

IO_TRANSMITTER

USER MANUAL

This user manual refers to:

PCB (K1002) version 2.1

Firmware version 1.4

Output PCB version 2.0



DOCUMENT VERSION HISTORY

Date	Revision	Notes
18.10.2022	1.0	Initial release.
22.11.2022	1.1	Changed to A5 format. Added Appendix. Minor updates in content.
9.1.2022	1.2	Added Relay PCB
12.1.2022	1.3	Minor updates in content.
16.2.2023	1.4	EMC Tests and technical data updates.
23.3.2023	1.5	Changed to Output PCB. Major changes in Menu structure.
21.12.2023	1.6	Firmware update. Analog inputs added. Region removed. On Mask 1 default changed to None
1.2.2024	1.7	Updated connectors documentation. Added examples appendix.

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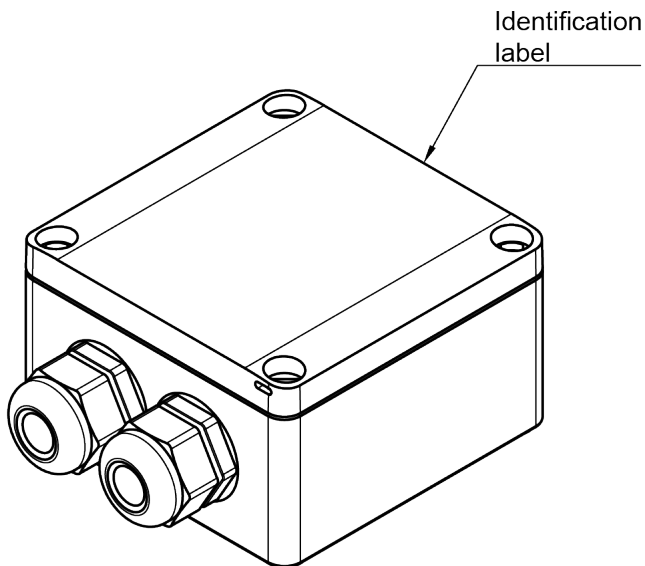
1 INTRODUCTION

The IO_Transmitter (IO_TX) is mainly designed to be used for transmitting signals from external sources to receivers within the IO_Series and Tele Radio Panther range.

The transmitter be used with Digital and Analog sources. Digital, such as sensors (8-32V, High Level) and push buttons, switches or similiar (Gnd, Low Level) or Analog inputs 0.5-4.5V, 0-5V, 0-10V for Joysticks, Potentiometers and similiar.

Please read this manual carefully before mounting, installing, configuring or operating this product.

The product is made in Finland.



2 PREFACE

2.1 REQUIRED SKILLS AND SAFETY

The user of this manual must have basic knowledge of machine controlling, electronical connections, and should follow general machine safety guidelines, directives and regulation appropriate to the location where the product will be used. A separate safety analysis is always recommended for the complete system.

The cabling should be designed and constructed according to best practice, an external fuse must be installed for the product's power supply.

Tele Radio Finland OY reserves the right to improve or change the product without further notice.

2.2 WARRANTY

Tele Radio Finland Oy gives the warranty of twelve (12) months to the products from commissioning or eighteen (18) months from the date of delivery of the products, whichever occurs first.

The warranty covers, during the warranty period, defects in the products and thereto related firmware resulting from faults in material, design or workmanship, not wear and tear caused by use. Any loss of earnings and other indirect costs caused by damage during the warranty period are not covered by the warranty, nor is any damage that the product may cause to another object or person.

The warranty covers the service or repair of the product, or if not possible to repair the product a replacement product or a new equivalent. The cost of returning a repaired, replaced or otherwise warranted product is covered by the warranty. The cost of sending the product for warranty service is the responsibility of the customer.

The warranty does not cover defects caused by: negligence of the user or installer, incorrect installation or handling of the product, power failure, power surges, heat, cold, humidity, thunderstorms or other natural phenomena.

The warranty does not cover defects caused by the ingress of sand, mud, water, etc. inside the product's enclosure, unless this is due to a manufacturing defect in the enclosure.

The warranty does not cover any costs related to removing or fastening of devices related to the products. Neither does the warranty cover the expenses of sending devices to or from the manufacturer for repairs. The warranty does not cover possible expenses relating to travelling, accommodation, daily benefits, etc. of installers.

