

4.0 - Limit Harnesses

LIMIT HARNESSES

Limit Harnesses are utilized with our Helix and Super Helix boxes. These harness connect directly into the 'Limit' port on the Helix boxes and allow for up to 4 limits to be set-up on the power positioning system. (eg. Tilt Limit , DLO limit, Anti-Tipper Limit, etc...). In addition to the standard Limit Harnesses, more specialized programmable Limit Switches/ Sensors have been developed for more *advanced* applications.



4.0- Limit Harnesses



I. Dual Limit Harnesses

C44B Limit Harness (*Dual Limit*)

Applicable Relay Boxes: Helix 5.0 and 5.3

(note: also compatible with earlier models: Helix 4.1, 4.9 and 5.1)

The C44B dual limit harness connects to the 'limit switches' port on the helix box. A separate moxex connection is provided for both the tilt limit and the drive lockout. Limit cables are labeled for identification.

Cable Connections:

- ◆ 'limit switches' connection to relay box (DB-9 pin)
- ◆ Limit 1 - **Tilt** (white moxex)
- ◆ Limit 2 - **Drive Lockout** (white moxex)



II. Four Limit Harnesses

C44C Limit Harness (*Four Limit*)

Applicable Relay Boxes: Helix 5.0 and 5.3

(note: also compatible with earlier models: Helix 4.1, 4.9 and 5.1)

The C44C four limit harness connects to the 'limit switches' port on the helix box. A separate moxex connection is provided for each of the 4 limit cables. Limit cables are labeled for identification. In addition to the tilt limit and drive lockout limit, the C44C harness provides limit connections for the anti-tipper latch and for the elevating seat lockout.

Note: The C44C harness is available in long and short lengths- (shorter style is shown).

Cable Connections:

- ◆ 'limit switches' connection to relay box (DB-9 pin)
- ◆ Limit 1 - **Tilt** (white moxex)
- ◆ Limit 2 - **Drive Lockout** (white moxex)
- ◆ Limit 3 - **Anti-Tip** (white moxex)
- ◆ Limit 4 - **Tilt Home (elevating seat lockout)** (white moxex)



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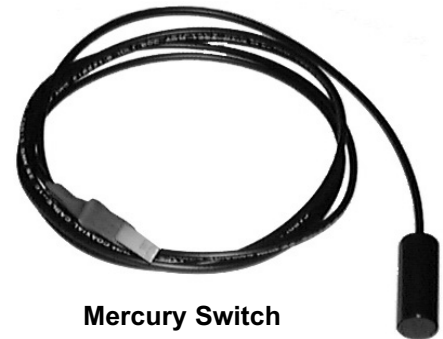


III. Standard Limit Switches

Standard Limit Switches

i) Mercury/ Tip Switches:

Mercury Switches are used for up to four separate functions on the TRx power positioning systems: setting the *drive lockout (DLO)*, setting the *tilt limit*, setting the *limit for the anti-tipper latch*, and setting the *elevating seat lockout*. These limits are set approximately at the factory, but must be checked (and adjusted if necessary) after an installation is completed. To adjust the switch angle, loosen the clamping nut, make the adjustment, and re-tighten the nut. For safety reasons, Motion Concepts does not recommend making adjustments beyond the factory recommended range.



Mercury Switch

Note: All mercury switches are *color coded* for easy recognition during installation/ maintenance:

Drive Lockout (DLO) Tip Switch = **RED**

Tilt Limit Tip Switch = **BLACK**

Anti-Tipper Lockout Tip Switch = **YELLOW**

PES Lockout Switch for Tilt-Elevating System = **WHITE** (*older systems used BLUE or GRAY*)

ii) Mechanical Switches:

Microswitches are often used to set the DLO inhibit, and/or to set the anti-tipper latch (when required) on TRx power positioning systems equipped with Power Elevating Seats.



Microswitch

Roller Switches are typically used to set the DLO inhibit on the Latitude power positioning system and to set the 'home' position on a Lateral-Tilt seating system. Mechanical Switches are set at the factory but must be checked after installation. (**Note:** Mechanical switches may also be utilized on other specialized TRx power positioning systems to set limits and/or the drive lockout).



Roller Switch

Important!

