

# ***SmartDrive MX2+***

Wheelchair Power Assist

## User's Manual

Informational videos available

**To get the most out of your SmartDrive,  
download the PushTracker app from the  
Apple or Google Play app Store.**

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for the latest updates!**



## Specification Sheet

## SmartDrive MX2+ Wheelchair Power Assist

Range (level / no resistance conditions):	Up to 12.3 miles (19.8 km)*
Maximum speed (level surface):	Adjustable [4 mph (6 km/h) default / 5.5 mph (8.9 km/h) optional^]
Maximum speed (6° incline):	Adjustable [4 mph (6 km/h) default / 5.5 mph (8.9 km/h) optional^]
Maximum acceleration:	Adjustable up to 2.0 ft/s <sup>2</sup> (0.6 m/s <sup>2</sup> ) [0.7 ft/s <sup>2</sup> (0.2 m/s <sup>2</sup> ) default]
Motor power:	250 W
Motor voltage:	36 V
Operating temperature:	-25 °C to 50 °C
Continuous theoretical driving range:	Up to 14.2 miles (22.9 km)*
Total weight:	13.5 lbs (6.1 kg)
Sound level:	60.7 dB(A)
Expected lifetime / service life:	5 years
Contains Bluetooth® LE:	FCC ID QQQBT113 IC ID 5123A-BGTBLE113

(\*) Performance measurements will vary based on user and chair characteristics, driving and battery conditions.

(^) May be restricted in certain regions.

NOTE: The stated values are from testing with a 331 lb. occupant. The range, speed, etc. vary depending on driving conditions.

### SmartDrive Model: MX2+

Overall length:	15.3 in (389 mm)
Overall width:	5.7 in (141 mm)
Overall height:	9.5 in (242 mm)
Omni-wheel diameter:	7.6 in (193 mm)
Omni-wheel width:	2.8 in (71 mm)
Weight:	12.5 lbs (5.7 kg)
Contained battery type:	Lithium-Ion (Lithium Iron Phosphate)
Nominal operating voltage:	36 V
Electric charge:	3.4 A-h
Firmware / app version(s):	Check App(s)

See **PushTracker / E2 User's Manual** provided for its specifications.

### Wheelchair Compatibility

Wheelchair frame type:	Rigid, Folding, Tilt-In Space, One-Arm Drive
Drive wheel diameter:	22, 24, 25 or 26 in (501, 540, 559 or 590 mm)
Folding frame attachment distance:	8.25 to 21.0 in (210 to 533 mm)
User weight:	30 to 331 lbs (14 to 150 kg)
Combined user / wheelchair weight:	Maximum 351 lbs (159 kg)

The SmartDrive has been tested and conforms to all applicable requirements of *ANSI/RESNA Standards for Wheelchairs - Volume 1 and Volume 2* and *EN 12184*.

\*\*A wheelchair's specifications provided by its manufacturer may be slightly affected by the addition of the SmartDrive.\*\*

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# 1. Introduction

## Intended Use of the SmartDrive

The Permobil / Max Mobility SmartDrive Wheelchair Power Assist device is exclusively intended to provide auxiliary power to manual wheelchairs to reduce the pushing power needed by their users, including pediatrics, with a user weight of 30 to 331 lbs (14 - 150 kgs). It is intended to be used by users capable of operating and maneuvering a powered and manual wheelchair, ultimately empowering them through enhanced mobility. It is also very strongly recommended that it be used on manual wheelchairs that meet the "Wheelchair Compatibility" dimensions listed in the **Specification Sheet**.

## Must Read Prior-to-Use Information

Improper use of the SmartDrive or the wheelchair it is attached, depending on surface, weather, and traffic conditions, can present a potential of injury and cause damage to the wheelchair or SmartDrive. Therefore, the SmartDrive must only be handled and used under the following prerequisites:

- The user is both physically and mentally capable of operating the wheelchair and device in all possible conditions and situations. **[Contraindication]**
- Proper instruction on its handling and operation has been received by reading and understanding this user's manual in its entirety.
- No technical modifications have been made to the device.
- The user must take time to become accustomed to the SmartDrive's response and performance by first practicing its operation in a safe area that is free from hazards. One should become familiar with the tap sensitivity, push recognition, deactivation response, acceleration / top speed, etc. of the device before venturing out with the device, where potentially hazardous situations may exist. It is strongly recommended that the user not attempt to use the SmartDrive outdoors until it can be safely operated indoors without difficulty.

If any issues or malfunctions exist, cease the use of the SmartDrive and contact Permobil [SmartDrive] / Max Mobility for service / further instruction. Any contrary use to the directions of this user's manual, to the recommendations of one's mobility equipment dealer, or to the technical limitations defined by either Permobil [SmartDrive] / Max Mobility and one's wheelchair manufacturer is considered to be misuse of the SmartDrive. Permobil [SmartDrive] / Max Mobility is not responsible for any injuries or damage caused by this type of misuse.

## Warnings and Safety Precautions



All warnings and safety precautions issued by one's wheelchair manufacturer must be heeded in addition to those stated in this and any other provided manuals / instructions / guides, to include that provided within the SmartDrive MX2+ app. Failure to do so could result in serious injury or death.



Handling or use of the SmartDrive MX2+ app or the SmartDrive by anyone who has not received proper instruction from this manual, the SmartDrive User's Manual and any other provided manuals / instructions / guides may result in serious injury or death.

Do not attempt to attach the SmartDrive to a wheelchair that does not meet the dimensions outlined in "Wheelchair Compatibility" section of the Specification Sheet.

One MUST familiarize themselves with the response and performance of the SmartDrive prior to regular use. Do not attempt to use outdoors until it can be safely operated indoors without colliding into walls or any other objects.

Methods for safe use of a SmartDrive attached wheelchair are different for each user depending on function and ability.

The specifications provided by one's wheelchair manufacturer may be slightly affected by the addition of the SmartDrive.

The addition of the SmartDrive to one's wheelchair may cause it to feel different. Take the time to become accustomed to this new feeling.

Always inspect your SmartDrive, PushTracker / E2, attachment hardware and SwitchControl button(s) for missing parts / damage prior to each use [see "Main-



tenance" section(s) for parts to pay attention to].

Make sure the SmartDrive and PushTracker / E2 [if used] are charged before use.



