Kinetico SystemHub

User Manual

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1 REVISION HISTORY

1.1 Revision History

Rev.	Date	Description	Prepared By	Reviewed By	Approved By
1.0	05-Nov-18	Initial draft version released	Kinetico	Kinetico	

Table 1 - Revision History

1.2 References

Documents	Revision

Table 2 – References

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2 USING THIS MANUAL

2.1 Purpose and Audience

This document provides Introduction, key features, design platform Architecture and interfaces, setup and use of Kinetico SysHub. It is intended for the users who are configuring this product. The user need to use this product to protects your home or building from water damage 24/7 with smart home technology that detects water leaks, alerts the home owner, and shuts off the main water supply automatically to prevent any further damage–even if disaster strikes and Internet is down.

2.2 Summary of chapters

Chapter No.	Chapter	Description
3	Overview	Describes Introduction, block diagram, Specifications, key features and the protocols it supports. Includes technical specifications.
4	Design Architecture and Interfaces	Describes Hardware interface idea and wireless technology support details.
5	Installation of SysHub	Describe details of List of content in box of product and how to install it on field
6	Setup of SysHub	Describes setup and configuration procedure with Wi-Fi using mobile application.
7	Contact us and support	Instructions for contacting Kinetico and Technical Support details
8	Appendix A	Acronyms and Glossary – Full forms of used short names
9	Appendix B	SysHub compliance details

Table 3 - References

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3 OVERVIEW

The "Kinetico SysHub" is a smart, customize, advance Product for next generation water leakage detection and damage prevention system with the help of leak detect sensor in Internet of Things. It also automatically shuts off the water as soon as a leak is detected during sensor is configured in Protect Mode. It is targeted for multiple use cases in various segments of IoT such as **Smart Home and Buildings**. The Kinetico SysHub is designed with core features like **ZigBee** and **Wi-Fi** Connectivity.

- Connect
  - SysHub monitors the home 24/7 for water leaks to help avoid water damage.
- Protect
  - The system can immediately detect both leaking water and dropping temperatures using water leak sensors. The water alarm sensor will alert the system to automatically shut off the home's water supply when a water leak is detected.
- Trust
  - Your home's water is shut off as soon as a leak is detected. Plus, you can remotely control your main water valve from anywhere.

3.1 Components

- **Kinetico Hub** - If a water leak is detected in your home, the SysHub receives the signals from the leak sensors placed in your home and directs the Valve to immediately shut off your home's water supply to eliminate the threat of water damage.
- **Kinetico App** – A new version of app that shall deliver instant notification when a leak is detected in your home that your water is subsequently shut off. Additionally, it shall alert you on your smart device if certain temperatures are reached or if sensor batteries are running low.
- **Kinetico Cloud** - Kinetico Cloud shall be based on Ayla Cloud which is a completely managed service that provides a full suite of operational, business intelligence, and analytics services to manage a cloud connected deployment throughout its life-cycle.

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3.2 Kinetico SysHub Block Diagram

Kinetico SysHub is one of the component of Kinetico System which is a Full Home Water Leak Detection System.
Kinetico is the customized hub for their next generation of leak detection and prevention system.

