APPLICATION NOTE

PPU 300 Modbus template information for PPU-2 retrofit PPU-2

Disclaimer

The contents of this document are subject to revision without notice. DEIF A/S shall have no liability for any error or damages of any kind resulting from the use of this document.

The English version of this document is the original language, and always takes precedence if there is any discrepancy with a translation of the document.

Trademarks

DEIF   *DEIF* is a registered trademark of DEIF A/S

All trademarks are the properties of their respective owners.

Copyright

Contents

1. Introduction

This document shows which PPU-2 Modbus addresses are included in the PPU-2 Modbus template for the PPU 300. The information in this document is meant to be used during the planning stages of a PPU-2 retrofit.

The PPU 300 has a default Modbus address for every function, input, output, and so on. The functions associated to Modbus addresses in PPU 300 are not the same as the associations in PPU-2. This means that the Modbus addresses from PPU-2 cannot be directly reused in PPU 300.

The PPU-2 Modbus template for PPU 300 does not include all of the PPU-2 Modbus addresses. Some addresses that are not included in the template can be configured in the PPU 300 onsite during the retrofit. By using the PPU-2 Modbus template and configuring the missing addresses manually, it is possible to retrofit a PPU-2 with a PPU 300 without the need to change the communication addresses in the Alarm Monitoring System (AMS), PLC, and so on.

Info

PPU 300 Modbus communication is based on Modbus TCP/IP, therefore an RS485/TCP convertor is required for the PPU-2 to PPU 300 retrofit.

Note

Before ordering a PPU 300, ensure that the PPU 300 has the required inputs and outputs to cover all of the options that were added to the PPU-2.

1.1 Further reading

More information

See the **Modbus** chapter in the **PPU 300 PICUS manual** for more information about how to import a Modbus template in PICUS and how to configure Modbus addresses using PICUS.

More information

See the **PPU 300 Modbus tables** for a list of all the available default Modbus addresses for PPU 300 and the functions associated to them by default.

1.2 PPU-2 options

The options added to a specific PPU-2 controller are noted on the silver label attached to the controller housing. Descriptions of the options are noted in the PPU-2 data sheet that is available on www.deif.com.

1.3 Conventions

The following conventions are used in this document:

Used in document	Description
	A symbol used to draw attention to extra information or an action that is not mandatory
Y	The Modbus address is included in the template.
N	The Modbus address is not available in the Modbus template, or it is not possible to setup the address using the Modbus configurator in PICUS.
Configure	The Modbus address must be configured manually using the Modbus configurator in PICUS during the retrofit.

2. Data tables

Note

Start synchronisation control, deload and mode selection are not standard PPU 300 functions. Use CustomLogic in PICUS to create the logic required to perform these functions. It is strongly recommended to use pulse commands to create the required logic.

2.1 Measurement table (read only) (function code 03h)

Address	Bit	Content	Description	Available
0			Application version	N
1		U_{L1-L2}	Generator voltage. Measured in [V]	Y
2		U_{L2-L3}	Generator voltage. Measured in [V]	Y
3		U_{L3-L1}	Generator voltage. Measured in [V]	Y
4		U_{L1-N}	Generator voltage. Measured in [V]	Y
5		U_{L2-N}	Generator voltage. Measured in [V]	Y
6		U_{L3-N}	Generator voltage. Measured in [V]	Y
7		f_{GEN}	Generator frequency. Measured in [Hz/100]	Y
8		I_{L1}	Generator current. Measured in [A]	Y
9		I_{L2}	Generator current. Measured in [A]	Y
10		I_{L3}	Generator current. Measured in [A]	Y
11		Cos-phi	-99...0...100 Generator cosinus-phi. Measured in cos-phi:100 Negative value means capacitive cos-phi	Y
12		P_{GEN}	Generator active power. Measured in [kW]. Negative value means reverse power	Y
13		Q_{GEN}	Generator reactive power. Measured in [kvar]. Positive value means generated inductive reactive power	Y
14		$U_{BBL1-L2}$	Busbar. Measured in [V]	Y
15		f_{BB}	Busbar frequency L1. Measured in [Hz/100]	Y
16 [HI]		R_{GEN} Export	Reactive energy counter, exported reactive power. Measured in [kvarh]. Max. 300000 Mvarh	Y
17 [LO]		R_{GEN} Export	Reactive energy counter, exported reactive power. Measured in [kvarh]. Max. 300000 Mvarh	Y
18 [HI]		E_{GEN} Export	Energy counter, exported power. Measured in [kWh]. Max. 300000MWh	Y
19 [LO]		E_{GEN} Export	Energy counter, exported power. Measured in [kWh]. Max. 300000MWh	Y
20	0	Alarms	1010. Reverse power	Y
	1		1020. Overcurrent step 1	Y
	2		1030. Overcurrent step 2	Y
	3		1060. Overcurrent inverse	Y

