XtraDrive (XD-) SERIES
AC SERVO DRIVER

Prior to installing the product, read these instructions thoroughly and retain for future reference.

Short Form
Installation Guide

Catalog No. 8U0107

XtraDrive Short Form Installation Guide
Cat. No. 8U0107, Rev. B
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1. Introduction

This guide describes the XtraDrive XD- SERIES AC SERVO DRIVER controlling Yaskawa ∑-II series or any compatible AC servomotor.

The product conforms to the following standards:

EN61000-6-2: 1999
EN55011: 1998, Group 1 Class A
However, because this product is a built-in type, reconfirmation of the above standards is required after being installed in the final product.

Upon receipt of the product and prior to installing the product, read these instructions carefully and retain for future reference. This will enable you to properly use the XtraDrive Series AC Servo Driver and carry out periodic inspection, maintenance, etc.

Related documents:

Title	Catalog No.
XtraDrive Series Servo System User's Manual	8U0108
AC Servo Motor Instructions for Yaskawa ∑-II series motors or documentation for other compatible motors	TOE-C231-2 (for ∑-II) Manufacturer's motor specification
XtraWare User's Manual	8U0109

Topics described in this manual include:

- Safety precautions
- Checking XtraDrive upon delivery
- Installing XtraDrive
- Wiring XtraDrive
- Operating XtraDrive
- Inspecting and maintaining XtraDrive

Some drawings in this guide are shown as typical examples and may differ from the shipped product.

You can order a copy of this guide by contacting your YET representative Contact information is provided on the copyright page. Please state the catalog number, which appears on the front cover.

Notes:
Some drawings in this guide are shown with the protective cover or shields removed in order to enhance clarity. Make sure all covers and shields are replaced before operating this product.
YET is not responsible for accidents or damages resulting from product modifications made by the user.

1.1. Safety Precautions

In this guide, safety precautions are classified as WARNING or CAUTION. It is extremely important that you pay close attention to these precautions.

The following symbols are used:

⚠ WARNING Indicates a potentially hazardous situation, which, if not avoided, could result in death or serious personal injury.

⚠ CAUTION Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate personal injury and/or damage to the equipment. In some instances, items described in CAUTION could also result in a serious accident.

Read the following safety precautions thoroughly before installation, operation, maintenance or inspection of the XtraDrive Servo Drives.

⚠ WARNING	
Installation	Reference Page No.
❑ After voltage resistance test, wait at least five minutes before servicing the product. *Failure to observe this warning could result in electric shock.*	13
Wiring	
❑ XtraDrive grounding must be in accordance with the national code and consistent with sound local practices. *Failure to observe this warning could result in electric shock or fire.*	17
Inspection and Maintenance	
❑ Be sure to turn OFF power before inspection or maintenance. *Failure to observe this warning could result in electric shock.*	31
❑ Never open the terminal cover while power is ON, and never turn ON power when the terminal cover is open. *Failure to observe this warning could result in electric shock.*	31
❑ After turning OFF power, wait at least five minutes before servicing the product. *Failure to observe this warning could result in residual electric charges causing electric shock.*	31

⚠ CAUTION

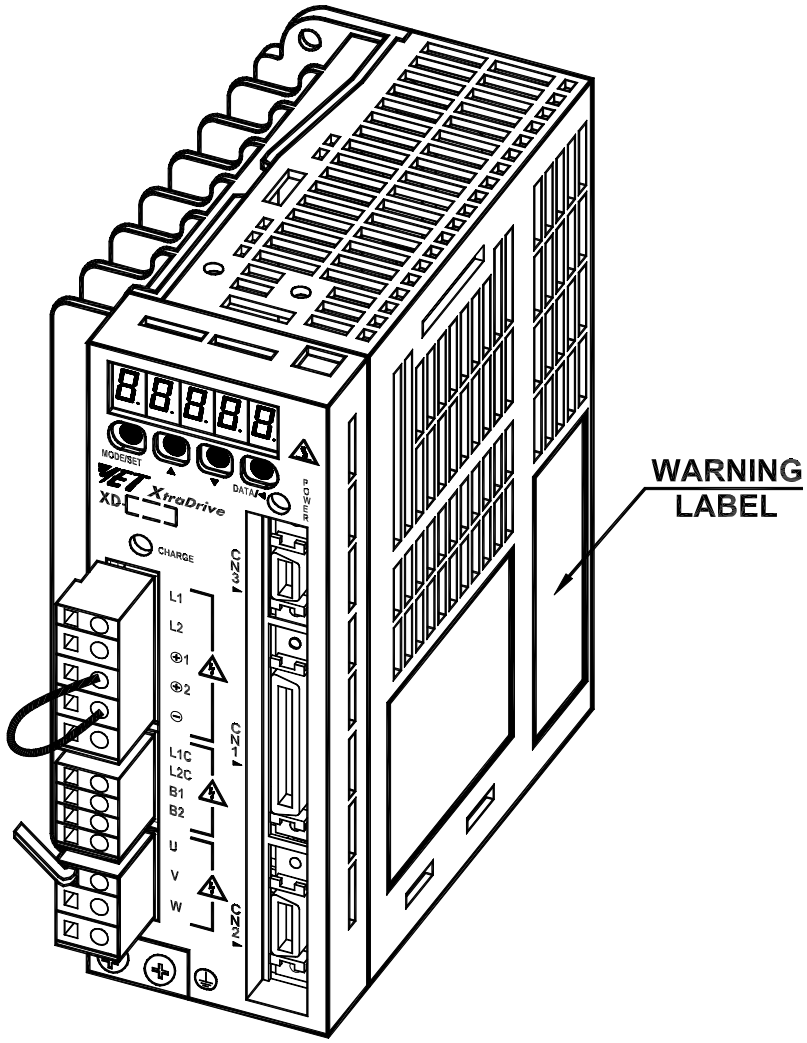
	Reference Page No.
Receiving	
❑ Use the specified combination of servomotor and XtraDrive. *Failure to observe this caution could result in fire or equipment failure.*	11
Installation	
❑ Never use the equipment near flammable materials or where it may be exposed to splashes of water or corrosive or flammable gases. *Failure to observe this caution could result in electric shock or fire.*	13
Wiring	
❑ Do not connect three-phase power supply to XtraDrive output terminals U, V, and W. *Failure to observe this caution could result in personal injury or fire.*	17
❑ Securely tighten screws on the terminal block and ground terminals of power input and motor connections.	17
❑ When using a 400V XtraDrive, the amount of current leaking from the power line increases. Therefore, use cables and isolation materials rated for 400V, and keep the wires as short as possible.	17
Operation	
❑ To avoid accidents, perform a test run of the servomotor with no load. *Failure to observe this caution could result in personal injury.*	30
❑ Before starting operation with a load connected, set up user constants suitable for the machine. *Failure to do so could result in overrun failure. When the load moves vertically, incorrect setting of the user constants may cause the load to fall.*	30
❑ Before starting operation with a load connected, make sure emergency-stop procedures are in place. *Failure to observe this caution could result in personal injury.*	30
❑ During operation, do not touch the XtraDrive's heat sink. *Failure to observe this caution could result in burns.*	30
❑ Motor overload protection is internally provided. For further information, refer to the XtraDrive User Manual Cat. No. 8U0108.	31
Inspection and Maintenance	
❑ Never change wiring while power is ON. *Failure to observe this warning could result in electric shock or personal injury.*	31

1.2. Warning Label

危 険 通電中および電源オフ後、5分間端子部に触るな！感電の恐れあり
WARNING Disconnect all power and wait 5 min.
before servicing. May cause electric shock.

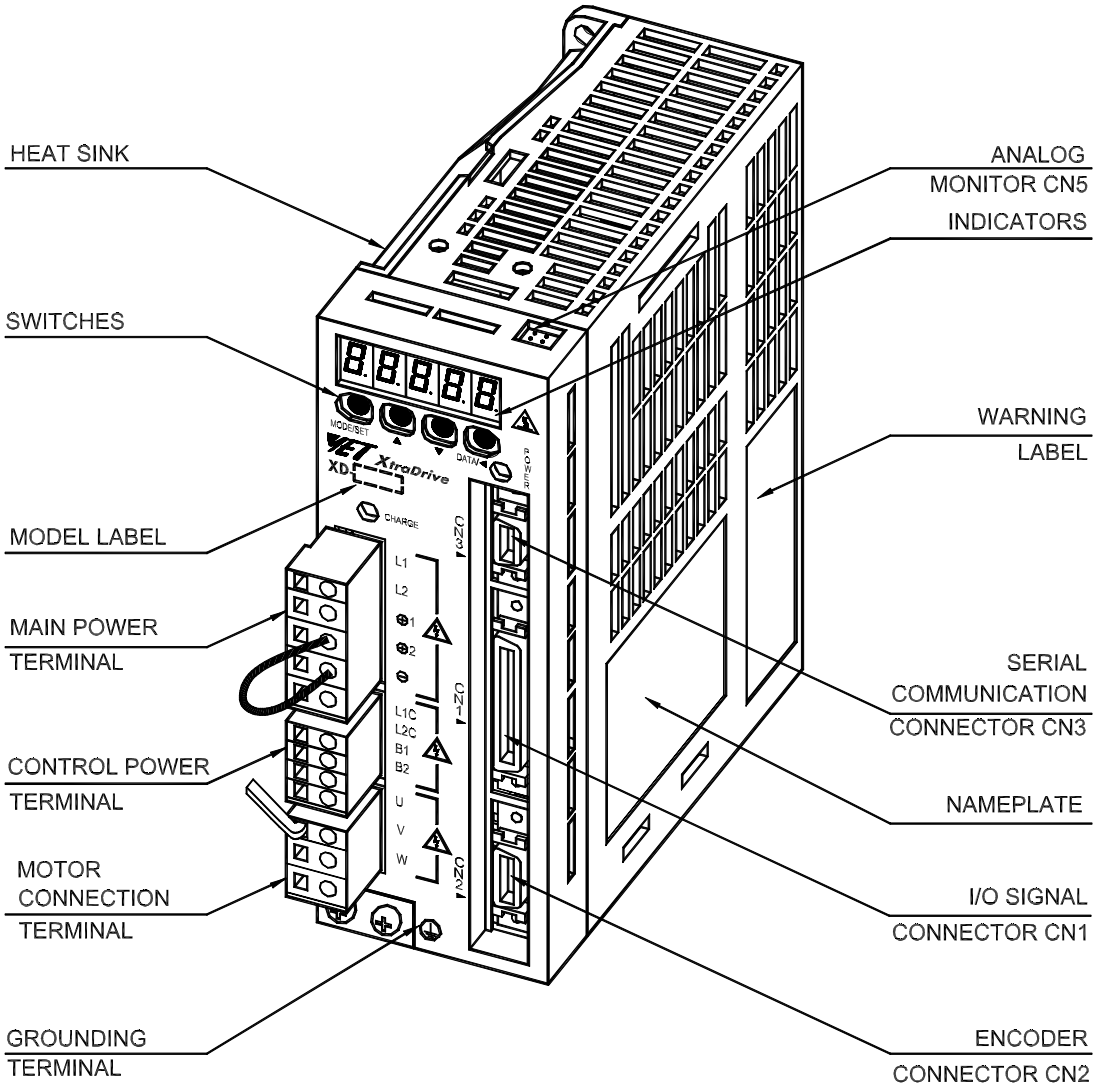
注 意 通電中はヒートシンクに触るな！火傷の恐れあり
CAUTION Do not touch heatsink when power is ON.
May cause burn.

必ずアース線を接続せよ
Use proper grounding techniques.



1.3. Parts

The part names of the XtraDrive series AC Servo Driver are shown in the following diagram:



2. Checking On Delivery

⚠ CAUTION

- Use the specified combination of servomotor and XtraDrive.

  Failure to observe this caution could result in fire or equipment failure.

For more information, refer to the XtraDrive Series User Manual (Cat. No. 8U0108).

