



Connect® & M μ Connect

CONTROLLER AND RTU

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Introduction

Thank you for choosing the MJK Connect® or Mµ Connect® Controller and RTU unit. MJK Connect® and Mµ Connect® are easy to install, calibrate and put into service, to get the most of Connect® and Mµ Connect®, MJK recommends, reading this manual to get familiar with the details regarding Connect® and Mµ Connect®. The instruments must be treated and used according to the guidelines provided by MJK Automation ApS, this will ensure a stable operation and accurate measurements.

Liability

MJK Automation ApS is liable according to the national regulations of Danish law on product liability. However, the liability is reduced to coverage of MJK Automation ApS public liability insurance of products. Unless specifically mentioned, MJK Automation ApS is not liable for loss of profits and working deficits or other indirect losses caused by the product.

Changes

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

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Complete manual for Connect® inclusive all menus and functions, technical specifications etc. are available for download the website in pdf format. <http://www.mjk.dk/downloads/downloads-products/downloads-rtu/downloads-connect/>

Complete manual for Mµ Connect® inclusive all menus and functions, technical specifications etc. are available for download the website in pdf format. <http://www.mjk.dk/downloads/downloads-products/downloads-rtu/downloads-my-connect/>

Complete manual for Instrument Link inclusive all menus and functions, technical specifications etc. are available for download the website in pdf format <http://www.mjk.dk/downloads/downloads-products/downloads-accessories/downloads-rtusoftware/>

Declaration of Conformity

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 un-
der our sole responsibility that
the product

Konformitätserklärung

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

Connect®

Styre- og overvågningsenhed

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

Declaration de conformité

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

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

Dichiarazione di conformità

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

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

Declaración de Conformidad

Nosotros, MJK Automation
A/S, DK-2850 Nærum, decla-
ramos bajo nuestra única re-
sponsabilidad que el producto

Connect®

Styre- og overvågningsenhed

auquel se réfère cette
déclaration est conforme à
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

89/336/EEC; 92/31/EEC

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

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

conformemente alla disposizioni
della Direttiva

89/336/EEC; 92/31/EEC

al cual se refiere esta decla-
ración, está en conformidad
con la(s) siguiente(e) norma(s) u
otros documentos normativos

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EN61000-6-1/-2:1999

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directiva(s)

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det fulde ansvar for at produktet

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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

Mμ Connect® RTU and I/O Expansion Modules

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

EN61000-6-4:2007,
EN61000-6-2:2005

efter bestemmelserne i
direktiv

2004/108/EC

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

EN61000-6-4:2007,
EN61000-6-2:2005

following the provisions of
Directive

2004/108/EC

auf das sich diese Erklärung
bezieht mit der/den folgenden
Norme(en) oder normativen
Dokument(en) übereinstimmt.

EN61000-6-4:2007,
EN61000-6-2:2005

Gemäss den Bestimmungen der
Richtlinie

2004/108/EC

Declaration de conformité

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 respon-
sabilità che l'apparecchio

Declaración de Conformidad

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

Mμ Connect® RTU and I/O Expansion Modules

auquel se réfère cette déclara-
tion est conforme à la (aux)
norme(s) ou autre(s) document(s)
normatif(s)

EN61000-6-4:2007,
EN61000-6-2:2005

conformément aux dispositions
de Directive

2004/108/EC

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

EN61000-6-4:2007,
EN61000-6-2:2005

conformemente alla disposizioni
della Direzione

2004/108/EC

al cual se refiere esta de-
claración, está en conformidad
con la(s) siguiente(e) norma(s) u
otros documentos normativos

EN61000-6-4:2007,
EN61000-6-2:2005

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

2004/108/EC

06.03.2012


Jens Kruse

Specifications & Order Numbers

Specifications

Mμ Connect®	
Power supply ③	11-30 V DC / 24 V AC ± 15% (Class II, UL 1310 approved for UL classified mounting)
Power consumption	8-40 VA, Depending on construction
Battery backup ③	Built-in battery charger includes supervising an external battery, (2 - 30 Ah)
Clock	Real-time clock incl. built-in lithium battery (expected lifetime 10 years at 20°C)
Memory	32 Mb Flash-memory, 10 X 36.000 logs depending on chosen protocol
Internal Communication	Modbus® RTU-mode
External Communication	Modbus® RTU-mode or COMLI®
Communication / Interface	1 pcs. Modem (Quad-Band EGSM 850/900/1800/1900 MHz) (205243) or 1 pcs. RS-232/485 galvanically separated (205240) 1 pcs. built-in WIFI, 802.11b/g (2,4 GHz), Max 25Mbps (64/128 bit WPA2(AES)) 1 pcs. RS-485 Din bus for I/O modules 1 pcs. RS-485 galvanically separated for INET (instrument net) 1 pcs. RS-485 galvanically separated for CNET (Connect net) 1 pcs. USB 1,1 type mini B, female 1 pcs. MMCX, female, for antenna (205343)
Enclosure	IP 20
Cabinet Material	PC (Polycarbonate)
Operating Conditions	- 20 ... 60 °C / -4...140°F
Weight	0,55 kg
CE Approval	EN 61000-6-4:2007, EN 61000-6-2:2005

Input & Output (I/O) RTU unit (3AI/6DI/2DO) incl. expansionmodules, Max. 32 DI, 32 DO, 16 AI og 16 AO	
Digital input ①	6 pcs. 10 - 30 V DC
Digital output ①	2 pcs. Elektronik relays (max. 28 V AC / 28 V DC / 300 mA)
Analogue input ①	3 pcs. galvanically separated, 16 bit resolution, 4-20 mA
Analogue output ①	Through optional Mμ Connect® I/O module, 4-20 mA, galvanically separated
Accuracy	AI: Better than ± 0,25 % of FS ②
Resolution	AI/AO: 16 bit
Powersupply for I/O	1 pcs. 15 V DC, 150 mA

① When using Mμ Connect® expansion modules the maximum number of input and outputs will be: 32 DI, 32 DO, 16 AI and 16 AO (32 digital input, 32 digital output, 16 analogue input and 16 analogue outputudgange) Expansion modules are mounted using a DIN-rail bus system.

② At operating condition of 0-50°C / 32-122°F

③ Min 15 VDC to charge the backup battery, battery is charged by either AC or DC supply.

Connect® Base	
Power supply	230/115 VAC 50 / 60 Hz, ± 10 % or 12 VDC accumulator
Power consumption	App. 25 VA
Battery backup	Built-in battery charger includes supervising an external battery, (2 - 30 Ah)
Clock	Real-time clock incl. built-in lithium battery (expected lifetime 10 years at 20°C)
Memory	32 Mb Flash-memory, 10 X 36.000 logs depending on chosen protocol
Internal Communication	Modbus® RTU-mode
External Communication	Modbus® RTU-mode orr COMLI®
Communication / Interface	1 pcs. RS-485 galvanically separated for INET (Instrument Net, MagFlux® / SuSix® e.g.) 1 pcs. RS-485 galvanically separated for CNET (Connect net) 1 pcs. communication module for security installations and other Connect units. 1 pcs. USB 1,1 type mini B, female
Enclosure	IP 67
Cabinet Material	Glass-reinforced polycarbonate
Operating Conditions	- 20 ... + 60 °C
Weight	1,5 kg
CE approval	EN 61000-6-4:2001, EN 61000-6-2:2001

Connect® I/O module max. 16 DI, 8 DO, 6 AI og 1 AO	
Digital input	16 pcs. 10 - 30 VDC
Digital output	8 pcs. with electronic relays (max. 28 VAC / 28 VDC / 300 mA)
Analogue input	6 pcs. galvanically separated, hi-res, 4 - 20 mA
Analogue output	1 pcs. galvanically separated, 4 - 20 mA
Accuracy	AI: Better than $\pm 0,25$ % of FS ①
Resolution	16 bit
Powersupply for I/O	3 pcs. 15 VDC, 150 mA
① at operating condition of 0-50°C	

Connect® Display	
Display	Background lit LCD-display (64 x 128 pixels) with softkeys
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 (lifetime 10 year@20°C)
Communication	RS-485 Modbus® RTU-mode for communication between 1 - 4 Connect® units
Interface 1	RS-485
Interface 2	USB 1,1 type mini B, female
Interface 3	Communications module
Memory	32 Mb Flash-memory, 30.000 loggings including date, time and measured values
Enclosure	IP 67
Cabinet material	Glass-reinforced polycarbonate
Protective cap	Transparent polycarbonate
Temperature range	- 20 ... 60 °C
Weight	0,5 kg

All specs is provided "all other equal" based on tests primarily by MJK R&D according to the Declaration of Conformity.

Order Numbers

Mμ Connect®	
205240	Mμ Connect® with RS485/RS232 and WIFI, 6DI/2DO/3AI
205243	Mμ Connect® with GSM/GPRS modem and WIFI 6DI/2DO/3AI

I/O expansion modules (maximum 16AI/16AO/32DI/32DO)	
205260	Mμ Connect® I/O module 12DI
205261	Mμ Connect® I/O module 12DO
205262	Mμ Connect® I/O module 6DI/6DO
205270	Mμ Connect® I/O module 6AI
205271	Mμ Connect® I/O module 6AO
205272	Mμ Connect® I/O module 3AI/3AO
205280	Mμ Connect® I/O module 6DI/3AI
205281	Mμ Connect® I/O module 6DI/3AO
205282	Mμ Connect® I/O module 6DO/3AI
205283	Mμ Connect® I/O module 6DO/3AO

Connect®		
205301	Connect® base W/O display	I/O module 16-8-6-1
205321	Connect® base w. display	I/O module 16-8-6-1
205341	Connect® base w. display and PSTN	I/O module 16-8-6-1
205342	Connect® base w. display and GSM	I/O module 16-8-6-1
205343	Connect® base w. display and GPRS	I/O module 16-8-6-1
205501	Connect® base	No I/O module
205505	Connect® display unit	-
205511	Connect® I/O module	I/O module 16-8-6-1

Accessories

Mμ Connect® Accessories	
500311	DIN bus (3DIV.) for montage af 1 stk. I/O modul
500312	DIN bus (6DIV.) for montage af det første I/O modul
691095	PC kabel mini USB/USB
840150	Instrument Link™
205205	Spændingsforsyning 100-240V AC til 24V DC/1.75 A
205505	Connect® Display enhed
205509	Monteringssæt for display i tavle front til Mμ Connect®

Connect Internal Communications modules		
205541	PSTN modem module	PSTN
205543	GSM/GPRS modem Quad band module	GPRS
205544	RS-232 galvanically separated module	RS-232
205545	RS-485 galvanically separated repeater module	RS-485
205546	Modbus® og RS-485 Communications module	RS-485
205547	Profibus® PA Communications module	Profibus

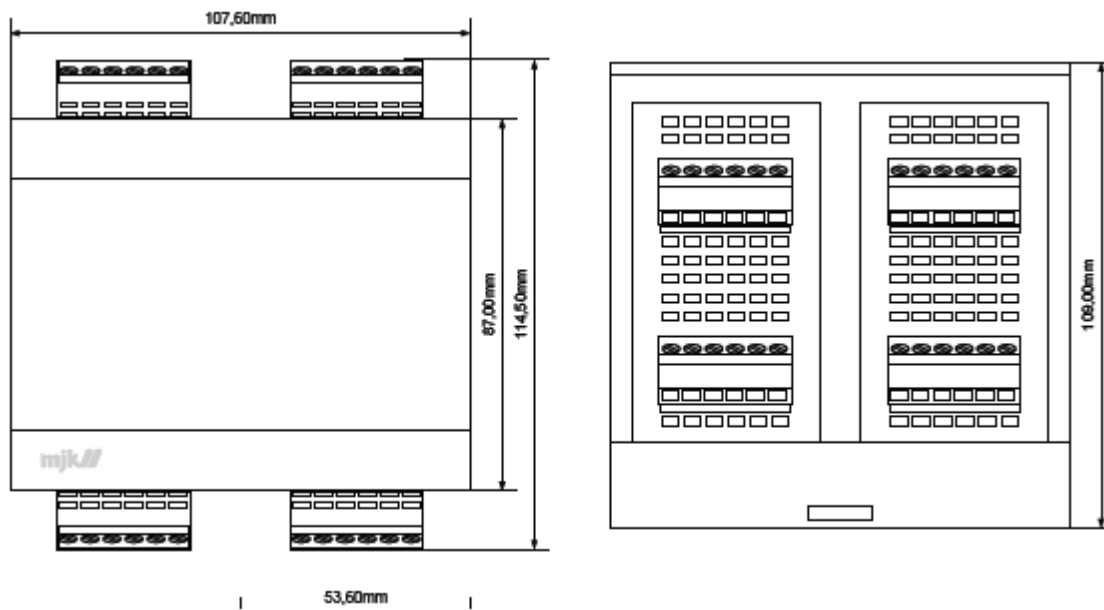
Connect Accessories	
205508	Kit for mounting of Connect® display at panel front
207936	Panel Mounting Bracket for wide Field Cabinet
691095	PC Mini USB/USB Cable
200115	Field mounting kit with rainroof/sun shield

Antennas	Device
205116-xxx	Antenna, small profile GSM
205175-xxx	Antenna, large profile GSM
205119-xxx	Antenna, Pole GSM
205185-xxx	Antenna, Wall GSM

Accumulator	Device
550244	Accumulator 12V/1,2Ah
550240	Accumulator 12V/2Ah
550241	Accumulator 12V/7,0Ah
550242	Accumulator 12V/12Ah

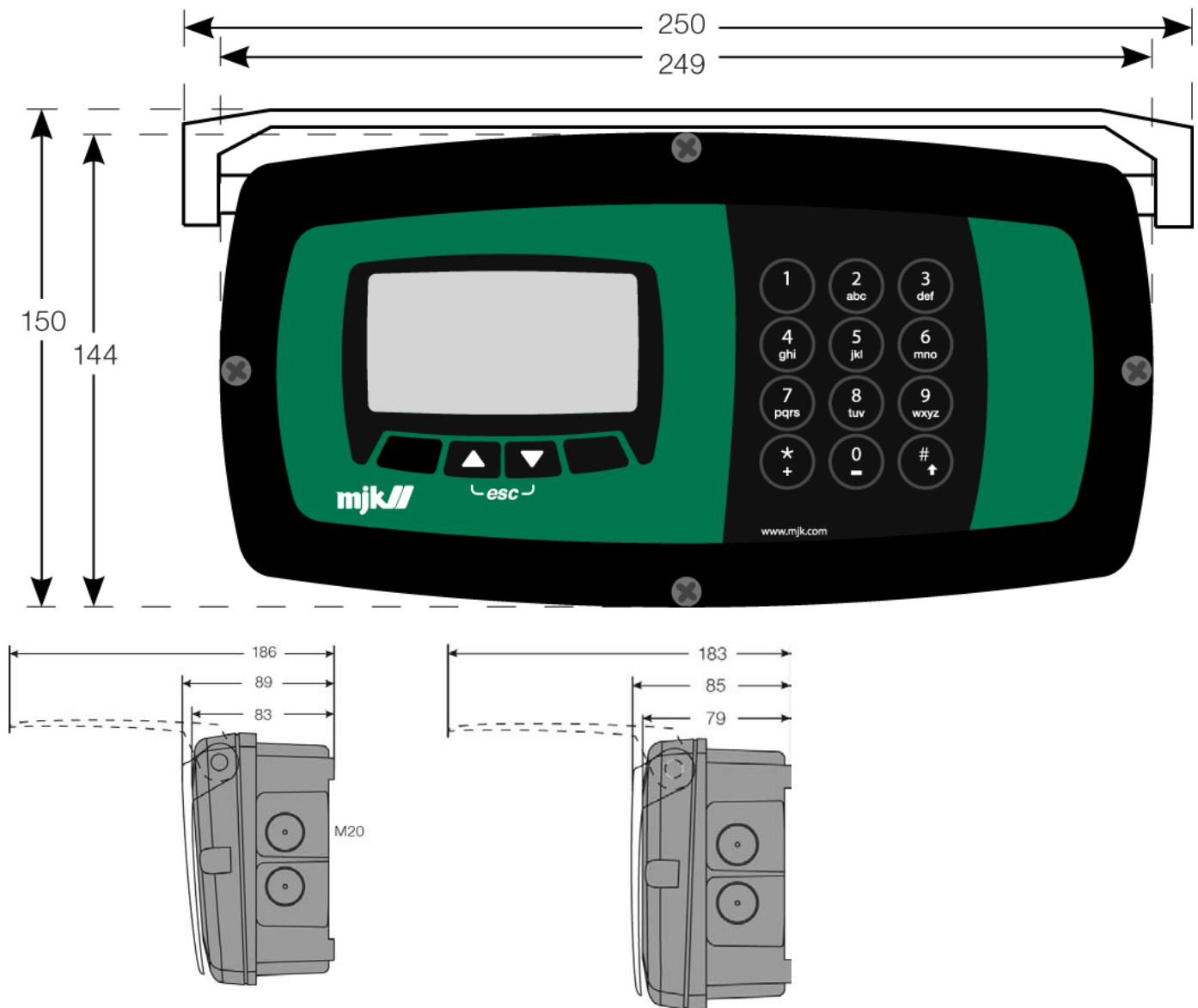
Dimensions

CPU Unit



I/O module





Electric And Mechanical Connecting And Mounting

Mμ Connect Connect

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



NEVER connect more than one unit to the individual input/output terminal.
ALWAYS disconnect the powersupply before connecting any units to the Connect / Mμ Connect®, Only re-connect the power supply when all mounting is completed.

Connect® / Mμ Connect® controller and RTU is using the same communications protocol as MagFlux® electromagnetic flow meter, SuSix® turbidity and suspended solids transmitter, Oxix and mA/Bus converter.

Physical Mounting

Only professionally trained personnel should install and connect M μ Connect..
If the equipment is mounted or connected to power incorrectly, the warranty will no longer be valid..
Please read the chapter regarding mounting and connecting power before doing so.

Mounting step-by-step

1. Ensure that the content matches the agreed delivery
2. Mount the Modbus connector on the backside of the M μ Connect unit if several units are going to be connected.
3. Click M μ Connect onto the DIN-rail, use a screwdriver in the orange lock as illustrated below.
4. Click one side on first – then the other (For example The top first and then the bottom)
5. Keep at least ½ inch free space on the top and bottom of M μ Connect
6. Ensure that M μ Connect is mounted firmly.
7. Connect all cables for input/output
8. Connect power cables
9. Start power supply
10. Start setup, using MJK Display or Instrument Link



Dismantling:

Before dismantling, please ensure that all M μ Connect controlled processes has been stopped.

1. Turn off the power supply
2. Disconnect power cables
3. Disconnect cables from input/output
4. Use a screwdriver or similar on the orange lock until the unit is released from the DIN rail.
5. Lift M μ Connect off the rail.

Note: Only one M μ Connect RTU unit for maximum 8 I/O expansion modules.

Mounting the Connect unit.

1. Ensure that the content matches the agreed delivery.
2. Remove the blind lid or display from the Connect unit.
3. If the MJK bracket(not included) is used as backplate, mount the Connect unit on this, using the holes in the 4 corners.
4. Mount Connect (with or without backplate) keeping space for cables from the bottom of the unit and at least 10mm above the unit.
5. Mount all cables from external units as well as all communication cables.
6. Mount SIM-card if needed.
7. Mount Display unit or blind lid.
8. Start power supply
9. Start programming the unit

Dismantling the Connect unit:

Before dismantling, please ensure that all Connect controlled processes has been stopped.

1. Turn off the power supply
2. Dismount blind lid or Display unit
3. Disconnect all cables

4. Dismount the Connect unit from the bracket

Correct mounting of the lid or Display unit

Place the Display unit or blind lid on top of the the Connect base.

Ensure the 4 holes are aligned perfectly between top and base

Tighten the 4 screws in 3 stages in the same order as the numbers

- Firstly tighten approx. 0,2 Nm (1.8lbf)
- Then tighten to approx 0,8 Nm (7lbf)
- Finally tighten to 1,5 Nm (13lbf)

If the screws are not tighten in the right order and providing the given torque the enclosure cannot be guaranteed.



I/O Expansion Modules

Multiple I/O modules can be connected to the RTU unit.

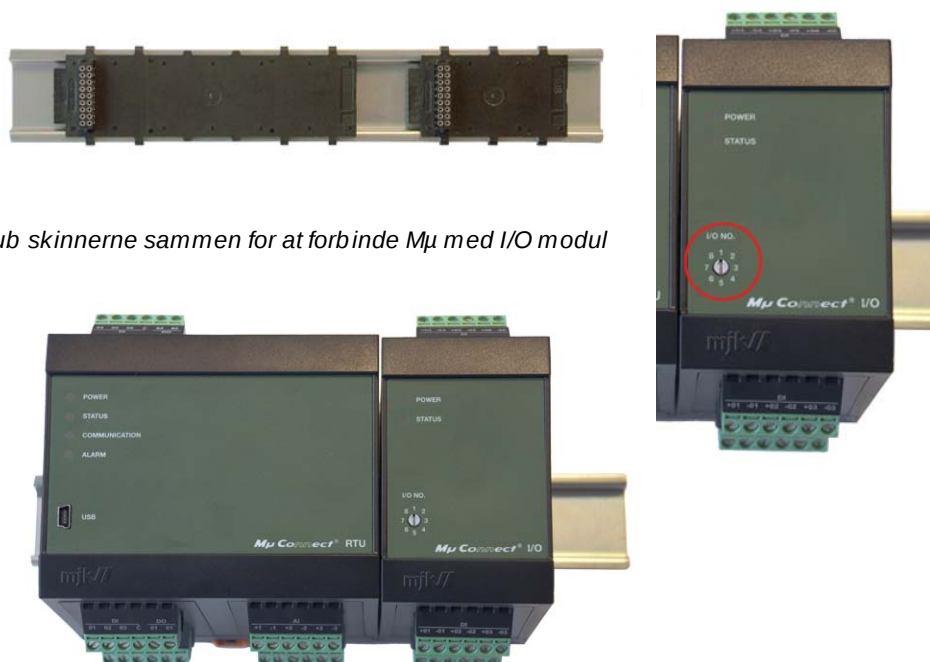
For connection, use the Modbus network in the Din system. This way, the amount of inputs and outputs can be up to 16AI, 16AO, 32DI, 32DO.

ALWAYS disconnect the power supply before mounting extra I/O modules.

First mount the DIN bus (6 DIV.) on M μ Connect, then mount the DIN bus (3 DIV.) on the selected I/O expansion modules. Now click-on the units to the DIN-rail and push the expansion modules to connect them to M μ Connect, ensuring the contacts in the DIN-bus adaptors is well connected.

REMEMBER: Setup the expansion module ID-number on the front of the individual expansion module. The expansion modules cannot hold the same ID-number (1-8)

Then connect the external units to the expansion modules, similar to the units connected to the M μ Connect RTU unit. The power can now safely be reconnected to the M μ Connect RTU unit, which is now powering the expansion modules. The configuration of these can now be done by using the MJK Display unit or simply a laptop PC and Instrument Link.



Skub skinnerne sammen for at forbinde M μ med I/O modul



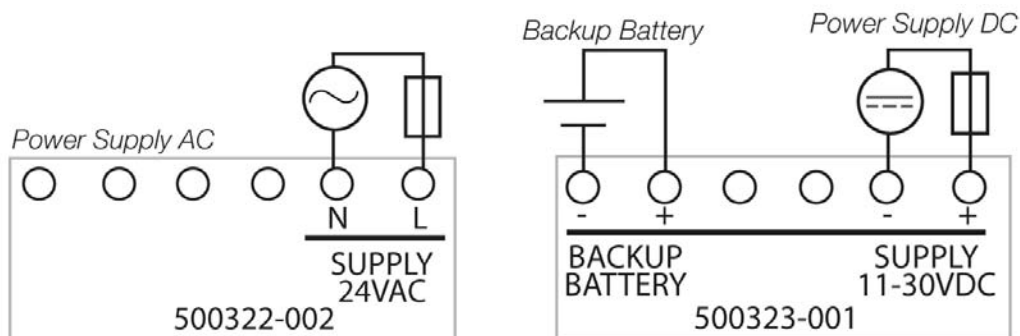
Husk at sætte nummer indstillingen på de valgte I/O ekspansionsmoduler, ingen moduler kan have det samme identifikationsnummer (1-8).

If e.g the number of max. DI (32) is past, the remaining DI 33 and higher will not be available

[Read more on I/O expansion modules](#)

Power Supply

Mu Connect® must be supplied from either 10-24 VAC, 8-40 VA OR 11-30 VDC, 8-40VA.
Fuse must be UL-listed. 12V, 3A OR 24V 2A.



Power Supply - 11-30 VDC

Terminal	Name/function
-	11-30 VDC minus
+	11-30 VDC plus

Power Supply - 10-24 VAC

Terminal	Name/function
N	10-24 VAC Nul
L	10-24 VAC Live

Power supply	Effect	Fuse
10-24 VAC	8-40 VA	12V, 3A or 24V 2A.
11-30 VDC	8-40 VA.	12V, 3A or 24V 2A.

Connect® must be supplied from a voltage group providing 230 VAC "B"
or from a 12 VDC constant-voltage power supply/battery "A".
The internal fuse is located at "C".



A. Power Supply - 12 VDC

Terminal	Name/function
-	12 VDC minus
+	12 VDC plus

B. Strømforsyning - 230/115 VAC

Terminal	Name/function
PE	Ground
N	230/115 VAC nul
L	230/115 VAC live

C1. 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

C2. Internal fuses

Voltage	Value	Order no.	Size
12 VDC	3,15 AT	550065	5 x 20 mm



NOTE! Mµ Connect® / Connect® RTU and control MUST NOT be connected to a power supply before all signal and power cables have been connected and secured.

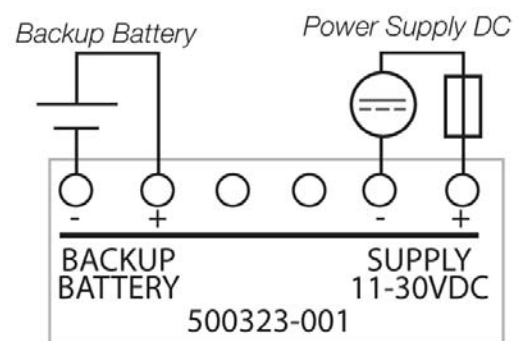


Warning! Connect® / Mµ Connect® RTU and control unit /display MUST NOT be installed in explosion hazardous environments

Back-up Battery

For Mµ Connect® a backup battery of 12VDC, 1,2Ah - 12Ah is recommended.

The backup battery is charged by AC as well as DC supply above 14,5 VDC.



The table shows examples of backup battery capacities 2, 7 and 12 Ah.

Mµ Connect® Battery capacity @ 12VDC ved 500mA load	70% possible	Backup time
2Ah	1,4Ah	1,4Ah/0,5A = 2,8 hours
7Ah	4,9Ah	4,9Ah/0,5A = 9,8 hours
12Ah	8,4Ah	8,4Ah/0,5A = 16,8 hours
Display connected, powersupply = 750mA		

For Connect® a backup battery of 12VDC, 2-30Ah is recommended.
"A"

The backup battery will automatically be charged when the unit is connected to a AC supply
"B".



The table shows examples of backup battery capacities 2, 7 and 12 Ah.

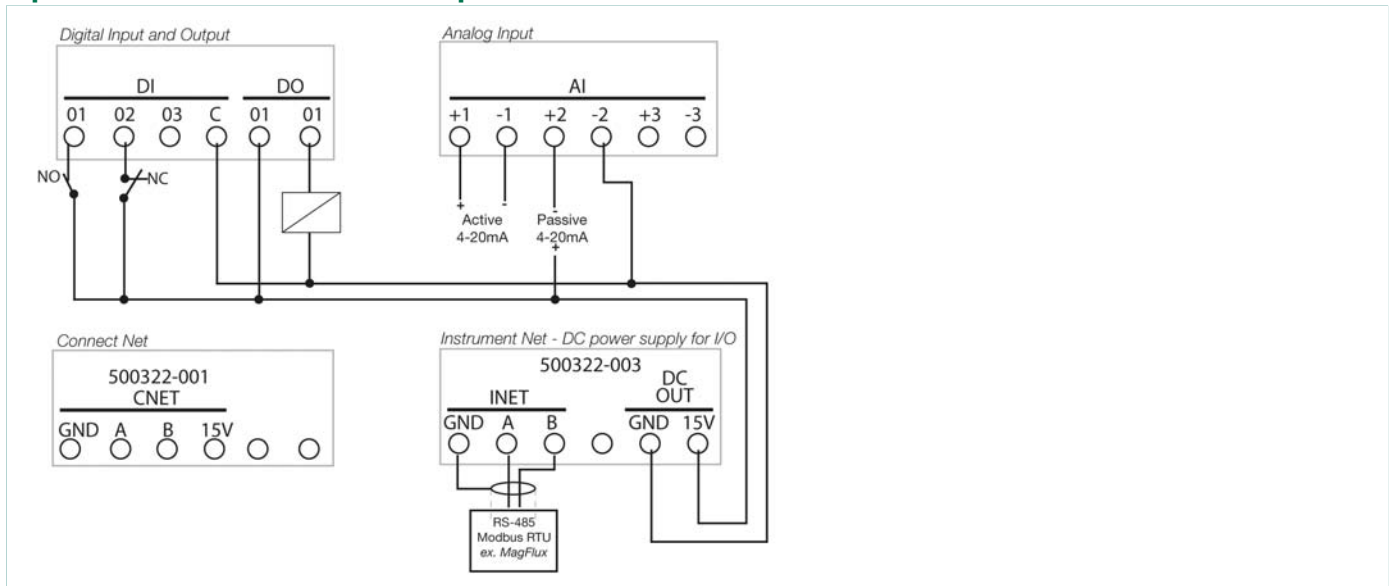
Connect® Battery capacity @ 12VDC ved 750mA load	70% possible	Backup time
2Ah	1,4Ah	1,4Ah/0,75A= 1,87 hours
7Ah	4,9Ah	4,9Ah/0,75A= 6,53 hours
12Ah	8,4Ah	8,4Ah/0,75A= 11,2 hours

I/O Signals Input-Output

M μ Connect® RTU provides a variety of analog inputs and 2 digital output, making it suitable for most small sized installations.

I/O	Amount	Voltage	
Digital Input (DI)	6	10-30 VDC	Passive
Digital Output (DO)	2	20 VAC/28VDC/300 mA	Electronic potential free relay
Analogue Input	3	4-20 mA +/- 0,25% of FS	Galvanically separated

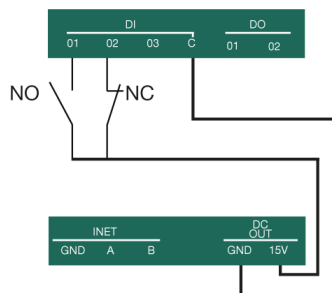
M μ Connect connection examples



Digital Input (DI)

Connecting digital input

Mμ Connect® RTU provides 6 digital, passive input terminals, activated by a voltage higher than 10 VDC and de-activated but voltage lower than 5 VDC.



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

The digital inputs is marked with "H", here shown with I/O module 16-8-6-1 installed.



Connect® Digital Input	
Terminal	Name/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 ÷ 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 ÷ terminal for DI 9 to DI 16
-------------	-------------------------------------

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

Connection examples.

The example shows connection of a NC and NO Contact for DI1 and DI2 (Note the common minusterminal with a jumper between "GND EXT" and "(-) COM DI 1-8").

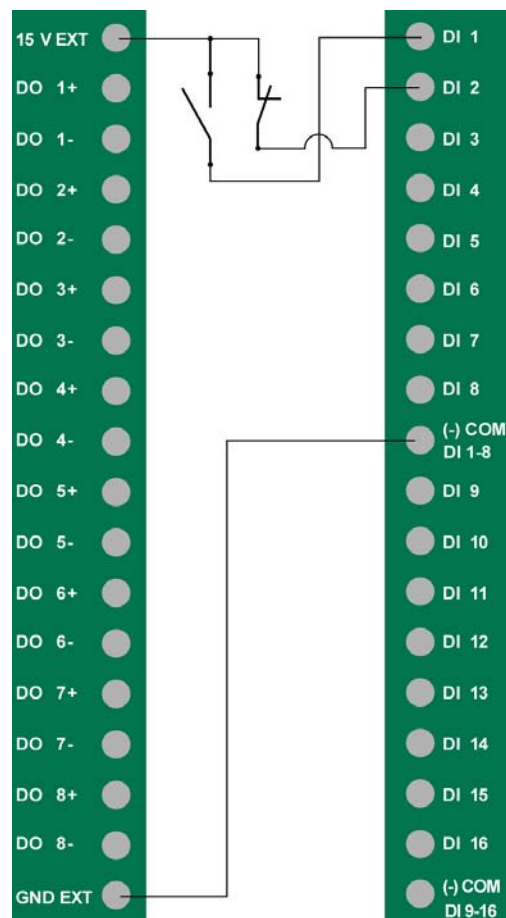
Connecting the NO contact:

1. Connect terminal "15V EXT" to: NO terminal "1"
2. Connect terminal "DI 1" to: NO terminal "2"
3. Connect terminal "GND EXT" and "(-) COM DI 1-8".

Connecting the NC contact:

1. Connect terminal "15V EXT" to: NC terminal "1"
2. Connect terminal "DI 2" to: NC 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 !

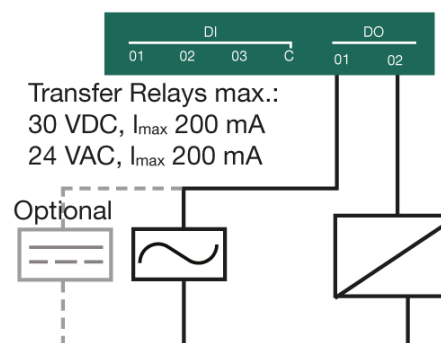
Note that inputs share minus in groups of 8 inputs, and that inputs can be individually configured to be normally open (NO) or normally closed (NC).

Digital Output (DO)

Connection for digital outputs

The outputs can individually be configured to be either NO (Normally Open) or NC (Normally Closed).

Mμ Connect® RTU is equipped with 2 digital outputs (DO1 - DO2), these are electronic potential free relays.



Connect® is equipped with 8 digital outputs (DO1 - DO8) with electronic potential-free relays (see position "G" with an MJK I/O Module 16-8-6-1 installed).



Digital outputs	
Terminal	Name/function
15V EXT	+15 VDC (pull-up for passive signals)
DO 1+	Max. 48 VAC/VDC / 120 mA
DO 1-	Ground
DO 2+	Max. 48 VAC/VDC / 120 mA
DO 2-	Ground
DO 3+	Max. 48 VAC/VDC / 120 mA
DO 3-	Ground
DO 4+	Max. 48 VAC/VDC / 120 mA
DO 4-	Ground
DO 5+	Max. 48 VAC/VDC / 120 mA
DO 5-	Ground
DO 6+	Max. 48 VAC/VDC / 120 mA
DO 6-	Ground
DO 7+	Max. 48 VAC/VDC / 120 mA
DO 7-	Ground

DO 8+	Max. 48 VAC/VDC / 120 mA
DO 8-	Ground
GND EXT	Ground for 15V EXT

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

Connection example.

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

Connecting of external transfer relay - internal voltage supply:

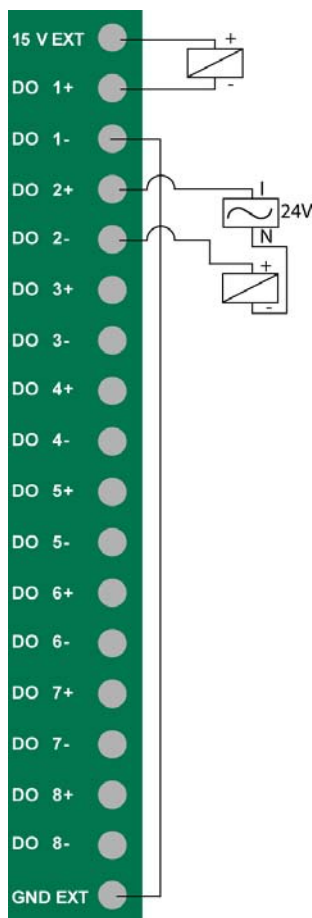
1. Connect terminal "15V EXT" to: transfer relay coil terminal "+"
2. Connect terminal "DO 1+" to: transfer relay coil terminal "-"
3. Connect terminals "DO 1-" and "GND EXT".

Connecting of external transfer relay - external voltage supply:

1. Connect terminal "DO 2+" to: voltage supply terminal "I" (24 VAC terminal, plus, live)
2. Connect terminal "DO 2-" to: relay terminal "+".
3. Connect relay terminal "-" to 24 VAC (n).'

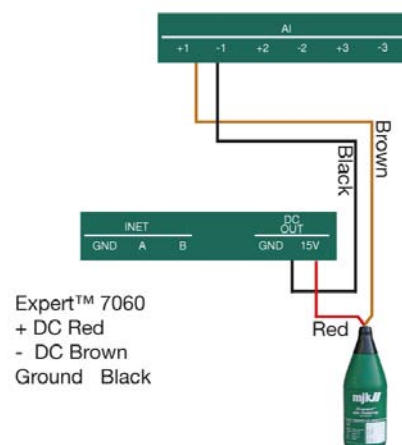
The digital outputs are equipped with electronic potential relays that can be loaded with max. 48 VAC / DC / 120 mA resistive load.

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



Analogue Input (AI)

Connecting for analogue input



Position "E" on the image, with a I/O module 16-8-6-1 installed.



Analogue Indgange	
Terminal	Name/Function
15V EXT	+15 VDC (pull-up for passive signaler)
AI 1+	4 - 20 mA, +15 VDC
AI 1-	Ground
AI 2+	4 - 20 mA, +15 VDC
AI 2-	Ground
AI 3+	4 - 20 mA, +15 VDC
AI 3-	Ground
AI 4+	4 - 20 mA, +15 VDC
AI 4-	Ground
AI 5+	4 - 20 mA, +15 VDC
AI 5-	Ground
AI 6+	4 - 20 mA, +15 VDC
AI 6-	Ground
GND AI	Ground for 15V EXT

Connection Example.

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" to: Expert cable "1" (red cable, +)
2. Connect terminal "AI2+" to: Expert cable "2" (brown conductor, return)
3. Connect terminal "AI2-" to: Connect terminal "GND AI"

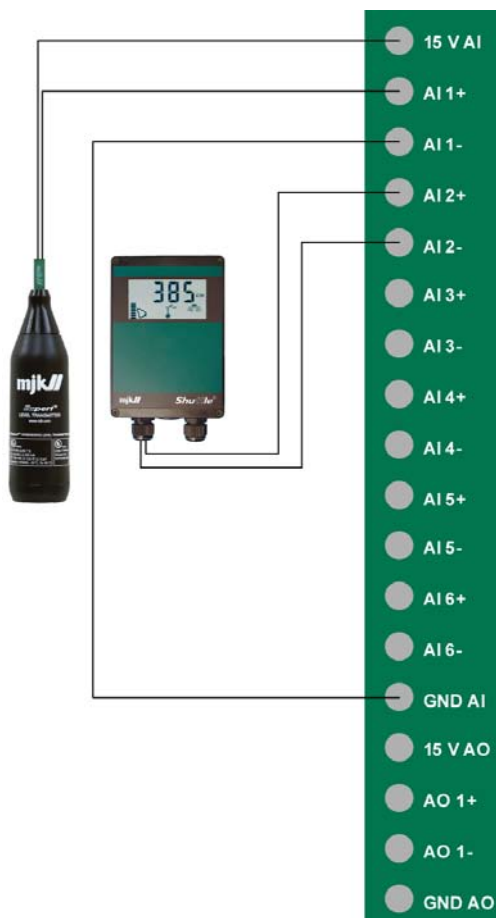
"Active" connection:

1. Connect terminal "AI1+" to: Shuttle terminal "11"
2. Connect terminal "AI1-" to: Shuttle terminal "10"

The analogue 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.

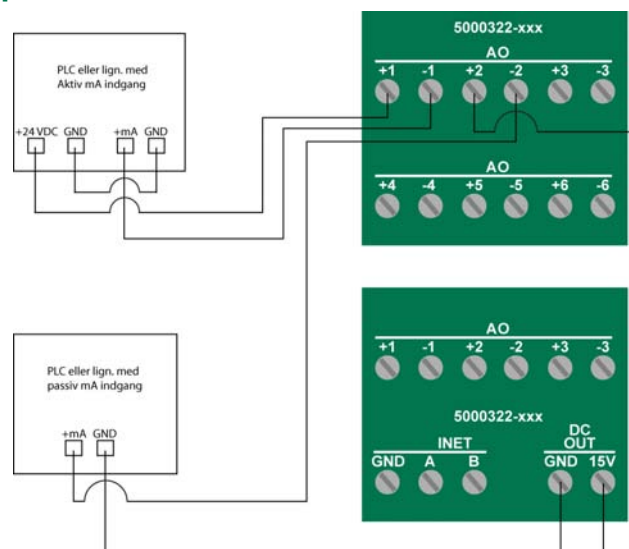


Important!

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

Analogue Output (AO)

Connecting to an active or passive analogue output



Connecting to active, analogue output

The analogue, passive output must receive no higher than 600V.

See position "F" on the image which includes an I/O module 16-8-6-1



Analogue Output	
Terminal	Name/Function
15V AO	+15 VDC (pull-up for passive signals)
AO 1+	+4 - 20 mA, +15 VDC
AO 1-	GND for AO1+
GND AO	GND for 15 V AO

The analogue output can be programmed to indicate primary units.

Connection Example.

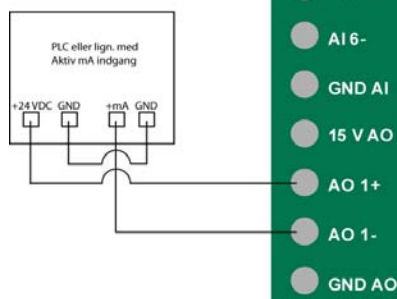
The example shows the connection of an external control unit, a PLC or similar with an **active**, analogue input.

"Active" connection:

1. Connect terminal "AO1+" to: PLC terminal "+24 VDC"
2. Connect terminal "AO1-" to: PLC terminal "+mA"
3. Connect PLC terminal to "GND".

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

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



Connecting to Passive, analogue output

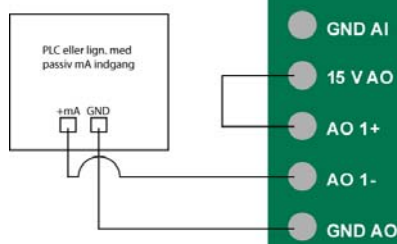
The example above shows the connection of an external control unit, a PLC, or similar with a **passive**, analog input.

"Passive" connection:

1. Connect terminal "AO1-" to: PLC terminal "+mA"
2. Connect terminal "GND AO" 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.



RS485 CNET & INET

Connect® and Mµ Connect® are equipped with serial ports (RS-485) Connect Net(CNET) and Instrument Net (INET), the protocol is Modbus.

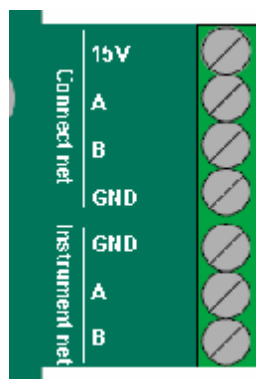
The serial communication is used for connection to various MJK Units or Modbus compatible equipment such as e.g. frequency transformers.

CNET is short for CONNECT-NET, and is used to connect to the MJK Display unit or e.g. a WIFI-module (found internally in Mµ Connect®).

INET is short for INSTRUMENT-NET and is used when Connect® / Mµ Connect® needs to retrieve data from external Modbus equipment such as flow meters, VFD's and pressure transmitters.



The Diagram shows the terminals on Mµ Connect.



The Diagram shows the terminals on Connect "D"



Connect® / Mµ Connect® Connect Net (CNET) RS-485 Terminal	Name/Function	Cable for Display unit
GND	Ground for Connect Net	Black
A	Data A	White
B	Data B	Grey
15V	+15 VDC	Red
Connect® / Mµ Connect® Instrument Net (INET) RS-485 Terminal	Name/Function	MJK instrument Terminal
GND	Ground for Instrument Net	-
A	Data A	A
B	Data B	B

MJK Instrument Connected To INET

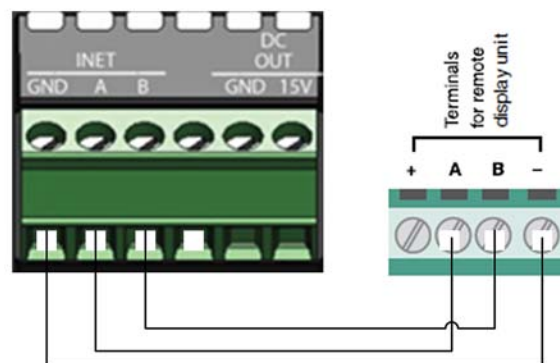
(MagFlux, SuSix/Oxix, mA-Bus converter)

Use a shielded 2-wire cable (twisted) (maximum 300m).

(691075 Communication cable 2x2x0,5mm² twisted pair + shield is recommended)

Maximum 4 MJK Instruments can be connected to one M μ Connect "Instrument net".

1. Connect® / M μ Connect® terminal INET (Instrument net) GND (shield) connects to: MJK Instrument terminal "Display -"
2. Connect® / M μ Connect® terminal "Instrument net A" connects to: MJK Instrument terminal "Display A".
3. Connect® / M μ Connect® terminal "Instrument net B" connects to: MJK Instrument terminal "Display B".



MJK Instrument connected to M μ Connect®

For Setup of the MJK Instrument, connect a MJK Instrument display for configuration.

Dismount the Display unit after setup of the unit and the MJK Instrument, without the display the instrument is then connected to Connect® / M μ Connect®.



a Display unit can not be connected to MagFlux while the MagFlux is connected to Connect/M μ Connect as the Display unit is a Master unit.

If several MJK instruments is connected to INET, these will need individual ID numbers 1-4.
read more on [Combined connections - example](#)

If Connect® / M μ Connect® with Display unit mounted, follow this path:



Index > Setup > System Setup > Technical Setup > Read/Write Reg.

Enter address 55500 > Select U16 (unsigned integers 16 bit) > Enter value 1 and wait for 1 minute > restart Connect® / M μ Connect®.

The MJK Instrument is now connected to the unit.

When controlling the connected unit, the primary process value can be read directly, this example shows a MagFlux:



Index > Setup > System Setup > Technical Setup > Read/Write Reg.

Enter address 2000 > Select F32 > Value shown... XXX.XX

[Read list regarding PV \(process value\) registers here.](#)

The individual Overview screens must hereafter be setup to show the measured values of the connected units.

[More information here](#)

Combined Connection - example

When one Connect, one SuSix and one MagFlux enhed is connected in network, "Instrument net" on Connect unit is connected to "Terminals for remote display unit" on SuSix and for "Terminals for remote display unit on MagFlux as illustrated.

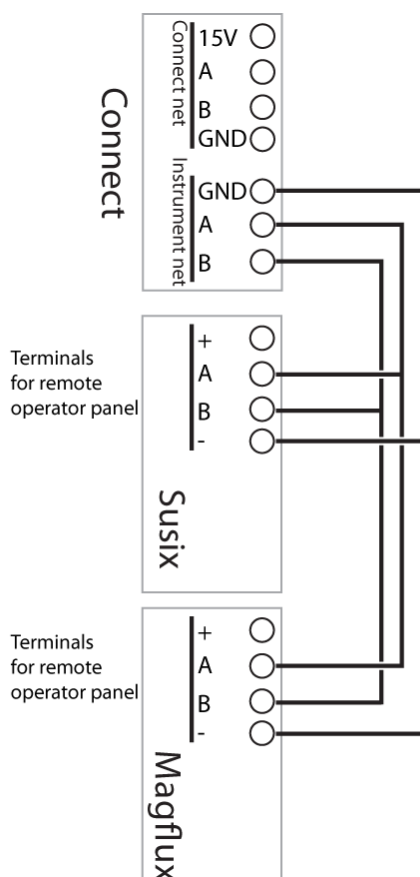
1. Connect terminal "**Instrument net GND**" (shield) to: SuSix terminal "**Display -**" and MagFlux terminal "**Display -**".

2. Connect terminal "**Instrument net A**" to : SuSix terminal "**Display A**" and MagFlux terminal "**Display A**".

3. Connect terminal "**Instrument net B**" terminal: SuSix terminal "**Display B**" and MagFlux terminal "**Display B**".

4. Connect unit must be configured with an unique ID number, so does SuSix and MagFlux .

A 2-wire cable with shield (maximum 300m) must be used. No more than 4 SuSix and/or MagFlux units can be connected to one Connect units "Instrument net".

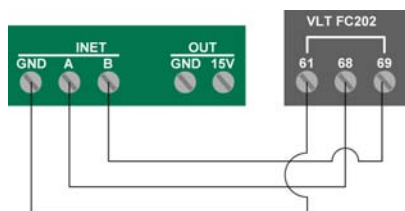


Ordernumbers for this configuration

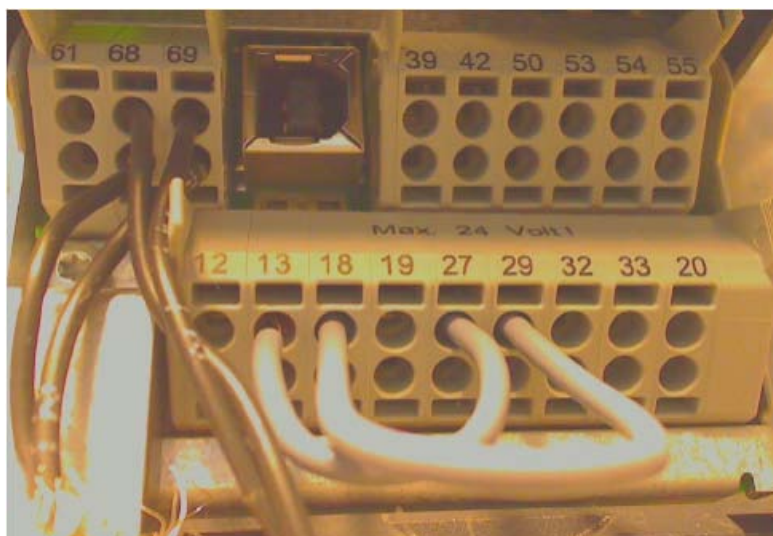
20534x	Connect base, with Display, incl. I/O module, with modem communications module by choice
2063xx	SuSix converter with or without Display
2079xx	MagFlux converter with or without Display

Danfoss VLT FC202 Connection To INET

M μ Connect - Danfoss VLT FC202:



I NET (Instrument NET):
Terminal A on INET on M μ
Connect for terminal 68 on
Danfoss VLT
Terminal B on INET on M μ
Connect for terminal 69 on
Danfoss VLT shield for GND.



Danfoss VLT FC202:
jumper between the following terminals:
from terminal 13 to terminal 27
from terminal 18 to terminal 29

Danfoss VLT FC202 setup

Parameter	Option	Danfoss VLT, description
8-30	2 (MODBUS)	Danfoss VLT / Main menu / Parameter 8 / 8-3xFC port settings / 8-30 = [2] MODBUS RTU
8-31	ID nr. Pumpe 1 VLT =100, Pumpe 2 = 101	Danfoss VLT / Main menu / Parameter 8 / 8-3xFC port settings / 8-31 Pump 1 [100], pump 2 [101]
8-32	BAUD rate = 2 (9600 baud)	Danfoss VLT / Main menu / Parameter 8 / 8-3xFC port settings / 8-32 = [2] 9600 baud
8-33	Parity = 0, (equal parity)	Danfoss VLT / Main menu / Parameter 8 / 8-3xFC port settings / 8-33 = [0] equal parity

Control signal

Parameter	Option	Danfoss VLT, description
5-02	(klemme 29 condition) = 1 (output)	Danfoss VLT / Main menu / Parameter 5 / 5-0xFC port settings / 5-02 = [1] Output

Schneider Altivar 61/71 Connected To INET

Mμ Connect - Schneider Altivar 61/71



I NET (Instrument NET):
Terminal A on 'INET in Mμ
Connect for
Terminal B at instrument net in
Mμ Connect Shield for GND.

Schneider Altivar 61/71 Setup. Communication parameters

Menu item	Select	Description
1. Drive menu	OK	
1.9 Communication	MODBUS NETWORK	
	MODBUS ADDRESS	Set Modbus id-nr to the needed value (100 – 107) to finish, press OK. Pump 1, ID nr. =100, Pump 2 = 101
MODBUS Baudrate	9.6 Kbps (9600 baud)	Set baud rate for 9.6 Kbps- OK
MODBUS Format	8-E-1	Set format 8-E-1 – OK
Modbus Timeout	10.0 s	Set value 10.0 s – OK. Restart the Device to implement the change.

