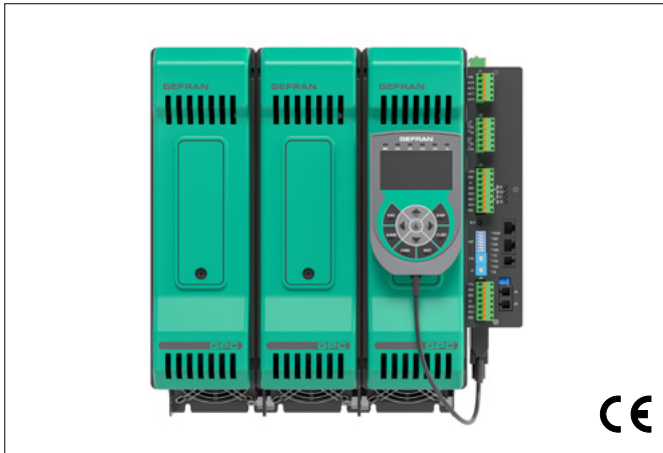


**CONFIGURATION MANUAL AND INSTALLATION IN
NETWORKS PROFIBUS**

Software version: 1.4x

Code: **81903 - 04/2024 - ITA**

This document is to supplement the manuals:

- Instructions for use and warnings
(COD. 81900 05/2020)
- Configuration and programming manual
(COD. 81901 11/2020)

The software version referred to in this manual is for the Modbus RTU/PROFIBUS Fieldbus Interface board inserted inside the GPC as PORT 2 serial communication port.

WARNING !

This manual should be considered as an integral part of the product, and must be available to people interacting with it at all times.

The manual must always accompany the product, even if it is transferred to another user.

Installers and/or maintainers are obliged to read this manual and scrupulously follow the instructions given herein and on the attachments thereto, since GEFran shall not be liable for damage caused to persons and/or property, or suffered by the product itself, if the conditions described below.



The Customer is obliged to respect industrial secrecy, so the following documentation and its attachments may not be tampered with or modified, reproduced or given to third parties, without the authorization of **GEFRAN**.

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1 • INTRODUCTION

The **"GPC 40A-600A"** series of modular power controllers with PROFIBUS DP fieldbus interface enables the rapid integration of a large number of compact control units for temperature control and heating device control (up to 372 zones), within advanced automation systems (such as PLCs, Supervision Systems, etc.) interconnected via communication networks and protocols defined by the standard.

It is not the purpose of this guide to describe the Fieldbus "PROFIBUS DP," it is assumed that the user has knowledge of the same and refers for any updates to the cited standard or the official website maintained by P.N.O. (Profibus Network Organization): www.profibus.com.

It is also assumed that the user is already familiar with the technical characteristics of GPC products, contained in the appropriate user manuals attached to the product, or downloadable from the GEFRA S.P.A. website www.gefran.com.

1.1. WARNINGS

Depending on the version of the GPC product purchased, use the corresponding GSD /3/ file:

COMPATIBILITY TABLE FW VERSIONS AND GSD FILES						
HISTORICAL VERSIONS		FW GFX-PROFI	MANUAL GPC PROFIBUS	GSD GFPC116C	LIBRERIE S7 GEFRAN.LIB	FW GPC 40/600A
1	Ver.	01.40	81903	01	01.00	02.11
	Date	30/11/2020	11/2020	03/11/2020	01/12/2011	12/2020
2	Ver.	01.40	81903	02	01.00	02.11 et seqq.
	Date	30/11/2020	11/2020	16/10/2023	01/12/2011	12/2020

2 • BIBLIOGRAPHICAL REFERENCES

/1/ IEC 61158, Digital data communications for measurement and control - Fieldbus for use in industrial control system

/2/ PROFIBUS Specification, Normative Parts of PROFIBUS –FMS, -DP, -PA according to the EN 50170

/3/ PROFIBUS Guideline Vol.1 GSD, Specification for PROFIBUS Device Description and Device Integration.

/4/ 81900_MHW_GPC_40/600A_ITA, INSTRUCTIONS FOR USE AND WARNINGS

/5/ 81901_MSW_GPC_40/600A_ITA CONFIGURATION AND PROGRAMMING MANUAL

/6/ 80902_MEMORY MAP_GPC_40/600A_ITA_EN

3 · MAIN TECHNICAL FEATURES

The **GFx-PROFI** Fieldbus Interface Module installs internally to GPC products and allows them to expand their communication by equipping them with the PROFIBUS DP protocol. It is a bridge between the PROFIBUS network and the MODBUS RTU network present in the GPC.

- Two channels of communication:
 - the first channel is the serial port with PROFIBUS DP slave protocol that allows connection to a Profibus master.
 - the second channel is a serial port with Modbus RTU protocol that allows connection to the GPC on which the module is installed.
- Management of one to three thermoregulation zones with single-phase, two-phase or three-phase GPC.
- Maximum number of GPC temperature control zones manageable by PROFIBUS master: 372 (124 knots x 3 zones).
- RS485 serial port galvanically isolated from power supply.
- Profibus DP slave operation even under the fault condition of the control part.
- PROFIBUS address selection via HW or SW.

3.1. TECHNICAL DATA

PROFIBUS port	
Protocol	Profibus DP V0 (slave)
Function	GPC Connection to a Profibus DP Master Device
Baud rate	Self-synchronization (9.6 ... 12000 kBit/s)
Connector	9 pin D-Type
Node address	HW: 1...99 selectable by rotary switches in the GPC
	SW: 1...124 via specific sw message
I/O data size	55 bytes I/O
Supported telegrams	Data_Exchange, Slave_Diag, Set_Prm, Chk_Cfg, Get_Cfg, Global_Control, Set-Slave-Add
File GSD	GPC116C.GSD
Modbus port	
Protocol	ModBus RTU (master) serial RS485
Function	Connection to the GPC instrument
Baud rate	19200bps
Connector	Not accessible from the outside
Node address	1...99 selectable by rotary switches in the GPC
Diagnostics	
LEDS: visible only for installers by removing the GPC cover	
Green	PROFIBUS node operational status
Steady off	Absence of communication with PROFIBUS Master
Blink 1.00sec	"AUTOMATIC BAUDRATE RESEARCH"
Blink 0.25sec	"WAIT FOR PARAMETERIZATION"
Blink 0.05sec	"WAIT FOR CONFIGURATION"
Fixed on	"DATA EXCHANGE"
Yellow	ASIC Status
Steady off	"DATA EXCHANGE" status
Fixed on	Other operating states
Red	Communication errors
Steady off	No communication errors
Blink 1.00sec	"State not possible"
Blink 0.25sec	"DP_State not possible"
Blink 0.05sec	"WD_State not possible"
Fixed on	Fault module

3.2. TIMING OF PROCESS DATA UPDATE

The Process Data transferred via PROFIBUS network between GFX-PROFI and the PROFIBUS Master PLC, are updated in the GPC controller by periodic read/write of the Modbus subnetwork, so regardless of the communication speed of the PROFIBUS network, the actual update of these variables is conditioned by the selected configuration.

