

Technical Specification for SMART BRAKE TECHNOLOGY

Model: Wireless hydraulic brakes – 2020

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Glossary

| | |
|----|-------------------------------|
| BU | Brake Unit |
| BC | Brake Control |
| HC | Hand Control |
| BT | Brake Trigger |
| BR | “Common term” for Brakeremots |
| * | Reservation discrepancies |

1.USAGE

1.1.Before use

1. Check for light signal. It may be necessary to charge or replace battery before use.
 - Brake lever:** Tilt the silicon lid on the side of the product.
 - Braking Unit:** Unscrew the lid on the front of the product. Use the included RollerSafe adapter to charge both BL and BU.
 - Brake trigger:** Unscrew the three screws with Torx 8. Replae the CR2032 battery by using your hands.
 - Brake control:** Unscrew the lock on the back side of the remote with a screwdriver or similar. Replae the CR2032 battery by using your hands.
2. When the products are charging, a **red** light will appear in both BL and BU.
 - Brake lever:** The lights can be seen at the top and bottom of the control.
 - Brake Unit:** The light can be seen around the charging point on the unit.
3. At 100% battery capacity, the light indicator on the BL and BU changes to a **Green** light.

1.2.Start and preparations

1. Press one time at the connection button on the BU to boot the system. The system will now perform a calibration test.
2. Calibration = System checks the brake pads' condition, to optimize lead-time in hydraulic pump. The system performs a fully automatic brake force test from minimum to maximum (more about the pump system in 1.3.2).

The system is based on the main units and clones that follow the motions. One master can control 7 clones at once. The first unit that get connected with a brake control is the master, the rest is works as clones.

a. If you use 1 BU and 1 or more BCs

1. On the brake unit, push and hold in the connection button for 8 seconds until the LED beside the USB starts to light **yellow**. When releasing the button, the yellow light switches to **green** and the brake light start light constantly. The constant brake light signal indicates that the unit is ready to start synchronizing.
2. Place the brake control to be used close to the brake unit.
 - i) Squeeze the lever/button on the control.When BC and BU are connected both the brake light and the **green** signal will disappear.
3. Start up the system by pushing the connection button once.
4. To connect multiple brake controls, repeat the proses.

b. If you use 2 BUs and 1 or more BCs

1. To obtain the strongest signals, choose the brake unit that is the one further away from the battery packages to be master (master = the first brake unit that is put in synchronization mode). Push and hold in the connection button for 8 seconds until the LED beside the USB starts to light **yellow**. When releasing the button, the yellow light switches to **green** and the brake light start light constantly. The constant brake light signal indicates that the unit is ready to start synchronizing.
2. On the other BU, push and hold in the connection button for 12 seconds until the LED beside the USB switch to a **purple** light. Release the button.
3. The clone (second connected brake unit) will automatically connect to the main brake unit. When the brake units are connected both the brake light and the **green** signal will disappear.
4. Start up the system by pushing the connection button once on both units.
5. To connect multiple brake units, repeat the proses.
6. To connect one or more brake controls, set the master brake unit in synchronization mode, and follow step 1.1.2 a)2.

1.3 Signals

The system uses a two-way radio frequency signal system, which means that BC communicates with BU and vice versa.

1.3.1 Connection signals

a. Brake unit

- i) When contact with a brake control the unit flashes a green light every 0.1 sec / 1.6 sec. beside the USB
- ii) **If the brake unit loses contact with a brake control a blue light will occur beside the USB under the charging latch.**

b. Brake lever

- i) When contact with brake unit the lever flashing a constant green light when the lever is pulled.
- ii) If the brake lever loses contact with the brake unit, a rapidly flashing blue/green light will occur in the control that lost the signal when pulling the lever.

c. Brake trigger

- i) When contact with brake unit the brake trigger flashing a constant green light when the lever is pulled.
- ii) If the brake trigger loses contact with the brake unit, a rapidly flashing blue light will occur in the control that lost the signal when pulling the lever.

d. Hand control

- i) When contact with brake unit the control flashing a constant green light when the button is triggered.
- ii) If the hand control loses contact with the brake unit, a rapidly flashing red light will occur in the control that lost the signal when triggering the button.

