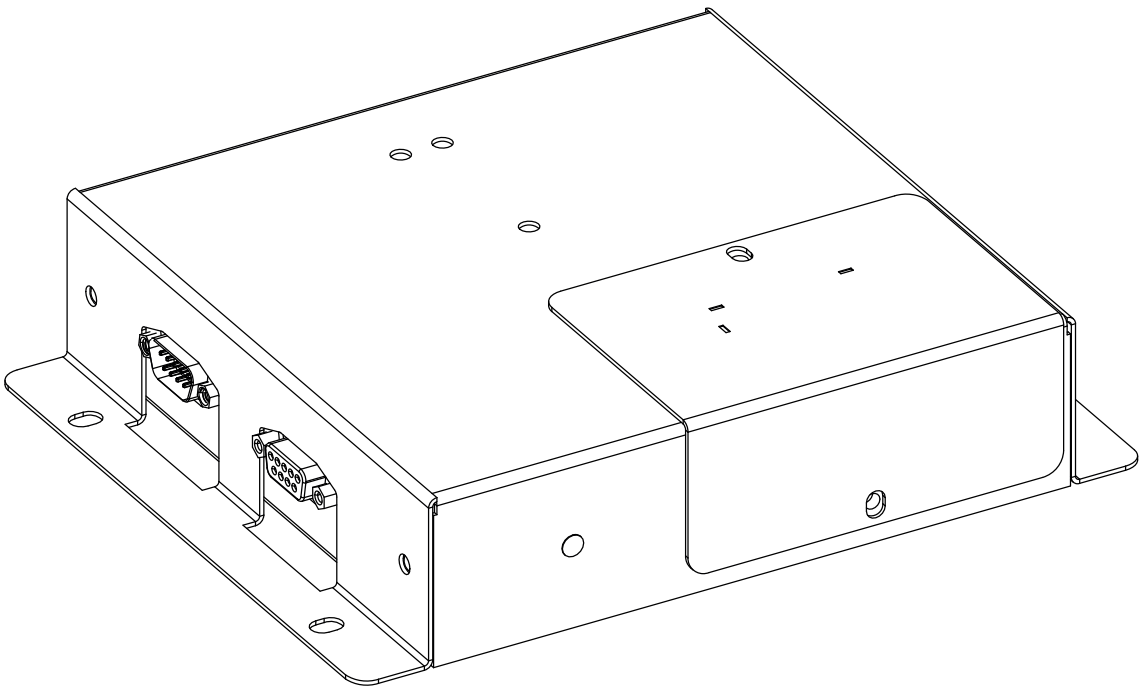

EN 1-44

SAM 1N

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1. GENERAL POINTS

A) REVISION

Revision	Date	Modification	SAM firmware version
1.0	15/09/2020	Creation	1.0
1.01	27/11/2020	Modification	1.0
1.02	21/06/2021	Modification	2.0
1.03	22/09/2021	Modification	2.0
1.04	20/06/2022	Correction	2.0
1.05	29/08/2022	Correction	2.0

B) INTRODUCTION

This document describes the commissioning and connection of SAM-1N within a PLC or robot network. The Smart Automation Module (SAM-1N) is a communication solution between compatible GYS welding powersources and most PLCs/robots. SAM-1N converts the internal communication language of GYS machines into machine language for complete PLC/robot management.
SAM-1N is designed to operate without changing its code, even if the welding process and communication network are changed.
The module provides access to almost all the parameters of the welding generator, allowing total control of the process by an automaton or a robot. The generator will be integrated into a machine and will be controlled by the internal control elements (automaton, HMI, ...).
SAM-1N transmits data on the current weld. This makes it possible to adjust the welding parameters by means of programming.
A generator can be used for several applications. The change will be made either by calling up JOBs pre-loaded in the generator or by selecting options in the user program of the machine in which the generator will be integrated.
The generator/SAM-1N assembly can be reassigned to a new system without modifying it (integration into a new machine, replacement of a PLC or robot, automation of a process, etc).

C) PRODUCT AND COMMUNICATION NETWORK COMPATIBILITY

The module provides access to almost all the parameters of the welding generator, allowing total control of the process by an automaton or a robot. Compatible GYS products are the following:

TIG PROCESS:
TITAN 231 DC FV / TITAN 321 DC / TITAN 400 DC / TITANIUM 230 AC/DC / TITANIUM 400 AC/DC

MIG/MAG PROCESS:
NEOPULSE 320C / 400 CW / 400G / 500G

SAM-1N supports the following communication protocols:

Network	File	Ref. GYS
Ethernet IP	EDS Available	062078
ModbusTCP	N/A	063013
Profinet	GSDML Available	062085
EtherCAT	ESI Available	063006
Devicenet	EDS Available	062092
CANopen	EDS Available	062108

2. SAFETY INSTRUCTIONS

Ce manuel d'utilisation comprend des indications sur le fonctionnement de l'appareil et les précautions à suivre pour la sécurité de l'utilisateur.
Merci de le lire attentivement avant la première utilisation et de le conserver soigneusement pour toute relecture future.
Ces instructions doivent être lues et bien comprises avant toute opération.
Toute modification ou maintenance non indiquée dans le manuel ne doit pas être entreprise.
Tout dommage corporel ou matériel dû à une utilisation non-conforme aux instructions de ce manuel ne pourra être retenu à la charge du fabricant.
En cas de problème ou d'incertitude, veuillez consulter une personne qualifiée pour manier correctement l'appareil.
Cet appareil doit être utilisé uniquement pour faire de la transmission de donnée dans les limites indiquées sur l'appareil et le manuel. Il faut respecter les instructions relatives à la sécurité. En cas d'utilisation inadéquate ou dangereuse, le fabricant ne pourra être tenu responsable.

Device suitable for indoor use only. Do not expose to rain or excessive moisture.

Do not cover the device

Do not place the device near a fire or subject it to heat or to longterm temperatures exceeding 50°C

This equipment is intended for industrial environments (class A) and not for residential sites where the electric current is supplied by the public low-voltage power supply network. There may be potential difficulties in ensuring electromagnetic compatibility on these sites, because of the conducted interferences, as well as radiated radioelectrical frequency.

Maintenance:
Service should be performed by a qualified person
Regularly take off the cover and remove dust with an air gun.
Under no circumstances should solvents or other aggressive cleaning agents be used.
Clean the device's surfaces with a soft, dry cloth.

The device complies with European Directive.
The certificate of compliance is available on our website.

EAC conformity mark (Eurasian Economic Commission)

Equipment in compliance with British requirements. The British Declaration of Conformity is available on our website (see home page).

Equipment in conformity with Moroccan standards. The declaration Cم (CMIM) of conformity is available on our website (see cover page).

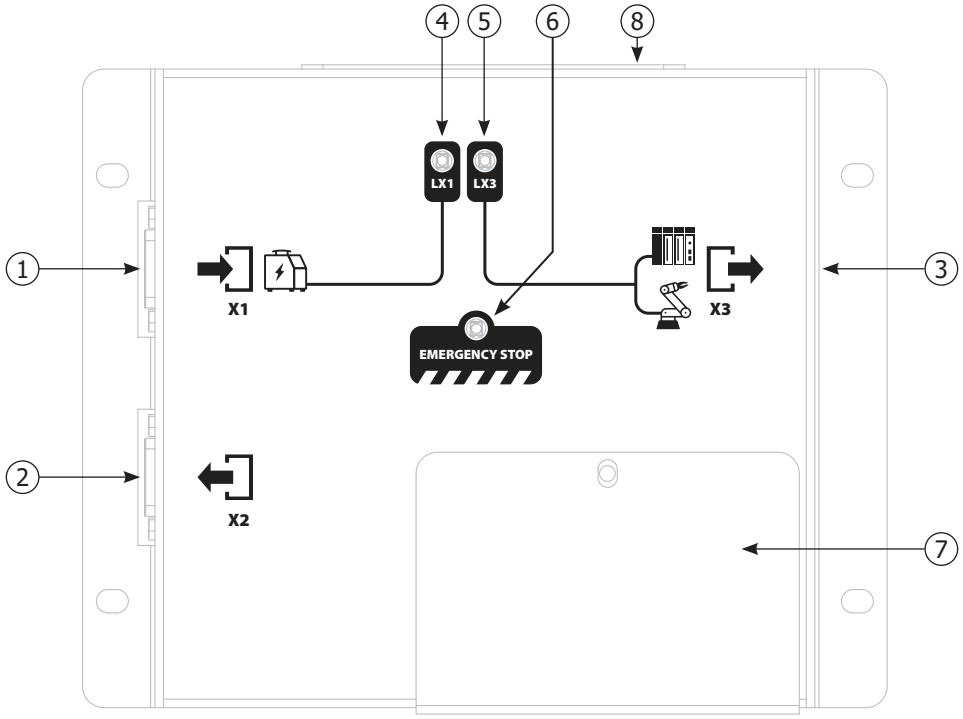
Recyclable product that falls within waste sorting recommendations

Disposal:
This product should be disposed of at an appropriate recycling facility. Do not dispose of in domestic waste.

3. PRODUCT PRESENTATION

The following figures show the names of the SAM-1N LEDs and connections:

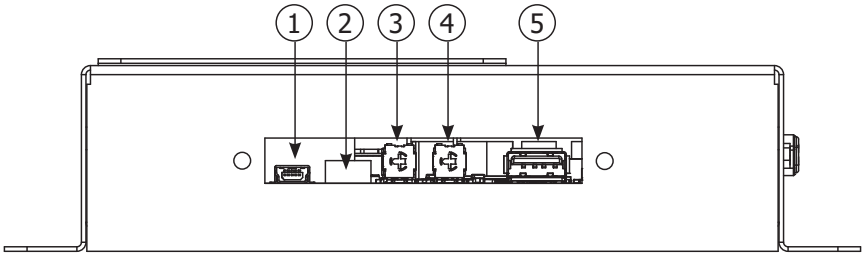
View from above



Description of the elements accessible on SAM-1N:

1- Male DB9 connector for GIN between the generator and the SAM-1N module
2- DB9 female connector between the SAM-1N module and other external modules
3- Connection to the control system
4- Source connection indicator
5- Indicator light for connection to the control system
6- Security status indicator light
7- Connection protection cover (access to terminal blocks X4 and X5 of the optional inputs/outputs and safety)
8- Protective cover for settings

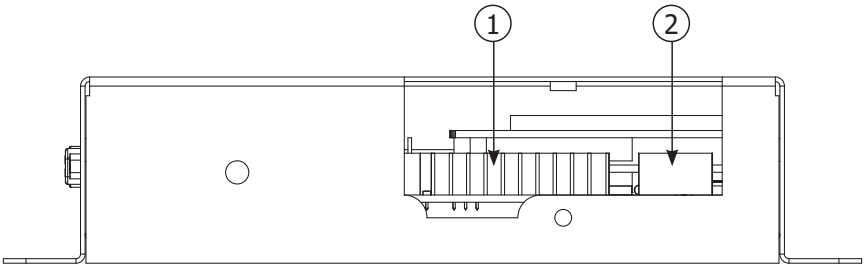
Back view



On the back of the SAM-1N, you can access the settings of some parameters by unscrewing the protective cover:

1- **C1 :** Mini USB for SAV (RS485)
2- **C2 :** Setting switch (see 5.a)
3- **C3 :** Adjusting the transmission speed (see 7. g)
4- **C4 :** Node identification or IP address (see 7. d)
5- **C5 :** USB-A port for after sales service (supplied) (cf 10. p)

Front view



Dismantling the flap 7 gives access to the option connection terminals:

1- **X4 :** Input/output connection terminal block (CF chapter 4. h.)
2- **X5 :** Safety connection terminal block (CF chapter 4. g)

4. PRODUCT INSTALLATION

A) HANDLING OF ESD-SENSITIVE PARTS

Before carrying out any work, switch off the product and disconnect it from the power supply.

Static electricity can damage electronic equipment. Use a grounded antistatic wrist strap, an ankle strap, or equivalent safety device to prevent electrostatic damage (ESD) when installing this product.

Electrostatic damage can irreparably damage the generator and/or the product. To protect electronic components from electrostatic damage, place this product on an antistatic surface, such as an antistatic discharge mat, antistatic bag or disposable antistatic mat.

Keep ESD-sensitive components in their original shipping packaging.
Hold the ESD-sensitive workpiece by its ends. Do not touch its pins.

Do not place the ESD-sensitive part on a non-conductive material or on a metal table. If the ESD-sensitive part has to be removed for any reason, first place it in a special ESD bag.

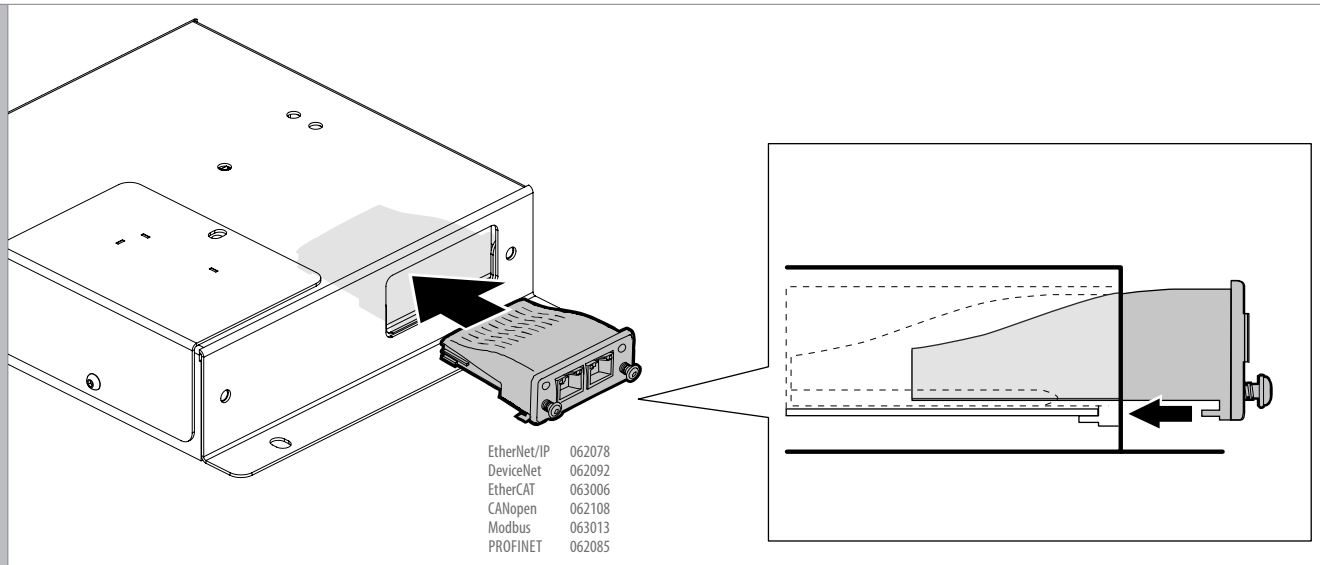
The appliance covers and metal tables are electrically grounded. They increase the risk of damage because they are a discharge path from the body via the ESD-sensitive part (large metal objects can be discharge paths without being earthed).
Be very careful when working with ESD-sensitive parts in cold weather and when the environment is heated, as low humidity increases static electricity.

B) MOUNTING THE ANYBUS COMMUNICATION MODULE

The Anybus communication module defines the industrial communication network and connects SAM-1N to it. It is essential for the functioning of the product.

