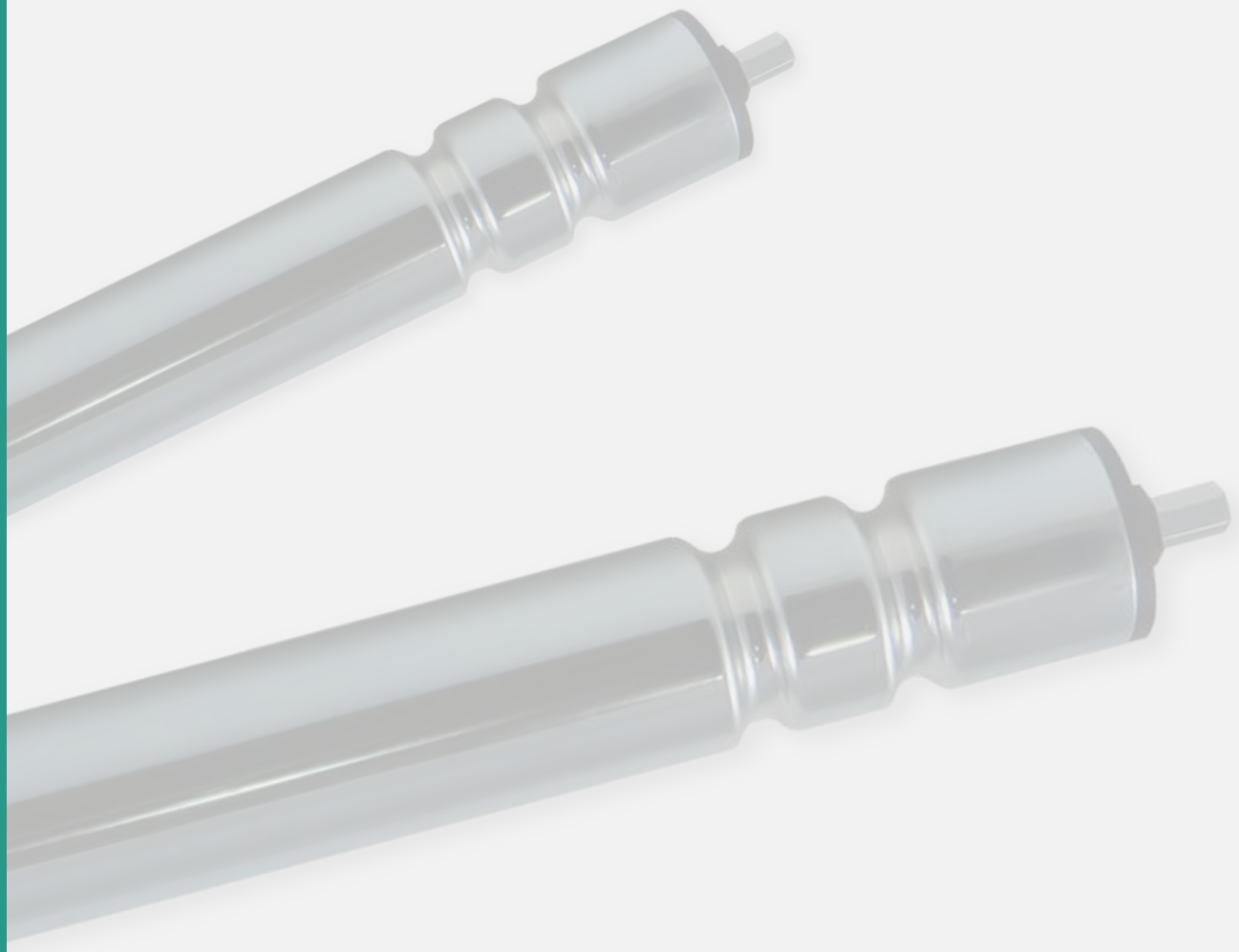
Bamboo

DC Powered Transmission Series

Motor driven rollers and intelligent control card



Bamboo

Bamboo Dynamics Corporation.,Ltd.

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About Bamboo Dynamics

Headquartered in Hsinchu, Taiwan's Leading Technological Hub, Bamboo Dynamics Corporation.,Ltd. focuses on designing, developing and manufacturing AI and machine learning systems, smart logistics, mechanical automation, motor control technology and software systems.

Being part of the BlackBear Industrial Group, we have been able to bring to the international and local markets many highly-integrated solutions by leveraging our know-how, industrial network communication expertise, and collaborations with the Industrial Technology Research Institute in Taiwan (ITRI), which include projects on motor dynamics, Bluetooth and Wi-Fi indoor locating, automated robot route planning, AI optical quality inspection, and warehouse management systems.

