Vekin Intelligent Switch

Prototype - Setup Guide

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1 Introduction

1.1 Background

This document provides a setup guide for the Vekin Intelligent switch prototypes with a touch interface, Wi-Fi connectivity, movement sensing, ambient light sensing and power measurement functionalities.

The document is updated with added features and builds on version 1.0 of the Setup Guide and Client Requirements.

1.2 Version Updates

- Updated power measurement tolerance

- Updated light sensor accuracy tolerance

- Added special specification for 3-gang version

- Updated operating voltage specification

- Removed touch and PIR sensitivity adjustment MQTT commands

- Corrected terminology

- Added correct model numbers to Table 2

- Added reboot command in MQTT

- Updated pictures

1.3 Intelligent Switch Specifications

The specification of the intelligent switch is set out in Table 1.

Table 1: Intelligent Switch Specifications

System parameters	Proposed design
Number of Channels	1-, 2- and 3-Gang versions (See Table 2)
Total Power	≤ 600W (1 & 2-Gang), ≤ 400W (3-Gang)
Operating Voltage Range	110 - 265V_{AC}
Frequency	50Hz
Surge Protection	Up to1.5kV

Wireless	Wi-Fi 2.4GHz
Wireless Standard	IEEE 802.11 b/g/n
Touch UI	1, 2 and 3 Button versions
Power Measurement	Total Load Up to 5% Accuracy
Ambient Light Sensing	Up to 5% Accuracy in Lux
Movement Sensing	PIR with Wall Mounted Fresnel Lens, 3 ±0.5m range
Application Programme Interface	MQTT Protocol
Dimming Algorithm	Leading-edge, Trailing-edge, Leading- and Trailing-edge
System Wiring	Live, Neutral and L+ for each gang

The intelligent switch is proposed as three variants, 1-, 2- and 3-gang. The maximum power output of the intelligent switch is 600W (400W for the 3-gang version), resulting in the following ratings per variant:

Table 2: Power Ratings per Variant (@230VAC)

System parameters	1 Gang (VINT-XIX-1)	2 Gang (VINT-XIX-2)	3 Gang (VINT-XIX-3)	Unit
Power per Gang	600	300	138	W
Current per Gang	2.6	1.3	0.6	A

Additional system performance specifications include the following:

- Multiple load type compatibility (Include incandescent/tungsten, LED loads)
- System over-heat protection
- Power failure memory feature
- Soft-on and soft-off feature
- Load power consumption measurement
- Ambient light sensing and reporting (Daylight harvesting applications)
- Movement detection and reporting
- Dimming algorithm selection: Leading-edge, Trailing-edge, Leading- and Trailing-edge

2 Intelligent Switch Connection

The 2-gang prototype intelligent switch is wired as shown below. Both LIVE and NEUTRAL connections are required at the intelligent switch. The **load** is connected between the **L1 or L2** and **N** terminals.
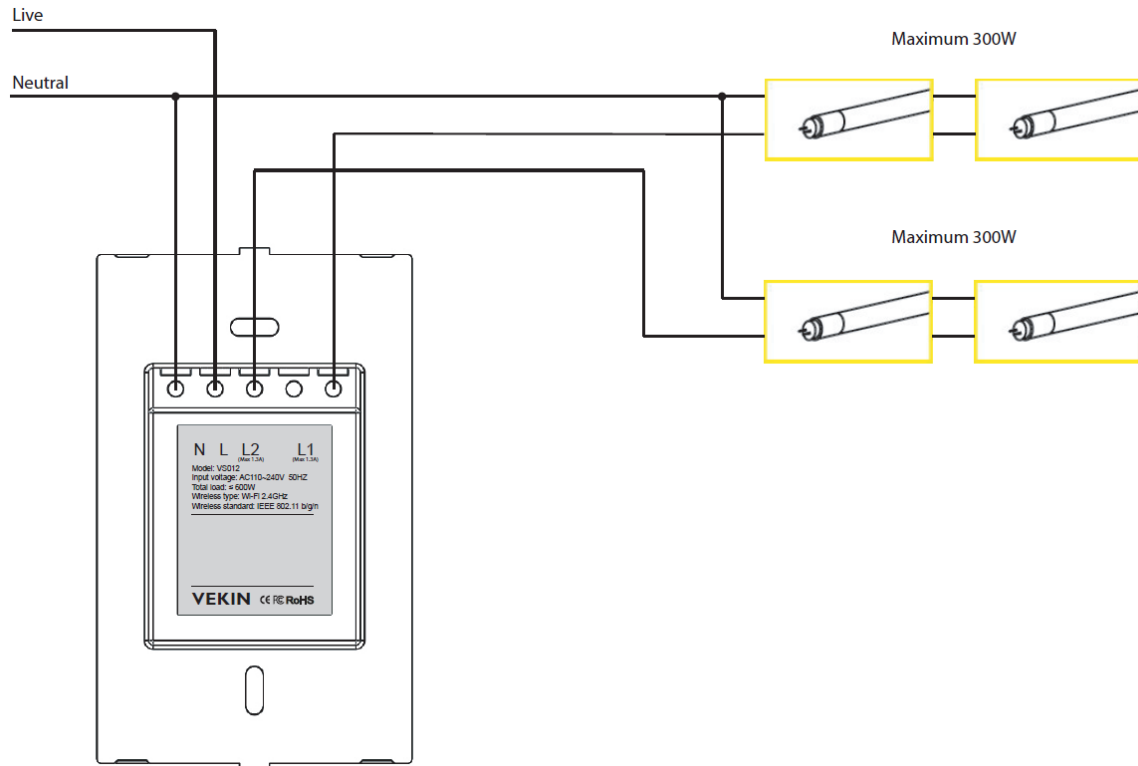

