

# HMI-L

Human Machine Interface - Lite  
P/N's: 10000033 & 10000070



## Product Features

- 2.8" capacitive touch TFT (240x320 pixels)
- Red + Green indication LED
- µSD port
- Wireless Connectivity- 2.4GHz (IEEE 802.15.4)
- RS485
  - UART rate 115200 bps
- Powerful MCU NXP ARM Cortex-M0+ @40 MHz
- On/off microswitch
- Real Time Clock with backup supply
- Temperature and humidity sensor
- 64 kbit EEPROM
- 1 Mbyte FLASH Memory
- PCB Connection to J-Link Needle
  - Adaptor for development/programming software

## Product Description

The HMI-L is a small inexpensive display unit. It can be used as a room thermostat or the main controller in low cost products.

## General Specifications

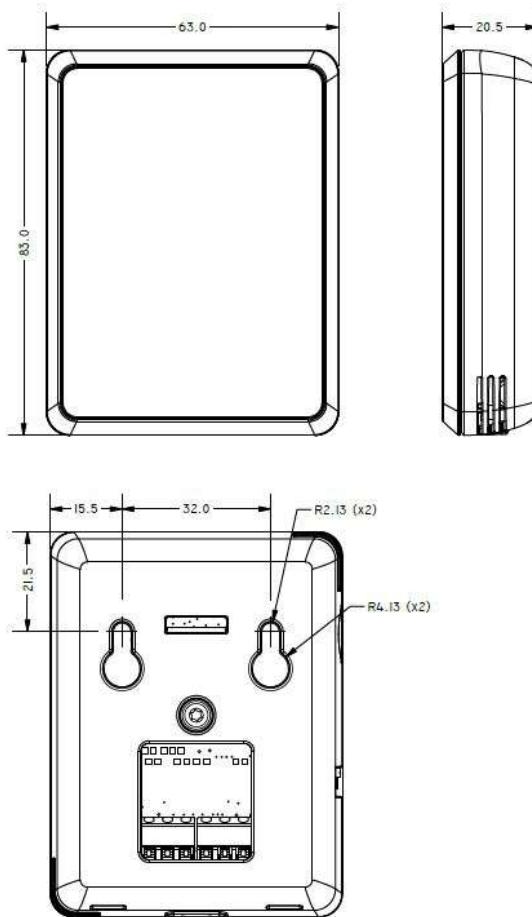
### **Environmental**

Operating Temperature Range: 0°C to + 55°C  
Storage Temperature Range: -40°C to +70°C  
Operating Humidity Range: 0% to 90% Non-Cond.  
Storage Humidity Range: 0% to 80% Non-Cond.  
Pollution Degree: 2  
Degree of Protection: IP20

### **Electrical**

Rated Supply Voltage(s): 5VDC, 12VDC, & 24VAC  
Current Consumption (Max Load): 250 mA @ 5V  
Overvoltage Category: I  
Rated Impulse Voltage: 0.33kV  
ESD Immunity: ±4kV Contact Discharge, ±8kV Air Discharge  
Maximum Cable Length: 50m

### **Dimensional Data**



## Safety Classification

### General

- Functions as the thermostat/control for geothermal heat pumps/ appliances.
- It is classified as a Class III, independently mounted, temperature/humidity sensing, operating electronic control with Class A functions and Type 1 actions.
- Terminals are for internal and external conductors.

### Disclaimers-Information to End User

A copy of the DoC (Declaration of Conformity) should accompany the end product when distributing it within the EU.

Any changes or modifications by an end user, not expressly approved by the party responsible for compliance, could void the user's authority to operate the equipment.

Contact the manufacturer if any issues arise at the following address:  
 myUpTech AB  
 Box 14  
 285 21 Markaryd  
 Sweden

Note: This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. If this equipment does cause harmful interference to radio or television reception, which can be deterred by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Increase the separation between the equipment and receiver.
2. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
3. Consult the dealer for help.

This device contains license-exempt transmitter/receiver that complies with Innovation, Science and Economic Development Canada's license-exempt RSS(s).

Operation is subject to the following two conditions:

1. This device may cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Le present appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisee aux deux conditions suivantes:

1. L'appareil ne doit pas produire de brouillage, et
2. L'utilisateur de l'appareil doit accepter tout brouillage radioelectrique subi, meme si le brouillage est susceptible d'en compromettre le fonctionnement.

