AKD™
HMI Modbus Communication with AKD

KOLLMORGEN

Because Motion Matters™

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A	Preliminary Edition	07/2011

Windows is a registered trademark of Microsoft Corporation

AKD is a registered trademark of Kollmorgen Corporation

Current patents:

US Patent 5,646,496 (used in control card R/D and 1 Vp-p feedback interface)

US Patent 5,162,798 (used in control card R/D)

US Patent 6,118,241 (used in control card simple dynamic braking)

Technical changes which improve the performance of the device may be made without prior notice.

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1   Table of Contents

2 About this User Guide

This application note is specifically for the Kollmorgen AKI series touch screen HMI's. However, some information applies to all HMI's. Further information on Modbus communication can be found in the Field-bus Manuals section of the AKD User Guide.

3   HMI Modbus Communication with AKD

3.1   Protocol

The following are required to connect an HMI to an AKD.

- The HMI must support Modbus TCP.
- It must have Ethernet hardware and a driver for Modbus TCP, though the driver does not have to be made specifically for the AKD.

The AKI HMI's are compatible with a "Kollmorgen Modbus Master" driver. The Beijer Electronics Exter HMI's can use a "Modicon Modbus Master" driver. Both work with the AKD.

3.2   IP Address

The subnet mask of the AKD is 255.255.255.0. The first three octets of the drive's IP address must be the same as the first three octets of the HMI's IP address. The last octet must be different.

The easiest IP settings to use are the AKD's static IP address configured with the rotary switches.

Example:

AKD set to **192.168.0.12** and HMI set to **192.168.0.3**

The IP addresses must be unique addresses on the local network (no other device on this particular local network can have the same IP address). The HMI has a configuration mode in which the IP address can be set manually.

3.3   Connection

The HMI's Ethernet port can be connected directly to the AKD's Ethernet port (X11) with a standard Ethernet cable. Or both devices can be connected to the LAN side of a router or switch on a local network. It is generally easier to commission the HMI when it is on a local network with the AKD and the PC. If a hub is used, the Modbus traffic can be monitored using Wireshark.

3.4   Modbus Register Addresses

The "Start Address" number for the AKD is zero. In other words, the first parameter is Modbus address zero (or 40000), and all address numbers are even numbers. The second parameter is address 2 (or 40002). Some HMI's may require the Start Address to be set to 1.

Property	Value
Communication mode	TCP
Default station	0
Modbus protocol	RTU
32-bit word mapping	Motorola
Addressing	Decimal
Start address	0
Silent time (ms)	0
Clock register	40000

The AKD has 32 bit parameters and 64 bit parameters. The 32 bit parameters are stored in two 16 bit registers, and the 64 bit parameters are stored in four 16 bit registers. To read/write a parameter through Modbus, specify the Modbus address number of the first register and the number of registers. To read AIN.VALUE, use Modbus address number 12 and specify to read two registers (or four registers for 64 bit parameters) To read only the lower 32 bits of a 64 bit parameter, specify the third register of that parameter and read two registers. The same applies for the upper 32 bits of a 64 bit parameter.

For example, to read the lower 32 bits of AOUT.VALUE, specify register number 30 and read two registers (30 and 31). The upper two registers are 28 and 29. Bit 15 of register 28 is the MSB and bit 0 of register 31 is the LSB.

For information on scaling modbus parameters see the AKD User Guide.

3.5 Basics of Communication

Modbus TCP is a simple protocol used for reading and writing drive parameters. When a read request is sent to the drive, the drive will return the value of the specified parameter. When a write command is sent to the drive, the drive will process the data and return a response stating whether or not the write was successful. If a read or write from an HMI is unsuccessful, often that may cause the other objects on that HMI screen to not function properly. HMI's will send the read and write command for all tags on a screen to the drive at the same time. This is called a block read/write. So if there is a problem with one tag, it is sometimes difficult to identify which one is causing the problem.

