Wheelchair-transformer CaterWil
model: GTS3

Instructions for Use

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Table of contents

1. Product Description

1.1 General description

Fig. 1

Wheelchair transformer CaterWil GTS3 with electrical drive is designed to be driven by disabled person or by the attendant. The wheelchair can overcome different kind of obstacles including stairs.

CaterWil has wheels and tracks platform. Wheels platform is used for moving on a smooth surface. Track platform is needed for overcoming stairs, curbs and other obstacles. In a wheel mode the track platform is hidden in its upper position doesn't slug and doesn't create resistance for moving. When the button pressed on a remote control the linear actuator is activated and though the mechanical system of levers the track platform goes down. Caterpillars are moved by the motors that rotate the wheels but using the additional gear that provides higher torque and lower speed on stairs.

The passenger's seat is installed on hinges and turned by the separate drive. Turning the seat is important when going up and down the stairs for displacing the center of mass and saving a vertical position of the passenger that is safe and comfortable. The seat is controlled by electronics in automatic cycle. Three axis sensors accelerometers determines the position of the main platform and the seat, using the acquired data system smoothly turns the seat leaving it's constant position relative to the horizon.

The power supply of the system is provided by batteries. Two main drives (left and right) that rotate wheels or tracks (depends on moving mode) are made as DC gear-motors. Each linear actuator is made as a DC motor driving a rod via a gear system. The actuators strokes are limited by limit switches.

The electronic system consists of two modules: remote control and process execution block. The data transition between the modules is organized by wire connection.

For safety management the main drive's system is equipped by electromagnetic brakes that activates in case of power loss. Also main drives has special handles that can disjoin the gears from wheels and tracks, this makes possible to roll the wheelchair by hands if the battery is discharged. Electronics monitors the battery charge and informs the user in case of low level.

The width of the device is 65 cm that allows using it at home conditions, going through interior doors and using elevators.

The CaterWil can climb stairs on tracks and can drive on a smooth surface on wheels (fig. 2). Climbing up the stairs can be done backwards only. Climbing down the stairs can be done forwards only. Different types of obstacles can be overcome according to fig. 3 and fig.4

WARNING! Driving DOWN the stairs is carried out only on the tracks going forward. Climbing up is carried out only on the tracks going backward!

WARNING! When driving on the stairs, the driver should sit straight, leaning back in the seat. The driver should not tilt the body to the sides and forward this can lead to skewed movement of the wheelchair, tracks slipping, disrupting the work of the wheelchair or falling!

1.2 Technical specifications

Table 1. Wheelchair specifications.

Characteristic	Unit	GTS3	GTS3 Export	Notes
Dimensions (length x width x height)	mm	(970-1400)x645x1230		Length depends on legrest position
Seat width	mm	450		
Seat depth	mm	435		
Seat height	mm	530		
Armrest height	mm	150-300		Adjustable
Lower leg length	mm	400-550		Adjustable
Weight empty	kg	115	95	
Max. load capacity	kg	100	115	
Front wheel size	mm	200		
Drive wheel size	mm	330		
Max speed on wheels	km/h	7	8	
Max speed on tracks	km/h	0,7	0,8	
Distance range	km	18	25	
Max stairs angle	deg	40		At step height 150 mm, step rounding radius 10 mm
Max step height	mm	200		At stair angle 25 deg, step rounding radius 10 mm
Max step rounding radius	mm	20		At step height 160 mm, stair angle 35 deg

Minimum space for 90 deg turn	cm	100x100		On tracks
Noise level	dBA	≤65		
Operating temperature	Deg C	-10 to 40		
Battery capacity	A*h	33	38	
Battery type		AGM	Lithium	
Drive motors voltage	V	24	27	2 pcs DC motors
Charger power requirements	V	220		
Nominal charging current	A	5		
Wheelchair protective system		IP54		