Always pay close attention to the surface that you are operating your wheelchair, whether your SmartDrive is on or not, as the front casters of your wheelchair can get stuck in cracks, ruts, holes, ledges, etc. Running into these obstacles can cause you to tip out of your chair.

Do not operate over significantly rough terrain, very slick surfaces, extreme slopes, or loose ground. This may cause a loss of traction, leading to injury or damage to your SmartDrive and void the warranty.

The SmartDrive is not designed to drive up or down large curbs / steps. Only perform this maneuver when absolutely necessary and always ask for help. Also be sure to turn OFF the power assist [via SwitchControl and PushTracker / E2] before maneuvering.

Use extreme caution when operating a SmartDrive attached wheelchair when near streets. Consider turning OFF the power assist [via SwitchControl and PushTracker / E2] to reduce risk.

When crossing major roads, intersection, railway crossings or highways as well as when you drive





steep, long slopes you should always consider having somebody accompany you in the interest of your safety.

With regards to driving up and down slopes, please adhere to the instructions and specifications given by the diverse wheelchair manufacturers.

Riding over curbs or obstacles can cause tipping and serious bodily harm. Turn OFF the power assist [via SwitchControl and PushTracker / E2] when attempting to ride in these situations. If you have any doubt that you can safely cross any curb or obstacle, ALWAYS ask for help. Be aware of your riding skills and personal limitations. Develop new skills only with the help of a companion.

The PushTracker / E2 should ONLY be worn by the user sitting in the wheelchair with the SmartDrive attached.

Use caution when operating a SmartDrive attached wheelchair indoors or in crowded / confined areas. Consider turning OFF the power assist [via SwitchControl and PushTracker / E2] to reduce the chance of collision, damage or injury.

Always turn OFF the power assist [via SwitchControl and PushTracker / E2] when parked to prevent accidental activation.

Always turn OFF the power assist [via SwitchControl and PushTracker / E2] before taking the PushTracker / E2 off of your wrist.

Tapping force does not need to be excessive or "hard".

Gentle, stiff wrist taps at a reasonable speed (i.e. one half (0.5) second between taps) is sufficient.

Always use caution when transferring in or out of the wheelchair. Every precaution should be taken to reduce the transfer distance and be certain the wheel locks are engaged to prevent the wheels from moving. Also always make sure the power assist is OFF [via SwitchControl and PushTracker / E2] when transferring to and from your chair.

The SwitchControl button(s) are designed to be used with a seat cushion as to prevent sitting directly on the cables. It is strongly recommended that a seat cushion be used on your wheelchair when using the button(s).



The SmartDrive and PushTracker have passed industry climate testing the same as power wheelchairs, and are considered rain / splash proof. Complete

submersion of either may cause malfunction or damage and void the warranty. Take the PushTracker off prior to bathing or showering.



Surface temperatures of the SmartDrive can increase and become hot to the touch when exposed to external sources of heat, such as sunlight.

Using Anti-Tippers substantially reduces your risk of falling over backwards, which can cause serious injury. If you are afraid of tipping over, use anti-tippers. Anti-Tippers will keep you from falling over, but they will limit your ability to be pulled up curbs and some other maneuvers. Just as children learn to ride bikes without training wheels, you may be able to learn to use your wheelchair with Anti-

Tippers. It is STRONGLY recommended that Anti-Tippers be employed to the wheelchair until the user has become accustomed to operating the SmartDrive in all possible environments, situations, and conditions.

Do not tip or wheel your wheelchair without assistance, unless you are highly skilled.

Do not shift your weight or sitting position toward the direction you are reaching as one's wheelchair may tip over backwards or sideways.

Do not lean over the top of the back upholstery to reach objects behind as this may cause the wheelchair to tip over.

Do not stand on the frame of your wheelchair.

Your wheelchair is not designed for weight training and is unsafe from use as a seat while weight training. Weight training from your wheelchair substantially changes the stability of your chair and may cause tipping.

Do not attempt to stop a moving wheelchair with wheel locks. Wheel locks are not brakes.

Do not take a SmartDrive attached wheelchair on an escalator or moving walkway. Serious bodily injury may occur.

Any unauthorized modifications to the SmartDrive will void the warranty and may create a safety hazard.

This product can expose you to chemicals including cumene, which is known to the State of California to cause cancer.



NOTES: Figures and diagrams of the SmartDrive in this manual may vary slightly from your device.

Google Play, Wear OS by Google, Android, the Apple logo, iPhone, iOS and Bluetooth are trademarks or registered trademarks of their respective owners.

Access to the Google Play Store to get the SmartDrive MX2+ [and any other] app on the PushTracker E2 may require the use of an existing Google account or creation of a new one. Separate policies, terms and conditions apply.

An electronic version of this User's Manual along with informational videos are available on our website for people with visual, reading or cognitive disabilities.

All product [including components], requirements, policies, terms and conditions, to include the contents of this and any other provided manual / instruction / guide, are subject to change without prior notice. For current product instruction and information refer to the official website.

The Serial Number of your SmartDrive is located on its underside. It is recommended that you save this User's Manual and record the Serial Number below for future reference.

SmartDrive Serial Number: \_\_\_\_\_

## Electromagnetic Interference (EMI)

Electromagnetic Interference comes from radio wave sources. Examples of these sources are radio / TV station transmitters, receivers, transceivers [send and receive signals], cell phones, walkie-talkies, etc. There are many sources of EMI in one's daily environment, some that are avoidable and some that one might not even realize. Powered electronic devices, such as the SmartDrive are susceptible to EMI, both strong and weak, from these types of transmitters, as well as from electrostatic discharges (ESD) and conducted sources. These interferences can cause unintentional activation of the SmartDrive motor or damage to its control system, potentially causing a safety hazard and leading to costly repairs.

Every power wheelchair or power assist device can resist EMI up to a certain level, also known as its "immunity level". The higher the immunity level, the less the device is at risk of interference. An immunity level of 20 V/m is understood to provide sufficient protection from the sources encountered on a daily basis. The SmartDrive has been tested and found to be immune to this minimum immunity level of 20 V/m. Though equipped to be sufficiently protected against EMI, any chair modifications or accessory additions can effect its immunity. Parts from other suppliers have unknown EMI properties, and their interaction with the SmartDrive is untested.

