



BUS MODULE PROFIBUS DPV1

FOR THYRO-S, THYRO-A AND THYRO-AX

July 2014 DE/EN - V3



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1. INTRODUCTION

The following operating instructions merely serve as a supplement and apply only in connection with the operating instructions of Advanced Energy power controllers Thyro-S, Thyro-A and Thyro-AX of types H1 and H RL1, as well as Thyro-A H RLP1. Particular attention must be paid to the safety instructions included in them.

1.1 GENERAL

The bus module PROFIBUS DPV1 can connect up to 8 power controllers of type Thyro-A...1, Thyro-AX...2 or power switches of type Thyro-S...1 to a PROFIBUS DPV1 master in any random order. Several bus modules can be employed at one device. Each bus module occupies one address on the PROFIBUS. The power supply of the bus module is provided by an external 24V d.c. power source (150 mA) which is fed into X11.1 (+) and X11.2 (ground) (reverse battery protected). Several modules can be operated at one power supply. For EMV reasons, the earth connection to terminal X11.3 must be as short as

possible. The PROFIBUS connector with a 9-terminal standard allocation must be connected to the socket X20.

1.2 SPECIFIC CHARACTERISTICS

- The bus module is a slave component with DP functionality and DP extension functions.
- Function control via LED
- 8 free application outputs X1 to X8 in each case terminal 5
- · Processing of actual values as float number in physical units
- · C-rail assembly
- When the bus module is linked to Thyro-AX, please be aware that data transfer is the same as for Thyro-A whereas special features or other additional parameters are excluded from this.

1.3 TYPE DESIGNATION

Bus module PROFIBUS DPV1	Order No. 2000 000 841
Corresponding GSD file	PSS306B5.GSD

1.4 WARRANTY

In the event of any claims in connection with the PROFIBUS DPV1 bus module, please contact us immediately quoting:

- Type designation
- Works number / Serial number
- Reason for the complaint
- Environmental conditions of the device
- Operating mode
- Period of use

Goods and services are subject to the general conditions of supply for products of the electrical industry, and our general sales conditions. Claims in connection with supplied goods must be submitted within one week of receipt, along with the delivery note. Advanced Energy will rescind all obligations such as warranty agreements, service contracts, etc. entered into by Advanced Energy or its representatives without prior notice if maintenance and repair work is carried out using anything other than original Advanced Energy spare parts or spare parts purchased from Advanced Energy.

2. SAFETY

2.1 IDENTIFICATION IN THE OPERATING INSTRUCTIONS

In these operating instructions, there are warnings before dangerous actions. These warnings are divided into the following danger categories:



DANGER Dangers that can lead to serious injuries or fatal injuries.



WARNING Dangers that can lead to serious injuries or considerable damage to property.



CAUTION Dangers that can lead to injuries and damage to property.



CAUTION Dangers that can lead to minor damage to property.

The warnings can also be supplemented with a special danger symbol (e.g. "Electric current" or "Hot parts"), e.g.



risk of electric current or



risk of burns.

In addition to the warnings, there is also a general note for useful information.



NOTE Content of note

2.2 GENERAL DANGER INFORMATION



DANGER

Failure to observe the safety regulations in the operating instructions for the power controllers used risk of injury or damage to the device or plant.

> Observe all safety regulations in the safety chapter of the operating instructions for the power controllers used.



DANGER

Electric current

Risk of injury from live parts/ risk of damage to the bus module

- > Never operate the device without the cover.
- > Only carry out adjustments or wiring when the device is deenergised.



CAUTION

Risk of damage to the bus module

The current at terminals X1.5 to X8.5 may not exceed 120 mA.

> Check the connection data of the upstream relay.



NOTE

Communication faults

To avoid communication faults, observe the following points:

- > Use shielded cables.
- > Ensure grounding on the bus module (X1.7 to X8.7). Do not also ground on the power controller.

2.3 OPERATOR REQUIREMENTS

The operator must ensure the following:

- That the safety regulations of the operating instructions are observed.
- That the accident prevention regulations valid in the respective country of use and the general safety regulations are observed.
- That all safety devices (covers, warning signs etc.) are present, in perfect condition and are used correctly.
- That national and regional safety regulations are observed.
- That the personnel have access to the operating instructions and safety regulations at all times.
- That operating conditions and restrictions resulting from the technical data are observed.
- That, should abnormal voltages, noises, increased temperatures, vibration or similar occur, the device is immediately put out of operation and the maintenance personnel is informed.

2.4 PERSONNEL REQUIREMENTS

Only qualified electro-technical personnel who are familiar with the pertinent safety and installation regulations may perform the following:

- Transport
- Installation
- Connection
- Start-up
- Maintenance
- Testing
- Operation.

These operating instructions must be read carefully by all persons working with or on the equipment prior to installation and initial start-up.

