

Quick Start Guide

Commissioning the Smart I/O Controller Digital

V1.0.1

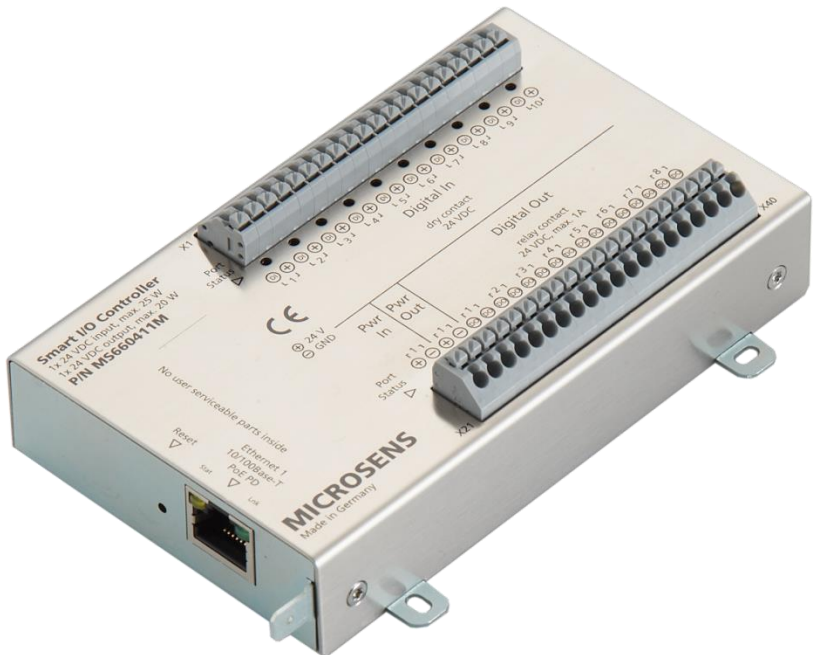


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0 Aim of this Quick Start Guide

This quick start guide will help you with

- the mechanical handling of the Smart I/O Controller Digital,
- connecting the power supply and commissioning the device,
- reset the device,
- connecting the signal cables (digital inputs and outputs),
- and setting up access to the network management.

For further information see the Web Manager of the managing MICROSENS switch or visit the MICROSENS website.

1 Mechanical Handling

The MICROSENS Smart I/O Controller Digital is ready to be attached via two different mountings:

- A clamp for top hat rail mounting,
- and four mounting tabs for direct attachment to wall, ceiling or any other backing equipment.

1.1 Top Hat Rail Mounting and Unmounting

On its bottom side the Smart I/O Controller Digital housing (Figure 1, Pos. 1) is equipped with a clamp for mounting the device onto a standard top hat rail (Figure 1, Pos. 2).

Note:

Assemble the clamp to the housing if not shipped with clamp already adapted. Be sure the clamp's release lever (Figure 1, Pos. 3) is pointing to the side with the Ethernet port.

1.1.1 Mounting on Top Hat Rail

1. Place the housing with the clamp's stationary fixture over the top hat rail (Figure 1, Pos. 4).
2. Gently press the housing (Figure 1, Pos. 5) until the clamp snaps into the top hat rail with an audible click.

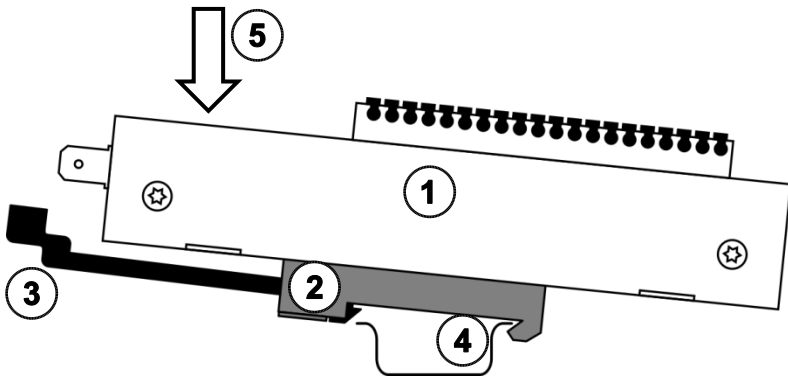


Figure 1: Top hat rail mounting

1.1.2 Unmounting from Top Hat Rail

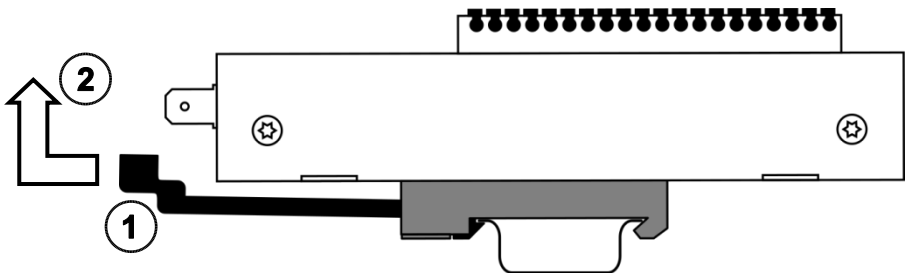


Figure 2: Top hat rail unmounting

1. Pull the release lever (Figure 2, Pos. 1) to unlock the clamp and lift the device (Figure 2, Pos. 2) to remove it from the top hat rail.

1.2 Mounting Tabs

To attach the Smart I/O Controller Digital directly to a wall, ceiling or any other suitable backing equipment, use the four mounting brackets (Figure 3, Pos 1 to 4).

