Industrial HAT

Datasheet

Version 1.1

Teleron

CONTENTS

Table List

Figure List

1. Overview

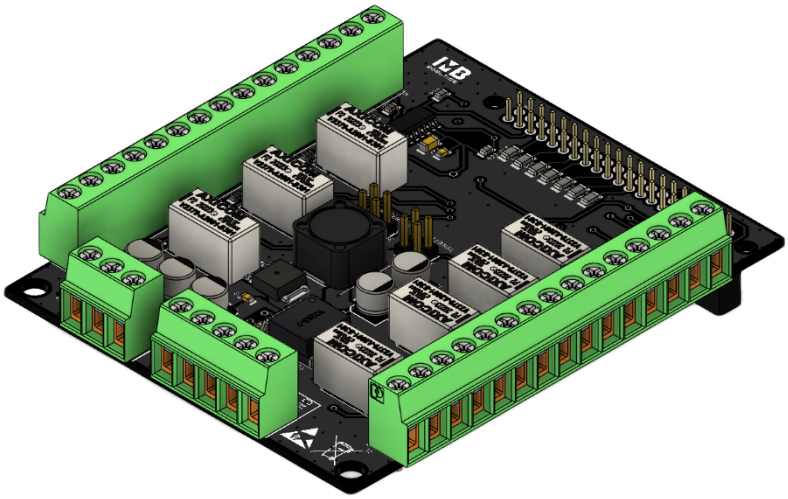

Figure 1: Overview of Industrial HAT

HAT, is an all-singing all-dancing monitoring and automation board, with three each of 0-24V tolerant inputs, relays, ADC (analog to digital converter) channels that allow you to read voltages from 0-24V (also ampere from 4-20mA).

Any of them are great for monitoring and controlling devices in your home, as much of the control circuitry in your home appliances will operate at 12 or 24V.

Table 1, shows the characteristics of Board.

Table 1: Features of Industrial HAT

Category	Items	Features
Hardware	Module Interfaces	SPI, I2C, EEPROM ADC, Relay
	Input Voltage Range	5V or 8V to 40V
	Rated Ampere	5A
	Minimum Ampere	3A
	Operating Junction Temperature Range	−40 to 125°C

