Connect®

Controller and RTU Unit



Installation and User Manual

Vol. I

Declaration of Conformity

Konformitetserklæring

Vi, MJK Automation A/S, DK-2850 Nærum, påtager os det fulde ansvar for at produktet

Declaration of Conformity

We, MJK Automation A/S, DK-2850 Nærum, declare under our sole responsibility that the product

Konformitätserklärung

Wir, MJK Automation A/S, DK-2850 Nærum, erklären in alleiniger Verantwortung, dass das Produkt

Connect®

Data Transmitter

som denne erklæring angår, er i overensstemmelse med følgende standard(er) eller andre normdokument(er).

EN61000-6-3/-4:2001, EN61000-6-1/-2:1999

efter bestemmelserne i direktiv

89/336/EEC; 92/31/EEC

to which this declaration relates is in conformity with the following standard(s) or other normative document(s).

EN61000-6-3/-4:2001, EN61000-6-1/-2:1999

following the provisions of Directive

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auf das sich diese Erklärung bezieht mit der/den folgenden Nor me(en) oder normativen Dokument(en) übereinstimmt.

EN61000-6-3/-4:2001, EN61000-6-1/-2:1999

Gemäss den Bestimmungen der Richtlinie

89/336/EEC; 92/31/EEC

Declaration de conformite

Nous, MJK Automation A/S, DK-2850 Nærum, déclarons sous notre seule responsabilité que le produit

Dichiarazione di conformità

Noi, MJK Automation A/S, DK-2850 Nærum, dichiariamo sotto la nostra esclusiva responsabilità che l'apparecchio

Declaración de Conformidad

Nosotros, MJK Automation A/S, DK-2850 Nærum, declaramos bajo nuestra única responsabilidad que el producto

Connect®

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auquel se réfère cette déclaration est conforme á la (aux) norme(s) ou autre(s) document(s) normatif(s)

EN61000-6-3/-4:2001, EN61000-6-1/-2:1999

conformément aux dispositions de Directive

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al quale questa dichiarazione si riferisce, è conforme alla seguente normativa(e) standard o ad altri documenti di normativa(e)

EN61000-6-3/-4:2001, EN61000-6-1/-2:1999

conformemente alla disposizioni della Direzione

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al cual se refiere esta declaración, está en conformidad con la(s) siguente(e) norma(s) u otros documentos normativos

EN61000-6-3/-4:2001, EN61000-6-1/-2:1999

según las disposiciones de la(s) directiva(s)

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1. Introduction

Thank you for choosing the MJK Connect® Controller and RTU Unit. We have done our outmost to design and manufacture a high quality instrument that should satisfy your requirements.

MJK Connect® is easy to install and put into service. However, read this manual first to learn more about the features, how to install, how to calibrate and how to operate the MJK Connect® Controller and RTU Unit.

The equipment must be treated and used as instructed by the manufacturer, MJK Automation A/S, to ensure stable operation and accurate measurements.

MJK Connect® can be obtained in several different versions each equipped with different combinations of analog and digital inputs, outputs, telephone, mobile modems, Bluetooth®, serial communication protocols, network topologies, repeaters, etc.

You can always contact your local representative or the MJK hot lines for advice and guidance:

- **Europe** Tel.: +45 45 56 06 56 E-mail: mjk@mjk.com
- **Denmark** Tel.: +45 45 56 06 56 E-mail: mjk@mjk.dk
- **Norway** Tel.: +47 69 20 60 70 E-mail: mjk@mjk.no
- **Sweden** Tel.: +46 53 31 77 50 E-mail: kontoret@mjk.se
- **Holland** Tel.: +31 251 672171 E-mail: mjknl@mjk.com
- **Ireland** Tel.: +353 8795 35625 E-mail: mke@mjk.com
- **USA** Tel.: +1 847 482 8655 E-mail: mjkusa@mjk.com
- **Australia** Tel.: +61 3 9758 8533 E-mail: ns@mjk.com

Visit our web sites at **www.magflux.dk** and **www.mjk.com** to learn more about MJK Automation A/S, our products and the people behind them.

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VLT® is a registered trademark of Danfoss A/S.

About this Manual

This manual is divided into two volumes, two tables of contents, nine chapters, eight appendices, cut-up menu structures and two indexes.

Volume I

1. Introduction

Contains a presentation of the MJK Connect Controller and RTU Unit, the structure of this manual and the operating principles.

2. Safety, Repair and Product Identification

Provide answers to issues regarding safety, mounting, repair, restrictions and product identification.

3. Specifications

A listing of all electrical specifications.

4. Power Supply and Signal Terminals

A thorough evaluation of power connections, fuse ratings, change of main supply and all input and output terminals.

5. Configuration and Hook-up Examples

Examples showing how Connect Controller and RTU Unit can be connected to, for example, MJK MagFlux flow meters, MJK SuSix transmitters, other Connect Controller and RTU Units, PLCs, active and passive units, modems, etc. in real-life scenarios.

6. Startup

Description of important check and basic settings to get started incl. the display and keyboard user interface.

7. Connect Menus

Comprehensive descriptions of the Connect menus, options and applications.

8. Mechanical Dimensions

The physical dimensions of the Connect unit.

9. Maintenance

Guidelines that must be followed to maintain stable and accurate operation.

* * * * *

Volume II

Appendix A. Pop-up Messages and Error Messages

A list of possible pop-up and error messages, explanations of error conditions, and advice about repair.

Appendix B. MJK-Field Link software

Contains a detailed user guide for the unique and intuitively designed MJK-Field Link software program. It is used for downloading log data and uploading new display and Connect firmware versions.

Appendix C. Log Files

Example log file illustrating the format and explaining the content.

Appendix D. Connect Link Software

A short user guide for the Connect Link software programme which can be used for downloading, changing, saving and uploading different Connect configurations to and fro a Windows-configured PC.

Appendix E. Front panel Cut-out Drawing

An example cut-out drawing of the front panel (**not** in 1:1 scale).

Appendix F. Energy Optimization - An Example

Describes a practical example of energy-optimization with one MJK Connect unit and two Danfoss frequency converters.

Appendix G. Two Interconnected Connect Units

Example showing how to double the number of in- and outputs.

Appendix H. Changing the Supply Voltage

Shows how to change the supply voltage 230 VAC <-> 115 VAC.

Menu Structures

A split-up presentation of the Connect menu structures. It provides a thorough overview and makes it easier to navigate between menus and sub-menus.

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2. Safety, Repair and Product Identification

Safety instructions

- Read this manual thoroughly.
- Pay attention to the environment at the installation site. Wear any required and necessary safety equipment and uphold all national and local safety regulations.
- Connect may transmit signals that may cause dangerous machinery to start. It is therefore necessary always to make sure that all connected machinery and other equipment are turned off effectively for example by removing main fuses or to turn off main switches or safety switches before beginning any programming, troubleshooting, maintenance or other types of service.
- **WARNING**: There is a risk of electric shocks from the mains terminals N and L. Avoid touching these while the Connect is being serviced or repaired.
- **WARNING:** Incorrect or incomplete installation or use can lead to physical injury and/or damaged materials!

Physical Installation

MJK Connect Controller and RTU Unit **MUST NOT** be installed in environments with danger of explosion.

Repair

Repair may only be performed by MJK or MJK-approved personnel.

Product Identification

Deliveries will normally include a Connect Controller and RTU Unit with an embedded I/O module and, if required, a communication module.

Check before mounting that the delivered goods correspond to the ordered. Part number as well as serial number are printed on labels placed on the packaging, the unit and the components of the unit. A label with the serial number and a barcode are placed on the unit in the top, right corner.

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3. Specifications

Specifications

Technical specifications are listed for the following units and modules:

- Connect display
- Connect base
- Connect I/O module 16-8-6-1
- Connect communication module (modem)

Connect Display	
Display	Background lit LCD-display (64 x 128 pixels) with soft-keys
Keypad	4 softkeys and one keypad for typing
Indication	Indication of measurements, operating data, functions, configuration and graphs
Power supply	From Connect base
Clock	Real-time clock with integrated lithium battery (10 years life expectancy)
Communication	RS-485 Modbus® RTU-mode for communication between one to four Connect units
Interface 1	RS-485
Interface 2	USB 1,1 type mini B, female
Interface 3	Communications module
Memory	32 Mb Flash-memory, 168.000 loggings including date, time and measured value
Enclosure	IP 67
Cabinet material	Glass-reinforced polycarbonate
Protective cap	Transparent polycarbonate
Temperature range	- 20 … 60 °C
Weight	0,5 kg

Table 1. Connect Display Specifications

Connect Base	
Power supply	115/230 VAC 50 / 60 Hz, ±10 %. Contact MJK for 12 and 24 VDC battery operation
Battery backup	Integrated lead battery charger with monitor
Capacity	External lead battery, 2-30 Ah depending on the desired backup time.
Power consumption	Approx. 15 VA
Clock	Real-time clock with integrated lithium battery (10 years life expectancy)
Memory	32 Mb Flash-memory, 200.000 loggings depending on chosen protocol
Interface	1 pc. RS-485 galvanic separation for 1-4 pcs. Connect 1 pc. RS-485 galvanic separation for 1-4 pcs. MagFlux® / SuSix®, Oxix, etc. 1 pc. communication module for security installations and other Connect units. 1 pc. USB 1,1 type mini B, female
Internal communication	Modbus® RTU-mode
External communication	Modbus® RTU-mode or COMLI®, optional
Enclosure	IP 67
Cabinet material	Glass-reinforced polycarbonate
Temperature range	- 20 … + 60 °C
Weight	1,5 kg
CE-approvals	EN 61000-6-4:2001, EN 61000-6-2:2001

Table 2. Connect Base Specifications

Connect I/O Module 16-8-6-1	
Digital inputs	16 pcs. 10 - 30 VDC
Digital outputs	8 pcs. with electronic relays (max. 48 VAC/VDC, 120 mA)
Analog inputs	6 pcs. galvanically separated, 4 - 20 mA
Analog output	1 pc. galvanically separated, 4 - 20 mA
Accuracy	Better than ± 0,25 %
Resolution	16 bit
Power supply	3 pcs. 15 VDC, 200 mA

Table 3. Connect I/O Module 16-8-6-1 Specifications

Connect Communication Modules	
PSTN	Hayes compatible telephone modem
GSM	Dual-band GSM modem
GPRS	Dual-band GPRS modem
RS-232 Opto	Galvanically isolated RS-232 for data radio/external equipment
RS-485 Opto	Galvanically isolated RS-485 with repeater for own lines
RS-485	Modbus®
Ethernet	RJ-45
Bluetooth	IEEE 802.15.1. Class 2, 2.5 mW
PROFIBUS	PROFIBUS ® PA
Data radio	License free, wireless communication
Prepared for other communication types	

Table 4. Connect communication modules

Order Numbers

Connect Order Numbers		
205301	Connect base without display	I/O module 16-8-6-1
205302	Connect base without display	I/O module 12-4-2-2
205321	Connect base with display	I/O module 16-8-6-1
205322	Connect base with display	I/O module 12-4-2-2
205341	Connect base with display and PSTN	I/O module 16-8-6-1
205342	Connect base with display and GSM	I/O module 16-8-6-1
205343	Connect base with display and GPRS	I/O module 16-8-6-1
205361	Connect base with display and PSTN	I/O module 12-4-2-2
205362	Connect base with display and GSM	I/O module 12-4-2-2
205363	Connect base with display and GPRS	I/O module 12-4-2-2
205501	Connect base	Without I/O module
205505	Connect display unit	-
205511	Connect I/O module	I/O module 16-8-6-1
205512	Connect I/O module	I/O module 12-4-2-2

Table 5. Connect Order Numbers

Internal Connect Communication Modules	
205541	Connect PSTN modem
205542	Connect GSM modem dual-band
205543	Connect GPRS modem dual-band
205544	Connect RS-232 opto, galvanically isolated RS-232
205545	Connect RS-485 opto, galvanically isolated RS-485 with repeater
205546	Connect RS-485 MODBUS®
205547	Connect RS-485 PROFIBUS® PA
205548	Connect Ethernet
205549	Connect Data radio
205550	Connect Bluetooth

Table 6. Internal Connect Communication Modules (modem)

Connect Accessories	
207936	Connect panel mounting kit
691092	USB cable for Connect <-> PC communication
200115	Local mounting kit including rain cover

Table 7. Connect Accessories

4. Power Supply and Signal Terminals

WARNING!

The Connect Controller and RTU Unit may not be installed in environments with danger of explosion!

Caution!

The Connect unit may not be connected to the main supply before all signal wires and power cords have been connected and secured.

Loosen the 4 screws shown with arrows and remove the display to gain access to the signal and power connection terminals.



Figure 1. Front Panel Screws

Power Supply

Connect must be supplied from a voltage supply group with a stable voltage (see “B”, Figure 2) or from a 12 VDC constant-voltage power supply/battery (see ”A”, Figure 2). The internal fuse is located at “C”.

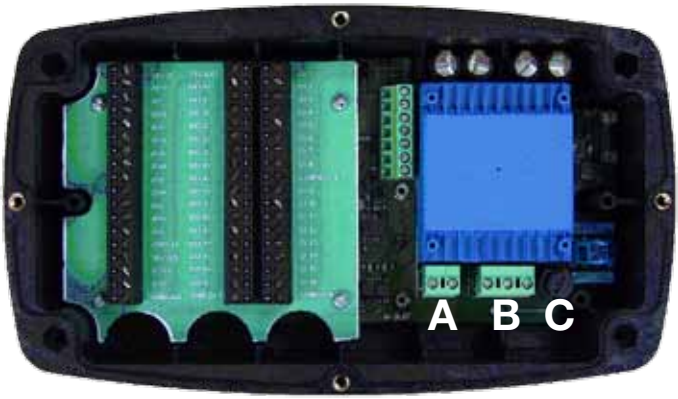


Figure 2. Connection Terminals and Fuse Location

Power Supply - 12 VDC	
Terminal	**Name/function**
-	12 VDC minus
+	12 VDC plus

Power Supply - 115 / 230 VAC	
Terminal	**Name/function**
PE	Ground
N	115 / 230 VAC nul
L	115 / 230 VAC live

Table 8. Power Supply 12 VDC and 115 / 230 VAC

Internal Fuses			
Voltage	**Value**	**Order no.**	**Size**
230 VAC	0.125 AT	550035	5 x 20 mm
115 VAC	0.315 AT	550045	5 x 20 mm
12 VDC	3.15 AT	550065	5 x 20 mm

Table 9. Internal Fuses

Display Wires

Display wires (and the display extension cable) are color coded as follows:

Display Wires	
Color code	**Name/function**
Red	+ 15 V
White	RS-485 A
Grey	RS-485 B
Black	GND

Table 10. Display wires

NB: The same signals/voltages are also available from the “Connect net” terminals.

Signal Terminals

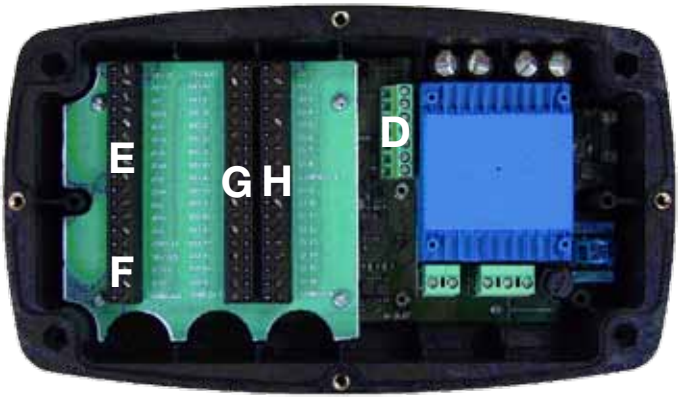


Figure 3. Signal Terminals

Digital Inputs

Connect is equipped with 16 digital, passive inputs which can be activated by a voltage higher than 10 VDC and deactivated by a voltage lower than 5 VDC (see position “H” on page **23** with an I/O Module 16-8-6-1 installed).

Digital Inputs	
Terminal	**Designation/Function**
DI 1	10 - 30 VDC
DI 2	10 - 30 VDC
DI 3	10 - 30 VDC
DI 4	10 - 30 VDC
DI 5	10 - 30 VDC
DI 6	10 - 30 VDC
DI 7	10 - 30 VDC
DI 8	10 - 30 VDC
COM DI 1-8	Common COM terminal for DI 1 to DI 8
DI 9	10 - 30 VDC
DI 10	10 - 30 VDC
DI 11	10 - 30 VDC
DI 12	10 - 30 VDC
DI 13	10 - 30 VDC
DI 14	10 - 30 VDC
DI 15	10 - 30 VDC
DI 16	10 - 30 VDC
COM DI 9-16	Common COM terminal for DI 9 to DI 16

Table 11. Digital Inputs

The digital inputs (DI 1 - DI 16) can for example be programmed for operation or alarm signals.

Digital Outputs

Connect is equipped with 8 digital outputs (DO1 - DO8) with electronic potential-free relays (see position “G” on page 23 with an MJK I/O Module 16-8-6-1 installed). The outputs can be individually configured to NO (normally open) or NC (normally closed).

Digital Outputs	
Terminal	**Designation/Function**
15V EXT	+15 VDC (pull-up for passive signals)
DO 1+	Max. +48 VAC/VDC / 120 mA
DO 1-	Ground for DO 1+
DO 2+	Max. +48 VAC/VDC / 120 mA
DO 2-	Ground for DO 2+
DO 3+	Max. +48 VAC/VDC / 120 mA
DO 3-	Ground for DO 3+
DO 4+	Max. +48 VAC/VDC / 120 mA
DO 4-	Ground for DO 4+
DO 5+	Max. +48 VAC/VDC / 120 mA
DO 5-	Ground for DO 5+
DO 6+	Max. +48 VAC/VDC / 120 mA
DO 6-	Ground for DO 6+
DO 7+	Max. +48 VAC/VDC / 120 mA
DO 7-	Ground for DO 7+
DO 8+	Max. +48 VAC/VDC / 120 mA
DO 8-	Ground for DO 8
GND EXT	Ground for 15V EXT

Table 12. Digital Outputs

The digital outputs (DO 1 - DO 8) can for example be programmed for pump operation.

Analog Inputs

See position ”E” on page 23 with an I/O Module 16-8-6-1 installed.

Analog Inputs	
Terminal	**Designation/Function**
15 V AI	+15 VDC (pull-up for passive signals)
AI1+	4 - 20 mA, +15 VDC
AI1-	Ground for AI1+
AI2+	4 - 20 mA, +15 VDC
AI2-	Ground for AI2+
AI3+	4 - 20 mA, +15 VDC
AI3-	Ground for AI3+
AI4+	4 - 20 mA, +15 VDC
AI4-	Ground for AI4+
AI5+	4 - 20 mA, +15 VDC
AI5-	Ground for AI5+
AI6+	4 - 20 mA, +15 VDC
AI6-	Ground for AI6+
GND AI	Ground for 15 V AI

Table 13. Analog Inputs

Analog Output

Maximum load for the passive output is 600Ω (see position ”F” on page 23 with an I/O Module 16-8-6-1 installed).

Analog Output	
Terminal	**Designation/Function**
15 V AO	+15 VDC (pull-up for passive signals)
AO1+	4 - 20 mA, +15 VDC
AO1-	Ground for AO1+
GND AO	Ground for 15 V AO

Table 14. Analog Output

The analog output can be programmed to indicate primary units.

Serial Communication

See position ”D” on page 23.

Use Connect serial communication to link to other devices such as MJK MagFlux and SuSix (see page 32)

RS-485 Serial Communication		
Terminal	**Designation/Function**	**MJK network**
RS 485-1, 15V	+15 VDC	Connect net
RS 485-1, A	Signal A1	
RS 485-1, B	Signal B1	
RS 485-1, GND	Ground for Connect net	
RS 485-2, GND	Ground for Instrument net	Instrument net
RS 485-2, A	Signal A2	
RS 485-2, B	Signal B2	

Table 15. RS-485 Serial Communication

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5. Configuration and Hook-up Examples

MJK Connect unit uses the same communication protocols as current MJK products like MJK MagFlux® flow meter, MJK SuSix ® turbidity and solids transmitter and other MJK Connect units. The Connect display unit can be used as a common display for these products.

This section shows a few configuration examples including cable connections, order numbers and typical connection examples:

- Connection to digital inputs (page **30**)
- Connection to digital outputs (page **32**)
- Connection to analog inputs (page **34**)
- Connection to passive, analog output (page **36**)
- Connection to active, analog output (page **37**)
- Connect unit with modem, one SuSix® and one MagFlux® unit (page **38**)
- Installation and connection to PSTN modem (page **40**)
- Installation and connection to GSM/GPRS modem (page **42**)
- Installation and connection to RS-232 modem (page **44**)

Connection to Digital Inputs

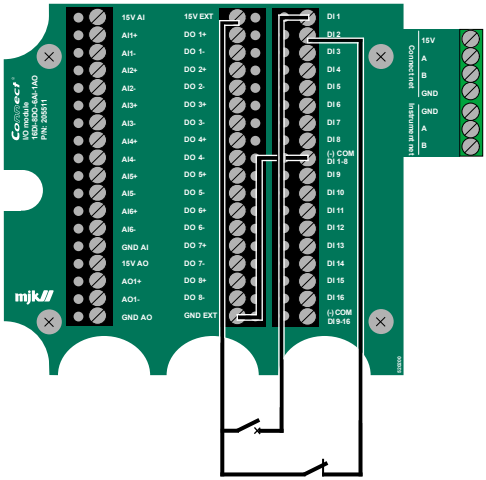


Figure 4. Connection to Digital Inputs

The example above shows the connection of an NC and an NO contact with DI1 and DI2. Note the common minus terminal with a jumper between “GND EXT” and (-) COM DI 1-8.

Connection of an NO contact:

1. Connect terminal ”**15V EXT**” is connected to:
   NO contact terminal ”**1**”
2. Connect terminal ”**DI 1**” is connected to:
   NO contact terminal ”**2**”
3. Connect terminals ”**GND EXT**” and ”**(-) COM DI 1-8**”.

Connection of an NC contact:

1. Connect terminal ”**15V EXT**” is connected to:
   NC contact terminal ”**1**”
2. Connect terminal ”**DI 2**” is connected to:
   NC contact terminal ”**2**”
3. Connect terminals ”**GND EXT**” and ”**(-) COM DI 1-8**”.

The digital inputs are passive, which causes the voltage to be supplied from an external voltage source or from terminal “15V EXT.

Important!

A commonly occurring installation error is inputs not connected to the correct, common minus terminal !

Note that inputs share minus in groups of 8 inputs, and that inputs can be individually configured to be normally open (NO) or normally closed (NC).

Connection to Digital Outputs

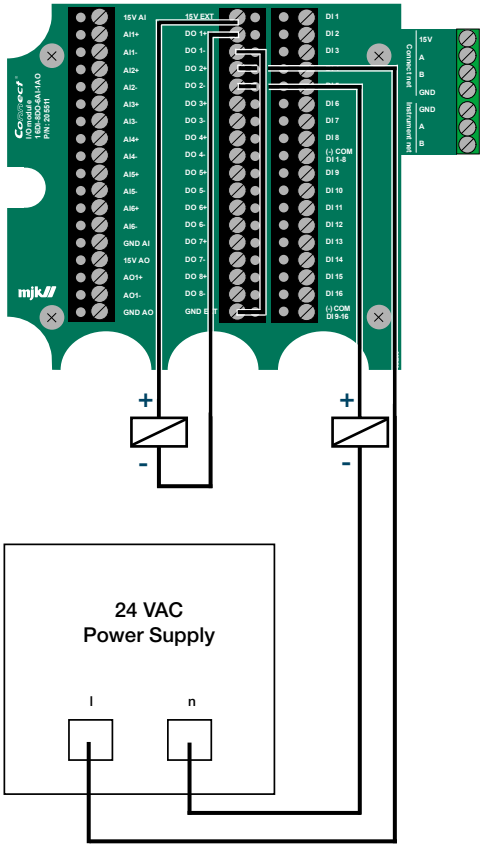


Figure 5. Connection to Digital Outputs

The example above shows connection of an external transfer relay (max. 120 mA), internally or externally voltage supplied.

Connection of external transfer relay - internally voltage-supplied

1. Connect terminal "**15V EXT**" is connected to:
   transfer relay coil terminal "**+**"
2. Connect terminal "**DO 1+**" is connected to:
   transfer relay coil terminal "**-**"
3. Connect terminals "**DO 1-**" and "**GND EXT**".

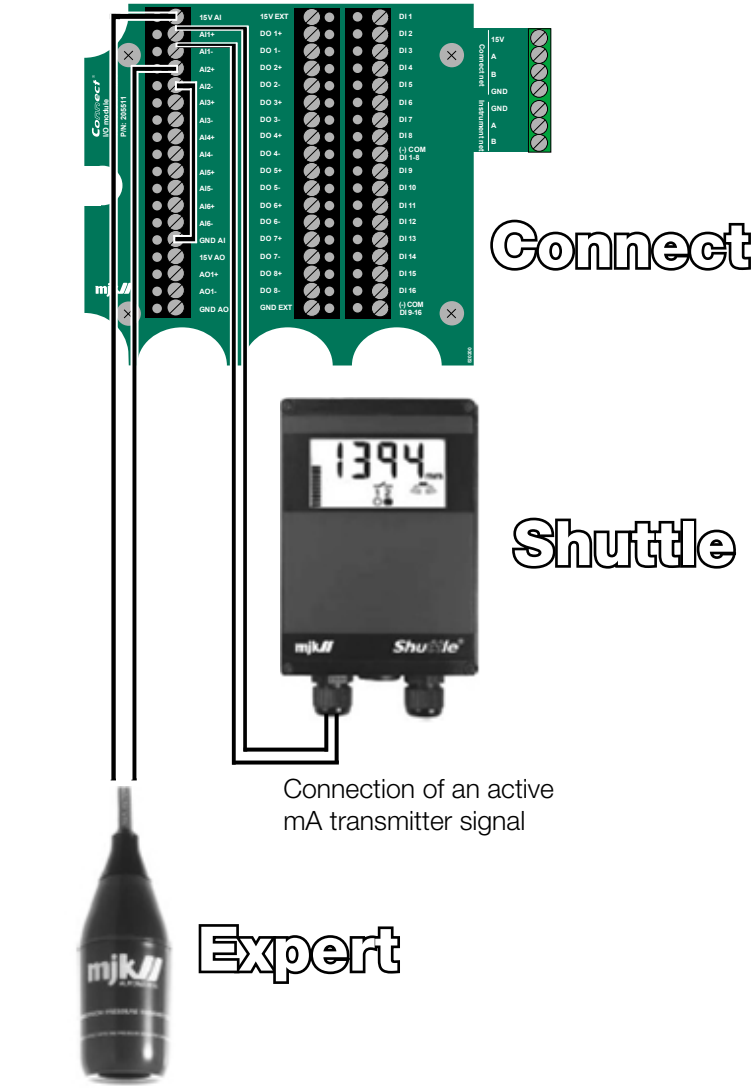
Connection of external transfer relay - externally voltage-supplied

1. Connect terminal "**DO 2+**" is connected to:
   voltage supply terminal "**l**" (24 VAC terminal, plus, live)
2. Connect terminal "**DO 2-**" is connected to:
   relay terminal "**+**".
3. Relay terminal **"-"** is connected to 24 VAC (n, neutral).

The digital outputs are equipped with electronic potential relays that can be loaded with max. 48 VAC / VDC / 120 mA resistive load.

Outputs can be individually configured to be normally open (NO, Normally Open) or normally closed (NC, Normally Closed).

Connection to Analog Inputs



Connection of an active mA transmitter signal

Connection of a passive mA transmitter signal

Figure 6. Connection to Analog Inputs

There is one device in the example on the previous page (here: Shuttle) with an active output connected to an analog input 1 (AI1) and one pressure transmitter (here: Expert) with a passive output connected to the analog input 2 (AI2).

”Passive” connection:

1. Connect terminal ”**15V AI**” is connected to:
   Expert cable **”1”** (**red cable, +**)
2. Connect terminal ”**AI2+**” is connected to:
   Expert cable **”2”** (**brown conductor, return**)
3. Connect terminal ”**AI2-**” is connected to:
   Connect terminal ”**GND AI**”

”Active” connection:

1. Connect terminal ”**AI1+**” is connected to:
   Shuttle terminal ”**11**”
2. Connect terminal ”**AI1-**” is connected to:
   Shuttle terminal ”**10**”

The analog inputs are passive and galvanic separated. This means that voltage must be supplied from an external voltage source or from the terminal marked “15V AI”.

Note that the terminals “AI2” and “GND AI” must be interconnected, and that the inputs only can be configured for 4-20 mA.

The black cable of the Expert cable set is a shield which must **only** be connected in case of severe noise problems.

Important!

Galvanic separation of analog inputs is important! Therefore apply separate power supplies for passive, analog input signals. Otherwise the electrical circuit would not be separated due to the common supply.

The inputs each have their own plus and minus terminals. Many installation errors occur, when an input is not connected to the correct minus terminal.

Connection to a passive, analog Output

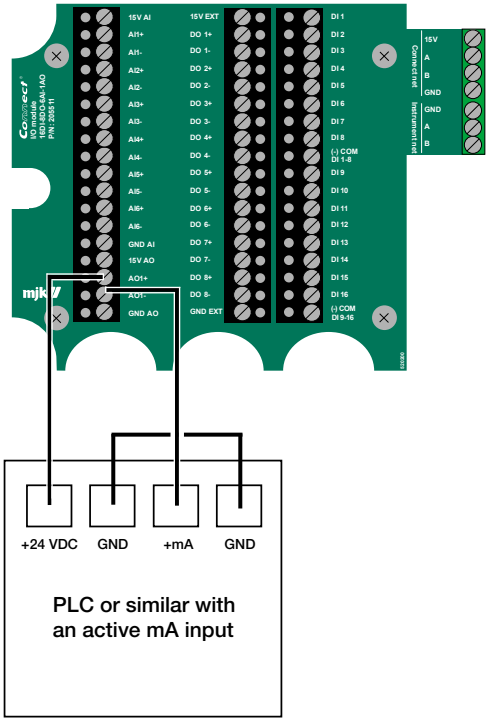


Figure 7. Connection to a passive, analog Output

The example above shows the connection of an external control unit, a PLC or similar with an **active**, analog input.

”Active” connection:

1. Connect terminal ”**AO1+**” is connected to:
   PLC terminal ”+24 VDC”
2. Connect terminal ”**AO1-**” is connected to:
   PLC terminal ”+mA”
3. PLC terminals ”**GND**” are connected.

The analog output (AO1) is passive. For an active output, the internal voltage supply from terminal “15V AO” must be used.

The analog output can only be configured for 4-20 mA, and the maximum load of the analog output is 600Ω.

Connection to an active, analog Output

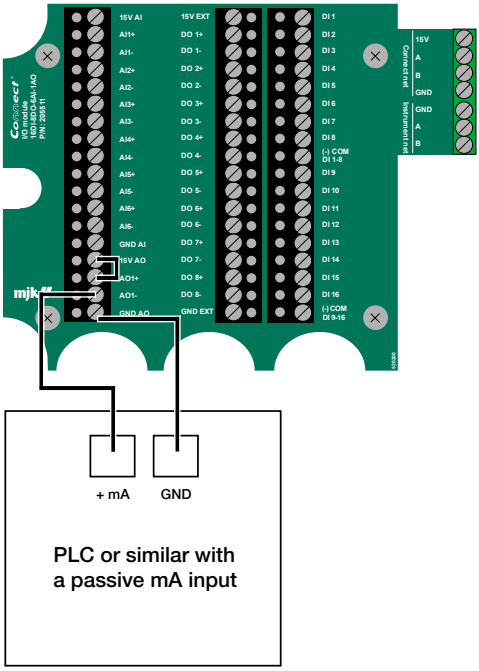


Figure 8. Connection to an active, analog Output

The example above shows the connection of an external control unit, a PLC, or similar with a **passive**, analog input.

”Passive” connection:

1. Connect terminal ”**AO1-**” is connected to:
   PLC terminal ”+mA”
2. Connect terminal ”**GND AO**” is connected to:
   PLC terminal ”GND”
3. Connect terminals ”**15V AO**” and ”**AO1+**”.

The analog output (AO1) is passive. For an active output, the internal voltage supply from terminals “AO 15V and GND AO” must be used. Note the jumper between “15V AO” and “AO1 +”, and that the analog output only can be configured for 4-20 mA. Max. load of the analogue output is 600Ω.

Connect Unit with Modem, one SuSix and one MagFlux

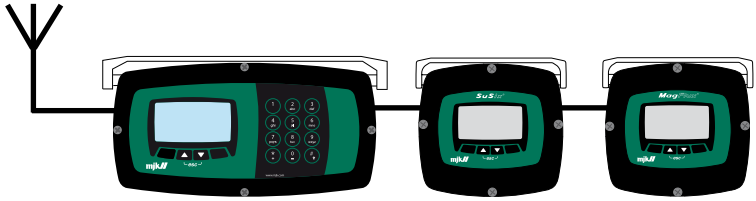


Figure 9. Connect Unit with Modem, one SuSix and one MagFlux

Order Numbers

Order numbers for this configuration:

- 1 pcs. 20534x Connect base, with display, with I/O module, with modem communication module of own choice
- 1 pc. 2063xx SuSix converter with or without display
- 1 pc. 2079xx MagFlux converter with or without display

Alternative options:

- See Connect units and MJK modem modules on page **19**.

Hook-up

When one Connect, one SuSix®, and one MagFlux® are linked in a network, “Instrument net” on the Connect is connected to “Terminals for remote display unit “ on the SuSix® and to ”Terminals for remote display unit” on the MagFlux® as shown on the following page.

1. Connect terminal ”**Instrument net GND**” (shield) is connected to: SuSix® terminal ”**Display -**” and MagFlux® terminal ”**Display -**”.
2. Connect terminal ”**Instrument net A**” is connected to: SuSix® terminal ”**Display A**” and MagFlux® terminal ”**Display A**”.
3. Connect terminal ”**Instrument net B**” is connected to: SuSix® terminal ”**Display B**” and MagFlux® terminal ”**Display B**”.
4. Configure the Connect with a unique ID number (see page **174**), which is different from the SuSix® and MagFlux® ID numbers.

You **must** use 2-wire cables with shield (max. 300m in total).

You can freely choose whether the SuSix® and/or MagFlux® devices should be with or without its own displays.

You can connect four SuSix® and/or MagFlux® units to the ”Instrument net” terminals of one Connect device as a maximum.

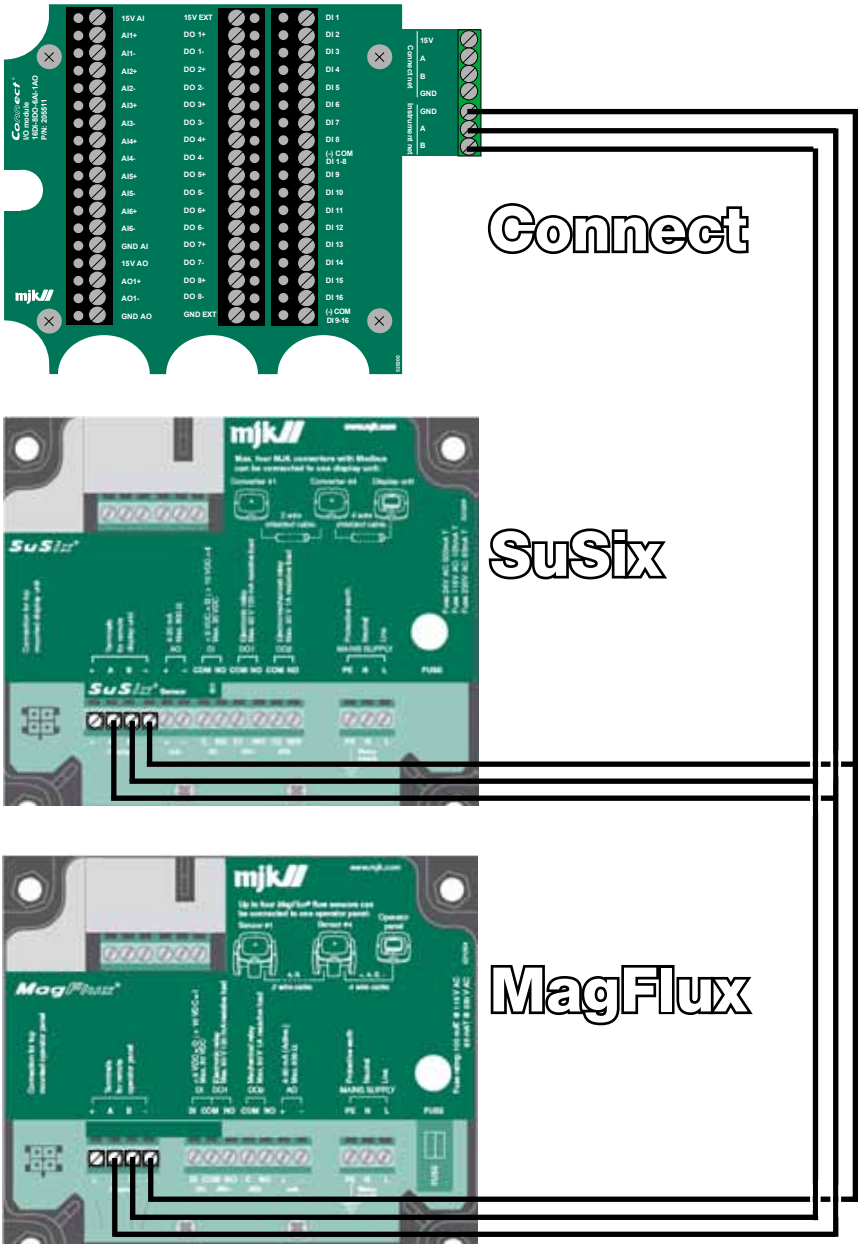


Figure 10. Hook-up for one Connect Unit with Modem, one SuSix and one MagFlux

Installation and Connection of a PSTN Modem



Figure 11. Installation and Connection of a PSTN Modem

The example above shows the installation and connection of a PSTN Connect modem

Order Numbers

Order numbers for this configuration:

- 1 pc. 205341 Connect base, with display, with I/O module 16-8-6-1, with PSTN modem

or

- 1 pc. 205321 Connect base, with display, with I/O module and
- 1 pc. 205541 Connect PSTN modem

Installation and Connection

1. Dismantle the Connect front panel (the display unit and 4 screws).
2. Dismantle the Connect I/O module (4 screws).
3. Mount the PSTN modem in the internal S4 interface for communication units and attach it with the supplied screws (4 pcs. M3x6).
4. Connect the PSTN modem with the supplied RJ11 cable. If the modem is to be connected to a terminal, the cable must be stripped at one end, and the red and blue conductor connected to the terminal block. Do not connect the black and yellow conductors.
5. Reinstall the Connect I/O module.
   Attention: Ensure that the connectors of the I/O module are mounted correctly to the motherboard, before the module is secured with 4 screws. Incorrect installation may cause that the Connect unit fails to start or that certain functions do not execute properly.
6. Remount the front panel.

Installation and Connection of a GSM/GPRS Modem



Figure 12. Installation and Connection of a GSM/GPRS modem

The example above shows the installation and connection of a Connect GSM/GPRS modem, plus connection of an MJK GSM or GPRS antenna: 205116/18 or 205120.

Order Numbers

Order numbers for this configuration:

- 1 pc. 205342/43 Connect base, with display, with I/O module 16-8-6-1, with GSM/GPRS modem

or

- 1 pc. 205321 Connect base, with display, with I/O module 16-8-6-1 and
- 1 pc. 205542/43 Connect GSM/GPRS modem

Installation and Connection

1. Dismantle Connect front panel (display unit, 4 screws).
2. Dismantle Connect I / O module (4 screws).
3. Mount GSM / GPRS modem (including SIM card) in the internal interface S4 for communication units and secure with the supplied screws (4 pcs. M3x6).
4. Connect GSM / GPRS modem to the desired type of antenna using a cable with MMCX male connector.
5. Reinstall Connect I/O module.
   Attention: *Please ensure that the socket of the I/O module is fitted correctly to the motherboard before the module is secured with 4 screws. Incorrect installation may cause the Connect unit to fail to start, or that certain functions do not run properly.*
6. Remount the Connect front panel

Installation and Connection of an RS-232 Modem

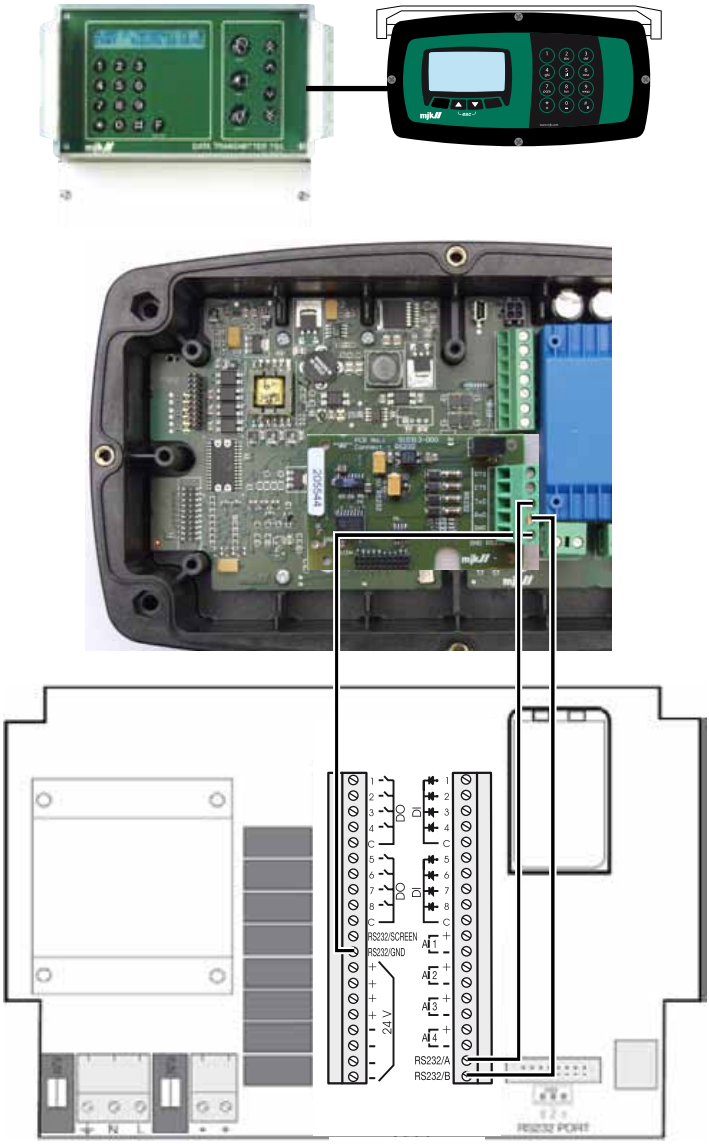


Figure 13. Installation and Connection of an RS-232 Modem

Example showing the installation and connection of a Connect RS-232 modem and connecting to a MJK 795 Data Transmitter.

Order Numbers

Order numbers for this configuration:

- 1 pc. 205321 Connect base, with display, with I/O module 16-8-6-1
- 1 pc. 205544 Connect RS-232 modem, opto, galvanic isolated

Installation and Connection

1. Dismantle the Connect front panel (display device, 4 screws).
2. Dismantle the Connect I/O module (4 screws).
3. Mount the RS-232 modem in the internal S4 interface for communication units and attach it with the supplied screws (4 pcs. M3x6).
4. Connect the RS-232 modem to the MJK 795 Data Transmitter with a 2-wire,insulated cable:
   Connect terminal “TxD” to 795 terminal “RS232 / A”
   Connect terminal “RxD” to 795 terminal “RS232 / B”
   Connect terminal “GND” to 795 terminal “RS232/GND”
5. Reinstall the Connect I/O module.
   Attention: *Please ensure that the socket of the I/O module is fitted correctly to the motherboard before the module is secured with 4 screws. Incorrect installation may cause the Connect unit to fail to start, or that certain functions do not execute properly.*
6. Remount the front panel of the Connect.

Installation and Connection of Opto/Galvanic RS-232 Modem

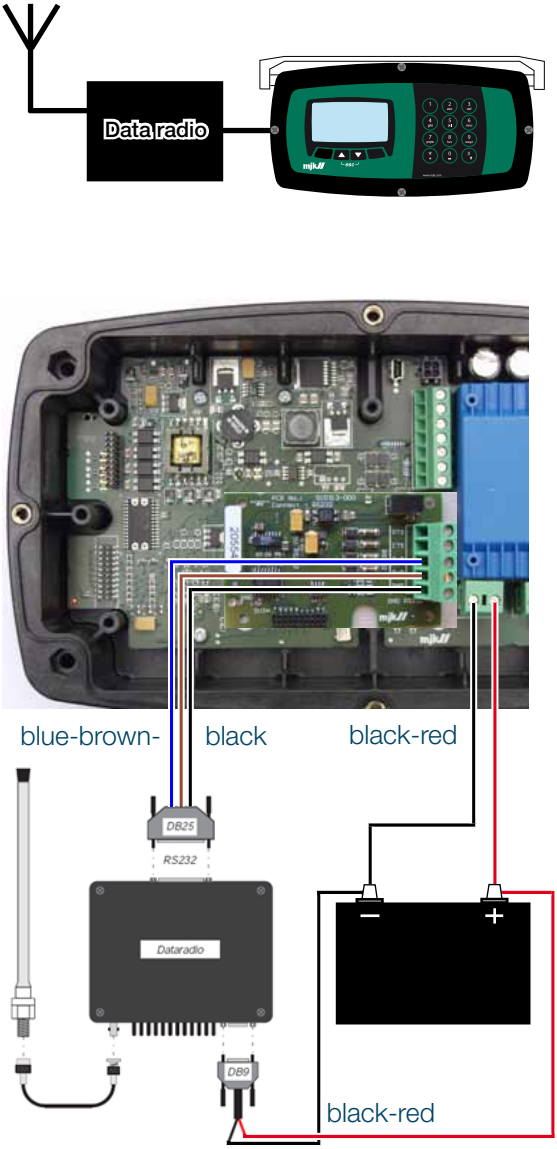


Figure 14. Installation and Connection of Opto/Galvanic RS-232 Modem

Example showing the installation and connection of a galvanically isolated, optical Connect RS-232 modem connected to a TP6000 UHF data radio.

Order Numbers

Order numbers for this configuration:

- 1 pc. 205321 Connect base, with display, with I/O module 16-8-6-1
- 1 pc. 205544 Connect RS-232 modem, galvanic isolated
- 1 pc. 205010 TP6000 UHF for radio communication
- 1 pc. 691049 MJK serial cable set with DB25 connectors for signals, and DB9 connector for power supply of TP6000 data radio
- 1 pc. 550242 MJK 12 VDC / 12 Ah battery

Installation and Connection

1. Dismantle the Connect front panel (display unit, 4 screws).
2. Dismantle the Connect I/O module (4 screws).
3. Mount the RS-232 modem in the internal S4 interface for communication devices and attach it with the supplied screws (4 pcs. M3x6).
4. Connect the RS-232 modem to the TP6000 data radio with the MJK 3-wire, DB25 cable:
   Connect terminal "**TxD**" is connected to the DB25 cable's **blue** lead
   Connect terminal "**RxD**" is connected to the DB25 cable's **brown** lead
   Connect terminal "**GND**" is connected to the DB25 cable's **black** lead
5. Reinstall the Connect I/O module.
   Attention: *Please ensure that the socket of the I/O module is fitted correctly to the motherboard before the module is secured with 4 screws. Incorrect installation may cause the Connect unit to fail to start, or that certain functions do not execute properly.*
6. Connect the external battery's minus pole to "**-12 VDC Accumulator**" and the plus pole to "**+12 VDC Accumulator**".
7. Remount the front panel of the Connect
8. Connect the external battery's **minus** pole to MJK's 2-wire DB9 cable's **black** lead, and the **plus** pole to DB9 cable's **red** lead.
9. Connect the DB9 connector and the antenna to the TP6000 data radio.

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6. Startup

Preliminary Checks

The following steps must be checked, before power is connected for the first time:

- The local mains supply voltage corresponds to the voltage printed on the unit's ID label.
- All electrical connections are made in accordance with the described electrical connections starting on page **21**.
- All terminal screws for cable connections are fastened and secured.
- All gaskets and cable connectors are fastened and secured.

Language Selection

1. The default display language is English (GB English). If another language is required, or following a language update, proceed to step 2.
2. Select "Menu / Display / Language" from the main menu and select for example "Nederlands" for Holland (see page **167**).

The Display - One Device Connected

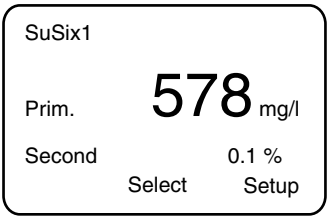
Chapter 7. Connect Menus (beginning on page 53) provides a detailed description of the screens that are displayed during setup, configuration, and normal operation. A 5-line LCD display shows the symbols and numbers of the current status.

