

Operation Signalling Module

For Calio

Supplementary Operating Manual



Legal information/Copyright

Supplementary Operating Manual Operation Signalling Module

Original operating manual

All rights reserved. The contents provided herein must neither be distributed, copied, reproduced, edited or processed for any other purpose, nor otherwise transmitted, published or made available to a third party without the manufacturer's express written consent.

Subject to technical modification without prior notice.

Contents

1	General.....	4
2	Storage.....	5
3	Description.....	6
3.1	Compatibility	6
3.2	General description	6
3.3	Selecting the operating mode	6
3.3.1	"In operation" message only	6
3.3.2	Operation/alert message	7
3.4	Connection to Modbus.....	7
3.5	Parameterisation	8
3.6	Technical data.....	10
4	Related Documents.....	11
4.1	Terminal wiring diagram	11
5	EU Declaration of Conformity.....	13

1 General

This supplementary operating manual accompanies the installation/operating manual. All information contained in the installation/operating manual must be observed.

Table 1: Relevant operating manuals

Type series	Reference number of the operating/installation manual
Calio	1157.82

Manufacturer's product literature For accessories and/or integrated machinery components observe the relevant manufacturer's product literature.

2 Storage

If the ambient conditions for storage are met, the accessories will give reliable service even after a prolonged period of storage. If stored properly, the product will be protected for a maximum of 12 months.

Table 2: Ambient conditions for storage

Ambient condition	Value
Relative humidity	85 % max. (non-condensing)
Ambient temperature	-10 °C to +70 °C

1. Store the device in dry conditions, if possible in its original packaging.
2. Store the device in a dry room in which the atmospheric humidity is maintained at a constant level (as far as this is possible).
3. Prevent excessive fluctuations in atmospheric humidity.

3 Description

3.1 Compatibility

The operation signalling module is configured and updated using the KSB Service Tool. A specific DTM (Device Type Manager) is available for this purpose. The Service Tool and DTM can be downloaded free of charge from the KSB web site. Download link: http://www.ksb.com/ksb-en/Products_and_Services/Automation/Software

3.2 General description

The ESM module communicates via Modbus with a maximum of 6 connected pumps and is connected to the Modbus terminal pair of the pumps for this purpose (see the operating manual for the pump).

The operation signalling module offers:

- 6 volt-free relay contacts
- 1 Modbus RTU interface

The Service Tool can be used to change the assignment of the volt-free messages. The relay contact that is assigned to a pump switches through if the pump's holding register is read and processed as "operation" or "pump start".

The respective relay of the operation signalling module is switched in the following scenarios:

1. If application or disconnection of the power supply (230 V AC) causes the pump to start or stop (RUN terminal pair must be bridged).
2. If, with power supplied (230 V AC), an external signal causes the pump to start or stop by way of the RUN terminal pair.
3. If a pump malfunction (E01-E04 or E06) is present and the pump is stopped.

NOTE	
The E05 message does not cause the pump to be stopped (warning).	

3.3 Selecting the operating mode

The ESM module can be operated in two different configurations:

3.3.1 "In operation" message only

In the "In operation message only" configuration, up to 6 pumps can be monitored during operation. For this purpose, the ESM module evaluates the respective "pump status" data point (holding register 07 D9) of the individual pumps and actuates the relay assigned to the pump if the register value changes.

Table 3: Parameter

Parameter	Register	Length [byte]	Type	Unit	Access type
Pump status	07 D9	00 01	UINT16	0 = Pump stop 1 = Pump in operation	R

For this purpose, parameter 3-1-1 Operating mode must be set to "In operation message only" via the Service Tool (Pactware).

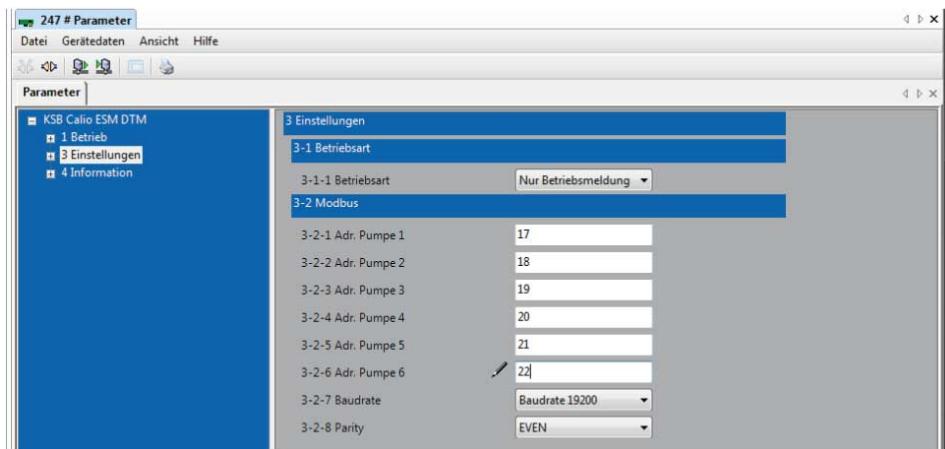


Fig. 1: Screenshot, "In operation" message only

3.3.2 Operation/alert message

In the "Operation/alert message" configuration, only up to 3 pumps can be monitored.

