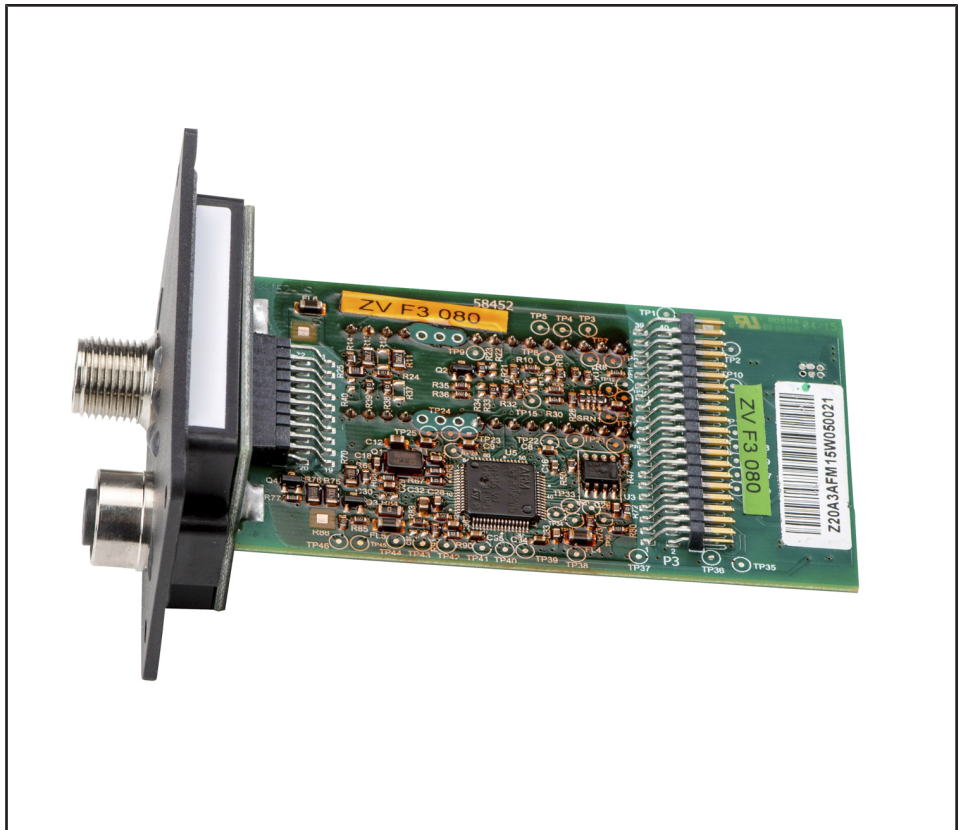


Field Bus Module

Modbus RTU Module

PumpDrive 2
PumpDrive 2 Eco

Supplementary Operating Manual



Legal information/Copyright

Supplementary Operating Manual Modbus RTU 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.

© KSB SE & Co. KGaA, Frankenthal 18/09/2020

Contents

1	Supplementary Operating Manual	4
1.1	General.....	4
1.2	Field bus module connections	4
1.3	Installing the field bus module.....	4
1.4	Connecting the field bus module	6
1.5	Modbus RTU module.....	6
1.6	Modbus RTU protocol	9

1 Supplementary Operating Manual

1.1 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 installation/ operating manual
PumpDrive 2	4074.81
PumpDrive 2 Eco	4074.82

1.2 Field bus module connections

The field bus modules are plug-in modules.

