

Sumitomo Drive Technologies



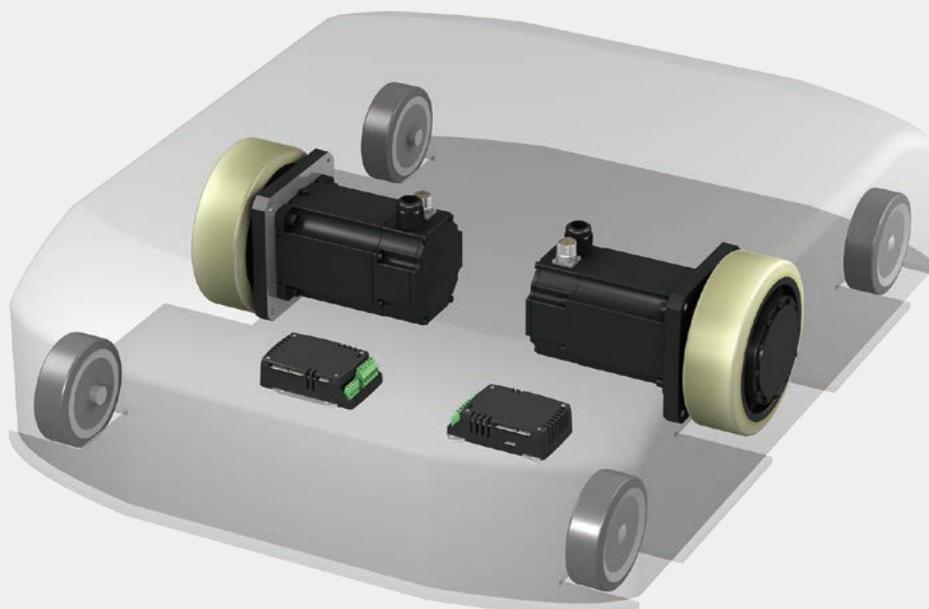
# Drive Solutions for AGV/AMR



**Combination of three smart components.**

**Creating a compact, integrated and intelligent solution of:  
Gear + Servo Motor + Drive for AGV/AMRs in one package!**

The necessary components are packaged together, making it easy to design and manufacture AGV/AMRs.



# Features

## Compact

The in-wheel structure realizes space-saving in AGV/AMRs. It contributes to lower the height of AGV/AMRs and more effective use of internal space.

Compact Drive with small installation area are available for ECO-S, ECO-M, and PRO-M.

## Capable of supporting a wide range of payloads

Multiple sizes and reduction ratios are available, allowing you to design AGVs and AMRs that support a wide range of payloads.

## High performance servo control

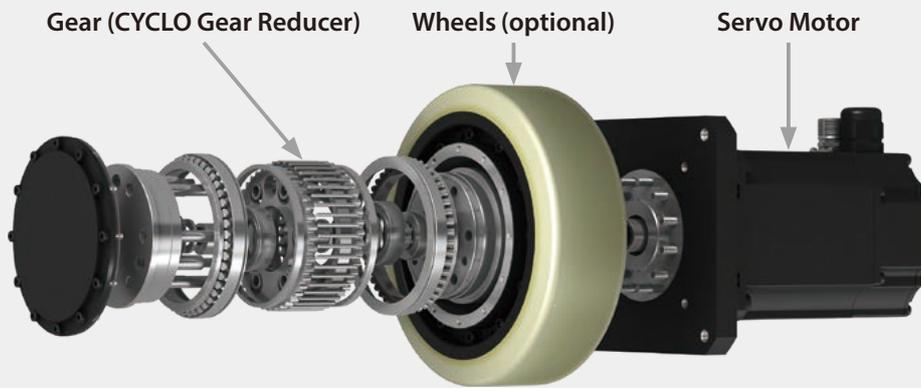
High speed, high precision, and high responsiveness are achieved by high-resolution servo control (the drive's internal control resolution is 16384 inc/rev).

The system can operate at an industry-leading max speed of 2.0m/s and max acceleration of 1.0m/s<sup>2</sup>.

## Superior safety

The CYCLO Gear Reducer principle with excellent impact resistance is used for the gear part.

With a focus on compliance with "ISO 3691-4: 2020 Industrial Trucks - Safety Requirements and Verification" and "JIS D 6802: 2022 Automated Guided Vehicles and Automated Guided Vehicle Systems - Safety Requirements and Verification", an optional version with STO (Safe Torque Off) capabilities is also available.



## Example of AGV/AMR Configuration

This is an example configuration of an AGV/AMR drive system. Depending on configuration conditions, it is possible to support a payload of over 3,000 kg.

We will propose the optimal smartris to maximize AGV/AMR performance.

