HMI/Modbus Panel

User documentation

PKJ Robotics Accessories

PKJ Robotic

Document description

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Notes

This user manual is intended exclusively for trained electrical specialist in control and automation technology and the HMI/Modbus Panel may only be operated in connection with the robot from Franka Emika.

The following standards are used in the design and documentation of the control unit:

EN 60204-1	Electrical equipment of machines
EN 61439-1	Low-voltage switchgear and controlgear assemblies
EN 61082-1	Preparation of documents used in electrotechnology
EN ISO 81346	Structuring principles and reference designations Part 1&2
EN ISO 13849	Safety-related parts of control systems Part 1&2
EN 62061	Functional safety of safety-related control systems

And are manufactured in accordance with the following directives:

2014/35/EU	Low-voltage directive
2014/30/EU	EMC-directive

Use of the application rules that the HMI/Modbus Panel is supplied in a defined software and hardware configuration and changes to the software or hardware by the user are not permissible and entail the exclusion of liability of P.K. Jeppesen & Søn A/S.

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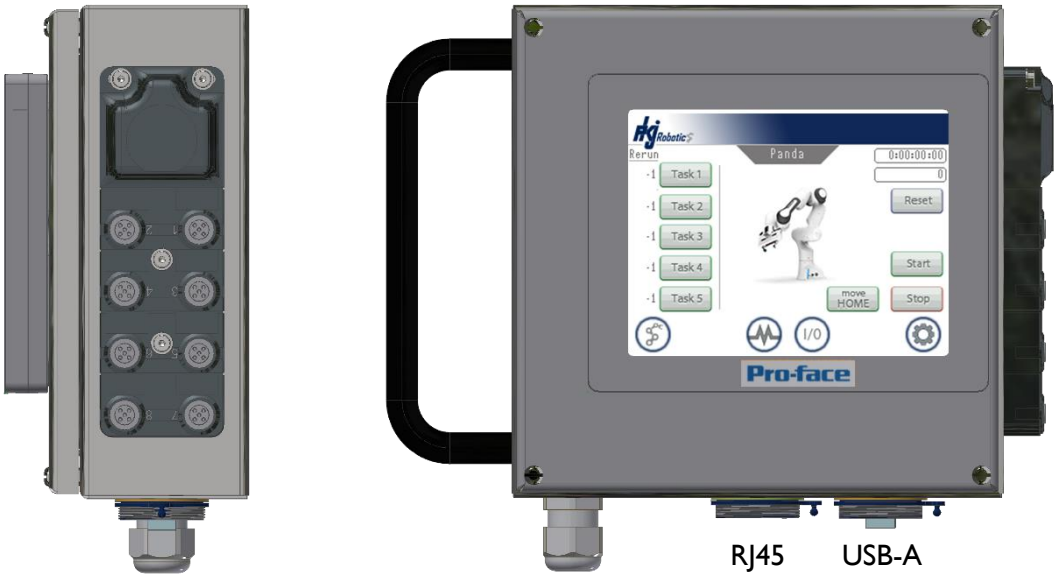
1. Introduction

Whit the PKJ Robotics HMI/Modbus Panel for industrial use, you have the opportunity of adding digital input and output sensors to your Panda and simulate signals on the 5,7" HMI screen.

With the default program installed on the PLC used as MODBUS SLAVE, you can in combination with Franka Emika's Panda and Apps like MODBUS WAIT and MODBUS SET use HMI buttons as Start and Stop when the robot is in run mode and add a counter for how many runs you would like from the HMI and see the total time for how long the program has been running.



Port 1-5: 5 digital input 24V DC

Port 6-8: 3 digital output 24V DC

10 in and 6 out if you use a Murr T-Coupler

230V AC

Figure 1 View of HMI/Modbus Panel from side and front

2. Specifications

2.1 General

GENERAL	
Dimensions (L x W x H)	200x200x98mm (303x273x98mm)
Weight	~ 4kg
PLC	Pro-face LM4301
HMI	Pro-face LT-4000M 5,7"
Murr	EXACT12, 8xM12, 5POL.
Power supply	230V+PE
Current load	<1 A
Frequency	50-60Hz
Control circuit voltage	24V DC
Electrical earthing system	TN-S
Icc	6 KA
Max fuse	13A gG/aM
IP Class	IP65
Ambient temperature	5-35 °C