2. Terminal Definitions

2.1 Terminal Layout

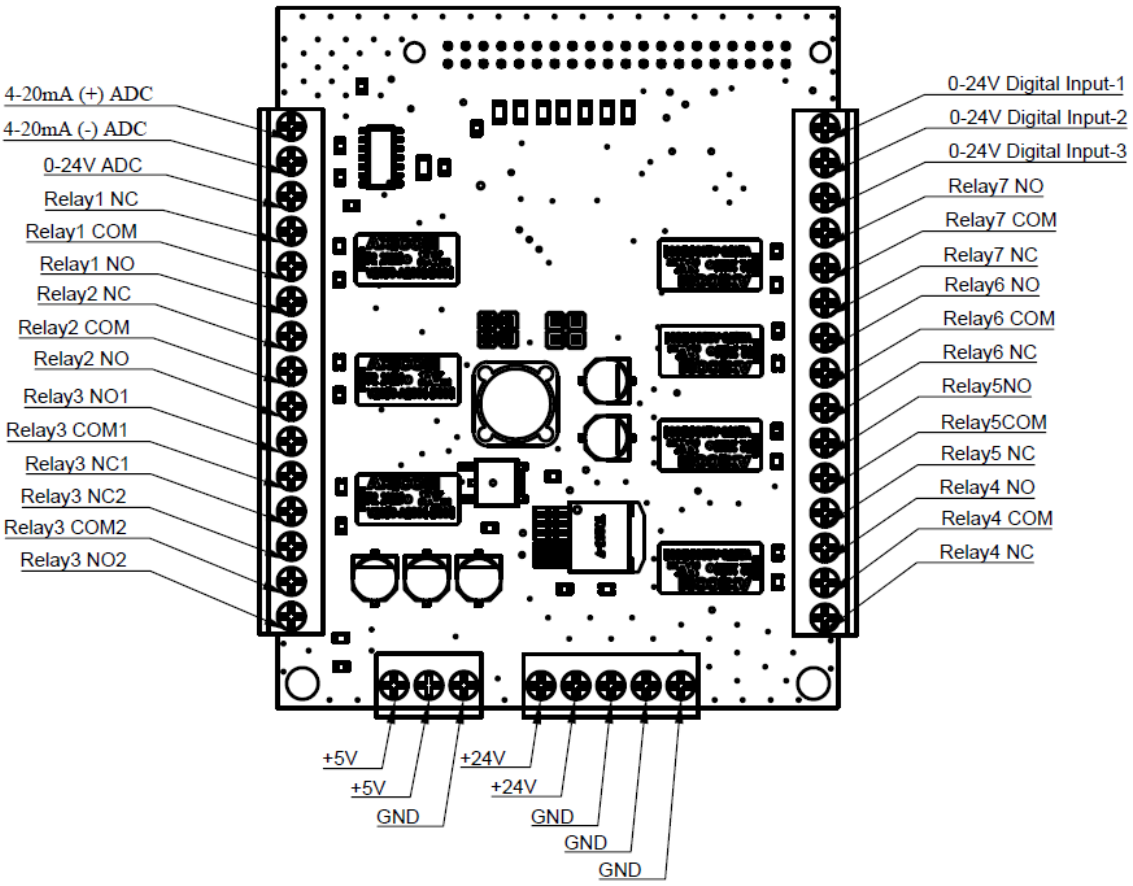

Figure 2: Industrial HAT Terminal Layout

2.2 Terminal Description

Industrial HAT has 38 terminals. Terminal definitions appear in Table 2.

Table 2: Terminal Descriptions

Definition	Type	Description
4-20mA (+) ADC	ADC	Analog Input in the 4-20 mA range
4-20mA (-) ADC	ADC	Analog Input in the 4-20 mA range
0-24V ADC	ADC	Analog Input the 4-20 V range
Relay1 NC	Relay	Normally Close Contact of Relay1
Relay1 COM	Relay	COM Contact of Relay2
Relay1 NO	Relay	Normally Open Contact of Relay1
Relay2 NC	Relay	Normally Close Contact of Relay2
Relay2 COM	Relay	COM Contact of Relay2
Relay2 NO	Relay	Normally Open Contact of Relay2
Relay3 NO1	Relay	1st Normally Open of Relay3
Relay3 COM1	Relay	1st COM Contact of Relay3
Relay3 NC1	Relay	1st Normally Close Contact of Relay3
Relay3 NC2	Relay	2nd Normally Close Contact of Relay3
Relay3 COM2	Relay	2nd COM Contact of Relay3
Relay3 NO2	Relay	2nd Normally Open Contact of Relay3
+5V	Power	5V Power Input
+5V	Power	5V Power Input
GND	Power	GROUND
+24V	Power	24V Power Input
+24V	Power	24V Power Input
GND	Power	GROUND
GND	Power	GROUND
GND	Power	GROUND
Relay4 NC	Relay	Normally Close Contact of Relay4
Relay4 COM	Relay	COM Contact of Relay4
Relay4 NO	Relay	Normally Open Contact of Relay4
Relay5 NC	Relay	Normally Close Contact of Relay5
Relay5 COM	Relay	COM Contact of Relay5
Relay5 NO	Relay	Normally Open Contact of Relay5
Relay6 NC	Relay	Normally Close Contact of Relay6
Relay6 COM	Relay	COM Contact of Relay6
Relay6 NO	Relay	Normally Open Contact of Relay6
Relay7 NC	Relay	Normally Close Contact of Relay7
Relay7 COM	Relay	COM Contact of Relay7
Relay7NO	Relay	Normally Open Contact of Relay7
0-24V DI-1	Digital Input	Digital Input in the 0-24V
0-24V DI-2	Digital Input	Digital Input in the 0-24V
0-24V DI-3	Digital Input	Digital Input in the 0-24V

2. Functional Descriptions

3.1 Feed Options

Industrial HAT offers two different feeding options for ease of use.

According to the feed to be given to the Industrial HAT supply input, the feed option determined by the jumper is connected from the headers.

