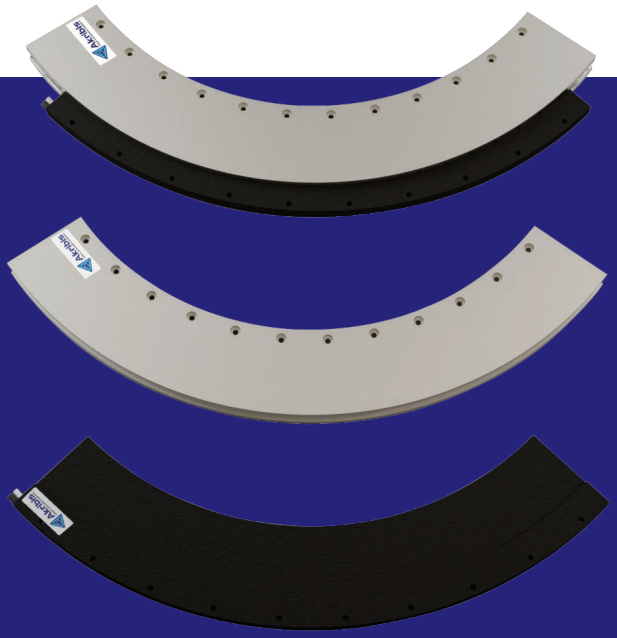


ACR SERIES

- Small thickness and light weight
- Large center hole
- Integrated hall sensor and temperature sensor
- Direct drive with high torque without cogging effect
- Limit-angle or 360-degree operation
- Multi-coil and multi-track configurations

EN-26.3.1

Introduction

Ironless ACR series arc motors are specifically desinged for angular motion with constrained rotation angles less than 360 degrees. Compared with DDR motors, Akribis's ACR series arc motors feature larger center holes, lower profile form factors, and higher stiffness. When coupled with larger radius circular encoder sacles and arc bearings, ACR motors can achieve better postioning, repeatability, and accuracy.

Continuous Torque T_{cn} = 19.8Nm ~ 460.7Nm

Peak Torque T_{pk} = 72.8Nm ~ 1382.2Nm

Features

- Ironless technology and no cogging force
- Thin coil design with low mass
- High motor constant
- Big center hole
- Integrated hall sensors
- Flexible configuration with multiple coils or tracks
- Multiple coils connected in series or parallel to increase torque output
- Multiple tracks attaching together to extend angle of rotation

Applications

In applications with limited angle of rotation where direct drive rotary motors are not necessary, ACR series arc motors can effectively lower cost and save space, particularly in systems with large radius of motion. Compared with conventional direct drive rotary motors, ACR arc motors can provide larger center hole, lower profile, and great torque output with optimized electromagnetic and mechanical design. ACR arc motors enable customers to develop more compact systems and to increase competitivity in the market.

Akribis ACR series arc motors are applicable to G2.5, G4.5, G6, G8.5, G10.5 and G11 LCD, 8-inch or 12-inch wafer processing and inspection equipment, as well as biomedical devices, precision assembly and industrial printing machines.

■ Limit-angle type

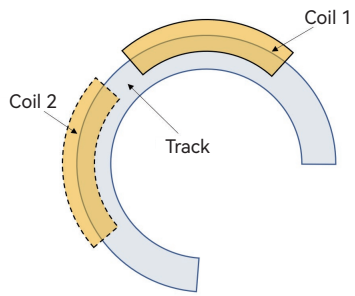
Model	Motion Radius (mm)
ACR240	240
ACR335	335
ACR820	820
ACR1240	1240
ACR1525	1525

■ 360° type

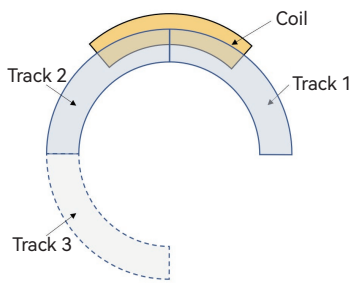
Model	Motion Radius (mm)
ACR240	240
ACR335	335
ACR820	820
ACR1240	1240
ACR1525	1525