Electromagnetic energy becomes increasing more intense the closer to the source you become. Therefore, it is recommended that the SmartDrive not be operated in close vicinity to sources of radio waves. There are three categories that EMI sources fall under:

1. Long Range Transceivers: These are sources of strong radio waves, including commercial radio and TV broadcast antenna towers and amateur (HAM) radios.
2. Medium Range Mobile Transceivers: These are sources of potentially strong radio waves, including two-way radios used by emergency vehicles, tractor-trailers, and taxis.
3. Handheld Transceivers: These are sources of relatively low strength waves but have the possibility of getting very close to your wheelchair, including walkie-talkies, citizen band (CB) radios, cell phones, and other personal communication devices.

The following are not likely to cause EMI problems: Cordless phones, MP3 / CD players, TV sets, and AM / FM radios.



**Do not operate hand-held transceivers (transmitters-receivers), such as citizens band (CB) radios, or turn on personal communication devices, such as cellular phones, while the power assist is ON.**

**Be aware of nearby transmitters, such as radio or TV stations, and try to avoid coming close to them.**

**If unintended movement occurs, turn the power assist OFF as soon as it is safe.**

**Be aware that adding accessories or components to your wheelchair may make it more susceptible to EMI [Note: There is not easy way to evaluate their effect on the overall immunity of the device].**

**Report all incidents of unintended movement to Permobil [SmartDrive] / Max Mobility, and note whether there is a source of EMI nearby.**

## USA / Canada

This device 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, including interference that may cause undesired operation. Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

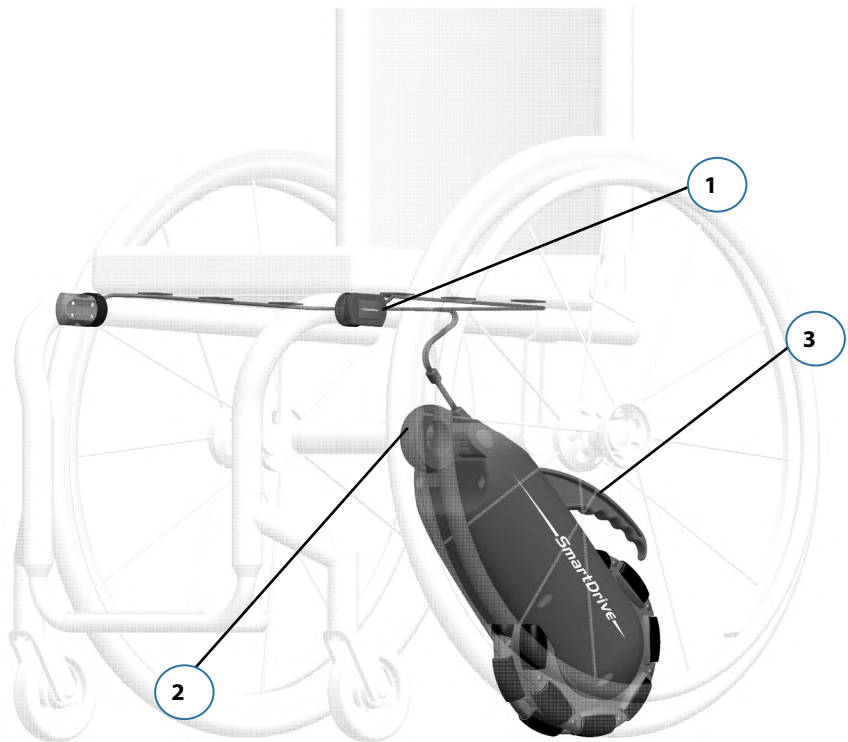
## Bluetooth™ Wireless Communication

Bluetooth™ wireless communication [2.4 GHz frequency band] is used by the PushTracker / E2 to communicate to the SmartDrive when to activate / deactivate the power assist, send and receive signals from a smartphone, etc. The PushTracker / E2 must be within 25 ft (8 meters) of the SmartDrive / smartphone to connect and communicate. The maximum output power of this technology is 10 mW, and the operation of this device in close proximity to other wireless devices [i.e. electromagnetic security systems, Bluetooth™ headsets, etc.] could cause the device to lose connection. Power assist is always deactivated whenever the motor is driving and there is a loss of connection; the SmartDrive will beep and PushTracker / E2 will also give indication when this happens. Worst case coexistence testing was performed on the device to ensure its safety and effectiveness. Please contact Permobil [SmartDrive] / Max Mobility immediately for troubleshooting if continuous connection issues are experienced with the device.



## List of Components

1. SwitchControl Button(s)
  2. Attachment Hardware
  3. SmartDrive / Drive Unit
  4. Rollers
  5. SmartDrive Handle
  6. SmartDrive LEDs
  7. SmartDrive Toggle Switch
  8. SmartDrive Charger Cover
  9. Charger / Button Receptacle
  10. Omni-Drive Wheel
  11. Charger / Button Connector
  12. Button LED
  13. Button Velcro Loop
  14. PushTracker *[if used]*
- or
14. SmartDrive MX2+ App on Push-Tracker E2 (TicWatch E2) *[if used]*



## 2. SmartDrive Set-Up

### SmartDrive Attachment

The SmartDrive is designed to easily and quickly attach to all types of manual wheelchairs, both rigid and folding. Refer to the **Specification Sheet** to verify the compatibility of the wheelchair. Custom SmartDrive attachment solutions are also available if the existing hardware does not work for the desired wheelchair.

Refer to the separate instructions provided with your attachment hardware for correct set-up prior to use.



**Adjustments made to the wheelchair set-up could affect the orientation of the SmartDrive. Adjust or replace the attachment hardware, if needed, whenever changes are made to the chair or its wheels.**

### SwitchControl Button(s)

The frame mounted SwitchControl button(s) are easily mounted to a wheelchair to allow for close access and easy pressing. The button(s) can be used to deactivate the motor, as well as provide a means of actively powering the motor.

Refer to the separate instructions provided with the button(s) for correct set-up prior to use.

### PushTracker / E2 [if used]

The PushTracker / E2 is designed to comfortably and securely attach to the top part of wrists of all sizes. It has an embedded accelerometer to recognise when you push, when you want to activate the power assist and also when you tap your hand against the handrim to deactivate the power assist. Additionally, it is equipped with visual and haptic feedback to indicate different information, states and activations / deactivations that occur during everyday use.