2.2 Dimensions

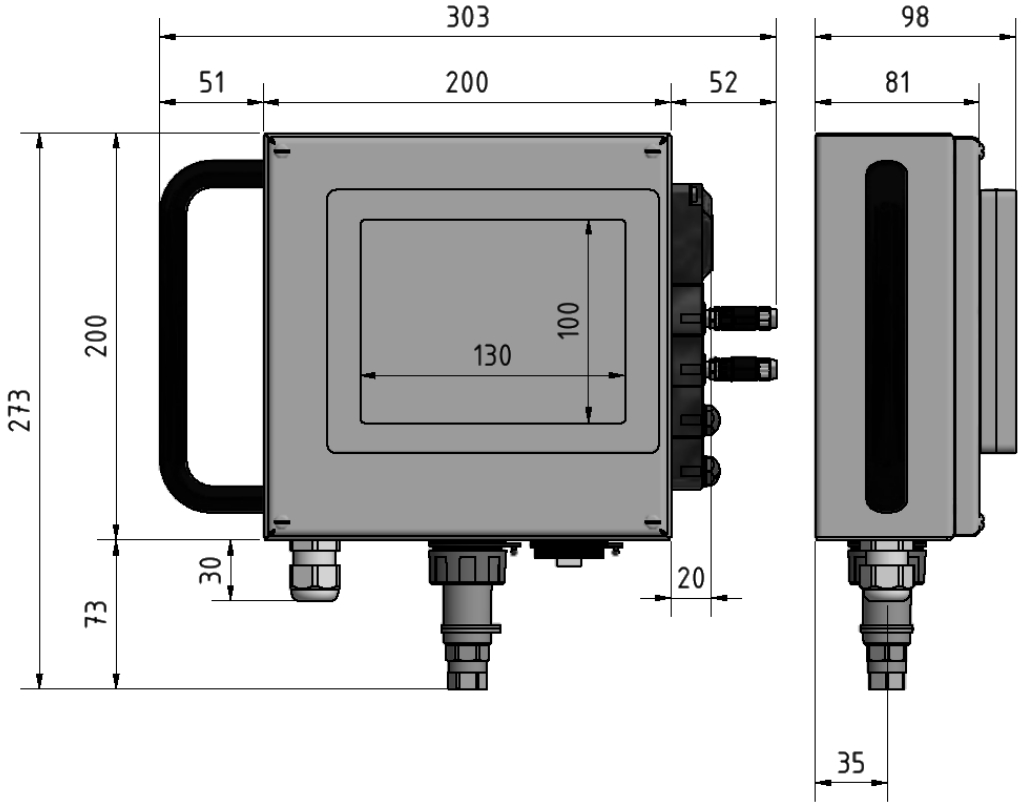


Figure 2 Dimensions of HMI/Modbus Panel

2.3 Component list

No.	Type	Description	Quantity
1	PFXLM4301TADAC	Pro-face 5,7" TFT Modul LT Digital/analog Source	1
2	8000-88580-0000000	EXACT12, 8XM12, 5 POLE	1
3	7000-12461-0000000	MOSA M12 Male 0° Field-wireable (IDC)	4
4	58627	Blind Plug M12, Plastic	4
5	K-USB3-WATER-S-3M+	USB3.0 Socket with Connector Waterproof Bayonet Connection	1
6	STP-65S	Cat 6 F/UTP patchcable - Black - 5 m	1
7	RJ45W	RJ45 socket for chassis, IP68	1
8	RJ45W-S	RJ45 chassis for patch cable, IP68	1
9	16655K	Power cable Denmark - 5m	1
10		Wallmount	1
11		Tablestand 30°	1

3. Murr Module

The HMI/Modbus Panel comes with a preinstalled Murr module with 5 digital input and 3 digital output or 10 in and 6 out if you use a Murr T-Coupler.

Figure 3 Murr Module

Each Murr port is wired according to *Figure 4*, and for 2 signals per port to *Figure 5*.

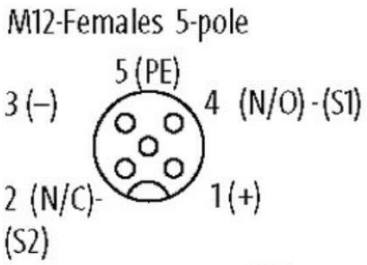


Figure 4 Murr port connection

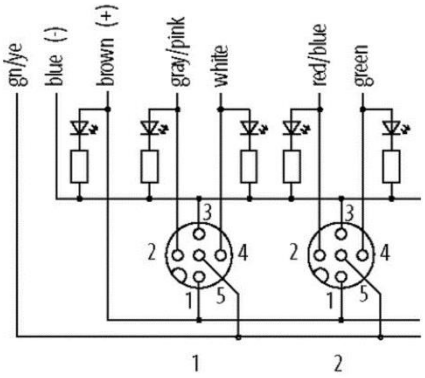


Figure 5 Murr ports wire for double signal using T-coupler

Connect 24V DC digital input sensors to Murr *port 1-5* and 24V DC digital output to Murr *port 6-8* using a MOSA M12 Male field wireable connector see *Figure 6*.

