

LOGICPlus™ Controller



USER MANUAL

LOGICPlus™ Controller

This manual is manufactured by the department of Product Development at SPACE TEK in Ishøj (Denmark).

The SPACE TEK policy is one of continuous product improvement and the right is reserved to alter specifications at any time without prior notice. Whilst reasonable efforts have been made to ensure that at the time of publishing this user manual is correct, the descriptions and illustrations appearing are not binding.

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LOGICPlus™ Controller

1 INTRODUCTION

The LOGICPlus™ Controller is a mobile storage system that is equipped with a computerised control system. It provides intuitive user operation of the mobile storage system.

The system ensures user safety through standard safety features. Additional safety features can always be added to a system.

Installation and use

The LOGICPlus™ Controller system controller is designed for simple 'plug and play' installation. Installation and operation require no special training.

The big touch screen buttons of the keypad allow easy operation of the system. In the event of problems, diagnostic indicators appearing on the keypad facilitate easy system trouble shooting.

The mobile system cleaning procedures can be performed by client staff with minimal system indoctrination.

2 SAFETY

In this chapter all information concerning the safety of the LOGICPlus™ Controller system controller is listed. Also the safety involved when installing and using the system is mentioned.

2.1 International standards

The LOGICPlus™ Controller system controller is tested and received compliance certification for the following international standards:

EN60249	Base materials for printed circuits
IEC326-1	Printed boards: general information for the specification writer
IEC326-5	Printed boards: specification for single- and double-sided printed boards with plated-through holes
IEC326-6	Printed boards: specification for multi layer printed boards
IEC664-1	Insulation co-ordination for equipment within low-voltage systems: principles, requirements and tests
EN60529	Degree of protection provided by enclosures (IP code)
UL94	Flammability rating of plastic materials
UL1950-2	Standard for safety for information technology equipment, including electrical business equipment
IEC950	Safety of information technology equipment, including electrical business equipment. Second edition of the IEC950
cUL	Underwriters laboratories inc. for Canada
ENEC	European Norms Electrical Certification
EN 60950	Safety of information technology equipment, including electrical business equipment.
CE	Conformité Européenne

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The LOGICPlus™ Controller system controller complies with the Low Voltage Directive 73/23/EEC, the Electromagnetic Compatibility (EMC) Directive 89/336/EEC and the CE Marking Directive 93/68/EEC.

Compliance with safety and EMC regulations depends upon installing and configuring the LOGICPlus™ Controller system controller correctly, including using the specified cables.

The LOGICPlus™ Controller system controller may only be installed by professional assemblers who are familiar with the requirements for safety and EMC.

2.2 Safety information

The installation must comply with all relevant safety legislation in the country of use.

2.2.1 Electrical safety

The voltage used in the control system can cause severe electric shock and/or burns, and could be lethal. Therefore extreme care is necessary at all times when working with or adjacent to the LOGICPlus™ Controller control system.

2.2.2 System Design

The LOGICPlus™ Controller control system is intended as a component for professional incorporation into complete mobile storage systems.

If installed incorrectly the control system may present a safety hazard. The control system uses high voltage and currents, carries a high level of stored electrical energy and is used to control mechanical equipment, which can cause injury.

Close attention is required to the electrical installation and the system-design to avoid hazards either in normal operation or in the event of equipment malfunction.

System-design, installation and maintenance must be carried out by personnel that have had the necessary training and experience.

2.2.3 Environmental limits

Instructions in this manual regarding transport, storage, installation and use of LOGICPlus™ Controller control system must be complied with, including the specified environmental limits. The control system must not be subjected to excessive physical force.

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2.2.4 Compliance with regulations

The installer is responsible for complying with all relevant regulations, such as national wiring regulations, accident prevention regulations and electromagnetic compatibility (EMC) regulations. Particular attention must be given to the selection of fuses or other protection and protective earth (ground) connections.

Within the European Union, all machinery in which the LOGICPlus™ Controller control system is used must comply with the following directives:
89/392/EEC: safety of machinery
89/336/EEC: electromagnetic compatibility

2.2.5 Safety of personnel

Before connecting the AC supply to the LOGICPlus™ Controller control system, it is important that the operating controls and their operation is understood. If in doubt, do not adjust the system. Damage may occur, or lives may be put at risk. Carefully follow the instructions in this manual.

2.2.6 Motor current monitoring system (MCMS)

This is a standard safety feature on the LOGICPlus™ Controller.

Every LOGICPlus™ Controller control system is provided with motor current monitoring system (MCMS). This system actually monitors the electrical current being utilized by the motor. During the first 50-70 mm of movement the system controller will detect a current change which it needs to move the mobile. Do not try to stop the mobile during this period of time, because it will build up the current and the mobile will not stop. If after this period of time the controller detects a minute change of current caused by pressure against the moving mobile, the MCMS control system of the LOGICPlus™ Controller issues an emergency STOP command and the mobile movement ceases

The red STOP lights on all the keypads will light up: on the mobile with the controller that issued the emergency stop command the red lights blink and STOP lights on all other mobiles illuminate steady. The aisles have to be checked for any persons or obstructions. By pressing the blinking STOP button the system is put back in operation mode.

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2.3 Safety remarks:

To ensure safety for all personnel concerned and to prevent damage to the LOGICPlus™ Controller and the stored goods, the following 'Safety Precaution Rules' must be observed during installation and use of the LOGICPlus™ Controller.

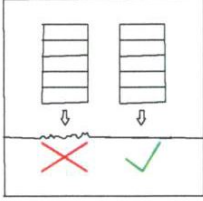

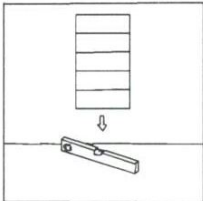

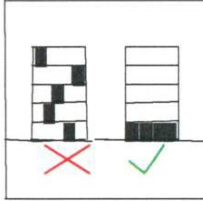

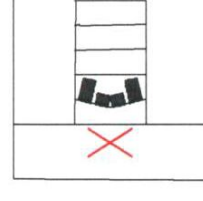

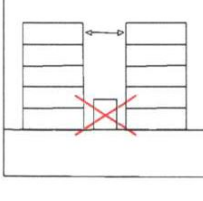
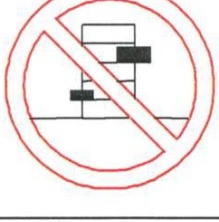
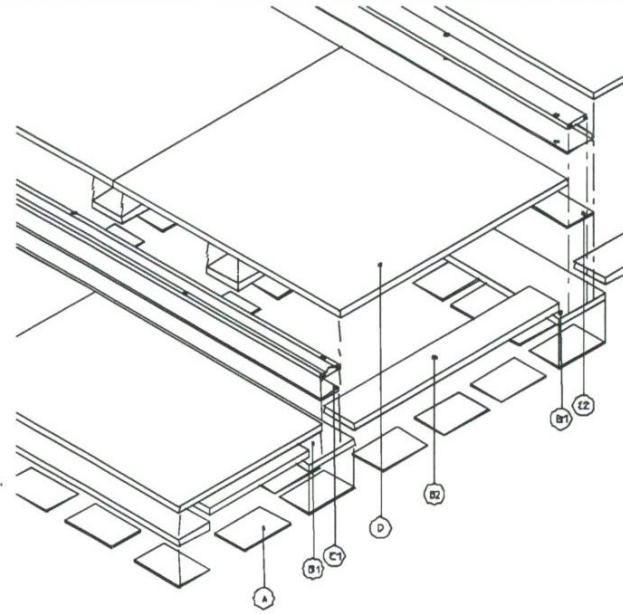
	<p>Prior to the installation of the LOGICPlus™ Controller, the part of the floor on which the system will be installed, must be adequately cleaned and cleared from all obstructions.</p>		<p>Do not use the top shelves of the shelving system for any storage.</p>
	<p>The floor should be as level as possible. Height deviations up to 10 mm can be levelled with levelling shims.</p>		<p>Never climb on the shelving system.</p>
	<p>Prevent uneven loads on the shelving system. Distribute loads evenly over the entire length of the shelving as much as practical. Store heavier loads on the lower shelves.</p>		<p>Never pull the shelving system over.</p>
	<p>Do not overload the system. Maximum 12000 kg. Distribute loads evenly.</p>		<p>Do not store round (rolling) objects in the shelving system.</p>
	<p>Do not store or leave objects in the aisle.</p>		<p>Prevent goods from jutting out of the shelving system.</p>

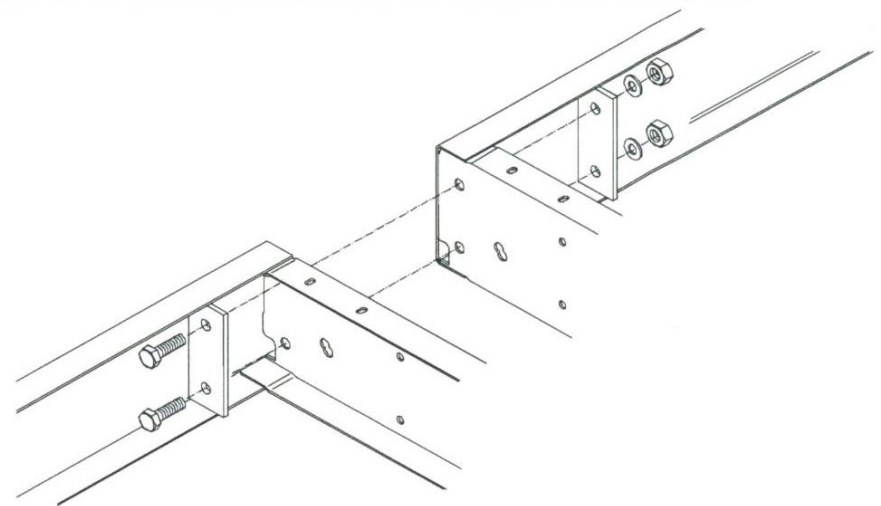
Table 1 Safety precaution rules.

