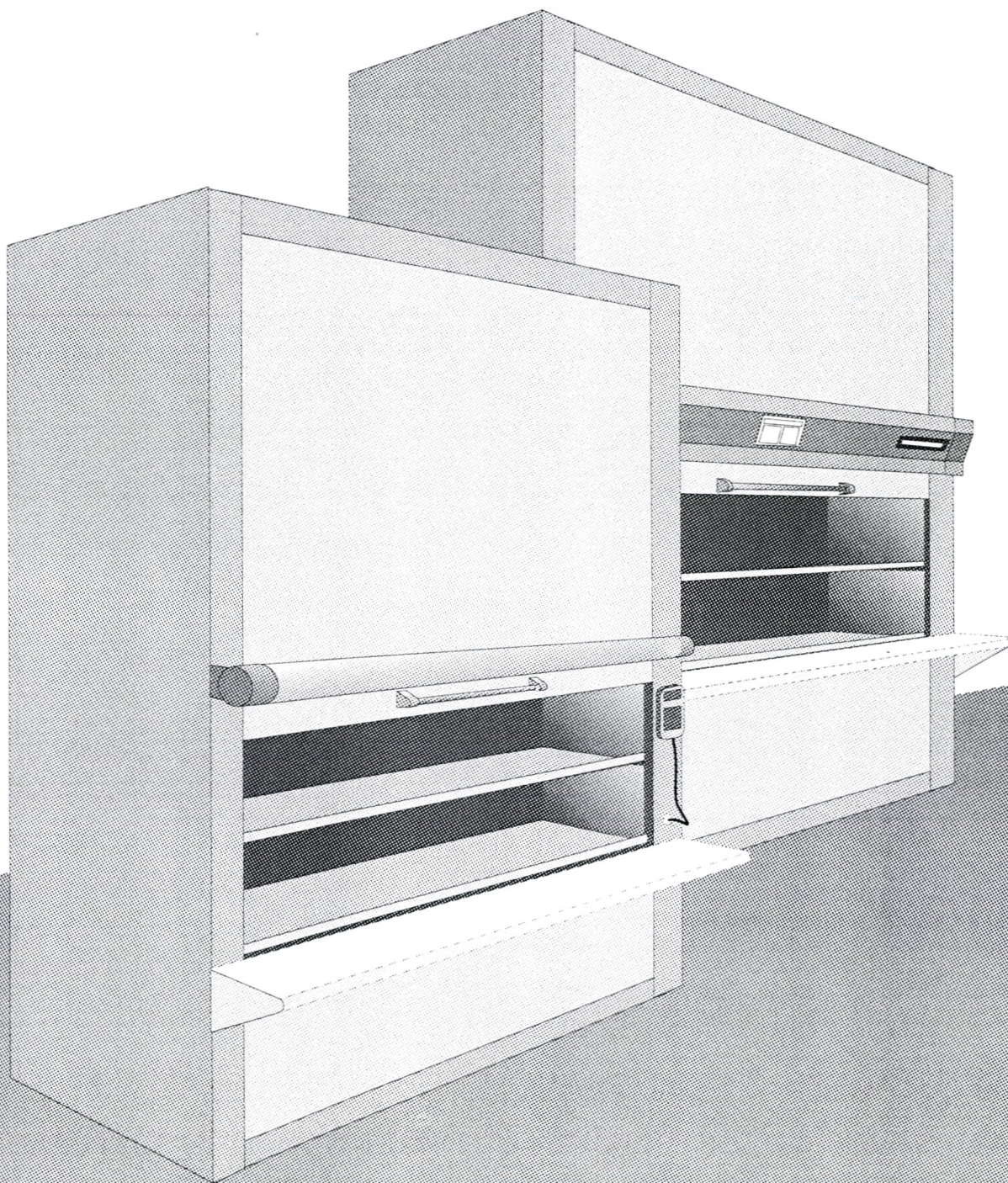


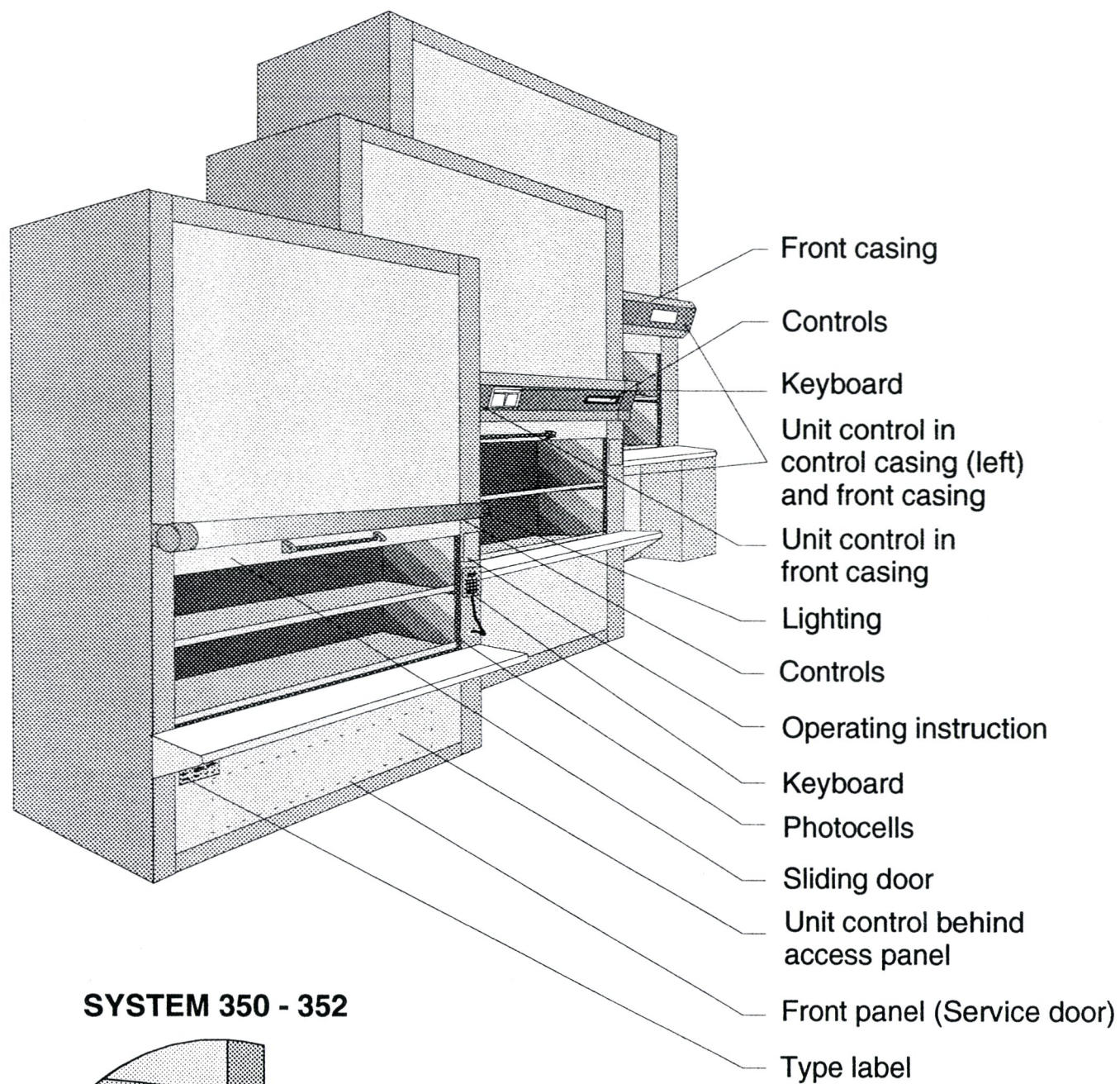
# SYSTEM 120



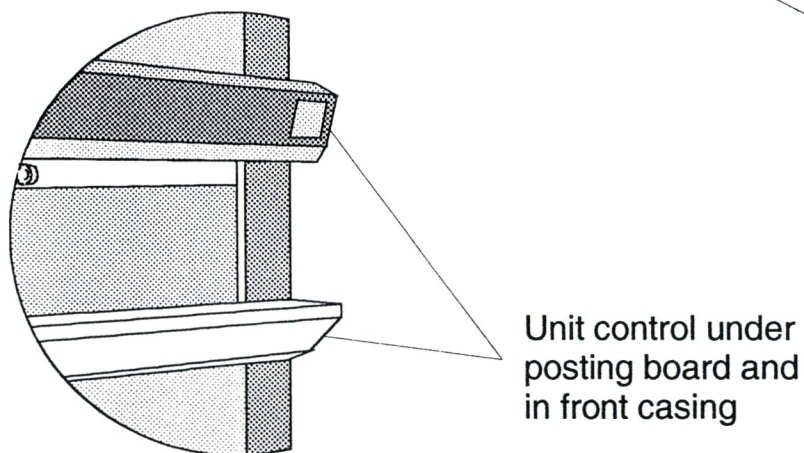
## Operating Manual



## SYSTEM COMPONENTS



## SYSTEM 350 - 352



## OPERATING MANUAL

## CONTENTS

<b>1</b>	<b>IMPORTANT REMARKS BEFORE OPERATING THE UNIT</b>	<b>3</b>
1.1	General instructions and regulations	3
1.1.1	Appropriate use	3
1.1.2	Forseeable improper operation	3
1.1.3	Operating personnel	3
1.1.4	Posting boards on automated storage/retrieval systems	3
1.1.5	Defect-damage removal	3
1.1.6	Readjusting the unit	3
1.1.7	Preventive Maintenance	3
1.1.8	Securing stored items	4
1.1.9	Noise emission	4
1.2	Installation	4
1.3	Floor Conditions	4
1.4	Power Supply	4
1.5	Line Fuse	4
<b>2</b>	<b>OPERATING CONDITION</b>	<b>4</b>
<b>3</b>	<b>SAFETY DEVICES</b>	<b>4</b>
3.1	Object protection	4
3.2	Accident protection	4
<b>4</b>	<b>CONTROLS</b>	<b>5</b>
4.1	Keyboard	5
4.2	Main switch	5
4.3	Power "ON" indicator lamp	5
4.4	RESET button	5
4.5	V.24 Computer signal lamp	5