READING CYCLES			
n. words	GPC monophas	GPC biphas	GPC threephas
24	100msec	100msec	100msec

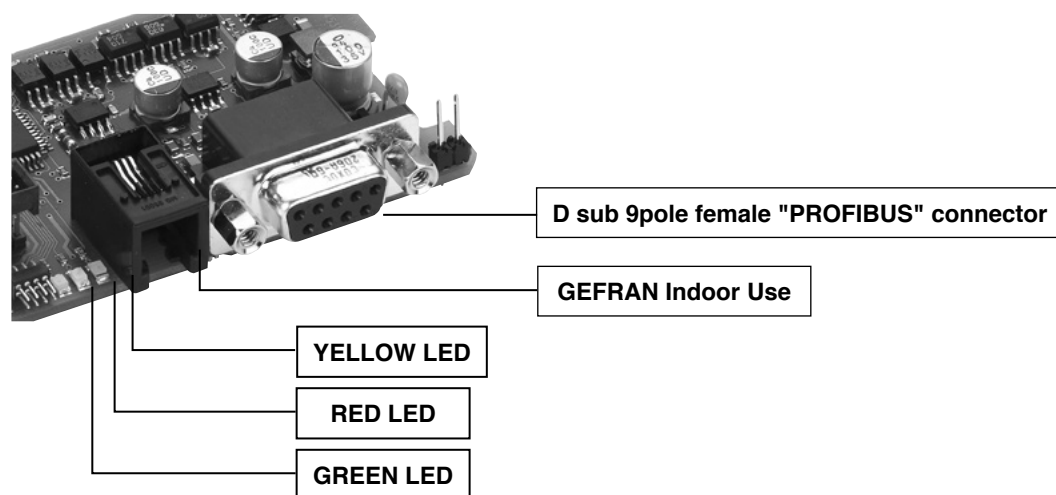
WRITING CYCLES			
n. words	GPC monophas	GPC biphas	GPC threephas
24	100msec	100msec	100msec

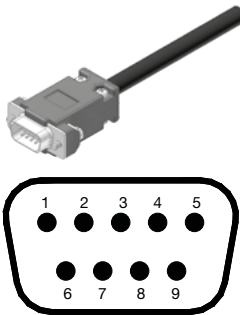
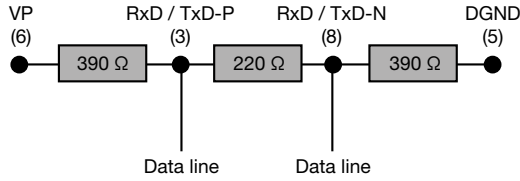
Write cycles are introduced into the scan cycle of read data only when the data has changed; the update of read data is slowed by one acquisition cycle.

4 • INSTALLATION

For a complete description of installation procedures and to general electrical connections, refer to the manual /4/, attached to the products.

4.1. ELECTRICAL CONNECTIONS TO THE PROFIBUS NETWORK



Connector SS D-SUB 9 poles male	N. Pin	Name	Description	Notes
	1	SHIELD	EMC Protection	it is recommended to connect the termination resistor as shown in the figure. 
	2	M24V	Output voltage.24V	
	3	RxD / Tx D-P	Receiver I transmitter date {B}	
	4	n.c.	n.c.	
	5	DGND	Vp Ground	
	6	VP	Tensione positiva +5 V	
	7	P24V	Positive voltage +24V	
	8	RxD / Tx D-N	Receiver I transmitter date {A}	
	9	n.c.	n.c.	

Cable Type: Shielded 22AWG conform to PROFIBUS

When the GPC is the last node in the PROFIBUS network, it is necessary to connect a 220ohm 1/4W termination resistor between the two signals "RxD/TxD-P" and "RxD/TxD-N" and two 390ohm 1/4W resistors for line polarization between the "VP" signal with "RxD/TxD-P" and between the "DGND" signal with "RxD/TxD-N."

In accordance with /2/, to ensure proper communication between PROFIBUS devices, it is necessary for the shielded cable to have special characteristics:

PARAMETER	TYPE CABLE "A"
Impedance Ω	135...165
Capacity pF/m	< 60
Resistenza di anello in 2/Km	< 110
Core diameter in mm	> 0,64
Loop resistance Ω /Km	> 0,34 (AWG22)

Using cables with such characteristics, the following line length can be obtained:

Baudrate in Kbit/sec	9,6	19,2	45,45	93,75	187,5	500	1500	3000	6000	12000
Max length in mt.	1200	1200	1200	1200	1000	400	200	100	100	100

GEFRAN S.p.A. supplies PROFIBUS-approved cables and connection systems as accessories to GPCs .

4.2. NODE ADDRESS SELECTION BY ROTARY SWITCH

The hexadecimal rotary switches on the GPC indicate the PROFIBUS network node address that is acquired when the instrument is turned on.

The GPC is supplied from the factory with rotary switch in position "0," and it is up to the customer to assign the correct position, considering that only 1 to 99 are valid.



DURING THE ROTATION OF THE ROTARY SWITCHES, THE GREEN RUN LED REMAINS ON STEADY, IT WILL RESUME NORMAL FLASHING WHEN THE NEW VALUE IS ACQUIRED AFTER ABOUT 5 SECONDS.



4.3. NODE ADDRESS SELECTION BY SOFTWARE

Through the appropriate PROFIBUS telegram **"SET SLAVE ADDRESS"** it is possible to assign the node address (1...124) by disabling the rotary-switch functionality for the Profibus network, while maintaining it for the Modbus subnetwork.

To restore rotary-switch functionality, the node address 125 must be sent via PROFIBUS telegram, immediately the node address is reassigned through the rotary-switch.

Through this feature, the number of temperature control zones can be expanded with a Profibus network, Up to a maximum of $124 \times 3 = 372$.

Note: Make sure that the Profibus Master hardware supports the ability to send the above message.

Example of software configuration:

1. Rotary-Switch "x10" in position 1 and "x1" in position 0.

Profibus network node is equal to 10.

Modbus network node is equal to 10.

2. Via software, the address 2 is sent to the GPC.

The Profibus network node is equal to 2.

Modbus network node is equal to 10.

3. Rotary-Switch "x10" in position 4 and "x1" in position 0.

Any change in the rotary-switch has meaning only for the Modbus subnetwork

The Profibus network node is equal to 2.

Modbus network node is equal to 40.

4. Via software, the address 125 is sent to the GPC.

The rotary-switch resumes setting the Profibus and Modbus network node.

The Profibus network node is equal to 40.

Modbus network node is equal to 40.

4.4. GPC CONFIGURATION SELECTION BY DIP-SWITCH

The GPC configuration **dip-switch** described in the manual /4/ under “*Descrizione Dip-Switches*” allows you to define the mode of operation of the instrument.

Dip "6," in particular, when it is in the "ON" position allows the factory values to be reset to "POWER ON," both with respect to temperature controller variables and PROFIBUS communication parameters.



AFTER RESTARTING THE INSTRUMENT WITH THE FACTORY PARAMETERS, REMEMBER TO RETURN DIP "6" TO THE "OFF" POSITION.

DIP "7" MUST NECESSARILY BE IN THE "OFF" POSITION !

5 · PROFIBUS DP DATA STRUCTURE

The data exchange structure handled by GFX-PROFIs is a function of the type of GPC device (single-phase, two-phase, or three-phase) and the resulting configuration selected.

The "Configuration Telegram" (**SAP 62**) should then contain the exact number of bytes, format and consistency, exchanged during the "DATA EXCHANGE" operational state (**SAP DEFAULT**).

Through an area of 7 consistent bytes always present in read and as many in write, called "**Dati Parametrici**", the PROFIBUS network Master device (PLC or Supervisor) can access any parameter of the GPC connected to the node. A second area of 48 bytes for reading, and the same number for writing, defined as "**Process Data**", allows it to quickly acquire or modify the value of 24 word variables of the instrument's Modbus map.