**It is recommended that your PushTracker / E2 be worn snug on your wrist to get the most reliable recognition of your hand movement for SmartDrive operation, propulsion activity tracking, etc. Ability to operate / maneuver the wheelchair can be affected if the PushTracker / E2, watches, jewellery, etc. are worn loosely or positioned such that they can become loose and interfere with handrim operation.**

Refer to the separate **PushTracker / E2 User's Manual** provided for information on re-paring or paring a new PushTracker / E2 to your SmartDrive.

The band on the PushTracker / E2 is designed for most users; but if you have difficulty securing the buckle / clasp, it doesn't fit right, or you wish to have one of a different color / material, the band can be easily replaced with essentially any off-the-shelf watch band of your choosing.

Refer to the separate **PushTracker / E2 User's Manual** provided for complete information, specifications, band size / attachment and operation details.

## 3. Operating the SmartDrive



**Always turn OFF the power assist [via SwitchControl and PushTracker / E2] when parked, before transferring in or out of your wheelchair, taking the PushTracker / E2 off of your wrist and / or SmartDrive off of your chair to prevent accidental activation.**

### Power Assist Ready

The user of a SmartDrive equipped wheelchair is able to use the power assist whenever desired or turn it OFF [via SwitchControl and PushTracker / E2] and operate their wheelchair as if the SmartDrive was not on their chair.

With the SmartDrive already attached to the wheelchair and powered on [as described in the separate attachment hardware instructions], the SmartDrive will wait for power assist to be turned ON by SwitchControl or the specifically paired PushTracker / E2.

To turn power assist ON with SwitchControl / take out of the standby state, press [with the 0.9 lbs (4 N) minimal needed force] and release one of the buttons. Indication of power assist ON via SwitchControl will be given on the button LED(s).

To turn power assist OFF with SwitchControl / put it in the standby state, press and release one of the buttons.



[If you have a PushTracker / E2] To turn power assist ON with the PushTracker / E2, press and release the Power Assist button. Indication of power assist ON via PushTracker / E2 will be given on both the SwitchControl button LED(s) and PushTracker / E2 [refer to the separate **PushTracker / E2 User's Manual** provided].

To turn power assist OFF with the PushTracker / E2, press and release the Power Assist button. Indication of power assist OFF via PushTracker / E2 will be given on both the SwitchControl button LED(s) and PushTracker / E2.

The SwitchControl button LED(s) give special indication for each of these power assist ON states, as well as having no flashing for power assist OFF.

Power assist OFF / standby state	No flashing
SwitchControl power assist ON only	Steady flashing
PushTracker / E2 power assist ON only	Rapid flashing
Both SwitchControl and PushTracker / E2 power assist ON	Double flashing

With the power assist OFF, or in the standby state, the SmartDrive will not be able to be activated to provide power assist, so you are able to push the wheelchair around with no power assist.

### EZ-ON Power Assist Ready *[on PushTracker only / not on PushTracker E2]*

With EZ-ON activated [see “SmartDrive Settings” in the **PushTracker User's Manual**], hold your arm so the PushTracker is completely horizontal [parallel to the ground]. When oriented correctly, the charging LED will illuminate blue [see graphics below], at which DOUBLE tapping down on the PushTracker screen will turn power assist ON. Repeat these actions in order to turn power assist OFF. This is a great feature if you have limited finger function that makes pressing the Power Assist Button difficult.



### SwitchControl Power Assist Deactivation

A SwitchControl button press and release will ALWAYS deactivate the motor / power assist any time that the motor is activated and driving. This is even if it is in the PushTracker / E2 power assist ON only state [see “Power Assist Ready” section].

Note that the device will still be in a state of power assist ready after a SwitchControl button press deactivation, and it must be put in power assist OFF / standby state if you do not want the motor to be activated.

### PushTracker / E2 Power Assist Deactivation *[if used]*

When used with a PushTracker / E2, there are different ways to deactivate the power assist depending on which Control Mode you are operating in [see different “Control Mode” sections]. The safest and therefore preferred way of deactivation is to perform a hitting motion with your PushTracker / E2 wearing arm. Motion sensors in the PushTracker / E2 sense this hitting motion / tap [see graphics below] and then deactivate the motor. Ideally, the deactivation motion will be performed by hitting your hand against the handrims with a stiff wrist prior to braking. Sufficient deactivation motion is indicated by the Indication [LED on the PushTracker or screen on the PushTracker E2] illuminating red. This indication is given even when the motor is not driving, so practice and familiarity should be done prior to use. Depending on your current Control Mode, a SINGLE tap or a DOUBLE tap may be required [see different Control Modes]. The sensitivity of this tap, or force / impact required, is also changeable depending on your needs [see the separate **PushTracker / E2 User's Manual** provided]. For best response, use the lower portion of your palm to perform the tap.



Whenever the motor is deactivated from this, the PushTracker / E2 will vibrate in addition to its Indication [LED on the PushTracker or screen on the PushTracker E2] being illuminated red as indication that power is no longer being provided.

The final way to deactivate the motor is to press and release the Power Assist button on the PushTracker / E2. This means of deactivation gives an illuminated red Indication, vibration and notification the PushTracker Display / PushTracker E2 screen before it disconnects wirelessly from the SmartDrive [turning power assist OFF].

If any malfunctions or push detection / braking / SwitchControl button / PushTracker / E2 issues are experienced with the SmartDrive, cease use of the device and contact Permobil [SmartDrive] / Max Mobility for assistance.