Address	Bit	Content	Description	Available
	4		1070. Fast overcurrent	Y
	5		1080. High overcurrent	Y
	6		Reserved	Y
	7		1100. U-DG High step 1	Y
	8		1110. U-DG High step 2	Y
	9		1120. U-DG Low step 1	Y
	10		1130. U-DG Low step 2	Y
	11		1140. f-DG High step 1	Y
	12		1150. f-DG High step 2	Y
	13		1160. f-DG Low step 1	Y
	14		1170. f-DG Low step 2	Y
	15		1180. U-BB High step 1	Y
21	0	Alarms	1190. U-BB High step 2	Y
	1		1200. U-BB Low step 1	Y
	2		1210. U-BB Low step 2	Y
	3		1220. f-BB High step 1	Y
	4		1230. f-BB High step 2	Y
	5		1240. f-BB Low step 1	Y
	6		1250. f-BB Low step 2	Y
	7		1260. Overload step 1	Y
	8		1270. Overload step 2	Y
	9		1280. Unbalance current	Y
	10		1290. Unbalance voltage	Y
	11		1300. Q import	Y
	12		1310. Q export	Y
	13		1320. Gen. neg. sequence current	Y
	14		1330. Gen. neg. sequence voltage	Y
	15		1390. Overload step 3	N
22	0	Alarms	1350. df/dt (ROCOF)	N
	1		1360. Vector jump	N
	2		3440. 4-20 mA input no. 1.1	Configure
	3		3460. 4-20 mA input no. 2.1	Configure
	4		3480. 4-20 mA input no. 3.1	Configure
	5		3500. 4-20 mA input no. 4.1	Configure
	6		3520. 4-20 mA input no. 5.1	Configure
	7		3540. 4-20 mA input no. 6.1	Configure
	8		3560. 4-20 mA input no. 7.1	Configure
	9		3580. 4-20 mA input no. 8.1	Configure
	10		3600. Pt100 no. 1.1	Configure

Address	Bit	Content	Description	Available
	11		3620. Pt100 no. 2.1	Configure
	12		3640. Overspeed (Tacho) 1	Y
	13		3120. Dig. input term. 23	Configure
	14		3130. Dig. input term. 24	Configure
	15		3140. Dig. input term. 25	Configure
23	0	Alarms	3150. Dig. input term. 26	Configure
	1		3160. Dig. input term. 27	Configure
	2		3170. Dig. input term. 43	Configure
	3		3180. Dig. input term. 44	Configure
	4		3190. Dig. input term. 45	Configure
	5		3200. Dig. input term. 46	Configure
	6		3210. Dig. input term. 47	Configure
	7		3220. Dig. input term. 48	Configure
	8		3230. Dig. input term. 49	Configure
	9		3240. Dig. input term. 50	Configure
	10		3250. Dig. input term. 51	Configure
	11		3260. Dig. input term. 52	Configure
	12		3270. Dig. input term. 53	Configure
	13		3280. Dig. input term. 110	Configure
	14		3290. Dig. input term. 111	Configure
	15		3300. Dig. input term. 112	Configure
24	0	Alarms	3310. Dig. input term. 113	Configure
	1		3320. Dig. input term. 114	Configure
	2		3330. Dig. input term. 115	Configure
	3		3340. Dig. input term. 116	Configure
	4		3350. Dig. input term. 117	Configure
	5		3360. Dig. input term. 118	Configure
	6		3370. Dig. input term. 127	Configure
	7		3380. Dig. input term. 128	Configure
	8		3390. Dig. input term. 129	Configure
	9		3400. Dig. input term. 130	Configure
	10		3410. Dig. input term. 131	Configure
	11		3420. Dig. input term. 132	Configure
	12		3430. Dig. input term. 133	Configure
	13		3660. Oil pressure (VDO sensor 1) 1	Configure
	14		3680. Water temperature (VDO sensor 2) 1	Configure
	15		3700. Fuel level (VDO sensor 3) 1	Configure
25	0	System alarms/status	Sync. fail. alarm	Y
	1		Generator breaker ON failure	Y