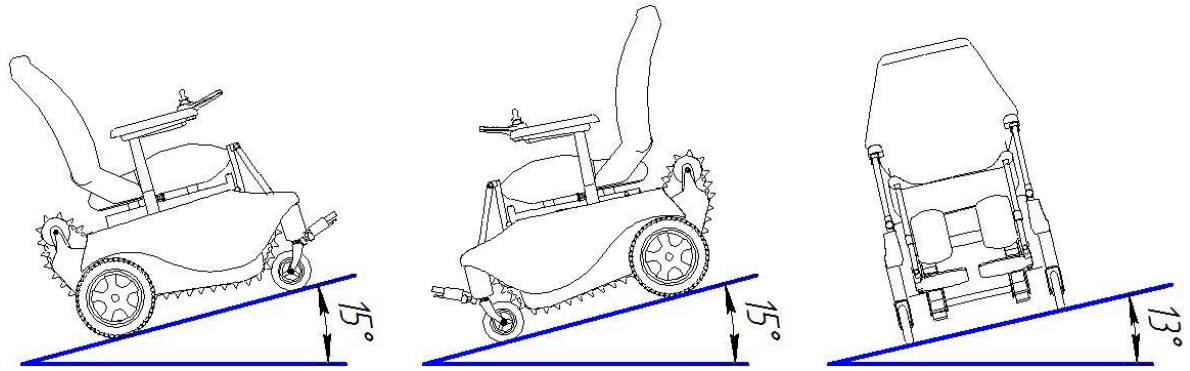

fig.2

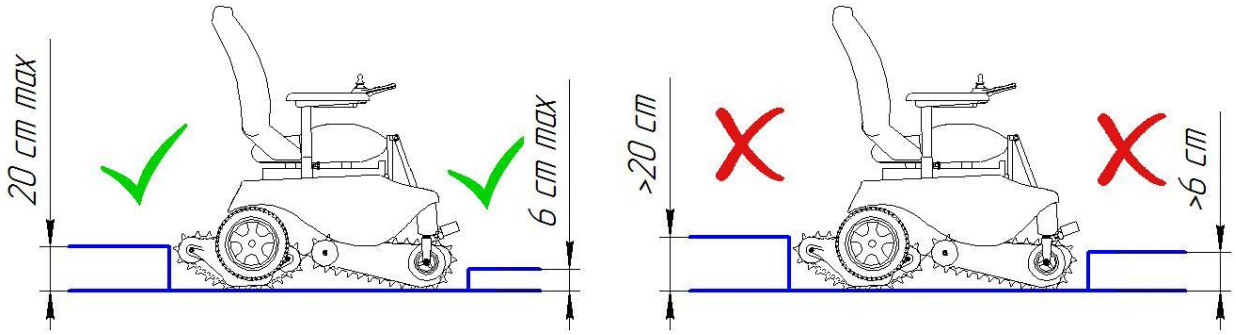

fig.3

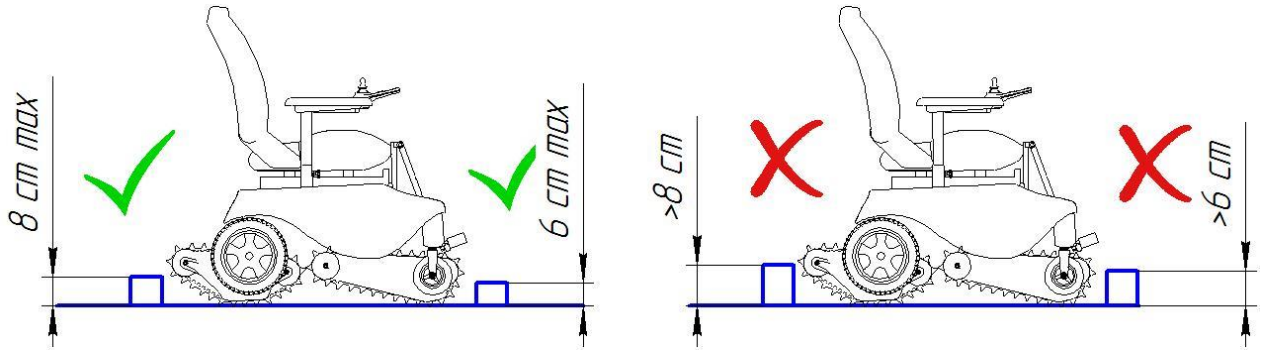

fig.4

1.3 Remote controller

The **Remote controller** is used to control the power wheelchair. The **Remote controller** consists of a keypad, LED display and joystick. The control panel is used to switch the power wheelchair on and off, to enter driving commands and to display the current state of certain functions and components.

