BENDER
The Power in Electrical Safety©

ISOMETER® iso685 Device family

Modbus settings

Insulation monitoring device
for IT AC systems
with galvanically connected rectifiers and inverters
and for IT DC systems

iso685_D00022_03_A_XXEN/12.2017

PLEASE READ THIS MANUAL AND ALL ACCOMPANYING DOCUMENTS THOROUGHLY
AND KEEP THEM IN A SECURE PLACE FOR FUTURE REFERENCE:

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1. General information

This appendix provides a complete description of the Modbus register for the ISOMETER® iso685 family of devices to facilitate access to information.

The adjustable parameters for individual keys are listed.

The ISOMETER® iso685 device family supports 4-digit addressing and the following Modbus functions:

1. Holding registers for reading values
   (Read Holding Register; function code 0x03)
2. Registers for device programming
   (Preset Multiple Registers; function code 0x10)

For the complete Modbus protocol specification, visit

http://www.modbus.org.

Requests to the iso685 Modbus/TCP-Server are carried out using the Function code FC3 (read input registers). The server generates a function-related response and sends it to the Modbus client.

Maximum of Modbus TCP requests per second: 100/s.

2.1 Exception code

If a request cannot be answered for whatever reason, the server sends a so-called exception code to limit possible errors.

Exception-Code	**Description**
0x01	Invalid function
0x02	Invalid data access
0x03	Invalid data value
0x04	Slave device error
0x05	Acceptance confirmed (response is delayed)
0x06	Request not accepted (repeat request if necessary)
0x08	Memory: Parity error
0x0A	Gateway path not available
0x0B	Gateway Error

2.2 Modbus request

By means of the function code FC3, the required information, in Words, can be read from the ISOMETER® iso685 input registers. To enable this, the start address and the Number of registers to be read must be specified.

Example:
The insulation value should be read from the input register with a start address of 0x2000.

Byte	**Name**	**Example**
Byte 0,1	Transaction identifier	0x0000
Byte 2,3	Protocol identifier	0x0000
Byte 4,5	Length field	0x0006
Byte 6	Unit identifier	BCOM device address
Byte 7	Modbus function code	0x03
Byte 8,9	Register address defined in “Modbus register assignment” on page 7	0x2000
Byte 10,11	Number of Words	0x0002

2.3 Modbus response

The response consists of 2 bytes per register. The byte sequence is defined with the Most Significant Bit (MSB) first.

Byte	**Name**	**Example**
…	…	…
Byte 7	Modbus function code	0x03
Byte 8	Byte count	0x04
Byte 9,10	Value in Register 0	0x1234 (fictitous value)
Byte 11,12	Value in Register 1	0x2345 (fictitous value)

2.4 Structure of exception code

Byte	**Name**	**Example**
…	…	…
Byte 7	Modbus function code	0x83
Byte 8	Exception code	0x01 or 0x02

3.1 High-byte test status

Value	**Description**
0	No test
1	Internal test
2	External test

3.2 Low-byte alarm status

Value	**Description**
0	No alarm
1	Pre-warning
2	Fault
3	Reserved
4	Warning
5	Alarm

3.3 High-byte range

Value	**Description**
0	=
1	<
2	>
3	Invalid

3.4 Low-byte unit

Value	**Description**
0	Invalid
1	None
2	Ohm
3	Ampere
4	Volt
5	Percent
6	Hertz
7	Baud
8	Farad
9	Henry
10	Degree Celsius
11	Degree Fahrenheit
12	Second
13	Minute
14	Hour
15	Day
16	Month
17	Watt
18	var
19	VA
20	Wh
21	varh
22	Vah
23	Degree
24	Hertz per second

4.1 device family iso685

4.1.1 device information

Register address (hexadecimal)	Register address (decimal)	Description	Number of Registers	Data type	Mode	Comment	Range	Unit	isoRW685W-D	iso685(W)-D/S	iso685(W)-D/S-B	iso685(W)-D/S-P	isoHR685(W)-D/S-I-B
0x510	1296	Device model	16	String UTF 8	RO				x	x	x	x	x
0x520	1312	Article Number	16	String UTF 8	RO				x	x	x	x	x
0x530	1328	Serial Number	16	String UTF 8	RO				x	x	x	x	x
0x540	1344	Manufacturer	48	String UTF 8	RO				x	x	x	x	x
0x570	1392	D-Number of Interface	1	Uint16	RO	Software Number of the interface unit			x	x	x	x	x
0x571	1393	Software-Version interface	1	Uint16	RO				x	x	x	x	x
0x578	1400	D-Number measuring technique	1	Uint16	RO	Software Number of the measuring technique			x	x	x	x	x
0x579	1401	Software version measuring technique	1	Uint16	RO				x	x	x	x	x
0x580	1408	D-Number FP200	1	Uint16	RO	Software Number of FP200							x
0x581	1409	Software version FP200	1	Uint16	RO								x

4.1.2 Measuring values

Register address (hexadecimal)	Register address (decimal)	Description	Number of Registers	Data type	Mode	Comment	Range	Unit	isoRW685W-D	iso685(W)-D/S	iso685(W)-D/S-B	iso685(W)-D/S-P	isoHR685(W)-D/S-I-B
0x1010	4112	Channel Number(1)	Number	Uint16	RO				x	x	x	x	x
0x1011	4113	Insulation value	2	Float	RO	Insulation value		Ω	x	x	x	x	x
0x1013	4115	Test and alarm status	1	Uint16	RO	High-byte test, Low-byte alarm status (see page 6)			x	x	x	x	x
0x1014	4116	Range and unit	1	Uint16	RO	High-byte range, Low-byte unit (see page 6)			x	x	x	x	x
0x1015 - 0x1018	4117 - 4120	Internal use			RO	Must be read. Values are only relevant for internal use.			x	x	x	x	x
0x1019 - 0x101F	4121-4127	Internal use	1	Uint16	RO	Must be read. Values are only relevant for internal use.			x	x	x	x	x
0x1020	4128	Channel Number(2)	1	Uint16	RO				x	x	x	x	x
0x1021	4129	Insulation value	2	Float	RO	Insulation value		Ω	x	x	x	x	x
0x1023 - 0x102F	4131-4143	See previous channel			RO				x	x	x	x	x
0x1030	4144	Channel Number(3)	1	Uint16	RO				x	x	x	x	x
0x1031	4145	Leakage capacitance	2	Float	RO			F	x	x	x	x	x
0x1033 - 0x103F	4147-4159	See previous channel			RO				x	x	x	x	x
0x1040	4160	Channel Number(4)	1	Uint16	RO				x	x	x	x	x
0x1041	4161	Voltage L1-L2	2	Float	RO	Voltage measured between phase L1 and phase L2		V	x	x	x	x	x
0x1043 - 0x104F	4163-4175	See previous channel			RO				x	x	x	x	x
0x1050	4176	Channel Number(5)	1	Uint16	RO				x	x	x	x	x
0x1051	4177	Voltage L1-L3	2	Float	RO	Voltage measured between phase L1 and phase L3		V	x	x	x	x	x
0x1053 - 0x105F	4179-4191	See previous channel			RO				x	x	x	x	x
0x1060	4192	Channel Number(6)	1	Uint16	RO				x	x	x	x	x
0x1061	4193	Voltage L2-L3	2	Float	RO	Voltage measured between phase L2 and phase L3		V	x	x	x	x	x
0x1063 - 0x106F	4195-4207	See previous channel			RO				x	x	x	x	x
0x1070	4208	Channel Number(7)	1	Uint16	RO				x	x	x	x	x
0x1071	4209	Voltage L1-PE	2	Float	RO	Voltage measured between phase L1 and PE		V	x	x	x	x	x
0x1073 - 0x107F	4211-4223	See previous channel			RO				x	x	x	x	x

