

DVC700 Series Controllers

DVC745 User Manual – Rev. B1



www.htccontrols.com

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Product Overview

The DVC745 is a robust digital output expansion controller for solenoid-operated ON/OFF valves, lights, alarms and more. It is designed to be used as an output expansion module for the DVC700 series controllers or as a stand-alone output module using direct CAN bus communication.

Each output may be individually configured to operate 12 or 24 V_{DC} coils or LED's.

The DVC745 must be initially configured using the Intella Program Loader Monitor (PLM) for Mac ID, Module Number, Baud Rate and CAN type.

The outputs can be configured using the PLM or any J1939 CAN capable Electronic Control Unit (ECU).

- 12 ON / OFF output expansion module
- Can be used with any J1939 CAN capable control device
- Can be combined with DVC700 series controllers as an output expansion module for large system solutions
- Utilize as a stand-alone output module via J1939
- SAE J1939 or DVC DeviceNet CAN bus communication
- Open/short detection for diagnostics
- Rugged and fully encapsulated
- SAE J1455 environment and load dump compliant
- IP67, 69K
- CE Certified

For the Mobile and Industrial hydraulic markets.



Hints & Tips

Hints & tips for successful application of High Country Tek's electro-hydraulic control products

ALWAYS do the following:

- Read this entire manual and product data sheets BEFORE starting.
- Isolate the controller from all other equipment BEFORE any form of welding.
- Isolate the controller from ANY form of battery charging or battery boosting.
- Be aware of the electrical & mechanical connections, and the expected reactions of the equipment.
- Operate the controller within the temperature range.
- Use the correct tools (i.e. P.C., software) etc.
- Separate High Voltage AC cables from Low Voltage DC signal and supply cables.
- Make sure power supply is CORRECT, ELECTRICALLY CLEAN, STABLE and rated for the full load.
- Make sure the controller voltage & current are compatible with the equipment!
- All unused wires / terminals should be terminated safely.
- Ensure ALL connectors have no unintended SHORT or OPEN circuits.
- Ensure ALL connectors are wired correctly, secure, locked in place and fully connected.
- Disconnect or connect wires to or from the controller only when the power supply is disconnected.
- Use adequate screening in areas of intense Radio Frequency fields.
- Ensure ALL work areas are clear of personnel before operating the controller.
- Follow and abide by local and country health & safety standards!

Software Safety

- Use the correct PLM and hardware combination.
- Cycle the power to ensure changes are accepted by the controller.
- When the PLM is first connected to a powered controller, a 'Handshake' takes place to confirm the internal software (BIOS) is compatible with the PLM. This allows the PC and the module to communicate. If an error is detected, the PLM will indicate "OFF LINE" and NOT allow communications.

Never do the following:

- Attempt to use this unit if you are unsure of electrical or hydraulic connections or expected operation.
- Operate this unit without the recommended power supply in put fuse installed as recommended power supply input fuse installed as recommended.
- Arc weld or charge batteries with this controller unit connected as damage can occur.
- Attempt to use this unit in areas where other AC or DC coils have not been fully suppressed.
- Install Amplifiers in vicinity of AC products – e.g. VFD Amplifiers, motor starters, HV fuses, etc.
- Use a power supply that is not rated for the correct required output current under full load.
- Allow wires to or from the unit to short circuit (to each other or chassis/cabinet)/.
- Attempt to use this unit in areas of intense radio Frequency (RF) without adequate screening measures.
- Disconnect or connect wires to or from this unit unless it is isolated form the power supply.
- Use this unit in temperatures that exceed specifications as operation may be affected.
- Start this unit without ensuring ALL work areas are clear from personnel.

Connections

Pin-Out

Pin	Function
-----	----------

A1	Output 1
A2	CAN H
A3	RXD

Pin	Function
-----	----------

B1	Output 2
B2	CAN L
B3	TXD

Pin	Function
-----	----------

C1	Output 3
C2	POWER COM
C3	POWER COM

D1	Output 4
D2	POWER COM
D3	POWER COM

E1	Output 5
E2	Output 6
E3	Output 7

F1	Output 8
F2	Output 9
F3	Output 10

G1	Output 11
G2	POWER COM
G3	POWER COM

H1	Output 12
H2	POWER COM
H3	POWER COM

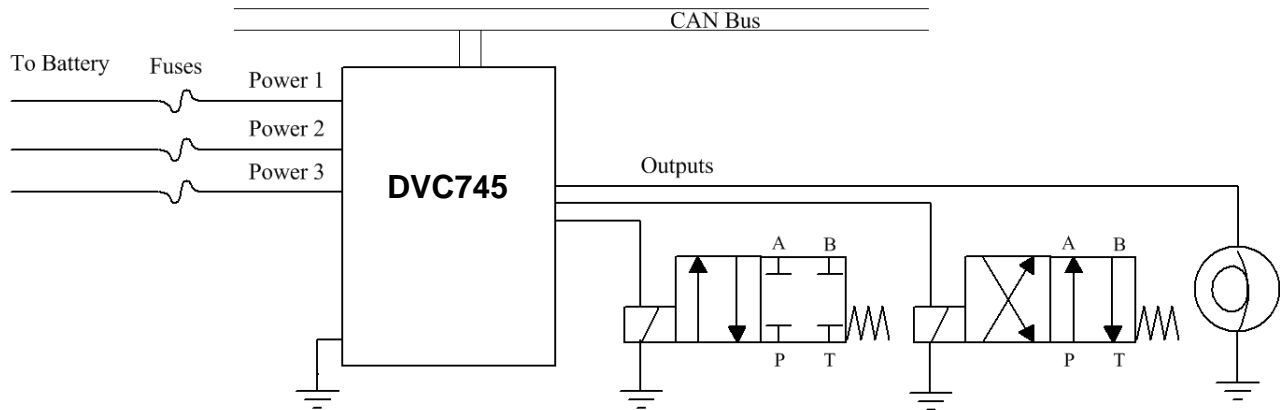
J1	+ POWER IN 1
J2	+ POWER IN 2
J3	+ POWER IN 3