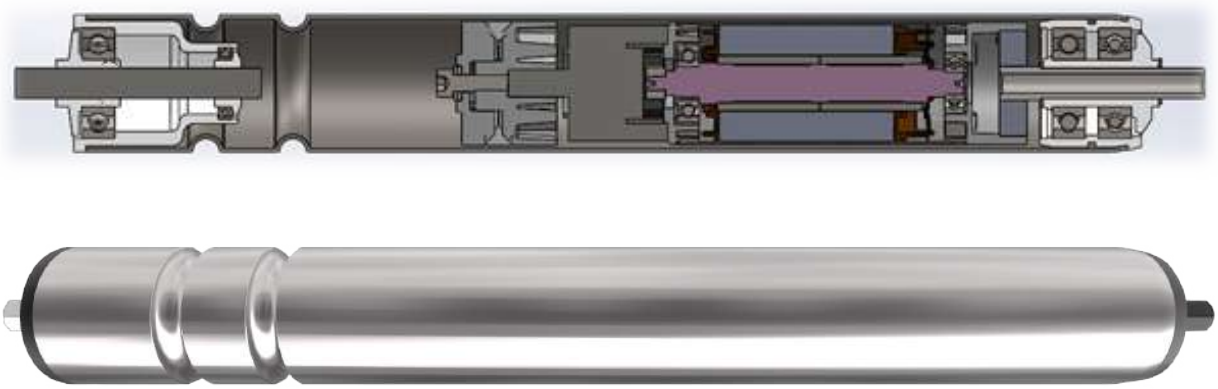
Past commissioned developments include an autonomous Bluetooth four-wheeler that can scan human bodies and create 3D models while in different ground conditions. Our sound mechanical engineering, combined with ITRI's imaging technology, produces comprehensive and adaptable solutions.

On dynamics, we are proud to support Industry 4.0 Revolution, offering industrial robotic solutions with competitive price-performance ratios. Our robots can be used in traditional industries such as spray coating, welding, loading, and stacking, as well as paired with industrial control interfaces to help clients overcome labor shortage and industrial automation upgrading issues.

Focusing on AI-incorporated transmission with mechanical automation and software systemization, Bamboo Dynamics applies research and the latest technology in factory automation and warehouse automation industries. Our motor driven rollers epitomize our innovation, flexibility, and speed, setting us out for the new era of 5G, machine learning, and big data analytics.

Motor driven roller specifications

Brushless DC motor roller



General specifications

- Declaration of Incorporation: Machinery Directive 2006/42/EC
- Directive conformity: EMC Directive 2014/30/EU
  RoHS Directive 2011/65/EU
- Standard conformity: EN61000-6-2 EMC-Immunity for industrial environments
  EN61000-6-4 EMC-Emission for industrial environments
- Roller outer diameters: 48.3 mm and 50 mm
- Installation length: 400 to 1000 mm
- Power cable length: 1200 mm
- Power cable connectors: Communications (JST #XHP-3); motor control (TE 1744423-1)
- Tube materials: zinc-plated steel tubes
- Interlocking options: Straight roller (S), Roller with round groove option (R),
  Poly-V head (V), Poly-O head (O), Toothed head (T)

TRUERoller motor driven roller series

Motor driven rollers, also known as powered rollers or motor powered conveyor rollers, contain high-efficiency motors and strong, sturdy planetary gears to ensure the rollers' functionality and reliability. Equipped with reduction gears in a whole range of ratios, MDRs can form conveyors of various specifications, each suitable for different customer requirements.

Technical specifications

- Operating voltage: DC 24 V
- Power: 50W@Turbo mode
  30W@Normal mode
- Motor efficiency: ~70%
- Noise: 50 dB (internal test data, 1 m distance, no load)
- Brake: Electronic brake
- Operating ambient temperature: −20°C to +40°C
- Ambient humidity: 10% to 90%, non-condensing

- Static load:

Length: Installation Length Unit: kg

Diameter \ Length	400	500	600	700	800	900	1000
Ø48.3、Ø50	60	50	50	45	40	35	30

- Motor characteristics:

★ Non-standard

Speed code	Gearbox stage	Gear ratio	Normal-mode				Turbo-mode			
			Tangential Speed (m/min)	Rated Torque (N-m)	Tangential Force (N)	Current (A)	Tangential Speed (m/min)	Rated Torque (N-m)	Tangential Force (N)	Current (A)
120	1	6.3	119.3	0.4	14.8	2.5	117.6	0.6	25.5	3.5
55	2	13.4	56.1	0.8	31.5		55.3	1.4	54.2	
★30	2	25	30.1	1.5	58.7		29.6	2.5	101.2	
★25	2	31.6	23.8	1.9	74.2		23.4	3.2	127.9	
20	2	40	18.8	2.3	93.9		18.5	4.0	161.9	