Register address (hexadecimal)	Register address (decimal)	Description	Number of Registers	Data type	Mode	Comment	Range	Unit	isoRW685W-D	iso685(W)-D/S	iso685(W)-D/S-B	iso685(W)-D/S-P	isoHR685(W)-D/S-I-B
0x1080	4224	Channel Number(8)	1	Uint16	RO				x	x	x	x	x
0x1081	4225	Voltage L2-PE	2	Float	RO	Voltage measured between phase L2 and PE			x	x	x	x	x
0x1083 - 0x108F	4227-4239	See previous channel			RO				x	x	x	x	x
0x1090	4240	Channel Number(9)	1	Uint16	RO				x	x	x	x	x
0x1091	4241	Voltage L3-PE	2	Float	RO	Voltage measured between phase L3 and PE			x	x	x	x	x
0x1093 - 0x109F	4243-4255	See previous channel			RO				x	x	x	x	x
0x10A0	4256	Channel Number(10)	1	Uint16	RO				x	x	x	x	x
0x10A1	4257	System frequency	2	Float	RO			Hz	x	x	x	x	x
0x10A3 - 0x10AF	4259-4271	See previous channel			RO				x	x	x	x	x
0x10B0	4272	Channel Number(11)	1	Uint16	RO				x	x	x	x	x
0x10B1	4273	System connection	2	Float	RO	0 = O.K. 101 = error			x	x	x	x	x
0x10B3 - 0x10BF	4275-4287	See previous channel			RO				x	x	x	x	x
0x10C0	4288	Channel Number(12)	1	Uint16	RO				x	x	x	x	x
0x10C1	4289	Connection to earth	2	Float	RO	0 = O.K. 102 = error			x	x	x	x	x
0x10C3 - 0x10CF	4291-4303	See previous channel			RO				x	x	x	x	x
0x10D0	4304	Channel Number(13)	1	Uint16	RO				x	x	x	x	x
0x10D1	4305	Device error	2	Float	RO	Number of the device error (e.g. 750 -> 7.50 CAN communication)			x	x	x	x	x
0x10D3 - 0x10DF	4307-4319	See previous channel			RO				x	x	x	x	x
0x10E0	4320	Channel Number(14)	1	Uint16	RO				x	x	x	x	x
0x10E1	4321	Device inactive	2	Float	RO	0 = active 1 = inactive			x	x	x	x	x
0x10E3 - 0x10EF	4323-4335	See previous channel			RO				x	x	x	x	x
0x10F0	4336	Channel Number(15)	1	Uint16	RO				x	x	x	x	x
0x10F1	4337	DC Offset	2	Float	RO	DC shift in the system 0 % = Fault on DC+ 100 % = Fault on DC-			x	x	x	x	x
0x10F3 - 0x10FF	4339-4351	See previous channel			RO				x	x	x	x	x

Register address (hexadecimal)	Register address (decimal)	Description	Number of Registers	Data type	Mode	Comment	Range	Unit	isoRW685W-D	iso685(W)-D/S	iso685(W)-D/S-B	iso685(W)-D/S-P	isoHR685(W)-D/S-I-B
0x1100	4352	Channel Number(16)	1	Uint16	RO				x	x	x	x	x
0x1101	4353	Quality of the measurement	2	Float	RO	Quality of measuring value 0 % = Poor quality => change profile 100 % = Good quality => Profile fits to the application		%	x	x	x	x	x
0x1103 - 0x110F	4355-4367	See previous channel			RO				x	x	x	x	x
0x1110	4368	Channel Number(17)	1	Uint16	RO				x	x	x	x	x
0x1111	4369	Minimum insulation value	2	Float	RO	Minimum insulation value measured		Ω	x	x	x	x	x
0x1113 - 0x111F	4371-4383	See previous channel			RO				x	x	x	x	x
0x1120	4384	Channel Number(18)	1	Uint16	RO				x	x	x	x	x
0x1121	4385	Symmetric alarm	2	Float	RO	DC fault shift in percent 0%-25% -> Fault on DC+ 25%-75% -> Symmetrical fault 75%-100% -> Fault on DC-	0…100	%	x	x	x	x	x
0x1123 - 0x112F	4387-4399	See previous channel			RO				x	x	x	x	x
0x1130	4400	Channel Number(19)	1	Uint16	RO				x	x	x	x	x
0x1131	4401	DC minus alarm	2	Float	RO	See 0x1121			x	x	x	x	x
0x1133 - 0x113F	4403-4415	See previous channel			RO				x	x	x	x	x
0x1140	4416	Channel Number(20)	1	Uint16	RO				x	x	x	x	x
0x1141	4417	DC plus alarm	2	Float	RO	See 0x1121			x	x	x	x	x
0x1143 - 0x114F	4419-4431	See previous channel			RO				x	x	x	x	x
0x1150	4432	Channel Number(21)	1	Uint16	RO						x	x	x
0x1151	4433	ISOnet device timeout	2	Float	RO	Address of the device in which the timeout occured	0…255				x	x	x
0x1153 - 0x115F	4435-4447	See previous channel			RO						x	x	x
0x1160	4448	Channel Number(22)	1	Uint16	RO						x	x	x
0x1161	4449	Incomplete Number of ISOnet devices	2	Float	RO	The value is always 0. Only the alarm status is changed from “ “no alarm“ to “fault“					x	x	x
0x1163 - 0x116F	4451-4463	See previous channel			RO						x	x	x
0x1170	4464	Channel Number(23)	1	Uint16	RO						x	x	x

Register address (hexadecimal)	Register address (decimal)	Description	Number of Registers	Data type	Mode	Comment	Range	Unit	isoRW685W-D	iso685(W)-D/S	iso685(W)-D/S-B	iso685(W)-D/S-P	isoHR685(W)-D/S-I-B
0x1171	4465	General ISOnet error	2	Float	RO	The value is always 0. Only the alarm status is changed from “no alarm“ to “fault“					x	x	x
0x1173 - 0x117F	4467-4479	See previous channel			RO						x	x	x
0x1180	4480	Channel Number(24)	1	Uint16	RO			V	x	x	x	x	x
0x1181	4481	DC shift to earth	2	Float	RO				x	x	x	x	x
0x1183 - 0x118F	4483 - 4495	See previous channel			RO				x	x	x	x	x
0x1190	4496	Channel Number(25)	1	Uint16	RO							x	
0x1191	4497	Number of active EDS channels	2	Float	RO							x	
0x1193 - 0x119F	4499 - 4511	See previous channel			RO							x	
0x11A0	4512	Channel Number(26)	1	Uint16	RO							x	
0x11A1	4513	Number of EDS alarms	2	Float	RO							x	
0x11A3 - 0x11AF	4515- 4527	See previous channel			RO							x	
0x11B0	4528	Channel Number(27)	1	Uint16	RO							x	
0x11B1	4529	Number of RCM alarms	2	Float	RO							x	
0x11B3 - 0x11BF	4531 - 4543	See previous channel			RO							x	

