SULZER

Control System Type ABS PCx

81300046D (07/2014)

EN

System Manual

www.sulzer.com

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Contents

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1 Information about the manual

The manual is split into following parts:

- Chapter 2 gives information of previous program versions.
- Chapter 3 gives a brief introduction how the PCx system works
- Chapter 4 describes how to configure the program.
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- Chapter 6 describes how the more complex control functions works
- Chapter 7 describes the program menus from the operator panels PCxop/h point of view
- Chapter 8 describes the additional function codes
- Chapter 9 describes the IO- and alarm numbers of the PCx
- Chapter 10 is an index of this manual

2 Version history.

This manual is supporting the software version 1.2 of the PCx.

New features for Rev B of this manual are:

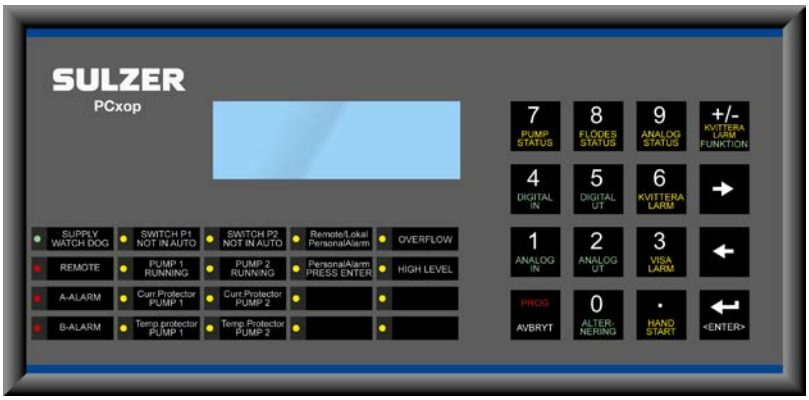
- Ramp times for analogue outputs
- New DI type, Alarm acknowledge
- New DI type, Manual start of pump
- Function 815, A delay between sending connect and ID string for LC- TRANSLATOR mode.
- Function 829, Alarm blocking when power failure alarm is active.
- Function 850, Energy save modes

3 General information about PCx

The PCx series is a control system from Sulzer. It contains three different modules, control processor unit PCx, expansion module PCxp and two operator panels PCxop.

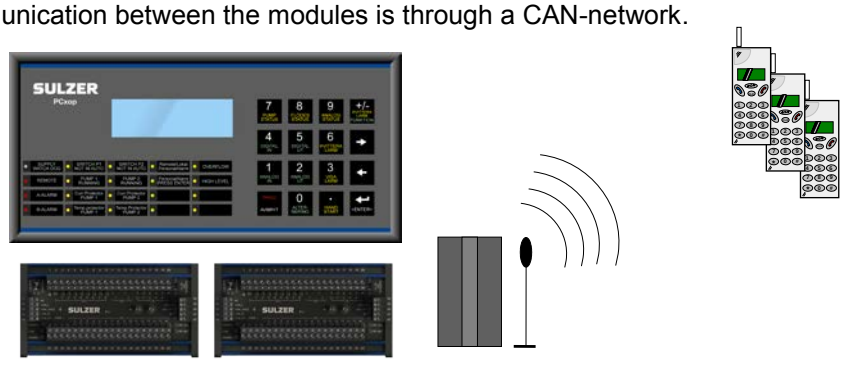
The control processor unit is a control computer PCx. The software in the PCx supports control of water and sewage pump works, pumping pits and booster stations. The PCx can also measure and log data, receive and transmit alarms. To do this the PCx has both digital and analogue in- and outputs. The PCx has a RS232/485 port for communicate with other systems.

The expansion module is a PCxp-unit, and its function is to expand the amount of in- and outputs. The PCxp-unit has also a RS232/485-port. Up to 7 PCxp-units can be connected to one single PCx.

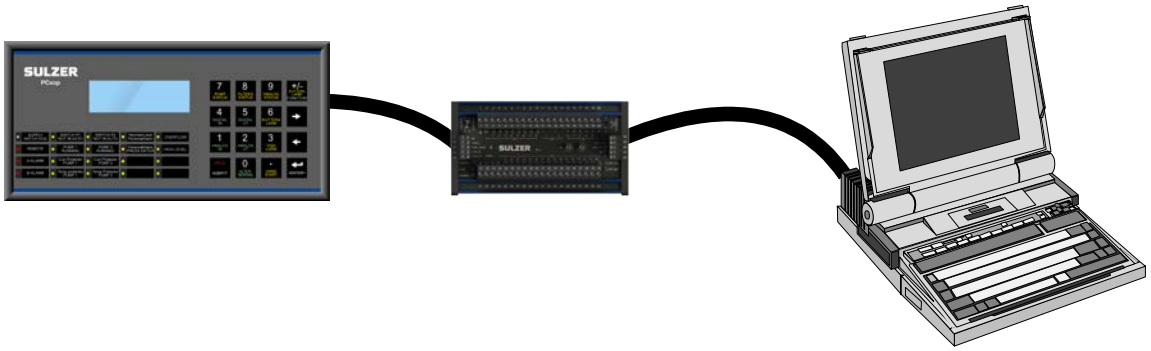


The PCxop is a permanent mounted panel.
The functions with the operator panel are to present information about the system and to put information in and configure the PCx

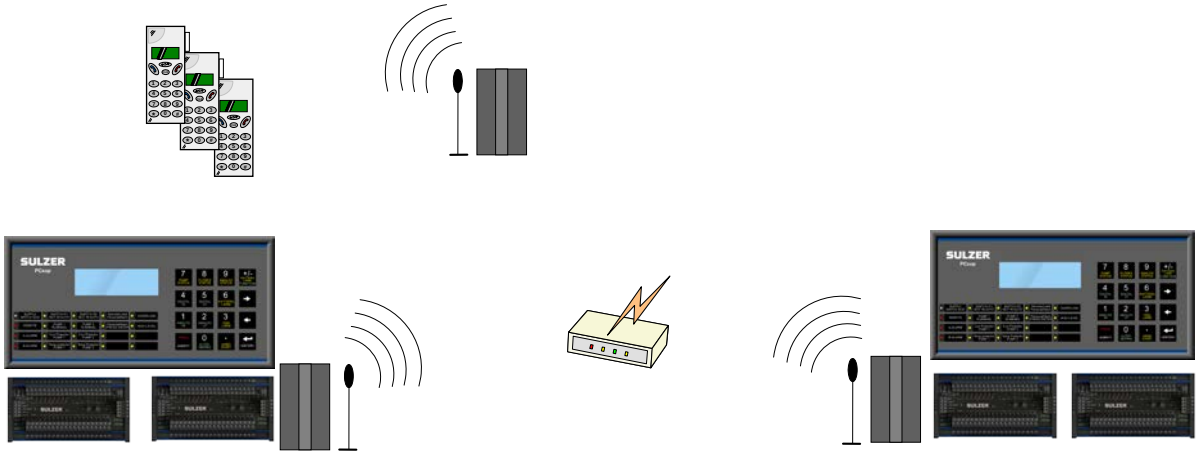
The communication between the modules is through a CAN-network.



The PCx can communicate with other systems through the interfaces RS232 and RS485. The PCx has built in functions for various kinds of accessories, for example modem and radio. The PCx can send alarms to supervision systems and SMS to mobile phones.



There are two ways to configure the system either by the operator panel or through a personal computer equipped with AQUA PROG software. The uplink to a computer could be a direct cable, a GSM-modem, radio or telephone-modem.



The PCx can be connected to a supervision and alarm handling system; an example is Aqua Vision from Sulzer. The communication is through the protocols COMLI or Modbus.

4 Program structure

4.1 General

The PCx is technically very advanced, which allowed us to develop a very powerful program for the control of water- and sewage works, pumping pits and booster stations.

The big difference between a normal PLC and the PCx-system is the programming or more correctly said the configuration of the unit. When configuring the PCx it is not necessary to learn a programming language or to make logic drawings, you just activate the built-in control functions needed, which are pre-programmed in the unit.

The larger parts in the PCx program structure are object-orientated.

When the needs of more control and complex measuring as for example pump pits the configuration is mainly done via the function keys ”Pump”, ”PUMP PIT” and ”Alarm” and also if needed ”Flow”.

Through the I/O keys ”Digital in”, ”Digital out”, ”Analogue in” and ”Analogue out” are the physical I/O of the unit linked to the control functions above

Extra functions for the unit are made through the ”Function” key.

All signals under I/O keys have specific names and will be described in this manual. All names of the predefined functions can be replaced with names that the user finds more adequate.

4.2 Data security

The PCx has 2 code access levels to prevent that unwanted changes of the program occur and a third basic level access where only the parameters are viewable.

- Operator access gives the possibility to change some of the set point values like start and stop levels of pumps but not to change the functions of the outputs.
- System access gives full access to all configuration levels in the PCx.
- Without an access code it is only possible to view parameters of the functions in the PCx.

From factory the unit is delivered with following access codes:

- Operator code = 1
- System code = 2

If these codes need to set to other values see function (F950).

Independent of what menu that are viewed on the PCxop the PCx-unit continues to work as normal.

If the PCxop keyboard has not been touched for 2 minutes the PCxop will automatically go back to the main menu. This means that the unit cannot be left with a system access level that can compromise the configuration of the system.

4.3 Keyboard description

Most of the keys on the keyboard have double functions depending on where you are in the menu tree. All showing and programming is done in the same way that makes it easy and fast to understand the system and use it.

Here follows a short description of the keys and its functions. Further information is available in the program module description.

- **PUMPPIT:**
  Status Pumped volume
  In this menu the pumped volume is shown for Pumppit 1-4 split into the last 7 days and as a total.
  Settings
  Here are the settings for the control, which are directly linked to the Pump pits. Settings for inflow calculations, overflow level and relative level.
  Pumppit valve
  Here a valve that is linked to the level in the pump pit can be configured.
- **Pump:**
  Pump status
  In this menu the running times of the pumps, the start counters and the calculated pump capacity for the last 7 days and as a total are found.
  Pump settings
  Here are the settings for the control parameters and functions of the pumps and the linking of the pumps to the pump pits.
  Pump valve
  In this menu you will find the settings of the control parameters and functions of valves that are connected to pumps.
- **Alarm:**
  Status
  Here the alarms are acknowledged and selected.
  Settings
  Here you find different possibilities to set-up alarms
  Set-up alarms
  Here only set-up alarms can be changed
- **Acknowledge alarm:**
  This key together with the arrow keys and ENTER key are used to acknowledge alarms. (Max number of alarm events in the alarm list is 500).
- **Function:**
  This function key together with 1-3 number code gives access to the special functions in the PCx.
- **Digital in:**
  This key is used to set the number of the Digital input to be programmed or shown the setting of.
- **Digital out:**
  This key is used to set the number of the Digital output to be programmed or shown the setting of.
- **Parameters:**
  Parameter settings of user specific data.
- **Analogue in:**
  This key is used to set the number of the Analogue input to be programmed or shown the setting of.
- **Analogue out:**
  This key is used to set the number of the Analogue output to be programmed or shown the setting of.
- **Flow:**
  Accumulated volume
  Here the accumulated flow for the flow and pulse channels are shown as a total value and split for the last 7 days.
- **Overflow status**
  In this menu the overflow status is shown for the last 7 days and as a total value.
  Actual values
  Here is shown the actual values for the Channel overflow measurement
- **Channel flow settings.**
  Here the Channel and overflow flowmeters are set.
- **Pump Start:**
  Her the status of the pumps is shown and the pumps can be started and stopped.

4.4 Show/Program

Show: (No access level)

Press the function key in which the sub function that you want to see is. Thereafter press **<ENTER>** key to verify your choice.

If a blinking marker is shown this means that you should either enter a value via the keyboard or step forward to next sub function with **<ARROW>** keys.
If you enter a function window with menu choice you chose the wanted menu with the**<ARROW>** keys and verify with the **<ENTER>** key. In certain menus the **<ENTER>** key is used to jump to the next menu and the <**ARROW>** key to step around inside the menu.

To get back to the main menu press <**CANCEL**> several times.