**The power assist driving can ALWAYS be deactivated by pressing and releasing a SwitchControl button. If you have a PushTracker / E2, pressing and releasing the Power Assist button will also deactivate the motor if driving by turning power assist OFF / wirelessly disconnecting it from the SmartDrive.**

**Serious care should always be taken on hills, inclines, ramps, in crowded / confined areas, etc.**

**Tapping force does not need to be excessive or “hard”. Gentle, stiff wrist taps at a reasonable speed (i.e. one half (0.5) second between taps) is sufficient.**

**While the PushTracker / E2 is designed to sense the tap / impact of your PushTracker / E2 wearing hand, other movements done with your hands while the motor is driving can possibly cause activation / deactivation. Whenever power assist is being provided, it is recommended to position your hands over your handrims for steering, then a stiff wrist tap then brake when desired to deactivate and slow down.**

**Always turn OFF the power assist [via SwitchControl and PushTracker / E2] when parked, before transferring in or out of your wheelchair, taking the PushTracker / E2 off of your wrist and / or SmartDrive off of your chair to prevent accidental activation.**

### **Momentary Control Mode [for SwitchControl]**

Momentary is the default control mode for power assist when activating the motor driving with the SwitchControl button(s). With SwitchControl power assist ON in this mode, the SmartDrive will start driving the motor by ramping up its speed [at the Acceleration rate set] to the configured SwitchControl Max Speed only while one of the buttons is being held. When the held button is released, or both of the buttons [if present] are pressed, the driving will deactivate. Remember that upon deactivation it does not put the device in the power assist OFF / standby state [see “Power Assist Ready” section].

It should be noted that the button must be pressed and held for longer than (1) second before the drive unit motor will start to drive. If it is released before this amount of time has lapsed, it will be registered as a button press only and cycle power assist OFF from the SwitchControl / put it in the standby state.

While driving, steering is still done by pinching on the handrims of the wheelchair. If the speed seems to increase at a rate or can get to a speed that is faster than you feel comfortable, change the Acceleration and SwitchControl Max Speed to values that are just right for you and your wheelchair skills.

In order to change the SwitchControl Mode, the SwitchControl Max Speed and / or Acceleration without the PushTracker E2, it will require the use of the PushTracker mobile (smartphone) app on a phone / device.

### **Latched Control Mode [for SwitchControl]**

Latched mode is another option for power assist activation with the SwitchControl button(s). With SwitchControl power assist ON in this mode, the SmartDrive will start driving the motor by ramping up its speed [at the Acceleration rate set] to the configured SwitchControl Max Speed while one of the buttons is being held. When the held button is released, the SmartDrive will remain driving / coast at the current speed when the button was released. When one of the buttons is pressed and released again, or both of the buttons [if present] are pressed, the driving will deactivate. Remember that upon deactivation it does not put the device in the power assist OFF / standby state [see “Power Assist Ready” section].

It should be noted that the button must be pressed and held for longer than (1) second before it is registered as a button hold, at which point the drive unit motor will start to drive. If it is released before this amount of time has lapsed, it will be registered as a button press only and deactivate the power assist [if driving] or cycle power assist OFF from the SwitchControl / put it in the standby state.

While driving, steering is still done by pinching on the handrims of the wheelchair. If the speed seems to increase at a rate or can get to a speed that is faster than you feel comfortable, change the Acceleration and SwitchControl Max Speed to values that are just right for you and your wheelchair skills.

In order to change the SwitchControl Mode, the SwitchControl Max Speed and / or Acceleration without the PushTracker E2, it will require the use of the PushTracker mobile (smartphone) app on a phone / device.

### MX2+ Control Mode *[if used with PushTracker / E2]*

MX2+ is the default control mode for power assist when used with the PushTracker / E2 [see the separate **PushTracker / E2 User's Manual** provided for details on changing modes]. This amazing operation allows you to push around as much as you want, and then quickly and easily get the power that you need for all situations. Operation of this mode is ideal for weaker pushers as it allows for motor activation at the tap of the wrist. Additionally, this and all control modes can also always be used with SwitchControl.

To activate power assist to drive in this mode, with the power assist ON and wirelessly connected, performing a DOUBLE tap by the PushTracker / E2 worn arm will begin the motor. This will begin driving the wheelchair forward at the Acceleration rate set in the PushTracker / E2 [see **PushTracker / E2 User's Manual**]. While the speed is ramping up, performing another SINGLE tap will hold the current speed. So the SmartDrive will continue to drive, or coast, at the speed that is reached when the SINGLE tap is performed. This is called setting your coast speed. The power assist will continue to drive at this coast speed until a DOUBLE tap is performed / sensed or the power assist is turned OFF.

While this mode is able to start driving you from rest, it also can be activated if you are already moving where it will quickly catch up to your speed and begin to accelerate from there. This means that you are able to give your wheelchair a quick push to get going, then DOUBLE tapping the PushTracker / E2 will immediately activate the SmartDrive to start ramping from the speed that you were able to reach from the push, until a SINGLE tap is performed to cruise or another DOUBLE tap is done to deactivate the motor.

This all might sound complicated, but it is actually very simple. Any DOUBLE tap will either activate and start ramping up the motor speed or deactivate it [if already driving], and a SINGLE tap while the motor is driving will set your coast speed [latch your current speed].

Steering is still done by pinching on the handrims of the wheelchair. The motor will be able to ramp up its speed at the Acceleration set in the PushTracker / E2, all the way up to the Max Speed that is also set in the PushTracker / E2 [see the separate **PushTracker / E2 User's Manual** for changing these]. So if the speed seems to increase at a rate or can get to a speed that is faster than you feel comfortable, change the Acceleration and Max Speeds to values that are just right for you and your wheelchair skills.

As always, quickly pressing and releasing a SwitchControl button [even in standby] will deactivate the motor [if driving]. Another less preferred option is pressing the Power Assist button on the PushTracker / E2 which will also deactivate the driving and turn power assist OFF.

If you are coasting [motor is already driving at a set speed from a SINGLE tap] and you wish to increase coast speed, there are a couple ways to do this. If you are able to perform a push to get going at the desired faster coast speed, then performing a SINGLE tap will cause the motor to latch and set the coast speed to your current speed. The second way that doesn't involve a push is to perform a DOUBLE tap to first deactivate the motor, then wait at least one (1) second to perform another DOUBLE tap to start the motor to ramp its speed again.

If any malfunctions or activation / deactivation / acceleration issues are experienced with the SmartDrive, cease use of the device and contact Permobil [SmartDrive] / Max Mobility for assistance.