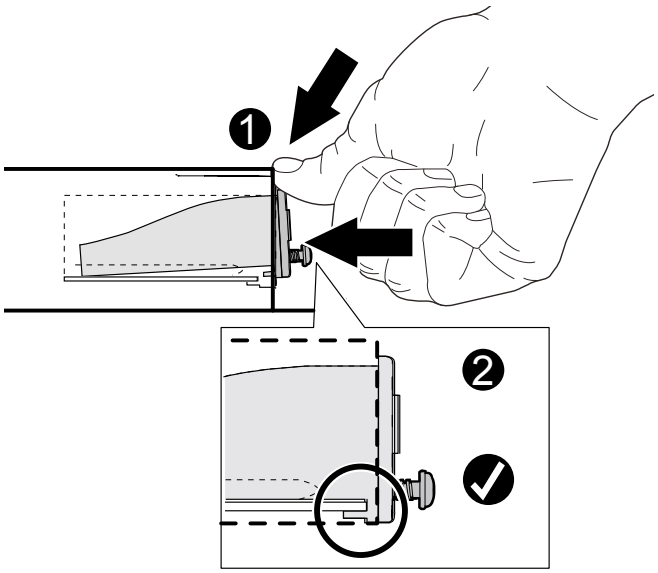
To mount the Anybus communication module follow the instructions below:

1

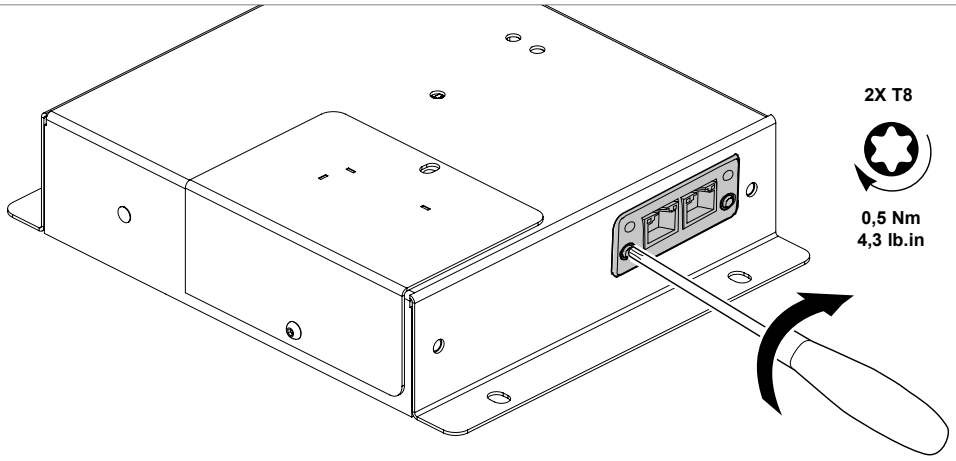


EtherNet/IP	062078
DeviceNet	062092
EtherCAT	063006
CANopen	062108
Modbus	063013
PROFINET	062085

2



3

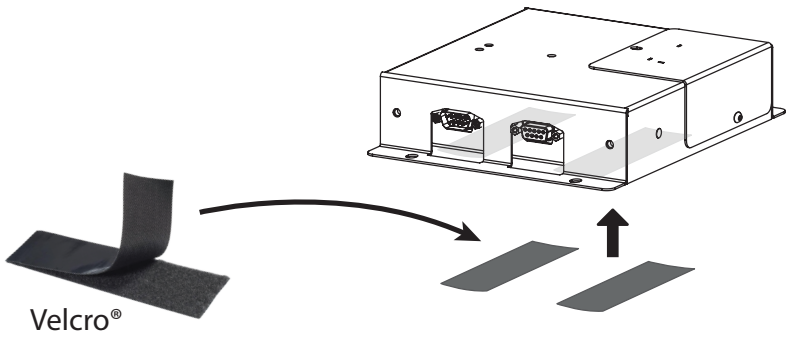


! If the Anybus communication module is incorrectly plugged in, it will not work. The LX3 LED will not illuminate when the product is started.

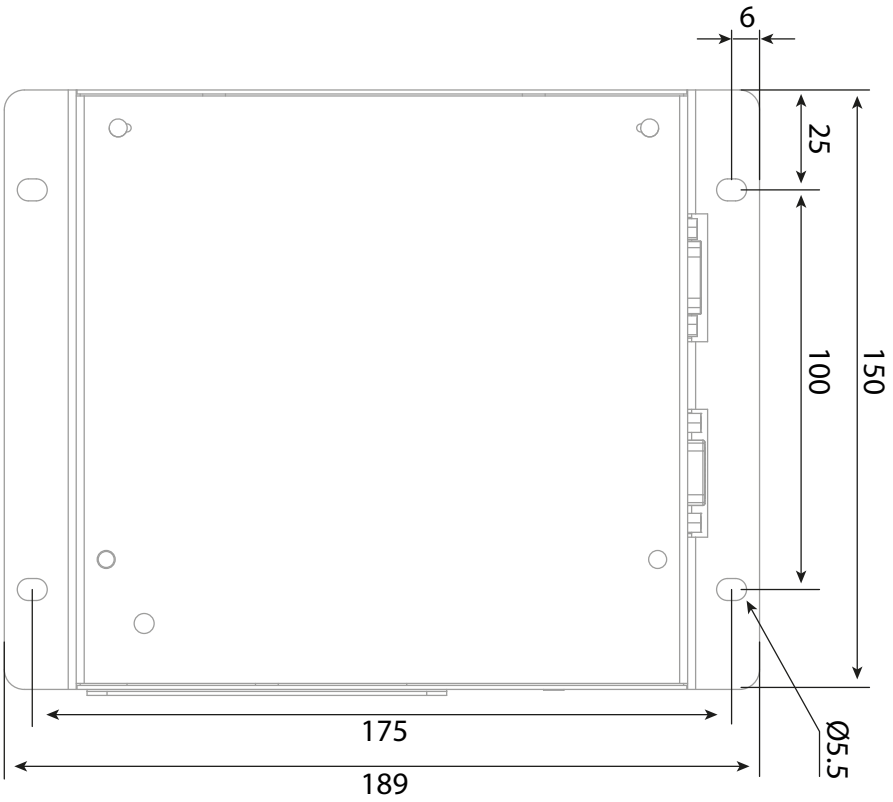
MOUNTING THE SAM-1N

There are 2 options for fixing SAM-1N:

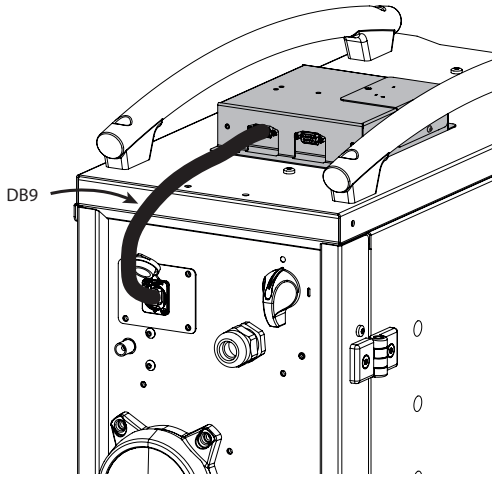
Fixing with the supplied Velcro fastener:



Fixing by means of 4 screws (not supplied) using the 4 oblong holes provided on the SAM-1N module in order to allow fixing on a support:



D) WIRING BETWEEN THE GYS GENERATOR AND THE SAM-1N MODULE



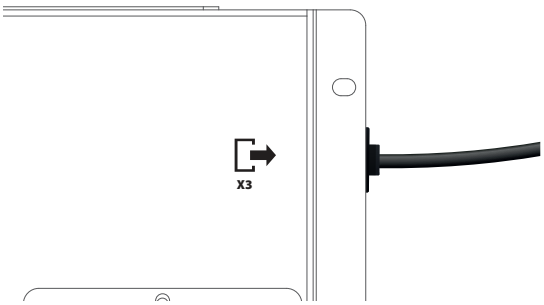
In order to connect SAM-1N to a generator, KIT-NUM MIG-1 (062993) must first be installed in case of MIG/MAG process or KIT-NUM TIG-1 (037960) in case of TIG process.
Please refer to the installation manuals of the NUM-kits for their installation.

Generator off, connect SAM-1N to the GYS generator via the supplied DB9 cable (between the DB9 output of the generator and the X1 input of SAM-1N).

NB: If it is necessary to deport the SAM-1N in an electrical enclosure, use a DB9 cable with a maximum length of 10 metres (DB9 Male-Female extension type, straight link, shielded cable and twisted wire pairs).

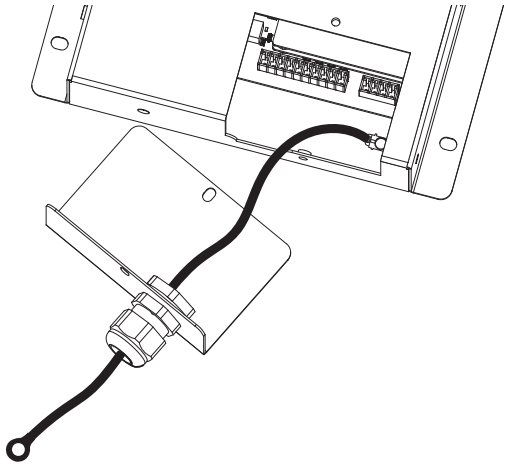
E) CONNECTING SAM-1N TO THE COMMUNICATION NETWORK

Connect the Anybus X3 communication module installed in the SAM-1N to the communication network of your installation using a suitable cable (not supplied, see module and network specifications Chap 7.).

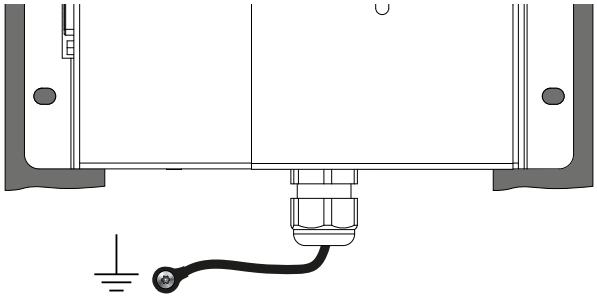


F) USE OF AN HF PROCESS

When using an HF process, connect the ground terminal of the SAM-1N to a screw of the generator via the supplied cable and the cable gland (see pictures):



SAM-1N connected to the earth of the product



If SAM-1N is installed in an electrical enclosure, connect the ground cable to the cabinet ground.

G) SWO FUNCTION (SAFE WELDING OFF)

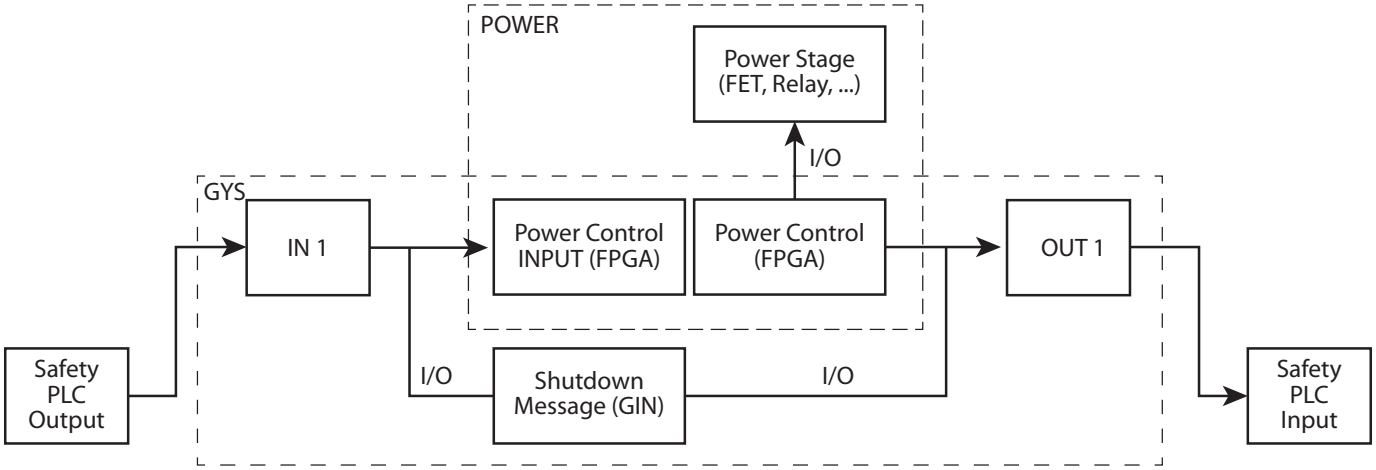
The «Safe Welding Off» function is mainly used to prevent the current or voltage generator from starting. It acts directly on the power of the generator in a very short time.

The function is also used to stop the generator safely in case of an emergency stop. This avoids abruptly interrupting the power supply to the generator in the event of a problem. It should be borne in mind that a break in the power supply downstream of the generator under load is dangerous and can damage the equipment.

I. Electrical safety

The «Safe Welding Off» function does not provide electrical isolation, therefore before working on the generator, it must be electrically isolated by switching off the power supply and isolating the generator locally (padlocking procedure).

II. Diagram of safety operating principle

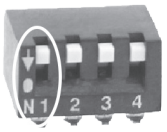


III. Adjusting the safety function

A switch on the side of the SAM-1N, behind cover plate 8, is provided to set the safety function of the SAM-1N. You just have to act on switch 1 and change its position (in high OFF state or in low ON state).

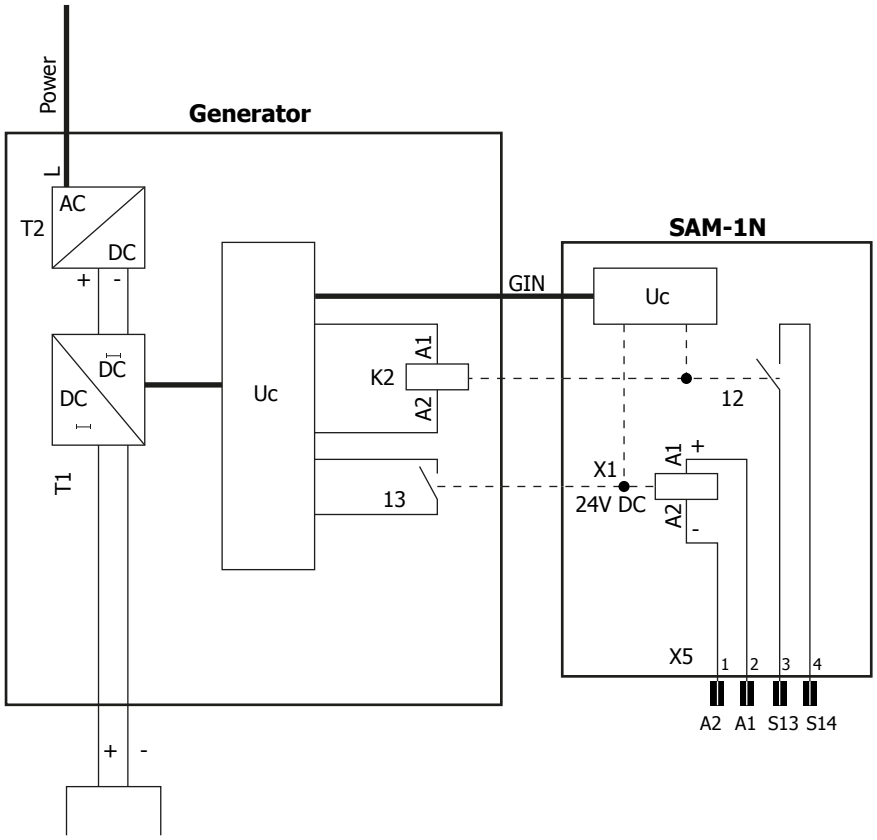
Switch settings table:

DIP Switch	Name	Position	Status
S1	Security activation	OFF	Security not activated
		ON	Security enabled
S2	Not used		



IV. SWO (Safe Welding Off) and feedback wiring

If switch 1 is set to the ON position and switch 2 to the OFF position, it will be necessary to wire the safety device. A terminal block dedicated to the safety function SWO (Safe Welding Off) is available under the connection protection cover 7 of SAM-1N.



! It is also necessary to apply the modification on the KIT-NUM of the generator to take into account the SWO function on SAM-1N, refer to the KIT-NUM manual.

It is also necessary to apply the modification on the KIT-NUM of the generator to take into account the SWO function of SAM-1N, refer to the KIT-NUM manual.
The feedback (terminals S13 and S14) is a 24 VDC digital positive logic output (it is active when it is high).
The feedback output (S13-S14) is only activated if the SWO input is activated.
The feedback output (S13-S14) will switch to OFF if a discrepancy occurs between the SWO input (A1-A2) and the welding station feedback or if the SWO input is disabled (switch 1 in OFF position).

! It is recommended to use a shielded cable to make the connection between the safety module and terminal block X5. Maximum wire cross-section will be 28-16AWG - 1.5mm².

V. Electrical characteristics of the Inputs/Outputs of terminal block X5

		EXIT (feedback)	ENTRY
Type of insulation		Dry contact	Relay
Connection		3- S13 NO contact 4- S14 Vdc	1- AU_A2: Mass 2- AU_A2: Vcc
Voltage range		20 to 30 VDC	20 to 30 VDC Logic threshold 15VDC Maximum low voltage at 3 V
Rated current at 24 VDC		Max 2A	10mA
Response time	at rated voltage	8ms	4ms
	maximum time	16ms	8ms
Test impulse train < 1ms at frequency below 100Hz		No reaction	No reaction

VI. Setting the Emergency STOP indicator

An indicator called EMERGENCY STOP LED is located on the top of the SAM-1N and informs about the status of the safety function.

Summary and descriptions of the states of the DEL EMERGENCY STOP:

LED colour		Status
	Fixed blue	N/A
	Extinguished / or white	Emergency stop not activated
	Red	Emergency stop engaged
	Green	Emergency stop not engaged
	Flashing red 2 Hz	Generator switched off

H) INPUTS/OUTPUTS INTEGRATED IN SAM-1N

The SAM-1N module also has 4 digital inputs and 4 digital outputs that can be controlled directly from the PLC or the robot.
They are accessible under the protective cover of the SAM-1N connections and are to be connected to the terminal board X4 (supplied).
They allow local connection of inputs (such as sensors, buttons, etc.) as well as actuators (such as indicators, solenoid valves, relays, etc.) without having to add a PLC input and output module.

! If parameter 3_03 Copy_CD_Touch is enabled, outputs 1 and 2 are assigned to report TouchSense and Collision detections respectively.

