By: Rudi Cheow / Last Updated: 25 November 2021

HOME CHARGING GUIDE FOR A TESLA MODEL 3 (AUSTRALIA)

1) INTRODUCTION

Disclaimer: *I am not a qualified electrician, and this guide should be regarded as a layman's compilation of the various discussions on charging solutions. If you follow any advice given here, you do so at your own risk.*

I wrote this guide as a resource for everyone approaching Model 3 ownership to address any questions/concerns regarding the options available for charging their car at home in Australia.

This guide only applies to the following scenarios:

1) Charging using main equipment available directly from Tesla Australia. I do not cover any third-party charging solutions (of which there are plenty on the market).
2) Owners without solar or who have no interest in integrating their solar array in such a way that the power going into the car is partially/fully supplied by the sun. This guide makes no mention of solar power nor any related equipment.
3) Owners who have their own property in which they can freely make electrical modifications. I provide no guidance for those who live in apartments or restricted rental properties etc.

2) FUNDAMENTALS: KILOWATTS

kW (kilowatt) is a measure of power (and for our purposes, how much electricity is *flowing*, or the rate/speed at which your car's battery is charged). For our purposes, this number can also be expressed in amps ("A"); just note that amps usually only denote the current flowing on a single phase of electricity – for three-phase installations, the actual output is tripled vs a single-phase installation (more on phases later).

kWh (kilowatt-hour) is a measure of energy storage capacity (i.e. how large the "petrol tank" is). Your car comes with a battery capacity that is measured in kWh (the Model 3 SR+/RWD has a 54kWh or 62kWh battery, while the Dual Motor Long Range and Performance models have a 75kWh or 82kWh battery).

The two measurements look similar but are fundamentally very different things.

The relationship between kW and kWh is simple: if your battery has a capacity of 50kWh and is completely empty, it will take one hour to fill it to 100% if you charge at 50kW, or ten hours to fill it to 100% if you charge at 5kW.

The table below roughly describes what the kW rate means in typical real-world home-charging situations with combined city/highway usage in mild weather:

Charge Rate *(assuming nominal AUS/NZ 230v)*	**KM Range Added per Hour**	**Time to Charge** *SR+/RWD 0%-100%*	**Time to Charge** *SR+/RWD 20%-80%*	**Time to Charge** *Dual Motor LR/P 0%-100%*	**Time to Charge** *Dual Motor LR/P 20%-80%*	**Charge Option**
2.3kW *10A Single-Phase*	15km/h	23½-27 hours	14-16 hours	32½-36 hours	19½-21½ hours	A
3.45kW *15A Single-Phase*	23km/h	15½-18 hours	9½-11 hours	21½-24 hours	13-14½ hours	C
7.36kW *32A Single-Phase*	50km/h	7-8½ hours	4½-5 hours	10-11½ hours	6-7 hours	D,E
11kW *16A Three-Phase*	75km/h	5-6 hours	3-3½ hours	6½-7½ hours	4-4½ hours	E

3) FUNDAMENTALS: CURRENT

The Model 3 runs on direct current (DC) electricity. Your house (and the national electricity grid) runs on alternating current (AC) electricity.

When charging your car, AC needs to be converted to DC so that it can get into the battery.

When you charge using a DC charger (e.g. a Tesla Supercharger), that AC>DC conversion is done on-site using huge and expensive equipment, which allows a very high current (some DC chargers offer up to 350kW) to be sent to the car directly as DC. The car accepts the large DC current and just feeds it as-is straight into the battery (this is why charging at a DC charger is so fast). The exact charge rate will fluctuate as you charge (depending on a variety of factors), but in general will always be substantially faster than any home charging solution.

When you charge at home, you supply the car with AC power, and the on-board charger built into the car converts that AC to DC before feeding the DC into the battery. This charger is relatively small, and in the case of the Model 3, can convert AC to DC at a max rate of 11kW (75km/hour). So even if you were able to supply a very large AC current to the car, the charge rate is capped by the max conversion rate of the internal charger.

4) FUNDAMENTALS: MODEL 3 CHARGING PORT

The subject of charging ports and standards can be confusing, but all you need to know is that the Model 3 is equipped with a charging port known as **CCS2**:

The CCS2 port is a hybrid port that allows you to plug in two different types of charging plugs into it:

The plug on the left is a **Combo 2** connector, and supplies DC current to the car (e.g. from a Tesla Supercharger).