4.6	Front light switch	5
4.7	Emergency switch	5
4.8	Expanded imbalance display	5
4.9	Emergency Service Switch (Option)	6



**OPERATING MANUAL**

---

<b>5</b>	<b>OPERATION</b>	<b>6</b>
<b>6</b>	<b>TYPE LABEL</b>	<b>7</b>
6.1	Type-Number	7
6.2	Total load capacity	7
6.3	Carrier load capacity	7
6.4	Carrier load capacity	7
6.5	Serial number	7
6.6	Power supply	7
<b>7</b>	<b>LOADING</b>	<b>8</b>
<b>8</b>	<b>EMERGENCY MANUAL OPERATION</b>	<b>8</b>
<b>9</b>	<b>SAFETY REGULATIONS FOR OPERATING</b>	<b>9</b>
<b>10</b>	<b>SERVICE</b>	<b>10</b>
<b>11</b>	<b>TROUBLE SHOOTING</b>	<b>11</b>
<b>12</b>	<b>SERVICE INSTRUCTIONS</b>	<b>12</b>
12.1	Mechanical part	12
12.2	Electrical part	13
12.3	Examination of danger and information signs	13
<b>13</b>	<b>DISASSEMBLY AND DISPOSAL</b>	<b>13</b>



## OPERATING MANUAL

### 1. IMPORTANT REMARKS BEFORE OPERATING THE UNIT



This symbol is to be found next to all operation safety instructions of this operating manual. Non-compliance could result in personal injury.



