KESSEL

ModBus Configuration for Comfort Plus

KESSEL ModBus RTU Protocol

Made in Germany

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1 Description Modbus

Configuration mode

The Modbus implemented in the KESSEL control unit follows the Modbus standard with the Modbus/RTU protocol. The transmission mode (stop bit, parity, baud rate) can be freely set. The number of data bits are specified as 8 and cannot be changed.

The device address can be freely set between 1 and 247. A message to all devices (broadcast) within a Modbus network is not supported.

The Modbus can be used to query (read mode) and write (write mode) control unit values. A combination of write and read modes can be used, for example, to trigger a scan of the SonicControl sensor and to read out the determined values.

The following Modbus functions are released for use in the KESSEL control unit:

Code	Modbus function	Register	Cluster
01_H	Read COIL status	00001 - 09999	Contains information about all the control unit's digital outputs
02_H	Read discrete input	10001 - 19999	Contains information about all the control unit's digital inputs
04_H	Read INPUT register	30001 - 39999	Contains general information (numerical values, revision index, etc.) about the control unit
03_H	Read HOLDING register	40001 - 49000	Contains general digital information (errors and events) for the control unit
06_H	Write HOLDING register	49001 - 49999	Instruction register to write commands to the control unit

Data values and types transmitted

The information described in the register tables can be one of 4 different data types and has to be interpreted according to this type.

The 4 types are Boolean (digital) value, enumeration, numerical value and time values (dates, times, etc.).

Specific features may occur within the 4 different types; these are also described in more detail.

⇨ Boolean value (digital values)

- Values are either 0 or 1
- Values are transmitted as an individual bit
- They describe states (errors, events, digital outputs and inputs (COIL))
- Digital states for errors and digital outputs and inputs are displayed permanently (e.g. battery error) as long as they are pending.
- In the case of events, the states (0: event has not taken place; 1: event has taken place) are saved in the control unit until they have been queried via the Modbus, then they are deleted (e.g. maintenance done).

⇨ Enumeration

- Enumeration values display the selected setting (e.g. Language --> see tables) in accordance with their numerical value

⇨ Numerical value

- Numerical values must be converted in accordance with the specified values for factor and offset
- The equation for calculating the numerical values is:

  Current value = transmitted value × factor - offset

- A more detailed description can be found in chapter Numerical values.

⇨ Time values

- Date values are transmitted as numerical values since 01.01.2000 (i.e. number of days since 01.01.2000)

  1 = 01.01.2000

  2 = 02.01.2000

  3 = 03.01.2000

  etc.

  - Currently only 2 date values are transmitted --> last and next maintenance
- Times are transmitted as numerical values starting from 0:00 hours
  - 1 = 0:01 hours
  - 365 = 6:05 hours
  - 1387 = 23:07 hours

The maximum time is 23:59 hours and has the numerical value 1439.

2 Functions

2.1 Numerical values

2.1.1 Transmission of values

All possible data types have to be taken into account when transferring numerical values from or to the control unit via the Modbus. This includes, amongst other things, the following differentiations between integer or rational, positive or negative, large or small number range.

In order to do justice to this procedure, only integer, positive values should be transmitted when configuring the ModBus. As a result, values that are not integer and/or that are negative have to be converted so that they can be transmitted as integer, positive value. Once the values have been transmitted, they have to be converted back into their original form so that they can be shown correctly.

An offset (conversion of negative values) and a factor (conversion of the rational share) have to be specified for every value when these converting the values.

In addition, pay attention to the ModBus limitations during the transmission of values. Registers are used for transmissions on the Modbus. A register is hereby always 16 bits in size.

Since some values that have to be transmitted are (much) larger and 16 bits are not enough for the transmission, these values have to be split over 2 (or more) registers.

Some values are much smaller and need no more than 8 bits for the transmission. These values should always be transmitted as 8 bits and are combined into one register.

The transmission values are currently 8 bits, 16 bits and 32 bits.

2.1.2 Value calculation in the control unit

Description

Since only integer, positive numerical values can be transmitted, all other values have to be adjusted to meet these criteria.

The values in the control unit must be converted in accordance with the specified factor and offset according to the following equation:

transmitted value = (value - offset) / factor

Example

This example shows how the value -10,531.4 has to be converted before it can be transmitted.

In principle, the value -10,531.4 lies between -32,768 and 32,767 and could be transmitted in a value range with an algebraic sign. The rational share - 0.4 - would then be lost.

So as to be able to transmit the value -10,531.4, it first has to be converted in the control unit.

The **factor 0.1** and the **offset -30,000** shall apply for the specified value.

Transmitted value = (-10,531.4 - (-30,000)) / 0.1 = 194,686

The calculated value is now positive and integer number. However, the value 194,686 is greater than 65,535 and thus cannot be transmitted with one register (see "Transmission of integer values", page 7).

2.1.3 Transmission of integer values

Description

As a result of the conversion in the control unit, only positive, integer values are transmitted via the ModBus's register.

If values exist that are greater than 65,535, two registers have to be used for the transmission.

The transmitted value has to be split into two parts; one part that contains the high-order 2 bytes and one that contains the low-order 2 bytes.

The value has to be converted into a hexadecimal value for this purpose.

The resulting byte sequence is then split between the registers accordingly for transmission.

Example

The value 194,686 is to be transmitted.

A register with 16 bits (maximum value 65,535) is too small for this, so that 2 registers have to be used.

