II. Programming and Adjustments

Dip Switches

Dip switches are located inside most control boxes and are used to set, enable, or disable various electronic functions operated through the control box. The switch settings often involve assigning motor functions, enabling or disabling limit switches and setting switch modes. The Configuration Guides provided with the control box will identify the various program options (Dip Switch settings) that are available/required to operate the power positioning system as desired (refer to p.40 for more information on Configuration Guides). See the images below for some examples of typical dip switches found in our control boxes.

i) Dip Switch for the M-17/27 combination relay box

```
1 2
#1 ON (up)
#2 ON (up)

1 2
#1 ON (up)
#2 OFF (down)

1 2
#1 OFF (down)
#2 ON (up)

1 2
#1 OFF (down)
#2 OFF (down)
```

- *D.L.O.- Disengaged*
- *Inhibit- Disengaged*
- *D.L.O.- Engaged*
- *Inhibit- Engaged*
- *D.L.O.- Engaged*
- *Inhibit- Disengaged*
- *D.L.O.= Drive Lock Out*

ii) Dip Switches for the Helix relay boxes

- Helix 4.1, 4.9 Relay Boxes
- Super Helix 5.1 Relay Box
- Super Helix 5.4/ 5.5 Relay Box

NOTES
II. Programming and Adjustments

Rotary Switches (Program Dials)

Rotary Switches or Program Dials are located inside some of our newer control boxes and, similar to the dip switches, are used to assign, enable, or disable various motor functions operated through the control box. The Configuration Guide provided with the control box will identify the various program options (Rotary Switch settings) that are available and the specific functions assigned to each program position. See below for an example of the Rotary Switch found in our M14/ M33 control box.

i) Rotary Switch for the M-14 and M-33 Control Box

e.g. Rotary Switch Settings taken from M33 Configuration Guide:

<table>
<thead>
<tr>
<th>Settings</th>
<th>Forward</th>
<th>Reverse</th>
<th>Left</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position 1</td>
<td>Motor 1 toggle</td>
<td>Motor 2 toggle</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>Position 3</td>
<td>Motor 1+2 toggle</td>
<td>Motor 2 toggle</td>
<td>Nil</td>
<td>Nil</td>
</tr>
</tbody>
</table>
II. Programming and Adjustments

Jumpers

Jumpers are small ‘plug-style’ pins, found inside most of our control boxes, that can be set in one of two possible positions. By altering a jumper setting, the circuitry of the box is changed. Jumpers are often used to set-up or enable the drive lockout mode for a specific power base. It is critical for the users safety that the jumpers are set-up properly. (Note: Each power base manufacturer will often require a unique set-up to allow the drive lockout to function properly). The Configuration Guide will illustrate the various jumper configurations and identify the appropriate program setting for the power base (refer to p.40 for more information on Configuration Guides).

The following are examples of some of the various Jumpers found inside our control boxes. For specific jumper setting information, please refer to the Configuration Guide provided with each seat control/relay box.

i) Jumper settings inside the M-49 Toggle Box

For normal operation of a seating system on both the Quickie and Invacare powerbases, the left and centre pin should be covered.

For Quantum (Jazzy) Power Bases:

**DLO POLARITY:** must be set to the **NO** (Normally Open) side. (Left & Centre pins)

**DLO COM:** must be set to the **GND** (Ground) side. (Left & Centre pins)

For Quickie & Invacare Power Bases:

**DLO POLARITY:** must be set to the **NC** (Normally Closed) side. (Right & Centre pins).

**DLO COM:** must be set to the **GND** (Ground) side. (Left & Centre pins)

ii) Jumper setting inside the M-17/27 Combination Relay Box

For a seating system installed on a Quantum (Pride) powerbase, the right and centre pin should be covered.
II. Programming and Adjustments

iii) Jumper settings inside the Helix 1.0

iv) Jumper settings inside the Helix 1.1

v) J8 - Jumper setting inside Helix 4.9 & 5.1

vi) J6 - Jumper inside the Helix 5.1*

vii) Jumper settings inside the Super Helix 5.3, 5.4, 5.5 Relay Boxes

NOTES

(*Note: J6 Jumper is not used for the Helix 4.9)
II. Programming and Adjustments

Actuator Speed Controls

The speed of the actuator motors is controlled via the relay box, and may be adjusted either by a direct speed control dial on the outside of the control box, or via an auxiliary speed potentiometer (speed pot) located inside the box. **Important:** motor speeds are pre-set at the factory - please ensure that any further speed adjustments do not compromise the safe operation of the power positioning system, or the safety of the client.

