AKD™ Quick Start

KOLLMORGEN ®

Because Motion Matters™

Edition: Revision A, February 2010
Valid for Hardware Revision: A, Patents Pending
Part Number 903-200000-00

Keep all manuals as a product component during the life span of the product.
Pass all manuals to future users / owners of the product.

Need Help?

Kollmorgen is committed to quality customer service. If you have trouble with the drive Quick Start setup, please contact Kollmorgen customer support:

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Before You Begin

Safety Precautions

Before you install the drive, review the safety instructions included in the *AKD Installation Manual*. Failure to follow these safety instructions may result in personnel injury or damage to equipment. The *AKD Installation Manual* is available on the CD included with the drive and also on the Kollmorgen website: www.kollmorgen.com.

Required Tools and Equipment

- Two M4 hexagon socket cap screws (DIN 912)
- 3 mm T-handle Allen key
- No. 2 Phillips head screwdriver
- Small slotted screwdriver
- Microsoft Windows 2000, XP, or Vista equipped PC with an available Ethernet port for connecting the drive. Windows screenshots in this guide show the XP environment.

Installing the Drive

First, install the drive hardware by following the steps detailed in this guide:

Step 1   Secure the Drive and Connect the Protective Earth (PE)
Step 2   Connect Logic Power and STO (X1 Connector)
Step 3   Connect Motor Power (X2 Connector)
Step 4   Connect Feedback (X10 Connector)
Step 5   Connect I/O (X7 and X8 Connectors)
Step 6   Connect AC Input Power (X3 and X4 Connectors)
Step 7   Connect Drive Communication (X11)
Step 8   Confirm Connections

After you install the drive hardware, you can install WorkBench from the CD or website and configure the drive through your PC as follows:

Step 9   Install and Start WorkBench
Step 10 Set Drive IP Address in WorkBench
Step 11 Enable the Drive Using the Setup Wizard

Hardware Installation

Minimum Wiring for Drive Operation

Figure 1 summarizes the minimum wiring needed to operate the drive. For reference, detailed wiring diagrams are included at the end of this Quick Start guide.

Steps 1 through 8 of this guide provide detailed information for each connection shown below:

Figure 1. Minimum Wiring for Drive Operation

Step 1: Secure the Drive and Connect the Protective Earth

Tools: • Two M4 hexagon socket cap screws (DIN 912)
         • 3 mm T-handle Allen key
         • No. 2 Phillips head screwdriver

Bolt the AKD to a conductive metal plate. See the *AKD Installation Manual* for dimensions and mounting information for your specific drive model.

Connect the protective earth (PE) to any ground screw on the drive grounding lug shown in Figure 2.

Grounding Lug

Figure 2. Protective Earth (PE) Connection

Step 2: Connect Logic Power and STO (X1 Connector)

Safe Torque Off (STO) is a restart lock safety feature that protects personnel by preventing an unintentional system restart. To use this feature, the STO pin must be connected to the output of a security control or a safety relay. The safety relay must comply with the requirements of the SIL 2 according to IEC 61800-5-2, PL d according to ISO 13849-1, or category 3 according to EN-954.

Connect logic supply and safe torque off (STO) as shown in Figure 3.

Pin	Signal	Description
1	+24 Vdc	Logic power
2	24 V GND	Supply GND
3	STO	STO enable

Figure 3. Logic Supply Pin Configuration

Please note the following when connecting logic power supply:

- Input current of up to 1 A is required. If the brake relay is used, current of up to 3 A must be supplied.
- Check your motor holding brake amperage requirements in order to size the 24 Vdc power supply.
- If STO is not needed, then pin 3 must be connected directly with +24 Vdc. The STO is then bypassed and cannot be used.
- Consult the installation manual for the proper wiring and use of STO.

Step 3: Connect Motor Power (X2 Connector)

Wire the motor power cable to the X2 mating connector according to Figures 4, 5, and 6 as appropriate.

