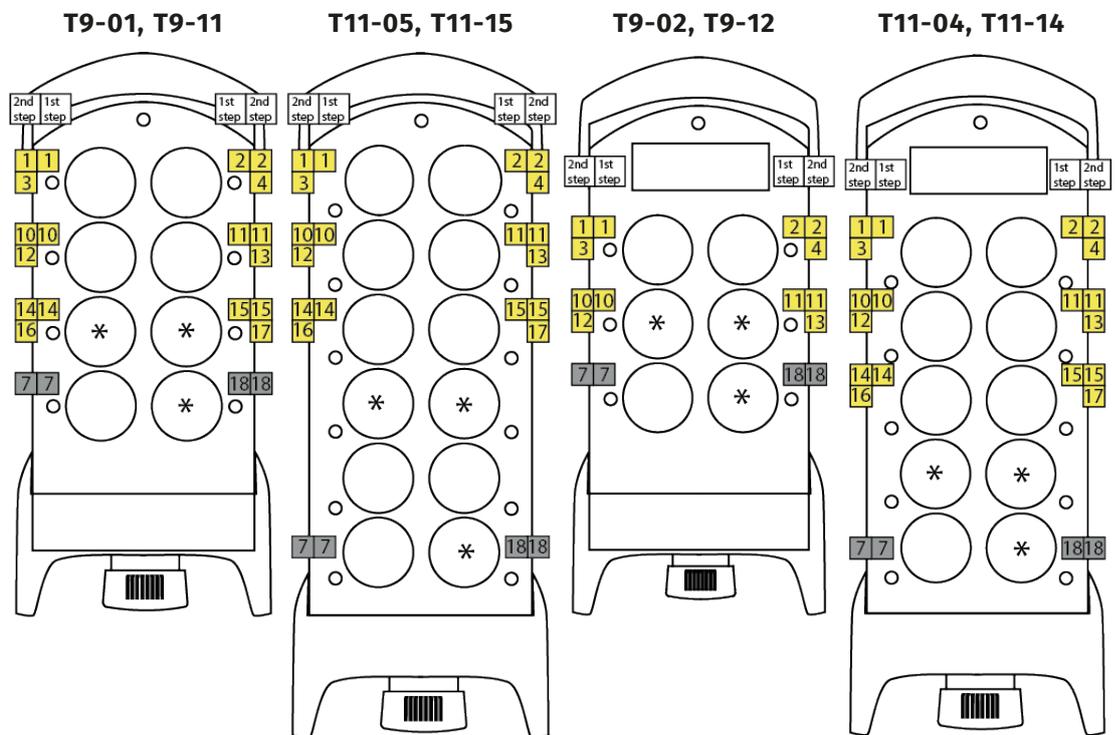


- 2 Relay number on the receiver
- Button functions
- Direction functions
- * Depending on the Load select mode selected on the transmitter.

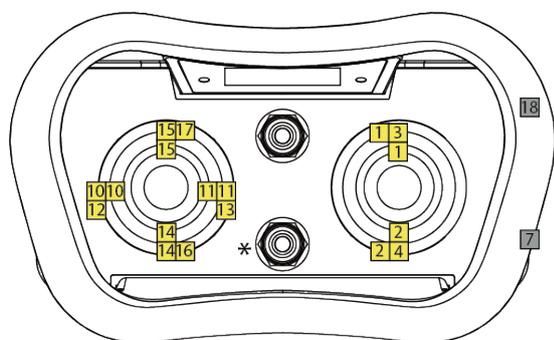
Transistor output (buzzer)	Transistor output activates together with relay 7
Load select relays	-
Programmable relay functions	Relay 6-7, 18-19 can be set to latching
Interlocking	Button transmitters - interlocking between direction functions horizontally aligned Joystick transmitters - interlocking between positive and negative side of each joystick axis
Zero position check	Active for all functions

9.4.8 OPERATING MODE 7

NOTE: This Operating mode supports **Load select mode**. See transmitter installation instructions for available **Load select modes**.



T12-20, T12-21 T12-30, T12-31



- 2 Relay number on the receiver
- Button functions
- Direction functions
- * Depending on the Load select mode selected on the transmitter.

Transistor output (buzzer)	Transistor output activates together with relay 7
Load select relays	Load select A: Relay 5 Load select B: Relay 6
Programmable relay functions	Relay 7, 18 can be set to latching

Interlocking	Button transmitters – interlocking between direction functions horizontally aligned Joystick transmitters – interlocking between positive and negative sides of each joystick axis
Zero position check	Active for all functions

9.5 Set momentary or latching relays functions

NOTE: Relay functions can be changed on the following receiver models: **R4-01, R4-03, R4-06, R4-08, R4-36, R4-38**

The setting options depend on the selected **Operating mode**. Relay functions can only be changed for relays assigned to a button function. Relays assigned to a direction function are not available for changes.

NOTE: If Operating mode 0 has been selected, the menu "Show/change momentary/latching functions" will not be available. Contact your representative for assistance.



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.



Ensure that the stop relays are deactivated before proceeding with the following instructions; LED SR/ LED 9 must be Off.

1. Press the **Function** button five times.
Function LED 5 flashes (red). Relay LEDs 1-7 (or LEDs 17, 11-16 and relay LEDs 10-19 on the relay expansion board) indicate the current setting, momentary or latching, according to the following table.
 ●: LED is lit. ○: LED is off.

Relay LED	Relay type
●	Latching relay
○	Momentary relay

2. Press the **Select** button to enter the setting mode.
Function LED 5 goes off. The LED for the first available relay to be changed flashes.¹
3. Press the **Function** button to change the setting.

¹If the relay is momentary, Function LED 5 remains off. If the relay is latching, Function LED 5 lights (red).

Function LED 5 changes status.

4. Press the **Select** button to confirm and move to the next available relay.
5. Repeat steps 3–4 for all available relays.
After the last change, all function LEDs light briefly. The receiver returns to normal operation.

9.6 Log a transmitter out

NOTE: This logout option should be used when a lost or damaged transmitter must be logged out from the receiver.

NOTE: If a transmitter has been lost or seriously damaged, use the replace procedure on the transmitter whenever possible.



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.



Ensure that the stop relays are deactivated before proceeding with the following instructions; LED SR/ LED 9 must be Off.

Function LED1 (red) and 2 (yellow) are lit (one or more transmitter are registered in the receiver and one transmitter is logged in).

1. Press the **Select** button for approx. 5 seconds.
Function LED 2 flashes fast (yellow).
2. Release the **Select** button.
Function LED 2 goes off. All function LEDs light briefly.

The logged in transmitter has been logged out. The receiver returns to normal operation. Any registered transmitter can now log in.

9.7 Erase all registered transmitters

NOTE: An erased transmitter cannot be logged in to the receiver until it has been registered in the receiver again.

NOTE: If a transmitter has been lost or seriously damaged, use the replace procedure on the transmitter whenever possible.

IMPORTANT! The following instructions will erase all registered transmitter(s) from the receiver but the transmitter(s) can still have the receiver registered in. To insure that both the transmitter and the receiver have been erased from each other, use the erase procedure on the transmitter (see relevant transmitter installation instructions).

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.



Ensure that the stop relays are deactivated before proceeding with the following instructions; LED SR/ LED 9 must be Off.

Function LED 1 should be lit (one or more transmitters are registered in the receiver).

1. Press the **Function** button once.
Function LED 1 flashes fast (red). Relay LEDs 1–7 (or LEDs 17, 11–16 on the relay expansion board) light to indicate the location number of the registered transmitters.
2. Press and hold the **Select** button for 10 s or until all function LEDs light briefly.
Function LED 1 flashes slow (red). Relay LEDs 1–7 light (or LEDs 17, 11–16 on the relay expansion board) (red).
3. Release the **Select** button.
*Relay LEDs 1–7 (or LEDs 17, 11–16 on the relay expansion board) go off. All function LEDs light briefly.
All registered transmitters have been erased. The receiver returns to normal operation.*

9.8 Master reset of the receiver

This procedure will erase all settings and all relay mapping from the receiver and restore factory defaults. This is not recommended if the receiver's TRS files are missing or when there is no programming possibilities.



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.



Ensure that the stop relays are deactivated before proceeding with the following instructions; LED SR/ LED 9 must be Off.

1. Press both the **Select** and the **Function** buttons for approx. 20 s or until all function LEDs go off.
2. Release both buttons.
All function LEDs light. All relay LEDs flash fast.
3. Press the **Select** button.
All function LEDs and relay LEDs go off. All function LEDs light briefly. The receiver has been reset. The receiver returns to normal operation.

CHAPTER 10: WARRANTY, SERVICE, REPAIRS, AND MAINTENANCE

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

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 AB
- 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 11: REGULATORY INFORMATION

NOTE: Models including additional naming conventions:

Model	Article names	Additional naming conventions
R4	R4-01	R00004-01, R4-1, TG-R4-1, TG-R4-01
	R4-03	R00004-03, R4-6, TG-R4-6, TG-R4-06
	R4-06	R00004-06, R4-6, TG-R4-6, TG-R4-06
	R4-08	R00004-08, R4-8, TG-R4-8, TG-R4-08
	R4-26	R00004-26, TG-R4-26
	R4-28	R00004-28, TG-R4-28
	R4-36	R00004-36, TG-R4-36
	R4-38	R00004-38, TG-R4-38
	R4-41	R00004-40, TG-R4-41
	R4-43	R00004-43, TG-R4-43

11.1 Europe

Applies to:

- **R4-01, R4-06, R4-26, R4-36, R4-41**

11.1.1 CE MARKING



Hereby, Tele Radio AB, declares that the radio equipment type(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 on the Tele Radio AB website, www.tele-radio.com.

11.1.2 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.

11.2 North America

Applies to:

- **R4-03, R4-08, R4-28, R4-38, R4-43**

11.2.1 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.

The radio module in this product is labelled with its own FCC ID and IC number. The FCC ID and IC is 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 radio module. The final end device must be labelled in a visible area with the following:

"Contains FCC ID: ONFC1104B"

"Contains IC: 4807A-C1104B"

11.2.2 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 (identify the device by certification number, or model number if Category II) 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 (identifier le dispositif par son numéro de certification ou son numéro de modèle s'il fait partie du matériel de catégorie I) 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, operations 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.