### AGV/AMR

Payload (AGV/AMR body + cargo)	kg	800	1100	1800	3000
Number of Driving Wheels		2	2	2	2
Number of Supporting Wheels		4	4	4	4
Load per Supporting Wheel	kg	125	125	125	250
Max AGV/AMRs Speed <sup>Note</sup>	m/s	2.00	2.00	2.00	1.78
Max AGV/AMRs Acceleration	m/s <sup>2</sup>	1.0	1.0	1.0	1.0
Wheel Diameter	mm	180	200	200	250
Rated Wheel Torque	N-m	15.8	24.0	39.3	80.9
Rated Wheel Output	W	392	537	878	1320



### smartris

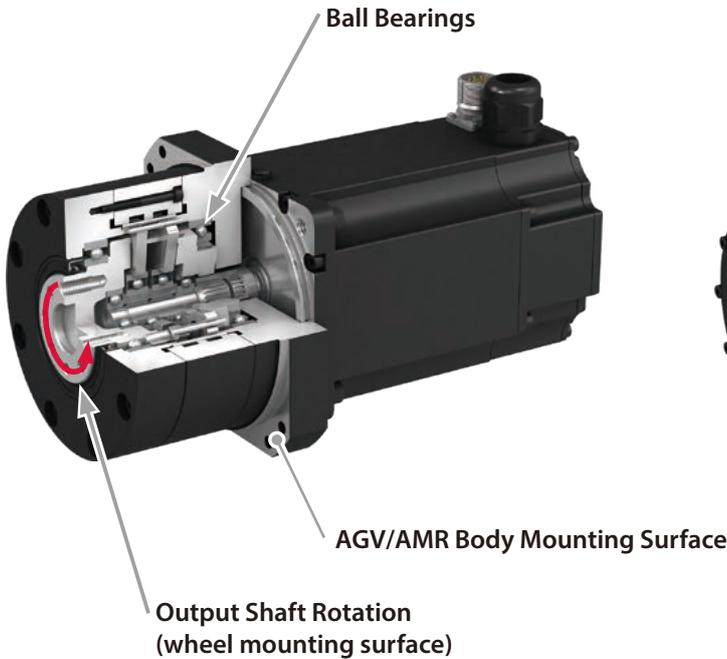
Type	ECO		PRO	
Size	S	M	M	L
Gearmotor Frame Size	5087E	5097E	5097P	5107P
Reduction Ratio	21	21	22	22

Note: This is the case for the drive with the input voltage specification of 48 VDC. With the Compact Drive with the input voltage specification of 24 VDC, the maximum running speed is 1/2.

# Gearmotor (Gear, Servo Motor) Specifications

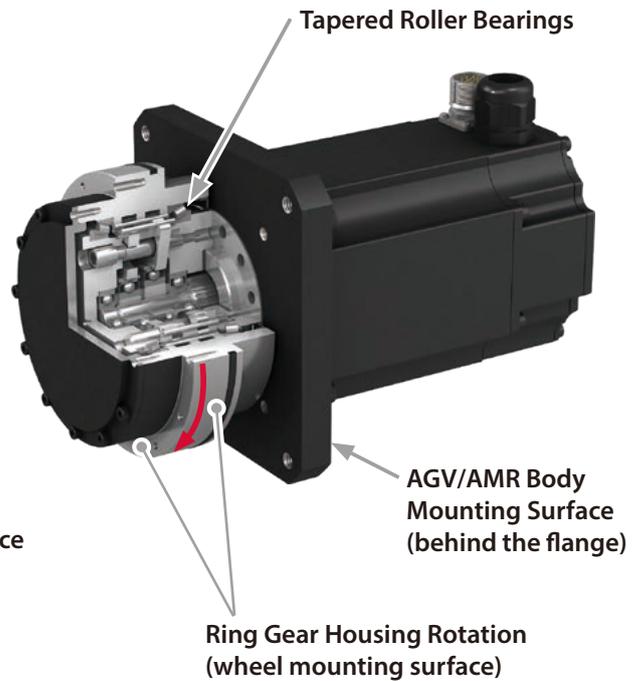
## ECO Type

- Output Shaft Rotation
- For Light Payload Machines



## PRO Type

- Ring Gear Housing Rotation
- High Radial Payload



Type		ECO						PRO				
Size		S		M		M		L				
Gearmotor Frame Size		5087E		5097E		5097P		5107P				
Input Voltage of the Drive	VDC	24 or 48						24 or 48		48		
Allowable Radial Load per Driving Wheel <sup>Note:1</sup>	N	1500		3000		6500		10000				
Reduction Ratio		21	25	29	21	25	29	22	26	22	26	30
Max Motor Speed <sup>Note:2</sup>	r/min	4500		4500		4500		3000				
Max Wheel Speed <sup>Note:2</sup>	r/min	214	180	155	214	180	155	205	173	136	115	100
Rated Wheel Torque	N·m	16.0	18.9	18.9	39.3	40.4	40.5	39.3	40.4	84.7	87.5	80.3
Peak Wheel Torque (2s)	N·m	61.9	73.7	84.8	145	179	207	145	179	294	360	246
Ambient Temperature	°C	-10 to +40 (0 to +40 if fitted with optional wheels)						-10 to +40 (0 to +40 if fitted with optional wheels)				
Ambient Humidity	%RH	85 or less (20 to 80 if fitted with optional wheels) with no condensation						85 or less (20 to 80 if fitted with optional wheels) with no condensation				
Protection Class		IP54						IP54				
Thermal Class		Motor: 155 (F), Brake: F						Motor: 155 (F), Brake: F				
Output Type		Output Shaft Rotation						Ring Gear Housing Rotation				

Note: 1. Allowable radial load of ECO Type is a value at the position inside the output shaft end face.