There is a relay for every monitored pump that indicates the operation of the pump and an additional relay that outputs a general fault message in the event of a malfunction.

For this purpose, the "error vector" is also evaluated in addition to the "pump status" data point.

Table 4: Pump status parameter

Parameter	Register	Length [byte]	Type	Unit	Access type
Pump status	07 D9	00 01	UINT16	0 = Pump stop 1 = Pump in operation	R

Table 5: Error vector bit code parameter

Parameter	Register	Length [byte]	Type	Unit	Access type
Error vector, bit code	07 D0	00 02	UINT16	Bit 0 = error code E01 Bit 1 = error code E02 Bit 2 = error code E03 Bit 3 = error code E04 Bit 4 = error code E05 Bit 5 = error code E06	R

In order to use this function, parameter 3-1-1 Operating mode must be changed to "Operation/alert message" via the Service Tool (Pactware).

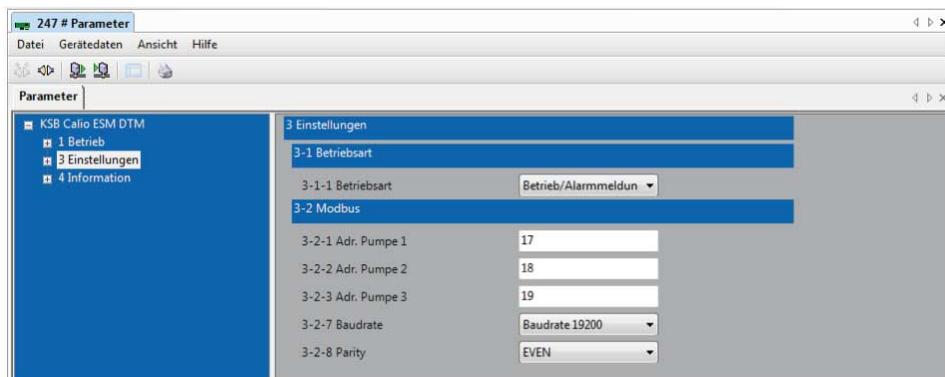


Fig. 2: Screenshot for operation/alert message

3.4 Connection to Modbus

The module offers a Modbus (RTU) interface that is used directly for integration in a Modbus network. The Modbus interface is equipped with an RS485 interface with Modbus (RTU) protocol in accordance with specification V1.1b.

Table 6: Modbus

Parameter	Description/value
Terminal cross-section	Max. 1.5 mm ²
Interface	RS485 (TIA-485A) optically isolated
Bus connection	Shielded bus cable, twisted in pairs, 1x 2x 0.5 mm ²
Cable length	1,000 m maximum, stub lines impermissible; for cable lengths > 30 m, suitable measures must be taken to ensure protection against overvoltages.
Wave impedance	120 Ohm (cable type B to TIA 485-A)
Data rate [Baud]	2.400, 4.800, 9.600, 19.200 (WE)
Protocol	Modbus RTU standard
Data format	8 data bits, EVEN parity, 1 stop bit
Modbus address	ID #17 (WE)

Also refer to the chapter on connecting to bus systems with Modbus in the pump operating manual.

If the module is operated as the end device in the field bus system or if a point-to-point connection with a field bus gateway is made, the terminating resistors must be set on the PCB in order to ensure correct operation. This can be achieved easily via DIL switch S1. (⇒ Section 4.1, Page 11)


Fig. 3: DIL switch S1

Table 7: DIL switch assignment

DIL switch	Connection	Description	Factory settings
1	ModBus RTU	RS485 termination	ON
2		RS485 termination	ON
3		Galvanically isolated GND (connecting RS485 GND with common GND)	OFF
4	System bus	CAN termination	ON
5		CAN termination	ON
6	Not used		OFF

3.5 Parameterisation

The modbus address for every pump can be set using the KSB Service Tool and the device-specific DTM. For this purpose, please download the necessary software from the KSB homepage.