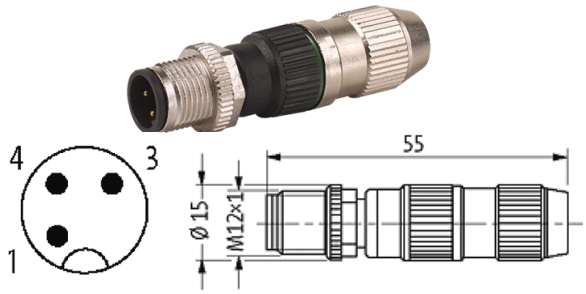


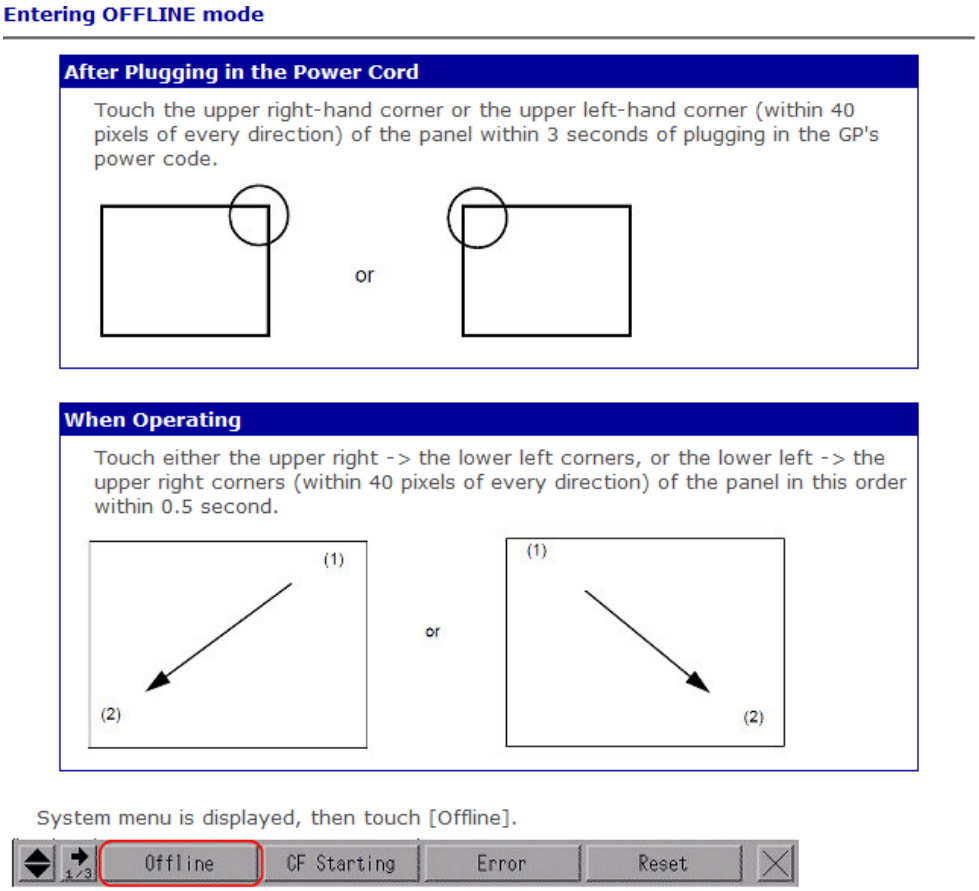
Figure 6 MOSA M12 Male Connector

The PLC program is limited to simple digital ON/OFF signals which does <u>not</u> include for example encoders or PWM signals.

The PLC has the opportunity of switching to analog Input/Output and PWM signals which require changes in the wiring to the PLC and a new setup of the PLC *(Not included – contact PKJ Robotics).*

4. Getting Started

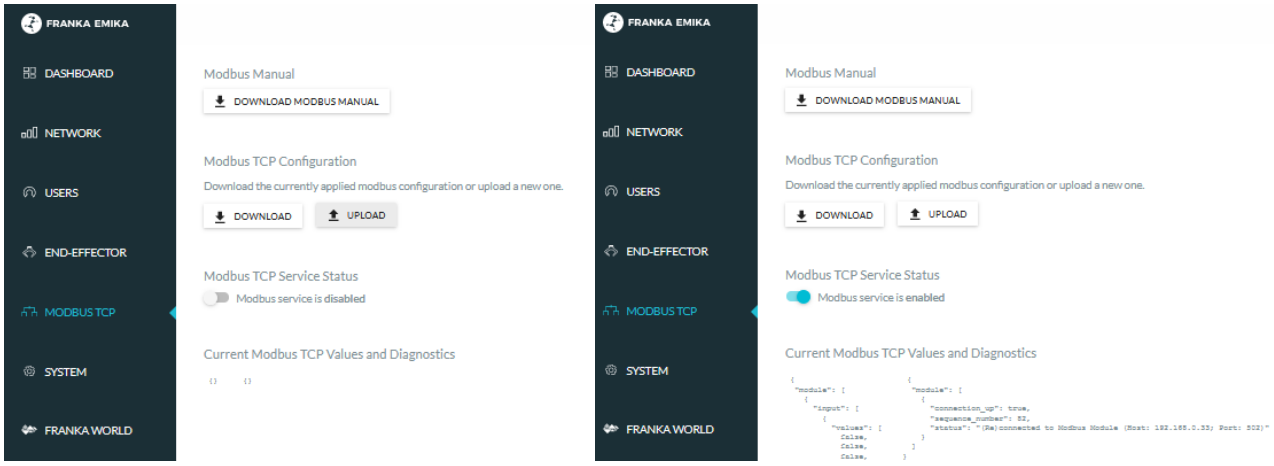
1. Connect the panel with an ethernet cable to your robot network or directly into the robot controller and power up by connecting the power cord to 230V AC.
2. OPTIONAL: Change the default IP Address: *192.168.0.33* and Gateway: *192.168.0.1* or jump to step 3.