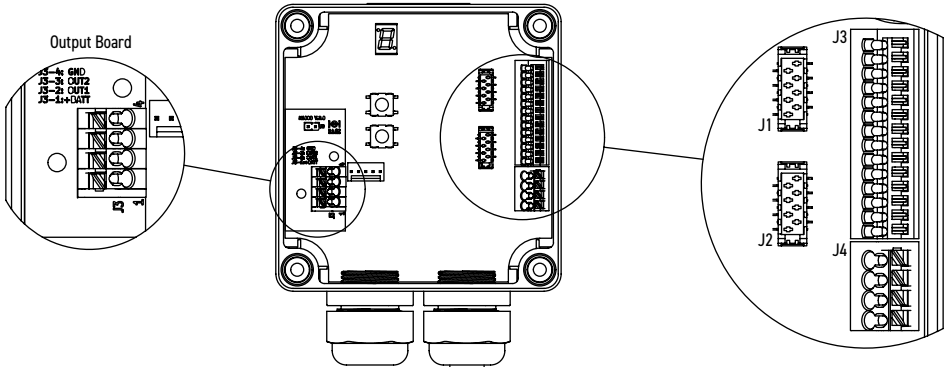
NOTE! The enclosure is rated IP66, however cable glands may be a subject of leakage and should be mounted pointing downwards. High pressure water cleaning is NOT recommended.

For further instructions on service or repair, please contact Tele Radio Finland.

3 TECHNICAL DATA

Input Voltage	8-32 VDC (or 5 VDC)
Current Consumption	~ 25 mA + (5V max 0.75 A)
Inputs (IN_1-12)	12 pcs (DIGITAL); configurable LOW (0V) or HIGH (8-32V), 2 analog, 0-5V, 0.5-4.5V, 0-10V
Reference Voltage Outputs	1 pc; 5V (0.75 A)
Digital Outputs (Output PCB) (Optional)	2 pcs; 2A each or max 3.5A both simultaneously (resistive or inductive load, activated by Inputs)
Ingress Protection	IP66
Dimensions (width x length x height)	100 x 100 x 60 mm
Connectors Dimensions	GND, POT, BATT, GND : max 1.5 m2 IN_1-12, GND: max 0.5 m2
Weight	~ 250g
Certifications	CE, FFC, IC, UKCA
Operating frequency	2.4 GHz (2.410 - 2.475 GHz as per IEEE 802.15.4)
Radio Transmission Power (typical)	+10dBm

4 ELECTRICAL CONNECTION



Connector Terminal Block J3

IO_TX	Function
J3-1	Ground
J3-2*	Input 12*
J3-3*	Input 11*
J3-4	Input 10
J3-5	Input 9
J3-6	Input 8
J3-7	Input 7
J3-8	Input 6
J3-9	Input 5
J3-10	Input 4
J3-11	Input 3
J3-12	Input 2
J3-13	Input 1
J3-14	Ground

Connector Terminal Block J4

J4-1	GND	Ground
J4-2	POT/EXT_IN	5V out/in (0,75A)
J4-3	BATT+	Supply power (8-32VDC)
J4-4	GND	Supply ground

All inputs are configurable **HI** or **LO** (see chapter 5.9)

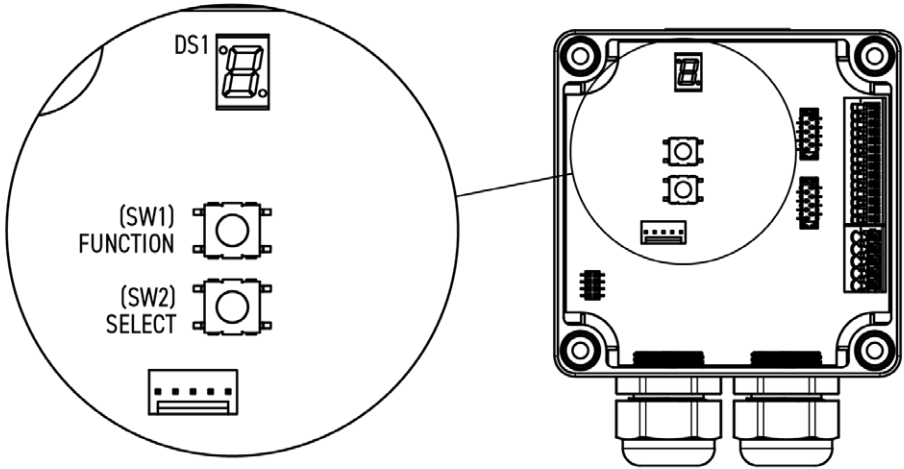
* Inputs 11 & 12 are also configurable as analog inputs (see chapter 4.9)