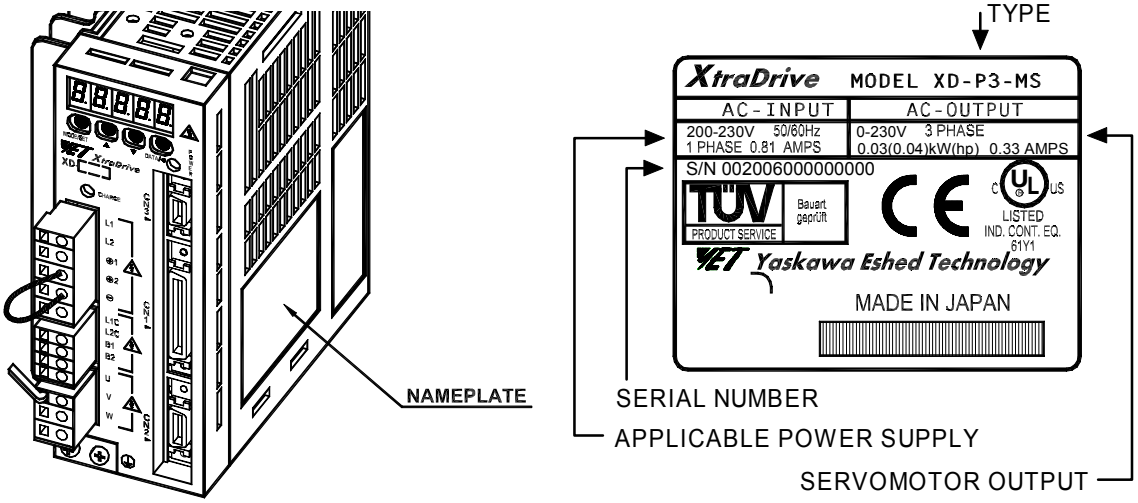
2.1. Checking Items

When XtraDrive series products are delivered, check the following:

Item	Remarks
Are the delivered products the ones you ordered?	Check the types marked on the nameplates of the servomotor and XtraDrive.
Does the motor shaft rotate smoothly?	The motor shaft should rotate smoothly when rotated manually. If the motor has brakes, it cannot be turned manually.
Is there any visible damage?	Check the overall appearance, and check for damage or scratches resulting from transportation.
Are any screws loose?	Tighten any loose screws with a screwdriver.

If any of the above items are faulty or incorrect, contact your local sales representative or the dealer from whom you purchased the product(s).

2.2. Appearance and Nameplate



2.3. Type Designation

XD - 01 - M S 01 R Y999

- XtraDrive Series
- Max. Applicable Servomotor Power (see table below)
- Input Voltage: M - 200VAC, or T - 400VAC
- Extended Functionality By Option Boards: S - no CN10 connector, or N - with CN10 connector
- Design Version # Blank, or 01-FF (optional)
- Blank, or R - Rack mounted, or V - Board coating (optional)
- Blank, or Y followed by 1 to 4 alphanumeric characters to identify customer applications (optional)

Output Capacity Code	Max. Applicable Servomotor Power (kW)	Output Capacity Code	Max. Applicable Servomotor Power (kW)
P3	0.03	08	0.75
P5	0.05	10	1.0
01	0.10	15	1.5
02	0.20	20	2.0
04	0.40	30	3.0
05	0.50		

3. Installation

XtraDrive series servo driver is a base-mount type servo controller. Incorrect installation will cause problems. Always observe the installation instructions provided below.

⚠ CAUTION

- Never use the equipment near flammable materials or where it may be exposed to splashes of water or corrosive or flammable gases.

  Failure to observe this caution could result in electric shock or fire.

3.1. Storage Temperature Range

If the XtraDrive is to be stored with the power cable disconnected, store it in a temperature range of between -20 ~ +85°C.

3.2. Operating Conditions

Ensure the following operating conditions for XtraDrive use:

Installation category (Overvoltage category)*: II
Pollution degree *: 2
Protection class *: 1X
Maximum altitude: 1000 m
* Conforming to the following standards:

EN55011: 1198 Group 1 Class A
EN61000-6-2: 1999

3.3. Installation Locations

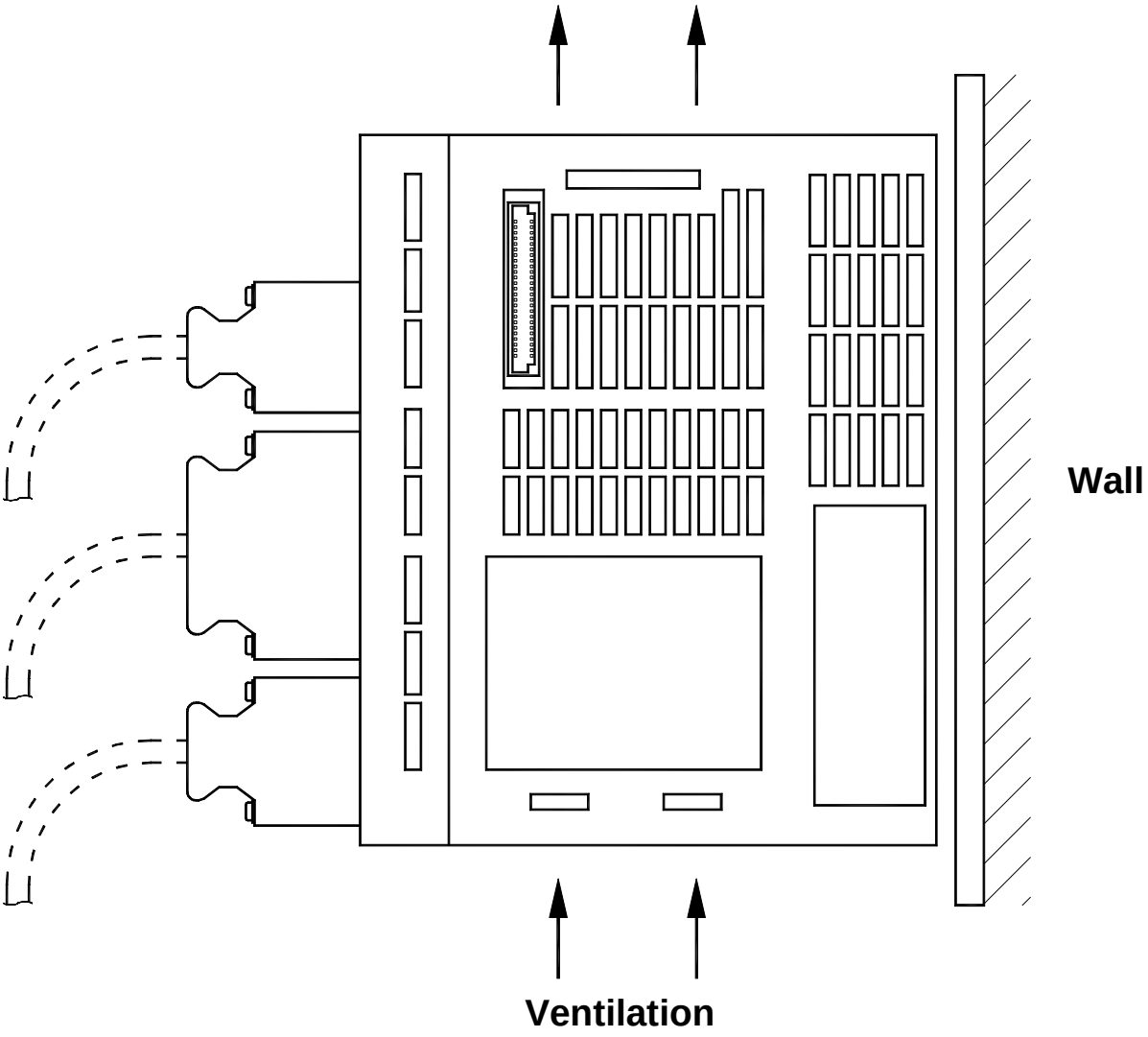
Different locations for the XtraDrive necessitate certain conditions as described in the following table:

Installation Location	Notes
Inside a control panel	Design the control panel size, unit layout, and cooling method so that temperature around the periphery of the XtraDrive does not exceed 55°C.
Near a heating unit	Suppress radiated heat from the heating unit and a temperature rise caused by convection so that the temperature around the periphery of the XtraDrive does not exceed 55°C.
Near a source of vibration	Install a vibration isolator underneath the XtraDrive to prevent it from receiving vibration.
In a location where corrosive gases are present	Corrosive gases do not immediately affect the XtraDrive but will eventually cause contactor-related devices to malfunction. Take appropriate action to protect against corrosive gases.
Other	Avoid installation in a hot and humid place or where excessive dust or iron powder is present in the air.

3.4. Orientation

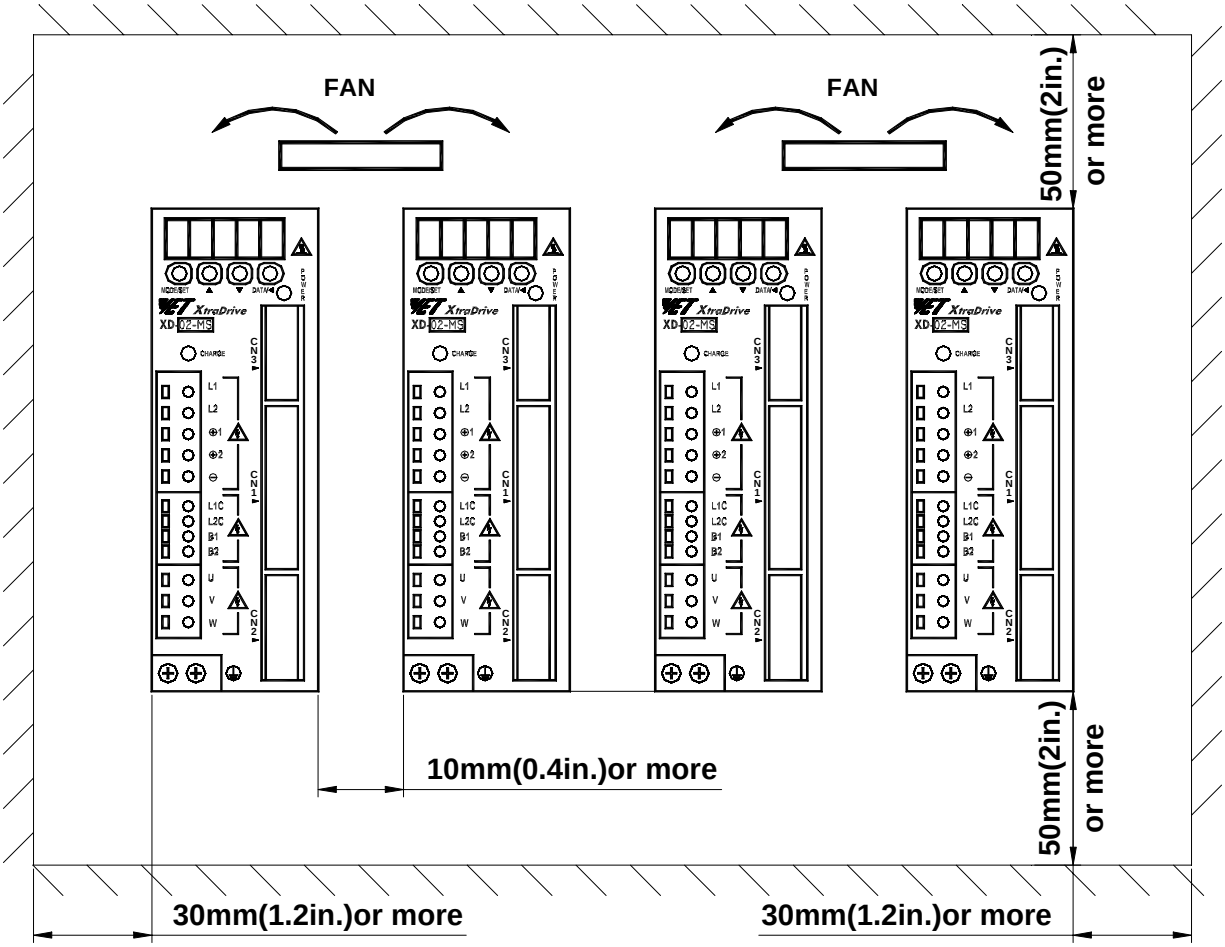
Install the XtraDrive perpendicular to the wall and orientate it as shown in the figure below.

Firmly secure the XtraDrive through two or four mounting holes (depending on the XtraDrive capacity).



3.5. Multiple XtraDrive Installation

When installing multiple XtraDrives side by side in a control panel, observe the following:



- **Front Panel**

Install XtraDrive perpendicular to the wall so that the front panel (digital operator mounted face) faces outward.

- **Cooling**

Provide sufficient space around each XtraDrive to allow cooling by fan and natural convection. When installing XtraDrives side by side, provide at least 10mm (0.4in.) space between them and at least 50mm (2in) space above and below them as shown in the figure above.

Install cooling fans above the XtraDrives to prevent the temperature around each XtraDrive from increasing excessively and also to maintain an even temperature inside the control panel.