Proceed as follows for the calculation and subsequent transmission by the control unit:

1. Convert to a hexadecimal value:
   - 194,686 --> 0x2F87E
2. Spit into bytes:
   - high-order bytes: 0x0002 (filled up with 0)
   - low-order bytes: 0xF87E
3. Transmit via ModBus

2.1.4 Receipt of integer values

Description

By specifying that only positive, integer values can be transmitted via the Modbus's register, those values that are received have to be converted back accordingly.

If values now exist that are greater than 65,535, two registers have to be taken into account during the reception/conversion.

The received value has to be compiled from two parts; one part that contains the high-order 2 bytes and one that contains the low-order 2 bytes.

After compilation, the value can be converted into a decimal value and used for further processing.

Example

A value is read out and received that needs 2 registers for its transmission.

The register with the lower address contains the value 0x0002.

The register with the higher address contains the value 0xF87E.

Proceed as follows for the reception and subsequent compilation:

1. Receive value of the 1st register (normally the register with the lower address):
   - 0x0002
2. Receive value of the 2nd register (normally the register with the higher address):
   - 0xF87E
3. Compile the received bytes:

   high-order bytes 0x0002
   low-order bytes 0xF87E
   ↓
   0x0002F87E
4. Convert the overall values into a decimal value
   - 0x0002F87E --> 194,686

2.1.5 Value calculation after receipt

Description

Since only integer, positive numerical values are transmitted, all other values have to be converted back to their original format after reception.

The values must be converted in accordance with the specified factor and offset after reception according to the following equation:

value = transmitted value * factor + offset

Example

In order to interpret the received value correctly, this has to be converted back to its original value after reception.

The **factor 0.1** and the **offset -30,000** shall apply for the specified value.

Value = 194,686 * 0.1 + (-30,000) = -10,531.4

The calculated value now corresponds to the original value in the control unit again (measured value, display value, etc.).

3 Register

3.1 COIL register

Description

The statuses of all of the control unit's digital outputs can be read out in the COIL registers.

These mainly include the relays to switch the various outputs.

Functions

The function code to read the COIL register is 0x01.

Register addresses

The COIL registers can be found in the address range from 00001 to 09999.

The following registers are currently used for the KESSEL control units:

- 1 - 500 (or: 00001 - 00500)
- 701 - 750 (or: 00701 - 00750)

3.1.1 COIL 00001 | Digital outputs 1

ModBus settings

Function code: **01_H**

Bit table

Register 00001															
Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
WDP	RS 1	RS 2	RSt	RWa	A24	EXT	KLM	LIN	-	-	-	-	-	-	-

Description

Bit	Size	Designation	Short name	Values		Description
0	1	Watchdog pulse	WDP	0:	off	Watchdog pulse that changes status every 30 seconds --> can be used as a monitoring signal
				1:	on	
1	1	Relay 1	RS 1	0:	Relay deactivated	Shows the status of the relay for the 1st main consumer
				1:	Relay activated	
2	1	Relay 2	RS 2	0:	Relay deactivated	Shows the status of the relay for the 2nd main consumer
				1:	Relay activated	
3	1	Fault relay	RSt	0:	Relay deactivated	Shows the status of the relay for the fault signal
				1:	Relay activated	
4	1	Warning relay	RWa	0:	Relay deactivated	Shows the status of the relay for the warning signal
				1:	Relay activated	
5	1	24V output	A24	0:	Relay deactivated	
				1:	Relay activated	
6	1	Ext. audible alarm	EXT	0:	Relay deactivated	
				1:	Relay activated	
7	1	Flap motor	KLM	0:	Motor deactivated	Shows the status of the flap motor
				1:	Motor activated	
8	1	LIN output	LIN	0:	Relay deactivated	
				1:	Relay activated	
9 - 15	7	not used	-			

3.2 Discrete input

Description

The values of the control unit's digital inputs are compiled in the Modbus function group.

Functions

The function code to read the COIL register is 0x02.

Register addresses

The COIL registers can be found in the address range from 10001 to 19999.

The following registers are currently used for the KESSEL control units:

- 1 (or: 10001)

3.2.1 Discrete input 10001 | Digital inputs

ModBus settings

Function code: **02_H**

Bit table

Register 00001															
Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
OFF	ON1	ON2	ALARM	-	-	-	-	-	-	-	-	-	-	-	-

Description

Bit	Size	Designation	Short name	Values		Description
0	1	Input OFF	OFF	0:	no signal	Shows the status of the input OFF
				1:	Signal present	
1	1	Input ON1	ON1	0:	Relay deactivated	Shows the status of the input ON1
				1:	Relay activated	
2	1	Input ON2	ON2	0:	Relay deactivated	Shows the status of the input ON2
				1:	Relay activated	
3	1	Input ALARM	ALARM	0:	Relay deactivated	Shows the status of the input ALARM
				1:	Relay activated	
4 - 15	11	not used	-			

3.3 Input register

Description

The error and status information for various control unit functions can be queried and set via the input registers.

These include the information that generally applies for the control unit as well as parameters and values for motors, pumps, flap, backwater, analogue sensors and others.

Functions

The function code to read the input register is 0x04.

Register addresses

The input registers can be found in the address range from 30001 to 39999.

The following registers are currently used for the KESSEL control units:

- 1 - 500 (or: 30001 - 30500):
  - ⇨ General data about the control unit

- 551 - 600 (or: 30551 - 30600):
  ⇨ Parameters and values for the connected pumps and motors
- 601 - 650 (or: 30601 - 30650):
  ⇨ Parameters and values for the flap and backwater
- 651 - 700 (or: 30551 - 30600):
  ⇨ Parameters and values for the sensor system and water level measurement

3.3.1 INPUT 30001 | Control unit variant

The control unit variant can be read out via the input register 30001.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values	Description
1	16	Control unit variant	0 not defined 1 Comfort Plus 2 FA PV 3 FKA 4 Pumpfix	The value indicates which control unit variant is connected.

