

Power Wheelchair 3 Series vs 5 Series

What are the key clinical differences?

Ensuring you don't over or under prescribe equipment can be difficult. Power wheelchairs (PWCs) can often be difficult to ensure appropriate prescription, especially as many of the key features can be hidden under the shroud or within the electronics. Let's break it down and have a closer look comparing the Permobil 3 Series and 5 Series PWCs in both front and mid wheel drive configurations.



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3 Series vs 5 Series



More Power

More power does not always mean better. With great power comes great responsibility; and this is also true when prescribing PWCs. A key difference between the 3 Series and 5 Series PWCs is the motor size. The 3 Series chairs have a 350W motor, whilst the 5 Series chairs have a 500W motor. The 5 Series PWCs are more clinically appropriate for clients who are navigating the outdoors on a regular basis, need to climb a variety of and/or navigate a hilly environment. The 500W motors compared to the 350W motors of the 3 Series, means that the 500W motor tolerates much more and works harder – it will navigate soft ground and hilly environments easier and for longer compared to the 350W motor. Not only does the 5 Series have more power; but it has increased torque. Torque is the rotational force which is created by the gear box and turns the wheels. A motor with increased torque is going to contribute towards a smoother ride and an increased ease of climbing obstacles at a slower speed. This will have a positive impact on the client as they will be able to access more difficult

terrains, but they will also experience less movement in their seated position when going over obstacles. This is important to consider for clients who may need to mobilise with alternative controls, have difficulties managing fatigue, posture and pain; requiring them to maintain the same position. For some individuals, millimeters matter to maximise function.

Having said that, the 3 Series PWCs are powered by a 350W motor. This motor provides ample power and torque for clients to navigate within their home and urban environments on a day-to-day basis. The 350W motor and associated torque provides ample power to navigate footpaths, gutters, thresholds and urban environments.

If the client requires the 5 Series with the 500W motors, it also is supplied standard with the larger Group 24 batteries (85Ah). This ensures that they have the battery power to access the environment for the time that they need it.

