# ZBELT-09CAN

User Manual

Version 0.3 z 2023-02-04

General information

The ZBELT-09 system is designed to signal the lack of fastening of seat belts in special vehicles not equipped with such a system at the factory. A characteristic feature of the system is wireless communication between devices in the 868MHz band. The system contains two types of devices:

- ZBELT-09CAN basis module installed in vehicle
- ZBELT-0F seat module installed in the armchair.

A maximum of 8 seats can be assigned to the driver module. The occupancy status of the seats as well as the fastening status of the seat belts is sent via the CAN bus. The device is equipped with a button used to pair the seat modules.
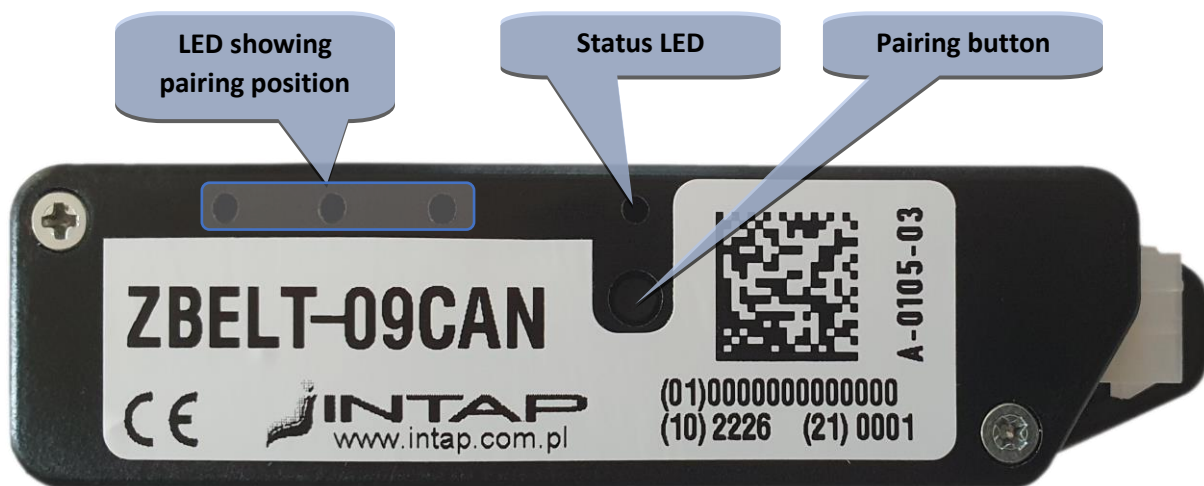
Base module - Installation in the vehicle

The driver module is installed in a place that provides the possibility of connecting the power supply and CAN BUS of the vehicle control system. Care should also be taken to ensure that this place provides the possibility of radio communication with the seat modules. It is unacceptable to place it in a place that shields electromagnetic waves, i.e. in a metal housing.

The module is fixed with two screws with a maximum diameter of 5mm.

Base module – Electrical connection

The device is equipped with a male 6-terminal MINI-FIT connector.

ZBELT-09CAN Signal outputs at the connector

PIN	Function	Remarks
1	Ground	
2	+12V/+24V Power	Constant power supply through 0.5A fuse
3	Positive input	Optionally +15 signal
4	CAN - H	CAN High signal
5	CAN - L	CAN Low signal
6	Negative input	Optionally speed signal – ground active