Programming/Configure:

When programming always start by pressing the **<PROG>** key and state your operator or system access code followed by **<ENTER>** to verify your choice.

Then you press the function key of the sub function you want to program and press the **<ENTER>** key to verify your choice.

A blinking marker means that you should enter a value via the keyboard or step forward to a sub function with
the **<ARROW>** keys..

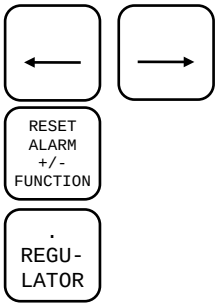
If you enter a function window with menu choice you chose the wanted menu with the **<ARROW>** keys and verify with the **<ENTER>** key. When a menu choice is a question for ex. YES/NO (Y/N), the **<ARROW>** keys are used to chose between YES and NO and the **<ENTER>** key to jump to the next menu.

To get back to the main menu press **<CANCEL>** several times.

4.5 Text writing

In the main part of the functions via the I/O keys you can set your own texts
Following characters are available:

abcdefghijklmnopqrstuvwxyzåäö !”#$%&’()*+,-./0123456789:;<=>?@
ABCDEFGHIJKLMNOPQRSTUVWXYZÅÄÖ\



With <ARROW> keys you step forward and backwards in the characters

With the <+/-> keys you step forward one position on the line.

With the <▪> key you can erase character by character.

5 Configuration

5.1 General

The PCx includes many functions and this chapter will give an overview of the available functions. Before you start configuring the PCx it is necessary to know to which in- and output the different functions use. It is not necessary to configure everything before the installation of the unit; the configuration can be changed and modified at any time without any disturbances in the functions.

The PCx can be configured using following steps:

- **I/O signals**
  Via I/O keys ”Digital in”, ”Digital out”, ”Analogue in” and ”Analogue out”.
- **Pumps**
  If pumps are to be controlled
- **PUMPPIT**
  If pumps are to be controlled
- **Alarm**
  If these were not already activated when setting the program functions ”Pump” and ”PUMPPIT” .
- **Flow**
  If flow is going to be calculated and stored.
- **Function codes**
  Functions that are not logically direct linked to above mentioned program modules.

How to configure these functions are described in chapter 7. In chapter 8 are the built in configurations listed that can easily be loaded and edited. Here are a very simple example on how to do an own control function for a pump pit that has two pumps and a level sensor. The sensor has a 4-20 mA range that equals to 1-3 m with P1 start level 0.7 m and stop level 1.0m and P2 start level 0.8 m and stop level 1.1m

Note! This example is only for showing how easy it is to connect in- and outputs on the PCx to the control features and that the built in configurations may be much better to start with as they have many options already set, protectors, alarms etc.

First connect the P1 through PUMP key menu and select pump settings-> normal operation. Step to Pump 1 and then connect it to pump pit 1. Thereafter set the start and stop levels for the P1 repeat it for P2. Configure two Digital outputs for both P1 and P2 through DIGITAL OUT key and set Dut 1 for P1 and Dut 2 for P2. Configure a Analogue input for the Level sensor through ANALOGUE OUT and set Ain 1 as Level Sensor PP 1 and configure the values for that sensor like 4 – 20 mA signal and set 4 mA equals to 0.1m and 20 mA equals to 3m. The PCx will now control the pumps in this pit as mention in the description before.

5.2 Pump control

A fast way to configure a new pumping station is to activate one of the standard configurations for 2, 3 or.4 pumps and modify the configuration to fit the specific application. To do this, look at the configuration descriptions at the end of this manual.

5.3 PC programs.

Two programs that supports the PCx is:

- **Aqua Prog**
  A program to configure the PCx from a Windows environment. For both fixed or called up communication.

- **AQUA VISION**
  A complete alarm and supervision system for ABS products. For both fixed or called up communication.

6 Program functions

In this chapter are the basics of the functionalities and properties for the PCx described.

6.1 Pump control

The PCx software is object oriented and below is the properties of a pump pit object and a pump object listed. The PCx can control up to 4 pump pits, which can be configured separately.

Properties for a pump pit are:

Can control pumps, which are connected to it. The pumps can have individual start and stop levels.
Can alternate between pumps in the pump pit both run time alternation and pump start alternation is available. The alternation do not need to be applied to all pumps in the pit only those that are configured to do this, an example is pump 1 and pump 3 is alternated and the pump 2 is not and is always using its individual setpoints.
A delay between different starts of pumps can be set for each pump pit, an option to prohibit that several pumps starts at the same time, this function can be used to avoid heavy loads on the electric net.
Can have a level sensor configured for it.
Can backup control pumps if a level sensor is damaged.
Can start pumps on a high inflow in order to start pumping earlier than the start level setpoint to prevent overflowing pits that do not have a large storage capacity, each pump can have its own start level.
Can control valves for the pit.
Can give status about overflow.
Can give status about the amounts of starts and stops in a pit etc.
Can have a day and night mode with different levels of operations.
Can send alarms about different failures and high – low levels and many more.
Can measure and calculate the in- and outflow of the pit.

The PCx can control up to 16 pumps. Some of the properties for a pump are listed here:

Can be linked to a pump pit or group.
Can be controlled by an own sensor, pump pit level sensor etc. which are connected to an analogue input.
Can have own setpoints for stop and start levels and these can be set to be different during day and night.
Can be speed controlled.
Can control the valves to the pump.
Can have a maximum time of operation, in example if the pump runs hot after 60 min it can be set to only be run just 60 min a time.
Automatic calculations of the capacity for the pump.
A pump can have its own start level of the inflow to the pump pit.
A pump curve can be inputted for each pump for more accurate calculations of the capacity of the pump.

6.1.1 Back - up control

As a safety against a broken level sensor a backup control function can be used. If the pump pit has a high-level float sensor fitted it can to start the pumps when the usual level sensor has been broken. It has a timer that can run the pumps after that the high level sensor has been deactivated. The timer can be set between 0 to 999 seconds. The alternation function, if it has been set for a pump, is still in use even during this back-up control. The time will be divided equally between the alternated pumps. If several pumps have been set to run with the back-up control will these start with the usual set time delay for the pump pit, even if the high-level float sensor has been deactivated during that time. A backup controlled start will be indicated in the alarm list.

6.1.2 Running indication

If the pumps are put in automatic control mode can an alarm for pump failure be received if there is a feedback indicator connected to the digital input or a current transformer connected to an analogue input.

6.1.3 Delays

Separate start and stop delays can be set for each pump. These delays are used before any alternation of pumps and work as a filter to avoid waves and other measuring disturbances affect the setpoints for the pumps.

Furthermore a min. time between starting different pumps can be set. This timer is activated when a setpoint is active and blocks the start of all other while the timer is active.

A min. time can be set before stopping a pump and different pumps can have different delays that prohibit the pumps to be stopped at the same time, in example when blocking a pump pit. That is used to prevent transients in the electric net, which often occur when stopping several big pumps at the same time.

NOTE! External control of separate pumps comes after set-points and the alternation and is not affected by the timer for min. time between pump starts or the pump stops.

6.1.4 Blocking

A blocking signal from a digital input can be used to block the whole PUMPPIT or a separate pump Blocking of a separate pump is done without time delay. When blocking a PUMPPIT the min. times between pump stops are active.

6.1.5 Manual start of pumps

A manual controlled pump is run without alternation and time delays. A manual start via the PCxopi can only be made if the water level is between the set start and stop levels for the pump unless an external button is mounted and connected to a digital input. Eventual alternation is reset when a manually started pump stops at a stop level or a manually stopped pump starts at its start level.

6.1.6 Reset motor protector

This function can reset the motor protector automatically. When the protector has been set the PCx can automatically try up to 3 times to reset it. If not successful during the last attempt an alarm will be set, ERROR M-PROT, and manual reset of the protector must be done.

Settings that can be done are a timeout from 1-999 sec and a reset pulse time from 1-99 sec.

Manoeuvre via Comli/Modbus is only possible if motor protector is fallen.
At Comli/Modbus manoeuvre with 0 all further attempts are stopped until the motor protector has been reset manually or a new Comli/Modbus manoeuvre is made
At Comli/Modbus manoeuvre with 1 the attempt counter is set to 0 and a new resetting sequence starts.
NOTE! The delay timer is executed before the pulse is sent even when using Comli/Modbus manoeuvre.

6.1.7 Reversing the pumps

This function can automatically reverse the pump. It has two different sequences that can be used. In the first sequence the function holds the pump in off position during pre-set delay time and thereafter activates another pre-set reversing output for a reversing time.

Another sequence is if a pump output is set as Pump Relay ON, the pump output will be activated 0.5 sec after the reversing output and will be closed 0.5 sec before the reversing output and thereafter the pump is blocked during the pre-set delay time before it goes back to normal running conditions.

The Pump reversing can be chosen to start automatically when PCx is resetting a motor protector and the pump capacity drops below a setpoint value or via Comli/Modbus communication.
A running sequence cannot be stopped via Comli/Modbus

6.1.8 Spray pumppit

This function counts the pump stops for a pump or a whole pump pit and gives an output impulse after a pre-set number. If a specific pump number is set, this function only counts the stops for the specified pump. If a specific pump pit is set, the function counts all pump stops for all the pumps in the pit.
If a pulse time is set to 0 the output is active while any of the pump(s), which controls the counter, are in an OFF position after the pre-set number of stops has been reached.

6.2 Valve control PUMP and PUMPPIT

6.2.1 Pump valve

The PCx can control Pump Valves through two different functions. One uses a digital output as VALVE CONTROL and the PCx activates the output the whole time the valve shall be open (same as pneumatic valves). The other function requires two digital outputs configured as an OPEN VALVE signal and a CLOSE VALVE signal. The valves can be without end point contacts or with indication of one or both end contacts. If the pump has a running indication from a current transformer or a digital input is the valve blocked until running indication from the pump is received.

When not using end contacts indication the OPEN and CLOSE relays are active during the time set in END POSITION MAX TIMES. "Pump time open" is the time the pumps are running before the valve starts opening. "Pump time closing" is the time the pump is running after closing of valve has started **NOTE!** Pump time can be set to be shorter or longer than valve time.

When end contact is used and is reached the OPEN or CLOSE outputs become deactivated. When “end contact closed” is reached the pump will stop even if the pump time closing is not reached.
If detection of the end contacts is not found within the pre-set MAX time a closing sequence will be made. Also if a closing indication is missing the pump will be blocked until the end contact is repaired If OPEN indication is missing the pump will be blocked until the set-point is OFF (New attempt will be made next time the pump starts). If both OPEN and close indication is received a closing sequence will be made and the pump blocked until the error is solved. This will be indicated by Alarm Valve error. If the CLOSED indication disappears a closing sequence will be made. If CLOSED indication does not reappear the pumps will be blocked as above. When the OPEN indication disappears the REOPEN sequence will be run for the pre-set time. If OPEN indication does not reappear the pumps will also be blocked as above.

IF "Blocking at error "is set the pump is blocked until the Alarm PUMP ERROR BLOCKING is acknowledged.

6.2.2 Pump pit valve

This built in function controls the valve of the pump pit. The valve opens as soon as any of the pumps in the pit starts and is closed when all pumps in the pit are OFF. The pump(s) which is running when a start of a closing sequence will continue(s) to run for the time set in PUMP TIME CLOSING. Otherwise the function is identical to PUMP VALVE.

6.2.3 Other information

If a level controlled valve has to be connected a free pump can be used to set up the pump valve without connecting any pump to the output.

6.3 Pump capacity and In/Outflow of the pit

In a normal pump pit is the inflow calculated continuously by the level change in the pit and the outflow is calculated by the sum of the capacities of the pumps that are running.

The capacity for a pump is calculated when only that pump is running. The calculation freezes the inflow value when the pump starts and thereafter the outflow is calculated during a preset time. The time must be long enough for the pump to reach full speed and for the water to reach full velocity in the pipe. These setting are found in the Pump menu. After the set delay for the start, the volume is calculated by the level difference during the measuring period. To get the real capacity, the calculated volume is recalculated to an outflow and the frozen inflow value is also added to this, if a pump curve has been inputted, will it also normalised the flow value to the lowest head of the pump. These calculations are assuming that the inflow is constant during the measuring period.