This symbol you will find next to all installation hints of this operating manual cautioning against electric tension.



This automated retrieval system is a precision-engineered unit equipped with a modern electronic control. It was designed and produced to ensure the safety of the operator and other personnel.

It has been built properly. In order to ensure safe operation and the durability of the unit, the user should read and observe the following instructions.

Any further technical alterations, especially in the field of safety installations, need to be permitted by the factory. Unauthorized alterations are forbidden and cancel any warranty. Beside the loss of the warranty the operating personnel is exposed to an immense risk of danger.

Any modifications, especially those concerning safety devices, must be approved in writing by the manufacturer. Unauthorized modifications are prohibited and lead to cancellation of liability. In addition to the loss of warranty, the operating personnel will be exposed to an unforeseeable involved risk of danger.

In this case the operator assumes all risk.

Please make sure that the relevant national safety regulations will be observed (eg. regulations concerning accident prevention of the employer's liability insurance association) with all assembly works and that all necessary auxiliary aids will be available to the assembly personnel.

### 1.1 General Instructions and Regulations

#### 1.1.1 Appropriate use

The vertical carousel serves as storage retrieval system according to the principle "paternoster"

#### 1.1.2 Forseeable improper operation

To exclude any direct or indirect endangering for the operator or a third person, any operation of the machine which is improper or a misuse is prohibited.

Transport of persons and animals as well as staying in the access area is forbidden.



Storage of easily inflammable resp. explosive liquids or chemicals is also forbidden.

Storage of goods without suitable interior fitments is forbidden.

Storage of unpacked food is forbidden.

#### 1.1.3 Operating Personnel

Carousels and storage/retrieval systems with automated interior fitments should only be operated by authorized personnel to whom the safety regulations are known. (I)

#### 1.1.4 Posting boards on Automated Storage/ Retrieval Systems

Posting boards on carousels and storage/retrieval systems with automated interior fitments may not be used as permanent working tables. (I)

#### 1.1.5 Defect-Damage Removal

Defects noticed on automated storage/retrieval systems which could present a danger to insured persons must be repaired immediately. The machine should not be used until the problem is corrected.

#### 1.1.6 Re-Adjusting the unit

If the unit has not been in operation for a long period of time, or if the unit has been moved to another area, the safety devices must be re-adjusted and, if necessary, be repaired before the unit is ready for use again (II)

#### 1.1.7 Preventive Maintenance

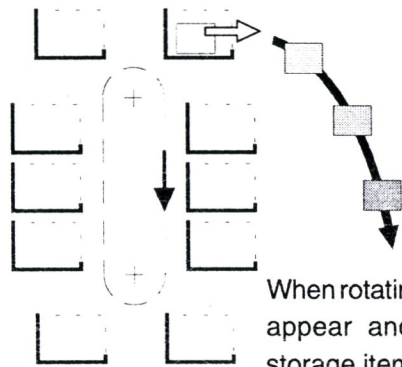
The employer has to see to it that automated retrieval systems or shelves and cabinets with automated interior fitments must be checked, but at least once a year by authorized personnel. The results of the checks have to be reported. (I)



## OPERATING MANUAL

### 1.1.8 Securing stored items

Automated storage/retrieval systems must be loaded in a way that stored items cannot fall out. This includes that also in case of an exchange of the stored items storage installations and -units are accommodated to the stored items. (I)



When rotating accelerating powers appear and so badly fastened storage items might fall out.

- (I) Sections from regulations for automated storage/retrieval systems ZH 1/428, edition of October 1988 "Employers' liability Insurance Company"(BG).
- (II) Sections from regulations for carousels, Form 2158d October 1981- 6000 of the "Swiss Accident Insurance Company".

### 1.1.9 Noise emission

The location of installation should be such that the sound emission is as low as possible. With max. load and max. imbalance the work place related, A-valued continuous sound intensity level produced by the machine is lower than 70 dB (A) [1].

Annotation: [1] Measuring method according to DIN 45635-01-KL 2 "Noise metering on machines".

### 1.2 Installation

Shelves have to be installed perpendicularly. Incorrect installation may cause increased wear or even damage to the unit. Therefore the units should only be installed by authorized service engineers.

### 1.3 Floor Conditions

The floor conditions for storage installations and -units must be such as the dead weights and net weights can be taken up securely.

The evenness of the floor must be within the permitted deviation of max 8mm to 3m distance. Should underlay plates be necessary for a perpendicular assembly of the unit, they must be underlaid at the columns.

For a later moving of the machine the erection surface has to be checked again with respect to the permitted foundation load

### 1.4 Power Supply

The power supply to the machine should be compared with the information on the type label.

### 1.5 Line Fuse

It is advisable to use time-delayed fuses as specified in the respectable technical manual or corresponding circuit breakers (16 A, 220 V).

## 2. OPERATING CONDITIONS

TEMPERATURE	5°C to +40° C (operating) -20°C to +70° C (Non-Operating)
HUMIDITY	10 - 90% Condensation not allowed
MAX. THERMAL SHOCK	15° C/h (Operating) 10° C/h (Non-operating)
OPERATING NOT ALLOWED	- in explosive atmosphere - in corrosive

## 3. SAFETY DEVICES

### 3.1 Object protection

Photocells (depending on equipment)

Photocells secure the working area. Their prior task is protection of the stored items.

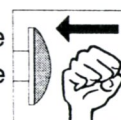
If the photocells are interrupted while the unit is in motion, the green key on the keyboard has to be pressed for re-start.

### 3.2 Accident protection

A number of safety devices are provided, which offer the operator a maximum of safety during operation.

