

## WorldSkills 2019 – #18 – Electrical Installations

## Test project description

## Module 1

GRID SIZE = 100x100mm

- A1 MAIN SWITCHBOARD
- B1 SUB BOARD FOR MOTOR CONTROL
- B2 TRAFFIC LIGHT (INSIDE GARAGE)
- B3 TRAFFIC LIGHT (OUTSIDE GARAGE)
  
- H1 LIGHT 1
- H2 LIGHT 2
- H3 LIGHT 3
- H4 LIGHT 4
  
- S1 TWO WAY OR INTERMEDIATE SWITCH
- S2 TWO WAY OR INTERMEDIATE SWITCH
- S3 TWO WAY OR INTERMEDIATE SWITCH
- S4 TWO WAY OR INTERMEDIATE SWITCH
- S5 KNX SWITCH (JUNG)
- S6 ROOM CONTROLLER (JUNG)
- S7 ROOM CONTROLLER (ABB)
- S8 2-GANG SWITCH (WITH FUSE)
  
- P1 SOCKET (HEATER)
- P2 SOCKET (AIR CONDITION)
  
- O1 SOCKET OUTLET 1
- O2 SOCKET OUTLET 2
- O3 SOCKET OUTLET 3
- O4 SOCKET OUTLET 4
- O5 SOCKET OUTLET 5
  
- PS POWER SUPPLY INLET
  
- M1 MOTOR 1

MESH TRAY  
100x60TRUNKING  
100x60MINI TRUNKING  
16x25mmFLEXIBLE PVC CONDUIT  
20mmPVC CONDUIT  
20mmCABLE  
H x W

S11	PUSH BUTTON (GREEN) CALL FOR OPENING GATE (FORWARD)
S12	EMERGENCY STOP PUSHBUTTON
S13	PUSH BUTTON (GREEN) CALL FOR CLOSING GATE (REVERSE)
S21	PUSHBUTTON (WHITE) CALL FOR DRIVE ACKNOWLEDGEMENT (OUT)
S22	PUSHBUTTON (WHITE) CALL FOR DRIVE ACKNOWLEDGEMENT (IN)
S23	BACKWARD IN AUTO MODE (LOGO! INPUT)
H11	INDICATION LIGHT (GREEN) GATE OPENING (FORWARD)
H12	INDICATION LIGHT (RED) MOTOR OVERLOAD TRIPPED
H13	INDICATION LIGHT (GREEN) GATE CLOSING (REVERSE)
H21	INDICATION LIGHT (RED) NO DRIVE ACKNOWLEDGEMENT (OUT)
H22	INDICATION LIGHT (GREEN) DRIVE ACKNOWLEDGEMENT (OUT)
H23	INDICATION LIGHT (RED) NO DRIVE ACKNOWLEDGEMENT (IN)
H24	INDICATION LIGHT (GREEN) DRIVE ACKNOWLEDGEMENT (IN)

MCB1	MAIN SWITCH
MCB2	FEED CONTROL CIRCUIT IN B1
OL1	MOTOR OVERLOAD PROTECTION
K1-5	CONTACTORS FOR STAR/DELTA-FORWARD/REVERSE GATE
TIMER	TIMER RELAY STAR/DELTA
LOGO! PS	LOGO! POWER SUPPLY
LOGO!	LOGO! MAIN UNIT WITH DISPLAY
LOGO! EXP	LOGO! EXPANSION MODULE
IP SWITCH	IP SWITCH
LOGO! KNX	LOGO! / KNX GATEWAY
KNX IP	KNX / IP ROUTER

MCB:	MINIMUM CABLE SIZE:
6A	>0,75 MM <sup>2</sup>
10A	>1,00 MM <sup>2</sup>
16A	>1,50 MM <sup>2</sup>
=/>20A	>2,50 MM <sup>2</sup>

FEED BETWEEN SWITCHBOARDS 2.5 MM<sup>2</sup> REGARDLESS PROTECTION.  
FEED TO HEATER 2,5 MM<sup>2</sup> REGARDLESS PROTECTION

MAIN SWITCH MUST ISOLATE ALL CIRCUITS  
RCD OR RCBO MUST AT LEAST PROTECT ALL OUTLET CIRCUITS

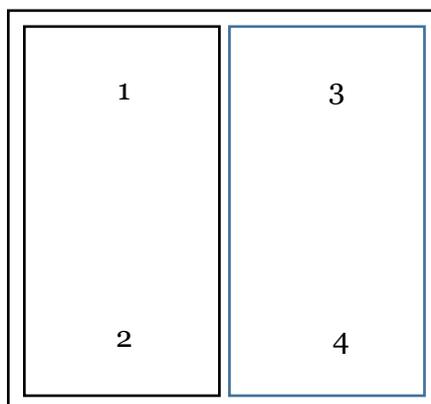
FREE POSITIONING OF DEVICES IN A1 IN SPECIFIED AREAS.