- **Where Mounted Side by Side**

  When installing XtraDrives side by side, provide at least 10 mm (0.4 in) space between them and at least 50 mm (2 in) space above and below them as shown in the figure above. Install cooling fans above the XtraDrives to prevent the temperature around each XtraDrive from increasing excessively and also to maintain the temperature inside the control panel evenly.

- **Environment Inside Control Box**

  Maintain the following conditions inside the control box:

  - Ambient temperature for XtraDrive: 0 to 55^{o}C
  - Humidity: 90% RH or less, no condensing.
  - Vibration: 4.9 m/s^{2}
  - No freezing.
  - Ambient temperature to ensure long-term reliability: 45^{o}C or less

3.6. Voltage Resistance Test

⚠ WARNING

- After voltage resistance test, wait at least five minutes before servicing the product.

  Failure to observe this warning could result in electric shock.

Conduct voltage resistance tests under the following conditions:

Voltage:	1500 V_{rms} AC, for one minute
Breaking current:	30 mA or more
Frequency:	50 or 60 Hz
Voltage applied points:	Between the frame ground and the point where the terminals L1, L2, L3, L1C, L2C, U, V and W are connected.

4. Wiring

This section provides a standard example for connecting XD series products to peripheral devices and briefly explains how to connect each peripheral device.

⚠ WARNING

- XtraDrive grounding must be in accordance with the national code and consistent with sound local practices.

  Failure to observe this warning could result in electric shock or fire.

⚠ CAUTION

- Do not connect three-phase power supply to XtraDrive output terminals U, V and W.

  Failure to observe this caution could result in personal injury or fire.

- Securely tighten screws on the terminal block and ground terminals of power input and motor connections.

  Failure to observe this caution can result in a fire.

- When using a 400V XtraDrive, the amount of current leaking from the power line increases. Therefore, use cables and isolation materials rated for 400V, and keep the wires as short as possible.

Refer to the XtraDrive's Design and Maintenance Manual for the following wiring instructions:

- Main circuit wiring
- I/O signal wiring
- Encoder wiring
- Example of connections

4.1. Cable Specifications

Ratings and specifications of cables for XtraDrives are summarized in the following tables.

⚠ CAUTION

- Do not bundle or run power and signal lines together in same duct.

  Keep power and signal lines at least 30 cm (11.81 in) apart.

- Use twisted-pair wires or shielded multi-core twisted-pair wires for signal and encoder (PG) feedback lines.

- The maximum length for signal lines are as follows:
  - Maximum of 3 m (9.84 ft) for reference input lines.
  - Maximum of 20 m (65.6 ft) for PG feedback lines.
  - Use a cable with 50 m (164.0 ft) specifications for distances over 20 m (65.6 ft).

The following table provides wire size specifications.

External Terminal Name				Wire Size [mm^2 (in^2)]				
				P3**	P5**	01**	02**	04**
For 200 V	Online terminals	Main circuit power input terminals	L1, L2 (Single phase)	AWG16 [HIV 1.25 (0.002)]				AWG14 [HIV 2.0 (0.003)]
		Motor connection terminals	U, V, W	AWG16 [HIV 1.25 (0.002)]				
		Control power supply input terminals	L1C, L2C	AWG16 [HIV 1.25 (0.002)]				
	Offline terminals	Control I/O signal connector	CN1	Twisted-pair or shielded twisted-pair wires. Core wire at least 0.12 mm2 (0.0002 in2), tinned, annealed copper twisted wires. Finished cable dimensions: Max. Ø16 mm (0.63 in) for CN1 and max. Ø 6.8 mm (0.27 in) for CN2.				
		PG signal connector	CN2					
		Ground terminal	⏚	AWG14 [HIV 2.0 (0.003)] min.				

External Terminal Name				Wire Size [mm^2 (in^2)]					
				05**	08**	10**	15**	20**	30**
For 200 V	Online terminals	Main circuit power input terminals	L1,L2,L3 (Three phase)	AWG14 [HIV 2.0 (0.003)]			AWG12 [HIV 3.5 (0.005)]		
		Motor connection terminals	U, V, W	AWG14 [HIV 2.0 (0.003)]		AWG12 [HIV 3.5 (0.005)]			AWG10 [HIV 5.5 (0.009)]
		Control power supply input terminals	L1C, L2C	AWG16 [HIV 1.25 (0.002)]					
	Offline terminals	Control I/O signal connector	CN1	Twisted-pair or shielded twisted-pair wires. Core wire at least 0.12 mm2 (0.0002 in2), tinned, annealed copper twisted wires. Finished cable dimensions: Max. Ø16 mm (0.63 in) for CN1 and max. Ø 6.8 mm (0.27 in) for CN2.					
		PG signal connector	CN2						
		Ground terminal	⏚	AWG14 [HIV 2.0 (0.003)] min.					

The following table shows types of cables and must be used with the previous tables for wire size specifications.

Cable Types		Allowable Conductor Temperature ºC
Symbol	**Name**	
PVC	Normal vinyl cable	-
IV	600V vinyl cable	60
HIV	Temperature-resistant vinyl cable	75

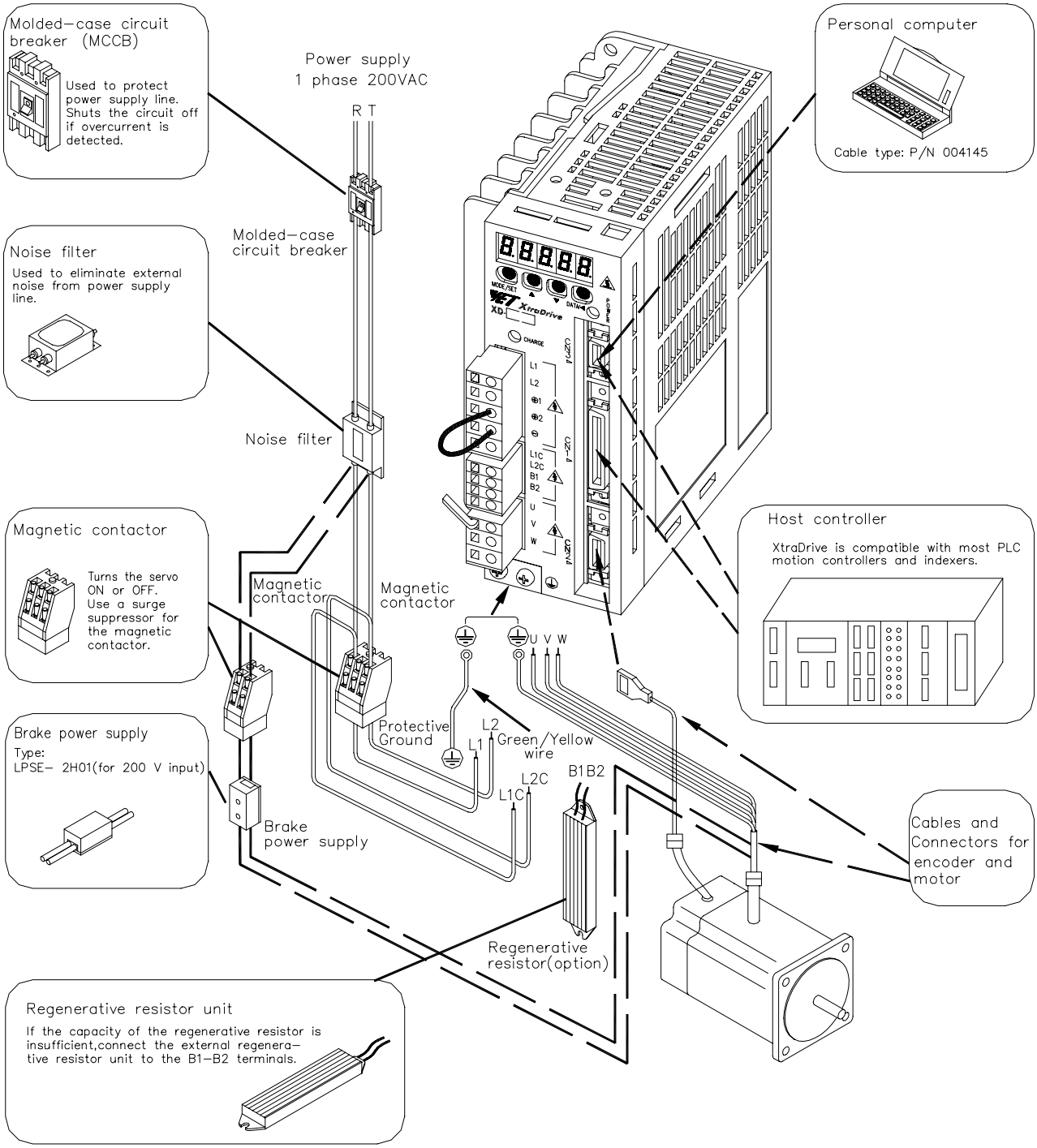
The following table shows appropriate cables for CN1 and CN2 XtraDrive connectors.

Wire sizes were selected for three cables per bundle at 40ºC ambient temperature with the rated current.

Connector Name and Signal		Item	Specification
Control I/O Signal Connector	CN1	Cable	Twisted-pair or shielded twisted-pair wire.
		Applicable wire	AWG24 [0.2 mm^2 (0.0003 in^2)], AWG26 [0.12 mm^2 (0.0002 in^2)], AWG28 [0.08 mm^2 (0.0001 in^2)], AWG30 [0.05 mm^2 (0.00008 in^2)].
		Finished cable dimension	Ø16.0 mm (Ø 0.63 in) MAX.
PG Signal Connector	CN2	Cable	Shielded twisted-pair wire.
		Applicable wire	AWG24 [0.2 mm^2 (0.0003 in^2)], AWG26 [0.12 mm^2 (0.0002 in^2)], AWG28 [0.08 mm^2 (0.0001 in^2)], AWG30 [0.05 mm^2 (0.00008 in^2)]. Use AWG22 [0.33 mm^2 (0.001 in^2)] for encoder power supply and AWG26 [0.12 mm^2 (0.0002 in^2)] for other signals. These conditions permit wiring distances up to 20 m (65.6 ft).
		Finished cable dimension	Ø6.8 mm (Ø 0.27 in) MAX.

4.2. Connecting to Peripheral Devices

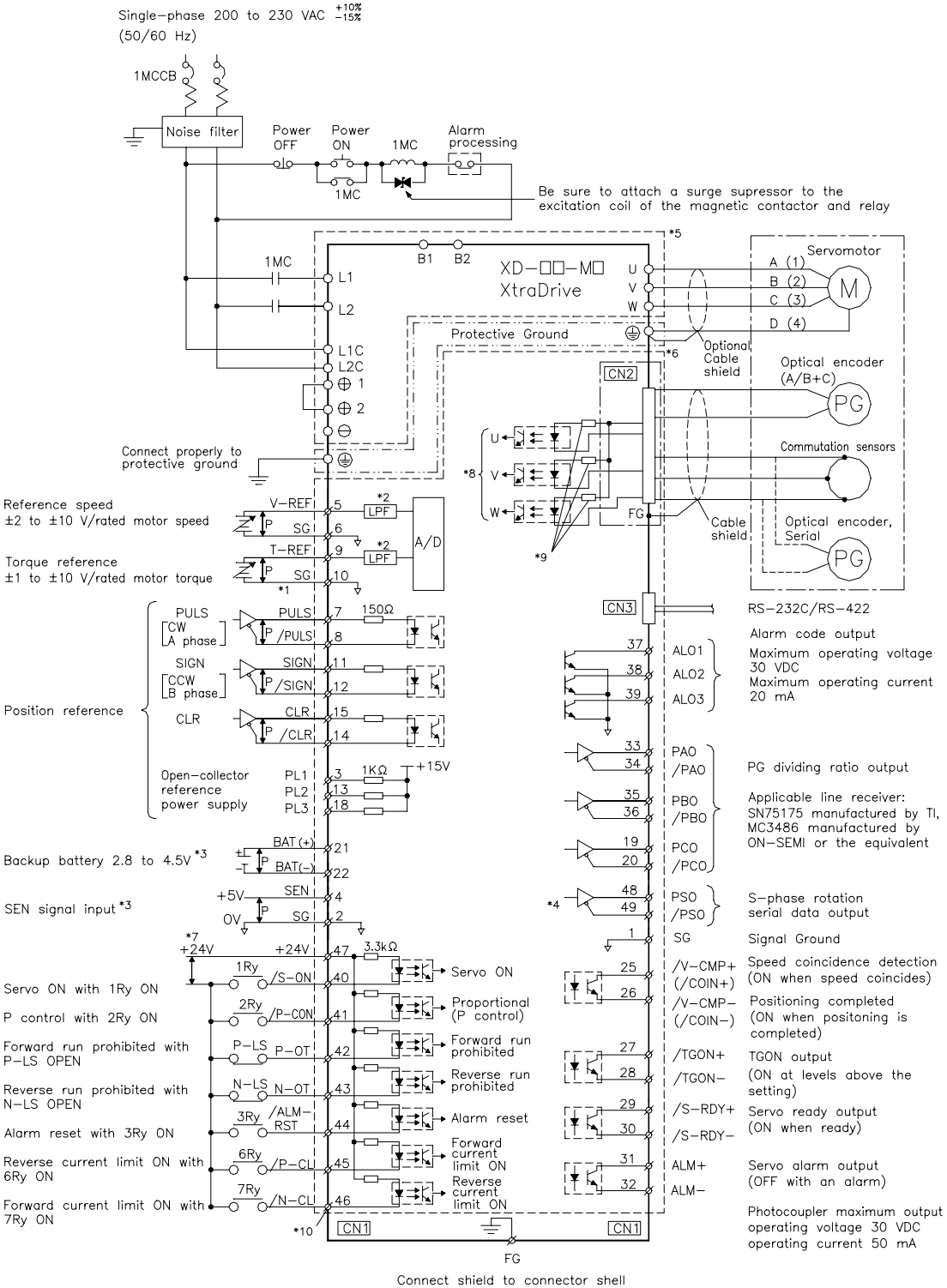
4.2.1. Single-phase 200V Main Circuit



4.2.2. Example of Connections for Single-phase 200V XtraDrive

The following diagram shows an example of standard XtraDrive connections.

