

INTERFACE IO-Link  
FOR MFC-3000 WELDING CONTROL

# **Configuration guide**

## **ESA-12**

Version 1.2 - 2021/20



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## INTRODUCTION

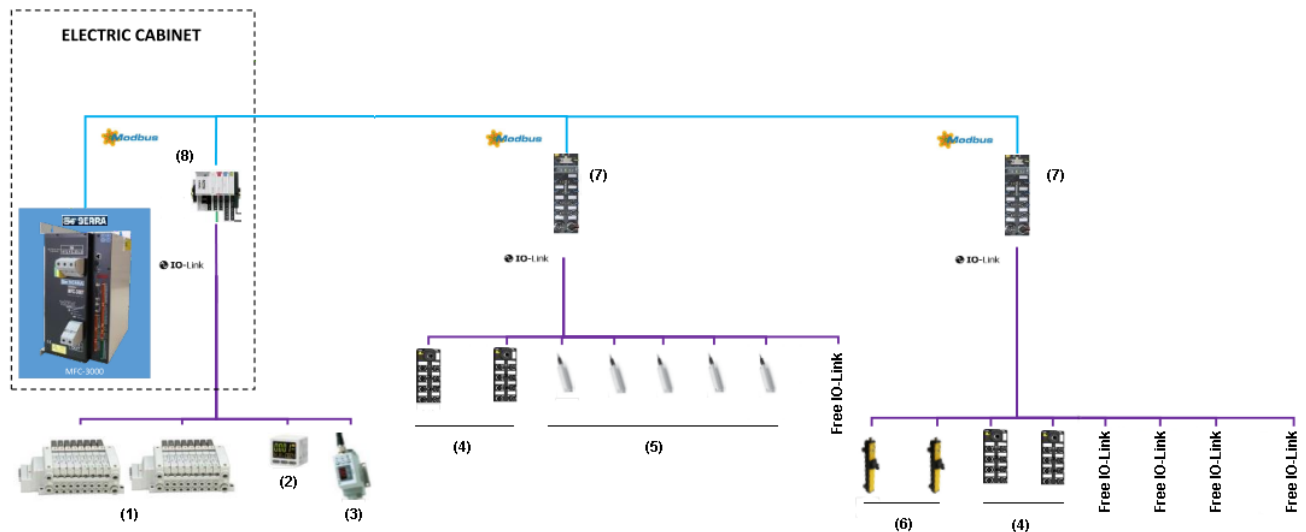
This document describes the configuration of an example network to be managed by the ESA-12 composed by ModBus/IO-Link gateways and IO-Link sensors and actuators.

This document links with external documents for simplicity and clarity, it must be used with the folder organization supplied with the zip file in order for the hyperlinks to work.

Reference about the ESA-12 board is available in the following link: [Manual \ en \\_man ESA-12 V1.2.pdf](#)

The net presented in this document is configured by means of the CPC-Connect software, in this document version 3.6.5 is used. Once this software is installed you can open the example project in the following address: ‘.\\_Project\_\CPC-Connect\_IoLink.RED’.

## Example Network



**Figure 1 - Network example**

this network is composed of

**Table 1 - Example components**

Tag	Reference	Description
[1]	SMC EX260-SIL1-00I32O	Two solenoid IO-Link valve block capable of driving 2 welding heads and 28 bistable valves/mechanisms
[2]	SMC ITV-IO	IO-Link Servo valve to adjust welding effort
[3]	SMC PF3W704	IO-Link Flow meter for refrigerating water with temperature control
[4]	TURCK TBIL-M1-16DXP	IO-Link 4x 16 digital inputs or outputs (configurable) blocs which makes $16 \times 4 = 64$ digital inputs/outputs.
[5]	SMC D-MPxxx	IO-Link 5x pneumatic cylinder position measure, which enable 5 electrodes measuring nut height.
[6]	TURCK LiXXXPX-Q25L	IO-Link 2x magnetic position ruler, which enable the position control of 2 welding heads
[7]	TURCK TBEN-L5-8IOL	Modbus/IO-Link gateways 2x connected to the welding controller ESA-12 master
[8]	TURCK BL-20 + 16 I + 8 O + 4IOL	Modbus/IO-Link gateway 1x with 16 digital inputs, 8 digital outputs and 4 IO-Link connections inside the control cabinet.