Allowable radial load of PRO Type is a value at the center of the gear part.

2. With the Compact Drive with the input voltage specification of 24 VDC, the maximum rotation speed of the motor and the wheel is 1/2.

3. The motor/brake power cable brakes will be shipped attached to the motor via a cable gland. (with cable length: 1 m)

## Standard Specifications

<b>Rotation Feedback</b>	Resolver with a resolution of 4096 <sup>Note:1</sup> (provided with a 1 m cable)	
<b>Brake</b> <sup>Note:2</sup>	PM brake (for holding)	
<b>Specification</b>	PM brake (for holding)	
<b>Release Voltage</b>	<b>VDC</b>	24±10%
<b>Current</b>	<b>ADC</b>	ECO-S 0.45, ECO-M/PRO-M/PRO-L 0.83
<b>Wheel</b>	The wheels are to be prepared by the customer, but they can also be provided by the manufacturer as an option.	

## Options

<b>Rotation Feedback</b> <sup>Note:3</sup>	Absolute encoder with a resolution 4096 <sup>Note:1</sup> (provided with a 1 m cable)			
	Absolute encoder with optional safety features with a resolution of 4096 <sup>Note:1</sup> (provided with a 1 m cable)			
<b>Wheels</b> <sup>Note:4</sup>	Wheels with urethane tires			
<b>Type</b>	<b>ECO</b>		<b>PRO</b>	
<b>Size</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>L</b>
<b>Gearmotor Frame Size</b>	<b>5087E</b>	<b>5097E</b>	<b>5097P</b>	<b>5107P</b>
<b>Wheel Size</b>	Ø180×65	Ø200×65	Ø200×66	Ø250×75
<b>Allowable Radial Load per Driving Wheel</b> <sup>Note:5</sup>	<b>N</b>	1500	3000	6500
<b>Allowable Speed</b>	<b>m/s</b>	2.00	2.00	1.78
<b>Tire Material</b>	Urethane hardness 90 (JIS A)		Urethane hardness 90 (JIS A)	
<b>Accessories</b> <sup>Note:6</sup>	M6 bolts 10pcs M6 washers 10pcs	M8 bolts 8pcs M8 washers 8pcs	M5 bolts 12pcs M5 washers 12pcs O-ring G-140 1pcs	M6 bolts 12pcs M6 washers 12pcs O-ring AS568-261 1pcs

Note: 1. The control resolution inside the drive is 16384 inc/rev.

2. The brake is for holding when parked and cannot be used for braking. Contact us if you wish to use the product for braking, such as an emergency stop.

3. Select an absolute encoder-compatible drive.

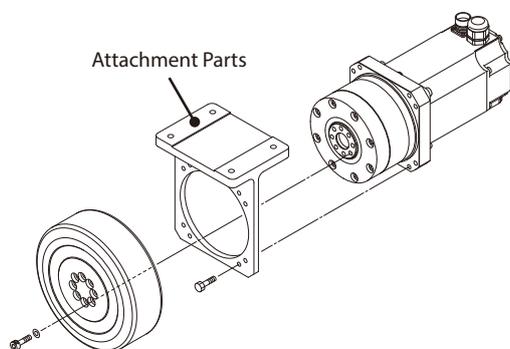
4. Intended for use in indoor area with smooth concrete surface and good electrical discharge properties. Cannot be used on wet, oily or dirty surfaces.

5. The allowable radial load is the same as for the standard specification (without wheels).

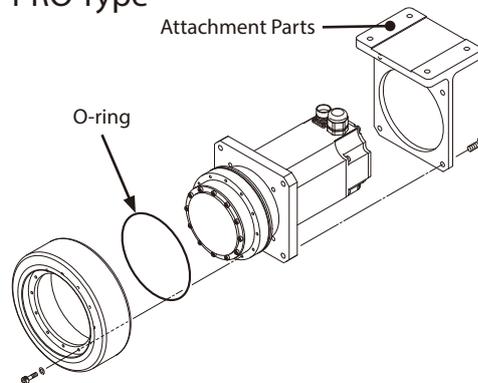
6. Wheels and accessories are shipped together with but not assembled to the gearmotor.