Output Board Connector Terminal Block (Optional)

J3-1	Supply power (8-32VDC)
J3-2	Output 1 (2A, activated by any input)
J3-3	Output 2 (2A, activated by any input)
J3-4	Ground

ATTENTION! Always GROUND both Output Board (J3-4) and Main Board (J4-4).

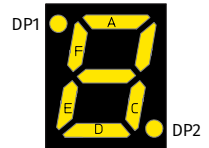
5 OPERATION



By default the Display shows the active input. 1...9, A=10, B=11, C=12.

The Dot (DP1) flashes when the transmitter is powered and also to indicate every new digit.

During restart, the firmware version is displayed.



5.1 REGISTERING



Registering means linking or joining a transmitter and a receiver. Make sure both are powered up before proceeding.

To enter Register Mode:

press the FUNCTION button - *the Dot (DP2) lits* - within 10 seconds, press the SELECT button - *the transmitter is now in register mode*.

In the receiver, also press the FUNCTION button and then the SELECT button.

When the registration is successful, all LEDs in the receiver flashes once.

(Depending on receiver-model, the registering procedure may differ slightly.)

To exit register mode, press any button, activate any input or power-cycle the transmitter.

Technical Note: The transmitter is sending btn1 & btn2 when in Register Mode.

5.2 MENU

To enter Menu Mode press and hold the FUNCTION button for 6 seconds.

ATTENTION! *Changes in Menu structure since FW Version 1.3. (UM V_1.5). If earlier FW version, use UM V_1.4 or older.*

In the Menu, press the FUNCTION button to navigate to next Menu Section.

Menu Sections:

- 1 CHANNEL
- 2 INPUT MODE
- 3 OFF DELAY I
- 4 OFF DELAY II
- 5 ON MASK I
- 6 ON MASK II
- 7 ANALOG/DIGITAL
- 8 END

To save and Exit Menu Mode, navigate to Menu Section 8 (5.10) and press SELECT button or leave the transmitter without pressing anything for 60 seconds - *the transimtter saves all changes and restarts*.

5.3 CHANNEL (Menu Section 1)



The transmitter can send on 14 different channels (12-25).

To change channel press the SELECT button.


If used in a dense wi-fi environments it's recommended to use channels 15, 20, 25. Heavy traffic on wi-fi (802.11) channels 1, 6 and 11 may otherwise cause some interference.


5.4 INPUT MODE (Menu Section 2)



(Factory default: LO)

To change Input Mode press the SELECT button.

 ... HI = Activated when pulled HIGH (8-32V)

 ... LO = Activated when pulled LOW (Ground)

5.5 OFF DELAY I (Menu Section 3)



(Factory default: 0.0)

The time **Output 1** remains active after deactivating an input can be set from 0-1,5 seconds in steps of 0,1 seconds.

To change Delay time press the SELECT button.

5.6 OFF DELAY II (Menu Section 4)



(Factory default: 0.0)

The time **Output 2** remains active after deactivating an input. Procedure as in Menu Section 3 (5.5).

5.7 ON MASK I (Menu Section 5)



(Factory default: None)

Choose which Input(s) will activate **Output 1**. The menu will loop thru every Input (1...9, A=10, B=11, C=12) with a 2 sec intervall. Active Input is indicated with lower display Dot (DP2).

To activate or deactivate Input press the SELECT button when respective Input number is shown in the display.

5.8 ON MASK II (Menu Section 6)



(Factory default: None)

Choose which Input(s) will activate **Output 2**. Procedure as in Menu Section 5 (4.7).

Technical Note: OUT1 and OUT2 are available at the receiver as buttons 15 and 16.

5.9 ANALOG/DIGITAL (Menu Section 7)



(Factory default: DI)

To change between Digital or Analog inputs press the SELECT button.