Detailed instructions and recommended settings for our standard limit switches are provided in our **TRx General Set-Up Manual** (provided with every seating system)

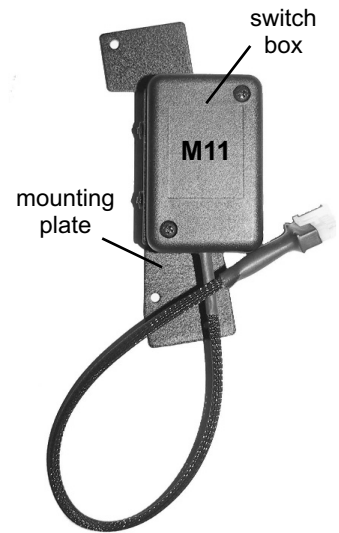
4.0- Limit Harnesses



IV. Specialized Limit Switches

M11 Tippy Angle Switch

The M11 tippy angle switch is **only** compatible with **Helix 5.4, 5.5 and 5.9** relay boxes. The M11 tippy switch plugs into the 'LIM1' port. For proper programming, the M11 Tippy must always be installed vertically so that it faces the right side of the chair (*mounts onto the relay box or mounting bracket*). Two internal jumpers (J1, J2) are pre-set at the factory based on the type of Tippy Switch (*see Jumper Settings below*). The tippy angle switch is designed to monitor the angle of the wheelchair seat back and provides limit signals for up to 4 chair positions (*Anti-Tip/ Home, Reduced-Speed Drive¹, Drive Lockout (DLO) & Tilt/ Recline Limit*). These limits are set via 4 push-button sensors located inside the switch box (**Note:** each sensor has a corresponding LED light above it). The unit is typically shipped with factory preset angles of 10°, 15°, and 25° respectively for limits 1, 2, and 3. Limit 4 is typically set at the factory to the maximum tilt/ recline angle (*this angle may vary depending on the type of seating system*).



¹**Reduced-Speed Drive:** limits the speed of a chair within an established tilt range and serves as an additional safety feature to the drive lockout (DLO). (**example:** with *Reduced-Speed Drive* set at 10° and *DLO* set at 20°, a wheelchair will travel at full speed up to a 10° back angle, and travel in reduced-drive between 10-20° (stopping at the DLO limit).

When initially connected or reset, all four LED lights should be lit inside the tippy switch. The default limit settings can be manually reset by pressing any 2 buttons simultaneously. To program the Tippy Switch, ensure the chair is placed on a level surface in its full upright position. Ensure Jumpers are configured properly. From the upright position, move the seat to the angle at which you wish to establish the *Anti-Tip/ Home* limit position (Limit 1). Wait 5 seconds then press and hold the Limit 1 push button on the sensor to set the angle; the corresponding LED will flash 3 times then go out to indicate that the limit is accepted. Continue setting the remaining limits in succession (*Limit 2... 3... 4*) by adjusting the seat to the desired angle and pressing the corresponding push-button to set the limit. (**Note:** to set *Limit 4* on a system with combined tilt & recline functions, first tilt the system fully, then recline the system to the desired angle/ limit).

Important! Each successive angle setting must be greater than the previous one by **at least 5°**. If any of the available limit functions are not used, then set the unused limit to the same angle as the next limit in succession.

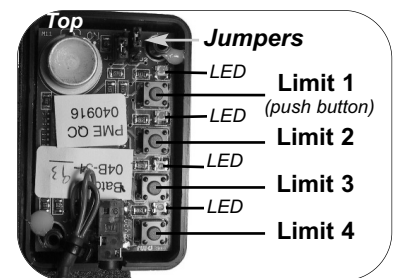
WARNING! to ensure proper function, **do not** remove the Tippy Switch from the mounting plate at any point during or after programming.

Jumper Settings:

Jumpers (J1, J2) are pre-set at the factory based on the type of Tippy Switch:
Setting for the M11 tippy = **J1- OFF; J2- ON**

Limit Settings:

- ◆ Limit 1 - **Anti-Tip/Home** (recommended setting = 0-10°)[^]
- ◆ Limit 2 - **Reduced-Speed Drive** (recommended setting = 10-20°)*
- ◆ Limit 3 - **Drive Lockout** (recommended setting = 20-25°)*
- ◆ Limit 4 - **Tilt Limit** (standard setting at maximum tilt/recline)



[^]**Note:** typical *Anti-Tip* setting= 10°; the *Home* setting is required for certain systems such as PES and Lateral Tilt; the 'Home' angle will vary depending on the system configuration.

