FROM CREATORS FOR CREATORS

automation supply

ASRA
Right Angle Sorter

Released: 05/11/2024
Version: 1.0

Manufacturer details

AUTOMATION SUPPLY
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1 | INTRODUCTION

Gearless BLDC Motors | Up to 1800 packages per hour | Plug and Play | AS DUAL 24V | 24V 240 Watt | 48V 480 Watt

1.1 Contents of this manual

This manual contains important product information for the AS Right Angle (RA) Sorter, including an AS RA Sorter Module and AS RA Control Box including the AS Dual Controller. It includes the intended use, integral safety measures, and guides for servicing, transport, and storing conditions.

The document also describes technical support for installation, maintenance, and troubleshooting. This manual is part of the product. Therefore, the product cannot be used without consulting the manual prior to installation or use.

1.2 Intended Use

The AS Right Angle Sorter system can be used for 90-degree sorting applications at moderate speeds.

Common applications:

- 90-Degree sorting
- Multi-level conveyors
- Workstations
- Mezzanine transport

1.3 Qualified Personnel

Only qualified personnel are allowed to work with or integrate the AS RA Sorters. Qualified personnel are expected to understand this manual and know national/ international safety regulations regarding industrial applications in the field of automation and intralogistics.

Take the following into consideration:

1. Relevant diagrams and user manuals of the AS RA Sorter
2. Regulations and requirements that are specific to this product and the integration solution
3. Safety and warning instructions as provided in this document. National/ International and local safety regulations

1.4 General Safety Measures

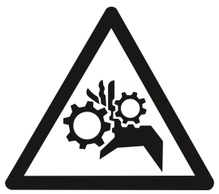
Please study the general safety measures provided in this document to minimize risks and faulty use of the product. The AS RA Sorter has been designed to meet safety standards in this field of application, however, risks may still occur when used inappropriately.

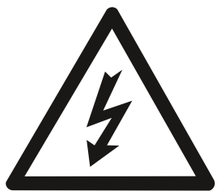
1. It is required to study and follow the manual and keep this manual in a safe and visual location near the system.
2. The supplier cannot be held responsible for faults and defects that would have been avoided by following this manual.
3. The supplier cannot be held responsible when changes are made and/or added to the system which has not been described and/or allowed in the manual.
4. The AS Dual Controller is developed to be integrated into the specified conveying systems with regard to the professional risk assessment of the integrator.
5. The power must always be switched off when maintenance or installation work is performed on the AS RA Sorter. Ensure that power cannot be accidentally switched on.

1.5 Dangers

While working with the AS RA Sorter, dangers may occur. Consult this list to prevent faulty installation, malfunction, or hazardous situations.

1. Maintenance and repair may only be executed by authorized and qualified personnel according to the appropriate national safety regulations. Otherwise, serious bodily injury may occur.
2. Before initiating or using the AS RA Sorter, make sure all unauthorized personnel have cleared the working area of the conveyor
3. Ensure the AS Dual Controller is only operated with I/O control voltages compliant with a SELV environment.
4. The power must always be switched off when maintenance or installation work is performed on the AS RA Sorter. Ensure that power cannot accidentally be switched on.
5. Check for visible damage regularly. Also, make sure mounts and screws are correctly tightened.
6. If you notice any faulty controller or system behavior, immediately cut the power and make sure it cannot accidentally be switched on. Contact qualified personnel to perform troubleshooting.
7. Make sure no unnecessary tools or equipment is near the sorter system when in operation. Tools or screws falling on the conveyor may cause serious damage to the system.
8. When installing or troubleshooting the sorter system, be aware that sensors or other signals may be triggered unintentionally, leading to hazardous situations. Be sure to always turn the power off in the event of installation or maintenance/troubleshooting.
9. Never try to open the AS Dual and AS RA Sorter





2 | GENERAL INFORMATION

Gearless BLDC Motors | Up to 1800 packages per hour | Plug and Play | AS DUAL 24V | 24V 240 Watt | 48V 480 Watt

2.1 Product description

The AS RA Sorter is a system that enables 90-degree sorting applications. It consists of an AS RA Sorter module and AS RA Control Box with AS Dual Controller.

AS RA Sorter Module

The AS RA Sorter module can sort up to 1800 packages per hour under a 90-degree angle.

AS Dual Controller

The AS Dual controller controls and facilitates interaction with the AS RA Sorter module.

2.2 Protection

The AS RA Sorter is powered by 24VDC. It features overtemperature and overcurrent protection. The AS Dual Controller has a built-in fuse that protects the user against short circuits and faulty connections, while needing to replace the controller when the fuse is broken.

2.3 Key Functionalities

AS RA Sorter Module

Profinet certified

The AS RA Sorter can be configured and controlled over ethernet through PROFINET. With this, it can seamlessly integrate with other components in the existing network.

Customized cartridges

Depending on your application, the AS RA Sorter module can be customized to feature cartridges with wheels or belts, allowing for increased versatility.

Suitable for many materials

The AS RA Sorter is suitable for a variety of materials, such as cartons, plastic crates, and bags/polybags.

AS Dual Controller

Real-Time Ethernet

One of the most essential features of the controller is the support of Real-Time Ethernet. This enables a PLC to control and monitor each controller. Currently, PROFINET is supported.

Current limitation

A desired current limit can be user-defined. When the rotation of the motor is blocked or the motor is running heavier, the controller will decrease the input current to hover around this value. The current limit is not a hard limit.

Boost Mode (No Power Limitation)

When the rotation of the motor is blocked or the motor is running heavier, the controller will increase the input current to a maximum (4.5 A per motor in Boost mode).

Overvoltage protection

AS Dual controllers are protected against generated power during stopping/braking. The overvoltage protection is not intended to protect against continuously generated overvoltages, such as when external forces drive the motor.

Forward mode

With multiple controllers connected, it is possible to have all controllers and corresponding motors behave the same. This is particularly useful for long and simple conveyor systems. In this setup, it is only required to control a single AS Dual controller and the rest copy the behavior.

Dedicated E-Stop (SIL 4, Performance level E)

Our integrated E-stop is designed to be used in a SIL 3 or SIL 4 environment but this requires additional external monitoring

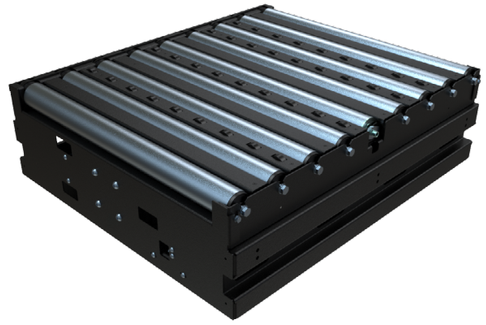
Application Firmware

AS Dual Controllers can be installed with application-specific firmware for our modules to enable true plug-and-play functionalities.

2.4 Scope of delivery

The scope of delivery defines what is included in the product, as well as required components that may be needed additionally in order to create a working application, it is advised to consult our website for training material to choose what components you need for your application or what kits are availlable. Or contact us via info@automationsupply.nl

		Information	Specifications	Details	
1	AS RA Sorter Module	Diverting of light and heavy packages. In standard widths 400, 600, 800, 1000 mm	Single sorter module. Four motor and four sensor connections	24V or 48V. Custom design and/or applications possible.	Included
2	AS RA Control Box	AS Stepper motor controller	Two axis stepper motor drive	24V; max. current 5,2A; 200 KHz stereo frequency	Included
		Cable Set	External Cables | Control Cable	- 2x splitter cable M12-M8 for lift sensors - 2x lift motor cable M8-4 - 24Vdc M12 for DUAL - Belt motor cable M8-5 snapin - Roller motor cable M8-5 snapin - M12 to RJ45 ethernet cable for connecting to PLC	Included
		24 V PSU	24V 20A Power Supply	480 Watt	Included
3	AS Dual Controller	Controlling the AS RA Sorter	2x motor | 6x I/O | 1x Power in | 2x Emergency	240 Watt	Included



3 | TECHNICAL SPECIFICATIONS

Gearless BLDC Motors | Up to 1800 packages per hour | Plug and Play | AS DUAL 24V | 24V 240 Watt | 48V 480 Watt

3.1 AS RA Sorter Module

Required Controllers	AS Dual [1]
Power Input Rollers and Belts	24 VDC 12A
Power consumption (Rated)	240 W
Motor Connector Roller en Belts	5-pin M8 Snap-in connector [2]
Motor Connector Lift	4-pin M8 Screw-in connector per stepper motor [3]
Sensor Connector	4-pin M8 [4x] [4]
Emergency connector	Yes 3-pin Snap-in connector
Motor types	AS MDR | AS External Motor | Stepper Motors [5]
Drive types	HTD5M for Lifting | Poly-V for transportation | Timing belt for diverting
Certifications	CE | ETL
Minimum and Maximum Speed	Min Speed 0.1 m/s | Max Speed 1.3 m/s [6]
Standard Configuration	1.240 products per hour at 35kg | 600 x 480 x 240 mm
High Speed Configuration	1.800 products per hour at 25kg | 480 x 480 x 240 mm
Sortable items	Cartons | Plastic Crates | Bags
Minimum item size	150 x 150 mm
Minimum and Maximum item weight	Minimum item weight: 100g | Maximum item weight: 35kg [7]

Additional information

1. The lift motors are controlled by the AS Dual using a stepper controller mounted in the control cabinet.
2. The motor for the Rollers and Belts are ASMDRs or ASEM motors that are based on analog 0 - 10 V on a M8 5-pin snap-in connector.
3. The lift motors are stepper motors that are driven by a DM545-B stepper controller, which is controlled by the AS Dual.
4. These sensors are lift sensors that are connected to the AS Dual Controller to check the top and bottom position of the diverting action.
5. The AS stepper motors cannot be bought separately since it is an integrated component of the Lift module inside the RA Sorter.
6. Min and maximum speed can vary based on application and chosen motor types, contact our sales team for the right requirements for your system.
7. The maximum weight of the RA Sorter for diverting actions can be increased up to 80 kg by dimensioning the right motors.

Please visit our website for the latest 3D CAD drawings and variations in dimensions/ configurations.

3 | TECHNICAL SPECIFICATIONS

Gearless BLDC Motors | Up to 1800 packages per hour | Plug and Play | AS DUAL 24V | 24V 240 Watt | 48V 480 Watt

3.2 AS Dual Controller

	24 VDC Input
Input voltage (Rated)	24 VDC 10A | range 18 -26 VDC
Motor Outputs (Rated)	2x 24 VDC at 4 A
Starting Current	4.5A at 24 VDC
Power Consumption (Rated)	240 W
Motor Connector	M8 5-pin Snap-in[2x]
I/O Connector	M8 4-pin Snap-in [3x] |
I/O Power	350 mA at 24 VDC
Emergency Connector	M8 3-pin Snap-in [2x]
Overvoltage Protection	+32 V at 24 VDC
Temperature Protection	> 90 C° shut down, resets after temperature falls below 90 C° and speed or power toggle.
Motor Interfaces	PWM 12Khz 10 V (10 - 100%) | Analog 0 -10 V (10 - 100%)
Communication Interfaces	Profinet | I/O [1]
Certifications	CE | ETL [2]
Ambient Temperature	Operation 0 to +40 C° | Transport -20 to +80 C°
Protection Rate	IP 54 | IP65 (on request) [3]
Installation Altitude	Max +1000 m from sea level
Dimensions LxWxH	210 x 75 x 31 mm
Weight	360 grams
Important information	• A short current spike can occur during start-up that exceeds the current cap of 4.5 A. • Do not connect a 24 V motor when a 48 V power supply is connected. • Do not connect a 48 V motor when a 24 V power supply is connected • Actual power consumption and efficiency vary based on installation, load, and motor type

Additional information

1. Currently, Profinet and I/O are available. We always improve our products, please contact us if EtherCAT and Ethernet IP are required for your project.
2. Contact us for information about applications in countries that require ETL-listed components.
3. Please contact us if your application requires an IP 65 protection rate or other requirements.

