<u>Using Kollmorgen Visualization Builder's G&L Motion Control driver (Motion Control protocol) for</u> <u>communications to Digital MMC Smart Drive (w/ drive resident control).</u>

Disclaimer: The user must be aware of hardware and software differences between what they have and what is demonstrated in this application note. They must also accept the responsibility of the risks and nuances with any conversion project. All functionality must be tested after implementation to ensure repeatable, reliable, and correct behavior and operation.

My demo used a serial connection from the controller to a Cimrex HMI via a serial connection (which I don't have now).

I found the following G&L application note to be helpful even if some of the screenshots are outdated.

https://www.kollmorgen.com/en-us/developer-network/gl-support-downloads-and-documentation/

G&L Application Notes

G&L Motion Control PiC Application Note Master List

Description	Number/Name	Most Recent Revision
Digital MMC/Exter Application Quick Start Guide	an000055.doc	26-Jan-2007

I used the following sample project. This is based on the hardware/demo I have so another demo program will need to be selected for other hardware, processors, etc.

PROJECT NAME: [C:\Program Files (x86)\G&L Motion Control\Applications V18.0.1\Examples\Digital MMC Smart Drive 1 Axis Sales Demo\Demo1AKM Pro Edition.PRJ

C:\G&L Motion Control Data\Applications V18.0.1\Examples\Digital MMC Smart Drive 1 Axis Sales Demo\Demo1AKM.Ido

Once I successfully compiled and downloaded the project (i.e. ladder, etc.) to the controller and was online without errors I looked in the folder of the project and target location for the compiler output.

In my case it is the same file path shown above.

C:\Program Files (x86)\G&L Motion Control\Applications V18.0.1\Examples\Digital MMC Smart Drive 1 Axis Sales Demo

The *.oid file is highlighted below.

Name	Date modified	Туре	Size
DemD1T60c-Files	12/7/2018 3:26 PM	File folder	
D1AKM21E.srv	10/18/2005 10:03	PiCPro Servo File	1 KB
d1akm21e.SVT	10/20/2008 1:39 PM	SVT File	1 KB
DemD1C69.cpa	6/30/2005 11:08 AM	CPA File	1,370 KB
DemD1T60c.cpa	5/15/2007 8:14 AM	CPA File	1,547 KB
🕌 DemD1T60c.zip	5/15/2007 8:15 AM	Compressed (zipp	178 KB
Demo1AKM MMC Edition.PRJ	8/23/2010 10:39 AM	PiCPro Project	3 KB
Demo1AKM Pro Edition.PRJ	3/16/2010 1:42 PM	PiCPro Project	3 KB
Demo1AKM.G&L	8/23/2010 10:39 AM	PiCPro Compress	521 KB
Demo1AKM.Ido	5/9/2007 11:16 AM	PiCPro Ladder File	30 KB
Demo1AKM.oid	5/9/2007 11:33 AM	OID File	118 KB
Demo1AKM.rem	5/9/2007 11:16 AM	REM File	55 KB
demod1.srv	6/16/2005 12:48 PM	PiCPro Servo File	1 KB
demod1.SVT	10/22/2008 6:17 PM	SVT File	1 KB
DemoD1Ex MMC Edition.PRJ	8/23/2010 10:40 AM	PiCPro Project	3 KB
DemoD1Ex Pro Edition.PRJ	3/16/2010 1:55 PM	PiCPro Project	3 KB
DemoD1Ex.bin	10/22/2008 10:11	BIN File	148 KB
DemoD1Ex.G&L	8/23/2010 10:40 AM	PiCPro Compress	521 KB
DemoD1Ex.ldo	5/8/2007 12:15 PM	PiCPro Ladder File	30 KB
DemoD1Ex.oid	5/8/2007 12:14 PM	OID File	118 KB
DemoD1Ex.rem	5/8/2007 12:15 PM	REM File	55 KB
MMCD1Demo.DDV	3/9/2007 3:29 PM	PiCPro Digital Driv	5 KB
MMCD1DemoWithAKM21E-AMN2-00.D	3/9/2007 3:30 PM	PiCPro Digital Driv	5 KB
H MMCD1YSMscaled4000FUPerRev.DDV	3/9/2007 3:30 PM	PiCPro Digital Driv	5 KB
Zdemosrv.lib	10/22/2008 10:11	LIB File	1 KB

On the Kollmorgen Visualization Builder side I started by creating a new project.