Figure 1: Hardware Connection Diagram

3 Network and MQTT Setup

3.1 Initial Startup

Each intelligent switch is pre-loaded with software and set up to function out of the box. The intelligent switches will therefore not attempt to connect to a Wi-Fi network on initial power up and requires set up for wireless control.

3.2 Entering Network Setup

A local webserver will automatically be activated when the intelligent switch is reset by either a MQTT command or touch buttons. The intelligent switch will make a hotspot available to which the installer can connect to by using a mobile device or computer directly. A browser can then be used to enter the unique IP address and enter the webserver hosted by the intelligent switch. This will allow the installer to enter/update the network and MQTT information. The following steps describe the process to set up the network setting on the 2-gang intelligent switch from a reset state.

1. **Get the intelligent switch in a reset state**:

- From a state where all touch buttons are blue, press and hold the buttons simultaneously for more than 10 seconds.

**Figure 2: Holding down the two buttons (>10s)**

- The unit will enter a configuration mode and the touch buttons will remain green in color. The *Vekin* logo will also start to breath/flash. The unit will now activate a mobile hotspot/ Wi-Fi network. Please note that the switch will still be fully functional in the configuration mode.

Figure 3: Device in configuration mode

2. **Connect to the Wi-Fi hotspot**:

- Connect to the specific intelligent switch using a mobile phone or computer. The hotspot made by the intelligent switch is named after each unit's unique ID/MAC number.

   o Hotspot Name: ***VINT-IY-X-xxxxxxxxxxxx***

      ▪ ***Y: Production year***

      ▪ ***X: Number of gangs***

      ▪ ***x: 12 digit ID/MAC number***

   o Password: ***setupsys***
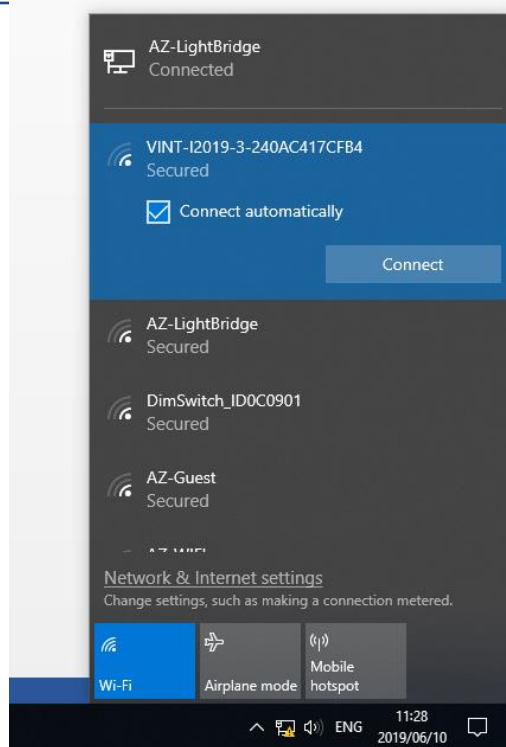
3. **Open the webserver**:

- Open a browser on the device connected to the hotspot and enter the necessary network and MQTT information.

  o Fixed IP address: 192.168.1.1

Figure 4: Intelligent switch network setup in browser

- o Only the SSID and Password is required for the network settings. The IP address and Gateway will be obtained automatically.