Notes:

K1	+ POWER IN 1
K2	+ POWER IN 2
K3	+ POWER IN 3

1. Each Power pin used must be individually fused with an ATO 5, AGC 5 or smaller fuse
2. High voltage transient protection is monitored on Power In 1 (Load Dump)
3. Power In 1, Power In 2 and Power In 3 are electrically separate Power Planes
4. Outputs 1 – 4 and the controllers on board logic is supplied from Power In 1
5. Outputs 5 – 8 are supplied from Power In 2
6. Outputs 9 – 12 are supplied from Power In 3

Example Configuration



Mating Connector Information

DELPHI PACKARD MATING CONNECTOR PARTS	
Connector 30 Pin Female:	12048455
Terminals, Female:	12103881
Cavity Plug:	12034413-B
Terminal Crimp Tool:	12039500
Extraction Tool:	12094429

Product Specifications

User Interface

The DVC745 is configured using HCT's free Intella® Program Loader Monitor (PLM). The PLM is used as the primary interface to specify the communication speed, type, module and MAC ID. The PLM can also be used to configure the outputs and for J1939 communication when used with other J1939 CAN capable Electronic Control Units (ECU). The PLM also contains a dashboard providing real time feedback for diagnostics and troubleshooting. The communication cable 999-10075 and adapter 108-00119 are required in order to communicate between a PC and the DVC745.

- Save and load data files
- Enable or disable open circuit detection
- Configure output errors to reset with unit power cycle or command output cycle
- Configure MAC ID, Module ID, communication rate and CAN communication types

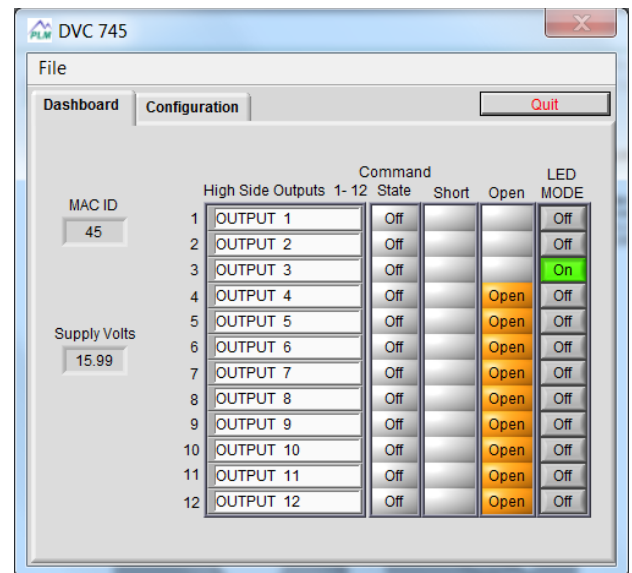


Figure 1 DVC745 PLM Dashboard Window

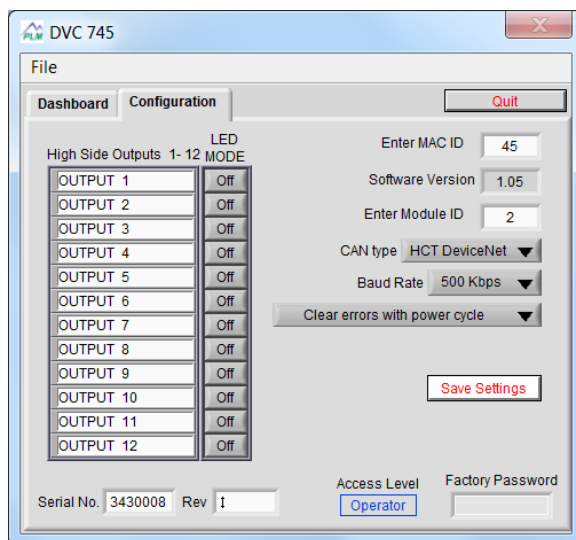


Figure 2 DVC745 PLM Configuration Window

- Command ON / OFF outputs directly from the DVC745 controller without needing a DVC710 or DVC707 master controller
- Configure the outputs directly from a CAN capable display including: command state, open circuit detection and error reset mode
- Monitor output status directly from a CAN capable display for safety messages and diagnostics
- Compatible with High Country Tek's rugged displays (PV780 and PV450)

Operational Specifications

Supply Voltage	9-30 V _{DC} (recommended operating voltage +12 to +28 V _{DC} , absolute maximum +/- 32 V _{DC})
Supply Current	30 Amps (recommended supply current per power pin 5 Amps, absolute maximum 8 Amps)
Operating Temperature	-40 to +85°C
Storage Temperature	-40 to +100°C
Weight	1.29 lbs (0.58 kg)
Dimensions	L: 5.50 in (140 mm) x W: 4.70 in (119 mm) x H: 1.65in (42 mm)
Enclosure	Solid potted, industry standard Deutsch enclosure with automotive connectors
NEMA / IP Rating	NEMA 6P / IP67, 69K