The user can select which variables to attribute to Process Data, depending on their application, via the "Parameterization Telegram" (**SAP 61**).

When the PROFIBUS Master requests diagnostics from the GPC via the "Diagnostic Data Request Telegram" (**SAP 60**), a packet of 9 bytes will be sent, including 7 bytes of standard information and 2 bytes of GPC-specific diagnostics.

5.1. NODE ADDRESS CHANGE TELEGRAM (SAP 55)

Attraverso la funzione "Set_Slave_Add" i Master Profibus di Classe 2 sono in grado di cambiare l'indirizzo degli Slave.

BYTE	DESCRIPTION	VALUE (HEX)
1	NEW ADDRESS	N
2	IDENTIFICATION NUMBER (HIGH BYTE)	0F
3	IDENTIFICATION NUMBER (LOW BYTE)	FB
4	ENABLING (00) / DISABLING (01) FURTHER CHANGES	00

5.2. CONFIGURATION TELEGRAM (SAP 62)

It is sent by the PROFIBUS Master to all Slave nodes before entering the "DATA EXCHANGE" operational state; in case of misconfiguration, the GPC does not make itself available for communication with the Master.

BYTE	DESCRIPTION (24 WORDS I/O)	VALUE (HEX)
1	7 CONSISTENT BYTES	B6
2	12 WORD INPUT/OUTPUT	7B
3	12 WORD INPUT/OUTPUT	7B

5.3. PARAMETERIZATION TELEGRAM (SAP 61)

The PROFIBUS Master uses this protocol, before entering the "DATA EXCHANGE" operational state, to identify itself to the GPC-PROFIBUS and specify the way it is to operate.

The telegram consists of a part of fixed data defined by the PROFIBUS standard (10 bytes) and a part of GPC-specific data (102 bytes).

The composition of such a telegram is carried out by the Hardware Configuration Software of the PROFIBUS Master, which detects the information contained in the "GSD" file.

BYTE	DESCRIPTION	DEFAULT	VALORE (HEX)
1 ≈ 7	IN ACCORDANCE WITH STANDARD EN50170		
8	RESERVED		00
9	RESERVED		00
10	RESERVED		00
11	GSD VERSION		01
12	DATA TYPE	-	-
13	ERROR BEHAVIOUR	NONE	00
14	STARTUP DELAY (MSB)	3 SEC	0B
15	STARTUP DELAY (LSB)		B8
16	SWAP BYTES	NO	00
17	PROCESS DATA INPUT 1 MSB	INSTRUMENT STATUS3 ZONE 1	06
18	PROCESS DATA INPUT 1 LSB		79
19	PROCESS DATA INPUT 2 MSB	INSTRUMENT STATUS4 ZONE 1	06
20	PROCESS DATA INPUT 2 LSB		7A
21	PROCESS DATA INPUT 3 MSB	CONTROLLER STATUS_W ZONE 1	05
22	PROCESS DATA INPUT 3 LSB		CF
23	PROCESS DATA INPUT 4 MSB	SINGLE-PHASE LOAD VOLTAGE ZONE 1	06
24	PROCESS DATA INPUT 4 LSB		EF
25	PROCESS DATA INPUT 5 MSB	SINGLE-PHASE LOAD CURRENT ZONE 1	06
26	PROCESS DATA INPUT 5 LSB		F1
27	PROCESS DATA INPUT 6 MSB	SINGLE-PHASE LOAD POWER ZONE 1	07
28	PROCESS DATA INPUT 6 LSB		70
29	PROCESS DATA INPUT 7 MSB	CONTROL OUTPUT VALUE ZONE 1	04
30	PROCESS DATA INPUT 7 LSB		02
31	PROCESS DATA INPUT 8 MSB	ANALOG INPUT VALUE ZONE 1	06
32	PROCESS DATA INPUT 8 LSB		3C
33	PROCESS DATA INPUT 9 MSB	INSTRUMENT STATUS3 ZONE 2	0A
34	PROCESS DATA INPUT 9 LSB		79
35	PROCESS DATA INPUT 10 MSB	INSTRUMENT STATUS4 ZONE 2	0A
36	PROCESS DATA INPUT 10 LSB		7A
37	PROCESS DATA INPUT 11 MSB	CONTROLLER STATUS_W ZONE 2	09
38	PROCESS DATA INPUT 11 LSB		CF
39	PROCESS DATA INPUT 12 MSB	SINGLE-PHASE LOAD VOLTAGE ZONE 2	0A
40	PROCESS DATA INPUT 12 LSB		EF
41	PROCESS DATA INPUT 13 MSB	SINGLE-PHASE LOAD CURRENT ZONE 2	0A
42	PROCESS DATA INPUT 13 LSB		F1
43	PROCESS DATA INPUT 14 MSB	SINGLE-PHASE LOAD POWER ZONE 2	0B
44	PROCESS DATA INPUT 14 LSB		70
45	PROCESS DATA INPUT 15 MSB	CONTROL OUTPUT VALUE ZONE 2	08
46	PROCESS DATA INPUT 15 LSB		02
47	PROCESS DATA INPUT 16 MSB	ANALOG INPUT VALUE ZONE 2	07
48	PROCESS DATA INPUT 16 LSB		44
49	PROCESS DATA INPUT 17 MSB	INSTRUMENT STATUS3 ZONE 3	12
50	PROCESS DATA INPUT 17 LSB		79
51	PROCESS DATA INPUT 18 MSB	INSTRUMENT STATUS4 ZONE 3	12
52	PROCESS DATA INPUT 18 LSB		7A
53	PROCESS DATA INPUT 19 MSB	CONTROLLER STATUS_W ZONE 3	11

