

AAL SERIES

- ▶ Frictionless guidance with high stiffness aerostatic bearings for the ultimate in smooth scanning motion
- ▶ Excellent geometric accuracy (straightness, flatness and angular accuracy) for demanding positioning applications
- ▶ Fully non-contact bearings, motors, and encoders eliminate wear and allows for stable maintenance-free performance
- ▶ Integrated stage cable management and modular XY stacking system eases integration
- ▶ Suitable for applications in semiconductor inspection and metrology, laser micromachining, diamond turning etc

EN-26.3.1

AAL270

Motor Specifications	Unit	Unshielded Cable Variant AAL270-X-XX-XX-X-A-X			Shielded Cable Variant AAL270-X-XX-XX-X-B-X	
Motor	-	AUM3-P-S3			AUM3-P-S3	
Continuous Force (NC) @100°C ¹	N	85			85	
Peak Force	N	433			433	
Force Constant ±10%	N/Arms	23.6			23.6	
Back EMF Constant ±10%	Vpeak/(m/s)	19.2			19.2	
Resistance (L-L) @25°C ±10% ²	Ω	3.3			3.3	
Inductance (L-L) ±40% ³	mH	2.62			2.62	
Continuous Current (NC) @100°C ¹	Arms	3.6			3.6	
Peak Current	Arms	18.4			18.4	
Max. Bus Voltage ⁴	Vdc	100			330	
Magnetic Period	mm	60			60	
Mechanical Specifications ⁵	Unit	100 mm	200 mm	300 mm	400 mm	500 mm
Resolution	μm	SINCOS	SINCOS	SINCOS	SINCOS	SINCOS
Accuracy (With Mapping)	μm	±0.2	±0.4	±0.4	±0.5	±0.5
Bidirectional Repeatability (ISO230-2)	μm	±0.075	±0.1	±0.15	±0.2	±0.2
Flatness	μm	±0.4	±0.5	±0.75	±1.5	±2.0
Straightness	μm	±0.4	±0.5	±0.75	±1.5	±2.0
Roll	arcsec	±1	±2	±3	±4	±5
Pitch	arcsec	±1	±2	±3	±4	±5
Yaw	arcsec	±1	±2	±3	±4	±5
Rated Payload	kg	40				
Max. No-Load Acceleration	m/s ²	20				
Max. No-Load Velocity	m/s	1.0				
Unloaded Moving Mass (Unshielded Cable Variants) AAL270-X-XX-XX-X-A-X	kg	7.3				
Unloaded Moving Mass (Shielded Cable Variants) AAL270-X-XX-XX-X-B-X	kg	7.7				
Unloaded Total Mass, Single Axis (Unshielded Cable Variants) AAL270-X-XX-XX-X-A-X	kg	22.7	26.0	29.3	32.5	35.8
Unloaded Total Mass, Single Axis (Shielded Cable Variants) AAL270-X-XX-XX-X-B-X	kg	23.8	27.2	30.6	33.9	37.3
Operational Ambient Temperature Range	°C	10~40				

¹ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.

² Resistance is measured by DC current with standard 0.5m lead wire.