4.1.3 Measured-value overview

Register address (hexadecimal)	Register address (decimal)	Description	Number of Registers	Data type	Mode	Comment	Range	Unit	isoRW685W-D	iso685(W)-D/S	iso685(W)-D/S-B	iso685(W)-D/S-P	isoHR685(W)-D/S-I-B
0x2000u	8192	Insulation vaue	2	Float	RO			Ω	x	x	x	x	x
0x2002u	8194	Minimum Insulation value	2	Float	RO	Minimum measured value		Ω	x	x	x	x	x
0x2004u	8196	Insulation capacitance	2	Float	RO			F	x	x	x	x	x
0x2006u	8198	Voltage L1-L2	2	Float	RO	Voltage measured between phase L1and phase L2		V	x	x	x	x	x
0x2008u	8200	Voltage L1-L3	2	Float	RO	Voltage measured between phase L1and phase L3		V	x	x	x	x	x
0x200Au	8202	Voltage L2-L3	2	Float	RO	Voltage measured between phase L2 and phase L3		V	x	x	x	x	x
0x200C	8204	Voltage L1-PE	2	Float	RO	Voltage measured between L1 and PE		V	x	x	x	x	x
0x200E	8206	Voltage L2-PE	2	Float	RO	Voltage measured between L2 and PE		V	x	x	x	x	x
0x2010	8208	Voltage L3-PE	2	Float	RO	Voltage measured between L3 and PE		V	x	x	x	x	x
0x2012	8210	System frequency	2	Float	RO			Hz	x	x	x	x	x
0x2014	8212	System connection	2	Float	RO	101 = Error; 0 = OK			x	x	x	x	x
0x2016	8214	Connection to earth	2	Float	RO	101 = Error; 0 = OK			x	x	x	x	x
0x2018	8216	Device error	2	Float	RO	Device error Number of (e.g. 750 -> 7.50 Communication CAN)			x	x	x	x	x
0x201A	8218	Device inactive	2	Float	RO	0 = active 1 = inactive			x	x	x	x	x
0x201C	8220	DC Offset	2	Float	RO	DC shift in the system 0 % = Fault on DC+ 100 % = Fault on DC-	0…100	%	x	x	x	x	x
0x201E	8222	Quality of measured value	2	Float	RO	Quality of measuring value 0 % = Poor quality => change profile 100 % = Good quality => Profile fits the application		%	x	x	x	x	x

Register address (hexadecimal)	Register address (decimal)	Description	Number of Registers	Data type	Mode	Comment	Range	Unit	isoRW685W-D	iso685(W)-D/S	iso685(W)-D/S-B	iso685(W)-D/S-P	isoHR685(W)-D/S-I-B
0x2026	8230	Duration of measuring pulse	2	Float	RO	0 % = Measuring pulse has switched 100 % = Measuring pulse just before switching		%	x	x	x	x	x
0x2028	8232	Voltage DC-PE	2	Float	RO	DC shift to earth		V	x	x	x	x	x
0x202A	8234	IL pos	2	Float	RO	PGH current positive		A				x	
0x202C	8236	IL neg	2	Float	RO	PGH current negative		A				x	
0x2030	8240	PGH start condition	2	Float	RO	mode in which the PGH has been started 0 = Start condition OFF 1 = Start condition MANUAL 2 = Start condition AUTO 3 = Start condition 1CYCLE						x	
0x2100	8448	I/O Status	2	UInt32	RO	Bit[0]: Digital Input 1 Bit[1]: Digital Input 1 Bit[2]: Digital Input 2 Bit[3]: Digital Input 2 Bit[4]: Digital Input 3 Bit[5]: Digital Input 3 Bit[6]: Digital Output 1 Bit[7]: Digital Output 2 Bit[8]: Relay 1 Alarm status Bit[9]: Relay 1 Switch status (includes configuration NO/NC) Bit[10]: Relay 2 Alarm status Bit[11]: Relay 2 Switch status (includes configuration NO/NC)							x

Register address (hexadecimal)	Register address (decimal)	Description	Number of Registers	Data type	Mode	Comment	Range	Unit	isoRW685W-D	iso685(W)-D/S	iso685(W)-D/S-B	iso685(W)-D/S-P	isoHR685(W)-D/S-I-B
0x2102	8450		1	Uint16	RO	Bit[0]: Iso. Alarm 1 Bit[1]: Iso. Alarm 2 Bit[2]: Connection fault (Ankopplung || E/KE) Bit[3]: DC- Alarm Bit[4]: DC+ Alarm Bit[5]: symmetric alarm Bit[6]: device fault Bit[7]: Sammelalarm Bit[8]: measuring ended Bit[9]: device inactive Bit[10]: DC-shift. Alarm Bit[11]: Common alarm EDS Bit[12]: PGH Pulse Bit[13]: ISOnet failure Bit[14]: PGH active							x
0x2110	8464		1	Uint16	RO	incremented by 1, if a new insulation measuring value exsists							x
0x2FFEu	12286	Actual IP Address	2	Uint32	RO	Currently used IP address aaa.bbb.ccc.ddd => aaa*256^3 + bbb*256^2+ ccc*256 + ddd			x	x	x	x	x

4.1.4 IP Configuration

Register address (hexadecimal)	Register address (decimal)	Description	Number of Registers	Data type	Mode	Comment	Range	Unit	isoRW685W-D	iso685(W)-D/S	iso685(W)-D/S-B	iso685(W)-D/S-P	isoHR685(W)-D/S-I-B
0x3000u	12288	DHCP on/off	1	Uint16	R/W	1 = DHCP on 2 = DHCP off	1…2		x	x	x	x	x
0x3001u	12289	IP Address	2	Uint32	R/W	Configured IP address (used when DHCP = off) aaa.bbb.ccc.ddd => aaa*256^3+ bbb*256^2 + ccc*256 + ddd	0… 4.294.967.295		x	x	x	x	x
0x3003u	12291	Standard Gateway	2	Uint32	R/W	Configured gateway (used when DHCP = off) aaa.bbb.ccc.ddd => aaa*256^3+ bbb*256^2 + ccc*256 + ddd	0… 4.294.967.295		x	x	x	x	x
0x3005u	12293	Subnet mask	1	Uint16	R/W	Configured subnet mask (used when DHCP = off) Number of leading “1“ s in the binary subnet mask e.g. 6 => 11111100.00000000.0000000 0.00000000 = 252.0.0.0	2…30		x	x	x	x	x

4.1.5 Modbus TCP

Register address (hexadecimal)	Register address (decimal)	Description	Number of Registers	Data type	Mode	Comment	Range	Unit	isoRW685W-D	iso685(W)-D/S	iso685(W)-D/S-B	iso685(W)-D/S-P	isoHR685(W)-D/S-I-B
0x3006u	12294	Modbus TCP on/off	1	Uint16	R/W	1 = Port 502 (ModbusTCP) on 2 = Port 502 (ModbusTCP) off	1…2		x	x	x	x	x
0x3007u	12295	Writing to registers on/off	1	Uint16	R/W	1 = Writing parameters on 2= Writing parameters off	1…2		x	x	x	x	x

Even though the Modbus TCP port is closed via Modbus TCP, it is still possible to set parameter values.
The port remains open until a new TCP connection has been established.