The data used has to be filtered to prevent that disturbance doesn't spoil the result of the calculation. The filter process uses one value of the last 5 measurements. The filter will first discard the 2 values with the highest deviation of the last 5 measured values then makes an average value of the remaining 3 values. Note, this means that changes in the configuration does not affect the measurements and calculations until at least 3 new calculations of the Pump capacity has been made. The last actual value is always the result of the last measurement.

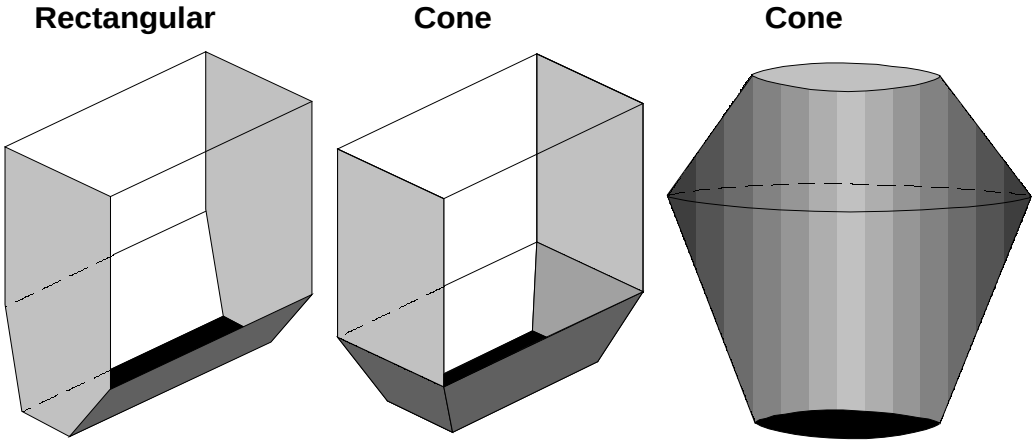
In the status menu for the Pump capacity both the actual and the filtered values are shown. An average value for all measurements during a day is made and is saved for 7 days. Also an average value for the week is made. Updating of all values is done after each new calculation. Each new day starts with the last actual value of the day before.

The outflow of the pit is calculated when the pumps are running. It is based on the capacity for the pumps and is accumulated to a pumped volume. If a level difference in the pit, during pumping, gives changes in the pump capacity according to the pump curve, this should be set in the PCx. The outflow will in this case be compensated with the actual level in the pit according to the pump curve, which gives a more accurate accumulated volume. As the pressure losses in a pipe can be higher if more than one pump is running at the same time, there is a possibility to adjust for it by setting a capacity factor when more pumps are active. A specific factor can be set for all steps between 2- 16 pumps active. In certain situations it can be extremely difficult to achieve a proper reading of the pump capacity. Setting the measuring time for the pump capacity to 0 seconds can in this case shut off the measurement. To get a working outflow measurement in these cases, the pump capacities (actual values)can be entered manually.

In the normal case the pumps are set to EMPTY the pit. When the pumps are used in ex. water towers ,it must be changed to pumps are FILLING the pit. In this case the inflow is the sum of the pump capacities and the outflow is calculated continuously based on the level changes.

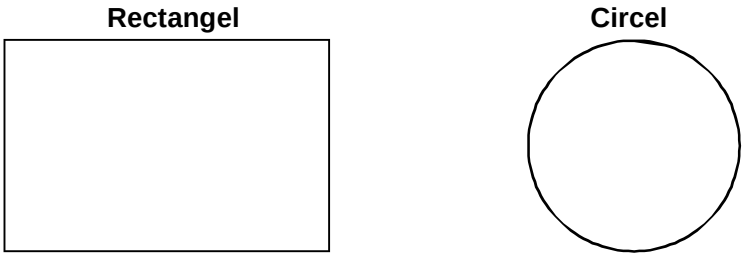
6.3.1 Pit shape

The continuous flow measurement is based on the fact that the PCx can calculate the volume by measuring the level difference during a set calculation time. For this calculation is to exact it is necessary that the area /level should be always known. This can be achieved by setting the level and area for all level where the pit changes shape, up to 9 break points + the area at zero point can be set.



To get a correct calculation at all levels even the pit shape has to be set as the calculation is different for different geometrical shapes. A shape that ends in a point is set as conical, if it ends as a wedge (2 parallel sides) it is set as rectangular shape, see figure above.

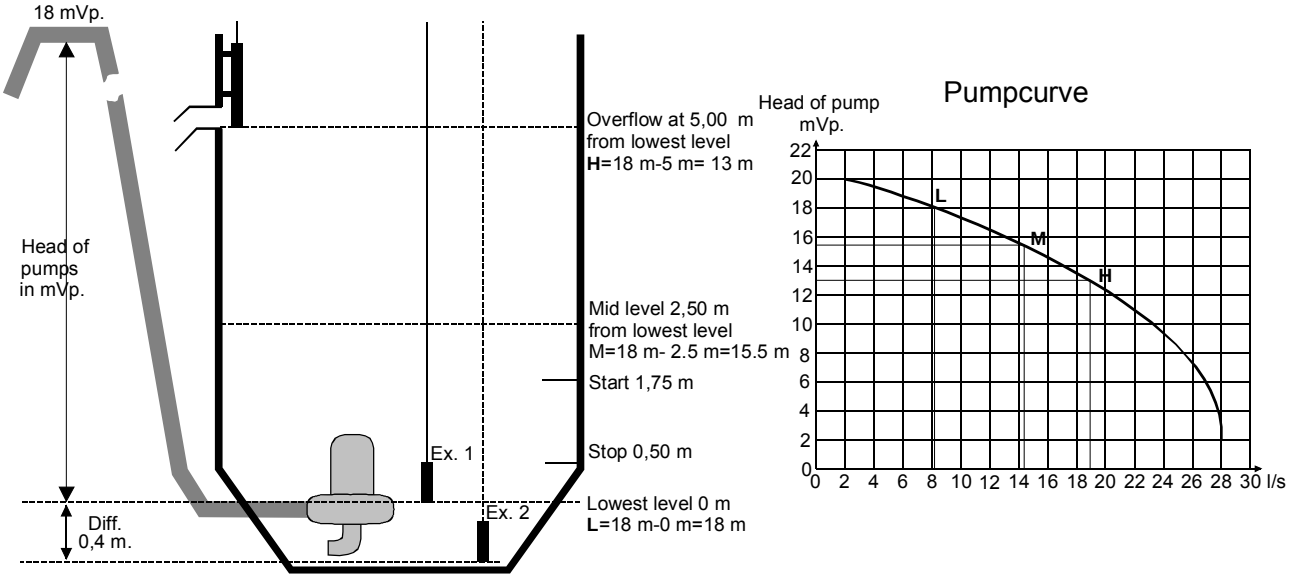
6.3.1.1 Example for area calculation:



A= L * W	**Ex.**	**A= pi * r²**	**Ex.**
A= Area	**A**= ?	**A**= Area	**A**= ?
L= Length	**L**= 2,20 meter	**pi**= 3,14...	**D**= 2,50 meter
W= Width	**W**= 1,75 meter	**R**= Radius = D/2	**R**= 2,5 / 2 = 1,25 meter
	A= 2,2 * 1,75		**A**= 3,14 * 1,25²
	A= 3,85 m²		A= 4,9 m²

6.3.2 Pump curve

The outflow from a pump pit is calculated by adding the calculated pump capacity for the pumps running. For some pumps the capacity can vary considerably depending on where the normal working range is on the pump curve. PCx can continuously adjust the calculated out flow to flow at actual level if the pump curve is available. The pump curve is set separately for each pump by setting 3 values from the pump curve. Best accuracy is achieved if these 3 values are chosen within the normal working range of the pump. The head of the pump must be known to get on the right part of the pump curve. The head is calculated from the highest point of the outlet pipe.



Actual head of pump =Total head of pump – actual level.

6.3.2.1 Example:

Setting of pump capacity is in integer l/s, which means that we have to adjust the levels to integers for the pump capacity.

Above pump curve gives following flows

		Head of pump (l/s)	Pump capacity
Lowest level (outlet level of pump)	**L**	18 m	8
Mid level		15.5 m	14.2
Mid level adjusted to integer flow in l/s	**M**	15.6 m	14
Highest level in pit	**H**	13 m	19

```
PUMP: 1   Pump curve
18.00 m =    8 l/s
15.60 m =   14 l/s
13.00 m =   19 l/s
```

Head:
If sensor is mounted according to Ex.1 (sensor 0-level = outlet level for pump) the head is set to18 m .
Often the sensor 0-point is lower than the outlet of the pump. In this case the difference must be added to the head.
The sensor according to Ex.2 is 0.4 m below the pump outlet. Head is set to 18 m + 0.4 m = 18.4 m.

Sensor according to Ex.1

```
PUMPPIT: 1  Flow:
Head of pumps for
compensation with
pump curve   18.00 m
```

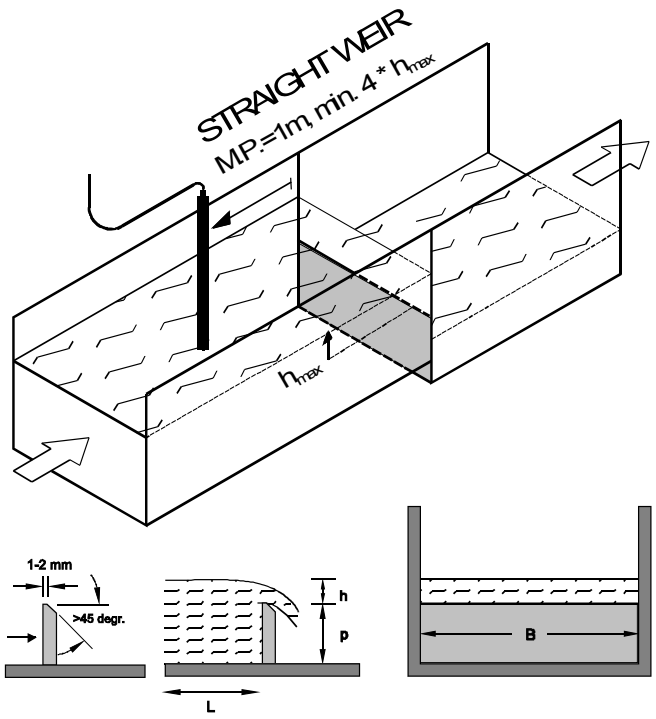
Sensor according to Ex.2

```
PUMPPIT: 1  Flow:
Head of pumps for
compensation with
pump curve   18.40 m
```

6.4 Flow

6.4.1 Measuring points Open channels / Weirs

6.4.1.1 Straight weir with and without side contraction



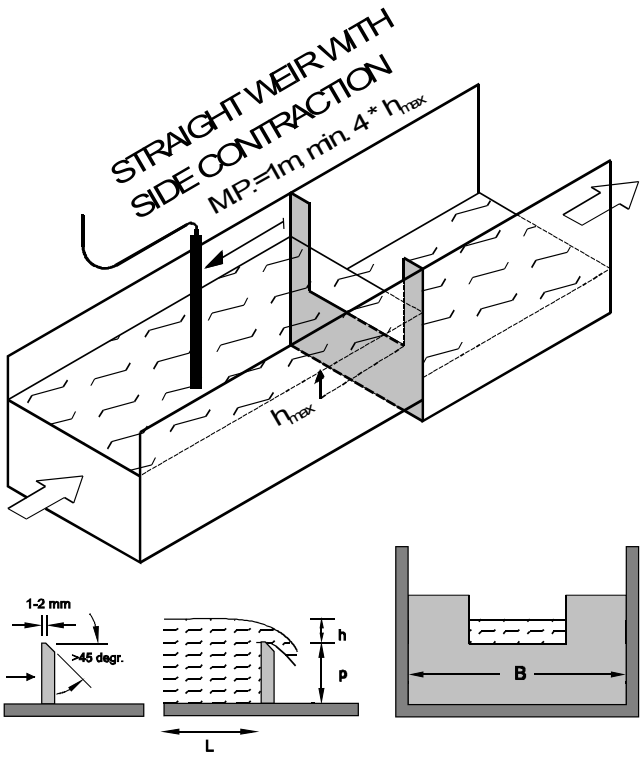
Flow parameters for straight weir without side contraction:

$Q = C_e * 2/3 * 2g * b_e * h_e^{1,5}$

- Width of weir **b** > 0,15 meter.
- Measuring height **h** > 0,06 meter.
- Weir height **p** > 0,09 meter.
- **h/p** = 0 - 2,55
- **Q** = flow in [m^3/sec]
- **C_e** = flow constant, a function of: **h, b** and **h/p**.