Select **Main Unit -> Ethernet -> LAN** and change to preferred network settings

Select **Exit -> Save changes and exit**

3. Download the pre-configured Modbus JSON-file at https://www.pkj-robotics.dk/support/download/
4. OPTIONAL: Configure the file to selected IP-address in step 2
5. Upload the JSON-file to your robotcontroller and enable Modbus TCP Configuration



5. HMI operator screen

In the following chapter describes how the HMI/Modbus Panel is operated on the 5,7" touchscreen.

5.1 Menu bottons


Start screen


Admin screen


Murr Module screen

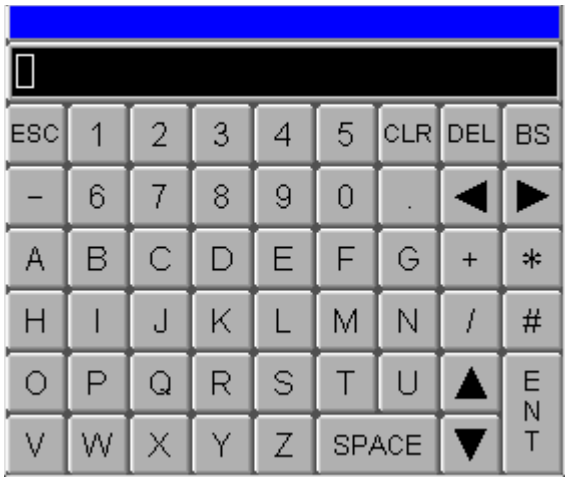
HMI I/O screen


Previous screen


Next screen

5.2 Keypad input

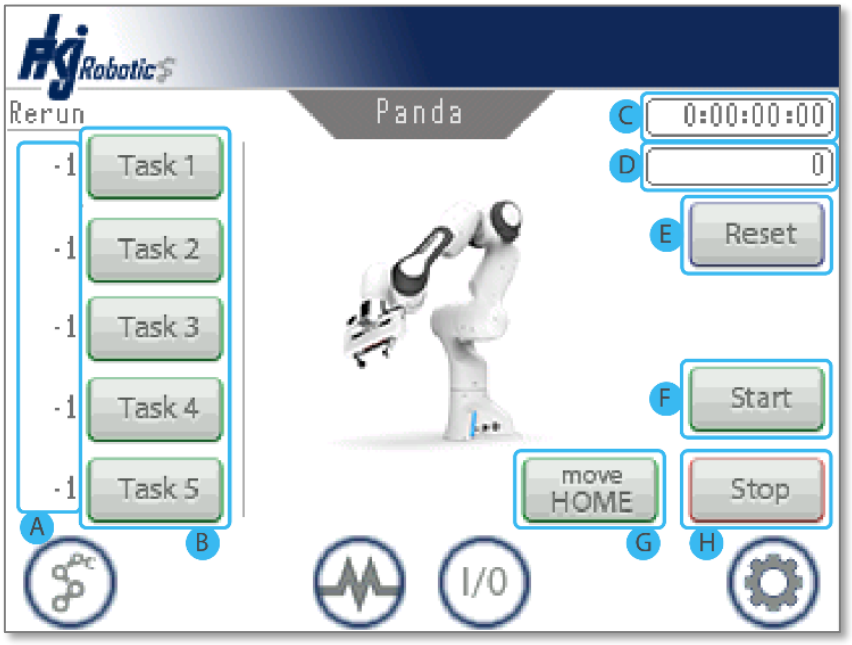
Numbers input



Numbers and letters input

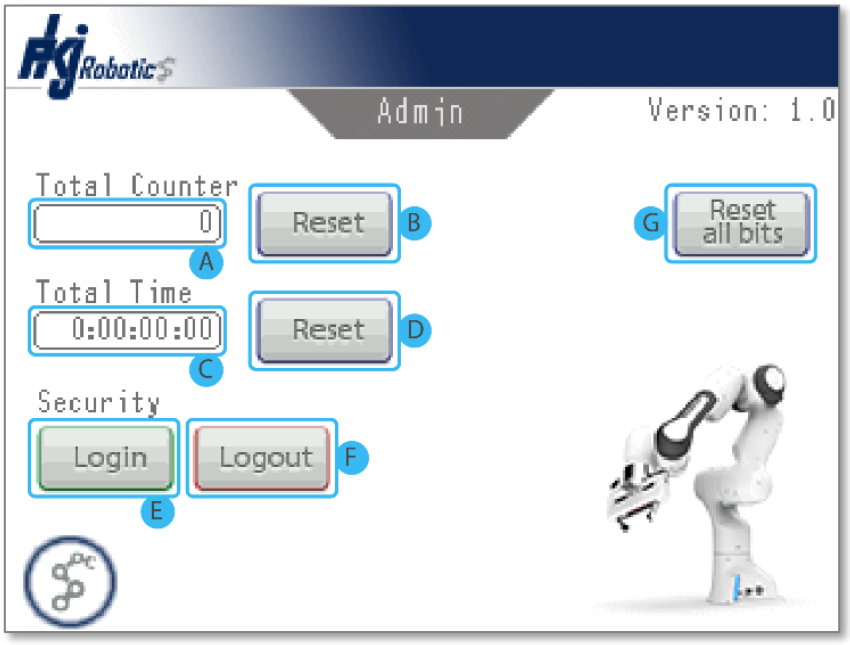
Press "ENT" to save input or press "CANCEL" or "ESC" to close without changes.