Marking of the input/output terminal block (top view):

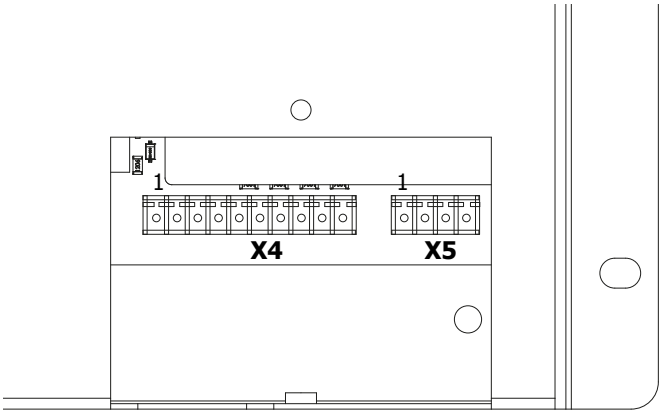
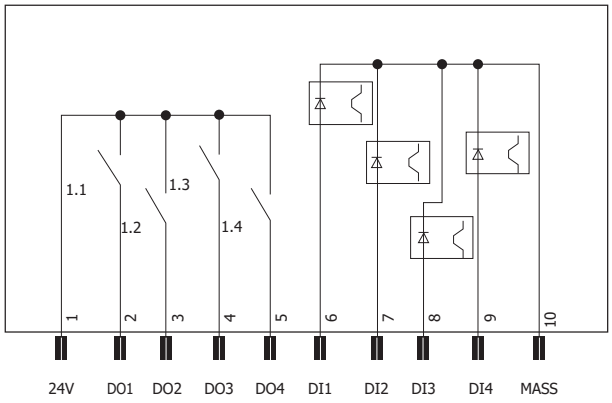


Diagram of terminal block X4:



The outputs are to be connected between terminals 1 to 5 and are arranged as follows:
- Terminal 1: 24 VDC power supply common to the outputs
- Terminal 2: Output No. 1
- Terminal 3: Output No. 2
- Terminal 4: Output No. 3
- Terminal 5: Output No. 4

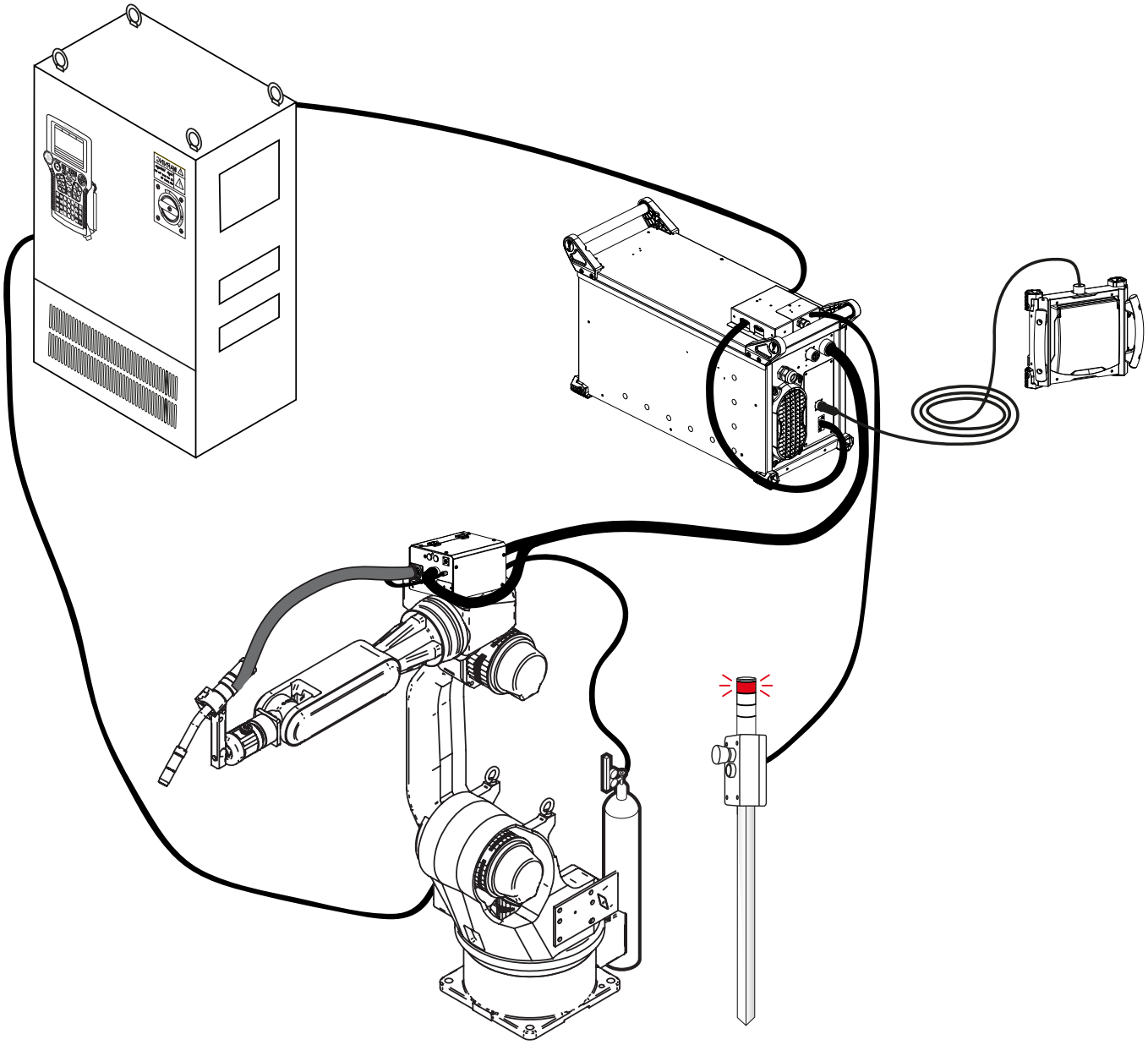
The inputs are to be connected to terminals 6 to 10 and are arranged as follows:
- Terminal 6: Input n° 1 24VDC
- Terminal 7: Input n° 2 24VDC
- Terminal 8: Input n° 3 24VDC
- Terminal 9: Input n° 4 24VDC
- Terminal 10: Ground 0 VDC common to the inputs

! It is recommended to make the connection between the safety module and terminal block X4 using a shielded cable. Maximum wire cross-section will be 28-16AWG - 1.5mm².

Summary and technical characteristics of the digital inputs and outputs SAM :

	Output	Input
Type of insulation	Contact SEC 24V DC 1 - 24VDC 2-5 - DO1 – DO4 (NO)	Insulated 500 VDC Photocoupler 6-9 - DI1 - DI4 (NO) 10 - Ground (0V)
ON Voltage Vmin/Vmax	+20V à +30 V	15VDC – 28VDC
OFF Voltage Vmin/Vmax		0VDC – 5 VDC
Input impédance		800 KOhm
Rated current at +24 V	Max 2A	10 mA

Connection example :



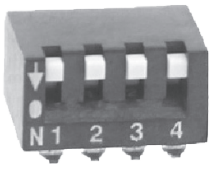
5. ADJUSTABLE SETTINGS

On the back of the SAM-1N there are several adjustment elements for setting the parameters of the module.
To access it, unscrew the two Torx20 screws and remove the protective cover.

A) C2 SWITCH SETTINGS

To change a setting, toggle the white switch up (OFF state) or down (ON state).
Status of C2 switch settings:

DIP Switch	Name	Position	Status
S1	Security activation	OFF	Security not activated
		ON	Security enabled
S2	Not used		
S3	Type of parameter access	OFF	Full access to parameters
		ON	Limited access to parameters
S4	Mode of operation	OFF	JOB_ACCESS
		ON	ADVANCED_ACCESS



The setting of switch S1 is described in paragraph 4. g) III.

Switch S3 in the third position is used to set the access mode to the generator parameters, the OFF position gives access to all parameters (FULL). The ON position gives limited access to the parameters (JOB or ADVANCED).
The fourth switch S4 is only active if the third switch is in the ON position. It sets the desired parameter set. In the OFF position, the station will be in JOB_ACCESS (calling up JOBs pre-recorded in the generator memory). In the ON position, the station will be in ADVANCED_ACCESS (SAM-1N receives the welding parameters from the PLC/robot).

! If a change in the type of access or operation mode is made, it will cause the parameter addresses to be reassigned when the SAM-1N is restarted.

B) ADJUSTMENT OF ENCODING WHEELS C3 - C4

The two encoder wheels are used to set the communication parameters of the SAM-1N according to the inserted Anybus communication module.


Settings C3: Transmission speed (see: Ch. 7. g)


C4 settings: IP address or node address (see: Chap.7. d and g)

6. SYSTEM SETUP

This chapter details the commissioning of the SAM-1N interface and describes its functions.

Voltage supply
SAM-1N is powered via the X1 connector. Depending on the number of elements connected to SAM-1, a (future) Power Supplier may be required.
Depending on the type of communication network (Connector X3), an external power supply may also be required (DeviceNET, CANopen ...).
The use of SAM-1N's digital I/O (Terminal Board X4) requires an external 24V DC power supply.

Switching on the power supply
As soon as the generator is switched on, SAM-1N will start and the LX1 LED flashes red. A self-diagnosis of the elements on the network is carried out at start-up. When SAM-1N is started, the LX1 indicator turns green.

In case of a problem on the SAM-1N or the generator, the LX1 LED lights up red and an error code is available on the generator HMI or on the SAM-1N web interface depending on the inserted communication module.

If a USB key containing an update is present on one of the USB ports, it will be done automatically at startup.
The LX1 indicator will blink red during the update.

LX1 indicator definition
The LX1 light indicates the general status of SAM-1N, below is a summary of the different states:

LED colour		Status
	Fixed blue	Generator not ready
	Extinguished / or white	SAM-1N not connected
	Flashing red 20 Hz	Initialisation
	Red	Fault detected
	Green	NTR

Setting the LX3 indicator
The LX3 LED indicates the status of the communication with the logic controller connected to the Anybus communication module:

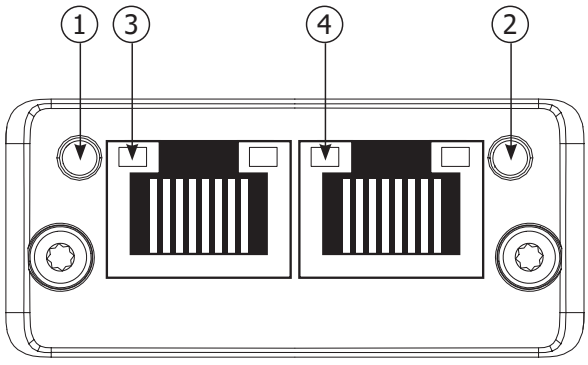
LED colour		Status
	Flashing blue 2 Hz	Waiting for automaton/robot connection
	Flashing blue 20 Hz	Initialisation
	Off	Anybus module not connected
	Red	Error in the automaton/robot connection
	Green fixed	NTR

7. FIELDBUS CONNECTION AND CONFIGURATION

A) PROFINET®

SAM-1N can be connected to a ProfiNET network with the optional Anybus communication module (ref 062085).
GYS offers an electronic GSDML configuration file that can be downloaded from its website in order to interface SAM-1N with a control unit in a ProfiNET structure. This XML-based GSD file describes the features and functions of SAM-1N. It contains all the parameter data necessary for the use of SAM-1N within your structure.

Technical specifications of the communication module Anybus - ProfiNET:



1- Network status LED
2- Module status LED
3- Connection activity LED (port 1)
4- Connection activity LED (port 2)

Description of the status of the network indicator 1:

LED colour		Status	Comments
	OFF	Offline	No power supply No connection to the I/O controller
	Green	Online (RUN)	Connection to the controller established Controller in RUN state
	Green - 1 flash	Online (OFF)	Connection to the controller established Controller in STOP state or bad data Synchronisation not completed
	Flashing green	Flashing	Used by the system tool to identify the network node.
	Red	Fatal error	Major internal error

	Red - 1 flash	Station name error	Unassigned station name
	Red - 2 flashes	IP address error	Unassigned IP address
	Red - 3 flashes	Configuration error	Identification different from actual identification

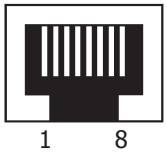
Description of the module 2 status indicator:

LED colour		Status	Comments
	OFF	Not initialized	No power supply or module being started or NW_INIT status
	Green	Normal operation	Status output module NW_INIT
	Green - 1 flash	Diagnostic event	A diagnostic event is present
	Red	Error	Module in exceptional state
	OFF	Fatal error	Major internal error
	Alternating red/green	Firmware update	Do not switch off the module, switching off during this phase can destroy the module.

Description of the status of the connection activity indicator 3 and 4:

LED colour		Status	Comments
	OFF	No connection	No communication
	Green	Connection established	Ethernet connection established, no communication present
	Green - 1 flash	Active connection	Ethernet connection established, communication in progress

Connecting the pins of the RJ45 ProfiNET socket:



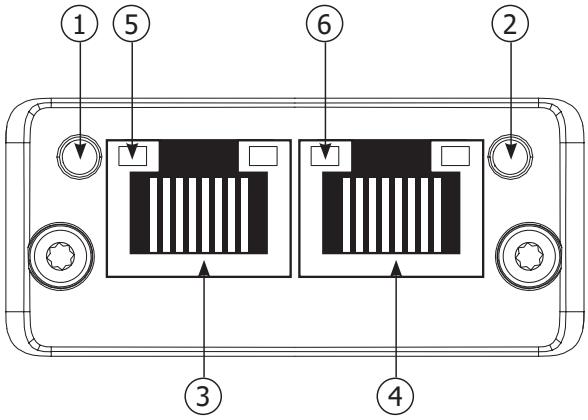
Pin	Description
4, 5, 7, 8	Connected to ground
6	RD-
3	RD+
2	TD-
1	TD+
Armouring	Cable armouring

For more information, go to: https://www.profibus.com

B) ETHERNET/IP®

SAM-1N can be connected to an EtherNET/IP network with the optional Anybus communication module (ref 062078).
GYS offers an EDS electronic data file downloadable from its website to interface SAM-1N into an EtherNET/IP network. This file contains all the information on SAM-1N settings.
The EtherNET/IP protocol has two modes of communication:
The explicit and the implicit:
- With explicit communication, the parameters are directly accessible at the correct addresses. All parameters to be read or written are accessible.
- With implicit communication, address information does not exist. The parameters are used / interpreted to link the information between the devices.

Technical specifications of Anybus - EtherNET/IP communication module:



1 - Network status LED
2 - LED module status
3 - Ethernet interface 1, Port 1
4 - Ethernet Interface 2, Port 2
5 - Connection activity LED (port 1)
6 - Connection activity LED (port 2)

Description of the status of the network indicator 1:

LED colour		Comments
○	OFF	No IP address
●	Green	Online, 1 connection or more established (CIP class 1 or 3)
◐	Flashing green	Online, no connection established
●	Red	Duplicate IP address, major fault
◐	Red flashing	Expired connections (CIP class 1 or 3)

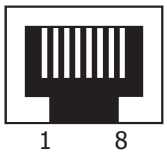
Description of the module 2 status indicator:

LED colour		Comments
○	OFF	No power supply
●	Green	Checking a scanner in progress
◐	Flickering green	Not configured or scanner inactive
●	Red	Major defect
◐	Flickering red	Acceptable defect

Description of the network activity status indicator 5 and 6:

LED colour		Comments
○	OFF	No communication
●	Green	Connection (100 Mbit/s) established
◐	Flickering green	Network activity (100 Mbit/s)
●	Yellow	Connection (10 Mbit/s) established
◐	Flickering yellow	Network activity (10 Mbit/s)

Connecting the pins of the RJ45 socket ProfiNET 3 and 4:



Pin	Description
4, 5, 7, 8	Connected to ground
6	RD-
3	RD+
2	TD-
1	TD+
Armouring	Cable armouring

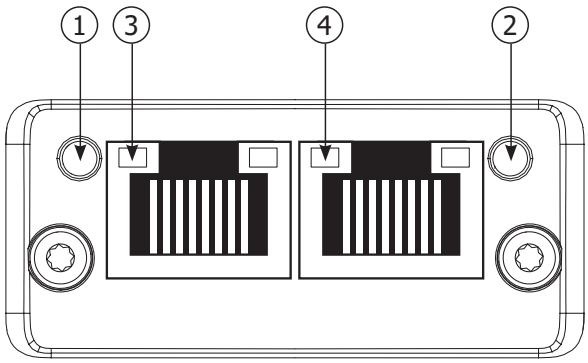
For more information, go to: https://www.profibus.com

For all EtherNET/IP related questions: https://www.odva.org

C) MODBUSTCP®

SAM-1N can be connected to an ModbusTCP network with the optional Anybus communication module (ref 063013).
ModbusTCP is an industrial communication protocol developed by Modicom. It allows communication between equipment connected to the same network.
The ModbusTCP GYS communication module is defined as a server and supports implicit messaging.

