

**Programmed with HCT's Intella Software Suite™**

23 I/O (14 inputs & 9 outputs), 2 CAN interfaces  
 Supply voltage 9-30Vdc

The DVC710 is a robust programmable controller for solenoid-operated proportional valves. It is uniquely designed with configurable I/O and two CAN communication ports. Its powerful combination of capabilities makes this controller well suited for stand-alone applications or to be utilized as a system master module when combined with the DVC700 series expansion modules.

- Advanced stand-alone programmable controller
- Total system master controller when combined with DVC700 series expansion modules
- Selectable PID closed-loop processes for pressure/speed control
- Configurable inputs and outputs
- Configurable input and output function curves
- Two CAN bus outputs
- Current regulated PWM outputs
- Open/short detection for diagnostics
- Rugged and fully encapsulated
- SAE J1455 environment and load dump compliant
- IP67, 69K
- CE Certified



**Operational Specifications**

|                              |   |
|------------------------------|---|
| <b>Supply Voltage</b>        | 9-30 V <sub>DC</sub> (recommended operating voltage +12 to +28 V <sub>DC</sub> , absolute maximum +/-32 V <sub>DC</sub> ) |
| <b>Supply Current</b>        | 15 Amps (recommended supply current per power pin 5 Amps, absolute maximum 8 Amps)  |
| <b>Operating Temperature</b> | -40 to +85°C  |
| <b>Storage Temperature</b>   | -40 to +100°C   |
| <b>Weight</b>                | 1.34 lbs (0.61 kg)  |
| <b>Dimensions</b>            | L: 5.50 in (140 mm) x W: 4.70 in (119 mm) x H: 1.65in (42 mm)   |
| <b>Enclosure</b>             | Solid potted, industry standard Deutsch enclosure with automotive connectors  |
| <b>NEMA / IP Rating</b>      | NEMA 6P / IP67, 69K   |

**Communication**

|                         |  |
|-------------------------|--|
| <b>CAN 1</b>            | 2.0B (maximum voltage +/-14V <sub>DC</sub> )                                       |
| Baud rates              | 125 kb/s, 250kb/s, 500kb/s, software configurable                                  |
| Protocol                | SAE J1939, HCT DeviceNet   |
| Default baud rate       | 250kb/s  |
| <b>CAN 2</b>            | 2.0B (maximum voltage +/-14V <sub>DC</sub> )                                       |
| Baud rates              | 125 kb/s, 250kb/s, 500kb/s, software configurable                                  |
| Protocol                | SAE J1939  |
| Default baud rate       | 250kb/s  |
| <b>Serial Interface</b> | RS232 (maximum voltage Rxd,RTS = +/-15V <sub>DC</sub> Txd = +/-8 V <sub>DC</sub> ) |

**Inputs**

|                          |   |
|--------------------------|---|
| <b>Digital (Qty 8)</b>   | Discrete high/low, software configurable  |
| Input Range              | 0 to +Supply, (Impedance Z = 32.4KΩ)  |
| Debounce Time            | 0 to 10 seconds, 10ms intervals, software configurable  |
| <b>Analog (Qty 3)</b>    | 0 - 5 V <sub>DC</sub> digital, (Impedance Z > 100KΩ), software configurable (Note: 2)   |
| <b>Universal (Qty 3)</b> | +/-1 V <sub>DC</sub> , 0 - 5 V <sub>DC</sub> , 0 - 10 V <sub>DC</sub> , 4 - 20 mA, digital, pulse (RPM, count, duty cycle, frequency and quadrature), software configurable (Note: 2) |
| Input Range              | Current mode: 0 to +22 mA maximum allowable current, (Impedance Z = 120KΩ)<br>Pulse: RPM/Pulse inputs will accept up to 24kHz on all RPM/Pulse inputs combined                        |

NOTE: 1) Maximum voltage on any input pin +/-32 V<sub>DC</sub>  
2) Analog and Universal inputs have configurable calibration, center and inverse modes

