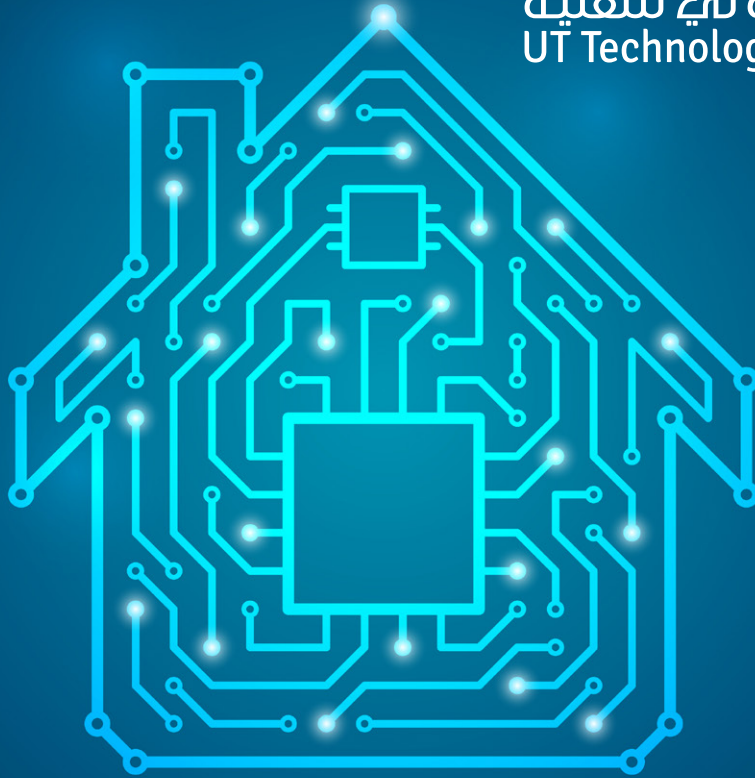


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UT Technology



UT TECHNOLOGY

SMART BUILDING AUTOMATION GUIDELINES

UTT Design guide requirements for Smart City Services

Revision 10

UT TECHNOLOGY

SMART BUILDING AUTOMATION GUIDELINES

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Revision 10

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01 UBIQUITOUS TELECOMMUNICATION TECHNOLOGY SMART BUILDING AUTOMATION GUIDELINES

Reem Island is considered as one of the most luxurious projects among the UAE which needs a high life standard for all types of units. One of the common technologies which can add value to residential and commercial buildings is Smart Building Technology. In order to insure quality, reliability and proper support of such critical technology, Ubiquitous Telecommunication Technologies (UTT) will be the sole provider of Smart Building Automation System and will be responsible of servicing and supporting Smart Building Automation System within Reem Island. Developers are kindly requested to insure the following:

- UTT is the exclusive provider of Smart Building Automation system within Reem Island and Rawdhat Abu Dhabi, no other third party will be allowed to provide Smart Building Automation systems.
- All apartments shall be either equipped with Smart Home Automation or Smart Home Ready.
- Smart Home Ready System consists of mandatory items mentioned in section 1.1.
- All connections shall be as per UTT Smart Building Automation Guidelines.
- It's the responsibility of consultant/contractor of the project to submit the drawings of the smart building automation system layout, bus cable layout and the schematic diagram for each apartment type as shown in Figure 1.1.2, 1.1.3 & Figure 1.1.4 respectively or Figure 1.2.1, 1.2.2 & 1.2.3 for Smart Home Basic System. The application for building approval should be submitted along with the drawings. Refer to Annex 2.1 for application form.

For any amendments or changes, the consultant is responsible to resubmit modified drawings to UTT indicating all the changes for re-approval prior starting of work.

- It's the responsibility of the MEP contractor assigned by the client to arrange the fixing of all conduits, back boxes, automation distribution panel, pull and terminate the electrical wires as mentioned in the Smart Building Automation Guideline automation distribution panel according to the approved drawings.
- UTT through its certified vendors will supply and install all the smart Building Automation cables and equipment after receiving a confirmed order from the Owner/Developers/Contractor. This scope is not allowed to be carried out by any other party.
- UTT will be conducting periodic site inspections in order to make sure that all the works done are according to UTT guidelines & approved drawings. The contractor should apply for a site inspection by submitting the application for building inspection. Refer to Annex 2.2 & 2.3 for the application form and the inspection checklist.
- Building Completion Certificate (BCC) will not be issued unless all UTT Smart Building Automation Guideline and approved drawings are implemented on site.
- Delivery period of Smart Building Automation equipment is 4 months after placing a confirmed order.

The centralized ADP is interconnected with communication bus cable, and controls Lights, HVAC, Access Control, Audio/Video Equipment, Shades, Drapes and ...etc. as shown in Figure 1.1.1.

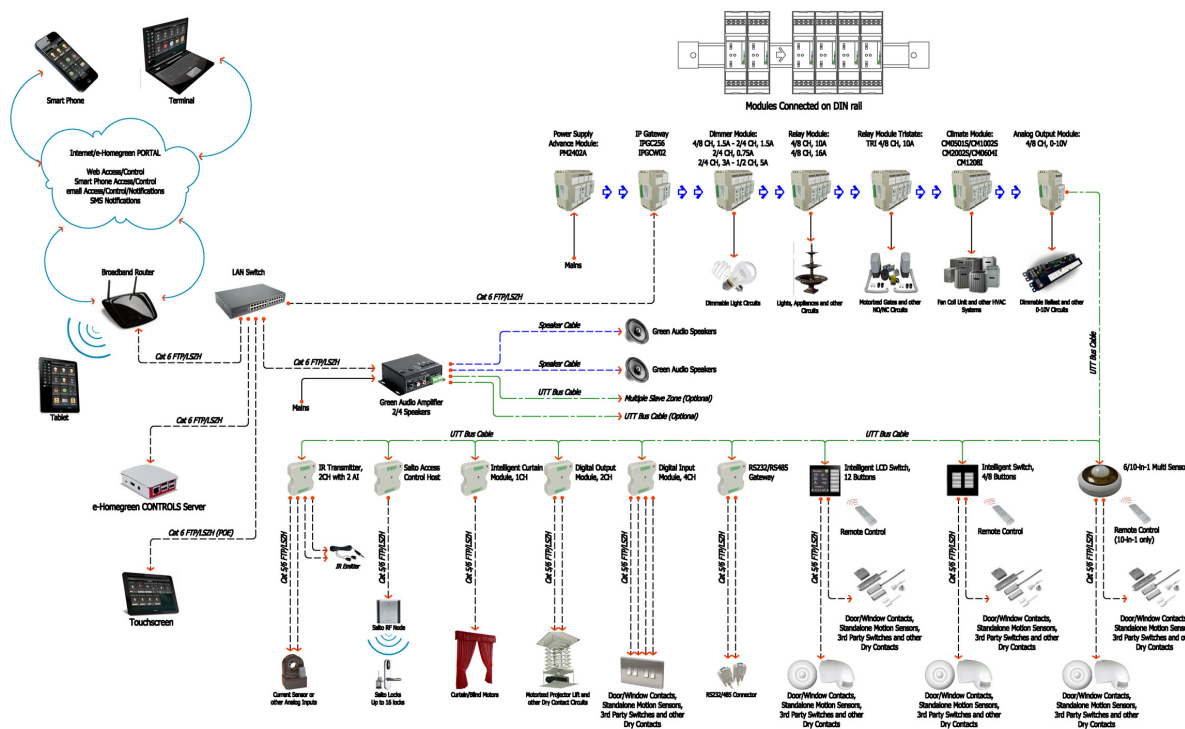


Figure 1.1.1: DIN Rail System Overview

1.1 SMART HOME READY

Smart Home Ready System provided by Ubiquitous Telecommunication Technologies (UTT) are based on Centralized DIN rail System Design where load dimming and switching control will be placed in central enclosures called the Automation Distribution Panel (ADP). The ADP should be installed inside mechanical rooms or electrical closets and receives AC wiring directly from breaker panel in the Electrical Distribution Board (EDB). In the apartment scenario, the ADP will be placed near the EDB.

The centralized ADP is interconnected with communication bus cable, and controls Lights, Fans, Motors, HVAC, Security, Audio/Video Equipment, Internet Cameras, Shades, Drapes, Skylights, Awnings, Shutters, Pool Equipment, and ...etc.

In Smart Home Ready System all loads shall be connected through the ADP. Terminal blocks (connectors) will be plugged in, to close the circuits and pass the current in order to test all loads from any short circuit.

The difference in this case compared to the standard conventional electrical connection is that, instead of connecting the load from the EDB through the conventional switch, it will pass through the ADP first. For instance, the line voltages (breakers) will be connected from the EDB to the ADP then from the ADP

to the load through the conventional switch. Controlling the loads will be through the normal conventional switches.

The Smart Home Ready System consists of:

- a) Fixing the ADP and terminating the lightings' wires into it through the terminal blocks [connectors] as mentioned in sections 1.1.1-1.1.3. The terminal blocks will be used for testing the lighting circuit.,
- b) Smart Home Keypad's & the bus cable requirements as mentioned in section 1.1.4.
- c) HVAC provision as mentioned in section 1.1.5.
- d) Shades and Curtain Control provision as mentioned in section 1.1.6.
- e) Motion sensor/Multi-Sensor provision as mentioned in section 1.1.7
- f) Entertainment (E) Outlet provision as mentioned in section 1.1.9.

UTT through its certified vendors will supply and install all the smart home/smart home Ready cables and equipment after receiving a confirmed order from the Owner/Developers/Contractor. This scope is not allowed to be carried out by any other party. All technical rules applied in Smart Home System are similar to Smart Home Ready System. The following sections will provide a detailed explanation about the DIN Smart Home Ready System that should be done in the home.

