PHASE
MOTION CONTROL

AxN

CONFIGURABLE MOTION

CONTROL PLATFORM

User Manual

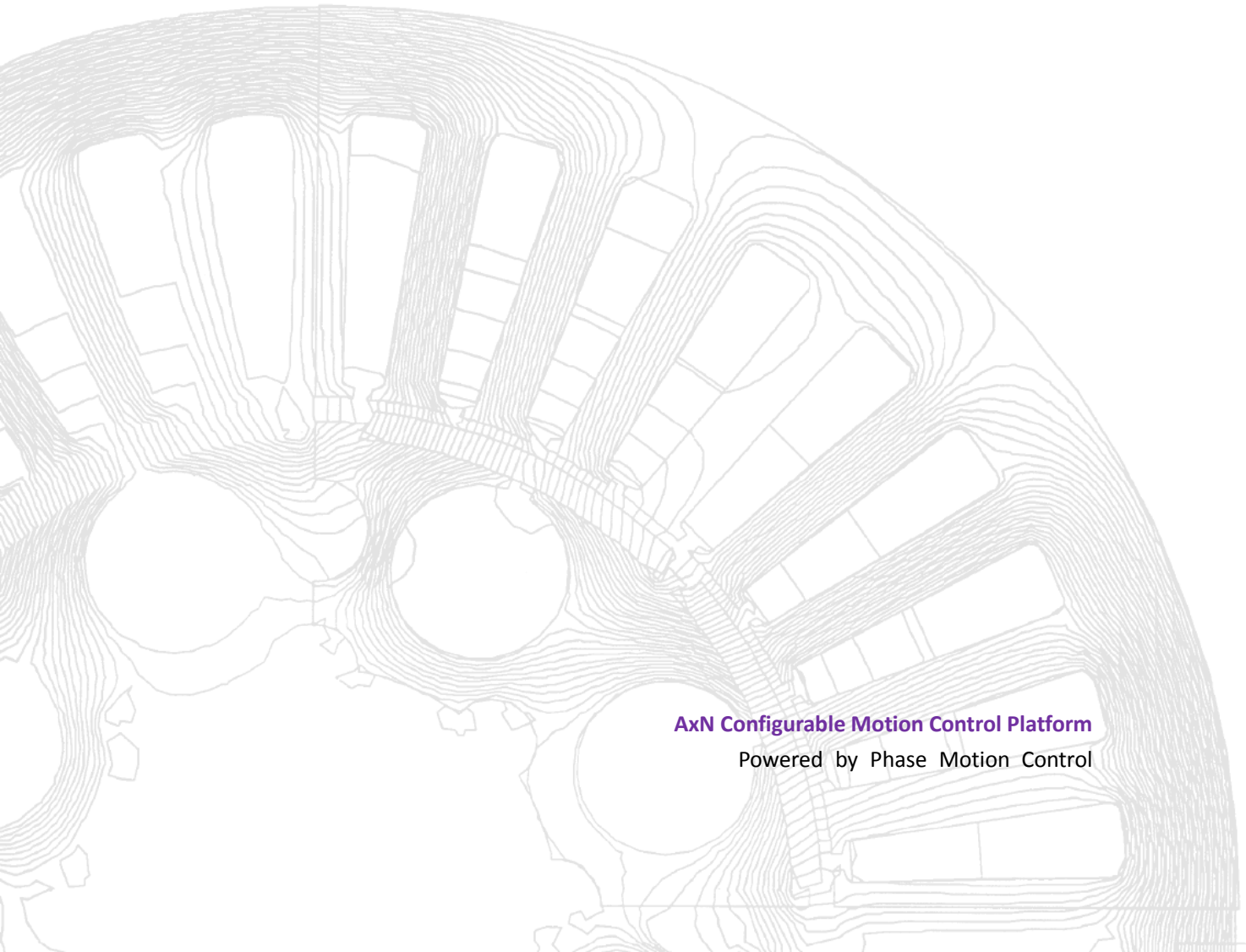
Support Model:

AxN Size2: AxN 15.30.4
AxN Size3: AxN 22.44.4、AxN 35.70.4、AxN 50.100.4
AxN Size4: AxN 70.140.4
AxN Size5: AxN 90.150.4、AxN 110.200.4

Version: 1.0 E

Summary

1 SAFETY INSTRUCTIONS (READ FIRST!)



1.1 Important Directions for Use

Appropriate Use

Introduction

PMC products represent state-of-the-art developments and manufacturing. They are tested prior to delivery to ensure operating safety and reliability.

The products may only be used in the manner that is defined as appropriate. If they are used in an inappropriate manner, then situations can develop that may lead to property damage or injury to personnel.

Note: PMC as manufacturer is not liable for any damages resulting from inappropriate use. In such cases, the guarantee and the right to payment of damages resulting from inappropriate use are forfeited. The user alone carries all responsibility of the risks.

Before using PMC products, make sure that all the pre-requisites for an appropriate use of the products are satisfied:

» Personnel that in any way, shape or form uses our products must first read and understand the relevant safety instructions and be familiar with appropriate use.
» If the products take the form of hardware, then they must remain in their original state, in other words, no structural changes are permitted. It is not permitted to decompile software products or alter source codes.
» Do not mount damaged or faulty products or use them in operation.
» Make sure that the products have been installed in the manner described in the relevant documentation.

Areas of Use and Application

Drive controllers made by PMC are designed to control electrical motors and monitor their operation. Control and monitoring of the motors may require additional sensors and actors.

Note: The drive controllers may only be used with the accessories and parts specified in this document. If a component has not been specifically named, then it may not be either mounted or connected. The same applies to cables and lines. Operation is only permitted in the specified configurations and combinations of components using the software and firmware as specified.

Every drive controller has to be programmed before commissioning, making it possible for the motor to execute the specific functions of an application. The drive controllers have been developed for use in single- and multi-axis drive and control tasks.

To ensure an application-specific use, the drive controllers are available with different drive power and different interfaces.

Typical applications of the drive controllers include:

» handling and mounting systems;

» packaging and food machines;
» printing and paper processing machines;
» machine tools.

The drive controllers may only be operated under the assembly and installation conditions described in this documentation, in the specified position of normal use and under the ambient conditions as described (temperature, degree of protection, humidity, EMC, etc.).

Inappropriate Use

Using the drive controllers outside of the operating conditions described in this documentation and outside of the indicated technical data and specifications is defined as “inappropriate use”.

Drive controllers must not be used, if
» ... they are subject to operating conditions that do not meet the specified ambient conditions. This includes, for example, operation under water, under extreme temperature fluctuations or extremely high maximum temperatures.
» Furthermore, the drive controllers must not be used in applications which have not been expressly authorized by PMC.
» Please carefully follow the specifications outlined in the general Safety Instructions!

1.2 Safety Instructions for Electric Drives and Controls

General Information

Using the Safety Instructions and Passing them on to Others

Do not attempt to install or commission this device without first reading all documentation provided with the product. Read and understand these safety instructions and all user documentation prior to working with the device. If you do not have the user documentation for the device, contact your responsible PMC sales representative. Ask for these documents to be sent immediately to the person or persons responsible for the safe operation of the device. If the device is resold, rented and/or passed on to others in any other form, then these safety instructions must be delivered with the device.

Improper use of these devices, failure to follow the safety instructions in this document or tampering with the product, including disabling of safety devices, may result in material damage, bodily harm, electric shock or even death!

Instructions for Use

Read these instructions before the initial startup of the equipment in order to eliminate the risk of bodily harm or material damage. Follow these safety instructions at all times.
» PMC is not liable for damages resulting from failure to observe the warnings provided in this documentation.
» Read the operating, maintenance and safety instructions in your language before starting up the machine. If you find that you cannot completely understand the documentation for your

product, please ask your supplier to clarify.

» Proper and correct transport, storage, assembly and installation as well as care in operation and maintenance are prerequisites for optimal and safe operation of this device.

» Only assign trained and qualified persons to work with electrical installations:

Only persons who are trained and qualified for the use and operation of the device may work on this device or within its proximity. The persons are qualified if they have sufficient knowledge of the assembly, installation and operation of the equipment as well as an understanding of all warnings and precautionary measures noted in these instructions.

Furthermore, they must be trained, instructed and qualified to switch electrical circuits and devices on and off in accordance with technical safety regulations, to ground them and to mark them according to the requirements of safe work practices. They must have adequate safety equipment and be trained in first aid.

» Only use spare parts and accessories approved by the manufacturer.

» Follow all safety regulations and requirements for the specific application as practiced in the country of use.

For machine and installation manufacturers:

» The devices have been designed for installation in industrial machinery.

» The ambient conditions given in the product documentation must be observed.

» The information given in the documentation of the product with regard to the use of the delivered components contains only examples of applications and suggestions.

The machine and installation manufacturer must make sure that the delivered components are suited for his individual application and check the information given in this documentation with regard to the use of the components, make sure that his application complies with the applicable safety regulations and standards and carry out the required measures, modifications and complements.

» Startup of the delivered components is only permitted once it is sure that the machine or installation in which they are installed complies with the national regulations, safety specifications and standards of the application.

» Operation is only permitted if the national EMC regulations for the application are met.

» The machine or installation manufacturer is responsible for compliance with the limiting values as prescribed in the national regulations.

» Technical data, connections and operational conditions are specified in the product documentation and must be followed at all times.

Explanation of Warning Symbols and Degrees of Hazard Seriousness

The safety instructions describe the following degrees of hazard seriousness. The degree of hazard seriousness informs about the consequences resulting from non-compliance with the safety instructions:

Warning symbol with signal word	Degree of hazard seriousness according to ANSI Z 535
	Death or severe bodily harm will occur.
	Death or severe bodily harm may occur.

	Bodily harm or material damage may occur.

Hazards by Improper Use

	High electric voltage and high working current! Risk of death or severe bodily injury by electric shock!
	Dangerous movements! Danger to life, severe bodily harm or material damage by unintentional motor movements!
	High electric voltage because of incorrect connection! Risk of death or bodily injury by electric shock!
	Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electrical equipment!
	Hot surfaces on device housing! Danger of injury! Danger of burns!
	Electrical hazard due to water leakage on electrical component. Risk of injury by improper handling! Risk of bodily injury by bruising, shearing, cutting, hitting, or improper handling of pressurized lines!

1.3 Instructions with regard to Specific Dangers

Protection against Contact with Electrical Parts

Note: This section only concerns devices and drive components with voltages of more than 50 Volt.

Contact with parts conducting voltages above 50 Volts can cause personal danger and electric shock. When operating electrical equipment, it is unavoidable that some parts of the devices conduct dangerous voltage.

High electrical voltage! Danger to life, electric shock and severe bodily injury!

» Only those trained and qualified to work with or on electrical equipment are permitted to operate, maintain and repair this equipment.
» Follow general construction and safety regulations when working on electrical power installations.

- Before switching on the device, the equipment grounding conductor must have been no detachably connected to all electrical equipment in accordance with the connection diagram.
- Do not operate electrical equipment at any time, even for brief measurements or tests, if the equipment grounding conductor is not permanently connected to the mounting points of the components provided for this purpose.
- Before working with electrical parts with voltage potentials higher than 50 V, the device must be disconnected from the mains voltage or power supply unit. Provide a safeguard to prevent reconnection.
- With electrical drive and filter components, observe the following:

  Wait 30 minutes after switching off power to allow capacitors to discharge before beginning to work. Measure the voltage on the capacitors before beginning to work to make sure that the equipment is safe to touch.
- Never touch the electrical connection points of a component while power is turned on.
- Install the covers and guards provided with the equipment properly before switching the device on. Before switching the equipment on, cover and safeguard live parts safely to prevent contact with those parts.
- A residual-current-operated circuit-breaker or r.c.d. cannot be used for electric drives! Indirect contact must be prevented by other means, for example, by an overcurrent protective device according to the relevant standards.
- Secure built-in devices from direct touching of electrical parts by providing an external housing, for example a control cabinet.

With electrical drive and filter components, observe the following:

High housing voltage and large leakage current! Risk of death or bodily injury by electric shock!

- Before switching on, the housings of all electrical equipment and motors must be connected or grounded with the equipment grounding conductor to the grounding points. This is also applicable before short tests.
- The equipment grounding conductor of the electrical equipment and the units must be non-detachably and permanently connected to the power supply unit at all times. The leakage current is greater than 3.5 mA.
- Over the total length, use copper wire of a cross section of a minimum of 10 mm^2 for this equipment grounding connection!
- Before start-up, also in trial runs, always attach the equipment grounding conductor or connect with the ground wire. Otherwise, high voltages may occur at the housing causing electric shock.

Protection against Electric Shock by Protective Low Voltage (PELV)

All connections and terminals with voltages between 5 and 50 Volt at PMC products are protective extra-low voltage systems which are provided with touch guard according to the product standards.

High electric voltage by incorrect connection! Risk of death or bodily injury by electric shock!

- To all connections and terminals with voltages between 0 and 50 Volt, only devices, electrical components, and conductors may be connected which are equipped with a PELV (Protective Extra-Low Voltage) system.
- Connect only voltages and circuits which are safely isolated from dangerous voltages. Safe isolation is achieved for example by isolating transformers, safe optocouplers or battery operation without mains connection.

Protection against Dangerous Movements

Dangerous movements can be caused by faulty control of connected motors. Some common examples are:

- improper or wrong wiring of cable connections
- incorrect operation of the equipment components
- wrong input of parameters before operation
- malfunction of sensors, encoders and monitoring devices
- defective components
- software or firmware errors

Dangerous movements can occur immediately after equipment is switched on or even after an unspecified time of trouble-free operation. The monitoring in the drive components will normally be sufficient to avoid faulty operation in the connected drives. Regarding personal safety, especially the danger of bodily harm and material damage, this alone cannot be relied upon to ensure complete safety. Until the integrated monitoring functions become effective, it must be assumed in any case that faulty drive movements will occur. The extent of faulty drive movements depends upon the type of control and the state of operation.

Dangerous movements! Danger to life, risk of injury, severe bodily harm or material damage!

- For the above reasons, ensure personal safety by means of qualified and tested higher-level monitoring devices or measures integrated in the installation. They have to be provided for by the user according to the specific conditions within the installation and a hazard and fault analysis. The safety regulations applicable for the installation have to be taken into consideration. Unintended machine motion or other malfunction is possible if safety devices are disabled, bypassed or not activated.

To avoid accidents, bodily harm and/or material damage:

- Keep free and clear of the machine's range of motion and moving parts. Possible measures to prevent people from accidentally entering the machine's range of motion are **using safety fences**, **using safety guards**, **using protective coverings** and **installing light curtains or light barriers**
- Fences and coverings must be strong enough to resist maximum possible momentum.

- Mount the emergency stop switch in the immediate reach of the operator. Verify that the emergency stop works before startup. Don't operate the device if the emergency stop is not working.
- Isolate the drive power connection by means of an emergency stop circuit or use a safety related starting lockout to prevent unintentional start.
- Make sure that the drives are brought to a safe standstill before accessing or entering the danger zone.
- Additionally secure vertical axes against falling or dropping after switching off the motor power by, for example, **mechanically securing the vertical axes**, **adding an external braking/ arrester/ clamping mechanism** or **ensuring sufficient equilibration of the vertical axes**
- The standard equipment motor brake or an external brake controlled directly by the drive controller are not sufficient to guarantee personal safety!
- Disconnect electrical power to the equipment using a master switch and secure the switch against reconnection for **maintenance**, **repair work**, **cleaning of equipment** and **long periods of discontinued equipment use**.
- Prevent the operation of high-frequency, remote control and radio equipment near electronics circuits and supply leads. If the use of such devices cannot be avoided, verify the system and the installation for possible malfunctions in all possible positions of normal use before initial startup. If necessary, perform a special electromagnetic compatibility (EMC) test on the installation.

Protection against Magnetic and Electromagnetic Fields during Operation and Mounting

Magnetic and electromagnetic fields generated by current-carrying conductors and permanent magnets in motors represent a serious personal danger to those with heart pacemakers, metal implants and hearing aids.

Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electrical equipment!

- Persons with heart pacemakers and metal implants are not permitted to enter following areas:
  Areas in which electrical equipment and parts are mounted, being operated or commissioned.
  Areas in which parts of motors with permanent magnets are being stored, repaired or mounted.
- If it is necessary for somebody with a pacemaker to enter such an area, a doctor must be consulted prior to doing so. The interference immunity of present or future implanted heart pacemakers differs greatly, so that no general rules can be given.
- Those with metal implants or metal pieces, as well as with hearing aids must consult a doctor before they enter the areas described above. Otherwise health hazards may occur.

Protection against Contact with Hot Parts

Hot surfaces at motor housings, on drive controllers or chokes! Danger of injury! Danger of burns!

- Do not touch surfaces of device housings and chokes in the proximity of heat sources! Danger of burns!
- Do not touch housing surfaces of motors! Danger of burns!
- According to operating conditions, temperatures can be higher than 60 °C, 140 °F during or after operation.
- Before accessing motors after having switched them off, let them cool down for a sufficiently long time. Cooling down can require up to 140 minutes! Roughly estimated, the time required for cooling down is five times the thermal time constant specified in the Technical Data.
- After switching drive controllers or chokes off, wait 15 minutes to allow them to cool down before touching them.
- Wear safety gloves or do not work at hot surfaces.
- For certain applications, the manufacturer of the end product, machine or installation, according to the respective safety regulations, has to take measures to avoid injuries caused by burns in the end application. These measures can be, for example: warnings, guards (shielding or barrier), and technical documentation.

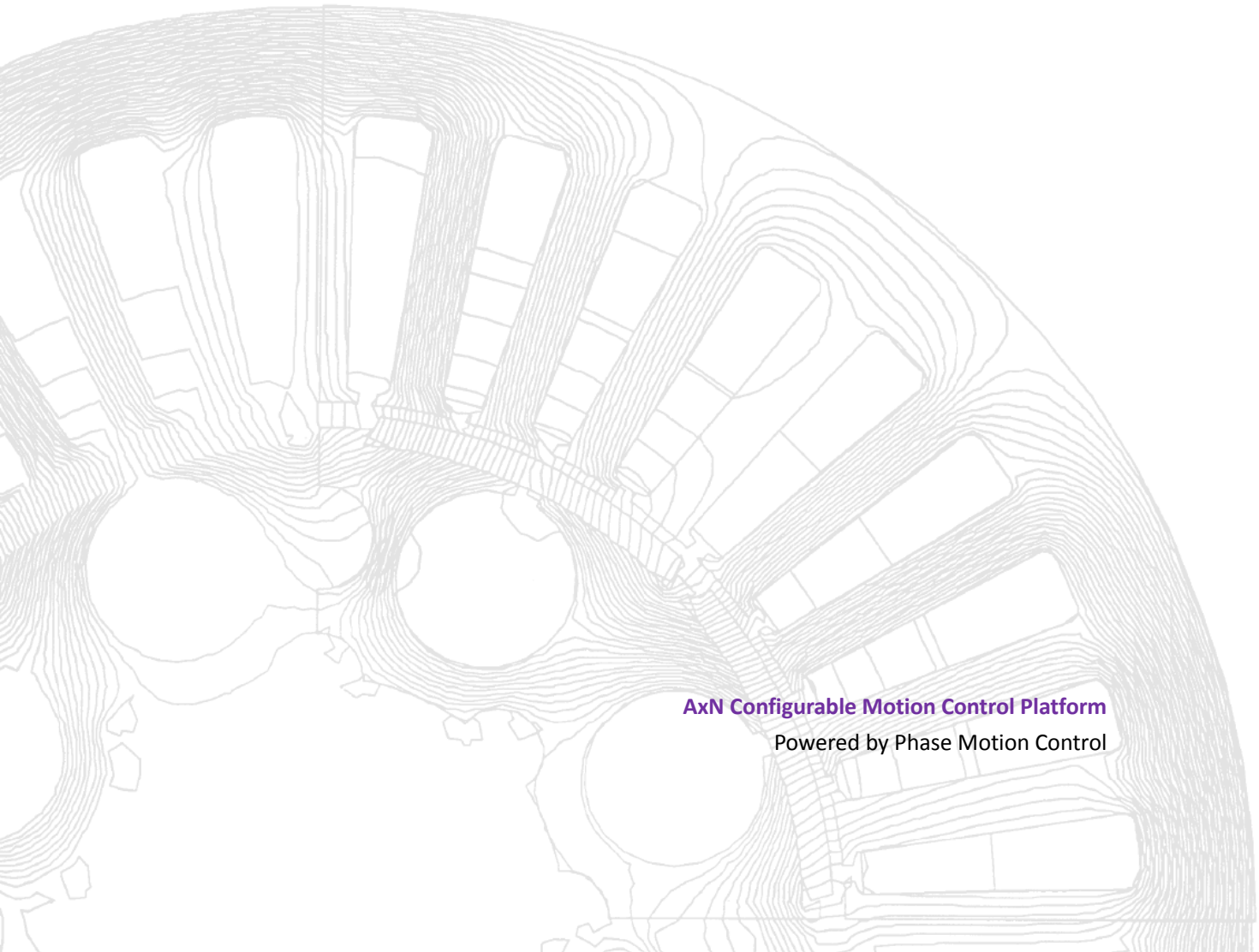
Protection during Handling and Mounting

In unfavorable conditions, handling and assembling certain parts and components in an improper way can cause injuries.

Risk of injury by improper handling! Bodily injury by bruising, shearing, cutting, hitting!

- Observe the general construction and safety regulations on handling and assembly.
- Use suitable devices for assembly and transport.
- Avoid jamming and bruising by appropriate measures.
- Always use suitable tools. Use special tools if specified.
- Use lifting equipment and tools in the correct manner.
- If necessary, use suitable protective equipment (for example safety goggles, safety shoes, safety gloves).
- Do not stand under hanging loads.
- Immediately clean up any spilled liquids because of the danger of skidding.

2 TECHNICAL SPECIFICATIONS



2.1 AxN Size 2 (AxN 15.30.4)

Specifications

Technical specifications(1)	Symbol	AxN 15.30.4	Units
Power Supply Voltage	V_{in}	150 ~ 500	Vac 3 phase
		0 ~ 800	Vdc
Auxiliary supply voltage	V_{aux}	24V ± 15% / 2A	Vdc
Output frequency	f	0 ~ 1200	Hz
Current output, S1(2)	I_n	15	Arms
Peak current(2)	I_p	30	Arms
Power Losses total(3)	P_l	200	W
Maximum output voltage	V_{out}	$V_{in} \times 0.95$	Vac
PWM frequency(4)	f_{pwm}	4 / 8 / 16	kHz
Efficiency at nominal power(2)	--	97.9	%
Input form factor (Full load)	--	0.9	Vac 3 phase
Maximum braking current	--	100% of I_p (peak current)	--
Cooling	--	1 fan 60×60×32	--
Flow rate	--	70	$m^3/hour$
Dimensions (H×D×W)	--	420×249×96	mm

(1) Test performed with full option control card and firmware 1.8.197
(2) V_{in} = 380 Vac, $V_{out} = V_{in} \times 0.95$, T_{amb} = 40°C, Comm.Freq.8kHz
(3) V_{in} = 380 Vac, I_n= 15 Arms, T_{amb} = 40°C, Comm.Freq.8kHz, Including input rectifier losses
(4) PWM frequency will automatically decrease at Zero Speed, in order to keep Nominal Current Output

Motor Feedback Options

Main Encoder (500kHz)	Sincos encoder 5 channels (2 absolute analog tracks/2 incremental analog tracks/index)
	Incremental encoder (1 Vpp or Different Line Driver)
	Sensorless algorithm (w/o feedback)
	Endat serial encoder 1.0 to 2.2 (default)
	Resolver
	Hiperface encoder
Secondary Encoder (500kHz)	Incremental digital encoder without commutation tracks (500kHz)
	Endat serial encoder

Programmable Input Signals

2 Differential analog inputs	± 10V (1mV) / R_{in} = 10kΩ
8 digital inputs	20 ~ 30V / R_{in} = 6.6kΩ to GND
3 insulated analog inputs (optional)	± 10V (1mV)
8 insulated digital inputs (optional)	5mA, 24Vdc max

Programmable Output Signals

2 analog outputs	0 ~ 10V (1mV) FS (30mA)
4 digital outputs	PNP open collector 24V (100mA)
1 watch dog relay	2A/30Vdc, 0.25A/250Vac, NO/NC contacts
2 insulated analog output (optional)	± 10V (1mV) FS (30mA)
2 insulated digital output (optional)	On-off switch, 9 ~ 28V/2A

Hardware Configuration

Processor speed: 80 MIPS µC + FPGA

120 MIPS µC + FPGA Extreme Version (Optional)

Task frequency:

– Current /drive monitoring: 1 MHz

– Position/speed loop: 8 kHz

– PLC fast task: 8 kHz

– PLC slow task: 15.625 Hz to 1 kHz user-programmable

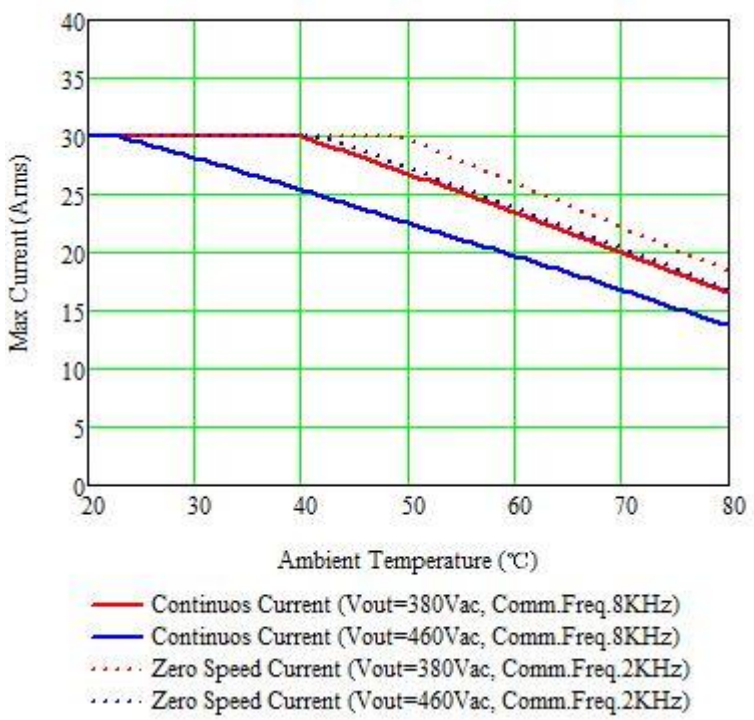
Position loop mode available

Target position register: 32 or 64 bits

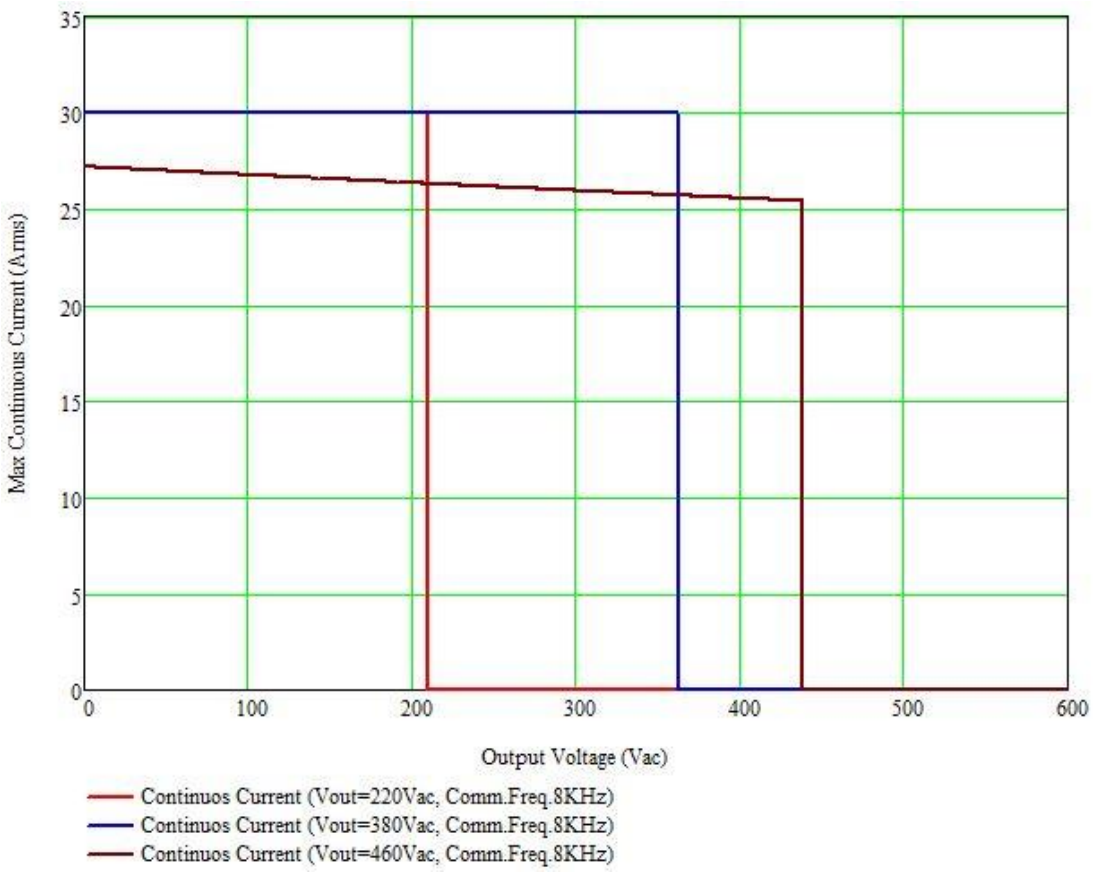
Full digital control Id/Iq, updated 16 kHz

Drive Operational Area of AxN Size2

Max Current VS. Ambient Temperature



Max Continuous Current VS. Output Voltage (at 40℃)



2.2 AxN Size 3 (AxN 22.44.4; AxN 35.70.4; AxN 50.100.4)

Specifications

Technical specifications[1]	Symbol	AxN 22.44.4	AxN 35.70.4	AxN 50.100.4	Units
Power Supply Voltage	V_{in}	150 ~ 500			Vac 3 phase
		0 ~ 800			Vdc
Auxiliary supply voltage	V_{aux}	24V ± 15% / 3A			Vdc
Output frequency	f	0 ~ 1200			Hz
Current output, S1[2]	I_n	22	35	50	Arms
Peak current[2]	I_p	44	70	100	Arms
Power Losses total[3]	P_l	280	400	590	W
Maximum output voltage	V_{out}	V_{in} ×0.95			Vac
PWM frequency[4]	f_{pwm}	4 / 8 / 16			kHz
Efficiency at nominal power[2]	--	98	98.2	98.1	%
Input form factor (Full load)	--	0.9			Vac 3 phase
Maximum braking current	--	100% of I_p (peak current)			--
Cooling	--	1 PWM fan 80×80×38			--
Flow rate	--	136			$m^3/hour$
Dimensions (H×D×W)	--	488×249×150			mm

(1) Test performed with full option control card and firmware 1.8.197
(2) V_{in} = 380 Vac, $V_{out} = V_{in} \times 0.95$, T_{amb} = 40°C, Comm.Freq.8kHz
(3) V_{in} = 380 Vac, I_n= 15 Arms, T_{amb} = 40°C, Comm.Freq.8kHz, Including input rectifier losses
(4) PWM frequency will automatically decrease at Zero speed, in order to keep Nominal current output

Motor Feedback Options

Main Encoder (500kHz)	Sincos encoder 5 channels (2 absolute analog tracks/2 incremental analog tracks/index)
	Incremental encoder (1 Vpp or Different Line Driver)
	Sensorless algorithm (w/o feedback)
	Endat serial encoder 1.0 to 2.2 (default)
	Resolver
	Hiperface encoder
Secondary Encoder (500kHz)	Incremental digital encoder without commutation tracks (500kHz)
	Endat serial encoder

Programmable Input Signals

2 differential analog inputs	± 10V (1mV) / R_{in} = 10kΩ
8 digital inputs	20 ~ 30V / R_{in} = 6.6kΩ to GND
3 insulated analog inputs (optional)	± 10V (1mV)
8 insulated digital inputs (optional)	5mA, 24Vdc max

Programmable Output Signals

2 analog outputs	0 ~ 10V (1mV) FS (30mA)
4 digital outputs	PNP open collector 24V (100mA)
1 watch dog relay	2A/30Vdc, 0.25A/250Vac, NO/NC contacts
2 insulated analog output (optional)	± 10V (1mV) FS (30mA)
2 insulated digital output (optional)	On-off switch, 9 ~ 28V/2A

Hardware Configuration

Processor speed: 80 MIPS µC + FPGA

120 MIPS µC + FPGA Extreme Version (Optional)

Task frequency:

– Current /drive monitoring: 1 MHz

– Position/speed loop: 8 kHz

– PLC fast task: 8 kHz

– PLC slow task: 15.625 Hz to 1 kHz user-programmable

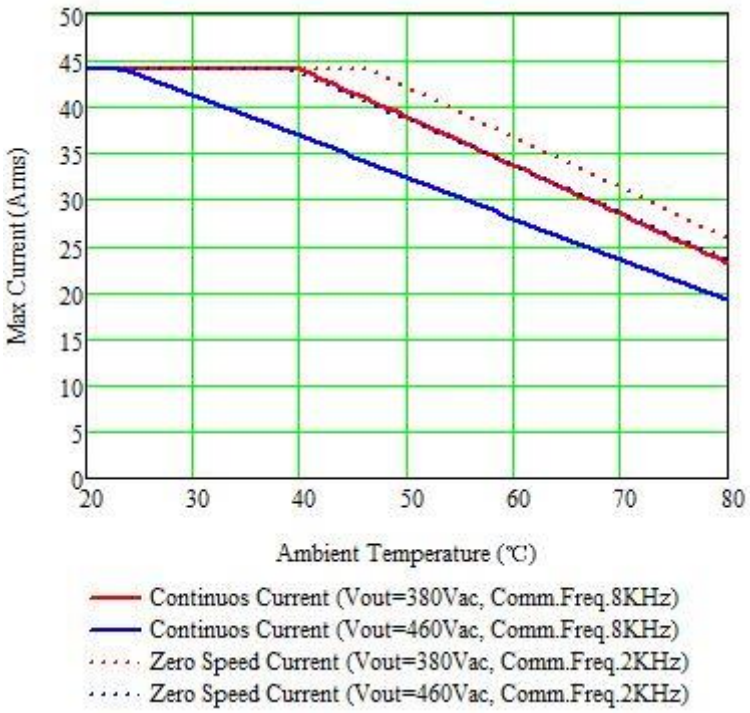
Position loop mode available

Target position register: 32 or 64 bits

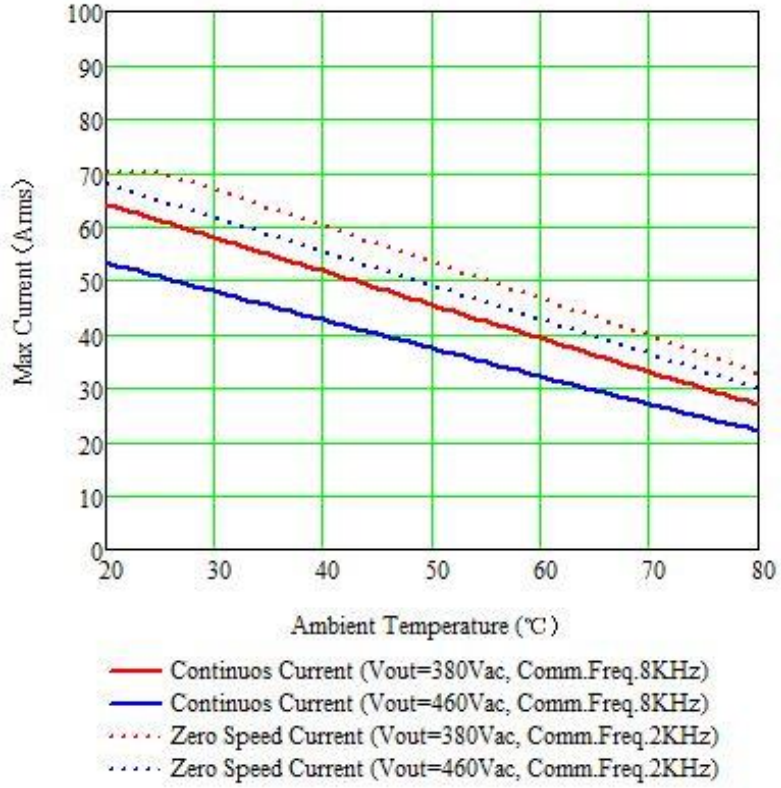
Full digital control Id/Iq, updated 16 kHz