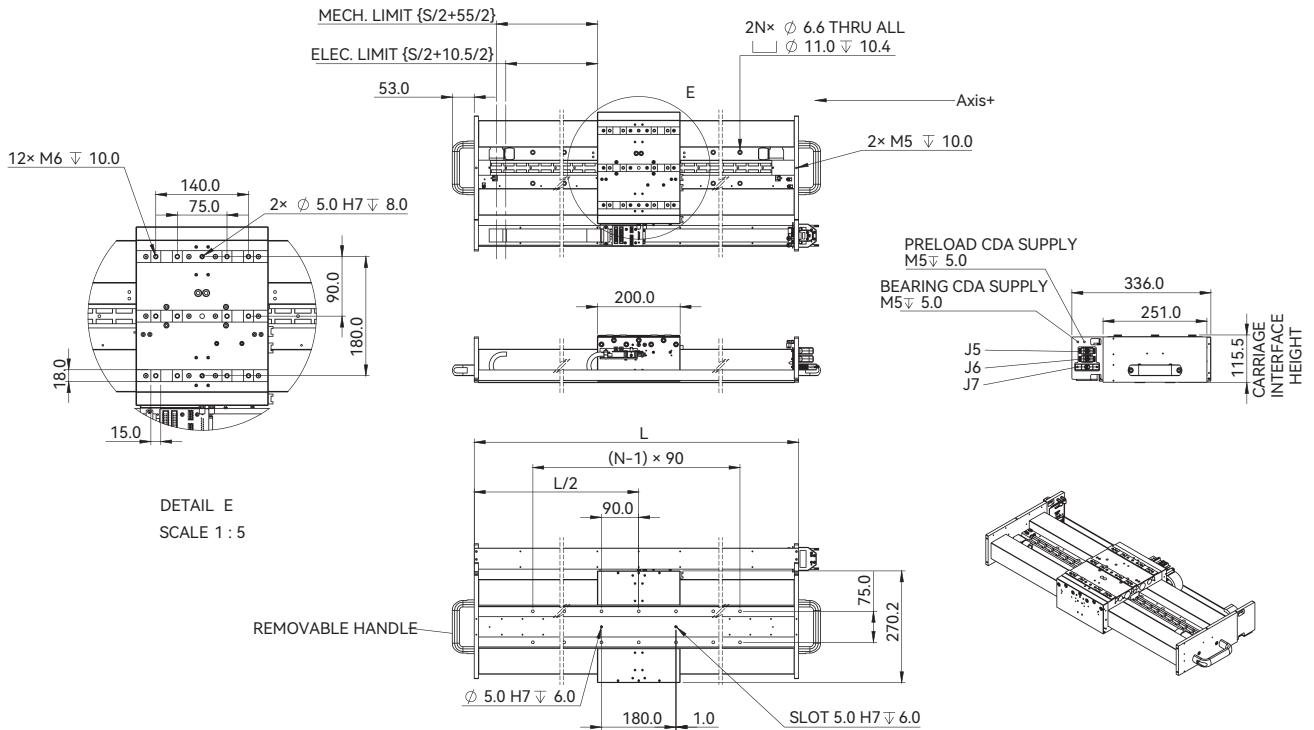
³ Inductance is measured by current frequency of 1 kHz. The variation range of AUM inductance is ±40% because three phase inductances are different. The value in the catalog is the average between the maximum and minimum values. For each phase, the variation range is ±20%.

⁴ Max. bus voltage of the unshielded cable variants is only 100V.

⁵ Mechanical specifications refer to single-axis modules. For XY-axis stage, contact Akribis (cust-service@akribis-sys.com).