1.1.1 AUTOMATION DISTRIBUTION PANEL (ADP)

There are two types of the DIN rail ADP that should be fixed inside the home next to the EDB which are:

1.1.1.1.5 DIN RAIL TYPE ADP:

- It should be used for two bedroom apartment type and above.
- It will house the dimmers and relays required for the lighting loads connections (channels):
 - 1st DIN rail : up to 16 lighting channels are available for dimming.
 - 2nd DIN rail : up to 16 lighting channels are available for relay.
 - 3rd DIN rail : up to 16 lighting channels are available for relay.
- It will house the HVAC modules required for the AC control:
 - 4th DIN rail : up to 10 HVAC channels are available for AC control.
- It will house the power supply and gateway:
 - 5th DIN rail : dedicated 220V protected breaker connection required.
- If more connection channels are required, please consult UTT.
- Its size is 975 x 435 x 101 mm (HWD). For more information, please refer to UTT certified ADP vendor.

1.1.1.2.3 DIN RAIL TYPE ADP:

- It should be used for studio and one bedroom apartment type only.
- It will house the dimmers and relays required for the lighting loads connections (channels):
 - 1st DIN rail : up to 16 lighting channels are available for dimming.
 - 2nd DIN rail : up to 12 lighting channels are available for relay.
- It will house the HVAC modules required for the AC control:
 - 2nd DIN rail : up to 4HVAC channels are available for AC control.
- It will house the power supply and gateway:

- 3rd DIN rail : dedicated 220V protected breaker connection required.
- If more connection channels are required, please consult UTT.
- Its size is 615 x 435 x 101 mm (HWD). For more information, please refer to UTT certified panel vendor.

1.1.2 CONNECTION BETWEEN ADP & THE OPTICAL NETWORK UNIT (ONU)

- 1 No. 25 mm conduit should be provided between the ADP and the ONU. It should enter the ADP and the ONU from the bottom center portion only as shown in Figure 1.1.7.
- 2 No. of Cat.6 cables should be pulled inside the conduit.
- 1 m length of cables should be kept inside the ADP and the ONU.

1.1.3 LOADS CONNECTION

- All the loads such as lightings, exhaust fans, doorbell and water heaters inside the home should be connected to the ADP using the electrical wires.
- The loads' wires should run inside conduits & enter the ADP from the top only.
- Each load should have its own line [wire] coming out from the ADP to the load location. The neutral wire can be shared between the loads fed from the same breaker and should return back to the ADP.
- 1 m length of electrical wire for each load should be kept inside the ADP.
- All the wires should be labeled and terminated at the ADP according to the approved drawings as shown in Figures 1.1.2, 1.1.3, 1.1.6 & 1.1.7. The labeling should be as follows:
 - D1, D2, D3... up to D16 for Dimmer Module Channels. The connections termination should start from the right side of the 1stDIN rail as shown in Figure 1.1.6.

- R17, R18, R19... up to R48 for Relay Module Channels. The connections termination should start from right side of the 2nd and 3rdDIN rails as shown in Figure 1.1.6.
- The details & rating of each load (for example: chandelier, 500watt) should be mentioned clearly in the apartment's smart home layout.