See below an example of a screen display for a Connect connected to a MJK SuSix turbidity and suspended solids transmitter unit without a local display.



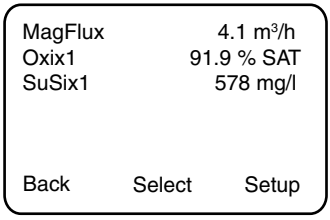
Figure 15. Display and Keyboard for Reading and Programming

The screen display above will in the rest of this manual be depicted as follows:

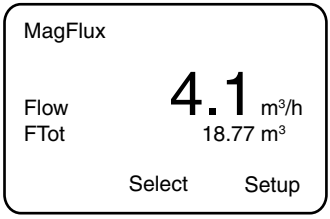


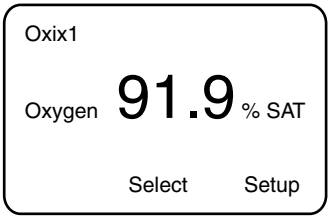
The Display - Multiple Devices Connected

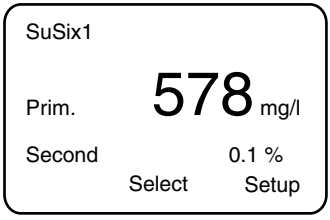
When several MJK devices are connected to the same network, for example one MagFlux® flow meter, one Oxix® dissolved oxygen transmitter and one SuSix® turbidity and suspended solids transmitter, measurements with different names and Modbus ID numbers are available from a "Display summary menu" at the top level (press "Back" repeatedly):



All connected devices are displayed and sorted by ID numbers, where after each single unit can be chosen and configured as desired:







Important: Several devices can only be operated as shown, if each device has been assigned a unique name and Modbus ID number. ***See page 174 for additional information.***

Display Keys

Numeric keys and soft keys (soft keys: the function is determined by the installed display firmware) are used for start-up and normal operation of the Connect unit. The function of the 4 soft keys is shown at the bottom of the display (here: Select and Setup). The numeric keypad on the right is used for direct menu selection and alpha-numeric entry of names and texts.

Setting the Display Contrast

To set the display contrast press the 2 outer keys down simultaneously (shown with arrows) and then press the up/down buttons as desired.



Figure 16. Setting the Display Contrast

To save a setting, press the 2 outer buttons simultaneously.

System Reset

It is possible to reset and refresh all system readings and key combinations by pressing all four buttons simultaneously. This feature is especially useful, when the device is being serviced, and the display language is not understood by the service personnel. A reset of the system changes the language into English.

A system reset must not be confused with the very comprehensive “Restore factory settings” (see page **158**), which erases all local configurations and preferences, and replaces them with the original factory settings.

7. Connect Menus

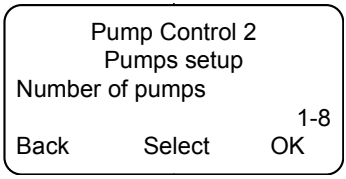
Connect menus and submenus are described in this chapter, and differentiated overviews with the menu structures are located at the end of this manual beginning on page 218.

Navigating the Menus

In order to facilitate navigation within and between the menus, the top-level path is shown below the heading. ***Example:***

Pumps setup

(Menu / Connect 1 / Functions Menu / Pump Control 2 / Pumps setup)



The following example:

Menu / Connect 1 / Functions Menu / Pump Control 2 / Pumps setup

is located as follows:

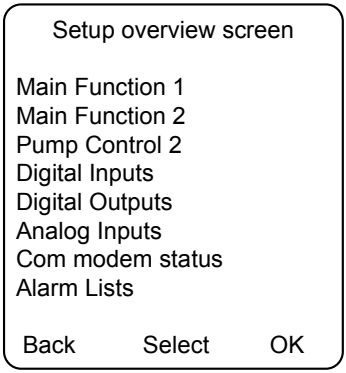
1. Press “Back” on the display until the 8 main menus appear.
2. Select for example “Overview screen 2”.
3. Select “Setup”
4. Select ”Connect 1”.
5. Select “Functions Menu”.
6. Select ”Pump Control 2”.
7. Select ”Pumps setup”.

Factory Defined Main Menu

The main menu or the overview menu, contains 8 factory set configurations reflecting common configurations of pump controllers and measuring assignments from real life.

However, notice that all these configurations can be changed and modified to meet specific demands.

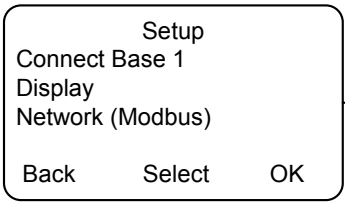
1. Press “Back” on the ***Connect*** display until the following screen is obtained (the names of the 8 menus may vary):



2. Press “Select” to select one of the factory-defined menus; for example “Pump Control 2”.
3. Use the up/down arrows beneath “Select” to highlight the desired function (and edit the factory-defined function, if required), or click “Setup” to enter the “Setup” window with options for manual configuration (see “Setup” on the following page).

Setup

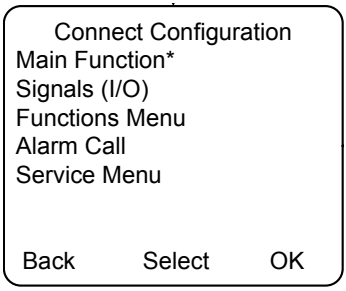
“Setup” contains 3 options (submenus):



- **Connect Base 1** which allows configuration of the parameters for pump control, definition of signals, functions, services and alarms just to mention a few examples. These tools/menus will be shown and described on the following pages beginning on page **56**.
- **Display** can be used to determine the language version, setting the time and date, to restore factory settings, etc. Continue to page **167** for a detailed description.
- **Network (Modbus)** provides tools for adding and removing devices, changing ID, etc.
  Continue to page **173** for a detailed description.

Connect Base 1 (Connect configuration)

(Setup / Connect Base 1)

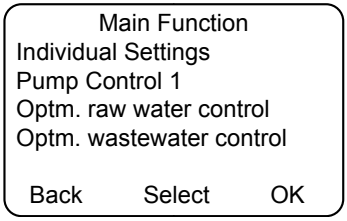


The overview menu “Connect configuration” shows all main menus:

- **Main Functions*** (including “Individual settings” and “Pump Control 1”
- **Signals (I/O)** (page 109)
- **Functions Menu** (page 122)
- **Alarm Call** (page 149)
- **Service Menu** (page 154)

Main Functions*

(Setup / Connect configuration / Main Functions*)

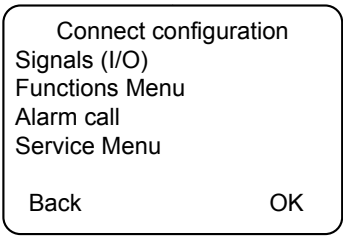


Through “Main Functions” the basic functionalities of Connect can be selected either by: an individual or a guided setup of pump management.

Note: This menu is only visible as long as there has been made no selection between “Individual settings” and “Pump Control 1”. When a selection has been made, the “Main functions” menu is no longer available and is replaced by “Pump Control 1”. However, you can access it again via “Service Menu / Factory Settings / Reset main function“ (described on page 158)

Connect Configuration / Individual Settings

(Setup / Connect configuration / Main functions* / Individual settings)



From “Individual settings” you can build individual configurations. See:

Signals (I/O): page **109**

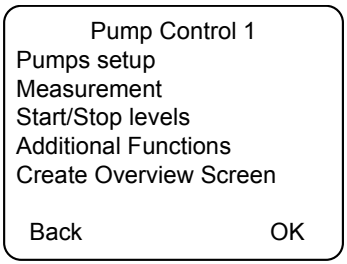
Functions Menu: page **122**

Alarm Call: page **149**

Service Menu: page **154**

Connect Configuration / Pump Control 1

(Setup / Connect configuration / Main functions* / Pump Control 1)



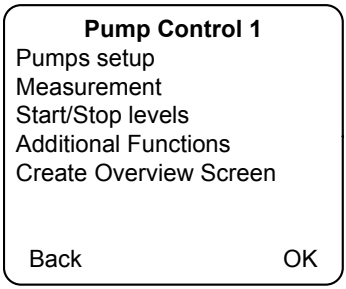
“Pump Control 1” is a standard wastewater installation with up to 8 pumps. Individual adjustment is hereby reduced to a minimum.

Detailed descriptions for individual adjustments are available on the following pages:

Pump Control 1 on page **58,** Measurement on page **61,** Start/Stop levels on page **61,** Additional Functions on page **62** and Create Overview Screen on page **70**.

Pump Control 1

(Setup / Connect configuration / Main functions* / Pump Control 1)

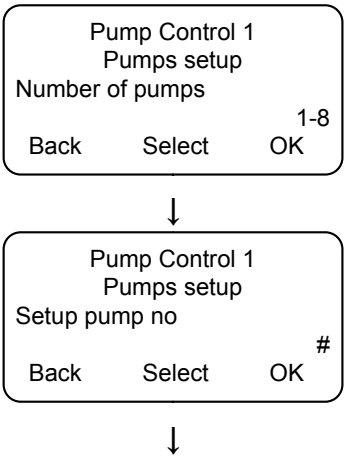


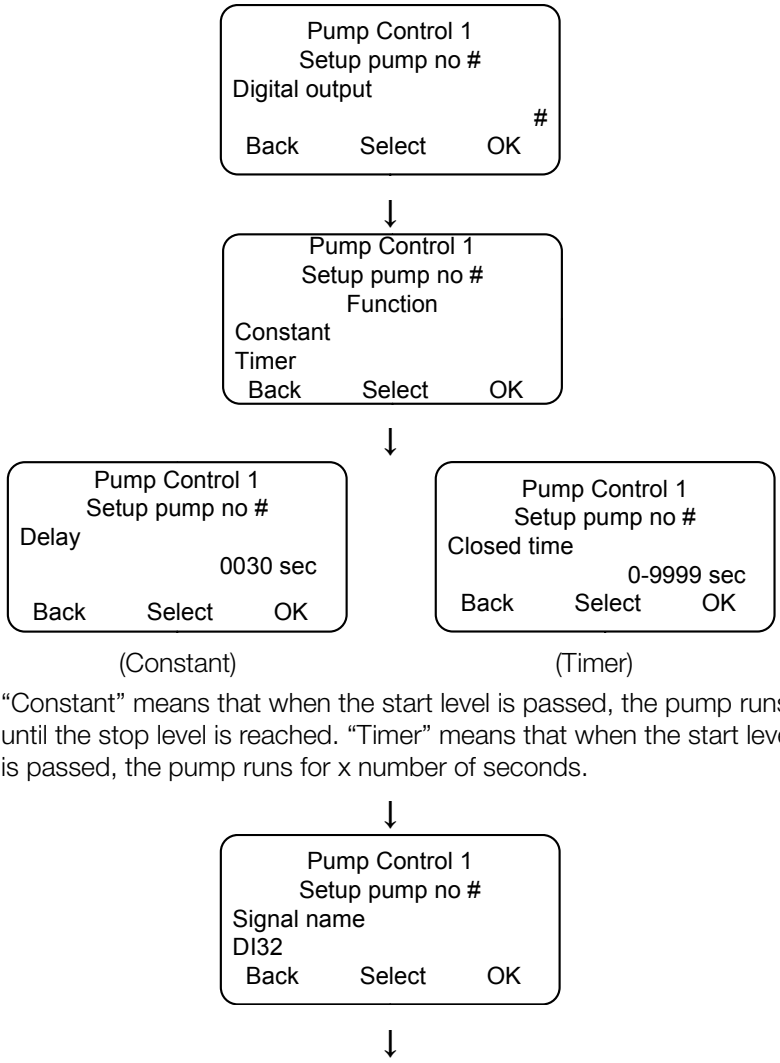
From “Pump Control 1” you can choose configuration parameters for up to 8 pumps including constant or time controlled functions as well as alternation and/or simultaneously running pumps to distribute load.

Pumps setup

(Setup / Connect configuration / Main functions* / Pump Control 1 / Pumps setup)

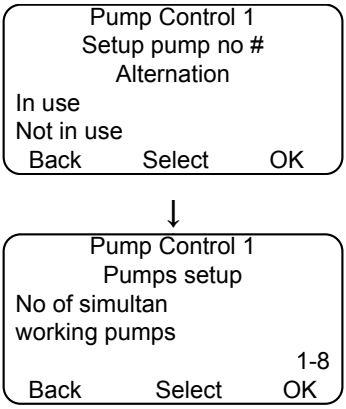
From “Pumps setup” you can choose constant or time based operation, alternation and/or simultaneously running pumps for distributing the load.





"Constant" means that when the start level is passed, the pump runs until the stop level is reached. "Timer" means that when the start level is passed, the pump runs for x number of seconds.

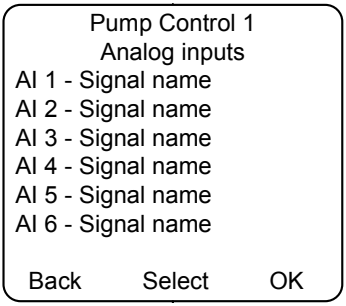
"Alternation" makes it possible to distribute the load between several pumps. The pumps can run one at a time or in pairs (simultaneous operation).



Measurement

(Setup / Connect configuration / Main functions* / Pump Control 1 / Measurement)

From “Measurement” the primary level signals including signal names, scaling and units can be selected and configured.

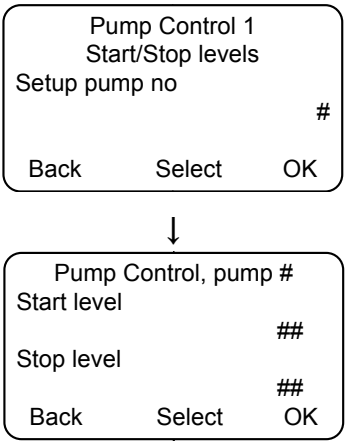


See the extended description of the analog inputs (AI) on page **109**.

Start/Stop levels

(Setup / Connect configuration / Main functions* / Pump Control 1 / Start/stop levels)

From “Start/stop levels” the start and stop levels for each pump can be defined separately.

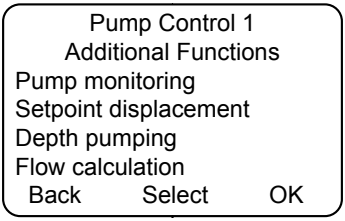


Additional functions

(Setup / Connect configuration / Main functions* / Pump Control 1 / Additional functions)

From “Additional functions” it is possible to select extended and more advanced options for pump controlling.

Notice that “Additional functions” is available only by selecting “Pump Control 1“ in “Main functions*“.

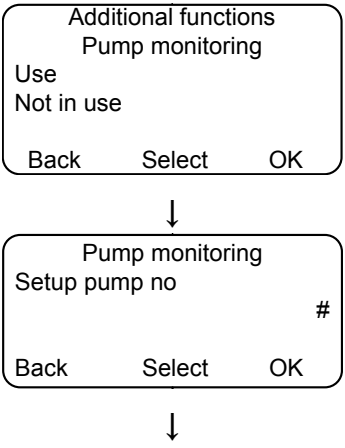


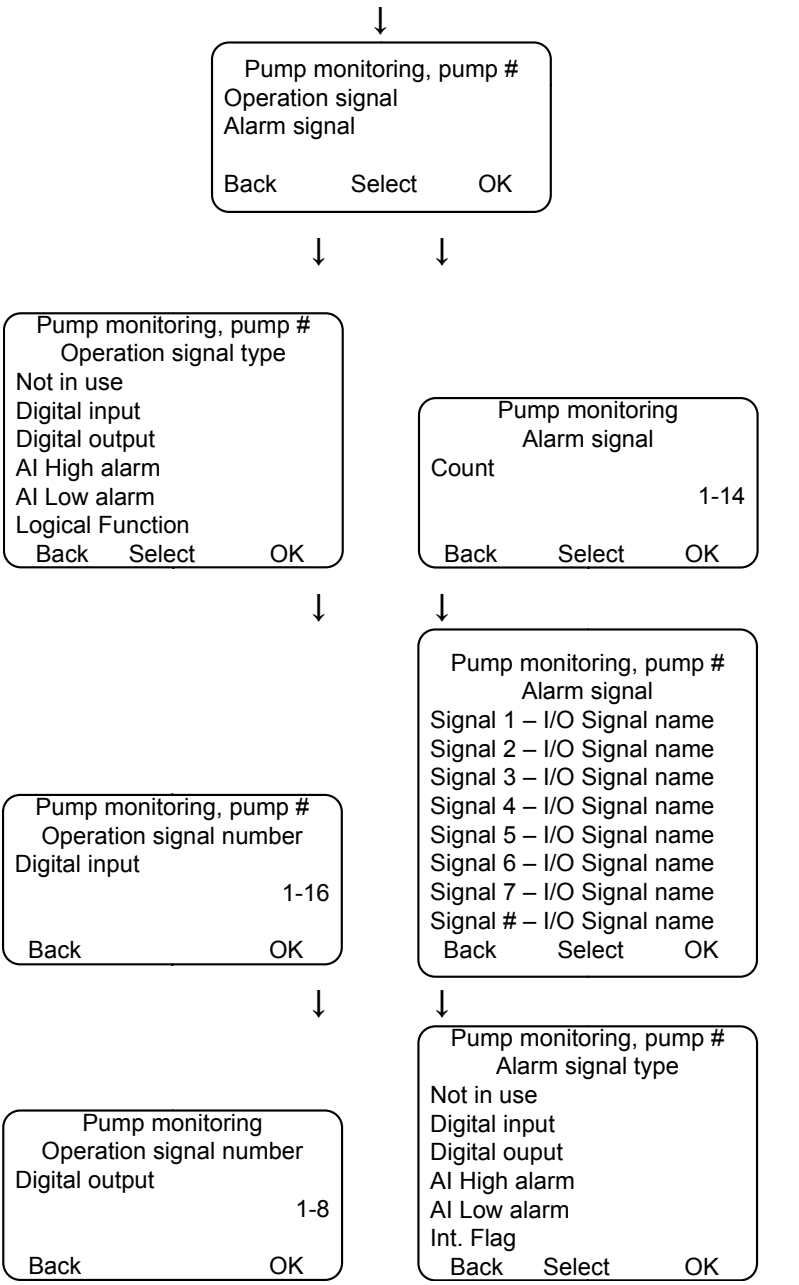
Pump monitoring is later described on page **62**, set point displacement on page **65**, depth pumping on page **67** and flow calculation on page **69**.

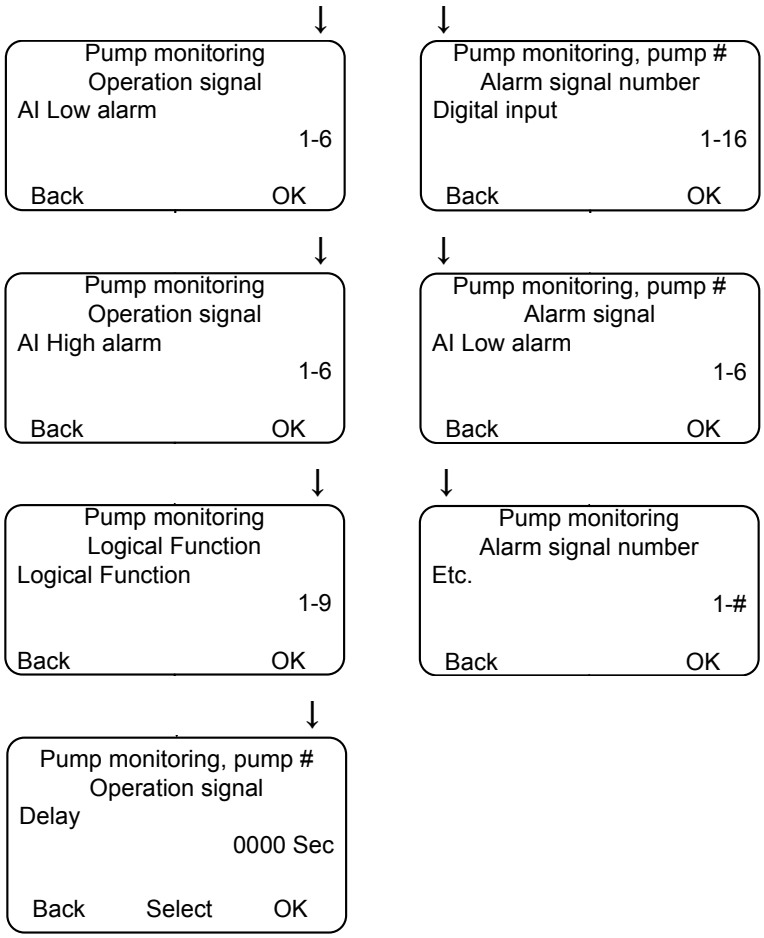
Pump monitoring

(Setup / Connect configuration / Main functions* / Pump control 1 / Additional functions / Pump monitoring)

From “Pump Monitoring” feedback from pumps can be established (for example alarm calls), and additionally signals can be send directly to the pumps (for example a forced start).



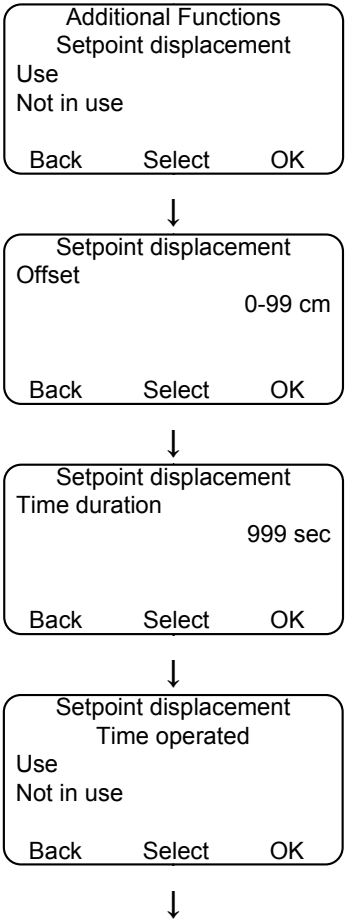

Pump monitoring, pump #
Operation signal
Alarm signal
Back Select OK
Pump monitoring, pump #
Operation signal type
Not in use
Digital input
Digital output
AI High alarm
AI Low alarm
Logical Function
Back Select OK
Pump monitoring
Alarm signal
Count
1-14
Back Select OK
Pump monitoring, pump #
Operation signal number
Digital input
1-16
Back OK
Pump monitoring, pump #
Alarm signal
Signal 1 – I/O Signal name
Signal 2 – I/O Signal name
Signal 3 – I/O Signal name
Signal 4 – I/O Signal name
Signal 5 – I/O Signal name
Signal 6 – I/O Signal name
Signal 7 – I/O Signal name
Signal # – I/O Signal name
Back Select OK
Pump monitoring
Operation signal number
Digital output
1-8
Back OK
Pump monitoring, pump #
Alarm signal type
Not in use
Digital input
Digital ouput
AI High alarm
AI Low alarm
Int. Flag
Back Select OK

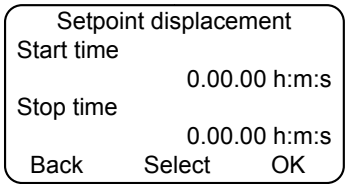

Pump monitoring
Operation signal
AI Low alarm
1-6
Back
OK
Pump monitoring, pump #
Alarm signal number
Digital input
1-16
Back
OK
Pump monitoring
Operation signal
AI High alarm
1-6
Back
OK
Pump monitoring, pump #
Alarm signal
AI Low alarm
1-6
Back
OK
Pump monitoring
Logical Function
Logical Function
1-9
Back
OK
Pump monitoring
Alarm signal number
Etc.
1-#
Back
OK
Pump monitoring, pump #
Operation signal
Delay
0000 Sec
Back
Select
OK

Setpoint displacement

(Setup / Connect configuration / Main functions* / Pump Control 1 / Additional functions / Setpoint displacement)

Setpoint displacement is important in SCADA installations for shifting min. and max. values up or down, and for using the sewerage system as a buffer at heavy rainfall or by day/night control.

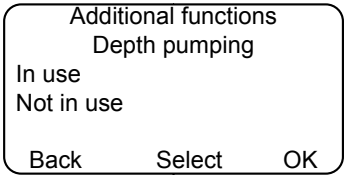



Setpoint displacement
Start time
0.00.00 h:m:s
Stop time
0.00.00 h:m:s
Back
Select
OK

Depth pumping

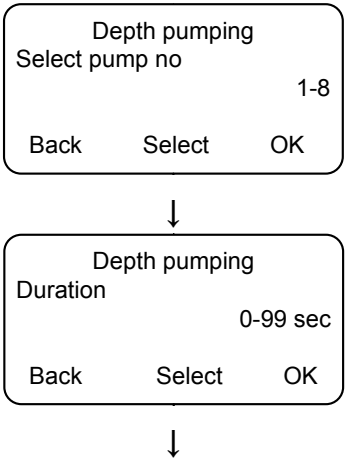
(Setup / Connect configuration / Main functions* / Pump Control 1 / Additional functions / Depth pumping)

From ”Depth pumping” you can decide whether a pump well should be emptied below its stop level in connection with sludge cleaning.

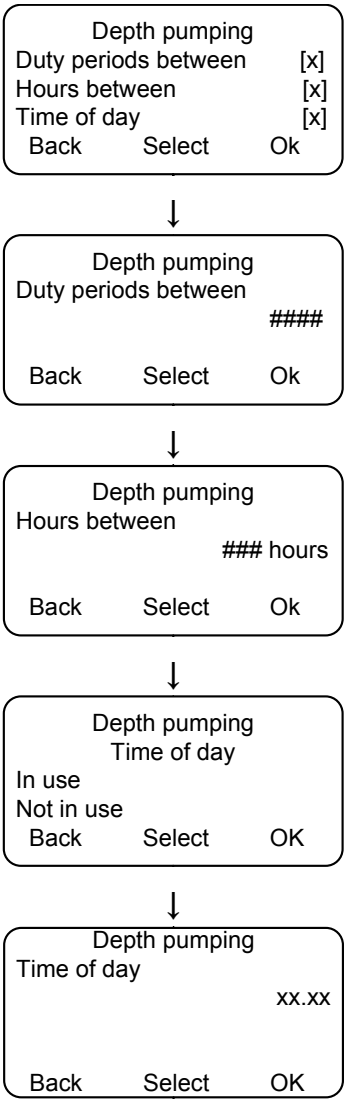


“Select pump no” defines which pump to use for depth pumping.

“Duration” sets the number of seconds for the pump to run after the level has passed the stop limit.



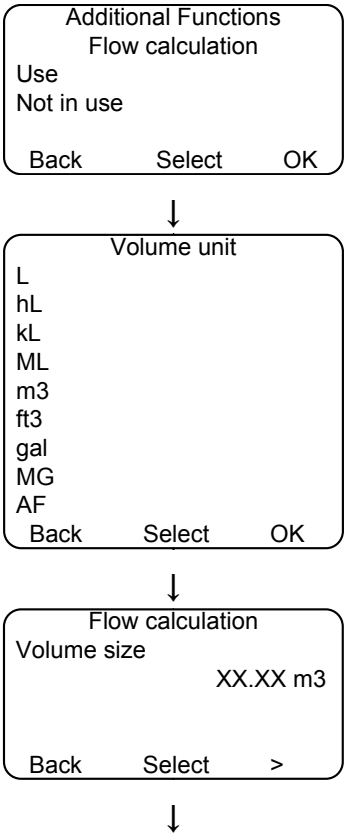
"Depth pumping" can be executed in 3 different ways:
after x number of starts (Duty period between), at a fixed interval over the day (Hours between), or once at a fixed time of day (Time of day).

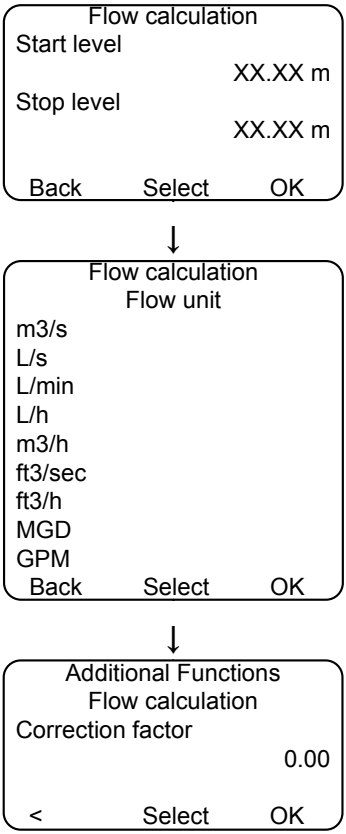


Flow calculation

(Setup / Connect configuration / Main functions* / Pump Control 1 / Additional functions / Flow calculation)

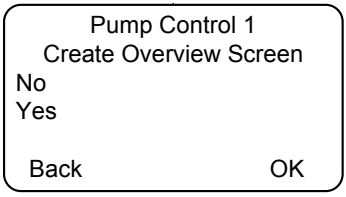
“Flow calculation” makes it possible to calculate the flow from the measured changes in level including taking into account the influx during pumping. This is achieved through physical measuring up and calculating of the volume of a pump well. It is also possible to set an adjustment factor to calibrate for example the amount of damming up.





Create Overview Screen

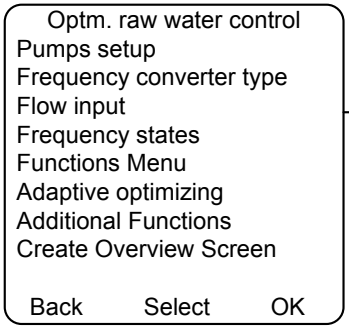
(Setup / Connect configuration / Main functions* / Pump control 1 / Create Overview Screen)



For each “Main function” there is a preconfigured screen based on the previous configurations including for example the selected number of functions, the number of pumps with corresponding I/O’s, etc.

Optimized raw water control

(Menu / Connect Base 1 / Main Functions / Optm. raw water control)



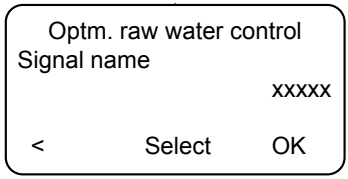
MJK's " Optm. raw water control" can be used for filling raw water containers or reservoirs.

The configuration parameters for MJK's Optm. raw water control is described on the following pages.

Pumps

(Menu / Connect Base 1 / Main Functions / Optimized raw water cotrol / Pumps)

"Signal name" should be a meaningful and descriptive name for the concerned pump control.

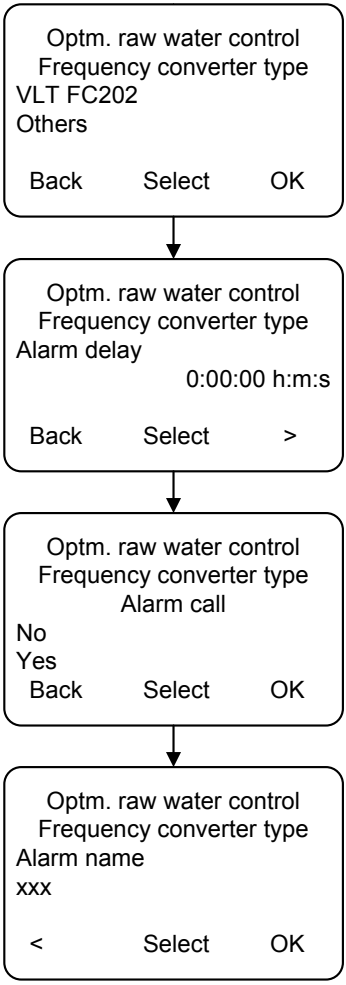


Frequency Converter Type

(Menu / Connect Base 1 / Main Functions / Optm. raw water control / Frequency converter type)

”VLT FC202” refers to the driver for the Danfoss’ VLT FC 202 frequency converter. “Others” refers to a generic driver for frequency converters which are not made by Danfoss.

“Alarm delay” must be entered in hours:minutes:seconds.



“Alarm call, No/Yes”. A “No” will prevent an alarm message from being sent (for example an SMS message).

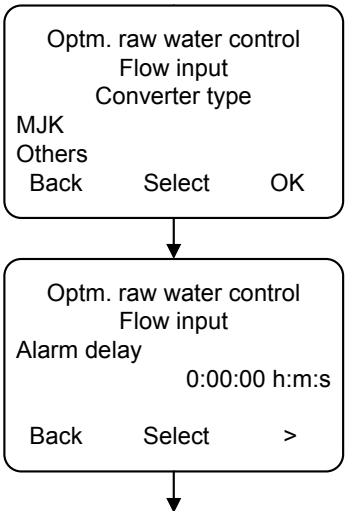
“Alarm name” is chosen signal name for alarms related to frequency converters.

Flow input

(Menu / Connect Base 1 / Main Functions / Optm. raw water control / Flow input)

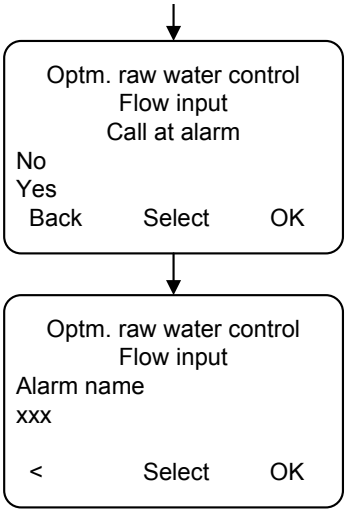
”MJK” indicates that a MJK MagFlux converter has been connected to the Connect. “Others” refers to a generic driver for non-MJK flow meters.

“Alarm delay” must be entered in minutes:seconds:milliseconds.



"Alarm call, No/Yes". A "No" will prevent an alarm message from being sent (for example an SMS message).

"Alarm name" is chosen signal name for alarms related to frequency converters.

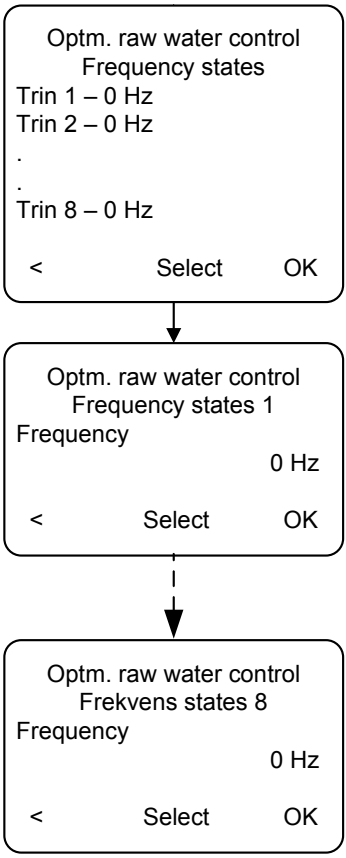


Frequency states

(Menu / Connect Base 1 / Main Functions / Optm. raw water control / Frequency states)

It is possible to run the raw water pumps in up to 8 fixed states, where each state corresponds to a certain frequency. If the level in the raw water container rises or falls, the Connect will automatically go one step up in case of rising and one step down in case of falling.

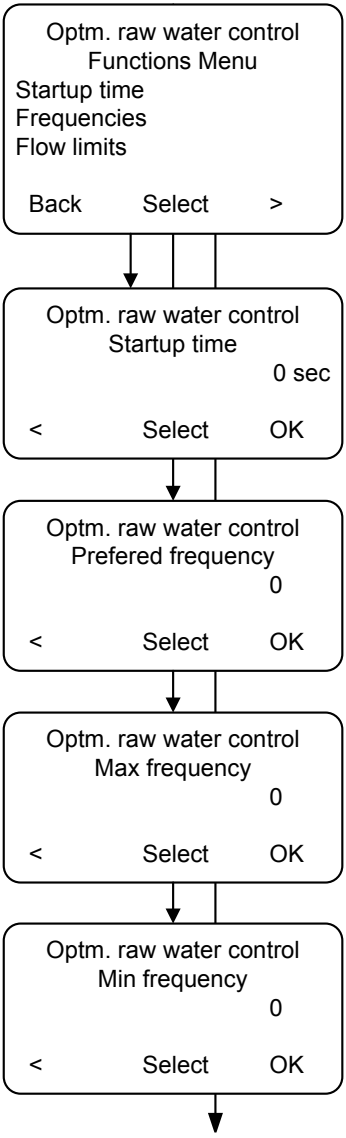
Each of the 8 states can be selected, and the output frequency can be changed individually.

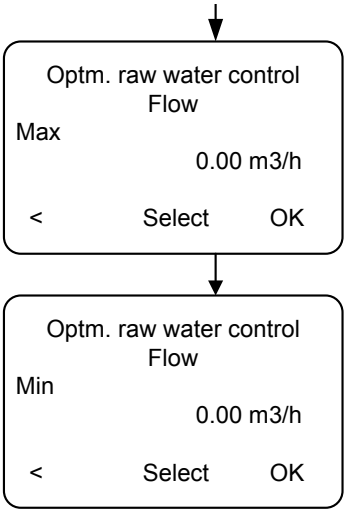


Functions Menu

(Menu / Connect Base 1 / Main Functions / Optm. raw water control / Functions Menu)

"Functions Menu" defines within which limits the pump should operate.





“Start-up time” indicates the time between the Connect receives a start signal until it has reached 50 Hz (ramp time)

“Preferred frequency” is a reference frequency. When the pump starts, it accelerates to the “Preferred frequency”-frequency and regulates itself until it reaches the lowest possible energy consumption within the set limits.

“Max frequency” is the highest acceptable frequency with which the pump should be run (normally the local mains frequency - 50 or 60 Hz).

“Min frequency” is the lowest acceptable frequency for the pump. It should not be set lower than 30 Hz to maintain cooling of the electric motor.

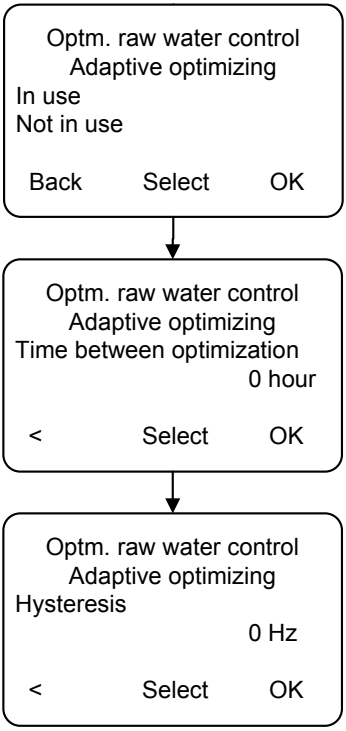
“Flow max” is the highest acceptable flow for the system. Max. flow is determined by the filter capacity.

“Flow min” is likewise the lowest acceptable flow for the system.

Adaptive optimizing

(Menu / Connect Base 1 / Main Functions / Optm. raw water control / Adaptive optimizing)

“Adaptive optimizing” makes the Connect capable of calculating the optimal operating condition possible based on the highest possible volume per kWh.



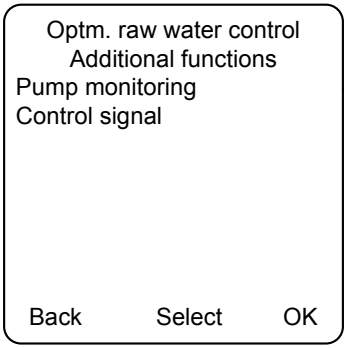
“Time between optimization” is the time in hours that goes between investigating for a better operating point.

“Hysteresis” determines how the Connect can optimize the energy consumption by trying to go one step up and one step down in order to find the optimal operating point. This is called hysteresis and is defined in Hz (c/s).

Additional Functions

(Menu / Connect Base 1 / Main Functions / Optm. raw water control / Additional Functions)

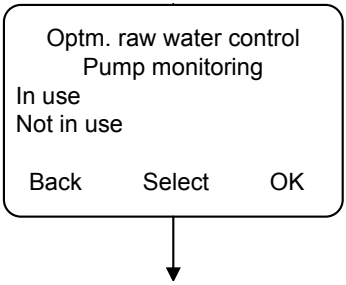
“Additional Functions” for optimized raw water control makes it possible to output a variety of informations in an easy way.

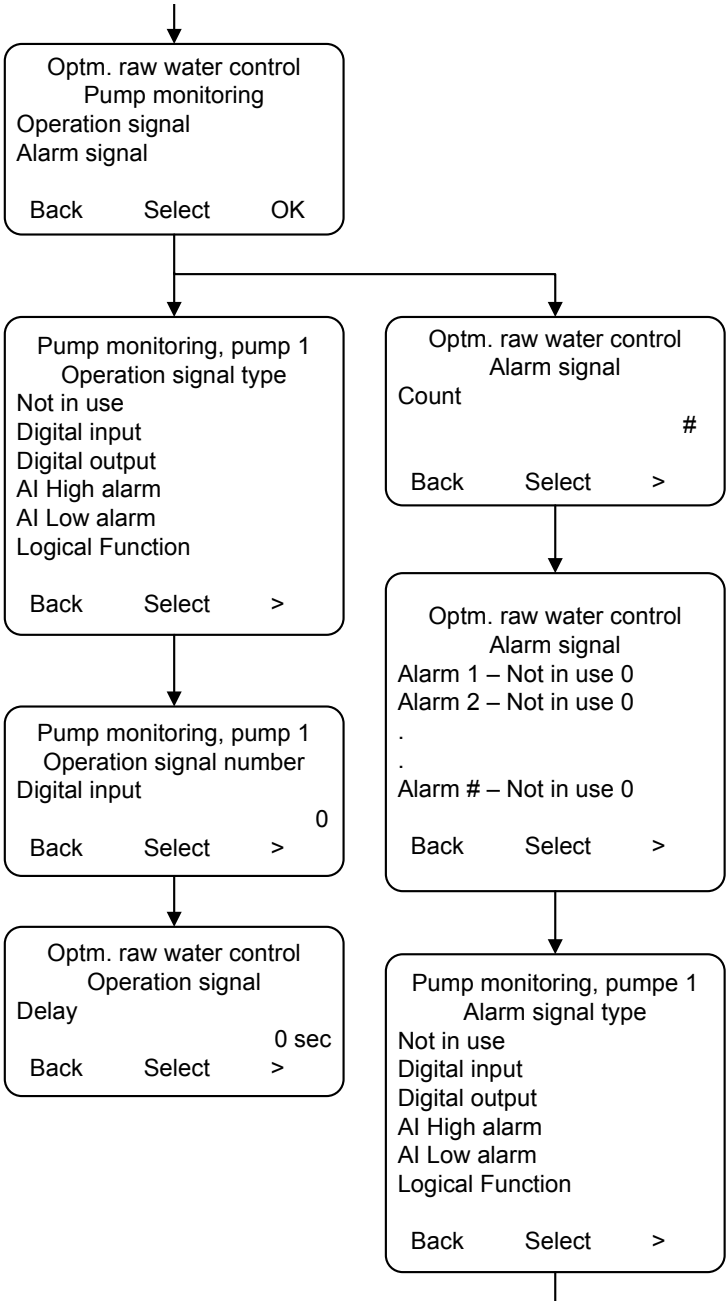


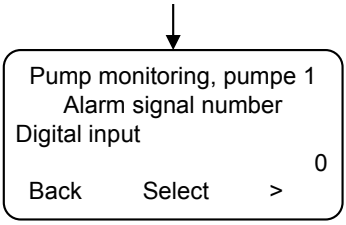
Pump monitoring

(Menu / Connect Base 1 / Main Functions / Optm. raw water control / Additional Functions / Pump monitoring)

“In use” activates the pump monitoring functions.




Optm. raw water control
Pump monitoring
Operation signal
Alarm signal
Back Select OK
Pump monitoring, pump 1
Operation signal type
Not in use
Digital input
Digital output
AI High alarm
AI Low alarm
Logical Function
Back Select >
Pump monitoring, pump 1
Operation signal number
Digital input
0
Back Select >
Optm. raw water control
Operation signal
Delay
0 sec
Back Select >
Optm. raw water control
Alarm signal
Count
#
Back Select >
Optm. raw water control
Alarm signal
Alarm 1 – Not in use 0
Alarm 2 – Not in use 0
.
.
Alarm # – Not in use 0
Back Select >
Pump monitoring, pumpe 1
Alarm signal type
Not in use
Digital input
Digital output
AI High alarm
AI Low alarm
Logical Function
Back Select >



“Pump monitoring / Operation signal” provides configuration of the operating signals, whereas “Alarm signal” provides configuration of the alarm signals.

“Operation signal type” defines what input type that reports pump operation. Only one pump can be set up for pump monitoring from these menu options.

“Operation signal number” defines which input number that reports pump operation. Only one pump can be set up for pump monitoring from these menu options.

“Delay” indicates the delay from the time the input is activated until the signal is received by the Connect. The purpose of this function is to prevent influence from fluctuations.

“Alarm signal” defines the number of alarms that should be registered from pump 1.

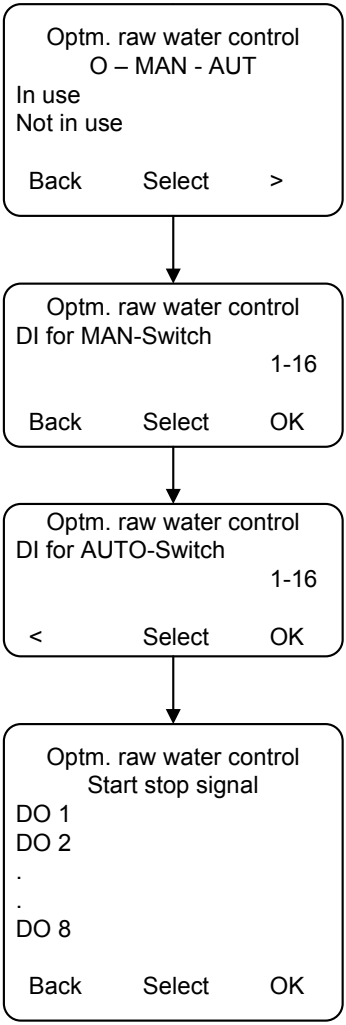
“Alarm signal type” indicates the type of input that reports an alarm. Several alarms can come from the same pump.

“Alarm signal number” defines the input number reporting an alarm. Several alarms can come from the same pump.

Control signal

(MMenu / Connect Base 1 / Main Functions / Optm. raw water control / Additional Functions / Control signal)

"O-MAN-AUT" in use provides feedback to the Connect about the operating condition (on or off) and about manual or automatic control.

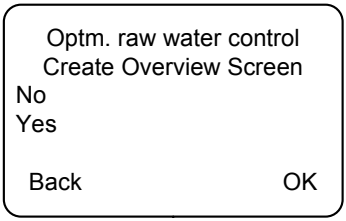


"DI for MAN-Switch" indicates the digital input that registers manual operation.
"DI for AUT-Switch" indicates the digital input that registers automatic operation.
"Start stop signal" indicates the digital outputs that can force a pump to a halt.

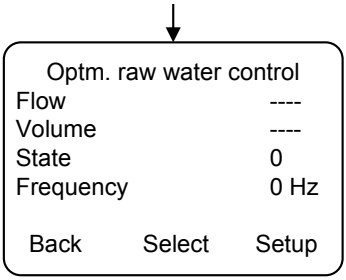
Create Overview Screen

(Menu / Connect Base 1 / Main Functions / Optm. raw water control / Additional functions / Create Overview Screen

"Create overview screen" automatically generates a standard overview screen for the display. It is defined by the configuration already done, and it is highly recommended always to create an overview screen after terminating a configuration.



See the following example:

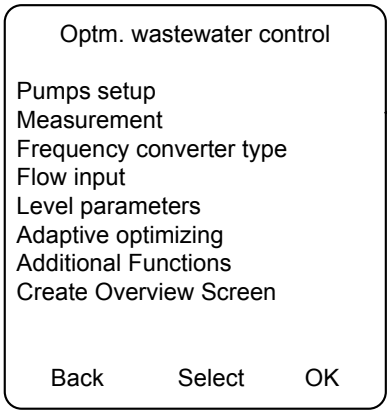


Optimized wastewater control

(Menu / Connect Base 1 / Main Functions / Optm. wastewater control)

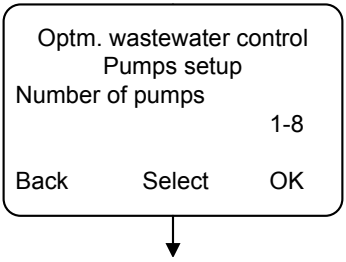
MJK's "Optimized wastewater control" can be used for emptying wastewater containers or reservoirs.

A practical example with a detailed description can be seen on page **204** in volume II of this manual.