2.5 INTENDED PURPOSE

The device may only be used for the purpose for which it was intended, as persons may otherwise be exposed to dangers (e.g. electric shock, burns) and plants also (e.g. overload). The user must therefore observe the following points:

- It is not permitted to make any unauthorised modifications to the unit or to use any spare parts or replacement parts not approved by Advanced Energy, or to use the unit for any other purpose.
- The warranty obligations of the manufacturer are only applicable if these operating instructions are observed and complied with.
- The device is a component that cannot function alone.

- Project planning must account for the proper use of the device.

2.6 USE OF THE DEVICE

2.6.1 OPERATION

- Only switch on the mains voltage at the machine when there is no danger to persons, system or load.
- Protect the device against dust and damp.
- Ensure that the ventilation openings are not blocked.

2.6.2 PRIOR TO INSTALLATION/START-UP

- If stored in a cold environment: ensure that the device is absolutely dry. (Allow the device a period of at least two hours to acclimatise before start-up.)
- Ensure sufficient ventilation of the cubicle if mounted in a cubicle.
- Observe minimum spacing.
- Ensure that the device cannot be heated up by heat sources below it.
- Ground the device in accordance with local regulations.
- Connect the device in accordance with the connection diagram.

2.6.3 MAINTENANCE, SERVICE, FAULTS

In order to avoid injuries and damage, the user must observe the following:

- Before all work:
- > Disconnect the device from all external voltage sources.
- > Secure the device against accidentally being switched back on.
- > Use suitable measuring instruments and check that there is no voltage present.
- > Ground and short-circuit the device.
- > Provide protection by covers or barriers for any neighbouring live parts.
- The device may only be serviced and repaired by trained electrotechnical personnel.

2.6.4 TRANSPORT

- Only transport the device in the original packaging.
- Protect the device against damage, caused by jolts, knocks and contamination, for instance.

3. FUNCTIONS

3.1 SETPOINT PROCESSING Thyro-S

The setpoint processing depends on how the bus module is connected to the power controllers.

For Thyro-S different variations can be realised as required. The connection of terminal X22.4 from the power controller Thyro-S controls the procedures (Chapt. 8, Fig. 3).

No connection to X22.4

The bus module is fully functional, the setpoint, however, is only accepted at the controller via the control terminal as analog signal.

• Connection to X22.4 has ground potential The setpoint is only accepted by the bus module. The controller's terminal X22.4 can be directly connected to earth if an alternative operation is

Connection to X22.4 is switched

excluded.

- Thyro-S's connection X22.4 is connected to one of the terminals X1.1 to X8.1 of the bus module (Fig. 3). With malfunctions on the bus the setpoint value will automatically be taken from the controller's setpoint input (logic input).
- Thyro-S's connection X22.4 is connected to one of the terminals 1.5 to X8.5 of the bus module (Fig. 3). The controllers can then individually beswitched (selectively) via bus to "hand". With malfunctions on the bus line an automatic switchover takes place, as indicated in Chapter 4.2, to the setpoint at the control terminals of the power controllers. ("set output data=0") or the last setpoint is retained (see Chapter 4.2, "Retain last values").
- If a terminal X1.5 to X8.5 of the bus module is not allocated, a relay with 24V coil can be connected for free use. The free circuit is integrated. The driver current is maximum 120mA. Ventilation cabinets, auxiliary heating, circuit breakers or control lamps, for example, can be activated with this.

3.2 SETPOINT PROCESSING Thyro-A/Thyro-AX

The setpoint processing depends on how the bus module is connected to the power controller.

For Thyro-A and Thyro-AX different variations can be realised depending on the requirements. The circuit of terminal X22.1 of the Thyro-A or the Thyro-AX power controller controls the procedures (Chapt. 7, Fig. 2). No connection to X22.1

The bus module is fully functional, the setpoint is, however, only accepted at the controller via the control terminal as analog signal.

- Connection to X22.1 has ground potential The setpoint is only accepted by the bus module. The controller's terminal X22.1 can be directly connected to earth if an alternative operation is excluded.
- Connection to X22.1 is switched
 - The circuit S22.1 of the power controller Thyro-A or Thyro-AX is connected to one of the terminals X1.1 to X8.1 (Fig. 2).

With malfunctions on the bus line all controllers are automatically switched over to the analog setpoint at the control terminals of the power controllers/switches.

- The circuit X22.1 of the power controller Thyro-A or Thyro-AX is connected to one of the terminals X1.5 to X8.5 of the bus module (Fig.2). Then each controller can be switched individually (selectively) via bus to "hand". With malfunctions on the bus line an automatic switchover takes place, as indicated in Chapter 4.2, to the setpoint at the control terminals of the power controller. ("set output data = 0") or the last setpoint is retained (see Chapt. 4.2, "Retain last values").
- If a terminal X1.5 to X8.5 of the bus module is not allocated, a relay with 24V coil can be connected for free use. The free circuit is integrated. The driver current is maximum 120 mA. Ventilation cabinets, auxiliary heating, circuit breakers or control lamps, for example, can be activated with this.