BYTE	DESCRIPTION	DEFAULT	VALORE (HEX)
54	PROCESS DATA INPUT 19 LSB		CF
55	PROCESS DATA INPUT 20 MSB	SINGLE-PHASE LOAD VOLTAGE ZONE 3	12
56	PROCESS DATA INPUT 20 LSB		EF
57	PROCESS DATA INPUT 21 MSB	SINGLE-PHASE LOAD CURRENT ZONE 3	12
58	PROCESS DATA INPUT 21 LSB		F1
59	PROCESS DATA INPUT 22 MSB	SINGLE-PHASE LOAD POWER ZONE 3	13
60	PROCESS DATA INPUT 22 LSB		70
61	PROCESS DATA INPUT 23 MSB	CONTROL OUTPUT VALUE ZONE 3	10
62	PROCESS DATA INPUT 23 LSB		02
63	PROCESS DATA INPUT 24 MSB	ANALOG INPUT VALUE ZONE 3	07
64	PROCESS DATA INPUT 24 LSB		4B
65	PROCESS DATA OUTPUT 1 MSB	NO DATA	05
66	PROCESS DATA OUTPUT 1 LSB		CE
67	PROCESS DATA OUTPUT 2 MSB	NO DATA	05
68	PROCESS DATA OUTPUT 2 LSB		CE
69	PROCESS DATA OUTPUT 3 MSB	NO DATA	05
70	PROCESS DATA OUTPUT 3 LSB		CE
71	PROCESS DATA OUTPUT 4 MSB	NO DATA	05
72	PROCESS DATA OUTPUT 4 LSB		CE
73	PROCESS DATA OUTPUT 5 MSB	NO DATA	05
74	PROCESS DATA OUTPUT 5 LSB		CE
75	PROCESS DATA OUTPUT 6 MSB	NO DATA	05
76	PROCESS DATA OUTPUT 6 LSB		CE
77	PROCESS DATA OUTPUT 7 MSB	NO DATA	05
78	PROCESS DATA OUTPUT 7 LSB		CE
79	PROCESS DATA OUTPUT 8 MSB	NO DATA	05
80	PROCESS DATA OUTPUT 8 LSB		CE
81	PROCESS DATA OUTPUT 9 MSB	NO DATA	05
82	PROCESS DATA OUTPUT 9 LSB		CE
83	PROCESS DATA OUTPUT 10 MSB	NO DATA	05
84	PROCESS DATA OUTPUT 10 LSB		CE
85	PROCESS DATA OUTPUT 11 MSB	NO DATA	05
86	PROCESS DATA OUTPUT 11 LSB		CE
87	PROCESS DATA OUTPUT 12 MSB	NO DATA	05
88	PROCESS DATA OUTPUT 12 LSB		CE
89	PROCESS DATA OUTPUT 13 MSB	NO DATA	05
90	PROCESS DATA OUTPUT 13 LSB		CE
91	PROCESS DATA OUTPUT 14 MSB	NO DATA	05
92	PROCESS DATA OUTPUT 14 LSB		CE
93	PROCESS DATA OUTPUT 15 MSB	NO DATA	05
94	PROCESS DATA OUTPUT 15 LSB		CE
95	PROCESS DATA OUTPUT 16 MSB	NO DATA	05
96	PROCESS DATA OUTPUT 16 LSB		CE
97	PROCESS DATA OUTPUT 17 MSB	NO DATA	05
98	PROCESS DATA OUTPUT 17 LSB		CE
99	PROCESS DATA OUTPUT 18 MSB	NO DATA	05
100	PROCESS DATA OUTPUT 18 LSB		CE
101	PROCESS DATA OUTPUT 19 MSB	NO DATA	05
102	PROCESS DATA OUTPUT 19 LSB		CE
103	PROCESS DATA OUTPUT 20 MSB	NO DATA	05
104	PROCESS DATA OUTPUT 20 LSB		CE
105	PROCESS DATA OUTPUT 21 MSB	NO DATA	05
106	PROCESS DATA OUTPUT 21 LSB		CE
107	PROCESS DATA OUTPUT 22 MSB	NO DATA	05
108	PROCESS DATA OUTPUT 22 LSB		CE
109	PROCESS DATA OUTPUT 23 MSB	NO DATA	05
110	PROCESS DATA OUTPUT 23 LSB		CE
111	PROCESS DATA OUTPUT 24 MSB	NO DATA	05
112	PROCESS DATA OUTPUT 24 LSB		CE

The value “**GSD Version**” is fixed in the GSD file and cannot be changed, it is used by the FW to identify precisely the version of the GSD file used by the PLC application SW with which the board is configured, to ensure functional compatibility.

“**Data Type**” indica quante variabili di Dati di Processo sono utilizzate per quel nodo Profibus. Deve corrispondere a quanto rilevato dal FW in fase di inizializzazione della rete modbus , altrimenti la comunicazione Profibus non viene attivata (1=16 words, 2=32 words).

The “**Error Behaviour**” defines how the controller should behave in case of communication breakdown of the Profibus network :

- 0 = **None** Does not change operating state (defaults to backward compatibility)
- 1 = **Switching Off** Off Switches to "Switching off SW" state (OFF).
- 2 = **Manual Mode** Switches to "Manual" state (MAN)
- 3 = **Setpoint SP2** Switches to setpoint 2 (SP2) (Activates only if parameter "hd.1" = 1)



At "Power-ON," the GPC controller moves to the operating state (ON/OFF, MAN/AUTO,SP1/SP2) in which it was in the previous "Power-OFF."

In the event of a communication interruption (e.g., PLC in "STOP" or PROFIBUS cable interrupted), the GPC goes into the desired operational state as defined by the Error Behaviour parameter.

If communication is restored without turning off the GPCs, all will return to the operational state defined by "Power-ON."

If the GPC is turned off while in the "Error" condition, at the next "Power-On" it will remain in this state until communication with the PLC is restored.

The “**Startup Delay**” represents the delay in msec in which the Output Process Data actually begins to be sent to the temperature controllers after the transition to the "DATA EXCHANGE" state. Prevents the delay of updating PLC periphery variables, transferring incorrect values to the GPCS.

It is settable from 0msec to 10000msec (default 3sec)

The “**Swap bytes**” parameter allows the position of the MSB byte to be reversed to LSB in the Process Data to facilitate the interpretation of values from different PLCs. (YES=SIEMENS STEP7)

The “**Process Data Input..**”and“**Process Data Output..**” configure which GPC variables you want to communicate with the PLC with the "Data Exchange Telegram (DATA EXCHANGE)" (SAP DEFAULT)

5.4. DIAGNOSTIC DATA REQUEST TELEGRAM (SAP 60)

When the PROFIBUS Master requests diagnostic information from the GPC-PROFIBUS, it responds with 6 bytes of standard information and 3 specific bytes

BYTE	DESCRIPTION	VALUE (HEX)
1 ≈ 6	IN ACCORDANCE WITH STANDARD EN50170	-
7	EXTERNAL DIAGNOSTIC LENGTH	3
8	MSB EXTERNAL DIAGNOSTICS GPC	XX
9	LSB EXTERNAL DIAGNOSTICS GPC	XX

In which

xx	TEXT	DESCRIPTION
00	-	NO ALARMS IN PROGRESS
01	DEVICE "N" TIMEOUT	ABSENCE OF MODBUS COMMUNICATIONS WITH GPC
02	DEVICE "N" UNKNOWN	UNRECOGNIZED INSTRUMENT
04	DEVICE "N" SETTING	GPC DIP SWITCH INCORRECT
08	DEVICE "N" WRITE ERROR	INCORRECT WRITTEN VALUE

5.5. DATA EXCHANGE (SAP DEFAULT)

After verifying the correct configuration and parameterization of the GPC-PROFIBUS through the telegrams seen above, the PROFIBUS Master activates the "DATA EXCHANGE" protocol in which it cyclically sends a few bytes out and reads as many bytes in to the PROFIBUS Slaves.

The number of I/O bytes is a function of the selected configuration: an area of 7 bytes, always present in all configurations, represents **"Dati Parametrici"**, while the **"Dati di Processo"** area consists of 48 bytes.