Flow conditions:

- Straight length: **L** > 10 * b, If some type of dampening device is used the straight length can be made shorter.
- The channel width should be the same after the weir for a distance of: 0,3 * h_{max}.
- A inlet with free fall into the channel must be at least 30 * h_{max} in front of the weir.



Flow parameters for straight weir with side contraction:

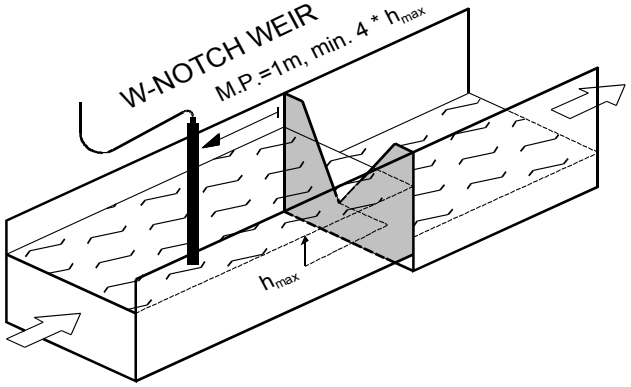
$Q = C_e * 2/3 * 2g * b_e * h_e^{1,5}$

- Weir width **b** > 0,15 meter
- Measuring height **h** > 0,06 meter
- Weir height **p** > 0,09 meter
- **h/p** = 0 - 2,55
- **b/B** = 0 - 1,00
- **(B-b)/2** > 0,10 metre
- **Q** = flow expressed in [m3/sec]
- **Ce** = flow constant, is a function of: **h, b, h/p** and **b/B**.

Flow conditions:

- Straight length: **L** > 10 * b, If some type of dampening device is used the straight length can be made shorter.
- **b** < 1 metre free fall after the weir at least 0,1 * h_{max}.
- **b** > 1 < 5 metre, min 0,25 * h_{max}.
- An inlet with free fall into the channel must be at least 30 * h_{max} in front of the weir.

6.4.1.2 V-notch weir and special v-notch weir in a measuring chamber



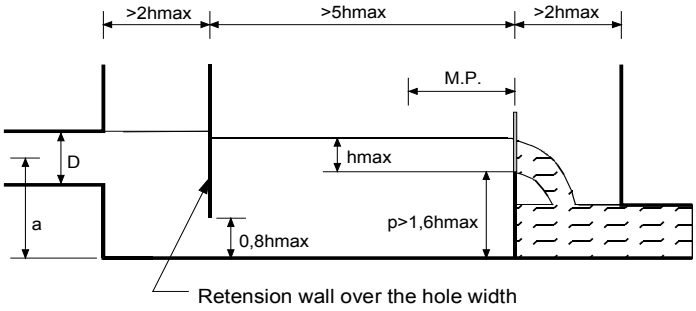
Flow parameters concerning V-weir (Thompson):

Q = Ce * 8/15 * tan(@/2) * 2g * he2,5

- Angle in degrees @ = 20 - 100
- Measuring height **h** >0,06 meter
- Weir height **p** >0,09 meter
- **h/p** = 0,1 - 2,00
- **p/B** = 0,1 - 1,00
- **Q** = flow expressed in m3/sek
- **Ce** = flow constant, is a function of: **h, @, h/p** and **p/B**.

Flow relationship:

- Straight length: **L** > 10 * b, If some type of dampening device is used the straight length can be made shorter.
- If **B/b** > 3 or $\mathbf{h_{max}/p}$ < 1 the distance can be reduced.
- A inlet with free fall into the channel must be at least 30 * h_{max} in front of the weir.



Flow parameters concerning special V-weir (Thompson) special:

$Q = C_e * 8/15 * \tan(@/2) * 2g * h_e^{2,5}$

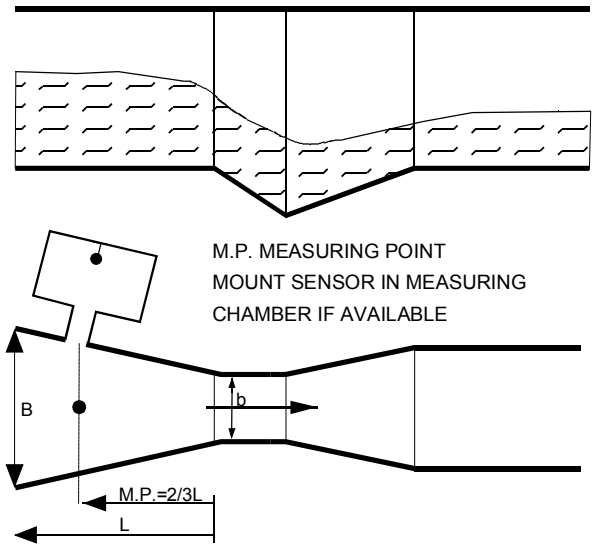
- Angle in degrees @ = 20 - 100
- Measuring height **h** > 0,06 meter
- Weir height **p** > 0,09 meter
- **h/p** = 0,1 - 2,00
- **p/B** = 0,1 - 1,00
- **Q** = flow expressed in m^3/sec
- $\mathbf{C_e}$ = flow constant, is a function
- of: **h, @, h/p** and **p/B**.

Except for above, the following should be taken into consideration:

- The pipe diameter **D** = 0,8 * h_{max}
- p + 0,55 * D = **a** = 0,6 * h_{max} + 0,5 * D
- 2 * h_{max} = **M.P.** = 4,9 * h_{max} preferably choose **M.P.** = 4 h_{max}
- **B** = 3,2 * h_{max}

6.4.1.3 Parshall and Venturi flume

PARSHALL FLUME



Flow parameters concerning Parshall flumes:

Q = C_e * b * h^{exp}

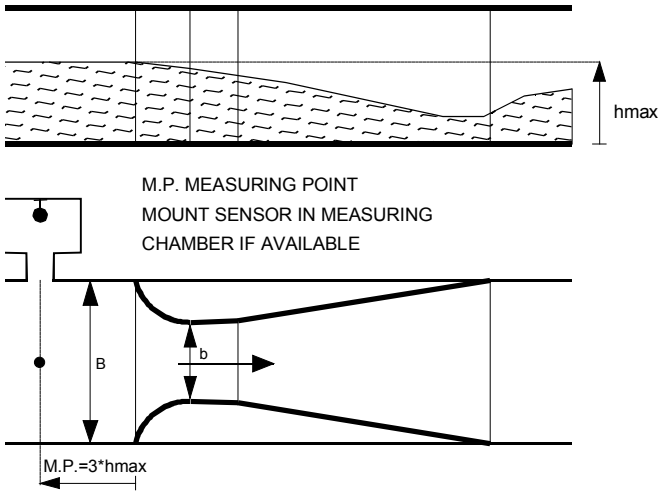
- **Q** = flow expressed in m^3/sec
- **C_e** = flow constant, is a function of among other: b/B. Varies between 2,316 (3") - 2,367 (36")
- **b** = contraction width
- **B** = channel width
- **Exp**. The exponent varies between 1,547 (3") - 1,566 (36").
- **h_{max}** 0,8 * B

Flow relationship:

- Straight length: **L** > 5 * B, If some type of dampening device is used the straight length can be made shorter.
- The channel gradient should be less than 0,1 - 0,3%.
- A inlet with free fall into the channel must be at least 30 * h_{max} in front of the weir.

Ce and exp. are programmed in the LF/LPF for the different channel widths.

VENTURI FLUME



Flow parameters concerning Venturi channels:

Q = 2/3 V 2/3g Cv Ce b $h^{1.5}$

- **Q** = Flow expressed in m^3/sek
- **g** = 9.8066
- **C**v = Flow constant, is a function of:: **b/B** > 0.3, **b/B** < 0.70
- **C**e = (**b**/(**b** + 0.004 **L**)) ((**h** - 0.003 **L**)/**h**)
- **b** = Contraction width
- **B** = Channel width
- **L** = Contraction length > 1.5 $\mathbf{h}_{max}$

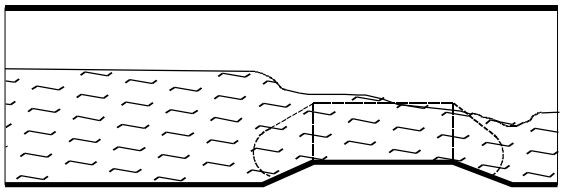
h = Level < 3 **b**

Flow relationship:

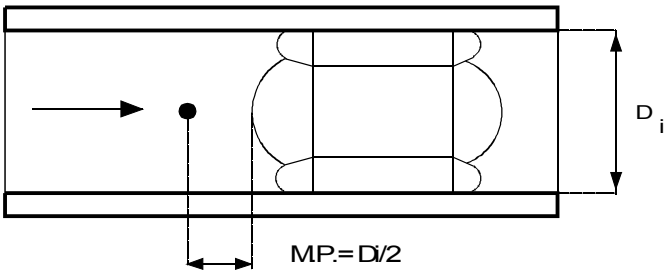
- Straight length: **L** > 5 * B, If some type of dampening device is used the straight length can be made shorter.
- The channel gradient should be less than 0,3 - 0,5%.
- A inlet with free fall into the channel must be at least 30 * h_{max} in front of the weir.

6.4.1.4 Palmer Bowlus flume

PALMER BOWLUS FLUME



M.P. SHOWS THE MEASURING POINT.



Flow parameters concerning Palmer Bowlus flumes:

- h_{max} for PB with pipe connection is 0,9 * D.
- h_{min} = 0,05 metre or 0,05 * D.
- h_{min} when D < 0,3 = 0,03 metre.
- h_{min} at polluted water 0,2 * D.

Flow relationship:

- Straight distance L > 6 x D.
  If any kind of flow dampening device is used the distance can be shortened.
- The channel gradient should be less than 0,1 - 0,3%.
- An outlet with a free fall into the channel should be at least 30 * hmax before the flume.

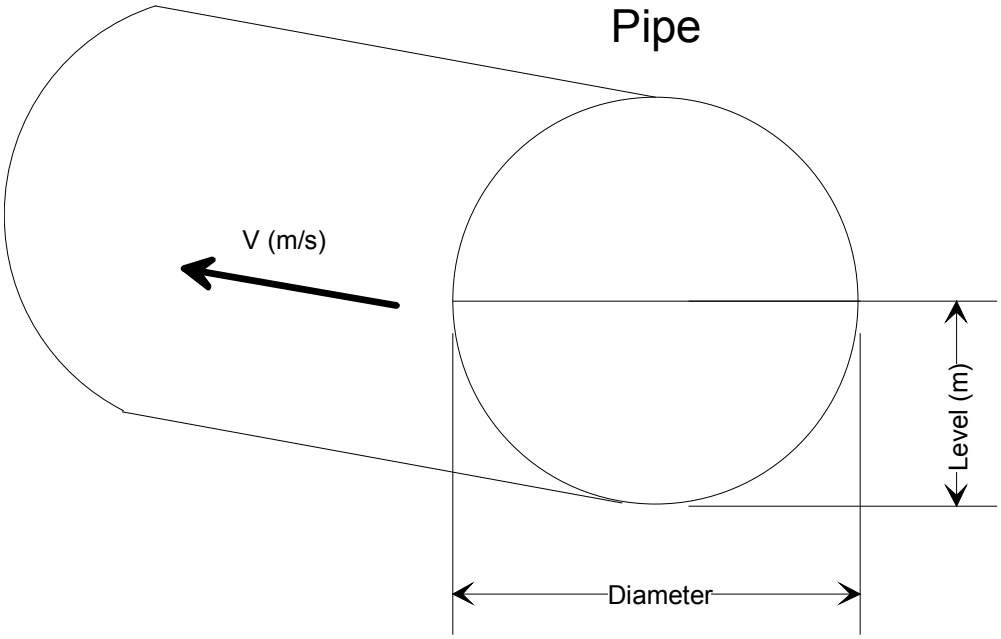
Use function "Known values" for calculation of PB flumes according to the table below.