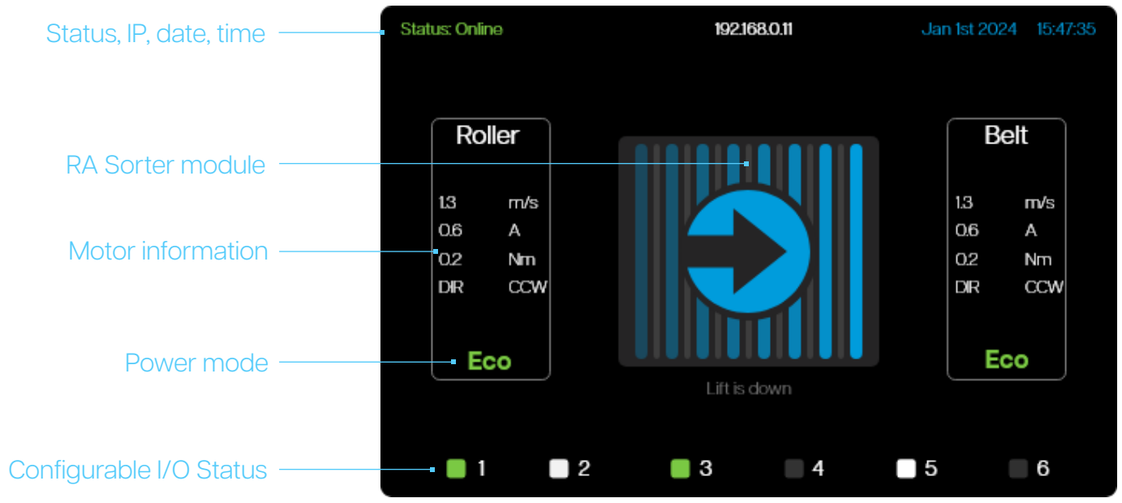
Please visit our www.automationsupply.nl for the latest 3D CAD drawings and other technical data.

Configurable I/O

I/O power	24 VDC
Input modes	PNP or NPN
Output	24Vdc sink/source
Output Power	350 mA
Protection	Short circuit connection | over current
Connection type	M8 4-pin via splitter cable
I/O Allocation	Connector 1:I/O 1 and I/O 2 (Left side of controller) Connector 2: I/O 3 and I/O 4 (Right side of controller) Connector 3: I/O 5 and I/O 6 (Right side of controller)

Display

Display specifications	3.5 inch 480 x 320 px | Full Color
Display notifications	1. Real time Motor Information 2. Communication Status 3. Errors and warnings (Emergency, Connection status and Warnings) 4. Real time I/O status (On, Off and disabled) 5. Dashboard (Application, Power Mode and Configuration type)

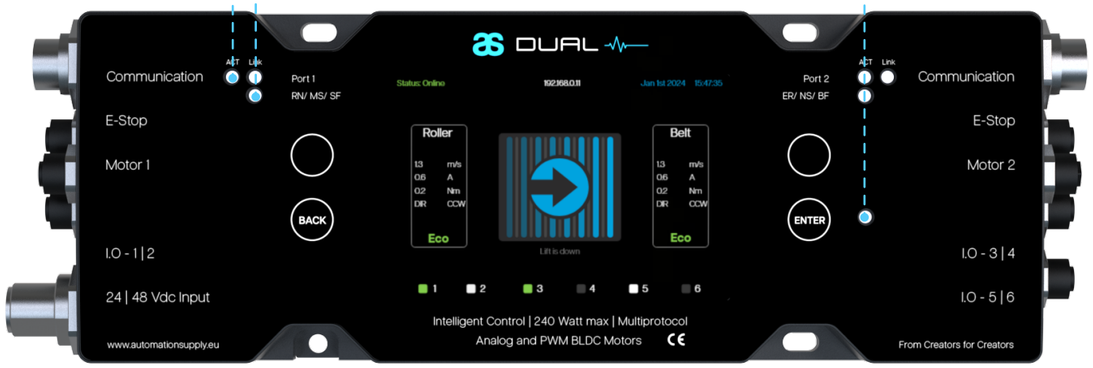


3 | TECHNICAL SPECIFICATIONS

Gearless BLDC Motors | Up to 1800 packages per hour | Plug and Play | AS DUAL 24V | 24V 240 Watt | 48V 480 Watt

Explanation of LEDs

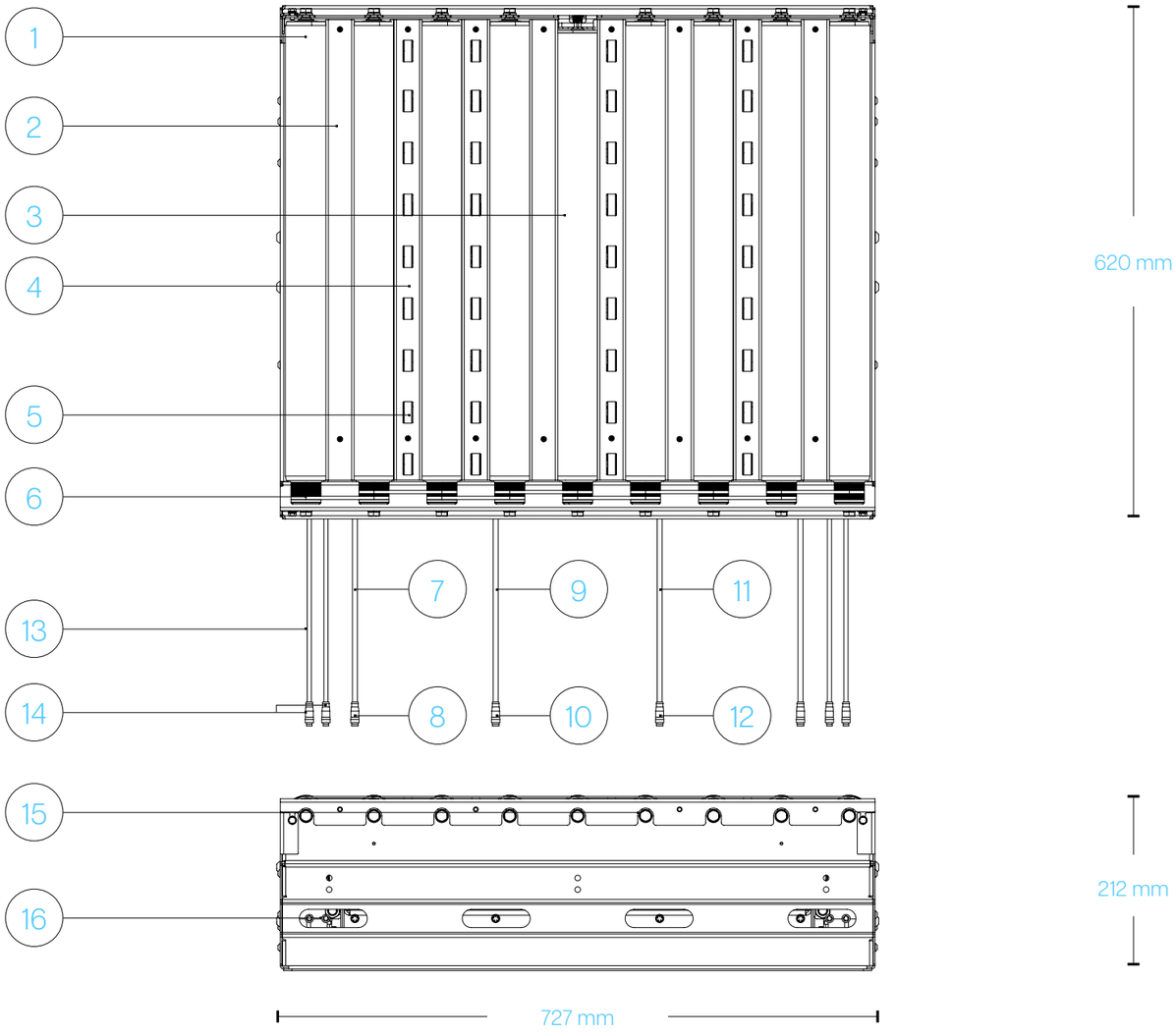
Real-Time Ethernet LEDs	
ER/ NS/ BF	Specific to the Real-Time Ethernet protocol.
RN/ MS/ SF	Specific to the Real-Time Ethernet protocol.
Ethernet LEDs	
ACT (Orange)	Flashes when there is ethernet activity on the port
Link (Green)	Ethernet port has a link
Power LED	
Off	Device is not powered
Red	Device is powered and is booting
Green	Device is successfully started
Green Blinking	Device is installing firmware



4 | COMPONENTS & DIMENSIONS

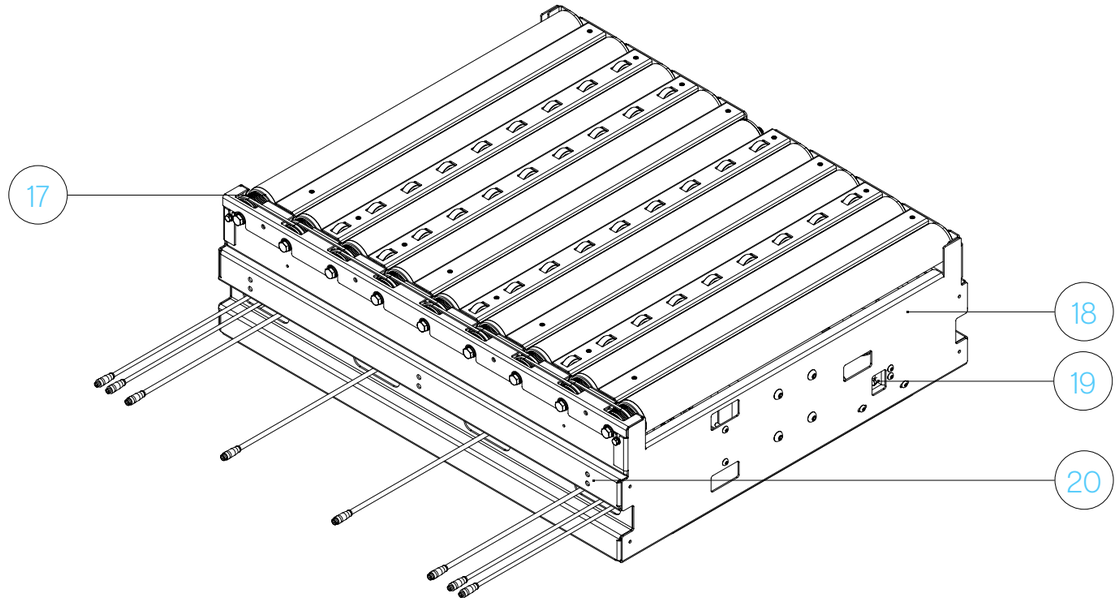
Gearless BLDC Motors | Up to 1800 packages per hour | Plug and Play | AS DUAL 24V | 24V 240 Watt | 48V 480 Watt

4.1 AS RA Sorter Module



	Description	Details		Description	Details
1	Slave Roller	Plastic Poly-V Slave roller	11	Divert Motor Cable	6 mm PU Cable
2	Dummy Cartridge	2 mm powder coated steel	12	Divert Motor Cable Connector	M8 5P Male
3	MDR Poly-V	ASMDR24V	13	Lift Sensor Cable	6 mm PU Cable
4	Divert Cartridge	2 mm powder coated steel	14	Lift Sensor Connector	M12 4P, A-coded [4x]
5	Cartridge wheel	Black Nylon	15	Slave Roller mounting	M8x20 bolt
6	Poly-V Belt	2PJ	16	Cable Outlet	40 x 20 mm
7	Lift Motor Cable	6 mm PU Cable	17	Fingerguard	2 mm powder coated steel
8	Lift Motor Connector	M8 4P Male	18	Sheet metal Casing	2 mm powder coated steel
9	Rollers Motor Cable	6 mm PU Cable	19	Lift spindle block [2x]	Including stepper motor and sensors
10	Rollers Motor Connector	M8 5P Male	20	Module Mounting holes	M8x1.25

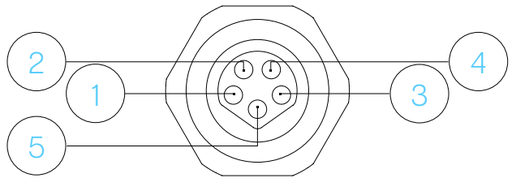
For mounting the RA Sorter the 3D model of the actual module is always leading.
Please contact us at info@automationsupply.nl for the latest models to ensure the module will fit your frame.