In my test, I did not have a physical hardware device (I simply used my laptop as the HMI in emulation mode; limited demo run-time). Initially I chose a hardware type that had a limitation as to how many tags it could hold thus when I imported the *.oid file into the project's database, I got errors. See your HMI's datasheets/manuals for details on this limitation. In this example KVB allowed me to import but when I Built the project I would get the following error. KVB has a 2000 count tag limitation?



Next I chose the G & L Motion Control (Motion Control protocol) driver in the list. Note that the Kollmorgen (Modbus TCP/IP) driver would also work IF you have the Modbus TCP ASFB library addition to your PicPro function blocks. For this test I want to use the sample project and the G&L driver.

Choose your target in the menu	Choose your preferred controller	Select the location of your pro
DEIGW	of OPC server in the menu below	in the menu below
Controllers Select brand	Select protocol	Next >
DEMO	Motion Control	< Previous
G & L Motion Control		
Kollmorgen		Finish
		Cancol
		Cancel
OPC UA Server		
URL		

The software prompted me to give the project a name.

	or OPC server in the men	u below	in the menu below
		1	Next >
Name:	G_and_L_Demo_lest		
Location:	C:\Users\Todd.Evans\Documents\Kollmorgen Projects	Browse	Previous
			Cancel
			Cancel
			Cancel

After Finish the project opened and I clicked under Project Explorer->Functions->Tags to open the Tags window.

Project Explorer	- 	Screet	n1 × Tags ×													-
	^	8	Tags													
Screen1		Tags	Controllers Triggers	Poll Group	s Index Regi	isters										
		Home	•													
		A	dd 🔹 Delete	Column Scali Data	is Visible ing i Exchange	☑ Others						Filter	Cross Reference	Show Selection	• Import	•
		Tag				Controllers	15	Scaling				Others				
		Nam	e	Data T	Access	Data Type	Control	Offset	Gain	Read Ex	Write Ex	Description	Poll Group	Always Ac	Non-volatile	Initia
O Contraction of the second se		> Tag1		DEFAULT	ReadWrite	DEFAULT			0	1	111		PollGroup1			
 Functions (4) 																
Alarm Server																
Wultiple Languages																
Security									30							•
Tags	~	Design	Script												Tags	used: 0
Error List																• ‡ ×
													101 A		A 4 1 1 1 1 1 1 1 1 1 1 1	1.0.000

I optionally deleted the Tag1 as I didn't need it. Next, I clicked on the Controllers tab and then selected Settings...

6	Tags					
Tags	Controllers	Triggers	Poll Groups	Index Regi	sters	
A	.dd 🔹	Delete •	Columns Scaling	Visible 9 [xchange	🛛 Others	
	1002					
Tag					Controllers	

Screen1 × Tags ×		-
🔁 Tags		
Tags Controllers Triggers Poll Groups Index Registers		
Home Add Delete		Controller Settings Show Selection •
Name	ID	Active
> Controller1		2

Under the Settings tab note the driver name and version. The default settings and communication method is shown below.

Mo	tion Control				×
Se	ttings Stations				
N	lotion Control 5.04.00				
	Settings				<u> </u>
	Communication mode		Serial		
	HMI ID		66		
	Communication me	ethod			
	Communication metho	d	Serial		
	Port		COM1		
	Baud		9600		
	Parity		None		
	Data bits		8		
	Stop bits		1		
	Tunneling protocol		TCP		
	Tunneling IP address		192.168.98.2	2	
	Tunneling port		6004		
	Tunneling local UDP po	ort	0		-
		ОК	Cancel	Apply	Help

A side note is when the Settings screen is shown, you can click on the Help button in the bottom right hand corner to get more information on the G&L driver.

securitys		<u> </u>
Communication mode	Serial	-
	66	
Communication method	Cardal	
Dort	COM1	
Baud	9600	
Parity	None	
Data hits	8	
Stop bits	1	
Tunneling protocol	TCP	
Tunneling IP address	192,168,98,2	
Tunneling port	6004	
Tunneling local UDP port	0	-

A portion of the Help details is shown below.