### Compliance

The HMI-L has been designed and tested to comply with the following standards:

- Safety
  - UL 60730-1 and UL 60730-2-9
  - CSA E60730-1 and E60730-2-9
  - EN 60730-1 and EN 60730-2-9
- Radio/Wireless
  - FCC CFR 47 Part 15 Subpart C and RSS-247
  - EN 300 328 v2.1.1
  - EN 301 489-1 v2.2.0 and EN 301 489-17 v3.2.0
  - EN 62311: 2008/EN 50566:2017
  - RED Directive 2014/53/EU
- Environmental
  - RoHS Directive 2011/65/EU and Directive 2015/863

### Markings

Per the noted compliance approvals, the following markings shall be included on all HMI-L Assemblies. There will be (2) labels located on the back of every HMI-L assembly.

- Applicant: myUpTech AB
- Manufacturing Year/Week/ Sequence Number: Unique
- Supplier Number: Unique
- Type I.D./ Article No.: Unique
- Serial No./Date Code: Unique
- QR Code
  - <....standard...>
- CE Marking
- UL Listed Component Marking (File E508387)
- FCC ID: 2AS2W-10000026
- IC: 24959-10000027
- HVIN: 10000033 or 10000070
- Voltage Rating: 5VDC, 12VDC, 24VAC
- WEEE Trash Bin
- Class III Control Symbol

Additionally, more information can be found on the display screen. At first power-up or by cycling power to the device, users can view the IC Identification Number,

the FCC Identification Number, Firmware Version Identification Number and the following statement:

"The device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation."

## Features and Connectors

### TFT Display

The HMI-L uses a TFT LCD touch display to interface with the user. It is connected to the PCB at connector X6.

TFT Display PH240320T086-LAC02 Specifications		
Resolution	240 (RGB) x 320 Dots	
Screen Size	71.12 mm (2.8 inch)	
Active Area	43.2 mm (W) x 57.6 mm (L)	
Viewing Area	44.2 mm (W) x 58.6 mm (L)	
Viewing Angle	60° in all directions	
Average Backlight Brightness	220 cd/m <sup>2</sup> (typ.) PWM controlled	
LED life time	20000 Hrs	
Touch Type	Projective Capacitive	
Input Method	Finger / max 5 Points Touch	
Response Time	31 ms (Typ.)	47 ms (max.)

Connector X3 TFT Display Connector	
Pin No.	Description
1	3V3
2	LED1 PWM controlled brightness
3	LED2 PWM controlled brightness
4	LED3 PWM controlled brightness
5	LED4 PWM controlled brightness
6	3V3
7	GND
8	3V3
9	3V3
10	NC
11	GND
12	GND
13	GND
14	GND
15	GND
16	GND
17	GND
18	GND
19	GND
20	GND
21	GND
22	GND
23	GND
24	GND
25	GND
26	GND

27	GND
28	GND
29	GND
30	GND
31	GND
32	GND
33	CS
34	GND
35	RS/SCL
36	GND
37	RESET
38	SPI MISO
39	SPI MOSI
40	3V3
41	GND
42	TOUCH I2C SCL
43	TOUCH I2C SDA
44	TOUCH I2C RESET
45	TOUCH I2C INT

### ABS Plastic Housing

The PCBA and display are housed in a (2) piece plastic case. An optional back plate for mounting is also available to allow for installation flexibility.

The plastic case is made of PC/ABS 45FS, which is cURus under File #E122538. It is rated UL94 HB and is rated HB40 at a thickness of 3mm and HB75 at a thickness of 1.5mm per the IEC 60695-11-10 test standard. It is white in color (NCS S 0500-N) and has an outer surface finish according to NS-1043.

### Microprocessor

- NXP MKW41Z512VHT4R Cortex M0 @ 40 MHz
- External Crystal Frequency of 32 MHz
- Maximum RF Power Transmitted: 3.5dBm
- Radio Operating Frequency Range: 2405 MHz to 2480 MHz
- Number of Channels: 16
- Bandwidth: 2MHz

### Peripherals

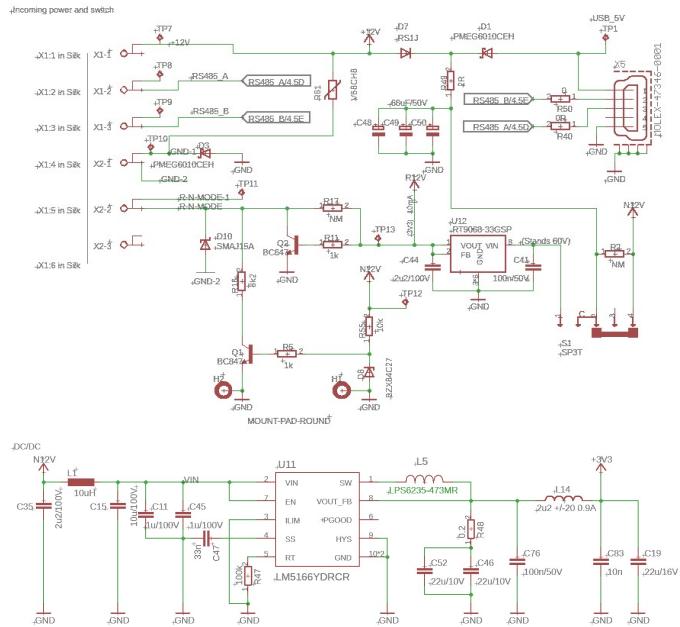
- EEPROM of 64 kb
- RTC
- 1 Mbyte flash memory