Configurations

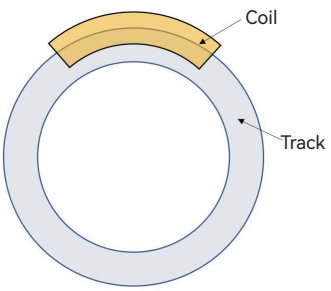
Akribis ACR series arc motors allow customers to flexibly configure systems based on their needs: multiple coils to increase torque output, or multiple tracks to increase range of motion. By attaching multiple tracks together, ACR motors can accomplish full 360° degrees of rotation.



Multi-Coil Configuration



Multi-Track Configuration



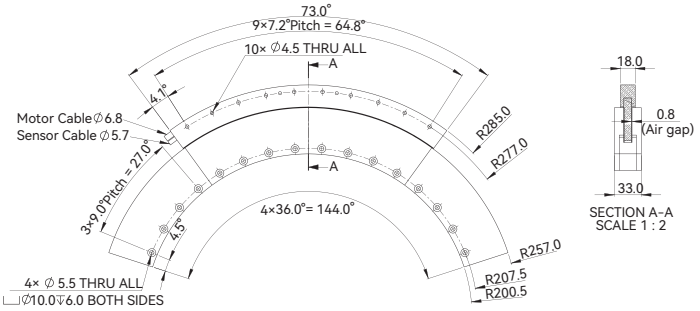
360° Configuration

ACR240-S5

ACR240-S5				
Performance Parameters		Symbol	Unit	Series
Continuous Torque (NC) @100°C [1]		T_{cn}	Nm	19.8
Peak Torque		T_{pk}	Nm	72.8
Torque Constant ±10%		K_t	Nm/Arms	19.77
Back EMF Constant ±10%		K_e	Vpeak/rpm	1.69
Motor Constant @25°C		K_m	Nm/Sqrt(W)	2.8
Resistance (L-L) 25°C ±10% [2]		R_{25}	Ω	35.2
Inductance (L-L) ±30% [3]		L	mH	19.5
Electrical Time Constant		τ_e	ms	0.6
Continuous Current (NC) @100°C [1]		I_{cn}	Arms	1.0
Peak Current		I_{pk}	Arms	3.7
Continuous Power Dissipation (NC) @100°C [1]		P_{cn}	W	68.0
Max. Coil Temperature		t_{max}	℃	100
Thermal Dissipation Constant (NC) [1]		K_{thn}	W/℃	0.9
Max. Bus Voltage		U_{bus}	Vdc	600
Magnetic Period		τ_{NN}	degree	7.2
Attraction Force		F_a	kN	0
Mechanical Parameters				
Coil Mass (NC)		m_{cn}	kg	1.1
Coil Length (NC)		L_{cn}	degree	73.0
Air Gap		δ	mm	0.8
Other Information				
Insulation Class		Class B (130°C)		
Protection Grade		IP00		
Compliance with Global Standards		RoHS		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations: NC-Natural Cooling.
[2] Resistance is measured by DC current with standard 1m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

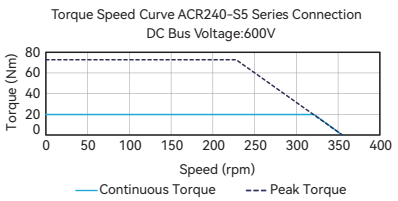
Dimension



Track Specifications

Parameter	Symbol	Unit	ACR240-TR36
Angle	L_{track}	degree	36
Mass	m_{track}	kg	1.4
Rotor Inertia	J_r	kg·m²	0.07

