ADVANCED ENERGY®

INTERFACE CARD DEVICENET

FOR THYRO-P AND THYRO-P MC

July 2014 DE/EN - V3

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1. INTRODUCTION

1.1 GENERAL

This communications card adds the DeviceNet communications interface to the Thyro-P (thyristor power controller). It can be used for integrating the Thyro-P into complex systems using the fieldbus. In addition, there are 4 digital electrically isolated inputs on the card (see section 6). These can be accessed via terminal X21.

1.2 SPECIFIC CHARACTERISTICS

The scope of delivery includes:
- A DeviceNet interface card
- A cover for installing in the Thyro-P
- A diskette containing the files needed for project planning
- These instructions

The DeviceNet connection uses a 5-pin Open Connector (X20). It provides the standard connection for DeviceNet. The DeviceNet card needs 80 mA from the 24V supply.

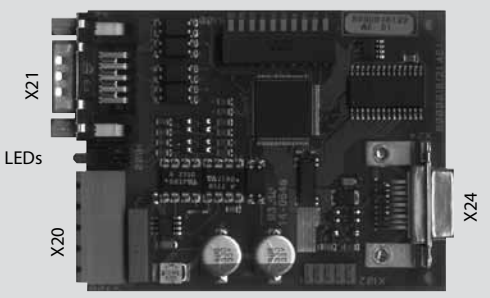

FIG. 1.1 DEVICENET INTERFACE CARD

1.3 TYPE DESIGNATION

DeviceNet interface card	Order No. 2000 000 394
Corresponding GSD file	03F9000C00010200

1.4 WARRANTY

In the event of any claims in connection with the DeviceNet interface card, 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 IDENTIFCATION 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 has 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 pupose 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, for instance, by jolts, knocks and contamination.

3. INSTALLATION & SETUP

3.1 INSTALLATION

Make sure that the control section is switched off. Plug the DeviceNet interface card into the extension slot and install the cover plate.

3.2 SETUP THE ADDRESS

For communication the DeviceNet interface card needs an address (0-63). For this the same address is used, which is also used for communi-cation via LWL (fibre optics) and RS232. This can be adjusted with the LBA-2, the Thyro-Tool Family and of course via DeviceNet. For DeviceNet the address range goes from 0 to 63. All addresses greater than 63 will be interpreted as 63. After change of Address a save is produced. That means all actual settings are also saved.

ATTENTION
The power controller must be switched off after a modification of the address via LBA-2 or Thyro-Tool Family, in order to activate the new address.

3.3 SETUP THE COMMUNICATION SPEED

This device detects the communication speed of the DeviceNet. So no adjustment has to be made. The communication speed 125, 250 and 500 kBaud are supported.

3.4 CONNECTION

Cable selection, cable routing, shielding, bus connector, bus termination and transmission times are all described in the "DeviceNet specification, volumes I, II", published by ODVA.
For connection to the DeviceNet we deliver with the card a standard open-style connector. Figure 3.1 shows how to connect the card to the DeviceNet.

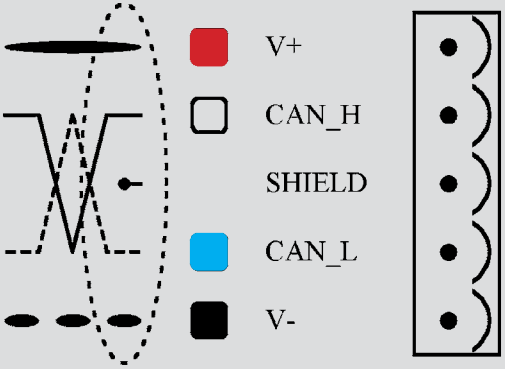

FIG. 3.1 WIRING CONNECTION

3.5 CONTROLLER SETUP

A controller needs an EDS file (electronic data sheet) for configuring each DeviceNet node. Therefore register the EDS-file, which is de-livered with the DeviceNet interface card, with the configuration tool. After installing the EDS file scan the network for any attached nodes. Next step is to configure the scanner. Therefore all nodes have to be added to the scanner's scan list. Then for every node the IO-Parameters have to be set. After downloading the configuration to the scanner, the Thyro-P is ready for communication.

4. OBJECT SPECIFICATIONS

4.1 0X01 IDENTITY OBJECT

This object provides identification of and general information about the device.

ATTR. ID	ACCESS RULE	NAME	DATA TYPE	DESCRIPTION OF ATTRIBUTE	SEMANTICS OF VALUES	DEFAULT
1	Get	Revision	UINT	Revision of this object.	If updates that require an increase in this value are made, then the value of this attribute increases by 1.	1
2	Get	Max Instance	UINT	Max. instance number of an object currently created in this class level of the device.	The largest instance number of a created object at this class hierarchy level.	1

TAB. 4.1 IDENTITY OBJECT CLASS ATTRIBUTES

ATTR. ID	ACCESS RULE	NAME	DATA TYPE	DESCRIPTION OF ATTRIBUTE	DEFAULT
1	Get	Vendor ID	UINT	Identification of vendor by number.	1017
2	Get	Device Type	UINT	Indication of general type of product. This device is a Communications Adapter.	12
3	Get	Product Code	UINT	Identification of a particular product of an individual vendor.	1
4	Get	Revision	STRUCT of:	Revision of the item the Identitiy Object represents.	
		Major Revision	USINT		1
		Minor Revision	USINT		1
5	Get	Status	WORD	Summary status of device.	1
6	Get	Serial Number	DINT	Serial number of device.	1
7	Get Name	Product STRIN	SHORT_	Human-readable identification.	Thyro-P DeviceNet Interface
8	Get	State	USINT	Present state of the device	
10	Get/Set	Heartbeat Intervall	USINT	The nominal interval between heartbeat messages in seconds	0

TAB. 4.2 IDENTITY OBJECT INSTANCE ATTRIBUTES

SERVICE CODE	SUPPORTED CLASS	SUPPORTED INSTANCE	SERVICE NAME	DESCRIPTION OF SERVICE
0x0E	Yes	Yes	Get_Attribute_Single	Returns the content of the specified attribute.
0x10	N/A	Yes	Set_Attribute_Single	Modifies a DeviceNet Object attribute value.
0x05	N/A	Yes	Reset	Invokes the Reset service for the device.

TAB. 4.3 IDENTITY OBJECT SERVICES

4.2 0X02 MESSAGE ROUTER OBJECT

The Message Router is implemented as an Object that has no externally visible Attributes or Services. It only implements a behavior.