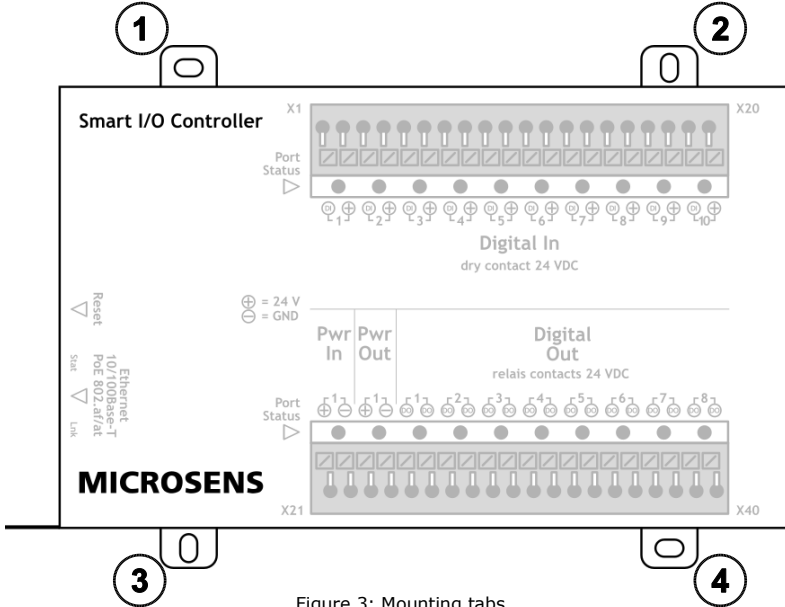


Figure 3: Mounting tabs

Note:

Make sure to secure the attachment adequately when using less mounting tabs! It is not recommended to use only one mounting tab or mounting tabs of only one side.

2 Connecting the Power Supply

The MICROSENS Smart I/O Controller Digital can be supplied by two alternative power inputs (single or joint):

- PoE+ (PD) via Ethernet port (Figure 4, Pos. 1).
- External 24 VDC via push clamp ports X21 and X22 (Figure 4, Pos. 2)

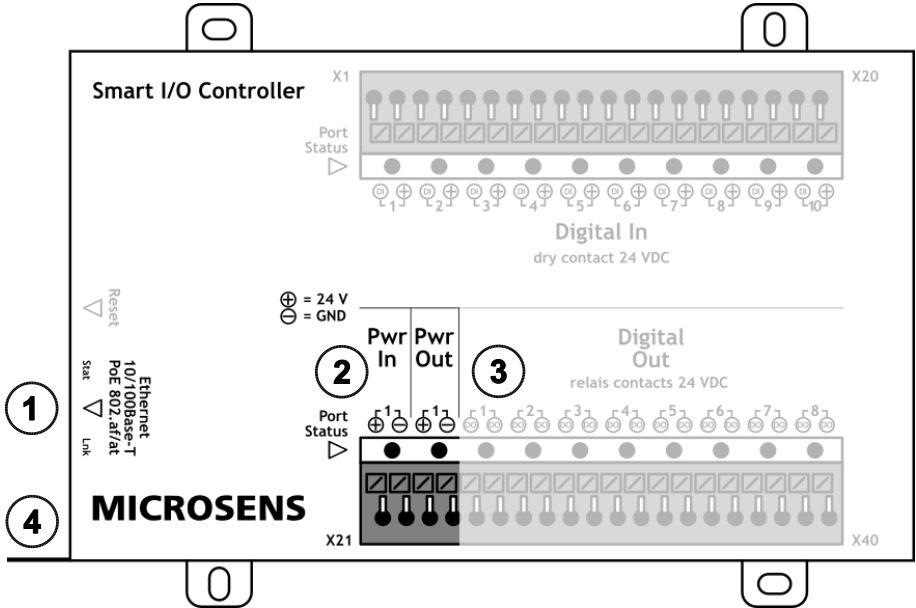


Figure 4: Power supply

2.1 Power Supply Specifications

Port	Signal	Meaning
X21, X22	Power In	External power input: 1x 24 VDC, two-wire cable (Figure 4, Pos. 2) maximum internal consumption 25 W
X23, X24	Power Out	Power output: 1x 24 VDC, two-wire cable (Figure 4, Pos. 3) maximum load 20 W
Ethernet		Ethernet uplink port: 1x 10/100Base-T, RJ-45, PoE (PD), 54 VDC (Figure 4, Pos. 1) maximum internal consumption 25 W

Note:

Make sure to enable PoE/PoE+ PD on the powering device. For enabling PoE on MICROSENS devices please refer to the respective documentation shipped with the device.

As soon as the external power supply is connected to the clamp ports X21 and X22 the respective "Pwr In" port status LED lights up (Figure 4, Pos. 2) indicating the supply voltage is present. With power supply only via PoE the "Pwr In" port status LED will not light up.

As soon as one of either PoE or external power supply is plugged in and present, the port status LED of "Pwr Out" lights up (Figure 4, Pos. 3).

2.2 Grounding with PoE Supply

For the installation of PoE components in corporate networks it is necessary to reference the DC supply voltage of all devices to the same ground level. Normally this will be the **positive polarity connected to ground level** of the building's electrical system (i.e. "earth").

Assuming, powering of the Smart I/O Controller Digital is done via a centralised far off PoE PSE device it is important to connect the grounding lead of the controller's chassis (Figure 4, Pos. 4) to the building's ground potential and thus to avoid "floating ground" problems. Besides safety issues, a floating ground of the network can cause problems if only one component accidentally or on purpose is grounded (Figure 5).

