XTRA.CAN TRANSPONDER

User Manual

Article No.   200.650, 200.660, 200.670

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Safety

All De Haardt's products are designed as supplement to make karting safer, but cannot replace safe track procedures. If equipment fails, the normal operating procedure must still be adequate to safely operate the track.

This document has been written with great care. However, the manufacturer cannot be held responsible, either for any errors occurring in this publication or for their consequences.

Support

Preferably by email: support@de-haardt.com

Table of Contents

1 Getting started

This manual provides information needed to install, configure and use the Xtra.CAN Transponder.

1.1 What is in the box

Figure 1 – Xtra.CAN Transponder

1.2 Additional items

Items that are not included, but may be purchased separately:

Article No.	Name	Description
200.632	Xtra.Config Plug	Hardware safety interlock, required for (re)configuring the Xtra.CAN Transponder

1.3 Product overview

Figure 2 – Product overview

2 Installation

2.1 Mounting

Transponder is to be fitted on a flat surface with three countersunk M5 bolts and lock-nuts. Surface can be either plastic or metal. Do not overtighten the bolts as enclosure is not allowed to deform. Optionally, if required the fixation may be improved with double sided adhesive tape.

Mount the transponder as high as possible on the kart, preferably with connectors facing downwards. This ensures optimum radio sensitivity all around.

To prevent radio degeneration, it is advisable to maintain a clearance to metal around the transponder internal antennae. These are marked green in the picture below.

Keep antennae away from metal

Figure 3 – Transponder antennae

2.2 Connectors

The Xtra.CAN Transponder features two connectors. A De Haardt network connector and a 12-pole multi-function port.

2.2.1 De Haardt network connector

Used for communication with other De Haardt products.
Mates with the De Haardt network cable.

Figure 4 – De Haardt network cable

> ⚠ Warning. If this connector is not used, keep it covered with a protective cap. This cap is preinstalled at the factory.

2.2.2 Multifunction port

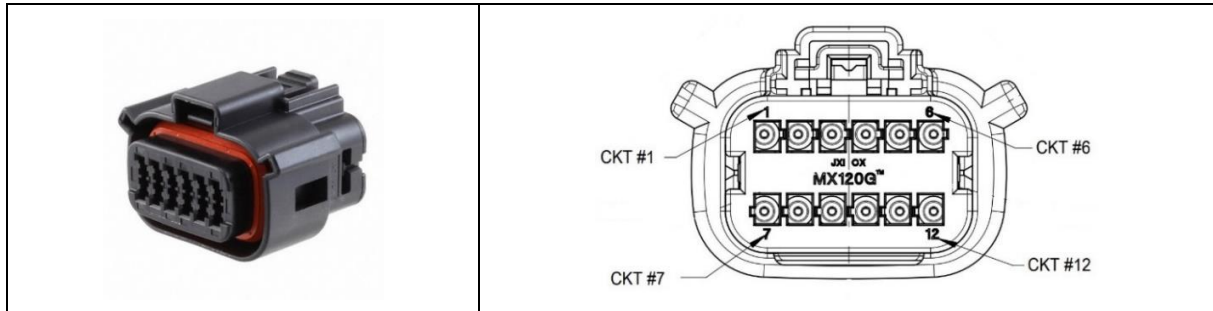This port mates with the Molex MX120G female automotive connector.

Figure 5 – Multifunction connector

Pin	Function	Recommended wire color
1	Battery +	Red
2	Digital output 3	Green
3	Digital output 2	Green
4	Digital input 2	Yellow
5	Digital input 4 or output 4	Yellow or Green
6	Digital IO return (0V) [*]	Black
7	Battery – (0V) [*]	Black
8	Digital output 1	Green
9	Digital input 1	Yellow
10	Digital input 3	Yellow
11	CAN data low	White
12	CAN data high	Blue

[*] Use separate connections for Battery– and Digital IO return

Cable assembly parts

Part No.	Manufacturer	Description
36792-1201	Molex	Female crimp connector housing
36799-0002	Molex	Crimp terminal female 22-20 AWG tin plated
36804-0001	Molex	Cavity plug for sealing voided circuits

Cable assembly parts are obtainable through Digi-key and RS-components amongst others.

> ⚠ Warning! Always install cavity plugs at unused connector positions. Otherwise, ingress protection cannot be guaranteed.