The radio module in this product is labelled with its own FCC ID and IC number. The FCC ID and IC is 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 radio module. The final end device must be labeled in a visible area with the following:

Le module radio est étiqueté avec sa propre identification FCC et son propre numéro de certification IC. L'identification FCC et le numéro de certification IC ne sont pas visibles lorsque le module est installé à l'intérieur d'un autre dispositif, c'est la raison pour laquelle la partie externe du dispositif dans lequel le module est installé doit également présenter une étiquette faisant référence au module inclus. Le produit final doit être étiqueté sur une zone visible avec les informations suivantes :

"Contains FCC ID: ONFC1104B"

"Contains IC: 4807A-C1104B"

11.2.3 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: ONFC1104B"

"Contains IC: 4807A-C1104B"

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

11.2.4 RADIO MODULE

The following products described in these instructions contain the radio modules:

PRODUCT	RADIO MODULE
R4-03, R4-08, R4-28, R4-38, R4-43	D00005-05

11.3 EAC

Applies to:

- **R4-01, R4-06, R4-26, R4-36, R4-41**

11.3.1 EAC STATEMENT (ДЕКЛАРАЦИЯ EAC)

This product is declared as compliant within Eurasian Economic Union (EAC). EAC declaration is available on request.

11.4 Brazil

Applies to:

- **R4-01, R4-06, R4-26, R4-36, R4-41**

11.4.1 ANATEL STATEMENT (DECLARAÇÃO ANATEL)

Este equipamento não tem direito à proteção contra interferência prejudicial e não pode causar interferência em sistemas devidamente autorizados.

Este produto não é apropriado para uso em ambientes domésticos, pois poderá causar interferências eletromagnéticas que obrigam o usuário a tomar medidas necessárias para minimizar estas interferências.

ANNEX A: CANOpen SPECIFICATION FOR TG2 SYSTEMS (IN ENGLISH)

NOTE: Applies to **R4-26** and **R4-28**.

A.1 Introduction	71
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Version: v14

A.1 Introduction

This document describes the installation, setup and CANOpen specification for system Tiger Generation 2 and the standard xApp protocol. This document is applicable for TG2 R4receivers **R4-26** and **R4-28**, and for both button and joystick transmitters.

It is intended for personnel with qualifications within electrical engineering and CANOpen communication. For additional documentation, see official CANOpen standards published by CiA and Tele Radio Installation instructions.

R4 receivers have 7 standard relays on the main board that can be controlled from the CANopen network.

A.2 General

The receiver unit CANopen interface operates according to CANopen Application Layer and Communication Profile and Predefined Connection Set defined in CiA DS-301 version 4.02.

A.2.1 GENERAL FEATURES:

- CANopen slave device
- 4 freely mappable Transmit Process Data Objects (TPDO)
- 4 freely mappable Receive Process Data Objects (RPDO)
- 1 Service Data Object (SDO)
- Synchronisation object (SYNC) consumer
- Emergency object (EMCY) producer
- NMT protocols
- Bootup protocol
- Node guarding protocol
- Heartbeat protocol
- Layer Setting Service (LSS)
- CANopen node ID selectable via user interface: 1–127
- CANopen bitrate selectable via user interface: 10 kbps, 20 kbps, 50 kbps, 100 kbps, 125 kbps, 250 kbps, 500 kbps, 800 kbps 1 Mbps
- Vendor ID: 0x000000A6

A.3 Bus termination

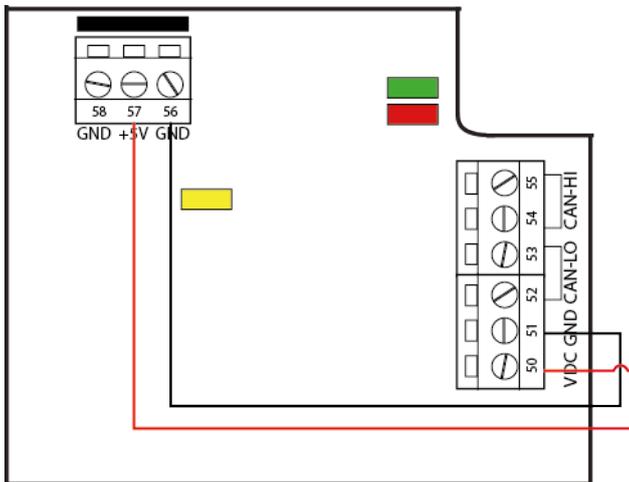
The CANopen interface does not contain an internal bus termination resistor. If the receiver unit is the last node on the bus, the bus has to be terminated externally.

A.4 CAN bus interface

For CAN bus interface, please see Tele Radio Installation instructions.

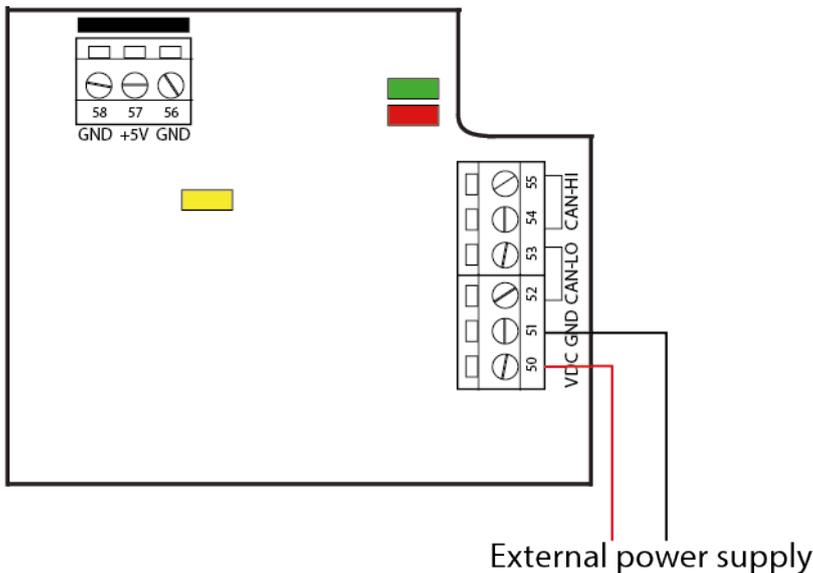
A.5 Power supply of CAN expansion board

A.5.1 INTERNAL POWER SUPPLY OF CAN EXPANSION BOARD



A.5.2 EXTERNAL POWER SUPPLY OF CAN EXPANSION BOARD

If galvanic isolation from the CAN bus is required, connect 5–24 V DC directly to the terminal block for CAN signals.



If no galvanic isolation is required, use the power supply from the receiver.

A.6 Selection of CANopen node ID

For assistance with setting CANopen node ID, please contact your representative.

A.7 Selection of the CANopen baud rate

For assistance with setting CANopen bitrate, please contact your representative.

A.8 LED indications

The CANopen interface has two indication LEDs, see table below.

A.8.1 RUN-LED

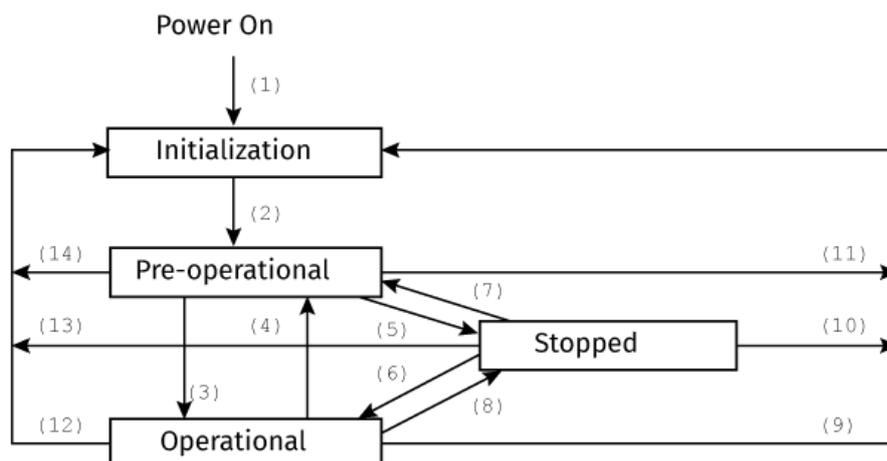
LED state	Indication	Description
Off	–	No power
Green	Operational	State = Operational
Green, blinking	Preoperational	State = Preoperational
Green, single flash	Stopped	State = Stopped

A.8.2 ERROR-LED

LED state	Indication	Description
Off	–	No power/device is in working condition
Red, single flash	Warning limit reached	A bus error counter reached or exceeded its warning level
Red, flickering	LSS	LSS services in progress
Red	Bus off (Fatal event)	Bus off

A.9 Internal states

The CANopen interface supports the following states:



State transition	Trigger for state transition
(1)	At power on the initialization state is entered autonomously
(2)	Initialization finished – enter state pre-operational automatically
(3), (6)	Start remote node indication (NMT message)

State transition	Trigger for state transition
(4), (7)	Enter pre-operational state indication (NMT message)
(5), (8)	Stop remote node indication (NMT message)
(9), (10) (11)	Reset node indication (NMT message)
(12), (13) (14)	Reset communication indication (NMT message)

A.10 Predefined connection set

The communication objects according to the predefined connection set have the following COB-IDs and communication parameters:

Object	Default COB-ID	Communication/Mapping parameters at index
NMT	0h	–
SYNC	80h	1005h, 1006h, 1007h
EMERGENCY (EMCY)	200h + Node ID	1014h, 1015h
RPDO 1	200h + Node ID	1400h, 1600h
RPDO 2	300h + Node ID	1401h, 1601h
RPDO 3	400h + Node ID	1402h, 1602h
RPDO 4	500h + Node ID	1403h, 1603h
TPDO 1	180h + Node ID	1800h, 1A00h
TPDO 2	280h + Node ID	1801h, 1A01h
TPDO 3	380h + Node ID	1802h, 1A02h
TPDO 4	480h + Node ID	1803h, 1A03h
Default SDO Client->Server (rx)	600h + Node ID	1200h
Default SDO Server->Client (tx)	580h + Node ID	1200h
NMT error control	700h + Node ID	1016h, 1017h

Default PDO transmission type is 254 (transmission when data changes).

A.11 Transmit Process Data Objects (TPDO) overview

The default mappings of the TPDOs are listed below. These are sent from the receiver unit to the CANopen network. The index/subindex in the object dictionary is shown below each description.