Technical specifications of the communication module Anybus - ModbusTCP:



1- Network status LED
2- Module status LED
3- Connection activity LED (port 1)
4- Connection activity LED (port 2)

Description of the status of the network indicator 1:

LED colour		Comments
○	OFF	No IP address or in EXCEPTIONAL state
●	Green	At least one mmodbus message received
◐	Flashing green	Waiting for a Modbus
●	Red	IP address conflict, fatal error
◐	Red flashing	Connection expired, no Modbus message received during the timeout period.

Description of the module 2 status indicator:

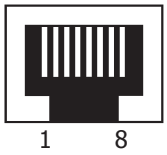
LED colour		Comments
○	OFF	No power supply
●	Green	Normal operation
●	Red	Major defect
◐	Red flashing	Minor defect
◐	Alternating red/green	Firmware update in progress

Description of the status of the connection activity indicator 3 and 4:

LED colour		Comments
○	OFF	No communication
●	Green	Connection (100 Mbit/s) established

	Green - 1 flash	Network activity (100 Mbit/s)
	Yellow	Connection (10 Mbit/s) established
	Flickering yellow	Network activity (10 Mbit/s)

Connecting the pins of the RJ45 female ModbusTCP socket:



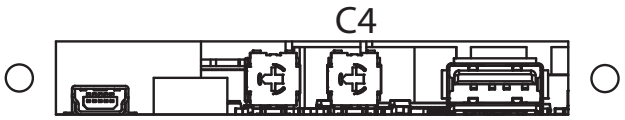
Pin	Description
4, 5, 7, 8	Connected to ground
6	RD-
3	RD+
2	TD-
1	TD+
Armouring	Cable armouring

D) SETTING THE IP ADDRESS

Procedure for setting the IP address for EtherNET, ProfiNET, ModbusTCP protocols.
By default, the IP address settings are as follows:

IP: 192.168.0.X /24
Subnet Mask 255.255.255.0
DHCP OFF

The setting of the IP address is done by the C4 encoder wheel, located behind the cover 8 of SAM-1N (see figure below).



IP address from 1 to 15.

Example for an IP address of SAM-1N: 192.168.0.8 -> wheel positioned at 8

The assignment can also be made online using :
- a PLC (refer to the PLC manual).
- from a computer (via the web page accessible to the IP address selected on encoder wheel C4 see Chap 8.).
- software (e.g. IPConfig available on the GYS website).

If the IP address is changed or lost, the network can be scanned using the network setup utility (supplied):

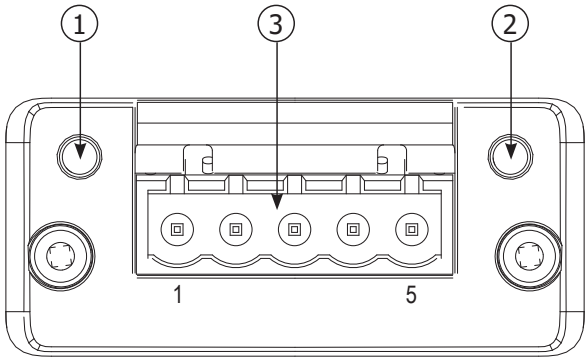
IPConfig
https://www.anybus.com/support/file-doc-downloads/anybus-support-tools?orderCode=tools
(See Appendix A for an explanation of how to use the utility).

! If the IP address is set with the C4 encoder wheel on the back of the box, it will be necessary to restart the product in order for the change to take effect.

E) DEVICENET®

SAM-1N can be connected to a DeviceNET network with the optional Anybus communication module (ref 062092).
DeviceNET is an open communication protocol used in industry to interconnect devices on a network using CAN technology.
GYS offers a downloadable EDS file on its website to interface SAM-1N in a DeviceNET network. This file contains all the information on SAM-1N settings.

Technical specifications of the communication module Anybus - DeviceNET:



1- Network status LED
2- Module status LED
3- DeviceNet connector

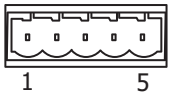
Description of the status of the network indicator 1:

LED colour		Comments
○	OFF	Offline / no mains supply
●	Green	Online, one connection or more established
◐	Flashing green	Online, no connection established
●	Red	Critical connection error
◐	Red flashing	One connection or more outdated
◐	Alternating red/green	Self test in progress

Description of the module 2 status indicator:

LED colour		Comments
○	OFF	Not operational
●	Green	Use under normal conditions
◐	Flashing green	Configuration error, commissioning required
●	Red	Non-acknowledgable defect
◐	Red flashing	Acceptable defect
◐	Alternating red/green	Self test in progress

DeviceNET connector pin assignment :



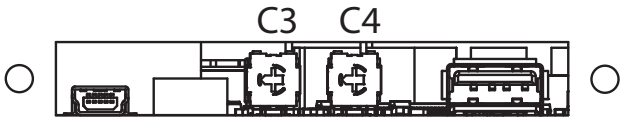
Pin	Signal	Description
1	V-	Negative potential of the bus
2	CAN_L	Low level bus
3	SHIELD	Cable ground
4	CAN_H	Bus high level
5	V+	Positive potential of the bus

! To ensure correct operation of the DeviceNet module, it must be connected to ground. It can accept a voltage between 11 and 25 VDC on the industrial network and has a maximum current consumption of 16mA in this voltage range.

For all EtherNET/IP related questions: https://www.odva.org

F) DEVICENET SETTINGS®

When using SAM-1N in a DeviceNET configuration, it is necessary to set the baud rate as well as the node address.
Adjustments are made by acting on the two encoding wheels C3 and C4 located on the rear of the SAM-1N.
The first (C3) sets the transmission speed.
The second (C4) determines the node address.



C3 - Speed
C4 - Knot

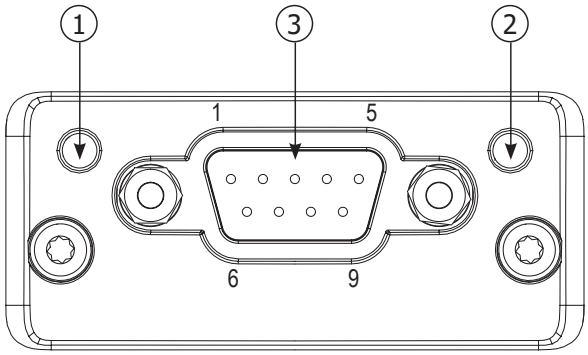
! In case of intervention on the encoding wheels, it will be necessary to restart the product in order for the changes to be effective.

Encoder wheel		Position	Value
C4	Node address	0	0
		1	1
		2	2
		3	3
		4	4
		5	5
		6	6
		7	7
		8	8
		9	9
		A	10
		B	11
		C	12
		D	13
		E	14
		F	15
C3	Baud rate	0	125 kBauds
		1	250 kBauds
		2	500 kBauds
		3	AUTO

G) CANOPEN®

SAM-1N can be connected to a CANopen network with the optional Anybus communication module (ref 062108).
GYS offers a downloadable EDS file on its website to interface SAM-1N in a CANopen network. This file contains all the information on SAM-1N settings.

Technical specifications of the communication module Anybus - CANopen:



1- Module status LED
2- Error LED
3- CANopen connections

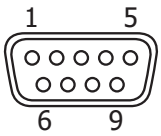
Description of the status of the network indicator 1:

LED colour		Description	Comments
○	OFF	-	No power supply
●	Green	Operational	The module is in an operational state
◐	Flashing green	Pre-operational	The module is in a pre-operational state
◐	Green - 1 flash	Stopped	The module is in the stopped state
◐	Flickering green	Autobaud	Baud rate detection
●	Red	EXCEPTIONAL STATE	The module is switched to the state: Exception

Description of the status of the error indicator 2:

LED colour		Description	Comments
○	OFF	-	No power or poor condition
◐	Red - 1 flash	Limit reached	Outdated bus counter
◐	Flickering red	LSS	LSS service in progress (alternating with status indicator)
◐	Red - 2 flashes	Error	An implusion error has occurred
●	Red	Bus stopped	Bus stop

CANopen connector pin assignment 3:

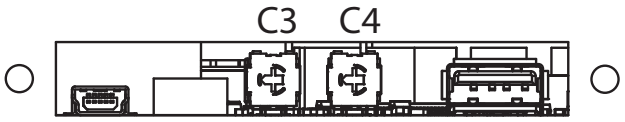


Pin	Description
1	-
2	CAN_L
3	CAN_GND
4	-
5	CAN_SHD

Pin	Description
6	-
7	CAN_H
8	-
9	-
10	CAN_SHIELD

H) CANOPEN® SETTINGS

When using SAM-1N in a CANopen configuration, it is necessary to set the baud rate as well as the node address.
Adjustments are made by acting on the two encoding wheels C3 and C4 located on the rear of the SAM-1N.
The first (C3) sets the transmission speed.
The second (C4) determines the node address.



C3 - Speed
C4 - Knot

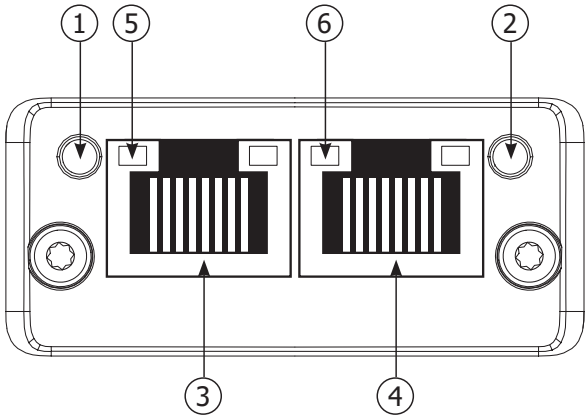
! In case of intervention on the encoding wheels, it will be necessary to restart the product in order for the changes to be effective.

Encoder wheel		Position	Value
C4	Node address	0	0
		1	1
		2	2
		3	3
		4	4
		5	5
		6	6
		7	7
		8	8
		9	9
		A	10
		B	11
		C	12
		D	13
		E	14
		F	255
C3	Baud rate	0	10 kBauds
		1	20 kBauds
		2	50 kBauds
		3	Reserved
		4	125 kBauds
		5	250 kBauds
		6	500 kBauds
		7	800 kBauds
		8	1 Mbps
		9	AUTO
		A	LSS
		B	Reserved
		C	Reserved
		D	Reserved
		E	Reserved
		F	Reserved

I) ETHERCAT®

SAM-1N can be connected to an EtherCAT network with the Anybus communication module ref 063006.
GYS offers a description file in XML format (ESI / ENI) that can be downloaded from its website in order to integrate SAM-1N in an EtherCAT structure.
EtherCAT is a fieldbus technology based on Ethernet. It is optimised to transfer data directly into the Ethernet frame. It works in real time hardware and is easy to implement.

Technical specifications of the communication module Anybus - EtherCAT :



1- Status LED
2- Error LED
3- EtherCAT (IN port)
4- EtherCAT (OUT port)
5- Connection activity LED (IN port)
6- Connection activity LED (OUT port)

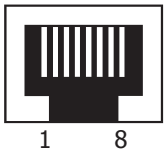
Description of the status of the module 1 status indicator:

LED colour		Description	Comments
○	OFF	Initialisation	Initialization state (or no power supply)
●	Green	Operational	Operational status
◐	Flashing green	Pre-operational	Pre-operational status
◐	Green - 1 flash	Safe-operational	Safe operating condition
◐	Flicker	Starting	Start-up status
●	Red	Fatal error	Fatal error, contact HMS technical service

Description of the status of the error indicator 2:

LED colour		Description	Comments
○	OFF	No error	No error or no power supply
◐	Red flashing	Configuration invalide	Impossible change of status received from the master
◐	Red - 1 flash	Involuntary change of state	Automatic change of slave status
◐	Red - 2 flashes	Sync Manager wat-chdog timeout	Refer to the HMS documentation
●	Red	Controller fault	Exception of the Anybus module. If the status and error lights are red, contact HMS technical support.
◐	Flicker	Start-up error	Firmware download error

EtherCAT 3 and 4 connector pin assignments:



Pin	Signal	Description
1	Tx+	
2	Tx-	
3	Rx+	
4	-	Normally unused. Linking them together
5	-	
6	Rx-	
7	-	Normally unused. Linking them together
8	-	

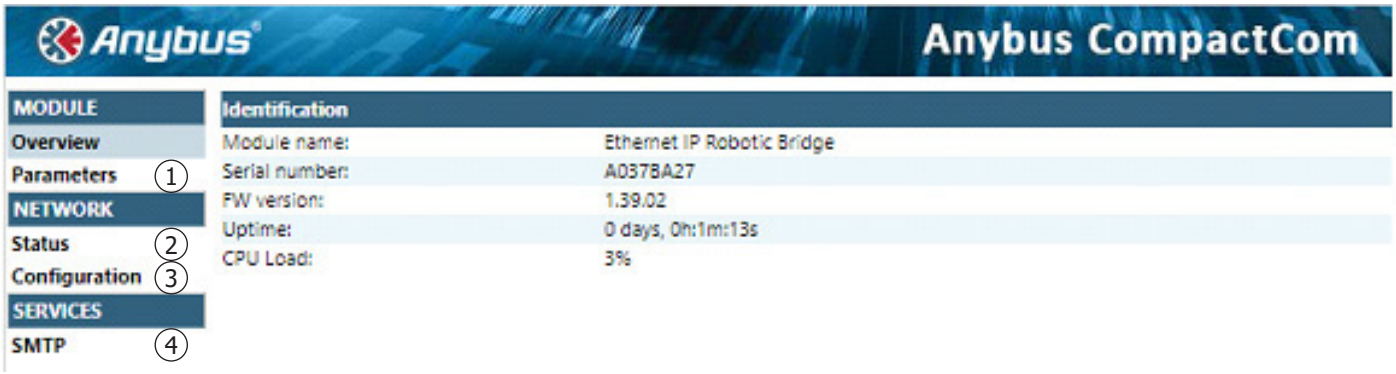
For EtherCAT related questions: https://www.ethercat.org/

8. INTERNET PAGE

The communication modules Anybus EtherNET/IP, ModbusTCP and ProfiNET have a web page for viewing parameters, error codes and forcing. The web page can be accessed from a web browser by directly entering the IP address of the set Anybus communication module.

After entering the IP address of your equipment in the address bar of your browser, the access is made directly on the home page:

A) HOME PAGE

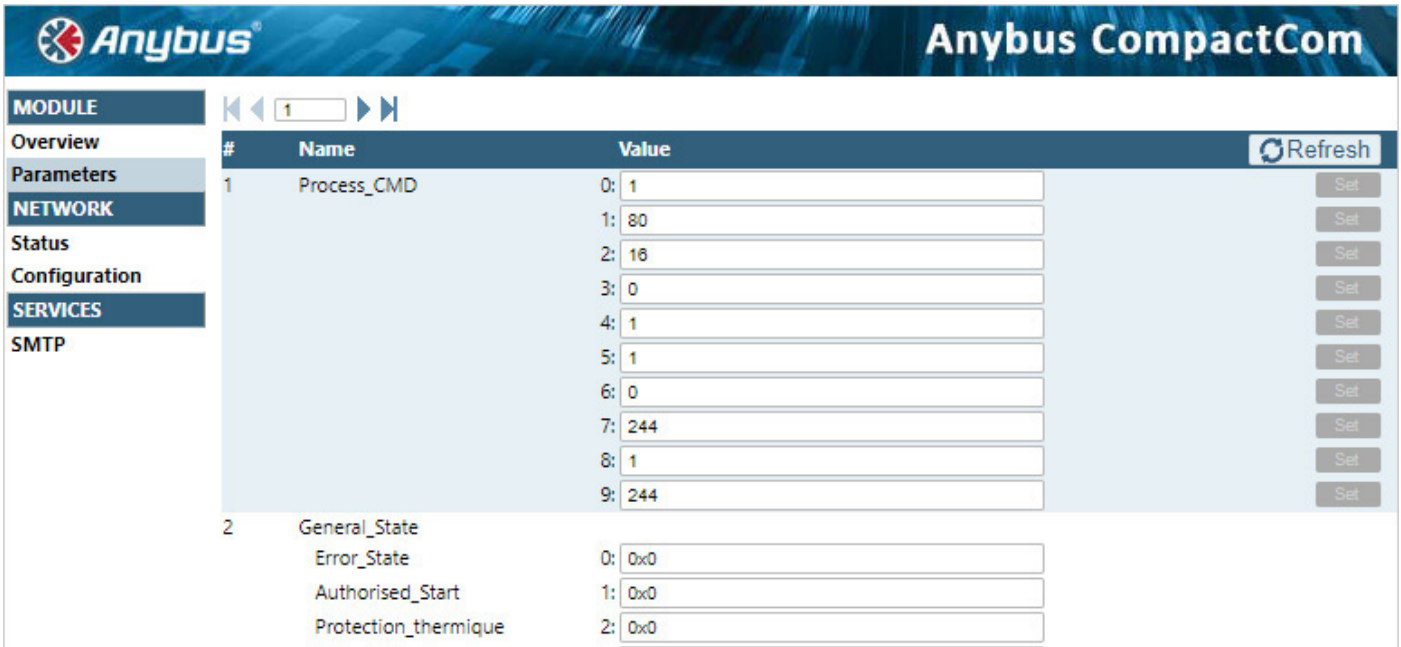


① Access to the parameters pages
② Access to the network status page
③ Access to the configuration page
④ Access to the SMTP page