3.3.2 INPUT 30002-30004 | Firmware revision index

The revision index for the firmware can be read out via the input registers 30002-30004.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
2	16	Firmware revision high	from:	0	First digit of the firmware revision index.
			to:	655536	
3	16	Firmware revision mid	from:	0	Second digit of the firmware revision index.
			to:	655536	
4	16	Firmware revision low	from:	0	Third digit of the firmware revision index.
			to:	655536	

3.3.3 INPUT 30005 | Product type

The product type can be read out via the input register 30005.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values	Description
5	16	Product type	0 not defined 1 Pumpfix Mono 2 Pumpfix Duo	Value for product type

Register	Size [bit]	Designation	Values	Description
			3 Lifting station Mono	
			4 Lifting station Duo	
			5 Pumping station Mono	
			6 Pumping station Duo	
			7 Lifting station XXL Mono	
			8 Lifting station XXL Duo	

3.3.4 INPUT 30006 | System variant

The system variant can be read out via the input register 30006.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values	Description
6	16	System variant	0 not defined	Value for system variant / no. of pumps
			1 1 motor-driven flap	
			2 2 motor-driven flaps	
			3 F Compact	
			4 F Compact Duo	
			5 F Mono	
			6 F Duo	
			7 F XL 200 l	
			8 F XL 200 l Duo	
			9 F XL 300 l	
			10 F XL 300 l Duo	
			11 F XL 450 l	
			12 F XL 450 l Duo	
			13 S underfloor	
			14 S Underfloor Duo	
			15 Special lifting station	
			16 Special lifting station Duo	
			17 F ATEX	
			18 F ATEX Duo	
			19 F w/o ATEX	
			20 F w/o ATEX Duo	
			21 S Mono	
			22 S Duo	
			23 F AP 501 Mono LW 800	
			24 F AP 501 Duo LW 800	
			25 F AP 501 Mono LW 1000	
			26 F AP 501 Duo LW 1000	
			27 S chamber module LW 600 Mono	
			28 S chamber module LW 600 Duo	
			29 S chamber module LW 1000 Mono	
			30 S chamber module LW 1000 Duo	

Register	Size [bit]	Designation	Values		Description
			31	Special pumping station ATEX Mono	
			32	Special pumping station ATEX Duo	
			33	Special pumping station w/o ATEX Mono	
			34	Special pumping station w/o ATEX Duo	
			35	F XXL Mono	
			36	F XXL Duo	
			37	Special lifting station XXL Mono	
			38	Special lifting station XXL Duo	

3.3.5 INPUT 30007 | Outputs / nominal sizes

The outputs / nominal sizes can be read out via the input register 30007.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
6	16	Outputs / nominal sizes	0	not defined	Value for outputs / nominal sizes
			1	KTP 500 / GTF500 (230V)	
			2	KTP 1000 (230V)	
			3	SPF 1400 (230V)	
			4	SPF 1500 (400V)	
			5	SPF 3000 (400V)	
			6	SPF 4500 (400V)	
			7	SPF 5500 (400V)	
			8	1.3 kW	
			9	1.9 kW	
			10	Ama Porter	
			11	230V / 2.5 - 4A	
			12	230V / 4 - 6.3A	
			13	230V / 6.3 - 10A	
			14	400V / 2.5 - 4A	
			15	400V / 4 - 6.3A	
			16	400V / 6.3 - 10A	
			17	400V / 12A	
			18	400V / 15A	
			19	400V / 18A	
			20	400V / 22A	
			21	400V / AA	
			22	400V / BA	
			23	400V / CA	
			24	400V / DA	
			25	STZ4400	
			26	STZ5200	
			27	STZ7500	
			28	STZ11000	

Register	Size [bit]	Designation	Values	Description
			29 GTF/GTK5200 30 Special pump 43 GTF600	

3.3.6 INPUT 30008 | Sensor configuration

The sensor configuration can be read out via the input register 30008.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values	Description
8	16	20 Sensor configuration	0 not defined 1 Pressure sensor + optical probe 2 Pressure sensor + LEF probe 3 Pressure sensor + float switch alarm 4 Pressure sensor + air bubbling 5 Pressure sensor+ air bubbling + float switch alarm 6 Float switch + Alarm 7 Float switch without off level 8 Level sensor 9 Level sensor + float switch alarm 10 Conductivity probe 11 Pressure sensor	Value for sensor configuration

3.3.7 INPUT 30009-30010 | Total running time

The total running time of the control unit can be read out via the input registers 30009 and 30010.

Two registers have to be used for the output because the value range (maximum value) is too high for one register.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values	Description
9 - 10	32	Total running time	Factor: 0.1 Offset: 0 Unit: h Range: 0h to 429496729.5h	The value indicates the measured total running time since initial commissioning of the control unit.

3.3.8 INPUT 30011-30012 | Power outage time

The power outage time of the control unit can be read out via the input registers 30011 and 30012.

Two registers have to be used for the output because the value range (maximum value) is too high for one register.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
11 - 12	32	Power outage time	Factor: Offset: Unit: Range:	0.1 0 h 0h to 429496729.5h	The value indicates the measured power outage time since initial commissioning of the control unit.

3.3.9 INPUT 30015 | Last maintenance

The last maintenance for the control unit can be read out via the input register 30015.

