



TECH NOTES-311

Integrating RACO[®] Verbatim[®]
Gateway with the Allen-Bradley[®]
CompactLogix[™] PLC via DH485

This technical note explains how to interface the RACO Verbatim Gateway system with the Allen-Bradley CompactLogix family of PLCs via DH485. All CompactLogix processors that have an integrated serial port and should contain the DH485 protocol. This port, along with the 1761-NET-AIC, allows the Verbatim Gateway to perform its alarm notifications and monitoring functions using the existing wiring to the Allen-Bradley CompactLogix PLC as inputs via the DH485 protocol. This technical note is applicable for all Verbatim Gateway models.

RACO-supplied components:

Verbatim Gateway (any model)
515VAB-ENI cable

Allen-Bradley-supplied components:

CompactLogix processors with built-in serial port
1761-CBL-AC00 (RS232 programming cable)
1761-NET-AIC (DF1 to DH485 protocol converter)
RSLogix[™] 5000 software

Optional Components:

Belden Cable (RS485)

Use #3106 or #9842 to connect to the DH485 connector Port 3 on the 1761-NET-AIC, where required.

Note: Not all CompactLogix processors include the integrated serial port. This tech note assumes the user is familiar with the CompactLogix processors that contain the required integrated serial port.

In order to facilitate DH485 communications, RACO provides a serial cable that connects the Verbatim Gateway to the 1761-NET-AIC. This cable has the RJ-45 connector required at the Verbatim Gateway end, and the 8-pin mini-DIN at the end that connects to Port 2 (RS232) of the 1761-NET-AIC card.



Communication Setup for the 1761-NET-AIC

The 1761-NET-AIC provides DH485 connectivity to the DH485 network.

STEP #1 — Use the 515VAB-ENI cable to connect the Verbatim Gateway to Port 2, (8-pin mini-DIN) on the 1761-NET-AIC.

STEP #2 — To connect to an existing DH485 network, use Port 3, the RS485 (i.e., Phoenix plug) connector.

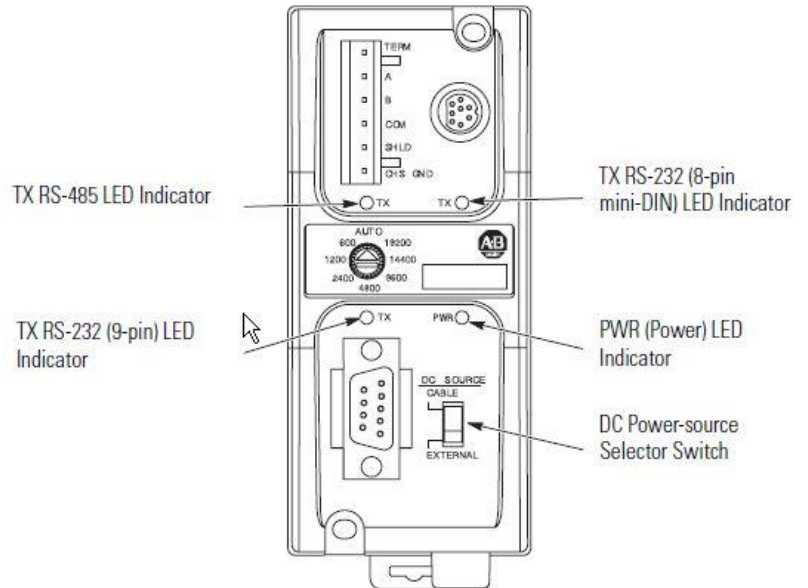
Connect the MicroLogix™ PLC to the 1761-NET-AIC via 1761-CBL-PM02 cable and the DB-9 end plugs to Port 1.

STEP #3 — At the center of the unit is a dial. Use this dial to select your baud rate and utilize the blank label to record this value.

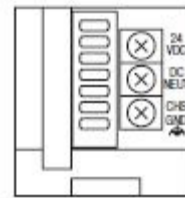
STEP #4 — An external isolated 24-VDC power source should be used and wiring terminals can be found at the bottom of the unit.

STEP #5 — Make sure the switch is in the “external” position. External power is always recommended.

LED Indicators and Selector Switch



IMPORTANT



Bottom View

Configuring the Allen-Bradley CompactLogix Serial Port

In order to utilize the integrated serial port, setting the port Protocol to DH485 is required.

STEP #1 — Launch RSLogix 5000 and open your CompactLogix File

Once your RSLogix 5000 file is open, select the Controller Properties button. This will launch the Controller Properties form.

STEP #2 — Select DH485 Protocol

To set the serial port protocol to DH485, select the System Protocol tab and go to the Protocol pull-down menu.