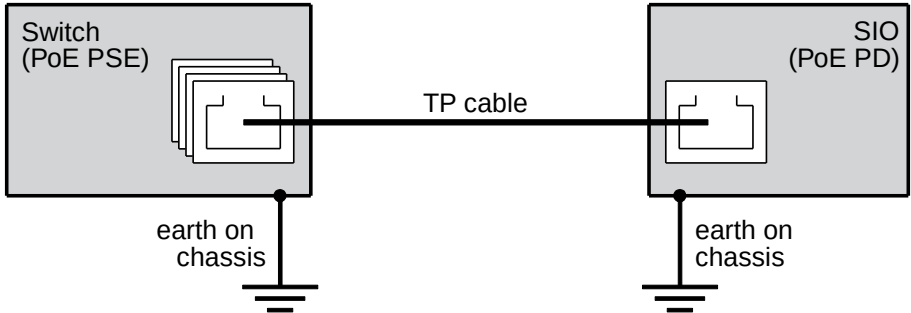


Figure 5: PoE supply with grounding

2.3 Grounding with External Power Supply

In contrast to the common use of negative polarity connected to ground level when using an external power supply make sure to connect the **positive polarity of the power supply to ground level**.

3 Reset the Smart I/O Controller Digital

The Smart I/O Controller Digital is equipped with a reset button next to the Ethernet port (see Figure 6).

Pressing the reset button with a pointed object for 1 second will reset the controller. During the reset operation all LEDs will light up for approx. 1 second.

4 Connecting the Digital Input/Output Ports

The Smart I/O Controller Digital is equipped with two 20-pin push clamp ports for digital input and output signals as well as input and output voltage (wire diameter 0.1 to 1.5 mm², stranded/solid).

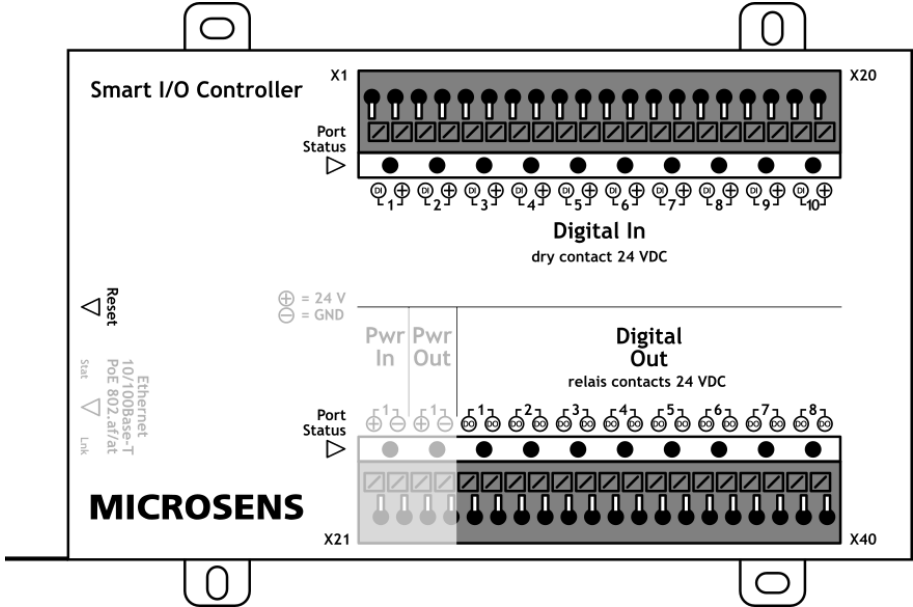


Figure 6: Input/output signals

The digital input/output push clamp pins have the following functions:

Port	Signal	Meaning
X1, X3, X5, X7, X9, X11, X13, X15, X17, X19	Digital In 1 ... Digital In 10	Digital input: 10x max. 24 VDC, opto-isolated (the use of 24 VDC is recommended) The port assignments are as follows: • X1 ... X19: Port voltage between 0 VDC and 24 VDC ("DI") • X2 ... X20: Ports connected to 24 VDC ("+") Note: When using 24 VDC for power supply a digital input voltage above 14 VDC is detected as signal level "high". Note: It is possible to use a shared 24 VDC input for multiple digital input ports by connecting the "+" pins (even pin numbers) with wire bridges.
X2, X4, X6, X8, X10, X12, X14, X16, X18, X20		
X25, X27, X29, X31, X33, X35, X37, X39	Digital Out 1 ... Digital Out 8	Digital output: 8x 24 VDC, open collector ("OC")
X26, X28, X30, X32, X34, X36, X38, X40		

5 Understanding the Status LEDs

The MICROSENS Smart I/O Controller Digital is equipped with status LEDs indicating the following signal states:

Port	Signal	Meaning
X1 ... X20	Digital In x	Digital input: - Green: Input contact closed - Off: Input open
X21, X22	Power In	External power input: - Green: Device powered by external power supply - Off: Device unpowered or powered by PoE.
X23, X24	Power Out	Power output: - Green: Power supply active - Off: No power supply
X26 ... X40	Digital Out x	Digital output: - Green: Output active (open collector pulls low) - Off: Output inactive

6 Operating the Smart I/O Controller Digital with MICROSENS Switches

Note:

Using MICROSENS Smart I/O Controller Digital is possible with MICROSENS switches containing Firmware 10.7.7 and newer. IPv6 has to be enabled.