Control signal

Menu item	Select	Description
1. Drive menu	OK	
1.6 Command	OK	
Ref.1 channel	OK	
MODBUS	OK	
Profile	OK	
Cmd Channel 1	OK, select "I/O profile" – OK	
Cmd Channel 1	Select "TERMINALS" – OK	Pres ESC

Error signal

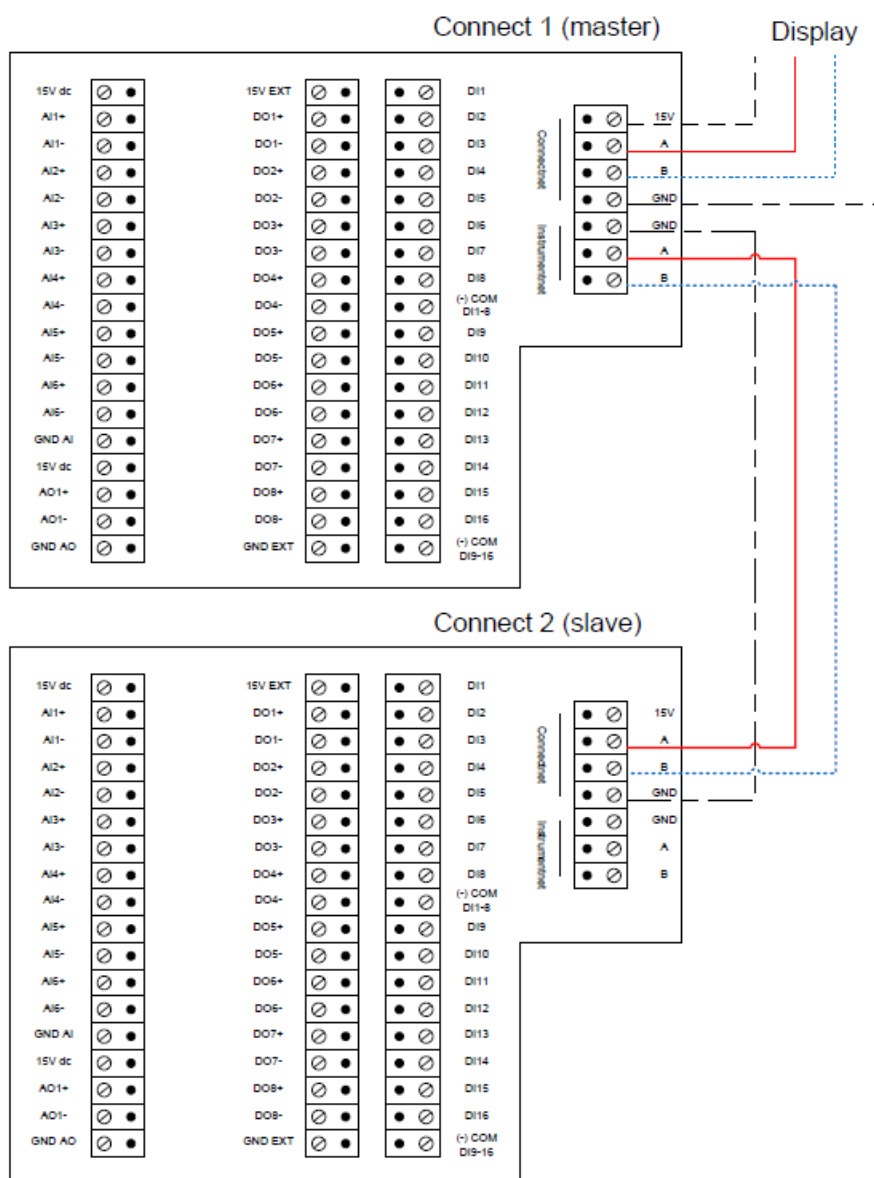
Menu item	Select	Description
1. Drive menu	OK	
1.8 FAULT MANAGEMENT	OK,	
AUTOMATIC RESTART	Select "Yes" – OK	Press ESC and select
COM. FAULT MANAGEMENT		
Modbus Fault mgt	Select "ignore"-OK	Tryk 4 * ESC to return to main screen

Two Connected Connect Units

Larger installations may need more inputs and outputs than one Connect unit can provide. Two units can be connected thereby offering 32 DI, 16 DO, 12 AI and 2 AO.

Only one display is necessary on the master unit (for example on Connect 1).

1. Connect the two connect units as illustrated and reconnect the voltage.



[2. Check setup here](#)

Use the display to check that the 32 DI, 16 DO, 12 AI and 2 AO is available.

CONNECT Display Unit

Connecting the Display.

Disconnect the power supply for M μ Connect.

Connect cables from the MJK Display unit to CNET terminal as illustrated; ensure the connection is established correctly.

Restart the power supply for M μ Connect®, so that the Display unit is now powered via the terminal.



Remove the 4 screw securing the front cover, mount the plug from MJK Display unit in the female socket marked with the text "DISPLAY". The plug can only be mounted "properly", the release-pin must face the mini-USB.

See position "L" on the image which includes an I/O module 16-8-6-1



Order numbers for this configuration:

205505	Connect® Display Unit
205508	Kit for mounting of Connect display at panel front
205509	M μ Connect® Display mounting kit for 205505

WiFi And Display

If WiFi and Display is to be used at the same time, connect the display to ID 2 and the amount of Displays for 2.



Change Display ID number for ID 2 and the amount of Displays for 2.

On Connect® / Mμ Connect® with Display mounted follow this path:



**Index > Setup > Network Setup > Connect network >
Change Display ID No. > 2 > OK
Number of Displays > 2 > OK**

USB

Attach the mini-USB cable to the mini-USB socket on the front of M μ Connect. As soon as the connection is established the M μ Connect can be configured using Instrument Link installed on a laptop PC.

The connection is established when the disc-drive named "MYCONNECT" is visible i "My Computer" additional "MJK Connect" units cannot be connected to Instrument Link similarly.

To avoid communication gaps between the Laptop PC and M μ Connect it is recommended to finish all configuration, and shutting down Instrument Link before disconnecting the USB.

USB on Connect Unit

Attach the mini-USB cable in the mini-USB socket marked with "I" on the image. As soon as the connection is established the Connect unit can be configured using Instrument Link installed on a laptop PC.

The connection is established when the disc-drive named "CONNECT" is visible i "My Computer" additional "MJK Connect" units cannot be connected to Instrument Link similarly.

To avoid communication gaps between the Laptop PC and M μ Connect it is recommended to finish all configuration, and shutting down Instrument Link before disconnecting the USB.



GSM/GPRS modem

Mounting and connecting GSM/GPRS modem on Connect

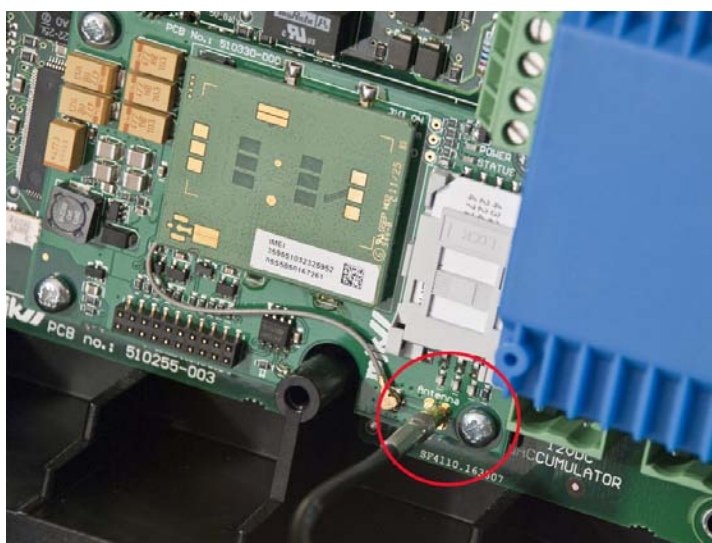
An antenna needs to be mounted for the Connect unit to be able to deliver surveillance and alarm data using the telephone and or data grid.

This example shows mounting and connecting a Connect GSM/GPRS modem, as well as connection of MJK GSM or GPRS antenna: 205116/18 or 205120

Mounting and connecting

1. Remove the front panel Connect (release the 4 screws).
2. Remove the Connect I/O module (release the 4 screws).
3. Mount the GSM/GPRS modem (incl. SIM-card) in the internal S4 interface for communication unit and tighten the screws delivered with the modem (4 pcs. M3x6).
4. Connect the GSM/GPRS modem "K" to the needed antenna using the cable MMCX male-plug. The antenna is automatically active.
5. Reinstall Connect I/O module.
6. Reinstall Connect front panel.

Note: Please ensure that the plugs on the I/O module is mounted correct in the mainboard, before locking the module using the 4 screws. Mounted incorrectly can cause the entire unit to not restart or that some functions will be out of order.



Connect order numbers for this configuration

205343	Connect® base w/ display GSM/GPRS I/O module 16-8-6-1	I/O modul 16-8-6-1
OR		
205321	Connect® base w/ display I/O modul 16-8-6-1	I/O modul 16-8-6-1
and		
205543	GSM/GPRS modem Quad band module	

SIM-card Mounting

For optimal usage of M μ Connect's surveillance and alarm options a phone or data SIM-card must be mounted.

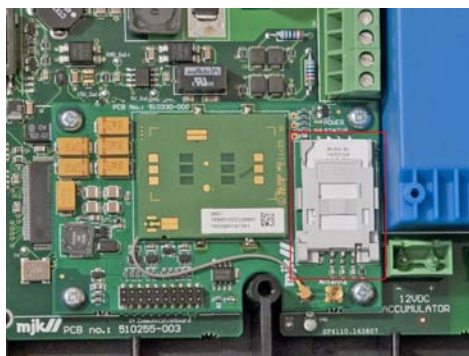
The communication is configured using Instrument Link.

Connection via the SIM card (the GSM/GPRS signal) is secured using an external antenna (not included).



To mount the SIM-card in a Connect unit

1. Remove the Connect front panel (display unit, 4 screws).
2. Dismount the Connect I/O module (4 screws).
3. Mount the GSM module in the internal S4 interface for communication units and lock using the supplied screws (4 pcs. M3x6).
4. Pull back the locking mechanism and tilt it upwards insert the SIM-card in the locking mechanism, it should enter easily
5. Push the locking mechanism down and push forward to lock it.
6. Reinstall the Connect front panel.



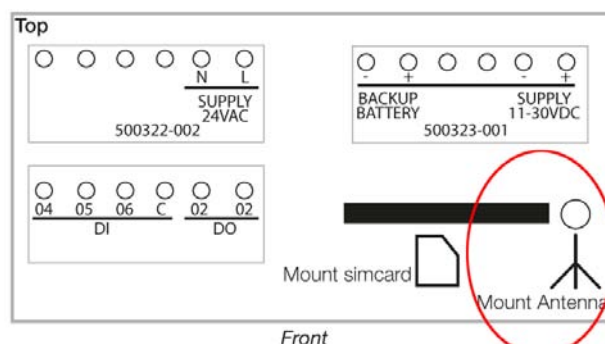
Connecting Antenna

M μ Connect needs an antenna to deliver surveillance and alarm data using the phone or data network.

Mount the antenna on top of the M μ Connect unit.

The antenna should be mounted externally on steel panels. The antenna does not need further configuration, but will instantly improve the GSM/GPRS signal, depending on the mounting and shielding conditions.

Read Datasheet GB 6.26 GSM-GPRS Antennas Datasheet for details.



There are several different antennas for the GSM/GPRS signal. Antennas are delivered with or without signal amplification. See the specification datasheet and ask a technician if necessary to ensure the best antenna solution for your setup.

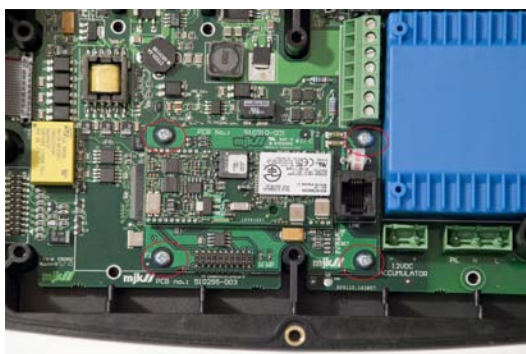
PSTN modem

Mounting and connecting a PSTN modem in Connect

Mounting and Connecting

1. Remove the Connect front panel (display unit, 4 screws).
2. Remove 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.
6. Remount the front panel.

OBS: 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.



Connect order numbers for this configuration

205341	Connect® base w/ display PSTN I/O module 16-8-6-1	I/O module 16-8-6-1
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OR

205321	Connect® base w/ display I/O module 16-8-6-1	I/O module 16-8-6-1
--------	--	---------------------

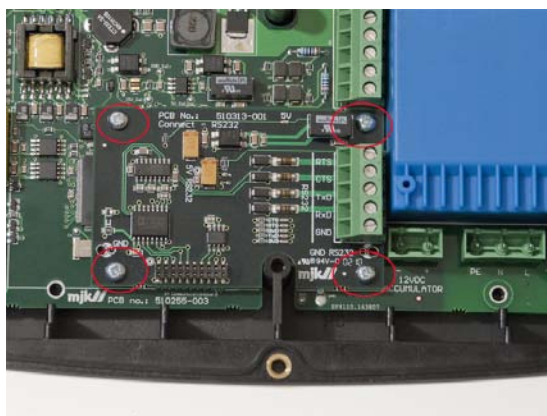
And

205541	PSTN modem module	
--------	-------------------	--

RS 232 Communications Module

RS-232 module is placed in position "K" on the image. On the image it is however a GSM modem that are installed.

1. Remove Connect front panel (display unit, 4 screws).
2. Remove Connect I/O module (4 screws).
3. Mount RS-232 module in the internal S4 interface for communication units and attach using the supplied screws (4 pcs. M3x6).
4. Reinstall Connect I/O module.
5. Reinstall Connect front panel.



RS 232 - Datatransmitter 795

Example showing mounting and connecting MJK 795 Data Transmitter to RS-232 com-module.

Mounting and connecting

1. Stop all running processes.
2. Remove Display or blind lid
3. Disconnect power supply
4. Connect RS-232 module for MJK 795 Data Transmitter using a 2-wire-shielded cable:

Connect terminal "TxD" to 795 terminal "RS232/A"

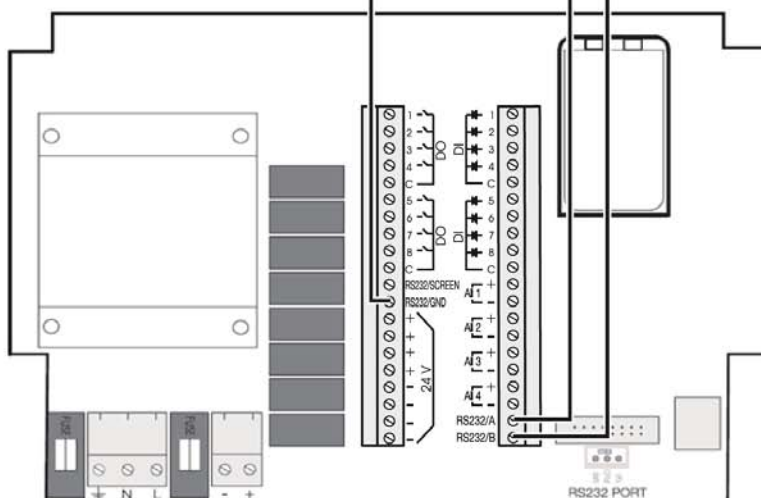
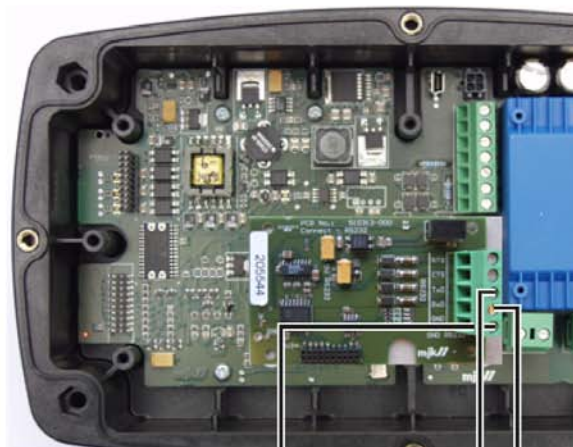
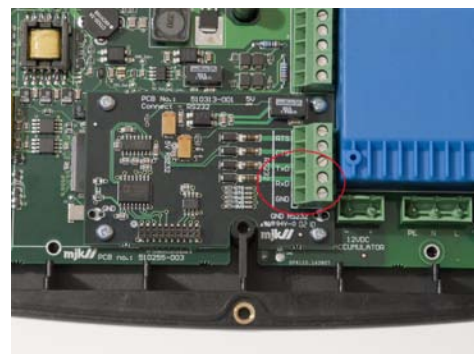
Connect terminal "RxD" to 795 terminal "RS232/B"

Connect terminal "GND" to 795 terminal "RS232/GND"

5. Reinstall Connect front panel.
6. Restart power supply

Note: 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.

the shown example is Datatransmitter 795 Master/Gateway for RS-232 module.



Connect order numbers for this configuration/denne konfiguration

205321	Connect® base w/ display I/O modul 16-8-6-1	I/O modul 16-8-6-1
205544	RS 232 galvanic insulated module	

RS 232 - Dataradio TP 6000

Example shows mounting and connecting of Dataradio TP 6000 for RS-232 com-modul.

Mounting and Connecting

1. Remove Connect front panel (display unit, 4 screws).
2. Stop power supply
3. Remove Connect I/O module (4 screws).
4. Mount RS-232 module in the internal S4 interface for communication units and attach using the supplied (4 pcs. M3x6). if it is not already mounted.
5. Connect RS-232 module to the data radio using MJK 3-conductor DB25-cable:

Connect terminal "TxD" to DB25-wire blue wire

Connect terminal "RxD" to DB25-wire brown wire

Connect terminal "GND" to DB25-wire black wire

6. Reinstall Connect I/O module.

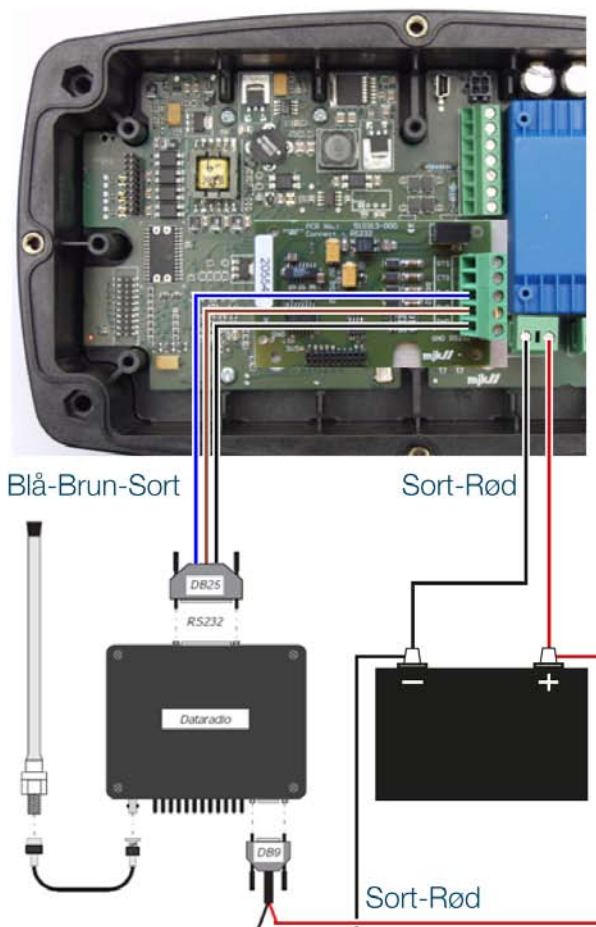
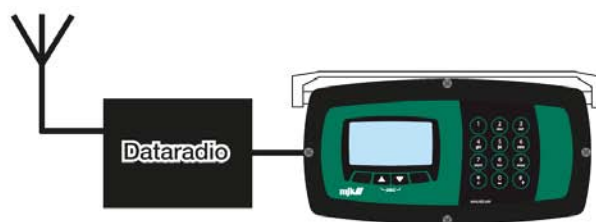
7. Connect the external battery negative-terminal for "-12 VDC Accumulator" and the positive terminal for "+12 VDC Accumulator".

8. Geninstallér Connect frontpanelet.

9. Connect the external battery negative terminal to the MJK 2-conductor DB9-cables black conductor, and the positive terminal to the DB9-cables red conductor.

10. Connect the DB9-plug and the antenna to the data radio.

Note: 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.



Connect order numbers for this configuration

205321	Connect® base w/ display I/O modul 16-8-6-1	I/O modul 16-8-6-1
205544	RS 232 galvanic insulated module	
550242	Accumulator 12V/12Ah	

RS 485 Communications Module

An external antenna need to be mounted for Connect to be capable to deliver surveillance and alarm data using the phone or data network.

Mounting and connecting

Remove the Connect front panel (display unit, 4 screws).

1. Disconnect power supply
2. Remove the Connect I/O module (4 screws).
3. Mount the RS 485 module on the internal S4 interface for communications units on position "K" and attach using the supplied screws (4 pcs. M3x6). (on the illustrational image a GSM module is mounted, see detail-image for the design of the RS-485 module)
4. Reinstall Connect I/O module.
5. Reinstall Connect front panel.

Note: 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.



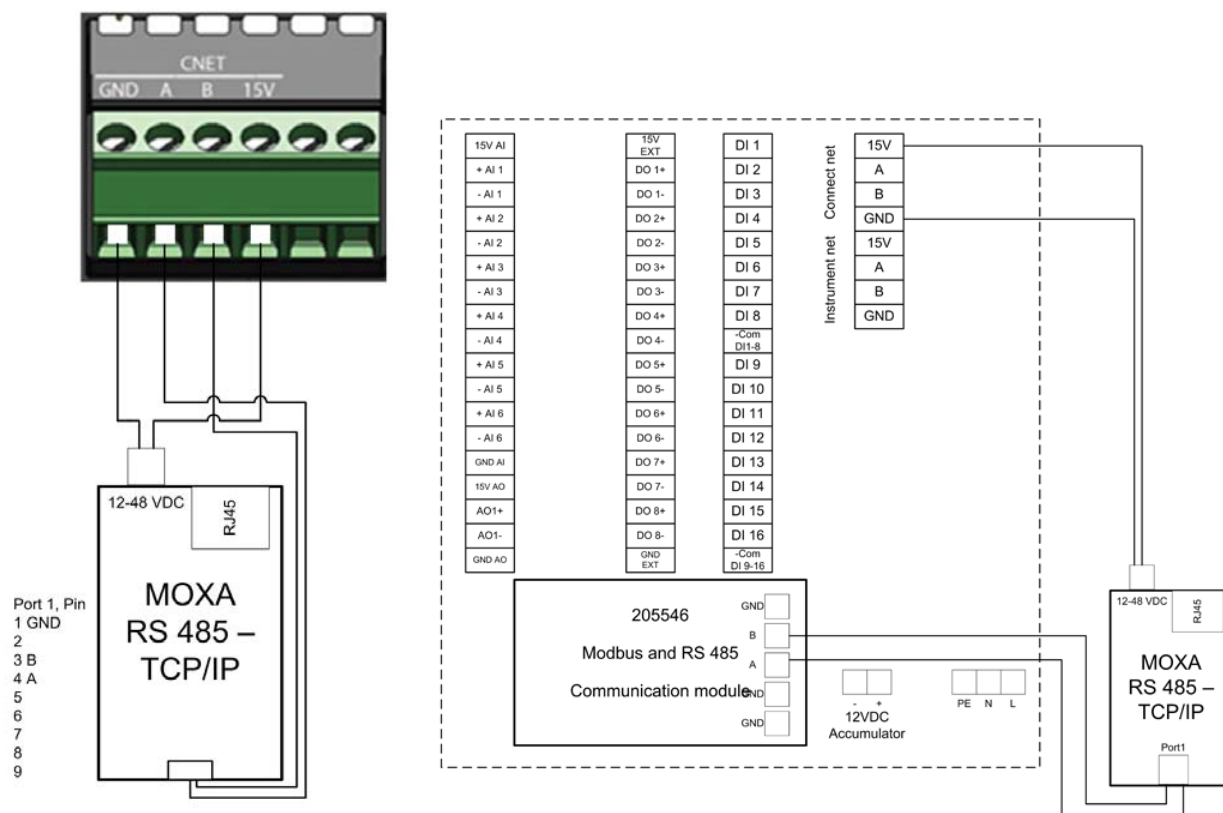
WIFI Module

[See WiFi and Display](#)

Connecting Ethernet TCP/IP

To communicate using the Ethernet, an external ethernet module such as Moxa Nport is connected to Connect® / Mµ Connect®.

Electrical connection



Port pin	9 Pin D-Sub Female
1	GND
3	B
4	A

Serial Moxa Nport setup:	
Baud Rate: 9600	Parity: Even
Data Bits: 8	Stop Bits: 1
Flow control: None	FIFO: Deactivated
Interface: RS-485 2 kabel	For detailed setup read: GB Applications note RS 485 to TCP IP using Moxa Nport unit.

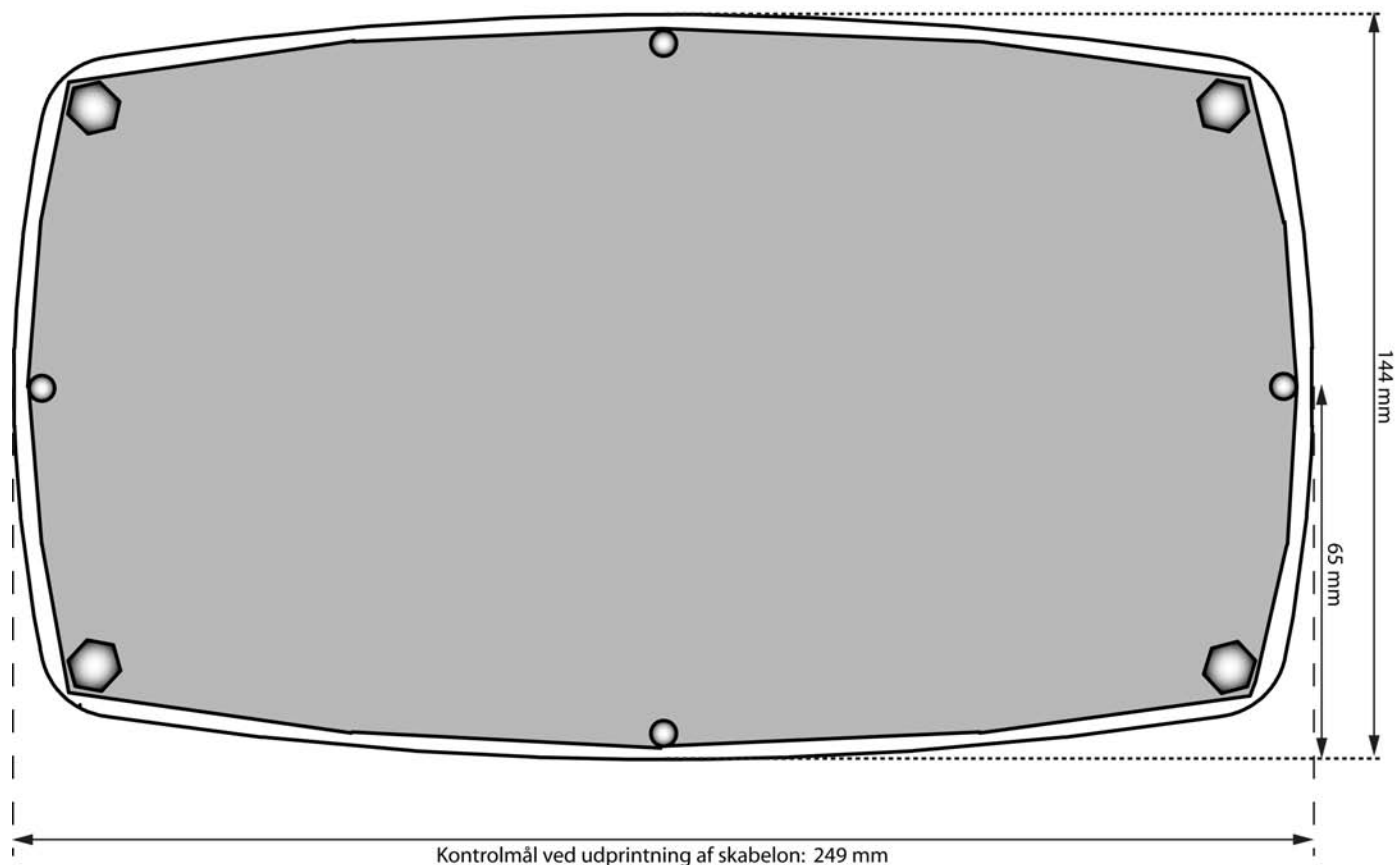
Front Panel Cut-out Template

Connect® Front panel template.

the outer lines illustrates Connect® cabinet, the grey area indicates the hole that are to be cut out of the board.

Connect® Frontpanel skabelon

Det ydre omrids indikerer Connect® frontpanelets konturer, og det grå-skraverede areal indikerer det hul, som skal udskæres i tavlen.



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

Daily Usage

This is a quick guide to get started using the Connect.

The following examples in this chapter will show and explain how a Connect unit is configured for pump control of 2 pumps on a waste water pump station.

In Connect, use the function "Pump Control 1" which controls the pumps based on the level in the pump sump.

The complete manual for Connect® and Mµ Connect® is always available on www.mjk.dk

This guide covers Connect® in the following firmware versions:

Firmware versions

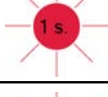
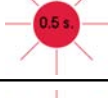
Product	Number	Revision
Connect® Base unit	844003	007-017
Connect® Display	841021	003

LED signals

LED Light on the front of M μ Connect is used for general communication, this way a laptop computer is not necessary if the M μ Connect is already configured.

The individual LEDs will blink/light up in different frequencies thereby indicating which process is active in the the M μ Connect unit e.g. Communication or warnings.



	Power up: All LEDS are lit followed by running light once down and once up.
	Status: M μ Connect® control unit is ready.
	Communication: Modem is resetting, or the signal for the GSM modem is too low. (Modem is reset once per hour)
	Modem is reset and M μ Connect® is ready to receive incoming signals.
	The unit is being called and awaits communication.
	The unit is connected and data can be transferred via modem and WiFi.
	ALARM: There is an active alarm signal
All LEDS are turned on shortly when the USB is connected and in a 10 minute interval.	

A more detailed table overview of the LED signals:

LED Signal	Description
All LEDS are lit followed by running light once down and once up.	Power-up sequence, every time the power is restored
STATUS	
LED blinks showing an interval of 3 sec.	M μ Connect RTU unit is ready
Communication	
LED lit permanently	Modem is resetting, or the signal for the GSM modem is too low. (Modem is reset once per hour)
LED blinks showing an interval of 3 sec.	Modem is reset and M μ Connect® is ready to receive incoming signals.
LED blinks showing an interval of 1 sec.	The unit is being called and awaits communication
LED blinks showing an interval of ½ sec.	The unit is connected and data can be transferred via modem and WiFi
Alarm	
LED blinks showing an interval of ½ sec.	There is an active alarm signal.

All LEDS are activated briefly with a 10 minute interval when the USB is connected

Display Screen

The Connect® Display unit can work no as well Connect® as Mp Connect®.

For daily usage, use the 4 soft keys beneath the display to navigate the menus.



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 Set up). The numeric keypad on the right is used for direct menu selection and alpha-numeric entry of names and texts.

Symbols and actual functions are described in details in the sections regarding the individual menus. The numeric keys can be used as short-cuts through the menu system and/or alfa-numeric programming of names, values and texts.

Key Function	Description
Outer Left Key	The outer left key will normally switch between Menu and Index (Toggle function)
Arrow keys	The center-arrow keys is used to browse up/down in the menus.
Outer Right Key	the Outer Right Key is mostly used for confirmation of choice and/or access to the next menu item

Contrast Setting

Adjust the contrast setting by pressing the 2 outer display keys (the keys in the red circles) simultaneously then adjust contrast, using the up/down keys until the desired contrast is achieved.

Save the new contrast setting by pressing the 2 outer display keys simultaneously once more.



Reset the System

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.



Bemærk: A system reset must not be confused with the very comprehensive “Restore factory settings”, which erases all local configurations and preferences, and replaces them with the original factory settings.

Function Keys

The daily operation of Connect® and Mµ Connect® is programmed using the functions keys.

The function keys (numeric keys) is also used as shortcuts and as fore entering names and texts (alfa-key function).



Each function key predefined functions and can be adapted depending on individual needs.

Index		
1	Pump Control 1	
2	Pump Control 2	
3	Optm. Pump Control 3	
4	Digital inputs	
5	Digital outputs	
6	Analog signals	
7	Com modem status	
8	Alarm list	
9	I/O Status	
Setup	Select	OK

When select **Index** function, an overview of the defined oversigtsskærme is created. select the desired screen, by moving the marker up/down using the arrow keys and pressing **OK**

Function key 1 - 3 provides the following functions:



Pump Control 1		
Level	128 cm	
P1 Running		
P1 Start	150 cm	
P1 Stop	50 cm	
Index	Select	P2

Pump Control 1. When arriving to the Connect® unit, the oversigtsskærm will show this screen.

Informations in the screen covers; current level, pump 1 operating condition and start/stop levels.



Pump Control 2		
Level	68 cm	
P1 Running		
P1 Start	150 cm	
P1 Stop	50 cm	
Index	Select	P2

Pump Control 2. When arriving to the Connect® unit, the oversigtsskærm will show this screen..

Informations in the screen covers; current level, pump 1 operating condition and start/stop levels.



Optm. Pump Control 3		
Level	288 cm	
P1 Running		
Flow	38 m³/h	
Energy saved	33 %	
Index	Select	P2



Function key 1 to 3 is only active when "create oversigtsskærm" is selected in the functions menu

Function key 4 to 9 provides the following functions:

Function key 4. Digital input



Digital inputs	
DI 1	☐
DI 2	☐
DI 3	☐
DI 4	☐
Index	Select

Informations in this screen shows the status of all Digital input terminals.

Function key 5. Digital Output



Digital outputs	
DO 1	☐
DO 2	☐
DO 3	☐
DO 4	☐
Index	Select

Informations in this screen shows the status of all Digital Output terminals.

Function key 6. Analogue Input



Analog signals	
AI 1	4 cm
AI 2	4 cm
AI 3	4 cm
AI 4	4 cm
indeks	Vælg

Informations in this screen shows the status of all Analogue Input terminals.

Function key 7. Communication Module Status



Com Modem Status	
Rx, Tx - None	☐
Modem	Idle
Connection	Idle
Signal strength (0-31)	31
IP Adr.	
APN name	
Communication ID	1
Index	Select OK

Shows status on Communication. Content depends on the communication module.

Function key 8. Alarm List



Alarm list	
1	☐
2	☐
3	☐
4	☐
...	
Reset All	
Index	Select OK

Informations regarding status on all alarms.

Active alarms is illustrated when the box is marked with "X". Choose the line showing the active alarm and press "OK" for further information regarding start and stop time of finished alarms .

When an alarm is active the dial-up function can be active and the alarm will be called to phone numbers in the defined in the call-list the installed communications module is automatically detected. The alarm-list is only available when a PSTN/GSM communications module is installed.

Function key 9. I/O Status



Status	
DI 1-8	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
DI 9-16	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
DO 1-8	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
LE 1-8	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
LE 9-16	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
AI 1	0,00 mA
AI 2	0,00 mA
AI 3	0,00 mA
AI 4	0,00 mA
AI 5	0,00 mA
AI 6	0,00 mA
AO 1	0,00 mA
Index	Select

Status on all input and output as well as analogue limits, Virtual analogue input and Logical Functions (LF).

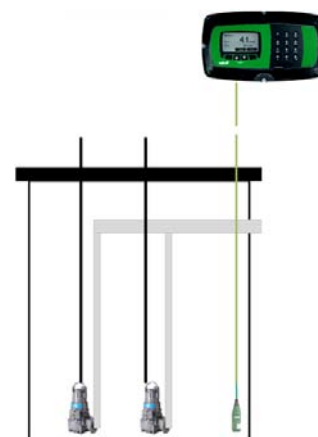


Scroll down using the arrow keys to see all menu items

Basic Configuration; Pump Control 1

This part explains how to configure the Connect unit for pump control of waste water pump station with 2 pumps.

I Connect benyttes funktionen "Pumpestyring 1" som styrer pumperne via niveauet i pumpesumpen.



This illustration shows a pump station with 2 submerged pumps.

Signal list.

First step is creating a signal list, thereby creating a complete overview of the signals between pump control of the pumps and from the pumps to the pump control.

The following tables shows examples from a standard equipped pump station.

The list shows signals to the digital input in this example.

Digital input	Signal Name	Relay function	Delay	Alarm/ Operation	Alternation
DI 1	Operation P1	NO	0 sec.	In use	In use
DI 2	Operation P2	NO	5 sec.	In use	In use
DI 3					
DI 4	Thermoalarm P1	NO	15 sec.	Alarm	
DI 5	Thermoalarm P2	NO	15 sec.	Alarm	
DI 6					
DI 7	Klixon P1	NO	0 sec.	Alarm	
DI 8	Klixon P2	NO	0 sec.	Alarm	
DI 9					
DI 10	MAN-0-AUT P1	NO		Alarm	
DI 11	MAN-0-AUT P2	NO		Alarm	
DI 12					
DI 13					
DI 14					
DI 15					
DI 16	High Level Switch	NO		Alarm	

The list shows the signals connected to the digital outputs in the example.

Digital Output	Signal Name	Relay function	Closing time (sec. on-time)	Delay
DO 1	Start / stop P1	NO- constant	0 sec.	0 sec.
DO 2	Start / stop P2	NO- constant	0 sec.	0 sec.
DO 3				
DO 4				
DO 5				
DO 6				
DO 7				
DO 8	Joint reset of thermo error	NO- time controlled	1 sec.	0 sec.

The list shows signals to the analogue input in this example.

Analogue Input	Signal Name	Scaling 4mA	Scaling 20mA	Unit	Unit	Midling
AI 1	Level	0	300	Level	cm	0 sec.
AI 2	Power P1	0	10	Other Units	A	0 sec.
AI 3	Power P2	0	10	Other Units	A	0 sec.
AI 4						
AI 5						
AI 6						

Analogue limits	In Use / Not In Use	Signalnavn	Setpoint	Delay (seconds)	Call
AI 1 High	In Use	High Level Alarm	XX	5	In Use
AI 1 Low	Not In Use	AI 1 LA	0	0	Not In Use
AI 2 High	In Use	High Level alarm P1	0	0	Not In Use
AI 2 Low	Not In Use	AI 2 LA	0	0	Not In Use
AI 3 High	In Use	High Level alarm P2	0	0	Not In Use
AI 3 Low	Not In Use	AI 3 LA	0	0	Not In Use
AI 4 High	Not In Use	AI 4 HA	0	0	Not In Use
AI 4 Low	Not In Use	AI 4 LA	0	0	Not In Use
AI 5 High	Not In Use	AI 5 HA	0	0	Not In Use
AI 5 Low	Not In Use	AI 5 LA	0	0	Not In Use
AI 6 High	Not In Use	AI 6 HA	0	0	Not In Use
AI 6 Low	Not In Use	AI 6 LA	0	0	Not In Use

Configuration

Next step is to configure the Connect according to the shown signal list.

In Functions menu choose Pump Control 1. configure the individual menu items according to the signal list.

Functions menu > Pump Control 1 contains the following items:

- Number of pumps: Number of pumps used in the configuration
- Measurement: What analogue input is attached to the level measurement incl. scaling and signal name
- Pumps: Configuration of the digital output for the pumps

-
- Start-stop Levels: start-stop levels on the selected amount of pumps
 - Control Word: 16-bit Control Word for intelligent pump control
 - Additional Functions:
 - o Flow Calculation
 - o Set point displacement
 - o Depth pumping
 - Create Overview Screen: will create the overview screen 1 as configured with the selected information
-

Step by step:

the setup will look approximately like this in the display

Connect indstillinger

Funktionsmenuer

Signaler (I/O)

Alarmopkald

System indstillinger

Netværk indstillinger

Indeks

OK

Select Functions Menu

Funktionsmenuer

Pumpstyring 1

Pumpstyring 2

Energi opTidstyretet p.styring

Råvandstyring

Tilbagestyring

Overløbsflow

Logiske funktioner

Datalogger

Tilbage

Vælg

OK

Select Pump Control 1

Pumpstyring 1

I brug

Ikke i brug

Tilbage

Vælg

OK

Select In Use

Pumpstyring 1

Antal pumper

1-8

Tilbage

Vælg

OK

Enter 2 select "OK"

Pumpstyring 1

Antal samtidige kørende pumper

1-8

Tilbage

Vælg

OK

Enter 2 and select "OK"

Pump Operating

This section is based on "Pump Control 1" which is the most commonly used Pump Control function.



Function key 1 will provide access to the Pump Control, and will normally be the active screen on the Connect unit when working on the station.

Please note the pre-defined read-outs that are shown here, can be adapted towards the individual needs.

The Daily usage of pumpestrying 1 is accessed with funktionstast 1.

oversigtsskærm 1 is standard and created in the function pumpestrying 1.

The most important informations in regards to the pump operation, current Level, Pump operational state and start/stop levels is shown in this screen.



If Connect® is left in this screen, this is the first screen shown at the next visit on the pump station.

Overview Screen Pump Control 1.

Pump Control 1		
Level	128 cm	
P1 Running		
P1 Start	150 cm	
P1 Stop	50 cm	
Index	Select	P2

by pressing the outer right button beneath the display, P2, the screen will switch to Pump 2 (control), and the "P2" (on the outer right will change to P3 or P4, depending on how many pumps is entered in the function pumpestrying1.

Choose what line to enter, by using the arrow-keys and press Select.



The actual screen may look differently depending on the individual setup.

Information and overview screen options:

Text line	Description
Pump Control 1	This is the name of the Function, change this for e.g. the name of the pump station in Pump .
Level	The actual level of the pump sump
P1 Operation	The operating conditions of the Pump is shown with text and icons, see the list below
P1 Start	Change the Start Level for the pump by marking the line and simply entering the new value using the numeric keys, then press "OK".
P1 Stop	Change the Stop Level for the pump by marking the line and simply entering the new value using the numeric keys, then press "OK".
Index	Switch between Overview screen and Functions Menu.
Select	Up/Down arrow is used to scroll the screen and to mark up a line or function.
P2	Ved at taste på højre taste under displayet, P2 skiftes der til et tilsvarende billede for pumpe 2 og denne tast skifter nu navn til P3 - P4 , afhængigt af hvor mange pumper der er oprettet under funktionen pumpestrying 1.

Operating state of the Pump	Icon	Description
P1 Operating		Digital output for the pump is operating and the return signal is OK.

P1 Stop		Digital output the pump is stopped
P1 Failure		Digital output for the pump is operating, the return signal is missing
P1 Blocked		Digital output for the pump is blocked

Start / Stop Level

To adjust start / Stop level do the following:

1

Press numeric key "1" to show Overview screen for Pump Control 1.

Pump Control 1		
Level	128 cm	
P1 Running		
P1 Start	150 cm	
P1 Stop	50 cm	
Index	Select	P2

Use the arrow keys and select the P1 Start line

Pump Control 1		
Level	128 cm	
P1 Running		
P1 Start	150 cm	
P1 Stop	50 cm	
Index	Select	P2

The last digit in the Start level is marked, now enter the new level using the [numeric keys](#).

Pump Control 1		
Level	128 cm	
P1 Running		
P1 Start	150 cm	
P1 Stop	50 cm	
Index	Select	P2

When the desired value is entered, select "OK" to save the value in the Connect®



Now scroll to the Stop Level line, using the arrow keys.

Pump Control 1		
Level	128 cm	
P1 Running		
P1 Start	150 cm	
P1 Stop	50 cm	
Index	Select	P2

Use the arrow keys and select the P1 Stop line

Pump Control 1		
Level	128 cm	
P1 Running		
P1 Start	150 cm	
P1 Stop	80 cm	
Index	Select	P2

The last digit in the Stop level is marked, now enter the new level using the [numeric keys](#).

Pump Control 1		
Level	128 cm	
P1 Running		
P1 Start	150 cm	
P1 Stop	80 cm	
Index	Select	P2

When the desired value is entered, select "OK" to save the value in the Connect®

To change the start/stop level on the additional pumps, press arrow down from "stop level" P1. P1 in the bottom-right corner will now change to P2 when the outer right display key is pressed. Press the outer right display key again, and the screen switches to Pump 2. Repeat the above described procedure. Press the outer-right display key continuously to switch between the pumps that are configured in Pump Control 1.



It is a prerequisite that Pump Control 1 is set-up and the Create Overview Screen is executed.

If a stop level higher than the start level is selected, the function is changed from emptying to filling.

Manual Operation

To Start or stop a pump manually do this:



Press numeric key "1" to view Overview screen for Pump Control 1.

Pump Control 1		
Level	128 cm	
P1 Running		
P1 Start	150 cm	
P1 Stop	50 cm	
Index	Select	P2

Use the arrow keys to select the second line, "P1 Running" showing the operating condition of the pump. When this line is marked, press "Operate" to enter menu for P1

Pump 1		
View data		
Start pump		
Stop pump		
Lock pump		
Reset control word		
Status	Select	OK

To start a pump, use the arrow keys to mark the Start Pump line, and press "OK".

The pump will now be activated and will be operating until the Stop level is reached.



A pump can only be activated if the level in the pump sump is above the defined stop level.

Pump 1		
View data		
Start pump		
Stop pump		
Lock pump		
Reset control word		
Status	Select	OK

To stop an activated pump, navigate to Stop Pump and press "OK"

To start or stop additional pumps, press arrow down from stop level P1.

Now the Lower right corner will read P2, press the outer right bottom and the screen switches to P2.

Repeat the procedure as described above.

4 different icon referring to the operating conditions of the pump:

Pump Operating Condition	Icon	Description
P1 Running		Digital output when the pump is running and the feedback signal is ok.
P1 Stopped		Digital output when the pump has stopped and the feedback signal is missing
P1 Error		Digital output when the pump is in use and the feedback signal is missing.
P1 Blocked		Digital output for the pump is not in operation/stopped



Switch between the pumps selected for Pump Control 1 by pressing the outer right key "P1".

It is a prerequisite that Pump Control 1 is fully set-up and that Overview Screen is created.



Use arrow key to scroll for eventual more lines.

Pump Data

Pump 1

View data

Start pump

Stop pump

Lock pump

Reset control word

Status Select OK

in this menu "View Data" will create overview screen for data from the the selected pump.

Der kan vælges imellem 3 forskellige data skærme:

Pumpestyring 1

P1 Ant. total 2266

P1 Tid total 4:45 t:m

P1 Vol. total 3666 m³

Mængde total 66225 m³

Status Vælg Næste

Totals

Pumpestyring 1

P1 Ant. I dag 56

P1 Tid i dag 0:44 t:m.

P1 Vol. i dag 59 m³

P1 Mængde 66 m³/h

Status Vælg Næste

Today

Pumpestyring 1

P1 Starts i går 5

P1 Tid i går 24 min.

P1 Mængde i går 87 m³

Status Vælg Næste

Yesterday

Tekst line	Description
Pump 1	This is the name of the function. You can change it to e.g. the pump number or any individual name.
P1 Total/Today/ Yesterday Cnt.	Count values (number of starts) for the selected pumps. The counter is connected to the selected DO for the pump. The counter is shown as totals, today values (since midnight) and as yesterday values. See register here
P1 Total/Today/ Yesterday tim.	Time values (on-time) for the selected pumps. The counter is connected to the selected DO for the pump. The counter is shown as totals, today values (since midnight) and as yesterday values.. See register here
P1 Volume/Total/ Today/ Yesterday	Volume values (number of units) for the selected pump. The counter is connected to the selected pump. The counter is shown as totals, today values (since midnight) and as yesterday values. See register here
P1 Capacity, Today	Capacity shows the total volume for all devices. The counters is shown as totals, today values, since midnight values and yesterday values. See register here
Status	Back to Main screen regarding pumpestyring1.
Select	Up/down arrows are used to scroll up and down in the current screen and select a line or function.
Next	Change to next pump data screen.



It is a prerequisite that Pump Control 1 is set-up an that Overview Screen is createdt.

Reset Control Word



Creating Overview Screen prerequisites that Pump Control 1 is set-up.

Menus and Operation

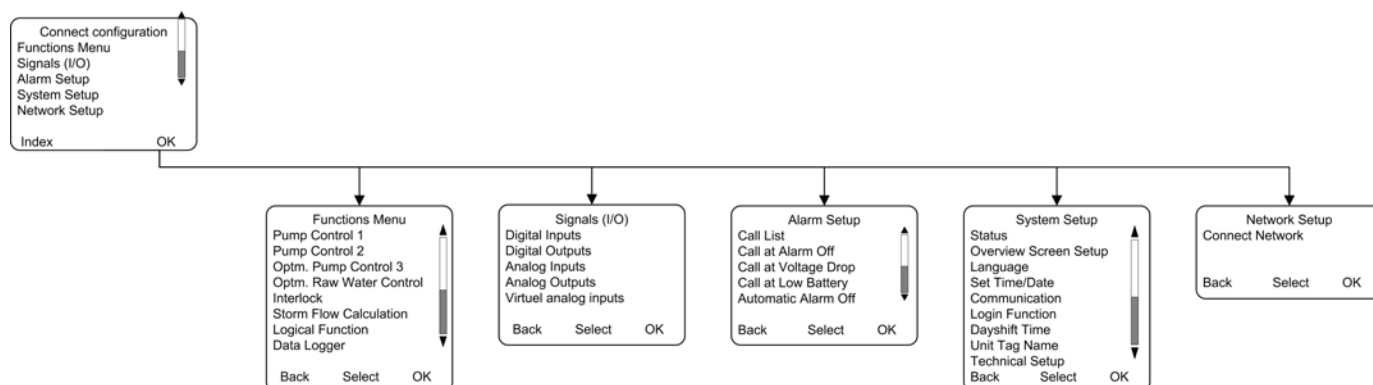
This chapter describes the simple menus and operating functions for M μ Connect®.

M μ Connect® is controlled using a MJK Display Unit, or Instrument Link which makes configuration and operation even more simple and easy.

The functions of M μ Connect can be divided in 5 main areas, each providing the necessary configuration and functions. These menus and function options provides the opportunity of configuring various parameters such as pump control, signal definitions, general configuration and alarms. Besides this, the service menu will provide additional options. The five main areas are:

- [Function menus](#)
- [Signals \(I/O\)](#)
- [Alarm Signals](#)
- [System](#) and Network setup

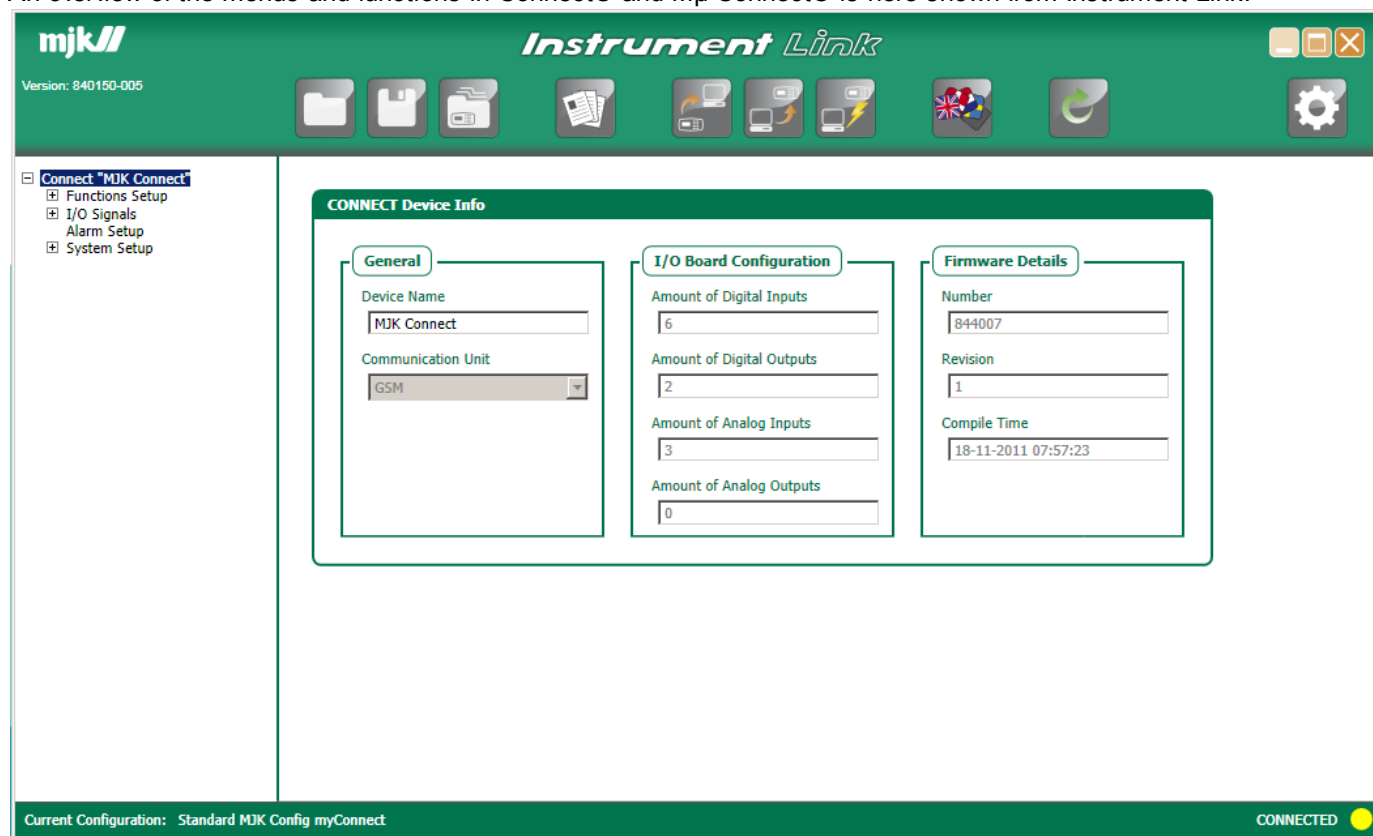
A Graphic view of the menu system is shown,below. The menu system illustrates when a MJK Display Unit is connected to the M μ Connect.



Similar menu items are seen in the Instrument Link menus.

In Instrument Link, the system and network menus are merged into one menu.

An overview of the menus and functions in Connect® and M μ Connect® is here shown from Instrument Link.



