# Motion Control Products Application note Generic drive interface: Add-On Instructions for Studio 5000 <sup>™</sup> / RSLogix5000<sup>™</sup>

Ready to use PLC function blocks, combine with a pre-written Mint application for simple control of MicroFlex e150, MicroFlex e190 and MotiFlex e180 drives via Ethernet/IP



AN00222

Rev F (EN)

#### Introduction

This application note details how to import and configure the ABB Generic Drive Interface (GDI) Add-on Instructions (AOI) using RSLogix 5000<sup>™</sup> version 19 (or later). The same principles can be applied for users of Logix Designer running under Studio 5000 ® so if using this later version of the Rockwell software please assume Logix Designer wherever RSLogix5000 is mentioned. These AOI provide pre-written data structures and function blocks that integrate seamlessly with the Mint based GDI and allow suitable Allen Bradley PLCs to control ABB drives running Mint programs that support Ethernet/IP (MicroFlex e150/e190 and MotiFlex e180). Note that MicroFlex e190 and MotiFlex e180 drives must be provided with the Mint memory card (option code +N8020).

The instructions promote consistency in all projects and greatly simplify the development of Allen Bradley PLC motion control applications where simple point to point motion is required.

This document assumes that the reader has basic knowledge of Allen Bradley PLCs, RSLogix5000 or Studio 5000, Ethernet/IP configuration, Mint Workbench and the Mint GDI. It is recommended that the reader refers to application note AN00204 for details on the Mint GDI operation and configuration.

The AOI with this application note provide mechanisms for an Allen Bradley Ethernet/IP equipped PLC to:

- Issue a home command
- Issue a command to detect a physical axis end stop and use this as a datum position (firmware version 5863 onwards required if using e150 or e180 drives)
- Issue a relative move
- Issue an absolute move
- Issue an incremental relative move (and optionally stop a programmed distance past a "fast-capture" position)
- Issue an incremental absolute move (and optionally stop a programmed distance past a "fast-capture" position)
- Setup an offset target for an incremental move (i.e. position the axis relative to a captured fast interrupt)
- Jog the axis
- Set the axis position
- Issue a speed reference
- Issue a torque reference
- Enable/disable the axis
- Enable/disable hardware limits
- Reset axis errors
- Perform a controlled stop or crash stop on the axis
- Gear the axis to a secondary encoder input
- Set speed, acceleration times, deceleration times and jerk times for all motion

1



Control modulo or non-modulo axes

At the same time the PLC is able to monitor status information from the drive including:

- Enabled state
- Ready to be enabled state
- Idle state
- In Position state
- Motor brake state
- Homed state
- Forward limit state
- Reverse limit state
- Fault state
- Stop input state
- Indication of missing fast latch interrupt
- Phase search status
- Frror code
- Measured position
- Measured velocity
- Following error
- Axis mode of operation
- RMS current

This is all achieved via, what appears to the PLC as, input and output registers. Because we have used 32 bit data (DINT data tyoe) for the interface each value is mapped onto a single 32-bit NETINTEGER or NETFLOAT location in the drive. An optional watchdog mechanism is also included, allowing the drive to take action (crash stop and disable by default) in the event of communication loss.

### Configuring the Generic Drive Interface (GDI) Mint program

The pre-written GDI Mint program only requires only a small amount of customisation to suit the user's application. Please refer to application note AN00204 for details.

### Configuring Ethernet/IP on the Mint based drive

MicroFlex e150 and Mint-enabled MicroFlex e190/MotiFlex e180 drives are delivered "pre-configured" for operation of the GDI via Ethernet/IP. Netdata mappings for 10 input and 10 output words of data are already configured (the GDI only actually requires 9 input words and 7 output words but 10 of each are provided for ease of expansion by the user if required). This configuration can be seen by entering the "Configuration" screen in Mint Workbench when connected to the drive. Upload the existing configuration from the drive and select the 'Ethernet/IP' section...

dentification					
etwork	EtherNet	/IP			
B	This page allows	to configu	ure the cor	ntroller's Et	herNet/I
erial	+ -	+ 0	-	$\uparrow \downarrow$	10/32
rvices	Receive	Bytes	Object	Element	Туре
	Assembly 150	4	Net Data	Channel 0	UINT32
P.	Transmit Assembly 100	4	Net Data	Channel 1	UINT32
dbus Server		4	Net Data	Channel 2	UINT32
dbus TCP Client		4	Net Data	Channel 3	UINT32
erNet/IP		4	Net Data	Channel 4	UINT32
		4	Net Data	Channel 5	UINT32
ata Utilisation		4	Net Data	Channel 6	UINT32
		4	Net Data	Channel 7	UINT32
		4	Net Data	Channel 8	UINT32
		4	Net Data	Channel 9	UINT32

You will see that there are 10 mapped Netdata elements (0 to 9) for Assembly 150 (data received by the drive) and 10 mapped Netdata elements (100 to 109) for Assembly 100 (data transmitted by the drive). There is no need to change any of these mappings for standard operation of the GDI.



#### Adding the drive to the PLC Ethernet/IP configuration

This process may vary slightly according to PLC model, for this application note we used a Logix5561TM processor (1756-L61) with a 1756-ENET/B Ethernet/IP module. In RSLogix5000 right-click the Ethernet/IP module and select "New Module...". From the list of possible Ethernet devices select Generic Ethernet Module as shown below:

Туре	Description	
1788-EN2DN/A	1788 Ethernet to DeviceNet Linking Device	^
1788-ENBT/A	1788 10/100 Mbps Ethernet Bridge, Twisted-Pair Media	
1788-EWEB/A	1788 10/100 Mbps Ethernet Bridge w/Enhanced Web Services	
1794-AENT/A	1794 10/100 Mbps Ethernet Adapter, Twisted-Pair Media	
Drivelogix5730 Etherne	et 10/100 Mbps Ethernet Port on DriveLogix5730	
EtherNet/IP	SoftLogix5800 EtherNet/IP	
ETHERNET-MODULE	Generic Ethernet Module	
ETHERNET-PANELVII	EW Ethernet/IP Panelview	
PowerFlex 700 Vector-	21 PowerFlex 700 Vector Drive (208/240V) via 20-COMM-E	
PowerFlex 700 Vector-	4I PowerFlex 700 Vector Drive (400/480V) via 20-COMM-E	
PowerFlex 700 Vector-	6I PowerFlex 700 Vector Drive (600V) via 20-COMM-E	
PowerFlex 700-200V-E	PowerFlex 700 Drive (208/240V) via 20-COMM-E	-
PowerFlex 700-400V-E	PowerFlex 700 Drive (400/480V) via 20-COMM-E	
PowerFlex 700-600V-E	PowerFlex 700 Drive (600V) via 20-COMM-E	Y
Show		
Vendor: All	Other      Specialty I/O     Select Al	1
		_
🔽 Analog 🔽 Di	gital 🔽 Communication 🔽 Motion 🔽 Controller 🛛 Clear All	5

You will now be asked to enter some basic information about the drive...