**Anytime the motor is already driving and a SINGLE tap is performed, the coast speed will be set to your current speed. If you are going down a decline causing you to descend at a speed faster than the set coast speed [motor is free-wheeling], a SINGLE tap will set the coast speed to your current faster speed. Consider switching the power assist OFF [via SwitchControl and PushTracker / E2] before descending down a slope to prevent this.**

**The acceleration of the SmartDrive could possibly cause the wheelchair to tip-over backwards, causing injury. It is recommended that the user lean slightly forward to prevent this tipping and to set the Acceleration to a rate that doesn't make this possible.**

### MX2 Control Mode *[if used with PushTracker / E2]*

MX2 mode [formerly known as "Normal Operation" mode] is another option for the power assist control mode that can be changed to [see the separate **PushTracker / E2 User's Manual** provided for details on changing modes]. In this mode, with the power assist ON and ready the SmartDrive is able to recognize when you have performed a push on the wheelchair. In turn, the device activates the omni-drive wheel, and an assistive drive power is provided, propelling you at a speed equal to that which was attained by the push. The SmartDrive is able to recognize each individual's push, so no alterations to one's propulsion technique is needed. This is useful for everyday use as it can significantly reduce the number of pushes that have to be performed while also keeping you active.

MX2 is designed to continue to drive you until a SINGLE tap is performed by the PushTracker / E2 worn arm or the power assist is turned OFF to deactivate the motor [as described in in the PushTracker / E2 Power Assist Deactivation section] OR until another, faster push is performed. In this last case, the SmartDrive will speed up and begin to drive at this faster attained when you pushed harder. Once a push is performed and the motor is activated, position your hands over your handrims [and SwitchControl button(s)] to be prepared to turn off the motor when braking / deactivated power is desired.

Refer to the separate **PushTracker / E2 User's Manual** provided on how to change / limit the Max Speed that the SmartDrive is able to activate and drive.

If any malfunctions or push detection / braking / SwitchControl button / PushTracker / E2 issues are experienced with the SmartDrive, cease use of the device and contact Permobil [SmartDrive] / Max Mobility for assistance.



**The SmartDrive is able to recognize all types of pushes. Do not alter the way that you push for this could lead to injuries in the future.**

**Care should be taken when using on a decline in all control modes. Consider switching the power assist OFF [via SwitchControl and PushTracker / E2] before descending down a slope.**

**The acceleration of the SmartDrive could possibly cause the wheelchair to tip-over backwards, causing injury. It is recommended that the user lean slightly forward to prevent this tipping.**

### MX1 Control Mode *[if used with PushTracker / E2]*

MX1 mode [formerly known as “Beginner Mode”] is one of the other options for the power assist Control Mode that can be selected [see the separate **PushTracker / E2 User's Manual** provided]. In this mode, the deactivation means is the same as MX2 mode [see “MX2 Control Mode” and “PushTracker / E2 Power Assist Deactivation” sections], but you are also able to deactivate the power assist by braking on the handrims of the wheelchair. The SmartDrive recognizes the deceleration that the wheelchair experiences from the braking and turns the motor off. This mode can be used effectively indoors and to prefect the tapping motion needed by the PushTracker / E2 to deactivate the motor, upon which most likely is time to switch to either MX2 or MX2+ mode to get the most out of your SmartDrive in all environments encountered on a daily basis.



**Refer to and heed all warnings for MX2 control mode.**

### Anti-Rollback

The SmartDrive is equipped to provide rollback resistance whenever power assist is activated while the wheelchair is moving backwards. This is a safety feature that requires the wheelchair to be at rest to begin driving. Whenever the rollback resistance is not activated, the SmartDrive will roll backwards freely.



**As warned before, serious care should be taken on all hills, inclines, ramps, etc.**

**The rollback resistance may not be able to prevent the quick rolling back on especially steep slopes and / or for very heavy wheelchair users.**

**Anti-rollback is not a parking brake. Be sure to secure your wheelchair with brakes if stopping on a slope is desired.**

### Operating Conditions

The SmartDrive is designed for typical operating conditions encountered by a manual wheelchair user on a daily basis. Permobil [SmartDrive] / Max Mobility recommends restricting the use of this device to indoor and light outdoor use. All operating conditions set forth by one's wheelchair manufacturer should always be heeded, in addition to the avoidance of the following:

- Loose dirt, sand or gravel
- Standing water
- Icy surfaces
- Rough terrain
- Extreme slopes

The total weight of the SmartDrive assembly is 13.5 lbs (6.1 kg). This weight should be included in calculating the on-board weight of the wheelchair. The maximum allowable on-board weight outlined by one's wheelchair manufacturer should never be exceeded with the addition of the SmartDrive.

The best way to climb ramps and inclines is to go slow. On cross-slopes, activate the motor to begin driving, then brake with the uphill hand on the wheelchair handrim to go straight.

Also, rollers on the omni-drive wheel allow for pivoting of the wheelchair as they smoothly roll side-ways over surfaces. Care should be taken to make sure the SmartDrive doesn't get caught on things like curbs or small sidewalk cracks when you pivot. The attachment hardware is designed to fail first, so if you get the SmartDrive stuck, this can break the clamp / folding adaptor bar and leave you without power assist. Sometimes it is best to turn the SmartDrive off, negotiate the situation manually and then start using the assistive power again.

If any part of the SmartDrive is accidentally submerged or doused in water, the user should cease usage and allow 12 hours for it to air dry before attempting to use again. It is recommended to always store the SmartDrive and PushTracker / E2 indoors. If your device has been stored in extreme temperatures, allow time for it to warm up or cool down prior to use.

The operating temperature of the SmartDrive is between -25 °C and 50 °C

If any malfunctions or issues are experienced with the SmartDrive, cease use of the device and contact Permobil [SmartDrive] / Max Mobility for assistance.

## 4. Batteries



**Although the battery in the SmartDrive is very small and compact, it can store a large amount of power. Faulty handling or storage can damage the equipment, and in some cases result in shocking, burns, or fire.**

### Battery Information

The SmartDrive houses the rechargeable Lithium Iron Phosphate battery used to power the motor. The best in Lithium-Ion technology, these batteries offer a significantly longer cycle life and faster charging rate than standard lithium ion cells.

The display on the PushTracker / screen on the PushTracker E2 [see the **PushTracker / E2 User's Manual**] and blue LEDs on top of the SmartDrive are used to indicate the battery charge levels of both. All four (4) LEDs being illuminated on the SmartDrive indicate a full battery. As the charge of the battery decreases, so does the number of LEDs being lit. The SmartDrive will give a beep whenever the SmartDrive battery is below 15% and the motor is driving to let you know charging of the battery should be done as soon as possible to avoid running completely out.