5.3 Start screen



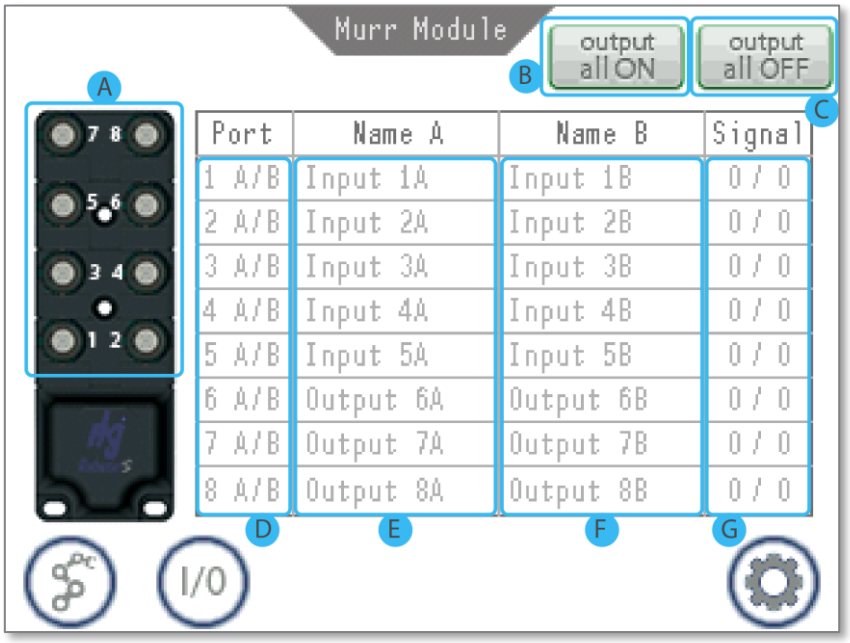
	Touch Function	Description
A	Keypad input	Count-down by one each time Modbus output signal goes HIGH for *Card 3-Task1-5_Count* When 0 reached, "Task 1-5" (B) goes LOW and set default value Default value: -1 = disables counter function. Input range: -1 to 999 *Note: PLC automatically reset Card 3-Task1-5_Count bit 600ms after count-down*
B	Bit invert	Select "Task 1-5" to set HIGH/LOW Modbus input signal for *Card 3-HMI_Task1-5*, when "Start" (F) is active. Default value: LOW
C	-	Timer count when "Start" (F) is on Default value: 0d:0h:0min:0sec
D	-	Count-up by one each time Modbus output signal goes HIGH for *Card 3-Start_Count* Default value: 0 *Note: PLC automatically reset Card 3-Start_Count bit 600ms after count-up*
E	Bit momentary	Select "Reset" to set default values to (A) (B) (C) (D)
F	Bit set	Select "Start" to set HIGH Modbus input signal for *HMI_Start* "Start" activates (B) (C) (G) Default value: LOW
G	Bit invert	Select "move HOME" to set HIGH Modbus input signal for *HMI_Move Home*, when "Start" (F) is active. When "move HOME" is active, "Task 1-5" (B) goes LOW Set Modbus output signal for *Card 3-Home_reset and Stop All* HIGH, which reset "move HOME" and deactivates "Start" (F) *Note: The function is intended to activate a pre-taught movement for the robot to move to. PLC automatically reset Card 3-Home_reset and Stop All.*
H	Bit momentary	Select "Stop" to deactivate "Start" (F)

5.4 Admin screen



	Touch Function	Description
A	-	Total Count-up by one each time Modbus output signal goes HIGH for *Card 3-Start_Count* Default value: 0 *Note: Value doesn't reset on PLC reboot.* *PLC automatically reset Card 3-Start_Count bit 600ms after count-up*
B	Bit momentary	Select "Reset" to set default value to (A) *Note: Function is only available by Security Login (E)*
C	-	Timer count when "Start" (F) 5.3 Start screen is on Default value: 0d:0h:0min:0sec
D	Bit momentary	Select "Reset" to set default value to (C) *Note: Function is only available by Security Login (E)*
E	Bit momentary	Security Login to enable function (B) (D) *Note:* ***Default password code: 1234***
F	Bit momentary	Security Logout to disable function (B) (D) and go to 5.3 Start screen
G	Bit momentary	Select to quick set all bits LOW for inputs and outputs

