

# Pioneering storage and retrieval units of the next generation.



# The extensive solutions package from the industry expert.

Use our industrial and application know-how to design highly-modern and pioneering storage and retrieval units.

As a drives and automation specialist with many years experience in intralogistics, we have been involved in numerous projects in the warehouse and airport area as well as the postal and parcel sector.

Due to their intensive and continuous dialogue with customers and insiders, our industrial and application engineers are always up-to-date with the very latest developments and are intimately familiar with the exacting demands of the market.

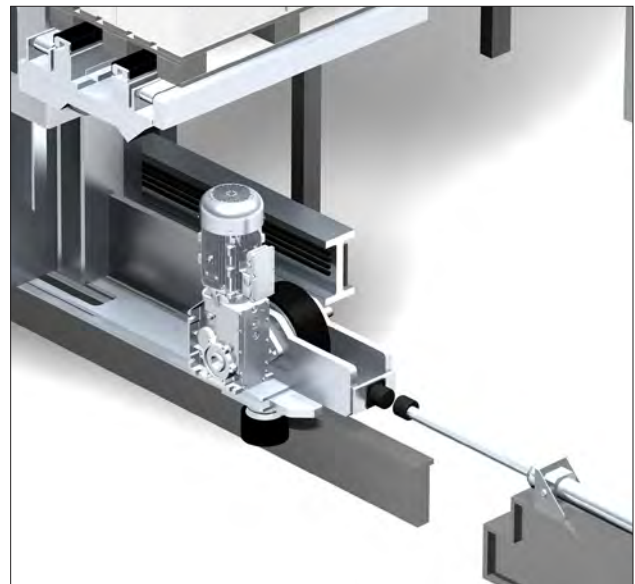
Our latest solutions package contains solutions that satisfy the important fundamental requirements for the storage and retrieval units of the next generation: the optimisation of plant performance and the reduction of commissioning times.

## ■ Intelligent

- Easy engineering by means of a centralised control architecture
- Reduction of commissioning times
- Optimisation of plant performance

## ■ Safe

- Integrated safety technology protection for people and equipment
- Without a safety control unit that travels along with the SRU



# Innovative and insightful concepts applied in practice.

Our solutions package combines experience and know-how with detailed knowledge of how the solutions are applied. We make engineering for you easy, while ensuring safe and energy-efficient operation, and enable

dynamic performance of your equipment in actual practice. Build your storage and retrieval unit of the next generation with the very best possible features.

## Efficient

Energy saving due to intelligent utilisation of the kinetic energy and power recovery of the excess energy.