The last maintenance is output as a numerical value. 01.01.2000 is taken as the basis for the calculation.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
15	16	Last maintenance	Factor: Offset: Unit: Range:	1 0 d 0d to 65535d	Value for last maintenance (days since 01.01.2000)

3.3.10 INPUT 30016 | Next maintenance

The next maintenance for the control unit can be read out via the input register 30016.

The next maintenance is output as a numerical value. 01.01.2000 is taken as the basis for the calculation.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
16	16	Next maintenance	Factor: Offset: Unit: Range:	1 0 d 0 d to 65535 d	Value for next maintenance (days since 01.01.2000)

3.3.11 INPUT 30017 | Battery voltage values

The battery voltage threshold can be read out via the input register 30017.

The battery voltage shows the current voltage value of the battery.

The battery voltage threshold indicates the value as of which a battery error is triggered and the battery has to be changed.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
17	8	Battery voltage	Factor: Offset: Unit: Range:	0.1 0 V 0V to 25.5V	Battery voltage value
	8	Battery voltage threshold	Factor: Offset: Unit: Range:	0.1 0 V 0 V to 25.5 V	Battery voltage threshold value

3.3.12 INPUT 30018 | Temperature

The temperature of the control unit can be read out via the input register 30018.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
18	16	Temperature	Factor: Offset: Unit: Range:	0.1 -50 °C -50 °C to 6503.5 °C	The value indicates the temperature measured at the control unit.

3.3.13 INPUT 30019 | Mains voltage L1

The mains voltage L1 of the control unit can be read out via the input register 30019.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
19	16	Mains voltage L1	Factor: Offset: Unit: Range:	1 0 V 0V to 65535V	Mains voltage L1 value

3.3.14 INPUT 30020 | Mains voltage L2

The mains voltage L2 of the control unit can be read out via the input register 30020.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
20	16	Mains voltage L2	Factor: Offset: Unit: Range:	1 0 V 0 V to 65535 V	Mains voltage L2 value

3.3.15 INPUT 30021 | Mains voltage L3

The mains voltage L3 of the control unit can be read out via the input register 30021.

ModBus settings — Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
21	16	Mains voltage L3	Factor: Offset: Unit: Range:	1 0 V 0 V to 65535 V	Mains voltage L3 value

3.3.16 INPUT 30022 | Language and power-up delay

The set language and the power-up delay can be read out via the input register 30022.

ModBus settings — Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
22	8	Language	0 not defined 1 Deutsch 2 English 3 French 4 Italian 5 Dutch 6 Polish		Language value
	8	Power-up delay	Factor: Offset: Unit: Range:	1 0 s 0s to 255s	Power-up delay value

3.3.17 INPUT 30024 | SDS interval

The days for the control unit's SDS interval can be read out via the input register 30024.

ModBus settings — Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
24	16	SDS interval days	Factor:	1	SDS interval days value
			Offset:	0	
			Unit:	d	
			Range:	0d to 65535d	

3.3.18 INPUT 30025| SDS interval time

The time of the control unit's SDS interval can be read out via the input register 30025.

The time is divided up into hours and minutes. Each of these are transmitted in 8 bit values

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
25	8	SDS interval time (hours)	Factor:	1	SDS interval time value (hours)
			Offset:	0	
			Unit:	h	
			Range:	0h to 255h	
	8	SDS interval time (minutes)	Factor:	1	SDS interval time value (minutes)
			Offset:	0	
			Unit:	min	
			Range:	0min to 255min	

3.3.19 INPUT 30551-30552 | Run time pump 1

The run time of the control unit's pump 1 can be read out via the input registers 30551 and 30552.

Two registers have to be used for the output because the value range (maximum value) is too high for one register.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
551 - 552	32	Run time pump 1	Factor:	0.1	Run time pump 1 value
			Offset:	0	
			Unit:	h	
			Range:	0h to 429496729.5h	

3.3.20 INPUT 30553-30554 | Operating cycles 1

The operating cycles of the control unit's pump 1 can be read out via the input registers 30553 and 30554.

Two registers have to be used for the output because the value range (maximum value) is too high for one register.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
553 - 554	32	Operating cycles 1	Factor:	1	Operating cycles pump 1 value
			Offset:	0	
			Unit:	x	
			Range:	0x to 4294967295x	

3.3.21 INPUT 30555-30556 | Run time pump 2

The run time of the control unit's pump 2 can be read out in the input registers 30555 and 30556.

Two registers have to be used for the output because the value range (maximum value) is too high for one register.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
555 - 556	32	Run time pump 2	Factor:	0.1	Run time pump 2 value
			Offset:	0	
			Unit:	h	
			Range:	0h to 429496729.5h	

3.3.22 INPUT 30557-30558 | Operating cycles 2

The operating cycles of the control unit's pump 2 can be read out in the input registers 30557 and 30558.

Two registers have to be used for the output because the value range (maximum value) is too high for one register.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
557 - 558	32	Operating cycles 2	Factor:	1	Operating cycles pump 2 value
			Offset:	0	
			Unit:	x	
			Range:	0x to 4294967295x	

3.3.23 INPUT 30559-30560 | Maximum operating cycles of pumps

The maximum operating cycles of the control unit's pumps can be read out via the input registers 30559 and 30560.