General Conr	nection Module Info					
Type: Vendor: Parent:	ETHERNET-MODULE G Allen-Bradley E_IP_Module	eneric Ethernet Mo	dule			
Name:	e150 Axis0	Co	onnection Para	ameters		
- Description:	P130_Aniso			Assembly Instance:	Size:	
		1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 -	input:	100	10	🗐 (32-bit)
		*	O <u>u</u> tput:	150	10	🗧 (32-bit)
Comm Format	Data - DINT		Configuration:	1	0	(8-bit)
Address / H	ost Name			_		* (
IP Addre	ss: 192 . 168 . 10	0.110	Status Input:			
🔘 <u>H</u> ost Na	me:		Status Output:			

Give the drive a recognisable name. Set the input assembly instance to 100 with a size of 10 (i.e. to match the drive settings). Set the output assembly instance to 150 with a size of 10 also (again to match the drive settings). If you have modified the amount of mapped data on the drive (e.g. to add more PDO values) it is important that these sizes match the amount of mapped data exactly. Enter 1 for the configuration assembly instance and set the size of this to 0 (i.e. it is not used). Now enter the IP address for the drive (192.168.0.1 is the default IP address for the drive but we've used 192.168.100.110 in our example – the drive's IP address can be modified via the 'Network' screen within the Mint Workbench 'Configuration' section). Any address is possible providing it matches the drive's settings and the first three octets (i.e. 192.168.100) match the setting for the Ethernet/IP module in the PLC rack (it is assumed the user knows how to change the Ethernet/IP module IP address if needed – refer to your Rockwell documentation if unsure). We changed our drive's IP address to suit the PLC's default subnet setting as this was easiest.

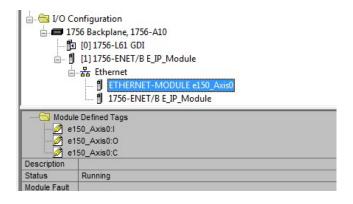


Now select the "Connection" tab and ensure the "Use Unicast Connection over Ethernet/IP" option is deselected as shown below if using drive firmware prior to 5853 (if the drive is running later firmware you can select the Unicast option if necessary). You can adjust the RPI interval if necessary, but we found that 10ms works well for most applications.

General Connection Mod	lule Info			
Requested Packet Interval	(RPI): 10.0 🖨 ms	: (1.0 - 3200.0 ms)		
🔲 Inhibit Module				
Major Fault On Controller	r If Connection Fails While	e in Run Mode		
Use Unicast Connection	) over EtherNet/IP			
Module Fault				
	ОК	Cancel	Apply	Help

Repeat this process for additional drives as required (remember to give each a unique name and IP address). For this application note we have just added a single MicroFlex e150 drive.

At this point you may want to download the PLC project and go "Online" to check communication is working correctly. If it is you should see something like this in your RSLogix5000 project tree...



The module status should indicate "Running" with no faults. If you cannot see this status (e.g. it shows "I/O Faulted") then check your Ethernet/IP module and Generic Ethernet Module settings.

#### Importing the User Defined Data Types and Add-On Instructions

Open the "Data Types" folder in the RSLogix project and right click the "User-Defined" folder...





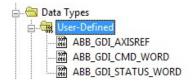
Select "Import Data Type..." and then navigate to and select the "ABB\_GDI\_DATATYPES.L5X" file that was included with this application note as shown below...

Look in:	🥼 Projects	8	· 🞯 🦸 📂 🗔 •	
(Au	Name	*	Date modified	Туре
2	🍌 Samples		21/09/2012 20:51	File fol
Recent Places	ABB_GDI_A	(IS_COMMS v1_0.L5X	20/02/2014 07:36	L5X Fil
-	ABB_GDI_CI	EAR v1_0.L5X	20/02/2014 07:36	L5X Fil
	ABB_GDI_DA	ATATYPES.L5X	19/02/2014 19:24	L5X Fil
Desktop ABB_GDI_F		DLLOW v1_0.L5X	20/02/2014 07:36	L5X Fil
ALC: NO	ABB_GDI_H	OME v1_0.L5X	20/02/2014 07:37	L5X Fil
(Income)	ABB_GDI_IN	CA v1_0.L5X	20/02/2014 07:37	L5X Fil
Libraries	ABB_GDI_IN	CR v1_0.L5X	20/02/2014 07:38	L5X Fil
	ABB_GDI_JC	G v1_0.L5X	20/02/2014 07:38	L5X Fil
	ABB_GDI_M	OVEABSOLUTE v1_0.L5X	20/02/2014 07:38	L5X Fil
Computer	ABB_GDI_M	OVERELATIVE v1_0.L5X	20/02/2014 07:39	L5X Fil
-	ABB_GDI_PO	DWER v1_0.L5X	20/02/2014 07:39	L5X Fil
	ABB_GDI_RE	SET v1_0.L5X	20/02/2014 07:39	L5X Fil
Network	٠			,
	File <u>n</u> ame:	ABB_GDI_DATATYPES.L5X	•	Import
	Files of type:	RSLogix 5000 XML Files (* L5X)	*	Cancel
	Files <u>c</u> ontaining:	Data Type	•	Help
	Int <u>o</u> :	Data Types		

Click on the Import... button. If the GDI data types do not already exist in the project you will be asked to create these as shown below:

Import Configuration				×
Find:	- <u>A</u> A AA	Eind/Replace		
Import Content:	Configure Data	Turn Danadia		
ABB_GDI_AXISREF	Import Name:	ABB_GDI_AXISREF		
References	Operation:	Create	- 0	
- Errors/Warnings		References will be imported as configured in the References folder		
	Final <u>N</u> ame:	ABB_GDI_AXISREF	▼ Properties	
	Description:		*	
			Ŧ	
			OK	Cancel Help
Ready			<u> </u>	

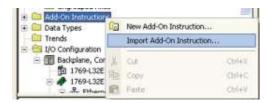
Click on OK. RSLogix will import all the user-defined data types required for operation of the GDI. At the end of the import your User-Defined folder should look like this...



The project now contains data types for the GDI axis (ABB\_GDI\_AXISREF) as well as data types for the command and status words used by this axis.

Now right click the "Add On Instructions" folder and select "Import Add-On Instruction..." as shown below...





Now navigate to and select an add-on instruction from those supplied with this application note. The ABB\_GDI\_AXIS\_COMMS instruction is essential as this handles the transfer of data from the PLC to the drive. For the remaining motion functions the user may wish to only import those required for a particular application but for this example we selected every single function. There is no way to select multiple functions at the same time so the import process must be repeated for each function. After clicking "Import..." click on the OK button on the next dialog to create the function...