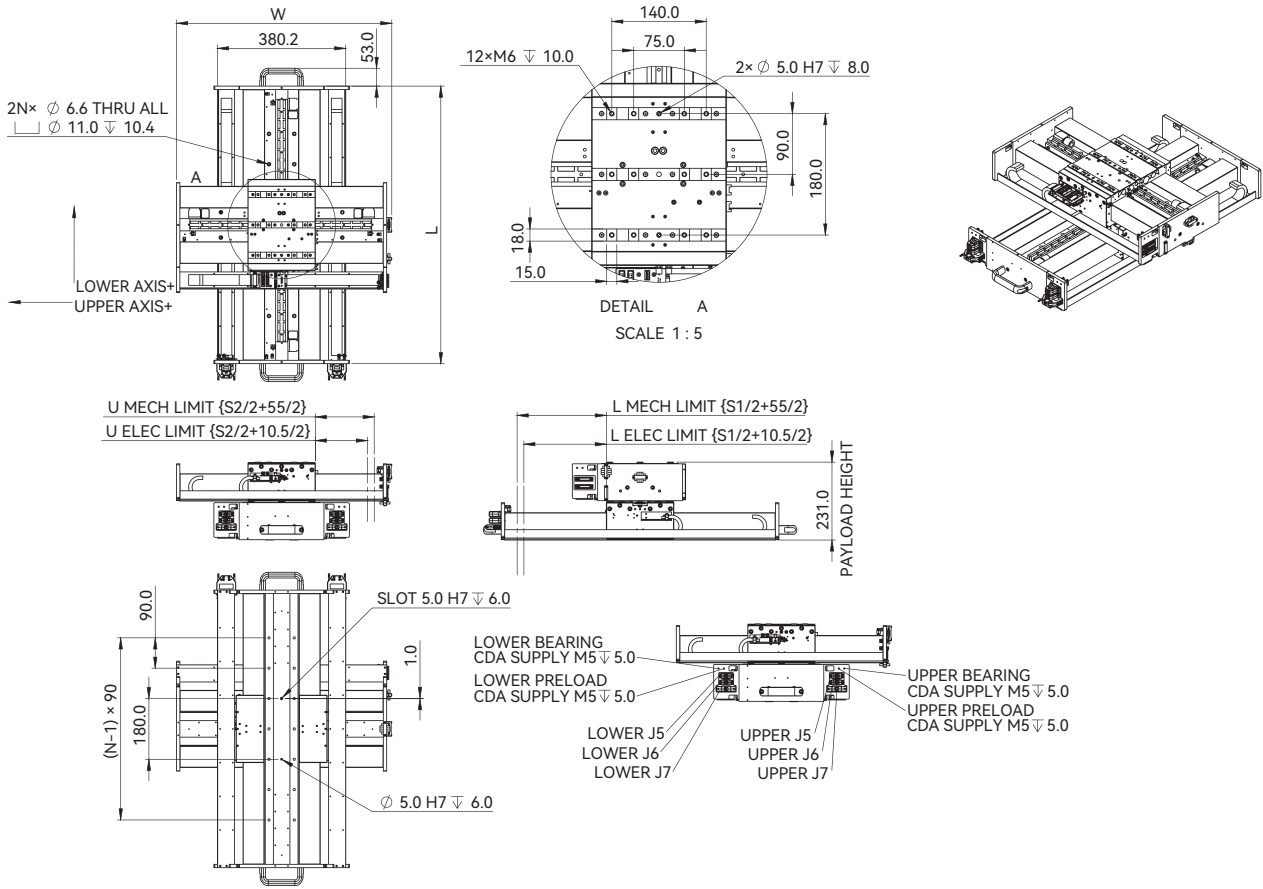
The contents of datasheet are subject to change without prior notice.

Unshielded Cable Variant - Single Axis (AAL270-X-XX-XX-X-A-X) Dimensional Drawing



Nom. Stroke, S (mm)	No. of Mounting Holes, N	Module Length, L (mm)	Module Mass (kg)	Moving Mass (kg)
100	3	423	22.7	7.3
200	3	523	26.0	
300	5	623	29.3	
400	5	723	32.5	
500	7	823	35.8	

