PULSE ROLLER

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480-1309Y-EU-R0

PULSE ROLLER

— GLOBAL MOTOR ROLLER TECHNOLOGIES —

PRODUCT CATALOG

DC24V
Powered

Table of Contents

Features of DC Brushless Motor

High torque

DC brushless motor provides much higher torque compare to the same size AC motor which enables to handle heavier load with minimum number of Motor Rollers.

Energy saving

DC brushless motor is known as more efficient at converting electricity into mechanical power than conventional AC induction motor.
Also, Motor Roller conveyor line is typically sub-divided into “Zones” and each zone is powered and controlled independently only when a tote is present (Run On Demand).
This Run On Demand feature provides further energy saving by more than 50% compared to the conventional drive conveyor.

Dynamic brake

DC brushless motor provides electrical brake method called Dynamic brake or Regenerative brake.
This feature provides instantaneous stop unless the product slips over the tube surface, thus there are no mechanical brake device or pneumatic cylinder are required for many cases.

Wide speed range

DC brushless motor provides wide speed range (e.g. SENERGY, Speed code 35 – Eco mode, diameter 50.0 mm provides from 5.0 to 49.8 m/min) and speed can be easily adjusted by Control card setting.

Functionality and Logic control

Our cutting-edge controls provide useful functions, not only Dynamic brake or Variable speed, but such as Constant Speed control (Maintaining running speed regardless of load conditions), Acceleration & Deceleration timer setting, etc.
Also ConveyLinx provides system-control-like functions such as ZPA (Zero Pressure Accumulation) which can minimise wirings and PLC programing.

PULSE ROLLER Drives Overview

SENERGY-Ai

Product type	Motor Roller
Rated voltage	DC24V
Output	50W (Max)
Conveyor speed	2.0 ~ 304.1 m/min (50.0 mm diameter)

PGD-Ai

Product type	Geared Drive
Rated voltage	DC24V
Output	50W (Max)
Rotational speed	8.5 ~ 528.9 rpm (Output shaft)

SENERGY-Ai

Introduction

Ai (Advanced intelligence) technology incorporates a small micro controller on the hall effect sensor board of the Senergy Ai motor and achieved to eliminate the need to have the commutation electronics inside the motor roller. The micro controller codes the hall effect signals to only one pin, allowing the connection with a standard M8-4pin connector for proven and fail-safe connection.

The micro controller also holds, roller serial number, roller diameter, gear ratio, manufacturing date and measures the real-time motor temperature. This allows in-depth analysis of the motor roller in operation. Ai technology is a brilliant piece of ingenuity in motorized rollers.

ECO and BOOST mode are two performance mode of Senergy Ai. In ECO mode the continuous performance is 40W, and 50W in BOOST mode. ECO mode is sufficient for most typical zoned conveyor applications. BOOST mode should be used for higher loads, belted zones or motion control application.

Both performance modes can be easily selected by our Control cards.

SENERGY-Ai

Product information

General information

-Tube material: Mild steel, zinc plating / Stainless steel (SUS304)
-Roller diameter: 48.6, 50.0, 57.0, 60.5 (mm)
-Min. roller length: Refer to the “Minimum available roller length table” below.
-Max. roller length: 1000 mm *Contact us for longer than 1000 mm.
-Connector: 4-pin M8 connector cabling
-Cable length: 1000 mm
-Advanced intelligence inside:
Internal diagnostics (Real time motor temp report)
Product information stored (Serial number, Date of Manufacturing, Gear ratio, Roller diameter, etc...)
-Operation: 0.5 sec ON / 0.5 sec OFF duty cycle (Minimum) or continuous within rated load

Compatible Control Technologies

EQUBE CONVEYLINX

Technical data

	Eco-mode	Boost-mode
Voltage	DC24V	
Nominal output	40W	50W
Rated current	2.5A	3.5A
Starting current	3.0A	5.0A
Ambient temperature	-10 ~ 40°C	
Ambient humidity	10 ~ 90% RH (No condensation)	

Available minimum roller length

Roller diameter	Speed Code	Interlocking option			
		Plain straight	Micro V-Pulley	Round Groove	Sprocket
48.6 / 50.0	15, 20, 25	324	317	356	329
	35, 45, 60, 75	296	289	329	301
	95, 125, 175, 215	273	266	305	278
57.0 / 60.5	15, 20, 25	309	N/A	329	301
	35, 45, 60, 75	282	N/A	302	274
	95, 125, 175, 215	258	N/A	278	250

Unit: mm

*We support even shorter length than those listed above using specially made components. Contact us for more details.