1.3.2 battery signals

a. Brake Unit

- i) When the battery capacity in BU is below 25%, the brake light will flash 0.2 second every 10 second and the USB light flashes red 2 sec / 10 sec.
- ii) When the battery capacity in the BU is below 15%, it goes into fail-safe mode. This is signalified by the brake lights flashing 0.2 sec / 1 sec, and the USB light will stop flashing

red. Learn more about Fail-Safe in chapter 3.

b. Brake lever

i) When the battery capacity in BL is below 25%, the light indicator will flash **red** 2 second every 10 second.

ii) When the battery capacity is below 15%, the light indicator will flash **red** 0.2 sec / 1 sec. And the brake Unit will go into fail-safe.

If fail-safe is caused by the brake levers drained battery a yellow light will occur beside the USB under the charging latch.

c. Brake trigger

i) When the battery capacity in BT is below 25%, the light indicator will flash **red** 2 second every 10 second.

ii) When the battery capacity is below 15%, the light indicator will flash **red** 0.2 sec / 1 sec. And the brake Unit will go into fail-safe.

If fail-safe is caused by the brake trigger drained battery a yellow light will occur beside the USB under the charging latch.

d. Hand control

There are no indicators at this remote for low battery. When the battery is all drained out, there will be no light from the remotes indicators

1.4 On/off activation

1. Push one time to **start up the system**. When starting you will hear the motor perform a braking test and the brake light will flash once.
2. Hold the activation button for 5 seconds to **turn off the system**. After 1 hour of inactivity it automatically turns off.

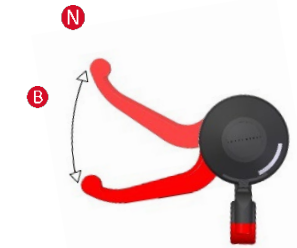
1.5 Brake Controls

1.5.1 Brake Control (BC)

- a. BL has a resolution of 100 points, providing a linear and seamless brake force.
- b. If the LED lights in the controller are not visible, check the battery capacity.
- c. The brake control is in standby mode when not in use, thus no “on / off” button.

a. Brake (B)

The range of movement (mm) for the brake lever is given by the position of the control, to fit with different hand sizes. Regardless of the range (mm), the brake will provide a linear force from 0% to 100%.



b. Parking brake (P)

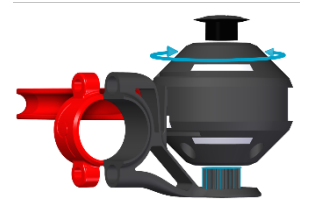
To activate parking brake push the lever one or two notch forward from neutral position. When parking brake is activated, BC signals a red flashing light. By activating the parking brake from the control, the unit locks the brakes and goes into a sleeping mode where SMART BRAKE does not use any power.



c. Position adjustments

The system automatically adjusts brake force per degree of lever movement when setting the control in a new position.

If the control is sat in a position where it does not use its full scope – squeeze the lever all the way in until it stops, **5 times**. The system then recognizes the length and concludes that it is full brake.



1.5.2 Hand Control (HC)

The Hand control is a one-handed remote control. It has a neck strap attached so it easily can be carried.

a. Brake

- i) By press and holding the brake button the force linearly increases from 0-100%.
- ii) By releasing the pressure on the button the brake force quickly release pressure on brakes

b. Park brake

- i) Push the button once to activate park brake. The force will linearly increase up to 100% and hold the pressure.
- ii) Push the button once to deactivate park brake.



1.4 Brake trigger (BT)

a. Brake

The pole control is controlled by one finger and apply force linearly from 0-100%.

b. Park brake

- i) Four pushes at the trigger between neutral and over 60% within 5 second activates parking brake. Release the brake by one more push. If failed to activate, try again after five seconds.
- ii) When park brake is activated the trigger flash red 0.2 sec / 4 sec.



1.6 Brake Unit

Braking lights

The braking lights on brake unit will be activated when the lever is activated for brake/parking brake mode. It is not possible to turn off

Charing point

Unscrew the latch with your fingers to get access to the charging point. Use the charger that comes with this product.

