AKD Communications Application Note: Telnet and Modbus TCP Rev. A Jan/2016

Overview

Although all AKDs (except Profinet) support Telnet and Modbus TCP, this application note applies specifically to the Motion Tasking (AKD-P) drive.

The AKD-Pxxxxx-NBAN-0000 supports Telnet and Modbus TCP for communications over Ethernet.

Ethernet TCP/IP is a generic term used with Ethernet networks and is not synonymous with Ethernet IP an open protocol managed by the ODVA organization.

<u>Telnet</u>

Telnet is what is used in the Workbench communications to the drive. You can see an example when you use the Workbench terminal.

Essentially Telnet is ASCII over Ethernet but for more details to the standard here is a URL to more information.

http://en.wikipedia.org/wiki/Telnet

We do not have examples specific to any controller or software but there are a couple of documents and files on our KDN website that may be helpful. One is a VB example and the other is using Hyperterminal.

http://kdn.kollmorgen.com/query/telnet?f[0]=im_field_tags%3A252

VB Telnet Example

Attached is an example Visual Basic **Telnet** communications program to talk to the AKD. No ... Last modified: Monday, December 8, 2014- 12:33 Dan.Wolke@Kollmorgen.com AKD **Telnet** VB Visual Basic ...

AKD Connection using HyperTerminal

11:28 jcoleman02 AKD Ethernet Hyperterminal Telnet communication ...

Protocols Supported by AKD Drive

Current general market model numbers and their supported protocols Model Number **Telnet** Modbus ... 2014- 08:34 Will Gaffga AKD CANopen EtherCAT Modbus Profinet **Telnet** model number protocol English ...

Modbus TCP

An alternative to Telnet is Modbus TCP. There are a myriad of different products from PC based applications using a Modbus TCP driver plug-in (i.e. ActiveX, dll, etc.) to HMIs and PLCs.

Another option is Modbus TCP. Modbus TCP is an open protocol managed by its organization. Unlike Telnet which is ASCII over Ethernet based, Modbus TCP is a register/address based communications protocol.

http://www.modbus.org

Demonstration of Telnet

This application note will demonstrate setting up a motion task via Hyperterminal and also describe where to find the documentation on Modbus TCP.

In the Motion Tasking drive is the table of Motion Task as shown:

🔊 Kollmorgen WorkBench					
File Edit View Tools Help					
🕝 🕥 🕢 Disable Stop 0 - Service 🗸	2 - Positi	on Mode 🗸 Disable & Clea	ar Faults Save To Device [Disconnect Panic	
Device Topology 4		. .	· · · · · · · · · · · · · · · · · · ·		
🔺 🎕 Start Page		Motion Tasks			
🖌 🇊 no_name (Online)		Motion Tasks allow you to defir	ne and configure drive motion task	is with their respective sequence.	
Settings					
Communication	(De our				
Power	Start	Motion Task Running:	Idle		
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Foldback	1				
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Limits	4				
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Encoder Emulation (X9 Cfg)	0				
√ Analog Input	5				
M S Analog Output	10				
Programmable Limit Switches	11				
 Enable/Disable 	12				
Position Capture	13				
Sk Motion Profile Table	14				
Performance Servo Tuner	14				
Slider Tuning	15				
Inotion Lasks Drive Motion Status	▶ 16				
Faults and Warnings	17				

Since Workbench has its own terminal I would suggest you start your application by issuing commands from the Workbench terminal. The advantage is you can set values using the command line (as you would in Hyperterminal or other 3rd party software) but also verify the values are written. This will give you a feel for our command/parameter naming convention.

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File Edit View Tools Help	
🔇 🕥 🕢 😡 Disable Stop 0 - Service -	2 - Position Mode - Disable & Clear Faults Save To Device Disconnect Panic
Device Topology #	Terminal
4 👹 Start Page	
A Settings	A command line interace to the device. Type a command and press return.
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Power	
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A Performance Servo Tuner	
A Slider Tuning	
Motion Tasks	
Eaults and Warnings	
Scope	
Parameter Load/Save	
Parameters	
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AND NOT CONTRACT DEFICE	

From the Workbench help you will find the AKD Parameter and Command Reference Guide. These parameters are grouped by function. Not exclusive but you will initially find interest in the DRV, HOME, and MT groups (Drive, Homing, Motion Task).