The following are examples of some of the various Speed Potentiometers found inside our relay boxes. The Configuration Guide provided with each seat control/relay box will identify when an internal speed pot is present *(refer to p.40 for more information on Configuration Guides).*

i) Auxiliary speed pot adjustment for the Helix 4.9 and Super Helix 5.1 boxes

The speed pot inside the Helix 4.9 and 5.1 box is used to control the motor speed for the auxiliary motor connection. This auxiliary port is generally used for anti-tipper actuators, and can also be used for the elevating actuator on a power elevating seat.

- Rotate counter clockwise* to slow motor speed.
- Rotate clockwise* to increase motor speed.

ii) Speed pot adjustment for the Helix 1.0

The speed pot inside the Helix 1.0 box controls the motor speed for the single actuator motor. Adjustments are made as per example i) above. Counter-clockwise to slow motor speed; clockwise to increase*.

iii) Speed pot adjustment for the AUX motor on the Super Helix 5.3, 5.4, 5.5

The speed pot inside the Helix 5.3, 5.4, 5.5 relay boxes controls the motor speed for the auxiliary actuator (i.e. motor 5). Adjustments are made as per example i) above. Counter-clockwise to slow motor speed; clockwise to increase*.

*Important!
Each speed pot has a ‘stop’ point in both the clockwise and counter-clockwise rotations; to avoid damaging the potentiometer, please be careful not to over adjust.
II. Programming and Adjustments

Configuration Guides

A Configuration Guide is provided with each of our control/relay boxes. The size and appearance of the configuration guides can vary depending on the complexity of the control box. The configuration guides provide all the set-up and programming options available to configure a power positioning system in order to satisfy the needs of the client. The following images (Figure 6a, 6b and 7.0) show some examples of configuration guides and identify the key areas to focus on when programming a TRx seating system.

Figure 6a. - Configuration Guide for the Helix 5.3
II. Programming and Adjustments

4.0 - the Electronic System

**Figure 6b. - Configuration Guide for the Helix 5.3 (e.g. Programming Options)**

*Note: this is an example only - not all program options are shown.*

This section identifies the designated motor assignments for the specified program number. Motor assignments may differ slightly depending on the type of seating system installed.

## Program Reference #

<table>
<thead>
<tr>
<th>Program #</th>
<th>Motor Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TILT</td>
</tr>
<tr>
<td>2</td>
<td>RECLINE</td>
</tr>
<tr>
<td>3</td>
<td>LEFT LEG</td>
</tr>
<tr>
<td>4</td>
<td>RIGHT LEG</td>
</tr>
<tr>
<td>5</td>
<td>ELEVATE</td>
</tr>
</tbody>
</table>

## Joystick Function

<table>
<thead>
<tr>
<th>Function</th>
<th>Motor Movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRx Switch</td>
<td>4-way toggle</td>
</tr>
<tr>
<td>TRx Switch</td>
<td>8-way toggle</td>
</tr>
</tbody>
</table>

## Dip Switch Set

<table>
<thead>
<tr>
<th>Limit Switch Assignment</th>
<th>Dip Switch Set</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIMIT SWITCH 1</td>
<td>TR DOWN LIMIT</td>
</tr>
<tr>
<td>LIMIT SWITCH 2</td>
<td>TRILE DLO LIMIT</td>
</tr>
<tr>
<td>LIMIT SWITCH 3</td>
<td>NL</td>
</tr>
<tr>
<td>LIMIT SWITCH 4</td>
<td>TILT HOME</td>
</tr>
</tbody>
</table>

Indicates the required Dip Switch settings to operate the power positioning system in accordance with the specific program #.