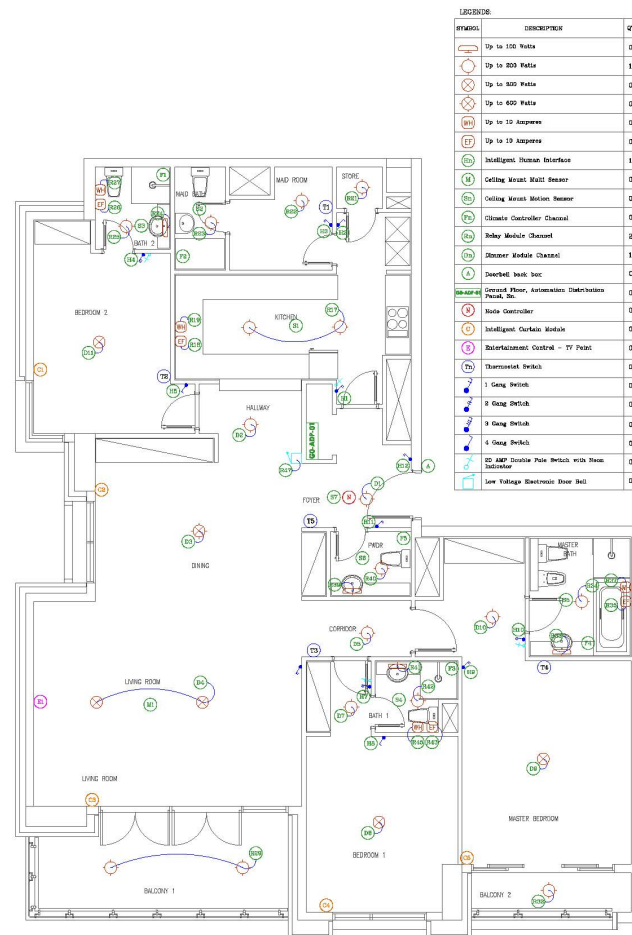


Figure 1.1.2: Apartment's Smart Home Basic System Layout

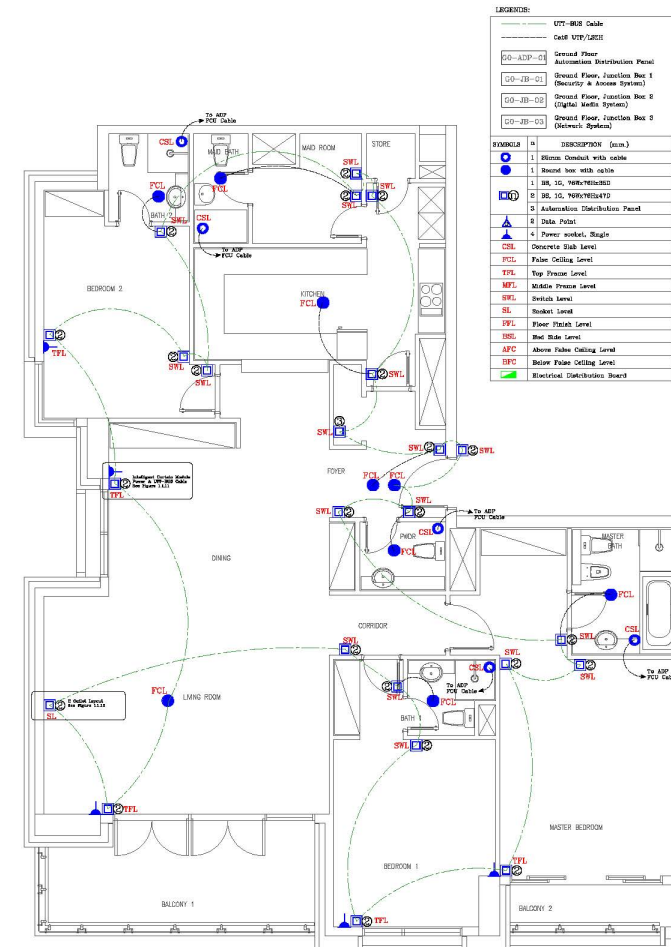


Figure 1.1.3: Apartment's Bus Cable Layout

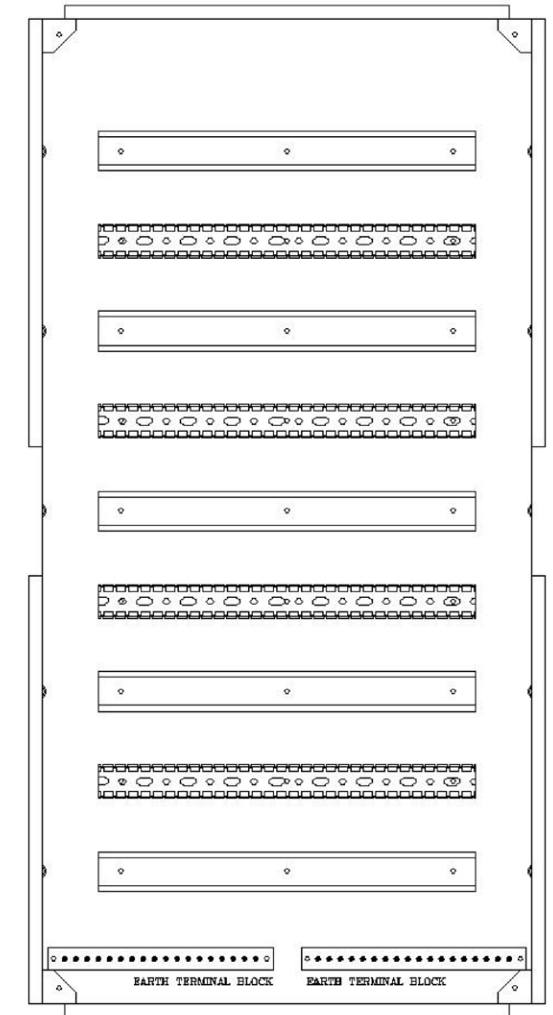


Figure 1.1.4: 5 DIN rail Type ADP

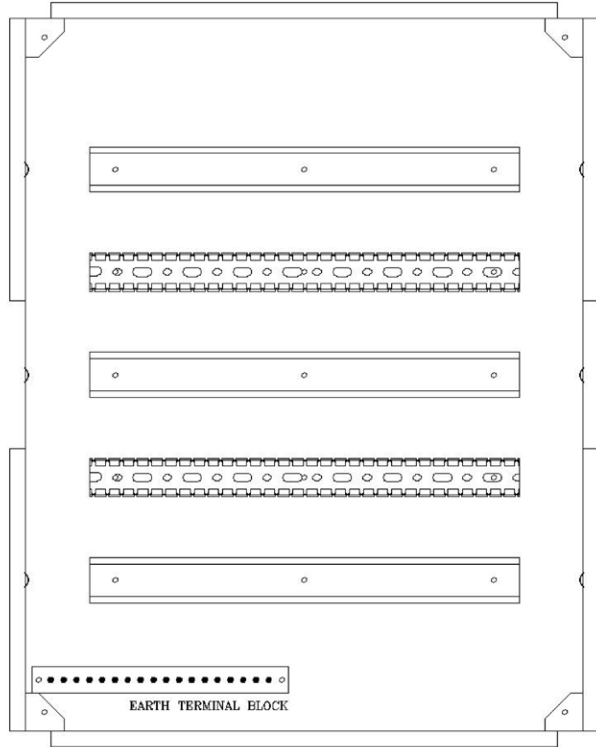


Figure 1.1.5: 3 DIN rail Type ADP

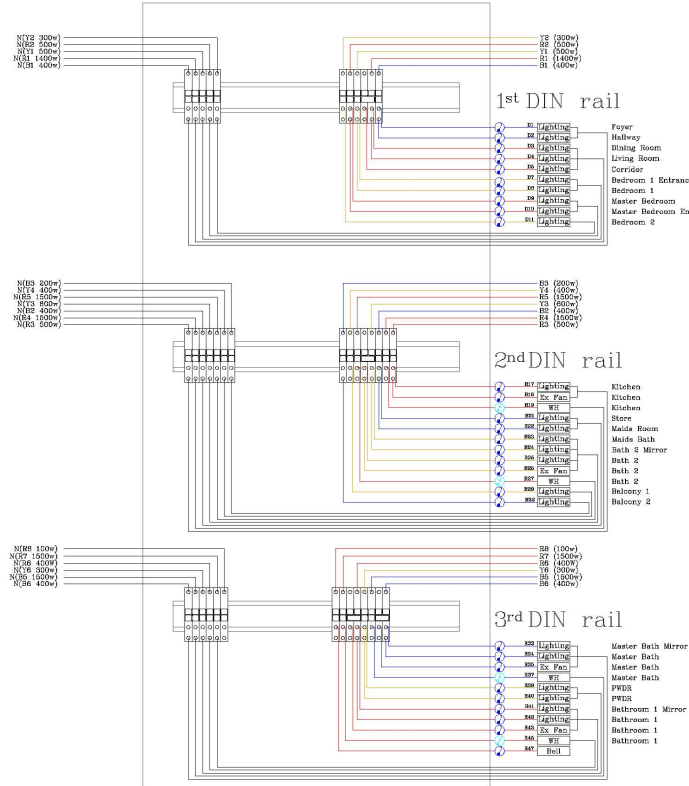


Figure 1.1.6: 1st, 2nd and 3rd Din rail Schematic Diagram

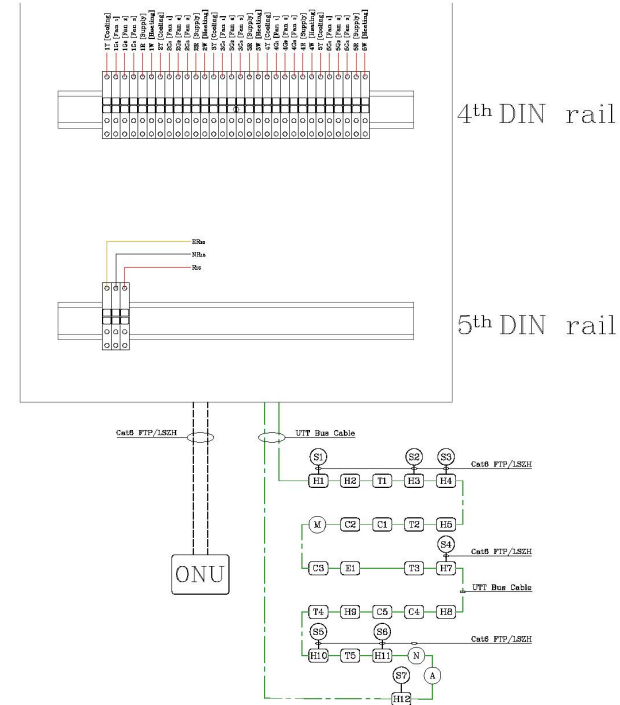


Figure 1.1.7: 4th and 5th Din rail Schematic Diagram

Note:

Terminal blocks will be used to terminate the lightings' electrical wires in order to test the loads from any short circuit, then on client request, the DIN Dimmer module, Relay module, LCD, Power Supply and the gateway/controller will be installed as Smart Home Full System. All the technical rules applied for the DIN Dimmer, DIN Relay, and Controller should be applied to the terminal blocks.

There are two types of the DIN rail Modules where the loads should be connected to within the ADP and a Gateway which are:

1.1.3.1 DIN RAIL DIMMER MODULE:

- The DIN rail Dimmer Module shown in Figure 1.1.8 is used to dim the lights to a certain percentage as well as to turn them ON/OFF.
- The lighting loads in the living room, dining room, and all bedrooms should be connected to the output channels of the dimmer module(s).



Figure 1.1.8: DIN rail 4 Channels Dimmer Module

- There are different type of dimmer module(s) to be used, depending on the number of output (load) channels and the output (load) rating.
- Each Unit (vertical slot/sideboard of the Module) from the dimmer module should be connected to the same breaker with its neutral as an input from the EDB.
- Each lighting load should have its own line (wire) connected to the dimmer module output. The neutral cable can be shared between the loads fed from the same breaker and should return back to the ADP.

- Dimmable ballasts for lights should be installed by the electrical contractor assigned from the client.
- The loads connections to the dimmer module are shown in Figure 1.1.6.

1.1.3.2 DIN RAIL RELAY MODULE:

- The DIN rail Relay Module shown in Figure 1.1.9 is used to toggle [ON/OFF] the lights, exhaust fans, doorbell and water heaters.
- The lighting loads in the kitchen, corridors and all bathrooms should be connected to the output channels of the relay module.
- The doorbell, exhaust fans and water heaters in the home should also be connected to the output channels of the relay module.



Figure 1.1.9: DIN rail 4 Channels Relay Module

- There are different type of relay module(s) to be used, depending on the number of output (load) channels and the output (load) rating.
- Each channel from the relay module can be connected to a different breaker with its neutral as an input from the EDB.

- Each lighting load, exhaust fan, doorbell, and water heater should have its own line (wire) connected to the relay module output. The neutral cable can be shared between the loads fed from the same breaker and should return back to the ADP.
- The loads connections to the relay module are shown in Figure 1.1.6.

1.1.3.3 DIN RAIL GATEWAY:

- The gateway shown in Figure 1.1.10 is required to connect the smart home system to the TCP/IP network.
- A dedicated 220V surge protected breaker should be connected to the power supply of the gateway located at the last rail of the ADP as shown in Figure 1.1.7.



Figure 1.1.10: DIN rail Gateway

Notes:

UTT through its certified venders will supply all the Smart Home Ready Devices after receiving a confirmed order from the Owner/Developers/Contractor. This scope is not allowed to be carried out by any other party.

Delivery period of Smart Home Basic Devices is 4 months after placing a confirmed order.

It's the responsibility of the MEP contractor assigned by the client to arrange the fixing of all conduits, back boxes, automation distribution panel, pull the electrical wires and terminate it in ADP as mentioned in the Smart Home Ready/Smart Home Guidelines and according to the approved drawings. All the technical rules mentioned in these sections should be applied even though only back boxes and cables will be used.

1.1.4 THE SMART HOME KEYPAD AND THE BUS CABLE

- Smart home keypads, shown in Figure 1.1.11, are programmable keypads that consist of 4 to 8 buttons or an LCD with 12 buttons where each button can be used for a single or multiple actions (scenes).

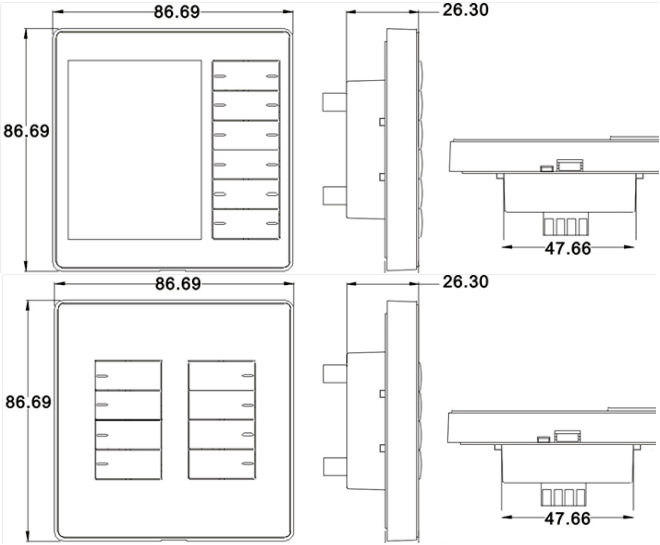


Figure 1.1.11: Smart Home Keypads

- A smart home keypad provision should be provided at the entry of each room, bathroom, kitchen & corridor inside the home as shown in Figure 1.1.2.
- The dimension of the keypad's faceplate is 86 x 86 mm (HW).
- The conventional switch will be used to toggle all the loads as On/Off.
- If a thermostat inside a living room is close to the LCD or Keypad of the room, just thermostat provision is enough for both of them. However, if the LCD or Keypad is away from the thermostat of the room, both thermostat and LCD or keypad provision should be provided.
- For each keypad, a UK sized back box (3" x 3") with a minimum depth of 47 mm should be installed.
- No electrical wires will pass by the keypad back boxes.
- The bus cable, supplied by UTT, should go out from the bottom center portion of the ADP in order to connect the back boxes of the keypads, thermostats, curtains, multi-sensors, and the entertainment (E) outlet. The cable should come back to the ADP after passing by the last back box in order to close the loop.
- The bus cable should pass by each back box without being cut where a minimum of 35cm from the cable should be kept inside each back box (two rounds inside the back box).
- The bus cable loop should be run inside 20 mm conduits. All the conduits should be laid from the ground below the tiles and not from the ceiling except for curtains and motion sensors.
- The looping is topology free (daisy chain, branch, star, etc.) If the total amount of cable used within a bus run is not more the 300m otherwise Daisy chain is highly recommended as shown in Figure 1.1.7.