Address	Bit	Content	Description	Available
	2		Generator breaker OFF failure	Y
	3		Generator breaker position fail. alarm	Y
	4		Phase sequence error alarm	Y
	5		Governor regulator fail. alarm	Y
	6		AVR regulator fail. alarm	Y
	7		Battery voltage alarm	Y
	8		Sync. window timer runout (menu 2052) *	N
	9		Reserved	Configure
	10		Reserved	Configure
	11		Start attempts	N
	12		Not used	
	13		Not used	
	14		Not used	
	15		Not used	
26	0	Alarm relay status	Relay 0	Configure
	1		Relay 1	Configure
	2		Relay 2	Configure
	3		Relay 3	Configure
	4		Relay 4	Configure
	5		Relay 5	Configure
	6		Relay 6	Configure
	7		Relay 7	Configure
	8		Relay 8	Configure
	9		Relay 9 (Stop engine)	Configure
	10		Relay 10	Configure
	11		Relay 11	Configure
	12		Relay 12	Configure
	13		Relay 13	Configure
	14		Relay 14	Configure
	15		Relay 15	Configure
27	0	Status	Mode 1	N
	1		Mode 2	N
	2		Mode 3	N
	3		Mode 4	N
	4		Mode 5	N
	5		Mode 6	N
	6		Deload	N
	7		Start sync./control	N
	8		Alarm inhibit	Configure

Address	Bit	Content	Description	Available
	9		Breaker position ON	Y
	10		Synchronising	Y
	11		Relay 16	Configure
	12		Not used	
	13		Not used	
	14		Not used	
	15		Not used	
28	0		3450. 4-20 mA input no. 1.2	Configure
	1		3470. 4-20 mA input no. 2.2	Configure
	2		3490. 4-20 mA input no. 3.2	Configure
	3		3510. 4-20 mA input no. 4.2	Configure
	4		3530. 4-20 mA input no. 5.2	Configure
	5		3550. 4-20 mA input no. 6.2	Configure
	6		3570. 4-20 mA input no. 7.2	Configure
	7		3590. 4-20 mA input no. 8.2	Configure
	8		3610. Pt100 no. 1.2	Configure
	9		3630. Pt100 no. 2.2	Configure
	10		3650. Overspeed (Tacho) 2	Configure
	11		3670. Oil pressure (VDO sensor 1) 2	Configure
	12		3690. Water temperature (VDO sensor 2) 2	Configure
	13		3710. Fuel level (VDO sensor 3) 2	Configure
	14		1370. Zero sequence current	Configure
	15		1380. Zero sequence voltage	Configure
29		U_{DG-max}	Generator max. voltage. Measured in [V]	Y
30		U_{DG-min}	Generator min. voltage. Measured in [V]	Y
31		$U_{BBL2-L3}$	Busbar voltage. Measured in [V]	Y
32		$U_{BBL3-L1}$	Busbar voltage. Measured in [V]	Y
33		U_{BB-max}	Busbar max. voltage. Measured in [V]	Y
34		U_{BB-min}	Busbar min. voltage. Measured in [V]	Y
35		U_{BBL1-N}	Busbar voltage. Measured in [V]	Y
36		U_{BBL2-N}	Busbar voltage. Measured in [V]	Y
37		U_{BBL3-N}	Busbar voltage. Measured in [V]	Y
38		Running time	Hour	Y
39		RPM	RPM	Y
40		S_{GEN}	Generator apparent power. Measured in [kVA]	Y
41		VDO 1	Not available	Configure
42		VDO 2	Not available	Configure
43		VDO 3	Not available	Configure
44		$PHI_{BBL1-L2}$	0...359 busbar phase angle. Measured in [deg.]	Y

