Electro-Hydraulic Control Solutions

Application Information

High Country Tek Inc

AI - 001

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Hydraulic Fan Drives

High Country Tek Inc. leads the industry for hydraulic fan controllers with years of experience and a range of field proven modules, some using discrete temperature thermistors that are readily available through the automotive industry and are a very cost competitive. Controllers such as the **HFS** can operate very well in a 'stand-alone' system making it ideal for retro-fit or system upgrade installations, especially on older equipment that is being re-powered or refurbished.

The latest generation of fan system controllers such as the **HFS-J** and the **DVC 7**, minimize external connections by using the established J1939 communications BUS for the temperature data needed for the fan speed control. This BUS is also used to send system and controller status messages to in-cab instrument clusters to inform the operator in real time of operating conditions and if any action should be taken. To further compliment the digital data, provision has been made for discrete external sensors or switches to be added as required, enabling the user to configure one controller in several different ways, to best suit the application.

The controllers themselves have been designed to operate transparently, be mechanically robust and built to survive extremes of environmental operation that exceed normal expectations for precise control electronics and also offer CE compliance for compatibility with other electronic systems and the units.

The controllers physical robustness is ensured by them being fully encapsulated in a flame resisting resin, giving the units a NEMA 4 or IP67 sealing rating allowing them to be mounted in the engine compartment where cyclic heat, humidity and debris are seen as part of the normal conditions.

To ensure that the controllers maintain integrity and continue to work as designed, the internal components are chosen to have extended temperature operation. All the electrical connectors used are high quality and polarized to aid with wiring harness assembly and avoid mis-connection during insertion, with the most advanced using a multi-pin automotive sealed variety. On all the controllers, complete setting configuration and operation observation can be done via the software on a PC running Windows® , with all critical input/output functions and alarms, annunciated by external LED indicators. All the external visual indicators are designed to be non critical to controller operation in the event that they suffer damage.

Overall physical dimensions of the controllers are kept as small as possible, allowing them to occupy the minimum footprint which allows the application engineers to chose the optimum mounting location.

Controller functionality may vary depending on what the application demands. The simplest (**HFS**) is a three channel temperature unit with just fan speed control. The most complex (**DVC 7**) can be user programmed to cater for several different fluid temperatures, offer fan reverse for radiator 'purge' or de-icing as well as auxiliary inputs and outputs that can interface with multiple external systems such as air-conditioning along with other logic valves and even extended monitoring functions.

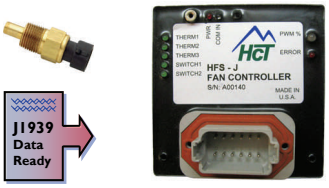
Because all of the fan controllers are programmable, they offer minimum inventory with maximum flexibility. The easy to use Graphical User Interface (GUI) is very intuitive, clear and simple to understand with passwords to protect critical OEM settings while allowing different levels of access authorization to be set. The characterization software allows the user to quickly and successfully tailor the operation to the individual system needs by entering minimal data, with Digital technology ensuring accuracy, repeatability and safe operation of the system.

All controllers offer alarm indicator functions with several offering high current alarm outputs capable of interfacing with external audio or visual indicators that can alert the operator of a system or controller fault code.

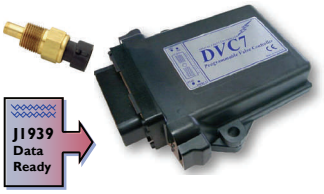
Additional information on all modules shown on this sheet can be found on our website at **www.highcountrytek.com**

Controllers to make life easy:

The **HFS** controller offers precise but simple uni-directional fan operation for up to three channels of temperature measurement. The unit accepts only discrete temperature sensors and can be fully programmed via the PC graphical user interface (GUI) software. This module must be used with the HCT Opto-2000 communications interface that should be ordered separately.

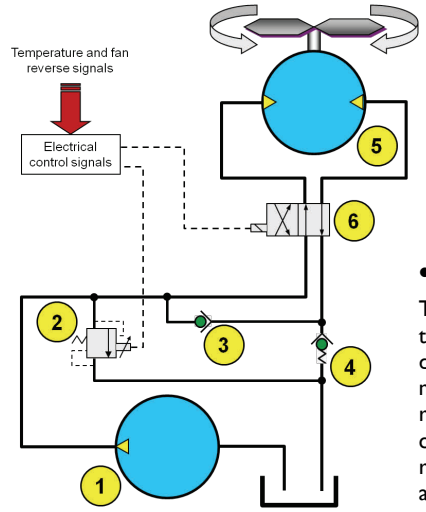


The **HFS-J** controller offers bi-direction fan control and uses the J-1939 data bus to make integration into systems easy and transparent with the minimum of external wiring effort. The option to add up to 2 external sensors is given to make this an extremely flexible controller with multiple circuit configurations possible. Programming is managed through the RS232 port and GUI software.