Drive Operational Area of AxN Size3

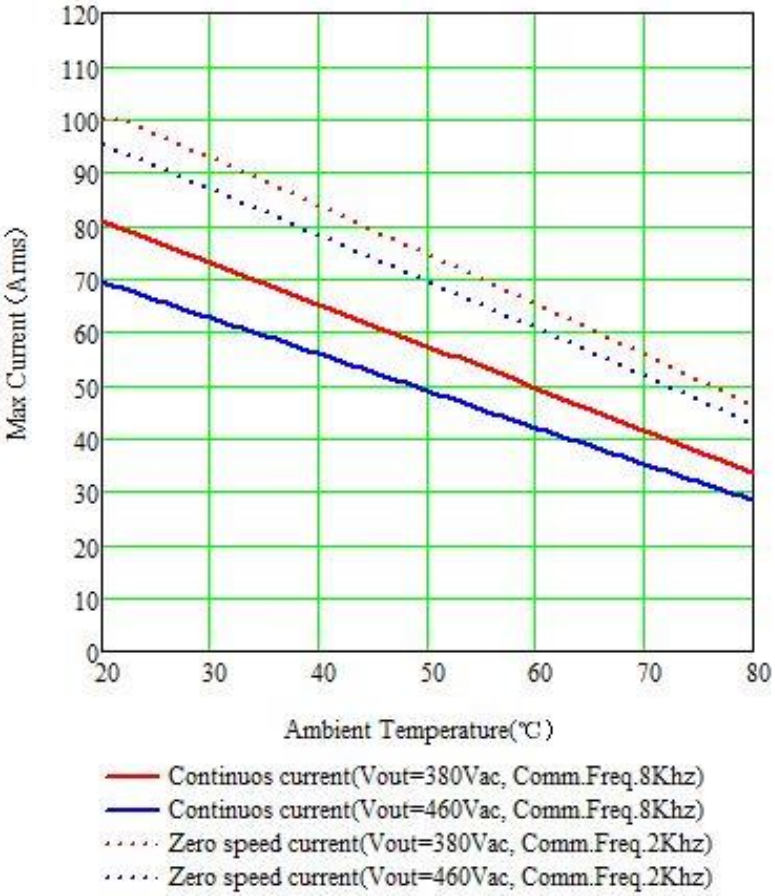
Max Current VS. Ambient Temperature



AxN 22.44.4

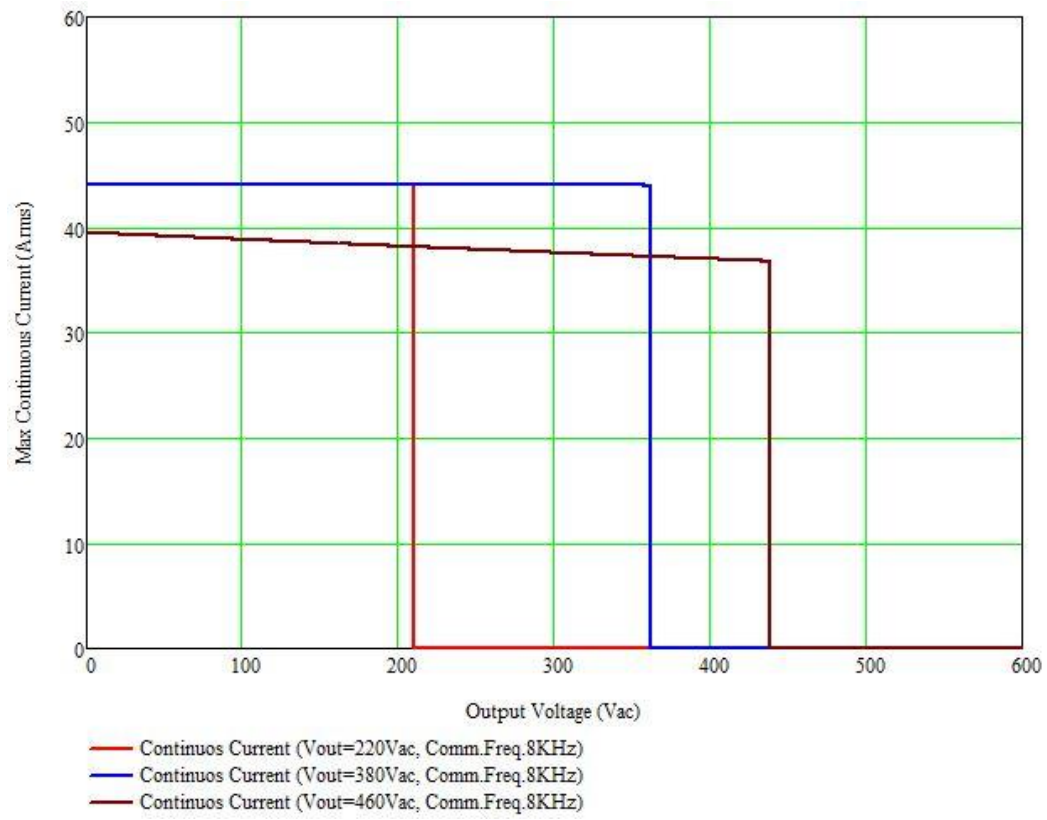


AxN 35.70.4

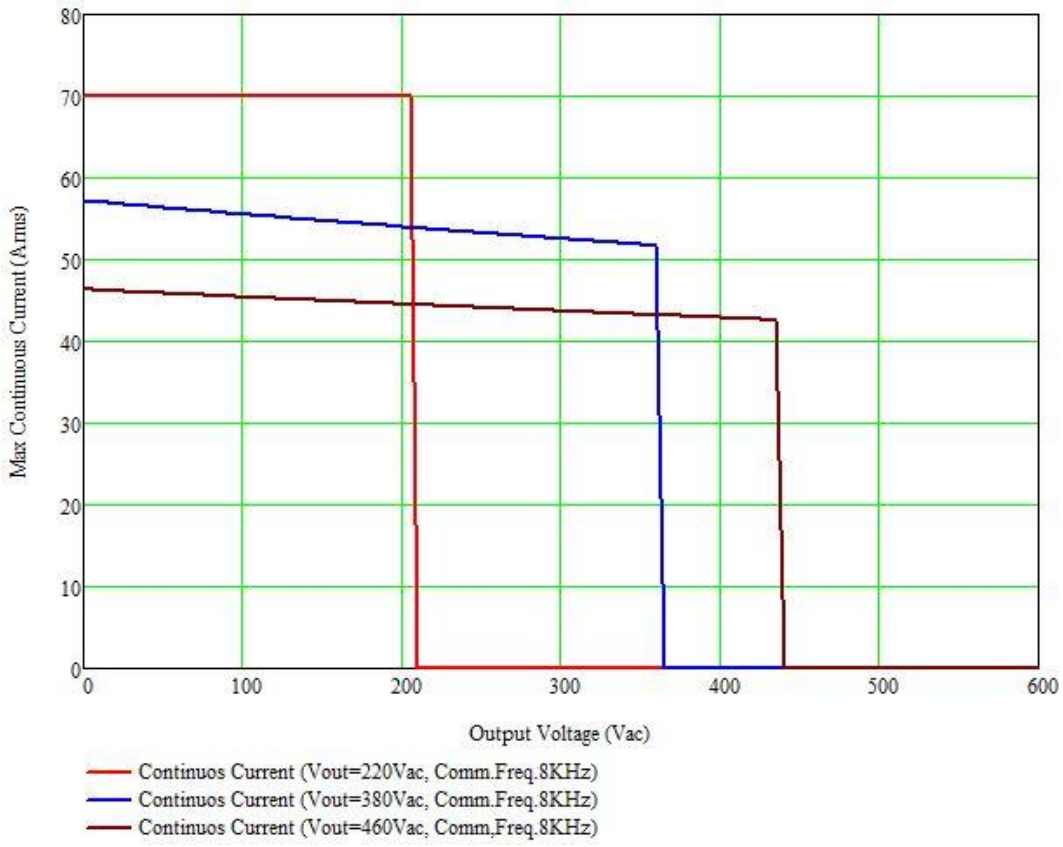


AxN 50.100.4

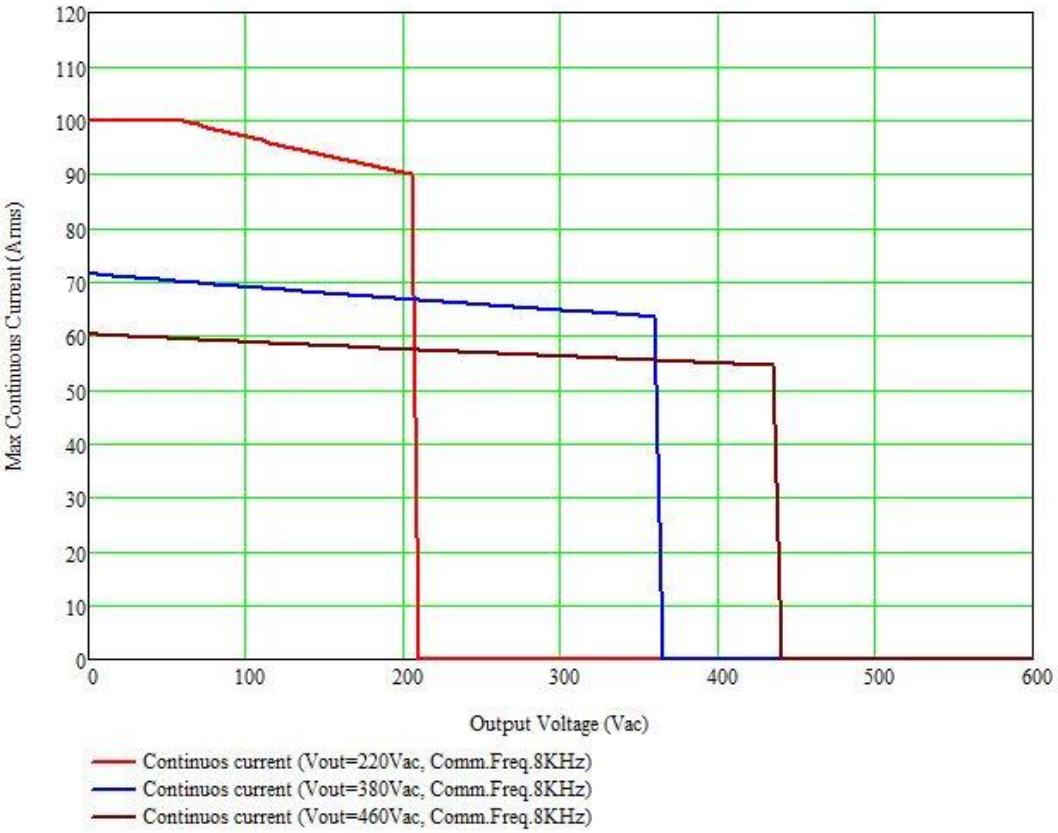
Max Continuous Current VS. Output Voltage (at 40℃)



AxN 22.44.4



AxN 35.70.4


Max Continuous Current (Arms)
120
110
100
90
80
70
60
50
40
30
20
10
0
0
100
200
300
400
500
600
Output Voltage (Vac)
Continuos current (Vout=220Vac, Comm.Freq.8KHz)
Continuos current (Vout=380Vac, Comm.Freq.8KHz)
Continuos current (Vout=460Vac, Comm.Freq.8KHz)

AxN 50.100.4

2.3 AxN Size 4 (AxN 70.140.4)

Specifications

Technical specifications(1)	Symbol	AxN 70.140.4	Units
Power Supply Voltage	V_{in}	150 ~ 500	Vac 3 phase
		0 ~ 800	Vdc
Auxiliary supply voltage	V_{aux}	24V ± 15% / 6A	Vdc
Output frequency	f	0 ~ 1200	Hz
Current output, S1(2)	I_n	70	Arms
Peak current(2)	I_p	140	Arms
Power Losses total(3)	P_l	870	W
Maximum output voltage	V_{out}	$V_{in} \times 0.95$	Vac
PWM frequency(4)	f_{pwm}	4 / 8 / 16	kHz
Efficiency at nominal power(2)	--	98.1	%
Input form factor (Full load)	--	0.9	Vac 3 phase
Maximum braking current	--	100% of I_p (peak current)	--
Cooling	--	2 PWM fan 80×80×38	--
Flow rate	--	110×2	$m^3/hour$
Dimensions (H×D×W)	--	488×249×200	mm

(1) Test performed with full option control card and firmware 1.8.197
(2) V_{in} = 380 Vac, $V_{out} = V_{in} \times 0.95$, T_{amb} = 40°C, Comm.Freq.8kHz
(3) V_{in} = 380 Vac, I_n= 15 Arms, T_{amb} = 40°C, Comm.Freq.8kHz, Including input rectifier losses
(4) PWM frequency will automatically decrease at Zero speed, in order to keep Nominal current output

Motor Feedback Options

Main Encoder (500kHz)	Sincos encoder 5 channels (2 absolute analog tracks/2 incremental analog tracks/index)
	Incremental encoder (1 Vpp or Different Line Driver)
	Sensorless algorithm (w/o feedback)
	Endat serial encoder 1.0 to 2.2 (default)
	Resolver
	Hiperface encoder
Secondary Encoder (500kHz)	Incremental digital encoder without commutation tracks (500kHz)
	Endat serial encoder

Programmable Input Signals

2 Differential analog inputs	± 10V (1mV) / R_{in} = 10kΩ
8 digital inputs	20 ~ 30V / R_{in} = 6.6kΩ to GND
3 insulated analog inputs (optional)	± 10V (1mV)
8 insulated digital inputs (optional)	5mA, 24Vdc max

Programmable Output Signals

2 analog outputs	0 ~ 10V (1mV) FS (30mA)
4 digital outputs	PNP open collector 24V (100mA)
1 watch dog relay	2A/30Vdc, 0.25A/250Vac, NO/NC contacts
2 insulated analog output (optional)	± 10V (1mV) FS (30mA)
2 insulated digital output (optional)	On-off switch, 9 ~ 28V/2A

Hardware Configuration

Processor speed: 80 MIPS µC + FPGA

120 MIPS µC + FPGA Extreme Version (Optional)

Task frequency:

– Current /drive monitoring: 1 MHz

– Position/speed loop: 8 kHz

– PLC fast task: 8 kHz

– PLC slow task: 15.625 Hz to 1 kHz user-programmable

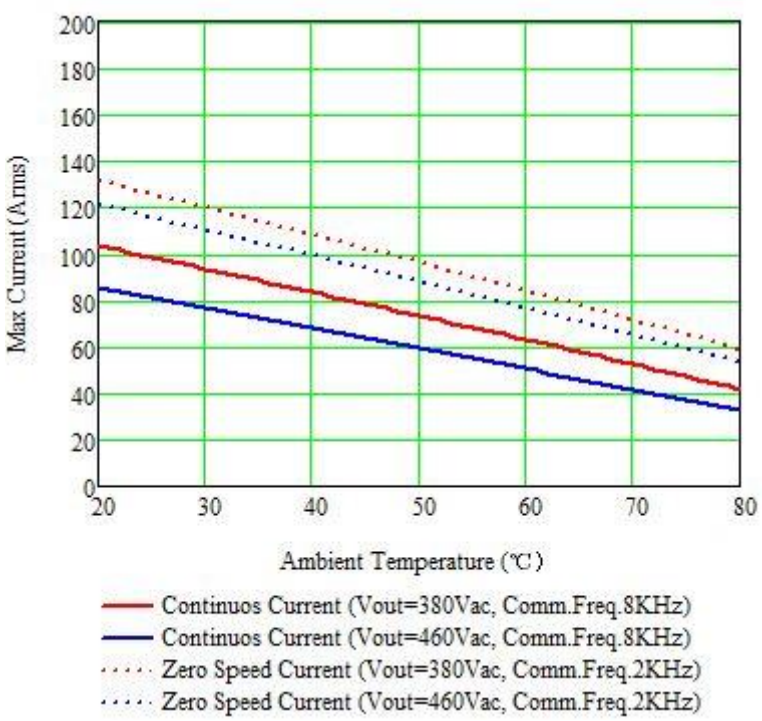
Position loop mode available

Target position register: 32 or 64 bits

Full digital control Id/Iq, updated 16 kHz

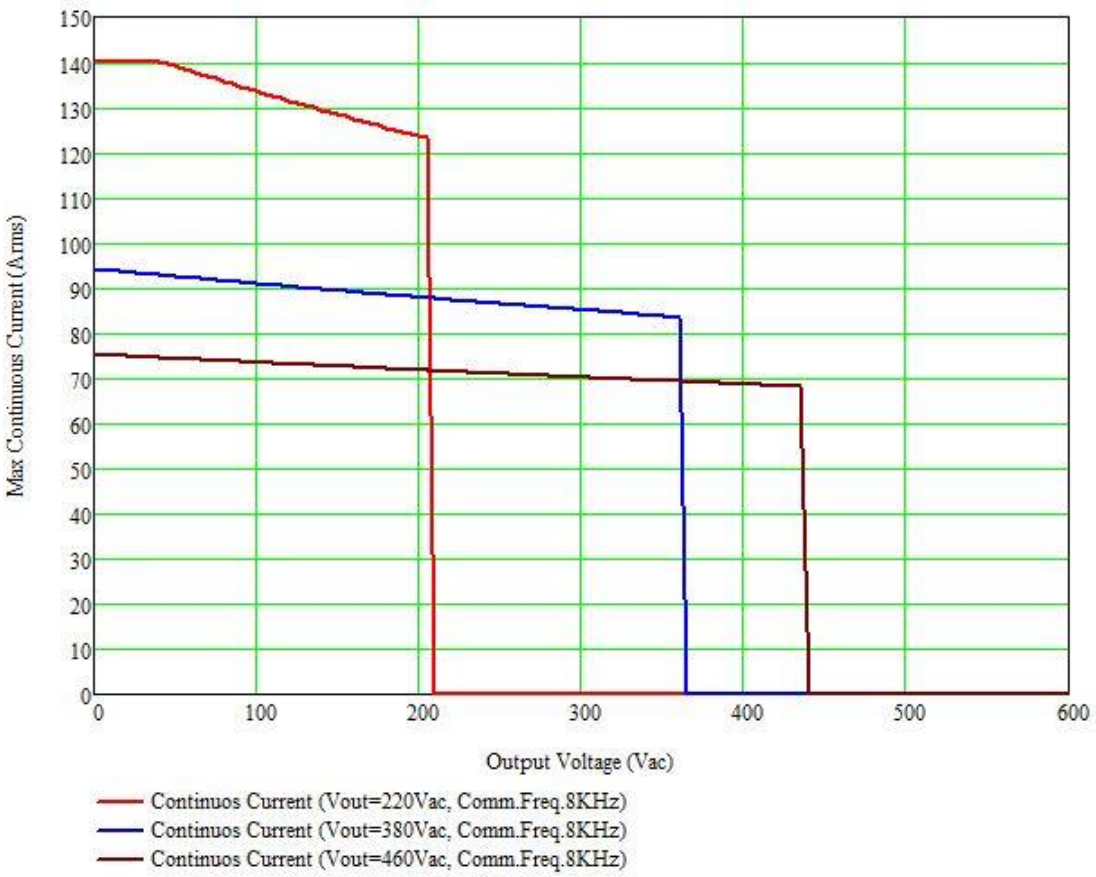
Drive Operational Area of AxN Size4

Max Current VS. Ambient Temperature



AxN 70.140.4

Max Continuous Current VS. Output Voltage (at 40℃)



AxN 70.140.4

2.4 AxN Size 5 (AxN 90.150.4; AxN 110.200.4)

Specifications

Technical specifications(1)	Symbol	AxN 90.150.4	AxN 110.200.4	Units
Power Supply Voltage	V_{in}	150 ~ 500		Vac 3 phase
		0 ~ 800		Vdc
Auxiliary supply voltage	V_{aux}	24V ± 15% / 8A		Vdc
Output frequency	f	0 ~ 1200		Hz
Current output, S1(2)	I_n	90	110	Arms
Peak current(2)	I_p	150	200	Arms
Power Losses total(3)	P_l	1050	1280	W
Maximum output voltage	V_{out}	V_{in} ×0.95		Vac
PWM frequency(4)	f_{pwm}	4 / 8 / 16		kHz
Efficiency at nominal power(2)	--	98.2	98.2	%
Input form factor (Full load)	--	0.9		Vac 3 phase
Maximum braking current	--	100% of I_p (peak current)		--
Cooling	--	3 PWM fan 80×80×38		--
Flow rate	--	110×3		$m^3/hour$
Dimensions (H×D×W)	--	725×249×286		mm

(1) Test performed with full option control card and firmware 1.8.197
(2) V_{in} = 380 Vac, $V_{out} = V_{in} \times 0.95$, T_{amb} = 40°C, Comm.Freq.8kHz
(3) V_{in} = 380 Vac, I_n= 15 Arms, T_{amb} = 40°C, Comm.Freq.8kHz, Including input rectifier losses
(4) PWM frequency will automatically decrease at Zero speed, in order to keep Nominal current output

Motor Feedback Options

Main Encoder (500kHz)	Sincos encoder 5 channels (2 absolute analog tracks/2 incremental analog tracks/index)
	Incremental encoder (1 Vpp or Different Line Driver)
	Sensorless algorithm (w/o feedback)
	Endat serial encoder 1.0 to 2.2 (default)
	Resolver
	Hiperface encoder
Secondary Encoder (500kHz)	Incremental digital encoder without commutation tracks (500kHz)
	Endat serial encoder

Programmable Input Signals

2 Differential analog inputs	± 10V (1mV) / R_{in} = 10kΩ
8 digital inputs	20 ~ 30V / R_{in} = 6.6kΩ to GND
3 insulated analog inputs (optional)	± 10V (1mV)
8 insulated digital inputs (optional)	5mA, 24Vdc max

Programmable Output Signals

2 analog outputs	0 ~ 10V (1mV) FS (30mA)
4 digital outputs	PNP open collector 24V (100mA)
1 watch dog relay	2A/30Vdc, 0.25A/250Vac, NO/NC contacts
2 analog output (optional)	± 10V (1mV) FS (30mA)
2 digital output (optional)	On-off switch, 9 ~ 28V/2A

Hardware Configuration

Processor speed: 80 MIPS µC + FPGA

120 MIPS µC + FPGA Extreme Version (Optional)

Task frequency:

– Current /drive monitoring: 1 MHz

– Position/speed loop: 8 kHz

– PLC fast task: 8 kHz

– PLC slow task: 15.625 Hz to 1 kHz user-programmable

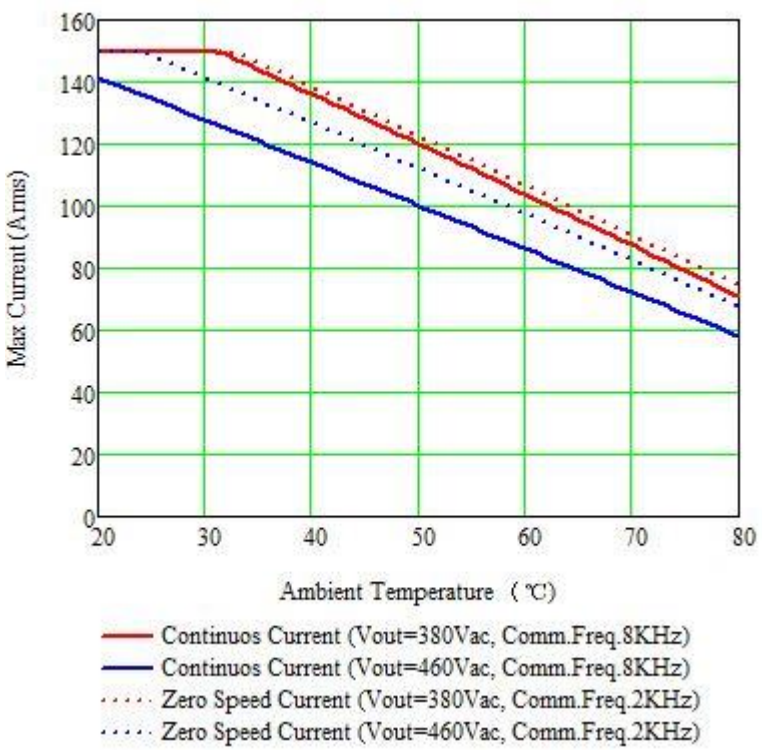
Position loop mode available

Target position register: 32 or 64 bits

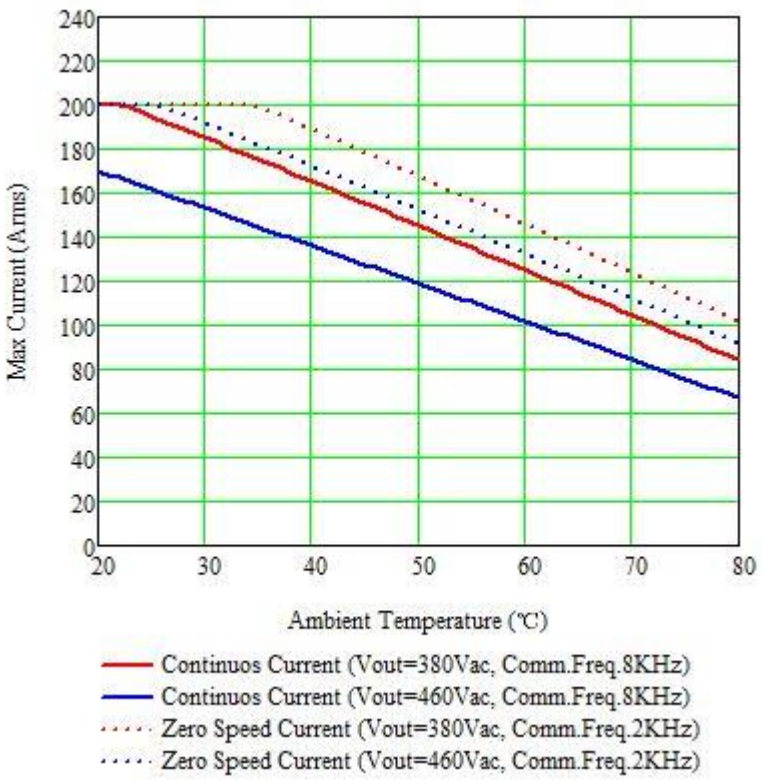
Full digital control Id/Iq, updated 16 kHz

Drive Operational Area of AxN Size5

Max Current VS. Ambient Temperature

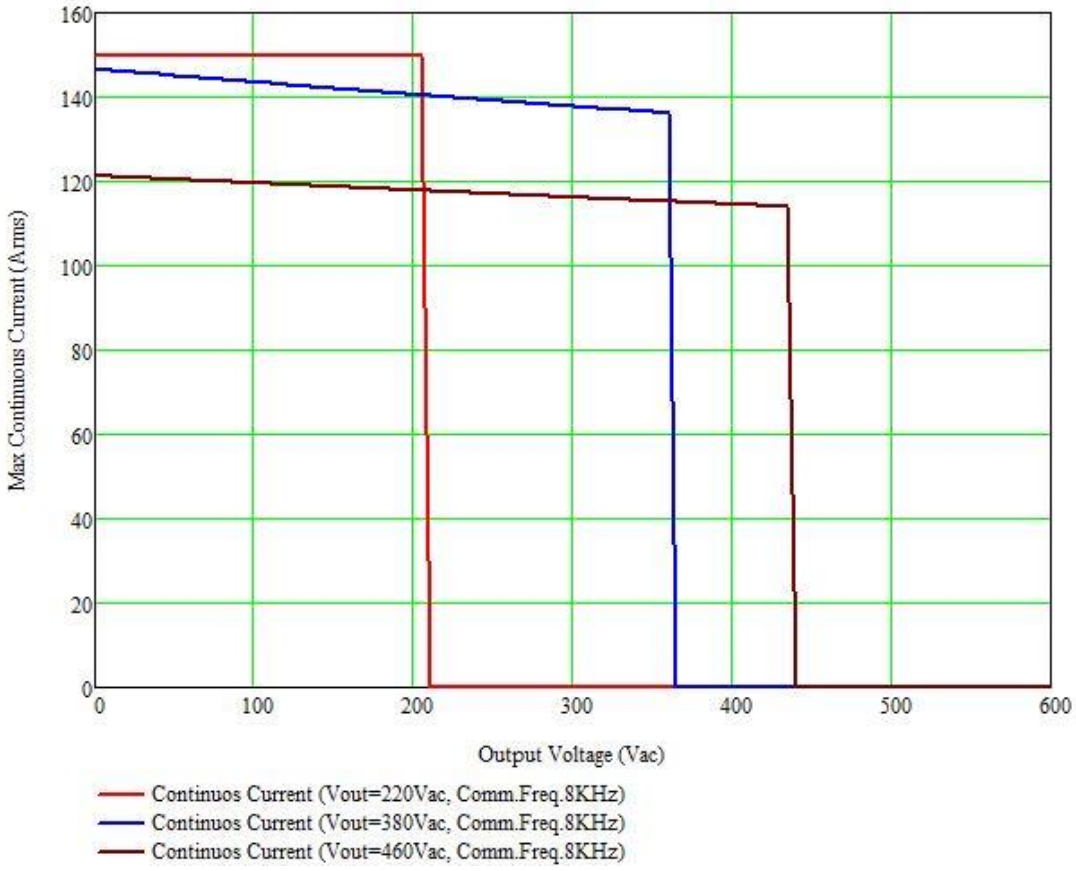


AxN 90.150.4

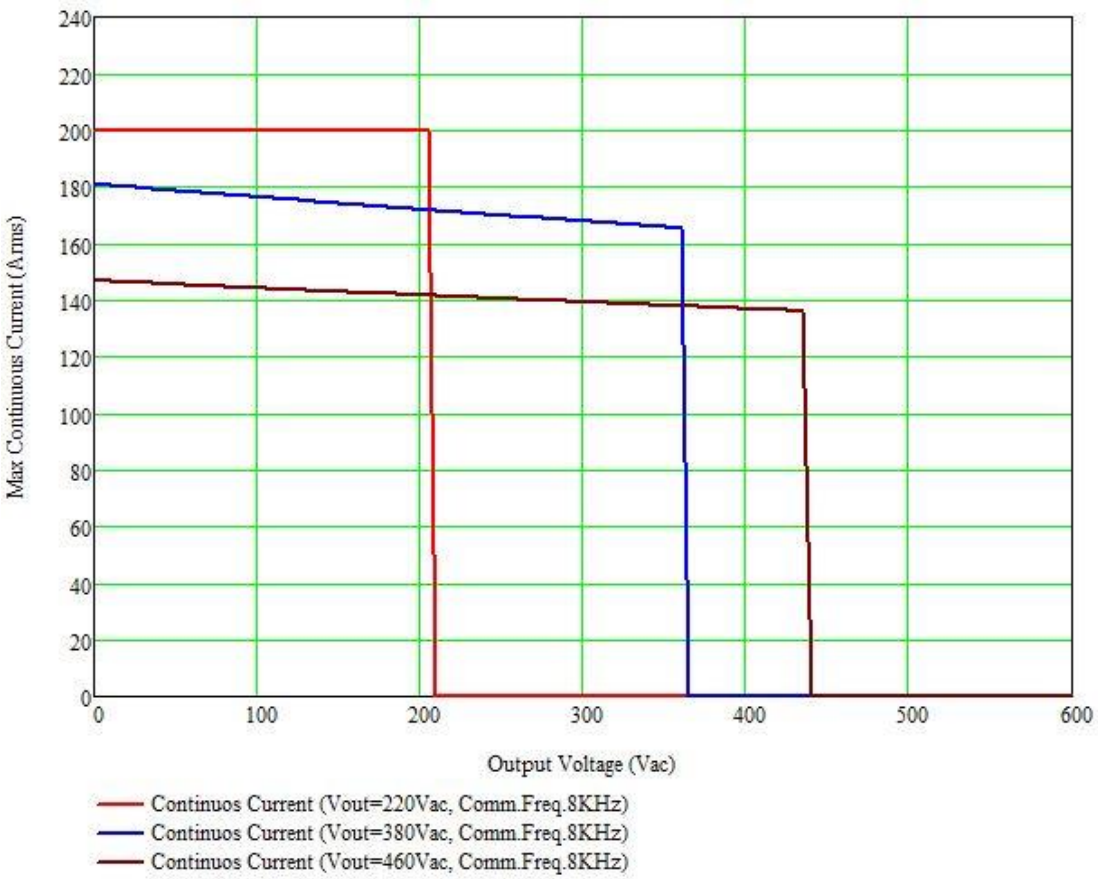


AxN 110.200.4

Max Continuous Current VS. Output Voltage (at 40℃)



AxN 90.150.4


Max Continuous Current (Arms)
240
220
200
180
160
140
120
100
80
60
40
20
0
0
100
200
300
400
500
600
Output Voltage (Vac)
Continuos Current (Vout=220Vac, Comm.Freq.8KHz)
Continuos Current (Vout=380Vac, Comm.Freq.8KHz)
Continuos Current (Vout=460Vac, Comm.Freq.8KHz)

AxN 110.200.4

2.5 AxN Series Ambient Conditions

Ambient Conditions

Ambient Conditions	AxN Series
Protection	IP20
Accident Prevention Regulations	According to local regulations
Mounting Altitude	Up to 1000m above MSL, over 1000 m above MSL with power reduction (1% per 100m)
Pollution Severity	2
Installation Type	Built-in unit, only for vertical installation in a switch cabinet with min. IP4x protection
Environment	Far away from corrosive, flammable gases, droplets of oil or dust etc.

Climatic Conditions

Climatic Conditions		AxN Series
In Transit	As per EN 61800-2，IEC 60721-3-2 class 2K3(1)	
	Temperature	-25℃ to +85℃
	Relative air humidity	5 to 90% without condensation
In Storage	As per EN 61800-2，IEC60721-3-1 class 1K3 和 1K4(2)	
	Temperature	-25℃ to +85℃
	Relative air humidity	5 to 90% without condensation
In Operation	As per EN 61800-2，IEC60721-3-3 class 3K3(3)	
	Temperature	0℃ to 40℃，up to 60℃ with power reduction(See graphic)
	Relative air humidity	5 to 95% without condensation

(1) The absolute humidity is limited to max. 60 g/m³. This means, at 70 °C for example, that the relative humidity may only be max. 40 %.

(2) The absolute humidity is limited to max. 29 g/m³. So the maximum values for temperature and relative air humidity stipulated in the table must not occur simultaneously.

(3) The absolute humidity is limited to max. 25 g/m³. That means that the maximum values for temperature and relative air humidity stipulated in the table must not occur simultaneously.

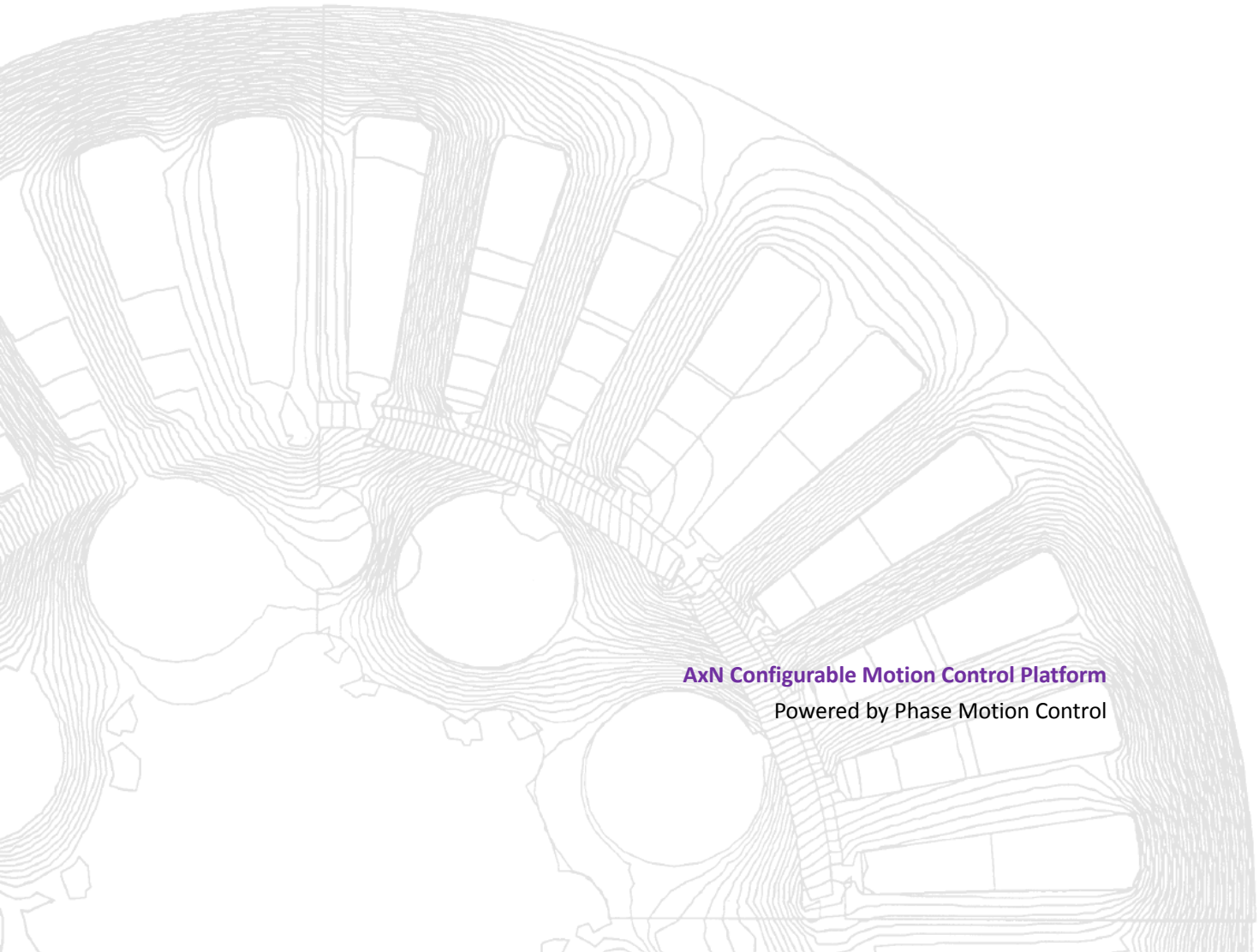
Mechanical Conditions

Mechanical Conditions		AxN Series	
Vibration Limit in Transit	As per EN 61800-2, IEC 60721-3-2 class 2M1		
	Frequency (Hz)	**Amplitude (mm)**	**Acceleration (m/s²)**
	$2 \leq f < 9$	3.5	Not Applicable
	$9 \leq f < 200$	Not Applicable	10
	$200 \leq f < 500$	Not Applicable	15
Shock Limit in Transit	As per EN 61800-2, IEC 60721-2-2 class 2M1		
	Drop height of packed device max. 0.25m		

Vibration Limit of the system(1)	As per EN 61800-2，IEC 60721-3-3 class 3M1		
	Frequency (Hz)	**Amplitude (mm)**	**Acceleration (m/s^2)**
	$2 \leq f < 9$	0.3	Not Applicable
	$9 \leq f < 200$	Not Applicable	1

(1) NOTE: The devices are only designed for stationary use.

3 MECHANICAL INSTALLATION



3.1 Notes for Operation

Avoid

Please be sure to avoid:

1. penetration of damp into the device;
2. aggressive or conductive substances in the immediate vicinity;
3. explosive and flammable substances in the immediate vicinity;
4. drill chippings, screws or foreign bodies dropping into the device;
5. ventilation openings being covered over, as otherwise the device may be damaged

Note

Note the following points:

1. Make sure every part of the drive is anchored before moving the drive. Failure to comply may result in minor or moderate injury from the drive parts falling.
2. Observe proper electrostatic discharge (ESD) procedures when handling the drive. Failure to comply could result in ESD damage to the drive circuitry;
3. Prevent foreign matter such as metal shavings or wire clippings from falling into the drive during installation and project construction. Failure to comply could result in damage to the drive. Place a temporary cover over the top of the drive during installation. Remove the temporary cover before start-up, as the cover will reduce ventilation and cause the drive to overheat.
4. Install proper cooling to ensure the temperature in the enclosure does not exceed 40 °C.

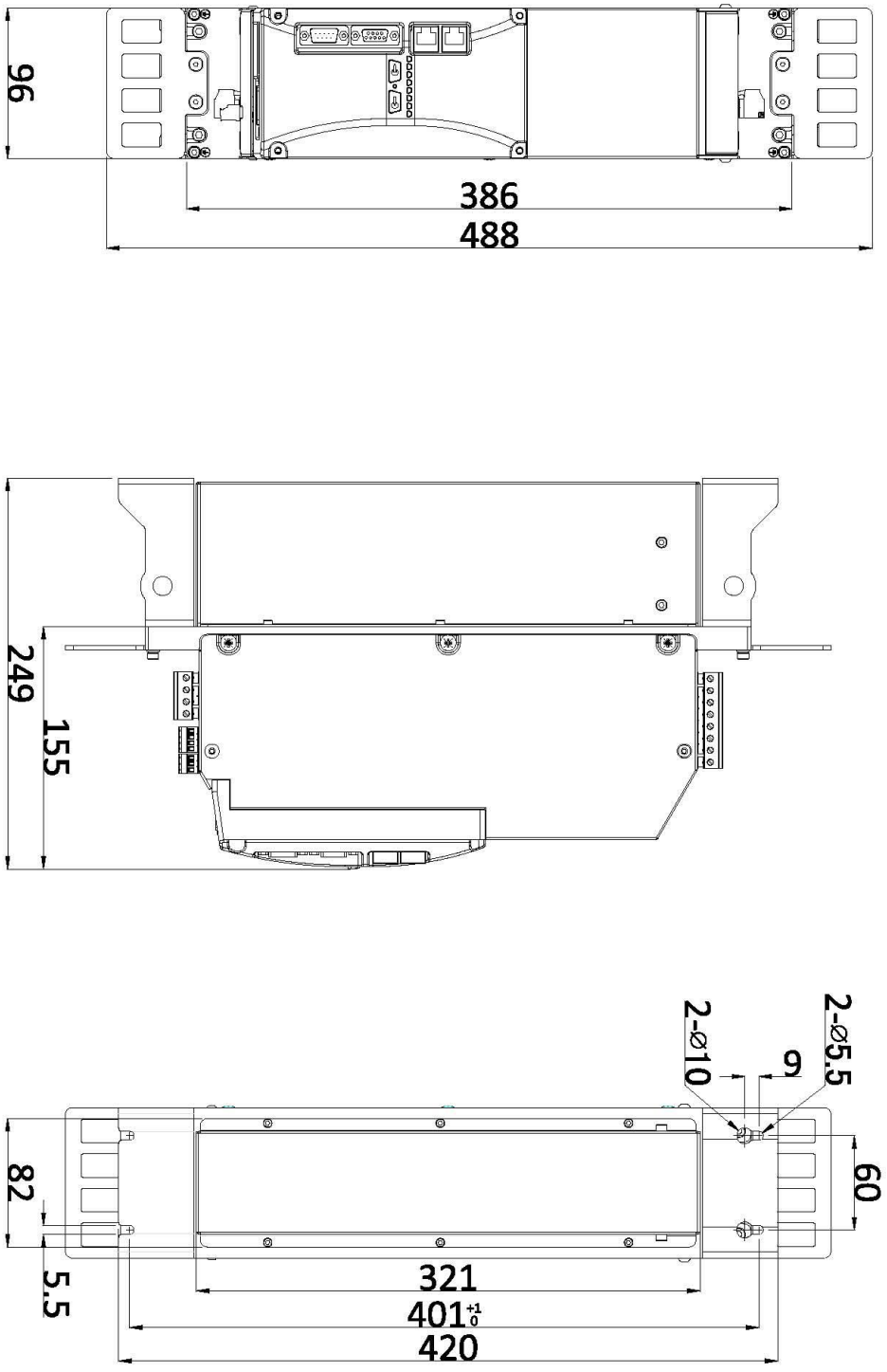
3.2 Installation Environment

To help prolong the optimum performance life of the drive, install the drive in the proper environment. The table below provides description of the appropriate environment for the drive.