See the separate **PushTracker / E2 User's Manual** provided for its low battery indication. Again, charging of this battery should be done as soon as possible to avoid running completely out.

It is encouraged to charge each battery every night to avoid running out of charge during daily use. The life of the batteries will not be deteriorated by charging when it is partially drained.

Make sure the charging receptacles are completely dry and free from debris [as the magnets and ports can attract some] before plugging in the charger, for this can cause a spark or short. Blow water out of the receptacle if you suspect there being water in it. It is also recommended to always cover the button / charger receptacle whenever either are not plugged into the SmartDrive.

Long-term storage of the batteries [more than 3 months] reduces its capacity through spontaneous discharge. Charge the battery to at least 75% before you store it long-term, and avoid storing the SmartDrive where the temperature is too high or with high humidity.



**Only use the provided charger to recharge the SmartDrive. Other chargers may damage your unit, or cause a fire. Also, always power off and never attempt to use the SmartDrive while charging.**

The battery charger is to be used indoors and in dry locations. Use an easily accessible outlet that is close to the SmartDrive that is to be charged.

Do not use or attempt to repair a damaged / defective charger. Contact Permobil [SmartDrive] / Max Mobility if a charger is damaged and do not dispose of in your household garbage.

The charging transformer box is intended to be laid flat during charging.

Only use the power supply cord provided with the charger. The charger is capable of operating at different voltages without adjustment.



## SmartDrive Battery Charging

To charge the SmartDrive, plug the battery charger cable into a wall outlet, at which point the green LED on the charger box will illuminate. Connect the magnetic charger connector to the powered off SmartDrive magnetic receptacle [moving the rubber plug to the side]. The magnets in the connectors will only allow the plug to connect in one direction. Once the unit is connected and charging, the LED on the charger will turn red. When the LED on the charger turns back to green, the SmartDrive is fully charged. Remove the connector from the SmartDrive and replace the rubber cap to protect the receptacle on the SmartDrive. The estimated charge time for a full recharge of the SmartDrive battery is approximately 3 hours.

See the separate **PushTracker / E2 User's Manual** provided for its charging instructions.



**Always store and charge the SmartDrive and PushTracker / E2 in a cool, dry area. Hot and damp environments can damage or short the unit, requiring a costly replacement.**

**Make sure the charging receptacles are completely dry before plugging in the charger, for this can cause a spark or short. Also, never attempt to use the PushTracker / E2 while charging.**



**Li-ion**

**Do not throw away the SmartDrive or PushTracker / E2. Please properly dispose of each by recycling at the end of its life or send it back to Permobil [SmartDrive] / Max Mobility.**



## Traveling and Shipping

Because the SmartDrive houses a Lithium-Ion battery, special considerations have to be taken when traveling on an airplane. The SmartDrive must be carried onto your plane and should be stored in the overhead bin. It is recommended that advanced arrangements be made with each airline operator and approval received prior to departure date. A "SmartDrive Airline Passenger / IATA Certificate" can be downloaded from the Permobil [SmartDrive] / Max Mobility website or provided upon request.

Use the provided foam stand for the SmartDrive to prevent movement and damage when transporting in a car. If riding in a cab, it is recommended to have the driver hand you the SmartDrive so that it doesn't get damaged from movement when placed in the trunk.

Also, special considerations need to be taken when shipping the SmartDrive due to the battery. Contact the shipping company being used for instructions on how to correctly package and label prior to shipping. Be sure to provide plenty of padding / protection for the SmartDrive to prevent damage during shipment.

## 5. Maintenance

### Inspection

Always inspect the SmartDrive, omni-drive wheel, PushTracker / E2, attachment hardware and SwitchControl button(s) for missing parts / damage prior to each use. Cease use and contact Permobil [SmartDrive] / Max Mobility or your mobility equipment dealer if you notice any of the following:

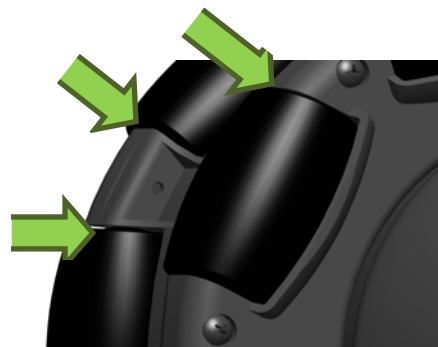
- Broken or cracked plastic
- Any of the rollers do not spin with little resistance, have flats worn in them or any other significant damage
- Significantly worn down rollers and / or damaged wheel plastic
- Ripping rubber on the PushTracker / E2
- Missing or loose screws
- Adaptive clamp has rotated downward [on rigid wheelchairs]
- Broken or fraying cables
- Magnetic receptacle or plug has collected metal shards
- Any abnormal motor activation / deactivation activity [during use]

### Cleaning

Cleaning of the SmartDrive can be done by wiping all of the parts down with a damp wash rag. This should be done at least once a month, or as needed.

### Roller Lubricating or Replacement

The omni-drive wheel contains 16 rubber rollers that may wear down, depending on driving conditions, after extensive use. These rollers are able to be replaced. Also, in snowy climates, salt may cause corrosion to the bearings on these rollers and affect their performance. Spraying lubrication on these bearings will increase their usable lives [see graphic to the right]. Contact your mobility equipment dealer or Permobil [SmartDrive] / Max Mobility for information on replacing / maintaining the rollers on your SmartDrive.



## Other Maintenance

Contact Permobil [SmartDrive] / Max Mobility or your mobility equipment dealer for any other maintenance or replacement that the device might need.

Download and connect to the App regularly to ensure your device is running the latest firmware, as features are added and improvements are made.

## Troubleshooting

It is strongly recommended to update the firmware on your device to the latest version via the App prior to any troubleshooting as your issue may have been resolved in later firmware releases.