Weight table

Diameter	Speed code	Roller length							
		300	400	500	600	700	800	900	1000
φ48.6	15, 20, 25	2.0	2.1	2.3	2.5	2.6	2.8	2.9	3.1
	35, 45, 60, 75	1.8	2.0	2.1	2.3	2.4	2.6	2.7	2.9
	95, 125, 175, 215	1.7	1.8	2.0	2.1	2.3	2.5	2.6	2.8
φ50	15, 20, 25	2.0	2.2	2.4	2.5	2.7	2.9	3.0	3.2
	35, 45, 60, 75	1.8	2.0	2.2	2.4	2.5	2.7	2.9	3.0
	95, 125, 175, 215	1.7	1.9	2.0	2.2	2.4	2.6	2.7	2.9
φ57	15, 20, 25	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.8
	35, 45, 60, 75	2.2	2.4	2.6	2.8	3.0	3.2	3.4	3.6
	95, 125, 175, 215	2.1	2.3	2.5	2.7	2.8	3.0	3.2	3.4
φ60.5	15, 20, 25	3.1	3.6	4.0	4.5	4.9	5.3	5.8	6.2
	35, 45, 60, 75	2.9	3.4	3.8	4.3	4.7	5.2	5.6	6.1
	95, 125, 175, 215	2.8	3.2	3.7	4.1	4.6	5.0	5.5	5.9

*Weight varies depending on interlocking options. Unit: kg

Wall thickness

Diameter	48.6	50.0	57.0	60.5
Thickness	1.4	1.5	1.5	3.25

Unit: mm

Static load capacity

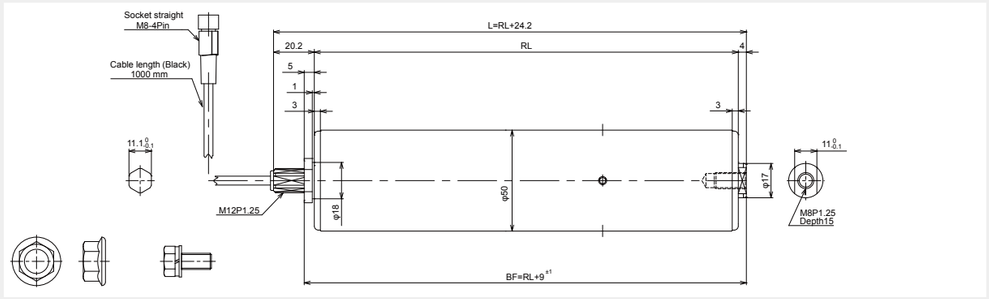
Diameter \ Length	300	400	500	600	700	800	900	1000
48.6	70	60	50	40	35	30	25	20
50.0	80	70	60	55	50	45	40	35
57.0	100	100	80	80	60	60	50	50
60.5	160	160	130	130	100	100	80	80

Unit: kg

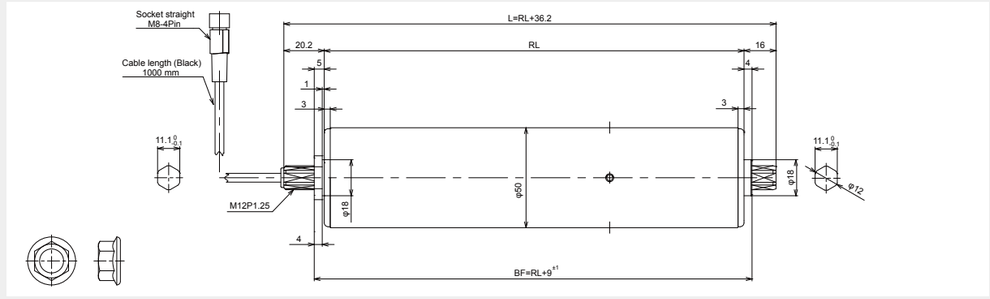
SENERGY-Ai

Dimensions (Reference drawing)