Connection Specifications

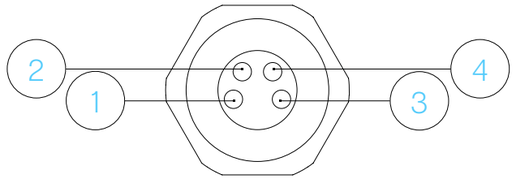
Motor Connectors (10, 12)

1. 24 V/ 48 V | Red | 0.32 mm²
2. Direction | Green | 0.25 mm²
3. GND | Blue | 0.32 mm²
4. Error/ Pulse | Black | 0.25 mm²
5. Speed | Yellow | 0.25 mm²



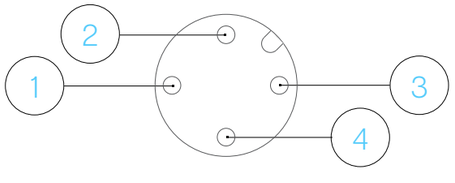
Lift Motor Connectors (8)

1. A+
2. B+
3. B-
4. A-



Sensor Connectors (14)

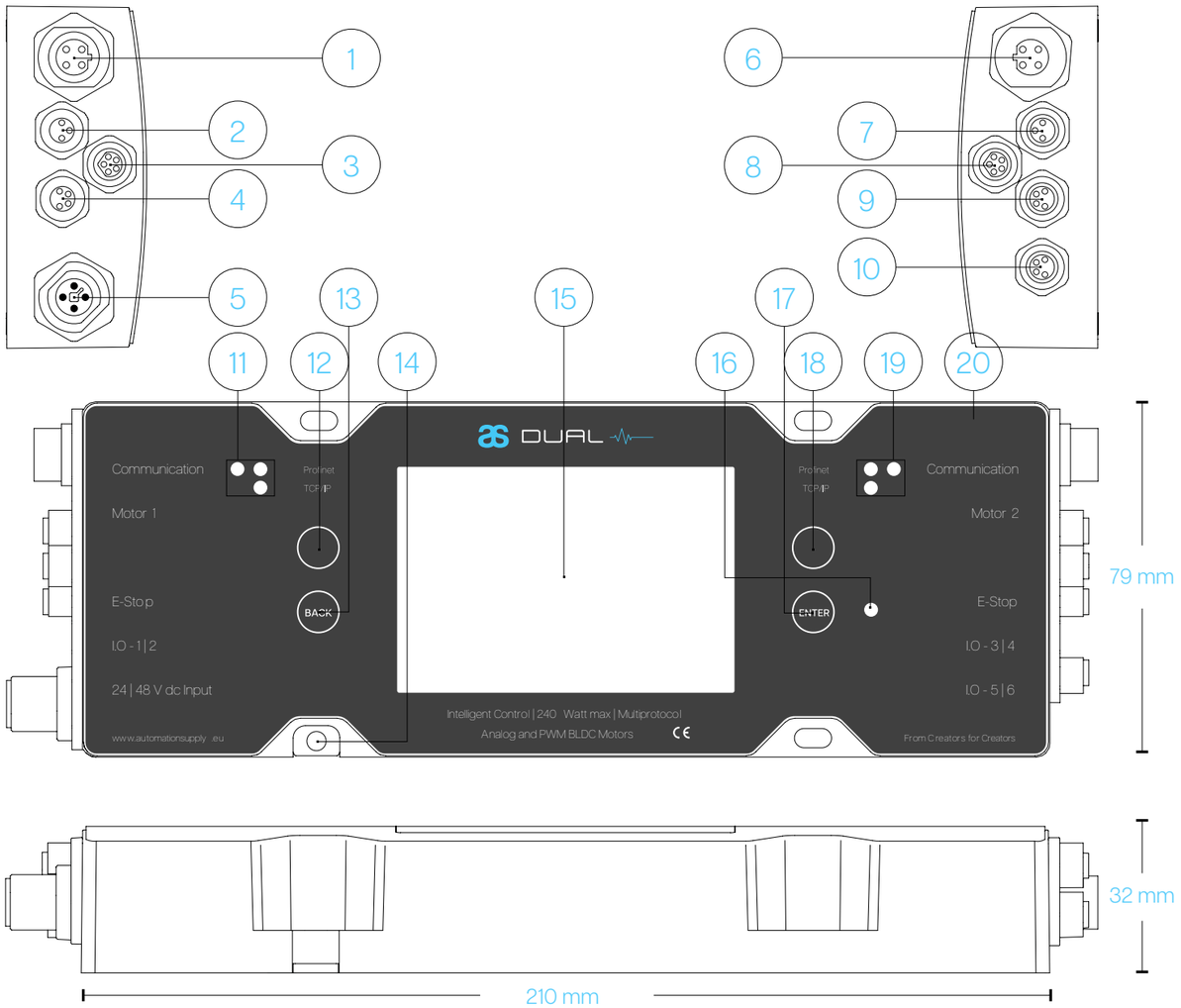
1. GND
2. Sig. 2
3. 24V
4. Sig. 1



4 | COMPONENTS & DIMENSIONS

Gearless BLDC Motors | Up to 1800 packages per hour | Plug and Play | AS DUAL 24V | 24V 240 Watt | 48V 480 Watt

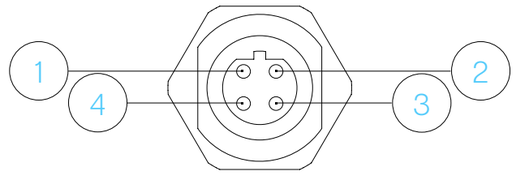
4.2 AS Dual Controller



	Description			Description	
1	Communication A	M12 4P Female (D-coded)	11	Communication status A	LED
2	Emergency A	M8 3P Female (snap-in)	12	Multi purpose button A (Left or Up)	Button
3	Motor 1	M8 5P Female (snap-in)	13	Return button (BACK)	Button
4	Configurable I/O 1 | 2	M8 4P Female (snap-in)	14	Ground for PE (use knurled washer)	Safety
5	Power in 24 | 48 V	M12 4P Male (T-coded)	15	3.5 inch full color display	Graphic UI
6	Communication B	M12 4P Female (D-coded)	16	Power status	LED
7	Emergency B	M8 3P Female (snap-in)	17	Enter button (OK)	Button
8	Motor 2	M8 5P Female (snap-in)	18	Multi purpose button B (Right or Down)	Button
9	Configurable I/O 3 | 4	M8 4P Female (snap-in)	19	Communication status B	LED
10	Configurable I/O 5 | 6	M8 4P Female (snap-in)	20	Product Sticker	Adhesive Sticker

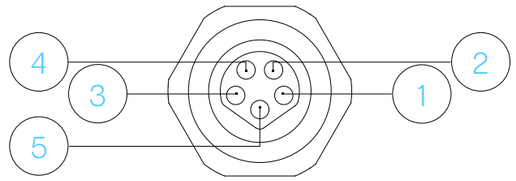
Communication Connector (female)
M12 4-pin D-coded

1. TD +
2. RD +
3. TD -
4. RD -



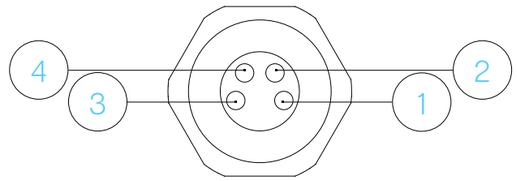
Motor Connector (female)
M8 5-pin snap in

1. 24 VDC / 48 VDC
2. Direction (<4V: CCW / >7V: CW)
3. GND
4. Error/ Pulse
5. Speed



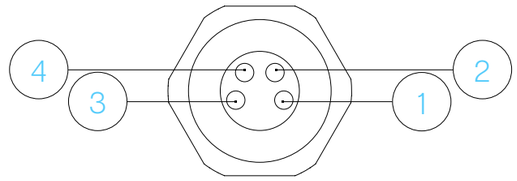
I/O 3 | 4 Connector (female)
M8 4-pin snap in

1. 24 VDC
2. Lift up request
3. GND
4. Lift sensor



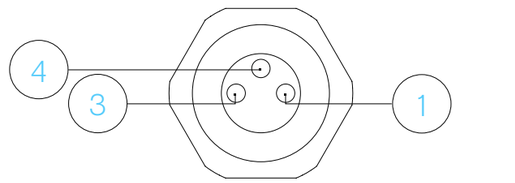
I/O 5 | 6 Connector (female)
M8 4-pin snap in

1. 24 VDC
2. Roller/Belt CCW
3. GND
4. Roller/Belt CW



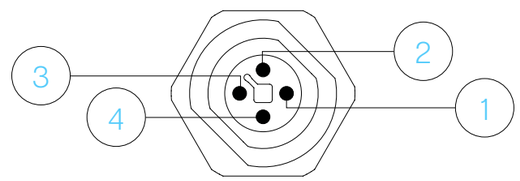
Emergency Connector (female)
M8 3-pin snap in

1. 24 VDC
3. GND
4. Sig 1



Power Connector (male)
M12 4-pin T-coded

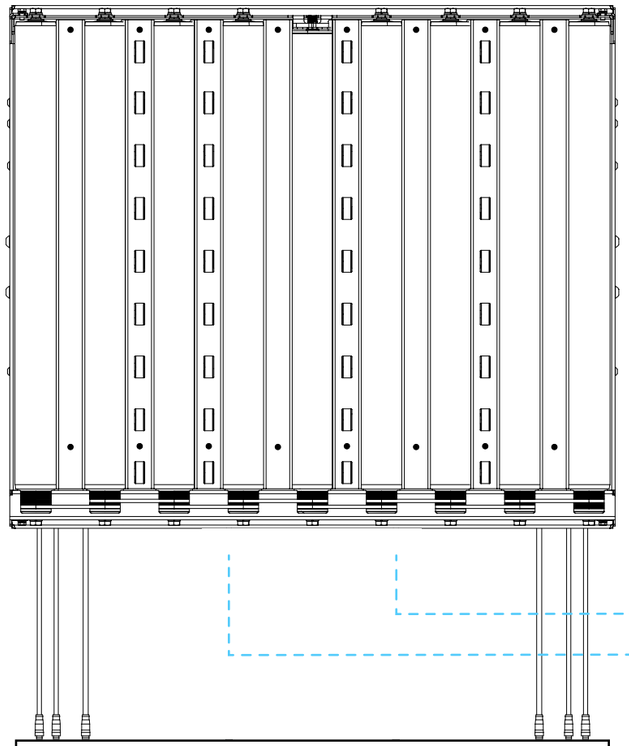
1. 24 VDC / 48 VDC
2. Not Connected
3. Ground
4. PE



4 | COMPONENTS & DIMENSIONS

Gearless BLDC Motors | Up to 1800 packages per hour | Plug and Play | AS DUAL 24V | 24V 240 Watt | 48V 480 Watt

4.3 AS RA Sorter System overview



Rollers motor cable

Belt motor cable

I/O 4 - 6

PLC

CONTROL BOX

Lift sensor down

Lift sensor up

Lift run

4.4 Available spare parts

- Belts
- Slave Roller
- Motor Driven Roller
- AS Dual Controller
- AS Lift Module

5 | SUPPORTED MOTORS & FEATURES

Gearless BLDC Motors | Up to 1800 packages per hour | Plug and Play | AS DUAL 24V | 24V 240 Watt | 48V 480 Watt

5.1 Supported motors

The AS RA Sorter module is controlled through an AS DUAL controller, which can also drive two Motor Driven Rollers (MDR). The motor is connected using a 5-pin M8 connector (snap-in) with analog (0-10V) interface. Besides AS motors, the brands of Interroll and Itoh Denki are also supported. The controller is compatible with both 24V and 48V motors. However, the user must ensure a voltage compatible with the connected motor is supplied to the AS controller.