Motor driven roller model numbering

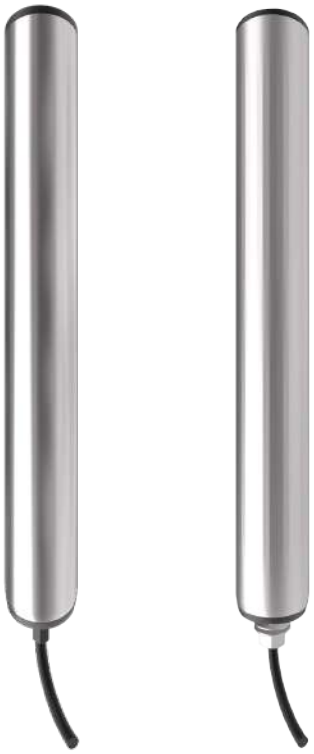
TR483 – H – 55 – 400 – 024 – 120 – 0 – ZS – S

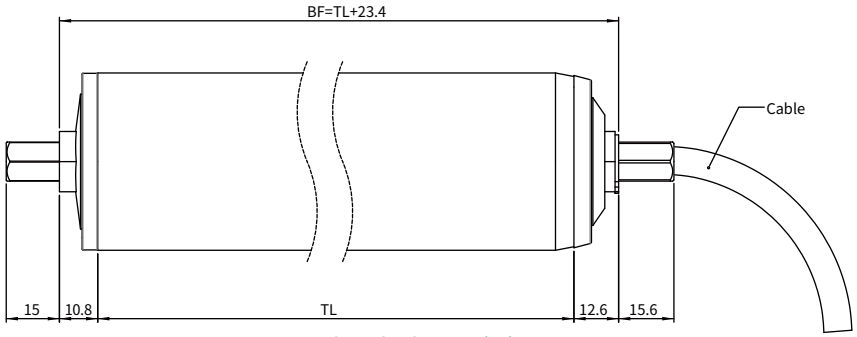
1 2 3 4 5 6 7 8 9 10

1. **Roller type:** TRUERoller
2. **Diameter:** 48.3 or 50.0 mm
3. **Shaft:** Spring-loaded HEX (H)、Female M8 thread (S)
4. **Speed code**
5. **Installation length:** 400 to 1000 mm
6. **Operating voltage:** 24V
7. **Cable length:** 120 cm
8. **Braking:** Electronic regenerative braking (0)
9. **Roller tube material:** Zinc-plated steel tubes (ZS)
10. **Interlocking options:** Straight (S)
    Round Groove (R)
    Poly-V head (V)
    Poly-O head (O)
    Toothed head (T)

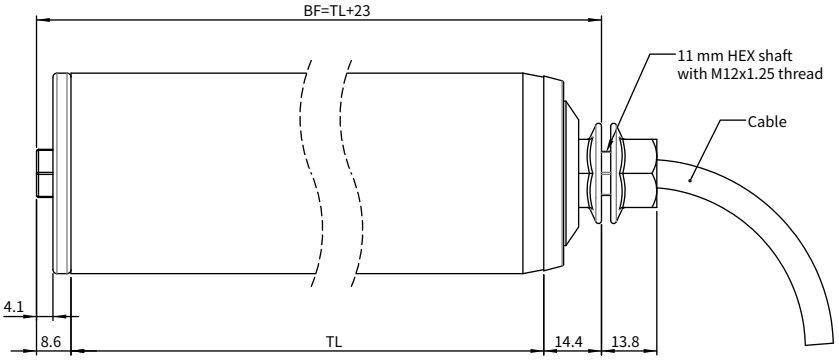
*For details or further requests, please contact Bamboo Dynamics.