3.3 OPERATING DISPLAY OF THE BUS MODULE

LED green Power supply present

_ED red	Status display PROFIBUS continuous light = card
	defective
Blinks with 1Hz	= No bus signal
Off	= OK

3.4 DIAGNOSTIC INDICATION

In case of an error, the bus-module sends a device-specific diagnosis to the master.

VALUE	MEANING
	telegram header
0x07	length of the device-specific diagnosis

0x82	header of the device-specific diagnosis
0x00	11
0x00	
??	status X1-X4
??	status X5-X8
0x00	telegram end

TAB. 1 DEVICE-SPECIFIC DIAGNOSIS

The status of each power controller is indicated by 2 bits.

BIT	STATUS X1-X4	STATUS X5-X8	
0-1	status X1	status X5	
2-3	status X2	status X6	
4-5	status X3	status X7	
6-7	status X4	status X8	
			_

TAB. 2 STATUS

These 2 bits have the following meaning.

VALUE	MEANING OF STATUS
00	no error at plug x?
01	error controller at plug X?
10	wrong controller at plug X?
11	no controller at plug X?

TAB. 3 STATUS CODING

3.5 ADDITIONAL FUNCTIONS FOR Thyro-S, Thyro-A AND Thyro-AX

By using a bus module, additional functions for the power controllers Thyro-S and Thyro-A or Thyro-AX can be employed.

All the accessible parameters of both type ranges can be found in the columns S/A/AX (abbr. for Thyro-S, Thyro-A and Thyro-AX) under R/W in Table 15. The most important ones are described in more detail in the controllers' operating instructions. Here means r = read (read only), w = write (write only) and r/w = read/write (read and write) is possible in acyclic data communication.

4. OPERATION

4.1 SETTING THE BUS ADDRESS

A device address, which only exists once in the system, must set in a switched-off state between 1 to 126 at the bus module via the switch S501.1 to S501.7.

S 501	1	2	3	4	5	6	7	8
	1	2	4	8	16	32	64	-

4.2 INITIAL CONFIGURATION (PARAMETERIZATION)

The following settings can be made via parameterization:

Valid output data:					
Here the suppression of certain output data can be activated.					
"Everything"	All telegrams are processed.				
"lgnore clear"	Ignore the master-clear-telegram and the output data with length 0.				
"Only if bit is set"	New output data are only taken over if the bit "Use				
	output data" = bit 8 of the digital IO tab. 1 is set.				
Reaction of an error:					
All terminals 1 of the potential.	terminal strips X1-X8 are separated from ground				
"Set output = 0"	Each terminal 5 is separated from the ground potential, i.e. the setpoint is read in at the controller by analog if terminal X22.1 of Thyro-A and Thyro-AX has been connected and terminal X22.4 of Thyro-S at has been connected with the respective terminals 5. Bit 0 to 7 of the digital I/O tab. 1.				
"Hold last values"	The last correct bus setpoint continues to be used.				

Actual values average - mean value:

Here the mean value of the actual values assessment can be activated. In the operating mode TAKT pro T0 is measured once.

",5 values" a mean is taken from 5 actual values					
"10 values"	a mean is taken from 10 actual values				
"20 values"	a mean is taken from 20 actual values				

4.3 CYCLIC DATA COMMUNICATION (CONFIGURATION)

Configuration of the log takes place by the addition of modules.

NOTE



If needed, the module "digital outputs" should always be added on the last position.

OFFSET	SETPOINT	TYPE	SIZE	UNIT
0	Setpoint Master X1	integer	2	4095 == 100[%]
2	Setpoint Master X2	integer	2	4095 == 100[%]
		integer	2	4095 == 100[%]
?	Digital outputs	integer	2	Bitwise

TAB. 4 CYCLIC TRANSMISSION DATA

BIT	MEANING
0	terminal X1.5
1	terminal X2.5
2	terminal X3.5
3	terminal X4.5
4	terminal X5.5
5	terminal X6.5
6	terminal X7.5
7	terminal X8.5
8	use output data

TAB. 5 DIGITAL OUTPUTS

SETPOINT (MASTER)	STATUS	RETURN VALUE (SUM, SEPTOINT)
0 to 409	= OFF	0
410 to 1091	= 1/5	819
1092 to 1706	= 1/3	1365
1707 to 3071	= 1/2	2047
3072 to 4095	= ON	4095

With Thyro-S the setpoint is interpreted as the operating mode.

TAB. 6 INTERPRETATION OF THE MASTER SETPOINTS FOR Thyro-S

The input data varies depending on controller type. The following tables show the input data available of each controller.