Communication

CAN	2.0B (maximum voltage +/-14V _{DC})
Baud rates	125 kb/s, 250kb/s, 500kb/s, 1Mb/s, software configurable
Protocol	SAE J1939, HCT DeviceNet
Default baud rate	250kb/s
Serial Interface	RS232 (maximum voltage Rxd,RTS = +/-15V _{DC} Txd = +/-8 V _{DC})

Outputs

Digital (Qty 12)	3,000 mA sourcing, software configurable
Current Leakage	Off = 370µA, Supply = +28 V _{DC} Off = 180µA, Supply = +13.6 V _{DC}
Diagnostics	Open/short circuit detection
Fly back protection	Integrated

NOTE: 1) Maximum voltage on any input pin +/-32 V_{DC}

Standards

Environmental	SAE J1455	Immunity	89/336/EEC, EN 61000-6-2
Temperature	Section 4.1.3.2	ESD	EN 61000-4-2
Salt Spray	Section 4.3.3.1	EMC	EN 61000-4-3
Steam Cleaning & Pressure Washing	Section 4.5.3.2	EMC	EN 61000-4-4
Vibration	Section 4.10.4.2	RF	EN 61000-4-6
Shock	Section 4.11.3.4	Emissions	89/336/EEC, EN 61000-6-4
Load Dump	Section 4.13.2.2.1.a		EN 55011

Certifications

CE Mark

Mounting

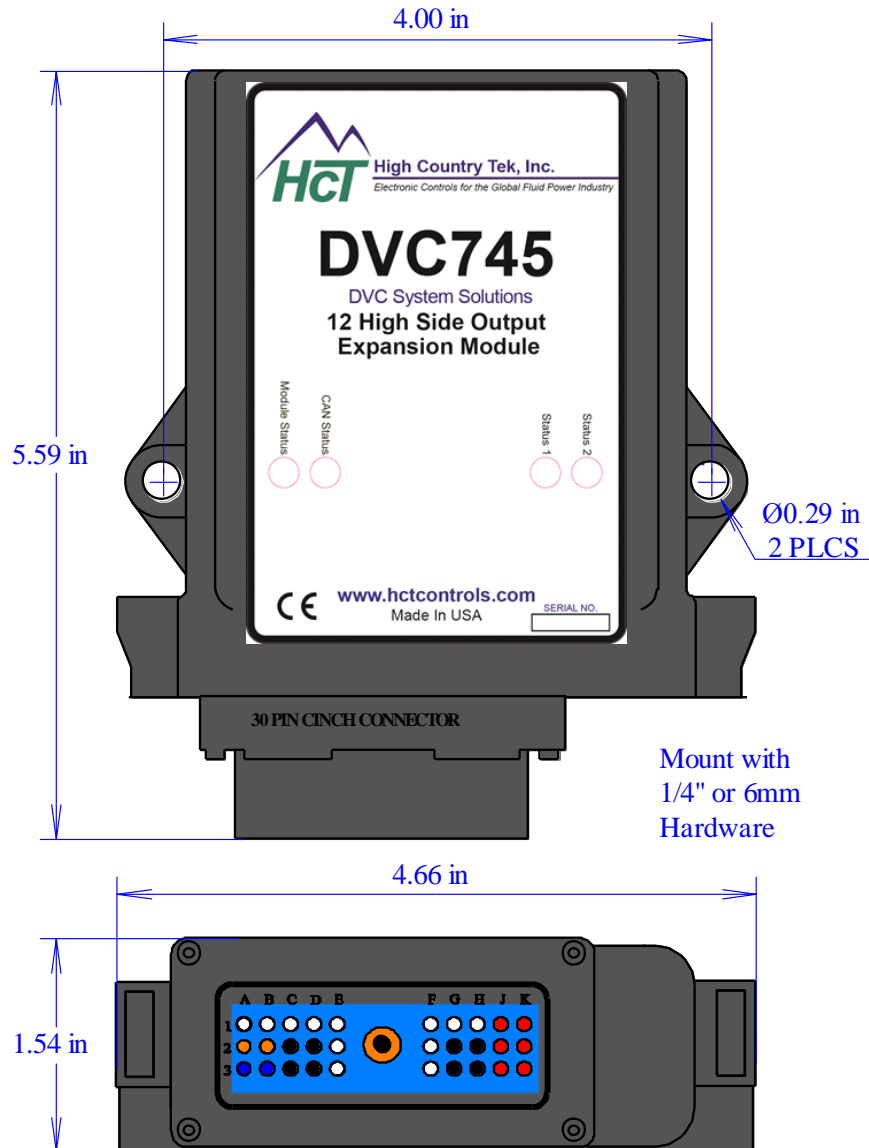


Figure 3 DVC745 dimensions

Notes:

- 1) All dimensions are in Inches (Millimeters).
- 2) Use 1/4 x 20 SAE Grade 2 bolts (M6 x 1 ISO Grade 8)
 - * Torque to 4 ft-lbs (5.4 N-m) Dry
 - * Torque to 3 ft-lbs (4.1 N-m) Oiled
- 2) Mount to a flat hard surface protected from excess heat and moving parts.
- 3) Factory recommended 18-22 AWG (1.02mm to 0.64mm) TXL, XSL, and GXL automotive grade wire
- 4) Each Power pin used must be individually fused with an ATO 5, AGC 5 or smaller fuse

