TECH NOTES-302

Integrating RACO® Verbatim®
Gateway with the Allen-Bradley®
SLC™ 500 series PLC via DH485
over RS485

This technical note explains how to interface the RACO Verbatim Gateway system with the Allen-Bradley SLC 500 PLC. The SLC 5/01, 5/02 and 5/03 family of PLCs all contain a native DH485 port. This allows the Verbatim Gateway to perform its alarm notifications and functions using the existing wiring to Allen-Bradley SLC 500 series as inputs via data communications.

The following components are required:

RACO-supplied components:
Verbatim Gateway (applies to the following models; 321VPLC-4C-32AB, 323VPLC-4C-64AB, 325VPLC-4C-96AB)
511VAB-500-1 Cable

Allen-Bradley-supplied components:
SLC 500 Series (SLC 5/01, 5/02, 5/03)
1747-AIC
RSLogix™ 500 software version 8.10.00
RS232 Cable (simple NULL modem — for RSLogix 500 software)

for use with Allen Bradley DH485 protocol

RJ45 MOD PLUG   RJ45 MOD PLUG

PLASTIC   6 FT. CORD   GOLD
CLIP   CONTACT
SIDE   SIDE
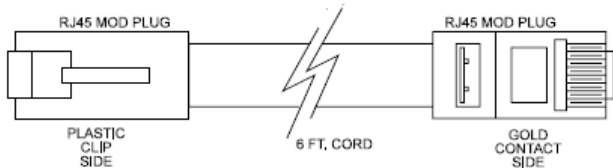
RJ-45 Connector Pinout	
1	Signal Ground
4	Data from Gateway
6	Data to Gateway

Note opposite orientation of mod plugs which maintains pin number consistency from end to end

RJ-45 Straight through pinout

1 ———— 1
2 ———— 2
3 ———— 3
4 ———— 4
5 ———— 5
6 ———— 6
7 ———— 7
8 ———— 8
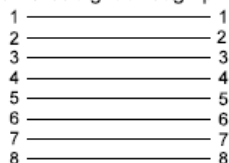
In order to facilitate data communications via DH485, RACO provides a simple straight-through serial cable, 511VAB500-1 (see above). This six-foot cable has the RJ-45 connector on both ends.

In addition to providing a connection between the PLC DH485 data highway and Verbatim Gateway, parameters need to be set within the Allen-Bradley and RACO Verbatim Gateway.

Communication Setup for the Allen-Bradley SLC 500 Platform

The DH485 port on the SLC 500 provides a means for the PLC to access your DH485 data highway. For an existing network it is most likely that the 1747-AIC (Isolated link coupler) would be required. If there is no network to access, the above cable would ideally suit, as it provides a direct connection between the Verbatim Gateway and PLC.

Communication setup for the SLC 500 DH485 data highway is very simple. It is configurable within your RSLogix™ 500 software.