Supported Motors		
Automation Supply	**Interroll**	**Itoh Denki**
AS 172 rpm	IR EC5000 108:1	ID XE/XP 17
AS 506 rpm	IR EC5000 78:1	ID XE/XP 30
AS 1033 rpm	IR EC5000 49:1	ID XE/XP 60
	IR EC5000 42:1	ID XE/XP 100
	IR EC5000 21:1	
	IR EC5000 18:1	
	IR EC5000 13:1	
	IR EC5000 9:1	

Supported motor features

Feature	Automation Supply	Interroll	Itoh Denki
Analog Interface	o	o	o
Direction	o	o	o
Current Limit	o	o	o
Current Stall	o	o	o
Acceleration	o	o	o
Deceleration	o	o	o
Power Mode	o	o	o
Speed Correction	o		
Speed Stall	o		
Error Detection	o		

5.2 Analog interface

The speed of the motors is controlled by an analog interface. The analog voltage (0-10V) will determine if the motor should run and how fast it should run.

Note: Itoh Denki Motors are controlled using 10 speed steps, the controller will respect this and will use the step closest to the selected speed.

5.3 Run and Direction pins

The direction of the motor is controlled by a direction pin. The controller will automatically control this pin when the motor is moving slow enough to change the direction.

Note: Itoh Denki Motors are controlled using a run pin, the controller will respect this and will use the run pin when necessary.

5.4 Acceleration and Deceleration

If an acceleration and/or deceleration rate are configured, the motor will respect this rate while ramping up or down. If during running at constant speed the speed drops more than 10% of the maximum speed, the motor will enter ramping up state again to accelerate with the configured rate.

5.5 Power Mode, Current Limit, and Current Stall

The current of the motor is constantly measured. If the ECO power mode is configured, the controller will automatically reduce the motor speed if the motor exceeds the configured current limit.

If the motor still draws more current than the limit for the configured time (Stall trip current), the motor will stall because of overcurrent. For more information see Stall Behaviour.

To ensure a correct start-up of the motor, the controller will allow maximum current for a short configurable period of time after the motor starts running.

If the BOOST power mode is configured, the current of the motor will never be limited.

6 | INTEGRATED MOTOR FEATURES

Gearless BLDC Motors | Up to 1800 packages per hour | Plug and Play | AS DUAL 24V | 24V 240 Watt | 48V 480 Watt

6.1 Speed Correction and Speed Stall

The live speed of the motor is constantly measured and displayed on the screen. If the motor is running at a constant speed, each second the speed is corrected if the actual speed differs too much from the configured speed.

If the speed reaches below 2% of the maximum speed for the configured time (Stall trip speed) the motor will stall because of speed. For more information see Stall Behaviour.

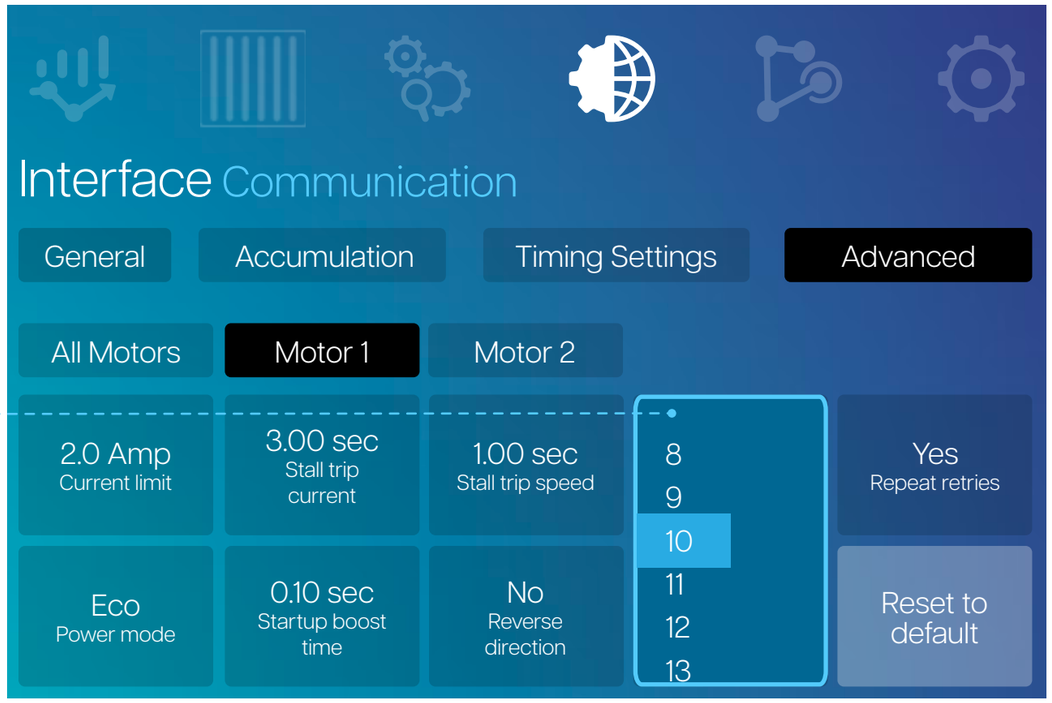
Note: These functions are only compatible with AS motors.

Stall Behaviour

If the motor is stalled, it will try to move again after three seconds. The controller will count how much retries have been made, this counter will be cleared once the motor is running for twice the amount of stall time.

If the motor keeps stalling and the counter reaches the configured stall retries, the motor is completely shut down and will not retry again. Once this happens, an error will be thrown by the controller based on the stall condition. This can be Overcurrent or Speed. Only if the setting repeat retries is enabled, the motor will retry again after 60 seconds.

If a button on the controller is pressed, the retries will be reset and the motors will retry immediately.



6.2 Error Detection

The motor is able to detect an error within the motor, which can occur from various reasons. The most important are:

- Overtemperature
- Overcurrent
- Over- or Undervoltage
- Stall

The controller will detect that the motor has an error and immediately try to reset this error. If an error is detected, an exception will be thrown and visible on the screen. If the error has been successfully reset, the exception will be removed.

Note: This function is only compatible with AS motors.

7 | DIRECT MOTOR CONTROL

Gearless BLDC Motors | Up to 1800 packages per hour | Plug and Play | AS DUAL 24V | 24V 240 Watt | 48V 480 Watt

7.1 Real-Time Ethernet or I/O Signals

The controller offers direct motor control using Real-Time Ethernet or the configurable I/O Both control methods offer the possibility to control motor Run, Direction and Speed.

7.2 Run control

Controlling the run can be done through Real-Time Ethernet or I/O This can be done by setting the Motor Run bit in the cyclic I/O Data.

Run	Run roller
FALSE	Off
TRUE	Run

7.3 Direction control

Controlling the direction can be done in the same way for both control methods. For Real-Time Ethernet this is done through setting the Motor Dir bit in the cyclic I/O Data. When using I/O signals this is done trhough configuring an configurable I/O with a Motor Dir function.

Direction	Direction roller
INACTIVE/FALSE	Clockwise (CW)
ACTIVE/TRUE	Counter clockwise (CCW)

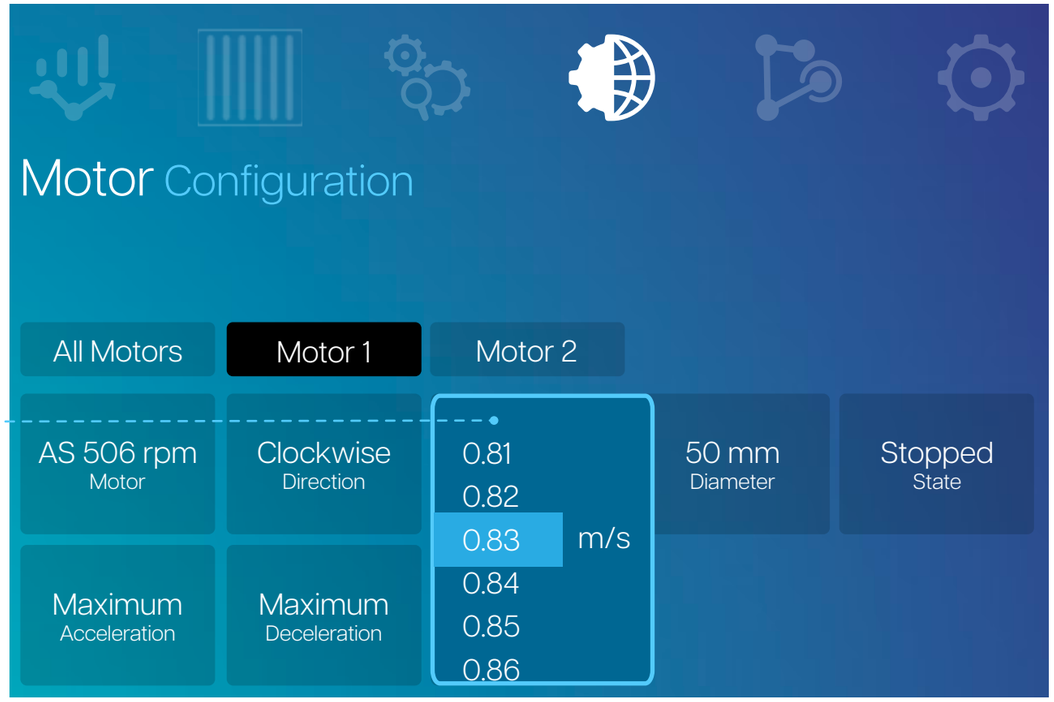
7.4 Speed control

When using Real-Time Ethenet, the speed can be changed using the Override Speed Value Word. The unit of the value in the data word is in cm/s.

During operation the speed can only be altered using Real-Time Ethernet. This can be done by changing the Override Speed Value Word. The unit of the value in the data word is in cm/s. The Override speed enable bit must be set high for this function to be active. When using I/O signals to directly control the motor, the speed which in configured in the menu will be used.

The default settings of these speed setpoints depend on the Motor Type and Diameter of the roller. The selectable speed ranges for the AS motors are shown below. All speed setpoints can be altered with a 0.01 m/s stepsize.

Motor type	Selectable speed range (50mm diameter)
AS 172 rpm	0.14 - 0.45 m/s
AS 507 rpm	0.40 - 1.32 m/s
AS 1033 rpm	0.81 - 2.70 m/s



8 | REAL-TIME ETHERNET & CYCLICAL I/O DATA

Gearless BLDC Motors | Up to 1800 packages per hour | Plug and Play | AS DUAL 24V | 24V 240 Watt | 48V 480 Watt

8.1 Cyclical I/O Data

Cyclic Data is data that will be exchanged at every fixed interval. The cyclic data exists of input- and output data. Input data is transported from the AS controller to the PLC. Output data is transported from the PLC to the AS Dual controller.