Straight Roller



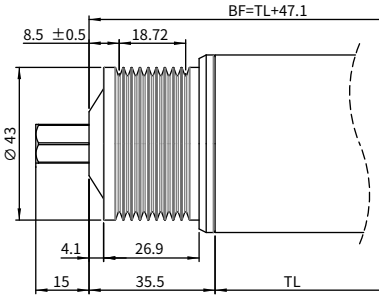


Spring-loaded HEX (H)

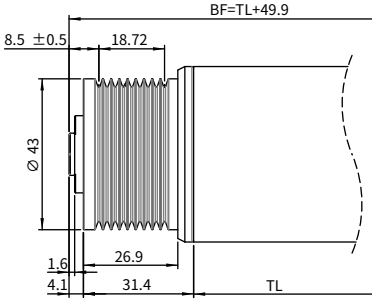


Female M8 thread (S)

Roller with Poly-V head

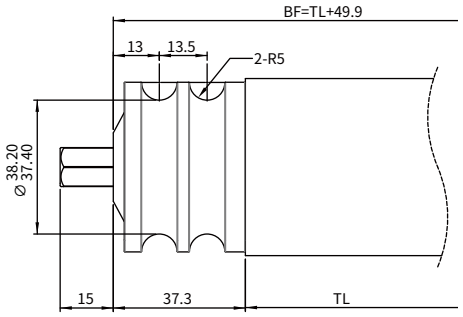


Spring-loaded HEX (H)

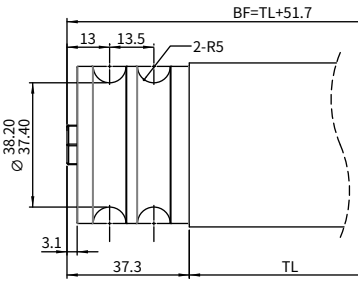


Female M8 thread (S)

Roller with Poly-O head

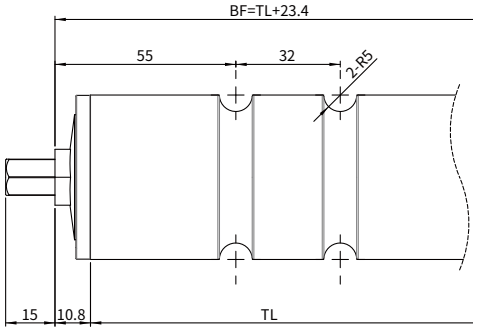


Spring-loaded HEX (H)

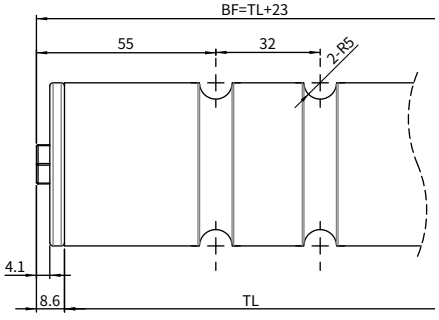


Female M8 thread (S)

Roller with Round Groove option

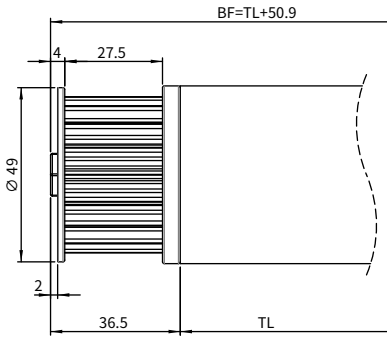


Spring-loaded HEX (H)



Female M8 thread (S)

Toothed head (For ∅50 with Female M8 thread only)

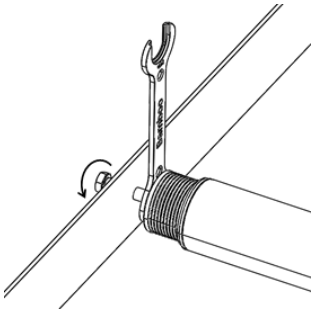


Poly-V Idle Roller (For details or further requests, please contact Bamboo Dynamics)