Pin	Signal	Description
1	-Br	Motor holding brake, negative
2	+Br	Motor holding brake, positive
3	PE	Protective earth (motor housing)
4	U	Motor phase U
5	V	Motor phase V
6	W	Motor phase W

Figure 4. Connector X2, AKD- xxxx06

Pin	Signal	Description
1	-Br	Motor holding brake, negative
2	+Br	Motor holding brake, positive
3	PE	Protective earth (motor housing)
4	U	Motor phase U
5	V	Motor phase V
6	W	Motor phase W

Figure 5. Connector X2, AKD-xxxx07
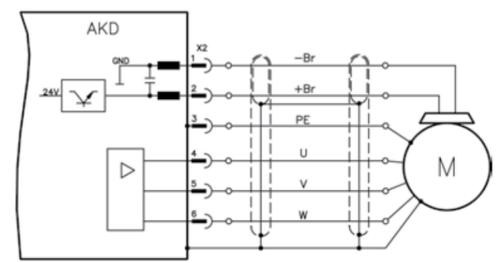
Figure 6. Motor Power Wiring Details, Cable length <= 25 m

Please note the following when connecting motor power:

- Refer to the wiring diagram included with your cable before connecting motor power.
- Some drive models do not have brake leads.
- Wire gauge required varies with drive amperage.

Step 4: Connect Feedback (X10 Connector)

Connect the feedback from the motor to the X10 connector according to Figure 7. Standard Kollmorgen motor feedbacks are plug-and-play and require no parameter setting for motor recognition and commutation to occur.

Figure 7. Feedback connection

Step 5: Connect I/O (X7 and X8 Connectors)

Connect required I/O according to the configuration shown in Figure 8. All pins are configurable; factory presets are shown in the pin configuration table.
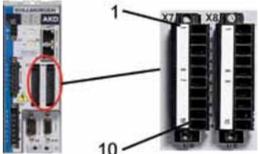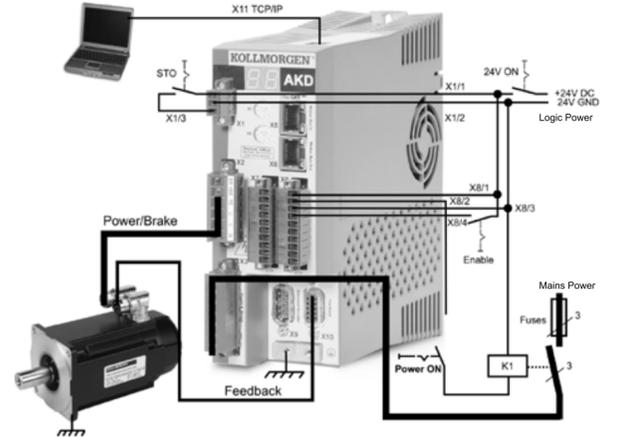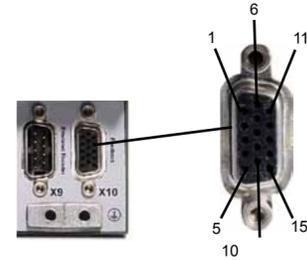

Figure 8.   I/O connection pin configuration

Connector	Pin	Signal	Preset Function	Specials
X7	1	DGND	Digital GND	
X7	2	Digital Input 7	Home switch, reference point	
X7	3	Digital Input 4	Off	
X7	4	Digital Input 3	Off	
X7	5	Digital Output 2-	Off	
X7	6	Digital Output 2+	Off	
X7	7	Digital Output 1-	Off	
X7	8	Digital Output 1+	Off	
X7	9	Digital Input 2	Off	High speed
X7	10	Digital Input 1	Off	High speed
X8	1	Fault Relay Output	-	
X8	2	Fault Relay Output	-	
X8	3	DGND	Digital GND	
X8	4	Digital Input 8	Hardware enable	Not programmable
X8	5	Digital Input 6	Negative limit switch	
X8	6	Digital Input 5	Positive limit switch	
X8	7	AGND	Analog GND	
X8	8	Analog Output +	Actual velocity voltage	
X8	9	Analog Input -	Velocity set point	
X8	10	Analog Input +	Velocity set point	

Step 6: Connect AC Input Power (X3 and X4 Connectors)

Connect AC input power for your AKD model as shown in Figures 9 and 10. Do not apply power until all hardware connections are made.

