GIMATIC

A business of BARNES GROUP INC

IOLBOX

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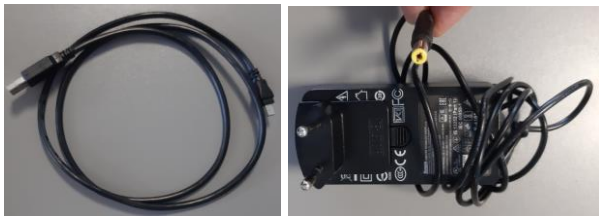
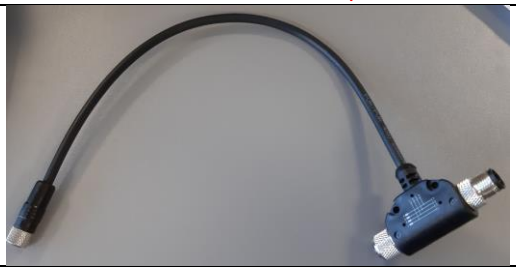
1. IO-LINK COMPONENTS

1. IOLBOX unit.
2. Master IO-Link unit.
3. USB adapter cable for master-PC connection (when using a generic USB master).
4. Power supply cable for the master.
5. Cable for connecting the IOLBOX to the master (M12-5 pin) and to the external power supply.
6. Standard M12-4 pin cable for serial communication between IOLBOX and grippers.
7. Junction nodes, according to the number of grippers to be connected.
8. Terminal node, to terminate the slave network.
9. Digital grippers with MODBUS RTU communication interface, up to a maximum of 5 devices. In the picture: MPPM1606IOL and MPLM1630IOL.
   Note:
   IODD files available at the following link https://www.gimatic.com/it/utility/
   IOL-MASTER-01 and IOL-MASTER-02 are included in the IOL-MASTER order code.

1 - IOLBOX	2 – IOL-MASTER-01
	
3/4 - USB and power supply cable (included in the master package)	5 – IOLBOX connection cable – master side (code: IOL-MASTER-02)
	
6 – IOLBOX connection cable – gripper side (code: CM12CF12-4-15)	7 - Junction node (code: CM12CF12CF8T4),
8 - Terminal node (code: CM1200400TERM)	9 - Digital command grippers MODBUS RTU interface (IOL version)

2. INTRODUCTION

In order to increase more and more the efficiency of its customers automatic systems, Gimatic offers a product that allows to exchange data over a network with a digital version of the standard plug & play grippers accessing their status and increasing the functions of diagnosis.

The IOLBOX is a gateway unit useful to communicate with an IO-Link master on one side, on the other with slave devices using the Modbus RS-485 protocol. Its task is to translate the messages into the two communication protocols and then provide the user with essential parameters and process data.

The master has the task of interfacing with the higher-level controller (such as PC or PLC) and controlling communication with the connected IO-Link devices (slaves).

IO-Link is a point-to-point connection between the IO-Link device and the IO-Link master. IO-Link is a communication protocol independent of the bus which cyclically transmits process data and diagnostic data from the sensors and actuators via a point-to-point connection.

IO-Link is defined in the international standard IEC 61131-9.

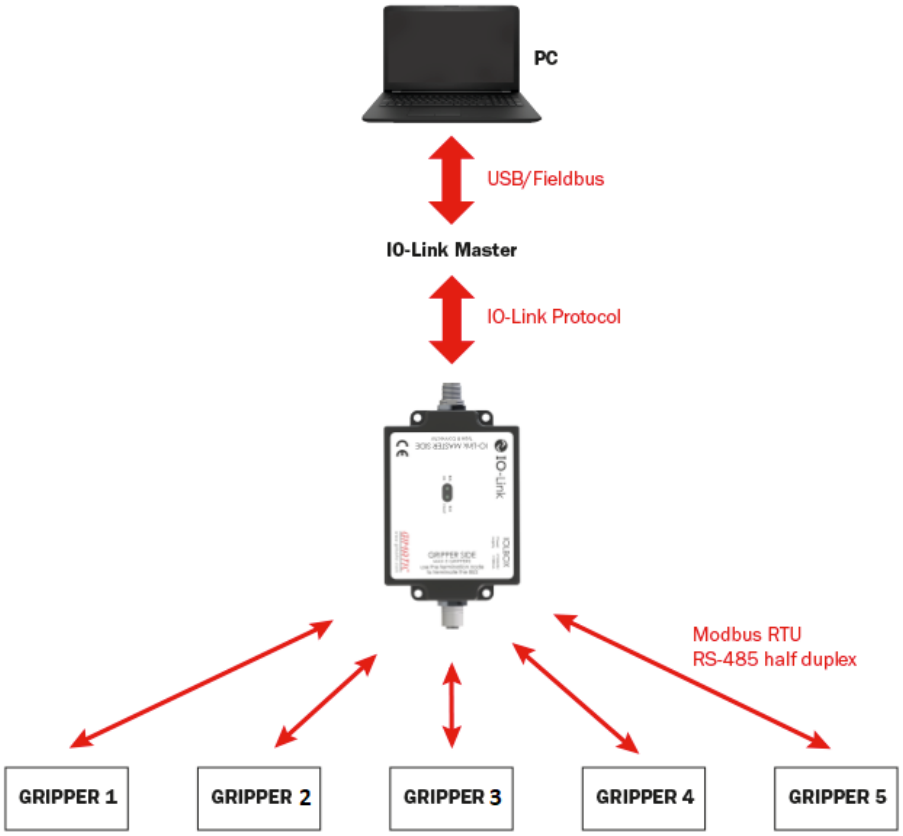
This technology has several advantages, including:

- Simple and standardized wiring: bidirectional serial connection via standard industrial cables without shielding.
- Increased availability of data.
- Remote configuration and monitoring.
- Simple replacement of devices.
- Advanced diagnostic features.

The IOLBOX allows to communicate up to a maximum of 5 grippers simultaneously and it is the only IO-Link device the master can communicate with thus using one single IO-Link master port to control all the 5 grippers (with an external power supply or B-type master model).

3. DESCRIPTION AND CHARACTERISTICS OF THE PRODUCT

The following picture shows the typical system architecture.



To correctly address the various messages, the grippers controlled by the IOLBOX must have a different slave ID that makes them recognizable by both the IOLBOX and the master unit.

3.1 Slave ID

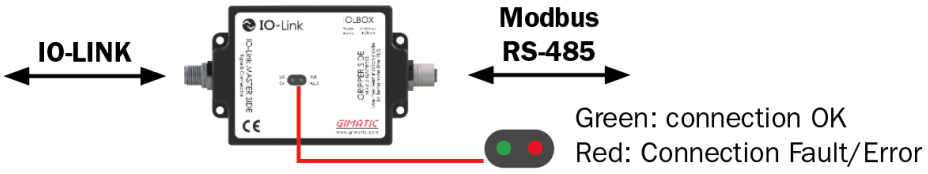
The slave ID is the identifier of each gripper and must be unique for all grippers connected to the same IOLBOX.

This parameter allows the IOLBOX to communicate with a specific gripper. As a factory setting all grippers have Slave ID = 0 but one can set a different value during installation by connecting, for example, one gripper at a time to the master. The grippers connected to the same IOLBOX must have progressive Slave ID, from Slave ID 1 to Slave ID 5.

3.2 Electrical connection

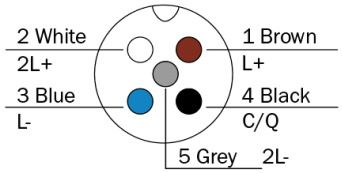
The IOLBOX is equipped on one side with an M12-5 pin female connector to communicate with the IO-Link master and on the other side with an M12-4 pin male connector to communicate in Modbus protocol with the connected grippers.

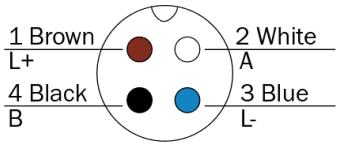
The following picture shows the pinout of both the IOLBOX connectors:



IO-Link Master Pinout (class B model)
Port Characteristics: M12 A-coded connector port with 5-poles (female)
Pin 1 = +24 Vdc IOLBOX power supply
Pin 3 = 0 Vdc ground for IOLBOX
Pin 4 = IO-Link communication
Pin 2 = +24 Vdc power supply for grippers
Pin 5 = 0 Vdc ground for grippers

Modbus RS-485 Pinout
Port Characteristics: M12 A-coded connector port with 4-poles (male)
Pin 1 = +24 Vdc device power
Pin 3 = 0 Vdc ground for device power
Pin 4 = Differential channel B
Pin 2 = Differential channel A





3.3 Exchanged parameters

The data exchanged between slave devices and master can be of two types: cyclic and acyclic.

The former are those parameters that are automatically transmitted on a regular basis, namely inputs and outputs. Inputs are the open/closed control and the adjustment of the grip force (represented by a percentage of the nominal force). The outputs are the virtual limit switches of the jaws position and the jaws stroke (with a resolution of 0.1 mm).

Acyclic data, on the other hand, are those data transmitted according to the needs or on request, such as slave ID (the only one that can also be written) and a list of gripper specific data: code, lot, serial number, firmware revision, maximum force, maximum stroke, mass, maximum frequency, and number of cycles executed.

The parameters exchanged are listed in the table on the following page, indicating whether they are accessible for reading and/or writing.

DATI CICLICI *CYCLIC DATA*					
Subindex dec	BitOffset dec	Name	Length	Access	Value/Range
240 (for ID = 1)	1 (for ID = 1)	Stato della pinza *Status of the gripper*	16 bit	ro	1 = Chiusa (Closed) 2 = Aperta (Open)
224 (for ID = 1)	2 (for ID = 1)	Corsa della pinza *Stroke of the gripper*	16 bit	ro	1 = 0.1 mm
240 (for ID = 1)	1 (for ID = 1)	Comando Command	16 bit	rw	1 = Chiusa (Closed) 2 = Aperta (Open)
224 (for ID = 1)	2 (for ID = 1)	Forza di presa Grip force	16 bit	rw	1÷100% Fmax
PARAMETRI ACICLICI *ACYCLIC PARAMETERS*					
Index dec		Name	Length	Access	Value/Range
64 (for ID = 1)		Codice *Gripper_code*	32 Byte	ro	-
65 (for ID = 1)		Numero di lotto Lot number	10 Byte	ro	-
66 (for ID = 1)		Seriale Serial	16 bit	ro	-
67 (for ID = 1)		Verisone FW FW review	16 bit	ro	-
68 (for ID = 1)		Massima forza testata Tested_Max_Force	16 bit	ro	1 = 1 N
69 (for ID = 1)		Corsa massima testata Tested_Max_Stroke	16 bit	ro	1 = 0.1 mm
70 (for ID = 1)		Massa Real_Mass	16 bit	ro	1 = 20 g
71 (for ID = 1)		Frequenza massima testata Tested_Max_Freq	16 bit	ro	1 = 0.1 Hz
72 (for ID = 1)		Numero di cicli eseguiti Working_Cycles_Number	16 bit	ro	1 = 100
73 (for ID = 1)		ID pinza Slave_ID	16 bit	rw	1÷5

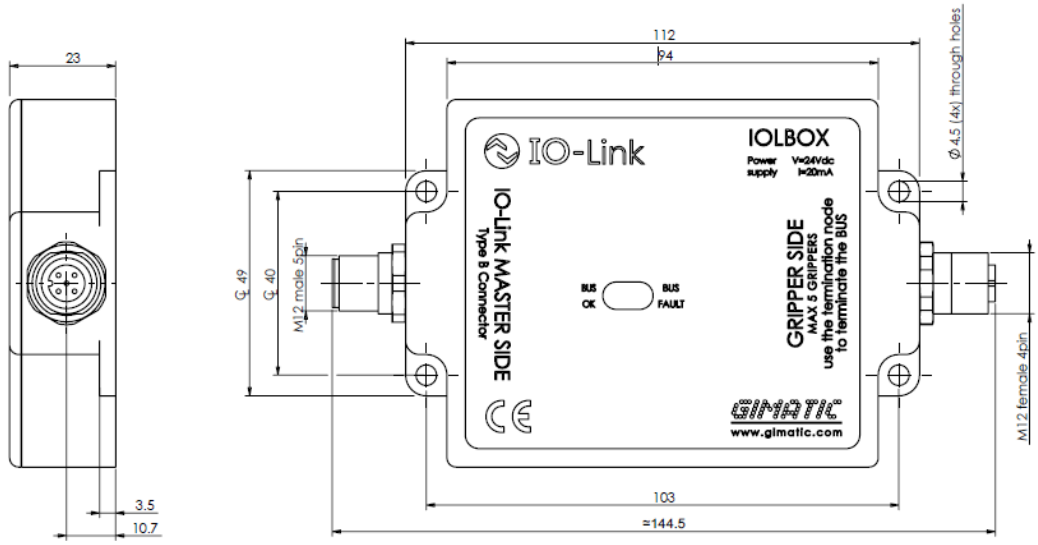
* Subindex, BitOffset e Index variano in base all'ID della pinza.
* Subindex, Bitoffset and Index change according to the ID of the gripper.

Below an example of communication to read data from a gripper.

IOLBOX	Richiesta *Request*	Data size	Slave ID	Function	Address		Number of data		CRCHI	CRCLO	
		word	1	4	0	0	0	2	255	7	
Pinza Grippers	*Risposta Reply*	Data size	Slave ID	Function	Number of data	Data 1-2 (Position)		Data 3-4 (Stroke)		CRCHI	CRCLO
		byte	1	4	4	0	2	0	203	255	200

3.4 Electrical/mechanical characteristics and dimensional drawing

Electrical/Mechanical Characteristics	
Power supply	24 [Vdc]
Current consumption (IOLBOX only)	20 [mA]
Operating temperature	5° ÷ 60°C
Mass	120 g



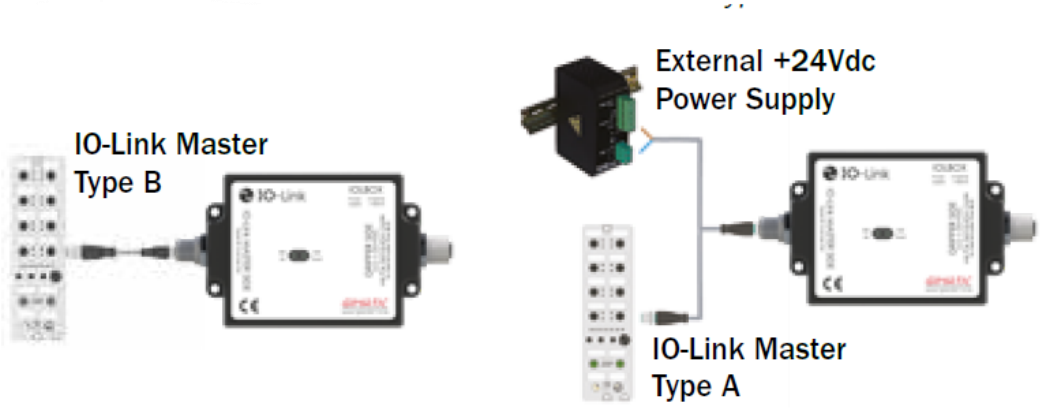
4. MASTER UNIT

The master and device pin assignment is based on the IEC 60947-5-2 specifications. For a master, two port classes are defined, port class A and port class B.

In a port class A, the pins 2 and 5 are not connected (NC). In a port class B, the pins 2 and 5 can be configured as an additional power supply.

Type A (or class A) masters may not provide enough current for the operation of grippers. In this case, an external power supply must be connected to pins 2 (+) and 5 (-) of the connector.

Type B (or class B) masters can be connected directly to the IOLBOX using the previously mentioned pinout. The following figures show the connections of both types of master.



