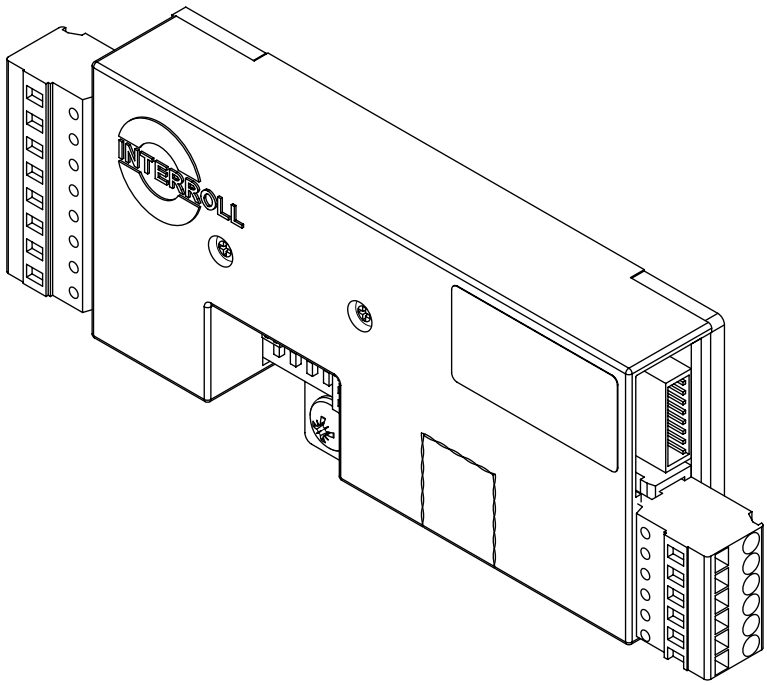
WE MAKE THE WORLD MOVE



User Manual

Interroll DriveControl

HC-EC100

HC-EC110

Manufacturer
Interroll Corporation
3000 Corporate Drive
USA-Wilmington, NC 28405
Tel. +1 910 799 11 00
Fax. +1 910 392 38 22
www.interroll.com

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Original language

Table of contents

Introduction

Handling of the user manual

In this manual the DriveControls HC-EC100 and HC-EC110 are referred to as HC-DriveControl.

Content of the manual

This manual contains important advice, notes and information about the HC-DriveControl in all phases of its lifecycle:

- Transport, assembly and commissioning
- Safe operation, maintenance and troubleshooting, disposal
- Accessories

Validity of the manual

The manual describes the HC-DriveControl as it is delivered by Interroll.

Special application designs require validation from Interroll and additional technical instructions.

The manual is part of the product

- ➢ For trouble-free, safe operation and warranty claims, read the manual and follow the instructions before handling the HC-DriveControl.
- ➢ Keep the manual near to the HC-DriveControl.
- ➢ Pass the manual on to any subsequent operator or occupant of the HC-DriveControl.
- ➢ Interroll does not accept any liability for malfunctions or defects due to non-observance of this manual.
- ➢ If you have any questions after reading the user manual, feel free to contact our customer service. See the last page for contact information.

Warning notices in this manual

The warning notices in this document refer to risks which may arise during usage of the HC-DriveControl. For relevant warning notices, *see "Safety", page 4* and the warning notices at the beginning of each chapter.

There are three categories of danger. The following signal words are used in the document as required:

- Danger
- Warning
- Caution

Signal word	Meaning
Danger	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
Warning	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
Caution	Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.

Structure of warning notices

⚠ DANGER

Nature and source of the hazard
Possible consequence of non-observance

➢ Information about how to avoid the hazard.

Introduction

Further symbols

NOTICE

This symbol identifies possible material damage.
➢ Information about how to avoid the damage.

This symbol displays safety instructions.

This symbol marks useful and important information.

➢ This symbol marks the steps that have to be carried out.

Safety

General safety instructions

The HC-DriveControl is designed according to the technical state of the art and is reliable in operation, once distributed. However, risks may still arise.

- Risks of physical injury to the user or bystanders.
- Adverse effects of the DriveControl and other material.

Disregarding the warning notices in this manual may lead to serious injury.

- ➢ Always read the entire operating and safety instructions before starting to work with the DriveControl and follow the information contained therein in full.
- ➢ Only instructed and qualified persons may work with the DriveControl.
- ➢ Always keep the user manual at hand when working at the DriveControl so you can consult it quickly if required.
- ➢ Always comply with relevant national safety regulations.
- ➢ If you have any questions after reading the operation manual, feel free to contact our customer service. See the last page for contact information.

Intended use

The HC-DriveControl may only be used for industrial applications and in an industrial environment to control a RollerDrive EC1xx. It must be integrated in a conveyor module or a conveying system. Any other use is considered inappropriate.

Use of the HC-DriveControl is only allowed in the areas described under product information.

Any changes that affect the safety of the product are not allowed.

The HC-DriveControl may only be used within the given operation limits.

Unintended use

Applications not according to the intended use of the HC-DriveControl require approval from Interroll.

Qualified persons

Qualified persons are persons who read and understand the manual and, taking national regulations into account, can competently execute incidental work.

Only instructed and qualified persons may work with the DriveControl, taking the following into account:

- the relevant manuals and diagrams,
- the warning and safety instructions in this manual,
- the system specific regulations and requirements,
- national or local regulations and requirements for safety and accident prevention.

Safety

Risks

The following list informs you about the various types of danger or damage that may occur while working with the HC-DriveControl.

Persons

- Maintenance or repair work must only be executed by authorized and qualified persons in accordance with the applicable regulations.
- Before using the DriveControl, ensure that no unauthorized persons are near the conveyor.

Electricity

- Only perform installation and maintenance work after you have switched off the power. Ensure that the power cannot be turned on accidentally.

Working environment

- Do not use the DriveControl in explosive atmospheres.
- Remove equipment or material which is not required from the workspace.

Avoiding malfunctions in operation

- Regularly check the DriveControl for visible damage.
- In case of fumes, turn off the power at once and ensure that it cannot be turned on accidentally.
- Contact qualified personnel immediately to find the source the malfunction.

Maintenance

- As the product is maintenance free, you only need to check regularly for visible damage and that all leads and screws are still tightened.

Interfaces

By assembling the DriveControl in a conveyor module, potential hazards may occur. These are not part of this manual and have to be analyzed during the design, installation and startup of the conveyor module.

- After assembling the DriveControl in a conveyor module, check the whole system for a new potential dangerous spot before turning on the conveyor.

Product information

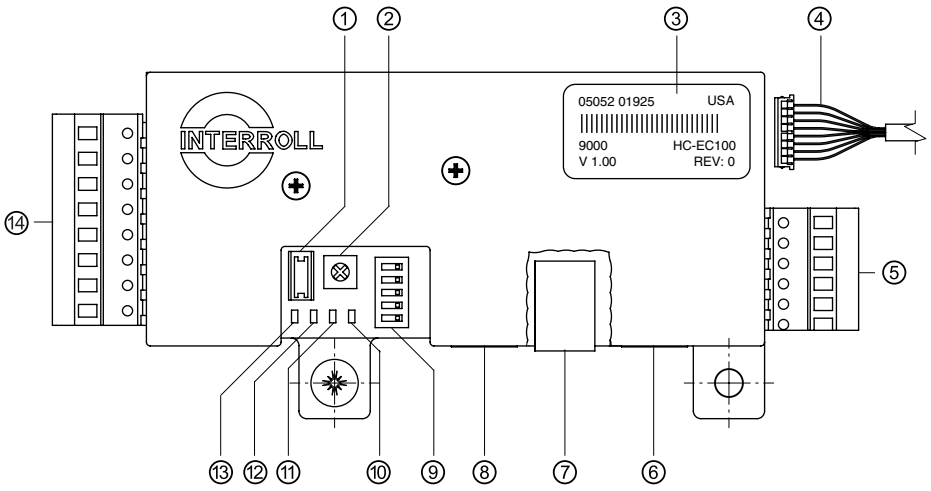
Versions of the HC-DriveControl

Version	Characteristics	Part #
HC-EC100	HybridControl for RollerDrive EC100 [1)]	9000
HC-EC100 Full	Like HC-EC100, but with digital I/O handshake [2)]	9001
HC-EC110	HybridControl for RollerDrive EC110 [1)]	9004

[1)] The HybridControl has ZPA and motor control functionality on board. If no peer-to-peer port is connected and DIP switches 4 and 5 are set to OFF, it switches automatically from ZPA-mode to motor control mode only.

[2)]The HC-EC100 Full has two pins per signal and all four signals are isolated. In this version, the digital signals are used instead of Smart I/O for exit and entry.

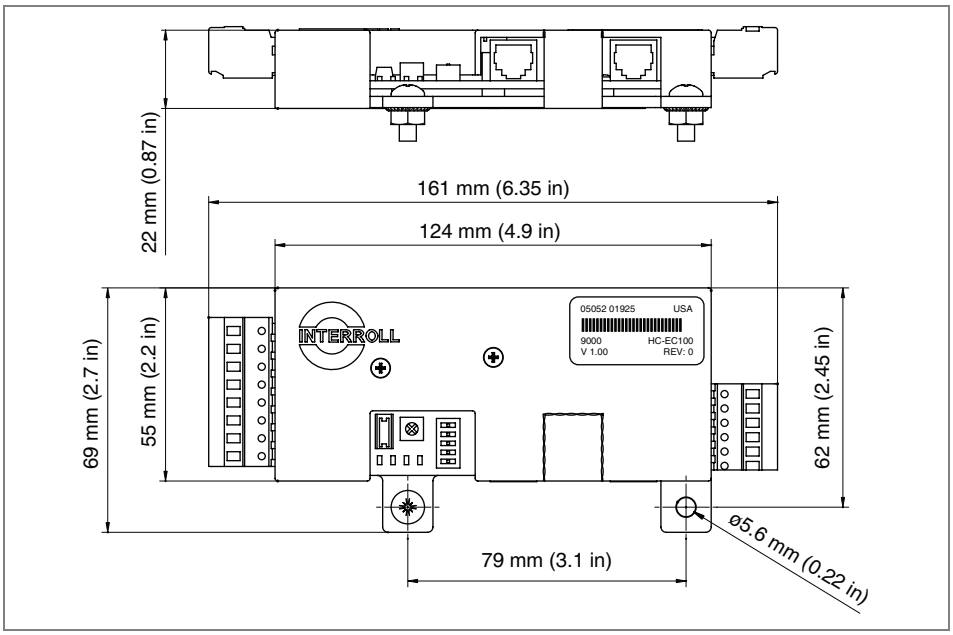
Components



① Fuse
② Speed potentiometer
③ Label
④ Motor cable of RollerDrive
⑤ Sensor connection
⑥ Upstream connection
⑦ Digital I/O handshake (only on HC-EC100 Full)
⑧ Downstream connection
⑨ DIP switches
⑩ Warning LED (amber)
⑪ Fault LED (red)
⑫ Power LED (green)
⑬ Fuse LED (red)
⑭ Power input and I/O terminal

Product information

Dimensions



Mounting hardware

The following mounting hardware is supplied:

- 2x button head screw 10-32 UNF x 0.5"
- 2x nut with captive star washer 10-32 UNF