Kollmorgen WorkBench Help	Second Country May 16-14
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Contents	
	8 =
AIN2 Parameters	You are here: AKD Parameter and Command Reference Guide > MT RESERVED WORDS
AOUT Parameters	
AOUT2 Parameters	MT Devenueters and Ceremonds
BODE Parameters	wit Parameters and Commanus
CAP Parameters	This section describes the MT parameters and commands.
CMP Parameters	
CPS Parameters	
CS Parameters	MI.ACC M. MT.CLEAR
DIN Parameters	MT.CNTL
DIO Parameters	MI.CONTINUE P MT.DEC
DOUT Parameters	MT.EMRGMT
DRV Parameters and Commands	MILFEEDRATE 79 MTLIST
DS402 Parameters	MT.LOAD
EIP Parameters	
FAULT Parameters	MT.NUM
FB1 Parameters	21 MT.P 79 MT PARAMS
FB2 Parameters	MT.SET
FB3 Parameters	21 MT.TNEXT 73 MT.TNUM
FBUS Parameters	MT.TNVSAVE
GEAR Parameters	MT.TPOSWND
GUI Parameters	MT.V
HOME Parameters	MT.VCMD
HWLS Parameters	
IL Parameters	Stay Connected with Kollmorgen
IP Parameters	
LOAD Parameter	
MODBUS Parameters	
MOTOR Parameters	
MT Parameters and Commands	
MT.ACC	
MT.CLEAR	

The same commands can be done within Workbench but to demonstrate this can be done externally, I followed the setup for Hyperterminal from the app. note on the website.

This is purely for demonstrational purposes to indicate how one might control the drive by sending commands over Ethernet. Every application is different.

In this example, the drive is software disabled, enabled, the operation mode was changed to position mode (2), the drive was then disabled. Next I set the motion task number (pointer) to 1 which is motion task 1 (row one if you were to check it in Workbench). Units are setup in Workbench but are not the focus of this app. note. Once motion task 1 was selected, I set the position, velocity, accel, decel for the move. Note the MT.CNTL value 0 results in an absolute move. If other move types are required or other advanced features of the motion task needs to be set, the MT.CNTL must be set to a decimal equivalent value of the binary bits within the MT.CNTL. Please see the Workbench help for more details and the definition of this parameter. MT. SET moves the current values of the MT parameters into the current motion task based on the MT.NUM (1 in this case). This method could be repeated by setting MT.NUM to another number (i.e. MT.NUM 2) to setup other motion tasks. To save the motion tasks and all drive parameter settings, issue a DRV.NVSAVE so everything will be nonvolatile on power cycle of the drive.

est - HyperTerminal	23
File Edit View Call Transfer Help	
>DRV.DIS >DRV.EN >DRV.OPMODE 2 >DRV.DIS	*
>MT.NUM 1 >MT.P 65536 >MT.V 500 >MT.ACC 10000 >MT.DEC 10000 >MT.CNTL 0 >MT.SET >DRV.NVSAVE	
Connected 0:02:27 ANSIW TCP/IP SCROLL CAPS NUM Capture Print echo	

Next I enabled the drive (software enable), commanded the drive to execute the home routine (see the Home screen in your project tree in Workbench for details). Finally I commanded Motion Task 1 to execute. Based on my units and scaling in the drive with 16 bit position units (65536=1rev), the motor moved 1 revolution.