Table over values to be set in function "known values" for PALMER BOWLUS FLUME

m	Z	4"	Z	6"	Z	8"	Z	10"	Z	12"	Z	15"	Z	18"	
0,01	1	0,10	1	0,14	1	0,18									l/sec
0,02	2	0,31	2	0,42	2	0,54	1	0,66	1	1,00	1	1,10	1	1,15	l/sec
0,03	3	0,64	3	0,82	3	1,05									l/sec
0,04	4	1,09	4	1,34	4	1,69	2	2,04	2	2,50	2	2,75		3,82	l/sec
0,05	5	1,64	5	1,99	5	2,46							2		l/sec
0,06	6	2,33					3	4,02	3	4,62	3	5,25			l/sec
0,07	7	3,15	6	3,70	6	4,46									l/sec
0,08	8	4,07					4	6,64	4	7,37	4	8,75	3	9,50	l/sec
0,10			7	7,46	7	8,70	5	9,95	5	10,87	5	13,00			l/sec
0,12			8	10,58	8	12,47									l/sec
0,14							6	19,01	6	20,37	6	23,75	4	24,75	l/sec
0,16					9	21,66									l/sec
0,18							7	37,85	7	33,75	7	38,75			l/sec
0,20							8	37,85					5	46,87	l/sec
0,24									8	58,30	8	68,00			l/sec
0,27													6	85,07	l/sec
0,30											9	104,0			l/sec
0,33													7	131,9	l/sec
0,36													8	165,0	l/sec

6.4.1.5 Flow measurements in a pipe

The PCx can measure the flow in a pipe if a velocity sensor and a level sensor is attached to it. The diameter of the pipe is configured in the FLOW key. The Velocity sensor and the Level sensor is configured on the ANALOGUE key. To configure a pipe flow measurement press the FLOW key and select a Flow channel (1-4), then select Pipe flow, set the diameter and what analogue input is used by the velocity sensor. Then configure the analogue inputs. See below for more info.



The flow key settings.

```
5 Flow ch 1     :
Pipe Flow
Pipe dia.   2.000 m
Speed sensor=A.in1:2
```

Select a flow channel and then pipe flow. Then set the diameter of the pipe and last select the analogue input used for the Speed sensor.

The analogue key settings.

```
IO-module:1(1) Ain:1
mA input
Channel flow
Flowmeter no.1
```

Select the input that has the level sensor and select Channel flow.

```
IO-module:1(1) Ain:2
mA input
Free-choice
Unit: m/s   2 decim.
```

Select the input with the speed sensor and select Free-choice.
Type in the unit m/s (it must be a meter per second signal or scaled to that.).

Now it is finished and the measurements should be active.

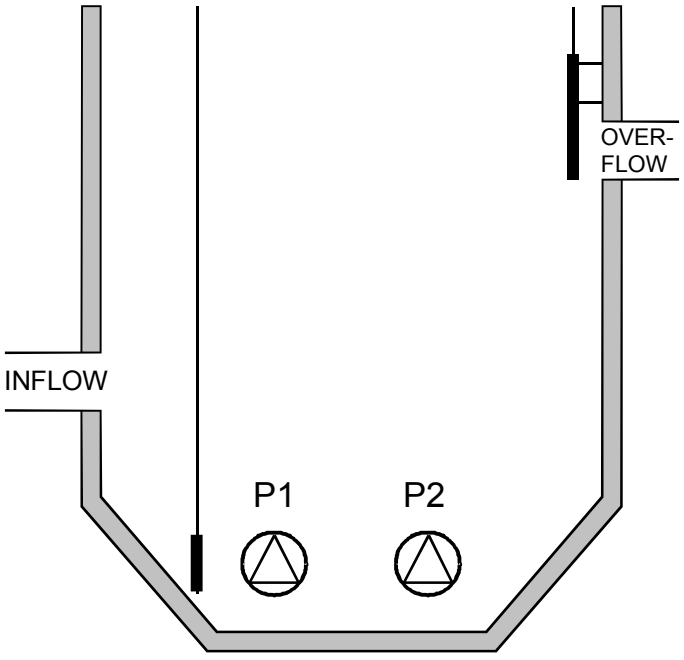
6.4.2 Overflow flow measuring

There are several methods that can be used to measure and calculate overflow flow:

1. Use a weir and a conventional flow meter.
Advantage: In most cases for standard PLC-systems will it increase the accuracy on the measurement.
Drawbacks: Expensive and on sensors that only measure the overflow can dirt and mud dry on it, when the pit is operating in normal conditions. The sensor has to be cleaned regularly to ensure correct measurements.

2. Use the same sensor that is used for the level measurement in the pit and a weir and start the flow measurement on analogue setpoint.
Advantage: The investment cost is low and the sensor will not need to be cleaned regularly.
Drawbacks: The system must have a very good resolution on the input to be able to measure the overflow correctly and a very accurate 0-point otherwise the measurement is wrong.

3. Use the same level sensor that is used for the level measuring in the pit and a weir and use a level switch to start the overflow measurement.
Advantage: The Investment cost is low and the sensor needs not to be cleaned regularly. The accuracy of the 0-point is not affecting the measurements due to that the switch is used as a 0-point.
Drawbacks: The analogue input needs to have a very good resolution to be able to measure the signal. The PCx has no problem with this in ex. A Sensor with the range of 10 meters the PCx has the resolution of < 0.7 mm.



The third method is used in the PCx

A digital input indicates if an overflow is occurring independent of what the level signal shows. The PCx locks this actual level and the PCx starts calculating the overflow level / flow from this value. This means that the level is measured with a very high accuracy with a right 0 - point. If an exact flow measurement is needed a weir or channel should be used.

The PCx program has all the functions available for calculating flow in weirs and channels. The overflow is measured separately for each pump pit. Number of overflows, overflow time and overflow level and the flow are logged.

The levels sensor is used as the actual level signal when the switch is activated it sets the 0 - point for the flow measurement. If no level switch is connected to the PCx the 0- point for the overflow can be set in "PUMPPIT / Settings / Options / Overflow" manually. Overflow will be registered when the level exceeds pre-set overflow level on the usual level sensor.
NOTE! This setpoint has no function if a digital input (Overflow switch) is set for overflow indication in the pump pit.

A delay can be set to prevent disturbances and that waves trigger the switch. After this delay the flow measurement starts and the time of the overflow is recorded. A counter keeps track of how many times the pit has overflowed.

The overflow time is only trigged when the level is higher than the stored (set) 0- point .
If a float sensor is used for a pump pit, which has no level sensor, the overflow time counts all the time the float is active.

The overflow alarm will stop after the float goes back to normal and the stop delay to avoid errors in the counter and to compensate for the start delay.

NOTE! If no alarm for the overflow is used will not the PCx register an overflow.

6.4.3 Ext. Flowmeters with mA.output.

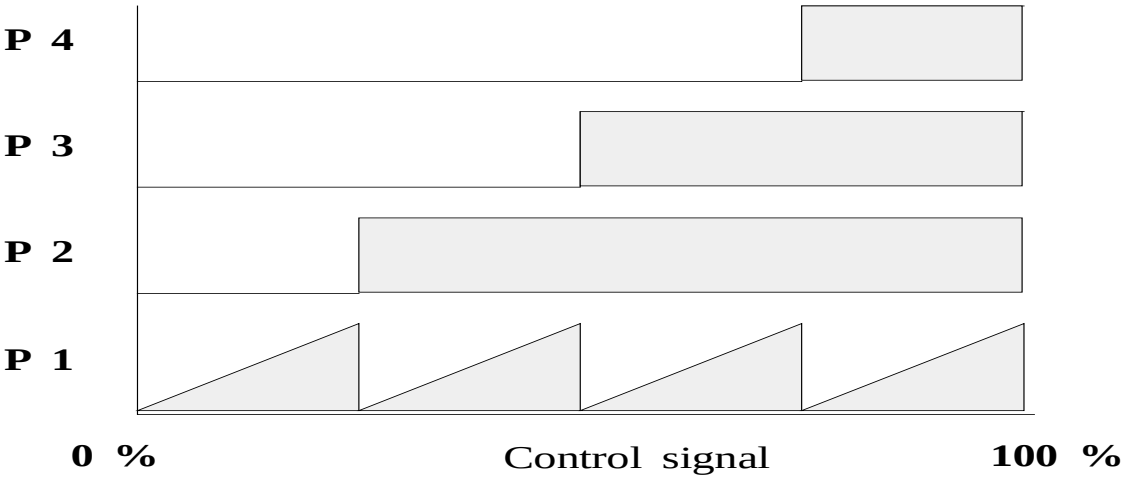
Existing Flowmeters can easily be connected to the PCx.

6.4.4 Ext. Flowmeters with pulse output.

PCx can add and calculate digital pulses from sensors.

6.5 Speed control of pumps

PCx has a built-in logic for PID or P-BAND control of speed controlled pumps
For pressure boosting the PID control is used for holding constant pressure in the pipeline.
In pump pits PID control can be chosen if the level should be kept at a precise level, alternative P-BAND control for equalising the flow for ex. in the last pit before a treatment plant.



The speed control works with one speed controlled pump and, if more boost is wanted, more fixed speed pumps. This means that when the speed controlled pump can't keep up pressure or flow a fixed speed pump is started and the speed of the speed controlled pump reduced to accommodate the increased pump capacity. This is called a pump group in the PCx program.

The control signal (Output signal PID controller or set level range for P-BAND) is automatically divided for the number of available pumps, which are not set blocked.

The automatic alternation of the fixed speed pumps is set individually for each pump as mentioned earlier. The speed controlled pump can be shifted via a built-in week timer on pre-set days and times.

Possibility to connect separate pressure sensors on the suction and pressure side and to set a highest allowed pressure difference between them with an automatic limitation of the output signal when the suction pressure is dropping (The output signal can be set to limited to the difference + suction pressure).

A setpoint can be used for blocking the pump when too low suction pressure is obtained.
A setpoint for min. speed for a pump can be used when running a speed-controlled mode.

A ramp up/down time can be used for increasing / decreasing the speed of pumps.
A separate start-up ramp for slow filling of piping at start-up of booster station.

When controlling a pump pit with speed-controlled pumps can sometimes cause settling in the pit and can clog the pipes if the speed of the pumps is low and therefore a low flow during long amount of time. To avoid this from happening can the pumps be controlled via extra level set-points for start and stopping the pumps. If the start set-point value is set higher than the normal set point the controller will speed up the pump every time the pump starts. To avoid long running times at low flows there is a possibility automatic lock the pump on a pre-set speed to empty the pit if the pump has been working in set minimum speed for a certain time.

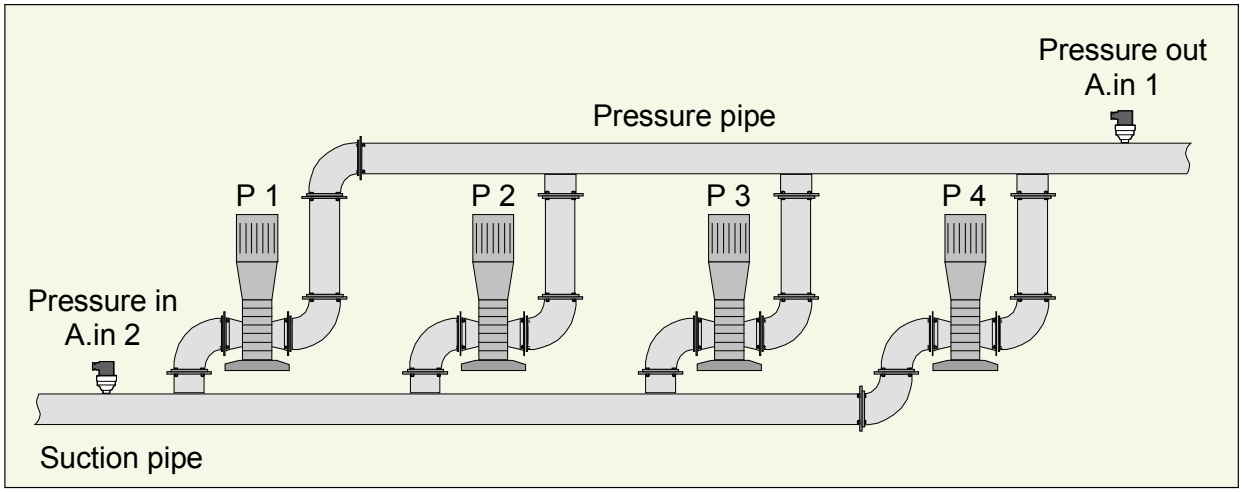
6.5.1 Function codes for speed controlling parameters.

