Instruction, Installation and Operation Guide for:

DVC750, Universal I/O Module

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DESCRIPTION

The **DVC750** expansion module is a multi-I/O unit designed to operate in conjunction with a DVC10 master controller module. The large number of additional, individually configurable inputs and outputs make it ideal for more complex applications that need additional operator interface and multi-coil drive capabilities. Several +5VDC regulated user voltages are also provided at the connector to supply power to external sensors or local command sources. To aide programming and make wiring simplified, the input and output groups are the same as the DVC710. The DVC750 communicates with the DVC710 controller through the HCT CAN Bus (high-speed communication) and utilizes a separate RS-232 port for programming, updates, monitoring, diagnostics and features such as setting the MAC ID (node) number e.t.c. The controller is packaged in the standard DVC series enclosure and fully encapsulated to withstand the fluid power harsh operating environments.

TECHNICAL DATA

Analog/Pulse Inputs – Qty (2)
These inputs can be configured as analog (0 to +5Vdc) or pulse (0 to +5Vdc) inputs. A +5Vdc Reference is supplied with each input for an external sensor.

PROGRAMMABLE MODES

A. Analog (0 to +5Vdc)
B. Pulse (0 to +5Vdc)
   1 Pulse Timeout – sets a flag if a pulse has not been detected for a certain amount of time.
   2 Pulses Per Rev – used for calculating RPM.

Note - The maximum pulse rate for each input is 7 kHz.

C. Counter Mode - For Counter pulse inputs, setup the Min and Max counts under Count Limits. The output value will be a percent of Min to Max count. The counter value may be read or set/reset by the application. The counter is incremented on every falling edge of the pulse input.

JOYSTICK/VOLTAGE CONFIGURATION OPTIONS

A. Enable Center - sets up upper and lower configuration for single axis joystick.
B. Deadband – Sets the % of deadband at center.

C. Voltage Calibration – Setting for the actual voltage received at the input (Min, Center and Max).
D. Voltage Limits – sets the Min a Max limits of the input. A flag is set when these limits are met. This feature detects unwanted conditions so that the controller can be safely programmed to a default condition

Note – The input will go high if the input is open (no connection).

E. Invert Output – Simply inverts the output control with respect to the input command.
F. Enable Ramps – applies ramping to the input.
G. Scaling – sets the offset and gain to the input which results to meaningful data displayed in the Loader Monitor.

ANALOG INPUTS – Qty (4)

The Analog inputs have a range of 0 to +5Vdc. A +5Vdc Reference is supplied with each input for an external sensor.

JOYSTICK/VOLTAGE CONFIGURATION OPTIONS

A. Enable Center - sets up upper and lower configuration for single axis joystick.
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DIGITAL INPUTS – QTY (8)

INPUTS 1 – 8 (SINKING)

A. These inputs are sinking (need +5Vdc to +32Vdc to cause the input to switch change states).

B. Indicators – The corresponding green LED will illuminate when the input is activated (programmable active high or low).

PROGRAMMABLE FEATURES

A. Inputs:
   1. Debounce - 0 to 2.5 seconds.
   2. Active High or Active Low.
   3. Toggle (latching) or No Toggle (non-latching) mode.

B. DVC722 programmable features are set by using the Intella Programming Tool and then loaded into the DVC710 Master Module.

C. The MAC ID and Baud Rate settings are set at each DVC722 module through the RS-232 serial port using the Program Loader Monitor. The default value for MAC ID is 22 and baud rate is 125k unless otherwise noted.

INPUT PROTECTION

A. Protected against shorts to ground and voltages up to +32Vdc.

+5Vdc REFERENCE – Qty (6)

All Analog and Analog/Pulse inputs have a corresponding +5Vdc reference output. The maximum current capability is 120mA (sum of all six +5Vdc references). A 5 x 20mm 125ma fuse is located at the back of the module for over-current protection.

Warning: Connecting this output to greater than +5Vdc may cause permanent damage to the DVC750 module.

OUTPUTS – Qty (9)

The outputs are designed to give the user a great deal of flexibility. The software gives the user the ability to manually or automatically control the sourcing voltage (HS OUT) to the positive side of the coil and control the pwm sinking capability (PWM OUT) to the negative side of the coil.

HIGH-SIDE OUTPUTS (HS OUT) – Qty (6)

These outputs are designed to source (supply) power supply voltage when activated. Each output is short protected and has open detection. The maximum current capability is 3Amps per channel.

PWM OUTPUTS (PWM OUT) – Qty (3)

These outputs are designed to proportionally sink current to ground using Pulse Width Modulation (PWM). Each output can be configured for a specified current range. This allows for maximum current sensing resolution for each application. All outputs are short circuit protected and current ranges above 150mA have open and short circuit detection as well.

Current Ranges – Each PWM output can be configured to a current range, which will produce the maximum current sensing resolution (see ordering guide).

Note: Current ranges “L”, “H”, and “D” are short circuit protected but do not have short circuit detection.

OUTPUT GROUPS (3)

The outputs are divided up into 3 output groups. Each output group has (2) High-Side outputs and (1) PWM output.

A. Programmable Features
   1. Dither Amplitude
   2. Dither Frequency
   3. Ramp Up and Ramp Down
   4. PID setting for current regulation and I/O functions.
   5. Min and Max current
   6. Output Group Selection
   7. Process selection including: Current regulation, Enable process PI, Enable current ramps, and PWM Duty cycle mode.