**Outputs**

|                         |  |
|-------------------------|--|
| <b>Digital (Qty 6)</b>  | 3,000 mA sourcing, software configurable   |
| Current Leakage         | Off = 370μA, Supply = +28 V <sub>DC</sub><br>Off = 180μA, Supply = +13.6 V <sub>DC</sub>   |
| Diagnostics             | Open/short circuit detection   |
| Fly back protection     | Integrated   |
| <b>PWM (Qty 3)</b>      | <b>DVC710:</b> 0 - 3,000 mA sinking proportional 10-bit resolution, software configurable<br><b>DVC710LC:</b> 0 - 1,500 mA sinking proportional 10-bit resolution, software configurable |
| Dither Frequency        | 1 - 500 Hz, software configurable  |
| Diagnostics             | Open/short circuit detection   |
| Fly back protection     | Integrated   |
| <b>Reference Output</b> | 0 - 5 V <sub>DC</sub> , (recommended 250 mA, absolute maximum 500 mA)  |

**Standards**

|                                   |                      |                  |                          |
|-----------------------------------|----------------------|------------------|--------------------------|
| <b>Environmental</b>              | SAE J1455            | <b>Immunity</b>  | 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     | <b>Emissions</b> | 89/336/EEC, EN 61000-6-4 |
| Load Dump                         | Section 4.13.2.2.1.a |                  | EN 55011                 |

**Certifications**

**CE Mark**

**Pin Out**

| <b>30 Pin Cinch, (P1)</b> |                 |            |                 |            |                 |
|---------------------------|-----------------|------------|-----------------|------------|-----------------|
| <b>Pin</b>                | <b>Function</b> | <b>Pin</b> | <b>Function</b> | <b>Pin</b> | <b>Function</b> |
| A1                        | RXD             | B1         | CAN 1 H         | C1         | CAN 2 H         |
| A2                        | TXD             | B2         | CAN 1 L         | C2         | UNI 1 INPUT     |
| A3                        | RTS             | B3         | SIG COM         | C3         | SIG COM         |

|    |             |    |               |    |             |
|----|-------------|----|---------------|----|-------------|
| D1 | CAN 2 L     | E1 | 5V REF OUTPUT | F1 | DIG 1 INPUT |
| D2 | UNI 2 INPUT | E2 | UNI 3 INPUT   | F2 | ANA 1 INPUT |
| D3 | SIG COM     | E3 | SIG COM       | F3 | SIG COM     |

|    |             |    |             |    |             |
|----|-------------|----|-------------|----|-------------|
| G1 | DIG 2 INPUT | H1 | DIG 3 INPUT | J1 | DIG 4 INPUT |
| G2 | ANA 2 INPUT | H2 | ANA 3 INPUT | J2 | DIG 5 INPUT |
| G3 | SIG COM     | H3 | SIG COM     | J3 | DIG 6 INPUT |

|    |             |
|----|-------------|
| K1 | + POWER IN  |
| K2 | DIG 7 INPUT |
| K3 | DIG 8 INPUT |

| <b>18 Pin Cinch, (P2)</b> |                 |            |                 |            |                 |
|---------------------------|-----------------|------------|-----------------|------------|-----------------|
| <b>Pin</b>                | <b>Function</b> | <b>Pin</b> | <b>Function</b> | <b>Pin</b> | <b>Function</b> |
| a1                        | + POWER IN      | b1         | HS 1 OUTPUT     | c1         | HS 3 OUTPUT     |
| a2                        | + POWER IN      | b2         | HS 2 OUTPUT     | c2         | HS 4 OUTPUT     |
| a3                        | PWM 1 OUTPUT    | b3         | PWM 1 OUTPUT    | c3         | PWM 2 OUTPUT    |

|    |              |    |              |    |           |
|----|--------------|----|--------------|----|-----------|
| d1 | HS 5 OUTPUT  | e1 | POWER COM    | f1 | POWER COM |
| d2 | HS 6 OUTPUT  | e2 | PWM 2 OUTPUT | f2 | POWER COM |
| d3 | PWM 3 OUTPUT | e3 | PWM 3 OUTPUT | f3 | POWER COM |

**Recommended Operating Parameters / Pin Functions**

Uppercase letters designates the 30-pin connector.