Torque-Speed Curve



ACR335-S5

ACR335-S5				
Performance Parameters		Symbol	Unit	Series
Continuous Torque (NC) @100°C [1]		T_{cn}	Nm	92.3
Peak Torque		T_{pk}	Nm	276.9
Torque Constant ±10%		K_t	Nm/Arms	77.2
Back EMF Constant ±10%		K_e	Vpeak/rpm	6.6
Motor Constant @25°C		K_m	Nm/Sqrt(W)	7.7
Resistance (L-L) 25°C ±10% [2]		R_{25}	Ω	67.1
Inductance (L-L) ±30% [3]		L	mH	69.8
Electrical Time Constant		τ_e	ms	1.0
Continuous Current (NC) @100°C [1]		I_{cn}	Arms	1.2
Peak Current		I_{pk}	Arms	3.6
Continuous Power Dissipation (NC) @100°C [1]		P_{cn}	W	185.4
Max. Coil Temperature		t_{max}	℃	100
Thermal Dissipation Constant (NC) [1]		K_{thn}	W/℃	2.5
Max. Bus Voltage		U_{bus}	Vdc	600
Magnetic Period		τ_{NN}	degree	9.0
Attraction Force		F_a	kN	0
Mechanical Parameters				
Coil Mass (NC)		m_{cn}	kg	1.8
Coil Length (NC)		L_{cn}	degree	90.4
Air Gap		δ	mm	0.85
Other Information				
Insulation Class		Class B (130°C)		
Protection Grade		IP00		
Compliance with Global Standards		RoHS		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations: NC-Natural Cooling.
[2] Resistance is measured by DC current with standard 1m cable.
[3] Inductance is measured by current frequency of 1 kHz.
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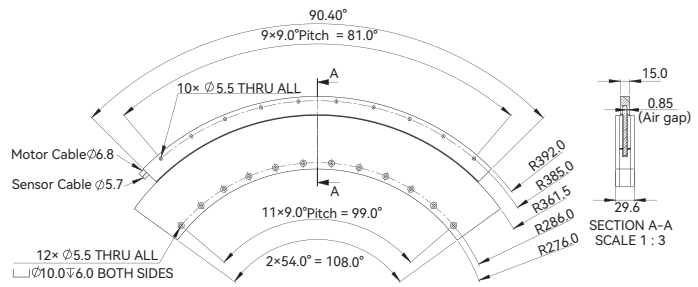
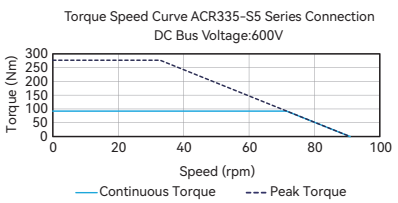
Dimension



Track Specifications

Parameter	Symbol	Unit	ACR335-TR36	ACR335-TR54
Angle	L_{track}	degree	36	54
Mass	m_{track}	kg	2.9	4.3
Rotor Inertia	J_r	kg·m²	0.29	0.44