Unshielded Cable Variant - XY-Axis (AAL270-X-XX-XX-X-A-X) Dimensional Drawing



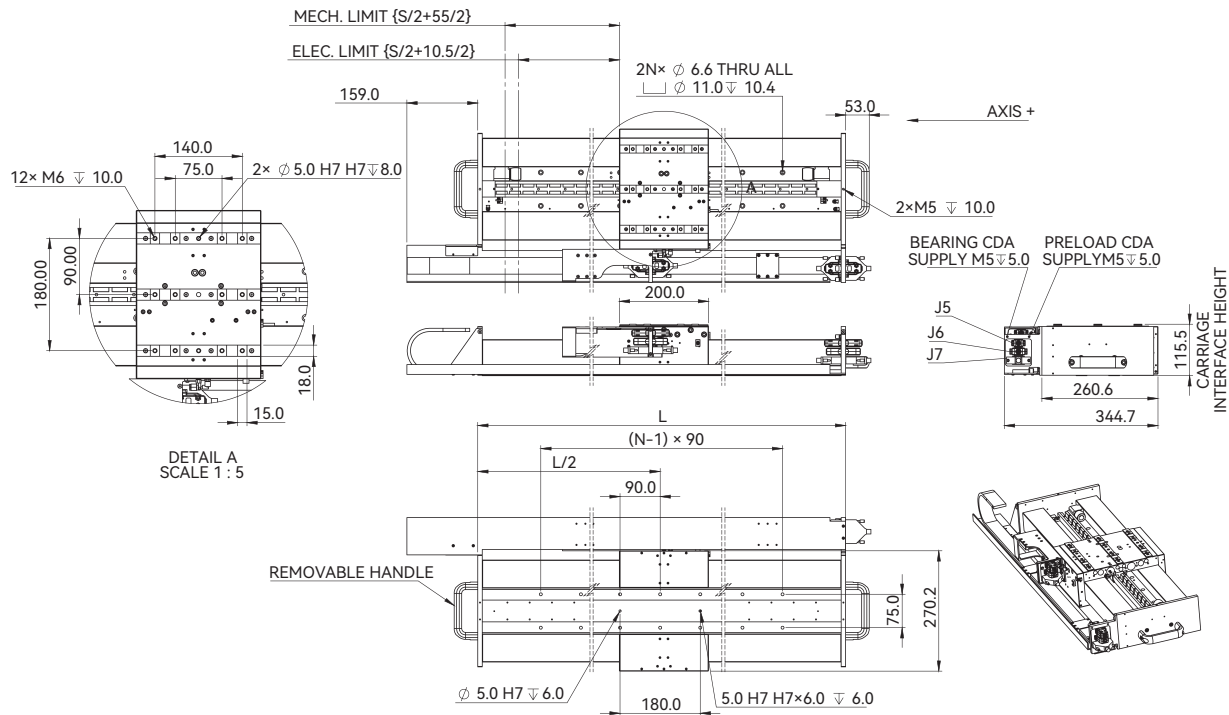
Upper Nom. Stroke, S2 (mm)	Module Width, W (mm)	Upper Module Mass (kg)
100	439	22.8
200	539	26.0
300	639	29.3

Lower Nom. Stroke, S1 (mm)	No. of Mounting Holes, N	Module Length, L (mm)	Lower Module Mass (kg)
100	3	423	23.5
200	3	523	26.8
300	5	623	30.1
400	5	723	33.4
500	7	823	36.8

Note:

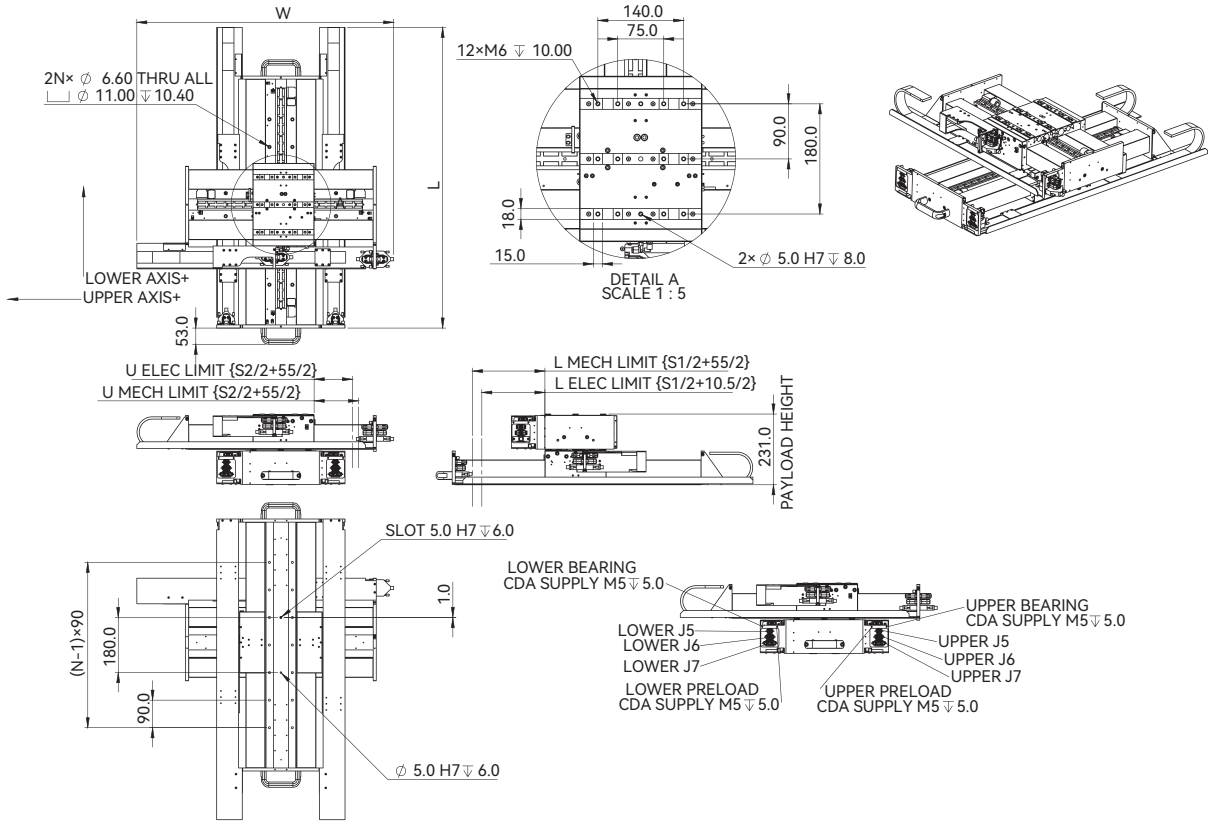
★ All modules unloaded moving mass = 7.3 kg