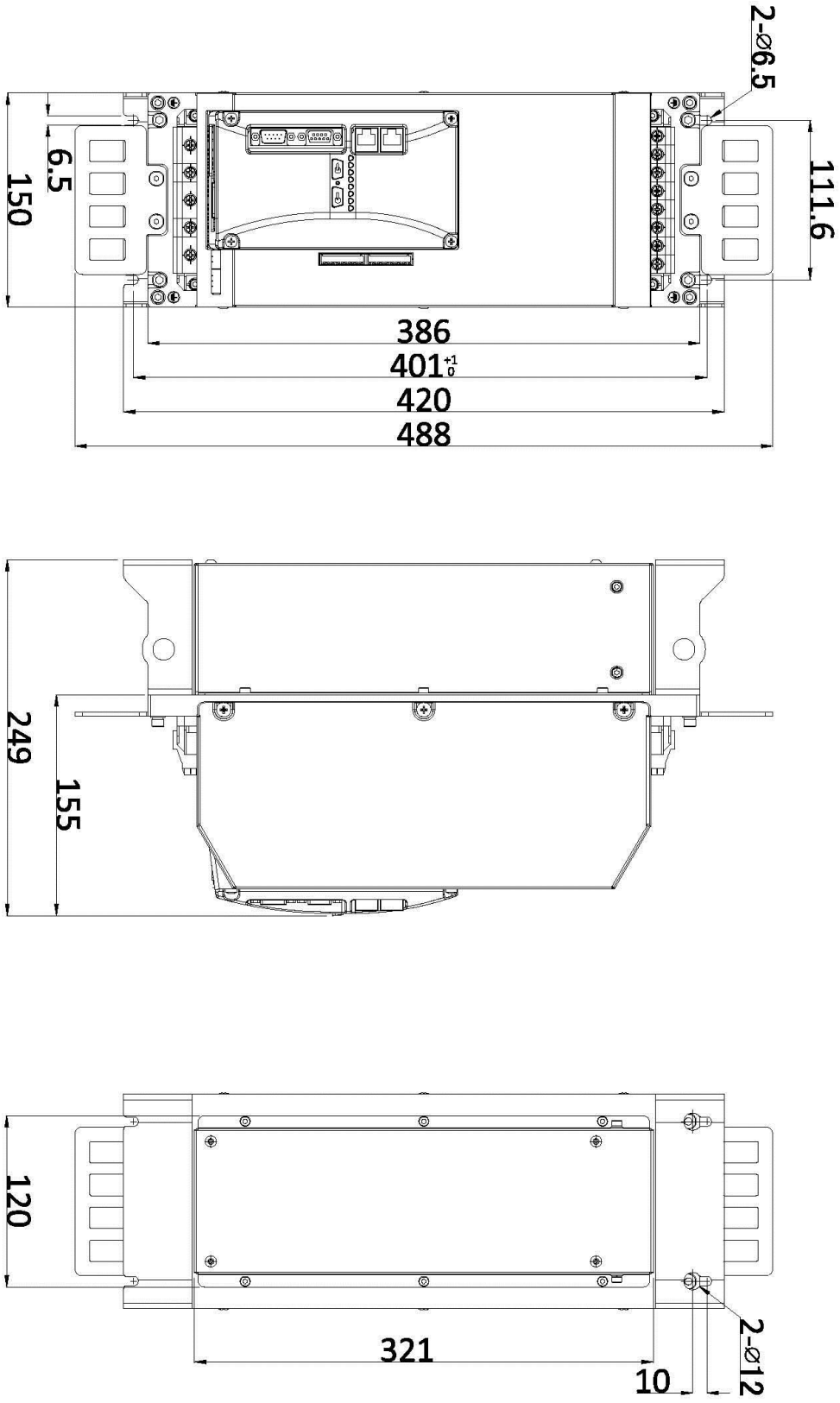
Environment	Condition
Installation Area	Indoor
Ambient Temperature	0℃ to 40℃, up to 50℃ with power reduction (2%/℃) Drive reliability improves in environments without wide temperature fluctuations. When using an enclosure panel, install a cooling fan or air conditioner in the area to ensure that the air temperature inside the enclosure does not exceed the specified levels. Do not allow ice to develop on the drive.
Humidity	5 to 90% without condensation
Surrounding Area	Install the drive in an area free from: 1. oil mist and dust 2. metal shavings, oil, water or other foreign materials 3. radioactive materials 4. combustible materials (e.g., wood)

	5. harmful gases and liquids 6. excessive vibration 7. chlorides
Altitude	Up to 1000m above MSL, over 1000 m above MSL with power reduction (3% per 100m)
Vibration	Amplitude up to 0.3mm at 2 to 9 Hz Acceleration up to 1m/s^2 at 9 to 200 Hz
Orientation	Install the drive vertically to maintain maximum cooling effects.

3.3 Overall Dimensions

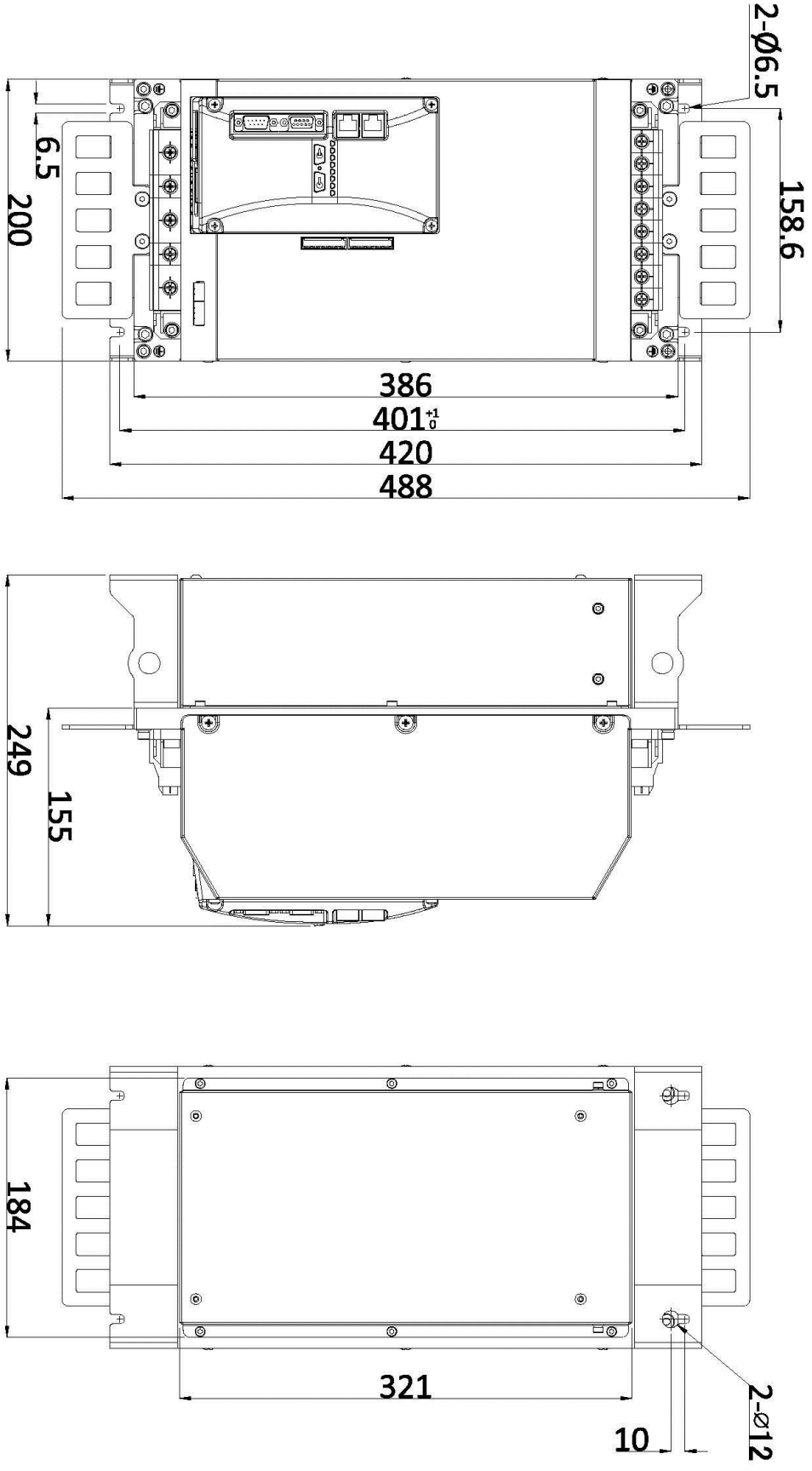


Overall Dimensions of AxN Size2 —— AxN15.30.4

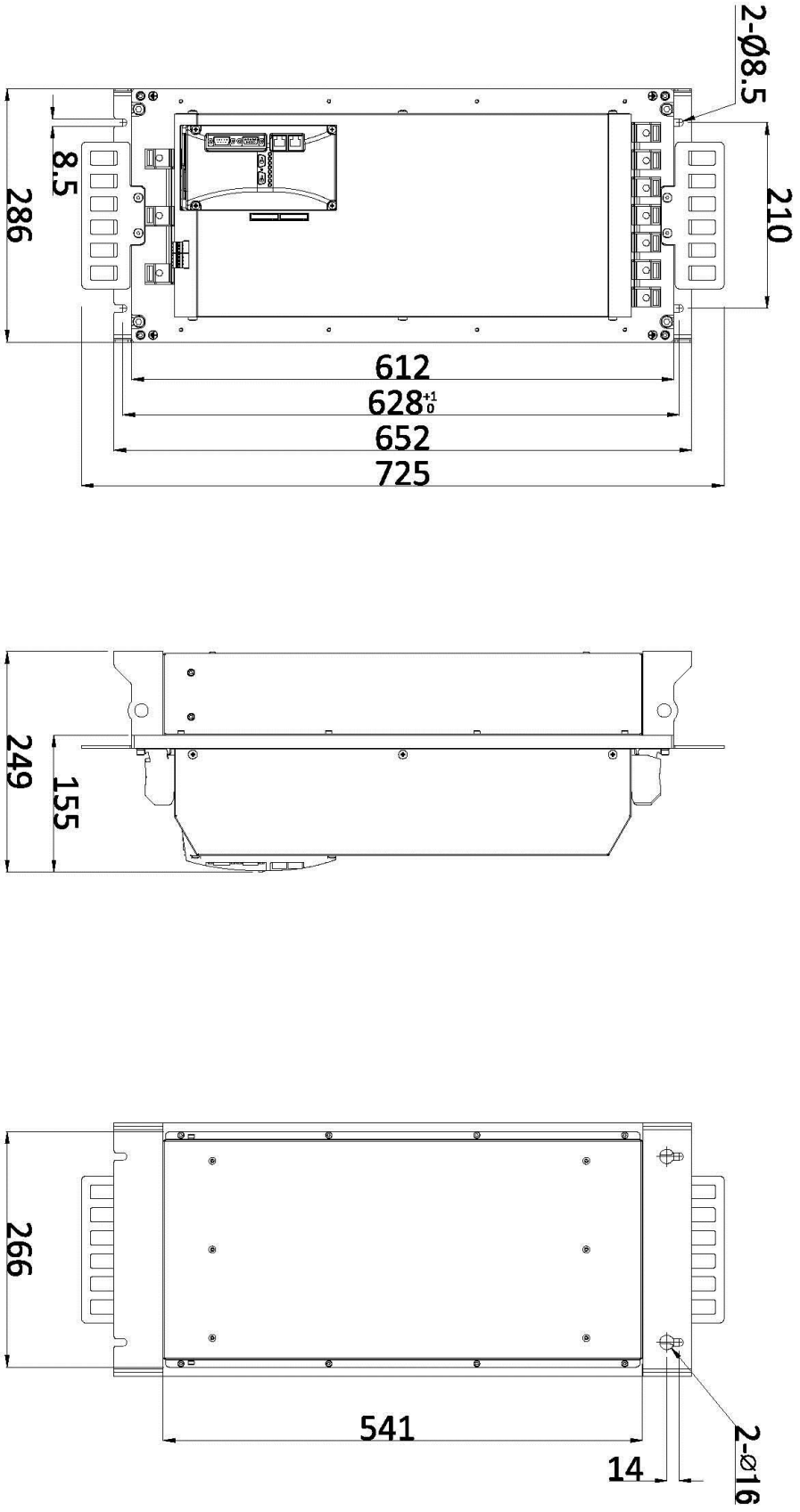


Overall Dimensions of AxN Size3

—— AxN22.44.4、AxN35.70.4、AxN50.100.4



Overall Dimensions of AxN Size4 —— AxN70.140.4



Overall Dimensions of AxN Size5

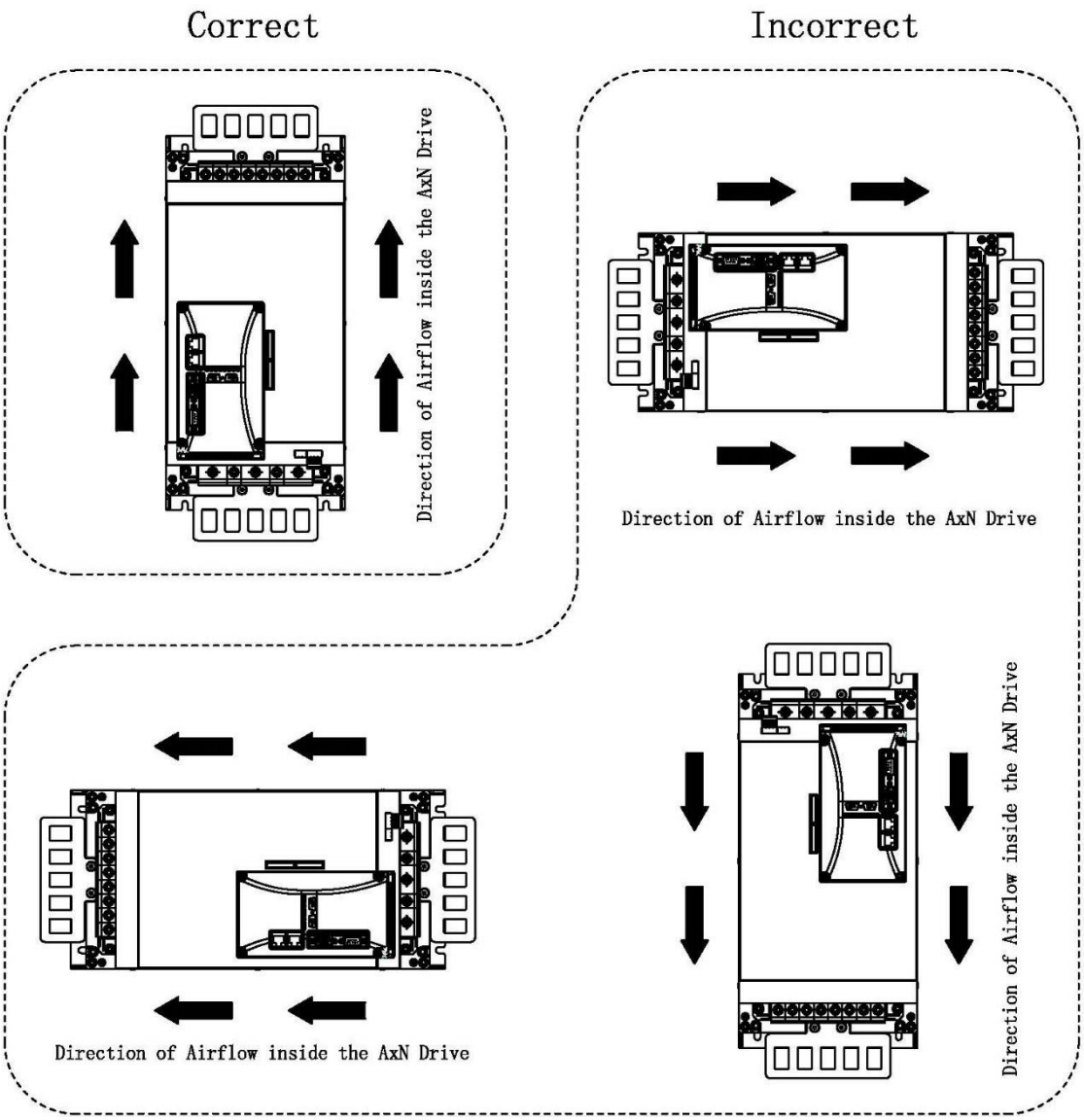
—— AxN90.150.4、AxN110.200.4

3.4 Installation Orientation and Spacing

Installation Orientation

To maintain proper cooling, install the AxN drive upright inside the switch cabinet as illustrated below:

WARNING: The airflow inside the drive must be upright after installation as illustrated below. If other form of installation must be taken, CONNECT PMC ENGINEER BEFORE INSTALLATION.

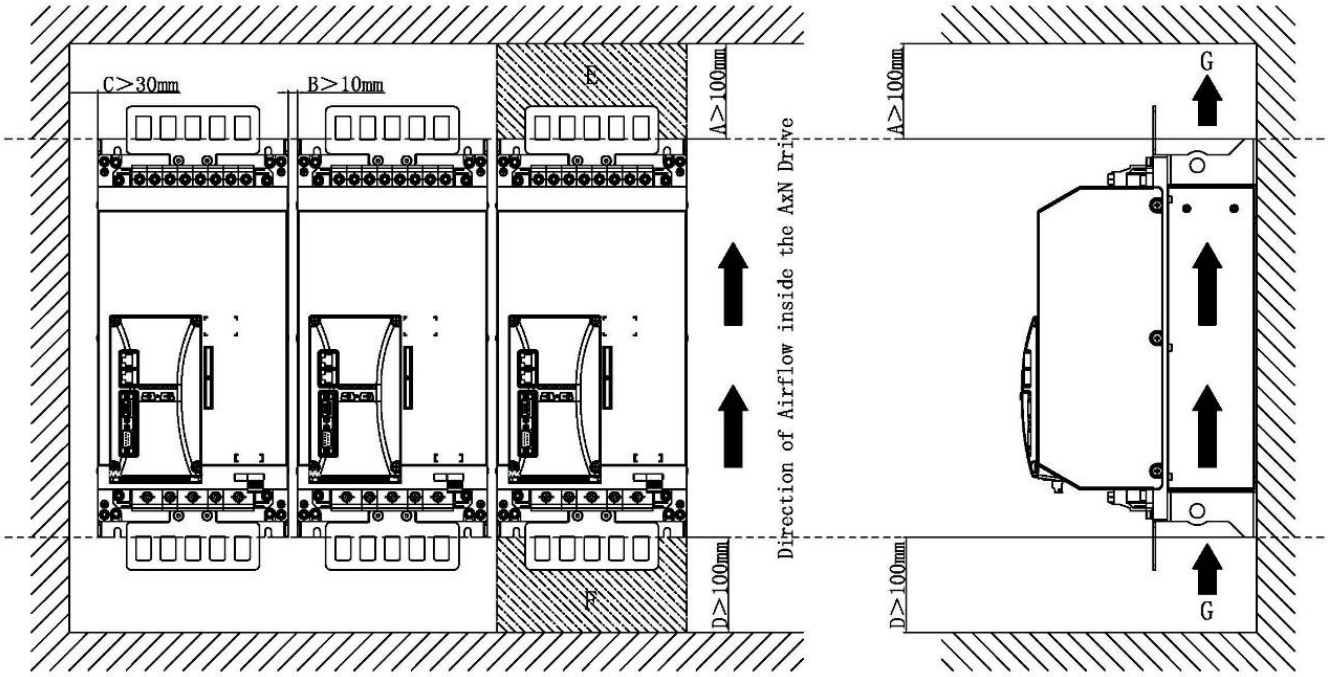


Installation Orientation of AxN Series Drive

Note: Using AxN Size4 as an example.

Installation Spacing

To maintain sufficient space for airflow and wiring, the space between AxN drive and other device (including other AxN drives) must comply the requirement below.



Installation Spacing of AxN Series Drive

Note: Using AxN Size4 as an example.

No.	Distance	Description
A	＞100mm	The distance between the top of the switch cabinet, to ensure enough space for air-out.
B	＞10mm	The distance between other device (including other AxN drives and peripheral devices)
C	＞30mm	The distance between the inside wall of the switch cabinet.
D	＞100mm	The distance between the bottom of the switch cabinet, to ensure enough space for air-in.
E	＞100mm	Air-out area, do not place any other device in this area
F	＞100mm	Air-in area, do not place any other device in this area
G		Airflow Direction

NOTE: The switch cabinet must have air outlets and inlets to ensure the thermal exchange between the cold air outside and the hot air inside.

3.5 Special Installation

Thanks to the modular design, AxN Series Drive is very flexible on installation. Other than standard installation, AxN Series Drive has two more installation forms: Though Panel Installation and Heat Conducting Base Installation.

Advantage and Application

The selection of the drive installation environment is very tricky, because the two key elements of drive installation is paradoxical. On the one hand, the installation environment should be airtight. Because it can protect the drive from oil, water, dust and other environmental elements which would damage the drive. But on the other hand, for the sake of heat dissipation, the drive needs an open environment.

Now, AxN Series Drive has two solutions for the confliction: Though Panel Installation and Heat Conducting Base Installation.

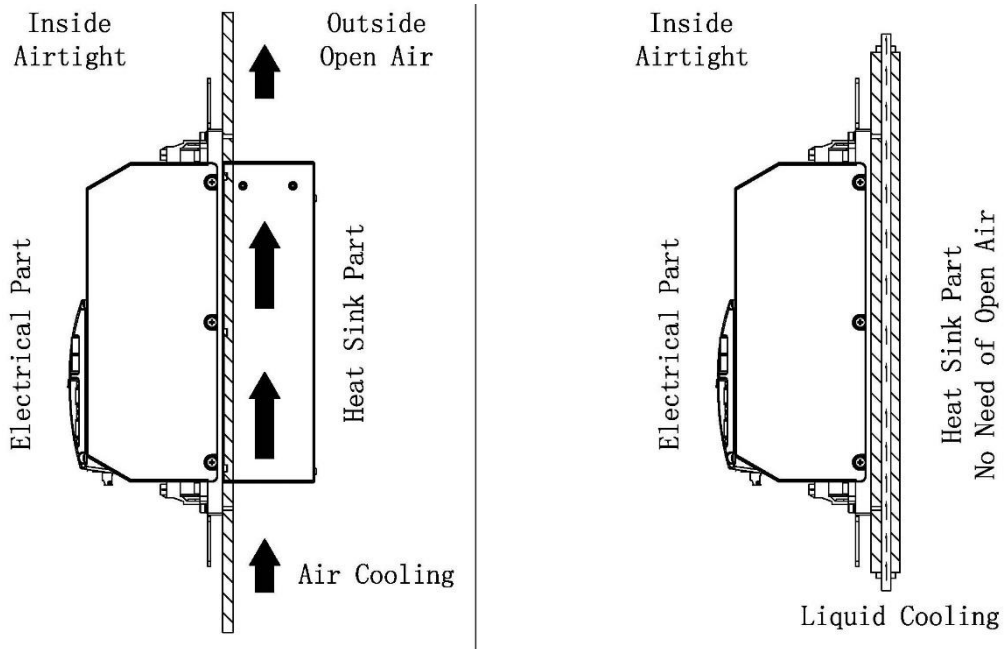
Through Panel Installation (Air Cooling)

The panel divides the drive into two parts which have different needs: the electrical part and the heat sink part. The electrical part needs airtight and the heat sink part needs open air, so that the confliction is solved natural.

If the panel is strong enough, the through panel installation can be performed in any switch cabinet. Also, if the system has a public air ducting, you can put AxN drive's heat sink into the air ducting by through panel installation.

Heat Conducting Base Installation (Liquid Cooling)

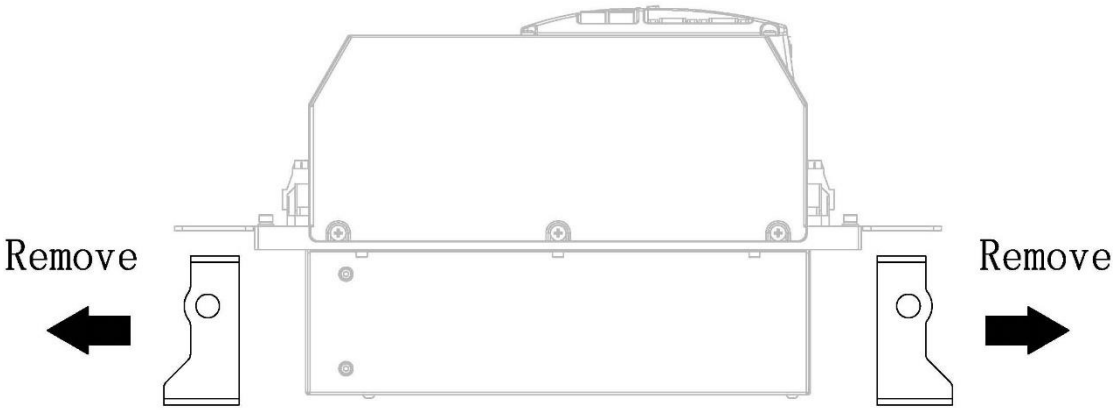
The Heat Conducting Base Version use system's heat conducting base to dissipate the heat, and no longer need heat sink and fan. So that it no long need the open air. Problem solved either.



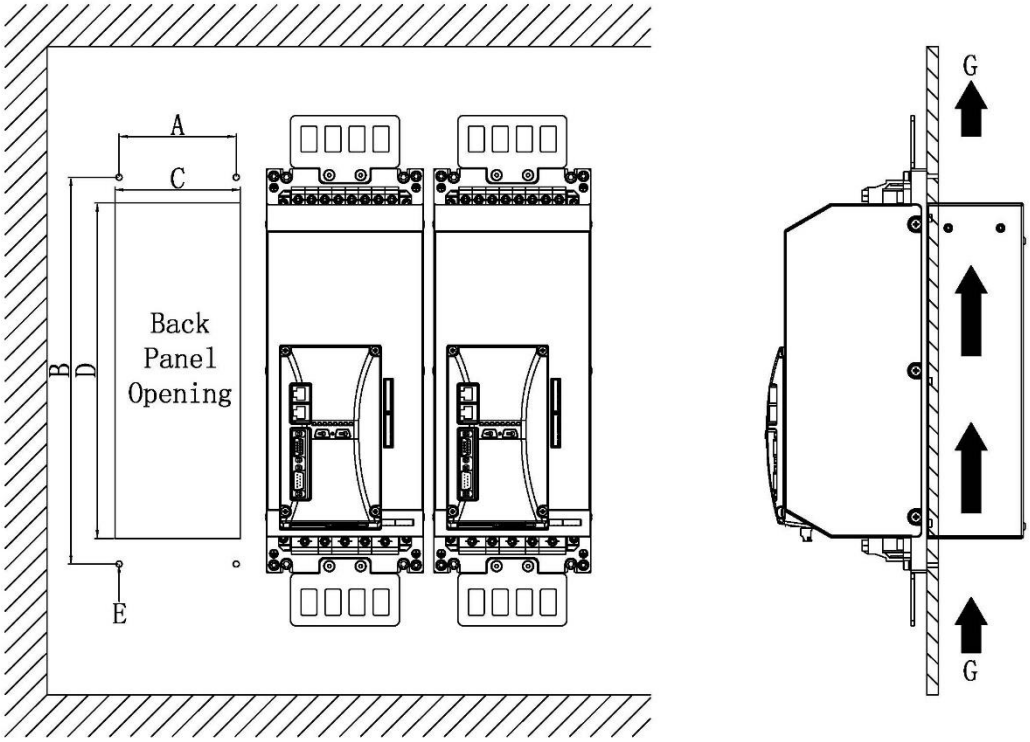
3.5.1 Though Panel Installation

Preparation

Before conduction Though Panel Installation, remove the hook module of AxN Series Drive as below:



Installation Dimensions



No.	Description	AxN Size2	AxN Size3	AxN Size4	AxN Size5
A	Horizontal Spacing of Screws(mm)	66 ± 0.3	112 ± 0.3	162 ± 0.3	240 ± 0.3
B	Vertical Spacing of Screws(mm)	370 + 0.5			596 + 0.8
C	Width of Panel Opening(mm)	82	120	184	266
D	Height of Panel Opening(mm)	321			541
E	Screw Hole	M5	M6		M8
G	Airflow Direction				

NOTE: Other installation spacing is as same as standard installation.

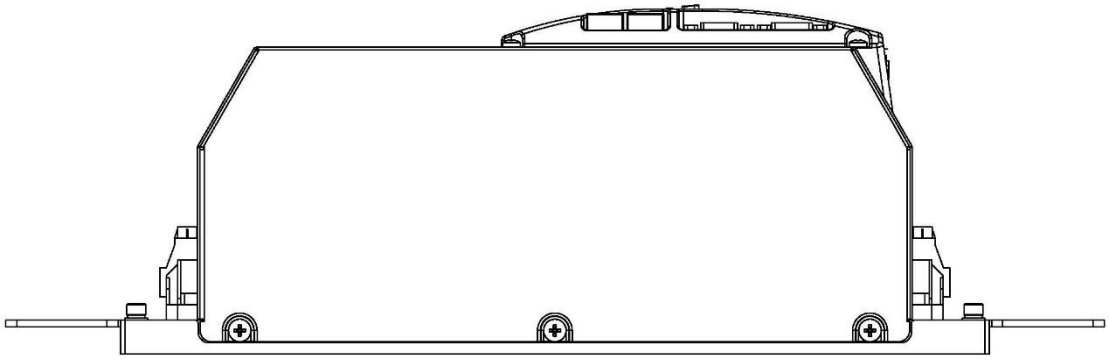
Installation Orientation

After Installation, if the heat sink of AxN Series Drive is in a stationary air, the installation orientation should be upright just like the standard installation. On the other hand, if the heat sink is in a stable airflow, the orientation of AxN drive should follow the external airflow direction.

3.5.2 Heat Conducting Base Installation

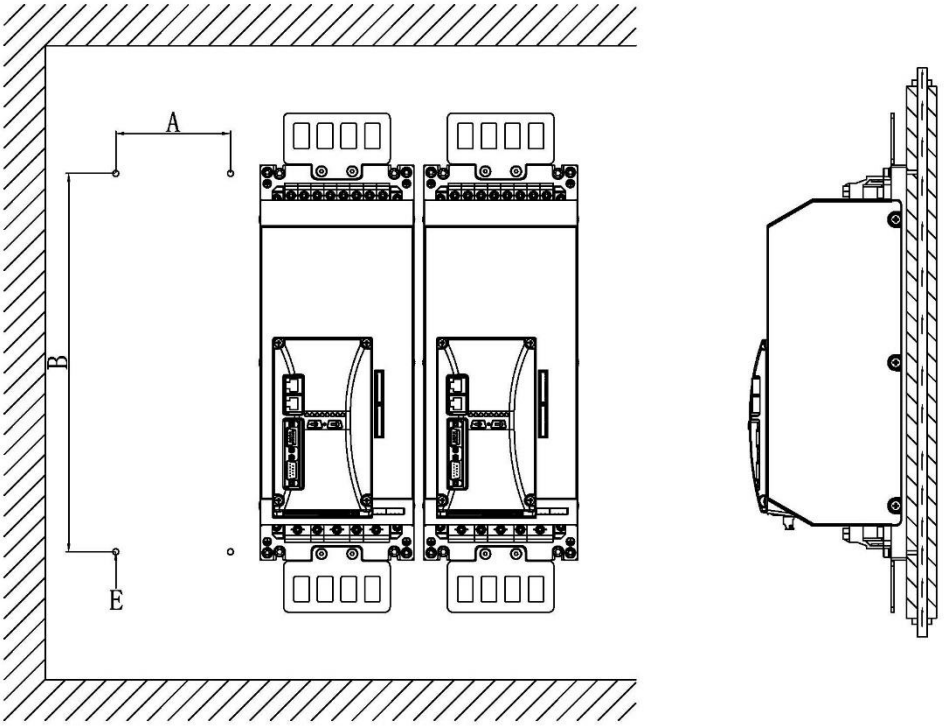
Preparation

Confirm that the drive is a Heat Conducting Base Version AxN Drive before the Installation. The Heat Conducting Base Version AxN Drive changes the heat sink by removing the cooling fins and fans, only left the heat conducting base. So that the Heat Conducting Base Version AxN Drive cannot be obtained by just removing some modules of a standard AxN drive. The heat conducing base version AxN drive should be specifically requested during order.



AxN Drive —— Heat Conducting Base Version

Installation Dimensions

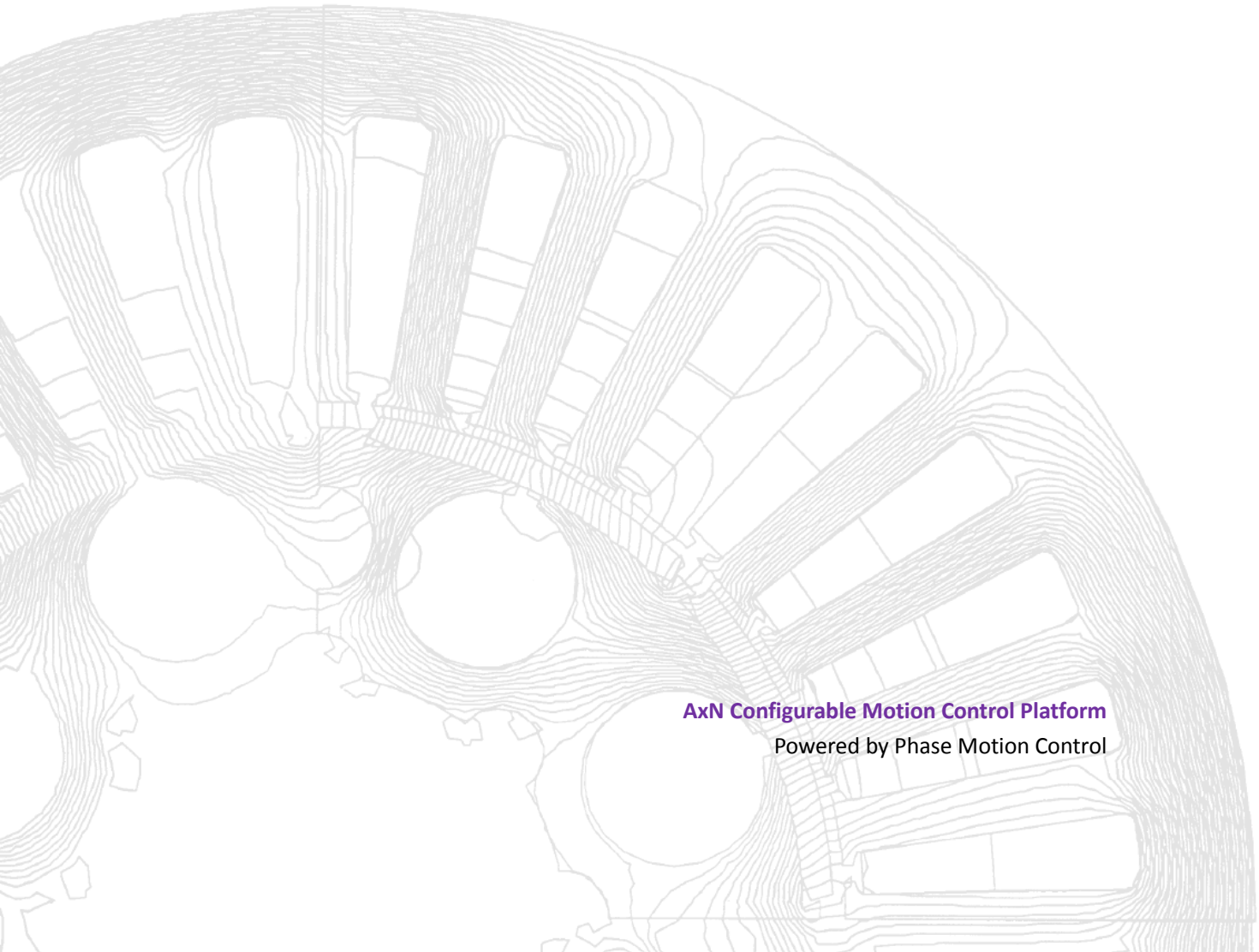


No.	Description	AxN Size2	AxN Size3	AxN Size4	AxN Size5
A	Horizontal Spacing of Screws(mm)	66 ± 0.3	112 ± 0.3	162 ± 0.3	240 ± 0.3
B	Vertical Spacing of Screws(mm)	370 + 0.5			596 + 0.8
E	Screw Hole	M5	M6		M8
G	Airflow Direction				

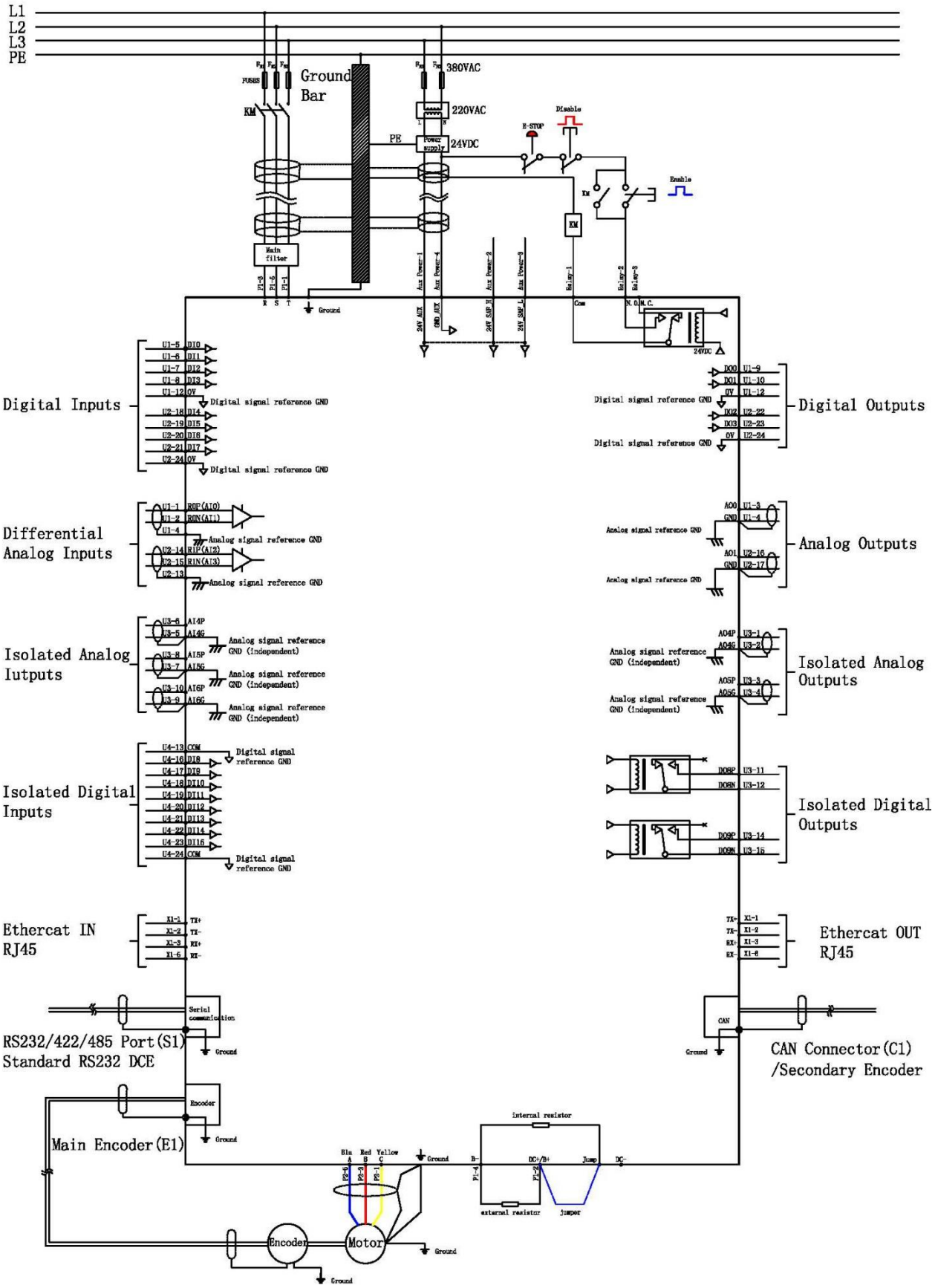
Installation Orientation

There are on special installation orientation request for heat conducting base version of AxN drive.