Plain straight



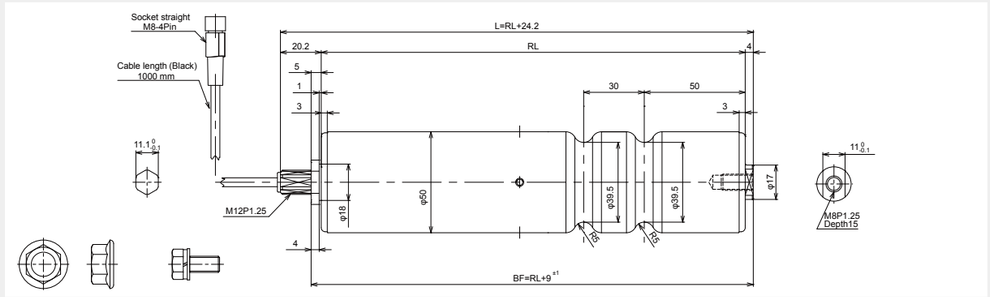
Plain straight



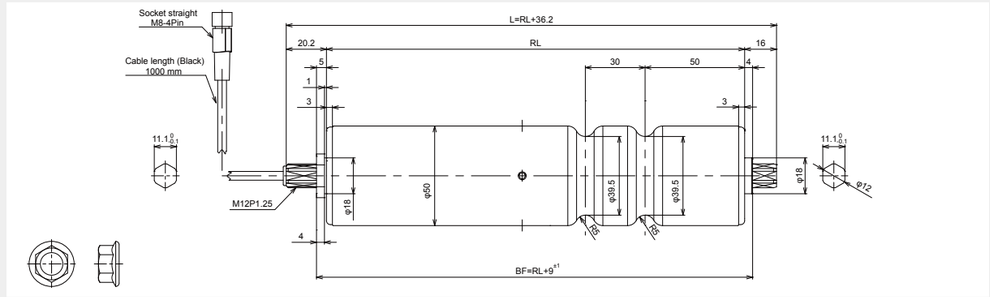
Micro V-Pulley

Micro V-Pulley

Round Grooves



Round Grooves



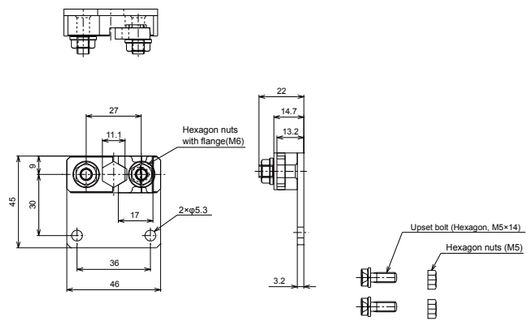
SENERGY-Ai

Bracket (for Non-threaded cable end shaft)

Standard accessory

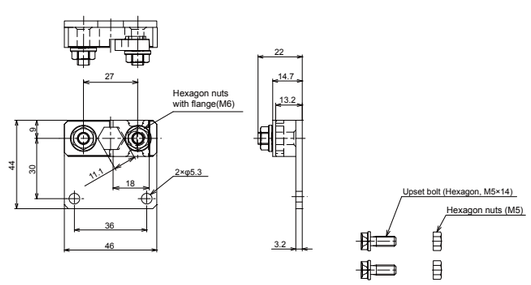
(Cable side)

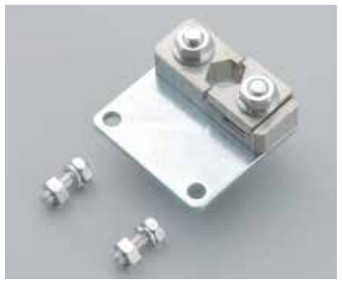
PR-D-30H-PU-N-ST
(Point-up)



* Note
Tightening torque (M6) : 8 ~ 10 N-m
Tightening torque (M5) : 2.3 ~ 3.5 N-m

PR-D-30H-FU-N-ST
(Flat-up)





* Note
Tightening torque (M6) : 8 ~ 10 N-m
Tightening torque (M5) : 2.3 ~ 3.5 N-m

SENERGY-Ai

Part numbers example

①	②	③		④		⑤		⑥	⑦	⑧	⑨	⑩
P R	-	A	D	-	5 0	-	5 0 0	-	4 5	Z	M	A	T

- ① Abbr. of PULSE ROLLER
- ② Spec.
- ③ DC24V
- ④ Roller Diameter
- ⑤ Roller length
- ⑥ Speed code
- ⑦ Tube material & Rubber lagging option
- ⑧ Motor option
- ⑨ Interlocking option
- ⑩ Shaft options

② Spec.

A --- Standard
W --- Wash-down rated (IP-66)
Z --- Freezer rated (-30ºC)

④ Roller Diameter

48 ---φ48.6
50 ---φ50.0
57 ---φ57.0
60 ---φ60.5

⑤ Roller length

Dimension RL（Unit: mm）*Available for every 1 mm unit

⑥ Speed code

Selection of speed range *See Characteristics data table for available speed codes.