5.5 Murr Module screen



	Touch Function	Description
A	-	Lamp indicator of port 1-8 A/B HIGH/LOW Color: Gray = LOW, Green = Port A HIGH, Blue = Port B HIGH *Note: See example* Figure 7
B	Bit momentary	Simulation option: Select "output all ON" to set port 6-8 A/B HIGH
C	Bit momentary	Simulation option: Select "output all OFF" to set port 6-8 A/B LOW
D	-	Description of Port 1-8 A/B Input (Port 1-5A): Read HIGH/LOW Modbus input signal on *Card 1-Murr1-5_1* Input (Port 1-5B): Read HIGH/LOW Modbus input signal on *Card 1-Murr1-5_2* Output (Port 6-8A): Write HIGH/LOW Modbus output signal on *Card 1-Murr6-8_1* Output (Port 6-8B): Write HIGH/LOW Modbus output signal on *Card 1-Murr6-8_2*
E	Keypad input	Name the individual ports for A *Note: Maximum 12 units*
F	Keypad input	Name the individual ports for B *Note: Maximum 12 units. Only available with using Murr T-coupler.*
G	-	Signal indicator of port 1-8 A/B, 0=LOW or 1=HIGH

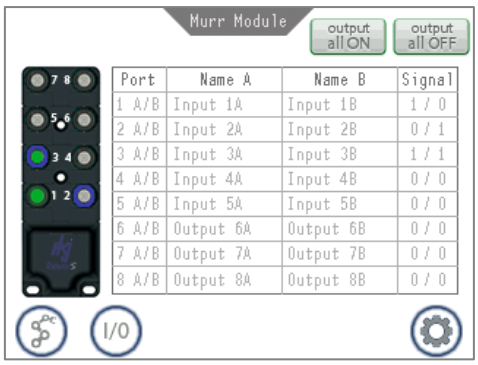
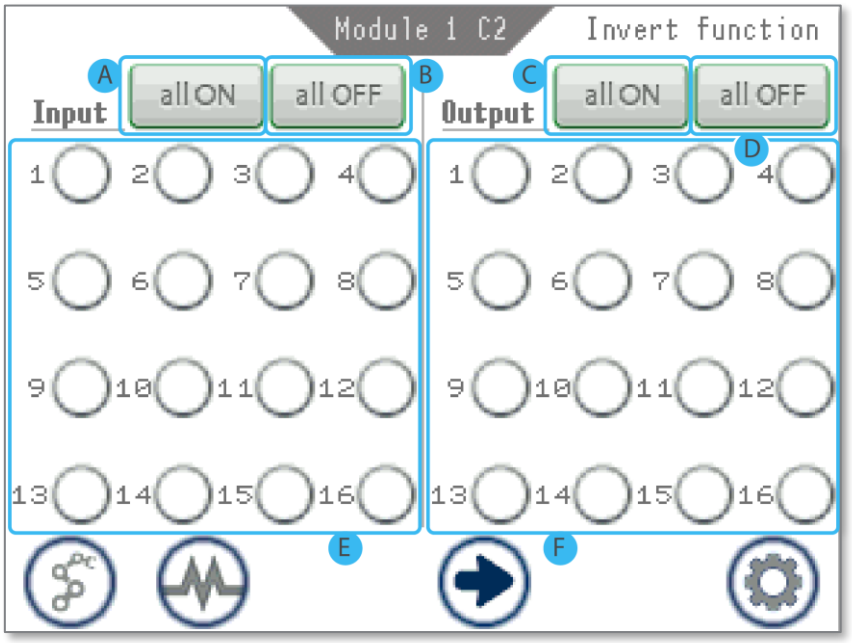


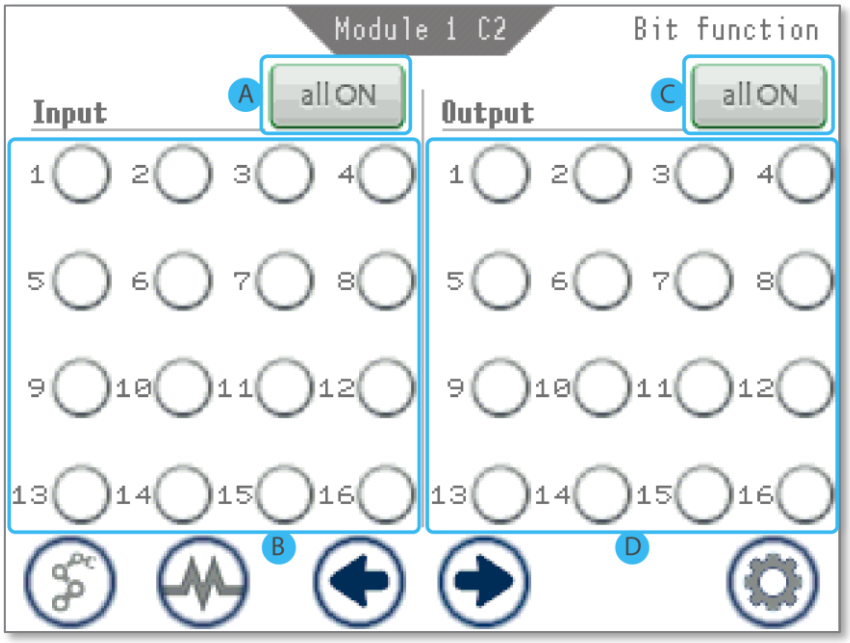
Figure 7 Example of Murr lamps. Port: 1A,2B, 3A and 3B is HIGH