fig. 5

1. **Chair down button**
2. **Chair up button**
3. **Track mode button**
4. **Special functions button**
5. **On/Off button**
6. **Horn button**
7. **Wheel mode button**
8. **Max speed down button**
9. **Max speed up button**
10. **Max speed level LED indicator**
11. **Battery charge LED indicator**
12. **Track mode LED indicator**
13. **Wheel mode LED indicator**
14. **Joystick**
15. **ESD button**

- **Chair up and down buttons**

Moves chair up or down in wheel mode for adjusting chair angle

- **Wheel and track mode buttons**

Start transforming into wheel mode (fig. 1) or track mode (fig. 6)

- **Special functions button**

Provide additional functions in combination with other buttons

- **Fn+ Speed up and down buttons**

increases and decreases joystick sensitivity.

- **On/Off button**

The on/off key is used for switching the power wheelchair on and for switching the power wheelchair off.

- **Horn button**

The horn will sound as long as the horn key is being pressed.

- **Speed up and down buttons**

Pressing the speed buttons shortly increases or reduces the speed level. After reaching the maximum or minimum speed level nothing changes.

- **Joystick**

The joystick controls the direction and speed of travel.

- **Battery Capacity LED indicator**

The LEDs show the battery charge

- **Speed Level LED indicator**

The LEDs show the currently selected speed level.

- **Track and wheel mode indicators**

Shows current mode activated. In activating process if blinking

Fig. 6

1.4 Batteries specifications

The wheelchar CaterWil GTS3 has 2 AGM batteries that are maintenance-free.

Table 2. Delta HRL 12-33 battery specifications

Nominal voltage	12V
Rated capacity (2 hour rate)	33Ah
Number of cell	6
Weight	11.5 kg
Dimensions (height x length x width)	195x130x168 mm

Discharge temperature	-20 to 60°C
Charge temperature	-10 to 60°C
Storage temperature	-20 to 60°C
Self discharge per month	3% of capacity at 20°C
Number of cycles at 40% capacity loss.	300 cycles of 100% discharge

1.5 Safety features

The wheelchar has safety features to provide maximum safety during exploitation, transportation and storage.

Table 3. Safety features.

№	Safety feature	Notes
1	ESD button	For emergency stop
2	Electromagnetic brakes that are active when power failure or shutdown	Parking-brakes and emergency brakes
3	40A fuse	For overload or short circuit prevention
4	Battery charge indicator	For battery discharge prevention
5	Emergency stop when Remote controller communication is failed	Automatic stop when Remote controller is unplugged or wires are damaged
6	Motors load control	If motors are overloaded systems stops automatically
7	Brakes monitoring	Automatic stop when brakes are unplugged or wires are damaged
8	Roll and pitch control system	System controls roll and pitch angles of the wheelchair and passengers seat. It slows down or stops moving if angles are dangerous.
9	Stop ends on linear actuators	Used for limiting motion of actuators
10	System self diagnostic	System checks all the components. If they are plugged and works fine. If not it will show an error (See Table 5. Troubles and remedies)
11	Safety belt	Optional

The driver is protected from scalding. The potential sources of heat like power electronics, motors and batteries are isolated from user.

1.6 Electromagnetic Interference (EMI)

Electromagnetic interference (EMI) is interference that can be generated from sources such as radio and TV stations, amateur radio (HAM) transmitters, two-way radios, and cellular phones.

Caterwil electronics is designed stable to EMI, all control signals are grounded and filtered by hardware and software. Caterwil has been tested to a radiated immunity level of 20 volts per meter. This means that the wheelchair is stable under electromagnetic interference of household equipment, personal devices, radio transmitters, TV stations and other public

equipment.