1. Functions menu	2. Signals (I/O)	4. System Setup
1. Functions menu 1.1 Pump Control 1 1.1.1 Number of pumps 1.1.2 Measurement 1.1.3 Pumps Setup 1.1.4 Start/Stop level 1.1.5 Control Word 1.1.6 Additional Functions 1.1.7 Create Overview Screen 1.2 Pump Control 2 1.2.1 Number of pumps 1.2.2 Measurement 1.2.3 Pumps Setup 1.2.4 Start/Stop level 1.2.5 Control Word 1.2.6 Additional Functions 1.2.7 Create Overview Screen 1.3 Optm. Pump Control 3 1.3.1 Number of pumps 1.3.2 Measurement 1.3.3 Pumps Setup 1.3.4 Frequency Converter Type 1.3.5 Flow Input 1.3.6 Level Parameters 1.3.7 Functions Setup 1.3.8 Adaptive Optimizing 1.3.9 Control Word 1.3.10 Additional Functions 1.3.11 Create Overview Screen 1.4 Optm. Raw Water Control 1.4.1 Pumps 1.4.2 Frequency Converter Type 1.4.3 Flow Input 1.4.4 Frequency States 1.4.5 Functions Setup 1.4.6 Adaptive Optimizing 1.4.7 Additional Functions 1.4.8 Create Overview Screen 1.5 Interlock 1.5.1 Receiver 1.5.2 Transmitter 1.6 Storm Flow Calculation 1.7 Logical Function 1.8 Data Logger 1.8.1 Standard Data Logger 1.8.2 Extended Data Logger 1.8.3 Event Data Logger 1.8.4 Display Data Logger	2.1 Digital Inputs 2.2 Digital Outputs 2.3 Analog Inputs 2.4 Analog Outputs 2.4.1 AO 1 2.5 Virtuel Analog inputs	4.1 Status 4.2 Overview Screen Setup 4.3 Language 4.4 Set Time/Date 4.4.1 Set Time/Date 4.4.2 Time Format 4.4.3 Daylight saving 4.5 Communication 4.5.1 Communications ID nr. 4.6 Login Function 4.6.2 Activate / Deactivate 4.7 Dayshift Time 4.8 Unit Tag Name 4.9 Technical Setup 4.9.1 Read/Write Reg. 4.9.2 FW Version 4.9.3 Factory Settings 4.9.4 Calibration
	3. Alarm Setup	5. Network Setup
	3.1 Call List 3.1.1 Call List 1 3.1.2 Call List 2 3.1.3 Call List 3 3.1.4 Call List 4 3.1.5 Call List 5 3.1.6 Call List 6 3.1.7 Call List 7 3.1.8 Call List 8 3.1.9 Call List 9 3.2 Call at Alarm Off 3.3 Call at Voltage Drop 3.4 Call at Low Battery 3.5 Automatic Alarm Off	5.1 Network Setup 5.1.1 Add Device 5.1.2 Change Device ID No. 5.1.3 Remove Device 5.1.4 Change Display ID No. 5.1.5 Set no of retries

Functions menus

The Functions Menu is allows adjustment of all fundamental parameters of the daily operations. Several sub-menus can be adjusted to optimize operations, at strat-up and after reset, Pump Control 1 will guide the user through a complete set-up routine via the menu system.

Besides the daily operations of pump control and energy optimized operation, the functions menus will provides access to intelligent programming such as logical functions which will set up variable parameters for the operation.

Pump Control 1

"Pump Control 1" allows choosing between set-up parameters for up to 8 pumps or valves depending on the numbers of available DO. The Mj Connect RTU unit provides 2 DO as standard and it is possible to use up to 32 expansion units in total.

Pump control 1 is based on level measurement.

The control is using the on/off principle from the selected start-stop levels which among other things includes constant or time based function and alternation of the pumps to allocate the total running time between the individual pumps.

The maximum number of simultaneously running pumps can be decided. The maximum capacity in Pump Control 1 is 8 pumps or valves.

Instrument Link

Version: 840150-005

Pump Control 1

In Use?

General

Measurement (AI)

AI1 "AI 1"

Unit: Not In Use

Decimals: 0

Scaling: 4 mA Scale = 0, 20 mA Scale = 1000

Average [s]: 0

Number of Pumps

Number of simultaneously working pumps

Control Word

In Use?

Number Of Retries

Current Configuration: Standard MJK Config myConnect

CONNECTED

"Control Word" is an advanced feature providing a more detailed pump control

Parameters for Pump Control 1

Menu Item	Option	Default	Description
In use	Yes/No		Activate/Deactivate Pump Control 1 .
General			Select the basic settings for Pump Control 1 :
Using Instrument Link: AI # specifications: Units, decimals, scaling and average is set in I/O Signals>Analogue Input			
Analogue input	AI1-3		Select the desired analogue input for Pump Control 1 Mj Connect RTU unit provides 3 AI and can be expanded with up to 16 AI.
Number of pumps	0-2 (8)		Select number of pumps for Pump Control 1 . Mj Connect RTU unit provides 2 DO and can be expanded with up to 32 DO. The maximum amount of pumps is 8 pumps (8 DO) (8). This needs DO I/O expansion module.
Number of simultaneously working pumps	0-2 (8)		Select the maximum amount of simultaneously working pumps for Pump control 1. The maximum amount of pumps is 8 (8 DO).
Control Word.	Yes/No	No	This function is described in details in the section regarding Control Word.

Display Set-up using Display unit



Pump Control 1 > Number of pumps

Set-up of pump control 1 is done easily by following the guided set-up in the Display Unit. When starting up the first time, or after restart on top of "reset to factory settings" the guide will automatically be activated when choosing the path Pump Control > Number of pumps. when the Pump Control 1 guide is finished, adjust the individual parameters by entering the individual sub-menus.

The set-up guide is equivalent to Instrument Link sections Pump Control 1, Pump Setup and Control Word.

adjustment can be done individually from the Pump Control 1 main menu>Sub Menus.

[Display Flowchart of Pump Control 1 here.](#)

Pump Setup

The configuration parameters for Pump Control without choosing Control Words:

- [-] Connect "MJK Connect"
 - [-] Functions Setup
 - [-] Pump Control 1
 - Pump Setup**
 - Additional Functions
 - [-] Pump Control 2
 - [-] Energy Optimizing Pump Con
 - [-] Interlock
 - [-] Storm Flow
 - [-] Logical Functions
 - [-] Data Logger
 - [-] I/O Signals
 - [-] Alarm Setup
 - [-] System Setup

Pump Number 1

Pump Setup

Control Output (DO)

DO1 "DO 1 "

Working: NO
Function: Constant
Delay [s]: 0

Start Level

Stop Level

Delay [s]

Pump Alternation

Pump Number 2

Pump Setup

Control Output (DO)

DO2 "DO 2 "

Working: NO
Function: Constant
Delay [s]: 0

Start Level

Stop Level

Delay [s]

Pump Alternation

Menu Item	Choice	Default	Description
Pump Setup			Choose the basic settings for the individual pump in Pump Control 1. The amount of controllable pumps is set in Number of Pumps.
Control Output (DO)	1-2 (8)		Select which DO relay to control the pump Using Instrument Link: DO# specifications: Working(relay function), function, Delay is set in I/O Signals> Digital Output
Start Level			Activation level of the pumps or valves. If the start level is set higher than the stop level the pump controller is configured for pumping out (emptying). If the start level is set lower than the stop level, the pump controller is configured for pumping in (filling).
Stop Level			Level for stopping the pumps or valves.
Delay (sec.)	0-59999	0	To avoid short term failure modes or level exceedances activating the relays, a delay can be set. If the assigned pumps should not start simultaneously due to strain load, the delay can be set differently for each relay.
Pump Alternation	In Use / Not in Use	In use	When choosing alternation, the alternation will be between all DO outputs selected in Pump Control 1. The output relays can be set for not in use or in use. If "not in use" is selected, the start and stop level values entered for the individual relay are the ones that activates the DO relay – and only that specific relay. When using alternation the alternating pumps are activated in a cycle, so that when a start level is passed, the next relay in the cycle is activated. If several start levels are passed, several pumps will be activated.



If a limited runtime interval of the pumps is needed, choose Time Operated in Functions setup>Pump Control > Additional functions – for the selected DO for the pump. This will make the selected DO stop the pump according to the chosen interval and the next pump in the alternation is activated as long as the stop level has not been reached.



None alternating pumps DO must be added after those who are alternating.

Pump set-up using Display unit



Pump Control 1 > Number of Pumps

Set-up of pump control 1 is done easily by following the guided set-up in the Display Unit. When starting up the first time, or after restart on top of "reset to factory settings" the guide will automatically be activated when choosing the path Pump Control > Number of pumps. when the Pump Control 1 guide is finished, adjust the individual parameters by entering the individual sub-menus.

The set-up guide is equivalent to Instrument Link sections Pump Control 1, Pump Setup and Control Word.

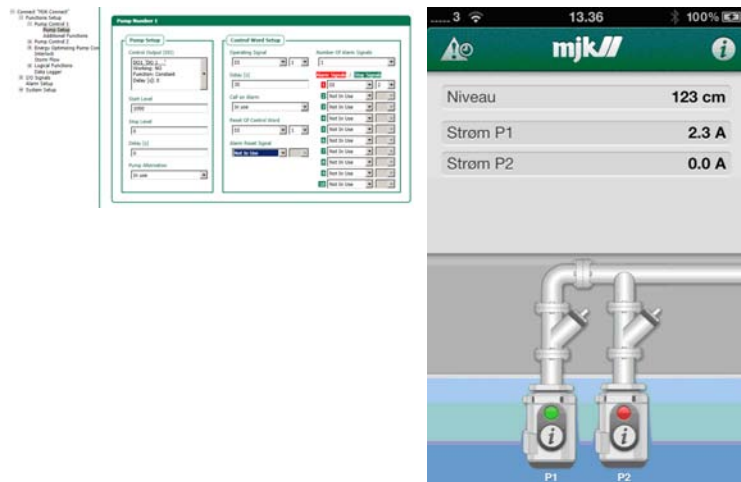
Adjustments can be done individually from the Pump Control 1 main menu>Sub Menus.

[Display Flowchart of Pump Control 1 here.](#)

Control Word

Idea and function

The Control Word function is to combine operation and stop/start alarm signals in one telegram (word). The idea is to simplify the panel build by minimizing the need for components and monitoring the pump. In short, then if a pump experiences errors, the remaining pump(s) automatically take over the control and the panel will try to correct the pump error.



The following example is based on the default setup for MJK 2 Pump App..

Separate set-up or adjustment using Control Word can also be made using the Display Unit.



Index > Setup > Functions menu > Pump Control 1 > Control Word

The guide will ensure a complete set-up, or check the flowchart for Pump Control 1 including sub menus.

[See flowchart here.](#)

Control Word Build-up

The function of the Control word is to collect operation, stop and alarm-signals into one Word =16bit.).

- Pumpe running
- Normal operation
- No Error.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
---	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----

- No Pump operation signal
- Thermal error
- Pump blocked

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
---	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----

Status information for the control word is built up like this:

BIT	Function
0	Stop / Alarm signal 1
1	Stop / Alarm signal 2
2	Stop / Alarm signal 3
3	Stop / Alarm signal 4
4	Stop / Alarm signal 5
5	Stop / Alarm signal 6
6	Stop / Alarm signal 7
7	Stop / Alarm signal 8
8	Stop / Alarm signal 9
9	Stop / Alarm signal 10
10	Internal use
11	Critical Pump Error (Pump is suspended) Is only set after retries have been exceeded.
12	Internal use
13	Blocked (0=released, 1=blocked)
14	Error on operation indication (0= OK, 1 = Error) Is only set after retries have been exceeded
15	Operation indication (0=pump is not running, 1=pump is running)

Commands sent information for the control word is built up like this:

BIT	Funktion
0	Start/Stop pump (0=stop, 1=start), reset control word, activate reset signal and remove blocking.
1	Stop pump and reset control word and remove blocking.
2	Not in use
3	Not in use
4	Not in use
5	Not in use
6	Not in use
7	Not in use
8	Not in use
9	Not in use
10	Not in use
11	Not in use
12	Not in use

13	Block pump. (Pump is suspended as long as this bit is activated. Resets med "0" i bit 0.
14	Not in use
15	Not in use

Control Word Activation

Menu Item	Option	Default	Description
In Use	No / Yes	No	Choose whether the function should be used
Number of retries	0-9	0	Enter the number of Retries when a pump error is detected. Max 3 retries is recommended, usually is 1 enough.

Control Word Set Up Parameters

Control Word Setup

Operating Signal

DI

1

Delay [s]

30

Call on Alarm

Not in use

Reset Of Control Word

Not In Use

Alarm Reset Signal

DO

1

Number Of Alarm Signals

1

Alarm Signals / Stop Signals

1

DI

2

2

DI

3

3

Not In Use

4

Not In Use

5

Not In Use

6

Not In Use

7

Not In Use

8

Not In Use

9

Not In Use

10

Not In Use

Menu Item	Option	Default	Description
Operating signal	Not in Use, DI, DO, Al.h.gr. Al.l.gr, IF.	Not in use In Use	The signal for the normal operation of the pump. Select type of I/O signal and signal No.
Delay	0-9999 Sec.	2	Delay on operation feedback in seconds before the pump is taken out of operation. Interval for active-signal. Typical 2-3 seconds.
Call	In Use / Not in Use		Choose whether an alarm should be sent, when an alarm or missing feedback is registered.
Alarm signals/stop signals:	0-10	0	Select the number of alarm signals to be used. The value must be between 0 and 10 and defines how many alarm signals are to be used in the control word. If you choose X number alarms, the rest (10 minus X) can be used as stop signals.
Alarm signals	Not in Use DI, DO		Signal type and number of alarms
Stop signals	Not in Use DI, DO	0	Signal type and number of stop signals
Alarm reset signal	Not in Use DI		Signal type and signal number Choose which DI that can reset the control word and reactivate a pump. - Also activates DO for reset. Note: DO will normally be set for time-controlled, 1 sec. for e.g. thermal alarm
Reset of Control Word	Not in Use DO,		Signal type and signal number Choose which DO to be activated when a pump is stopped due to alarm or missing operation feedback signal.
Number of Alarm signals	0-10		

Operation Examples

Example 1:

Normal operation.

1. Level rises to start level 1
2. Check that DI 2, 3 are on "ON". If not, start P1.
3. Wait for up to 5 seconds for an operation signal on DI1.
4. The operation signal can be read on bit 15 in the control word.
5. Pump to start level while DI 1,2,3 are monitored
6. At normal operation, DI1 will be "ON" until P1 stops. DI 2,3 are "OFF"

Example 2:

Missing operation message.

1. Level rises to start level 1
2. Check that DI 2, 3 are on "ON". If not, start P1
3. Wait for up to 5 seconds for an operation signal on DI1.
4. Operation signal on DI 1 is missing. Stop P1. The Error status can be read in control word bit 14 after the number of retries has been exceeded. Then bit 11 in the control word is set, indicating that the pump did not start.
5. Check if another alternating pump is available and without errors. The control finds P2 and activates P2. It will pump to stop level and stop P2.
6. Level rises to start level 1.
7. Check that DI 2, 3 are on "ON". If not, start P1.
8. Since P1 is inactive, P2 will take over again. When this cycle has run the defined number of retries is exited and becomes a critical alarm, read on bit 11 in the control word, and it is registered in the alarm list with the following text: <signal name for DO1> - <signal name for DI 1> and a call is made to example the Scada system.

Since P1 has a critical alarm, P1 is deactivated and P2 will hereafter start every time. This continues until the control word for P1 is reset either from the SCADA or by activating DO1.

Example 3:

Thermo error on P1, DI 2.

1. Level rises to start level 1
 2. Check that DI 2,3 are on "ON". If not, start P1
 3. Wait for up to 5 seconds for an operation signal on DI1.
 4. When DI 2 goes on "ON" due to a thermo error, P1 is stopped. This error can be read in the pump control word on bit 0.
 5. When the level rises to start level 1 and DI 2 still is "ON", an alternative pump without errors is found (in this example P2), which starts and pump down to stop level.
 6. Next time the level rises to start level 1 and DI 2 still is "ON", P2 will start and pump down to stop level.
- This cycle will repeat until number of reconnection times has been reached. Hereafter, this alarm will be registered as a critical error and the pump will be inactivated (bit 11 = 1).

If the level rises to start level 2, an alarm will immediately activate, since the control wish to run with 2 pumps, but only P2 has been running since P1 has errors. In this situation, the number of retries will be ignored and the text in the alarm list will be the following: <signal name for DO1 > - <signal name for DI 1> and a call is made to for example the Scada system.

If the thermo error on DI 2 disappears, retries on connecting P1 will happen automatically. If P1 after x number of retries don't reactivate, a critical alarm will be made with the following text in the alarm list: <signal name for DO1 > - <signal name for DI 1> and a call is made to for example the Scada system.

Example 4:

Stop signal on DI 3.

1. When DI 3 is active, P1 is stopped.
2. Status can be read in the control world on bit 2.
3. This is not an alarm, but a stop signal, so no registration or alarm call will be made.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
---	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----

Additional Functions

In Additional Functions, more advanced functions for the Pump Setup is set.

Please Note that Additional functions is only available when chosen Pump Control 1 and energy optimized pump control.

Setup for additional functions:

- [-] Connect "MJK Connect"
- [-] Functions Setup
 - [-] Pump Control 1
 - Pump Setup
 - Additional Functions**
 - [-] Pump Control 2
 - [-] Energy Optimizing Pump Control
 - [-] Interlock
 - [-] Storm Flow
 - [-] Logical Functions
 - [-] Data Logger
 - [-] I/O Signals
 - [-] Alarm Setup
 - [-] System Setup

Flow Calculation

In Use? No

Setup

Volume Unit

Volume Size 0

Start Level 0

Stop Level 0

Flow Unit

Setpoint Displacement

In Use? No

Setup

Offset 0

Time Duration (min) 0

Time Operated Not in use

Start Time (hh:mm:ss) 0 0 0

Stop Time (hh:mm:ss) 0 0 0

Depth Pumping

In Use? Yes

Setup

Select Pump For Depth Pumping

Duration (0-99 sec) 0

Duty Periods Between Not in use

Hours Between 0

Use Time Of Day (hh:mm) Not in use

Separat opsætning eller justering af tillægsfunktioner kan ligeledes foretages via Display enhed.



Functions Menu > Pump Control 1 > Additional Functions

From additional functions you will find access to:

- Pump Monitoring
- Setpoint displacement
- Depth Pumping
- Flow calculation

The individual sub-menu will guide through a complete set-up.

[See flowchart here.](#)

Calculating The Pump Flow

From the physical measurement and calculation of the volume of the pump well, you can calculate the flow and Pump capacity with the "Pump flow calculation" based on the measured level changes – taking any inlet during emptying into consideration as well.

- Calculation of flow and capacity based on volume and time
- Pump flow calculation based on linear and non-linear volumes
- The calculation is the average of 10 pump cycles
- A minimum of 10 intakes to the pump station is a prerequisite for the flow calculation.
- All pumps must have at least one independent start/stop cycle.

A pump well is normally circular in its cross section and has the same diameter from top to bottom. This means that the water surface area is unchanged and can be included in a calculation of volume changes in the pump well.

Flow Calculation

In Use?

Setup

Volume Unit

Volume Size

Start Level

Stop Level

Flow Unit

As Mj Connect measures the water surface level in the pump well, then a single calculation based on changes in level (dl) over time (dt) together with a fixed value for the pump well cross-section will give a pretty precise picture of the volume change – and thereby the flow in the pump well.

For the flow measuring, a known volume between two levels is entered. This way, the pump controller is capable of measuring the flow based on the measured level changes. In the flow calculation, the possibility of intake during emptying is taken into consideration.

To measure the flow, the following prerequisites must be fulfilled:

1. All start and stop levels must be outside the area of the flow calculation. Meaning, the flow calculation can only be done between the lowest start level entry and the highest stop level entry.

The connected pumps must run alone regularly in order to get a reliable flow measuring.

2. The drawing shows a pump well with markings of the start and stop levels for 2 pumps, and a marking of the flow measuring area.

200 cm High level alarm, (set)

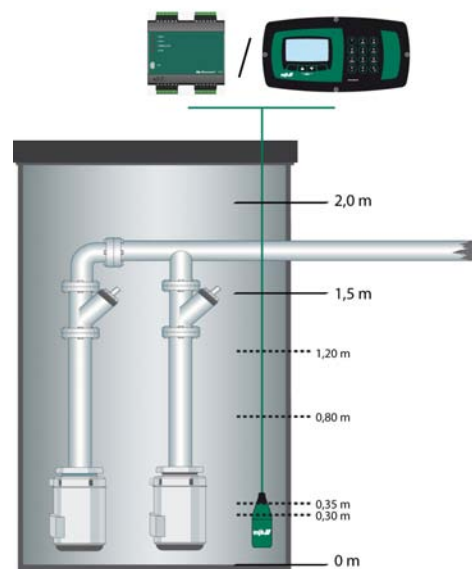
150 cm, Start level for pump 2

120 cm, Start level for pump 1

80 cm, Start of the flow measuring level area for volume measurement

35 cm, Stop of flow measuring

30 cm, Joint stop level for all pumps



To make sure the calculation is precise, it is important that the water surface area remains unchanged in the flow calculation area. Therefore, the flow calculation area must be chosen between two levels in the pump well that do not contain intake pipes or other components that influence the surface area.

Furthermore, the calculation area needs to be within the start and stop limits of the pump. This way the pump is either stopped or started to achieve a constant flow during the flow calculation.

Flow Calculation Parameters

- [-] Connect "MJK Connect"
 - [-] Functions Setup
 - [-] Pump Control 1
 - Pump Setup
 - Additional Functions
 - [-] Pump Control 2
 - [-] Energy Optimizing Pump Control
 - [-] Interlock
 - [-] Storm Flow
 - [-] Logical Functions
 - [-] Data Logger
 - [-] I/O Signals
 - [-] Alarm Setup
 - [-] System Setup

Flow Calculation

In Use? Yes

Setup

Volume Unit l

Volume Size 0

Start Level 0

Stop Level 0

Flow Unit l/min

Menu Item	Choice	Default	Description
In use	Yes/No	No	Choose if the function pump flow calculation should be activated
Volume unit			Chose preferred units
Volume size			Enter known volume. Must be a value between start and stop levels.
Start level			Start level of known volume. If the control is set for intake, the start level is the lowest accepted level. If the control is set for emptying, the start level is the highest accepted level.
Stop level			Stop level of known volume. If the control is set for intake, the stop level is the highest accepted level. If the control is set for emptying, the stop level is the lowest accepted level.
Flow Unit			Choose the preferred unit for the flow.

Set Point Displacement

The function is used to increase the amount of waste water in the sewer system during e.g. heavy rain. Thereby optimizing the flow for the waste water plant.

If this function is activated all start and stop levels will be displaced to a level set in **Offset** for the period of time set in **Time Duration**. This function is typically activated by a SCADA plant e.g. via data-net communication.

A predefined period of time can also be selected for start and stop.

- [-] Connect "MJK Connect"
 - [-] Functions Setup
 - [-] Pump Control 1
 - Pump Setup
 - Additional Functions
 - [-] Pump Control 2
 - [-] Energy Optimizing Pump Con
 - Interlock
 - Storm Flow
 - [-] Logical Functions
 - Data Logger
 - [-] I/O Signals
 - [-] Alarm Setup
 - [-] System Setup

Setpoint Displacement

In Use? Yes

Setup

Offset 0

Time Duration (min) 0

Time Operated Not in use

Start Time (hh:mm:ss) 0 0 0

Stop Time (hh:mm:ss) 0 0 0

Menu Item	Choice	Default	Description
In Use	Yes/No		Activate the setpoint function.
Offset			
Time Duration (min)	0- 59999		Set time for Offset. Will stop when duration is reached.
Time Operated	In use / Not in use		Displacement activation setting – using 24-hour clock, set start/stop time
Start time (hh:mm:ss)	hh:mm:ss		Time for activating the function.
Stop tidspunkt	hh:mm:ss		Time for de-activating the function.

Depth Pumping

The function is used to order the pumping well emptied to a point below the normal stop point in order to be capable of e.g. removing sediments after a pre-decided number of starts, a pre-set time or clock.

- [-] Connect "MJK Connect"
- [-] Functions Setup
 - [-] Pump Control 1
 - Pump Setup
 - Additional Functions
 - [+] Pump Control 2
 - [+] Energy Optimizing Pump Con
 - Interlock
 - Storm Flow
 - [+] Logical Functions
 - Data Logger
 - [+] I/O Signals
 - Alarm Setup
 - [+] System Setup

Depth Pumping

In Use?

Yes

Setup

Select Pump For Depth Pumping

0

Duration (0-99 sec)

0

Duty Periods Between

Not in use

0

Hours Between

Not in use

0

Use Time Of Day (hh:mm)

Not in use

0 0

Menu Item	Choice	Default	Description
In Use	Yes/No		Activate the Depth pumping .
Select Pump for Depth Pumping	0-2 (8)		Choose the output (which pump) to perform the depth pumping. Only 1 pump can be chosen at the time.
Duration (0-99 sec.)	0-99 sek.		Choose the duration of the depth pumping in seconds after the normal stop level is reached; the depth pumping will start on the selected pump.
Duty periods between	0-9999		Choose the number of starts between depth pumping on the selected pump. Counted on the select DO
Hours Between	0-9999 t		Choose the interval between depth pumping in hours.
Use Time Of Day (hh:mm)	Yes/no hh:mm		Clock-timing for activating the function

Pump Control 2

This function is a simple pump control based on level measurement and start-stop levels.

Can be used simultaneously with Pump Control 1. No more than 8 pumps or valves can be controlled in Pump Control 2.

- [-] Connect "MJK Connect"
 - [-] Functions Setup
 - [-] Pump Control 1
 - Pump Setup
 - Additional Functions
 - [+] **Pump Control 2**
 - [-] Energy Optimizing Pump Con
 - [-] Interlock
 - [-] Storm Flow
 - [-] Logical Functions
 - [-] Data Logger
 - [+] I/O Signals
 - [-] Alarm Setup
 - [-] System Setup

Pump Control 2

In Use? Yes

General

Measurement (AI)

None selected

Please select a AI

Number of Pumps 2

Number of simultaneously working pumps 2

Menu Item	Choice	Default	Description
In Use	Yes/No		Activate Pump Control 2
General	AI 1-6	None selected	Select the used AI for Pump Control 2 Mμ Connect RTU unit provides 3 AI and can be expanded with further I/O modules to provide up to 16 AI.
Using Instrument Link: AI # specifications: Unit, decimal, and average is set in I/O Signals>Analogue input			
Number of pumps	1-8	0	Select number of pumps for Pump Control 2 Mμ Connect RTU unit provides 2 DO and can be expanded with further I/O modules to provide up to 32 DO 8 pumps are the maximum selectable amount (8DO)
Number of simultaneously working pumps.	1-8		Select the maximum number of pumps to be activated simultaneously for Pump Control 2 8 pumps are the maximum selectable amount (8DO) I/O Expansion module providing DO is needed for this function.

Display Opsætning Pumpestyring 2



Functions menu > Pump Control 2

Set-up of Pump Control 2 is done in the Display units functions menu.

Use the sub-menus to set-up the full function the menu items is similar to the menu items in Instrument Link.

Adjustments can be done individually from Pump Control 2 main menu and is saved automatically. Iltvis fra Pumpestyring 2 hovedmenu og gemmes automatisk.

[Display Flowchart of Pump Control 2 here](#)

Pump Set Up

Opsætningsparametre for Pumpeopsætning:

- [-] Connect "MJK Connect"
 - [-] Functions Setup
 - [+] Pump Control 1
 - [-] Pump Control 2
 - Pump Setup**
 - [-] Energy Optimizing Pump Control
 - [-] Interlock
 - [-] Storm Flow
 - [+] Logical Functions
 - [-] Data Logger
 - [+] I/O Signals
 - [-] Alarm Setup
 - [+] System Setup

Pump Number 1

Pump Setup

Control Output (DO)

None selected

Please select a DO

Start Level

1000

Stop Level

0

Delay [s]

0

Pump Alternation

In use

Pump Number 2

Pump Setup

Control Output (DO)

None selected

Please select a DO

Start Level

1000

Stop Level

0

Delay [s]

5

Pump Alternation

In use

Menu Item	Choice	Default	Description
Pump setup			Choose the basic settings for the individual pump in Pump Control 2. The amount of controllable pumps is set in Number of Pumps.
Control Output (DO)	1-2 (8)		Select the relay to control the pump. Set-up the chosen relay in I/O Signals>Digital Outputs(8) Needs I/O expansion module providinDO.
Start Level			Activation level of the pumps or valves. If the start level is set higher than the stop level, the pump controller is configured for emptying. If the start level is set lower than the stop level, the pump controller is configured for filling.
Stop Level		0	Level for stopping the pumps or valves..
Delay (sec.)	0- 59999	0	To avoid short term failure modes or level exceedances activating the relays, a delay can be set. If the assigned pumps should not start simultaneously due to strain load, the delay can be set differently for each relay.
Pump Alternation	In use / Not in use	In Use	When choosing alternation, the alternation will be between all DO outputs selected in Pump Control 1. The output relays can be set for not in use or in use. If "not in use" is selected, the start and stop level values entered for the individual relay are the ones that activates the DO relay – and only that specific relay. When using alternation the alternating pumps are activated in a cycle, so that when a start level is passed, the next relay in the cycle is activated. If several start levels are passed, several pumps will be activated.

Connect Pump set-up using Display



pump control 2 > Pumps Setup

Pump set-up is a part of the menu item Pump Control 2 in the Display unit.

Adjustments can be done individually from the Pump Control 2 menu. Complete the set-up set-up and create Overview Screen.

[Display Flowchart of Pump control 2 see here.](#)

Energy Optimized Pump Control

Is a way of controlling the waste water pumping and at the same time saving energy.

Make the perfect operating conditions to control the frequency converters in an energy saving way.

Energy optimized waste water pumping is controlling the well emptying process.

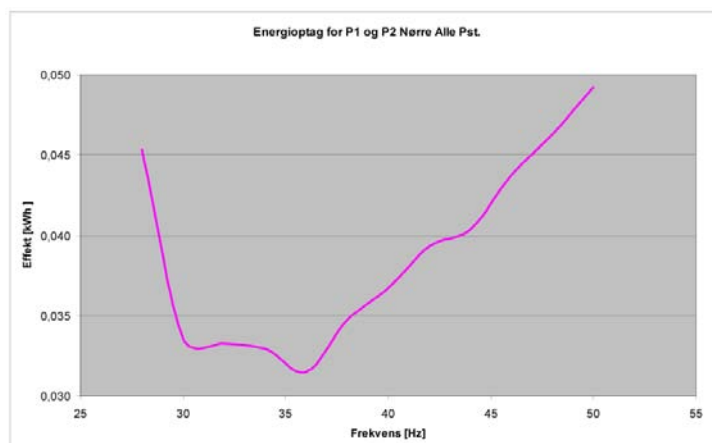
There are certain prerequisites to achieve the energy optimization; there must be a frequency converter on each pump, an electromagnetic flowmeter on the exit pipe from the pumping station and an exact and correct level meter.

Principle of energy optimizing

The Function Energy optimized wastewater pumping is chosen to move more water for less money, meaning a similar ratio between KW consumption and ft^3 and pumped water.

The actual values are constantly gathered using the MODBUS connection, connecting the M μ Connect, MagFlux and the frequency converter. This way the M μ Connect will be capable of adjusting the usage of the frequency converters constantly according to the actual conditions (considering too large inlet flow, worn out pump impellers, etc.)

The graph shows the proportions between the frequency and the KW/m 3 .



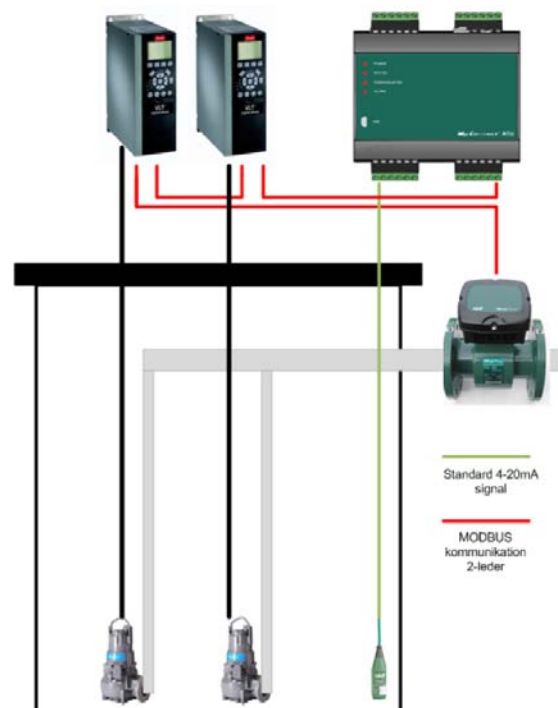
Using the MJK MagFlux electromagnetic flowmeter will create a further advantage when used with the built-in MODBUS communication. This communication is standard in M μ Connect and MagFlux. Several other frequency converters on the market are delivered including the MODBUS communications module.

The shown example is based on the following hardware setup:

- M μ Connect
- MagFlux without display
- Expert pressure transmitter 7060
- Danfoss VLT FC202 Aqua Drive

The MODBUS signals are transferred using a 2-wire shielded cable. This decreases the cost of the installation, and the size of the breaker panel.

[Read more on Danfoss VLT FC202 INET connection](#)



Energy Optm. Pump Control Standard Set Up

Connect® / Mµ Connect® is measuring the level in the pump well. When the level is above the start level the unit will start one pump using the MODBUS communication to the frequency converter. The frequency converter starts running at full speed (50Hz) to set the water in motion. After the "start up time" the unit ramps the VFD down to the reference frekvens. Energy optimization is now in progress. Connect/Mµ Connect is keeping the pumps operating until the minimum level is reached. Hereafter the Mµ Connect lowers the speed of the VFD down to the min. frekvens and pumps to stop level. This is to avoid too many starts.

When using energy optimization in Mµ Connect the following parameters should be entered ahead of start-up.

- [-] Connect "MJK Connect"
- [-] Functions Setup
 - [-] Pump Control 1
 - [-] Pump Control 2
 - [-] Pump Setup
 - [-] **Energy Optimizing Pump Control**
 - [-] Interlock
 - [-] Storm Flow
 - [-] Logical Functions
 - [-] Data Logger
 - [-] I/O Signals
 - [-] Alarm Setup
 - [-] System Setup

Energy Optimizing Pump Control

In Use? Yes

General

Measurement (AI)
None selected
 Please select a AI

Number of Pumps
0

Level Parameters

Maximum Level
0

Start Level
0

Preferred Level
0

Minimum Level
0

Stop Level
0

Control Word

In Use?
No

Number Of Retries
0

Frequency Converter

Type
DANFOSS FC202

Call on Alarm
Not in use

Alarm Delay (hh:mm:ss)
0 : 0 : 0

Alarm Name
VFD ALARM

Flow Input

Type
Mjk MagFlux

Call on Alarm
Not in use

Alarm Delay (hh:mm:ss)
0 : 0 : 0

Alarm Name
FLOW Alarm

Adaptive Optimizing

In Use?
No

Time between optimizing (0-999 hours)
0

Hysteresis [Hz] (1-9)
0

Functions Setup

Wash Out start time
0 : 0 : 0

Wash Out Duration (0-999 sec)
0

Startup Time (0-99 sec)
0

Maximum Flow Limit
0

Minimum Flow Limit
0

When using Energy Optimizing, the following parameters is needed.

Parameters for Energy optimized waste water pumping.

Menu Item	Choice	Default	Description
In use?	Yes/No		Activate the function Energy Optimized Waterwater Pump Control
Analog input	AI1-3 (6)	AI1	Setup the level measurement. In "Analog Input" the individual analogue 4-20 input can be configured. "Scaling" provides an option of changing the units from e.g. m to cm.
Antal pumper	1-8		Number of pumps used with frequency converter to achieve energy optimized operation.

Note: For ON - OFF control of VLT, choose DO in additional functions> Control Signals

Energy optimized pump control using the Display device



Functions menu > Optm. Pump Control 3

The Set-up procedure on Display is similar to Instrument Link, [flowchart over selve menuen ses her](#).

Energy Optimized Pump Control - Level Parameters

- [-] Connect "MJK Connect"
- [-] Functions Setup
 - [+] Pump Control 1
 - [-] Pump Control 2
 - Pump Setup
 - [+] Energy Optimizing Pump Control**
 - Interlock
 - Storm Flow
 - [+] Logical Functions
 - Data Logger
- [+] I/O Signals
- Alarm Setup
- [+] System Setup

Level Parameters

Maximum Level

Start Level

Preferred Level

Minimum Level

Stop Level

When reaching "Max level" all pumps will start at maximum frequency (normally 50 Hz)

Menu Item	Choice	Default	Description
Maximum Level			Max level at normal operation (levels above the entered value will stop energy optimized operation) At "Max Level" all pumps will start on maximum frequency (normally 50Hz)
Start Level			"Start level" will start the pump at 50Hz for x seconds, after this operation the frequency will be lowered to the reference frequency. Please note that there must be an adequate difference between start and stop levels to avoid damages to the pumps and relays.
Preferred Level			Preferred level is the reference level that should be the "desired level" during pump operation.
Minimum Level			Minimum Level is regulating down to the minimum frequency. (Hz. Lowest, chosen rotation/capacity for the pumps)
Stop Level			"Stop Level" will stop the pumps to avoid running dry. Note that there must be an adequate difference between start and stop levels to avoid damages to the pumps or relays, and that the stop level cannot be lower than allowed by the producer of the used pumps.



Functions menu > Optm. Pump Control 3 > Level Parameters

The Level settings in the Display unit is similar to Instrument Link.

[flowchart of Display menu here.](#)

Control Word

- [-] Connect "MJK Connect"
 - [-] Functions Setup
 - [+] Pump Control 1
 - [-] Pump Control 2
 - Pump Setup
 - [+] Energy Optimizing Pump Control**
 - Interlock
 - Storm Flow
 - [+] Logical Functions
 - Data Logger
 - [+] I/O Signals
 - Alarm Setup
 - System Setup

Control Word

In Use?

Yes

Number Of Retries

0

Activation of Control Word will open a new window in the Menu Optm. Pump Control 3 > Pumps setup, this window is similar to the standard control word window.

See specific details [here](#).

Menu Item	Choice	Default	Description
In Use	Yes/No	No	Activate Control Word menu
Number of retries 0-9	0-9	0	Number of retries accepted before the Control Word function will automatically be activated

When using the Display unit follow this path:



Functions menu > Optm. Pump Control 3 > Control Word

When using the Display unit, set-up of Control Word is done in a guided procedure, in Instrument Link it is made in 2 separate steps.

The Set-up is similar to Instrument Link, [flowchart of Display menu here](#).

Frequency Converter

For energy optimizing a selection of frequency converter can be used.
The selected VFD must be equipped with MODBUS RTU communication interface.

- [-] Connect "MJK Connect"
 - [-] Functions Setup
 - [+] Pump Control 1
 - [-] Pump Control 2
 - Pump Setup
 - [+] Energy Optimizing Pump Control**
 - Interlock
 - Storm Flow
 - [+] Logical Functions
 - Data Logger
 - [+] I/O Signals
 - Alarm Setup
 - [+] System Setup

Frequency Converter

Type

Call on Alarm

Alarm Delay (hh:mm:ss)

Alarm Name

Example: The selected frequency converter is Danfoss VLT FC202; Mjk Connect already holds the necessary register, making communication between the units straightforward. If the VFD doesn't appear in the list, select "other"
Control signals – start/stop signals for the frequency converter can be chosen in the chpt. Additional Functions – Control signal – either via MODBUS or as a DO.
All VFD's have individual parameters that need to be set on the converter itself. For example motor data, Ramp up time, ID-number and communication.

Read more: [MODBUS network](#). [electric connection](#)

Menu Item	Choice	Default	Description
Type	Danfoss FC202 Omron V1000 ABB ACS550 SCHNEIDER ATV71 FLYGT PS200 Other Units	Danfoss FC202	Danfoss FC202 frequency converter Omron V1000 frequency converter ABB ACS550 frequency converter SCHNEIDER ATV71 frequency converter FLYGT PS200 frequency converter "Others" referring to a generic driver for frequency converter without MODBUS communication.
Call on alarm	In Use Not In Use	In Use	Choose whether you wish an alarm message (For example an SMS when an error at VLT or the connection occurs).
Alarm Delay	hh:mm:ss:m:s	0:0:0	To avoid short term failure alarms, setup a delay for the alarm
Alarm Name		VFD Alarm	Name the alarm for the SMS message. The name should be a defining name for example "frequency converter failure"

Frequency Converter Using the Display unit



Functions menu > Optm. Pump Control 3 > Frequency Converter Type

The set-up is similar to set-up using Instrument Link, [flowchart over Display menuen ses her](#).

Flow Input

Another parameter is the flow measurement from the pumping well, use e.g. a MJK MagFlux connected using RS-485 for Mp Connect. A different flow meter can be connected using I/O.

- [-] Connect "MJK Connect"
 - [-] Functions Setup
 - [+] Pump Control 1
 - [-] Pump Control 2
 - Pump Setup
 - [+] **Energy Optimizing Pump Control**
 - Interlock
 - Storm Flow
 - [+] Logical Functions
 - Data Logger
 - [+] I/O Signals
 - Alarm Setup
 - System Setup

Flow Input

Type

Call on Alarm

Alarm Delay (hh:mm:ss)

Alarm Name

Menu Item	Choice	Default	Description
Type	MJK MagFlux Other Units Not in Use	MJK MagFlux	When selecting MJK MagFlux flowmeter, note the flow direction. When selecting Others, AO and DO must be defined
Call on Alarm	Not in Use In Use	Not in Use	Select "In use" to receive an alarm call when activated.
Alarm Delay	T:m:s	0:0:0	To avoid short term failure alarms, set-up a delay for the alarm
Alarm Name		Flow Alarm	Enter Alarm Name here; this will be stated in "Alarm Cause" on the SMS and when attaching the Connect Display unit.

On the Display unit the Flow input is set-up this way.



Functions menu > Optm. Pump Control 3 > Flow input

Choose between MJK Converter or "Other Units", the guide from these two choices will vary as Connect unit provides extended communications options working with MJK units, hence fewer settings is necessary at a pure MJK set-up. The set-up is similar to Instrument Link, [flowchart of Display menu](#).

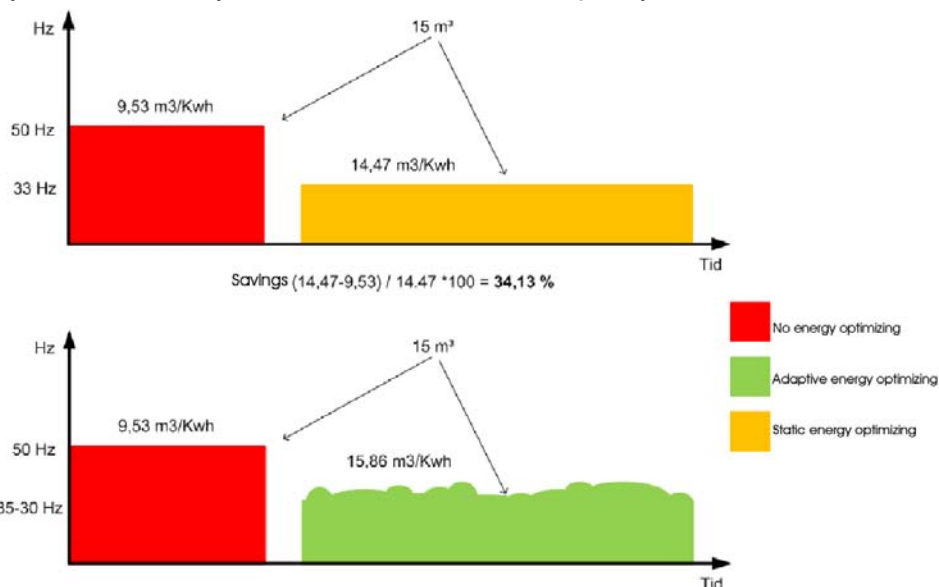
Adaptive Energy Optimizing

According to a variable the frequency will be increased or decreased (Normally app. 1Hz) compared to the reference level. The operation will continue using the new frequency for app. 1 minute. New measurements will be made during this time and the new ratio will be held up to ratio of the reference frequency. If the new frequency is better than the reference frequency the new frequency will automatically be used as new reference frequency.

Example:

Start 33 Hz (reference frequency) – trim active
Control at 34 Hz – not good
Control at 32 Hz – better
Control at 31 Hz – better
Control at 30 Hz – not good

Mj Connect hereafter chooses 32 Hz as new reference frequency.



- [-] Connect "MJK Connect"
 - [-] Functions Setup
 - [+] Pump Control 1
 - [-] Pump Control 2
 - Pump Setup
 - [+] **Energy Optimizing Pump Control**
 - Interlock
 - Storm Flow
 - [+] Logical Functions
 - Data Logger
 - [+] I/O Signals
 - Alarm Setup
 - [+] System Setup

Adaptive Optimizing

In Use?

Time between optimizing (0-999 hours)

Hysteresis [Hz] (1-9)

Menu Item	Choice	Default	Description
In Use	Yes/No		Yes will activate Adaptive energy optimizing
Time between optimizing	0-999 timer	0	Number of hours between the automatic optimizing routine. 0= continuously optimizing
Hysteresis	1-9 Hz	0	Amount of HZ for each step during automatic optimizing. Typical 1Hz.

Adaptive energy optimizing using the Displayenheden is setup by following this path:



Functions menu > Optm. Pump Control 3 > Adaptive Optimizing

Hysteresis can only be set-up using Instrument Link.

The rest of the set-up is similar to Instrument Link, [flowchart of Display menu.](#)

Wash Out Function

Wash out function is used with great advantage when using frequency control of pumps, as sediment in the pipes can appear due to e.g. slow flow. The wash out function will help keeping the pipes clean.

The wash out routine will start on a defined time of day, and will run once daily. If a pump is already in use on the defined time, this pump will be stopped and the level will increase until the start level. After this the pump will be activated on the maximum frequency and operate on this until the routine is completed. At the same time the kW consumption will be measured for later energy calculations.

- [-] Connect "MJK Connect"
 - [-] Functions Setup
 - [+] Pump Control 1
 - [-] Pump Control 2
 - Pump Setup
 - [+] Energy Optimizing Pump Control**
 - Interlock
 - Storm Flow
 - [+] Logical Functions
 - Data Logger
 - [+] I/O Signals
 - Alarm Setup
 - [+] System Setup

Functions Setup

Wash Out start time

0

0

0

Wash Out Duration (0-999 sec)

0

Startup Time (0-99 sec)

0

Maximum Flow Limit

0

Minimum Flow Limit

0

Menu Item	Options	Default	Description
Wash Out start time	hh:mm:ss	0:0:0	Time of day for starting the wash out function (24 hour clock)
Wash out duration	0-99 sec.	0	Duration of Wash Out operation
Startup time (0-99 sec)	0-99 sec.	0	Startup time for operation at max speed (operating at 50 Hz – max 111 sec.)
Max flow Limit	0- 9,9991E+37	0	When the max level is reached pump 2 will start if max flow is not exceeded
Minimum Flow Limit	0-50 (60) Hz	0	Lowest frequency the pump(s) may operate at, Consult the pump manufacture.

Wash Out function using Display unit and Connect is found using this path:



Functions menu > Optm. Pump Control 3 > Additional Functions > Wash out

Firstly set the starting time, then duration of the wash out.

The set-up is similar to Instrument Link, [flowchart of Display menu.](#)

Pump Setup

Set the frequency Hz for the selected pump. (If in doubt consult the manufacturer of the pump for information of Min and Max. frequency)

- [-] Connect "MJK Connect"
 - [-] Functions Setup
 - [+] Pump Control 1
 - [-] Pump Control 2
 - Pump Setup
 - [-] Energy Optimizing Pump Control
 - Pump Setup**
 - Additional Functions
 - [+] Logical Functions
 - Storm Flow
 - Data Logger
 - [+] I/O Signals
 - Alarm Setup
 - System Setup

Pump Number 1

Pump Setup

Preferred frequency [Hz]

Minimum frequency [Hz]

Maximum frequency [Hz]

Control Word Setup

Operating Signal

Delay [s]

Call on Alarm

Reset Of Control Word

Alarm Reset Signal

Number Of Alarm Signals

Alarm Signals / Stop Signals	
1	Not In Use
2	Not In Use
3	Not In Use
4	Not In Use
5	Not In Use
6	Not In Use
7	Not In Use
8	Not In Use
9	Not In Use
10	Not In Use

Menu Item	Options	Default	Description
Preferred frequency [Hz]	0-59999 Hz	0	Reference, optimal frequency. Set this frequency manually based on test operations.
Minimum Frequency	0-59999 Hz	0	Lowest frequency (speed) for pump(s)
Maximum frequency [Hz]	0-59999 Hz	0	Highest frequency (speed) for pump(s)

Adaptive energy optimizing using the Display unit is set-up by following this path:



Funktionen menu > Optm. Pump Control 3 > Pumps Setup

The Pump set-up offers Frequency controlled pumping, the Display unit provides fewer options compared to Instrument Link, which provides additional Control Word function, the individual DO and Instrument Net can however be set to 0-AUT-MAN.

The set-up is in general similar to Instrument Link, [flowchart of Display menu.](#)

Additional Functions

Depth Pumping

This function is used is the pumping well should be emptied to a point below the normal stop level to remove sediment after a predefined amount of starts, operating time or hours.

This depth pumping provides the same options as depth pumping in **Pump control 1**.

Control signal

- [-] Connect "MJK Connect"
 - [-] Functions Setup
 - [+] Pump Control 1
 - [-] Pump Control 2
 - Pump Setup
 - Energy Optimizing Pump Control
 - Pump Setup
 - Additional Functions**
 - Interlock
 - Storm Flow
 - [+] Logical Functions
 - Data Logger
 - [+] I/O Signals
 - Alarm Setup
 - System Setup

Depth Pumping

In Use? Yes

Setup

Select Pump For Depth Pumping
1

Duration (0-99 sec)
0

Duty Periods Between
No
0

Hours Between
No
0

Use Time Of Day (hh:mm)
No
0 0

Control Signal

Pump Number 1

O - MAN - AUT
In use

DI for MAN - Switch

DI for AUTO Switch

DO for Start Stop Signal

Reference AO

Menu Item	Choice	Default	Description
Control Signal			Used to indicate switches of "O-MAN-AUT" in the panel. Will report if the operating conditions are turned off, if there is manual control or automatic control of e.g. pump 1.
O-MAN-AUT	Not in use/In use	Not in use	In use will activate this function
DI for MAN-switch	1-6		Set the DI to register manual.
DI for AUTO-switch	1-6		Set DI to register automatic operation.. IMPORTANT! Same output used for start-stop of VLT
DO for Start - Stop signal	1-2		Set the DO that can force a shut down of the pump in position 0 OR force a start of the pump in position MAN
Reference AO			Set the AO for controlling the VFD without MODBUS communication. This requires I/O expansion module that provide AO.

Depth pumping using Display unit and Connect



Functions menu > Optm. Pump Control 3 > Additional Functions > Depth pumping

Set the individual parameters - the set-up is similar to Instrument Link, [flowchart of Display menu](#).

SCADA Parameters

All parameters referred to here can be read via a SCADA system. Parameters can be adjusted from the SCADA system. [Registerlist](#)

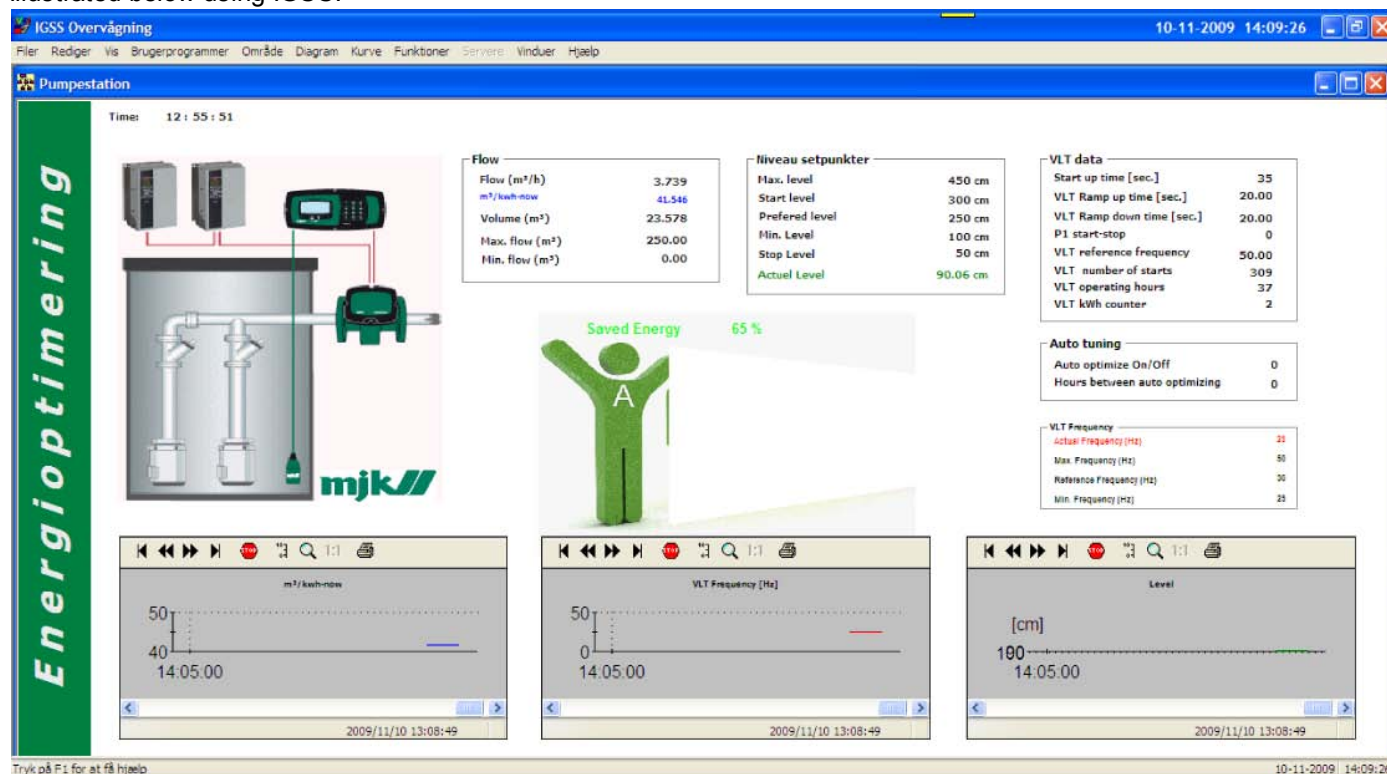
Registerlist (Modbus) in Mj Connect:

- Register regarding flow meter [2000 – 2028]
- Register regarding VFD setup [3000 – 3159]
- Additional parameters [50000 – 50600]

SCADA systems that support MODBUS RTU can show parameters for Mj Connect is:

- IGSS (via 60/61 commands),
- BV-system 2000
- IFix.