Recommended Operating Parameters / Pin Functions

Pin	Name	Function/Features	Range
J1, K1	Power In 1 (Note: 1)	Positive Power Supply Input Outputs 1 – 4 and Logic	+12V _{DC} to +28V _{DC}
J2, K2	Power In 2 (Note: 1)	Positive Power Supply Input Outputs 5 - 8	+12V _{DC} to +28V _{DC}
J3, K3	Power In 3 (Note: 1)	Positive Power Supply Input Outputs 9 - 12	+12V _{DC} to +28V _{DC}
C2, C3, D2, D3 G2, G3, H2, H3	Power Common (Note: 1)	Return for Power Supply or Signal Com	0 Volts (GND)
A1, B1, C1, D1, E1, E2, E3, F1, F2, F3, G1, H1	Outputs	Sourcing Discreet Output	<p>Default Mode</p> <p>On = +Supply 3,000mA</p> <p>Off = +Supply 370μA, Supply = 28V_{DC}</p> <p>Off = +Supply 180μA, Supply = 13.6V_{DC}</p> <p>LED Mode</p> <p>On = +Supply 3,000mA</p> <p>Off = 2.3V_{DC} 342μA, Supply = 28V_{DC}</p> <p>Off = 1.13V_{DC} 166μA, Supply = 13.6V_{DC}</p>

Notes:

1. Maximum continuous current allowed on any single connector Pin = 8 Amps
2. All limits are guaranteed by testing or statistical analysis
3. Each Power pin used must be individually fused with an ATO 5, AGC 5 or smaller fuse
4. High voltage transient protection is monitored on Power In 1 (Load Dump)
5. Power In 1, Power In 2 and Power In 3 are electrically separate Power Planes
6. Outputs 1 – 4 and the controllers on board logic is supplied from Power In 1
7. Outputs 5 – 8 are supplied from Power In 2
8. Outputs 9 – 12 are supplied from Power In 3

Diagnostic Indicators

Module Status	
LED STATE	MEANING
Off	There is no power applied to the module.
On GREEN	The module is operating in a normal condition.
Flashing GREEN	Device is in standby state. May need servicing.
On RED	Module has an unrecoverable fault.
Flashing RED	Low Supply Voltage.
CAN Status	
On GREEN	Communication established with another Master Controller
Flashing GREEN	Waiting to establish communication with the Master Controller
On RED	J1939 Communications are in a timed out state
Flashing RED	The HCT DeviceNet communication is in a timed-out state
Status 1	
One GREEN Flash	An output has changed its state
On GREEN	Normal operation
Status 2	
On GREEN	Normal operation

Configuration

Getting Started

For programming the DVC745 for use with the DVC707 or DVC710 master controllers, please refer to document number, 021-00163 DVC710 Family System and Programming Guide. Programmable features of the DVC745 for use as a standalone module on a J1939 CAN bus is explained below. Regardless of the type of system that the DVC745 is installed on, the following parameters are set using the Intella® Programming Loader Monitor (PLM) communicating through the modules serial port using communication cable 999-10075 and adapter 108-00119.

- Module Number
- MAC ID
- Module Baud Rate
- CAN bus Type

When used as a standalone module on a J1939 CAN bus the following parameters may be configured by using either the PLM or J1939 communication protocols:

- Output Mode (normal / LED)
- Reset Output Errors with Power Cycle or Command Cycle

Module Status and Serial Number may all be viewed through the Intella® Programming Loader Monitor.

The DVC745 must be powered up, indicated by the Module Status LED, to communicate with the module. Download the PLM software from HCT's website here:

<http://www.hctcontrols.com/software/index.htm>

DVC745 PLM Dashboard Window

The main Dashboard tab on the DVC745's PLM screen displays the current status of all 12 outputs at the same time. The modules MAC ID and supply voltage is also displayed here. The drop down menu for file operations allows the user to read and save data files containing the modules profile information.

Output State

High Side Outputs are Voltage Sourcing outputs; they provide positive voltage to the load. High Side Outputs may be considered to be like a switch, the state of the output may be either true (on/set) or false (off/reset). The resistance of the load along with the system voltage determines the amount of current though the load. Each load must be individually wired from its output connector pin to the load, however a return "Ground" wire back to the DVC745 is not necessary and a local / frame Ground is sufficient.

Output Short

This is an indicator only, it is true when the hardware has detected that the output is shorted to ground. Shorts are detected when the output is in the ON state. Output Errors may be reset with respect to the Reset Outputs Mode.

Output Open

This is an indicator only, it is true when the hardware has detected that the output is Open and there is no path to ground through a load. Open circuits are detected when the output is in the OFF state. When in LED Mode, Open output detection is automatically disabled. Output Errors may be reset with respect to the Reset Outputs Mode.

File Menu

Available in the Intella® Programming Loader Monitor, the File Menu is used to Save / Load configuration files between DVC745 Modules.