## LEGAL INFORMATION

### Safety warning system

This manual contains warnings that must be observed to maintain safety of users and to prevent property damage. Warnings related to personal safety are signaled in the manual with an alert symbol, those related to property damage have no alert symbol.

According to the danger classification:



Indicates that lack of corresponding precautions **will** result in death or irreversible personal injury.



Indicates that lack of corresponding precautions **can** result in death or irreversible personal injury.



Indicates that lack of corresponding precautions can result in reversible personal injury.



Indicates that lack of corresponding precautions can result in property damage.

If more than one danger level is present, the danger signal will relate to the highest danger level.

A warning with the personal injury symbol can also include a warning on property damage.

### Qualified Personnel

The product or system described in this documentation can only be operated by qualified personnel for the job according to the relevant information, particularly with the safety warnings and instructions.

Qualified personnel are those who, based on their experience and training are capable of identifying risks and avoid potential dangers during the use of the product or system.

### Appropriate use of Serra Soldadura SAU products



Products Engineered and Manufactured by Serra Soldadura can only be used for the functions and applications described in their catalog and the relevant technical documentation. If products and components from other manufacturers are used these must be recommended or approved by Serra Soldadura. The appropriate transport, storage, installation, assembly, commissioning, operation and maintenance are mandatory to ensure that products will work in a safe and problem free manner. Acceptable ambient conditions must be fulfilled. The information in the relevant documentation must be taken into account.

### Trademarks

**ModBus** is a *Schneider Electric* registered trademark licensed to the *Modbus Organization Inc.*

**IO-Link** is a *PROFIBUS Nutzerorganisation e. V.* Registered trademark.

**PACTware** *PACTWARE CONSORTIUM e. V.* Registered trademark.

**TURCK** is a *Hans Turck GmbH & Co. KG.* Registered trademark.

**SMC** is a SMC Corporation registered trademark.

### **Disclaimer**

The contents of this publication have been reviewed to ensure consistency with the described hardware and software.

As the possibility of discrepancies cannot be completely eliminated, we cannot guarantee complete consistency.

However, the information in this publication is regularly reviewed and necessary corrections are included in subsequent editions.



# ModBus/IO-Link Gateways PLC configuration

## TURCK BL20

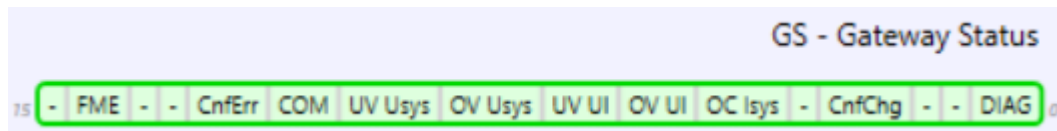
Is an IP20 model to be assembled with additional boards, adding the input/output functionality to the ensemble inside the cabinet.

A 16 digital input and a 8 digital output module are added to the gateway in the preconfigured module, together with a 4 IO-Link connections controller.

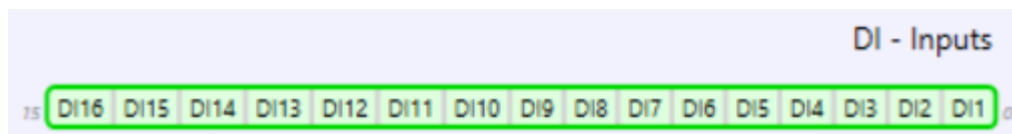
The information of the gateway module is found in [Catalog \Abstract BL20 Manual-D301173.pdf](#). The memory map of the ensemble can also be seen in html format [Catalog \TURCK BL20 html\BL20-E-GW-EN\\_web\index.html](#).

From the huge amount of information mapped inside this element, CPC-Connect uses the following information:

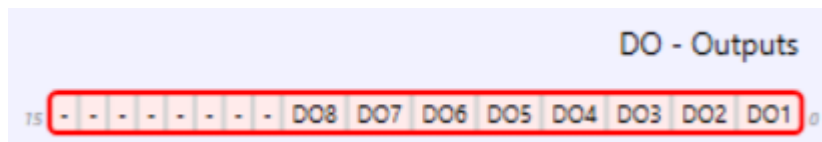
- **GS Gate status:** register 0x100C Diagnostic information on the status of the gateway.