Product information

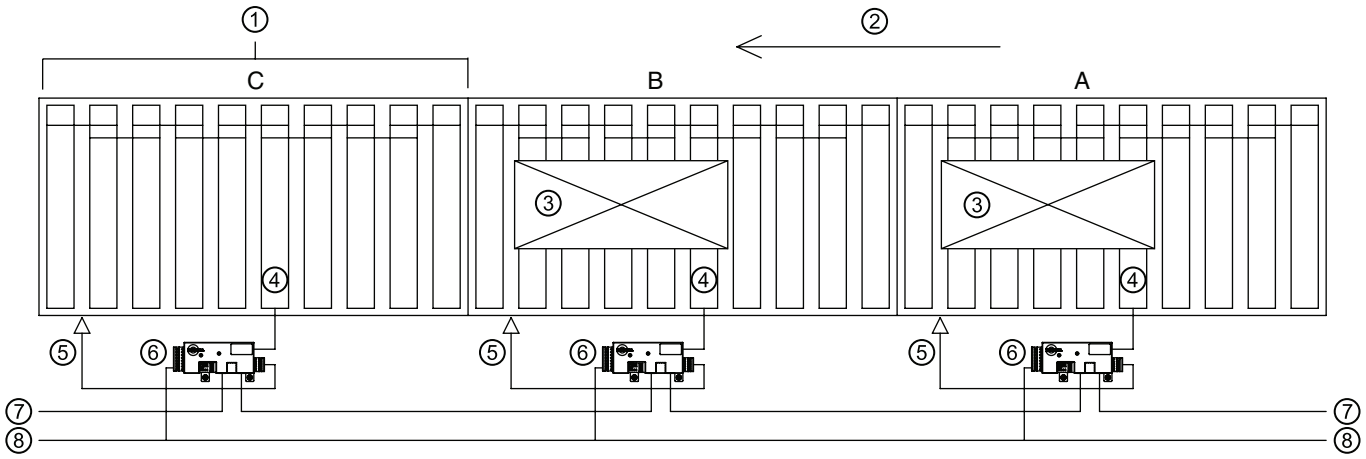
ZPA technology

ZPA is short for zero pressure accumulation. The HC-DriveControl provides true zero pressure accumulation and other control options to a conveyor system. Each HC-DriveControl controls a RollerDrive unit, which in turn drives idler rollers using O-rings or other belts. The HC-DriveControl, the RollerDrive, and the idler rollers (with associated sensors and switches) are assembled into a short conveyor section – a zone.

Zero pressure accumulation occurs as zones hold packages until the next downstream zone clears its sensor. When accumulation occurs, a low signal is passed upstream until each consecutive zone is occupied. Packages never push each other, and no line pressure occurs.

A logic-controlled, zero pressure conveyor is created when a number of zones are connected together and a simple six-wire phone cable links each HC-DriveControl electronically. The RollerDrives only operate when a package is detected by a photoeye. If the downstream zone is empty, the package moves forward.

Principle of zones



Typical ZPA conveyor configuration

① Zone
② Direction of travel
③ Load
④ RollerDrive
⑤ Photoeye
⑥ HC-DriveControl
⑦ Peer-to-peer communication cable
⑧ +24 VDC / GND

Zone A has a package at the photoeye. The HC-DriveControl of zone A recognizes its presence, checks zone B for availability and requests permission to transfer the package to zone B. Since zone B has also a package, its HC-DriveControl denies the permission until this package has been transfered to zone C (singulation mode), or has at least started being transfered (enhanced singulation mode). The singulation method depends on the setting of DIP switch SW3.

The HC-DriveControl of zone A will only start to operate the RollerDrives in its zone after it gets permission from the HC-DriveControl of zone B.

Product information

Product description

Features

- **Zone-to-zone communication**: Activities in upstream and downstream zones are monitored by photoeyes to permit control in various situations.
- **Diagnostics**: LEDs provide motor, sensor, and jam diagnostics as well as power, fuse, and temperature status.
- **Reverse or jog entire system**: Switch settings and connections on the board allow the user to reverse the zone-to-zone logic, jog the entire system, or reverse or jog parts of the system, or bypass those functions altogether (default) without the use of external cards.
- **NPN or PNP**: All inputs and outputs can be switched, collectively, for NPN or PNP with one switch. Only "No fault output" is always active high (failsafe function with 24 VDC in "No fault status").
- **Multiple dependent RollerDrives in one zone**: Up to three RollerDrives can be run from one HC-DriveControl (and two dependent cards) to achieve multiple RollerDrives in a single zone. This signal can also be used by a PLC as a "motor running" status input.
- **Smart braking**: Depending on upstream and downstream zone occupancy, the RollerDrive will brake if needed, and coast if no braking is required. This saves on power, heat, and vibration in the RollerDrive and ultimately in the system. When no photoeyes are blocked in the system, all RollerDrives are in coast mode.
- **Dynamic braking**: RollerDrive acts like a generator and DriveControl feeds back current into the RollerDrive windings.
- **Zero motion hold**: When the DriveControl has no start signal, the RollerDrive will be held in place.
- **Advanced braking**: The combination of dynamic braking followed by zero motion hold provides superior braking and holding for many applications.

Operation modes

The operation modes of a RollerDrive conveyor with HC-DriveControls include:

- **Standby**: The RollerDrives are turned off if the zone is empty.
- **Accept**: When a load reaches the sensor at the upstream end of the zone, the RollerDrives turn on to accept it.
- **Transfer**: The RollerDrives continue to run to ensure that the load entering the upstream end of the zone is transferred to the downstream end. This creates a smooth transition and high throughput.
- **Discharge**: The RollerDrives in the zone continue running to discharge the load if no accumulation command is received from the downstream zone.

Product information

Safety and stall functions

There are different levels of over-temperature or stall-related functions:

- **Jam protection**: If the HC-DriveControl detects a jam or obstruction at the downstream end of the zone, it sends an accumulation signal to the upstream zone, preventing a build-up of accumulation pressure that could cause product damage or personal injury.
- **Motor temperature foldback**: At a motor temperature of 80 °C (176 °F) the DriveControl will fold back peak current down to continuous current. This is indicated by the amber LED lighting up constantly. When the RollerDrive cools down, the amber LED extinguishes, and the maximum peak current is now possible again. The motor can run at this reduced current limit indefinitely without harming the DriveControl or motor.
- **Motor temperature shutdown**: At a motor temperature of 100 °C (212 °F) the HC-DriveControl will shut down the motor and the motor will go into dynamic braking. This is indicated by the red led flashing five times. When the RollerDrive cools back down, the red LED stops flashing and motor operation will resume.
- **Motor stall current limiting**: When the motor is stalled, the current will fold back to 1.4 A until the stall is cleared.
- **DriveControl temperature foldback**: At a card temperature of 70 °C (158 °F) the DriveControl will foldback peak current down to continuous current. This is indicated by the amber LED lighting up constantly. When the DriveControl cools down, the amber LED extinguishes, and the maximum peak current is now possible again. The DriveControl can run at this reduced current limit indefinitely without harming the DriveControl or motor.
- **DriveControl temperature shutdown**: At a DriveControl temperature of 90 °C (194 °F) the DriveControl will shutdown the motor and the motor will go into dynamic braking. This is indicated by the red LED flashing four times. When the DriveControl cools back down the red LED stops flashing and motor and DriveControl operation will resume.

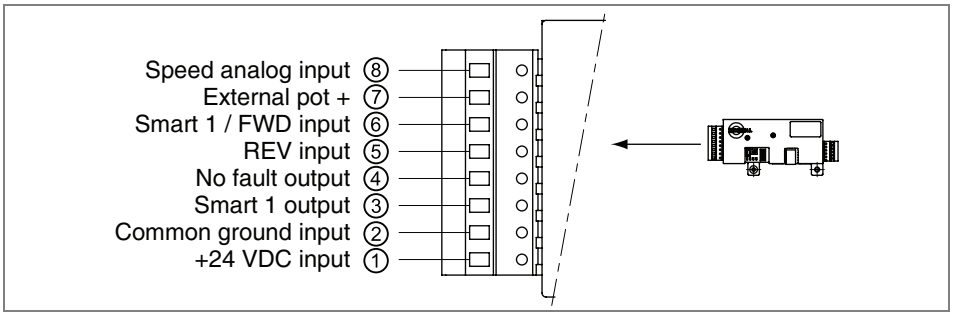
Incline and decline applications

Due to the zero motion hold and regenerative braking features, the HC-DriveControl and RollerDrive EC1xx can be used for incline and decline applications up to an angle of 15°.

Product information

Inputs and outputs

Power input and I/O connections



⑧ **Speed analog input:** External speed control down to approximately 33% of the maximum speed. When using a 10 kΩ external potentiometer, the wiper must be connected here. The on-board potentiometer should be set to maximum (CW) so it will not affect the external speed setting (for the wiring diagrams *see page 18*).

⑦ **External pot+:** An external 10 kΩ potentiometer can be used to adjust the speed down to approximately 33% of the maximum speed. The on-board potentiometer should be set to maximum (CW) so it will not affect the external speed setting (for the wiring diagrams *see page 18*).

⑥ **Smart 1 / FWD input:** Has various functions depending on zone type:
- In entry zone: acts as a start signal for the handshake with previous machines or conveyors.
- In exit zone: acts as a start signal to discharge the conveyor as handshake to following systems.
- In transport zone: acts as jog signal for the specific zone or the whole conveyor (depending on the DIP switch settings)
- In dependent zone: acts as jog command to run the motor.

This input is PNP/NPN selectable (with DIP switch 1).

⑤ **REV input:** Invokes the system reverse function, causing all interconnected controls to operate in reverse transport mode while the signal is active. When in dependent mode, the motor will simply run in reverse while this signal is active. This input is PNP/NPN selectable (with DIP switch 1).

④ **No fault output:** Active high (+24 VDC) when either in NPN or PNP mode. Signal goes low only when system faults occur.

③ **Smart 1 output:** Has various functions depending on zone type:
- In entry zone: reflects the status of the zone (occupied or free) for handshake with previous systems.
- In exit zone: reflects the status of the zone (occupied or free) for handshake with following systems.
- In transport zone: is the connection to control a second RollerDrive in the zone by interfacing with Smart 1 IN of the dependent zone.
- In dependent zone: reflects the status of the sensor.

This output is PNP/NPN selectable (with DIP switch 1).

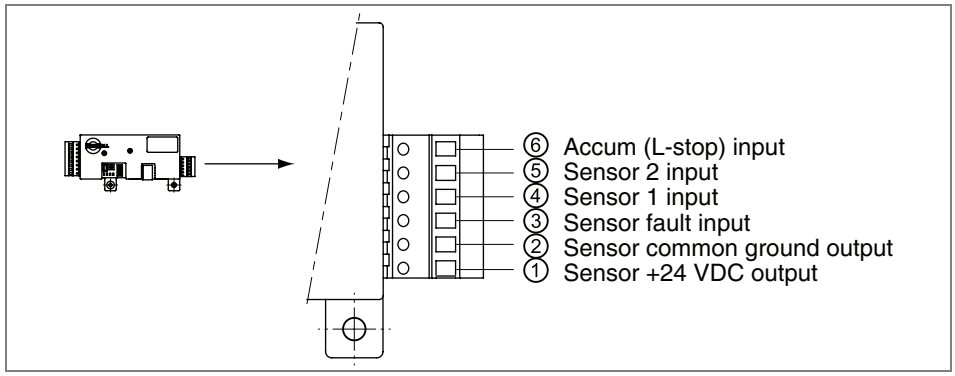
② **Common ground input:** Must be connect to the main power ground.

① **+24 VDC input:** Main power supply 24 VDC (voltage range *see "Technical data", page 16*).

The HC-DriveControl is protected against reverse polarity, but the power supply must provide a short circuit or over current protection and a voltage ripple tolerance of less than 5%.

Product information

Sensor connection



⑥ **Accum (L-stop) input:** An active signal (NPN/PNP switchable) on this terminal input will cause the HC-DriveControl to accumulate in this zone until the signal is removed. A manual switch or a PLC controller can provide the signal referenced to a common DC ground (NPN) or +24 VDC (PNP). This input is PNP/NPN selectable (with DIP switch 1).

⑤ **Sensor 2 input:** Used as a start sensor. It is located at the upstream edge of the zone and tells the first zone in a conveyor to run. This input is PNP/NPN selectable (with DIP switch 1).

④ **Sensor 1 input:** Located at the downstream edge of the zone. This input is PNP/NPN selectable (with DIP switch 1).