Address	Bit	Content	Description	Available
45		PHI$_{BBL1-DGL1}$	0...359 busbar/generator phase angle. Measured in [deg.]	N
46		CB$_{oper}$	Circuit breaker operations counter	Y
47		U$_{SUPPLY}$	Supply voltage. Measured in [V/10]	Y
48		PT100 (1)	Not available	Configure
49		PT100 (2)	Not available	Configure
50			Control register table address 0	N
51			Control register table address 1	N
52			Control register table address 3	N
53			Control register table address 4	N
54			Control register table address 5	N
55			Analogue input no. 1 (scaled)	Configure
56			Analogue input no. 2 (scaled)	Configure
57			Analogue input no. 3 (scaled)	Configure
58			Analogue input no. 4 (scaled)	Configure
59			Analogue input no. 5 (scaled)	Configure
60			Analogue input no. 6 (scaled)	Configure
61			Analogue input no. 7 (scaled)	Configure
62			Analogue input no. 8 (scaled)	Configure
63			No. of alarms	N
64			No. of unacknowledged alarms	N
65		PF	-99…0…100 generator power factor. Measured in [PF/100] Negative value means capacitive power factor	Y
66		Not used		
67		Not used		
68		Not used		
69		Not used		
70		Not used		
71		Not used		
72		Not used		
73		Not used		
74 [HI]		R$_{GEN}$ Import	Reactive energy counter, imported reactive power. Measured in [kvarh]. Max. 300000 Mvarh	N
75 [LO]		R$_{GEN}$ Import	Reactive energy counter, imported reactive power. Measured in [kvarh]. Max. 300000 Mvarh	N
76 [HI]		E$_{GEN}$ Import	Energy counter, imported power. Measured in [kWh]. Max. 300000MWh	N
77 [LO]		E$_{GEN}$ Import	Energy counter, imported power. Measured in [kWh]. Max. 300000MWh	N

2.2 Control register table (write only) (function code 10h)

Address	Bit	Content	Description	Available
0		Power regulator setpoint	+/-100% of nominal power Activated in menu 4051	N
1		PF regulator setpoint	60...100 stated as PF value/100. The value 100 means PF = 1 Activated in menu 4055	N
2	0	Control command	This bit must be 1 when writing the command word. If the bit is 0, the control command is ignored	N
	1		Mode 1	N
	2		Mode 2	N
	3		Mode 3	N
	4		Mode 4	N
	5		Mode 5	N
	6		Mode 6	N
	7		Deload	N
	8		Start sync./reg.	N
	9		Alarm inhibit	N
	10		Alarm ack. This bit is automatically reset in Multi-line 2	N
	11		Second setpoint (protection functions)	N
	12		Remote mode (option M1/M2)*	N
	13		Local mode (option M1/M2)*	N
3		Frequency regulator setpoint	-50...50 Hz/10 referring to nominal frequency Activated in menu 4052	N
4		Voltage regulator setpoint	-100...100%/10 of nominal voltage Activated in menu 4053	N
5		Reactive power regulator setpoint	-250...250% of produced power. A negative value means capacitive reactive power, and a positive value means inductive reactive power Activated in menu 4054	N

2.2.1 Date and time setting

Address	Content	Description	Available
19000	Year setting	2003...2099	N
19001	Month setting	1...12	N
19002	Date setting	1...31	N
19003	Day setting	1...7 (1 = Monday, 7 = Sunday)	N
19004	Hour setting	0...23	N
19005	Second setting	0...59	N

2.3 Command flags table (write only) (function code 0Fh)

Address	Content	Description	Available
0	Mode 1		N
1	Mode 2		N
2	Mode 3		N
3	Mode 4		N
4	Mode 5		N
5	Mode 6		N
6	Deload		N
7	Start sync./reg.		N
8	Alarm inhibit		N
9	Alarm ack.	This bit is automatically reset in Multi-line 2	N
10	2nd setpoint	Use second set of protection parameters	N
11	Remote*	Remote running mode (option M1/M2)	N
12	Local*	Local running mode (option M1/M2)	N

2.4 Status flags table (read only) (function code 01h)

Address	Content	Description	Available
0	Mode 1		N
1	Mode 2		N
2	Mode 3		N
3	Mode 4		N
4	Mode 5		N
5	Mode 6		N
6	Deload		N
7	Start sync./reg.		N
8	Alarm inhibit		Configure
9	Breaker pos. on		Configure
10	Synchronising		Configure
11	Remote		Configure

3. Parameters, digital inputs and outputs

Only a selection of PPU-2 parameters is available in the PPU 300. Because the PPU 300 also includes parameters that are not available in PPU-2 and the parameters in PPU 300 are configured in a different way, none of the PPU-2 parameter addresses are included in the Modbus template.