⑦ Tube material & Rubber lagging option

Z --- Steel, Zinc plating, No lagging *Z is standard for Dia. 48.6 and 50.
A --- Steel, Unichrome plating, No lagging *A is standard for Wash-down rated and Dia. 57 & 60.5.
J --- Stainless tube
B --- 3 mm Black rubber
W --- 3 mm Urethane
Q --- 2 mm PVC sleeve

⑧ Motor option

M --- SENERGY-Ai (M8 connector)

⑨ Interlocking option

A --- Plain straight, No interlocking
B --- V-Pulley
G --- Round groove
H --- Micro V-pulley (Poly vee)

⑩ Shaft options

T --- M12 threaded hex (Cable end) + M8 female threaded
Y --- Specialty
P --- M12 threaded hex (Cable end) + Spring-loaded hex
F --- Non threaded hex (Cable end) + M8 female threaded
Q --- Non threaded hex (Cable end) + Spring-loaded hex

Characteristics data

Roller Dia: 50.0 mm

Speed Code	Gearbox	ECO-mode								BOOST-mode						
		Speed (m/min)	Torque(N-m)			Tangential force(N)		Current (A)		Speed (m/min)	Torque(N-m)			Tangential force(N)		Current (A)	
			Rated	Starting	Accel	Rated	Starting	Rated (max)	Starting		Rated	Starting	Accel	Rated	Starting	Rated (max)	Starting
15	3 stage	2.0 ~ 20.3	2.97	16.39	4.95	118.8	655.7	2.5	3.0	2.0 ~ 14.7	5.40	21.37	7.94	216.0	855.0	3.5	5.0
20		2.7 ~ 27.7	2.17	12.00	3.62	86.9	480.0			2.7 ~ 20.0	3.95	15.64	5.81	158.1	625.8		
25		3.4 ~ 33.8	1.78	9.83	2.97	71.2	393.4			3.4 ~ 24.4	3.24	12.82	4.76	129.6	513.0		
35	2 stage	4.9 ~ 49.9	1.20	6.66	2.00	48.3	266.6			4.9 ~ 36.1	2.19	8.69	3.59	87.8	347.7		
45		6.0 ~ 60.8	0.99	5.46	1.65	39.6	218.5			6.0 ~ 44.0	1.80	7.12	2.94	72.0	285.0		
60		8.2 ~ 83.1	0.72	4.00	1.20	28.9	160.0			8.2 ~ 60.1	1.31	5.21	2.15	52.7	208.6		
75		10.1 ~ 101.4	0.59	3.27	0.98	23.7	131.1			10.1 ~ 73.3	1.08	4.27	1.76	43.2	171.0		
95	1 stage	13.3 ~ 133.8	0.44	2.48	0.73	17.9	99.3			13.3 ~ 96.8	0.81	3.23	1.49	32.7	129.5		
125		18.1 ~ 182.5	0.33	1.82	0.55	13.2	72.8			18.1 ~ 131.9	0.60	2.37	1.09	24.0	95.0		
175		24.7 ~ 249.3	0.24	1.33	0.40	9.6	53.3			24.7 ~ 180.3	0.43	1.73	0.78	17.5	69.5		
215		30.2 ~ 304.1	0.19	1.09	0.32	7.9	43.7			30.2 ~ 219.9	0.36	1.42	0.65	14.4	57.0		

Senergy Ai torque values are tested data and shall help to apply the product in a right way.

- Rated torque :
  This torque value can be delivered by Senergy Ai for continuous use without overheating in environmental temperature of 25ºC. Average torque of start/stop operation should not exceed this torque value.

- Starting torque :
  This torque is the peak value of motor stall torque.

- Accel torque :
  This torque is the average torque which is present in the phase of acceleration up to set speed. This torque value can be used to calculate real acceleration time of an application. However torque consumption of idler rollers and belts also must be taken into consideration.

NOTE : When the motor is warmed up, torque performance will be less than above values, therefore enough safety factor consideration is necessary to pick the right speed code for each application.

SENERGY-Ai

Optional spec.

Wash-down rated

-IP rating: IP-66
-Material: All stainless made (Pipe: SUS304, Side plate and shaft: SUS303)
-Roller diameter: 48.6, 50.0, 57.0, 60.5 (mm)
-Min. roller length: Refer to the “Available minimum roller length” table below.
-Max. roller length: 1000 mm *Contact us for longer than 1000 mm.
-Cable length: 1000 mm

Compatible Control Technologies

EQUBE CONVEYLINX

* Controls are not Wash-down rated.