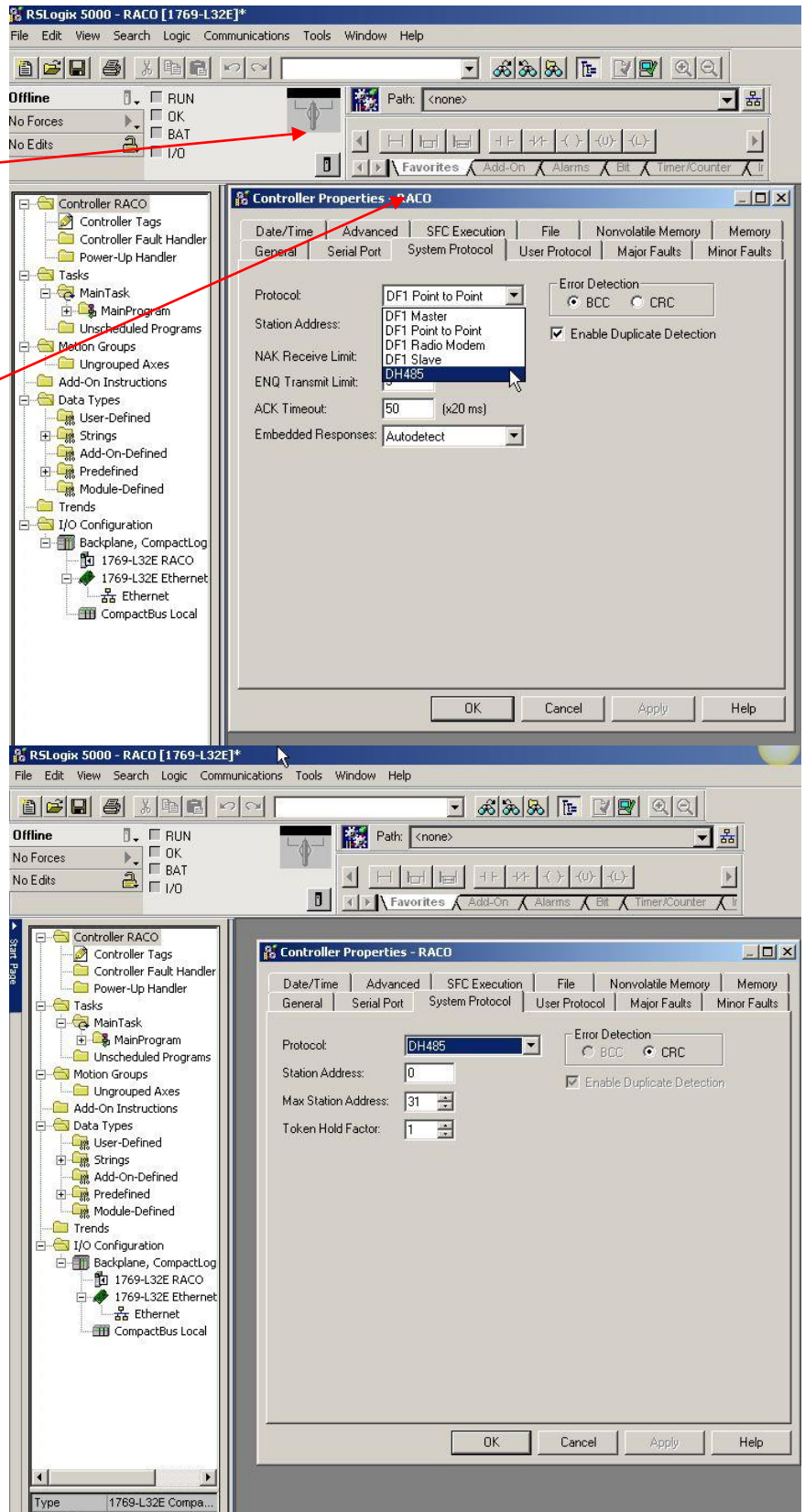
STEP #3 — Configure your DH485 settings

Now that you've selected DH485 as communication protocol for the serial port, set the Station Address for the PLC. For example, set this value to 1.

Set the maximum number of stations within your network. This number should reflect the number of stations on your network to optimize for speed.

Default is 31.

The Token Hold Factor default is 1.



Configuring the Allen-Bradley CompactLogix Registers

The Verbatim Gateway supports the SLC™ platform file structure for referencing data.