Pin	Signal	Description
AKD-x00306 to AKD-x00606 (X3)		
4	L1	Line 1
5	L2	Line 2
6	L3	Line 3
7	PE	Protective Earth
AKD-x01206 (X3)		
5	L1	Line 1
6	L2	Line 2
7	L3	Line 3
8	PE	Protective Earth
AKD-x02406 (X4)		
AKD-x02406 & AKD-xxxx07 (X4)		
1	L1	Line 1
2	L2	Line 2
3	L3	Line 3
4	PE	Protective Earth

Figure 9. Input power pin configurations

Figure 10. AC Input power wiring diagram

Please note the following when connecting AC input power:

- Single-phase operation is available on AKD-x00306, AKD-x00606, and AKD-x01206 models. For a single phase AC line, connect L1 and L2, with L3 left open circuited. The PE is connected in the same manner as 3-phase operation.
- A pre-installed jumper is included if the unit has internal braking resistor. For external braking resistor use, please consult the installation manual.

Step 7: Connect Drive Communication (X11)

1. Assign an IP Address
To establish communication between the PC and the drive, you must first set the drive IP address using either static or dynamic IP addressing.

- **Static IP addressing:**
The S1 and S2 rotary switches on the front panel of the drive correspond to the IP address setting of the drive.
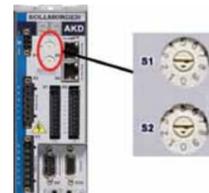

Figure 11. Rotary switches for static IP addressing

IP address = 192.168.0.S1S2

For example, if S1 is set to 3 and S2 is set to 5, then the IP address is 192.168.0.35.

- **Dynamic IP addressing (DHCP and Auto-IP):**

If the S1 and S2 switch are both set at 0, then the drive is in Dynamic Host Configuration Protocol (DHCP) mode. The drive will acquire its IP address from an external DHCP server if one is present in the network.

If a DHCP server is not present, then the drive will assume an automatic private IP address of the form 169.254.0.xx. If your PC is directly connected to the drive and set to obtain an IP address automatically in the TCP/IP settings, then a connection is established between the devices using compatible automatically generated addresses. This connection can require as long as a minute to complete.

• Changing the IP address:

If the drive is not powered on, then you can change the IP address using the rotary switches, and the change takes effect upon drive restart. You can also change the IP address while the drive is powered on. If you move the rotary switches while 24 V logic power is supplied to the drive, then you must unplug the network cable from the drive for three seconds or longer. This action will reset the address and the new address will take effect when the cable is plugged in again.

2. Connect the Drive to the Network

After you have assigned the drive IP address, you have two connection options: direct connection or hub/switch/router connection.

Option A: Direct Connection

1. Connect the AKD directly to the PC using a standard Ethernet (straight) patch cable. You can also use a crossover cable, since the drive detects the cable type automatically. Use static IP addressing for a direct connection.

Figure 12. Option A: Direct Connection

2. Set the PC IP address. In Windows, select **Start>Control Panel>Network Connections**. Choose the correct network connection for the port over which you will connect to the AKD.

3. In the network connection window, scroll to Internet Protocol (TCP/IP) and then select **Properties**. Configure the TCP/IP properties as shown below and click **OK**.

4. Check the AKD address setting and make sure that S1 and S2 are set to a nonzero value (static IP connection).

The connection is now configured to establish a point-to-point direct connection between the AKD and the PC using WorkBench. You can now skip to Step 8.

Option B: Network device connection

1. Set the rotary switches on the drive to zero.

2. Connect the drive and the PC to the network. The network must include a DHCP server (usually standard in corporate networks). If the network does not have a DHCP server, you can connect using a stand-alone router with a built-in DHCP server. In either case, both the PC and the drive acquire IP addresses automatically.

Figure 13. Option B: Hub or Switch Connection to a Corporate Network

Figure 14. Option B: Connection to a Router

Step 8: Confirm Connections

After completing Steps 1 through 7, you can turn on logic power to the drive through the X1 connector (bus voltage is not needed for communications).

After power is supplied, the drive displays a sequence of LED flashes:

1. –
2. [ ]
3. I-P
4. Drive IP address, flashed sequentially (for example, 192.168.0.5).
5. Drive status (opmode "o0" [current mode],"o1" [velocity mode], or "o2" [position mode]) or fault code if the drive is in a fault condition.

Confirm that the link LEDs on the drive (green LED on the RJ45 connector) and on your PC are both illuminated. If both LEDs are illuminated, then you have a working electrical connection.