4 ELECTRICAL INSTALLATION



4.1 Standard Connection Diagram



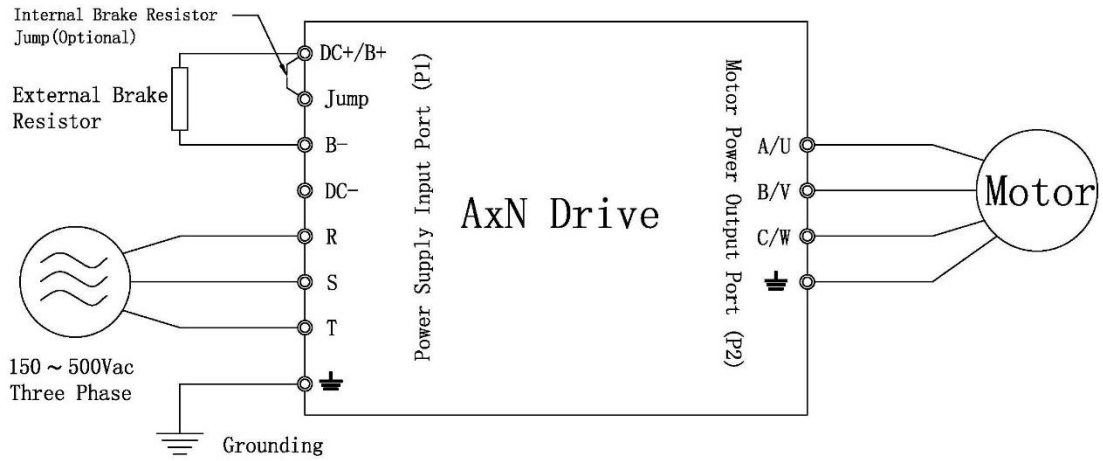
4.2 Main Circuit

4.2.1 Main Circuit Connection Diagram

AxN Series Drive can use AC power or DC power as its power supply. Refer to the following figures for standard drive connection diagram.

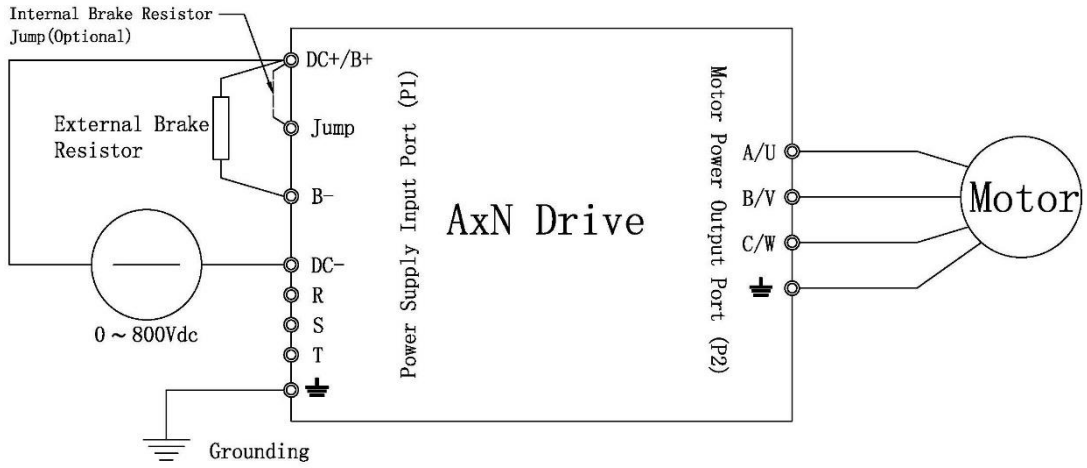
NOTE: DO NOT USE BOTH AC power supply and DC power supply AT THE SAME TIME!

AC Power Supply



Main Circuit Connection Diagram: AC Power

DC Power Supply



Main Circuit Connection Diagram: DC Power

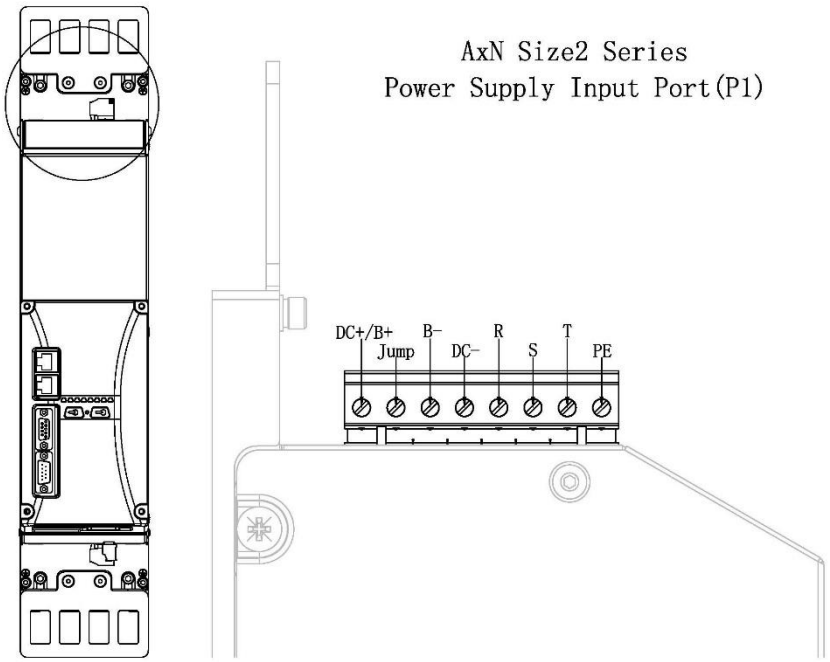
4.2.2 Power Supply Input Port (P1)

AxN Series Drives' Power Supply Input Port (P1) have 8 terminals: PE, T, S, R, DC-, B-, Jump and DC+/B+. And the P1 port has 4 functions by using different combinations of terminals: **AC Power Supply Input**, **DC Power Supply Input**, **External Brake Resistor Connection** and **Internal Brake**

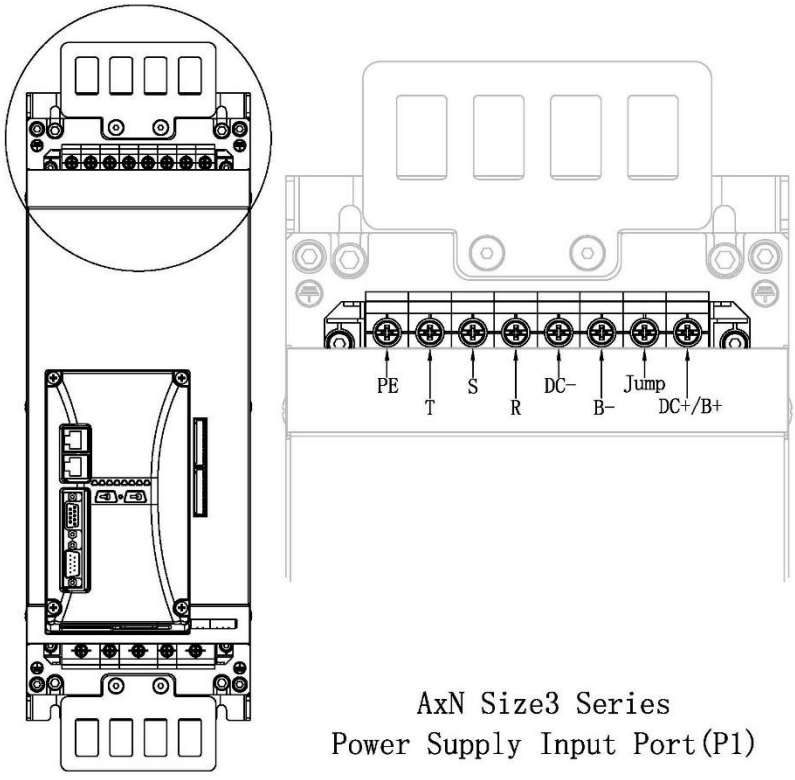
Resistor Activation. The appearance of P1 ports may be different depend on Sizes. But they all have the same functions.

Port Location

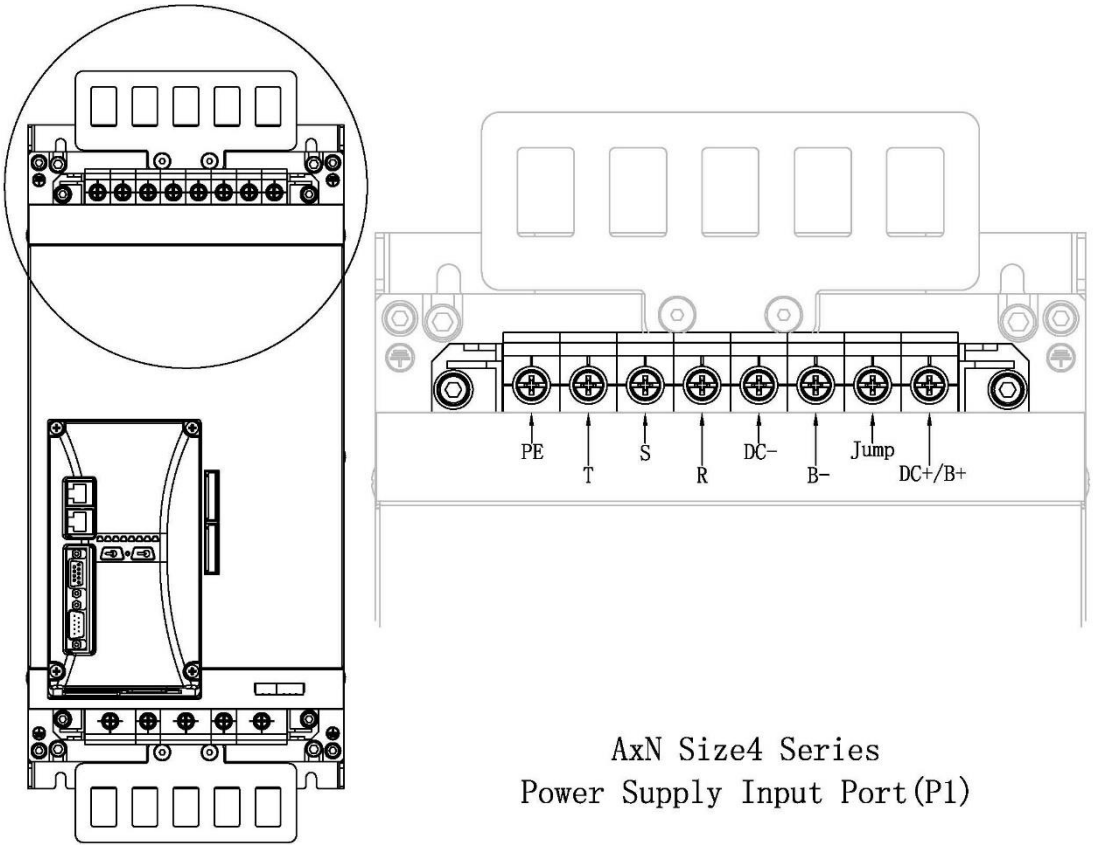
AxN Series Drive's Power Supply Input Port (P1) is on the top of the drive. Refer to the following figures for exact locations on different Sizes Drives.



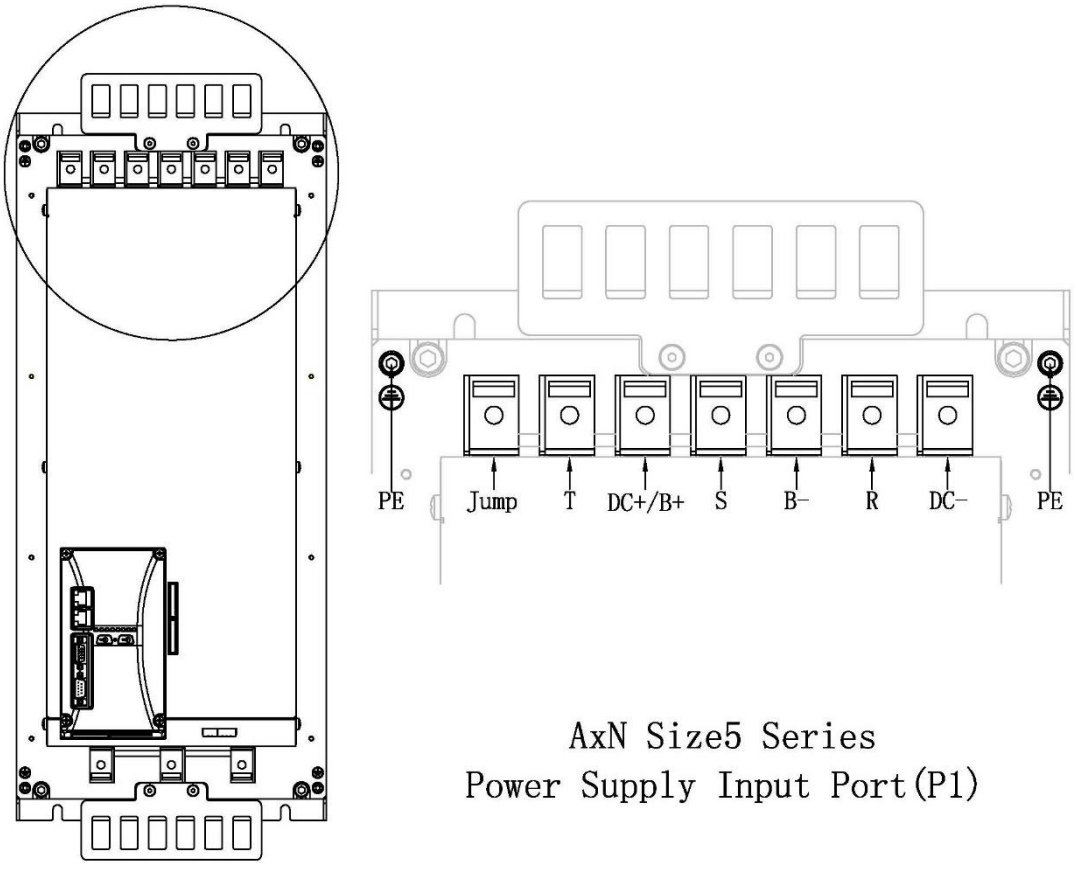
Size2 (AxN 15.30.4)



Size3 (AxN 22.44.4, AxN 35.70.4, AxN 50.100.4)



Size4 (AxN 70.140.4)



Size5 (AxN 90.150.4, AxN 110.200.4)

Terminal Configuration

AxN Series Drive's Power Supply Input Port (P1) has 8 terminals: PE, T, S, R, DC-, B-, Jump and DC+/B+ (AxN Size5 Series use the PE terminals on the shield as its P1 PE terminal). And the P1 port has different functions by using different combinations of terminals. Refer to following table for more details:

Function	Terminal	Definition	Description
AC Power Supply Input	**T**	Three phase AC power supply: phase	150 ~ 500 Vac three phase AC power supply
	S	Three phase AC power supply: phase	
	R	Three phase AC power supply: phase	
	PE	Three phase AC power supply: grounding	
DC Power Supply Input	**DC+/B+**	DC power supply: positive (+)	0 ~ 800 Vdc DC power supply
	DC-	DC power supply: negative (-)	
	PE	DC power supply: grounding	
External Brake Resistor	**DC+/B+**	External brake resistor: positive (+)	More details refer to 4.2.5 Brake Resistor
	B-	External brake resistor: negative (-)	
Internal Brake Resistor	**DC+**	Internal brake resistor: positive (+)	More details refer to 4.2.5 Brake Resistor
	Jump	Internal brake resistor: negative (-)	

4.2.3 AC Power Supply Input

AC Power Supply Requirement

Mains Supply	AxN Series
Voltage	150 ~ 500V
Type	Three-phase AC power
Frequency	50/60Hz
Fluctuation of Frequency	±10% (45 ~ 66Hz)
Asymmetry	±3%

Cable

Wire Gauge

AxN series drive must use a 4 wire cable with shield as its AC power supply cable. Refer to the table below to select the appropriate cables for different types:

AxN Series	Current (A rms)	Recommended Gauge (mm^2)	Recommended Gauge (AWG)
AxN 15.30.4	15	4.17	11
AxN 22.44.4	22	5.26	10
AxN 35.70.4	35	8.37	8
AxN 50.100.4	50	13.3	6
AxN 70.140.4	70	16.77	5
AxN 90.150.4	90	21.15	4
AxN 110.200.4	110	26.67	3

Pre-insulated Crimp Terminals

Crimping pre-insulated Terminals on the wires will enhance the connection stability and simplicity between the cable and drive. AxN Size 2, 3 and 4 series drives are recommended to use the E Series Cord End Terminals manufactured by KST. And AxN Size 5 series drives are recommended to use the RNY Series Ring Terminals also manufactured by KST. Refer to the following table to select the appropriate terminals for different types:

NOTE: AxN Size5 Series' Cable MUST be crimped with Ring Terminals before installation.

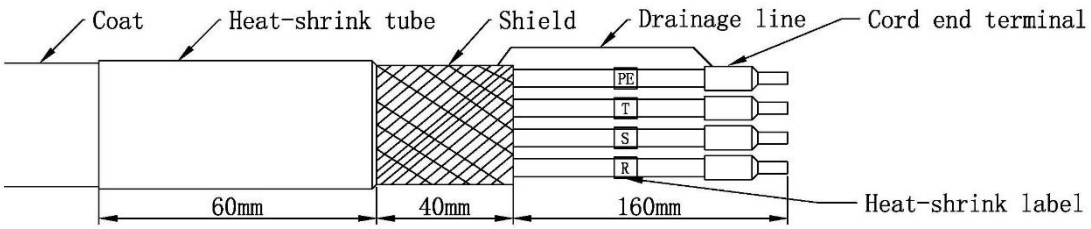
AxN Series	Recommended Pre-insulated Crimp Terminals	Recommended Strip Length(mm)
AxN 15.30.4	E4012	14
AxN 22.44.4	E6012	14
AxN 35.70.4	E10-12	14
AxN 50.100.4	E16-12	14
AxN 70.140.4	E16-12	14
AxN 90.150.4	RNYB22-8(Phase) / RNYBS22-6(Ground)	12
AxN 110.200.4	RNYB22-8(Phase) / RNYBS22-6(Ground)	12

Cable Shield Grounding

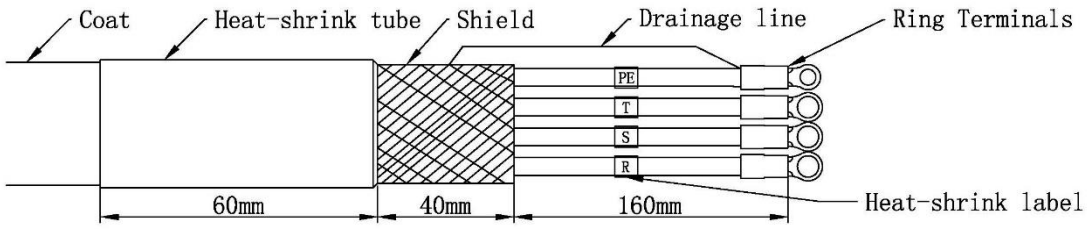
Wiring the cable shield to ground is a very helpful method to reduce interference. Follow these two precautions to ground the cable shield:

1. Pull out some shield and fix it on the outside of the cable with heat-shrink tube.
2. Use a drainage line to connect the Cable Shield and PE (Ground) wire.

Cable Sketch



AxN Size2, Size3, Size4



AxN Size5

AC Power Installation

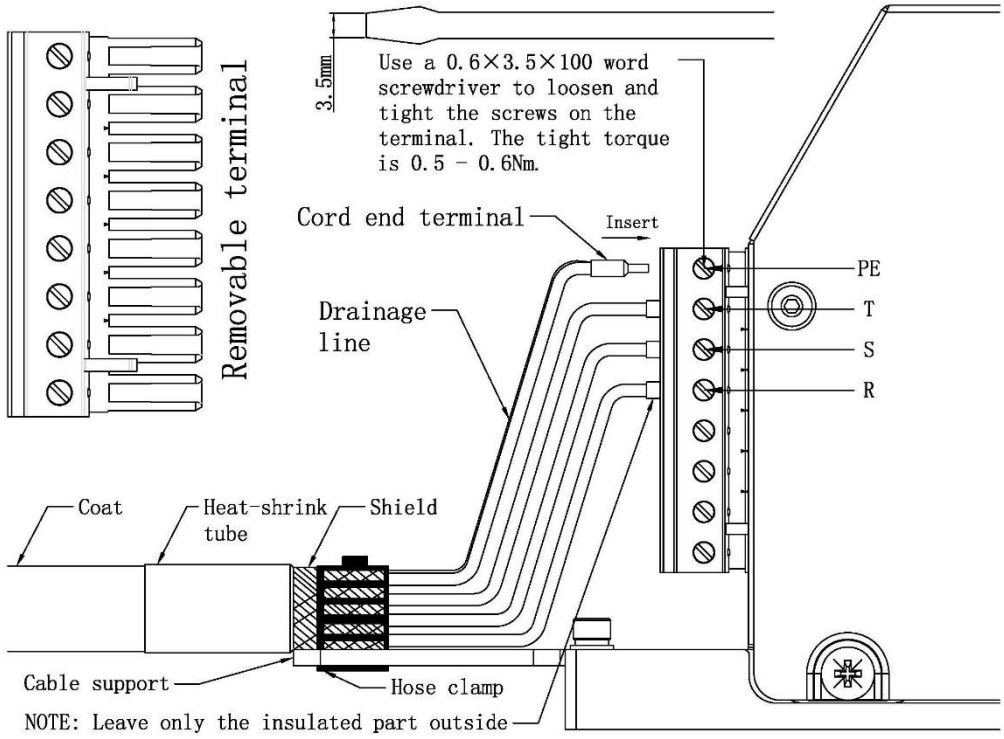
Wiring and Torque Specification

Insert the 4 wires of the AC power supply cable into the correspond terminals on the P1 port: **T to T, S to S, R to R and PE to PE**. For AxN Size2 Series, the nominal torque to tight these terminals is 0.5 ~ 0.6 Nm; for AxN Size 3, 4 and 5, the nominal torque to tight these terminals is 4.0 ~ 4.5 Nm.

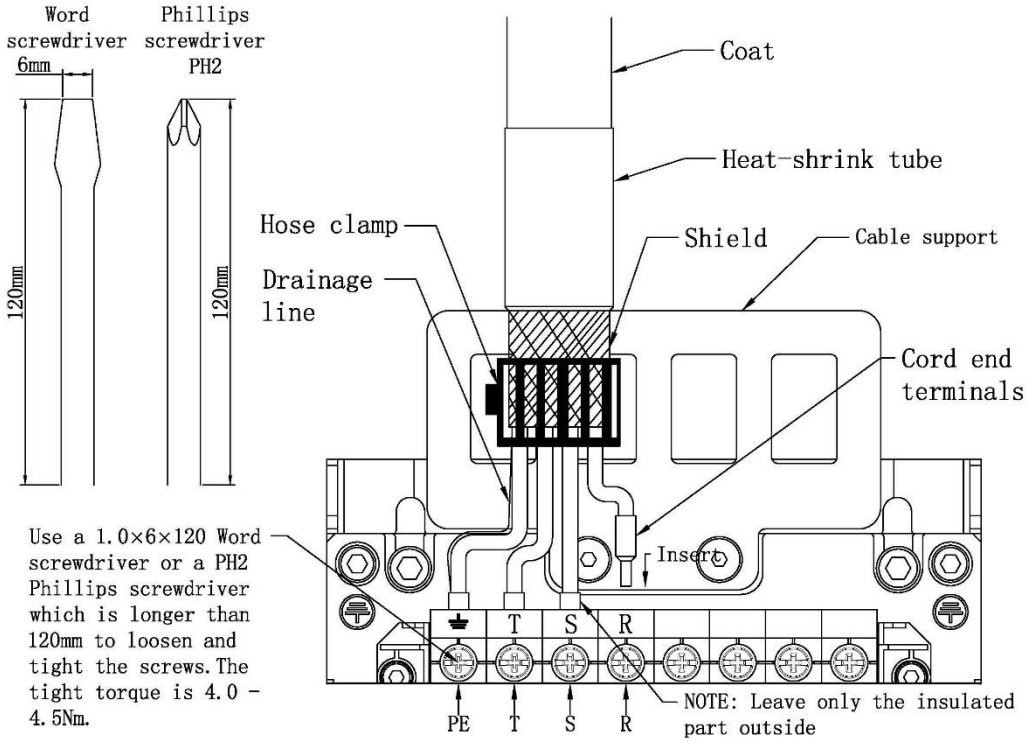
If the tight torque reaches higher than 8.5Nm, the terminal will be broken.

Cable Fixing

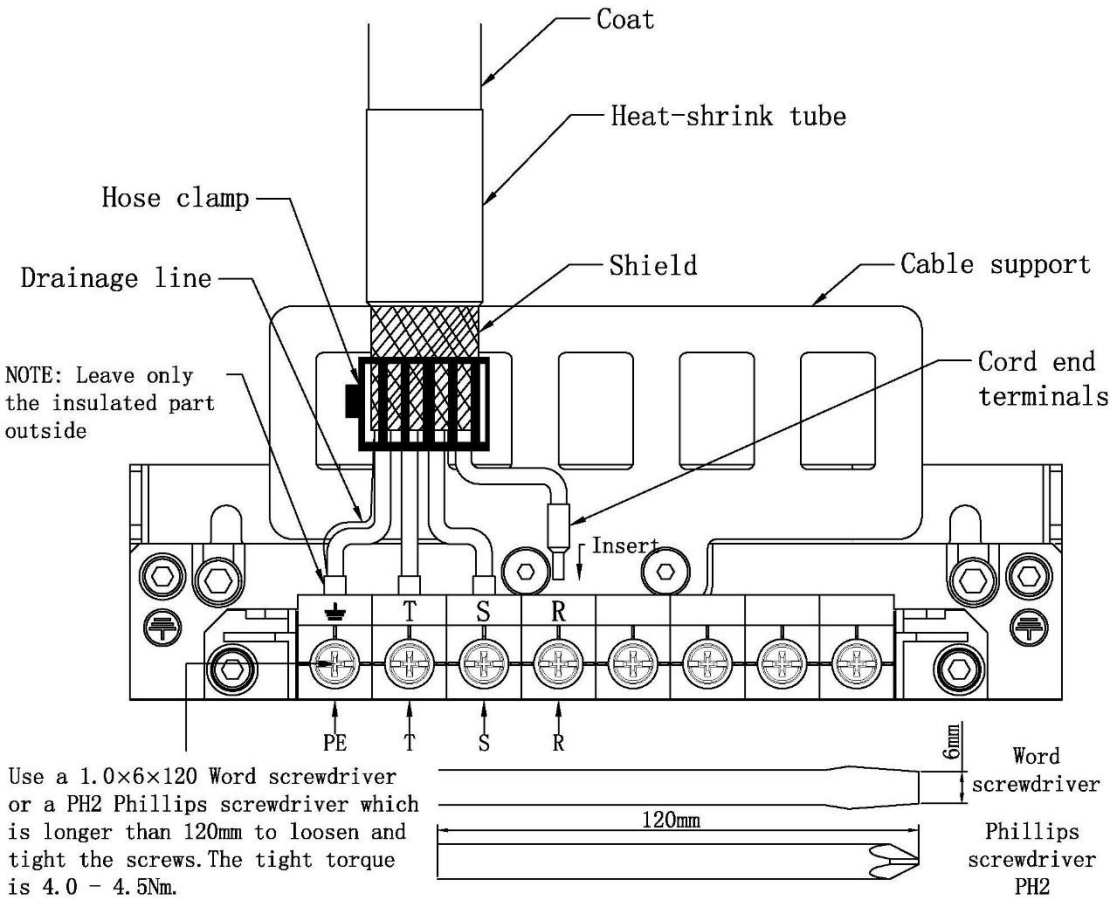
Use a hose clamp to fix the cable on the cable support. Make sure that the cable shield has a large-area contact against the cable support, so that they can together be grounded through drive housing.



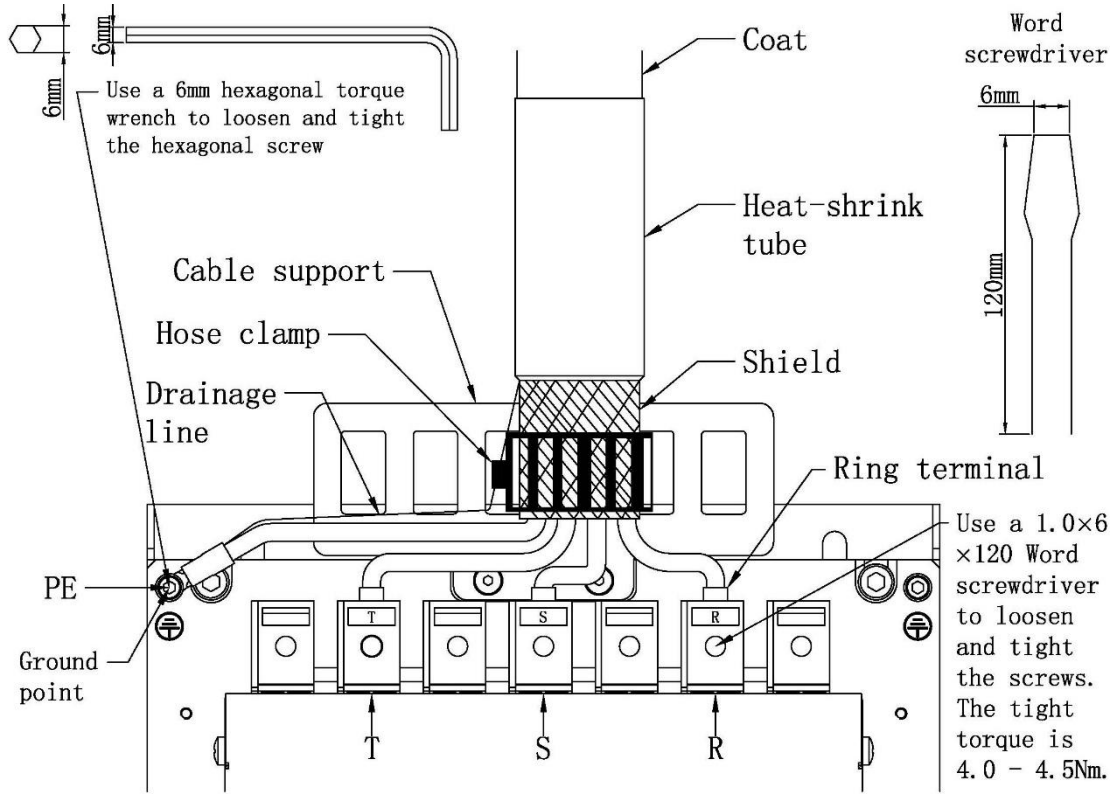
Size2 (AxN 15.30.4)



Size3 (AxN 22.44.4, AxN 35.70.4, AxN 50.100.4)



Size4 (AxN 70.140.4)



Size5 (AxN 90.150.4, AxN 110.200.4)

4.2.4 DC Power Supply Input

DC Power Supply Requirement

Main Supply	AxN 15.30.4	AxN 22.44.4	AxN 35.70.4	AxN 50.100.4	AxN 70.140.4	AxN 90.150.4	AxN 110.200.4
Voltage	565V						
Type	DC power						
Fluctuation of Voltage	0 ~ 800V						
Nominal Current Output (Arms)	18.4	27.1	43	61.5	85.8	110.4	134.9
Peak Current Output (Arms)	36.8	54.2	86	123	171.6	220.8	269.8
Nominal Power at 565V (KW)	10.4	15.3	24.3	34.7	48.5	62.4	76.2
Peak Power at 565V (KW)	20.8	30.5	48.5	69.3	97	103.9	138.6

Cable

Wire Gauge

AxN series drive must use a 3 wire cable with shield as its DC power supply cable. Refer to the table below to select the appropriate cables for different types:

AxN Series	Current (A rms)	Recommended Gauge (mm^2)	Recommended Gauge (AWG)
AxN 15.30.4	18.4	5.26	10
AxN 22.44.4	27.1	6.63	9
AxN 35.70.4	43	10.55	7
AxN 50.100.4	61.5	16.77	5
AxN 70.140.4	85.8	21.15	4
AxN 90.150.4	110.4	26.67	3
AxN 110.200.4	134.9	33.62	2

Pre-insulated Crimp Terminals

Crimping pre-insulated Terminals on the wires will enhance the connection stability and simplicity between the cable and drive. AxN Size 2, 3 and 4 series drives are recommended to use the E Series Cord End Terminals manufactured by KST. And AxN Size 5 series drives are recommended to use the RNY Series Ring Terminals also manufactured by KST. Refer to the following table to

select the appropriate terminals for different types:

NOTE: AxN Size5 Series' Cable MUST be crimped with Ring Terminals before installation.

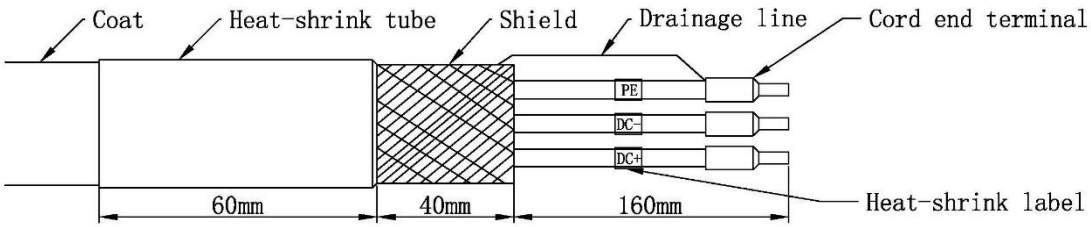
AxN Series	Recommended Pre-insulated Crimp Terminals	Recommended Strip Length(mm)
AxN 15.30.4	E6012	14
AxN 22.44.4	E10-12	14
AxN 35.70.4	E16-12	14
AxN 50.100.4	E16-12	14
AxN 70.140.4	E16-12	14
AxN 90.150.4	RNYB22-8(Phase) / RNYBS22-6(Ground)	12
AxN 110.200.4	RNYB22-8(Phase) / RNYBS22-6(Ground)	12

Cable Shield Grounding

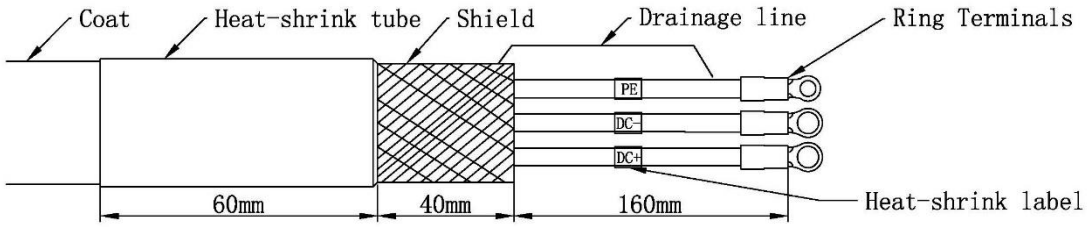
Wiring the cable shield to ground is a very helpful method to reduce interference. Follow these two precautions to ground the cable shield:

1. Pull out some shield and fix it on the outside of the cable with heat-shrink tube.
2. Use a drainage line to connect the Cable Shield and PE (Ground) wire.

Cable Sketch



AxN Size2, Size3, Size4



AxN Size5

DC Power Installation

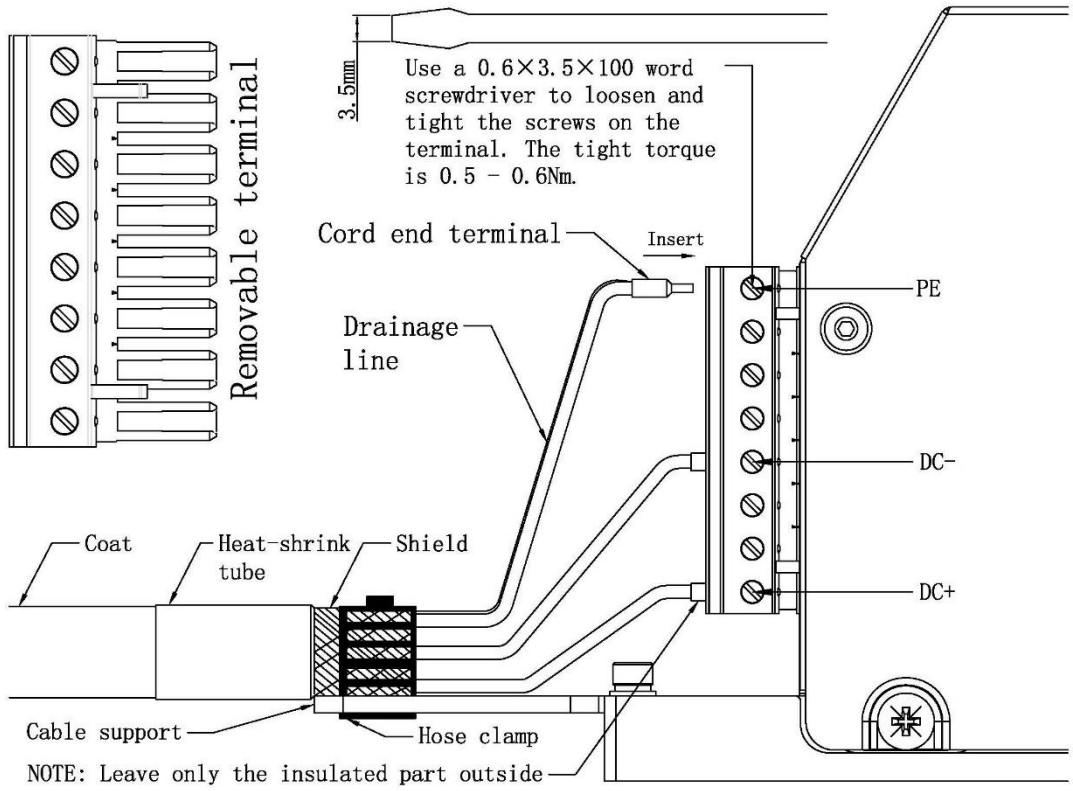
Wiring and Torque Specification

Insert the 3 wires of the DC power supply cable into the correspond terminals on the P1 port: **DC+ to DC+/B+, DC- to DC- and PE to PE**. For AxN Size2 Series, the nominal torque to tight these terminals is 0.5 ~ 0.6 Nm; for AxN Size 3, 4 and 5, the nominal torque to tight these terminals is 4.0 ~ 4.5 Nm. If the tight torque reaches higher than 8.5Nm, the terminal will be broken.