- o All MQTT information is required.

- o Enter 0 in the SSID and Broker areas for standalone usage. (No Wi-Fi connectivity).

- o Choose dimming technique (SMART dimming is recommended).

- o Press send after all the areas are filled in.

- o The browser will respond with the following message.

The ssid is: 0
And the password is:

The MQTT broker is: 0
The MQTT username is:
And the MQTT password is:

And the Dimming Technique is: 0

Device will reset now and connect to Wi-Fi and MQTT!
Please use the touch buttons to enter this setup again!
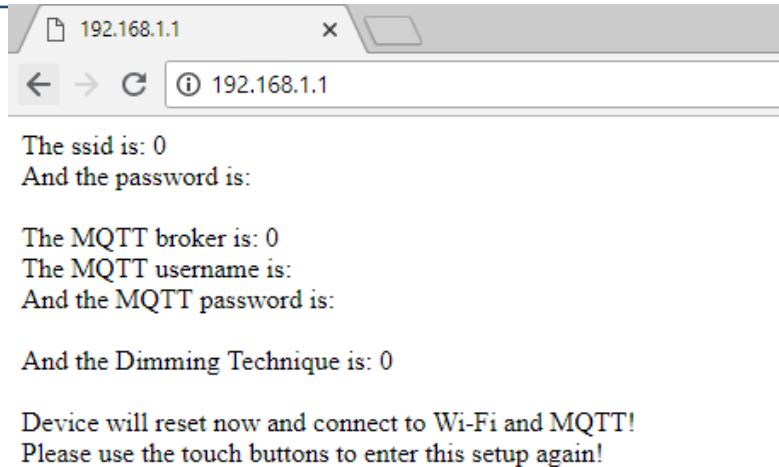
Figure 5: Web browser response after setup

4. The intelligent switch will automatically store the preferred settings after the above message is displayed and connect to the Wi-Fi network and MQTT broker.

- The unit is ready and online once all the touch buttons are blue.

- It will also send the following information to the MQTT broker to confirm successful connection.

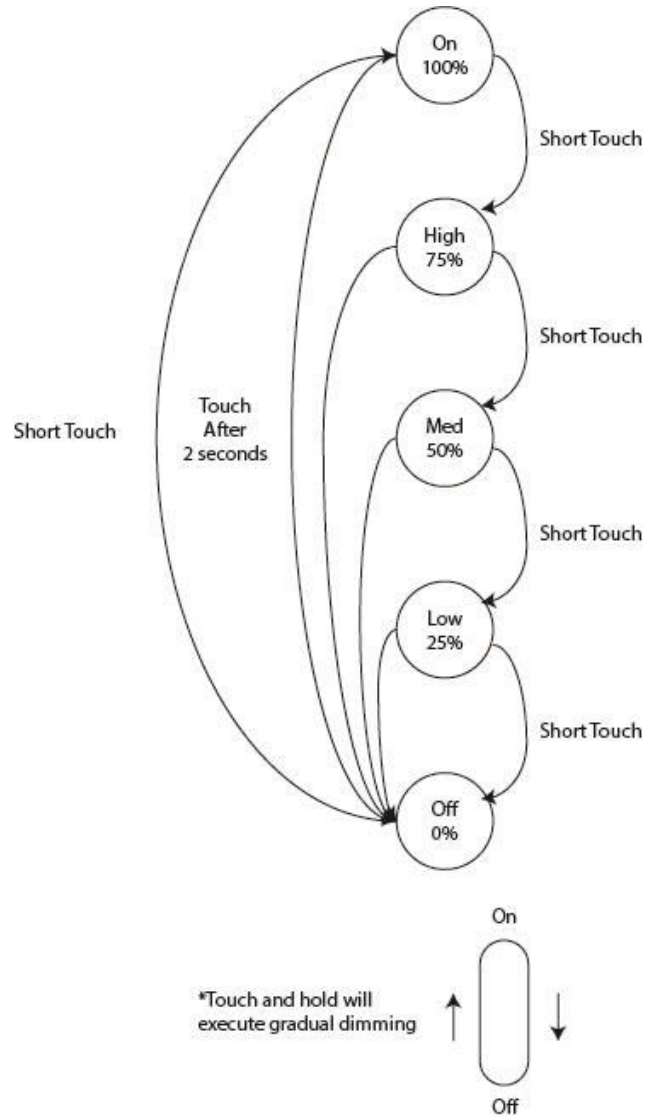| Topic	Message
VINT/ID240AC417CFB4	Dimmer Switch Online!
VINT/ID240AC417CFB4/CH1	CH1 Connected
VINT/ID240AC417CFB4/CH2	CH2 Connected
VINT/ID240AC417CFB4/CH3	CH3 Connected
VINT/ID240AC417CFB4/GROUP	Grouping Ready
VINT/ID240AC417CFB4/CONFIG	Config Ready
VINT/ID240AC417CFB4/POW	Power Consumption Setup Ready
VINT/ID240AC417CFB4/PIR	PIR Setup Ready
VINT/ID240AC417CFB4/ALS	ALS Setup Ready
VINT/ID240AC417CFB4/VEKIN	VEKIN Report Ready
VINT/GLOBAL	Global Ready