**STEP #1 — Launch RSLogix 500 Software**

The illustration below applies to SLC 5/01 and 5/02 processors. To configure communication parameters, click the "Controller Properties" symbol, shown below. This will launch the "DH485 Configuration" form.
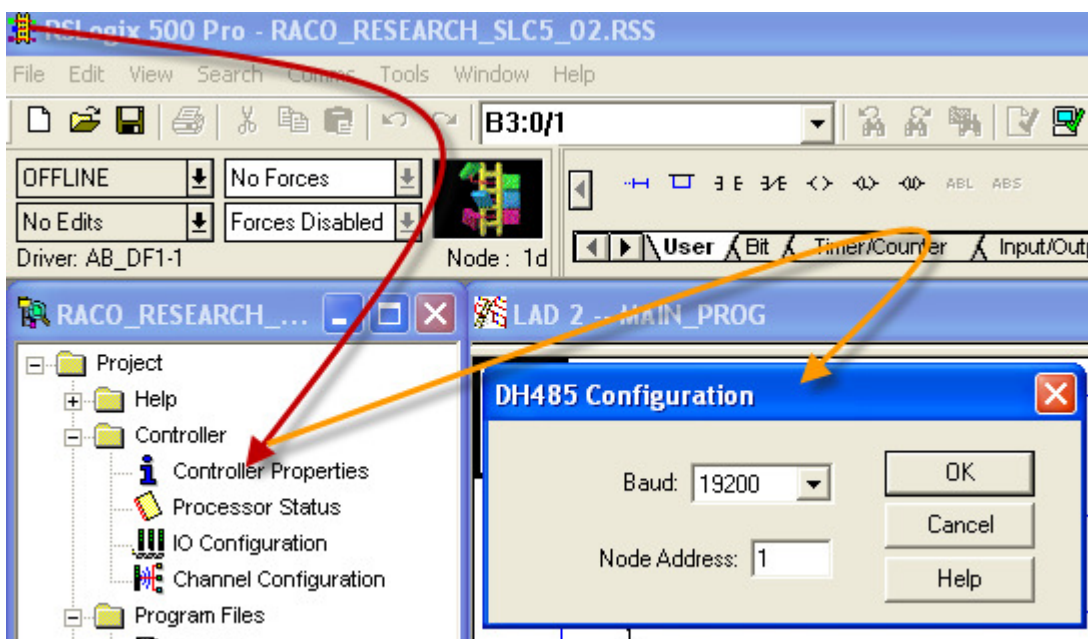
STEP #2 — Channel Configuration

In the illustration on the previous page, we have selected a Baud rate of 19,200 and a Node Address of 1. Click "OK" and the controller communication parameters are configured.

The form differs when setting the parameters within the SLC 5/03 processor. In addition to the "Baud" and "Node Address" settings, a "Driver" field, "Token Hold Factor" and "Max. Node Address" field can be found. Set the "Driver" field to DH485. The "Token Hold Factor" represents the number of transmissions (plus retries) that the node holding the token sends on to the data link. The default is 1. The "Max. Node Address" is the highest address before the token loops back to zero. For best performance, this should be set at 1 above the highest active node present on the highway (range from 1–31). Click 'OK' and your communications setup is complete.
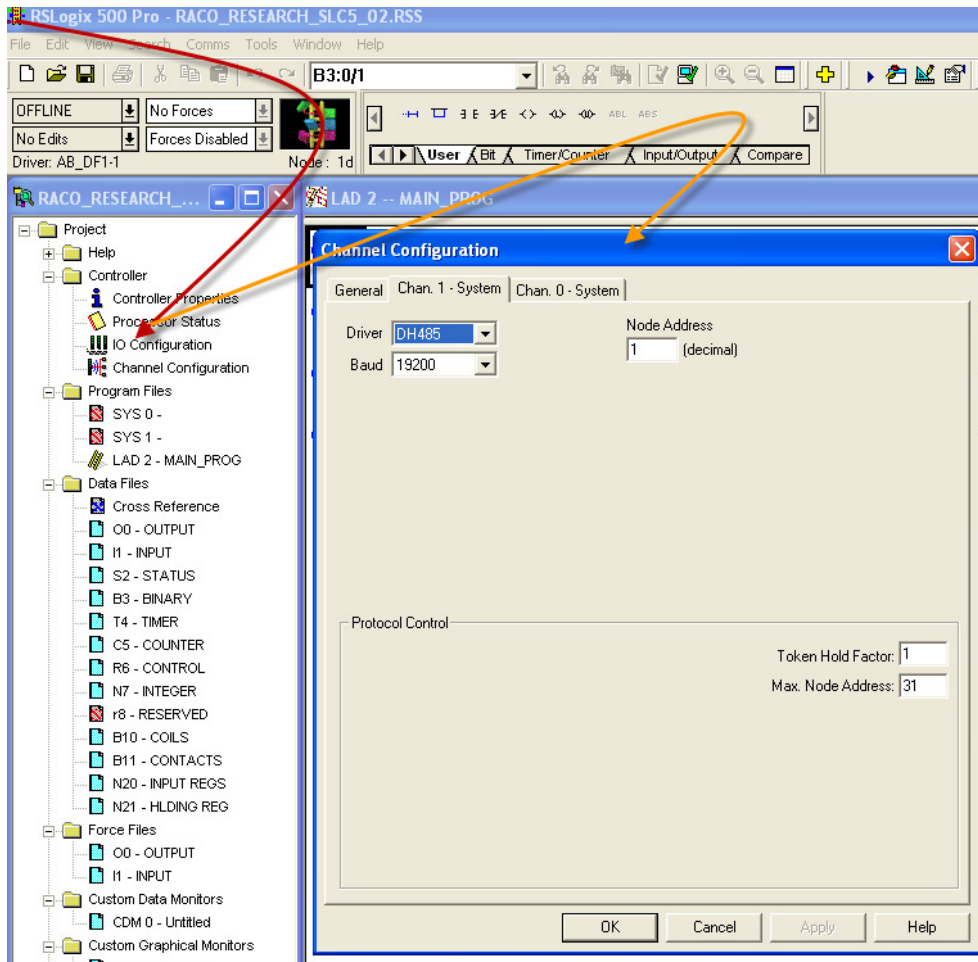
Communication Setup for the Verbatim Gateway