DATA OUTPUT (FROM PROFIBUS MASTER TO SLAVE)																								
DATA								PROCESS DATA																
PARAMETRICS								WORD 1		WORD 2		WORD 3		WORD 4			WORD 22		WORD 22		WORD 23		WORD 24	
"REQUEST"								LSB	MSB	LSB	MSB	LSB	MSB	LSB	MSB		LSB	MSB	LSB	MSB	LSB	MSB	LSB	MSB
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	≈	48	49	50	51	52	53	54	55	

DATA INPUT (PROFIBUS SLAVE TO MASTER)																							
DATA							PROCESS DATA																
PARAMETRICS							WORD 1		WORD 2		WORD 3		WORD 4			WORD 22		WORD 22		WORD 23		WORD 24	
"ANSWER"							LSB	MSB	LSB	MSB	LSB	MSB	LSB	MSB		LSB	MSB	LSB	MSB	LSB	MSB	LSB	MSB
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	≈	48	49	50	51	52	53	54	55

"Parametric Data" are 'consistent' data that allow any MODBUS variable, either in bit or word format, present in the GPCs connected to the PROFIBUS node to be read or written

PARAMETRIC DATA		
BYTE	PARAMETER	DESCRIPTION
1	TRG	TRIGGER BYTE: WITH EACH NEW "REQUEST" IT SHOULD BE INCREMENTED BY 1. "ANSWER" WILL BE CORRECT ONLY WHEN THE VALUE BECOMES EQUAL.
2	ADD SLAVE	MODBUS ADDRESS OF THE GPC PRESENT IN THE PROFIBUS NODE
3	FC	FUNCTION CODE TO SPECIFY THE OPERATION: BIT/WORD READING/WRITING
4	FACT 1	DEPENDENT ON FUNCTION CODE
5	FACT 2	DEPENDENT ON FUNCTION CODE
6	FACT 3	DEPENDENT ON FUNCTION CODE
7	FACT 4	DEPENDENT ON FUNCTION CODE

Reading a Bit: Function Code 1 o 2

Request bytes

TRG	ADD SLAVE	FC	ADD MSB	ADD LSB	NB MSB	NB LSB
TRIGGER	SLAVE ADDRESS	1 O 2	BIT ADDRESS TO READ	BIT ADDRESS TO READ	NUMBER OF BITS TO BE READ. (ALWAYS 00)	NUMBER OF BITS TO BE READ. (ALWAYS 01)

Response bytes

TRG	ADD SLAVE	FC	NB	BIT	#	#
RESPONSE TO TRIGGER SET	CONFIRM SLAVE ADDRESS	CONFIRM OPER. CODE. (1 O 2)	NUMBER OF BYTES READ (ALWAYS 1)	BIT VALUE: 0 OR FF	VACUUM	VACUUM

Reading a word: Function Code 3 o 4

Request bytes

TRG	ADD SLAVE	FC	ADD MSB	ADD LSB	NW MSB	NW LSB
TRIGGER	SLAVE ADDRESS	3 O 4	WORD ADDRESS TO READ	WORD ADDRESS TO READ	NO. OF WORD TO READ. (ALWAYS 00)	NO. OF WORD TO READ. (ALWAYS 01)

Response bytes

TRG	ADD SLAVE	FC	NB	W MSB	W LSB	#
RESPONSE TO TRIGGER SET	CONFIRM SLAVE ADDRESS	CONFIRM OPERATION CODE	NUMBER OF BYTES READ (ALWAYS 2)	MSB VALUE OF THE WORD	WORD LSB VALUE	VACUUM

Writing in a Bit: Function Code 5

Request bytes

TRG	ADD SLAVE	FC	ADD MSB	ADD LSB	BIT	00
TRIGGER	SLAVE ADDRESS	5	BIT ADDRESS TO WRITE	BIT ADDRESS TO WRITE	BIT VALUE TO WRITE (00 OR FF)	ALWAYS 00

Response bytes

TRG	ADD SLAVE	FC	ADD MSB	ADD LSB	BIT	00
RESPONSE TO TRIGGER SET	CONFIRM SLAVE ADDRESS	CONFIRM OPERATION CODE	WRITTEN BIT ADDRESS	WRITTEN BIT ADDRESS	WRITTEN BIT VALUE (00 OR FF)	ALWAYS 00

Writing in a word: Function Code 6

Request bytes

TRG	ADD SLAVE	FC	ADD MSB	ADD LSB	W MSB	W LSB
TRIGGER	SLAVE ADDRESS	6	WORD ADDRESS TO WRITE	WORD ADDRESS TO WRITE	WORD VALUE TO WRITE	WORD VALUE TO WRITE

Response bytes

TRG	ADD SLAVE	FC	ADD MSB	ADD LSB	W MSB	W LSB
RESPONSE TO TRIGGER SET	CONFIRM SLAVE ADDRESS	CONFIRM OPERATION CODE	WRITTEN WORD ADDRESS	WRITTEN WORD ADDRESS	VALUE MSB WORD WRITTEN	VALUE LSB WORD WRITTEN

In case of an error instead of the operation code 80hex plus the requested operation code will be returned. The CODE field will return the error code.

Response bytes

TRG	ADD SLAVE	FC	CODE	#	#	#
RESPONSE TO TRIGGER SET	CONFIRM SLAVE ADDRESS	OPERATION CODE + 80HEX	ERROR CODE	VACUUM	VACUUM	VACUUM

Error codes: 1 = Illegal function 2 = Illegal data address 3 = Illegal data value
 6 = Slave device busy 9 = Illegal number data 10 = Read only data

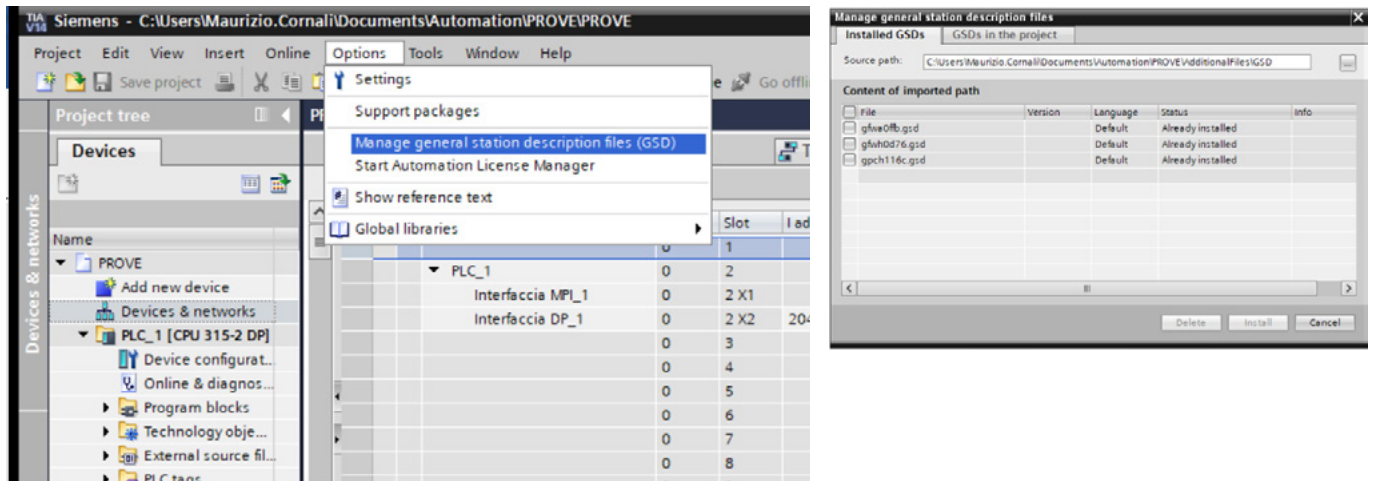
As described earlier, "Process Data" represents the MODBUS variables configured via Parameterization Telegram; the GPC occupies 24 words of the Process Data area.