1.1.5 HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

- Each thermostat requires a UK sized back box (3" x 3") with a minimum depth of 47 mm. It should be labeled as T1, T2 & T3...etc.
- The bus cable loop should pass by the thermostat's back box without being cut where a minimum of 35cm from the cable should be kept inside each back box (two rounds inside the back box).
- The location of each thermostat & its labeling should be indicated on the smart home system layout, bus cable layout and the schematic diagram as in Figures 1.1.2, 1.1.3, 1.1.7 & 1.1.12 respectively.
- Depending on the FCU used, keep all wires between the convention thermostat and FCU, and extend all the wires terminated at each FCU controller PCB to the ADP (using same size of wires and cables) by using 25mm conduit and label them accordingly in both sides. For example:
 - FCU1 cables will be 1Y, 1G1, 1G2, 1G3, 1R and 1W.
 - FCU2 cables will be 2Y, 2G1, 2G2, 2G3, 2R, and 2W.
 - FCU3 cables will be 3Y, 3G1, 3G2, 3G3, 3R, and 3W.
- The wires coming from each FCU should be terminated at the 4th DIN rail of the 5 DIN rail Type ADP or at the 2nd DIN rail of the 3 DIN rail Type ADP.
- Living area thermostat will be replaced with the Smart Home LCD in the Smart Home Basic projects.
- A complete data sheets for HVAC system used and thermostat sample should be submitted to UTT.

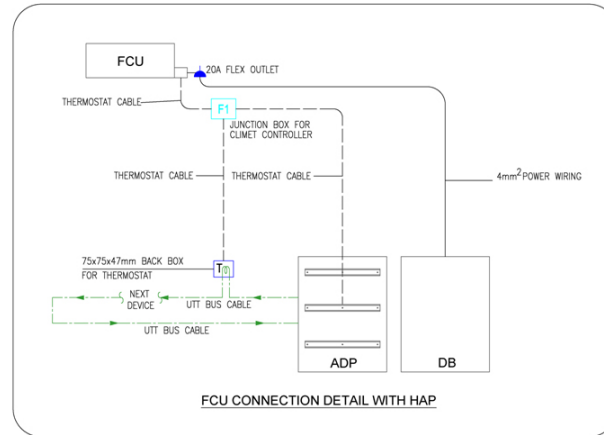


Figure 1.1.12: FCU Connection Details

1.1.6 SHADES AND CURTAIN CONTROL

- Two back boxes with blank plates should be provided at the top right side of all windows at the curtain location (10-20 cm away from the window frame) as in Figure 1.1.13. As a suggestion, creating a curtain box helps hiding the back boxes.

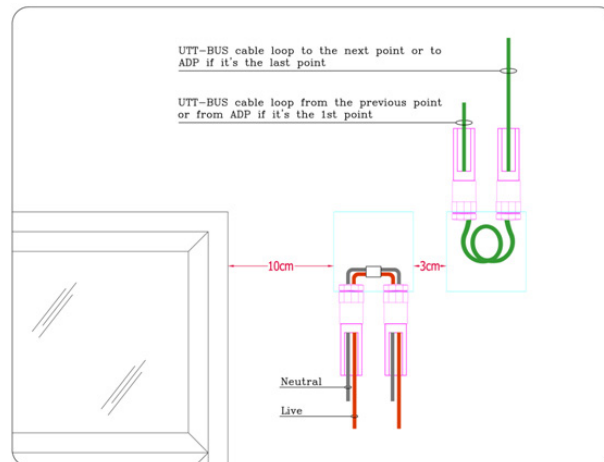


Figure 1.1.13: Shade & Curtain Connections

- The first covered back box has a power cable. It is a normal power used to energize the curtain's motor.
- The second back box is a UK sized back box (3" x 3") with a minimum depth of 47 mm. It should be provided with a blank plate and labeled as C1, C2, and C3...etc.
 - Inside this covered back box, the bus cable loop should pass without being cut where a minimum of 35cm from the cable should be kept inside each back box (two rounds inside the back box).
- The location of each curtain & its labeling should be indicated on the smart home system layout, bus cable layout and the schematic diagram as in Figures 1.1.2, 1.1.3& 1.1.7 respectively.

1.1.7 MOTION SENSOR/ MULTI-SENSOR

- A sensor is used to trigger the programmed actions once the presence of a person is detected.
- two Type of sensors will be used as follows:
 - A. PIR Motion Sensors:
 - Each bathroom, entrance, and kitchen inside the home should have a motion sensor on its ceiling and it's optional to have it for the other rooms & corridors. A Cat.6 cable should be extended inside a 20 mm conduit from each motion sensor to the nearest keypad available in the room. The Cat.6 cable should be labeled from both sides as S1, S2 and S3...etc. according to the number of motion sensors to be installed.
 - B. Multi-Sensor:
 - In the living room zone, a multi-sensor labeled as M should be provided at the center of the ceiling near the TV location. The bus cable loop should pass by the multi-sensor round back box without being cut where a minimum of 35cm of the cable should be kept inside the round back box (two rounds inside the back box). The round back box should be covered by a blank plate.
- The location of each sensor & its labeling should

be indicated on the smart home system layout, bus cable layout and the schematic diagram as in Figures 1.1.2, 1.1.3& 1.1.7 respectively. According to the number of Multi-sensors to be installed, it should be labeled as M1, M2 and M3...etc...

1.1.8 ACCESS CONTROL SYSTEM

- In the main entrance area, access control Node controller labeled as N should be provided at the center of the ceiling in foyer or entrance location along with power outlet box. The bus cable loop should pass by the Node controller round back box without being cut where a minimum of 35cm of the cable should be kept inside the round back box (two rounds inside the back box).
- The round back box should be covered by a blank plate.
- The power box has a power outlet. It is a normal power used to energize the Node controller.
- In the main entrance area, access control Node controller labeled as N should be provided at the center of the ceiling in foyer or entrance location along with power outlet box. The bus cable loop should pass by the Node controller round back box without being cut where a minimum of 35cm of the cable should be kept inside the round back box (two rounds inside the back box).
- The round back box should be covered by a blank plate.
- The power box has a power outlet. It is a normal power used to energize the Node controller.

1.1.9 ENTERTAINMENT (E) OUTLET

- According to the telecom guidelines, at least 1 dual data outlet is available in the living room zone at the TV location. Next to this data outlet, an outlet labeled as E with a blank plate should be provided as shown in Figure 1.1.14 along with a dual power socket.

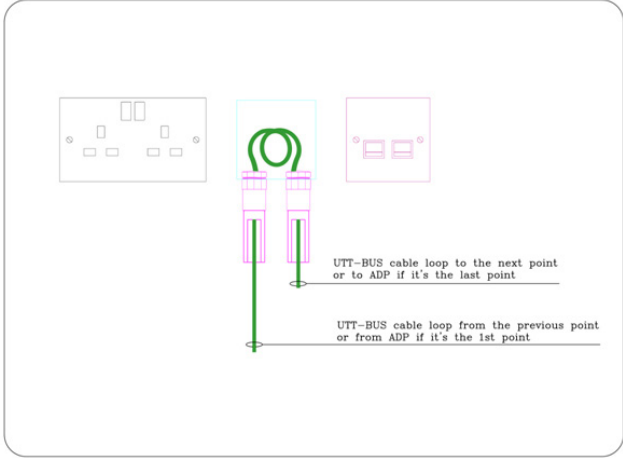


Figure 1.1.14: E Outlet Layout

- A UK sized back box (3" x 3") with a minimum depth of 47 mm should be used for the E outlet.
- The bus cable loop should pass by the E outlet without being cut where a minimum of 35cm from the cable should be kept inside the back box (two rounds inside the back box).
- The location of the E outlet & its label should be indicated on the smart home system layout, bus cable layout and the schematic diagram as in Figures 1.1.2, 1.1.3& 1.1.7 respectively. According to the number of Entertainment outlets to be installed, it should be labeled as E1, E2 and E3... etc...

1.1.10 AUDIO (A) DISTRIBUTION

- Each room (zone), which requires an audio distribution, will need the following to be installed in the ceiling:
 - 1 No. Amplifier: requires 220v power supply and Cat.6A cable from ONU.
 - 1 No. Pair of speakers: 1 speaker cable from each speaker in same zone to the amplifier.
- 1 No. E outlet will be required at each zone.
- A Cat.6 cable should be extended inside a 20 mm conduit from the amplifier location to the E outlet in

- the room. The Cat.6 cable should be labeled from both sides as E1, E2 and E3...etc.
- The location of the speakers & its labeling should be indicated on the smart home system layout, bus cable layout and the schematic diagram.

1.1.11 IR RECEIVER

- IR receiver triggers the programmed actions once the end user uses an IR remote control.
- The bus cable loop should pass by the IR receiving round back box without being cut where a minimum of 35cm of the cable should be kept inside the round back box (two rounds inside the back box). It should be labeled from both sides as IR1, IR2 and IR3...etc.
- The location of each IR receiving& its labeling should be indicated on the smart home system layout, bus cable layout and the schematic diagram.

1.1.12 PENTHOUSE & TOWN HOUSE

- For a penthouse or town house consisting of a lower floor & upper floor, sections 1.1.1 to 1.1.14 are applied; however, the following should be taken into considerations for:
- Section 1.1.1 a secondary ADP should be fixed at the upper floor next to the upper floor EDB. 1 No. bus cable should be extended between the secondary ADP and the ADP located at the lower floor (which is called Master ADP) inside a 25 mm conduit. The bus cable should be labeled from both sides as L1.
- Section 1.1.2 another 1 No. Cat.6 cable should be extended from the ONU to the secondary ADP inside a 25 mm conduit. The Cat6 cable should be labeled from both sides as L1.
- Section 1.1.3 all the lighting loads, exhaust fans, and water heaters of the upper floor should be connected to the secondary ADP. A dedicated 220V surge protected breaker should be connected to the power supply of the gateway located at the last DIN rail of the secondary ADP.