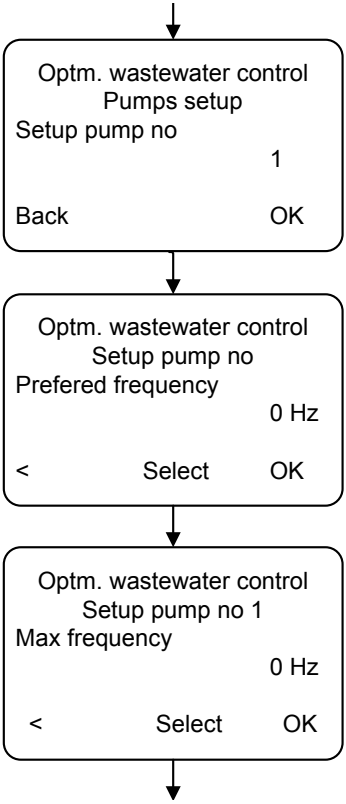


Pumps setup

(Menu / Connect Base 1 / Main Functions / Optm. wastewater control / Pumps setup)



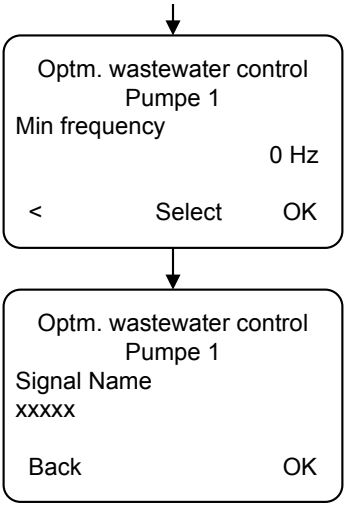
"Number of pumps" indicates the number of pumps with frequency converters for energy optimizing operation.



With “Setup pump no” you select the pump for configuration.

“Preferred frequency” is a reference frequency. When the pump starts, it accelerates to the “Preferred frequency”-frequency and regulates itself until the lowest possible energy consumption is reached within the allowed limits.

“Max frequency” is the highest acceptable frequency with which the pump may run. It should not be set higher than pump’s labelled frequency to prevent damage to the electric motor.



“Min frequency” is the lowest acceptable frequency at which the pump may run. It should not be set lower than 30 Hz to maintain sufficient cooling of the electric motor.

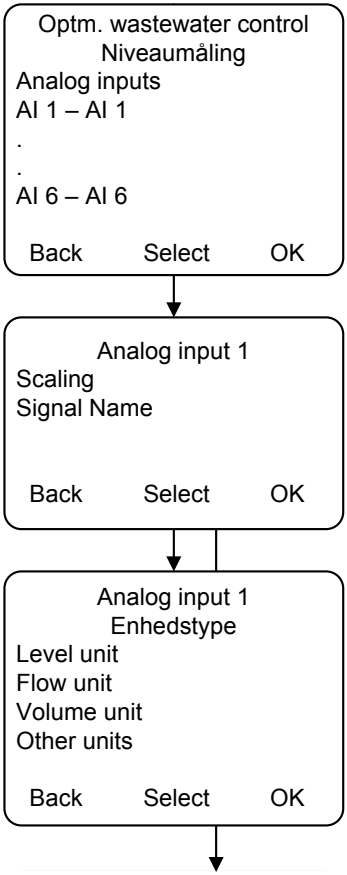
“Signal name” should be an descriptive name for the chosen pump. This name will also be shown on the display.

Measurement

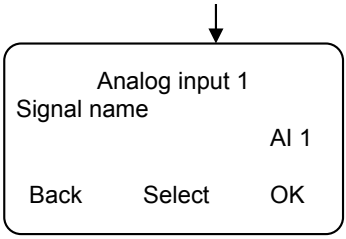
(Menu / Connect Base 1 / Main Functions / Optm. wastewater control / Pumps setup)

Under “Analog inputs” the individual analog 4-20 mA inputs can be configured. The individual inputs can be selected with the arrow keys.

“Scaling” provides selection of the measuring unit.



“Unit type” provides selection of the unit type, for example from m^3/s to l/h for the value that is registered by the relevant analog input. Also see page **109**.



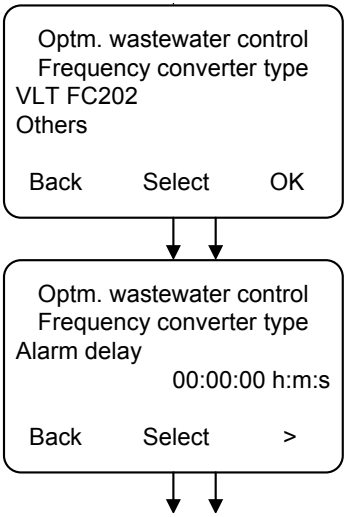
As “Signal name” select an expressive name for the individual analog inputs.

Frequency converter type

(Menu / Connect Base 1 / Main Functions / Optm. wastewater control / Frequency converter type)

”VLT FC202” refers to the driver for the Danfoss’ VLT FC 202 frequency converter. “Others” refers to a generic driver for frequency converters which are not made by Danfoss.

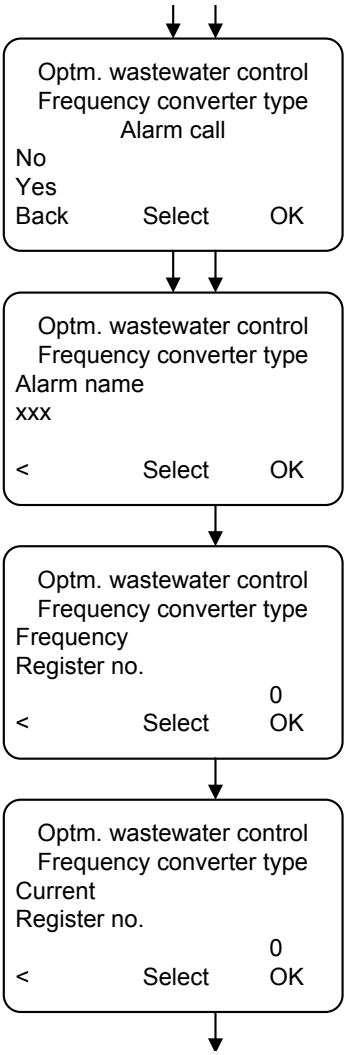
“Alarm delay” must be entered in hours:minutes: seconds.

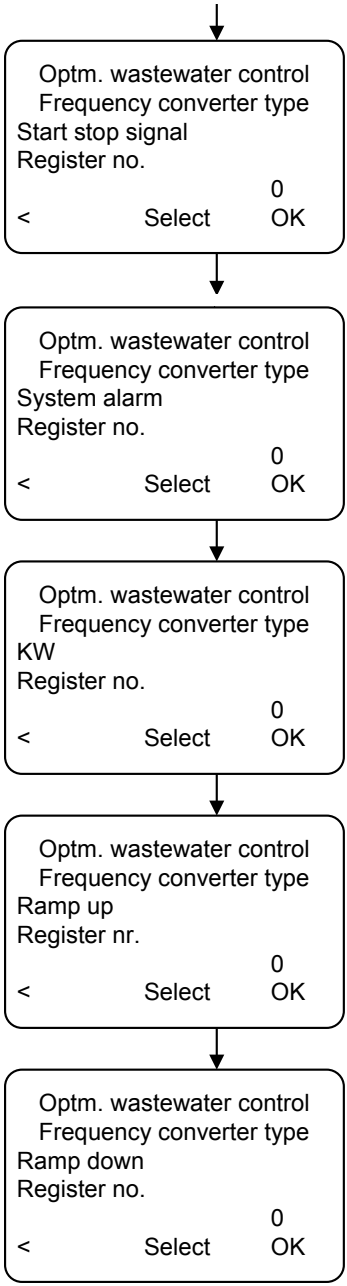


"Alarm call, No/Yes". A "No" will prevent an alarm message from being sent (for example an SMS message).

"Alarm name" is chosen signal name for alarms related to frequency converters.

For "Others" you must specify in which registers the values for frequency, current, start stop signal, alarm, kW, ramp, etc. shall be located.




Optm. wastewater control
Frequency converter type
Start stop signal
Register no.
0
< Select OK
Optm. wastewater control
Frequency converter type
System alarm
Register no.
0
< Select OK
Optm. wastewater control
Frequency converter type
KW
Register no.
0
< Select OK
Optm. wastewater control
Frequency converter type
Ramp up
Register nr.
0
< Select OK
Optm. wastewater control
Frequency converter type
Ramp down
Register no.
0
< Select OK

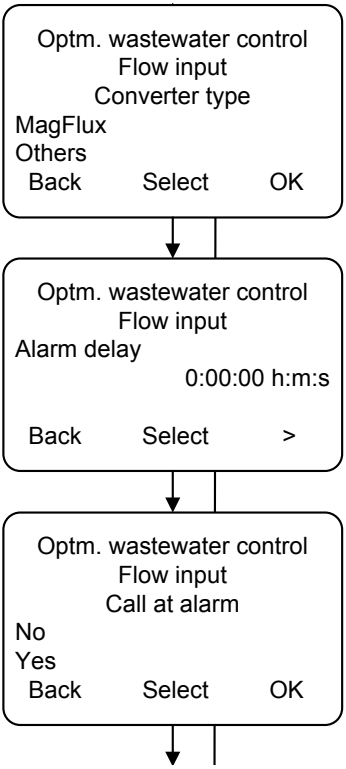
Flow input

(Menu / Connect Base 1 / Hovedfunktioner* / Energioptimeret spildevandspumpestyring / Flow indgang)

"MJK" indicates that an MJK MagFlux flow meter is connected to the Connect unit. "Others" refers to a generic driver for non-MJK flow meters and is described under "Measurement" on page 87.

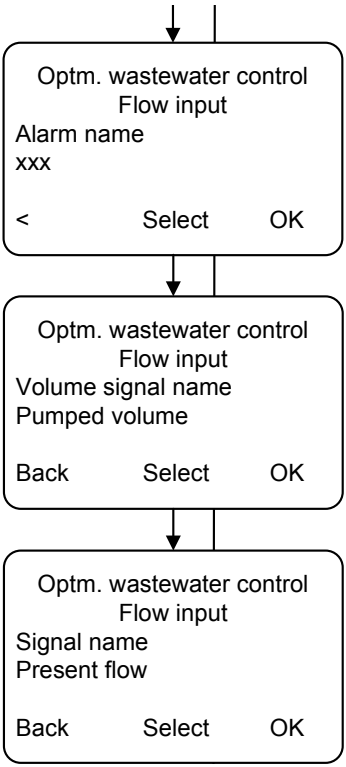
"Alarm delay" must be entered in hours:minutes:seconds.

"Alarm call, No/Yes". A "No" will prevent an alarm message from being sent (for example an SMS message).



“Alarm name” is a signal name for alarms concerning frequency converters.

“Volume signal name” should be a meaningful name for the volume measurement such as “Pumped vol.”. The same applies for “Flow signal name”. A meaningful and descriptive name should be given for the flow measurement such as “Present flow”.



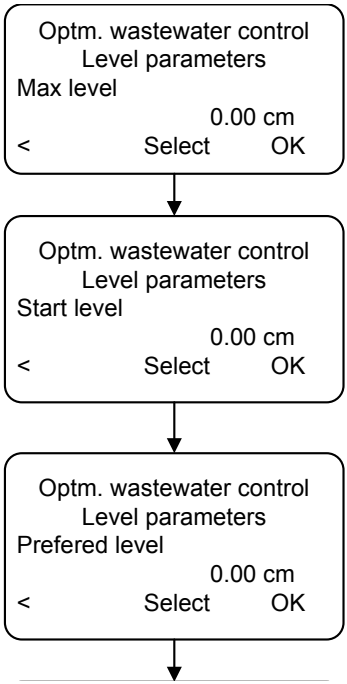
Level parameters

(Menu / Connect Base 1 / Main Functions / Optm. wastewater control / Level parameters)

At “Max level” all pumps start at max. frequency (typically 50 Hz).

At “Start level” all pumps run at max. frequency for x seconds, after which the frequency is lowered to the reference frequency. Note that there should be an appropriate difference between the start and stop limits to avoid damage to the pumps and relays.

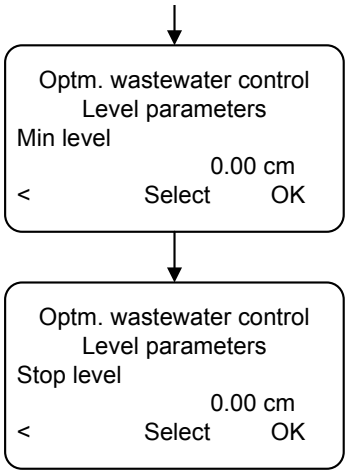
“Preferred level” is the reference level which is kept constant after operation at max. frequency.



At “Min level” the frequency is lowered to min. set frequency (lowest chosen rev/capacity).

At “Stop level” the pump is stopped to avoid running dry. When the level decreases to this level, all the pumps stop. Note that there should be an appropriate difference between the start and stop limits to avoid damage to the pumps and the relays.

The stop level should not be set lower than the pump manufacturer’s recommendations.

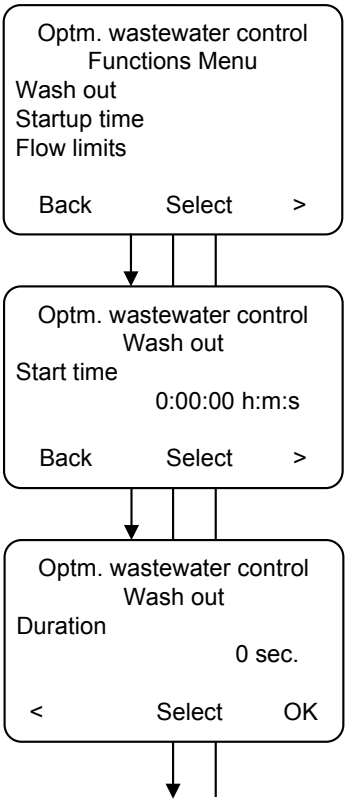


Functions Menu

(Menu / Connect Base 1 / Main Functions / Optm. wastewater control / Functions Menu)

“Wash out/Start time” indicates when the frequency of the pump increases to max. frequency in order wash out the pipes.

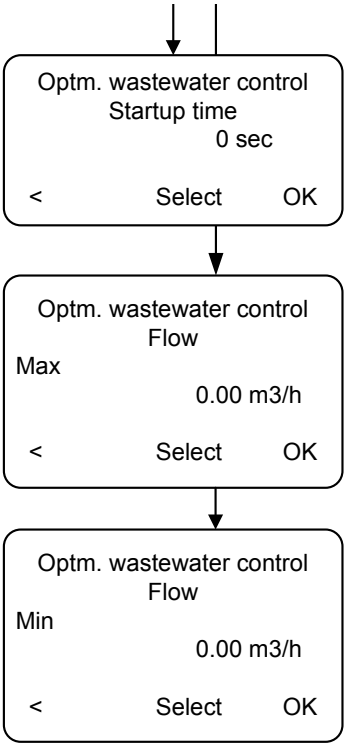
“Duration” is the time during which the pump should run at max. frequency.



"Startup time" shows the number of seconds from the time when the Connect gets its start signal until it reaches 50 Hz (ramp time). Is entered in seconds.

"Max" is the highest allowed flow for the system.

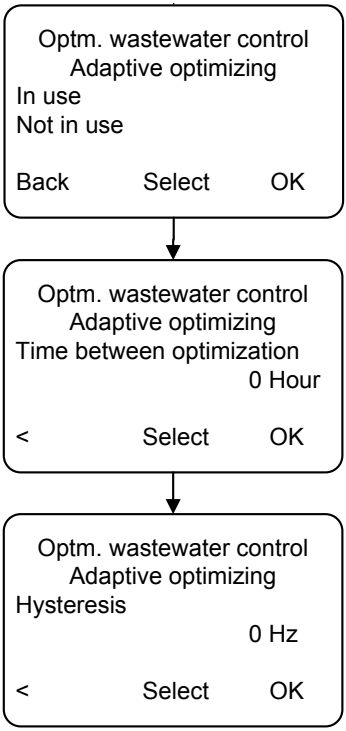
"Min" is lowest acceptable flow.



Adaptive optimizing

(Menu / Connect Base 1 / Main Functions / Optm. wastewater control / Adaptive optimizing)

“Adaptive optimizing/In use” enables calculation of the optimal operating point. It is calculated from to highest obtainable volume per kWh. If necessary, the frequency is automatically re-adjusted.



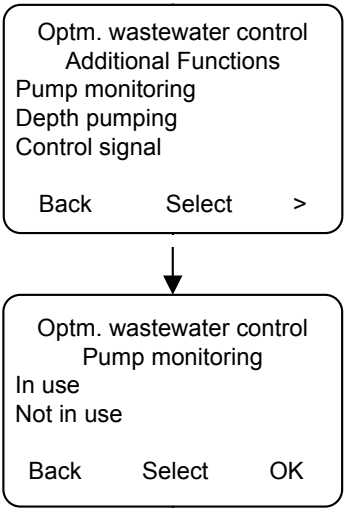
“Time between optimization” is the time spent while the Connect searches for a better operation point. The time is indicated in full hours.

“Hysteresis” decides how the Connect can optimize by increasing one step and decreasing one step to reach a more suitable point of operation. This step is called hysteresis and is entered in Hz.

Additional functions

(Menu / Connect Base 1 / Main Functions / Optm. wastewater control / Additional functions)

Additional functions for optimized wastewater pumping provides several useful options for the current control.



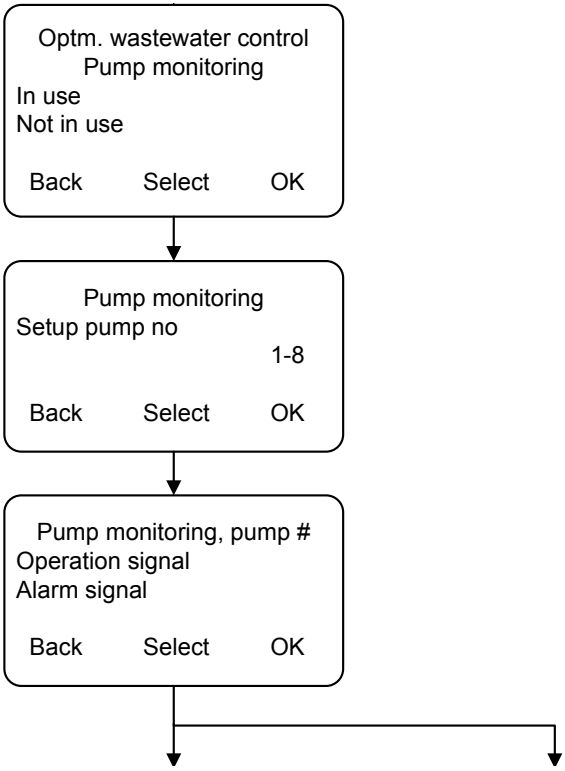
Pump monitoring

(Menu / Connect Base 1 / Hovedfunktioner* / Energioptimeret spildevandspumpestyring / Tillægsfunktioner / Pumpeovervågning)

“Pump monitoring/In use” activates the pump monitoring functions. In “Setup pump no” the required pump is selected.

“Operation signal” enables setting of the operation signals.

“Alarm signal” enables configuration of the alarm signals.



Operation signal (see figure, next page, left half)

“Operation signal type” indicates which type of input that reports pump operation. Only one pump can be set up for pump monitoring using these menu options.

“Operation signal number” defines the digital input’s number that reports pump operation. Only one pump can be set up for pump monitoring using these menu options.

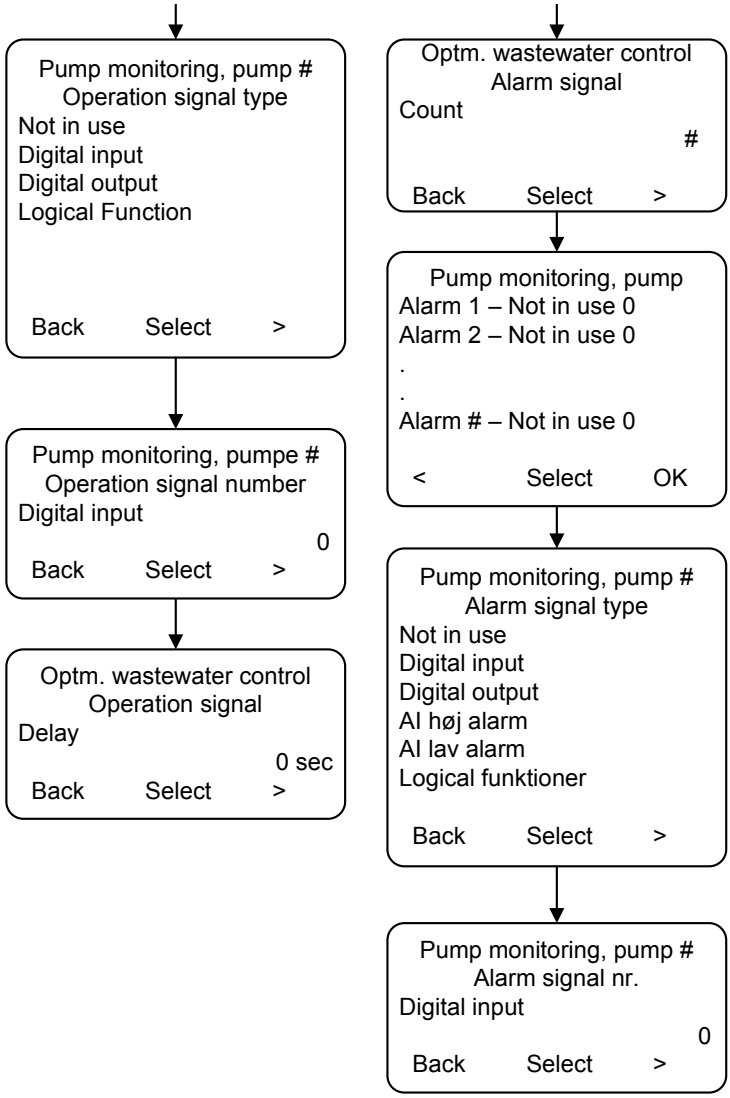
“Delay” indicates the delay from the time that the input is activated until the signal enters the Connect. The purpose of this function is to prevent fluctuations.

Alarm signal (see figure, next page, right half)

“Alarm signal/Count” defines the number of alarms that can be received from pump 1.

“Alarm signal type” defines which type of input that can report an alarm. Several alarms from the same pump are accepted.

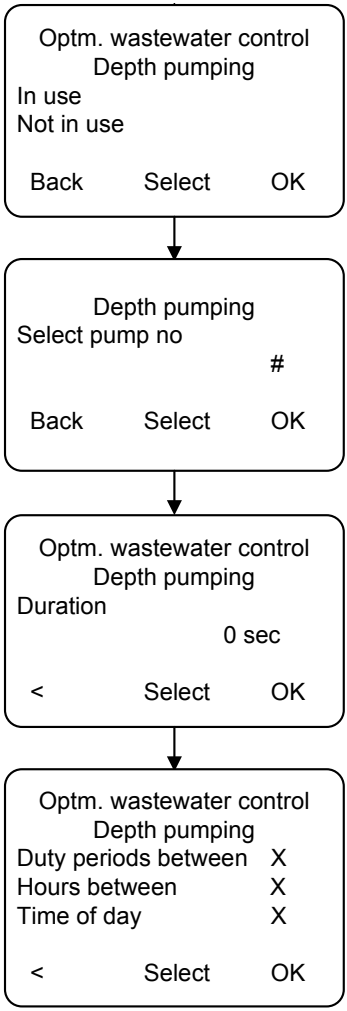
“Alarm signal number” indicate which digital input that may report an alarm. Several alarms from the same pump are accepted.


Pump monitoring, pump #
Operation signal type
Not in use
Digital input
Digital output
Logical Function
Back Select >
Pump monitoring, pumpe #
Operation signal number
Digital input
0
Back Select >
Optm. wastewater control
Operation signal
Delay
0 sec
Back Select >
Optm. wastewater control
Alarm signal
Count
#
Back Select >
Pump monitoring, pump
Alarm 1 – Not in use 0
Alarm 2 – Not in use 0
.
.
Alarm # – Not in use 0
< Select OK
Pump monitoring, pump #
Alarm signal type
Not in use
Digital input
Digital output
AI høj alarm
AI lav alarm
Logical funktioner
Back Select >
Pump monitoring, pump #
Alarm signal nr.
Digital input
0
Back Select >

Depth pumping

(Menu / Connect Base 1 / Main Functions / Optm. wastewater control / Additional functions / Depth pumping)

Depth pumping is a function that pumps to a lower level than the normal stop value. The purpose of depth pumping is to pump away some of the sludge that inevitably accumulate at the bottom of a well.



“Select pump no” indicate which pump that run depth pumping every time.

“Duration” is the time in seconds that the pump should run on after the stop value has been reached.

“Duty periods between” is the number of start/stops between which depth pumping is running.

“Hours between” is the number of hours between which depth pumping is running.

“Time of day” indicates the time where depth pumping is running.

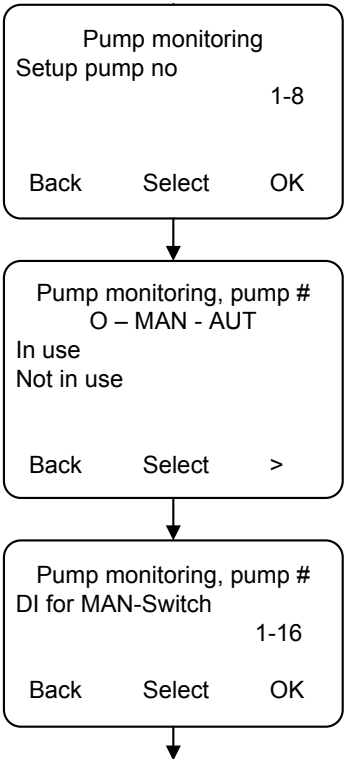
Control signal

(Menu / Connect Base 1 / Main Functions / Optm. wastewater control / Additional functions / Control signal)

“Pump monitoring/Setup pump no” indicates which pump to monitor.

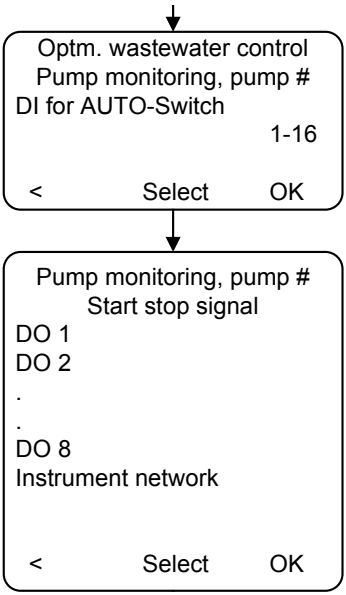
“O-MAN-AUT” in use enables reporting to the Connect whether the operation condition is set to off, there is a manual control, or there is automatic control of for example pump 1.

“DI for MAN-Switch” indicates which digital input that registers manual operation.



"DI for AUTO-Switch" indicates which digital input that registers automatic operation.

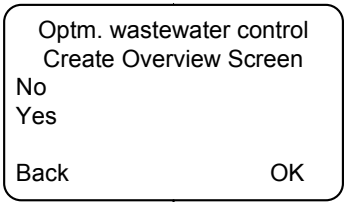
"Start stop signal" indicates which digital output that can force a pump to stop in position "0".



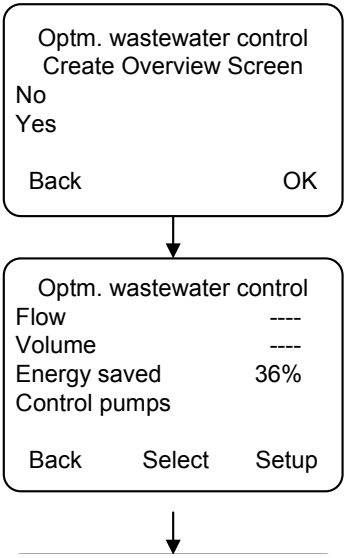
Create Overview Screen

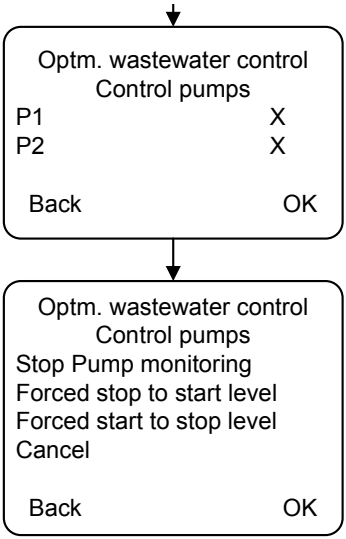
(Menu / Connect Base 1 / Main Functions / Optm. wastewater control / Additional functions / Create Overview Screen

“Create overview screen” automatically generates a preconfigured overview screen for the display. It is defined by the configuration already done, and it is highly recommended always to create an overview screen after terminating a configuration.



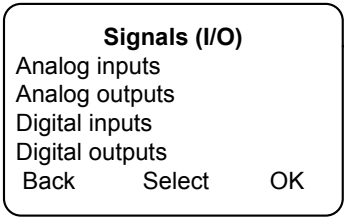
See the following example:




Optm. wastewater control
Control pumps
P1 X
P2 X
Back OK
Optm. wastewater control
Control pumps
Stop Pump monitoring
Forced stop to start level
Forced start to stop level
Cancel
Back OK

Signals (I/O)

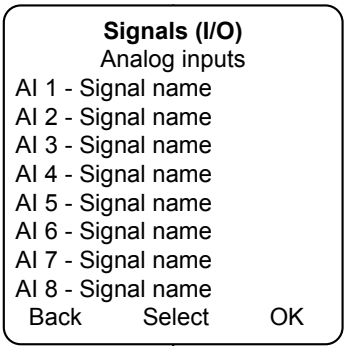
(Setup / Connect 1 / Signals (I/O))

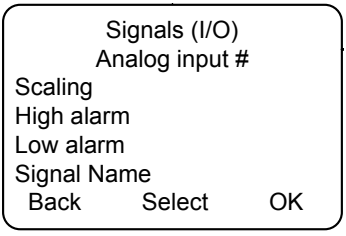


All analog and digital inputs and outputs (the number depends on the chosen I/O board) can be configured individually according to for example scaling, setpoints for contour lines, averaging, etc.

Analog inputs

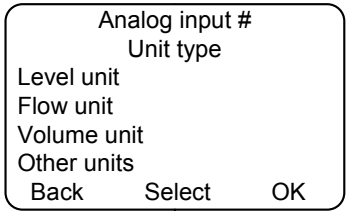
(Setup / Connect 1 / Signals (I/O) / Analog inputs)



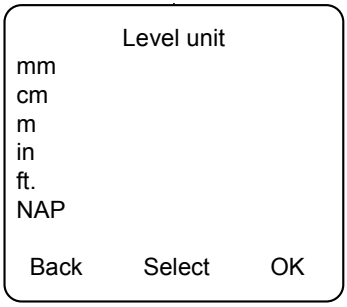


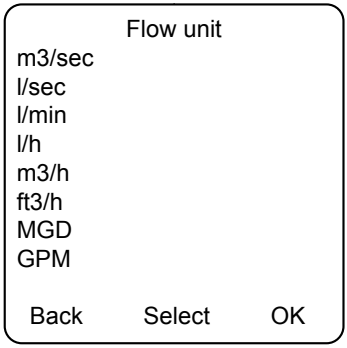
"Scaling" is further described on page **110**, "High alarm" on page **112**, "Low alarm" on page **113**, and "Signal name" on page **114**.

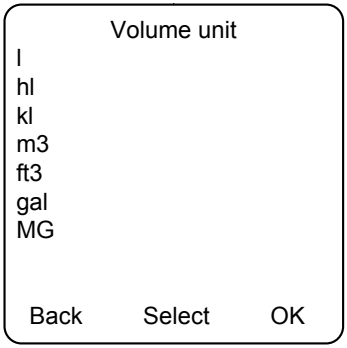
Scaling

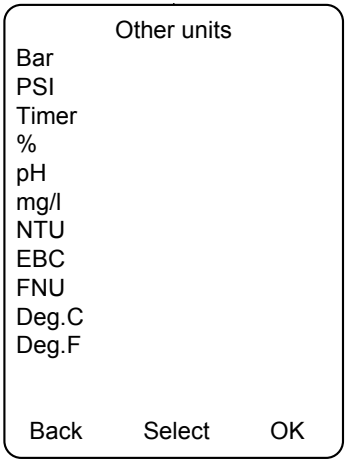


The primary units - level, flow, volume and other units - consist of:

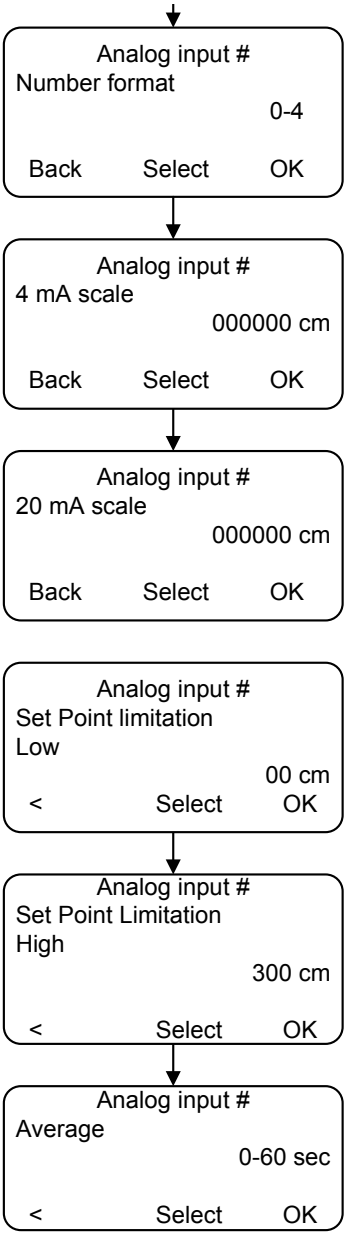






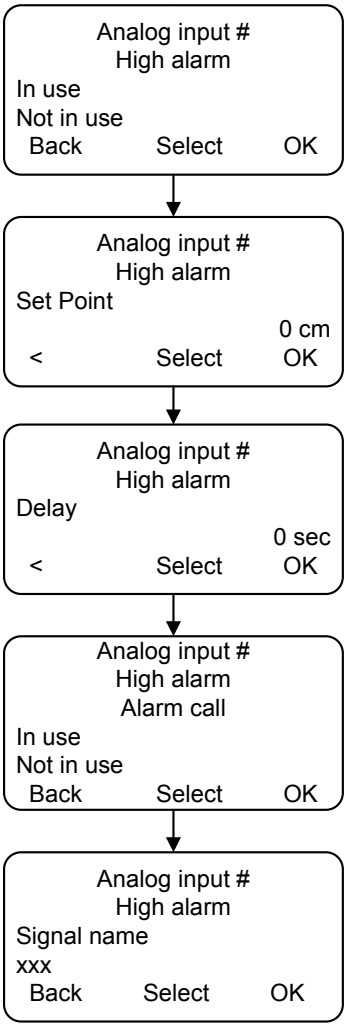


Each of the individual units may subsequently be configured according to the 4- and 20 mA settings, limitations, alarm thresholds (high and low alarm) and the signal name.


Analog input #
Number format
0-4
Back Select OK
Analog input #
4 mA scale
000000 cm
Back Select OK
Analog input #
20 mA scale
000000 cm
Back Select OK
Analog input #
Set Point limitation
Low
00 cm
< Select OK
Analog input #
Set Point Limitation
High
300 cm
< Select OK
Analog input #
Average
0-60 sec
< Select OK

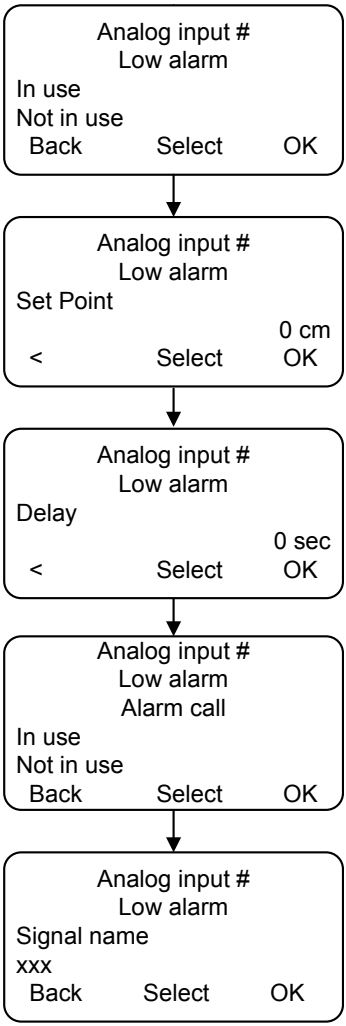
High alarm

To indicate or act when a high value is exceeded, “High alarm” can be used i.a. to create a signal delay during short-term overruns and to trigger alarm calls.
The value for a high alarm should always be higher than for a low alarm (see next page).

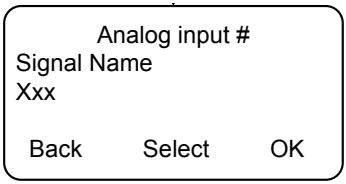


Low alarm

To indicate or act when a low values is exceeded, “Low alarm” can be used i.a. for signal delay during short-term overruns and to trigger alarm calls.
The value for a low alarm should always be lower than for a high alarm (see previous page).



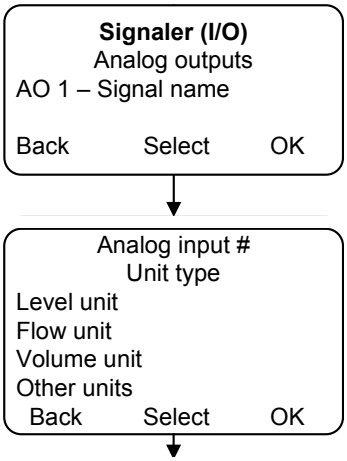
Signal name



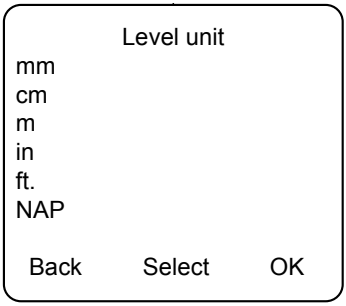
Analog outputs

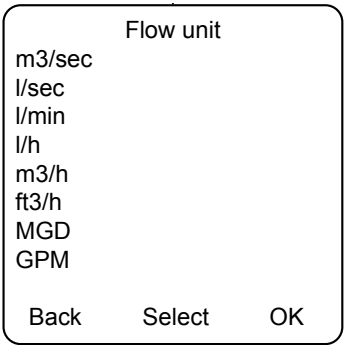
(Setup / Connect 1 / Signals / Analog outputs)

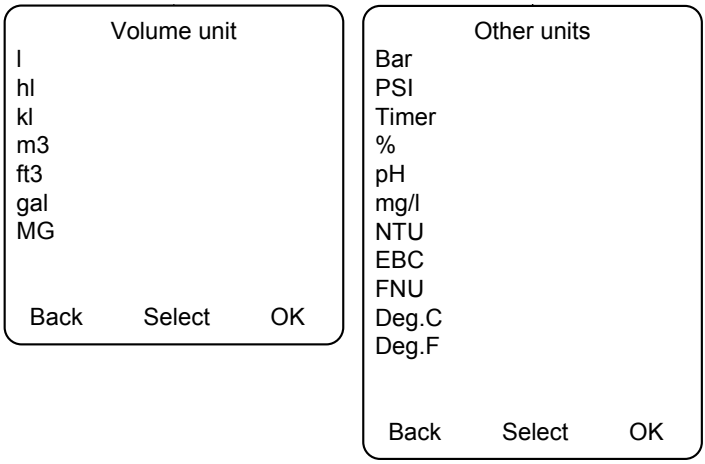
From “Analog outputs” it is possible to select a scaling of primary units, a position of decimal points, definition of 4 and 20 mA settings, high and low limitation as well as ramp time.



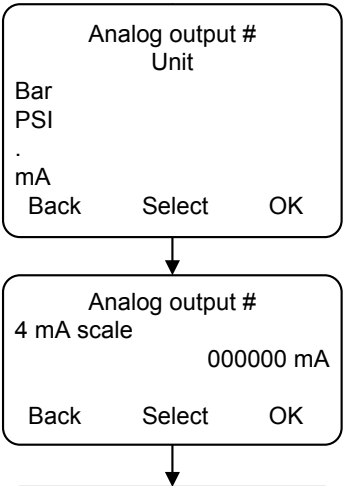
The primary units - level, flow, volume and other units - consist of:

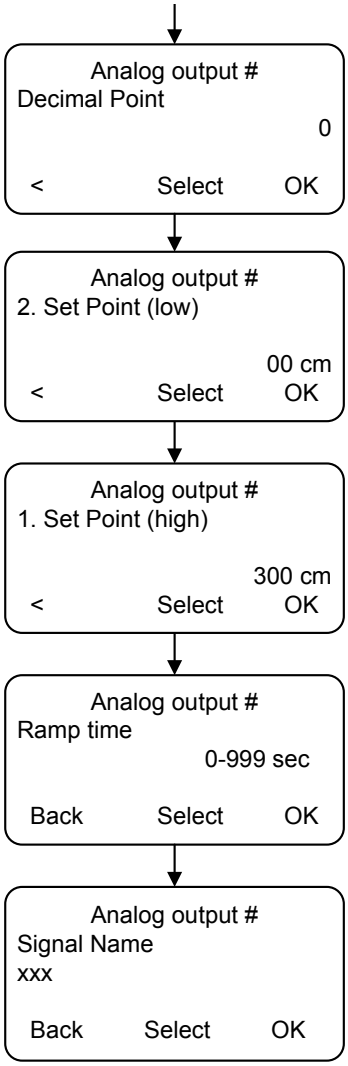






Each of the individual units may subsequently be configured according to the 4- and 20 mA settings, high and low alarm thresholds and the signal name.




Analog output #
Decimal Point
0
< Select OK
Analog output #
2. Set Point (low)
00 cm
< Select OK
Analog output #
1. Set Point (high)
300 cm
< Select OK
Analog output #
Ramp time
0-999 sec
Back Select OK
Analog output #
Signal Name
xxx
Back Select OK

Digital inputs

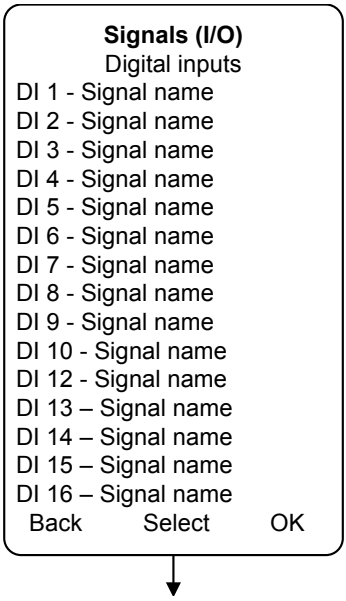
(Setup / Connect 1 / Signals / Digital inputs)

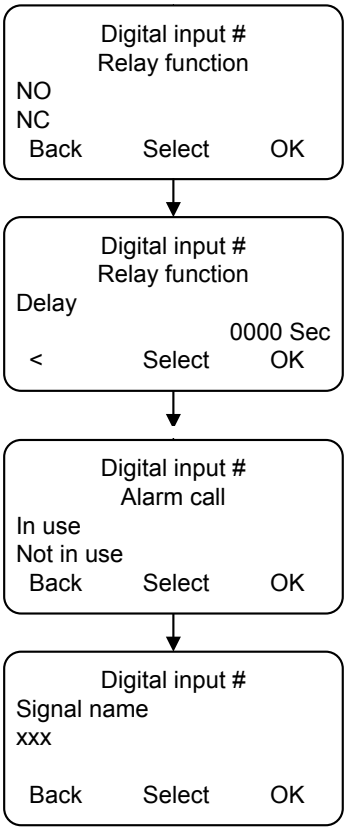
The digital inputs can be used for registration in the operating log and/or the alarm log, as well as a start signal for an alarm or an SMS.

The relay function can be set up for NO (Normally Open, relay position (here: open) with no voltage/signal at the input) or NC (Normally Closed, relay position (here: closed) with no voltage/signal the input).

Activation of the digital input can be delayed with a desired number of seconds, and alarm calls can be performed as required.

The signal name will be shown on the overview screens or as text in SMS messages.




Digital input #
Relay function
NO
NC
Back Select OK
Digital input #
Relay function
Delay
0000 Sec
< Select OK
Digital input #
Alarm call
In use
Not in use
Back Select OK
Digital input #
Signal name
xxx
Back Select OK

Digital outputs

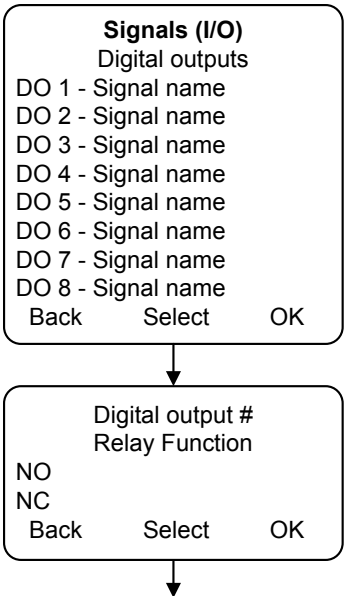
(Setup / Connect 1 / Signals / Digital outputs)

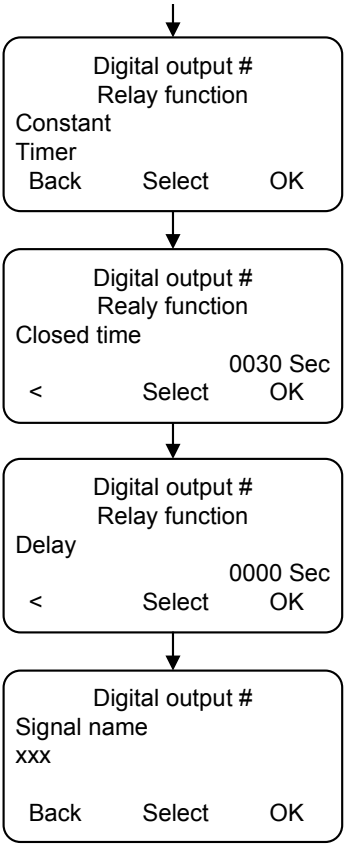
The digital output can among others be used to define the normal condition of the relay function: NO (Normally Open) or NC (Normally Closed).

Moreover it is possible to determine whether the pump control should be constant or time controlled. If constant, the output becomes active (high) when receiving a start signal. It becomes inactive (low) after receiving a stop signal, as opposed to time control which causes the output to become active (high) for a specified amount of time after receiving a start signal. It automatically becomes inactive (low) when the working time expires.

Activation of the output relay can be delayed with a desired number of seconds.

The signal name will be shown on the overview screens or as text in SMS messages.

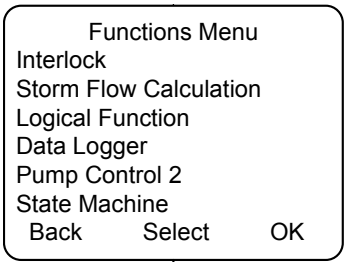



Digital output #
Relay function
Constant
Timer
Back
Select
OK
Digital output #
Realy function
Closed time
0030 Sec
<
Select
OK
Digital output #
Relay function
Delay
0000 Sec
<
Select
OK
Digital output #
Signal name
xxx
Back
Select
OK

Functions Menu

(Setup / Connect 1 / Functions Menu)

The Functions Menu contains additions and extensions to the “normal” existing functions. The options are: Interlock, Storm Flow Calculation, Logical Functions, Data logger, Pump Control 2 and State Machine.



1. Press the up/down buttons to highlight the desired menu line. Then press OK to select the menu.

Interlock

(Setup / Connect 1 / Functions Menu / Interlock)

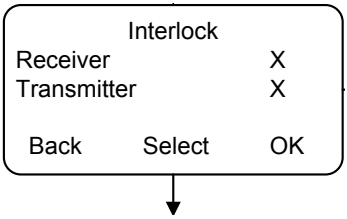
“Interlock” provides connection of two Connect units in order to send communication commands to each other. One of the Connect units is for example capable of remotely controlling the output of the other.

A practical example could be regulation of wastewater in sewerage systems during heavy rain. In that situation it is possible to stop a pump upstream in the system, and in that way use the sewerage network as a buffer.
Notice that both Connect devices are still autonomous.

Another example could be raw water extraction in water plants, where one Connect registers the level of water in the clear water tank. When needed, it sends a signal to a well where another Connect then starts a pump.

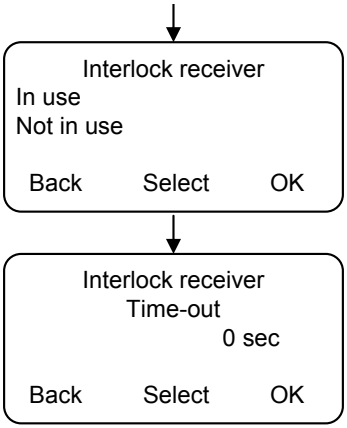
When using interlock, the Connect units must be configured as a transmitter unit (Transmitter) and a receiver unit (Receiver). The “Receiver” can configure one Connect to receive commands from another Connect, and the “Transmitter” can configure the other Connect to transmit commands to other Connect units.