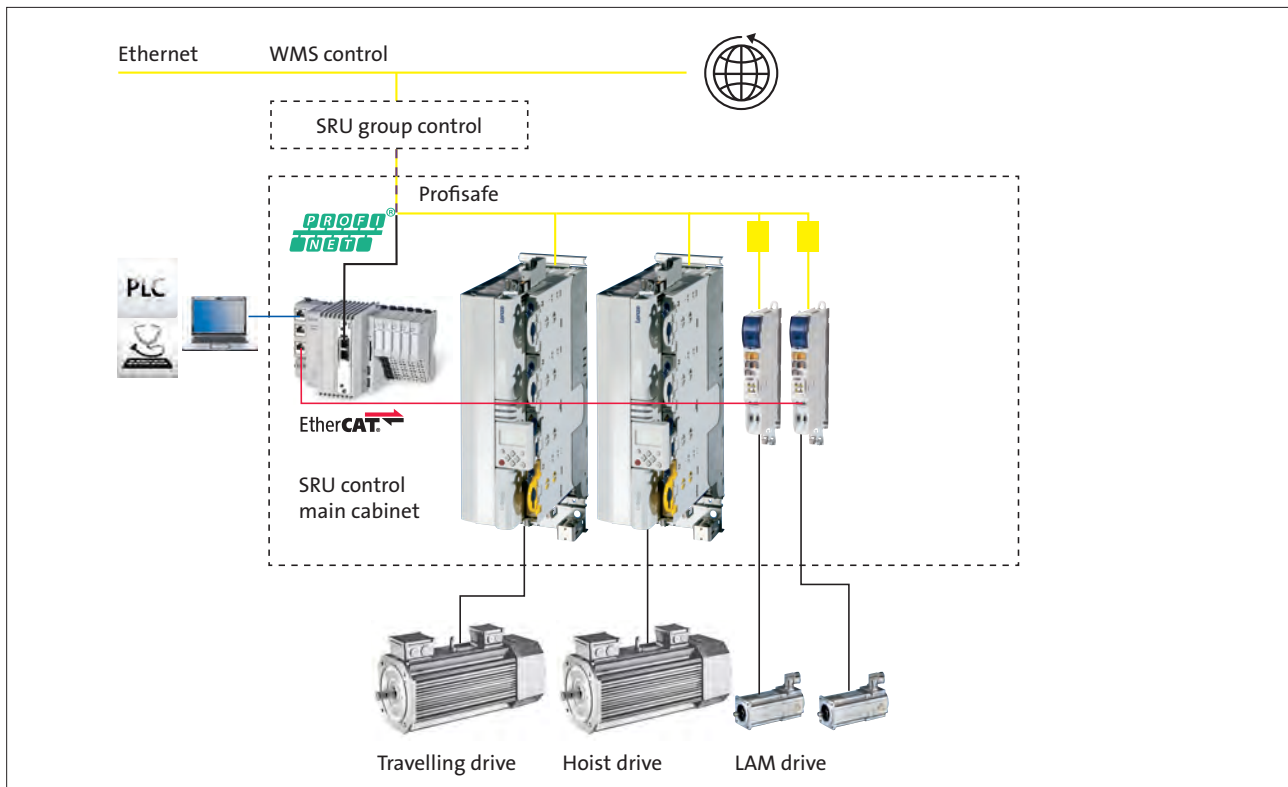


## Dynamic

Optimised plant performance due to state-of-the-art control technology.



## Centralised control architecture: Controller-based Automation.



*Encapsulation of the SRU functions as an autonomous unit*

## Controller-based topology – Our knowledge, your benefits.

**A motion controller for all the functions of the SRU provides the topology most suitable for easy engineering.**

### **Quick and easy commissioning**

- Graphic user guidance (GUI)
- Graphic machine visualisation
- Virtual hardware

### **Easy diagnostics**

- Simultaneous display of the oscilloscope signals of the entire machine

### **Easy controller settings**

- Load identification and online tuning make it easy to carry out the controller settings for travelling drives and hoist drives.

### **Logics at a glance**

- SRU fully solved in one controller
- All data stored centrally on an SD card

### **New functions**

- Mast oscillation compensation
- Online tuning
- Automatic load identification
- Precise controller feedforward control

### **Concise topology**

- Easy inverter replacement
- No lateral communication of data between the frequency inverters



## Lenze FAST machine module: Storage and retrieval unit

**SRU, the new Lenze FAST machine module, combines all the functions for control of the SRU: Everything at a glance!**

## Lenze FAST Application Software Toolbox

- Fully prepared IEC 61131 function blocks for motion control of the SRU
- Open code, open standards
- Lenze-standardised, proven software

### Newly available in the Lenze FAST module

- Mast oscillation compensation
- Online tuning
- Automatic load identification
- Precise controller feedforward control

## Full flexibility for specific know-how

- The user can integrate his own software anytime or carry out changes
- Protection of know-how ensured by password protection.



*The SRU Lenze FAST machine module also contains 15 years of Lenze experience in the context of storage and retrieval unit automation*

- *Stacker Crane Motion*
- *Stacker Crane Control*
- *Stacker Crane Follower*
- *Stacker Crane Loadsharing*
- *Stacker Crane Antipendulum*

## Reduction of engineering and commissioning times.

## SRU machine module

All the function blocks and technology modules have been specially prepared for an SRU application.

## Parameterisation instead of programming

- Easy and fast actuation of the functions
- Fast actuation thanks to user guidance with the help of the GUI user interface
- Programmed function blocks remain in the background

## Virtual teachware

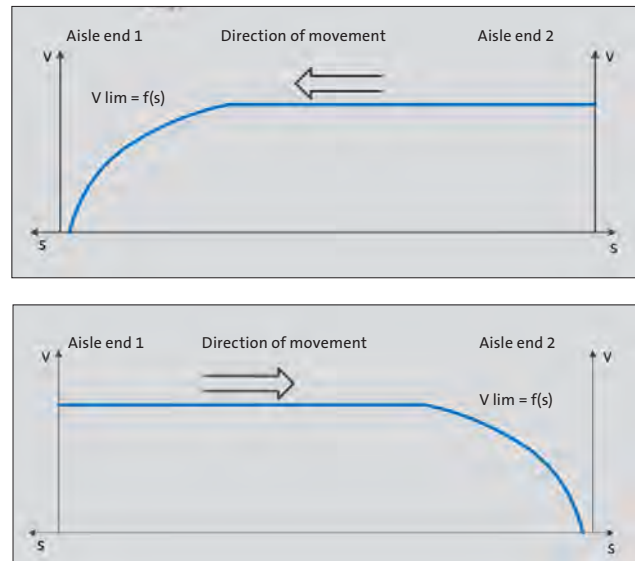
## Prepared SRU visualisation makes engineering and commissioning easy