Torque-Speed Curve



ACR820-S5

ACR820-S5				
Performance Parameters		Symbol	Unit	Series
Continuous Torque (NC) @100°C [1]		T_{cn}	Nm	331.5
Peak Torque		T_{pk}	Nm	994.5
Torque Constant ±10%		K_t	Nm/Arms	195.0
Back EMF Constant ±10%		K_e	Vpeak/rpm	16.7
Motor Constant @25°C		K_m	Nm/Sqrt(W)	26.2
Resistance (L-L) 25°C ±10% [2]		R_{25}	Ω	37.0
Inductance (L-L) ±30% [3]		L	mH	47.0
Electrical Time Constant		τ_e	ms	1.3
Continuous Current (NC) @100°C [1]		I_{cn}	Arms	1.7
Peak Current		I_{pk}	Arms	5.1
Continuous Power Dissipation (NC) @100°C [1]		P_{cn}	W	206.7
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant (NC) [1]		K_{thn}	W/°C	2.8
Max. Bus Voltage		U_{bus}	Vdc	600
Magnetic Period		τ_{NN}	degree	4.0
Attraction Force		F_a	kN	0
Mechanical Parameters				
Coil Mass (NC)		m_{cn}	kg	2.5
Coil Length (NC)		L_{cn}	degree	40.4
Air Gap		δ	mm	1.1
Other Information				
Insulation Class		Class B (130°C)		
Protection Grade		IP00		
Compliance with Global Standards		RoHS		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations: NC-Natural Cooling.
[2] Resistance is measured by DC current with standard 1m cable.
[3] Inductance is measured by current frequency of 1 kHz.
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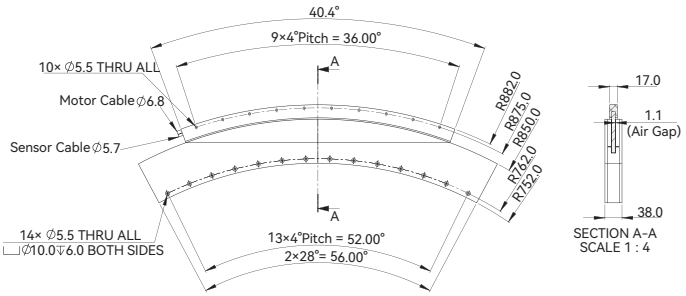
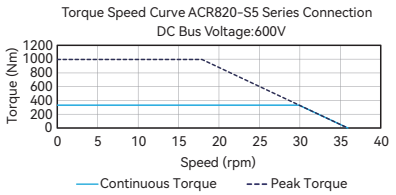
Dimension



Track Specifications

Parameter	Symbol	Unit	ACR820-TR24	ACR820-TR28
Angle	L_{track}	degree	24	28
Mass	m_{track}	kg	7.1	8.3
Rotor Inertia	J_r	kg·m²	4.5	5.3

Torque-Speed Curve

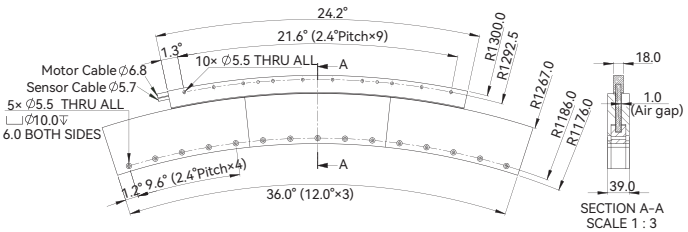


ACR1240-S5

ACR1240-S5				
Performance Parameters		Symbol	Unit	Series
Continuous Torque (NC) @100°C [1]		T_{cn}	Nm	334.95
Peak Torque		T_{pk}	Nm	1202.4
Torque Constant ±10%		K_t	Nm/Arms	257.7
Back EMF Constant ±10%		K_e	Vpeak/rpm	22.03
Motor Constant @25°C		K_m	Nm/Sqrt(W)	37
Resistance (L-L) 25°C ±10% [2]		R_{25}	Ω	37.5
Inductance (L-L) ±30% [3]		L	mH	43.5
Electrical Time Constant		τ_e	ms	1.2
Continuous Current (NC) @100°C [1]		I_{cn}	Arms	1.3
Peak Current		I_{pk}	Arms	4.6
Continuous Power Dissipation (NC) @100°C [1]		P_{cn}	W	122.5
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant (NC) [1]		K_{thn}	W/°C	1.6
Max. Bus Voltage		U_{bus}	Vdc	600
Magnetic Period		τ_{NN}	degree	4.0
Attraction Force		F_a	kN	0
Mechanical Parameters				
Coil Mass (NC)		m_{cn}	kg	2.6
Coil Length (NC)		L_{cn}	degree	24.2
Air Gap		δ	mm	1.0
Other Information				
Insulation Class		Class B (130°C)		
Protection Grade		IP00		
Compliance with Global Standards		RoHS		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations: NC-Natural Cooling.
[2] Resistance is measured by DC current with standard 1m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