4 Operating the Intelligent Switch

4.1 Manually – Touch Interface

When all buttons are lit blue/green, the load can be controlled by the intelligent switch.

1. **The intelligent switch consists of a touch button for each gang. The buttons control the light levels as follows (see Figure 6):**

- If pressed/touched once, from a blue state, the dim level will step to an "On" level. It will follow the following sequence with each short touch thereafter:

- o ON – 100%
- o HIGH – 75%
- o MED – 50%
- o LOW – 25%
- o OFF – 0%

- A touch after a no-touch period of 2 seconds will switch off the load immediately (to an "Off" level).

- A touch and hold (long touch) will gradually dim the load until the button is released.

Figure 6: Touch Dimming Sequence

2. **Reset the network settings by press and holding the buttons simultaneously for more than 10 seconds.**

4.2 MQTT Command Structure

4.2.1 MQTT Topic and Message Definitions

The demonstration unit can also be controlled by the following MQTT command structure:

MQTT Topic	MQTT Message
VINT **/** *IDxxxxxxxxxxxx* **/** S*elect*	*Command* **=** *Value* **=** *Signature*

where:

- **VINT**: Classify type of device to communicate to (For future projects, controlling other types of devices such as air-conditioning systems).

- **IDxxxxxxxxxxxx**: Unique intelligent switch ID to communicate to, where xxxxxxxxxxxx is the 12-digit device mac address.

- **Select**: Select an intelligent switch channel/gang or group to modify.

- **Command**: Command byte to execute certain operations/tasks.

- **Value:** Value byte for the selected command.

- **Signature:** Data encryption message signature set together by using the unique ID of each device. (Not implemented in the demonstration unit. – Leave empty)

The MQTT command structure have various options as listed below. These options of different variables described above exists for each intelligent switch and the broker/server has the freedom to communicate to individual or multiple units at the same time.

Table 3: MQTT Command Set

MQTT Topic		MQTT Message		Intelligent Switch Actions	Default Values
IDxx…	*Select*	*Command*	*Value*		
ID552467 (Example ID)	CH1	PowerLevel (or P)	0-100	Adjust Dim Level (%), 0: Off, 100: Max On	0: Off
		GroupSelect	0-2	0: No Group, 1: Group 1, 2: Global	0: No Group
	CH2	PowerLevel (or P)	0-100	Adjust Dim Level (%), 0: Off, 100: Max On	0: Off
		GroupSelect	0-2	0: No Group, 1: Group 1, 2: Global	0: No Group
	CH3	PowerLevel (or P)	0-100	Adjust Dim Level (%), 0: Off, 100: Max On	0: Off
		GroupSelect	0-2	0: No Group, 1: Group 1, 2: Global	0: No Group