1.7 Electrostatic discharge (ESD) protection

The frame of the CaterWil wheelchair is grounded, that provides normal level of ESD protection. There is no need to use personal ESD protective equipment.

1.8 Materials safety

The chair and accessories are made of non-harmful non-allergic materials that has no limitations for contact with human skin

1.9 Vibrations protection

The wheelchair can generate low frequency vibrations from 0.1 to 80 Hz from drive chains and tracks. CaterWil is equipped with series of plastic and rubber dampers that reduce vibrations amplitude and protect user from uncomfortable feelings and motion sickness.

2. Start-up and restarting instructions

2.1 Installing footrests

Dismantling

1. Unlock the clamp (see fig. 7).
2. Rotate the footrest until the latch is released from engagement.
3. Pull the footrest up to remove it.

Reassembly

1. Insert the footrest from above, aligning the pins and holes.
2. Rotate the footrest until the latch engages, until it clicks.

Fig. 7 Footrest

1. Pin holes
2. Adjusting handle
3. Clamp
4. Shin pillow
5. Foot pad

WARNING! It's strictly prohibited to stand on a foot pad!

2.2 Adjusting the Lower Leg Length

1. Loosen the screws on the footrest bar (see fig. 8).
2. Move the footplate up or down to adapt the height to the individual lower leg length and seat cushion thickness.
3. Retighten the screws.

2.3 Adjusting footrest angle

To elevate the footrest (see fig. 8):

1. Use the release lever on the footrest
2. Move the footrest to the desired position
3. Let go of the release lever

Fig. 8

2.4 Adapting the Remote controller position to Arm Length

To adapt the Remote controller to the arm length of the user, you must loosen a clamper on the Remote controller holder (see fig. 9). You can now slide the control panel backwards and forwards.

Fig. 9

2.5 Swing-away Remote controller holder

To allow the user to drive the power wheelchair closer to an object or under the edge of a table, the control panel can be swung to the side (see fig. 10).

1. Swing the Remote controller holder to the side.
2. Push it to bring the Remote controller holder back to its original position.

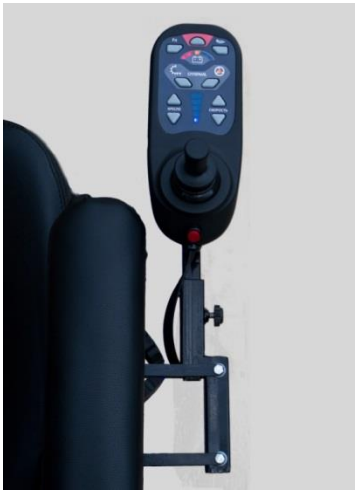

Fig. 10

2.6 Adjusting the armrest

To adapt the armrest height to the arm length of the user, you must loosen two clampers on the armrest holder (see fig. 9). You can now slide the armrest up and down.

2.7 Safety Belt

The GTS3 can be equipped with a safety belt.

To apply the lap belt, insert the two buckle halves into each other until they lock in place fig. 11). Then, verify that the belt has locked by trying to pulling it apart. The lap belt should not be too tight on the body. Objects caught under the belt can cause painful pressure sores.

To open the lap belt, press the red release button.

The belt length can be adjusted on both sides.

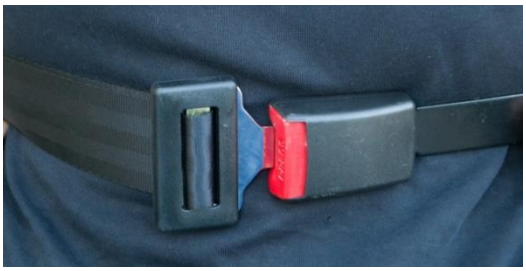

Fig. 11

2.8 Turning on/off and operating

1. Make sure the ESD button is pressed. If it is not - push it to activate the wheelchair.
2. Press the On/Off button to turn on the wheelchair

WARNING! Make sure that all other buttons are not pressed and the joystick is not inclined before turning on the wheelchair. Otherwise the wheelchair turns off automatically.