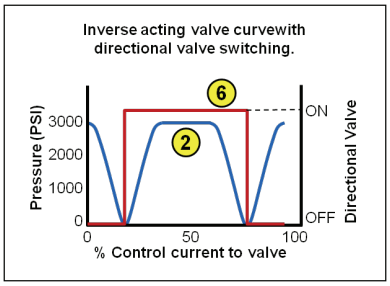
The **DVC 7** controller offers the most design flexibility with multiple Input / Output options that can be user programmed to suit virtually any fan drive application through the HCT Intella™ software. Again J-1939 interface is available as well as discrete I/O as required. This unit is capable of multiple fan drive motor control as may be required for increased heat rejection loads.

Application Information



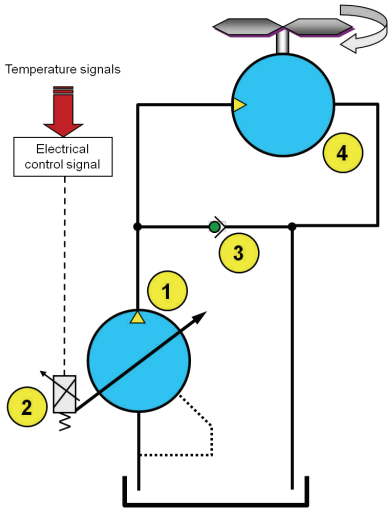
Bi-Directional, fixed displacement system with pressure control.

1. Fixed displacement pump.
2. Proportional pressure control valve.
3. Anti-cavitation check valve.
4. Anti-drain check valve.
5. Fixed displacement motor.
6. Directional valve (fan reverse)



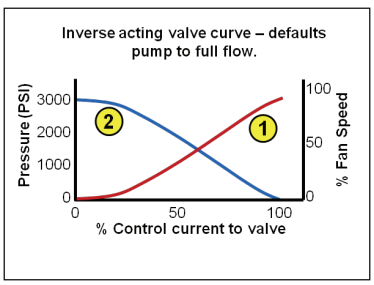
- **Cost Effective**

This easy to use, cost effective solution uses fixed displacement pump and motor products with a reverse acting pressure control valve with full flow relief for safety. The circuit also uses a directional valve to offer the option of a reverse feature to 'purge' or de-ice the radiator. The check valves are fitted to stop cavitation and to ensure the motor is always full of oil after a prolonged period of non operation. Fan speed and reverse operation is fully taken care of by the controller.



Uni-Directional, Variable displacement system with pressure compensator speed control.

1. Variable displacement pump.
2. Pressure control valve (pilot size).
3. Anti-cavitation check valve.
4. Fixed displacement motor.



- **Efficiency**

Variable displacement pumps offer the best power saving opportunities because of the ability to have virtually zero flow. This circuit is shown for a uni directional fan drive but can be easily configured to give reverse operation is required. The pump control in this example uses a reverse operating proportional pressure control pilot valve to control the pumps compensator setting. Again, this circuit is easy to apply and will demonstrate significant fuel savings to the user.

Value Proposition:

The circuits shown above all have some common features that are becoming even more appealing to the end user as we see new legislation and the price of fuel increase.

These configurations have been shown to give reductions in fuel usage as high as 10—20% meaning the vehicle can operate longer on a single full tank.

- **Fan speed on demand.**

Use only the horse Power needed at that moment in time, which reduces engine averaged load and saves fuel usage. Use the 'freed' HP for increasing production and maximizing operation time.

- **Reduce Noise emissions.**

The fan spins only at the speed necessary to cool the fluids to the ideal set-points. This reduces the external noise generation as well as improved operator working conditions.

- **Legislation.**

The accurate cooling offered with these systems can help make an applications engine comply with the latest mandatory regulations for noise and emissions standards.

- **De-coupled from engine.**

The fan is now able to spin independently of the engine RPM. This means that in applications with low engine RPM, the fan can be driven faster to allow cooling or on a cold day, spin slower on a faster RPM application. This ability allows the fluids being cooled to meet the requirements to ensure the engine always runs at the correct temperature.

- **Radiator positioning.**

Being able to remote mount the fan motor also opens up design avenues for the manufacturers regarding radiator placement and positioning on the application. This can improve air-flow and also free up space within the engine compartment.

- **Default to full fan speed.**

This feature ensures that even if the control valve becomes disconnected or the controller loses power, the fan will always be available to cool and protect the engine from overheating.

- **Installation & Maintenance.**

Installing an engine into a chassis with the flexible positioning of a hydraulic fan system is easier and faster than with a fixed fan because the overall engine length is reduced while the maintenance takes less costly time because if the simplicity of the system.

- **Fan Reverse.**

This feature allows the radiator to be cleaned of clogging debris, bringing back efficiency and allowing the cooling system to operate as designed.

- **Reduced operating costs.**

Hydraulic fan drives means NO belts to tighten, NO pulleys to replace and no expensive Cardin shafts with universal joints to lubricate, all of this saving the user expensive labor while decreasing application downtime and increasing operating income.

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