Optional spec.

Freezer rated

-Applicable Temp: From 0 down to -30ºC (No condensation)
-Tube material: Mild steel, zinc plating / Stainless steel (SUS304)
-Side plate material: Aluminium
-Roller diameter: 48.6, 50.0, 57.0, 60.5 (mm)
-Min. roller length: Same as standard model
-Max. roller length: 1000 mm *Contact us for longer than 1000 mm.
-Cable length: 1000 mm

Compatible Control Technologies

EQUBE CONVEYLINX

* For freezer application, above controls need to be specially made. Please contact us for more details.

Part numbers example

PR - WD - 50 - 500 - 45AMAT

- W: Spec. — W for Wash-down
- A: Tube material & Rubber lagging option — A is standard for Wash-down rated.

Part numbers example

PR - ZD - 50 - 500 - 45ZMAT

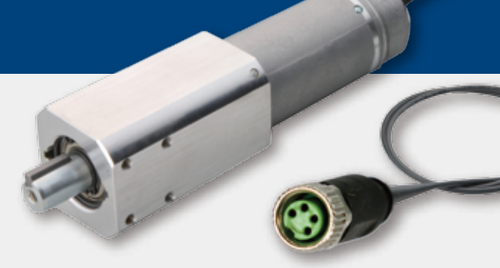
- Z: Spec. — Z for Freezer rated

Available minimum roller length

Roller diameter	Speed Code	Interlocking option			
		Plain straight	Micro V-Pulley	V-Pulley	Round Groove
48.6 / 50.0	15, 20, 25	360	344	351	381
	35, 45, 60, 75	332	317	324	354
	95, 125, 175, 215	309	294	301	330
57.0 / 60.5	15, 20, 25	347	N/A	341	347
	35, 45, 60, 75	320	N/A	314	320
	95, 125, 175, 215	296	N/A	290	296

Unit: mm

*We support even shorter length than those listed above using specially made components. Contact us for more details.



PGD-Ai -Pulse Geared Drive-

Product information

General information

-Mounting: M5 x 7mm
-Shaft diameter: 16 mm
-Key: 5 x 5 x 25 mm
-Cable length: 1000 mm

Compatible Control Technologies

EQUBE CONVEYLINX

Technical data

	Eco-mode	Boost-mode
Voltage	DC24V	
Nominal output	40W	50W
Rated current	2.5A	3.5A
Starting current	3.0A	5.0A
Ambient temperature	-10 ~ 40ºC	
Ambient humidity	10 ~ 90% RH (No condensation)	

Weight table

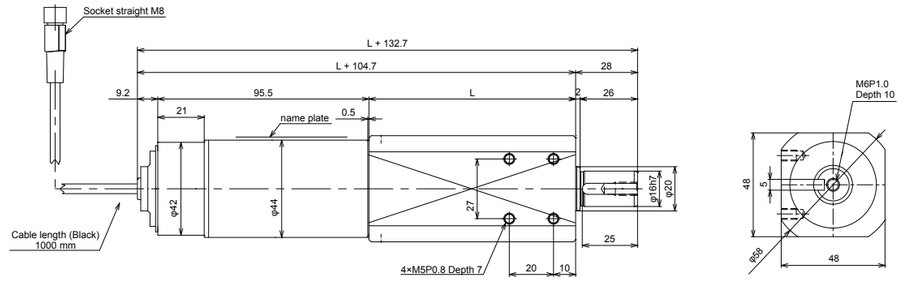
Gear box	Reduction ratio	Weight
3 stage	67, 45, 33, 27	1.5
2 stage	18, 15, 11, 9	1.2