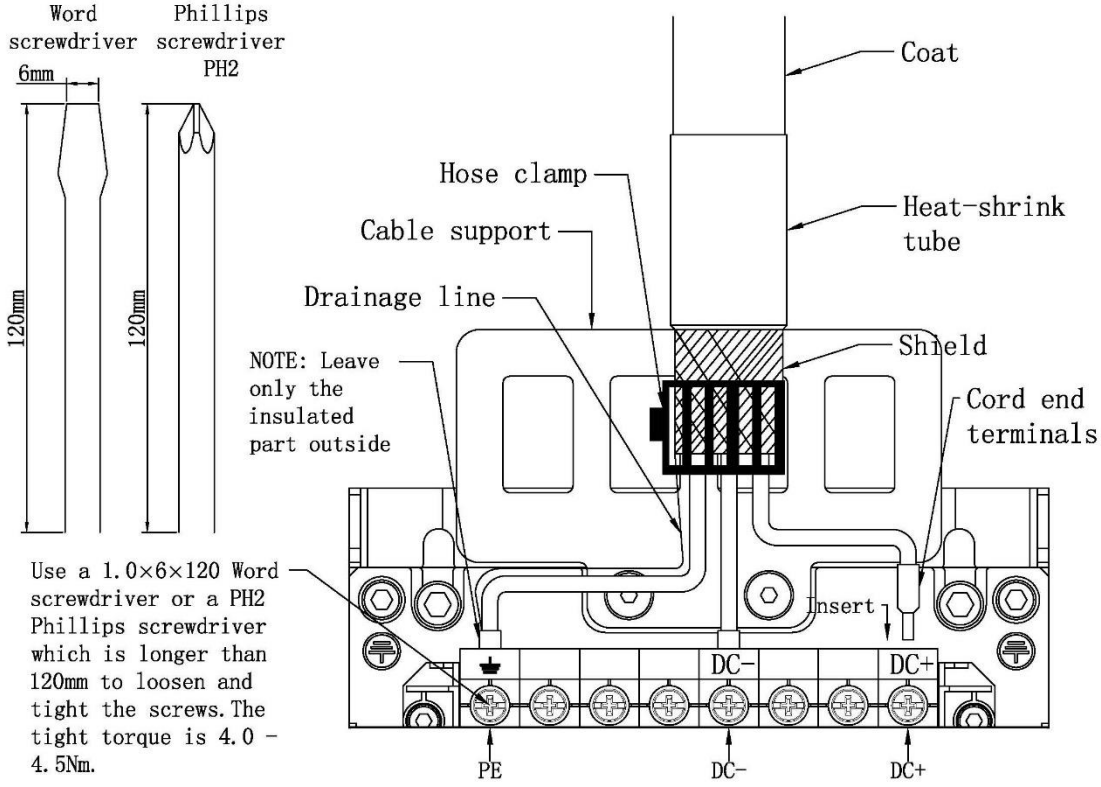
Cable Fixing

Use a hose clamp to fix the cable on the cable support. Make sure that the cable shield has a large-

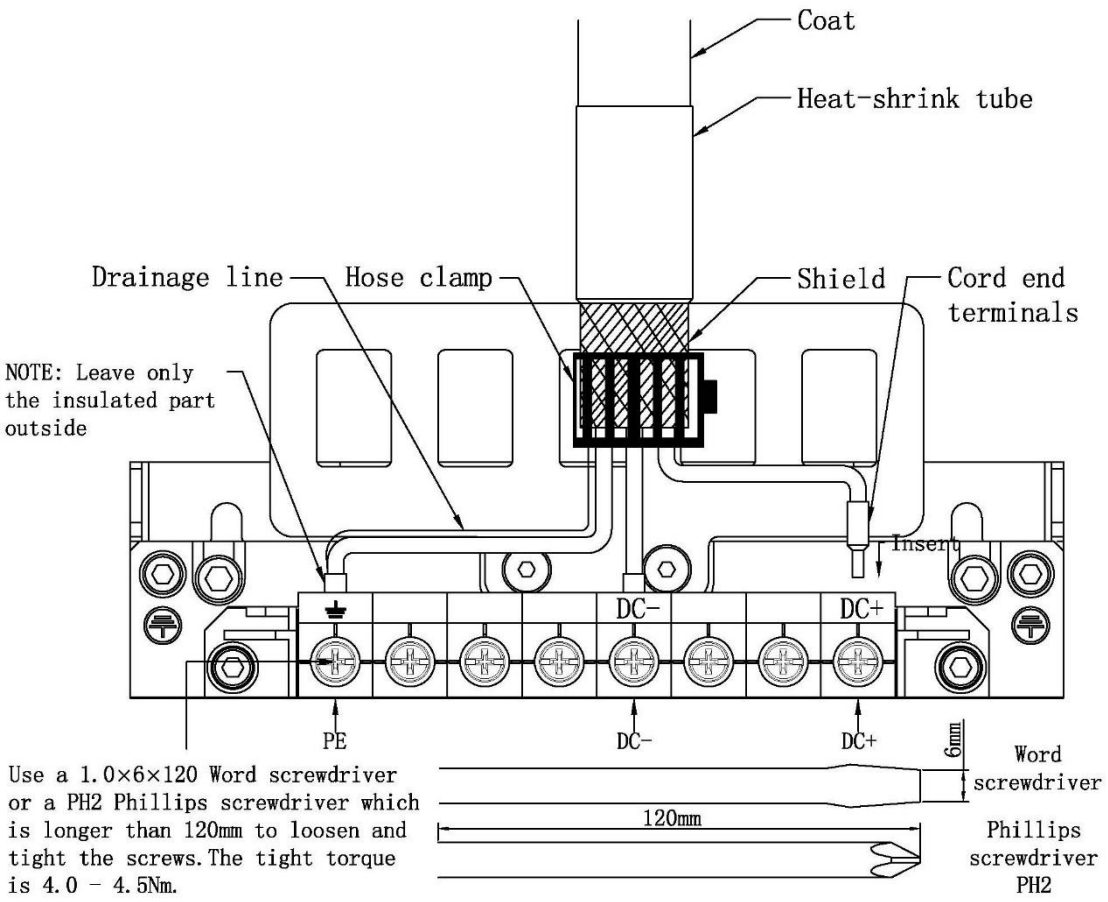
area contact against the cable support, so that they can together be grounded through drive housing.



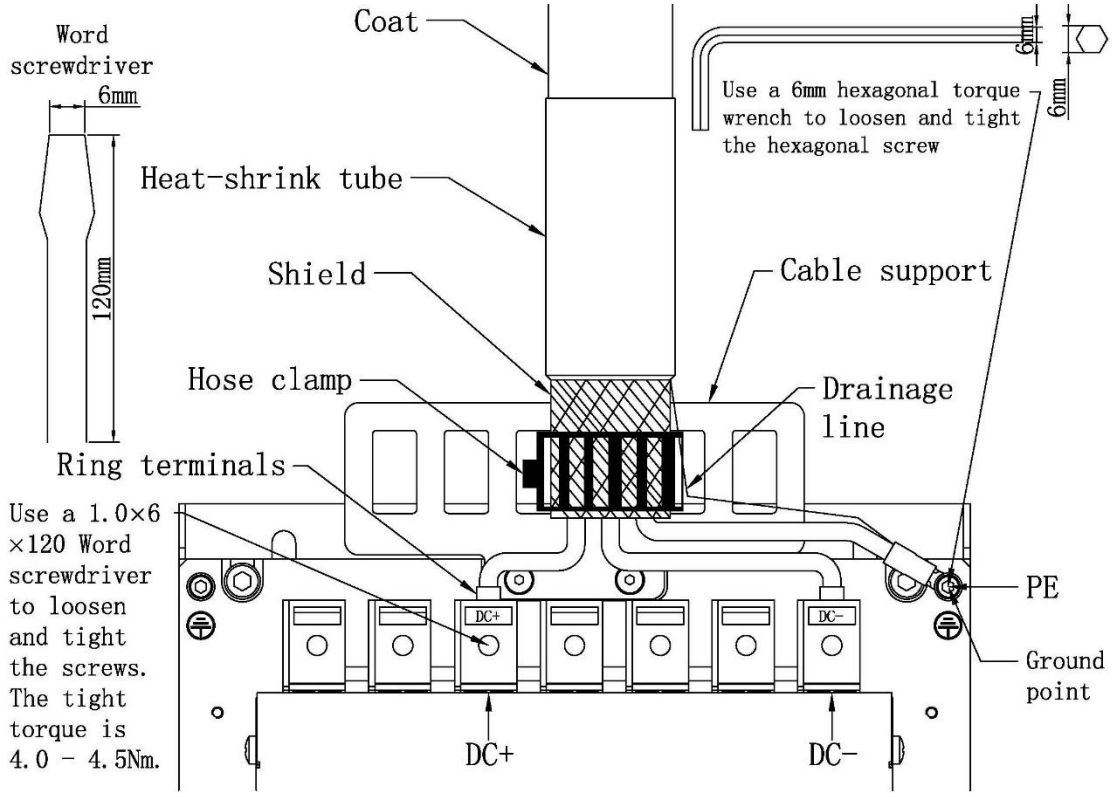
Size2 (AxN 15.30.4)



Size3 (AxN 22.44.4, AxN 35.70.4, AxN 50.100.4)



Size4 (AxN 70.140.4)



Size5 (AxN 90.150.4, AxN 110.200.4)

4.2.5 Brake Resistor

Dynamic braking (DB) helps bring the motor to a smooth and rapid stop when working with high inertia loads. As the drive lowers the frequency of a motor with high inertia connected, regeneration occurs. This can cause an overvoltage situation when the regenerative energy flows back into the DC bus capacitors. A brake resistor prevents these overvoltage faults.

AxN Series Drive has an internal brake resistor inside the drive. And it can also connect an external brake resistor (Recommended).

WARNING: Do not operate AxN Drive without any brake resistor. Failure to comply may result in damage to braking circuit or drive.

Internal Brake Resistor

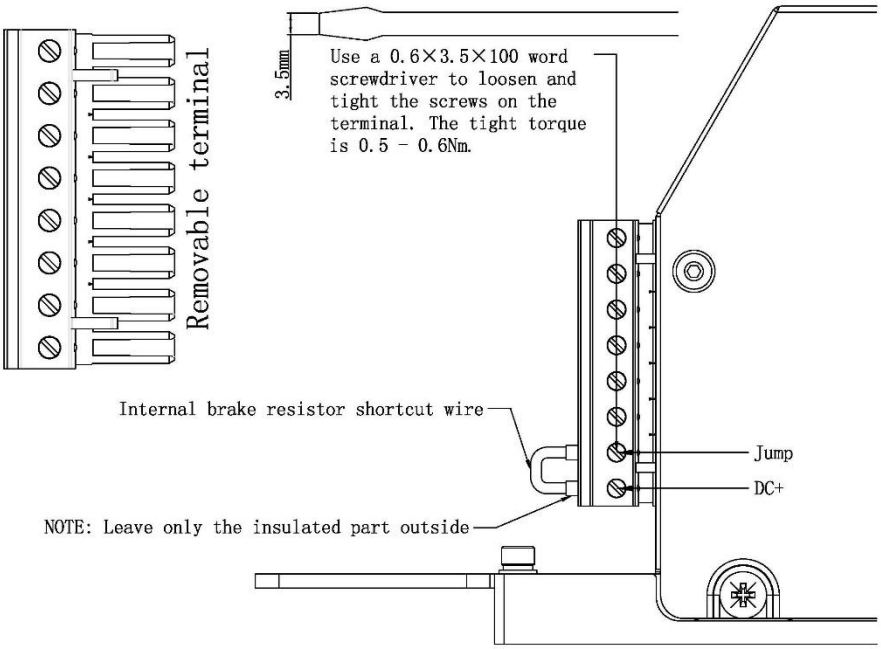
Specifications

Every AxN Series Drive has an internal brake resistor. Regard to its properties, using internal brake resistor in real applications is **NOT** recommended. Refer to the following table for more details:

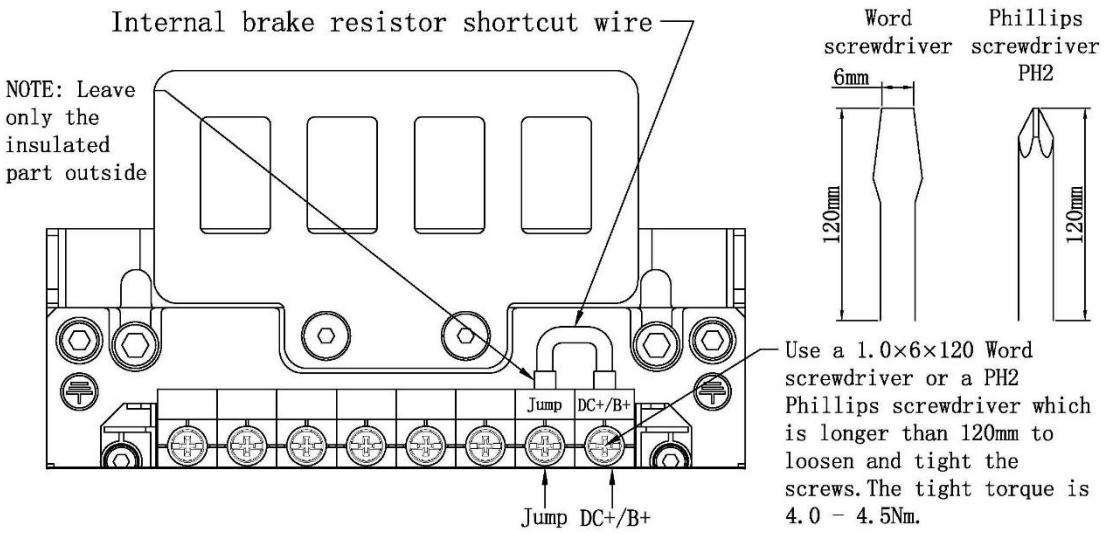
AxN Series	Resistance (Ω)	Power (W)
AxN 15.30.4	18	60
AxN 22.44.4	12	60
AxN 35.70.4	7	60
AxN 50.100.4	5	60
AxN 70.140.4	3.5	60
AxN 90.150.4	3.5	150
AxN 110.200.4	3	150

Activation

Use the attached shortcut wire to connect the Terminals, **Jump** and **DC+/B+**, in order to activate the Internal Brake Resistor inside the AxN Series Drive.

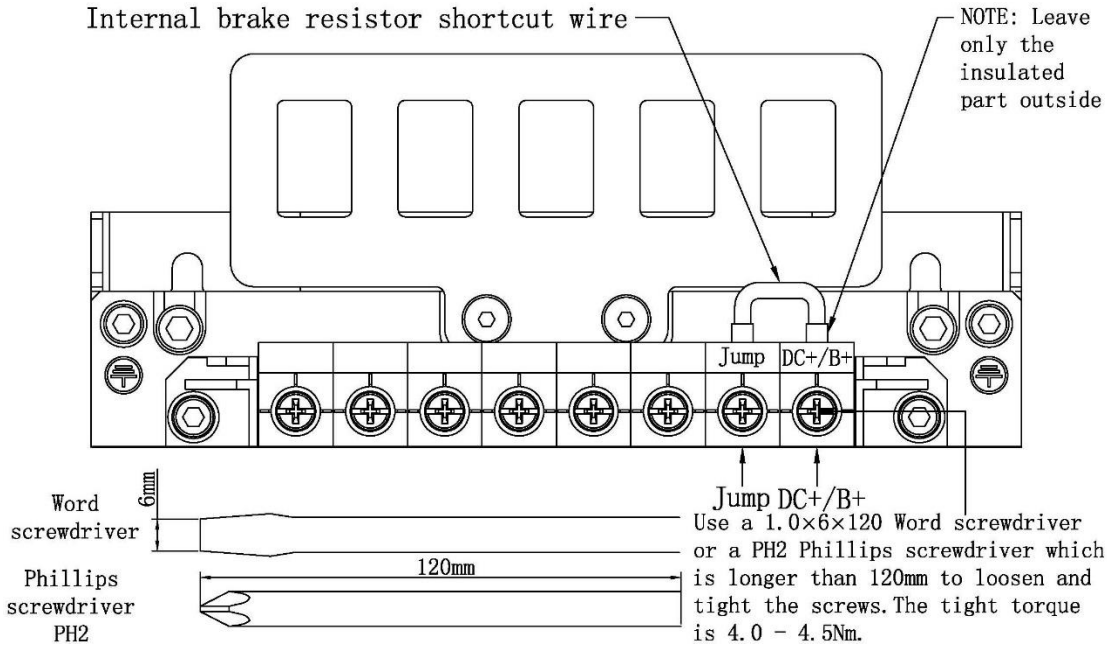


Size2 (AxN 15.30.4)

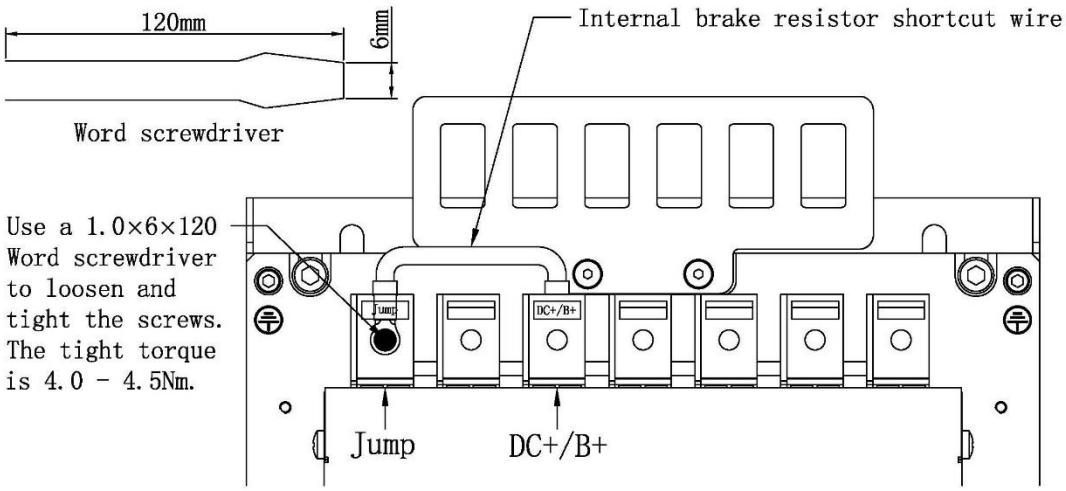


Size3 (AxN 22.44.4, AxN 35.70.4, AxN 50.100.4)

0



Size4 (AxN 70.140.4)



Size5 (AxN 90.150.4, AxN 110.200.4)

External Brake Resistor

The External Brake Resistor must be sized properly in order to dissipate the required power to decelerate the load in desired time. There are three important factors: **Resistance, Maximum Absorb Energy** and **Maximum Power.**

Resistance

The selection of the external brake resistor resistance must be proper. If the resistance is smaller than Minimum Resistance, the IGBT might be damaged by the overload brake current. And if the resistance is bigger than Maximum Resistance, the brake procedure might be abort because of the high DC-Bus Voltage (over 900V).Refer to following table to check the Minimum and Maximum Resistance of external brake resistor which is suitable for a particular drive:

AxN Series	Minimum Resistance (Ω)	Maximum Resistance (Ω)
AxN 15.30.4	18	18.4
AxN 22.44.4	9	13.8
AxN 35.70.4	6	7.9
AxN 50.100.4	4.5	5.5
AxN 70.140.4	2.1	4
AxN 90.150.4	2	3.7
AxN 110.200.4	2	2.7

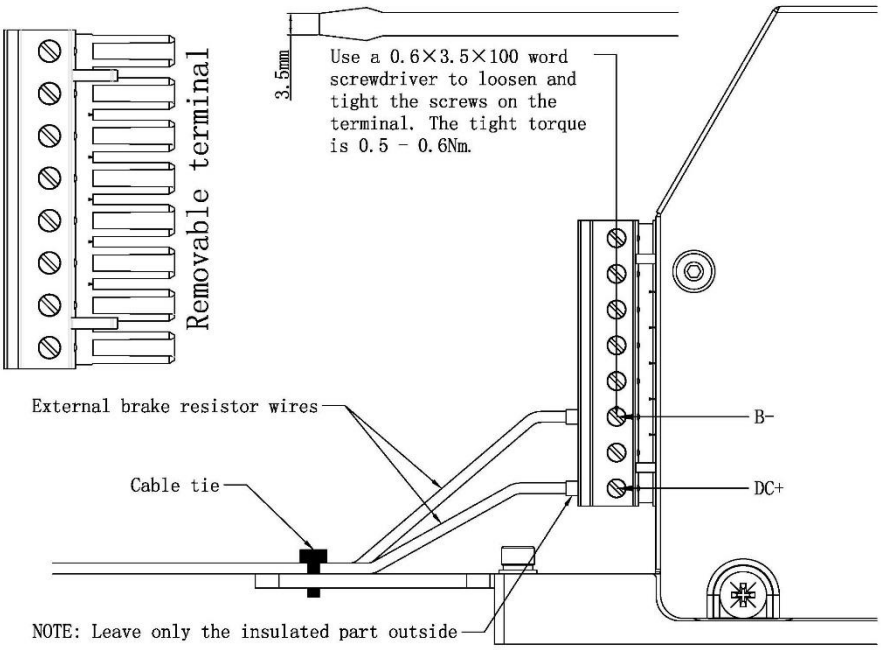
Maximum Absorb Energy and Maximum Power

Maximum Absorb Energy and Maximum Power are two important factors to evaluate the energy absorption ability of the brake resistor. The values of these two factors may differ from one application to another, but the basic idea is always the same, to dissipate the required power to decelerate the load in desired time.

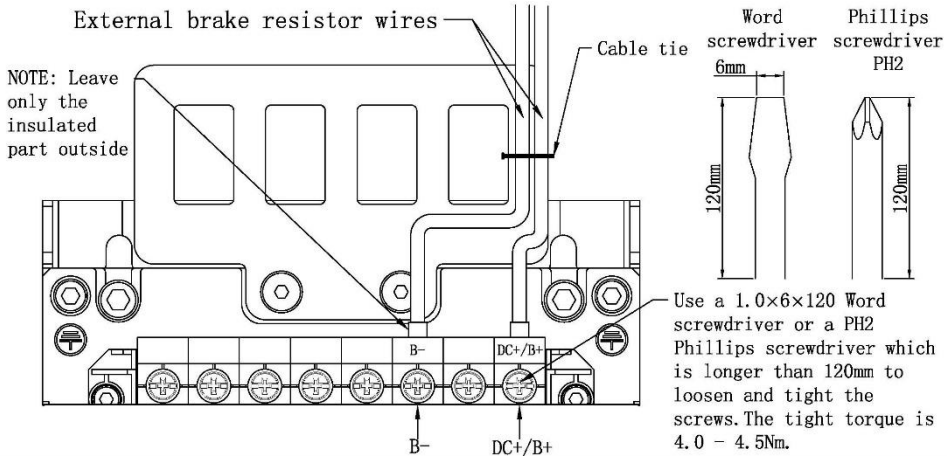
NOTE: Brake resistor wires' insulation grade must be higher than 1000Vac and 3000Vdc.

Installation

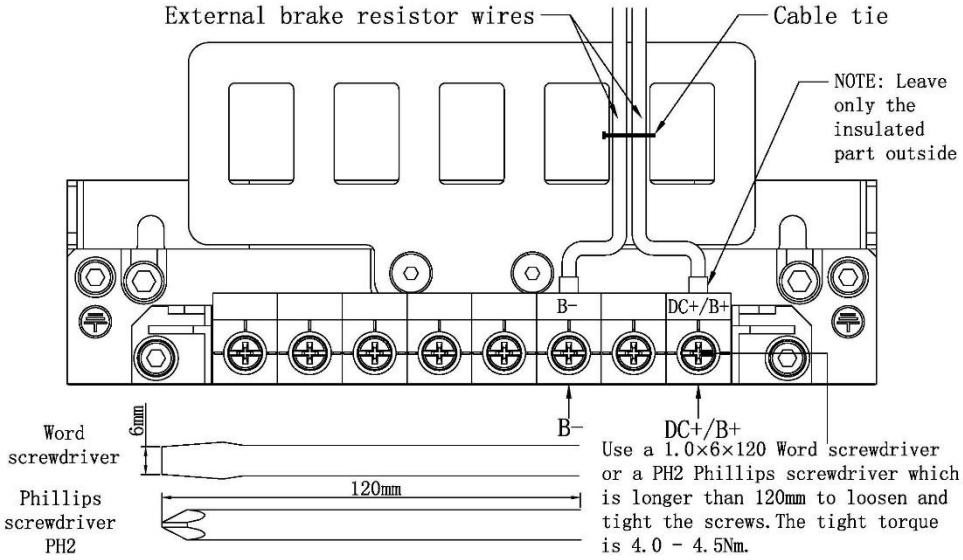
Connect the brake resistor's wires to the Terminals, **DC+/B+** and **B-**. Then fix the wires on AxN drive's cable support. For AxN Size2 Series, the nominal torque to tight these terminals is 0.5 ~ 0.6 Nm; for AxN Size 3, 4 and 5, the nominal torque to tight these terminals is 4.0 ~ 4.5 Nm. If the tight torque reaches higher than 8.5Nm, the terminal will be broken.



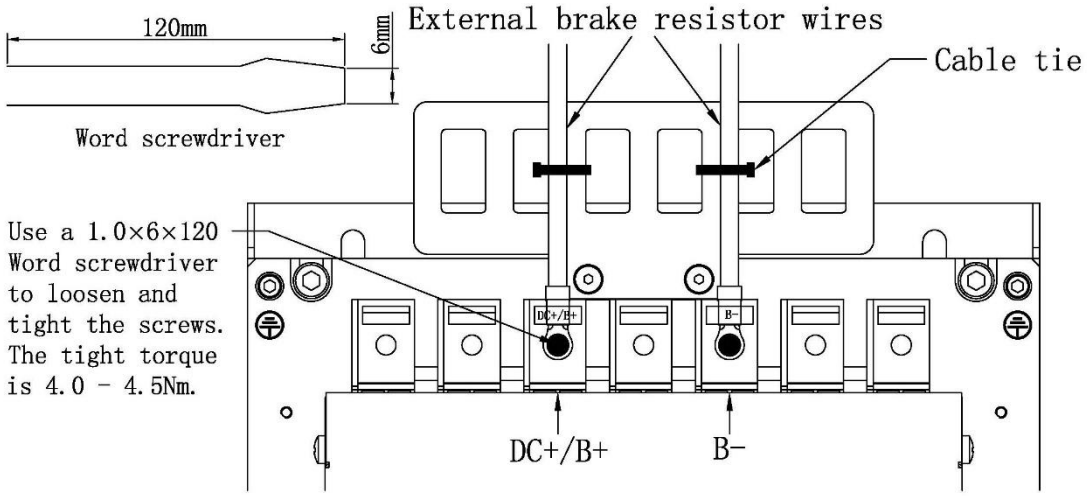
Size2 (AxN 15.30.4)



Size3 (AxN 22.44.4, AxN 35.70.4, AxN 50.100.4)



Size4 (AxN 70.140.4)



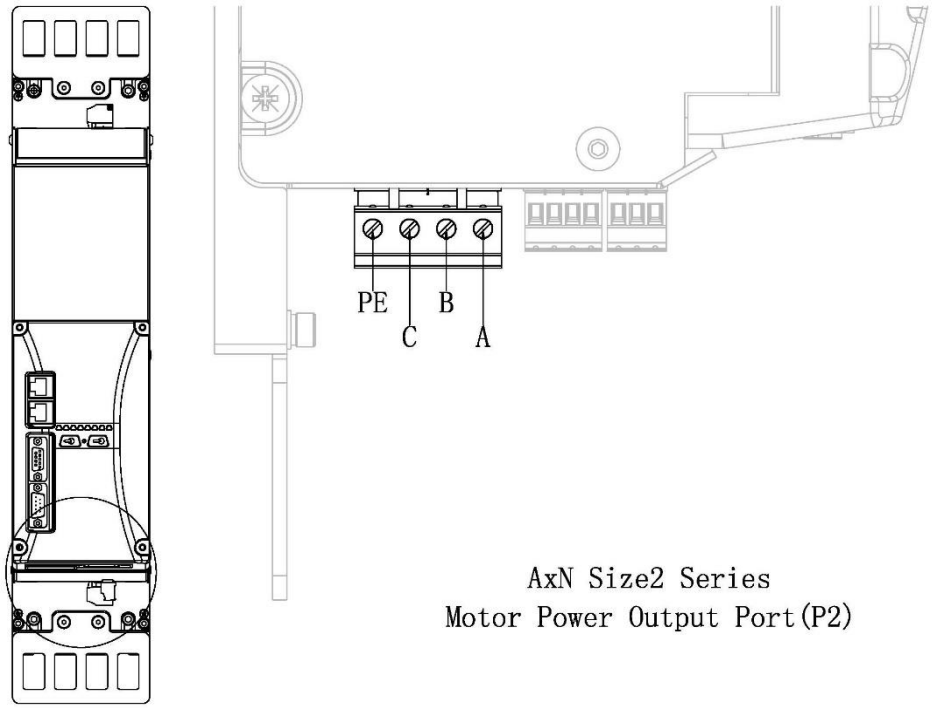
Size5 (AxN 90.150.4, AxN 110.200.4)

4.2.6 Motor Power Output Port (P2)

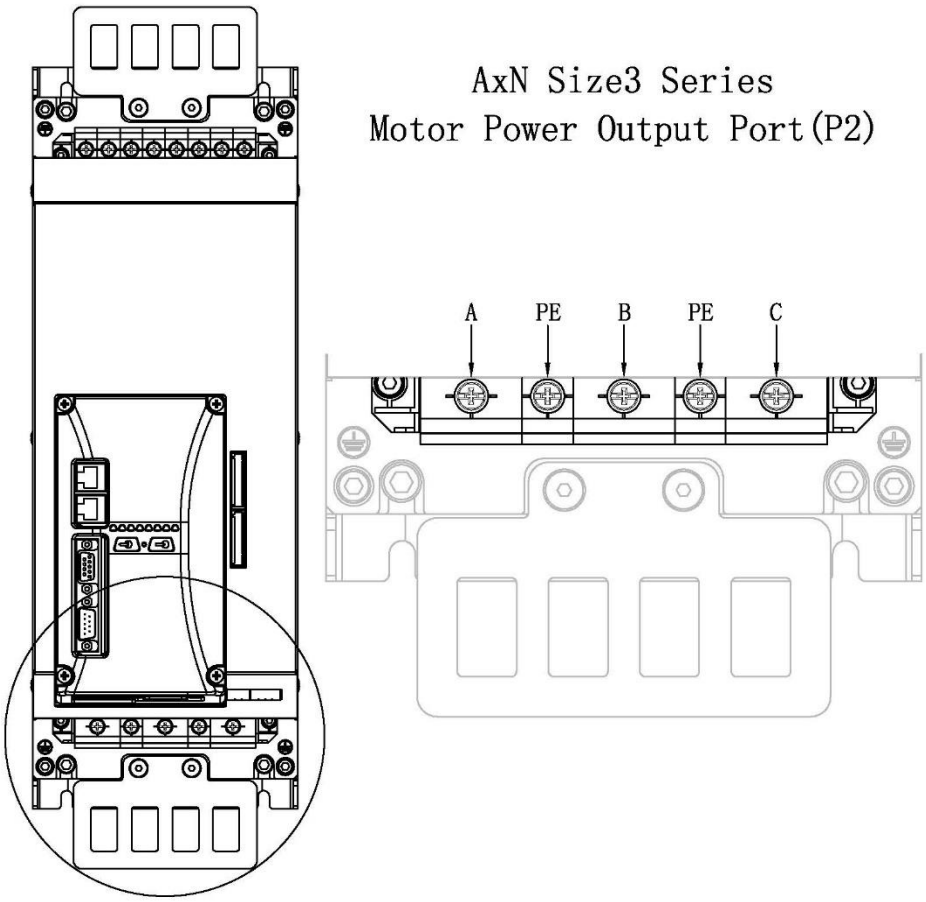
AxN Series Drive's Motor Power Output Port (P2) has 5 terminals: **A, PE, B, PE and C**. The appearance of P2 ports may be different depend on Sizes. But they all have a same function: Output Power to the Motor.

Port Location

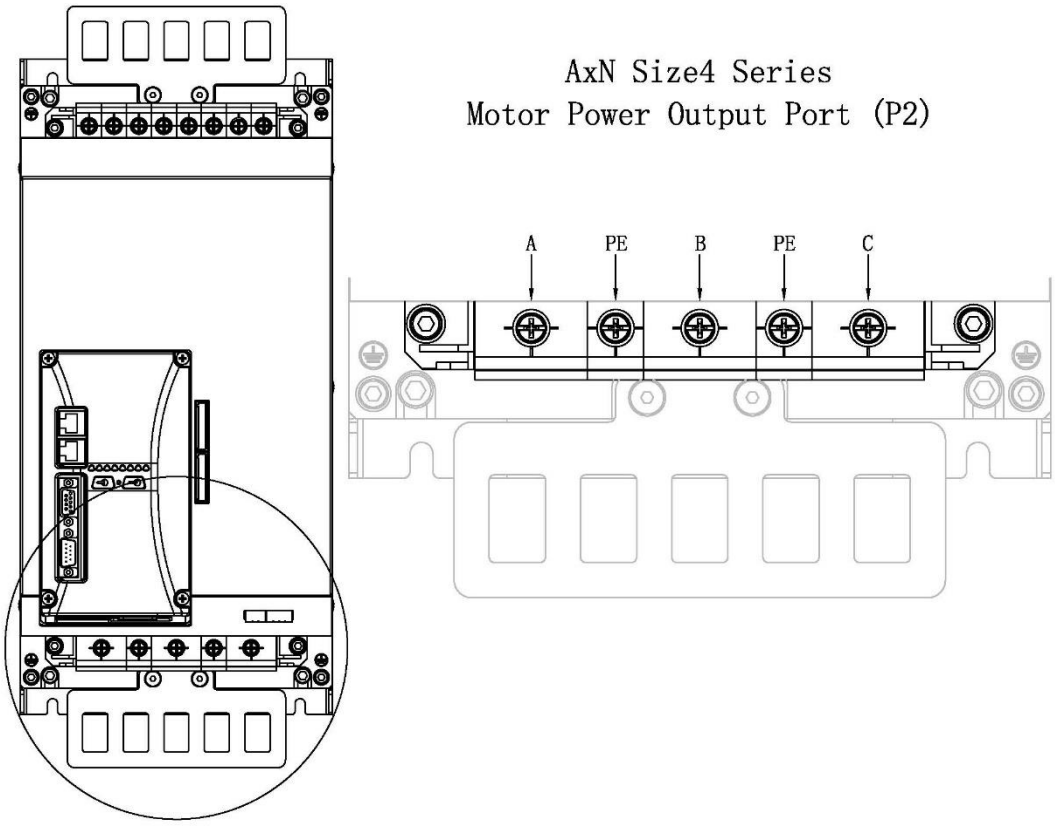
AxN Series Drive's Motor Power Output Port (P2) is on the bottom of the drive. Refer to the following figures for exact locations on different Sizes Drives.



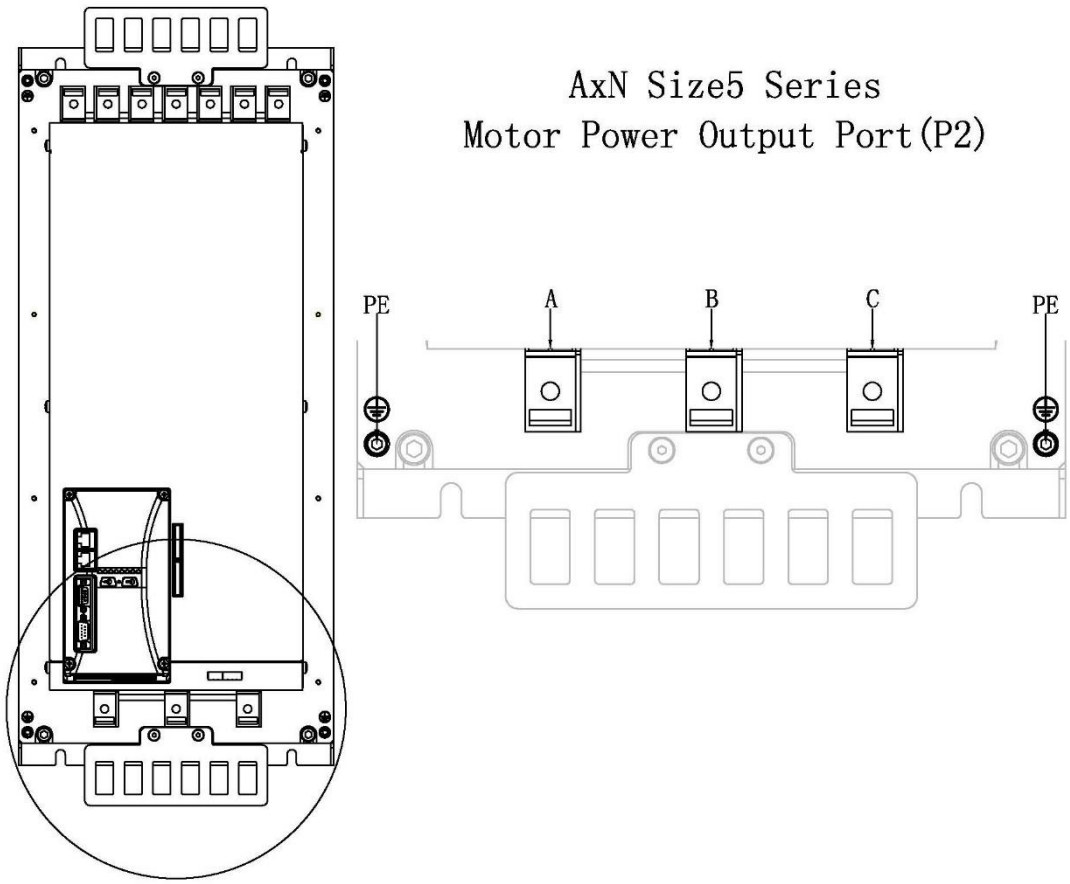
Size2 (AxN 15.30.4)



Size3 (AxN 22.44.4, AxN 35.70.4, AxN 50.100.4)



Size4 (AxN 70.140.4)



Size4 (AxN 90.150.4, AxN 110.200.4)

Terminal Configuration

AxN Series Drive's Motor Power Output Port (P1) has 5 terminals: A, PE, B, PE and C (AxN Size5 Series use the PE terminals on the shield as its P2 PE terminal). The only function of P2 port is to transport power to the motor through Motor Power Cable. The wires of the Motor Power Cable must correspond one to one with the terminals on the P2 port. Refer to following table for more details:

Motor Power Output Port (P2)	Motor Power Cable	Descriptions
A	U/1	Phase **U** wire **must** connect to **A** terminal
B	V/2	Phase **V** wire **must** connect to **B** terminal
C	W/3	Phase **W** wire **must** connect to **C** terminal
PE	PE	Grounding wire PE can connect to either one of PE terminals

WARNING: The correspondence between the Motor Power Output wires and terminals should be adhered! Otherwise the motor cannot work properly!