4.1 Master by Pepperl+Fuchs

For testing and configuration purpose a generic USB master can be used, like the one by Pepperl+Fuchs:

This is a USB type A master with the purpose of connecting IO-Link devices to a USB port of the PC.

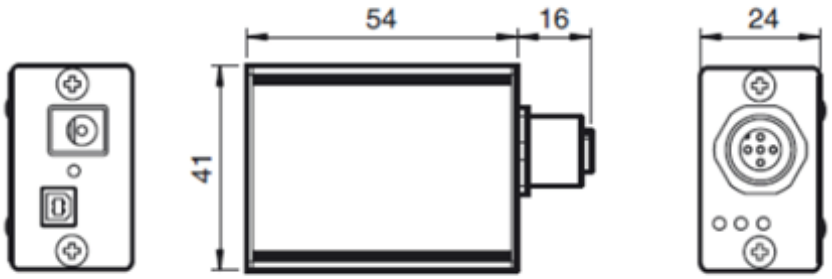
In the initial test and verification phase of the system, power can be supplied directly from the USB master. Otherwise, during the work phase, it is necessary to supply an external power supply.

4.1.1 Technical data

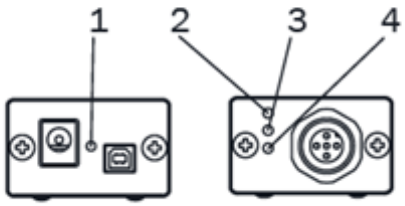
Technical data	
Indicators/operating means	
Fuction indicator	*Communication: led green* *Status display: led yellow* *Diagnostic display: led red* *Operating voltage indicator: yellow LED*
Eletrical specifications	
Operating voltage	24 V DC/ USB 5 V DC
Operating current	< = 500 mA
Interface	
Interface type	*IO-Link*
Protocol	*IO-Link V1.1, IO-LINK V1.0*
Supported baud rates	*COM 1 (4.8 kBaud), COM2 (38.4kBaud), COM 3 (230,4 kBaud)*
Output	
Load current	*max. 80 mA via USB for sensor supply voltage 1 A via external power supply*
Ambient conditions	
Ambient temperature	0 ... 45 °C (32 ... 113 °F)
Storage temperature	-40 ... 80 °C (-40 ... 176 °F)
Relative humidity	*95% non-condensing*
Mechanical specifications	
Degree of protection	*IP20 (when properly connected)*
Connection	*IO-Link port: 5-pin, M12x1 socket, A-coded* *Operating voltage: DC-9, 2.1 mm* *USB 2.0 : MiniB USB plug-in connector*
Material	
Housing	*Aluminium*
Mass	*Approx. 100g*
General information	
Scope of delivery	*USB connection cable* *24V DC power supply* *IO-Link USB Master 2.0*
Approvals and certificates	
Approvals	CE

4.1.2 Dimensional drawing and pinout

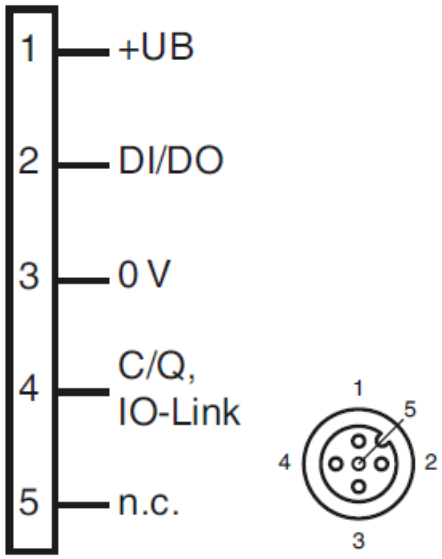
Dimensions (mm)



Light indicator



1	Operating display	*yellow*
2	Signal display CH1 (C/Q)	*green/yellow*
3	Signal display CH2 (DI/DO)	*yellow*
4	Error display	*red*



4.1.3 Accessories (included in the package)

Regulator 24Vdc

USB Cable

Regulator Adapter

4.2 Master by Baumer

Alternately, it is possible to use the wireless IO-Link master by Baumer called SensControl (included in Gimatic order code IOL-MASTER).

This is a type A master with integrated battery that allow to exchange data with the IOLBOX using the Bluetooth technology end an appropriate app (the *SensControl* app is available in Apple AppStore and Google PlayStore: from your device, open the store and enter “SensControl“ into the search box).

With the app the user can read and write data more easily through the use of a smartphone or a tablet.

SensControl works best with a Bluetooth Smart (Bluetooth LE) connection. The tablet or smartphone must support Bluetooth Smart. The technology is part of the Bluetooth specification from Version 4.0.

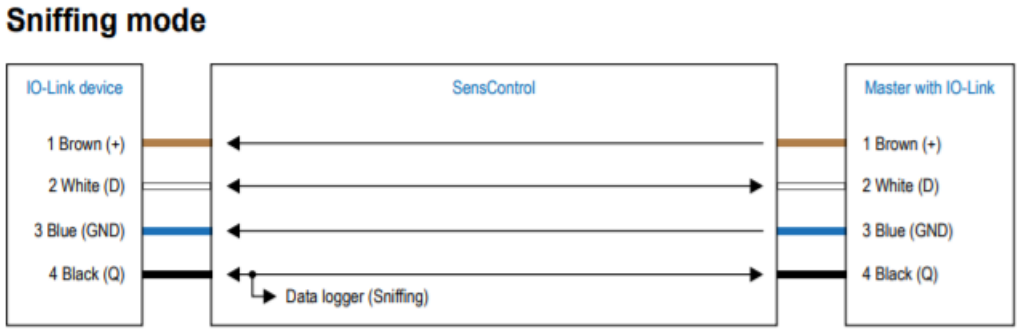
4.2.1 Other modes of operation

For completeness, we report two other modes of operation of the wireless master by Baumer, which are not needed with our IOLBOX.

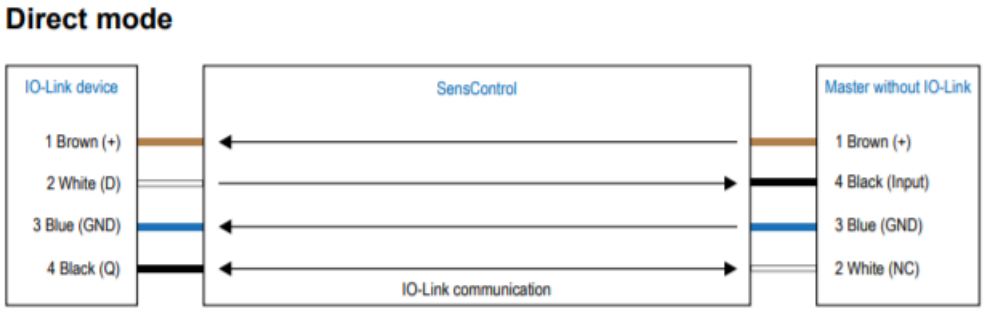
In fact, in addition to working as an IO-Link master, SensControl has two other modes of operation.

In Sniffing mode, the SensControl is switched between the IO-Link device and the IO-Link master.

Without affecting the existing connection between the IO-Link device and IO-Link master, the SensControl tracks their communication and saves it to an SD card (which can be plugged into the SensControl). The data can be read and analysed later from there. To use the SensControl in Sniffing mode, an SD card first needs to be plugged into the slot at the rear of the SensControl. To switch the SensControl to Sniffing mode, press the button on the front 3 times in quick succession. The device now switches to Sniffing mode, indicated by LED2 lighting blue. Now connect an IO-Link master and an IO-Link device to the relevant connectors on the rear of the device. Data recording starts automatically. A new file is created for every Sniffing session. To exit Sniffing mode, press the button on the front again 3 times in quick succession. This is the recommended way to exit Sniffing mode, so that all data can be written to the SD card.



If modern, IO-Link capable, 4-wire devices are used on master without IO-Link (such as a PLC with digital input), SensControl makes available the full IO-Link functionality of the devices. For this, the device must be configured such that apposite connector is switched as an output, and it makes available the original function of a conventional device. SensControl connects output to the master and permits in parallel communication to the IO-Link device.

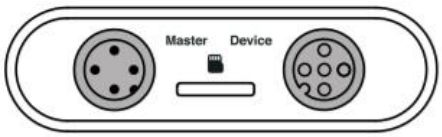


For any details about these two different modes of operation please refer to the Baumer website.

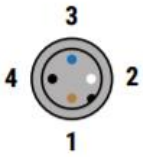
4.2.2 Technical data

TECHNICAL DATA	
Dimensions	70 × 20 × 95 mm (B×H×D)
Weight	154 g
Interfaces	1 × M12 5-pin connector for IO-Link device (Class A), 1 × M12 4-pin connector for IO-Link master (Class A), 1 × Micro SD card, 1 × Mini USB, Bluetooth Smart, WLAN
Standards supported	IO-Link versions: 1.0 and 1.1, IODD versions: 1.0.1 and 1.1
Power supply	Either over the USB port integrated, the IO-Link master or the battery fitted In Battery mode: Max. current of IO-Link device: 350 mA, operating time > 3 h at 2 W, voltage of IO-Link device: 24 V 20 %
Maximum transmit power	WLAN: 18 dBm Bluetooth Smart: 2 dBm
Standards	CE EN 55022 /2010 Class A, EN 55024 /2010 + A1 /2015 Contains FCC ID: W7OMRF24WG0MAMB Contains FCC ID: PVH0950 IC: 5325A-0950

4.2.3 Pinout

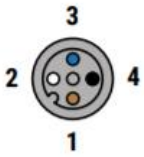


Connector for IO-Link master



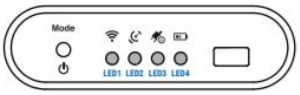
Pin 1	(+) Brown
Pin 2	(DI/DQ) White
Pin 3	(GND) Blue
Pin 4	(C/Q) Black

Connector for IO-Link device



Pin 1	(+) Brown
Pin 2	(DI/DQ) White
Pin 3	(GND) Blue
Pin 4	(C/Q) Black
Pin 5	(NC)

LED indicators



LED1 indicates the WLAN mode of the device

- Lights red = *SensControl* is providing an Access Point (Soft AP)
- Lights green = *SensControl* is connected to another WLAN in Infrastructure mode
- Flashing blue together with LED2 = *SensControl* being started or is in Firmware update mode
- Off = *SensControl* neither making a WLAN available nor been able to connect to the potentially configured WLAN

LED2 provides information on the IO-Link communication status

- Lights green = *SensControl* working in Master mode and the IO-Link device currently in status "OPERATE"
- Lights red = No IO-Link device connected, or unable to switch to the "OPERATE" status. No communication is possible with the device connected to the IO-Link jack.
- Flashing blue together with LED1 = *SensControl* being started or is in Firmware update mode
- Flashing blue = *SensControl* working in Sniffing mode
- Lights blue = *SensControl* working in Sniffing mode and waiting for a STARTUP command from the IO-Link master connected
- Lights yellow = *SensControl* unable to start Sniffing mode because the SD card cannot be used (an SD card is not inserted, no memory is available on the SD card or the first partition does not have FAT32 formatting)

LED3 provides information on the power supply being used

- Lights red = *SensControl* working in Battery mode
- Lights green = USB being used to work the *SensControl* and the batteries are being charged
- Lights blue = The master port is being used to power the IO-Link device connected

LED4 shows the charge status of the batterie

- Lights red = Battery is almost flat
- Lights green = Battery is fully charged

4.2.4 Accessories (included in the package)

A conventional Mini USB cable can be used to charge the SensControl. The USB cable can be connected to a conventional charger for mobiles or to a PC/laptop. Whilst a PSU or other power supply is connected to the USB port, IO-Link devices with a power consumption up to 200 mA can be run.

5. PC SOFTWARE

A generic computer or laptop with Windows operating system can be interfaced with a generic USB master using the USB cable.

In case of use of the USB master by Pepperl+Fuchs the following programs are required:

- PACTware 4.1: to test, configure and use the IO-Link master, reading and writing slave parameters, system information, etc.
- IODD DTM Configurator: for loading and install the IODD files.
- IODD files linked to slaves: for the use of any Gimatic gripper it is enough to download only one complete file.
- Master drive: for the correct operation of the master-PC connection.

The PC software allows the reading and writing of data from/to the IOLBOX.

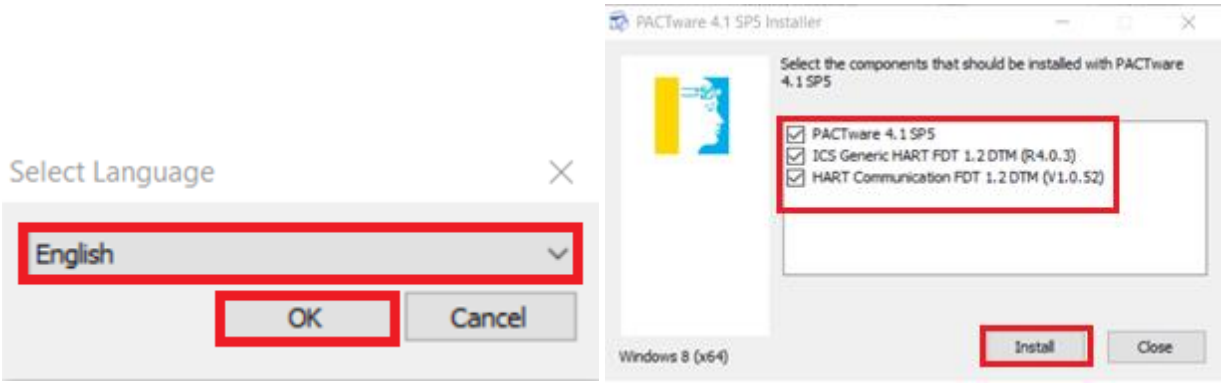
In case of use of the IOL-MASTER-01 (wireless master by Baumer) one must only download the SensControl app useful to communicate with the master through Bluetooth technology.

Below are the wizards for downloading and installing these programs.