4.3 0X03 DEVICENET OBJECT

ATTR. ID	ACCESS RULE	NAME	DATA TYPE	DESCRIPTION OF ATTRIBUTE	SEMANTICS OF VALUES	DEFAULT
1	Get	Revision	UINT	Revision of the DeviceNet Object Class Definition upon which the implementation is based.	If updates that require an increase in this value are made, then the value of this attribute increases by 1.	2

TAB. 4.4 DeviceNet OBJECT CLASS ATTRIBUTES

ATTR. ID	ACCESS RULE	NAME	DATA TYPE	DESCRIPTION OF ATTRIBUTE	DEFAULT
1	Get/Set	MAC ID	USINT	Node Address.	63
2	Get/Set	Baud Rate	USINT	Baud Rate.	Auto (2)
3	Get/Set	BOI	BOOL	Bus-Off interrupt.	1
4	Get/Set	Bus-Off Counter	USINT	Number of times DeviceNet went to the Bus-Off state.	0
5	Get	Allocation Information	STRUCT of:		
		Allocation Choice Byte	BYTE	Refer to DeviceNet Specification.	0
		Master´s MAC ID	USINT	MAC ID of Master (from Allocate)	0xFF

TAB. 4.5 DeviceNet OBJECT INSTANCE ATTRIBUTES

SERVICE CODE	SUPPORTED		SERVICE NAME	DESCRIPTION OF SERVICE
	CLASS	INSTANCE		
0x0E	Yes	Yes	Get_Attribute_Single	Returns the content of the specified attribute.
0x10	N/A	Yes	Set_Attribute_Single	Modifies a DeviceNet Object attribute value.
0x4B	N/A	Yes	Allocate_Master/ Slave_Connection_Set	Requests the use of the Predefined Master/Slave Connection Set.
0x4C	N/A	Yes	Release_Group_2_ Identifier_Set	Indicates that the specified Connections within the Predefined Master/Slave Connection Set are no longer desired. These connections are to be released (Deleted).

TAB. 4.6 DeviceNet OBJECT SERVICES

4.4 0X04 ASSEMBLY OBJECT

The Assembly Object binds attributes of multiple objects, which allows data to or from each object to be sent or received over a single connection.

ATTR. ID	ACCESS RULE	NAME	DATA TYPE	DESCRIPTION OF ATTRIBUTE	SEMANTICS OF VALUES	DEFAULT
1	Get	Revision	UINT	Revision of this object.	If updates that require an increase in this value are made, value of this attribute increases by 1.	2
2	Get	Number of Instances	UINT	Number of object instances currently created at this class level of the device.	The number of object instances at this class hierarchy level.	6

TAB. 4.7 ASSEMBLY OBJECT CLASS ATTRIBUTES

ATTR. ID	ACCESS RULE	NAME	DATA TYPE	DESCRIPTION OF ATTRIBUTE	DEFAULT
3	Get	Data	ARRAY	The data contained in the assembly object (see assembly).	

TAB. 4.8 ASSEMBLY OBJECT INSTANCE ATTRIBUTES

SERVICE CODE	SUPPORTED		SERVICE NAME	DESCRIPTION OF SERVICE
	CLASS	INSTANCE		
0x0E	Yes	Yes	Get_Attribute_Single	Returns the content of the specified attribute.

TAB. 4.9 ASSEMBLY OBJECT SERVICES

4.5 0X05 CONNECTION OBJECT

CONNECTION INSTANCE ID	CONNECTION
1	Explicit Connection
2	Polled I/O Connection
3-7	Dynamic Explicit Connections

TAB. 4.10 CONNECTION CLASS INSTANCES

ATTR. ID	ACCESS RULE	NAME	DATA TYPE	DESCRIPTION OF ATTRIBUTE	SEMANTICS OF VALUES	DEFAULT
1	Get	Revision	UINT	Revision of this object.	If updates that require an increase in this value are made, then the value of this attribute increases by 1.	1

TAB. 4.11 CONNECTION CLASS ATTRIBUTES

ATTR. ID	ACCESS RULE	NAME	DATA TYPE	DESCRIPTION OF ATTRIBUTE
1	Get	State	USINT	State of the object.
2	Get	Instance_type	USINT	Indicates either I/0 or Messaging Connection
3	Get/Set[4]	TransportClass_ trigger	BYTE	Defines behaviour of the Connection.
4	Get/Set[4]	DeviceNet_ produced_ connection_id	UINT	Placed in DeviceNet Identifier Field when the Connection transmits on a DeviceNet subnet. Described on Vol. 3, DeviceNet Adaption of CIP.
5	Get/Set[4]	DeviceNet_ consumed_ connection_id	UINT	DeviceNet Identifier Field value that denotes message to be received on a DeviceNet subnet. Described in Vol. 3, DeviceNet Adaption of CIP.
6	Get[1/4]/Set[4]	DeviceNet_ initial_comm_ characteristics	BYTE	Defines the Message Group(s) across which productions and consumptions associated with this Connection occur on a DeviceNet subnet. Described in Vol. 3, DeviceNet Adaption of CIP.
7	Get	Produced_ connection_size	UINT	Maximum number of bytes transmitted across this Connection.
8	Get	Consumed_ connection_size	UINT	Maximum number of bytes received across this Connection.
9	Get/Set	Expected_ packet_rate	UINT	Defines timing associated with this Connection.
12	Get	Watchdog_ timeout_action	USINT	Defines how to handle Inactivity/Watchdog timeouts
13	Get	Produced_ connection_ path_length	UINT	Number of bytes in the produced_connection_path attribute
14	Get/Set[2/3/4]	Produced_ connection_path	Packed EPATH	Specifies the Application Object(s) whose data is to be produced by this Connection Object. See Appendix C.
15	Get	Consumed_ connection_ path_length	UINT	Number of bytes in the consumed_connection_path attribute.
16	Get/Set[2/3/4]	Consumed_ connection_path	Packed EPATH	Specifies the Application Object(s) that are to receive the data consumed by this Connection Object. See Appendix C.
17	Get/Set[2/3/4]	Production_ inhibit_time	UINT	Defines minimum time between new data production. This attribute is required for all I/O Client connections, except those with a production trigger of Cyclic.

TAB. 4.12 CONNECTION CLASS INSTANCE ATTRIBUTES

1 Only Explicit Connection, 2 Only Polled I/O Connection, 3 Only COS/Cyclic I/O Connection,
4 Only Dynamic Explicit Connections

SERVICE CODE	SUPPORTED CLASS	SUPPORTED INSTANCE	SERVICE NAME	DESCRIPTION OF SERVICE
0x0E	Yes	Yes	Get_Attribute_Single	Returns the content of the specified attribute.
0x10	N/A	Yes	Set_Attribute_Single	Modifies a DeviceNet Object attribute value.
0x05	N/A	Yes	Reset	Used to reset the Inactivity/Watchdog Timer associated with a Connection Object. When a Connection in the Timed Out or Deferred Delete state receives a Reset request it also transitions back to the Established state.
0x08	Yes	N/A	Create	Used to instantiate a Connection Object.
0x09	N/A	Yes	Delete	Used to delete a Connection Object and to release all associated resources.
0x0D	N/A	Yes[4]	Apply_Attributes	Used to deliver the Connection Object to the application, which performs the set of tasks necessary to create the specified connection.