Shielded Cable Variant - Single Axis (AAL270-X-XX-XX-X-B-X) Dimensional Drawing



Nom. Stroke, S (mm)	No. of Mounting Holes, N	Module Length, L (mm)	Module Mass (kg)	Moving Mass (kg)
100	3	423	23.5	7.7
200	3	523	26.8	
300	5	623	30.6	
400	5	723	33.4	
500	7	823	36.8	

Shielded Cable Variant - XY-Axis (AAL270-X-XX-XX-X-B-X) Dimensional Drawing



Upper Nom. Stroke, S2 (mm)	Module Width, W (mm)	Upper Module Mass (kg)
100	668	23.9
200	768	27.3
300	868	30.7

Lower Nom. Stroke, S1 (mm)	No. of Mounting Holes, N	Module Length, L (mm)	Lower Module Mass (kg)
100	3	682	25.6
200	3	682	29.2
300	5	782	32.7
400	5	882	36.3
500	7	982	39.8

Note:

★ All modules unloaded moving mass = 7.7 kg

Ordering Part Number (OPN)

AAL270-B-10P-ACA2-S-A5

Model:

AAL270

Finish:

B: Black Anodized
E: EN

Effective Stroke:

10: 100mm
20: 200mm
30: 300mm
40: 400mm
50: 500mm

Precision Grade:

P: Precision

Stage Interface Connectors:

2: Motor: DSUB 9W4/Encoder: DSUB 15/
Hall & Limit Switch: DSUB 9
5: Motor: DSUB 9W4/Encoder: DSUB 15/
Limit Switch: DSUB 15

Cable Type:

A: Unshielded Cable Variants
B: Shielded Cable Variants

Cable Configuration:

S: Single Axis
L: XY Stack, Lower Axis
U: XY Stack, Upper axis

Scale Type:

2: Glass G8 Soda Lime, 8ppm/K^②
3: Glass G0 Robax/Zerodur, 0ppm/K^②
A: Zeromet/Invar, 0.75ppm/K^①

Encoder Type:

ACA: ABI-51G, SINCOS (1Vpp)
R4A: TONIC, SINCOS (1Vpp)

AAL270-B-10UP-H2A2-S-A5

Model:

AAL270

Finish:

B: Black Anodized
E: EN

Effective Stroke:

10: 100mm
20: 200mm
30: 300mm
40: 400mm
50: 500mm

Precision Grade:

UP: Ultraprecision

Stage Interface Connectors:

2: Motor: DSUB 9W4/Encoder: DSUB 15/
Hall & Limit Switch: DSUB 9
5: Motor: DSUB 9W4/Encoder: DSUB 15/
Limit Switch: DSUB 15

Cable Type:

A: Unshielded Cable Variants
B: Shielded Cable Variants

Cable Configuration:

S: Single Axis
L: XY Stack, Lower Axis
U: XY Stack, Upper axis

Scale Type:

2: Glass G8 Soda Lime, 8ppm/K^②
3: Glass G0 Robax/Zerodur, 0ppm/K^②

Encoder Type:

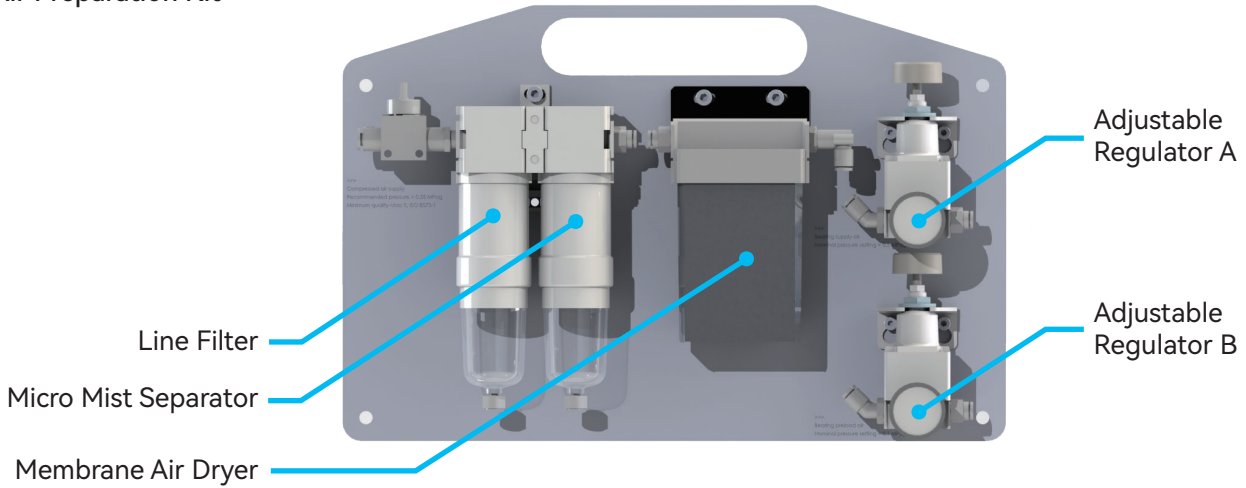
H2A: LIF4, SINCOS (1Vpp)

Note:

- ① R4A encoder option compatible with A scale option only.
- ② ACA and H2A encoder options compatible with 2 or 3 scale options only.
- ③ A cable type option compatible with ACA encoder option only.
- ④ A cable type option compatible with 5 stage interface connectors option only (Hall sensor not exposed).
- ⑤ B cable type option compatible with 2 stage interface connectors option only.
- ★ Products can be customized to suit specific working environments, please contact cust-service@akribis-sys.com.

AAL Accessories

Air Preparation Kit



- Features:**
- **Line Filter**
 - Large dust particle filtration and water droplet separation
 - Nominal filtration rating: 1 μ m
 - Filtration efficiency: 99%
 - Water droplet removal ratio: 99%
 - **Micro Mist Separator**
 - Dust filtration, Oil mist separation
 - Nominal filtration rating: 0.01 μ m
 - Filtration efficiency: 99.9%
 - Oil mist concentration on the outlet side: Max. 0.1mg/m³ [\approx 0.08 ppm]
 - **Membrane Air Dryer**
 - Outlet air atmosphere pressure dew point is $\leq -20^{\circ}\text{C}$
 - **Adjustable Regulator A**
 - Adjust outlet air pressure from 0~1MPa, minimum precision: 0.04MPa
 - **Adjustable Regulator B**
 - Adjust outlet air pressure from 0~0.2MPa, minimum precision: 0.01MPa

Ordering Part Number (OPN)

AALACC-AIRPREP

Model:

AALACC

Accessory Type:

AIRPREP: Air Preparation Kit

XY Stack Integration and Calibration

AAL270 air bearing stage XY stack orthogonality calibration service provides the following options based on your perpendicularity requirements:

AALACC-XYN

Model:

AALACC

Accessory Type:

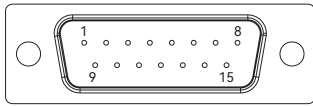
XYN: XY Stack Integration, Non-precision, Orthogonality Not Measured
 XY5: XY Stack Integration and Calibration, 5 arcsec Orthogonality
 XY10: XY Stack Integration and Calibration, 10 arcsec Orthogonality

Note:

★ Products can be customized to meet specific working environment, please contact cust-service@akribis-sys.com.