4.2.7 Motor Power Output

Cable

Wire Gauge

AxN series drive must use a 4 wire cable with shield as its Motor Power Output cable. Refer to the

table below to select the appropriate cables for different types:

AxN Series	Current (A rms)	Recommended Gauge (mm^2)	Recommended Gauge (AWG)
AxN 15.30.4	15	4.17	11
AxN 22.44.4	22	5.26	10
AxN 35.70.4	35	8.37	8
AxN 50.100.4	50	13.3	6
AxN 70.140.4	70	16.77	5
AxN 90.150.4	90	21.15	4
AxN 110.200.4	110	26.67	3

Pre-insulated Crimp Terminals

Crimping pre-insulated Terminals on the wires will enhance the connection stability and simplicity between the cable and drive. AxN Size 2, 3 and 4 series drives are recommended to use the E Series Cord End Terminals manufactured by KST. And AxN Size 5 series drives are recommended to use the RNY Series Ring Terminals also manufactured by KST. Refer to the following table to select the appropriate terminals for different types:

NOTE: AxN Size5 Series' Cable MUST be crimped with Ring Terminals before installation.

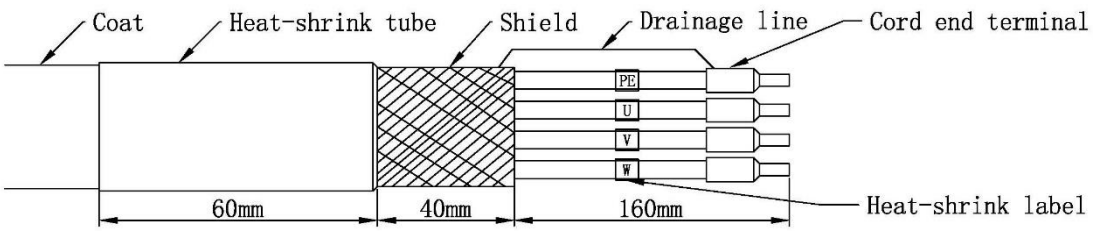
AxN Series	Recommended Pre-insulated Crimp Terminals	Recommended Strip Length(mm)
AxN 15.30.4	E4012	14
AxN 22.44.4	E6012	14
AxN 35.70.4	E10-12	14
AxN 50.100.4	E16-12	14
AxN 70.140.4	E16-12	14
AxN 90.150.4	RNYB22-8(Phase) / RNYBS22-6(Ground)	12
AxN 110.200.4	RNYB22-8(Phase) / RNYBS22-6(Ground)	12

Cable Shield Grounding

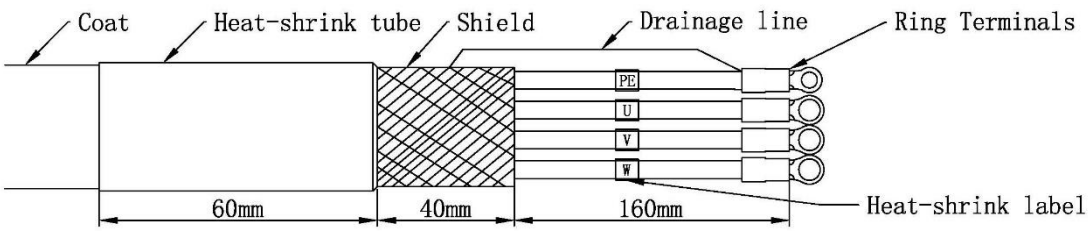
Wiring the cable shield to ground is a very helpful method to reduce interference. Follow these two precautions to ground the cable shield:

3. Pull out some shield and fix it on the outside of the cable with heat-shrink tube.
4. Use a drainage line to connect the Cable Shield and PE (Ground) wire.

Cable Sketch



AxN Size2, Size3, Size4



AxN Size5

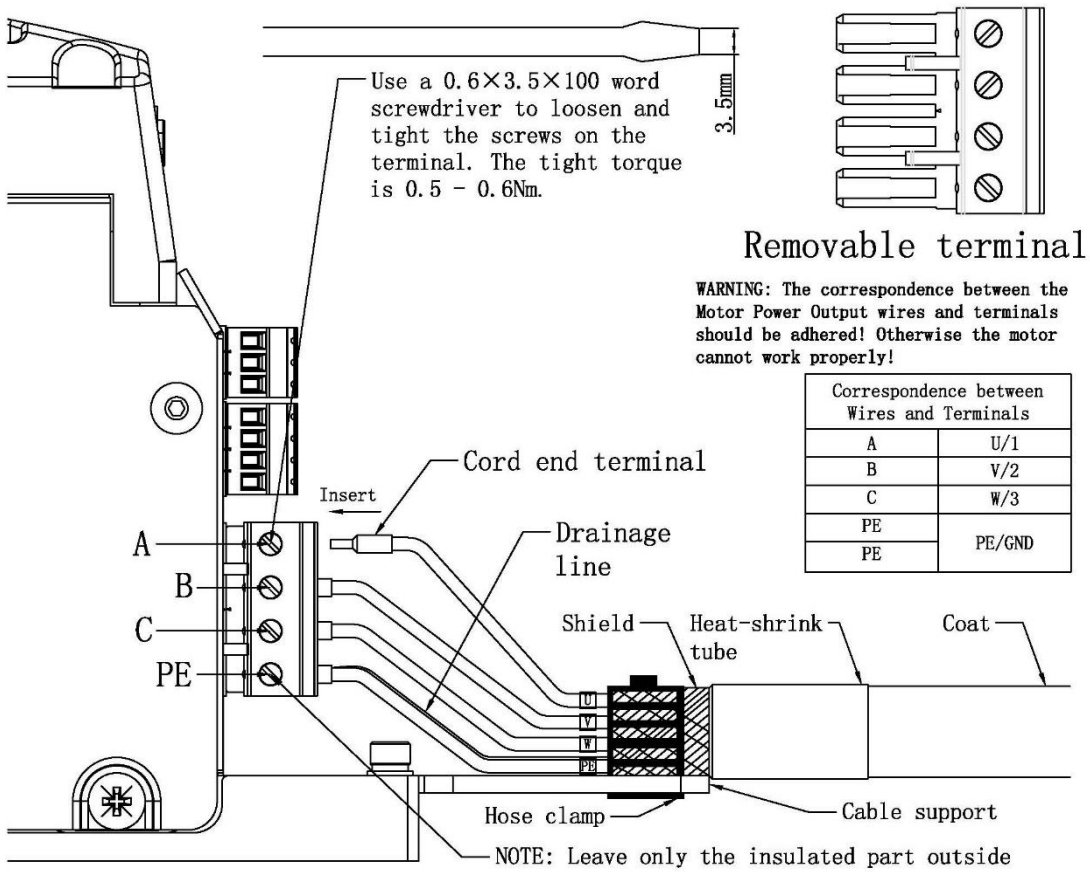
Motor Power Output Installation

Wiring and Torque Specification

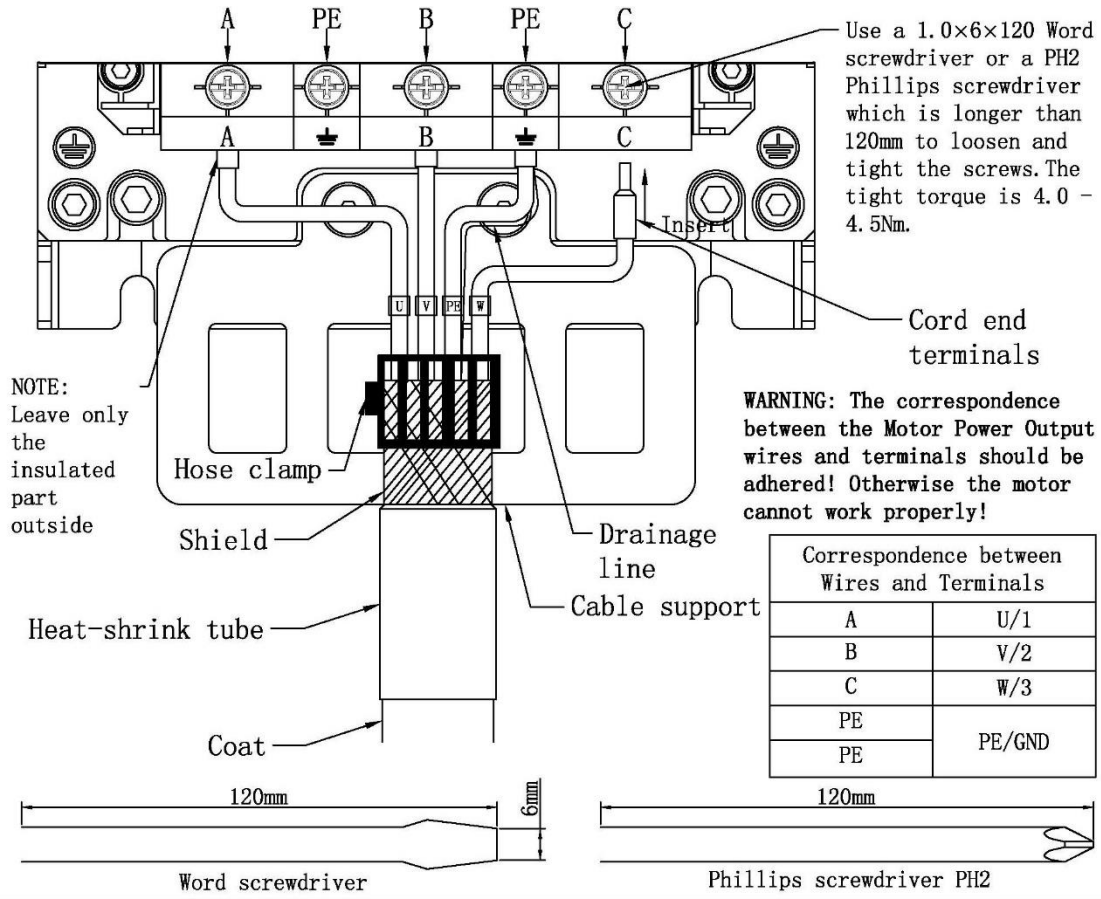
Insert the 4 wires of the motor power cable into the correspond terminals on the P2 port: **U to A, V to B, W to C and PE to PE**. The nominal torque to tight these terminals is 4.0 ~ 4.5Nm. If the tight torque reaches higher than 8.5Nm, the terminal will be broken.

Cable Fixing

Use a hose clamp to fix the cable on the cable support. Make sure that the cable shield has a large-area contact against the cable support, so that they can together be grounded through drive housing.

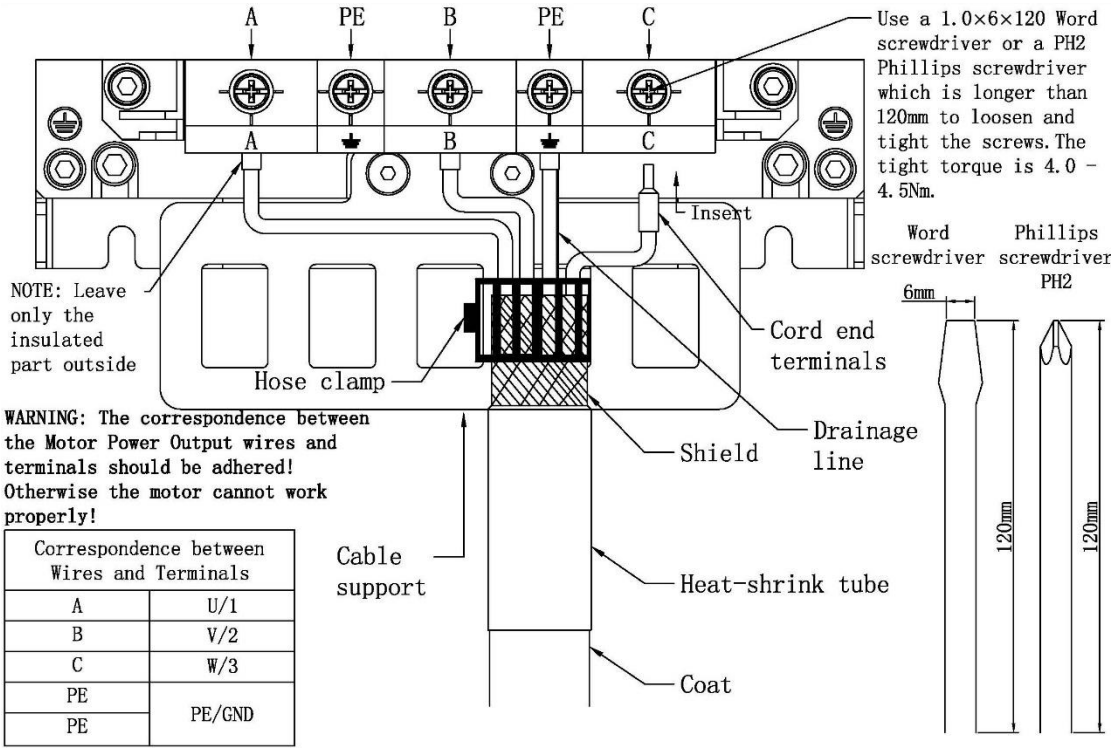


Size2 (AxN 15.30.4)



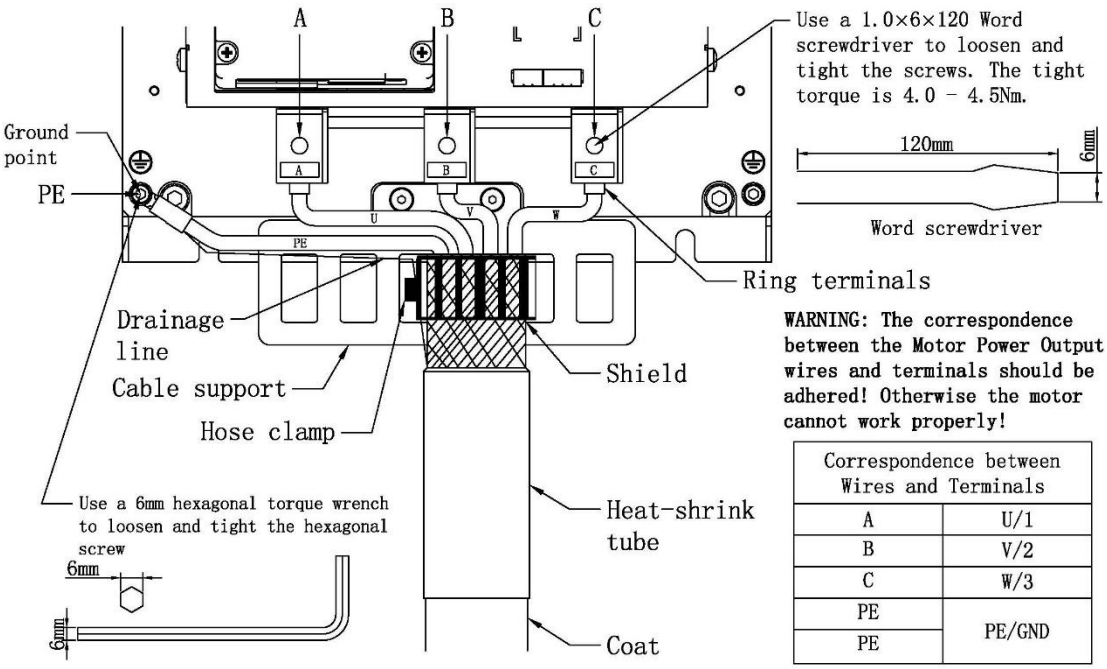
Correspondence between Wires and Terminals	
A	U/1
B	V/2
C	W/3
PE	PE/GND
PE	

Size3 (AxN 22.44.4, AxN 35.70.4, AxN 50.100.4)



Correspondence between Wires and Terminals	
A	U/1
B	V/2
C	W/3
PE	PE/GND
PE	

Size4 (AxN 70.140.4)



Correspondence between Wires and Terminals	
A	U/1
B	V/2
C	W/3
PE	PE/GND
PE	

Size4 (AxN 90.150.4, AxN 110.200.4)

4.3 Control Circuit

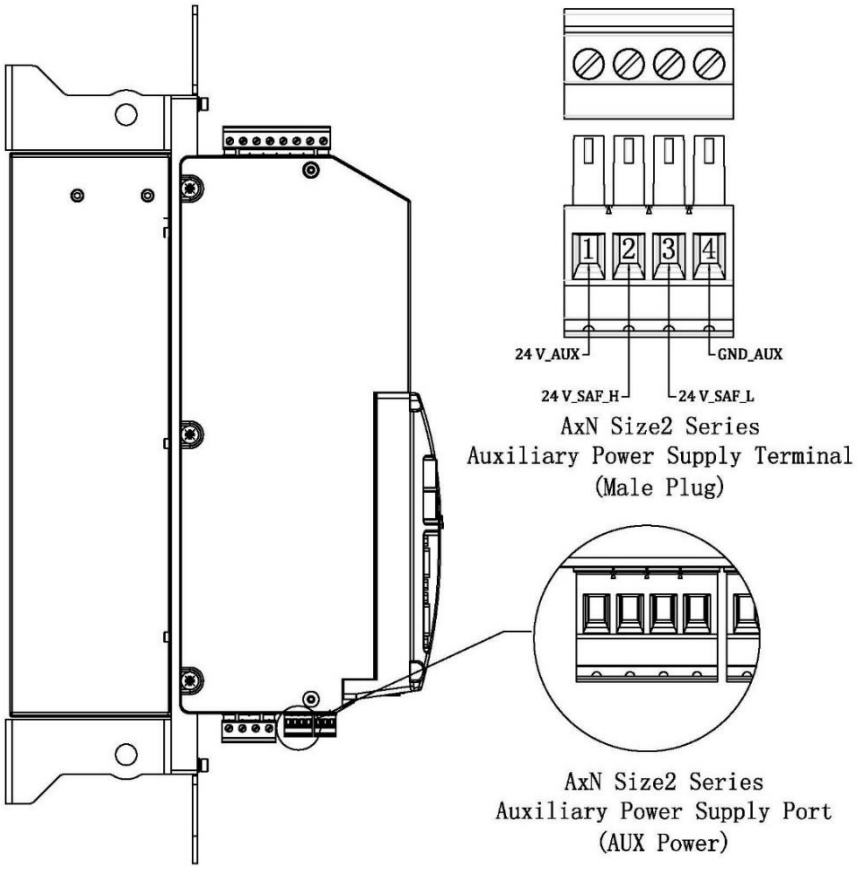
4.3.1 Auxiliary Power Supply (AUX Power)

Auxiliary Power Supply Requirement

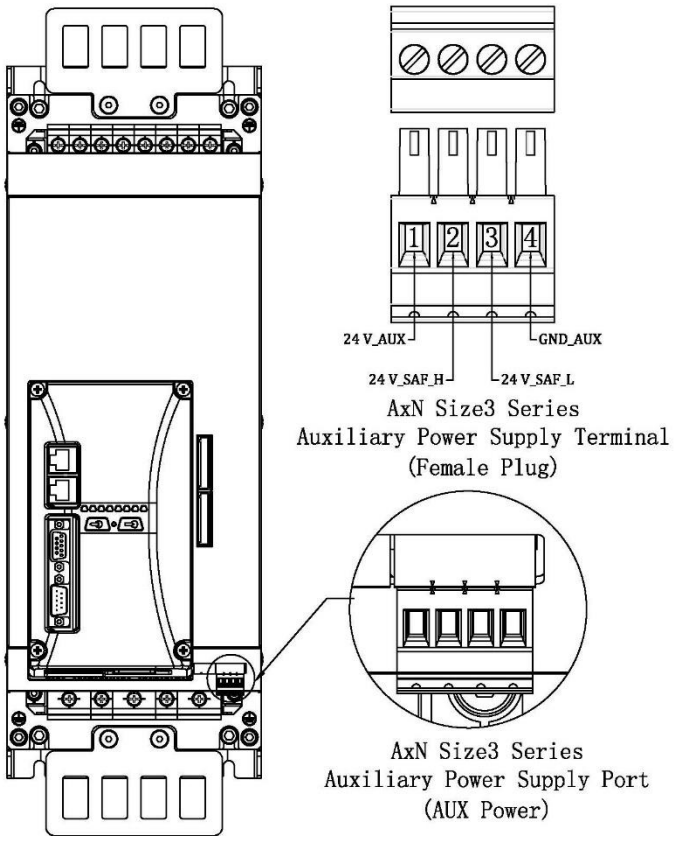
Main Supply	AxN 15.30.4	AxN 22.44.4	AxN 35.70.4	AxN 50.100.4	AxN 70.140.4	AxN 90.150.4	AxN 110.200.4
Voltage	24V						
Type	DC power						
Fluctuation of Voltage	±15% (22.8 ~ 25.2V)						
Nominal Power	72W				144W	192W	
Nominal Current	3A				6A	8A	

Port Location

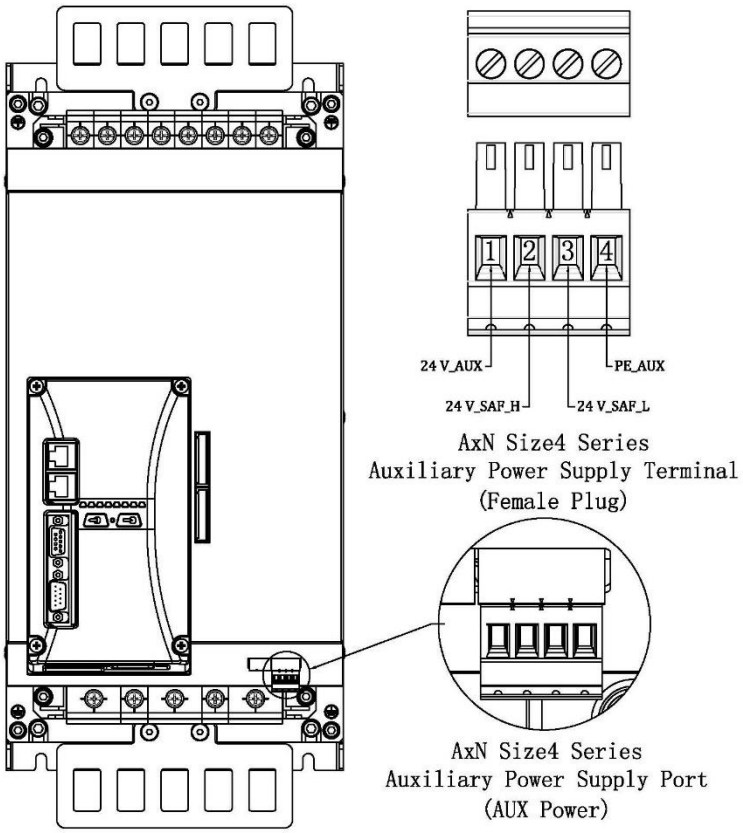
AxN Series Drive's Auxiliary Power Supply Port (Female Plug, 4Pin) is on the right bottom of the drive. And a corresponding Auxiliary Power Supply Terminal (Male Plug, 4Pin) is provided in the accessories. Refer to the following figures for exact locations on different Sizes Drives.



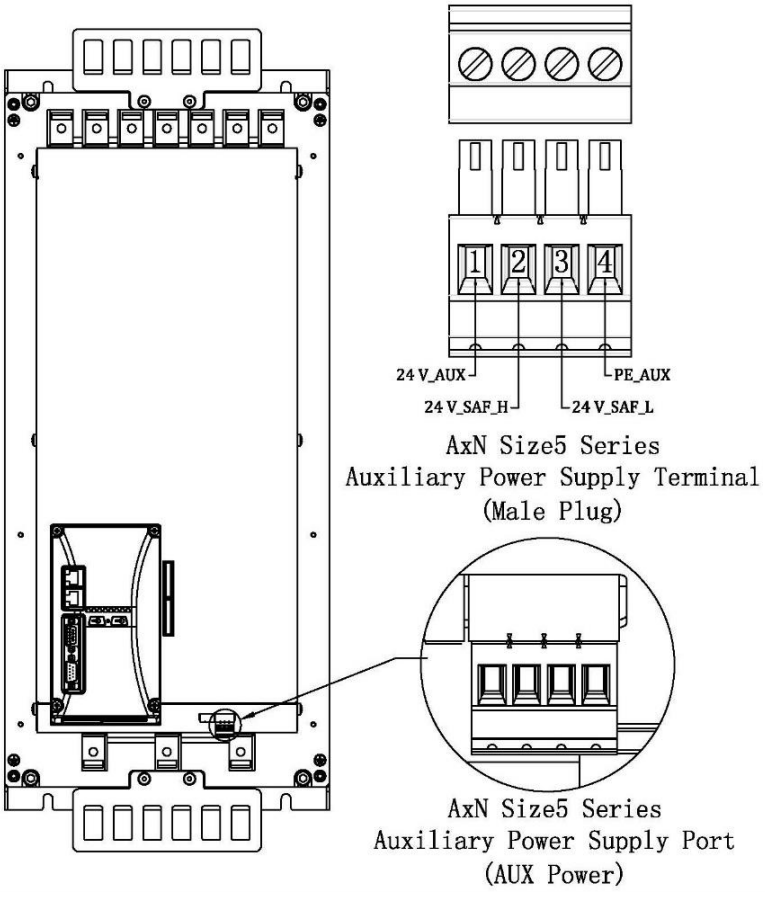
Size2 (AxN 15.30.4)



Size3 (AxN 22.44.4, AxN 35.70.4, AxN 50.100.4)



Size4 (AxN 70.140.4)



Size5 (AxN 90.150.4, AxN 110.200.4)

Terminal Configuration

Pin	Name	Function	Description
1	24V_AUX	Control circuit power supply	24Vdc Positive
2	24V_SAF_H	STO high-side power bridge power supply	24Vdc Positive
3	24V_SAF_L	STO low-side power bridge power supply	24Vdc Positive
4	GND_AUX	Reference ground	24Vdc Negative

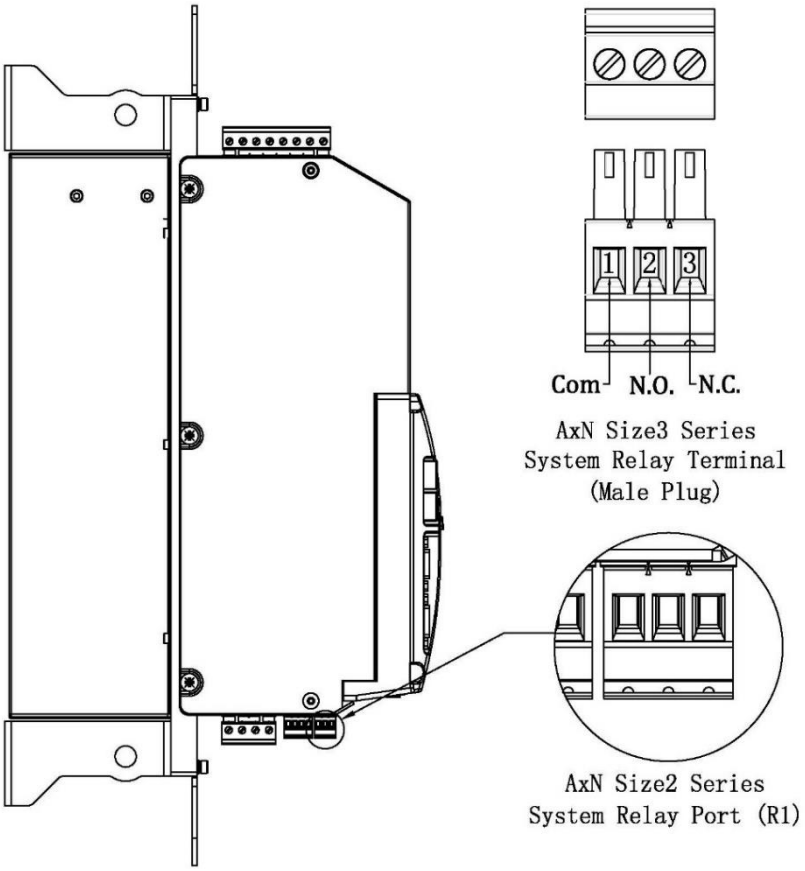
STO Function

Normal version AxN Series Drive does not have the STO function. If you want to use the STO function, you must order a STO version AxN Series Drive. There are 2 pins which are related to the STO function, 24V_SAF_H and 24V_SAF_L. If you cut either of these pins' power, STO will be activated and the motor will stop. Normal version AxN Series Drive has already internally short cut Pin 24V_AUX, 24_SAF_H and 24V_SAF_L, so that STO function is disabled.

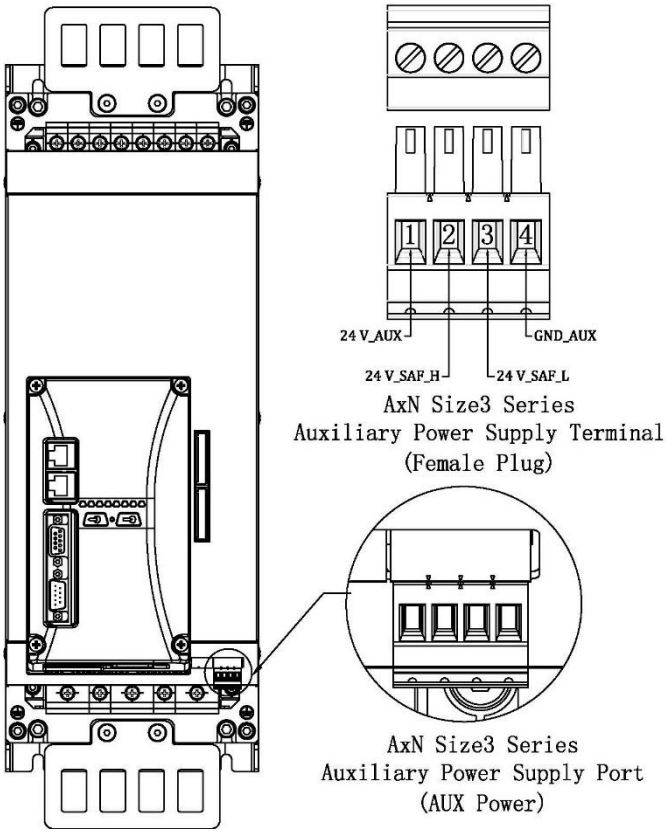
4.3.2 System Relay (R1)

Port Location

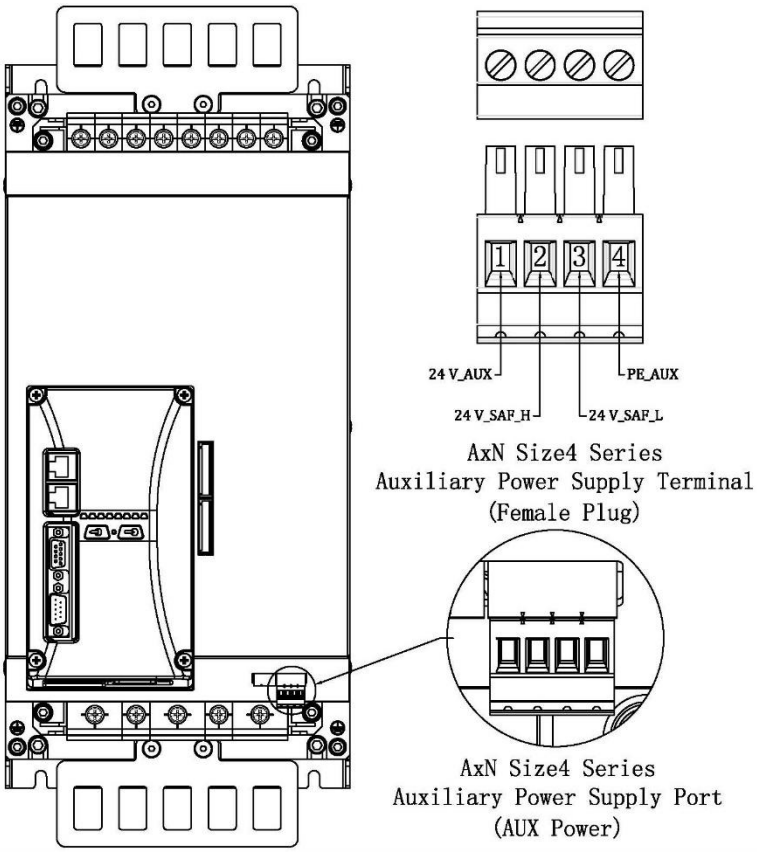
AxN Series Drive's System Relay Port (Female Plug, 3Pin) is on the right bottom of the drive. And a corresponding System Relay Terminal (Male Plug, 3Pin) is provided in the accessories. Refer to the following figures for exact locations on different Sizes Drives.



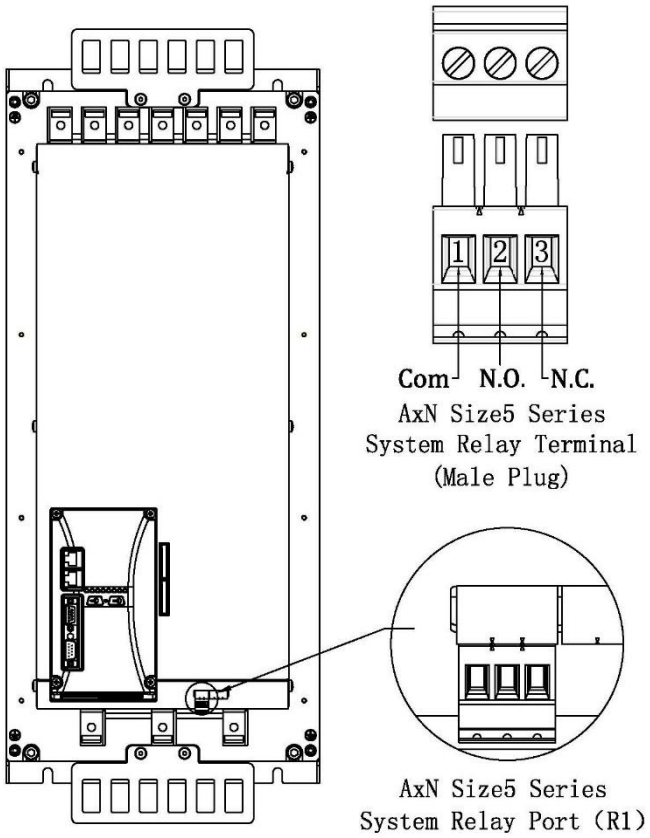
Size2 (AxN 15.30.4)



Size3 (AxN 22.44.4, AxN 35.70.4, AxN 50.100.4)



Size4 (AxN 70.140.4)



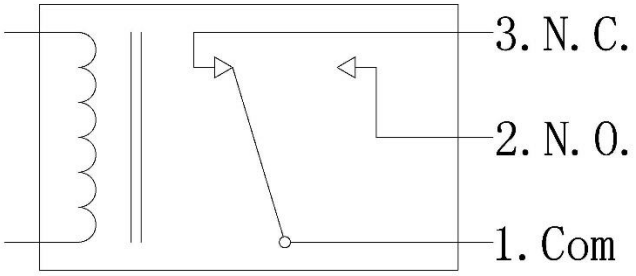
Size5 (AxN 90.150.4, AxN 110.200.4)

Terminal Configuration

Pin	Name	Function	Description
1	Com	Common relay contact	To be used as drive system OK signal
2	N.O.	Relay normally open contact	
3	N.C.	Relay normally closed contact	

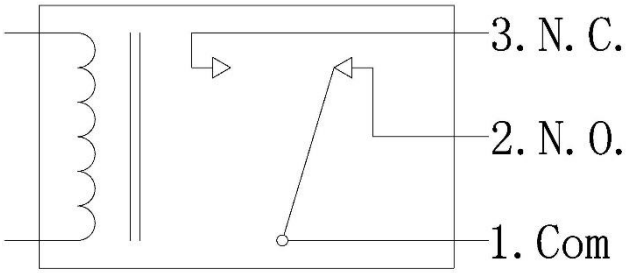
Diagram

AxN Series Drive use a relay to indicate the status. When Drive is power off or system is not ready, the circuit is connected between N.C. (Normally Closed) and Com. In the meantime, the circuit is disconnect between N.O. (Normally Open) and Com, illustrated as below.



System NOT Ready

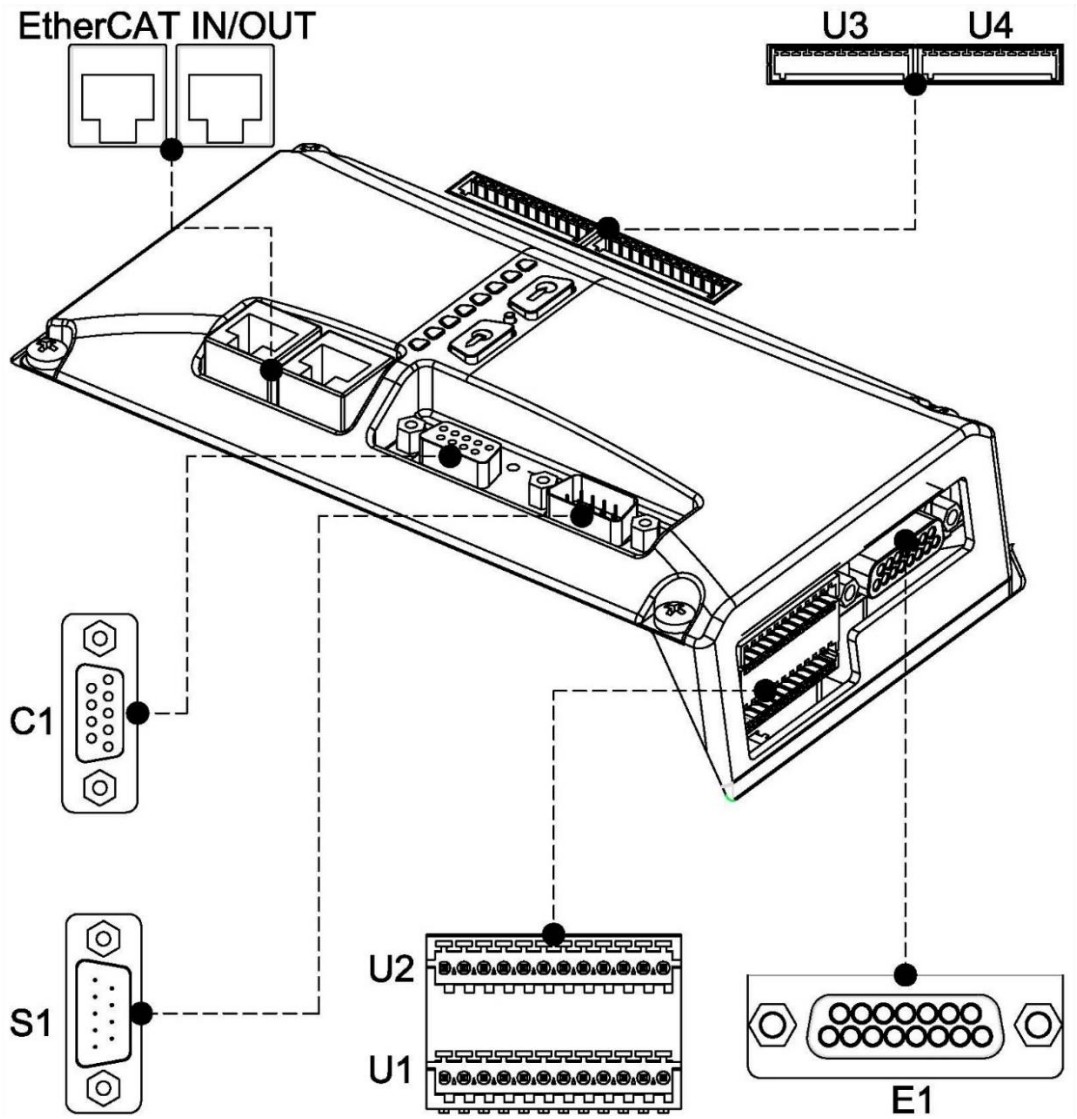
When the drive is ready, N.O. connects Com and N.C. disconnects Com, illustrated as below.