③ **Sensor fault input:** If sensor 1 has a fault output for low gain, it can be connected to this input. This input is PNP/NPN selectable (with DIP switch 1).

② **Sensor common ground output:** Power ground connection for sensor 1 and sensor 2.

① **Sensor +24 VDC output:** +24 VDC power supply for sensor 1 and sensor 2.

Only the sensors mentioned below may be chosen: (sensor supply current from the board is 50 mA max)

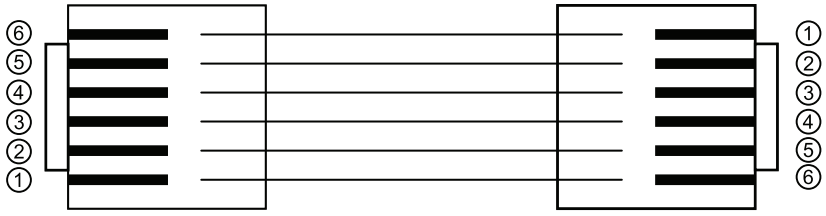
- NPN retro reflective (reflector required) - dark operate, normally open (NO) contact
- NPN diffused (no reflector) - light operate, normally closed (NC) contact
- PNP retro reflective (reflector required) - dark operate, normally open (NO) contact
- PNP diffused (no reflector) - light operate, normally closed (NC) contact

Product information

Peer-to-peer communication

Even though all of the external inputs and outputs are NPN and PNP switchable, the HC-DriveControl peer-to-peer communications always use NPN TTL logic. This means that if a signal passing from board to board is high, it is not in operation. If it is low (grounded), it is either performing its designated function or sending the function signal to a nearby board.

All logic operates from a regulated and filtered 5 VDC power supply on the HC-DriveControl. The 5 VDC power is delivered by a converter on the board which converts the 24 VDC power that the board receives into 5 VDC for the internal logic and peer-to-peer board communications (For communication cable hardware *see "Accessories", page 42*).



Downstream peer-to-peer

⑥ Jog (I/O) [left]
⑤ Reverse (I/O)
④ Accumulation (I/O)
③ B sensor (OUT)
② Ground
① NPN (IN) [right]

Upstream peer-to-peer

① Jog (I/O) [right]
② Reverse (I/O)
③ Accumulation (I/O)
④ C sensor (IN)
⑤ NPN (IN)
⑥ Ground [left]

While different segments of a system may operate at different input voltages, the DC ground for each system must be held at the same potential (0 VDC) to ensure good operation and clean signals. In other words, when multiple power supplies are used, the DC grounds must always be connected together.

When a peer-to-peer port is connected to another ZPA product, the NPN (in) signal is pulled low except for the case where a HC-DriveControl is upstream.

Product information

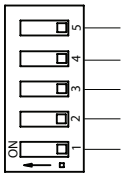
DIP switches

The DIP switches allow the selection of various types of control operations. The default DIP switch settings are all OFF. This would provide:

- Standard HC-DriveControl connectivity upstream and downstream (SW4, SW5)
- In standard singulate mode (SW3)
- Motor running counter clockwise (SW2)
- All NPN inputs and outputs (SW1)

DIP switch settings are read at reset (power-up) only.

DIP switch settings



	ON	OFF
SW5: Downstream	Override	Standard
SW4: Upstream	Override	Standard
SW3: Singulation	Enhanced	Standard
SW2: Rotation	CW	CCW
SW1: Logic	PNP	NPN

The following table shows the switch position for different situations:

DIP switch	ON (left position)	OFF (right position)
SW5 Downstream	**Override:** the downstream peer-to-peer cable is connected to another HC-DriveControl and the jog/ reverse signal is transmitted	**Standard:** the jog/reverse signal is not transmitted
SW4 Upstream	**Override:** the upstream peer-to-peer cable is connected to another HC-DriveControl and the jog/reverse signal is transmitted	**Standard:** the jog/reverse signal is not transmitted
SW3 Singulation	**Override:** enhanced singulated release (*see "Glossary", page 43*) is needed	**Standard:** singulated release (*see "Glossary", page 43*) is needed
SW2 Rotation	**Clockwise** (rotation of the RollerDrive seen from the cable end)	**Counter clockwise** (rotation of the RollerDrive seen from the cable end)
SW1 Logic	**PNP:** all external inputs, photoeye inputs and outputs are active high (24 VDC)	**NPN:** all external inputs, photoeye inputs and outputs are active low (0 VDC ground). This excludes the "No fault output" which is always active high (+24 VDC) when in either NPN or PNP mode.

Product information

- Local jog and reverse are always enabled, but upstream and downstream propagation are controlled by DIP switch 4 and DIP switch 5 respectively.
- It is now simple to use DIP switch 4 and DIP switch 5 to define jog/reverse groups, or to defeat jog and reverse completely (recommended whenever not in use).
- If the RollerDrive is mounted with the cable exiting the opposite side of the conveyor frame, switch SW2 has to be set in the opposite position to maintain equal direction of travel.
- For special cases *see "Setting options and wiring diagrams", page 19*

Meaning of the LEDs

The LEDs provide motor, sensor, and jam diagnostics as well as power, fuse, and temperature status. The following table shows the meaning of the LEDs (flashes are ¼ second on, and ¼ second off, in a fixed 4 second time period):

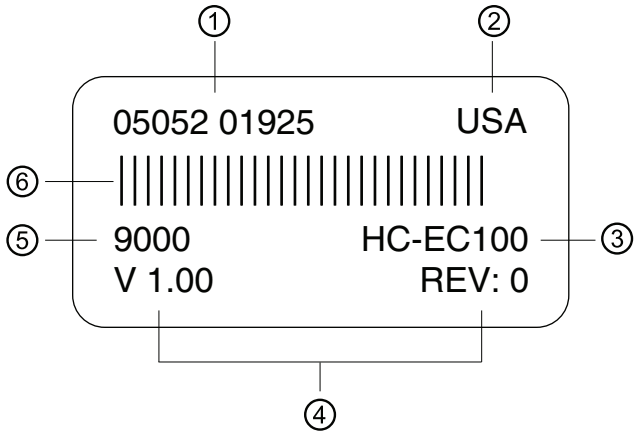
LED	Color	Status	Meaning
Fuse	red	on steady (all other LEDs are off)	Fuse blown
Power	green	on steady	Power ok
Fault	red	on steady	Stalled motor Jam at or between sensors
		flashing once	Motor or motor cable open or disconnected
		flashing twice	Over-voltage detection 29 VDC ± 0.2 VDC (will cease normal operation)
		flashing three times	Under-voltage detection 19 VDC ± 0.2 VDC (will cease normal operation)
		flashing four times	DriveControl severe temperature shut-down (will cease normal operation until cool)
		flashing five times	Motor severe temperature shut-down (will cease normal operation until cool)
		flashing six times	Low gain or bad sensor (sensor with fault output connected)
Warning	amber	flashing once	Motor current is limited to maximum continuous current due to motor over-temperature
		flashing twice	Motor current is limited to maximum continuous current due to card over-temperature

There is no error output if the amber LED is flashing.

Product information

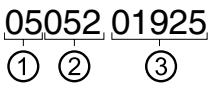
DriveControl label

The specifications on the DriveControl label are used to identify the HC-DriveControl. This is required to use the DriveControl as intended.



① Serial number
② Country of production
③ Product name
④ Revision information
⑤ Article number
⑥ Identification barcode

The serial number contains the following information about the production date:



① Year
② Day of the year
③ Sequential number of the produced units on that day

Technical data

Nominal voltage	24 VDC
Voltage range	22 to 28 VDC
Voltage ripple tolerance	< 5%, < 1% recommended
Continuous current	HC-EC100: 1.8 A HC-EC110: 2.5 A
Peak current	4.1 A
Fuse	5 A slow blow Littlefuse 0452005
Protection classification	IP20
Ambient temperature for operation	0 °C to 40 °C (32 °F to 104 °F)
Ambient temperature for transport and storage	-20 °C to 75 °C (-4 °F to 167 °F)
Ambient temperature changes	max. 1 °K/min; 3 h; two cycles according to IEC 68-2-14
Ambient humidity	max. 90% not condensing
Installation altitude above sea level	max. 1000 m (max. 3300 ft)

Product information

Speed settings

On board speed setting

The speed can be continuously adjusted (between 100% and approximately 10% for the HC-EC100 and 33% for the HC-EC110) by the potentiometer on the DriveControl. Default setting is maximum.

Gear ratio	Speed range	
	EC100 + HC-EC100	**EC110 + HC-EC110**
4:1	–	2.41 to 0.8 m/s (475 to 157 fpm)
9:1	–	1.07 to 0.36 m/s (211 to 70 fpm)
12:1	1.32 to 0.15 m/s (260 to 30 fpm)	0.8 to 0.26 m/s (158 to 52 fpm)
16:1	1.03 to 0.1 m/s (202 to 20 fpm)	0.6 to 0.2 m/s (119 to 39 fpm)
24:1	0.69 to 0.13 m/s (135 to 14 fpm)	0.4 to 0.13 m/s (79 to 26 fpm)
36:1	0.44 to 0.05 m/s (88 to 9 fpm)	0.27 to 0.09 m/s (53 to 17 fpm)
48:1	0.35 to 0.04 m/s (68 to 7 fpm)	0.2 to 0.07 m/s (40 to 13 fpm)
64:1	0.25 to 0.03 m/s (50 to 5 fpm)	0.15 to 0.05 m/s (30 to 10 fpm)
96:1	0.17 to 0.02 m/s (34 to 3 fpm)	–

If more than one DriveControl has to run with reduced speed, it is recommended to set the speed externally (by PLC or external potentiometer; *see "External speed setting", page 18*) and activate peer-to-peer communication using DIP switch 4 (Upstream) and DIP switch 5 (Downstream).

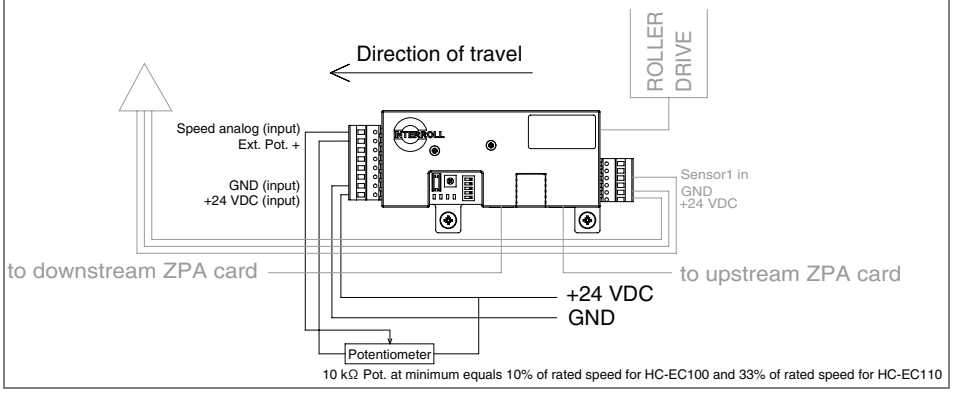
Product information

External speed setting

Apart from the potentiometer on the DriveControl, there are other ways to set the speed.

When the DIP switch settings ON / OFF are stated, both settings are possible for the shown wiring (for the meaning of the settings *see "DIP switches", page 14*).