Lowercase letters designates the 18-pin connector.

| Pin                                  | Name                                 | Function/Features  | Range   |
|--------------------------------------|--------------------------------------|--|---|
| K1, a1, a2                           | Power In                             | Positive Power Supply Input  | +12V <sub>DC</sub> to +28V <sub>DC</sub>  |
| C2, D2, E2                           | Universal Inputs<br>(Notes: 3, 4, 6) | Analog<br>Digital<br>Pulse (RPM)<br>Counter<br>PWM<br>Quadrature (Uni_2 & 3) | +/-1 Volt<br>0-5Volts<br>0-10Volts<br>4-20mA  |
| E1                                   | 5V REF                               | Reference Output   | 5Volts, 500mA   |
| F1, G1, H1,<br>J1, J2, J3,<br>K2, K3 | Digital Inputs<br>(Note: 5)          | On / Off.  | 0 to +Supply  |
| F2, G2, H2                           | Analog Inputs<br>(Note: 3)           | Analog<br>Active Low Digital   | 0-5Volts<br>0 to +Supply  |
| b1, b2, c1,<br>c2, d1, d2            | High Side<br>Outputs                 | Sourcing Discreet Output   | On = +Supply 3,000mA (0-1,500 mA<br>DVC710LC)<br>Off = +Supply 370µA, Supply = 28V <sub>DC</sub><br>Off = +Supply 180µA, Supply = 13.6V <sub>DC</sub> |
| a3, b3, c3,<br>d3, e2, e3            | PWM Outputs                          | Sinking PWM Output   | 10 bit resolution, 0 to +Supply<br>0 to 3,000 mA (0-1,500 mA DVC710LC)  |

**Notes:**

1. Maximum continuous current allowed on any single connector Pin = 8 Amps
2. All limits are guaranteed by testing or statistical analysis
3. Input impedance, 100KΩ with respect to Ground (0V<sub>DC</sub>)
4. Input impedance, 120Ω with respect to Ground (0V<sub>DC</sub>)
5. Input impedance, 32.4KΩ with respect to Ground (0V<sub>DC</sub>)
6. RPM/Pulse inputs will accept up to 24kHz on all RPM/Pulse inputs combined

**LED Diagnostic Indicators**

| <b>Module Status</b>  |   |
|-----------------------|---|
| <b>LED STATE</b>      | <b>MEANING</b>                                  |
| Off                   | There is no power applied to the module.        |
| On <b>GREEN</b>       | The module is operating in a normal condition.  |
| Flashing <b>GREEN</b> | Device is in standby state. May need servicing. |
| On <b>RED</b>         | Module has an unrecoverable fault.              |
| On <b>YELLOW</b>      | System Disabled active                          |
| Flashing <b>RED</b>   | Low Supply Voltage.                             |

| <b>CAN Status</b>     |  |
|-----------------------|--|
| <u>Off</u>            | There is no J1939 device (or other DVCs) in the project.   |
| On <b>GREEN</b>       | Communication established with another Master Controller   |
| Flashing <b>GREEN</b> | Waiting to establish communication with the Expansion Modules                                    |
| On <b>RED</b>         | The device has detected an error that has rendered it incapable of communicating on the network. |
| Flashing <b>RED</b>   | One or more messages are in a timed out state.   |

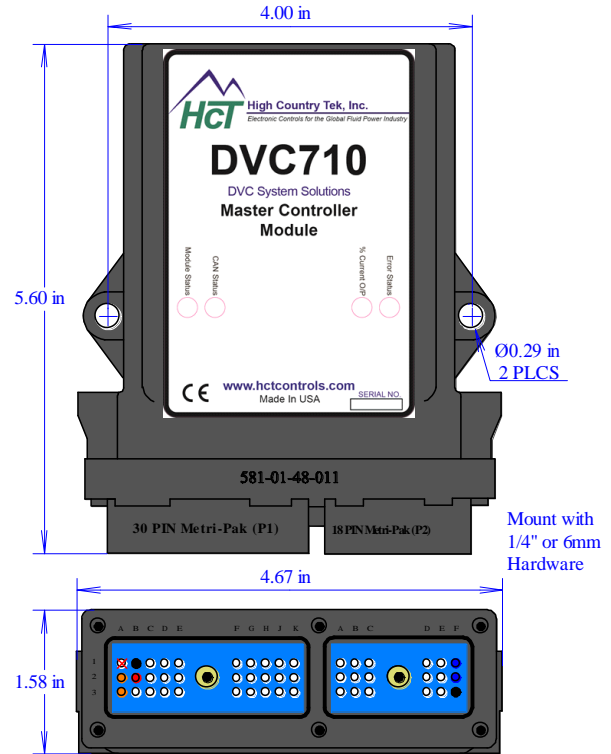
| <b>% Current O/P</b>   |  |
|--|--|
| <b>LED STATE</b>   | <b>MEANING</b>                                 |
| Off (Outputs Disabled) <b>GRN</b> (0-33%) <b>YEL</b> (34-66%) <b>RED</b> (66-100%) |  |
| Flashing <b>GREEN</b>  | PWM or High Side output Open circuit detected  |
| Flashing <b>RED</b>  | PWM or High Side output Short circuit detected |