B) SETTINGS ACCESS PAGE

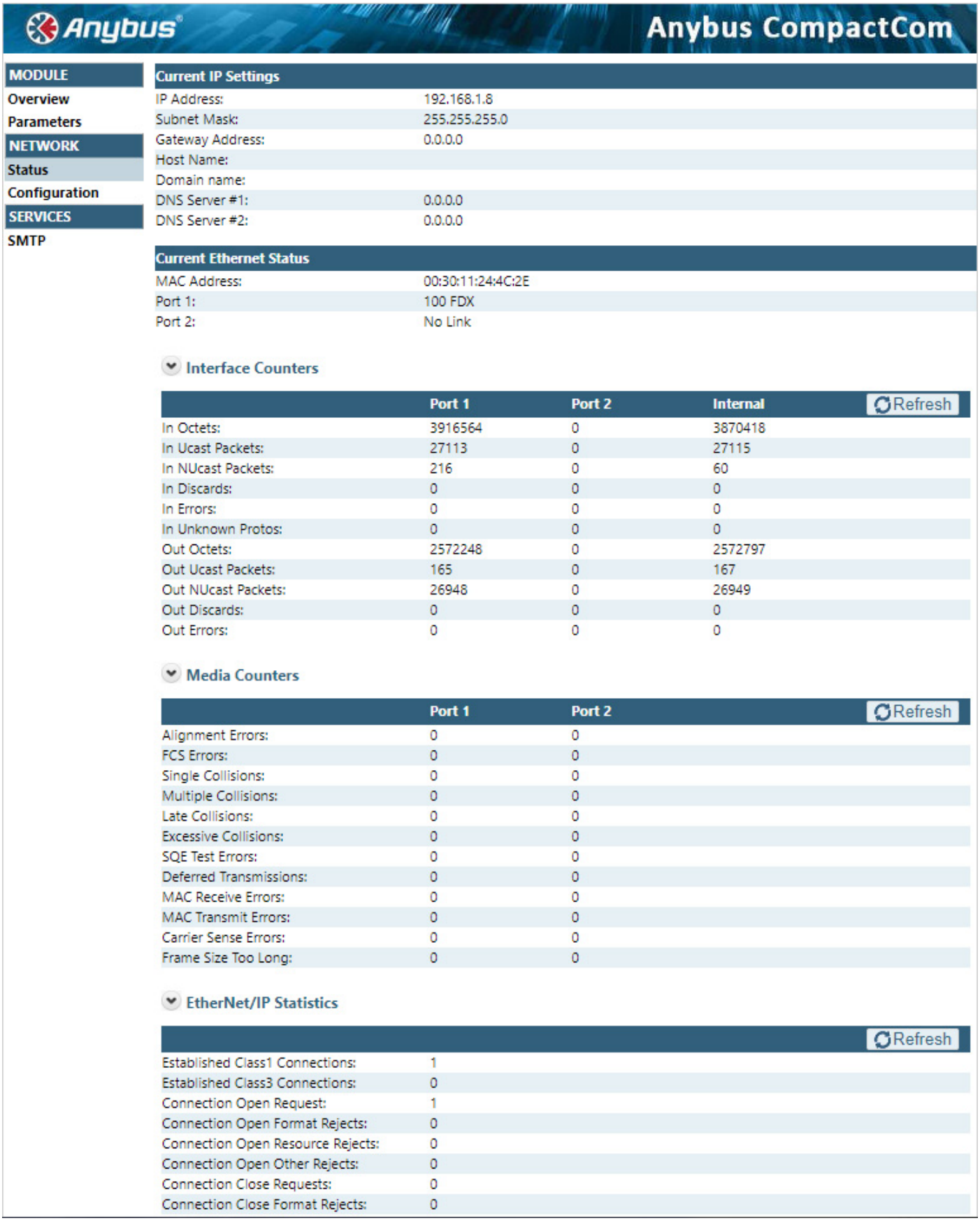
By clicking on the «Parameters» link, it is possible to access all accessible parameters. It is possible to navigate through all the pages by clicking on the icons:

▶	Forward one page
▶|	Go to the last page
◀	Back one page
|◀	Go to the first page
Refresh	Refreshing values



C) PAGE STATUS

The «Status» page contains all of the connection information.
It is possible to retrieve the IP address, data exchange counters, ... on all SAM-1N ports.
Il est possible d'y retrouver l'adresse IP, les compteurs d'échanges de données, … sur tous les ports de SAM-1N.



D) PAGE CONFIGURATION

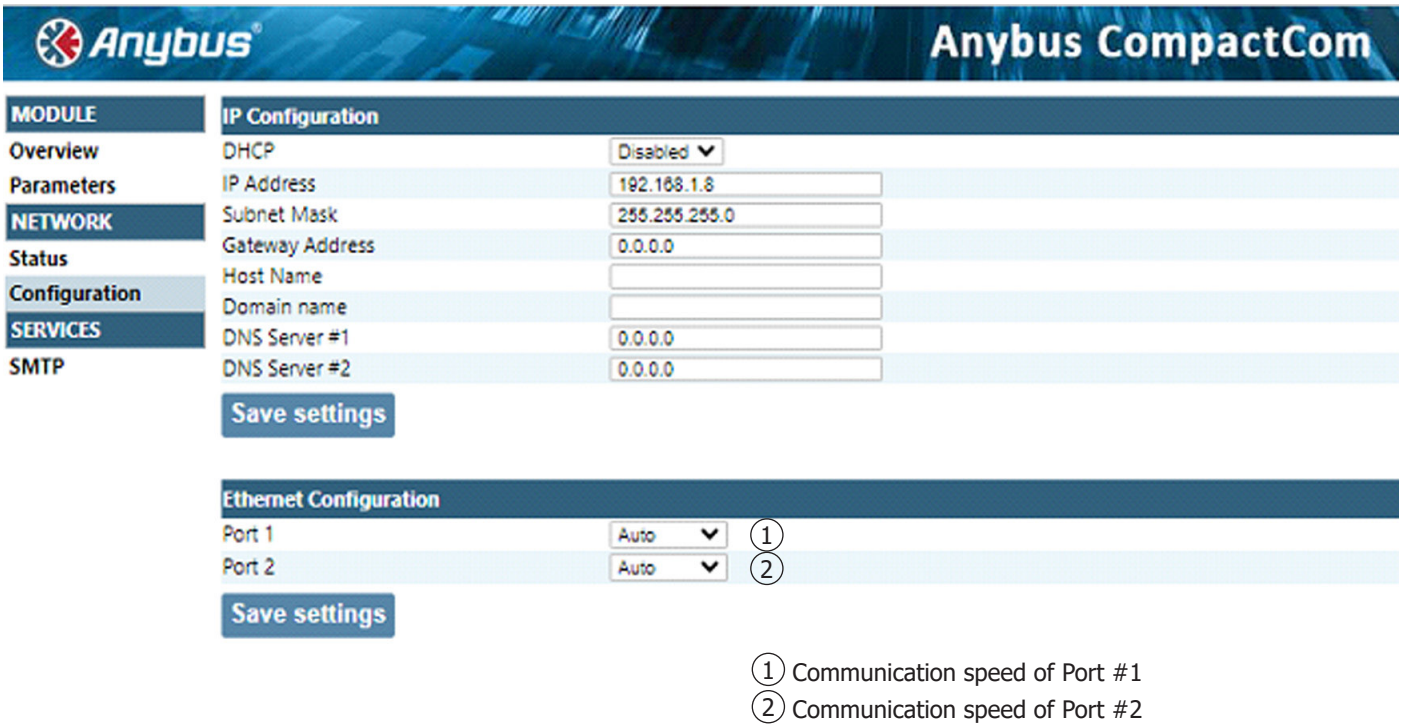
From the Configuration page, you have access to change the network connection settings.
To change the IP address of SAM-1N, enter the values in the various fields.

DHCP: automatic IP address assignment by the router (Enable) or manual (Disabled)

If the setting is set to Disabled, it is mandatory to enter values in the fields:

IP Address
Subnet Mask
Other values are optional and depend on the network on which SAM-1N is connected.

Example of a manual entry of connection parameters.
The IP address 192.168.1.8 is assigned to SAM-1N, and the subnet mask is 255.255.255.255.0.

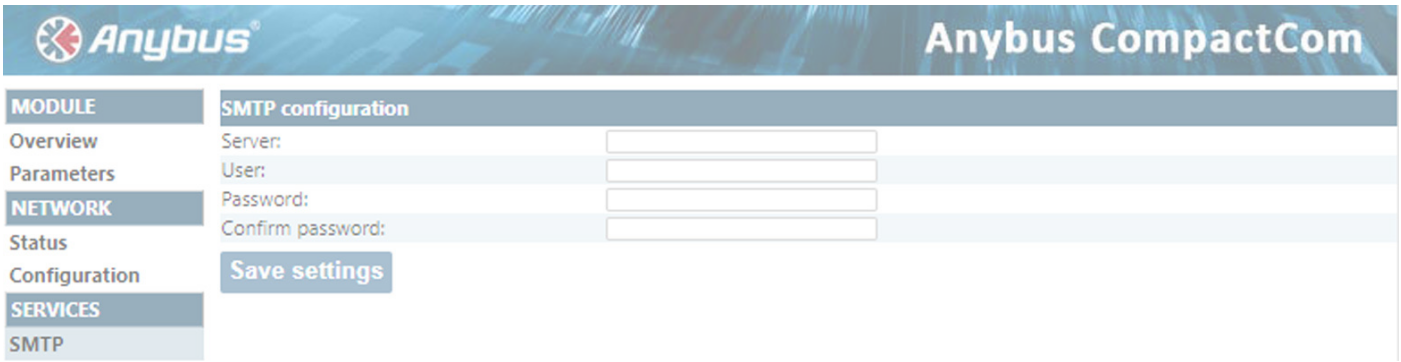


① Communication speed of Port #1
② Communication speed of Port #2

! After entering the values in the various fields, it is necessary to validate them by clicking on the «Save Settings» button, then restart SAM-1N and enter the new IP address assigned to SAM-1N in the browser in order to be able to access the pages again.

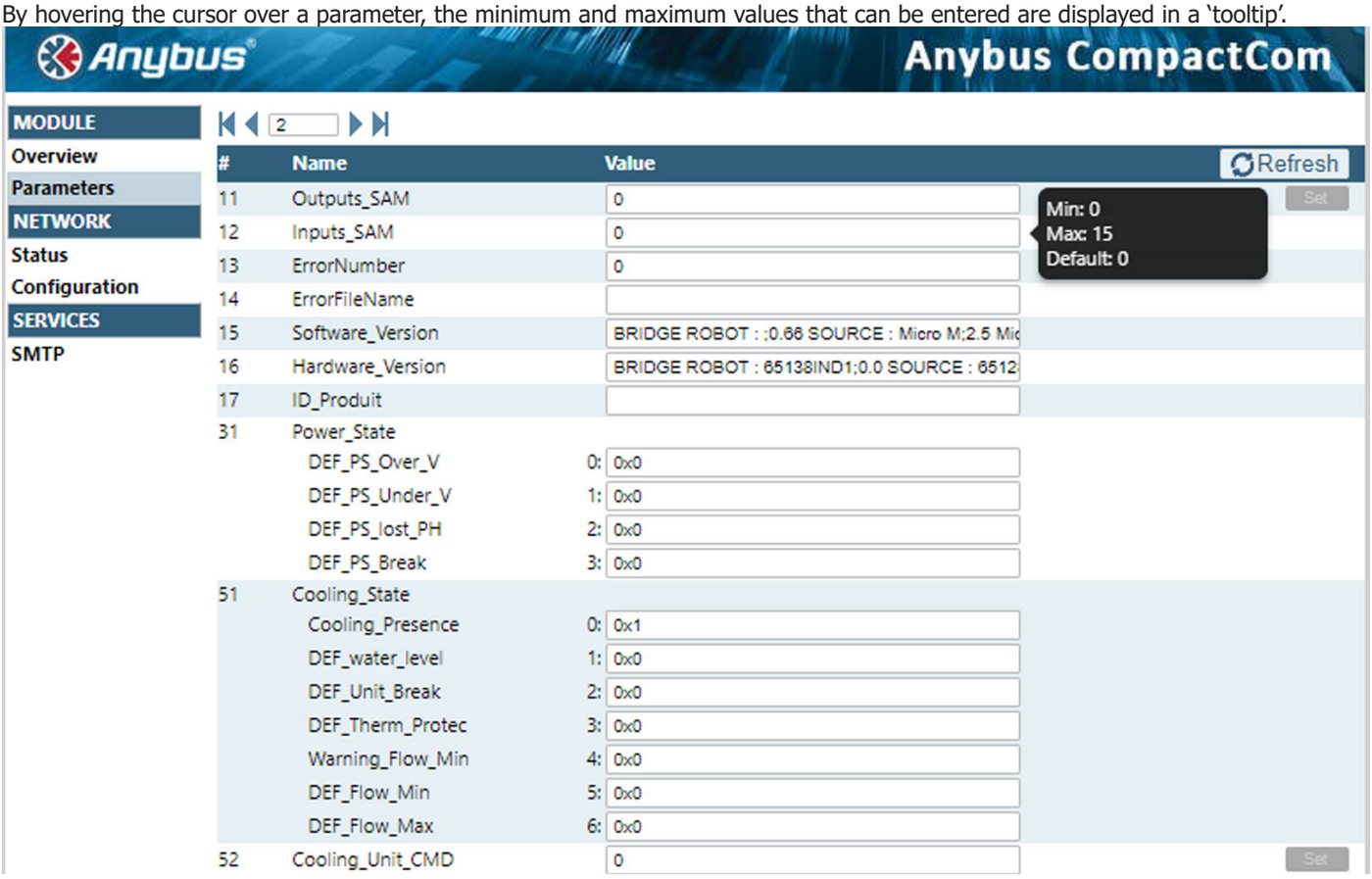
E) SMTP PAGE

The SMTP function is not used on SAM-1N.



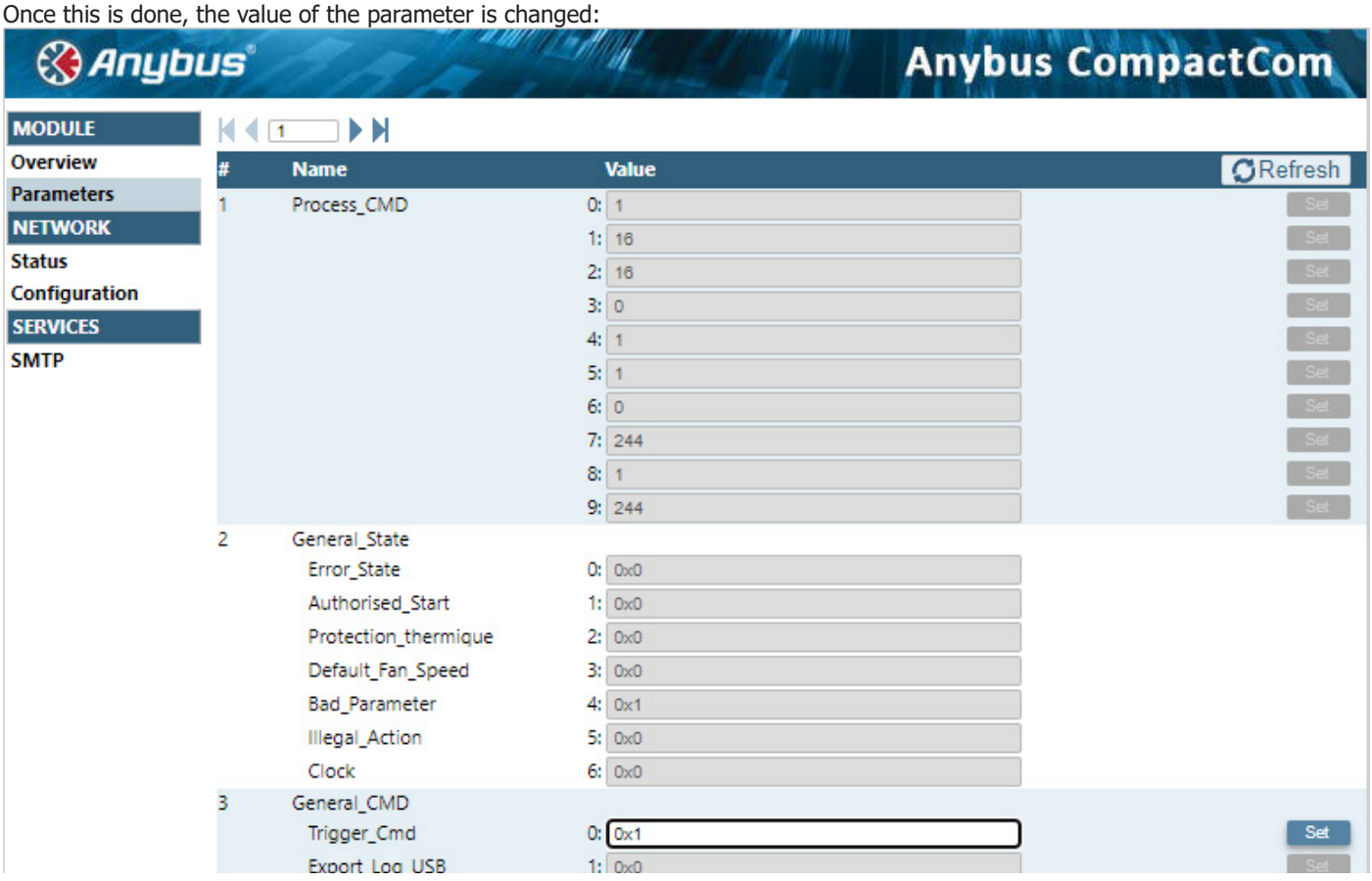
F) CHANGING A PARAMETER FROM THE WEB PAGE

Settings can be changed directly from the SAM-1N Web page. To do this, simply position yourself on the field of the value to be modified by double clicking on it. The field is then highlighted in blue and you can enter the new value.
By hovering the cursor over a parameter, the minimum and maximum values that can be entered are displayed in a 'tooltip'.