In DIGITAL Mode, all inputs are digital.

In any ANALOG mode, **inputs 11 & 12 are analog**, inputs 1-10 are digital and the transmitter sends in continuous mode.

... ... **Digital** Mode, discontinuous mode.

... ... **Analog 0,5-4,5V** (Joystick), continuous mode.

... ... **Analog 0-5V** (Potentiometer), continuous mode.

... ... **Analog 0-10V**, continuous mode.

Technical Note:

The analog value will be transmitted in place of Btn 17-24 and 25-32.

Btn 11 or 12 are active when the analog value is not zero.

5.10 END (Menu Section 8)



To Save and Exit press the SELECT button.

6 APPROVALS AND SAFETY

6.1 EMC TESTS

Emission tests according to the test specification EN 61000-6-3: residential, commercial and light industry.

Emission test	Test method	Conclusion
Radiated disturbance	CISPR 16-2-3 (2016+AMD1:2019)	Pass
Conducted disturbance at mains ports	CISPR 16-2-1 (2017-06 ed. 3.1)	Pass

Immunity tests according to the test specification EN 61000-6-2: industrial environment.

Immunity test	Test method	Performance Criterion	Conclusion
Electrostatic Discharge (ESD)	EN 61000-4-2 (2008-12)	B	Pass
Radiated RF Electromagnetic Field	EN 61000-4-3 (2020-09)	A	Pass
Fast Transient (EFT/B)	EN 61000-4-4 (2012-04)	B	Pass
Conducted RF Common Mode	EN 61000-4-6 (2013-03)	A	Pass

Emission tests according to the E/CEC Regulation No. 10, Revision 6 (2019)

Emission test	Test method	Conclusion
Measurement of radiated interference field strength in the frequency range 30 – 1000 MHz	E/CEC Reg. No. 10, Annexes 7 and 8	Pass
Measurement of conducted disturbances	E/CEC Reg. No. 10, Annex 10	Pass

Immunity tests according to the E/ECE Regulation No. 10, Revision 6 (2019), (immunity related functions).

Immunity test procedures and acceptance criteria to comply with:

Agricultural and forestry machinery, ISO 14982:1998 and

Earth-moving and building construction machinery – (EMC), ISO 13766-1:2018

Immunity test	Test method	Conclusion
Radiated radio-frequency electromagnetic field	E/ECE Reg. No. 10, Annex 9	Pass
Immunity to transient disturbances conducted along supply lines	E/ECE Reg. No. 10, Annex 10, ISO 7637-2: 2004	Pass

	Pulse 24 V, Test Method	Pulse 12 V, Test Method	Perf. Criterion
1	-450V, 500 pulses	-112V, 500 pulses	C
2a	+55V, 500 pulses	+55V, 500 pulses	B
2b	+20V, 10 pulses	+10V, 10 pulses	C
3a	-220V, 1 h	-165V, 1 h	A
3b	220V, 1 h	112V, 1 h	A
Starting Profile	-16V, 8V, 10 pulses	-9V, -6V, 10 pulses	B
Load Dump, unclamped	123V, 10 pulses	56V, 5 pulses	C

ISO 10605 Electrostatic Discharge (ESD) 330pF

Air Discharge	Contact Discharge	Indirect Discharge
±8.0kV	±6.0kV	±6.0kV

(For more detailed reports, please contact Tele Radio Finland)

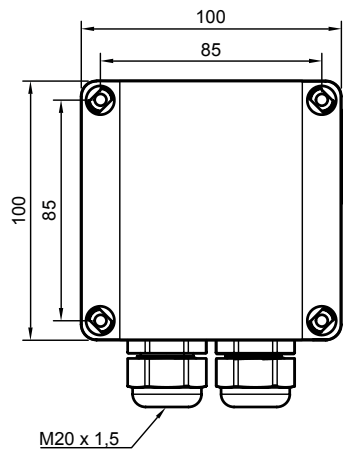
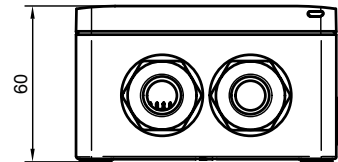
6.2 ENVIRONMENTAL TESTS

The enclosure is certified according to EN 62208:2011:2011

Degree of protection (EN 60529)	IP66 / IP67
Mechanical strength (EN 62262)	IK08 +35 oC / -40 oC
Material	Polycarbonate

7 DIMENSIONS AND MOUNTING

When mounting the transmitter in moist or otherwise harsh environments, make sure that the cable glands are pointing downwards.