PROCESS DATA		
BYTE	INPUT	OUTPUT
8	PROCESS DATA INPUT 1 MSB	PROCESS DATA OUTPUT 1 MSB
9	PROCESS DATA INPUT 1 LSB	PROCESS DATA OUTPUT 1 LSB
10	PROCESS DATA INPUT 2 MSB	PROCESS DATA OUTPUT 2 MSB
11	PROCESS DATA INPUT 2 LSB	PROCESS DATA OUTPUT 2 LSB
12	PROCESS DATA INPUT 3 MSB	PROCESS DATA OUTPUT 3 MSB
13	PROCESS DATA INPUT 3 LSB	PROCESS DATA OUTPUT 3 LSB
14	PROCESS DATA INPUT 4 MSB	PROCESS DATA OUTPUT 4 MSB
15	PROCESS DATA INPUT 4 LSB	PROCESS DATA OUTPUT 4 LSB
16	PROCESS DATA INPUT 5 MSB	PROCESS DATA OUTPUT 5 MSB
17	PROCESS DATA INPUT 5 LSB	PROCESS DATA OUTPUT 5 LSB
18	PROCESS DATA INPUT 6 MSB	PROCESS DATA OUTPUT 6 MSB
19	PROCESS DATA INPUT 6 LSB	PROCESS DATA OUTPUT 6 LSB
20	PROCESS DATA INPUT 7 MSB	PROCESS DATA OUTPUT 7 MSB
21	PROCESS DATA INPUT 7 LSB	PROCESS DATA OUTPUT 7 LSB
22	PROCESS DATA INPUT 8 MSB	PROCESS DATA OUTPUT 8 MSB
23	PROCESS DATA INPUT 8 LSB	PROCESS DATA OUTPUT 8 LSB
24	PROCESS DATA INPUT 9 MSB	PROCESS DATA OUTPUT 9 MSB
25	PROCESS DATA INPUT 9 LSB	PROCESS DATA OUTPUT 9 LSB
26	PROCESS DATA INPUT 10 MSB	PROCESS DATA OUTPUT 10 MSB
27	PROCESS DATA INPUT 10 LSB	PROCESS DATA OUTPUT 10 LSB
28	PROCESS DATA INPUT 11 MSB	PROCESS DATA OUTPUT 11 MSB
29	PROCESS DATA INPUT 11 LSB	PROCESS DATA OUTPUT 11 LSB
30	PROCESS DATA INPUT 12 MSB	PROCESS DATA OUTPUT 12 MSB
31	PROCESS DATA INPUT 12 LSB	PROCESS DATA OUTPUT 12 LSB
32	PROCESS DATA INPUT 13 MSB	PROCESS DATA OUTPUT 13 MSB
33	PROCESS DATA INPUT 13 LSB	PROCESS DATA OUTPUT 13 LSB
34	PROCESS DATA INPUT 14 MSB	PROCESS DATA OUTPUT 14 MSB
35	PROCESS DATA INPUT 14 LSB	PROCESS DATA OUTPUT 14 LSB
36	PROCESS DATA INPUT 15 MSB	PROCESS DATA OUTPUT 15 MSB
37	PROCESS DATA INPUT 15 LSB	PROCESS DATA OUTPUT 15 LSB
38	PROCESS DATA INPUT 16 MSB	PROCESS DATA OUTPUT 16 MSB
39	PROCESS DATA INPUT 16 LSB	PROCESS DATA OUTPUT 16 LSB
40	PROCESS DATA INPUT 17 MSB	PROCESS DATA OUTPUT 17 MSB
41	PROCESS DATA INPUT 17 LSB	PROCESS DATA OUTPUT 17 LSB
42	PROCESS DATA INPUT 18 MSB	PROCESS DATA OUTPUT 18 MSB
43	PROCESS DATA INPUT 18 LSB	PROCESS DATA OUTPUT 18 LSB
44	PROCESS DATA INPUT 19 MSB	PROCESS DATA OUTPUT 19 MSB
45	PROCESS DATA INPUT 19 LSB	PROCESS DATA OUTPUT 19 LSB
46	PROCESS DATA INPUT 20 MSB	PROCESS DATA OUTPUT 20 MSB
47	PROCESS DATA INPUT 20 LSB	PROCESS DATA OUTPUT 20 LSB
48	PROCESS DATA INPUT 21 MSB	PROCESS DATA OUTPUT 21 MSB
49	PROCESS DATA INPUT 21 LSB	PROCESS DATA OUTPUT 21 LSB
50	PROCESS DATA INPUT 22 MSB	PROCESS DATA OUTPUT 22 MSB
51	PROCESS DATA INPUT 22 LSB	PROCESS DATA OUTPUT 22 LSB
52	PROCESS DATA INPUT 23 MSB	PROCESS DATA OUTPUT 23 MSB
53	PROCESS DATA INPUT 23 LSB	PROCESS DATA OUTPUT 23 LSB
54	PROCESS DATA INPUT 24 MSB	PROCESS DATA OUTPUT 24 MSB
55	PROCESS DATA INPUT 24 LSB	PROCESS DATA OUTPUT 24 LSB

6 · USING GPC-PROFIBUS WITH SIEMENS TIA-PORTAL

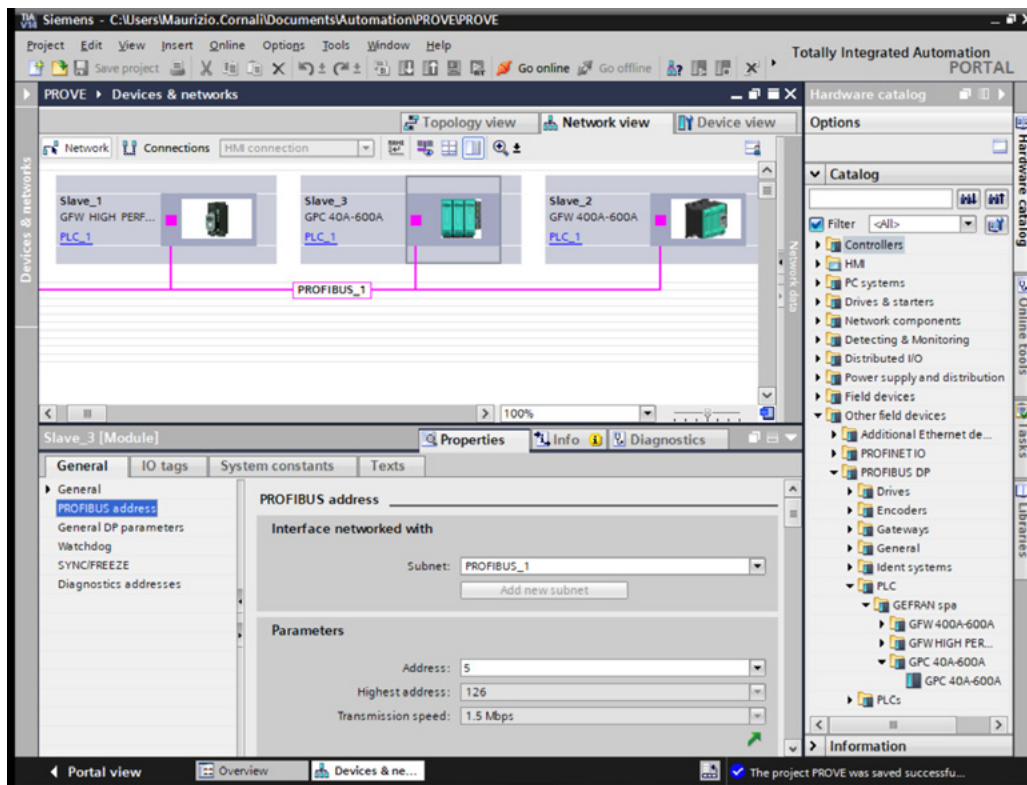
6.1. CONFIGURATION

The file "GPC116C.GSD" contains the information needed to manage a node GPC PROFIBUS DP Slave. This file must be installed in the SIEMENS TIA-Portal programming environment in order to enter GPCs into the Hardware configuration of the PROFIBUS network. It is assumed that the user knows how to use SIEMENS SW "TIA Portal" and has created a project with a CPU that has PROFIBUS interface.



