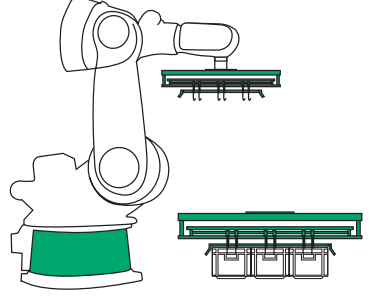


# Innopal

Palletizing Robots for Returnables



Modular, Versatile, Highly Productive, and Future-Safe –  
The New Generation of Palletizing and Depalletizing Robots from KHS



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# Innapal Palletizing Robots – A Name for an Advanced Generation of Machines



The new-generation KHS palletizers are modular design machines operated by robot technology. This is why we call them “palletizing robots”.

A new drive concept was developed with main features such as servomotors, toothed belts, and continuous-path control. The overall concept consistently meets all market demands for:

- High flexibility  
Product conversion and changeover easily carried out during production operation.
- Great reliability  
High-availability palletizing robots operate dependably in three-shift operation and handle products exceptionally gently at that.

- Ease of maintenance  
Standardized operating for all machines.  
Ergonomically perfect.  
Control panels with large-size graphical user interfaces.
- Environmental soundness  
Low power, water, and air consumption, small footprint, and in general low-noise operation.

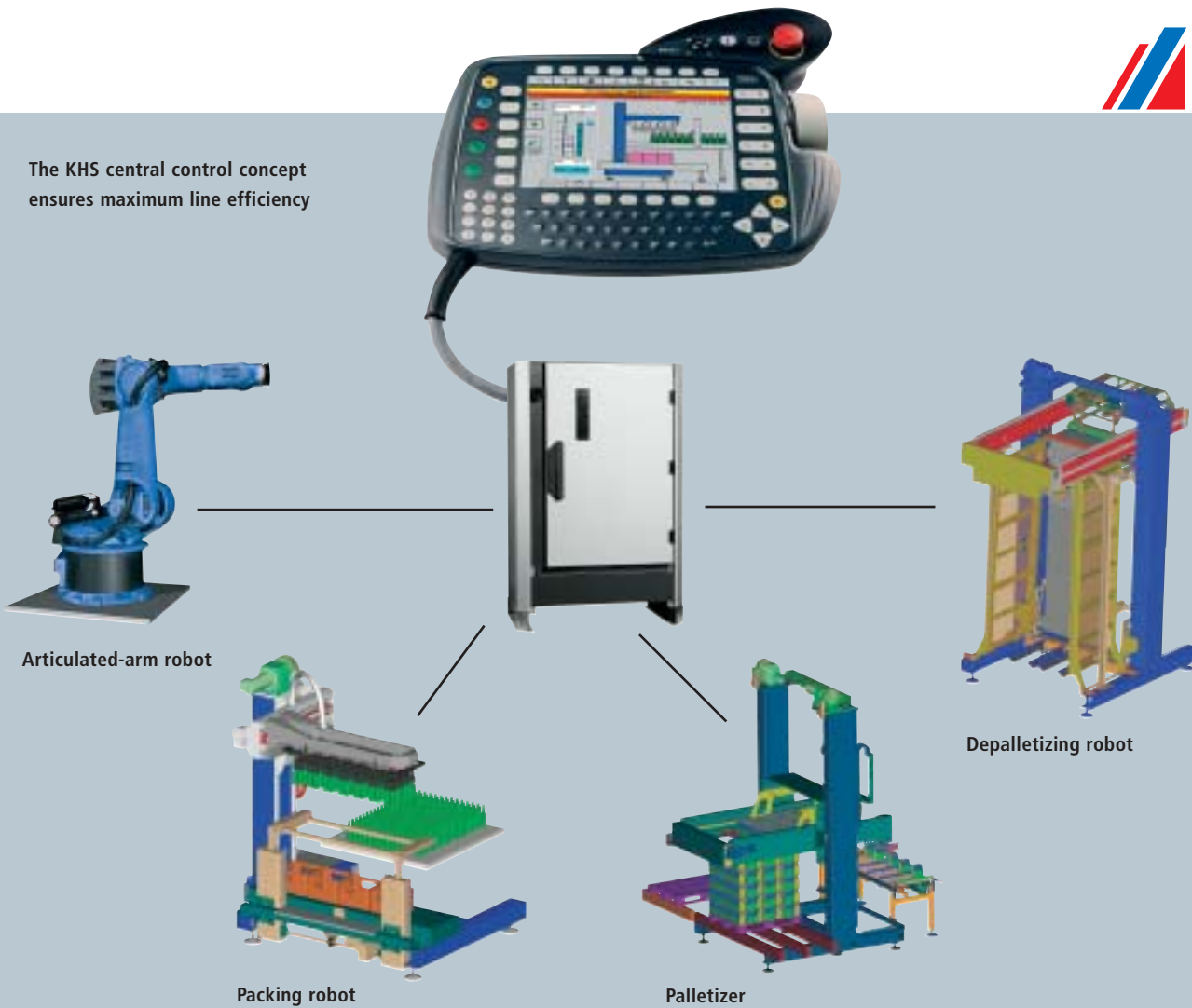
#### For implementation this means specifically:

- Identical, interchangeable modules such as guide columns, floor frames, lift drives.  
Reduction of the assortment of parts to thus cut the cost of spare part stockkeeping.
- Standardized modular drive technology for all machines.  
Servodrives. Coordinated control of axis movement.  
Absolute drive position sensing system.  
Highly dynamic, sequence of motion optimally matched directly to the product; position accuracy of  $\pm 0.5$  mm.

Supply lines enclosed in a hose



The KHS central control concept ensures maximum line efficiency



- A typical characteristic of the KHS PC-based robot control: Only one intelligence that controls everything!  
**No more interface problems.**
- Use of heavy-duty toothed belt drives.  
**Smooth operation, minimum wear, low-cost servicing and maintenance.**
- All product-contacting machine parts are plastic-covered.  
**High product assurance and gentlest possible handling of the goods to be processed.**
- Extensive use of bus technology.  
**Less cabling effort.**
- Integration of Soft PLC and visualization.  
**Prerequisite for easy and safe operating.**
- Consistent use of plug-and-socket components.  
**Plug & Play technology in servo control cabinets for simplified handling. Saves time and work.**
- Direct Teleservice via modem or LAN.  
**Direct service capabilities for greater reliability. Simplified troubleshooting.**

# Innapal PKS 1 Palletizing and Depalletizing Robots – For the Low to Medium Capacity Range

- Processable product line:  
**Plastic crates, low-wall crates, split boxes.**
- Palletizer with grouping station. Move-up table equipped with chain mats.  
**Easily adapted to various layer formations.**
- Depalletizer with distribution table. De-rowing table equipped with chain mats and a mechanical de-rowing station or separator rollers.  
**Reliable, row-by-row infeed of empties to the system.**
- Palletizing or depalletizing with the same machine.  
One head, one allocator or distribution table.  
**Enables you to solve two work tasks with one machine.**
- The Innapal PKS can be equipped with various palletizing heads.  
**This makes it flexible for use for a wide variety of products.**
- Simple adaptation to various pallet formats.  
**Increases the versatility of your line.**





■ The lifting facility and cross-conveying station operate with servo technology and toothed belt drives.

**The result: Quiet operation, nearly no wear, reduced servicing effort.**

■ All swivelable parts are bedded in permanently lubricated roller bearings or swivel heads.

**Reduced servicing effort.**

■ Consistent use of robot technology, programmable robot axes, and bus technology.

**Exact palletizing and depalletizing positions, flexible adaptation to prespecified palletizing tasks.**

Technical Specifications	Innopal PKS 1 EN Depalletizer	Innopal PKS 1 BN Palletizer	Innopal PKS 1 CN Combined Palletizer/Depalletizer
Machine speed	380 layers per hour	380 layers per hour	320 layers per hour
Maximum pallet height	2,000 mm	2,000 mm	2,000 mm
Pallet dimensions	750 to 1,300 mm (across and in direction of palletizing)		