A.11.1 TPDO 1: SYSTEM STATUS

U8	U8	U16	U8	U8	U8	U8
Byte 1	Byte 2	Byte 3 Byte 4	Byte 5	Byte 6	Byte 7	Byte 8

U8	U8	U16	U8	U8	U8	U8
RX packet counter	TX status	Relay status	Active radio channel	RX RSSI	RX inputs	RX status
2002h/01h	2002h/02h	2001h/01h	2002h/03h	2002h/04h	2002h/05h	2002h/06h

A.11.2 TPDO 2: BUTTONS AND DIRECTIONS

U32				U32			
Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Buttons				Directions for joystick transmitter with digital outputs			
2003h/01h				2003h/02h			

A.11.3 TPDO 3: RESERVED

U32				U32				
Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	
Directions for transmitter with analogue outputs				Load selection		TX type	Reserved	
				Load A-P		Only modified by LML	Only modified by base system	
				Safe state data				
2003h/03h				2004h/01h				

A.11.4 TPDO 4: RESERVED

U8	U8	U8	U8	Data type: N/A			
Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
TX analogue in 1	TX analogue in 2	TX analogue in 3	TX analogue in 4	Reserved	Reserved	Reserved	Reserved
2005h/01h	2005h/02h	2005h/03h	2005h/04h	Not mapped			

A.12 Receive Process Data Objects (RPDO) overview

The default mappings of the RPDOs are listed below. These are received by the receiver unit from the CANOpen network. The index/subindex in the object dictionary is shown below each description.

A.12.1 RPDO 1: RELAY CONTROL

U16		U16		U16		U8	U8
Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8

U16	U16		U16	U8	U8
Relay control Relay 1-12+buzzer output	Reserved	Reserved	Simulated RX digital inputs	Simulated RX analogue inputs	
2101h/01h	0006h/00h (dummy)		2103h/01h	2104h/01h	2104h/02h

A.12.2 RPDO 2: FIELDBUS INPUT REGISTER 1 AND 2

U32				U32			
Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
Fieldbus input register 1				Fieldbus input register 2			
2102h/01h				2102h/02h			

A.12.3 RPDO 3: FIELDBUS INPUT REGISTER 3 AND 4

U32				U32			
Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
Fieldbus input register 3				Fieldbus input register 4			
2102h/03h				2102h/04h			

A.12.4 RPDO 4: RX ANALOG OUT

I16		I16		I16		I16	
Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
RX analogue out 1		RX analogue out 2		RX analogue out3		RX analogue out 4	
2105h/01h		2105h/02h		2105h/03h		2105h/04h	

A.13 Manufacturer Specific Objects

The following Manufacturer specific objects are available in the object dictionary:

Index	Object name	Description	Data type	Access
2001h	Receiver unit to CANopen: Relay status	Status of the stop relays, function relays and buzzer	U16 array	RO
2002h	Receiver unit to CANopen: System status	Load selection, relay status, radio channel, TX type, RX inputs, misc RX status	U8 array	RO
2003h	Receiver unit to CANopen: TX buttons and directions	Buttons and directions from button transmitter, 2 step and 4 step joystick transmitter, analogue joystick transmitter	U32 array	RO
2004h	Receiver unit to CANopen: Safe state data	Safe state data from transmitter: Load select and TX type	U32 array	RO
2005h	Receiver unit to CANopen: TX general analogue inputs	General analogue input values from TX, signer or unsigned	U8 array	RO
2006h	Receiver unit to CANopen: TXID/RFID for session	TXID for current session + RFID/PIN if used	U32 array	RO
2007h	Receiver unit to CANopen: Extended radio flags	All internal radio flags in RX	U16 array	RO
2008h	Receiver unit to CANopen: Weight sensor values	Signed 32-bit values from weight sensors	I32 array	RO
2009h	Receiver unit to CANopen: Digital inputs from TigerLynx	Up to 8 sets of 32 digital inputs mirrored on a TigerLynx network designated Loads A-H	U32 array	RO
200Ah	Receiver unit to CANopen: Logical digital inputs	Logical digital inputs mapped to weight limits	U32 array	RO

Index	Object name	Description	Data type	Access
200Bh	Receiver unit to CANopen: Counters	Counter values in data flash-based non-volatile counters 1–32	U32 array	RO
2101h	CANopen to receiver unit: Relay Control	Relay control from CANopen	U16 array	RW
2102h	CANopen to receiver unit: Fieldbus input registers	Feedback to TX from CANopen	U32 array	RW
2103h	CANopen to receiver unit: Simulated RX digital inputs	Digital inputs set from CANopen, sent as feedback to TX	U16 array	RW
2104h	CANopen to receiver unit: Simulated RX analogue inputs	Digital analogue set from CANopen, sent as feedback to TX	U8 array	RW
2105h	CANopen to receiver unit: RX analogue outputs	Up to 16 analogue outputs connected as modbus devices	I16 array	RW
2201h	Receiver unit config data: Counter max values	Maximum values for counters indexed with values in 2202h	U32 array	RW
2202h	Receiver unit config data: Counter map	Counter indexes for maximum values in 2201h	U8 array	RW

A.13.1 OBJECT 2001H: RELAY STATUS

Index: 2001h	
Name: Relay status	
Sub-indexes: 01h	
Data type: U16	
Access: RO	
Subindex	Description
1	Relay status Bit 00: Relay 1 Bit 01: Relay 2 Bit 02: Relay 3 Bit 03: Relay 4 Bit 04: Relay 5 Bit 05: Relay 6 Bit 06: Relay 7 Bit 07: Relay 8 Bit 08: Relay 9 Bit 09: Relay 10 Bit 10: Relay 11 Bit 11: Relay 12 Bit 12: Reserved Bit 13: Reserved Bit 14: Buzzer output Bit 15: Stop relay 1-2

A.13.2 OBJECT 2002H: SYSTEM STATUS

Index: 2002h	
Name: System status	
Subindexes: 0Ah	
Data type: U8	
Access: RO	
Subindex	Description
1	<p>RX packet counter:</p> <p>Packet counter for the number of received radio packets by the receiver unit. It increases value by 1 for every 8th received radio packet and counts from 0 to 255, and then resets and starts over again.</p>
2	<p>TX status:</p> <p>Bit 0,1: Transmitter battery level: 00 = Battery empty, 11 = Battery full</p> <p>Bit 2: Transmitter charge status: 0 = Passive, 1 = Active</p> <p>Bit 3: Transmitter lost feedback: 0 = Feedback, 1 = No feedback</p> <p>Bits 4-7: Reserved</p>
3	<p>Active radio channel:</p> <p>433MHz frequency band: Value 1-69 => radio channel 1-69</p> <p>915MHz frequency band: Value 1-15 => frequency bank 1-15</p> <p>2.4GHz frequency band: Value 11-26 => radio channel 11-26</p> <p>If the radio link is down and the receiver frequency scanning is active, the value for active radio channel is 00h.</p> <p>If cable control is used, the value for active radio channel is FFh.</p>
4	<p>RX RSSI:</p> <p>Bits 0-3: Receiver RSSI level: 0000 = RSSI low, 1111 = RSSI high. If cable control is used, Receiver RSSI level = 1111</p> <p>Bits 4-7: Reserved</p>
5	<p>RX inputs:</p> <p>Bit 0: Receiver main board digital input 1: 0 = Digital input open , 1 = Digital input connected to GND</p> <p>Bit 1: Receiver main board digital input 2: 0 = Digital input open , 1 = Digital input connected to GND</p> <p>Bits 2-7: Reserved</p>

6	<p>RX status:</p> <p>Bit 0: Stop relay status: 0 = Stop relays passive, 1 = Stop relays active</p> <p>Bit 1: Radio link status/TX alive: 0 = Radio link down, 1 = Radio link up</p> <p>Bit 2: Session status: 0 = No session with TX, 1 = In session with TX</p> <p>Bit 3: TX Zero position status: 0 = Zero position lost, 1 = Zero position acquired</p> <p>Bit 4: Cable control: 0 = Cable control passive, 1 = Cable control active</p> <p>Bits 5–7: Reserved</p>
7	<p>Session TX slot:</p> <p>Values 00h–0Eh: Current slot ID when session is active</p> <p>Value FFh: No session is active</p>
8	<p>Current RFID permissions:</p> <p>Bits 0–6: General RFID tag/PIN permission bits</p> <p>Bit 7: RFID tag/PIN has admin privileges</p>
9	<p>Low pass filtered RSSI direct value:</p> <p>Values 0–254: RSSI value in -dBm</p> <p>Values 255: No radio link</p>
10	<p>Weight sensor active:</p> <p>Bits 0–3: Weight sensor 1–4 active</p>

A.13.3 OBJECT 2003H: BUTTONS AND DIRECTIONS

Index: 2003h	
Name: Buttons and directions	
Subindexes: 04h	
Data type: U32	
Access: RO	
Subindex	Description
1	<p>Bit 00: Button 03 step 1 on TX06/TX08/TX10/TX10A/TX12/TX12A*</p> <p>Bit 01: Button 03 step 2 on TX06/TX08/TX10/TX10A/TX12/TX12A*</p> <p>Bit 02: Button 04 step 1 on TX06/TX08/TX10/TX10A/TX12/TX12A*</p> <p>Bit 03: Button 04 step 2 on TX06/TX08/TX10/TX10A/TX12/TX12A*</p> <p>Bit 04: Button 05 step 1 on TX08/TX10/TX10A/TX12/TX12A*</p> <p>Bit 05: Button 05 step 2 on TX08/TX10/TX10A/TX12/TX12A*</p> <p>Bit 06: Button 06 step 1 on TX08/TX10/TX10A/TX12/TX12A*</p> <p>Bit 07: Button 06 step 2 on TX08/TX10/TX10A/TX12/TX12A*</p> <p>Bit 08: Button 07 step 1 on TX10, button 09 step 1 on TX12/TX12A*</p> <p>Bit 09: Button 07 step 2 on TX10, button 09 step 2 on TX12/TX12A*</p> <p>Bit 10: Button 08 step 1 on TX10, button 10 step 1 on TX12/TX12A*</p> <p>Bit 11: Button 08 step 2 on TX10, button 10 step 2 on TX12/TX12A*</p> <p>Bit 12: Button 01 step 1 on TX06/TX08/TX10/TX10A/TX12/TX12A*</p> <p>Bit 13: Button 01 step 2 on TX06/TX08/TX10/TX10A/TX12/TX12A*</p> <p>Bit 14: Button 02 step 1 on TX06/TX08/TX10/TX10A/TX12/TX12A*</p> <p>Bit 15: Button 02 step 2 on TX06/TX08/TX10/TX10A/TX12/TX12A*</p> <p>Bit 16: Left start button step 1 on TX06/TX08/TX10/TX10A/TX12/TX12A, SB4 on TXJD*</p> <p>Bit 17: Left start button step 2 on TX06/TX08/TX10/TX10A/TX12/TX12A*</p> <p>Bit 18: Right start button step 1 on TX06/TX08/TX10/TX10A/TX12/TX12A, SB3 on TXJD*</p> <p>Bit 19: Right start button step 2 on TX06/TX08/TX10/TX10A/TX12/TX12A*</p> <p>Bit 20: Button 07 step 1 on TX12/TX12A, SB1 on TXJD*</p> <p>Bit 21: Button 07 step 2 on TX12/TX12A*</p> <p>Bit 22: Button 08 step 1 on TX12/TX12A, SB2 on TXJD*</p> <p>Bit 23: Button 08 step 2 on TX12/TX12A*</p> <p>Bit 24: Upper right switch on TXJD</p> <p>Bit 25: Upper left switch on TXJD</p> <p>Bit 26: Mid right switch on TXJD</p> <p>Bit 27: Mid left switch on TXJD</p> <p>Bit 28: Lower right switch on TXJD</p> <p>Bit 29: Lower left switch on TXJD</p> <p>Bit 30: Reserved</p> <p>Bit 31: Reserved</p> <p>* TX06 is referring to T9-02, T9-12, T9-22 TX08 is referring to T9-01, T9-11 TX10 is referring to T11-04, T11-14, T11-24 TX10A is referring to T14-x TX12 is referring to T11-5, T11-15 TX12A is referring to T15-x TXJD is referring to T12-2x, T12-3x</p>