6.5.1.1 F.600

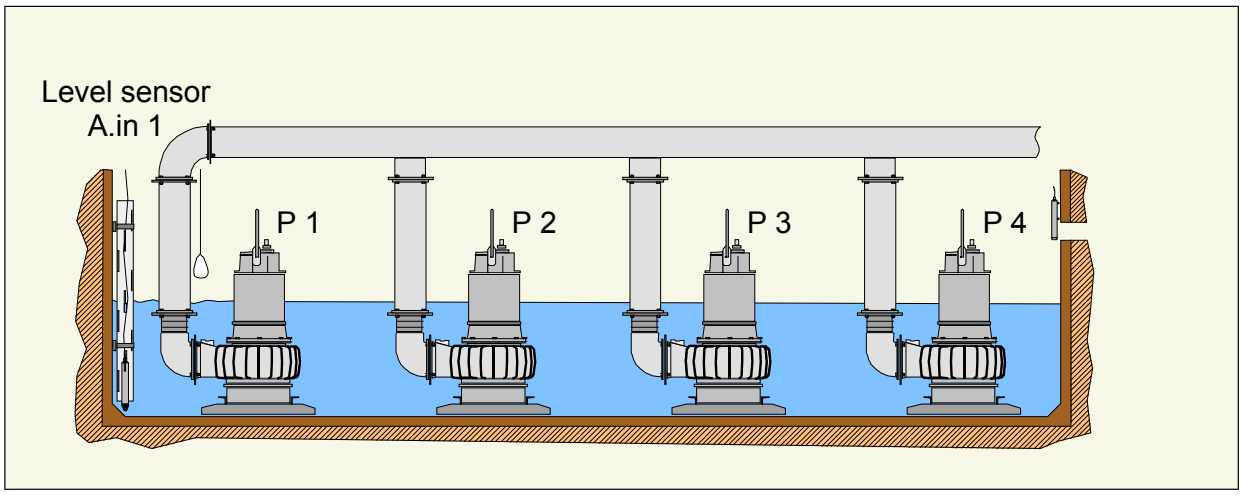
Ramp times for 0-100 % speed (0 - 999 seconds). Separate values can be used for increasing or decreasing the speed. Furthermore a start-up ramp time can be set. The start-up ramp is active until the pressure has reached the set-point or until set ramp time multiplied with the number of pumps is reached. For ex. the pit has 3 pumps and the start-up ramp time is set to 500 seconds.
After max. 1500 seconds (500*3) i.e. about 25 minutes the controller will switch over to the normal ramps for increasing / decreasing speed.

6.5.1.2 F.610

Control via extra level set-points (ON / OFF).



If this set to **OFF** (like in booster stations) a minimum speed for the speed controlled pump can be set. The speed controlled pump is stopped, if no fixed speed pumps are running and the speed goes below a pre-set low speed.



If this setting in **ON** PID or P-BAND (like in a pump pit) the level set-points and minimum speed for a low flow can be set. When the pump has run on minimum speed for a set time a pre-set value for locked speed is switched on (Must normally be higher than minimum speed). The locked value is switched off if the start set-point is reached. If locked speed is set to 0 the function is not used.

For a position ”ON P-BAND” the working range for the available pump capacity must be set, the PID controller is not used in this case.

6.5.1.3 F.620

Week timer for alternation of speed controlled pump. A time is set for each day (Monday-Sunday) if the no alternation is wanted the time should be set to 0:00. The alternation of speed-controlled pumps is only used on pumps that are set to be speed controlled.

6.5.1.4 F.630

An option for manual set the actual speed-controlled pump.

6.5.1.5 F.640

Max. difference between the suction side and pressure side. Will compensate the set point value when the suction pressure is decreasing. If no compensation of difference is used it should be set 0, or no analogue signal is set as signal for suction pressure for the pumps.

6.5.1.6 F.650

This function can block a pump when too low suction pressure is obtained. If any value is set accep pt than 0 is set, the PID controller is blocked if the suction pressure goes below the set-point level.

6.5.1.7 F.660

Limiting PID signal during switching of fixed speed pumps? (NO/YES).
Without limit the PID controller continuous to work during the time delays for pump switching. This gives the fastest adjustment at large flow changes, but can lead to unwanted start and stops.
If YES, the PID controller is limited at 10 percent over /under speed when the delays for start/stop of the pumps is active. This gives a better feedback to the speed controlled pumps but can lead to longer times to reach the set-point value at large changes in the flow.

6.5.1.8 F.702

Automatic alternation at pump failure. If fixed-speed pumps are used in a speed-controlled pump group this function should be set ON.

6.5.1.9 F.705

Min. time between every change of the pump output signals.
This is the only pump related timer which is activated when pumps are blocked (for ex, Hand,0,Auto) and should be set ON to avoid unnecessary pump starts and stops , by giving the controller time to adjust for the new parameters and situations..

6.5.2 General settings

The settings that are for ON - OFF control and are applicable for speed control are made in the Pump and Pump pit menus. For ex. min. times between Start - Stop are made in "Pump_pit/Settings/Times/Start-stop delay" and ”Pump/Pump settings/times/Delay”

6.5.3 Related analogue input types:

The analogue inputs on the PCx can be configured as different objects. The whole list of them is in chapter 7.6.and here some brief info also listed.

6.5.3.1 Outgoing pressure:

Pressure sensors that can be chosen for pump group 1-4.
This type is **not allowed** together with type Level sensor for the same pump group.
Pump group 1 and 2 can either be controlled with an ON-OFF control or controlled by the PID controller. The PCx controls the actual pressure and uses the available capacity of the pumps to reach the set-point value in the PID controller.
NOTE! Pump group 3 and 4 can only be controlled with ON-OFF control.

6.5.3.2 Suction pressure:

Measures the pressure before the pumps and gives the possibility to limit the set-point value at a too low suction pressure.

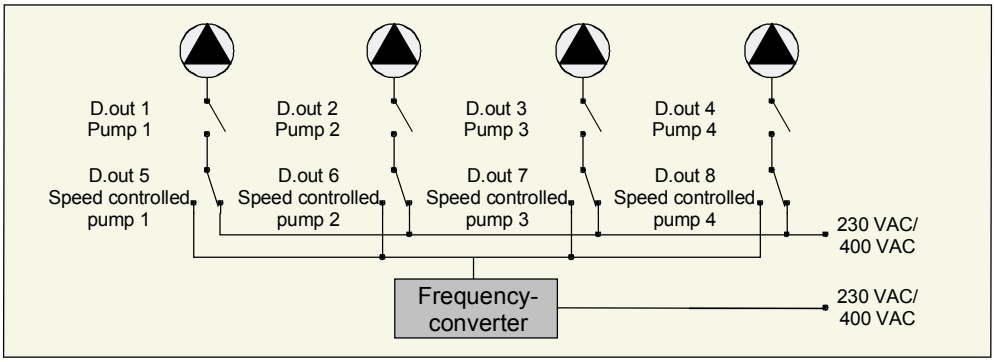
6.5.4 Related digital out type: Speed controlled pump

An output is set for each pump that is going to be controlled via a common frequency changer.
Only one of these outputs is active for connection of the pump to the frequency changer (Hardware interlocking should be made). See below.

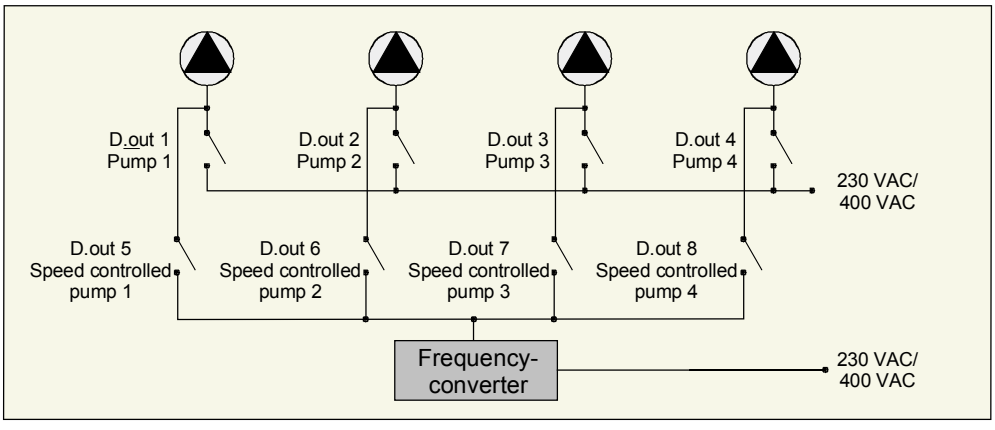
6.5.4.1 Setting: "Pump running controlled by this relay?" YES/NO.

If "NO" is set the output of this relay for the actual sped controlled pump is always closed and the on – off function is made by the normal pump relay.
If "YES" the relay is only closed when the pump is speed controlled and the normal pump relay for the same pumps always open when the pump is speed controlled.
NOTE! When changing these settings both the pump relay and the relay for speed can close! Interlocking must be done if this is not allowed in the cabinet.

Pumps controlled via this relay? = *NO*



Pumps controlled via this relay? = *YES*



NOTE! This setting must be done for each output that is set for speed control.

6.6 PID controller

The PCx have 2 PID controllers. The built-in PID controllers are available under function key REGULATOR. These can be used when a constant pressure, level, flow is needed. The actual value is often an analogue input signal that should be controlled. The set-point value for the PID controller can be a manually set value, a remote controlled or an analogue in signal.
The controller signal (true or inverted signal) can be connected to a mA output or used internally by the PCx as set-point value for shifting motors or as in signal for speed-controlled pumps.

6.6.1 PID-parameters

The function of a controller is mainly based on the basic PID parameters.

6.6.1.1 P amplification

The parameter P is the amplification of the controller. If actual value and set-point value is not the same there will be a deviation that is multiplied with the set amplification of the controller. The result will be the output signal from the controller. If the I time and D time = 0 the controller works as a normal proportional controller. The integrating and derivation functions are closed when they are set to 0.

When P-band controller is used, there will be a fixed deviation depending on the set amplification. If the amplification is increased the output signal from the controller will increase and the fixed deviation will be smaller. This works well if the actual value is fairly constant. With a high amplification and high variations in the measured, actual, value there will be a risk for overcompensation of the output signal. If this occurs the actual value will start to fluctuate around the set-point value.
If the amplification is not set too high the fluctuation will stop after a while and the output signal will stabilise. If the amplification is too high the fluctuations will not stop. This is the disadvantage of only using the P-band controller.

Using the integrating function of the controller can solve this problem. (I-time). I time
A PI controller has the P amplification connected in parallel with an integrating link and the sum of the two values is the controller output signal. A controller with this function is called a proportional-integrating controller. Integration is a mathematical expression that means adding. In this case the time is added which makes that the output signal from the integrating part groves with constant speed if the deviation remains constant. At normal control the deviation decreases because the controller output signal changes the actual value and the signal from the integrating part decreases and will have a constant value when the deviation is zero.

The integration time is set in seconds and is defined as the time it takes for the output signal to go from 0% to 100% at 100% deviation with the amplification set to 1.