Safeguards are designed into the SmartDrive and PushTracker / E2 for your safety and to prevent damage to the circuit board and battery from other part failures or atypical situations. Most of these log an Error code that can be viewed on the PushTracker / E2 [ERR: ### - see "About" screen of "Settings Descriptions" section in the separate **PushTracker / E2 User's Manual** provided]. Here is a list of these safeguards, how they are indicated and how to address them:

- [ERR: 007] Motor deactivation when driving accompanied by a single SmartDrive beep indicates a loss of wireless connection between the PushTracker / E2 and SmartDrive [see "Bluetooth™ Wireless Communication" section].
- [ERR: 005] No motor activation or motor deactivation when driving accompanied by a double SmartDrive beep indicates that the angle of the SmartDrive is outside its allowed operating range. If this repeats with the SmartDrive angled correctly [at approx. 45 degrees], the SmartDrive circuit board will have to be replaced as its gyro chip may be bad.
- [ERR: 002] Two (2) blinking SmartDrive LEDs indicate a bad motor. The motor will have to be replaced before it is operable again.
- [ERR: 003] Three (3) blinking SmartDrive LEDs indicate a current spike. The SmartDrive will need to be turned off and then on to use again.
- [ERR: 004] Four (4) blinking SmartDrive LEDs indicate overheating inside the unit. Turn the SmartDrive off and let it cool before using again.
- No LEDs or response on the SmartDrive / PushTracker / E2 indicate a dead battery. Attempt to recharge [as described in the "SmartDrive Battery Charging" section and separate **PushTracker / E2 User's Manual** provided].

Contact Permobil [SmartDrive] / Max Mobility or your mobility equipment dealer for any other issues that you experience with the device.

## 6. Warranty

Permobil [SmartDrive] / Max Mobility offers a two (2) year warranty against manufacturing defects. Permobil [SmartDrive] / Max Mobility's obligation under this warranty shall be limited to repairing or providing replacement of part(s), which are found to be defective. Any part(s) of the system replaced by us at our discretion shall be with a functionally operative part.

This warranty may be voided if: 1) the product is not used according to instructions given in this instruction manual, 2) defects were caused by improper use as determined by the company personnel, 3) modification or alteration of any nature is made in the electrical circuitry or physical construction, or 4) defects are due to cause beyond control like lightning, abnormal voltage or while in transit at the purchaser's place of business.

Permobil [SmartDrive] / Max Mobility is not responsible for any damage to one's wheelchair caused by the attachment or operation of the SmartDrive.

## 7. European Commission (EC) Authorized Representative



Advena Ltd.  
Tower Business Center  
2nd Floor, Tower St.  
Swatar BKR 4013  
Malta

# SmartDrive MX2+ Training Certification

**It is important for your safety and the safety of those around you that you are properly trained to use the SmartDrive. Please take this training seriously and be sure to fill-in all information. If you do not understand something, just ask.**

SmartDrives are shipped in Momentary Control Mode [for SwitchControl] and MX2+ Control Mode [if used with PushTracker / E2] with moderate Max Speed and Acceleration settings. This allows for familiarity and the different deactivation to be practiced prior to extensive use.

To quickly change the SmartDrive settings and get the most out of your SmartDrive, download the PushTracker mobile (smartphone) app in the Apple or Google Play Store. There are also instructional videos available that are very helpful in learning all about your SmartDrive [use the Closed-Caption for subtitles in other languages].

1) Read ALL provided manuals / instructions / guides. Please heed all the warnings and cautions in yellow, as this information is important for your safety. Pay close attention to situations where it is safest and necessary to turn the SmartDrive power assist OFF [via SwitchControl and PushTracker / E2].

2) Demonstrate each of the skills to your dealer and check them off once you are confident with each skill:

- ☐ Making sure power assist is OFF, install the PushTracker / E2 onto your wrist [if used]. **Understanding that power assist should be OFF whenever handling the SmartDrive [ or transferring into / out of our chair],** switch the SmartDrive on and install it onto your wheelchair.
- ☐ Use the SwitchControl button(s) to turn power assist ON, noting the SwitchControl LED flashing, then activate the motor by pressing and holding. Next deactivate the driving, then brake to stop the wheelchair. Finally turn power assist OFF again with the SwitchControl. Repeat this, activating and driving multiple times before turning power assist OFF, always noting the LED indication
- ☐ Turn the power assist ON [via SwitchControl and PushTracker / E2] and allow for it to wirelessly connect to the SmartDrive.  
[If used with PushTracker / E2]
  - ☐ Before doing anything, practice SINGLE tapping your hand against your handrims with a stiff wrist. You will see the PushTracker / E2 Indication go red if it's a good tap. Also practice DOUBLE taps. Continue to practice these taps until you get it every time.
  - ☐ Activate the motor with a DOUBLE tap, SINGLE tap to set a slow coast speed and finally DOUBLE tap then brake to stop.
  - ☐ Activate the motor again with a DOUBLE tap, this time setting a faster coast speed, and then DOUBLE tap brake to stop.
  - ☐ Once you have perfected the tapping needed by the PushTracker / E2 to activate / set the coast speed / deactivate the motor, try to activate the motor, set a comfortable coast speed, turn in a figure 8, and then tap brake stop.
  - ☐ With PushTracker / E2 power assist ON, also turn SwitchControl power assist ON, noting the change in flashing indication. Now use the different controls simultaneously / in combination to understand how you might use each or both for different environments, situations, etc.
- ☐ If possible, find a LONG / FLAT / OPEN space to allow the SmartDrive to ramp up to Maximum Speed. Adjust the Maximum Speed or Acceleration to values that are comfortable in that and all predicted use environments.

**If all skills are not able to be performed by the client, try the MX2 [or MX1] and / or Latched control modes and repeat this training.**

3) Sign this form below and have the provider keep with the client's records.

SmartDrive Serial Number: \_\_\_\_\_ Date: \_\_\_\_\_

## Client

I certify that I have read all the User's Manuals / labeling and demonstrated the skills checked above. I accept that the SmartDrive can be dangerous if not used carefully and I take responsibility for making responsible driving choices while using it. I understand there are many situations where the power assist should be turned OFF to prevent it from unintentionally powering forward, including: downhill slopes, up or down curbs, climbing large sidewalk cracks, while in confined spaces, before handling either the PushTracker / E2 or SmartDrive, whenever parked and / or transferring into / out of my wheelchair.

Name: \_\_\_\_\_ Signature: \_\_\_\_\_

## Provider

I have observed the client performing the skills checked above.

Name: \_\_\_\_\_ Signature: \_\_\_\_\_