The following seven-step procedure will configure your Verbatim Gateway to link its Remote Channels (RC) to your PLC via DH485. Once linked, the Verbatim Gateway will monitor RC status and Alarms according to your settings.

Connections to the PLC are via the onboard RJ45 port or NET. With the V232/485, two NET / ports are provided. NET ID = 1 is dedicated to the DH485 protocol and NET ID = 2 is configurable for either Modbus RTU Master or DF1. (Refer to table #1.)

STEP #1 — Protocol Driver (4906)
When setting the Protocol, Node Address and Communication parameters, it is good practice to include the NET ID (i.e. 4901, 4903, 4904, 4905 and 4906).
Insert the NET ID immediately following the parameter number, as defined below.

Table #1

N	Protocol	Reference	Description	Nets
0	NONE		Device disabled	All nets
2	DH485	7.4.2	Allen-Bradley DH485 protocol	Net1 on V232/485 only
3	DF1	7.4.1	Allen-Bradley serial interface	**Net1 (on VDP only) Net2**
4				
5	MODBUSM	7.4.3	Modbus Master	**Net1 (on VDP only) Net2**
128	LDL	7.4.5	Local data logging may only be used on one device	**Net1 (on VDP only) Net2, 4**

As per the Table #1 above, set the Protocol Driver to DH485 on NET 1.
Key in 4906 1<point> 2 <enter>
To read the Protocol Driver for Net 1, key in 4906 1<enter>

STEP #2 — Node Address (4905)
Choose a unique DH485 NODE address for the Verbatim Gateway.
Via the RSLogix 500, we've already selected NODE / STATION 1 for the PLC. DH485 allows NODE addresses to range from 0–13.

For example, set the Gateway NODE address to 2 by using code 4905.
To set the NODE address of NET 1, key in 4905 1<point> <2> <enter>
To read the NODE address of NET 1, key in 4905 1 <enter>

STEP #3 — Communication Parameters (4901, 4903, 4904)
Select the communication parameters. These must match with the driver settings on your PLC. The only communication parameter applicable for the DH485 driver is 4901.

RACO recommends a BAUD rate of 19200.
BAUD rate = 19200 for "19200" on NET 1, key in 4901 1<point>19200 <enter>
Stop Bits, Parity and Data Bits are not applicable when using the DH485 driver.

STEP #4 — Confirmations (4900, 4901, 4930, 4946)
Step #4 will validate all preceding steps.