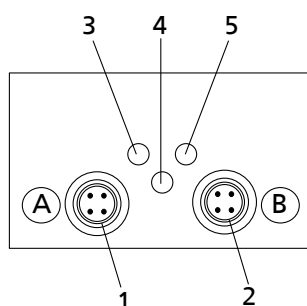


Fig. 1: Field bus module

Table 2: Field bus module

Item	Component	Description
1	M12 connector A	B-coded
2	M12 socket B	B-coded
3	Amber LED signal lamp	Internal bus communication OK (heartbeat detected)
4	Green LED signal lamp	Communication on field bus side active/possible
5	Red LED signal lamp	Modbus malfunction or communication fault

- Can be retrofitted
- Internal T-connector (bus looped through); uninterruptible even in the event of a frequency inverter power failure
- Connector for self-assembly

1.3 Installing the field bus module

The field bus module can be fitted in an available slot of the frequency inverter.

Blind cover



Fig. 2: Blind cover

1	Blind cover
---	-------------

1. Unscrew the cross recessed head screws in the blind cover.
2. Remove the blind cover.

Field bus module



Fig. 3: Inserting the field bus module



Fig. 4: Securing the field bus module

1. Carefully insert the field bus module into the open slot. The plug-in module is guided on rails until it engages in the contact.

2. Secure the field bus module using the 4 cross recessed head screws. IP55 enclosure protection is not provided until the screws have been tightened.



CAUTION

Incorrect assembly

Impairment of protection provided by the enclosure (protection may be compromised)!

- Cover unused M12 connections with a cap (included in the scope of supply).

1.4 Connecting the field bus module

Observe the following when connecting the field bus module:

- Before the bus connection is established among the nodes, potential equalisation must have been implemented and checked.
- For high-frequency shielding, use shielded cables and assemble according to EMC requirements.
- A minimum distance of 0.3 metres is recommended between such cables and other electric conductors.
- Do not use the bus cable to make any further connections in addition to the field bus module (for example, 230 V alert and 24 V start).
- A cable specified for the field bus module must be used as the connecting cable.



CAUTION

Incorrect installation
Damage to the field bus module!

▷ Never supply power to the field bus module via the M12 connections.

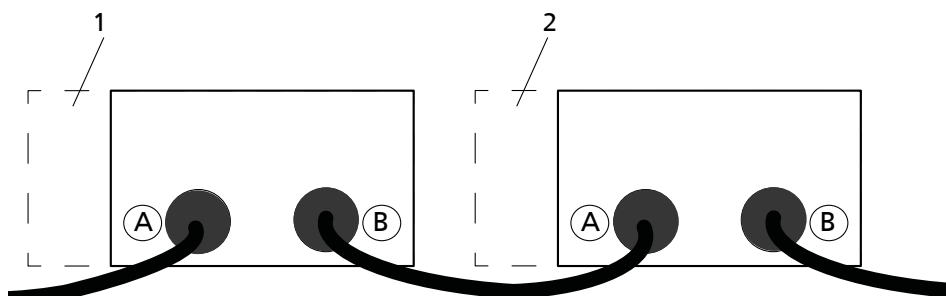


Fig. 5: Connecting the field bus module

Table 3: Connecting the field bus module

Item	Device	M12 connector
1	Frequency inverter 1	M12 connector A: Coming M12 socket B: Going
2	Frequency inverter 2	M12 connector A: Coming M12 socket B: Going

1.5 Modbus RTU module

The Modbus RTU module is equipped with an RS485 interface with the Modbus RTU protocol in accordance with specification V1.1b. Configuration takes place via frequency inverter parameters.

Communication protocol	MODBUS (RTU)
Bus terminator	External
Interface	EIA-485 (RS485)
Transmission rate	19,200 bit/s (variable)
Device type	Slave
Bus access	Polling between master and slave
Parity	▪ Even ▪ Odd ▪ No Parity

A cable specified for Modbus modules that has the following properties must be used as a connecting cable:

- Flexible
- Shielded
- Twisted wires for the data line (D0-D1)
- The wave impedance should be at least 100 Ohm.
- Third core or second core pair for the common ground



Fig. 6: Pin assignment: a) Contact arrangement of M12 connector, b) Contact arrangement of M12 socket