Keep hands out of operating unit in order to avoid any injury.

Emergency Stop Switch: In case of danger the emergency stop switch stops the complete unit.





## OPERATING MANUAL

**Sliding door**

The completely opened sliding door works as a safety bar in its end-position. The machine can only start if the sliding door is fully opened.

**Front Access Panel (Service Door)**

The lower front access panel is equipped with a safety switch which prevents the operation of the unit when the panel is open. It is removable and can be disengaged by means of a screwdriver or a similar device (e. g. a coin) for the retrieval of items accidentally dropped into the machine.

**Motor protection**

The motor is provided with a safety switch which prevents running of the unit when the hand wheel or hand crank is detached for emergency service.

**Accident protection photocells (in case of extensions, otherwise optional)**

They prevent the unit's running in case of pulled-out or irregularly locked extensions.

In case of other interruptions of the safety circuit (safety bar, front access panel, motor protection, accident protection photocells) the RESET button has to be pressed first and then the green key on the keyboard.

**4. CONTROLS****4.1 Keyboard (Terminal)**

Electronic control unit (see Operating Instructions for Terminals)

**4.2 Main Switch**

ON/OFF switch of unit and of all connected peripheral devices.

**4.3 Power "ON" indicator lamp**

Unit "ON" control

**4.4 RESET button (green)**

when control system is situated inside the front case > green illuminated push button.

**4.5 Computer connection signal lamp (yellow)**

Signal lamp for computer communication . (Option)

**4.6 Front light switch**

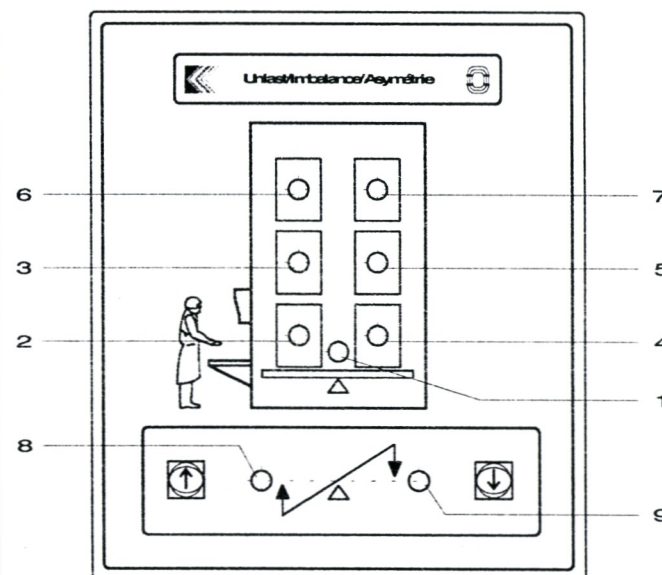
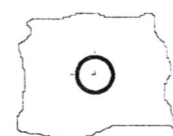
Switch for illumination of front light (only for installed front light).

**4.7 Emergency Switch**

Unit stop in case of danger.

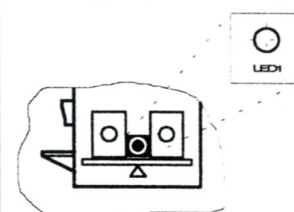
**4.8 Expanded imbalance display**

(optional and only in connection with imbalance register for units with a loading capacity greater than 3t)

**Operating manual:**

The imbalance display informs the user about the loading condition of the automated retrieval system.

Loading is symbolized by



7 luminous diodes.

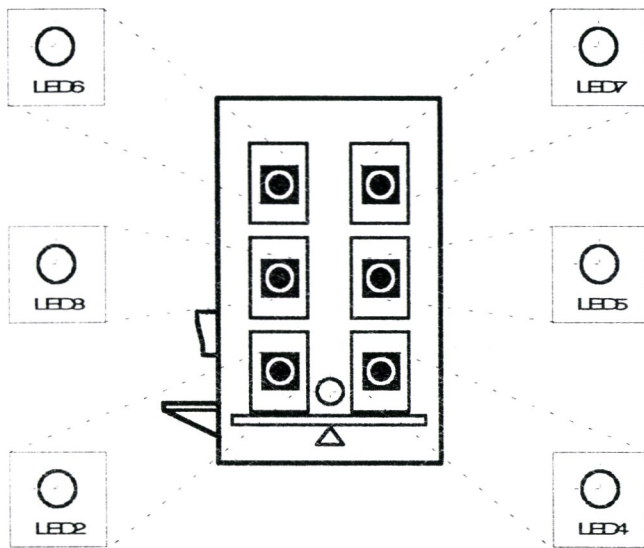
The green luminous diode (LED1) announces symmetrical loading.

Unsymmetrical loading conditions are present when one of the two carrier loads has a higher loading. Three luminous diodes inform the user about the current loading conditions.



## OPERATING MANUAL

A higher loading of the forward carrier load (withdrawal area) is signalized by the two yellow LED 2 and 3, as well as by the red LED 6. The two yellow LED 4 and 5, as well as the red LED 7 draw one's attention to higher loading.



### Flashing of one of the yellow LED 2 or 4 signifies:

Unequal loading.

### Flashing of two yellow LEDs 2 and 3 or 4 and 5 signifies:

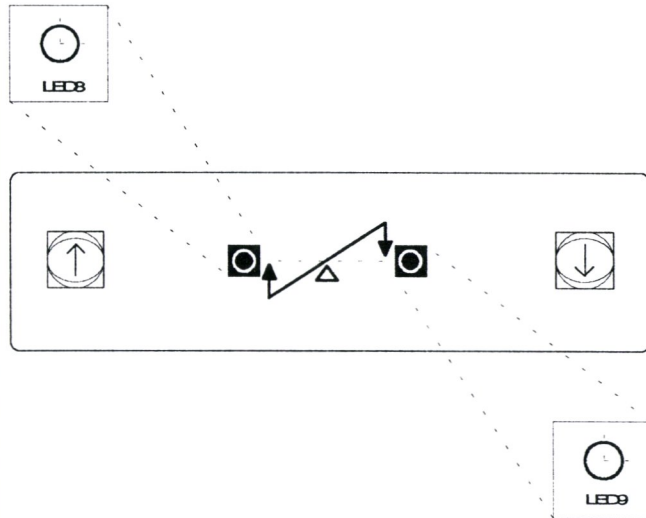
Immensely unsymmetrical loading.

