USER MANUAL

LPCXpresso1549-Arduino-ACH550 powered automatic fan controller and ventilation system

Chapter 1 - Introduction

This is the user manual for LPCXpresso1549-Arduino-ACH550 powered automatic fan controller and ventilation system. The system consists of three buttons, an LCD screen, a fan and a vent.

The buttons are DOWN, ACTION and UP, respectively. The LCD screen provides user interface for the system. The LCD screen and the fan are both controlled by software and require no physical user interaction. The LCD screen does not come with touch screen capabilities. The vent needs be physically adjusted and it is not controlled by software nor electrical components.

Chapter 2 - Basic Usage and Mode Toggling

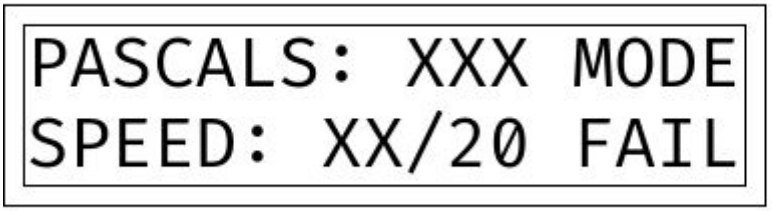

Figure 1: The default run screen of the system. XXX represents the pascal value, MODE is replaced with AUTO or MANU depending of the current mode. XX is replaced by the current fan speed and the FAIL text is shown if the system can not meet the wanted air pressure with the current vent setting.

The system can be run in automatic mode or in manual mode. The mode can be toggled from the MODE SETUP screen which can be accessed by pressing any button when the system is running. The mode can be changed with the DOWN and UP buttons and confirmed with the ACTION button.

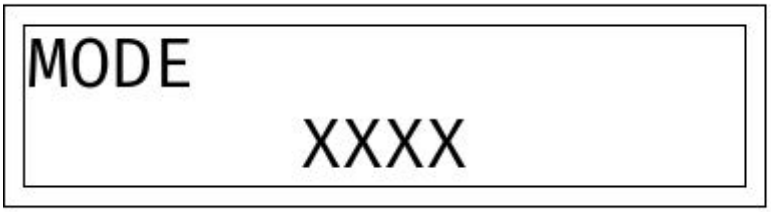

Figure 2: The mode setup screen of the system. MODE represents the current value of the selection which can be adjusted with the DOWN and UP buttons. The XXXX shows the mode independent values which can be adjusted at the mode setting screen in figure 3.

The mode independent values can be adjusted at the MODE SETTING screen which is activated when the ACTION button is pressed in the MODE SETUP. The MODE SETTING screen can be distinguished from the MODE SETUP screen by the brackets around the mode independent value. The value can be adjusted with DOWN and UP buttons, and the current setting can be confirmed with the ACTION button. The MODE SETTING screen will be cancelled after 5 seconds of inactivity. Furthermore, the MODE SETUP screen and its settings will be discarded after 30 seconds of inactivity.

Figure 3: The mode setting screen. In this screen the independent value of the current mode can be determined. The DOWN and UP buttons change the value respectively, and the ACTION button confirms it.

The vent of the ventilation unit is operated with physical interaction. The vent is opened by rotating it counterclockwise. The vent can closed by rotating it in the clockwise direction. The adjustment of the vent affects the pressure in the ventilation. More the vent is open, the lower the pressure will be due to the better airflow. With a tightened, closed vent, the pressure is higher as the airflow is captured inside the ventilation system.

Chapter 2.1 - Automatic Mode

The automatic mode measures the air pressure in the ventilation unit. In this mode, the wanted air pressure can be adjusted to meet the needs of the end-user. This mode automatically adjusts the fan speed to meet the set air pressure demand. The wanted air pressure can be adjusted between 0-120 Pa.

To use the automatic mode, press the any button when the device is powered on, in stand-by or in the default run screen of any mode. This opens the MODE SETUP screen. In the MODE SETUP screen, press the DOWN and/or the UP buttons until the AUTOMATIC MODE option is selected. Confirm the selection with the ACTION button. This opens the MODE SETTING screen in which one can set the wanted air pressure. The wanted air pressure can be adjusted with the DOWN and UP buttons. The DOWN button decrements the wanted air pressure and the UP button increments it. After confirming the setting with the ACTION button, the device runs in automatic mode with the set air pressure value.