Unshielded Cable Variants Connectors (AAL270-X-XX-XX-X-A-X)

J5: ENCODER CONNECTOR

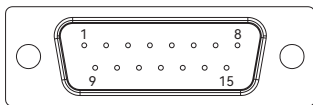


DA-15 MALE
 CONTACT FINISH: GOLD
 SHELL FINISH: NICKEL
 4-40 FEMALE THREADED
 RECOMMENDED MATING COMPONENTS:
 • NORCOMP 171-015-202 OR
 • NORCOMP 171-015-203 OR
 • 3M 8315-7000

ENCODER VERSION	SIGNAL OUTPUT	SIGNAL PERIOD (μm)
AAL270-x-xxx-ACA-x-x-x	SINCOS 1Vpp	20

PIN	SIGNAL	REMARKS
1	COS-	ENCODER COS INVERTED
2	SIN-	ENCODER SIN INVERTED
3	INDEX+	ENCODER INDEX NON-INVERTED
4	+5V	ENCODER POWER SUPPLY
5	RESERVED	DO NOT CONNECT
6	NC	NOT CONNECTED
7	RESERVED	DO NOT CONNECT
8	RESERVED	DO NOT CONNECT
9	COS+	ENCODER COS NON-INVERTED
10	SIN+	ENCODER SIN NON-INVERTED
11	INDEX-	ENCODER INDEX INVERTED
12	0V	ENCODER POWER SUPPLY RETURN
13	RESERVED	DO NOT CONNECT
14	NC	NOT CONNECTED
15	NC	NOT CONNECTED
CASING	SHIELD	-

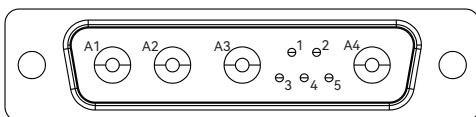
J6: SENSOR CONNECTOR



DA-15 MALE
 CONTACT FINISH: GOLD
 SHELL FINISH: NICKEL
 4-40 FEMALE THREADED
 RECOMMENDED MATING COMPONENTS:
 • NORCOMP 171-015-202 OR
 • NORCOMP 171-015-203 OR
 • 3M 8315-7000

PIN	SIGNAL	REMARKS
1	RESERVED	DO NOT CONNECT
2	RESERVED	DO NOT CONNECT
3	RESERVED	DO NOT CONNECT
4	RESERVED	DO NOT CONNECT
5	RESERVED	DO NOT CONNECT
6	EXTLIMIT_SUP	LIMIT POWER SUPPLY
7	EXTLIMIT_RTN	LIMIT POWER RETURN
8	NC	NOT CONNECTED
9	NC	NOT CONNECTED
10	RLS-	REVERSE LIMIT SWITCH DARK-ON
11	RLS+	REVERSE LIMIT SWITCH LIGHT-ON
12	NC	NOT CONNECTED
13	NC	NOT CONNECTED
14	FLS+	FORWARD LIMIT SWITCH LIGHT-ON
15	FLS-	FORWARD LIMIT SWITCH DARK-ON
CASING	SHIELD	-

J7: MOTOR CONNECTOR

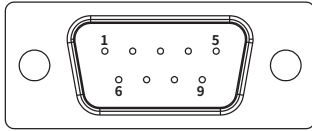


9W4 MALE
 CONTACT FINISH: GOLD
 SHELL FINISH: NICKEL
 4-40 FEMALE THREADED
 RECOMMENDED MATING COMPONENTS:
 • NORCOMP 681M9W4203L001