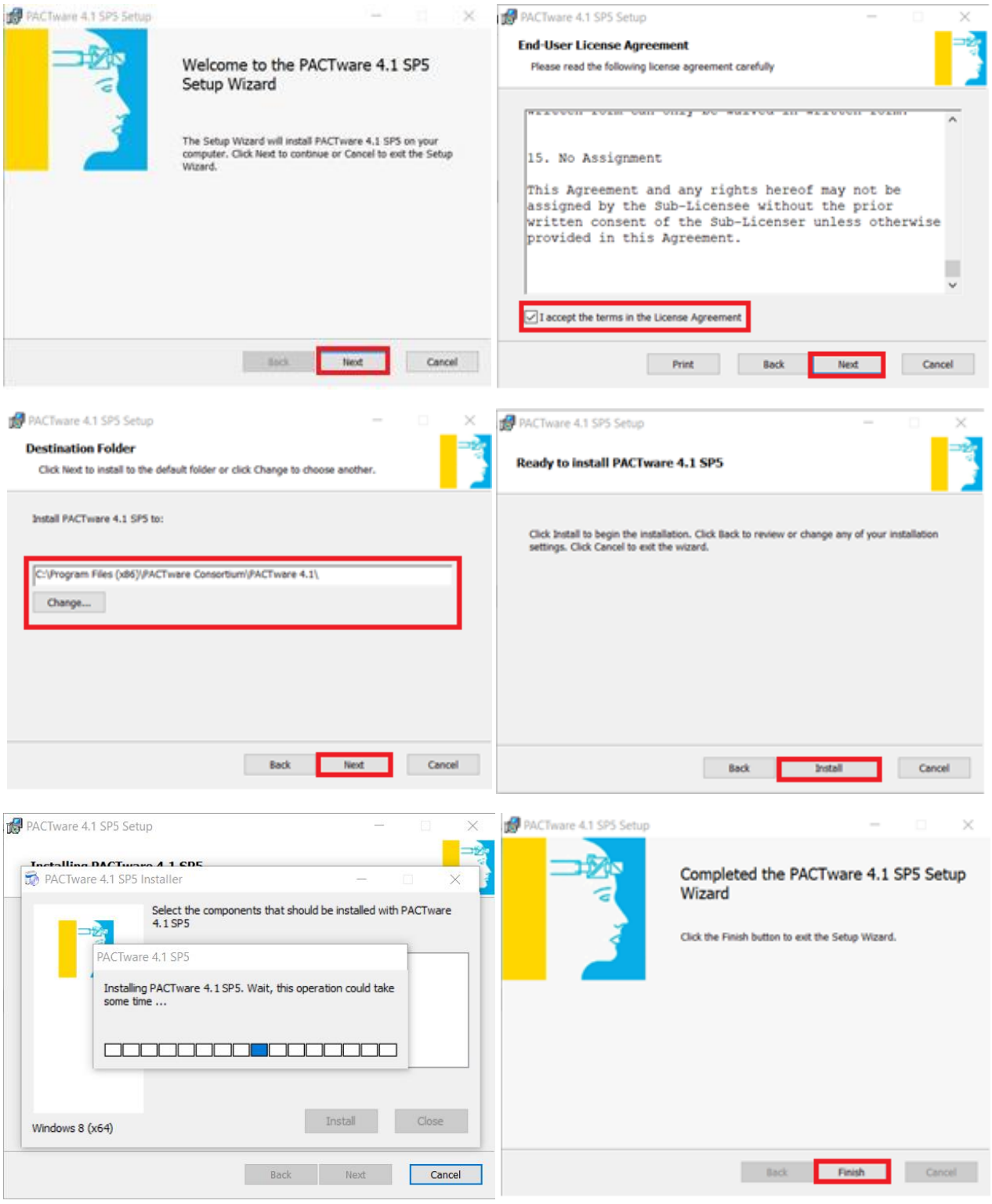
5.1 PACTware 4.1 installation

The PC software can be downloaded from https://www.pepperl-fuchs.com/italy/it/classid_163.htm?view=productdetails&prodid=45160#software .
The content must be extracted from a compressed folder.
Double-click on the application named “setup” to start the installation.

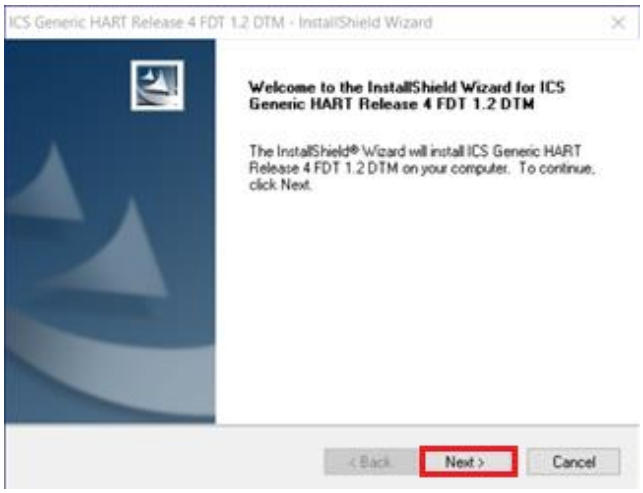
Select the language and components you want to install (leave the mark on them all as pre-set) and click 'Install'.

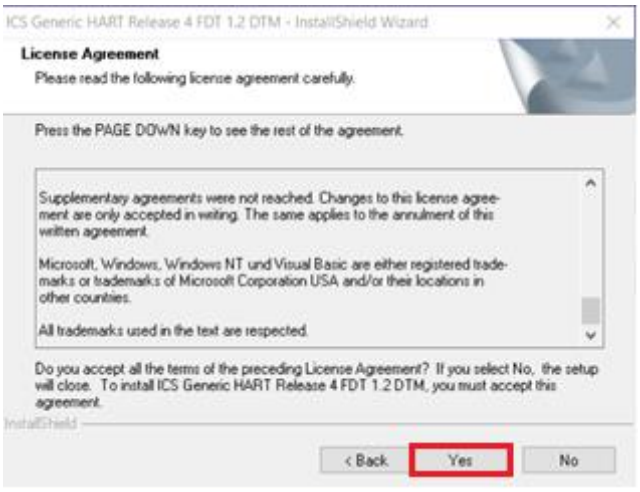


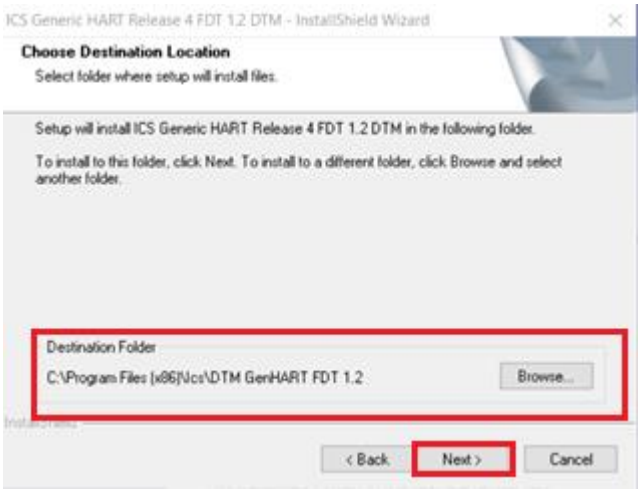
At this point follow the normal installation procedures (read and accept the license agreement and select the desired destination folder).

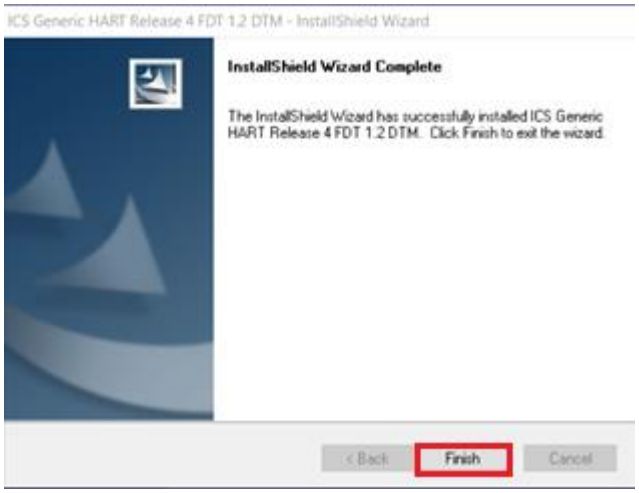


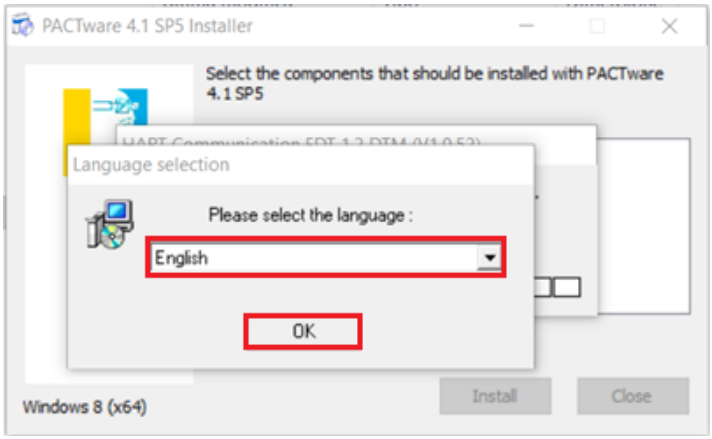
At this point, as previously selected, the installation of two other associated programs will start. Please, follow the indicated steps.


ICS Generic HART Release 4 FDT 1.2 DTM - InstallShield Wizard
Welcome to the InstallShield Wizard for ICS Generic HART Release 4 FDT 1.2 DTM
The InstallShield® Wizard will install ICS Generic HART Release 4 FDT 1.2 DTM on your computer. To continue, click Next.
< Back
Next >
Cancel

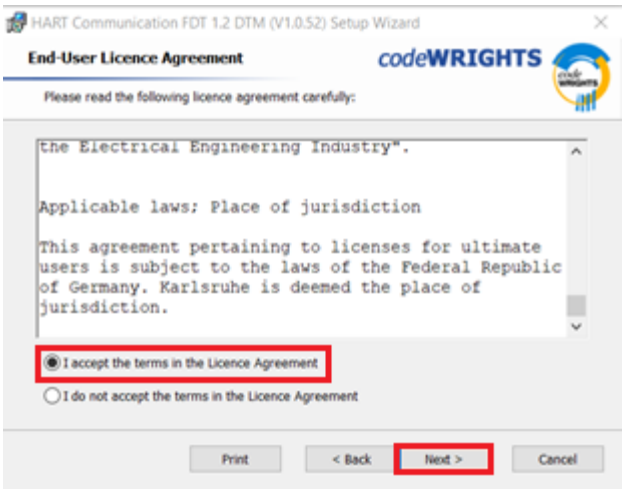

ICS Generic HART Release 4 FDT 1.2 DTM - InstallShield Wizard
License Agreement
Please read the following license agreement carefully.
Press the PAGE DOWN key to see the rest of the agreement.
Supplementary agreements were not reached. Changes to this license agreement are only accepted in writing. The same applies to the annulment of this written agreement.
Microsoft, Windows, Windows NT und Visual Basic are either registered trademarks or trademarks of Microsoft Corporation USA and/or their locations in other countries.
All trademarks used in the text are respected.
Do you accept all the terms of the preceding License Agreement? If you select No, the setup will close. To install ICS Generic HART Release 4 FDT 1.2 DTM, you must accept this agreement.
InstallShield
< Back
Yes
No

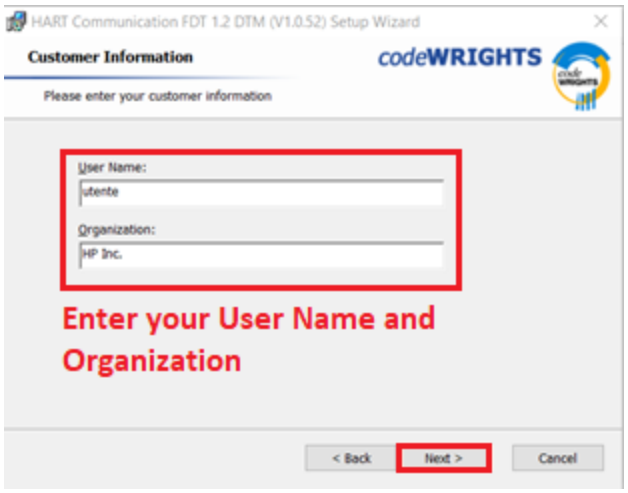

ICS Generic HART Release 4 FDT 1.2 DTM - InstallShield Wizard
Choose Destination Location
Select folder where setup will install files.
Setup will install ICS Generic HART Release 4 FDT 1.2 DTM in the following folder.
To install to this folder, click Next. To install to a different folder, click Browse and select another folder.
Destination Folder
C:\Program Files (x86)\Ics\DTM GenHART FDT 1.2
Browse...
InstallShield
< Back
Next >
Cancel

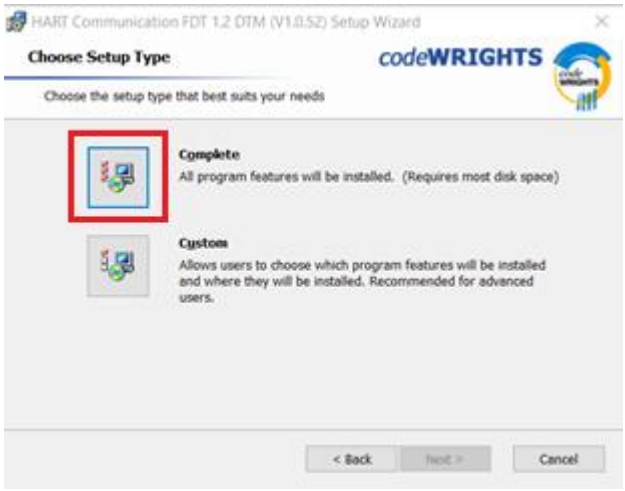

ICS Generic HART Release 4 FDT 1.2 DTM - InstallShield Wizard
InstallShield Wizard Complete
The InstallShield Wizard has successfully installed ICS Generic HART Release 4 FDT 1.2 DTM. Click Finish to exit the wizard.
< Back
Finish
Cancel

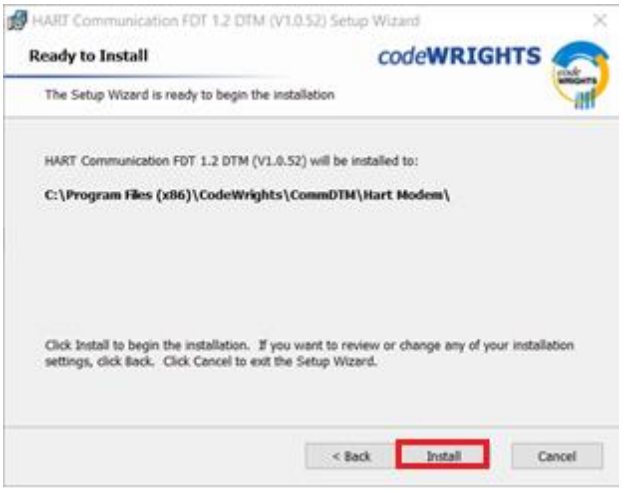

PACTware 4.1 SP5 Installer
Select the components that should be installed with PACTware 4.1 SP5
Language selection
Please select the language :
English
OK
Windows 8 (x64)
Install
Close

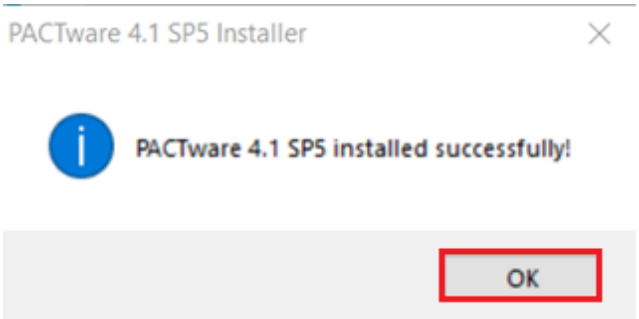
HART Communication FDT 1.2 DTM (V1.0.52) Setup Wizard
HART
Welcome to HART Communication FDT 1.2 DTM (V1.0.52) Setup Wizard!
The Setup Wizard will install HART Communication FDT 1.2 DTM (V1.0.52) on your computer. Click Next to continue or Cancel to exit the Setup Wizard.
Next >
Cancel











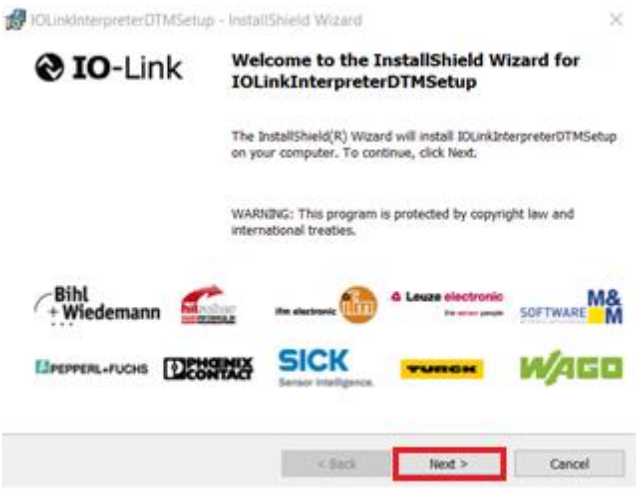
5.2 IODD DTM Configurator installation

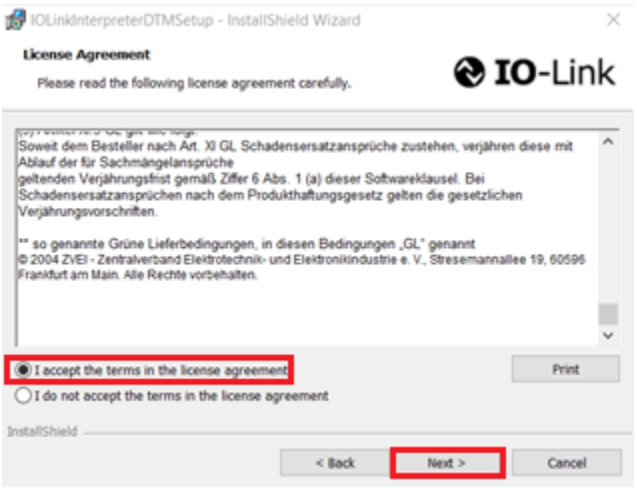
The IODD interpreter can be downloaded from https://www.pepperl-fuchs.com/italy/it/classid_1804.htm?view=productdetails&prodid=47321#software .