Design the circuit so that the main circuit power supply turns OFF at emergency stop.



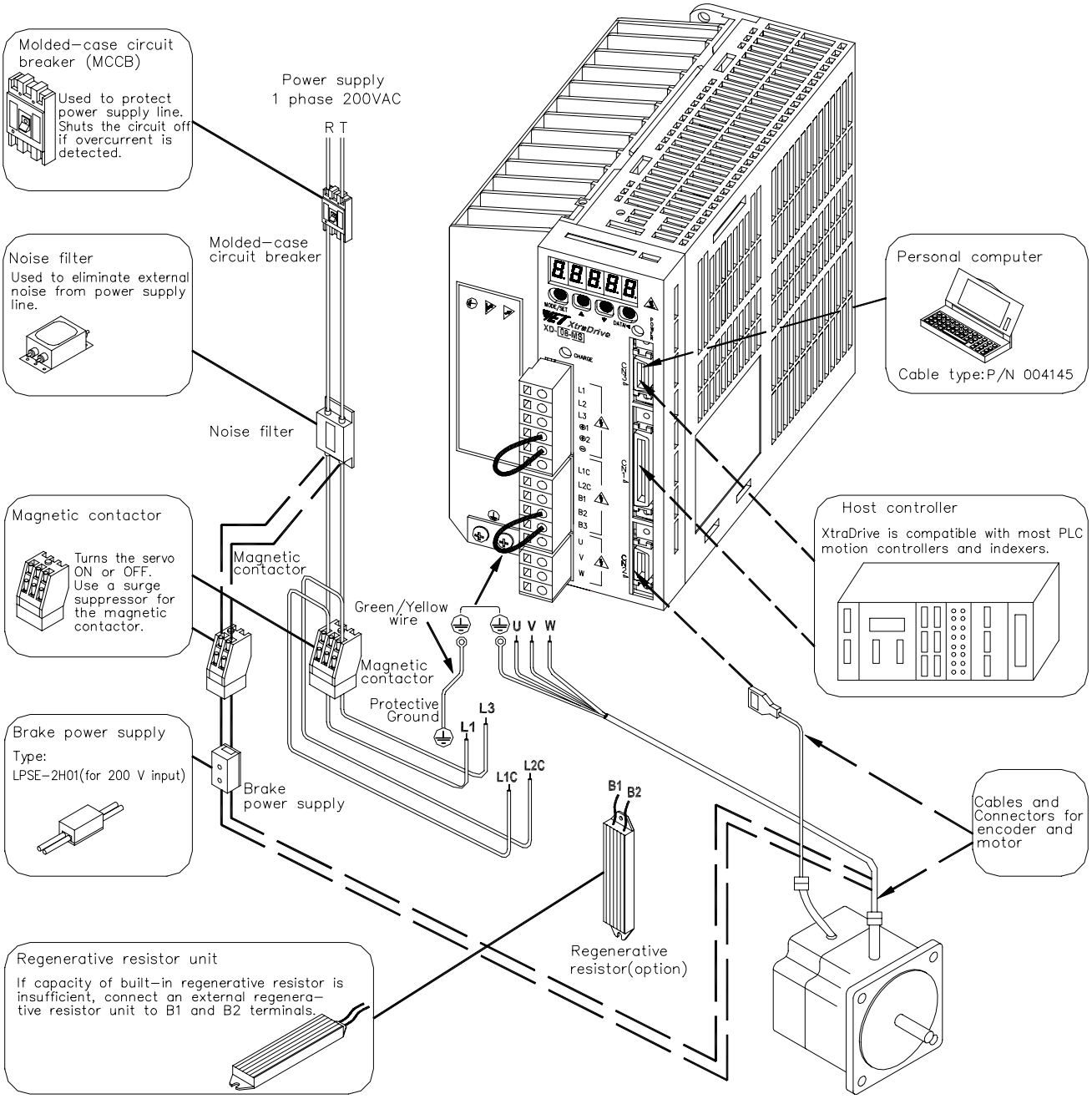
*1. P represents twisted-pair wires
*2. The time constant for the primary filter is 47us.
*3. Connect only with an absolute encoder.
*4. Used only with an absolute encoder.
*5. These circuits are hazardous, therefore are separated by protecting separator.
*6. These circuits are SELV circuits, therefore are separated from all other circuits by double and reinforced insulator.
*7. Use a double-insulated 24-VDC power supply.
*8. Optional – not available in all models.
*9. Resistors are different for each model.
*10. ∅ Represents contacts of CN1 connector

4.2.3. Single-phase 0.8kW 200V Main Circuit

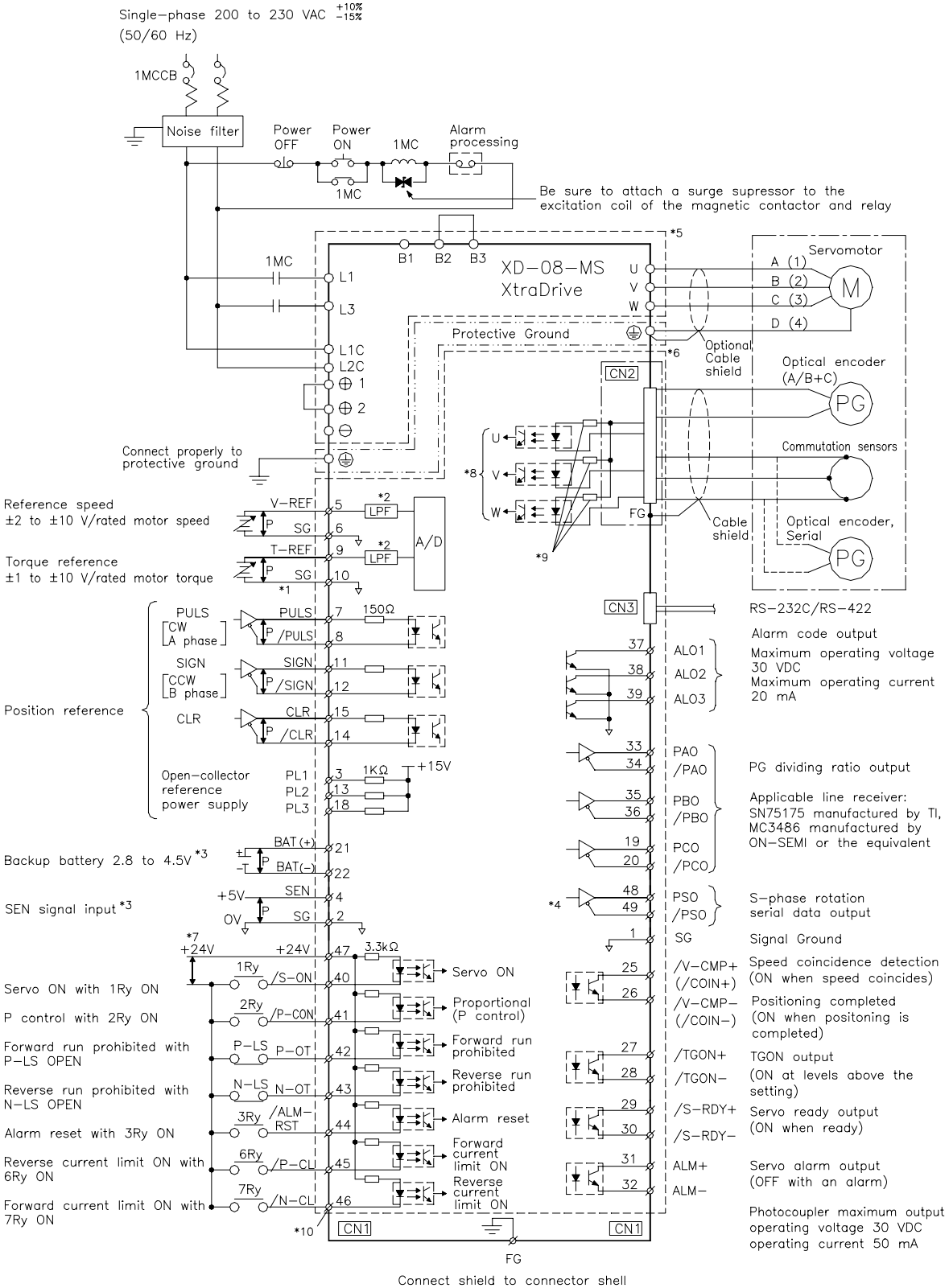
XtraDrive XD-08-MS has been changed from three-phase specifications to single-phase. Main circuit connection terminals (**L1**, **L2**, **L3**) remained.

These devices have terminal **B3** and internal regenerative resistor. Observe the following points.

1. Connect main power supply shown below to **L1** and **L3** terminals. Power supply is single-phase, 220 to 230 VAC +10% to –15%, 50/60Hz. If power supply of 187V (-15% of 220V) or less is used, alarm A.41 indicating voltage shortage, may occur when accelerating to max speed with max torque of motor.
2. Short-circuit **B2** and **B3** terminals using the internal regenerative resistor. If capacity of the regenerative resistor is insufficient, remove the lead between **B2** and **B3** terminals and connect an external regenerative resistor unit to **B1** and **B2** terminals.