4.1.6 ISOnet

Register address (hexadecimal)	Register address (decimal)	Description	Number of Registers	Data type	Mode	Comment	Range	Unit	isoRW685W-D	iso685(W)-D/S	iso685(W)-D/S-B	iso685(W)-D/S-P	isoHR685(W)-D/S-I-B
0x3008u	12296	ISOnet	1	Uint16	R/W	1 = off 2 = ISOnet via BCOM					x	x	x
0x3009u	12297	Number of ISOnet [Bytes] subscribers via BCOM	1	Uint16	R/W		2…20				x	x	x

4.1.7 BCOM

Register address (hexadecimal)	Register address (decimal)	Description	Number of Registers	Data type	Mode	Comment	Range	Unit	isoRW685W-D	iso685(W)-D/S	iso685(W)-D/S-B	iso685(W)-D/S-P	isoHR685(W)-D/S-I-B
0x300Au	12298	BCOM system name	8	String UTF 8	R/W	BCOM system name	A-Z0-9_		x	x	x	x	x
0x3012u	12306	BCOM subsystem address	1	Uint16	R/W	BCOM device address	1…255		x	x	x	x	x
0x3013u	12307	Device address	2	Float	R/W		1…255		x	x	x	x	x
0x3014u	12308	Message timeout	2	Float	R/W	BCOM message timeout	0.1…10	s	x	x	x	x	x
0x3016u	12310	Repeat interval	1	Uint16	R/W	Time interval in which a BCOM messages is sent from a device to the Gateway at the latest	0…65.535	s	x	x	x	x	x
0x3019u	12313	DNS server IP	2	Uint32	R/W	IP address of the DNS server aaa.bbb.ccc.ddd => aaa*256^3 + bbb*256^2 + ccc*256 + ddd	0… 4.294.967.295		x	x	x	x	x
0x301Bu	12315	DNS domain	128	String UTF 8	R/W	DNS domain	a-z0-9\.\-		x	x	x	x	x

4.1.8 Time / Date

Register address (hexadecimal)	Register address (decimal)	Description	Number of Registers	Data type	Mode	Comment	Range	Unit	isoRW685W-D	iso685(W)-D/S	iso685(W)-D/S-B	iso685(W)-D/S-P	isoHR685(W)-D/S-I-B
0x3098u	12440	Time	2	Unix Time	R/W				x	x	x	x	x
0x309Au	12442	0	2	0	R				x	x	x	x	x
0x309Cu	12444	Time zone	2	Float	R/W	Time zone offset	-12…+14	h	x	x	x	x	x
0x309Eu	12446	NTP on/off	1	Uint16	R/W	1 = NTP on 0 = NTP 0ff	1…2		x	x	x	x	x
0x309Fu	12447	NTP server IP	2	Uint32	R/W	IP address of the NTP server aaa.bbb.ccc.ddd => aaa*256^3 + bbb*256^2 + ccc*256 + ddd	0… 4.294.967.295		x	x	x	x	x
0x30A1u	12449	Date format	1	Uint16	R/W	1 = d.m.y 2 = m.d.y	1…2		x	x	x	x	x
0x30A2u	12450	Summertime	1	Uint16	R/W	1 = off 2 = DST 3 = CEST	1…3		x	x	x	x	x
0x30A3u	12451	Time format	1	Uint16	R/W	1 = 12 h 2 = 24 h	1…2		x	x	x	x	x

4.1.9 BS-Bus

Register address (hexadecimal)	Register address (decimal)	Description	Number of Registers	Data type	Mode	Comment	Range	Unit	isoRW685W-D	iso685(W)-D/S	iso685(W)-D/S-B	iso685(W)-D/S-P	isoHR685(W)-D/S-I-B
0x30A4u	12452	BS bus address	1	Uint16	R/W	BS bus address	1…90		x	x	x	x	x

4.1.10 Digital Input Functions

Register address (hexadecimal)	Register address (decimal)	Description	Number of Registers	Data type	Mode	Comment	Range	Unit	isoRW685W-D	iso685(W)-D/S	iso685(W)-D/S-B	iso685(W)-D/S-P	isoHR685(W)-D/S-I-B
0x30A5u	12453	Digital Input 1 Function	1	Uint16	R/W	1 = Off 2 = Test 3 = Reset 4 = Deactivate device 5 = Start initial measuring 6 = Insulation fault location (iso685-x-P)	1…6		x	x	x	x	x
0x30A6u	12454	Digital Input 1 Mode	1	Uint16	R/W	1 = active high 2 = active low	1…2		x	x	x	x	x
0x30A7u	12455	Digital Input 1 T(on)	2	Float	R/W	ON delay because of debounce	0.1…300	s	x	x	x	x	x
0x30A9u	12457	Digital Input 1 T(off)	2	Float	R/W	OFF delay because of debounce	0.1…300	s	x	x	x	x	x
0x30ABu	12459	Digital Input 2 Function	1	Uint16	R/W	see 0x30A5u - 0x30A9u	1…6		x	x	x	x	x
0x30ACu	12460	Digital Input 2 Mode	1	Uint16	R/W	see 0x30A5u - 0x30A9u	1…2		x	x	x	x	x
0x30ADu	12461	Digital Input 2 T(on)	2	Float	R/W	see 0x30A5u - 0x30A9u	0.1…300	s	x	x	x	x	x
0x30AFu	12463	Digital Input 2 T(off)	2	Float	R/W	see 0x30A5u - 0x30A9u	0.1…300	s	x	x	x	x	x
0x30B1u	12465	Digital Input 3 Function	1	Uint16	R/W	see 0x30A5u - 0x30A9u	1…6		x	x	x	x	x
0x30B2u	12466	Digital Input 3 Mode	1	Uint16	R/W	see 0x30A5u - 0x30A9u	1…2		x	x	x	x	x
0x30B3u	12467	Digital Input 3 T(on)	2	Float	R/W	see 0x30A5u - 0x30A9u	0.1…300	s	x	x	x	x	x
0x30B5u	12469	Digital Input 3 T(off)	2	Float	R/W	see 0x30A5u - 0x30A9u	0.1…300	s	x	x	x	x	x