3. After 1 second of loading the wheelchair can be operated. The wheelchair is in safe mode until any button or joystick activated. To start driving incline the joystick in direction of driving. To stop driving release the joystick. To start execution of other commands press necessary button.
4. Press the On/Off button one more time to turn the wheelchair off when finished.

NOTICE! There is no need to press ESD button to turn off the wheelchair during normal operations. Press the ESD button for emergency stop only.

3. Maintenance Manual

3.1 Cleaning and Care

WARNING! Do not use any aggressive cleansing agents, solvents, or hard brushes for cleaning the power wheelchair. Never use a water jet or high-pressure cleaning apparatus for cleaning the power wheelchair.

Prior to disinfection, clean the seat and back upholstery as well as the seat cushion, the control panel and the armrest.

3.2 Automatic switch

The automatic switch works as a fuse. It is located under the seat (see fig. 12).

The automatic switch turns off the wheelchair in case of short circuit of overload. Turn it on when the problem solved.

The automatic switch can also be turned off manually for safe any transportation. It has to be turned off for avia transportation.

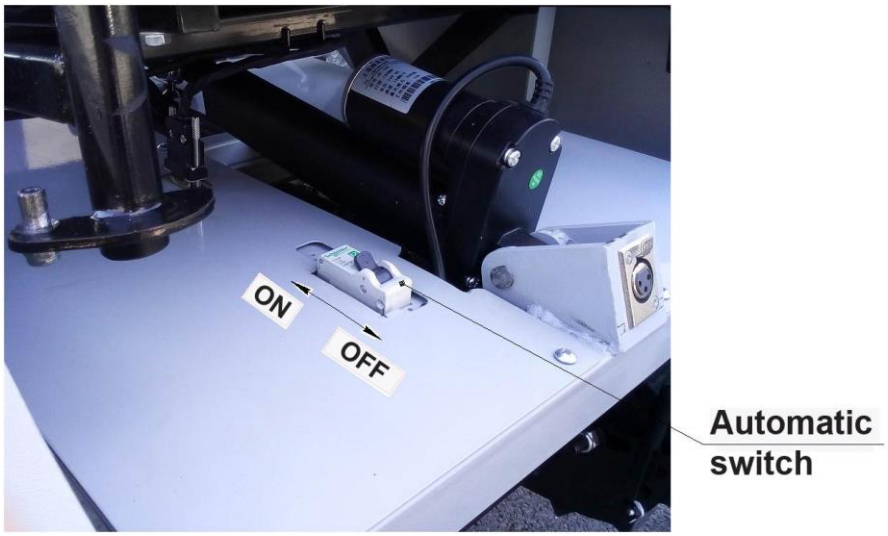

Fig. 12

3.3 Replacing Batteries

NOTICE It's recommended that both batteries be replaced if one battery is defective.

1. Open battery box covering by unscrewing 2 bolts using 8 mm wrench.
2. Unscrew wires from installed batteries
3. Remove batteries from the battery box.
4. Install new batteries into the battery box.
5. Screw wires on new batteries as on the fig. 13. Red wire to the red terminal, black wire to the black terminal.
6. Close the battery box covering back by screwing 2 bolts using 8 mm wrench.

WARNING If wires are connected to the wrong terminals with wrong polarity it will permanently damage the control system