First you define which one who is the “Receiver” and which one is the “Transmitter”.



Receiver

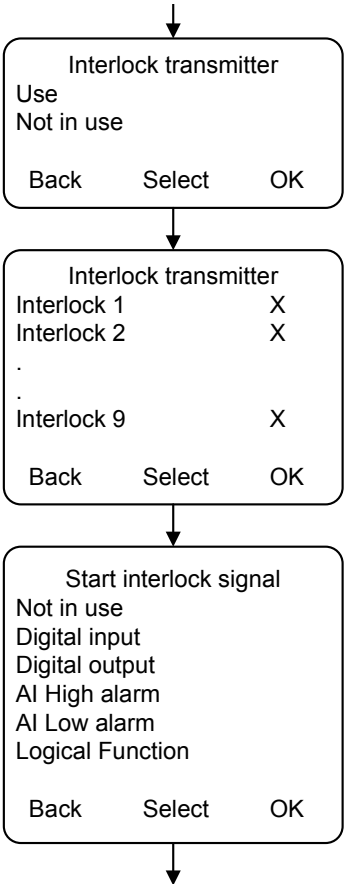
“In use” sets theConnect up to receive commands from other Connect devices.



“Time out” is for example used, if a Connect has received a command form another Connect to hold a signal, or to release a signal after a time-out. If a new signal is sent within the time-out period, the time-out is reset, and the countdown restarts.
Notice that the time-out period must be longer than the transmitter interval on the transmitting Connect unit.

Transmitter

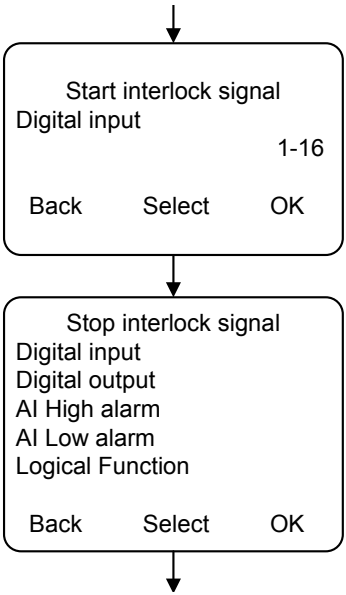
“In use” sets the Connect up to transmit commands to other Connect units.



“Interlock x” opens for configuration of the selected interlock. One Connect unit can handle up to 9 different interlocks.

“Start interlock signal” indicates which input or function on the transmitting Connect that shall activate “Interlock x”

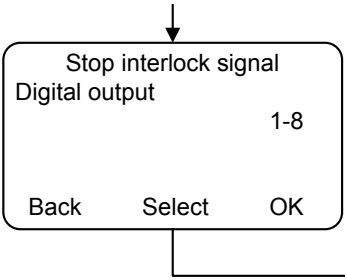
"Start interlock signal/Digital input" (as an example) indicates which start signal that presently is being configured.



With "Stop interlock signal" you can select which signal, when it goes low, will make the one Connect unit call the other and set its output to low. When the receiver gets the stop signal, it returns to its normal state.

As long as the signal is high, calls will continue with the selected interval. If the calling interval is set to 10 minutes or more, the remotely controlled output should then be configured with an on-time of more than 10 minutes (for example 15 min.), so that an output is not constantly high, if a fault situation should arise (for example a disconnected phone cable).
In this way you make sure that the output itself goes low, even if the communication fails. At flawless communication the on-time of the remotely controlled output will be initialised at every single call, and the remotely controlled output will thereby stay high, as long as the controlling signal is active.

With “Stop interlock signal/Digital output” (receiver’s output type) you select which digital output (or other signal) that should activated on the receiver.



“Receiver output type” determines whether there should be placed a digital output on the receiver or another signal (see next page).

“Digital output” indicates which digital output on the receiver that should be activated (see next page).

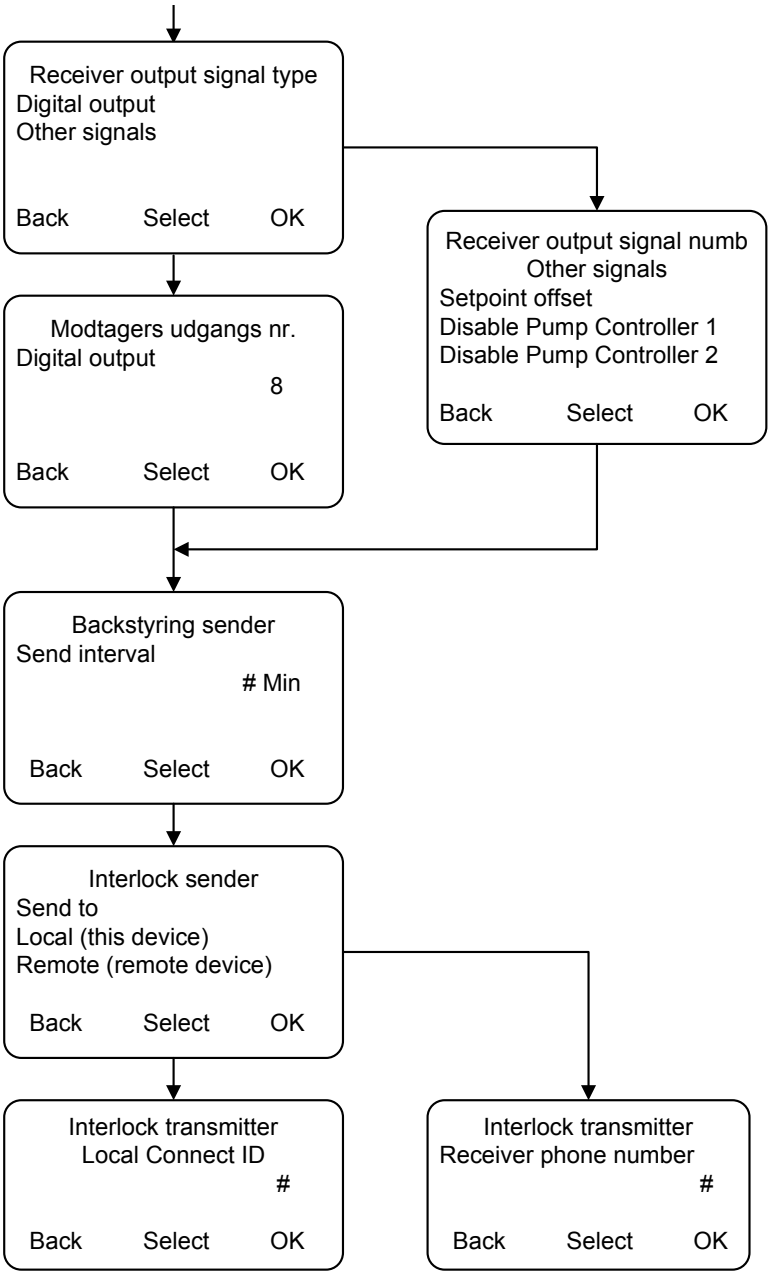
“Other signals” enables set point shift or temporary deactivation of pump controls on the receiving Connect (see next page).

“Transmitter interval” indicates with which interval the transmitting Connect should send a command to the receiving Connect, in order for the receiving Connect to maintain status of the interlock output (see next page).

Notice that time-out on the receiver should be higher than the transmitter interval. Function and communication mode determines how often a call is necessary. It would, for example, be expensive to make calls every fifth minute to exchange interlock commands between two Connect units when it comes to stopping a wastewater pump during a stormflow, or if the communication takes place over a called connection (see next page).

“Send to” can either be this Connect (local) or a remote Connect (remote) (see next page).

“ID no” indicates, whether local or remote, that the unit must have a unique ID number (see next page).
If the receiver is another Connect unit, which is directly connected on the samme multi-drop line via the RS485-port, the Connect’s ID number must be entered with a minus sign in front.


Receiver output signal type
Digital output
Other signals
Back Select OK
Modtagers udgangs nr.
Digital output
8
Back Select OK
Receiver output signal numb
Other signals
Setpoint offset
Disable Pump Controller 1
Disable Pump Controller 2
Back Select OK
Backstyring sender
Send interval
Min
Back Select OK
Interlock sender
Send to
Local (this device)
Remote (remote device)
Back Select OK
Interlock transmitter
Local Connect ID
#
Back Select OK
Interlock transmitter
Receiver phone number
#
Back Select OK

If the receiver is another Connect unit,which communicates via data radio, the ID number of the Connect is entered without a minus sign in front.

If the receiver is another Connect unit, which can be called through a telephone modem or a GSM modem, the telehone number for the Connect is entered.

If the receiver is a Connect unit, which is part of another group of Connets, the ID number/telephone number for the group's master followed by the ID number of the desired Connect is entered.

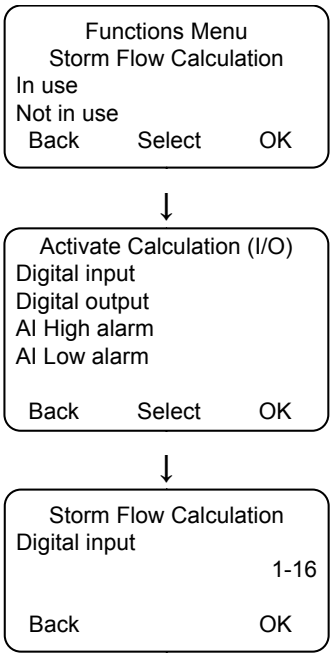
Notice that only one master Connect unit can directly remote-control other Connect units in other groups.

Storm Flow Calculation

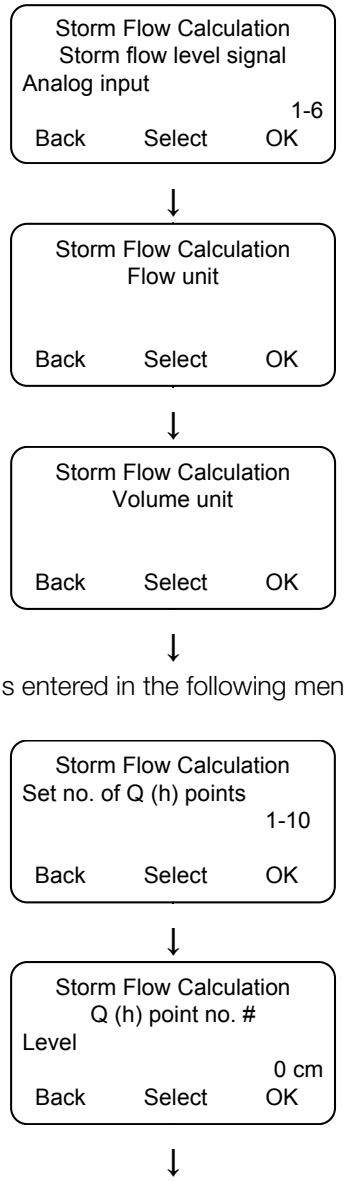
(Setup / Connect 1 / Functions Menu / Storm Flow Calculation)

In most instances it is interesting to know when a larger storm flow begins, When it ends and the amount (m^3/h).

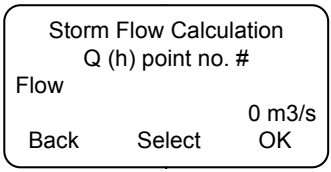
For this purpose an MJK Connect unit can be used. One digital input is connected to the level signal from an MJK 7060 pressure transmitter, and one analog input is connected an MJK 501 level switch with 2 electrodes placed at the storm flow crest. When the electrodes short-circuit, the level reading is reset, and hereafter can the flow be calculated from the remaining level signal.



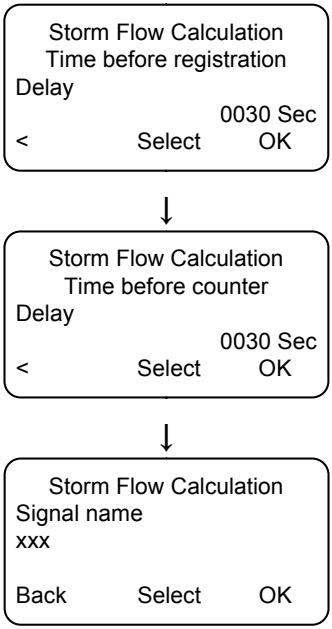
The functions of “Digital input”, “Digital output”, “AI High alarm”, and “AI Low alarm” are identical. The following sub-menus are:



The weir's Q(h) graph is entered in the following menus to calculate the storm flow.

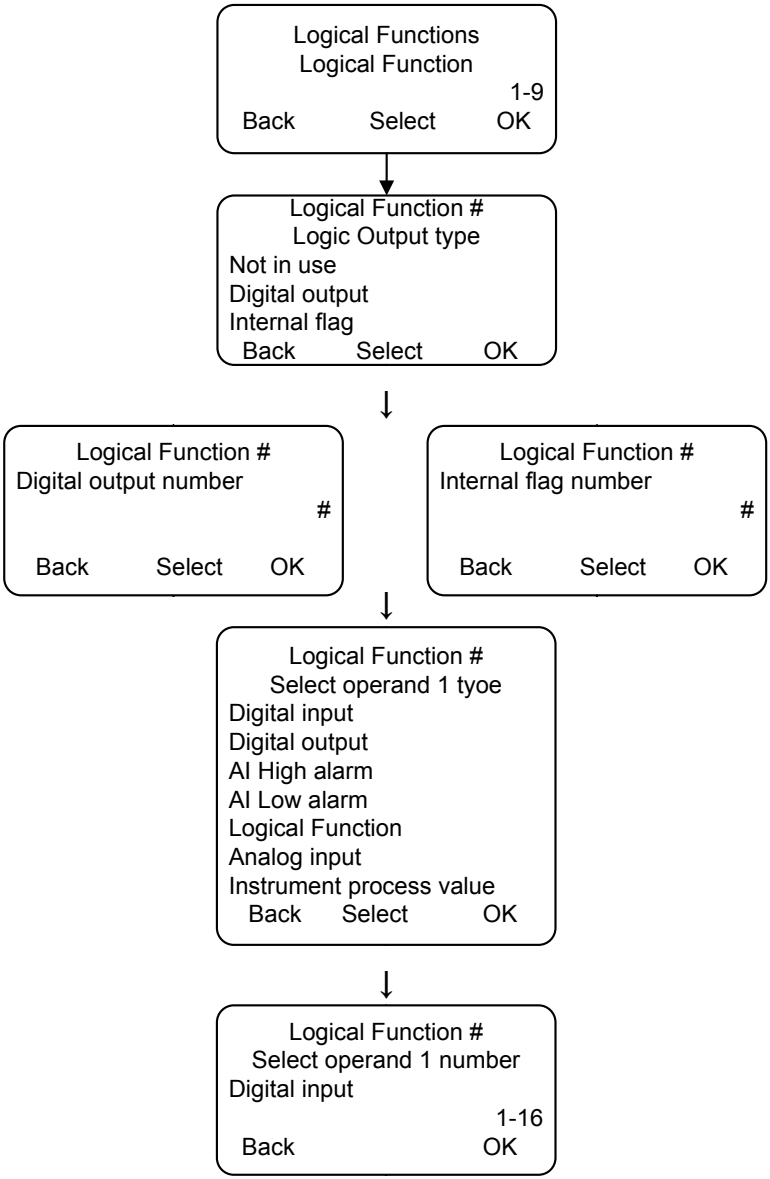


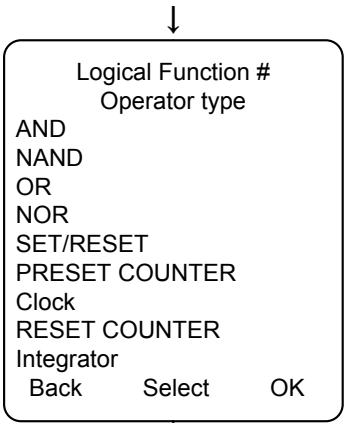
To filter out “noise” (small storm flows before and after a “real” storm flow), appropriate delays must be defined both before registration and before the next storm flow counter.



Logical Functions

(Setup / Connect 1 / Functions Menu / Logical Functions)

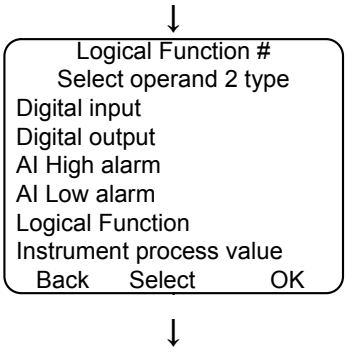


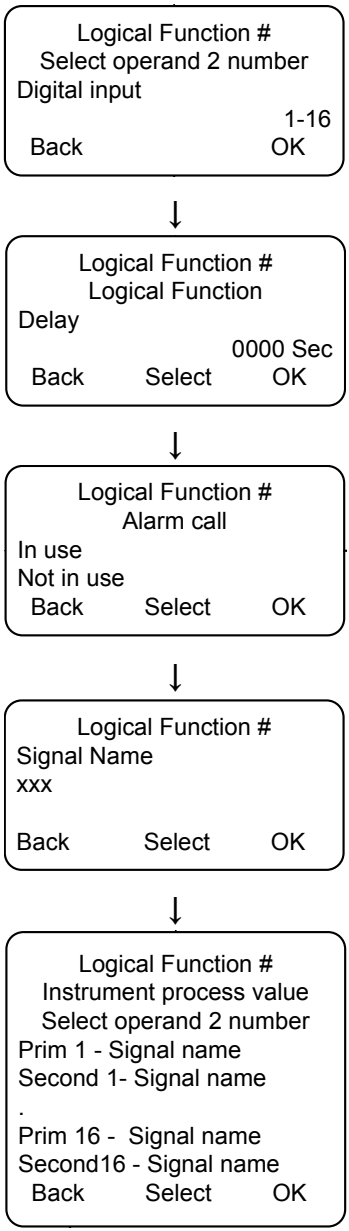


The truth tables for AND, NAND, OR and NOR are for 2 operants:

AND: Q = A x B	The output is high only when both A and B are high. Otherwise the output is low.
NAND: Q = $\overline{A \times B}$	Output is low only when both A and B are high. Otherwise the output is high.
OR: Q = A + B	Output is low only when both A and B are low. Otherwise the output is high.
NOR: Q = $\overline{A + B}$	Output is high only when both A and B are low. Otherwise the output is low.

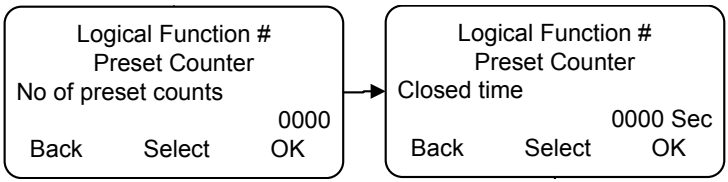
See description of “Preset counter”, “Clock”, “Reset counter” and “Integrator” on page **135** and **136**.




Logical Function #
Select operand 2 number
Digital input
1-16
Back
OK
Logical Function #
Logical Function
Delay
0000 Sec
Back
Select
OK
Logical Function #
Alarm call
In use
Not in use
Back
Select
OK
Logical Function #
Signal Name
xxx
Back
Select
OK
Logical Function #
Instrument process value
Select operand 2 number
Prim 1 - Signal name
Second 1- Signal name
.
Prim 16 - Signal name
Second16 - Signal name
Back
Select
OK

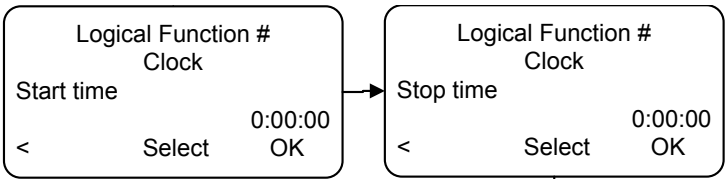
Preset counter

When for instance a number of pulses have been registered, the relay can be preset to be pulled (closed) for a number of seconds.

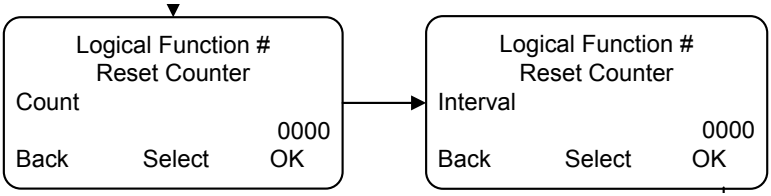


Clock

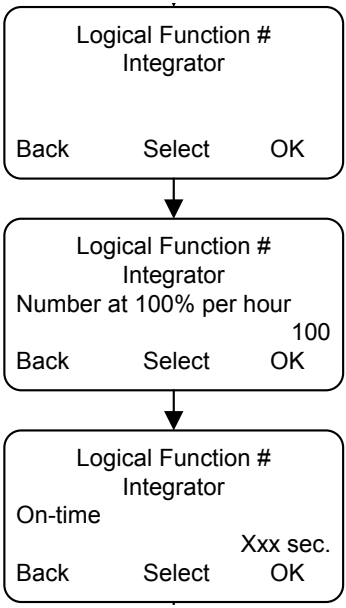
The build-in clock is a 24-hour clock (00:00:00 - 23:59:59).



Reset counter

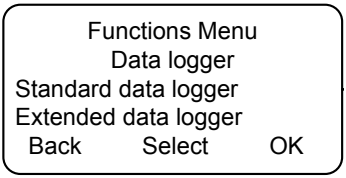


Integrator


Logical Function #
Integrator
Back Select OK
Logical Function #
Integrator
Number at 100% per hour
100
Back Select OK
Logical Function #
Integrator
On-time
Xxx sec.
Back Select OK

Data logger

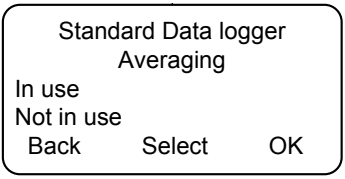
(Setup / Connect 1 / Functions Menu / Data logger)



Standard data logger

(Setup / Connect 1 / Functions Menu / Data logger / Standard data logger)

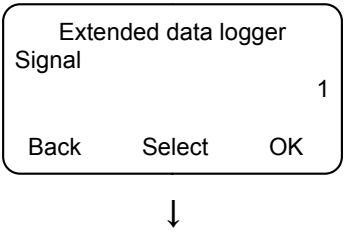
The standard Connect data logger operates with fixed signals and time intervals.

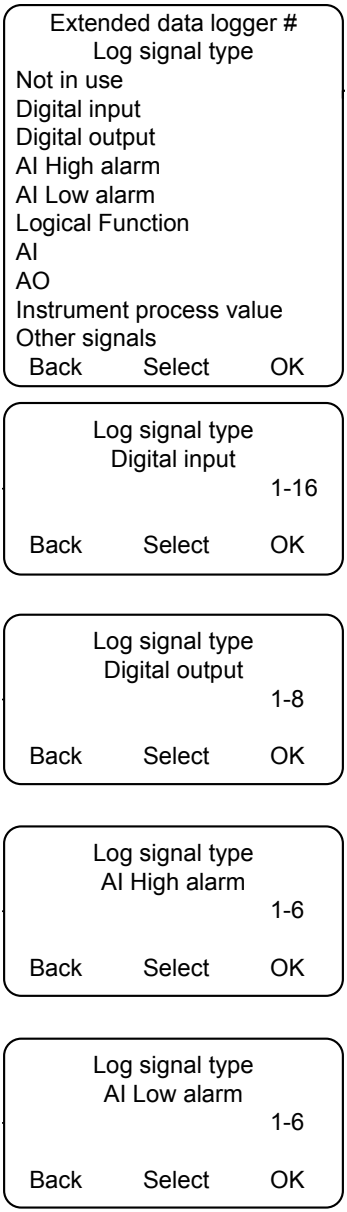


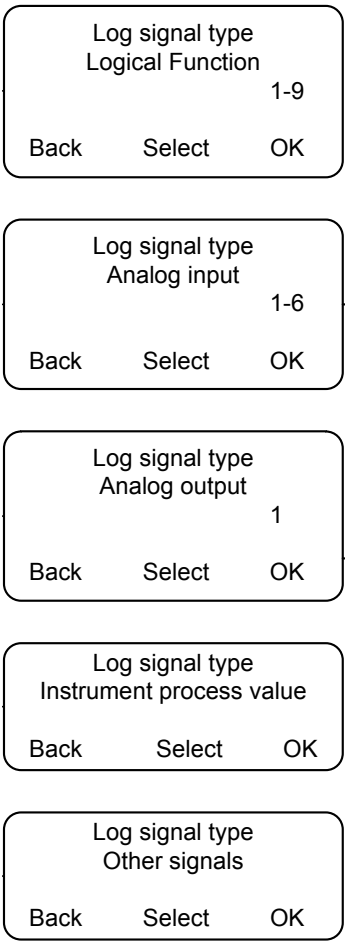
Extended data logger

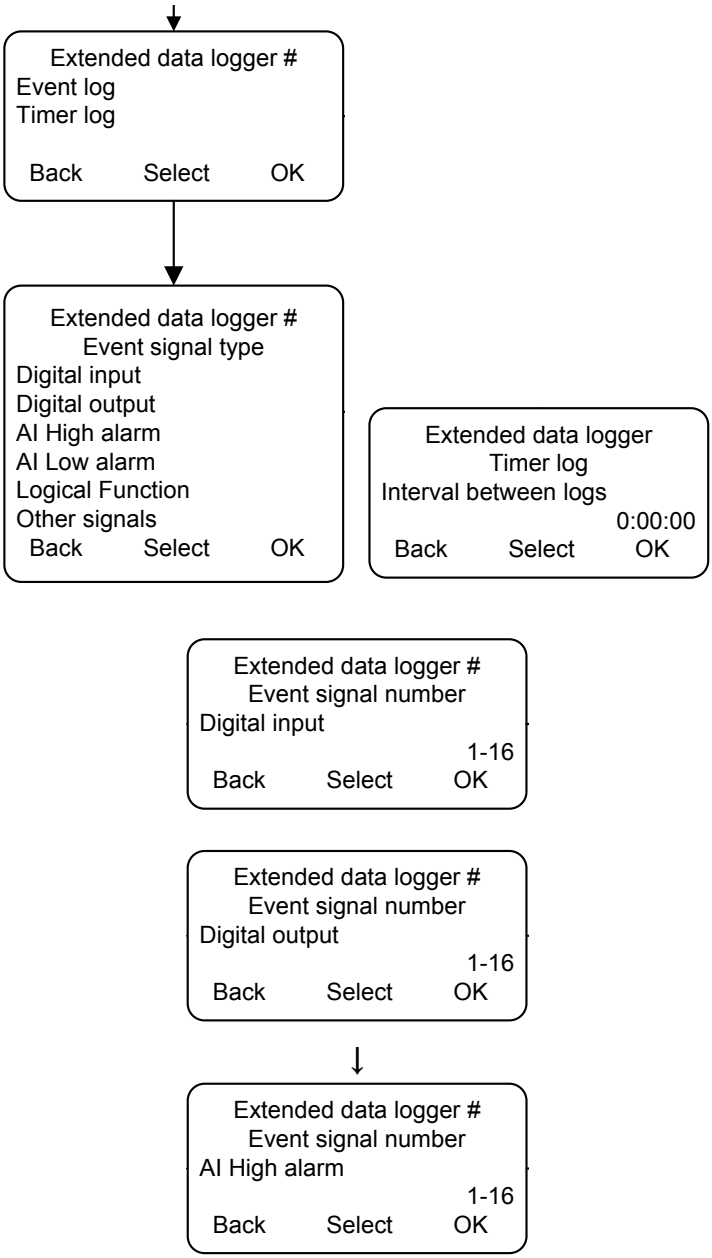
(Setup / Connect 1 / Funktions Menu / Data logger / Extended data logger)

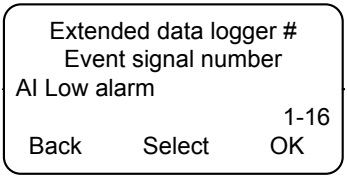
The extended Connect data logger makes it possible to operate with variable signals and time intervals.

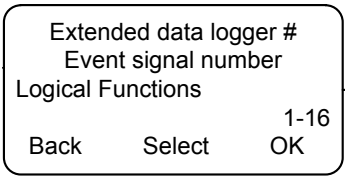


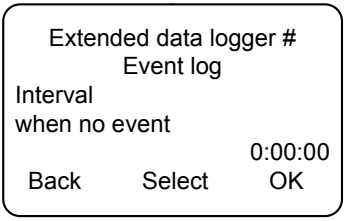

Extended data logger #
Log signal type
Not in use
Digital input
Digital output
AI High alarm
AI Low alarm
Logical Function
AI
AO
Instrument process value
Other signals
Back Select OK
Log signal type
Digital input
1-16
Back Select OK
Log signal type
Digital output
1-8
Back Select OK
Log signal type
AI High alarm
1-6
Back Select OK
Log signal type
AI Low alarm
1-6
Back Select OK


Log signal type
Logical Function
1-9
Back Select OK
Log signal type
Analog input
1-6
Back Select OK
Log signal type
Analog output
1
Back Select OK
Log signal type
Instrument process value
Back Select OK
Log signal type
Other signals
Back Select OK


Extended data logger #
Event log
Timer log
Back Select OK
Extended data logger #
Event signal type
Digital input
Digital output
AI High alarm
AI Low alarm
Logical Function
Other signals
Back Select OK
Extended data logger
Timer log
Interval between logs
0:00:00
Back Select OK
Extended data logger #
Event signal number
Digital input
1-16
Back Select OK
Extended data logger #
Event signal number
Digital output
1-16
Back Select OK
Extended data logger #
Event signal number
AI High alarm
1-16
Back Select OK

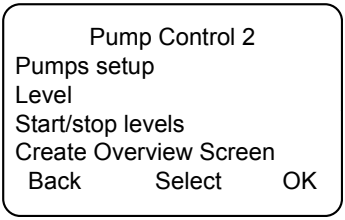

Extended data logger #
Event signal number
AI Low alarm
1-16
Back
Select
OK


Extended data logger #
Event signal number
Logical Functions
1-16
Back
Select
OK


Extended data logger #
Event log
Interval
when no event
0:00:00
Back
Select
OK

Pump Control 2

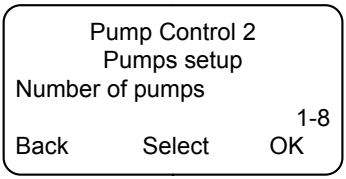
(Setup / Connect 1 / Functions Menu / Pump Control 2)



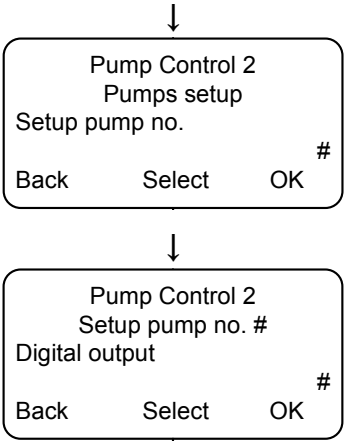
The following menus apply for simple and basic pump controls (as opposed to the previous descriptions of the configuration of “Pump Control 1” on page 58).

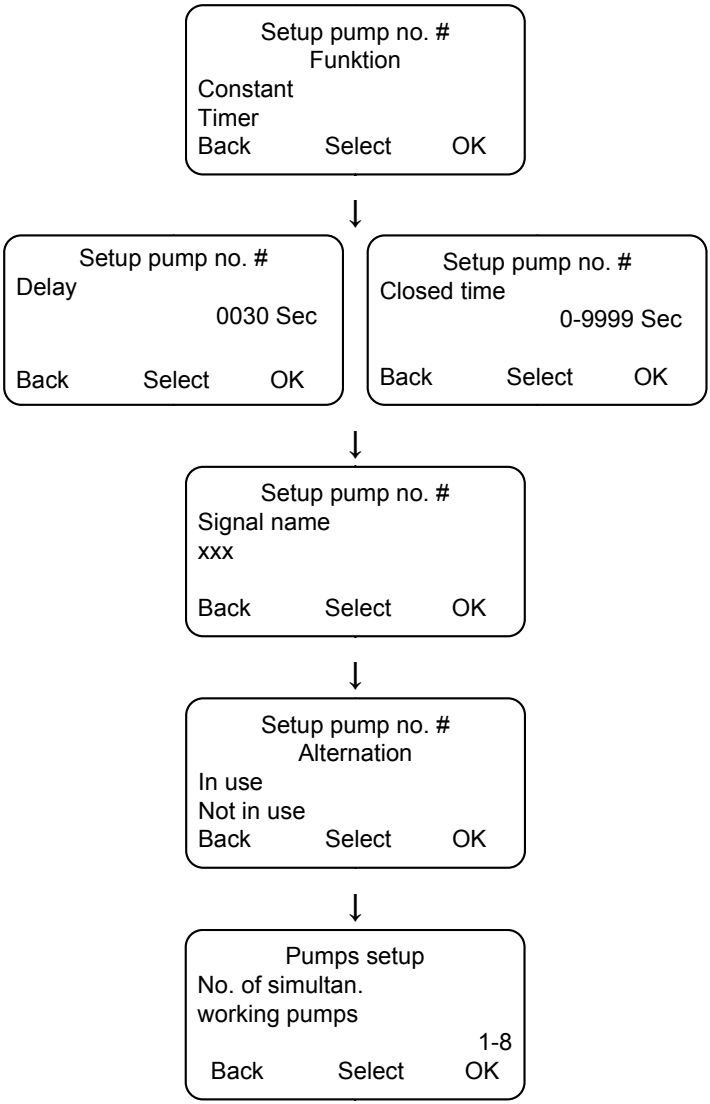
Pumps setup

(Setup / Connect 1 / Functions Menu / Pump Control 2 / Pumps setup)



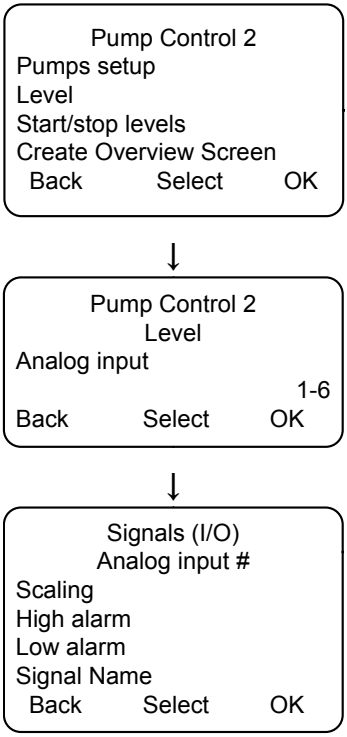
Note that the number of available pumps depends on the I/O board and previously “used” pumps in “Pump Control 1” on page 58.




Setup pump no. #
Funktion
Constant
Timer
Back Select OK
Setup pump no. #
Delay
0030 Sec
Back Select OK
Setup pump no. #
Closed time
0-9999 Sec
Back Select OK
Setup pump no. #
Signal name
xxx
Back Select OK
Setup pump no. #
Alternation
In use
Not in use
Back Select OK
Pumps setup
No. of simultan.
working pumps
1-8
Back Select OK

Level

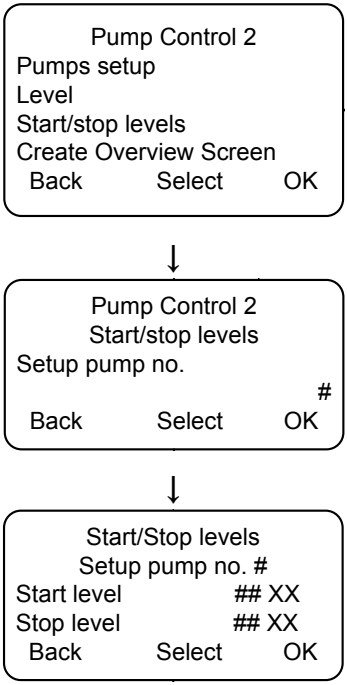
(Setup / Connect 1 / Functions Menu / Pump Control 2 / Level)



The menu for “Signals (I/O), Analog input #” continues as described for “Signals (I/O) / Analog inputs” on page **109**.

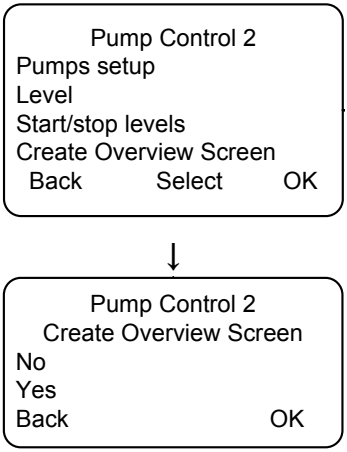
Start/stop levels

(Setup / Connect 1 / Functions Menu / Pump Control 2 / Start/stop levels)



Create overview screen

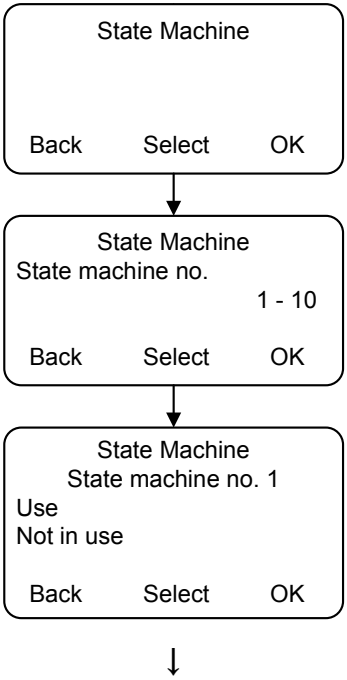
(Setup / Connect 1 / Functions Menu / Pump Control 2 / Create overview screen)



For every main function there is a defined screen configuration that includes the selected number of functions (here: the number of pumps with corresponding I/O's)

State Machine

(Setup / Connect 1 / Functions Menu / State Machine)



Alarm call

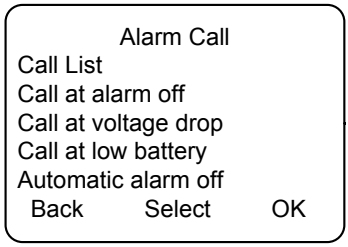
(Setup / Connect 1 / Alarm call)

Alarms have memory and reset functions. This means that when the alarm signal becomes inactive, it is remembered that the signal once had been active. This “active” state must be reset by the user, before a new active signal can be accepted as a valid alarm signal. For both types of signals apply that the number of active conditions and the time interval, in which the signal has been active, will be registered.

If alarm call has been selected, the Connect unit will in case of an alarm call the first number on the call list followed by the next, etc.

If the call is made to a modem, it is the responsibility of a higher ranking main station to reset the alarm and stop the call routine. If the call is made to a SCADA/PC or telephone, the routine is stopped by calling back to the Connect unit. This does not reset the alarms, but stops only the call routine.

If an alarm occurs during a call routine, the call continues without interference. This means that the new alarm is not reported, until a call is sent to the next number in the call list.

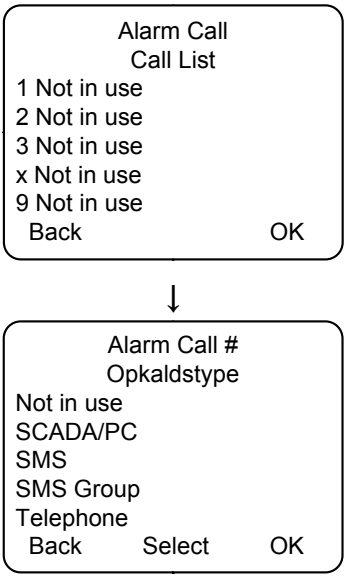


Call list

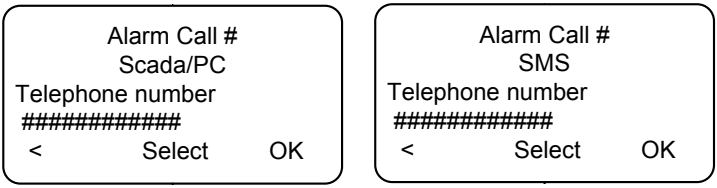
(Setup / Connect 1 / Alarm call / Call list)

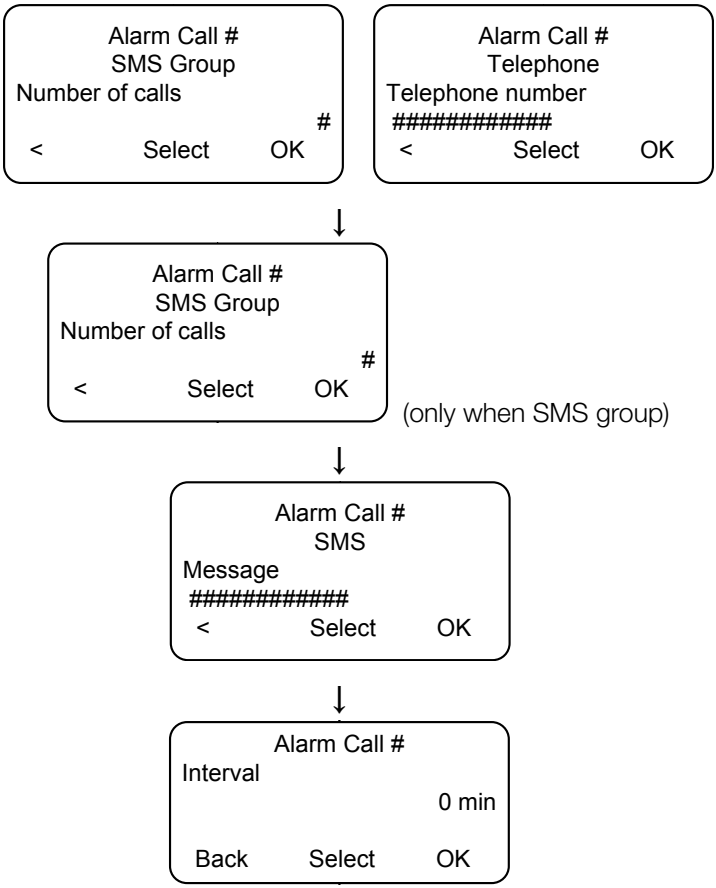
When alarm calls are made, the numbers and the order in which they are called are defined in the call list. It is automatically detected which communication module is connected to the unit.

The menu “Call list” is only available when a PSTN/GSM communication module is connected.



Four different types of calls are available: SCADA/PC, SMS, SMS Group and Telephone.

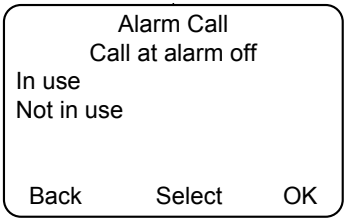



Alarm Call #
SMS Group
Number of calls
#
< Select OK
Alarm Call #
Telephone
Telephone number
#############
< Select OK
Alarm Call #
SMS Group
Number of calls
#
< Select OK
(only when SMS group)
Alarm Call #
SMS
Message
#############
< Select OK
Alarm Call #
Interval
0 min
Back Select OK

Call at alarm off

(Setup / Connect 1 / Alarm call / Call at alarm off)

Alarm calls are processed when the alarm state changes back to normal.

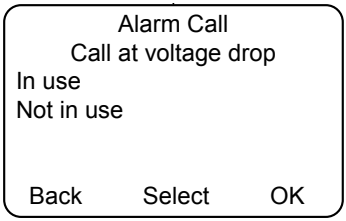


Automatic calling at alarm off can be selected and deselected.

Call at voltage drop

(Setup / Connect 1 / Alarm call / Call at voltage drop)

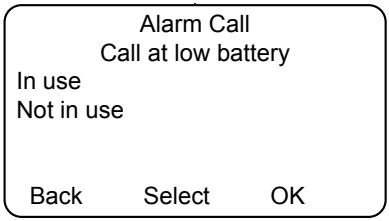
If the mains voltage (115 or 230 VAC) drops below the nominal value, you can activate (use) or deactivate automatic sending of an alarm call.



Call at low battery

(Setup / Connect 1 / Alarm call / Call at low battery)

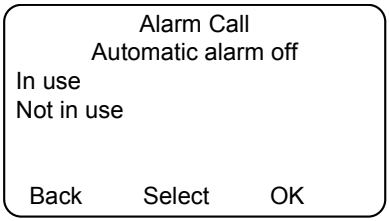
If the battery voltage drops below 11,5 VDC, you can activate (use) or deactivate (not in use) automatic sending of an alarm call.



Automatic alarm off

(Setup / Connect 1 / Alarm call / Automatic alarm off)

If an alarm has not been reset, and additional nine alarms happen, the not-reset alarm becomes the tenth alarm and cannot be seen on the alarm list. It is then automatically reset, if the function “Automatic alarm off” is activated
This function can also be used, if alarms are not acknowledged.

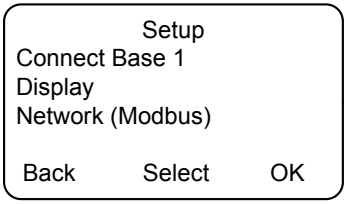


Automatic alarm off can be selected and deselected.

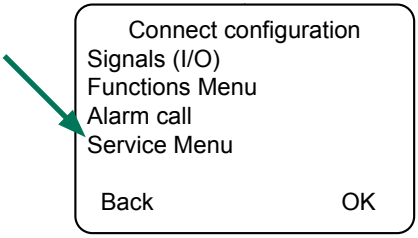
Service Menu

(Setup / Connect 1 / Service Menu)

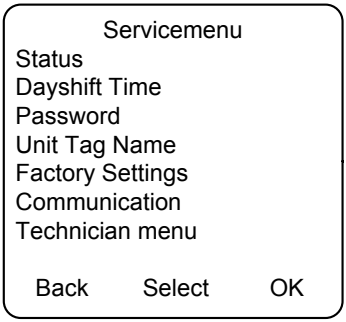
The service menu is intended for calibration, setup and trouble shooting by authorised MJK service personnel.



1. Activate the “Setup” menu, mark for instance “Connect 1” and press OK to select the device.

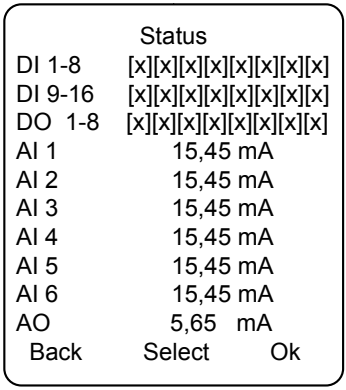


2. Select the “Service Menu” with tools for indication of status, day shift moment, change of unit tag name, return to factory settings, extra tools for service personnel, etc.



Status

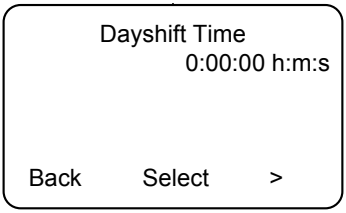
(Setup / Connect 1 / Service Menu / Status)



The ”Status” menu shows which digital inputs and outputs are active, and the signal values of the analog inputs and outputs.

Day Shift Time

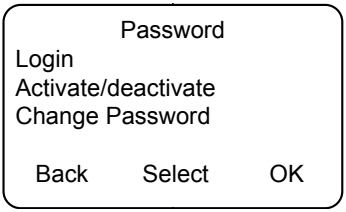
(Setup / Connect 1 / Service menu / Day Shift Time)



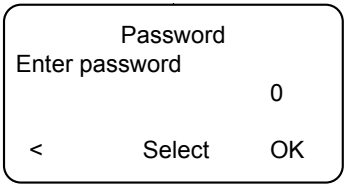
“Day Shift Time” can be applied if you want to shift the time of day for instance in connection with energy optimizing operation during the night.

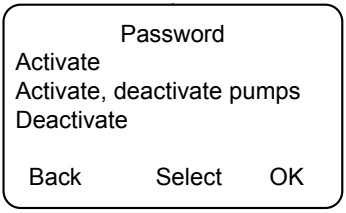
Password

(Setup / Connect 1 / Service Menu / Password)



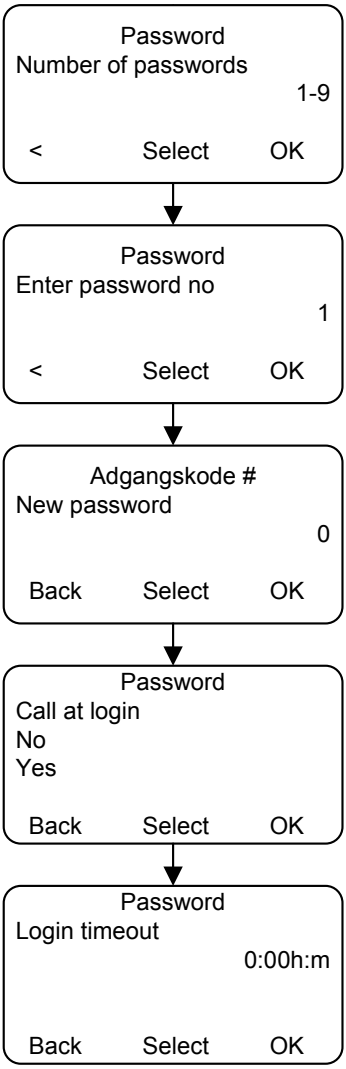
A login password can be requested to ensure authorized access to the Connect unit. A maximum of 20 simultaneous passwords (in the range 0000 - 9999) provides practically all relevant employees with their own password.