| <b>Error Status</b>    |                                  |
|------------------------|----------------------------------|
| <b>LED STATE</b>       | <b>MEANING</b>                   |
| Off                    | No errors                        |
| On <b>RED</b>          | PWM 1 Open or Short Detected     |
| On <b>GREEN</b>        | PWM 2 Open or Short Detected     |
| On <b>YELLOW</b>       | PWM 3 Open or Short Detected     |
| Flashing <b>YELLOW</b> | High Side Open or Short Detected |
| Multi Digit Blink Code | Application defined blink codes. |

### Physical Description

**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



### Connections

|                                  |                           |
|----------------------------------|---------------------------|
| <b>Module Connector - 48 Pin</b> | Cinch 581-01-48-011       |
| <b>Mating Connector - 18 Pin</b> | Delphi Packard 15492546-B |
| <b>Mating Connector - 30 Pin</b> | Delphi Packard 15492542-B |
| <b>Mating Connector Pins</b>     | Delphi Packard 12103881   |

### Order Guide

| Part Number      | Description  |
|------------------|--|
| <b>DVC710</b>    | 3x dual channel master controller, 2x CAN ports (0 to 3 Amp output)  |
| <b>DVC710LC</b>  | 3x dual channel master controller, 2x CAN ports (0 to 1.5 Amp output)  |
| <b>999-10279</b> | DVC710 QPS Kit (includes 1x DVC710, 1x 999-10104, 1x 999-10107, 1x 999-10075, 1x 108-00119)  |
| <b>999-10303</b> | DVC710LC QPS Kit (includes 1x DVC710LC, 1x 999-10104, 1x 999-10107, 1x 999-10075, 1x 108-00119)                                    |
| <b>999-10075</b> | Communications Cable, multi-controller, 4-way to PC (RS232), 2m length, auto-grade   |
| <b>108-00119</b> | Adapter, USB to RS232, use with 999-10075 assembly, only required if PC has no RS232 'D' ports                                     |
| <b>999-10076</b> | Serial port adapter for program updates, 4 wires   |
| <b>999-10319</b> | DVC710, 48 pin connector kit with 2x CANbus (Deutsch) connector shell + pins, and serial port adapter 999-10076, assembly required |
| <b>999-10320</b> | DVC710, 48 pin prototype harness with 2x CANbus (Deutsch), 3m length, auto grade with serial port adapter 999-10076                |

**DVC710 Output Features**

|                              |   |
|------------------------------|---|
| <b>Output Groups (Qty 3)</b> | Designed with 3 output groups consisting of 2x digital sourcing outputs and 1x PWM sinking output allowing the user to configure each output group in one of four different configurations. <b>Reference Figures 1 and 2.</b> |
| Dual Coil High-Side          | To be used with proportional dual coil applications   |
| Single Coil High-Side        | Independently control a single proportional output and a single discrete output   |
| Single Coil Low-Side         | Independently control a single proportional output and two discrete outputs   |
| High-Side Only               | Independently control two discrete outputs  |