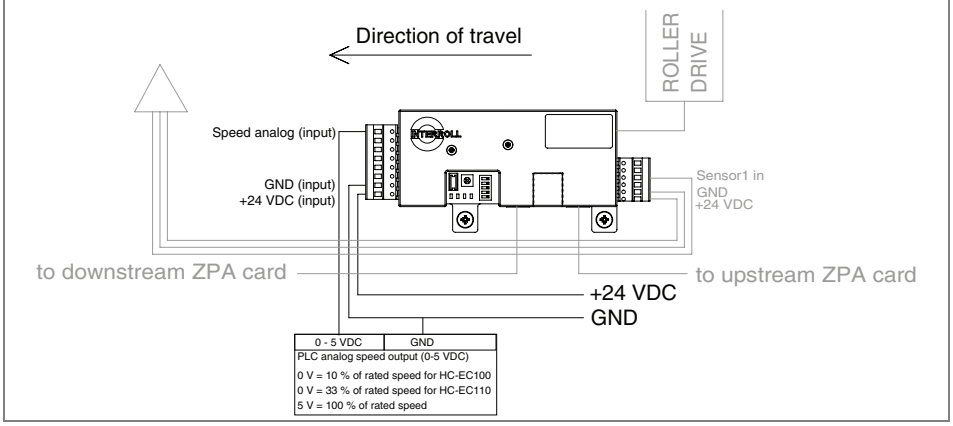
External speed set by potentiometer



DIP switch settings:

- SW5: ON / OFF (If SW5 is ON, speed setting is transferred downstream.)
- SW4: ON / OFF (If SW4 is ON, speed setting is transferred upstream.)
- SW3: ON / OFF
- SW2: ON / OFF
- SW1: ON / OFF

External speed set by PLC



DIP switch settings:

- SW5: ON / OFF (If SW5 is ON, speed setting is transferred downstream.)
- SW4: ON / OFF (If SW4 is ON, speed setting is transferred upstream.)
- SW3: ON / OFF
- SW2: ON / OFF
- SW1: ON / OFF

Product information

Setting options and wiring diagrams

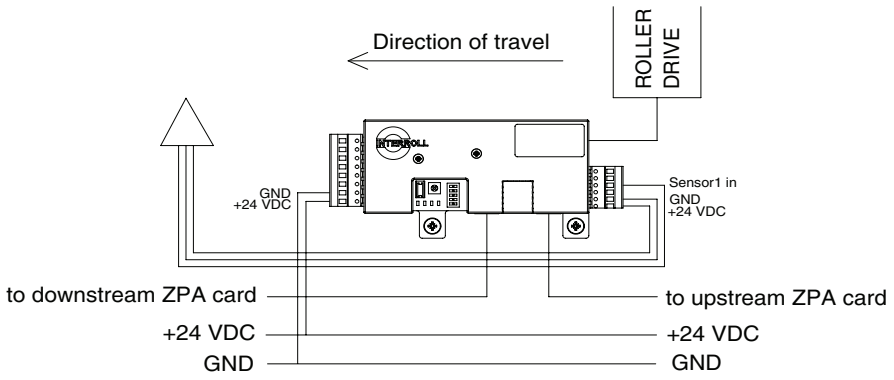
This chapter explains the DIP switch settings for different applications.

When the DIP switch settings ON / OFF are stated, both settings are possible for the shown wiring (for the meaning of the settings *see "DIP switches", page 14*).

HC-DriveControl is between two HC-DriveControls

Upstream device	**HC-DriveControl**			
Downstream device	**HC-DriveControl**			
DIP switch 4	**Off**	**On**	**Off**	**On**
DIP switch 5	**Off**	**On**	**On**	**Off**
Upstream peer-to-peer jog/reverse	Disabled	Functional	Disabled	Functional
Downstream peer-to-peer jog/reverse	Disabled	Functional	Functional	Disabled
Zone type	ZPA-mode	ZPA-mode	ZPA-mode	ZPA-mode
Smart 1 (in)	Jog	Jog	Jog	Jog
Reverse (in)	System reverse	System reverse	System reverse	System reverse
Smart 1 (out)	Motor run	Motor run	Motor run	Motor run
Sensor 2	Another C sensor	Another C sensor	Another C sensor	Another C sensor

Standard configuration

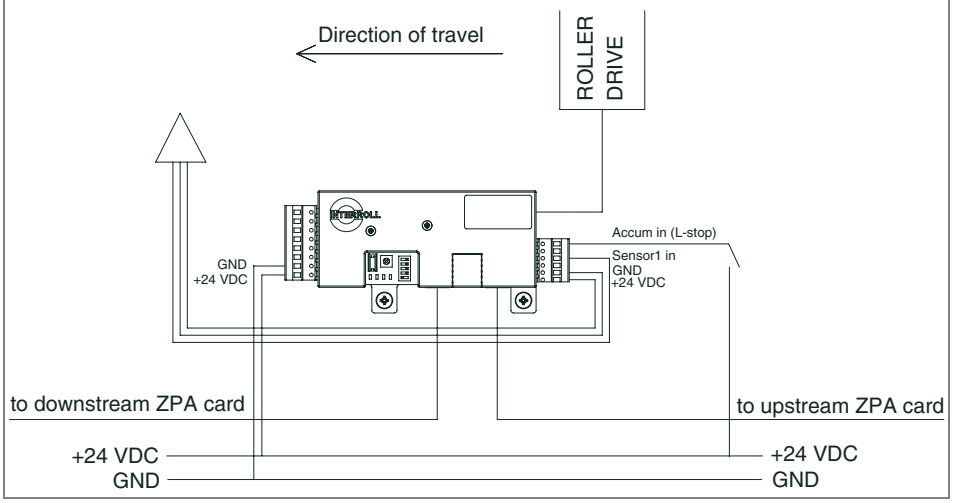


DIP switch settings:

- SW5: ON / OFF
- SW4: ON / OFF
- SW3: ON / OFF
- SW2: ON / OFF
- SW1: ON / OFF

Product information

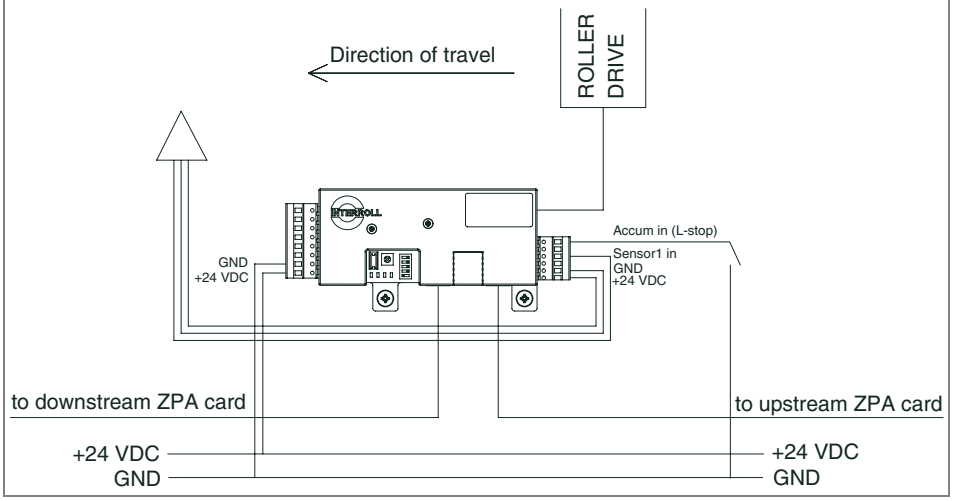
Accumulation (L-stop) in PNP mode



DIP switch settings:

- SW5: ON / OFF
- SW4: ON / OFF
- SW3: ON / OFF
- SW2: ON / OFF
- SW1: ON

Accumulation (L-stop) in NPN mode

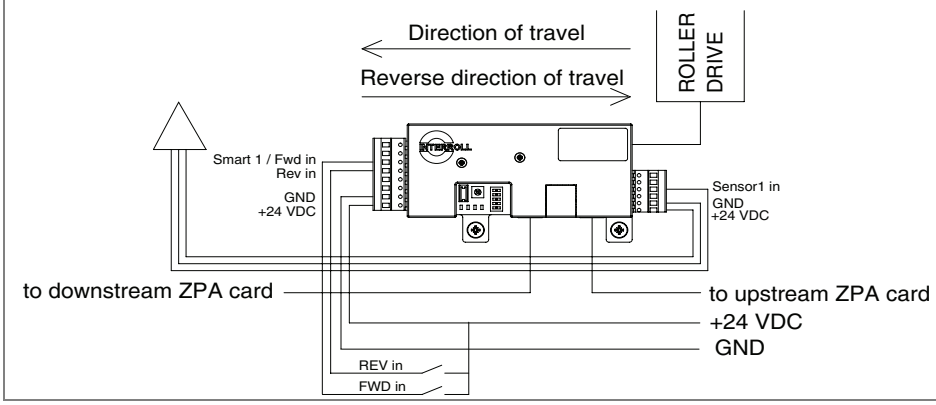


DIP switch settings:

- SW5: ON / OFF
- SW4: ON / OFF
- SW3: ON / OFF
- SW2: ON / OFF
- SW1: OFF

Product information

External direction set in PNP mode



DIP switch settings:

- SW5: ON / OFF (If SW5 is ON, direction setting is transferred downstream.)
- SW4: ON / OFF (If SW4 is ON, direction setting is transferred upstream.)
- SW3: ON / OFF (If REV signal is active, SW3 has to be OFF.)
- SW2: ON / OFF
- SW1: ON

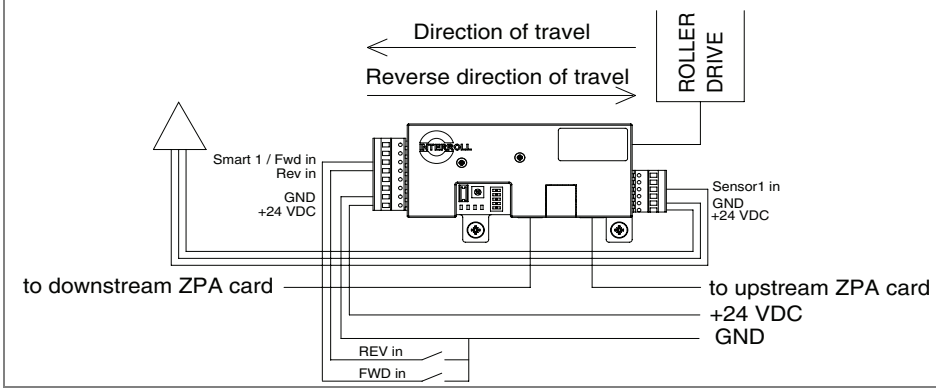
Start options:

- FWD connected to 24 VDC at PNP mode causes ccw rotation.
- REV connected to 24 VDC at PNP mode causes cw rotation.
- FWD and REV connected to 24 VDC at PNP mode causes coast mode.

- FWD signal acts like a jog signal, disregarding ZPA functionality and photoeye signals.
- REV signal reverses motor and logic direction; upstream becomes downstream and C sensor becomes B sensor.

Product information

External direction set in NPN mode



DIP switch settings:

- SW5: ON / OFF (If SW5 is ON, direction setting is transferred downstream.)
- SW4: ON / OFF (If SW4 is ON, direction setting is transferred upstream.)
- SW3: ON / OFF (If REV signal is active, SW3 has to be OFF.)
- SW2: ON / OFF
- SW1: OFF

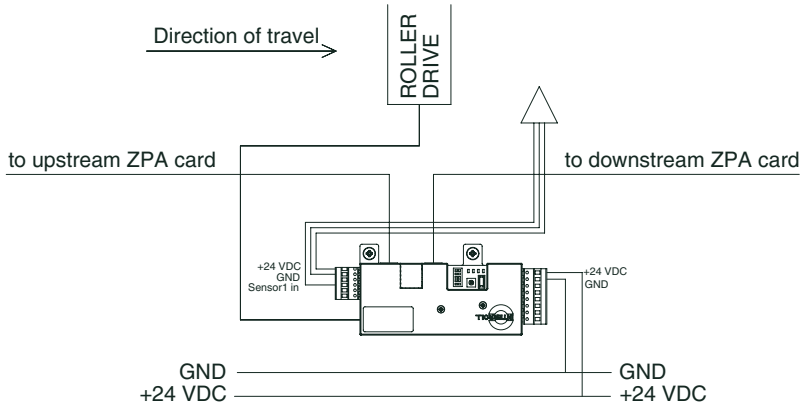
Start options:

- FWD connected to GND at NPN mode causes ccw rotation.
- REV connected to GND at NPN mode causes cw rotation.
- FWD and REV connected to GND at NPN mode causes coast mode.