2	<p>Bits 0–7: Directions for TXJD with digital outputs</p> <p>Left joystick x-axis on TXJD with digital outputs: Joystick position is represented as a signed 8-bit value -127...+127 Value -127...-1 corresponds to a negative position on x-axis Value +1...+127 corresponds to a positive position on x-axis</p> <p>Bits 8–15: Directions for TXJD with digital outputs</p> <p>Left joystick y-axis on TXJD with digital outputs: Joystick position is represented as a signed 8-bit value -127...+127 Value -127...-1 corresponds to a negative position on y-axis Value +1...+127 corresponds to a positive position on y-axis</p> <p>Bits 16–23: Directions for TXJD with digital outputs</p> <p>Right joystick x-axis on TXJD with digital outputs: Joystick position is represented as a signed 8-bit value -127...+127 Value -127...-1 corresponds to a negative position on x-axis Value +1...+127 corresponds to a positive position on x-axis</p> <p>Bits 24–31: Directions for TXJD with digital outputs</p> <p>Right joystick y-axis on TXJD with digital outputs: Joystick position is represented as a signed 8-bit value -127...+127 Value -127...-1 corresponds to a negative position on y-axis Value +1...+127 corresponds to a positive position on y-axis</p>
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3	<p>Bits 0–7: Directions for transmitter with analogue outputs</p> <p>Left joystick x-axis on TXJD with analogue outputs: Joystick position is represented as a signed 8-bit value -127...+127 Value -127...-1 corresponds to a negative position on x-axis Value +1...+127 corresponds to a positive position on x-axis</p> <p>Button 3 and 4 on TX10A/TX12A: Button 3 is represented as a signed 8-bit value -127...-1 Button 4 is represented as a signed 8-bit value +1...+127</p> <p>Bits 8–15: Directions for transmitter with analogue outputs</p> <p>Left joystick y-axis on TXJD with analogue outputs: Joystick position is represented as a signed 8-bit value -127...+127 Value -127...-1 corresponds to a negative position on y-axis Value +1...+127 corresponds to a positive position on y-axis</p> <p>Button 5 and 6 on TX10A/TX12A: Button 5 is represented as a signed 8-bit value -127...-1 Button 6 is represented as a signed 8-bit value +1...+127</p> <p>Bits 16–23: Directions for transmitter with analogue outputs</p> <p>Right joystick x-axis on TXJD with analogue outputs: Joystick position is represented as a signed 8-bit value -127...+127 Value -127...-1 corresponds to a negative position on x-axis Value +1...+127 corresponds to a positive position on x-axis</p> <p>Button 7 and 8 on TX12A: Button 7 is represented as a signed 8-bit value -127...-1 Button 8 is represented as a signed 8-bit value +1...+127</p> <p>Bits 24–31: Directions for transmitter with analogue outputs</p> <p>Right joystick y-axis on TXJD with analogue outputs: Joystick position is represented as a signed 8-bit value -127...+127 Value -127...-1 corresponds to a negative position on y-axis Value +1...+127 corresponds to a positive position on y-axis</p> <p>Button 1 and 2 on TX10A/TX12A: Button 1 is represented as a signed 8-bit value -127...-1 Button 2 is represented as a signed 8-bit value +1...+127</p> <p>* TX10A is referring to T14-x TX12A is referring to T15-x TXJD is referring to T12-2x, T12-3x</p>
4	<p>Bits 0–31: General TX digital inputs 1–32</p>

A.13.4 OBJECT 2004H: SAFE STATE DATA

Index: 2004h	
Name: Safe state data	
Subindexes: 01h	
Data type: U32	
Access: RO	
Subindex	Description
1	<p>Bits 0–15: Load selection</p> <p>Bit 00: Load A Bit 01: Load B Bit 02: Load C Bit 03: Load D Bit 04: Load E Bit 05: Load F Bit 06: Load G Bit 07: Load H Bit 08: Load I Bit 09: Load J Bit 10: Load K Bit 11: Load L Bit 12: Load M Bit 13: Load N Bit 14: Load O Bit 15: Load P</p> <p>Bits 16–23: TX type</p> <p>Value 0 => Undefined Value 1 => TX06* Value 2 => TX08* Value 3 => TX10* Value 4 => TX12* Value 5 => TXJD* Value 6 => TX10A* Value 7 => TX12A* Values 8–255 => Reserved</p> <p>Bits 24–31: Reserved</p> <p>Allocated for safe state data sent from transmitter to receiver.</p> <p>* TX06 is referring to T9-02, T9-12, T9-22 TX08 is referring to T9-01, T9-11 TX10 is referring to T11-4, T11-14, T11-24 TX10A is referring to T14-x TX12 is referring to T11-05, T11-15 TX12A is referring to T15-x TXJD is referring to T12-2x, T12-3x</p>

A.13.5 OBJECT 2005H: TX GENERAL ANALOGUE INPUTS

Index: 2005h	
Name: TX general analogue inputs	
Subindexes: 04h	
Data type: U8	
Access: RO	
Subindex	Description
1	General analogue input 1 on TX
2	General analogue input 2 on TX
3	General analogue input 3 on TX
4	General analogue input 4 on TX

A.13.6 OBJECT 2006H: TXID/RFID FOR SESSION

Index: 2006h	
Name: TXID/RFID for session	
Subindexes: 02h	
Data type: U32	
Access: RO	
Subindex	Description
1	TXID when session is active Value 0: No session active
2	RFID when session is active Value 0: No session active or no RFID tag/PIN used

A.13.7 OBJECT 2007H: EXTENDED RADIO FLAGS

Index: 2007h	
Name: Extended radio flags	
Subindexes: 01h	
Data type: U16	
Access: RO	
Subindex	Description
1	<p>Bits 0–11: Extended radio flags</p> <p>Bit 00: Stop relay status: 0 = Stop relays passive, 1 = Stop relays active</p> <p>Bit 01: Safe function relay 1 status: 0 = SF1 passive, 1 = SF1 active</p> <p>Bit 02: Safe function relay 2 status: 0 = SF2 passive, 1 = SF2 active</p> <p>Bit 03: Radio link status/TX alive: 0 = Radio link down, 1 = Radio link up</p> <p>Bit 04: Short radio timeout status: 0 = Short timeout expired, 1 = Short timeout not expired</p> <p>Bit 05: AFC lock status: 0 = AFC lock lost, 1 = AFC lock acquired</p> <p>Bit 06: Session status: 0 = No session with TX, 1 = In session with TX</p> <p>Bit 07: Radio packed reception status: 0 = Last packed invalid, 1 = Last packed valid</p> <p>Bit 08: Relay power status: 0 = Relay power off, 1 = Relay power on</p> <p>Bit 09: RSSI too weak status: 0 = RSSI above low limit, 1 = RSSI below low limit</p> <p>Bit 10: RSSI too strong status: 0 = RSSI below high limit, 1 = RSSI above high limit</p> <p>Bit 11: TX Zero position status: 0 = Zero position lost, 1 = Zero position acquired</p> <p>Bits 12–15: Reserved</p>

A.13.8 OBJECT 2008H: WEIGHT SENSOR VALUES

Index: 2008h	
Name: Weight sensor values	
Subindexes: 04h	
Data type: I32	
Access: RO	
Subindex	Description
1	Weight sensor 1 value
2	Weight sensor 2 value
3	Weight sensor 3 value
4	Weight sensor 4 value

A.13.9 OBJECT 2009H: DIGITAL INPUTS FROM TIGERLYNX NETWORK

Index: 2009h	
Name: Digital inputs from TigerLynx network	
Subindexes: 08h	
Data type: U32	
Access: RO	
Subindex	Description
1	<p>Mirrored digital inputs for Load A</p> <p>Bit 00: Zero position for Load A</p> <p>Bit 01: Digital input 1 on base board for Load A</p> <p>Bit 02: Digital input 2 on base board for Load A</p> <p>Bits 03–29: Logical digital inputs for Load A</p> <p>Bit 30: Digital input 1 on TigerLynx unit for Load A</p> <p>Bit 31: Digital input 2 on TigerLynx unit for Load A</p>
2	<p>Mirrored digital inputs for Load B</p> <p>Please see Load A for information on specific bits</p>
3	<p>Mirrored digital inputs for Load C</p> <p>Please see Load A for information on specific bits</p>
4	<p>Mirrored digital inputs for Load D</p> <p>Please see Load A for information on specific bits</p>
5	<p>Mirrored digital inputs for Load E</p> <p>Please see Load A for information on specific bits</p>
6	<p>Mirrored digital inputs for Load F</p> <p>Please see Load A for information on specific bits</p>
7	<p>Mirrored digital inputs for Load G</p> <p>Please see Load A for information on specific bits</p>
8	<p>Mirrored digital inputs for Load H</p> <p>Please see Load A for information on specific bits</p>

A.13.10 OBJECT 200AH: LOGICAL DIGITAL INPUTS

Index: 200Ah	
Name: Logical digital inputs	
Subindexes: 01h	
Data type: U32	
Access: RO	
Subindex	Description
1	Bit 0: Always 0 Bits 1–31: Logical digital inputs mapped to weight limits

A.13.11 OBJECT 200BH: COUNTERS

Index: 200Bh	
Name: Counters	
Subindexes: 20h	
Data type: U32	
Access: RO	
Subindex	Description
1–32	Counter value for counters 1–32