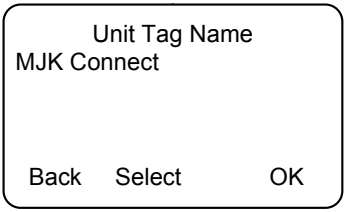
When a valid login password is entered, you can choose to send a message to a SCADA system informing that the Connect is now under local control and who is presently logged on.

When an employee logs out, the Connect can be configured to send a message to the SCADA system about the event. If no logging occurs within a preset time frame (1 - 60 min.), the Connect will likewise send a message to the SCADA system.


Password
Number of passwords
1-9
< Select OK
Password
Enter password no
1
< Select OK
Adgangskode #
New password
0
Back Select OK
Password
Call at login
No
Yes
Back Select OK
Password
Login timeout
0:00h:m
Back Select OK

Unit Tag Name

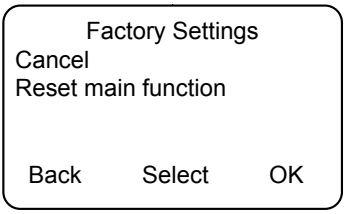
(Setup / Connect 1 / Service Menu / Unit Tag Name)



“Unit Tag Name” provides the opportunity to change the default name “MJK Connect” to an approved name in a larger SCADA system with specific name conventions.

Factory Settings

(Setup / Connect 1 / Service Menu / Factory Settings)

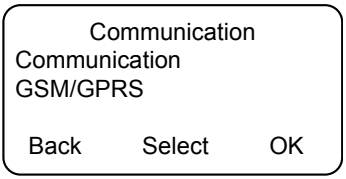


If the Connect configuration gets out of hand, or if you want to change to another main function, the factory main function settings can be restored with “Reset main function”.

“Cancel” is a loop hole, if you unintentionally have ended up in the “Factory Settings” menu.

Communication

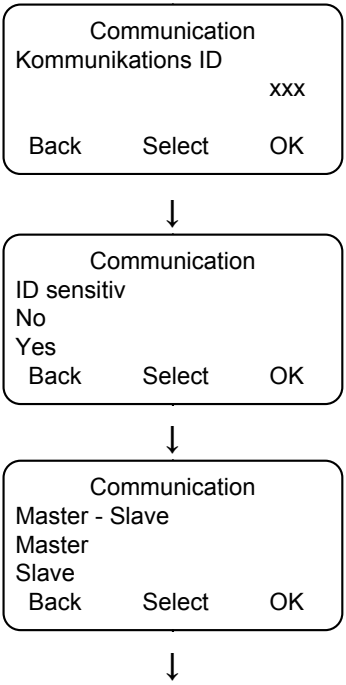
(Setup / Connect 1 / Service Menu / Communication)

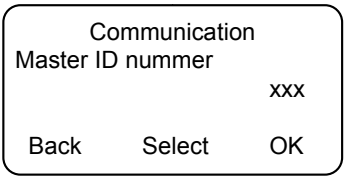


The “Communication” window has two options: “Communication” and “GSM/GPRS”.

Communication

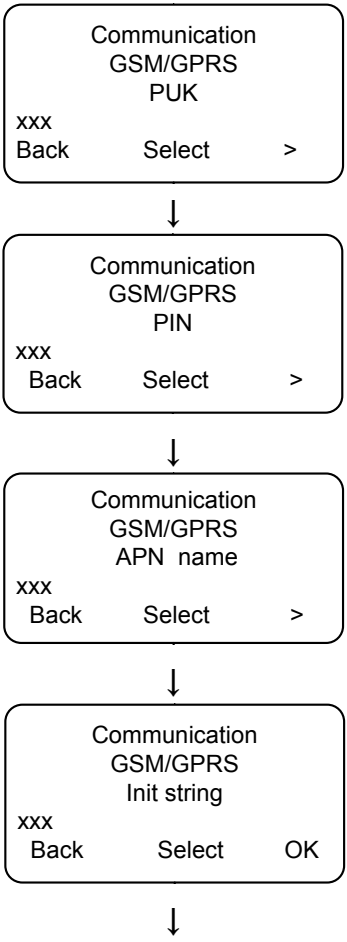
(Setup / Connect 1 / Service Menu / Communication / Communication)

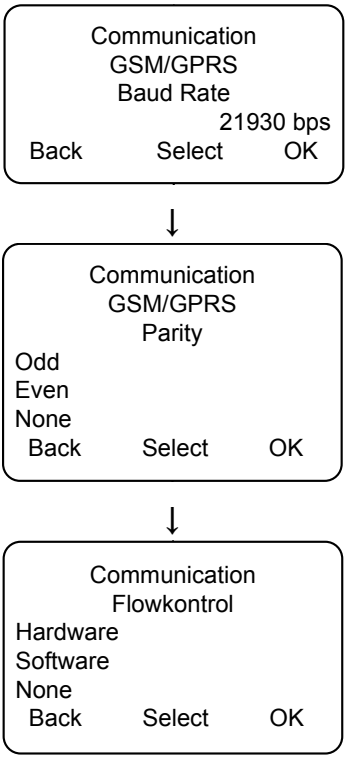




GSM/GPRS

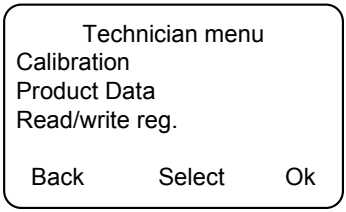
(Setup / Connect 1 / Service Menu / Communication / GSM/GPRS)




Communication
GSM/GPRS
Baud Rate
21930 bps
Back Select OK
Communication
GSM/GPRS
Parity
Odd
Even
None
Back Select OK
Communication
Flowkontrol
Hardware
Software
None
Back Select OK

Technician Menu

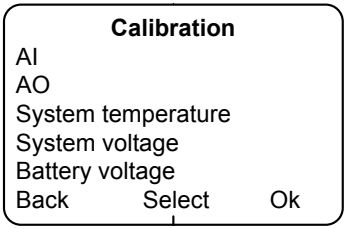
(Setup / Connect 1 / Service Menu / Technician Menu)



The “Technician Menu” window has three options: “Calibration”, “Product data” and “Read/write reg.”.

Calibration

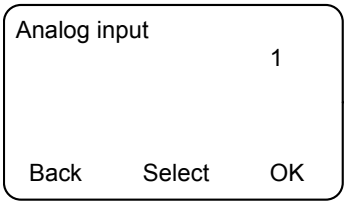
(Setup / Connect 1 / Service Menu / Technician Menu / Calibration)



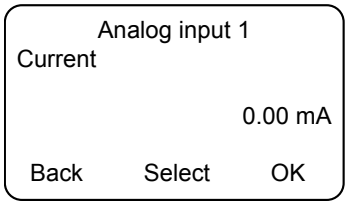
Press the up/down keys to highlight the required menu line and press OK to select the menu.

AI

(Setup / Connect 1 / Service Menu / Technician Menu / Calibration / AI)

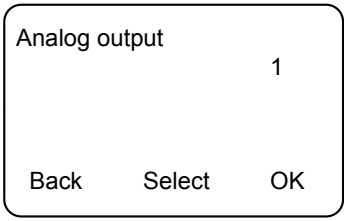


Apply a well-defined current to the analog input (for example 10.00 mA measured at the input with a calibrated digital multi-meter) and then enter the exact value.

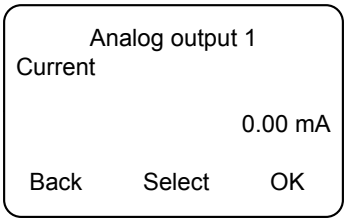


AO

(Setup / Connect 1 / Service Menu / Technician Menu / Calibration / AO)

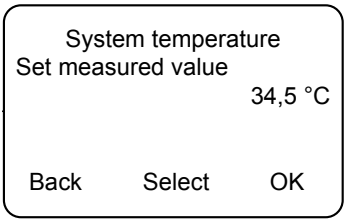


Apply a well-defined current to the analog output (for example 10.00 mA measured at the output with a calibrated digital multi-meter) and then enter the exact value.



System temperature

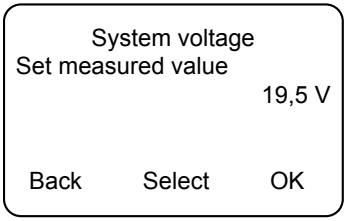
(Setup / Connect 1 / Service Menu / Technician Menu / Calibration / System temperature)



The system temperature is set to the measured temperature from a calibrated, digital thermometer.

System voltage

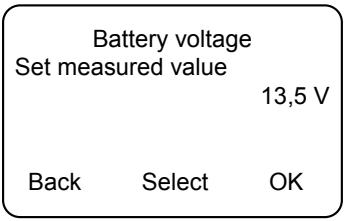
(Setup / Connect 1 / Service Menu / Technician Menu / Calibration / System voltage)



The system voltage is set to the measured voltage from a calibrated, digital multi-meter.

Battery voltage

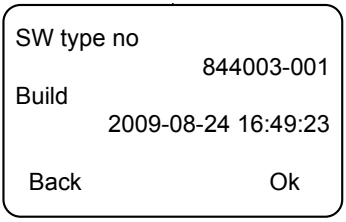
(Setup / Connect 1 / Service Menu / Technician Menu / Calibration / Battery voltage)



The battery's voltage is set to the measured voltage from a calibrated, digital multi-meter.

Product data

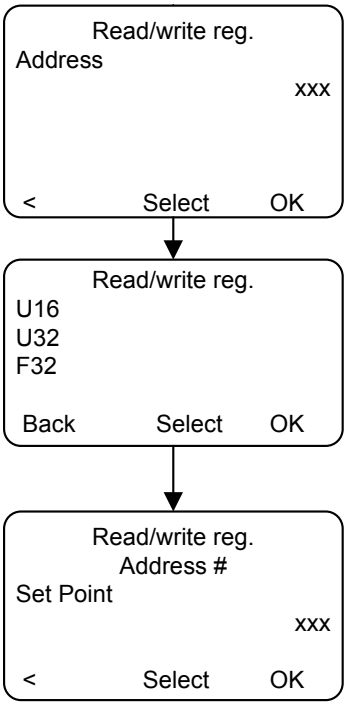
(Setup / Connect 1 / Service Menu / Technician Menu / Calibration / Product data)



The software version and build date can be read in connection with troubleshooting and/or a planned update.

Read/write reg.

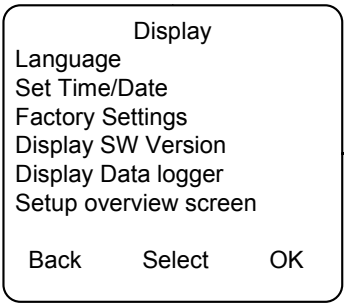
(Setup / Connect 1 / Service Menu / Technician Menu / Calibration / Read/write reg.)



You can both read and write in the Connect registers. This functionality can for instance be used to synchronize two different counters.

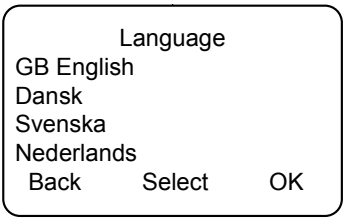
Display

(Menu / Display)



Language

(Menu / Display / Language)



Press the up/down keys to highlight the required language and press OK to select it. The options are:

Dansk, Svenska, Nederlands

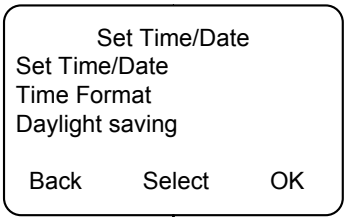
The above languages can be selected through “Languages” from the English standard configuration.

GB English

English is the factory set language version.

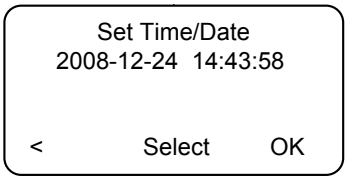
Set Time/Date

(Menu / Display / Set Time/Date)



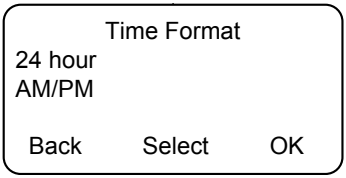
Press the up/down keys and OK to select the required time format.

Set Time/Date



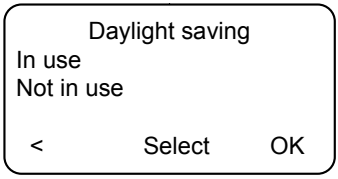
The format is: YYYY-MM-DD hh: mm: ss

Time Format



24 or 12-hour indication of time can be selected.

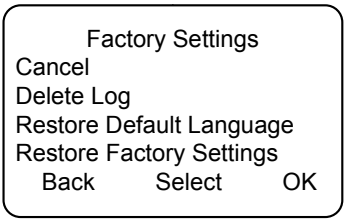
Daylight saving



Automatic daylight saving adjustment can be selected/deselected.

Factory settings

(Menu / Display / Factory settings)



Press the up/down keys to highlight the desired option and press OK to select it. The options are:

Cancel

Leave the menu without any changes.

Delete log

Delete and erase the log (cannot be undone!)

Restore Default Language

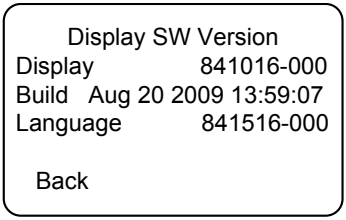
Return to the factory-installed language: GB English

Restore Factory Settings

If the current configuration does not fully function, or if the system hangs, or if you want to return to the “Main Functions” menu (see also page 56), it is possible to restart with the default factory settings.

Display SW Version

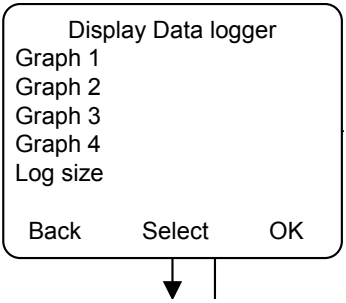
(Menu / Display / Display SW Version)



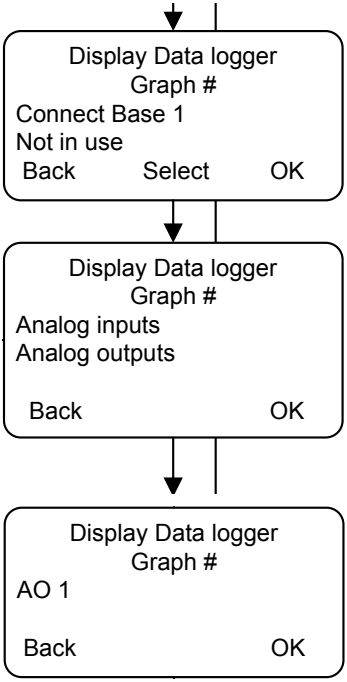
The display software (firmware) version, build date/time and the language version are shown.

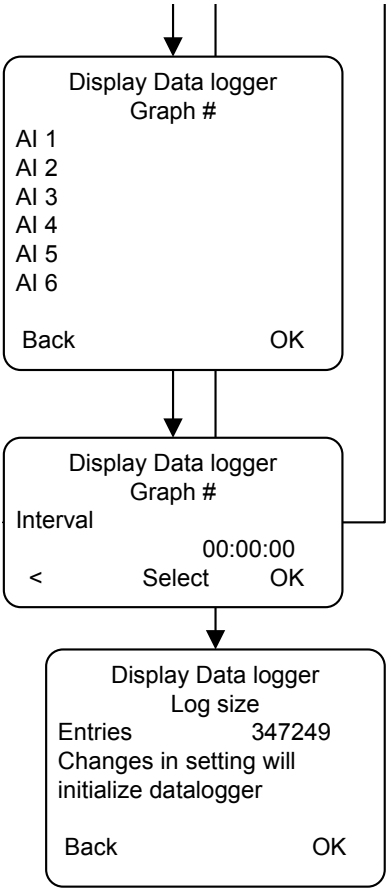
Display Data Logger

(Menu / Display / Display Data Logger)



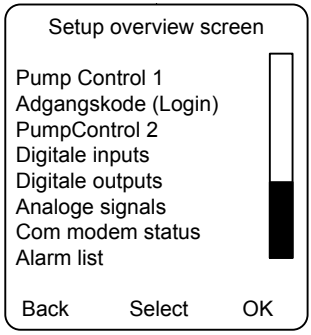
For each of the four graphs it is possible to define in use/not in use and analog inputs and outputs.




Display Data logger
Graph #
AI 1
AI 2
AI 3
AI 4
AI 5
AI 6
Back
OK
Display Data logger
Graph #
Interval
00:00:00
<
Select
OK
Display Data logger
Log size
Entries
347249
Changes in setting will
initialize datalogger
Back
OK

Setup overview screen

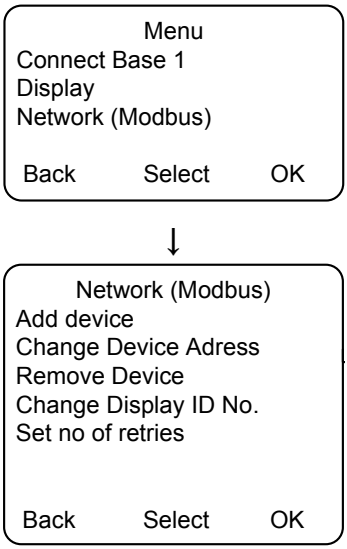
(Menu / Display / Setup overview screen)



Press the up/down keys to highlight the required overview screen and press OK to select it; for example “Pump Control 2”.

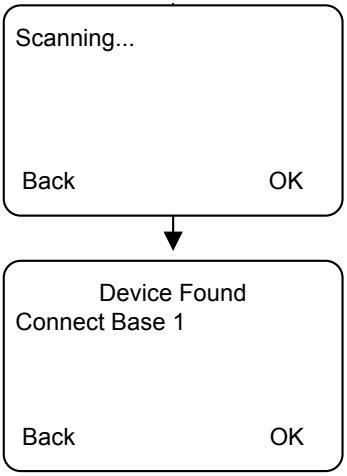
Network (Modbus)

(Menu / Network (Modbus))



Add device

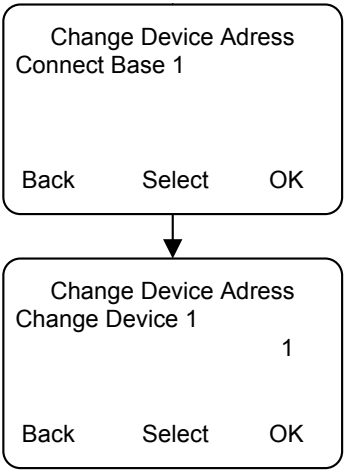
(Menu / Network (Modbus) / Add device)



Connect scans the system/network and displays the identified units.

Change Device Address

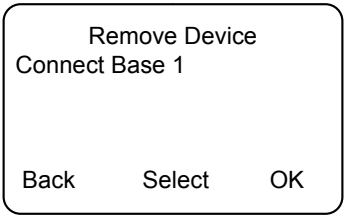
(Menu / Network (Modbus) / Change Device Address)



Press the up/down keys to highlight the required device and press OK to change its ID number.

Remove device

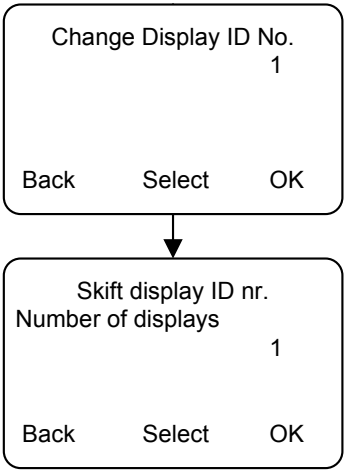
(Menu / Network (Modbus) / Remove device)



Press the up/down keys to highlight the required device and press OK to remove it.

Change display ID No.

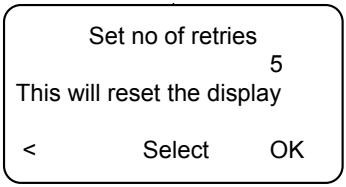
(Menu / Network (Modbus) / Change display ID No.)



Press the up/down keys to highlight the required action and press OK to enter the number of display units (for example “2” if you have one Connect, one MagFlux with display and two MagFlux devices without a display).

Set no. of retries

(Menu / Network (Modbus) / Set no. of retries)



Retransmission may be needed in connection with noise over the line to remote units and a Modbus time-out.

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8. Mechanical dimensions

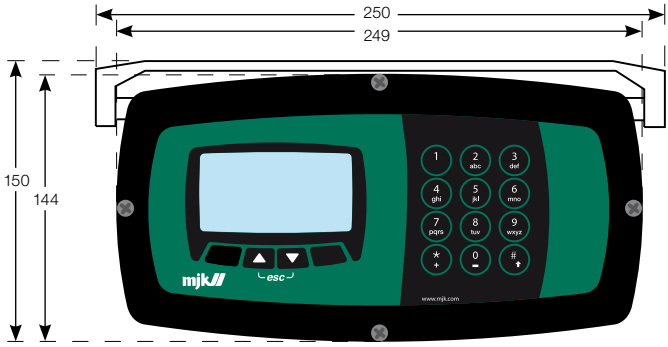


Figure 17. Mechanical Dimensions - Height x width

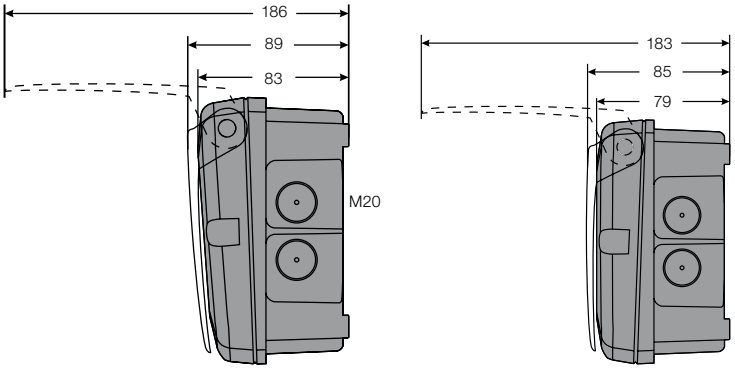


Figure 18. Mechanical Dimensions - Depth

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9. Maintenance

The Connect unit requires no maintenance as such, but it should still be cleaned frequently to maintain proper readability of the display. MJK recommends a solution of mild soap and lukewarm water.

Service Agreement

A service agreement ensures the operational reliability and accuracy of the equipment. Contact your regional or national MJK sales and service representatives for a service agreement based on regular service visits.

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MJK Automation A/S are liable to the common rules of Danish law on product liability, however, the liability is reduced to coverage of our public liability insurance of products. To the extent where nothing else follows in lines of invariable rules of law, we are not liable for loss of profits and working deficits or other indirect losses.

Changes

As our products are developed continuously, we reserve the right to make any alterations without prior notice..

MJK Automation A/S
DK: +45 45 56 06 56
NO: +47 69 20 60 70
SE: +46 53 31 77 50
NL: +31 251 672171
IRL: +353 879535625
USA: +1 847 482 8655
AUS: +61 3 9758 8533

Connect®

Controller and RTU Unit



Installation and User Manual

Vol. II

Declaration of Conformity

Konformitetserklæring

Vi, MJK Automation A/S, DK-2850 Nærum, påtager os det fulde ansvar for at produktet

Declaration of Conformity

We, MJK Automation A/S, DK-2850 Nærum, declare under our sole responsibility that the product

Konformitätserklärung

Wir, MJK Automation A/S, DK-2850 Nærum, erklären in alleiniger Verantwortung, dass das Produkt

Connect®

Data Transmitter

som denne erklæring angår, er i overensstemmelse med følgende standard(er) eller andre normdokument(er).

EN61000-6-3/-4:2001, EN61000-6-1/-2:1999

efter bestemmelserne i direktiv

89/336/EEC; 92/31/EEC

to which this declaration relates is in conformity with the following standard(s) or other normative document(s).

EN61000-6-3/-4:2001, EN61000-6-1/-2:1999

following the provisions of Directive

89/336/EEC; 92/31/EEC

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EN61000-6-3/-4:2001, EN61000-6-1/-2:1999

Gemäss den Bestimmungen der Richtlinie

89/336/EEC; 92/31/EEC

Declaration de conformite

Nous, MJK Automation A/S, DK-2850 Nærum, déclarons sous notre seule responsabilité que le produit

Dichiarazione di conformità

Noi, MJK Automation A/S, DK-2850 Nærum, dichiariamo sotto la nostra esclusiva responsabilità che l'apparecchio

Declaración de Conformidad

Nosotros, MJK Automation A/S, DK-2850 Nærum, declaramos bajo nuestra única responsabilidad que el producto

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auquel se réfère cette déclaration est conforme á la (aux) norme(s) ou autre(s) document(s) normatif(s)

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conformément aux dispositions de Directive

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conformemente alla disposizioni della Direzione

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EN61000-6-3/-4:2001, EN61000-6-1/-2:1999

según las disposiciones de la(s) directiva(s)

89/336/EEC; 92/31/EEC

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Appendix A. Pop-up and Error Messages

Alarms	
Current over range	**Alarm** - The mA connection has exceeded the 4 - 20 mA range. For example 3,5 or 20,5 mA.
Factory reset occurred	**Alarm** - A factory reset has occurred. Some settings have changed. Check all used settings.
High alarm	**Alarm** - The high limit has been detected.
Low alarm	**Alarm** - The low limit has been detected.
mA connection	**Alarm** - The mA connection is not connected. If the current-out is used, deactivate mA Current out to stop this alarm.
Error messages	
EEPROM write error	**Error** - EEPROM write error. If error keeps popping up, contact MJK.
System	**Error** - Internal VCC error. See the event log for details.
System error	**Error** - The system software is inoperable including faulty alarm and sensor bits. Contact MJK.
Warnings	
-	-
-	-

Info	
System reset occurred	**Info** - The converter has been subject to a software or hardware reset.
USB	
Flash programming please wait	Programming is in progress but not finished.
Flash programming done	Programming is finished.
Flash crc error	Cyclic redundancy check error.
Unknown command flash user text	Invalid command issued.
Flash address overrun	A write error has occurred.
File phase error	Internal USB error.
File write failure	A write error has occurred.
USB protocol overrun	A communication error has occurred.

Appendix B. MJK-Field Link Software

MJK-Field Link Software contains many update functions which will be described in further details on the following pages.

The Connect base, the display unit, and the language function can be updated separately. However, after a display unit update the language function must be reinstalled.

A. Connect a PC to the Connect base
B. Update base firmware
C. Connect a PC to the Connect display unit
D. Save log data
E. Update display firmware
F. Update language firmware

Important !

- **All screen configurations are deleted** when installing new firmware! See procedure A, step 8, on page **183** on how to save the current screen configuration.
- Existing log data can/must be saved in a file before installing new firmware! See procedure “D. Save log data” on page **187**.
- Wait until all transfer functions and programming functions are completed before disconnecting and reconnecting the USB link. If an ongoing update (particularly Flash programming) is interrupted from the outside, it may result in system halt, and a MJK service technician must be contacted!
- A precondition for using the MJK-Field Link is a Java configured PC. If this is not the case, the MJK-Field Link CD contains a folder named “Java offline install” with the appropriate files.

A. Connect a PC to the Connect base

1. Insert the MJK-Field Link CD in the PC. Shortly after the opening menu will appear.



Figure 19. Field Link Opening Menu

If the auto-run function does not start, locate the file “MJK-Field-Link-0xx.exe” (for example MJK-Field-Link-003.exe) and click “Run”.

2. Loosen the four screws that secure the display unit (the front panel) and remove it.
3. Connect a USB mini A/B cable to the mini USB female B connector at the top and in the middle of the main circuit board (next to the display cable).
4. Connect the other end of the USB cable (max 4.7 meters) to the PC.
5. Select “File” in the menu and click “Mount USB”.



Figure 20. Mount USB

6. If required, you can synchronize the Connect with the PC:



Figure 21. Synchronize Device Time?

7. Once the connection has been established, the link status will be shown in the display:



Figure 22. Link Status Display

8. If you want to save the current display screen setting as a backup, or to install it on other displays, select “File/Read Settings” and save the configuration as a binary file. The opposite function, “File/Write Settings”, copies the configuration from a saved binary file to a connected Connect.



Figure 23. Save Screen Configuration

B. Update Base Firmware

1. Select the ”Firmware” menu and click ”Connect”.



Figure 24. Firmware/Connect

2. Search and locate the new base firmware in hex format (or contact MJK Support for a valid file).

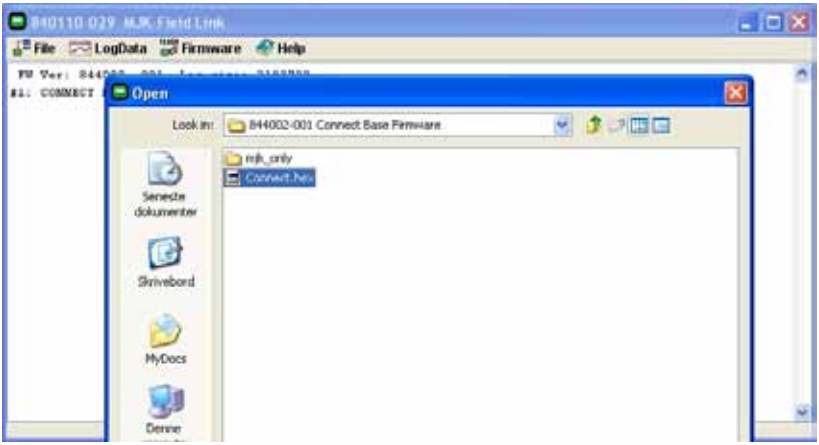


Figure 25. Locate Base Firmware

3. Confirm Flash updating and keep the log file if required,



Figure 26. Connect Flash Updating

and follow the progress on the display (see following screen picture).



Figure 27. Transferring Firmware

4. After a couple of minutes the transfer and update are complete (”Programming CONNECT Unit . . . Done”).

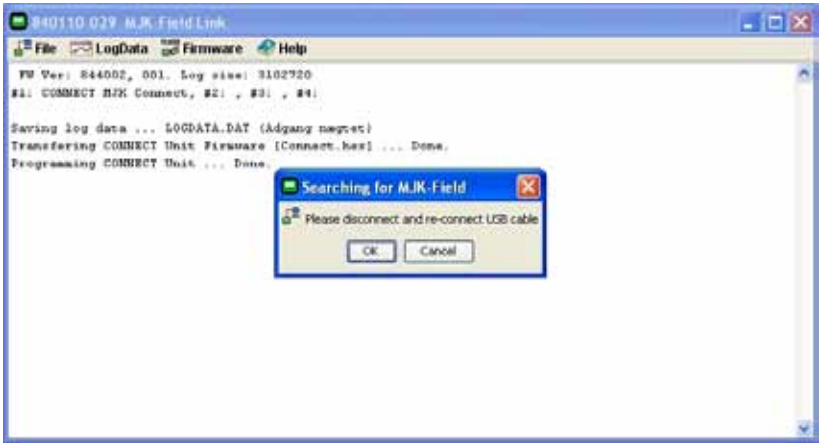


Figure 28. Programming Done

5. Disconnect and reconnect the USB link as requested and click “OK”. The newly installed firmware version will then appear near the bottom of the screen, for example:

FW Ver. 844002, 001. Log size: 3102720

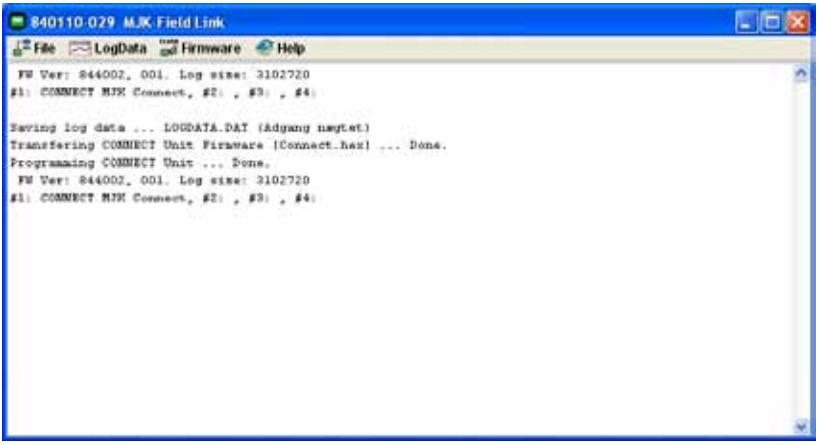


Figure 29. Firmware Status

C. Connect a PC to the Connect display unit

1. Remove the USB cable from the Connect main PCB and connect instead to the USB female-B connector on the back of the display unit.

D. Save Log Data

1. Select ”LogData” and click ”Save Log to File”.

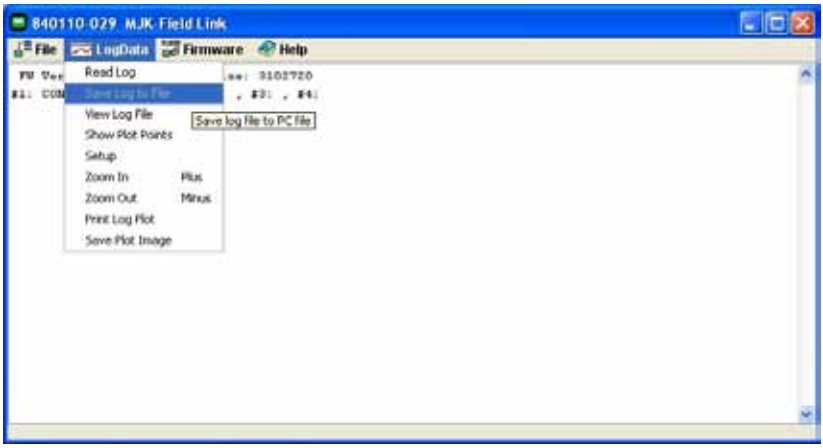


Figure 30. Save Log to File

2. Assign a filename, go to the file destination and click “Save”.

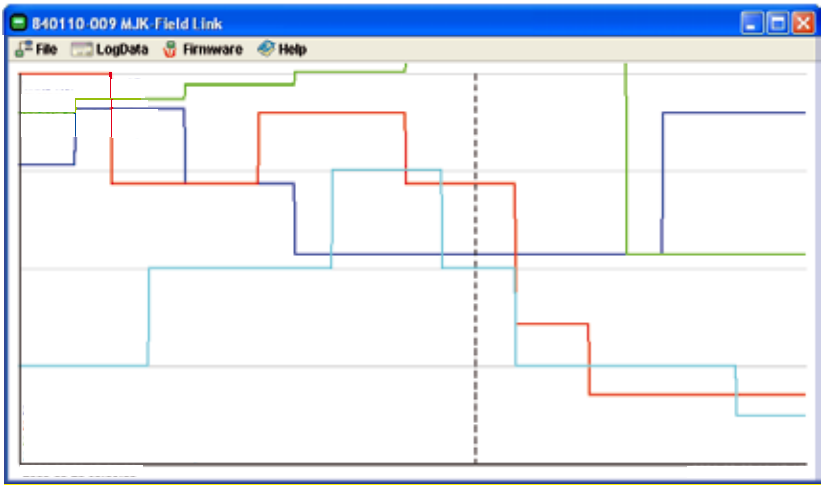


Figure 31. Save

E. Update Display Firmware

1. Select ”Firmware” and click ”Display”.



Figure 32. Firmware/Display

2. Search and locate the new display firmware in hex format (see example ”841014-008 Display firmware 2009-03-02.hex” below).

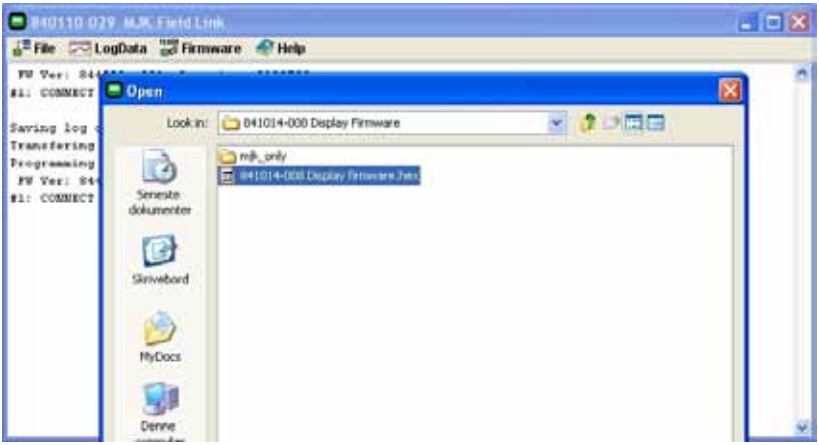


Figure 33. Locate Firmware

3. Confirm file transfer and follow the progress on the screen.



Figure 34. Confirm File Transfer

4. Once the display firmware is transferred, the log file can be kept if required, and the display unit is subsequently programmed. Expect this process to take a couple of minutes.

IMPORTANT: DO NOT disconnect until the Connect display has stabilized completely. Programming takes a couple of minutes during which the MJK logo and the new link status is shown on the PC display.

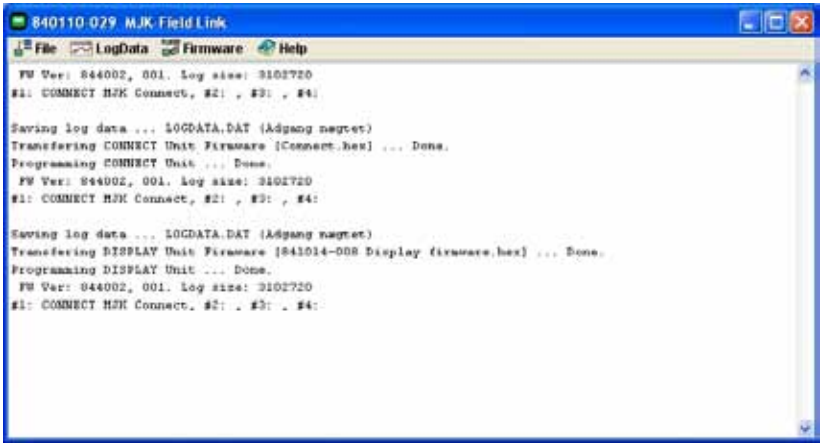


Figure 35. Field Link Status

5. If required, you can adjust the contrast of the Connect display unit by pressing the two outer keys simultaneously (shown with arrows) and then pressing the up/down keys as needed.



Figure 36. Contrast Setting

6. Save the new setting by pressing the two outer keys simultaneously once again.

F. Update Language

All languages will be deleted during a display firmware update. As a consequence the required languages need reinstalling.

1. Select ”File” and click ”Languages”

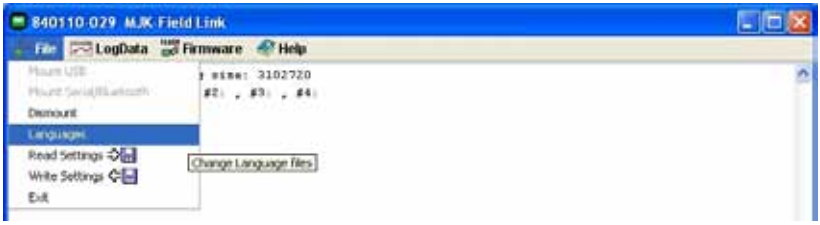


Figure 37. File/Languages

2. A dialog box appears showing the status of the installed languages (there are no installed languages after a firmware update).



Figure 38. Language Status

3. Click “Add”, locate the desired language text file or language pack on the CD (for example ”841514-008 Text file 2009-04-02.txt”) and click “Open”.

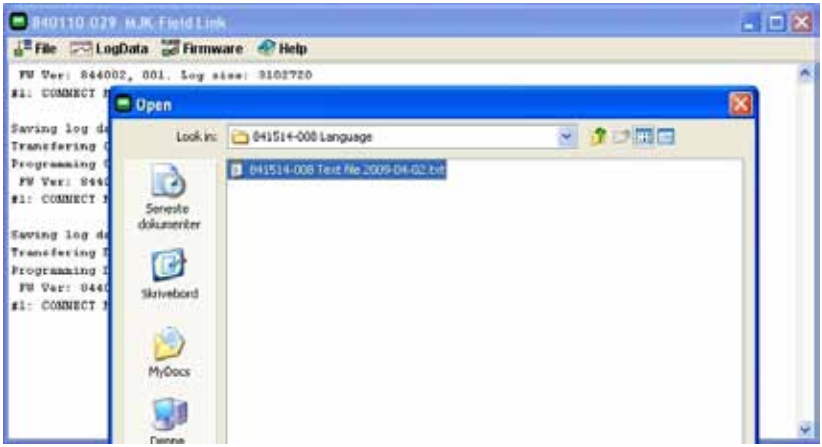


Figure 39. Select a Language Text File

4. Select a language or a language pack (Connect) from the dialog box and click “OK”.

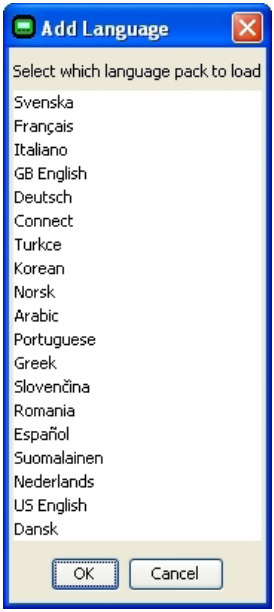


Figure 40. Add Language/Language Pack

5. The selected languages are then transferred and installed. If required, it is possible to remove languages from the list with “Delete” and “Close”.

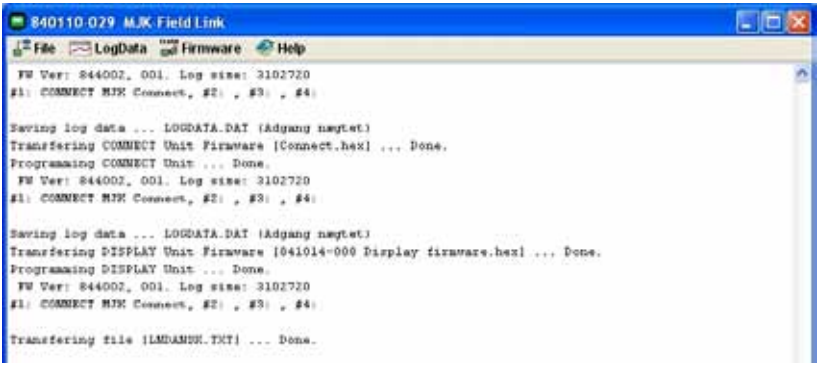


Figure 41. Update Status

6. Select “Dismount USB” followed by “Exit” to finish the Connect firmware update:



Figure 42. Finishing the Update

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Appendix C. Log Files

The Connect log file shown below is the result of a csv file (see “Save Log Data” procedure on page **187**) which has been opened with the spreadsheet utility Microsoft® Excel®. The example illustrates four ***MagFlux***® units connected to a Connect unit which are logging every 10 seconds.

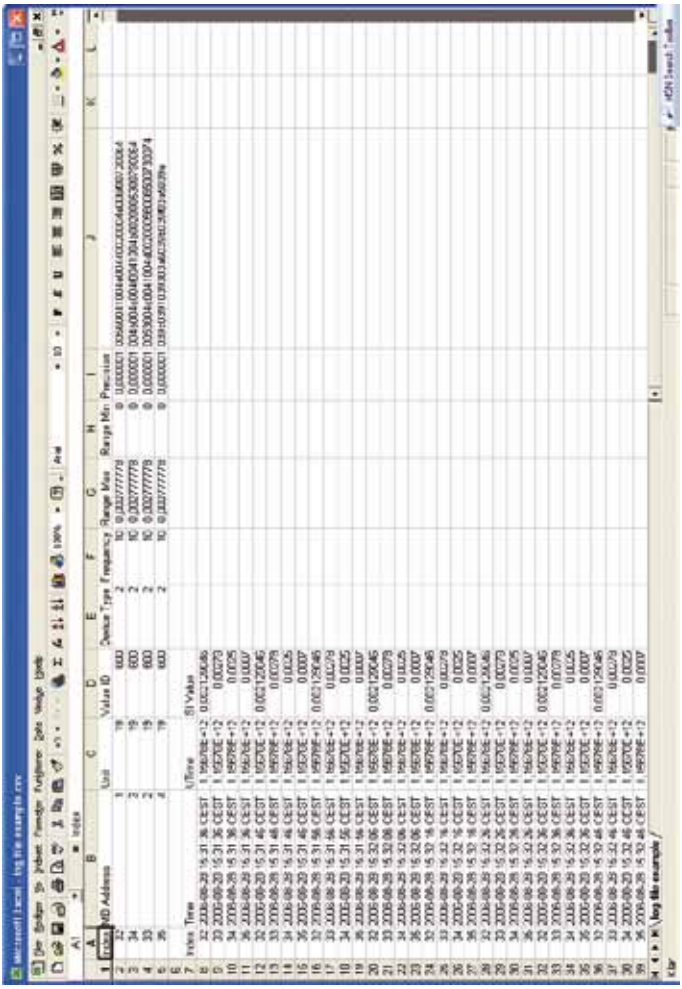


Figure 43. Example Log File

The parameters/values are described on the following page.

Index Converter ID (here four converters: 32, 33, 34 and 35)

MB Address Modbus address (here: 1, 2, 3 and 4)

Unit SI unit according to MJK's device codes (here: 19 = m^3/h)

MJK Device Codes		
Code no.	**Unit**	
16	GPM	gallons per minutte
17	l/min	liters per minutte
19	m^3/h	cubic meters per hour
23	MGD	million gallons per day
24	l/sec	liters per second
28	m^3/sec	cubic meters per second
57	%	percentage
95	mg/l	milligrammes per litre
96	kg/l	kilograms per litre
97	g/l	grammes per litre
130	ft^3/h	cubic feet per hour
138	l/h	liters per hour
139	ppm	parts per million
246	NTU	Nephelometric Turbidity Units
248	FNU	Formazin-Nephelometric Units
249	EBC	European Brewery Convention
250	FTU	Formazin Turbidity Units

Figure 44. MJK Device Codes

Value ID Modbus address for flow (here: 600)

Device Type Device type (here: 2 = MagFlux)

MJK Device Type Codes	
Kode nr.	**Enhed**
1	Display device
2	MagFlux electro-magnetic flow meter
3	Connect data transmitter
4	702 Comtroller
5	Shuttle level transmitter
6	pHix pH-transmitter
7	Redox
8	Expert pressure transmitter
9	SuSix
10	Field log
11	Oxix dissolved oxygen transmitter

Figure 45. MJK Device Type Codes

Frequency	Log interval in seconds (here: 10 seconds)
Range Max	Maximum value for graph
Range Min	Minimum value for graph
Precision	The accuracy of the SI value
Column J	Sensor name as entered by the user
Time	Date and time in Central European Standard Time (CEST)
UTime	Time in UNIX format. Number of seconds elapsed since 00:00 1 January 1970.
SI Value	The value in SI units (**S**ystème **I**nternational d'Unités)

Do the following to plot the log file's data:

1. Run Excel and open the csv log file.
2. Sort according to "Index", click on the "Diagram Guide" tool in the tool menu, and select the required curve or graph format (see example below).

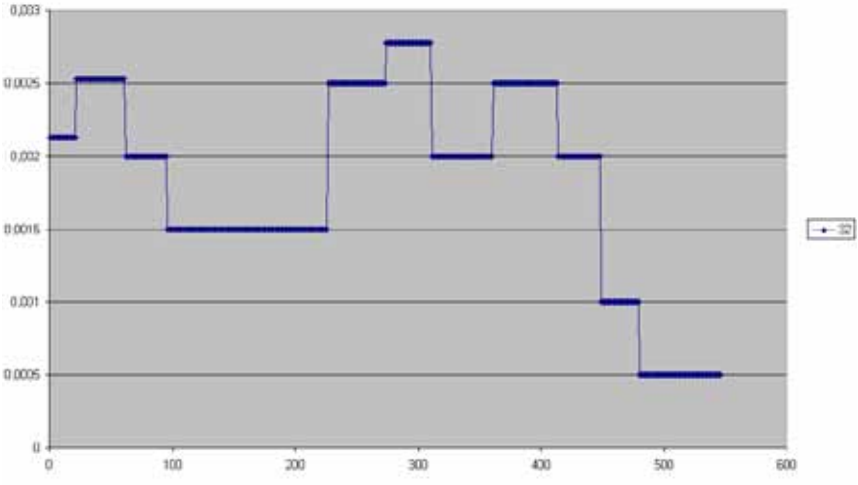


Figure 46. Graphical Display of Log File Data (in Excel)

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Appendix D. MJK Instrument Link Software

MJK Instrument Link software is a configuration and utility program for downloading, changing, saving and uploading Connect configurations from and to a Windows based PC.