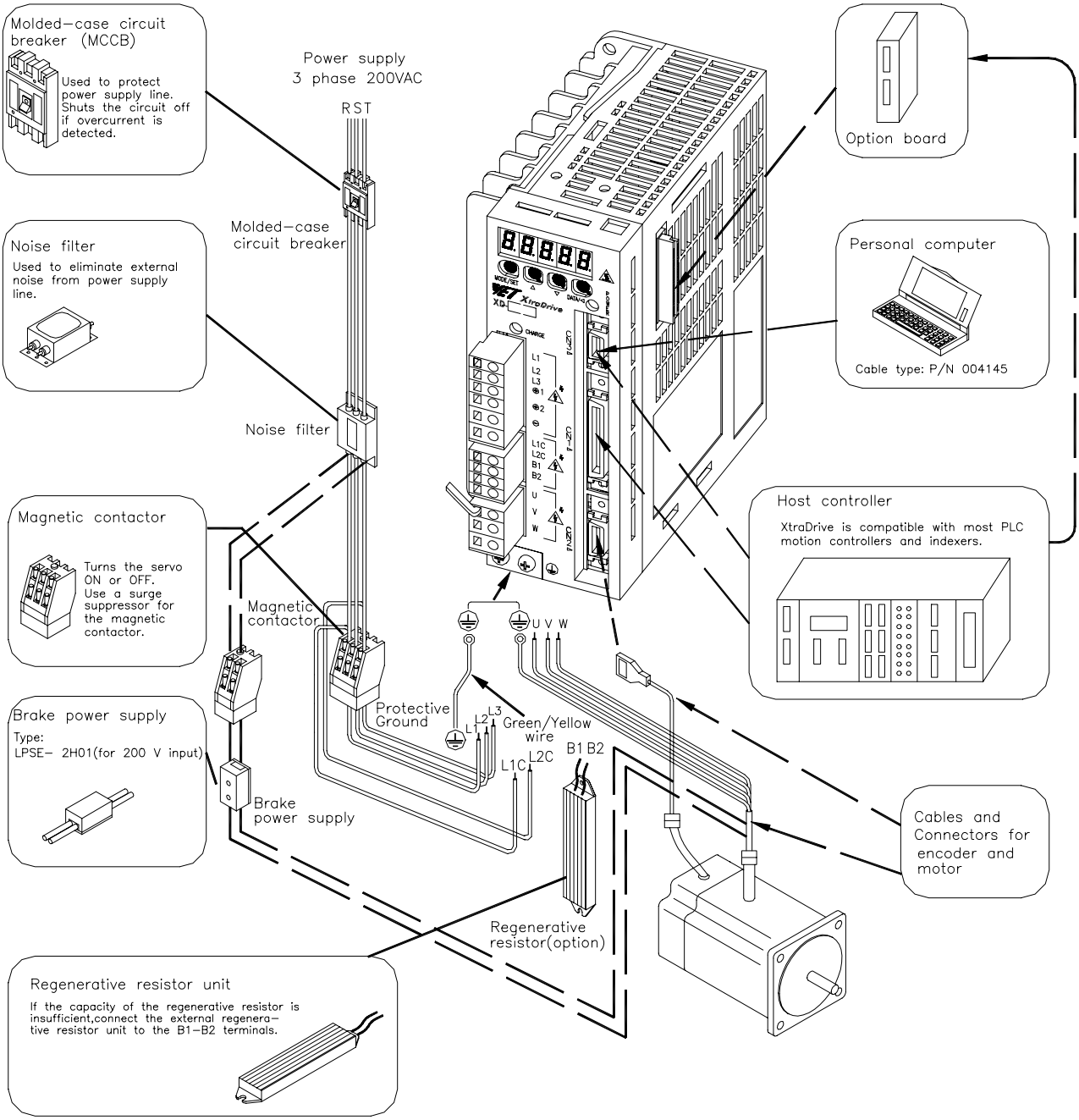


4.2.4. Example of Connections for Single-phase 200V 0.8kW XtraDrive

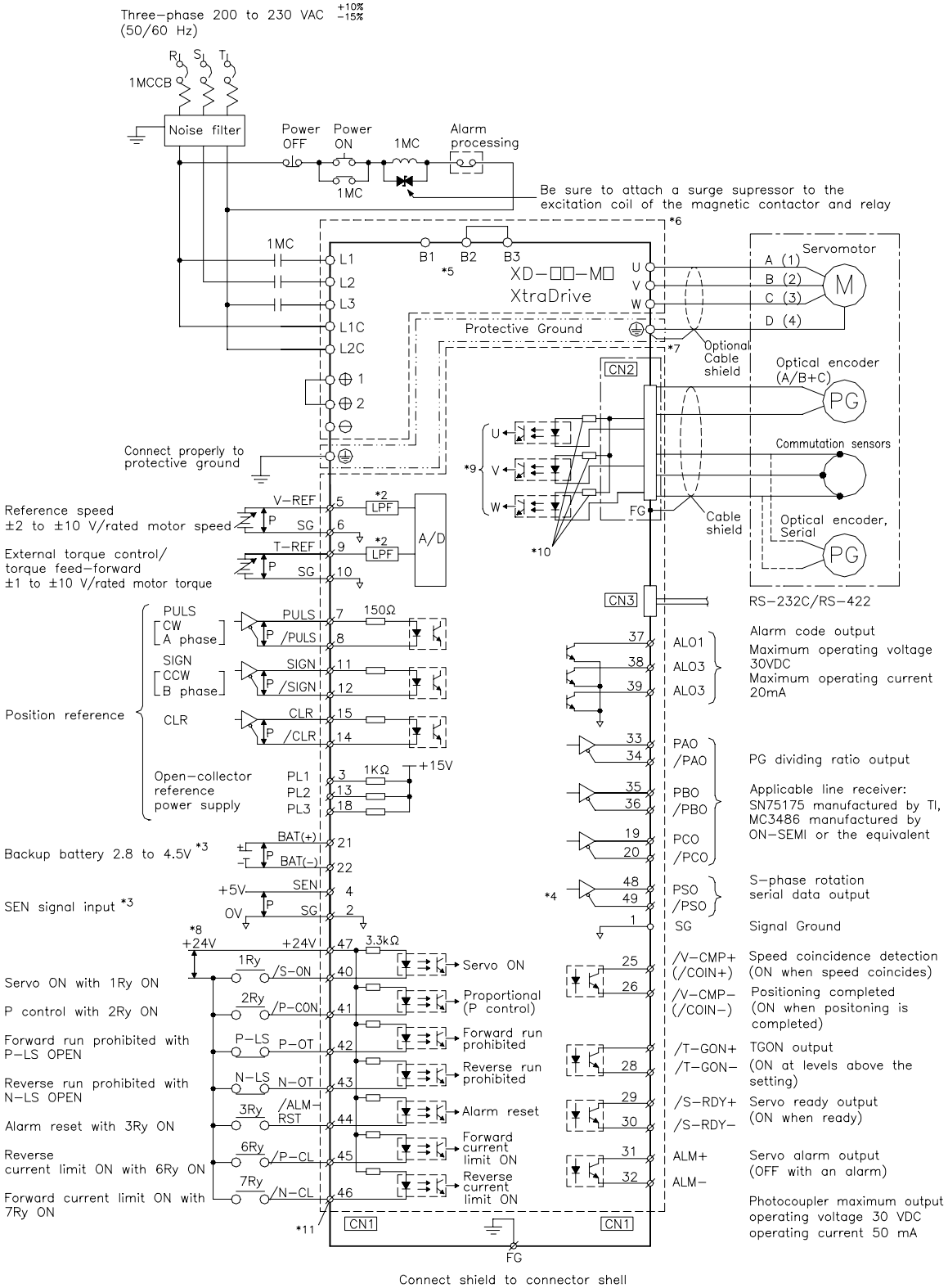


*1. P represents twisted-pair wires
*2. The time constant for the primary filter is 47us.
*3. Connect only with an absolute encoder.
*4. Used only with an absolute encoder.
*5. These circuits are hazardous, therefore are separated by protecting separator.
*6. These circuits are SELV circuits, therefore are separated from all other circuits by double and reinforced insulator.
*7. Use a double-insulated 24-VDC power supply.
*8. Optional – not available in all models.
*9. Resistors are different for each model.
*10. ∅ Represents contacts of CN1 connector

4.2.5. Three-phase 200V Main Circuit



4.2.6. Example of Connections for Three-phase 200V XtraDrive



*1. P represents twisted-pair wires

*2. The time constant for the primary filter is 47us.

*3. Connect only with an absolute encoder.

*4. Used only with an absolute encoder.

*5. Connect an external regenerative resistor between terminals B1 and B2.(for XtraDrives with big capacity)

*6. These circuits are hazardous, therefore are separated by protecting separator.

*7. These circuits are SELV circuits, therefore are separated from all other circuits by double and reinforced insulator.

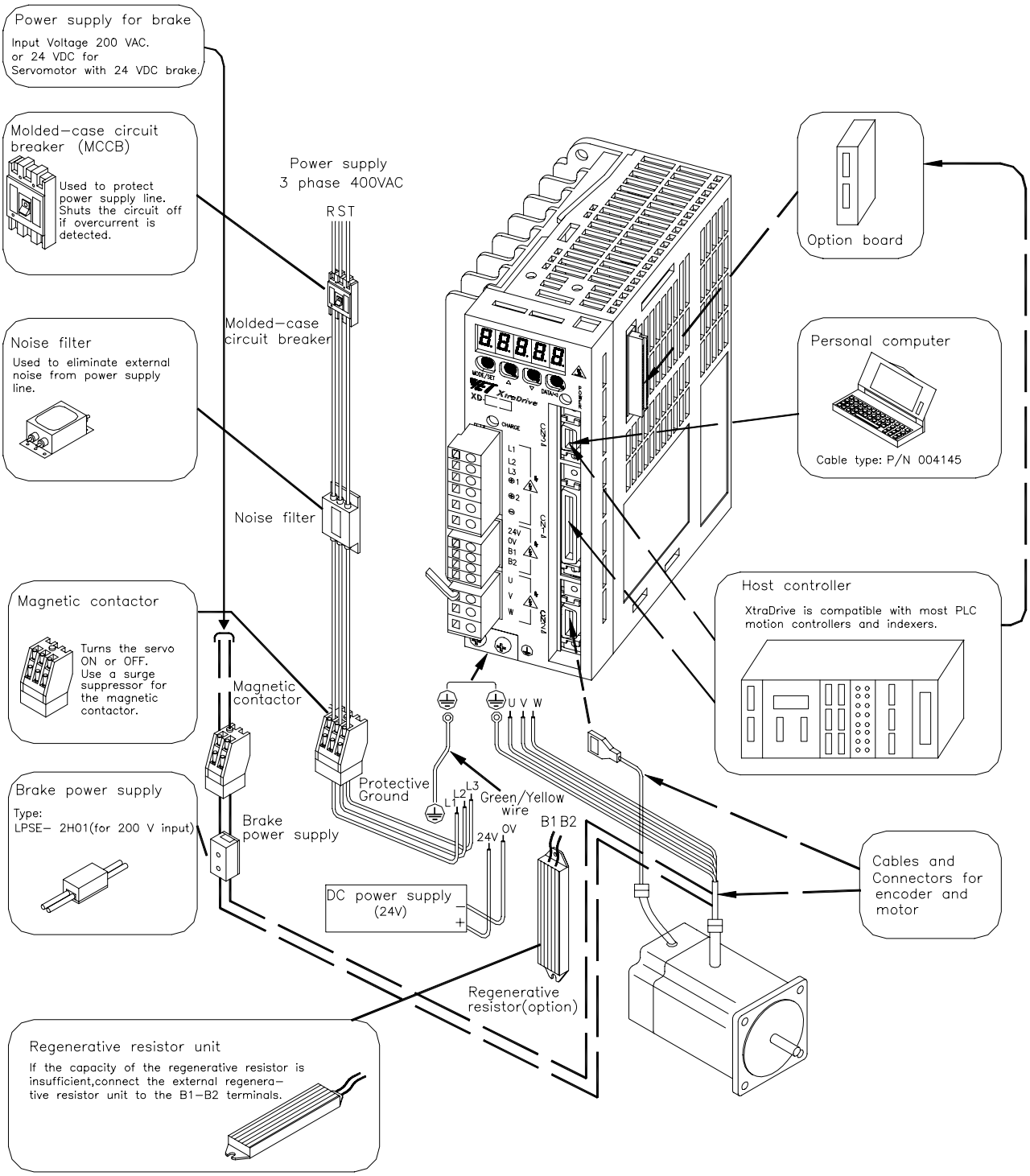
*8. Use a double-insulated 24-VDC power supply.

*9. Optional – not available in all models.