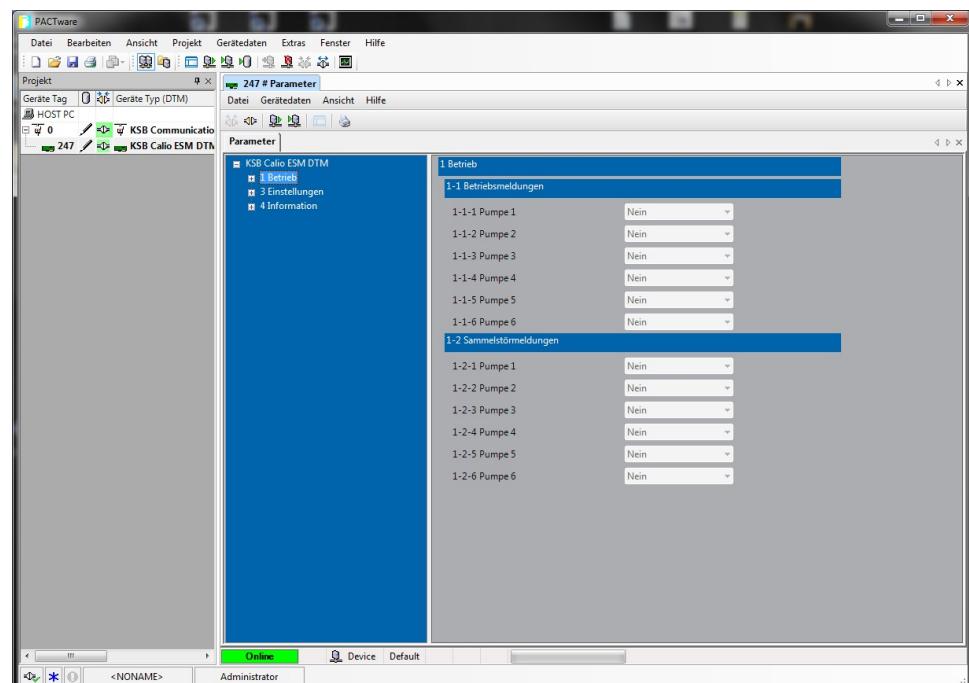
Link: http://www.ksb.com/ksb-en/Products_and_Services/Automation/Software

To connect to the ESM module, the service cable must be connected to the service interface (plug connector 1, (⇒ Section 4.1, Page 11)) of the module. Then start Pactware and carry out "Automatic device detection".


Fig. 4: Parameterisation

The topology is now structured and a connection is established with the device. The current status of the individual pumps is displayed in menu 1 "Operation".

	NOTE This view mode does not update itself automatically and must be updated via the "Load data from device" function!
--	--


Fig. 5: Parameter settings

In menu 3 "Settings", the operating mode (parameter 3-1-1 (⇒ Section 3.3, Page 6)) and the Modbus addresses of the individual pumps (parameter 3-2-1 to parameter 3-2-6) and the communication settings (parameter 3-2-7 Baud rate and 3-2-8 Parity) can be set.

The default settings are as follows:

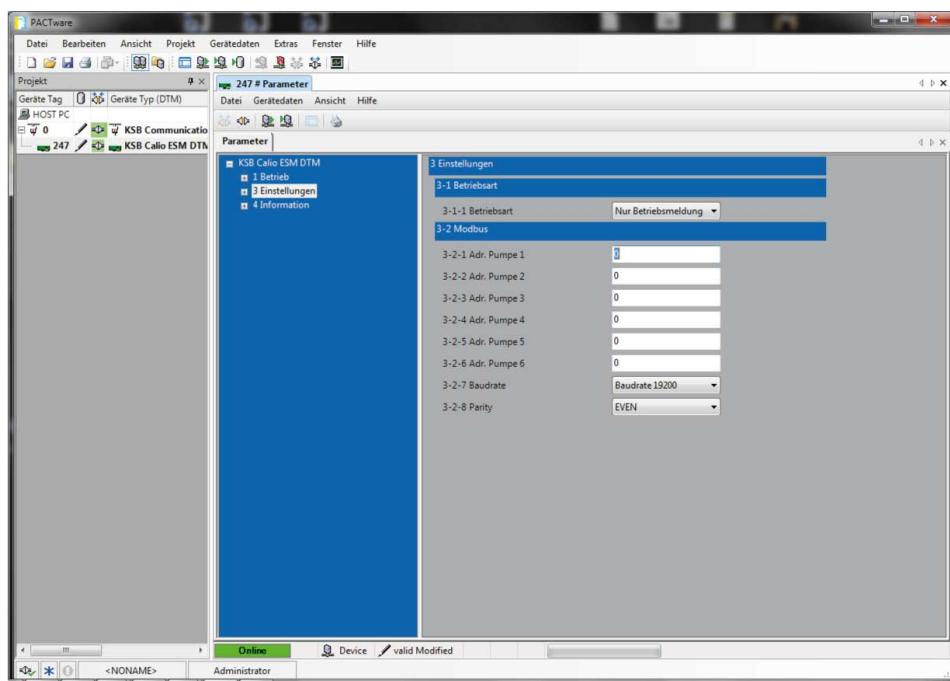


Fig. 6: Default settings

To change the Modbus address of the pump, a 1-to-1 Modbus connection must be established between the pump and the ESM module. Then set parameter 3-2-1 Adr., pump 1 to the default address (17) of the pump.

Now, by changing parameter 3-2-1 again, the Modbus address of the pump can be changed as often as required.

The Modbus addresses of the pumps can also be changed with every Modbus master, regardless of the ESM. For this purpose, the corresponding register must be overwritten with the new address value as described in the pump operating manual.

Table 8: Modbus address

Parameter	Register	Length [byte]	Type	Unit	Access type
Modbus address	0B B9	00 01	UINT16	0 - 240; default address 17	R/W

NOTE	
Write parameters can only be changed if the "Modbus" operating mode is activated for the respective pump (see pump operating manual).	

3.6 Technical data

Characteristic	Value
Power supply	9-30 VDC
Enclosure	IP20
Switching capacity of individual signals	30 V/1 A
Housing design	Top hat rail housing
Weight	0,3 kg