4	Find: Find Within: Final Name	- A A	Eind/Replace		
port C	Content:				
-6	Add-On Instructions		n Instruction Properties		
4	ABB_GDI_AXIS_COMI		ABB_GDI_AXIS_COMMS		
	- B Routines	Operation:	Create -	10	
	References		References will be imported as configured in the References folders		
- 83	Errors/Warnings*	Final <u>N</u> ame:	ABB_GDI_AXIS_COMMS	Properties	
		Description:			
		Revision:	v1.0		
		Revision Note:			
		Vendor:			
	m	•			
				OK Can	cel Help

You may see a warning after importing the function. This can be ignored, it occurs because the functions themselves refer to the ABB\_GDI\_AXISREF data type which wasn't included in the function import. This is because we imported this earlier/separately – this has been done so the data type can be modified independently from the motion functions if required in the future.

After importing all the motion functions your Add On Instructions folder should look something like this (depending on which motion function blocks you decided to import)...

Add-On Instructions
ABB_GDI_AXIS_COMMS
ABB_GDI_CLEAR
H ABB_GDI_FOLLOW
HABB_GDI_HOME
H ABB_GDI_INCA
ABB_GDI_INCR
ABB_GDI_JOG
ABB_GDI_MOVEABSOLUTE
ABB_GDI_MOVERELATIVE
ABB_GDI_POWER
🖶 🛅 ABB_GDI_RESET
ABB_GDI_SETPOSITION
ABB_GDI_SPEEDREF
ABB_GDI_STOP
ABB GDI TORQUEREF

We are now ready to start using these instructions to create some motion in our PLC application. The first step is to create a tag in our project for each axis. For this application note we only have a single MicroFlex e150. We will create this tag in our "Controller Tags" folder in RSLogix5000 (so it has global scope for the project code).



Right click the Controller Tags icon and select "New Tag...". A dialog appears allowing you to name this tag and, most importantly, define a data type for it. We need to select our ABB\_GDI\_AXISREF as the data type as shown below...

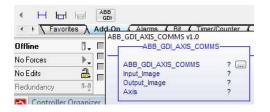
lata Types:	
ABB_GDI_AXISREF	OK
ABB_GDI_AXIS_COMMS	Cancel
ABB_GDI_AXISREF	
ABB_GDI_CMD_WORD ABB_GDI_STATUS_WORD	Help
LARM	
LARM_ANALOG	
LARM_DIGITAL	
Array Dimensions	
Dim 2 Dim 1 Dim 0	
La Land C Land C Land	

We can either create unique tags for each axis or we can create an array of axes using the Dim 0 up/down control (where each element of the array is then of our ABB\_GDI\_AXISREF data type). As we only have a single axis we'll just create a single tag.

After clicking OK and entering some other information about our axis tag we ended up with this dialog...

<u>√</u> ame:	Axis0		OK
<u>D</u> escription:	Indexing Conveyor Axis	*	Cancel Help
		*	
Usage:	<pre>cnormal&gt;</pre>	*	
<u>o</u> saye.	Chounder		
<u>o</u> sage. Typ <u>e</u> :	Base	ction	
		ction]	
— - Тур <u>е</u> :		ction	
Typ <u>e</u> : Alias <u>F</u> or:	Base	-	
Typ <u>e</u> : Alias <u>F</u> or: Data <u>T</u> ype:	Base  Connel	-	

Click OK to create this new tag. The name we give this tag is how we will reference the axis/drive from now on. We now need to include an instance of the ABB\_GDI\_AXIS\_COMMS function for each axis in our application.... For this application note we will just use the Main Routine for our program logic. Select the first rung and from the instruction toolbox select the ABB\_GDI function relating to COMMS (as you hover over each instruction button an image of the function block appears as shown below)

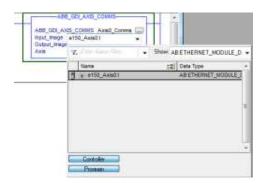


Once this block has been added to the rung you need to create a tag for the instance of this function block (tags must be created for every function block instance used in the program). Click on the ? next to ABB\_GDI\_AXIS\_COMMS and enter a name (we called ours Axis0\_Comms to indicate it is the communication function for Axis 0). After entering the name, right click it and select "New Axis0\_Comms" (or whatever you've called your tag). A dialog will appear allowing you to define this new tag...



Mame:	Anno_Comm		OK.
Qescription			Cancel
			Help
∐sage:	[osenab		
	Base	ectan	
Type:	Sale Lonn	ounipr.	
Typ <u>e</u> Nias <u>F</u> or		+	
	ABB_GDI_AVIS_COMMS		
Mias <u>F</u> or		+	
Nias <u>F</u> or Data <u>T</u> ype:	ABB_GDI_AVIS_COMMS	+	

Click OK to accept the default tag settings. We now need to link the communication block's input and output images to the input and output assemblies for our Ethernet/IP drive. Double-click on the ? next to Input Image and then click on the drop down arrow. RSLogix will show a list of possible input assemblies from the project (as we have only added a single drive to the Ethernet network we can only select from one possible item as shown below)...



Repeat this process for the Output Image. Finally we need to link this function to our axis tag, so enter Axis0 (or whatever you called your tag of type ABB\_GDI\_AXISREF earlier) as the value for the Axis parameter. If you have followed these instructions correctly your first program rung should look something like this...



We can now download this to the PLC and test that we have basic communications operating correctly. Double-click the Controller Tags icon in RSLogix5000 to open the Monitor Tags window. Expand the Axis0 tag and you will see the outgoing and incoming data...



cope: 🛅 test 🛛 👻 Show	All Tags					<ul> <li>▼, 4</li> </ul>
Name <u>28</u> A	Value 🗲	Force Mask 🛛 🗲	Style	Data Type	Description	Constan
- Axis0	{}	{}		ABB_GDI_AXISR	Indexing Convey	Г
+ Axis0.CommandWord	{}	{}		ABB_GDI_CMD	Indexing Convey	
+ Axis0.CommandType	0		Decimal	DINT	Indexing Convey	
Axis0.Value	0.0		Float	REAL	Indexing Convey	
Axis0.Speed	0.0		Float	REAL	Indexing Convey	
Axis0.Accel	0.0		Float	REAL	Indexing Convey	
-Axis0.Decel	0.0		Float	REAL	Indexing Convey	
Axis0.AcceUerk	0.0		Float	REAL	Indexing Convey	
-Axis0.Decel/erk	0.0		Float	REAL	Indexing Convey	
Axis0.LatchOffset	0.0		Float	REAL	Indexing Convey	
+ Axis0.StatusWord	{}	{}		ABB_GDI_STAT	Indexing Convey	
Axis0.Pos	-466.8025		Float	REAL	Indexing Convey	
Axis0.Vel	0.0		Float	REAL	Indexing Convey	
-Axis0.FolError	0.0		Float	REAL	Indexing Convey	
+ Axis0.AxisMode	0		Decimal	DINT	Indexing Convey	
Axis0.CurrentMeas	0.024382766		Float	REAL	Indexing Convey	
+ Axis0.ErrorCode	10000		Decimal	DINT	Indexing Convey	
+ e150_Axis0:C	{}	{}		AB:ETHERNET		Г
+_ e150_Axis0:I	{}	{}		AB:ETHERNET		Г
+ e150_Axis0:0	{}	{}		AB:ETHERNET		Г

If the Mint GDI application is running on the drive then the drive's position, measured velocity, measured current etc... will all be updating according to the drive's actual values – this will confirm that everything is working correctly and you are ready to continue to program your motion application on the PLC.