- FWD signal acts like a jog signal, disregarding ZPA functionality and photoeye signals.
- REV signal reverses motor and logic direction; upstream becomes downstream and C sensor becomes B sensor.

Product information

Left to right conveyor



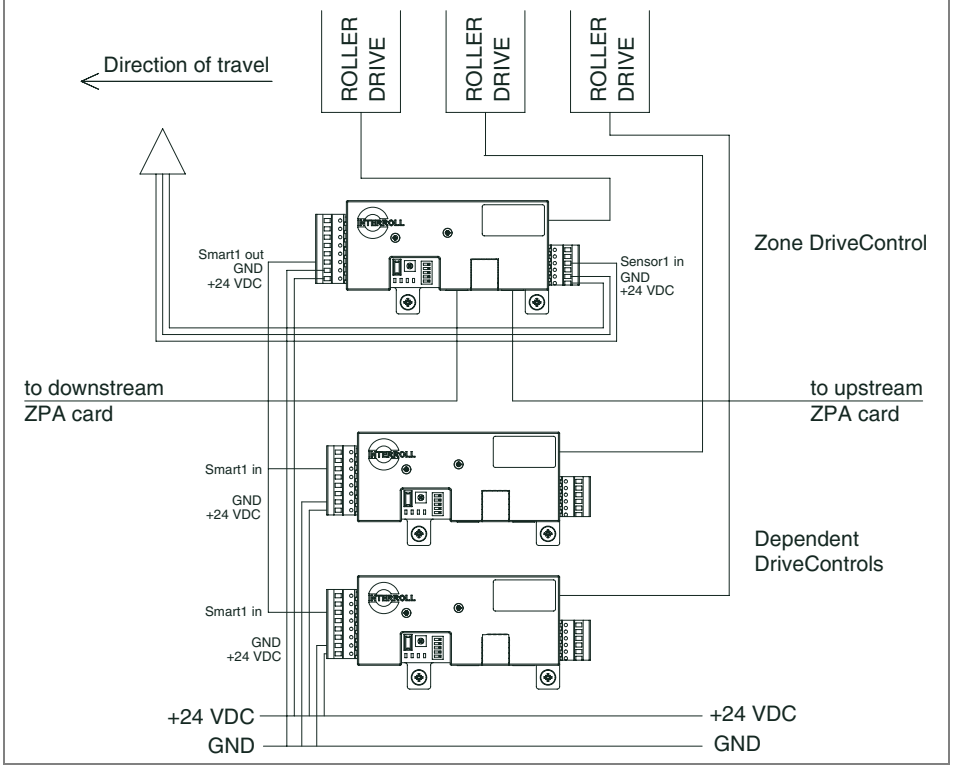
DIP switch settings:

- SW5: ON / OFF
- SW4: ON / OFF
- SW3: ON / OFF
- SW2: ON / OFF
- SW1: ON / OFF

Works like a standard configuration, only the HC-DriveControl is turned upside-down.

Product information

Multiple RollerDrives in one zone



A reverse command to the Zone DriveControl will not be communicated to the dependent DriveControls.

Zone DriveControl DIP switch settings:

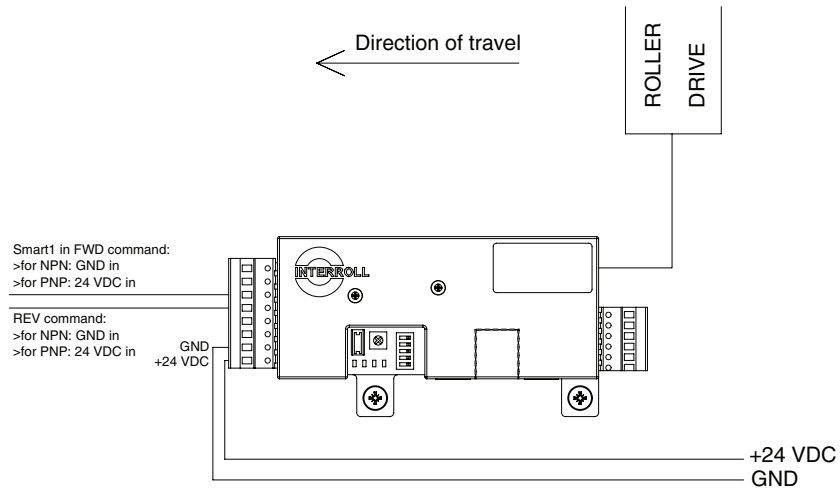
- SW5: OFF
- SW4: OFF
- SW3: ON / OFF
- SW2: ON / OFF
- SW1: ON / OFF

Dependent DriveControl DIP switch settings:

- SW5: OFF
- SW4: OFF
- SW3: OFF
- SW2: ON / OFF
- SW1: ON / OFF (must have the same switch setting as zone DriveControl (logic mode NPN or PNP))

Product information

HC-DriveControl as motor control board



DIP switch settings:

- SW5: OFF
- SW4: OFF
- SW3: OFF
- SW2: ON / OFF
- SW1: ON / OFF

Start options:

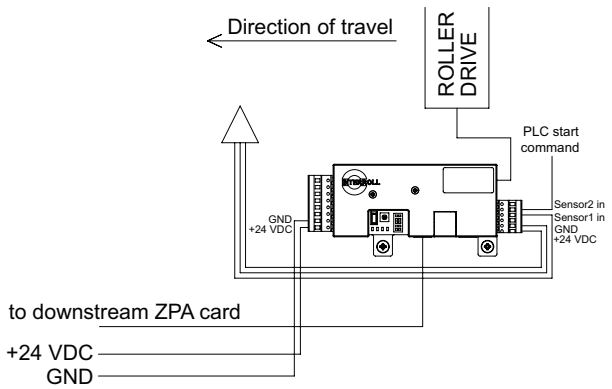
- FWD connected to 24 VDC causes ccw rotation.
- REV connected to 24 VDC causes cw rotation.
- FWD and REV connected to 24 VDC causes coast mode.

Product information

HC-DriveControl is entry zone

Upstream device	-	-	-	-
Downstream device		**HC-DriveControl**		
DIP switch 4	**Off**	**On**	**Off**	**On**
DIP switch 5	**Off**	**On**	**On**	**Off**
Upstream peer-to-peer jog/reverse	Disabled	Functional	Disabled	Functional
Downstream peer-to-peer jog/reverse	Disabled	Functional	Functional	Disabled
Zone type	Smart I/O entry	ZPA-mode	Smart I/O entry	ZPA-mode
Smart 1 (in)	Request	Jog	Request	Jog
Reverse (in)	System reverse	System reverse	System reverse	System reverse
Smart 1 (out)	Perm.	Motor run	Perm.	Motor run
Sensor 2	Not used (smart I/O)	Another C sensor	Not used (smart I/O)	Another C sensor

Standard configuration with PLC or photoeye start command



DIP switch settings:

- SW5: ON / OFF
- SW4: ON / OFF (specifies if this zone is a transport or entry zone; if sensor 2 IN is used, SW 4 must be set to ON)
- SW3: ON / OFF
- SW2: ON / OFF
- SW1: ON / OFF

Sensor 2 IN start signal (by PLC or photoeye):

- Start signal for PNP: 24 VDC
- Start signal for NPN: GND

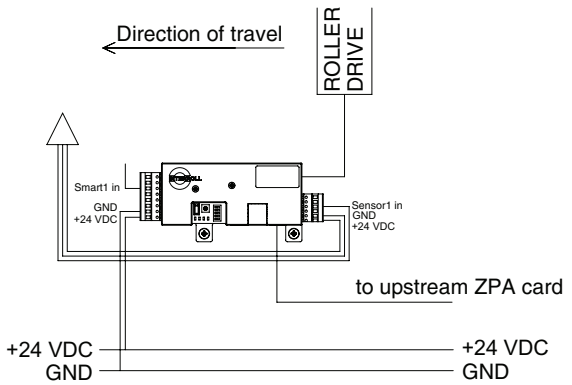
If you are using a photoeye as a starting signal, connect sensor 2 IN with the photoeye.

Product information

HC-DriveControl is exit zone

Upstream device	**HC-DriveControl**			
Downstream device	**-**	**-**	**-**	**-**
DIP switch 4	**Off**	**On**	**Off**	**On**
DIP switch 5	**Off**	**On**	**On**	**Off**
Upstream peer-to-peer jog/reverse	Disabled	Functional	Disabled	Functional
Downstream peer-to-peer jog/reverse	Disabled	Functional	Functional	Disabled
Zone type	Smart I/O entry	ZPA-mode	ZPA-mode	Smart I/O entry
Smart 1 (in)	Perm.	Jog	Jog	Perm.
Reverse (in)	System reverse	System reverse	System reverse	System reverse
Smart 1 (out)	Request	Motor run	Motor run	Request
Sensor 2	Another C sensor	Another C sensor	Another C sensor	Another C sensor

Standard configuration with "Smart 1 IN" start command



DIP switch settings:
- SW5: ON / OFF (specifies if this zone is a transport or exit zone)
- SW4: ON / OFF
- SW3: ON / OFF
- SW2: ON / OFF
- SW1: ON / OFF

Smart 1 IN signal (by PLC or photoeye):
- Start signal for PNP: 24 VDC
- Start signal for NPN: GND

Product information

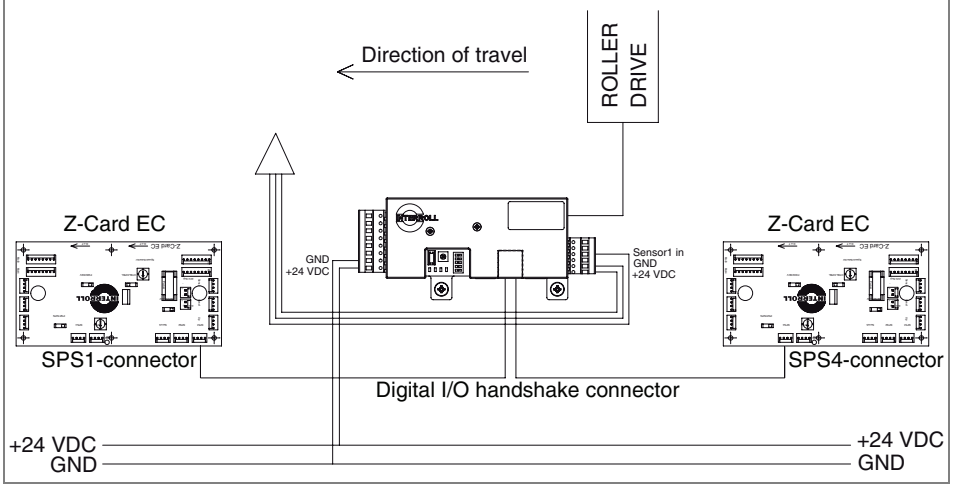
HC-EC100 Full in conjunction with Z-Cards EC

Only the HC-EC100 Full (Art. # 9001) is equipped with a digital I/O-handshake terminal. It is specially designed for easy Z-Card EC connection. HC-EC110 is not available with digital I/O-handshake terminal.