Table 4: Pin assignment

Pin	Core colour code		Assignment of M12 connector / M12 socket (B-coding)	Signal
	Cable (CAN open)	Cable (DIN 47100)		
1	-	-	VP (+5V)	+5V
2	Blue	Brown	D-	RS-485 A / data -
3	Black	Green	GND	GND
4	White	White	D+	RS-485 B / data +
5	Shielding	Shielding	Shielding	Shielding
Thread	-	-	Shielding	Shielding

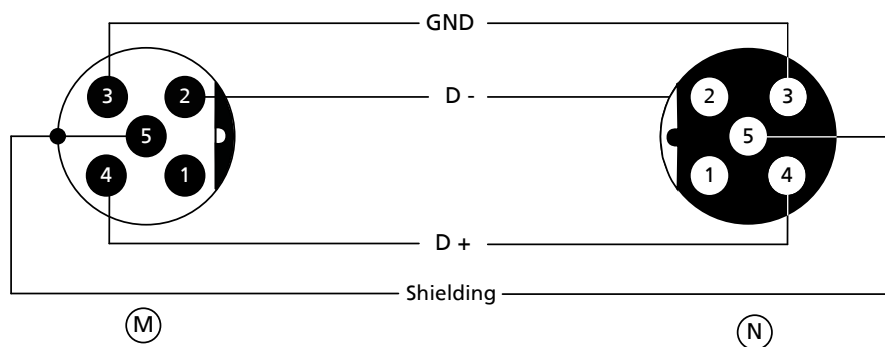


Fig. 7: User-configured cable

Ⓜ	M12 connector	Ⓝ	M12 socket
---	---------------	---	------------

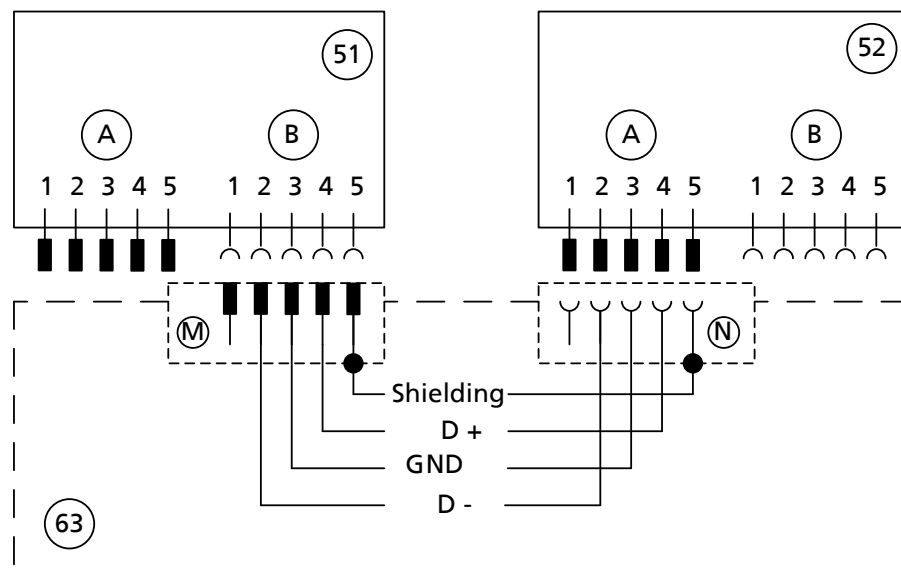


Fig. 8: Wiring diagram

Bus terminator The terminating resistors must conform to the following standard: Profibus standard DP DIN 19245, part 3, section 6.3.

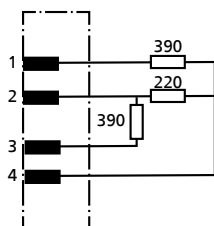


Fig. 9: Bus terminating resistor M12

The field bus terminating resistor can be plugged directly into the M12 socket. Bus polarisation does not take place if the field bus module is de-energised. If the bus terminator is to be independent of the field bus module power supply, it must be implemented externally using an active bus terminator.