### Flashing of two yellow LEDs and red LED 6 or 7 signifies:

That the max. upper asymmetry is reached or exceeded.

The unit has to be brought into a more equal loading condition by means of reloading or unloading.

In addition to the asymmetry display there is another display to support the user when equalizing the loading condition. LED 8 and 9 show him in which direction he has to move the carrier load to obtain a loading balance.



### 4.9 Emergency Service Switch (Option)

Enables the unit to run from bottom to top in case of control failure. The safety devices (except for object protection photo cells) remain active.

## 5. OPERATION

1. Open sliding door completely. For first operation see operating instructions for keyboards (Terminals).
2. Switch on main switch. Pilot lamp will light up.
3. Press green RESET button.  
Please see operating manual of terminal.



Should the machine not be ready for use after having observed above-mentioned instructions, please see chapter "Trouble Shooting" for further details.

According to the Safety Regulations for units with two or more access openings, operation is only possible from one opening at a time. The others must be closed.



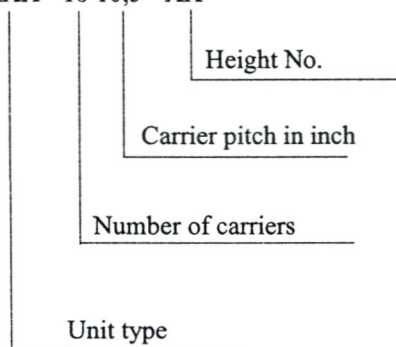
# OPERATING MANUAL

## 6. TYPE LABEL

BELLHEIMER METALLWERK GMBH		D-76752 Bellheim	
<p>Typ-Bezeichnung Modell-Nr. Modell-Nr.</p>			
<p>Einheit-Nummer Güter-Nr. Ser-Nr.</p>			
<p>Statistik Year of construction Année de construction</p>			
<p>U.S. Customs-Nr. Taux douan.</p>			
<p>Charge totale</p>			
<p>U.S. Federal tax identification number 3 and 4 digit number Charge maximale par Statut, uniformément répartie</p>			
<p>Unit Charge Unit Douaniers</p>			
<p>Die Summe der Fachwerte auf die angegebenen Gesamt-Nutzen in beiden Fall überschreitet The sum of carrier facts must not exceed the total facts Le total des charges de tous les statutaires ne doit pas excéder la charge totale admissible</p>			
		kg	kg
		kg	max.kg
		kg	kg
		V-	A
		kg	kVA

## 6.1 Type-Number

Beispiel : SYSTEM XXX - 18 10,5 - XX



## 6.2 Total load

The total load is the sum of all individual carrier loads.

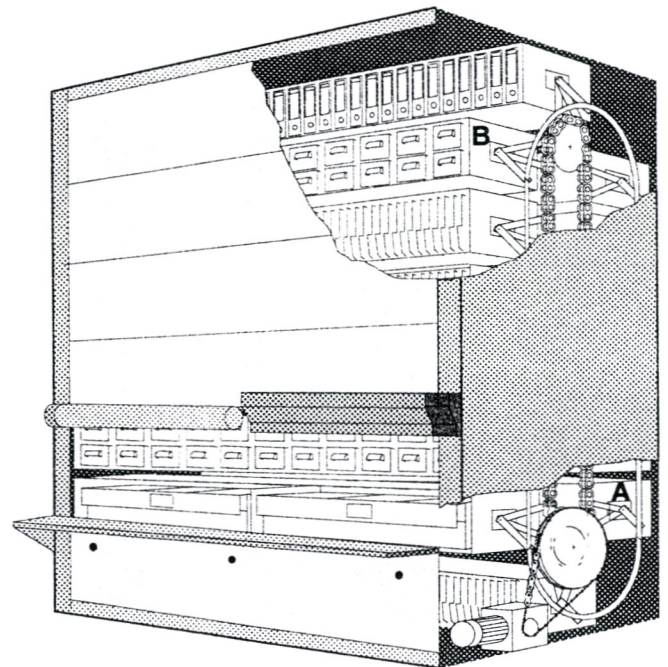
### 6.3 Admissible Carrier Load

The carrier load is the max. load per carrier.

However, this is a surface load which has to be equally distributed.

## 6.4 Max. Imbalance

Imbalance is the difference in weight loads between front **B** and back **A** carrier loads.



## 6.5 Serial-Number

For inquiries the serial number has to be stated in addition to the unit type. This number gives us also the production date.

## 6.6 Electrical Power Supply

These figures must be compared with the given power supply before the first operation of the unit is startet.



## OPERATING MANUAL

### 7. LOADING

The unit operates at maximum efficiency if all carriers carry approx. the same weight. It is desirable to maintain balance for continued satisfactory operation.



The maximum loading capacities are stated on the type label.

#### Method of first loading:

Select the first carrier and load it. After this has been loaded select the carrier opposite to the first carrier.

#### Example:

In a unit with 30 carriers, after the first carrier has been loaded, select the 16th carrier. After the 16th carrier is loaded, the 17th carrier is selected. Next the 2nd one is selected and loaded; followed by the 3rd and 18th, and 19th and 4th, and so on ...