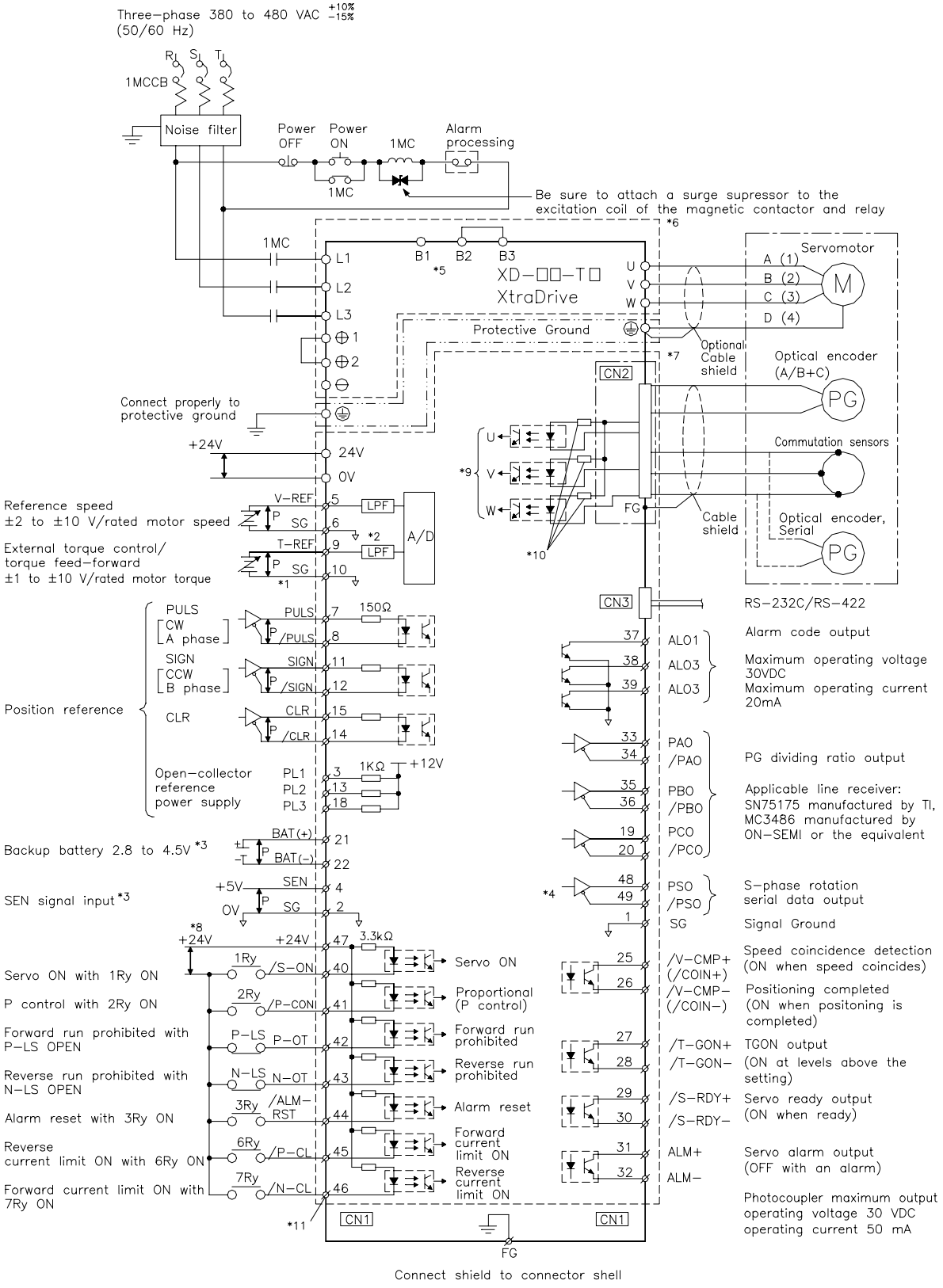
*10. Resistors are different for each model.

*11. ∅ Represents contacts of CN1 connector

4.2.7. Three-phase 400V Main Circuit

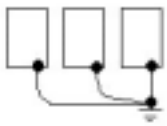


4.2.8. Example of Connections for Three-phase 400V XtraDrive



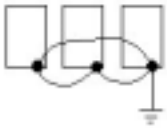
*1. P represents twisted-pair wires
*2. The time constant for the primary filter is 47us.
*3. Connect only with an absolute encoder.
*4. Used only with an absolute encoder.
*5. Connect an external regenerative resistor between terminals B1 and B2.(for XtraDrives with big capacity)
*6. These circuits are hazardous, therefore are separated by protecting separator.
*7. These circuits are SELV circuits, therefore are separated from all other circuits by double and reinforced insulator.
*8. Use a double-insulated 24-VDC power supply.
*9. Optional – not available in all models.
*10. Resistors are different for each model.
*11. ∅ Represents contacts of CN1 connector

In conformance with local electrical codes, ground the XtraDrive grounding terminal ⏚ (grounding resistance: 100 Ω or less).
Be sure to connect the grounding wire of the servomotor to ⏚ of the XtraDrive.
Never share the grounding cable or main grounding point with welding equipment, power equipment or other high-voltage devices. Separate the grounding cable from wiring of high-voltage equipment.
Make the grounding wire as short as possible. For cable size, refer to the XtraDrive Series User Manual (Cat. No.8U0108).
If two or more XtraDrives are used, ground them as shown in (a) below.
Avoid methods (b) and (c).



GOOD
(a)

POOR
(b)



POOR
(c)

4.3. AC Power Source Supply

Use the XtraDrive AC power source supply according to product ratings. See the following table for details.

Power	XtraDrive	Motor Output	Specifications	Connection Terminals
1-Phase 200V	XD-P3-M☐ to 04-M☐	30 W to 400 W	1-phase 200 VAC to 230 VAC (+10% to -15%), 50/60 Hz	L1, L2 (Main) LIC, L2C (Control)
	XD-08-M☐	750 W	1-phase 220 VAC to 230 VAC* (+10% to -15%), 50/60 Hz	L1, **L3** (Main)
			1-phase 200 VAC to 230 VAC (+10% to -15%), 50/60 Hz	L1C, L2C (Control)
3-Phase 200V	XD-10-M☐ to XD-30-M☐	1.0, 2.0 and 3.0 kW	3-phase 220 VAC to 230 VAC (+10% to -15%), 50/60 Hz	L1, L2, L3 (Main)
			1-phase 200 VAC to 230 VAC (+10% to -15%), 50/60 Hz	L1C, L2C (Control)
3-Phase 400V	XD-05-T☐ to XD-30-T☐	0.5, 1.0, 1.5, 2.0 and 3.0 kW	3-phase 380 VAC to 480 VAC (+10% to -15%), 50/60 Hz	L1, L2, L3 (Main)
			DC power supply +24 V (±15%) (not provided by YET)	24V, 0V (Control)

* When a power supply of 187V (-15% of 220V) or less is used, alarm A41, indicating voltage shortage, may occur when accelerating to max speed with max torque of servomotor.

4.4. DC Power Source Supply

3-Phase 400V XtraDrive models require 24VDC for its control circuit. The user must provide a 24VDC ±15% power supply with a current capacity of at least 1Ampere. This power supply must also be able to withstand a surge of up to 3Amperes for 50msec. It should be connected to the terminals marked 24V and 0V on the XtraDrive.

⚠ WARNING

Do not connect AC voltage to these terminals.
Doing so may cause permanent damage to the amplifier.

4.5. Noise Control

If the signal line is affected by noise, malfunction may result.
Separate power cables from control cables.
Make the signal line as short as possible and use twisted-pair wires.
Never use a line filter (for power input) for servomotor circuit. If peripheral devices malfunction due to the noise from XtraDrive, insert a line filter (for output, type LF-310KA, made by Tokin Corp.) between the servomotor and XtraDrive.

5. Operation

This section describes precautions that should be taken at test run and during operation. For instructions on test run and operation, refer to XtraDrive Series User Manual (P/N 8U0108).

5.1. Precautions at Test Run

⚠ CAUTION

- To avoid accidents, run the servomotor only in test run (without load).

  Failure to observe this caution could result in personal injury.

- Before starting operation with a load connected, set up user constants suitable for the machine.

  Failure to do so could result in overrun failure. When the load moves vertically, incorrect setting of the user constants could cause the load to fall.

- Before starting operation with a load connected, make sure emergency-stop procedures are in place.

  Failure to observe this caution could result in personal injury.

5.2. Conducting Test Run for Servomotor Without Load

When the servomotor is operated without a load, set the speed loop gain (user constant Pn100) to 40 or less. (The factory setting is 40.)
The speed loop gain (user constant Pn100) is determined by:
Load inertia ≧ servomotor inertia * (1 to 3).
Therefore, if the servomotor is rotated without a load (i.e., without load inertia) or if the load inertia is small, the servomotor may oscillate.
To avoid this possibility, set the value of Pn100 (speed loop gain) to 40 or less and then switch servo ON.

5.3. Conducting Test Run with Servomotor Connected to Machine

Initial parameters for XtraDrive are set assuming normal operation conditions. Before conducting a test run, set up user constants suitable for the machine.
Failure to do so could result in machine overrun or breakdown.
For the setting procedures and methods, refer to XtraDrive Series User Manual (Cat. No. 8U0108).
The following items should be checked during the test run:

- Unusual vibration
- Abnormal noise
- Excessive temperature rise

5.4. Precautions During Operation

⚠ CAUTION

- During operation, do not touch the XtraDrive's heat sink.

  Failure to observe this caution could result in burns.

Motor overload protection is provided internally. Refer to the XtraDrive Series Servo System User Manual for rating.

6. Inspection and Maintenance

This section describes the basic inspection and maintenance procedures for XtraDrive Series AC Servo Driver and battery replacement for absolute encoder. If any failure occurs on XtraDrive, refer to XtraDrive Series User Manual (Cat. No. 8U0108, *Troubleshooting*).

Contact your YET representative if the problem persists.

⚠ WARNING

- Be sure to turn OFF power before inspection or maintenance.

  Failure to observe this warning could result in electric shock.
- Never open the terminal cover while power is ON, and never turn ON power when the terminal cover is open.

  Failure to observe this warning could result in electric shock.
- After turning OFF power, wait at least five minutes before servicing the product.

  Otherwise, residual electric charges could result in electric shock.

⚠ CAUTION

- Never change wiring while power is ON.

  Failure to observe this caution could result in electric shock or personal injury.

6.1. XtraDrive

The inspection and maintenance procedures listed in the table below should be performed at least once every year.

Item	Procedure	Remedy
Clean unit interior and circuit boards	Check for dust, dirt and oil on surfaces.	Clean with compressed air if necessary.
Loose screws	Check for loose terminal block and connector screws.	Tighten any loose screws.
Defective parts in unit or on circuit boards	Check for discoloration, damage or discontinuities due to heating.	Contact your YET representative.

6.2. Replacing Parts

The following parts are subject to mechanical wear or deterioration over time. To avoid failure, replace these parts at the frequency indicated.

Part	Standard Replacement Period	Replacement Method
Cooling fan	4 to 5 years	Replace with new part
Smoothing capacitor	7 to 8 years	Test. Replace with new part if necessary.
Relays	-	Test. Replace if necessary.
Fuse	10 years	Replace with new part.
Electrolytic Capacitor on Circuit Board	5 years	Test. Replace with new circuit board if necessary.

6.3. Operating Conditions

Ambient Temperature: annual average 30°C
Load factor: 80% max.
Operation rate: 20-hours/day max.

6.4. Replacing Battery for Absolute Encoder

Battery replacement is only required for servo systems using an absolute encoder. When battery voltage is 2.7V or less, XtraDrive outputs absolute encoder battery alarm (A.83, when using Yaskawa ∑-II motors with absolute encoder) only when the XtraDrive power is ON, but not while XtraDrive is operating.

6.4.1. Recommended Battery

Lithium battery: ER6VC3, manufactured by Toshiba Battery Co. Ltd., 3.6 2000mAh or other compatible lithium battery.

Battery kit: JZSP-BA02 (battery and connector). Use this battery kit with cables P/N 004143 and 004149.

6.4.2. Replacing Battery

1. With XtraDrive control power turned ON, replace the old battery with a new one.
2. Turn OFF the XtraDrive control power to clear the absolute encoder battery alarm (A.83).
3. Turn ON the XtraDrive control power.
4. Make sure that XtraDrive is operating normally after power is turned on.

Battery replacement is now completed. After replacing the battery, initialize the absolute encoder. Refer to XtraDrive Series User's Manual (Cat No. 8U0108), Initializing of Absolute Encoder.

7. Installation Conditions of EMC Directive

The following conditions must be satisfied for a combination of SGM□H servomotor and XtraDrive to comply EMC Directives (EN61000-6-2 and EN55011, Group 1 Class A).