For proper operation of the base module, it is required to connect a constant power supply available after removing the ignition key, ground and CAN communication lines.
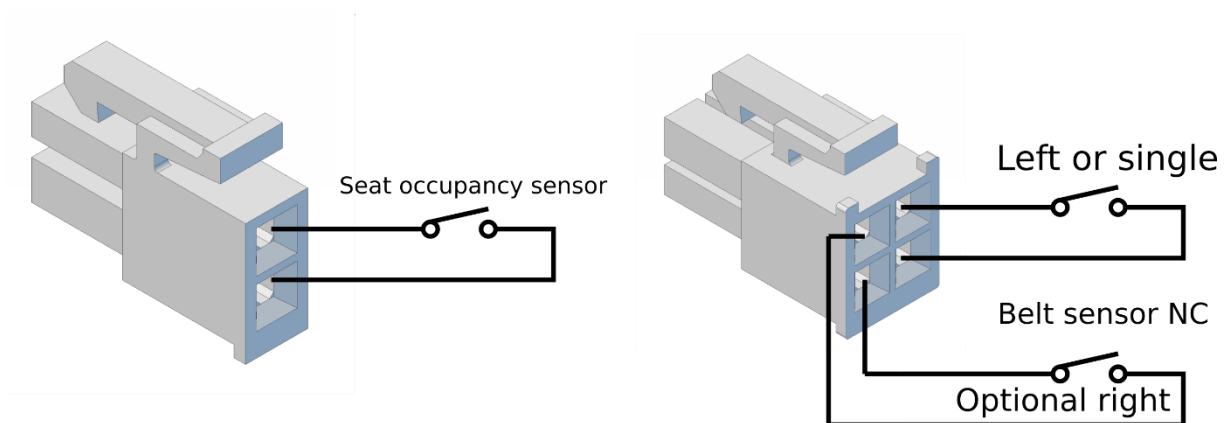
Base Module – Device Status
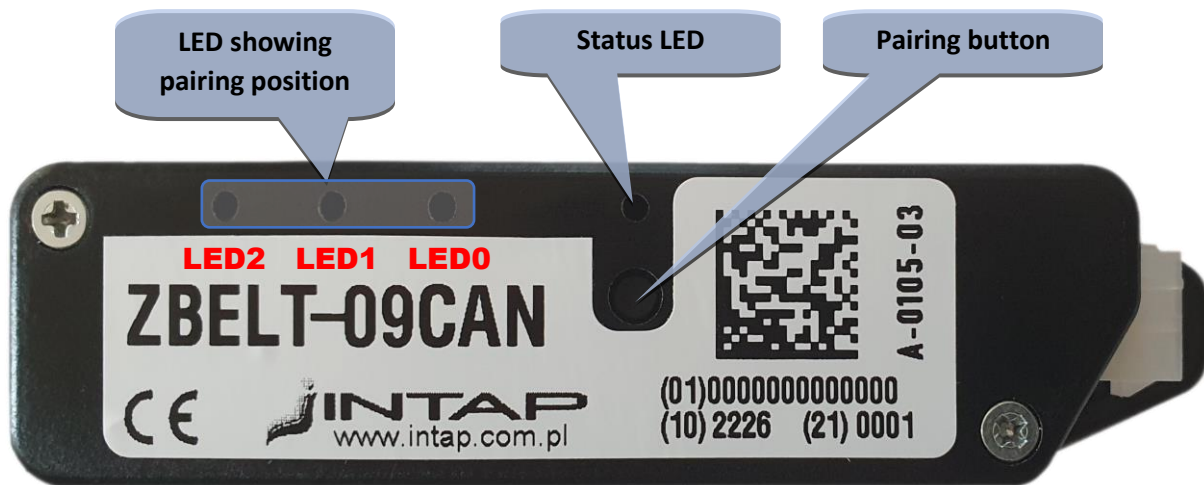
State	status LED	Pairing LEDs		
		2	**1**	**0**
Normal operation	Short red flashes = presence of power Short green flash = received radio frame		Dark	
Pairing	Short red flashes = presence of power Short green flash = received radio frame			
	1			ON
	2		ON	
	3		ON	ON
	4	ON		
	5	ON		ON
	6	ON	ON	
	7	ON	ON	ON
	8	ON	ON	ON
Lack of Pairing	Solid red			ON
Module reset	Solid red	ON	ON	ON
CAN BUS Mode select	GREEN Fast blinking			
	Mode 1			ON
	Mode 2		ON	
	Mode 3		ON	ON
	Mode 4	ON		
	Mode 5	ON		ON
	Mode 6	ON	ON	
	Mode 7	ON	ON	ON