TAB. 4.13 CONNECTION CLASS SERVICES

4.6 0X0F PARAMETER OBJECT

ATTR. ID	ACCESS RULE	NAME	DATA TYPE	DESCRIPTION OF ATTRIBUTE	SEMANTICS OF VALUES	DEFAULT
1	Get	Revision	UINT	Revision of this object.	If updates that require an increase in this value are made, then the value of this attribute increases by 1.	1
2	Get	Number of instances	UINT	Max. instance number of an object currently created in this class level of the device.	The largest instance number of a created object at this class hierarchy level.	0
8	Get	Parameter Class Descriptor	UINT	Bits that describe parameters.		0x0C
9	Get	Configuration Assembly Instance	UINT	Instance number of the configuration assembly.	This attribute shall be set to zero if a configuration assembly is not supported.	0

TAB. 4.14 PARAMETER CLASS ATTRIBUTES

SERVICE CODE	SUPPORTED		SERVICE NAME	DESCRIPTION OF SERVICE
	CLASS	INSTANCE		
0x0E	Yes	N/A	Get_Attribute_Single	Returns the content of the specified attribute.
0x15	Yes	N/A	Restore	Restores all parameter values from non-volatile storage.
0x16	Yes	N/A	Save	Saves all parameter values to non-volatile storage.

TAB. 4.15 PARAMETER CLASS SERVICES

4.7 0X64-0X66 VENDOR SPECIFIC OBJECT

These three classes are for control of the Thyro-P. Each class has just one instance. Table 4.16 shows an overview of all attributes. For more details refer to Chapter 9.

CLASS ID	GROUPS OF ATTRIBUTES	DESCRIPTION
0x64	Setpoints	The setpoints controls the output power of the Thyro-P.
	Actual	This values showing the actual state of the Thyro-P.
	Functions	Via these output values certain functions in the Thyro-P can be executed.
	Hardware	Detail description of the Thyro-P hardware.
0x65	Operating Mode	Configuration of the operation modes.
	Times	Specified time depending on operation mode.
	Controls	Configuration of the regulation.
	Limit	Limit configuration for voltage, current I and power.
	Control characteristic	Control of the setpoint characteristics.
0x66	Temperature	Control of the heat sink monitoring.
	Analog outputs	Configuration of the analog outputs.
	Monitoring	Monitoring of mains voltage and load.
	LED & Relays	Configuration of the LEDs and Relays.
	Miscellaneous	Some other configurations.

TAB. 4.16 Thyro-P ATTRIBUTES

ATTR. ID	ACCESS RULE	NAME	DATA TYPE	DESCRIPTION OF ATTRIBUTE	SEMANTICS OF VALUES	DEFAULT
1	Get	Revision	UINT	Revision of this object.	If updates that require an increase in this value are made, then the value of this attribute increases by 1.	1
2	Get	Max instance	UINT	Max. instance number of an object currently created in this class level of the device.	The largest instance number of a created object at this class hierarchy level.	1

TAB. 4.17 VENDOR SPECIFIC OBJECTS CLASS ATTRIBUTES

SERVICE CODE	SUPPORTED		SERVICE NAME	DESCRIPTION OF SERVICE
	CLASS	INSTANCE		
0x0E	Yes	Yes	Get_Attribute_Single	Returns the content of the specified attribute.
0x10	N/A	Yes	Set_Attribute_Single	Modifies a DeviceNet Object attribute value.

TAB. 4.18 VENDOR SPECIFIC OBJECT SERVICES

5. STATUS LEDs

For trouble shooting the DeviceNet interface card has two LEDs. The meaning of these LEDs is described in the DeviceNet specifications. An LED test is performed at power-up to allow a visual inspection to be performed.

MODULE STATUS LED

This bi-color (green/red) LED provides device status. It indicates whether or not the device has power and is operating properly. Table 5.1 defines the module status LED. The states shown reflect the device states specified in the Identity Object.

FOR THIS STATE	LED IS:	TO INDICATE
No power	Off	There is no power applied to the device.
Device Operational	Green	The device is operating in a normal condition.
Device in Standby (The Device Needs Commissioning)	Flashing Green	The device needs commissioning due to configuration missing, incomplete or incorrect. The Device may be in the Standby state. Refer to the Identity Object in Volume 1, CIP Common, Chapter 5: Object Library.
Minor Fault	Flashing Red	Recoverable Fault
Unrecoverable Fault	Red	The device has an unrecoverable fault; may need replacing.
Device Self Testing	Flashing Red & Green	The Device is in SelfTest. Refer to the Identity Object in Volume II for Device states.

TAB. 5.1 MODULE STATUS LED

NETWORK STATUS LED

This bi-color (green/red) LED indicates the status of the communication link. Table 5.2 defines the network status LED. The states shown reflect the network access state machine.

FOR THIS STATE:	LED IS:	TO INDICATE
Not Powered Not On-line	Off	Device is not on-line. - The device has not completed the Dup_MAC_ID test yet. - The device may not be powered, look at Module Status LED.
On-line, Not Connected	Flashing Green	Device is on–line but has no connections in the established state. - The device has passed the Dup_MAC_ID test, is on–line, but has no established connections to other nodes. - For a UCMM capable device it means that the device has no established connections.
Link OK On-line, Connected	Green	The device is on–line and has connections in the established state. - For a Group 2 Only device it means that the device is allocated to a Master. - For a UCMM capable device it means that the device has one or more established connections.
Connection Time-Out	Flashing Red	One or more I/O Connections are in the Timed–Out state.
Critical Link Failure	Red	Failed communication device. The device has detected an error that has rendered it incapable of communicating on the network (Duplicate MAC ID, or Bus–off).
Communication Faulted and Received an Identify Comm. Fault Request - Long Protocol	Flashing Red & Green	The device has detected a Network Access error and is in the Communication Faulted state. The device has subsequently received and accepted an Identify Communication Faulted Request - Long Protocol message.

TAB. 5.2 NETWORK STATUS LED

6. DIGITAL INPUTS

The bus card provides three digital inputs as well as an input for the activation of the local operation (see section 7), via the 9-pin sub D plug (X21). These are automatically reproduced on the bus (Table 8.5).