Unit: kg

Characteristics data

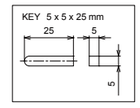
Nominal Gear ratio	Actual Gear ratio	Gear box	ECO-mode Speed (rpm)	ECO-mode Torque(N-m) Rated	ECO-mode Torque(N-m) Starting	ECO-mode Torque(N-m) Accel	ECO-mode Current(A) Rated (max)	ECO-mode Current(A) Starting	BOOST-mode Speed (rpm)	BOOST-mode Torque(N-m) Rated	BOOST-mode Torque(N-m) Starting	BOOST-mode Torque(N-m) Accel	BOOST-mode Current(A) Rated (max)	BOOST-mode Current(A) Starting
67	67.222•••	3 stage	8.5 ~ 86.7	4.40	24.4	7.33	2.5	3.0	8.5 ~ 62.7	8.03	31.81	11.82	3.5	5.0
45	45.00		12.8 ~ 129.0	2.97	16.39	4.95			12.8 ~ 93.3	5.40	21.37	7.94		
33	32.999•••		17.4 ~ 176.3	2.17	12.00	3.62			17.4 ~ 127.5	3.95	15.64	5.81		
27	27.00		21.3 ~ 215.1	1.78	9.83	2.97			21.3 ~ 155.5	3.24	12.82	4.76		
18	18.333•••	2 stage	31.4 ~ 317.3	1.20	6.66	2.00			31.4 ~ 229.5	2.19	8.69	3.59		
15	15.00		38.4 ~ 387.2	0.99	5.46	1.65			38.4 ~ 280.0	1.80	7.12	2.94		
11	10.999•••		52.4 ~ 528.9	0.72	4.00	1.20			52.4 ~ 382.5	1.31	5.21	2.15		
9	9.00		64.0 ~ 645.3	0.59	3.27	0.98			64.0 ~ 466.6	1.08	4.27	1.76		

Dimensions (Metric)



"L" dimension

2-stage	93.5 mm
3-stage	116.9 mm



PGD-Ai -Pulse Geared Drive-

Part numbers example

①			②	③	④	⑤
PGD024-SE2	-		18	A	A	A
Identification of Pulse Geared Drive-Ai			Nominal gear ratio	Spec.	Output shaft finish	Custom spec.

② Nominal gear ratio

Selection of gear ratio *See Characteristics data table for available gear ratios.

③ Spec.

A --- Standard

④ Output shaft finish

A --- Standard key-way shaft (No attachment)

⑤ Custom spec.

A --- Standard Y --- Others

Control

EQUBE

Small & Simple Control Card

Features

- Part number : EQube-Ai-P
- M8 - 4 pin connector for Motor
- ECO mode performance only
- LED Indicator for Power, Run, Reverse and Error
- 32 fixed speed setting by DIP Switch setting
- 3 stage speed selection via signal input
- Bi-directional operation
- Dynamic brake
- PI regulator (stable speed control)
- 16 stage Accel / Decel timer for 0 - 2.5 sec by DIP Switch setting
- Only PNP input applicable

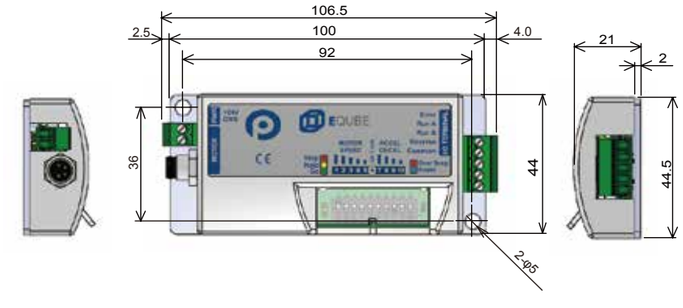
Technical data

Voltage	DC24V
Voltage range	18 ~ 28V
Rated current	2.5A
Starting current	3.0A
Fuse	Present

Applicable environment

Operating ambient temp	-10 ~ 80ºC
Operating ambient humidity	10 ~ 90% RH (Non condensation)
Storage ambient temp	-10 ~ 75ºC
Storage ambient humidity	10 ~ 90% RH (Non condensation)
Vibration	2G or less

Dimensions and parts



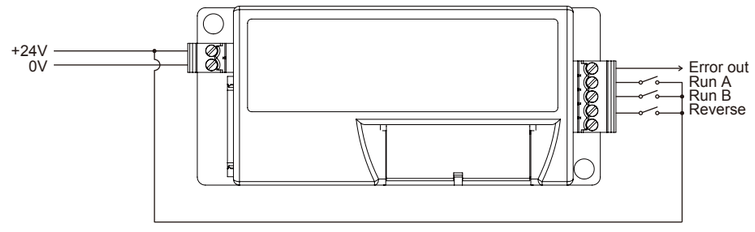
DIP Switch Speed and Acceleration / Deceleration Setting

DIPSW

*Above setting is for illustrative only

No.	Function	Description
1	Speed setting	32 fixed stages available by DIP switch combinations
2		
3		
4		
5		
6	Direction of rotation	ON = CCW, OFF = CW
7	Acceleration / Deceleration timer setting	16 fixed timer (0 ~ 2.5 sec) available by DIP switch combinations
8		
9		
10		

Wiring



Speed setting via signal input

Run A	100% of set speed by DIP switch
Run A + B	75% of set speed by DIP switch
Run B	50% of set speed by DIP switch