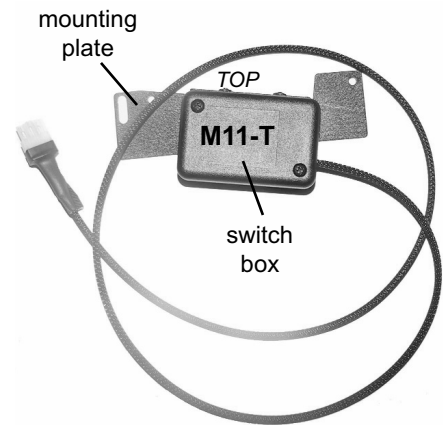
Note: to ensure safe operation of the wheelchair, the Reduced Drive limit should not exceed the recommended 20°, and the DLO limit should not exceed the recommended 25°.

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M11-T Tippy Angle Switch

The M11 tippy angle switch is **only** compatible with **Helix 5.4, 5.5** and **5.9** relay boxes *and* is used exclusively with **Tilt-Only systems**. The M11 tippy switch plugs into the 'LIM1' port, and is always mounted horizontally on the left side of the inner seat frame. Two internal jumpers (J1,J2) are pre-set at the factory based on the type of Tippy Switch (see *Jumper Settings* below). The tippy angle switch is designed to monitor the angle of the wheelchair seat back and provides limit signals for up to 4 chair positions (*Anti-Tip/ Home, Reduced-Speed Drive¹, Drive Lockout & Tilt Limit*). These limits are set via 4 push-button sensors located inside the switch box (**Note:** each sensor has a corresponding LED light above it). The unit is typically shipped with factory preset angles of 10°, 15°, and 25° respectively for limits 1, 2, and 3. Limit 4 is typically set at the factory to the maximum tilt/ recline angle (*this angle may vary depending on the type of seating system*).



¹Reduced-Speed Drive: limits the speed of a chair within an established tilt range and serves as an additional safety feature to the drive lockout (DLO). (**example:** with *Reduced-Speed Drive* set at 10° and *DLO* set at 20°, a wheelchair will travel at full speed up to a 10° back angle, and travel in reduced-drive between 10-20° (stopping at the DLO limit).

When initially connected or reset, all four LED lights should be lit inside the tippy switch. The default limit settings can be manually reset by pressing any 2 buttons simultaneously. To program the Tippy Switch, ensure the chair is placed on a level surface in its full upright position. Ensure Jumpers are configured properly. From the upright position, move the seat to the angle at which you wish to establish the *Anti-Tip/ Home* limit position (Limit 1). Wait 5 seconds the press and hold the Limit 1 push button on the sensor to set the angle; The corresponding LED will flash 3 times then go out to indicate that the limit is accepted. Continue setting the remaining limits in succession (*Limit 2... 3... 4*) by adjusting the seat to the desired angle and pressing the corresponding push-button to set the limit.

❗ Important! Each successive angle setting must be greater than the previous one by **at least 5°**. If any of the available limit functions are not used, then set the unused limit to the same angle as the next limit in succession.

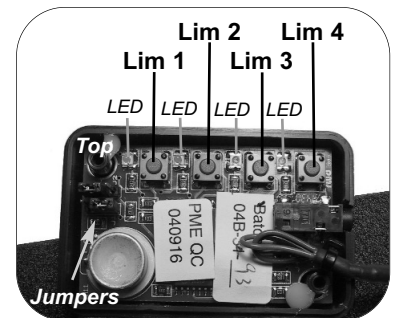
⚠ WARNING! to ensure proper function, **do not** remove the Tippy Switch from the mounting plate at any point during or after programming.

Jumper Settings:

Jumpers (J1, J2) are pre-set at the factory based on the type of Tippy Switch:
Setting for the **M11-T** tippy = **J1- ON; J2- OFF**

Limit Settings:

- ◆ Limit 1 - **Anti-Tip/Home** (recommended setting = **0-10°**)[^]
- ◆ Limit 2 - **Reduced-Speed Drive** (recommended setting = **10-20°**)*
- ◆ Limit 3 - **Drive Lockout** (recommended setting = **20-25°**)*
- ◆ Limit 4 - **Tilt Limit** (standard setting at maximum tilt)



[^]Note: typical *Anti-Tip* setting= 10°; the *Home* setting is required for certain systems such as PES and Lateral Tilt; the 'Home' angle will vary depending on the system configuration.

***Note:** to ensure safe operation of the wheelchair, the *Reduced Drive* limit should not exceed the recommended 20°, and the *DLO* limit should not exceed the recommended 25°.