As soon as the Smart I/O Controller Digital is connected to the power supply (PoE or external supply) and to the corporate network the controller is accessible via a MICROSENS switch containing the MICROSENS SmartDirector.

Note:

Because of using IPv6 link local addresses it is possible to operate a remote Smart I/O Controller Digital with a MICROSENS switch via the IPv6 corporate network as long as the connection is not routed.

6.1 Defining and Assigning a Function Template

Before pairing the Smart I/O Controller Digital to the MICROSENS G6 switch it is recommended to define its port functions via a template to ensure the desired effect.

Note:

After pairing the controller it is possible at all times to change the settings determined by the template.

These settings are assigned to the corresponding device on first pairing and after each apply and are stored in the G6 firmware. So even after restart or local change the configuration retains these settings.

Using the Web Manager:

- ☐ Start the web browser and enter the IP address of the respective G6 device.
- ☐ Log into the Web Manager with the administrator credentials.
- ☐ Select the **Controller** screen, then select the tab **SDIOC**.

Using the Web Manager:

- In the section **Device.controller.smart_digital_io_config** add a new table entry for the Smart I/O Controller Digital (e.g. "SDIOC_1" as a unique name) and click on the button "+".

Figure 7: Web Manager - Controller - SDIOC - Enter New Entry

- The new controller entry is created with default values assigned to its template fields.

- Enter or change the following values:

Figure 8: Web Manager - Controller - SDIOC - Name/Idle Time

- **Name:** Identifies the device in the system as alias to the MAC or link local ipv6 address.
- **Din idle time:** Defines the timeout in seconds for resending the status as long as no signal change happens to a digital input port. After this time set has expired, the status of each enabled digital input port will trigger a new status message.

Note:

The following options are identical for all 10 digital input ports. For clarity reasons only the settings for digital input port 1 are displayed.

Note:

Make sure to use unique combinations of device name, attribute and instance number for all ports!

Figure 9: Web Manager - Controller - SDIOC - Din Mode/Attribute/Transformation

- **Din x mode:** Enables or disables each digital input port by checking or unchecking the respective option.

Note:

Enable the specific port to create the respective actor/sensor status.

- **Din x attribute:** Defines the function (or an alias) which the Smart Director uses while processing the actions caused by a status change of the specific port. The value is freely definable and can be altered to the project's needs. E.g., when using motion detection on the controller changing the attribute to "MOTION" clarifies this port is used with a motion sensor in the lighting system when configured in the same sensor group. The use of identical attribute names for multiple ports is possible.

Note:

It is possible to assign a specific instance number to the attribute by adding the number with a ":" to the attribute name, e.g., if a push button is connected to the digital input port "Din 1" but for whatever reasons should be allocated to "instance 21" instead of the port's default instance number "1" the equivalent attribute value could be "PUSHBUTTON:21"

- **Din x transformation:** Enables the user to alter the value before it will be sent from the controller to the Smart Director. By default, a status "High" on the input port is processed as string value "1", while a status "Low" is processed as string value "0". E.g., with a transformation setting "0=off, 1=on" the input port's value is translated into "off" or "on" before being processed by the Smart Director.

Using the Web Manager:

Note:

The following options are identical for all 8 digital output ports. For clarity reasons only the settings for digital output port 1 are displayed.

Note:

Make sure to use unique combinations of device name, attribute and instance number for all ports!

dout1 mode	☐
dout1 attribute	DIGITAL_OUT_1
dout1 transformation	

Figure 10: Web Manager - Controller - SDIOC - Dout Mode/Attribute/Transformation

- **Dout x mode:** Enables or disables each digital output port by checking or unchecking the respective option.

Note:

Enable the specific port to create the respective actor/sensor status.

- **Dout x attribute:** Defines the function (or an alias) which the Smart Director uses while processing the actions caused by a status change of the specific port. The value is freely definable and can be altered to the project's needs. E.g., when using blind control on the controller changing the attribute to "BLIND_UP" clarifies this port is used with a blind relay in the lighting system for opening the blind when configured in the same actor group. The use of identical attribute names for multiple ports is possible.

Note:

It is possible to assign a specific instance number to the attribute by adding the number with a ":" to the attribute name, e.g., if a blind relay is connected to the digital output port "Dout 1" but for whatever reasons should be allocated to "instance 21" instead of the port's default instance number "1" the equivalent attribute value could be "BLIND_UP:21".

- **Dout x transformation:** Enables the user to alter textual values into appropriate digital values before it will be sent to the Controller. E.g., if the processing result is either "UP" or "DOWN" the transformation setting "DOWN=0, UP=1" will translate these values into specific digital values needed by the Smart I/O Controller Digital.

- Perform changes to the controller's configuration as needed and click on the button **apply to running configuration** to save the changes to the running configuration.

6.2 Pairing the Smart I/O Controller Digital and the MICROSENS Switch

The following steps describe how to pair a Smart I/O Controller Digital via the Web Manager of a MICROSENS switch.

Note:

For this overview primarily the use of the Web Manager is shown. Using the CLI for pairing the devices is relatively easy because the Web Manager uses the respective CLI commands as labels for fields and sections.

Using the Web Manager:

- Start the web browser and enter the IP address of the respective G6 device.
- Log into the Web Manager with the administrator credentials.

Using the Web Manager:

- Select the **SmartOffice** screen, then select the tab **Basic Configuration**.