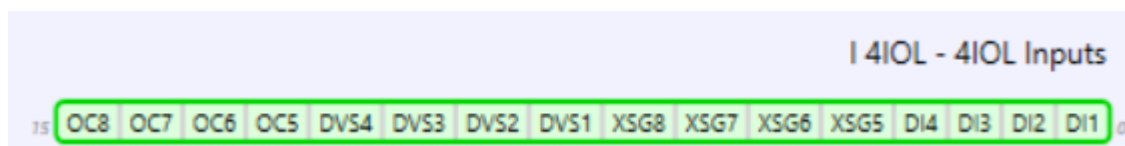
- **DI Digital Inputs:** corresponding to the 16 digital input board documented in [Catalog \Abstract BL20 Manual I O-D300717.pdf](#)



- **DO Digital Outputs:** corresponding to the 8 digital output board documented in the same link [Catalog \Abstract BL20 Manual I O-D300717.pdf](#)



- **I4IOL Digital Inputs:** corresponding to the use of the IO-Link connecting points as inputs, operation mode that can be configured using the Gateways internal configuration software PACTware. This is documented in [Catalog \Abstract BL20 Manual 4IOL-D301333.pdf](#)



- **O4IOL Digital outputs:** corresponding to the use of the IO-Link connecting points as , operation mode that can be configured using the Gateways internal configuration software PACTware. This is documented in [Catalog \Abstract BL20 Manual 4IOL-D301333.pdf](#)



The IO-Link devices eventually connected to this ensemble map their information to the Process Image of the 4IOL board, and will be discussed later.

As the four IO-Link connections are used in this example the I4IOL and O4IOL blocks are not mapped to the PLC memory space. The GS diagnostic information is mapped to a separated from the inputs input zone in order to make the configuration more readable.

IoLink				
I/O	Variable	Device	Device type	IoEx
I	I 4IOL	Cabinet	BL20-E-GW-EN-16I08O04IOL	
I	DI	Cabinet	BL20-E-GW-EN-16I08O04IOL	EEX00L
I	GS	Cabinet	BL20-E-GW-EN-16I08O04IOL	EEX04L
O	O 4IOL	Cabinet	BL20-E-GW-EN-16I08O04IOL	
O	DO	Cabinet	BL20-E-GW-EN-16I08O04IOL	SEX00L

There is also the IO-Link slave occupation configuration to this element and also the Ethernet Network parameters.

**BL20-E-GW-EN-16I08O04IOL**

Name:

IP:

Mask:

Gateway:

IoLink devices:

IoLink chanr	Type	Name
0	EX260-SIL1-00I32O	GroupVannes1
1	EX260-SIL1-00I32O	GroupVannes2
2	ITV-IO	ServoVanne
3	PF3W704	Debit

## TURCK TBEN-L5-8IOL

Is an IP6X model capable of supporting 8 IO-Link connections. This module is documented in [Catalog \Abstract TBEN manual-D301407.pdf](#) and has a large memory map that can also be viewed in html format in [Catalog \TURCK TBEN .html\TBEN-L5-8IOL Modbus TCP Memory Map.html](#)

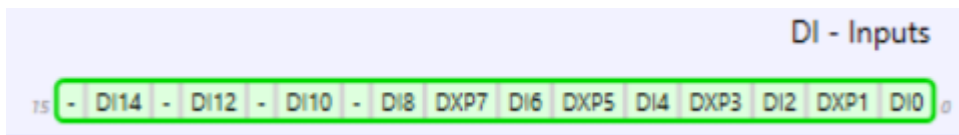
Most of the map is used for the IO-Link device data exchange. However the following gateway module blocks can be mapped additionally:

- **MS Module Status:** register 0x100C Diagnostic information on the status of the gateway.