- Section 1.1.4 the bus cable of the upper floor keypads, thermostats, curtains, sensors, and E outlet should be extended directly to the secondary ADP.

- Section 1.1.7 a Multi-sensor should be provided at the upper floor living room area.
- Section 1.1.9 an E outlet should be provided at the upper floor living room area at the TV location.

02 LED LIGHT

An LED lamp is a light-emitting diode (LED) product that is assembled into a lamp (or light bulb) for use in lighting fixtures. LED lamps have a lifespan and efficiency that is several times better than incandescent lamps, and significantly better than most fluorescent lamps, with some chips able to emit more than 100 lumens per watt.

The advantages of LED lighting over traditional light sources are numerous:

- High efficiency providing substantial energy savings
- Long lifetime reducing maintenance needs and costs
- Instant start and higher resistance to switching cycles
- Low operating temperature creating additional

potential savings on air-conditioning

- No hazardous material, 100% mercury free

This guideline is designed to assist the user in identifying potential interior and exterior architectural applications for LEDs by giving specific design examples typically found in residential and commercial categories. This guideline identifies lumen packages that would be necessary for various applications.

2.1 LED LAMP LUMINAIRES

In this part, minimum lumen required for various application will be present in table 1.2.2. LED lamp luminaires shall to be of a type as based on calculations submitted by the contractor.

	Energy savings	Lifetime	Starting time	Switching cycles	Heat resistance	Directional	Mercury Free	Affordability
LED	 80%	 40 000hrs	 <1sec.	 ≥ 40,000	 Warm	 25° / 40°	 0mg	 \$\$\$
CFL	 80%	 10 000hrs	 <60sec.	 ≥ 10,000	 Hot	 ≥ 110°	 > 5mg	 \$\$
INC. or HAL.	 0%	 2 000hrs	 <1sec.	 ≥ 4,000	 Very Hot	 25° / 40°	 0mg	 \$

Figure 1.2.1: Advantages of LED lighting

General Building Areas	IES Standards Illumination Level
CIRCULATION AREA	
Corridors, Passageway	100
Lift	150
Stairs	150
Escalator	150
External Covered Ways	30
ENTRANCES	
Entrance halls, lobbies, waiting rooms	150
Enquiry desk	500
Gate houses	300
KITCHENS	
Foods stores	150
General	500
OUTDOOR	
Controlled entrance halls or exit gate	150
Entrance and exit car park	30
Stores, stockyards	30
FURTHER EDUCATION ESTABLISHMENT	
Lecture theatres general	500
Chalkboard	500
Demonstration benches	500
Examination halls, seminar rooms, teaching spaces	500
Laboratories	500
FURTHER EDUCATION ESTABLISHMENT	
Workshop	300

General Building Areas	IES Standards Illumination Level
Staff rooms, student rooms\students hostels etc.	300
Gymnasium	300
LIBRARIES	
Shelves, book stack	150
Reading table	300
Reading rooms, newspaper and magazines	300
Reference libraries	500
Counters	500
Industrial covered ways	50
STAFF RESTAURANTS	
Centre cafeterias, dining room	300
MEDICAL AND FIRST AIDS CENTERS	
Consultant room, treatment areas	500
Medical stores	100
Rest room	150
STAFF ROOM	
Changing locker and cleaner's room,	150
Rest rooms	150
STORE AND STOCK ROOMS	
Telecommunication board,	100
switchboard rooms	100
Cordless switchboard	300
Apparatus rooms	150
Tele printer rooms	500

General Building Areas	IES Standards Illumination Level
CIRCULATION AREA	
Corridors, Passageway	100
Lift	150
Stairs	150
Escalator	150
External Covered Ways	30
ENTRANCES	
Entrance halls, lobbies, waiting rooms	150
Enquiry desk	500
Gate houses	300
KITCHENS	
Foods stores	150
General	500
OUTDOOR	
Controlled entrance halls or exit gate	150
Entrance and exit car park	30
Stores, stockyards	30
FURTHER EDUCATION ESTABLISHMENT	
Lecture theatres general	500
Chalkboard	500
Demonstration benches	500
Examination halls, seminar rooms, teaching spaces	500
Laboratories	500
FURTHER EDUCATION ESTABLISHMENT	
Workshop	300

General Building Areas	IES Standards Illumination Level
Staff rooms, student rooms\students hostels etc.	300
Gymnasium	300
LIBRARIES	
Shelves, book stack	150
Reading table	300
Reading rooms, newspaper and magazines	300
Reference libraries	500
Counters	500
Industrial covered ways	50
STAFF RESTAURANTS	
Centre cafeterias, dining room	300
MEDICAL AND FIRST AIDS CENTERS	
Consultant room, treatment areas	500
Medical stores	100
Rest room	150
STAFF ROOM	
Changing locker and cleaner's room,	150
Rest rooms	150
STORE AND STOCK ROOMS	
Telecommunication board,	100
switchboard rooms	100
Cordless switchboard	300
Apparatus rooms	150
Tele printer rooms	500

General Building Areas	IES Standards Illumination Level
WOODWORKING SHOP	
Rough sawing, bench work	300
Sizing, planning, rough sanding medium and bench work gluing cooperage	500
Fine bench and machine work fine sanding, finishing	750
Railway station parcel and left luggage offices counters	300
Circulation area	150
Waiting area	300
HOSPITAL	
Ward unit bed heads general	30-50
General	150
Night	0.1
Nurse station evening	300
Pharmacies dispensing bench	500
Shelves	150
Reception general	300
Enquiry desk	500
Laboratories	500
Operating theatre suits general	400
Recovery room and intensive care units	30-50
X-ray department radio-diagnostic and rooms fluoroscopy	500
Dental surgeries	500
HOMES	
Living rooms general	50
Casual reading	150
Sewing darning studies desk and portaged	300

General Building Areas	IES Standards Illumination Level
OFFICE	
General office with mainly clerical task and typing office	500
Deep plan general offices	750
Business machine and typing	750
Filling room	300
Conference rooms	750
OFFICES AND SHOPS	
Executive office	500
Computer rooms	500
Punch card rooms	750
Drawing offices drawing boards	750
Reference table and general	500
Print room	300
SHOP	
Conventional with counters	500
Conventional with wall display	500
Conventional with wall display	500
SHOP	
Self service	500
Supermarkets	500
Hypermarkets	500
General	500
Bedroom general	50
Bed lead kitchen	150
Kitchen working areas	300

General Building Areas	IES Standards Illumination Level
Bathrooms	100
Halls and landings	150
Stairs	100
Workshops	300
Garages	50
INDOOR SPORTS AND RECREATIONAL BUILDING	
Athletics, basketball, bowls, judo	300
Hockey	700
BADMINTON COURTS	
BILLIARD ROOMS	
General	100
Table	special lighting
CARD ROOMS	300
GYMNASIA GENERAL	500
SWIMMING POOL	
Top pool	500
Spectator areas	150
Club recreational	300
PUBLIC AND EDUCATIONAL BUILDING ASSEMBLY AND CONCERT HALLS	
Theatre and concert halls	100
Cinemas	50
Multipurpose	500

General Building Areas	IES Standards Illumination Level
GENERAL	
Changing rooms showers lookers rooms	150
TABLE TENNIS	
Club	300
Recreational	200

2.2 PROTECTION CLASSIFICATION

All interior lighting fixture enclosures shall be classified in accordance with the IP classification system and two digit number code, following table 1.2.3 present some sample areas:

Installation	Considerations
Residential/Office/ School	Generally clean, dry and free from harmful deposits of dust, but some condensate may be present due to atmospheric conditions. Minimum protection typically IP2XC for dry conditions.
Control rooms/ Sub-Stations	Generally dry and free from harmful deposits of dust, but some condensate may be present due to atmospheric conditions. Where access is restricted to skilled or instructed persons, IP2X is the typical minimum requirement for dry conditions.
Commercial/ Light Industrial	May not be clean, but normally dry and free from harmful deposits of dust. Suitable minimum protection, a) Where condensate is not present, IP2XC b) Where condensate may be present, IP21C. c) Equipment installed within range of fire sprinkler systems, IP22C. Machine control equipment, where fluids may be present, e.g. lathes, millers etc., typically IP54. Consideration should also be given to the corrosive properties of certain fluids

- If more connection channels are required, please consult UTT.
- Its size is 975 x 435 x 101 mm (HWD). For more information, please refer to UTT certified ADP vendor.

- It should be used for studio and one bedroom apartment type only.
- It will house the dimmers and relays required for the lighting loads connections [channels]:
 - 1st DIN rail : up to 16 lighting channels are available for dimming.
 - 2nd DIN rail : up to 12 lighting channels are available for relay.
- It will house the HVAC modules required for the AC control:
 - 2nd DIN rail : up to 4HVAC channels are available for AC control.
- It will house the power supply and gate way:
 - 3rd DIN rail : dedicated 220V protected breaker connection required.
- If more connection channels are required, please consult UTT.
- Its size is 615 x 435 x 101 mm (HWD). For more information, please refer to UTT certified panel vendor.

- 1 No. 25 mm conduit should be provided between the ADP and the ONU. It should enter the ADP and the ONU from the bottom center portion only as shown in Figure1.1.7.

