

TECHNICAL NOTE

■ Introduction

To facilitate specifying or servicing of ENVIRCO® MAC 10 fan filter units equipped with specific pressure sensors, pressure switches, and pressure transducer options, this technical note will describe what application the pressure devices are used for along with recommendations on how to prevent them from adversely affecting the associated FFU's operation.

■ MAC 10 Options

There are three primary applications for using pressure switches with ENVIRCO FFUs.

Application 1: Motor Run Indicator Light (IL)

- » For this application, ENVIRCO FFUs are equipped with a green LED that is mounted in the filter frame and is visible roomside. The LED indicator light will be turned ON (green) when motor is operating and will be turned OFF when motor is not operating.
- » There are three different control scenarios used to implement the Motor Run Indicator Light:
 1. IQ and LEDC FFU models can use their motor controller card to determine if the motor is running and then automatically control the light.
 2. For AC motor powered FFUs without motor controller cards, an internal differential pressure switch is used. The differential pressure switch senses and compares both the room air pressure vs. the pressure inside the FFU. After a minimal differential is detected, the pressure switch closes a set of normally open “dry” contacts to switch on the green light.
 3. AC powered FFUs with IR (Infrared Controls) can use the controller mentioned above to control the green light.

Application 2: Filter Load Light (PS)

- » For this application, ENVIRCO FFUs are equipped with a red LED that is mounted in the filter frame and is visible roomside. The LED indicator light will be turned ON (red) when the air pressure at the filter face increases, most likely due to the filter being dirty and blocking airflow.
- » For this application, the functionality is implemented with a differential pressure switch located inside the FFU. The differential pressure switch constantly compares the pressure differential across the filter, and when the pressure increases to 0.65” WC, it will close a set of normally open “dry” contacts to switch on the red Filter Load Light. This is a warning alert indicator that informs to check for proper airflow or velocity through the HEPA filter. High pressure of ≥ 0.65 ” is a condition that is often the result of a very dirty air filter. It is generally recommended to replace your filter when it reaches twice the initial static pressure value.

Application 3: Filter Pressure Monitoring (SPS)

- » A pressure transducer is a device that converts a measured pressure into a corresponding DC voltage. The sensor delivers an output voltage that is typically 0-10 VDC and is scaled linearly across the pressure range. For example, a 0-1” WC pressure transducer will output 0 VDC at 0” WC and 10 VDC at 1” WC. Since the scale is linear, and as an example, the output would be 5 VDC at 0.5” WC.

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- » ENVIRCO is not directly supplying a specific control system design that utilizes such a pressure transducer function, but through its Universal Control Card (noted below), ENVIRCO provides a communication link between pressure transducers and network controllers to relay the sensor reading up to higher level controllers.
- » There are two typical scenarios where pressure transducers can be used to measure and report air pressure performance of ENVIRCO FFUs.
 1. The 0-10 VDC signal is connected from the pressure transducer to a pressure gauge or pressure display device. The gauge or display converts the 0-10 VDC signal into an electronic or electromechanical display.
 2. The 0-10 VDC is has a local output from the transducer but connects electronically to a building management system (BMS) or other control systems. To aid this type of control environment, ENVIRCO provides a means to relay/transfer the 0-10 VDC signal reading back up into the BMS or other motor control network. This is implemented through the Universal Control Card (UCC). The UCC has two terminals for connecting to the 0-10 VDC pressure transducer analog input. The UCC has an onboard analog to digital conversion for converting the 0-10 VDC analog signal from the pressure transducer into a digital value. The digital value is then placed into a register which is addressable and readable from the BMS. This application can only be used with the MODBUS network for control and monitoring. It cannot be used with analog speed control of the FFUs, as analog speed control needs to use the same analog to digital controller for another function.

■ Special Notes

Of significant importance, pressure transducers noted in the above discussion need to be connected to a power supply, as they are not passive devices. Specific care needs to be taken when powering these transducers to prevent electrical problems that may cause faulty FFU operation from occurring. Control power connections to the transducers shall not be borrowed or connected from an FFU circuit inside or out. In some actual cases, users have connected their transducers to the same control voltage that feeds the FFU UCC, but this alone has caused a variety of problems associated with electrical loading and electrical ground coupling occurring through the UCC power signals. Instead of connecting the pressure transducer power supply to the same UCC power source, the pressure transducer must be powered from a different control voltage transformer or a different external source altogether.