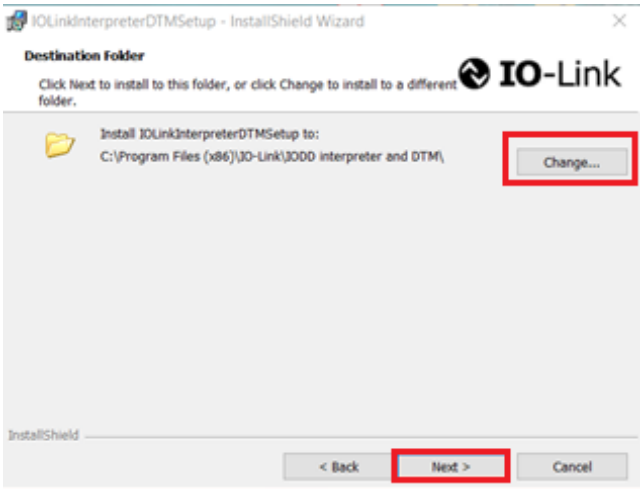
Please follow the below described installation procedure.

Nome
Ultima modifica
Tipo
Dimensione
ISSetupPrerequisites
15/04/2020 10:15
Cartella di file
1031.mst
15/04/2020 10:15
File MST
248 KB
1033.mst
15/04/2020 10:15
File MST
20 KB
Data1
15/04/2020 10:15
File CAB
3.084 KB
IO-LinkInterpreterAndDTM
15/04/2020 10:15
Pacchetto di Wind...
4.753 KB
setup
15/04/2020 10:15
Applicazione
3.909 KB

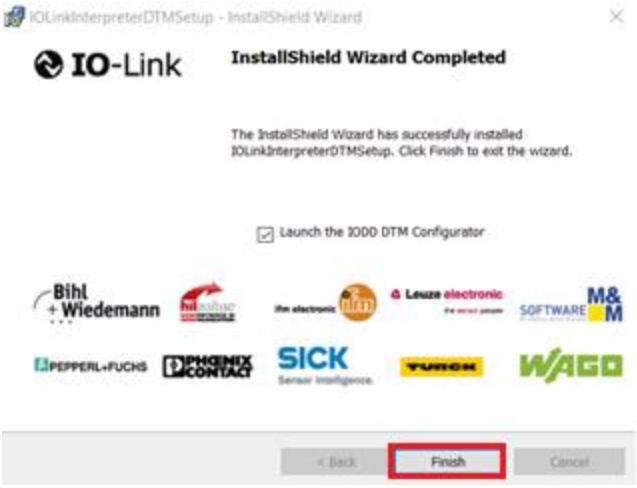
Windows protected your PC
Windows Defender SmartScreen prevented an unrecognized app from starting. Running this app might put your PC at risk.
More info
Don't run
Windows protected your PC
Windows Defender SmartScreen prevented an unrecognized app from starting. Running this app might put your PC at risk.
App: setup.exe
Publisher: Unknown publisher
Run anyway
Don't run


IOLinkInterpreterDTMSetup - InstallShield Wizard
IO-Link
Welcome to the InstallShield Wizard for IOLinkInterpreterDTMSetup
The InstallShield(R) Wizard will install IOLinkInterpreterDTMSetup on your computer. To continue, click Next.
WARNING: This program is protected by copyright law and international treaties.
Bihl + Wiedemann
Leuze electronic
SOFTWARE M&M
PEPPERL+FUCHS
PHOENIX CONTACT
SICK
WAGO
< Back
Next >
Cancel


IOLinkInterpreterDTMSetup - InstallShield Wizard
License Agreement
Please read the following license agreement carefully.
IO-Link
Soweit dem Besteller nach Art. XI GL Schadensersatzansprüche zustehen, verjähren diese mit Ablauf der für Sachmängelansprüche
geltenden Verjährungsfrist gemäß Ziffer 6 Abs. 1 (a) dieser Softwareklausel. Bei Schadensersatzansprüchen nach dem Produkthaftungsgesetz gelten die gesetzlichen Verjährungsvorschriften.
** so genannte Grüne Lieferbedingungen, in diesen Bedingungen „GL" genannt
© 2004 ZVEI - Zentralverband Elektrotechnik- und Elektronikindustrie e. V., Stresemannallee 19, 60596 Frankfurt am Main. Alle Rechte vorbehalten.
I accept the terms in the license agreement
I do not accept the terms in the license agreement
Print
InstallShield
< Back
Next >
Cancel


IOLinkInterpreterDTMSetup - InstallShield Wizard
Destination Folder
Click Next to install to this folder, or click Change to install to a different folder.
IO-Link
Install IOLinkInterpreterDTMSetup to:
C:\Program Files (x86)\IO-Link\IODD interpreter and DTM\
Change...
InstallShield
< Back
Next >
Cancel

IOLinkInterpreterDTMSetup - InstallShield Wizard
Ready to Install the Program
The wizard is ready to begin installation.
IO-Link
Click Install to begin the installation.
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.
InstallShield
< Back
Install
Cancel



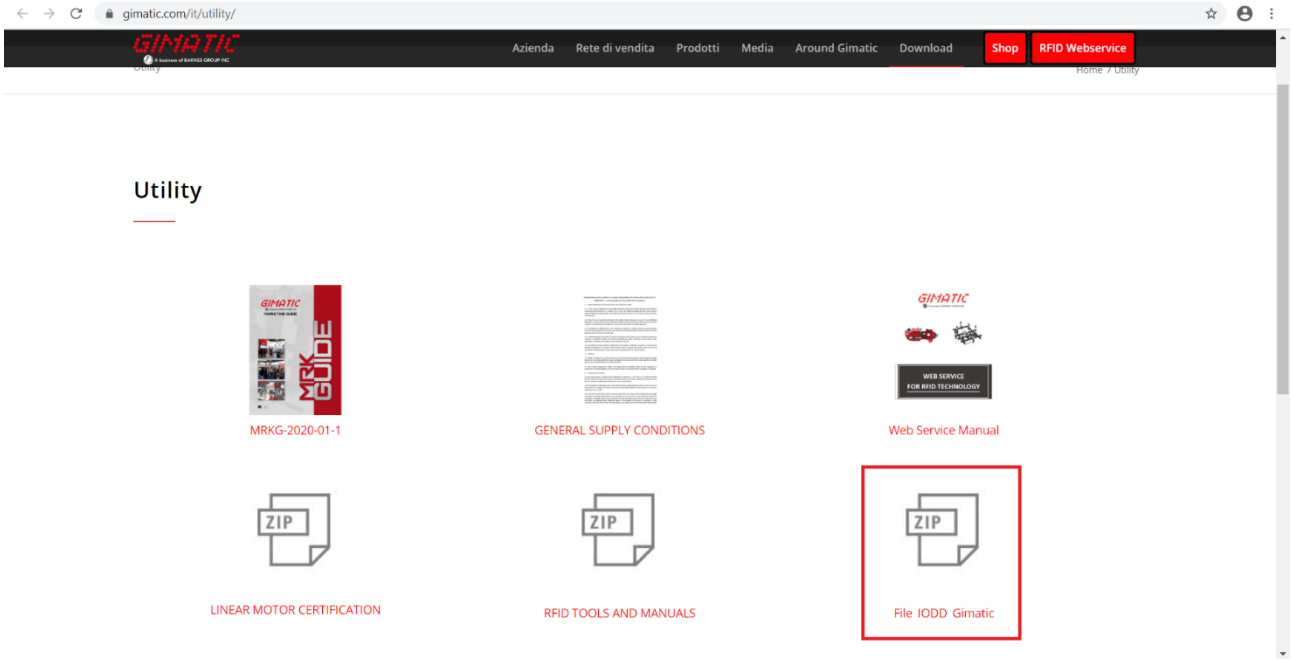
5.3 IODD file download

It is important to assign a unique and sequential slave ID (from 1 to 5) to the connected grippers so that errors do not arise during the reading and writing of the parameters.

The control interface of the IOLBOX and the grippers is defined by the IOLBOX IODD file which contains all the descriptions of the devices and the data necessary for the operation.

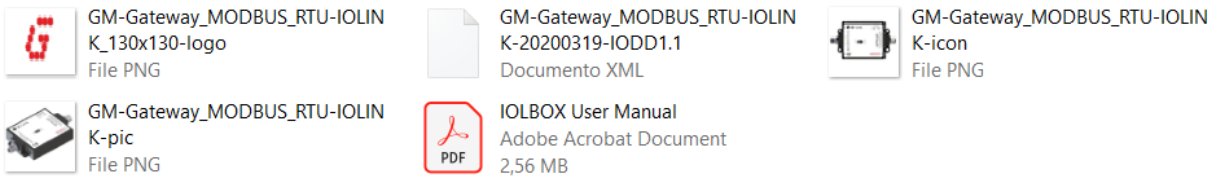
The IODD file can be downloaded at the following link:

https://www.gimatic.com/it/utility/ .



Clicking on the highlighted box “Gimatic IODD File” will proceed with the download of the compressed folder.

Once extracted its contents, we find the following files:



The IODD file of interest is the XML document called “GM-Gateway_MODBUS_RTU_IOLINK-20200319-IODD1.1" and must then be loaded in the appropriate master management software.

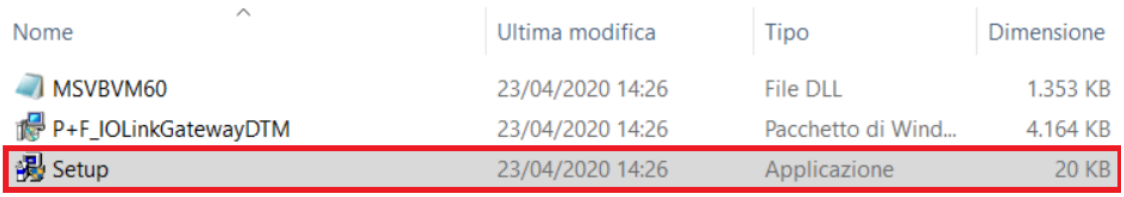
5.4 Master drive installation

To ensure proper communication between Pepperl+Fuchs master and PC, the drivers available at the following link must be installed:

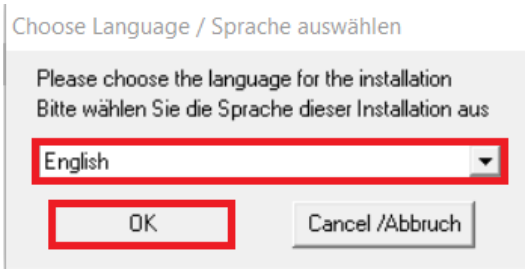
https://www.pepperl-fuchs.com/italy/it/classid_6436.htm?view=productdetails&prodid=85182 .

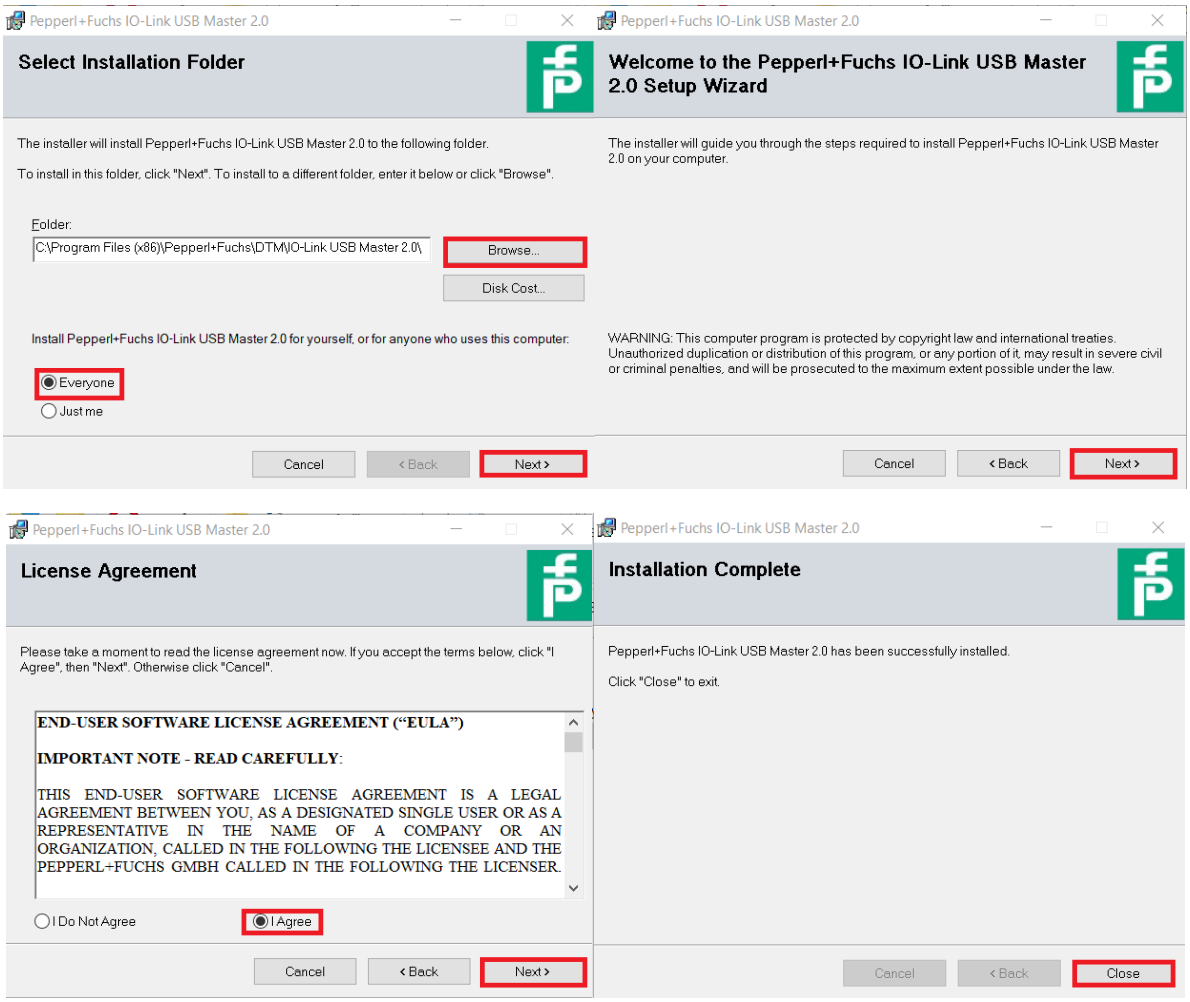
Please follow the below procedure.

Extract files from the downloaded compressed folder and double click on file ”setup.exe”.



Select language, installation location and accept the license agreement to start the installation.





5.5 App download for IOL-MASTER-01 (wireless master by Baumer)

In case of use of the IOL-MASTER-01 there is no need of physical connection, just download the app at the following link:

- Android: https://play.google.com/store/apps/details?id=com.baumer.senscontrol.android
- IOS: https://apps.apple.com/us/app/senscontrol/id1484069590

Download the application according to the operating system of the device with which one want to control the IOLBOX.