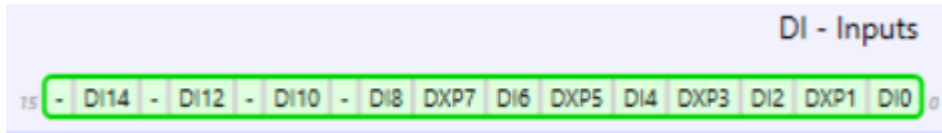
**MS - Module Status**

TS - FCE - - - COM V1 - V2 - - - - - ARGEE DIAG 0

- **DI Digital Inputs:** process input data address 0x0000 corresponding to the 12 digital inputs available in the module if the IO-Link signals are used as digital inputs, configurable with PACTware configuration software.



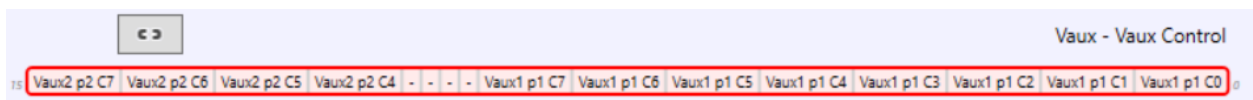
- **DVS Data Valid Signals:** process input data address 0x0001 Information about the input state of the IO-Link signals used as digital inputs, configurable with PACTware configuration software.



- **DO Digital outputs:** process output data address 0x0000 corresponding to the 4 configurable digital outputs, when IO-Link signals are not used.



- **Vaux Auxiliary voltages** control: process output data address 0x0081, allows control of the different Vaux pins of the 8 IO-Link connectors.



I	DI	Outils	TBEN-L5-8IOL	
I	DVS	Outils	TBEN-L5-8IOL	EEX04H
I	MS	Outils	TBEN-L5-8IOL	EEX05L
O	DO	Outils	TBEN-L5-8IOL	
O	Vaux	Outils	TBEN-L5-8IOL	SEX06L

I	DI	TêteSoudage	TBEN-L5-8IOL	
I	DVS	TêteSoudage	TBEN-L5-8IOL	EEX05H
I	MS	TêteSoudage	TBEN-L5-8IOL	EEX06L
O	DO	TêteSoudage	TBEN-L5-8IOL	
O	Vaux	TêteSoudage	TBEN-L5-8IOL	SEX06H

In this example no IO-Link connection is thought to be declared as digital input or output, so the registers DI and DO are not mapped.

Vaux is mapped to the PLC outputs, in order to allow the PLC program to be able to control this voltages.

The IO-Link occupation and communication parameter must also be configured in this modules.

**TBEN-L5-BIOL**

Name:

IP:

Mask:

Gateway:

IoLink devices:

IoLink chanr	Type	Name
0	TBIL-M1-16DXP	ESOutil1
1	TBIL-M1-16DXP	ESOutil2
2	D-MPXXX	CilElect1
3	D-MPXXX	CilElect2
4	D-MPXXX	CilElect3
5	D-MPXXX	CilElect4
6	D-MPXXX	CilElect5
7	!No IoLink device	

**TBEN-L5-BIOL**

Name:

IP:

Mask:

Gateway:

IoLink devices:

IoLink chanr	Type	Name
0	LiXXXPX-Q25L	Tête1
1	LiXXXPX-Q25L	Tête2
2	TBIL-M1-16DXP	ESTête1
3	TBIL-M1-16DXP	ESTête2
4	!No IoLink device	
5	!No IoLink device	
6	!No IoLink device	
7	!No IoLink device	

## IO-Link PLC mapping

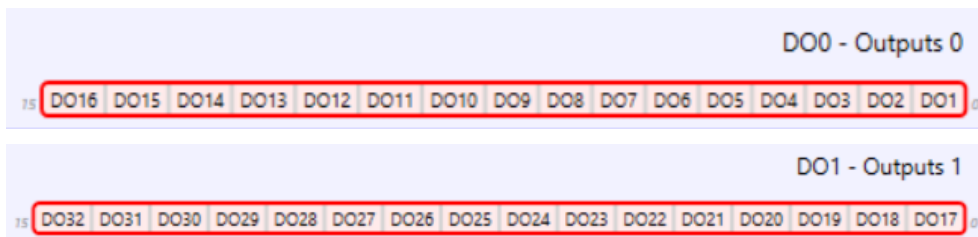
In this section we will show how the different IO-Link sensors and actuators are mapped to the PLC memory

### Valve header SMC EX260

In the used model documented in [Catalog \Abstract SMC om\\_ex260-sil1\\_io-linken.pdf](#) there are only output words to be mapped from the element process data as shown in the configuration, corresponding each to a solenoid valve activation.