#### Table with sequence for loading carriers:

20 carriers: 1 - 11 - 12 - 2 - 3 - 13 - 14 - 4 - 5 -  
15 - 16 - 6 - 7 - 17 - 18 - 8 - 9 - 19 -  
20 - 10

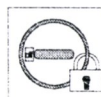

26 carriers: 1 - 14 - 15 - 2 - 3 - 16 - 17 - 4 - 5 - 18 -  
19 - 6 - 7 - 20 - 21 - 8 - 9 - 22 - 23 - 10 -  
11 - 24 - 25 - 12 - 13 - 26

30 carriers: 1 - 16 - 17 - 2 - 3 - 18 - 19 - 4 - 5 - 20 -  
21 - 6 - 7 - 22 - 23 - 8 - 9 - 24 - 25 - 10 -  
11 - 26 - 27 - 12 - 13 - 28 - 29 - 14 -  
15 - 30

### 8. EMERGENCY SERVICE WHEN CURRENT SUPPLY FAILS

In case of a failure of the current supply the unit can be operated by means of the hand crank (which is situated behind the front access panel); for larger units (> 5 tons) the hand crank is only a service/maintenance aid.

#### Please observe the following procedure:

1. Switch off the unit or remove main plug.
2. Switch off main switch and secure with a padlock against switching on again. 
3. Remove cover of photocells (in case of Sys. 250-251, 180-182) or hand crank (in case of Sys 120; 650-652).
4. Open front access panel, in case of SYS 650-652 remove motor cowling (only necessary for units with mechanical brake: Sys 180-182; 250-251; 650-652).
5. Introduce hand crank and turn it on the motor to the right or to the left until it snaps in. (As soon as the hand crank cover plate is mounted on the shaft a safety switch prevents start when the power supply is restored).
6. With units with mechanical brake place brake lever and press it down - or in case of SYS 650-652 screw in break lever and pull it upwards. 

Hold hand crank so that it will not move in case of imbalance loading.

7. The carriers may now be cranked up or down.
8. After power is restored the unit is not ready for operation until the crank is disengaged, the cover plate replaced and the front access panel closed. Then switch on the unit and depress the green RESET button. Carrier number must be defined again.
9. Put unit into operation (see Chapter 5, Operation).



## OPERATING MANUAL

## 9. SAFETY REGULATIONS FOR

- cleaning works
- works on motor, gearing and chains
- all works inside the unit

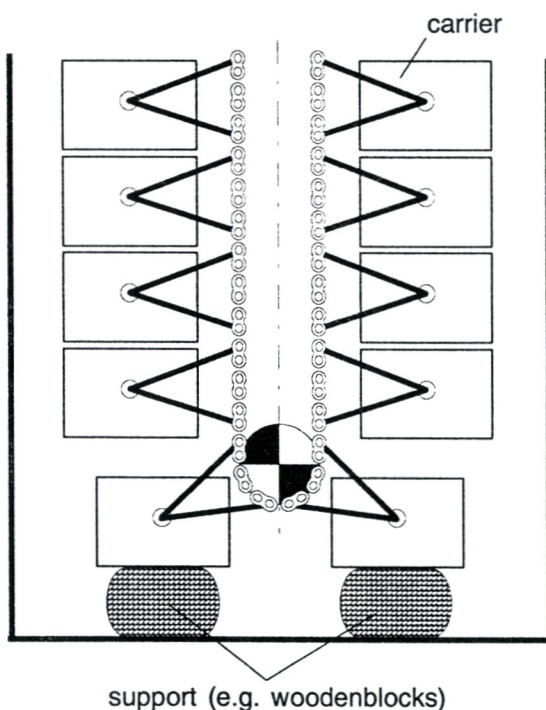
Since the imbalanced load of the unit is equalized when working on motor, gear box or drive chain, i. e. the carriers move uncontrolled, the unit must be secured as follows:

1. Close and lock the sliding door by key (pull off key) to avoid unauthorized access.



2. Remove line plug, or turn main switch off and lock it.

3. Move carriers to a position as shown by means of handcrank.

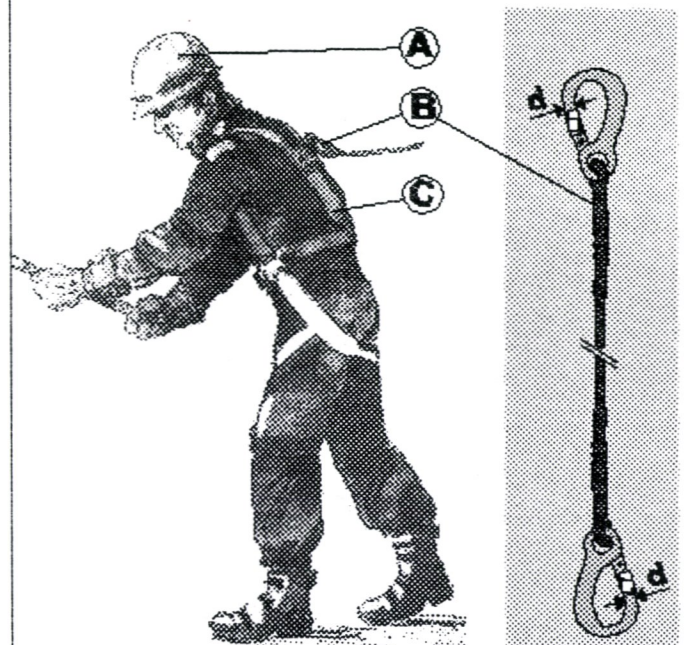


4. support both rows (front and back) with suitable material, e. g. wooden blocks.

Only when the above-mentioned items are properly accomplished, start work on motor, gear box or chain guide.