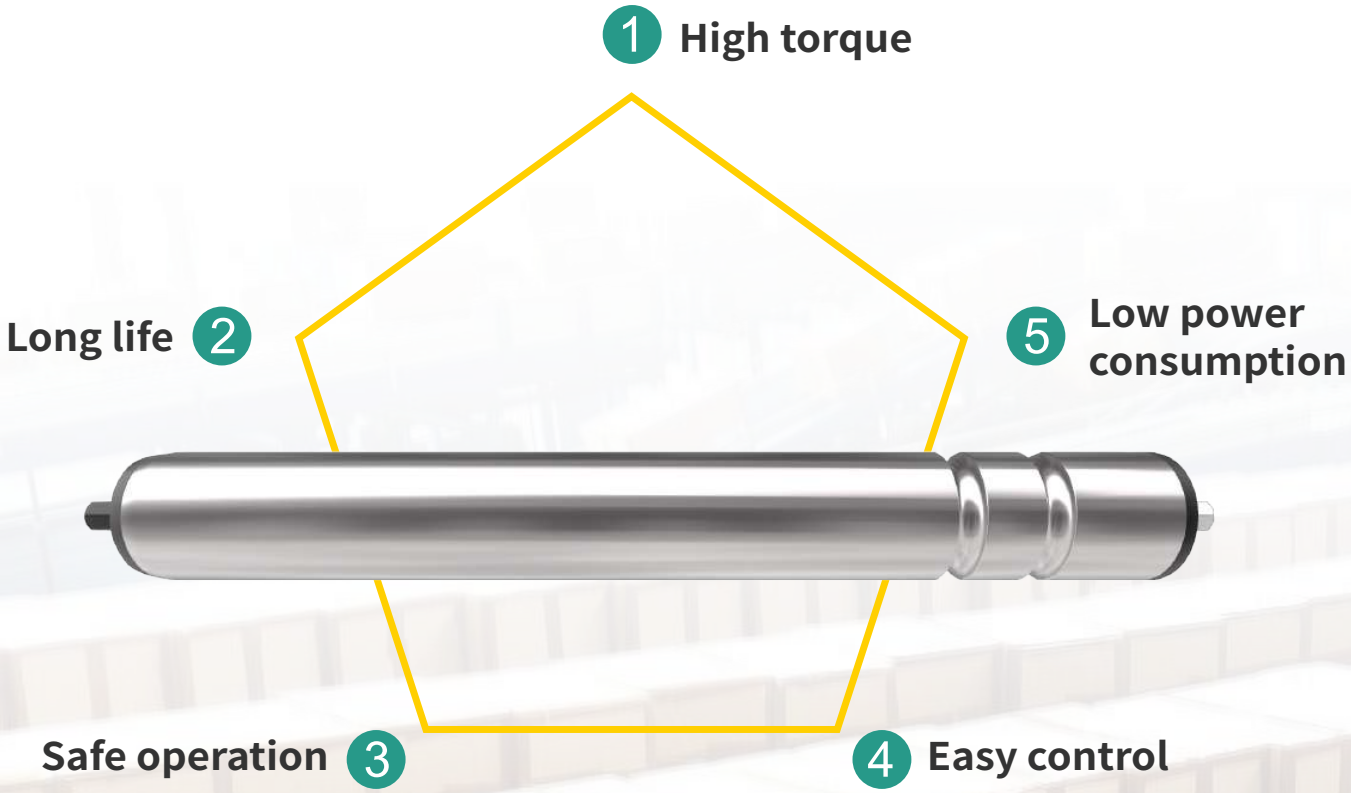
Extension cable

- Plug-in design
- Cable length = 1.2m

Wrench (For Poly-V head with Female M8 thread)



Advantages of brushless DC motor rollers



1. Permanent magnet rotors with high torque, applicable to a wide range of applications.
2. High relative efficiency, generates lower heat and leads to longer service life.
3. Multiple throttle mechanisms to achieve enhanced safety.
4. Easy speed and torque control.
5. Reduced power consumption and noise by activating rollers only in necessary zones.

Comparison of motor characteristics

Excellent ○ Fair △ Poor X

	Brushless DC motor	Carbon brush DC motor	AC induction motor
High torque	○	○	X
Long life	○	X	△
Safe operation	○	○	△
Easy control	○	X	X
Low power consumption	○	○	X

Disadvantages of carbon brush DC motors

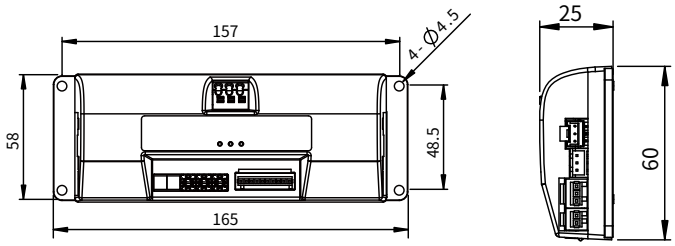
Due to friction, the carbon brushes on DC motors can wear down, a process which produces carbon dust and shortens motor life. This motor type is now rarely seen in powered rollers.

Disadvantages of AC induction motors

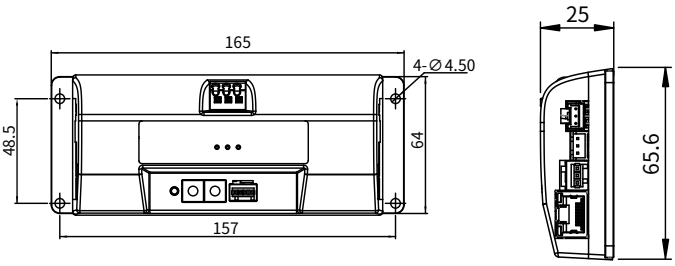
AC induction motors are asynchronous motors.
To adjust motor speed, additional speed variation controllers are required and will increase costs.
AC induction motors are mainly used in fixed-speed scenarios.
their torque is smaller than that of brushless DC motors,
They cannot be precisely positioned, have lower efficiency, and heat up more, which impacts their service life.