NOTE

The frequency inverter is reset when a field bus module is replaced or retrofitted. Menu 3-12 for setting the parameters of the field bus module is then enabled in the control panel.

1.6 Modbus RTU protocol

Table 5: Address range of system (0000 - 00FF)

Modbus address	Parameter name	Menu number	Size	Data type	Unit	Group	Access (r: read, w: write)	Bit	Description
0000	Modbus Status	-	DWORD	32-bit bit field	-	System Status	r	0	System connection OK
								1	Pump 1 online
								2	Pump 2 online
								3	Pump 3 online
								4	Pump 4 online
								5	Pump 5 online
								6	Pump 6 online
0002	System Alerts	-	DWORD	32-bit bit field	-	System Status	r	0	Lack of water
0004	<i>Reserved</i>	-	-	-	-	System Status	-	-	-
0006	System Warnings	-	DWORD	32-bit bit field	-	System Status	r	0	Setpoint monitoring
		-	-					1	Actual value monitoring
								2	Flow rate monitoring
								3	Suction pressure monitoring
								4	Discharge pressure monitoring
								5	Differential pressure monitoring
								6	Temperature monitoring
								7	Low flow velocity
								8	Overflow
0008 - 00FE	<i>Reserved</i>	-	-	-	-	System Status	-	-	-
0020	System Start / Stop	1-3-1	DWORD	Boolean	-	System Control	r, w	-	-
0022	Actual Value (Closed-loop Control)	1-2-3-1	DWORD	Float32	Base unit of the type of control selected	System Control	r, w	-	-
0024	Setpoint (Closed-loop Control)	1-3-2	DWORD	Float32	Base unit of the type of control selected	System Control	r, w	-	-
0026	Control Value (Open-loop Control)	1-3-3	DWORD	Float32	Speed	System Control	r, w	-	-

Modbus address	Parameter name	Menu number	Size	Data type	Unit	Group	Access (r: read, w: write)	Bit	Description
0028	Maximum Number of Pumps Running	3-7-2	DWORD	UINT32	-	System Control	r, w	-	-
002A	Control Point	3-6-2	DWORD	ENUM	-	System Control	r, w	0	Local
								1	Field bus
002C	Actual Value Source	3-6-3	DWORD	ENUM	-	System Control	r, w	0	Local
								1	Field bus
002E	Actual Value (Closed-loop Control) in Percent	1-2-3-1	DWORD	Float32	Percent	System Control	r, w	-	-
0030	Setpoint (Closed-Loop Control) in Percent	1-3-2	DWORD	Float32	Percent	System Control	r, w	-	-
0032	Control Value (Open-loop Control) in Percent	1-3-3	DWORD	Float32	Percent	System Control	r, w	-	-
0034-003E	<i>Reserved</i>	-	-	-	-	System Control	-	-	-
0040	Suction Pressure	1-2-3-2	DWORD	Float32	Pressure base unit	System Process Variable	r	-	-
0042	Discharge Pressure	1-2-3-3	DWORD	Float32	Pressure base unit	System Process Variable	r	-	-
0044	Differential Pressure	1-2-3-4	DWORD	Float32	Pressure base unit	System Process Variable	r	-	-
0046	Flow Rate	1-2-3-5	DWORD	Float32	Flow rate base unit	System Process Variable	r	-	-
0048	Level	1-2-3-6	DWORD	Float32	Level base unit	System Process Variable	r	-	-
004A	Temperature	1-2-3-7	DWORD	Float32	Temperature base unit	System Process Variable	r	-	-
004C	Flow Velocity of Fluid Handled	1-2-3-8	DWORD	Float32	Velocity	System Process Variable	r	-	-
004E	Head	1-2-3-9	DWORD	Float32	Height	System Process Variable	r	-	-
0050-005E	<i>Reserved</i>	-	-	-	-	System Process Variable	-	-	-
0060	Immediate Pump Changeover	1-3-5	DWORD	Boolean	-	System Function	w	-	-
0062	Immediate Pipe Flushing	1-3-6	DWORD	Boolean	-	System Function	w	-	-
0064	Type of Control	3-6-1	DWORD	ENUM	-	System Control	w	0	OFF (open-loop control)
								1	Discharge pressure