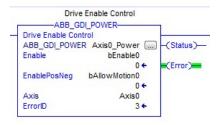


### **AOI GDI Function Blocks**

The following sections detail the use of the AOI GDI function blocks:

### ABB\_GDI\_POWER

This function block is used to enable / disable an axis. The enable input enables the power stage in the drive and not the function block itself.



	Туре	Description
VAR_IN_OUT		
Axis	ABB_GDI_AXISREF	Reference to the axis structure
VAR_INPUT		
Enable	BOOL	Whilst true the PLC will request the axis to be enabled
EnablePosNeg	BOOL	Whist true motion in both directions is permitted. If false motion is prevented (or a stop is performed if motion is already in progress)
VAR_OUTPUT		
Status	BOOL	Indicates whether the axis is enabled (1) or not (0)
Error	BOOL	Set to true if the axis is in error
ErrorID	DINT	Indicates the Mint error code reported by the axis

### ABB\_GDI\_HOME

ABB_GDI	_HOME-	1
ABB_GDI_HOME Execute	Axis0_Home bHome0	-(Done
Decilies	0 +	-(Busy
Position	0	-(Error)
HomeSpeed	10	2.0
HomeAccel	100	
HomeDecel	200	
HomeAccelJerk	0	
HomeDecelJerk	0	
HomeBackOff	10	
Axis	Axis0	
ErrorID	0 ←	

This function block is used to datum an axis. The details of the datum sequence are dependent on the Home type set in the Mint GDI program. The Position input is used to set the axis position at the end of a successful datum sequence.

	Туре	Description	
VAR_IN_OUT			
Axis	ABB_GDI_AXISREF	Reference to the axis structure	
VAR_INPUT			
Execute	BOOL	Start the datum sequence on a rising edge	
Position	REAL	Absolute position to be set at the end of a successful datum	
		sequence	
HomeSpeed	REAL	Homing speed in user units/sec	
HomeAccel	REAL	Homing accel rate in user units/sec <sup>2</sup>	
HomeDecel	REAL	Homing decel rate in user units/sec <sup>2</sup>	
HomeAccelJerk	REAL	Homing accel jerk rate in user units/sec <sup>3</sup> (set to 0 for	
		trapezoidal motion)	
HomeDecelJerk	REAL	Homing decel jerk rate in user units/sec <sup>3</sup> (set to 0 for	
		trapezoidal motion)	
HomeBackOff	REAL	Ratio of Home speed to backoff speed	
VAR_OUTPUT			
Done	BOOL	Indicates that the axis has homed successfully. If the	
		Execute input is removed during homing and the axis	
		completes the home sequence the Done output will be set	
		for one PLC scan. If the Execute input remains 1 then the	
		Done output will also remain set (providing the home was	
		successful)	
Busy	BOOL	Set true whilst the homing sequence is in progress	
Error	BOOL	Set true if the axis is in error	
ErrorID	DINT	Indicates the Mint error code reported by the axis	





# ABB\_GDI\_FIND\_END\_STOP

A00_00	DI_HOME-	A
ABB_GDI_HOME	Axis0_Home	-(Done)-
Execute	bHome0	
	0 ←	-(Busy)-
Position	0	And Con-
		-(Error)-
HomeSpeed	10	
HomeAccel	100	
HomeDecel	200	
HomeAccelJerk	0	
HomeDecelJerk	0	
HomeBackOff	10	
Axis	Axis0	
ErrorID	0 ←	

This function block is used as an alternative way to datum an axis in the absence of a home sensor. The axis will run at a commanded velocity with a programmed torque limit until this torque limit is reached and the speed of the axis is less than the programmed idle velocity. The Position input is used to set the axis position at the end of a successful datum sequence.

	Туре	Description
VAR_IN_OUT		
Axis	ABB_GDI_AXISREF	Reference to the axis structure
VAR_INPUT		
Execute	BOOL	Start the datum sequence on a rising edge
Position	REAL	Absolute position to be set at the end of a successful datum
		sequence
FindSpeed	REAL	Speed in user units/sec (the sign of this value determines the
		seek direction)
FindAccel	REAL	Accel rate in user units/sec <sup>2</sup>
FindDecel	REAL	Decel rate in user units/sec <sup>2</sup>
FindAccelJerk	ccelJerk REAL Accel jerk rate in user units/sec <sup>3</sup> (set to 0 for trapezoidal	
		motion)
FindDecelJerk	REAL	Decel jerk rate in user units/sec <sup>3</sup> (set to 0 for trapezoidal
		motion)
TorqueLimit	REAL	Torque limit to apply during sequence (% of drive rated
		current)
VAR_OUTPUT		
Done	BOOL	Indicates that the axis has found the end stop successfully. If
		the Execute input is removed during the sequence and the
		axis finds the end stop the Done output will be set for one
		PLC scan. If the Execute input remains 1 then the Done
		output will also remain set (providing the sequence was
		successful)

# ABB\_GDI\_MOVERELATIVE

This function block is used to command a controlled motion of a specified distance relative to the start position.

ABB_GD	DI_MOVERELATIVE	1
ABB_GDI_MOVER	RELATIVE Axis0_MoveR	(Done)-
Execute	bMoveR0	
	0 ←	-(Busy)-
Distance	fMoveDistance0	
	0.0 ←	-(Error)-
Velocity	fMoveVel0	100 A 100
	0.0 ←	
Accel	fMoveAccel0	
	0.0 ←	
Decel	fMoveDecel0	
	0.0 ←	
AccelJerk	fMoveAccelJerk0	
	0.0 ←	
DecelJerk	fMoveDecelJerk0	
	0.0 ←	
Axis	Axis0	
ErrorID	0 ←	

	Туре	Description	
VAR_IN_OUT	•		
Axis	ABB_GDI_AXISREF	Reference to the axis structure	
VAR_INPUT		·	
Execute	BOOL	Start the motion on a rising edge	
Distance	REAL	Relative distance for the move (in user units)	
Velocity	REAL	Maximum speed (not necessarily reached) in user units/sec	
Accel	REAL	Accel rate in user units/sec <sup>2</sup>	
Decel	REAL	Decel rate in user units/sec <sup>2</sup>	
AccelJerk	REAL	Accel jerk rate in user units/sec <sup>3</sup> (0 for trapezoidal motion)	
DecelJerk	REAL	Decel jerk rate in user units/sec <sup>3</sup> (0 for trapezoidal motion)	
VAR_OUTPUT		1	
Done	BOOL	Indicates that the axis has reached the target position successfully. If the Execute input is removed during motion and the relative move completes the Done output will be set 1 for one PLC scan. If the Execute input remains True then the Done output will also remain set (providing the target position was successfully achieved)	
Busy	BOOL	Set True whilst the relative move is in progress	
Error	BOOL	Set True if the axis is in error	
ErrorID	DINT	Indicates the Mint error code reported by the axis	



# ABB\_GDI\_MOVEABSOLUTE

This function block is used to command a controlled motion to a specified absolute position. This function can be used with Modulo axes (in which case the shortest route to the specified position will be taken).