Intelligent control card specifications

TCI



TCN



Appearance and dimensions

Casing：IP20 protection; ABS VO flame retardant material
Heatsink：Aluminum with securing holes

Environmental requirements

Operating temperature：Ambient temperature 0°C to +40°C (+32°F to +104°F)
Ambient humidity：5% to 95%, non-condensing
Installation altitude：Max. 1000 m
Storage temperature：－40°C to +85°C (－40°F to +185°F)

Electrical specifications

- Rated voltage：24 V DC
- Power source protection：Resettable fuse; built-in overvoltage protection circuit
- Operating voltage range：21.6 to 26.4 VDC
- Currents operating at 24 VDC：

Standby Current		~0.2A
Single Zone	Rated Current (Normal Mode)	~2.5A
	Rated Current (Turbo Mode)	~3.5A
	Inrush Current	~8A

*If using a 2-zone driver, the maximum current will be twice the single zone rated current.

Intelligent control card model numbering

Graphical representation				
Ordering code	TCI-201Z	TCI-202Z	TCN-202ZP	TCN-202ZE
❶ **Product code** TC：TRUEControl	TC*			
❷ **Interface**	I/O		Network	
❸ **No. of Controllable rollers**	2			
❹ **Hardware version**	01	02		
❺ **ZPA**	Yes			
❻ **Protocol**	n/a		Profinet	Ethernet/IP

*TC: TRUEControl

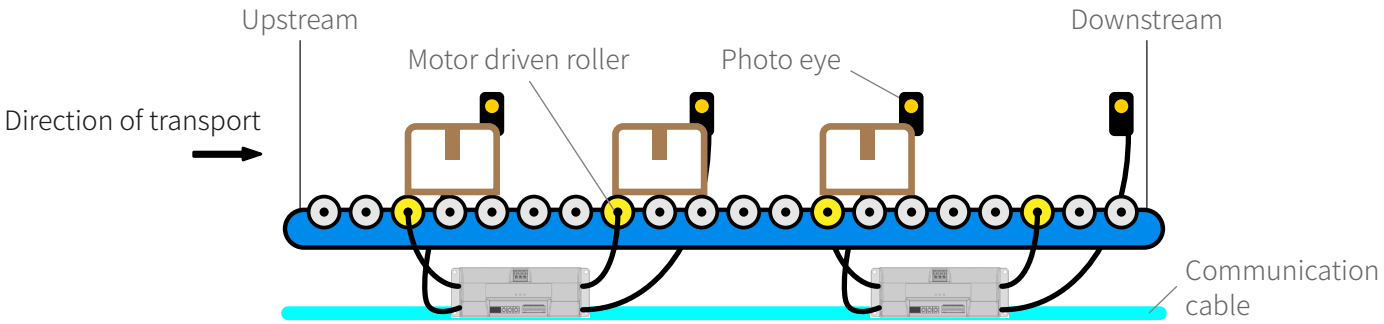
Sample control card ordering code

TC	N	2	02	Z	P
❶	❷	❸	❹	❺	❻

is a 2-zone 2nd gen driving card with Profinet interface and ZPA function

About Zero Pressure Accumulation (ZPA)

Conveyors in autonomously controlled factories and warehouses have the capability to transport, sort, distribute, and combine products during transmission. Zero Pressure Accumulation (ZPA) manages the conveyor in small zones with different transmission speeds. The zones are connected to upstream and downstream conveyor zones and receive upstream products with flexibility. Photo-eye sensors verify when products reach or leave a position, and check that products are conveyed downstream as needed according to sorting, distribution, and combination transport requirements. Brake controls ensure that even when accumulation occurs, the items will not be subject to undue collision that may result in crushing, falling, or incorrect transmission.



Note: Each intelligent control card (2-zone driver) comes with 2 motor driven rollers and 2 photo eyes. The number of idle rollers varies with conveying distance.

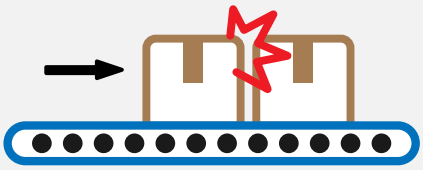
Advantages of ZPA

- Zoned control paired with power-conserving motors result in less energy consumption and better noise management.
- Zoned management and planning enables higher flexibility for conveyor process routes.
- Multiple control modes built in the control card facilitate easy completion of conveyor zone tasks using only the control card wiring.
- User-friendly control card communication interface allows management of more complex zoned conveyors and large-scale conveyors.
- Safe, low-voltage control card complies with safety regulations.
- Simple system for easy wiring and operation.