	GROUP	PowerLevel (or P)	0-100	Adjust Dim Level (%) for group (Selected Intelligent)	0: Off
	CONFIG	Reboot	n/a	Reboot the intelligent switch	Default values not re-loaded
		Reset	n/a	Activates the intelligent switch configuration mode (webserver)	Default values not re-loaded
		PowerMemory	Enable/Disable	Enable or disable memory feature for power failure	Enable
		LogoLED	0-20	Set Logo LED to automatic switch off after certain time of no motion (Minutes)	1min
		ReadMemory	n/a	View values stored in memory (Debugging)	n/a
		RestoreDefaults	n/a	Load default values into memory (Intelligent switch will reboot)	n/a
		▉▉▉▉	Enable/Disable	Retrieve Azoteq debug information	Disable
	POW	Sensor	Enable/Disable	Enable or disable power consumption sensor	Enable
		Report	Enable/Disable	Enable or disable power consumption MQTT report (Enables Power Sensor)	Enable
		ChangeBlock	1-80	Adjust power consumption change block range (%)	1%
		SampleInterval	1-60	Adjust power consumption sampling and reporting interval (Seconds)	15s
		GetPower	n/a	Sends power (W) consumption of selected intelligent switch via MQTT	n/a
	PIR	Sensor	Enable/Disable	Enable or disable motion sensor	Enable

		Report	Enable/Disable	Enable or disable motion MQTT report	Enable
		LevelCH1	0-100	Set dim level for CH1 (%)	0%
		LevelCH2	0-100	Set dim level for CH2 (%)	0%
		LevelCH3	0-100	Set dim level for CH3 (%)	0%
		BlockTime	1-60	Set block time after previous motion trigger (Seconds)	2s
		Timeout	1-250	Set time-out after motion trigger (Minutes)	1m
		Invert	Enable/Disable	Invert motion sensor reaction (Invert dimming direction)	Disable
	ALS	Sensor	Enable/Disable	Enable or disable ambient light sensor (Disable resets calibration value)	Disable
		Report	Enable/Disable	Enable or disable light MQTT report (nW/cm2)	Enable
		CHSelect	CH1-3/CHALL	Select intelligent switch channel to react on light sensor	CHALL
		Calibrate	n/a	Dark room, load full on (Duration = 7s)	100 000 nW/cm2
		AutoCalibrate	Enable/Disable	Enable or disable light sensor calibration	Disable
		SampleInterval	1-250	Set light sample interval (Seconds)	15s
		BlockRange	0-100	Block range above calibrated minimum light value (%)	10%
		DimTempo	1-250	Adjust dimming tempo for channels selected	5
		PIRBlock	Enable/Disable	Enable or disable motion detection calibration and day light harvesting blocker (Enables PIR)	Disable

		PIRBlock	1-60	Set block period after previous motion detection (Seconds)	10s
	VEK	Report	Enable/Disable	Enable or disable Vekin format reporting (Format: CH1_Level : CH2_Level : CH3_Level : Power : Lux : Motion)	Enable
		ReportInterval	1-250	Adjust the reporting interval of the Vekin format reporting	10s
GLOBAL	n/a	PowerLevel (or P)	0-100	Adjust Dim Level (%) for global (All Intelligent switches selected on Global)	0: Off

4.3 Feature Descriptions

The MQTT command set listed in Table 3 include parameters to control the light level output, movement detection sensor, ambient light sensor, power consumption sensor, grouping settings and general device adjustments.

The features are highlighted and described in the remainder of this document.

4.3.1 Device Configuration

Each intelligent switch can be configured using the CONFIG as selection in the MQTT topic. The following command messages can be executed:

Topic: *VINT/IDxxxxxxxxxxxx/CONFIG*

Message:

Reboot – Device will reboot and reload saved settings. Please note that MQTT settings will not be erased from memory if this command is executed.

Reset – Device will reboot and reset network settings. The intelligent switch will enter its configuration mode and switch to a local hotspot. Please note that MQTT settings will not be erased from memory if this command is executed.

PowerMemory – Enable or disable the memory feature for unexpected power failures. Enabling this parameter will continuously store each gang's dim level and will automatically restore the dim level after a power failure. This feature is enabled by default.

LogoLED – Adjust the time that the logo LED remains on after movement is detected. If the parameter is set to zero, the LED will remain on and never switch off. The default for this parameter is set to one minute.

ReadMemory – Display latest stored values in memory. This command is typically used for debugging purposes and to verify correct setup. Please see Figure 7 as an example of such a memory report.