A.13.12 OBJECT 2101H: RELAY CONTROL

Index: 2101h	
Name: Relay control	
Subindexes: 01h	
Data type: U16	
Access: RWW	
Subindex	Description
1	<p>Relay Control</p> <p>By writing to this field, a CANopen Master device may control the relays and buzzer output on the Tiger receiver. There is one bit for each relay where 0 = Relay passive, 1 = Relay active. There is a bit for buzzer output where 0 = Buzzer output passive, 1 = Buzzer output active.</p> <p>Bit 00: Relay 1 Bit 01: Relay 2 Bit 02: Relay 3 Bit 03: Relay 4 Bit 04: Relay 5 Bit 05: Relay 6 Bit 06: Relay 7 Bit 07: Relay 8 Bit 08: Relay 9 Bit 09: Relay 10 Bit 10: Relay 11 Bit 11: Relay 12 Bit 12: Reserved Bit 13: Reserved Bit 14: Buzzer output Bit 15: Stop relays 1–2</p> <p>Stop relays can only be activated if allowed by the safety CPUs. Stop relays are automatically activated on Zero Position if this is specified in Settings.</p> <p>The SIL certified stop function is not valid if the stop relays are controlled from the CANopen network</p>

A.13.13 OBJECT 2102H: FIELDBUS INPUT REGISTERS

Index: 2102h	
Name: Fieldbus input registers	
Subindexes: 04h	
Data type: U32	
Access: RWW	
Subindex	Description
1	Reserved for general feedback from CANopen network
2	Reserved for general feedback from CANopen network
3	Reserved for general feedback from CANopen network
4	Reserved for general feedback from CANopen network

A.13.14 OBJECT 2103H: SIMULATED RX DIGITAL INPUTS

Index: 2103h	
Name: Simulated RX digital inputs	
Subindexes: 01h	
Data type: U16	
Access: RWW	
Subindex	Description
1	Reserved for simulated RX digital inputs Bit 00: Receiver digital input 1 Bit 01: Receiver digital input 2 Bit 02: Receiver digital input 3 Bit 03: Receiver digital input 4 Bit 04: Receiver digital input 5 Bit 05: Receiver digital input 6 Bit 06: Receiver digital input 7 Bit 07: Receiver digital input 8 Bit 08: Receiver digital input 9 Bit 09: Receiver digital input 10 Bit 10: Receiver digital input 11 Bit 11: Receiver digital input 12 Bit 12: Receiver digital input 13 Bit 13: Receiver digital input 14 Bit 14: Receiver digital input 15 Bit 15: Receiver digital input 16

A.13.15 OBJECT 2104H: SIMULATED RX ANALOGUE INPUTS

Index: 2104h	
Name: Simulated RX analogue inputs	
Subindexes: 02h	
Data type: U8	
Access: RWW	
Subindex	Description
1	Reserved for simulated RX analogue inputs Receiver analogue input 1
2	Reserved for simulated RX analogue inputs Receiver analogue input 2

A.13.16 OBJECT 2105H: RX ANALOGUE OUTPUTS

Index: 2105h	
Name: RX analogue outputs	
Subindexes: 10h	
Data type: I16	
Access: RWW	
Subindex	Description
1-16	Receiver analogue output 1-16

A.13.17 OBJECT 2201H: COUNTER MAX VALUES

Index: 2201h	
Name: Counter max values	
Subindexes: 10h	
Data type: U32	
Access: RWW	
Subindex	Description
1-16	Counter max values 1-16

A.13.18 OBJECT 2202H: COUNTER MAP

Index: 2202h	
Name: Counter map	
Subindexes: 10h	
Data type: U8	
Access: RWW	
Subindex	Description
1	Counter index for counter max values 1 (one-based) Values 1–32: Counter X is used for max value 1 Value 0: This max value is not used
2–16	Counter index for counter max values 2–16 (one-based) See value definitions in subindex 1

A.14 Emergency object (EMCY)

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
EMCY error code low byte	EMCY error code high byte	Error register (1001h)	Manufacturer specific field (not used)				

The EMCY error codes for internal CANopen diagnostics are interpreted as follows:

EMCY error code	Description
8110h	CAN controller signalled a lost message
8120h	CAN controller reached the warning limit due to error frames
8210h	A received PDO was smaller than specified by the valid mapping table
8220h	The DLC of a received PDO exceeded the length specified by the valid mapping table
8130h	An error control event has occurred (either a life guarding or a heartbeat event)
8140h	CAN controller has recovered from a BUS OFF state
8150h	COB-ID collision detected

A.15 Object dictionary

A.15.1 ABBREVIATIONS

RO	Read Only
RW	Read, Write
RWW	Read, Write on process output
U8	Unsigned8
U16	Unsigned16

U32	Unsigned32
I8	Integer8
I16	Integer16
I32	Integer32

A.15.2 GENERAL PARAMETERS

Index	Object name	Subindex	Description	Data type	Access	Note
0002h	Dummy object	00h	Dummy typeobject for I8	U32	RW	0000 0008h
0003h	Dummy object	00h	Dummy type object for I16	U32	RW	0000 0010h
0004h	Dummy object	00h	Dummy type object for I32	U32	RW	0000 0020h
0005h	Dummy object	00h	Dummy type object for U8	U32	RW	0000 0008h
0006h	Dummy object	00h	Dummy type object for U16	U32	RW	0000 0010h
0007h	Dummy object	00h	Dummy type object for U32	U32	RW	0000 0020h
1000h	Device type	00h	Device type	U32	RO	0000 0000h (No Profile)
1001h	Error register	00h	Error register	U8	RO	–
1003h	Predefined error field	00h	Number of errors	U8	RW	–
		01h–08h	Error field	U32	RO	
1005h	COB-ID sync	00h	COB-ID sync	U32	RW	Default value is 0000 0080h
1006h	Communication cycle period	00h	Period between transmissions of SYNC in μ s	U32	RW	0000 0000h
1007h	Synchronous window length	00h	Synchronous window length in μ s (0 is disabled)	U32	RW	0000 0000h
1008h	Manufacturer device name	00h	Manufacturer device name	Visible string	RO	"R4-26"
1009h	Manufacturer hardware version	00h	Manufacturer hardware version	Visible string	RO	–
100Ah	Manufacturer software version	00h	Manufacturer software version	Visible string	RO	–
100Ch	Guard time	00h	Guard time	U16	RW	–
100Dh	Life time factor	00h	Life time factor	U8	RW	–

Index	Object name	Subindex	Description	Data type	Access	Note
1010h	Store parameters	00h	Largest subindex supported	U8	RO	02h
		01h	Store all parameters	U32	RW	Both subindexes have the same effect when ASCII "save" is written
		02h	Store communication parameters	U32	RW	
1011h	Restore parameters	00h	Largest subindex supported	U8	RO	02h
		01h	Restore all default parameters	U32	RW	Both subindexes have the same effect when
		02h	Restore communication default parameters	U32	RW	
1014h	COB-ID EMCY	00h	COB-ID EMCY	U32	RO	ASCII "load" is written
1015h	Inhibit time EMCY	00h	Inhibit time EMCY	U16	RW	Default value is 0000h
1016h	Consumer heartbeat time	00h	Number of entries	U8	RO	01h
		01h	Consumer heartbeat time	U32	RW	Node ID + Heartbeat time. Value must be a multiple of 1ms.
1017h	Producer heartbeat time	00h	Producer heartbeat time	U16	RW	-
1018h	Identity object	00h	Number of entries	U8	RO	04h
		01h	Vendor ID	U32	RO	-
		02h	Product code	U32	RO	-
		03h	Revision number	U32	RO	-
		04h	Serial number	U32	RO	-

A.15.3 SERVER SDO PARAMETERS

Index	Object name	Subindex	Description	Data type	Access	Note
1200h	Server SDO parameter	00h	Largest subindex supported	U8	RO	02h
		01h	COB ID Client to Server (Receive SDO)	U32	RO	Node ID + 0600h
		02h	COB ID Server to Client (Transmit SDO)	U32	RO	Node ID + 0580h

A.15.4 RECEIVE PDO COMMUNICATION PARAMETERS

Index	Object name	Subindex	Description	Data type	Access	Note
1400h	Receive PDO communication parameter	00h	Largest subindex supported	U8	RO	05h
...		01h	COB-ID used by PDO	U32	RW	–
1403h		02h	Transmission type	U8	RW	–
		03h	Inhibit time (not used)	U16	RW	–
		05h	Event timer (not used)	U16	RW	–

A.15.5 RECEIVE PDO MAPPING PARAMETERS

Index	Object name	Subindex	Description	Data type	Access	Note
1600h	Receive PDO mapping parameter	00h	Number of mapped application objects in PDO	U8	RW	–
...		01h	Mapped object no. 1	U32	RW	–
1603h		02h	Mapped object no. 2	U32	RW	–
		U32	RW	–
		n	Mapped object no. n	U32	RW	–

A.15.6 TRANSMIT PDO COMMUNICATION PARAMETERS

Index	Object name	Subindex	Description	Data type	Access	Note
1800h	Transmit PDO communication parameter	00h	Largest subindex supported	U8	RO	05h
...		01h	COB-ID used by PDO	U32	RW	–
1803h		02h	Transmission type	U8	RW	–
		03h	Inhibit time	U16	RW	–
		05h	Event timer (ms)	U16	RW	–

A.15.7 TRANSMIT PDO MAPPING PARAMETERS

Index	Object name	Subindex	Description	Data type	Access	Note
1A00h	Transmit PDO mapping parameter	00h	Number of mapped application objects in PDO	U8	RW	–
...		01h	Mapped object no. 1	U32	RW	–
1A03h		02h	Mapped object no. 2	U32	RW	–
		U32	RW	–
		n	Mapped object no. n	U32	RW	–

A.15.8 MANUFACTURER SPECIFIC PARAMETERS, OUTGOING

Index	Object name	Subindex	Description	Data type	Access	Note
2001h	Receiver unit to CANopen: Relay status	00h	Largest subindex supported	U8	RO	01h
		01h	Status of the stop relays, function relays and buzzer	U16	RO	-
2002h	Receiver unit to CANopen: System status	00h	Largest subindex supported	U8	RO	0Ah
		01h	RX packet counter	U8	RO	-
		02h	TX status	U8	RO	-
		03h	Active radio channel	U8	RO	-
		04h	RX RSSI	U8	RO	-
		05h	RX inputs	U8	RO	-
		06h	RX status bits	U8	RO	-
		07h	Session TX slot	U8	RO	-
		08h	Current RFID permissions	U8	RO	-
		09h	Low pass filtered RSSI direct value	U8	RO	-
		0Ah	Weight sensor active bits	U8	RO	-
2003h	Receiver unit to CANopen: TX buttons and directions	00h	Largest subindex supported	U8	RO	04h
		01h	Buttons	U32	RO	-
		02h	Directions for joystick transmitter with digital outputs	U32	RO	-
		03h	Directions for joystick transmitter with analogue outputs	U32	RO	-
		04h	TX general digital inputs	U32	RO	-
2004h	Receiver unit to CANopen: Safe state data	00h	Largest subindex supported	U8	RO	01h
		01h	Safe state data from TX	U32	RO	-
2005h	Receiver unit to CANopen: TX general analogue inputs	00h	Largest subindex supported	U8	RO	04h
		01h	TX general analogue input 1	U8	RO	-
		02h	TX general analogue input 2	U8	RO	-
		03h	TX general analogue input 3	U8	RO	-
		04h	TX general analogue input 4	U8	RO	-