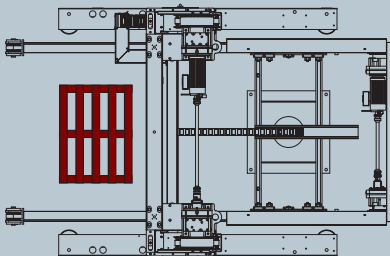
## Innapal PKN Palletizing or Depalletizing Robots – The Base Robot for Three Capacity Models



Innapal PKN with fixed cross-conveying

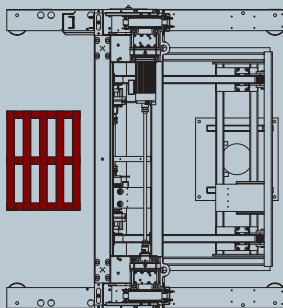
- The Innapal PKN can be equipped with various palletizing heads.  
**This makes it flexible for use for a wide variety of products.**
- Processable product line:  
**Plastic crates, low-wall crates, split boxes, kegs, and casks.**
- Simple adaptation to various pallet formats.  
**Increased versatility of your line.**

- Palletizer with grouping station. Move-up table equipped with chain mats.  
**Easily adapted to various layer formations.**
- Compact modular design system.  
**Takes up considerably less space.**
- Depalletizer with distribution table. De-rowing table equipped with chain mats and a mechanical de-rowing station or separator rollers.  
**Reliable, row-by-row infeed of empties to the system.**
- Each layer is centered from all sides prior to discharge/infeed.  
**Safety and high stability of the entire pallet load.**
- The lifting facility and cross-conveying station operate with servo technology and toothed belt drives.  
**The result: Quiet operation, nearly no wear, reduced servicing effort.**
- Consistent use of robot technology, programmable robot axes, and bus technology.  
**Exact palletizing and depalletizing positions, flexible adaptation to prespecified palletizing tasks.**
- All swivelable parts are bedded in permanently lubricated roller bearings or swivel heads.  
**Reduced servicing effort.**



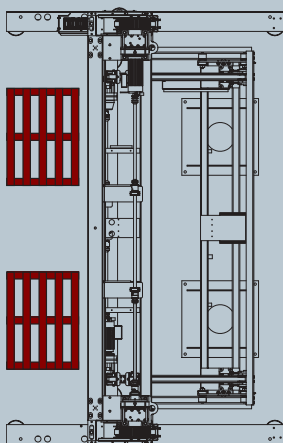
#### Technical Data, Innopal PKN

Machine output, palletizer	300 layers per hour, pack infeed at bottom
Machine output, depalletizer	350 layers per hour, pack infeed at bottom
Maximum pallet height	2,000 mm
Pallet dimensions	750 to 1,300 mm (across and in direction of palletizing)



#### Technical Data, Innopal PKTN 1

Machine output, palletizer	500 layers per hour, pack infeed at bottom
Machine output, depalletizer	500 layers per hour, pack infeed at bottom
Maximum pallet height	2,000 mm
Pallet dimensions	750 to 1,300 mm (across and in direction of palletizing)



#### Technical Data, Innopal PKTN 2

Machine output, palletizer	800 layers per hour, pack infeed at bottom
Machine output, depalletizer	800 layers per hour, pack infeed at bottom
Maximum pallet height	2,000 mm
Pallet dimensions	Two 750 to 1,300 mm (across and in direction of palletizing)



# Innapal PKTN 1 Palletizing or Depalletizing Robots – Single-station Machine for Your Capacity Range up to 500 Layers per Hour

- Innapal PKTN 1– the single pallet station palletizing or depalletizing solution for the medium capacity range.  
**High reliability through fully developed engineering.**
- Manually adjustable side centering or automatic crate centering for format changeover.  
**Simple, fast adaptation to various layer patterns and dimensions.**  
**High versatility of your line.**
- Telescopic cross-conveying.  
**Used for overlapping work areas of several machines for high output.**
- Processable product line:  
**Plastic crates, low-wall crates, split boxes, kegs, and casks.**

General view of an Innapal PKTN 1 returnables palletizer





Distribution table

- Parallel telescopic cross-conveying of both palletizing and depalletizing units.

**No time lost changing pallets = higher output through short working paths.**

- Precision timing of work steps between pickup and discharge. No interruptions when changing from full to empty pallets.