A detailed description of the Instrument Link user interface is contained in the manual “MJK Instrument Link Utility”.

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Appendix E. Front Panel Cut-out Template

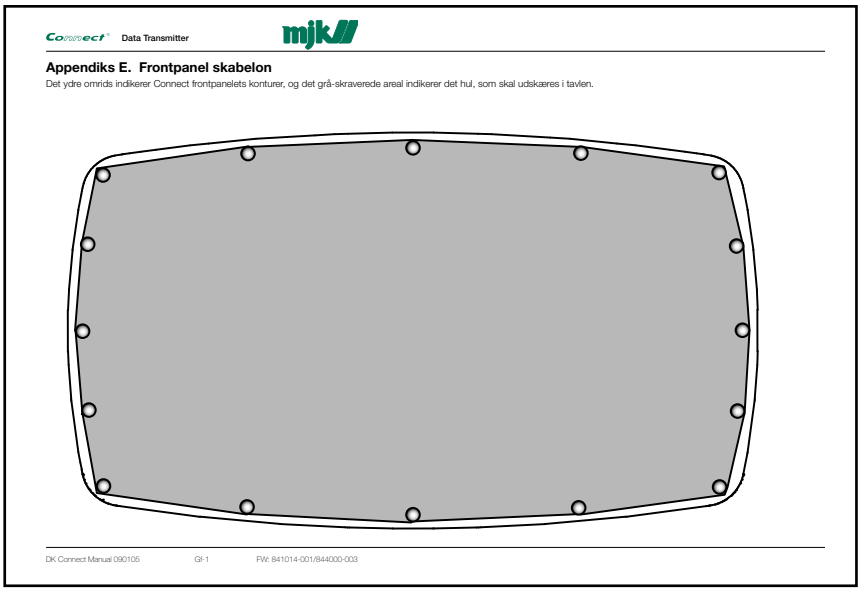


Figure 47. Front Panel Cut-out Template

The shown template is **not** in 1:1 ratio. It merely illustrates how a 1:1 ratio template can be made on for example a size A3 piece of paper.

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Appendix F. Energy optimization - an example

With the Connect as the central controlling unit it is possible to do energy optimization at pumping stations. The only demands are a frequency converter for every pump, an electro-magnetic flow transmitter on the outlet tube from the pumping station, and an accurate level meter.

With benefit the MJK MagFLux electro-magnetic flow meter can be used to communicate through the Modbus protocol which is standard in both Connect and MagFlux. Several frequency converters on the market can be delivered with a Modbus communication module.

The example on page **204** uses the following hardware:

- 1 pc. MJK Connect unit with a GSM/GPRS modem
- 1 pc. MJK MagFlux flow transmitter unit without display
- 1 pc. MJK Expert pressure transmitter 7060 unit
- 2 pcs. Danfoss VLT FC202 Aqua Drive frequency converters

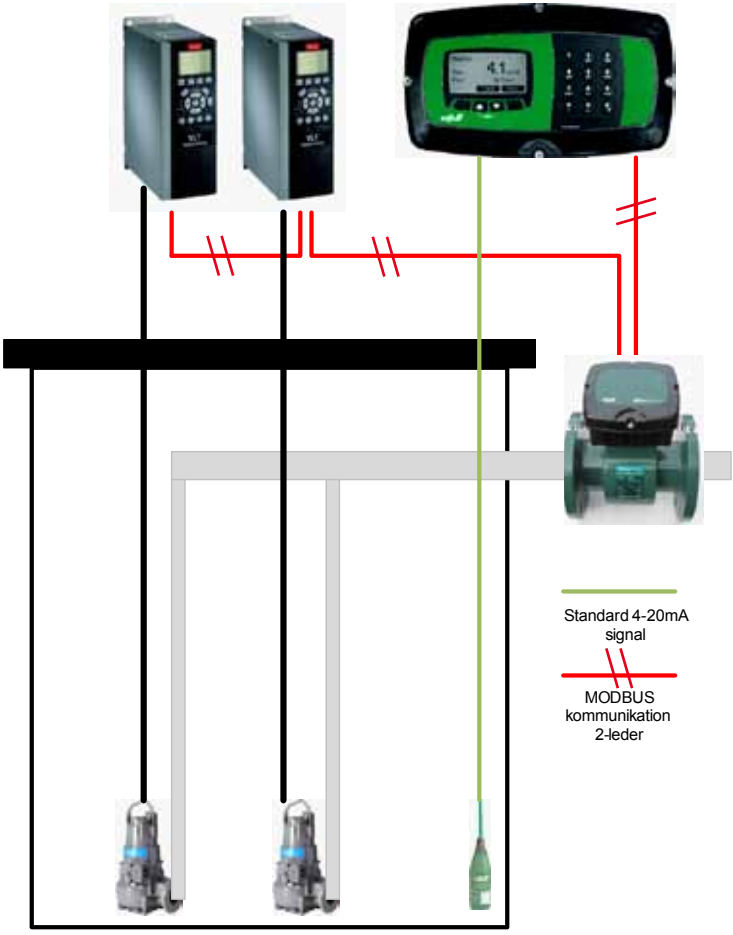


Figure 48. Example of Energy Optimization

The Modbus signals are brought to the devices through a standard 2-conductor, pair twisted cable with covering. This decreases the costs of installation and the demands for space for an electric board.

Principle for Energy Optimization

Energy optimization with the Connect is about moving as much water while spending as little energy as possible. The relation between kW spend and cubicmeters pumped should be as small a possible.

The actual values are gathered constantly through the Modbus connection between the Connect, Magfluxm and the frequency converter. Hereby the Connect is always capable of regulating the frequency converter according to the actual conditions.

The actual values are gathered constanlty through the Modbus connection between the Connect, Magflux, and the frequency converter. Hereby the Connect is always capable of regulating the frequency converter according to the actual conditions.

Function Parameters

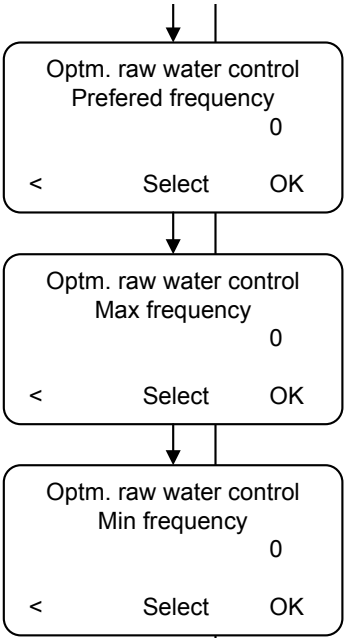
When optimizing the energy consumption of the Connect the following parameters need to be entered before starting:

For the entire pump station

- Start/stop level
- Max level at normal operation (a higher level turns optimizing off)
- Holding time (at 50 Hz until the flow is stable)
- Flush at time of day
- Number of pumps in alternation
- Max level, start level, desired level, min level, and stop level.

For each pump (typically provided by the pump supplier)

- Max. frequency
- Min. frequency
- Reference frequency (requested frequency, optimal frequency/ rotation speed)



SCADA Parameters

All parameters which are mentioned here can read out through an SCADA system and they can be adjusted both from a Connect device as well as an SCADA system.

Supported SCADA systems are IGSS (through 60/61 commands) and BV System 2000.

Control Principle

Normal Operation

The Connect measures the level in the pumping sump. At a level above the starting level, the Connect will start a pump using Modbus communication to the frequency converter. The frequency converter begins to go at full speed (50 Hz) to set the water in motion. After ended “holding time” the Connect device ramps down the frequency converter to the reference frequency and energy optimizing has hereby been put in effect.
The Connect keeps the pumps going until a minimum level has been reached. Hereafter the Connect ramps frequency converter to the min level and the pump to a stop. The reason for this is to avoid an unnecessary amount of starts.

In many situations where a pump cannot move water fast enough, for instance during hard rainfall, the Connect incorporates another pump. Pump 2 starts as the above mentioned pump 1 and ramps down to the reference frequency and hereby helps pump 1.
If the level still rises and reaches max level at normal operation, the Connect will turn off energy optimizing and run both pumps at 50 Hz (full speed). Hereafter both pumps will run until full stop at 50 Hz. At the next start energy optimizing is activated once again.

Flush Function

The flush function can with great benefit be used for frequency controlling of the pumps as sediments in the pumping cables will happen for instance due to low velocity of liquids.

The flush function can help keep the pipes clean. It starts at an entered, fixed time of day and will always go once every day. If a pumps is running at that specific time of day, it will be stopped and the level rise to start level. Afterwards the pumps starts at max frequency and runs until stop. At the same time the kW consumption is measured for later energy calculations.

Depth Pumping

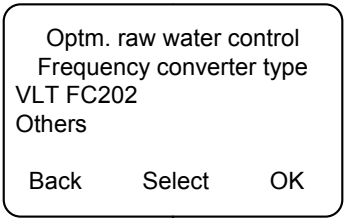
Under additional functions it is possible to select depth pumping. With this function it is possible to select that the pump should run lower than stop level. Depth pumping can be configured to run after x numbers of starts, after x numbers of hours, or a certain moment of day.

Hardware

Frequency Converter

In the presentation of energy optimizing “Danfoss VLT Aqua FC202” has been chosen. It can be configured through the Connect device under “Energy optimizing”. The Connect adjusts itself to the chosen frequency converter, and common for the frequency converters is at they as a standard are/can be delivered with the Modbus communication interface.

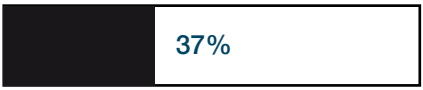
For every frequency converter there are certain parameters which need to be configured from the frequence converter front panel such as ID numbber and communication protocol (see appendix 1).



Display

On the display of the Connect device it is possible get a read-out of the saved energy as a percentage (%) or as a bar graph. This calculation is done in relation to the measurement at 50 Hz and the reference frequency.

Saved energy in relation to normal operation can for instance be displayed in this way:



Automatic Optimization

After a variable interval the Connect either increases or decreases the frequency in relation to the reference frequency. Typically 1 Hz up or down. This frequency will be used in approx. 1 minute. The kW and m^3 are measured and their ratio is compared to that of the entered reference frequency. If this frequency is better than the entered reference frequency, the new frequency will be used as reference frequency.

Annex 1

A pump station with an MJK Connect controller and RTU unit, two Danfoss VLT FC202 frequency converter units and an MJK MagFlux flow transmitter (see wiring diagram on the following pages).

Electrical connections of the Modbus cable

The Modbus cable must be a shielded, twisted-pair, 2-lead cable.

Between the MJK Connect unit and the Danfoss VLT units:

Terminal A on “Instrument Net” to terminal “68” on the Danfoss units

Terminal B on “Instrument Net” to terminal “69” on the Danfoss units

The shield to “GND”.

On the Danfoss VLT FC202s:

A cable jumper (shortcut) between the following terminals:

Terminal 13 to terminal 27

Terminal 18 to terminal 29

Danfoss VLT configuration

Communication:

- Parameter 8-30, protokol option = 2 (Modbus)
- Parameter 8-31, ID no. for pumpe 1’s VLT = 100, pumpe 2 = 101
- Parameter 8-32, Baud rate = 2 (9600 baud)
- Parameter 8-33, Paritet = 0, (even parity)

Control signal:

- Parameter 5-02 (state of terminal 29) = 1 (output)

MagFlux

The connections to the MagFlux unit are similar to the Danfoss units:

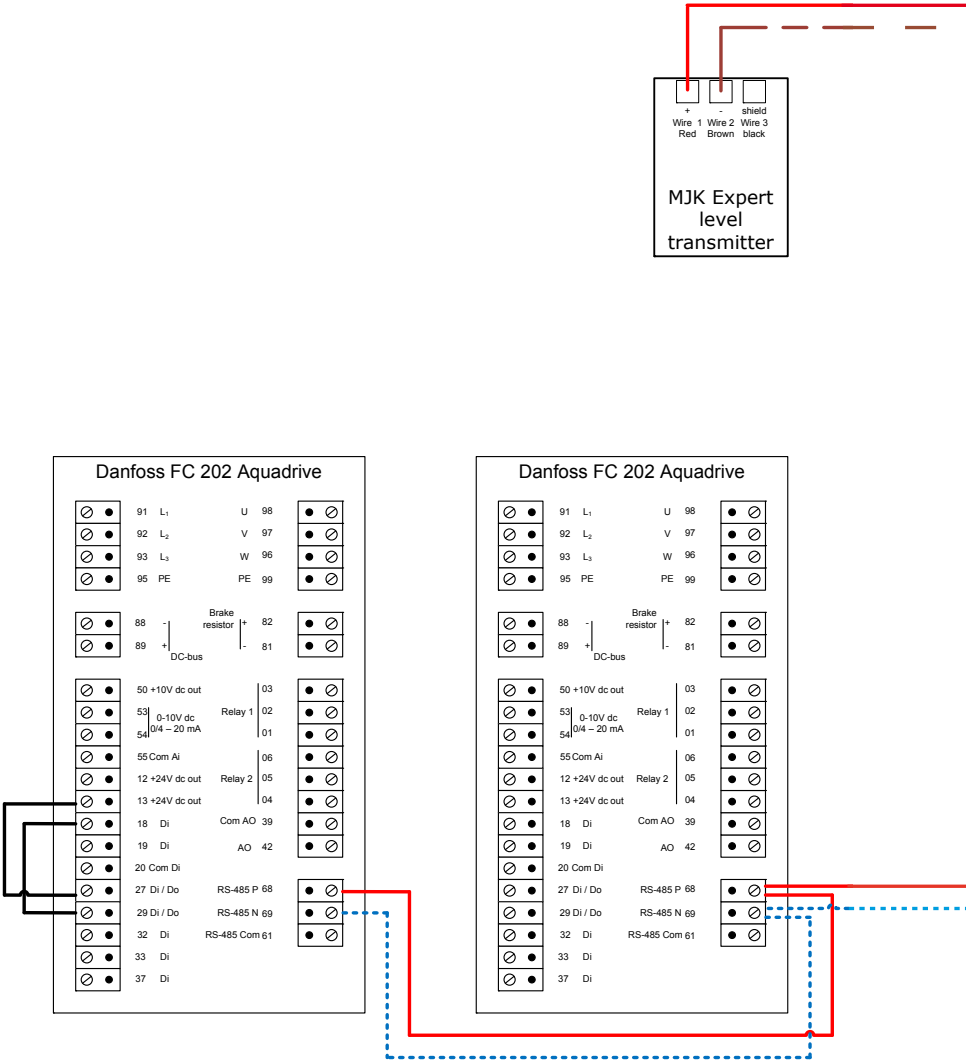
Connection to Modbus RS485 A, B and GND (-).

The MagFlux must have “1” as ID no. (factory default).

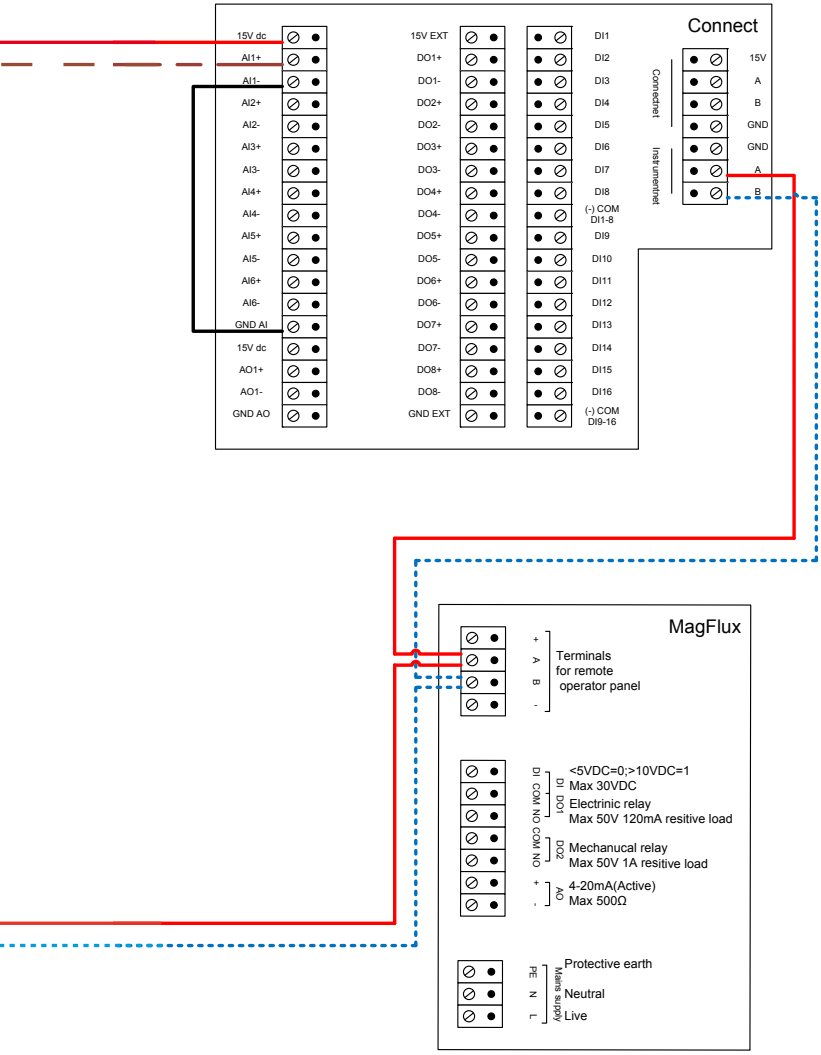
Menu Structures - Flow Charts

See also the menu structures for energy-optimized raw- and wastewater pump control on pages 238 and 242.

Wiring Diagram - Example



Wiring Diagram - Example continued 1



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Appendix G. Two Interconnected Connect Units

Larger installations may require more in- and outputs than one Connect unit can offer. Two units can be interconnected to provide full 32 digital inputs, 16 digital outputs, 12 analog inputs and 2 analog outputs. Only a display on the master unit is required (for example on Connect 1).

1. Interconnect the two units as shown on Figure 49 and power up.

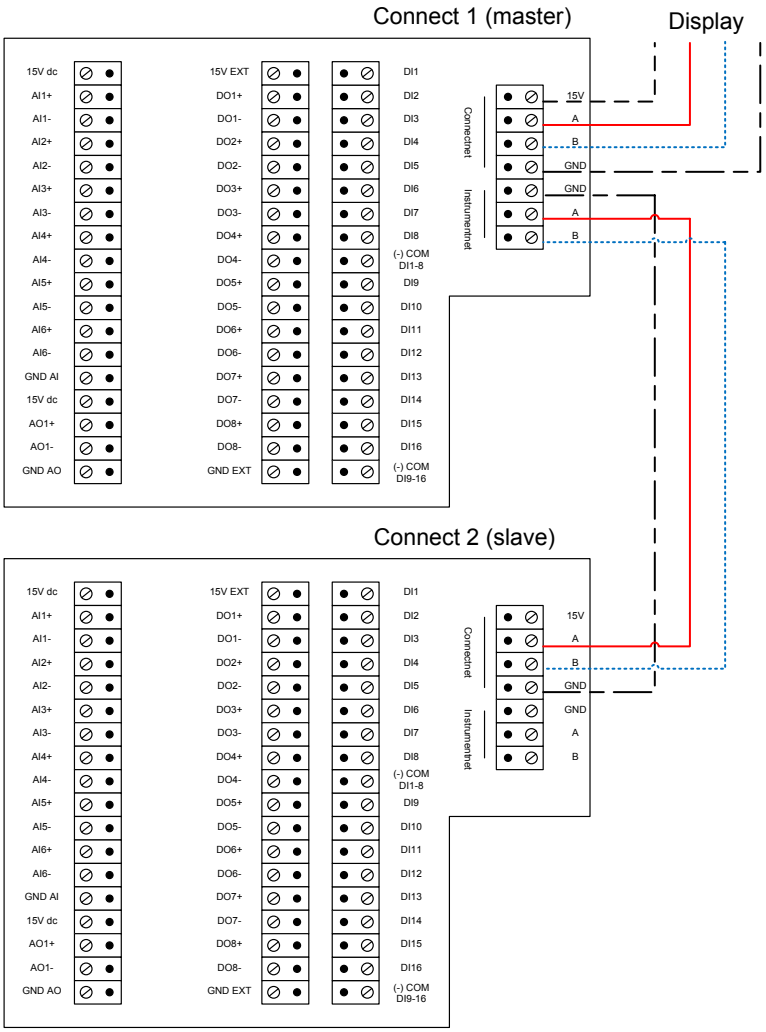
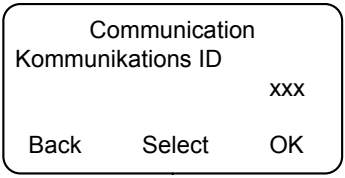
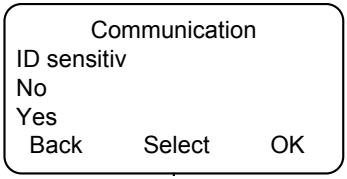


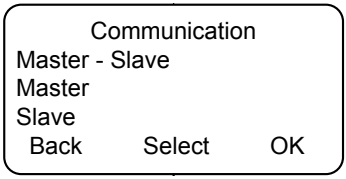
Figure 49. Two Interconnected Connect Units

2. Go to ***Setup/Connect Base 1/Service Menu/Communication*** on Connect unit 1 (the master unit) and press OK to accept the default communication ID (1).

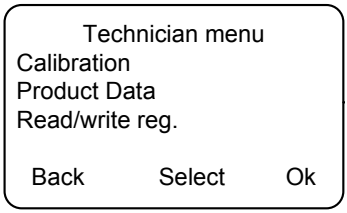


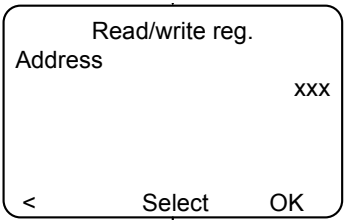
3. Select “No” for ID sensitive and “Slave” for Master-Slave.



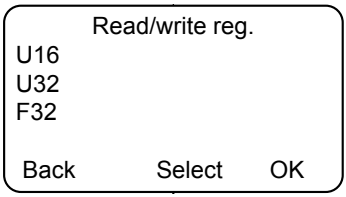


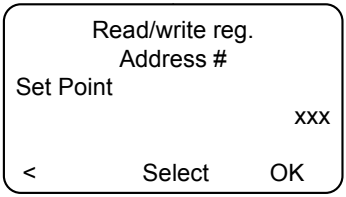
4. Go to *Setup/Connect Base 1/Service Menu/Technician Menu/ Read/write reg.* on Connect unit 1 and enter “55500” as address.





5. Select “U16” and enter ”1” as set point.





6. Restart the Connect 1 unit, wait approx. 1 minute and verify from the display that 62 in- and outputs are now available.

Appendix H. Changing the Supply Voltage

Follow the procedure below to change the supply voltage from 230 VAC to 115 VAC or vice versa. Connect is by default set to 230 volts, 50/60 Hz alternating current.

1. Loosen the four screws on the front panel and remove the display unit (see also page **21**).
2. Unplug the display unit (remember the lock!) and remove it.
3. Loosen and remove the four screws that secure the green I/O Module PCB and then lift it out.
4. Loosen and remove the four screws that secures the bottom PCB (the motherboard).
5. Lift out the bottom PCB, turn it around and check the soldered side. This is what you should expect to see for a 230 VAC configuration:

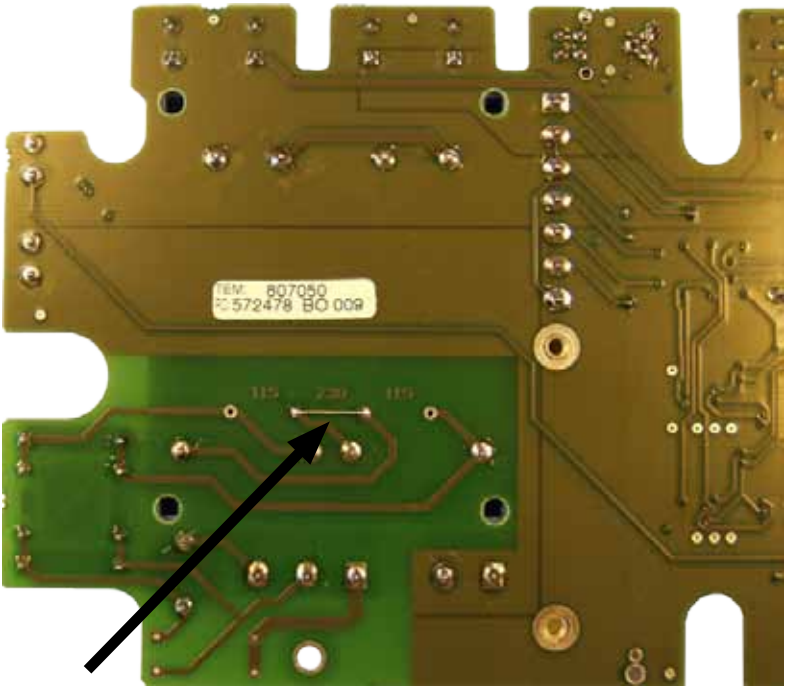


Figure 50. 230 VAC single-jumper location

6. Remove the jumper (see the arrow) with a soldering iron.

7. See on the picture below, where to solder the two new jumpers to obtain a 115 VAC configuration:

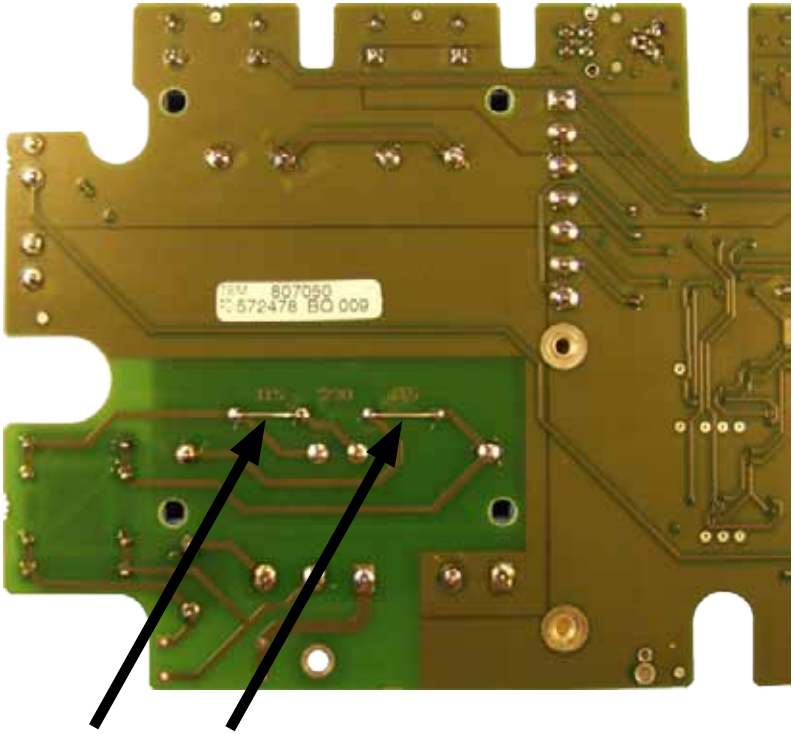


Figure 51. 115 VAC Dual-jumper Location

8. Adjust, place in position and solder the two jumpers (wires) in the positions indicated by the black arrows.
9. Flip over the bottom PCB and replace the 63 mAT fuse at the right with a 125 mAT fuse (or vice versa going from 115 VAC to 230 VAC).
10. Reinsert the bottom PCB and reassemble the Connect unit in the reverse order (see also steps 4, 3, 2 and 1).

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Menu Structures

Connect Menu (page 220)

- **Main functions** (page 224)
  - Individual settings (page 226)
  - Pump Control 1 (page 228)
    - Additional functions (page 230)
      - Pump monitoring (page 232)
      - Depth pumping (page 236)
  - Energy-optimized Raw Water Pump Control (page 238)
    - Additional Functions (page 241)
  - Energy-optimized Wastewater Pump Control (page 242)
    - Additional Functions (page 245)
    - Wastewater Overview Screens (page 247)
- **Signals (I/O)** (page 248)
  - Digital inputs and outputs (page 249)
  - Analog inputs and outputs (page 250 and page 252)
- **Functions menu** (page 254)
  - Interlock (page 254)
  - Storm Flow Calculation (page 256)
  - Logical functions (page 258)
  - Data logger (page 262)
    - Standard and extended data logger (page 262)
  - Pump Control 2 (page 266)
  - State Machine (page 268)
- **Alarm call** (page 270)
  - Call list (page 270)
  - Call at battery off (page 270)
  - Call at low battery (page 271)
  - Call at voltage drop (page 271)
  - Automatic alarm reset (page 271)
- **Service Menu** - page 272
  - Status (page 272)

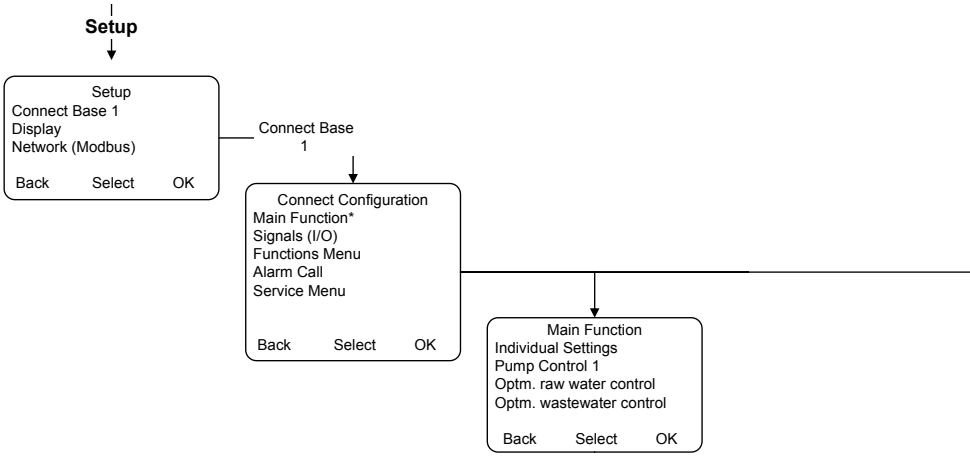
Menu Structures - continued 1

Dayshift time (page 272)
Password/Log in (page 273)
Device name (page 273)
Factory settings (page 273)
Communication (page 274)
Communication and PSTN (page 274)
GSM/GPRS, RS 232 and RS 485 (page 274)
Technician Menu (page 276)
Calibration (page 276)
Product data (page 276)
Read/write in reg. (page 276)

Display (page 278)
Language (page 278)
Set Time/Date (page 279)
Set Time/Date (page 279)
Time format (page 279)
Daylight saving (page 279)
Factory settings (page 279)
Cancel (page 279)
Delete log (page 279)
Restore default language (page 279)
Restore factory settings (page 279)
Display S/W Version (page 279)
Display Data Logger (page 280)
Setup overview screen (page 280)

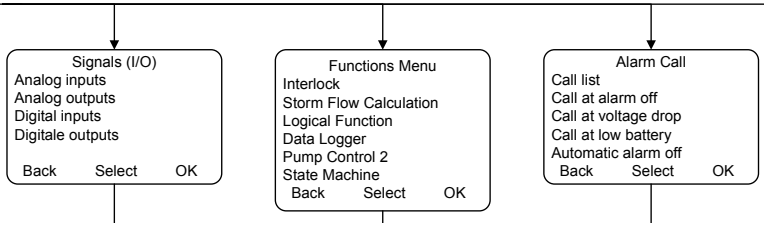
Modbus (page 282)
Add device (page 282)
Change converter ID no. (page 283)
Remove device (page 283)
Change display ID no. (page 283)
Number of re-transmissions (page 283)

Connect Menu



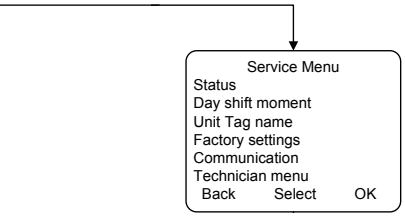
See a detailed read-out of “Main Functions” on page **224.**

Connect Menu - continued 1



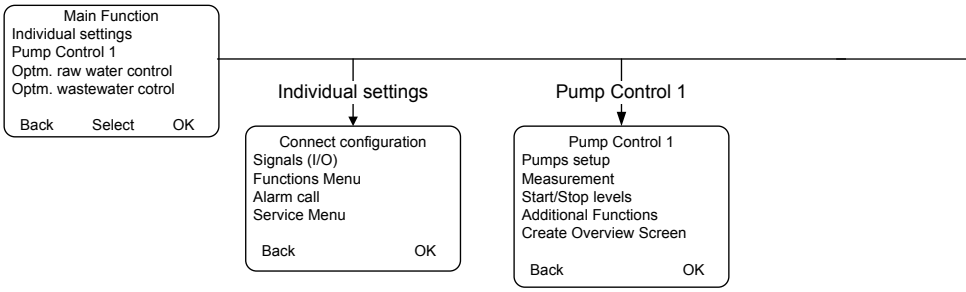
See a detailed read-out of “Signals” on page 248, “Functions Menu” on page 256, and “Alarm Call” on page 270.

Connect Menu - continued 2



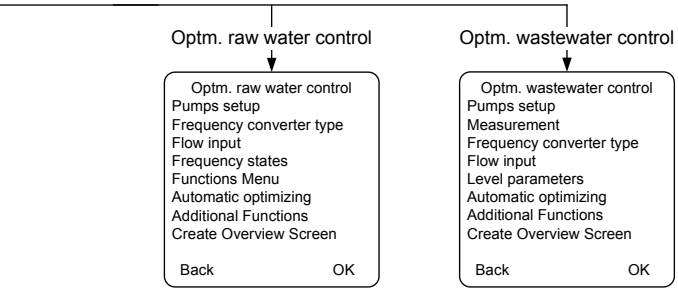
See a detailed read-out of “Service menu” on page 272.

Main functions



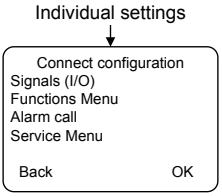
See a detailed read-out of “Individual settings” on page **226** and “Pump Control 1” on page **228.**

Main functions - continued 1



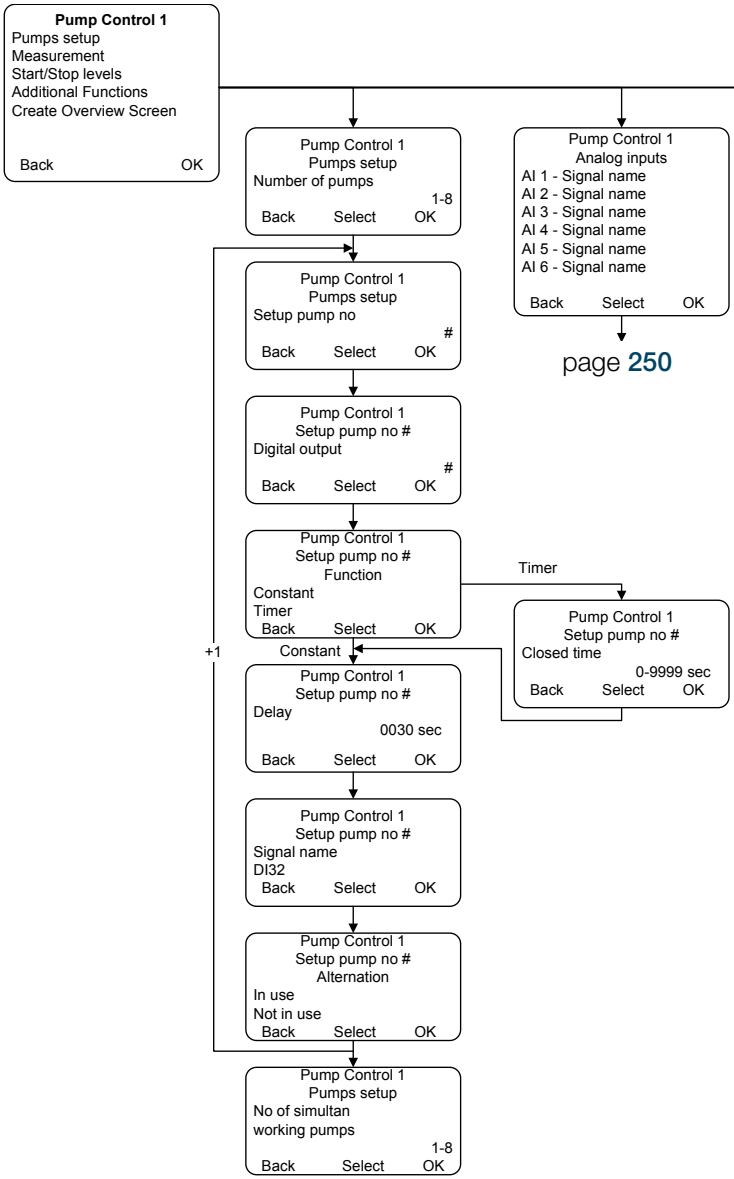
See a detailed read-out of “Optimized raw water control” on page **238** and “Optimized wastewater control” on page **242.**

Individual settings



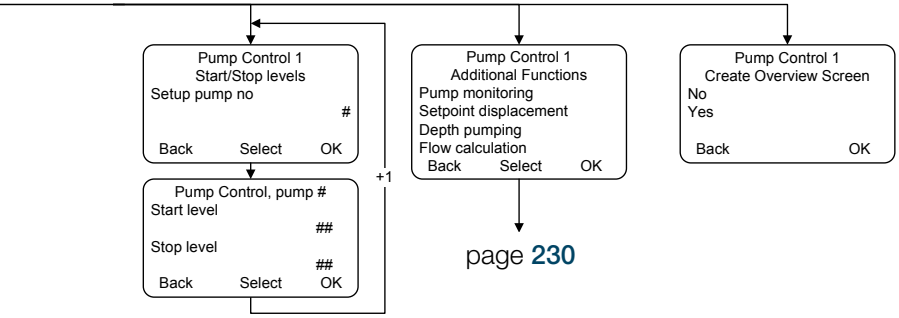
See a detailed read-out of “Signals (I/O)” on page **248**, “Functions Menu” on page **256**, “Alarm Call” on page **270** and “Service menu” on page **272**.

Pump Control 1



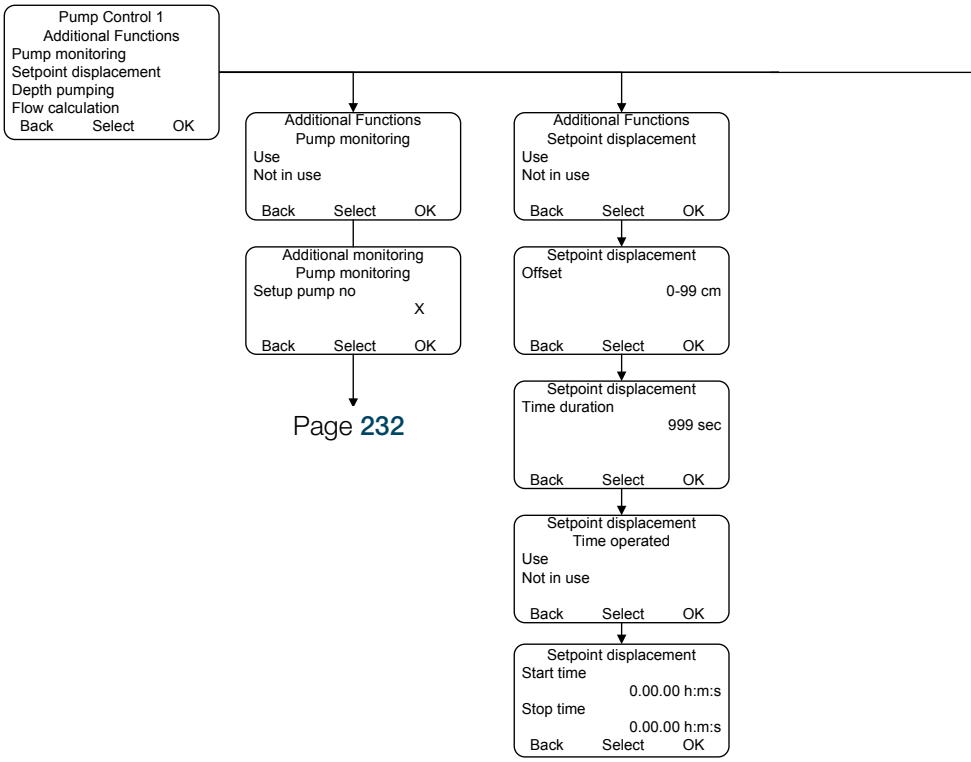
See a detailed read-out of “Analog inputs” on page **250.**

Pump Control 1 - continued 1



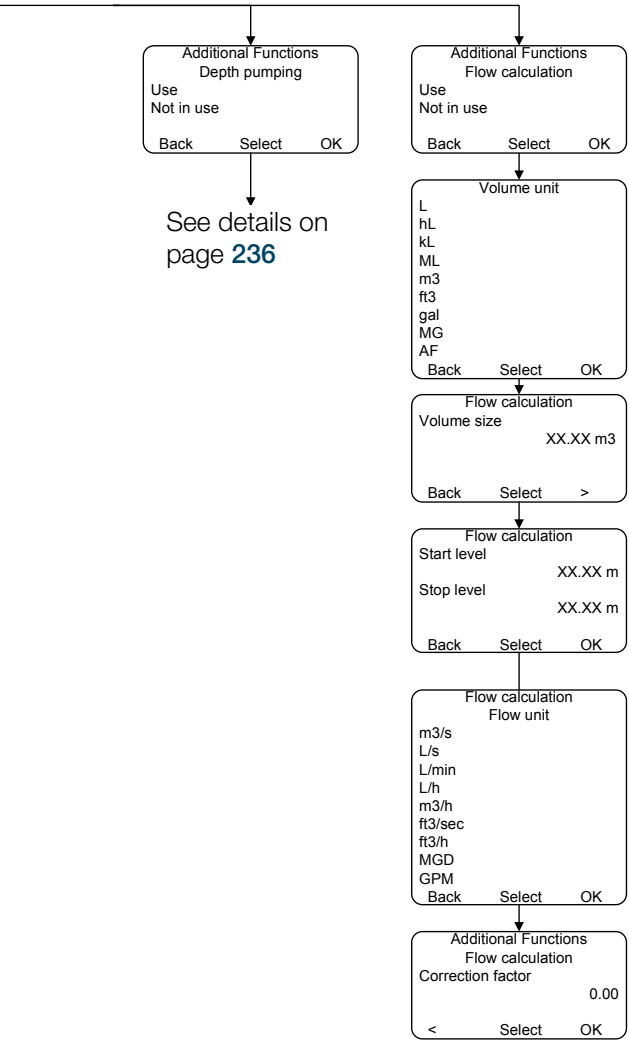
See a detailed read-out of “Additional functions” on page 230.