Index	Object name	Subindex	Description	Data type	Access	Note
2006h	Receiver unit to CANopen: TXID/RFID for session	00h	Largest subindex supported	U8	RO	02h
		01h	TXID for session	U32	RO	-
		02h	RFID for session	U32	RO	-
2007h	Receiver unit to CANopen:	00h	Largest subindex supported	U8	RO	01h
	Extended radio flags	01h	Extended radio flags on RX	U16	RO	-
2008h	Receiver unit to CANopen:	00h	Largest subindex supported	U8	RO	04h
	Weight sensor values	01h	Value of weight sensor 1	I32	RO	-
		02h	Value of weight sensor 2	I32	RO	-
		03h	Value of weight sensor 3	I32	RO	-
		04h	Value of weight sensor 4	I32	RO	-
2009h	Receiver unit to CANopen:	00h	Largest subindex supported	U8	RO	08h
	Digital inputs from TigerLynx network	01h	Mirrored digital inputs for Load A	U32	RO	-
		02h	Mirrored digital inputs for Load B	U32	RO	-
		03h	Mirrored digital inputs for Load C	U32	RO	-
		04h	Mirrored digital inputs for Load D	U32	RO	-
		05h	Mirrored digital inputs for Load E	U32	RO	-
		06h	Mirrored digital inputs for Load F	U32	RO	-
		07h	Mirrored digital inputs for Load G	U32	RO	-
		08h	Mirrored digital inputs for Load H	U32	RO	-
200Ah	Receiver unit to CANopen:	00h	Largest subindex supported	U8	RO	01h
	Logical digital inputs	01h	Logical digital inputs	U32	RO	-

Index	Object name	Subindex	Description	Data type	Access	Note
200Bh	Receiver unit to CANopen: Counters	00h	Largest subindex supported	U8	RO	20h
		01h-20h	Counter value for counters 1-32	U32	RO	-

A.15.9 MANUFACTURER SPECIFIC PARAMETERS, INCOMING

Index	Object name	Subindex	Description	Data type	Access	Note
2101h	CANopen to receiver unit: Relay control	00h	Largest subindex supported	U8	RO	01h
		01h	Relay control from CANopen	U16	RWW	-
2102h	CANopen to receiver unit: Fieldbus input registers	00h	Largest subindex supported	U8	RO	04h
		01h	Fieldbus input register 1	U32	RWW	-
		02h	Fieldbus input register 2	U32	RWW	-
		03h	Fieldbus input register 3	U32	RWW	-
		04h	Fieldbus input register 4	U32	RWW	-
2103h	CANopen to receiver unit: Simulated RX digital inputs	00h	Largest subindex supported	U8	RO	01h
		01h	Simulated RX digital inputs	U16	RWW	-
2104h	CANopen to receiver unit: Simulated RX analogue inputs	00h	Largest subindex supported	U8	RO	02h
		01h	Receiver analogue input 1	U8	RWW	-
		02h	Receiver analogue input 1	U8	RWW	-

Index	Object name	Subindex	Description	Data type	Access	Note
2105h	CANopen to receiver unit: RX analogue outputs	00h	Largest subindex supported	U8	RO	10h
		01h	Receiver analogue output 1	U16	RWW	–
		02h	Receiver analogue output 2	U16	RWW	–
		03h	Receiver analogue output 3	U16	RWW	–
		04h	Receiver analogue output 4	U16	RWW	–
		05h	Receiver analogue output 5	U16	RWW	–
		06h	Receiver analogue output 6	U16	RWW	–
		07h	Receiver analogue output 7	U16	RWW	–
		08h	Receiver analogue output 8	U16	RWW	–
		09h	Receiver analogue output 9	U16	RWW	–
		0Ah	Receiver analogue output 10	U16	RWW	–
		0Bh	Receiver analogue output 11	U16	RWW	–
		0Ch	Receiver analogue output 12	U16	RWW	–
		0Dh	Receiver analogue output 13	U16	RWW	–
		0Eh	Receiver analogue output 14	U16	RWW	–
		0Fh	Receiver analogue output 15	U16	RWW	–
		10h	Receiver analogue output 16	U16	RWW	–
2201h	Receiver unit config data:	00h	Largest subindex supported	U8	RO	10h
	Counter max values	01h–10h	Counter max value 1–16	U32	RO	–
2202h	Receiver unit config data:	00h	Largest subindex supported	U8	RO	10h
	Counter map	01h–10h	Counter index for max value 1–16, one-based	U8	RO	–

ANNEX B: J1939 SPECIFICATION FOR TG2 SYSTEMS (IN ENGLISH)

NOTE: Applies to **R4-41, R4-43**

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Version: v01

B.1 Introduction

This document describes the installation, setup and J1939 communication profile for Tele Radio TG2 receiver units **R4-41, R4-43, R4-45**. It is intended for personnel with qualifications within electrical engineering and J1939 communication. For additional documentation, see official J1939 standards.

R4 receivers have 7 standard relays on the main board that can be controlled with J1939.

B.2 General

The receiver unit J1939 interface operates according to SAE J1939 DA.

This document describes the messages provided by Tele-Radio J1939 default spec and general information about using the CAN protocol with extended 29-bit CAN identifiers.

Definitions:

Parameter Group Numbers identifiers (PGN): 18-bit subset of the 29-bit extended CAN.

Suspect Parameter Numbers parameters (SPN): identifier for the CAN signals /parameters contained in the databytes.

B.2.1 GENERAL FEATURES

TG2 CAN/J1939 unit is arbitrary address capable by default, but fixed address operation is also possible.

- Baudrate: 250 kbps.
- Default starting network address is 128/0x80 (dec/hex). For other value, contact your representative.
Tele Radio Node claiming ends at 251/0xFB and then restarts at 0x00.
- PGNs 0x0FF00 – 0x0FFFF are reserved for proprietary use.
- Tele radio's default message size for J1939 is 8 bytes.

Byte \ Bit	7	6	5	4	3	2	1	0
0	7	6	5	4	3	2	1	0
1	15	14	13	12	11	10	9	8
2	23	22	21	20	19	18	17	16
3	31	30	29	28	27	26	25	24
4	39	38	37	36	35	34	33	32
5	47	46	45	44	43	42	41	40
6	55	54	53	52	51	50	49	48
7	63	62	61	60	59	58	57	56

B.2.2 NAME MESSAGE WHEN CLAIMING ADDRESS

The Name message is 64 bit (8 bytes) and follows the structure below (for more details about addresses and names, please refer to the J1939/81 standard).

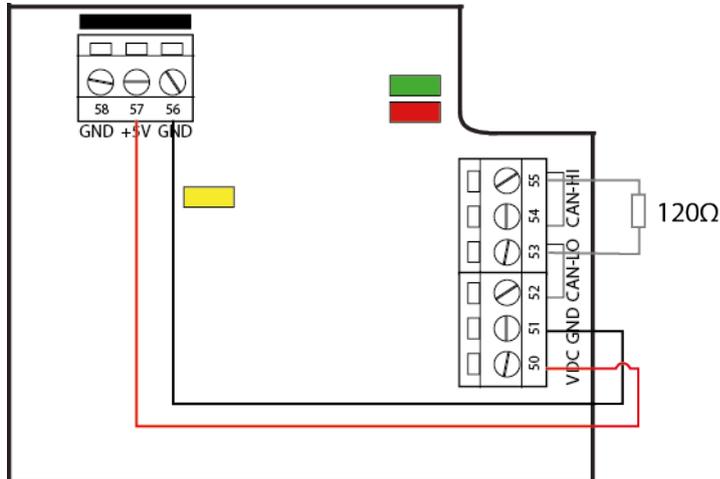
Bits 0-20 are used for the receiver's serial number.

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
(hex)	ss	ss	0s	00	00	FF	FE	80

s = serial number

B.3 Bus termination

The CANopen interface does not contain an internal bus termination resistor. If the receiver unit is the last node on the bus, the bus has to be terminated by connecting an extra resistor on pin 53 and 55.

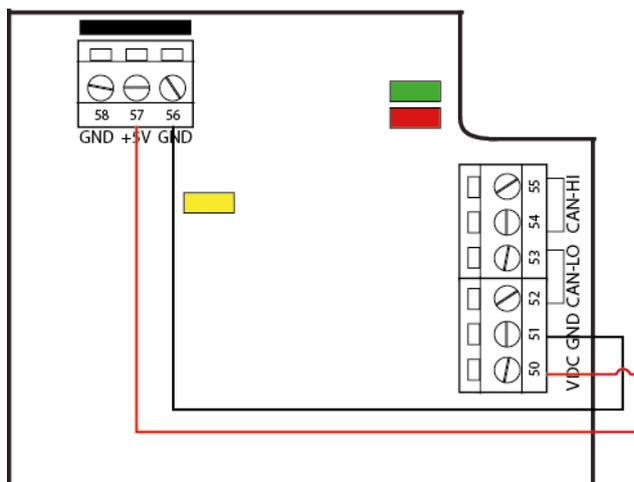


B.4 CAN bus interface

For CAN bus interface, please see Tele Radio Installation instructions.