**Noticeable time savings and increased robot availability.**

- Pack infeed or discharge possible at practically any height.

**Great flexibility that enables you to solve your individual palletizing tasks.**



Clamping gripper head



Clamping units of the gripper head



## Innopal PKTN 1 Palletizing or Depalletizing Robots – Single-station Machine to Palletize Your Casks and Kegs



Innopal PKTN 1 with telescopic cross-conveying

- Innopal PKTN 1– the single pallet station palletizing or depalletizing solution for palletizing casks and kegs.  
**High reliability through fully developed engineering.**
- By equipping the Innopal PKTN 1 with various gripper heads, it can also be used to palletize casks and kegs.  
Optional automatic gripper head changing.  
**A highly flexible base concept. Suitable for a widest possible range of applications.**
- Telescopic cross-conveying.  
**Used for overlapping work areas of several machines for high output.**

For processing kegs, plastic contour carriers, and wooden pallets. Complete palletizing area with Innopal PKTN 1, Innopal RS 3, and gantry-type centering



# Innopal PKTN 2 Palletizing or Depalletizing Robots – Two-station Machine for Your Capacity Range up to 800 Layers per Hour



■ Innopal PKTN 2 – the double pallet station palletizing or depalletizing solution for your high capacity range.

**Fast, reliable “double-pack” palletizing or depalletizing. Proportionally low cost of investment**

■ The Innopal PKTN 2 can be equipped with various gripper heads. Automatic gripper head changing also optionally available.

**Enables you to process a widest possible range of different pack styles and layer patterns.**

■ Processable product line:

**Plastic crates, low-wall crates, split boxes, kegs, and casks.**

■ Single or multiple-lane infeed and discharge table models available according to the output, layer formation, and task definition.

**This palletizer thus offers you a wide variety of application options.**

■ Stoppers rising from below position both layers under the gripper heads in the machine infeed.

**High precision and positioning accuracy that produces high palletizing output in the first place.**



Innopal PKTN 2 with gripper head for full packs



## Innopal RS 3 Single-column Robots – For Load Capacities of up to 500 kg and Your Capacity Range up to 520 Layers per Hour



Gripper head with full crates in an Innopal RS 3

- Innopal RS 3 – multiple-station palletizing or depalletizing robot with a 180-degree working radius.

For you this means: A wide variety of models and uses, high output, and greater flexibility within a small amount of space.

- Modular drive technology used such as maintenance-free, highly dynamic servomotors and low-noise toothed belts. Shorter cycle times, reduced wear, and less servicing effort.

- Palletizing or depalletizing with the same machine. One head, one allocator table, one distribution table. Solve two work tasks with one machine, save on the cost of investment.

- The three-axis device can be easily reprogrammed. Gives you more freedom, greater flexibility, and optimal capabilities for adaptation to various palletizing tasks.

Double palletizing system with two Innopal RS 3 robots





Clamping head of an Innopal RS 3 depalletizer

- Each layer is centered from all sides prior to discharge/ infeed.  
This ensures that the entire pallet load is securely stacked or destacked.
- The control is modular in design. Braking energy recovery, time tagging, and ASI bus technology.  
This maintains safety and saves reference travel.
- Greatly reduced number of external sensors.  
For you this means: fewer spare parts, increased operational safety, lower operating costs, and last but not least higher line efficiency.

- Can be equipped with additional gripper heads.  
Optional capabilities for automatic gripper head changing.  
Enables you to process a widest possible assortment of products.
- Processable product line:  
Plastic crates, low-wall crates, split boxes, kegs, and casks.



Individual lengthwise and crosswise clamping of each row

#### Technical Specifications

Machine speed	520 layers per hour
Load capacity	500 kg

## Innapal RK Articulated-arm Robots – For Loads up to 210 kg, 360 kg, and 570 kg



Innapal RK depalletizer and clamping head

- Innapal RK – articulated-arm model palletizing or depalletizing robot. Can be converted and used for many other packing and palletizing tasks.  
**Great flexibility of use, future-safe investment, and fast return on investment.**
- Multi-axis controlled articulated robot with one 360-degree working radius.  
**Total freedom of movement. No “blind spots”.  
Optimally adaptable to all project plans.**
- Possible palletizing and depalletizing with only one machine, one head, one allocator table, one distributor table, and two pallet spaces.  
**Only one machine for two tasks. You save on pallet conveyors and the cost of investment.**
- Full freedom of movement within a small amount of space.  
**Saves you space and lets you to place several pallets and infeed belts in one robot area.**