Modbus address	Parameter name	Menu number	Size	Data type	Unit	Group	Access (r: read, w: write)	Bit	Description
0064	Type of Control	3-6-1	DWORD	ENUM	-	System Control	w	2	Suction pressure
								3	Differential pressure
								4	Differential pressure (sensorless)
								5	Flow rate
								6	Temperature (cooling)
								7	Temperature (heating)
								8	Suction-side level
								9	Discharge-side level
								10	Flow rate (sensorless)
0066	Fixed Speed Percent	3-6-5-1	DWORD	Float32	In % of the speed value range	System Control	w	-	-
0068-006E	Reserved	-	-	-	-	-	-	-	-

Table 6: Address range of pump 1 (0100 - 01FF)

Modbus address	Parameter name	Menu number	Size	Data type	Unit	Group	Access (r: read, w: write)	Bit	Description
0100	Pump Status	-	DWORD	ENUM	-	Pump Status	r	1	Pump stopped
								2	Pump running
								3	Pump starting
								4	Pump stopping
								5	Pump stopped and interlocked
								6	Pump running and interlocked
								7	Pump on standby

Modbus address	Parameter name	Menu number	Size	Data type	Unit	Group	Access (r: read, w: write)	Bit	Description
0102	Pump Alerts	-	DWORD	32-bit bit field	-	Pump Status	r	0	Thermal motor protection
								1	Overvoltage
								2	Undervoltage
								3	Phase failure, motor side
								4	Short circuit
								5	Hardware fault
								6	Heat sink temperature high
								7	PCB temperature high
								8	Overcurrent
								9	Braking resistor
								10	Dynamic overload protection
								11	Firmware update required
								12	Dry running
								13	Dry running (external)
								14	Hydraulic blockage
								15	No master control
								16	No matching motor data available
								17	No motor data available
								18	AMA fault
								19	CtrlBoard Power Off
								20	24 V undervoltage
								21	HMI hardware test not passed
								22	IO hardware test not passed
								23	External alarm
0104	Reserved	-	DWORD	-	-	Pump Status	-	-	-
0106	Pump Warnings		DWORD	32-bit bit field		Pump Status	r	0	Dynamic overload protection
								1	Overvoltage
								2	Undervoltage

Modbus address	Parameter name	Menu number	Size	Data type	Unit	Group	Access (r: read, w: write)	Bit	Description
0106	Pump Warnings		DWORD	32-bit bit field		Pump Status	r	3	Resonance range
								4	Broken wire
								5	Actual value failure
								6	Hydraulic blockage
								7	Part load
								8	Overload
								9	Heat sink temperature high
								10	PCB temperature high
								11	Current high
								12	Current low
								13	Speed monitoring
								14	Frequency high
								15	Frequency low
								16	Power high
								17	Power low
								18	Limited stop ramp
								19	24 V overload
								20	PumpMeter communication
								21	General settings loaded
								22	External alarm
0108	<i>Reserved</i>	-	DWORD	-	-	Pump Status	-	-	-
010A	Information on Pump	-	DWORD	32-bit bit field	-	Pump Status	r	0	Pump maintenance/service interval
								1	Drive disabled
010C	<i>Reserved</i>	-	-	-	-	Pump Status	-	-	-
010E	Pump Operating Mode	1-3-8	DWORD	ENUM	-	Pump Control	r, w	1	Off
								2	Manual
								0	Auto
0110	Control Value (Manual)	1-3-4	DWORD	UINT32	Speed	Pump Control	r, w	-	-