4.1.11 Digital Output Functions

Register address (hexadecimal)	Register address (decimal)	Description	Number of Registers	Data type	Mode	Comment	Range	Unit	isoRW685W-D	iso685(W)-D/S	iso685(W)-D/S-B	iso685(W)-D/S-P	isoHR685(W)-D/S-I-B
0x30B7u	12471	Digital Output 1 Function 1	1	Uint16	R/W	1 = off 2 = Insulation alarm 1 3 = Insulation alarm 2 4 = Connection fault 5 = Alarm DC- 6 = Alarm DC+ 7 = Symmetric Alarm 8 = Device error 9 = Common alarm 10 = Measuring finished 11 = Device inactive 12 = DC shift alarm (iso685-x-P only) 13 = Common alarm EDS 14 = EDS-Search pulse (only iso685-x-P)	1…14		x	x	x	x	x
0x30B8u	12472	Digital Output 1 Function 2	1	Uint16	R/W	see 0x30B7u	1…14		x	x	x	x	x
0x30B9u	12473	Digital Output 1 Function 3	1	Uint16	R/W	see 0x30B7u	1…14		x	x	x	x	x
0x30BAu	12474	Digital Output 1 Mode	1	Uint16	R/W	1 = Passive 2 = Active	1…2		x	x	x	x	x
0x30BBu	12475	Digital Output 1 Test	1	Uint16	R/W	1 = Test on 2 = Test off	1…2		x	x	x	x	x
0x30BCu	12476	Digital Output 2 Function 1	1	Uint16	R/W	see 0x30B7u - 0x30BBu	1…14		x	x	x	x	x
0x30BDu	12477	Digital Output 2 Function 2	1	Uint16	R/W	see 0x30B7u - 0x30BBu	1…14		x	x	x	x	x
0x30BEu	12478	Digital Output 2 Function 3	1	Uint16	R/W	see 0x30B7u - 0x30BBu	1…14		x	x	x	x	x
0x30BFu	12479	Digital Output 2 Mode	1	Uint16	R/W	see 0x30B7u - 0x30BBu	1…2		x	x	x	x	x
0x30C0u	12480	Digital Output 2 Test	1	Uint16	R/W	see 0x30B7u - 0x30BBu	1…2		x	x	x	x	x

4.1.12 Analog Output Functions

Register address (hexadecimal)	Register address (decimal)	Description	Number of Registers	Data type	Mode	Comment	Range	Unit	isoRW685W-D	iso685(W)-D/S	iso685(W)-D/S-B	iso685(W)-D/S-P	isoHR685(W)-D/S-I-B
0x30C1u	12481	Analogue Output Function	1	Uint16	R/W	1 = Insulation value 2 = DC shift	1…2		x	x	x	x	x
0x30C2u	12482	Analogue Output Mode	1	Uint16	R/W	1 = 0…20 mA 2 = 4…20 mA 3 = 0… 400 µA 4 = 0…10 V 5 = 2…10 V	1…5		x	x	x	x	x
0x30C3u	12483	Analogue Output Midscale	1	Uint16	R/W	1 = Linear 2 = 28 kΩ 3 = 120 kΩ	1…3		x	x	x	x	x
0x30C4u	12484	Analogue Output Test	1	Uint16	R/W	1 = Test on 2 = Test off	1…2		x	x	x	x	x

4.1.13 Buzzer

Register address (hexadecimal)	Register address (decimal)	Description	Number of Registers	Data type	Mode	Comment	Range	Unit	isoRW685W-D	iso685(W)-D/S	iso685(W)-D/S-B	iso685(W)-D/S-P	isoHR685(W)-D/S-I-B
0x30C5u	12485	Summer Function 1	1	Uint16	R/W	1 = OFF 2 = Iso.Alarm 1 3 = Iso.Alarm 2 4 = connection fault 5 = DC- Alarm 6 = DC+ Alarm 7 = sysmetric alarm 8 = device fault 9 = Sammelalarm 10 = measuring ended 11 = device inactive 12 = DC-Shift Alarm (only iso685-x-P) 13 = Common alarm EDS 14 = EDS-Search Pulse (only iso685-x-P)	1…14		x	x	x	x	x
0x30C6u	12486	Summer Function 2	1	Uint16	R/W	see 0x30B7u	1…14		x	x	x	x	x
0x30C7u	12487	Summer Function 3	1	Uint16	R/W	see 0x30B7u	1…14		x	x	x	x	x
0x30C8u	12488	Summer Test	1	Uint16	R/W	1 = Test on 2 = Test off	1…2		x	x	x	x	x

4.1.14 Relays

Register address (hexadecimal)	Register address (decimal)	Description	Number of Registers	Data type	Mode	Comment	Range	Unit	isoRW685W-D	iso685(W)-D/S	iso685(W)-D/S-B	iso685(W)-D/S-P	isoHR685(W)-D/S-I-B
0x30C9u	12489	Relay 1 Test	1	Uint16	R/W	1 = Test on 2 = Test off	1…2		x	x	x	x	x
0x30CAu	12490	Relay 1 Mode	1	Uint16	R/W	1 = N/O 2 = N/C	1…2		x	x	x	x	x
0x30CBu	12491	Relay 1 Function 1	1	Uint16	R/W	see 0x30B7u	1…14		x	x	x	x	x
0x30CCu	12492	Relay 1 Function 2	1	Uint16	R/W	see 0x30B7u	1…14		x	x	x	x	x
0x30CDu	12493	Relay 1 Function 3	1	Uint16	R/W	see 0x30B7u	1…14		x	x	x	x	x
0x30CEu	12494	Relay 2 Test	1	Uint16	R/W	1 = Test on 2 = Test off	1…2		x	x	x	x	x
0x30CFu	12495	Relay 2 Mode	1	Uint16	R/W	1 = N/O 2 = N/C	1…2		x	x	x	x	x
0x30D0u	12496	Relay 2 Function 1	1	Uint16	R/W	see 0x30B7u	1…14		x	x	x	x	x
0x30D1u	12497	Relay 2 Function 2	1	Uint16	R/W	see 0x30B7u	1…14		x	x	x	x	x
0x30D2u	12498	Relay 2 Function 3	1	Uint16	R/W	see 0x30B7u	1…14		x	x	x	x	x

4.1.15 Insulation alarm

Register address (hexadecimal)	Register address (decimal)	Description	Number of Registers	Data type	Mode	Comment	Range	Unit	isoRW685W-D	iso685(W)-D/S	iso685(W)-D/S-B	iso685(W)-D/S-P	isoHR685(W)-D/S-I-B
0x30D3u	12499	Response value 1	2	Uint32	R/W		Std.: 1k - 10M HR: 1k - 3G	Ω	x	x	x	x	x
0x30D5u	12501	Response value 2	2	Uint32	R/W		Std.: 1k - 10M HR: 1k - 3G	Ω	x	x	x	x	x
0x30D7u	12503	Type of mains supply system	1	Uint16	R/W	1 = DC 2 = AC 3 = 3AC	1…3		x	x	x	x	x
0x30D8u	12504	Profiles	1	Uint16	R/W	1 = Power circuits 2 = Control circuits (not HR) 3 = Generator (not HR) 4 = High capacitance 5 = Inverter >10Hz 6 = Inverter < 10Hz 7 = Customized Profile 8 = Service Profile [only changeable, if profile parameters are changed in the service menu]	1...8 7... 8 from V 1.23		x	x	x	x	x
0x30D9u	12505	Coupling monitoring	1	Uint16	R/W	1 = Coupling monitoring on 2 = Coupling monitoring off	1…2		x	x	x	x	x
0x30DAu	12506	Coupling devices	1	Uint16	R/W	1 = No coupling device 2 = AGH150W4-AK160 3 = AGH204S-AK80 4 = AGH204S-AK160 5 = AGH520S 6 = AGH676S-4	1…6		x	x			
0x30DBu	12507	Fault memory	1	Uint16	R/W	1 = Fault memory on 2 = Fault memory off	1…2		x	x	x	x	x
0x30DCu	12508	Start-up delay	1	Uint16	R/W		0…120	s	x	x	x	x	x
0x30DDu	12509	Activate/deactivate device	1	Uint16	R/W	1 = Activates device 2 = Deactivates device	1…2		x	x	x	x	x
0x30DE	12510	DC Alarm	1	Uint16	R/W		20…1000	V	x	x	x	x	x
0x30DF	12511	DC Alarm on/off	1	Uint16	R/W	1 = DC Alarm on 2 = DC Alarm off	1…2		x	x	x	x	x