KOLLMORGEN

Because Motion Matters*

G & L Motion Control

Introduction **Release Notes** Disclaimer Limitations Connecting To The Controller Point To Point Connection Multidrop Connection Ethernet Connection **Communication Ports** Cables Settings Serial Advanced Routing Stations Addressing Digital Signals Analog Signals Station Handling Import Module Efficient Communication Troubleshooting Error Messages

Introduction

For information about the controller we refer to the manual for the current system.

Release Notes

Version	Release	Description
5.04	October 2017	Corrected performance issue.
5.03	June 2017	Added support for new HMI platform.
5.02	June 2016	Added support for new HMI platform.
5.01	April 2011	Support for new HMI models. Corrected problem when communicating with more than one controller. Added unicode string support for certain HMI models. Updated helpfile.
5.00	May 2009	Initial version Note: This version will replace version 4 of the G & L Motion Control drivers for those HMI models that have such drivers. The new driver is based on a new driver platform and may differ slightly and also require a reconfigure of the driver properties.

Disclaimer

Please note that changes in the controller protocol or hardware, which may interfere with the functionality of this driver, may have occurred since this documentation was created. Therefore, always test and verify the functionality of the application. To accommodate developments in the controller protocol and hardware, drivers are continuously updated. Accordingly, always ensure that the latest driver is used in the application.

At the time of authoring this application note, I did not have a serial cable to test so I elected to use Ethernet instead.

Ð	Settings	
	Communication mode	Serial 👻
1	HMI ID	Serial
E	Communication method	Ethernet
į	Communication method	Serial
ł	Port	COM1
ł	Baud	9600
j	Parity	None
đ	Data bits	8
3	Stop bits	1
1	Tunneling protocol	TCP
ł	Tunneling IP address	192.168.98.2
ł	Tunneling port	6004
1	Tunneling local UDP port	0

The HMI ID is only valid at Serial Communication as stated in the Motion Control driver help mentioned above.

Ethernet 66	mmunication mode 41 ID
66	11 ID
	mounication mathed
	ommunication method
	dvanced
	outing

Settings

Ξ	Settings	
	Communication mode	Serial
	HMI ID	66

Parameter	Description
Communication mode	Specifies if the physical connection is serial or Ethernet.
HMI ID	Sets the ID of the HMI. This property is only valid at serial communication.

Next click on the Stations tab and change the IP Address to the target G&L Controller.

Motion C	ontrol				×
Settings	Stations				
Station	IP Address	Port	Checksum		
1	192, 168, 1, 1	7728	0		
				Add	Remove
		ОК	Cancel	Apply	Help

This is the same IP Address when using TCP/IP to communicate to the G&L Controller with PicPro (check the Online pull-down menu->Comm Settings:

Communication Settings	? ×
Serial Communication Port: Baud Rate:	ОК
COM1 - 57600 -	Cancel
Network	Help
IP Address/Name:	Net Info
99.33.1.56	
Additional Network Info	
	TCP/IP Timeouts
	Extend timeouts
C Serial	C Local MMC for PC

Back to the setting under Stations in KVB, the address is changed. The default station number of 1 and the Port of 7728 was left at default as well as the Checksum (the documentation is unclear on how this is used or what the setting means).

1	99.33.1.56	7728	0	

Click Apply and OK.

Now we're ready to import the *.oid file generated by PicPro. Under the Tags tab there is an Import list box on the far right highlighted below.

Clicking on the down arrow of the Import listbox, lists the options. The one we want is "Import tags to Controller 1"

Filter			
	Cross Reference	Show Selection •	port 🔸
	Dell Course	Import complete taglist Export complete taglist Import tags to [Controller	1]

Impact module:	Filenomer	
import module:	riiename:	
G & L Motion Control import format	•	
Note the format !		Click to browse for the *.oid file.

Navigate to the folder and file and select; then click on "Open".