## Reduction of the buffer length saves space.

### Reduction of the buffer length with safety system integrated in the drive

- Approaching of the buffer at a maximum of 70% of the top speed – allows reduction of the buffer length by 50%
- Reliably detected speed with higher-level detection of the position guarantees that the position-dependent speed is safely monitored as required
- Utilisation of the maximum speed in every place
- This safety system also includes safe brake control



*Envelope curve for safe monitoring of the position with direction-dependent monitoring of the speed.*

## The absence of collision buffers lowers the costs.

With the technology described above, collision buffers can be dispensed with if there is a safe mechanical braking system in the SRU.

- Reduced mounting effort
- Fewer wearing parts
- Less maintenance
- Less weight
- More storage space available



# Safety functions protect people, material and warehouse goods.

## **Safe operation of the load handling device when people are working in adjacent aisles**

- Increases plant availability

## **Safe limitation of the lifting distance when the LAM has been extended**

- Protection of the load, the storage and retrieval unit and the shelves



## Automatic coordination of travelling drive and hoist drive.

Energy savings through intelligent coordination of travelling drive and hoist drive

Energy-efficient and intelligent coordination of travelling drive and hoist drive has been integrated in the Lenze FAST SRU machine module.



*Automatic and intelligent coordination of travelling drive and hoist drive saves up to 7% of energy.*



# Innovative cost reduction thanks to new kind of power recovery concept.

## New regenerative module for the recovery of regenerative energy

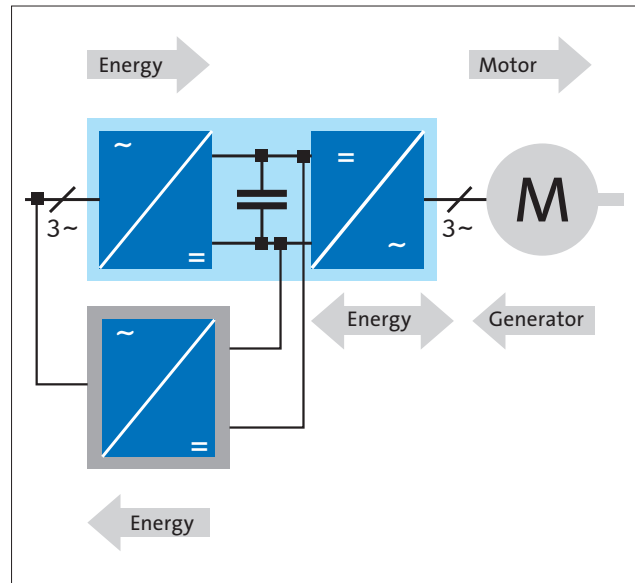
### Compact and lightweight

- Due to innovative technology, considerably fewer filters, as a result of which everything is considerably smaller and lighter
- Pure power recovery function
- No external filters or chokes

### No parameterisation, no bus, no tools

- Extremely straightforward commissioning
  - Connection of brake resistors possible in order to cover low-energy power peaks at the inverter
  - Extra power can easily be connected in parallel

**Simply better: smaller, lighter, amortised more quickly**



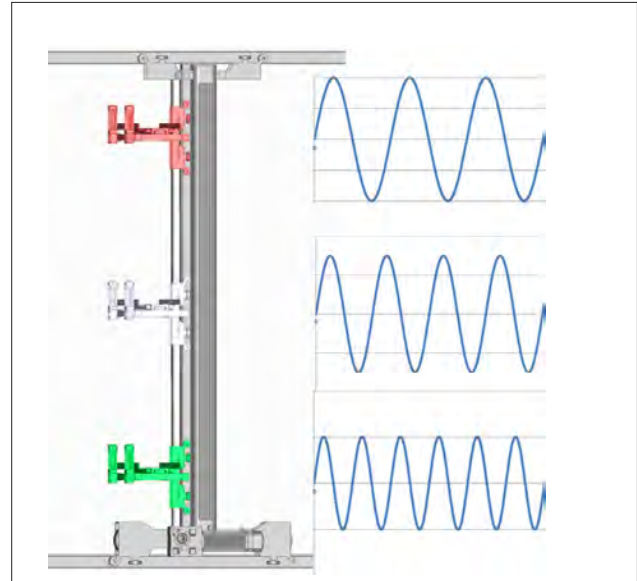
## Compensation of mast oscillations.