Figure 11: Web Manager - SmartOffice - Basic Configuration - Scan Controllers

- In the section **Device.smartoffice.director_config** click on the button **scan light controllers**.
 - The SmartDirector starts searching for connected Smart Controllers. As long as no controller is found the section **scanned Light Controllers** stays empty.
 - After successfully scanning for available Smart Controllers the Web Manager lists all found controllers.

scanned Light Controllers (2 Entries, Filter = SIOC)									
# Slr/Prt	IP address IP mode	Uptime (sec) Uptime (decoded) NW Timeout	vScan vFW vFW	Article Nr Serial Nr remote Name	Controller ID remote Director ID local Director ID	configured local Name Status	Config Actions	Pairing Actions	
1 2/3	fe80::260:a7ff:fe09:: static	5315 0 days, 01:28:35 1943	5 K 5.2c	MS660301M 813050 SDIOC_1	0060A70965B70043 0000000000000000 0060A7092FB70044	unconfigured DirID not set	identify add	-	
2 2/2	fe80::260:a7ff:fe09:: static	6668 0 days, 01:51:08 0	5 G 2.18	MS660401M-V1 00899137 SIO	0060A709893E0043 0060A7092FB70044 0060A7092FB70044	unconfigured DirID match	identify add	pair as	SIO

Hint values derived from local configuration or status are marked blue.

Figure 12: Web Manager - SmartOffice - Basic Configuration - Available Controllers

- As long as no device of the suitable product type is created previously the column **Pairing Actions** of the respective Smart I/O Controller Digital is empty. A click on the button **identify** of the controller entry causes the port LEDs of this controller to blink several times. This ensures to use the correct controller for the next steps.
- Click on the button **add** to create the respective device entry.
 - This new device entry is named "scanned_<Controller-ID>" and assigned to the product type "SMARTLIGHT_CONTROLLER".
- Select the tab **Device Configuration** and in the section **Device.smartoffice.device_config** scroll down to the formerly created entry.

Figure 13: Web Manager - SmartOffice - Device Configuration - Added Device

- Change the **device name** to the name corresponding to the previously created controller (e.g., "SDIOC_1").
- From the drop-down list select the **product type** "DIGITAL_IO_CONTROLLER".

Using the Web Manager:

- Click on the button **apply to running configuration** to save the changes to the running configuration.
- Select the tab Basic Configuration and in the section **Device.smartoffice.director_config** click on the button **scan light controllers**.
 - The SmartDirector again starts searching for connected Smart Controllers. As long as no controller is found the section **scanned Light Controllers** stays empty.
 - After successfully scanning for available Smart Controllers the Web Manager lists all found controllers.

scanned Light Controllers (2 Entries, Filter = SIOC)									
# Slr/Prt	IP address IP mode	Uptime (sec) Uptime (decoded) NW Timeout	vScan vHW vFW	Article Nr Serial Nr remote Name	Controller ID remote Director ID local Director ID	configured local Name Status	Config Actions	Pairing Actions	
1 2/3	fe80::260:a7ff:fe09:: static	7299 0 days, 02:01:39 3927	5 K 5.2c	MS660301M 813050 SDIOC_1	0060A70965B70043 0000000000000000 0060A7092FB70044	unconfigured DirID not set	identify add	pair as	SIOCd ▾
2 2/2	fe80::260:a7ff:fe09:: static	8652 0 days, 02:24:12 0	5 G 2.18	MS660401M-V1 00839137 SIO	0060A709893E0043 0060A7092FB70044 0060A7092FB70044	unconfigured DirID match	identify add	pair as	SIO ▾

Hint values derived from local configuration or status are marked blue.

Figure 14: Web Manager - SmartOffice - Basic Configuration - Available Controllers

- In the column **Pairing Actions** the drop-down list offers the selection of the previously added and modified device entry.
- Select the fitting device from the drop-down list and click on the button **pair as**.
 - The Smart I/O Controller Digital is now properly paired to the SmartDirector of the MICROSENS G6 Switch.
 - Additionally the pairing process sets the previously empty **device id** to the correct value.

6.3 Functional Test of the Paired Smart I/O Controller Digital

After pairing the Smart I/O Controller Digital the Smart Director automatically generates the corresponding entries for the device and its **enabled** sensors and actors as well. The following steps describe how test the correct pairing of a Smart I/O Controller Digital via the Web Manager of the paired MICROSENS switch.

Note:

For this overview primarily the use of the Web Manager is shown. Using the CLI for pairing the devices is relatively easy because the Web Manager uses the respective CLI commands as labels for fields and sections.

Using the Web Manager:

- Select the **SmartOffice** screen, then select the tab **Device Status**.
 - In the section **Device.smartoffice.device_information** there should be listed an entry for the paired Smart I/O Controller Digital with the device name previously assigned.

Device.smartoffice.device_information (11 entries)					
#	name	hardware id	device type	operational state	actor attributes
1	SLC_1	0060a709b6e10043	ACTOR_SENSOR	NORMAL	LED_PANEL, RAMP_TIME, RGB_LIGHT
2	ButtonSwitch_1	0035FAAA	SENSOR	NORMAL	
3	BlindsActor_Zone_1_Id_1		UNUSED	IN_CONFIG	
4	OnOffSwitch_Id_1		UNUSED	IN_CONFIG	
5	OnOffSwitch_Id_2		UNUSED	IN_CONFIG	
6	OnOffSwitch_Id_3		UNUSED	IN_CONFIG	
7	OnOffSwitch_Id_4		UNUSED	IN_CONFIG	
8	Thermostat_Zone_1		UNUSED	IN_CONFIG	
9	ClimateRegulator_Zone_1		UNUSED	IN_CONFIG	
10	SIO	0060a709893e0043	ACTOR_SENSOR	NORMAL	ao1, ao2, do1, do2
11	SDIOC_1	0060a70965b70043	ACTOR_SENSOR	NORMAL	do2

☐ refresh values every 3 seconds
 refresh

Figure 15: Web Manager - SmartOffice - Device Status - Smart I/O Controller Digital

Using the Web Manager:

- Change to the tab **Sensor Status**.