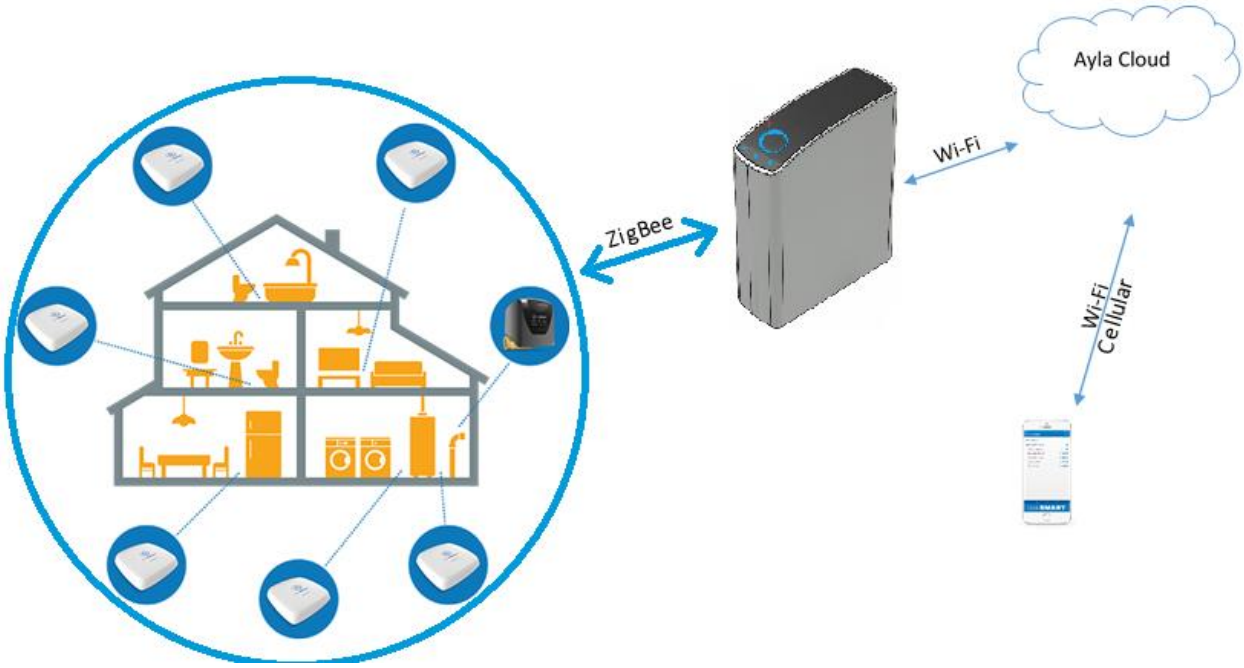

Figure 1 - Kinetico SysHub Block Diagram

3.3 Kinetico SysHub - Specifications and Features

Hub Kit Content	1. Hub with battery pre-installed 2. Power adapter 3. Quick start guide
Power Adapter	Input of Power Adapter: 100-240V AC / 50-60Hz Output of Power Adapter: 5V DC, 1A Type: Wall plug mount Pin standard: NEMA 1-15P (two-pole, no ground)
Primary supply	Through AC/DC power adapter
Secondary supply	Built-in, field replaceable Li-Po battery pack Uninterrupted switching to secondary supply in absence of primary supply.
Backup on secondary supply	Up to 3.5 hours continuous operation of the product.
Battery	Li-Po battery (18350 cell)- 3.7V, 850mAh
Wi-Fi	802.11 b/g/n, WPA-PSK, WEP, PCB Trace Antenna, Wi-Fi compliant
ZigBee	802.15.4 (2.4 GHz)
Antenna diversity	Support for ZigBee Antenna 1: PCB trace antenna

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	Antenna 2: Chip antenna
Flash	8MB
Operation Buttons	1x User input (Wi-Fi Provisioning) 1x Factory reset 1x Power On/Off
Status Indicator	1x RGB LED
Operating System	FreeRTOS
Certification:	FCC, IC
Operating Temperature	0C to 45C
Storage Temperature	-20C to 45C (Driven by battery specifications)
Operating Humidity	10%~90%RH (Non-condensing)
Storage Humidity	10%~90%RH (Non-condensing)
Enclosure Dimensions (in mm)	92 x 35 x 90 mm (L x W X H)
Weight (in g)	90gram

Table 4 - Kinetico SysHub specifications

Note: The Primary source of power is Adapter and battery is only used for backup when primary source is not present.

3.4 Protocol & Security Support

The SysHub contains a full-featured wireless software stack:

- AP and Station Mode for Wi-Fi
- ZigBee
- WPA/WPA2 Personal

3.5 Wi-Fi Addresses and Port Numbers

3.5.1 Hardware Address

The hardware address of Wi-Fi is also referred to as the physical address, or MAC address. Sample ways hardware address may be represented:

- 00-80-A3-14-1B-18
- 00:80: A3:14:1B:18

3.5.2 Port Numbers

Every TCP connection is defined by a destination and source IP Address, and a destination and source port number. For example, a Telnet server commonly uses TCP port number 23.