8.2 Input Data

Category	Type	Name	Remark
General	Byte	Sorter State	See table below
	Byte	Reserved	
	Bool	Lift Running	
	Bool	Lift Direction Up	
	Byte	Reserved	
Roller Motor	Bool	Roller Running	
	Bool	Roller Direction CW	
	Bool	Roller Error	
	Byte	Reserved	
	Word	Roller Set Speed	Speed in cm/s
	Word	Roller Live Speed	Speed in cm/s
	Word	Roller Live Current	Consumed current in mA
	Word	Roller Status Code	
	DWord	Roller Motor Runtime	Accumulated runtime in minutes
	Word	Reserved	
Belt Motor	Bool	Belt Running	
	Bool	Belt Direction CW	
	Bool	Belt Error	
	Byte	Reserved	
	Word	Belt Set Speed	Speed in cm/s
	Word	Belt Live Speed	Speed in cm/s
	Word	Belt Live Current	Consumed current in mA
	Word	Belt Status Code	
	Word	Belt Motor Runtime	Accumulated runtime in minutes
	Word	Reserved	

ACM States

Value	Name
0	INITIALIZING
1	UNDETERMINED
2	PREPARE_RISING
3	RISING
4	UP
5	PREPARE_LOWERING
6	LOWERING
7	DOWN
8	BELT_RUN_CW
9	BELT_RUN_CCW
10	ROLLER_RUN_CW
11	ROLLER_RUN_CCW
12	ERROR

8 | REAL-TIME ETHERNET & CYCLICAL I/O DATA

Gearless BLDC Motors | Up to 1800 packages per hour | Plug and Play | AS DUAL 24V | 24V 240 Watt | 48V 480 Watt

Status Codes

Value (Hex)	Name	Description
0x0000	OK	No error
0x2000	MTR_STALL	The motor is stalled due to low speed
0x2001	MTR_OC	The motor is stalled due to overcurrent
0x2002	MTR_ERROR	The motor reports an error
0x3000	FS_OFFLINE	The fail-safe CPU is offline
0x3001	FS_DFU_FAIL	The fail-safe CPU cannot be updated
0x3002	FS_EMRG_FAIL	The periodic test of the fail-safe circuit has failed
0x4000	VCC_CHECK_FAIL	The input voltage is incorrect
0xF000	EMRG_STOP	The emergency stop is active

8.3 Output Data

Category	Type	Name	Remark
General	Bool	Sorter Control Enable	
	Byte	Required State	See table below
Roller Motor	Bool	Roller Control Enable	
	Bool	Roller Motor Run	
	Bool	Roller Direction CW	
	Bool	Roller Speed Override Enable	
	Byte	Reserved	
	Word	Roller Override Speed	Speed in cm/s
	Word	Reserved	
Belt Motor	Bool	Belt Control Enable	
	Bool	Belt Motor Run	
	Bool	Belt Direction CW	
	Bool	Belt Speed Override Enable	
	Byte	Reserved	
	Word	Belt Override Speed	Speed in cm/s
	Word	Reserved	

RA Sorter Required States

Value	Name
0	STOPPED
1	UP
2	DOWN
3	BELT_ RUN_CW
4	BELT_RUN_CCW
5	ROLLER_RUN_CW
6	ROLLER_RUN_CCW

9 | PROTOCOL SPECIFIC INFORMATION

Gearless BLDC Motors | Up to 1800 packages per hour | Plug and Play | AS DUAL 24V | 24V 240 Watt | 48V 480 Watt

9.1 PROFINET

When commissioning PROFINET, the PLC saves a copy of the AS controller settings. When a connection is established, the settings are pushed to the device. All settings configurable in the engineering software (TIA Portal) are displayed below. Ensure these settings are configured correctly in the engineering software because they will overwrite the current settings in the AS controller.

Settings

Category	Setting
Device	IP-Address
	Netmask
	Gateway
AS RA Sorter	Emergency Detection
	Emergency 24V Power Left
	Emergency 24V Power Right
	Motors OVP Mode
	Periodic fail-safe test
	Roller Motor Type
	Roller Diameter (mm)
	Roller Acceleration (dm/s^2)
	Roller Deceleration (dm/s^2)
	Roller Speed Value (cm/s)
	Roller Power Mode
	Run roller while lift moving
	Belt Motor Type
	Belt drive Diameter (mm)
	Belt Acceleration (dm/s^2)
	Belt Deceleration (dm/s^2)
	Belt Speed Value (cm/s)
	Belt Power Mode
	Run belt while lift moving

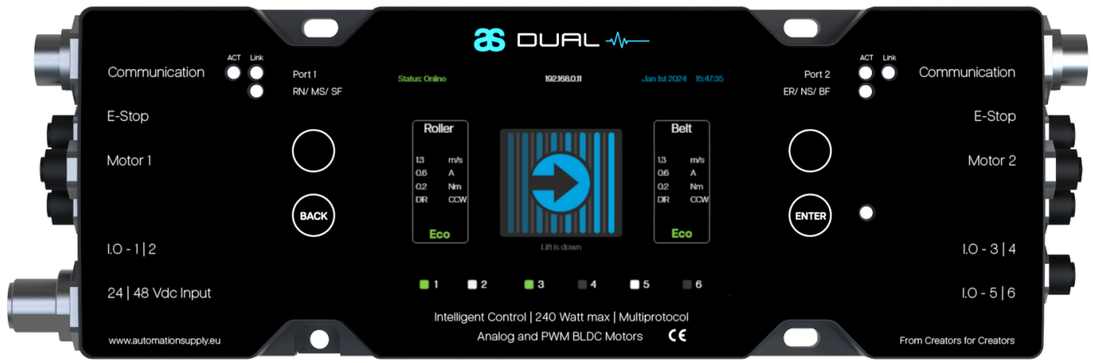
9.2 Protocol specific LEDs

The device has two LEDs to signal the Real-Time Ethernet status. Both the ER/NS/BF and RN/MS/SF LEDs have a different meaning depending on the protocol used. The table below shows the signalling for PROFINET.

RTE LEDs	Type
SF (System Failure)	
Off	No Error
Red, flashing 1Hz	DCP Signal service is initiated via the bus
Red	Watchdog timeout
	Channel, generic or extended diagnosis present
	System error
BF (Bus Failure)	
Off	No Error
Red, flashing 2Hz	No data exchange
Red	No configuration
	Low speed physical link
	No physical link

10 | CONTROL HIERARCHY

Gearless BLDC Motors | Up to 1800 packages per hour | Plug and Play | AS DUAL 24V | 24V 240 Watt | 48V 480 Watt



1. REAL-TIME ETHERNET

When the bit “Sorter Control Enable” is set in the Real-Time Ethernet cyclical I/O data, the PLC controls the sorter using the required state. This also automatically controls the motors in certain states.
If the Control Enable bit for the belt or roller motor is enabled, this motor can be overridden using the “Motor Run” and “Direction” bit. If the bit “Speed Override Enable” is set, the PLC will override the motors speeds with the speed in the “Override Speed” word.

2. CONFIGURABLE I/O

If the above is not applicable, the RA sorter can be controlled via I/O signals.
The following signals are available:
Input 4 = Lift up
Input 5 = Belt/Roller Run CW
Input 6 = Belt/Roller Run CCW

The controller will automatically select the roller when the lift is in down position and the belt when the lift is in the up position. If none of the run signals are active, the lift signal will not be evaluated as well.
To prepare the lift in a position, enable both run signals. This will ensure that only the lift will move to the desired position without enabling the roller or belt.

11 | SETTINGS & CONTROLS

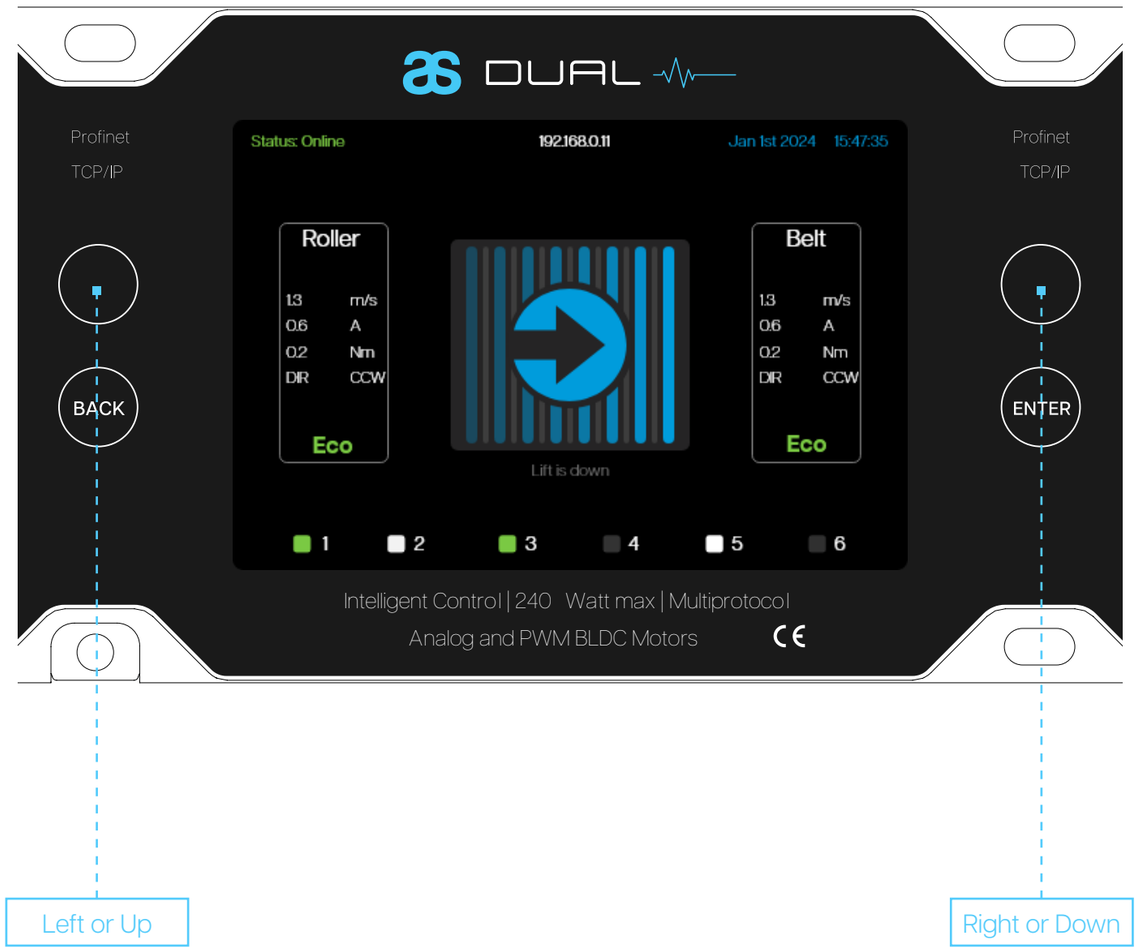
Gearless BLDC Motors | Up to 1800 packages per hour | Plug and Play | AS DUAL 24V | 24V 240 Watt | 48V 480 Watt

11.1 Dashboard Functionalities

Information and core parameters

The dashboard creates an overview of the most important parameters and statuses. For each motor, the live status, current usage, power mode, torque and direction can be seen. If the motor is running, the circle will rotate with the correct speed and in the correct direction.

The middle circle represents the communication status. Here the IP-Address and current control method can be seen, as well as the communication status. At the bottom of the screen you can see the status of each configurable I/O, this can be either disabled, active or inactive. In the top right corner the current date and time can be observed.



Live status definitions

The table show the definition of the live status of the controller and motor.

Parameter	Description
Motor Specific	
Speed / State	Live speed in m/s if the motor is running, otherwise either Stopped, Error or Stalled
Current	Live current in A
Torque	Live torque in Nm
Direction	Current direction of the motor
Power Mode	Active configured power mode, either ECO or BOOST
Communication	
IP-Address	Current configured IP-Address of the device
Comm. Status	Current communication status, either online, fieldbus offline or neighbor offline
Control Method	The current active control method
Configurable I/O	
I/O Status	Each I/O can either be disabled (grey), inactive (white) or active (green)
Date & Time	The top-right corner of the screen will display the configured date and time

11 | SETTINGS & CONTROLS

Gearless BLDC Motors | Up to 1800 packages per hour | Plug and Play | AS DUAL 24V | 24V 240 Watt | 48V 480 Watt

11.2 Main Menu

How to navigate through the main menu

The main menu consists of six main categories., which are explained on the next page. Use the left and right button to navigate through the categories and click the enter button to enter the selected category and go a layer down into the menu. Click the back button to go one layer up in the menu.

RA Sorter

Setup

RA Sorter setup contains all settings for the AS RA Sorter module, such as:

- Configuration
- Test

Motor

Configuration

The motor menu contains the core parameters that can be set for the best performance, such as:

- Motor Type
- Direction and Speed
- Acceleration and Deceleration
- Boost or Eco mode

Interface

Communication

The interface menu consists of multiple settings categories. The following categories are available:

- Emergency Stop
- Advanced motor settings

Configuration

Inputs & Outputs

The configuration menu can be used to configure the I/Os. The following parameters can be set:

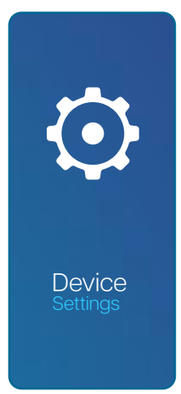
- CIO Function
- CIO High / Low Active
- CIO Input Type PNP / NPN

Device

Settings

The device menu contains the device specific settings which are not associated with a motor or segment.