		HC-EC100 Full between Z-Cards	HC-EC100 Full before Z-Card		HC-EC100 Full after Z-Card	
Upstream device		**Z-Card EC**	**HC-EC100 Full**		**Z-Card EC**	**Z-Card EC**
Downstream device		**Z-Card EC**	**Z-Card EC**	**Z-Card EC**	**HC-EC100 Full**	
DIP switch 4		**Off**	**Off**	**On**	**Off**	**Off**
DIP switch 5		**Off**	**Off**	**Off**	**Off**	**On**
Upstream peer-to-peer jog/reverse		Disabled	Disabled	Functional	Disabled	Disabled
Downstream peer-to-peer jog/ reverse		Disabled	Disabled	Disabled	Disabled	Functional
Digital I/O on board		Yes	Yes	Yes	Yes	Yes
Zone type		Digital I/O dependent	Digital I/O exit	Digital I/O exit	Digital I/O entry	Digital I/O entry
Smart 1 (in)		Jog	Jog	Jog	Jog	Jog
Reverse (in)		System reverse	System reverse	System reverse	System reverse	System reverse
Smart 1 (out)		B sensor	B sensor	B sensor	B sensor	B sensor
Sensor 2		Not used (digital I/O)	Another C sensor	Another C sensor	Not used (digital I/O)	Not used (digital I/O)
Upstream digital I/O	Req (out)	N/C	N/C	N/C	In use	In use
	Perm (in)	N/C	N/C	N/C	In use	In use
Downstream digital I/O	Req (out)	In use	In use	In use	N/C	N/C
	Perm (in)	In use	In use	In use	N/C	N/C

Product information

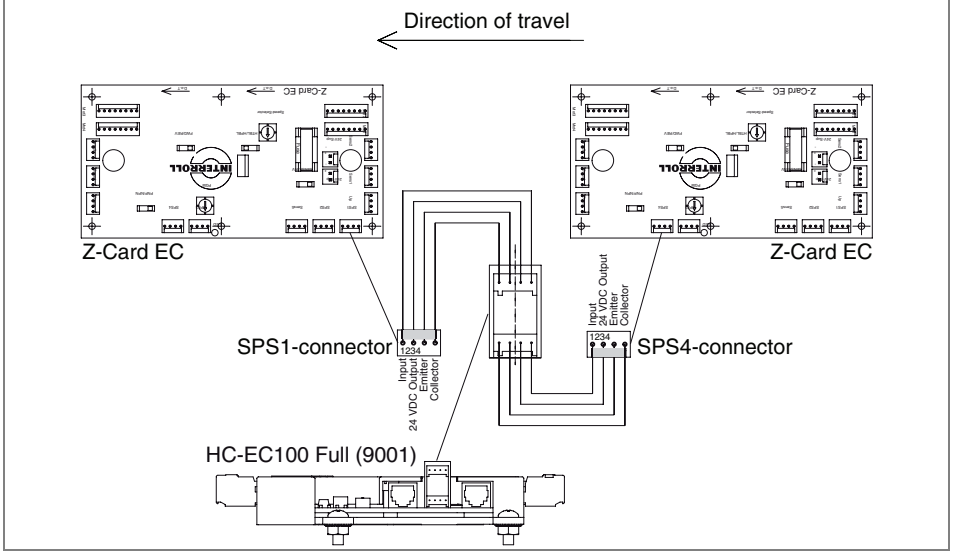
Standard configuration



DIP switch settings:

- SW5: ON / OFF
- SW4: ON / OFF
- SW3: ON / OFF
- SW2: ON / OFF
- SW1: ON / OFF

Digital I/O connection to Z-Card

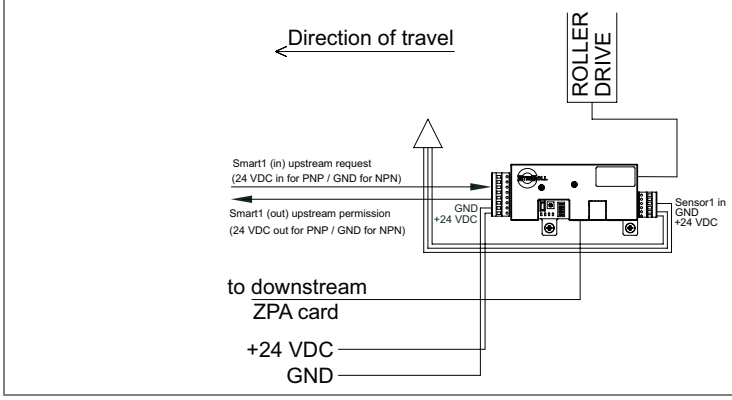


Product information

HC-DriveControl in conjunction with PLC-handshakes

	HC-DriveControl after PLC-handshake (entry zone)		HC-DriveControl before PLC-handshake (exit zone)		HC-DriveControl between PLC-handshakes
Upstream device	**PLC**		**HC-DriveControl**		**PLC**
Downstream device	**HC-DriveControl**		**PLC**		**PLC**
DIP switch 4	**Off**	**Off**	**Off**	**On**	**Off**
DIP switch 5	**Off**	**On**	**Off**	**Off**	**Off**
Upstream peer-to-peer jog/reverse	Disabled	Disabled	Disabled	Functional	Disabled
Downstream peer-to-peer jog/ reverse	Disabled	Functional	Disabled	Disabled	Disabled
Zone type	Smart I/O entry	Smart I/O entry	Smart I/O exit	Smart I/O exit	Smart I/O dependent
Smart 1 (in)	Request	Request	Perm.	Perm.	Run
Reverse (in)	System reverse	System reverse	System reverse	System reverse	System reverse
Smart 1 (out)	Perm.	Perm.	Request	Request	B sensor
Sensor 2	Not used (smart I/O)	Not used (smart I/O)	Another C sensor	Another C sensor	Not used

HC-DriveControl after PLC-handshake (entry zone)



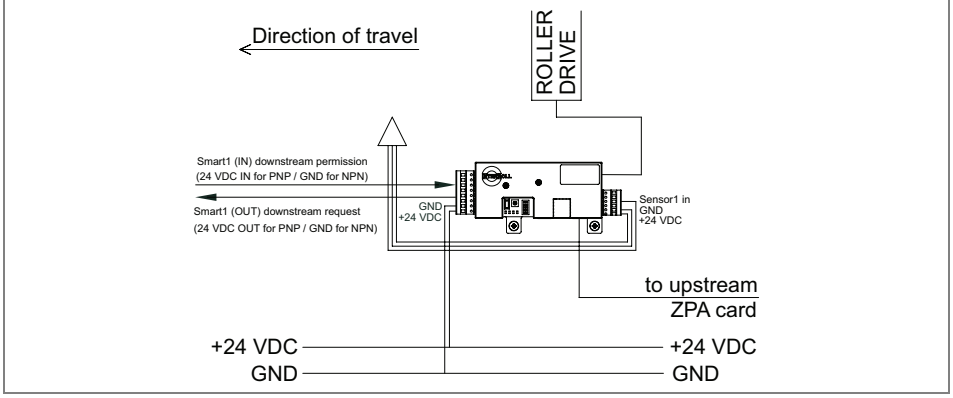
DIP switch settings:

- SW5: ON / OFF
- SW4: OFF
- SW3: ON / OFF
- SW2: ON / OFF
- SW1: ON / OFF

- A smart I/O based handshake is required at the interface
- DIP switch 4 must be OFF to make this zone into an entry zone
- Jog and reverse are enabled only if DIP switch 5 is ON

Product information

HC-DriveControl before PLC-handshake (exit zone)

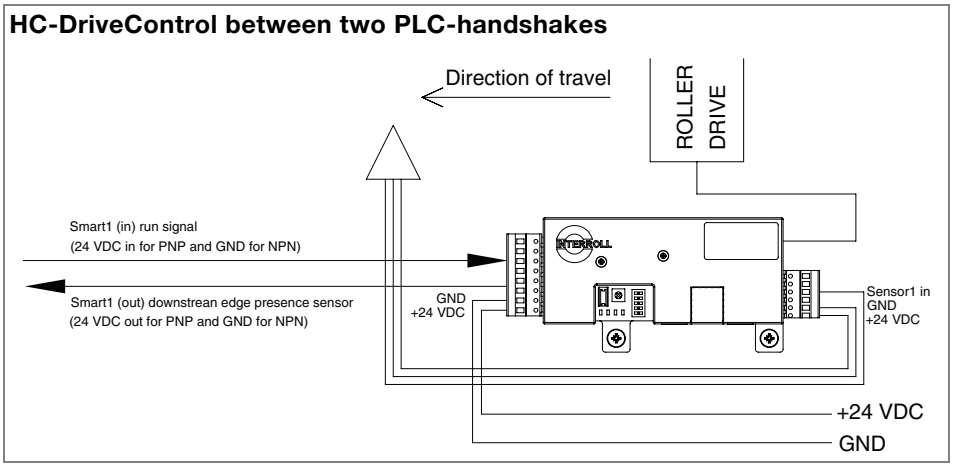


DIP switch settings:

- SW5: OFF
- SW4: ON / OFF
- SW3: ON / OFF
- SW2: ON / OFF
- SW1: ON / OFF

- A smart I/O based handshake is required at the interface
- DIP switch 5 must be OFF to make this zone into an exit zone
- Jog and reverse are enabled only if DIP switch 4 is ON

HC-DriveControl between two PLC-handshakes



DIP switch settings:

- SW5: OFF
- SW4: OFF
- SW3: ON / OFF
- SW2: ON / OFF
- SW1: ON / OFF

- A smart I/O based handshake is required at both interfaces
- DIP switch 4 and DIP switch 5 must both be OFF to make this zone into a dependent zone.

Transport and storage

Transport

- Each DriveControl is packed in its own carton case.

⚠ CAUTION

Risk of injury due to improper transport

➢ Transport may only be carried out by qualified and authorized persons.
➢ Observe the following notices.

➢ Do not stack more than four carton boxes.
➢ Check the fixation of the DriveControls before transport.
➢ Avoid hard shocks during transport.
➢ Check each DriveControl visually for damage after transport.
➢ In case of damage, take photos of the damaged parts.
➢ To maintain the warranty, report any damage caused by transport instantly to the transport company and Interroll.
➢ Do not transfer the DriveControls between warm and cold environments. This may cause condensing water.

Storage

⚠ CAUTION

Risk of injury due to improper storage

➢ Do not stack more than four carton boxes.

➢ Check each DriveControl for damage after storage.

Assembly

Warning notices concerning assembly

NOTICE

Risk of damage leading to failure or shortened life expectancy of the DriveControl

➢ Observe the following notices.

- ➢ Do not drop or mishandle the DriveControl to avoid internal damage.
- ➢ Check each DriveControl visually for damage before assembly.

Warning notices concerning the electrical installation

NOTICE

Risk of damage to the DriveControl

➢ Observe the following notices.

- ➢ The electrical installation may only be executed by qualified and authorized persons.
- ➢ Disconnect the power before installing, removing or rewiring the DriveControl.
- ➢ Do not apply AC current to the RollerDrive or DriveControl device at any time as this will cause irreparable damage.
- ➢ Do not apply too much stress to the connector pins. Bending the wires at the connector can cause damage to the insulation of the wires, which could result in failure of the DriveControl or the RollerDrive.
- ➢ Ensure that the RollerDrive, the DriveControl and the 24 VDC power source are properly earthed through the frame or supporting structure in which the RollerDrive and the DriveControl are installed. Failure to do so could cause the buildup of static electricity or ground loops and can cause the motor or DriveControl to malfunction or fail prematurely.
- ➢ Do not spin the RollerDrive manually, as this generates an induction voltage which could damage the DriveControl.

Installing the HC-DriveControl in a conveyor system

- ➢ Use the DriveControl as a template and mark the center of the two mounting holes. For the distance between the holes, *see "Dimensions", page 7*.
- ➢ Drill two ø 5.6 - 6 mm (0.22 - 0.24 in) mounting holes at the marked spots.
- ➢ Insert the button head screws in the holes on the opposite side the DriveControl is to be mounted.
- ➢ Install the DriveControl to the frame with the screws protruding through the mounting holes.
- ➢ Slip the nuts to the screws and tighten.
- ➢ Ensure that there is a ground path between the DriveControl and the conveyor frame it is mounted to.