8 REGULATORY INFORMATION

This product is subject to THE EUROPEAN PARLIAMENT AND OF THE COUNCIL DIRECTIVE 2012/19/EU on waste electrical and electronic equipment (WEEE). For proper treatment, recovery and recycling, please take this product to a designated collection point.



This product is in compliance with the Radio Equipment Directive 2014/53/EU. The latest version of the complete EU Declaration of Conformity is available on request from Tele Radio Finland Oy.



This product conforms with the regulatory requirements for the UKCA (UK Conformity Assessed) marking. The latest version of the complete UK Declaration of Conformity is available on request from Tele Radio Finland Oy or from the website www.radio-remote.com



IMPORTANT: Contains FCC ID: VW4A091729. This equipment 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 (FCC 15.19).



IMPORTANT: 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 when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense (FCC section 15.105).

This device complies with Industry Canada licence-exempt RSS standard(s). 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 the 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, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This equipment complies with radio frequency exposure limits set forth by Industry Canada for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the device and the user or bystanders.

Cet équipement est conforme aux limites d'exposition aux radiofréquences définies par Industrie Canada pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre le dispositif et l'utilisateur ou des tiers.

Contains Transmitter Module IC:11019A-091729

APPENDIX A: Declaration of Conformity EU

EU Declaration of Conformity

1. **Product model:** IO_Transmitter

2. **Name and address of the manufacturer or his authorized representative:**

Tele Radio Finland OY
Gerbyntie 14
65230 VAASA
+358 20 144 3030
myynti@tele-radio.com

3. **This declaration of conformity is issued under the sole responsibility of the manufacturer.**

4. **Object of the declaration:**

Equipment: Radio Remote Control Transmitter
Brand name: Tele Radio Finland OY, IO_Series
Model/type: IO_Transmitter
Product code: 500-005-382-02

5. **Directives**

- Radio Equipment Directive, RED 2014/53/EU
- Restriction of Hazardous Substances in Electrical and Electronic Equipment Directive (RoHS) 2011/65/EU, Annex 2015/863/EU

6. **References to the harmonized standards used or references to the other technical specifications in relation to which conformity is declared:**

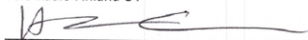
- EN 300328:V2.2.2
Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques
- EN 61000-6-2:2005, EN 61000-6-4:2007+A1:2011
Electromagnetic compatibility (EMC)
Part 6-2: Generic standards ± Immunity for industrial environments
Part 6-3: Generic standards ± Emission standard for residential, commercial and light industry
- EN 62368-1:2014+A11:2017
Audio/Video, Information and communication technology equipment Part 1: Safety requirements
- EN 62479:2010
Assessment of the compliance of low power electronic and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10 MHz to 300 GHz)

Approval is only valid for products in delivery state, including standard hardware and software. If the products are delivered to OEM manufacturers for their use (integration) in final or combined products, it is in the responsibility of the OEM manufacturer to demonstrate compliance with all applicable EU directives and standards. The Tele Radio Finland OY declaration of conformity serves as input to the declaration of conformity for the final product.

7. **Signed for and on behalf of:**

VAASA 27.6.2022

Manufacturer:
Tele-Radio Finland OY


Henrik Lähdekorpi, Chief Executive Officer

APPENDIX B: Declaration of Conformity UK

UK Declaration of Conformity

1. **Product model:** IO_Transmitter

2. **Name and address of the manufacturer or his authorized representative:**


Tele Radio Finland OY
Gerbyntie 14
65230 VAASA
+358 20 144 3030
myynti@tele-radio.com

3. **This declaration of conformity is issued under the sole responsibility of the manufacturer.**

4. **Object of the declaration:**

Equipment: Radio Remote Control Transmitter
Brand name: Tele Radio Finland OY, IO_Series
Model/type: IO_Transmitter
Product code: 500-005-382-02

5. **Regulations**

- The Radio Equipment Regulations 2017
- The device and its homogenous materials comply with The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment regulations 2012, and following amendments, and carries the  mark accordingly.