Illustrated below using IGSS.



Display Read-Outs

When connecting a MJK Connect display unit using INET it is possible to receive a read-out on the saved energy. This calculation is based on measurement at 50Hz and at the reference frequency.



m3/Kwh This illustration is created using custom display lines, setup: 3159 as float, 3 decimals, unit -

Finalize the set-up procedure by setting up the Overview Screen on the Display unit connected to the Connect unit, This will provide an overview of the operations and power savings.



Functions menu > Optm. Pump Control 3 > Create Overview Screen

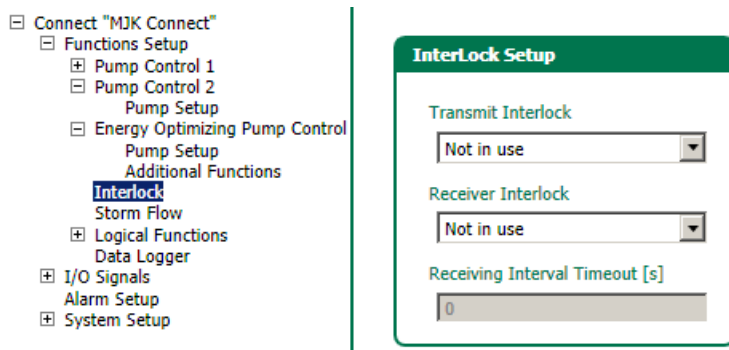
[Flowchart of Display menu.](#)

Interlock

“Interlock” can set-up exchange of commands between two M μ Connect units. This way one M μ Connect can take control remotely of e.g. a DO on another M μ Connect.

An example could be waste water regulation in the sewer system when experiencing heavy rain; you may experience a pump stopping earlier, to use the pipes as a regular buffer for the system. Note that both of the M μ Connects is still working independently. Another scenario could be raw water well in a water work; M μ Connect will register the level in the clean water tank. When the need of water occurs M μ Connect will send a signal for the drilling, making another M μ Connect start the pump.

When using Interlock the M μ Connect must be configured for transmitting interlock or receiving interlock.



Menu Item	Options	Default	Description
Transmit Interlock	Not in Use In Use	Not in Use	Select if the M μ Connect unit should send interlock commandos for other M μ Connect units
Receiver Interlock	Not in Use In Use	Not in Use	Select if the M μ Connect unit should receive interlock commandos for other M μ Connect units
Receiving Interval Time out [s]	0- 9999 sec.		"Time out" is used if a M μ Connect has not received a "keep the signal" command from another M μ Connect, to releasing the signal after time out is reached. If a new signal is received before the time out is reached, the time out will be reset and start a new countdown. Note that the time out must be higher than the sending interval on the transmitting M μ Connect unit.

Signal Set Up For Interlock

Interlock 1-9 opens the configuration of up to 9 individual interlocks

- [-] Connect "MJK Connect"
- [-] Functions Setup
 - [-] Pump Control 1
 - [-] Pump Control 2
 - [-] Pump Setup
 - [-] Energy Optimizing Pump Control
 - [-] Pump Setup
 - [-] Additional Functions
 - Interlock**
 - [-] Storm Flow
 - [-] Logical Functions
 - [-] Data Logger
 - [-] I/O Signals
 - [-] Alarm Setup
 - [-] System Setup

InterLock Setup

Transmit Interlock

Receiver Interlock

Receiving Interval Timeout [s]

Interlock 1

Signal Setup

Start InterLock Signal

Stop InterLock Signal

Receiver Output Signal Type

InterLock Transmission Setup

Send Interval [min]

Local Or Remote

Send Type

Receiver Phone Number

Local ID

Remote ID

Interlock 2

Signal Setup

Start InterLock Signal

Stop InterLock Signal

Receiver Output Signal Type

InterLock Transmission Setup

Send Interval [min]

Local Or Remote

Send Type

Receiver Phone Number

Local ID

Remote ID

Menu Item	Options	Default	Description
Start InterLock Signal	DI DO AI High AI Low Internal Flag VAI High VAI Low	DI	Select input or function on the transmitter unit, that will activate "InterLock X"
Stop InterLock Signal	DI DO AI High AI Low Internal Flag VAI High VAI Low	DI	Select input or function on the transmitter unit, that will deactivate "InterLock x". The "Stop InterLock" signal will, when low, will have one unit calling the other unit and setting an output low. When the receiver receives the stop signal, the receiver will return to "normal mode" When the signal is high As long as the signal is high, the call will happen with the chosen transmission interval. If the interval is set to 10 minutes or more, the remote output should therefore be configured as time controlled with an on-time of more than 10 minutes (e.g. 15 minutes), so that the output is not constantly high if an error should occur such as a broken phone cable. In this way you ensure that the output goes low by itself if the communication fails. With flawless communication the on-time on the remote unit will be initialised at each call, and the remote output will therefore be high, as long as the controlled signal is active.
Receiver Output Signal Type	DO Other signal		The Receiver Output Signal Type decides which DO or other signal will be activated on the receiver. Other Signal provides the option of creating set point displacement or temporarily stop pump control 1 or pump control 2 on the receiving unit.

Note: If the same start and stop signal is chosen, the receiver will adjust to the chosen signal. If different start-stop signals is chosen, the receiver will start on "START" and will stay "ON" until the stop signal is activated.

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Interlock Transmission Setup

- [-] Connect "MJK Connect"
 - [-] Functions Setup
 - + Pump Control 1
 - [-] Pump Control 2
 - Pump Setup
 - [-] Energy Optimizing Pump Control
 - Pump Setup
 - Additional Functions
 - Interlock**
 - Storm Flow
 - + Logical Functions
 - Data Logger
 - + I/O Signals
 - Alarm Setup
 - + System Setup

InterLock Transmission Setup

Send Interval [min]

Local Or Remote

Send Type

Receiver Phone Number

Local ID

Remote ID

Menu Item	Options	Default	Description
Send Interval	0-9999 min.	0	"Send interval" determines which interval the transmitter unit is using to send the command to the receiver unit to keep the state of the interlock output. Note that time out on the receiver unit must be higher than the sending interval.
Local or Remote	Remote Local	Remote	Receiver type can either be this unit (local this device) or a remote unit (Remote device).
Send type	Dial Up (PSTN/GSM) / Network (RS232/485)	Dial Up	Transmitter type determines how often a call is necessary. As an example, it will be costly to call every five minutes to exchange feedback commands between two units, when talking about stopping a waster water pump with overflow, if the communication is done by Dial-up (PSTN/GSM).
Receiver Phone Number			If the unit is capable of being called through phone or GSM modem, the number of the unit is entered here. If the receiver is a slave unit in a group of unit, the phone number on the group's master and then the slave unit's ID are entered. Please note that only one master Connect unit can remote control other units in other slave groups directly.
Local ID			Unique ID number for the Unit
Remote ID			If the receiver is connected using network (RS232/485) data radio, the receivers ID number is written here.

Interlock, Set-up using the Display unit



Functions menu > Interlock

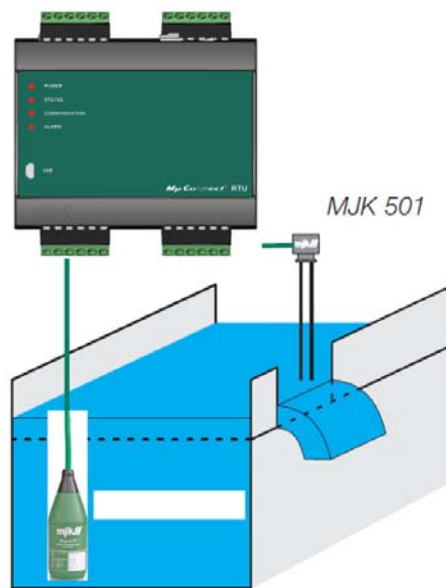
to setup as well transmitter as receiver.

[Flowchart of Interlock.](#)

Storm Flow Calculation

M μ Connect can calculate Storm flow by using a digital input and an analogue input.

A MJK Level transmitter is in this example providing the level signal M μ Connect®, and a MJK level electrode 501 with level relay is mounted exactly where the Storm flow starts. When this happens, the level measurement is set to zero and flow is measured from the rest of the level signal.



Note: M μ Connect is most often connected to a MJK level meter with a measuring range designed for the pump control. The measuring range is normally higher than necessary for a flow measuring: typical 10 meters for the pump control and 10-20 centimeters for the flow calculation. The accuracy on the pump control level measurement is therefore as the entire flow measuring area.

Storm Flow Calculation

- [-] Connect "MJK Connect"
 - [-] Functions Setup
 - [+] Pump Control 1
 - [+] Pump Control 2
 - Pump Setup
 - [+] Energy Optimizing Pump Control
 - Pump Setup
 - Additional Functions
 - Interlock
 - Storm Flow**
 - [+] Logical Functions
 - Data Logger
 - [+] I/O Signals
 - Alarm Setup
 - [+] System Setup

Storm Flow Calculation

In Use? Yes

General

Activate Calculation (I/O)

AI High 1

Measurement (AI)

AI2 "AI 2"

Unit: Not In Use

Decimals: 0

Scaling: 4 mA Scale = 0, 20 mA Scale = 1000

Average [s]: 0

Flow Unit m³/h

Volume Unit m³

Menu Item	Options	Default	Description
In Use	No / Yes	No	Select Yes to activate Storm Flow calculation
Activate calculation (I/O)	DI DO AI high AI low Logical function		Select the Input connected to the Level Electrode. The Input will activate and reset the level measurement.
Analogue input			Select the AI, that provides the level signal to the flow calculation.
Flow Unit	m3/s m3/h l/s l/min l/h feet3/h MGallons/d Gallons/min		Select Flow unit
Volume Unit	l hl kl m3 feet3 gallons Mgallons		Select Volume unit

Set-up the Level / Flow points

The Storm flow Q/h curve must be entered in this menu in order for Mj Connect to calculate the Storm flow volume. To ensure the accuracy of the measurement, you should use as many Q/h places as possible.

- [-] Connect "MJK Connect"
 - [-] Functions Setup
 - [+] Pump Control 1
 - Pump Setup
 - [-] Pump Control 2
 - Pump Setup
 - [-] Energy Optimizing Pump Control
 - Pump Setup
 - Additional Functions
 - Interlock
 - Storm Flow**
 - [+] Logical Functions
 - Data Logger
 - [+] I/O Signals
 - Alarm Setup
 - System Setup

Storm Flow Calculation

In Use?
Yes

General

Activate Calculation (I/O)
AI High 1

Measurement (AI)
AI2 "AI 2"
Unit: Not In Use
Decimals: 0
Scaling: 4 mA Scale = 0, 20 mA Scale = 1000
Average [s]: 0

Flow Unit
m³/h

Volume Unit
m³

Setup Q (h) Points

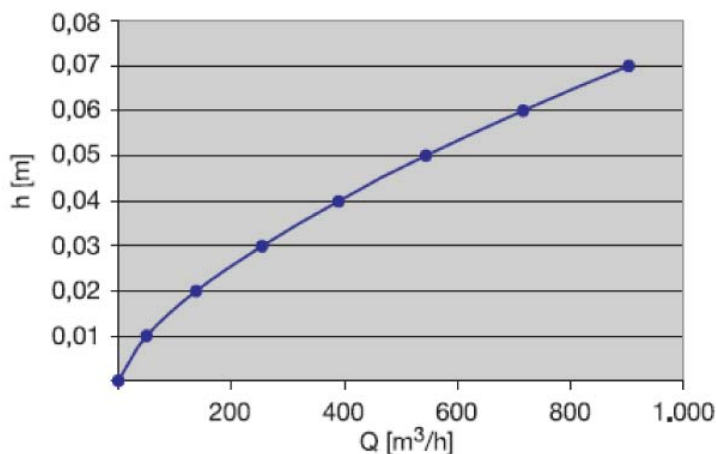
Number Of Q (h) Points
10

Q (h) Points Setup

No.	Level (h)	Flow (Q)
1	0	0
2	0	0
3	0	0
4	0	0
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0

Menu Item	Options	Default	Description
Number of Q (h)	0-10	0	The number of Q(h) points that are desired for the piece by piece linearisation of the storm flow calculation.. The number can be set between 1 and 10; Zero flow is calculated to 0 m ³ /h.
Level (h)			Enter the level (h) in a Q(h) place. The level MUST be higher than previous entered levels.
Flow (Q)			Enter the volume (Q) in a Q(h) place.

Below a Q/h curve and a Q/h table are shown for a rectangular overflow with side contraction:



Registerlist

Storm Flow Calculation using Display unit



Functions menu > Storm Flow Calculation

Set-up is similar to Instrument Link, [flowchart of Display menu.](#)

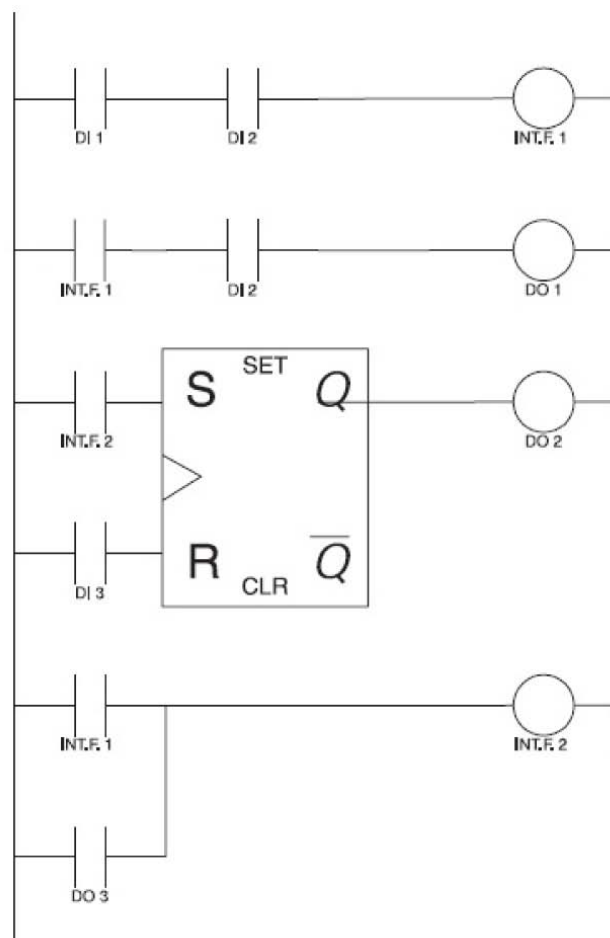
Logical Functions

Logical (PLC) functions provides the Mμ Connect the ability to solve control functions.

In this menu, simple logical functions such as AND, NAND, OR, NOR, SET/RESET, presets or clock based on different digital signals in Mμ Connect is found.

The ability to set internal flags, allows programming combinations of more logical functions to achieve a PLC logic functions in Mμ Connect.

The result of the logical function is sent to one of the internal flags, which can be used in other functions or directly to a digital output.



Example: Combined Alarm.

A typical use of the logical function is the wish to combine several alarms/statuses so that an alarm is only sent in critical situations such as the pump being active, but only uses very little power – a classic example of the pump possibly having lost the impel.

Menu Item	Default	Description
In Use	No	
Activate Calculation (I/O)		Select the input connected to the level electrode. Input will activate the flow calculation and reset the level measurement.
Analogue Input		Select AI, providing the level signal for the flow calculation.
Flow Unit		Select Flow unit

Internal flag 1 = Logic 1

Signal name = Combi alarm 1

- [-] Connect "MJK Connect"
- [-] Functions Setup
 - [+] Pump Control 1
 - [+] Pump Control 2
 - [+] Energy Optimizing Pump Control
 - Interlock
 - Storm Flow
 - [-] **Logical Functions**
 - "IF 1"
 - "IF 2"
 - "IF 3"
 - "IF 4"
 - "IF 5"
 - "IF 6"
 - "IF 7"
 - "IF 8"
 - "IF 9"
 - "IF 10"
 - "IF 11"
 - "IF 12"
 - "IF 13"
 - "IF 14"
 - "IF 15"
 - "IF 16"
- Data Logger
- I/O Signals
- Alarm Setup
- System Setup

Logical Functions 1

Signal Name
IF 1

Logic Output Type: Not In Use Operand 1 Type: Not In Use Operator Type: AND Operand 2 Type: Not In Use Delay [s]: 0

Start Time (hh:mm:ss): 00:00:00 Stop Time (hh:mm:ss): 00:00:00 No. of preset counts: 0 Close Time [s]: 0 Call on Alarm: Not in use

Logical Functions 2

Signal Name
IF 2

Logic Output Type: Not In Use Operand 1 Type: Not In Use Operator Type: AND Operand 2 Type: Not In Use Delay [s]: 0

Start Time (hh:mm:ss): 00:00:00 Stop Time (hh:mm:ss): 00:00:00 No. of preset counts: 0 Close Time [s]: 0 Call on Alarm: Not in use

Menu Item	Options	Default	Description
Signal name			
Output type	Not in use / DO / logical function	Not in use	Choose whether the logical function should activate a DO or an internal flag.
Internal flag			To improve the possibilities of conducting logical functions, up to 16 internal flags can be set. An internal flag is a logical function where the flag is set when a certain combination of signals has been achieved – and then these flags are used together with other signals to conduct the final function. Internal flags can be described as a software relay with memory.
Logic type			Choose the PLC function desired to be used between logic signal A and B. See below for explanations of the logical functions
Choose Logical signal 1. (A)			1. Operand
Choose Logical signal 2. (B)			2. Operand.
Delay	0-59999 sec.		Set the time interval in which both logical signals must be active to set the chosen output type.
AND			The output is only high when both A and B are high. Otherwise it is low.
NAND			The output is only high when both A and B are high. Otherwise it is low.
OR			The output is only low when both A and B are low. Otherwise it is high.
NOR			The output is only high when both A and B are low.

Set -Reset.			A simple flip / flop function, Operand 1 sets the function, Operand 2 resets function. Reset holds 1.st priority. Is used for simple on/off control of pumps with flow switches.
Number of Preset Counts			When the number of presets is reached, a e.g. Digital Output will operate in the Close Time. After this, the count-down will restart.
Number of Presets	0- 59999		Enter number of restarts
Close Time	0- 59999		On-time for the output chosen for the preset counter function.
Clock	0- 59999 sek.		The built-in clock is a 24-hour clock. When the desired time has been reach, the chosen output go on high – nomatter the output status.
Start time	hh:mm:ss	0:0:0	Time of the day for start of the function.
Stop time	hh:mm:ss	0:0:0	Time of the day for stop of the function.
Call on alarm.	Not in Use In Use	Not in Use	Chose if an alarm call should be activated if the logic function is activated, used for e.g. Combi alarms.

Registerlist (Modbus)

- Register Logical functions I/O Status reg.[188–190] [1796–1954]
- Register Setup parameters [63498–64208]

Logical functions using the Display unit:



Functions menu > Logical Function

The Menu is created to automatically guide through set-up of up to 9 individual logical functions. Parameters are similar to Instrument Link, [flowchart of Display menu](#).

Datalogger

Mμ Connect and Connect provides 3 individual dataloggers.

- [Display datalogger.](#)
- [Comli standard RTU logger](#)
- [Modbus standard and event based datalogger](#)

Display datalogger

The Display provides a data logger with a capacity of app. 160.000 loggings.

The Data logger is working following a FIFO principle (first in, first out). If the data logger is full, and more data is entered, the first recorded data will be deleted to make space.

Inputs for data logging:

Logging interval is set between 10 seconds to 9999 seconds.

The Data log contains:

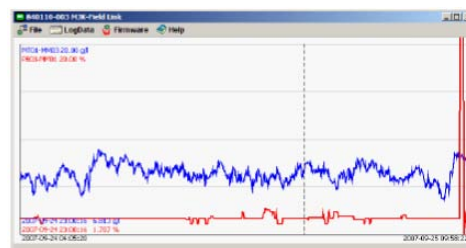
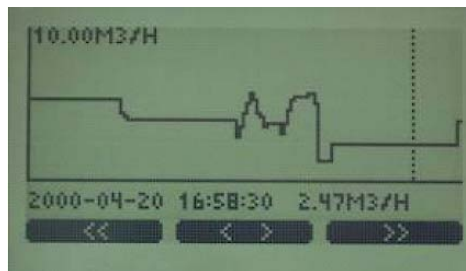
- Date
- Time
- Analogue Value

In case of electrical cut the logger will stop, and continue as soon as the power is reconnected.

If additional units is connected to a Display unit, all units will hold individual logging interval which can work for sorting. All units is sharing the memory space of 160.000 loggings.

Log data can be shown directly on the display unit or exported in an external CSV (comma separated) file. MJK – Field Link software is needed to transfer for CSV file, using a USB port in the display unit.

After export the format can be viewed in e.g. Microsoft Excel ([MJK Field Link](#) details).



Display data logger.

Example of logging capacity at selected intervals

Interval		Capacity		
Seconds	Minutes	Hours	Days	Years
10			19	0,06
30		444	56	0,16
	1	1333	111	0,31
	5	2667	556	1,54
	10	13333	1111	3,09
	15	40000	1667	4,63
	30	80000	3333	9,26
	60	160000	6667	18,52



Functions menu > Data Logger

[Flowchart of Display menu.](#)

Comli standard RTU datalogger

Input for data logging: AI 1-6

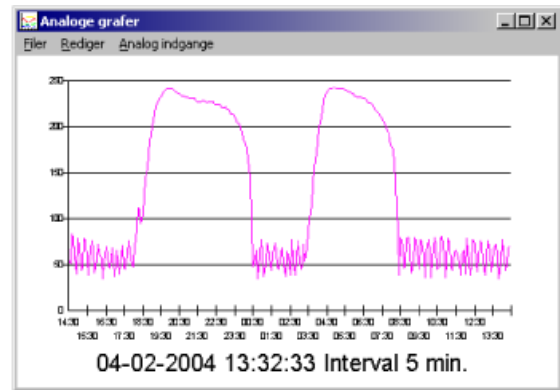
Standard data logger operates with fixed intervals and a log of 5 minutes.

- Log interval, 5 minutes on AI 1-6 analogue input
- 288 registers per AI 1-6
- 24 hours capacity

Data log contains:

- Analogue value

[Registerlist](#) (Comli)



Comli Extended RTU Datalogger

Extended data logger The extended data logger lets you log with a common variable time interval.

Input for extended data logging: AI 1-6

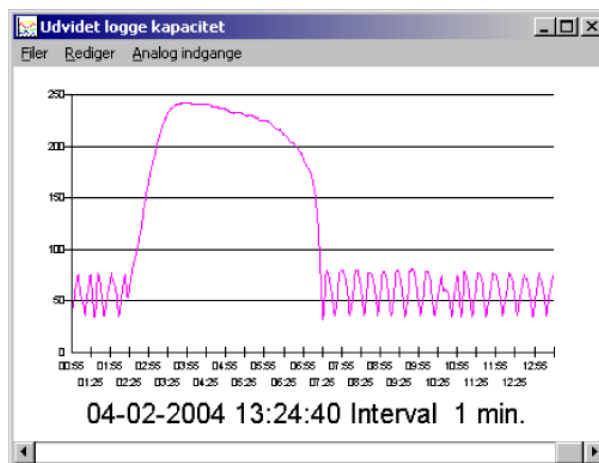
- Log interval, 30 sec, 1,5,10,30 or 60 min. on all 6 analog inputs.
- Runs simultaneously with the 5 min. logger.
- 2880 registers per analog input

Datalog contains:

- Date (Via MJK Link)
- Time (Via MJK Link)
- Analogue value

[Registerlist](#), Comli extended data logger

These addresses can only be used in connection to IGSS and the processor type "MJK-EXTENDED"



Comli extended RTU data logger example on log capacity at selected log interval.

Interval		Capacity	
Seconds	Minutes	Hours	Days
10		8	0,33
30		24	1
60	1	48	2
120	2	96	4
180	3	144	6
240	4	192	8
300	5	240	10
360	6	288	12
420	7	336	14
480	8	384	16
540	9	432	18
600	10	480	20
660	11	528	22
720	12	576	24
780	13	624	26
840	14	672	28
900	15	720	30
960	16	768	32
1020	17	816	34
1080	18	864	36
1140	19	912	38
1200	20	960	40
1260	21	1008	42
1320	22	1056	44
1380	23	1104	46
1440	24	1152	48
1500	25	1200	50
1560	26	1248	52
1620	27	1296	54
1680	28	1344	56
1740	29	1392	58
1800	30	1440	60

Comli Time Difference Data Logger

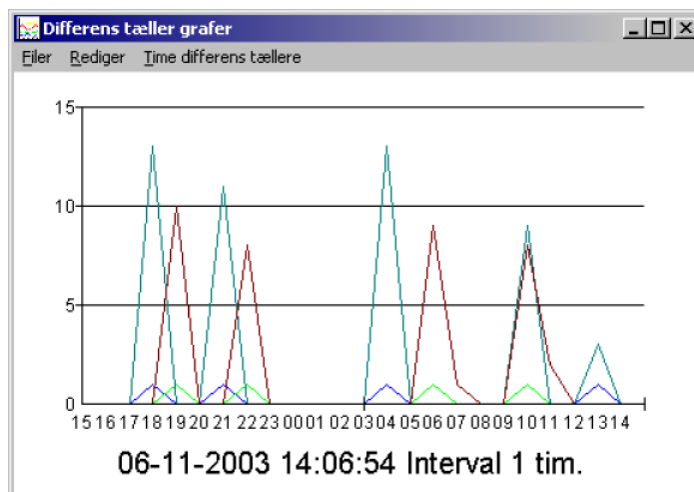
- Register list (MODBUS)Extended data logger[xxxx–yyyy]
- Time difference data loggerLogs counters and time counters
- 24 registers per counter
- 24 hours capacity

Data log contains:

- Date (Via MJK Link)
- Time (Via MJK Link)
- Counting and time value

[Registerlist](#), Comli Extended Data Logger

These addresses can only be used in connection to IGSS and the processor type "MJK-EXTENDED"



Modbus Standard RTU Data Logger

This extended data logger (currently merely supported by MODBUS driver 76 for IGSS) is providing the option of operating with 16 variable signals and time intervals.

Choose between fixed time interval and/or event logger in which the time interval depends on an even to occure e.g. a digital signal at storm flow.

This logger is configured from a connected Display.

Logging into 20.000 registers sharing he selected amount of signals (1-16)

The logged data is date and time in local time from the Mμ Connect.

The shown examples is from IGSS:

[illegible]

Modbus Event Based RTU Data Logger

I/O Signals

Set-up the functions of the individual digital and analogue input and output. The individual input or output is easily renamed, making the set-up more intuitive during normal operations.

Digital Input

- [-] Connect "MK Connect"
- [-] Functions Setup
- [-] I/O Signals
 - [-] Digital Inputs
 - D11: "DI 1"
 - D12: "DI 2"
 - D13: "DI 3"
 - D14: "DI 4"
 - D15: "DI 5"
 - D16: "DI 6"
 - Digital Outputs
 - Analog Inputs
 - Analog Outputs
 - Alarm Setup
 - System Setup

Digital Input 1

Signal Name
DI 1

Relay Function
NO / NC
NO

Delay [s]
0

Alarm
Call on Alarm
Not in use

Digital Input 2

Signal Name
DI 2

Relay Function
NO / NC
NO

Delay [s]
0

Alarm
Call on Alarm
Not in use

Menu Item	Options	Default	Description
Signal name		DI x	Enter the signal name here. It will be shown in Alarm cause on the SMS and when connecting a Connect display.
NO/NC	NO/NC	NO	Select relays function for output, as operation current (Normally Open) or (Normally Closed).
Delay (sec.)	0-19999	0	To avoid that short error statuses or level overflows activate the relays, a delay can be set.
Call on alarm	Not in Use In Use	Not in Use	Choose whether an alarm call should be made on activation.

Digital input I/O signals is configured on the Display unit using this path:



Signals (I/O) > Digital Input

This is similar to Instrument Link, [flowchart of Display menu](#).

Digital Output

- [-] Connect "MJK Connect"
 - [+] Functions Setup
 - [-] I/O Signals
 - [+] Digital Inputs
 - [+] **Digital Outputs**
 - [+] Analog Inputs
 - [-] Analog Outputs
 - [-] Alarm Setup
 - [+] System Setup

Digital Output 1

Signal Name
DO 1

Relay Function

NO / NC
NO

Function
Constant

Close Time [s]
0

Delay [s]
0

Menu Item	Options	Default	Description
Signal name	DO 1-2	DO x	Enter the signal name. Is shown when connecting the Connect display.
NO/NC	NO/NC	NO	Choose the relay function for the output as work voltage (Normally Open) or rest voltage (Normally Closed).
Function	Constant / Time controlled	Constant	If Constant is selected, DO will be controlled by the connected function in the main functions. When time controlled is selected, DO will shut down when the time runs out.
Close Time (s.)	0-59999	0	Select time for On time on DO
Delay (s.)	0-59999	0	To avoid short term failure or short term exceeding of levels will activate the relays, a delay can be set.

Digital Output I/O signals is configured using this path:



Signals (I/O) > Digital Output

The set-up is similar to Instrument Link, [flowchart of Display menu](#).

Note that the expression Close Time in Instrument Link and Closed time in Connect

Analogue Input

- [-] Connect "MJK Connect"
- [-] Functions Setup
- [-] I/O Signals
 - [-] Digital Inputs
 - [-] Digital Outputs
 - [-] **Analogue Inputs**
 - [-] Analogue Outputs
- [-] Alarm Setup
- [-] System Setup

Analogue Input 1

Signal Name
AI 1

Scaling

Unit Type
Level

Unit
mm

Decimal Point
2

4 mA Scale
0

20 mA Scale
10

Average [s]
0

High Alarm

In Use?
No

Signal Name
AI 1 H.

Set Point
0

Delay [s]
0

Call on Alarm
Not in use

Low Alarm

In Use?
No

Signal Name
AI 1 L.

Set Point
0

Delay [s]
0

Call on Alarm
Not in use

Set Point Limitation

Low
0

High
1000

Scaling

Menu Item	Options	Default	Description
Signal name	AI 1-6	AI x	Enter the signal name. Is shown when connecting a Connect display.
Unit type	Level Flow Volume Other units		Select units
Unit			Select unit for the chosen type
Decimal Point	0-8		Select number of decimals
4 mA Scaling			Value of 4 mA of the chosen unit in Unit type
20 mA Scaling			Value of 20 mA of the chosen unit in Unit type
Average (s.)	0- 59999		To avoid that short error statuses or level overflows activate the relays, a delay can be set.

High / Low alarm Exceeding the analogue level is registered.

Menu Item	Options	Default	Description
In Use?	Yes / No	No	
Signal name	AI x H. / L.		Enter the signal name, this will be shown in "Cause of alarm" on SMS and when connecting the Display to the Connect unit.
Set point			
Delay (s.)	0- 59999	0	To avoid that short error statuses or level overflows activate the relays, a delay can be set
Opkald	Not in Use in use	Not in use	Choose whether an alarm call should be made on activation.

Set Point Limitations Is used to limit the set-up of start/stop levels and analogue limits

Menu Item	Options	Default	Description
Low		0	
High		1000	

Analogue input I/O signals is configured using the Display unit via this path:



Signals (I/O) > Analog inputs

From this menu choose set-up of scaling, high alarm, low alarm and set point limitation.
The procedure is similar to Instrument Link, [flowchart of Display menu](#).

Analogue Output

Example on activation of proportional AO according to AI

if a proportional analogue output according to e.g. Level is needed use the State Machine

AI 1 (Level) is read on register 264.

This value is written to AO1 (analogue Output 1) in register 628

```
[ 0]: END NOT USED 0 [ 0: 0]
[ 1]: READ ADR->F32REG NOT USED 0 264 [ 301989888: 264]
[ 2]: WRITE F32REG->ADR NOT USED 0 628 [ 318767104: 628]
[ 3]: END NOT USED 0 0 [ 0: 0]
```

Data	Signal No.	Function
0	SM 1 state(0) reg: 40000	END NOT USED 0
0	SM 1 data(0) reg: 40002	
301989888	SM 1 state(1) reg: 40004	READ ADR->F32REG NOT USED 0 264
264	SM 1 data(1) reg: 40006	
318767104	SM 1 state(2) reg: 40008	WRITE F32REG->ADR NOT USED 0 628
628	SM 1 data(2) reg: 40010	
0	SM 1 state(3) reg: 40012	END NOT USED 0 0
0	SM 1 data(3) reg: 40014	



AO 1 is scaled and min/max limits for AO is set.

If AI 1 is scaled 0 to 1000 the chosen AO must be set accordingly.

If the AO is used as amplifier, 20 mA can be scaled to 500. This way AO will provide 20 mA when AI is 12 mA.

- [-] Connect "MJK Connect"
 - [+] Funktionsmenuer
 - [-] I/O Signaler
 - [+] Digitale indgange
 - [+] Digitale udgange
 - [+] Analoge indgange
 - [-] Analoge udgange**
 - AO1: "AO 1"
 - Alarmopkald
 - [+] System indstillinger

Analog udgang 1

Signal navn
AO 1

Skalering

Enhedstype
Ikke i brug

Enhed
[]

Antal decimaler
0

4 mA skalering
0

20 mA skalering
0

Måleområde begrænsning

Lav
0

Høj
0

Analogue Output

Menu Item	Option	Default	Description
Signal name	Depending on configuration	AO X	Enter the signal name. Is shown when connecting a Connect display.
Unit type	Level Flow Volume Other units		Select units
Unit			Choose unit for the selected type
Decimal Point	0-8		Scaled value is rounded to the selected number of digits.
4 mA Scaling			4 mA value for the selected unit in unit type.
20 mA Scaling			20 mA value for the selected unit in unit type.

Måleområde begrænsning

Menu Item	Option	Default	Description
Low		0	
High		0	

Configuration of analogue output I/O signals using Display unit



Signals (I/O) > Analog Outputs

From this menu choose set-up of scaling and set point limitation.
The set-up is similar to Instrument Link, Ramp time is set using the Display Unit.
[flowchart of Display menu.](#)

Virtual Analogue Input

Configuration.

Display navigation for the Connect unit provides the option of setting up to 16 different virtual inputs.

The Virtual Analogue inputs is providing a significant expansion of the capacity, and can be used for various individual purposes including high/low alarm, these are similar to the ordinary analogue inputs, but besides that Function Type can be selected.

Scaling

Menu Item	Option	Default	Description
Function type	Not in Use AI difference Register Address	Not in Use	AI difference, is based on the difference between two AI.
Scaling			
Signal name	VAI 1-6	VAI x	Enter the signal name, this will be shown in "Cause of alarm" on SMS and when connecting the Display to the Connect unit.
Unit type	Level Flow Volume Other units		Select units
Unit			Select unit for the chosen type
Decimal Point	0-8		Scaled value is rounded to the selected number of digits.
Dividing factor			

High / Low alarm logging of analogue limit.

Menu Item	Option	Default	Description
In Use	Yes / No	No	
Signal name	VAI x H. / L.		Enter the signal name, this will be shown in "Cause of alarm" on SMS and when connecting the Display to the Connect unit.
Value			
Delay (s.)	0- 59999	0	To avoid that short error statuses or level overflows activate the relays, a delay can be set
Call	Not in Use In Use	Not in Use	Choose whether an alarm call should be made on activation.

Note: it is now possible to do data logging VAI from Display data logger.

[Flowchart for VAI](#)

Alarm Call

When an alarm is activated, an alarm flag is set. This alarm flag stays high until the alarm is signed. Although the alarm status is cleared, the alarm flag stays high until a confirmation has taken place.

For both types of signals the following is true; number of active statuses and the amount of time the signal has been active, are both registered. During an alarm status, the unit (if an alarm call is chosen) will call the first number in the call list, then the second, etc.

By calling a modem, it is the task of the Scada System to clear the alarm and stop the call routine. When calling SRO/ PC (SRO= Scada) or phone number, the routine is stopped by calling back to the control and monitor unit. This does not clear the alarm, but only stops the call routine.

If an alarm is activated while the call routine is taking place, the calls will continue as planned. This means that the new alarm will not be reported by call until the next number in the call list.

- [-] Connect "MJK Connect"
 - [+] Functions Setup
 - [-] I/O Signals
 - [+] Digital Inputs
 - [+] Digital Outputs
 - [+] Analog Inputs
 - [+] Analog Outputs
 - Alarm Setup**
 - [+] System Setup

Alarm

General

Automatic Alarm Reset

Call At Alarm Off

Call At Voltage Drop

Call At Low Battery

Menu Item	Options	Default	Description
Call at Alarm Off			Call when the alarm status is normal again. Call at alarm off can be turned on or off.
Call at Voltage Drop			If the net voltage AC or DC is lost, a call can be initiated. This requires a connected backup battery.
Call at Low Battery			If the connected backup battery voltage falls below 11.5 VDC, a call can be initiated.
Call at Automatic Alarm Reset			If an alarm has not been reset and 9 more alarms are activated, meaning a total of 10 non-reset alarms and the 10th alarm therefore can't be viewed in the alarm list, the alarm is reset automatically if the function "Automatic Alarm Reset" has been activated. The function can also be used if no signing is used for alarms.

Alarm call via the Display unit



Connect Configuration > Alarm Setup

From this menu item, configure the Call List using the guided menu
 From Alarm Call menu it is also possible to activate different types of call alarms.
 the set-up is similar to Instrument Link, [flowchart of Display menu](#).

[Register for alarm handling](#)

Call List

At alarm calls, the defined numbers in the call lists are called in the order they are set in.

The communication module connected to the unit is auto detected.

The menu "Call type" is only available when a GSM/GPRS communication module is available.

- ☐ Connect "MJK Connect"
- ☑ Functions Setup
- ☑ I/O Signals
- ☑ Alarm Setup
- ☑ System Setup

Alarm

General

Automatic Alarm Reset
In use

Call At Alarm Off
In use

Call At Voltage Drop
In use

Call At Low Battery
In use

Alarm Call List

No.	Alarm call type	Phone Number	Sms Message	Call Interval [min]
1	PC			0
2	Sms			0
3	Group Sms			0
4	Call			0
5	Not Used			0
6	Not Used			0
7	Not Used			0
8	Not Used			0
9	Not Used			0

Menu Item	Options	Default	Description
Call Type			Four different call types are available. Please see below.
PC (SCADA)			Chosen for calls to Scada systems.
Phone Number			Number of the receiver.
SMS			Enter the SMS text up to 18 characters. The SMS message will be shown on the cell phone on 4 lines: Tag name (entered in General/Name) Alarm cause (entered under Signal name) Mjk Connect (Unit type) Start: hh:mm - dd:mm:yyyy (time and date for sending the message). If the SMS messages are not being sent, then check the SIM card in a cell phone. When sending SMS messages, the messages are delivered to an external server, which means that the unit does not have the ability to test that an SMS message has been received by the recipient.
Group SMS			Is chosen for up to 16 simultaneous SMS messages with the same text as described under "SMS".
Call			Is chosen for calls to a land line phone. The subscription should have show-number functionality enabled.
Call interval (min.)	0-9999 min.		Enter a delay between calls. Typically 5 minutes

SMS text example

The screendump shows a SMS for iPhone.

The shown phone number is the SIM-card in the M μ Connect / Connect. If the number is saved in the phones "contact-list" a name will be shown e.g. the place of the provider of the alarm.

Line 1: Unit Name

Line 2: Signal Name

Line 3: SMS text (as provided on the previous configuration)

Line 4: Start time and date for alarm

Line 5: Stop time and date for alarm



SMS Group

- [-] Connect "MJK Connect"
 - [+] Functions Setup
 - [+] I/O Signals
 - [+] Alarm Setup**
 - [+] System Setup

Sms Group

Number of calls

Sms Message

Phone Numbers

1		9	
2		10	
3		11	
4		12	
5		13	
6		14	
7		15	
8		16	

Menu Item	Options	Default	Description
Number of calls	1-16	0	Choose number of SMS recipients
SMS			Enter the SMS text up to 18 characters. The SMS message will be shown on the cell phone on 4 lines: Tag name (entered in General/Name) Alarm cause (entered under Signal name) Mμ Connect (Unit type) Start: hh:mm - dd:mm:yyy (time and date for sending the message). If the SMS messages are not being sent, then check the SIM card in a cell phone. When sending SMS messages, the messages are delivered to an external server, which means that the unit does not have the ability to test that an SMS message has been received by the receiptient
Telephone number	1-16		Numbers of up to 16 individual receiptients of SMS

System Settings

Is used for basic configuration of the unit itself. The menu should only be used by trained staff, or by a MJK/Xylem technician.

Communication

- [-] Connect "MJK Connect"
 - [+] Functions Setup
 - [+] I/O Signals
 - Alarm Setup
 - [-] System Setup
 - Communication
 - Day Shift Moment
 - SRO Setup
 - Wireless

Communication

Communication Setup

Connect ID (1-247)

ID Sensitive

Master Or Slave

Master ID Number (1-247)

GSM/GPRS Setup

APN Name

Init String

Baud Rate

Connect Timeout (sec)

Menu Item	Options	Default	Description
Communication setup			General setup for communication
Connect ID	1-247	1	Connect ID number is used when having more units on the same SRO system or BUS connection to identify the individual unit.
ID sensitive	No/Yes	No	If set to "Yes", a unique Connect ID must be used.
Master or Slave			Choose whether this unit should be Master (the unit that sends out alarms) or a Slave unit connected to another Master via the CNET or INET port.
GSM/GPRS			Specific settings for GSM/GPRS communication.
APN name	0-32 characters, aA-zZ, 0-9		APN = Access Point Name. A unique name given by the GPRS operator for identification on a GPRS network. (only capital letters)
Init string		at +cfun=1	Different modems are not necessarily able to talk to each with the default setup. Modems use many different settings and protocols. In order for two modems to communicate, they must agree on a number of things such as speed, error correction, compression algorithms, etc. By sending a modem an init string, you can control some of these parameters.
Baudrate	2400 4800 9600 19200 38400 57600 115200	9600	The baud rate or speed at which the serial data is transmitted or received.
Connect timeout	65 S.	0-59999	If GSM/GPRS connection is online, and the communication is stopped for more then the time out period, the modem is reset..

Communication on Display Unit



System Setup > Communication

This configuration is different from Instrument Link as the menu guide also covers SCADA set-up.

[Flowchart of Display menu.](#)

Mμ Connect / Connect as Client

To connect a Mμ Connect / Connect unit to a fixed IP-adress and TCP-port, (GPRS) :

Including MPLS

Complete APN settings.

If communications is within a MPLS-net the APN must be the APN provided by the phone distributor.

Without MPLS

Runing wihtout MPLS, the APN will typically be named INTERNET.

- [-] Connect "MJK Connect"
 - [+] Functions Setup
 - [+] I/O Signals
 - Alarm Setup
 - [-] System Setup
 - Communication**
 - Day Shift Moment
 - SRO Setup
 - Wireless

Communication

Communication Setup

Connect ID (1-247)

ID Sensitiv

Master Or Slave

Master ID Number (1-247)

GSM/GPRS Setup

APN Name

Init String

Baud Rate

Connect Timeout (sec)

General

The fixed IP address, which Mμ Connect / Connect should be connected to, is entered as INIT-string, an example could be: [@10.20.30.40](#) "@" is used to indicate to Mμ Connect / Connect, that there must be connected to the following IP address.



TCP port is provided as follows:

FW before 844008: is tcp-port = 2000 + ID-number on Connect

FW after 844008. enter the selected TCP-port in register 64370 as an U16.

Overview Screens

Predefined [overview screens](#) Connect® / Mµ Connect®.

Besides this, it is possible to define individual overview screens providing individual content. The following examples is created based on a MJK Instrument connected using [RS 485 INET](#).

MagFlux connected to Mµ Connect® / Connect®

The MagFlux display connected to MagFlux the ID number should be set to Modbus ID "1 - 4". After this, the MagFlux can be configured with the necessary values for AO and DO
Disconnect and remove the Display Unit from the MagFlux.



Read the MagFlux manual to learn more on changing the settings.

Process value PV registers for MagFlux, Oxix, SuSix:

Primary measured values from the connected units via INET is written to PV registers that can be logged in the display data logger.

Adress No.	ID number	Description	Data type	Description
2000	1	Device 1 PV 1 Value	F32	Primary value
2029	2	Device 2 PV 1 Value	F32	Current flow register
2058	3	Device 3 PV 1 Value	F32	[unit is setting dependent]
2087	4	Device 4 PV 1 Value	F32	
2014	1	Device 1 PV 2 Value	F32	Secondary value
2043	2	Device 2 PV 2 Value	F32	Volume register
2072	3	Device 3 PV 2 Value	F32	[unit is setting dependent]
2101	4	Device 4 PV 2 Value	F32	

Following examples shows MJK Instruments, MagFlux, shown with current flow and volume.

Read-out of current MagFlux flow, as PV.



First select:

Index > Setup > System Setup > Overview Screen Setup > Analog signals > Select Line Content > Line 8 > Display > Custom 1

Then change to the current screen 6 line 8:

Index > Analog signals > Custom > OK >

Name (enter e.g. flow, finish by "Ok" x2) >

Enhed > Flow unit > m3/t

Modbus ID > ID 1-4

Register address > 2000 (enter "2000" finish by "ok" x2) >

Register data type > F32 (integer numbers 32 bit)

Decimal Point > 2

Push "Back" until overview screens is visible. The current flow is now readable on overview screen 6 line 8.

[To set-up this value in display logger](#)

Red-out of MagFlux counter, as PV.



First select:

Index > Setup > System Setup > Overview Screen Setup > Digital inputs > Select Line Content > Line 3 > Display > Custom 2

Then change to the current screen 4 line 3:

Index > Digital inputs > Custom > OK >

Navn (enter e.g. flow counter, finish by "Ok" x2) >

Unit Type > Volume unit > m3

Modbus ID > ID 1-4

Register address > 2014 (Enter "2014" finish by "ok" x2) >

Register data type > U16 (integer numbers 16 bit)

Decimal Point > 0

Push "Back" until overview screens is visible. The current flow is now readable on overview screen 4 line 3.

[To set-up this value in the Display Logger](#)

Read-out of current MagFlux flow, as VAI.

By choosing current MagFlux flow, as VAI, the value can be used in other menus and functions as well as for defining limits etc.

If the Display is mounted, an overview screen is selected, here no. 6, add an optional line (8) using [VAI 1](#)



First select:

Index > Setup > System Setup > Overview Screen Setup > Analog signals > Select Line

Content > Line 8 >

Connect base1 > Virtuel analog input > VAI 1

Then change to:

Connect Configuration > Signals (I/O) > Virtuel analog input > VAI 1

Function type > Register address > 2000 (enter "2000" finish by "ok" x2)

Register data type > F32 (decimal numbers 32 bit)

Scaling > Signal name > (enter e.g. Flow, finish by "Ok" x2) >

Unit Type > Flow unit > m3/t

Decimal Point > 2

now the current flow is readable in line 8 on screen 6.

Overview screens

Generally configuration via



System Setup > Overview Screen Setup

Overview screens is a guided menu, depending on individual selection, which will ensure step-by-step configuration.

Set-up Day Shift Moment

- [-] Connect "MJK Connect"
 - [+] Functions Setup
 - [+] I/O Signals
 - Alarm Setup
 - [-] System Setup
 - Communication
 - Day Shift Moment**
 - SRO Setup
 - Wireless

Day Shift Moment

Time of day (hh:mm:ss)

0

0

0

Menu Item	Option	Default	Description
Day Shift Moment			The default day shift happens at midnight, but can be changed so a day runs from for example 07:00 to 07:00. Set the delay from midnight in this option

Day shift Moment set-up using the Display unit



System Setup > Dayshift Time

Set-up the time for the individual day-registers to reset and restart.

[Flowchart of Display menu.](#)

SCADA Configuration

- [-] Connect "MJK Connect"
 - [+] Functions Setup
 - [+] I/O Signals
 - Alarm Setup
 - [-] System Setup
 - Communication
 - Day Shift Moment
 - SRO Setup**
 - Wireless

SRO Setup

General

SRO System

Number Status Telegram

Use Custom Register

Menu Item	Options	Default	Description
SRO System (SCADA system)	Standard System 2000 IGSS driver 13/75 IGSS Driver54 CITECT SYSTEM 2000 60 COMMAND UNIVIEW VA ING	Standard System 2000 IGSS driver 13/75	A specific register setup for specific Scada systems are chosen here. For example register ID number placement, etc. When choosing Default (System 2000/IGSS driver 13/75) no change is made in relation to the standard register plan.
Number of Status Telegrams	2	0-7	Number of status telegrams decides how many registers is mailed to the scada-systemet. 1 = send register 0 - 31 ind til Scada 2 = send register 0 – 63 ind til Scada 3 = send register 0 - 95 ind til Scada
Use Custom Register	No / Yes	No	For adaptation to specific SCADA Systems, an edit of the register list can be made. Typically when GPRS transmission is used, the amount of data are reduced. This register is moved to lie in succession, therefore only a few telegrams are sent. Is entered manually using Connect® display > technical setup > read/write reg. The specific register list is defined from register 57000 and 287 registers ahead. The User specific register list merely covers COMLI.

SCADA Communications configuration on the Display Unit:



System Setup > Communication

The configuration of SCADA is the finalizing part of the communications set-up, the configuration is different from Instrument Link as Instrument Link besides SCADA system and user specified register and can choose to receive between 1-7 status telegrams.

[Flowchart of Display menu.](#)

Set-up Wireless

- ☐ Connect "MJK Connect"
 - ⊕ Functions Setup
 - ⊕ I/O Signals
 - Alarm Setup
 - ☐ System Setup
 - Communication
 - Day Shift Moment
 - SRO Setup
 - Wireless**

Wireless

Wireless Settings

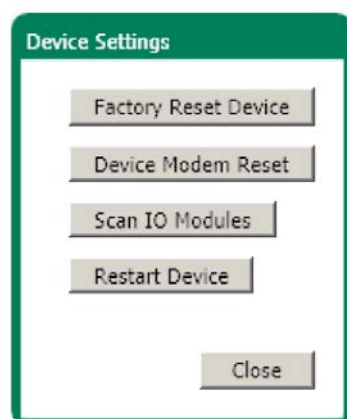
Wireless SSID (aA-zZ, 0-9)

Wireless Password (min. 8 char)

Menu Item	Options	Default	Description
Wireless SSID	aA-zZ, 0-9	My Connect	For indication of SSID broadcasting (name)
Password	8-18 characters (digits/letters)		Wi-Fi Protected Access II. WPA2(AES) Enter unique code for Mj Connect. Must be at least 8 characters.

Set-up or adjustments of the configuration will automatically be included in the internal update cyclus after maximum 3 minutes, after this the new configuration of the wireless signal is completed.

Device Settings



Menu Item	Options	Default	Description
Factory Reset Device			This function will delete all data and setups and will set the unit to default factory setup.
Device Modem Reset			This function resets the built-in modem..
Scan IO Modules			This function scans the I/O BUS for added I/O modules. If you connect I/O modules, these will first be shown in Instrument Link after restart and transfer of the unit.
Restart Device			This restarts the unit. Note: "Restart Device" will cause all factory settings including adjustment as well as any other added information to be deleted!

Access Code (login)

Creation of access codes using the display unit:



From Overview screen select following path:

Index > Setup > 4 > 6 this will access configuration of access codes

Activate > Login enter "2045"

Change Password Enter the amount of needed access codes. Enter the new access codes.

Decide if the device should call a given SCADA when login is performed.

Decide eventual timeout for login.

To log out select login and enter 0000 as code.



To de-activate all pumps during login, choose "activate/deactivate pumps". This will deactivate all pumps from Pump Control 1 will automatically be stopped when login is performed.

Creation of login on overview screen:



From Overview screen select following path:

Index > Menu > 4 > 2 To define overview screen

Select Lin content

Select which line the login should be placed on

*Select **Connect base 1***

Other Units > Log in

Now Login is an option directly from the Overview screen

[See Flowchart.](#)

SMS Commandos

Online data and status from the Connect device can be sent directly as a SMS

Require a SMS status for the devices GSM number showing the text from the "SMS to Connect"-column to receive the reply providing the relevant content from the Connect device.

A SMS showing the text:

STATUS DI1 STATUS DI2 STATUS DI3

Will provide 3 reply SMS, one for each selected DI.

SMS commando and reply

Action	SMS for Connect	Reply from Connect (example)
Send online data from Connect	ONLINE DATA or "Connect ID-no."	Connect ID x DI 1-8: 00000000 DI 9-16: 00000000 DO 1-8: 00000000 AI1 = 139.53 AI2 = 560.55 AI3 = 32.43 AI4 = 1078.31 AI5 = -0.42 AI6 = 142.10
Status and operating data from the selected digital input (DI)	STATUS DI#	MJK Connect LABEL: DI x DI x STATUS: OFF COUNTER: TOTAL: 0 TODAY: 0 YESTERDAY: 0 TIME: TOTAL: 0 h TODAY: 0 min. YESTERDAY: 0min.
Status and operation data for the selected Digital Output (DO)	STATUS DO#	MJK Connect LABEL: DO x DO x STATUS: OFF COUNTER: TOTAL: 0 TODAY: 0 YESTERDAY: 0 TIME: TOTAL: 0 h TODAY: 0 min. YESTERDAY: 0min.