Connection button

Charging point



1.7 Single remote kit

a. Brake Lever

If SMART BRAKE is bought with one brake lever, it will not be possible to upgrade to more controls without changing the remote firmware. Contact your reseller.

b. Brake Trigger or Hand Control

If SMART BRAKE is bought with one brake trigger or hand control, it is possible to upgrade to more controls without upgrading the firmware.

1.8 Duo remote kit

a. Brake Lever

If SMART BRAKE is bought with one brake lever and another control, it is possible to upgrade to more controls without changing the remote firmware.

b. Companion control and fail-safe

i) You are free to choose which control to use as a companion control. The last remote to get out of signal reach will activate fail-safe to make sure the companion always are close enough to activate the brakes. When the remote that got out of reach regain its signal the brake unit will automatically deactivate fail-safe after two seconds.

ii) If the occupant uses SMART BRAKE without a companion, the second remote needs to be within the signal reach area to not activate fail-safe. There is no way to deactivate a remote for single remote use when two controls are activated.

1.9 Disconnect a control

SMART BRAKE remembers its connection even if the battery is drained, taken out or not been used for a while. To disconnect a remote, it needs to be connected to another brake unit.

a. Turn off the brake unit that the remote currently is connected to.

b. Activate synchronization mode at the new brake unit that the remote is going to be connected to and trigger the control.

Explanation: Multiple brake control can only be connected to one brake unit. The brake unit can be connected to multiple brake units, which becomes slaves to the master (the master is the one brake unit that is connected to brake remotes, and brake units-slaves).

Brake remotes only controls one brake unit (Master unit). It is the master unit that controls the rest of the brake units (slaves).

2. TECHNICAL INFO

2.1 Communication platform

- | | |
|------------------------|--|
| 1. Brake lever (BC): | Bidirectional 2,4 GHz RF, BLE, 3.7V, Micro USB type B charging point |
| 2. Brake Unit (BU): | Bidirectional 2,4 GHz RF, BLE, 3.7, Micro USB type B charging point |
| 3. Brake control (HC): | Directional 2,4 GHz RF, BLE, 3V, battery: CR2032 |
| 4. Brake trigger (BT): | Directional 2,4 GHz RF, BLE, 3V, battery: CR2032 |
| 5. Charge cable: | 2 x Micro USB type B, 1 mete |
| 6. Charger: | Double contact - 280mAh |
| 7. APP: | TBD (Firmware update functionality) BLE. (IOS/Android) |

2.2 Battery

Brake Control

Battery capacity: 3.7V, 190mAh, Li-Polymer, rechargeable battery
 Charging time: 2.5 hours to fully charge

Brake Unit

Battery capacity: 3,7V, 3500mAh, Li-Polymer, rechargeable battery
 Charging time: 3.5 hours to fully charge
 Active usages: Est. 4 000 brake cycles

Hand control

Battery capacity: 3V, 220mAh, Cr2032, non rechargeable battery
 Battery life: > One year

Brake trigger

Battery capacity: 3V, 220mAh, Cr2032, non rechargeable battery
 Battery life: > One year

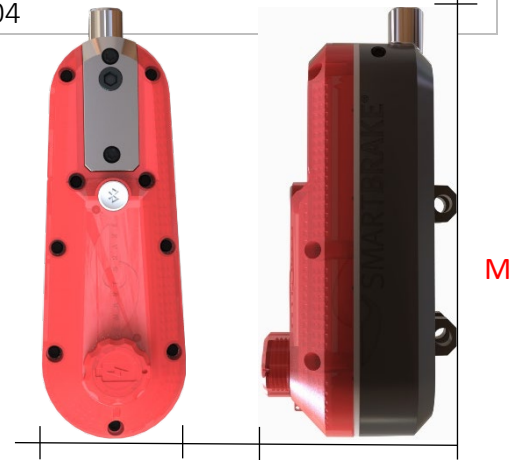
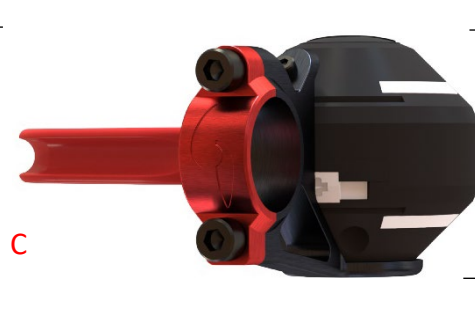
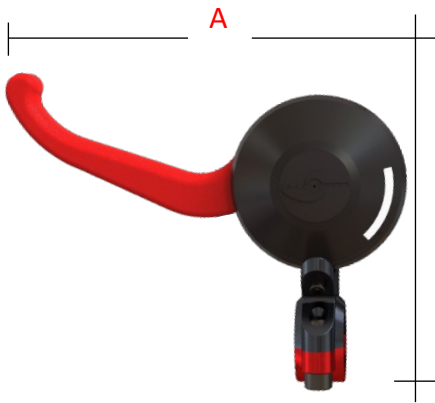
2.3 Force