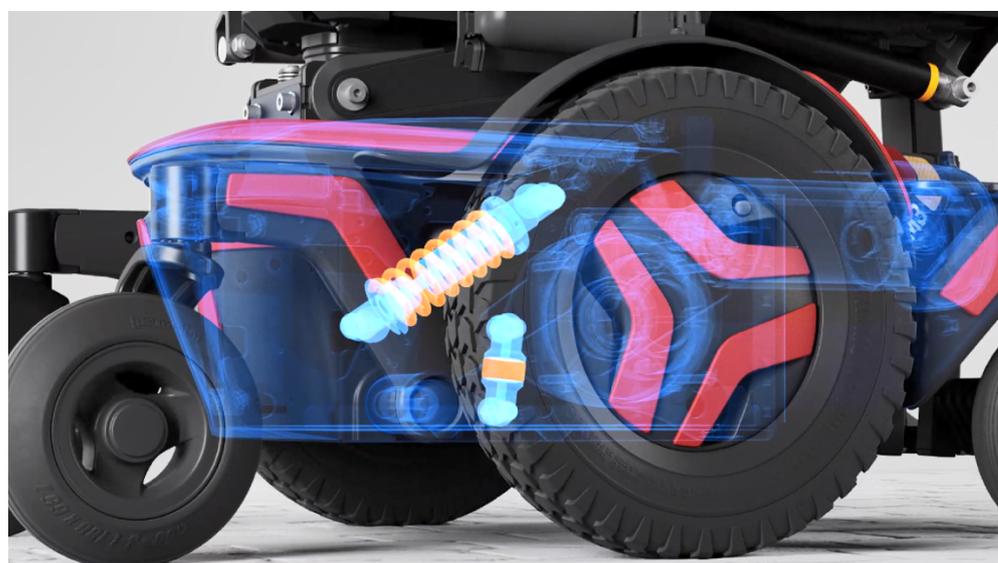
Ride Comfort and Stability

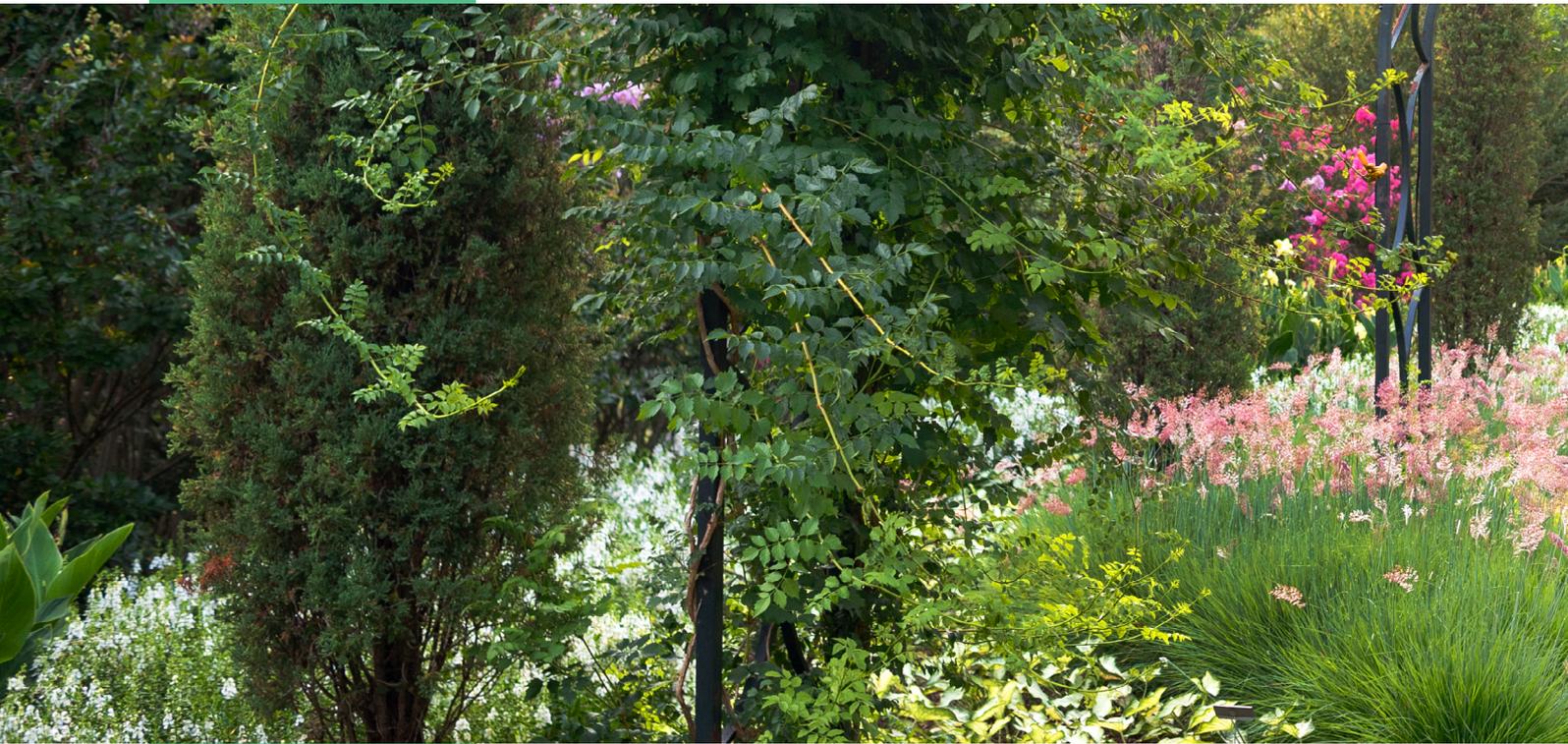
When talking about power wheelchairs, suspension is a term which we use when comparing chairs, however not all suspension is created equal. Prescribing a wheelchair with a high level of suspension can have a positive impact on a client's health and wellbeing. Good suspension can decrease the risk and experience of tone, pain and fatigue, as there is less vibration and movement experienced by the client when seated (Chenier & Aissaoui, 2014). A suspension system can differ greatly between chairs and is made up of the tyres, tyre air, springs, shock absorbers and linkages. Together this system absorbs the vibration resulting in stability and improved ride comfort for the client. The final element of suspension is road holding which relates to how well the wheels maintain contact with the ground. This is important for the client as not only do keeping the wheels on the ground contribute to a stable and comfortable chair, but it contributes to improved climbing abilities and thus increasing environmental access.

ComfortRide



FlexLink suspension





M3 vs M5



The M3's suspension is made up of a linear spring and a second rubber polymer called the FlexLink. This dual suspension dampens the vibration felt by the client when the front castors and then drive wheel pass over obstacles. It provides a good level of vibration dampening for clients in urban environments and for those who do not experience pain and fatigue. The M5 uses the same suspension system as the M3, but also has an additional linkage in the form of a linear spring at the drive wheel. This helps to create independent movement of the drive wheel, resulting in an even smoother, stable and comfortable ride. This is especially relevant for clients who report or experience pain, fatigue, or experience difficulties when they are 'bounced' out of their seated position from the vibration. In addition, the castors and drive wheels all move independently of each other, which contribute further to overall increased performance and ride comfort, particularly when climbing, as the independent castor arms help to minimise the chance of the drive wheel losing contact with the ground. Suspension and ride comfort can also be improved further on the M5, as it can be prescribed with the aggressive tyre package which enables the chair to be prescribed with 8" castors. The larger castors contribute to a smoother ride and increased climbing ability.