→ ◆ ↑ 🗔 → This PC → SYSTEM & DATA (C:) → G&L Motion	Control Data > Applicat	ions V18.0.1 > Examples > Digital N	MMC Smart Drive 1 Axis Sales Demo	5 × 0	Search Digital	I MMC Smart D	Dri.
roanize New folder						8ee 👻 🗖	
Videos	^	Name	Date modified	Туре	Size	No. of Concession, Name	
L SYSTEM & DATA (C:)		DemD1T60c-Files	2/13/2019 12:32 PM	File folder			
ENG (\\RADVSVFP02\DATA\$) (F:)		Demo1AKM.oid	2/14/2019 3:36 PM	OID File	118 KB		
gROUP (\\RADVSVFP03\DATA\$) (G:)		DemoD1Ex.oid	5/8/2007 12:14 PM	OID File	118 KB		
todd.evans (\\RADVSVFP02\DATA\$\HOME) (H:)							
TP (\\RADVSVAP03\DATA\$) (J:)							
ENG (\\RADVSVFP02\DATA\$) (N:)							
n DOC (\\RADVSVFP03\DATA\$) (O:)							
PROD (\\RADVSVFP02\DATA\$) (P:)							
TECH (\\RADVSVFP02\DATA\$) (T:)							
APPS (\\RADVSVFP03\DATA\$) (W:)							
= FNC AVE JL = 4-011 (7.)	~						
File name: Deme10KM aid					OID Files (* o	(d)	

📃 Import	Tags						×
Import mo	dule:		File	name:			
G & L Mot	ion Control im	port format	• C:\G	S&L Mo	otion Control Data\App	olications V18.0.1\Examples	Dig
More							
Select pa	arameters to	import:					
✓ Name	✓ DataType	Size	Access	Right	✓ Offset		
Gain	Address	Description	Always	Active	PollGroupName		
Save mappi	ing as import r	nodule Show P	review			Import (Cancel

Click on the "Import" button in the bottom right corner of the Import Tags window (see above).

📕 Select Tags				\times
All Items				~
	OK	(Canc	el

Check the box for All Items and click OK.

If the import was successful the report (result) will be confirmed as follows:



As stated before, I get errors later on build warning me that the number of tags exceed the KVB limitation of 2000.

The following progress status bar appears.

	-1115	 _

When it is finished the tags will appear in the Tags list (columns and rows).

s Controllers Trigger	5 Poll Group	s Index Regi	sters											
ome														
	Column	s Visible								Filter				
Add • Delete	✓ Scali Data	ing Exchange	✓ Others								Cross Reference	Show Selection	. • Impor	rt.
ag	Last and the second sec		Controllers		Scaling				Others					
lame	Data T	Access	Data Type	Control	Offset	Gain	Read Ex	Write Ex	Description		Poll Group	Always Ac	Non-volatile	
	·· DEFAULT	ReadWrite	BOOL	1:BOOL 1_1		0	1				PollGroup1	10	E	
_HMI_StopPB	DEFAULT	ReadWrite	BOOL	1:BOOL 1_2		0	1				PollGroup1	(m)		
_AckAlarms	DEFAULT	ReadWrite	BOOL	1:BOOL 1_3		0	1				PollGroup1	107	5	
_MachineStartInput	DEFAULT	ReadWrite	BOOL	1:BOOL 1_4		0	1				PollGroup1	1	<u></u>	
_EstopInput	DEFAULT	ReadWrite	BOOL	1:BOOL 1_5		0	1				PollGroup1	[TT]	m	
_CstopInput	DEFAULT	ReadWrite	BOOL	1:BOOL 1_6		0	1				PollGroup1	127	1	
_ESTOP_PB	DEFAULT	ReadWrite	BOOL	1:BOOL 1_7		0	1				PollGroup1			
_HomeSw	DEFAULT	ReadWrite	BOOL	1:BOOL 1_8		0	1				PollGroup1	17		
CENTE	DEFAULT	ReadWrite	BOOL	1:BOOL 1_9		0	1				PollGroup1	1 77	<u></u>	
_GENID														

Now that the tags have been added. First we want to verify communications by working with only one tag. I chose the _1_HMI_MachineStartPB. This application note assumes if this is not a bench test that the machine is in a state that toggling the value/state of this tag will not result in any action on the machine!!! The objective here is to test communications between the HMI and the G&L Controller. They user may choose a different Boolean tag to test if desired.