The module resets whenever the power is switched on, but it can also be caused by a problem with CAN communication (no frame confirmation) or a module hanging causing the Watchdog system to work.
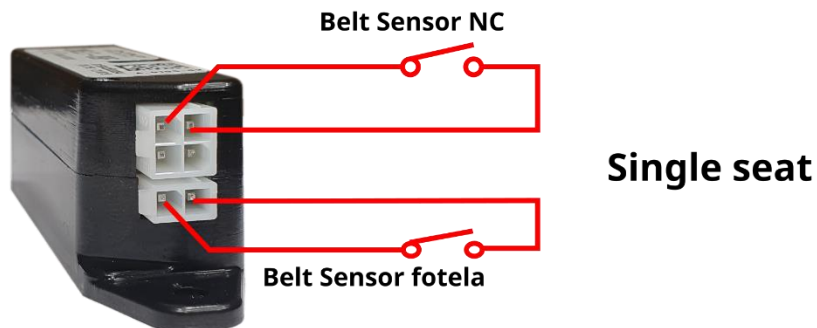
Seat module connections

There are two sensors connected to the seat module:

- Seat occupancy pressure sensor - closed when the seat is occupied
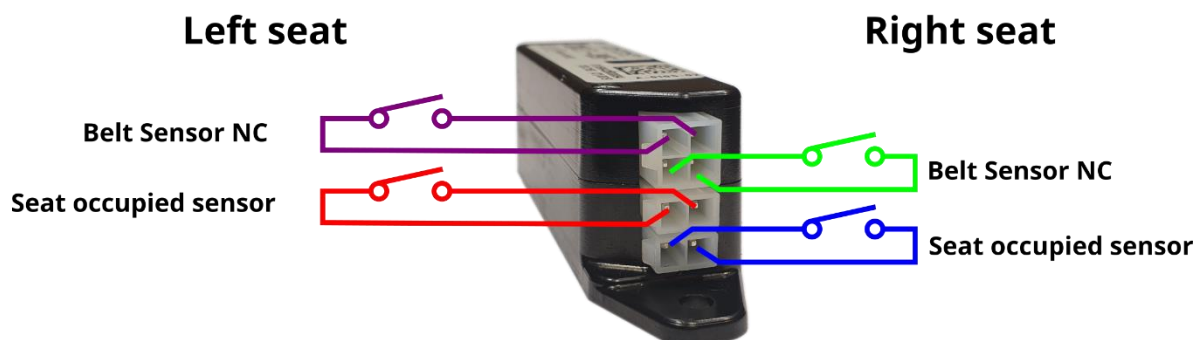
- Micro-switch located in the safety belt buckle – short when the belt is not fastened