Action	SMS for Connect	Reply from Connect (example)
Status and operation data for the selected Analogue Input (AI)	STATUS AI#	MJK Connect LABEL: AI x AI x VALUE: 32.48 MAX. VALUE TOTAL: 32.51 MAX. VALUE TODAY: 32.51 MAX. VALUE YESTERDAY: 32.51
Status and operation data for the selected Analogue high level	STATUS HL AI#	MJK Connect LABEL: AI x H. AI HL x STATUS: OFF COUNTER: TOTAL: 0 TODAY: 0 YESTERDAY: 0

		TIME: TOTAL: 0 h. TODAY: 0 min. YESTERDAY: 0min.
Status and operation data for the selected Low Level	STATUS LL AI#	MJK Connect LABEL: AI x L. AI LL x STATUS: OFF COUNTER: TOTAL: 0 TODAY: 0 YESTERDAY: 0 TIME: TOTAL: 0 h. TODAY: 0 min. YESTERDAY: 0min.

Action	SMS for Connect	Reply from Connect (example)
Status and operation data for the selected Internal Flag (IF)	STATUS IF#	MJK Connect LABEL: IF x IF x STATUS: OFF COUNTER: TOTAL: 0 TODAY: 0 YESTERDAY: 0 TIME: TOTAL: 0 h. TODAY: 0 min. YESTERDAY: 0min.

Action	SMS for Connect	Reply from Connect (example)
Activate the selected digital output (DO)	SET DO#	SET DO#, OK
Deactivate the selected digital output (DO)	CLEAR DO#	CLEAR DO#, OK
Send set point to the selected mA-Output	SET AO#=yyy.yyy	SET AO#=yyy.yyy, OK

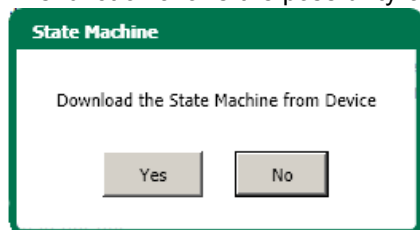
Action	SMS for Connect	Reply from Connect (example)
Read a set point from the selected mA-output	READ AO#	READ AO#=yyy.yyy, OK
Write a text-string to the selected register	WSTRREGxxxx=<text>	WSTRREGxxxx=<text>
Read a text-string from the selected register	RSTRREGxxxx	RSTRREGxxxx=<text>

Action	SMS for Connect	Reply from Connect (example)
Write U16 value to the selected register (U16=0->65535)	WU16REGxxxx=yyyyy	RU16REGxxxx=yyyyy
Read U16 value from the selected register (U16=0->65535)	RU16REGxxxx	RU16REGxxxx=yyyyy
Write U32 value to the selected register (U32=0->4294967295)	WU32REGxxxx=yyyyyyyyyy	RU32REGxxxx=yyyyyyyyyy
Read U32 value from the selected	RU32REGxxxx	RU32REGxxxx=yyyyyyyyyy

register (U32=0->4294967295)		
Write F32 value to the selected register (F32=decimal point)	WF32REGxxxx=yyy.yyy	RF32REGxxxx=yyy.yyy
Read F32 value from the selected register (F32=decimal point)	RF32REGxxxx	RF32REGxxxx=yyy.yyy

State Machine, Sequence Control

This function allows the possibility of creating sequences (statements) for special controls.



By importing the set-up from a unit, for example state machine programming can be downloaded and saved together with the set-up

To program the up to 10 state machines [MJK State Machine Software](#) must be used:

1. Select which State Machine to configure
2. Then choose what signal must conduct a reset function of the State Machine.

If the reset signal is activated state machine will goto state <data>- Reset signal should be on state 0.

3. Finally select the states that must be performed. when function, signal type, signal no. and data is entered, select "Add state".

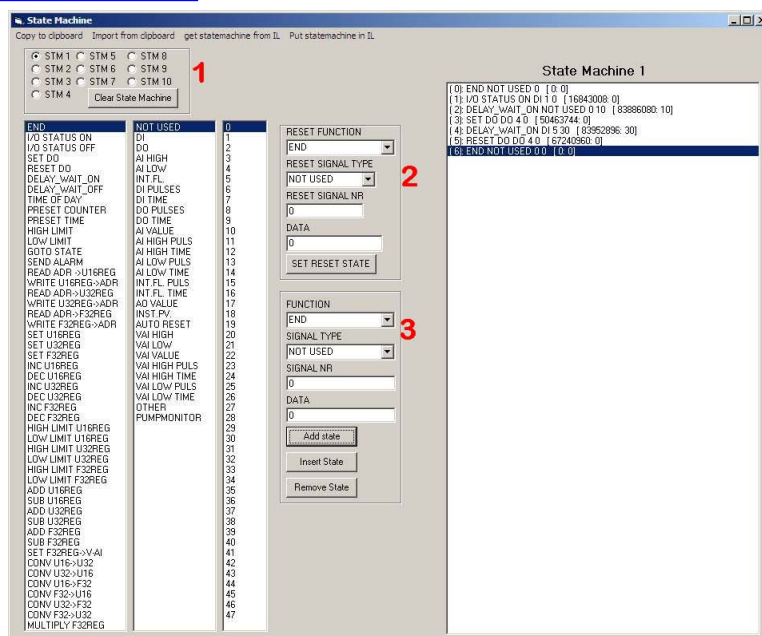
the programmed states is seen in the example.

Example:

In this example a reset state is not set

This state machine will perform the following:

- 1) Wait for DI1 to be activated
 - 2) Wait for 10 seconds
 - 3) Pull DO 4
 - 4) Wait for DI5 to be activated or goto next step after 30 seconds
 - 5) Reset DO 4
 - 6) Final state. (goto state 1)
- up to 10 state machines can be programmed.



Readout/set of timer-delays in State Machine



First Select:

Index > Setup > System Setup > Overview Screen Setup > Overview Screen 2 > Select Line Content > Line 1 > Display > Custom 1

Then, goto Overview Screen 2 linje 1:

Index > Overview screen 2 > Custom > OK >

Name (write. Timer1 , Sec. , enter "Ok" x2) >

Unit (Other units, select "None")

Modbus ID (Enter ID no 1, enter "OK" x2)

Register address > 4XXXX >

Register datatype > U32

Number of decimals > 0

Word Swap > No

Enter "Back" to the overview screen is shown. The Timer value can now be read and set by the Overview screen 2 line

1. [Registerliste](#)

Overview Of State Functions

Each state machine can hold up to 100 states. The total of 16 U16 registers, 16 U32 registers and 16 float registers, these are used when reading/writing to the registerlist.

Function	Signal Type	Signal No.	Data	Description
ENDSTATE	not used	0	0	Any state machine MUST be finalized with and END-STATE, as this indicates that state machine must goto State 1.
I/O STATUS ON	DI DO INTFL AIH AIL	1-xx	x	The function awaits the activation of the chosen signal. If data = 0 wait for signal to be activated. If data > 0 the <data>state will be activated
I/O STATUS OFF	DI DO INTFL AIH AIL	1-xx	x	The function awaits the chosen signal to be de-activated. If data = 0 wait for de-activation. If data > 0 go to state <data>.
SET DO	DO	1-xx	0	The function sends activation signal to the selected DO.
RESET DO	DO	1-xx	0	The function sends de-activation signal for the selected DO.
DELAY WAIT ON	DI DO INTFL AIH AIL	1-xx	seconds	The function awaits <data> seconds for activation of signal. If signal does not appear within set time goto next state.
DELAY WAIT OFF	DI DO INTFL AIH AIL	1-xx	seconds	The function waits for <data> seconds for signal de-activation. If signal does not appear within set time goto next state.
TIME OF DAY	not used	0	seconds from kl 00:00	The function waits for the selected time of day, then goto next state.
PRESET COUNTER	DI DO INTFL AIH AIL	1-xx	x	The function waits for <data> amount of impulses on the selected signal then goto next state..
PRESET TIME	DI DO INTFL AIH AIL	1-xx	x	The function waits for the selected signal to be active for <data> seconds, then goto next state.
HIGH LIMIT	AI1-x	1-6	Limit Value	The function waits for the selected AI to surpass the value of <data>
LOW LIMIT	AI1-x	1-6	Limit Value	The function waits for the selected AI to decline to a value set in <data>
GOTO STATE	not used	0	state no	The function changes to the state set in <data>
SEND ALARM	not used	0	0	The function activates an alarm call as configured in the alarm list.
READ ADR - >U16REG	not used	0-15	Modbus Adr	The function stores content of modbus register address <data> in U16REG[signal nr.]

WRITE 16REG->ADR	not used	0-15	Modbus Adr	The function copies content of U16REG[signal nr.] to Modbus register address<data>.
READ ADR->U32REG	not used	0-15	Modbus Adr	The function stores content of Modbus register address <data> in U32REG[signal nr.]
WRITE U32REG->ADR	not used	0-15	Modbus Adr	The function copies content of U32REG[signal nr.] to Modbus register address<data>.
READ ADR->F32REG	not used	0-15	Modbus Adr	The function stores content of Modbus address<data> into F32REG[signal nr.]
WRITE F32REG->ADR	not used	0-15	Modbus Adr	The function copies content of F32REG[signal nr.] for Modbus address<data>
SET U16REG	not used	0-15	Value	The function copies content of <data> into U16REG[signal nr.]
SET U32REG	not used	0-15	Value	The function copies content of <data> into U32REG[signal nr.]
SET F32REG	not used	0-15	Value	The function copies content of <data> into U32REG[signal nr.]
INC U16REG	not used	0-15	Value	The function adds content of <data> to U16REG[signal nr.]
DEC U16REG	not used	0-15	Value	The functions subtracts content of <data> from U16REG[signal nr.]
INC U32REG	not used	0-15	Value	The function adds content of <data> to U32REG[signal nr.]
DEC U32REG	not used	0-15	Value	The function subtracts content of <data> from U32REG[signal nr.]
INC F32REG	not used	0-15	Value	The function adds content of <data> to F32REG[signal nr.]
DEC F32REG	not used	0-15	Value	The function subtracts content of <data> from F32REG[signal nr.]
HIGH LIMIT U16REG	not used	0-15	Value	Function waits for value of U16REG[signal nr.] > data then goto next state. REMEMBER: Updating U16REG[signal nr.] in another state machine when this function is used.
LOW LIMIT U16REG	not used	0-15	Value	Function waits for value of U16REG[signal nr.] < data then goto next state. REMEMBER: Updating U16REG[signal nr.] in another state machine when this function is used.
HIGH LIMIT U32REG	not used	0-15	Value	Function waits for value of U32REG[signal nr.] > data then goto next state. REMEMBER: Updating U32REG[signal nr.] in another state machine when this function is used.
LOW LIMIT U32REG	not used	0-15	Value	Function waits for value of U32REG[signal nr.] < data then goto next state. REMEMBER: Updating U32REG[signal nr.] in another state machine when this function is used.

				<i>nr.] in another state machine when this function is used.</i>
HIGH LIMIT F32REG	not used	0-15	Value	Function waits for value of F32REG[signal nr.] > data then goto next state. REMEMBER: Updating F32REG[signal nr.] in another state machine when this function is used.
LOW LIMIT F32REG	not used	0-15	Value	Function waits for value of F32REG[signal nr.] < data then goto next state. REMEMBER: Updating F32REG[signal nr.] in another state machine when this function is used.
ADD U16REG	not used	0-15	Value	Function U16REG[signal nr] = U16REG[signal nr] + U16REG[data]
SUB U16REG	not used	0-15	Value	Function U16REG[signal nr] = U16REG[signal nr] - U16REG[data]
ADD U32REG	not used	0-15	Value	Function U32REG[signal nr] = U32REG[signal nr] + U32REG[data]
SUB U32REG	not used	0-15	Value	Function U32REG[signal nr] = U32REG[signal nr] - U32REG[data]
ADD F32REG	not used	0-15	Value	Function F32REG[signal nr] = F32REG[signal nr] + F32REG[data]
SUB F32REG	not used	0-15	Value	Function F32REG[signal nr] = F32REG[signal nr] - F32REG[data]
SET F32REG->V-AI	not used	0-15	Value	Function VAL[signal nr] = F32REG[data] REMEMBER: Set F32REG[data] for the needed value before activating SET F32REG->V-AI.
CONV U16->U32	not used	0-15	Value	Function U32REG[signal nr] = U16REG[data]
CONV U32->U16	not used	0-15	Value	Function U16REG[signal nr] = U32REG[data]
CONV U16->F32	not used	0-15	Value	Function F32REG[signal nr] = U16REG[data]
CONV F32->U16	not used	0-15	Value	Function U16REG[signal nr] = F32REG[data], integral number
CONV U32->F32	not used	0-15	Value	Function F32REG[signal nr] = U32REG[data]
CONV F32->U32	not used	0-15	Value	Function U32REG[signal nr] = F32REG[data], integral numbers.
MULTIPLY F32REG	not used	0-15	Value	Function F32REG[signal nr] = F32REG[signal nr] *

Software

[MJK Instrument Link](#) is used for communication between Connect® or Mµ Connect® and a PC using standard USB cable, Wi-Fi and/or PSTN/GSM/GPRS modem.

[MJK Smart phone App](#), provides the option of viewing and editing the configuration as well as viewing online data from pump control Connect® and Mµ Connect® devices.

[MJK Field Link™](#) is used for communication between your MJK instrument to a PC by use of a standard USB cable.

[MJK State Machine](#) software provides the option of creating sequences (statements) for special control.

MJK Instrument Link

For general operation of Instrument Link please read the manual

DK 6.28 Instrument Link Quick Guide downloadable from:

www.mjk.dk/downloads/downloads-products/downloads-accessories/downloads-rtusoftware.html

Specifications

Minimum system requirements

- PC: USB 2.0
- Microsoft Windows XP sp2/ Vista /Win 7, 32bit
- Microsoft .net 3,5 framework, screen resolution 1280x800

Instrument Link including updates is free, the latest released version is at any time downloadable from the address above.

Instrument Link 5.0

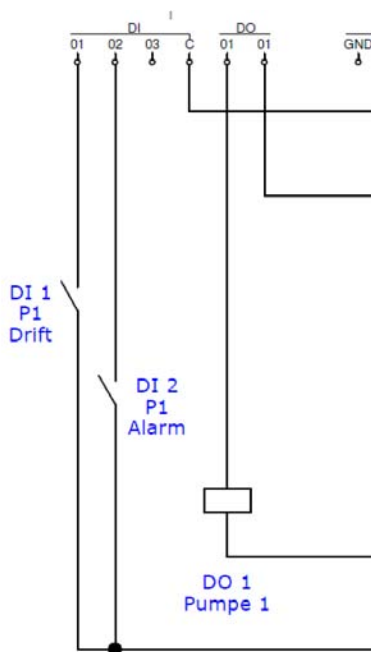
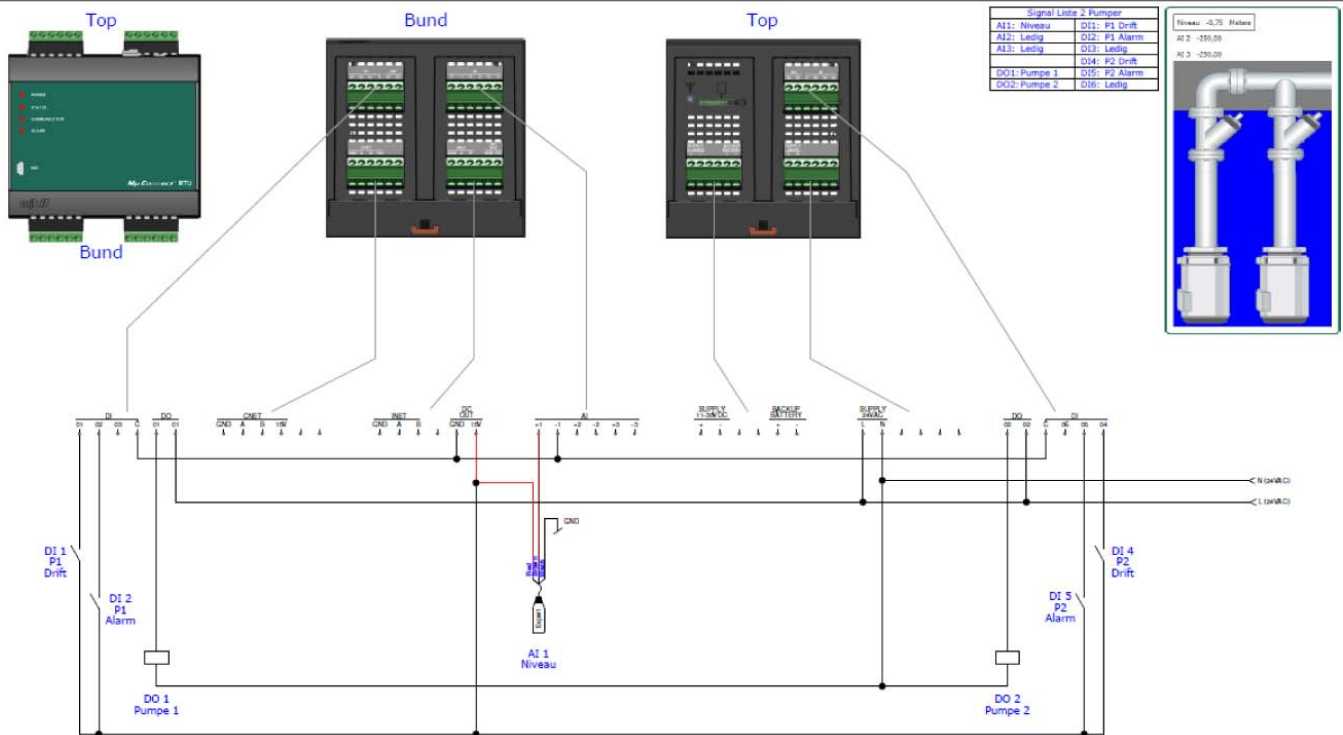
Konfigurationsværktøj for MJK Instrumenter



Quick Guide

MJK Smartphone App

Diagramme for usage of Smartphone App



D			MJK AUTOMATION AG Engesser 1 DE-3550 Nidarm Tel.: +49 43 58 59 44 Fax: +49 43 58 59 59	Date: 2011-09-29
C				Schematic by: MPE
B				Drawing no.:
A				My Connect 2P App
Date		Change	MJK my Connect 2P Standard	

Digital input	Signal name	Relay function	Delay	Alarm / Operating
DI 1	Operating P1	NO	5 seconds.	Operating
DI 2	Thermal error P1	NO	15 seconds.	Alarm
DI 3	Klixon P1	NO	0 seconds.	Alarm
DI 4	Operating P2	NO	5 seconds.	Operating
DI 5	Thermal error P2	NO	15 seconds.	Alarm
DI 6	Klixon P2	NO	0 seconds.	Alarm

Digital input	Signal name	Relay function	Closing time / seconds on time	Delay
DO 1	Start / stop P1	NO- Constant	0 seconds	0 seconds.
DO 2	Start / stop P2	NO- Constant	0 seconds	0 seconds.

Analogu e input	Signal name	Scaling	Scaling 20mA	Unit type	Unit	Average
AI 1	Level	0	300	Level	Cm	0 seconds.
AI 2	Current P1	0	10	Other units	A	0 seconds.
AI 3	Current P2	0	10	Other units	A	0 seconds.

Analogue limits	In Use / Not in Use	Signal name	Set Point	Delay (seconds)	Opkald
AI 1 High Limit	In Use	High level alarm	XX	5	In Use
AI 1 Low Limit	Not in Use	AI 1 LA	0	0	Not in Use
AI 2 High Limit	In Use	High current alarm P1	0	0	Not in Use
AI 2 Low Limit	Not in Use	AI 2 LA	0	0	Not in Use
AI 3 High Limit	In Use	High current alarm P2	0	0	Not in Use
AI 3 Low Limit	Not in Use	AI 3 LA	0	0	Not in Use

Communication - WiFi	SSID name	Password
WiFi	mjk	12345678

Communication – GSM /GPRS	APN name (all caps)	Phone no.	IP address
GSM eller GPRS	xxxxxxxxxx.DK1.TDC		

Following configuration is based on usage of and for usage of the pump monitor in online data in Instrument Link.

Manage Configurations

Available Configurations

Import

Export

Delete

Mu Connect 2P App
Configuration for Mu Connect incl. control word for 2 pumps for smart phone app. Basic Setup.
I/O configuration
AI1: Level
AI2: Available
AI3: Available
DI1: P1 operation
DI2: P1 Alarm
DI3: Available
DI4: P2 operation
DO1: Pump 1

MuConnect
DEMO 2P incl Control Word for app

[Min nye oprettelse](#)

Close

- ☐ Connect "MJK Connect"
- ☐ Funktionsmenuer
 - ☐ Pumpestyring 1
 - ☐ Pumpestyring 2
 - ☐ Energi optimeret pumpestyring
 - ☐ Tilbagestyring
 - ☐ Overløbsflow
 - ☐ Logiske funktioner
 - ☐ Display datalogger
- ☐ I/O Signaler
- ☐ System indstillinger

Pumpestyring 1

I brug?

Ja

Generelt

Analog indgang

AI3 "AI 3"

Enhed: Ikke i brug

Antal decimaler: 0

Skalering: 4 mA skalering = 0, 20 mA skalering = 1000

Midling (Sek.): 0

Antal pumper

5

Antal samtidig kørende pumper

2

Kontrolord

I brug?

Ja

Antal genindkoblinger (0-9)

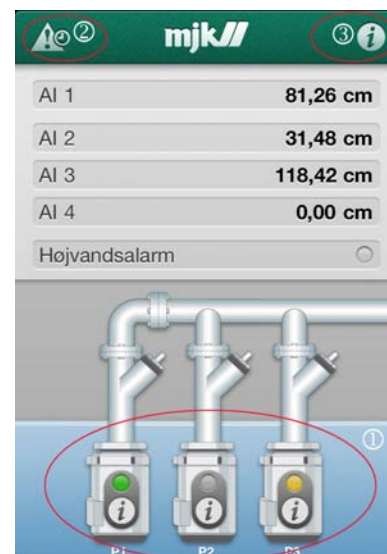
2

Smartphone App - User Interface

Main screen in the Mj Connect App provides an overview of the current operations in the set-up as well as simple navigation for sub-sides containing detailed information.

The coloured dots on the pumps shows eventual alarms or current power on the connected pumps. A high level alarm will be marked with a colour and be featured on a list.

1. Select a pump to check and/or adjust the settings for the pump by pressing "i" on the graphic.
2. Alarm History.
3. System Information.



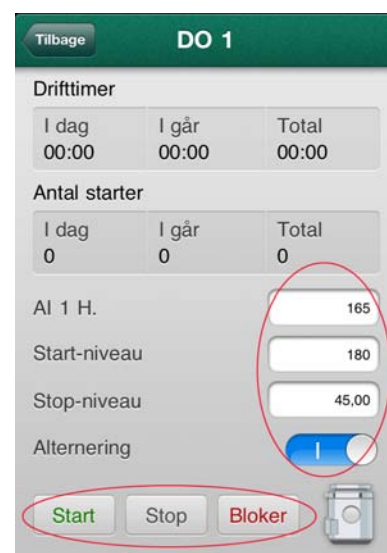
1. The individual pump window

Provides information on operating hours, number of starts on the top. below this, the conditions for pump activation/deactivation can be adjusted.

Press the white box, and enter the needed value for high level alarm, start level and stop level.

Activate or deactivate Alternation

In the bottom manual start/stop/block buttons allows overruling the already set configuration.



2. Alarm History

Provides an overview of the latest alarms both actual and closed alarms are visible.

The blocks is providing type of alarm, start and eventually stop time.

The individual alarm is besides that marked with a colour, the colours will help categorizing the importance of the individual alarm quickly.



3. System Information

Is providing an overview of the data connection.

Beneath the data overview an overview of the voltage on the individual inputs is found.

System information	
MJK Connect	
System tid	06/11/2012 15.05
GSM status	Idle
GSM signal styrke	2
APN	
IP	
AI 1: AI 1	5,30 mA
AI 2: AI 2	4,50 mA
AI 3: AI 3	5,89 mA
DI 1: DI 1	Off 

No connection to device

"Run Demo-mode" is providing a virtual mode allowing configuration which can be changed, thereby used for training actions i coherence with alarms.

This mode will of course have no influence on the ordinary control of Mµ Connect at all.



MJK Field Link

MJK Field Link™ 840110

Communication software for MagFlux, SuSix, Oxix, mA/Bus Converter, Connect and Mµ Connect.

Functions

MJK Field Link™ used for communications between an MJK instrument and a PC using standard USB cabel.

Log Data

Import and show Log Data an export as CSV file.

Firmware

Upload latest firmware via MJK Field Link™ for Display and converters

Specifications

Minimum system krav

- Microsoft Windows XP sp2/ Vista /Win 7, 32bit
- Java
- USB 2.0, MJK USB cable 691095 PC recommended

Download

Field Link www.mjk.dk

[direct link for the download center](#)



MJK-Field Link does not need installation, the .exe file works as an application

MJK-Field Link is used for updating firmware on Connect® base, Display as well as language file. download and saving screen configuration from Connect Display ® display.

Update functions

MJK-Field Link Software contains more update functions which will be described in details on the following pages. Connect base, display device and language file can be updated individually, but on top of a Display device update, the language file must be re-installed.

- Connect PC to Connect base device
- Update Connect® base firmware
- Connect PC to Connect display device
- Save log data
- Update display firmware
- Update Language firmware



Important !

All screen resolutions is reset when installing new firmware! See procedure A, step 8 on page **183**, how to save the current display screen resolution.

Existing log data can/must be saved before installing new firmware!

Wait for all transfer and programming functions to be completely finished before disconnecting the USB cable. If an update process is running (especially Flash programming) is interrupted it may result in the system will block and a MJK technician must be called!

To run MJK-Field Link the PC must have Java installed.

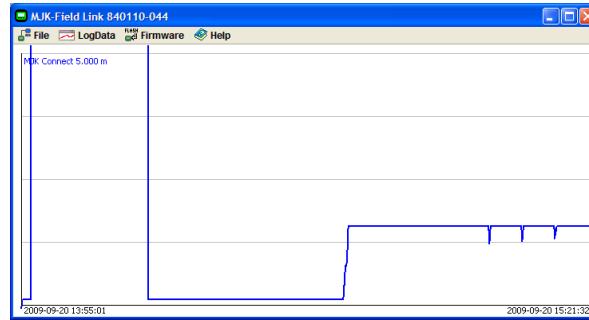
Data logger

Enter "logData" and "read Log"

Data logger in Connect display will be transferred to PC. Wait...

Now, you can save data logger as a CSV file.

The CSV file can be opened with Microsoft Excel.



Serial	MJK Address	Unit	Value ID	Device Type	Frequency	Range	Min Range	Max Precision	SensorName	MJK Connect
1	20-09-2009 13:55		0.066577987							
2	20-09-2009 13:55		0.066704842							
3	20-09-2009 13:55		0.071442279							
4	20-09-2009 13:55		0.081907146							
5	20-09-2009 13:55		0.020443223							
6	20-09-2009 13:55		0.106020720							
7	20-09-2009 13:55		0.110103480							
8	20-09-2009 13:55		0.110103480							
9	20-09-2009 13:55		0.110103480							
10	20-09-2009 13:55		0.110103480							
11	20-09-2009 13:55		0.110103480							
12	20-09-2009 13:55		0.110103480							
13	20-09-2009 13:55		0.110103480							
14	20-09-2009 13:55		0.110103480							
15	20-09-2009 13:55		0.110103480							
16	20-09-2009 13:55		0.110103480							
17	20-09-2009 13:55		0.110103480							
18	20-09-2009 13:55		0.110103480							
19	20-09-2009 13:55		0.110103480							
20	20-09-2009 13:55		0.110103480							
21	20-09-2009 13:55		0.110103480							
22	20-09-2009 13:55		0.110103480							
23	20-09-2009 13:55		0.110103480							
24	20-09-2009 13:55		0.110103480							
25	20-09-2009 13:55		0.110103480							
26	20-09-2009 13:55		0.110103480							
27	20-09-2009 13:55		0.110103480							
28	20-09-2009 13:55		0.110103480							
29	20-09-2009 13:55		0.110103480							
30	20-09-2009 13:55		0.110103480							
31	20-09-2009 13:55		0.110103480							
32	20-09-2009 13:55		0.110103480							
33	20-09-2009 13:55		0.110103480							
34	20-09-2009 13:55		0.110103480							
35	20-09-2009 13:55		0.110103480							
36	20-09-2009 13:55		0.110103480							
37	20-09-2009 13:55		0.110103480							
38	20-09-2009 13:55		0.110103480							
39	20-09-2009 13:55		0.110103480							
40	20-09-2009 13:55		0.110103480							
41	20-09-2009 13:55		0.110103480							
42	20-09-2009 13:55		0.110103480							
43	20-09-2009 13:55		0.110103480							
44	20-09-2009 13:55		0.110103480							
45	20-09-2009 13:55		0.110103480							
46	20-09-2009 13:55		0.110103480							
47	20-09-2009 13:55		0.110103480							
48	20-09-2009 13:55		0.110103480							
49	20-09-2009 13:55		0.110103480							
50	20-09-2009 13:55		0.110103480							

MJK Device Codes

Code no.		Unit
16	GPM	gallons per minute
17	l/min	liters per minute
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

MJK Device Type Codes

Code no.	Unit
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 preassure transmitter
9	SuSix
10	Field log
11	Oxix dissolved oxygen transmitter

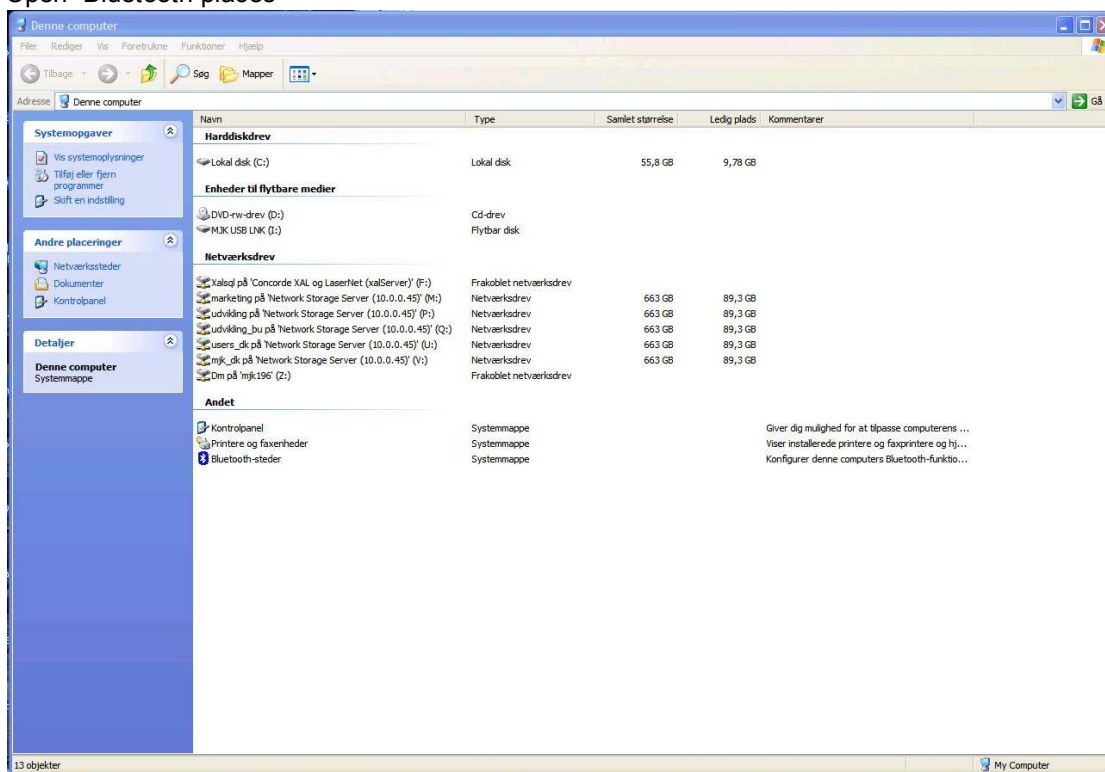
Frequency	Log interval in seconds (here: 10 seconds)
Range Max	Maximum value for graph
Range Min	Minimum value for graph
Precision	The accuracy of the SI value
Column J	Sensor name as entered by the user
Time	Date and time in Central European Standard Time (CEST)
UTime	Time in UNIX format. Number of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

Bluetooth

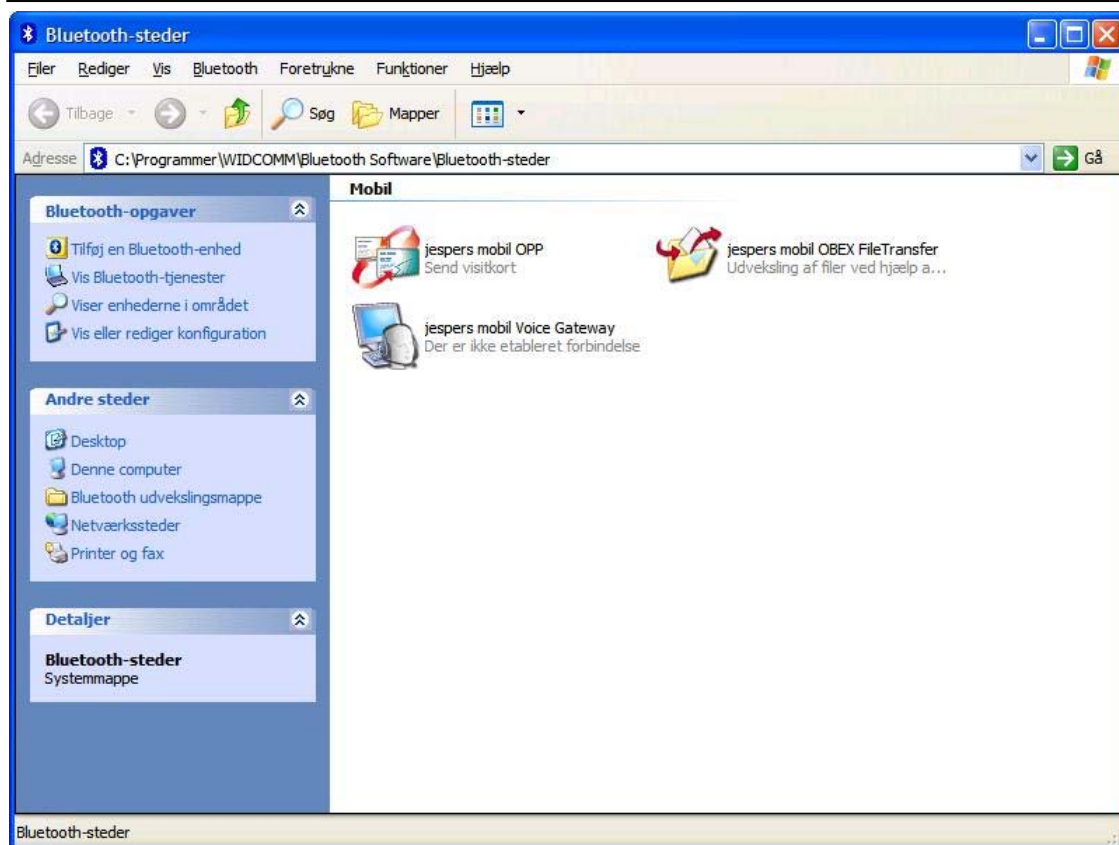
Open "This computer"



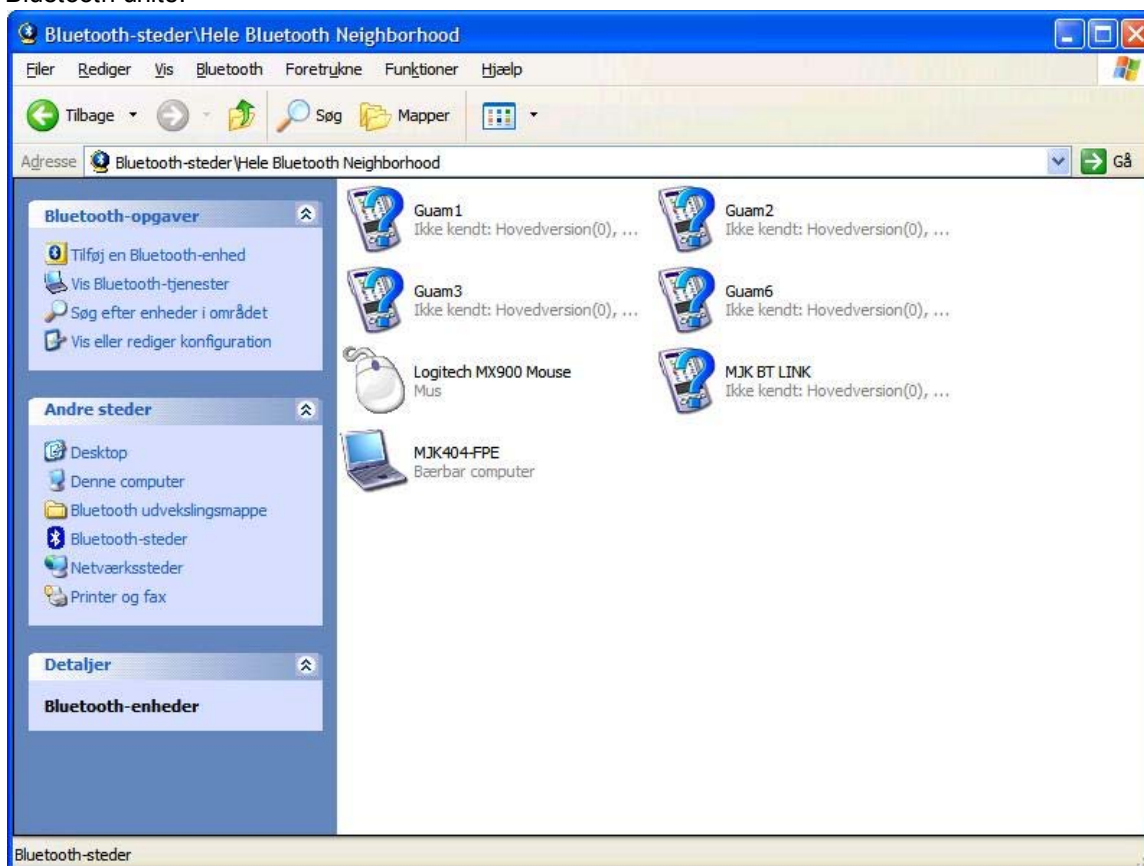
Open "Bluetooth places"



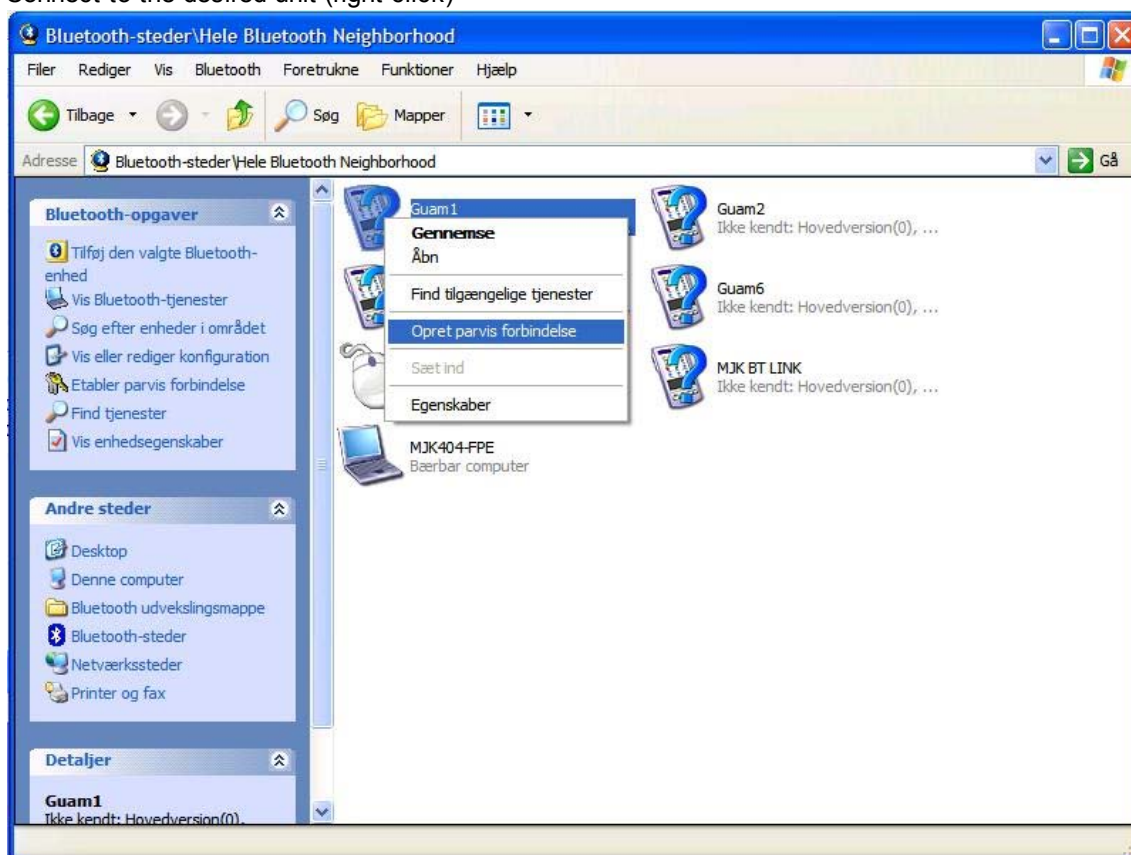
Select "Show bluetooth units"



Bluetooth units:



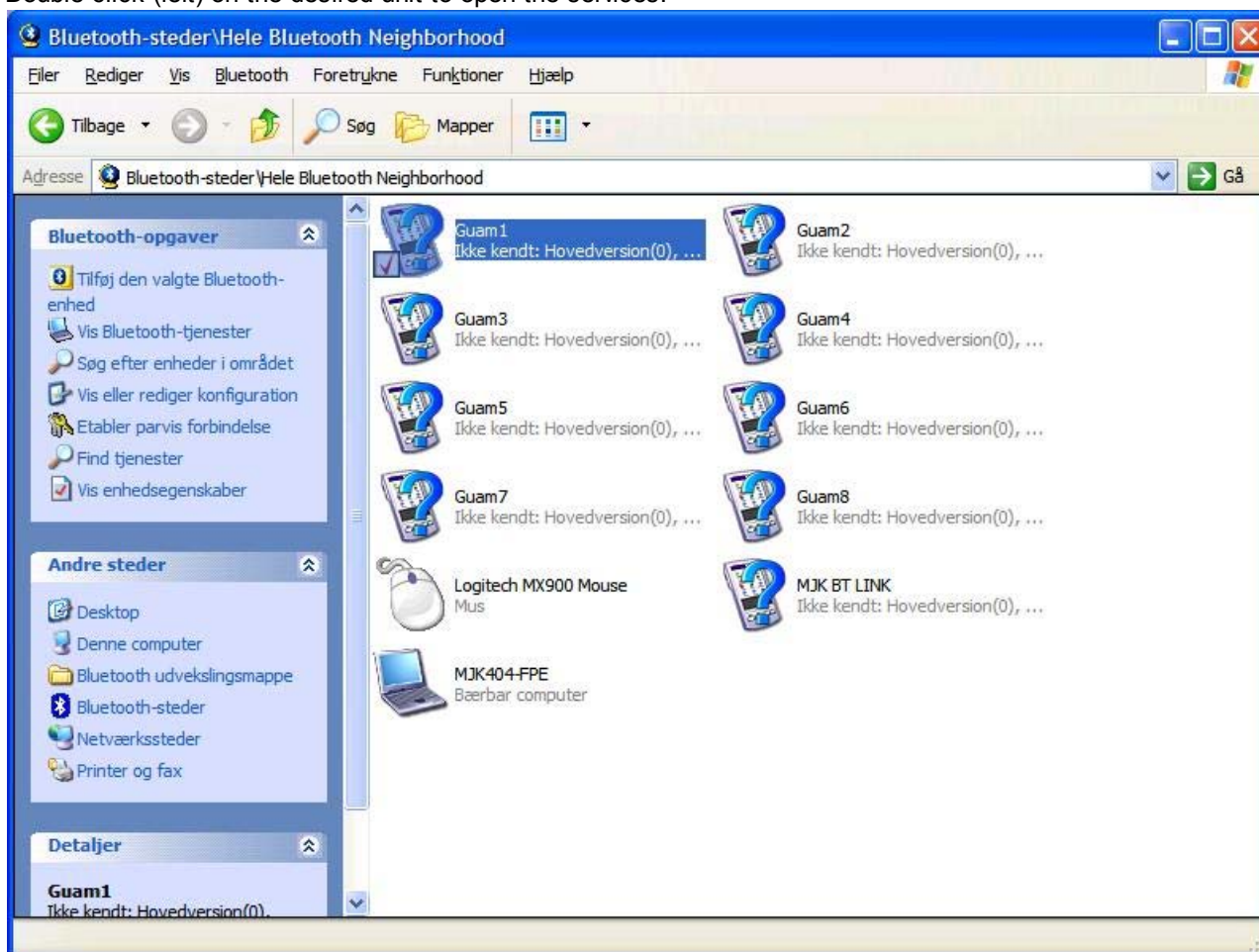
Connect to the desired unit (right-click)



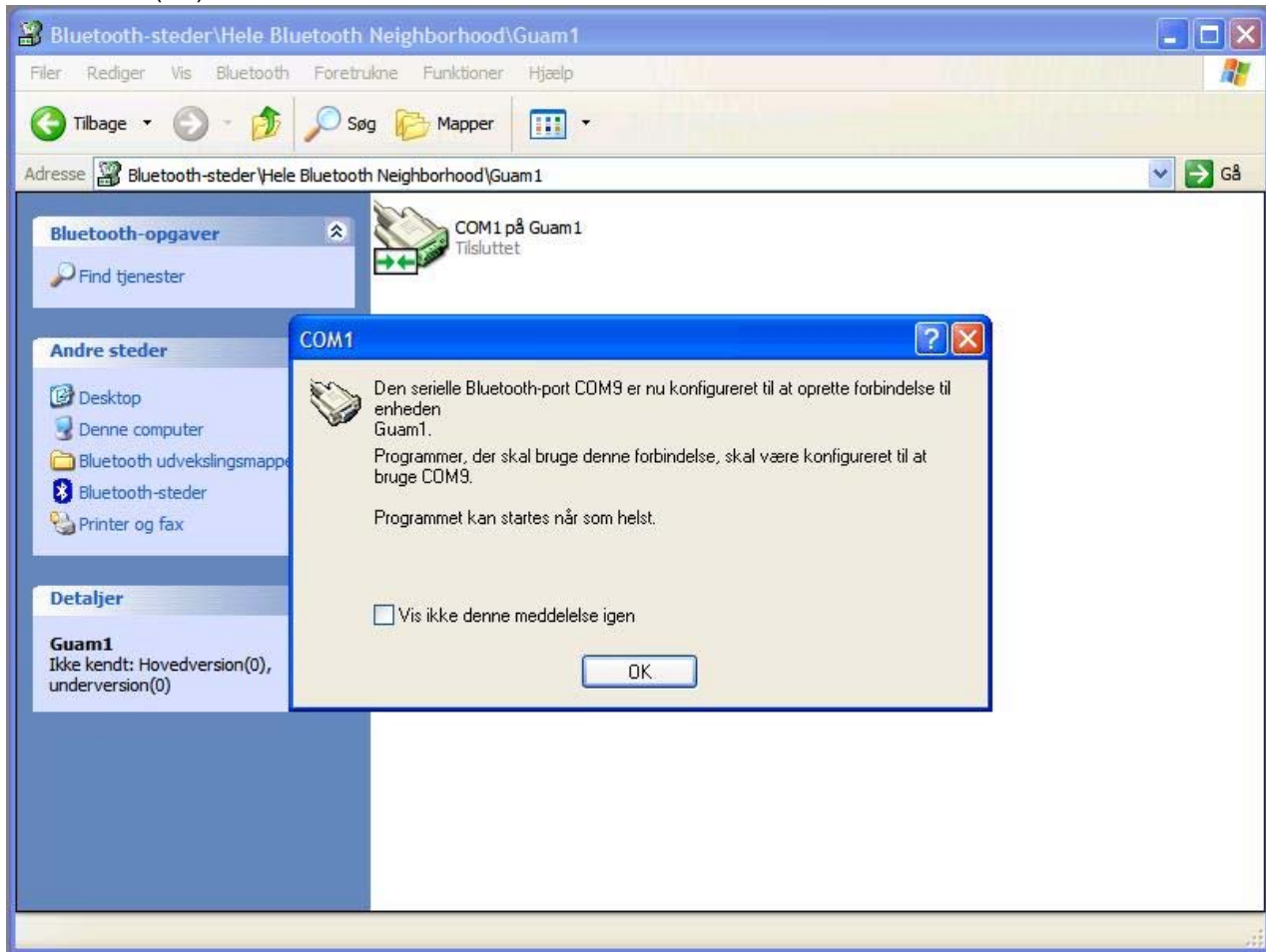
Type code (default = 1000)



Double-click (left) on the desired unit to open the services:



Double-click (left) COM1 service to connect to service:



(remember to disconnect COM1 service before connecting to a new unit)

Remember the new COM-port (COM9)

Start MJK-Field-Link and choose "Mount Serial/Bluetooth"

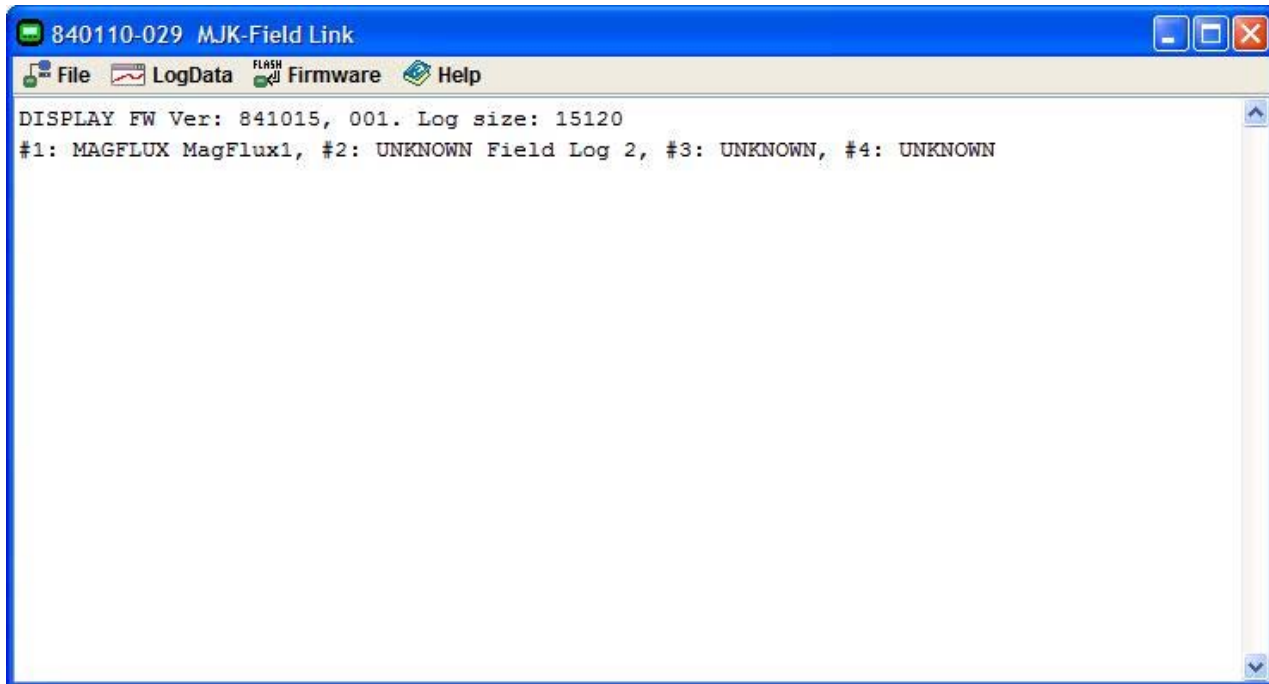


Select the new COM-port (COM9 in this example):



(it is possible to use "Auto").

MJK-Field Link is now connected:



Update Language

All languages will be deleted during a display firmware update. As a consequence the required languages need reinstalling via the service programme Field Link.

1. Select "File" and click "Languages"
2. A dialog box appears showing the status of the installed languages (there are no installed languages after a firmware update).
3. Click "Add", locate the desired language text file or language pack on the CD (for example "84151-003 Text file) and click "Open".
4. Select a language or a language pack (Connect) from the dialog box and click OK.
5. The selected languages are then transferred and installed. If required, it is possible to remove languages from the list with "Delete" and "Close".
6. Select "Dismount USB" followed by "Exit" to finish the Connect firmware update.