Note: See the DVC710 Programming User Manual for more details on programmable features.

INPUT/OUTPUT FUNCTIONS – Qty (6)

The DVC750 Firmware incorporates six separate Input / Output Functions that can be individually programmed. The I/O Function gives the user the ability to change the relationship of the output with the input (see sample screen below). This gives the user the ability to program a linear response on the output in relation to a non-linear input curve on the input or visa-versa. The input and output being controlled must both reside on the DVC750. The input and output is based on 0 to 100% (Min. to Max.). Different

adjustable points on the response curve give the user full flexibility to control non-linear responses. These functions are adjustable while the controller is running in order to adjust unknown output characteristics.
* Note – See the DVC710 Programming User Guide for more details.

LOCALIZED CLOSED LOOP FUNCTIONS

All inputs have the ability to be used in a closed loop configuration with the outputs locally. Most closed loop configurations such as speed and rpm control require very fast response times. Closing the loop locally, instead of over the CAN Bus on the Master Module, will result in the response needed for these configurations.

COMMUNICATIONS

A. The DVC750 has two communication ports:
   1 Can Bus 2.0B – This port is used to communicate to other DVC modules as well as an ECM (engine control module).
   2 RS-232 serial port is used for:
      i. Downloading and uploading software.
      ii. Monitoring the functions of the DVC750.
      iii. Setting parameters on the fly (fine-tuning).

POWER SUPPLY

A. The DVC750 Power Input has the following features:
   1 Voltage Input Range - 8.0Vdc to 32Vdc
   2 Reverse polarity protection and transient protection up to 1.5K Watts Peak Pulse Power Dissipation
   3 Multiple power and ground pins must be used if driving over 8 amps (at one time).

INDICATORS

A. Digital Input Status (8ea 3mm Green LED)
   1 Turns on when the corresponding input is activated. Inputs can be programmed as active high or low.
B. High-Side Output Driver Status (6ea 3mm Green LED)
   1 Turns on when the corresponding High-side output is activated. Blinks once per second for an open circuit. Blinks four times per second for a short circuit.

C. PWM Output Driver Status (3ea 5mm Red/Green)
   1 These LEDs indicate how hard the module is driving the corresponding channel by displaying the duty-cycle status of the output. The LED will display from red to green as the output duty-cycle changes from 0% to 100% (50% displaying yellow).

D. Module Status (MS) (1ea 5mm Red/Green)
   1 Off – There is no power applied to the Module.
   2 On green – The module is operating in a normal condition.
   3 Flashing green – Device in standby state. May need commissioning.
   4 Flashing red – Recoverable Fault.
   5 On red – Module has an unrecoverable fault.
   6 Flashing Red/Green – Device is in self-test.

E. Network Status (NS) (1ea 5mm Red/Green)
   1 Off - Device in not on-line.
   2 Flashing green – Device in on-line but has not established connection to other nodes.
   3 On green – Device in on-line and has established connection to other nodes.
   4 Flashing red – One or more connections are in a timed-out state.
   5 On red – The device has detected an error that has rendered it incapable of communicating on the network.

PACKAGING

A. Physical Size: 6.2L” x 4.75W” x 1.65H” encapsulated module.
B. Each module has two mounting holes 4.0” a part. Each mounting hole has an I.D. of 0.325”.
C. Weight – 1 lb. 7 oz.

CONNECTORS

A. The DVC722 uses a Cinch 1.5 mm SHS series (or compatible) sealed electronic header designed for severe under-hood environments. IP69K
B. Then CAN Bus connector on the DVC722 is a standard 5-pin M12 type CAN Bus (DeviceNet compliant) connector.

MATING CONNECTORS

A. DVC Series 48-pin Connector Kit: HCT P/N: 999-10077
   Includes the following:

(1) Connector, 30-pin (P16)
(1) Connector, 18-pin (P17)
(60) Terminals
(25) Plugs, Delphi Packard

B. Mating for CAN Bus connector (P18)
   1. 5-pin Female M12 DeviceNet compliant connector.

C. Mating to the RS-232 Port – The RS-232 port is accessed through the 30-pin connector at (P16). A DVC Serial Port Adapter is available to connect to the 30-pin Female mating connector. A DVC RS-232 Cable can then be used to interface from the DVC Serial Port Adapter to a PC. Drawings for these two cables are supplied for user assembly; otherwise they are available from HCT.

   1. DVC Serial Port Adapter: HCT P/N: 999-10082
   2. DVC RS-232 Cable Assembly: HCT P/N: 999-10075

Note: The DVC Slave Serial Port Adapter comes with a plug. The plug is used to keep the cable weather-tight when not connected to peripherals.

ENVIRONMENTAL

- Operating Temperature: -40 Celsius to 70 Celsius
- Storage Temperature: -40 Celsius to 85 Celsius

DVC750 Product Manual

- Mining & Exploration
- Agriculture
- Cranes & lifts
- Refuse & Recycling
- Construction
- Off-Road vehicles
- Forestry, Wood & Pulp
- Reclamation & Salvage
- Oil Field & Sands
- Demolition Equipment
- Cooling Solutions
- Military Apparatus
- Specialty Use
- Remote Control
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- Emission Controls
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