## How to Install the Product on an AGV/AMR

### ECO Type



### PRO Type

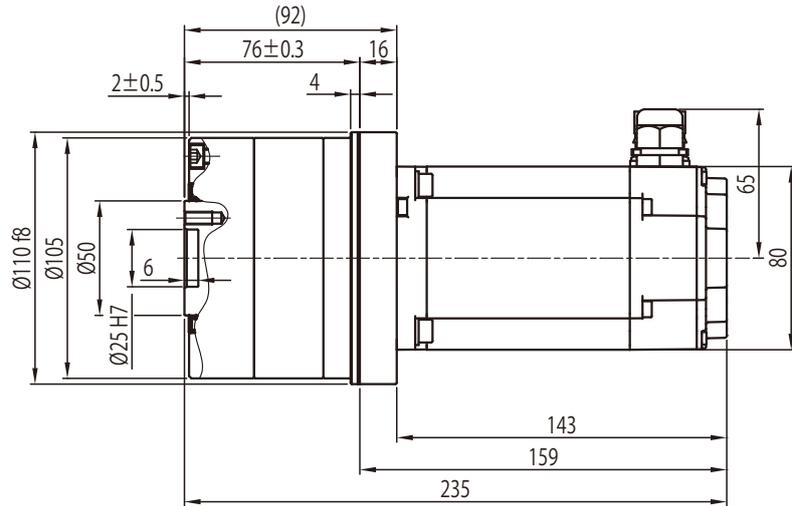
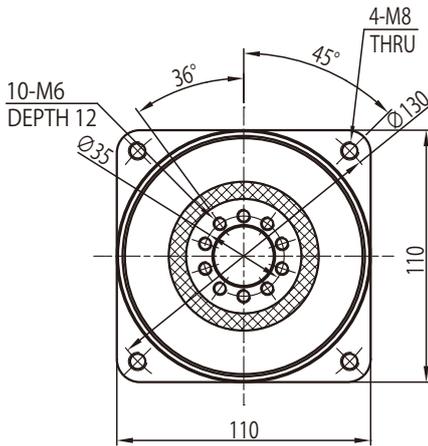


- For the ECO Type, the gearmotor must be installed on the AGV/AMR body before the wheels are installed.
- Attachment parts are not included.
- If the wheels are prepared by the customer, please prepare the bolts, washers, and O-rings by yourself. Optional wheels will be provided with all the wheel accessories listed in the option column.
- For details such as the tightening torque, refer to the instruction manual.

## Dimensional Drawing of ECO Type

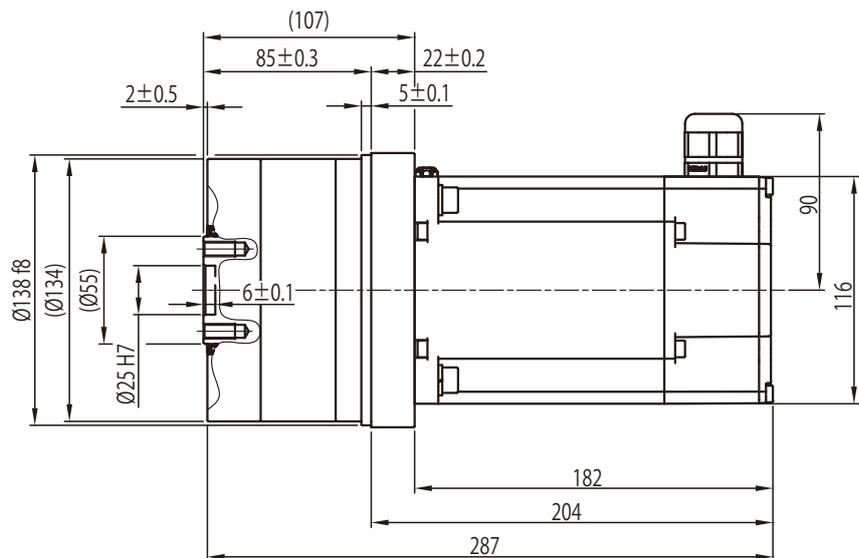
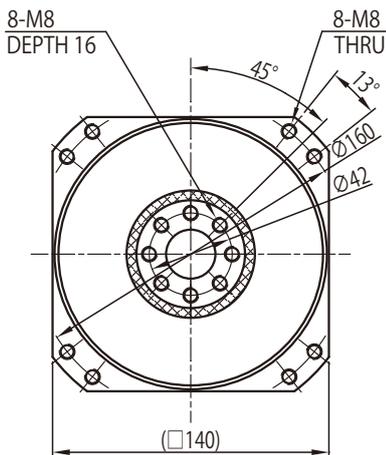


### ECO-S/5087E



Mass: 5.6kg

### ECO-M/5097E



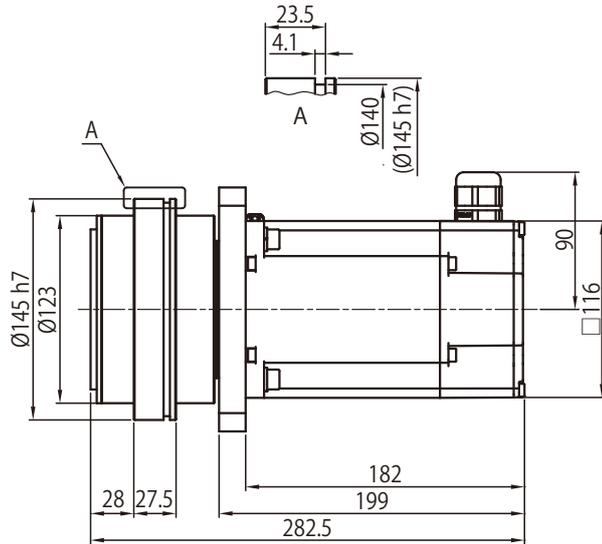
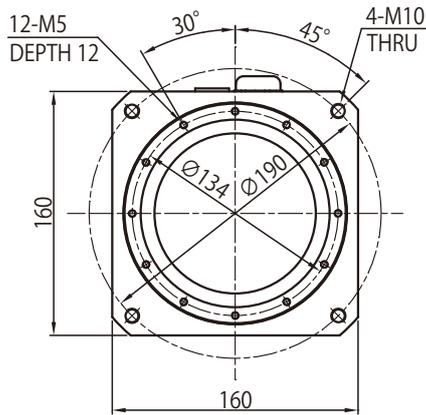
Mass: 11.3kg

Note) 1. The wheels need to be prepared by the customer, but they can also be provided by the manufacturer as an option.  
2. Shown are the dimensions where a resolver is used for rotation feedback. Inquire for dimensions with an absolute encoder.