Two registers have to be used for the output because the value range (maximum value) is too high for one register.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
559 - 560	32	Maximum operating cycles of pumps	Factor:	1	Maximum operating cycles pump value
			Offset:	0	
			Unit:	x	
			Range:	0x to 4294967295x	

3.3.24 INPUT 30561 | Current pump 1

The current of the control unit's pump 1 can be read out via the input register 30561.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
561	16	Current pump 1	Factor:	0.1	Current pump 1 value
			Offset:	0	
			Unit:	A	
			Range:	0A to 6553.5A	

3.3.25 INPUT 30562 | Current pump 2

The current of the control unit's pump 2 can be read out via the input register 30562.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
562	16	Current pump 2	Factor:	0.1	Current pump 2 value
			Offset:	0	
			Unit:	A	
			Range:	0A to 6553.5A	

3.3.26 INPUT 30563 | Maximum pump current

The maximum pump current of the control unit can be read out via the input register 30563.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
563	16	Maximum pump current	Factor:	0.1	Maximum pump current value
			Offset:	0	

Register	Size [bit]	Designation	Values		Description
			Unit:	A	
			Range:	0A to 6553.5A	

3.3.27 INPUT 30564 | Minimum pump current

The minimum pump current of the control unit can be read out via the input register 30564.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
564	16	Minimum pump current	Factor:	0.1	Minimum pump current value
			Offset:	0	
			Unit:	A	
			Range:	0A to 6553.5A	

3.3.28 INPUT 30565 | On delay

The on delay of the control unit can be read out via the input register 30565.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
565	16	On delay	Factor:	1	On delay value
			Offset:	0	
			Unit:	sec	
			Range:	0sec to 65535sec	

3.3.29 INPUT 30566 | Post run time

The post run time of the control unit can be read out via the input register 30566.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
566	16	Post run time	Factor:	1	Post run time value
			Offset:	0	
			Unit:	sec	
			Range:	0sec to 65535sec	

3.3.30 INPUT 30567 | Max. run time

The max. run time of the control unit can be read out via the input register 30567.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
567	16	Max. run time	Factor:	1	Max. run time value
			Offset:	0	
			Unit:	min	
			Range:	0min to 65535min	

3.3.31 INPUT 30568 | Max. number of runs

The max. number of runs of the control unit can be read out via the input register 30568.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
568	16	Max. number of runs	Factor:	1	Max. number of runs value
			Offset:	0	
			Unit:	A	
			Range:	0A to 65535A	

3.3.32 INPUT 30569-30570 | Energy usage pumps

The calculated energy usage of the control unit's pumps can be read out via the input registers 30569 and 30570.

Two registers have to be used for the output because the value range (maximum value) is too high for one register.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
569 - 570	32	Energy usage pumps	Factor:	0.1	Energy usage pump value
			Offset:	0	
			Unit:	kWh	
			Range:	0kWh to 429496729.5kWh	

3.3.33 INPUT 30601-30602 | Backwater phase

The total backwater phase of the control unit can be read out via the input registers 30601 and 30602.

Two registers have to be used for the output because the value range (maximum value) is too high for one register.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
601 - 602	32	Backwater phase	Factor:	0.1	Total backwater phase value
			Offset:	0	

Register	Size [bit]	Designation	Values		Description
			Unit:	h	
			Range:	0h to 429496729.5h	

3.3.34 INPUT 30603-30604 | Backwater occurrences

The total backwater occurrences for the control unit can be read out via the input registers 30603 and 30604.

Two registers have to be used for the output because the value range (maximum value) is too high for one register.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
603 - 604	32	Backwater occurrences	Factor:	1	Total backwater phase of control unit value
			Offset:	0	
			Unit:	x	
			Range:	0x to 4294967295x	

3.3.35 INPUT 30605-30606 | Flap operating cycles

The flap operating cycles of the control unit can be read out via the input registers 30605 and 30606.

Two registers have to be used for the output because the value range (maximum value) is too high for one register.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
605 - 606	32	Flap operating cycles	Factor:	1	Flap operating cycles value
			Offset:	0	
			Unit:	x	
			Range:	0x to 4294967295x	

3.3.36 INPUT 30607-30608 | Maximum flap operating cycles

The max. operating cycles of the control unit’s flap can be read out via the input registers 30607 and 30608.

Two registers have to be used for the output because the value range (maximum value) is too high for one register.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
607 - 608	32	Maximum flap operating cycles	Factor:	1	Maximum flap operating cycles value
			Offset:	0	
			Unit:	x	

Register	Size [bit]	Designation	Values		Description
			Range:	0x to 4294967295x	

3.3.37 INPUT 30609 | Flap current

The flap current of the control unit can be read out via the input register 30609.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
609	16	Flap current	Factor:	1	Flap current value
			Offset:	0	
			Unit:	mA	
			Range:	0mA to 65535mA	

3.3.38 INPUT 30610 | Maximum flap current

The max. flap current of the control unit can be read out via the input register 30610.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
609	16	Maximum flap current	Factor:	1	Max. flap current value
			Offset:	0	
			Unit:	mA	
			Range:	0mA to 65535mA	

3.3.39 INPUT 30611 | On delay flap

The on delay of the control unit's flap can be read out via the input register 30611.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
611	16	On delay flap	Factor:	1	On delay flap value
			Offset:	0	
			Unit:	s	
			Range:	0s to 65535s	

3.3.40 INPUT 30612 | Post run time flap

The post run time of the control unit's flap can be read out via the input register 30612.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
610	16	Post run time flap	Factor:	1	Post run time flap value
			Offset:	0	
			Unit:	s	
			Range:	0s to 65535s	

3.3.41 INPUT 30651 | Air bubbling offset

The air bubbling offset for the control unit's pressure sensor can be read out via the input register 30651.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
651	16	Air bubbling offset	Factor:	1	Pressure sensor's air bubbling offset value
			Offset:	0	
			Unit:	mm	
			Range:	0 mm to 65535 mm	