The plug on the right is a **Type 2** connector, and supplies AC current to the car. When you charge the car at home, you will be using this connector.

5) FUNDAMENTALS: SINGLE-PHASE vs THREE-PHASE

Electricity supply into your property in Australia is either delivered as single-phase or three-phase. Single-phase means that you have one line of mains power coming off the street into your home, and three-phase means you have three lines.

Most houses in Australia are single-phase, but if you want to verify which one you have, the easiest way is to locate your main switchbox and see what type of main breaker switch you have:

Single-Phase

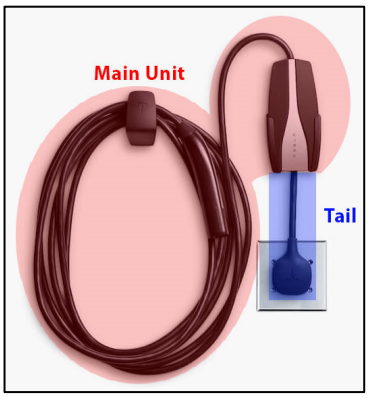
Three-Phase

If your main switch is just a single narrow one, you have single-phase power. If your main switch looks like three individual switches joined with a bar, you have three-phase power. Knowing which supply your property has is important for assessing what charging options/speeds are available to you.

Note that if necessary, it is usually possible to upgrade your house from single-phase to three-phase (usually costs a few thousand dollars) – consult your electrician if you want to consider this option. It may be required in situations where you have devices with a high and continuous current draw (e.g. swimming pool pumps or central A/C units) – EV charging can add considerable load to your electricity supply in these situations and bring a single-phase system to its knees.

6) THE UNIVERSAL MOBILE CONNECTOR (UMC)

The equipment that comes included with your car is called the "Universal Mobile Connector" (commonly referred to as the **UMC**). The UMC consists of two separate components:



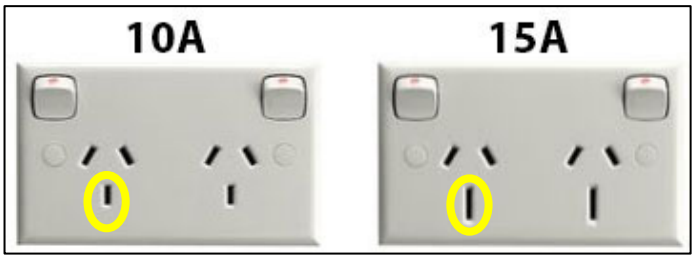
1) The **main unit** (the main power brick which comes with a permanently-attached charging cable that terminates in a Type 2 connector).

2) The **tail** (the cable/piece which connects the main power brick to your household electricity supply). This is modular and can be disconnected from the main unit (similar to a laptop charger). All UMC tails have internal circuitry which communicate the maximum charge rate to the main unit, thus ensuring that the UMC will never try to draw current beyond what that tail and the power socket is rated to provide.

In Australia, the UMC comes supplied with two separate tails: 10A and 15A.

The 10A tail plugs into a standard Australian household power socket. These are the standard sockets you will find all over your house. This tail allows the UMC to draw a max current of 10A (charge rate of 15km/h).

The 15A tail plugs into a 15A Australian power socket. These are not very common, but you may already have one in your house (typically in outdoor/garage/patio locations). This tail allows the UMC to draw a current of 15A (charge rate of 23km/h).



The 10A and 15A plugs look very similar, but observe how the earth (middle) pin on the 15A socket is taller. This design means that you can insert a 10A plug into a 15A socket (and it will work just fine), but you cannot insert a 15A plug into a 10A socket (due to the risk of the device drawing more current than the socket is rated to supply).

Key point: While Tesla only supply 10A and 15A tails with the UMC, the UMC itself is capable of actually charging your car at 32A (50km/h) if you have the right supporting equipment - this is **much** faster. "Upgrading" the UMC to charge at 32A is therefore a very popular option for home charging (and in my opinion is the best overall option for balancing cost and charge speed). More details on this can be found further in this guide (see Option D in Section 8).

Finally, note that the UMC is a single-phase device – it only uses one phase of electricity, even if it is plugged into a three-phase socket (this is not an issue for most people).

The UMC is a safe and reliable piece of equipment, and can be used as your daily charging solution for many years. It is also portable, allowing you to take it along with you on long trips etc.