Be certain to read any “Notes” associated with each program.

### Notes:

- Programs 5 & 6 appear identical, however program 5 has the recline function synchronized with the legrests, whereas program 6 operates the recline function independent from the legrests.

### Program # 5

- **Program # 5**

<table>
<thead>
<tr>
<th>Motor</th>
<th>Function</th>
<th>Motor Movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TILT</td>
<td>TRx Switch (4-way)</td>
</tr>
<tr>
<td>2</td>
<td>RECLINE</td>
<td>TRx Switch (8-way)</td>
</tr>
<tr>
<td>3</td>
<td>LEFT LEG</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>RIGHT LEG</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>ELEVATE</td>
<td></td>
</tr>
<tr>
<td>ECU</td>
<td>NL</td>
<td></td>
</tr>
</tbody>
</table>

### Program # 6

- **Program # 6**

<table>
<thead>
<tr>
<th>Motor</th>
<th>Function</th>
<th>Motor Movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TILT</td>
<td>TRx Switch (4-way)</td>
</tr>
<tr>
<td>2</td>
<td>RECLINE</td>
<td>TRx Switch (8-way)</td>
</tr>
<tr>
<td>3</td>
<td>LEFT LEG</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>RIGHT LEG</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>ELEVATE</td>
<td></td>
</tr>
<tr>
<td>ECU</td>
<td>NL</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Programs 5 & 6 appear identical, however program 5 has the recline function synchronized with the legrests, whereas program 6 operates the recline function independent from the legrests.
II. Programming and Adjustments

Figure 7.0 - Configuration Guide for the Helix 1.0

Helix 1.0 Seat Controller

The Helix 1.0 Seat Controller (further Controller) is a device which controls one seat positioning actuator of a wheelchair by a single and/or by a dual switch. The single switch is used in the toggle mode while the dual switch is used in the direct mode. The Controller features overcurrent protection in Overcurrent Limit mode and adjustable speed control. The Controller provides inputs for Drive Inhibit sensors which can be disabled or enabled. If the Drive Inhibit sensor is enabled, the Controllers generate Drive Lockout signal when the sensor opens.

Connection

- Connect the Controller to an actuator by the white 2-position Anderson connector harness.
- Connect the Controller to the wheelchair base system by the 3-position Anderson connector harness.
- Connect the single switch, dual switch, and Drive Inhibit sensor, if they are used, by plugging them into corresponding front panel phone jacks.

Setup

- Open the cover of the Controller’s enclosure.
- Enable or disable Drive Inhibit sensor by setting jumper Limit 2.
- Close the cover.

Operation

- To run the Controller using the single switch, toggle the switch to adjust the seat. If a pushbutton is used, press and hold the pushbutton to move in one direction; release the pushbutton, then press and hold it to move in the opposite direction.
- To run the Controller using the dual switch, move switch in the requested direction. If a 2-pushbutton switch is used, press and hold one pushbutton to move in one direction; use the other one to move in the opposite direction.
- To adjust the speed of an actuator, open the Controller’s cover and set the required speed using the SPEED potentiometer. Close the cover.

2-pin Anderson actuator connector description

<table>
<thead>
<tr>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>Actuator plus</td>
</tr>
<tr>
<td>Black</td>
<td>Actuator minus</td>
</tr>
</tbody>
</table>

3-pin Anderson connector description

<table>
<thead>
<tr>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>Drive Lockout signal</td>
</tr>
<tr>
<td>Black</td>
<td>Battery minus</td>
</tr>
<tr>
<td>Red</td>
<td>Battery plus (24V)</td>
</tr>
</tbody>
</table>

Internal Jumper set in the ‘enabled’ position

Internal Speed Pot (potentiometer) used to control actuator speed
II. Programming and Adjustments

Standard Limit Switches

**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.

**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)

**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. 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).

### i. Setting the Drive Lockout for Tilt/Recline Systems

All TRx systems with tilt and/or recline functions are supplied with a drive lockout switch. This prevents the drive motors from operating if the back is positioned beyond a pre-determined angle. The recommended drive lockout angle is 15° to 20° from the vertical* (see diagram below). The mercury switch for the drive lockout is identified by a RED colored end. After the angle has been set, ensure the drive lockout is tested. Further adjustments may be required.