3.3.42 INPUT 30652 | Sensor height

The height of the pressure sensor can be read out via the input register 30652.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
652	16	Sensor height	Factor:	1	Pressure sensor height value
			Offset:	0	
			Unit:	mm	
			Range:	0 mm to 65535 mm	

3.3.43 INPUT 30653 | Sensing zone level sensor

The pre-set sensing zone for the level sensor can be read out via the input register 30653.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
653	16	Sensing zone level sensor	Factor:	1	Sensing zone for the level sensor value
			Offset:	0	
			Unit:	x	
			Range:	0x to 65535x	

3.3.44 INPUT 30654 | OFF 1 - level

The OFF 1 level to switch off pumping can be read out via the input register 30654.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
654	16	OFF 1 - level	Factor: Offset: Unit: Range:	1 0 mm 0 mm to 65535 mm	OFF 1 level to switch off pumping value

3.3.45 INPUT 30655 | OFF 2 - level

The OFF 2 level to switch off the 2nd pump can be read out via the input register 30655.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
655	16	OFF 2 - level	Factor: Offset: Unit: Range:	1 0 mm 0 mm to 65535 mm	OFF 2 level to switch off the 2nd pump

3.3.46 INPUT 30656 | ON 1 - level

The ON 1 level to start pumping can be read out via the input register 30656.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
656	16	ON 1 - level	Factor: Offset: Unit: Range:	1 0 mm 0 mm to 65535 mm	ON 1 level to start pumping value

3.3.47 INPUT 30657 | ON 2 - level

The ON 2 level to switch on the 2nd pump can be read out via the input register 30657.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
65/	16	ON 2 - level	Factor:	1	ON 2 level to switch on the 2nd pump

Register	Size [bit]	Designation	Values		Description
			Offset:	0	
			Unit:	mm	
			Range:	0 mm to 65535 mm	

3.3.48 INPUT 30658 | Alarm level

The alarm level can be read out via the input register 30658.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
658	16	Alarm level	Factor:	1	ALARM level value
			Offset:	0	
			Unit:	mm	
			Range:	0 mm to 65535 mm	

3.3.49 INPUT 30659 | Optical probe

The values for the optical probe can be read out via the input register 30659.

The register is split into 2 ranges with 8 bits each. The error detection time and logic time for the optical probe can be read out. The logic time indicates the response time of the optical probe.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
659	8	Error detection time optical probe	Factor:	1	Error detection time optical probe value
			Offset:	0	
			Unit:	s	
			Range:	0s to 255s	
	8	Logic time optical probe	Factor:	1	Logic time optical probe value
			Offset:	0	
			Unit:	s	
			Range:	0s to 255s	

3.3.50 INPUT 30660 | Temperature drift

The temperature drift for the control unit's pressure sensor can be read out via the input register 30660.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
660	16	Temperature drift	Factor:	1	Pressure sensor temperature drift value
			Offset:	0	
			Unit:	%	

Register	Size [bit]	Designation	Values		Description
			Range:	0% to 65535%	

3.3.51 INPUT 30661 | Pressure error threshold

The threshold as of which the pressure error is triggered can be read out via the input register 30661.

The register is divided into 2 ranges with 8 bits each. The 1st range contains the value for the pressure error threshold. The 2nd range is not currently in use.

ModBus settings

Function code: **04_H**

Description

Regis-ter	Size [bit]	Designation	Values		Description
661	8	Pressure error threshold	Factor: Offset: Unit: Range:	1 0 mm 0 mm to 255 mm	Pressure error threshold value
	8	not used	-		

3.3.52 INPUT 30662 | Offset pressure sensor

The offset for the pressure sensor can be read out via the input register 30662.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
662	16	Offset pressure sensor	Factor: Offset: Unit: Range:	1 -10000 mm -10000 mm to 55535 mm	Pressure sensor offset value

3.3.53 INPUT 30663 | Delay pressure drop routine

The delay for the pressure drop routine can be read out via the input register 30663.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
663	16	Delay pressure drop routine	Factor: Offset: Unit: Range:	1 0 s 0s to 65535s	Pressure drop routine delay value

3.3.54 INPUT 30664 | Current level

The current water level in the system's tank can be read out via the input register 30664.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
664	16	Current level	Factor: Offset: Unit: Range:	1 0 mm 0 mm to 65535 mm	Current (water) level in tank value

3.3.55 INPUT 30665 | LP-constant 1

The LP-constant 1 (low-pass constant 1) to filter the pressure sensor signal can be read out via the input register 30665.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
665	16	LP-constant 1	Factor: Offset: Unit: Range:	1 0 x 0x to 65535x	LP-constant 1 of the pressure sensor signal value

3.3.56 INPUT 30666 | LP-constant 2

The LP-constant 2 (low-pass constant 2) to filter the pressure sensor signal can be read out via the input register 30666.

ModBus settings

Function code: **04_H**

Description

Register	Size [bit]	Designation	Values		Description
666	16	LP-constant 2	Factor: Offset: Unit: Range:	1 0 x 0x to 65535x	LP-constant 2 of the pressure sensor signal value

3.4 Holding register

Description

The error and status information for various control unit functions can be queried via the holding registers.

These include the information that generally applies for the control unit as well as status values for motors, pumps, flap, backwater and others.

Functions

The function code to read the holding register is 0x03.

Register addresses

The holding registers can be found in the address range from 40001 to 49999.