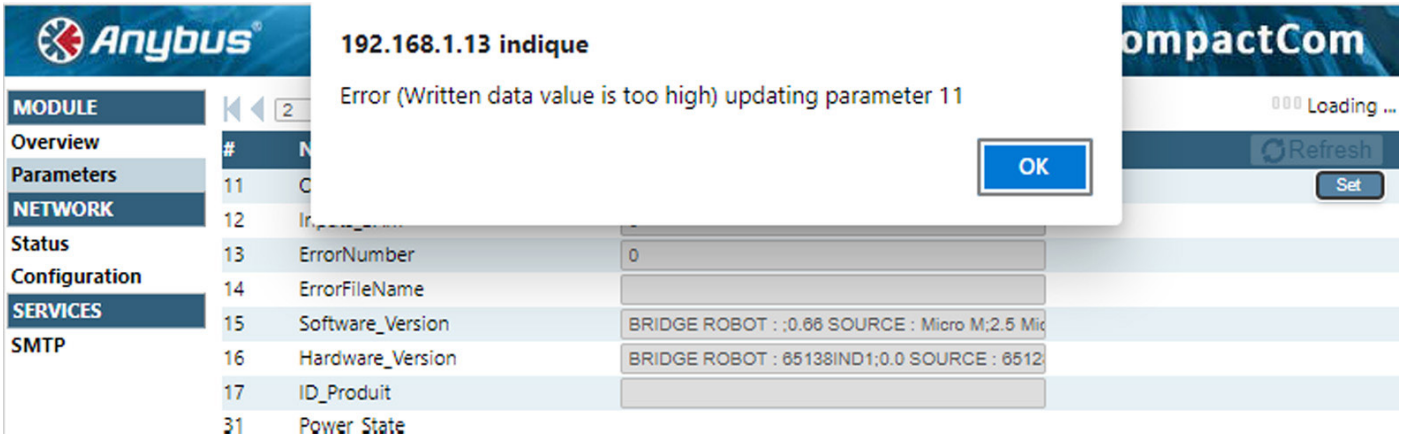


Once the value is entered, simply click the SET button at the end of the line to send the value to SAM-1N.

Once this is done, the value of the parameter is changed:



If a value is entered out of range, an error message will be displayed.

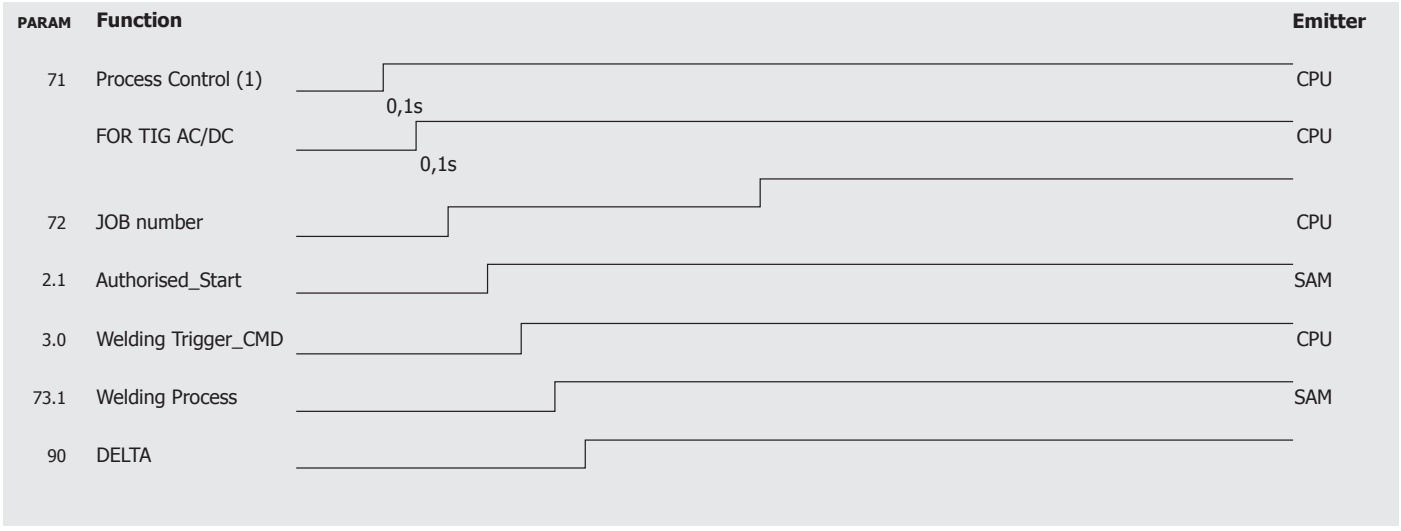


9. WELDING PROCESSES

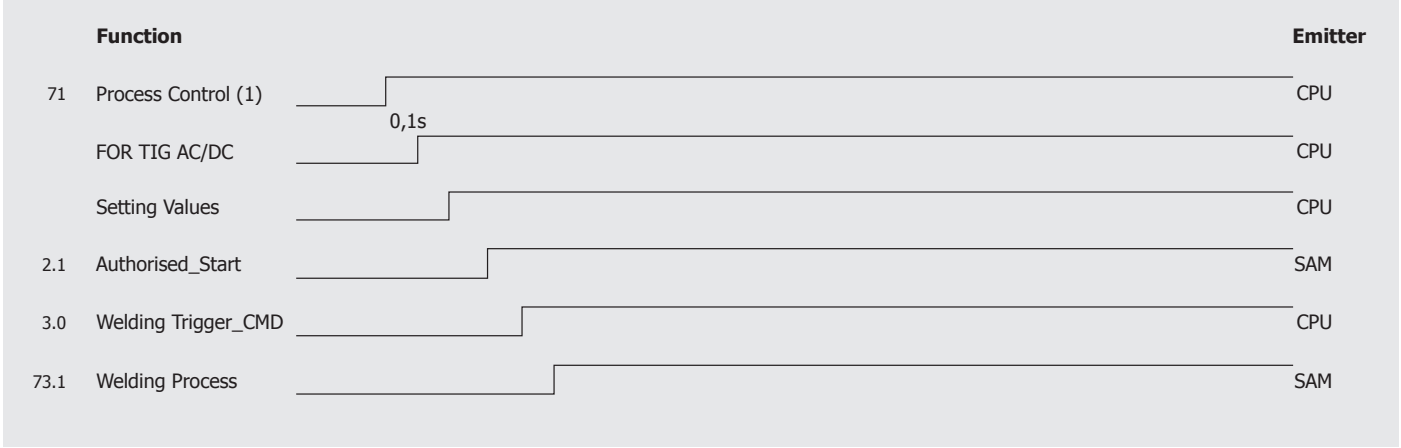
This chapter provides diagrams of different welding processes.