Seat occupancy sensor

Left or single

Belt sensor NC

Optional right

ZBELT-09F

Belt Sensor NC

Single seat

Belt Sensor fotela

ZBELT-09FD

Left seat

Right seat

Belt Sensor NC

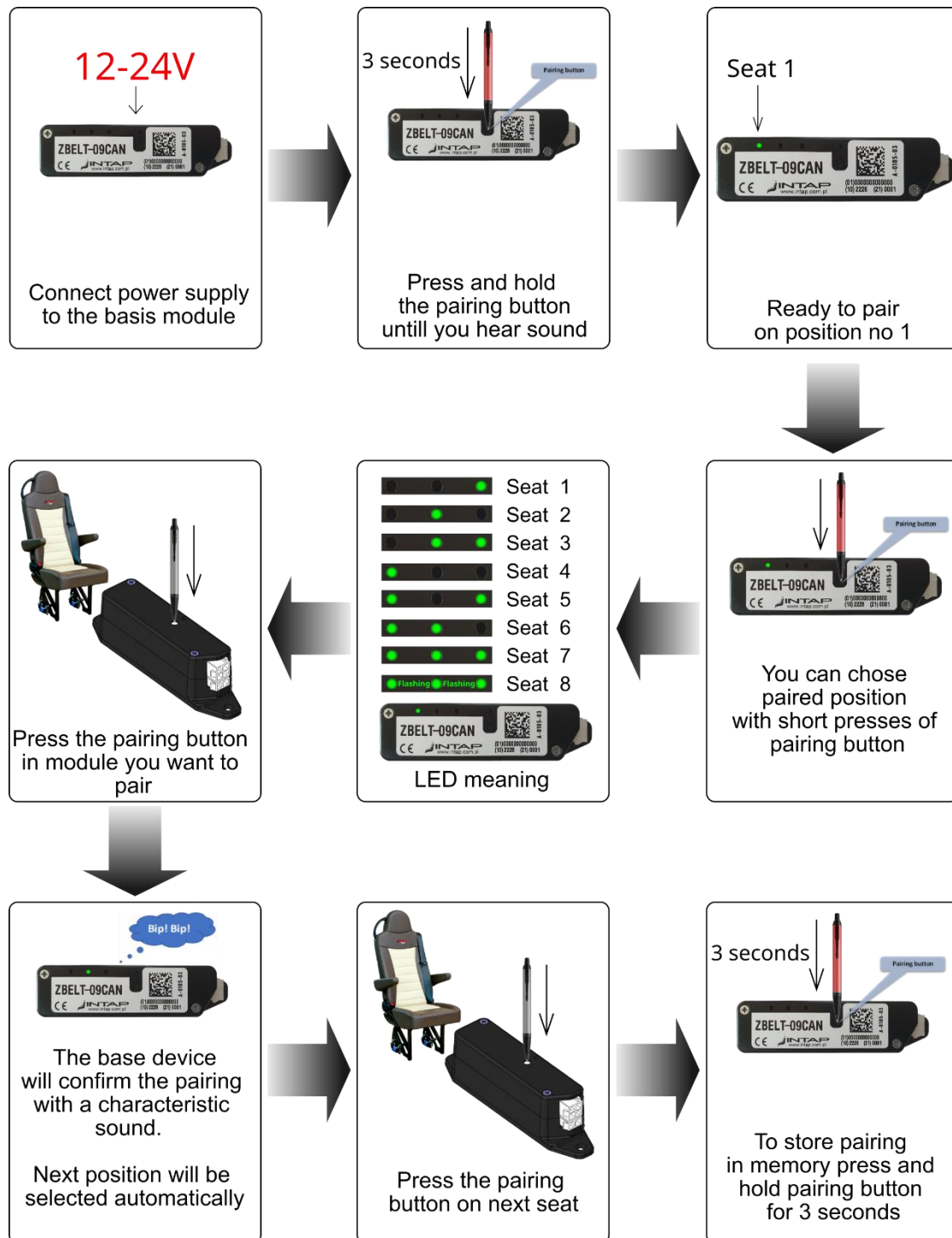**Seat occupied sensor**

Belt Sensor NC

Seat occupied sensor

Seats pairing process

In order for the system to work properly, it is required to assign the seats to their numbers in the system so that the display system can present them properly.

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1. If you pair an seat in a new location, the system will automatically free up its old position. Multiple pairing of the same chair in subsequent positions will result in their erasing one by one.
2. Pairing the seat with another base module will erase the pairing with the current module. So the chair module can be paired with only one base.

Replacing battery in the seat module

The seat module is powered by a 3,6V lithium battery placed inside the module. The battery should last at least two years. You need to replace it when the driver's panel indicates low battery by flashing the seat belt symbol.

> You should use **ER14505** battery type.
>
> Please note that it is **NOT** popular 1.5V AA battery.
>
> Using other battery will damage the module!

To replace battery you have to open seat module. Please follow instructions below.

① Unscrew the screws using a philips screwdriver and remove the cover

② Remove the electronics board

③ Remove old battery

④ Carefully put new ER14505 battery OBSERVE THE POLARITY!