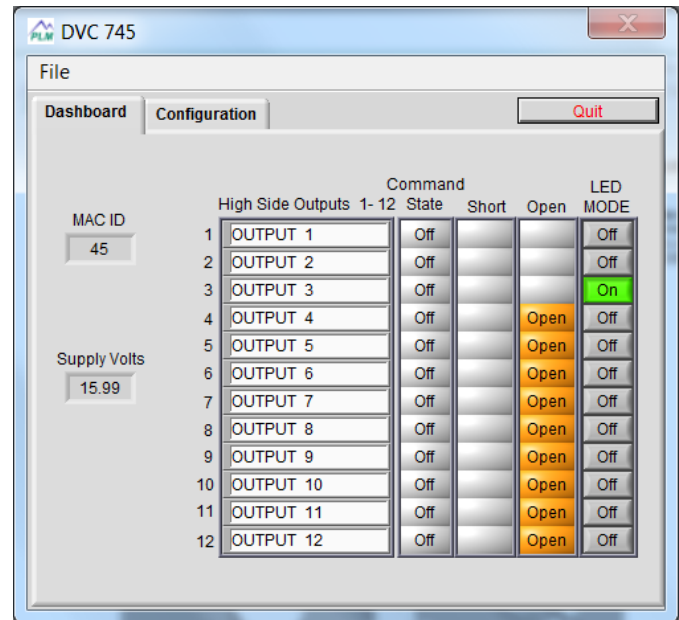


Figure 4 DVC745 PLM Dashboard Window

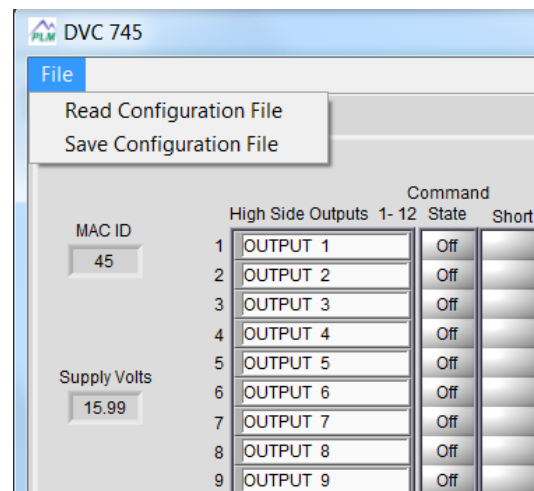


Figure 5 DVC745 PLM File Menu

DVC745 PLM Configuration Window

The Configuration tab is where the user can setup each individual output mode and module settings. Simply select or enter the desired values and select the Save Settings button to send the new settings to the module. Profile changes made here are automatically saved in the modules permanent memory. Password operation beyond Operator is reserved for factory use only.

LED Output / Mode

Configured with the Intella® Programming Loader Monitor or over the CAN Bus. When in LED Mode, the DVC745 will configure its internal circuits to add a pull down resistor on the output pin and prevent the output from dimly driving the LED when off. Open Circuit detection is also disabled in this mode.

MAC ID Number

Configured with the Intella® Programming Loader Monitor, the MAC ID Number is used to Identify the Module on the CAN Bus when connected to a system with a DVC707 / DVC710 Master Module.

Range: 1 to 63

Module ID Number

Configured with the Intella® Programming Loader Monitor, the Module ID Number is used to determine the PGN address scheme used when in J1939 mode.

Range: 1 to 127

CAN Type

Configured with the Intella® Programming Loader Monitor, the CAN Type is used to determine whether the DVC745 will be used as an expansion module with a DVC Master Module or as a standalone module operating on a J1939 CAN Bus.

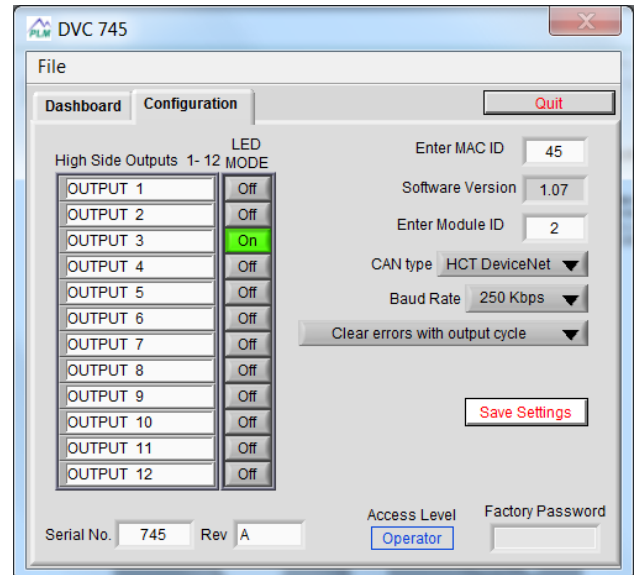


Figure 6 DVC745 PLM Configuration Window

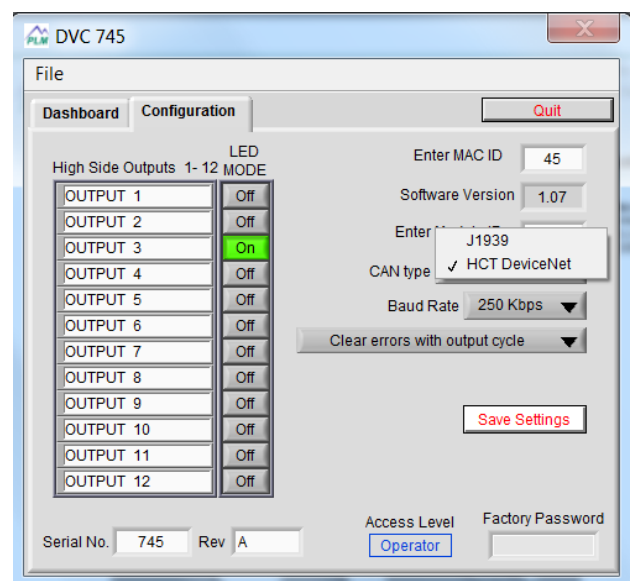


Figure 7 DVC745 CAN Types

Baud Rate

Configured with the Intella® Programming Loader Monitor, the Baud Rate determines CAN bus message rate.