PIN	DESIGNATION	FUNCTION
1	Earth	Earth
2	M1	Ground for IN0 and IN1
3	IN 0	Input 0
4	IN 1	Input 1
5	M24	Ground/internal 24 V supply
6	M2	Ground for IN2 and IN3
7	IN 2	Input 2
8	IN 3	Input 3
9	+24	+24V/internal 24V supply

TAB. 6.1 CONNECTION ASSIGNMENT X21

Inputs 0 and 1 always relate to ground M1 and inputs 2 and Loc always relate to ground M2. There is also a 24 V supply provided for connecting simple signalers such as limit switches, etc. This would make the following connection possible, for example:

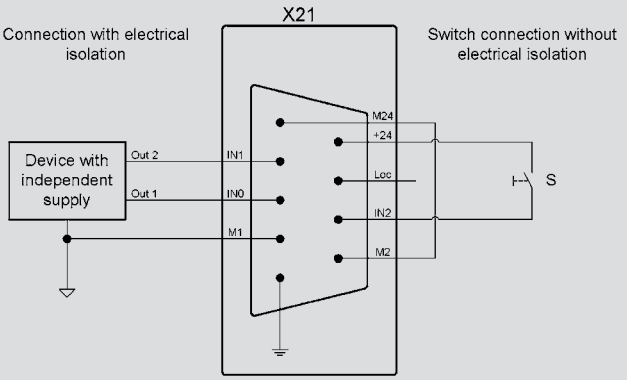

FIG. 6.2 EXAMPLE OF CONNECTING INPUTS

7. LOCAL OPERATION OF THE SETPOINT MOTORPOTI

In certain situations, e.g. failure of the bus, is it sometimes necessary to change the desired value quickly. This can take place over the LBA-2. It is however pedantic for certain applications too. In order to remove this deficiency, the possibility of the local operation of the Setpoint Motorpoti was created via switches.
The local operation of the setpoint Motorpoti can be activated via the Loc input (pin 8). It is then possible to switch the value SW_ACTIV between remote (open) and local (closed) via the input IN0 (pin 3).
In the local operation mode the setpoint motorpoti value can be changed over the inputs IN1 and IN2, whereby the setpoint value with pressed key changes according to figure 7.1. For example the setpoint goes up 30% if the UP key is pressed for 10s. With simultaneous operation of the Up and Down keys the desired value is reduced.

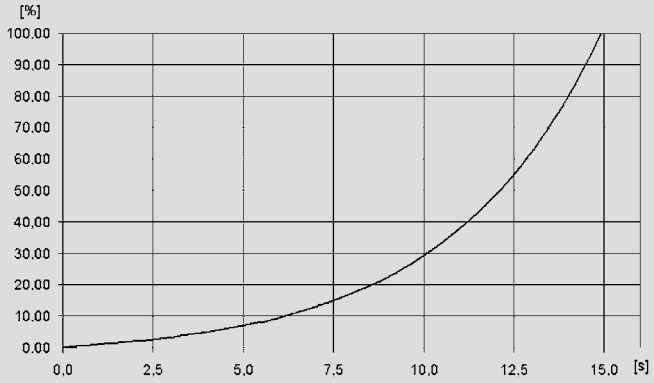

FIG. 7.1 RELATIVE CHANGING OF THE MOTORPOTI SETPOINT OVER THE TIME

For the local operation the plug X21 is to be connecting as follows.

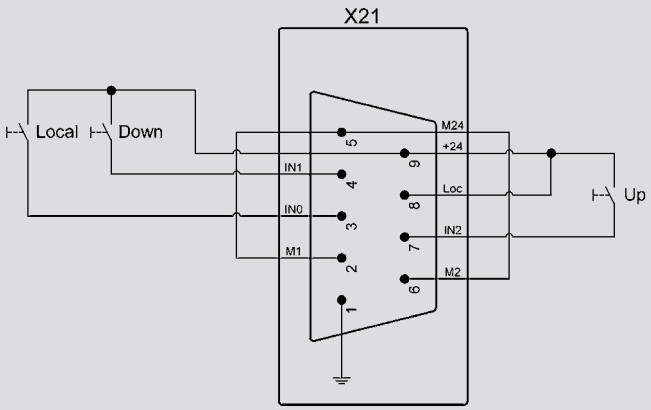

FIG. 7.2 LOCAL OPERATION OF THE SETPOINT MOTORPOTI

Note: When using the local operation the following points are to be considered:

1. To prevent a precipitous modification of the setpoint when switching from remote to local, the „setpoint motorpoti" is set in the remote operation equal to the „setpoint master". This takes place automatically by setting the „Mopo = Master" Bit (Table 8.1 and Table 8.2).
2. To prevent a preciptious modification of the setpoint when switching from local to remote, the following procedures have to be executed while the switch „local" is closed: („4 digital inputs„ bit 0=0):
   Deactivating of the process regulator, writing continuously the value of „setpoint total" into „setpoint master". For that, the „setpoint total" must be transferred cyclically.
3. When switching from local to remote the process regulator must be initialized with the „setpoint total" and shall only be activated afterwards. The following flow chart is a result of the above adjustments (see Figure 7.3).

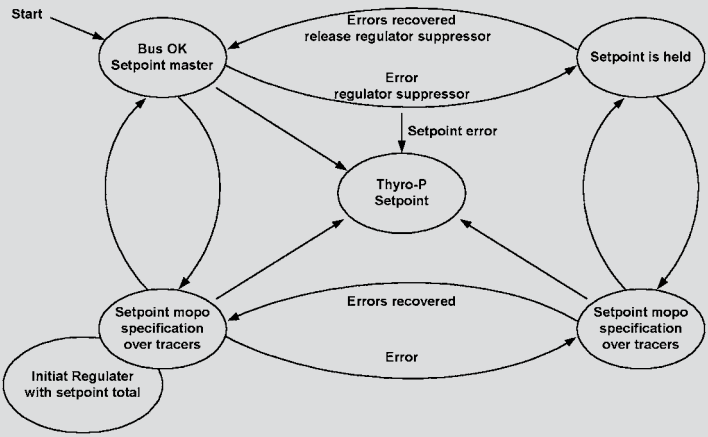

ABB. 7.3 STATE DIAGRAM

8. ASSEMBLY

8.1 ASSEMBLY 101: SETPOINT (OUTPUT FOR POLL)

BYTE	P.ID	TYPE	VALUE
0	38	BYTE	Configuration (Table 8.2)
1-2	1	UINT	Setpoint Master (16383 == 100 [%])
3-4	2	UINT	Setpoint Master Error (16383 == 100 [%])

TAB. 8.1 OUTPUT ASSEMBLY 101

NOTE

For power control the „Setpoint master" is used in normal operation.
If the poll connection is interrupted, or the poll telegram length is zero, then the „Setpoint master error" is used.