4 Related Documents

4.1 Terminal wiring diagram

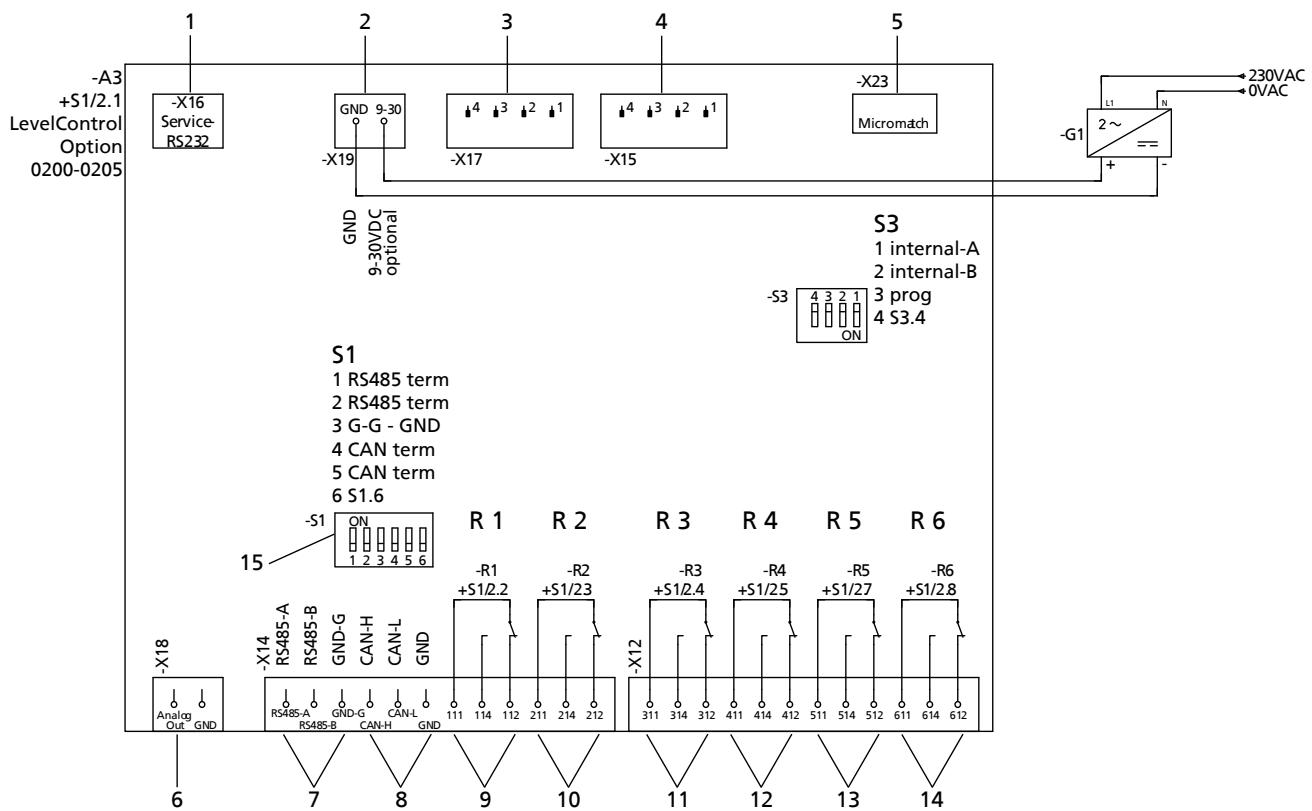


Fig. 7: Terminal wiring diagram

1	Service interface	2	Power supply: 9 - 30 V DC
3	Not used	4	Not used
5	Not used	6	Not used
7	ModBus RTU connection	8	Not used
9	Volt-free "In operation" message 1	10	Volt-free "In operation" message 2
11	Volt-free "In operation" message 3	12	Volt-free "In operation" message 4
13	Volt-free "In operation" message 5	14	Volt-free "In operation" message 6
15	ModBus RTU terminating resistors	R 1-6	Relays 1 - 6

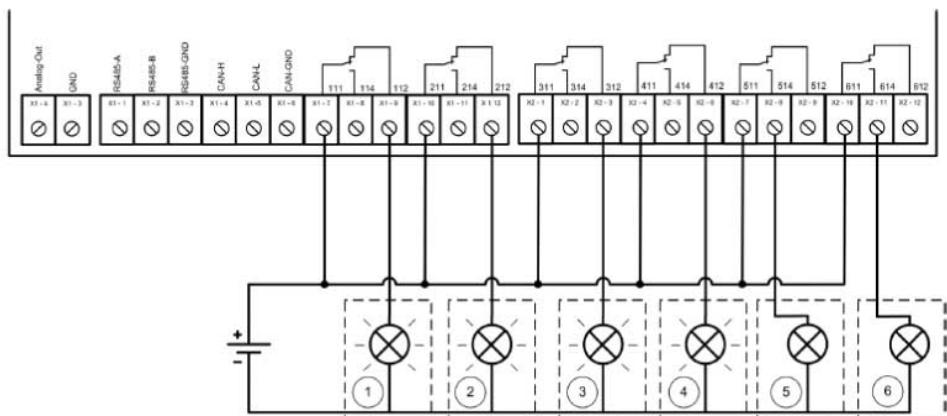


Fig. 8: Example wiring

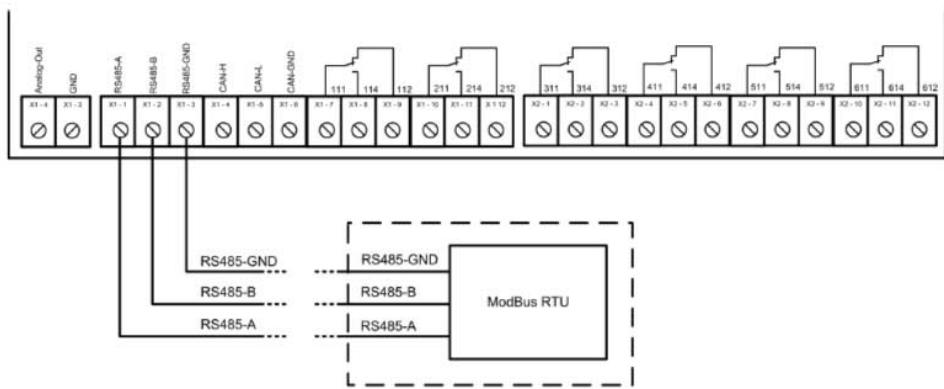


Fig. 9: Connection to Modbus

5 EU Declaration of Conformity

Manufacturer: **KSB SE & Co. KGaA**
Johann-Klein-Straße 9
67227 Frankenthal (Germany)

The manufacturer herewith declares that **the product**:

Operation signalling module

Serial number range: 2018w01 to 2019w52

- is in conformity with the provisions of the following Directives as amended from time to time:
 - Electromagnetic Compatibility Directive 2014/30/EU
 - Low-voltage Directive 2014/35/EU

The manufacturer also declares that:

- The following harmonised international standards have been applied:
 - EN 60439-1,
 - EN 61000-6-2, EN 55022

The EU Declaration of Conformity was issued in/on:

Frankenthal, 1 February 2018



Joachim Schullerer

Head of Product Development Pump Systems and Drives

KSB SE & Co. KGaA
Johann-Klein-Straße 9
67227 Frankenthal



KSB SE & Co. KGaA

Johann-Klein-Straße 9 • 67227 Frankenthal (Germany)

Tel. +49 6233 86-0

www.ksb.com