The DriveControl and conveyor frame should be at the same potential referenced to earth ground.

Assembly

Electrical installation

The connector supplied with the RollerDrive EC1xx mates up with the header on the DriveControl.

The connectors "Power input and I/O terminal" and "Sensor connection" are cage clamp terminals.

- To actuate the cage clamp, use the supplied tool or insert a small screwdriver.
- Plug in the RollerDrive connector.
- Plug in the peer-to-peer connection cable, if applicable.

Initial startup and operation

Initial startup

Inspections before initial startup

- Ensure that all bolts are tightened according to the specifications.
- Ensure that no additional dangerous areas arise due to interfaces to other components.
- Ensure that the wiring is in accordance with the specification and legal directives.
- Check all protection devices.
- Ensure that no bystanders are in dangerous areas around the conveyor.

Operation

NOTICE

Damage to the DriveControl or the motor of the RollerDrive due to induction

- Do not push items along the roller conveyor by hand.
- Do not spin the RollerDrive manually.

Inspections before every startup

- Check the position of the DIP switches (*see "DIP switches", page 14*).
- Check the speed settings at the speed potentiometer. It is recommended to run the RollerDrive at maximum speed.
- Check the DriveControl for visible damage.
- Check all protection devices.
- Ensure that no bystanders are in dangerous areas around the conveyor.
- Clearly specify and monitor the way goods are placed on the conveyor.

Changing settings

- To reduce the speed manually, turn the potentiometer counterclockwise with a small screwdriver.
- To increase the speed manually, turn the potentiometer clockwise with a small screwdriver.
- To set the DIP switches, carefully use a small screwdriver.

Procedure in case of accident or malfunction

- Stop the conveyor at once and ensure that it cannot be started accidentally.
- In case of an accident: Provide first aid and make an emergency call.
- Inform the responsible person.
- Have the malfunction repaired by qualified persons.
- Start the conveyor only after this has been approved by qualified persons.

Maintenance and cleaning

Warning notices concerning maintenance and cleaning

⚠ CAUTION

Risk of injury due to improper handling or accidental motor starts

- ➢ Maintenance work and cleaning may only be executed by qualified and authorized persons.
- ➢ Only perform maintenance work after switching off the power. Ensure that the DriveControl cannot be turned on accidentally.
- ➢ Set up signs indicating maintenance work.

Maintenance

Checking the DriveControl

The DriveControl must be checked at regular intervals to avoid malfunctions.

- ➢ Monthly check the DriveControl and its leads for visible damage.
- ➢ Annually ensure that the screws of the DriveControl are still tight and that the cables are still laid properly and connected to the terminals.

Replacing the DriveControl

If a DriveControl is damaged, it has to be replaced.

- ➢ Install a new DriveControl (*see "Abandonment", page 41* and *see "Assembly", page 33*).

Replacing fuse

- ➢ Carefully use tweezers to remove and insert the fuse. Ensure you do not damage the fuse holder, the circuit board or its devices.

Cleaning

Dust and dirt in combination with humidity may bridge the electric circuit. Therefore, in a dirty environment, periodic cleaning will help to avoid short-circuits which could damage the DriveControl.

- ➢ Regularly blow off dust and dirt with low compressed air.

Troubleshooting

Error search

When troubleshooting the conveyor system, keep in mind that each HC-DriveControl controls a zone. If a problem exists in a zone or a section of zones, the symptoms might exist either in the zone or in the neighboring zone.

Keep in mind that information travels downstream. The cause of most control problems can be found upstream.

Symptom	Possible cause	Help
System is not operating	No power supply	Check whether the output voltage of the power supply is within the specified voltage range.
	Wrong polarity of the bus line inputs	Verify the polarity of the bus line inputs to DriveControl (*see "Inputs and outputs", page 11*).
	Wrong position of the DIP switch 1	Verify that the position of the DIP switch 1 Logic (NPN or PNP) matches the sensor type (*see "DIP switches", page 14*).
	Fuse is blown	Replace the fuse (*see "Replacing fuse", page 36*).
Zone runs without package	Wrong sensor output	Check the type of sensor output (*see "Sensor connection", page 12*).
	Wrong alignment of sensors	Verify the alignment of the sensors. Align the photoeyes to see the conveyor field only, no overhead lights, side frames, etc.
	Jog command by an inadvertently grounded Smart 1 / FWD input command	Check the connection of Smart 1 / FWD input
	Communication cable is twisted or defective	Check the communication cable upstream
	Photoeye is not connected properly	Check the connection of the photoeye to HC-DriveControl. Verify the photoeye pin assignment (*see "Sensor connection", page 12*).
	Photoeye is damaged	Replace the photoeye.
	If the zone continues to run without any communication cables connected and no photoeye input, HC-DriveControl is damaged.	Replace HC-DriveControl. Assembly of the DriveControl *see "Assembly", page 33*.

Troubleshooting

Symptom	Possible cause	Help
Multiple zones run continuously	Communication cable is defective, sending a jog command	Find the farthest zone in the upstream direction that is running continuously. Check the communication cables of this zone.
	Different ground of a multiple power supply	Verify that a common ground is shared by all supplies.
System reverses or jogs without prompting	Fuse is blown If DIP switch 4 and 5 are ON for all cards, a blown fuse or loss of power in one DriveControl sends a reverse jog command to all DriveControls in the system.	Check the fuses in all DriveControls of the system and replace the blown one (*see "Replacing fuse", page 36*).
	Miswired communication cable	Check the communication cables in the entry zone of the system. Replace the miswired cables.
Zone stops when package arrives Zone does not accept package	Zone receives the accumulate signal	Check that the zone is not receiving the accumulate signal from the downstream zone. Ensure that there is no jumper installed from ground to the Accum (L-stop) input terminal on the HC-DriveControl of the zone where the package stops. If a switch is used instead of a jumper, check that the switch is off.
	Communication cable to or between the zones is miswired	Check the communication cables and replace them if they are miswired.
	No power supply of the HC-DriveControl	Check the power input to HC-DriveControl
	No power supply of the RollerDrive EC1xx	Verify that the motor wires are terminated properly.
	Communication cable is miswired between the zone that is operating and the zone that is not	Replace the cable.
Package stops within a zone	Photoeye is not aligned properly	Check the alignment of the photoeye.
	Speed of the RollerDrive EC1xx is too slow	Calculate the speed and the distance to ensure the time limit is not exceeded. The package has max. 4.5 seconds to clear the upstream photoeye and reach the next downstream photoeye. Adjust the speed of the RollerDrive.
	Jammed package	Remove jammed packages.
	Jammed roller	Remove the cause of the jam or replace the roller.

Troubleshooting

Symptom	Possible cause	Help
Package coasts into the next zone instead of stopping immediately	Package is heavy or has a low coefficient of friction	Move the photoeye further back into the zone. Apply a coating that increases the friction between the rollers and the packages.
Zone does not reverse	Communication cable to upstream zone is miswired	Replace the communication cable.
	Signal has not been sent and received properly	Check the output of the upstream DriveControl and the input to the DriveControl.
	Different ground of the zones	Check that a common ground exists between both zones.
System turns off when several zones are in use at the same time	Power supply is not sufficient	Ensure that the 24 VDC power supply has adequate power for the system requirements. Check that the AC voltage source and DC voltage power supply are installed correctly.
DriveControl does not recognize the start sensor	Sensor and reflector are not aligned properly	Check the alignment of the sensor and reflector. Check the settings of DIP switch 4 and 5.
RollerDrive EC1xx is not in braking mode without any packages on the conveyor system	This is not an error. It is a power-saving feature. The RollerDrive EC1xx is in coast mode until it is commanded to run or accumulate.	

Troubleshooting

The following errors are reported by illuminated LEDs:

(also *see "Meaning of the LEDs", page 15*)

Symptom	Possible cause	Help
Motor is in brake mode, red fault LED flashes once and error output is active ("No fault output" is active).	Invalid state of motor hall effect sensor • Broken wire • Failed hall effect sensor	Replace the RollerDrive.
	Voltage over or under limits • Power supply fluctuations, failure or overload condition	Check the power supply.
On a decline, motor is in brake mode momentarily. Red fault LED flashes twice ("No fault output" is active) or power supply shutdown or fuse blown on card.	Overvoltage detection (caused by over speed or excessive back EMF) • decline angle too high • package weight too high	• Reduce decline angle • Use brake roller to keep speed low
	Motor overrun, overset speed • Package enters zone at a higher than anticipated speed	Reduce the package entry speed.
Red fault LED flashes six times and error output is active ("No fault output" is active).	Low gain signal from sensor • Dirty sensor lens or misaligned	Clean the sensor lens and align the sensor.
Current folds back to maximum continuous current, amber fault LED is on.	Card or motor over temperature • Excessive load or duty cycle	Reduce the load of packages or throughput of the zone
Current folds back to approximately 1.5 A while applying consistent torque. Red fault LED is on and error output is active ("No fault output" is active).	Motor stall condition • Obstruction or load too heavy to be conveyed	Once the stall condition is removed, the RollerDrive will resume normal operation.

Abandonment and disposal

Abandonment

⚠ CAUTION

Risk of injury due to improper handling

- ➢ Abandonment may only be executed by qualified and authorized persons.
- ➢ Only abandon the DriveControl after switching off the power. Ensure that the DriveControl cannot be turned on accidentally.

- ➢ Disconnect all cables from the DriveControl.
- ➢ Unscrew the screws attaching the DriveControl to the conveyor frame.
- ➢ Extract the DriveControl from the conveyor frame.

Disposal

The operator is responsible for the proper disposal of the DriveControl. In doing so, industry-specific and local provisions must be observed for the disposal of the DriveControl and its packaging.

Appendix

Accessories

DriveControls

Part	Part #
Z-Card EC Easy	89Z2
Z-Card EC Full	89Z3

Plugs and cables

Part	Description
Power and I/O plug	• 8-pin cage clamp type connector, Wago part # 231-308/026-004 • Wire diameter: – Minimum 0.08 mm^2 (AGW 28) – Maximum 2.5 mm^2 (AGW 12)
Sensor plug	• 6-pin cage clamp type connector, Wago part # 734-106/000-004 • Wire diameter: – Minimum 0.08 mm^2 (AGW 28) – Maximum 1.5 mm^2 (AGW 14)
Peer-to-peer cable	• Cable: 6 pos flat cable, SPC technology part # TXW6205-WF • Two plugs: 6 pos AMP modular connector plug, AMP part # 5-641337-3 • Conductor Size AWG: 24 • Assembly tool: AMP part # 2-231652-8
Dig. I/O plug (only on HC-EC100 Full #9001)	• Double-stack header on the board, Phoenix Contact socket, part # 1961164 • Plugs: Phoenix Contact part # 1881341
Motor plug	• The motor plug for the RollerDrive consists of a plug and terminal pins – Plug: AMP part # 175778-8 – Terminal pins: AMP part # 1-175102-1 • Crimping tool AMP part # 9184381

Appendix

Glossary

Back EMF Electromotive force (voltage) generated by a package arriving at high speed at a powered RollerDrive under no load prior to the package's arrival. EMF is a counter-voltage phenomenon that is always present in a motor. Excessive back EMF can cause a current backlash that may damage the DriveControl or power supply. Care should be taken to minimize excessive back EMF by minimizing the speed differences between the gravity conveyor and/or different zones of powered conveyor sections.

B sensor Downstream edge presence sensor of own zone

C sensor Downstream edge presence sensor of upstream zone

Coast mode The RollerDrive is running freely without power or braking.

Digital I/O Software automatically detects if circuitry is on board
(Digital I/O handshake only on HC-EC100 Full available)

DIP switch 4 Affects upstream peer-to-peer propagation of speed, jog and reverse signals for certain scenarios.

DIP switch 5 Affects downstream peer-to-peer propagation of speed, jog and reverse signals for certain scenarios.