NOTE : For more details, please refer to User's Manual available on pulseroller.com

Control

CONVEYLINX

Networked, Built-in ZPA (Zero Pressure Accumulation) Controller

Features

- Part number : ConveyLinx-Ai2 (for Senergy-Ai roller and PGD-Ai)
- M8 - 4 pin connector for Motors and Sensors
- PROFINET Ethernet I/P, Modbus/TCP, Connectivity
- 2 Zones control (Up to 4 sensors and 2 motors connections)
- Baud rate: 10Mbps / 100Mbps
- Both NPN/PNP photo-eye sensor applicable
- ZPA (Zero Pressure Accumulation) logic; Singulation, Train and Gap Train
- EasyRoll Software for changing default configuration and customizing functionality of each module
- Auto configuration for quick set-up (from EasyRoll software)
- Motor error detection (Overload, Over-current, motor not connected)
- Jam error detection (Sensor Jam, Arrival Jam)
-Separate power for Motor and Logic

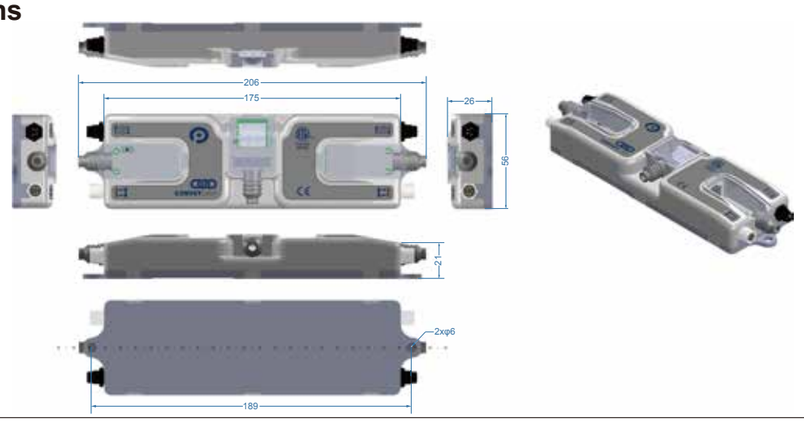
Technical data

Voltage	DC24V
Voltage range	18 ~ 28V
Rated current	5.0A (Eco), 7.0A (Boost) *Two Motors
Starting current	6.0A (Eco), 10.0A (Boost) *Two Motors
Fuse	Present

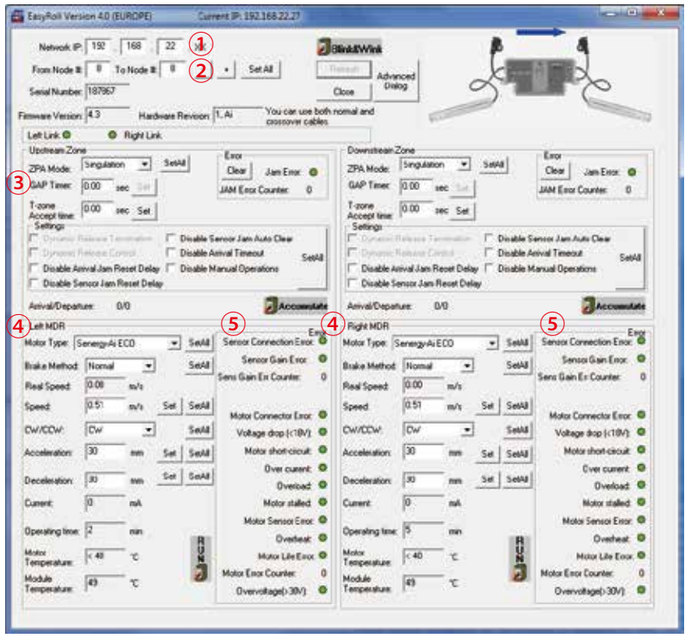
Applicable environment

Operating ambient temp	0 ~ 40ºC
Operating ambient humidity	10 ~ 90% RH (Non condensation)
Storage ambient temp	-10 ~ 75ºC
Storage ambient humidity	10 ~ 90% RH (Non condensation)
Vibration	2G or less