Modbus address	Parameter name	Menu number	Size	Data type	Unit	Group	Access (r: read, w: write)	Bit	Description
0112	Reserved	-	-	-	-	Pump Control	-	-	-
0114	Speed	1-2-1-1	DWORD	Float32	Speed	Pump Process Variable	r	-	-
0116	Motor Input Power	1-2-1-2	DWORD	Float32	Output base unit	Pump Process Variable	r	-	-
0118	Pump Input Power	1-2-1-3	DWORD	Float32	Output base unit	Pump Process Variable	r	-	-
011A	Pump Set Input Power	1-2-1-4	DWORD	Float32	Output base unit	Pump Process Variable	r	-	-
011C	Motor Current	1-2-1-5	DWORD	Float32	Ampere	Pump Process Variable	r	-	-
011E	Motor Voltage	1-2-1-6	DWORD	Float32	Volt	Pump Process Variable	r	-	-
0120	Output Frequency	1-2-1-7	DWORD	Float32	Hz	Pump Process Variable	r	-	-
0122	DC Link Voltage	1-2-1-8	DWORD	Float32	Volt	Pump Process Variable	r	-	-
0124	Heat Sink Temperature	1-2-1-9	DWORD	Float32	Temperature base unit	Pump Process Variable	r	-	-
0126	PCB Temperature	1-2-1-10	DWORD	Float32	Temperature base unit	Pump Process Variable	r	-	-
0128	Motor Torque	1-2-1-11	DWORD	Float32	Nm	Pump Process Variable	r	-	-
012A	Frequency Inverter Efficiency	1-2-1-12	DWORD	Float32	Percent	Pump Process Variable	r	-	-
012C	Pump Suction Pressure	1-2-2-1	DWORD	Float32	Pressure base unit	Pump Process Variable	r	-	-
012E	Pump Discharge Pressure	1-2-2-2	DWORD	Float32	Pressure base unit	Pump Process Variable	r	-	-
0130	Pump Differential Pressure	1-2-2-3	DWORD	Float32	Pressure base unit	Pump Process Variable	r	-	-
0132	Pump Flow Rate	1-2-2-4	DWORD	Float32	Flow rate base unit	Pump Process Variable	r	-	-
0134	Energy Meter (kWh)	1-4-1-1	DWORD	UINT32	kWh	Pump Process Variable	r	-	-
0136	Frequency Inverter Operating Hours	1-4-2-1	DWORD	UINT32	Hours	Pump Process Variable	r	-	-
0138	Pump Operating Hours	1-4-2-3	DWORD	UINT32	Hours	Pump Process Variable	r	-	-
013A	Number of Starts	1-4-2-5	DWORD	UINT32	-	Pump Process Variable	r	-	-
013C	Time to Service	1-6-1	DWORD	UINT32	Hours	Pump Process Variable	r	-	-
013E	Reserved	-	-	-	-	-	-	-	-
0140	Immediate Functional Check Run	1-3-6	DWORD	Boolean	-	Pump Function	w	-	-
0142	Reset Messages	-	DWORD	Boolean	-	Pump Function	w	-	-

Modbus address	Parameter name	Menu number	Size	Data type	Unit	Group	Access (r: read, w: write)	Bit	Description
0144 - 014F	Reserved	-	-	-	-	-	-	-	-
0150	Digital Input Status	1-2-4-6	DWORD	32-bit bit field	-	Pump Process Variable	r	-	-
0152	Analog Input 1 Value	1-2-4-1	DWORD	Float32	Percent	Pump Process Variable	r	-	-
0154	Analog Input 2 Value	1-2-4-2	DWORD	Float32	Percent	Pump Process Variable	r	-	-
0156	Analog Input 3 Value	1-2-4-3	DWORD	Float32	Percent	Pump Process Variable	r	-	-
158	Digital Output Status	1-2-4-7	DWORD	32-bit bit field	-	Pump Process Variable	r	-	-
15A	Digital Input 1 Function	3-8-6-1	DWORD	ENUM	-	Pump Control	w	0	No function
								1	System start
								2	Potentiometer auto -
								3	Potentiometer auto +
								4	Control point
								5	Alternative setpoint / control value active
								6	Control digital bit 0
								7	Control digital bit 1
								8	Control digital bit 2
								9	Dry running protection
								10	Reset messages
								11	Control AOUT bit 0
								12	Control AOUT bit 1
								13	Reserve
								14	Reserve
								15	Reserve
								16	Reserve
								17	External message
								18	Potentiometer manual -
								19	Potentiometer manual +