⑤ Put the electronics back to enclosure

⑥ Put the cover and set the screws
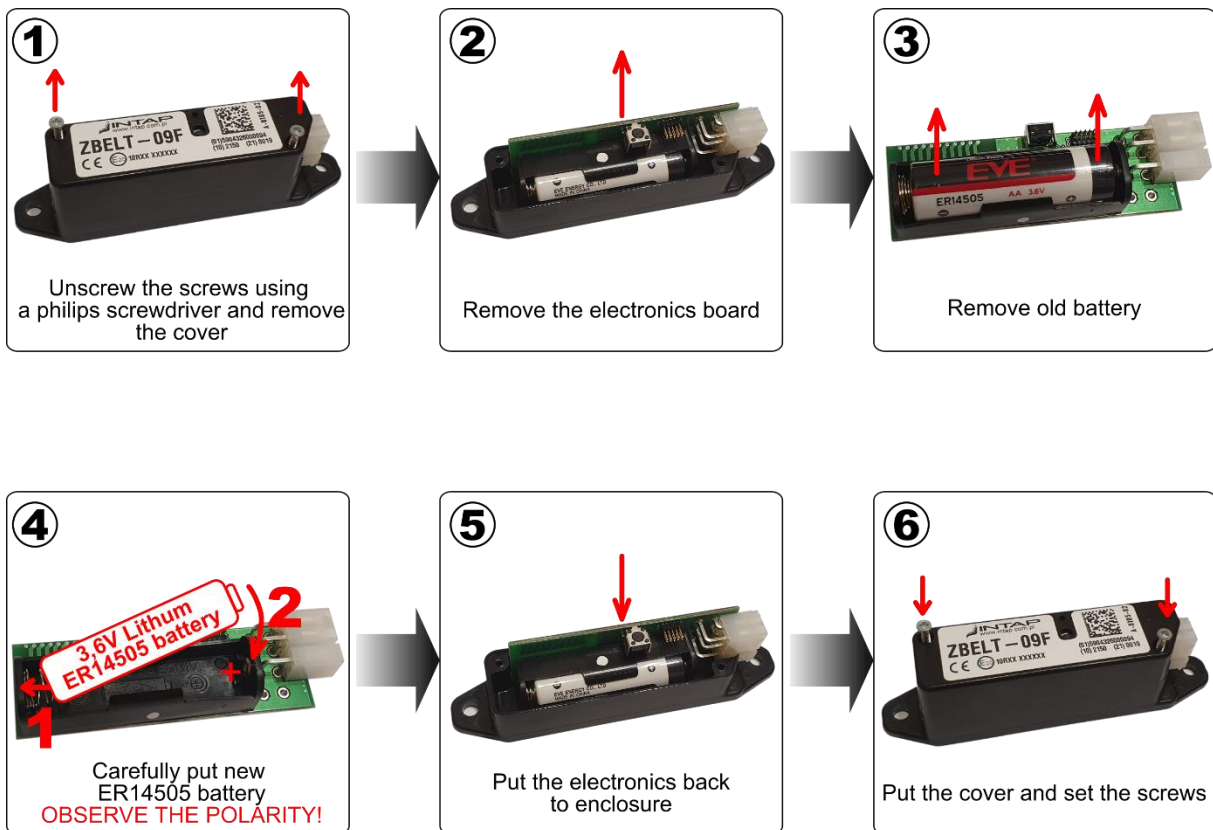
Technical data

Seat module ZBELT-09F

–	rated supply voltage	**3,6V – lithium battery ER14505**
–	power consumption	**~1.4uA in waking time mode**
–	transmiter power	**~8dBm ERP**
–	Radio frequency	**868,5MHz**
–	type of modulation	**LORA**
–	battery life	**>4 years**

Moduł bazowy ZBELT-09CAN

–	rated supply voltage	**12V lub 24V**
–	power consumption	**~4mA@12V w czuwaniu**
–	transmiter power	**~11dBm ERP**
–	Radio frequency	**868,5MHz**
–	type of modulation	**LORA**