3.6 Tags

Tags are the links between an object on an HMI screen and the Modbus register number for a drive parameter. Specify each tag with the Modbus address number, the data size, data type, and whether it is read-only, write-only, or read/write. The data size will always be 32 bit. The data type can be Integer or Float (floating point decimal). All of the AKD parameters that have three digits after the decimal point have a data type of Float. These Float parameters will need to be scaled by 1000, since Modbus data values do not have a decimal point (there is no need to do any conversion from floating point decimal to decimal). The tags in the AKI has a gain for handling the scaling. Set the gain to 0.001 to divide the Modbus data value by 1000 to get the actual decimal value.

Tag			Scaling		Controllers	
Name	Data Type	Access Right	Offset	Gain	Data Type	AKDMod...
> Ainoffset ⋯	FLOAT	ReadWrite	0	0.001	INT32	40006
cmdsource	INT32	ReadWrite	0	1	INT32	40226
Disable	INT32	Write	0	1	INT32	40236
Enable	INT32	Write	0	1	INT32	40254
Opmode	INT32	ReadWrite	0	1	INT32	40270
Actposition	FLOAT	Read	0	0.001	INT32	40590
Actvelocity	FLOAT	Read	0	0.001	INT32	40858

3.7   Object Properties

Each object, such as a numeric field, button, picture, etc., has a list of properties that must be configured. Set these display properties according to the expected Modbus data, including the data type, data size, and number of decimal places.
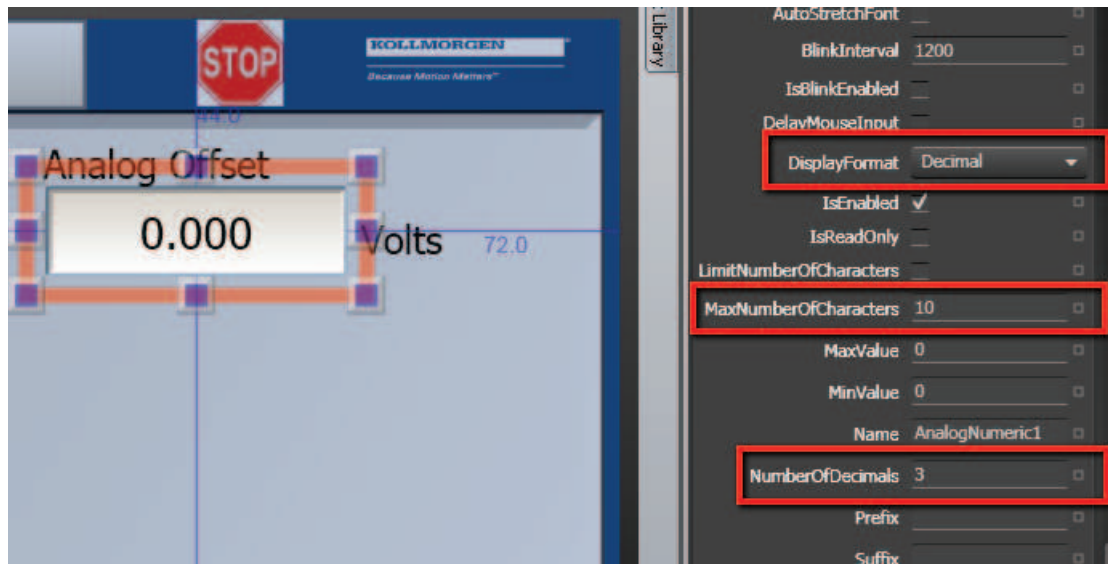
3.8   Poll Groups

Each tag must be a member of one poll group. The update interval is user defined for each poll group. Each of the tags in a particular poll group will be read at the specified update rate for that poll group. The purpose for poll groups is to allow some tags to update at different intervals than other tags. Some tags, such as actual position or actual current, might need to be updated every 30 ms. Other tags, such as the homing speed, do not need to be updated at a fast rate. So, processor bandwidth can be most efficiently utilized by grouping the tags into poll groups with different update rates.

About Kollmorgen

Kollmorgen is a leading provider of motion systems and components for machine builders. Through world-class knowledge in motion, industry-leading quality and deep expertise in linking and integrating standard and custom products, Kollmorgen delivers breakthrough solutions that are unmatched in performance, reliability and ease-of-use, giving machine builders an irrefutable marketplace advantage.

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