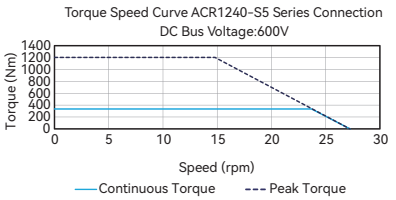
Dimension



Track Specifications

Parameter	Symbol	Unit	ACR1240-TR12
Angle	L_{track}	degree	12
Mass	m_{track}	kg	4.95
Rotor Inertia	J_r	kg·m²	7.5

Torque-Speed Curve



ACR1525-S5

ACR1525-S5				
Performance Parameters		Symbol	Unit	Series
Continuous Torque (NC) @100°C [1]		T_{cn}	Nm	460.7
Peak Torque		T_{pk}	Nm	1382.2
Torque Constant ±10%		K_t	Nm/Arms	257.3
Back EMF Constant ±10%		K_e	Vpeak/rpm	22.0
Motor Constant @25°C		K_m	Nm/Sqrt(W)	37.6
Resistance (L-L) 25°C ±10% [2]		R_{25}	Ω	31.2
Inductance (L-L) ±30% [3]		L	mH	37.5
Electrical Time Constant		τ_e	ms	1.2
Continuous Current (NC) @100°C [1]		I_{cn}	Arms	1.8
Peak Current		I_{pk}	Arms	5.4
Continuous Power Dissipation (NC) @100°C [1]		P_{cn}	W	193.4
Max. Coil Temperature		t_{max}	℃	100
Thermal Dissipation Constant (NC) [1]		K_{thn}	W/℃	2.6
Max. Bus Voltage		U_{bus}	Vdc	600
Magnetic Period		τ_{NN}	degree	1.84
Attraction Force		F_a	kN	0
Mechanical Parameters				
Coil Mass (NC)		m_{cn}	kg	2.2
Coil Length (NC)		L_{cn}	degree	18.52
Air Gap		δ	mm	1.0
Other Information				
Insulation Class		Class B (130°C)		
Protection Grade		IP00		
Compliance with Global Standards		RoHS		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations: NC-Natural Cooling.
[2] Resistance is measured by DC current with standard 1m cable.
[3] Inductance is measured by current frequency of 1 kHz.
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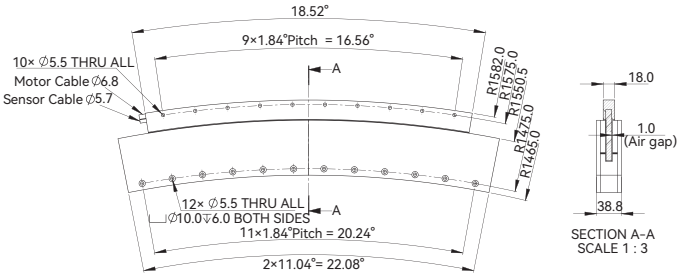
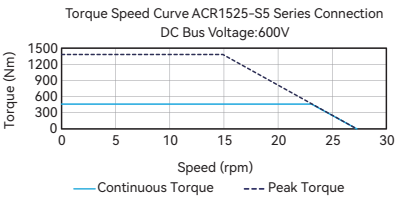
Dimension



Track Specifications

Parameter	Symbol	Unit	ACR1525-TR11.04
Angle	L_{track}	degree	11.04
Mass	m_{track}	kg	5.4
Rotor Inertia	J_r	kg·m²	12.3