Select the GSD file from the medium where it is stored (USB Key or Hard Disk) and install it. A new device will be added to the catalog with the entry **“GPC 40A-600A”**.

Expand in the **“Hardware Catalog”** area the **“Other field device”**, folder, then **“PLC”** and finally **“GEFRAN spa”**, locating our instrument:

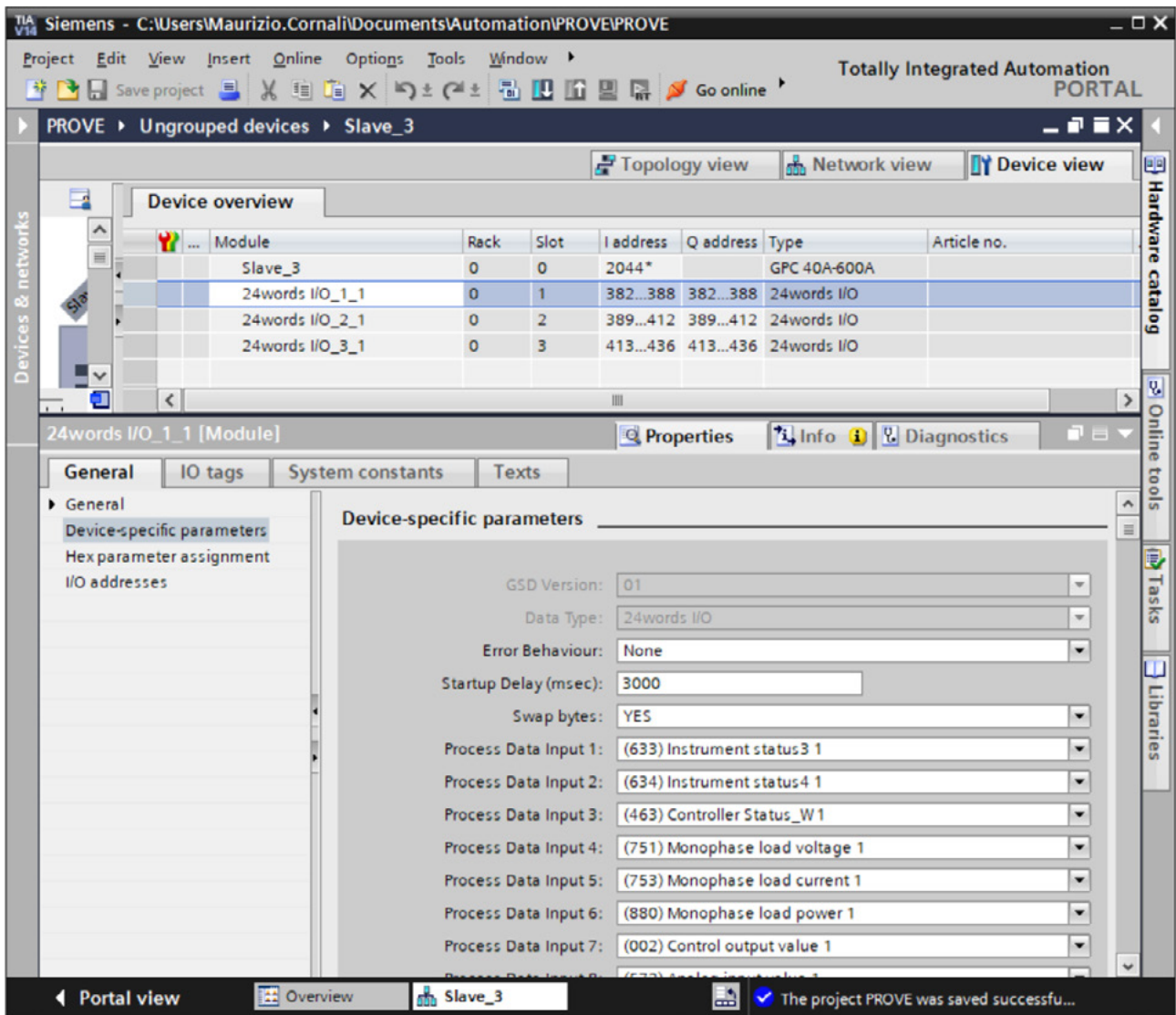


Drag the icon of the affected device with the mouse and deposit it in the **“Network View”** area.

A new Profibus slave (Slave_3) will be created, which must be connected to the PROFIBUS network.

Select in the “**Network view**” window the new Slave and through the “**Properties**”, assign the PROFIBUS node address which should be consistent with the one set in the GPC Rotary Switches.

In the “**Device view**” area, the characteristics of our device , the CPU memory area allocation and configurable parameters are highlighted.



The screenshot shows the Siemens TIA Portal interface. The 'Device overview' table is as follows:

Module	Rack	Slot	I address	Q address	Type	Article no.
Slave_3	0	0	2044*		GPC 40A-600A	
24words I/O_1_1	0	1	382...388	382...388	24words I/O	
24words I/O_2_1	0	2	389...412	389...412	24words I/O	
24words I/O_3_1	0	3	413...436	413...436	24words I/O	

The 'Properties' window for the '24words I/O_1_1 [Module]' shows the following 'Device-specific parameters':

- GSD Version: 01
- Data Type: 24words I/O
- Error Behaviour: None
- Startup Delay (msec): 3000
- Swap bytes: YES
- Process Data Input 1: (633) Instrument status3 1
- Process Data Input 2: (634) Instrument status4 1
- Process Data Input 3: (463) Controller Status_W1
- Process Data Input 4: (751) Monophase load voltage 1
- Process Data Input 5: (753) Monophase load current 1
- Process Data Input 6: (880) Monophase load power 1
- Process Data Input 7: (002) Control output value 1

The first 7 bytes represent the “**Parametric Data**” in the figure correspond to I/O addresses 382...388 (**24words I/O_1_1**).

The next 48 bytes represent “**Process Data**”, divided between I/O addresses 389...412 (**24words I/O_2_1**) and I/O addresses 413...436 (**24words I/O_3_1**)



Always check that the Hardware configurator has assigned contiguous memory addresses for all zones in the Rack. In case of "holes" in addressing, manually assign the first address in an area that you know is free. "I" (input) addresses must be the same as "O" (output) addresses.

It is useful during hardware configuration of GPCs to reserve the memory area where to place our device

6.2. PARAMETERIZATION

On the “**Properties**”, page, selecting “**Device-specific parameters**” also allows the user's preferred Process Data to be configured.