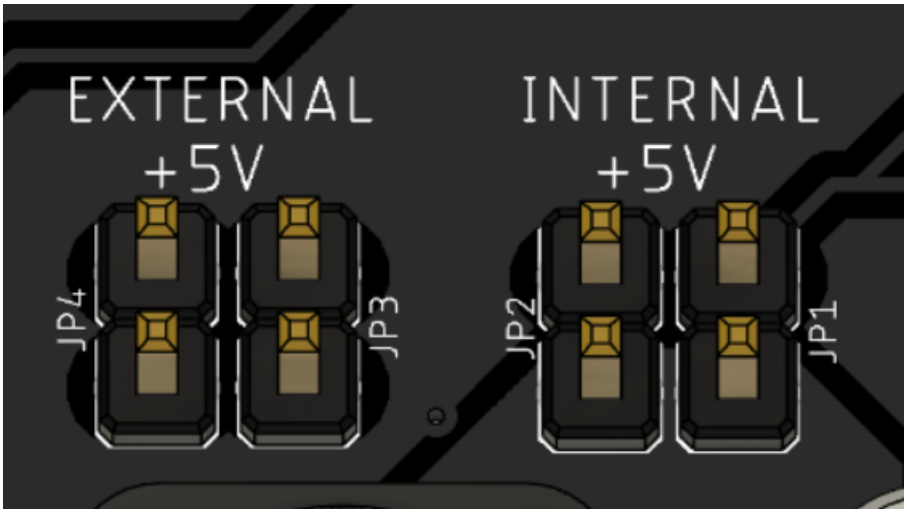

Figure 3: Feed Options

If 5V is connected to the supply input of the Industrial HAT; EXTERNAL +5V headers are connected to each other.
If 24V is connected to the supply input; INTERNAL +5V headers are connected to each other.

3.2 Analog Channels

The analog channels will return a floating point number between 0-24 or 4-20, representing the voltage and ampere measured on each channel. The one screw terminal connected channel is tolerant up to 24V.

Note that the ADC channels have an approximate ±2% accuracy, and you should take this into account when looking at your readings.

One of the three analog inputs on THAT are 24V tolerant.

The 24V tolerant input have a basic voltage divider, using 120k and 820k resistors, that divides up to 25.85v down to the 0-3.3v range supported by the ADC. This slight over-range is compensated for in the library.

Two of the three analog inputs on the Automation Board are 4-20mA tolerant.

The input with a tolerance of 4-20mA performs the reading with a resistance of 249R. Slight over-range is compensated for in the library.

The measurements made with the ADC are transferred to your development board using I2C communication.

Please see the document section of your development board (Raspberry Pi etc.) you have used to view the data via I2C communication.

The I2C pins correspond to the following pins on the Raspberry Pi:

- SDA -> GPIO2
- SCL -> GPIO3

3.3 Inputs

There are 3 digital inputs with tolerance up to 24V on the Industrial HAT.

The three input channels are, again, tolerant up to 24V. Their state will be low below 1V, high between 3 and 24V, and undefined (either low or high) between 1 and 3V (these are approximate, not exact values). When read, they will return 0 for low and 1 for high.

The GPIO pins corresponding to the digital inputs when used with Raspberry Pi are listed in Table 3. For the GPIO pins corresponding to the digital inputs, check the corresponding pins on the development board you have used.

Definition	Description	Pin Equivalent
0-24V DI1-1	1st Digital Input	GPIO26
0-24V DI1-2	2nd Digital Input	GPIO19
0-24V DI1-3	3rd Digital Input	GPIO13

Table 3: Input Pins

3.4 Relays

Relays are mechanical switches that are turned on and off by an electromagnet on one side. They work in much the same way as the outputs, although they can tolerate up to 2A each and should be switched on the high side rather than the low. Plus, they have the advantage of having both normally open and normally closed sides.

Which side you choose to use - the normally open or normally closed - depends on the default state you want. If you're switching a device that will be switched off a majority of the time and then will be switched on then you'll want to use the normally open side, and if your device will be switched on a majority of the time and then switched off then you'll want to use the normally closed side.

The relays are closed in the first state and the control of the relays is done with GPIO pins. If the relevant GPIO pin of the relay to be used is pulled high (1), the relay will become active and the led in front of the relevant relay will turn on.

The respective GPIO pins of the relays are shown in Table 4 for Raspberry Pi. Check the corresponding pins on the development board you will use.