ARR ODI MOMENT	BSOLUTE Axis0 MoveA	(Done)-
Execute	bMoveA0	C Dolle -
Execute	0.	-(Busy)-
Position	fMoveAPos	(Dusy)
1 oonion	0.0 +	-(Error)-
Velocity	fMoveVel0	
	0.0 ←	
Accel	fMoveAccel0	
	0.0 ←	
Decel	fMoveDecel0	
	0.0 ←	
AccelJerk	fMoveAccelJerk0	
	0.0 ←	
DecelJerk	fMoveDecelJerk0	
	0.0 ←	
ModuloAxis	bModulo0	
	0 ←	
Axis	Axis0	
ErrorID	0 ←	

	Туре	Description	
VAR_IN_OUT			
Axis	ABB_GDI_AXISREF	Reference to the axis structure	
VAR_INPUT			
Execute	BOOL	Start the motion on a rising edge	
Position	REAL	Target position for the move (in user units)	
Velocity	REAL	Maximum speed (not necessarily reached) in user units/sec	
Accel	REAL	Accel rate in user units/sec <sup>2</sup>	
Decel	REAL	Decel rate in user units/sec <sup>2</sup>	
AccelJerk	REAL	Accel jerk rate in user units/sec <sup>3</sup> (0 for trapezoidal motion)	
DecelJerk	REAL	Decel jerk rate in user units/sec <sup>3</sup> (0 for trapezoidal motion)	
ModuloAxis	BOOL	Defines whether the axis is a modulo axis (i.e. using an ENCODERWRAP to define travel within one cycle). Absolute moves when using modulo axes are always implemented via the shortest path (e.g. an absolute move to 20 degrees from 350 degrees on a 0-360 degree modulo axis will result in forward travel of 30 degrees)	
VAR_OUTPUT			
Done	BOOL	Indicates that the axis has reached the target position successfully. If the Execute input is removed during motion and the absolute move completes the Done output will be set True for one PLC scan. If the Execute input remains True then the Done output will also remain set (providing the target position was successfully achieved)	



### ABB\_GDI\_INCR

This function block is used to command a controlled motion of a specified distance relative to the target position at the time of the execution. The target position resulting from a call to this function block can be modified whilst motion is still in progress by any of the following methods:

- a. By issuing another ABB\_GDI\_INCR or ABB\_GDI\_INCA function (providing input parameter BufferMode is True)
- b. By setting the input parameter Latchmode to True and specifying a value for the input parameter LatchOffset. Mint code on the drive will then automatically modify the axis target position such that it stops the LatchOffset distance past the axis position captured by the defined fast interrupt. A bit within the Axis status word (btLatchMissed) is available to indicate failure to detect this fast interrupt (this condition may then be used to alert the operator to a system failure for example). Using Latchmode and LatchOffset allows simple implementation of indexing conveyor applications.

ABB_GDI_INCR		Туре	Description
BB_GDLINCR Axis0_IncR(Done)	VAR_IN_OUT		
xecute blncR0	Axis	ABB_GDI_AXISREF	Reference to the axis structure
0 + (Busy) Distance flncrDistance	VAR_INPUT	, – –	1
0.0 ← (Error)		BOOL	Start the motion on a rising edge
/elocity fMoveVel0	Distance	REAL	Relative distance for the move (in user units)
0.0 Accel fMoveAccel0	Velocity	REAL	Maximum speed (not necessarily reached) in user
0.0 €	5		units/sec
ecel fMoveDecel0	Accel	REAL	Accel rate in user units/sec <sup>2</sup>
0.0 + ccellerk fMoveAccellerk0	Decel	REAL	Decel rate in user units/sec <sup>2</sup>
0.0 +	AccelJerk	REAL	Accel jerk rate in user units/sec <sup>3</sup> (0 for trapezoidal
ecelJerk fMoveDecelJerk0			motion)
0.0 +	DecelJerk	REAL	Decel jerk rate in user units/sec <sup>3</sup> (0 for trapezoidal
atchMode bLatchMode			motion)
atchOffset fLatchOffset	LatchMode	BOOL	Sets whether the axis should utilise the configured
0.0 ←			fast latch interrupt and set a new target position
ufferMode bBufferMode0 0 ←			'LatchOffset' user units past the captured position
xis Axis0	LatchOffset	REAL	Defines the distance past the captured fast position
rrorID 0 <del>¢</del>			(in user units) the target for GDI_INCR should be
			modified by (when input parameter LatchMode is s
			True)
	BufferMode	BOOL	Defines whether the function block should set the
			Done output and complete as soon as the move ha
			been loaded. Setting BufferMode True allows the
			application to trigger further incremental moves
			whilst existing moves are in progress
	VAR_OUTPUT	· ·	
	Done	BOOL	When BufferMode is set False this indicates that the
			axis has reached the target position successfully. I
			the Execute input is removed during motion and th
			relative move completes the Done output will be se
			True for one PLC scan. If the Execute input remain
			True then the Done output will also remain set
			(providing the target position was successfully
			achieved). When BufferMode is set True the Done
			output is set for one PLC scan to indicate successf
			loading of the move
	Busy	BOOL	Set True whilst the function block is in progress
	Error	BOOL	Set True if the axis is in error
	ErrorID	DINT	Indicates the Mint error code reported by the axis

ABB\_GDI\_INCR is also useful if the application needs to modify SPEED/ACCEL/DECEL of a relative move already in progress. Moves loaded using ABB\_GDI\_MOVERELATIVE are profiled using the SPEED/ACCEL/DECEL loaded at the time and these cannot be changed once the move has started. By using ABB\_GDI\_INCR with the input parameter BufferMode set True then it is possible to modify the profile parameters by loading another ABB\_GDI\_INCR (with new SPEED/ACCEL/DECEL) with input parameter Distance set to zero.



### ABB\_GDI\_INCA

This function block is used to command a controlled motion to a specified absolute position. This function differs from ABB\_GDI\_MOVEABSOLUTE in that the target position can be modified whilst motion is in progress by any of the following methods:

- a. By issuing another ABB\_GDI\_INCR or ABB\_GDI\_INCA function (providing input parameter BufferMode is True)
- b. By setting the input parameter Latchmode to True and specifying a value for the input parameter LatchOffset. Mint code on the drive will then automatically modify the axis target position such that it stops the LatchOffset distance past the axis position captured by the defined fast interrupt. A bit within the Axis status word (btLatchMissed) is available to indicate failure to detect this fast interrupt (the example programs show how missing 3 latches in a row can be detected this condition may then be used to alert the operator to a system failure for example).