OFFSET	ACTUAL VALUES	TYPE	SIZE	UNIT
0	Load voltage L1	float	4	[V]
4	Supply voltage L1	integer	2	[V]
6	Total setpoint	integer	2	4095 == 100[%]
8	Error	integer	2	-
10	Status	integer	2	-

TAB. 7 CYCLIC INPUT DATA Thyro-S 1S...H1

OFFSET	ACTUAL VALUES	TYPE	SIZE	UNIT
0	Load voltage L1	float	4	[V]
4	Load current L1	float	4	[A]
8	Supply voltage L1	integer	2	[V]
10	Total setpoint	integer	2	4095 == 100[%]
12	Error	integer	2	-
14	Status	integer	2	-

TAB. 8 CYCLIC INPUT DATA Thyro-S 1S...H RL1

OFFSET	ACTUAL VALUES	TYPE	SIZE	UNIT
0	Load voltage L1	float	4	[V]
4	Supply voltage L1	integer	2	[V]
6	Total setpoint	integer	2	4095 == 100[%]
8	Error	integer	2	-
10	Status	integer	2	-

TAB. 9 CYCLIC INPUT DATA Thyro-A 1A...H1

OFFSET	ACTUAL VALUES	TYPE	SIZE	UNIT
0	Load voltage L1	float	4	[V]
4	Load current L1	float	4	[A]
8	Supply voltage L1	integer	2	[V]
10	Power (H RLP1/H RLP2)	float	4	[W]
14	Total setpoint	integer	2	4095 == 100[%]
16	Error	integer	2	-
18	Status	integer	2	-

TAB. 10 CYCLIC INPUT DATA Thyro-A 1A...H RL1/H RLP1/ Thyro-AX 1A...H RL2/H RLP2

OFFSET	ACTUAL VALUES	TYPE	SIZE	UNIT
0	Load voltage L1	float	4	[V]
4	Supply voltage L1	integer	2	[V]
6	Load voltage L3	float	4	[V]
10	Supply voltage L3	integer	2	[V]
12	Total setpoint	integer	2	4095 == 100[%]
14	Error	integer	2	-
16	Status	integer	2	-

TAB. 11 CYCLIC INPUT DATA Thyro-A 2A...H1

OFFSET	ACTUAL VALUES	TYPE	SIZE	UNIT
0	Load voltage L1	float	4	[V]
4	Load current L1	float	4	[A]
8	Supply voltage L1	integer	2	[V]
10	Load voltage L3	float	4	[V]
14	Load current L3	float	4	[A]
18	Supply voltage L3	integer	2	[V]
20	Power (H RLP1/H RLP2)	float	4	[W]
24	Total setpoint	integer	2	4095 == 100[%]
26	Error	integer	2	-
28	Status	integer	2	-

TAB. 12 CYCLIC INPUT DATA Thyro-A 2A...H RL1/H RLP1/ Thyro-AX 2A...H RL2/H RLP2

OFFSET	ACTUAL VALUE	TYPE	SIZE	UNIT
0	Load voltage L1	float	4	[V]
4	Mains voltage L1	integer	2	[V]
6	Load voltage L2	float	4	[V]
10	Mains voltage L2	integer	2	[V]
12	Load voltage L3	float	4	[V]
16	Mains voltage L3	integer	2	[V]
18	Total setpoint	integer	2	4096 = 100%
20	Alarms	integer	2	-
22	Status	integer	2	-

TAB. 13 CYCLIC INPUT DATA Thyro-A 3A...H1

OFFSET	ACTUAL VALUE	TYPE	SIZE	UNIT
0	Load voltage L1	float	4	[V]
4	Load current L1	float	4	[A]
8	Mains voltage L1	integer	2	[V]
10	Load voltage L2	float	4	[V]
14	Load current L2	float	4	[A]
18	Mains voltage L2	integer	2	[V]
20	Load voltage L3	float	4	[V]
24	Load current L3	float	4	[A]
28	Mains voltage L3	integer	2	[V]
30	Total power	float	4	[W]
34	Total setpoint	integer	2	4096 = 100%
36	Alarms	integer	2	-
38	Status	integer	2	-

TAB. 14 CYCLIC INPUT DATA Thyro-A 3A...H RL1/Thyro-AX 3A...H RL2 MAXIMUM 6 Thyros

OFFSET	ACTUAL VALUE	TYPE	SIZE	UNIT
0	Load voltage L1	float	4	[V]
4	Load current L1	float	4	[A]
8	Power L1	float	4	[W]
12	Mains voltage L1	integer	2	[V]
14	Load Voltage L2	float	4	[V]
18	Load current L2	float	4	[A]
22	Power L2	float	4	[W]
26	Mains voltage L2	integer	2	[V]
28	Load Voltage L3	float	4	[V]
32	Load current L3	float	4	[A]
36	Power L3	float	4	[W]
40	Mains voltage L3	integer	2	[V]
42	Total Power	float	4	[W]
46	Total setpoint	integer	2	4096 = 100%
48	Alarms	integer	2	-
50	Status	integer	2	-

TAB. 15 CYCLIC INPUT Thyro-A 3A...H RLP1/Thyro-AX 3A...H RLP2 MAXIMUM 4 Thyros

OFFSET	ACTUAL VALUES	TYPE	SIZE	UNIT
0	Load voltage L1	float	4	[V]
4	Load current L1	float	4	[A]
8	Supply voltage L1	integer	2	[V]
10	Load voltage L3	float	4	[V]
14	Load current L3	float	4	[A]
18	Supply voltage L3	integer	2	[V]
20	Power (H RLP1/H RLP2)	float	4	[W]
24	Total setpoint	integer	2	4095 == 100[%]
26	Error	integer	2	-
28	Status	integer	2	-

TAB. 16 CYCLIC INPUT DATA Thyro-??