2.3   Power cable routing

The Xtra.CAN Transponder communicates with the motor controller through CAN and digital IO lines. For proper communication it is important that there is no voltage difference between motor controller and shutdown transponder BAT- connections. Therefore, don't tie the Xtra.CAN Transponder directly to the battery, but via the motor controller instead.
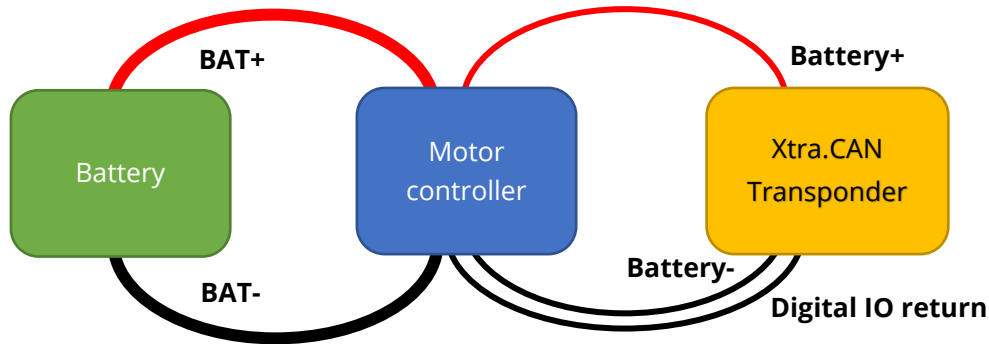

Figure 6 – Power cable routing

2.4   Boost switch

The Xtra.CAN Transponder features a boost function that is controlled through an external switch. If boost is required, then tie a switch between digital input 3 (connector pin 10) and digital IO return (connector pin 6). See the Xtra.Remote Control Use Manual for further information.

2.5   Safety output

Should a problem occur in the Xtra.CAN Transponder, then digital output 1 (connector pin 8) is forced low. This could be monitored by the motor controller to bring the go-kart in a safe state. If not needed, this pin can be left unconnected.

3   Operation

3.1   Typical setup

Modern motor controllers are equipped with a CAN bus and can be controlled as well as monitored through it. The Xtra.CAN transponder brings motor control and diagnostics in the hands of the track operator. It interfaces between the motor controller and the De Haardt safety system.
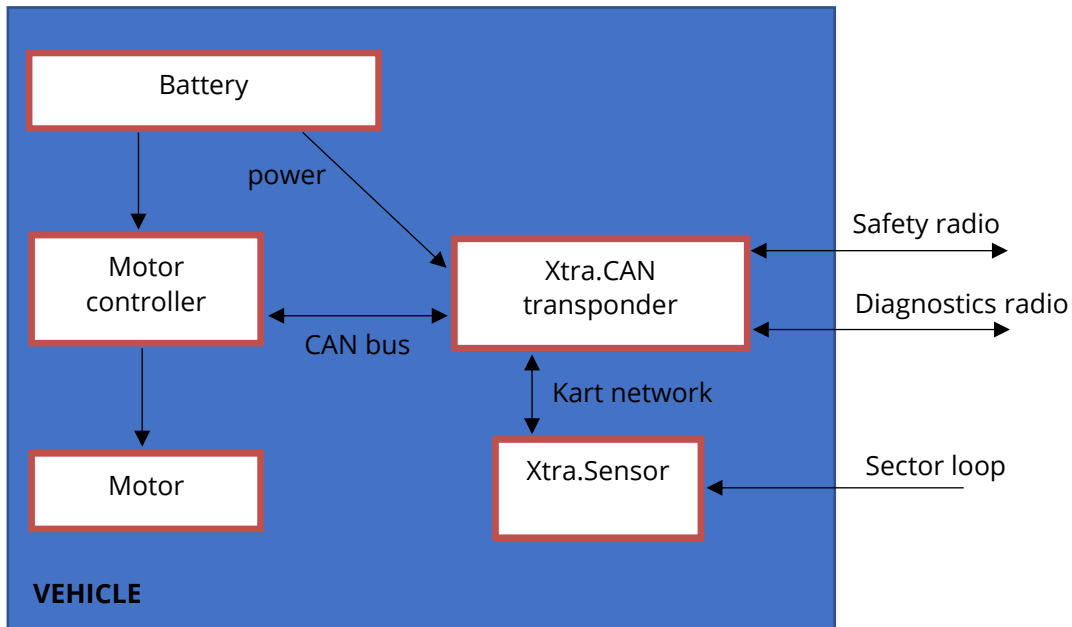

Figure 7 – Typical go-kart configuration

3.2   Speed control

The Xtra.CAN transponder instructs the motor controller through CAN with a user-programmable lookup-table. Depending on the speed button pressed on the Xtra.Remote Control, a table-entry is selected for setting maximum speed, torque and up to 8 additional bits. The speed lookup table is programmed with the Xtra.Config Tool.

	Speed	Torque				BRK	D3	D2	D1	D0
STOP	0	1000	☐	☐	☐	☑	☐	☐	☐	☐
SPD 1	1000	900	☐	☐	☐	☐	☐	☐	☐	☐
SPD 2	1500	800	☐	☐	☐	☐	☐	☐	☐	☐
SPD 3	2000	700	☐	☐	☐	☐	☐	☐	☐	☐
SPD 4	2500	600	☐	☐	☐	☐	☐	☐	☐	☐
SPD 5	3000	500	☐	☐	☐	☐	☐	☐	☐	☐
SPD 6	3500	400	☐	☐	☐	☐	☐	☐	☐	☐
SPD 7	4000	300	☐	☐	☐	☐	☐	☐	☐	☐
SPD 8	4500	200	☐	☐	☐	☐	☐	☐	☐	☐

Figure 8 – Xtra.Config Tool example profiles

3.3 Displays

The displays show actual system status.