**Note:** For any tilt-only (no recline) seating system the DLO limit switch is typically mounted to the seat frame, and for a Tilt/Recline seating system the DLO switch is typically mounted to the side of the relay box (on the back pan).

**Important:** If the drive is locked out when the switch angle is adjusted, the tilt or recline will have to be activated again before re-testing the drive lockout. The drive lockout will remain engaged until the tilt or recline has been activated, regardless of the switch angle.

*Note: the Drive Lockout limit should always be set to the angle that best meets the individual needs of the user and overall stability of the wheelchair. However, the DLO angle should not exceed the maximum 20° back angle.
II. Programming and Adjustments

ii. Drive Lockout Microswitch for Power Elevating Seats

All TRx systems with Power Elevating Seats (PES) are equipped with a microswitch for the drive lockout. This microswitch prevents the drive motors from functioning when the seat actuator is elevated beyond a recommended 1/2” limit [measured from the home (lowest) position]. The microswitch/drive lockout functions as a ‘normally closed’ circuit. This provides fail safe operation. As soon as the seat is elevated over the 1/2” limit, the switch is opened and the drive lockout is engaged.

The microswitch is typically mounted to the underside of the seating system and is attached to an actuator mounting plate in either a vertical or horizontal position (depending on the seating system). See images below illustrating both mounting orientations. Ensure the drive lockout microswitch is tested after installation. Further adjustments may be required.

eg. Horizontally mounted microswitch on a PES system with tilt/recline

eg. Vertically mounted microswitch on an elevate-only seating system
II. Programming and Adjustments

iii. Setting the Tilt Limit Switch

All TRx systems with tilt and/or recline functions (power or manual recline) are available with a tilt limit function. This function prevents the back angle from extending beyond a pre-set angle. The correct tilt angle limit differs for each installation. The limit switch should be set so that with any combination of tilt and recline, there is no chance of interference between the back of the TRx system and the wheelchair base or any accessories located at the back. The recline angle should never extend beyond 5° from the horizontal\(^*\) (see diagram below). The mercury switch used for the tilt limit on the seating system is colored BLACK. After the tilt angle has been set, ensure the tilt limit is tested. Further adjustments may be required.

Note: For any tilt-only (no recline) seating system the tilt limit mercury switch is typically mounted to the underside of the seat frame, and for a Tilt/Recline seating system, the mercury switch is typically mounted to the side of the relay box mounting bracket (on the back of the system).

\(^*\)Note: the tilt limit switch will need to be set to best meet the needs of the user. However, the recline angle should not be permitted to extend beyond the recommended 5°.

The following images show examples of typical limit switch mounting positions on our TRx seating systems. Note: mercury/tip switches are normally mounted on the control box mounting bracket for systems with tilt/recline, and to the underside of the seat for systems with tilt only.

VIEW from right* side (*when sitting in the chair)

\[\text{DLO Tip Switch}\]

\[\text{Tilt Limit Switch}\]

\[\text{Anti-Tipper Lockout Switch}\]

\[\text{DLO Tip Switch}\]

\[\text{Tilt Limit Switch}\]

\[\text{Anti-Tipper Lockout Switch}\]

\[\text{DLO Tip Switch}\]

\[\text{Tilt Limit Switch}\]

\[\text{Anti-Tipper Lockout Switch}\]

\[\text{DLO Tip Switch}\]

\[\text{Tilt Limit Switch}\]

\[\text{Anti-Tipper Lockout Switch}\]

\[\text{DLO Tip Switch}\]

\[\text{Tilt Limit Switch}\]

\[\text{Anti-Tipper Lockout Switch}\]