The advantage of a PI controller is that the output signal from the I part totally eliminates the fixed deviation that a P controller has. This gives the possibility to lower the amplification of the controller and by this get a more stable process can occur as if too high amplification is used i.e. oscillation around the set-point. The speed of the change in the output signal will in this case be so high that the actual value can't stop at zero deviation but overshoot. The controller in the PCx has a special damping that normally prevents overshooting. At very short I time the actual value will fluctuate around the set-point. If the I time is set too long the controller will not cope with fast changes of the actual value. Adding a derivation function can however sometimes solve this problem.

6.6.1.2 D time

A PID controller has the P and I parts coupled in parallel with a derivation part, which output signal is added to the signal from the P and I parts to give the controller output signal.
A controller with this function is called proportional-integrating-derivation (PID) controller.
With the derivation function the speed of change of the actual value is detected i.e. the slope of the of the actual value. (derivative)
The controller will give a big change for a short time when a change of the actual value occurs.. When the change has stopped (derivative = 0) the influence of the D parts decreases and will finally stop.
The D part makes the controller faster to react on changes of the actual value and can when correctly set be stabilising for the process.
The effect of the D function is decided by the set D time. A short D time gives a small out signal change of short time while a long D time gives a large out signal change long duration. If the D time is set to 0 the D function is closed.

The D time is defined as the width (pulse time) of the derivative impulse (on the output signal) when it has dropped to 63 % if its max value after a change in actual value.

The D time is more difficult to set than the I time. Wrong set D time easily gives fluctuation around the set-point. If problems occur it is better to close the D function. (D time = 0 s).

6.7 Shift motor

This function is used for the control of for ex. valves with increase-decrease pulses on a digital output and a measured position can be returned via an analogue input (actual value). The value can be manual, remotely set or an analogue input signal. Max. 4 Shift motors can be controlled by the PCx. To avoid small position adjustments, which can damage the mechanical parts, a dead zone can be set. The PCx will not send control impulses while the set-point deviation is smaller than the set dead zone. Status menu and settings for shift motors are in F.720.

6.7.1 Related outputs

6.7.1.1 Shift motor INCREASE and DECREASE

Digital outputs can be set as Increase or decrease and the PCx will send control impulses with a pre-set pulse time and a min interval between the impulses. Reached set-points and/or position stops the control impulses.

6.7.2 Related inputs

6.7.2.1 Shift motor Max and Min

Digital inputs can be set as End position indication for a shift motor to stop impulses and to allow an alarm to be set if the analogue input, actual, value and pre-set, known, value for an end contact differs.

6.7.2.2 Block shift motor

A digital input can be set to block a shift motor output, in example when a Hand-Auto switch is used.

6.7.2.3 Force shift motor

A digital input can be set as force shift motor. If the PCx receives a signal on that input, the function will use a set point value and control the shift motor to that position.

6.8 Remote control

6.8.1 Comli/Modbus master

For controlling other PCx- units or devices, the PCx can be configured to be a Comli/Modbus master.

A timer event or an I/O event can activate the Master function. In the meantime the PCx works as a normal slave unit.

NOTE! Only one master is allowed on a fixed line.
If a central control system is connected will the central system normally be used as master.

Up to 8 master channels can be set up where Comli/Modbus slave identity and eventual tel. no. are set up for each channel.

Up to 127 Comli messages can be set and up to 127 Modbus messages can be set.

For each message is stated:

IO type:	**which can be as follows:**
• Inactive.	
• Digital IO.	(Message type 0 - 3).
• Standard Dataregister.	Reg. 0-3071 (message type '0' and '2').
• Cross ref. register.	As standard but gives scaling possibilities. See Comli/Modbus register manual about cross ref. register.
• Extended Comli register.	Reg. 0-65535 (message type '<' and '=').

Local IO or register no. for IO types:

Read/write: "Read from" or "Write to" slave.

Master channel: 1-8. controls which slave the Master shall communicate with.

IO or register or no. in slave:

The master controls messages in number sequence (1-127) and where this is possible several messages are collected into only one telegram to send. In order to limit the number of Comli/Modbus telegrams, the data that is in sequence in a slave should therefore also be placed in sequence in the master configuration.

If an error occurs when trying to communicate with a slave, the telegram will be resent once.
If also that telegram gives an error, the communication for that actual channel will stop and an alarm for communication error will be trigged. But a new attempt will be made the next time the master communication is trigged

6.8.2 Trig of Comli/Modbus master

Under configuration of Com.-master channel the desired interval between communications can be separately set for each master channel. If 0 seconds is set the timer function is closed

Furthermore each IO-number between 0-511 can be set to trig the master communication each time the status for the IO number is changed. The IO-trigger always effects all master channels.

6.9 Analogue history

Up to 32 analogue signals can be logged at the same time in the PCx. The log interval can be between 2 seconds and up to 6 hours. The types that can be logged are *Actual value* which logs the actual measuring value, *average*, *Min* and *Max value* during the log interval.
The resolution of the log data can be set as16 or 32 bit value.

The data are stored in a compressed format in the PCx and the maximal amount of historic data can vary with the compression factor, which can be increases if the log signals have less variation.

When the data is logged the signals are divided into blocks, where each block equals 1 day of normal logging. The maximum amount of blocks is 100 (about a quarter of a year with normal logging) for each signal, which is stored in the PCx. Block 0 is always active as log block, block 1=yesterdays log data a.s.o.

Older blocks are always moved on step when a new block is created. When 100 blocks are reached for a channel the oldest block will be erased before the next one is moved up.

If many signals are logged with short intervals the memory may not be big enough to save all data for 100 days. The PCx automatically erases the oldest blocks if the memory starts to be full, to avoid loss of ongoing data collection. The same signals can be logged with different time intervals on different log channels. A new log block is always started at midnight. Log values from midnight to actual time for activating are set to 0 in the block when the block is activated manually.

The historic data can be downloaded from the PCx by AquaVision or AquaProg system.
The latest 24 hours can be read from data register also see next chapter. To view the data on the PCxop use F410 (see page 94).

6.9.1 Expanded analogue history

With the expanded analogue history there is a possibility to select a day and read 24 hours of the analogue history with the expanded Comli telegram. The F.401 must be used to set up the channels for this feature. The register area for expanded data is reg. 16384 - 32767. This allows maximum 16384 log values to be read.

The start register holds the first log value for the day and the following values in sequence.
At for ex. 6 min logging interval the start register is at 0;06 o'clock (min, max or average is the value between 0;00-0;06 logged) and the next reg. data is at 0;12 o'clock a.s.o. until 24;00.
The start register for each channel must therefore be set according to set log interval.
If the start registers for different channels overlap each other will the data for the lowest channel number will be returned and the data from the higher channel number is inaccessible. The start register for channels not used must be set to 0.

Information about how many values are available for the present day can be found in reg. 12050-12069 (reg. 12050=number of values for channel 0, 12051-69 for channel 1-19 a.s.o.)
The information for log channels 20-31 is located in register 13846-13857

Yesterday's values are returned for register numbers that are higher than for present day. Missing data gives 0 when reading.

Which day that shall be expanded is selected in function F401 or controlled with register 13858-13889 for log channels 0-31, with the value 0 for today and 1 for yesterday a.s.o.

In the PCx there is a possibility to choose to log 32 bit data. If the log channel is set for 32-bit logging each log value will be placed in 2 registers (same as handling with double register in the PCx).
At for ex. 6 minutes logging 480 registers will be used for a day at 32-bit log, and 240 registers at16-bit log allocated. For the 32-bit read out to work correctly, the register address in the Comli telegram AND the start address for the 24h history must always be even and the required number of bytes in the Comli telegram must be dividable by 4.

6.10 Alarm handling / time stamped events

The PCx stores the last 4096 events in the memory.

An event can be either an alarm or an in-/output changes status, for ex. storage of start-/stop times for a pump.

The logging of alarms is automatically activated while the in the I/O logging must set to activated and is set separately for each I/O event.

An event is registered with date and time when the alarm is:
- Activated
- Inactivated
- Acknowledged (3 events for an alarm cycle)

An event is registered with date and time when an I/O is:
- Activated
- Inactivated (2 events for an I/O)

The number of alarms in the log depends, as said above, on if the I/O log is activated and how many I/O is to be registered.

The alarm list shows, depending on configuration, if the alarm in the list is locally acknowledged and by whom or remote acknowledged by for ex a central control system.

Different access levels can be set to the function ”Acknowledge alarm”, they are listed below.

- No access level required
- Operator access level required
- System access level required
- 9 personal codes

The control computer has 2 diodes for indication of A-and B-Alarm. C-Alarm is only shown in the alarm list.

LED –alarm indication:

- When an alarm is not acknowledged, not necessary active at the present time, the diode flashes.
- When an alarm is acknowledged but still active, the diode is still lighten.
- When an alarm is acknowledged and is not active, the diode is turned off automatically.
- If alarm dial-up is pending when all alarms are in off state, the diode will flash slowly (for 1 second it is on and then off for 3 seconds) until the dial up is completed successfully.

6.11 Modem and alarm call

The PCx have several possibilities to send alarms. If the PCx are connected to a central supervision system, the first call is normally made to this system. If not a connection can be established to the supervision system further attempts can be made with pagers and/or GSM telephones. The first connection can be routed to an alarm receiver of free choice.

6.11.1 F. 810 Hayes init. before call

With this function the Hayes string to be sent to the modem before the call is made, can be set and tested. The Hayes string can be up to 20 digits. The initial AT is not needed to be set. If an error in the string occurs and not an OK answer from the modem is received, the call will be stopped.

Before the own Hayes string is sent, the PCx always sends a default string, which is "ATH0E0V1Q0" i.e. telephone on hook (h0), echo off (e0), text result (v1), result codes on (q0). These basic settings are needed for a good function and should not be changed.

6.11.2 F. 811 Hayes reset after disconnect

With this function the Hayes string is sent after disconnect to the modem can be set and tested. Default settings for this function is "ATQ0&W" i.e. result codes on (q0), and save all settings permanently (&w).

This function gives a possibility for ex. to shut down resulting codes ("q1") after alarm call , which can be desirable in certain applications.
NOTE! "q1" can never be used if CALL SIGNAL is used to acknowledge an alarm.

6.11.3 F. 812 Number of call signals before modem answer.

With this function the number of call signals before the modem answers is set. This function MUST always be set if modem is connected to the PCx. The reason is that this value, for the number of call signals, also is used for the initiation of the modem according to F.813

6.11.4 F. 813 Modem initiation.

If alarm calling is set (F.815) this function is automatically performed every 3:rd hour after that the latest data communication with the PCx. Use function F.813 to do this initiation manually.

At initiation the power to the modem is first turned off for 4 seconds. The RTS signal goes low during this time. The power is switched on again to the modem. After 2 seconds the default initiation for the modem is done and if GSM modem is used the PIN code is sent. Then the number of call signals(F.813) and finally the Hayes reset(F.811) is sent.

6.11.5 F. 814 Max number of attempts to send alarm calls.

Max number of attempts to try to send an alarm call. For each new alarm that the PCx receives and that is going to be sent this counter is set to zero. Default number of attempts is 20.

6.11.6 F. 815 Alarm calls

When a new alarm is raised in the PCx, it tries to call the first alarm telephone number. If this fails after 3 attempts, 3 new attempts are made to the next alarm telephone number a.s.o.. Closed telephone numbers in this list are disregarded. This continues until the set max number of attempts in function F.814 is reached. If a central supervision system is used, this normally is the first alarm telephone number and the following numbers can be used to call different persons if the supervision system is offline.

Total amount of telephone numbers that can be set is 4. For each number following alternatives can be set.