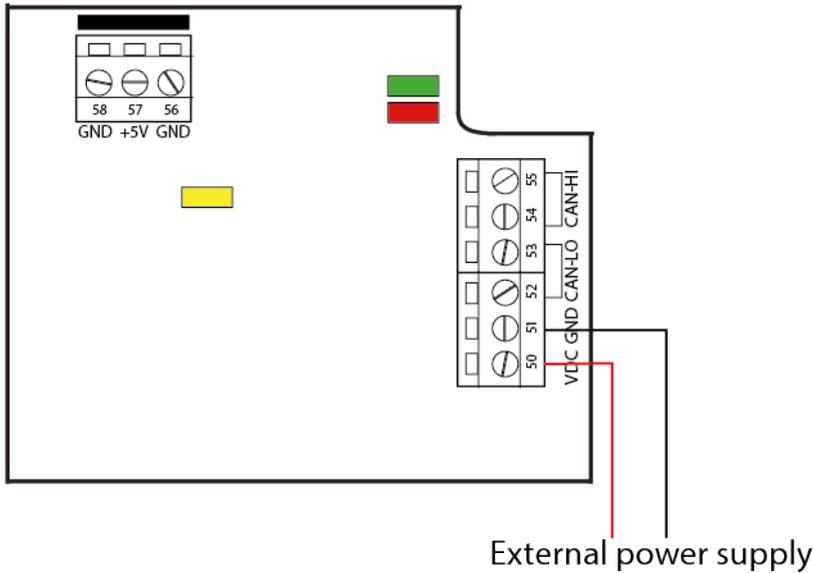
B.5 Power supply of CAN expansion board

B.5.1 INTERNAL POWER SUPPLY OF CAN EXPANSION BOARD



B.5.2 EXTERNAL POWER SUPPLY OF CAN EXPANSION BOARD

If galvanic isolation from the CAN bus is required, connect 5–24 V DC directly to the terminal block for CAN signals.



If no galvanic isolation is required, use the power supply from the receiver.

B.6 LED indications

The J1939 interface has two indication LEDs, see table below.

B.6.1 RUN-LED

LED color	On	Single flash
Green	Operational	No address

J1939 communication state	Description
Operational	Address claim is correct, processing messages.
No address	Address claim is still running or has failed.

B.6.2 ERROR-LED

LED color	On	Single flash
Red	Bus off	Warning limit reached

J1939 error code message	Problem description
Bus Off	CAN controller is in bus off.
Warning limit reached	At least one of the error counters in the CAN controller has reached or exceeded its warning level (e.g. too many error frames).

B.7 Request messages accepted

PGNs FF00h – FF02h are 64 bits each.

NOTE: Transmission repetition rate is not defined by default but can be adjusted to customer needs. Contact your representative for assistance.

NOTE: "Priority" and "Source address" values are voluntary and can be adjusted to customer needs (contact your representative for assistance).

NOTE: For incoming PGNs, "Priority" and "Source address" are actually not relevant. In the table below, "Priority Y" and "Source address Z/0xZZ (dec/hex)" are therefore only used as an example for the identifier.

B.7.1 PGN: RELAY CONTROL

Transmission repetition rate ¹	Data length (bytes)	Default priority (dec)	PGN (dec/hex)	Source address (dec/hex)	Identifier ² (hex)
–	8	Y	65280/ 0xFF00	Z/ 0xZZ	0xYYFF00ZZ

• Relay control – Relay 1–12+buzzer output

To control the relays and buzzer output on the Tiger receiver. There is one bit for each relay and one bit for buzzer.

SPN name	SPN start (bit)	SPN length (bit)	Description
Relay 1	0	1	0 = Relay passive; 1 = Relay active
Relay 2	1	1	0 = Relay passive; 1 = Relay active
Relay 3	2	1	0 = Relay passive; 1 = Relay active
Relay 4	3	1	0 = Relay passive; 1 = Relay active
Relay 5	4	1	0 = Relay passive; 1 = Relay active
Relay 6	5	2	0 = Relay passive; 1 = Relay active
Relay 7	6	2	0 = Relay passive; 1 = Relay active
Reserved	7	7	–
Buzzer output	14	1	0 = Buzzer output passive 1 = Buzzer output active
Stop relays 1–2	15	1	0 = Relay passive 1 = Relay active

¹Not defined by default but can be adjusted to customer's need. Contact your representative for assistance.

²Identifier (hex) = Priority (hex) + PGN (hex) + Source address (hex)

• **Simulated RX digital inputs**

SPN name	SPN start (bit)	SPN length (bit)	Description
Receiver digital input 1	32	1	0 = Digital input off; 1 = Digital input on
Receiver digital input 2	33	1	0 = Digital input off; 1 = Digital input on
Receiver digital input 3	34	1	0 = Digital input off; 1 = Digital input on
Receiver digital input 4	35	1	0 = Digital input off; 1 = Digital input on
Receiver digital input 5	36	1	0 = Digital input off; 1 = Digital input on
Receiver digital input 6	37	1	0 = Digital input off; 1 = Digital input on
Receiver digital input 7	38	1	0 = Digital input off; 1 = Digital input on
Receiver digital input 8	39	1	0 = Digital input off; 1 = Digital input on
Receiver digital input 9	40	1	0 = Digital input off; 1 = Digital input on
Receiver digital input 10	41	1	0 = Digital input off; 1 = Digital input on
Receiver digital input 11	42	1	0 = Digital input off; 1 = Digital input on
Receiver digital input 12	43	1	0 = Digital input off; 1 = Digital input on
Receiver digital input 13	44	1	0 = Digital input off; 1 = Digital input on
Receiver digital input 14	45	1	0 = Digital input off; 1 = Digital input on
Receiver digital input 15	46	1	0 = Digital input off; 1 = Digital input on
Receiver digital input 16	47	1	0 = Digital input off; 1 = Digital input on

• **Simulated RX analog inputs**

SPN name	SPN start (bit)	SPN length (bit)	Description
Receiver analogue input 1	48	8	Range: 0-255
Receiver analogue input 2	56	8	Range: 0-255

B.7.2 PGN: FIELDBUS INPUT REGISTER 1 AND 2

Transmission repetition rate ¹	Data length (bytes)	Default priority (dec)	PGN (dec/hex)	Source address (dec/hex)	Identifier (Hex)
-	8	Y	65281/ 0xFF01	Z/0xZZ	0xYYFF01ZZ

SPN name	SPN start (bit)	SPN length (bit)	Description
Fieldbus input register 1	0	32	Reserved for general feedback from the CAN network
Fieldbus input register 2	32	32	Reserved for general feedback from the CAN network

¹Not defined by default but can be adjusted to customer's need. Contact your representative for assistance.

B.7.3 PGN: FIELDBUS INPUT REGISTER 3 AND 4

Transmission repetition rate ¹	Data length (bytes)	Default priority (dec)	PGN (dec/hex)	Source address (dec/hex)	Identifier (Hex)
–	8	Y	65282/ 0xFF02	Z / 0xZZ	0xYYFF02ZZ

SPN name	SPN start (bit)	SPN length (bit)	Description
Fieldbus input register 3	0	32	Reserved for general feedback from the CAN network
Fieldbus input register 4	32	32	Reserved for general feedback from the CAN network

B.8 Request messages transmitted

PGNs FF80h – FF82h are 64 bits each. They are sent each time any value in them changes. Current contents of these PGNs can also be requested with standard J1939 Request PGN message.

NOTE: Transmission repetition rate is not defined by default but can be adjusted to customer needs. Contact your representative for assistance.

NOTE: "Priority" and "Source address" values are voluntary and can be adjusted to customer needs.

NOTE: The source address claimed by default is 128/0x80 (dec/hex). If 128/0x80 is not available, the next address (129/0x81) will be claimed automatically instead, and so on.

NOTE: In the tables below, "Priority 6" and "Source address 128/0x80 (dec/hex)" are the default values.

B.8.1 PGN: SYSTEM STATUS

Transmission repetition rate	Data length (bytes)	Default priority (dec)	PGN (dec/hex)	Source address (dec/hex)	Identifier ² (hex)
On change	8	6	65408/ 0xFF80	128/ 0x80	0x18FF8080

- **RX packet counter**

Packet counter for the number of received radio packets by the receiver unit.

¹Not defined by default but can be adjusted to customer's need. Contact your representative for assistance.

²Identifier (hex) = Priority (hex) + PGN (hex) + Source address (hex)

SPN name	SPN start (bit)	SPN length (bit)	Description
Packet counter	0	8	Counter increases value by 1 for every 8th radio packet received and counts from 0 to 255, then resets and starts over again.

• **TX status**

SPN name	SPN start (bit)	SPN length (bit)	Description
Transmitter battery level	8	2	0/00 = Battery empty 1/01 = 17% ≤ Battery ≤ 33% 2/10 = 33% < Battery ≤ 50% 3/11 = Battery full
Transmitter charge status	10	1	0 = Passive 1 = Active
Transmitter lost feedback	11	1	0 = Feedback 1 = No feedback
Reserved	12	4	–

• **Relay status**

Status for relays and buzzer outputs.

SPN name	SPN start (bit)	SPN length (bit)	Description
Relay 1	16	1	Relay status for relay 1 (1 = active)
Relay 2	17	1	Relay status for relay 2 (1 = active)
Relay 3	18	1	Relay status for relay 3 (1 = active)
Relay 4	19	1	Relay status for relay 4 (1 = active)
Relay 5	20	1	Relay status for relay 5 (1 = active)
Relay 6	21	2	Relay status for relay 6 (1 = active)
Relay 7	22	2	Relay status for relay 7 (1 = active)
Reserved	23	7	–
Buzzer output	30	1	Relay status for the buzzer (1 = active)
Stop relays 1–2	31	1	Relay status for stop relays 1–2 (1 = active)

• **Active radio channel**

433 MHz frequency band: Value 1–69 => radio channel 1–69

915 MHz frequency band: Value 1–15 => frequency bank 1–15

2.4 GHz frequency band: Value 11–26 => radio channel 11–26

SPN name	SPN start (bit)	SPN length (bit)	Description
Active radio channel	32	8	0/0x00 = radio link is down and the receiver frequency scanning is active 255/0xFF = cable control is used

• **RX RSSI**

SPN name	SPN start (bit)	SPN length (bit)	Description
Receiver RSSI level	40	4	Range 0...15 where 0 is low and 15 is high If cable control is used, Receiver RSSI level = 1111
Reserved	44	4	-

• **RX inputs**

SPN name	SPN start (bit)	SPN length (bit)	Description
Receiver main board digital input 1	48	1	0 = Digital input open 1 = Digital input connected to GND
Receiver main board digital input 1	49	1	0 = Digital input open 1 = Digital input connected to GND
Reserved	50	6	-

• **RX status**

SPN name	SPN start (bit)	SPN length (bit)	Description
Stop relay status	56	1	0 = Stop relays passive 1 = Stop relays active
Radio link status/TX alive	57	1	0 = Radio link down 1 = Radio link up
Session status	58	1	0 = No session with TX 1 = In session with TX
TX Zero position status	59	1	0 = Zero position lost 1 = Zero position acquired
Cable control	60	1	0 = Cable control passive 1 = Cable control active
Reserved	61	3	-