Downstream Normally this is the zone to the left of another given zone. The reference is always that packages move from upstream to downstream.

Dynamic braking For DC motors, dynamic braking is a method of stopping a motor by applying a resistive load across the motor winding leads after disconnection from the DC supply. The motor operates as a generator. By its nature, dynamic braking has no holding power by itself, i.e. the motor can still be rotated by outside forces. Interroll has added zero motion hold to achieve this.

EC1xx Short form for Interroll 24 VDC brushless RollerDrive versions:
- EC100
- EC110

Edge full Also referred to as "product waiting". It indicates that an upstream zone has a product at its downstream edge sensor waiting to be moved into the next downstream zone. Edge full is a signal transmitted across the peer-to-peer cable used by the HC-DriveControl for zone-to-zone communication.

Enhanced Singulated release Also called wave release. A method of release which allows the upstream release of a package as soon as the downstream package blocks the photoeye of the downstream zone with its leading edge. This dramatically increases throughput over singulated release but can sometimes result in lost packages. There is also a short delay that is propagated upstream to eliminate all packages starting at the exact same time.

Foldback current Maximum allowable current is decreased by the DriveControl.

HC-DriveControl Short form for a single zone DriveControl for Interroll 24 VDC brushless RollerDrives:
- HC-EC100: Can be used as DriveControl (motor control) and as ZPA zone control for RollerDrives EC100
- HC-EC110: Can be used as DriveControl (motor control) and as ZPA zone control for RollerDrives EC110

Appendix

Idler rollers	Non-powered rollers attached to a RollerDrive typically via O-rings or multi-rip belts.
Jam protection	A method of protecting packages that are possibly jammed in a zone. If the HC-DriveControl detects a jam or obstruction at the downstream end of the zone, it sends an accumulation signal to the upstream zone preventing a buildup of accumulation pressure.
Jog	RollerDrive runs continuously as long as the command is set. If jog mode is activated, DriveControl disregards ZPA or photoeye signals.
N/C	No care; affects nothing
NPN-override	DIP switch 4 is for upstream, DIP switch 5 is for downstream.
O-rings	O-rings made of materials such as polyurethane that connect RollerDrives to their associated idler rollers.
Perm	Permission: Signal to upstream zone to discharge zone (send load).
Photoeye	An ON/OFF sensor that uses light to sense the presence of objects. If the light beam is broken, an object is present. Usually the light is reflected back to the sensor via a reflector placed on the opposite side of the conveyor frame from the sensor itself. The HC-DriveControl can use either NPN type or PNP type photoeyes. NPN sensors indicate an active state by a grounded connection being made (NPN mode) or a 24 VDC connection being made (PNP mode).
Req	Request from upstream zone to discharge zone in downstream direction.
RollerDrive	One of several types of DC powered rollers manufactured by Interroll Corporation.
Singulated release	A method of releasing packages where packages are allowed into downstream zone only after the trailing edge of the package currently occupying that downstream zone clears the zone's downstream edge sensor.
Singulation	DIP switch 3 chooses either standard or enhanced singulation, significant for all zone types except smart I/O dependent.
Upstream	The opposite of "downstream" (see definition). Typically, the zone to the right of another zone.
Zero motion hold	For DC motors, zero motion hold is a method of holding a motor by applying a small amount of current to the motor winding leads. When the HC-DriveControl is commanded to stop and accumulate, the braking action is twofold. First, the motor/package is stopped using dynamic braking. Second, the motor is held in place by zero motion hold. In this state the HC-DriveControl will resist being rotated by outside forces.
Zone	A segment of conveyor typically comprised of one RollerDrive and multiple idler rollers interconnected by O-rings or some other device for driving the idlers.
ZPA	Zero pressure accumulation: The process of moving packages on a conveyor in such a manner that they do not touch each other (also *see "ZPA technology", page 8*).

Appendix

Manufacturer's declaration

in terms of the EC-Machine Directive 98/37/EC and its amendment 98/79/EC, Annex II B

The manufacturer:

Interroll Corporation

3000 Corporate Drive

Wilmington, NC 28405

hereby declares with sole responsibility that the product range

- DriveControl HC-EC100
- DriveControl HC-EC100 Full
- DriveControl HC-EC110

is not a ready-to-use assembly in terms of the EC-Machine Directive and therefore does not fully comply with the requirements of this directive. It must not be put into service until the machinery into which it is to be incorporated has been declared to conform with the provisions of the Machine Directive.

Applied EC Directives:

Machine Directive 98/37/EC and its amendment 98/79/EC

Low Voltage Directive 2006/95/EC

EMC Directive 2004/108/EC

RoHS Directive 2002/95/EC

Applied harmonized norms:

EN ISO 12100 Part1 and Part2

Wilmington, November 7th 2007

Richard Keely

(VP of Manufacturing)

(This declaration can be obtained at www.interroll.com, if needed.)

INTERROLL®

DRIVES & ROLLERS

Europe/Nordic

Denmark
Interroll Nordic A/S
Hammerholmen 2-6
DK-2650 Hvidovre/Denmark
Tel. +45 36 88 33 33
Fax +45 36 88 33 72
dk-sales@interroll.com

Interroll Service
Islandsvej 5
DK-7900 Nykøbing M.
Tel. +45 97 71 15 55
Fax +45 97 71 16 55
dk-sales@interroll.com

Iceland
IBH ehf
Dugguvogur 10
104 Reykjavik
Iceland
Tel. +354 562 6858
Fax +354 562 6862
ingi@ibh.ehf.is

Finland
Tel. +358 9 54 94 94 00
Fax +358 9 54 94 94 16

Norway
Tel. +47 32 88 26 00
Fax +47 32 88 26 10

Sweden
Tel. +46 35 227077
Fax +46 35 227078

Western/Southern Europe

France
Interroll S.A.S.
ZI de Kerannou
B.P. 34
F-29250 Saint Pol de Léon
Tel. +33 298 24 41 00
Fax +33 298 24 41 02
f-sales@interroll.com

Italy
Rulli Rulmeca S.p.A.
Via A. Toscanini, 1
I-24011 Almè (Bg)
Tel. +39 035 4300111
Fax +39 035 545523
i-sales@interroll.com

Portugal
Rulmeca Interroll de Portugal Lda
Apartado 69, Centro Civico
P-6201-909 Covilhã
Tel. +351 275 330 780
Fax +351 275 330 789
p-sales@interroll.com

Spain
Interroll España S.A.
C.I. Santiga
C/Puig dels Tudons, 5
E-08210 Barberà del Vallès
Tel. +34 93 729 96 50
Fax +34 93 718 96 50
e-sales@interroll.com

United Kingdom
Interroll Ltd.
Brunel Road
Earlstrees Industrial Estate
GB-Corby, Northants NN17 4UX
Tel. +44 1536 200 322
Fax +44 1536 748 505
gb-sales@interroll.com

Central Europe

Germany
Interroll Fördertechnik GmbH
Höferhof 16
D-42929 Wermelskirchen
Tel. +49 2193 23 0
Fax +49 2193 20 22
d-sales@interroll.com

Austria
Tel. +49 2193 23 187
Fax +49 2193 23 164

Belgium
Tel. +49 2193 23 131
Fax +49 2193 23 164

Luxembourg
Tel. +49 2193 23 190
Fax +49 2193 23 164

Netherlands
Tel. +49 2193 23 151
Fax +49 2193 23 164

Switzerland
Tel. +49 2193 23 190
Fax +49 2193 23 164

Benelux
Interroll Trommelmotoren b.v.
Veldweg 38
NL-6075 Herkenbosch
Tel. +31 4755 33701
Fax +31 4755 32597
nl-drummotors@interroll.com

Eastern Europe

Czech Republic
Interroll CZ, s.r.o.
G. Šimka 3147
CZ-69003 Břeclav
Tel. +420 519 330 210
Fax +420 519 330 211
cz-sales@interroll.com

Hungary
Tel. +36 23 337 891
Fax +36 23 337 892

Poland
Interroll Polska Sp. z o.o.
ul. Jagiellońska 78
lok. 3.31
PL-03-301 Warszawa
Tel. +48 22 334 63 43
Fax +48 22 675 72 92
pl-sales@interroll.com

Slovakia
Tel. +421 2 4363 8102
Fax +421 2 4342 7294

Slovenia
Tel. +386 1 56 56 370
Fax +386 1 56 56 372

Turkey
Roller Makina San. Ve. Tic. Ltd. Sti.
Zihni Sakaryali Ali Sok.
Ufuk Apt. No. 1 D. 11
Ersoy Sahil Sitesi
81070 Suadiye
Istanbul
Tel. +90 216 386 37 75
Fax +90 216 386 38 22
tr-sales@interroll.com

Near East

Israel
ComTrans-Tech Ltd.
P.O.B. 17433
Tel-Aviv 61174
Israel
Tel. +972 54 4 27 27 47
Fax +972 3 7 44 08 64
il-sales@interroll.com

Africa

South Africa
Interroll SA Pty. Ltd.
P.O. Box 327
Isando 1600
ZA-Gauteng
Tel. +27 11 974 1901
Fax +27 11 974 1896
za-sales@interroll.com

North & South America

USA
Interroll Corporation
3000 Corporate Drive
USA-Wilmington, NC 28405
Tel. +1 910 799 11 00
Fax +1 910 392 38 22
usa-sales@interroll.com

Canada
Interroll Canada Ltd.
1201 Gorham Street
CDN-Newmarket
Ontario L3Y 8Y2, Canada
Tel. +1 905 727 3399
Fax +1 905 727 3299
cdn-sales@interroll.com

Argentina
Interroll South America
Calle 117, No. 3591
B1650NRU San Martin
Provincia de Buenos Aires
Tel. +54 11 4753 8005
Fax +54 11 4754 1332
ar-sales@interroll.com

Brasil
Interroll Brasil
Av. Portugal 918
CEP 06651-970
Itapevi - SP
Tel. +55 11 41 43 43 43
Fax +55 11 41 43 77 19
br-sales@interroll.com

Asia

China
Interroll (Suzhou) Co. Ltd.
Unit 10B, Modern Industrial Square
No. 333 Xing Pu Road
Suzhou Industrial Park
Suzhou, Jiangsu Province
People's Republic of China
Postal Code: 215126
Tel. +86 512 6256 0383
Fax +86 512 6256 0385
cn-sales@interroll.com

Japan
Interroll Japan Co. Ltd.
302-1 Shimokuzawa
Sagamihara-shi
JPN - Kanagawa 229-1134
Tel. +81 42 764 2677
Fax +81 42 764 2678
jpn-sales@interroll.com

Korea
Interroll Korea Corporation
Room 301, Dongsan Bldg, 333-60
Shindang-Dong, Choong-ku
Seoul
Tel. +822 2 231 1900
Fax +822 2 254 36 83
kr-sales@interroll.com

Singapore
Interroll (Asia) Pte. Ltd.
386 Jalan Ahmad Ibrahim
629156 Singapore
Republic of Singapore
Tel. +65 6266 6322
Fax +65 6266 6849
sgp-sales@interroll.com

Thailand
Interroll (Thailand) Co. Ltd.
41/6 Moo 6, Bangchalong,
Bangplee
Samutprakarn 10540
Tel. +66 2 337 0188 91
Fax +66 2 337 01 92
th-sales@interroll.com

Australia & New Zealand

Australia
Conveyor Solutions Australia Pty. Ltd.
70 Keon Parade
Thomastown 3074
Melbourne
Tel. +61 3 9460 2155
Fax +61 3 9460 2029
aus-sales@interroll.com

New Zealand
Anthony Group (NZ) Ltd.
42 Parkway Drive
Mairangi Bay
NZ-Auckland 10
Tel. +64 9 478 6150
Fax +64 9 479 6394
nz-sales@interroll.com

For other countries please
see contacts at
www.interroll.com

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