- Installed firmware
- Communication parameters
- Device preferences



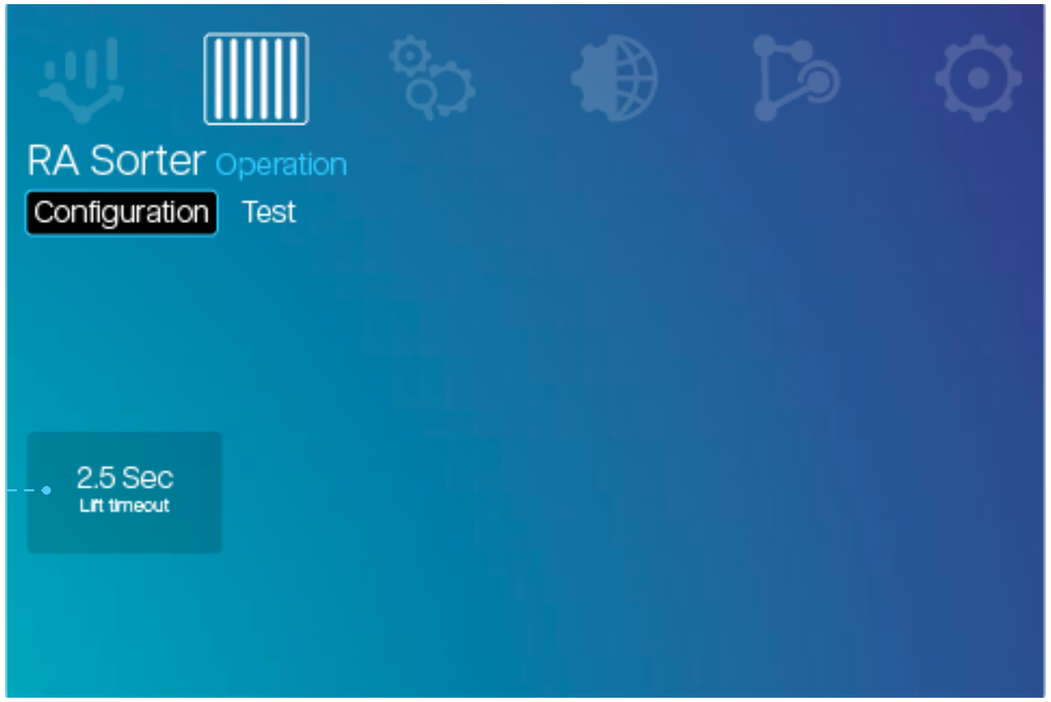
Analytics (Coming soon)

Performance

The AS Dual Controller has many data points that can be stored in order to facilitate functions such:

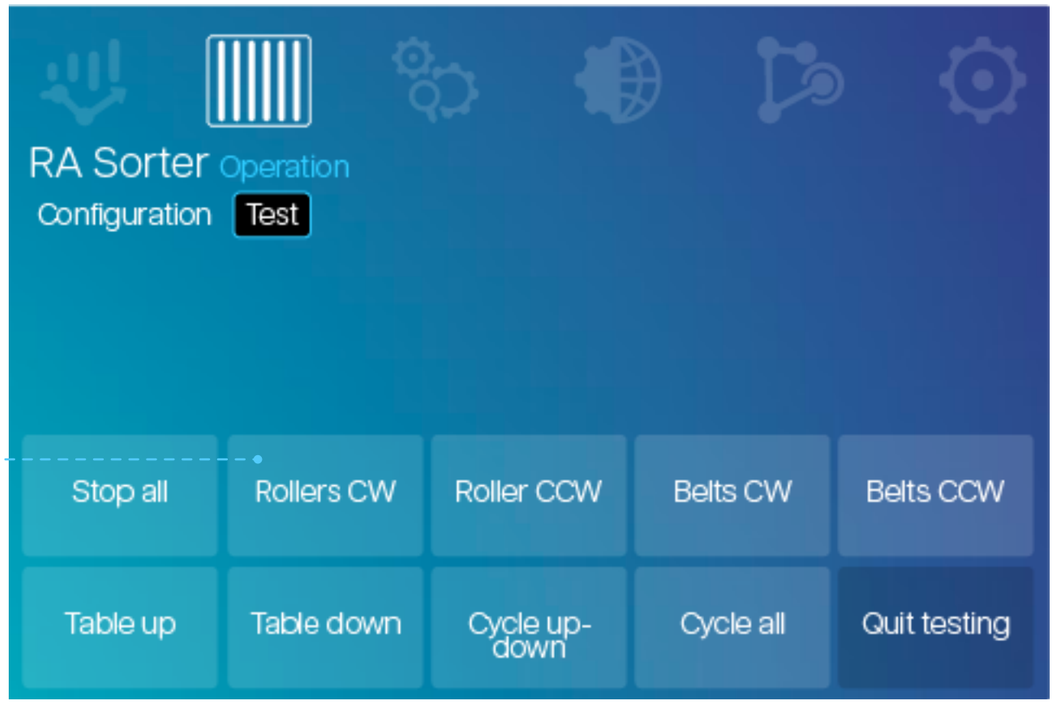
- Energy efficiency
- Preventive maintenance
- Optimization

11.3 Right Angle Sorter Operation



Lift timeout

A timeout for the lift in the Right Angle Sorter can be specified between 1.0 and 9.0 seconds.



All features of the Right Angle Sorter can be **tested** in the Test panel. This is not the actual configuration of the sorter. This should be configured through the I/Os or through PROFINET.

Rollers CW/CCW

Set the direction of the rollers in the Right Angle Sorter to clockwise (CW) or counter-clockwise (CCW). Determines the conveying direction.

Belts CW/CCW

Set the direction of the belts in the Right Angle Sorter to clockwise (CW) or counter-clockwise (CCW). Determines the sorting direction.

Table up/down

Push sorting belts up or down. Determines the direction of packages on the Right Angle Sorter.

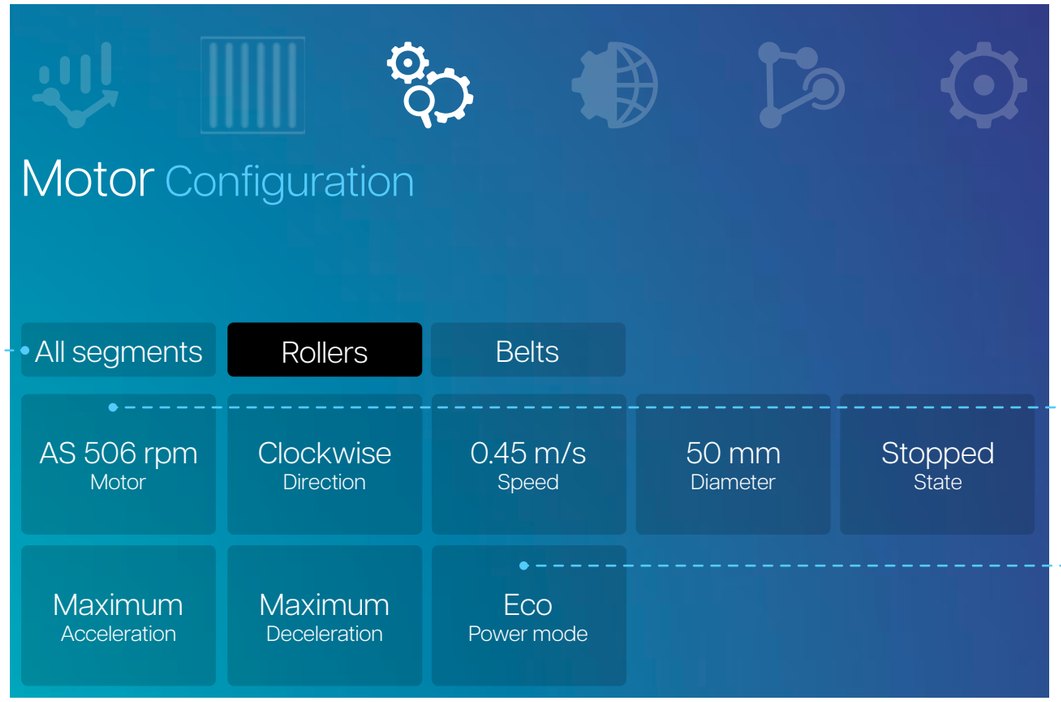
Cycle up-down/all

Cycle table up and down or cycle through all RA Sorter functions; table and rollers.

11 | SETTINGS & CONTROLS

Gearless BLDC Motors | Up to 1800 packages per hour | Plug and Play | AS DUAL 24V | 24V 240 Watt | 48V 480 Watt

11.4 Motor Configuration



How to navigate through the motor configuration menu

All settings shown can be configured individually for the rollers and the (sorting) belts. To view the settings of a specific motor, select this motor in the selection bar. Once a motor is selected, it turns black. To reach the settings keep pressing the left or right button, after the last motor is highlighted it will automatically go down to the settings. Additionally, settings can be changed for all segments.

Motor type

By default the motor is disabled. To enable a motor, select the correct motor type in this setting. The following motor types are supported.

Supported Motors		
Automation Supply	**Interroll**	**Itoh Denki**
AS 172 rpm	IR EC5000 108:1	ID XE/XP 17
AS 506 rpm	IR EC5000 78:1	ID XE/XP 30
AS 1033 rpm	IR EC5000 49:1	ID XE/XP 60
	IR EC5000 42:1	ID XE/XP 100
	IR EC5000 21:1	
	IR EC5000 18:1	
	IR EC5000 13:1	
	IR EC5000 9:1	