Properties

24words I/O_1_1 [Module]

Properties Info Diagnostics

General IO tags System constants Texts

General

Device-specific parameters

Hex parameter assignment

I/O addresses

Device-specific parameters

GSD Version: 01

Data Type: 24words I/O

Error Behaviour: None

Startup Delay (msec): 3000

Swap bytes: YES

Process Data Input 1: (633) Instrument status3 1

Process Data Input 2: (634) Instrument status4 1

Process Data Input 3: (463) Controller Status_W 1

Process Data Input 4: (751) Monophase load voltage 1

Process Data Input 5: (753) Monophase load current 1

Process Data Input 6: (880) Monophase load power 1

Process Data Input 7: (002) Control output value 1

Process Data Input 8: (572) Analog input value 1

Process Data Input 9: (633) Instrument status3 2

Process Data Input 10: (634) Instrument status4 2

Process Data Input 11: (463) Controller Status_W 2

Process Data Input 12: (751) Monophase load voltage 2

Process Data Input 13: (753) Monophase load current 2

Process Data Input 14: (880) Monophase load power 2

Process Data Input 15: (002) Control output value 2

Process Data Input 16: (836) Analog input value 2

Process Data Input 17: (633) Instrument status3 3

Process Data Input 18: (634) Instrument status4 3

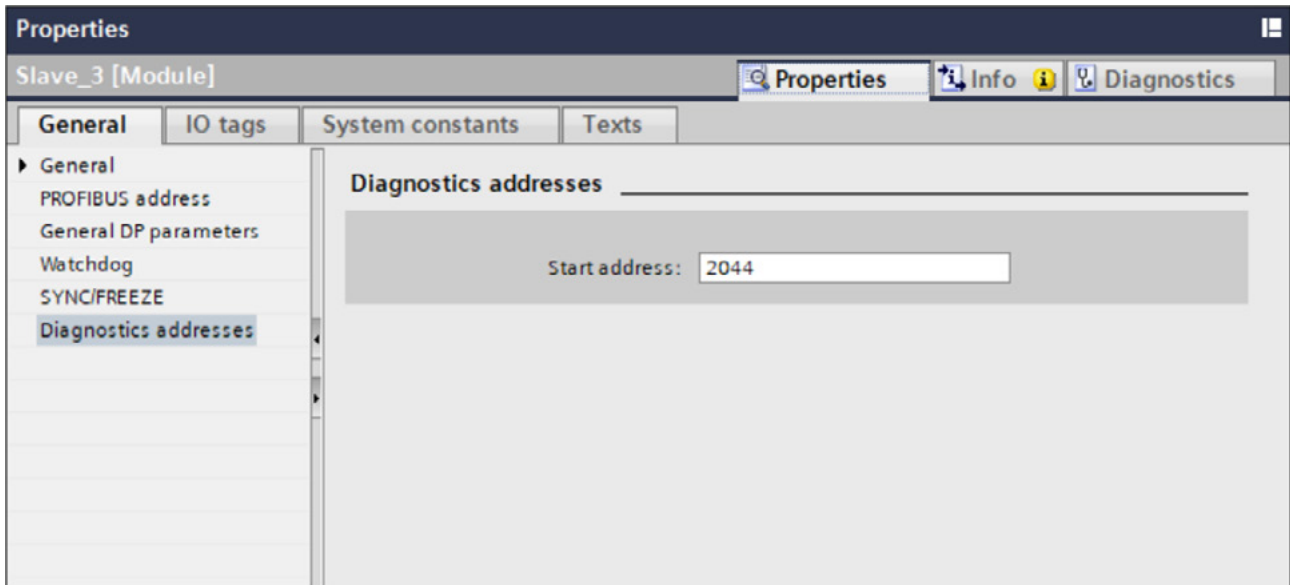
As seen above, it is possible to assign a Modbus Memory Map variable found in the drop-down menu to each of the 24 input and output words available for each GPC instrument.



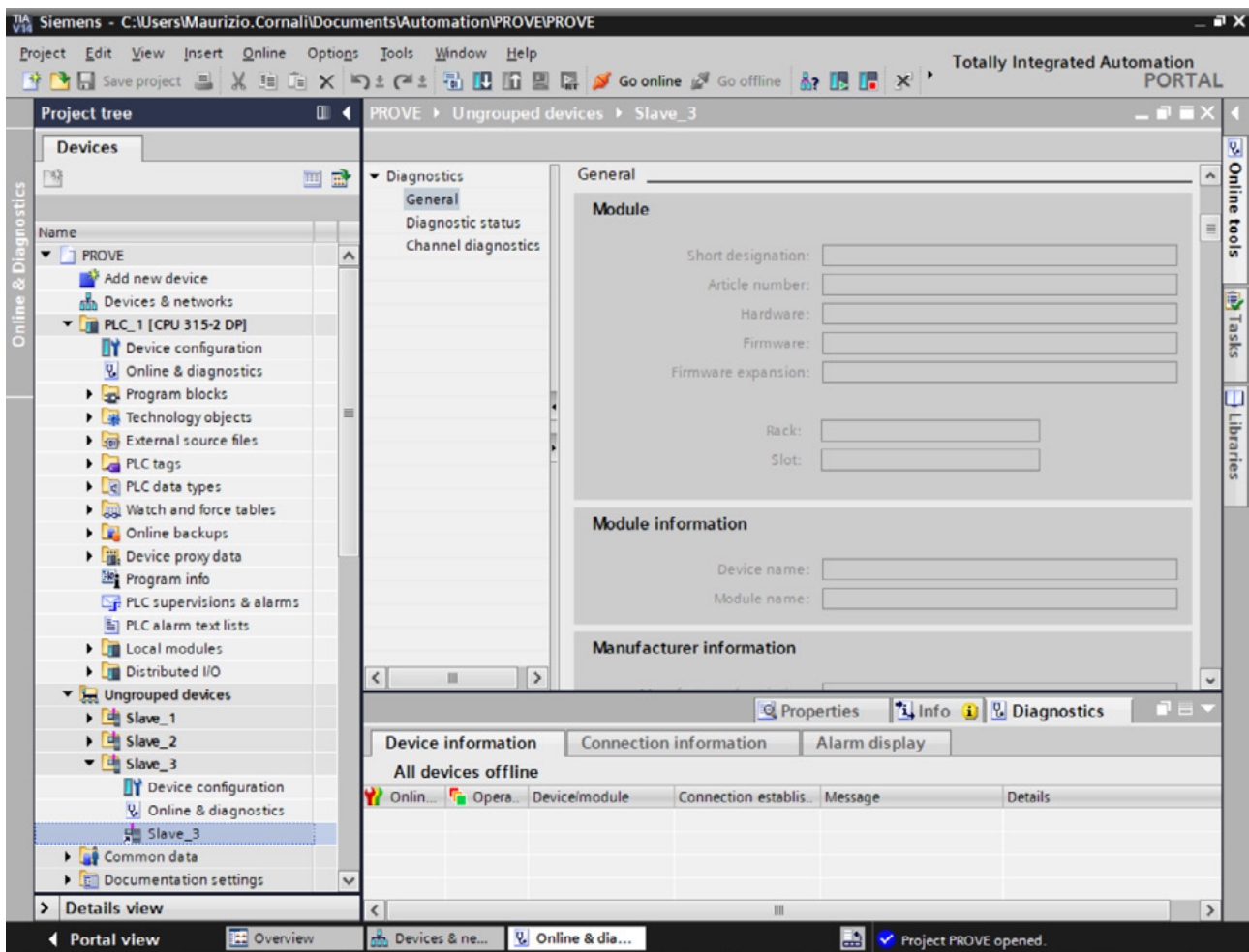
INPUT AREA data cyclically are read from the GPCs, while OUTPUT AREA data are written to the controller only if the data is varied.

6.3. STANDARD SLAVE DIAGNOSTIC AREA

Select in the “**Network view**” window the new Slave, through the “**Properties**” you can locate the address of the global diagnostic area of the slave.



The slave provides in addition to the standard bytes, extended diagnostic data in a word.



GEFRAN

GEFRAN spa
via Sebina, 74
25050 Provaglio d'Iseo (BS) Italy
Tel. +39 0309888.1
Fax +39 0309839063
info@gefran.com
<http://www.gefran.com>