- All the loads such as lightings, exhaust fans, doorbell and water heaters inside the home should be connected to the ADP using the electrical wires.
- The loads' wires should run inside conduits & enter the ADP from the top only.
- Each load should have its own line (wire) coming out from the ADP to the load location. The neutral wire can be shared between the loads fed from the same breaker and should return back to the ADP.
- 1 mlength of electrical wire for each load should be kept inside the ADP.
- All the wires should be labeled and terminated at the ADP according to the approved drawings as shown in Figures 1.1.6 & 1.1.7. The labeling should be as follows:
 - D1, D2, D3... up to D16 for Dimmer Module Channels. The connections termination should start from the right side of the 1st DIN rail.
 - R17, R18, R19... up to R48 for Relay Module Channels. The connections termination should start from right side of the 2nd and 3rd DIN rails.
- The details & rating of each load (for example: chandelier, 500watt) should be mentioned clearly in the apartment's smart home layout as shown in Figure 1.3.2.



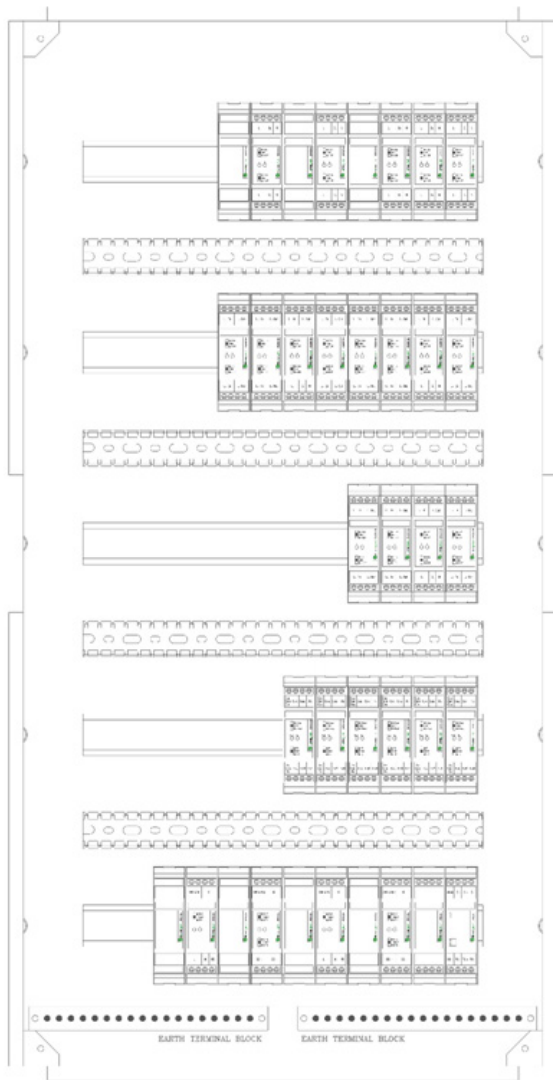


Figure 1.3.4: Apartment's Smart Home System Schematic Diagram

There are two types of the DIN rail Modules where the loads should be connected to within the ADP and a Gateway which are:

1.2.3.1 DIN RAIL DIMMER MODULE:

- The DIN rail Dimmer Module shown in Figure 1.3.5 is used to dim the lights to a certain percentage as well as to turn them ON/OFF.
- The lighting loads in the living room, dining room, and all bedrooms should be connected to the output channels of the dimmer module(s).



Figure 1.3.5: DIN rail 4 Channels Dimmer Module

- There are different type of dimmer module(s) to be used, depending on the number of output (load) channels and the output (load) rating, which are:
 - 2 x 0.75A channels of dimming output.
 - 4 x 0.75A channels of dimming output.
 - 2 x 1.5A channels of dimming output.
 - 4 x 1.5A channels of dimming output.
 - 8 x 1.5A channels of dimming output.
 - 2 x 3A channels of dimming output.

- 4 x 3A channels of dimming output.
- 1 x 5A channels of dimming output.
- 2 x 5A channels of dimming output.

- Each Unit (vertical slot/sideboard of the Module) from the dimmer module should be connected to the same breaker with its neutral as an input from the EDB.
- Each lighting load should have its own line (wire) connected to the dimmer module output. The neutral cable can be shared between the loads fed from the same breaker and should return back to the ADP.
- Dimmable ballasts for lights should be installed by the electrical contractor assigned from the client.
- The loads connections to the dimmer module are shown in Figure 1.1.6.

1.2.3.2 DIN RAIL RELAY MODULE:

- The DIN rail Relay Module shown in Figure 1.3.6 is used to toggle (ON/OFF) the lights, exhaust fans, doorbell and water heaters.
- The lighting loads in the kitchen, corridors and all bathrooms should be connected to the output channels of the relay module.
- The doorbell, exhaust fans and water heaters in the home should also be connected to the output channels of the relay module.
- There are different type of relay module(s) to be used, depending on the number of output (load) channels and the output (load) rating, which are:
 - 4 x 10A channels of relay output.
 - 8 x 10A channels of relay output.
 - 4 x 16A channels of relay output.
 - 8 x 16A channels of relay output.
- Each channel from the relay module can be connected to a different breaker with its neutral as an input from the EDB.

- Each lighting load, exhaust fan, doorbell, and water heater should have its own line (wire) connected to the relay module output. The neutral cable can be shared between the loads fed from the same breaker and should return back to the ADP.
- The loads connections to the relay module are shown in Figure 1.1.6.



Figure 1.3.6: DIN rail 4 Channels Relay Module

1.2.3.3 DIN RAIL GATEWAY:

- The gateway shown in Figure 1.3.7 is required to connect the smart home system to the TCP/IP network.
- A dedicated 220V surge protected breaker should be connected to the power supply of the gateway located at the last rail of the ADP shown in Figure 1.1.7.



Figure1.3.7: DIN rail Gateway

1.2.4 THE SMART HOME KEYPAD AND THE BUS CABLE

- Smart home keypads, shown in Figure1.3.8, are programmable keypads that consist of 4 to 8 buttons or an LCD with 12 buttons where each button can be used for a single or multiple actions [scenes].
- A smart home keypad should be provided at the entry of each room, bathroom, kitchen & corridor inside the home as shown in Figure 1.3.2.
- If a bathroom is available inside a room & the bathroom is close to the entry of the room, one keypad is enough for both of them. However, if the bathroom is away from the entry of the room, two smart keypads should be provided: one for the bathroom & the other one for the room.

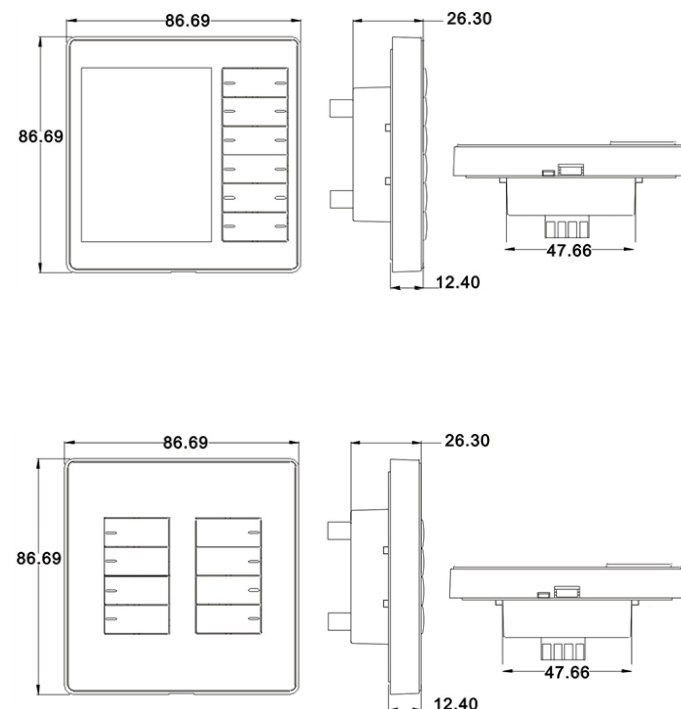


Figure1.3.8: Smart Home Keypads

- Each smart home keypad requires a UK sized back box (3" x 3") with a minimum depth of 47 mm. It should be labeled as H1, H2, and H3...etc.
- The dimension of the keypad's faceplate is 86 x 86 mm (HW).
- The bus cable, supplied by UTT, should go out from the bottom center portion of the ADP in order to connect the back boxes of the smart home keypads, thermostats, curtains, multi-sensors, and the entertainment (E) outlet. The cable should come back to the ADP after passing by the last back box in order to close the loop.

- The bus cable should pass by each back box without being cut where a minimum of 35cm from the cable should be kept inside each back box (two rounds inside the back box).
- The bus cable loop should be run inside 20 mm conduits. All the conduits should be laid from the ground below the tiles and not from the ceiling except for curtains and sensors.
- The looping is topology free (daisy chain, branch, star, etc.) If the total amount of cable used within a bus run is not more the 300m otherwise Daisy chain is highly recommended as shown in Figure1.1.7.
- 1 No. 20mm conduit with Cat.6 cable should be provided between the doorbell switch and the nearest smart home keypad as shown in Figure1.3.9.

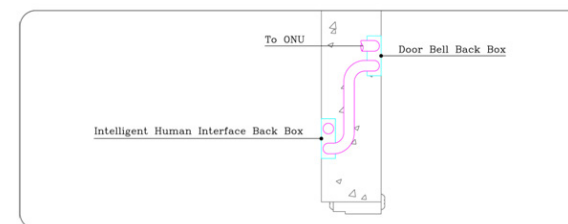


Figure1.3.9: Connection between the Smart Home Keypad and the Doorbell

- 1 No. 20mm conduit with Cat.6 cable should be provided between the water heater conventional switch and the nearest smart home keypad as shown in Figure1.3.10.