# Dimensional Drawing of PRO Type

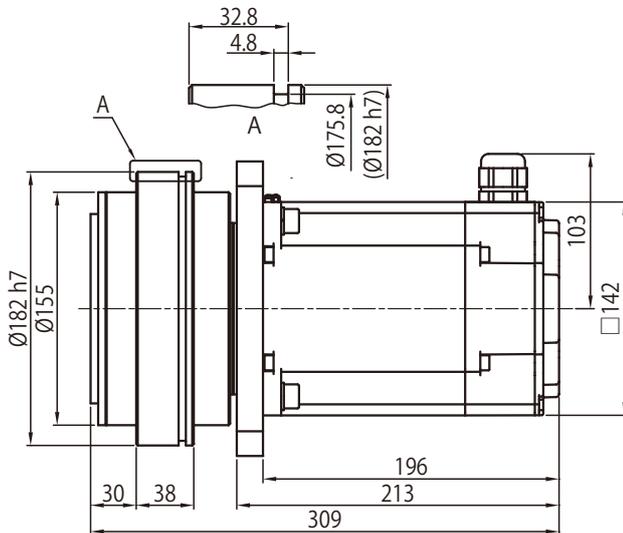
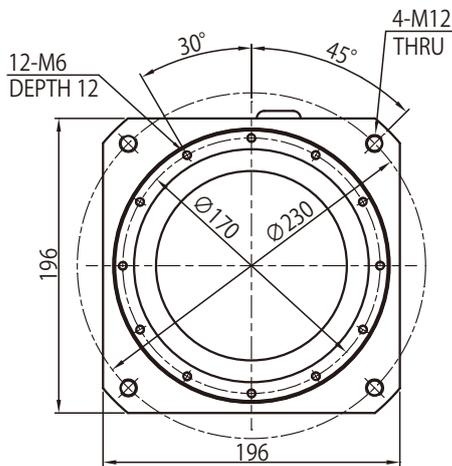


## PRO-M/5097P



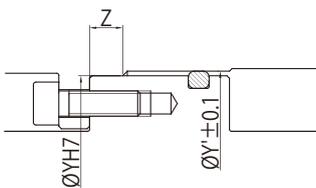
Mass: 14.5kg

## PRO-L/5107P



Mass: 24.5kg

### Recommended Inner Dimensions of Processed Wheel for Mounting



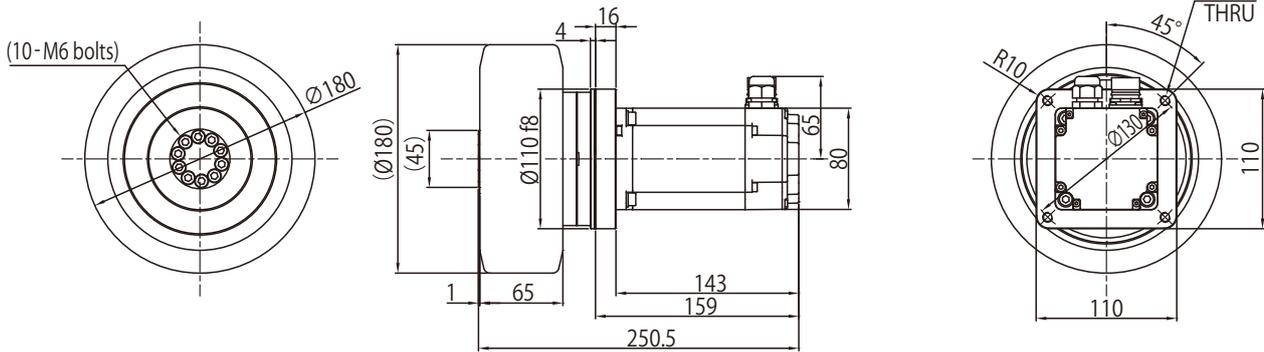
Size	Frame Size	Spigot Width	Spigot Inner Diameter Y	O-ring Inner Diameter Y'	O-ring (Nitrile Rubber)	
					Part Number	Wire Diameter × Inner Diameter
M	5097P	6	145	145.5	G-140	3.1×139.4
L	5107P	8	182	182.5	A5568-261	3.53×171.04

- Note) 1. The wheels need to be prepared by the customer, but they can also be provided by the manufacturer as an option.  
 2. Shown are the dimensions where a resolver is used for rotation feedback. Inquire for dimensions with an absolute encoder.  
 3. Mount O-ring (to be prepared by the customer) to prevent molybdenum disulfide grease (an anti-fretting agent) applied to the spigot part from leaking outside through any gaps.