7.1. EMC Installation Conditions

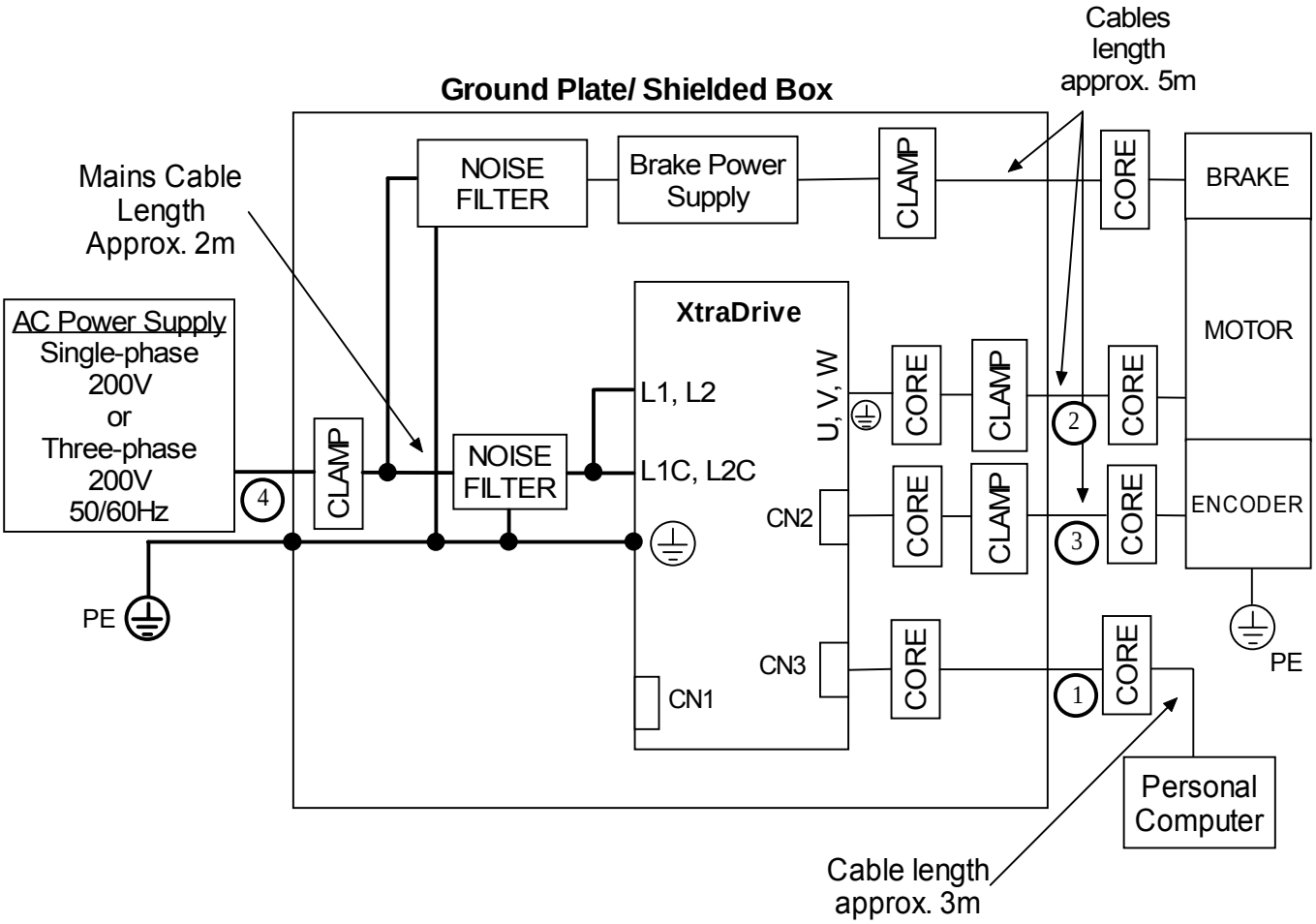
This section describes the test installation conditions prepared by YET that meet EMC guidelines for all XtraDrive models, including the standard type (base mounted) and rack-mounted. The actual EMC level may differ depending on the actual system's configuration, wiring and other conditions.

7.2. Installation for Single- and Three-phase 200V XtraDrive(PC)

XD-P3-M□ to -30-M□ (30W to 3.0kW)

Represents option with PC connected to CN3 connector.

Note: Shielded Box with door closed



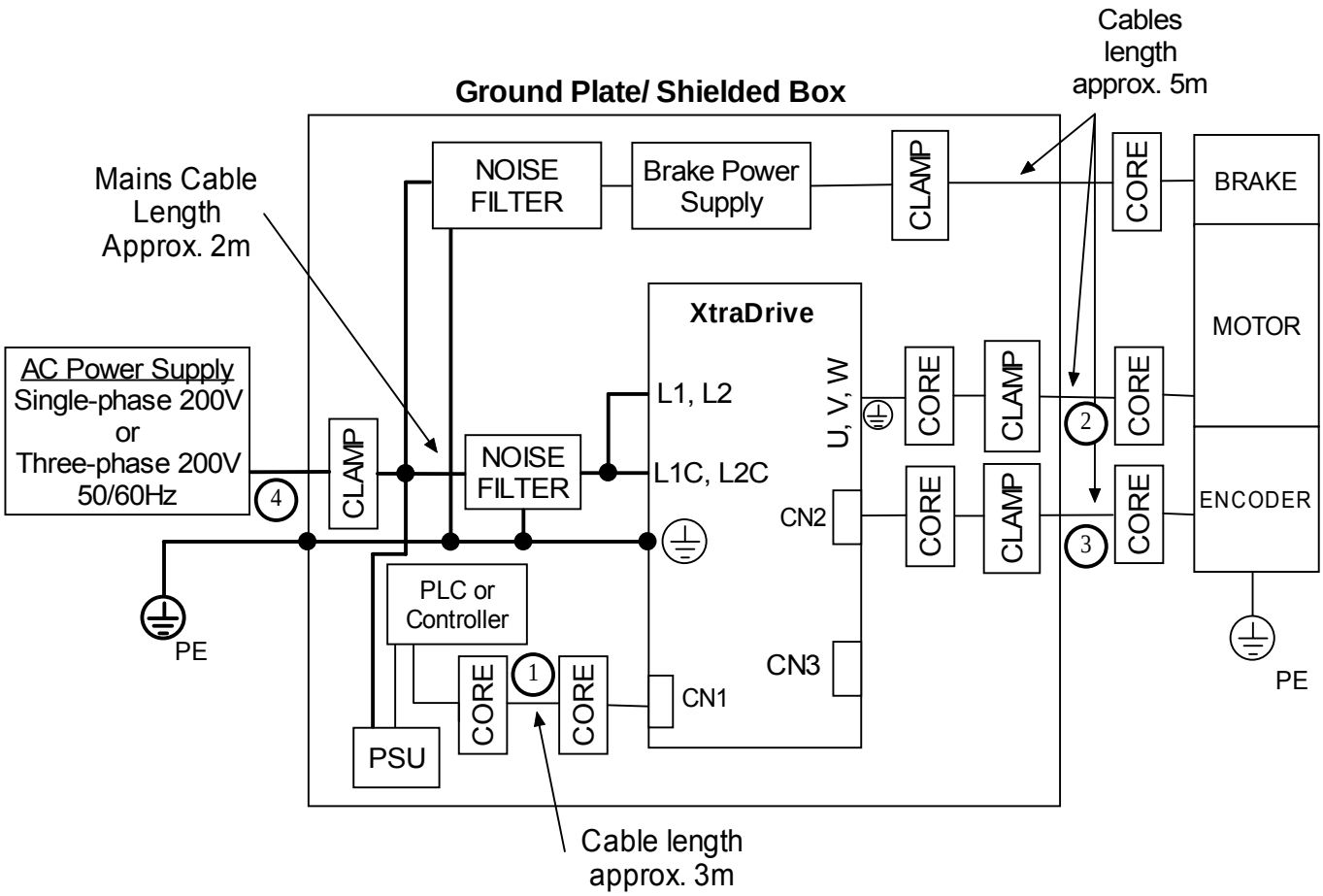
Symbol	Cable Name	Specification
①	PC communication cable	Shielded cable
②	Servomotor cable	Shielded cable
③	Encoder cable	Shielded cable
④	AC line cable	Shielded cable

7.3. Installation for Single- and Three-phase 200V XtraDrive (PLC)

XD-P3-M□ to -30-M□ (30W to 3.0kW)

Represents option with PLC or controller connected to CN1 connector.

Note: Shielded Box with door closed



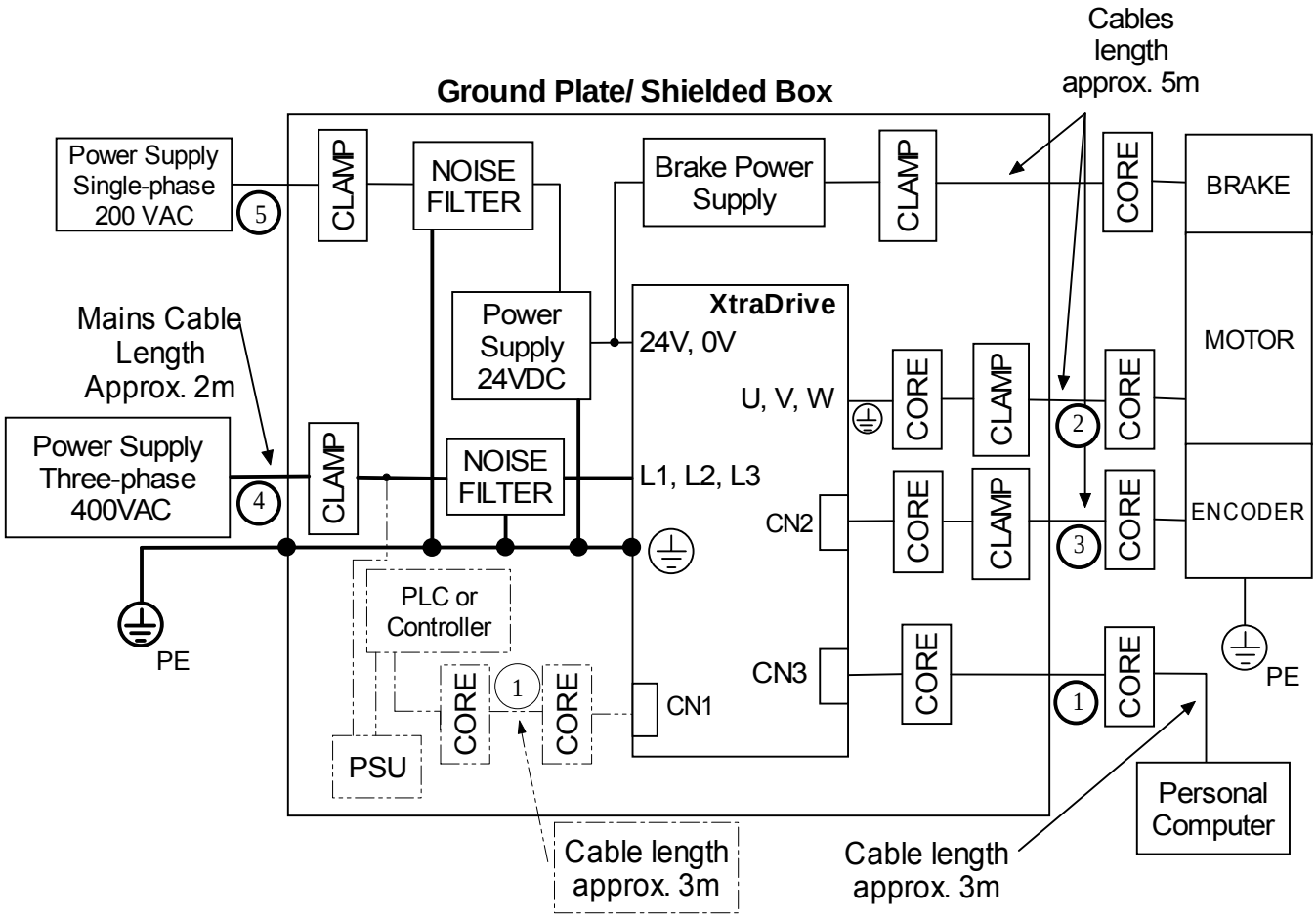
Symbol	Cable Name	Specification
①	PLC communication cable	Shielded cable
②	Servomotor cable	Shielded cable
③	Encoder cable	Shielded cable
④	AC line cable	Shielded cable

7.4. Installation for Three-phase 400V XtraDrive

XD-10-T□ to -30-T□ (0.5 kW to 3.0 kW)

Represents option with PLC or controller connected to CN1 connector or PC connected to CN3 connector.

Note: Shielded Box with door closed



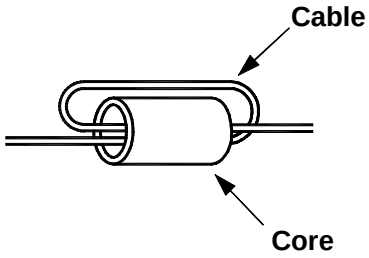
represents option with PLC or controller connected to CN1 connector.