Please note: If requested an updated language text file will be sent from MJK

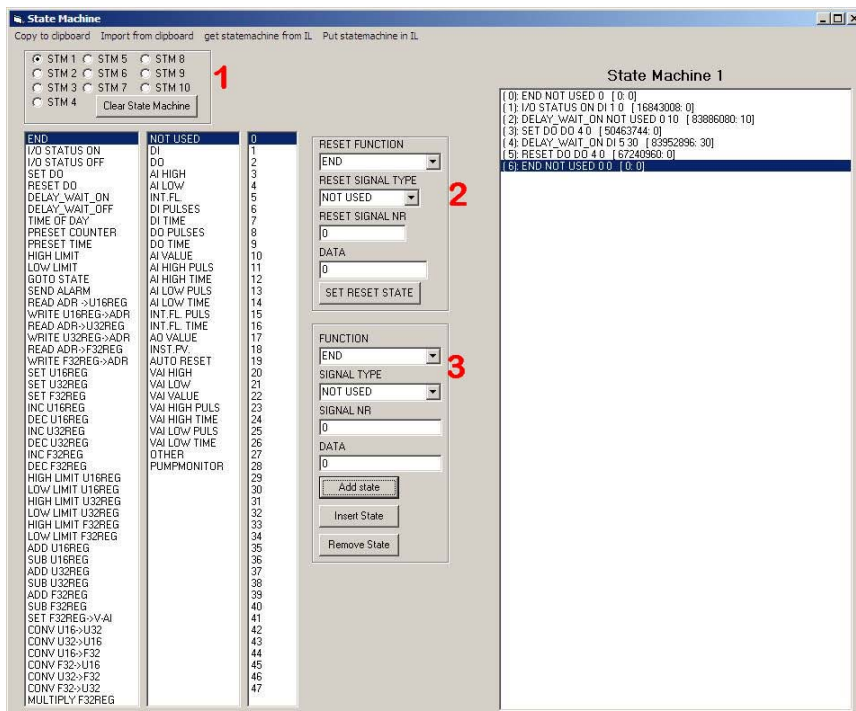
MJK State Machine Software

Specifications

Minimum system requirements

PC: USB 2.0 connection

Microsoft Windows XP sp2/ Vista /Win 7,
32bit



Register List

Firmware Versions

Product	Number	Revision
Connect®	844003	007-015
Mμ Connect®	844006	003

Brief Revision History

Product	Revision	Description
Connect®	006	
Mμ Connect®	002	

Register Overview

Modbus Start reg.	Description
20	Hardware description
38	Software Converter
168	I/O - Status
196	Raw values for Digital input/output (DI/DO) and Analog input/output (AI/AO)
264	
328	Storm flow measurement
344	Pump operational data
540	Level Control operational data
628	Analog set point so the SRO can make a ramp
692	Operation data DO 1-36
1012	Operation Data DI 1-32
1332	AI 1-16 limit flags operational data
1796	Operational data for internal flags
1941	Process Values for connected devices
2071	Reload settings
10350	Watch dog reset
	<i>288 logged values for each analog input 1 to 8 Process value 1 and 2 from slave devices (288 values for each PV)</i>

Digital Logs	Description
55000	General purpose registers
56000	Pump monitoring
57000	Customized register list
57500	Pump control extra functions
57700	Group SMS phone numbers
58000	Calibration settings
58200	

Set up Parametre	Description
58500	Setup Parametre Extended Data logger
59000	Analog input setup parameters
60408	Digital input Setup parameters
60888	Digital output setup parameters
61528	Analog output setup parameters
62200	STD. Pump control setup parameters
62587	Level Control
62902	Alarm Control
63215	Data logger Standard
63219	Interlock
63498	Logical functions (1-16)
64218	Storm flow calculation
64356	System parameters
65449	Texts

For a complete register, please see separate document

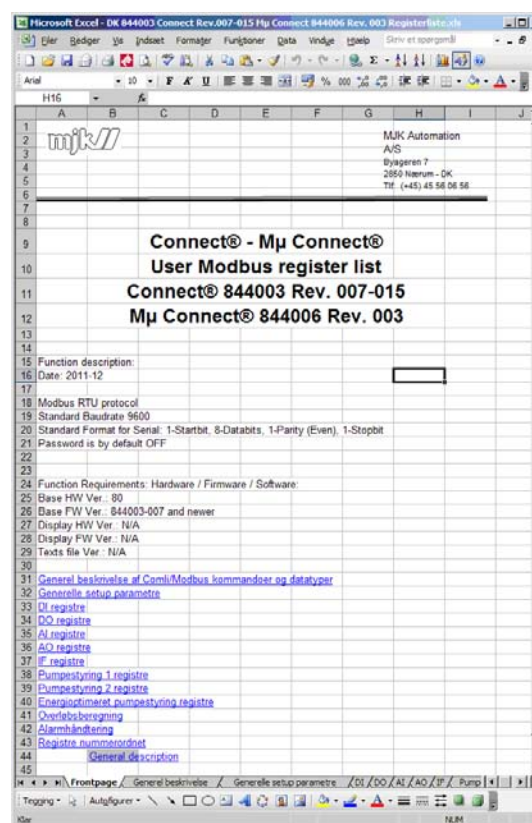
DK 844003

Connect Rev.007-015

Mµ Connect 844006 Rev. 003 Register list

Can be found on the following link:

www.mjk.dk/downloads/downloads-products/downloads-rtu/downloads-connect.html



General Description Of Comli Protocol

Comli	Description
Standard Baudrate	9600
Standard Format for Serial:	1-Startbit, 8-Databits, 1-Parity (Even), 1-Stopbit
Password	By default OFF

Commands

Name	Description
48 - Write registers	Used for write/reset operation data and logs as unsigned word (16 bit)
50 - Read registers	Used for read operation data and logs as unsigned word (16 bit)
51 - Write bit	Used for set/reset of a I/O signal. For example DO and alarm status
52 - Read bit	Used for read status on I/O for example DI, DO, AI high/low limit and IF (internal flags)
60 - Read RAM	Used for read operation data and setup of parameters as unsigned word (16 bit), unsigned double word (32 bit) or Float (32 bit) depends on register type.
61 - Write RAM	Used for write operation data and setup of parameters as unsigned word (16 bit), unsigned double word (32 bit) or Float (32 bit) depends on register type.
73 - Read time/date	Read time and date for Connect
74 - Write time/date	Write time and date for Connect

Data Types

Name	Description
U16	Unsigned word (16 bit)
U32	Unsigned double word (32 bit)
F32	Float (32 bit)
STR20	String with 20 chars

General Description Of Modbus RTU Protocol

Modbus RTU	Description
Standard Baudrate	9600
Standard Format for Serial:	1-Startbit, 8-Databits, 1-Parity (Even), 1-Stopbit
Password	By default OFF

Commands

Name	Description
Holding Register 3/16	Modbus register 3 reads the entire register, and 16 writes to the entire register.

Data Types

Name	Description
U16	Unsigned word (16 bit)
U32	Unsigned double word (32 bit)
F32	Float (32 bit)
STR20	String with 20 chars

General Set-up Parameters

General parameters	Comli commands	Modbus commands	Data type	Adr	Description
Device Type	R Ram - 60	R 3	U16	0	0=Not in use, 3=Connect (0-65535)
Modbus Connect ID	R/W Ram - 60/61	R/W 3/16	U16	1	Connect net id (1-4)
FW version	R Ram - 60	R 3	U32	2	Connect FW version
FW revision	R Ram - 60	R 3	U16	40	Connect FW revision
Connect name	R/W Ram - 60/61	R/W 3/16	STR20	10	Enheds navn
Number of DI	R Ram - 60	R 3	U16	20	
Number of DO	R Ram - 60	R 3	U16	21	
Number of AI	R Ram - 60	R 3	U16	22	
Number of AO	R Ram - 60	R 3	U16	23	
Communication board	R Ram - 60	R 3	U16	24	0=PSTN, 1=GSM, 2=GPRS, 3=RS232, 4=RS485, 5=Bluetooth, 6=No interface, 7=Profibus
Control signals	R Ram - 60	R 3	U16	43	Bit 0=E(error) , Bit 1=Active alarm, Bit 2= , Bit 3= , Bit 4=Low battery, Bit 5=Test call/alarms, Bit 6=Alarm call, Bit 7=Voltage failure, Bit 8=Interlock

Time and date parameters	Comli commands	Modbus commands	Data type	Adr	Description
Time/date in Connect	R Ram - 60	R 3	U32	51	(in seconds since 1 January 1970)
Build time/date	R Ram - 60	R 3	U32	53	
Seconds	R/W Ram - 60/61	R/W 3/16	U16	55	
Minutes	R/W Ram - 60/61	R/W 3/16	U16	56	
Hours	R/W Ram - 60/61	R/W 3/16	U16	57	
Days	R/W Ram - 60/61	R/W 3/16	U16	58	
Months	R/W Ram - 60/61	R/W 3/16	U16	59	
Years	R/W Ram - 60/61	R/W 3/16	U16	60	Time for latest reset (in seconds since 1 January 1970)
Reset time	R Ram - 60	R 3	U32	62	
Shift between daylight saving time/standard time	R/W Ram - 60/61	R/W 3/16	U16	64363	0=no, 1= yes
Time of day shift (day report)	R/W Ram - 60/61	R/W 3/16	U32	64373	Stated in seconds (0-86399)

Communication module parameters	Comli commands	Modbus commands	Data type	Adr	Description
RX-status	R Ram - 60	R 3	U16	120	0=no traffic, 1=Comm.
TX-status	R Ram - 60	R 3	U16	121	0=no traffic, 1=Comm.
Modem status	R Ram - 60	R 3	U16	122	0=idle, 1=reset, 2=connected, 3=connecting, 4=master, 5=interlock wire, 6=alarm call
Connection status	R Ram - 60	R 3	U16	123	0=idle, 1=ready, 2=waiting, 3=connected
IP address	R Ram - 60	R 3	STR16	124	
GSM signal volume	R Ram - 60	R 3	U16	132	0-31 (99=measurement performed)
Interface-type (if radio)	R/W Ram - 60/61	R/W 3/16	U16	64385	0=transparent, 1= TP6000
Flow control	R/W Ram - 60/61	R/W 3/16	U16	64394	0=none, 1=hardware, 2=software
Connection timeout	R/W Ram - 60/61	R/W 3/16	U16	64397	Only for GPRS: reset of modem if no communication during timeout.
ID sensitive	R/W Ram - 60/61	R/W 3/16	U16	64400	0=No, 1= Yes
Master/slave	R/W Ram - 60/61	R/W 3/16	U16	64401	0=master, 1=slave
APN-name	R/W Ram - 60/61	R/W 3/16	STR32	64406	CAPS only
Connect ID no.	R/W Ram - 60/61	R/W 3/16	U16	64426	(1-247)
Connect ID no.	R/W reg. - 50/48		U16	20	(1-247)
SRO type	R/W Ram - 60/61	R/W 3/16	U16	64429	0=IGSS(driver13/75)/IFIX/ System2000, 1=IGSS(driver54), 3=CITECT, 4=System2000(Hreg), 5=VA-ingeniören, 6=Uniview
Init string for modem	R/W Ram - 60/61	R/W 3/16	STR20	64430	lowercase start with @små bogstaver, skal starte med 'at'

Reset commandos	Comli commands	Modbus commands	Data type	Adr	Description
Reload Settings	R/W Ram - 60/61	R/W 3/16	U16	5120	0=No, 1= Yes
WD Reset	R/W Ram - 60/61	R/W 3/16	U16	10350	0=No, 1= Yes

Digital Input, Operating And Set-up Parameters

Operating Param eters	Comli Comm ands	Modbus Comma nds	Data Type	DI 1	DI 2	DI 3	DI 4	DI 5	DI 6	DI 7	DI 8	DI 9	DI 10	DI 11	DI 12	DI 13	DI 14	DI 15	DI 16	Descri ption
IO Status (OCT)	R bit - 52		bit	10	11	12	13	14	15	16	17	20	21	22	23	24	25	26	27	
IO Alarm (OCT)	R/W bit - 52/51		bit	30	31	32	33	34	35	36	37	40	41	42	43	44	45	46	47	
IO Status reg.	R reg. - 50		U16: bit offset	1:0	1:1	1:2	1:3	1:4	1:5	1:6	1:7	2:0	2:1	2:2	2:3	2:4	2:5	2:6	2:7	
IO Status reg.	R Ram - 60	R 3/16	U16: bit offset	17 2:0	17 2:2	17 2:4	17 2:6	17 2:8	17 2:10	17 2:12	17 2:14	17 3:0	17 3:2	17 3:4	17 3:6	17 3:8	17 3:10	17 3:12	17 3:14	
IO Status delay reg.	R Ram - 60	R 3/16	U16: bit offset	17 2:1	17 2:3	17 2:5	17 2:7	17 2:9	17 2:11	17 2:13	17 2:15	17 3:1	17 3:3	17 3:5	17 3:7	17 3:9	17 3:11	17 3:13	17 3:15	
IO Alarm reg.	R/W reg. - 50/48		U16: bit offset	3:0	3:1	3:2	3:3	3:4	3:5	3:6	3:7	4:0	4:1	4:2	4:3	4:4	4:5	4:6	4:7	
IO Alarm reg.	R/W Ram - 60/61	R/W 3/16	U16: bit offset	17 6:0	17 6:2	17 6:4	17 6:6	17 6:8	17 6:10	17 6:12	17 6:14	17 7:0	17 7:2	17 7:4	17 7:6	17 7:8	17 7:10	17 7:12	17 7:14	
Pulses total	R/W reg. - 50/48		U16	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	
Pulses today	R/W reg. - 50/48		U16	12 8	12 9	13 0	13 1	13 2	13 3	13 4	13 5	13 6	13 7	13 8	13 9	14 0	14 1	14 2	14 3	
Pulses Yesterday	R/W reg. - 50/48		U16	20 8	20 9	21 0	21 1	21 2	21 3	21 4	21 5	21 6	21 7	21 8	21 9	22 0	22 1	22 2	22 3	
Time Total (hours)	R/W reg. - 50/48		U16	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	
Time Today (min)	R/W reg. - 50/48		U16	14 4	14 5	14 6	14 7	14 8	14 9	15 0	15 1	15 2	15 3	15 4	15 5	15 6	15 7	15 8	15 9	
Time Yesterday (min)	R/W reg. - 50/48		U16	22 4	22 5	22 6	22 7	22 8	22 9	23 0	23 1	23 2	23 3	23 4	23 5	23 6	23 7	23 8	23 9	
Pulses total	R/W Ram - 60/61	R/W 3/16	U32	10 12	10 22	10 32	10 42	10 52	10 62	10 72	10 82	10 92	11 02	11 12	11 22	11 32	11 42	11 52	11 62	
Pulses Today	R/W Ram - 60/61	R/W 3/16	U16	10 14	10 24	10 34	10 44	10 54	10 64	10 74	10 84	10 94	11 04	11 14	11 24	11 34	11 44	11 54	11 64	
Pulses Yesterday	R/W Ram - 60/61	R/W 3/16	U16	10 15	10 25	10 35	10 45	10 55	10 65	10 75	10 85	10 95	11 05	11 15	11 25	11 35	11 45	11 55	11 65	
Time total (min)	R/W Ram - 60/61	R/W 3/16	U32	10 16	10 26	10 36	10 46	10 56	10 66	10 76	10 86	10 96	11 06	11 16	11 26	11 36	11 46	11 56	11 66	

Set up parameters	Comli Commands	Modbus Commands	Data Type	DI 1	DI 2	DI 3	DI 4	DI 5	DI 6	DI 7	DI 8	DI 9	DI 10	DI 11	DI 12	DI 13	DI 14	DI 15	DI 16	Descri ption
NO/NC	R/W Ram - 60/61	R/W 3/16	U16	60 40 8	60 42 3	60 43 8	60 45 3	60 46 8	60 48 3	60 49 8	60 51 3	60 52 8	60 54 3	60 55 8	60 57 3	60 58 8	60 60 3	60 61 8	60 63 3	0=NO, 1=NC
Delay	R/W Ram - 60/61	R/W 3/16	U16	60 40 9	60 42 4	60 43 9	60 45 4	60 46 9	60 48 4	60 49 9	60 51 4	60 52 9	60 54 4	60 55 9	60 57 4	60 58 9	60 60 4	60 61 9	60 63 4	(0- 9999 second s)
Call On Alarm	R/W Ram - 60/61	R/W 3/16	U16	60 41 2	60 42 7	60 44 2	60 45 7	60 47 2	60 48 7	60 50 2	60 51 7	60 53 2	60 54 7	60 56 2	60 57 7	60 59 2	60 60 7	60 62 2	60 63 7	0=No, 1=Yes
Signal Name	R/W Ram - 60/61	R/W 3/16	STR 20	60 41 3	60 42 8	60 44 3	60 45 8	60 47 3	60 48 8	60 50 3	60 51 8	60 53 3	60 54 8	60 56 3	60 57 8	60 59 3	60 60 8	60 62 3	60 63 8	

Digital Input, data logger

Time difference logs	Comli Commands	Modbus Commands	Data Type	DI 1	DI 2	DI 3	DI 4	DI 5	DI 6	DI 7	DI 8	DI 9	DI 10	DI 11	DI 12	DI 13	DI 14	DI 15	DI 16	Description
Pulse start adr.	R/W reg. - 50/48		U16	1728	1752	1776	1800	1824	1848	1872	1896	1920	1944	1968	1992					
Pulse end adr.	R/W reg. - 50/48		U16	1751	1775	1799	1823	1847	1871	1895	1919	1943	1967	1991	2015					
Time start adr.	R/W reg. - 50/48		U16	2016	2040	2064	2088	2112	2136	2160	2184	2208	2232	2256	2280					
Time end adr.	R/W reg. - 50/48		U16	2039	2063	2087	2111	2135	2159	2183	2207	2231	2255	2279	2303					

Digital Output, Operating And Set Up Parameters

Operating Parameters	Comli Commands	Modbus Commands	Data Type	DO 1	DO 2	DO 3	DO 4	DO 5	DO 6	DO 7	DO 8	Description
IO Status (OCT)	R/W bit - 52/51		bit	0	1	2	3	4	5	6	7	
IO Status reg.	R reg. - 50		U16:bit offset	0:0	0:1	0:2	0:3	0:4	0:5	0:6	0:7	
IO Status reg.	R Ram - 60	R 3/16	U16:bit offset	168:0	168:2	168:4	168:6	168:8	168:10	168:12	168:14	
IO Set	R/W Ram - 60/61	RW 3/16	U16:bit offset	168:0	168:1	168:2	168:3	168:4	168:5	168:6	168:7	
IO Status delay reg.	R Ram - 60	R 3/16	U16:bit offset	168:1	168:3	168:5	168:7	168:9	168:11	168:13	168:15	
Pulser total	R/W Ram - 60/61	RW 3/16	U32	692	702	712	722	732	742	752	762	
Pulser i dag	R/W Ram - 60/61	RW 3/16	U16	694	704	714	724	734	744	754	764	
Pulser i går	R/W Ram - 60/61	RW 3/16	U16	695	705	715	725	735	745	755	765	
Tid total (sek)	R/W Ram - 60/61	RW 3/16	U32	696	706	716	726	736	746	756	766	
Tid i dag (sek)	R/W Ram - 60/61	RW 3/16	U32	698	708	718	728	738	748	758	768	
Tid i går (sek)	R/W Ram - 60/61	RW 3/16	U32	700	710	720	730	740	750	760	770	

Set up parameters	Comli Commands	Modbus Commands	Data Type	DO 1	DO 2	DO 3	DO 4	DO 5	DO 6	DO 7	DO 8	Description
NO/NC	R/W Ram - 60/61	RW 3/16	U16	60888	60908	60928	60948	60968	60988	61008	61028	0=NO, 1=NC
Constant/Time	R/W Ram - 60/61	RW 3/16	U16	60889	60909	60929	60949	60969	60989	61009	61029	0=Constant, 1=Time
Delay	R/W Ram - 60/61	RW 3/16	U16	60892	60912	60932	60952	60972	60992	61012	61032	(0-9999 seconds)
On/Operating-time	R/W Ram - 60/61	RW 3/16	U16	60895	60915	60935	60955	60975	60995	61015	61035	(0-9999 seconds)
Signalname	R/W Ram - 60/61	RW 3/16	STR20	60898	60918	60938	60958	60978	60998	61018	61038	

Analogue Input, Operating And Set Up Parameters

Operating Parameters	Comli Commands	Modbus Commands	Data Type	AI 1	AI 2	AI 3	AI 4	AI 5	AI 6	Description
Status High Limit	R bit - 52		bit	50	51	52	53			0=off, 1=on
Status High Limit reg.	R reg. - 50		U16:bit offset	5:0	5:1	5:2	5:3			0=off, 1=on
Status High Limit reg.	R Ram - 60	R 3/16	U16:bit offset	180:0	180:2	180:4	180:6	180:8	180:10	0=off, 1=on
Status High Limit delay reg.	R Ram - 60	R 3/16	U16:bit offset	180:1	180:3	180:5	180:7	180:9	180:11	0=No, 1=going on
Alarm High Limit	R/W bit - 52/51		bit	60	61	62	63			0=off, 1=on
Alarm High Limit reg.	R reg. - 50		U16:bit offset	6:0	6:1	6:2	6:3			0=off, 1=on
Alarm High Limit reg.	R Ram - 60	R 3/16	U16:bit offset	182:0	182:2	182:4	182:6	182:8	182:10	0=off, 1=on
Status Low Limit	R bit - 52		bit	54	55	56	57			0=off, 1=on
Alarm Low Limit	R/W bit - 52/51		bit	64	65	66	67			0=off, 1=on
Status Low Limit reg.	R Ram - 60	R 3/16	U16:bit offset	184:0	184:2	184:4	184:6	184:08	184:10	0=off, 1=on
Status Low Limit delay reg.	R Ram - 60	R 3/16	U16:bit offset	184:1	184:3	184:5	184:7	184:9	184:11	0=No, 1=going on
Alarm Low Limit	R/W bit - 52/51		bit	64	65	66	67			0=off, 1=on
Alarm Low Limit reg.	R reg. - 50		U16:bit offset	6:4	6:5	6:6	6:7			0=off, 1=on
Alarm Low Limit reg.	R Ram - 60	R 3/16	U16:bit offset	186:0	186:2	186:4	186:6	186:8	186:10	0=off, 1=on
Scaled value	R reg. - 50		U16	16	17	18	19	21	15	
Scaled value	R Ram - 60	R 3/16	F32	264	268	272	276	280	284	
High Limit pulse total	R/W reg. - 50/48		U16	80	81	82	83			
High Limit pulse today	R/W reg. - 50/48		U16	160	161	162	163			
High Limit pulse yesterday	R/W reg. - 50/48		U16	240	241	242	243			
High Limit time total (hours)	R/W reg. - 50/48		U16	88	89	90	91			
High Limit time today (minutes)	R/W reg. - 50/48		U16	168	169	170	171			
High Limit time yesterday (minutes)	R/W reg. - 50/48		U16	248	249	250	251			
High Limit pulse total	R/W Ram - 60/61	RW 3/16	U32	1332	1351	1370	1389	1408	1427	
High Limit pulse	R/W Ram -	RW 3/16	U16	133	135	137	139	141	142	

today	60/61			4	3	2	1	0	9
High Limit pulse yesterday	R/W Ram - 60/61	RW 3/16	U16	1335	1354	1373	1392	1411	1430
High Limit time total (sec)	R/W Ram - 60/61	RW 3/16	U32	1336	1355	1374	1393	1412	1431
High Limit time today (sec)	R/W Ram - 60/61	RW 3/16	U32	1338	1357	1376	1395	1414	1433
High Limit time yesterday (sec)	R/W Ram - 60/61	RW 3/16	U32	1340	1359	1378	1397	1416	1435
Low limit pulse total	R/W reg. - 50/48		U16	84	85	86	87		
Low limit pulse today	R/W reg. - 50/48		U16	164	165	166	167		
Low limit pulse yesterday	R/W reg. - 50/48		U16	244	245	246	247		
Low limit time total (timer)	R/W reg. - 50/48		U16	92	93	94	95		
Low limit time today (min)	R/W reg. - 50/48		U16	172	173	174	175		
Low limit time yesterday (min)	R/W reg. - 50/48		U16	252	253	254	255		
Low limit pulse total	R/W Ram - 60/61	RW 3/16	U32	1636	1646	1656	1666	1676	1686
Low limit pulse today	R/W Ram - 60/61	RW 3/16	U16	1638	1648	1658	1668	1678	1688
Low limit pulse yesterday	R/W Ram - 60/61	RW 3/16	U16	1639	1649	1659	1669	1679	1689
Low limit time total (sec)	R/W Ram - 60/61	RW 3/16	U32	1640	1650	1660	1670	1680	1690
Low limit time today (sec)	R/W Ram - 60/61	RW 3/16	U32	1642	1652	1662	1672	1682	1692
Low limit time yesterday (sec)	R/W Ram - 60/61	RW 3/16	U32	1644	1654	1664	1674	1684	1694
Max scaled value (total)	R/W reg. - 50/48		U16	120	121	122	123		
Max scaled value (today)	R/W reg. - 50/48		U16	200	201	202	203		
Max scaled value (yesterday)	R/W reg. - 50/48		U16	280	281	282	283		
Max scaled value (total)	R/W Ram - 60/61	RW 3/16	F32	1342	1361	1380	1399	1418	1437
Max scaled value (today)	R/W Ram - 60/61	RW 3/16	F32	1345	1364	1383	1402	1421	1440
Max scaled value (yesterday)	R/W Ram - 60/61	RW 3/16	F32	1348	1367	1386	1405	1424	1443

Set up parameters	Comli Commands	Modbus Commands	Data Type	AI 1	AI 2	AI 3	AI 4	AI 5	AI 6	Description
4 mA scaling	R/W Ram - 60/61	RW 3/16	F32	590 02	590 90	591 78	592 66	593 54	594 42	
20 mA scaling	R/W Ram - 60/61	RW 3/16	F32	590 08	590 96	591 84	592 72	593 60	594 48	
Low Limit	R/W Ram - 60/61	RW 3/16	F32	590 17	591 05	591 93	592 81	593 69	594 57	
High Limit	R/W Ram - 60/61	RW 3/16	F32	590 23	591 11	591 99	592 87	593 75	594 63	
Average	R/W Ram - 60/61	RW 3/16	U16	590 29	591 17	592 05	592 93	593 81	594 69	(0-60 seconds)
High Limit in Use	R/W Ram - 60/61	RW 3/16	U16	590 32	591 20	592 08	592 96	593 84	594 72	0=No, 1=Yes
High Limit	R/W Ram - 60/61	RW 3/16	F32	590 33	591 21	592 09	592 97	593 85	594 73	
High Limit Delay	R/W Ram - 60/61	RW 3/16	U16	590 39	591 27	592 15	593 03	593 91	594 79	(0-64800 seconds)
Call on High Limit	R/W Ram - 60/61	RW 3/16	U16	590 42	591 30	592 18	593 06	593 94	594 82	0=No, 1=Yes
Low Limit in use	R/W Ram - 60/61	RW 3/16	U16	590 43	591 31	592 19	593 07	593 95	594 83	0=No, 1=Yes
Low Limit alarm	R/W Ram - 60/61	RW 3/16	F32	590 44	591 32	592 20	593 08	593 96	594 84	
Low Limit alarm delay	R/W Ram - 60/61	RW 3/16	F16	590 50	591 38	592 26	593 14	594 02	594 90	(0-64800 seconds)
Call on Low Limit alarm	R/W Ram - 60/61	RW 3/16	U16	590 53	591 41	592 29	593 17	594 05	594 93	0=No, 1=Yes
Signal name for AI	R/W Ram - 60/61	RW 3/16	STR20	590 58	591 46	592 34	593 22	594 10	594 98	
Signal name for High Limit alarm	R/W Ram - 60/61	RW 3/16	STR20	590 68	591 56	592 44	593 32	594 20	595 08	
Signal name for Low Limit alarm	R/W Ram - 60/61	RW 3/16	STR20	590 78	591 66	592 54	593 42	594 30	595 18	

Analogue Input, Data Logger

5 Min. logs	Comli Commands	Modbus Commands	Data Type	AI 1	AI 2	AI 3	AI 4	AI 5	AI 6	Description
5 min. log start adr. scaled value	R/W reg. - 50/48		U16	288	576	864	1152	1440		
5 min. log slut adr. scaled value	R/W reg. - 50/48		U16	575	863	1151	1439	1727		
5 min. log start adr. scaled value	R Datalog - 75		U16	1000	1288	1576	1864	2152	2440	
5 min. log slut adr. scaled value	R Datalog - 75		U16	1287	1575	1863	2151	2439	2727	

Extended log	Comli Commands	Modbus Commands	Data Type	AI 1	AI 2	AI 3	AI 4	AI 5	AI 6	Description
Extended log start adr.scaled value	R/W reg. - 50/48		U16	13312	17408	21504	25600	29696	33792	(for IGSS)
Extended log End adr.scaled value	R/W reg. - 50/48		U16	16191	20287	24383	28479	32575	36671	(for IGSS)

Time Difference logs	Comli Commands	Modbus Commands	Data Type	AI 1	AI 2	AI 3	AI 4	AI 5	AI 6	Description
Pulse High Limit start adr.	R/W reg. - 50/48		U16	2304	2328	2352	2376			
Pulse High Limit slut adr.	R/W reg. - 50/48		U16	2327	2351	2375	2399			
Time High Limit start adr.	R/W reg. - 50/48		U16	2496	2520	2544	2568			
Time High Limit slut adr.	R/W reg. - 50/48		U16	2519	2543	2567	2591			
Pulse Low Limit start adr.	R/W reg. - 50/48		U16	2400	2424	2448	2472			
Pulse Low Limit end adr.	R/W reg. - 50/48		U16	2423	2447	2471	2495			
Time Low Limit start adr.	R/W reg. - 50/48		U16	2592	2616	2640	2664			
Time Low Limit end adr.	R/W reg. - 50/48		U16	2615	2639	2663	2687			

Analogue Output, Operating and Set Up Parameters

Operating parameters	Comli Commandos	Modbus Commandos	Modbus Commandos	AO 1	Description
AO set point	R/W Ram - 60/61	RW 3/16	F32	628	

Set up parameters	Comli Commandos	Modbus Commandos	Modbus Commandos	AO 1	Description
4 mA scaling	R/W Ram - 60/61	RW 3/16	F32	61530	
20 mA scaling	R/W Ram - 60/61	RW 3/16	F32	61536	
Low Limit	R/W Ram - 60/61	RW 3/16	F32	61545	
High Limit	R/W Ram - 60/61	RW 3/16	F32	61551	
Signal name	R/W Ram - 60/61	RW 3/16	STR20	61560	

Internal Flag, Operating and Set Up Parameters

Drift parameters	Comli Commandos	Modbus Commandos	Data Type	IF 1	IF 2	IF 3	IF 4	IF 5	IF 6	IF 7	IF 8	IF 9	IF 10	IF 11	IF 12	IF 13	IF 14	IF 15	IF 16	Description
IO Status (OCT)	R bit - 52		bit	13 0	13 1	13 2	13 3	13 4	13 5	13 6	13 7									
IO Alarm (OCT)	R/W bit - 52/51		bit	14 0	14 1	14 2	14 3	14 4	14 5	14 6	14 7									
IO Status reg.	R Ram - 60	R 3/16	U16: bit offset	18 8:0	18 8:2	18 8:4	18 8:6	18 8:8	18 8:10	18 8:12	18 8:14	18 9:0	18 9:2	18 9:4	18 9:6	18 9:8	18 9:10	18 9:12	18 9:14	
IO Alarm reg.	R/W Ram - 60/61	R/W 3/16	U16: bit offset	19 0:0	19 0:2	19 0:4	19 0:6	19 0:8	19 0:10	19 0:12	19 0:14	19 1:0	19 1:2	19 1:4	19 1:6	19 1:8	19 1:10	19 1:12	19 1:14	
Pulses total	R/W Ram - 60/61	RW 3/16	U32	17 96	18 06	18 16	18 26	18 36	18 46	18 56	18 66	18 76	18 86	18 96	19 06	19 16	19 26	19 36	19 46	
Pulses Total	R/W Ram - 60/61	RW 3/16	U16	17 98	18 08	18 18	18 28	18 38	18 48	18 58	18 68	18 78	18 88	18 98	19 08	19 18	19 28	19 38	19 48	
Pulses Yesterday	R/W Ram - 60/61	RW 3/16	U16	17 99	18 09	18 19	18 29	18 39	18 49	18 59	18 69	18 79	18 89	18 99	19 09	19 19	19 29	19 39	19 49	
Time total (secs.)	R/W Ram - 60/61	RW 3/16	U32	18 00	18 10	18 20	18 30	18 40	18 50	18 60	18 70	18 80	18 90	19 00	19 10	19 20	19 30	19 40	19 50	
Time today (secs.)	R/W Ram - 60/61	RW 3/16	U32	18 02	18 12	18 22	18 32	18 42	18 52	18 62	18 72	18 82	18 92	19 02	19 12	19 22	19 32	19 42	19 52	
Time Yesterday (secs.)	R/W Ram - 60/61	RW 3/16	U32	18 04	18 14	18 24	18 34	18 44	18 54	18 64	18 74	18 84	18 94	19 04	19 14	19 24	19 34	19 44	19 54	

Set up parameters	Comli Commandos	Modbus Commandos	Data Type	IF 1	IF 2	IF 3	IF 4	IF 5	IF 6	IF 7	IF 8	IF 9	IF 10	IF 11	IF 12	IF 13	IF 14	IF 15	IF 16	Description
Output Type	R/W Ram - 60/61	RW 3/16	U16	63 49 8	63 54 3	63 58 8	63 63 3	63 67 8	63 72 3	63 76 8	63 81 3	63 85 8	63 90 3	63 94 8	63 99 3	64 03 8	64 08 3	64 12 8	64 17 3	0=N ot In Use, 1=D O, 2=IF
Output no.	R/W Ram - 60/61	RW 3/16	U16	63 49 9	63 54 4	63 58 9	63 63 4	63 67 9	63 72 4	63 76 9	63 81 4	63 85 9	63 90 4	63 94 9	63 99 4	64 03 9	64 08 4	64 12 9	64 17 4	DO=1-8, IF=1-16
Function	R/W Ram - 60/61	RW 3/16	U16	63 50 2	63 54 7	63 59 2	63 63 7	63 68 2	63 72 7	63 77 2	63 81 7	63 86 2	63 90 7	63 95 2	63 99 7	64 04 2	64 08 7	64 13 2	64 17 7	

0=AND, 1=NAND, 2=OR, 3=NOR, 4=Set/reset, 5=Preset cnt, 6=time, 7=Reset cnt, 8= Integrator

Operand 1 type	R/W Ram - 60/61	RW 3/16	U16	63 50 3	63 54 8	63 59 3	63 63 8	63 68 3	63 72 8	63 77 3	63 81 8	63 86 3	63 90 8	63 95 3	63 99 8	64 04 3	64 08 8	64 13 3	64 17 8	
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NOT USED = 0, DI = 1, DO = 2, AI_HIGH = 3, AI_LOW = 4, INTERNAL_FLAG = 5, DI_PULSES = 6, DI_TIME = 7, DO_PULSES = 8, DO_TIME = 9, AI_VALUE = 10, AI_HIGH_PULSES = 11, AI_HIGH_TIME = 12, AI_LOW_PULSES = 13, AI_LOW_TIME = 14, INTERNAL_FLAG_PULSES = 15, INTERNAL_FLAG_TIME = 16, AO_VALUE = 17, INSTRUMENTNET_PROCESS_VALUE = 18, AUTO_RESET=19, VAI_HIGH = 20, VAI_LOW = 21, VAI_VALUE = 22, VAI_HIGH_PULSES = 23, VAI_HIGH_TIME = 24, VAI_LOW_PULSES = 25, VAI_LOW_TIME = 26, TYPE_OTHER = 27, KONTROLORD = 28.

Operand 1 no	R/W Ram - 60/61	RW 3/16	U16	63 50 4	63 54 9	63 59 4	63 63 9	63 68 4	63 72 9	63 77 4	63 81 9	63 86 4	63 90 9	63 95 4	63 99 9	64 04 4	64 08 9	64 13 4	64 17 9	DI=1 -16, DO= 1-8, AIH =1- 6, AIL= 1-6, IF=1 -16
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Operand 2 type	R/W Ram - 60/61	RW 3/16	U16	63 50 7	63 55 2	63 59 7	63 64 2	63 68 7	63 73 2	63 77 7	63 82 2	63 86 7	63 91 2	63 95 7	64 00 2	64 04 7	64 09 2	64 13 7	64 18 2	
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NOT USED = 0, DI = 1, DO = 2, AI_HIGH = 3, AI_LOW = 4, INTERNAL_FLAG = 5, DI_PULSES = 6, DI_TIME = 7, DO_PULSES = 8, DO_TIME = 9, AI_VALUE = 10, AI_HIGH_PULSES = 11, AI_HIGH_TIME = 12, AI_LOW_PULSES = 13, AI_LOW_TIME = 14, INTERNAL_FLAG_PULSES = 15, INTERNAL_FLAG_TIME = 16, AO_VALUE = 17, INSTRUMENTNET_PROCESS_VALUE = 18, AUTO_RESET=19, VAI_HIGH = 20, VAI_LOW = 21, VAI_VALUE = 22, VAI_HIGH_PULSES = 23, VAI_HIGH_TIME = 24, VAI_LOW_PULSES = 25, VAI_LOW_TIME = 26, TYPE_OTHER = 27, KONTROLORD = 28.

Operand 2 nr	R/W Ram - 60/61	RW 3/16	U16	63 50 8	63 55 3	63 59 8	63 64 3	63 68 8	63 73 3	63 77 8	63 82 3	63 86 8	63 91 3	63 95 8	64 00 3	64 04 8	64 09 3	64 13 8	64 18 3	
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DI=1-16, DO=1-8, AIH=1-6, AIL=1-6, IF=1-16

Delay	R/W Ram - 60/61	RW 3/16	U16	63 51 1	63 55 6	63 60 1	63 64 6	63 69 1	63 73 6	63 78 1	63 82 6	63 87 1	63 91 6	63 96 1	64 00 6	64 05 1	64 09 6	64 14 1	64 18 6	(0- 6480 0 seco nds)
Forvalgst æller Value	R/W Ram - 60/61	RW 3/16	U16	63 51 4	63 55 9	63 60 4	63 64 9	63 69 4	63 73 9	63 78 4	63 82 9	63 87 4	63 91 9	63 96 4	64 00 9	64 05 4	64 09 9	64 14 4	64 18 9	(0- 6000 0)
Forvalgst æller On- time	R/W Ram - 60/61	RW 3/16	U16	63 51 7	63 56 2	63 60 7	63 65 2	63 69 7	63 74 2	63 78 7	63 83 2	63 87 7	63 92 2	63 96 7	64 01 2	64 05 7	64 10 2	64 14 7	64 19 2	(0- 6480 0 seco nds)
Start time (sec.)	R/W Ram - 60/61	RW 3/16	U32	63 52 0	63 56 5	63 61 0	63 65 5	63 70 0	63 74 5	63 79 0	63 83 5	63 88 0	63 92 5	63 97 0	64 01 5	64 06 0	64 10 5	64 15 0	64 19 5	(863 99 seco nds)
Stop time (sec.)	R/W Ram - 60/61	RW 3/16	U32	63 52 6	63 57 1	63 61 6	63 66 1	63 70 6	63 75 1	63 79 6	63 84 1	63 88 6	63 93 1	63 97 6	64 02 1	64 06 6	64 11 1	64 15 6	64 20 1	(863 99 seco nds)

Alarm Call	R/W Ram - 60/61	RW 3/16	U16	63 53 2	63 57 7	63 62 2	63 66 7	63 71 2	63 75 7	63 80 2	63 84 7	63 89 2	63 93 7	63 98 2	64 02 7	64 07 2	64 11 7	64 16 2	64 20 7	0=N o, 1=Y es
Signal name	R/W Ram - 60/61	RW 3/16	U16	63 53 3	63 57 8	63 62 3	63 66 8	63 71 3	63 75 8	63 80 3	63 84 8	63 89 3	63 93 8	63 98 3	64 02 8	64 07 3	64 11 8	64 16 3	64 20 8	

Pump Control 1, Operating And Set Up Parameters

Operating parameters	Comli Commands	Modbus Commands	Data Type	P1	P2	P3	P4	P5	P6	P7	P8	Description
IO status	R bit - 52		bit	70	71	72	73	74	75	76	77	
Starts Total	R/W reg. - 50/48		U16	96	97	98	99					
Starts today	R/W reg. - 50/48		U16	176	177	178	179					
Starts Yesterday	R/W reg. - 50/48		U16	256	257	258	259					
Total Operating Time	R/W reg. - 50/48		U16	100	101	102	103					
Operating Time Today	R/W reg. - 50/48		U16	180	181	182	183					
Operating Time Yesterday	R/W reg. - 50/48		U16	260	261	262	263					
Total Pumped Volume	R/W reg. - 50/48		U16	105	106	107	108					
Pumped Volume Today	R/W reg. - 50/48		U16	185	186	187	188					
Pumped Volume Yesterday	R/W reg. - 50/48		U16	265	266	267	268					
Pumping Capacity	R/W reg. - 50/48		U16	112	113	114	115					
Status-Word for Pump	R/W reg. - 50/48		U16	304 8	304 9	305 0	305 1					
IO status register	R Ram - 60	R 3/16	U16:bit offset	192 :0	192 :1	192 :2	192 :3	192 :4	192 :5	192 :6	192 :7	
Starts Total	R/W Ram - 60/61	RW 3/16	U32	344	367	390	413	436	459	482	505	
Starts Today	R/W Ram - 60/61	RW 3/16	U16	346	369	392	415	438	461	484	507	
Starts Yesterday	R/W Ram - 60/61	RW 3/16	U16	347	370	393	416	439	462	485	508	
Operating Time Total	R/W Ram - 60/61	RW 3/16	U32	348	371	394	417	440	463	486	509	
Operating Time Today	R/W Ram - 60/61	RW 3/16	U32	350	373	396	419	442	465	488	511	
Operating Time Yesterday	R/W Ram - 60/61	RW 3/16	U32	352	375	398	421	444	467	490	513	
Pumped Volume Total	R/W Ram - 60/61	RW 3/16	F32	354	377	400	423	446	469	492	515	
Pumped Volume Today	R/W Ram - 60/61	RW 3/16	F32	358	381	404	427	450	473	496	519	
Pumped Volume Yesterday	R/W Ram - 60/61	RW 3/16	F32	360	383	406	429	452	475	498	521	
Pumped Volume Total sum	R/W Ram - 60/61	RW 3/16	F32	528								
Pumped Volume sum Today	R/W Ram - 60/61	RW 3/16	F32	532								

Pumped Volume sum Yesterday	R/W Ram - 60/61	RW 3/16	F32	534								
Current flow	R/W Ram - 60/61	RW 3/16	F32	536								
Pump Capacity	R/W Ram - 60/61	RW 3/16	F32	362	385	408	431	454	477	500	523	
Control Word for pump	R/W Ram - 60/61	RW 3/16	U16	366	389	412	435	458	481	504	527	
Status register for Control Word	R Ram - 60	R 3/16	U16:bit offset	167 :0	167 :1	167 :2	167 :3	167 :4	167 :5	167 :6	167 :7	
Forced Start of pump	R/W Ram - 60/61	RW 3/16	U16	140	143	146	149	152	155	158	161	
Forced stop of pump	R/W Ram - 60/61	RW 3/16	U16	141	144	147	150	153	156	159	162	
Block Pump	R/W Ram - 60/61	RW 3/16	U16	142	145	148	151	154	157	160	163	

Set up parameters	Comli Commands	Modbus Commands	Data type	P1	P2	P3	P4	P5	P6	P7	P8	Description
Pump Control In Use/ Not In Use	R/W Ram - 60/61	RW 3/16	U16	625 05								0=No, 1=Yes
Pump Control maximum pumps	R/W Ram - 60/61	RW 3/16	U16									
DO for Pumps	R/W Ram - 60/61	RW 3/16	U16	622 41	622 74	623 07	623 40	623 73	624 06	624 39	624 72	
Alternation in Use	R/W Ram - 60/61	RW 3/16	U16	622 44	622 77	623 10	623 43	623 76	624 09	624 42	624 75	0=No, 1=Yes
Start Level	R/W reg. - 50/48		U16	24	25	26	27					
Stop Level	R/W reg. - 50/48		U16	28	29	30	31					
Start Level	R/W Ram - 60/61	RW 3/16	F32	622 45	622 78	623 11	623 44	623 77	624 10	624 43	624 76	
Stop Level	R/W Ram - 60/61	RW 3/16	F32	622 51	622 84	623 17	623 50	623 83	624 16	624 49	624 82	
Delay	R/W Ram - 60/61	RW 3/16	F16	622 57	622 90	623 23	623 56	623 89	624 22	624 55	624 88	

Control Word parameters	Comli Commands	Modbus Commands	Data type	P1	P2	P3	P4	P5	P6	P7	P8	Description
Control Word In Use/ Not in Use	R/W Ram - 60/61	RW 3/16	U16	560 01								
Control Word re-entries	R/W Ram - 60/61	RW 3/16	U16	560 00								
Operating signal type	R/W Ram - 60/61	RW 3/16	U16	560 05	560 41	560 77	561 13	561 49	561 85	562 21	562 57	
Operation Sign no.	R/W Ram - 60/61	RW 3/16	U16	560 06	560 42	560 78	561 14	561 50	561 86	562 22	562 58	
Operation Signal Delay	R/W Ram - 60/61	RW 3/16	U16	560 07	560 43	560 79	561 15	561 51	561 87	562 23	562 59	
Amount of Alarm-indicators	R/W Ram - 60/61	RW 3/16	U16	560 02	560 38	560 74	561 10	561 46	561 82	562 18	562 54	
Alarm indicator 1 signal type	R/W Ram - 60/61	RW 3/16	U16	560 10	560 46	560 82	561 18	561 54	561 90	562 26	562 62	
Alarm indicator 1 signal no.	R/W Ram - 60/61	RW 3/16	U16	560 11	560 47	560 83	561 19	561 55	561 91	562 27	562 63	
Alarm indicator 2 signal type	R/W Ram - 60/61	RW 3/16	U16	560 12	560 48	560 84	561 20	561 56	561 92	562 28	562 64	
Alarm indicator 2 signal no.	R/W Ram - 60/61	RW 3/16	U16	560 13	560 49	560 85	561 21	561 57	561 93	562 29	562 65	
Alarm indicator 3 signal type	R/W Ram - 60/61	RW 3/16	U16	560 14	560 50	560 86	561 22	561 58	561 94	562 30	562 66	
Alarm indicator 3 signal no.	R/W Ram - 60/61	RW 3/16	U16	560 15	560 51	560 87	561 23	561 59	561 95	562 31	562 67	
Alarm indicator 4 signal type	R/W Ram - 60/61	RW 3/16	U16	560 16	560 52	560 88	561 24	561 60	561 96	562 32	562 68	
Alarm indicator 4 signal no.	R/W Ram - 60/61	RW 3/16	U16	560 17	560 53	560 89	561 25	561 61	561 97	562 33	562 69	
Alarm indicator 5 signal type	R/W Ram - 60/61	RW 3/16	U16	560 18	560 54	560 90	561 26	561 62	561 98	562 34	562 70	
Alarm indicator 5 signal no.	R/W Ram - 60/61	RW 3/16	U16	560 19	560 55	560 91	561 27	561 63	561 99	562 35	562 71	
Alarm indicator 6 signal type	R/W Ram - 60/61	RW 3/16	U16	560 20	560 56	560 92	561 28	561 64	562 00	562 36	562 72	
Alarm indicator 6 signal no.	R/W Ram - 60/61	RW 3/16	U16	560 21	560 57	560 93	561 29	561 65	562 01	562 37	562 73	
Alarm indicator 7 signal type	R/W Ram - 60/61	RW 3/16	U16	560 22	560 58	560 94	561 30	561 66	562 02	562 38	562 74	
Alarm indicator 7 signal no.	R/W Ram - 60/61	RW 3/16	U16	560 23	560 59	560 95	561 31	561 67	562 03	562 39	562 75	
Alarm indicator 8 signal type	R/W Ram - 60/61	RW 3/16	U16	560 24	560 60	560 96	561 32	561 68	562 04	562 40	562 76	
Alarm indicator 8 signal no.	R/W Ram - 60/61	RW 3/16	U16	560 25	560 61	560 97	561 33	561 69	562 05	562 41	562 77	
Alarm indicator 9 signal type	R/W Ram - 60/61	RW 3/16	U16	560 26	560 62	560 98	561 34	561 70	562 06	562 42	562 78	
Alarm indicator 9 signal no.	R/W Ram - 60/61	RW 3/16	U16	560 27	560 63	560 99	561 35	561 71	562 07	562 43	562 79	
Alarm indicator 10 signal type	R/W Ram - 60/61	RW 3/16	U16	560 28	560 64	561 00	561 36	561 72	562 08	562 44	562 80	
Alarm indicator 10 signal no.	R/W Ram - 60/61	RW 3/16	U16	560 29	560 65	561 01	561 37	561 73	562 09	562 45	562 81	

Set point displacement set up	Comli Commands	Modbus Commands	Data type	P1	P2	P3	P4	P5	P6	P7	P8	Description
Set Point Displacement in Use	R/W Ram - 60/61	RW 3/16	U16	575 02								0=No, 1=Yes
Activate Set Point Displacement	R/W Ram - 60/61	RW 3/16	U16	575 01								0=No, 1=Yes
Set Point Displacement (offset cm)	R/W Ram - 60/61	RW 3/16	F32	575 03								
Duration (minutes)	R/W Ram - 60/61	RW 3/16	U16	575 09								
"Displacement on Time" In Use	R/W Ram - 60/61	RW 3/16	U16	575 12								0=No, 1=Yes
Start Time	R/W Ram - 60/61	RW 3/16	U32	575 13								
Stop time	R/W Ram - 60/61	RW 3/16	U32	575 19								

Depth Pumping set up	Comli Commands	Modbus Commands	Data type	P1	P2	P3	P4	P5	P6	P7	P8	Description
Depth Pumping In Use	R/W Ram - 60/61	RW 3/16	U16	575 25								0=No, 1=Yes
Pump for Depth Pumping	R/W Ram - 60/61	RW 3/16	U16	575 26								
Starts between Depth Pumping	R/W Ram - 60/61	RW 3/16	U16	575 27								(0-9999)
Time between Depth Pumping	R/W Ram - 60/61	RW 3/16	U16	575 30								(0-999)
Time between Depth Pumping in Use	R/W Ram - 60/61	RW 3/16	U32	575 33								
Duration of depth Pumping (sec)	R/W Ram - 60/61	RW 3/16	U32	575 40								(0-300 sec)
Depthpumping time	R/W Ram - 60/61	RW 3/16	U32	575 34								

Flow calculation set up	Comli Commands	Modbus Commands	Data type	P1	P2	P3	P4	P5	P6	P7	P8	Description
Calculation in use	R/W Ram - 60/61	RW 3/16	U16	575 46								0=No, 1=Yes
Start Level for Volume	R/W Ram - 60/61	RW 3/16	U32	575 49								
Stop Level for Volume	R/W Ram - 60/61	RW 3/16	U32	575 55								
Volume Size	R/W Ram - 60/61	RW 3/16	U32	575 61								

Pump Control 2, Operating And Set Up Parameters

Drift parameters	Comli commands	Modbus commands	Data type	P1	P2	P3	P4	P5	P6	P7	P8	Description
Status	R/W Ram - 60/61	RW 3/16	U16	550	561	572	583	594	605	616	627	0=stopped, 1=Operating
Starts Total	R/W Ram - 60/61	RW 3/16	U32	540	551	562	573	584	595	606	617	
Starts Today	R/W Ram - 60/61	RW 3/16	U16	542	553	564	575	586	597	608	619	
Starter Yesterday	R/W Ram - 60/61	RW 3/16	U16	543	554	565	576	587	598	609	620	
Operating time Total	R/W Ram - 60/61	RW 3/16	U32	544	555	566	577	588	599	610	621	
Operating time Today	R/W Ram - 60/61	RW 3/16	U32	546	557	568	579	590	601	612	623	
Operating time Yesterday	R/W Ram - 60/61	RW 3/16	U32	548	559	570	581	592	603	614	625	

Set up parameters	Comli commands	Modbus commands	Data type	P1	P2	P3	P4	P5	P6	P7	P8	Description
DO for Pump	R/W Ram - 60/61	RW 3/16	U16	626 38	626 71	627 04	627 37	627 70	628 03	628 36	628 69	0=No, 1=Yes
Alternation in use	R/W Ram - 60/61	RW 3/16	U16	626 41	626 74	627 07	627 40	627 73	628 06	628 39	628 72	
Start Level	R/W Ram - 60/61	RW 3/16	F32	626 42	626 75	627 08	627 41	627 74	628 07	628 40	628 73	
Stop Level	R/W Ram - 60/61	RW 3/16	F32	626 48	626 81	627 14	627 47	627 80	628 13	628 46	628 79	
Amount of pumps	R/W Ram - 60/61	RW 3/16	U16	625 87							(1-8)	
No of simultaneously running pumps	R/W Ram - 60/61	RW 3/16	U16	625 90							(1-8)	
AI for Level	R/W Ram - 60/61	RW 3/16	U16	625 93								

Energy Optimized Pump Control, Operating And Set Up Parameters

Drift parameters	Comli commands	Modbus commands	Data type	P1	P2	P3	P4	P5	P6	P7	P8	Description
Reference	R/W Ram - 60/61	RW 3/16	U16	3000	3019	3038	3057	3076	3095	3114	3133	0=0.00%, 10000=100.00%
Effect	R Ram - 60	R 3/16	U32	3001	3020	3039	3058	3077	3096	3115	3134	
Voltage	R Ram - 60	R 3/16	U16	3003	3022	3041	3060	3079	3098	3117	3136	(0-1000 VAC)
Frequency	R Ram - 60	R 3/16	U16	3004	3023	3042	3061	3080	3099	3118	3137	0-100 Hz
Current	R Ram - 60	R 3/16	U32	3005	3024	3043	3062	3081	3100	3119	3138	0.00-1000000.00 A
Alarm-Word	R Ram - 60	R 3/16	U16	3007	3026	3045	3064	3083	3102	3121	3140	
Total number of starts	R Ram - 60	R 3/16	U32	3008	3027	3046	3065	3084	3103	3122	3141	
DC-voltage	R Ram - 60	R 3/16	U16	3014	3033	3052	3071	3090	3109	3128	3147	(0-1000 VDC)
Total Operating Time	R Ram - 60	R 3/16	U32	3015	3034	3053	3072	3091	3110	3129	3148	
kWh-counter	R Ram - 60	R 3/16	U32	3017	3036	3055	3074	3093	3112	3131	3150	(0-99999999 kWh)
Status-word for pump	R/W Ram - 60/61	RW 3/16	U16	3161	3162	3163	3164	3165	3166	3167	3168	
Energy Saving %	R Ram - 60	R 3/16	F32	3156								(0-100 %)