LOGICPlus™ Controller

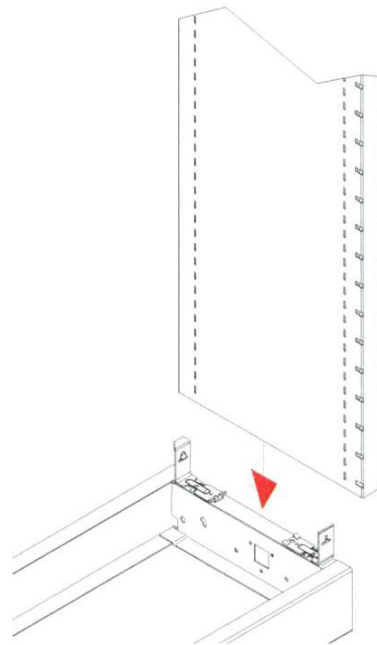
3 INSTALLATION



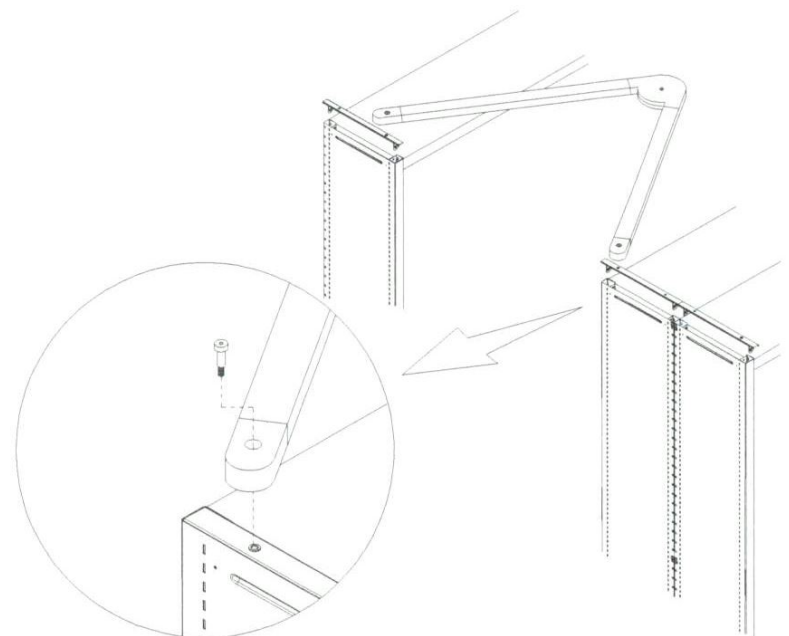
1) Install rails and floor (see Compactus® Archive assembly instruction)



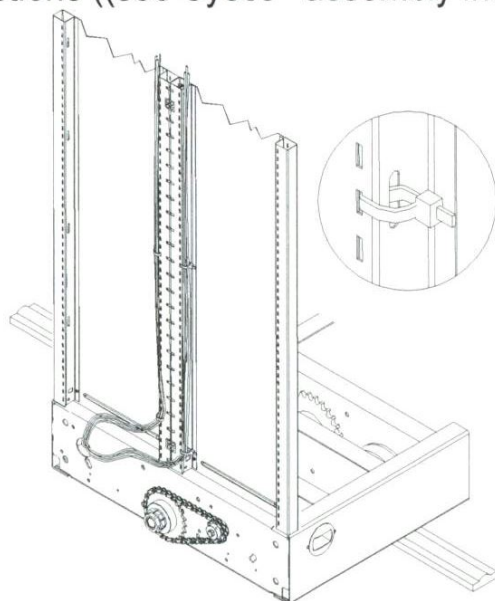
2) Install bases (see Compactus® Archive assembly instruction)



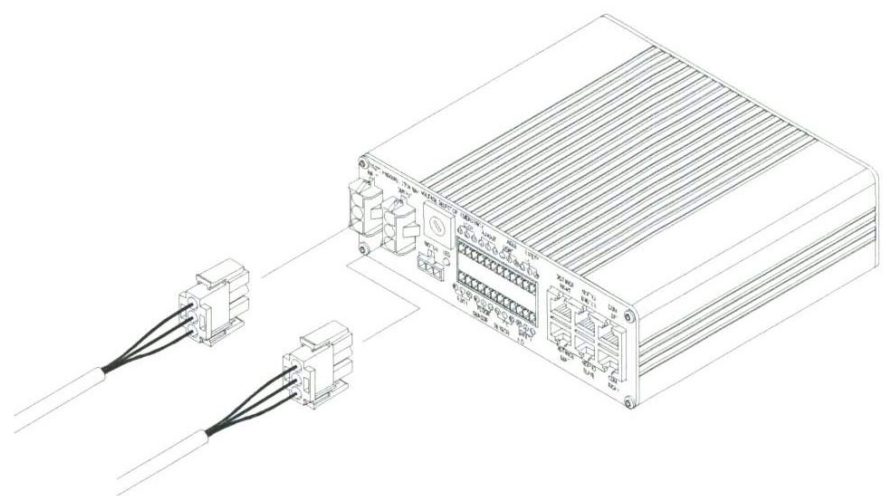
3) Install racking according to installation instructions ((see Sysco® assembly instruction))



4) Close the aisles and install the cable conduits

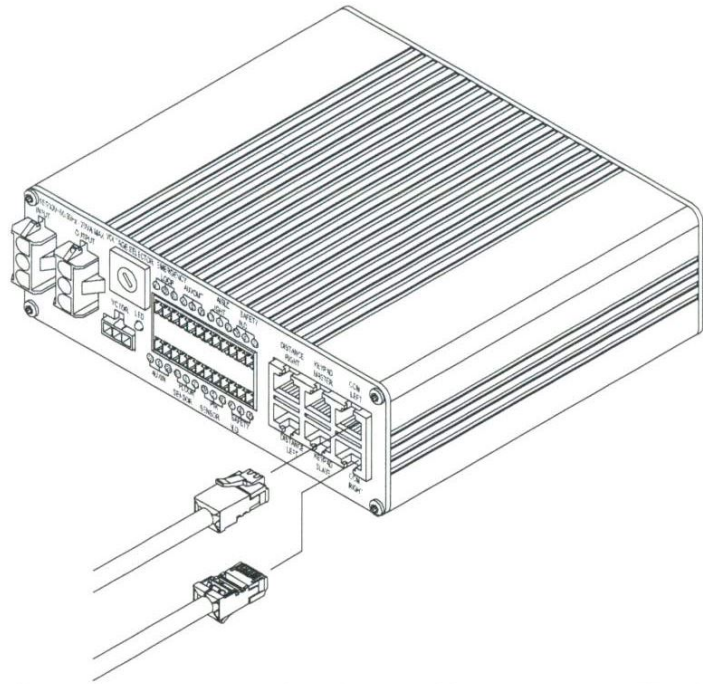


5) Lead down the cables, strap them with ty-rap to the uprights and guide them trough the hole in the crossbeam

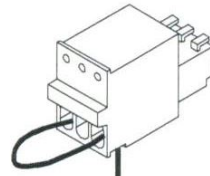


6) Connect power cables as described in connection diagram on page 5/5

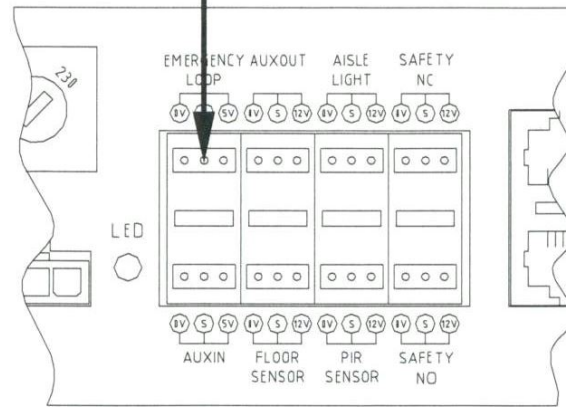
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7) Connect communication cables as described in connection diagram on page 4 - 5

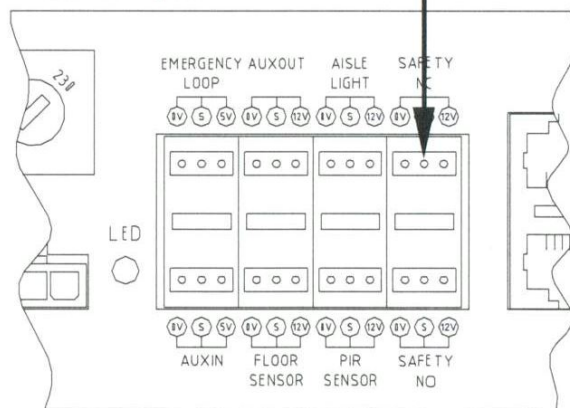
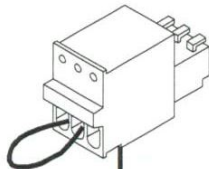