I added a button on the screen and with the button highlighted selected the Actions pull-down menu and configured for the tag value to be 1 on Mouse Down and 0 on Mouse Up.

General	Actions						
Select Acti	on		Set Analog _1_HMI_MachineStartPB 1	•	Set Analog _1_HMI_MachineStartPB 0		
	Mouse Leave	Γ.	Mouse Down	Fa.	Mouse Up	Es.	
			249.0	215.0 Button 426.0		650.0	

Next I saved the project.

Since I used the PC as the HMI, I selected Build and then Run from the Project pull-down menu.



The sample project has the following code in the ladder for Ethernet communications. The Slot number may vary depending on your hardware. Note the Port number 7728 was the default in KVB when we set the IP address under Controller->Settings->Stations.



Next I went to network 17 in the ladder to monitor the state of the Boolean tag.



On pressing down of the button the contact is closed.



On release the contact is opened.



🕄 Running in demo mode-

Button

Lastly I tested a non-Boolean and arbitrarily selected the Home Rate.

📇 Tags								
Tags Controllers Triggers	Poll Group	s Index Regi	sters					
Home								
Add	Column	s Visible ng [Exchange	☑ Others					
Tag			Controllers		Scaling			
Name 👻	Data T	Access	Data Type	Control	Offset	Gain	Read Ex	Write
_1_AS_1_JRATE1	DEFAULT	ReadWrite	UINT32	1:UDINT	0	1		
_1_AS_1_JRATE2	DEFAULT	ReadWrite	UINT32	1:UDINT	0	1		
_1_AS_1JRATE3	DEFAULT	ReadWrite	UINT32	1:UDINT	0	1		
_1_AS_1PLUS	DEFAULT	ReadWrite	BOOL	1:BOOL 1	0	1		
_1_AS_1HRATE ···	DEFAULT	ReadWrite	UINT32	1:UDINT	0	1		
_1_AS_1DIM	DEFAULT	ReadWrite	INT32	1:DINT 4	0	1		
_1_AS_1OPTN	DEFAULT	ReadWrite	UINT16	1:WORD	0	1		
_1_AS_1BKOFF	DEFAULT	ReadWrite	BOOL	1:BOOL 1	0	1		
1 AS 1 HOMF [Name] Like '%[_]1[_]AS[_	DFFAULT]1[_]%' •	ReadWrite	BOOI	1:ROOL 1	0	1		
AND THE ADDRESS OF A	(c) (c) (c)			1002				

With an Analog Numeric added to the screen I clicked on General to format it.

B. 23 47 • (* • • •		Properties	Noniniorgen visualization	00110C1 2:40 - 0_0110	i cipento rest	
Home Project System	Insert View	Dynamics General Action	ıs			
Integer Zero Fill Limit Characters to Number of Decimals 1	Prefix Suffix	_1_AS_1_HRATE • Select Security Groups • Default •	Auto Stretch Font Disable Operator Input Transparent	E <u>E</u> 3 B	On Input On Display Lower Limit 0 Upper Limit 1000	
Display Format	Prefix/Suffix	Tag / Security	Format	Text Alignment	Validation	
Project Explorer	Screen1 × Tags >	<	ſ		Sutton 401.0	
Contractions (4) Contraction			L	286.0	44.0	518.0

Here is a closer look at the setup:

Home P	roject System	Insert View	Dynamics General Action	15		
Integer - Limit Characters to	Zero Fill	Prefix Suffix	_1_AS_1_HRATE • Select Security Groups •	Auto Stretch Font Disable Operator Input		On Input On Display Lower Limit Unsee Limit 1000
Number of Decimals Display For	1 mat	Prefix/Suffix	Default * Tag / Security	Format	Text Alignment	Validation
Project Explorer		Screen1 × Tags	×			

I saved, built, and ran the project again and then monitored rung 26: Home 1. Note the RATE input tag AS[1].HRATE changed to the value of 555 as set by the data input field on the HMI screen.