Range: Selectable, 125kB, 250kB, 500kB and 1MB

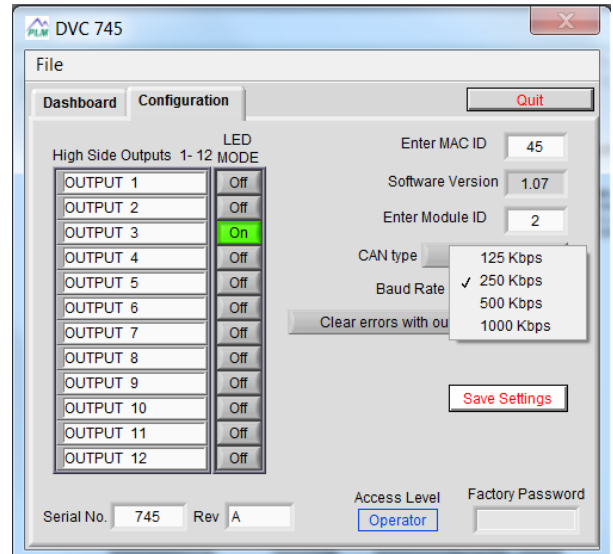


Figure 8 DVC745 CAN Types

Reset Outputs Mode

Configured with the Intella® Programming Loader Monitor or over the CAN Bus, the Reset Outputs Mode is used to determine the behavior of the DVC745 with respect to resetting output errors. When in Reset Open/Shorts with Power Cycle, any output error must be reset by cycling power to the module. When in Reset Open/Shorts with Output Cycle, errors are automatically reset when the command to the output is off.

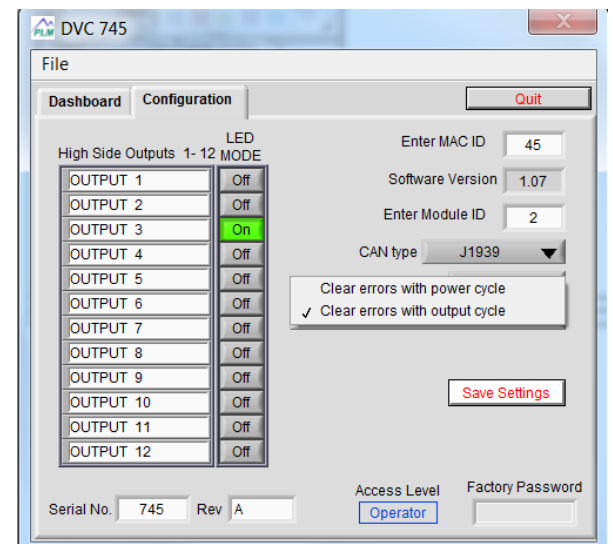


Figure 9 DVC745 Reset Outputs Mode

Save Settings

When making changes to the modules configuration through the Intella® Programming Loader Monitor, Select “Save Settings” to write the changes to the module.

To access previously saved settings, use the file drop down menu and select “Read Configuration File”.

Access Level

Displays the modules current authorized password level (display only).

Factory Password

For factory use only.

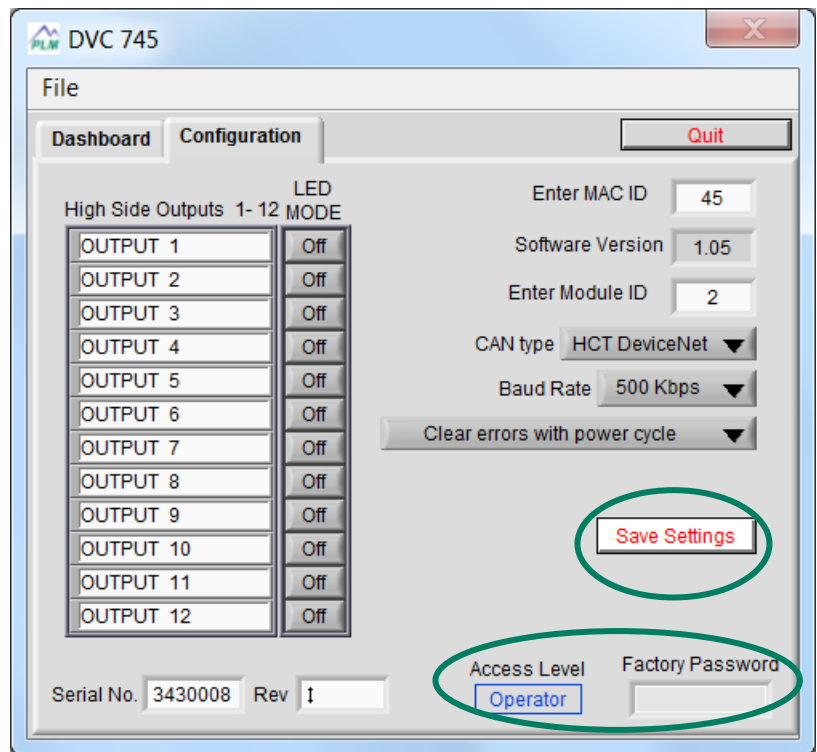


Figure 10 DVC745 PLM Save Settings

J1939 CAN Bus Communication

The DVC745 may be installed directly on a J1939 CAN Bus and operate without the need for a DVC710/707 Master module using the following message format. When in J1939 Mode, the DVC745 will automatically broadcast its status on the CAN Bus using a predefined PGN determined by the Module number assigned to the input module.

The DVC745 transmits and receives all J1939 messages using Source Address 0x22 (Aux Valve Controller) only. The Modules ID number determines which PGN Numbers the module will transmit and receive on the J1939 Bus. It sets the PDU Specific (PS) part of the message header for the Configuration Message that the unit will accept when being configured over the J1939 Bus. For example, a unit with the Module ID of 1 would accept PGN: 0xFF01 SA: 0x22 as a command input. Using this format, the user may command up to 127 separate expansion modules on a single Bus using any number of master controllers. Valid module ID numbers are 1 through 127.