Definition	Pin Equivalent
Relay1	GPIO4
Relay2	GPIO17
Relay3	GPIO27
Relay4	GPIO22
Relay5	GPIO10
Relay6	GPIO9
Relay7	GPIO11

Table 4: Relay Pins

3. Dimensions

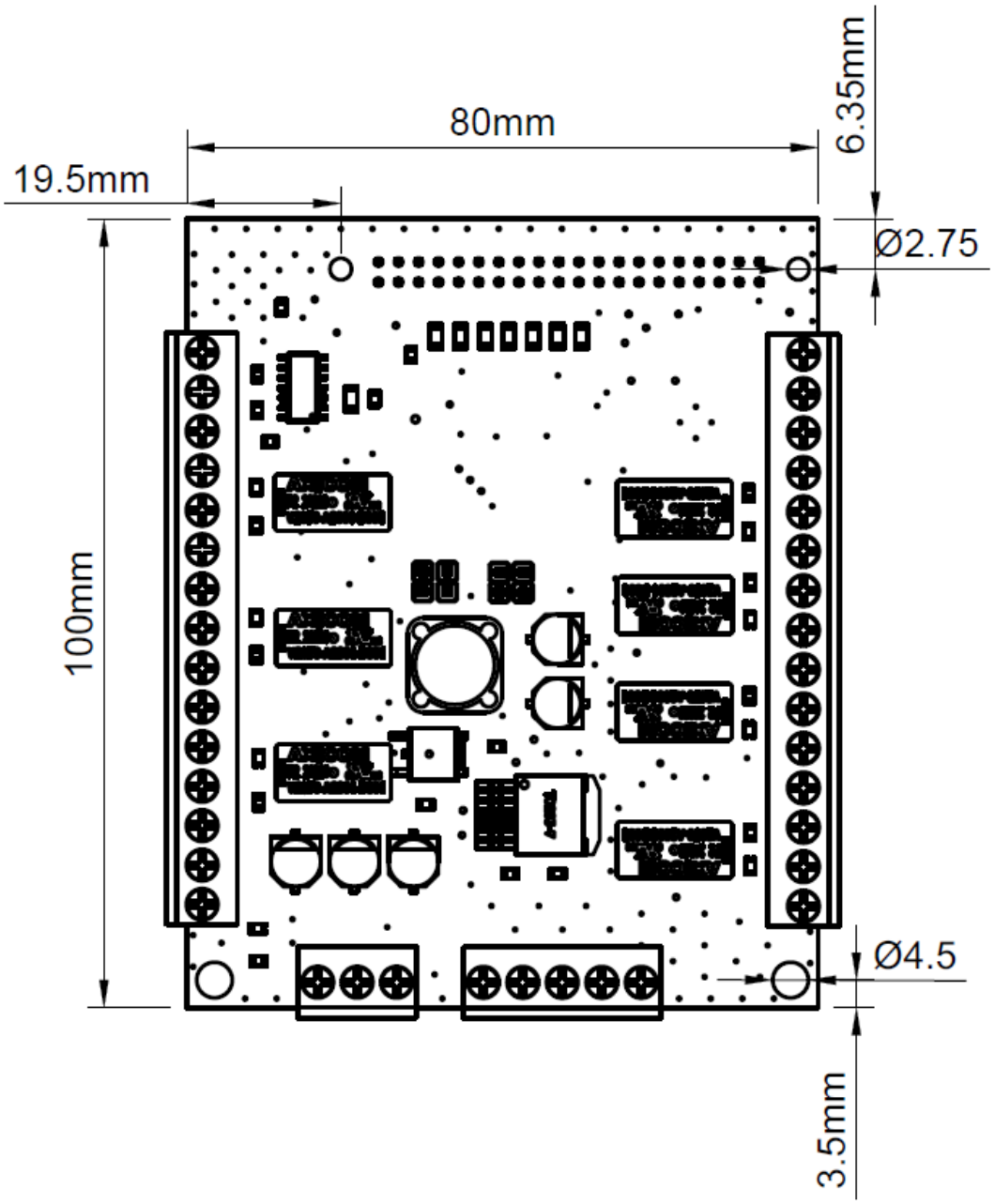

Figure 4: Dimensions