The emergency loop plug (918E12-03) is a one-wire plug, which is already installed in the **EMERGENCY LOOP** connector of all mobiles by the manufacturer

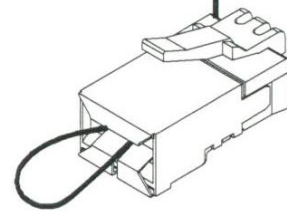
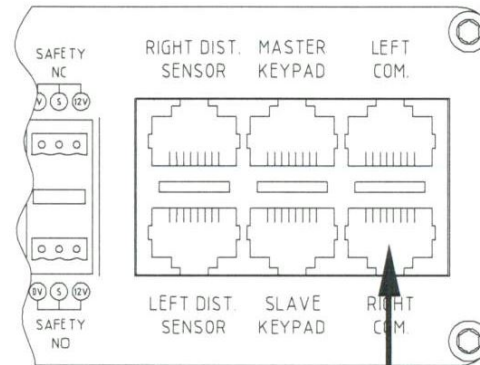


8) Connect the proper endplugs

The safety N.C. loop plug (918E12-04) is a one-wire plug, which is already installed by the manufacturer in the SAFETY N.C. connector of all mobiles. This plug must be removed when you connect an optical safety device to this connector (p.e. photocells)



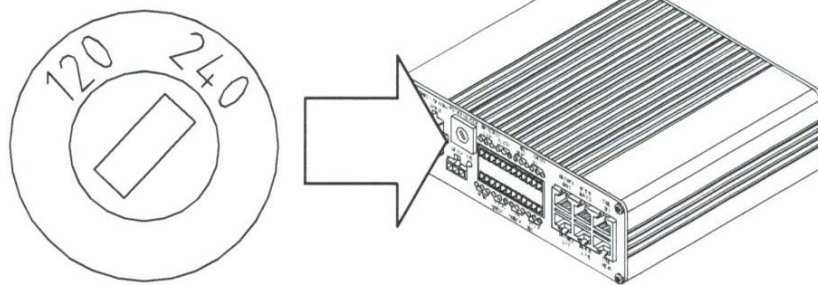
9) Connect the proper endplugs



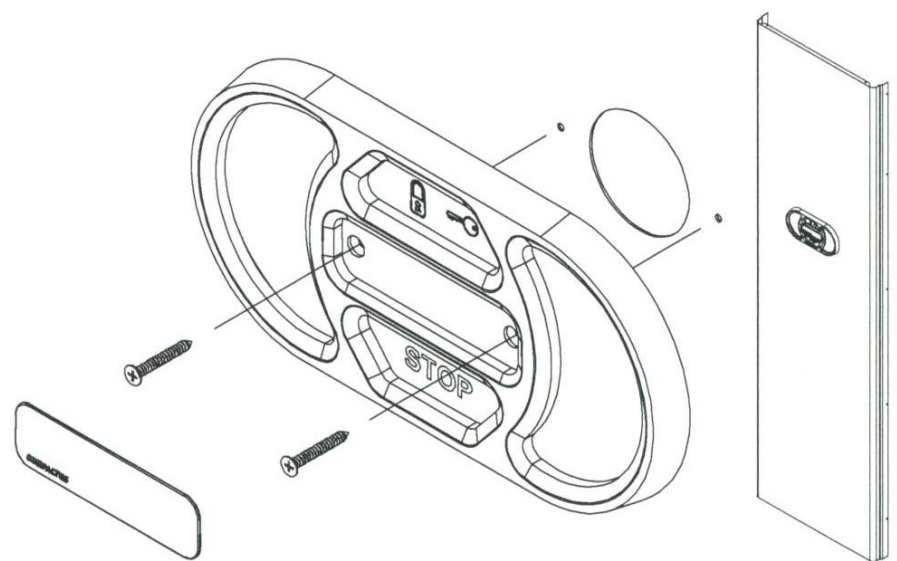
Always plug the communication end plug (918E13-01) in the **RIGHT COM** connector in the controller of the far right mobile

10) Connect the proper endplugs

VOLTAGE SELECTOR

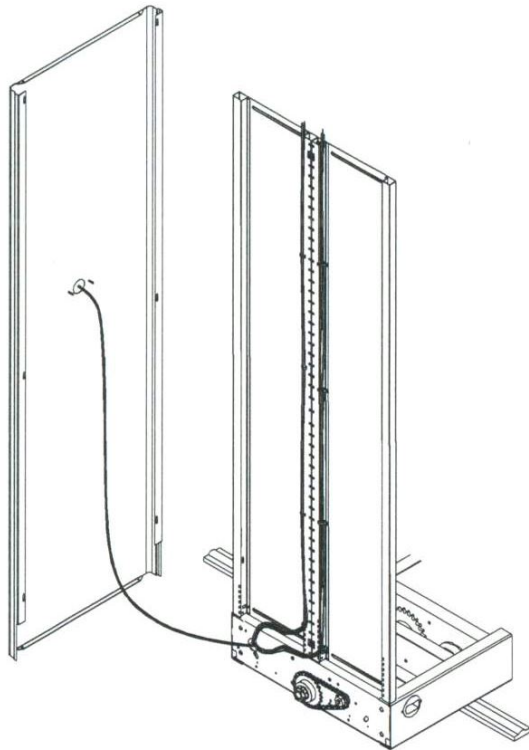


11) Check voltage selector setting

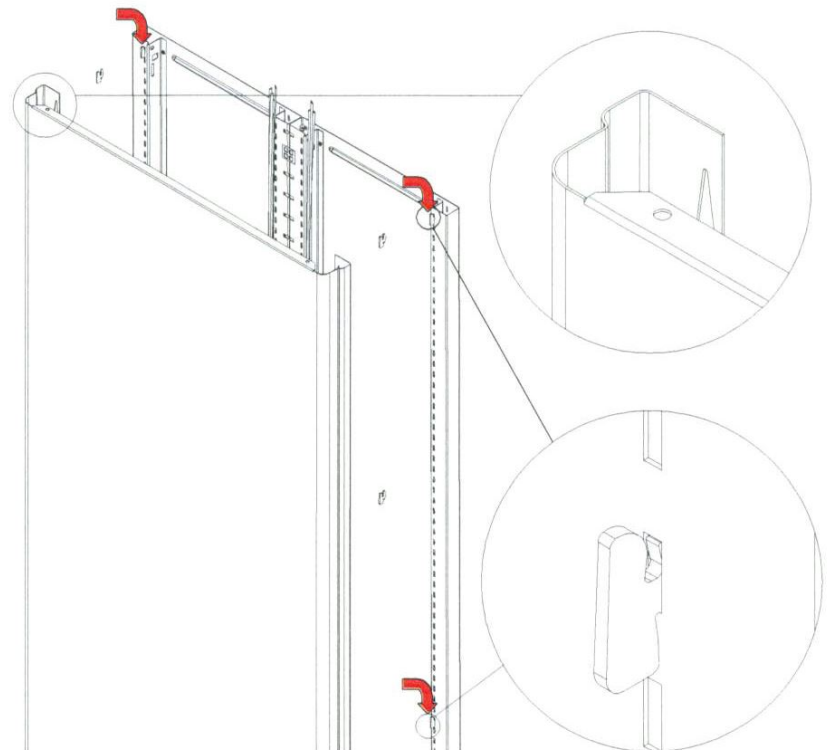


12) Fix keypads to the frontpanels

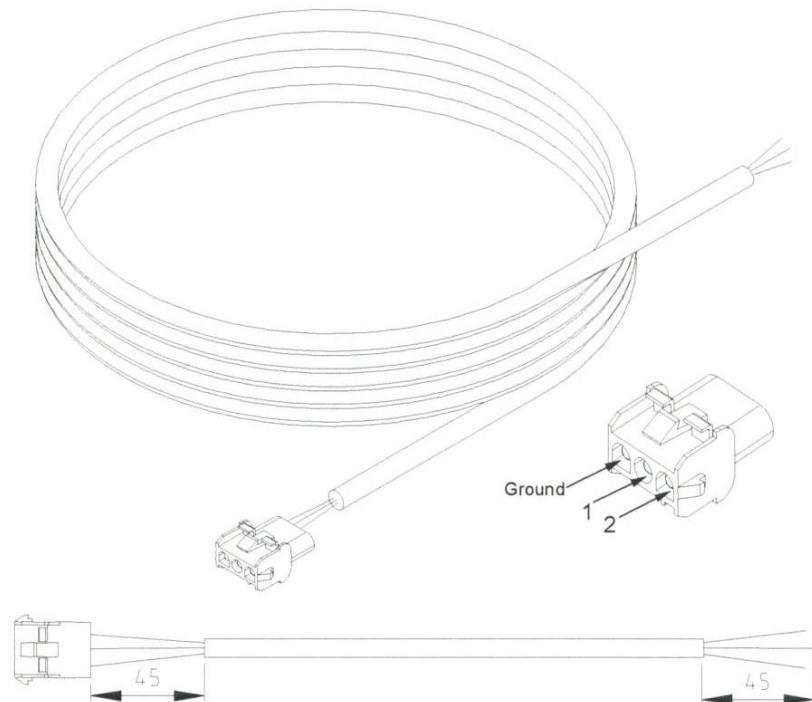
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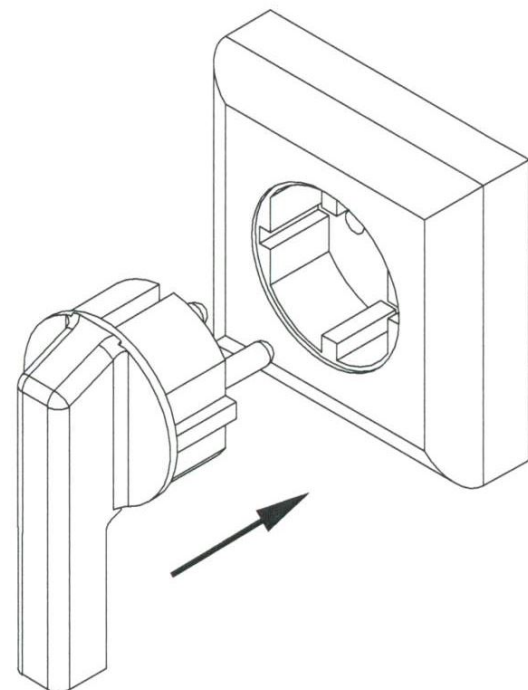
13) Connect the keypad with the controller using the red keypad cable