7) THE WALL CONNECTOR

On their online store, Tesla sell charging equipment that is designed to be permanently installed in your home. This device used to be called the "High Power Wall Connector" (or HPWC), but has now been renamed simply to "Wall Connector" *(side note: when Tesla talk about "destination chargers" available at points of interest like hotels, restaurants and tourist destinations, these units are usually Wall Connectors)*.

The Wall Connector is compatible with both single-phase and three-phase electricity supply, can be configured to output a wide range of charge rates (depending on how it is installed).

In Australia, the Wall Connector is usually installed to supply either 7.36kW (50km/h) for single-phase properties or 11kW (75km/h) for three-phase properties.

The Wall Connector needs to be installed by an electrician, and the installation costs can vary from a few hundred up to a few thousand dollars (depending on the complexity of your circumstances). Typically however, installation costs range between $350-$1,200 (Tesla-approved installers will generally cost more than your local neighbourhood electrician).

The Wall Connector terminates in a Type 2 connector.

It is not meant to be portable, and as such it is not meant for travel.

8) CHARGING OPTIONS: SLOWEST & CHEAPEST to FASTEST & MOST EXPENSIVE

So now that I've given you the foundations you need to understand, how should you charge your car?

The answer depends on a variety of factors:

- Your budget
- The charge rate you need (e.g. if you do a long daily commute, you will probably need a faster charge rate)
- Your physical electrical supply (including how far your parking spot is from your switchboard)
- Personal preferences on aesthetics, portability, redundancy etc

I cannot tell you which is the best for your circumstances, but what I will do is break down all the common options available so that you can make an informed choice.

OPTION A: UMC WITH 10A TAIL

Typical Installation Cost: None
Charge Rate: 2.3kW / 15km/h

Simply use the UMC with the included 10A tail on any household socket. The charge rate is relatively slow, but for many people, it is more than enough for their typical daily needs (and if they ever find themselves in situations where the charge is not fast enough, they will simply visit a faster public charger to do a quick top-up).

OPTION B: UMC WITH 15A TAIL INSERTED INTO 10A SOCKET USING 10A>15A ADAPTOR

Typical Installation Cost: $85
Charge Rate: 2.3kW / 15km/h

WARNING: *This option is included for the sake of completeness because it is mentioned on old forum posts and comments etc, but is now redundant and no longer has any practical benefit. For years, the 10A tail for the UMC was capped at delivering only 8A, and this option was a popular method people used to charge at a full 10A from a regular household socket (leading to a significant 25% increase in charge speed). However, as of August 2021, this option is now redundant because a Model 3 software update now allows the UMC 10A tail to charge at a full 10A. Therefore, there is no longer a reasonable situation where this option should be considered.*

You can buy adaptors which will allow you to convert a 10A socket into a 15A socket.

With this method, you insert the adaptor into your 10A power socket, and then use the 15A UMC tail with the adaptor. This "tricks" the UMC into thinking you're using a 15A socket instead of a 10A socket.

One downside to using this method is that the adaptor was never designed to deliver a continuous supply of high current for long periods of time (which is what happens when you charge your car). Thus, you run into risk of overheating the adaptor and using it beyond what it was designed to do.

Also, if you choose to go down this route, you should limit the charge rate in your car's settings to 10A to make sure the car does not draw more current than the power socket is legally rated to supply (see Point 1 in Section 9 below). Doing this still gives you a 25% speed benefit over using the basic 10A tail (which supplies 8A max).

If you do not limit the charge rate in your car to 10A, then the car will attempt to draw 12A from the UMC (the 15A tail supplies 12A max). You do this at your own risk as it goes against the electrical code. In many cases, attempting to draw 12A will cause the adaptor/switchboard to trip, but you will find reports online from people who are able to successfully and continuously draw 12A using this option. I do not recommend you copy them – in my opinion, the extra 20% is not worth the risk.

OPTION C: UMC WITH 15A TAIL

Typical Installation Cost: $80-$250 / None
Charge Rate: 3.45kW / 23km/h

Simply use the UMC with the included 15A tail on a 15A household socket.

If you already have a 15A power socket near where you park your car, then this is the no-brainer option because it requires zero installation cost. Alternatively, you can get an electrician to install a 15A socket near your car for a low cost.

This option offers you a significant 50% charge rate increase over using the basic 10A tail.