BIT	VALUE	DESCRIPTION
0	Mopo = Master	Activate the write of the „Setpoint master" on the „Setpoint motorpoti", if the power controller is in „Remote" operation and the Device is on-line and has connections in the established state.
1	All values are local	Here can be determined, which values can be adjusted in the „local mode" locally. 0 Only the setpoints are locally given. 1 No value is given by the master.
2-3	Actual values average	Here the averaging of the actual values can be activated. In the operating mode „TAKT" is measured once per T_0, with „VAR" once per 0,2s. 00 Averaging is off 01 Averaging over 5 Values 10 Averaging over 10 Values 11 Averaging over 20 Values
4	Regulator suppressor	Through this Bit the regulator suppressor can be controlled. 0 Regulator suppressor off 1 Regulator suppressor on
5	Use setpoint	New setpoints only taken over if this bit is set. 0 Ignore new setpoints 1 Use new setpoints

TAB. 8.2 DESCRIPTION OF THE CONFIGURATION BYTE

NOTE

If the power controller is in remote operation („Setpoint master" is active only), can it be useful, if the „Setpoint master" is also written on the „Setpoint motorpoti". So when switching from remote to local no skip function is on the Setpoint.

8.2 ASSEMBLY 102: SETPOINT, STATE… (INPUT FOR POLL)

BYTE	P.ID	TYPE	VALUE
0	23	UINT	Total setpoint (16383 == 100 [%])
2	30	BYTE	LED & Relays state (Table 7.4)
3	31	BYTE	Digital Input (Table 7.5)
4-5	32	WORD	Thyro-P state (Table 7.6)
6	117	BYTE	Setpoint active (Table 7.7)

TAB. 8.3 INPUT ASSEMBLY 102

BIT	HARDWARE STATE
7	Relay K3 on
6	Relay K2 on
5	Relay K1 on
4	LED OVERHEAT on
3	LED FAULT on
2	LED PULSE LOCK on
1	LED LIMIT on
0	LED CONTROL on

TAB. 8.4 LED & RELAYS STATE

BIT	INPUT STATE
3	nLOC
2	Input 2 (nUp)
1	Input 1 (nDown)
0	Input 0 (nLocal)

TAB. 8.5 DIGITAL INPUT

BIT	STATE
15	MOSI in peak current limitation
14	SYNC fault
13	Overvoltage in mains
12	Undervoltage in mains
11	Overcurrent in load circuit
10	Undercurrent in load circuit
9	Regulator suppressor
8	Overtemperature
7	Limit
6	U limit
5	I limit
4	P limit
3	Pulse switch-off
2	Sensor breakage or short circuit
1	res.
0	SSC fault

TAB. 8.6 Thyro-P STATE

BIT	ACTIVE
3	Setpoint Motorpoti
2	Setpoint Master
1	Setpoint terminal 11
0	Setpoint terminal 10

TAB. 8.7 SETPOINT ACTIVE

8.3 ASSEMBLY 103: ACTUAL VALUE Thyro-P 1P

BYTE	P.ID	TYPE	VALUE
0-3	3	REAL	Power L1
4-7	4	REAL	Voltage Load L1
8-11	5	REAL	Current L1
12-15	6	REAL	Load L1
16-17	7	UINT	Voltage Main L1
18-19	8	UINT	Reserve L1

TAB. 8.8 INPUT ASSEMBLY 103

8.4 ASSEMBLY 104: ACTUAL VALUE Thyro-P 2P

BYTE	P.ID	TYPE	VALUE
0-3	3	REAL	Power L1
4-7	4	REAL	Voltage Load L1
8-11	5	REAL	Current L1
12-15	6	REAL	Load L1
16-17	7	UINT	Voltage Main L1
18-19	8	UINT	Reserve L1
20-23	15	REAL	Power L3
24-27	16	REAL	Voltage Load L3
28-31	17	REAL	Current L3
32-35	18	REAL	Load L3
36-37	19	UINT	Voltage Main L3
38-39	20	UINT	Reserve L3

TAB. 8.9 INPUT ASSEMBLY 104

8.5 ASSEMBLY 105: ACTUAL VALUE Thyro-P 3P

BYTE	P.ID	TYPE	VALUE
0-3	3	REAL	Power L1
4-7	4	REAL	Voltage Load L1
8-11	5	REAL	Current L1
12-15	6	REAL	Load L1
16-17	7	UINT	Voltage Main L1
18-19	8	UINT	Reserve L1
20-23	9	REAL	Power L2
24-27	10	REAL	Voltage Load L2
28-31	11	REAL	Current L2
32-35	12	REAL	Load L2
36-37	13	UINT	Voltage Main L2
38-39	14	UINT	Reserve L2
40-43	15	REAL	Power L3
44-47	16	REAL	Voltage Load L3
48-51	17	REAL	Current L3
52-55	18	REAL	Load L3
56-57	19	UINT	Voltage Main L3
58-59	20	UINT	Reserve L3

TAB. 8.10 INPUT ASSEMBLY 105

8.6 ASSEMBLY 106: OTHER ACTUAL VALUE

BYTE	P.ID	TYPE	VALUE
0-3	21	REAL	Total power
4-5	22	INT	Temperature
6-7	24	UINT	Setpoint Motorpoti (16383 == 100 [%])
8-9	25	UINT	Setpoint terminal 10
10-11	26	UINT	Setpoint terminal 11
12-13	27	UINT	On-angle alpha
14-15	28	UINT	On-time value
16-17	29	UINT	Period time [ms]

TAB. 8.11 INPUT ASSEMBLY 106

9. ATTRIBUTES

All attributes are listed in the following tables. The attributes are split into 3 objects (100-102). The Instance is always 1. The epath to a parameter is „20 Class. ID 24 01 30 Attr.ID“ for example the epath to the „Setpoint Master“ is 20 64 24 01 30 64 (all values hex).