Comparing ZPA and traditional conveyors

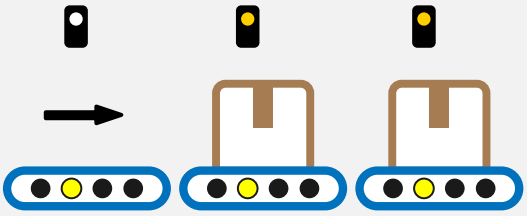
Accumulation of conveyed items

Traditional conveyors



Unless there are brake controls, once accumulation occurs the items can be subject to undue collision that may result in crushing, falling, or incorrect transmission.

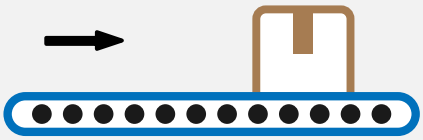
ZPA conveyors



With zone photo eyes and drive-stop control, ZPA conveyors can avoid the issues that traditional conveyors face.

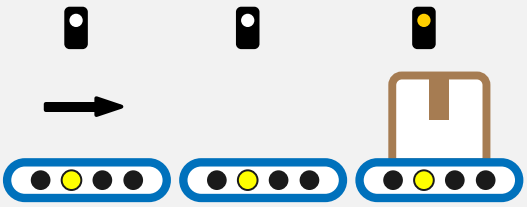
Power consumption and noise

Traditional conveyors



In operation mode, the entire conveyor runs as one, so power consumption is higher and the operating noise is loud.

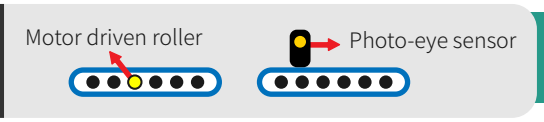
ZPA conveyors



With zoned control and power-conserving motors, ZPA conveyors have limited energy consumption and better noise management.

Eight ZPA functions

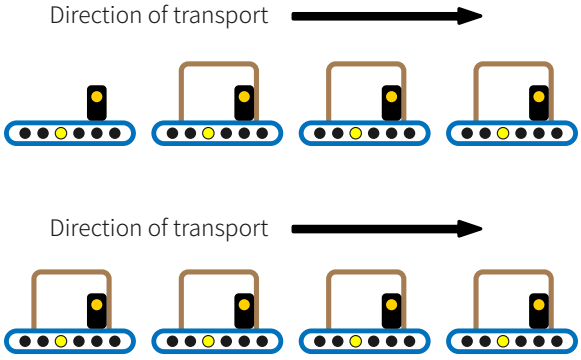
Diagram guide



1 Accumulation

Items enter the conveyor system and fill up zones

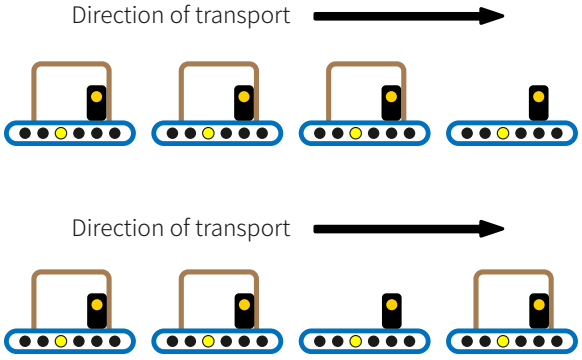
Items in the first zone will move down the conveyor until it enters the photo eye' s range. If the photo eye in the next zone is blocked, the motor driven roller will cease moving, stopping the item on the conveyor as well. If the photo eye in the next zone is clear, the roller will continue running and the item will arrive at the next zone.



2 ZPA

Item release by singulated (SING) mode

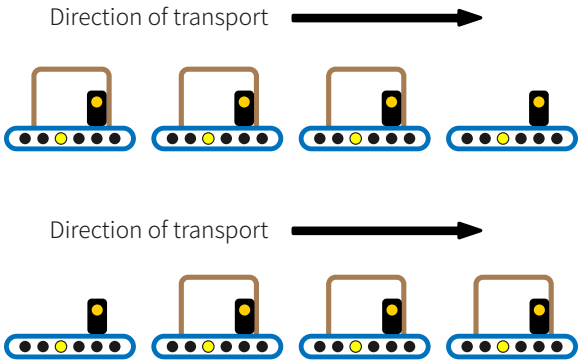
Once an item moves out of a photo eye' s sensing range on an accumulated conveyor, the item in the previous zone will move forward, continuing on until all zones are again full.