14) Install the frontpanels


















15) Connect power supply cable

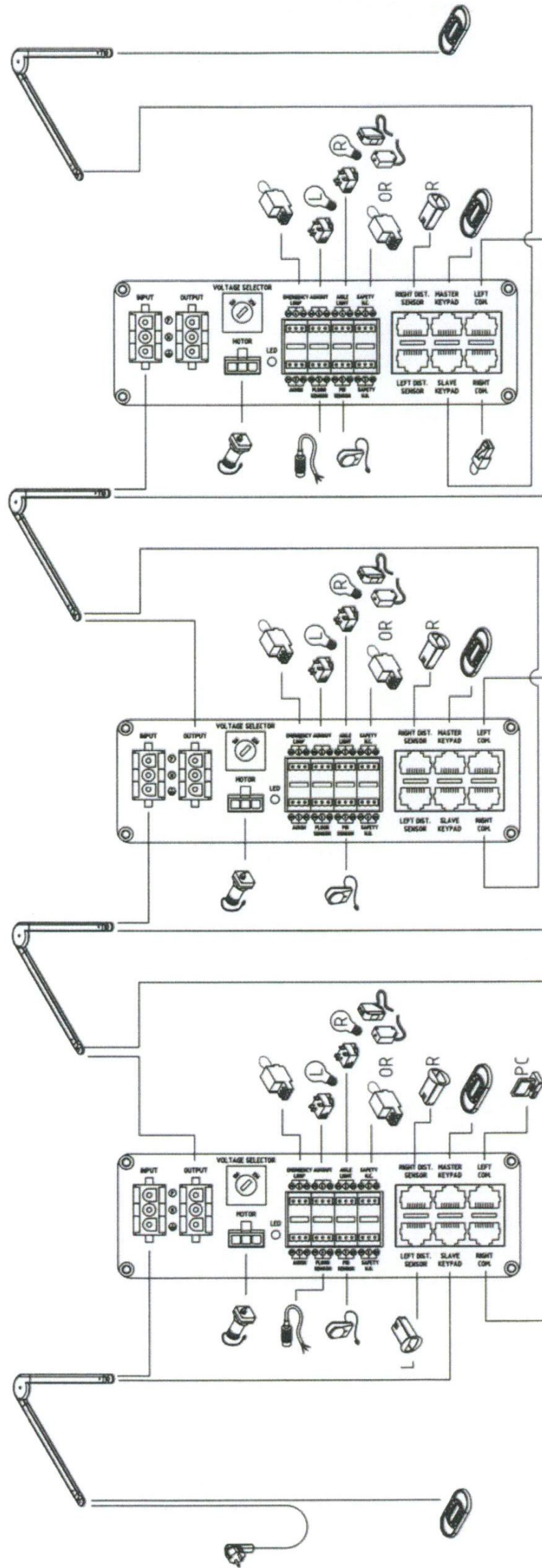


16) Perform final hardware check and power up the system. It will configure automatically

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Connection diagram

	PIR sensor (optional)		Photocell or safety plinth		Communication end plug
	Left distance sensor		Keypad		Emergency loop plug type 3 (installed by manufacturer)
	Right distance sensor		Personal computer (optional)		Safety N.C. loop plug type 4
	Right aisle light relay (optional)		Floorsensor (optional)		Cable conduit
	Left aisle light relay (optional)		Motor 24VDC		Wall socket plug (supplied by sales office)



Connection diagram far right mobile

Connection diagram middle mobile

Connection diagram far left mobile

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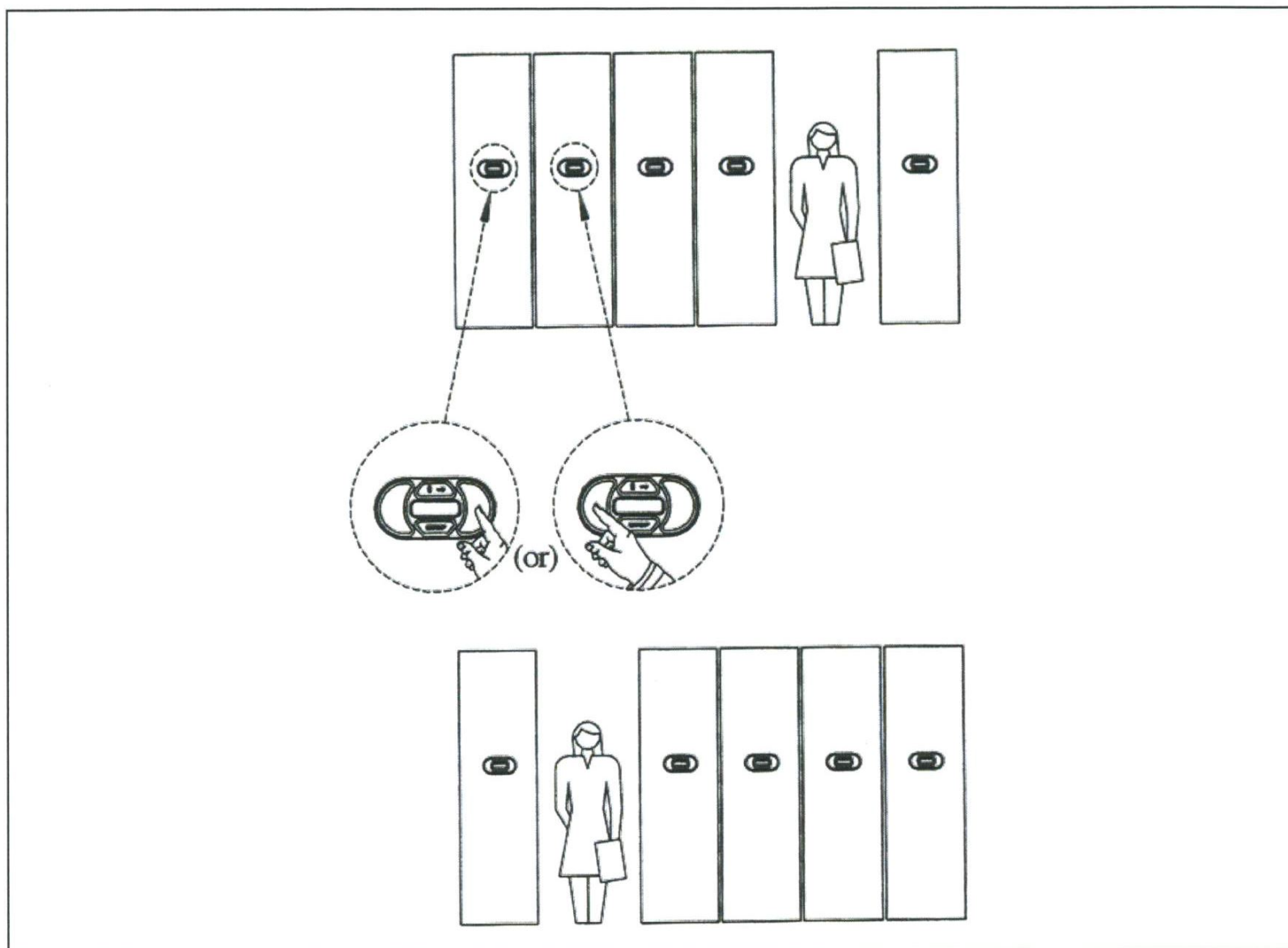