System Ready

4.4 Communication Port

4.4.1 Overview of Communication Port Panel



Name	Function	Description
E1	Encoder Connector	SinCos, Endat, Digital Incremental with Hall, Resolver and Hiperface
U1/U2	User Connectors	4 Analog Inputs, 2 Analog Outputs; 8 Digital Inputs, 4 Digital Outputs
S1	Serial Bus Connector	RS232, RS422 and RS485 / Secondary CAN
C1	CAN Connector	Main CAN / Auxiliary Encoder
EtherCAT IN/OUT	EtherCAT Connector	RJ45 100Base-TX
U3/U4	Insolated User Connectors (Optional)	Insolated: 3 Analog Inputs, 2 Analog Outputs; 8 Digital Inputs, 2 Digital Outputs. Optional

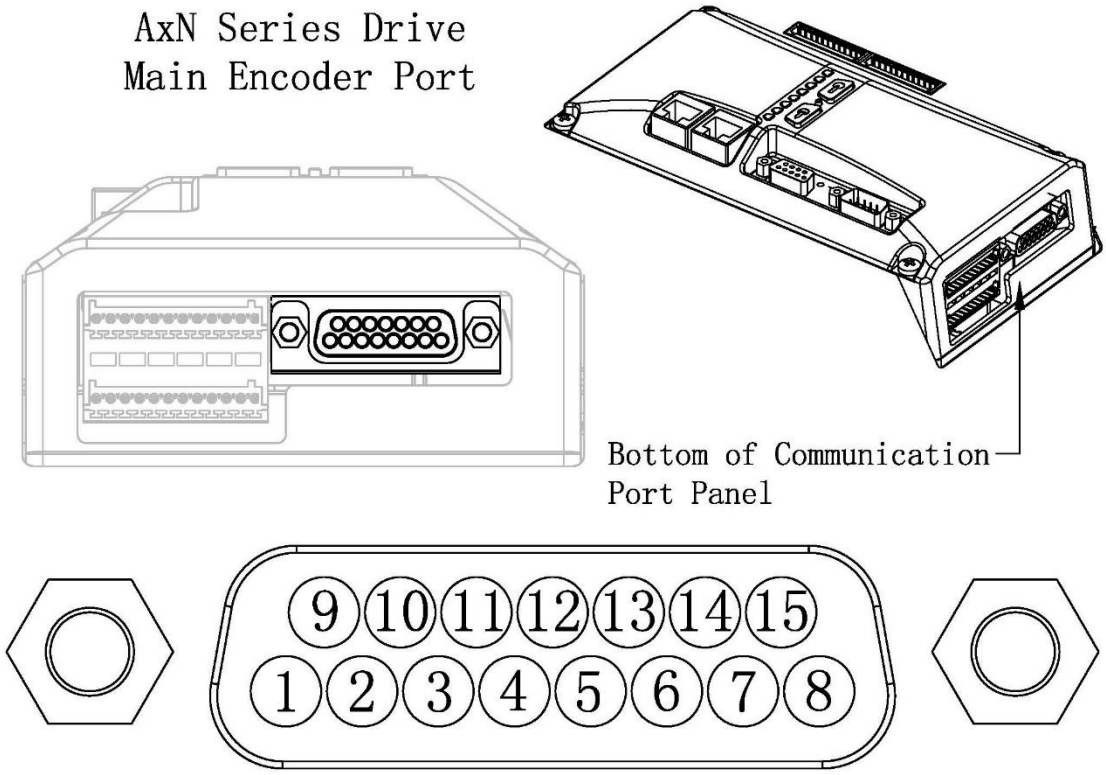
4.4.2 E1 Connector——Main Encoder Port

AxN Series Drive's Main Encoder Port is used to connect motor's position sensor (encoder). AxN Series Drive can support 5 different kinds of position sensor: Sincos Encoder, Endat Encoder, Digital Incremental Encoder with Hall, Resolver and Hiperface Encoder. Different position sensor has different pin assignment, refer to correspond section for more details.

If the motor is manufactured by Phase Motion Control, our Prefabricated Encoder Cables are recommended. Refer to: Appendix: Accessories ——5.2 Prefabricated Encoder Cable for more details.

Port Location

AxN Series Drive's Main Encoder Port (Female Plug, 15 Pin D-Sub) is on the right bottom of the Communication Port Panel. Refer to the following figures for exact location.

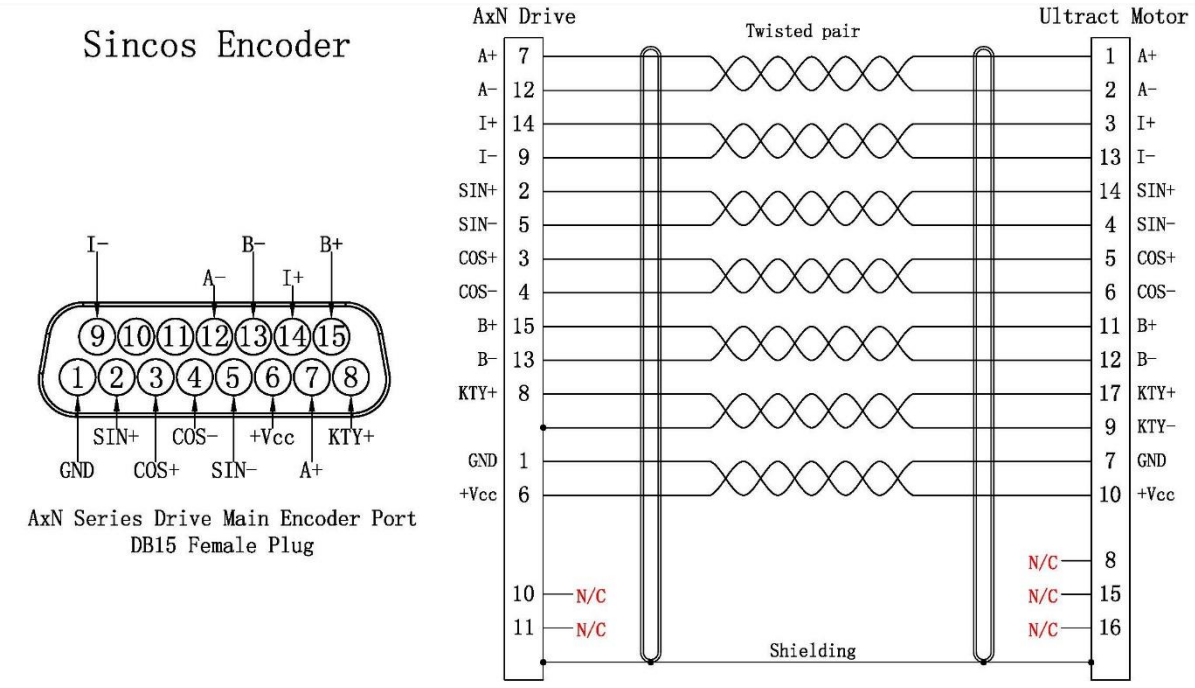


4.4.3 Sincos Encoder

Pin Assignment

Pin	Name	Function	Signal Description
1	GND	Supply ground	Encoder ground
2	SIN+	Encoder absolute channel	1 Vpp differential
3	COS+	Encoder absolute channel	1 Vpp differential
4	COS-	Encoder absolute channel	1 Vpp differential
5	SIN-	Encoder absolute channel	1 Vpp differential
6	+Vcc	Encoder supply, 5Vdc	Positive supply voltage
7	A+	Encoder incremental channel	1 Vpp differential
8	KTY+	Thermal sensor positive	
9	I-	Encoder index	1 Vpp differential
10	——	——	——
11	——	——	——
12	A-	Encoder incremental channel	1 Vpp differential
13	B-	Encoder incremental channel	1 Vpp differential
14	I+	Encoder index	1 Vpp differential
15	B+	Encoder Incremental channel	1 Vpp differential

Connection Table (with Ultract Series Motors)



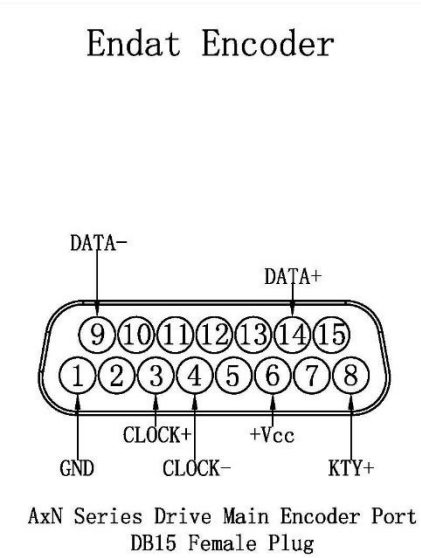
1) N/C——No Connection;
2) Connector back shell shielded 360° (Both ends);
3) ● means that the shield or cable should connect to connectors.

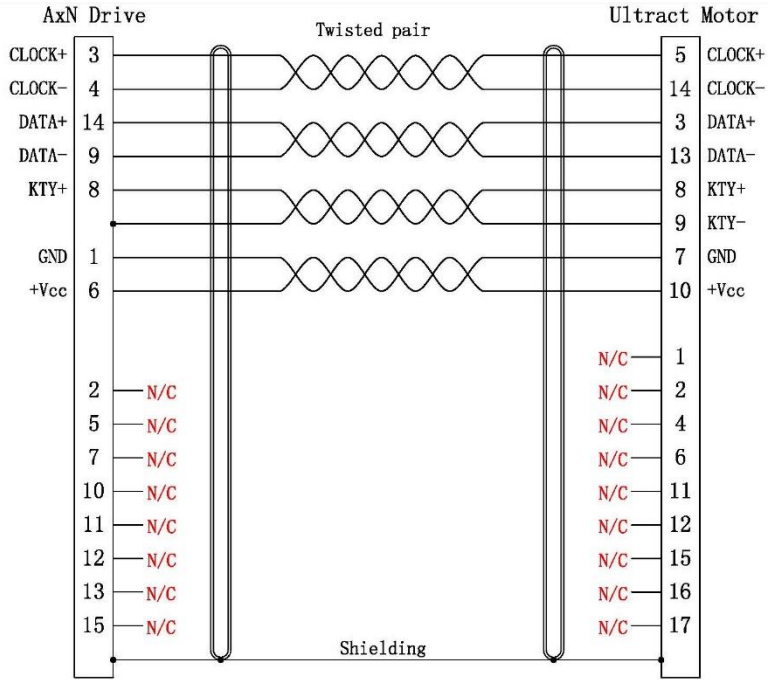
4.4.4 Endat Encoder

Pin Assignment

Pin	Name	Function	Signal Description
1	GND	Supply ground	Encoder ground
2	——	——	——
3	CLOCK+	Endat clock	TTL
4	CLOCK-	Endat clock	TTL
5	——	——	——
6	+Vcc	Encoder supply, 8Vdc	Positive supply voltage
7	——	——	——
8	KTY+	Thermal sensor positive	
9	DATA-	Endat data	TTL
10	——	——	——
11	——	——	——
12	——	——	——
13	——	——	——
14	DATA+	Endat data	TTL
15	——	——	——

Connection Table (with Ultract Series Motors)





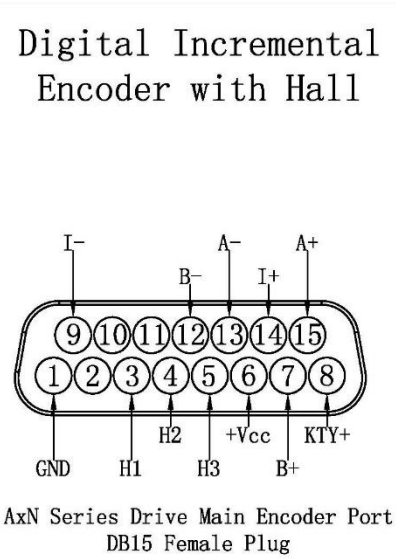
1) N/C——No Connection;
2) Connector back shell shielded 360° (Both ends);
3) ● means that the shield or cable should connect to connectors.

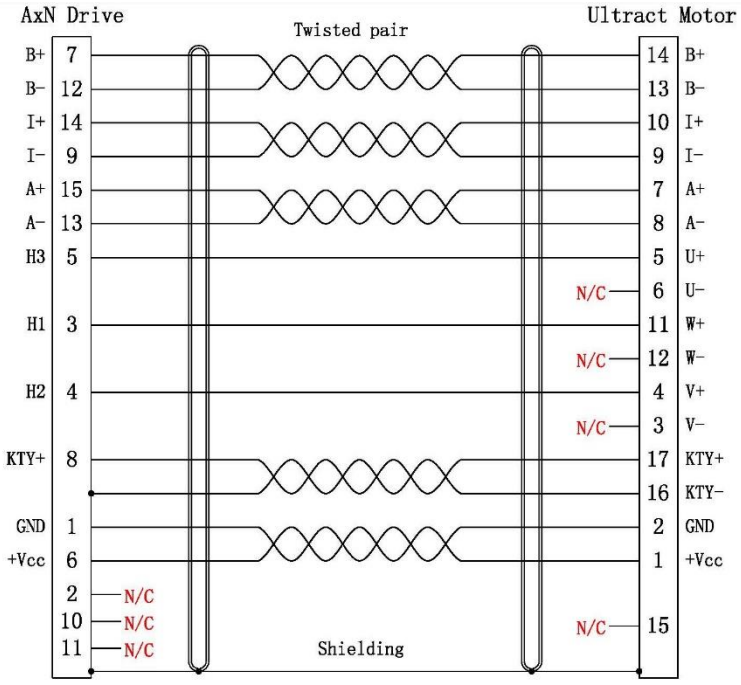
4.4.5 Digital Incremental Encoder with Hall

Pin Assignment

Pin	Name	Function	Signal Description
1	GND	Supply ground	Encoder ground
2	——	——	——
3	H1	Hall sensor	TTL
4	H2	Hall sensor	TTL
5	H3	Hall sensor	TTL
6	+Vcc	Encoder supply, 8Vdc	Positive supply voltage
7	B+	Encoder incremental channel	TTL
8	KTY+	Thermal sensor positive	
9	I-	Encoder index	TTL
10	——	——	——
11	——	——	——
12	B-	Encoder incremental channel	TTL
13	A-	Encoder incremental channel	TTL
14	I+	Encoder index	TTL
15	A+	Encoder incremental channel	TTL

Connection Table (with Ultract Series Motors)





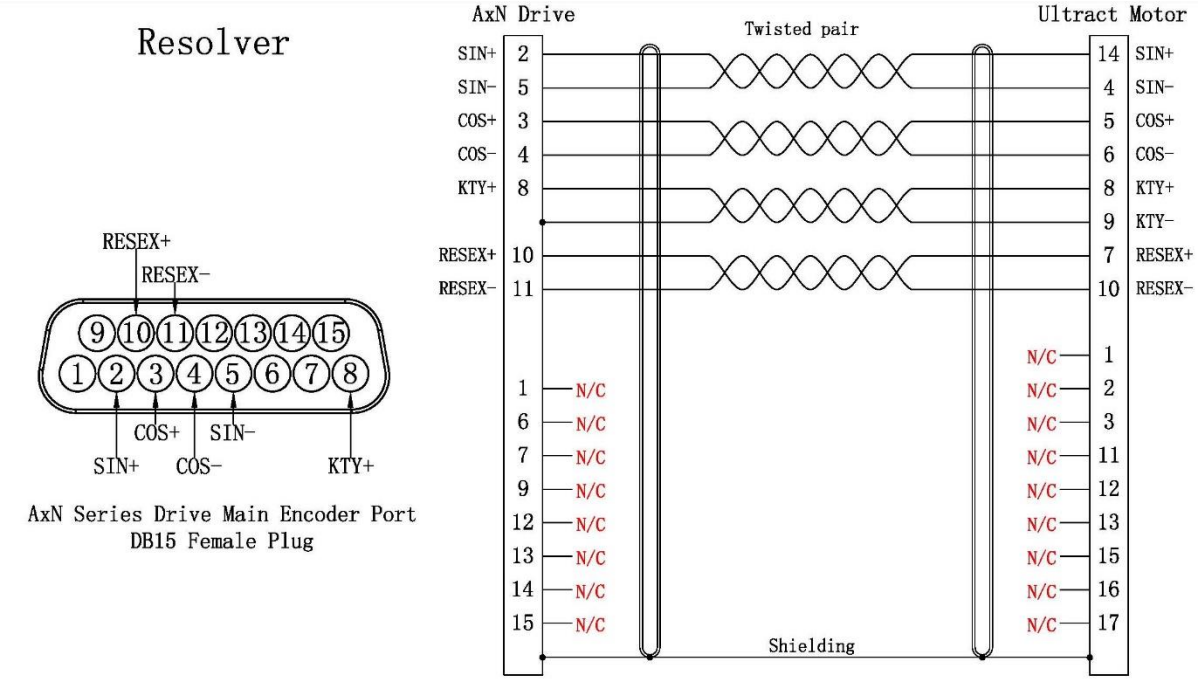
1) N/C——No Connection;
2) Connector back shell shielded 360° (Both ends);
3) ● means that the shield or cable should connect to connectors.

4.4.6 Resolver

Pin Assignment

Pin	Name	Function	Signal Description
1	——	——	——
2	SIN+	Absolute channel	Differential signal
3	COS+	Absolute channel	Differential signal
4	COS-	Absolute channel	Differential signal
5	SIN-	Absolute channel	Differential signal
6	——	——	——
7	——	——	——
8	KTY+	Thermal sensor positive	
9	——	——	——
10	RESEX+	Resolver energising +	8kHz sinusoidal wave
11	RESEX-	Resolver energising -	8kHz sinusoidal wave
12	——	——	——
13	——	——	——
14	——	——	——
15	——	——	——

Connection Table (with Ultract Series Motors)



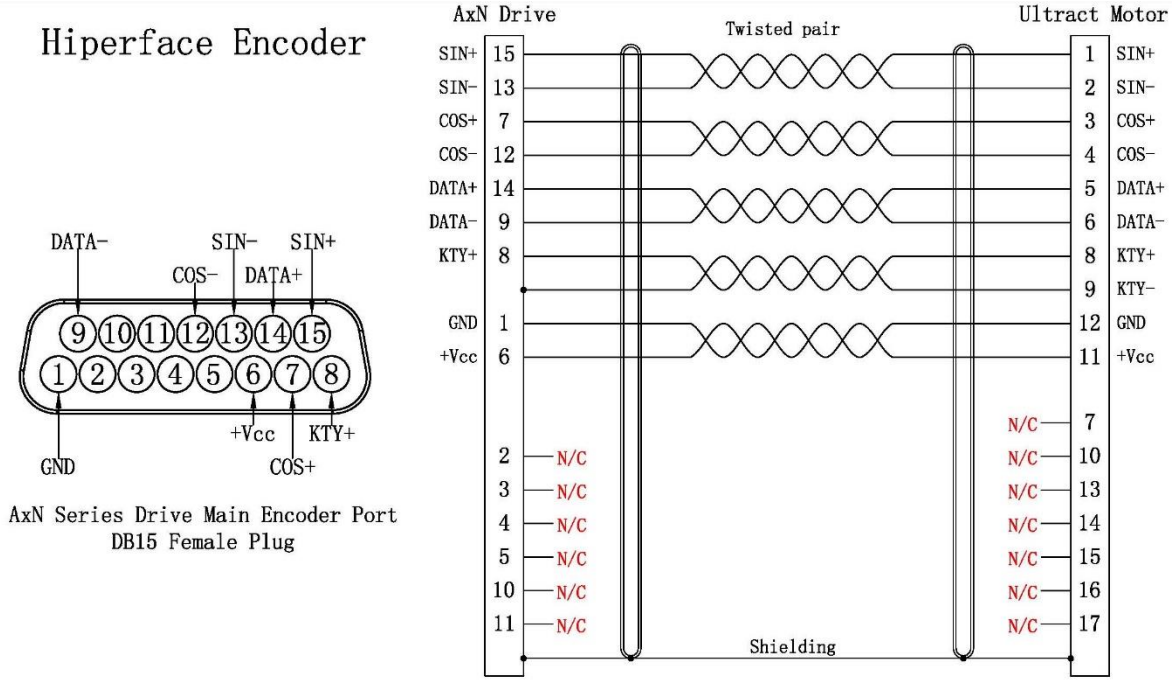
1) N/C——No Connection;
2) Connector back shell shielded 360° (Both ends);
3) ● means that the shield or cable should connect to connectors.

4.4.7 Hiperface Encoder

Pin Assignment

Pin	Name	Function	Signal Description
1	GND	Supply ground	Encoder ground
2	——	——	——
3	——	——	——
4	——	——	——
5	——	——	——
6	+Vcc	Encoder supply, 8Vdc	Positive supply voltage
7	COS+	Process data channel	TTL
8	KTY+	Thermal sensor positive	
9	DATA-	RS-485 parameter channel	TTL
10	——	——	——
11	——	——	——
12	COS-	Process data channel	TTL
13	SIN-	Process data channel	TTL
14	DATA+	RS-485 parameter channel	TTL
15	SIN+	Process data channel	TTL

Connection Table (with Ultract Series Motors)



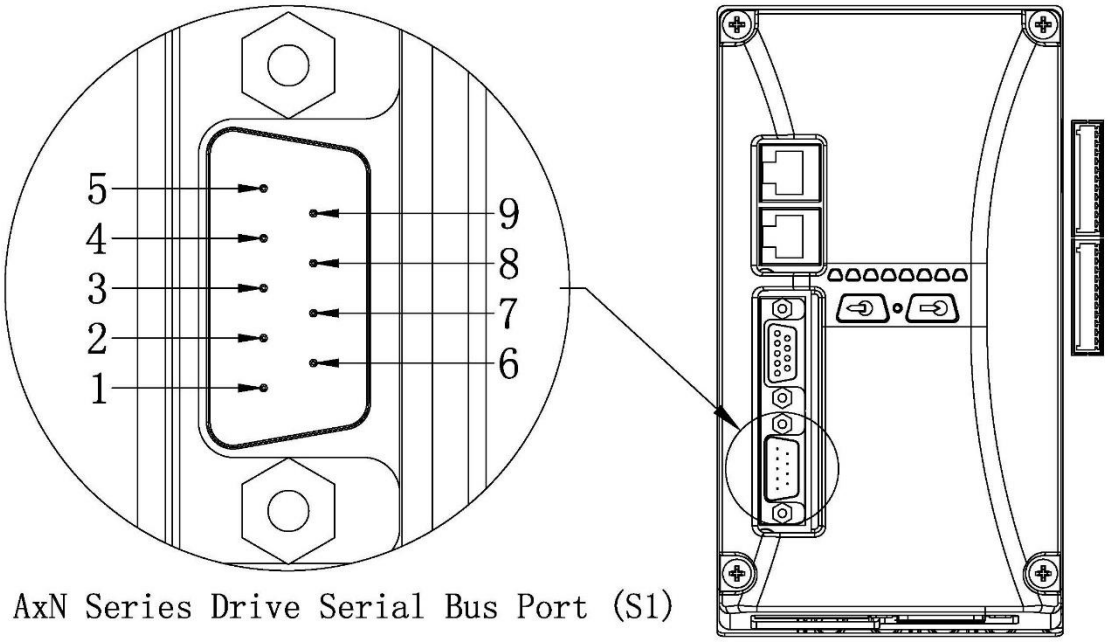
1) N/C——No Connection;
2) Connector back shell shielded 360° (Both ends);
3) ● means that the shield or cable should connect to connectors.

4.4.8 S1 Connector——Serial Bus Port

AxN Series Drive's Serial Bus Port (S1) supports RS-232, RS-422, RS-485 and CAN protocol. But only one communication interface can be used at a time.

Port Location

AxN Series Drive's Serial Bus Port (Male Plug, 9 Pin D-Sub) is on the downside of drive's communication port panel. Refer to the following figures for exact location.

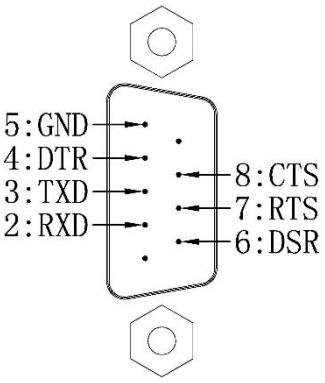


AxN Series Drive Serial Bus Port (S1)

4.4.9 RS-232

Pin Assignment

Pin	Standard RS-232	AxN RS-232	Function
1	DCD	---	Data Carrier Detect
2	RXD	RXD	Received Data
3	TXD	TXD	Transmitted Data
4	DTR	DTR	Data Terminal Ready
5	GND	GND	Common Ground
6	DSR	DSR	Data Set Ready
7	RTS	RTS	Request To Send
8	CTS	CTS	Clear To Send
9	RI	---	Ring Indicator



Notes:

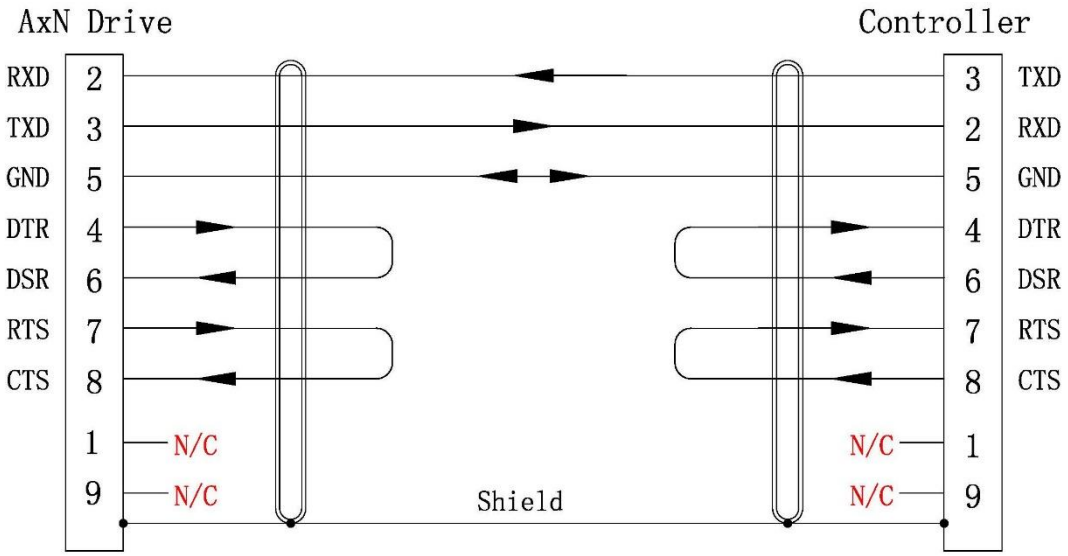
1. RS-232 devices may be classified as Data Terminal Equipment (DTE) or Data Communication Equipment (DCE); this defines at each device which wires will be sending and receiving each signal. AxN Series Drive is a Data Communication Equipment (DCE), and a controller or a computer is a Data Terminal Equipment (DTE).

2. The signal voltage is ±12V, and the max current of DTR (Pin4) is 100mA.

Minimal "3-wire" Connection

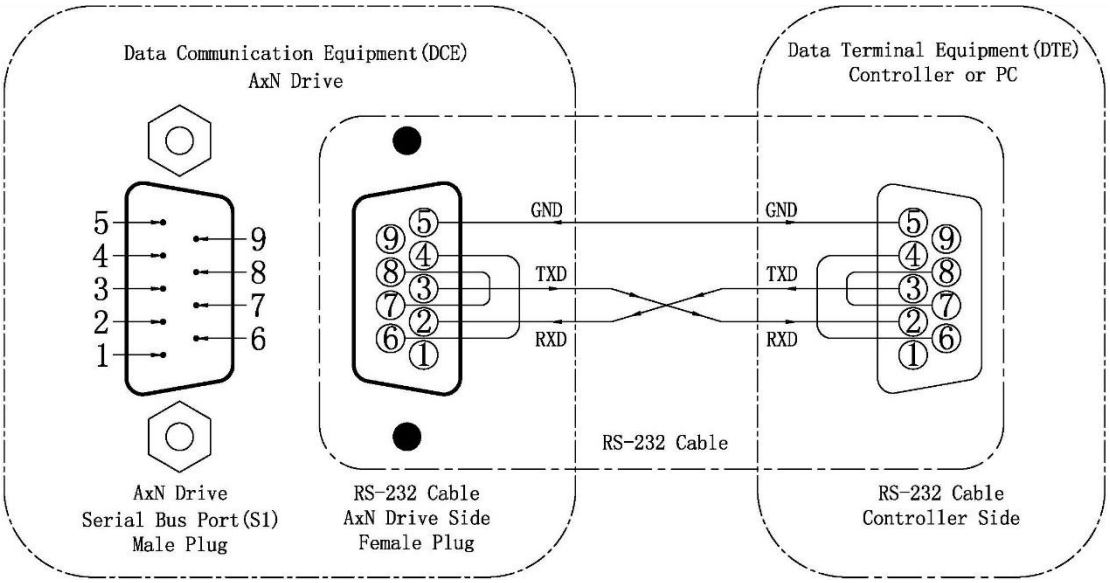
A minimal "3-wire" RS-232 connection consisting only of transmit data, receive data, and ground, is commonly used when the full facilities of RS-232 are not required. And it also the minimal connection requirement of Cockpit communication with AxN Series Drive.

Connection table



1) N/C——No Connection;
2) Connector back shell shielded 360° (Both ends);
3) ● means that the shield or cable should connect to connectors.

Connection diagram

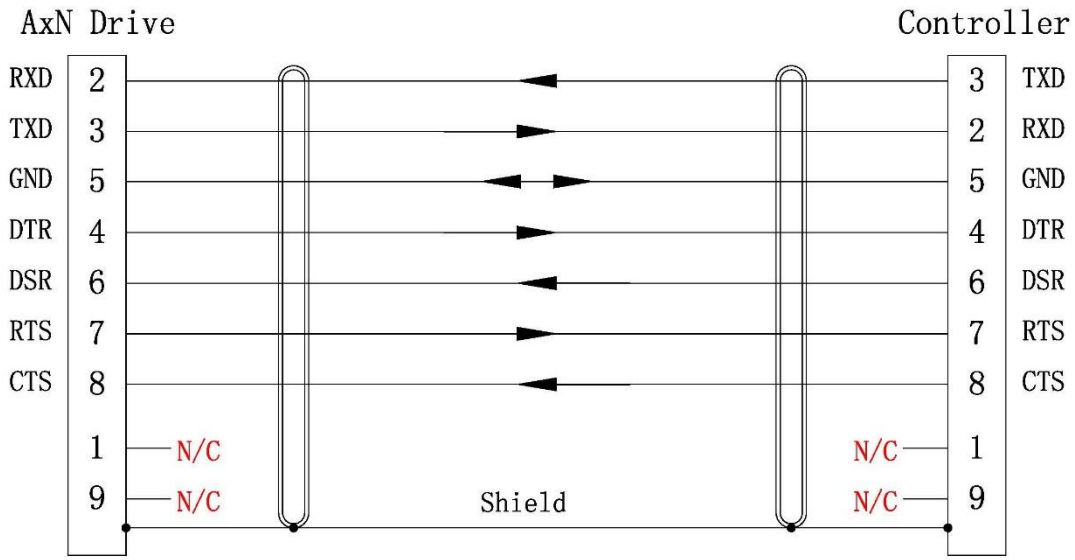


Maximal "7-wire" Connection

When the controller has a full facilities of RS-232, "7-wire" connection is the maximal connection which AxN series drive can support.

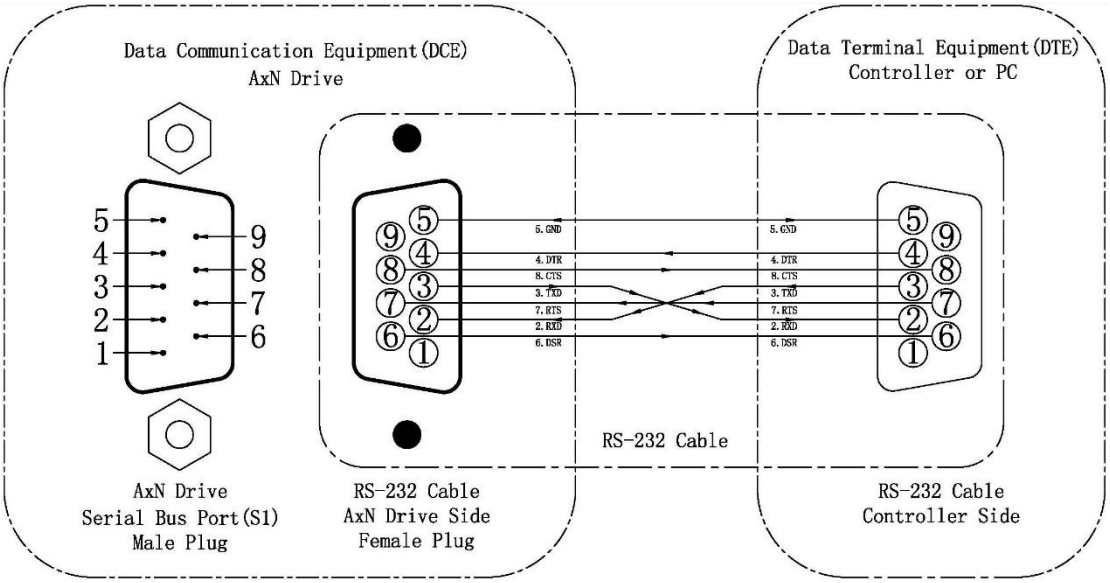
NOTE: Do **NOT** use "9-wire" connection, AxN series drive do not support DCD and RI function.

Connection table



1) N/C——No Connection;
2) Connector back shell shielded 360° (Both ends);
3) ● means that the shield or cable should connect to connectors.

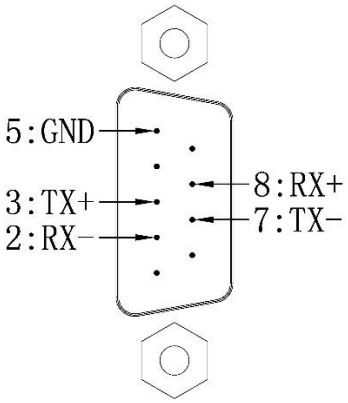
Connection diagram



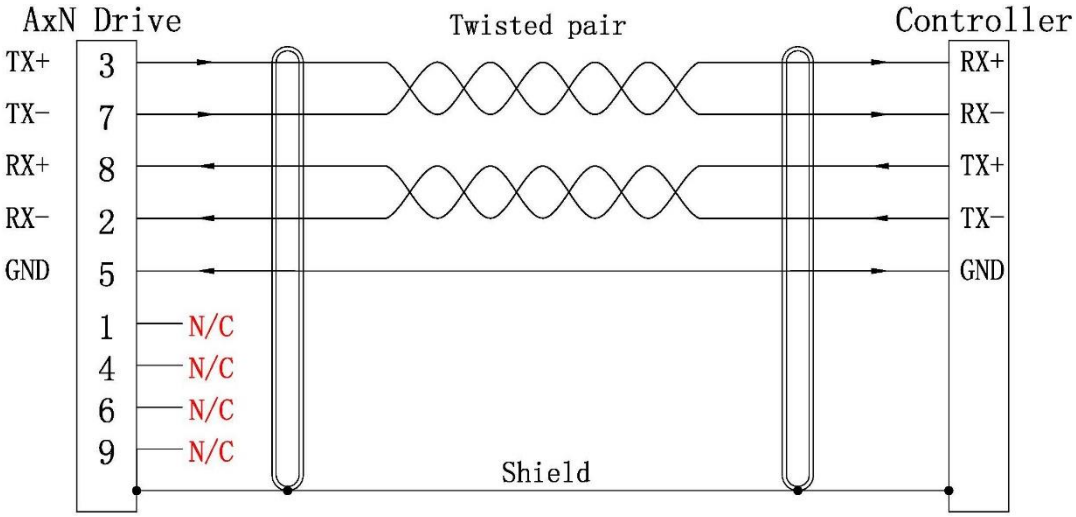
4.4.10 RS422/RS485

Pin Assignment

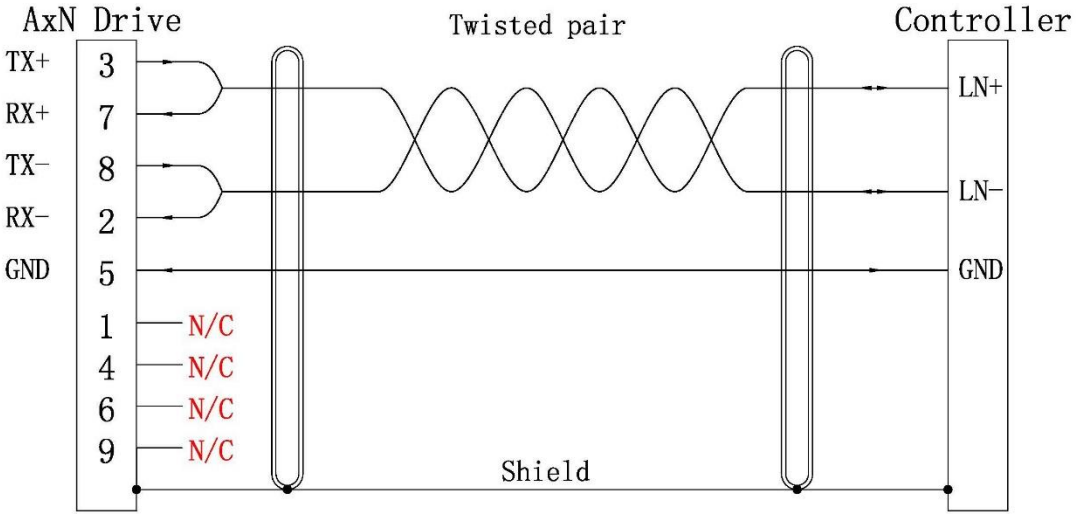
Pin	RS-422	RS-485	Function
1	---	---	---
2	RX—	RX—(LN—)	Receive Data -
3	TX＋	TX＋(LN＋)	Transmit Data +
4	---	---	---
5	GND	GND	Ground connection
6	---	---	---
7	TX—	TX—(LN—)	Transmit Data -
8	RX＋	RX＋(LN＋)	Receive Data +
9	---	---	---



RS-422 Connection Table



RS-485 Connection Table



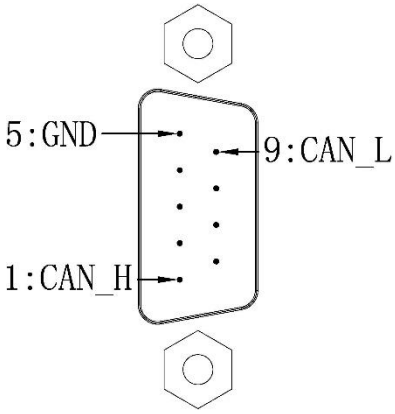
1) N/C——No Connection;
2) Connector back shell shielded 360° (Both ends);
3) ● means that the shield or cable should connect to connectors.