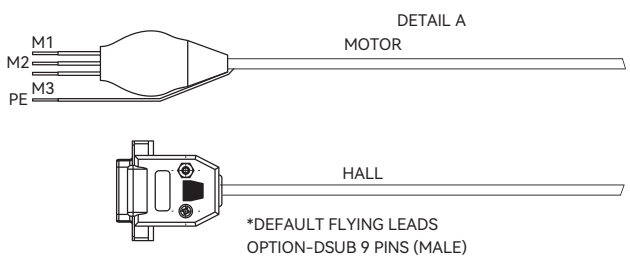
Torque-Speed Curve

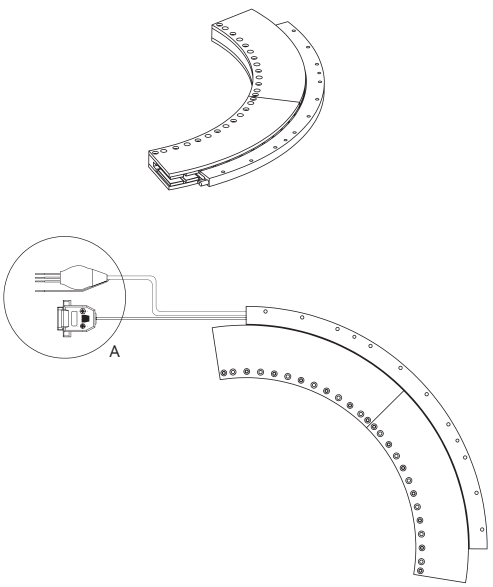


Motor Cable Connection

MOTOR CABLE

PIN	DESCRIPTION	COLOR
-	M1	BLACK1
-	M2	BLACK2
-	M3	BLACK3
-	PE	YELLOW/GREEN





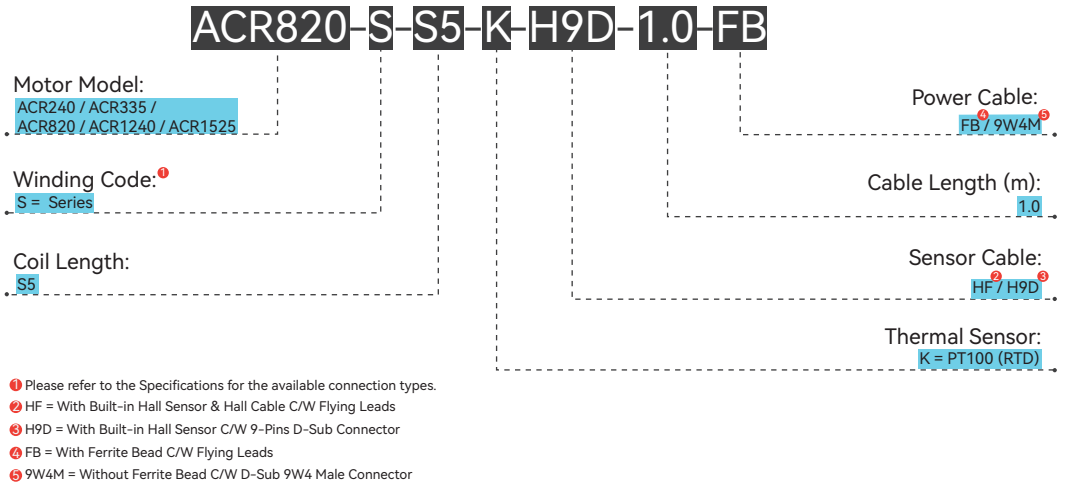
HALL CABLE

PIN	DESCRIPTION	COLOR
1	HA	GREEN
2	HB	YELLOW
3	HC	GREY
4	5VDC	BROWN
5	0VDC	WHITE
8	T1	PINK
9	T2	BLUE

THERMAL SENSOR WIRE
(K TYPE - PT100)
(J TYPE - THERMOSTAT)

Part Numbering

Motor Coil



1 Please refer to the Specifications for the available connection types.
2 HF = With Built-in Hall Sensor & Hall Cable C/W Flying Leads
3 H9D = With Built-in Hall Sensor C/W 9-Pins D-Sub Connector
4 FB = With Ferrite Bead C/W Flying Leads
5 9W4M = Without Ferrite Bead C/W D-Sub 9W4 Male Connector

Motor Track

6 Please refer to Dimensions for available tracks.