Figure 1 Open the desired aisle

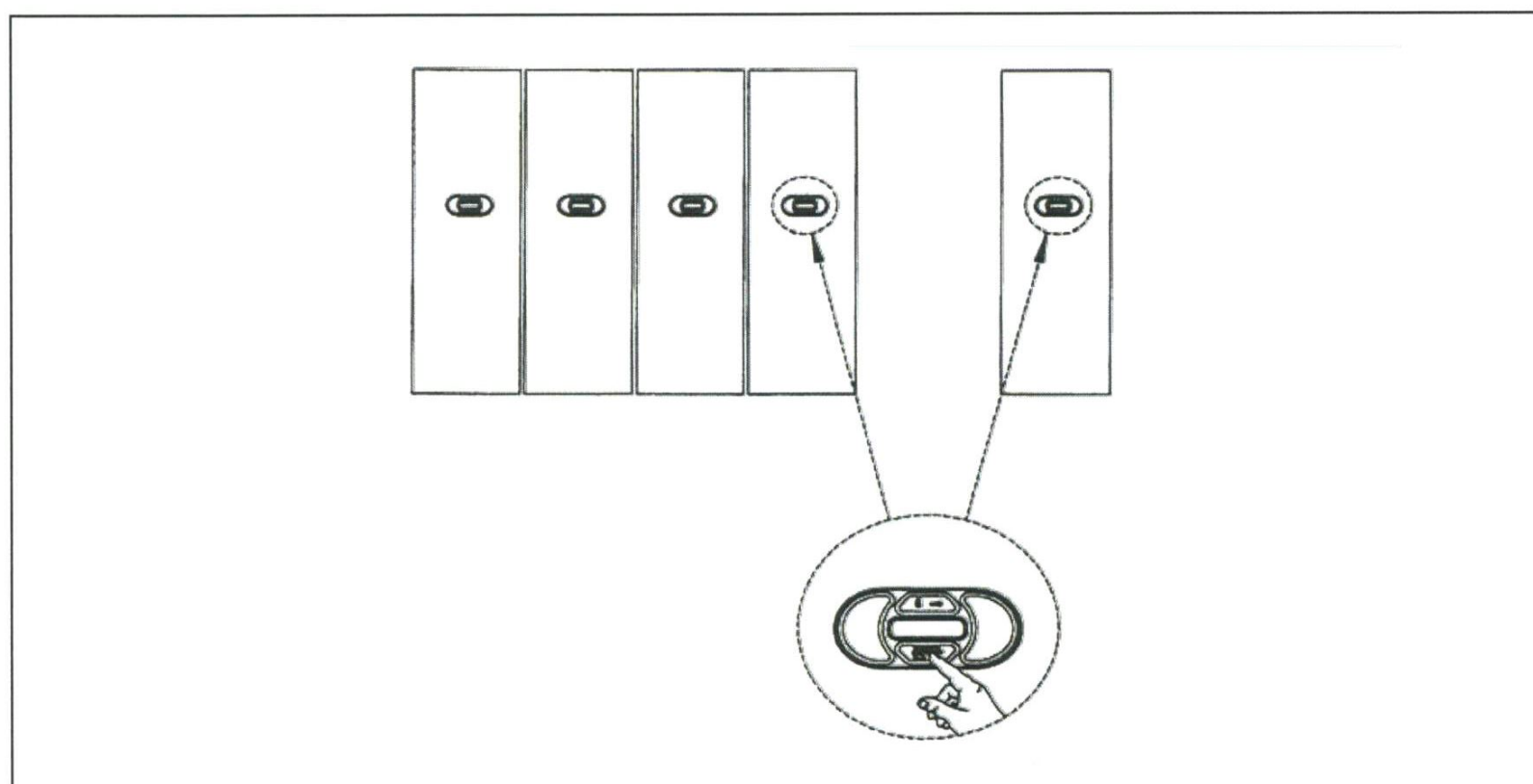


Figure 2 Touch STOP touch-pads on both sides of the opened aisle

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4 OPERATION

In this chapter all methods for operating the system are explained.

The keypad can receive information from programming keys when it is put in the 'PROGRAM' mode. The 'PROGRAM' mode is obtained by pressing the STOP button of the keypad so that the red lights start blinking.

If an operation act is only applicable when a certain option in the system is chosen, it is explained separately with an *italic* header.

4.1 Opening aisles

- Push an OPEN button next to the aisle you want to open (see figure 1). The touch-pad can be touched on either side of the desired aisle location.

Passive safety is active (refer to chapter 4.7 Optional: Passive safety)

- Clear the open aisle(s) first by pushing the illuminated STOP buttons on the left- and right-hand side of the open aisle(s) (see figure 2).
- Push an open button next to the aisle you want to open (see figure 1).

The new aisle OPEN button has to be touched within 10 seconds after clearing the current aisle(s) (by touching the illuminated STOP buttons).

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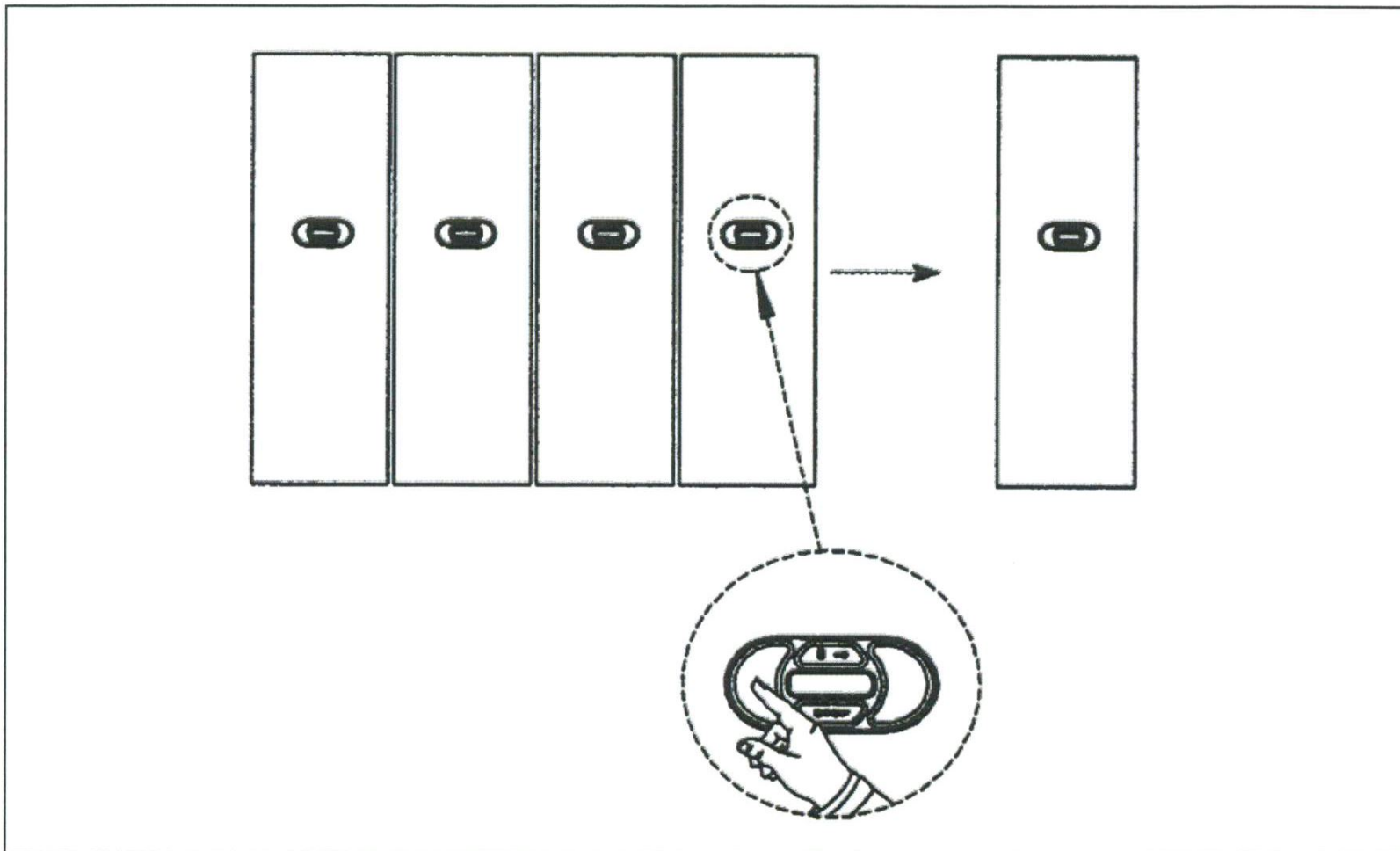