Figure 15. Active connection LED

Step 8: Confirm Connections (continued)

While the PC is connecting, your taskbar will show the following acquiring icon:

Wait for this icon to change to the limited functionality icon (this process can take up to one minute).

Although Windows displays this limited functionality icon for the drive connection, the PC can communicate fully with the drive. Using WorkBench, you can now configure the drive through this connection.
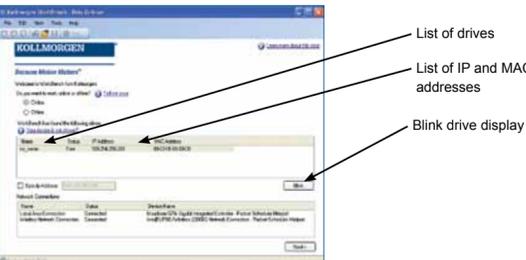
Software Setup

Step 9: Install and Start WorkBench

WorkBench is included on the CD that came with your drive. To install WorkBench, insert the CD and select one of the two versions of WorkBench: *Full Setup.exe* or *Setup.exe*. *Full Setup.exe* contains the Microsoft .NET framework needed to run WorkBench. *Setup.exe* does not include Microsoft .NET framework. WorkBench is also available on the Kollmorgen Web site: www.kollmorgen.com.
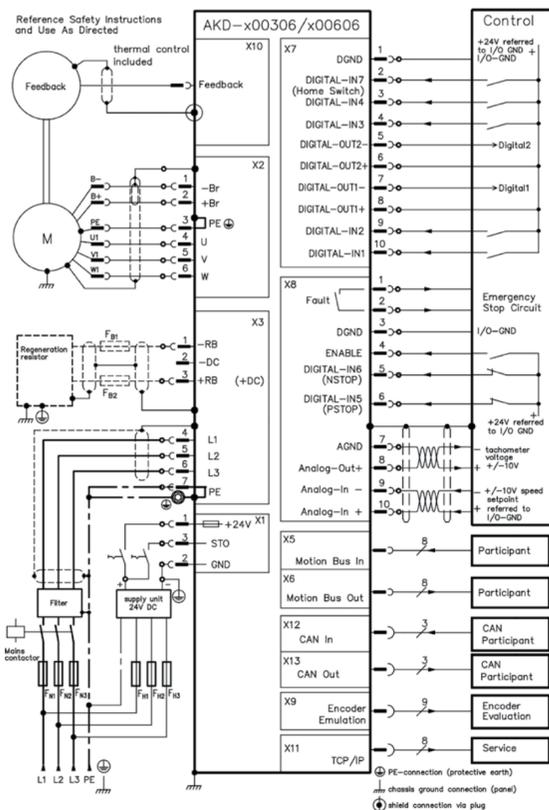
Once installation is complete, click the WorkBench icon to start the program. WorkBench will show a list of all the drives that it can find on your local network. Select the drive you wish to configure and then click **Next**.

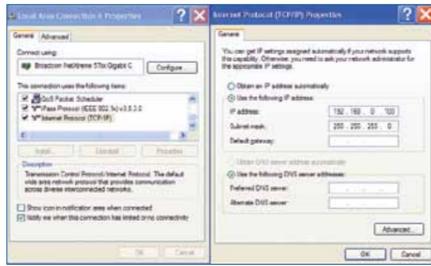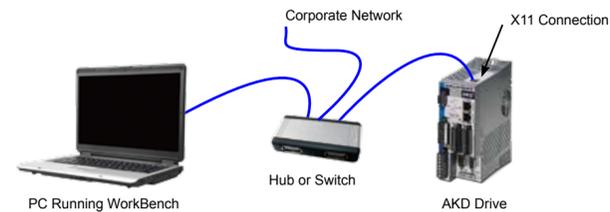If WorkBench does not automatically show the drive, then go to Step 10.

Step 9: Install and Start WorkBench (continued)

If multiple drives are detected, a drive can be uniquely identified using one of the following methods:
1. The MAC address of the drive. This is printed on the sticker on the side of the drive.
2. The name of the drive. The drive name is set using WorkBench. A new drive defaults to "No_Name."
3. Blinking the display. Select a drive and click **Blink** to force the display on the front of the drive to blink on and off for 20 seconds.