5.6 HMI I/0 screen - Invert function



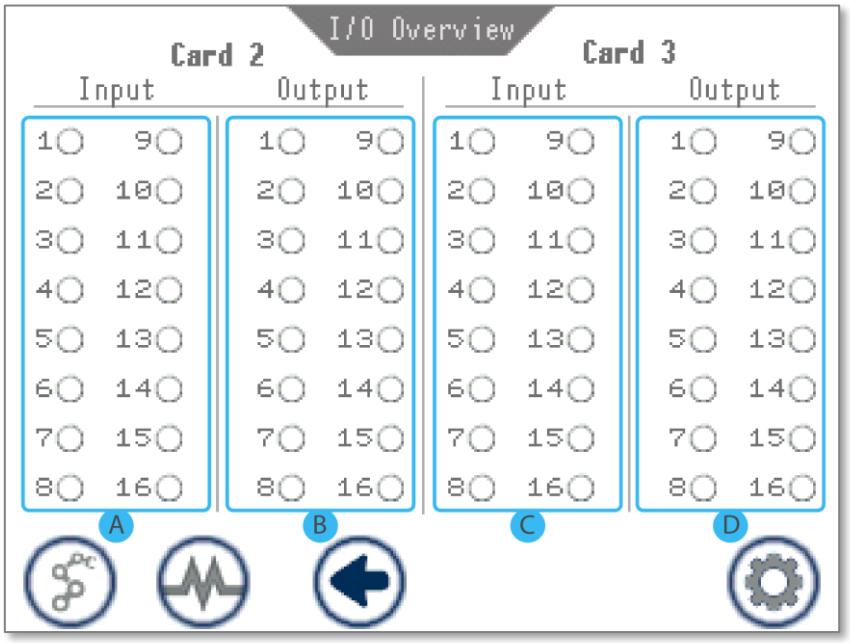
	Touch Function	Description
A	Bit momentary	Select "all ON" to set input *Card 2-HMI_1-16* HIGH
B	Bit momentary	Select "all OFF" to set input *Card 2-HMI_1-16* LOW
C	Bit momentary	Select "all ON" to set output *Card 2-HMI_1-16* HIGH
D	Bit momentary	Select "all OFF" to set output *Card 2-HMI_1-16* LOW
E	Bit invert	Select Input 1-16 to set input *Card 2-HMI_1-16* HIGH/LOW Color: White = LOW, Green = HIGH
F	Bit invert	Select Output 1-16 to set output *Card 2-HMI_1-16* HIGH/LOW Color: White = LOW, Green = HIGH

5.7 HMI I/0 screen – Momentary Bit function



	Touch Function	Description
A	Bit momentary	Select "all ON" to set input *Card 2-HMI_1-16* momentary HIGH
B	Bit momentary	Select Input 1-16 to set input *Card 2-HMI_1-16* momentary HIGH Color: White = LOW, Green = HIGH
C	Bit momentary	Select "all ON" to set output *Card 2-HMI_1-16* momentary HIGH
D	Bit momentary	Select Output 1-16 to set output *Card 2-HMI_1-16* momentary HIGH Color: White = LOW, Green = HIGH

5.8 HMI I/0 screen - Overview



	Touch Function	Description
A	-	Lamp indicator input *Card 2-HMI_1-16.* Color: White = LOW, Green = HIGH
B	-	Lamp indicator output *Card 2-HMI_1-16.* Color: White = LOW, Green = HIGH
C	-	Lamp indicator input *Card 3-* port *1-16.* Color: White = LOW, Green = HIGH See 6.1.3 Module 1: Card 3 – HMI Preset Inputs
D	-	Lamp indicator Output *Card 3-* port *1-16.* Color: White = LOW, Green = HIGH See 6.2.3 Module 1: Card 3 – HMI Preset Outputs

6. IO list

6.1 Digital Input

6.1.1 Module 1: Card 1 – Murr Module Inputs

Pin	Name	Description
1	Murr1_1	Input Murr Port 1A
2	Murr1_2	Input Murr Port 1B using Murr T-Coupler
3	Murr2_1	Input Murr Port 2A
4	Murr2_2	Input Murr Port 2B using Murr T-Coupler
5	Murr3_1	Input Murr Port 3A
6	Murr3_2	Input Murr Port 3B using Murr T-Coupler
7	Murr4_1	Input Murr Port 4A
8	Murr4_2	Input Murr Port 4B using Murr T-Coupler
9	Murr5_1	Input Murr Port 5A
10	Murr5_2	Input Murr Port 5B using Murr T-Coupler