The housings of the ZBELT-09CAN and ZBELT-09F modules are identical:
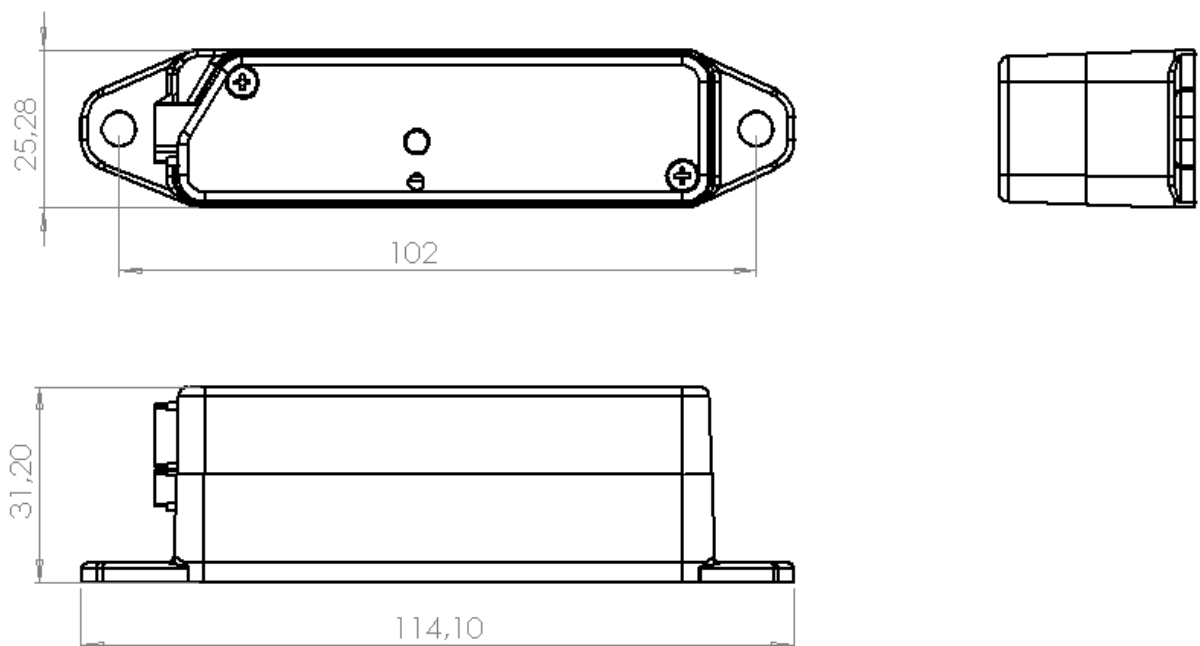
Installer settings – CAN Bus mode select
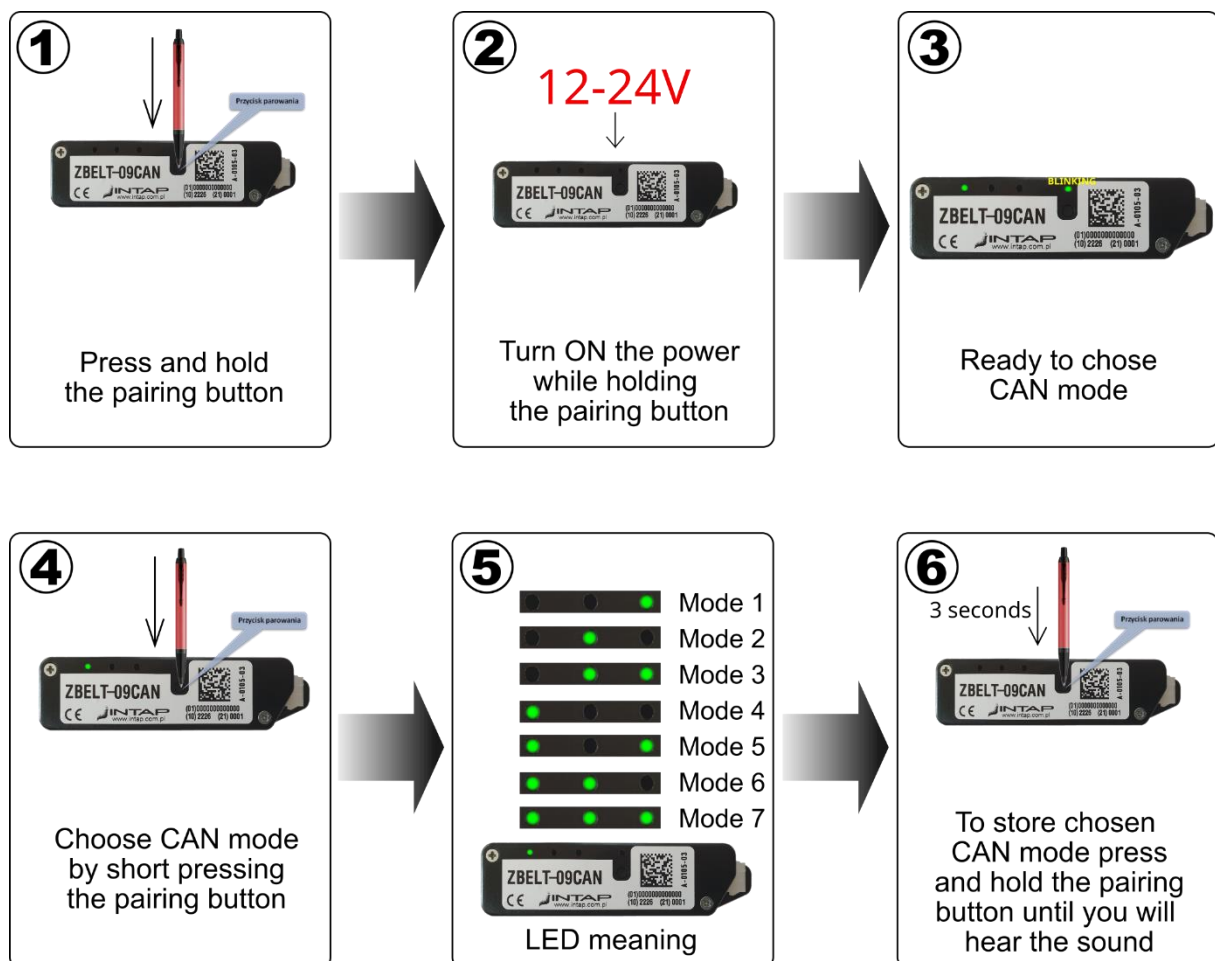
The ZBELT-09CAN device can cooperate with various control systems with which the bodybuilder equips the vehicles. In order for the communication to work properly, it is necessary to select the speed of the CAN bus, the type of identifier (11/29bit) and frame IDs. The ZBELT-09 device can operate in one of 7 modes.