4.4.11 Auxiliary CAN

AxN Series Drive supports CANOpen protocol and has two independent CAN controller. The auxiliary CAN controller links to the S1 connector.

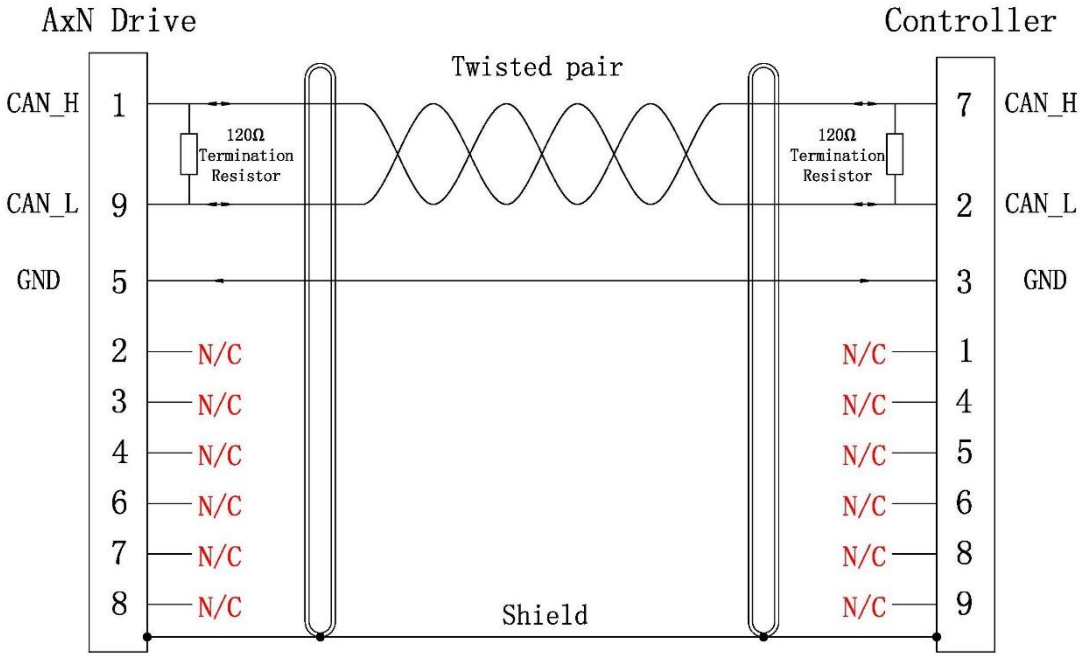
Pin Assignment

Pin	CANOpen	Function
1	CAN_H	CAN_H bus line (dominant high)
2	---	---
3	---	---
4	---	---
5	GND	Ground connection
6	---	---
7	---	---
8	---	---
9	CAN_L	CAN_L bus line (dominant low)



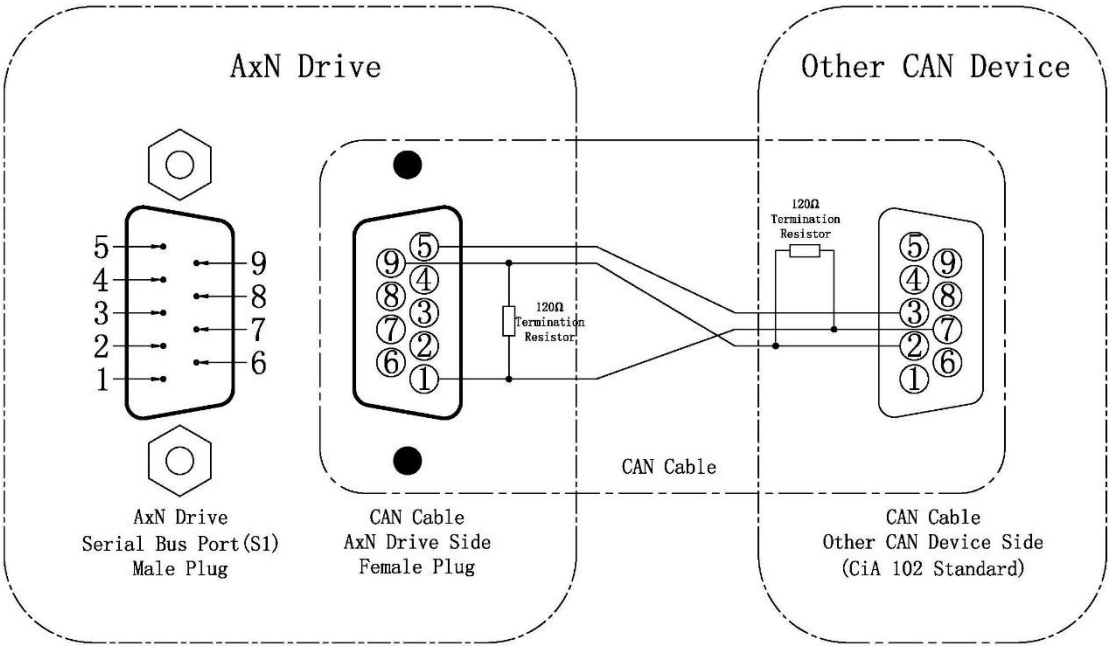
Note: CANOpen pin assignment on S1 connector does NOT meet CiA 102 Standard.

Connection Table



1) N/C——No Connection;
2) Connector back shell shielded 360° (Both ends);
3) ● means that the shield or cable should connect to connectors.

Connection diagram



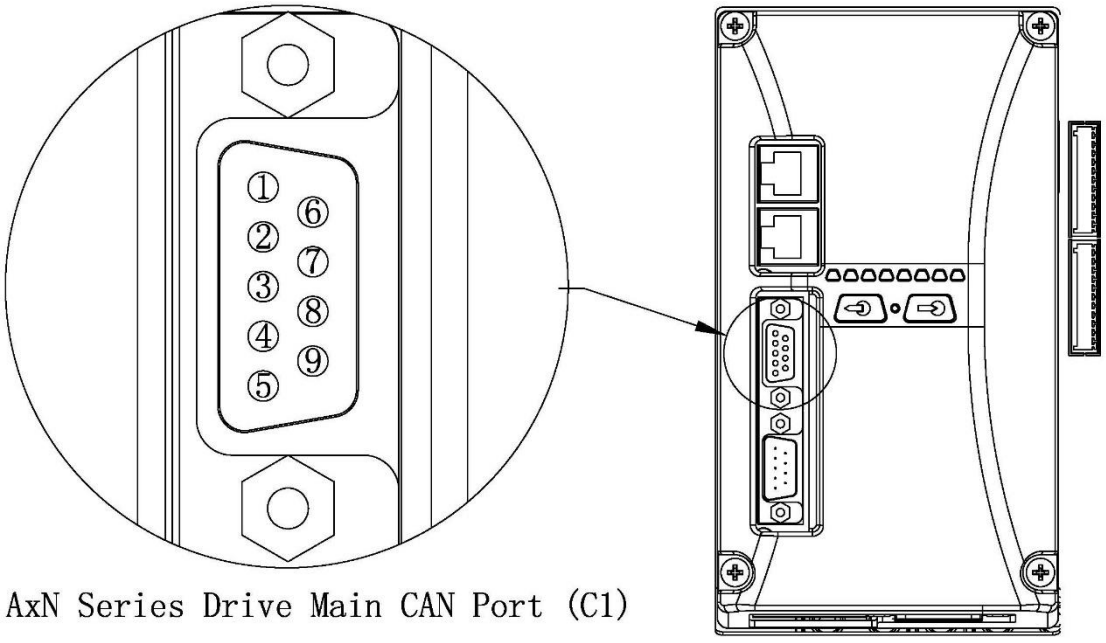
Note: Only the first and the last CAN node device should use a 120Ω terminal resistor.

4.4.12 C1 Connector——Main CAN Port

AxN Series Drive's Main CAN Port (C1) connects to the main CAN controller inside the AxN drive. It the default CAN network port of AxN drive. Moreover, C1 port can also be used as Auxiliary Encoder Port.

Port Location

AxN Series Drive's Main CAN Port (Female Plug, 9 Pin D-Sub) is on the middle side of drive's communication port panel. Refer to the following figures for exact location.

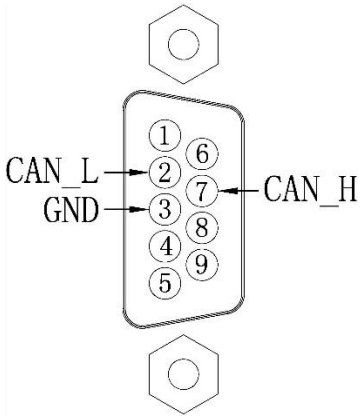


4.4.13 Main CAN

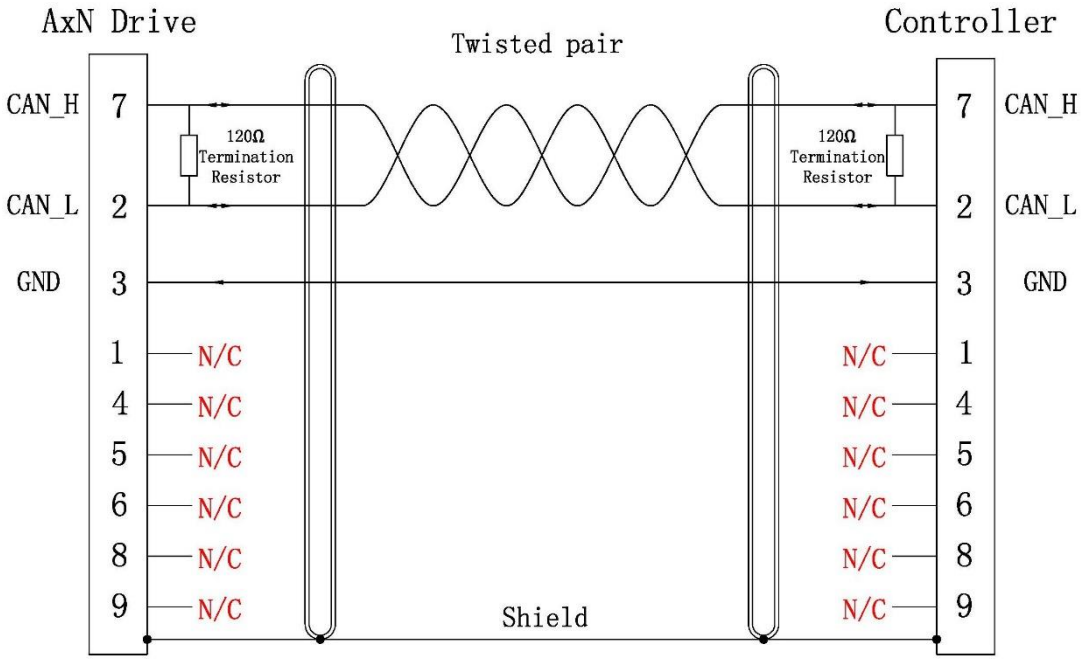
AxN Series Drive supports CANOpen protocol and has two independent CAN controller. The main CAN controller links to the C1 connector.

Pin Assignment

Pin	CANOpen	Function
1	---	---
2	CAN_L	CAN_L bus line (dominant low)
3	GND	Ground connection
4	---	---
5	---	---
6	---	---
7	CAN_H	CAN_H bus line (dominant high)
8	---	---
9	---	---

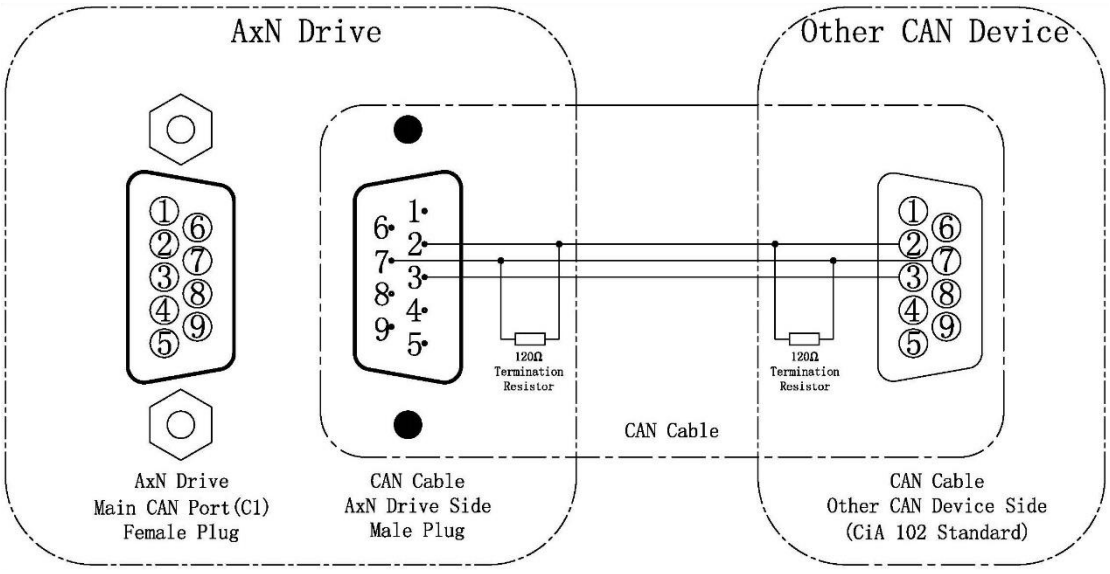


Connection Table



1) N/C——No Connection;
2) Connector back shell shielded 360° (Both ends);
3) ● means that the shield or cable should connect to connectors.

Connection diagram



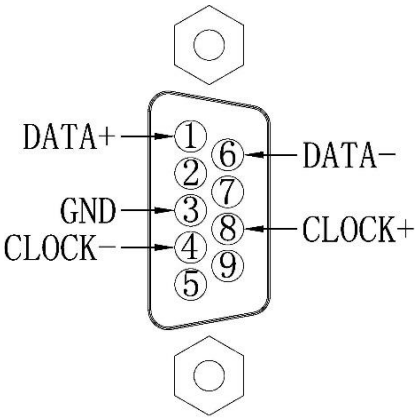
Note: Only the first and the last CAN node device should use a 120Ω terminal resistor.

4.4.14 Auxiliary Encoder

C1 port is also the Auxiliary Encoder Port. It supports Endat Encoder IN, Incremental Encoder IN and Simulated Incremental Encoder OUT. The output voltage of Simulated Incremental Encoder is 0 ~ 3.3V.

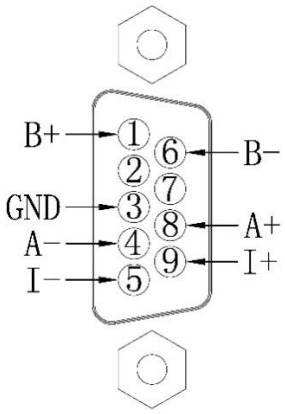
Endat Encoder (IN)

Pin	Name	Function
1	DATA+	Endat Data
2	---	---
3	GND	Ground connection
4	CLOCK-	Endat Clock
5	---	---
6	DATA-	Endat Data
7	---	---
8	CLOCK+	Endat Clock
9	---	---



Incremental Encoder (IN/OUT)

Pin	Name	Function
1	B+	Encoder incremental channel
2	---	---
3	GND	Ground connection
4	A-	Encoder incremental channel
5	I-	Encoder index
6	B-	Encoder incremental channel
7	---	---
8	A+	Encoder incremental channel
9	I-	Encoder index

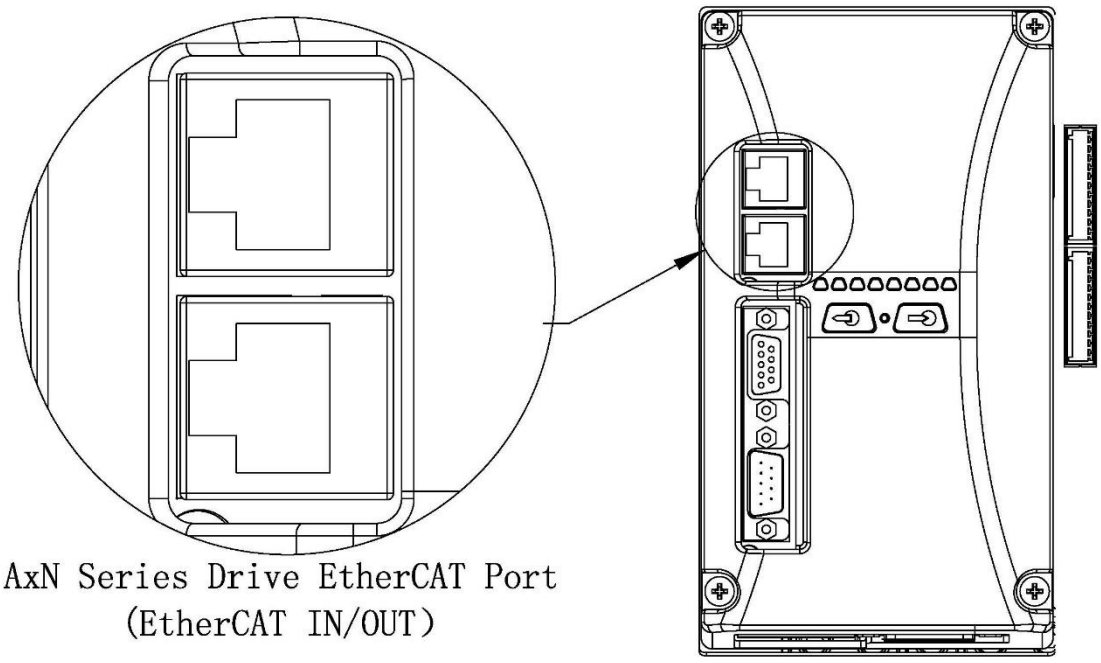


4.4.15 EtherCAT IN/OUT——EtherCAT Port

AxN Series Drive supports EtherCAT fieldbus protocol. And can be connected to a EtherCAT network through two connectors: EtherCAT IN and EtherCAT OUT.

Port Location

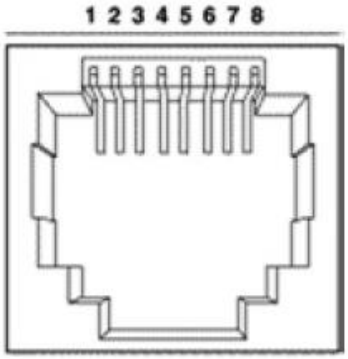
AxN Series Drive's EtherCAT Port is on the upside of drive's communication port panel, formed by two RJ45 100Base-TX female plug. Refer to the following figure for exact location.



AxN Series Drive EtherCAT Port
(EtherCAT IN/OUT)

Pin Assignment

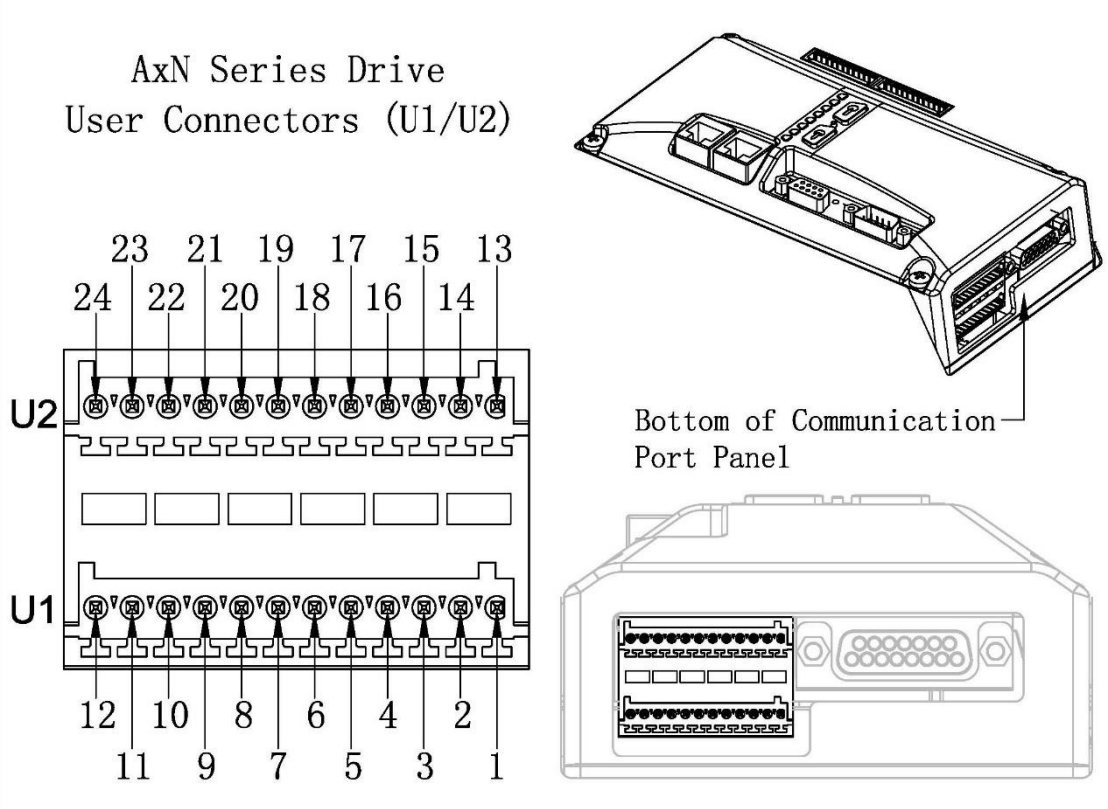
Pin	Name	Function
1	TX +	Transmit Data +
2	TX -	Transmit Data -
3	RX +	Receive Data +
4	---	---
5	---	---
6	RX -	Receive Data -
7	---	---
8	---	---



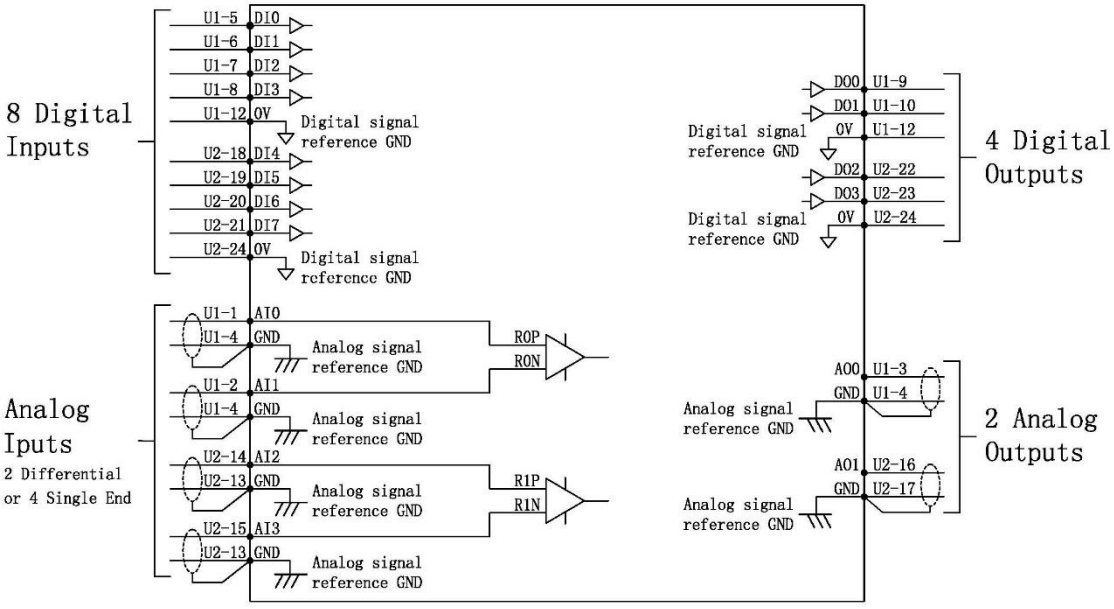
4.4.16 U1/U2——User Connectors

Port Location

AxN Series Drive's User Connectors (Male Plug, 2 × 12 pin) are on the left bottom of the Communication Port Panel. Refer to the following figure for exact location.



Diagram



NOTE: All analog signal reference GND are the same, and all digital signal reference GND are the same.

Pin Assignment

User Connector U1

Pin	Name	Function	Signal Description
1	R0P (AI0)	Programmable analog input	±10V, Zin=10KΩ, able to switch between differential mode and single end mode(1)
2	R0N (AI1)	Programmable analog input	±10V, Zin=10KΩ, able to switch between differential mode and single end mode(1)
3	AO0	Programmable analog output	0 ~ 10V f.s., 30 mA
4	GND	Analog reference ground	Analog signals reference
5	DI0	Programmable digital input	6.6 kΩ to ground, 20-30 V
6	DI1	Programmable digital input	6.6 kΩ to ground, 20-30 V
7	DI2	Programmable digital input	6.6 kΩ to ground, 20-30 V
8	DI3	Programmable digital input	6.6 kΩ to ground, 20-30 V
9	DO0	Programmable digital output	PNP open collector, 24 V, 100mA max
10	DO1	Programmable digital output	PNP open collector, 24 V, 100mA max
11	24V	Auxiliary supply of control circuits	22 ~ 30Vdc to Pin 12 (0V), 500mA
12	0V	Auxiliary supply negative	Digital signal reference

User Connector U2

Pin	Name	Function	Signal Description
13	GND	Analog reference ground	Analog signals reference
14	R1P (AI2)	Programmable analog input	±10V, Zin=10KΩ, able to switch between differential mode and single end mode(1)
15	R1N (AI3)	Programmable analog input	±10V, Zin=10KΩ, able to switch between differential mode and single end mode(1)
16	AO1	Programmable analog output	0 ~ 10V f.s., 30 mA
17	GND	Analog reference ground	Analog signals reference
18	DI4	Programmable digital input	6.6 kΩ to ground, 20-30 V
19	DI5	Programmable digital input	6.6 kΩ to ground, 20-30 V
20	DI6	Programmable digital input	6.6 kΩ to ground, 20-30 V
21	DI7	Programmable digital input	6.6 kΩ to ground, 20-30 V
22	DO2	Programmable digital output	PNP open collector, 24 V, 100mA max
23	DO3	Programmable digital output	PNP open collector, 24 V, 100mA max
24	0V	Auxiliary supply negative	Digital signal reference

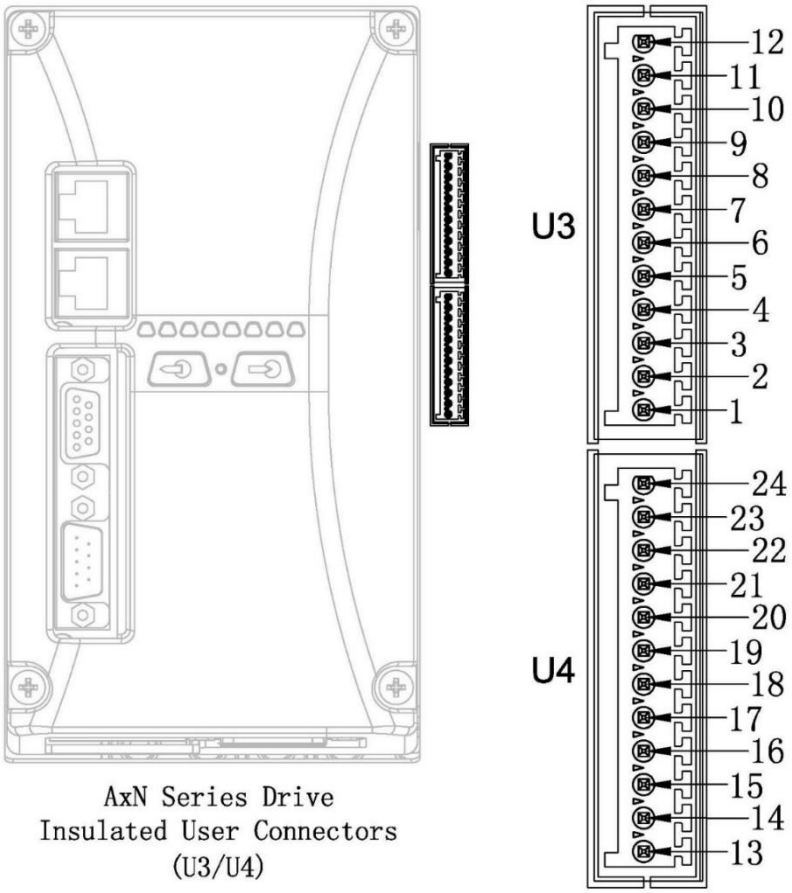
Notes:

1. AxN Series Drive has 4 single end analog inputs or 2 differential analog inputs, and they can be switched by software. The default mode is differential mode. When analog inputs are in differential mode, pin R0P (U1-1) and pin R0N (U1-2) map the R0 channel in software, and pin R1P (U2-14) and pin R1N (U2-15) map the R1 channel in software. On the other hand, when analog inputs are in single end mode, pins: AI0 (U1-1), AI1 (U1-2), AI2 (U2-14) and AI3 (U2-15) respectively map channels AI0, AI1, AI2 and AI3 in software.

4.4.17 U3/U4——Insulated User Connectors

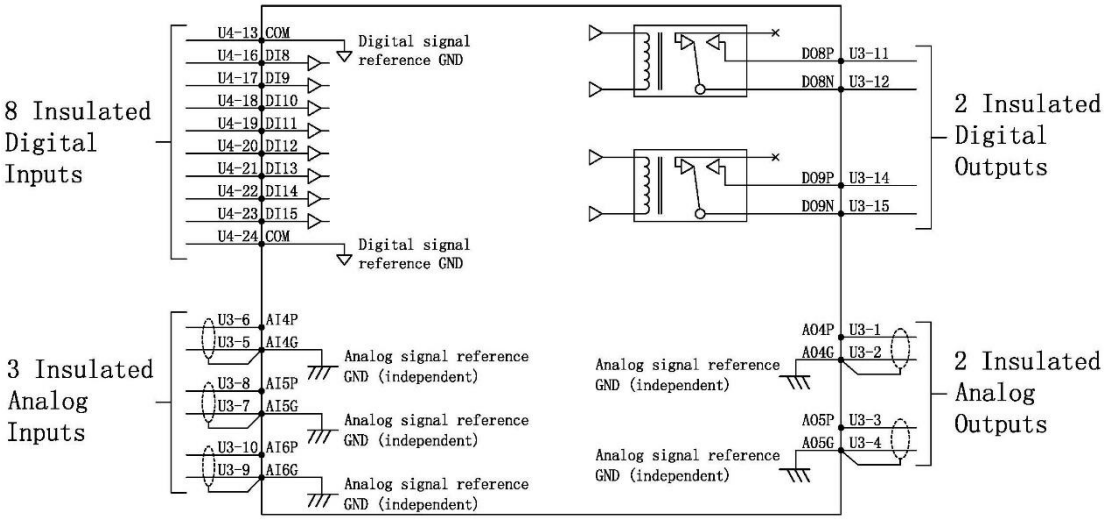
Port Location

AxN Series Drive's Insulated User Connectors (Male Plug, 2×12 pin) are on the right of the Communication Port Panel. Refer to the following figure for exact location.



AxN Series Drive
Insulated User Connectors
(U3/U4)

Diagram



NOTE: All analog signal reference GND are independent, but all digital signal reference GND are the same.

Pin Assignment

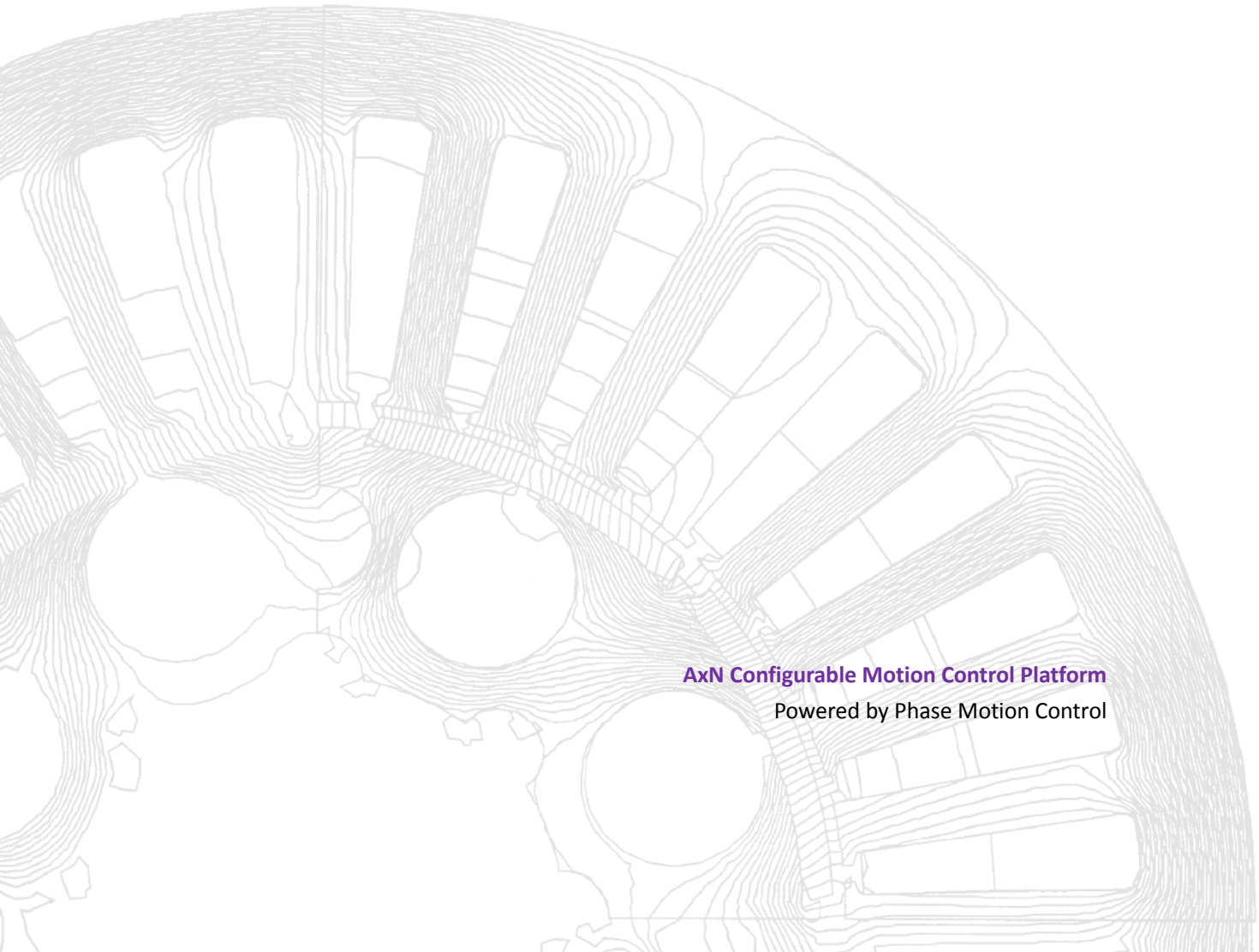
Insulated User Connector U3

Pin	Name	Function	Signal Description
1	AO4P	Programmable analog output	±10V f.s., 30 mA
2	AO4G	Analog reference ground	Insulated reference ground
3	AO5P	Programmable analog output	±10V f.s., 30 mA
4	AO5G	Analog reference ground	Insulated reference ground
5	AI4G	Analog reference ground	Insulated reference ground
6	AI4P	Programmable analog input	±10V
7	AI5G	Analog reference ground	Insulated reference ground
8	AI5P	Programmable analog input	±10V
9	AI6G	Analog reference ground	Insulated reference ground
10	AI6P	Programmable analog input	±10V
11	DO8P	Programmable digital output	On/Off switch, 9V ~ 28Vdc/2A
12	DO8N	Programmable digital output	

Insulated User Connector U4

Pin	Name	Function	Signal Description
13	COM	Digital reference ground	Insulated reference ground for digital input
14	DO9P	Programmable digital output	On/Off switch, 9V ~ 28Vdc/2A
15	DO9N	Programmable digital output	
16	DI8	Programmable digital input	5mA, 24Vdc max
17	DI9	Programmable digital input	5mA, 24Vdc max
18	DI10	Programmable digital input	5mA, 24Vdc max
19	DI11	Programmable digital input	5mA, 24Vdc max
20	DI12	Programmable digital input	5mA, 24Vdc max
21	DI13	Programmable digital input	5mA, 24Vdc max
22	DI14	Programmable digital input	5mA, 24Vdc max
23	DI15	Programmable digital input	5mA, 24Vdc max
24	COM	Digital reference ground	Insulated reference ground for digital input

5 APPENDIX: ACCESSORIES



5.1 Prefabricated Motor Power Output Cable

Order Code Definition

The Order Code can provide all the necessary specifications about a Prefabricated Motor Power Output Cable. Choose the specifications and use the corresponding order cable to order.

Order Code	PW	-C	-D16	-5	-GTV
Cable Type	Power Cable				
Terminal Type	Motor Side/Drive Side C = Ring terminal/Cord end terminal F = Ring terminal/Ring terminal S = Stripped wires/Cord end terminal R = Stripped wires/Ring terminal A = Aviation plug/Cord end terminal				
Wire Gauge(1)	D1.5=4×1.5mm²	B1.5=4×1.5mm²+2×__mm²			
	D2.5=4×2.5mm²	B2.5=4×2.5mm²+2×__mm²			
	D04 =4×4mm²	B04 =4×4mm²+2×__mm²			
	D06 =4×6mm²	B06 =4×6mm²+2×__mm²			
	D10 =4×10mm²	B10 =4×10mm²+2×__mm²			
	D16 =4×16mm²	B16 =4×16mm²+2×__mm²			
	D25 =4×25mm²	B25 =4×25mm²+2×__mm²			
Length	3=3m 5=5m 7=7m X(2)=X m				
Shield Type	G = General shielded	I = General + Internal shielded	N = No shield		
Trace Chain or Not	S = Standard	T = Trace chain			
Coat material	V=PVC	U=PUR(3)			

Notes:

1. B in the Wire Gauge means power cable for motor with brake, the gauge of brake wires should be provided either;
2. Cable Length are not just 3, 5 and 7m, order whatever cable length you want;
3. Cable Coat made by PUR is oil resistant and wear resistant.

Example

Order Code: PW-C-D16-7-GTV

Power cable; terminal type of motor side is ring terminal, terminal type of drive side is cord end terminal; wire gauge is 4×16mm²; length is 7m; general shielded; trace chain; insulating layer material is PVC.

5.2 Prefabricated Encoder Cable (for Phase Motors)

Order Code Definition

The Order Code can provide all the necessary specifications about a Prefabricated Encoder Cable. Choose the specifications and use the corresponding order cable to order.

Order Code	CE	-X	-A28	-5	-ISU	-xx
Cable Type	CN = Endat Encoder (EQN1325/ECN1313) CE = Endat Encoder (ECI1319/EQI1331) CS = Sincos Encoder CR = Resolver CH = Incremental with Hall sensor					
Terminal Type	X=Aviation plug / DB15(180°outlet) Y=Aviation plug/DB15(45°outlet)					
Wire Gauge(1)	A28=AWG28					
Length	3=3m 5=5m 7=7m X(2)=X m					
Shield Type	G = General shielded I = General + Internal shielded N = No shield					
Trace Chain or Not	S = Standard T = Trace chain					
Coat material	V=PVC U=PUR(3)					
Reserve Code	Reserve					

Example

Order Code: CE-X-A28-5-ISU

Endat cable(ECI1319/EQI1331); terminal type of motor side is aviation plug, terminal type of drive side is DB15 connector(180 °outlet); internal diameter is AWG28; length 5m; general and internal shielded; standard, not trace chain; insulating layer material is PUR.