The PGN numbers 0xFF01 through 0xFF7F are used as the Command and Configuration Messages for the DVC745. PGN numbers 0xFF00 and 0xFF80 are reserved for special functions. PGN numbers 0xFF81 through 0xFFFF are used as the complementary Status Messages transmitted by the DVC745. The user can calculate the PGN that the Module will transmit as its Status Message by adding 0x80 to the Module ID. For example, a unit with a module ID of 61 would accept PGN 0xFF3D as a command message and would transmit PGN 0xFFBD as its Status Message, $0xFF3D + 0x80 = 0xFFBD$. A list of Module IDs, Command Message PGNs and Status Message PGNs is listed below.

The DVC745 will transmit its state message whenever there is a state change on one of the outputs or at least once every 1000mS. The DVC745 will transmit a Profile Acknowledgment message each time that it receives and processes a valid profile message. The Profile Acknowledgment message will contain the exact same data field that was received in the profile message and may be used by the controlling ECU to verify that the output was profiled correctly.

The DVC745 expects to receive a command message at least once every 1000mS. If the DVC745 detects a timeout on the command message, it will shut down all outputs and turn the CAN Status LED to RED.

Status Message Format

Transmission Cycle Time: 1000mS or on change.
 Data Length: 8
 Data Page: 1
 PDU Format: 255
 PDU Specific: Module ID + 128 (0x80)
 Priority: 6
 Parameter Group Number: 65409 Through 65535 (FF81 Through FFFF)

<u>Start Position</u>	<u>Length</u>	<u>Parameter Name</u>
1.1	1 Byte	Multiplexer
2.1	1 Byte	Module Type
3.1	2 bits	Output 1 State
3.3	2 bits	Output 2 State
3.5	2 bits	Output 3 State
3.7	2 bits	Output 4 State
4.1	2 bits	Output 5 State
4.3	2 bits	Output 6 State
4.5	2 bits	Output 7 State
4.7	2 bits	Output 8 State
5.1	2 bits	Output 9 State
5.3	2 bits	Output 10 State
5.5	2 bits	Output 11 State
5.7	2 bits	Output 12 State
6.1	1 bit	Output 1 Mode
6.2	1 bit	Output 2 Mode
6.3	1 bit	Output 3 Mode
6.4	1 bit	Output 4 Mode
6.5	1 bit	Output 5 Mode
6.6	1 bit	Output 6 Mode
6.7	1 bit	Output 7 Mode
6.8	1 bit	Output 9 Mode
7.1	1 bit	Output 9 Mode
7.2	1 bit	Output 10 Mode
7.3	1 bit	Output 11 Mode
7.4	1 bit	Output 12 Mode
7.5 – 8.8	10 bits	Reserved

Message Definitions

Multiplexer

Data Length:	1 Bytes
Resolution:	1 bit, 0 offset
Data Range:	0 to 255
Operational Range:	1 to 5
Definitions:	0 – Invalid 1 – Profile Mode 2 – Profile Acknowledgement 3 – Reserved 4 – Command Outputs (DVC745) 5 – Save Profile to Permanent Memory 6...255 – Reserved

Module Type

Data Length:	1 Byte
Resolution:	1 bit, 0 offset
Data Range:	0 to 255
Operational Range:	1 to 2
Definitions:	1 – DVC725 2 – DVC745

Output State

Data Length:	2 bits
Resolution:	1 bit, 0 offset
Data Range:	0 to 3
Operational Range:	0 to 3
Definitions:	0 – Output Off 1 – Output On 2 – Output Open 3 – Output Short

Output Mode

Data Length:	1 bit
Resolution:	1 bit, 0 offset
Data Range:	0 to 1
Operational Range:	0 to 1
Definitions:	0 – Normal Mode 1 – LED Mode

Command / Profile Message Format

Transmission Repletion:	1000mS minimum	
Data Length:	8	
Data Page:	1	
PDU Format:	255	
PDU Specific:	Module ID # 1 – 127	(0x01 – 0x7F)
Priority:	N/A	
Parameter Group Number:	65281 Through 65407	(FF01 Through FF7F)

<u>Start Position</u>	<u>Length</u>	<u>Parameter Name</u>
1.1	1 Byte	Multiplexer
2.1	1 Byte	Module Type
3.1	1 bit	Output 1 Command / Profile
3.2	1 bit	Output 2 Command / Profile
3.3	1 bit	Output 3 Command / Profile
3.4	1 bit	Output 4 Command / Profile
3.5	1 bit	Output 5 Command / Profile
3.6	1 bit	Output 6 Command / Profile
3.7	1 bit	Output 7 Command / Profile
3.8	1 bit	Output 8 Command / Profile
4.1	1 bit	Output 9 Command / Profile
4.2	1 bit	Output 10 Command / Profile
4.3	1 bit	Output 11 Command / Profile
4.4	1 bit	Output 12 Command / Profile
4.5	3 bits	Not Used
4.8	1 bit	Reset Faults With Command Cycle
5.1	4 Bytes	Reserved

Message Definitions

Multiplexer

Data Length:	1 Byte
Resolution:	1 bit, 0 offset
Data Range:	0 to 255
Operational Range:	1 to 5
Definitions:	0 – Invalid
	1 – Profile Mode
	2 – Profile Acknowledgement
	3 – Reserved