VINT/ID240AC417CFB4/CONFIG		Reading values from memory for debugging!
VINT/ID240AC417CFB4/CONFIG		Device: VINT-I2019-3
VINT/ID240AC417CFB4/CONFIG		Mac Address: 24:0A:C4:17:CF:B
VINT/ID240AC417CFB4/CONFIG		Software Version: V1.0
VINT/ID240AC417CFB4/CONFIG		Setup Level: Normal Boot
VINT/ID240AC417CFB4/CONFIG		Local Group CH1: Off
VINT/ID240AC417CFB4/CONFIG		Local Group CH2: Off
VINT/ID240AC417CFB4/CONFIG		Local Group CH3: Off
VINT/ID240AC417CFB4/CONFIG		Global Group CH1: Off
VINT/ID240AC417CFB4/CONFIG		Global Group CH2: Off
VINT/ID240AC417CFB4/CONFIG		Global Group CH3: Off
VINT/ID240AC417CFB4/CONFIG		WIFI Connection: Connected
VINT/ID240AC417CFB4/CONFIG		Logo LED Timeout: 1 Minutes
VINT/ID240AC417CFB4/CONFIG		Power Failure Memory: Enabled
VINT/ID240AC417CFB4/CONFIG		Dimming Type: Smart
VINT/ID240AC417CFB4/CONFIG		Touch Threshold: 16
VINT/ID240AC417CFB4/CONFIG		Pir Sensor: Enabled
VINT/ID240AC417CFB4/CONFIG		Pir CH1 Dim Level: 0 %
VINT/ID240AC417CFB4/CONFIG		Pir CH2 Dim Level: 0 %
VINT/ID240AC417CFB4/CONFIG		Pir CH3 Dim Level: 0 %
VINT/ID240AC417CFB4/CONFIG		Pir Report: Enabled
VINT/ID240AC417CFB4/CONFIG		Pir Timeout: 1 Seconds
VINT/ID240AC417CFB4/CONFIG		Pir Invert: Disabled
VINT/ID240AC417CFB4/CONFIG		Pir Sensitivity: 50 (Max 63)
VINT/ID240AC417CFB4/CONFIG		Pir Block Time: 2 Seconds
VINT/ID240AC417CFB4/CONFIG		Als Sensor: Disabled
VINT/ID240AC417CFB4/CONFIG		Als Calibration Value: 100000 nW/cm2
VINT/ID240AC417CFB4/CONFIG		Als Sample Period: 15 Seconds
VINT/ID240AC417CFB4/CONFIG		Als Report: Enabled
VINT/ID240AC417CFB4/CONFIG		Als CH Select: CHALL
VINT/ID240AC417CFB4/CONFIG		Als Block Range: 10 %
VINT/ID240AC417CFB4/CONFIG		Als Dimming Tempo: 10 (x20ms)
VINT/ID240AC417CFB4/CONFIG		Als Auto Calibrate: Disabled
VINT/ID240AC417CFB4/CONFIG		Als Pir Block: Disabled
VINT/ID240AC417CFB4/CONFIG		Als Pir Block Period: 10 Seconds
VINT/ID240AC417CFB4/CONFIG		Power Sensor: Enabled
VINT/ID240AC417CFB4/CONFIG		Power Report: Enabled
VINT/ID240AC417CFB4/CONFIG		Power Change Block Range: 1 %
VINT/ID240AC417CFB4/CONFIG		Power Sample Period: 15 Seconds
VINT/ID240AC417CFB4/CONFIG		Vekin Report: Enabled
VINT/ID240AC417CFB4/CONFIG		Vekin Report Interval: 10 Seconds
VINT/ID240AC417CFB4/CONFIG		CH1 Dim Level For Power Failure: 25 %
VINT/ID240AC417CFB4/CONFIG		CH2 Dim Level For Power Failure: 0 %
VINT/ID240AC417CFB4/CONFIG		CH3 Dim Level For Power Failure: 0 %

Figure 7: Memory Reading Example

RestoreDefaults – Load default values into memory as listed in Table 3. LED's will cycle through their colors.

4.3.2 Power Consumption Reporting

The intelligent switch is capable of automatically report power consumption changes via the MQTT network. The feature can be enabled and adjusted by selecting *POW* in the MQTT topic. The following commands are available:

Topic: *VINT/IDxxxxxxxxxxxx/POW*

Message:

Sensor – Enable or disable the automatic power consumption measurement feature. This feature is enabled by default.