9.1 ATTRIBUTES OF CLASS 0X64

P.ID	ATTR ID	SETPOINT	TYPE	UNIT	R/W
1	100	Setpoint Master	UINT	16383 == 100[%]	r / w
2	101	Setpoint Master Error	UINT	16383 == 100[%]	r / w

TAB. 9.1 SETPOINTS

P.ID	ATTR ID	SETPOINT	TYPE	UNIT	R / W
3	110	Power L1	REAL	[W]	r
4	111	Voltage Load L1	REAL	[V]	r
5	112	Current L1	REAL	[A]	r
6	113	Load L1	REAL	[S]	r
7	114	Voltage Main L1	UINT	[V]	r
8	115	Reserve L1	UINT		r
9	120	Power L2	REAL	[W]	r
10	121	Voltage Load L2	REAL	[V]	r
11	122	Current L2	REAL	[A]	r
12	123	Load L2	REAL	[S]	r
13	124	Voltage Main L2	UINT	[V]	r
14	125	Reserve L2	UINT		r
15	130	Power L3	REAL	[W]	r
16	131	Voltage Load L3	REAL	[V]	r
17	132	Current L3	REAL	[A]	r
18	133	Load L3	REAL	[S]	r
19	134	Voltage Main L3	UINT	[V]	r
20	135	Reserve L3	UINT		r
21	140	Total power	REAL	[W]	r
22	141	Temperature	INT	[°C]	r

23	142	Total setpoint	UINT	16383 == 100[%]	r
24	143	Setpoint Motorpoti	UINT	16383 == 100[%]	r
25	144	Setpoint terminal 10	UINT	16383 == 100[%]	r
26	145	Setpoint terminal 11	UINT	16383 == 100[%]	r
27	146	On-angle alpha	UINT	18000 == 180°el	r
28	147	On-time value	UINT	[period]	r
29	148	Period time	UINT	[µs]	r
30	149	LED & Relays state	BYTE	--	r
31	150	Digital Input	BYTE	4 Bit	r
32	151	Thyro-P state	WORD	(Table 7.6)	r
33	152	State	USINT	--	r

TAB. 9.2 ACTUAL VALUES

P.ID	ATTR ID	VALUE	TYPE	VALUE RANGE	COMBO-OPT	UNIT	R/W	DEFAULT
34	160	Acknowledge	BOOL	0...1	Off, QUIT		r / w	Off
35	161	Reset	BOOL	0...1	Off, RESET		r / w	Off
37	163	Ext. Error message	BOOL	0...1	Off, ON		r / w	Off
38	164	Configuration	BYTE	Bit 0 Mopo = Master Bit 1 Local values Bit 2-3 Actual values average Bit 4 Regular supressor Bit 5 Use setpoint	Off, ON Setpoint, All Off, 5, 10, 20 values Off, ON No, Yes		r / w	Off Setpoint Off Off No
39	165	Reserve 1	BYTE				r / w	0
40	166	Reserve 2	BYTE				r / w	0

TAB. 9.3 FUNCTIONS

P.ID	ATTR ID	VALUE	TYPE	VALUE RANGE	COMBO-OPT	UNIT	R/W	DEFAULT
41	170	Power controller rated current	UINT	0...65535A		A	r	110
42	171	Rated current in LSB	UINT	0...65535			r	0
43	172	Current converter ratio	UINT	0...65535			r	100
44	173	Load resistor current	UINT	0...653 Ohm		0,01 Ohm	r	91
45	174	Scaling factor current	UINT	0...65535			r	845
46	175	Current value threshold	UINT	0...65535		???	r	65535
47	176	Power controller connection voltage	UINT	0...1000V		V	r	400
48	177	Rated voltage in LSB	UINT	0...65535			r	0
49	178	Mains voltage user	UINT	0...1000V		V	r	400
50	179	Voltage converter ratio	UINT	0...1000			r	16
51	180	Voltage range changeover	USINT	0...2	230 V, 400 V, 690 V		r	1
52	181	Load resistor voltage	UINT	0...65535Ohm		Ohm	r	2000
53	182	Load resistor voltage range 1	UINT	0...65535Ohm		Ohm	r	1111
54	183	Load resistor voltage range 2	UINT	0...65535Ohm		Ohm	r	667
55	184	Scaling factor 230V	UINT	0...65535			r	1279
56	185	Scaling factor 400V	UINT	0...65535			r	1324
57	186	Scaling factor 500-690V	UINT	0...65535			r	1344
58	187	Min. frequency	UINT	14286...25000, 1/X * 10^6			r	22222
59	188	Max. frequency	UINT	14286...25000, 1/X * 10^6			r	15151
60	189	Frequency tolerance	USINT	0...100		%	r	10
61	190	Power controller rated power	UDINT	0...		W	r	44000
62	191	Rated power hi in LSB	UDINT	0...			r	0
63	192	Potentiometer regulator parameter Ti	UINT	0...65535			r	0
64	193	Potentiometer regulator parameter Kp	UINT	0...65535			r	0
65	194	Voltage divider resitor	UINT	0...65535		Ohm	r	32400
66	195	Meter circuit	USINT	0...5	Aron 1/2 Aron 1, 1/2 Aron 2, 1/2 Aron 3, Asymmetrical load, Symmetrical, load		r	0

TAB. 9.4 HARDWARE

9.2 ATTRIBUTES OF CLASS 0X65

P.ID	ATTR ID	VALUE	TYPE	VALUE RANGE	COMBO-OPT	UNIT	R/W	DEFAULT
67	100	Operating mode	USINT	0...2	TAKT, VAR, SSSD		r/w	0
68	101	Op. of molybdenum silicide rods	USINT	0...2	OFF, RAMP, STELL		r/w	0
69	102	Service mode	BOOL	0...1	OFF, ON		r/w	0
70	103	Automatic synchronization for multiple power controller applications	BOOL	0...1	OFF, ON		r	0
71	104	ASM total current	UINT	1...65535		A	r/w	220
72	105	ASM threshold	UINT	1...65535			r/w	200
73	106	ASM tolerance	UINT	1...65535			r/w	100
74	107	ASM time constant	UINT	1...65535			r/w	100
75	108	ASM delay	UINT	1...65535			r/w	1
76	109	Number of controlled phases	USINT	1...3			r/w	1
77	110	Directly earthed conductor	BOOL	0...1	OFF, ON		r/w	0
78	111	Re-ignitions	BOOL	0...1	OFF, ON		r/w	0
79	112	Phase shift	BOOL	0...1	OFF, ON		r/w	0
80	113	Phase shift polarity	BOOL	0...1	plus minus		r/w	0
81	114	Phase shift L1	UINT	0...360°el		0.01°el	r/w	0
82	115	Phase shift L2	UINT	0...360°el		0.01°el	r/w	0
83	116	Phase shift L3	UINT	0...360°el		0.01°el	r/w	0
84	117	Number of sync voltages	USINT	1...3			r/w	1
85	118	Rotating field	BOOL	0...1	right, left		r/w	0
86	119	Canal-separation	BOOL	0...1	OFF, ON		r/w	1