## Dimensional Drawing of ECO Type (with optional wheels)

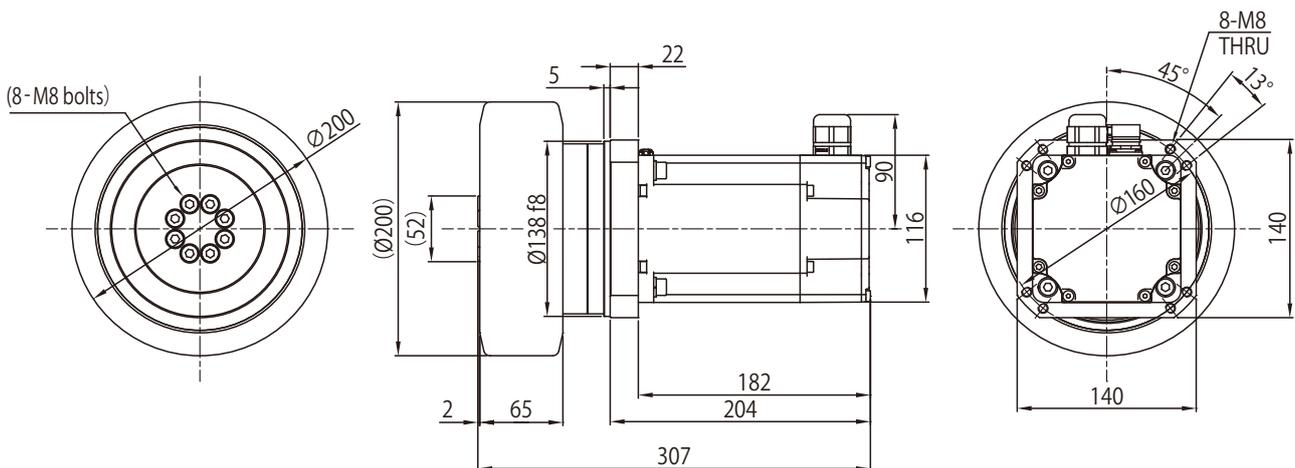


### ECO-S/5087E



Mass: 9.3kg

### ECO-M/5097E



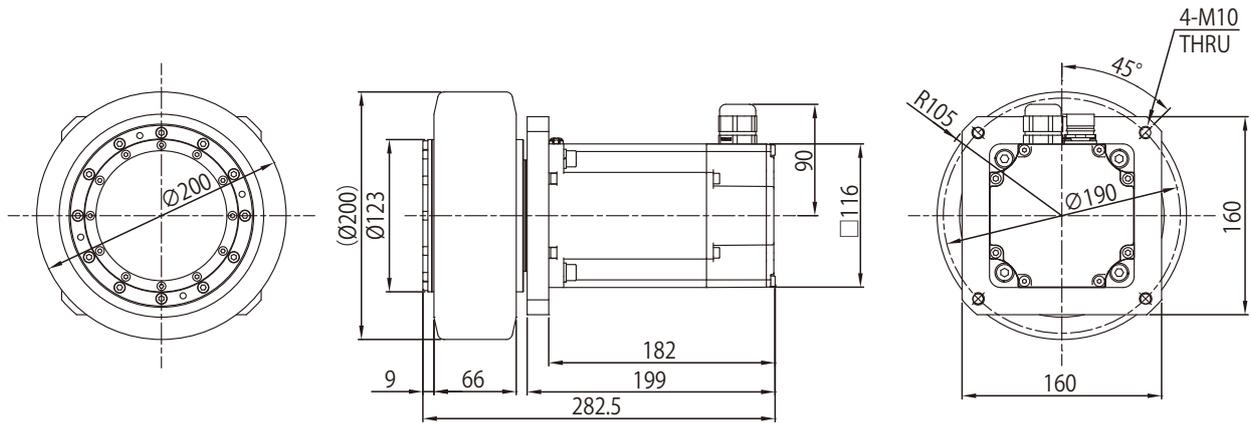
Mass: 15.6kg

Note) 1. The wheels are shipped together with the tightening bolts and washers without being assembled to the gearmotor.  
2. Shown are the dimensions where a resolver is used for rotation feedback. Inquire for dimensions with an absolute encoder.