3 ZPA

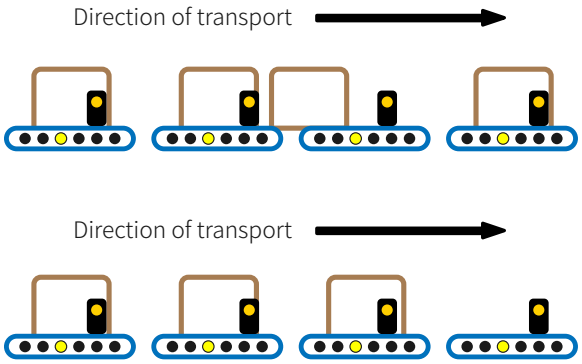
Item release by slug (SLUG) mode

Once an item moves out of a photo eye' s sensing range on an accumulated conveyor, all accumulated items from previous zones will move forward together, continuing on until the next zone is occupied.



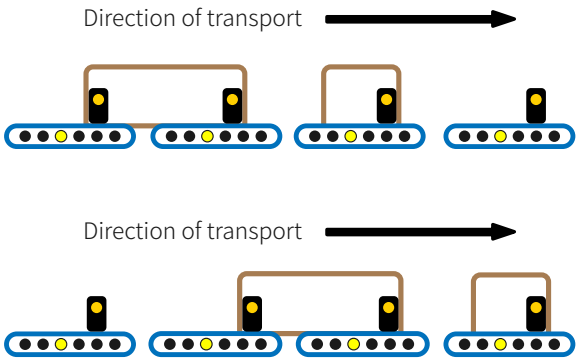
4 Back-to-back detection

Closely set items can be parted to individual zones through zoned control using either a combination of SING and SLUG modes, or solely SING mode.



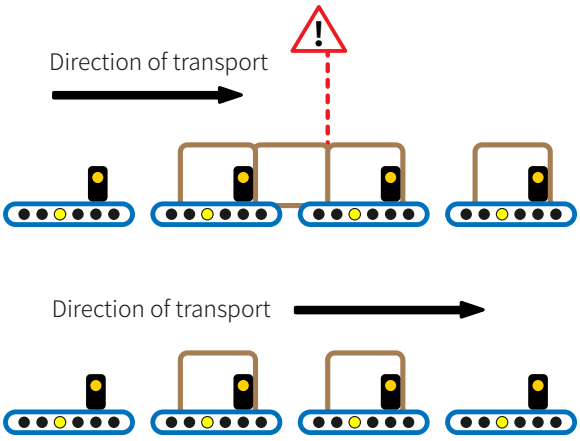
5 Long box detection

Motor control cards for two zones activate their rollers simultaneously to move long items forward.



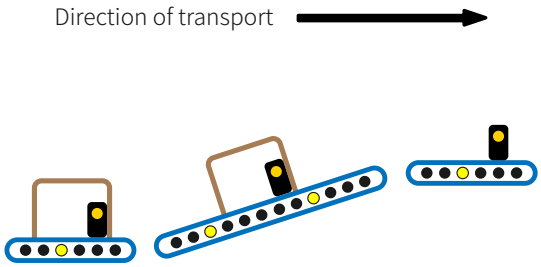
6 Jam timer detection

When conveyed items are crowded together and block a zone photo eye for longer than the jam timer setting, an alarm will go off. The conveyor will resume normal operation once the stack-up or crowding is cleared.



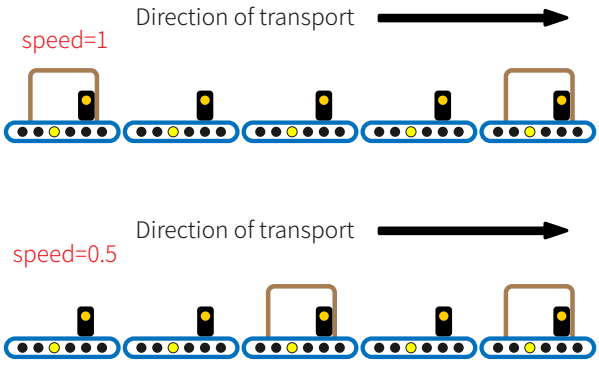
7 Master/slave mode

The master motor control card and the cards in other zones operate normally, while the slave motor card is configured to run and stop simultaneously with the master, giving the zone double driving force.



8 Half-speed control

With half-speed control, a zone will only run at half speed when the next zone is occupied, thus preventing items from rushing into the next zone at high speed.



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