6. **References to the harmonized standards used or references to the other technical specifications in relation to which conformity is declared:**


- EN 300328:V2.2.2
Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques
- EN 61000-6-2:2005, EN 61000-6-4:2007+A1:2011
Electromagnetic compatibility (EMC)
Part 6-2: Generic standards ± Immunity for industrial environments
Part 6-3: Generic standards ± Emission standard for residential, commercial and light industry
- BS EN 62368-1:2014+A11:2017
Audio/Video, information and communication technology equipment Part 1: Safety requirements
- BS EN 62479:2010
Assessment of the compliance of low power electronic and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10 MHz to 300 GHz)

Approval is only valid for products in delivery state, including standard hardware and software. If the products are delivered to OEM manufacturers for their use (integration) in final or combined products, it is in the responsibility of the OEM manufacturer to demonstrate compliance with all applicable EU directives and standards. The Tele Radio Finland OY declaration of conformity serves as input to the declaration of conformity for the final product.

7. **Signed for and on behalf of:**

VAASA 27.6.2022

Manufacturer: Tele-Radio Finland OY


Henrik Lähdekorpi, Chief Executive Officer

APPENDIX C: BUTTON_FLEX

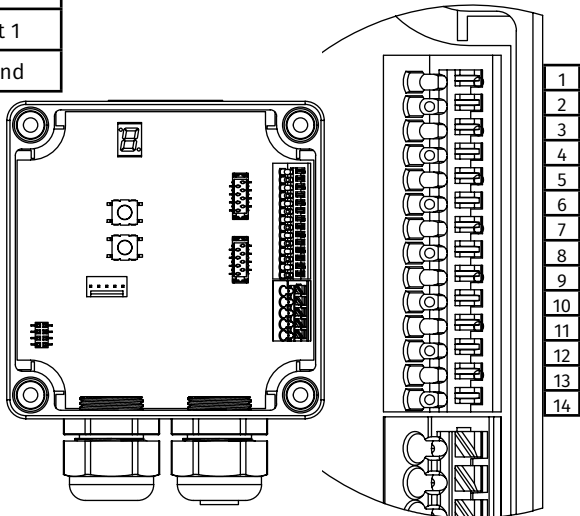
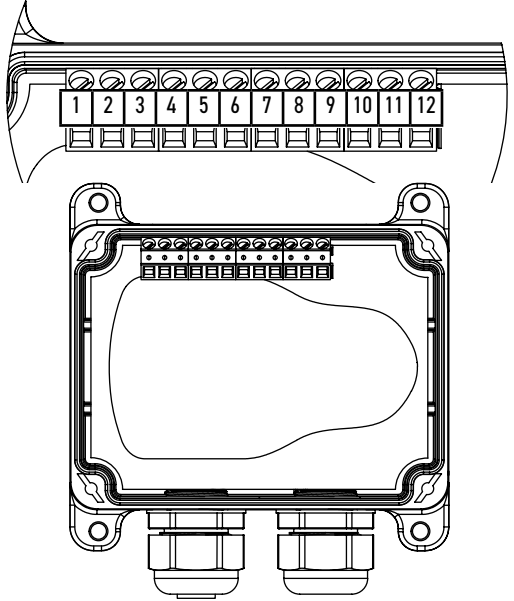
The Button_Flex is an easy way to add extra push-button functions to a joystick or any other similar controlling unit. Available in 3- or 6-button versions with a 1,5m cable and connector that fits directly into the IO_Transmitter's connector J1 or J2.



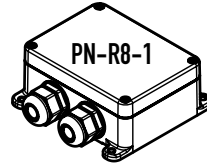
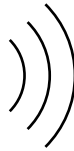
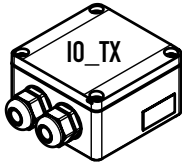
APPENDIX D: REPLACING THE T2182 (WALL TRANSMITTER)

J3 connector corresponding to T2182 connector:

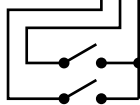
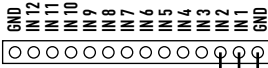
IO_TX	T2182	Function
J3-1	7	Ground
J3-2		Input 12
J3-3		Input 11
J3-4	12	Input 10
J3-5	11	Input 9
J3-6	10	Input 8
J3-7	9	Input 7
J3-8	8	Input 6
J3-9	6	Input 5
J3-10	5	Input 4
J3-11	4	Input 3
J3-12	3	Input 2
J3-13	2	Input 1
J3-14	1	Ground



APPENDIX E: WIRING- AND APPLICATIONS EXAMPLES



Connector J3



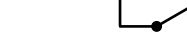
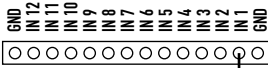
Connector J4



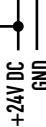
Example 1:

8-32V Supply. Transmitting **low** side input (Digital In 1 and 2) to Panther receiver.