Symbol	Cable Name	Specification
①	PLC, Controller or PC communication cable	Shielded cable
②	Servomotor cable	Shielded cable
③	Encoder cable	Shielded cable
④	AC line cable	Shielded cable
⑤	AC line cable	Shielded cable

7.5. Cable Core and Cable Clamp

7.5.1. Cable Core

Attach the core on the cable as shown in the diagram below, which shows two turns of the cable:

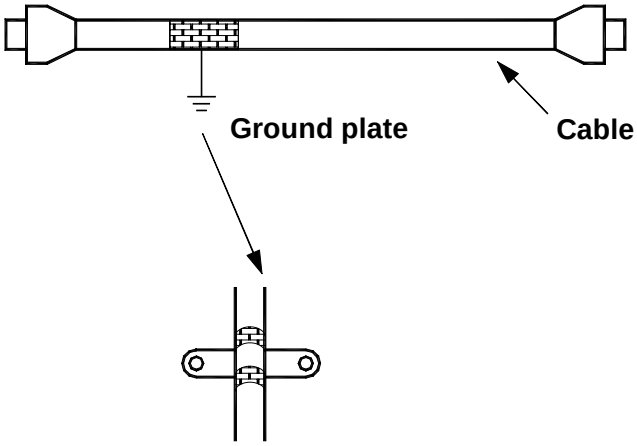


The table below lists the cable names and the mounting positions of the core:

Cable Name	Core Mounting Position
Controller cable	Near the Controller and the XtraDrive.
Servomotor cable	Near the XtraDrive and the Servomotor.
Encoder cable	Near the XtraDrive and the Servomotor.

7.5.2. Cable Clamp

Fix and ground the cable shield using a piece of conductive metal. The figure below shows an example of a cable clamp, controller side.



8. Peripheral Devices

8.1. Peripheral Device Types and Capacities

The following table gives examples of peripheral devices for using with Yaskawa or other compatible motors.

Main Circuit Power Supply	Model		Applicable Servomotor (Yaskawa or other manufacturer)	Power Supply Capacity per XtraDrive (kVA)	MCCB or Fuse Capacity *1 (A_{rms})	Recommended Noise Filter *2		Magnetic Contactor Current (A)
	Capacity (kW)	XD-*3				Model	Specifications	
Single-phase 200V	0.03	P3-M□	SGMAH-A3A	0.2	4	FN2070 -6/07	Single-phase 250 VAC, 6A	20
	0.05	P5-M□	SGMAH-A5A	0.25				
	0.10	01-M□	SGMAH-01A	0.40				
			SGMPH-01A					
	0.20	02-M□	SGMAH-02A	0.75				
			SGMPH-02A					
	0.40	04-M□	SGMAH-04A	1.2	8	FN2070 -10/07	Single-phase 250 VAC, 10A	20
			SGMPH-04A					
	0.75	08-M□	SGMAH-08A	2.1	11	Fn2070 -16/07	Single-phase 250 VAC, 16 A	35
			SGMPH-08A					
Three-Phase 200V	1.0	10-M□	SGMGH-09A□A	2.3	7	Fn258L -16/07	Three-phase 480VAC, 16A	35
			SGMGH-09A□B					
			SGMSH-10A					
	2.0	20-M□	SGMGH-20A□A	4.3	13			
			SGMGH-20A□A					
			SGMSH-20A					
	3.0	30-M□	SGMDH-22A	5.9	13	Fn258L -30/07	Three-phase 480VAC, 30A	35
			SGMGH-30A□A					
			SGMGH-30A□B					
			SGMSH-30A					
Three-phase 400 V	0.45	05- T□	SGMGH-05D	1.2	1.7	Fn258L -7/07	Three-phase 480 VAC, 7 A	35
	1.0	10-T□	SGMGH-09D	2.3	3.4			
			SGMSH-10D					
			SGMUH-10D					
	1.5	15-T□	SGMGH-13D	3.2	4.6			
			SGMSH-15D					
			SGMUH-15D					
	2.0	20-T□	SGMGH-20D	4.9	7.1	Fn258L -16/07	Three-phase 480 VAC, 16 A	35
			SGMSH-20D					
	3.0	30-T□	SGMGH-30D	6.8	9.8			
			SGMSH-30D					
			SGMUH-30D					

*1. This is net value for rated load. When selecting fuses, determine the capacity using the prescribed derating. Braking characteristics at 25°C: 200% for 2s min.; 700% for 0.01s min.

*2. The FN type noise filter is manufactured by Schaffner. The FMAC type noise filter is manufactured by Timonta.

*3. □ - optional letter: S - no optional board; N - with optional board.

8.2. Noise Filter for Brake Power Supply

The table below shows the recommended noise suppression filters models:

Circuit	Filter model*	Manufacturer
Main power circuit	FN2070-6/^{xx} or FN2070-10/^{xx}	Schaffner
Brake power circuit	FN2070-6/^{xx} or FMW2-52-6/07	Schaffner or Timonta

* Depends on XtraDrive model capacity: FN2070-6/^{xx} for 30, 50, 100 and 200W, FN2070-10/^{xx} for 400W.

^{xx} - connection type: 07 = wire, 06 = for soldering or fast-on.

8.3. Cable Specifications

Shield cables should be used for the following cables:

- AC power input line cable (between power supply and noise filter)
- Servomotor cable (between XtraDrive and Servomotor)
- Encoder cable (between XtraDrive and Servomotor)
- Controller cable (between XtraDrive and controller)

8.4. Recommended Ferrite Cores

Cable	Encoder Cable		Power Cable	
Manufacturer	**Absolute**	**Serial**	**30W to 400W**	**0.8kW to 3kW**
Tokin Corp.	ESD-SR-25	ESD-SR-25	ESD-SR-25	-
Fair-Rite Corp.	0444173551	0444164181	0444173551	-
TDK Corp.	-	-	-	PC40T96x20x70

8.5. Shield Box

A shield box, a closed metallic enclosure, should be used for shielding from electromagnetic interference. The structure of the box should allow the main body, door, cooling unit etc. to be attached to the ground. The box opening should be as small as possible.

9. Appendix A

9.1. I/O Signals Connector CN1

CN1 connector is required to connect the host controller to XtraDrive. It comprised of a connector and a connector cover.

■ Mating 50-Pin Connector Model (Kit)

	YET P/N	Connector Parts
Connector	4J4003	10150-3000VE *
Case		10350-52A0-008 *

* Manufactured by Sumitomo 3M Co.

■ Terminal Layout

Pin No.	Name	Pin No.	Name
1	Signal Ground	26	/V-CMP- (out 1-)
2	Signal Ground	27	/TGON+ (out 2+)
3	PL1	28	/TGON- (out 2-)
4	SEN	29	/S-RDY+ (out 3+)
5	V-REF	30	/S-RDY- (out 3-)
6	Signal Ground	31	ALM+ (out 4+)
7	PULS	32	ALM- (out 4-)
8	/PULS	33	PAO
9	T-REF	34	/PAO
10	Signal Ground	35	PBO
11	SIGN	36	/PBO
12	/SIGN	37	ALO1
13	PL2	38	ALO2
14	/CLR	39	ALO3
15	CLR	40	/S-ON
16	TMON	41	/P-CON
17	VTG	42	P-OT
18	PL3	43	N-OT
19	PCO	44	/ALM-RST
20	/PCO	45	/P-CL
21	BAT+	46	/N-CL
22	BAT-	47	+24V IN
23	NC*	48	PSO
24	NC*	49	/PSO
25	/V-CMP+ (out 1+)	50	NC*

Note: NC – Leave contact open (Not Connected)

9.2. Encoder Connector CN2

■ Mating 20-Pin Connector Model

	YET P/N	Connector Parts
Connector	4J4001	10120-3000VE*
Cover	4J0101	10320-52A0-008*

* Manufactured by Sumitomo 3M Co.

■ Terminal Layout

Pin No.	Name	Pin No.	Name
1	PG GND	11	Serial PG GND
2	PG GND	12	BAT+
3	PG GND	13	BAT-
4	PG +5V	14	PC
5	PG +5V	15	/PC
6	PG +5V	16	PA
7	NC*	17	/PA
8	PS	18	PB
9	/PS	19	/PB
10	Serial PG +5V	20	NC*

Note: NC – Leave contact open (Not Connected)

■ Terminal Layout for Encoder Connector with Commutation Sensors (Optional)

Pin No.	Name	Pin No.	Name
1	PG GND	11	GND
2	PG GND	12	BAT+
3	PG GND	13	BAT-
4	PG +5V	14	PC
5	PG +5V	15	/PC
6	PG +5V	16	PA
7	/UIN	17	/PA
8	PS	18	PB
9	/VIN	19	/PB
10	NC*	20	/WIN

Note: NC – Leave contact open (Not Connected)

9.3. Serial Communication Connector CN3

■ Mating 14-Pin Connector Model

YET P/N	Connector Parts	
4J4002	**Connector**	10114-3000VE*
4J0102	**Cover**	10314-52A0-008*

* Manufactured by Sumitomo 3M Co.

■ Terminal Layout

Pin No.	Name	Pin No.	Name
1	TXD	8	TXD
2	/TXD	9	/TXD
3	RXD	10	RXD
4	/RXD	11	NC*
5	NC*	12	NC*
6	/RXD	13	+5V
7	RT (termination resistor)	14	GND

Note: NC – Leave contact open (Not Connected)

9.4. Analog Monitor Connector CN5

■ Mating 4-Pin Connector Model

	YET P/N	Model
Socket	4J7004	DF11-4DS-2C*
Pin	4J0414	DF11-EP2428SCA*

* Manufactured by Hirose Electric Co.

■ Mating Cable Model

YET P/N	Model
4W1003	DE9404559*

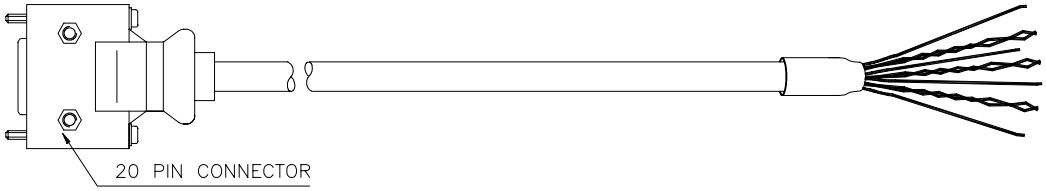
* Manufactured by Yaskawa Electric Co.

■ Terminal Layout

Pin No.	Wire Color	Name
1	Red	Analog Monitor 2
2	White	Analog Monitor 1
3	Black	GND
4	Black	GND

9.5. Connecting Pulse A/B Encoder without C Pulse (Index Pulse)

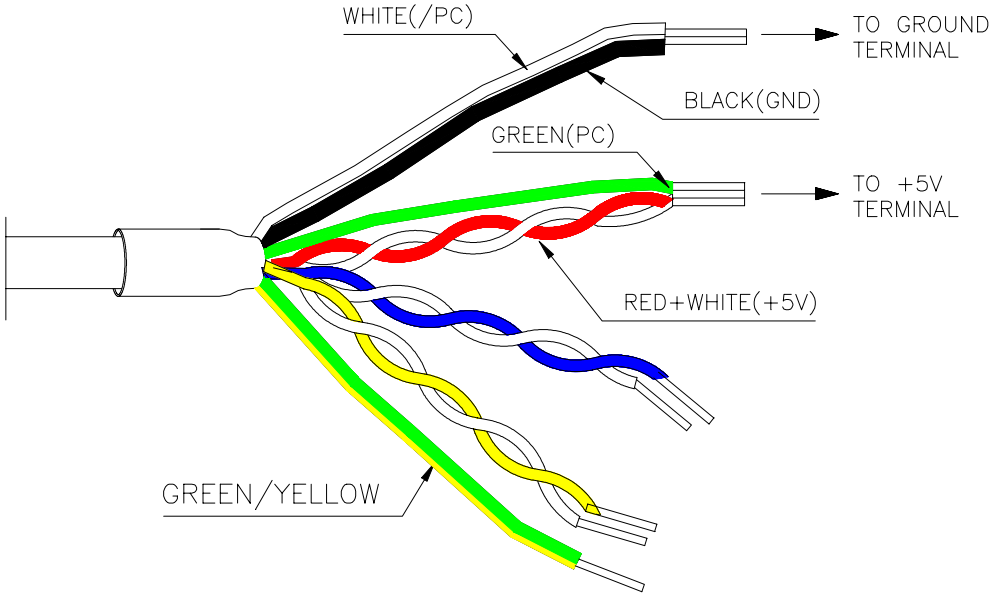
OEM Encoder Cable



XtraDrive Side Pin Number (20-pin connector)	Signal Name	Wire Color	Remarks
1,2,3	PG GND	Black	---
4,5,6	PG +5V	Red	Twisted Pair
		White	
14	PC	Green	Twisted Pair
15	/PC	White	
16	PA	Blue	Twisted Pair
17	/PA	White	
18	PB	Yellow	Twisted Pair
19	/PB	White	
FG	Connector Shield	Yellow/Green	---

In case of using an A/B encoder without C pulse:

- Connect signal PC (Green Wire) directly to +5V terminal (together with Red-White PG +5V wires)
- Connect signal /PC (White wire from Green-White pair) directly to GND terminal (together with Black wire)



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