PIN	SIGNAL	REMARKS
A1	M1	MOTOR PHASE 1
A2	M2	MOTOR PHASE 2
A3	M3	MOTOR PHASE 3
A4	PE	PROTECTIVE EARTH
1	T1	PT100 IN 2-WIRE CONNECTION
2	T2	
3	RESERVED	DO NOT CONNECT
4	NC	NOT CONNECTED
5	NC	NOT CONNECTED
CASING	SHIELD	-

Shielded Cable Variants Connectors (AAL270-X-XX-XX-X-B-X)

J5: SENSOR CONNECTOR



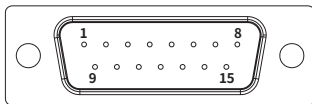
DE-9 MALE
CONTACT FINISH: GOLD
SHELL FINISH: NICKEL
4-40 FEMALE THREADED

RECOMMENDED MATING COMPONENTS:

- NORCOMP 171-009-202 OR
- NORCOMP 171-009-203 OR
- WURTH 61800924923

PIN	SIGNAL	REMARKS
1	HA	HALL SIGNAL A
2	HB	HALL SIGNAL B
3	HC	HALL SIGNAL C
4	+5VDC	HALL POWER SUPPLY
5	0VDC	HALL POWER RETURN
6	FLS	FORWARD LIMIT SWITCH DARK-ON
7	EXTLIMIT_SUP	LIMIT POWER SUPPLY
8	EXTLIMIT_RTN	LIMIT POWER RETURN
9	RLS	RESERVE LIMIT SWITCH DARK-ON
CASING	SHIELD	-

J6: ENCODER CONNECTOR



DA-15 MALE
CONTACT FINISH: GOLD
SHELL FINISH: NICKEL
4-40 FEMALE THREADED

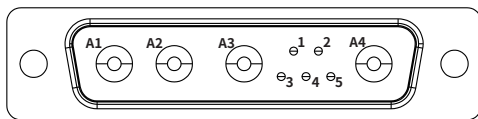
RECOMMENDED MATING COMPONENTS:

- NORCOMP 171-015-202 OR
- NORCOMP 171-015-203 OR
- WURTH 61801524923

Encoder Option	Signal Output	Signal Period (µm)
AAL270-x-xxx-ACA-x-x-x	SINCOS 1Vpp	20
AAL270-x-xxx-R4A-x-x-x	SINCOS 1Vpp	20
AAL270-x-xxx-H2A-x-x-x	SINCOS 1Vpp	4

PIN	SIGNAL	REMARKS
1	COS-	ENCODER COS INVERTED
2	SIN-	ENCODER SIN INVERTED
3	INDEX+	ENCODER INDEX NON-INVERTED
4	+5V	ENCODER POWER SUPPLY
5	NC	NOT CONNECTED
6	NC	NOT CONNECTED
7	P/H SENSOR	PQ signal for AAL270-x-xxx-R4A-x-x-x HL signal for AAL270-x-xxx-H2A-x-x-x
8	Q/L SENSOR	
9	COS+	ENCODER COS NON-INVERTED
10	SIN+	ENCODER SIN NON-INVERTED
11	INDEX-	ENCODER INDEX INVERTED
12	0V	ENCODER POWER RETURN
13	NC	NOT CONNECTED
14	NC	NOT CONNECTED
15	NC	NOT CONNECTED
CASING	SHIELD	-

J7: MOTOR CONNECTOR



9W4 MALE
CONTACT FINISH: GOLD
SHELL FINISH: TIN
4-40 FEMALE THREADED

RECOMMENDED MATING COMPONENTS:

- NORCOMP 681M9W4203L001
- HARTING 09693017094

PIN	SIGNAL	REMARKS
A1	M1	MOTOR PHASE 1
A2	M2	MOTOR PHASE 2
A3	M3	MOTOR PHASE 3
A4	PE	PROTECTIVE EARTH
1	T1	PT100 IN 2-WIRE CONNECTION
2	T2	
3	RESERVED	DO NOT CONNECT
4	NC	NOT CONNECTED
5	NC	NOT CONNECTED
CASING	SHIELD	-