## Dimensional Drawing of PRO Type (with optional wheels)

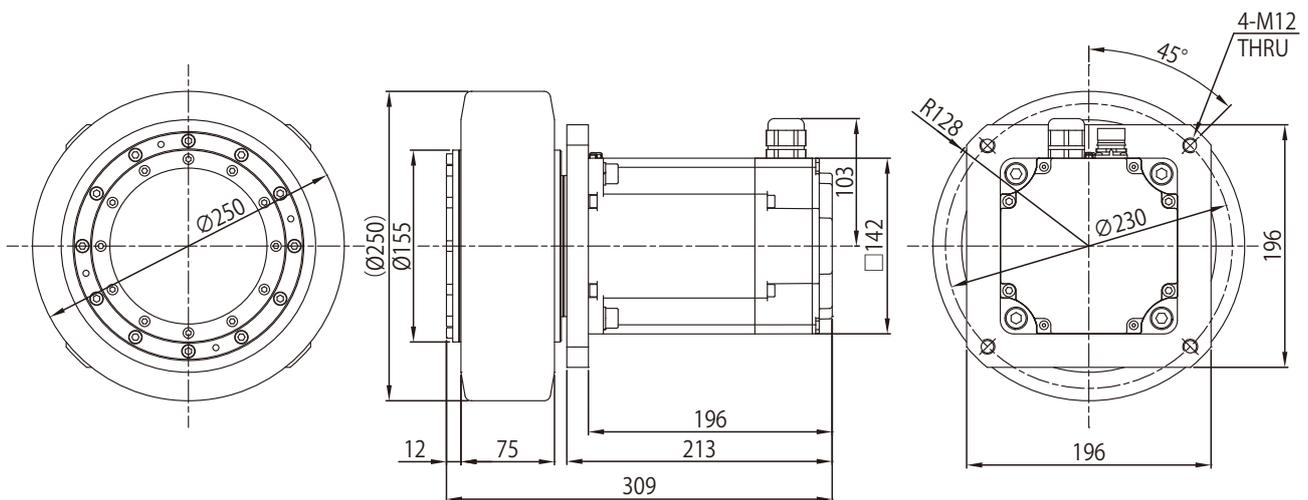


### PRO-M/5097P



Mass: 17.5kg

### PRO-L/5107P



Mass: 29.7kg

Note) 1. The wheels are shipped together with the tightening bolts, O-ring and washers without being assembled to the gearmotor.  
2. Shown are the dimensions where a resolver is used for rotation feedback. Inquire for dimensions with an absolute encoder.

# Drive Dimensions and Specifications

Optical drives for AGV/AMR are prepared.

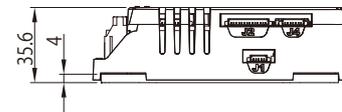
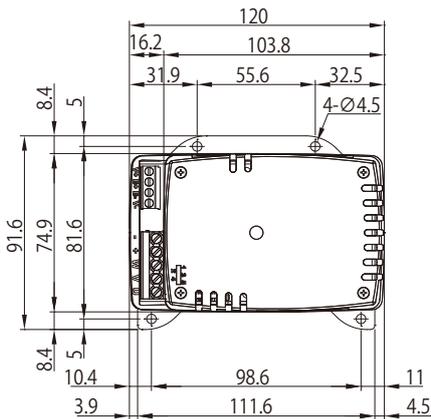
- Gain control adjusted for common AGV/AMR applications
- Implements CANopen (DS402) or RS-485 Modbus RTU
- Equipped with emergency stop input function

Type	ECO		PRO	
Size	S	M	M	L
Gearmotor Frame Size	5087E	5097E	5097P	5107P
Drive Nomenclature	Compact Drive AG210		Compact Drive AG210	Normal Drive AG110 <sup>Note: 1</sup>
	Normal Drive AG110		Normal Drive AG110	
Rated Current	Arms	12.5	25.8	25.8
Peak Current (2sec)	Arms	41.0	96.3	96.3
Peak Current (10sec)	Arms	24.9	57.5	57.5
Input Voltage of the Drive	VDC	Select Compact Drive 24 (20-60) or 48 (30-60), Normal Drive 48 (30-60)		
Rotation Feedback		Resolver (absolute encoder is available as an option)		
Communication Method		Select CANopen (DS402) or RS-485 Modbus RTU <sup>Note: 2</sup>		
Control Mode		Speed control, torque control		
Digital Input		Two inputs <sup>Note: 3</sup> Photocoupler insulation (24V±20%, 7mA, with an input impedance of 3kΩ) can be used with either sink logic or source logic		
Digital Output		Two outputs <sup>Note: 3</sup> Photocoupler insulation (24V±20%, 100mA) can be used with sink logic or source logic		
Safety Function		Select with STO or without STO (Safe Torque Off) capabilities		
Protection Class		Compact Drive IP20, Normal Drive IP54		
Certification		CE, UL, KC (UL and KC certification for Compact Drive are in-process of acquisition) <sup>Note: 5</sup>		

Note: 1. For PRO-L/5107P, only Normal Drive can be connected.  
 2. Contact us about analog mode applications.  
 3. Four points can be used in analog mode.

4. Power cable is not supplied with the product. Control cable (0.4m long) is supplied with the Compact Drive. Control cable is not supplied with the Normal Drive.
5. If UL or KC compliance is required, be sure to specify when ordering.

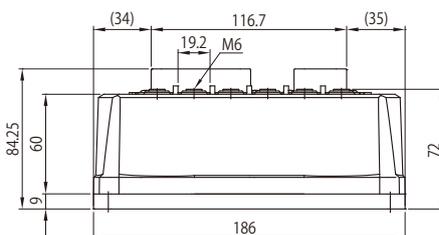
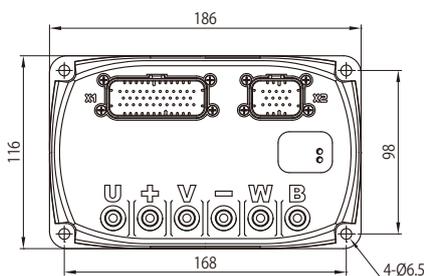
## Compact Drive (AG210)



Mass: 0.3kg



## Normal Drive (AG110/AG120)



Mass: 1.6kg



# Controller

The controller is not included in the smartris package.