TAB. 9.5 OPERATING MODE

P.ID	ATTR ID	VALUE	TYPE	VALUE RANGE	COMBO-OPT	UNIT	R/W	DEFAULT
87	120	Phase angle of the 1st half-wave	UINT	0...180°el		0.01°el	r/w	6000
88	121	Soft-start time (setting)	UINT	0...9980 ms		period	r/w	15
89	122	Soft-down time (setting)	UINT	0...9980 ms		period	r/w	15
90	123	Cycle period	UINT	0... T0_MAX		period	r/w	50
91	124	Max. cycle period	UINT	02...1310s		period	r/w	250
92	125	Maximum cycle on-time	UINT	0,02... T0		period	r/w	50
93	126	Minimum cycle on-time	UINT	0...T0		period	r/w	0
94	127	Min. pause	USINT	0...200ms		period	r/w	3
95	128	Synchronous cycle	BOOL	0...1	internal, external		r/w	0
96	129	Synchronous cycle address	UINT	0...655350 ms		period/2	r/w	0

TAB. 9.6 TIMES

P.ID	ATTR ID	VALUE	TYPE	VALUE RANGE	COMBO-OPT	UNIT	R/W	DEFAULT
97	130	Regulation	USINT	0...8	Uload^2, Uload eff, Iload^2, Iload eff, Real power, res, res, res, without regulation		r/w	0
98	131	Standard regulator	BOOL	0...1	OFF, ON		r/w	1
99	132	PID-regulator, I-part	UINT	0 = off 0...65535			r/w	800
100	133	PID-regulator, P-part	UINT	0 = off 0...65535			r/w	160
101	134	PID-regulator, counter P-part	UINT	0...65535			r/w	1
102	135	PID-regulator, D-part	UINT	0 = off 0...65535			r/w	0
103	136	PID-regulator, I-part, default value	UINT	0 = off 0...65535			r	800
104	137	PID-regulator, P-part, default value	UINT	0 = off 0...65535			r	160
105	138	PID-regulator, counter P-part, default value	UINT	0...65535			r	1
106	139	PID-regulator, D-part, default value	UINT	0 = off 0...65535			r	0
107	140	Rate of angular displacement 1	UINT	0...65535			r/w	1100
108	141	Rate of angular displacement 2	UINT	0...65535			r/w	50

TAB. 9.7 CONTROLS

P.ID	ATTR ID	VALUE	TYPE	VALUE RANGE	COMBO-OPT	UNIT	R/W	DEFAULT
109	142	Min. r.m.s. voltage setpoint	UINT	0...65535 V		V	r/w	0
110	143	Max. r.m.s. voltage setpoint	UINT	0...65535 V		V	r/w	440
111	144	Min. r.m.s. current setpoint	UINT	0...65535 A		A	r/w	0
112	145	Max. r.m.s. current setpoint	UINT	0...65535 A		A	r/w	110
113	146	Min. power setpoint hi	UDINT	0...		W	r/w	0
114	147	Max. power setpoint hi	UDINT	0...		W	r/w	48400
115	148	Front pulse limit position	UINT	0...180°el		0.01°el	r/w	18000
116	149	Back pulse limit position	UINT	0...180°el		0.01°el	r/w	0

TAB. 9.8 LIMIT

P.ID	ATTR ID	VALUE	TYPE	VALUE RANGE	COMBO-OPT	UNIT	R/W	DEFAULT
117	150	Setpoint activation	BYTE	0...15	Bit 0 = 1 (Setpoint t10 active) ...		r/w	15
118	151	Setpoint linking	USINT	0...3	_ADD, IADD, _PRO, IPRO		r/w	0
119	152	Factor peak current limitation	UINT	0...1000			r/w	25
120	153	Setpoint jump correction	BOOL	0..1	OFF, ON		r/w	1
121	154	Input voltage/current terminal 10	USINT	0...2	5 V, 10 V, 20 mA		r/w	2
122	155	Control start regulator input terminal 10	UINT	dependent on SW_INP_IU_10		0.3mV 0.6mV 1.22uA	r/w	240
123	156	Control end regulator input terminal 10	UINT	dependent on SW_INP_IU_10		0.3mV 0.6mV 1.22uA	r/w	16383
124	157	Input voltage/current terminal 11	USINT	0...2	5 V, 10 V, 20 mA		r/w	0
125	158	Control start regulator input terminal 11	UINT	dependent on SW_INP_IU_11		0.3mV 0.6mV 1.22uA	r/w	240
126	159	Control end regulator input terminal 11	UINT	dependent on SW_INP_IU_11		0.3mV 0.6mV 1.22uA	r/w	16383
127	160	Control start master	UINT	0...65535			r/w	0
128	161	Control end master	UINT	0...65535			r/w	16383
129	162	Control start motor potentiomenter	UINT	0...65535			r/w	0
130	163	Control end motor potentiometer	UINT	0...65535			r/w	16383

TAB. 9.9 CONTROL CHARACTERISTIC

9.3 ATTRIBUTES OF CLASS 0X66

P.ID	ATTR ID	VALUE	TYPE	VALUE RANGE	COMBO-OPT	UNIT	R/W	DEFAULT
131	100	Temperature sensor	USINT	0...3	none, PT100, PT1000, NTC		r/w	0
132	101	Characteristic number	USINT	0...7	Characteristc 0... Characteristic 7		r/w	0
133	102	Level wire breakage	UINT	0...4000		Ohm	r/w	2000
134	103	Level short circuit	UINT	0...4000		Ohm	r/w	800
135	104	Temperature error duration	UINT	1...1000		period	r/w	10

TAB. 9.10 TEMPERATURE

P.ID	ATTR ID	VALUE	TYPE	VALUE RANGE	COMBO-OPT	UNIT	R/W	DEFAULT
136	105	Averaging	UINT	0...1000			r/w	25
137	106	Actual value output 1	USINT	0..1	20 mA, 10V		r/w	0
138	107	Offset 1	UINT	0...20000µA		µA	r/w	4000
139	108	Measuring instrument full-scale deflection DAC1, voltage	UINT	0...10000mV		mV	r/w	10000
140	109	Measuring instrument full-scale deflection DAC1, current	UINT	0...20000µA		µA	r/w	20000
141	110	Configuration register analog output 1	WORD	bitwise			r/w	26
142	111	Scale end value voltage actual value output 1	UINT	0...65535 V		A	r/w	500
143	112	Scale end value current actual value output 1	UINT	0...65535 A		V	r/w	150
144	113	Scale end value power actual value output 1	UDINT	0...		W	r/w	50000
145	114	Scale end value alpha actual value output 1	UINT	0...180°el		0.01°el	r/w	18000
146	115	Actual value output 2	USINT	0..1	20 mA,10V		r/w	0
147	116	Offset 2	UINT	0...20000µA		µA	r/w	4000
148	117	Measuring instrument full-scale deflection DAC2, voltage	UINT	0...10000mV		mV	r/w	10000
149	118	Measuring instrument full-scale deflection DAC2, current	UINT	0...20000µA		µA	r/w	20000
150	119	Configuration register analog output 2	WORD	bitwise			r/w	18
151	120	Scale end value voltage actual value output 2	UINT	0...65535 V		A	r/w	500
152	121	Scale end value current actual value output 2	UINT	0...65535 A		V	r/w	150
153	122	Scale end value power actual value output 2	UDINT	0...		W	r/w	50000
154	123	Scale end value alpha actual value output 2	UINT	0...180°el		0.01°el	r/w	18000
155	124	Actual value output 3	USINT	0..1	20 mA, 10V		r/w	0
156	125	Offset 3	UINT	0...20000µA		µA	r/w	4000
157	126	Measuring instrument full-scale deflection DAC3, voltage	UINT	0...10000mV		mV	r/w	10000
158	127	Measuring instrument full-scale deflection DAC3, current	UINT	0...20000µA		µA	r/w	20000
159	128	Configuration register analog output 3	WORD	bitwise			r/w	10
160	129	Scale end value voltage actual value output 3	UINT	0...65535 V		A	r/w	500
161	130	Scale end value current actual value output 3	UINT	0...65535 A		V	r/w	150
162	131	Scale end value power actual value output 3	UDINT	0...		W	r/w	50000
163	132	Scale end value alpha actual value output 3	UINT	0... 180°el		0.01°el	r/w	18000