Work area with several pack and pallet spaces





Whole-layer pack discharge of an Innopal RK depalletizer

- Use of ultra-modern robot technology.  
**For you this means:**
  - Highly dynamic, maintenance-free servomotors
  - High performance
  - Less space due to fewer peripherals in the surrounding area
  - Lower cost of investment in conveying systems
  
- The robot is programmable. Virtually all sequences of motion are programmable.  
**The result: Maximum flexibility of use and increased assurance for solving future palletizing tasks.**

- High-resolution absolute encoders ensure precise positioning and exact reproducibility.  
**Ideal for palletizing a widest possible range of products and layer patterns.**
  
- The control is modular in design. Braking energy recovery, absolute encoders, and bus technology.  
**This increases safety and saves reference travel.**
  
- The Innopal RK can be equipped with other gripper heads. Optional automatic gripper head changing.  
**Even more layer and product processing flexibility. Saves you time and work effort.**
  
- Special gripper head for the articulated robot with a 570-kg load capacity for layer-by-layer palletizing of kegs  
**Further proof of the flexibility of use.**
  
- Processable product line:  
**Plastic crates, low-wall crates, split boxes, kegs, and casks.**



Innopal

Technical Specifications	Innopal RK 4-180	Innopal RK 6-350	Innopal RK 6-500
Load capacity	210 kg	360 kg	570 kg
Machine speed	520 cycles per hour	425 cycles per hour	380 cycles per hour
Maximum pallet height	2,500 mm		
Pallet dimensions	400 to 1,300 mm (across and in direction of palletizing)		

## Innapal ASH Depalletizing Robots – For Fully Automatic Infeed of Your New Containers to the Processing Operation



Pushoff and container discharge of an Innapal ASH

- The Innapal ASH depalletizing robot including the inserted liner and frame removers, pallet lift, and pallet conveyor operate fully automatically. Equipped with state-of-the-art robotics and ASI bus system.  
**Your benefit: Simple cabling and transparent installation.**

- Exact pallet centering by means of adjustable well walls on the left and right.  
**Reliable pallet position fixing in the well directly below the pushoff carriage. Reliable, gentle depalletizing of new containers; no danger of collapse during the entire depalletizing process.**

- Each layer to be depalletized is centered by a four-sided pushoff carriage.  
**Prerequisite for safe high-speed depalletizing down to the last layer.**

- Servo technology and toothed belts used to drive the pushoff carriage.

**A low-noise, low-wear method requiring less servicing.**

- All product-contacting surfaces covered with plastic.

**Ensures gentle handling of new containers.**



Three-sided guidance of empty container pallets in the lift well of the Innapal ASH



Partially depalletized empties pallet



Handling packing aids

- The inserted liners are held in place by grippers during the pushoff process.

**The result: Reliable container pushoff. The inserted liner remains in place.**

- Simple adaptation to various pallet formats.  
Increases the versatility of your line.

- Reliable processing of various container heights and diameters.  
Saves you the cost of investment in expensive extra equipment.

- Belt or chain mat discharge of containers.  
**Highly efficient conveying technology.**

- Wooden and steel frames are removed separately and placed in special magazines.  
**Perfect disposal of packing aids that ensures uninterrupted, time-saving depalletizing without the need of operator intervention.**

- Product range for depalletizing:  
New glass containers, PET containers, cans.  
**Maximum container height: 400 mm.**

#### Technical Specifications

Handling robot in the machine	280 layers per hour, PET 300 layers per hour, glass
Handling robot plus frame remover	400 layers per hour, cans
Maximum pallet height	2,600 mm
Pallet dimensions	750 to 1,300 mm in direction of discharge 750 to 1,250 mm across direction of discharge