O	DO0	GroupVannes1	EX260-SIL1-00I32O	SEX00H
O	DO1	GroupVannes1	EX260-SIL1-00I32O	SEX01L
O	DO0	GroupVannes2	EX260-SIL1-00I32O	SEX01H
O	DO1	GroupVannes2	EX260-SIL1-00I32O	SEX02L

With the mapping of the bits

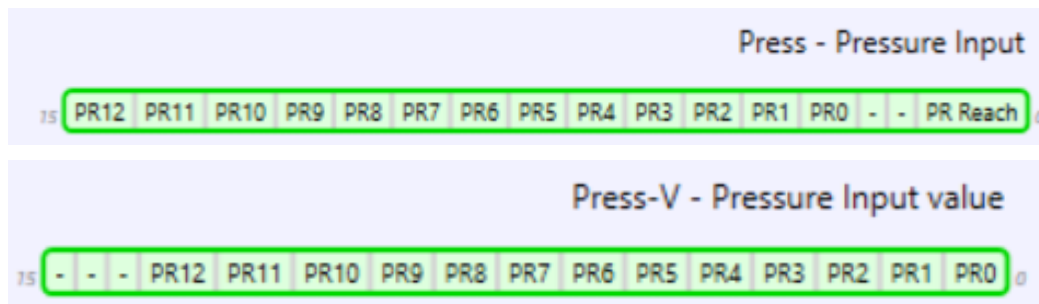


### Servo valve SMC ITV

The used model is documented in [Catalog \Abstract SMC DIT-69900-OM005.pdf](#) the process data blocs to be mapped from the element process data, which is composed by: the valve's output pressure set point (output for the PLC) and the output pressure measurement.

I	Press	ServoVanne	ITV-IO	
I	Press-V	ServoVanne	ITV-IO	ANL09
O	PressS	ServoVanne	ITV-IO	SEX05L

When selecting any of the three block there is an explanation of the information related to this position, visible at the bottom of the screen. Names of the bits are copied from the manufacturer's information for clear reference to their manual:



The first input block is the raw input value register obtained from the servo valve, this can be mapped to any IOEX (PLC) input. The second block is the analog information extracted from the raw data, which can be mapped to an analog input. Analog inputs in the MFC-3000 PLC function can be scaled by a parameter and be used once scaled in the PLC program.

For the setup value:



Only the raw version is provided and, as it can be seen, it must be shifted left three positions before sending to the servo valve the set point.

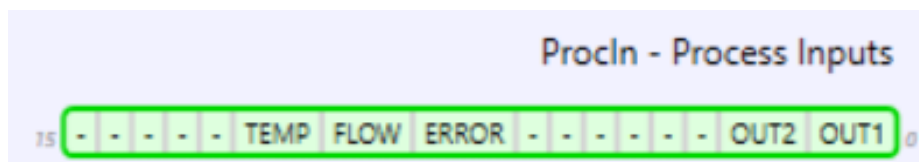
## Flow meter SMC PF3W704

The used model is documented in [Catalog \Abstract\\_SMC\\_PF3W.pdf](#), and has three process data blocks available as shown

I	Procln	Debit	PF3W704	EEX00H
I	Temp	Debit	PF3W704	ANL10
I	Flow	Debit	PF3W704	ANL11

Temperature and flow are directly mapped to analog inputs because they have the word length and aligning valid right from the raw source.

The process in data has a by bit meaning



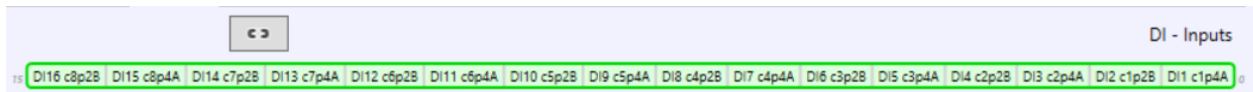
Related to its configuration, this will be discussed later. This word is mapped raw into the PLC memory.