Connector J3



Connector J4

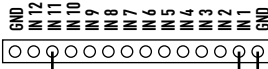


Example 2:

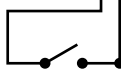
8-32V Supply. Transmitting **high** side input (Digital In 1) to Panther receiver.

Set Input Mode to HIGH in Menu Section 2.

Connector J3



EXTERNAL
0-10V



Connector J4

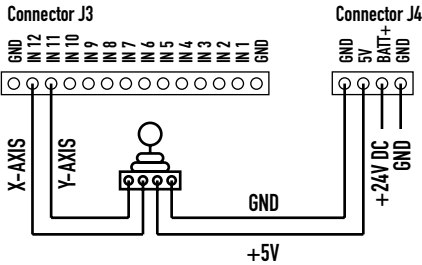


Example 3:

8-32V Supply. Transmitting **0-10V input** (Analog In) + low side input (Digital In) to Panther receiver.

Set Analog/Digital to Analog 0-10V in Menu Section 7.

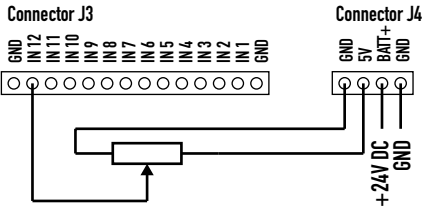
NOTE! To get the analog value out from a R8-1 receiver, use expansion board D12-4 or use the CAN receiver R18.



Example 4:

8-32V Supply. Transmitting input from **Joystick** (Analog In) to Panther receiver.

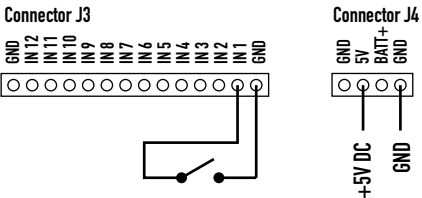
Set Analog/Digital to Analog 0,5-4,5V in Menu Section 7.



Example 5:

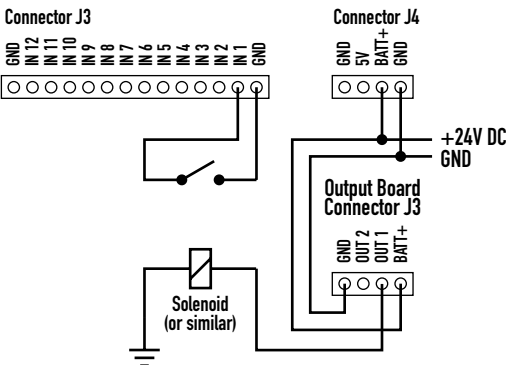
8-32V Supply. Transmitting input from **Potentiometer** (Analog In) to Panther receiver.

Set Analog/Digital to Analog 0-5V in Menu Section 7.



Example 6:

Using only **5V Supply**. Transmitting low side input (Digital In) to Panther receiver.



Example 7:

8-32V Supply. Transmitting low side input (Digital In) to Panther receiver + Using the **Output Board**.

Set Off Delays and On Masks for Outputs in Menu Sections 3-6.

APPENDIX F: PRODUCT CODES

Following products codes may be ordered as is. Other versions or combinations upon request from Tele Radio Finland Oy.

500-005-382-02	IO_TX	IO_SERIES Transmitter, 12 inputs, 8-32VDC
500-005-426-14	IO_TX BF3 CHA	IO_SERIES Transmitter + Button_flex_3 + Cig plug
500-008-466-45	IO_TX BF6 CHA	IO_SERIES Transmitter + Button_flex_6 + Cig plug
500-007-186-75	IO_TX OUTPUT BOARD	IO_SERIES Transmitter + K1008 Output Board

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