The brake unit provides a maximum of 64 bar.

2.4 Weights and Measures

| PART | DESCRIPTION | SIZE (mm), (g) |
|------|-------------|----------------|
| A | Width | 126 |
| B | Height | 47 |
| C | Length | 89 |
| D | Weight | 80 |
| E | Width | 53 |
| F | Height | 13.7 |
| G | Length | 53 |
| H | Weight | 38 |
| I | Width | 22.5 |
| J | Height | 53.8 |
| K | Length | 58.4 |
| L | Weight | 28 |
| M | Width | 46 |
| N | Height | 69 |
| O | Length | 145.2 |
| P | Weight | 304 |

Brake lever



Brake Unit

Hand control



Brake trigger



2.5 Brake caliper

- a. Tektro Auriga Twin HD-T525 calipers included.
- b. Magura HS11 –hydraulic rim brakes

2.6 Leading time

Train with SMART BRAKE at a safe place before getting into potential hazards situations. The braking systems leading time from pulling the lever until the brake is fully enclosed is about one* second due to the motor speed.

2.7 Signal range

20+m distance when brake unit and controller in free sight. 20m distance when bike frame/motor in between unit/controller

3. FAIL-SAFE

Fail-safe mode is an automatic security feature built into the technology and will be activated by drained battery or signal failure over two seconds.

When fail-safe mode is activated, the brakes start at 1% braking force and act linearly up to 100% over a period of 4 seconds. Then the brake locks. To release the brake in to a neutral position, turn off the brake unit by holding the connectivity button for four seconds.

3.1 Fail-Safe caused by brake unit

- a. Brake unit battery capacity is less than 15%. Indicated by a short flash with the brake lights every second and same with a **red** light beside the USB.
- b. Lost connection with another brake unit. Indicated by a short flash with the brake lights every second and same with a **blue** light beside the USB.

3.2 Fail-Safe caused by a brake remote

- a. Brake remote battery capacity is less than 15%.
 - i) Indicated on the brake unit by a short flash with the brake lights every second and same with a **yellow** light beside the USB.
 - ii) Indicated on the brake remote by a short **red** flash every second.
- b. Brake remote lost connection with the master brake unit.
 - i) Indicated on the brake unit by a short flash with the brake lights every second and same with a **blue** light beside the USB.
 - ii) Indicated on the brake lever and trigger by a short **blue** flash every second when lever is pulled.
 - iii) Indicated on the hand control by a short **red** flash every second when button is triggered.

4. WARNING

To avoid damage to the components, or potential serious malfunction to SMART BRAKE, follow these safety instructions carefully. Violation of these safety instructions can cause serious and / or fatal injuries, and potentially damage the battery or charger that may cause fire, chemical burns, and / or electrolyte leakage.

1. Use only the included RollerSafe adapter and USB cable. Using other adapters and USB cables can cause the battery to overheat, catch fire, and / or explode.
2. Do not change or disassemble the battery or charger. Avoid draining the battery or charger. Do not use a battery or charger that has been damaged. Signs of damage include discoloration, cracks, punctures, or leakage. If you notice any abnormalities, immediately remove the charger from the equipment.
3. Avoid exposure to extreme heat or cold (+40/-40 Celsius). Do not place the battery or charger in or near a fire or in a place where static electricity occurs.
4. Do not charge the battery in damp or wet places. Avoid exposure to moisture and / or water during charging.
5. Do not leave the battery connected to the charger after full charging. Store the battery at room temperature.

5. CONTACT



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