Control box with GyroSense

Start of operation

After mounting the controller and the control panels, making all electrical connections, and making sure that the right parameter set is loaded to the controller, the table can be put into service.

Upon power up, the table makes a reference run to acquire the reference position. To do so the "up" or "down" key must be pressed until the table reaches the reference position (normally the lowest point or the position of a limit switch) and further until the table elevates to the lowest programmed position (this may be about 20mm or 3/4" higher than the lowest position).

After the reference has been established, the table is ready for regular operation. By pushing the "up" or "down" key, the table can be moved between the upper and the lower positions defined in the parameter set in the controller specific for this table.

Current based collision detection

As a standard all controllers are equipped with a simple, current based collision detection. This collision detection must be activated through the parameter set. To achieve a satisfactory functioning of this feature, parameters specific to the table must be defined and entered.

When activated the current based collision detection will stop the movement of the table as soon as the tabletop hits an obstacle. After the stop the tabletop will move in the opposite direction by the distance specified in the parameter set. After that the "up" or "down" key must be pressed again to move the table.

Attention: Please note that the sensitivity of the current based collision detection on downward movements is reduced drastically if the table is loaded with weight!

Should the performance of the current based collision detection not be satisfactory, the use of the GyroSense or the GraviSense collision detection system is recommended.

GyroSense based collision detection

The Laing GyroSense System provides collision detection between a table and an obstacle. To enable that, controllers ordered with this option are equipped with a very sensitive sensor that will sense even the smallest disturbance of the table's upward or downward movement.

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This system ensures a reliable detection of a collision, if the collision leads to a very small change in the position of the tabletop.

To sense such a change in position, the GyroSense equipped controller must be mounted to the tabletop. Placing the controller in the crossbar will not work!

Attention: Even if the system will sense reliably even very small, unusual movements of the table, it cannot be 100% insured that this will avoid injuries of the table users and persons around the table as also the mechanic of the table and the environment of the table can cause such injuries! This is why no liability can be accepted for personal injury or any other damage! It is the user's sole responsibility to make sure, that personal injury and any other damage is avoided throughout the operation of the table.

GraviSense based collision detection

As a third option for the collision detection the gravitation sensor can be used. This mode reacts to the change of the angle of the tabletop throughout travel.

For every axis it can be adjusted at which deviation from the starting angle a collision event is initiated. This option eliminates the danger, that the table may tilt by more than the adjusted angle. If the angle is for example set to 2°, the movement will stop as soon as the absolute angle in reference to the center of earth varies by more than 2° throughout travel.

To sense such a change in position, the GraviSense equipped controller must be mounted to the tabletop. Placing the controller in the crossbar will not work!

Attention: Even if the system will sense reliably even very small, unusual movements of the table, it cannot be 100% insured that this will avoid injuries of the table users and persons around the table as also the mechanic of the table and the environment of the table can cause such injuries! This is why no liability can be accepted for personal injury or any other damage! It is the user's sole responsibility to make sure, that personal injury and any other damage is avoided throughout the operation of the table.

Adjusting the sensitivity level by the user

After using the table over a longer period of time it is possible, that the movement of the table becomes rough because of wear and/or dirt. This may result in an activation of the collision detection without any collision occurring. Therefore, it is possible for the user to change the sensitivity level of the collision detection by using the control panel menu.

This happens simultaneously for all three types of collision detection if they are activated and for all values set for the motors or axes.

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By default, the sensitivity level is set to the highest sensitivity "2".

For each type of collision detection there is a percentage set in the controller, by which the limit value of the sensitivity is being changed. When changing the sensitivity level from 2 to 3, each limit value is being multiplied by the according percentage and added to the limit value, when switching from 3 to 4 it is added once again.

If the limit value for the Y-axis is adjusted for example to 40 and the percentage change is set to 50 %, then, when switching the sensitivity level from 2 to 3, 50 % of 40 are being added, so the limit value amounts to 60. When switching from 2 to 4, the limit value amounts to 80, the collision detection hence is only half as sensitive as with the default setting.