### Task:

Reduction of mast oscillations, resulting in better plant performance due to shortened picking times

### Solution: Input shaper

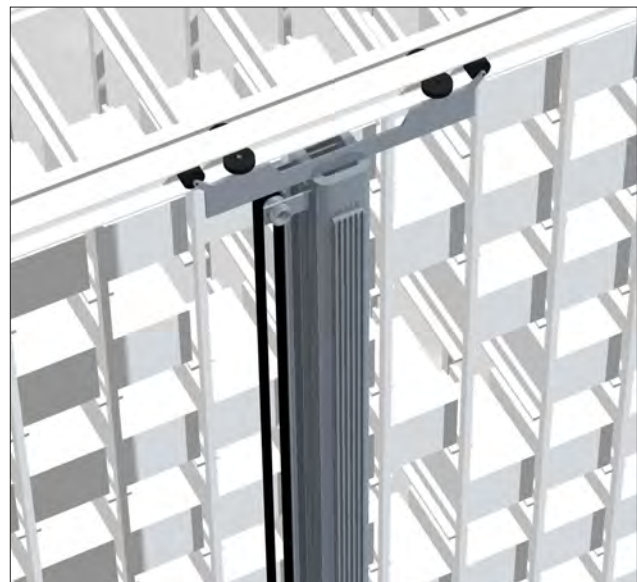
- Easy
- Robust
- Effective
- Load height identification of oscillation frequency and amplitude



## For container units: omission of the anti-oscillation drive.

### Newly developed motion control system prevents oscillations of the mast without an anti-oscillation drive

- Cost saving in the case of the drive
- Reduced commissioning effort
- Significant weight saving
- No service at upper end of mast

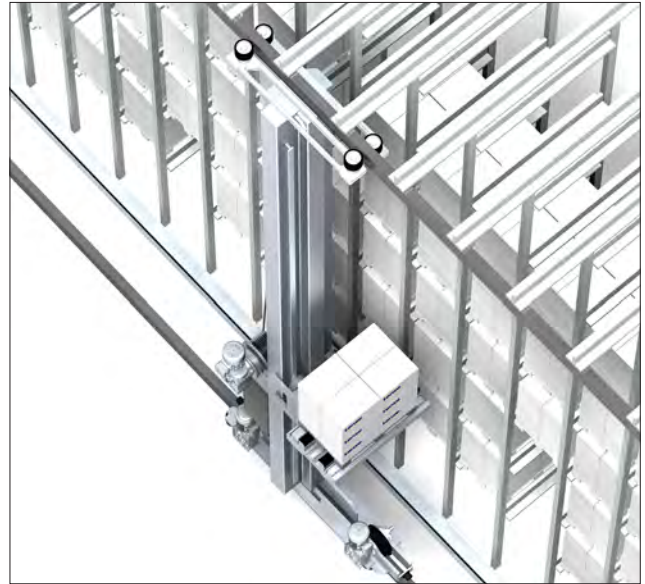


*Miniload SRU: Massive saving potential*

# In the case of pallet devices: more double cycles, more plant performance.

**In the case of storage and retrieval units without an anti-oscillation drive, the newly developed mast oscillation compensation system results in a substantial time saving of up to 10%**

- More double cycles per hour
- Pure software solution
- Parameterised and commissioned quickly
- Reduces alternating mechanical stress on the mast



*Pallet storage and retrieval unit: No time wasted waiting for the mast to stop oscillating*

## Online load identification: Application Software Toolbox Lenze FAST

**Automatic identification of the mechanical parameters of the SRU makes it possible to do the following:**

- Monitor the most important parameters and tune the control system online
- Exact controller settings in the servo drive
- Dynamic adjustment when there is an alternating load
  - Torque control with precise torque feedforward control
  - Considerable reduction of the mast's tendency to oscillate
- Protection of the mechanics



# Optimisation of plant availability: Guided shutdown in the event of a mains failure.

## **Use of the energy of motion for controlled shutdown of the drives**

- Guided shutdown of the drives in the event of a mains failure without immediate application of the mechanical brake
- Much less wear caused by high mechanical stress during an emergency stop with the mechanical brake
- Especially relevant in countries with unstable power grids.
- Low maintenance expenditure

**Frequent mains failures no longer cause additional plant wear.**