Figure 3 Move the carrier to create the desired stopping distance

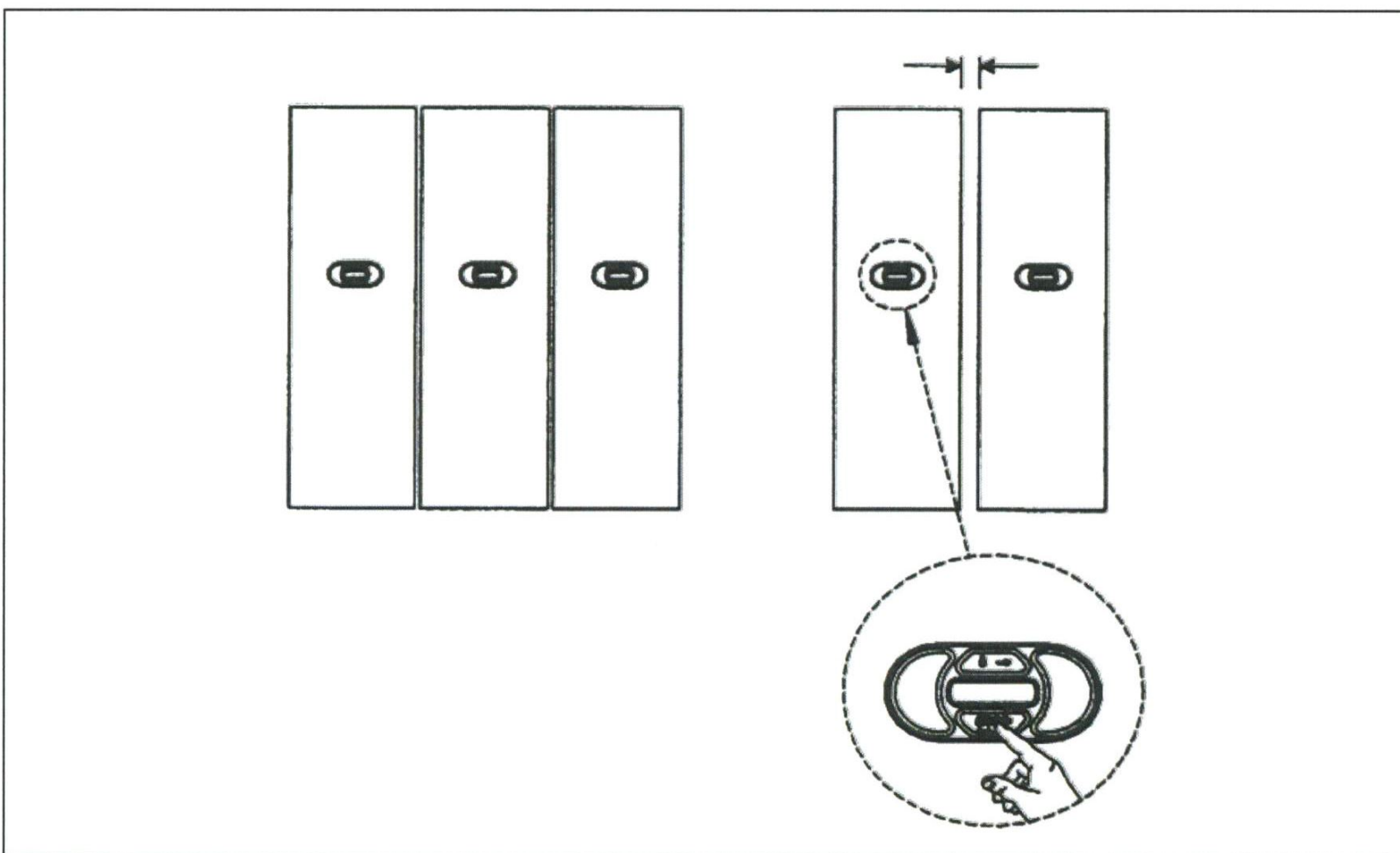


Figure 4 Press the stop button when the carrier is at the desired distance from the adjacent carrier

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4.2 Adjusting the mobile base stopping distance

To accommodate better ventilation in for instance a system with exceptionally vulnerable goods, the stopping distance between two bases can be adjusted.

Each carrier can be programmed to stop at any distance up to ± 250 mm away from an adjacent mobile or the wall.

Step 1

Look in the aisle, in which you want to create a stopping distance, on which side of the aisle the distance sensor is situated.

Move the mobile with the distance sensor in that aisle and create the desired distance opening (see figure 3) by pressing the stop button when the mobile is at the desired distance from the adjacent mobile, static or wall (see figure 4).

The moving mobile stops, the STOP button starts blinking and all other STOP buttons illuminate.

Step 2

Touch the STOP button. The red lights on all STOP buttons go out.

Step 3

Take the blue/grey programming key for calibration of stopping distance.

Put the keypad in the 'PROGRAM' mode by touching the STOP button: The red lights start blinking.

Swipe the keypad's key symbol (see figure 5) with the programming key.

The red light above the key symbol light's up for ± 2 seconds: the sensor is now programmed to stop at the new distance.

Step 4

Press STOP to put the system back in operation mode.

Follow the same steps for all mobiles you want the stopping distance changed of.

Note that the far left mobile has 2 distance sensors, which are programmed at the same time. Thus, both sides must be set to the desired distance when programming the stopping distance. When only the left side of this mobile needs to be programmed at a stopping distance: keep something non-transparent (e.g. your shoe or a piece of paper) against the distance sensor on the right hand side of the mobile before programming.

4.3 Change an adjusted stopping distance back to normal or set it to a smaller distance

Step 1

In the aisle you want to change the stopping distance back to normal (0 mm) or set to a smaller distance, look for the distance sensor. Keep something non-transparent (e.g. your shoe or a piece of paper) against this distance sensor.

Step 2

Take the blue/grey programming key for calibration of stopping distance.

Put the keypad in the 'PROGRAM' mode and swipe the keypad's key symbol (see figure 5) with the programming key.

The red light above the key symbol light's up for ± 2 seconds: the sensor is now programmed to close at the normal distance (0 mm).

Step 3

Press STOP to put the system back in operation mode.

To set the new (smaller) stopping distance follow the steps described in 4.2.

Follow the same steps for all mobiles you want to change back to normal or set to a smaller distance.

Note that the far left mobile has 2 distance sensors, which are programmed at the same time. Thus, both sides must be set to the desired distance when programming the stopping distance.

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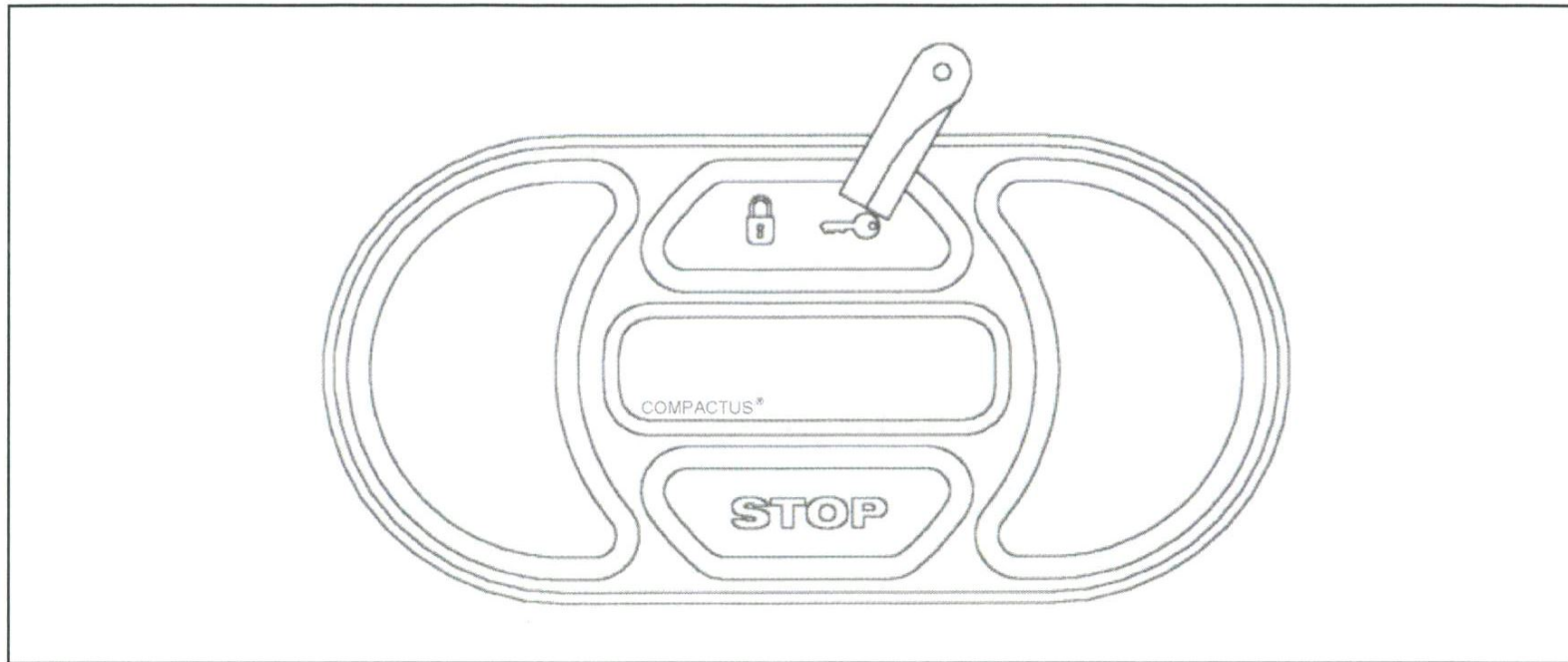


Figure 5 Swipe the keypad's unlock symbol with the transponder key

4.4 Accessing a secured aisle

Step 1

Touch the aisle button of the keypad: the key symbol will start flashing.

Step 2

Take the transponder access key (TAK). Swipe the key symbol on the keypad (see figure 5).

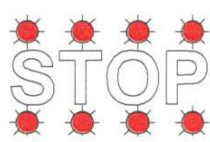
Step 3

The aisle will be activated and open if the TAK code and the mobile's code match.

Remember to secure the aisle again by closing it!