If configured in this way in the controller, sensitivity level 1 can be selected by the user, which results in all collision detections being deactivated.

Attention: In this case no collision detection is provided anymore.

Adjusting the sensitivity level is described in the menu description for "LM" and "LD" control panels.

Software Wizard

When you connect the programming cable to the controller and the computer you need to install the Wizard program from the homepage www.laing-controller.de/apps
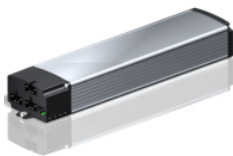
Please open the Wizard:

- Choose to optimize the controller.
- Go to the folder collision.
- Now you are able to change the sensitivity of the GyroSense

Reference run

At first start up, when the table legs have an uneven height or if the wrong height is indicated, a reference run is required. For this the reference mode must be activated by pushing the "down" arrow 4 times.

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When the reference mode is activated, all legs will move downwards with the defined reference speed, no matter if the "up" or "down" key is pressed. The movements are synchronized until the first leg reaches its reference position, after that the remaining legs will continue moving in the "current mode" until they reach their reference position. After that the travel will be set to "0", that means that the control panel will show the height above the floor. Then the drives move upwards by the defined bottom margin.

The reference position can be acquired by:

- Hitting the lower stop of the drive
- Reaching a middle switch
- Reaching a limit switch at the lower end what disconnects the motor.

The method by which the reference position is being acquired must be set in the Wizard.

If a power failure occurs or the mains plug is being pulled out while traveling, the controller will go to reference mode automatically.

If it isn't possible to perform a reference run downwards, a reference run can be set upwards. For this, it is required that the drive contains a limit switch or an upper stop at the top position, which can be driven against.

Determining the stroke by the reference run

When the stroke detection is activated in the Wizard, a reference run will not only establish the reference position but will also determine the stroke of the drive. To enable this, the drives must be equipped with a limit switch at bottom and at the top, or the drive must support, that the bottom and top mechanical stop can be hit to enable the controller to determine the end position without limit switch. If this is the case, the feature can be activated in the Wizard in two ways. It is possible to activate it either in a way, that the stroke is determined in every reference run or just once.

When the reference run is activated, then all drives will move downwards with the set reference speed, irrespective of whether the "up" or "down" arrow is pressed. The movements are synchronized until the first leg reaches its reference position, after that the remaining legs will continue moving in the current mode until they reach their reference position. After that, the travel will be set to "0", that means that the control panel will show the height above the floor.

Then the movement is reversed, the drives move upwards, until the first drive reaches its upper limit switch or hits the upper mechanical limit. Then all drives will stop, the actual height will be entered as travel and the drives will move downwards by the defined "top margin" or in case this is lower than the "top margin" to the "user high".

After this process the stroke is set and isn't smaller than the "minimum pass" anymore, which is why it won't be detected again with the next reference run if the "one time" stroke detection is

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set. If a stroke detection is still desired, the automatic stroke detection can be requested by the menu 63 (menu 63 is only visible when the automatic stroke detection is activated).

Safety zone

For applications where there is risk of an accident when reaching the final part of the downward movement, e.g., when heavy tool shop tables are moved, a safety zone can be activated.

This function must be activated in the controller through the Wizard. There also a height must be entered where the safety zone starts, and a speed must be defined which is active while in the safety zone.

This function is only active when moving downwards!

If the controller is set accordingly, the downwards movement will stop when the set height is reached. Only after pressing the down button again, the movement will continue with the speed set for the safety zone.

Alternatively, the controller can be set through the Wizard in a way, that the movement continues with the speed set for the safety zone when the set height is reached. In this case the button doesn't have to be pushed again.

Through P35 the starting point of the safety zone can be set. For this, the drive must be driven to the desired height, then first P12, after that P35 must be called.

If the bottom user height is changed, the safety zone also moves for the set difference because the safety zone is always calculated based on the bottom user height.

Safety Input

The controller connector for motor 1 provides an input which can be configured as safety input. This function must be activated in the controller through the Wizard, also the voltage levels for normal operation and triggering of the safety function must be set. The connection is made through the safety adapter which provides an RJ45 connector where the safety devices can be connected.