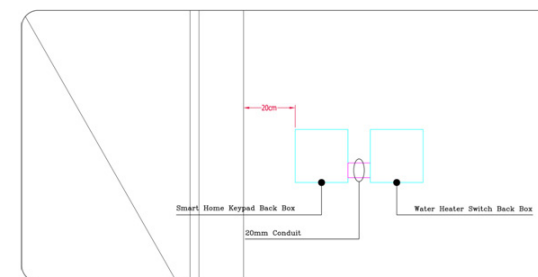


Figure1.3.10: Connection between the Smart Home Keypad and Water Heater Switch

1.2.5 HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

- Each thermostat requires a UK sized back box (3" x 3") with a minimum depth of 47 mm. It should be labeled as T1, T2, and T3...etc.
- The bus cable loop should pass by the thermostat's back box without being cut where a minimum of 35cm from the cable should be kept inside each back box (two rounds inside the back box).
- If the thermostat is located exactly next to the smart keypad, there is no need to have a separate UK sized back box for it. The smart keypad will be used to control the lighting as well as the AC.
- The location of each thermostat & its labeling should be indicated on the smart home system layout, bus cable layout and the schematic diagram as in Figures 1.3.2, 1.3.3 & 1.1.7 respectively.
- Depending on the FCU used, extend all the wires (exclude neutral wire) terminated at each FCU controller PCB to the ADP by using 25mm conduit and label them accordingly in both sides. For example:

- FCU1 cables will be 1Y, 1G1, 1G2, 1G3, 1R, and 1W.
- FCU2 cables will be 2Y, 2G1, 2G2, 2G3, 2R, and 2W.
- FCU3 cables will be 3Y, 3G1, 3G2, 3G3, 3R, and 3W.

- The wires coming from each FCU should be terminated at the 4th DIN rail of the 5 DIN rail Type ADP or at the 2nd DIN rail of the 3 DIN rail Type ADP
- A complete data sheets for HVAC system used should be submitted to UTT.

1.2.6 SHADES AND CURTAIN CONTROL

- Two back boxes with blank plates should be provided at the top right side of all windows at the curtain location (10-20 cm away from the window frame) as in Figure1.3.11. As a suggestion, creating a curtain box helps hiding the back boxes.

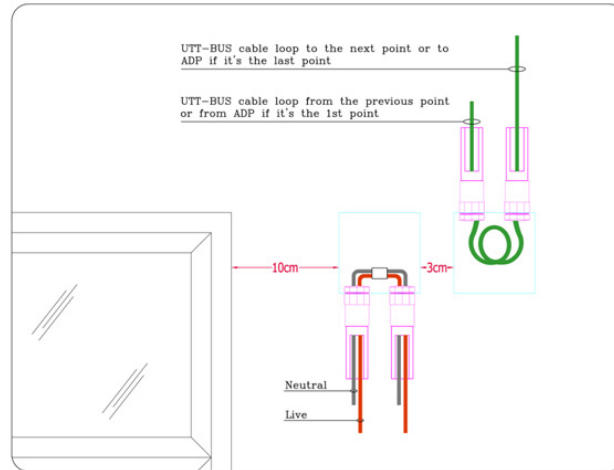


Figure1.3.11: Shade & Curtain Connections

- The first covered back box has a power cable. It is a normal power used to energize the curtain's motor.
- The second back box is a UK sized back box (3" x 3") with a minimum depth of 47 mm. It should be provided with a blank plate and labeled as C1, C2, and C3...etc.
 - Inside this covered back box, the bus cable loop should pass without being cut where a minimum of 35cm from the cable should be kept inside each back box (two rounds inside the back box).
- The location of each curtain & its labeling should be indicated on the smart home system layout and bus cable layout in Figures 1.3.2& 1.3.3 respectively.

1.2.7 MOTION SENSOR/ MULTI-SENSOR

- A sensor is used to trigger the programmed actions once the presence of a person is detected
- Two Type of sensors will be used as follows:

A.PIR Motion Sensor:

- Each bathroom, entrance, and kitchen inside the home should have a motion sensor on its ceiling and it's optional to have it for the other rooms & corridors. A Cat.6 cable should be extended inside a 20 mm conduit from each motion sensor to the nearest keypad available in the room. The Cat.6 cable should be labeled from both sides as S1, S2 and S3...etc. according to the number of motion sensors to be installed.

B.Multi-Sensor:

- In the living room zone, a multi-sensor labeled as M should be provided at the center of the ceiling near the TV location. The bus cable loop should pass by the multi-sensor round back box without being cut where a minimum of 35cm of the cable should be kept inside the round back box (two rounds inside the back box).etc.

- The location of each sensor & its labeling should be indicated on the smart home system layout and bus cable layout as in Figures 1.3.2&1.3.3 respectively. According to the number of Multi-sensors to be installed, it should be labeled as M1, M2 and M3...etc.

1.2.9 ENTERTAINMENT (E) OUTLET

- According to the telecom guidelines, at least 1 dual data socket is available in the living room zone at the TV location. Next to this data socket, an outlet labeled as E should be provided as shown in Figure 1.3.12 along with a dual power socket.

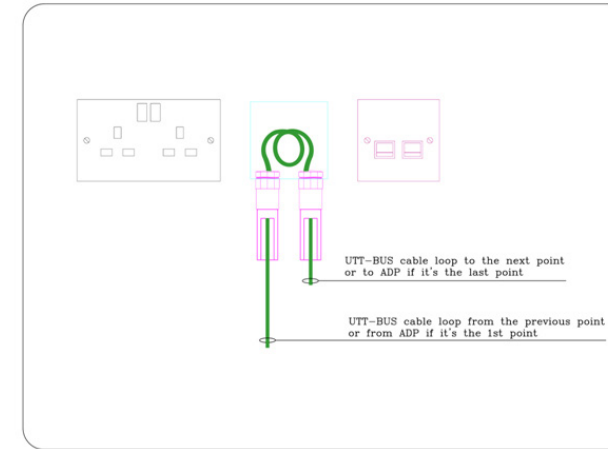


Figure1.3.12: E Outlet Layout

- A UK sized back box (3" x 3") with a minimum depth of 47 mm should be used for the E outlet.
- The bus cable loop should pass by the E outlet without being cut where a minimum of 35cm from the cable should be kept inside the back box (two rounds inside the back box).
- The location of the E outlet & its label should be indicated on the smart home system layout, bus cable layout and the schematic diagram as in Figures1.3.2&1.3.3 respectively. According to the number of Entertainment outlets to be installed, it should be labeled as E1, E2 and E3...etc...

1.2.10 AUDIO (A) DISTRIBUTION

- Each room (zone), which requires an audio distribution, will need the following to be installed in the ceiling:
 - 1 No. Amplifier: requires 220v power supply and Cat.6A cable from ONU.
 - 1 No. Pair of speakers: 1 speaker cable from each speaker in same zone to the amplifier.
- 1 No. E outlet will be required at each zone.
- A Cat.6 cable should be extended inside a 20 mm conduit from the amplifier location to the E outlet in the room. The Cat.6 cable should be labeled from both sides as E1, E2 and E3...etc.

The location of the speakers & its labeling should be indicated on the smart home system layout, bus cable layout and the schematic diagram.

1.2.11 IP CAMERA

- An RJ-45 outlet and single power outlet should be provided at the camera location.
- The Cat.6A cable of the RJ-45 outlet should come from the ONU & be labeled as IP1, IP2, and IP3... etc.
- The location of each IP Camera & its labeling should be indicated on the smart home system layout, bus cable layout and the schematic diagram.

1.2.12 IR RECEIVER

- IR receiver triggers the programmed actions once the end user uses an IR remote control.
- The bus cable loop should pass by the IR receiver round back box without being cut where a minimum of 35cm of the cable should be kept inside the round back box (two rounds inside the back box). It should be labeled from both sides as IR1, IR2 and IR3...etc.
- The location of each IR receiver & its labeling should be indicated on the smart home system layout, bus cable layout and the schematic diagram.

1.2.13 PENTHOUSE & TOWN HOUSE

For a penthouse or town house consisting of a lower floor& upper floor, sections 1.3.1 to 1.3.12 are applied; however, the following should be taken into considerations for:

- Section 1.3.1, a secondary ADP should be fixed at the upper floor next to the upper floor EDB. 1 No. bus cable should be extended between the secondary ADP and the ADP located at the lower floor (which is called Master ADP) inside a 25 mm conduit. The bus cable should be labeled from both sides as L1.
- Section 1.3.2, another 1 No. Cat.6a cable should be extended from the ONU to the secondary ADP inside a 25 mm conduit. The Cat6a cable should be labeled from both sides as L1.
- Section 1.3.3, all the lighting loads, exhaust fans, and water heaters of the upper floor should be connected to the secondary ADP. A dedicated 220V surge protected breaker should be connected to the power supply of the gateway located at the last DIN rail of the secondary ADP.
- Section 1.3.4, the bus cable of the upper floor keypads, thermostats, curtains, sensors, and E outlet should be extended directly to the secondary ADP.
- Section 1.3.7, a Multi-sensor should be provided at the upper floor living room area.
- Section 1.3.9, an E outlet should be provided at the upper floor living room area at the TV location.

02 ANNEXURE

2.1 IMPORTANT NOTES

- This design guide explains in general, all UTT requirements that will facilitate the provision of automation services to new buildings, yet the requirements indicated in the 'NOC' (No Objection Certificate) should be fully complied.
- Developers/Consultants/Designers/Contractor must liaise with UTT at the design stage and obtain UTT approval on the final Design Drawings.
- UTT approval is valid for one year from the date of the approval, the Owner/Developers/Contractor should re-submit the design drawing for renewal.
- Minimum two sets of automation design drawings must be submitted for study and approval. Before tendering, the submission shall be done through the proper channel
- Where deviations/comments/amendments are advised on the Design, Drawings must be corrected and re-submitted for approval.
- UTT through its certified venders will supply and install all the smart home/smart home ready cables and equipment after receiving confirmed order from the Owner/Developers/Contractor. This scope is not allowed to be carried out by any other party.
- On completion of the requirements, any comments and snags advised by UTT Building Inspector must be attended by the Contractor or Owner of the building, soon to avoid delays in the issuance of the Building Completion Certificate.
- One set of approved 'As-Built' drawings must be submitted along with the Building Completion Certificate, which will be certified by UTT.