4.1.16 Insulationfault search / PGH Settings

Register address (hexadecimal)	Register address (decimal)	Description	Number of Registers	Data type	Mode	Comment	Range	Unit	isoRW685W-D	iso685(W)-D/S	iso685(W)-D/S-B	iso685(W)-D/S-P	isoHR685(W)-D/S-I-B
0x30E0	12512	EDS current	1	UInt16	R/W	1 = 1mA 2 = 1,8mA 3 = 2,5mA 4 = 5mA 5 = 10mA 6 = 25mA 7 = 50mA	1…7					x	
0x30E1	12513	EDS mode	1	Uint16	R/W	1 = Manual 2 = auto 3 = 1 cycle	1…3					x	
0x30E2	12514	Portable EDS (yes/no)	1	Uint16	R/W	1 = on 2 = off	1…2					x	
0x30F0	12528	RS-485 protocol	1	Uint16	R/W	1 = BS-Bus 2 = isoData	1…2						x
0x30F5	12533	isoData mode	1	Uint16	R/W	1 = Mode 1 2 = Mode 2 3 = Mode 3	1…3						x
0x30F6	12534	ISOsync	1	Uint16	R/W	1 = on 2 = off	1…2						x

4.1.17 Control commands

Register address (hexadecimal)	Register address (decimal)	Description	Number of Registers	Data type	Mode	Comment	Range	Unit	isoRW685W-D	iso685(W)-D/S	iso685(W)-D/S-B	iso685(W)-D/S-P	isoHR685(W)-D/S-I-B
0x4803	18435	Test	1	Uint16	W		64260		x	x	x	x	x
0x4804	18436	Reset	1	Uint16	W		65025		x	x	x	x	x
0x4901	18689	Start initial measurement	1	Uint16	W		65025		x	x	x	x	x
0x4902	18690	EDS start	1	Uint16	W		65025					x	
0x4903	18691	EDS stop	1	Uint16	W		65025					x	

4.2 Insulation fault monitoring devices EDSxxx

4.2.1 EDS device information

- Start address: 0x7FF0 (32752)

Parameter	RegOffset	Modus	Data type	Werte
1. EDS type	0	R	Uint16	Bit 0 - 44x Bit 1 - 44xxAB Bit 2 - 46x Bit 3 - 49x (Indicates which EDS types are connected to the ISOMETER®)
2. Number of devices	1	R	Uint16	
3. Number of channels	2	R	Uint16	
4. Number of relays	3	R	Uint16	
5. Number of buzzers	4	R	Uint16	
6. Number of digital outputs	5	R	Uint16	
7. Number of digital inputs	6	R	Uint16	
8. EDS Scan	7	R	Uint16	0 - no scan 1 - do scan

4.2.2 EDS device parameters

- device: 1-21
- start address: 0x8000 (32768)
- device offset: 0xA (10)

Device 1

Parameter	Mode	Data type	Reg Offset	Bits																										Deci-mal	Definition
				Bus type								Bus address								Channel type								Number of channels							
				31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
1. Bus type	R	Uint32	0	0	0	0	0	0	0	0	0																							0	Not connected
				0	0	0	0	0	0	0	1																							1	BS
				0	0	0	0	0	0	1	0																							2	BB
2. Bus address												0	0	0	0	0	0	0	0															0	Not connected
												0	0	0	0	0	0	0	1															1-90	Device address
												...																							
3. Channel type																				0	0	0	0	0	0	0	0								0	Not available
																				0	0	0	0	0	0	0	1								1	EDS440
																				0	0	0	0	0	0	1	0								2	EDS441
																				0	0	0	0	0	0	1	1								3	EDS440xLAB
																				0	0	0	0	0	1	0	0								4	EDS441xLAB
																				0	0	0	0	0	1	0	1								5	EDS460
																				0	0	0	0	0	1	1	0								6	EDS461
																				0	0	0	0	0	1	1	1								7	EDS490
																				0	0	0	0	1	0	0	0								8	EDS491
4. Number of channels																												0	0	0	0	0	0	0	0	0	Not connected
																												0	0	0	0	0	0	0	1	1	6 Channels
																												0	0	0	0	0	0	1	0	2	12 Channels

Device 1

Parameter	Mode	Data type	Reg Offset	Deci-mal	Definition
5. Fault memory	R/W	Uint16	2	0	Not available
				1	On
				2	Off
6. Trigger	R/W	Uint16	3	0	Not available
(44x/460/490)				1	Com
				2	Auto
7. System type	R/W	Uint16	4	0	Not available
(46x/49x)				1	DC
				2	AC
				3	3AC
8. Frequency	R/W	Uint16	5	0	Not available
(46x/49x)				1	50 Hz
				2	60 Hz
				3	400 Hz
				4	DC
Reserved		Uint16	6		
Reserved		Uint16	7		
Reserved		Uint16	8		
Reserved		Uint16	9		

Device 2

Parameter	Mode	Data type	Reg Offset	Deci-mal	Definition
Bus type	R	Uint16	10	*	*
Bus address	R	Uint16	11	*	*
...*	...*	...*	...*	...*	...*

* see table device 1

For device 3…21 see table device 1.

4.2.3 Channel parameter

- Channel: 1-252
- Start address: 0x8200 (33280)
- device offset: 0x14 (20)

Channel 1

Parameter	Mode	Data type	Reg Offset	Bits																										Deci-mal	Definition
				Bus type								Bus address								Device channel								Channel type							
				31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
1. Bus type	R	Uint32	0	0	0	0	0	0	0	0	0																							0	Not connected
				0	0	0	0	0	0	0	1																							1	BS
				0	0	0	0	0	0	1	0																							2	BB
2. Bus address												0	0	0	0	0	0	0	0															0	Not connected
												0	0	0	0	0	0	0	1															1-90	Device channel
												...																							
3. Device channel																				0	0	0	0	0	0	0	0							0	Not connected
																				0	0	0	0	0	0	0	1							1-12	Device channel
																				...															
4. Channel type																												0	0	0	0	0	0	0	0	0	Not available
																												0	0	0	0	0	0	0	1	1	EDS440
																												0	0	0	0	0	0	1	0	2	EDS441
																												0	0	0	0	0	0	1	1	3	EDS440xLAB
																												0	0	0	0	0	1	0	0	4	EDS441xLAB
																												0	0	0	0	0	1	0	1	5	EDS460
																												0	0	0	0	0	1	1	0	6	EDS461
																												0	0	0	0	0	1	1	1	7	EDS490
																												0	0	0	0	1	0	0	0	8	EDS491