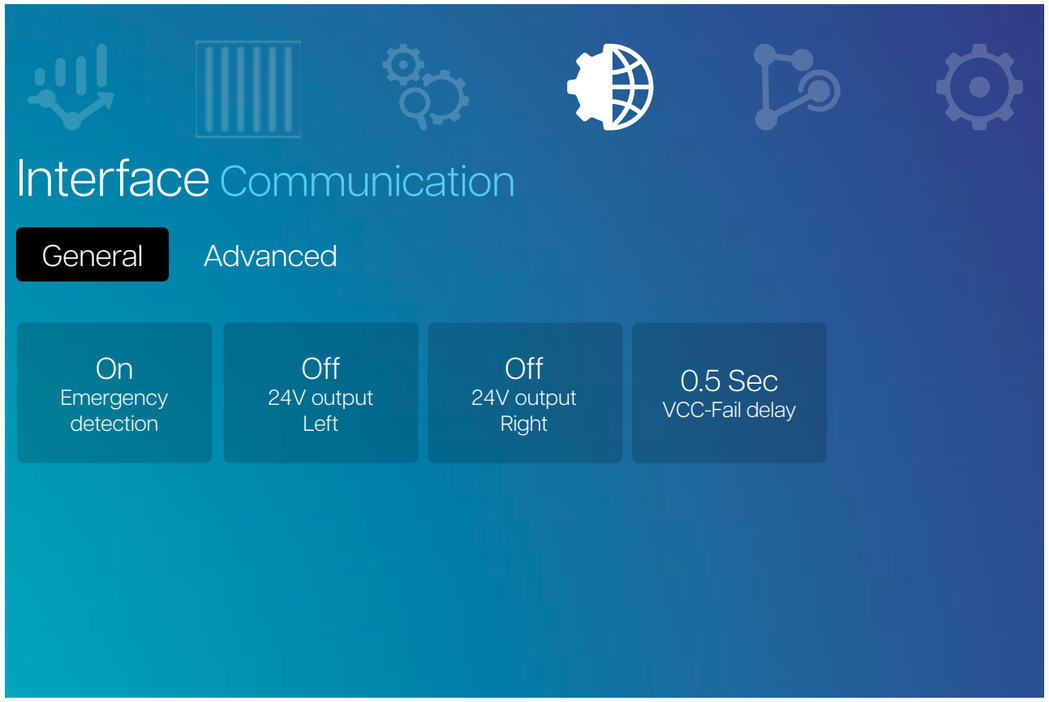
Other parameters

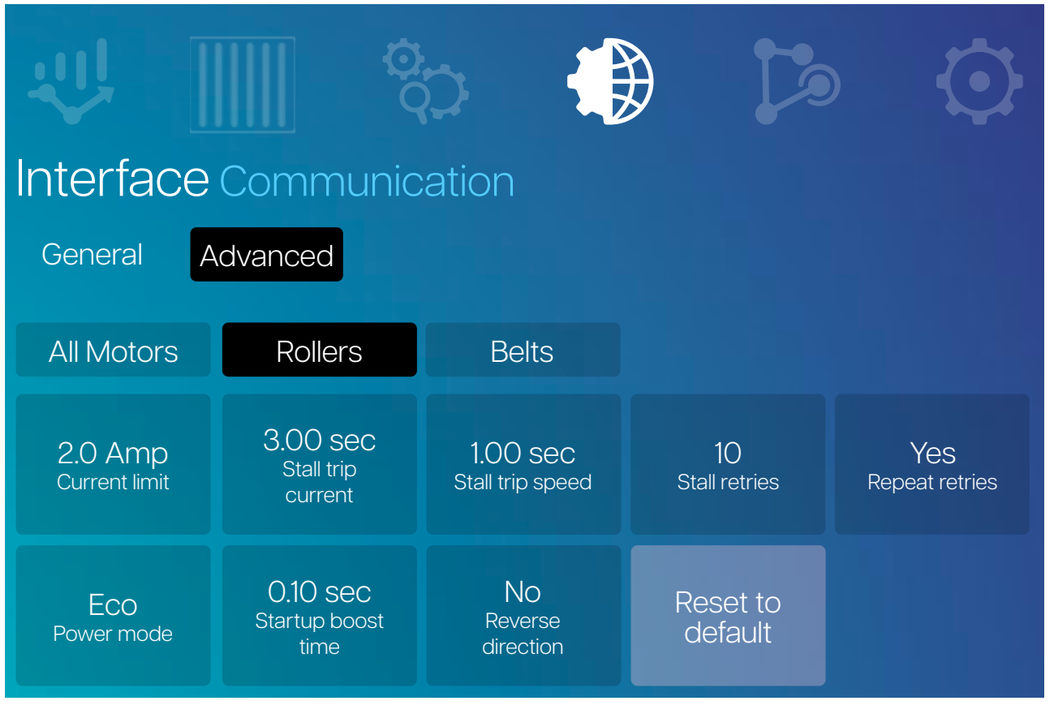
For a overview of the other available parameters, please see the table below.

Parameter	Description
Direction	The direction of the motor: Clockwise (CW) or Counter Clockwise (CCW).
Speed	The motor speed in steps of 0.01 m/s. The range depends on motor type and diameter.
Diameter	The motor diameter can be configured between 30mm and 250mm.
Run State	The motor can be stopped or running. This setting will be overridden by Fieldbus, I/O or ACM
Acceleration	Acceleration of the motor from 0.1 to 4.0 m/s^2 or maximum.
Deceleration	Deceleration of the motor from 0.1 to 4.0 m/s^2 or maximum.
Power Mode	Both Eco and Boost are avialable. In boost mode the motor will not be restarined.

Gearless BLDC Motors | Up to 1800 packages per hour | Plug and Play | AS DUAL 24V | 24V 240 Watt | 48V 480 Watt

11.5 Interface Communication





How to navigate through the Interface menu

The general tab contains the emergency stop settings, these settings are not configurable per motor. The advanced tab contains advanced motor settings which can be configured per motor, these include stall settings and current limit. The layers in the menu can be navigated through the back and enter buttons.

Emergency detection

The controller has an emergency stop function which is enabled by default. This function requires 24V at the signal pin of at least one of both E-Stop connectors so it can enable the power to the motors. If the 24V signal is removed, the power to all motors is also cut by hardware while keeping the controller powered.

The controller can detect this and will show an error on the screen. If the E-Stop function is not used, it should be disabled by turning this setting off. Turning this setting off will override the emergency function so the motors are always powered.

24V output Left / Right

The controller has two E-Stop connectors, one on each side. Both connectors feature a 24V supply pin to easily attach a safety device, for instance an emergency stop button. The 24V on this pin is turned off by default. If needed, these can be turned on individually for the left or right side.

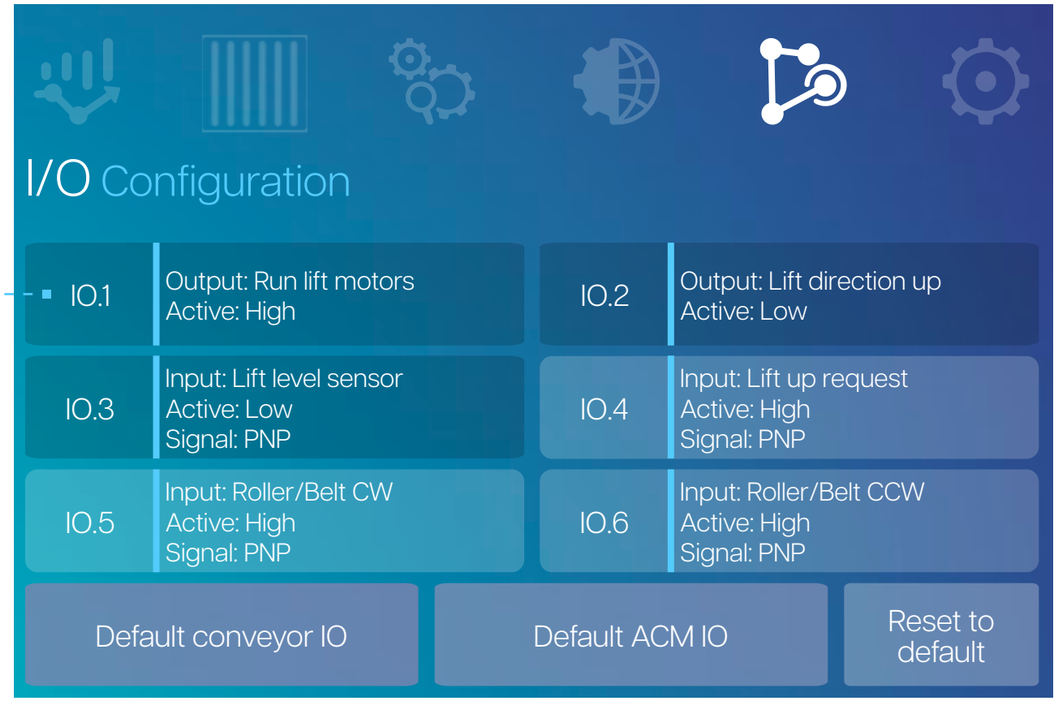
Advanced parameters

Parameter	Description
Current limit	Current limit used in ECO power mode as well as detecting a stall based on current.
Stall trip current	Time windows the motor must be drawing too much current to enter a current stall.
Stall trip speed	Time window in which the motor must be moving at a very low speed to enter a speed stall.
Stall retries	Number of times that a motor retires after a stall. The counter will be reset once the motor does not detect a stall for twice the time window.
Repeat retries	If enabled and the motor stall retries have been reached, the motor will retry after 60 seconds.
Power Mode	ECO for more sustainable use, BOOST for maximum speed
Startup boost time	After the motor starts, allow maximum current for this time window to ensure the motor is able to start correctly.
Reverse direction	If enabled, this setting will ensure the direction of the motor is flipped. This can be convenient when a single motor needs to be installed the other way around.

11 | SETTINGS & CONTROLS

Gearless BLDC Motors | Up to 1800 packages per hour | Plug and Play | AS DUAL 24V | 24V 240 Watt | 48V 480 Watt

11.6 I/O Configuration



Configurable I/Os 1-3

I/Os 1-3 are used for standard functionalities of the RA Sorter: Running the lift motors and direction, and reading the level sensor. These can not be used for other I/O peripherals, hence they are greyed out.

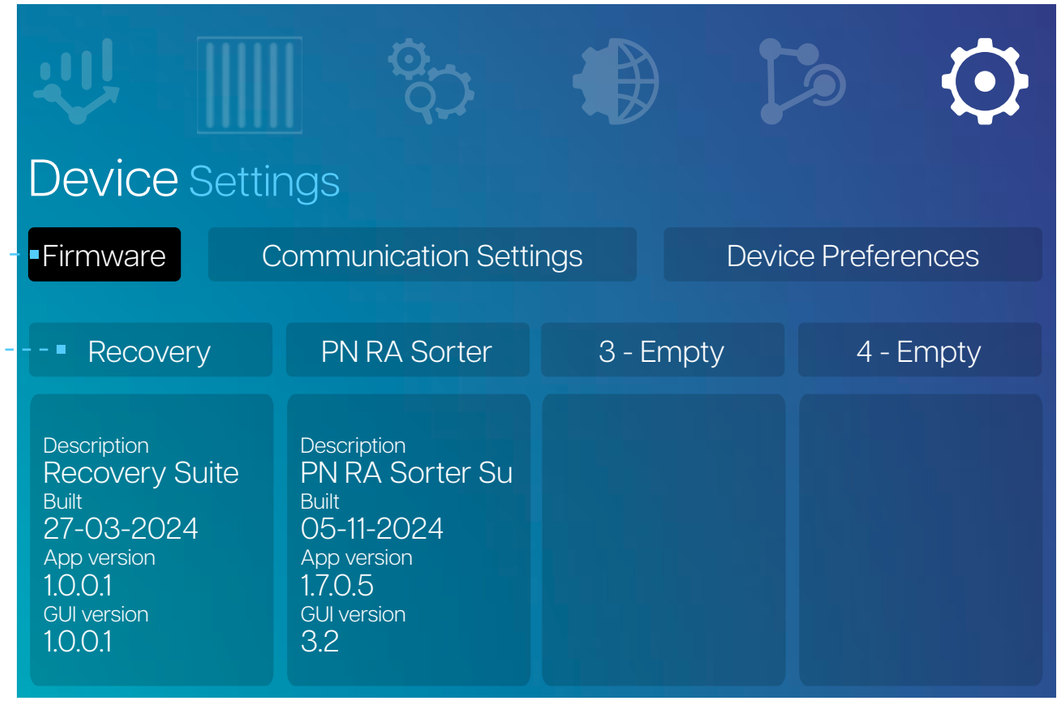
Configurable I/Os 4-6

I/Os 4-6 can be configured to be HIGH or LOW. This allows for I/O-based control over the RA Sorter. The meaning of the LOW/HIGH combinations can be found in the table below.

I/O 4: Lift to up	I/O 5: Roller/Belt CW	I/O 6: Roller/Belt CCW	Meaning
L	L	L	System inactive
H	L	L	System inactive
L	H	H	Lift is moved down
H	H	H	Lift is moved up
L	H	L	Lift is moved down, Rollers spin CW
L	L	H	Lift is moved down, Rollers spin CCW
H	H	L	Lift is moved up, Belts spin CW
H	L	H	Lift is moved up, Belts spin CCW

Gearless BLDC Motors | Up to 1800 packages per hour | Plug and Play | AS DUAL 24V | 24V 240 Watt | 48V 480 Watt

11.7 Device Settings

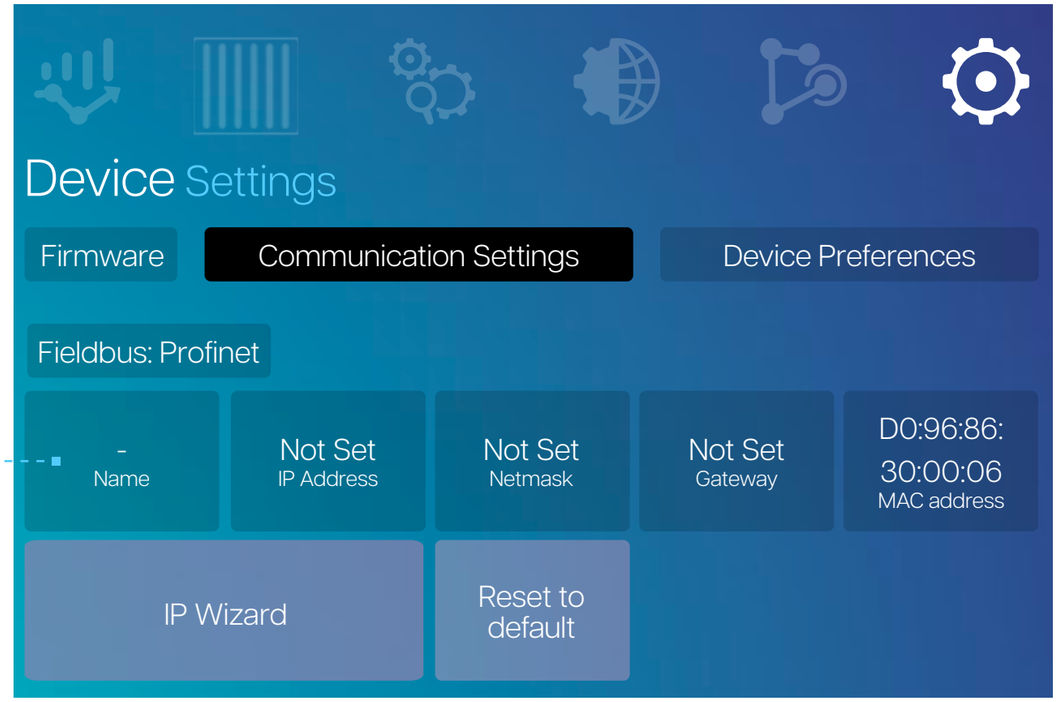


Firmware

In the firmware menu, an overview of all available firmware can be seen. The device has four slots available. The firmware can be installed by highlighting it and clicking enter.