Flow data parameters	Comli commands	Modbus commands	Data type	P1	P2	P3	P4	P5	P6	P7	P8	Description
Flow	R Ram - 60	R 3/16	F32	2000								
Pumped Volume Total	R Ram - 60	R 3/16	F32	2014								

Set up parameters	Comli commands	Modbus commands	Data type	P1	P2	P3	P4	P5	P6	P7	P8	Description
Energy optimized pump control : In use / not in use	R/W Ram - 60/61	RW 3/16	U16	29								0=No, 1=Yes
Ramp up time	R/W Ram - 60/61	RW 3/16	U32	3010	3029	3048	3067	3086	3105	3124	3143	(0.00-999999.00 seconds)
Ramp down time	R/W Ram - 60/61	RW 3/16	U32	3012	3031	3050	3069	3088	3107	3126	3145	(0.00-999999.00 seconds)
Optimizing frequency	R/W Ram - 60/61	RW 3/16	U16	50121	50182	50243	50304	50365	50426	50487	50548	(0-50 Hz)

Maximum frequency	R/W Ram - 60/61	RW 3/16	U16	501 24	501 85	502 46	503 07	503 68	504 29	504 90	505 51	(0-50 Hz)
Minimum frequency	R/W Ram - 60/61	RW 3/16	U16	501 27	501 88	502 49	503 10	503 71	504 32	504 93	505 54	(0-50 Hz)
AI for Level	R/W Ram - 60/61	RW 3/16	U16	500 03								(1-6)
Number of pumps	R/W Ram - 60/61	RW 3/16	U16	500 00								(1-8)
Frequency transformer type	R/W Ram - 60/61	RW 3/16	U16	500 06								0=VLT 1=I/O
Frequency transformer alarm Yes/No	R/W Ram - 60/61	RW 3/16	U16	500 13								
Frequency transformer alarm delay	R/W Ram - 60/61	RW 3/16	U32	500 07								
Frequency transformer alarm name	R/W Ram - 60/61	RW 3/16	STR2 0	500 14								
Flowmeter type	R/W Ram - 60/61	RW 3/16	U16	500 31								0=MagFlux 1=AI
Flowmeter AI number	R/W Ram - 60/61	RW 3/16	U16	500 32								
Flowmeter alarm Yes/No	R/W Ram - 60/61	RW 3/16	U16	500 39								
Flowmeter alarm delay	R/W Ram - 60/61	RW 3/16	U16	500 33								
Flowmeter alarm name	R/W Ram - 60/61	RW 3/16	STR2 0	500 40								
Maximum Level	R/W Ram - 60/61	RW 3/16	F32	500 68								
Start pump Level	R/W Ram - 60/61	RW 3/16	F32	500 50								
Optimizing Level	R/W Ram - 60/61	RW 3/16	F32	500 62								
Minimum Level	R/W Ram - 60/61	RW 3/16	F32	500 74								
Stop Level	R/W Ram - 60/61	RW 3/16	F32	500 56								
Time for wash-out	R/W Ram - 60/61	RW 3/16	U32	500 80								
Duration of wash-out	R/W Ram - 60/61	RW 3/16	U16	500 82								
start time (at 50 Hz)	R/W Ram - 60/61	RW 3/16	U16	500 85								

Maximum flow limit	R/W Ram - 60/61	RW 3/16	F32	50088								
Minimum flow limit	R/W Ram - 60/61	RW 3/16	F32	50090								

Autotuning set up	Comli commands	Modbus commands	Data type	P1	P2	P3	P4	P5	P6	P7	P8	Description
Autotuning i brug	R/W Ram - 60/61	RW 3/16	U16	50092								0=No, 1=Yes
Antal timer mellem autotuning	R/W Ram - 60/61	RW 3/16	U16	50093								(0- timer)

Depth Pumping set up	Comli commands	Modbus commands	Data type	P1	P2	P3	P4	P5	P6	P7	P8	Description
Depth Pumping in use	R/W Ram - 60/61	RW 3/16	U16	50099								0=No, 1=Yes
Pump for Depth Pumping	R/W Ram - 60/61	RW 3/16	U16	50100								
Starts between Depth Pumping	R/W Ram - 60/61	RW 3/16	U16	50101								
Hours between Depth Pumping	R/W Ram - 60/61	RW 3/16	U16	50104								
Time for Depth Pumping in use	R/W Ram - 60/61	RW 3/16	U16	50107								
Time for Depth Pumping	R/W Ram - 60/61	RW 3/16	U32	50108								
Duration of Depth Pumping	R/W Ram - 60/61	RW 3/16	U32	50114								

Control Word Parameters	Comli commands	Modbus commands	Data type	P1	P2	P3	P4	P5	P6	P7	P8	Description
Control Word in use	R/W Ram - 60/61	RW 3/16	U16	50120								0=No, 1=Yes
Operating Signal Type	R/W Ram - 60/61	RW 3/16	U16	50130	50191	50252	50313	50374	50435	50496	50557	
Operating Signal no.	R/W Ram - 60/61	RW 3/16	U16	50131	50192	50253	50314	50375	50436	50497	50558	
Operating signal Delay	R/W Ram - 60/61	RW 3/16	U16	50132	50193	50254	50315	50376	50437	50498	50559	
Number of alarm-indicators	R/W Ram - 60/61	RW 3/16	U16	50133	50194	50255	50316	50377	50438	50499	50560	
Alarm indicator 1 signal type	R/W Ram - 60/61	RW 3/16	U16	50134	50195	50256	50317	50378	50439	50500	50561	
Alarm indicator 1 signal no.	R/W Ram - 60/61	RW 3/16	U16	50135	50196	50257	50318	50379	50440	50501	50562	
Alarm indicator 2 signal type	R/W Ram - 60/61	RW 3/16	U16	50136	50197	50258	50319	50380	50441	50502	50563	
Alarm indicator 2	R/W Ram -	RW 3/16	U16	501	501	502	503	503	504	505	505	

signal no.	60/61			37	98	59	20	81	42	03	64
Alarm indicator 3 signal type	R/W Ram - 60/61	RW 3/16	U16	501 38	501 99	502 60	503 21	503 82	504 43	505 04	505 65
Alarm indicator 3 signal no.	R/W Ram - 60/61	RW 3/16	U16	501 39	502 00	502 61	503 22	503 83	504 44	505 05	505 66
Alarm indicator 4 signal type	R/W Ram - 60/61	RW 3/16	U16	501 40	502 01	502 62	503 23	503 84	504 45	505 06	505 67
Alarm indicator 4 signal no.	R/W Ram - 60/61	RW 3/16	U16	501 41	502 02	502 63	503 24	503 85	504 46	505 07	505 68
Alarm indicator 5 signal type	R/W Ram - 60/61	RW 3/16	U16	501 42	502 03	502 64	503 25	503 86	504 47	505 08	505 69
Alarm indicator 5 signal no.	R/W Ram - 60/61	RW 3/16	U16	501 43	502 04	502 65	503 26	503 87	504 48	505 09	505 70
Alarm indicator 6 signal type	R/W Ram - 60/61	RW 3/16	U16	501 44	502 05	502 66	503 27	503 88	504 49	505 10	505 71
Alarm indicator 6 signal no.	R/W Ram - 60/61	RW 3/16	U16	501 45	502 06	502 67	503 28	503 89	504 50	505 11	505 72
Alarm indicator 7 signal type	R/W Ram - 60/61	RW 3/16	U16	501 46	502 07	502 68	503 29	503 90	504 51	505 12	505 73
Alarm indicator 7 signal no.	R/W Ram - 60/61	RW 3/16	U16	501 47	502 08	502 69	503 30	503 91	504 52	505 13	505 74
Alarm indicator 8 signal type	R/W Ram - 60/61	RW 3/16	U16	501 48	502 09	502 70	503 31	503 92	504 53	505 14	505 75
Alarm indicator 8 signal no.	R/W Ram - 60/61	RW 3/16	U16	501 49	502 10	502 71	503 32	503 93	504 54	505 15	505 76
Alarm indicator 9 signal type	R/W Ram - 60/61	RW 3/16	U16	501 50	502 11	502 72	503 33	503 94	504 55	505 16	505 77
Alarm indicator 9 signal no.	R/W Ram - 60/61	RW 3/16	U16	501 51	502 12	502 73	503 34	503 95	504 56	505 17	505 78
Alarm indicator 10 signal type	R/W Ram - 60/61	RW 3/16	U16	501 52	502 13	502 74	503 35	503 96	504 57	505 18	505 79
Alarm indicator 10 signal no.	R/W Ram - 60/61	RW 3/16	U16	501 53	502 14	502 75	503 36	503 97	504 58	505 19	505 80
Alarm indicator 11 signal type	R/W Ram - 60/61	RW 3/16	U16	501 54	502 15	502 76	503 37	503 98	504 59	505 20	505 81
Alarm indicator 11 signal no.	R/W Ram - 60/61	RW 3/16	U16	501 55	502 16	502 77	503 38	503 99	504 60	505 21	505 82
Alarm indicator 12 signal type	R/W Ram - 60/61	RW 3/16	U16	501 56	502 17	502 78	503 39	504 00	504 61	505 22	505 83
Alarm indicator 12 signal no.	R/W Ram - 60/61	RW 3/16	U16	501 57	502 18	502 79	503 40	504 01	504 62	505 23	505 84
DO start/stop signal	R/W Ram - 60/61	RW 3/16	U16	501 63	502 24	502 85	503 46	504 07	504 68	505 29	505 90
MAN.-AUTO Switch in use	R/W Ram - 60/61	RW 3/16	U16	501 65	502 26	502 87	503 48	504 09	504 70	505 31	505 92
DI no. for MAN.	R/W Ram - 60/61	RW 3/16	U16	501 66	502 27	502 88	503 49	504 10	504 71	505 32	505 93
DI no. for AUTO	R/W Ram - 60/61	RW 3/16	U16	501 69	502 30	502 91	503 52	504 13	504 74	505 35	505 96

Storm Flow Calculation

Drift parameters	Comli commandos	Modbus commandos	Data type	Addres s	Description
Stormflow flow m3/h	R/W reg. - 50/48		U16	22	
Stormflow volume Total m3	R/W reg. - 50/48		U16	104	
Stormflow volume today m3	R/W reg. - 50/48		U16	184	
Stormflow volume yesterday m3	R/W reg. - 50/48		U16	264	
Stormflow flow Actual	R Ram - 60	R 3/16	F32	328	
Stormflow volume Total	R/W Ram - 60/61	R/W 3/16	F32	332	
Stormflow volume today	R/W Ram - 60/61	R/W 3/16	F32	336	
Stormflow volume yesterday	R/W Ram - 60/61	R/W 3/16	F32	338	
Stormflow Level	R Ram - 60	R 3/16	F32	340	
Niveau for beregning af overløb, Niveau minus ...					
Timedif-logs					
Stormflow volume m3 start adr.	R/W reg. - 50/48		u16	2880	
Stormflow volume m3 stop adr.	R/W reg. - 50/48		u16	2903	
Setup parameters	Comli commando	Modbus commando	Data type	Addres s	AI-RS485
Stormflow No/Yes	R/W Ram - 60/61	R/W 3/16	U16	64218	
Stormflow zero signal type	R Ram - 60	R 3/16	U16	64221	
Stormflow zero signal no	R/W Ram - 60/61	R/W 3/16	U16	64224	
Stormflow level signal type	R/W Ram - 60/61	R/W 3/16	U16	64227	
Stormflow level signal no	R/W Ram - 60/61	R/W 3/16	U16	64230	
Stomflow no of Q(H) points	R/W Ram - 60/61	R/W 3/16	U16	64233	
				Flow Q	Level H
Stormflow Q(H) 1	R/W Ram - 60/61	R/W 3/16	F32	64242	64236
Stormflow Q(H) 2	R/W Ram - 60/61	R/W 3/16	F32	64254	64248
Stormflow Q(H) 3	R/W Ram - 60/61	R/W 3/16	F32	64266	64260
Stormflow Q(H) 4	R/W Ram - 60/61	R/W 3/16	F32	64278	64272
Stormflow Q(H) 5	R/W Ram - 60/61	R/W 3/16	F32	64290	64284
Stormflow Q(H) 6	R/W Ram - 60/61	R/W 3/16	F32	64302	64296
Stormflow Q(H) 7	R/W Ram - 60/61	R/W 3/16	F32	64314	64308
Stormflow Q(H) 8	R/W Ram - 60/61	R/W 3/16	F32	64326	64320
Stormflow Q(H) 9	R/W Ram - 60/61	R/W 3/16	F32	64338	64332
Stormflow Q(H) 10	R/W Ram - 60/61	R/W 3/16	F32	64350	64344

Logical Functions

188	IF 8-1 status	U16	none	Read Only	Internal flag 1-16 status
189	IF 16-9 status	U16	none	Read Only	Internal flag 1-16 status
190	IF 8-1 alarm status	U16	none	Reset/Read	Internal flag 1-16 alarm status
191	IF 16-9 alarm status	U16	none	Reset/Read	Internal flag 1-16 alarm status

	Operating data for internal flag.	
1796	IF 1 no of pulses total	U32{Low}
1797		U32 {High}
1798	IF 1 no of pulses today	U16
1799	IF 1 no of pulses yesterday	U16
1800	IF 1 time total	U32{Low}
1801		U32 {High}
1802	IF 1 time today	U32{Low}
1803		U32 {High}
1804	IF 1 time yesterday	U32{Low}

	Logic-function (1)			
6349 8	Logical expression 1 Output Signal type	U16	R/W	Logical expression 1
6349 9	Logical expression 1 Output number	U16	R/W	
6350 0	Logical expression 1 Output number Min	U16	Read Only	
6350 1	Logical expression 1 Output number Max	U16	Read Only	
6350 2	Logical expression 1 Operator type	U16	R/W	
6350 3	Logical expression 1 Operand 1 Signal type	U16	R/W	
6350 4	Logical expression 1 Operand 1 number	U16	R/W	
6350 5	Logical expression 1 Operand 1 number Min	U16	Read Only	
6350 6	Logical expression 1 Operand 1 number Max	U16	Read Only	
6350 7	Logical expression 1 Operand 2 Signal type	U16	R/W	
6350 8	Logical expression 1 Operand 2 number	U16	R/W	
6350 9	Logical expression 1 Operand 2 number Min	U16	Read Only	

6351 0	Logical expression 1 Operand 2 number Max	U16	Read Only	
6351 1	Logical expression 1 Delay	U16	R/W	
6351 2	Logical expression 1 Delay Min	U16	Read Only	
6351 3	Logical expression 1 Delay Max	U16	Read Only	
6351 4	Logical expression 1 Preset counter value	U16	R/W	
6351 5	Logical expression 1 Preset counter value Min	U16	Read Only	
6351 6	Logical expression 1 Preset counter value Max	U16	Read Only	
6351 7	Logical expression 1 Preset counter closed time	U16	R/W	
6351 8	Logical expression 1 Preset counter closed time Min	U16	Read Only	
6351 9	Logical expression 1 Preset counter closed time Max	U16	Read Only	
6352 0	Logical expression 1 Start time HH:MM	U32 {Low}	R/W	Seconds from year 2000. Hour and minutes of day is used
6352 1		U32 {High}	R/W	
6352 2	Logical expression 1 Start time HH:MM Min	U32 {Low}	Read Only	
6352 3		U32 {High}	Read Only	
6352 4	Logical expression 1 Start time HH:MM Max	U32 {Low}	Read Only	
6352 5		U32 {High}	Read Only	
6352 6	Logical expression 1 Stop time HH:MM	U32 {Low}	R/W	Seconds from year 2000. Hour and minutes of day is used
6352 7		U32 {High}	R/W	
6352 8	Logical expression 1 Stop time HH:MM Min	U32 {Low}	Read Only	
6352 9		U32 {High}	Read Only	
6353 0	Logical expression 1 Stop time HH:MM Max	U32 {Low}	Read Only	
6353 1		U32 {High}	Read Only	
6353 2	Logical expression 1 Alarm call on/off	U16	R/W	
6353 3	Logical expression 1 Label	STR 20	R/W	

Alarm Handling

Operating parameters	Comli commando	Modbus commando	Data type	address							
Control-signal	R/W bit - 52/51		bit	102	1=alarm for sending						
Control-signal	R/W Ram - 60/61	RW 3/16	U16	43:6	1=alarm for sending						
Sign all alarms	R/W Ram - 60/61	RW 3/16	U16	58336							
Alarm parameters			Data type	Alarm 1	Alarm 2	Alarm 3	Alarm 4	Alarm 5	Alarm 6	Alarm 7	Alarm 8
Alarm text	R Ram - 60	R 3/16	STR20	58200	58217	58234	58251	58268	58285	58302	58319
Start Time	R Ram - 60	R 3/16	U32	58210	58227	58244	58261	58278	58295	58312	58329
Stop Time	R Ram - 60	R 3/16	U32	58212	58229	58246	58263	58280	58297	58314	58331
Alarm signal type	R Ram - 60	R 3/16	U16	58214	58231	58248	58265	58282	58299	58316	58333
Alarm signal no.	R Ram - 60	R 3/16	U16	58215	58232	58249	58266	58283	58300	58317	58334
Alarm status	R/W Ram - 60/61	RW 3/16	U16	58216	58233	58250	58267	58284	58301	58318	58335
0=alarm signed for and alarm condition is no longer present, 1=alarm signed for and alarm condition is still present, 2=alarm not signed for and alarm condition is no longer present, 3=alarm not signed for and alarm condition is still present											

Setup parameters											
			Data type	adr.							
Automatic Alarm Resetting	R/W Ram - 60/61	RW 3/16	U16	62902	0=no, 1=yes						
Call on automatic alarm reset	R/W Ram - 60/61	RW 3/16	U16	62903	0=no, 1=yes						
Call on power supply failure	R/W Ram - 60/61	RW 3/16	U16	62904	0=no, 1=yes						
Call on low battery voltage	R/W Ram - 60/61	RW 3/16	U16	62905	0=no, 1=yes						
Connect Phone no. (PSTN)	R/W Ram - 60/61	RW 3/16	STR20	62909							
SMSC telefonno.	R/W Ram - 60/61	RW 3/16	STR20	62918							

Process Value For Connected Devices

Modbus address	Description	Data type
2000	Device 1 PV 1 Value	F32
2002	Device 1 PV 1 Unit	U16
2003	Device 1 PV 1 Name	STR 20
2013	Device 1 PV 1 Precision	S16
2014	Device 1 PV 2 Value	F32
2016	Device 1 PV 2 Unit	U16
2017	Device 1 PV 2 Name	STR 20
2027	Device 1 PV 2 Precision	S16
2028	Device 1 control signal	U16
2029	Device 2 PV 1 Value	F32
2031	Device 2 PV 1 Unit	U16
2032	Device 2 PV 1 Name	STR 20
2042	Device 2 PV 1 Precision	S16
2043	Device 2 PV 2 Value	F32
2045	Device 2 PV 2 Unit	U16
2046	Device 2 PV 2 Name	STR 20
2056	Device 2 PV 2 Precision	S16
2057	Device 2 control signal	U16
2058	Device 3 PV 1 Value	F32
2060	Device 3 PV 1 Unit	U16
2061	Device 3 PV 1 Name	STR 20
2071	Device 3 PV 1 Precision	S16
2072	Device 3 PV 2 Value	F32
2074	Device 3 PV 2 Unit	U16
2075	Device 3 PV 2 Name	STR 20
2085	Device 3 PV 2 Precision	S16
2086	Device 3 control signal	U16
2087	Device 4 PV 1 Value	F32
2089	Device 4 PV 1 Unit	U16
2090	Device 4 PV 1 Name	STR 20
2100	Device 4 PV 1 Precision	S16
2101	Device 4 PV 2 Value	F32

2103	Device 4 PV 2 Unit	U16
2104	Device 4 PV 2 Name	STR 20
2114	Device 4 PV 2 Precision	S16
2115	Device 4 control signal	U16
2116	Device 5 PV 1 Value	F32
2118	Device 5 PV 1 Unit	U16
2119	Device 5 PV 1 Name	STR 20
2129	Device 5 PV 1 Precision	S16
2130	Device 5 PV 2 Value	F32
2132	Device 5 PV 2 Unit	U16
2133	Device 5 PV 2 Name	STR 20
2143	Device 5 PV 2 Precision	S16
2144	Device 5 control signal	U16
2145	Device 6 PV 1 Value	F32
2147	Device 6 PV 1 Unit	U16
2148	Device 6 PV 1 Name	STR 20
2158	Device 6 PV 1 Precision	S16
2159	Device 6 PV 2 Value	F32
2161	Device 6 PV 2 Unit	U16
2162	Device 6 PV 2 Name	STR 20
2172	Device 6 PV 2 Precision	S16
2173	Device 6 control signal	U16
2174	Device 7 PV 1 Value	F32
2176	Device 7 PV 1 Unit	U16
2177	Device 7 PV 1 Name	STR 20
2187	Device 7 PV 1 Precision	S16
2188	Device 7 PV 2 Value	F32
2190	Device 7 PV 2 Unit	U16
2191	Device 7 PV 2 Name	STR 20
2201	Device 7 PV 2 Precision	S16
2202	Device 7 control signal	U16
2203	Device 8 PV 1 Value	F32
2205	Device 8 PV 1 Unit	U16
2206	Device 8 PV 1 Name	STR 20
2216	Device 8 PV 1	S16

	Precision	
2217	Device 8 PV 2 Value	F32
2219	Device 8 PV 2 Unit	U16
2220	Device 8 PV 2 Name	STR 20
2230	Device 8 PV 2 Precision	S16
2231	Device 8 control signal	U16
2232	Device 9 PV 1 Value	F32
2234	Device 9 PV 1 Unit	U16
2235	Device 9 PV 1 Name	STR 20
2245	Device 9 PV 1 Precision	S16
2246	Device 9 PV 2 Value	F32
2248	Device 9 PV 2 Unit	U16
2249	Device 9 PV 2 Name	STR 20
2259	Device 9 PV 2 Precision	S16
2260	Device 9 control signal	U16
2261	Device 10 PV 1 Value	F32
2263	Device 10 PV 1 Unit	U16
2264	Device 10 PV 1 Name	STR 20
2274	Device 10 PV 1 Precision	S16
2275	Device 10 PV 2 Value	F32
2277	Device 10 PV 2 Unit	U16
2278	Device 10 PV 2 Name	STR 20
2288	Device 10 PV 2 Precision	S16
2289	Device 10 control signal	U16
2290	Device 11 PV 1 Value	F32
2292	Device 11 PV 1 Unit	U16
2293	Device 11 PV 1 Name	STR 20
2303	Device 11 PV 1 Precision	S16
2304	Device 11 PV 2 Value	F32
2306	Device 11 PV 2 Unit	U16
2307	Device 11 PV 2 Name	STR 20
2317	Device 11 PV 2 Precision	S16
2318	Device 11 control signal	U16

2319	Device 12 PV 1 Value	F32
2321	Device 12 PV 1 Unit	U16
2322	Device 12 PV 1 Name	STR 20
2332	Device 12 PV 1 Precision	S16
2333	Device 12 PV 2 Value	F32
2335	Device 12 PV 2 Unit	U16
2336	Device 12 PV 2 Name	STR 20
2346	Device 12 PV 2 Precision	S16
2347	Device 12 control signal	U16
2348	Device 13 PV 1 Value	F32
2350	Device 13 PV 1 Unit	U16
2351	Device 13 PV 1 Name	STR 20
2361	Device 13 PV 1 Precision	S16
2362	Device 13 PV 2 Value	F32
2364	Device 13 PV 2 Unit	U16
2365	Device 13 PV 2 Name	STR 20
2375	Device 13 PV 2 Precision	S16
2376	Device 13 control signal	U16
2377	Device 14 PV 1 Value	F32
2379	Device 14 PV 1 Unit	U16
2380	Device 14 PV 1 Name	STR 20
2390	Device 14 PV 1 Precision	S16
2391	Device 14 PV 2 Value	F32
2393	Device 14 PV 2 Unit	U16
2394	Device 14 PV 2 Name	STR 20
2404	Device 14 PV 2 Precision	S16
2405	Device 14 control signal	U16
2406	Device 15 PV 1 Value	F32
2408	Device 15 PV 1 Unit	U16
2409	Device 15 PV 1 Name	STR 20
2419	Device 15 PV 1 Precision	S16
2420	Device 15 PV 2 Value	F32
2422	Device 15 PV 2 Unit	U16

2423	Device 15 PV 2 Name	STR 20
2433	Device 15 PV 2 Precision	S16
2434	Device 15 control signal	U16
2435	Device 16 PV 1 Value	F32
2437	Device 16 PV 1 Unit	U16
2438	Device 16 PV 1 Name	STR 20
2448	Device 16 PV 1 Precision	S16
2449	Device 16 PV 2 Value	F32
2451	Device 16 PV 2 Unit	U16
2452	Device 16 PV 2 Name	STR 20
2462	Device 16 PV 2 Precision	S16
2463	Device 16 control signal	U16
2464	Device 17 PV 1 Value	F32
2466	Device 17 PV 1 Unit	U16
2467	Device 17 PV 1 Name	STR 20
2477	Device 17 PV 1 Precision	S16
2478	Device 17 PV 2 Value	F32
2480	Device 17 PV 2 Unit	U16
2481	Device 17 PV 2 Name	STR 20
2491	Device 17 PV 2 Precision	S16
2492	Device 17 control signal	U16
2493	Device 18 PV 1 Value	F32
2495	Device 18 PV 1 Unit	U16
2496	Device 18 PV 1 Name	STR 20
2506	Device 18 PV 1 Precision	S16
2507	Device 18 PV 2 Value	F32
2509	Device 18 PV 2 Unit	U16
2510	Device 18 PV 2 Name	STR 20
2520	Device 18 PV 2 Precision	S16
2521	Device 18 control signal	U16
2522	Device 19 PV 1 Value	F32
2524	Device 19 PV 1 Unit	U16

2525	Device 19 PV 1 Name	STR 20
2535	Device 19 PV 1 Precision	S16
2536	Device 19 PV 2 Value	F32
2538	Device 19 PV 2 Unit	U16
2539	Device 19 PV 2 Name	STR 20
2549	Device 19 PV 2 Precision	S16
2550	Device 19 control signal	U16
2551	Device 20 PV 1 Value	F32
2553	Device 20 PV 1 Unit	U16
2554	Device 20 PV 1 Name	STR 20
2564	Device 20 PV 1 Precision	S16
2565	Device 20 PV 2 Value	F32
2567	Device 20 PV 2 Unit	U16
2568	Device 20 PV 2 Name	STR 20
2578	Device 20 PV 2 Precision	S16
2579	Device 20 control signal	U16
2580	Device 21 PV 1 Value	F32
2582	Device 21 PV 1 Unit	U16
2583	Device 21 PV 1 Name	STR 20
2593	Device 21 PV 1 Precision	S16
2594	Device 21 PV 2 Value	F32
2596	Device 21 PV 2 Unit	U16
2597	Device 21 PV 2 Name	STR 20
2607	Device 21 PV 2 Precision	S16
2608	Device 21 control signal	U16
2609	Device 22 PV 1 Value	F32
2611	Device 22 PV 1 Unit	U16
2612	Device 22 PV 1 Name	STR 20
2622	Device 22 PV 1 Precision	S16
2623	Device 22 PV 2 Value	F32
2625	Device 22 PV 2 Unit	U16
2626	Device 22 PV 2 Name	STR 20
2636	Device 22 PV 2 Precision	S16

2637	Device 22 control signal	U16
2650	Device 1 PV 1 Min	F32
2652	Device 1 PV 1 Max	F32
2654	Device 1 PV 2 Min	F32
2656	Device 1 PV 2 Max	F32
2658	Device 2 PV 1 Min	F32
2660	Device 2 PV 1 Min	F32
2662	Device 2 PV 2 Max	F32
2664	Device 2 PV 2 Min	F32
2666	Device 3 PV 1 Max	F32
2668	Device 3 PV 1 Min	F32
2670	Device 3 PV 2 Min	F32
2672	Device 3 PV 2 Max	F32
2674	Device 4 PV 1 Min	F32
2676	Device 4 PV 1 Max	F32
2678	Device 4 PV 2 Min	F32
2680	Device 4 PV 2 Min	F32
2682	Device 5 PV 1 Max	F32
2684	Device 5 PV 1 Min	F32
2686	Device 5 PV 2 Max	F32
2688	Device 5 PV 2 Min	F32
2690	Device 6 PV 1 Min	F32
2692	Device 6 PV 1 Max	F32
2694	Device 6 PV 2 Min	F32
2696	Device 6 PV 2 Max	F32
2698	Device 7 PV 1 Min	F32
2700	Device 7 PV 1 Min	F32
2702	Device 7 PV 2 Max	F32
2704	Device 7 PV 2 Min	F32
2706	Device 8 PV 1 Max	F32
2708	Device 8 PV 1 Min	F32
2710	Device 8 PV 2 Min	F32
2712	Device 8 PV 2 Max	F32
2714	Device 9 PV 1 Min	F32
2716	Device 9 PV 1 Max	F32
2718	Device 9 PV 2 Min	F32
2720	Device 9 PV 2 Min	F32
2722	Device 10 PV 1 Max	F32
2724	Device 10 PV 1 Min	F32

2726	Device 10 PV 2 Max	F32
2728	Device 10 PV 2 Min	F32
2730	Device 11 PV 1 Min	F32
2732	Device 11 PV 1 Max	F32
2734	Device 11 PV 2 Min	F32
2736	Device 11 PV 2 Max	F32
2738	Device 12 PV 1 Min	F32
2740	Device 12 PV 1 Min	F32
2742	Device 12 PV 2 Max	F32
2744	Device 12 PV 2 Min	F32
2746	Device 13 PV 1 Max	F32
2748	Device 13 PV 1 Min	F32
2750	Device 13 PV 2 Min	F32
2752	Device 13 PV 2 Max	F32
2754	Device 14 PV 1 Min	F32
2756	Device 14 PV 1 Max	F32
2758	Device 14 PV 2 Min	F32
2760	Device 14 PV 2 Min	F32
2762	Device 15 PV 1 Max	F32
2764	Device 15 PV 1 Min	F32
2766	Device 15 PV 2 Max	F32
2768	Device 15 PV 2 Min	F32
2770	Device 16 PV 1 Min	F32
2772	Device 16 PV 1 Max	F32
2774	Device 16 PV 2 Min	F32
2776	Device 16 PV 2 Max	F32

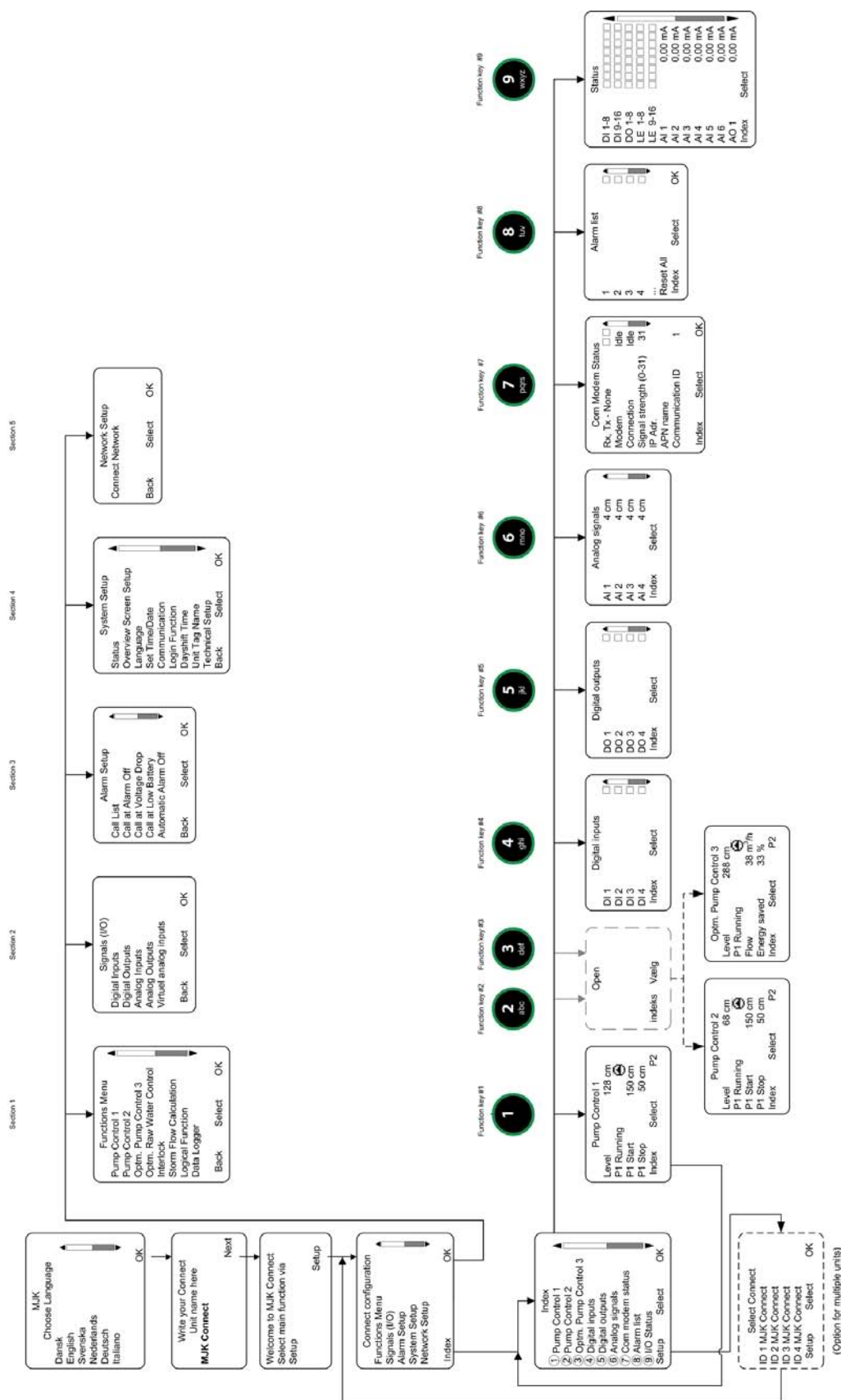
Customized Register

Modbus address	Description	Data type	Command
57000	customized register list start	U16	R/W
57255	customized register list stop	U16	R/W

State Machine

Modbus address	Description	Data type	Commands	
40000	State Machine 1	U32	R/W	
40400	State Machine 2	U32	R/W	
40800	State Machine 3	U32	R/W	
41200	State Machine 4	U32	R/W	
41600	State Machine 5	U32	R/W	
42000	State Machine 6	U32	R/W	
42400	State Machine 7	U32	R/W	
42800	State Machine 8	U32	R/W	
43200	State Machine 9	U32	R/W	
43600	State Machine 10	U32	R/W	
44010	State Machine 1 pointer	U16	Read Only	
44011	State Machine 2 pointer	U16	Read Only	
44012	State Machine 3 pointer	U16	Read Only	
44013	State Machine 4 pointer	U16	Read Only	
44014	State Machine 5 pointer	U16	Read Only	
44015	State Machine 6 pointer	U16	Read Only	
44016	State Machine 7 pointer	U16	Read Only	
44017	State Machine 8 pointer	U16	Read Only	
44018	State Machine 9 pointer	U16	Read Only	
44019	State Machine 10 pointer	U16	Read Only	
44020	State Machine Write protection	U32{Low}	R/W	protection code is "45560656", it resets all state machines and enables WRITE to commands
		U32{High}		The protection code resets at "No Carrier" or at power-up

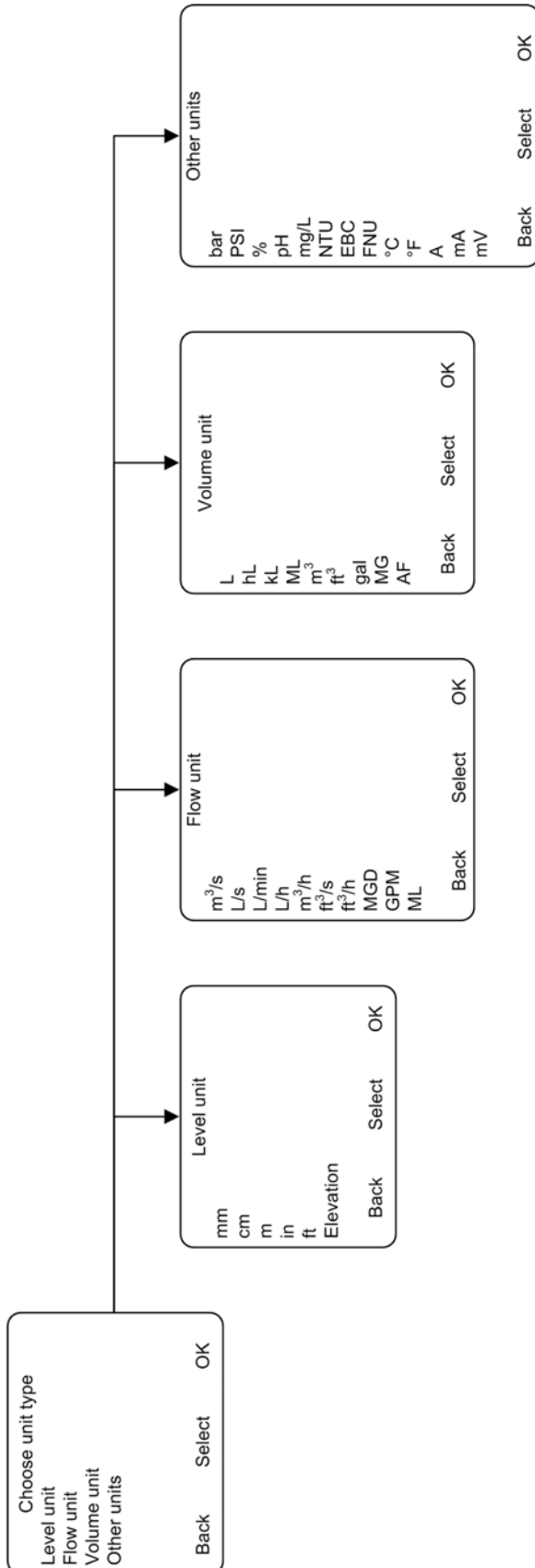
Display menus, Flowcharts



Functions menu - units general

Units in the Display

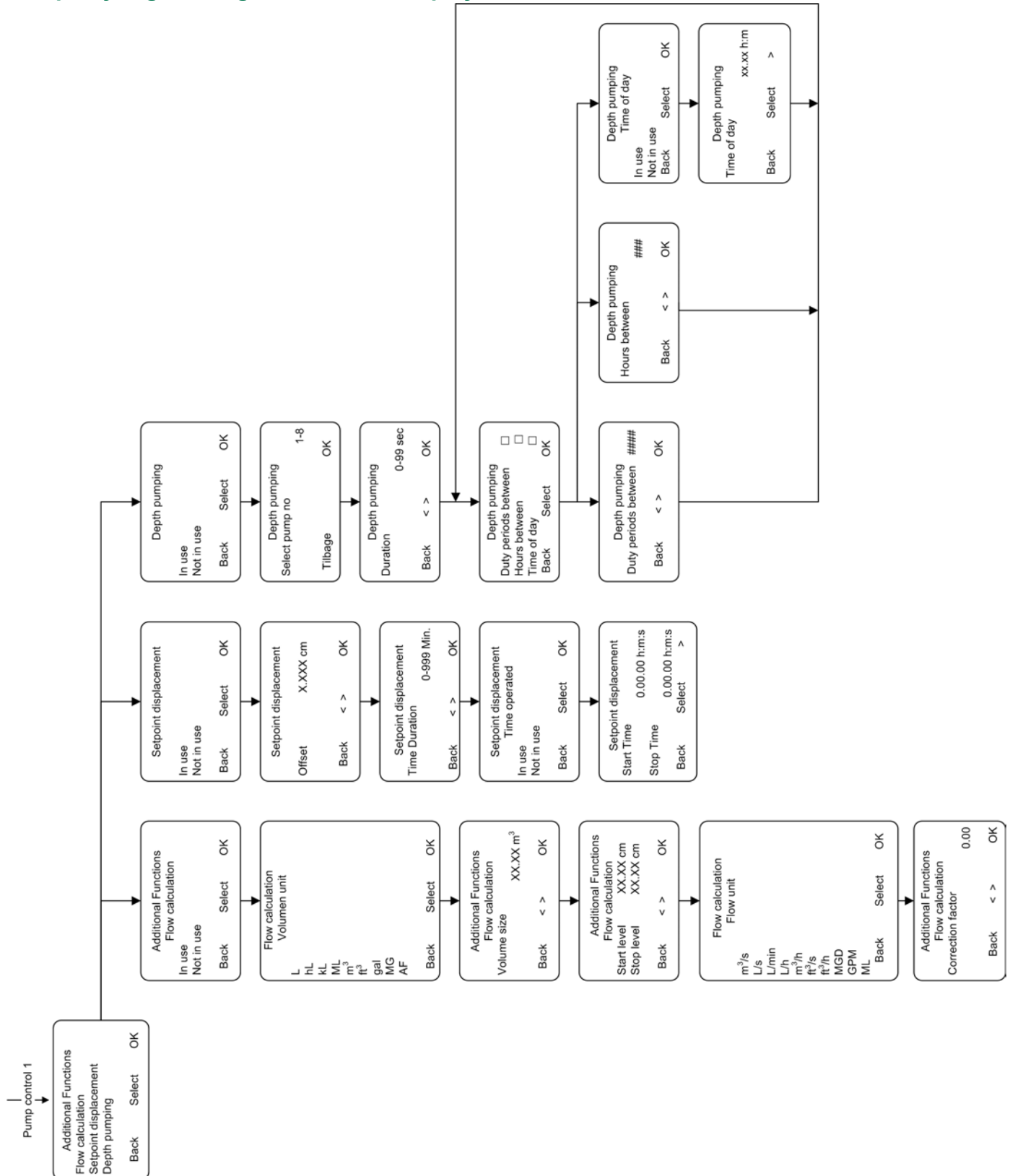
Measuring units is configured several places in the navigations menu, the selectable units are the same in all levels of the menu, and shown here.



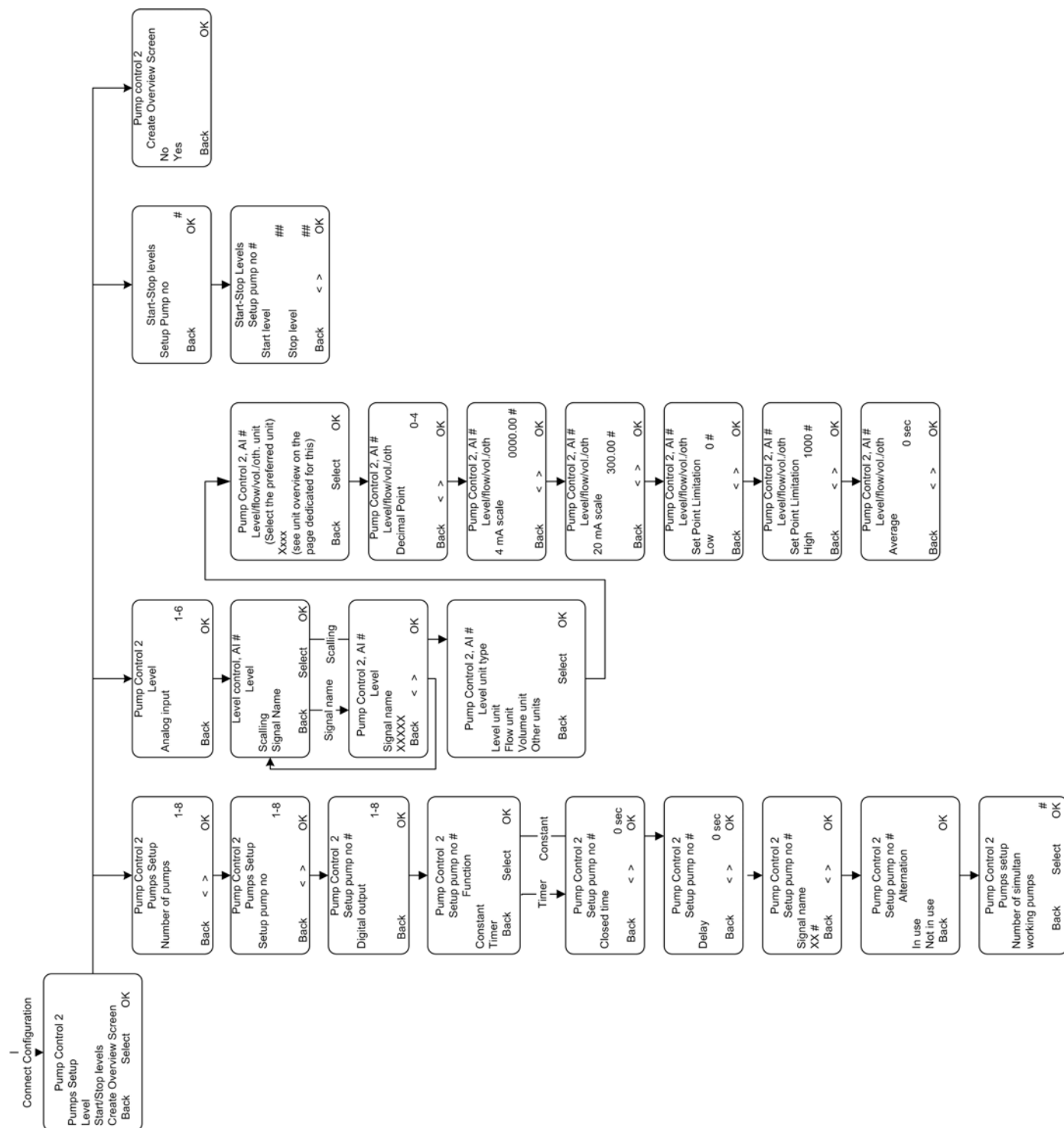
Pump Control 1



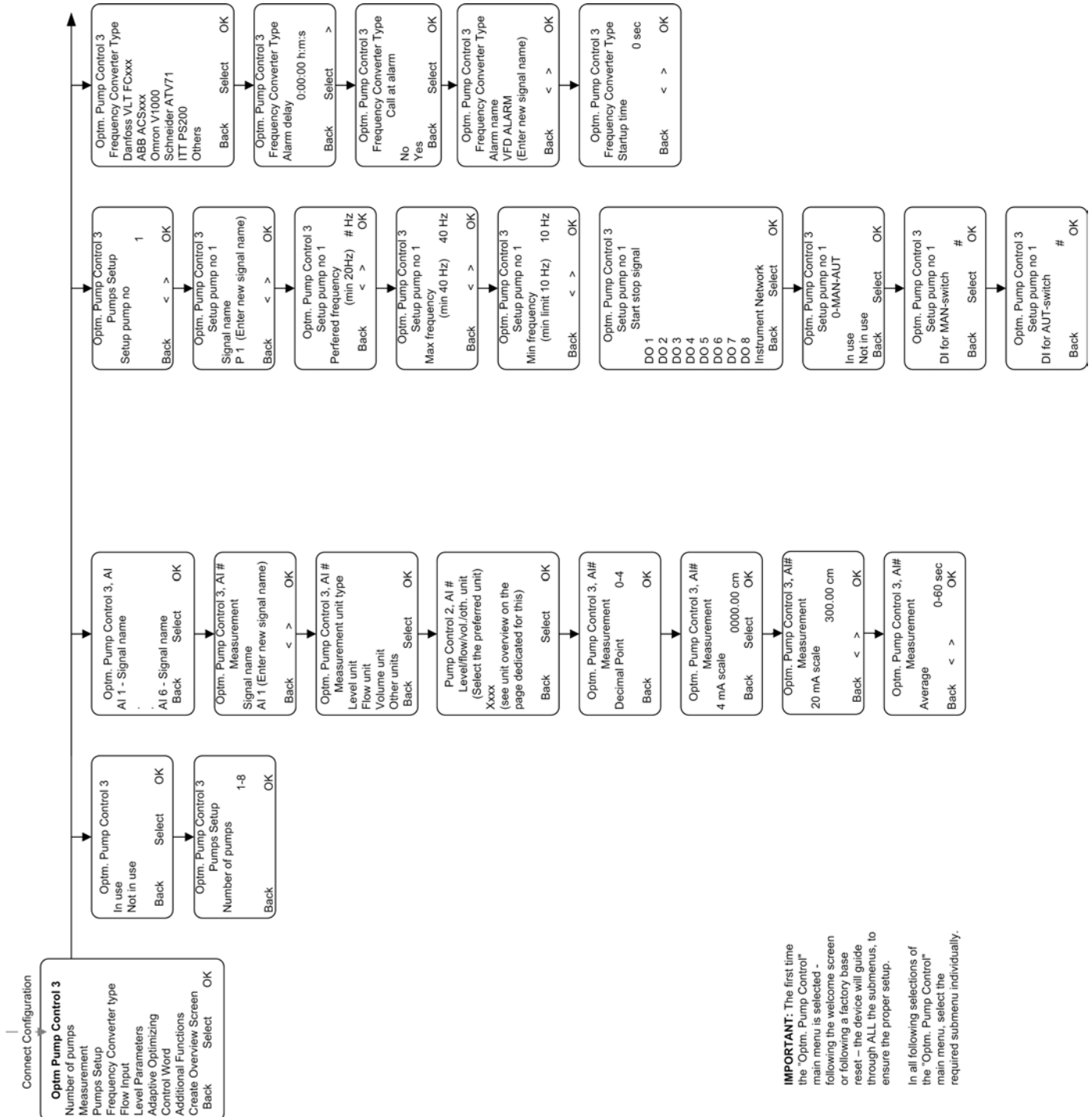
Pumpestyring 1 Tillægsfunktioner - Display flowchart