2.2 REQUIRED DOCUMENTATION FOR HANDOVER (PROJECT COMPLETION) NOC/BCC ISSUANCE

Design Stage (before starting construction)

- Design Drawings approval form signed and stamped
 - 2 sets of the design drawings stamped by the consultant
 - 1 CD with the CAD drawings, CD shall be labeled with all the details
 - Contact list of the concerned engineers for the project (consultant)
- For Al Reem Island, all drawings to be submitted through M/s Bunya.
- For Rawdhat Abu Dhabi, all drawings to be submitted by consultant directly.

Smart Building Automation Drawing approval

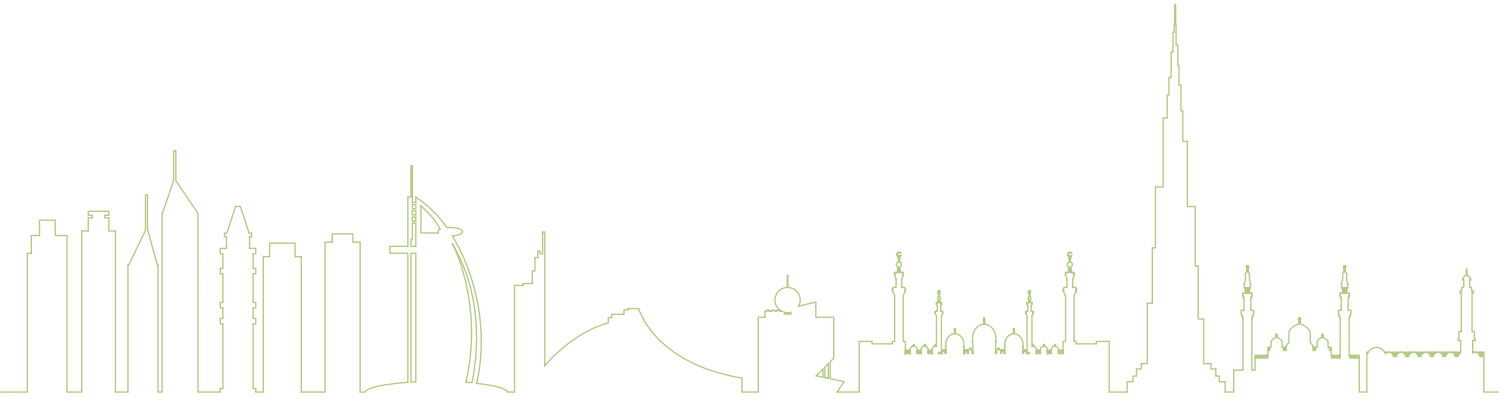
- 1) Cover letter from Consultant with drawing reference for each sheet
- 2) Two hard copies of Home Automation System drawings with soft copies in two separate hard box files clearly labeled with Sector & Plot
- 3) All contact information for Main contractor, MEP contractor and Consultant to be included along the cover letter.

Mock up inspection

- Mock up inspection request form signed and stamped
- Mock up Layout and schematic diagram showing all automation details.

Final inspection stage

- Final inspection request form signed and stamped by all parties



- Unit types & apartment numbers sheet.
Building Completion Certificate (BCC)
- All of the above fully complied 100%
- Compliance with Smart City Infrastructure BCC requirements.

2.4 APPLICATION FOR BUILDING INSPECTION

Application for Building Inspection

☐ Smart Home
☐ 1st & 2nd Inspection

☐ Telecom
☐ Subsequence Inspection

STRUCTURE TYPE

☐ Villa
☐ Tower 1-09 storey
☐ Tower 10-19 storey
☐ Tower 20-29 storey
☐ Tower 30-39 storey
☐ Tower 40-49 storey
☐ Tower ≥ 50 storey
☐ Commercial Building
☐ School
☐ Hotel
☐ Office Complex
☐ GSM Site

No. of Villas :

No. of Towers :

No. of Towers :

No. of Towers :

No. of Towers :

No. of Towers :

No. of Towers :

☐ Commercial Complex

☐ Utility Building

☐ Mosque / Imam House

☐ Hospital / Clinic

☐ Others :

LOCATION DETAILS

Project Name :

Sector :

Plot No. :

No. of Floors :

No. of Flats :

STRUCTURE DETAILS

Developer :

Owner :

Contact No. :

CONSULTANT DETAILS

Name :

P.O.Box :

Fax No. :

Contact Person :

Contact No. :

CONTRACTOR DETAILS

Name :

P.O.Box :

Fax No. :

Contact Person :

Contact No. :

SUB CONTRACTOR / ELECTRICAL CONTRACTOR DETAILS

Name :

P.O.Box :

Fax No. :

Contact Person :

Contact No. :

FOR ACCOUNTING USE ONLY

Ref. :

Invoice No. :

Fax No. :

Details :

FOR OFFICIAL USE ONLY

Ref. :

Application Checked By :

Date :

Approved By :

Valid up to :

*Note : 6 Months Validity Relevant documents : Copy of approved drawings

PO Box: 3838 - Abu Dhabi, United Arab Emirates T: +971 2 618 4718 E: info@ut.ae W: www.ut.ae

Project Name: Plot: Sector:

S. No.	Item Discription	Area	Model No.	False Ceiling	Qty Required	Dimmable	Color Temprature (k)	Lumens Required	Note
		Apart. LIVING		YES/NO		MUST BE DIMMABLE			
		Apart. BEDROOM		YES/NO		MUST BE DIMMABLE			
		Kitchen		YES/NO					
		Apart. Corridor		YES/NO					
		Main Lift Lobby		YES/NO					
		Toilet		YES/NO					
		Shower area/ Toilet		YES/NO					
		Gym		YES/NO					
		Apart. Corridor+ lift lobby		YES/NO					
		Service area		YES/NO					
		Parking		YES/NO					
		Staircase		YES/NO					

2.6 INSPECTION CHECKLIST

Date: / /

Project: _____ Sector: _____ Plot: _____

Inspection Types: Regular ☐ Final ☐

1 Enclosure

1.1 Termination	☒ Done	☐ Not Done	☐ Done with comments
1.2 Labeling	☒ Done	☐ Not Done	☐ Done with comments
1.3 CAT-6	☐ Installed	☐ Not Installed	☐ Installed with comments
1.4 Bus Cable	☐ Installed	☐ Not Installed	☐ Installed with comments
1.5 Gateway Power	☒ Connected	☐ Not Connected	☐ Connected with comments

2 Keypad

2.1 Location	☐ Match	☐ Not Match	☐ Match with comments
2.2 Back box (47mm)	☐ Installed	☐ Not Installed	☐ Installed with comments
2.3 Bus Cable	☐ Installed	☐ Not Installed	☐ Installed with comments

3 HVAC

3.1 Back Box (47mm)	☐ Installed	☐ Not Installed	☐ Installed with comments
3.2 Bus Cable	☐ Installed	☐ Not Installed	☐ Installed with comments
3.3 Termination	☐ Installed	☐ Not Installed	☐ Installed with comments
3.4 Labeling	☐ Done	☐ Not Done	☐ Done with comments

4 Shade & Curtain Control

4.1 Location	☐ Match	☐ Not Match	☐ Match with comments
4.2 Power	☐ Installed	☐ Not Installed	☐ Installed with comments
4.3 Bus Cable	☐ Installed	☐ Not Installed	☐ Installed with comments
4.4 Labeling	☐ Done	☐ Not Done	☐ Done with comments

5 Motion Sensor

5.1 Location	☐ Match	☐ Not Match	☐ Match with comments
5.2 CAT-6 Cable	☐ Installed	☐ Not Installed	☐ Installed with comments
5.3 Labeling	☐ Done	☐ Not Done	☐ Done with comments

6 Multi-Sensor

6.1 Location	☐ Match	☐ Not Match	☐ Match with comments
6.2 Bus Cable	☐ Installed	☐ Not Installed	☐ Installed with comments
6.3 Labeling	☐ Done	☐ Not Done	☐ Done with comments

7 Access Control System

7.1 Location	☒ Match	☐ Not Match	☐ Match with comments
7.2 Node Cable	☐ Installed	☐ Not Installed	☐ Installed with comments
7.3 Labeling	☒ Done	☐ Not Done	☐ Done with comments

8 Entertainment (E) Outlet

8.1 Location	☐ Match	☐ Not Match	☐ Match with comments
8.2 Back box (47mm)	☐ Installed	☐ Not Installed	☐ Installed with comments
8.3 Bus Cable	☐ Installed	☐ Not Installed	☐ Installed with comments
8.4 Labeling	☐ Done	☐ Not Done	☐ Done with comments

9 Audio (A) Distribution

9.1 Location	☐ Match	☐ Not Match	☐ Match with comments
9.2 E Outlet (47mm)	☐ Installed	☐ Not Installed	☐ Installed with comments
9.3 Cat.6 Cable	☐ Installed	☐ Not Installed	☐ Installed with comments
9.4 Labeling	☐ Done	☐ Not Done	☐ Done with comments

10 IP Camera

9.1 Location	☐ Match	☐ Not Match	☐ Match with comments
9.2 RJ-45 Outlet	☐ Installed	☐ Not Installed	☐ Installed with comments
9.3 Labeling	☐ Done	☐ Not Done	☐ Done with comments

11 IR Receiver

11.1 Location	☐ Match	☐ Not Match	☐ Match with comments
11.2 CAT-6 Cable	☐ Installed	☐ Not Installed	☐ Installed with comments
11.3 Labeling	☐ Done	☐ Not Done	☐ Done with comments

General Notes:

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Next Inspection date

All the comments should be rectified maximum before two days from the next inspection date

UTT Engineer:

Signature.....

Site Engineer Name:

Signature:





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