Report – Enable or disable the power consumption reporting feature. The new power consumption result will be sent to the MQTT broker when it exceeds the change block percentage. (Please see *ChangeBlock* for adjusting the reporting sensitivity.)

ChangeBlock – Set the change percentage for the power consumption reporting. If the power consumption is 100W for example and the *ChangeBlock* percentage is set at 10%, it will only report a new power measurement if the new value is more than 110W or less than 90W.

SampleInterval – Adjust the interval at which power consumption samples are taken. By default, power consumption values are taken every 15 seconds.

GetPower – Retrieve a single power consumption reading and send it back to the MQTT broker.

4.3.3 Movement Detection

Each intelligent switch consists of a motion detection sensor (PIR) which can be used to automatically dim or switch on the lights when movement is detected. It can also be used as a security feature to report movement to the MQTT broker. The sensor can be enabled and set up when selecting PIR in the MQTT topic:

Topic: *VINT/IDxxxxxxxxxxxx/PIR*

Message:

Sensor – Enables or disable the movement detection sensor. The sensor is enabled by default.

Report – Enable or disable automatic movement detection feedback to the MQTT broker. When enabled, any movement detected within the range of the sensor will be reported. This feature will typically be used for security purposes or testing.

LevelCH1/2/3 – Set the dim level to which each gang should react when no movement is detected for a certain period (see *Timeout*). Setting this parameter to zero (as per default) for any of the gangs will disable the movement detection action for that gang. If this value is set to 25% for example, and the dim level for that gang is set to 100%, the light will automatically dim from 100% to 25% if no movement is detected for longer than the *TimeOut* parameter. As soon as movement is detected, the intelligent switch will react by adjusting the dim level from 25% back to 100%.

BlockTime – Adjust the block time after movement is detected. This parameter blocks any movement triggers for the duration set. If this parameter is set to 2 seconds, the movement detection will be ignored for 2 seconds after a new movement trigger.

Timeout – Adjust the timeout period after movement is triggered. Any movement triggers will reset the counter which is compared with the *Timeout* parameter.

Invert – Enable or disable the invert movement detection action. If this parameter is enabled, movement detection will let the dim level increase from the initial level to the set parameter (*LevelCH1/2/3*) level.
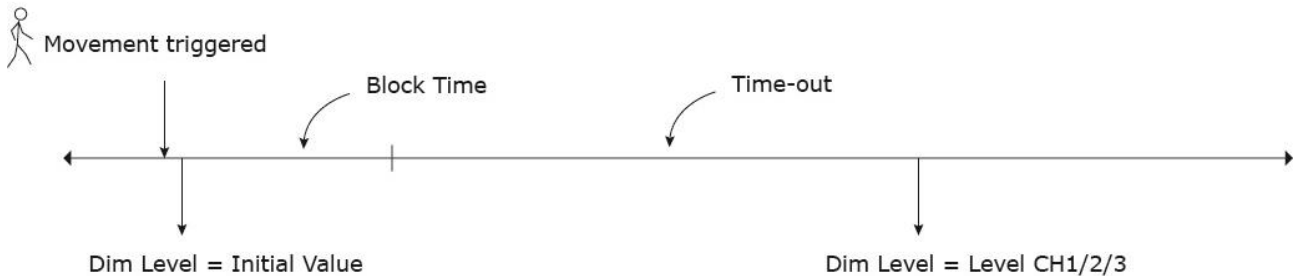
Figure 8: Movement Detection Parameter Explanation

4.3.4 Ambient Light Sensing

An ambient light sensor enables the intelligent switch to automatically adjust light dim levels according to external light entering the room. This feature attempts to reduce the power consumed by building lights during the daytime. Light intensity measurements can also be sent back to the MQTT broker automatically. The sensor consists of an automatic calibration algorithm to reduce installation time and overall complexity.

This feature is accessed by selecting ALS in the MQTT topic. The following commands can be used to enable and adjust the sensor's functionalities:

Topic: *VINT/IDxxxxxxxxxxxx/ALS*

Message:

Sensor – Enable or disable the ambient light sensor actions. Enabling this parameter will start automatic light level compensation if the light level is above the calibrated value and all ALS selected gangs have a dim level of 100%. Disabling the parameter will restore the default calibration value. The sensor actions are disabled by default.