Additional functions

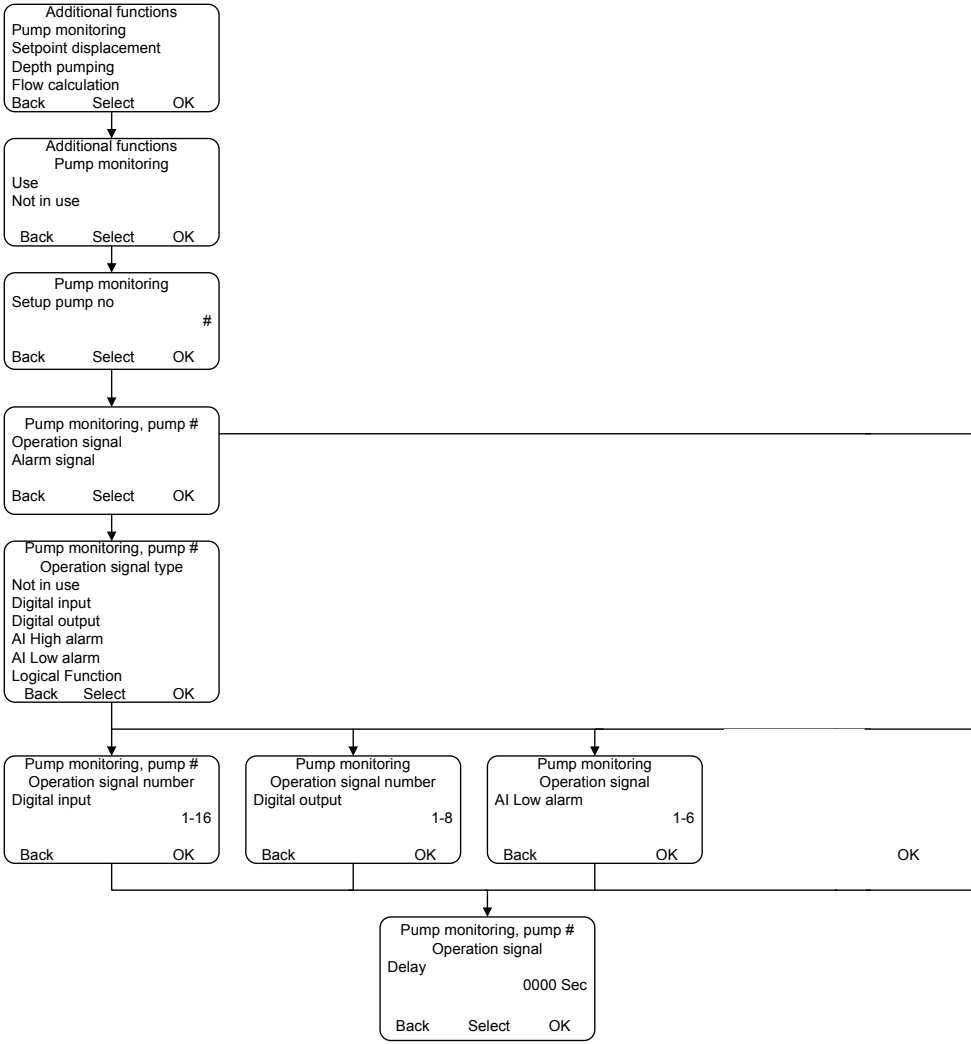


See a detailed read-out of “Pump monitoring” on page **232.**

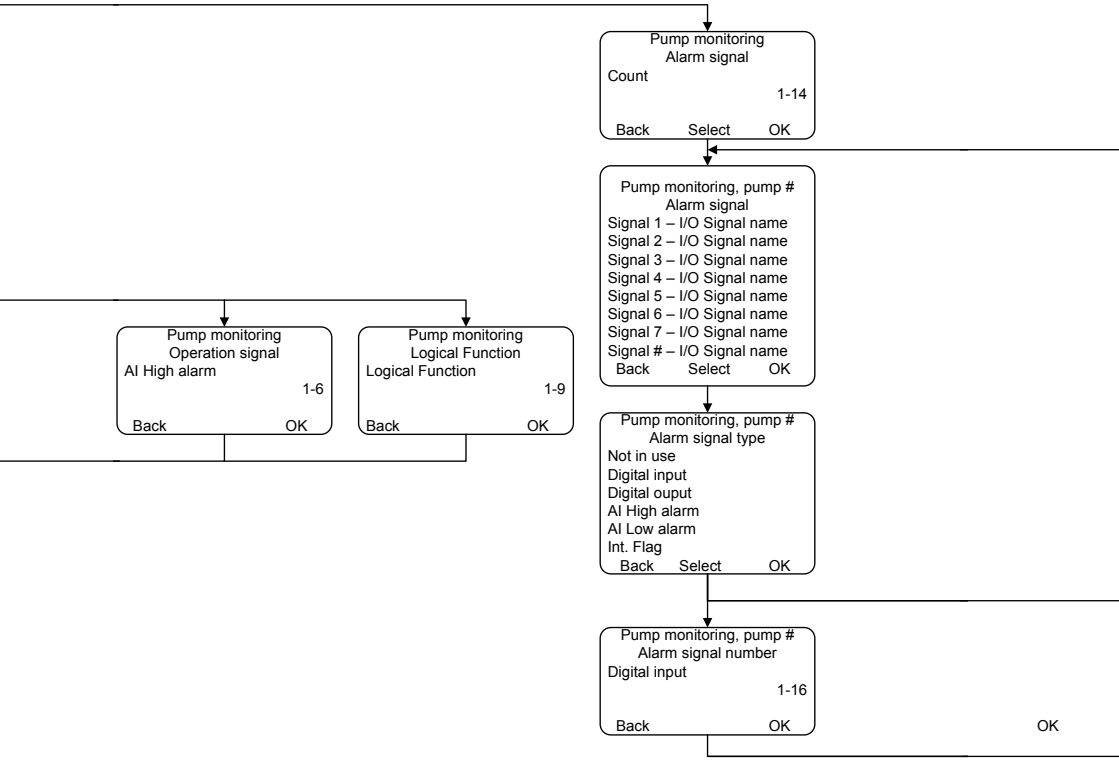
Additional functions - continued 1



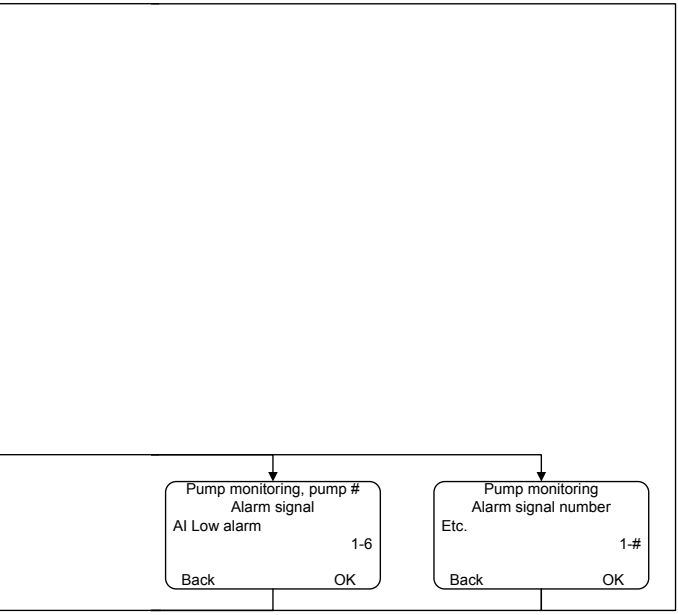
Pump monitoring



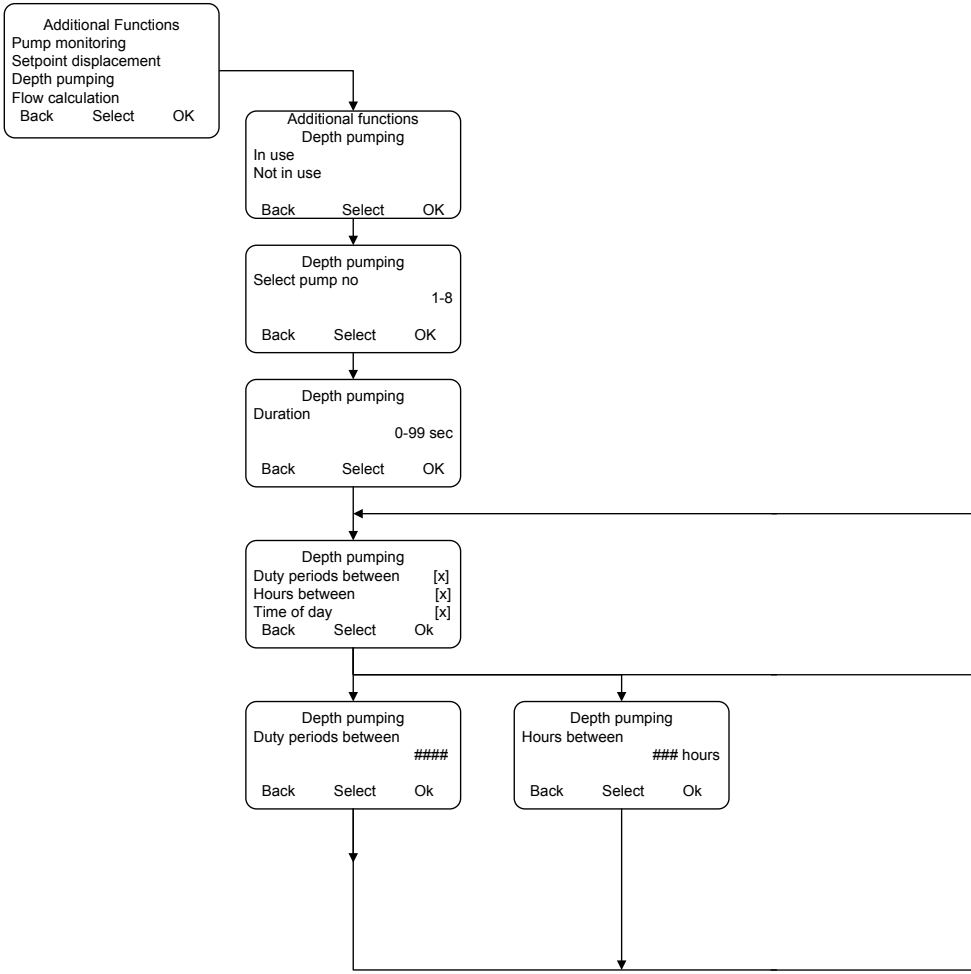
Pump monitoring - continued 1



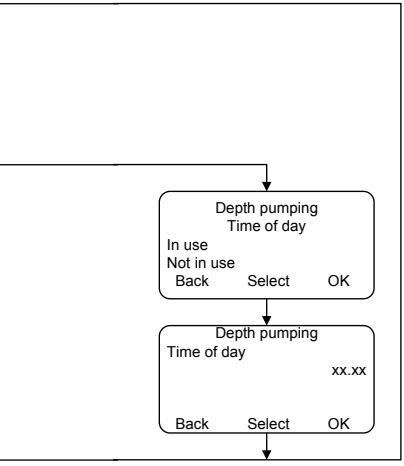
Pump monitoring - continued 2



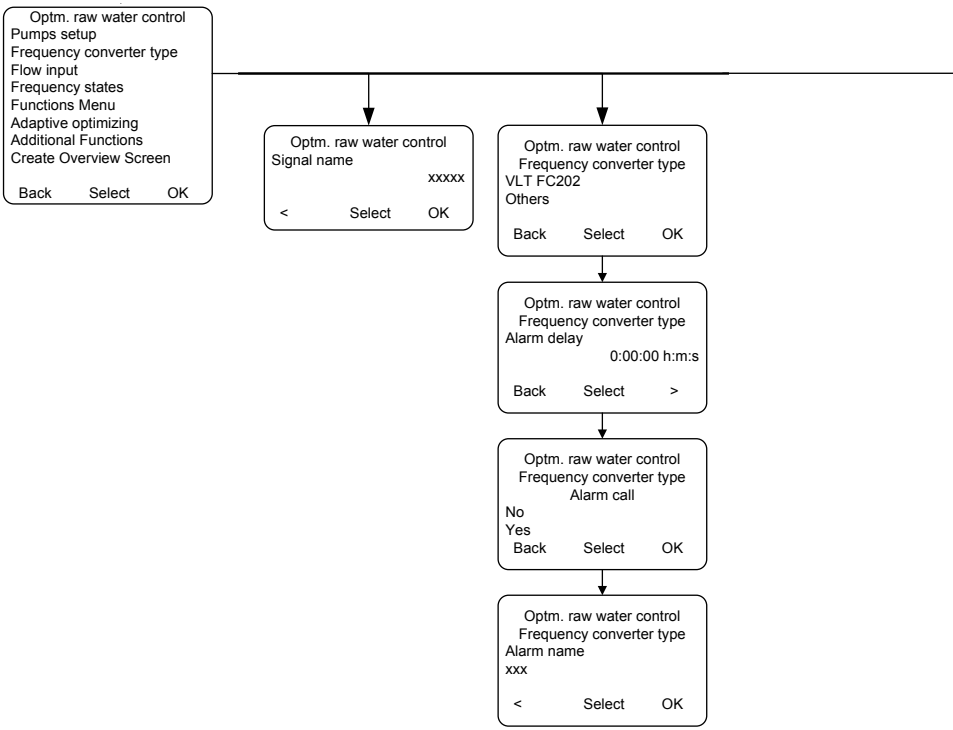
Depth pumping



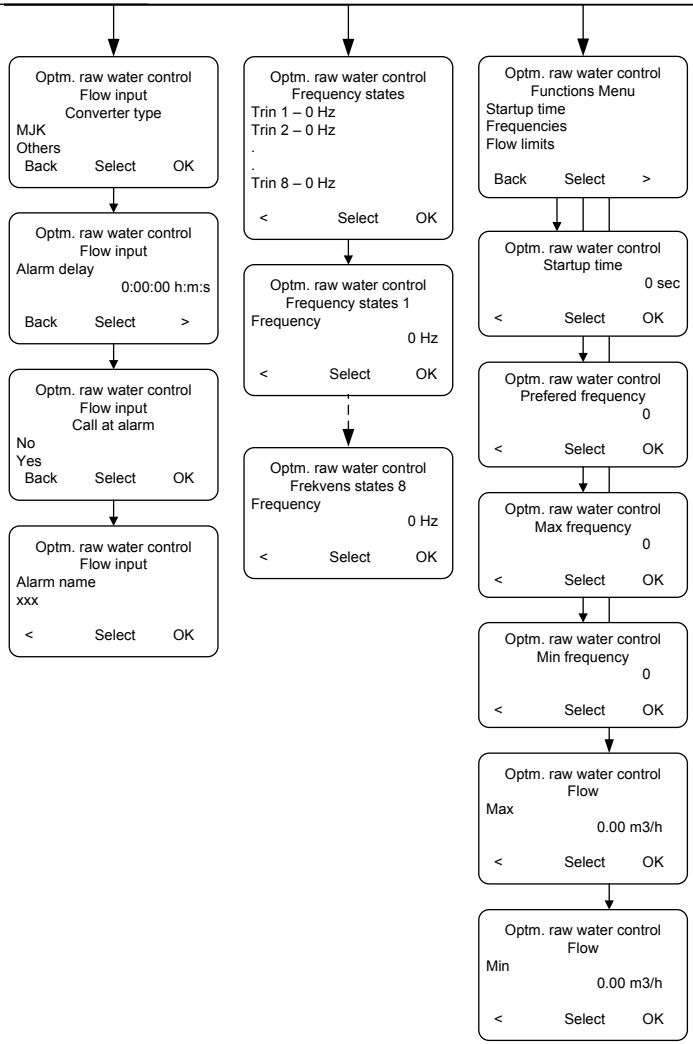
Depth pumping - continued 1



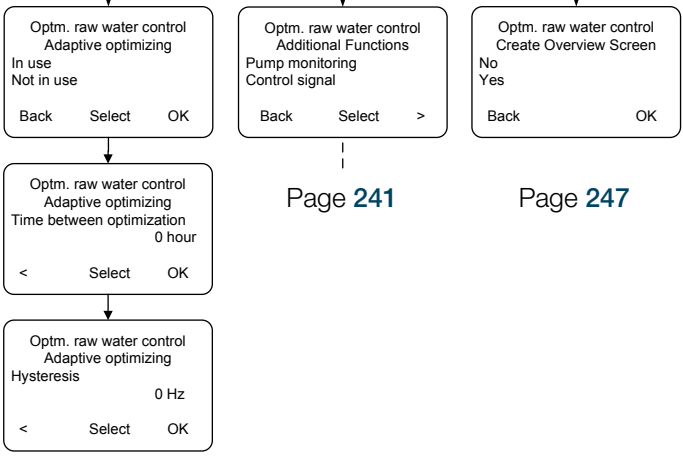
Energy-optimized Raw Water Control



Energy-optimized Raw Water Control - continued 1



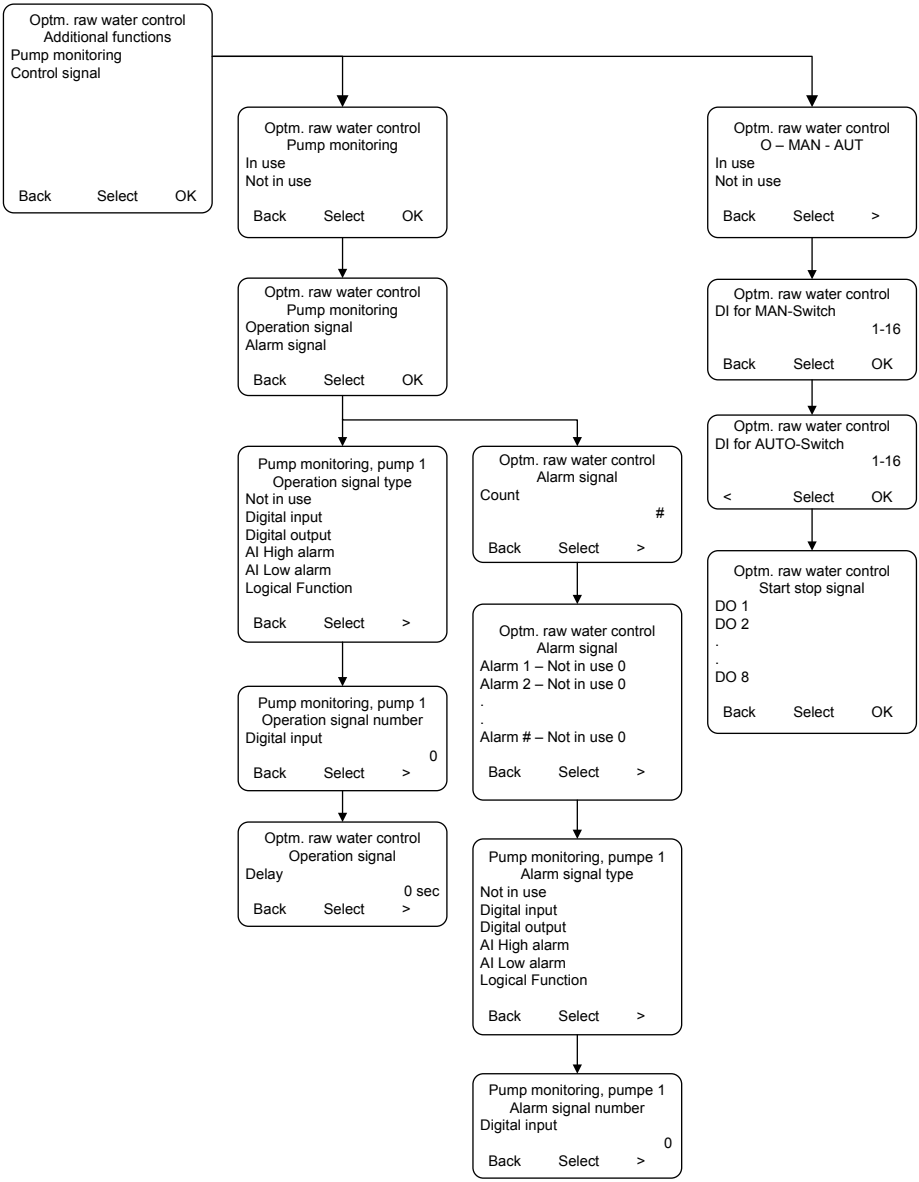
Energy-optimized Raw Water Control - continued 2



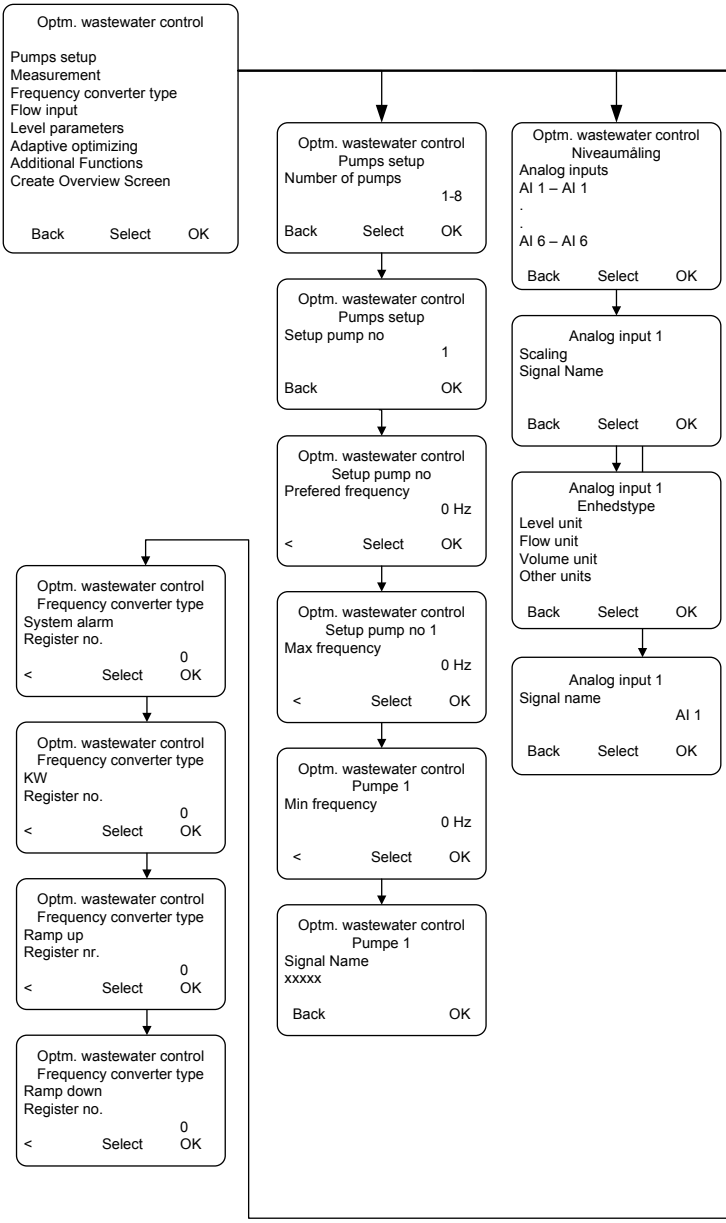
Page 241

Page 247

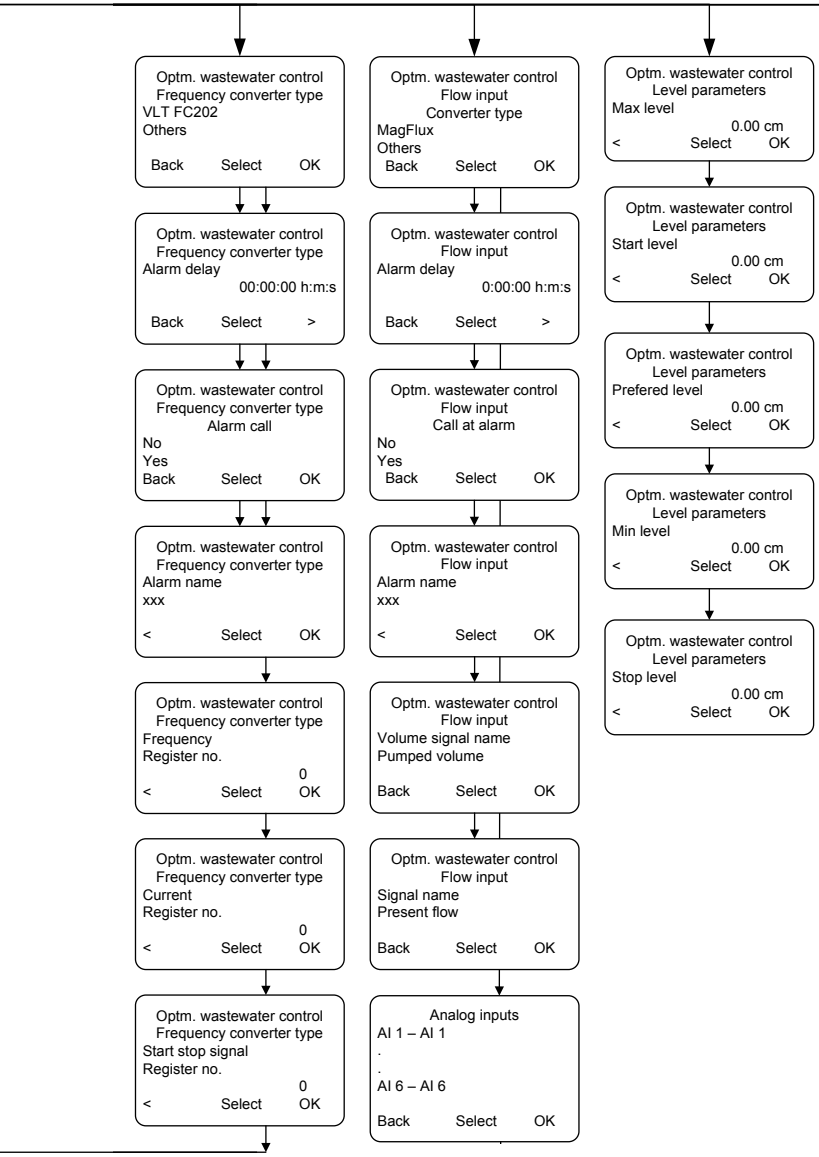
Additional Functions - Raw Water



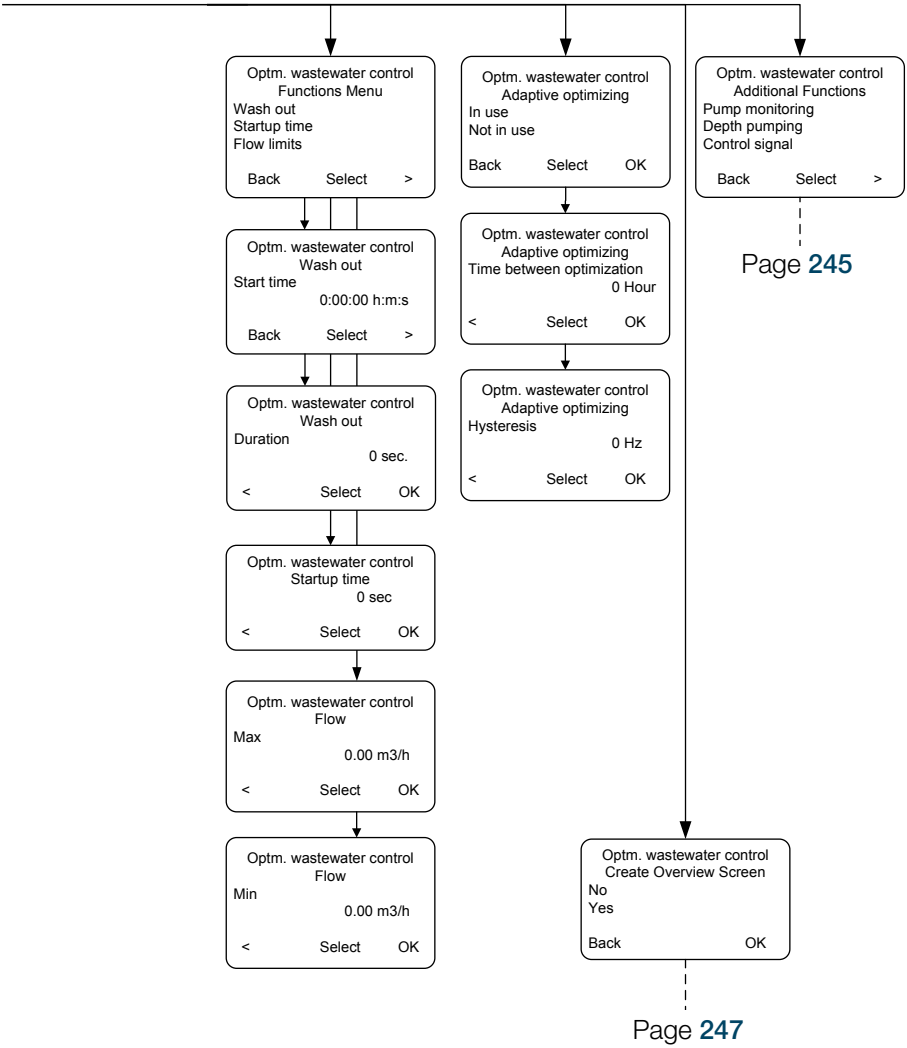
Energy-optimized Wastewater Control



Energy-optimized Wastewater Control - continued 1

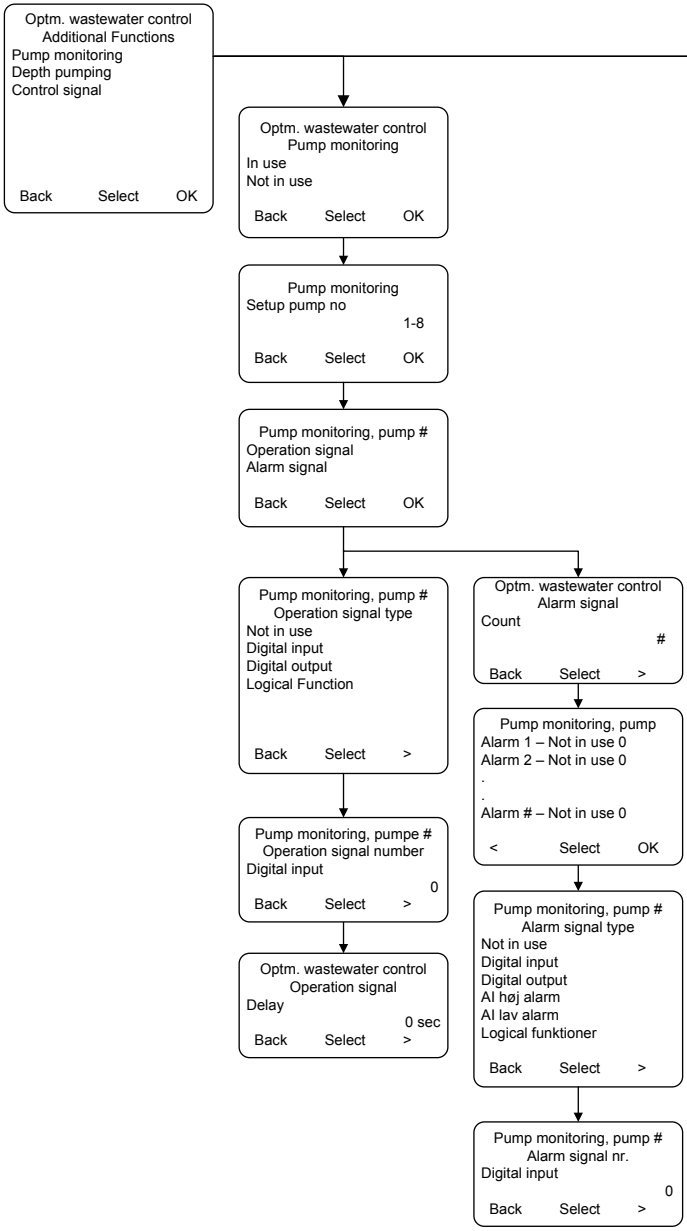


Energy-optimized Wastewater Control - continued 2

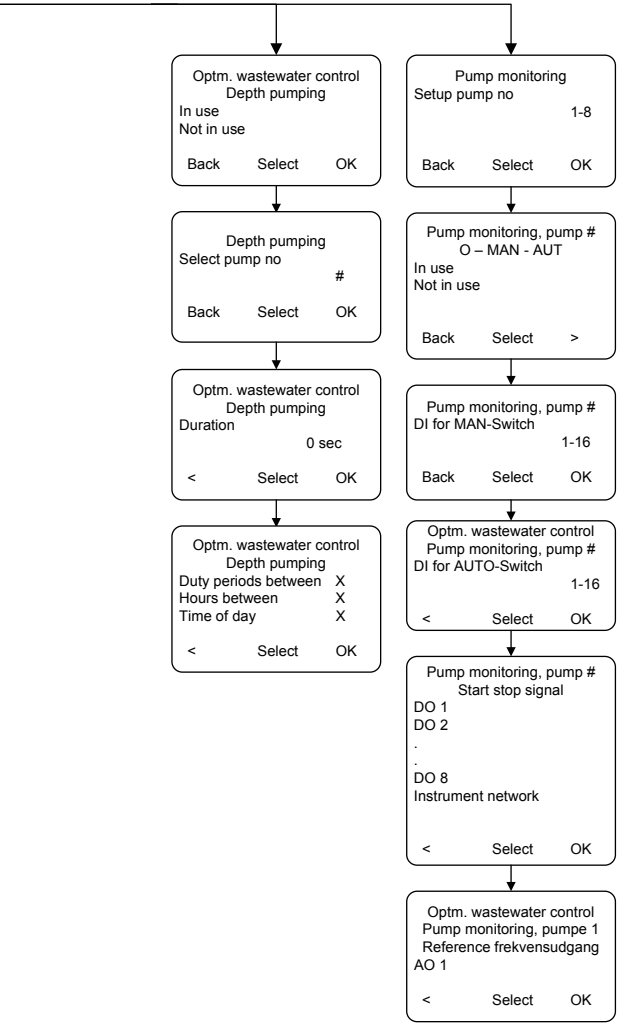


See a detailed read-out of “Create Overview Screen” on page **247** and “Additional Functions” on page **245.**

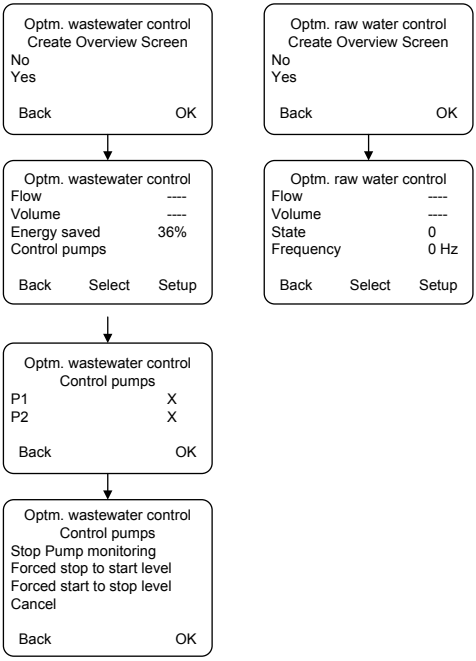
Additional Functions - Wastewater



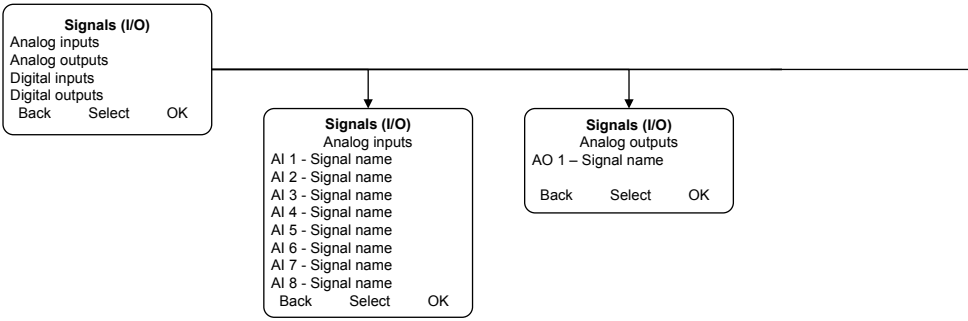
Additional Functions - Wastewater - continued 1



Create Overview Screen

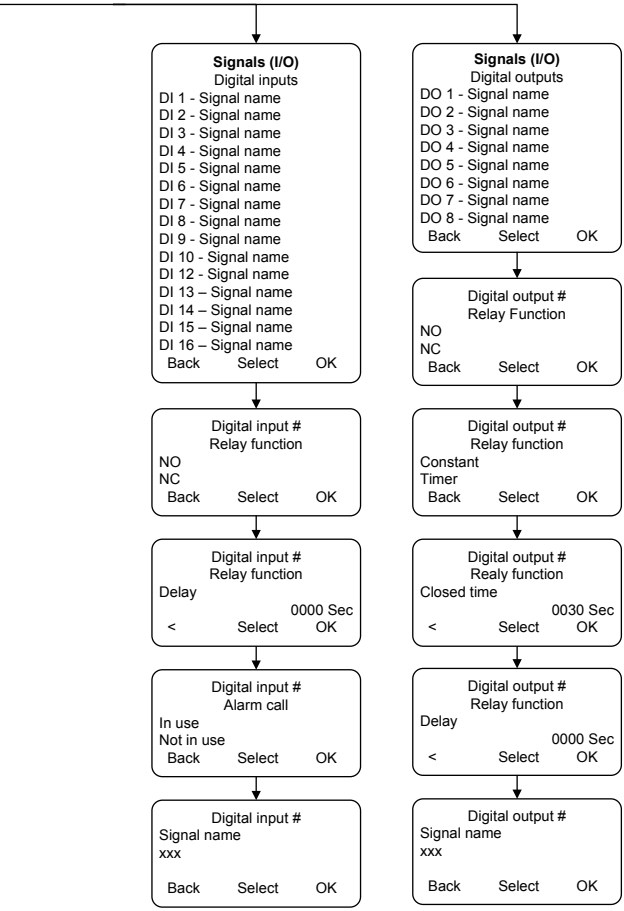


Signals (I/O)

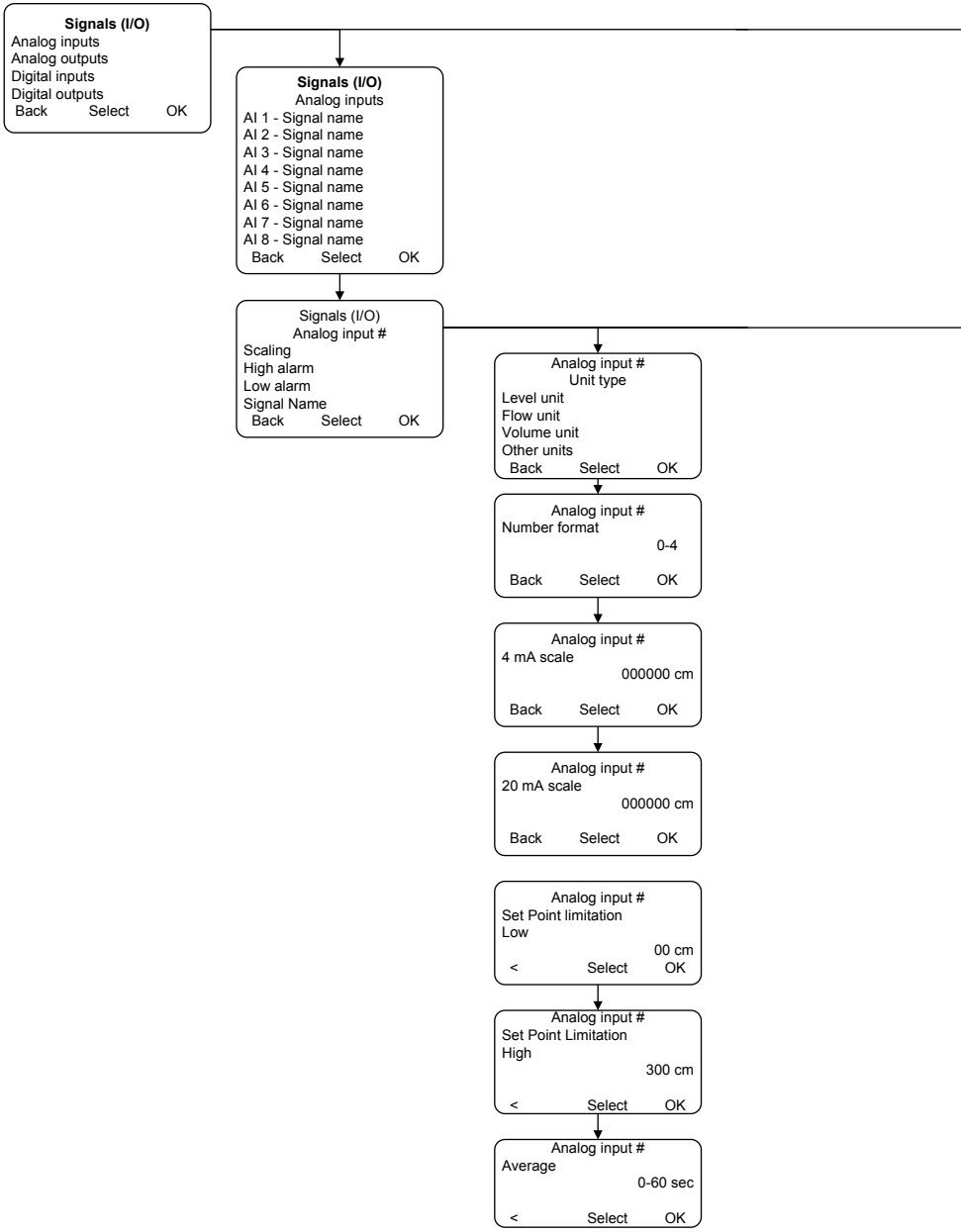


See a detailed read-out of “Analog inputs” on page **250** and “Analog outputs” on page **252.**

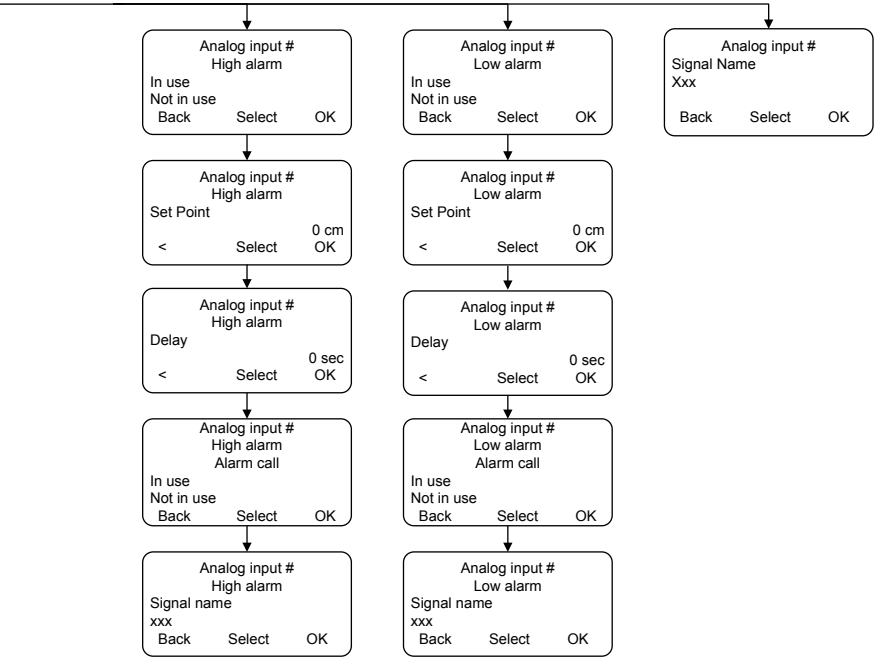
Signals (I/O) - continued 1



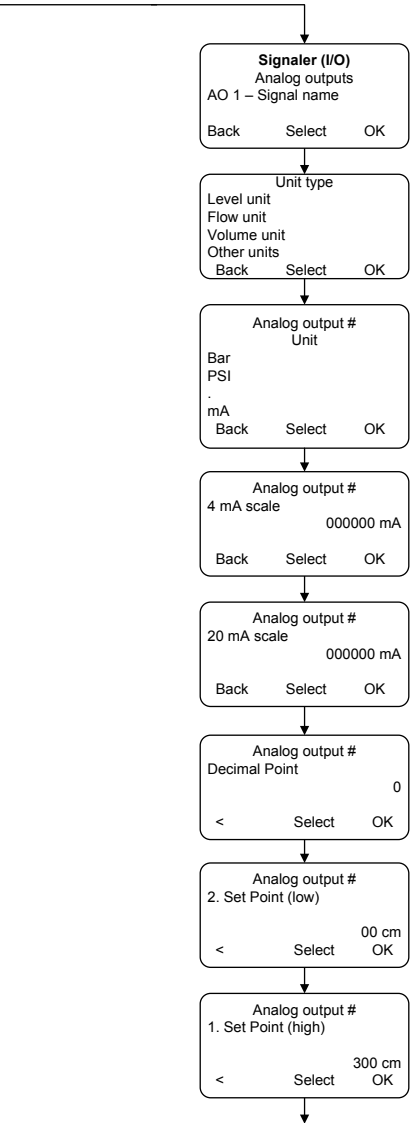
Signals (I/O) - continued 2



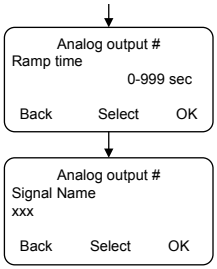
Signals (I/O) - continued 3



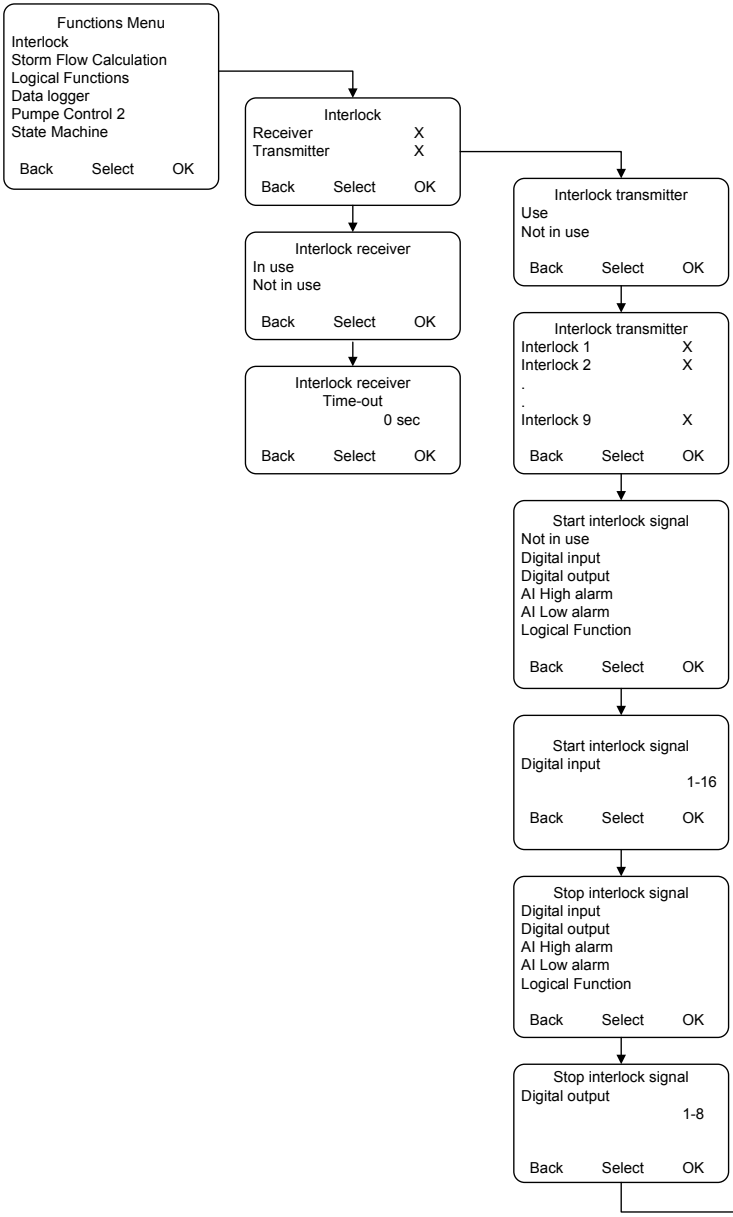
Signals (I/O) - continued 4



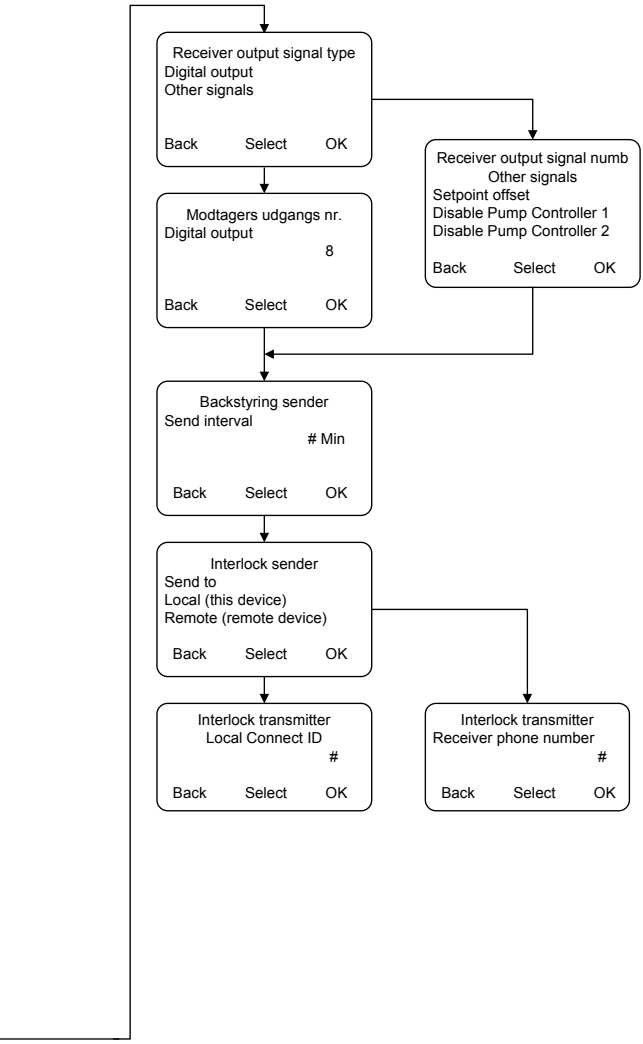
Signals (I/O) - continued 5



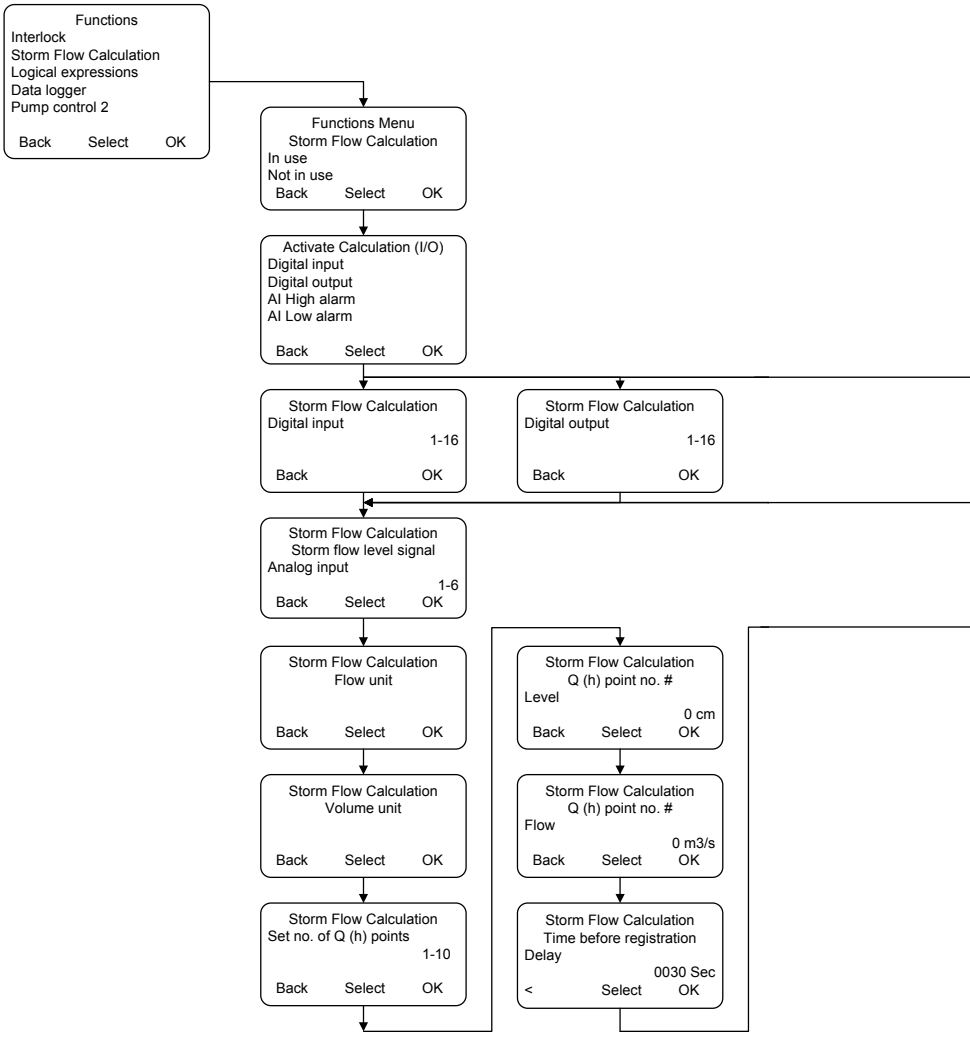
Interlock


Functions Menu
Interlock
Storm Flow Calculation
Logical Functions
Data logger
Pumpe Control 2
State Machine
Back Select OK
Interlock
Receiver X
Transmitter X
Back Select OK
Interlock receiver
In use
Not in use
Back Select OK
Interlock receiver
Time-out
0 sec
Back Select OK
Interlock transmitter
Use
Not in use
Back Select OK
Interlock transmitter
Interlock 1 X
Interlock 2 X
.
.
Interlock 9 X
Back Select OK
Start interlock signal
Not in use
Digital input
Digital output
AI High alarm
AI Low alarm
Logical Function
Back Select OK
Start interlock signal
Digital input
1-16
Back Select OK
Stop interlock signal
Digital input
Digital output
AI High alarm
AI Low alarm
Logical Function
Back Select OK
Stop interlock signal
Digital output
1-8
Back Select OK