If no control of the controller type is necessary (Chapt. 3.4), for simplification purposes the module Thyro-?? can also be used. Then the following input data is always transmitted (even if it is not available). For example, a single-phase device has no values for L3.

4.4 ACYCLIC COMMUNICATION

Via acyclic communication various parameters can be read out or changed. Parameters are thereby addressed via the so-called slot number and index number.

General information on the bus module can be read out via slot 0. The following table shows the available parameters.

INDEX	ADDR.	SYMBOL	NAME	VALUE RANGE	COMBO-OPT	UNIT	R/W
0		GER_1	Device type at port X1	5, 9, 10,	Thyro-S; Thyro-A; Thyro-AX		r
1		GER_2	Device type at port X2	5, 9, 10,	Thyro-S; Thyro-A; Thyro-AX		r
2		GER_3	Device type at port X3	5, 9, 10,	Thyro-S; Thyro-A; Thyro-AX		r
3		GER_4	Device type at port X4	5, 9, 10,	Thyro-S; Thyro-A; Thyro-AX		r
4		GER_5	Device type at port X5	5, 9, 10,	Thyro-S; Thyro-A; Thyro-AX		r
5		GER_6	Device type at port X6	5, 9, 10,	Thyro-S; Thyro-A; Thyro-AX		r
6		GER_7	Device type at port X7	5, 9, 10,	Thyro-S; Thyro-A; Thyro-AX		r
7		GER_8	Device type at port X8	5, 9, 10,	Thyro-S; Thyro-A; Thyro-AX		r
8		res.					
9		VERS_J	Version year (firmware)	09999	(bus module)		r
10		VERS_M	Version month (firmware)	112	(bus module)		r
11		VERS_T	Version day (firmware)	131	(bus module)		r

TAB. 17 RECOGNITION OF EXISTING BUS CONNECTIONS VIA SLOT 0

DEVICE TYPE	H1	H RL1/H RL2	H RLP1/H RLP2
Thyro-S 1S	5	37	-
Thyro-A 1A/Thyro-AX 1A	9	41	297
Thyro-A 2A/Thyro-AX 2A	10	42	298
Thyro-A 3A/Thyro-AX 3A	11	43	299

TAB. 18 DEVICE CODE

The parameters of the controller can be actuated via slot 1-8. The following table shows the parameters available.

CONTR	OLLER PARAME	TERS				R/W			
INDEX	SYMBOL	NAME	VALUE RANGE	COMBO-OPT.	UNIT	hyro-S Thyro-A1A, Thyro-AX1A Thyro-A2A, Thyro-AX2A	Thyro-A 3A, Thyro-AX 3A	DEFAULT	NOTE
0	GER	Device type	0, 5, 9, 10,	none; Thyro-S 1S; Thyro- A; Thyro-AX			L	Type	
-	I_TYP	Controller type current	01000		A	r r	r	Type	
2	U_TYP	Controller a.c. voltage	01000		>	-	-	Type	
e	P_TYP_H	Controller type output Hi	065535		65535W	r	r	Type	H RLP1/H RLP2
4	P_TYP_L	Controller type output Low	065535		M	r	L	Type	H RLP1/H RLP2
5	WANDLER	Equipment	0	Bit coded		-	r	Type	
9	BETR	Operating mode Thyro-A/Thyro-AX	03	res., TAKT, VAR, QTM		r/w *	r/w *	TAKT	S1.1-2
7	BETR	Operating mode Thyro-S	03, 16	OFF, 1/2, 1/3, 1/5, 1		L		1	S1.1-2
8	AN1	Phase angle of 1st half wave	0180		°el	r/w *	r/w *	60°el	R201
6	SST	Soft start duration (given)	0100		period	r/w *	r/w *	6 period	R201
10	SDN	Soft stop duration (given)	0100		period		r/w	6 period	
11	ТО	Pulse period duration	01000		period	r r/w *	r/w *	50 period	R201
12	MP	Minimum interval	010		period	r/w *	r/w *	3 period	R201
13	TSMAX	Maximum pulse connection time	0T0		period	r/w	r/w	50 period	
14	TSMIN	Minimum pulse connection time	0T0		period	r/w	r/w	0 period	
15	V_IE	Front impulse stop	0180		°el	r/w	r/w	180°el	
16	Н_Е	Back impulse stop	0180		°el	r/w	r/w	0°el	
17	RE	Control (value analogue output)	08	U _{load} 2, U _{load ms} , I _{load 2} ,		r/w *	r/w *	U_{last^2}	S1.3-5
				loadrms' res.,					Power
				Real power, res., res.,					only with
				Without regulation					H RLP1/H RLP2
18	П_1	PID controller, I part	0 = off 065535			r/w	r/w	20	
19	KP_1	PID controller, P part	0 = off 065535			r/w	r/w	60	
20	kR_1	PID controller, counter P part	065535			r/w	r/w	10	
21		res.					r/w		
22	UEMA	Effective voltage setpoint maximum	0		^	r/w *	r/w *	440V	R202 **
23	IEMA	Effective current setpoint maximum	0		0,1A	r/w *	r/w *	110A	R203
24	PMA_H	Output setpoint max. Hi	065535		65535 W	r/w *	r/w *	0	R202 **
25	PMA_L	Output setpoint max. Low	065535		N	r/w *	r/w *	44000W	R202 **