- 4 – Command Outputs (DVC745)
- 5 – Save to Permanent Memory
- 6...255 – Reserved

Module Type

- Data Length: 1 Byte
- Resolution: 1 bit, 0 offset
- Data Range: 0 to 255
- Operational Range: 1 to 2
- Definitions:
 - 1 – DVC745
 - 2 – DVC745

Output Command

- Data Length: 1 bit
- Resolution: 1 bit, 0 offset
- Data Range: 0 to 1
- Operational Range: 0 to 1
- Definitions:
 - 0 – Output Off
 - 1 – Output On

Output Profile

- Data Length: 1 bit
- Resolution: 1 bit, 0 offset
- Data Range: 0 to 1
- Operational Range: 0 to 1
- Definitions:
 - 0 – LED Mode Off
 - 1 – LED Mode On

Reset Faults With Command Cycle

- Data Length: 1 bit
- Resolution: 1 bit, 0 offset
- Data Range: 0 to 1
- Operational Range: 0 to 1
- Definitions:
 - 0 – False, Output errors may only be reset by cycling power to the module.
 - 1 – True, Output errors may be reset by cycling the outputs command.

Module ID & PGN Map

Module Id	Command PGN	Status PGN
1	FF01	FF81
2	FF02	FF82
3	FF03	FF83
4	FF04	FF84
5	FF05	FF85
6	FF06	FF86
7	FF07	FF87
8	FF08	FF88
9	FF09	FF89
10	FF0A	FF8A
11	FF0B	FF8B
12	FF0C	FF8C
13	FF0D	FF8D
14	FF0E	FF8E
15	FF0F	FF8F
16	FF10	FF90
17	FF11	FF91
18	FF12	FF92
19	FF13	FF93
20	FF14	FF94
21	FF15	FF95
22	FF16	FF96
23	FF17	FF97
24	FF18	FF98
25	FF19	FF99
26	FF1A	FF9A
27	FF1B	FF9B
28	FF1C	FF9C
29	FF1D	FF9D
30	FF1E	FF9E
31	FF1F	FF9F
32	FF20	FFA0
33	FF21	FFA1
34	FF22	FFA2
35	FF23	FFA3
36	FF24	FFA4
37	FF25	FFA5
38	FF26	FFA6
39	FF27	FFA7
40	FF28	FFA8
41	FF29	FFA9
42	FF2A	FFAA
43	FF2B	FFAB

Module Id	Command PGN	Status PGN
44	FF2C	FFAC
45	FF2D	FFAD
46	FF2E	FFAE
47	FF2F	FFAF
48	FF30	FFB0
49	FF31	FFB1
50	FF32	FFB2
51	FF33	FFB3
52	FF34	FFB4
53	FF35	FFB5
54	FF36	FFB6
55	FF37	FFB7
56	FF38	FFB8
57	FF39	FFB9
58	FF3A	FFBA
59	FF3B	FFBB
60	FF3C	FFBC
61	FF3D	FFBD
62	FF3E	FFBE
63	FF3F	FFBF
64	FF40	FFC0
65	FF41	FFC1
66	FF42	FFC2
67	FF43	FFC3
68	FF44	FFC4
69	FF45	FFC5
70	FF46	FFC6
71	FF47	FFC7
72	FF48	FFC8
73	FF49	FFC9
74	FF4A	FFCA
75	FF4B	FFCB
76	FF4C	FFCC
77	FF4D	FFCD
78	FF4E	FFCE
79	FF4F	FFCF
80	FF50	FFD0
81	FF51	FFD1
82	FF52	FFD2
83	FF53	FFD3
84	FF54	FFD4
85	FF55	FFD5
86	FF56	FFD6

Module Id	Command PGN	Status PGN
87	FF57	FFD7
88	FF58	FFD8
89	FF59	FFD9
90	FF5A	FFDA
91	FF5B	FFDB
92	FF5C	FFDC
93	FF5D	FFDD
94	FF5E	FFDE
95	FF5F	FFDF
96	FF60	FFE0
97	FF61	FFE1
98	FF62	FFE2
99	FF63	FFE3
100	FF64	FFE4
101	FF65	FFE5
102	FF66	FFE6
103	FF67	FFE7
104	FF68	FFE8
105	FF69	FFE9
106	FF6A	FFEA
107	FF6B	FFEB
108	FF6C	FFEC
109	FF6D	FFED
110	FF6E	FFEE
111	FF6F	FFEF
112	FF70	FFF0
113	FF71	FFF1
114	FF72	FFF2
115	FF73	FFF3
116	FF74	FFF4
117	FF75	FFF5
118	FF76	FFF6
119	FF77	FFF7
120	FF78	FFF8
121	FF79	FFF9
122	FF7A	FFFA
123	FF7B	FFFB
124	FF7C	FFFC
125	FF7D	FFFD
126	FF7E	FFFE
127	FF7F	FFFF

Accessories

Order Guide

Part Number	Description
DVC745	12 high side ON / OFF output expansion module, 1x CAN port
999-10075	Communications Cable, multi-controller, 4-way to PC (RS232), 2m length, auto-grade
108-00119	Adapter, USB to RS232, use with 999-10075 assembly, only required if PC has no RS3232 'D' ports
999-10076	Serial port adapter for program updates, 4 wires
999-10318	DVC745, 30 pin connector kit with 1x CANbus (Deutsch) connector shell + pins, and serial port adapter 999-10076, assembly required
999-10313	DVC745, 30 pin prototype harness with 1x CANbus (Deutsch), 3m length, auto grade with serial port adapter 999-10076

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