Report – Enable or disable automatic light level reporting via MQTT. The light level will be sent after every sample received from the sensor. The reporting interval or tempo can be there for adjusted using the *SampleInterval* parameter.

CHSelect – This parameter selects the gangs that should be considered for ambient light sensing. All the gangs/channels are selected by default and therefor light level compensation will only occur when all three (or two) gangs are 100% on. We recommend that this parameter is left unchanged unless the lights connected to the three gangs are not in the same room.

Calibrate – Manual calibration can be done by calling this command. The purpose of this calibration method is to do an instant calibration instead of using the automatic calibration

method. Before executing manual calibration, it is important that the unit is properly installed and that the room is made as dark as possible. During manual calibration, the intelligent switch will automatically switch on all selected gangs to 100% to measure the maximum light that the connected load can supply. The value is then stored in memory and the selected lights are switched off to finish manual calibration.

AutoCalibrate – Turns on the auto calibration feature. With this feature enabled, the maximum light level will automatically be calibrated over a few days. Auto calibration will only occur when all selected ALS gangs/channels are switched on at 100% so that the algorithm can automatically adjust the light level. It is recommended that the lights are left on (at 100%) for a few evenings in order for the auto calibration algorithm to find the correct light calibration value.

SampleInterval – Adjust the interval at which light measurements are taken. A lower value will trigger light dimming quicker. However, a longer sample interval is recommended to minimize the effect of automatic light level adjustments.

BlockRange – Set the block range above the calibration value. This parameter blocks dimming actions for small deviations in light levels above the calibration value. A block percentage of 10% will only let dimming take place if the light level increases 10% above the calibrated value.

DimTempo – Adjust the tempo at which dimming is executed. This parameter can be set according the like of the user. A slower dimming tempo is recommended to eliminate visible dimming effects.

PIRBlock – Enable or disable the movement detection light level adjustment blocker. The feature ignores light level deviations when movement is sensed. Light level deviations will be ignored for a certain period of time which is also set using the same command. A default value of 10 seconds means that the light sensing will only continue if there was no movement detected after 10 seconds from the previous movement sensed.

4.3.5 Vekin Reporting

A quick reporting mechanism is included which can be used to get all important information at a fixed interval. The Vekin reporting mechanism is enabled by default and will report the dimming level of each channel, power consumption, ambient light level (Lux) and motion monitoring status will be reported every 10 seconds (default) in the following format:

CH1_Level:CH2_Level:CH3_Level:Power:Lux:Motion

Topic: *VINT/IDxxxxxxxxxxxx/VEK*

Message:

Report – Enable or disable the Vekin reporting via MQTT.

ReportInterval – Adjust the Vekin reporting interval. This value can be set to any desired value between one and 250 seconds.

4.3.6 Gang and Intelligent Grouping

Internal gang/channel grouping and global intelligent grouping can be set up on each intelligent switch to the like of the user and/or to match the building layout.

This feature is accessed by selecting the CH1/2/3 in the MQTT topic. The following commands can be used to enable and configure grouping:

Topic: *VINT/IDxxxxxxxxxxxx/CHg (g = 1, 2 or 3)*

Message:

GroupSelect – Each gang or channel can be grouped to a local group which is specific to the selected intelligent switch. If gang 1 and 3 is grouped in one intelligent switch locally, a command to the *VINT/IDxxxxxxxxxxxx/GROUP* topic will adjust the dim level of gang 1 and 3 together. Any combination of local grouping can be selected.

Each gang of each intelligent switch can be set to *GLOBAL* grouping by selecting *2* when changing the *GroupSelect* command. All intelligent switches on the Wi-Fi network can be controlled simultaneously as follows:

Topic: *VINT/GLOBAL*

Message:

PowerLevel – Sending a dim level to the global group. All gangs from intelligent switches set up to react to global grouping commands will react to the dim level set by this command.

FCC Warning
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, and (2) this device must accept any inte rference received, including interference that may cause undesired operation.

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 a particular installation. If this equipment does cause harmful interferenceto 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.

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 and your body.

Contact Information

	USA	**Asia**	**South Africa**
Physical Address	6507 Jester Blvd Bldg 5, suite 510G Austin TX 78750 USA	Rm1227, Glittery City Shennan Rd Futian District Shenzhen, 518033 China	1 Bergsig Avenue Paarl 7646 South Africa
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