OPTION D: UMC WITH 32A TAIL

Typical Installation Cost: $400-$800 (including tail)
Charge Rate: 7.36kW / 50km/h

This is my preferred option and, in my view, represents the best balance between cost and charge speed.

As mentioned before, while the UMC comes supplied with 10A and 15A tails, the UMC is actually internally capable of charging your car at 32A. This is a **very** significant upgrade to charging speed and should take care of the needs of almost any Tesla owner (it allows you to fully charge any Model 3 overnight).

In order to take advantage of 32A charging with the UMC, you need two things:

1) **A 32A power socket near where you park your car**

Single-Phase 3-Pin **Three-Phase 5-Pin**

Most homes will not have this socket, so you will probably need to get an electrician to install it. The cost for this typically ranges from $250-$600.

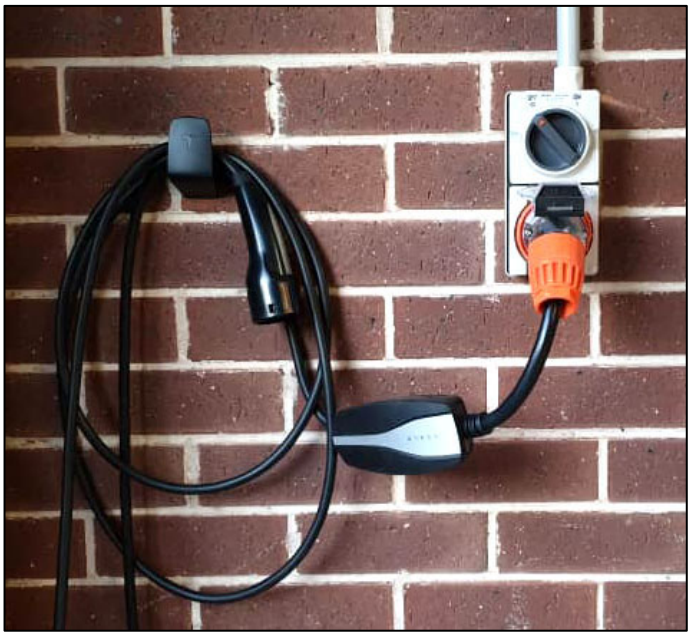
The general advice is to install the correct socket depending on whether you have single-phase (3-pin) or three-phase (5-pin) electricity, but some people elect to install a 5-pin socket even if they only have single-phase electricity (with only one phase being wired to the socket). Whether you do this is up to you and whether your electrician will do it (some won't, citing regulations etc – there is debate on the forums on the legality of doing this).

2) A 32A tail for the UMC

Tesla Australia do not sell a 32A tail for the UMC, but a number of aftermarket providers do. They manufacture it by sourcing an official Tesla 32A tail from another market and replacing the plug with one that fits Australian 32A sockets.

A popular local supplier for the tail is EVSE:
https://evse.com.au/product/tesla-gen-2-mobile-connector-adaptor-32-amp-7-kw-3-pin/ *(3-pin tail / single-phase)*
https://evse.com.au/product/tesla-gen-2-mobile-connector-adapter-32-amp-7-kw-umc/ *(5-pin tail / three-phase)*
Note: EVSE are not the only supplier for aftermarket tails – Google will help you find others. If ordering from EVSE, use the discount code ***EVSE10*** *to get 10% off your order.*

Once you've installed the socket and have purchased the tail, your setup will look something like this:



An additional benefit of using this option is that you can use your 32A tail and UMC with public 32A sockets dotted all around Australia (typically at fairgrounds, camping sites and industrial locations – note however that the vast majority of these public locations will use 32A three-phase/5-pin sockets, and the 3-pin tail does not work with the 5-pin socket).

OPTION E: WALL CONNECTOR

Typical Installation Cost: $1,000-$2,000 (including Wall Connector)
Charge Rate: 7.36kW / 50km/h (single-phase) • 11kW / 75km/h (three-phase)

This is a popular option, but is also the most expensive one of all the common options.

Note that if your electricity supply is single-phase, **the Wall Connector cannot charge any faster than Option D above**. So if you have single-phase supply, generally the only reasons you would opt for the Wall Connector are installation aesthetics and/or wanting to keep the UMC in the car as a portable/travel/backup option. There is no functional benefit in terms of charge speed.

If you have three-phase supply, the charge speed is significantly faster than what the UMC is capable of, but you need to consider if you really need a charge rate of 75km/h.