Device.smartoffice.sensor_list (117 entries)

#	device	instance	attribute	associated groups
109	SDIOC_1	1	DIGITAL_IN_1	
110	SDIOC_1	3	DIGITAL_IN_3	
111	SDIOC_1	4	DIGITAL_IN_4	
112	SDIOC_1	5	DIGITAL_IN_5	
113	SDIOC_1	6	DIGITAL_IN_6	
114	SDIOC_1	7	DIGITAL_IN_7	
115	SDIOC_1	8	DIGITAL_IN_8	
116	SDIOC_1	9	DIGITAL_IN_9	
117	SDIOC_1	10	DIGITAL_IN_10	

☐ refresh values every 3 seconds

refresh

Figure 16: Web Manager - SmartOffice - Sensor Status

- In the section **Device.smartoffice.sensor_list** in the column **device** there should be listed the Smart I/O Controller Digital with its assigned name.
 - In the column **attribute** there exists one row entry for every digital input port of the controller, named by its assigned attribute. This corresponds to the attribute assignments "Din x attribute" defined in the controller's template configuration step (see above).
 - The column **instance** incrementally counts all input ports of the respective controller, beginning with "1". Depending on the prior attribute assignments the instance number can vary from the default numbering order.
- If any sensors are connected to the Smart I/O Controller Digital yet, both their last actual value and their last response are shown in the status list. Scroll to the right to see those status table entries.
 - Change to the tab **Actor Status**.

Device.smartoffice.actor_list (17 entries)

#	device	instance	attribute	associated groups
10	SDIOC_1	2	DIGITAL_OUT_2	
11	SDIOC_1	1	DIGITAL_OUT_1	
12	SDIOC_1	3	DIGITAL_OUT_3	
13	SDIOC_1	4	DIGITAL_OUT_4	
14	SDIOC_1	5	DIGITAL_OUT_5	
15	SDIOC_1	6	DIGITAL_OUT_6	
16	SDIOC_1	7	DIGITAL_OUT_7	
17	SDIOC_1	8	DIGITAL_OUT_8	

☐ refresh values every 3 seconds

refresh

Figure 17: Web Manager - SmartOffice - Actor Status

Using the Web Manager:

- With actors or sensors already connected to the Smart I/O Controller Digital it is possible to get or set values from specific ports. Select the **Controller** screen, then select the tab **SDIOC**.

manual get value		manual get value
manual set value		manual set value

Figure 18: Web Manager - Controller - SDIOC - Manually Get/Set Port Values

- In the section **Device.controller.smart_digital_io_config** scroll down to the rows **Manual get value** and **Manual set value**. E.g., to get a value from a sensor connected to digital input port 1 enter the value "Din1" into the get value field and click on the button **manual get value**. After a short processing time the Web Manager displays the received value.

6.4 Updating the Device's Firmware

The Smart I/O Controller Digital has its own firmware that can be manually updated via the Web Manager of a connected MICROSENS G6 switch. To update the firmware proceed as follows:

Using the Web Manager:

- Start the web browser and enter the IP address of the respective G6 device.
- Log into the Web Manager with the administrator credentials.
- Select the **Controller** screen, then select the tab **SDIOC** and scroll down to the bottom of the dialogue.
- In the section **DHHTTP(s) upload via Web Manager** open the browser's file selection dialogue with a click on the button "Browse":

HTTP(s) upload via Web Manager				
	File	start	abort	
SDIOC firmware	Durchsuchen... Keine Datei ausgewählt.	start	abort	
log		0 %		

available SDIOC firmware files on device (1 entry)				
#	filename	filesize	filetime	remove
1	SDIOC9183_v4_12.bin	124016	2020-04-16 01:56:59	remove

Figure 19: Web Manager - Controller - SDIOC - HTTP(s) Firmware Upload

- In the file selection dialogue select the local firmware file and click the button **Ok**.
- Click on the button Start to begin the upload process to the G6 device.
 - After successfully uploading the file it appears in the section **available SDIOC firmware files on device**.

Note:

This list contains all available firmware files stored in the controller specific directory of the G6 device's memory. To remove this file click on the respective button **remove**.

Using the Web Manager:

- To update the controller's firmware open the screen **SmartOffice** and change to the tab **Device Configuration**.

Device.smartoffice.device_config (21 of 64 entries)

#	Parameter	Value
21	device name	SDIOC_1
	location	
	latitude	
	longitude	
	altitude	
	placement	UNSET
	product type	DIGITAL_IO_CONTROLLER
	device id	00:60:A7:09:B6:FF
	network address	
	additional parameter	
	network failure action	KEEP_CURRENT
	identify	identify
	restart	restart
	calibrate	calibrate
	pair	pair
	unpair	unpair
	update firmware	update firmware

Figure 20: Web Manager - SmartOffice - Device Configuration - Update Firmware

- In the section **Device.smartoffice.device_config** scroll down to the respective controller.
- In the field **update firmware** enter the name of the firmware file you want to load into the controller and click on the button **update firmware**.