The following registers are currently used for the KESSEL control units:

- 1 - 500 (or: 40001 - 40500):
  ⇨ General data about the control unit
- 501 - 550 (or: 40501 - 40550):
  ⇨ Error and status display for the control unit communication
- 551 - 600 (or: 40551 - 40600):
  ⇨ Error and status display for the connected pumps and motors
- 601 - 650 (or: 40601 - 40650):
  ⇨ Error and status display for the flap and backwater

3.4.1 HOLDING 40001 | General status and errors

ModBus settings

Function code: **03_H**

Bit table

Register 40001															
Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
SYS	AkA	DrF	PhF	DrE	BatÜ	BatF	Init	War	WarE	Manual	PTyp	ParR	ParW	ExpW	Quit

Description

Bit	Size	Designation	Short name	Values	Description
0	1	System status	SYS	0: OK 1: ALARM	All of the system's error messages are compiled in the system status.
1	1	Acoustic alarm	AkA	0: inactive 1: active	Indicates whether the control unit's acoustic alarm is active
2	1	Rotary field error	DrF	0: no error 1: error	Rotary field error status
3	1	Phase error	PhF	0: no error 1: error	Phase error status
4	1	Rotary field detection	DrE	0: deactivated 1: activated	Rotary field detection status
5	1	Battery monitoring	BatÜ	0: deactivated 1: activated	Battery monitoring status
6	1	Battery error	BatF	0: no error 1: error	Battery error status
7	1	Initialisation	Init	0: not done 1: done	Shows whether initialisation has been carried out.
8	1	Maintenance	War	0: not necessary 1: due	Shows whether maintenance is necessary.
9	1	Maintenance event	WarE	0: not done	Shows whether a maintenance event has been carried out.

Bit	Size	Designation	Short name	Values	Description
				1: done	
10	1	Manual operation	Manual	0: deactivated 1: activated	Manual operation status (compilation of manual operations)
11	1	Product type changed	PTyp	0: no event 1: event has taken place	Product type changed status
12	1	Parameter read in	ParR	0: no event 1: event has taken place	Parameter read in status
13	1	Parameter changed	ParW	0: no event 1: event has taken place	Parameter changed status
14	1	Expert parameter changed	ExpW	0: no event 1: event has taken place	Expert parameter changed status
15	1	Failure confirmed	Quit	0: no event 1: event has taken place	Failure confirmed status

3.4.2 HOLDING 40002 | General status and errors

ModBus settings

Function code: **03_H**

Bit table

Register 40002															
Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
Lgb	SDS	SDSE	USB	AQuit	AC	DC	HAC	HDC	HpK	HeS	-	-	HpKW	-	-

Description

Bit	Size	Designation	Short name	Values	Description
0	1	Log book read	Lgb	0: no event 1: event has taken place	Log book read status
1	1	SDS	SDS	0: not necessary 1: done	SDS status
2	1	SDS result	SDSE	0: no error 1: error	SDS result status
3	1	USB stick	USB	0: not detected 1: detected	USB stick status
4	1	Automatic alarm acknowledgement	AQuit	0: deactivated 1: activated	Automatic alarm acknowledgement status
5	1	AC output	AC	0: deactivated 1: activated	AC output status
6	1	DC output	DC	0: deactivated 1: activated	DC output status
7	1	AC output manual operation	HAC	0: deactivated 1: activated	AC output manual operation status
8	1	DC output manual operation	HDC	0: deactivated	DC output manual operation status

Bit	Size	Designation	Short name	Values	Description
				1: activated	
9	1	Manual operation, potential-free contact (fault)	HpK	0: deactivated 1: activated	Manual operation, potential-free contact (fault) status
10	1	Manual operation, ext. audible alarm	HeS	0: deactivated 1: activated	Manual operation, ext. audible alarm status
11 - 12	2	not used	-		
13	1	Manual operation, potential-free contact (warning)	HpKW	0: deactivated 1: activated	Manual operation, potential-free contact (warning) status
14 - 15	2	not used	-		

3.4.3 HOLDING 40501 | Status and error signals for the control unit communication

ModBus settings

Function code: **03_H**

Bit table

Register 40501															
Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
Kom	LIN	HKom	-	-	-	-	-	-	-	-	-	-	-	-	-

Description

Bit	Size	Designation	Short name	Values	Description
0	1	Communication	Kom	0: no error 1: error	Communication status
1	1	LIN error	LIN	0: no error 1: error	LIN error status
2	1	Manual operation, communication	HKom	0: deactivated 1: activated	Manual operation, communication status
3 - 15	13	not used	-		

3.4.4 HOLDING 40551 | Status and error signals for motors and pumps

ModBus settings

Function code: **03_H**

Bit table

Register 40551															
Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
MS1	MS2	RF1	RF2	Th1A	Th1B	Th2A	Th2B	ÜP1	ÜP2	UP1	UP2	GP1	GP2	GzP1	GzP2

Description

Bit	Size	Designation	Short name	Values	Description
0	1	Motor protection 1	MS1	0: no error 1: error	Motor protection 1 status
1	1	Motor protection 2	MS2	0: no error	Motor protection 2 status