4.5 Optional: Safety plinth

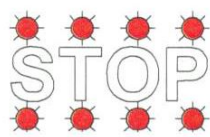
The safety plinth is installed along the mainbeam of the mobile base on one or both sides of the aisle. The safety plinth enables persons or objects in a closing aisle to stop the moving mobiles. By kicking or hitting the lower part of the steel bar (plinth) the main power to the motors is cut off.



As a result, all eight red STOP lights will blink on the mobile with the controller that issued the emergency stop command and all eight STOP lights on the other mobiles illuminate. Touch the STOP button with blinking red lights to put the system back in operation mode.

4.6 Optional: Photo cells

A pair of photocells is situated on the mainbeam of the mobile base on one or both sides of the aisle. When an aisle is closing and the photocell infrared beam is interrupted by an object or person along the mainbeam the main power to the motors is cut off.



As a result, all eight red STOP lights will blink on the mobile with the controller that issued the emergency stop command and all eight STOP lights on the other mobiles illuminate. Touch the STOP button with blinking red lights to put the system back in operation mode.

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4.7 Optional: passive safety

This safety feature forces the user to look in the opened aisle before another aisle can be opened. After any movement within a section of mobiles the stop lights on the keypad will illuminate on both sides of the aisle(s) created. The aisle(s) have to be cleared by touching the illuminated STOP buttons (within 5 seconds - this time is adjustable; see PC link software) to be able to open another aisle in that section (refer to 4.1). Doing this, the user is forced to look into the current aisle(s) and will notice if another person is present in an aisle. After clearing the current aisle(s) a new aisle button has to be touched within 10 seconds (this time is adjustable; see PC link software).

When the system is turned on for the first time, the passive safety feature is not activated. It can be de-activated or activated with the red/grey transponder programming key.

Turn passive safety on again.

Step 1

Take the red/grey passive safety programming key. Put the keypad into 'PROGRAM' mode.

Step 2

Swipe the key symbol on the keypad (see figure 5).

When the red light above the key symbol light's up for ± 2 seconds passive safety is activated.

Turn off passive safety.

Step 1

Take the red/grey passive safety programming key.

Put the keypad into 'PROGRAM' mode by touching the STOP button: The red lights will illuminate.

Step 2

Swipe the key symbol on the keypad (see figure 5).

When the red light above the key symbol light's up for ± 2 seconds passive safety is de-activated.

5 TROUBLESHOOTING AND ERROR CODES

When technical problems occur with the operation of the system:

- Turn the system off (disconnect power).
- Wait approximately 10 seconds.
- Turn the system on.

Now the system has checked and reset its programming.

If the problem still occurs:

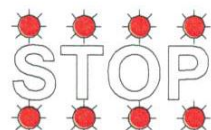
Take note of the keypads to see if any of the STOP pads is illuminated by a single red light.

In table 2 the possible error codes, their cause and the remedy are shown.

First, reset the system by touching the STOP touch-pad.

When the motor current monitoring system (MCMS) is activated the red STOP lights on all the keypads will light up:

On the mobile with the controller that issued the emergency stop command the red lights blink and STOP lights on all other mobiles illuminate steady. The aisles have to be checked for any persons or obstructions. By touching the blinking STOP button the system is put back in operation mode.



When an emergency stop command is issued due to the optional safety features (safety plinth or photocells) the all eight red STOP lights will blink on the mobile with the controller that issued the emergency stop command and all eight STOP lights on the other mobiles illuminate. The aisles have to be checked for any persons or obstructions.

By touching the STOP button with blinking red lights the system is put back in operation mode.

If, despite of following up the below given remedies, the error code remains, contact the authorised service representative.

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INDICATION ERROR	CAUSE	REMEDY
	Right distance sensor error	<ul style="list-style-type: none"> Check if the right distance sensor is connected
	Left distance sensor error or no communication to left side controller	<ul style="list-style-type: none"> On left side mobile: check if the left distance sensor is connected Other mobiles: check communication cable with left side controller
	Reserved for future enhancements	
	Motor error / emergency loop circuit error (Voltage supplied, but no current detected)	<ul style="list-style-type: none"> Check emergency loop Make sure that no photocells are interrupted Check motor connection Make sure that all applicable emergency loop plugs are placed
	Communication error left	<ul style="list-style-type: none"> Check communication cable with left side controller
	Communication error right	<ul style="list-style-type: none"> Check communication cable with right side controller On right side controller: Check if communication end plug is present
	Communication error master keypad	<ul style="list-style-type: none"> Check keypad cable
	Communication error slave keypad	<ul style="list-style-type: none"> Check slave keypad cable

Table 2 Error codes and troubleshooting.

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6 MAINTENANCE

The maintenance of the system is negligible.

6.1 Cleaning

A damp cloth can be used to remove dust particles.



Don't clean the system or a chipboard floor construction with liquids!

6.2 Floor chain

Check and retighten the floor chain once a year. The tension of the chain must be in that order that by moving the mobiles the chain cannot be lifted as a result of the movement.

Dirty floor rails obstruct the mobile bases in their movement. Therefore it is advised to inspect the floor rails at regular intervals and clean them if necessary.

6.3 Disengagement of the drive system

It is possible to move the mobile bases manually by pushing or pulling. This may be required in case of:

- installation of the system
- mains electrical power break down
- system failure

Manual movement requires that the drive system of each of the mobile bases is disengaged. Do this by releasing the transmission sprocket from the drive shaft by loosening the drive coupling.

6.3.1 *Disengagement of the drive system < 6 meter*

For disengagement of the system, working at the front panel of the first mobile base (refer to figure 10), remove the plastic cover plug located in the centre of the plate or remove the steel front panel and proceed as follows:

Step 1

Using the special -32 mm- socket wrench, loosen the transmission coupling by turning one full rotation counter clockwise.



Do not remove the drive coupling.

Step 2

Repeat step 1 for each mobile base.

Step 3

Retain the cover plugs for reinstallation later on.

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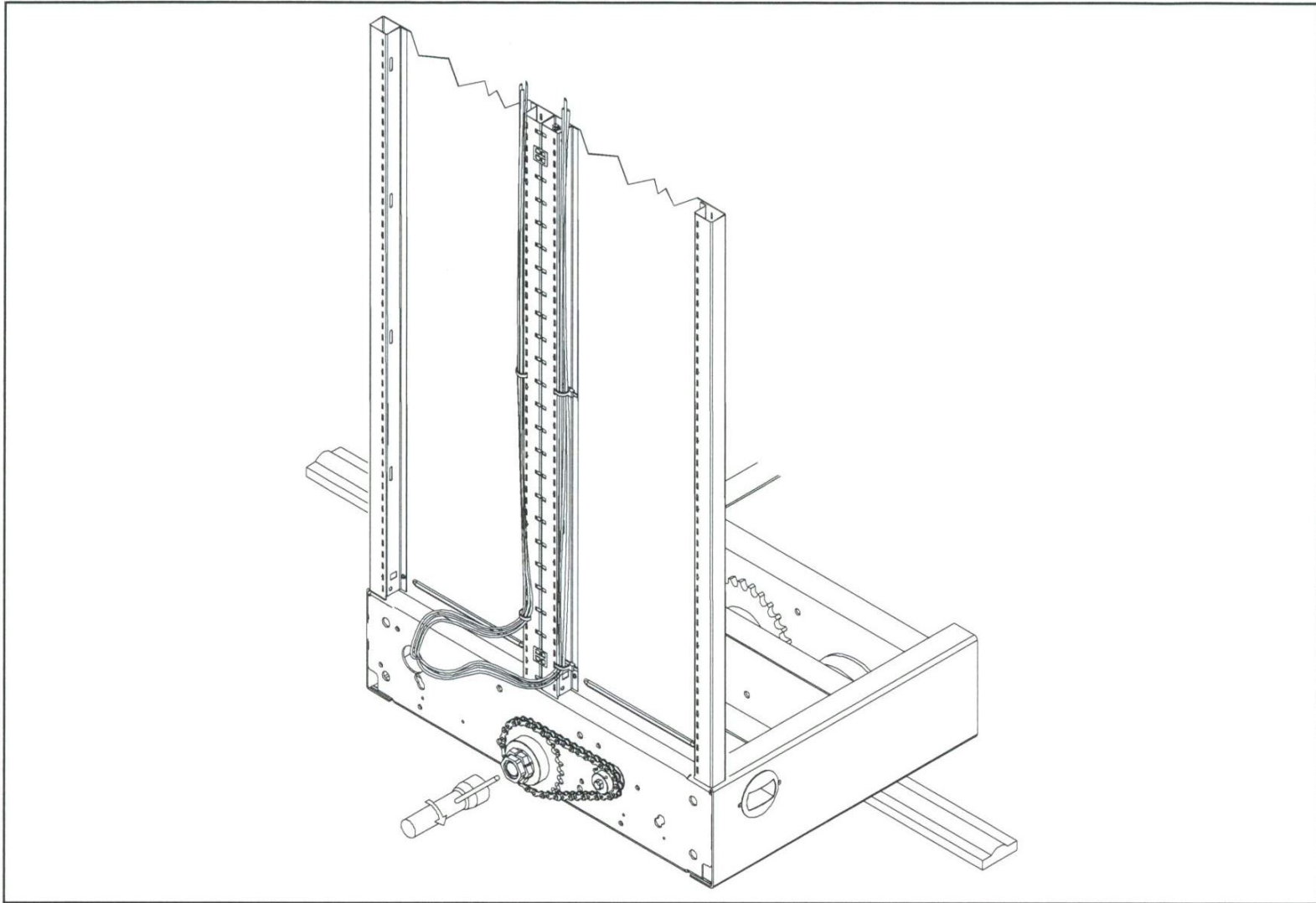


Figure 5 Disengagement of the drive system

6.3.2 Reengagement of the drive system

For reengagement of the system, proceed as follows:

Step 1

Using the special -32 mm- socket wrench, fasten the transmission coupling by:

- pressing the wrench in axial direction to position the coupling and transmission sprocket correctly.
- turning the wrench clockwise making sure the coupling is torqued tight.