Parameters, digital input and digital output addresses must be configured manually during the retrofit of the PPU-2.

3.1 Parameter table

None of the parameters listed in the PPU-2 H2 Parameter table are added to the PPU-2 Modbus template. These parameters must be configured manually.

More information
See the **PPU 300 Modbus tables** for a list of all the available default Modbus addresses for PPU 300 and the functions associated to them by default.

3.2 Digital input table (read only 01h)

Note
The functions of the addresses marked as not available must be programmed in CustomLogic using PICUS (ML 300 PC utility software).

Address	Content	Description	Available
1500	-	Not used	
1501	127	Binary input (option M13)	Configure
1502	128	Binary input (option M13)	Configure
1503	129	Binary input (option M13)	Configure
1504	130	Binary input (option M13)	Configure
1505	131	Binary input (option M13)	Configure
1506	132	Binary input (option M13)	Configure
1507	133	Binary input (option M13)	Configure
1508-1528	-	Reserved	N
1529	43	Deload	N
1530	44	Man. governor up	Configure
1531	45	Man. governor down	Configure
1532	46	Man. AVR up	Configure
1533	47	Man. AVR down	Configure
1534	48	Mode 1	N
1535	49	Mode 2	N

Address	Content	Description	Available
1536	50	Mode 3	N
1537	51	Mode 4	N
1538	52	Mode 5	N
1539	53	Mode 6	N
1540	54	Breaker position off	Configure
1541	55	Breaker position on	Configure
1542	23	Alarm inhibit	Configure
1543	24	Alarm acknowledge	Configure
1544	25	Sync. start	N
1545	26	Control via external communication	N
1546	27	Block loss of mains	N
1546-1574	Reserved		N
1575	110	Binary input option M2	Configure
1576	111	Binary input option M2	Configure
1577	112	Binary input option M2	Configure
1578	113	Binary input option M2	Configure
1579	114	Binary input option M2	Configure
1580	115	Binary input option M2	Configure
1581	116	Binary input option M2	Configure
1582	117	Binary input option M2	Configure
1583	118	Binary input option M2	Configure

3.3 Digital output table (read only 01h)

Address	Content	Description	Available
2000	69/70	AVR up	Configure
2001	71/72	AVR down	Configure
2002	65/66	Governor up	Configure
2003	67/68	Governor down	Configure
2004	126/127	Relay 10	Configure
2005	128/129	Relay 11	Configure
2006	130/131	Relay 12	Configure
2007	132/133	Relay 13	Configure
2008 - 2015	-	Not used	Configure
2016	57/58	Relay 5	Configure
2017	59/60	Relay 6	Configure
2018	61/62	Relay 7	Configure
2019	63/64	Relay 8	Configure
2020	-	Not used	Configure

Address	Content	Description	Available
2021	-	Not used	Configure
2022	-	Not used	Configure
2023	-	Not used	Configure
2024	-	Not used	Configure
2025	5/6	Relay 1	Configure
2026	8/9	Relay 2	Configure
2027	11/12	Relay 3	Configure
2028	14/15	Relay 4	Configure
2029	17/18	Sync. relay (on in short time)	Configure
2030-2043	Reserved		Configure
2044	120/121	Start (engine)	Configure
2045	122/123	Stop (engine) (relay 9)	Configure
2046	124/125	Start prepare (engine)	Configure

4. Glossary

4.1 Terms and abbreviations

AMS   Alarm Monitoring System

PPU   Paralleling and protection unit

4.2 Units

Unit	Unit Name	Quantity name	US unit	US name	Conversion	Alternative units
A	ampere	Current				
Hz	hertz	Frequency (cycles per second)				
V	volt	Voltage				
var	volt-ampere reactive	Reactive power				
V AC	volt (alternating current)	Voltage (alternating current)				
V DC	volt (direct current)	Voltage (direct current)				
W	watt	Power				