TAB. 9.11 ANALOG OUTPUTS

P.ID	ATTR ID	VALUE	TYPE	VALUE RANGE	COMBO-OPT	UNIT	R/W	DEFAULT
164	133	Mains voltage monitoring minimum	UINT	0...1000 V		V	r/w	320
165	134	Mains voltage monitoring maximum	UINT	0...1000 V		V	r/w	480
166	135	Undercurrent monitoring	BOOL	0...1	OFF, ON		r/w	0
167	136	Overcurrent monitoring	BOOL	0...1	OFF, ON		r/w	0
168	137	Load break	BOOL	0...1	REL_, ABS		r/w	0
169	138	Undercurrent monitoring value	UINT	0...99 %		%	r/w	0
170	139	Overcurrent monitoring value	UINT	0...255 %		%	r/w	0
171	140	Undercurrent monitoring value	UINT	0...65535			r/w	0
172	141	Overcurrent monitoring value	UINT	0...65535			r/w	0
173	142	Monitoring L2 enable	BOOL	0...1	OFF, ON		r/w	0
174	143	Monitoring L3 enable	BOOL	0...1	OFF, ON		r/w	0

TAB. 9.12 MONITORING

P.ID	ATTR ID	VALUE	TYPE	VALUE RANGE	COMBO-OPT	UNIT	R/W	DEFAULT
175	144	LED & Relays work princ,iple	BYTE	0...256, bitewise	Open-circuit principle, Closed-circuit, principle		r/w	224
176	145	LED CONTROL mode	WORD	0...65535			r/w	4096
177	146	LED LIMIT mode	WORD	0...65535			r/w	0
178	147	LED PULSE LOCK mode	WORD	0...65535			r/w	0
179	148	LED FAULT mode	WORD	0...65535			r/w	1792
180	149	LED OVERHEAT mode	WORD	0...65535			r/w	0
181	150	Relay K1 mode	WORD	0...65535			r/w	1792
182	151	Relay K2 mode	WORD	0...65535			r/w	768
183	152	Relay K3 mode	WORD	0...65535			r/w	59392
184	153	LED CONTROL config 0	WORD	0...65535			r/w	0
185	154	LED LIMIT config 0	WORD	0...65535			r/w	2048
186	155	LED PULSE LOCK config 0	WORD	0...65535			r/w	256
187	156	LED FAULT config 0	WORD	0...65535			r/w	0
188	157	LED OVERHEAT config 0	WORD	0...65535			r/w	0
189	158	Relay K1 config 0	WORD	0...65535			r/w	0
190	159	Relay K2 config 0	WORD	0...65535			r/w	2048
191	160	Relay K3 config 0	WORD	0...65535			r/w	1
192	161	LED Control config 1	WORD	0...65535			r/w	0
193	162	LED LIMIT config 1	WORD	0...65535			r/w	0
194	163	LED PULSE LOCK config 1	WORD	0...65535			r/w	0
195	164	LED FAULT config 1	WORD	0...65535			r/w	256
196	165	LED OVERHEAT config 1	WORD	0...65535			r/w	0
197	166	Relay K1 config 1	WORD	0...65535			r/w	256
198	167	Relay K2 config 1	WORD	0...65535			r/w	0
199	168	Relay K3 config 1	WORD	0...65535			r/w	0

TAB. 9.13 LED & RELAYS

P.ID	ATTR ID	VALUE	TYPE	VALUE RANGE	COMBO-OPT	UNIT	R/W	DEFAULT
200	169	Data logger register	DWORD	0...65535			r/w	2048
201	170	Reset trigger on error register hi	DWORD	0...65535			r/w	0
202	171	Pulse switch-off on error register	DWORD	0...65535			r/w	0
203	172	Version year	UINT	0...9999			r	2004
204	173	Version month	USINT	1...12			r	9
205	174	Version day	USINT	1...31			r	3
206	175	Userparameter 0	UINT	0...65535			r/w	0
207	176	Userparameter 1	UINT	0...65535			r/w	0
208	177	Userparameter 2	UINT	0...65535			r/w	0
209	178	Userparameter 3	UINT	0...65535			r/w	0
210	179	Userparameter 4	UINT	0...65535			r/w	0
211	180	Userparameter 5	UINT	0...65535			r/w	0
212	181	Userparameter 6	UINT	0...65535			r/w	0
213	182	Userparameter 7	UINT	0...65535			r/w	0
214	183	Userparameter 8	UINT	0...65535			r/w	0
215	184	Userparameter 9	UINT	0...65535			r/w	0
216	185	Userparameter 10	UINT	0...65535			r/w	0
217	186	Userparameter 11	UINT	0...65535			r/w	0
218	187	Userparameter 12	UINT	0...65535			r/w	0
219	188	Userparameter 13	UINT	0...65535			r/w	0
220	189	Userparameter 14	UINT	0...65535			r/w	0

TAB. 9.14 MISCELLANEOUS

10. TECHNICAL SPECIFICATIONS

DEVICENET	
Address range	0 - 63 (64 - 999 => 63)
Communication speed	125, 250 and 500 kBaud
Connector	Open-style connector
DEVICENET SUPPLY	
Voltage range	11 - 25 V
Inrush current (25V)	4 A for 10ms
Operation current	80 mA max.

FEATURES
Auto baud detection
Module Status LED
Network Status LED
Complete control of all Thyro-P attributes

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Specifications are subject to change without notice.

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