Note:

If the input field is left blank the latest firmware file is selected by default.

7 Configuring MQTT

The MICROSENS Smart I/O Controller Digital acts as MQTT client for sending and receiving MQTT messages from and to an MQTT broker in the network, regarding the controller's digital input and output port values. This is important if you want to use the Smart I/O Controller Digital in automation projects with interaction between field devices.

7.1 Prerequisites

The controller always works with IPV6 Link Local Addresses. Therefore, the MQTT broker has to be enabled working with IPV6 addresses. However, he can easily translate between IPV4 and IPV6 because of the architecture of MQTT.

The MQTT protocol enables a very large range of different devices acting as broker, publisher and subscriber on the OSI transport layer. The device communicates only via TCP port 1883 or – if adjusted – over Websockets on Port 9001 for external communications.

7.2 Using Smart Config Tool for MQTT Configuration

Note:

Use the MICROSENS Smart Config Tool for MQTT configuration of the Smart I/O Controller Digital. The application is available for download via the MICROSENS web site under www.microsens.com/support/downloads.

To configure the MQTT settings as follows:

1. Start the Smart Config Tool.

Note:

This is a portable Microsoft® Windows® application that works without installation. For general information about using the Smart Config Tool please refer to the application's help function via the button **instructions** on the upper right hand pane.

2. Hit the button **Scan** on the upper left hand pane.

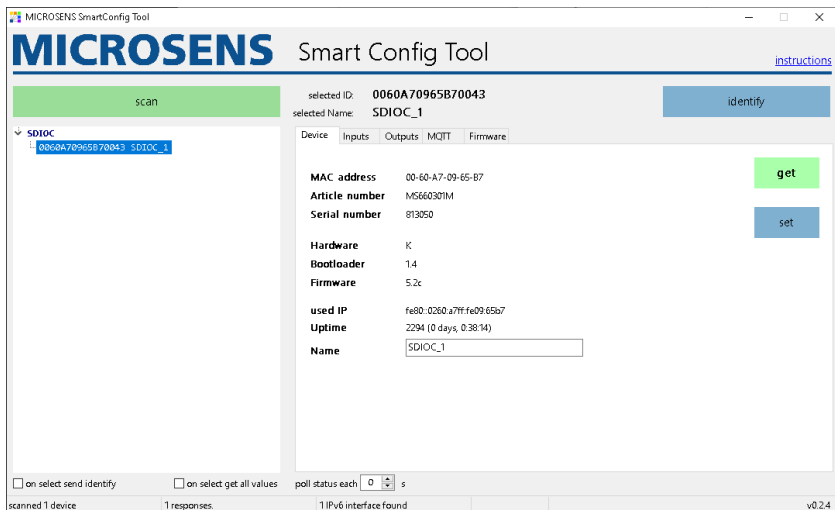


Figure 21: Smart Config Tool - Start Page - Scan Result

A tree view list of all identified Smart I/O Controller Digital devices appears after the scan process is finished.

3. In the tree view select the device you want to configure and its configuration is shown automatically. If the parameter should be updated, click on **get** for updating the values.

Note:

As the configuration of the device took place previously via the Web Manager GUI it is not necessary to change parameters like device name or port names here. Should this be necessary anyway, bear in mind to double-check those settings with the Smart Director settings (e.g. adapt scripts etc.).

Note:

Check the option **On select get all values** on the bottom left hand pane to show all the device's parameters immediately after selecting the device.

4. Click on the button **identify** to cause the selected device's port LEDs to blink, making sure this is the device you want to configure within the following steps.
5. For configuring MQTT change to the tab **MQTT**.

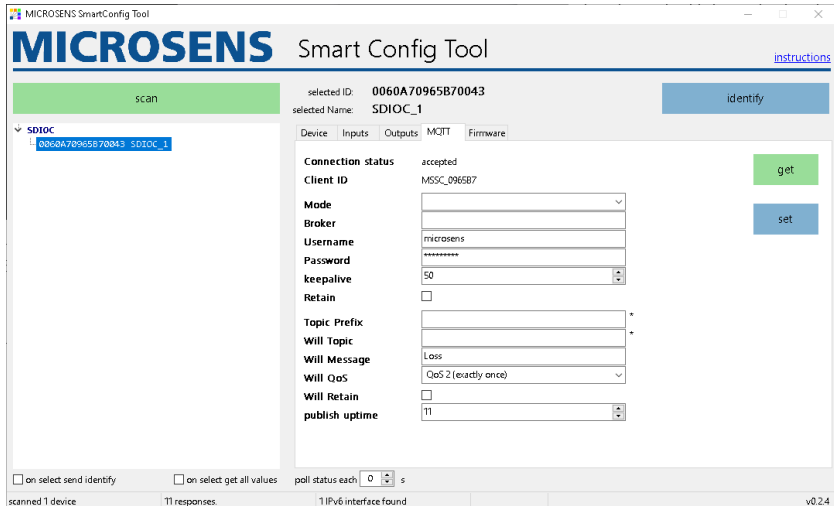


Figure 22: Smart Config Tool - MQTT Parameters

The parameters have the following meaning:

- **Connection Status:** Shows the connection status to the MQTT broker (read only).
 - Disconnected: No active connection to an MQTT broker in the network.
 - Accepted: The Smart I/O Controller Digital is connected to an MQTT broker.
 - Timeout: The connection to the MQTT broker is closed due to a timeout.
 - refused protocol: The MQTT broker refused the connection due to an invalid or unknown MQTT protocol version.
 - refused ID: The MQTT broker refused the connection due to an invalid client ID.
 - refused server: The MQTT service is unavailable.
 - refused authentication: The MQTT broker refused the connection due to invalid client credentials
 - refused authorisation: The client does not have the appropriate access rights.
 - unknown: The connection closed due to unknown reasons.
 - connecting: The Smart I/O Controller Digital is connecting to the MQTT broker.
 - paused: The connection is paused.
- **Client ID:** The client ID that is built from a part of the MAC-Adress which is shown on the tab **Device** (read only).
- **Mode:** Determines the MQTT mode (read/write).
 - Disabled: MQTT disabled.
 - QoS 0 (at most once):

- no guarantee for message delivery
- no acknowledgement of receiving the message by MQTT broker
- no storing or re-transmitting the message by MQTT publisher
- Packet ID automatically set to "0"
- QoS 1 (at least once):
 - guarantee for delivering the message successfully at least one time to the broker
 - storing and re-transmitting the message unless acknowledgement by the broker
 - acknowledgement contains the unique packet ID only, so the publisher can assign message and acknowledgement
- QoS 2 (exactly once):
 - guarantee for delivering every message exactly one time to the broker
 - publisher and broker using a four-part handshake for sending and acknowledgement
 - acknowledgement messages between publisher and broker contain the packet ID only to assign message and acknowledgements
- **Broker:** Sets the IPv6 address of the MQTT broker (read/write).
- **Username:** Username for MQTT broker access (read/write).
- **Password:** Password for MQTT broker access (write).
 - As soon as valid parameters for broker IPv6 address, credentials and MQTT mode are set and the broker is reachable, the MQTT broker connection status changes to "accepted".
- **Keepalive:** Sets the interval in seconds within which the controller sends a message to its MQTT broker (read/write) to announce itself as present. This prevents from being disconnected by the broker.
- **Retain:** This flag determines whether the broker will save this message as the last valid sample for this specific topic. In case a new MQTT client subscribes for this topic the broker transmits this message to the subscriber.
- **Topic Prefix:** The MQTT topics will always start with this string as identifier (read/write).
- **Will Topic:** This "last will topic" is sent to the MQTT broker on every first connection or on a parameter change. The broker forwards it to subscribers in case the controller (as publisher) loses the connection to the broker indicating the connection failure (read/write).
- **Will Message:** Sets the message for the last will topic in case of loss of connection (read/write).
- **Will QoS:** Sets the MQTT mode for the last will topic (read/write).
 - Settings correspond to the MQTT mode settings above. It is recommended to use a higher QoS level for last will topics.
- **Will Retain:** If set the broker saves the last will message to inform new subscribers about the controller has lost its connection previously (read/write).
- **Publish uptime:** Sets the interval in seconds within which the controller sends its uptime to the broker using the topic "<topic prefix>/uptime" (read/write).
 - Setting this parameter to "0" disables this function.

7.3 Using MQTT Topics with MICROSENS Switches

A topic can be understood as the category of a message. Topics are structured hierarchically (with a forward slash as delimiter between levels), comparable to a file system structure (e.g. "Building/Floor1/Room1/CeilingLight").

Topics are defined by the user, where a user friendly self-descriptive naming convention mirrors the Smart Building infrastructure.

Topic names are case sensitive (".../CeilingLight" differs from ".../ceilinglight") and must contain at least one character.

Note:

It is possible to use every UTF-8 character (besides "\$" since this character is used by the broker for internal statistics).

The use of the following wildcards is possible:

- **+**: This character replaces a single level in a topic.
Example: "Building/Floor1/+ /Temperature"
This topic addresses the "Temperature" related messages for all rooms on "Floor1".

- **#:** This character replaces multiple levels in a topic.

Example: "Building/Floor1/#"

This topic addresses all occurring messages on "Floor1".

Note:

The use of wildcards is allowed when using microScript to register topics.

It is not allowed using the MQTT mapping table and matching multiple topics to only one component is not appropriate (e.g. matching a sensor to a topic containing multiple rooms).

For setting up topics or IDs more easily it is possible to use specific variables. The following variables with their respective value are available:

- **{SMO}**: fixed text "SmartOffice"
- **{MFG}**: fixed manufacturer's name (i.e. "MICROSENS")
- **{MAC}**: MAC address of the device
(Device.factory.device_mac, e.g. "00:60:A7:09:37:4E")
- **{IP4}**: IPv4 address of this device
(Device.ip.v4_status.dynamic_device_ip, e.g. "10.100.89.187")
- **{IP6}**: IPv6 address of this device
(if enabled, Device.ip.v6_status.ip, e.g. "fe80::260:a7ff:fe09:374e/64")
- **{DMN}**: Domain name of the Smart Office network
(Device.smartoffice.director_config.domain_name, e.g. "domain1")
- **{ART}**: article number of this device
(Device.factory.article_number, e.g. "MS652119PM")
- **{SER}**: serial number of this device
(Device.factory.serial_number, e.g. "00345860")
- **{LOC}**: SNMP SysLocation
(Management.snmp.device_info.sys_location, e.g. "Office")
- **{NAM}**: SNMP SysName
(Management.snmp.device_info.sys_name, e.g. "MICROSENS G6 Micro Switch")

The variables can be combined e.g. in topics like "{SMO}/{MFG}_{MAC}/".

Note:

These variables are limited to the use with MICROSENS G6 switches (e.g., for microScripts). They cannot be used i.e. with MQTT topics of a Smart I/O Controller Digital.

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