Parameter	Mode	Data type	Reg Offset	Deci-mal	Definition
5. Active	R/W	Uint16	2	0	Not available
				1	On
				2	Off
6. CT type	R/W	Uint16	3	0	Not available
				1	Type A (44x)
				2	Type AB (441-LAB)
				3	W/WR (46x/49x)
				4	WS (46x/49x)
7. CT monitoring	R/W	Uint16	4	0	Not available
				1	On
				2	Off
8. IΔL	R/W	Float	5	<0	Not available
					2mA - 10mA (4x0)
					200µA - 1mA (4x1)
9. IΔN	R/W	Float	7	<0	Not available
					100mA - 10A (440)
					100mA - 1A (441)
10. Inverter (46x/49x)	R/W	Uint16	9	0	Not available
				1	On
				2	Off
11. T(on) (46x/49x)	R/W	Float	10	<0	Not available
					0 s
					6 s
					12 s
					18 s
					24 s
12. T(off) (46x/49x)	R/W	Float	12	<0	Not available
					0 s
					6 s
					12 s
					18 s
					24 s

Parameter	Mode	Data type	Reg Offset	Deci-mal	Definition
13. Mode (49x)	R/W	Uint16	14	0	Not available
				1	N/O
				2	N/C
				3	N/O-T
				4	N/C-T
Reserved	R	Uint16	15	-	
Reserved	R	Uint16	16	-	
Reserved	R	Uint16	17	-	
Reserved	R	Uint16	18	-	
Reserved	R	Uint16	19	-	

Channel 2

Parameter	Mode	Data type	Reg Offset	Deci-mal	Definition
Bus type	R	Uint16	20	*	*
Bus address	R	Uint16	21	*	*
...*	...*	...*	...*	...*	...*

* see table channel 1

For channel 3…252 see table channel 1.

4.2.4 Relay parameter

- Relays: 1-42
- Start address: 0xB100 (45312)
- Relay offset: 0xF (15)

Relay 1

Parameter	Mode	Data type	Reg Offset	Bits																										Deci-mal	Definition
				Bus type								Bus address								Relay Number of								Channel type									
				31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
1. Bus type	R	Uint32	0	0	0	0	0	0	0	0	0																							0	Not connected
				0	0	0	0	0	0	0	1																							1	BS
				0	0	0	0	0	0	1	0																							2	BB
2. Bus address												0	0	0	0	0	0	0	0															0	Not connected
												0	0	0	0	0	0	0	1															1-90	Device address
												...																							
3. Relay Number of																				0	0	0	0	0	0	0	0								0	Not connected
																				0	0	0	0	0	0	0	1								1-2	Relay
																				...															
4. Channel type																												0	0	0	0	0	0	0	0	0	Not available
																												0	0	0	0	0	0	0	1	1	EDS44x
																												0	0	0	0	0	0	1	0	2	EDS46x/49x

Parameter	Mode	Data type	Reg Offset	Decimal	Definition
5. Relay mode	R/W	Uint16	2	0	Not available
				1	N/O
				2	N/C
6. Test	R/W	Uint16	3	0	Not available
				1	On
				2	Off
7. Function1 (44x)	R/W	Uint16	4	0	Not available
				1	Off
				2	IΔL
				3	IΔn
				4	Device error
				5	Anschlussfehler
				6	Common alarm
8. Function2 (44x)	R/W	Uint16	5	0	Not available
				1	Off
				2	IΔL
				3	IΔn
				4	Device error
				5	Connection fault
				6	Common alarm
9. Function3 (44x)	R/W	Uint16	6	0	Not available
				1	Off
				2	IΔL
				3	IΔn
				4	Device error
				5	Connection fault
				6	Common alarm
10. Alarm	R/W	Uint16	7	0	Not available
				1	On
				2	Off
11. Device error	R/W	Uint16	8	0	Not available
				1	On
				2	Off

Parameter	Mode	Data type	Reg Offset	Decimal	Definition
Reserved	R	Uint16	9	-	
Reserved	R	Uint16	10	-	
Reserved	R	Uint16	11	-	
Reserved	R	Uint16	12	-	
Reserved	R	Uint16	13	-	
Reserved	R	Uint16	14	-	

Relay 2

Parameter	Mode	Data type	Reg Offset	Deci-mal	Definition
Bus type	R	Uint16	15	*	*
Bus address	R	Uint16	16	*	*
...*	...*	...*	...*	...*	...*

* see table Relay 1

For relay 3…42 see table Relay 1.

4.2.5 Buzzer parameter

- Buzzer: 1-21
- Buzzer address: 0xB700 (46848)
- Buzzer offset: 0xA (10)

Buzzer 1

Parameter	Mode	Data type	Reg Offset	Bits																Decimal	Definition
				Bus type								Bus address									
				31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16		
1. Bus type	R	Uint16	0	0	0	0	0	0	0	0	0									0	Not connected
				0	0	0	0	0	0	0	1									1	BS
				0	0	0	0	0	0	1	0									2	BB
2. Bus address												0	0	0	0	0	0	0	0	0	Not connected
												0	0	0	0	0	0	0	1	1-90	Device address

Parameter	Mode	Data type	Reg Offset	Deci-mal	Definition
3. Test	R/W	Uint16	3	0	Not available
				1	On
				2	Off
4. Function1	R/W	Uint16	4	0	Not available
				1	Off
				2	IΔL
				3	IΔn
				4	Device error
				5	Connection fault
				6	Insulation fault locaton
				7	Common alarm
5. Function2	R/W	Uint16	5	0	Not available
				1	Off
				2	IΔL
				3	IΔn
				4	Device error
				5	Connection fault
				6	Insulation fault locaton
				7	Common alarm
6. Function3	R/W	Uint16	6	0	Not available
				1	Off
				2	IΔL
				3	IΔn
				4	Device error
				5	Connection fault
				6	Insulation fault locaton
				7	Common alarm
Reserved	R	Uint16	7	-	
Reserved	R	Uint16	8	-	
Reserved	R	Uint16	9	-	
Reserved	R	Uint16	10	-	
Reserved	R	Uint16	11	-	

Buzzer 2

Parameter	Mode	Data type	Reg Offset	Deci-mal	Definition
Bus type	R	Uint16	10	*	*
Bus address	R	Uint16	11	*	*
...*	...*	...*	...*	...*	...*

* see table buzzer 1

For buzzer 3…21 see table buzzer 1.