The SensControl app sources IODD files from online memory. The app currently accesses https://www.ioddhub.com where it searches for IODD files for IO-Link devices. The SensControl app stores IODD files downloaded previously, and associated images, in an offline cache. If the files required have been downloaded before, the app can also be used without an Internet connection

The IODD files of the IOLBOX must not upload by the users but they are already available on the IODD hub.

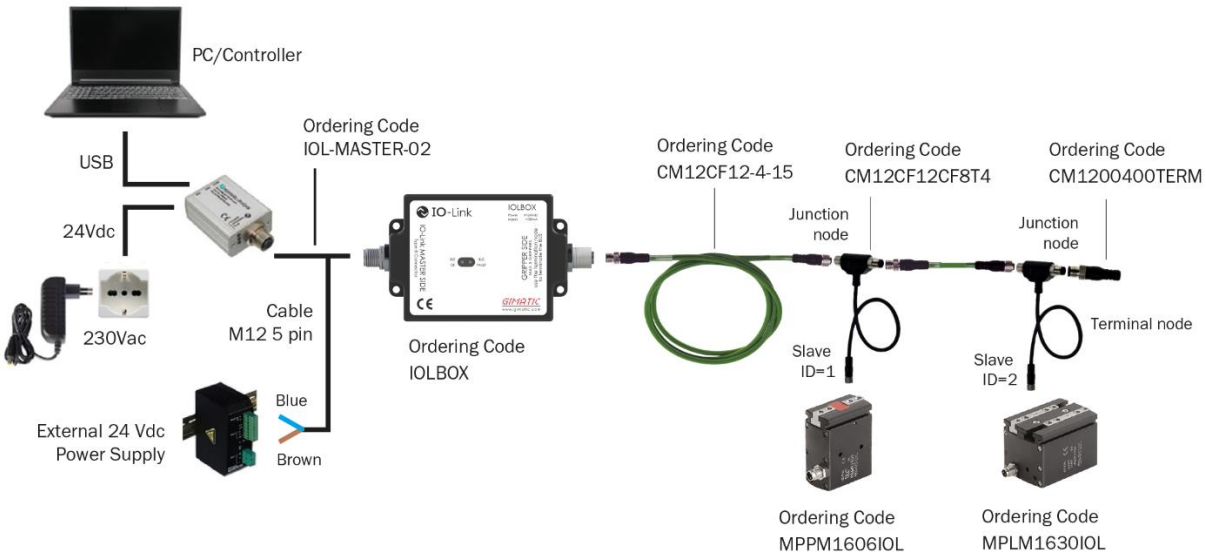
6. SYSTEM SETUP WITH PEPPERL+FUCHS MASTER

The user can connect in series up to 5 grippers to a single IOLBOX unit which is the only IO-Link device connected to the IO-Link master using therefore only one node of the master.

In the following an example of how to connect two grippers (MPPM1606IOL and MPLM1630IOL) is shown.

Below is the wiring of the grippers at the IOLBOX.

6.1 Commissioning



Insert the power supply cable and the USB cable into the master.

Connect the master to the dual M12-5 pin cable (IOL-MASTER-02).

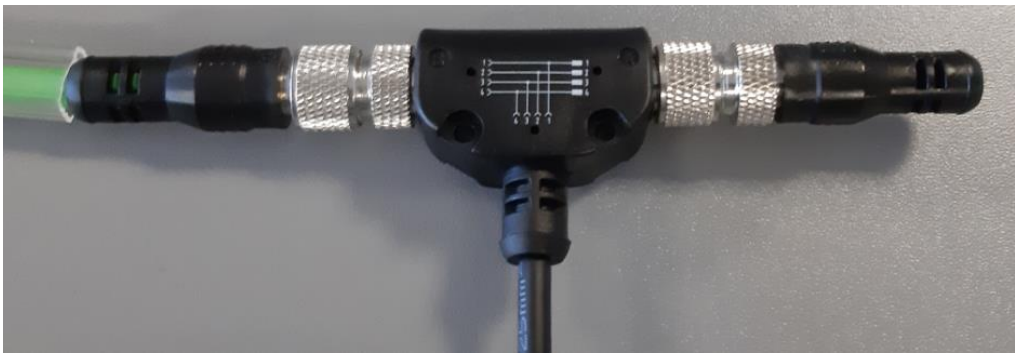
Connect the other two free cable ends to the IOLBOX (master side, M8-5 female pin connector) and to an external 24 Vdc power supply.

For example, to connect 5 grippers of size 32 (the larger size of the Gimatic grippers) it is advisable to put a power of at least 120 W.

Connect the IOLBOX (grippers side, M8-4 male pin connector) to the CM12CF12-4-15 cable required to connect the grippers.

Insert a junction node and a gripper. Repeat this procedure for every gripper.

Lastly connect the terminal node which is important because to terminate the RS-485 network (it includes a 120 Ohm resistor between channels A and B of the serial bus).

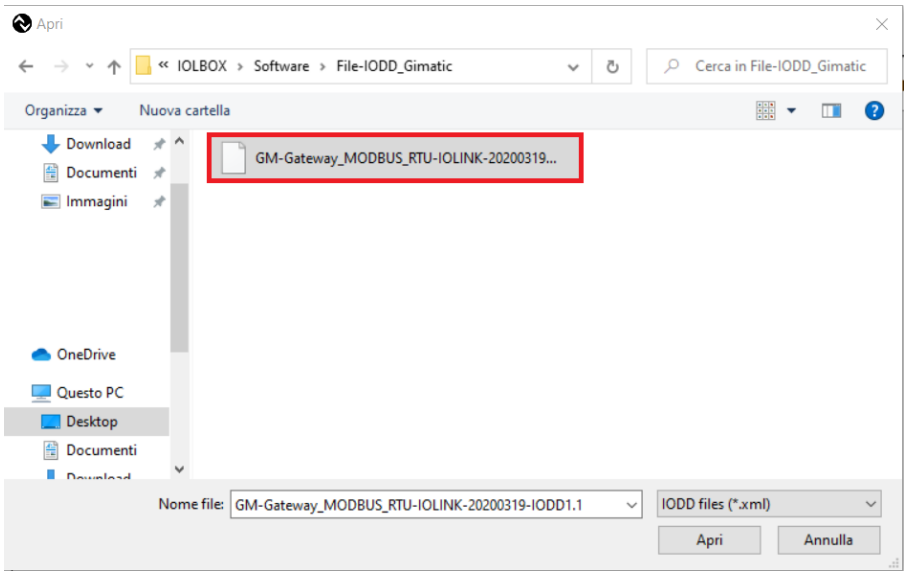


To conclude the setup phase, connect the master to the power supply and to PC: the master yellow LED should turn on (master powered but not configured).

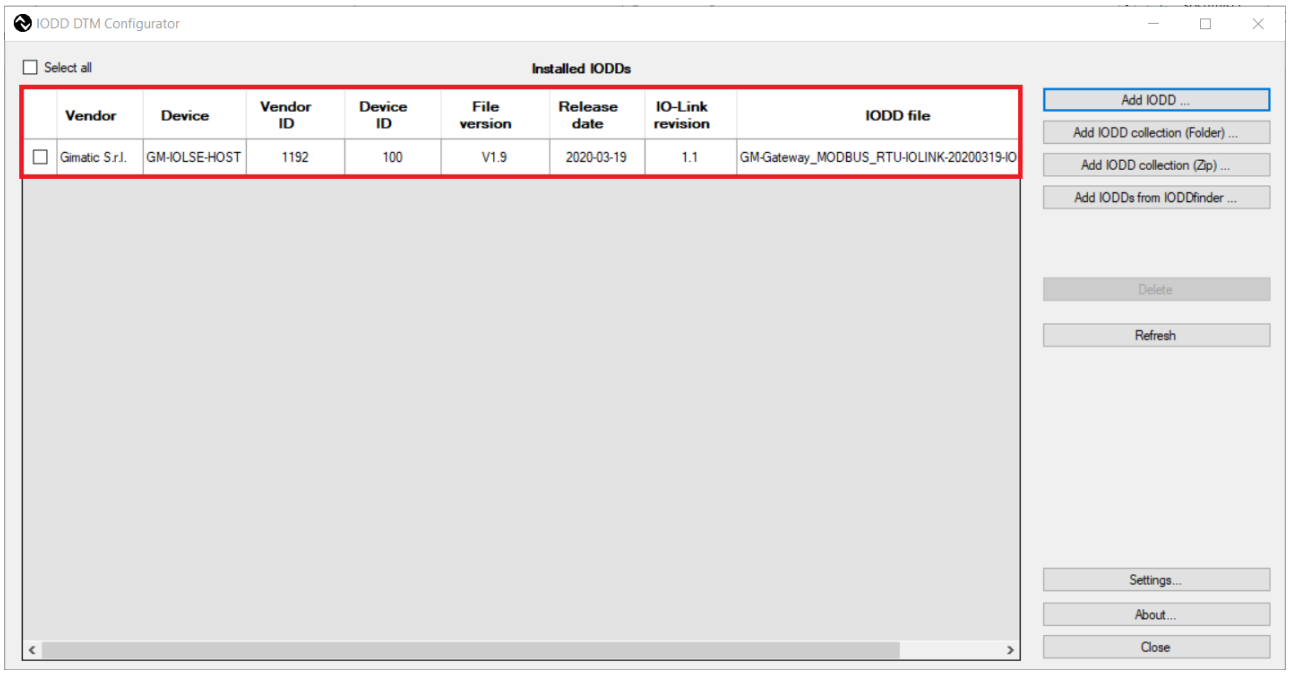
6.2 IODD file upload

Run the IODD DTM Configurator program and click on the “Add IODD” button.

Select the file for your local folder.



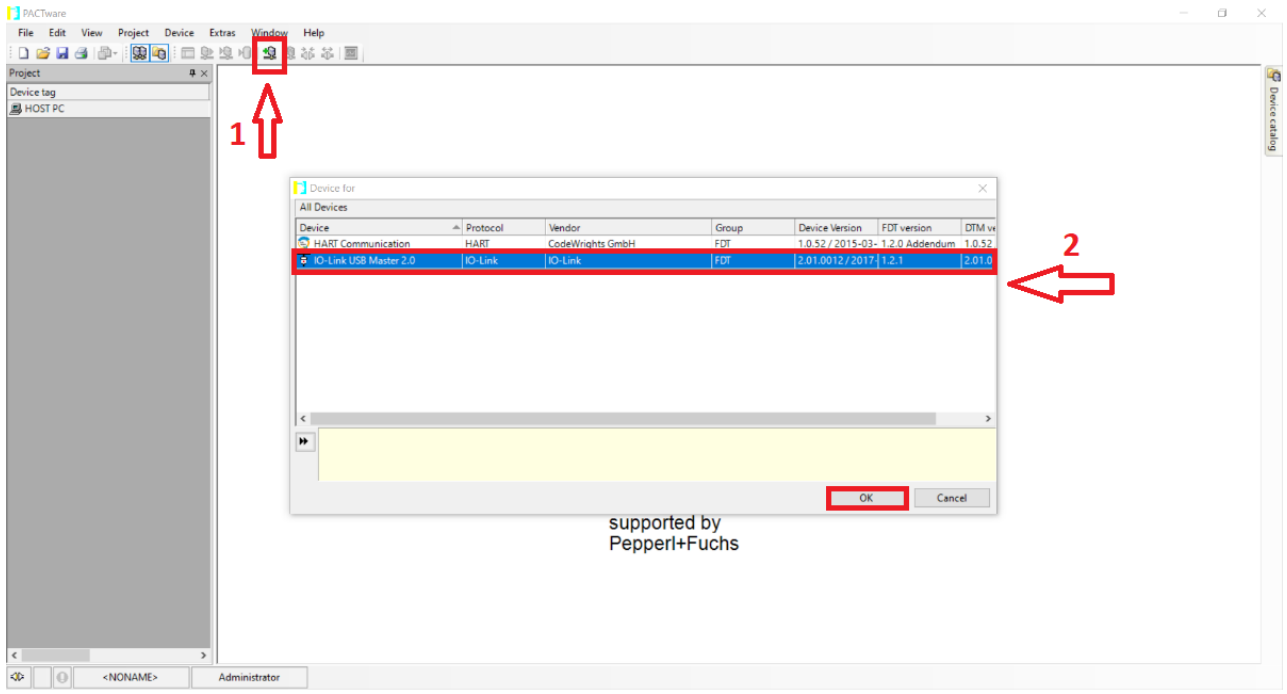
If the operation is successful it will be possible to view the Gimatic IODD file in the list of installed IODD.



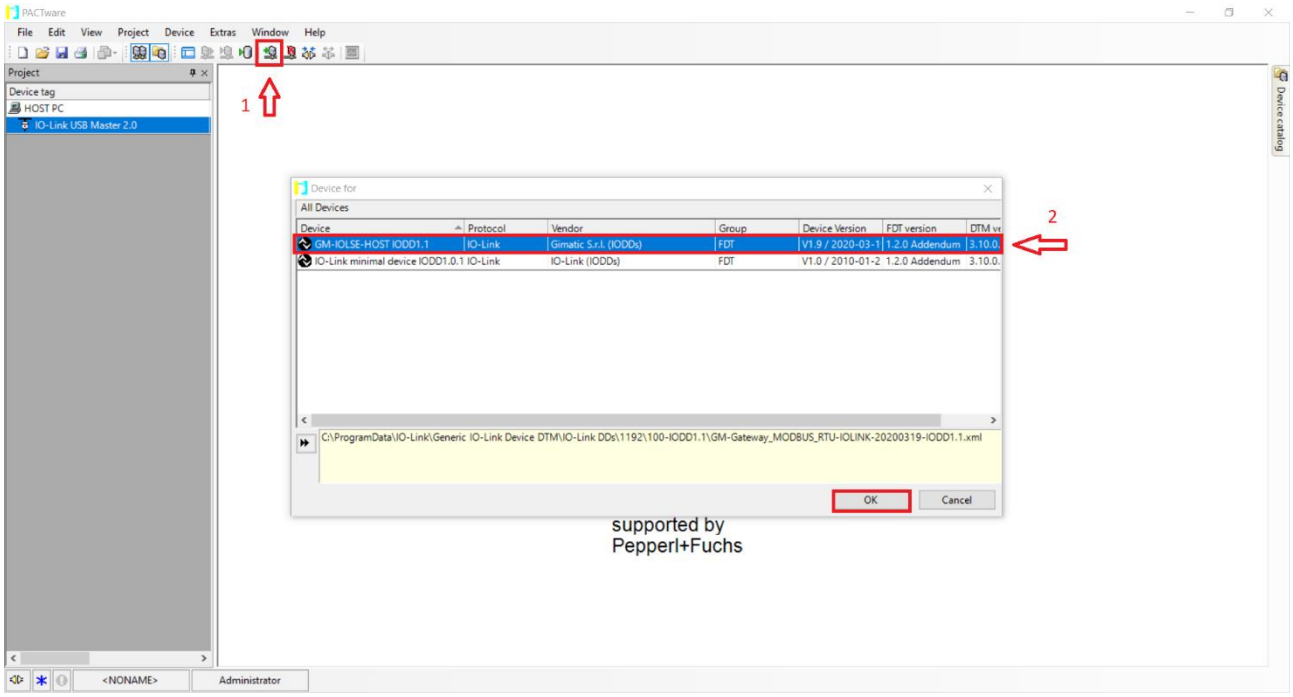
PACTware software will interface with the IODD DTM Configurator. Minimize this program and launch PACTware.

6.3 Connection to PACTware 4.1 software

Click “Add device” in the PACTware interface and select “IO-Link USB Master 2.0”.