Dimensions



EasyRoll Configuration Software



Main screen

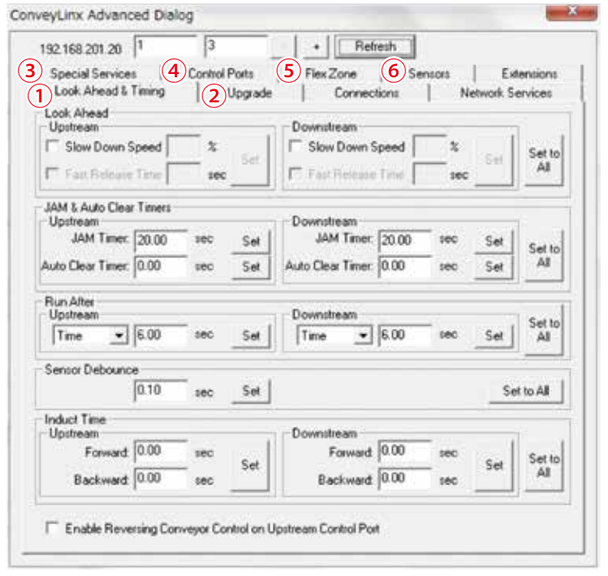
1. Network IP – The Subnet of the particular ConveyLinx network to be connected.

2. Node No. – A range of Nodes in which to be connected.

3. Upstream Zone / Downstream Zone – Selection of ZPA mode, GAP timer and T-bone accept timer settings, etc.

4. Left / Right MDR (Motor Roller) -Selections for changing performance mode, speed, braking method, Accel/Decel distance setting, etc as well as showing values of operation status.

5. Error – Error indicators of Sensor connection, Motor connection, Over current, Overload, etc.



Advanced dialog screen

* Press F2 key to invoke the Advanced Dialog.

1. Setting of Look Ahead feature, JAM timer, Run After timer, etc.

2. Upgrade - Upgrade of firmware version

3. Special Service - Reset operating time, Clear Motor-short circuit error

4. Control Ports - Control ports' configuration

5. Flex Zone - Flex Zone feature setting

6. Sensors - Sensor ports' configuration

NOTE : For more details, please refer to User's Manual available on pulseroller.com

Calculation of Motor Roller capability

Required tangential force

$F(N) = m \cdot g \cdot \mu$

F = Required tangential force
m = Mass (kg)
g = Gravitational acceleration 9.8 m/s^2
μ = Coefficient of friction

Coefficient of friction

Material	Wood	Steel	Cardboard	Plastic	Rubber
μ	0.02 ~ 0.05	0.01 ~ 0.02	0.05 ~ 0.1	0.02 ~ 0.04	0.1

---Example---
Weight of the product --- 50 kg
Material of the product --- Cardboard (μ=0.1, maximum)
Conveyor speed --- 40m/min

F = 50 x 9.8 x 0.1 = 49N

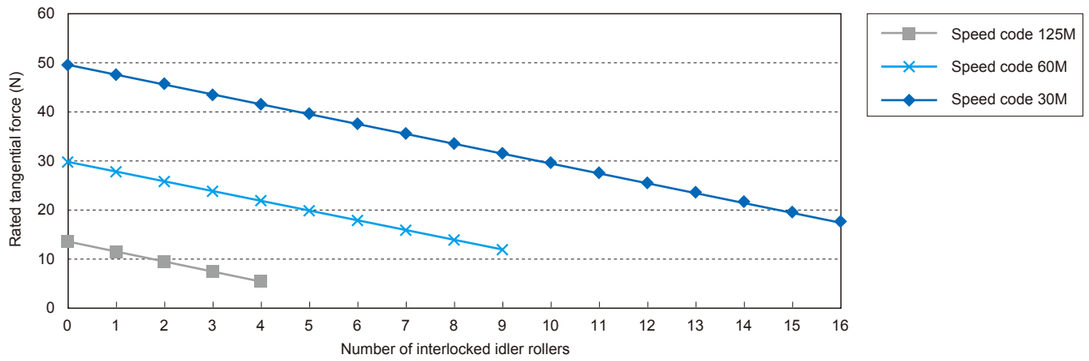
The model which can operate at 40m/min is;
PR-AD-50-500-35ZSAA (SENERGY, Diameter: 50mm, Speed code35 - Eco mode)
Starting tangential force: 274.3N

Since its tangential force exceeds the required tangential force (274.3 > 49), the selected model is considered to be capable to handle 50 kg cardboard.
*Note: please include adequate value of safety factor for the actual calculation of required tangential force. The required tangential force varies depending on various conditions.

Power loss when interlocking with idler rollers

This is very important factor when selecting a model for applications.
As the table below shows that the capability (Tangential force) of PULSE ROLLER is lost when interlocking with idler rollers.

SENERGY – Eco mode, Micro-V pulley type



SENERGY – Boost mode, Micro-V pulley type