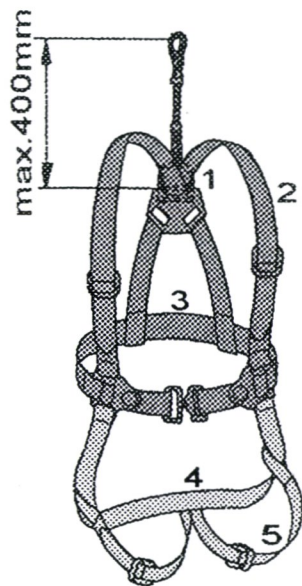
For assembly-, maintenance and service operations inside the unit, it is absolutely necessary to have safety equipment, if the unit is higher than 3m. This equipment should contain a crash protection (rope with safety snap hook and a safety belt), a safety helmet, a folding ladder and a padlock (shackle diameter max. 8mm). The wearing of a safety helmet is recommended during all work on the unit.

## SAFETY EQUIPMENT



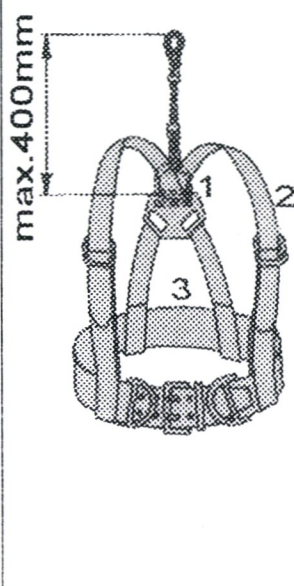
- (A) Safety helmet
- (B) Rope with safety snap hook  
max. hook diameter  $d = 12\text{mm}$
- (C) Catching belt form A or B

## OPERATING MANUAL



Catching belt form A

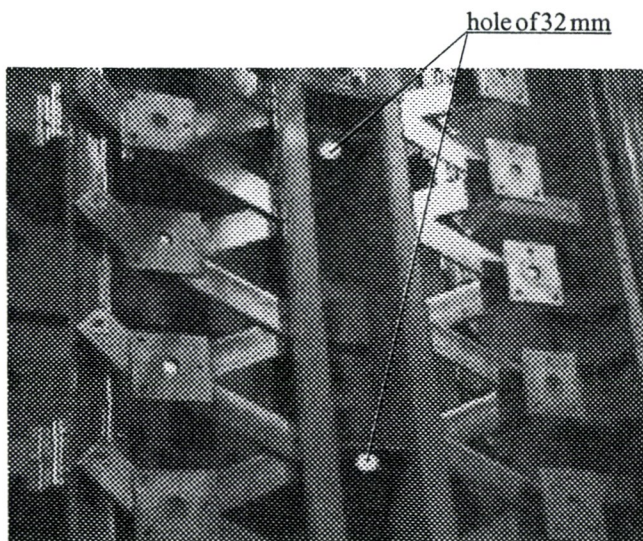
- 1) mounting ring
- 2) shoulder strap
- 3) belly-belt
- 4) sitting belt
- 5) belt for the leg



Catching belt form B

- 1) mounting ring
- 2) shoulder strap
- 3) safety belt

The chain guide is located in the endframes of the unit. Starting with a height of approx. 2 m, every 700 mm reinforcement plates are welded into it. There is a hole of 32 mm in each of these reinforcement plates, which is provided for the anchoring of the crash protection safety snap hook.



## 10. SERVICE

Every unit is designed to give years of trouble free service.

They require only reasonable care and normal preventive maintenance.

The machines should be checked as required, however at least once a year by authorized personnel. This procedure will be described on the following pages.

All executed maintenance and service works must be confirmed by an expert in the test book. (Accompanying documents)

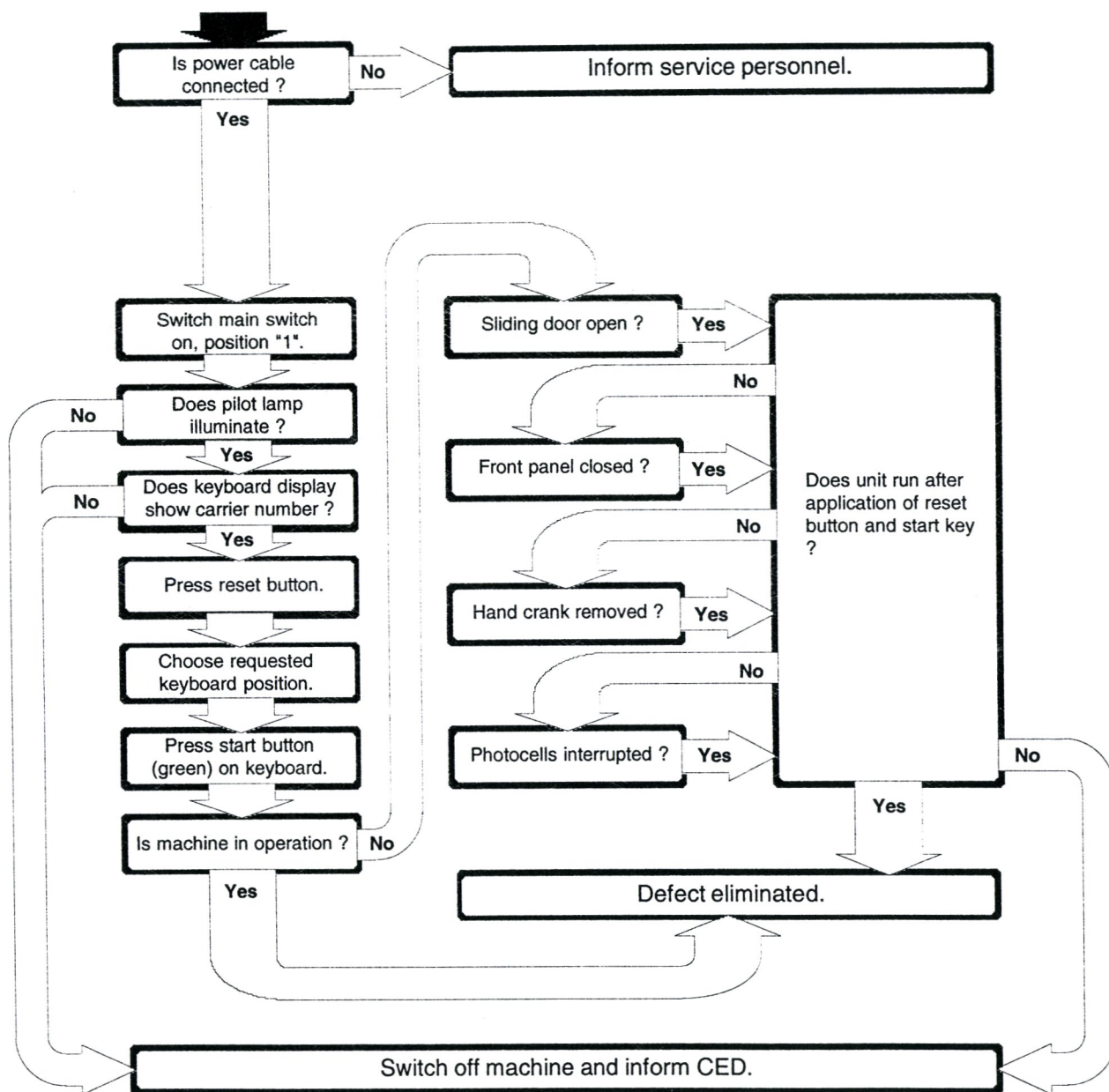
It is recommended to enter into a contract of maintenance at the time the unit is installed. This will ensure the unit receives the correct service at minimum cost.