TAB. 19 CONTROLLER PARAMETERS SLOT 1-8

CONTRC	OLLER PARAME	TERS					R/W			
INDEX	SYMBOL	NAME	VALUE RANGE	COMBO-OPT.	UNIT	Thyro-S	Thyro-A 1A, Thyro-AX 1A Thyro-A 2A, Thyro-AX 2A	Thyro-A 3A, Thyro- AX 3A	DEFAULT	NOTE
26	SW_ACTIV	Setpoint activation	03	"Bit0=1 (Setpoint X2.4		L	-	-	0	
				active), Bit1=1 (Setpoint						
				Master active)"						
27		res.								
28		res.								
29		res.								
30	РF	Actual value output Offset	04095		20/4095 mA		r/w *	r/w *	0mA	S1.9
31	FA	Scale and value actual value output	04095		1 / 819		r/w *	r/w *	1	R204
32	SPG_MIN	Power monitor circuit min.	01000		>	r/w	r/w	r/w	Type	
33	SPG_MAX	Power monitor circuit max.	01000		^	r/w	r/w	r/w	Type	
34	UN_S	Undercurrent monitoring	01	Off, On		-	r/w *	r/w *	Off	R205
35		res.								
36	LASTBRUCH_MIN_ABS	Load fault, minimum value	04095		100/4095 %	-	r/w *	r/w *	%0	R205
37		res.						r/w		
38	SYNC_ADR	Synchronous phase address	065535		period / 2		r/w	r/w	100	
39	IMAB	Pulse switch-off with fault	065535	Bit coded		r/w	r/w	r/w	0	
40	STA_RE	Start trigger regul. analog setpoint	04095		20/4095 mA		r/w *	r/w *	0mA	S1.6
41	STE_RE	End trigger regul. analog setpoint	04095		20/4095 mA		r/w	r/w	20mA	
42		res.						r/w		
43	MOSI_FA	Peak current value limit	04095				r/w	r/w	Type	
44	RELAIS_CTRL	Relay configuration 1	065535	Bit coded			r/w	r/w	447	
45	RELAIS_CTRL_2	Relay configuration 2	065535	Bit coded			r/w	r/w	0	
46	VERS_T	Version day	131			L	L	L		
47	VERS_M	Versions month	112			-	L	L		
48	VERS_J	Versions year	09999			r	L	r		
49	DAC1_CTRL	Analogue output configuration	010			r/w	r/w	r/w	6	
50		Controller lock	01	Off, On			r/w	r/w	Off	
51		res.					r/w	r/w		
52		Save	01	Off, Save		r/w	r/w	r/w	Off	
53	MITTEL	Mean value analogue output	065535				r/w	r/w	100	

TAB. 19 CONTROLLER PARAMETERS SLOT 1-8

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NOTE

If a potentiometer or contact of DIP switch S1 is entered in the "Note" column of the table 15 (Controller parameters), this hardware setting is used when the mains returns (For exceptions, see * or **)

- * In the "Thyro-Tool" mode (switch S1.3-5 on "On") the parameters marked with * are not given by the switches and Potis, instead, the stored values are used.
- ** The allocation of the parameters marked with ** to the Poti depends on the chosen controller mode.

Setpoint and actual values can also be read or changed via DPV1. The following values are available.