### Sensors

- Internal NTC thermistor 5%: 0°C to + 55°C
- Temperature and humidity sensor:
  - Temperature: 5-55°C +/- 0.4°C
  - Humidity: 20-80 %RH +/- 3 %RH

## Internal Power Supply

The HMI-L can handle a supply voltage of 5 VDC using the micro USB port X5, and 12 VDC or 24 VAC using the 6-pole connector X1.

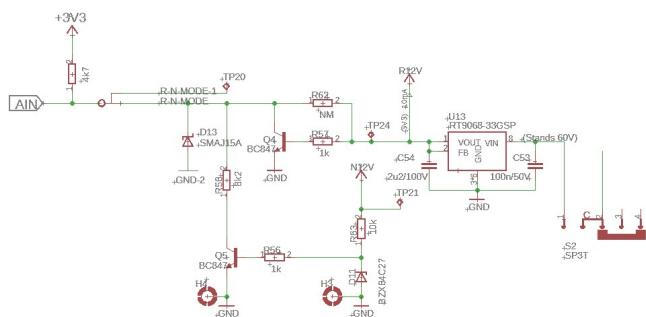


## Incoming Power and RS 485

Communication and power are connected to X1. The HMI-L communicates with products over RS485.

Using the switch S1 the HMI-L can be switched ON/OFF or into an emergency recovery mode depending on what certified model is being used. Model 10000033 is only able to be switched ON or OFF, but model 10000070 can be switched ON, OFF, or into R-N Mode (emergency recovery mode).

When recovery mode is selected the HMI-L will not function, but its LEDs will be turned on to their maximum brightness. A connected board can sense that this mode has been selected using a pullup resistor and analog input as seen in the following example.



## Connector X1 Power Input and RS485

Pin No.	Description
1	5VDC, 12VDC, or 24VAC
2	RS485 A
3	RS485 B
4	GND
5	R-N-Mode
6	NC

## Flash Memory

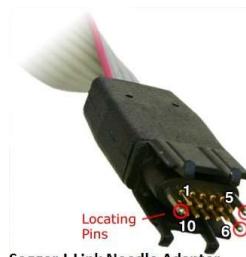
For the unit to be updated via IEEE 802.15.4 the new firmware must be entirely downloaded to the HMI-L then checked and applied. This is done by storing the downloaded firmware in a 1Mbyte flash memory chip.

The flash memory chip communicates using SPI.

## JTAG Interface

A Segger J-Link needle adapter (8.06.04 J-LINK 10-PIN NEEDLE ADAPTOR) is used for connecting the programming device to the HMI-L. It is connected directly to the PCB in position X6.

X6 JTAG Programming Interface	
Pin No.	JTAG Signal Name
1	VTref
2	SWDIO/TMS
3	GND
4	SWCLK/TCK
5	+5V
6	SWO/TDO
7	RTCK
8	TDI
9	/TRST
10	SRST



Segger J-Link Needle Adapter

## Micro SD

The HMI-L is equipped with a Micro SD slot, which can be used to upload new firmware and optionally store log files.

### Connector X4 MicroSD Card

Pin No.	Description
1	NC
2	SPI CS
3	SPI MOSI
4	3V3
5	SPI CLK
6	GND
7	SPI MISO
8	NC
11	CD (1)
12	GND

## Micro USB

The HMI-L can also be optionally powered via micro-USB by connecting to connector X5. Connector X5 also has the capability to communicate through pins X5-2 and X5-3.

### Connector X5 Micro USB

Pin No.	Description
1	5V
2	RS485 B
3	RS485 A
4	NC
5	GND

## Summary of PCB Connectors

Below is a list of all connectors included as part of the HMI-L.

### Connectors

Pos.	PCB Connector
X1	WAGO Push Fit – 6 Pole (P/N: 2060-1453/998-404)
X3	Molex FPC for TFT display (P/N: 54104-4531)
X4	Molex MicroSD card slot (P/N: 503398-1892_SD)
X5	Molex Micro USB port (power only) (P/N: 47346-0001)
X6	N/A- Pads for JTAG Adaptor

### LED Indicators

LEDs 1 and 2 are located adjacent to each other and shine through the same hole in the screens plastic case appearing as 1 LED. The LED light sequence is user configurable.

### LED Summary

Designator	Indicates	Color
LED1/2	Status	Green/Red

## HMI-L PCBA