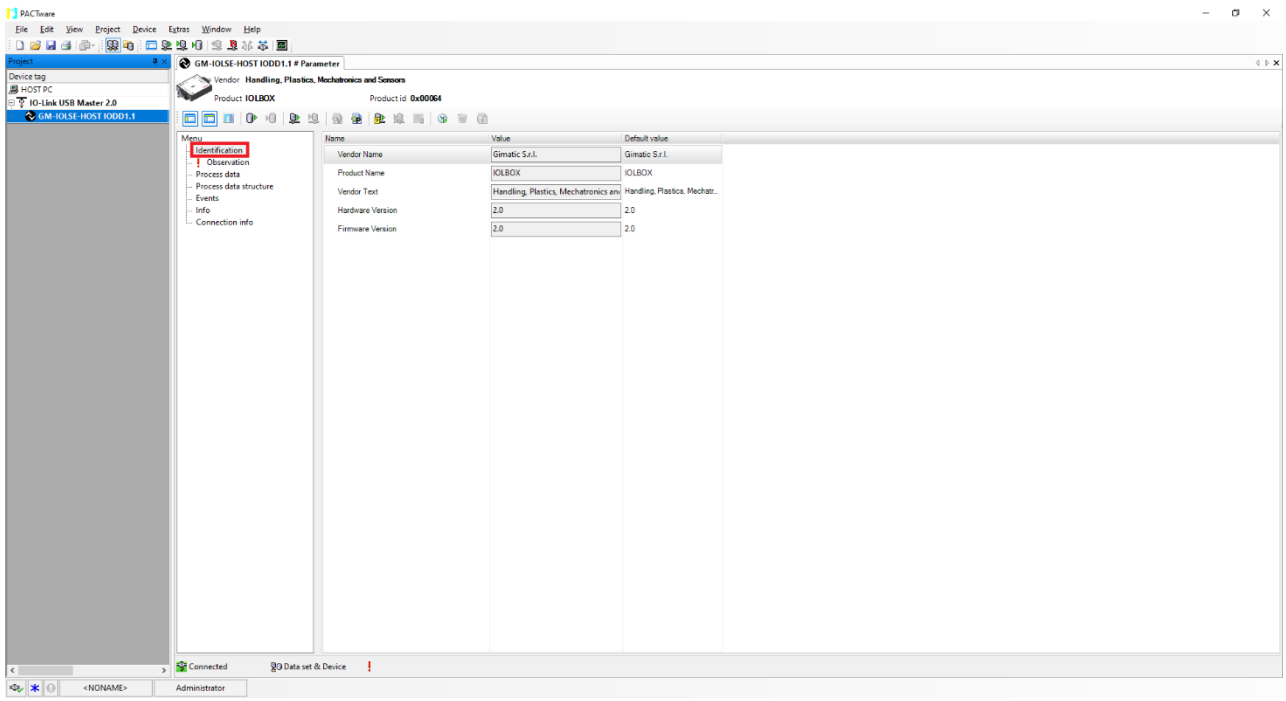
Highlight the newly added master in the left part of the screen and add the IODD file. If the previous upload is successful, you can see and add your own file (“GM-IOLSE-HOST IODD1.1" by Gimatic).



At this point the master has been properly configured and it's possible to proceed with its connection and read and write operations.

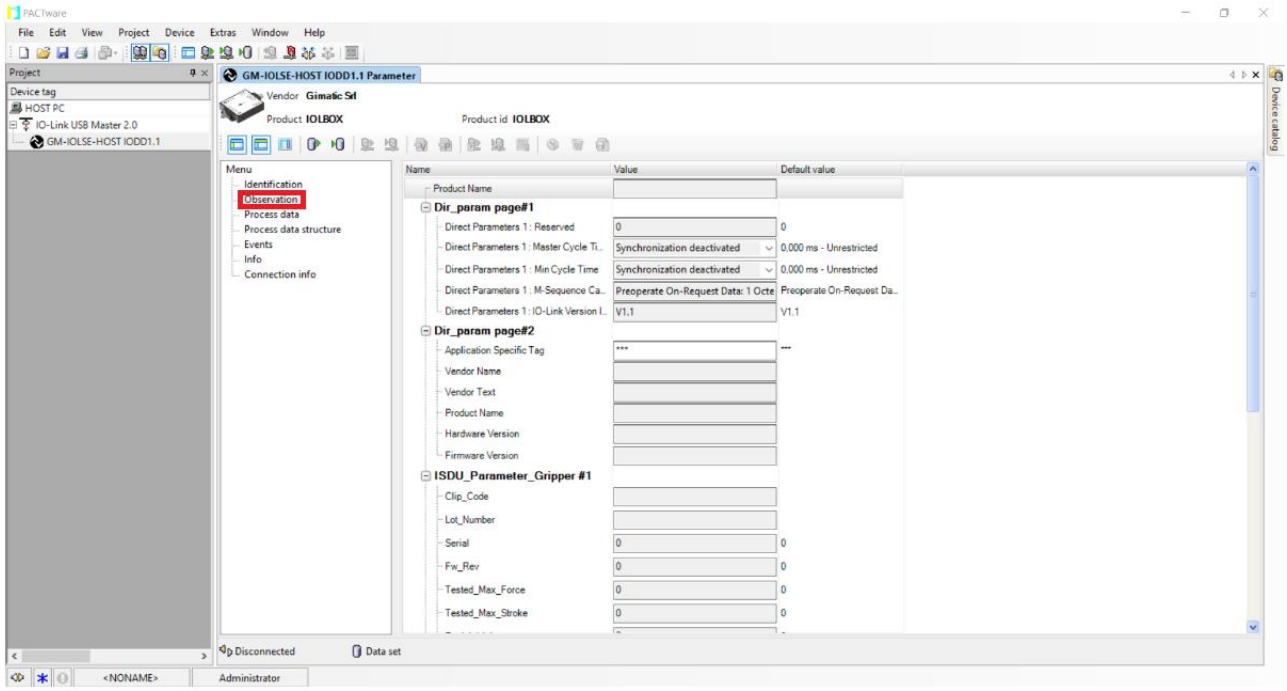
By double-clicking on "GM-IOLSE-HOST IODD1.1" the interface menu appears with several data, fields that will be automatically compiled once is correctly established the connection between master and PC:

- Identification: general information about the IOLBOX product, such as product name, vendor test, hardware and firmware version.

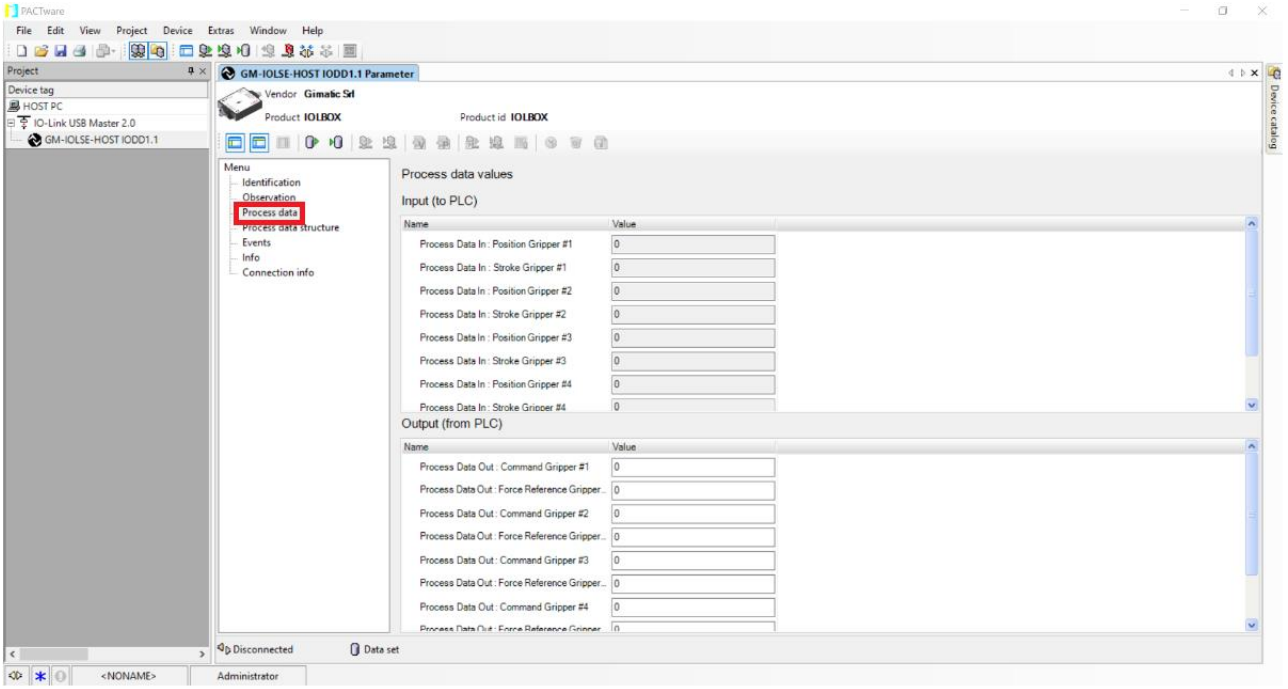


- Observation: acyclic parameters of the connected grippers. Here it's possible to view parameters such as gripper code, batch number, serial number, firmware version, maximum tested force, etc. These boxes are almost all grey, so they represent parameters that can only be read by the user (white boxes mean write parameters). The only parameter that can be written is the slave ID. It is

recommended to change the ID slave only in case of anomalies: the slave ID is automatically assigned to the grippers progressively to their connection.
As you can see from the previous image, there is an exclamation point near "Observation" because you must perform a reading operation before any writing operation.



- Process data: list of inputs and outputs related to each slave. From here it's possible to control the individual grippers by writing the closed/open values (1 or 2) and percentage of the force to be used (0-100%) and read their status.

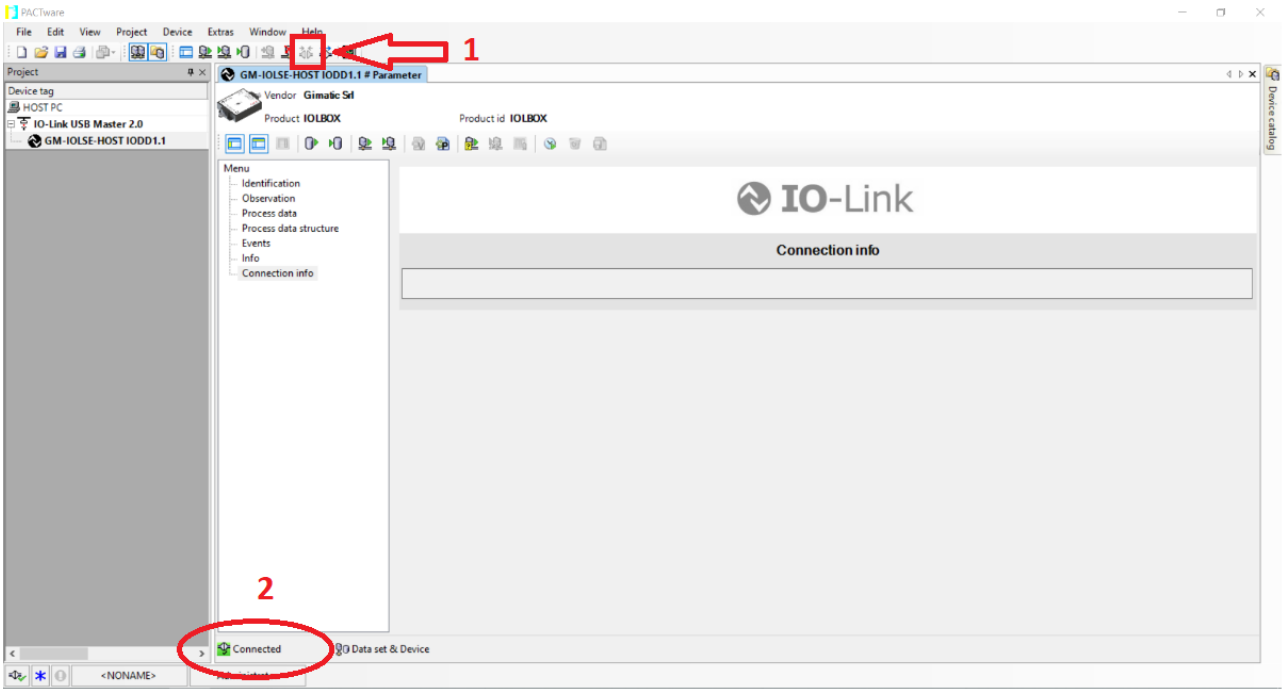


- Process data structure: shows the index that have the values in the table of the IODD file and their length; it is interpretable to a summary of the IODD file.
- Events: list of events that occur during the process.

- Info: general information.
- Connection info: indicates the status of the master's connection.

6.4 Reading/Writing

To proceed with the operation of reading and writing the user must first activate the connection between the master and the PC, as shown below.



If the master is correctly connected, the highlighted text appears at the bottom of the screen and the green LED on the IOLBOX is active (red LED means that IOLBOX is power supplied but no connected).

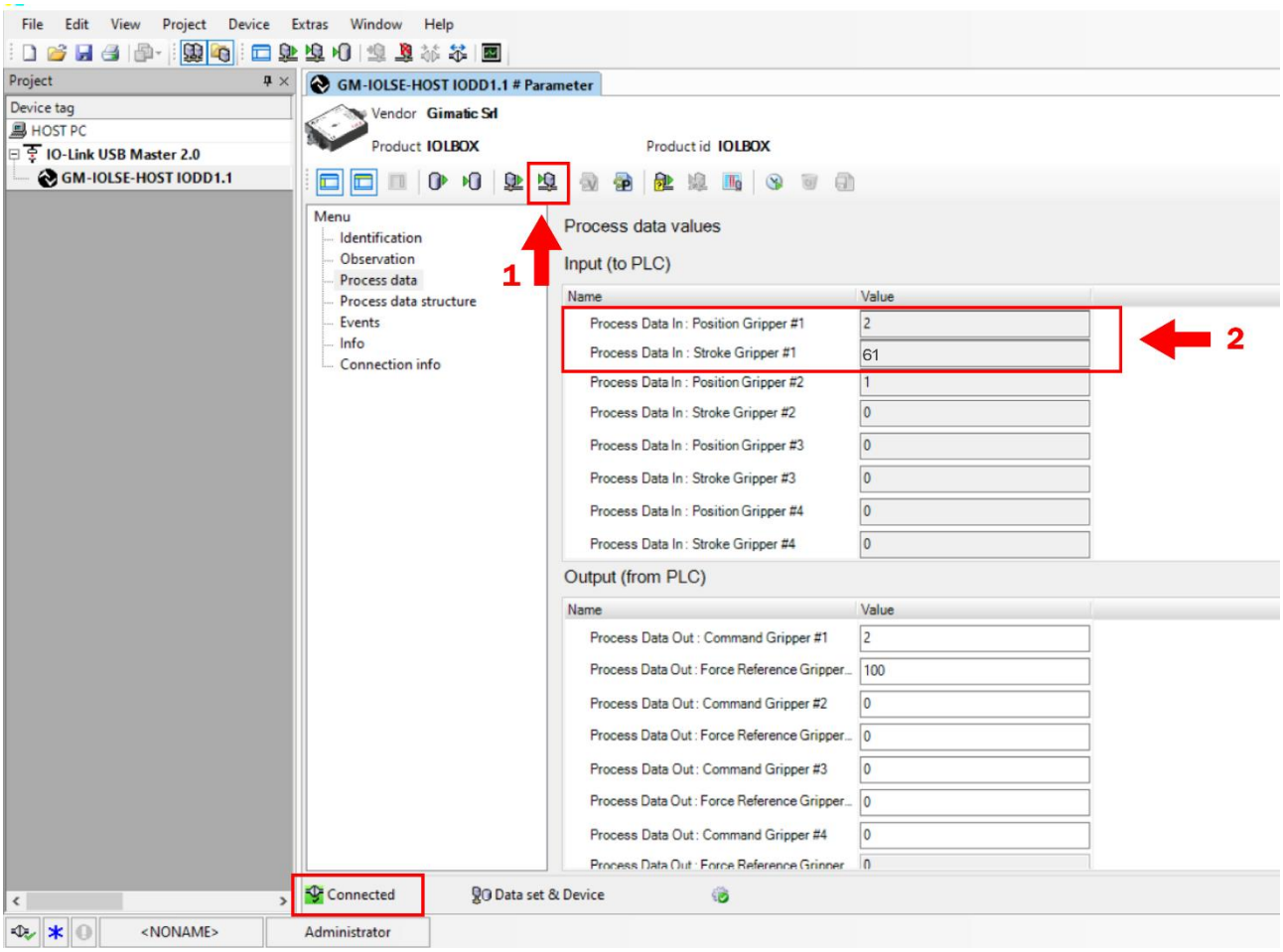
Be careful not to be in the situation of disconnected or disturbed signal.