\[\text{DLO Tip Switch}\]

\[\text{Tilt Limit Switch}\]

\[\text{Anti-Tipper Lockout Switch}\]

\[\text{DLO Tip Switch}\]

\[\text{Tilt Limit Switch}\]

\[\text{Anti-Tipper Lockout Switch}\]

\[\text{DLO Tip Switch}\]

\[\text{Tilt Limit Switch}\]

\[\text{Anti-Tipper Lockout Switch}\]

\[\text{DLO Tip Switch}\]

\[\text{Tilt Limit Switch}\]

\[\text{Anti-Tipper Lockout Switch}\]

\[\text{DLO Tip Switch}\]

\[\text{Tilt Limit Switch}\]

\[\text{Anti-Tipper Lockout Switch}\]

\[\text{DLO Tip Switch}\]

\[\text{Tilt Limit Switch}\]

\[\text{Anti-Tipper Lockout Switch}\]

\[\text{DLO Tip Switch}\]

\[\text{Tilt Limit Switch}\]

\[\text{Anti-Tipper Lockout Switch}\]

\[\text{DLO Tip Switch}\]

\[\text{Tilt Limit Switch}\]

\[\text{Anti-Tipper Lockout Switch}\]

\[\text{DLO Tip Switch}\]

\[\text{Tilt Limit Switch}\]

\[\text{Anti-Tipper Lockout Switch}\]

\[\text{DLO Tip Switch}\]

\[\text{Tilt Limit Switch}\]

\[\text{Anti-Tipper Lockout Switch}\]

\[\text{DLO Tip Switch}\]

\[\text{Tilt Limit Switch}\]

\[\text{Anti-Tipper Lockout Switch}\]

\[\text{DLO Tip Switch}\]

\[\text{Tilt Limit Switch}\]

\[\text{Anti-Tipper Lockout Switch}\]

\[\text{DLO Tip Switch}\]

\[\text{Tilt Limit Switch}\]

\[\text{Anti-Tipper Lockout Switch}\]

\[\text{DLO Tip Switch}\]

\[\text{Tilt Limit Switch}\]

\[\text{Anti-Tipper Lockout Switch}\]

\[\text{DLO Tip Switch}\]

\[\text{Tilt Limit Switch}\]

\[\text{Anti-Tipper Lockout Switch}\]

\[\text{DLO Tip Switch}\]

\[\text{Tilt Limit Switch}\]

\[\text{Anti-Tipper Lockout Switch}\]

\[\text{DLO Tip Switch}\]

\[\text{Tilt Limit Switch}\]

\[\text{Anti-Tipper Lockout Switch}\]

\[\text{DLO Tip Switch}\]

\[\text{Tilt Limit Switch}\]
II. Programming and Adjustments

iv. Setting the Limit Switch for the Anti-Tipper Latch

These limit switches are found only on TRx systems equipped with an anti-tipper latching system:

1) For tilt-only, recline-only and tilt/recline systems with anti-tip, a mercury switch is used to set the back angle at which the anti-tipper latches engage. The mercury switch for the anti-tipper latch is identified by a YELLOW colored end.

2) For tilt/recline systems equipped with a Power Elevating Seat (PES), a separate Microswitch is used to control when the anti-tipper latches engage. The microswitch is mounted to the underside of the seating system and works in combination (mounted side by side) with the drive lockout microswitch for PES. (Refer to Part ii. Drive Lockout Microswitch for Power Elevating Seats, p.55).

The switches should be set as follows:

**Tilt-only systems:** The limit switch for the anti-tipper latching system should be set to **engage when the seat angle is at 10°**, regardless of what the pre-tilt is. (Note: This anti-tip limit switch is typically mounted to the side of the seat frame for tilt-only systems).

**Tilt/ Recline systems and Recline-only systems:** The limit switch for the anti-tipper latching system should be set to **engage when the back reclines 10°** from the upright position. (Note: This anti-tip limit switch is typically mounted to the side of the control box mounting bracket (on the back of the seating system).

