Technical Bulletin, Communicating with Allen-Bradley™ Programmable Logic Controllers

OMNI FLOW COMPUTERS, INC.
12620 West Airport Boulevard, Suite 100
Sugar Land, Texas 77478 United States of America
Phone-281.240.6161 Fax: 281.240.6162
www.omniflow.com

NOTE: User Manual Reference - This Technical Bulletin complements the information contained in the User Manuals, and is applicable to all firmware revisions.

This bulletin was previously published as an appendix to user manuals of firmware revisions Version .70 and earlier.

Allen-Bradley Communications – This feature allows communicating with Allen-Bradley™ PLCs. However, OMNI Flow Computers is not responsible for the operation, connectivity or compatibility of Allen-Bradley products, and furthermore, we do not warrant these products.

Table of Contents

Scope

All firmware revisions of OMNI 6000/OMNI 3000 Flow Computers allow communications with Allen-Bradley™ Programmable Logic Controllers (PLCs). This Technical Bulletin refers to communication aspects specific to the OMNI Flow Computer and serves as information only. Please refer to the manufacturer for any support or information on Allen-Bradley products.

Abstract

The OMNI 6000 Flow Computer provides serial communications via port # 4 between the flow computer and an Allen-Bradley™ Programmable Logic Controller (PLC), usually via a KE or KF Communication Module connected to the Data Highway. Data is transmitted serially at a maximum rate of 38.4 kbps using 8 data bits, 1 stop bit and no parity bit. Average speed of response to a message request is approximately 75 msec.

Protocol and Error Checking

Both the DFI full duplex protocol and the half duplex protocol are supported. CRC or BCC error checking can be utilized when using either full duplex or half duplex.

PLC Supported

The OMNI computer supports the following Allen-Bradley™ PLC types and messages. Note that bit level operations are not supported.

PLC-2	Unprotected Block Reads and Writes
PLC-3	Word Range Reads and Writes
PLC-5	Typed Reads and Writes
SLC-5/02, 5/03	Unprotected Typed Reads and Writes

Flow Computer Database

Serial Ports #1, #2, #3 and #4 in .74+ firmware revisions support communications using superset of Modbus™ Protocol. This is the native communications language of the flow computer. Several thousand variables are available within the Database. The primary numbering system used to identify these variables is their 'index number'. The actual digits of the index number indicate the type of variable and in many cases application area within the computer.

4th and 5th Digit from the Right Identifies Type of Variable

1??? Variable is a digital status or command bit
3??? Variable is a 16 bit signed integer
4??? Variable is a 8 character ASCII string
5??? Variable is a 32 bit signed integer
7??? Variable is a 32 bit IEEE floating point
8??? Variable is a 32 bit IEEE floating point
13??? Variable is a 16 bit signed integer
14??? Variable is a 16 character ASCII string
15??? Variable is a 32 bit signed integer
17??? Variable is a 32 bit IEEE floating point

3rd Digit from Right Identifies which Area within the Application

?1?? Variable relates to Meter Run #1
?2?? Variable relates to Meter Run #2
?3?? Variable relates to Meter Run #3
?4?? Variable relates to Meter Run #4
?5?? Variable is scratchpad

?6?? Variable is PID related or scratchpad

?7?? Variable is a command write.

?8?? Variable is related to station functions

?9?? Variable is related to prover functions

How the Allen-Bradley™ Accesses the OMNI Flow Computer Database

PLC-2

This family is usually limited as to the type of data and address range. Data is always transferred as block reads and writes.

Five (5) translation tables are provided where the user can specify what data within the database will be concatenated into read or write groups. The starting address of each data block is selectable.

NOTE: The PLC2 does not understand 32-bit integer or 32-bit IEEE floating points but can pass these variable types to devices that do understand them.

Translation Tables #1 through #3 are used to set up block reads which can contain status points packed 16 to a word, 16-bit or 32-bit integers and IEEE floating points.

Translation Table #4 is used for block writes of status and command bits only. Data is packed 16 to a word.

Translation Table #5 provides for block writes to any selected data.

PLC-3

This family can use the methods described as well as 'word range reads and writes' of any variable within the database (refer to PLC-5 list for starting addresses).

PLC-5

This family utilizes 'typed reads and writes' of the complete Database. To accommodate the PLC-5 'file system' method of addressing, the Modbus index numbers serve as the basis of the internal file system of the computers as it appears to a PLC-5 device. Table 1 shows typical examples:

Table 1. Modbus Indices Versus PLC-5 Addresses

MODBUS INDEX #	PLC-5 ADDRESS	ELEMENT SIZE	COMMENT
1101	N11:01	1 Word (16 Flags)	Meter #1 Status Flags
1217	N12:17	1 Word (16 Flags)	Meter #2 Status Flags
1701	N17:01	1 Word (16 Flags)	Command Flags
3201	N32:01	1 Word (Integer)	Meter #1 Data
3210	N32:10	1 Word (Integer)	Offsets track
3901	N39:01	1 Work (Integer)	Prover Data
4101	B41:01	1 Byte (ASCII)	4Words per Variable
4102	B41:02	1 Byte (ASCII)	1Byte per element
5101	N51:01	1 Word (Long Integer)	2 Words per variable
5102	N51:02	1 Word (Long Integer)	2Words per variable
5103	N51:03	1 Word (Long Integer)	Same again
7401	F74:01	2 Words (IEEE Float)	2 Words per variable
7405	F74:05	2 Words (IEEE Float)	Offsets track

Valid Starting Addresses of PLC-5 Files

16-Bit Integers

N10:01 N11:01 N12:01 N13:01 N14:01 N15:01 N16:01 N17:01 N18:01 N19:01
N30:01 N31:01 N32:01 N33:01 N34:01 N35:01 N36:01 N37:01 N38:01 N39:01

8-Character Strings

B41:01 B42:01 B43:01 B44:01 B45:01 B46:01 B47:01 B48:01 B49:01

32-Bit Integers

N51:01 N52:01 N53:01 N54:01 N55:01 N58:01 N59:01

32-Bit IEEE Floating Points

F70:01 F71:01 F72:01 F73:01 F74:01 F75:01 F76:01 F77:01 F78:01 F79:01

Bit Integers

N130 :01 N134:01

16-Character Strings

B140:01

32-Bit Integers

N150:01

32-Bit IEEE Floating Points

F170:01

DOCUMENT REVISION HISTORY

DOCUMENT INITIAL RELEASE DATE.....06-May-2003

REVISION	DATE	PURPOSE / CHANGE REQUEST
A	06-May-2003	Maintained on the Web - Initial release
B	31-March-2009	DCR 090075