If the safety device provides a voltage triggering the safety function, the controller reacts as if there would be a collision. The movements will be stopped, and the drives will move in the opposite direction by the amount defined under "move back after collision".

The activation of the safety input can also be done automatically, when the safety adapter is plugged in. The automatic activation must be set in the Wizard, then the safety input function is activated and stays activated after the safety adapter was plugged in once to the motor 1 connector.

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If the adapter is removed after that, the safety function will stay activated, that means an operation without safety adapter and attached safety equipment is not possible. By use of the "LD" control panels this function can be reset to auto detect mode, as described below in the menu Handling section.

Attention: The controller can only be used to protect equipment. It is not suitable to protect humans!
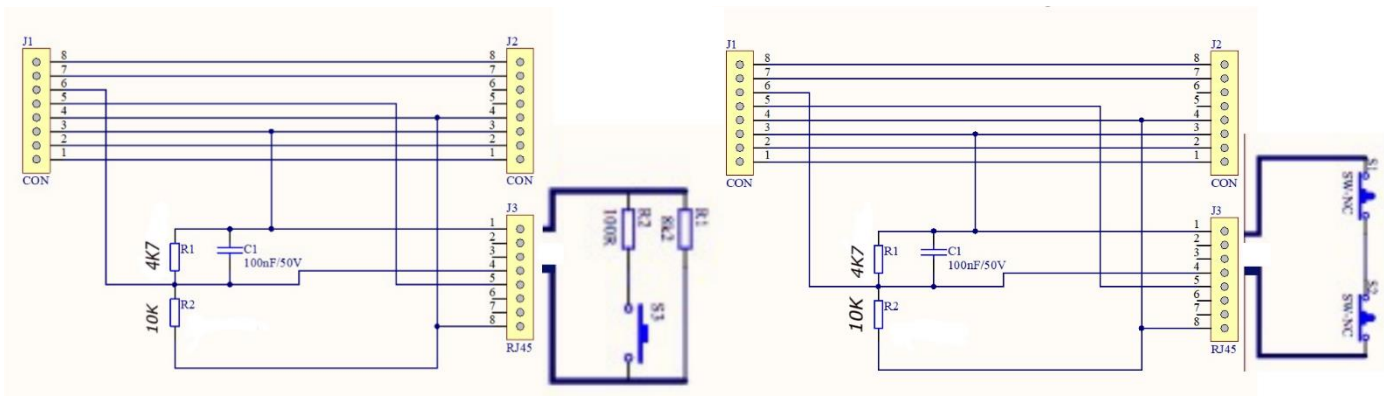
The picture shows the connection of a ribbon switch or sensing bumper to the safety input of the controller. The left side shows the content of the safety adapter, on the right side the part provided by the customer is shown in bolt lines. The 100 Ohm resistor represents the contact resistance of the ribbon switch.

The picture shows the connection of light curtains to the safety input of the controller. The left side shows the content of the safety adapter, on the right side the part provided by the customer is shown in bolt lines.

Automatic motor recognition

When the automatic motor recognition is activated in the controller through the Wizard the controller will check at every start up, how many motors are connected by sensing where the Pin 3 to 6 of the motor connector is bridged.

If the number of detected motors equals the number set in the Controller, the drives will work.

If the number of detected motors is bigger than the number set in the Controller, the number of detected motors will be saved to the controller.

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If the number of detected motors is smaller

than the number set in the Controller, the drives will not work, the failure code F16 "Motor Presence Error" will be shown. In this case the number of motors in the controller must be changed by the Wizard or by using the "LD" control panels as described below in the menu handling section (see menu handling section chapter 9).

When the automatic motor recognition is activated in the controller, it is recommended to set the number of motors to 1 when the controller is delivered to the customer. This can be done through the Wizard or by downloading the appropriate configuration file. Then, when put into service the controller will automatically set the number of motors to the number recognized.

The number of motors can be selected between one and the number of motor channels of the controller used.

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