>DRV.EN >HOME.MOVE >MT.MOVE 1 >									T III	
Connected 0:21:41 ANSI	w		TCP/IP SCF	OLL CAPS	NUM Ca	pture Prin	t echo			
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Kolimorgen WorkBench File Edit View Tools Help Go Go Go Disable Stop 0 - Service Device Topology Go Topology Ton name (Online) Go Settings Forum Communication Power	• 2	- Positi	on Mode - Disable & Clear Fa Motion Tasks Motion Tasks allow you to define an Motion Task Running: Idle	ults Save To Device	Disconnect	Panic tive sequence.				Learn more about
W Regen			Position (Counte 16Bt)	Velocity [mm]	Acce	leration (mm/e)	Deceleration (mm /s)	Profile	Time	Next Task
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Feedback 2	IП	1	65536.000	500.000	9999.	946	9999.946	Trapezoidal	- Absolute	▼ None
E) Brake		2							-	
Hits		3								
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Home		-								
(i) Current Loop		5								
W Velocity Loop		6							• •	
O Position Loop		7							•	
Encoder Emulation (X9 Cfg)		8								
Analog Input		9								
M- Analog Output		10							•	
Programmable Limit Switches		11							•	-
Enable/Disable		12							•	-
Position Capture		13							· ·	•
Performance Servo Tuner		14							-	-
Slider Tuning		15							-	-
Motion Tasks Drive Motion Status		16							•	•
Faults and Warnings		17							•	-
Scope		18							v	-
Parameter Load/Save	•						III			
Terminal	s	More >: ave Mot	> ion Tasks To Drive Reload Tas	ks From Drive						Import From File Export
Add New Kollmorgen Device	Ľ									
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no_name (Online) VL.FB - Velocity feedback	sk			-1.221 rpm						_

If your controller (PC, PLC, etc.) can emulate the same functionality as demonstrated with Hyperterminal then you can control the AKD using the same methodology. Note this doesn't go into details regarding communication errors or confirmation of read/write success (i.e. checksums).

Modbus TCP

An alternative to Telnet is Modbus TCP.

In Workbench Help there is a section for fieldbus manuals. Under that section is "Modbus Manual". For users of AKD BASIC note that it also has a variable mapping range of 5000 to 5999 (see the AKD BASIC Programming manual for more details).



There are 2 tables with the drive parameters: The Modbus Parameter table (note the parameter, register address, and attribute/data types are given). There is also a Modbus 64bit to 32 bit mapping where some parameters that are in the first table dimensioned as a 64bit word are in the 32 bit mapping table redimensioned as a 32 bit word. In some cases this is easier to read/write data depending on your Modbus TCP drive/controller. As noted, Modbus is a register/address based protocol.

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KOLLMORGEN®						
Contents Index Browse		E				
Configuring with Linear Motors	~		You are here: AKD Fieldbus Manuals > Fieldbus Manuals > Mod	bus Manua	l > Modbus	Parameter Table
Selecting Units for Your Application						
Configuring General Drive Settings						
Using Command Source and Operating Modes			Modbus Parameter Table			
Creating Motion				Modbus	1	
Saving Your Drive Configuration			Parameter	Register	ls 64-bit?	Attributes
Tuning Your System				Address		
Using the Scope			AIN.CUTOFE	0		32-bit
Using Parameters and the Terminal Screen			AIN.DEADBAND	2		16-bit
ierminai			AIN.ISCALE	4		32-bit
Parameter List			AIN.OFFSET	6		16-bit, signed
Parameter Load/Save				-	24	0443
Parameter Comparer		- I	AINFSCALE	°	Tes	64-bit, signed
Faults and Warnings			AIN.VALUE	12		16-bit
Troubleshooting the AKD			AIN.VSCALE	14		32-bit
Firmware and Firmware Updates				16		Command
Connection Diagrams				10		22 hit
Record of document revisions			ADDILISCALL	10		52-51
AKD Parameter and Command Reference Guide	-		AOUT.MODE	20		16-bit
AKD BASIC Programming Manual			AOUT.OFFSET	22		16-bit, signed
AKD Fieldbus Manuals			AOUT.PSCALE	24	Yes	64-bit
Modbus Manual			AOUT.VALUE	28	Yes	64-bit, signed
Modbus Dynamic Mapping				32	Yes	64-bit signed
Modbus Parameter Table						00.00
Modbus 64-bit Parameters to 32-bit Mapping			AUUT.VSCALE	36		32-bit
Modbus Errors			BODE.EXCITEGAP	38		8-bit
CANopen Object Dictionary			BODE.FREQ	40		32-bit
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