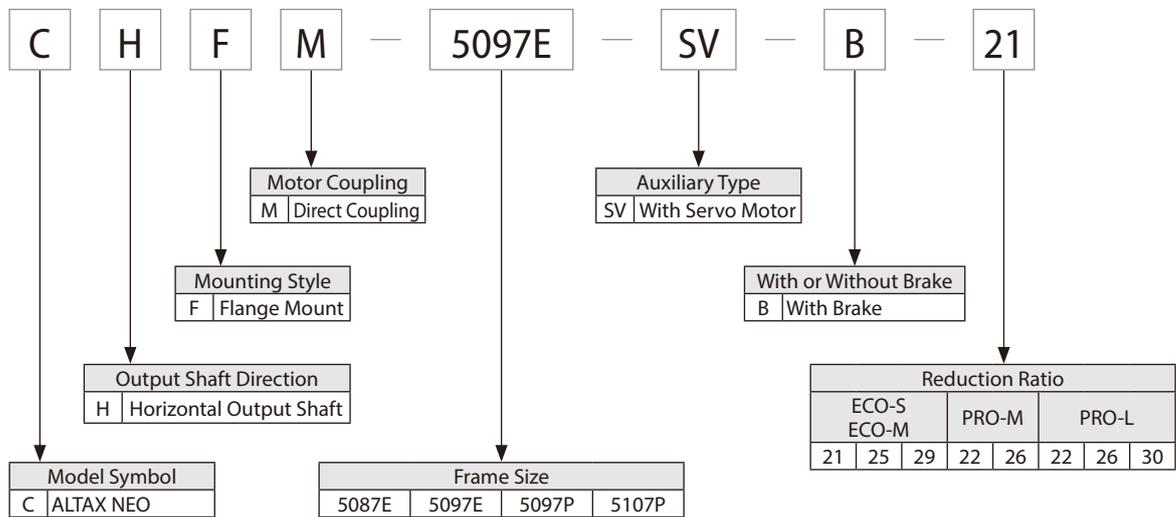
The product has been tested and verified to work with the following controllers in communication mode.

- BlueBotics/Autonomous navigation system ANT lite+ (CANopen)
- Hitachi Industrial Equipment Systems Co., Ltd./Laser positioning system ICHIDAS, industrial controller HX series (RS-485 Modbus RTU)

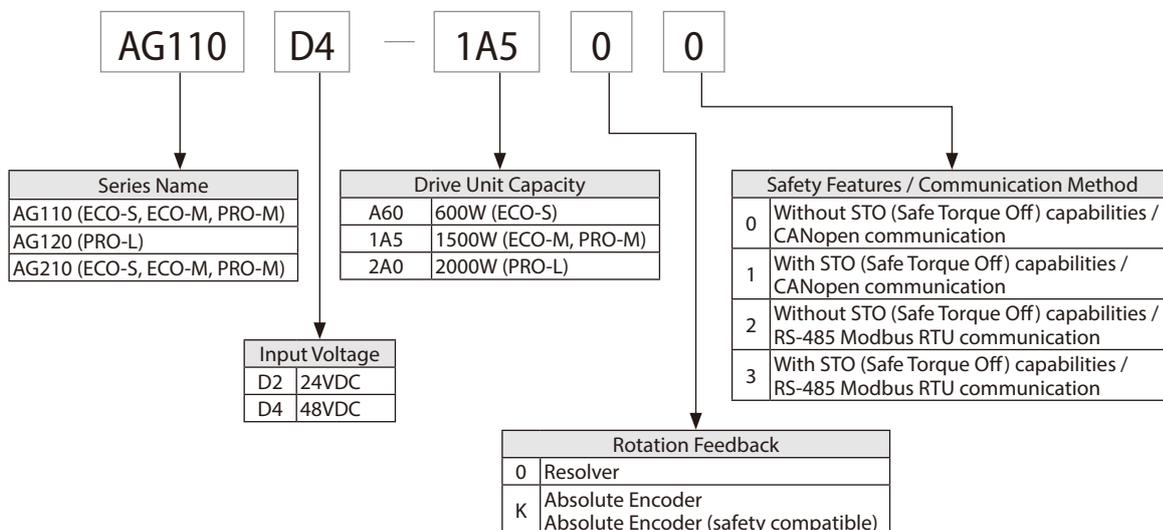
Contact us for further details.

# Nomenclature

## Gearmotor (Gear + Servo Motor)



## Drive



Shaping the future  
together



Sumitomo Drive Technologies  
LAFERT GROUP



Smartris products use servo motors provided by Lafert S.p.A., an Italian industrial motor manufacturer that became part of the Sumitomo Heavy Industries Group in 2018. Lafert S.p.A. offers a wide range of electronic and control products, including high-efficiency magnet motors, induction motors, and servo motor drives, to meet customer needs in the fields of automation and energy.

Sumitomo Heavy Industries Group will continue to provide drive solutions that meet the sophisticated needs of society by mutually utilizing and integrating the technologies and knowledge of gearmotors, electronics, and control.



Specifications, dimensions, and other items are subject to change without prior notice.

 Sumitomo Heavy Industries, Ltd.

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