Step 2

Replace the plastic cover plug.

Step 3

Repeat steps 1 and 2 for each mobile base.

Step 4

Resume electric operation.

6.3.3 Disengagement and reengagement of the drive system > 6 meter

When it is necessary to disengage the drive system of a system longer than 6 meter, look for the shelf under which the motor is situated (close to the floor chain) and empty it. Remove the shelf.

To disengage and reengage the system, follow the steps described in chapter 6.3.1 and 6.3.2.

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7 PARTS LIST

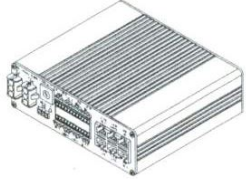

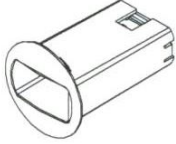
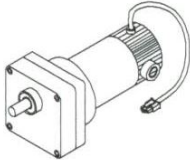
Part		Part number
Standard parts		
	Controller	918E02-01
	Keypad and logo plate	918E03-01
	Distance sensor	918E04-01
	Motor	918E01-01

Table 3 Parts list standard parts

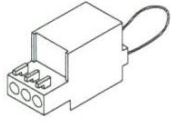
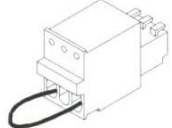
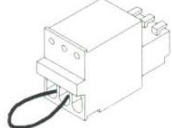
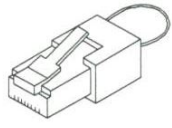
Part		Part number
Standard parts		
	Emergency loop plug (1 wire bridge)	918E12-01
	Emergency loop plug	918E12-03
	Safety N.C. loop plug	918E12-04
	Communication end plug	918E13-01

Table 4 Parts list standard parts: Plugs

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Part		Part number	Standard or option
Transponder keys			
	Transponder key for calibration of stopping distance (bleu/grey)	918E10-01	Standard
	Transponder key to 'lock' mobiles or installation (yellow/grey)	918E10-02	Option
	Transponder key for passive safety (red/grey)	918E10-03	Option
	Transponder key 'manual drive' (green/grey)	918E10-04	Option
	Access key black Access key white Access key red Access key orange Access key green Access key blue Access key yellow Access key brown Access key grey Access key purple	918E10-05 918E10-06 918E10-07 918E10-08 918E10-09 918E10-10 918E10-11 918E10-12 918E10-13 918E10-14	Option
	Master key, will open every secured aisle (red/yellow)	918E10-15	Option

Table 5 Parts list transponder keys

LOGICPlus™ Controller

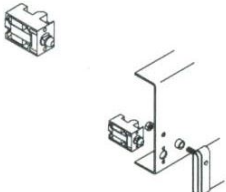
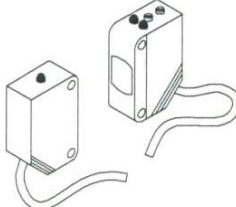

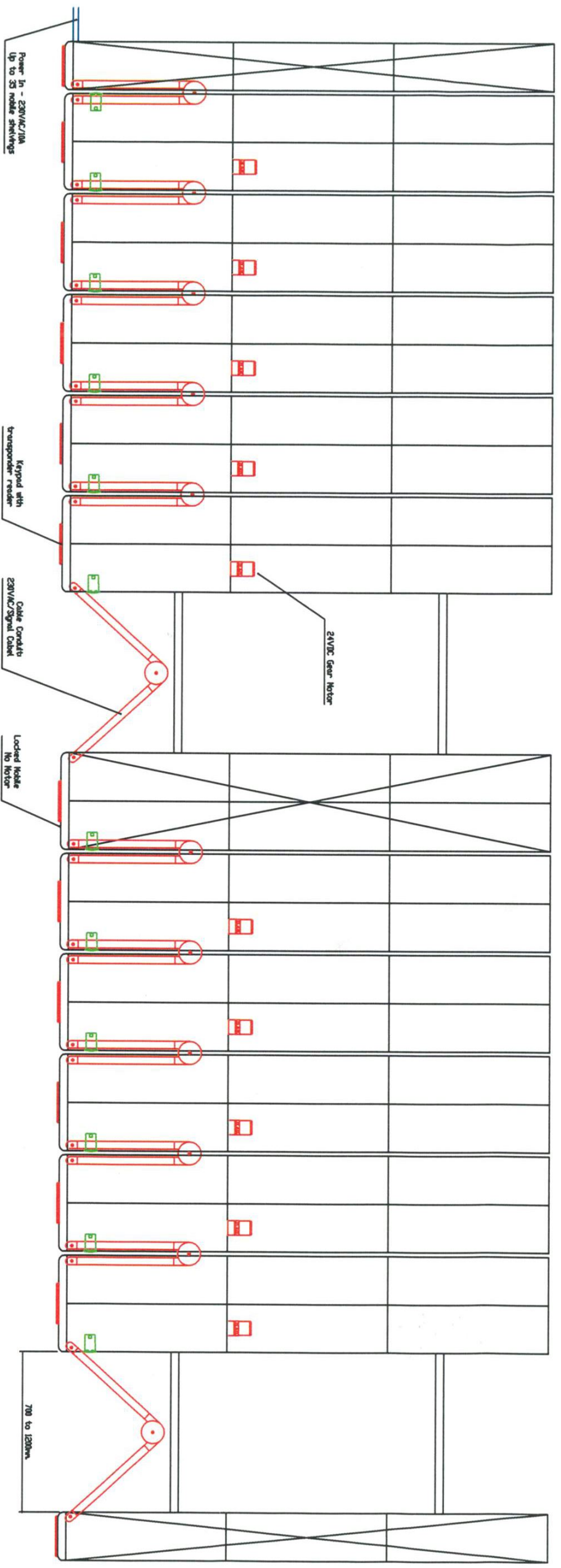
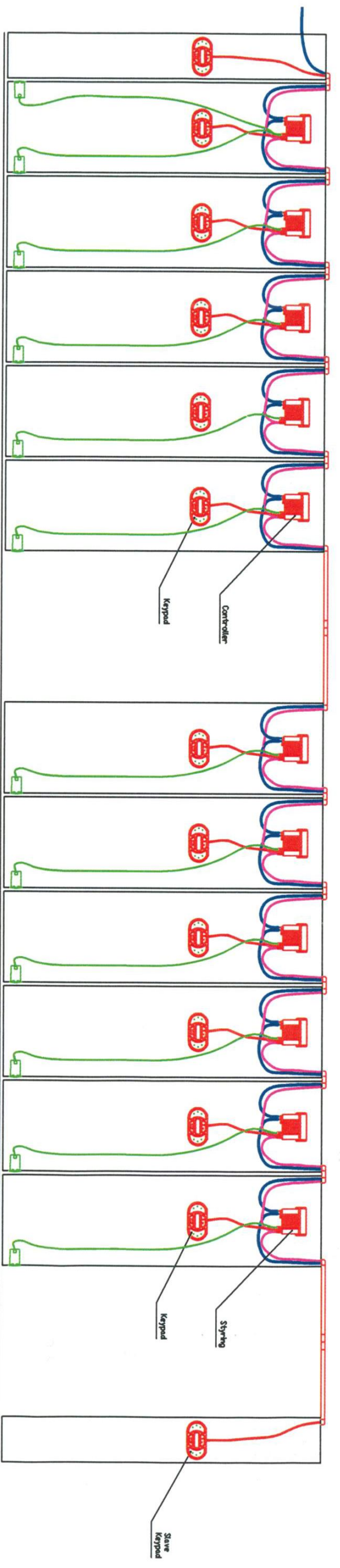
Part	Part number	
Safety features		
	Safety plinth switch Safety plinth	090A01-0063 914C04
	Photo cell set complete	918S01-02
	Motion detector	Not yet established

Table 6 Parts list safety features



SPACE-TEK EUROPE Aps		MAF:	-	Vægt:	-Kg	Scale:	-
Baldershol 286, 2. sal DK-2835 Ishøj		Form:	-	Overflade:	-	Indl:	-
Tel: +45 43 30 50 05 Fax: +45 43 94 50 25		Reference:	A2	LOGICPlus Control System			
		Udarb. Dato:	09.11.05	Ename:			
		Kontr.:	ET	Tegn. nr.:			
		Norm:					
		Dette tegning er var afsluttet og					
		skal ikke uden var tilladelse fore-					
		tages, kopieres eller udbreves til					
		udredskende.					
Nr.	Ændring	Dato	Navn	Varenummer:	Erstatler:	Erstattes af:	
						STE-00401	
						Typical Installation	