To read the BAUD rate for NET 1, key in 4901 1 <enter>

To verify communication settings reflect the above, at NET 1, key in 4900 1<enter>
To verify successful network communications on NET 1, key in 4930 <point> 1 <enter>
To verify active node addresses on NET 1, key in 4946 1<enter>

STEP #5 — Set Defaults
This step simplifies Channel Configuration (i.e. Step 6).
By setting to Default both the NET ID and NODE / STATION address, it is no longer necessary to reference them when setting Channel Configuration.

Set the following to DEFAULT:
1   NET ID, used to communicate via DH485 (i.e. 1)
2   NODE / STATION address of the target PLC

To change the NET ID to 1, key in 4910 1 <enter>
To confirm the NET ID, key in 4910 <enter>

To change the PLC NODE / STATION address to 1 of NET 1, key in 4911 1 <enter>
To confirm PLC NODE / STATION address, key in 4911 <enter>

STEP #6 — Channel 1 & 2 Configuration (4501) (4502)
Since Verbatim Gateway channels are completely compatible with the logical and I/O addressing scheme for the file structure of the SLC series processors, the table below should look familiar.

Table #2

Identifier	File Type	Example	
O	Output	O:1.0/0	(SLC500)
		O:017/10	(PLC5)
I	Input	I:0.1/0	(SLC500)
		I:013/07	(PLC5)
S	Status	S:2	(word)
		S:2/0	(bit)
B	Bit	B:0	(word)
		B9:0/1	(bit)
T	Timer	T4:0.2	(word)
		T:0.0/1	(bit)
C	Counter	C5:0.2	(word)
		C10:0.0/1	(bit)
R	Control	R6:2.1	(word)
		R:2/15	(bit)
N	Integer	N:1	(word)
		N:1/0	(bit)
F	Floating Point	F:2	(32-bit word)
NOTE: Cannot specify 16 or 1-bit points with F file type.			
D, G, M1, etc…	All other types	Not Supported	

Table #2 shows the Allen-Bradley-supported address types available to link to Verbatim Gateway channels. Indirect, indexed and symbolic addressing schemes are not supported.

The two examples below illustrate the link to the PLC data table (via DH485, Table #2) to the Verbatim Gateway channels.

Example #1
To link B3:0/0 in the PLC to Channel 1 as per the PLC file structure illustrated above, key in the following:

4501 <point> <shift> <B> <3> <shift> <:> <0> <shift> </> <0> <point> <enter>
To verify the current address entered, key in 4501<point><enter>
To read address value, key in 4001<point><enter>, this will read actual PLC value assigned to Channel 1.

Example #2
To link N7:0 in the SLC PLC to Channel 2 as per our PLC file structure illustrated above, key in the following:

4502 <point> <shift> <N> <7> <shift> <:> <0> <point> <enter>
To verify the current address entered, key in 4502<point><enter>
To read address value, key in 4002<point><enter>, this will read actual PLC value assigned to Channel 2.

STEP #7 — Assignment of Alarm Conditions
Having created and tested your Remote Channels, Step #6, you are now able to assign alarm conditions.

Channel #1, configured as discrete, is either ON or OFF
Should this channel be linked to a "Failsafe" point in the PLC, (i.e. ON = NORMAL, OFF = ALARM) we would alarm when OFF. In this case, we would key in 45 01 2.

To alarm when ON, (i.e. signal is HIGH) key in 45 01 1
To alarm when OFF, (i.e. signal is LOW) key in 45 01 2
To read Alarm status for Channel 1, key in 4001<enter>.

Channel #2, configured as Analog, operates within the range from 0 to 65, 535
Should this channel be linked to a pressure signal in PLC, and the process requires pressure remain within an acceptable level, otherwise ALARM (for example, BELOW 10,000 AND ABOVE 30,000).

We would key in the following:
To alarm when the analog signal falls below a value, for example 10,000; key in 45 02 5 10000
To read the LOW set point alarm; key in 45 02 5
To alarm when the analog signal rises above a value, for example 30,000; key in 45 02 6 30000
To read the HIGH set point alarm; key in 45 02 6