As the system uses only a small fan not meant for actual ventilation system, a high air pressure can not be met if the ventilation is adjusted too open, as the air pushed from the fan to the ventilation unit goes straight through it. If an error message, FAIL, is shown at the bottom-right corner of the LCD screen, adjust the vent of the ventilation unit by rotating the vent clockwise to a point where it is closed enough for the air pressure requirements to be met.

Chapter 2.2 - Manual Mode

In manual mode, the fan speed is user-defined and it is not automatically adjusted by the wanted air pressure. The fan speed can be set in-between values 0-20, in which the 20 represents the maximum speed of the fan.

To use the manual mode, press the ACTION button when the device is powered on and is running a mode. This opens the MODE SETUP screen. In the MODE SETUP screen, press the DOWN and/or the UP buttons until the MANUAL MODE option is selected. Confirm the selection with the ACTION button. This opens the MODE SETTING screen in which the fan speed can be set. The fan speed can be adjusted with the DOWN and UP buttons. The DOWN button decrements the fan speed and the UP button increments it. After confirming the setting with the ACTION button, the device runs in manual mode with the set fan speed.

The air pressure can be adjusted by changing the fan speed and/or physically adjusting the ventilation unit. The current air pressure can be seen at the PASCALS field of the LCD screen when the system is running in the manual mode.

Chapter 2.3 - Standby Mode

The standby mode is a power saving mode. In this mode, the fan does not operate at all but the controls of the systems are enabled.

The standby mode can be enabled from the MODE SETUP screen. The MODE SETUP screen can be accessed from the DEFAULT RUN screen shown in figure 1 by pressing any button. In the MODE SETUP screen press DOWN and UP buttons until the STANDBY is selected. Confirm the selection with the ACTION button. This opens the MODE SETTING screen in which the setting YES or NO can be chosen with DOWN and UP buttons. Confirm the selection with the ACTION button. The device enters the standby mode if YES is selected and into normal operation by selecting NO.

As the standby mode is a mode in which the fan does not operate at all, the system does not do its basic ventilation procedure. In this mode, the device responds to the user input as normal, yet it does not operate the fan at all. If the standby mode is enabled when the system is in operation, the operation is returned after the standby mode is disabled.

Chapter 3 - Troubleshooting

PROBLEM:	SOLUTION:
A wanted pressure can not be achieved in the automatic mode even though the fan is operating at full speed. The LCD screen is showing FAIL in the bottom-right corner.	The fan does not provide enough airflow for high pressure when the vent is fully opened. Please consider adjusting the vent by rotating the vent clockwise for the airflow to be enough for the wanted pressure.
The LCD does not accept touch input.	The LCD does not provide touch capabilities. The system is operated with the physical buttons. Refer chapter 2 for the button operation.
The vent is stuck and can not be adjusted. The vent might appear to be rotating but the vent is not opening/closing.	The ventilation unit might require some aggressive user interaction. The rotating vent itself is made of two parts. Remove the top part of the vent by wedging a sharp object in between the parts and crack it open with the leverage to separate them. The lower part is easier to get loose when the top part is not attached.
The fan does not spin when the fan speed is set to a low number in the manual mode.	For extremely low fan speeds an user interaction is required for the fan to start spinning. Gently tap the fan counterclockwise for it to start spinning.
The LCD / fan / automatic mode does not work.	Check the wiring. As the system is a prototype with unsoldered components, a loose wire making poor contact is a possibility. The software itself is flawless and can not be the culprit in this scenario.
The fan does not spin regardless of the mode setting.	Check that the system is not in standby mode, as the device is responsive yet unoperational while standby is enabled.
The ITM-console prints weird messages with undocumented values I do not understand.	The ITM-console is for debugging purposes and does not need an end-user interaction. The messages mean that the system is working and is programmed perfectly.