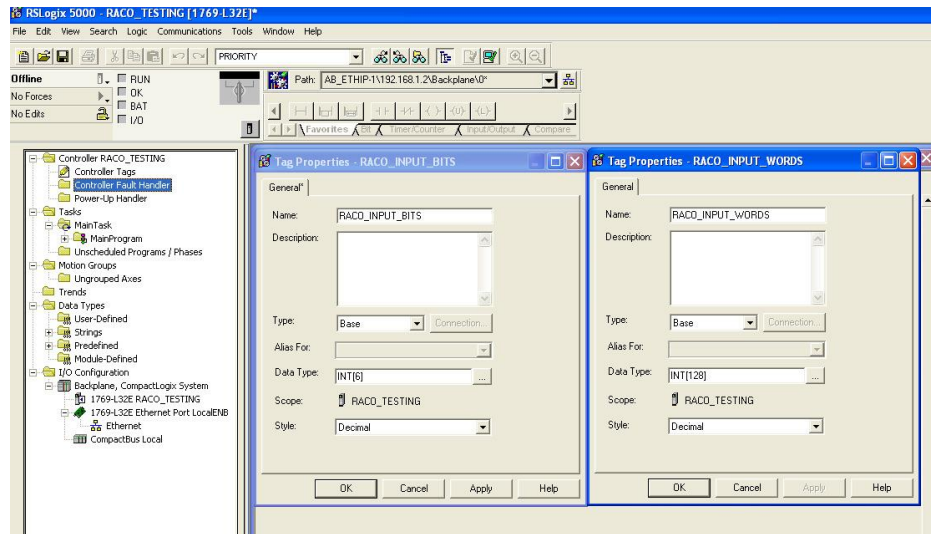
The CompactLogix uses “base” tags that are custom-created to address normal internal data. These base tags would not normally be compatible for communications without “mapping” or converting to the SLC file structure.

In order to convert to the SLC file structure, it is necessary to first configure CompactLogix base tags.

STEP #1 — Configure CompactLogix Base Tags

Complete the Tag Properties form, as per your application requirements. In the above example, we’ve created both Boolean and Integer tags. We’ve selected an array of six words for Boolean (i.e., $6 * 16 = 96$ bits) and 96–16 bit integer words.

Note: Verbatim Gateway can support up to 96 Remote Channels.

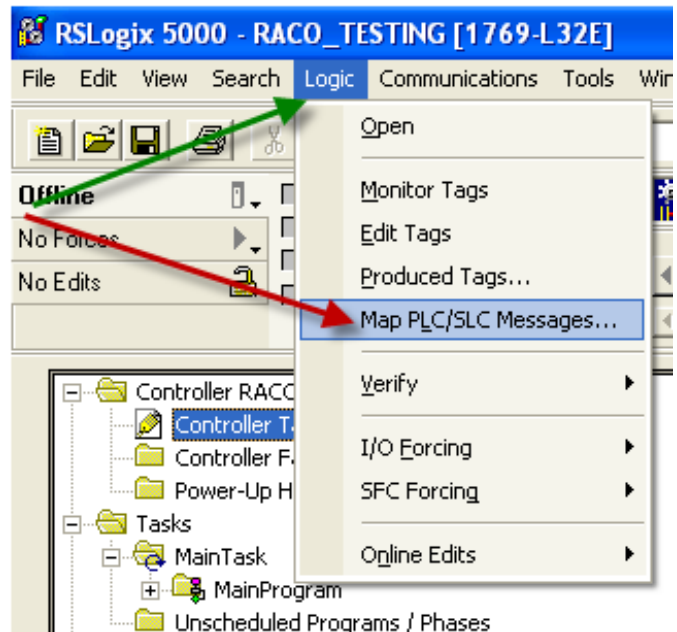


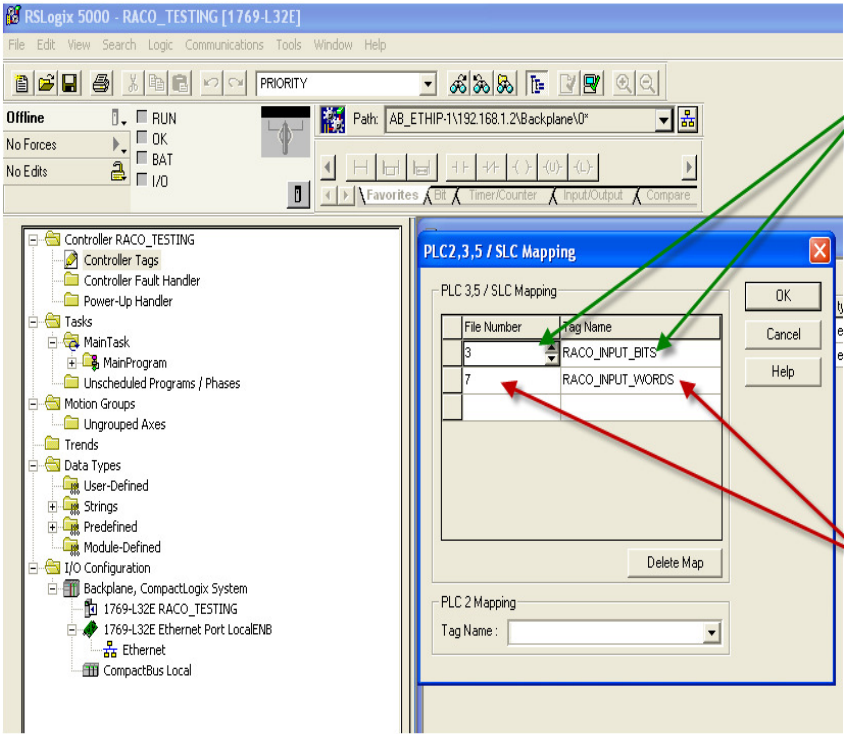
STEP #2 — Mapping CompactLogix Tags to SLC