If you can connect to the drive at this point, then skip Step 10.

Step 10: Set Drive IP Address in WorkBench

If WorkBench does not automatically show your drive, then you can set the IP address manually in WorkBench as follows:
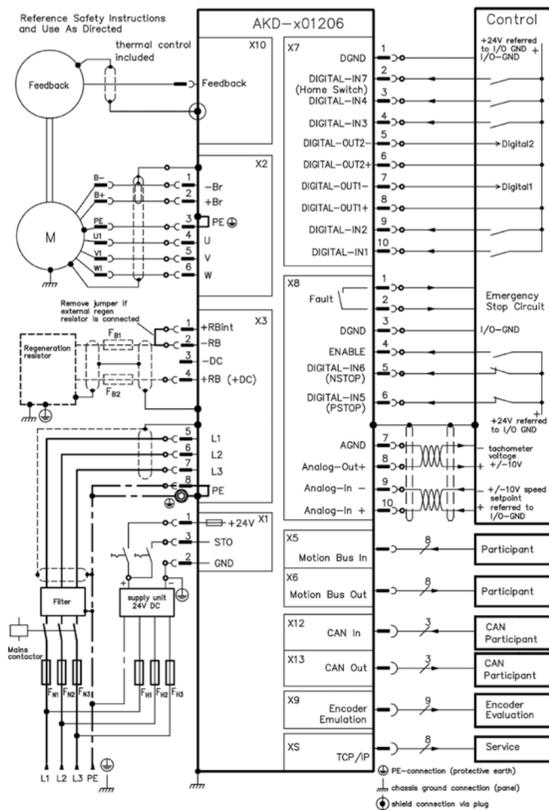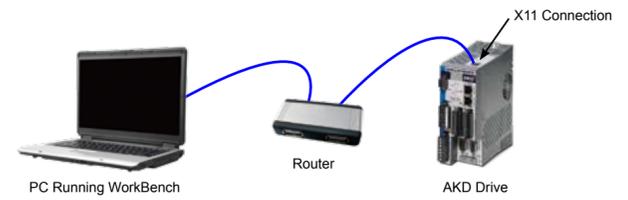
1. Display the IP address. You can show the drive IP address on the drive display by pressing button B1 shown in Figure 16. The display shows the digits and dots of the IP address in sequence (for example, 192.168.1.5). You can also display the IP address by disconnecting and then reconnecting the Ethernet cable.

Figure 16. IP address display button B1

Step 10: Set Drive IP Address in WorkBench (continued)

2. Enter the drive IP address. Once the IP address has been determined, manually enter the drive IP address into the **Specify Address** box in WorkBench as shown below. Then click **Next** to connect.
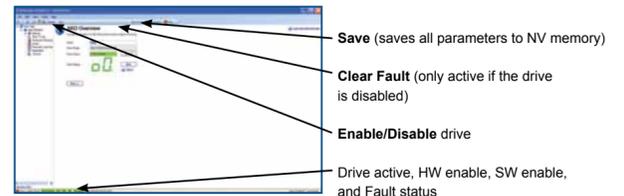

Step 11: Enable the Drive Using the Setup Wizard

Once a connection to the drive has been established, the **AKD Overview** screen appears. Your drive appears in the navigation area on the left of the screen. Right click on your drive name and select **Setup Wizard** from the drop-down menu. The Setup Wizard guides you through the initial drive configuration.

After completing the Setup Wizard, your drive should be enabled. If the drive is not enabled, check the following:
1. The hardware enable (HW) must be in the enabled state (pin 4 on X8 connector, see Step 5).
2. The software enable (SW) must be in the enabled state. Activate using the **Enable/Disable** button on the upper toolbar on WorkBench or in the **Overview** screen.
3. No faults may be present (click **Clear Fault** button on the upper tool bar to clear any faults).

The status of the HW enable, SW enable, and Faults is displayed in the lower toolbar of the WorkBench software. The drive is connected if the lower right corner shows **Online**. You can now use the Settings to complete advanced configuration of your drive.

Wiring Diagram, 3A and 6A

AKD-x00306 to x00606

Wiring Diagram, 12A

AKD-x01206

Wiring Diagram, 24A

AKD-x02406