**Tilt/ Recline systems with PES:** The microswitch for the anti-tipper latching system should be set to engage when the seat actuator has been **elevated beyond a recommended 1/2” limit.** (measured from the seat's home (lowest) position.)

Ensure the anti-tipper latching system is tested after the limit switches have been set. Further adjustments may be required.

e.g.- CG-Tilt System with Anti-Tipper tip switch
II. Programming and Adjustments

v. Setting the PES Lockout Limit Switch for Tilt-Elevating Systems

All TRx systems with tilt and/or recline functions (power or manual recline) in combination with a power elevating seat, are equipped with a power elevating seat (PES) lockout limit switch. This limit switch prevents the PES actuator from elevating when the seating system is tilted and/or reclined beyond a set position. The limit switch is factory set to lockout the PES actuator if the tilt and/or recline angle increases beyond a maximum 8° from the seating system’s original pre-tilt (“home”) position. The recommended lockout setting/range should be between 3° and 8°.

The limit switch used to set the elevating actuator lockout is identified by a WHITE colored end. After the switch angle has been set, ensure that the elevating actuator lockout is tested. Further adjustments may be required. The PES lockout limit switch

Note: The powerbase must be level when adjusting the tip switch setting.

All mercury switches are color coded for easy recognition during installation and/or 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 (earlier systems used BLUE or GRAY)
II. Programming and Adjustments

Specialized Limit Switches/ Controls:

i. M11 Tipsy Angle Switch

The M11 tipsy angle switch is **only** compatible with Helix 5.4, 5.5 and 5.9 relay boxes. The M11 tipsy switch plugs into the 'LIM1' port. For proper programming, the M11 Tipsy 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 Tipsy Switch (see Jumper Settings below). The tipsy 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 Drive, 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).

When initially connected or reset, all four LED lights should be lit inside the tipsy switch. The default limit settings can be manually reset by pressing any 2 buttons simultaneously. To program the Tipsy 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).

When initially connected or reset, all four LED lights should be lit inside the tipsy switch. The default limit settings can be manually reset by pressing any 2 buttons simultaneously. To program the Tipsy 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).

```
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).
```

**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 Tipsy 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 Tipsy Switch:

Setting for the **M11 tipsy** = **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°.
II. Programming and Adjustments

ii. M11-T Tipsy Angle Switch

The M11 tipsy 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 tipsy 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 Tipsy Switch (see Jumper Settings below). The tipsy 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 Drive*, 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).

When initially connected or reset, all four LED lights should be lit inside the tipsy switch. The default limit settings can be manually reset by pressing any 2 buttons simultaneously. To program the Tipsy 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.

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

\[\text{WARNING!} \quad \text{to ensure proper function, do not remove the Tipsy Switch from the mounting plate at any point during or after programming.}\]

Jumper Settings:

Jumpers (J1, J2) are pre-set at the factory based on the type of Tipsy Switch:

Setting for the M11-T tipsy = 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)

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

\[\text{*Note: to ensure safe operation of the wheelchair, the Reduced Drive limit should not exceed the recommended 20°, and the DLO limit should not exceed the recommended 25°.}\]
The M59 two-directional limit control is an add-on limit box that is designed to provide two opposite end limits (i.e.; forward-back, up-down, left-right) for a single actuator on a power positioning system. The M59 is installed in-line with the seat controller (relay box) and the seat positioning actuator and operates independently from the limits or lockouts connected with the relay box. It is designed to work with Helix relay boxes, but will work with other relay boxes with the appropriate cable harnesses or adapters.

To connect the M59 limit control, plug the limit sensors into the forward and backward limit ports (limit sensors will need to be set-up to the desired limits). Connect the ‘Motor In’ cable to the appropriate actuator output from the relay box. Connect the ‘Motor Out’ cable to the actuator. The 24V power connection to the 24V battery.

With the limit sensors set, the connected actuator will function normally within the preset range. Once the forward limit position is reached, the actuator will only run backward, and conversely, once the backward limit position is reached, the actuator will only run forward.