ABB_GDI_INCA		Туре	Description
Absolute incremental move ABB_GDI_INCA Axis0_IncA	VAR_IN_OUT		
Execute blncA0	Axis	ABB_GDI_AXISREF	Reference to the axis structure
0 ← -(Busy) Position flncAPos	VAR_INPUT		1
0.0 + -(Error)-	Execute	BOOL	Start the motion on a rising edge
Velocity fMoveVel0	Position	REAL	Absolute position target for the move (in user units)
0.0 ← Accel fMoveAccel0	Velocity	REAL	Maximum speed (not necessarily reached) in user
0.0 ←			units/sec
Decel fMoveDecel0 0.0 ←	Accel	REAL	Accel rate in user units/sec <sup>2</sup>
AccelJerk fMoveAccelJerk0	Decel	REAL	Decel rate in user units/sec <sup>2</sup>
0.0 Decellerk fMoveDecellerk0	AccelJerk	REAL	Accel jerk rate in user units/sec <sup>3</sup> (0 for trapezoidal
			motion)
LatchMode bLatchMode	DecelJerk	REAL	Decel jerk rate in user units/sec <sup>3</sup> (0 for trapezoidal
0 ← LatchOffset fLatchOffset			motion)
0.0 ←	LatchMode	BOOL	Sets whether the axis should utilise the configured fast
ModuloAxis bModulo0 0 ←			latch interrupt and set a new target position
BufferMode bBufferMode0			'LatchOffset' user units past the captured position
0 ← Axis Axis0	ModuloAxis	BOOL	Defines whether the axis is a modulo axis (i.e. using a
Axis Axis0 ErrorID 0 ←			ENCODERWRAP to define travel within one cycle).
			Absolute moves when using modulo axes are always
			implemented via the shortest path (e.g. an absolute
			move to 20 degrees from 350 degrees on a 0-360
			degree modulo axis will result in forward travel of 30
			degrees)
	LatchOffset	REAL	Defines the distance past the captured fast position (in
			user units) the target for ABB_GDI_INCA should be
			modified by (when input parameter LatchMode is set
			True)
	BufferMode	BOOL	Defines whether the function block should set the
			Done output and complete as soon as the move has
			been loaded. Setting BufferMode True allows the
			application to trigger further incremental moves whilst
			existing moves are in progress
	VAR OUTPUT		5 1 5
	Done	BOOL	When BufferMode is set False this indicates that the
			axis has reached the target position successfully. If the
			Execute input is removed during motion and the
			relative move completes the Done output will be set
			True for one PLC scan. If the Execute input remains
			True then the Done output will also remain set
			(providing the target position was successfully
			achieved). When BufferMode is set True the Done
			output is set for one PLC scan to indicate successful
			loading of the move
	Busy	BOOL	Set True whilst the function block is in progress
	Error	BOOL	Set True whilst the function block is in progress
	ErrorID	DINT	Indicates the Mint error code reported by the axis
	EIIUID		mulcales the Mint endi code reported by the axis

ABB\_GDI\_INCA is also useful if the application needs to modify SPEED/ACCEL/DECEL of an absolute move already in progress. Moves loaded using ABB\_GDI\_MOVEABSOLUTE are profiled using the SPEED/ACCEL/DECEL loaded at the time and these cannot be changed once the move has started. By using ABB\_GDI\_INCA with the input parameter BufferMode set True then it is possible to modify the profile parameters by first loading a ABB\_GDI\_INCA move and then loading a ABB\_GDI\_INCR (with new SPEED/ACCEL/DECEL) with input parameter Distance set to zero.



### ABB\_GDI\_JOG

This function block is used to command a constant speed move on the axis (using the position loop controller in the drive). Motion is performed as long as the Execute input remains True.

Jog (positio	n control)	8 30 40
ABB_GDI_J	OG Axis0_Jog	(Done)
Execute	bJog0	
	0 ←	-(Busy)
JogSpeed	fJogSpeed0	
	0.0 +	(Error)
Accel	fJogAccel0	
	0.0 +	
Decel	fJogDecel0	
	0.0 +	
AccelJerk	fJogAccelJerk0	
	0.0 +	
DecelJerk	fJogDecelJerk0	
	0.0 +	
Axis	Axis0	
ErrorID	0 +	

	Туре	Description		
VAR_IN_OUT				
Axis	ABB_GDI_AXISREF	Reference to the axis structure		
VAR_INPUT				
Execute	BOOL	Start the motion on a rising edge and maintain motion		
		as long as the input remains True. Motion ramps to		
		zero speed at the configured Decel rate when Execute		
		becomes False		
JogSpeed	REAL	Value for the speed the axis will reach in user		
		units/sec		
Accel	REAL	Accel rate in user units/sec <sup>2</sup>		
Decel	REAL	Decel rate in user units/sec <sup>2</sup>		
AccelJerk	REAL	Accel jerk rate in user units/sec <sup>3</sup> (0 for trapezoidal		
		motion)		
DecelJerk	REAL	Decel jerk rate in user units/sec <sup>3</sup> (0 for trapezoidal		
		motion)		
VAR_OUTPUT				
Done	BOOL	Set True as soon as the Jog command has been		
		successfully issued and remains set until Execute		
		becomes False or an axis error occurs		
Busy	BOOL	Set True whilst the function block is in progress		

# ABB\_GDI\_SETPOSITION

This function block is used to set the axis position (encoder and position values on the drive) to a programmed value. The axis must be idle when this function is called, otherwise the axis will return an "action not possible - motion in progress" error (Error code 10). If the axis is using an absolute encoder this will set/teach a new absolute position (GDI Mint program v2.17 onwards).

ABB_GDI_SETF Modify axis position	POSITION-	<u> </u>
ABB_GDI_SETPOSITION	Axis0_SetPos	-(Done)-
Execute	bSetPos0	
	0 ←	-(Busy)-
Position	fPosition	
	0.0 +	-(Error)-
Axis	Axis0	
ErrorID	0 ←	

	Туре	Description
VAR_IN_OUT		
Axis	ABB_GDI_AXISREF	Reference to the axis structure
VAR_INPUT		
Execute	BOOL	Set the new position on a rising edge
Position	REAL	Value for the axis position to be set (in user units)
VAR_OUTPUT		
Done	BOOL	Set True as soon as the command has been issued (regardless of whether it was successful or not – use the Error output to determine whether the command was successful). Remains True until the Execute input is removed. If the Execute input is removed before the Done bit is set then the Done bit will be set for a single PLC cycle.
Busy	BOOL	Set True whilst the function block is in progress (cleared once the Done bit is set)
Error	BOOL	Set True if the axis is in error
ErrorID	DINT	Indicates the Mint error code reported by the axis



# ABB\_GDI\_STOP

This function block is used to perform a controlled stop on the axis at the programmed deceleration rate.