## OPERATING MANUAL

## 11. TROUBLE SHOOTING

Problems during operation may be located by following the procedure described in this chapter. The correct operation can also be efficiently checked with this procedure.



More detailed description of error codes please see  
Keyboard User Reference Manual.

## OPERATING MANUAL

### 12. SERVICE INSTRUCTIONS

This unit is constructed in such a manner that it will operate for years without breakdown.

However, careful treatment and regular maintenance is necessary.



Service should be performed as required, however

**AT LEAST ONCE A YEAR,**

by a competent service technician.



**All performed maintenance and service works have to be confirmed in the check list (see accompanying documents) by the competent service technician.**


It is recommended to enter into a contract of maintenance at the time the unit is installed. This will ensure the unit receives the correct service at minimum cost.




**For all maintenance and service works it is absolutely required to stick to the safety regulations specified in chapter 9.**

#### 12.1 MECHANICAL PART

1. Check and tighten motor drive chain. This has to be done directly after loading of a new machine (see Technical Manual).
2. Check and tighten screws of the main shaft. (Torque see Technical Manual)
3. Check carrier chains. If you can determine any slack tighten carrier chain (check with hand crank). Then adjust curved tracks again. This has to be done as soon as a new machine is loaded (see Technical Manual).
4. Check motor drive sprocket and main drive sprocket.
5. Check wear of guide rollers.
6. Check door:
  - door movement
  - wear down of wire ropes
7. If necessary grease curved tracks and stabilizer tracks as well as door guides.
8. Check function of break. Stopping distance of carriers must be smaller than shift of the safety bar.
9. Check safety functions.

Do not put hand and do not step into the certain danger area when carrying out the following checks. 

- Start unit and wait for stop
- press *safety bar* and keep it pressed
- start unit
- ⇒ the unit ought not run - display shows MISTAKE (see operating manual)
- release safety bar
- start unit and wait for stop
- push RESET button
- open lower *access panel*
- push RESET button
- start unit
- ⇒ the unit ought not run - display shows mistake (see operating manual)
- close access panel
- push RESET button
- start unit and wait for stop
- insert *hand crank*
- push RESET button
- start unit

Should the security equipment refuse to work hand crank might get out of control. 

- ⇒ the unit ought not run - display shows mistake (see operating manual)
- remove hand crank
- push RESET button
- start unit and wait for stop
- interrupt *photo cells*
- push RESET button
- start unit
- ⇒ the unit ought not run - display shows mistake (see operating manual)
- stop interruption

Each photocell has to be checked separately. 



## OPERATING MANUAL

- push RESET button
- start unit and wait for stop
- operate *emergency switch*
- push RESET button
- start unit
- ⇒ the unit ought not run - display shows mistake (see operating manual)
- release emergency switch
- push RESET button



Should the unit run although a security equipment is operated it has to be stopped immediately and service personnel must be informed.



### 12.2 ELECTRICAL PART

1. Check of photocells referring to function and adjustment  
 Object protection:  
 Check whether the adjustment value of the photocells measures at least 1.8 VAC.  
 Protection of personnel:  
 See technical description WERAC (ID-Nr. 36537.9).  
 Check adjustment of photocells in compliance with carrier applications. The unit must switch off if the trays or extensions are not completely pushed in.
2. Check of adjustment of the proximity switch. The bearing play to the carrier arm should be 3-5 mm.
3. Check the exact contact of the grounded earth line (yellow, green) with the grounded earth rails on the frame. This safety installation is checked according to the regulations of the various countries. (E. g. in Germany according to VDE 0701).
4. D.C. Motors:  
 Check the brushes of the drive motor. The brushes should be replaced if half of their original length of approx. 22 mm (11 mm) has worn off.

### 12.3 Examination of danger and information signs

Any danger and information signs are for protection and must not be removed. They always have to be attached in a conspicuous place. Signs which are illegible or damaged must be replaced by new ones.

## 13. DISASSEMBLY AND DISPOSAL

The vertical carousel is to be disposed according to national regulations at the end of its service life.

For disassembly and disposal it is suggested to entrust authorized and specialized companies.