6.4.1 Reading example

To start the reading operation just click on the appropriate button on the bottom of the screen and wait for the completion of the process.

The reading will require a slightly longer wait time than writing as the master will now read all the parameters, even the acyclic ones included in the "Observation" menu.

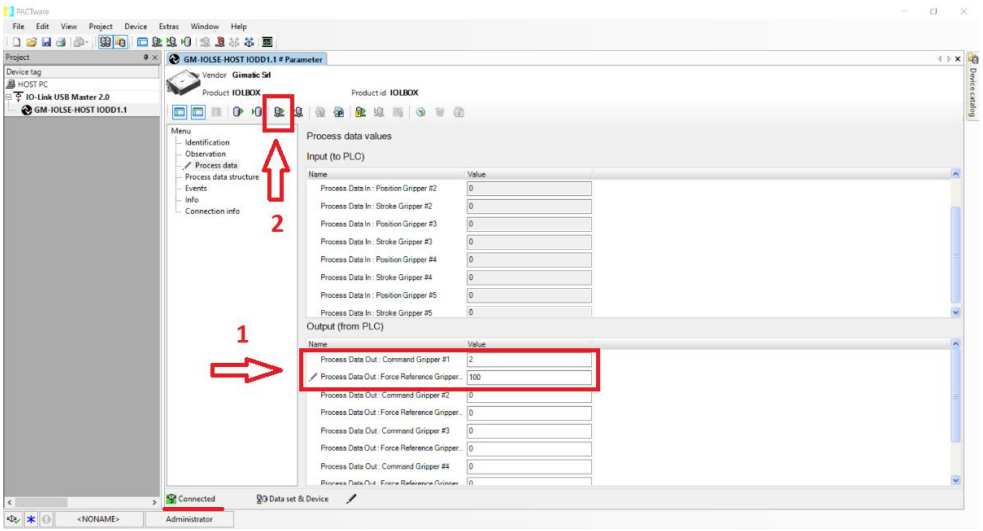
Once the operation is over, it' possible to view the "Input" parameters, such as "Position Gripper #1" and "Stroke Gripper #1" (these will have changed value in case of any previous write operation).

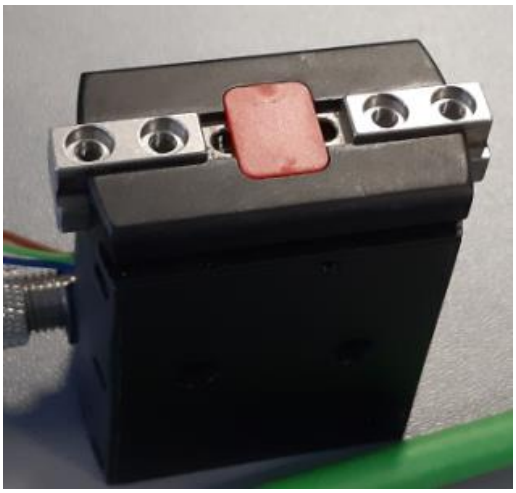


6.4.2 Writing example

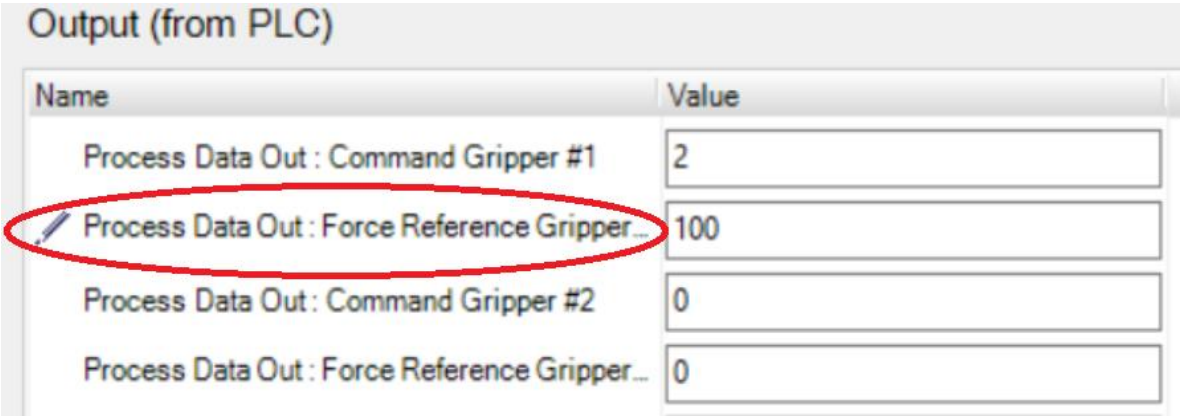
Select the desired output data to be modified, for example “Command Gripper #1” and “Force Reference #1”, and insert the desired data to write, for example 2 (that is open) and 100 (that is 100% of force).

Click on the write button and waiting the end of the loading (look at the green bar at the bottom of the screen): the device with slave ID = 1 (the MPPM1606IOL in this example) performs a full opening motion with 100% of gripping force.



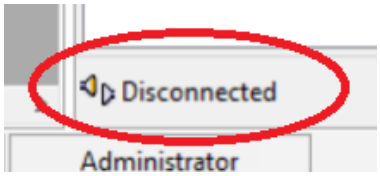


During the writing operation a small pencil icon appears close to the parameter currently set.



6.5 Disconnection

Disconnect the master through the appropriate button at the top of the screen and wait for the label “Disconnected" to appear at the bottom of the window (also check the red LED on the IOLBOX: IOLBOX powered but not connected).

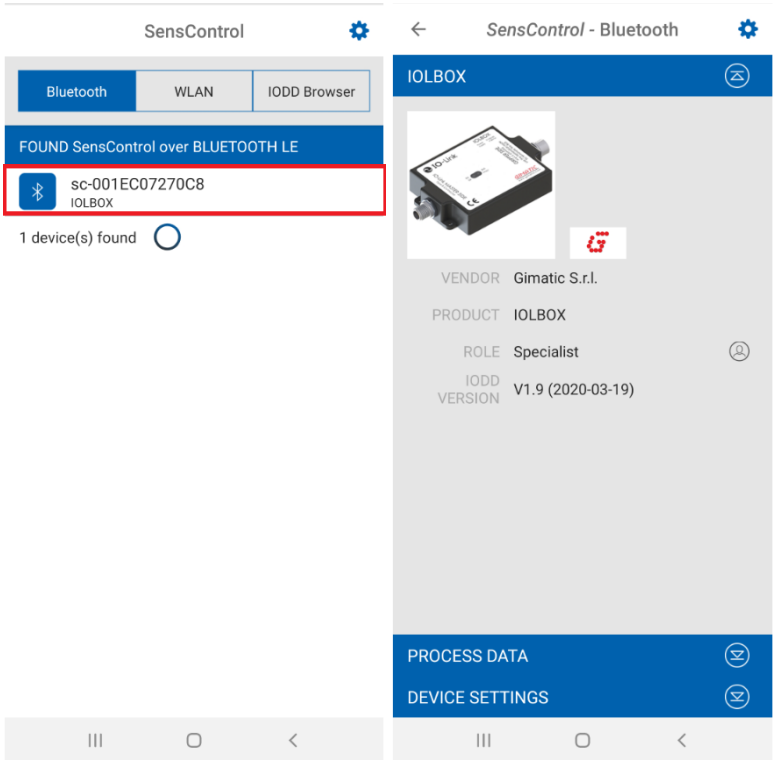


7. SYSTEM SETUP WITH IOL-MASTER-01 (WIRELESS MASTER BY BAUMER)

In case of use of the master “SensControl” by Baumer, for the physical connection of the master, IOLBOX and grippers please refer to the previous chapter (6.1), with the exception that this model of master has its own battery so it is not necessary to connect it to the PC (if not in case of low battery).

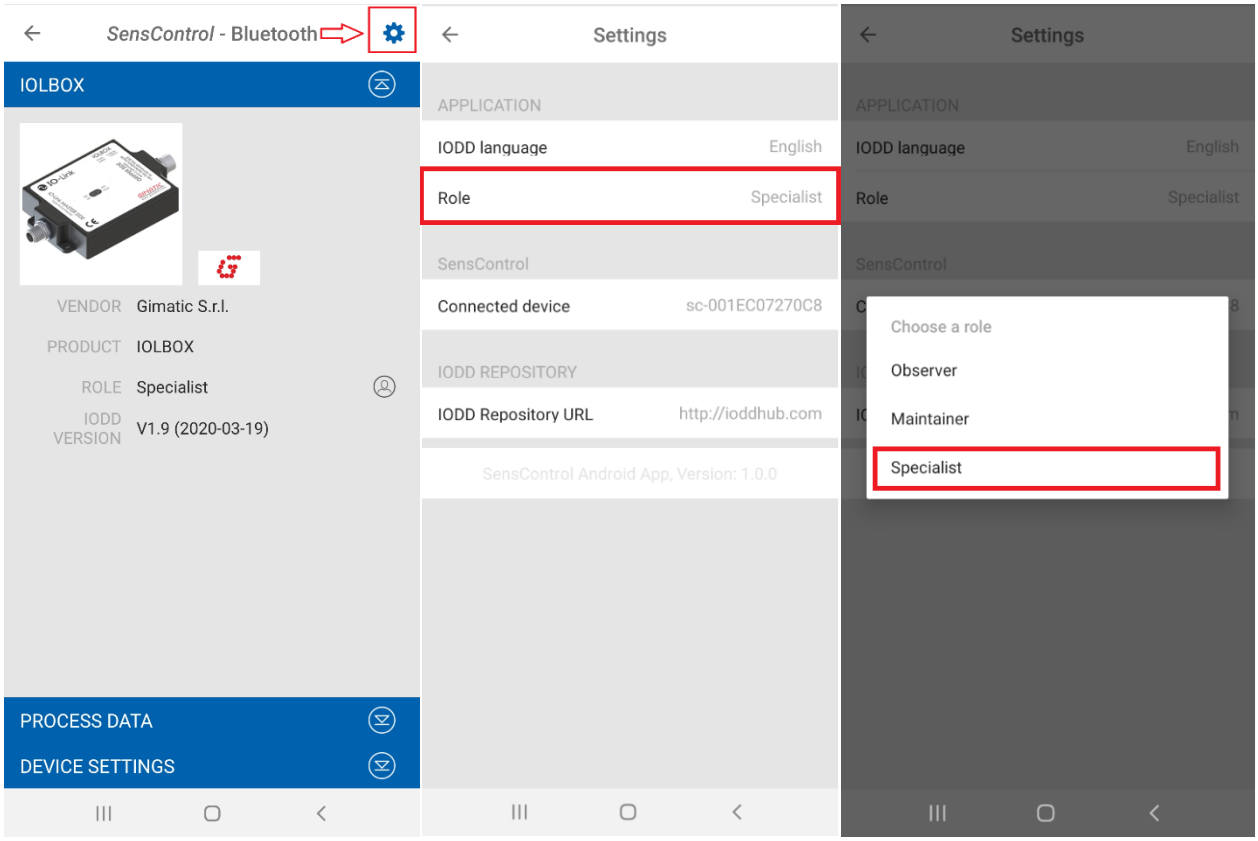
As mentioned above, no software is needed but the SensControl app is enough. Once the entire system is wired and the master is switched on, if the IOLBOX has been connected correctly, you should see the LED 2 turn on with green colour indicating that a slave device is seen by the master.

At this point access the app, wait a few seconds for the IOLBOX to be located via Bluetooth and click on to access the various features. Below are the steps for an Android device, but the procedure is quite similar for iOS devices as well.

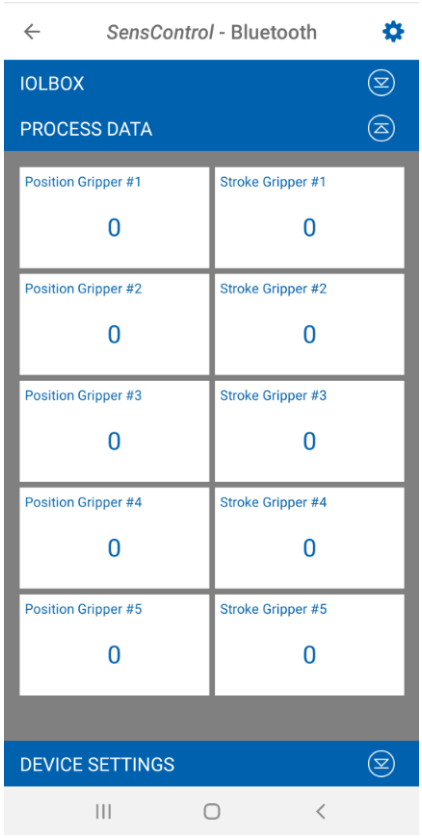


In the “IOLBOX” section one can see the general information of the product, such as vendor and product name, role and IODD version.

Please be careful that the role is set to "Specialist" so that you can properly access all read and write operations, otherwise go to settings and select the correct role:



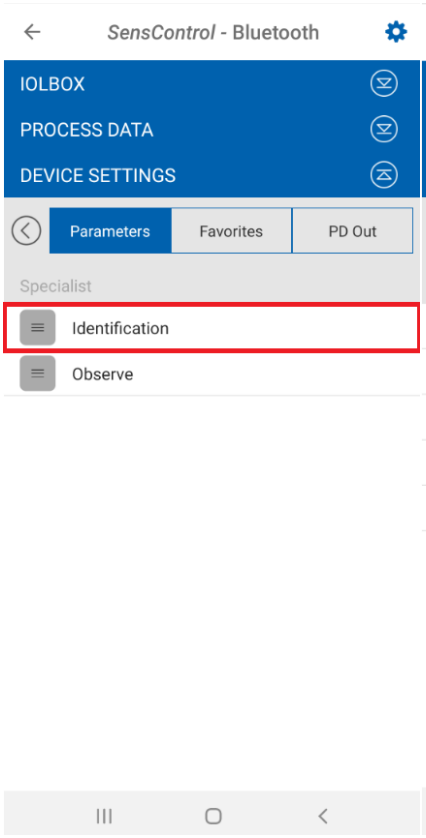
In “PROCESS DATA” one can see the cyclic data of the system, that is the stroke and the position of each gripper.