F3 vs F5



The overall design of a front wheel drive PWC has a positive impact on a client being able to access their environment compared to a mid wheel drive PWC as the drive wheel is at the front of the chair. This means that the larger drive wheel is the wheel which is first to encounter and climb over obstacles. As it is larger than the castors of a mid wheel drive chair, it can climb over larger obstacles. As the motor connects to the drive wheels of PWCs, this means that the front wheel drive chair is pulling instead of ploughing through terrains. This has a positive impact on the client sitting in the chair. They will experience less vibration, more stability and overall improved ride comfort.

Whilst the F3 provides a high level of suspension and ride comfort which much of the population would find ideal, the F5 provides a very high level of ride comfort as oil dampening technology is used within the piston of the suspension. The F3 uses gas within the piston of the suspension. The oil dampening technology helps to control the extension phase of the spring at a higher level compared to the gas of the F3. This is where the oil absorbs the energy of the spring which lessens the intensity of the “bounce up”. This improves the ride quality and movement experienced by the client sitting in the chair.

Ride Position



Due to the combination of additional suspension, independent castor arm articulation and drive wheel movement, 500W motors and increased torque; the 5 Series PWCs are an ideal prescription for clients who need to maintain their ride position when using alternative drive controls or switches. The 5 series PWCs should be considered for clients who need to maintain their position to use alternative controls or to maintain their function. The higher level of suspension, vibration dampening, and ease of climbing helps the client maintain their seated position as there is less movement at the seat. Finally, do not forget the impact that the position of the drive wheel can have on the clients overall ride comfort, stability and access.

Power Seat Functions

Both the 3 Series and 5 Series PWCs have comparable power seat function capabilities, however there is a difference in the ActiveHeight™. The 3 Series provides 12" of vertical height, whilst the 5 Series provides 14". The additional 2" of vertical height can have a significant functional impact for clients. When considering prescribing an additional 2" of vertical reach, ensure that you are completing functional assessments and even perhaps the modified functional reach test (MFRT). Consider the additional 2" and the increased independence in accessing the environment, maintaining shoulder integrity, assisting to minimise pain and increase social participation.

On both the 3 Series and 5 Series when ActiveHeight (elevate) is used, the seat moves back (3.5" at full elevation) which improves the overall stability of the chair

and allows for the chair to be driven without suspension lockout. This means that the client is still able to drive with suspension and independent castor arm and wheel movement.

The F3 and F5 differ only in the amount of ActiveReach™, with the F3 offering 30degrees whilst the F5 offers 45degrees. The M Series offers 20degrees of ActiveReach. ActiveReach uses a combination of both anterior tilt, elevation, leg elevation and recline. This enables the client to have the best functional position, whilst maintaining their position.



Prescribing Considerations

Consider the 3 Series first unless:

- The individual lives or accesses hilly terrain on a regular basis
- The individual accesses terrains which are not level
- The individual needs an extremely stable ride due to postural needs or alternative drive controls
- The individual requires a high level of pain, fatigue, and postural management, requiring a high level of suspension needs
- The individual requires an additional 2" of functional reach or 15 additional degrees of forward reach

If you are unsure and want to discuss the clinical applications further, reach out to one of the Clinical Services Team members via our email at education.au@permobil.com or education.nz@permobil.com



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Tilly Brook

MOccThy (Hons) (OT)

Clinical Educator
Permobil APAC

Tilly Brook graduated from the University of Adelaide in 2008 with a Bachelor of Health Science followed by a Masters of Occupational Therapy (Hons) in 2010 from the University of Sydney. Tilly worked within rehabilitation, working primarily with adults with a brain injury until 2015 when she moved to Singapore. In Singapore, she worked with children and adults at the Cerebral Palsy Alliance School (CPAS). In 2017 Tilly's clinical knowledge continued as she worked with Mobility Solutions in Auckland, New Zealand. On her return to Australia, Tilly assisted in the development of the Clinical Hub Team at Sunrise Medical where her passion and experience for mentoring and educating therapists grew. Tilly Joined Permobil in January 2022 and is driven to grow therapists, enabling them to be the best therapist they can be.

Permobil Australia
1300 845 483
education.au@permobil.com
www.permobil.com/en-au

Permobil New Zealand
0800 115 222
education.nz@permobil.com
www.permobil.com/en-nz