Bit	Size	Designation	Short name	Values	Description
				1: error	
2	1	Relay error 1	RF1	0: no error 1: error	Relay error 1 status
3	1	Relay error 2	RF2	0: no error 1: error	Relay error 2 status
4	1	Thermal protection 1A or TF1	Th1A	0: no error 1: error	Thermal protection 1A or TF1 status
5	1	Thermal protection 1B	Th1B	0: no error 1: error	Thermal protection 1B status
6	1	Thermal protection 2A	Th2A	0: no error 1: error	Thermal protection 2A status
7	1	Thermal protection 2B	Th2B	0: no error 1: error	Thermal protection 2B status
8	1	Overcurrent pump 1	ÜP1	0: no error 1: error	Overcurrent pump 1 status
9	1	Overcurrent pump 2	ÜP2	0: no error 1: error	Overcurrent pump 2 status
10	1	Undercurrent pump 1	UP1	0: no error 1: error	Undercurrent pump 1 status
11	1	Undercurrent pump 2	UP2	0: no error 1: error	Undercurrent pump 2 status
12	1	Max. number of runs pump 1	GP1	0: Max. number not reached 1: Max. number reached	Max. number of runs pump 1 status
13	1	Max. number of runs pump 2	ParW	0: Max. number not reached 1: Max. number reached	Max. number of runs pump 2 status
14	1	Max run time pump 1	GzP1	0: Max. time not reached 1: Max. time reached	Max. run time pump 1 status
15	1	Max run time pump 2	GzP2	0: Max. time not reached 1: Max. time reached	Max. run time pump 2 status

3.4.5 HOLDING 40552 | Status and error signals for motors and pumps

ModBus settings

Function code: **03_H**

Bit table

Register 40552															
Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
AP1	AP2	MSP1	MSP2	S1B	AB	Tls	HP1	HP2	-	-	-	-	-	-	-

Description

Bit	Size	Designation	Short name	Values	Description
0	1	Automatic operation, pump 1	AP1	0: deactivated 1: activated	Automatic operation pump 1 status
1	1	Automatic operation, pump 2	AP2	0: deactivated 1: activated	Automatic operation pump 2 status
2	1	Maximum operating cycles for pump 1 exceeded	MSP1	0: Max. not reached 1: Max. reached	Maximum operating cycles for pump 1 exceeded status
3	1	Maximum operating cycles for pump 2 exceeded	MSP2	0: Max. not reached 1: Max. reached	Maximum operating cycles for pump 2 exceeded status
4	1	S1/S3 operation	S1B	0: S1 operation active 1: S3 operation active	S1/S3 operation status
5	1	Alternating operation	AB	0: deactivated 1: activated	Alternating operation status
6	1	Dry-run protection	Tls	0: deactivated 1: activated	Dry-run protection status
7	1	Manual operation, pump 1	HP1	0: deactivated 1: activated	Manual operation pump 1 status
8	1	Manual operation, pump 2	HP2	0: deactivated 1: activated	Manual operation pump 2 status
9 - 15	7	not used	-		

3.4.6 HOLDING 40601 | Status and error signals for flaps and backwater

ModBus settings

Function code: **03_H**

Bit table

Register 40601															
Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
KlF	MFKl	Kl	Rück	AutoKl	MSK	SDSKl	SDSE	HKl	-	-	-	-	-	-	-

Description

Bit	Size	Designation	Short name	Values	Description
0	1	Flap error	KlF	0: no error 1: error	Flap error status
1	1	Flap motor error	MFKl	0: no error 1: error	Flap motor error status
2	1	Flap	Kl	0: open 1: closed	Flap status
3	1	Backwater	Rück	0: No backwater 1: Backwater	Backwater status
4	1	Flap automatic operation	AutoKl	0: deactivated 1: activated	Flap automatic operation status

Bit	Size	Designation	Short name	Values	Description
5	1	Maximum operating cycles for flap exceeded	MSK	0: Max. not reached 1: Max. reached	Maximum operating cycles for flap exceeded status
6	1	SDS flap	SDSKI	0: not done 1: done	SDS flap status
7	1	SDS result, flap	SDSE	0: unsuccessful 1: successful	SDS result, flap status
8	1	Flap manual operation	HKI	0: deactivated 1: activated	Flap manual operation status
9 - 15	7	not used	-		

3.4.7 HOLDING 40651 | Status and error signals for flaps and backwater

ModBus settings

Function code: **03_H**

Bit table

Register 40651															
Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
DF	Da	SF	SFKI	Temp	NF	NE	SDa	-	-	-	-	-	-	-	-

Description

Bit	Size	Designation	Short name	Values	Description
0	1	Pressure error	DF	0: no error 1: error	Pressure error status
1	1	Pressure loss	Da	0: no error 1: error	Pressure loss status
2	1	Probe error	SF	0: no error 1: error	Flap status
3	1	Probe error flap	SFKI	0: no error 1: error	Probe error flap status
4	1	Temperature exceeded	Temp	0: not exceeded 1: exceeded	Temperature exceeded status
5	1	Level error	NF	0: no error 1: error	Level error status
6	1	Illogical level input	NE	0: correct level input 1: illogical level input	Illogical level input status
7	1	Save pressure loss	SDa	0: deactivated 1: activated	Save pressure loss status
8 - 15	8	not used	-		

3.4.8 HOLDING 40701 | Status and error signals for the extension devices

ModBus settings

Function code: **03_H**

Bit table

Register 40701															
Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
BFE	KIFE	ME	SFE	-	-	-	-	-	-	-	-	-	-	-	-

Description

Bit	Size	Designation	Short name	Values	Description
0	1	Battery error, extension device	BFE	0: no error 1: error	Battery error, extension device status
1	1	Flap error, extension device	KIFE	0: no error 1: error	Flap error, extension device status
2	1	Motor error, extension device	ME	0: no error 1: error	Motor error, extension device status
3	1	Probe error, extension device	SFE	0: no error 1: error	Probe error, extension device status
4 - 15	13	not used	-		

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