## Innapal ASN Depalletizing Robot – Infeed Your New Containers to the Processing Operation Always at the Right Height



Partially depalletized empties pallet

- The Innapal ASN depalletizing robot including height control, inverted tray and inserted liner removers operate fully automatically. Equipped with state-of-the-art robotics and ASI bus system.  
**Processing the complete task program within a limited amount of space. Simple cabling and transparent installation.**

- Infinitely variable discharge height for new containers. Any height is possible.  
**Enabling you to meet all individual requirements of your line.**
- Exact pallet centering by means of adjustable centering on the left and right sides.  
**Reliable pallet position fixing directly below the pushoff carriage. Reliable and gentle handling of new containers. No danger of collapse during the entire depalletizing process.**
- Grippers hold the inserted liners in place during pushoff.  
**The result: Reliable container pushoff. The inserted liner remains in place.**
- Each layer to be depalletized is centered by a four-sided pushoff carriage.  
**Safe depalletizing down to the last layer even at high speeds.**

Handling robot manipulating packing aids with the help of a magazine or drop chute





Pushoff carriage with all-sided container guidance

- Servo technology and toothed belts used to drive the pushoff carriage.  
**Less noise, less wear, less servicing effort.**
- All product-contacting surfaces are covered with plastic; the distance plate is made of plastic (PTFE) or stainless steel.  
**Gentle treatment of new containers even at high outputs.**

- Simple adaptation to various pallet formats.  
**This saves time and increases the versatility of your line.**
- You can process containers of various heights and diameters.  
**This saves you the cost of investment in expensive extra equipment.**
- Wooden and steel frames are grasped separately and stacked in separate magazines.  
**Perfect packing aid disposal coupled with a continuous time-saving depalletizing process. Without operator intervention.**
- Product range for depalletizing:  
**New glass containers up to 400 mm in height.**



#### Technical Specifications

Handling robot in the machine	200 layers per hour
Handling robot in the bottle table area	240 layers per hour
Handling robot in the machine with pallet removal	200 layers per hour
Maximum pallet height	2,400 mm
Pallet dimensions	750 to 1,300 mm in direction of discharge 750 to 1,250 mm across direction of discharge

## Innapal HR Handling Robots – Liner Inserter as Extra Equipment



Innapal HR handling robot processing inserted liners for two half pallets each

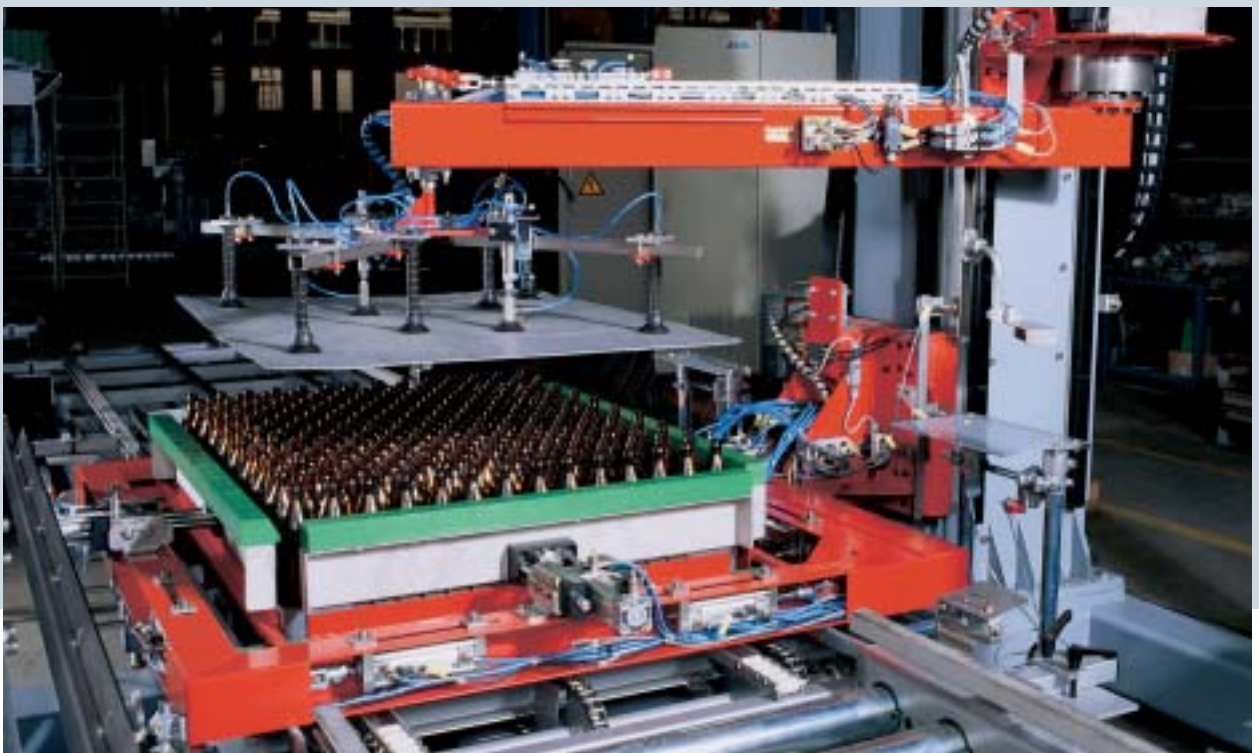
- Safe stacking of soft packs on pallets requires inserted liners, inverted trays, cover frames. The Innapal HR handling robot is the ideal accessory for depalletizing these palletizing aids.