Setting number	Bus speed	ID mode	FRAME IDENTIFIERS		
			SEAT_OCCUPATION	ZBELT_COMMAND	ZBELT_INFO
1	250kbit	11bit	0x75	0x76	0x77
2	250kbit	29bit	0x18F0075	0x18F0076	0x18F0077
3	500kbit	11bit	0x75	0x76	0x77
4	500kbit	29bit	0x18F0075	0x18F0076	0x18F0077
5	Do not use ! Reserved for future use.				
6					
7					

① Press and hold the pairing button

② 12-24V Turn ON the power while holding the pairing button

③ Ready to chose CAN mode

④ Choose CAN mode by short pressing the pairing button

⑤ Mode 1 / Mode 2 / Mode 3 / Mode 4 / Mode 5 / Mode 6 / Mode 7 — LED meaning

⑥ 3 seconds — To store chosen CAN mode press and hold the pairing button until you will hear the sound

CAN frames format

Data	SEAT_OCCUPATION		Send Addres / ID				SEAT_OCCUPATION_ID		
CYCLE	1000ms		Speed						
Length	5 bytes		Transmision direction				ZBELT-09CAN -> USER SYSTEM		

	Decryption	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Green LED (seat occupied, belt fastened)	Seat8_green	Seat7_green	Seat6_green	Seat5_green	Seat4_green	Seat3_green	Seat2_green	Seat1_green
Byte 1	Red LED (seat occupied, belt not fastened)	Seat8_red	Seat7_red	Seat6_red	Seat5_red	Seat4_red	Seat3_red	Seat2_red	Seat1_red
Byte 2	Pairing Status (1=paired, 0=free)	Seat8_pair	Seat7_pair	Seat6_pair	Seat5_pair	Seat4_pair	Seat3_pair	Seat2_pair	Seat1_pair
Byte 3	Low Battery warning	Seat8_LBW	Seat7_LBW	Seat6_LBW	Seat5_LBW	Seat4_LBW	Seat3_LBW	Seat2_LBW	Seat1_LBW
Byte 4	Pairing in progress seat number	8bit value - 0x0=not pairing, 0x01=waiting for seat 1 pairing, 0x02=waiting for seat 2 pairing.........							
UWAGI NOTES									

Data	PAIRING	Send Addres / ID	ZBELT_COMMAND_ID
CYCLE	send once	Speed	
Length	1 bytes	Transmision direction	USER SYSTEM -> ZBELT-09CAN

Byte 0	Pairing order for seat no …	8bit value - 0x00 = stop pairing, 0x01 = pair seat 1, 0x02 = pair seat 2, 0x03 = pair seat 3, …… 0x08 – pair seat 8
UWAGI NOTES	Po odebraniu ramki urządzenie oczekuje na parowanie modułu fotela na pozycji którą otrzymało. Po sparowaniu modułu wraca do normalnej pracy. Parowanie następnego fotela wymaga kolejnej ramki. After receiving the frame, the device waits for the chair module pairing in the position it received. After the module is paired, it returns to normal operation. Pairing the next seat requires another frame.	

Data	PAIRING ERASE	Send Addres / ID	ZBELT_COMMAND_ID
CYCLE	send once	Speed	
Length	7 bytes	Transmision direction	USER SYSTEM -> ZBELT-09CAN

Byte 0	0xFF
Byte 1	0x45 = 'E'
Byte 2	0x52= 'R'
Byte 3	0x41= 'A'
Byte 4	0x53= 'S'
Byte 5	0x45= 'E'
Byte 6	0x00

UWAGI NOTES	Aby wykasować parowanie należy wysłać ramkę 0x76 zawierającą 7 bajtów danych: **0xff „ERASE" 0x00** To erase all paired seats, send the 0x76 frame containing 7 data bytes: **0xff "ERASE" 0x00**

Data	GET INFO	Send Addres / ID	ZBELT_COMMAND_ID
CYCLE	send once	Speed	
Length	1 bytes	Transmision direction	USER SYSTEM -> ZBELT-09CAN

Byte 0	0xFE

UWAGI NOTES	Urządzenie jednorazowo wyśle w odpowiedzi ramkę **ZBELT_INFO** Device will send one **ZBELT_INFO** frame.

Data	GIVE VERSION	Send Addres / ID	ZBELT_INFO_ID
CYCLE	send once	**Speed**	
Length	7 bytes	**Transmision direction**	ZBELT-09CAN -> USER SYSTEM

Byte 0		**CAN board firmware version**	
Byte 1		**TRX PCB firmware version**	
Byte 2		**TRX Frequency calibration factor**	
Byte 3	`LSB`	`0xF1`	
Byte 4		`0x68`	**4 bytes serial numer**
Byte 5		`0x5F`	**i.e. 23030001 = 0x015F68F1**
Byte 6	`MSB`	`0x01`	

UWAGI NOTES	Ramka do celów informacyjnych. Implementacja w systemie użytkownika nie jest konieczna This frame is for information purposes only. Implementation in user system is not necessary.