6.1.2 Module 1: Card 2 – HMI Buttons Inputs

Pin	Name	Description
1	HMI_1	Input HMI Port 1
2	HMI_2	Input HMI Port 2
3	HMI_3	Input HMI Port 3
4	HMI_4	Input HMI Port 4
5	HMI_5	Input HMI Port 5
6	HMI_6	Input HMI Port 6
7	HMI_7	Input HMI Port 7
8	HMI_8	Input HMI Port 8
9	HMI_9	Input HMI Port 9
10	HMI_10	Input HMI Port 10
11	HMI_11	Input HMI Port 11
12	HMI_12	Input HMI Port 12
13	HMI_13	Input HMI Port 13
14	HMI_14	Input HMI Port 14
15	HMI_15	Input HMI Port 15
16	HMI_16	Input HMI Port 16

6.1.3 Module 1: Card 3 – HMI Preset Inputs

Pin	Name	Description
1	HMI_Start	HMI Start button
2	HMI_Task1	HMI Task 1 button
3	HMI_Task2	HMI Task 2 button
4	HMI_Task3	HMI Task 3 button
5	HMI_Task4	HMI Task 4 button
6	HMI_Task5	HMI Task 5 button
7	HMI_Move Home	HMI move Home button

6.2 Digital Output

6.2.1 Module 1: Card 1 – Murr Module Outputs

Pin	Name	Description
1	Murr6_1	Output Murr Port 6A
2	Murr6_2	Output Murr Port 6B using Murr T-Coupler
3	Murr7_1	Output Murr Port 7A
4	Murr7_2	Output Murr Port 7B using Murr T-Coupler
5	Murr8_1	Output Murr Port 8A
6	Murr8_2	Output Murr Port 8B using Murr T-Coupler

6.2.2 Module 1: Card 2 – HMI Buttons Outputs

Pin	Name	Description
1	HMI_1	Output HMI Port 1
2	HMI_2	Output HMI Port 2
3	HMI_3	Output HMI Port 3
4	HMI_4	Output HMI Port 4
5	HMI_5	Output HMI Port 5
6	HMI_6	Output HMI Port 6
7	HMI_7	Output HMI Port 7
8	HMI_8	Output HMI Port 8
9	HMI_9	Output HMI Port 9
10	HMI_10	Output HMI Port 10
11	HMI_11	Output HMI Port 11
12	HMI_12	Output HMI Port 12
13	HMI_13	Output HMI Port 13
14	HMI_14	Output HMI Port 14
15	HMI_15	Output HMI Port 15
16	HMI_16	Output HMI Port 16

6.2.3 Module 1: Card 3 – HMI Preset Outputs

Pin	Name	Description
1	Start_Count	Count-up by one when HIGH. See 5.3 Start screen (D) *Note: PLC automatically reset Card 3-Start_Count bit 600ms after each count-up*
2	Task1_Count	Count-down by one when HIGH. See 5.3 Start screen (A) *Note: PLC automatically reset Card 3-Task1_Count bit 600ms after each count-down*
3	Task2_Count	Count-down by one when HIGH. See 5.3 Start screen (A) *Note: PLC automatically reset Card 3-Task2_Count bit 600ms after each count-down*
4	Task3_Count	Count-down by one when HIGH. See 5.3 Start screen (A) *Note: PLC automatically reset Card 3-Task3_Count bit 600ms after each count-down*
5	Task4_Count	Count-down by one when HIGH. See 5.3 Start screen (A) *Note: PLC automatically reset Card 3-Task4_Count bit 600ms after each count-down*
6	Task5_Count	Count-down by one when HIGH. See 5.3 Start screen (A) *Note: PLC automatically reset Card 3-Task5_Count bit 600ms after each count-down*
7	Home_reset and Stop All	When HIGH reset "move HOME" and deactivates "Start". See 5.3 Start screen (F) (G)

7. Extra

7.1 Table stand

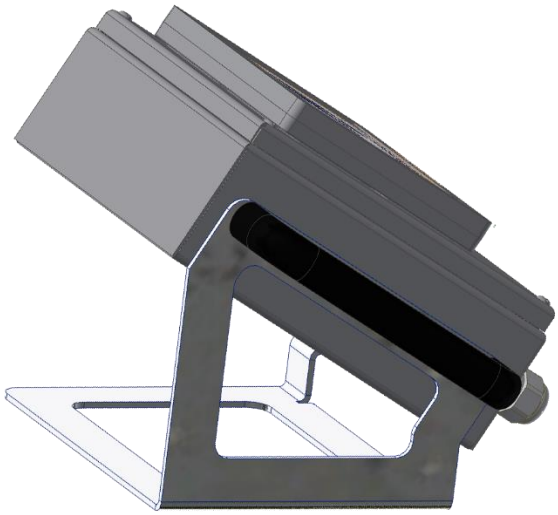


Figure 8 Table stand

7.2 Wall mount

Figure 9 Wall mount

7.3 Upload program by USB

Use the USB port to upload an update or a custom PLC program.

(Not included - Contact PKJ Robotics)