Display	Character	Description
SPEED	0-8	Actual speed limit
SPEED	C	Configuration mode (Xtra.Config Plug), drive disabled
SPEED	E	Error (hardware), transponder may not operate correctly
SPEED	P	Programming firmware
SPEED	-	Main power not connected, drive disabled
STAT	0-8	Product type, shown briefly at power-up
STAT	≡	Activity indicators: safety radio, diagnostics radio, CAN bus

3.4 Sector system

Additional features like sector control and lap-timing may be installed separately by fitting the Xtra.Sensor to the De Haardt network port. More information about these features and configuration is available in the Xtra.Sensor, Xtra.Beacon and Xtra.Black Box user Manuals.

3.5 Diagnostics

The PRO version of the Xtra.CAN Transponder collects diagnostic data from motor controller, BMS, batteries and other devices on the CAN bus. These data are accessible through the De Haardt Diagnostics radio.

4 Configuration

4.1 Configuration tools

Configuration of the Xtra.CAN Transponder is done through the Xtra.Remote Control and / or Xtra.Config Tool software. See the appropriate manuals for further information.

Parameter	Xtra.Remote Control	Xtra.Config Tool
Kart number	✓	✓
Group numbers	✓	✓
Track configuration	✓	✓
Startup speed limit	✓	✓
CAN termination		✓
CAN configuration		✓
CAN speed and torque settings		✓

4.2 Startup speed limit

The maximum allowed speed at startup. Range 0 – 8.

4.3 CAN termination

Both ends of a CAN transmission line ought to be terminated with 120-ohms resistors. For this purpose, the Xtra.CAN transponder has got a 120-ohm resistor internally that can be switched on or off through a software configuration. This termination should be enabled only if required.

5 Technical specifications

5.1 Dimensions and mass

		Units
External size (Width x Length x Thickness)	66 x 118 x 39	mm
Weight	230	g

5.2 Environmental

	Min	Typ.	Max	Unit
Temperature range for operation	-10		55	°C
Temperature range for storage and transport	-20		70	°C
Relative humidity range for operation and transport	20		80	%
Ingress Protection rating		65		IP

5.3 Input power

	Min	Typ.	Max	Unit
Power dissipation		1	15	W
Input current			500	mA
Input voltage range [*]	11	48	70	V

[*] De Haardt cannot guarantee safe operation beyond 70V

5.4   CAN bus

The CAN Transponder features a software-controlled CAN termination. Termination can be modified with the Xtra.Config Tool software.

	Min	Typ.	Max	Unit
CAN HI / LO – input voltage range	-30		30	V
CAN bus speed			1M	bps
Termination OFF resistance		30k		ohm
Termination ON resistance		120		ohm

5.5   Digital outputs

The Xtra.CAN Transponder features four digital outputs and four digital inputs. Input number 4 is shared with output number 4 on the multifunction connector.

Digital outputs sink to ground, source 12V or float to high-impedance state. Behavior can be changed with the Xtra.Config Tool software.

	Min	Typ.	Max	Unit
Number of outputs	3		4	V
Output low – voltage [**]		0.3		V
Output low – sink current (per channel)			2	A
Output high – voltage [**]	11.5	12.2	12.5	V
Output high – source current (total for all channels) [***]			1	A
Output floating – clamping voltage (rev. 6, 2018)		28		V
Output floating – clamping voltage (rev. 7, 2020)		36		V
Output floating – max allowed voltage (rev. 8, 2022)		60		V

[**] Depends on output current
[***] Maximum output current will be lower when powered from batteries under 30V

5.6   Digital inputs

All digital inputs are low-level sensitive. This means that sinking a digital input to ground activates it. Deactivation is done by floating or sourcing to 9V or higher. Inactive digital inputs are pulled up to 12V internally. Digital input number 1 can optionally be configured as high-level sensitive. Behavior can be changed with the Xtra.Config Tool software.

	Min	Typ.	Max	Unit
Number of inputs	3		4	V
Input 1, 2, 3 voltage range	-1		70	V
Input 4 voltage range (rev. 6, 2018)	-1		28	V
Input 4 voltage range (rev. 7, 2020)	-1		36	V
Input 4 voltage range (rev. 8, 2022)	-1		60	V
Pull-up voltage		12.2		V
Threshold low-level sensitive input	3	5.2		V
Threshold high-level sensitive input [****]		7.7	9	V

[****] Only input 1 can be configured high-level sensitive