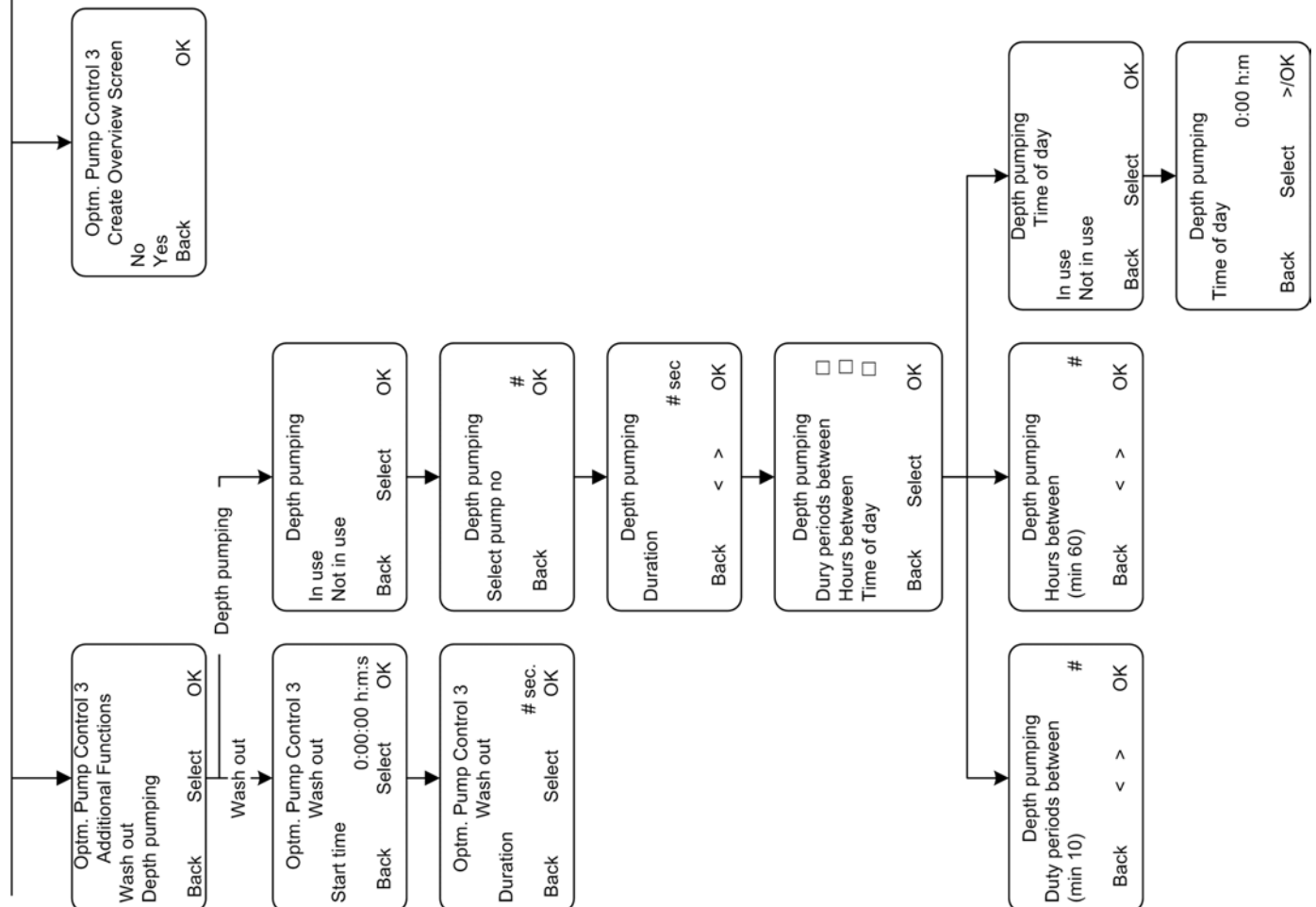
Pump Control 2



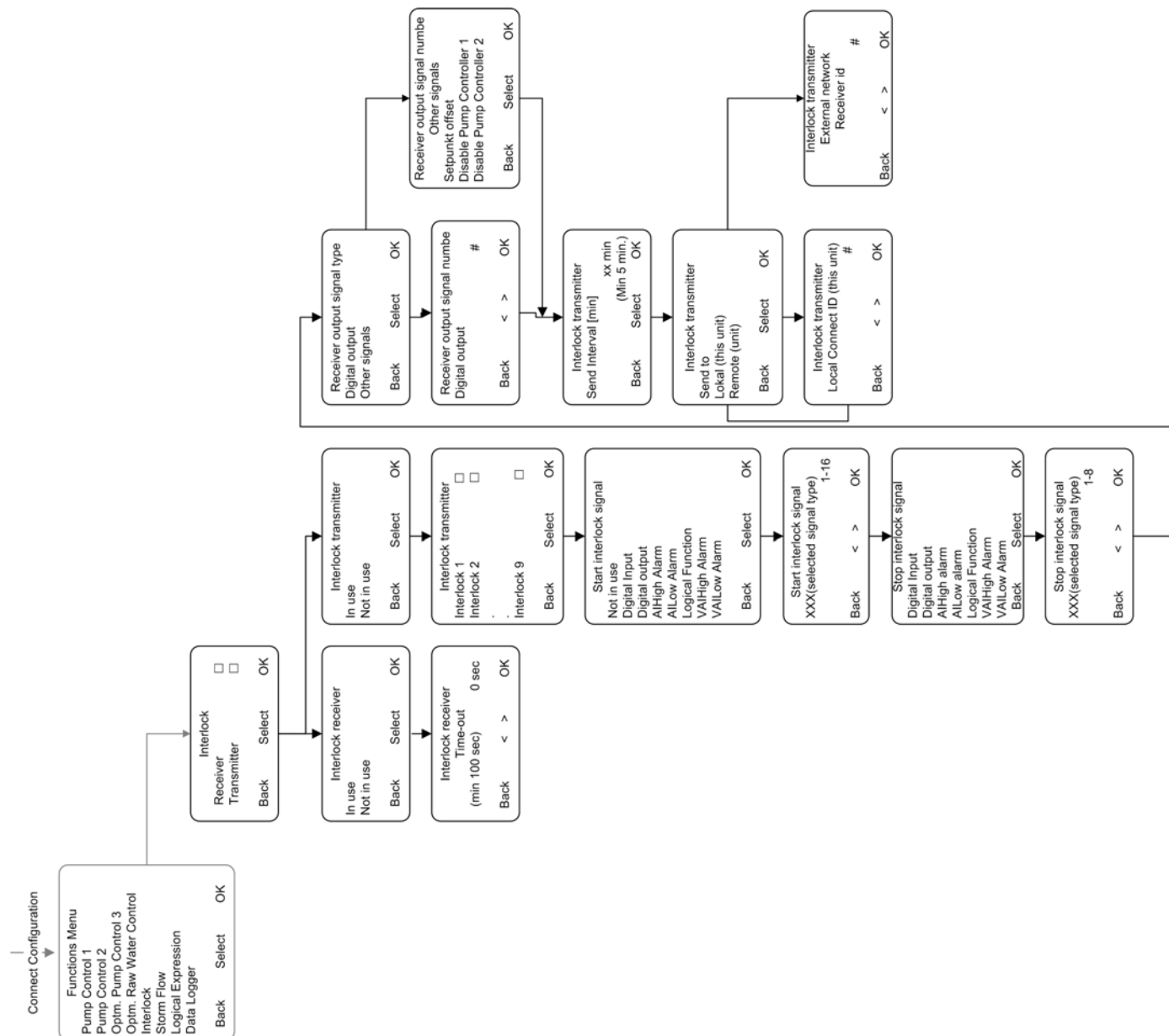
Energy optimized Pumpcontrol



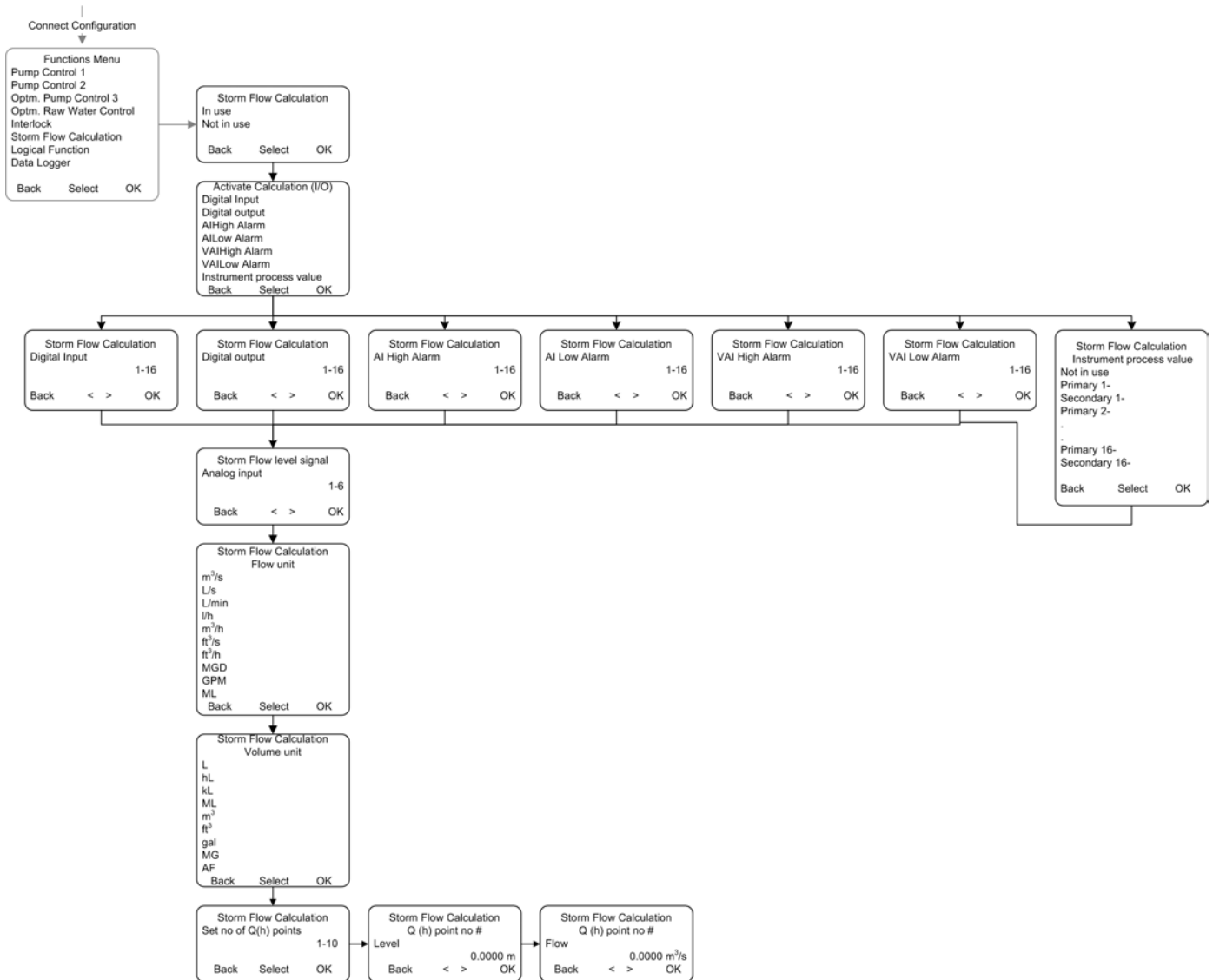
Energi optimeret pumpestyring, fortsat



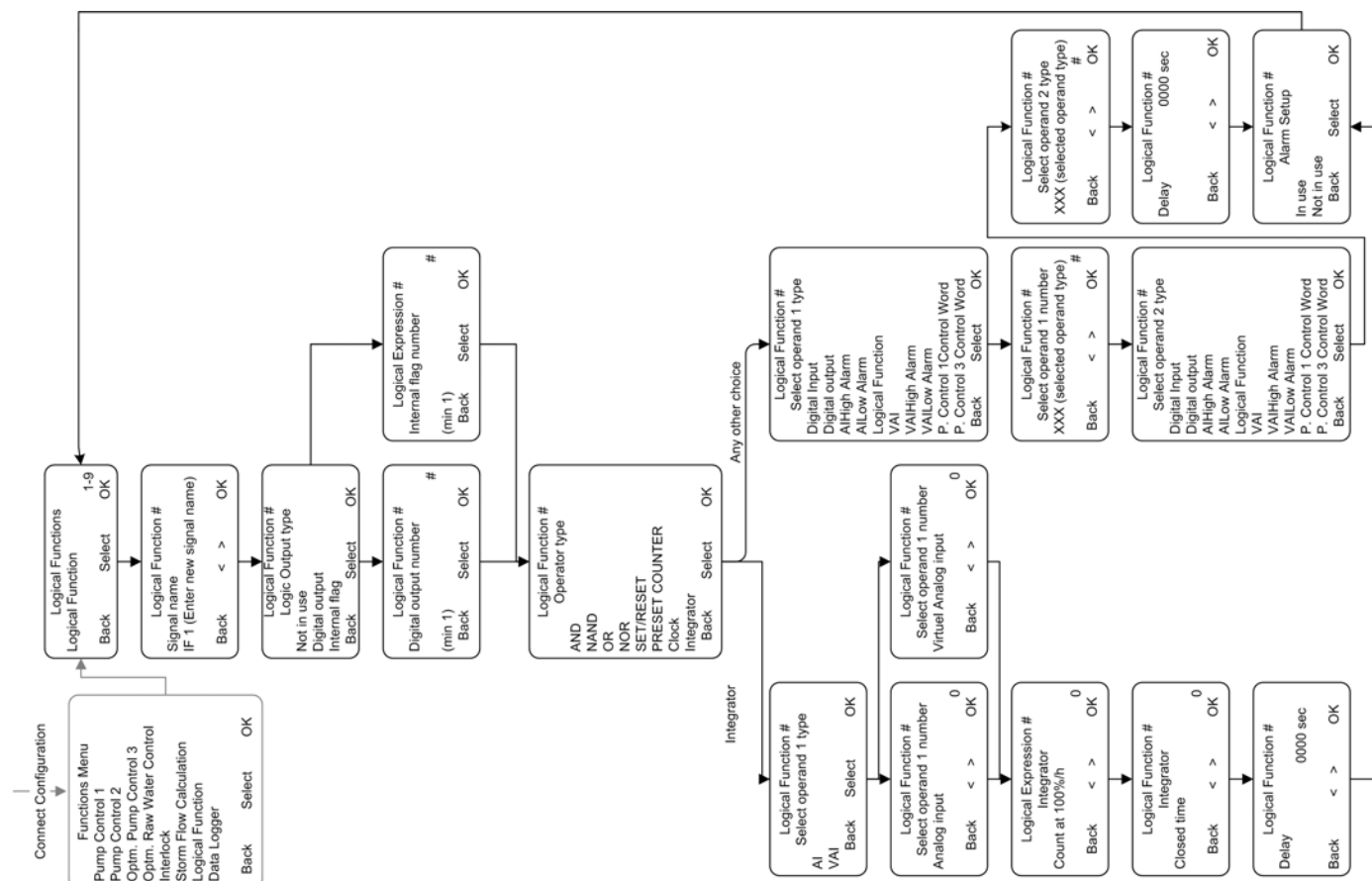
Interlock



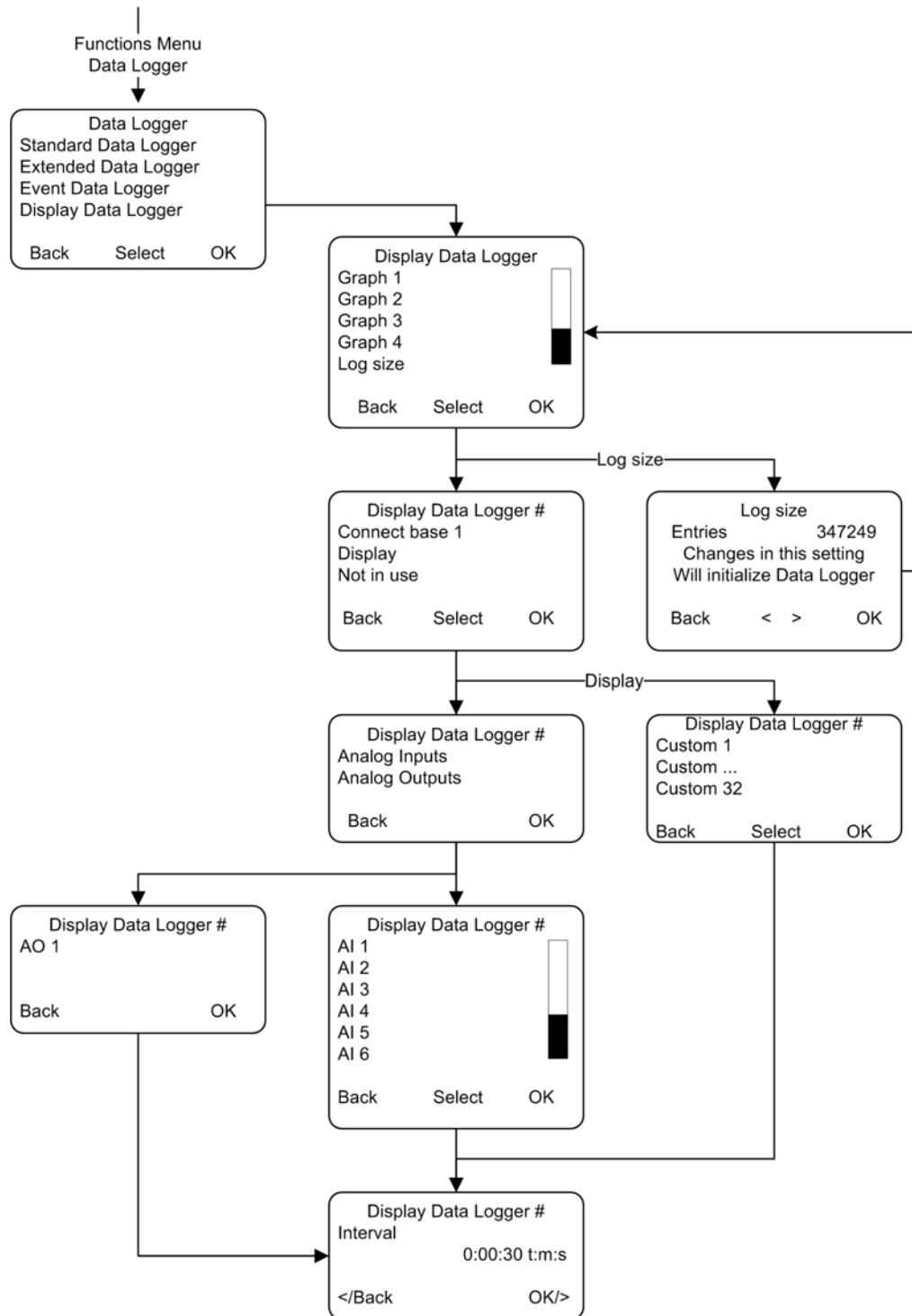
Storm Flow Calculation



Logical Functions

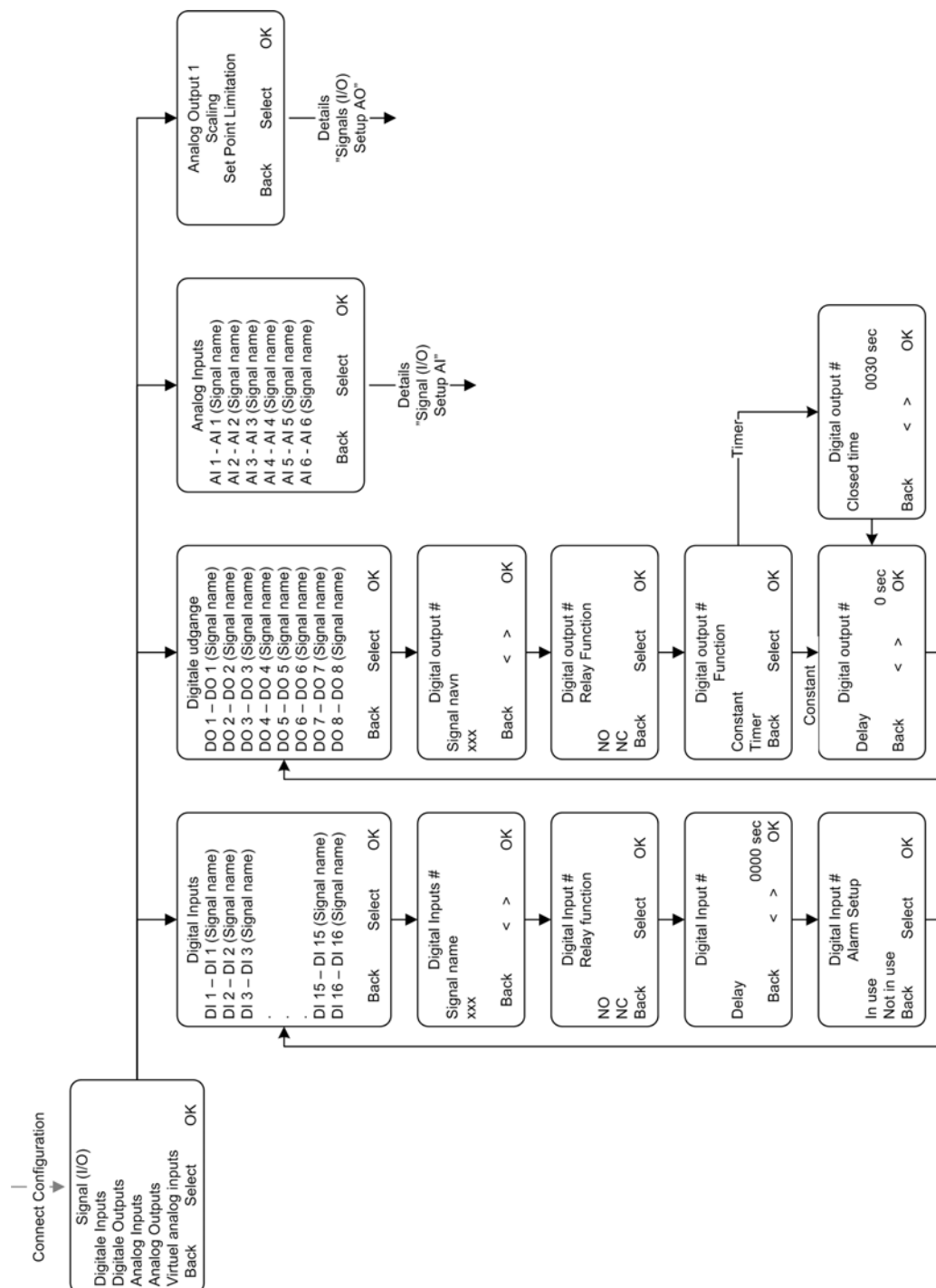


Display Data Logger

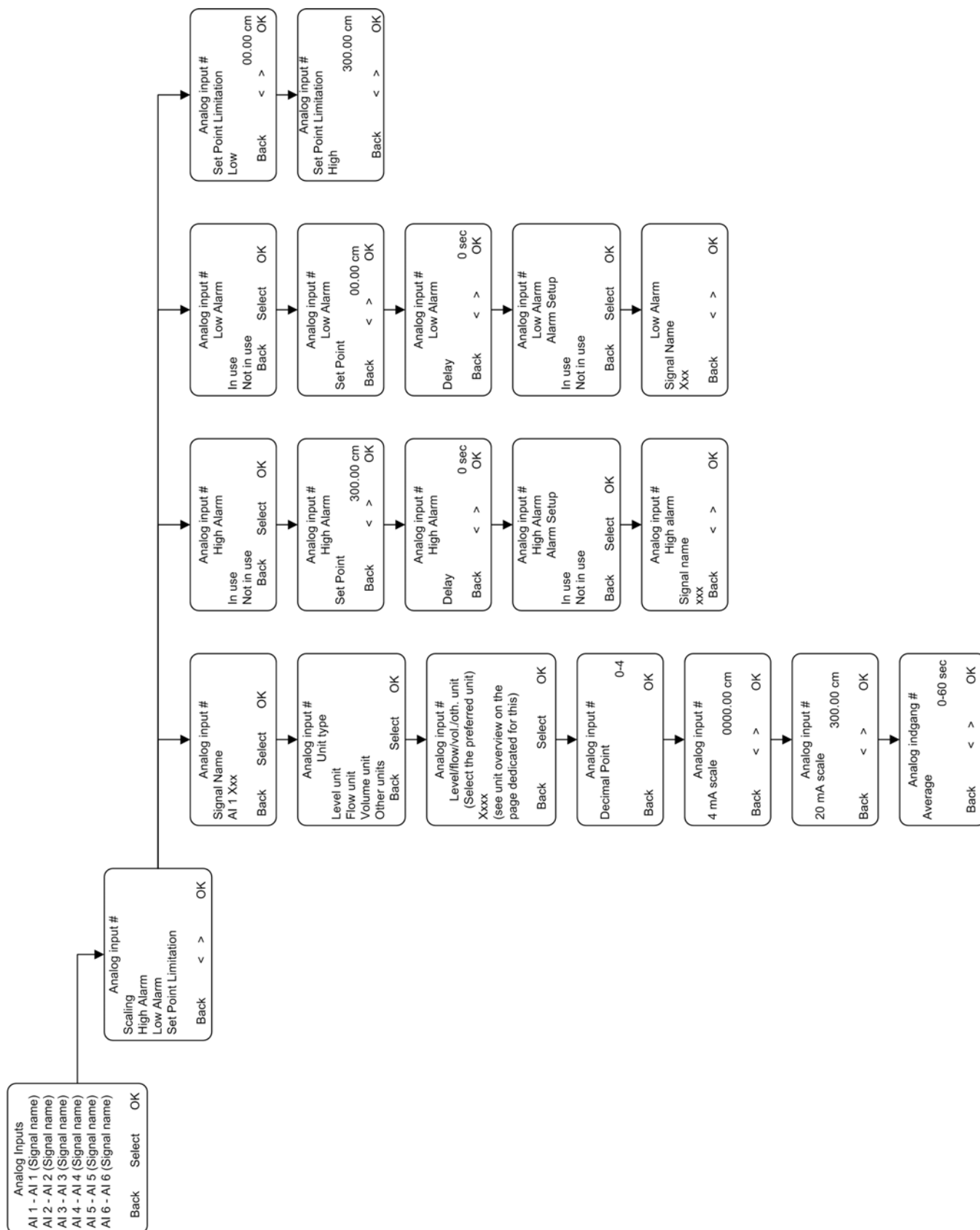


I/O Signals

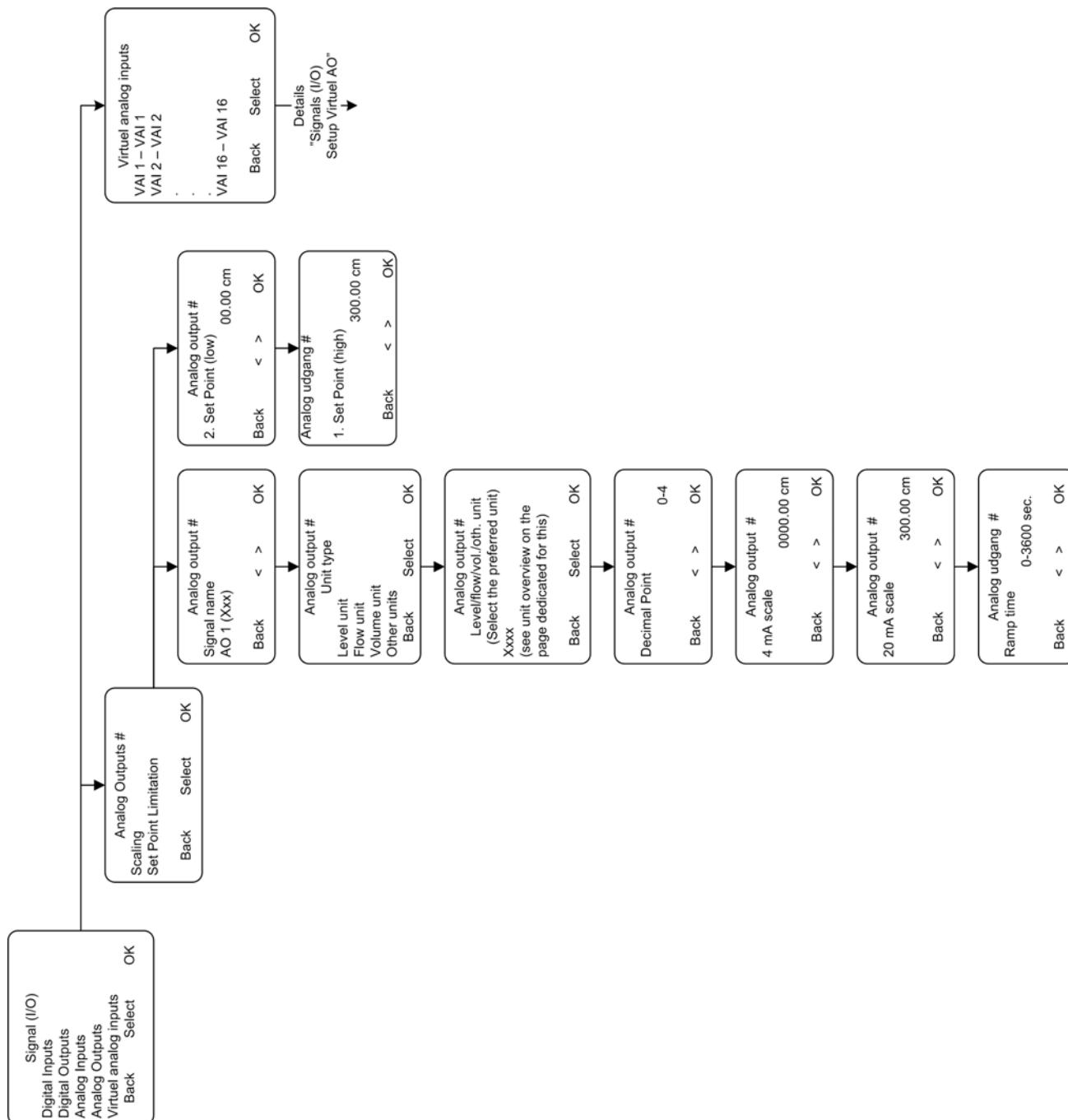
Digital Input & Output



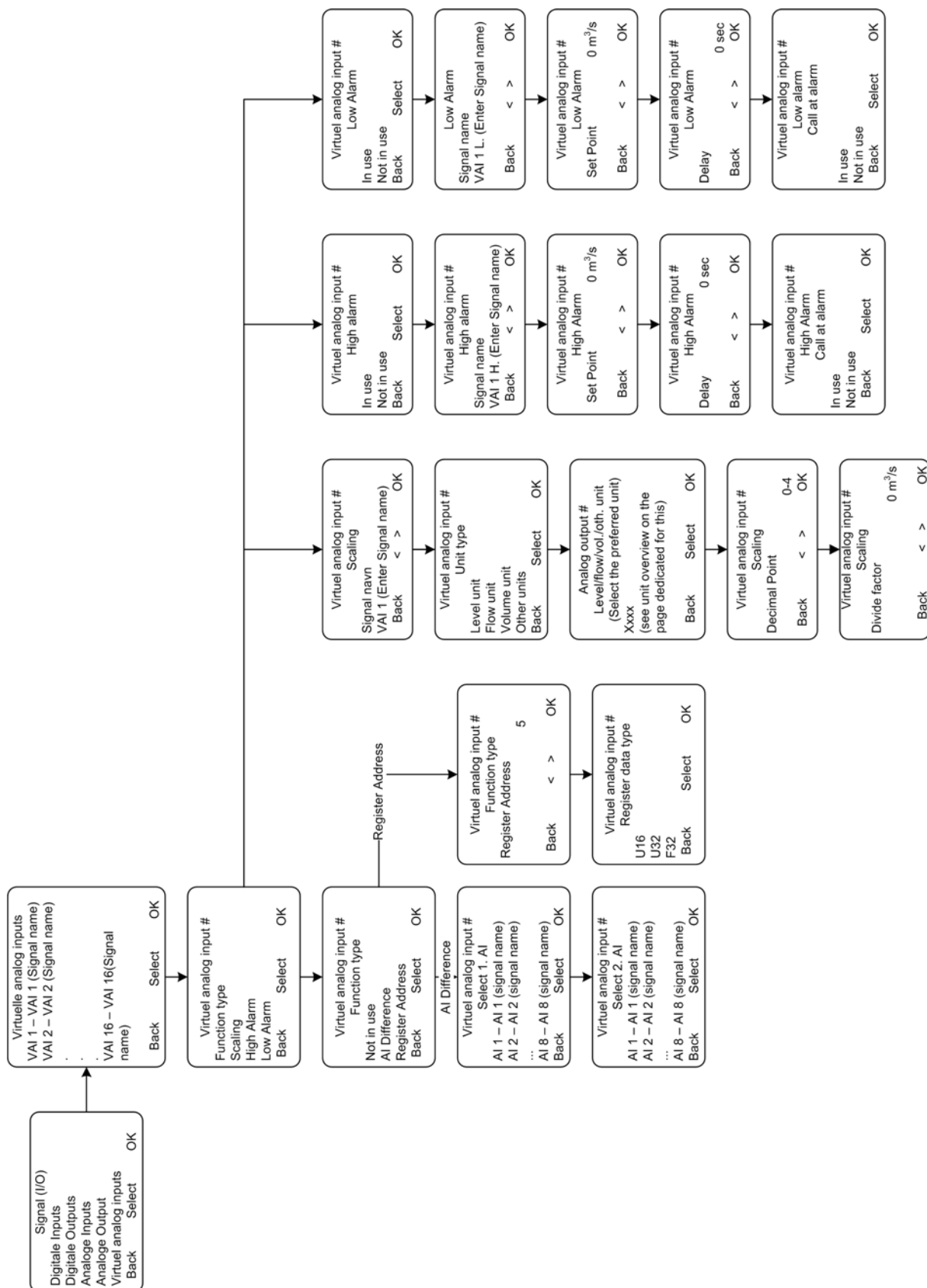
Analog input



Analog Output

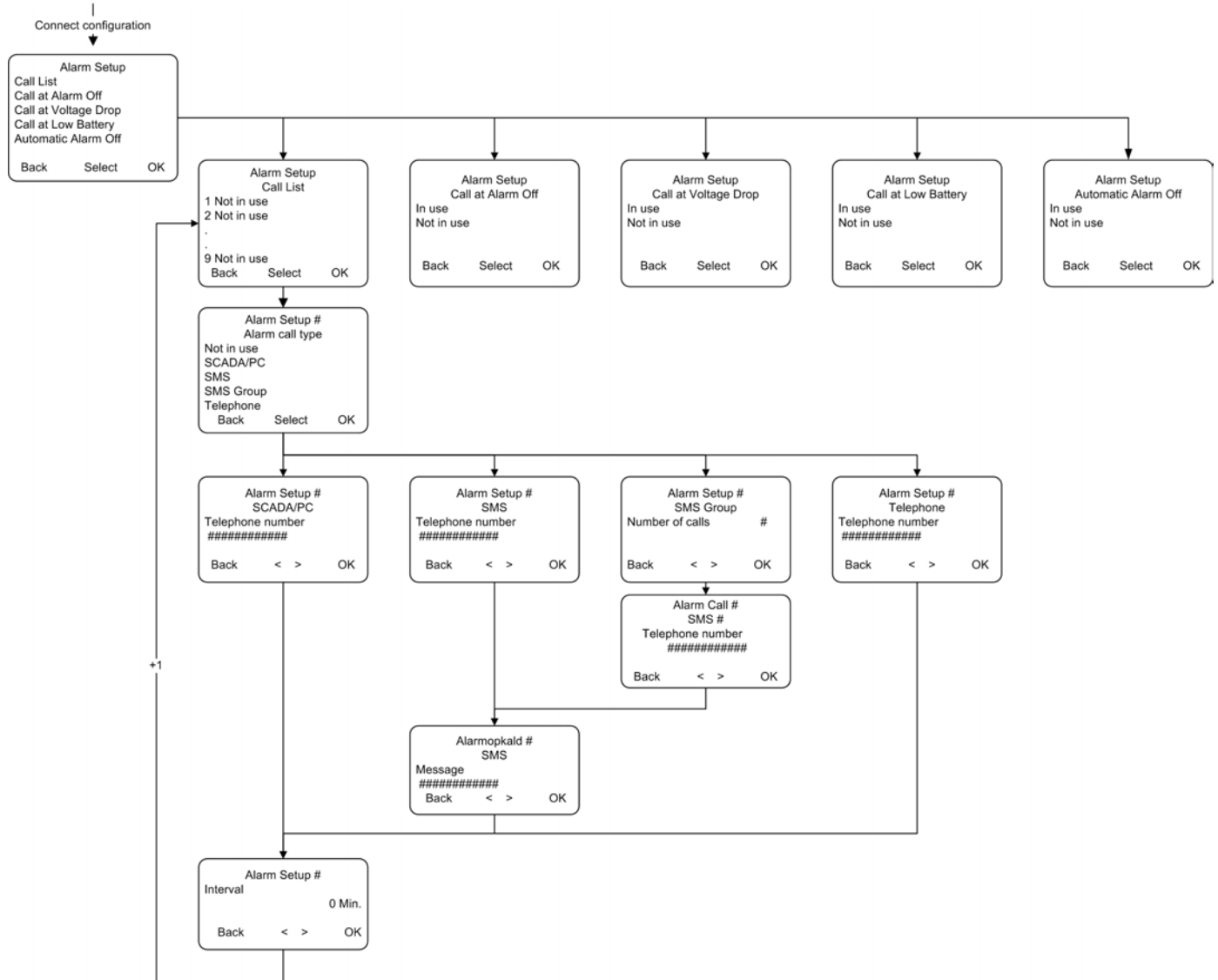


Virtual Analog Input



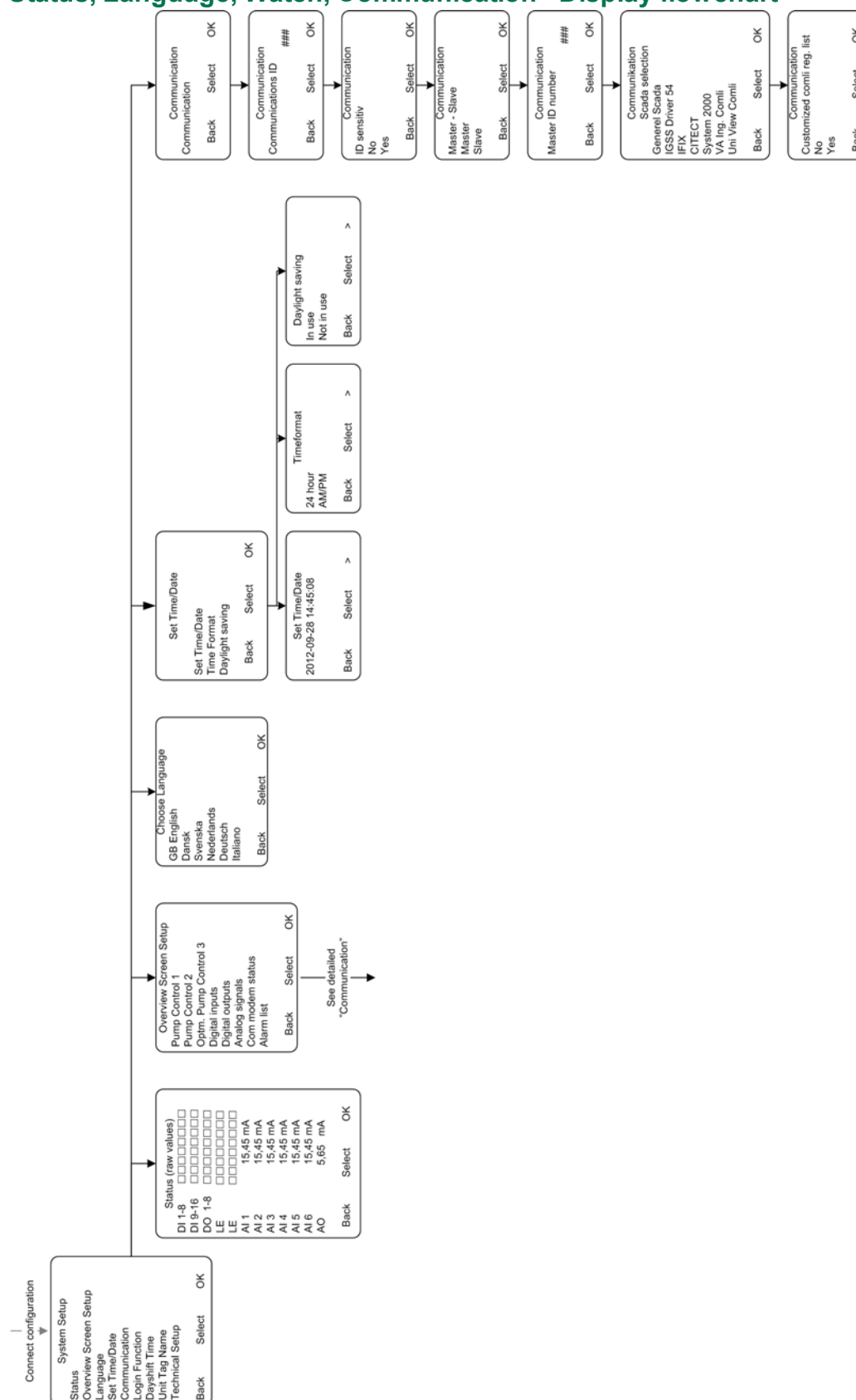
Alarm Setup

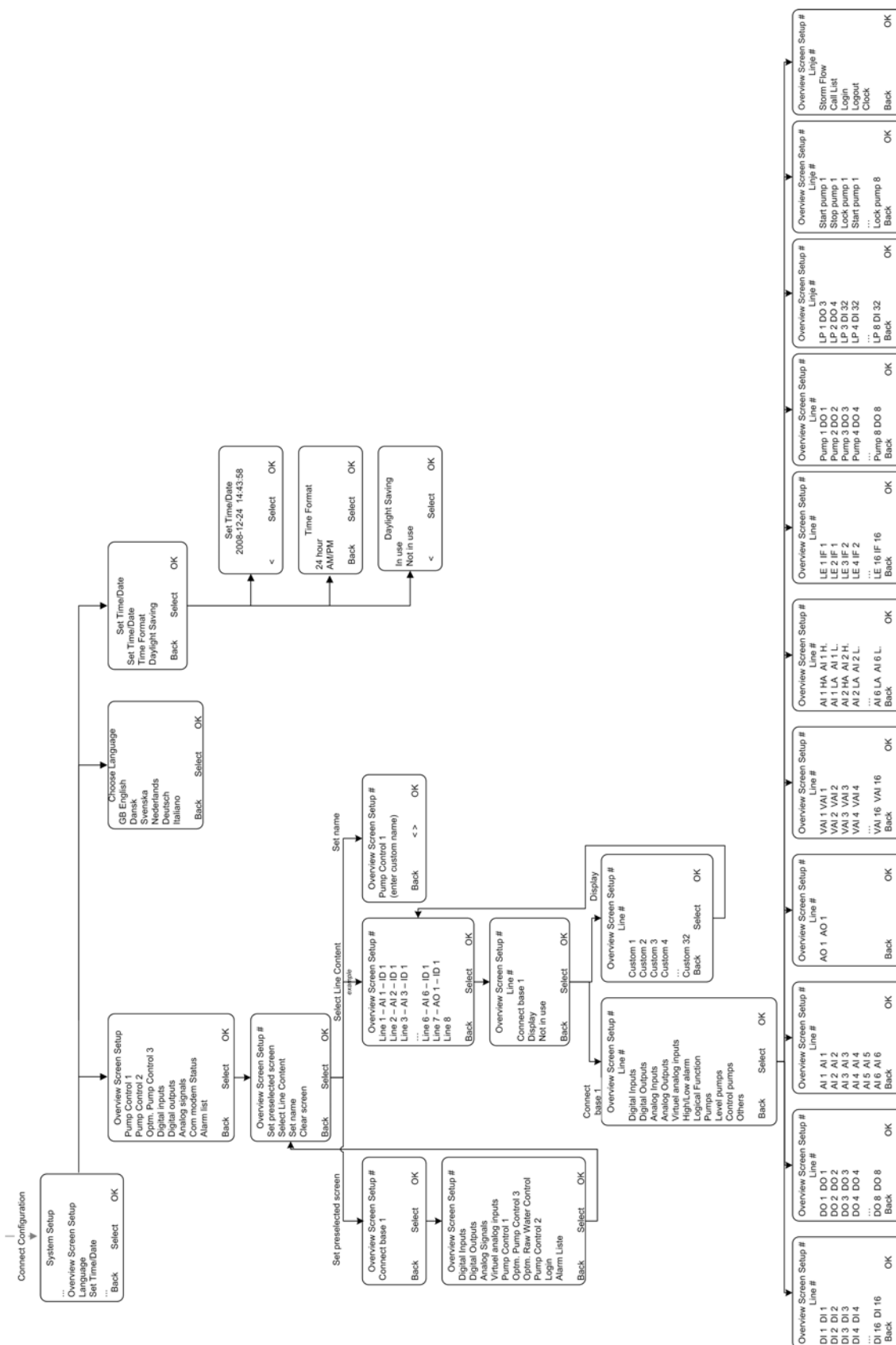
Alarm Setup



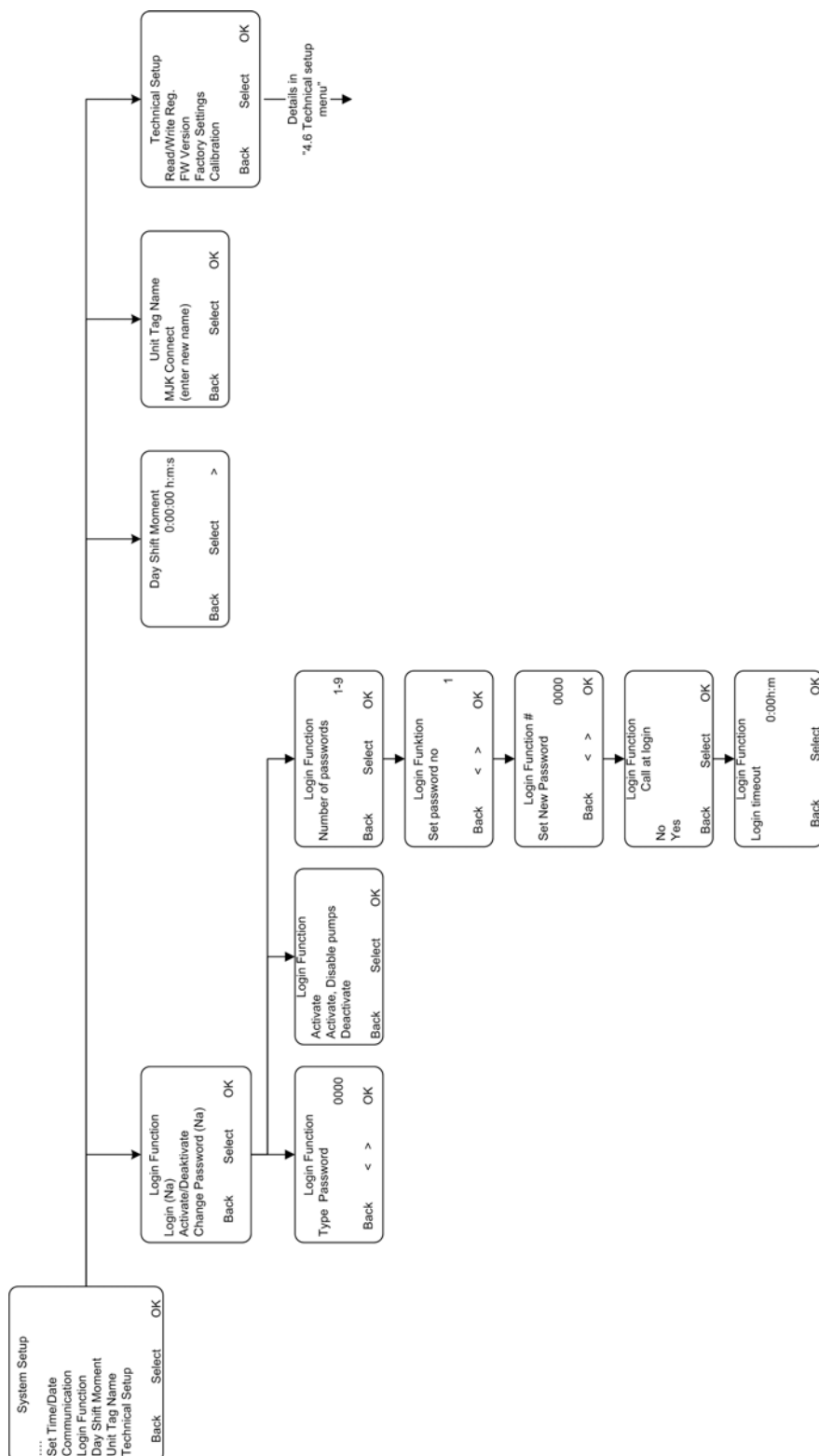
System Setup

Status, Language, Watch, Communication - Display flowchart

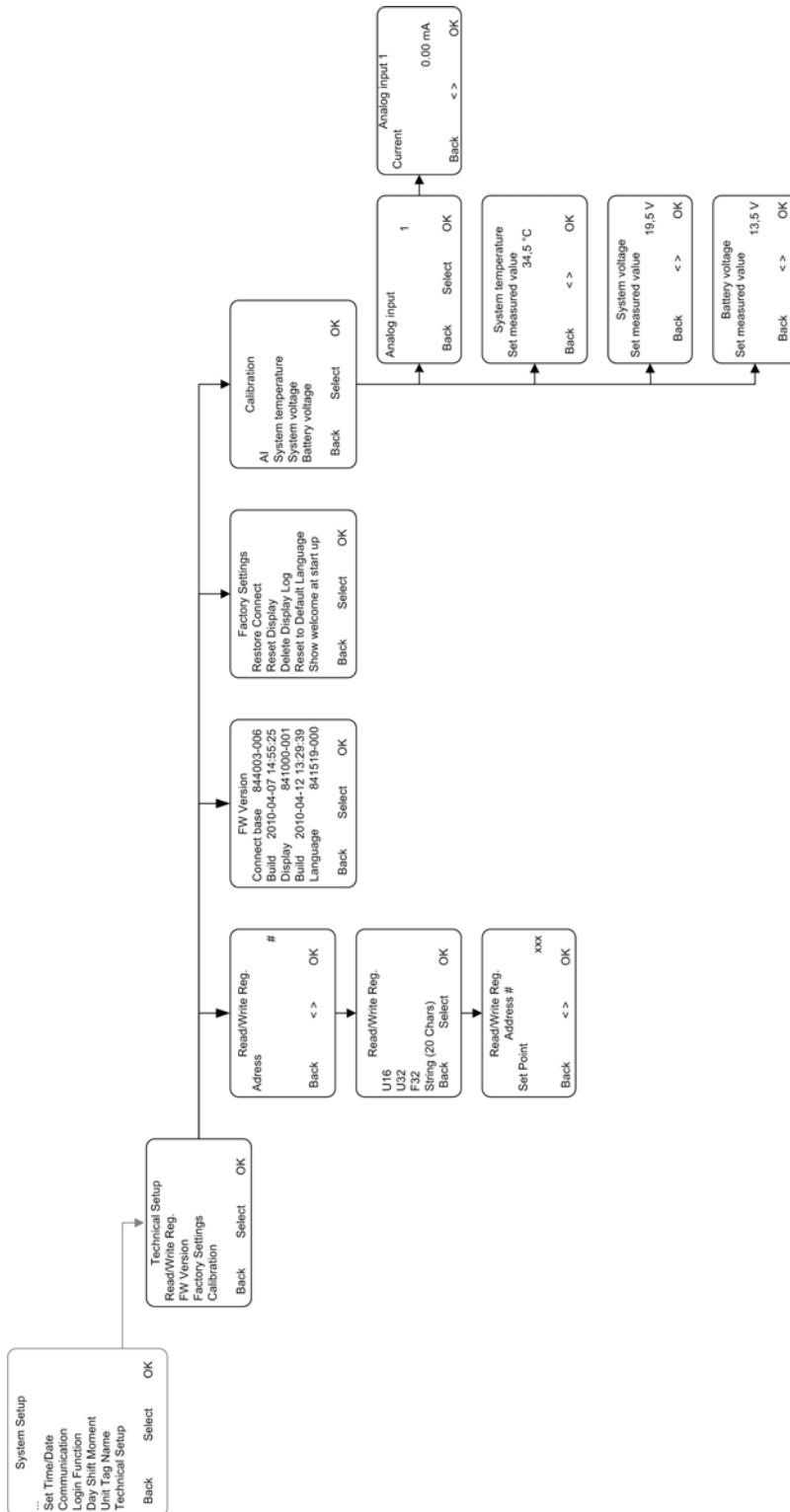




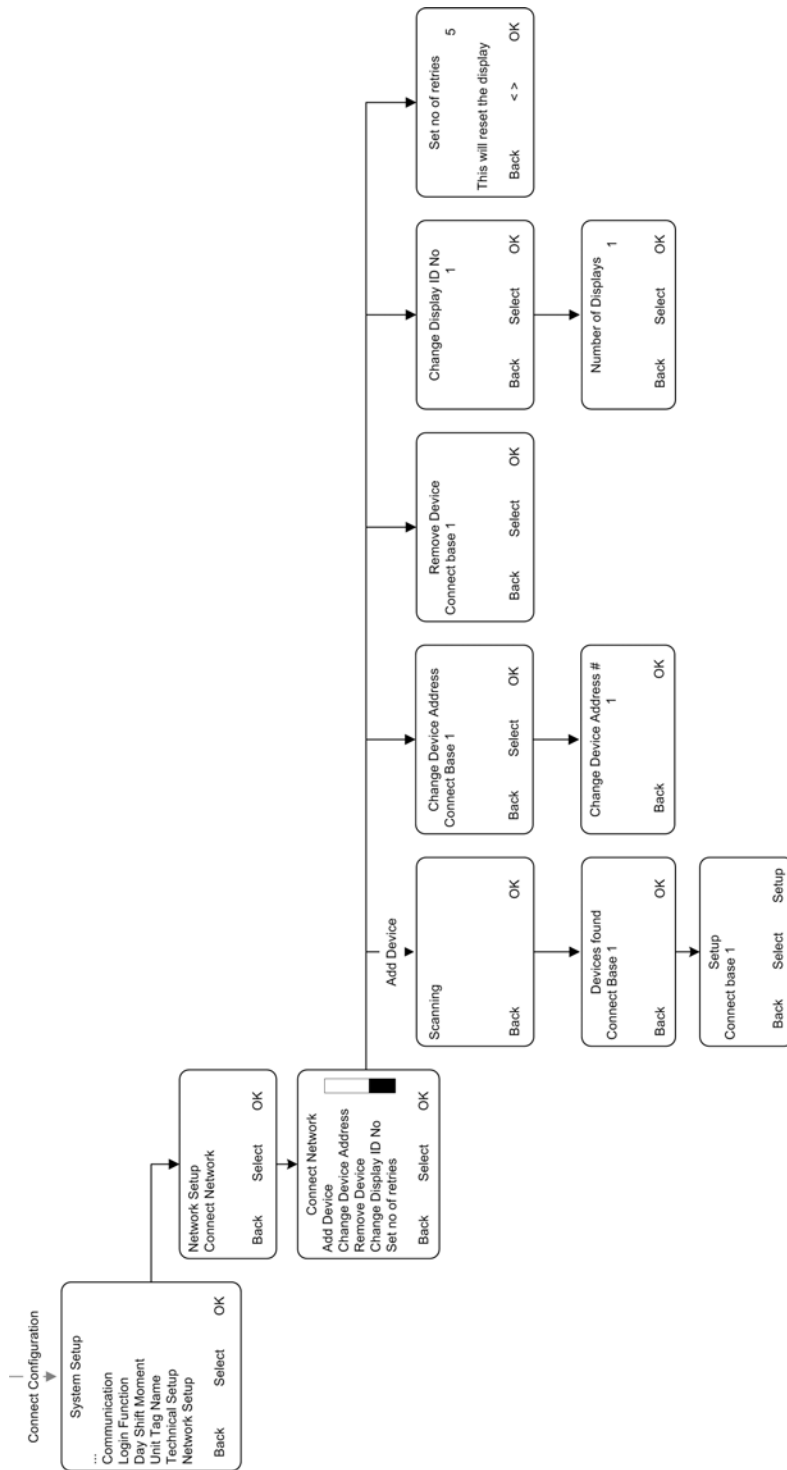
Access code, Day Shift, Unit Tag Name



Technical Set-up



Network Setup



Display pop-up alarms and notifications

Alarm

Name	Description
Current overrange	mA does not match 4 - 20 mA. e.g. 3,5 or 20,5 mA.
Factory reset occurred	reset to factory settings is performed. certain settings are changed. check all settings.
High alarm	High set point has been detected.
Low alarm	Low set point has been detected.
mA connection	The mA connection is not connected. If the current-out is used, deactivate mA Current out to stop this alarm.

Notifications

Name	Description
Eeprom write error	Error - Eeprom writing failure. In case of repeated notifications call an MJK technician.
System	Error - Internal VCC error. see event log for details
System error	Error - System software not working inclusive failure alarm and/or sensor parts. Contact MJK.

Warnings

Name	Description

Info

Name	Description
System reset occurred	Info - Converter have performed a software update and/or hardware reset.

USB

Name	Description
Flash programming please wait	Programming in progress but not finished.
Flash programming done	Programming finished.
Flash crc error	Cyclic redundancy check error.
Unknown command flash user text	Invalid command issued.
Flash address overrun	writing failure occurred
File phase error	Internal USB failure.
File write failure	writing failure occurred
USB protocol overrun	Communications error occurred.

Xylem |'zīləm|

- 1) The tissue in plants that brings water upward from the roots;
- 2) A leading global water technology company.

We're 12,700 people unified in a common purpose: creating innovative solutions to meet our world's water needs. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. We move, treat, analyze, and return water to the environment, and we help people use water efficiently, in their homes, buildings, factories and farms. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise, backed by a legacy of innovation.

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