A) DIAGRAM OF A WELDING CYCLE

Job Mode init

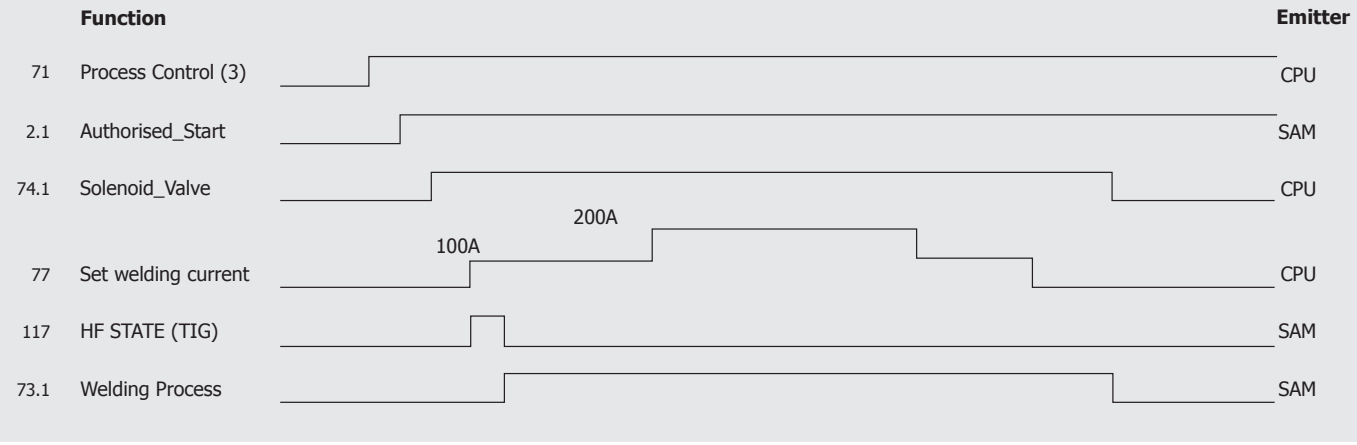


Advanced Mode init



B) DIAGRAM OF A WELDING CYCLE IN TRACKING MODE

Tracking Mode GTAW

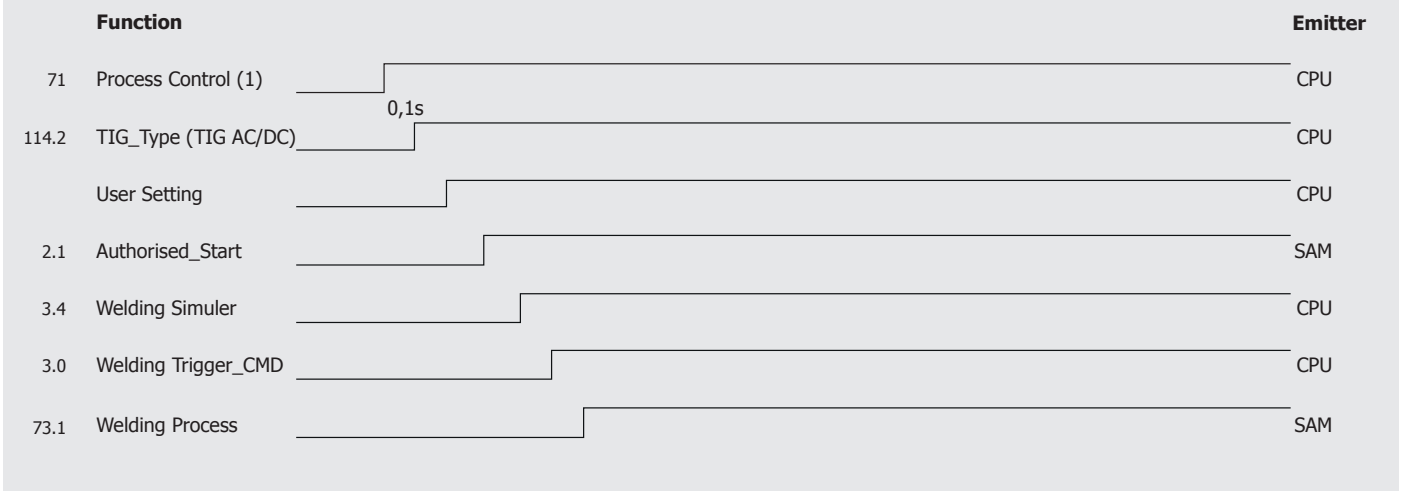


Welding cycle

C) DIAGRAM OF A WELDING CYCLE IN SIMULATION MODE

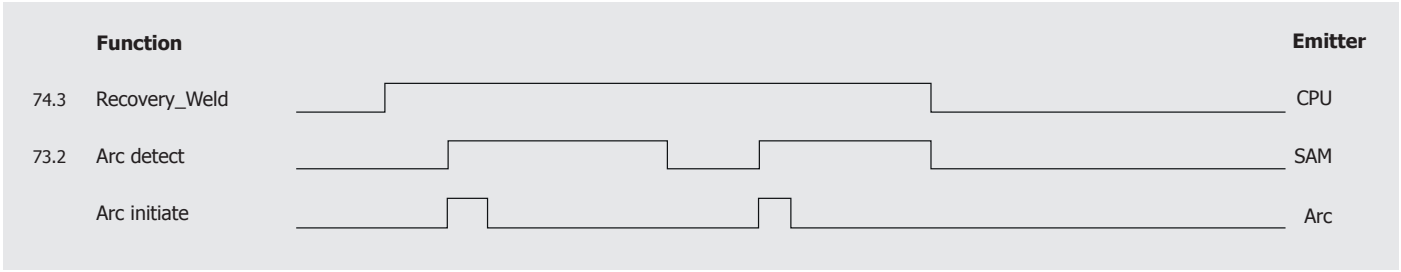
JOB Mode init

Advanced Mode init



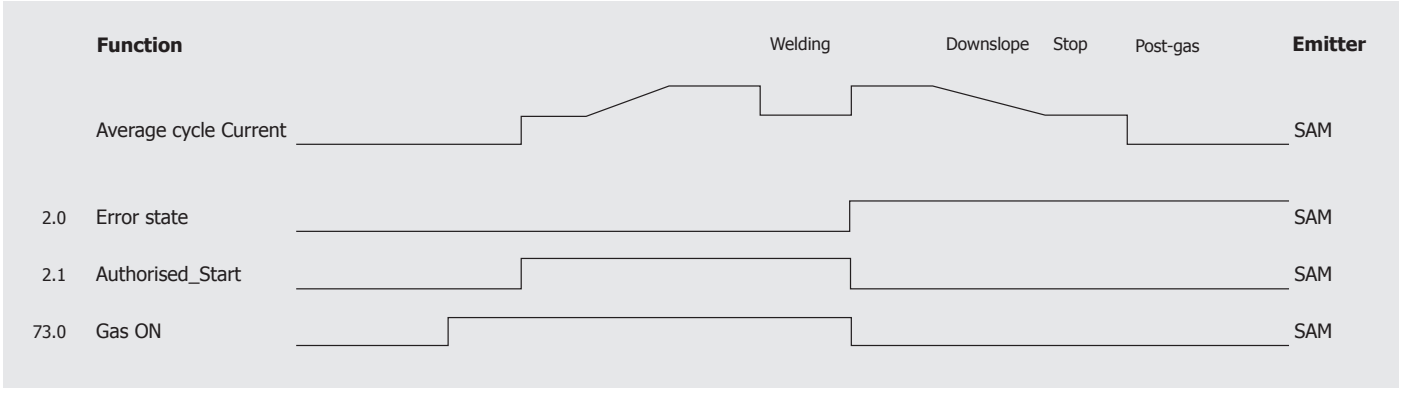
D) DIAGRAM OF A WELD REWORK

Rework arc ignition GTAW HF and GMAW

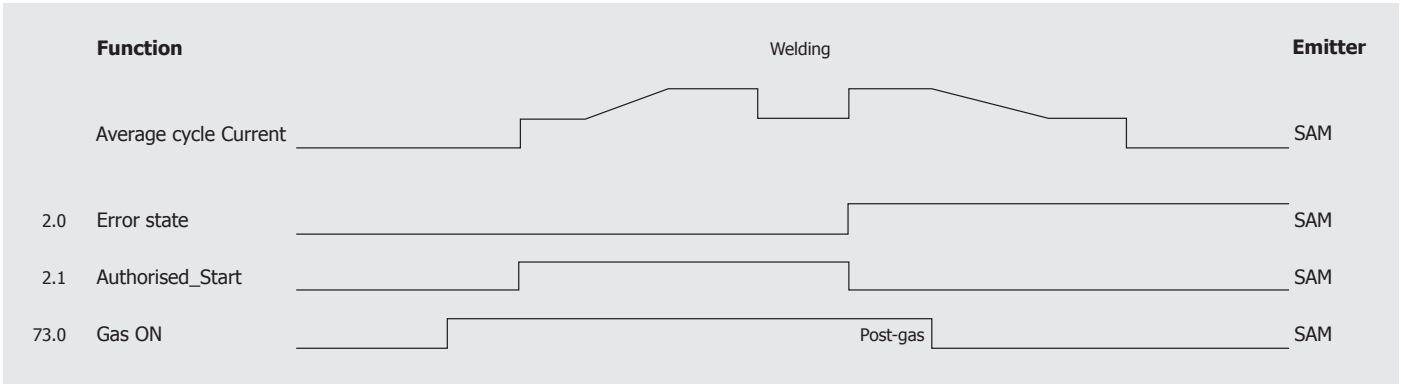


E) DIAGRAM IN CASE OF ERROR

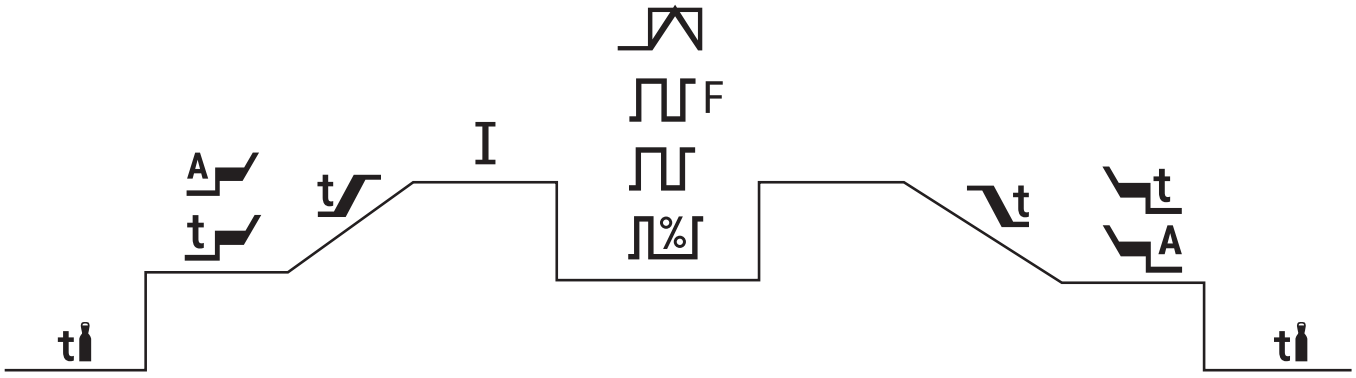
Error Urgent



Error NO Urgent



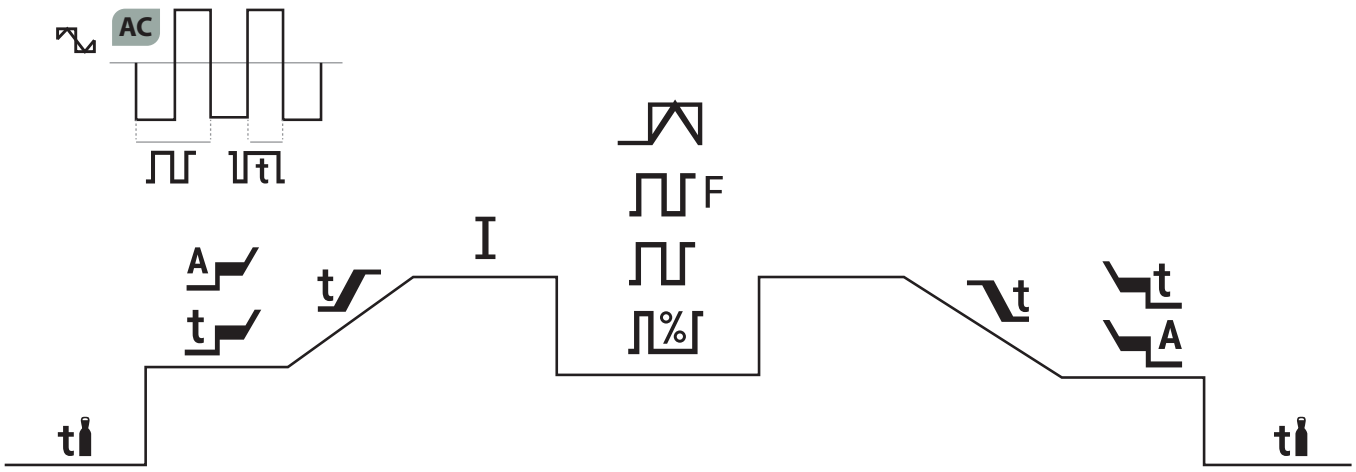
F) PARAMETER CURVES IN DC TIG



ti	79	Pre-gas_Time
A	82	Start_Current
t	81	Start_Time
t	83	Upslope_Time
Active if Module Arc =1		
F	88	Pulse_FREQ
	89	Pulse_Cycle
%	87	Cold_PERC
	111	Pulse_Waveform
t	84	Downslope_Time
t	85	Stop_Time
A	86	Stop_Value
ti	80	Post-gas_Time
I	77	Weld_Current
	118	Electrod_Dia

If Pulse Freq<2,5 Khz, Fast Pulse=0

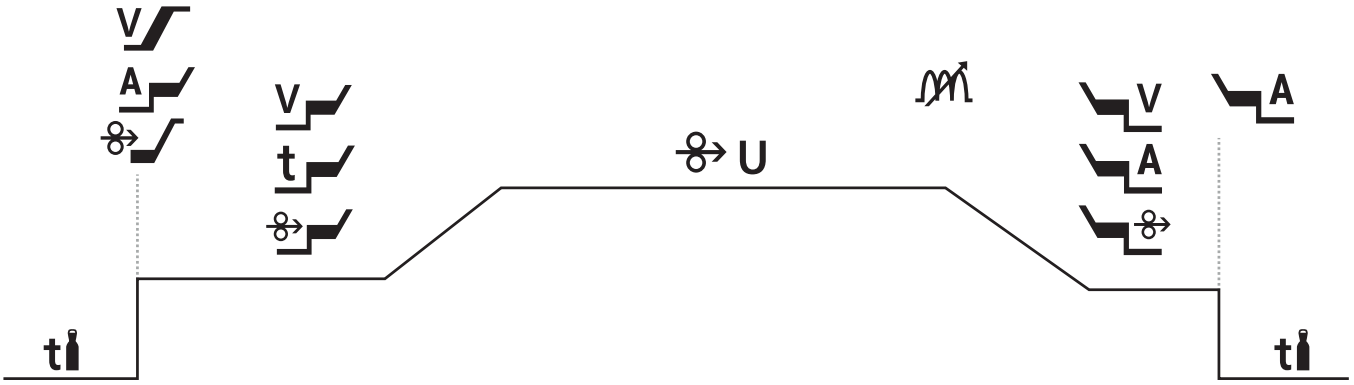
G) PARAMETER CURVES IN AC TIG



t	79	Pre-gas_Time	
A	82	Start_Value	
t	81	Start_Time	
t	83	Upslope_Time	
Active if Module Arc =1			
F	88	Pulse_FREQ	
	89	Pulse_Cycle	
%	87	Cold_PERC	If Pulse Freq<2,5 Khz, Fast Pulse=0
	111	Pulse_Waveform	
t	84	Downslope_Time	
t	85	Stop_Time	
A	86	Stop_Value	
t	80	Post-gas_Time	
I	77	Weld_Current	
	133	AC_FREQ	
t	134	AC_Duty_Cycle	
	135	AC_Waveform	
	118	Electrod_Dia	

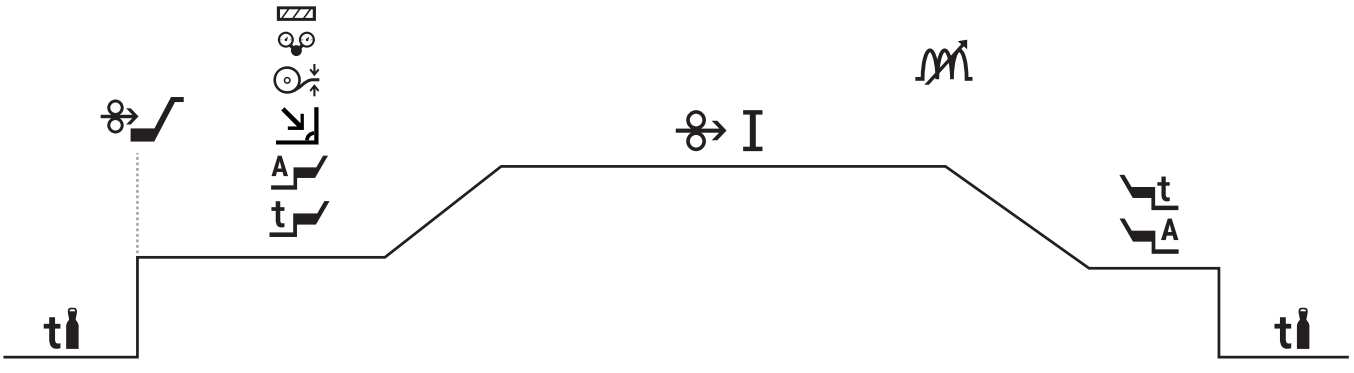
H) PARAMETER CURVES IN STANDARD MIG/MAG MODE

Standard MIG/MAG mode



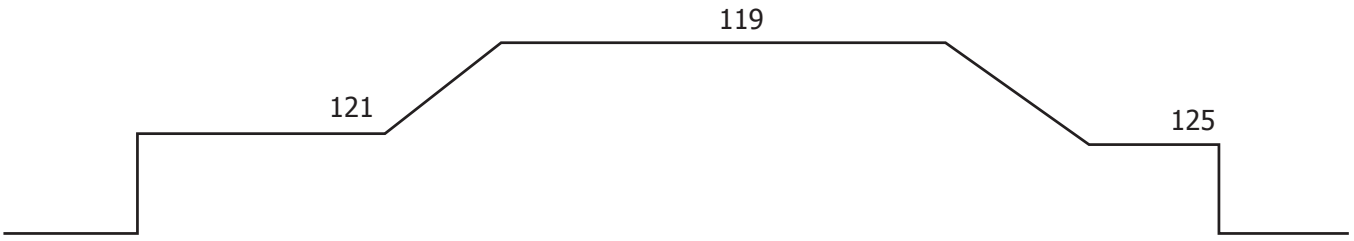
	79	Pre-gas_Time
	117	Creep_Voltage
	128	Istart
	162	Creep_Speed
	82	Start_Value
	81	Start_Time
	166	Hot_Start_Speed
	163	Weld_Speed
U	112	Weld_Voltage
	86	Stop_Value
	85	Stop_Time
	167	Crater_Fill_Spd
	129	Burn_back
	80	Post-gas_Time
	126	Self

MIG/MAG synergic standard mode



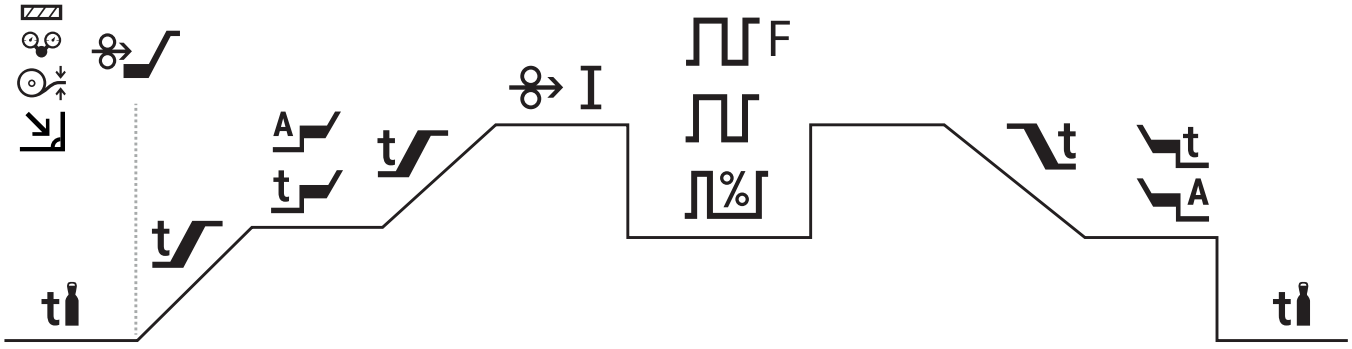
	116	Couple
	165	DIAM_wire

	127	Position
	79	Pre-gas_Time
	162	Creep_Speed
	82	Start_Value
	81	Start_Time
	163	Weld_Speed
	77	Weld_Current
	86	Stop_Value
	85	Stop_Time
	80	Post-gas_Time
	126	Self

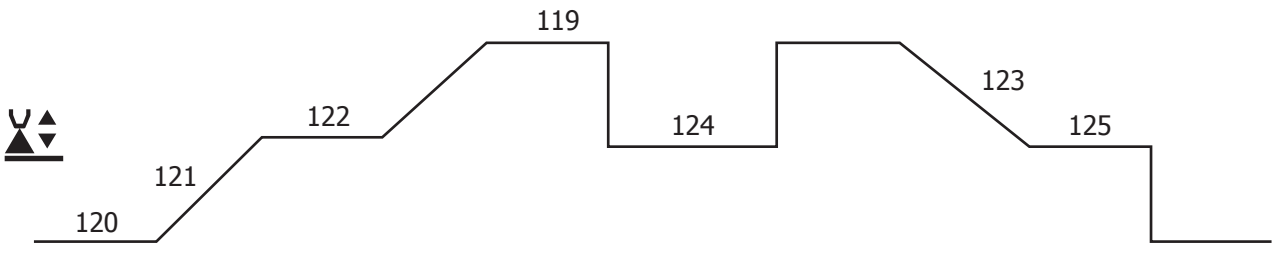


121	SoftStartArc_LEN
119	Arc_LEN
125	Crater_Arc_LEN

I) PARAMETER CURVES IN PULSED MIG-MAG MODE



	116	Couple
	165	DIAM_wire
	127	Position
t	79	Pre-gas_Time
	162	Creep_Speed
t	118	Soft_Start_Time
A	82	Start_Value
t	81	Start_Time
t	83	Upslope_Time
Active if Module Arc =1		
F	88	Pulse_FREQ
	89	Pulse_Cycle
%	87	Cold_PERC
t	84	Downslope_Time
t	85	Stop_Time
A	86	Stop_Value
t	80	Post-gas_Time
	126	Self
I	77	Weld_Current
	163	Weld_Speed



120	Start_Arc_LEN
121	SoftStartArc_LEN
122	Upslope_Arc_LEN
119	Arc_LEN

124	Cold_Arc_LEN
123	DownslopeArc_LEN
125	Crater_Arc_LEN

10. MAINTENANCE

A) REPLACING THE BATTERY

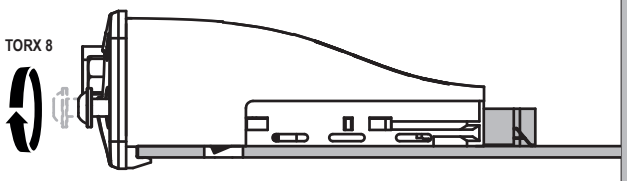
SAM-1N contains a backup battery type CR1220 (ref 63750) present on the electronic board. When a warning message is displayed the battery needs to be replaced as soon as possible.

To replace the battery, remove the cover covering the electronic board. If using a T100 safety module, remove it, slide the battery out of its housing and remove it.
Place the new battery in front of the battery compartment (make sure that the polarity of the battery is correct) and slide it to the bottom of the compartment. If a T100 safety module is used, put it back in place and refit the cover covering the electronic board. It will be necessary to reset the time in the SAM-1N as soon as it is switched back on.

B) REPLACING AN ANYBUS MODULE

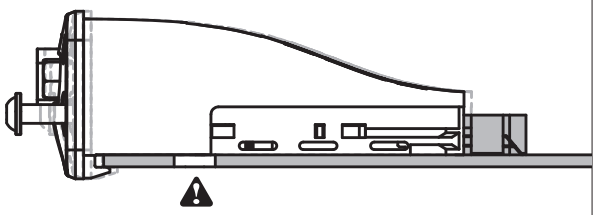
If it is necessary to replace the communication module, proceed as follows:

1



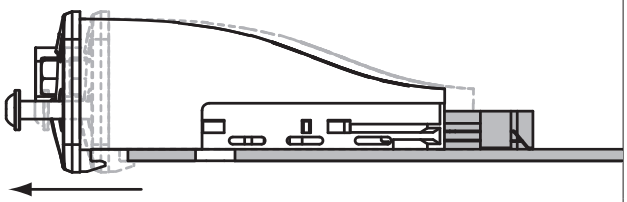
Unscrew the two screws of the module in place

2



Until the two lugs are disengaged

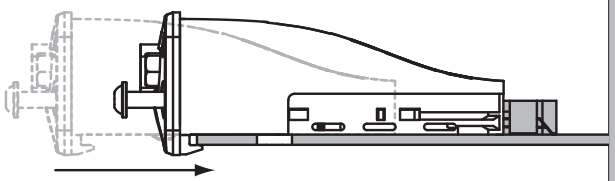
3



Remove the communication module and place it in an ESD packaging.