Modbus address	Parameter name	Menu number	Size	Data type	Unit	Group	Access (r: read, w: write)	Bit	Description
15A	Digital Input 1 Function	3-8-6-1	DWORD	ENUM	-	Pump Control	w	20	Reserve
								21	Start pump changeover
								22	Start functional check run
								23	Start pipe flushing
								24	Overflow
								25	Lack of water
								26	Parameter set changeover
15C	Digital Input 2 Function	3-8-6-2	DWORD	ENUM	-	Pump Control	w	0	No function
								1	System start
								2	Potentiometer auto -
								3	Potentiometer auto +
								4	Control point
								5	Alternative setpoint / control value active
								6	Control digital bit 0
								7	Control digital bit 1
								8	Control digital bit 2
								9	Dry running protection
								10	Reset messages
								11	Control AOUT bit 0
								12	Control AOUT bit 1
								13	Reserve
								14	Reserve
								15	Reserve
								16	Reserve
								17	External message
								18	Potentiometer manual -
								19	Potentiometer manual +
								20	Reserve

Modbus address	Parameter name	Menu number	Size	Data type	Unit	Group	Access (r: read, w: write)	Bit	Description
15C	Digital Input 2 Function	3-8-6-2	DWORD	ENUM	-	Pump Control	w	21	Start pump changeover
								22	Start functional check run
								23	Start pipe flushing
								24	Overflow
								25	Lack of water
								26	Parameter set changeover
15E	Digital Input 3 Function	3-8-6-3	DWORD	ENUM	-	Pump Control	w	0	No function
								1	System start
								2	Potentiometer auto -
								3	Potentiometer auto +
								4	Control point
								5	Alternative setpoint / control value active
								6	Control digital bit 0
								7	Control digital bit 1
								8	Control digital bit 2
								9	Dry running protection
								10	Reset messages
								11	Control AOUT bit 0
								12	Control AOUT bit 1
								13	Reserve
								14	Reserve
								15	Reserve
								16	Reserve
								17	External message
								18	Potentiometer manual -
								19	Potentiometer manual +
								20	Reserve
								21	Start pump changeover

Modbus address	Parameter name	Menu number	Size	Data type	Unit	Group	Access (r: read, w: write)	Bit	Description
15E	Digital Input 3 Function	3-8-6-3	DWORD	ENUM	-	Pump Control	w	22	Start functional check run
								23	Start pipe flushing
								24	Overflow
								25	Lack of water
								26	Parameter set changeover
160	Role in Multiple Pump System	3-7-1	DWORD	ENUM	-	Pump Control	w	0	Master control
								1	Auxiliary control
0162 - 01FF	Reserved	-	-	-	-	-	-	-	-

Table 7: Address ranges for further pumps

Modbus address	Description
0200-02FF	Pump 2
0300-03FF	Pump 3
0400-04FF	Pump 4
0500-05FF	Pump 5
0600-06FF	Pump 6

Address examples for further pumps

- 0200: Status Pump 2
- 0330: Differential Pressure Pump 3
- 0614: Speed Pump 6



KSB SE & Co. KGaA

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

Tel. +49 6233 86-0

www.ksb.com

4074.803/08-EN (01512588)