Controlled s	stop	-
ABB_GDI_S	STOP Axis0_Stop	) -(Done)
Execute	bStop0	
2000 m	0 ←	-(Busy)-
Decel	fStopDecel0	
	0.0 +	(Error)-
DecelJerk	fStopDecelJerk0	1.
	0.0 +	
Axis	Axis0	
ErrorID	0 ←	

	Туре	Description
VAR_IN_OUT		1
Axis	ABB_GDI_AXISREF	Reference to the axis structure
VAR_INPUT		
Execute	BOOL	Start the controlled stop on a rising edge
Decel	REAL	Decel rate in user units/sec <sup>2</sup>
DecelJerk	REAL	Decel jerk rate in user units/sec <sup>3</sup> (0 for trapezoidal motion)
VAR_OUTPUT		
Done	BOOL	Set True when the axis becomes idle after completing the controlled stop or if an error occurs when the stop command is issued. Remains True until the Execute input is removed. If the Execute input is removed before the Done bit is set then the Done bit will be set for a single PLC cycle.
Busy	BOOL	Set True whilst the stop is in progress – cleared once the Done bit is set
Error	BOOL	Set True if the axis is in error
ErrorID	DINT	Indicates the Mint error code reported by the axis

# ABB\_GDI\_CLEAR

This function block is used to crash stop the axis and interrupt any motion that is in progress. The axis will remain enabled (providing ABB\_GDI\_POWER is requesting the enabled state and the axis is not in error).

4	ABB_GDI_ Cancel loaded mot		
	ABB_GDI_CLEAR Execute		(Done) (Busy)
		0 ←	-(Error)-
	Axis	Axis0	1
	ErrorID	0 ←	

	Туре	Description
VAR_IN_OUT	•	
Axis	ABB_GDI_AXISREF	Reference to the axis structure
VAR_INPUT		
Execute	BOOL	Start the crash stop on a rising edge
VAR_OUTPUT		
Done	BOOL	Set True when the axis becomes idle after completing the crash stop or if an error occurs when the crash stop command is issued. Remains True until the Execute input is removed. If the Execute input is removed before the Done bit is set then the Done bit will be set for a single PLC cycle.
Busy	BOOL	Set True whilst the stop is in progress – cleared once the Done bit is set
Error	BOOL	Set True if the axis is in error
ErrorID	DINT	Indicates the Mint error code reported by the axis



### ABB\_GDI\_RESET

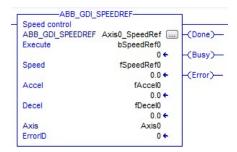
This function block is used to reset any axis error that is present.

1	ABB_GD	_RESET	-
_	Reset error condit	1	
	ABB_GDI_RESET	Axis0_Reset	Done)
	Execute	bReset0	(Busy)-
		0 ←	-(Error)-
	Axis	Axis0	
	ErrorID	0 +	

	Туре	Description
VAR_IN_OUT	·	
Axis	ABB_GDI_AXISREF	Reference to the axis structure
VAR_INPUT	·	
Execute	BOOL	Start the fault reset on a rising edge
VAR_OUTPUT		
Done	BOOL	Set True when the axis no longer has an error present. Remains True until the Execute input is removed. If the Execute input is removed before the Done bit is set then the Done bit will be set for a single PLC cycle. The Done bit will not be set if the error could not be cleared (use the Busy output to detect when the fault reset has been attempted)
Busy	BOOL	Set True whilst the function block is attempting to clear any axis error
Error	BOOL	Set True if the axis is in error
ErrorID	DINT	Indicates the Mint error code reported by the axis

### ABB\_GDI\_SPEEDREF

This function block is used to command a speed/velocity reference on the axis. In this mode of operation the position loop is not used on the drive (so no following error is recorded or acted upon). The axis will remain in Speed control mode (as indicated by the Statusword bits for Controlmode) until motion of another control mode type is issued (e.g. a position controlled move). To switch from zero speed operation (in speed control mode) to holding position (in position control mode) an ABB GDI MOVERELATIVE could be issued, for example, with a relative move distance of zero user units.



	Туре	Description	
VAR_IN_OUT			
Axis	ABB_GDI_AXISREF	Reference to the axis structure	
VAR_INPUT			
Execute	BOOL	Start the axis on a rising edge and maintain	
		motion as long as the input remains True.	
		Motion ramps to zero speed at the configured	
		Decel rate when Execute becomes False	
Speed	REAL	Value for the speed the axis will reach in user	
		units/sec. Can be modified whilst Execute is	
		True to change the axis speed	
Accel	REAL Accel rate in user units/sec <sup>2</sup>		
Decel	REAL	Decel rate in user units/sec <sup>2</sup>	
VAR_OUTPUT			
Done	BOOL	Set True as soon as the speed reference has	
		been issued (regardless of whether it was	
		successful or not). The Done output remains set	
		until Execute becomes False	
Busy	BOOL	Set True whilst the function block is in progress	
		(i.e. whilst Execute is True)	
Error	BOOL	Set True if the axis is in error	
ErrorID	DINT	Indicates the Mint error code reported by the	
		axis	





# ABB\_GDI\_TORQUEREF

This function block is used to command a torque (current) reference on the axis. In this mode of operation the position loop is not used on the drive (so no following error is recorded or acted upon). The axis will remain in torque control mode (as indicated by the Statusword bits for Controlmode) until motion of another control mode type is issued (e.g. a position controlled move). To switch from zero torque operation (in torque control mode) to holding position (in position control mode) an ABB GDI MOVERELATIVE could be issued, for example, with a relative move distance of zero user units.

	) control	
ABB_GDI_TOR	QUEREF Axis0_Torque	-(Done)-
Execute	bTorqueRef0	
	0 ←	-(Busy)-
Torque	fTorque0	
	0.0 ←	-(Error)-
RiseTime	fTorqueRiseTime	See Constant
	0.0 ←	
FallTime	fTorqueFallTime	
	0.0 ←	
Axis	Axis0	
ErrorID	0 ←	

	Туре	Description
VAR_IN_OUT		
Axis	ABB_GDI_AXISREF	Reference to the axis structure
VAR_INPUT		
Execute	BOOL	Start the torque reference on a rising edge and maintain torque as long as
		the input remains True. Torque ramps to zero at the configured FallTime rate
		when Execute becomes False
Torque	REAL	Value for the torque reference the axis will use (in % of
		DRIVERATEDCURRENT – see Mint Help file). Can be modified whilst
		Execute is True to change the torque produced
RiseTime	REAL	Sets the time taken (in ms) for current to rise from zero to
		DRIVEPEAKCURRENT (see Mint Help file)
FallTime	REAL	Sets the time taken (in ms) for current to fall from DRIVEPEAKCURRENT to
		zero (see Mint Help file)
VAR_OUTPUT		
Done	BOOL	Set True as soon as the torque reference has been issued (regardless of
		whether it was successful or not). The Done output remains set until Execute
		becomes False
Busy	BOOL	Set True whilst the function block is in progress (i.e. whilst Execute is True)
Error	BOOL	Set True if the axis is in error
ErrorID	DINT	Indicates the Mint error code reported by the axis







# ABB\_GDI\_FOLLOW

This function block is used to command the axis to start following the configured master encoder reference at the programmed follow ratio (only position locked gearing is possible when using e100 drives, e150 drives offer additional following modes).