The following is a list of the default server port numbers running on the Kinetico SysHub:

- **TCP Port 443**: HTTPS (Web Manager Configuration)
- **TCP Port 80**: HTTP (Web Manager Configuration)

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3.6 Kinetico SysHub information Label

The Kinetico SysHub information Label on the device contains the following information about the specific unit:

- Label-1
  - Company logo
  - Model Name
  - Serial Number
  - MAC Address
  - Wi-Fi module FCC ID
  - Wi-Fi module IC ID
  - FCC ID
  - IC ID

e.g.:

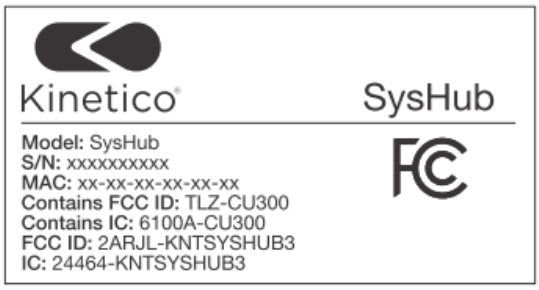

Figure 2 - Product Label-1 inside battery holder

- Label-2
  - Company logo
  - Serial Number
  - Wi-Fi MAC Address
  - QR Code with Serial Number and Wi-Fi MAC Address details

e.g.:

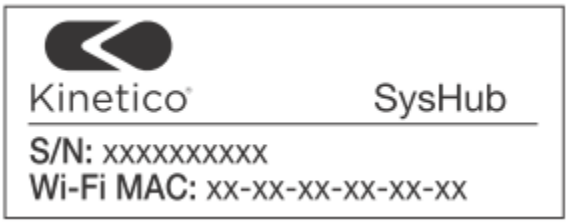

Figure 3 – Serial Number Label-2 on the bottom side of enclosure

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4 THE KINETICO SYSHUB USER INTERFACES

The Kinetico SysHub implements an advanced next generation wireless interfaces like Wi-Fi and ZigBee. This section provides information about different user interactions of SysHub.

The basic user interaction diagram is shown as per below image:

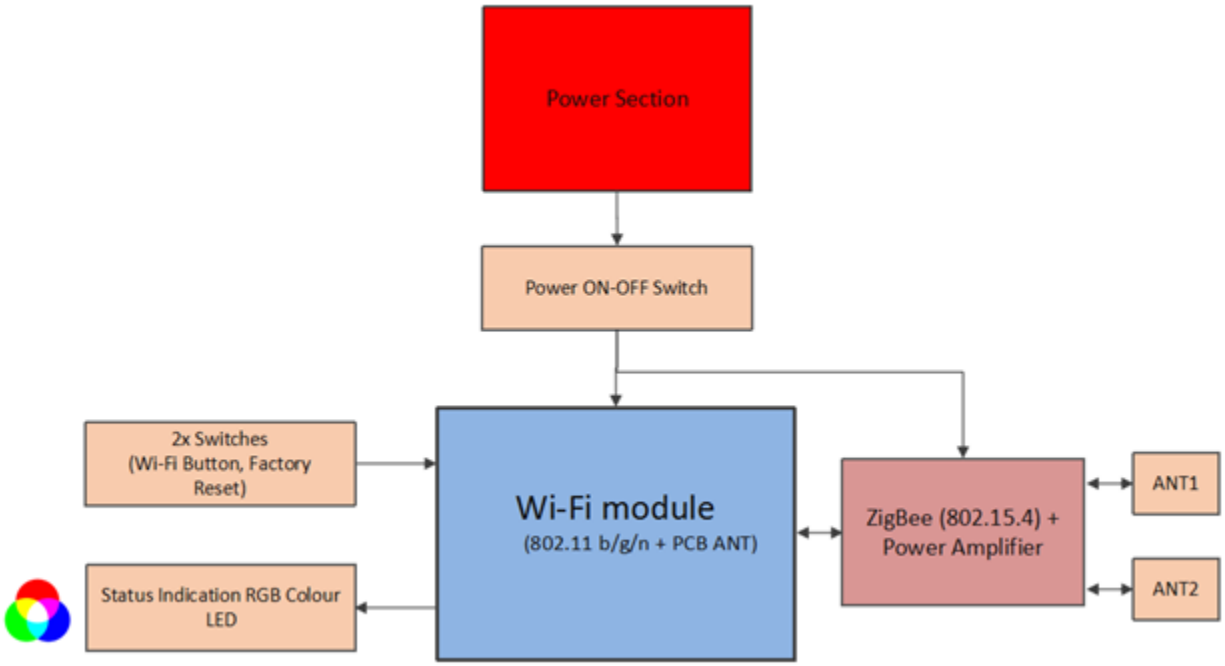

Figure 4 – User interaction Block Diagram

The above diagram has following main Sections:

1. Power Section - Power supply and Battery Protection, Battery Charging and Switching Circuit
2. Wi-Fi
3. ZigBee
4. User Interface Switch
5. Status Indication RGB LED

4.1 Power Supply

The Kinetico board power is supplied by two sources:

1. **Primary Supply (Power Adapter):** It is the main power source of Kinetico SysHub. The output of power supply adapter is 5V, 1A power Adapter.

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Figure 5 - Power supply adapter

2. **Secondary Supply (Li-ion battery):** It supports 3.8 to 4.2V range and it is used for battery backup and supply power if power adapter is not used.

Figure 6 – Li-ion battery compartment and placement with polarity

Note: User must initially supply power through power adapter once and then it can switch supply power through battery.

4.2 Wi-Fi

Kinetico SysHub support of Single Band (2.4GHz) Wi-Fi Module. This module is FCC/CE/IC/NCC Certified. The SysHub supports following features:

- Wi-Fi Micro-Controller Smart Energy Platform Solution
- I/O Interface Support: UART, JTAG, GPIO, SSP, I2C and GPT
- Support of IEEE 802.11b/g/n Wi-Fi

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- Integrated Printed- Antenna
- LGA package

4.3 ZigBee

- **ZigBee:**

The ZigBee SoC is an ultra-low power, high performance wireless chip. It supports following features:

- 2.4GHz IEEE802.15.4 compliant
- TX power 8.5 dBm/10 dBm & with PA up to max. 20dBm
- Receiver sensitivity –96 dBm
- TX current 24 mA at 10 dBm
- TX current 21.2 mA at 8.5 dBm
- RX current 14.3 mA at maximum input level –2 dBm
- 3.3 V operation
- Support with both Chip and PCB Antenna

- **Power Amplifier Module**

The power amplifier module is a high-performance, fully integrated RF front-end module (FEM) designed for ZigBee applications.

- Integrated PA with up to +21 dBm output power
- Integrated LNA (2 dB noise figure typical) and bypass path
- Integrated antenna diversity switching for all modes
- Single-ended transmit/receive interface
- Fast switch on/off time: < 800 ns
- Supply range: 1.8 V to 3.6 V
- Sleep mode current: < 1 µA typical
- No external bias resistor is required
- Antenna Diversity support

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4.4 User Interface Switch

The Kinetico has three below user interaction switch:

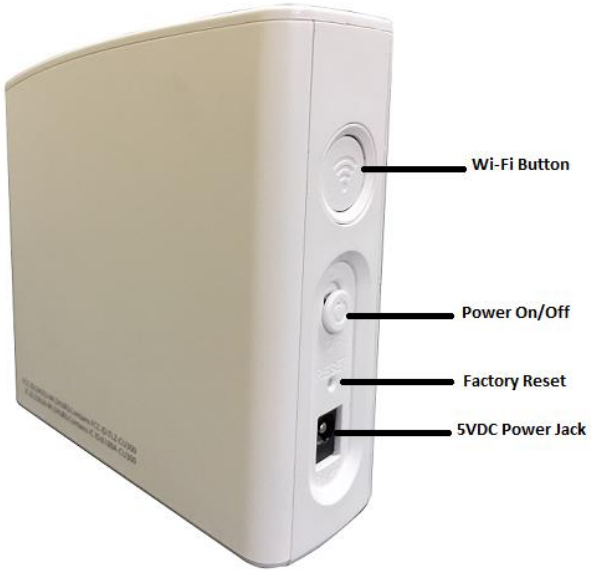

Figure 9 – SysHub switch details

1. **Wi-Fi Provisioning Button:** Use to put Wi-Fi in provision mode and press for 5 seconds to reset Wi-Fi credentials.
2. **Factory Reset:** To reset the SysHub by 15-second-long press. It is also used to reboot the system without removing power supply. Pressing the switch will drive logic zero on RESET signal, which will affect every module on SysHub.
3. **Power ON/OFF Switch:** To ON and OFF the power of Kinetico SysHub.