## Digital I/O TURCK TBIL

The documentation for this module can be found at [Catalog \Abstract\\_TURCK\\_TBILx\\_manual-100014593.pdf](#). The configuration of the I/O pins as inputs or outputs will be discussed later. It has two data blocks mapped for control of the outputs and reading of the inputs

I	DI	ESOutil1	TBIL-M1-16DXP	EEX01L
O	DO	ESOutil1	TBIL-M1-16DXP	SEX02H

With the inputs mapped:



And the outputs mapped:



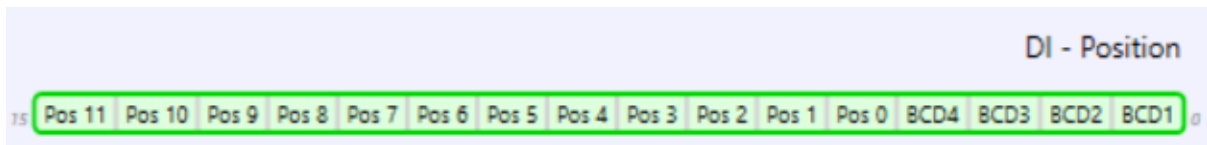
Together with the input/output number, the connector and pin number is indicated.

## Cylinder position measure SMC D-MP

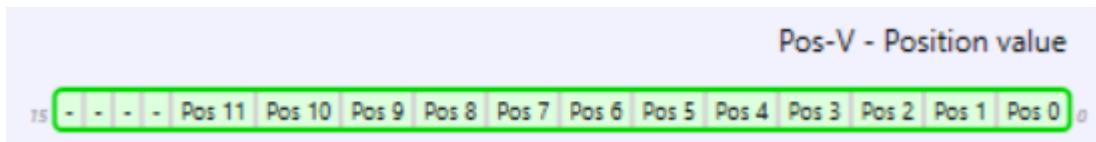
This module is documented in [Catalog \Abstract SMC D-xS-OMU0002.pdf](#) and has two data blocks for the same information

I	DI	CilElect1	D-MPXXX	
I	Pos-V	CilElect1	D-MPXXX	ANL04

In raw format



And with the analog information extracted



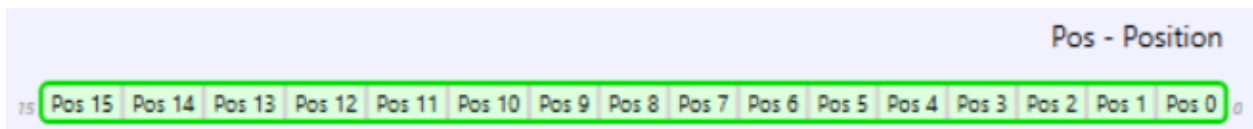
In the example this second option is directly mapped to an analog input.

## Magnetic position measure TURCK LiXXXPX-Q25L

This module is documented in [Catalog \Abstract TURCK LI D101821.pdf](#) and has only one data block

I	Pos	Tête1	LiXXXPX-Q25L	ANL02
I	Pos	Tête2	LiXXXPX-Q25L	ANL03

As the information is correctly aligned and is possible its use as analog input or I/O word.



In the example both are mapped to analog inputs.

## ModBus/IO-Link Gateways IO-Link configuration

The configuration of the ModBus/IO-Link Gateways must be carried out by the supplier appropriated software.

A consortium of industries supplying IO-Link technologies has been created and named *PACTWARE CONSORTIUM e.V.*

The configuration software PACTware can be downloaded from the web site of any of its members, for example: <https://www.turck.us/en/product/PACTware>

The example file (generated with PACTware version 5.0.5.31) can be found in the following location once the software is installed: ‘.\\_Project\_\IoLinkExample.PW5’

The main steps for the configuration are shown in: [Videos \pactware\\_conf.mp4](#)

It must be said that the ‘fine’ configuration of the IO-Link Masters is not completely shown, specifications and functionalities of the IO-Link technology must be studied for this job

..oOo..



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