INDEX	ACTUAL VALUES	TYPE	SIZE	UNIT
64	Setpoint Master	integer	2	4095 == 100[%]
72	Load voltage L1	float	4	[V]
74	Load current L1	float	4	[A]
76	Mains voltage L2	integer	2	[V]
92	Load voltage L3	float	4	[V]
94	Load current L3	float	4	[A]
96	Mains voltage L3	integer	2	[V]
102	Total set value	integer	2	4095 == 100[%]
103	Setpoint terminal 4	integer	2	4095 == 100[%]
104	Connection angle alpha	integer	2	-
105	Acutal value connection time T_{s}	integer	2	-
106	Period duration (mains)	integer	2	[µs]
107	Temperature T1	integer	2	[°C]
115	Error	integer	2	-
116	Status	integer	2	-

TAB. 20 ACTUAL VALUES SLOT

DESCRIPTION		Thyro-A/Thyro-AX		Thyro-S	
Thyro-S, Thyro-A and Thyro-AX	BIT	LEDs	RELAYS*	LEDs	RELAYS*
Frequency measurement	Bit0	Pulse Inhibit LED	dropped out	Test LED flashes slowly	dropped out
outside of 47 Hz to 63 Hz		flashes slowly			
SYNC error, no zero crossing within	Bit1	Pulse Inhibit LED	dropped out	Test LED flashes slowly	dropped out
the gate		flashes slowly			
Temperature monitoring triggered	Bit2	Load Fault LED	dropped out	Load Fault flashes slowly	dropped out
		flashes slowly			
Load Error	Bit3	Load Fault LED on	dropped out	Load Fault on	dropped out
Flash values invalid	Bit4	Pulse Inhibit LED a.	dropped out	Test LED a. Load Fault LED	dropped out
		Load Fault LED		flash fast simultaneously	
		flash fast simultaneously			
Mains Undervoltage	Bit5	Pulse Inhibit LED,	dropped out	Load Fault LED and	dropped out
(< AD_P_SPG_MIN)		Load Fault LED		Test LED on	
		a. Test-LED on			
Mains Overvoltage	Bit6	none	energised	none	energised
(> AD_P_SPG_MAX)					
Master/Slave error (only with Thyro-					
A 2A/Thyro-AX 2A)	Bit8	none	energised	only with Thyro-A/Thyro-AX	
Undervoltage Limit	Bit9	none	energised	only with Thyro-A/Thyro-AX	
Overvoltage Limit	Bit10	none	energised	only with Thyro-A/Thyro-AX	
Undercurrent Limit	Bit11	none	energised	only with Thyro-A/Thyro-AX	
Overcurrent Limit	Bit12	none	energised	only with Thyro-A/Thyro-AX	
Low Power Limit	Bit13	none	energised	only with Thyro-A/Thyro-AX	
High Power Limit	Bit14	none	energised	only with Thyro-A/Thyro-AX	

4.5 STATUS AND ERROR COMMUNICATION

TAB. 21 ERROR FLAGS (ERROR):

*The table only shows the default configuration of the relay function. It can be configured by Thyro-Tool Family, which message shall be shown by the relay and which not. The relay only exists in H RL1, H RLP1, H RL2 or H RLP2 device, not in the H1 types.

DESCRIPTION		Thyro-A/Thyro-AX		Thyro-S	
Thyro-S, Thyro-A and Thyro-AX	BIT	LEDs	RELAIS*	LEDs	RELAIS*
Pulse blocking active (bridge X2.1-	Bit0	Pulse Inhibit LED on	energised	none	energised
X2.2 open)					
Mains frequency is 60 Hz	Bit2	none	energised	none	energised
U limiting active	Bit4	Pulse Inhibit LED a. Load	energised	only with Thyro-A/Thyro-AX	
		Fault LED flash slowly			
		alternately			
I limiting active	Bit5	Pulse Inhibit LED a. Load	energised	only with Thyro-A/Thyro-AX	
		Fault LED flash slowly			
		alternately			
P limiting active	Bit6	Pulse Inhibit LED a. Load	energised	only with Thyro-A/Thyro-AX	
		Fault LED flash slowly			
		alternately			
Relay status (0=relay off/ 1=relay	Bit8	none	on/off	none	on/off
on)					
Bus module active (0=no bus	Bit11	none	energised	none	energised
modul/1=bus module active)					
Thyristor short-circuit (Thyro-S)	Bit14	only with Thyro-S		Test-LED u. Load Fault LED	dropped out
				flash slowly	
				alternately	
Failure in rotating field/phase	Bit15	Pulse Inhibit LED a. Test LED	dropped out	only with Thyro-A/Thyro-AX	
(only Thyro-A 2A or 3A or		flash slowly			
Thyro-AX 2A or 3A)		simultaneously			

TAB. 22 ERROR FLAGS (STATUS):

*The table only shows the default configuration of the relay function. It can be configured by Thyro-Tool Family, which message shall be shown by the relay and which not. The relay only exists in H RL1, H RLP1, H RL2 or H RLP2 device, not in the H1 types!

5. EXTERNAL CONNECTIONS

5.1 CURRENT SUPPLY

+24V to X11, current consumption ca. 150 mA



The above connecting diagram shows the essential functions of the bus module.

5.2 OPERATING ELEMENTS AND TERMINAL STRIPS

This chapter describes the terminal strips, connectors and operating elements.