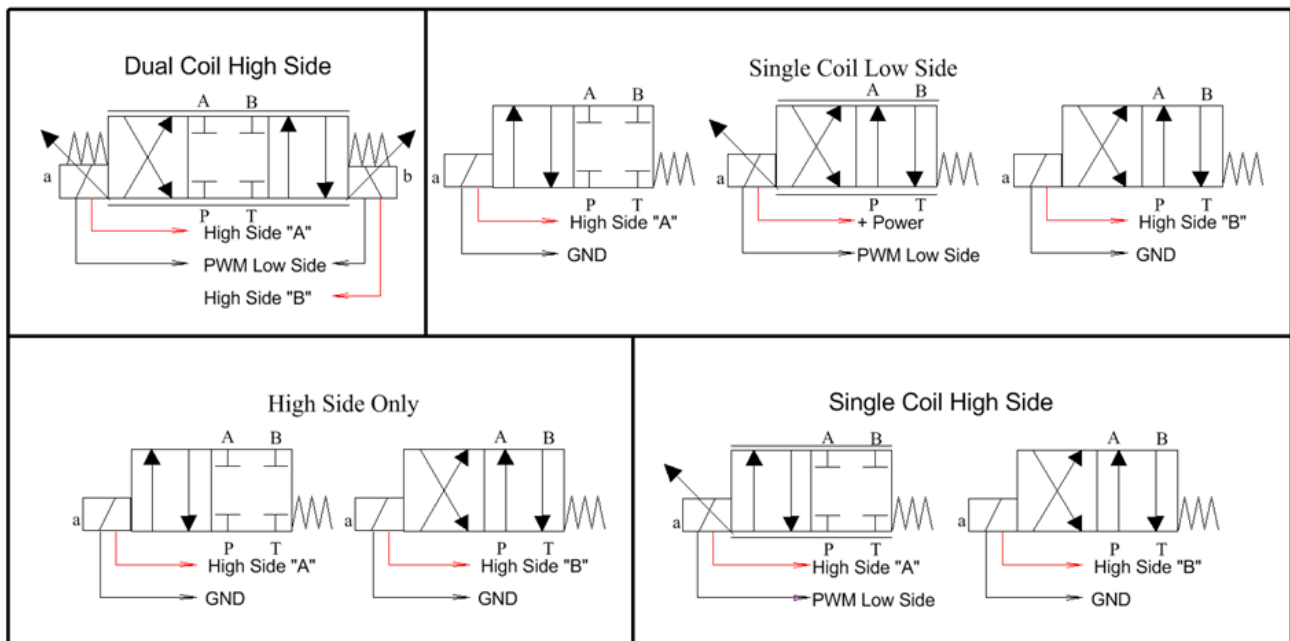


Figure 1: DVC710 output configurations.

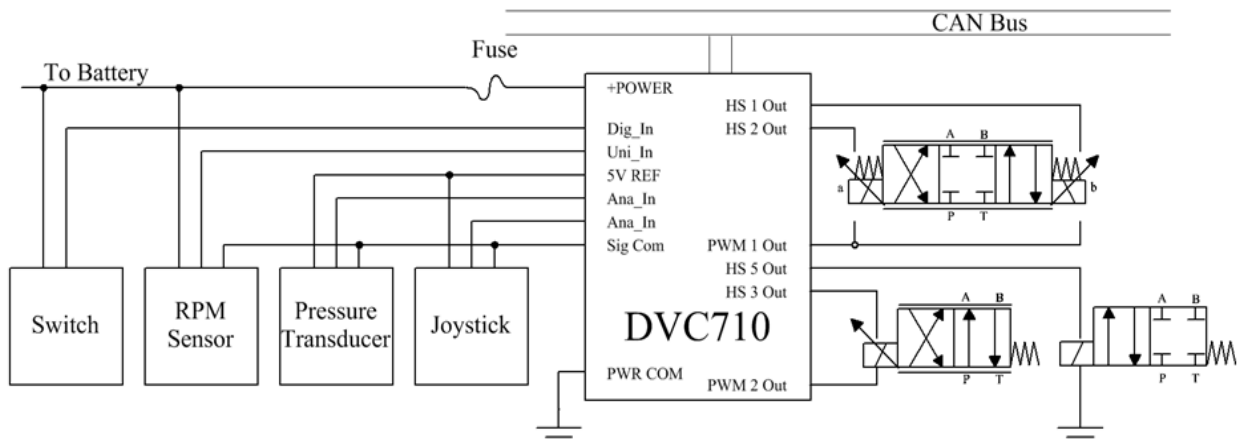


Figure 2: DVC710 example wiring diagram using two different output group configurations.

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