Recovery Firmware

Recovery firmware is always pre-installed. This firmware can also be re-installed by holding down the enter button while the controller is powered on. This can fix the device in a case of corrupt or faulty firmware.



Name

Each device can be given a name using the configuration tool. This setting will display the assigned name.

IP Address / Netmask / Gateway

The device needs an IP address to be able to communicate to its neighbours. In this menu, the IP Address, netmask and gateway can be set.

Neighbour IPs

The IP address of a connected neighbour must be known to the controller. These settings can be used to manually change the IP address of the left or right neighbour.

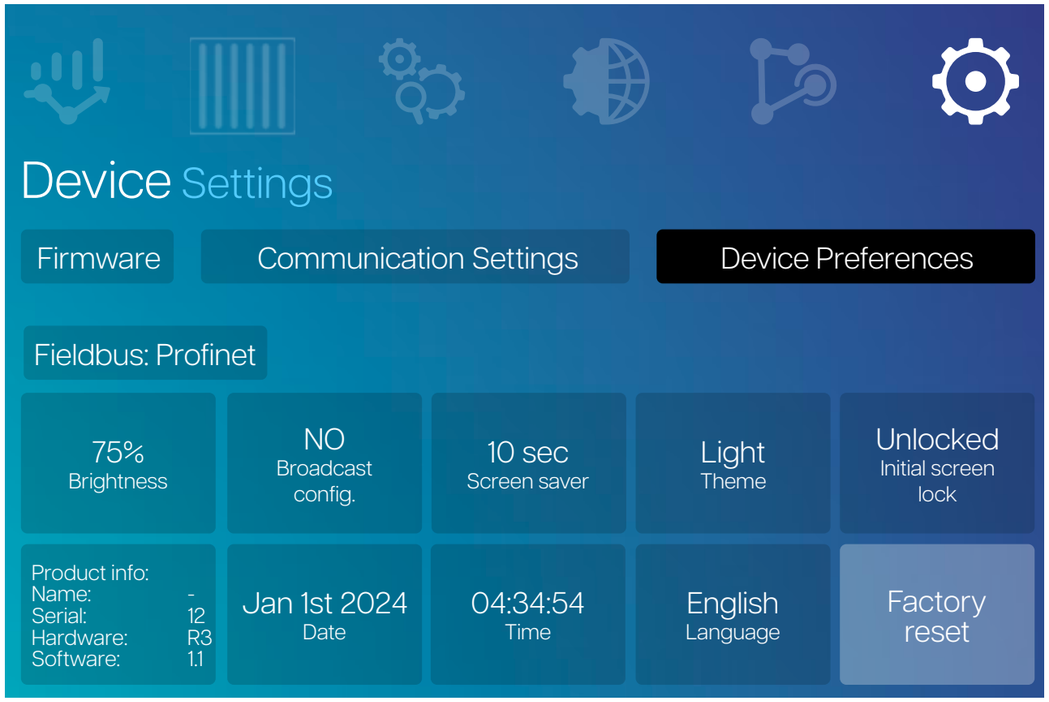
IP Wizard

To ease the IP configuration of long chains of conveyor, an IP wizard is present. Using this method the following parameters can be quickly configured for all controllers in a chain: IP Addres / Netmask / Gateway, neighbour IP Adresses, ACM Direction

11 | SETTINGS & CONTROLS

Gearless BLDC Motors | Up to 1800 packages per hour | Plug and Play | AS DUAL 24V | 24V 240 Watt | 48V 480 Watt

Device Settings



Preferences

Parameter	Description
Brightness	The screen brightness can be configured between 20% and 100%.
Broadcast config	If enabled, setting changes will be broadcasted to all controllers in the network
Sreen saver	After this time window without any button presses or warnings/errors, the screen will go dark
Theme	A light and dark themer are available.
Initial screen lock	Screen lock state which will be applied on startup.
Date / time	The date can be changed using these settings.
Language	Currently, only english is supported

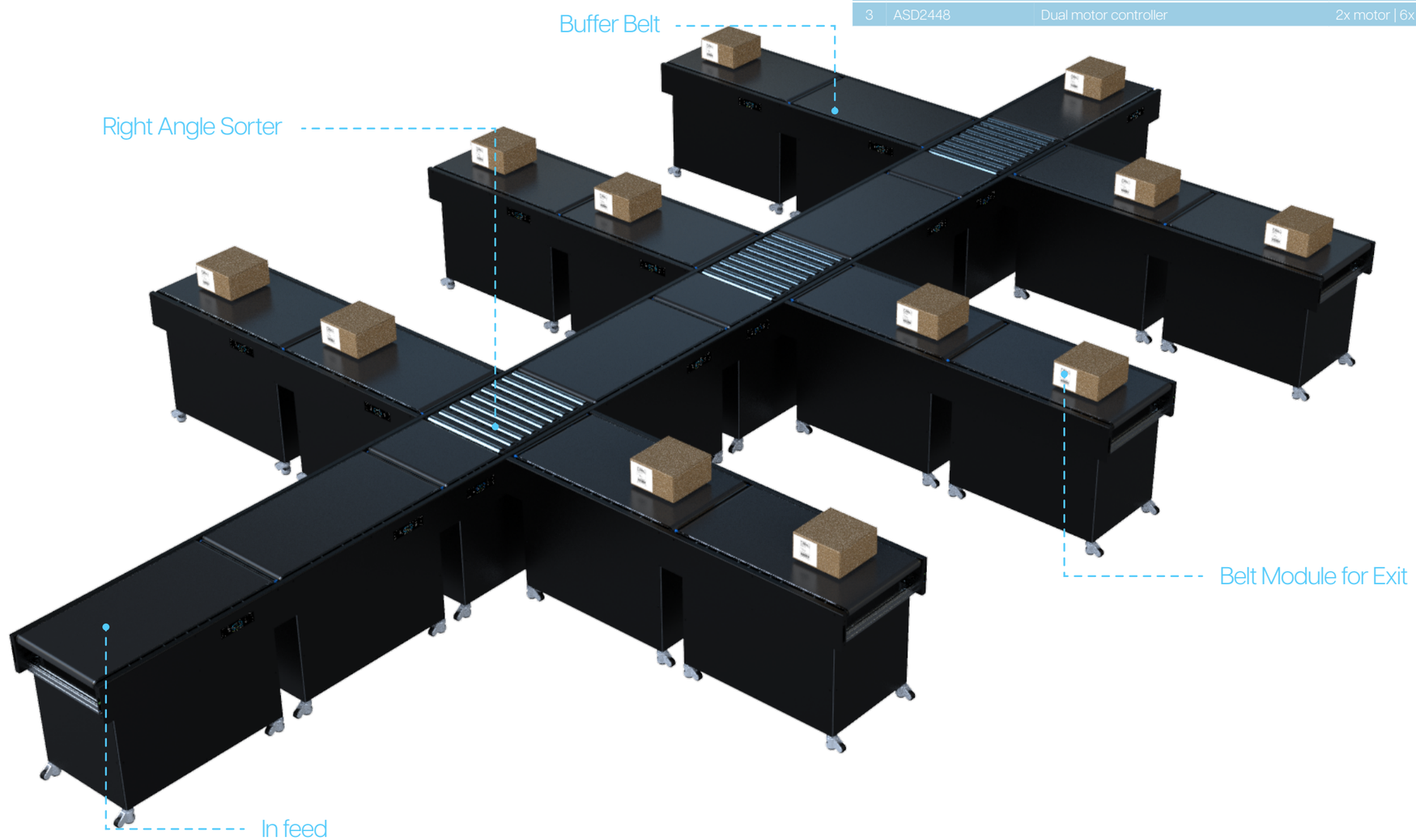
12 | EXAMPLE APPLICATION

Gearless BLDC Motors | Up to 1800 packages per hour | Plug and Play | AS DUAL 24V | 24V 240 Watt | 48V 480 Watt

Example application: Modular Sorting System

Learn more on www.automationsupply.nl

* Infeed and sorting strategy to be processed by WMS system of end-customer



Required Components and Modules

		Information	Specifications
1	ASRA	Right Angle Sorter	Sorts up to 1.800 Packages per hour @ 35 kg
2	ASBM	Belt Module	Transport weights up to 35 kg @ 1.25 m/s
3	ASD2448	Dual motor controller	2x motor | 6x I/O | 1x Power in | 2x Emergency

Disclaimer

AS and AS partners are not responsible for integration and usage of our products outside of the specified application range , technical specifications and in combination with third party components.

Images may differ from the actual product due to our continuous product improvement.

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13 | WARRANTY

Gearless BLDC Motors | Up to 1800 packages per hour | Plug and Play | AS DUAL 24V | 24V 240 Watt | 48V 480 Watt

13.1 Standard warranty

Automation Supply products are provided with a warranty period of 6 months after delivery.

13.2 Void warranty

Automation Supply products are not subjected to warranty if:

1. The product manual has not been consulted prior to using the product
2. The product has been opened or damaged
3. The product has not been purchased from Automation Supply and/or her partners
4. The product has been used for other purposes than described in the manual

14.1 Removal

Beware of the risk of injuries while removing the AS RA Sorter from the conveyor system. Only authorized and qualified personnel is allowed to perform these kinds of tasks. Ensure the power is switched off and cannot be accidentally switched on again during removal. When removing the controller from the conveyor system, make sure the following tasks are being executed in this specific order:

1. Cut all power from the system or, if applicable, the specific segment.
2. If necessary, label the cables in order to ensure they are put back in the right place.
3. Disconnect all the cables from the system.
4. Remove the mounting screws that secure the controller to the conveyor system.
5. Gently remove the controller. Make sure not to drop or bump it, as this might result in irreversible damage.
6. Make sure any loose cables are off the floor and cannot be damaged by accident.

14.2 Disposal

The disposal of the AS RA Sorter must be compliant to industry-specific national and local provisions. The responsibility for the right disposal of the AS RA Sorter and the accompanying packaging and accessories lies completely with the industrial operator which should consider the proper regulations surrounding the disposal of electronic devices.

15 | DECLARATION OF CONFORMITY

Gearless BLDC Motors | Up to 1800 packages per hour | Plug and Play | AS DUAL 24V | 24V 240 Watt | 48V 480 Watt

EU Declaration of conformity

The manufacturer: **Automation Supply (EPHI BV)**

Address: Ondernemingenweg 26
5627 BV Eindhoven
The Netherlands

Tel: +31(0) 40 304 17 58
Web **www.automationsupply.nl**

Hereby declare that the following product:

AS Right Angle Sorter
AS RA Control Box
AS Dual Controller

is in conformity with the following standards and/ or other normative documents:

2014/30/EU - EMC Directive

Furthermore if relevant, the following harmonized standards are used:

EN 61010-1:2010 - Safety requirements for control equipment
EN 61800-3:2018 - Adjustable speed electrical power drive systems - EMC requirements

Eindhoven, 01-03-2024

M.P Karapun
Managing Director

T. de Kok
Operations Manager