Allocation of the 7 terminal connector X1 to X8:

- 1 Total ground connected
- 2 RxD
- 3 TxD
- 4 Ground
- 5 Individually connectable ground
- 6 Ground
- 7 Earth potential for screen connection

Allocation of the 3 terminal connector X11:

X11:1+24 V

```
X11: 2 24 V - ground
```

X11: 3 connected earthing cable should be as short as possible for EMC reasons

Allocation of the 9 terminal sub-D socket X20: Standard allocation

```
S 501 device address S501.1 2 3 4 5 6 7 8
1 2 4 8 16 32 64 -
```

Example: Switch 3 and $4_{"}$ on" = 4 + 8 = address 12

6. INTERFACES

6.1 SYSTEM INTERFACE

The bus module is connected to the respective system interfaces of the power controller via X1 to X8 (4-lead, 2x2 twisted, joint screen). The transmission rate is 34.400 Bd. The asynchronous signals are transmitted with 8bit, no parity, one stop bit.

The log begins with STX, followed by an identification key, the data and ends with a check sum. Faulty logs are ignored.

6.2 PROFIBUS INTERFACE

This interface, in accordance with RS485, is designed for a transmission rate up to 12Mbd. The allocation corresponds to the industrial standard. The length of the data line and the transmission rate are in fixed relation. The maximum lengths of the bus master given in the manufacturer's specifications may not be exceeded.

7. CONNECTING DIAGRAMS THYRO-A/THYRO-AX



FIG. 2 CONNECTING DIAGRAM Thyro-A/Thyro-AX

8. CONNECTING DIAGRAMS Thyro-S



9. SPECIAL REMARKS

9.1 INSTALLATION

The bus module can be arranged as desired. On delivery the device is set at bus address 00.

9.2 SERVICE

The delivered devices have been produced under quality standard ISO 9001. Should nevertheless faults or problems arise, please contact our Advanced Energy team for assistance (see chapter CONTACT INFORMATION).

9.3 CHECK LIST

- Set address switch according to bus plan application.
- Carry out cabling.
- Feed 24V d.c. green LED must light up,
- bus module is ready for operation,
- red LED stops blinking as soon as the PROFIBUS starts operating.
- Should errors occur, the bus master's log must be evaluated.

10. TECHNICAL DATA

Voltage supply	24 VDC (+/-20 %)150 mA
Possible bus address	es 1 to 126, only one address necessary per bus
	module
Connection options	Up to 8 Advanced Energy power controllers of the
	Thyro-S, Thyro-A and Thyro-AX series of typesH1,H
	RL1,H RLP1,H RL2 andH RLP2
Function check	via LEDs
Mounting	On DIN rail
Ambient temperatur	e max. 65 °C

11. DIMENSIONAL DRAWINGS



Phönix EMG 150 casing 150x75x55 mm without upper part of plug, recommended space required 150x150 mm

12. ACCESSORIES AND OPTIONS

Cord set, screened cables are available with the bus module. One loom of cables consists of 4 connecting cables for the connection of 4 power controllers.

Order No. 2000 000 848 Bus module connecting cable for 4 controllers, 2.5 m long

Order No. 2000 000 849 Bus module connecting cable for 4 controllers, 1.5 m long

13. APPROVALS AND CONFORMITY

- Data transmission acc. to IEC 61158 / IEC 61784
- Quality standard acc. to DIN EN ISO 9001
- CE conformity
- Low voltage directive 73/23 EEC
- EMC directive 89/336 EEC; 92/31 EEC
- Marking directive 93/68 EEC

DIRECTIVES

The CE mark on the device confirms compliance with the EC directives 72/23 EEC for low voltage and 89/339 EEC for electromagnetic compatibility if the instructions on installation and start-up described in the operating instructions are followed.

In Detail

DEVICE APPLICATION CONDITIONS

Integrated device (VDE0160)		DIN EN 50 178
General requirements		DIN EN 60146-1-1:12.97
Operating conditions		DIN EN 60 146-1-1; ch. 2.5
Area of application, industrial		CISPR 6
Temperature behaviour		DIN EN 60 146-1-1; ch. 2.2
Storage temperature (D)		-25 °C − +55 °C
Transport temperature (E)		-25 °C – +70 °C
Operating temperature (better B)		-10 °C – +55 °C
Humidity class	В	DIN EN 50 178 Tab. 7 (EN 60 721)
Degree of contamination	2	DIN EN 50 178 Tab. 2
Air pressure		900 mbar * 1000 above sea level
Index of protection	IP00	DIN EN 69 529
Protection class	III	DIN EN 50 178 chap. 3
Mechanical jolt		DIN EN 50 178 chap. 6.2.1
Tests in acc. with		DIN EN 60 146-1-1 4.
EMC ermitted interference		EN 61000-6-4
Radio interference		
suppression control unit	Class A	DIN EN 55011:3.91 CISPR 11
EMC resistance		EN 61000-6-2
ESD	8 kV(A)	EN 61000-4-2:3.96
Burst control lines	1 kV (A)	EN 61000-4-4
Conductor-bound		EN 61000-4-6



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