## SWITCHGEAR

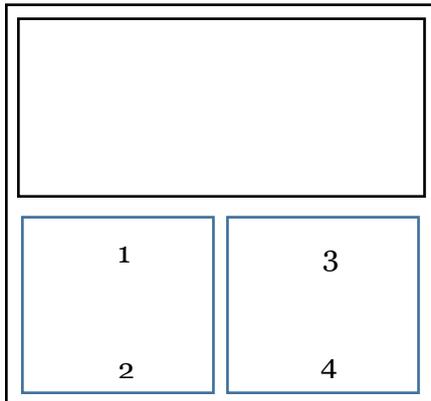
## TERMINALS

## KNX

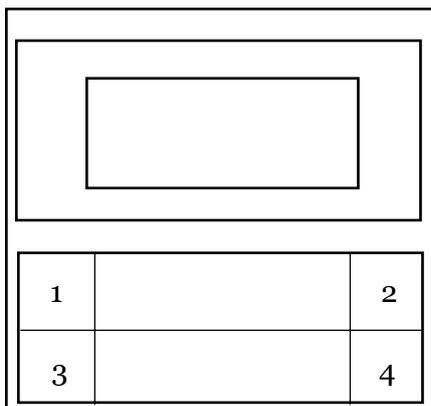
S5, Jung



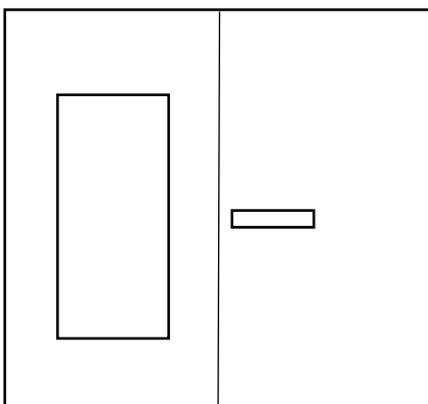
S6, Jung



S7, ABB



S8 Jung



#### Switch actuator:

Switch actuator Channel A1=H2

Switch actuator Channel A2=Heater

Switch actuator Channel A3=Cooler

Switch actuator Channel A4=O3

Switch actuator Channel A5=O1

Switch actuator Channel A6=O2

Switch actuator Channel A7=O4

#### Dimmer actuator

Dimmer actuator Channel 1=H1

Dimmer actuator Channel 2=H3

#### KNX Functions:

S5 Button 1 switch on and dim up H1

S5 Button 2 switch off and dim down H1

S5 Button 3 toggle H1 (ON/OFF)

S5 Button 4 dim H1 up and down

S6 Button 1 set S6 Thermostat in heating mode

S6 Button 2 set S6 Thermostat in cooling mode

S6 Button 3 switch on sockets O1, O2, O3 and O4

S6 Button 4 Switch off sockets O1 and O2.

S6 Display automatically shift between showing the it's own temperature and the external temperature from S7

S7 display always show the external temperature from S6

S6 Thermostat operates P1 and P2 in heating and cooling mode as per indicated function on drawing.

S7 Button 1 Toggle H3 (ON/OFF)

S5 Button 2 dim H3 up and down

S7 Button 3 Scenario: H1=50%, H2=ON, H3=100%, O1 and O2=ON, O3 and O4=OFF, S6=Cooling mode

S7 Button 4 Scenario: Act like a central off and switch off all lights, sockets, cooling and heating.

S8 rocker up=S6 Thermostat in comfort mode

S8 rocker down=S6 Thermostat in frost/heat protection mode

Traffic light control via LOGO! :

To enter garage the pushbutton on the outside is pressed. The inside "reen light turn off immediately and 2 seconds later the inside red light turns on. After another 2 seconds the green light on the inside turns on.

To leave garage the pushbutton on the inside is pressed. The outside "green" light turn off immediately and 2 seconds later the outside red light turns on. After another 2 seconds the green light on the outside turns on.

If there have been no pushbuttons pressed for 10 seconds the green light on the inside and the red light on the outside should be turned on.

Conventional gate control:

Gate open (forward) as long as S11 is pressed.

Gate close (reverse) as long as S13 is pressed.

Gate have to be interlocked so it can't open and close at the same time.

Gate motor have to use star/delta control.

Motor should switch from star to delta after 5 seconds.

If emergency stop push button is activated motor must be stopped and cannot start again until it is reset.

Conventional light control:

S1, S2, S3 and S4 should independently switch on and off H4.

If H4 is on, any switch will turn it off.

If H4 is off, any switch will turn it on.

General instructions:

Cables:

L1 Brown  
L2 Black  
L3 Grey  
N Blue  
PE Green/Yellow

Single stranded wire:

L Any color, however not blue or green/yellow  
N Blue  
PE Green/Yellow  
+24V Red  
+24V Blue

Junction box can be used and positioned freely.

Circuits:

Heater and cooler on the same MCB 10A

Socket O1 and O2 protected by RCBO

A1 Main switch 32A

B1 protected by MCB 16A

KNX protected by MCB type B 6A

Control circuit in B1 protected by MCB type C 6A