4.5 User LED Indications

Single RGB LED is used to provide indication about different SysHub functionality.

Below table indicates color mark to represent specific events.

LED indication	Primary Supply	Secondary Supply
Red	No Wi-Fi Connection	No Wi-Fi Connection
Red Blinking	No Internet Access	No Internet Access
Blue	System is OK	NA

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Green Blinking	Initializing Pairing Mode	Initializing Pairing Mode
Green	Firmware upgrade in progress	Firmware upgrade in progress
Yellow-Orange	NA	System is OK, running on battery
Yellow-Orange Blinking	NA	LOW Battery
Light Purple	Factory Reset in progress	Factory Reset in progress
Red and Blue blinking	Abnormal Condition	Abnormal Condition

Table 5 - User LED Indications

Figure 10 – SysHub user interaction LED

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5 INSTALLATION OF KINETICO SYSHUB

The Kinetico SysHub comes with its required contents and it is mentioned in below section.

5.1 Kinetico SysHub Box Content

The Kinetico SysHub comes with following listed items:

Item	Description
SysHub	SysHub unit with 18350 Li-ion battery
Power Adapter	DC 5V, 1A
Documentation	Quick Start Guide

Table 6 - Kinetico SysHub Box Content

5.2 User required Items

To complete your demo installation, you need following items and it is not standard parts of Kinetico SysHub. User needs to manage it.

Item	Description
Internet connectivity	To connect SysHub to cloud over Wi-Fi
Mobile Device (Android/iOS)	To access application and function the SysHub
Mobile Application	Mobile Application (Support on Android and/or iOS)

Table 7 - Other Require Equipment

Warning: User needs to keep the product at least 20 cm away from the body when it is in working condition.

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6 MOBILE APPLICATION SETUP OF KINETICO SYSHUB

Kindly refer Kinetico SysHub User Guide_v1.1 for setup and configuration of Mobile application on Android and/or iOS platform.

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7 APPENDIX-A

7.1 Acronyms & Glossary

The following terms are used in this document

Sr No#	Terms	Definition
1.	GPIO	General Purpose Input and Output
2.	I2C	Inter Integrated Circuit
3.	IoT	Internet of Things
4.	JTAG	Joint Test Action Group
5.	LDO	Low Dropout
6.	LED	Light Emitting Diode
7.	SDRAM	Synchronous Dynamic Random-Access Memory
8.	PA	Power Amplifier
9.	SoC	System on Chip
10.	LNA	Low Noise Amplifier
11.	SPI	Serial Peripheral Interface
12.	TBD	To Be Define
13.	U. FL	Ultra-Miniature RF Connector
14.	UART	Universal Asynchronous receiver and Transmitter
15.	USB	Universal Serial Bus

Table 8 - Acronyms & Glossary

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8 APPENDIX-B

8.1 Compliance

Design Platform Name Model:
Kinetico SysHub

Conforms to the following standards or other normative documents:

FCC: FCC part 15 modular certification ID: 2ARJL – KNTSYSHUB3

IC: Industry Canada RSS-247 modular certification IC: 24464- KNTSYSHUB3

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FCC STATEMENT

1. This 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.
(2) This device must accept any interference received, including interference that may cause undesired operation.

2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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 radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in an installation. If this equipment does cause harmful interference to radio or television reception, which can be determined 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:

Reorient or relocate the receiving antenna.
Increase the separation between the equipment and receiver.
Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
Consult the dealer or an experienced radio/TV technician for help.

RF Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body

IC Statement

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) This device may not cause interference, and (2) This device must accept any interference, including interference that may cause undesired operation of the device. This device complies with RSS-247 of Industry Canada. Operation is subject to the condition that this device does not cause harmful interference. This Class B digital apparatus complies with Canadian ICES-003 (Cet appareil numérique de la Classe B conforme à la norme NMB-003 du Canada).

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This equipment (IC: 24464-KNTSYSHUB3) complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Cet équipement (IC: 24464-KNTSYSHUB3) est conforme aux limites IC d'exposition aux radiations définies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec une distance minimale de 20 cm entre le radiateur et votre corps. Cet émetteur ne doit pas être situé ou opérant en conjonction avec une autre antenne ou émetteur.

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