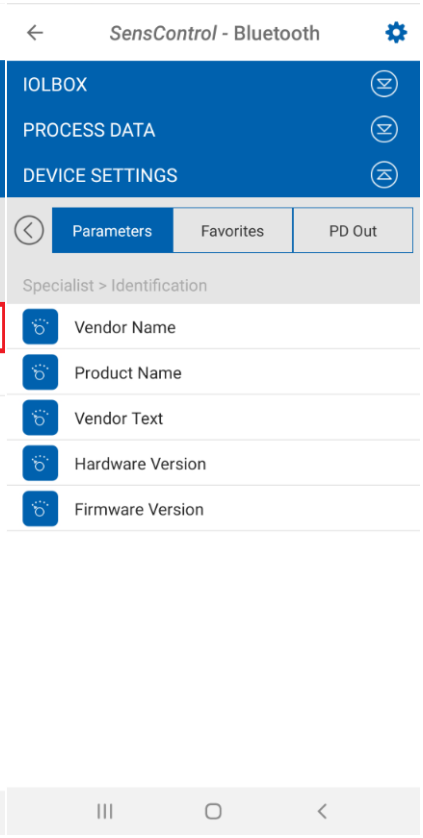


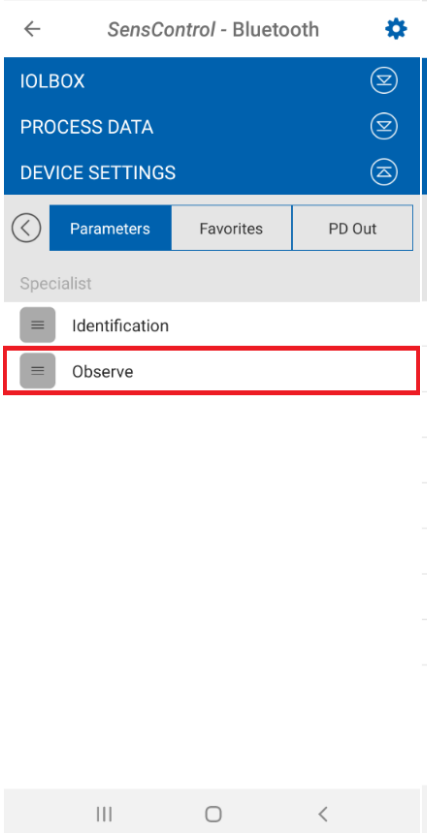
For the meaning of these parameters please refer to chapter 3.3 (Exchanged parameters).

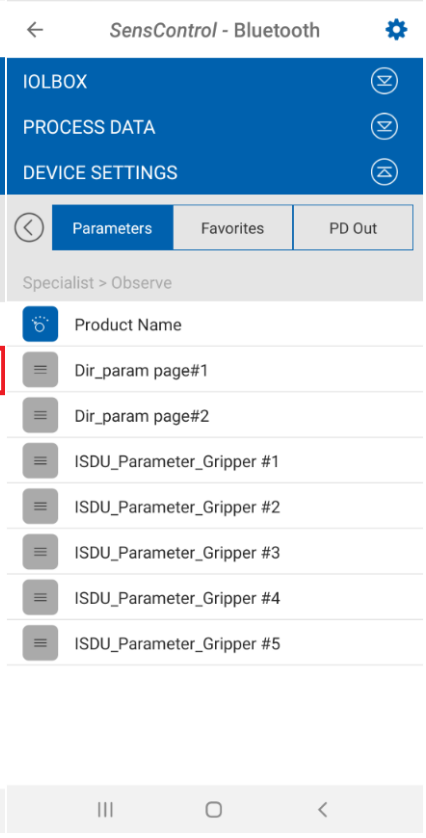
In "DEVICE SETTINGS" instead you can access the acyclic parameters of the system and the writing of cyclic data (and then control the connected grippers).

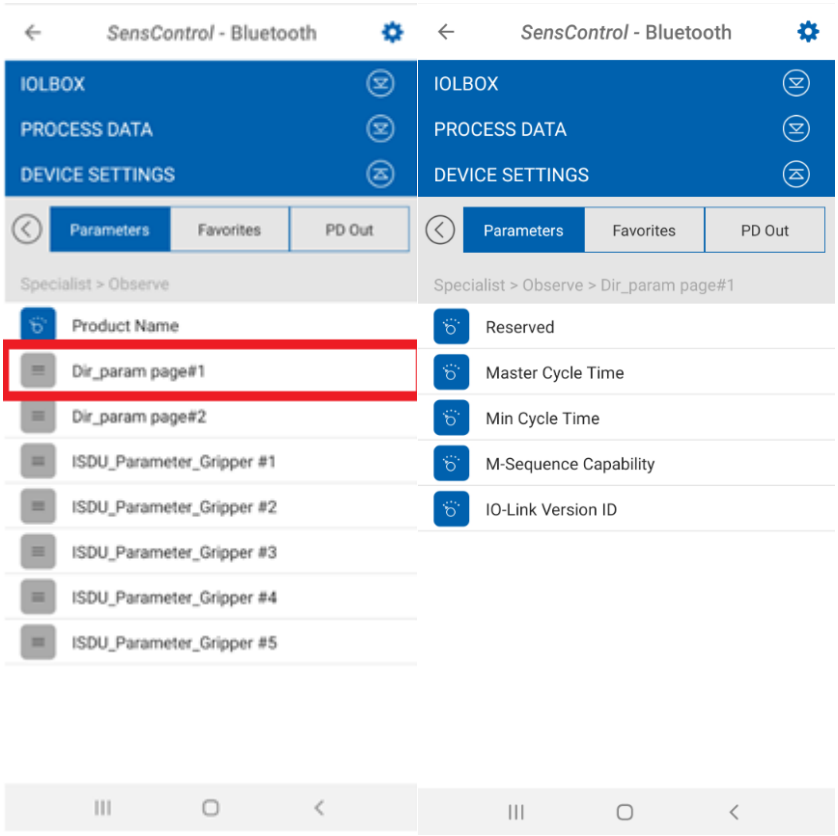
In detail, if the role from "Specialist" is set, in “Parameters” section one can access two settings: "Identification" (which includes parameters like vendor and product name, vendor text and hardware and firmware version) and "Observe" which includes all the acyclic parameters.

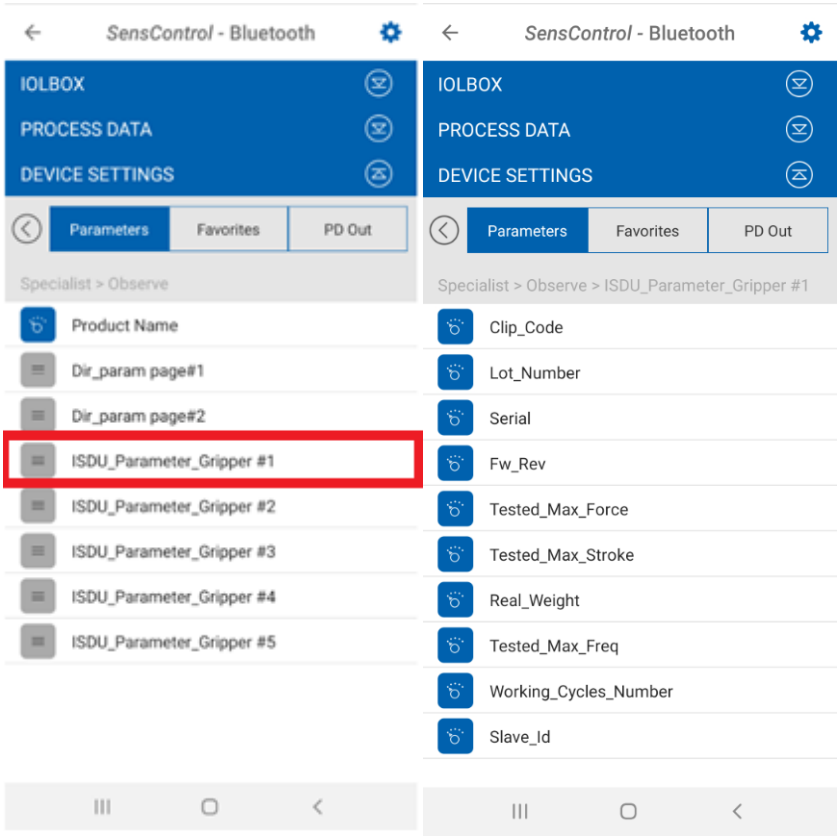

SensControl - Bluetooth
IOLBOX
PROCESS DATA
DEVICE SETTINGS
Parameters
Favorites
PD Out
Specialist
Identification
Observe


SensControl - Bluetooth
IOLBOX
PROCESS DATA
DEVICE SETTINGS
Parameters
Favorites
PD Out
Specialist > Identification
Vendor Name
Product Name
Vendor Text
Hardware Version
Firmware Version

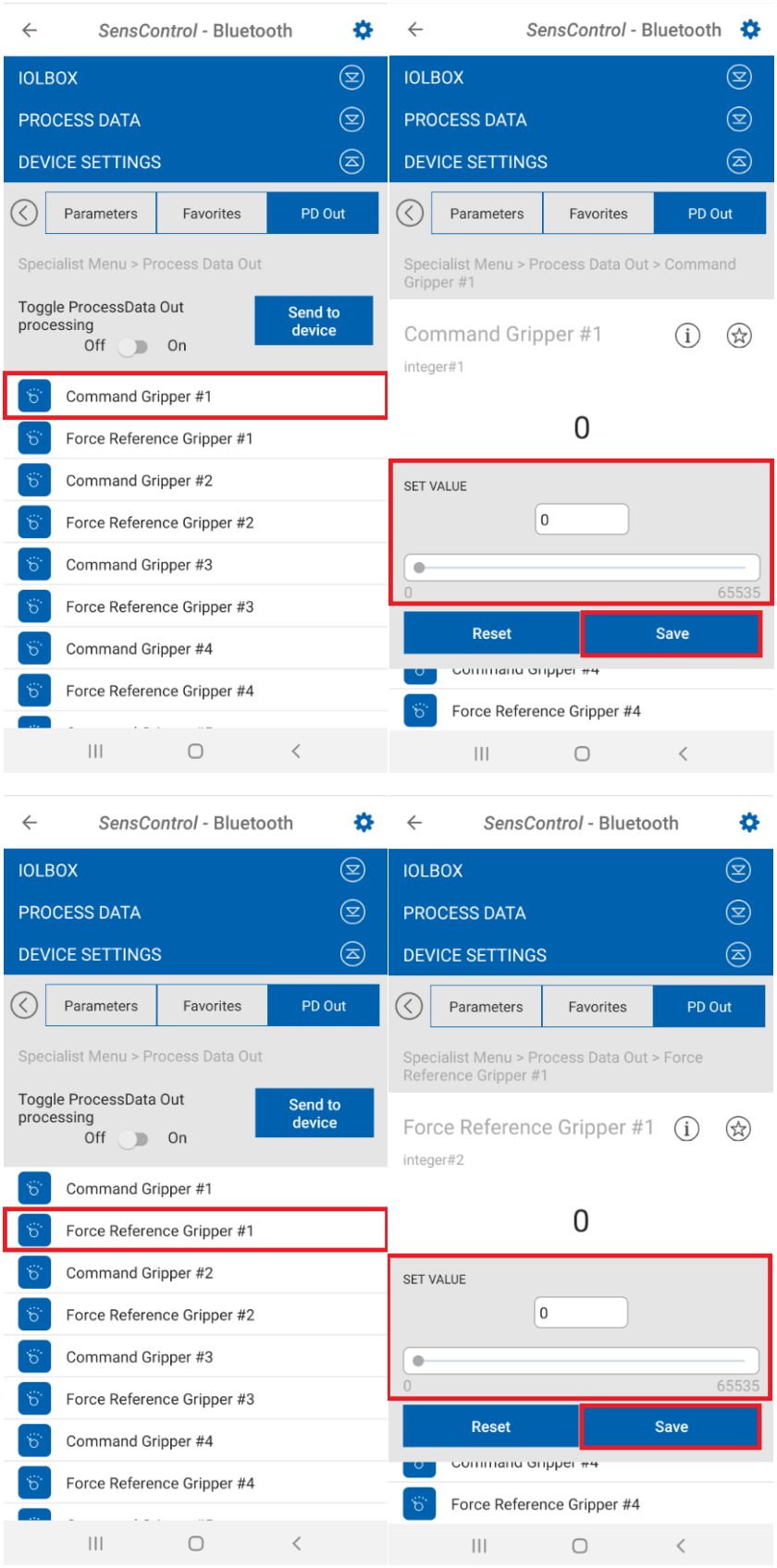

SensControl - Bluetooth
IOLBOX
PROCESS DATA
DEVICE SETTINGS
Parameters
Favorites
PD Out
Specialist
Identification
Observe


SensControl - Bluetooth
IOLBOX
PROCESS DATA
DEVICE SETTINGS
Parameters
Favorites
PD Out
Specialist > Observe
Product Name
Dir_param page#1
Dir_param page#2
ISDU_Parameter_Gripper #1
ISDU_Parameter_Gripper #2
ISDU_Parameter_Gripper #3
ISDU_Parameter_Gripper #4
ISDU_Parameter_Gripper #5

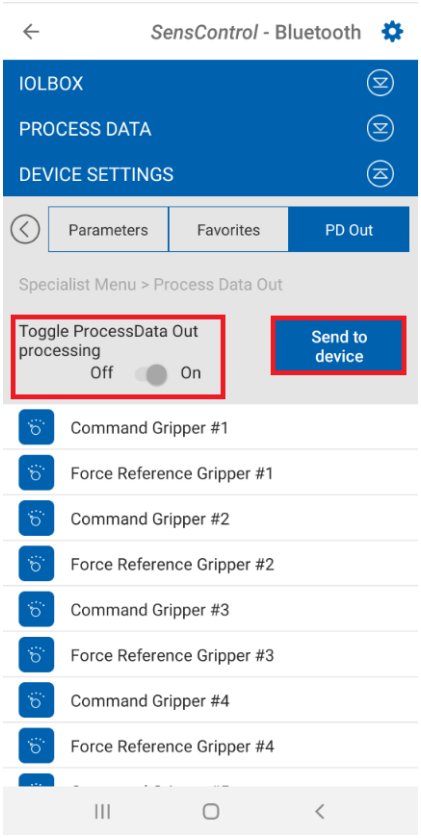

SensControl - Bluetooth
IOLBOX
PROCESS DATA
DEVICE SETTINGS
Parameters
Favorites
PD Out
Specialist > Observe
Product Name
Dir_param page#1
Dir_param page#2
ISDU_Parameter_Gripper #1
ISDU_Parameter_Gripper #2
ISDU_Parameter_Gripper #3
ISDU_Parameter_Gripper #4
ISDU_Parameter_Gripper #5
SensControl - Bluetooth
IOLBOX
PROCESS DATA
DEVICE SETTINGS
Parameters
Favorites
PD Out
Specialist > Observe > Dir_param page#1
Reserved
Master Cycle Time
Min Cycle Time
M-Sequence Capability
IO-Link Version ID


SensControl - Bluetooth
IOLBOX
PROCESS DATA
DEVICE SETTINGS
Parameters
Favorites
PD Out
Specialist > Observe
Product Name
Dir_param page#1
Dir_param page#2
ISDU_Parameter_Gripper #1
ISDU_Parameter_Gripper #2
ISDU_Parameter_Gripper #3
ISDU_Parameter_Gripper #4
ISDU_Parameter_Gripper #5
SensControl - Bluetooth
IOLBOX
PROCESS DATA
DEVICE SETTINGS
Parameters
Favorites
PD Out
Specialist > Observe > ISDU_Parameter_Gripper #1
Clip_Code
Lot_Number
Serial
Fw_Rev
Tested_Max_Force
Tested_Max_Stroke
Real_Weight
Tested_Max_Freq
Working_Cycles_Number
Slave_Id

In “PD Out” instead one can modify the value of the cyclic data and so command the grippers. It is possible to setting the “Command Gripper” (1 for close and 2 for open, different values there will not take in consideration) and the “Force Reference gripper” (0 ÷ 100 % of the maximum force, different values there will not take in consideration).



Once modify the necessary values, please remember to activate the “Toggle ProcessData Out processing” and click on the “Send to device” button.



If everything is OK, the grippers must have moved as it was set.

7.1 Disconnection

To turn off the master, press and hold the button until the four LEDs are switched off. You can now exit the app and disconnect all devices.