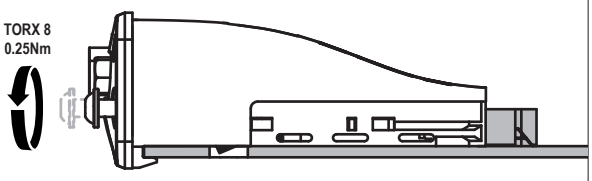
Then proceed with the installation of the new module:

1



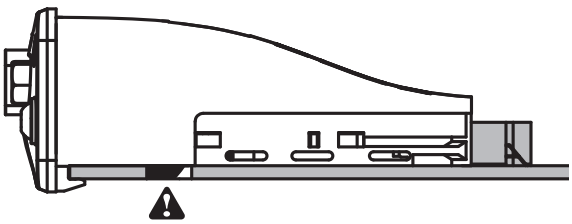
Insert the module into SAM-1N

2

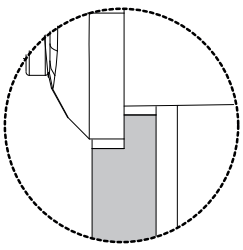


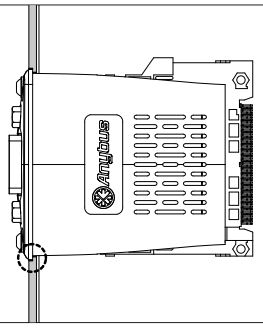
Screw the two Torx8 screws

3



Make sure that the module and lugs are in place.



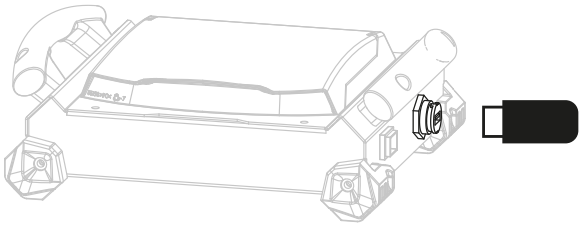


C) UPDATE

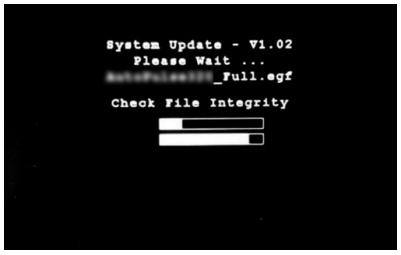
1- Before using the product for the first time, it is advisable to check the presence of a new «Software» update on the SAV GYS website (customer code required). SAM-1N is supplied with a USB memory stick containing a firmware version. Check that this is the latest update available.

2- Disconnected all appliances from the network.

3- Insert the supplied USB key in its dedicated port and start the unit.



4- The screen appears if a new version is detected. Wait until the end of the step and restart the product after disconnecting the USB key.



! Before performing an update, be aware of the changes made by the new firmware. In the case of a major version change, a parameter shift may occur in which case changes will also have to be made to the PLC/robot program.

D) LIST OF DEFECTS

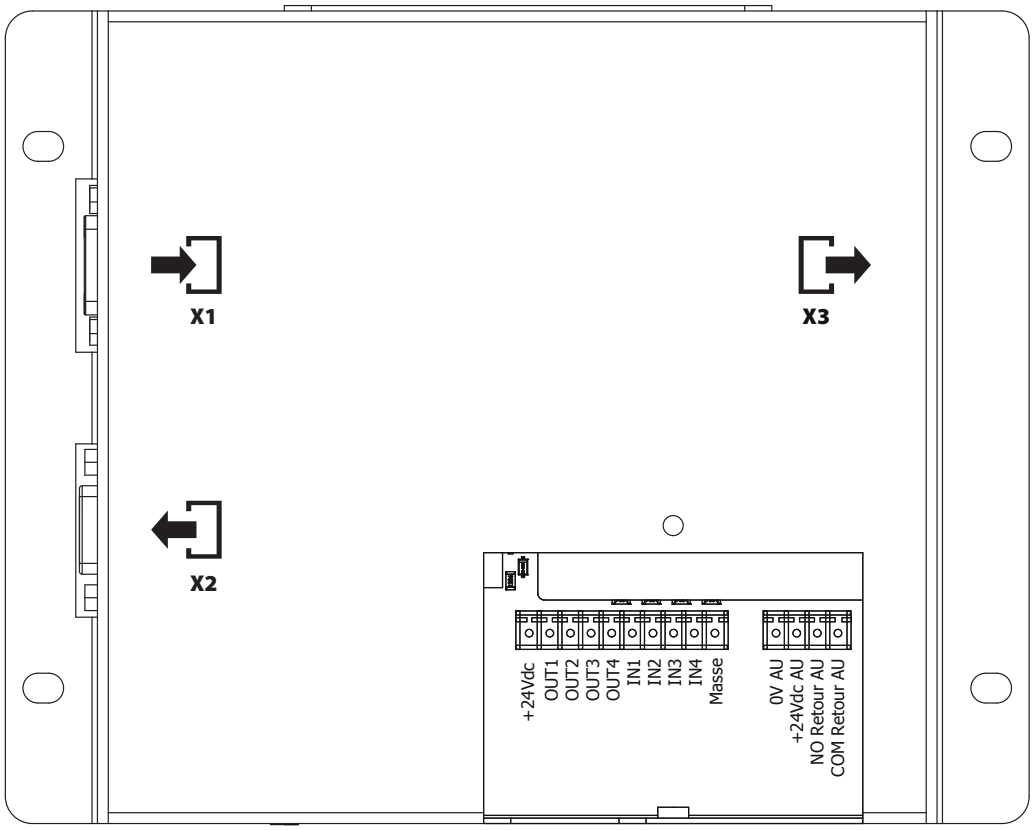
Defects that may occur on the material are reported on different parameters. The list below lists them and includes an explanation for each defect.

#	Identification	Description	Action
1	Protection_Thermique	Thermal protection triggered	Generator overheating. See generator manual
2	Default_Fan_Speed	Fan fault	See generator manual
3	DEF_PS_Over_V	Overvoltage fault	A power surge has occurred. See generator manual
4	DEF_PS_Under_V	Undervoltage fault	A voltage drop has occurred. See generator manual
5	DEF_PS_lost_PH	Phase break fault	See generator manual
6	DEF_PS_Break	Disconnected from the network	See generator manual
7	DEF_water_level	Problem with the water level in the cooling unit	See instructions for the cooling unit
8	DEF_Unit_Break	Cooling unit disconnected	See instructions for the cooling unit
9	DEF_Therm_Protec	Thermal protection achieved on the cooling unit	See instructions for the cooling unit
10	Warning_Flow_Min	Minimum Flow Threshold Alert	See instructions for the cooling unit
11	DEF_Flow_Min	Default of minimum flow rate threshold	See instructions for the cooling unit
12	DEF_Flow_Max	Default of maximum flow rate threshold	See instructions for the cooling unit
13	DEF_CC_Overload	MIG short circuit	See generator manual
14	DEF_I_EARTH	Earth current fault	See generator manual
15	DEF_over_V_MOT	Motor overvoltage fault reel motor	See reel instructions
16	DEF_over_A_MOT	Fault on reel motor current	See reel instructions
17	DEF_SPD_REG	Motor reel motor speed fault	See reel instructions
18	DEF_collision	Collision state detection	See reel instructions
19	End_wire	End of wire reel	See reel instructions
20	Wire_move	Abnormal wire movement	See reel instructions

ANNEXES

ANNEXE A

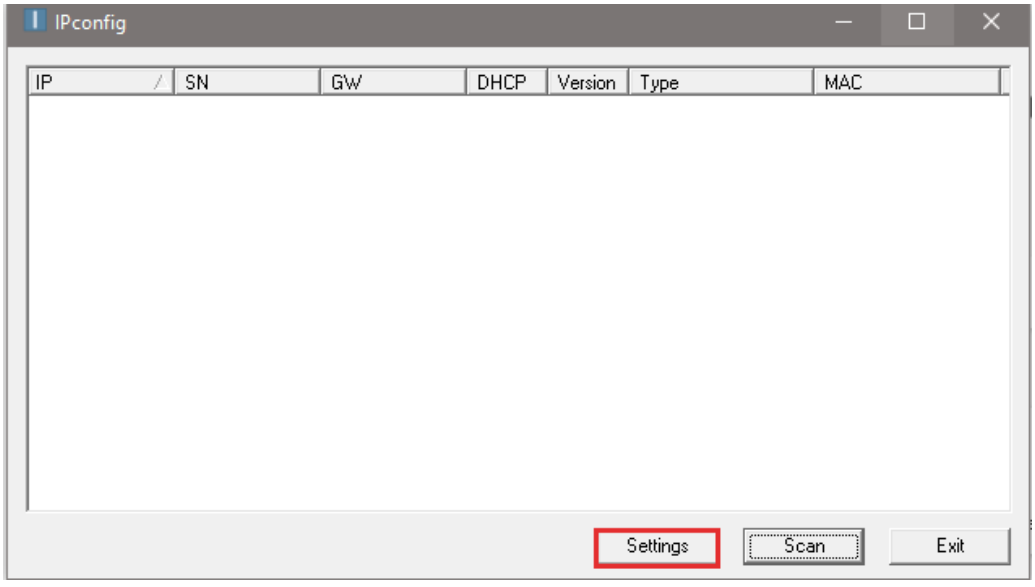
SAM-1N wiring diagram



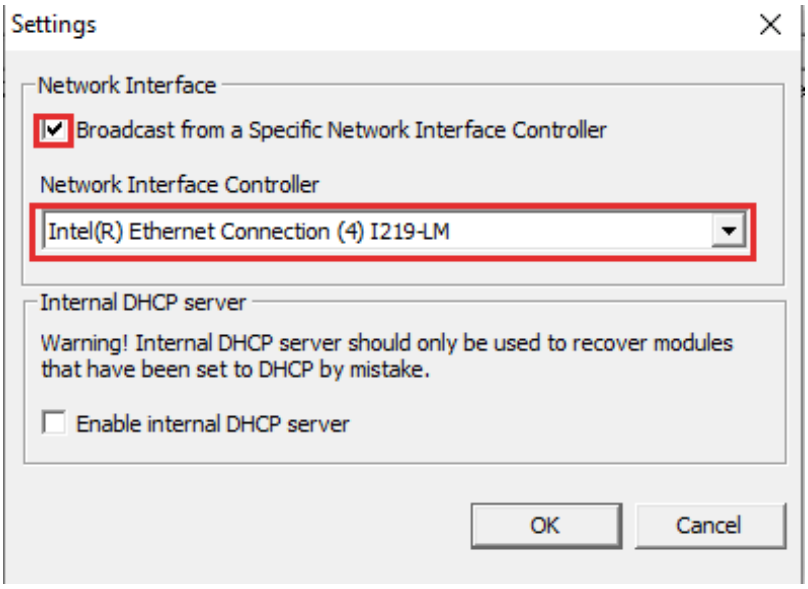
ANNEXE B

Using the IPconfig software

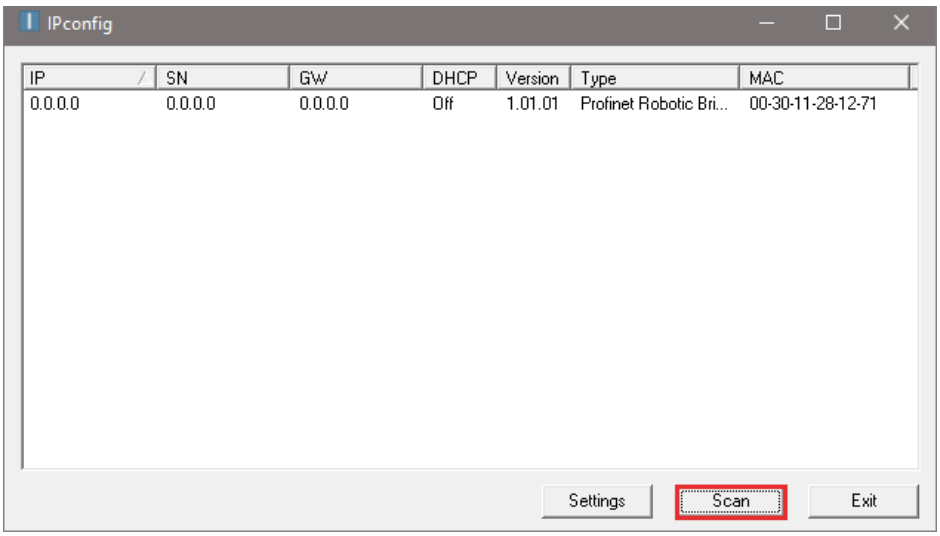
Launch the software by double clicking on the IPconfig icon.
Click on «Settings».



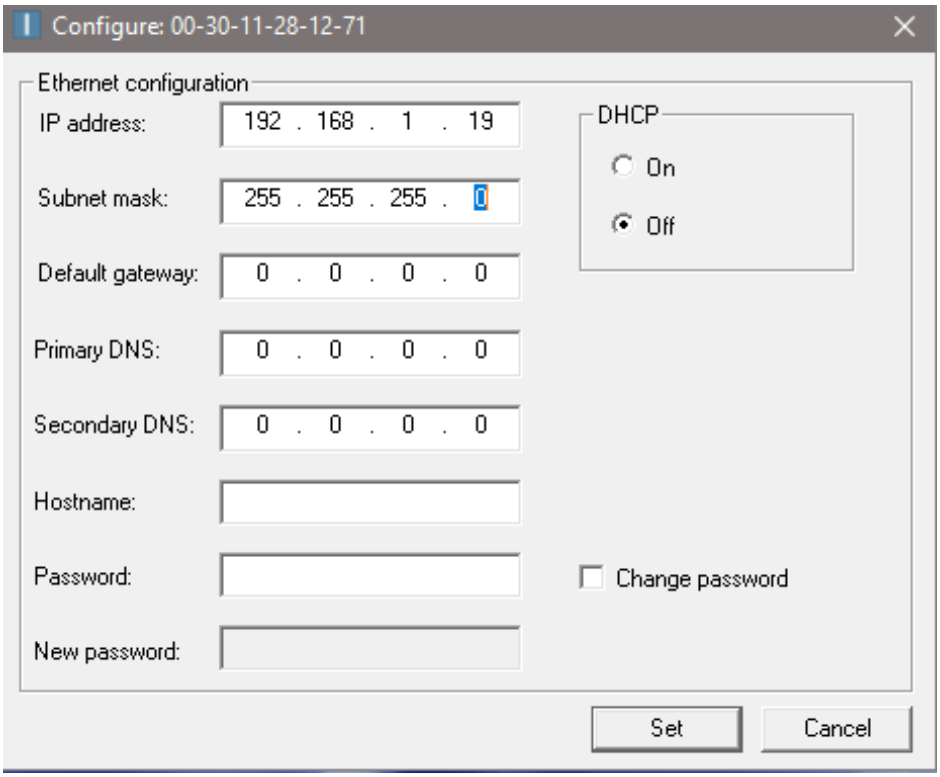
Check the box «Broadcast from a Specific Interface Controller», then under «Network interface Controller» select the network card to which the SAM-1N is connected and confirm.



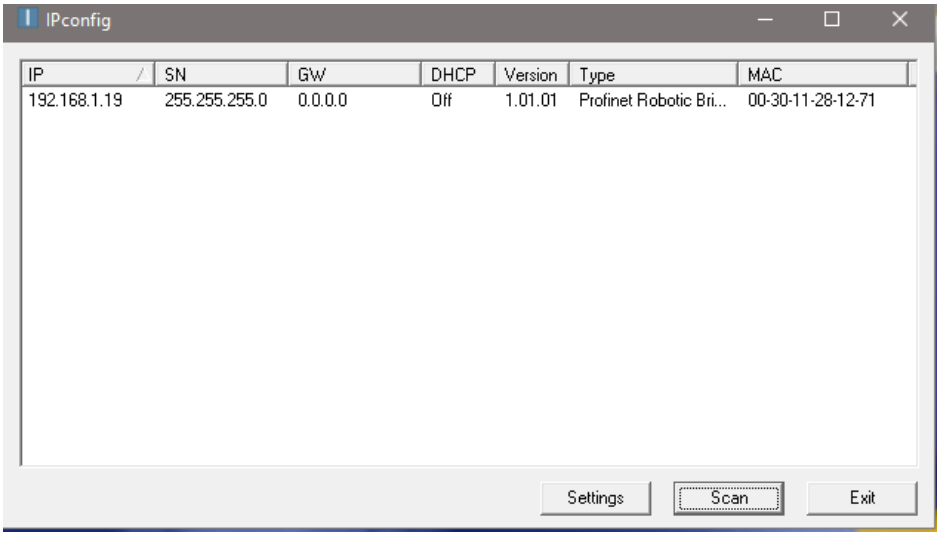
Click on «Scan» to start a search for products connected to the network.
The result is displayed:



Once you have found the product, you can change the IP address of a device by selecting it and then clicking on the Settings button. A new page opens where you can enter the connection settings.



Validate the new parameters by clicking on the Set button, the IPconfig software scans the network again and displays its result. It is then possible to check that the new connection parameters have been memorised.



It is now possible to connect to SAM-1N at the desired IP address.

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