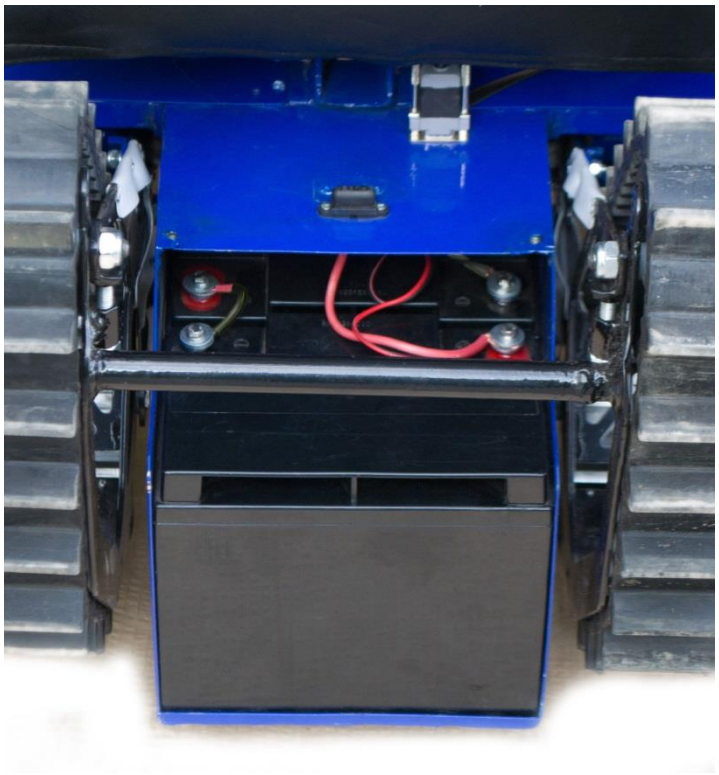

Fig. 13

3.4 Tighten screws

All screws must be tightened with torque according to the table:

Table 4. Screws tightening torque

Thread diameter	Tightening torque
M 4	3 Nm
M 5	5 Nm
M 6	10 Nm
M 8	25 Nm
M 10	50 Nm
M 12	85 Nm

3.5 Troubleshooting

During the operation there can appear some failures. Please use the table to identify and fix the problem. If problems can not be solved please inform service center.

3.6 System of self-diagnostics

During the operation of the wheelchair-transformer "CaterWil" some problems may arise. CaterWil GTS3 has a self-diagnosis system. If a problem is detected, the check is displayed on the control panel. In this case, the LEDs No. 6, 12 start blinking. The warning code is determined by the numbers of the burning LEDs 1-5 (Fig. 14). The value of the check code is shown in Table 5.

Fig.14. LEDs on the control panel

For example, if the 6, 12 flashes and the LEDs No. 1, No. 3 are lit, then the check code will be 1+3

Table 5. System of self-diagnostic

Check code	Check name	Reason
1	Error of chair angle sensor	Cable of the chair angle sensor are disconnected or damaged
		Fault of the chair angle sensor
		Fault of the electronics box
2	Error of wheelchair angle sensor	Fault of the electronics box
1+2	Error of positioning of wheelchair or chair angle sensor	Cable of the chair angle sensor are disconnected or damaged
		Error of positioning of the chair angle sensor or electronics box
		Fault of the chair angle sensor
		Fault of the electronics box
3	High wheelchair angle	The wheelchair is turned over
		Wrong electronics box positioning
		Fault of the electronics box
4	Overload of track platform motor	High load on track platform motor
		Fault of the track platform motor
		Fault of the electronics box
1+4	Overload of chair motor	High load on chair motor
		Fault of the chair motor
		Fault of the electronics box
2+4	No signal from track platform motor	Cable of the track platform motor are disconnected or damaged
		Fault of the track platform motor
2+3+4	Start up error	Buttons or joystick are pressed when started
		Fault of the remote controller
1+2+3+4	Left brake error	Cable of the left brake are disconnected from electronics box
		Fault of the left brake
		Fault of the electronics box
5	Right brake error	Cable of the right brake are disconnected from electronics box
		Fault of the right brake

		Fault of the electronics box
1+2+5	Transistor overload	High load of main motors
		Fault of the electronics box
3+5	Current overload	High load of main motors
		Fault of the electronics box
1+3+4+5	Joystick not calibrated	Calibration data is corrupted or not set
		Fault of the remote controller
2+3+4+5	No signal from joystick	Poor contact between remote controller board and joystick
		Fault of the joystick
1+2+3+4+5	No signal from electronic box	Poor contact between remote controller and electronics box
		Fault of the remote controller
		Fault of the electronics box

Reload the wheelchair to reset the check