

SoftPLC Adam Series 4000 I/O Module

I. INTRODUCTION

The "*Adam4000 TLM*" is a TOPDOC Loadable Module (TLM) that provides several Ladder Logic Instructions (TLI's) for communication to the Adam Series 4000 I/O. This module is available for systems running *SoftPLC* version 4 and above..

II. ADAM SERIES 4000 I/O CONFIGURATION

Each *Adam Series 4000* I/O Module must be configured using the *Adam 4000 Utility Software*. This software is provided by Advantech Automation Corporation and must be installed on a computer with a Microsoft Windows operating system.

Prior to running the software, you will need connect 24vdc to each module and wire the RS-485 communication network to a RS-485/RS-232 converter; like the *ADAM-4522*. The RS-232 cable will then connect to your Windows computer's serial port. Using the *Adam 4000 Utility software*, you will need to set the baud rate to the default of 9600 and scan the RS-485 network for the modules to be configured. Next you will need to assign a unique address to each module (0-255) and set the baud rate and checksum to the desired values. For analog modules, you will also need to set the Data Format and Input/Output range.

III. Installation on the SoftPLC Runtime

The "*Adam4000 TLM*" (*adam4000.tlm.so*) must installed in the "/SoftPLC/tlm" directory on a version 4.x SoftPLC system. This can be done using a FTP Client such as Filezilla, or using a secure copy (SCP) utility. Filezilla is available on the SoftPLC Product CD.

In order for the module to be selectable in the *NexGen* Module Editor, the *Adam4000.DEF* file must be installed in the "\SoftPLC\tlm" directory on the Windows PC..

The recommended configuration parameters for the ADAM400 TLM are illustrated below:

MODULE=/SoftPLC/tlm/adam4000.tlm.so COMPORT=2 BAUD=384 TIMEOUT=50 CHECKSUM

For local APP editing with TOPDOC *NexGen* version 1.x, the ADAM4000 TLM (*adam4000.tlm.so*) must be put in the "\SoftPLC\tlm" directory on the Windows PC.

IV. MODULE OPTION PARAMETERS

There are four (4) command line arguments supported by the Adam4000 TLM:

1. **COMPORT**=*n* - where **1**=COM1, **2=COM2 (default)**, **3**=COM3, or **4**=COM4.
2. **BAUD**=*nnnn* - where **96**=9600, **192=19200 (default)**, **384**=38400, **576**=57600, and **1152**=115200 baud.
3. **TIMEOUT**=*nnn* - Adjustable from **5** to **500** msec; **default=50 msec**.
4. **CHECKSUM** - If specified, enables 2 character HEX checksum; **default =not enabled**.
5. **DEBUG** – enables detailed diagnostic print messages. **default = not enabled**.

Note: *The Adam Series 4000 I/O requires the following communication settings that are preset by the driver (non-configurable): **NO Parity, 8 bits, 1 Stop bit.***

V. RUNTIME TLI'S

The following TLI's are provided to read/write to the Adam Series 4000 I/O Modules. All parameters are integers except where noted specifically as floating point.

1. **A4017 - "8 Analog Inputs"**, read 8 channels in volts/current. Parameter AI must be a floating point file with a length of 8 elements.

Addr: Module Address (0-255)
AI: Float file, length is 8 elements
ErrCode: Error code; SUCCESS if zero

2. **A4024 -"4 Analog Outputs"**; write a given value to a specified analog output channel and/or reads 4 digital input states. Mode variable determines whether operation is I/O (0), read digital inputs only (1) or write analog output only (2). AO values are written by channel index to A4024. For example: AO[Chan].

Addr: Module Address (0-255)
Chan: Channel (0-3)
AO: Float file, length is 4 elements Eng. Units (volts/mA)
DI: Integer for 4 digital inputs
Mode: All=0, Input=1, Outputs=2
ErrCode: Error code; SUCCESS if zero

3. **A4069 - "8 Relay Outputs"**; write to 8 digital outputs.

Addr: Module Address (0-255)
DO: Integer with digital output states to write
ErrCode : Error code; SUCCESS if zero

4. **A4080 - "Counter/Frequency"**; reads one of two 32 bit counter or frequency channels. Value data register can be either an Integer or Floating Point file. Mode variable determines whether operation is I/O (0), read 32 bit counter/frequency value only (1) or write digital outputs only (2). If the Value data type is integer, then Channel 0 starts at Value[0] and Channel 1 at Value[2]. If the Value data type is floating point, then Channel 0 starts at Value[0] and Channel 1 at Value[1].

Addr: Module Address (0-255)
Chan: Channel, 0 or 1
Value: Integer or float file, length is 4 elements
DO: Integer with digital output states to write
Mode: All=0, Input=1, Outputs=2
ErrCode: Error Code; SUCCESS if zero

5. A4080CTL - “Stop/Start/Reset”; Controls counter/frequency module channels. Stops counting when cmd = 0. Starts counting when cmd = 1. Resets or clears counter when cmd = 2.

Addr: Module Address (0-255)
Chan: Channel, 0 or 1
Cmd: Start (0), Stop (1), or Reset (2)
ErrCode: Error code, SUCCESS if zero

6. A4080CFG - “Set MIN/MAX”; Configures counter/frequency module channels. Sets minimum 32 bit value when cmd = 0. Sets maximum 32 bit value when cmd = 1. Value is placed in a two (2) integers, low then high word order. Channel 0 will use 2 integers starting at Value[0] and Channel 1 will use 2 integers starting as Value[2].

Addr: Module Address (0-255)
Chan: Channel 0 or 1.
Value: Integer file, length is 4 elements
Cmd: Set Min (0) or Max (1)

VI. POSSIBLE ERROR CODES

- 1001 - Invalid Comm Port number
- 1002 - Invalid command line argument
- 1003 - Invalid timeout value given
- 1004 - Unable to open Comm Port
- 1005 - No response within Timeout value
- 1006 - Invalid command; '?' received from module!
- 1007 - Invalid module address
- 1008 - Invalid length; response exceeds internal string buffer size!
- 1009 - Invalid baud rate specified
- 1010 - Selected Comm Port is closed
- 1011 - Invalid checksum; received bad!
- 1012 - Received Ignore command from module
- 1013 - Invalid command format
- 1014 - Invalid Data Format sent or received
- 1015 - Invalid Data Format requested by user (0-2 only!)
- 1016 - Invalid Channel Number
- 1017 - Declared data format does not match module programming
- 1018 - Invalid Data Value encountered, value set to zero.
- 1019 - Invalid Watch Dog Value
- 1020 - Command is not supported
- 1021 - Invalid mode
- 1022 - Invalid Command Request

VII. PERFORMANCE

1. The driver was tested from 9600 to 115200 baud with following response times in milliseconds. Some TLI's have a both a read & write operation mode. In this case, there will be two (2) response times separated by a forward slash '/'. In this case, the first value is the response time of the Input operation and the second is the output response time.

<u>TLI</u>	<u>9600</u>	<u>19200</u>	<u>38400</u>	<u>57600</u>	<u>115200</u>
A4017	95	60	37	35	27
A4024	22/31	13/18	8/12	7/9	5/7
A4069	22	13	8	6	5
A4080	29/26	17/15	11/10	n/a	n/a

Notes:

1. Adam-4080 limited to 38400 maximum baud rate.
2. The Adam-4080 will not respond to back to back requests to set the minimum and/or maximum count values for a module address. As a result, the A4080CFG TLI should only be called once per scan for each unique module address.