B.8.2 PGN: BUTTONS AND DIRECTIONS

Transmission repetition rate	Data length (bytes)	Default priority (dec)	PGN (dec/hex)	Source address (dec/hex)	Identifier (Hex)
On change	8	6	65409/ 0xFF81	128/ 0x80	0x18FF8180

• **Buttons**

NOTE: TX06 is referring to T9-02, T9-12, T9-22
 TX08 is referring to T9-01, T9-11
 TX10 is referring to T11-04, T11-14, T11-24
 TX10A is referring to T14-x
 TX12 is referring to T11-5, T11-15
 TX12A is referring to T15-x
 TXJD is referring to T12-2x, T12-3x

SPN name	SPN start (bit)	SPN length (bit)	Description
Button 03 step 1	0	1	on TX06/TX08/TX10/TX10A/TX12/TX12A (1 = button active)
Button 03 step 2	1	1	on TX06/TX08/TX10/TX10A/TX12/TX12A (1 = button active)
Button 04 step 1	2	1	on TX06/TX08/TX10/TX10A/TX12/TX12A (1 = button active)
Button 04 step 2	3	1	on TX06/TX08/TX10/TX10A/TX12/TX12A (1 = button active)
Button 05 step 1	4	1	on TX08/TX10/TX10A/TX12/TX12A (1 = button active)
Button 05 step 2	5	1	on TX08/TX10/TX10A/TX12/TX12A (1 = button active)
Button 06 step 1	6	1	on TX08/TX10/TX10A/TX12/TX12A (1 = button active)
Button 06 step 2	7	1	on TX08/TX10/TX10A/TX12/TX12A (1 = button active)
Button 07 step 1	8	1	on TX10 (1 = button active)
Button 09 step 1			on TX12/TX12A (1 = button active)
Button 07 step 2	9	1	on TX10 (1 = button active)
Button 09 step 2			on TX12/TX12A (1 = button active)
Button 08 step 1	10	1	on TX10 (1 = button active)
Button 10 step 1			on TX12/TX12A (1 = button active)
Button 08 step 2	11	1	on TX10 (1 = button active)
Button 10 step 2			on TX12/TX12A (1 = button active)
Button 01 step 1	12	1	on TX06/TX08/TX10/TX10A/TX12/TX12A (1 = button active)
Button 01 step 2	13	1	on TX06/TX08/TX10/TX10A/TX12/TX12A (1 = button active)
Button 02 step 1	14	1	on TX06/TX08/TX10/TX10A/TX12/TX12A (1 = button active)
Button 02 step 2	15	1	on TX06/TX08/TX10/TX10A/TX12/TX12A (1 = button active)
Left start button step 1	16	1	on TX06/TX08/TX10/TX10A/TX12/TX12A (1 = button active)
SB4			on TXJD (1 = button active)
Left start button step 2	17	1	on TX06/TX08/TX10/TX10A/TX12/TX12A (1 = button active)
Right start button step 1	18	1	on TX06/TX08/TX10/TX10A/TX12/TX12A (1 = button active)
SB3			on TXJD (1 = button active)
Right start button step 2	19	1	on TX06/TX08/TX10/TX10A/TX12/TX12A (1 = button active)
Button 07 step 1	20	1	on TX12/TX12A (1 = button active)
SB1			on TXJD (1 = button active)
Button 07 step 2	21	1	on TX12/TX12A (1 = button active)
Button 08 step 1	22	1	on TX12/TX12A (1 = button active)
SB2			on TXJD (1 = button active)
Button 08 step 2	23	1	on TX12/TX12A (1 = button active)
Upper right switch	24	1	on TXJD (1 = button active)
Upper left switch	25	1	on TXJD (1 = button active)
Mid right switch	26	1	on TXJD (1 = button active)
Mid left switch	27	1	on TXJD (1 = button active)
Lower right switch	28	1	on TXJD (1 = button active)
Lower left switch	29	1	on TXJD (1 = button active)
Reserved	30	2	-

• **Directions for joystick transmitter with digital outputs**

Joystick position is represented as a signed 8-bit integer (value -5...+5 for a 5-step joystick).

SPN name	SPN start (bit)	SPN length (bit)	Description
Left joystick x-axis	32	8	Value -5...-1 corresponds to a negative position on x-axis Value +1...+5 corresponds to a positive position on x-axis
Left joystick y-axis	40	8	Value -5...-1 corresponds to a negative position on y-axis Value +1...+5 corresponds to a positive position on y-axis
Right joystick x-axis	48	8	Value -5...-1 corresponds to a negative position on x-axis Value +1...+5 corresponds to a positive position on x-axis
Right joystick y-axis	56	8	Value -5...-1 corresponds to a negative position on y-axis Value +1...+5 corresponds to a positive position on y-axis

B.8.3 PGN: RESERVED

Transmission repetition rate	Data length (bytes)	Default priority (dec)	PGN (dec/hex)	Source address (dec/hex)	Identifier (Hex)
On change	8	6	65410/ 0xFF82	128/ 0x80	0x18FF8280

• **Directions for transmitters with analog outputs**

NOTE: TX10A is referring to T14-x
TX12A is referring to T15-x
TXJD is referring to T12-2x, T12-3x

SPN name	SPN start (bit)	SPN length (bit)	Description
Left joystick x-axis	0	8	on TXJD with analogue outputs: Joystick position is represented as a signed 8-bit integer (value -127...+127) Value -127...-1 corresponds to a negative position on x-axis Value +1...+127 corresponds to a positive position on x-axis
Button 3 and 4			on TX10A/TX12A: Button 3 is represented as a signed 8-bit integer (value -127...-1) Button 4 is represented as a signed 8-bit integer (value +1...+127)

SPN name	SPN start (bit)	SPN length (bit)	Description
Left joystick y-axis	8	8	on TXJD with analogue outputs: Joystick position is represented as a signed 8-bit integer (value -127...+127) Value -127...-1 corresponds to a negative position on y-axis Value +1...+127 corresponds to a positive position on y-axis
Button 5 and 6			on TX10A/TX12A: Button 5 is represented as a signed 8-bit integer (value -127...-1) Button 6 is represented as a signed 8-bit integer (value +1...+127)
Right joystick x-axis	16	8	on TXJD with analogue outputs: Joystick position is represented as a signed 8-bit integer (value -127...+127) Value -127...-1 corresponds to a negative position on x-axis Value +1...+127 corresponds to a positive position on x-axis
Button 7 and 8			on TX12A: Button 7 is represented as a signed 8-bit integer (value -127...-1) Button 8 is represented as a signed 8-bit integer (value +1...+127)
Right joystick y-axis	24	8	on TXJD with analogue outputs: Joystick position is represented as a signed 8-bit integer (value -127...+127) Value -127...-1 corresponds to a negative position on y-axis Value +1...+127 corresponds to a positive position on y-axis
Button 1 and 2			on TX10A/TX12A: Button 1 is represented as a signed 8-bit integer (value -127...-1) Button 2 is represented as a signed 8-bit integer (value +1...+127)

• **Safe state data**

SPN name	SPN start (bit)	SPN length (bit)	Description
Load A	32	1	Load selection
Load B	33	1	Load selection
Load C	34	1	Load selection
Load D	35	1	Load selection
Load E	36	1	Load selection
Load F	37	1	Load selection
Load G	38	1	Load selection
Load H	39	1	Load selection
Load I	40	1	Load selection
Load J	41	1	Load selection
Load K	42	1	Load selection
Load L	43	1	Load selection

SPN name	SPN start (bit)	SPN length (bit)	Description
Load M	44	1	Load selection
Load N	45	1	Load selection
Load O	46	1	Load selection
Load P	47	1	Load selection
TX type	48	4	0/0000 => Undefined 1/0001 => TX06 (referring to T9-02-12-22) 2/0010 => TX08 (referring to T9-01-11) 3/0011 => TX10 (referring to T11-04-14-24) 4/0100 => TX12 (referring to T11-05-15) 5/0101 => TXJD (referring to T12-2x, T12-3x) 6/0110 => TX10A (referring to T14-07-08-09) 7/0111 => TX12A (referring to T15-07-08-09)
Reserved	52	4	Allocated for safe state data sent from transmitter to receiver.

ANNEX C: GLOSSARY

DC

Diagnostic Coverage

FIT

Failures in time (1 FIT = 1 failure per 10^9 hours)

HFT

Hardware Fault Tolerance

MTTF

Mean Time To Failure

PFH

Probability of Failure per Hour

PL

Performance level

SFF

Safety Failure Fraction

SIL

Safety Integrity Level

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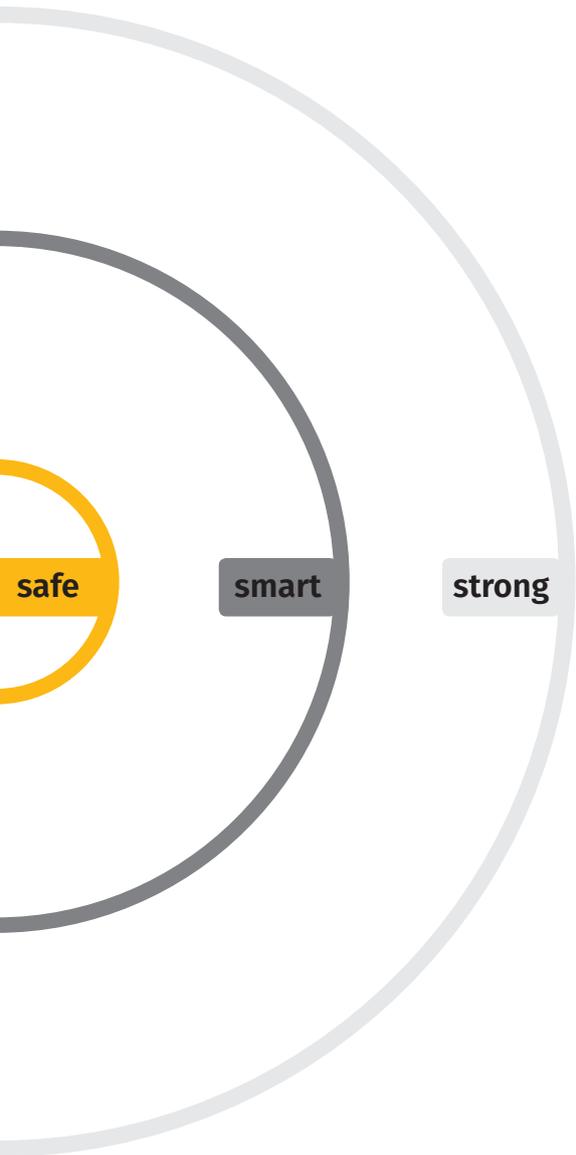
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