The Wall Connector is usually installed as a permanent fixture (often with hidden wiring etc):

Note however that some people opt to install the Wall Connector in combination with a 32A socket:

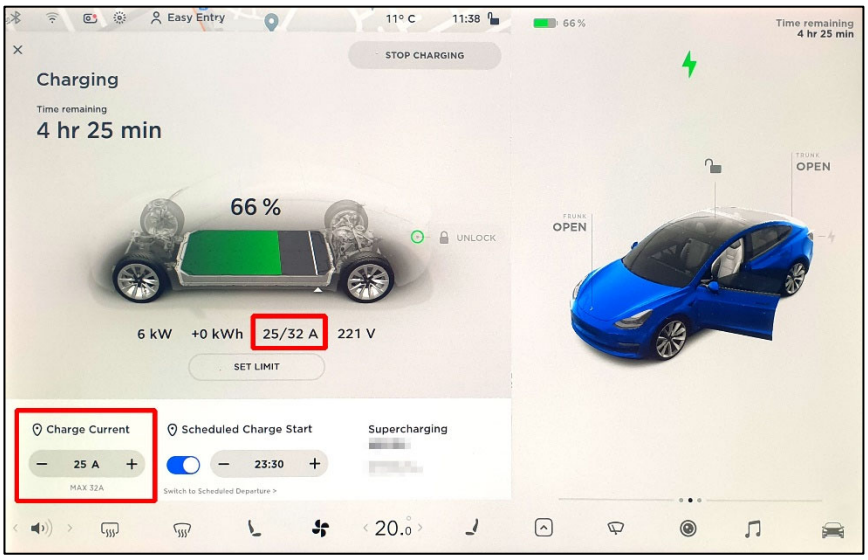
In this setup above, the Wall Connector is terminated in a 32A plug, which is then plugged into a 32A socket.

The benefits of this method are that the Wall Connector is more “portable”, and that the 32A socket can be used for other devices (e.g. if your Wall Connector fails, you can simply re-use the socket with your UMC and a 32A tail, ensuring that you’re still able to charge your car at a fast rate).

The downsides are small additional cost, less clean aesthetics, and that some people say that this method is not “Tesla-approved” (this is possible hearsay, and even if true, the consequences of this are not clear). So do not be surprised if you contact a Tesla-approved electrician and are told that they will refuse to do it this way.

9) OTHER MISCELLANEOUS NOTES

1) When using an AC connector (e.g. the UMC or Wall Connector), you can manually limit the current that the car draws:



In my situation above, I use the 32A tail with the UMC but limit my car to only draw 25A (to put less load on my electrical system). Strictly-speaking, I don't have to do this and drawing 32A almost certainly won't cause any problems, but 25A is sufficient for my needs so I opted to increase my margin of safety.

2) You can download the official manuals from Tesla here:
https://www.tesla.com/en_AU/support/charging-product-guides
You will find manuals for the UMC and Wall Connector– they are important (and official!) sources of information.

3) Tesla is not the only manufacturer of wall/portable charging solutions. There are plenty of options available on the market, and most of the options in Australia terminate in a Type 2 connector which is 100% compatible with the Model 3. You may also find they offer better smart integration with your solar system (if you have one), and smart features like timed charging, WiFi connectivity etc. The only notable downside of the non-Tesla options is that the Type 2 plug itself doesn't have the Tesla-specific button which allows you to open the Model 3's charge port remotely, but this is a non-issue as simply giving the charge port a light tap will open it.

4) Your local electricity supplier may have a plan/deal available where you get a free Type 2 EV wall connector in exchange for signing up for their scheme. It's worth investigating what options are available in your area.

5) There are UMC tails and matching power sockets in all sorts of varieties. These may be cheaper or more appropriate for your circumstances than the options described above. Examples of what's available out there:
- Aftermarket 16A tail for the UMC that plugs into a 15A socket (4kW charge rate • 25km/h)
- Aftermarket 20A tail for the UMC that plugs into a 20A socket (5kW charge rate • 33km/h)
- Aftermarket 25A tail for the UMC that plugs into a 25A socket (6kW charge rate • 42km/h)
- Aftermarket 32A tail for the UMC that plugs into a "Blue Commando" socket (7kW charge rate • 50km/h)

10) CONCLUSION

I hope the above sufficiently breaks down all the confusion and terminology surrounding home charging your Model 3.

Please let me know if you spot any errors or omissions and I will update this document.

Good luck!