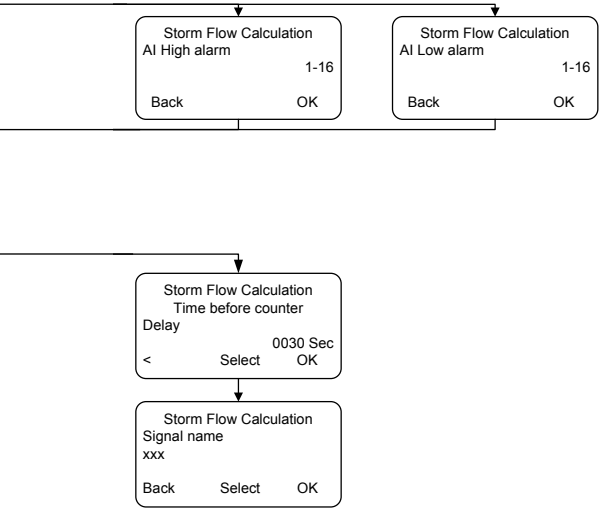
Interlock - continued 1



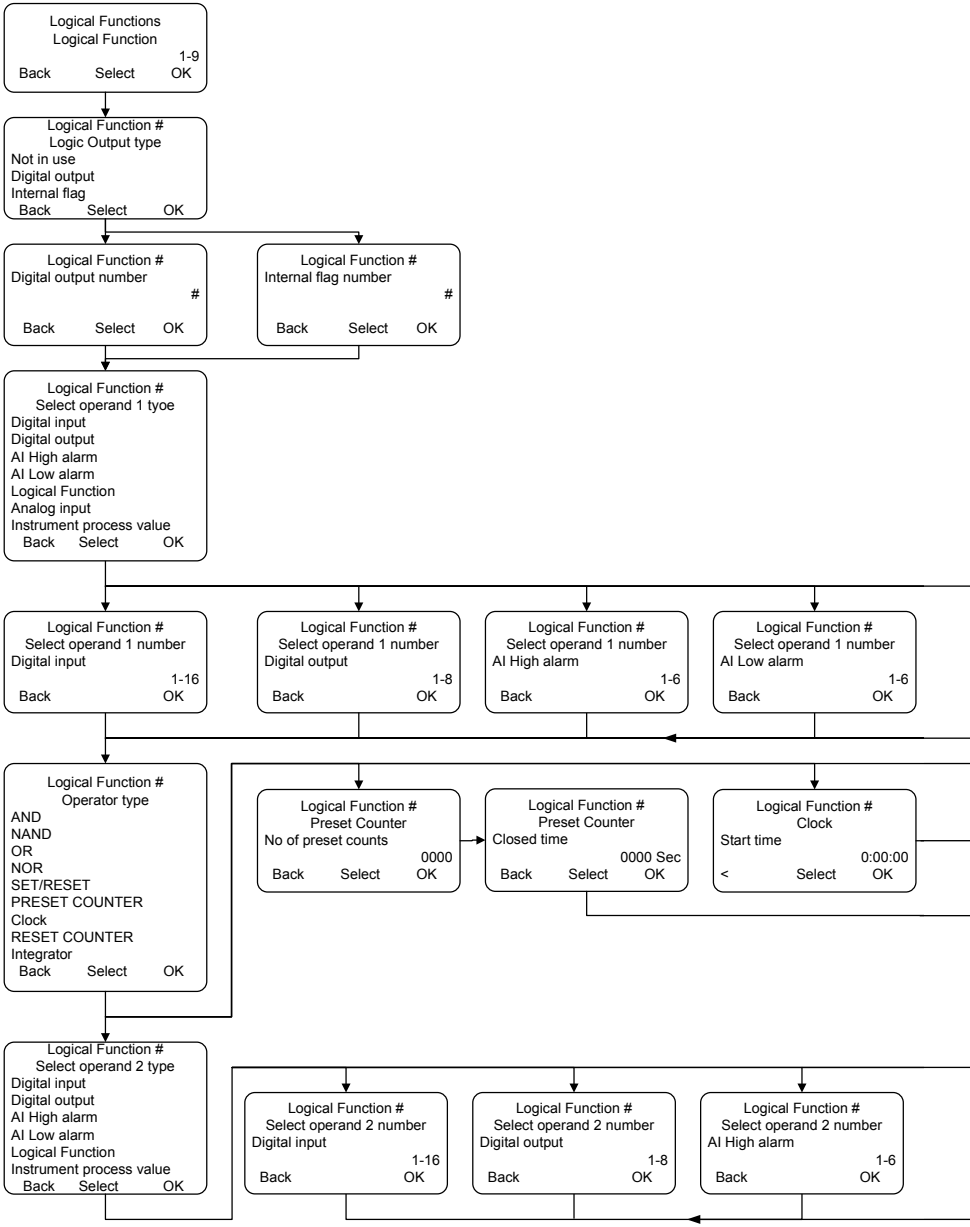
Storm Flow Calculation



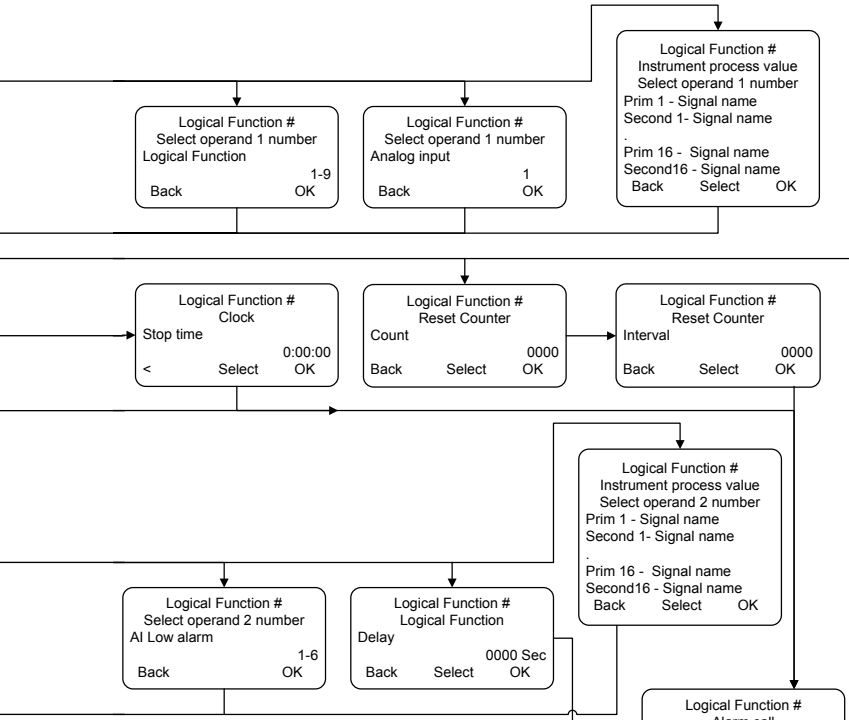
Storm Flow Calculation - continued 1



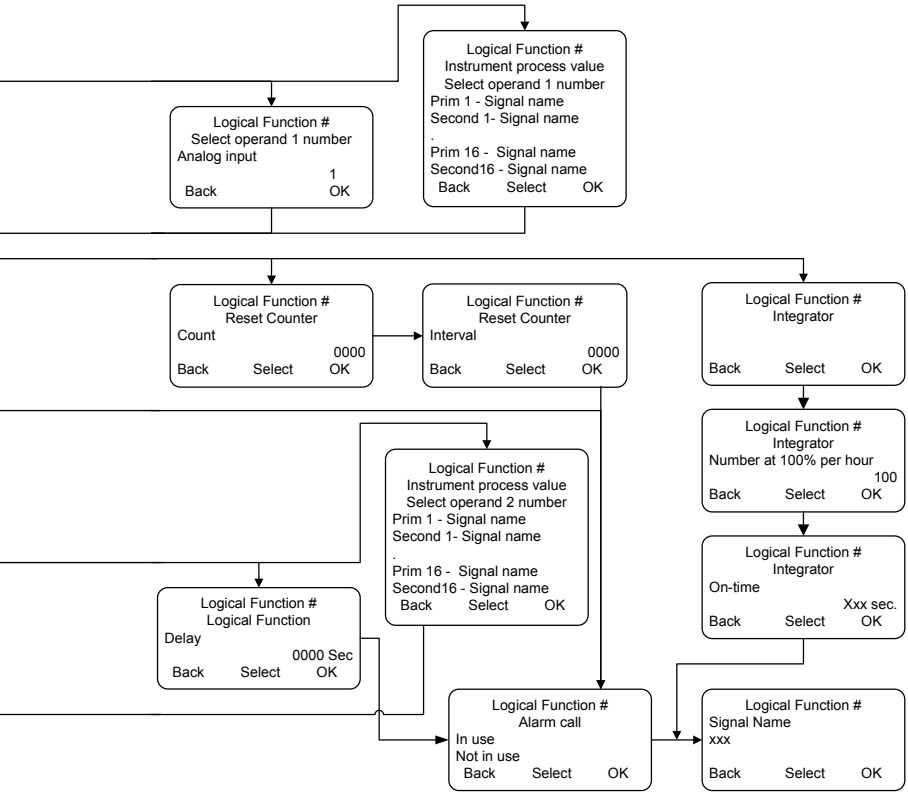
Logical Functions



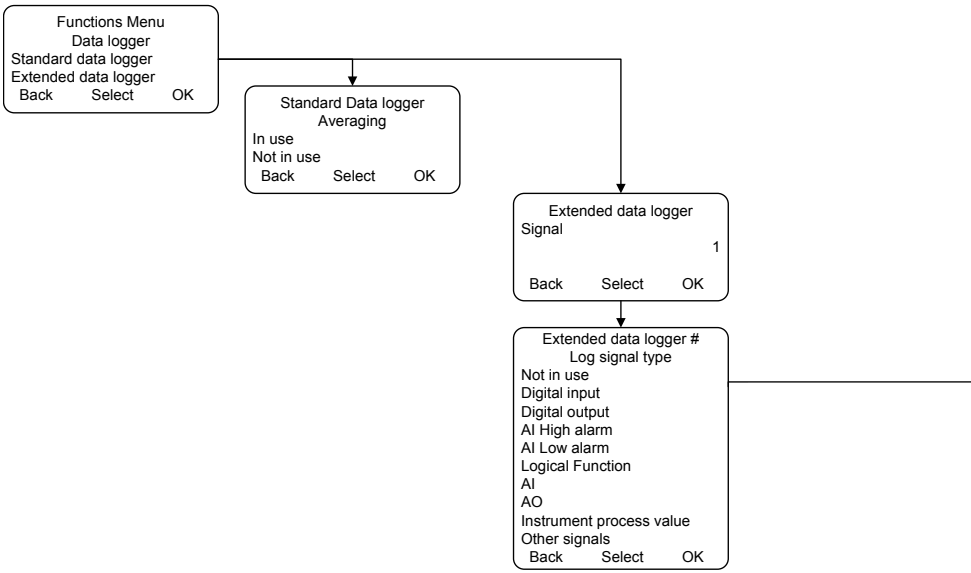
Logical functions - continued 1



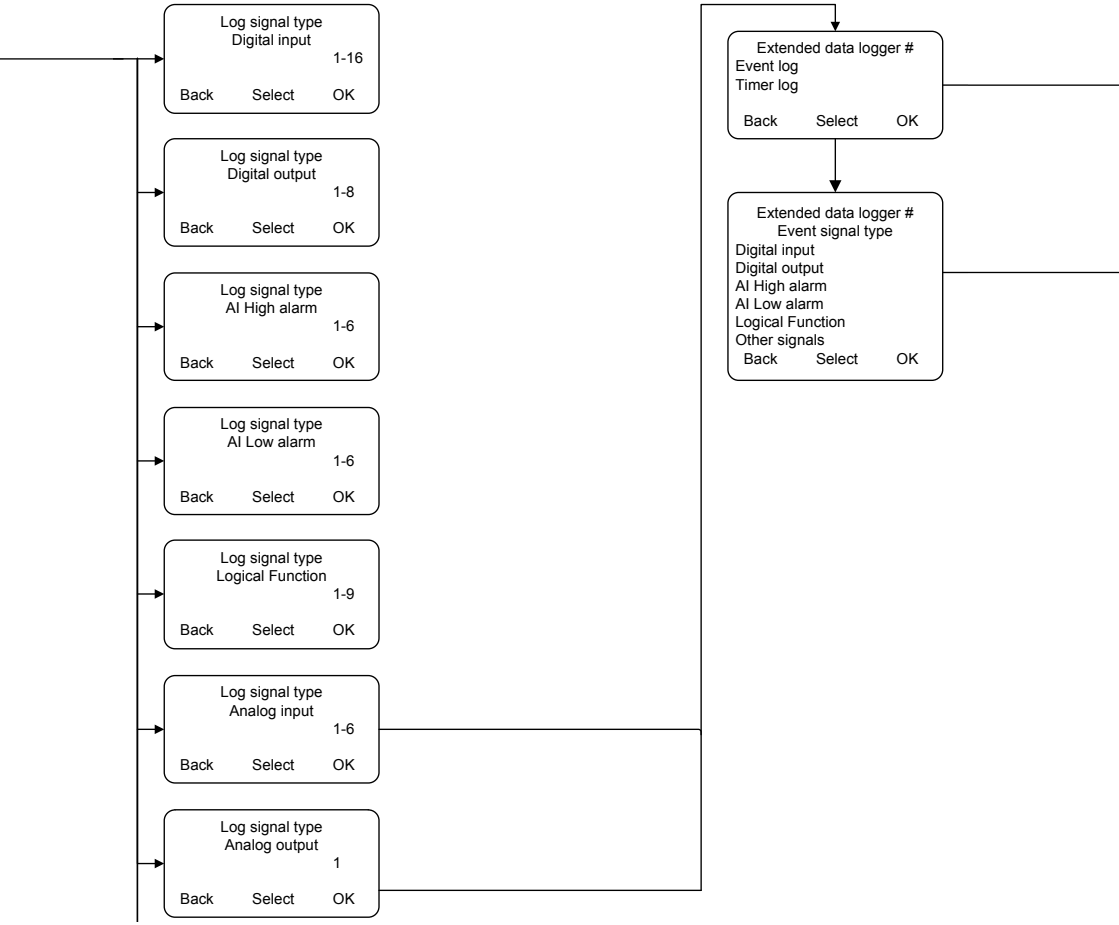
Logical functions - continued 2



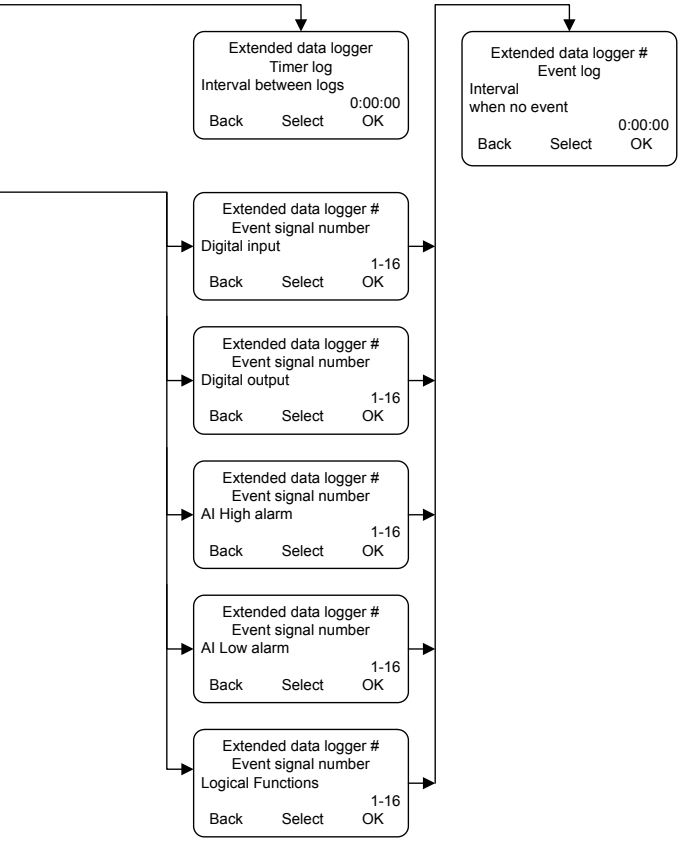
Data logger


Functions Menu
Data logger
Standard data logger
Extended data logger
Back Select OK
Standard Data logger
Averaging
In use
Not in use
Back Select OK
Extended data logger
Signal
1
Back Select OK
Extended data logger #
Log signal type
Not in use
Digital input
Digital output
AI High alarm
AI Low alarm
Logical Function
AI
AO
Instrument process value
Other signals
Back Select OK
Log signal type
Instrument process value
Back Select OK
Log signal type
Other signals
Back Select OK

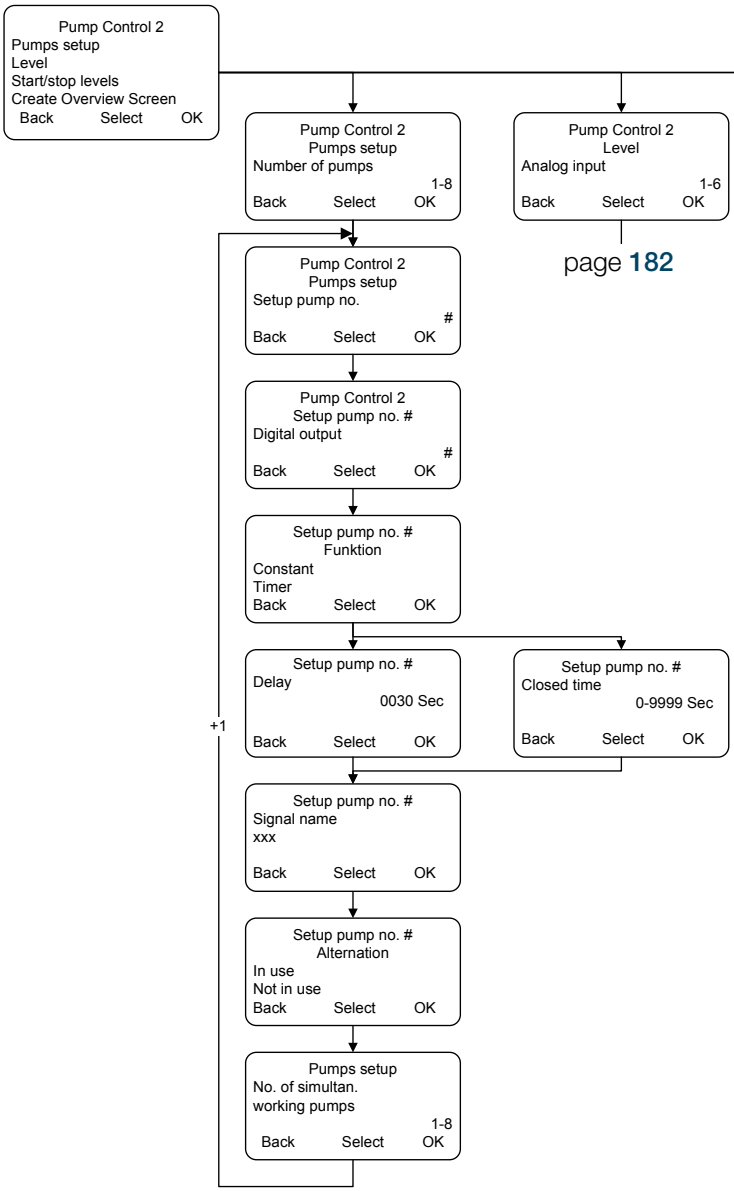
Data logger - continued 1



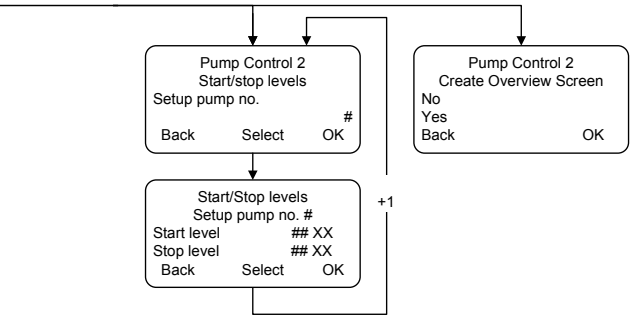
Data logger - continued 2



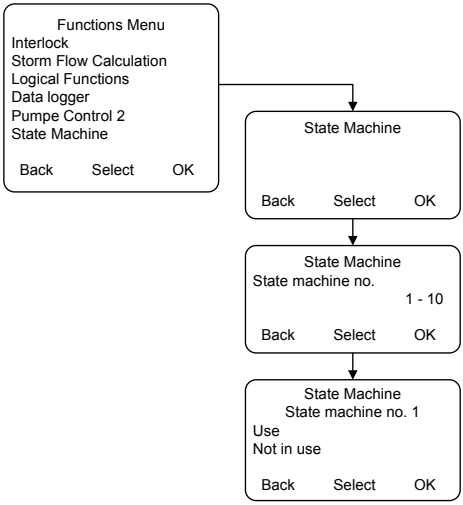
Pump Control 2



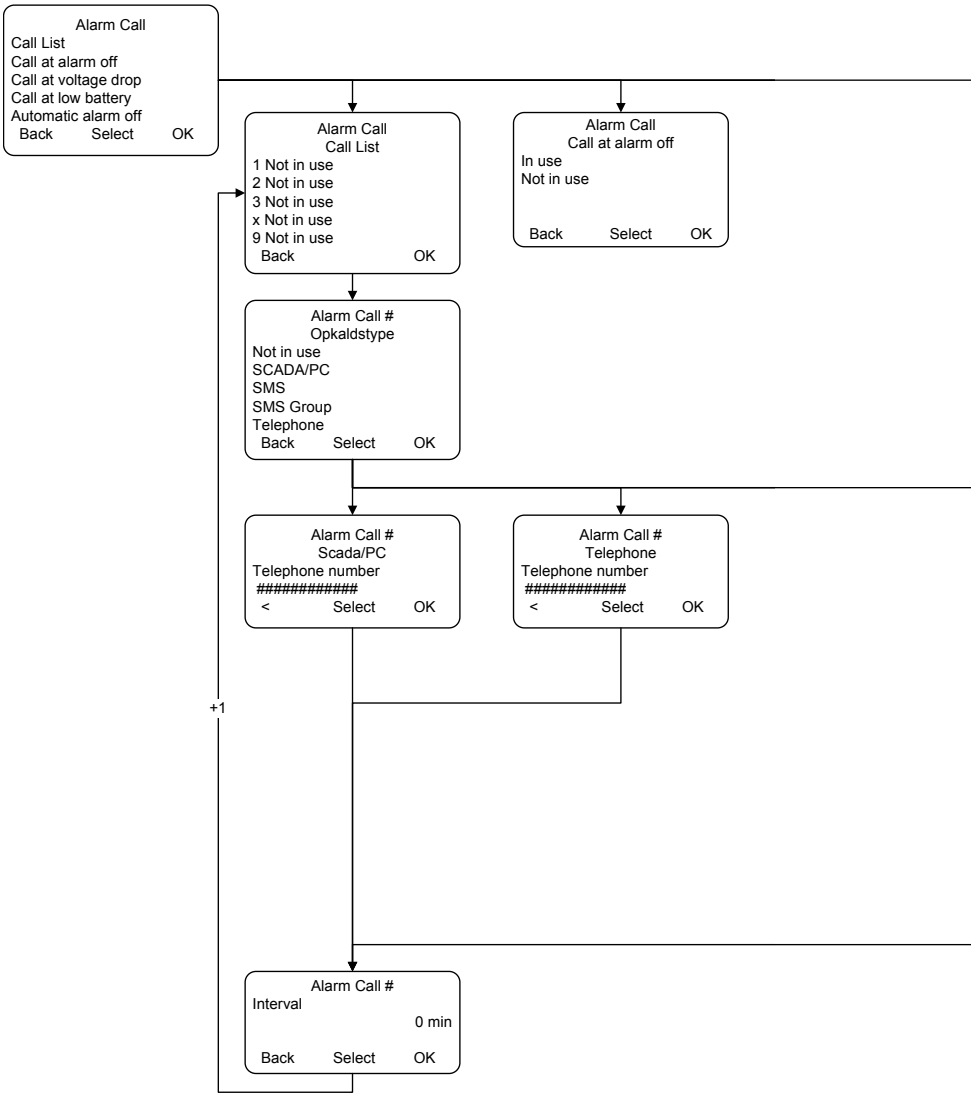
Pump Control 2 - continued 1



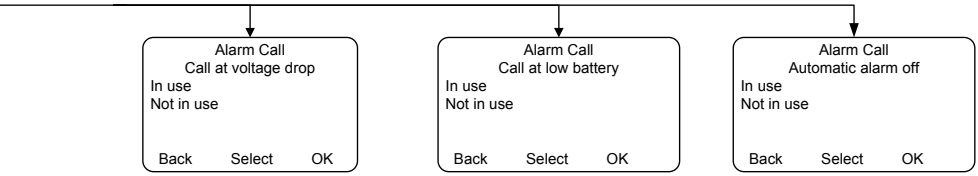
State Machine

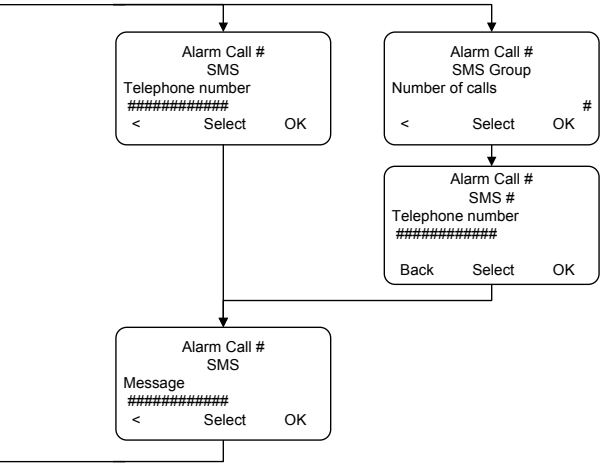


Alarm call

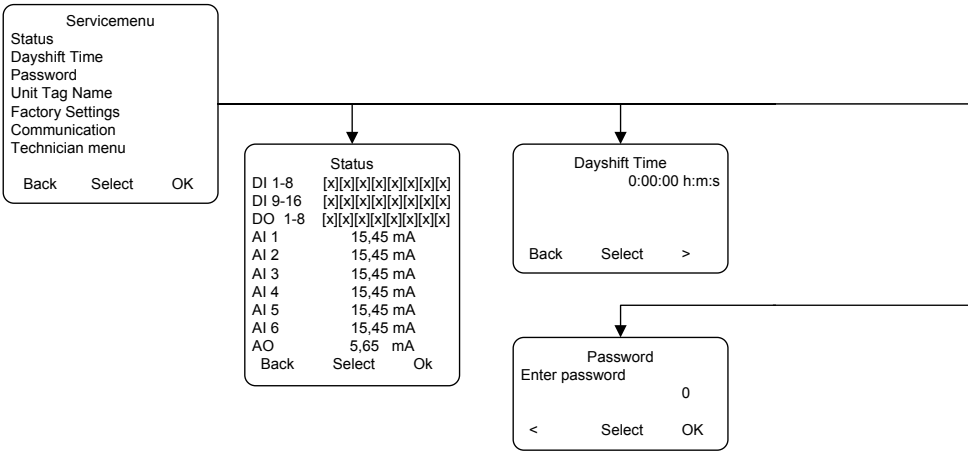

Alarm Call
Call List
Call at alarm off
Call at voltage drop
Call at low battery
Automatic alarm off
Back Select OK
Alarm Call
Call List
1 Not in use
2 Not in use
3 Not in use
x Not in use
9 Not in use
Back OK
Alarm Call
Call at alarm off
In use
Not in use
Back Select OK
Alarm Call #
Opkaldstype
Not in use
SCADA/PC
SMS
SMS Group
Telephone
Back Select OK
Alarm Call #
Scada/PC
Telephone number
############
< Select OK
Alarm Call #
Telephone
Telephone number
############
< Select OK
+1
Alarm Call #
Interval
0 min
Back Select OK

Alarm call - continued 1

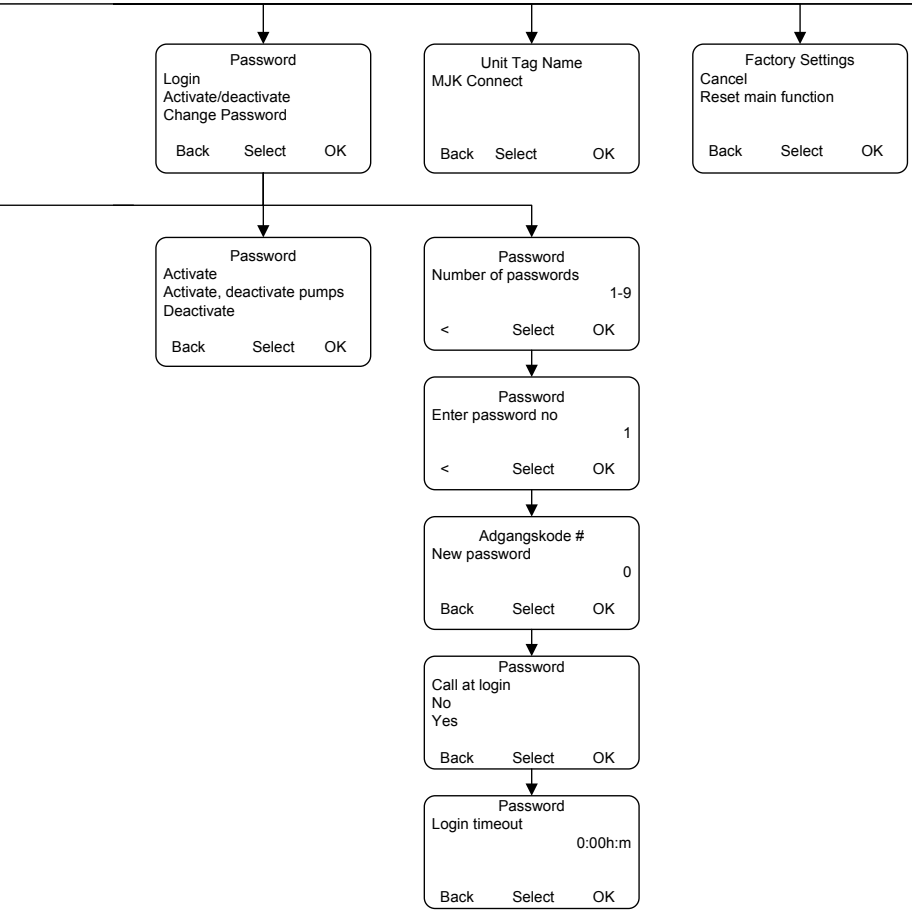




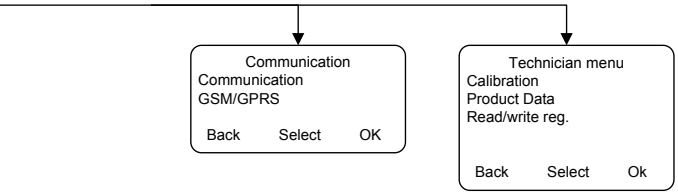
Service menu



Service menu - continued 1

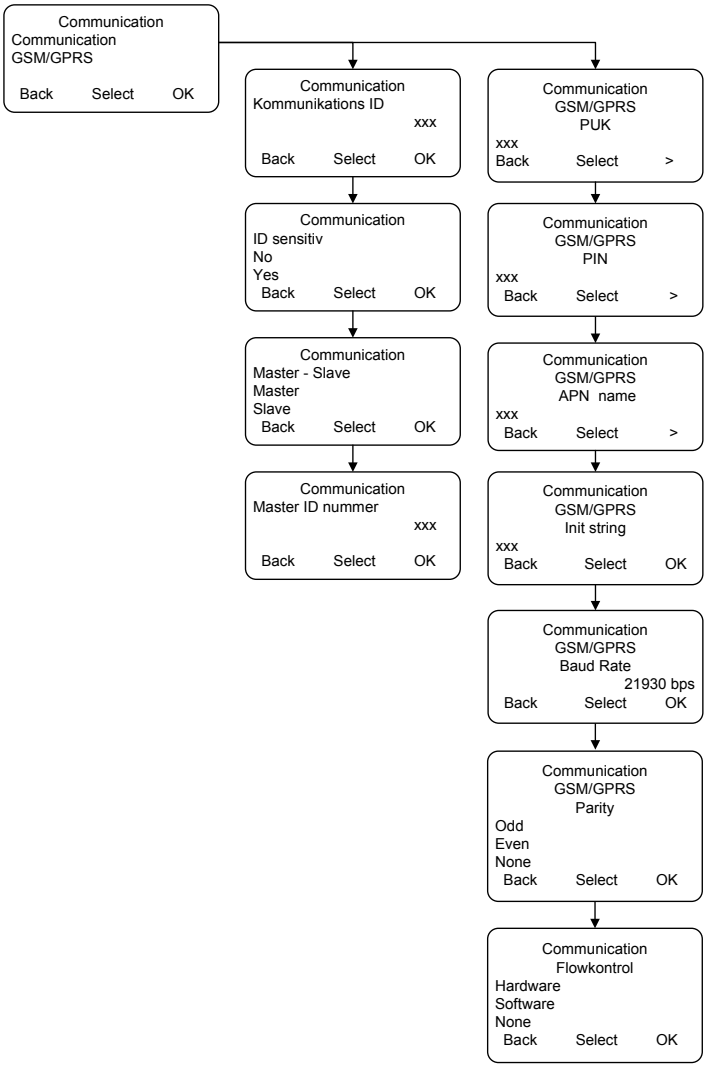


Service menu - continued 2

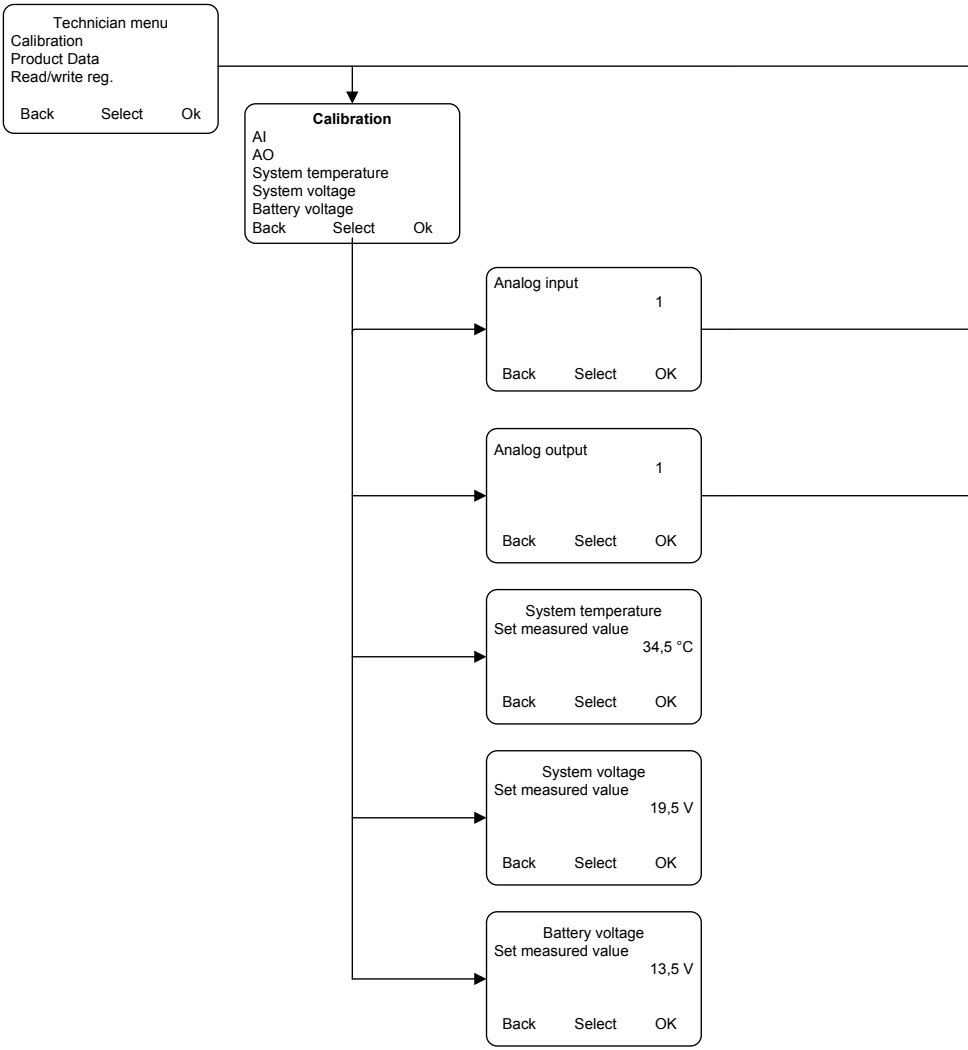


The “Communication” menu continues on page **275,** and ”Technician menu” continues on page **276**.

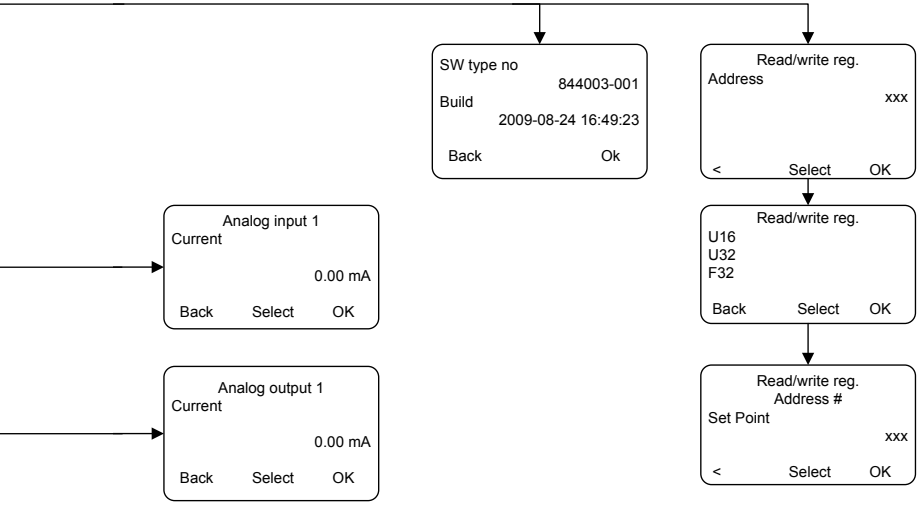
Service menu / Communication



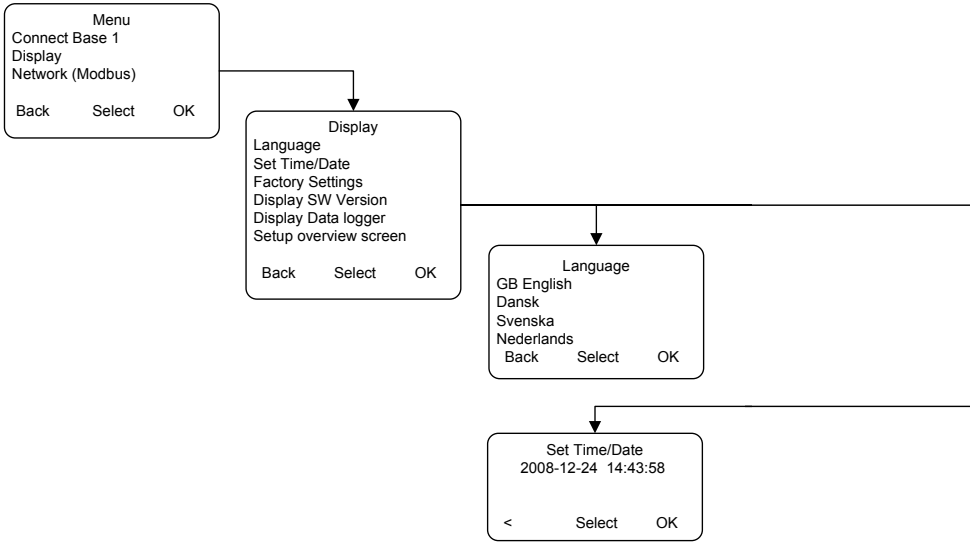
Service menu / Technician Menu



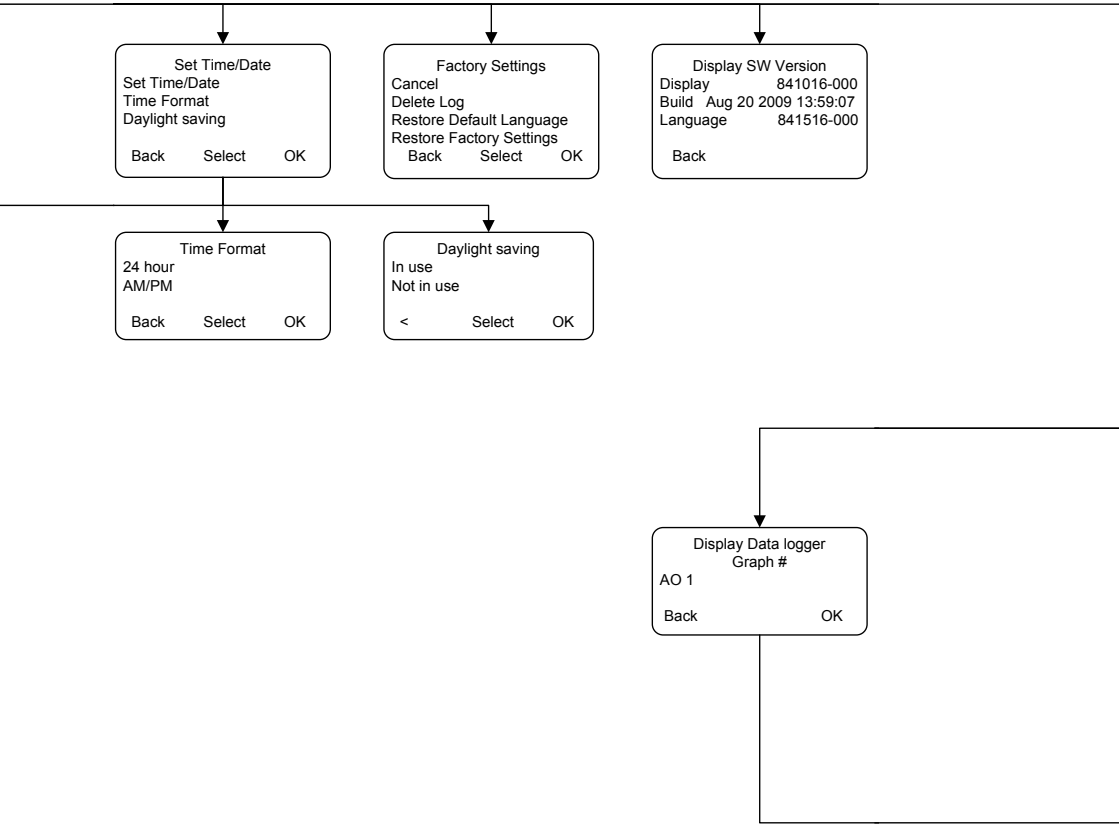
Service menu / Technician menu - continued 1



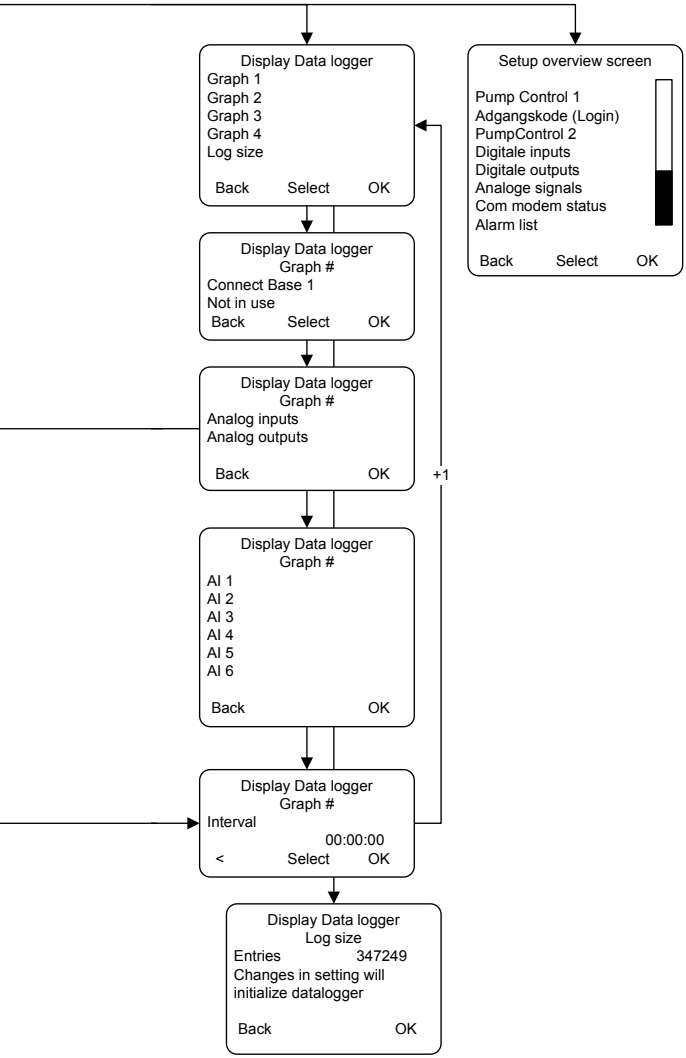
Display


Menu
Connect Base 1
Display
Network (Modbus)
Back Select OK
Display
Language
Set Time/Date
Factory Settings
Display SW Version
Display Data logger
Setup overview screen
Back Select OK
Language
GB English
Dansk
Svenska
Nederlands
Back Select OK
Set Time/Date
2008-12-24 14:43:58
< Select OK

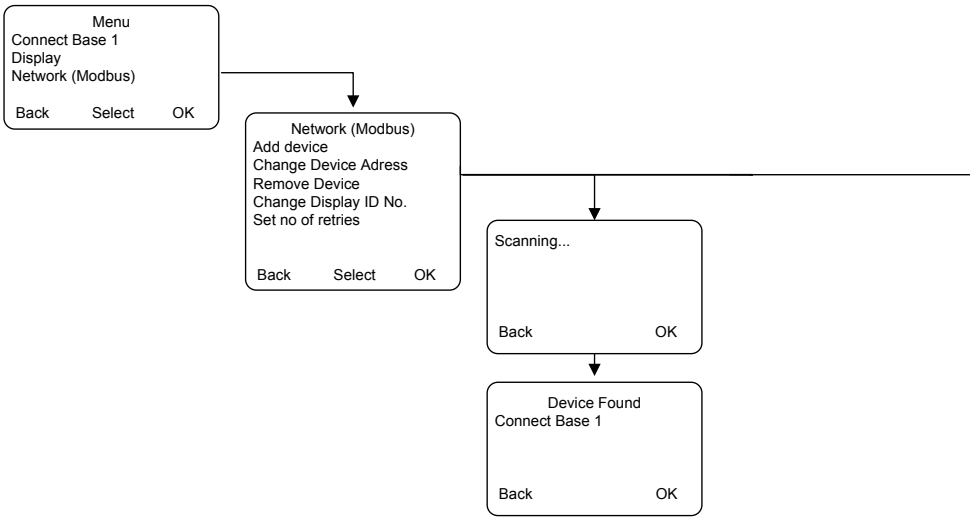
Display - continued 1



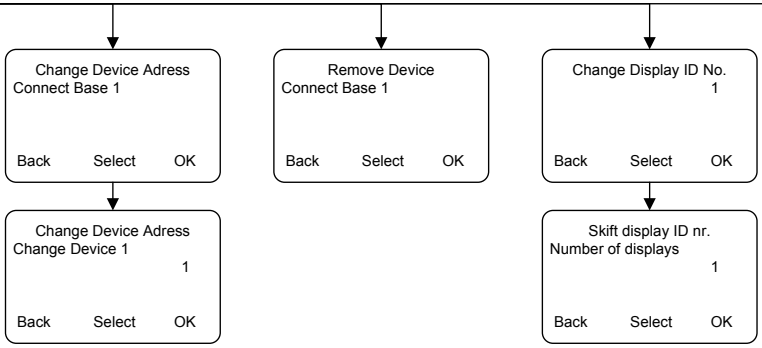
Display - continued 2



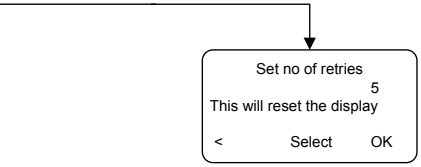
Network (Modbus)



Network (Modbus) - continued 1



Network (Modbus) - continued 2



eof

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MJK Automation A/S
DK: +45 45 56 06 56
NO: +47 69 20 60 70
SE: +46 53 31 77 50
NL: +31 251 672171
IRL: +353 879535625
USA: +1 847 482 8655
AUS: +61 3 9758 8533