4.2.6 Digital output parameter

- Buzzer: 1-21
- Start address: 0xB900 (47360)
- DigOut offset: 0xA (10)

Digital Output1

Parameter	Mode	Data type	Reg Offset	Bits																Decimal	Definition
				Bus type								Bus address									
				15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
1. Bus type	R	Uint16	0	0	0	0	0	0	0	0	0									0	Not connected
				0	0	0	0	0	0	0	1									1	BS
				0	0	0	0	0	0	1	0									2	BB
2. Bus address	R	Uint16	0									0	0	0	0	0	0	0	0	0	Not connected
												0	0	0	0	0	0	0	1	1-90	Device address

Parameter	Modus	Datentyp	Reg Offset	Dezimal	Bedeutung
3. Test	R/W	Uint16	1	0	Not available
				1	On
				2	Off
4. Function1	R/W	Uint16	2	0	Not available
				1	Aus
				2	IΔL
				3	IΔn
				4	Device error
				5	Connection fault
				6	Common alarm
5. Function2	R/W	Uint16	3	0	Not available
				1	Aus
				2	IΔL
				3	IΔn
				4	Device error
				5	Connection fault
				6	Common alarm
6. Function3	R/W	Uint16	4	0	Not available
				1	Aus
				2	IΔL
				3	IΔn
				4	Device error
				5	Connection fault
				6	Common alarm
Reserved	R	Uint16	5	-	
Reserved	R	Uint16	6	-	
Reserved	R	Uint16	7	-	
Reserved	R	Uint16	8	-	
Reserved	R	Uint16	9	-	

Digital Output 2

Parameter	Mode	Data type	Reg Offset	Decimal	Definition
Bus type	R	Uint16	10	*	*
Bus address	R	Uint16	11	*	*
...*	...*	...*	...*	...*	...*

* see table digital output 1

For digital output 3…21 see digital output 1.

4.2.7 Digital Input parameter

- Inputs: 1-42
- Start address: 0xBB00 (47872)
- DigIn offset: 0xA (10)

Digital Input 1

Parameter	Mode	Data type	Reg Offset	Bits	Deci-mal	Definition
				Bus type / Bus address / Digital input Number of		
				31 30 29 28 27 26 25 24 / 23 22 21 20 19 18 17 16 / 15 14 13 12 11 10 9 8 / 7 6 5 4 3 2 1 0		
1. Bus type	R	Uint32	0	0 0 0 0 0 0 0 0	0	Not connected
				0 0 0 0 0 0 0 1	1	BS
				0 0 0 0 0 0 1 0	2	BB
2. Bus adress				0 0 0 0 0 0 0 0	0	Not connected
				0 0 0 0 0 0 0 1	1-90	Device address
				...		
3. Digital input No.				0 0 0 0 0 0 0 0	0	Not connected
				0 0 0 0 0 0 0 1	1	Input
				0 0 0 0 0 0 1 0	2	Input

Parameter	Mode	Data type	Reg Offset	Decimal	Definition
4. Mode	R/W	Uint16	2	0	Not available
				1	Active high
				2	Active low
5. ton	R/W	Float	3	<0	Not available
				x in s	
6. ton	R/W	Uint16	5	<0	Not available
				x in s	
7. Function	R/W	Uint16	7	0	Not available
				1	Off
				2	TEST
				3	RESET
Reserved	R	Uint16	8	-	
Reserved	R	Uint16	9	-	

Digital Input 2

Parameter	Mode	Datatype	Reg Offset	Decimal	Definition
Bus type	R	Uint16	10	*	*
Bus address	R	Uint16	11	*	*
...*	...*	...*	...*	...*	...*

* see table digital input 1

For digital input 3…21 see table digital input 1.

4.2.8 Measuring value IΔL

- Measuring value IΔL: 1-252
- Start address: 0xD000 (53248)
- Measuring value offset: 0x4 (4)

Measuring value 1

Parameter	Mode	Data type	Reg Offset
Measuring value	R	Float	0
Alarm/ Unit/ Range/ Test	R	Uint16	2
Description	R	Uint16	3

The registers for a measuring value must be read during one access.

* see " Reading the parameters Alarm, Unit, Range and Test"

Reading the parameters Alarm, Unit, Range and Test

Word 0x00		0x01		0x02		0x03	
HiByte	LoByte	HiByte	LoByte	HiByte	LoByte	HiByte	LoByte
Floating point value				AT&T	R&U	Channel description	

Every analogue BMS device channel can contain alarm messages, operating messages, measured values, test messages and descriptive text. Both analogue and digital information can be transmitted.

- AT&T = Alarm type and test type (internal/external)
- R&U = Range and unit

A&T = Alarm type and test type (internal/external)

Bit	Bits								Meaning
	7	6	5	4	3	2	1	0	
	Test external	Test internal	Status	Reserved	Reserved	Alarm	Error		
Alarm type						0	0	0	No alarm
						0	0	1	Prewarning
						0	1	0	Device error
						0	1	1	Reserved
						1	0	0	Alarm
						1	0	1	Alarm
Reserved						1	1	0	Reserved
						...	...	...	Reserved
						1	1	1	Reserved
Test	0	0							No test
	0	1							Internal test
	1	0							External test

- The alarm type is coded by the bits 0 to 2.
- The bits 3 and 4 are reserved and always have the value 0.
- Bit 5 usually has the value 0 and represents the digital value of the status
- This column is relevant for the SMI472 only.
- Bit 6 or 7 are usually set when an internal or external test has been completed.
- Other values are reserved.
- The complete byte is calculated from the sum of the alarm type and the test type.

R&U = Range and unit

Bit	Bits								Meaning
	7	6	5	4	3	2	1	0	
Unit				0	0	0	0	0	Invalid (init)
				0	0	0	0	1	No unit
				0	0	0	1	0	Ω
				0	0	0	1	1	A
				0	0	1	0	0	V
				0	0	1	0	1	%
				0	0	1	1	0	Hz
				0	0	1	1	1	Baud
				0	1	0	0	0	F
				0	1	0	0	1	H
				0	1	0	1	0	°C
				0	1	0	1	1	°F
				0	1	1	0	0	Second
				0	1	1	0	1	Minute
				0	1	1	1	0	Hour
				0	1	1	1	1	Day
				1	0	0	0	0	Month
				…	…	…	…	…	Reserved
				1	1	1	1	0	CODE
				1	1	1	1	1	Reserved
				…	…	…	…	…	Reserved
				1	1	1	1	1	Reserved
Scope	0	0							TRUE Value
	0	1							TRUE Value is higher than ...
	1	0							TRUE Value is lower than ...
	1	1							FALSE Value

The unit is coded in the bits 0 to 4.

The bits 6 and 7 describe the range of validity of a value. Bit 5 is reserved.

The whole byte is calculated from the sum of the unit and the range of validity.

Caution!
If the unit byte refers to CODE, the recorded value or status will result in a text message. The content of this text message is listed in the table on page 45 or page 49. The floating point value contains an internal CODE but no valid measured value.

Measuring value2

Parameter	Modus	Data type	Reg Offset
Measuring value	R	Float	4
...*	...*	...*	...*

* see table measuring values 1

For measuring value 3…252 see table measuring value 1.

4.2.9 Measuring IΔn

- Measuring value IΔn: 1-252
- Start address: 0xDA00 (55808)
- Measuring value offset: 0x4 (4)

Measuring value 1

Parameter	Mode	Data type	Reg Offset
Measuring value	R	Float	0
Alarm/ Unit/ Range/ Test *	R	Uint16	2
Description	R	Uint16	3

* Information about reading the parameters Alarm, Unit, Range and Test can be found in the chapter "Reading the parameters Alarm, Unit, Range and Test" auf Seite 36.

Measuring value 2

Parameter	Mode	Data type	Reg Offset
Measuring value	R	Float	4
...*	...*	...*	...*

* see table measuring values 1

For measuring value 3…252 see table measuring value .

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