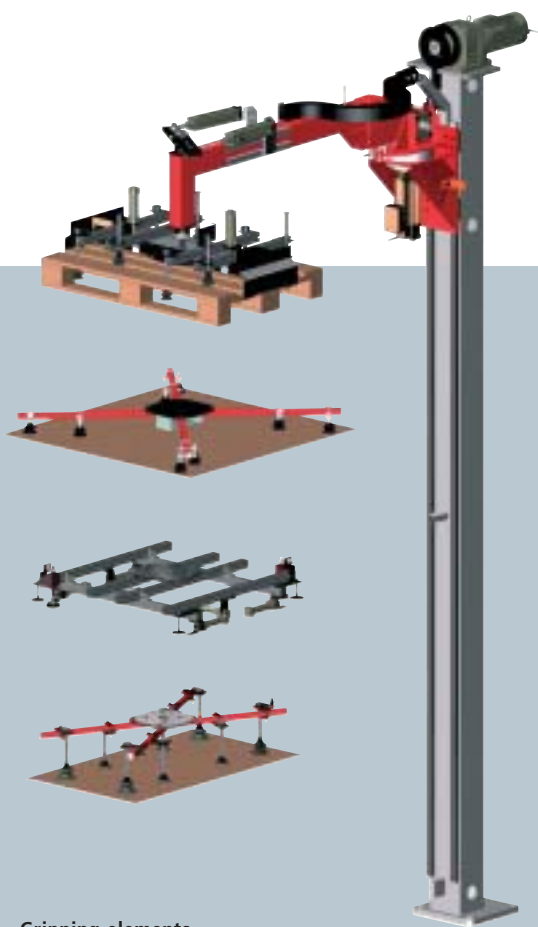
Fast, reliable removal of inserted liners, palletizing aids, and sorted placement in corresponding magazines in a preprogrammed depalletizing rhythm.  
High positioning accuracy.

- Compact modular design system.

The perfect enhancement to all Innapal palletizing robots.

Suction head pickup of inserted liners





Gripping elements

- Range of products for processing:  
 Inserted liners made of plastic, cardboard, etc.  
 Inverted trays  
 Inverted tray bases  
 Pallets (all types)  
 Cover frames

- Various gripping elements can be used. For inserted liners, pallets, cover frames.  
**Flexibility that enables you to fulfill a widest possible range of requirements.**
- Can also be equipped with two additional pallet gripper arms.  
**This enables you to process two half pallets simultaneously.**
- Pneumatic suction cup grippers for inserted liners.  
**Reliable, exact mode of operation even in the high performance range.**
- Toothed belt drive.  
**Great reliability, low wear, reduced servicing effort.**
- Precision linear guidance by bead chain.  
**Low-noise operation, lubricated for life.**



#### Technical Specifications

Maximum vertical travel	2,610 mm
Load for swivel arm with vacuum gripper	Depends on inserted liner surfaces
Load for swivel arm with pallet gripper	50 kg



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