	I_FOLLOW-			Туре	Description
	W Axis0_Follow	(Done)-	VAR_IN_OUT	1	1
Execute	bFollow0		Axis	ABB_GDI_AXISRE	Reference to the axis structure
Ratio	0 ← fRatio0	-(Busy)-		F	
Ralio	0.0 +	-(Error)-	VAR_INPUT		1
Axis	Axis0		Execute	BOOL	Start the follow on a rising edge. The axis will remain in
ErrorID	0 ←				follow mode when the Execute input becomes False (to
		-			stop the follow issue another motion command or clear
					motion using ABB_GDI_CLEAR)
			Ratio	REAL	Value for the follow (gear) ratio between the axis and
					the master encoder reference (the value will affected
					by the scaling of the axis and the scaling of the master
					encoder – see the Mint Help file topic for FOLLOW). To
					set a new ratio whilst following it is necessary to issue
					a new ABB_GDI_FOLLOW command
			VAR_OUTPUT	•	•
			Done	BOOL	Set True as soon as the follow has been issued
					(regardless of whether it was successful or not). The
					Done output remains set until Execute becomes False
			Busy	BOOL	Set True whilst the function block is in progress (i.e.
					whilst Execute is True)
			Error	BOOL	Set True if the axis is in error
			ErrorID	DINT	Indicates the Mint error code reported by the axis



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### ABB\_GDI\_AXIS\_COMMS

This function block is used to transfer command/status data between the application layer and the communication layer of the PLC program. An instance of the relevant function block must exist for each axis in the application.

ABB_GDI_AXIS					
Data transfer to/from Ethernet module					
ABB_GDI_AXIS_COMMS Axis0_Comms					
Input_Image e150_Axis0:I					
Output_Image	e150_Axis0:0				
Axis	Axis0				

	Туре	Description
VAR_IN_OUT		
Input_Image	AB:ETHERNET_MODULE_DINT_40Bytes:I:0	Reference to the input assembly instance for the axis
Output_Image	AB:ETHERNET_MODULE_DINT_40Bytes:O:0	Reference to the output assembly instance for the axis
Axis	ABB_GDI_AXISREF	Reference to the axis structure

### **Using the Axis Structure**

Most of the functionality of the GDI is encapsulated by the various GDI functions provided as Add On Instructions. However, in some cases the application logic may find access to the axis structure data useful. The ABB\_GDI\_AXISREF data type deceleration is shown below:

Name	Data Type	Style	Description	External Access
🗄 CommandWord	ABB_GDI_CMD_WO			Read/Write
CommandType	DINT	Decimal		Read/Write
Value	REAL	Float		Read/Write
Speed	REAL	Float		Read/Write
Accel	REAL	Float		Read/Write
Decel	REAL	Float		Read/Write
AccelJerk	REAL	Float		Read/Write
Decellerk	REAL	Float		Read/Write
LatchOffset	REAL	Float		Read/Write
🕂 StatusWord	ABB_GDI_STATUS_			Read/Write
Pos	REAL	Float		Read/Write
Vel	REAL	Float		Read/Write
FolError	REAL	Float		Read/Write
AxisMode	DINT	Decimal		Read/Write
CurrentMeas	REAL	Float		Read/Write
ErrorCode	DINT	Decimal		Read/Write

This data structure in turn contains two further data structures (ABB\_GDI\_CMD\_WORD and ABB\_GDI\_STATUS\_WORD). The declarations for these are shown below:

#### Command word

	Name	Data Type	Style	Description	External Access
	btEnable	BOOL	Decimal	Enable	Read/Write
	btMotionAllowed	BOOL	Decimal	Allow Motion	Read/Write
	btPosLatchEnable	BOOL	Decimal	Enable Position Latch	Read/Write
	btDisFwdLimit	BOOL	Decimal	Disable Fwd Limit	Read/Write
	btDisRevLimit	BOOL	Decimal	Disable Reverse Limit	Read/Write
-	btModulo	BOOL	Decimal	Modulo Axis	Read/Write
	btFaultReset	BOOL	Decimal	Reset Fault	Read/Write
	btTriggerCmd	BOOL	Decimal	Trigger Motion Cmd	Read/Write
	btWatchDog	BOOL	Decimal	Watchdog	Read/Write
	btlgnoreFE	BOOL	Decimal	FolErrorMode	Read/Write



#### Status word

Name	Data Type	Style	Description	External Access
btEnabled	BOOL	Decimal		Read/Write
btidle	BOOL	Decimal	1	Read/Write
btInPos	BOOL	Decimal		Read/Write
btBrakeEngaged	BOOL	Decimal		Read/Write
btHomed	BOOL	Decimal		Read/Write
btFwdLimit	BOOL	Decimal		Read/Write
btRevLimit	BOOL	Decimal		Read/Write
btFault	BOOL	Decimal	1	Read/Write
btStopInput	BOOL	Decimal		Read/Write
btReadyToEnable	BOOL	Decimal		Read/Write
btControlMode0	BOOL	Decimal		Read/Write
btControlMode1	BOOL	Decimal		Read/Write
btTriggerDone	BOOL	Decimal		Read/Write
btPermitted	BOOL	Decimal		Read/Write
btLatchMissed	BOOL	Decimal		Read/Write
btFaultReset	BOOL	Decimal	1	Read/Write
btPhaseSearchDone	BOOL	Decimal		Read/Write

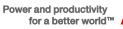
The PLC code can therefore access any of this data via these structures.

#### Example:

Two rungs accessing the axis data structure directly, one reading the status of the Forward Limit Input on the drive and the other storing the measured axis velocity...

Axis0_FwdLimitActive
Move Source Axis0.Vel 0.0+ Dest Axis0_MeasVel 0+

Being able to access this data directly allows great flexibility in the PLC application code (e.g. for an indexing conveyor application the PLC application can access the latch missed status bit (btLatchMissed) and use this to drive a counter that stops motion if a certain number of latches (fast interrupts) are missed in a row).





#### **Communication Watchdog**

By default the Mint GDI is configured to use a watchdog mechanism. From receipt of the first message from the PLC the Mint program checks that communication is still active. If this is lost the axis will stop and no further moves will be possible until the error is cleared. It is possible to disable the watchdog (see AN00204 for details), but for completeness an example watchdog for the PLC is shown below (this is included in the example PLC application included with this application note).

	*** WATCHDOG TO DRIVE ***	1414
I / F		TON Timer On Delay Timer WatchdogTerr Preset 1000+ Actum 0+
	500ms chieff pulse to drive to keep Watchdog alive Constant in Mint program can be used to enable/disable Watchdog monitoring Loss of Watchdog if monitoring enabled will stop motion	
1		Watchdog
LEQ		Axis0 CommandWord btWatchDog
Less Than or Eql (A<=B) Source A WatchdogTmr.ACC Source B 0+ 500		

#### **Example Application**

In addition to the AOI files included with this application note the download also includes an example PLC application. The example PLC application contains the watchdog example, the direct axis structure access example rungs and instances of every single GDI function block (the RSLogix5000 data watch can be used to poke data into the relevant input parameters to exercise these functions).

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#### **Contact us**

For more information please contact your local ABB representative or one of the following:

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