In order to access the Mapping feature, first select “Logic.”

As indicated by the green arrow, right click “Logic” tab and the drop-down will open, displaying the “Map SLC” feature (red arrow).

Once the “Map SLC” feature is clicked (red arrow), the SLC Mapping form will be displayed on screen.





STEP #3 — Completing the SLC Mapping Form

With the SLC Mapping form now open, select the Tag Name configured for binary, in this example the name RACO_INPUT_BITS will be assigned File Number 3.

Below, add RACO_INPUT_WORDS under Tag Name and associate it with File Number 7.

Click OK and your tag mapping to the SLC file structure is complete. The PLC is now ready to communicate with the Verbatim Gateway.

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 addresses, 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).

Table #1

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

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 or 4906). Insert the NET ID immediately following the parameter number, as defined below.

Per Table #1 above, set the Protocol Driver to DH485 on NET 1.

Key in the following: 4906 1 <point> 2 <enter>

To read the Protocol Driver for NET 1, key in the following: 4906 1 <enter>

STEP #2 — Node Address (4905)

Choose a unique DH485 NODE address for the Verbatim Gateway. As illustrated above, we've already selected NODE / STATION 1 for the PLC. DH485 allows NODE addresses to range from 0–31.

For example, set the Gateway NODE address to "2" by using code 4905.

To set the NODE address of NET 1, key in the following: 4905 1 <point> <2> <enter>

To read the NODE address of NET 1, key in the following: 4905 1 <enter>

STEP #3 — Communication Parameter (4901)

Select the communication parameter. This must match with the driver settings on your PLC. The only communication parameter applicable for the DH485 driver is 4901.

RACO recommends the following communication settings:

BAUD rate = 19200 for "19200" on NET 1, key in the following: 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 verify successful network communications on NET 1, key in the following: 4930 <point> 1 <enter>

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

To verify communication settings reflect the above, at NET 1, key in the following: 4900 1 <enter>

To verify active node addresses on NET 1, key in the following: 4946 1 <enter>

STEP #5 — Set Defaults

This step simplifies Channel Configuration (i.e., Step #6).

By setting the NET ID and NODE / STATION address to Default, 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 the following: 4910 1 <enter>

To confirm the NET ID, key in the following: 4910 <enter>

To change the PLC NODE / STATION address to “1” of NET 1, key in the following: 4911 1 <enter>

To confirm PLC NODE / STATION address, key in the following: 4911 <enter>

STEP #6 — Channel 1 & 2 Configuration (4501) (4502)

Now that you’ve mapped the CompactLogix base tags to the SLC file type, and 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 between the PLC data table (via DH485, Table #2) and 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> <3> <shift> <:> <0> <shift> </> <0> <point> <enter>

To verify the current address entered, key in the following: 4501 <point> <enter>

To read address value, key in the following: 4001 <point> <enter>. This will read the actual PLC value assigned to Channel 1.

Example #2

To link the SLC mapped N7:0 register in the CompactLogix PLC to Channel 2 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 the following: 4502 <point> <enter>

To read address value, key in the following: 4002 <point> <enter>. This will read the actual PLC value assigned to Channel 2.

STEP #7 — Assignment of Alarm Conditions

Having created and tested your Remote Channels in 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 the following: 45 01 1

To alarm when OFF (i.e., signal is LOW), key in the following: 45 01 2

To read alarm status for Channel 1, key in the following: 4001 <enter>

Channel #2, configured as Analog, operates within the range from 0–65, 535.

Should this channel be linked to a pressure signal in PLC, and the process requires that 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 (e.g., 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, (e.g., 30,000), key in: 45 02 6 30000

To read the HIGH set point alarm, key in: 45 02 6

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