6.11.6.1 F.815 Possible alarm services

CLOSED	Number unused.
GSM/BEEPER (UCP) See also F.820 and F.821	Sends alarm as SMS text messages to GSM cellular phones with UCP protocol (Universal Computer Protocol), supported by a many of the leading GSM operators in Europe.
OPTIONS:	Max no of messages to transfer / alarm dial. This value differs between operators and must be correct to prevent missing alarms.
CENTRAL SYSTEM	For central monitoring and alarm systems.
OPTIONS:	
1.	Alarm condition for alarm dialup.
2.	Timeout for central system to acknowledge the alarm dial. PCx will disconnect and make a new alarm dial if no acknowledge is done within this time.
LC-TRANSL.SYSTEM	After connect PCx will send the Comli/Modbus identity as a text string. Otherwise the same as CENTRAL SYSTEM.
MINICALL TEXT Se also F.822 and F.823	Text beeper alarms according to the THS-protocol ver. A 3.0. Only used in Sweden.
SMS GSM MODEM (PDU) Only if GSM modem is connected to PCx	Sends alarms as SMS text messages direct to a GSM cellular phone. Phone number must be entered in international format with leading country code. Every operator also has a unique service address (Short Message Service Centre) that must be entered in international format. This service requires GSM modems with support for SMS text messages in PDU format (like PC-Card V.dot GSM-RS232, Siemens M1 or M20).

6.11.7 F.816 Waiting time between alarm calls

When an error in the modem-Tele communications occurs or no alarm acknowledgement is received, the PCx disconnects the modem and makes a new attempt after this set time.

6.11.8 F.817 Chose type of acknowledgement to stop alarm calls.

Local alarm acknowledgement and writing through COMLI/Modbus to Reg. 333 or. IO-no 511 always acknowledges the alarm call.

If telephone number 1 in F.815 is the CENTRAL SYSTEM or LC-TRANSL.SYSTEM the writing to Reg. 333 is set automatically as this is demanded by supervision systems.

For other alarm possibilities there are following alternatives.

No acknowledgement:	If the PCx succeeds to transfer the alarm information to computer of the alarm operator the alarm is directly acknowledged. If there is an error in the alarm communication the PCx will continue to call until correct communication with the alarm operator is established.
Ring signal:	The PCx listens for a ring signal from the modem after that the alarm has been sent and this alarm is acknowledges by the call on the first CALL signal. **NOTE!** HAYES INITIATION must allow for verbal answering codes from modem.
Write to Reg. 333:	For Central system. If a 1 is written, the Central system takes the responsibility for disconnecting the line between them. For all other values the PCx disconnects the line directly after writing is done, this function is duplicated on IO 511
All Data communicaton:	Acknowledges a call as soon as an approved Comli/Modbus telegram is received on the modem port.

6.11.9 F.818 Acknowledgement of local alarm list from supervision system.

An alarm acknowledgement on a call acknowledges that the alarm has been received. From a central supervision system there is a possibility here to at the same time acknowledge all alarms in the local alarm list of the PCx.

6.11.10 F.819 Stations identity.

Here the number that is reported at alarm calls to GSM or pager is set. This number is also used for identification by the supervision system via Data reg. 584. If the station name is set will this also be sent to a text receiver.

6.11.11 F.820 Sender information for GSM alarm (UCP protocol)

Depending on net supplier. Senders telephone number or number received from supplier plus a password if supplier demands this.

6.11.12 F.821 Receiver information for GSM alarms (UCP protocol)

When the PCx will report an alarm, it will try to dial each receiver 3 times. When new alarms is raised it will always start with the first receiver. Disabled receivers will be ignored. When the telephone list in F.815 is finished it will start with the next receiver in this list. This means only one receiver will be called on each function call on F.815. Four receivers can be configured with following options.

DISABLED	Unused.
TEXT	GSM cellular phone with SMS text support OPTION: Send "Only station ID" or Send "Alarm specification".
NUMBERS	For future use
TONE	For future use

The format for telephone numbers differs between operators. Some demands national format and other require international format.

6.11.13 F.824 Hold alarm dial when visiting the station.

This function does only apply if a digital input is set-up for personal alarm. An alarm call for personal alarm will only occur if the hold function is enabled. Other unacknowledged alarms will be sent when visiting indication ends.

6.12 Logical functions

The PCx can be programmed with own logical control functions. The functions used is IO-bit and logical IO. These are connected to a digital output and to fetch information about the system see chaper IO- and alarm numbers and more information about these functions can be view in the next chapter.

6.12.1 Logic IO

For logic conditions on 1 to 5 IO numbers of free choice and the following conditions can be set: ”OR ON”, ”AND ON”, ”OR OFF”, ”AND OFF”.

6.12.2 IO-bit

Used to connect an IO number of free choice to an output signal either as a pulse when the IO goes active, or with a start and stop delay.

7 Function keys

In this chapter the function keys of the PCx is described. When directly pressing a function key on the PCxop a “show” position is entered, which means that settings or changes of a value cant be made. Normally used for reading status values. For programming and changing values first press the PROG. key. State your access code and press ENTER. Then you press the wanted function key.
Following menus are shown:


```
99-02-01    11.46:45

Type access code!
                    0
```

Set for ex. 2 (Factory set code) for system access.


```
99-02-01    11.46:58

Type access code!
                    2
```

Confirm entry with <ENTER>


```
99-02-01    11.47:10

Choose function
SYSTEM PROG
```

Chose wanted function key.

The access code is valid for 10 minutes from the pressing of any key.
Access code is reset if a function key is pressed from main menu without first pressing the PROG. key.

As long as the access code is valid the request for access code are skipped.


```
99-02-01    11.47:45

Choose function
SYSTEM PROG
```

To revert to the main menu press PROG./CANCEL key.


```
99-02-01    11.48:03
Inflow 1     0.1 l/s
Outflow 1    0.0 l/s
Level 1     1.54 m
```

PROG./CANCEL key gives access to the programming position when in the main menu. In all other menu types it allows you to pop back to the previous programming field or menu.

Table of contents for chapter 7

7.1 Pump

8
PUMP

Function key for program type ”PUMP”

```
Pump status
Pump settings
Pump valve
Alarm blocking
```

Below the hierarchy for program type ”PUMP” is shown.
Field positions that can be changed or set are shown in grey.
Certain fields are inaccessible in certain positions depending on Access code entered, look at start of this chapter to know how the access code are entered.

7.1.1 Pump status

```
Pump status
Pump settings
Pump valve
Alarm blocking
```

```
Pump status

     Running times
     Pump capacity
```

This menu is for showing status of the pump for a 7 days period. Two submenus are there.

7.1.1.1 Running times

```
Pump status

     Running times
     Pump capacity
```

```
P: 1 PUMP 1
TOTAL
Rtime:     1:00 h:mm
Starts :         3
```

```
P: 1 PUMP 1
Today
Rtime:     0:40 h:mm
Starts :         2
```

```
P: 1 PUMP 1
Day 7
Rtime:     0:00 h:mm
Starts :         0
```

7.1.1.2 Pump capacity

```
Pump status

     Running times
     Pump capacity
```

```
P: 1 PUMP 1
Actual value
Pumpcap. =   5.0 l/s
at  0.00 m head
```

```
P: 1 PUMP 1
Last reading
not filtered
pumpcap. =   5.0 l/s
```

```
P: 1 PUMP 1
Day 7 average value
Pumpcap. =   5.0 l/s
at  0.00 m head
```

7.1.2 Pump settings

```
Pump status
Pump settings
Pump valve
Alarm blocking
```

```
PUMP SETTINGS
 Control
 Timing
 Options  Pump alarm
```

In the menu pump settings all the properties for each pump can be entered.

7.1.2.1 Pump control

```
PUMP SETTINGS
 Control
 Timing
 Options  Pump alarm
```

```
 PUMP CONTROL
  Normal control
  Night levels
  Inflow start
```

The control menu has 3 submenus

7.1.2.1.1 Normal control

```
 PUMP CONTROL
  Normal control
  Night levels
  Inflow start
```

```
PUMP: 1   PUMPPIT 1
Alternate:    ON
Start lev.   1.50 m
Stop Lev.    0.70 m
```

Properties for each pump. Options are if it should be controlled from a pump pit or some other signal. This function also sets the control levels for a pump or a pump pit, if the option is set to alternate with other pumps. If it set to alternate with other pumps, the start/stop level is connected to the pit instead of a specific pump. In example two pumps has alternation on and the P1 has a start level of 2 meters and that P2 has a start level of 3 meters. When the water level in the pit ecceds 2 meters Depending on which one that wasn’t the last one running will be started. And if the level is above 3 meters both pumps will be started.

7.1.2.1.2 Night levels

```
PUMP CONTROL
 Normal control
 Night levels
 Inflow start
```

```
PUMP: 1
No time control
```

```
PUMP: 1
Day / Night control
Start night   1.10 m
Stop  night   0.60 m
```

In this submenu there is an option to have different control levels during day and night, If Normal control / Night levels are chosen the control levels during the night time is set here, the day level is set in normal control. The controller shifts between Normal control and Night levels at times set in Function 110, F110.

7.1.2.1.3 Start on high inflow

```
PUMP CONTROL
 Normal control
 Night levels
 Inflow start
```

```
PUMP: 1
Pumpstart at
inflow       0.0 l/s
( 0 = Inactive )
```

This function can start the pumps before a start level is reached based in how high the inflow is into a pit.
In this menu the set point value is entered.

NOTE! This function is included in the function that controls alternation, if turned on, of pumps in the same pit. In example if two pumps in a pit are set with different set points for the inflow it will alternate between the pumps if only one setpoint is reached and if both are reached then will both pumps be started.

7.1.2.2 Pump settings / times

```
PUMP SETTINGS
 Control
 Timing
 Options  Pump alarm
```

```
PUMP TIMING
 Delay
 Max run time
```

Under the menu Timing there are two submenus. One for set a Start and a stop delay and the other is for limiting the time that a pump is run at a single operation.

7.1.2.2.1 Delays

```
PUMP TIMING
 Delay
 Max run time
```

```
PUMP: 1    Delay on
set-points
On   :   1 seconds
Off  :   1 seconds
```

This menu sets the values on delays before a set-point level is activated. These times are primarily set to avoid unwanted start and stops of pumps depending on short period changes in the level signal due to external factors.

NOTE! These times are valid for a specific start and stop level and not for a specific pump if alternation is turned ON

7.1.2.2.2 Max running time

```
PUMP TIMING
 Delay
 Max run time
```

```
PUMP: 1
Max run time
          0:00 h:mm
( 0 = Inactive )
```

This setting allows the pump to be stopped before the stop level is reached if a set time is exceeded. The timer is set zero as long as the start level is exceeded and the timer starts running when the level is below the start level. The pump is stopped when the timer value is exceeded.

NOTE! These times are valid for a specific start and stop level and not for a specific pump if alternation is turned ON

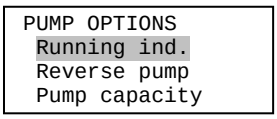
7.1.2.3 Pump settings / options

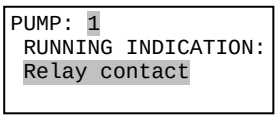
```
PUMP SETTINGS
 Control
 Timing
 Options  Pump alarm
```

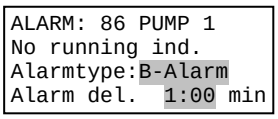
```
PUMP OPTIONS
 Running ind.
 Reverse pump
 Pump capacity
```

In this menu the running indication, reverse pump and the pump capacity options can be set.

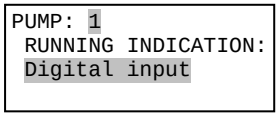
7.1.2.3.1 Running indication



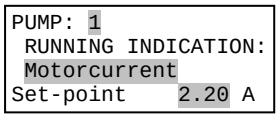




This function sets what type of signal that should be used for register start of pumps. If relay contact is set the output signal to the pump is used for register that a pump is running.



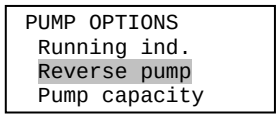
If a digital input is set as the running indicator.

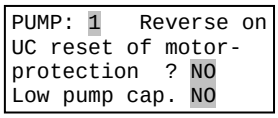


If a current transformer is used must the value for the start current be set.

If relay contact is selected, manual starts from outside the PCx are not registered.

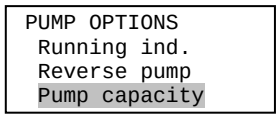
7.1.2.3.2 Reverse pump

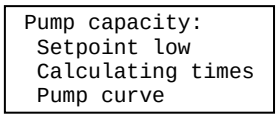




In this menu are the options for automatically reversing the pump. They are:
When the PCx resets the Motor protector or if a pump has a low pump capacity

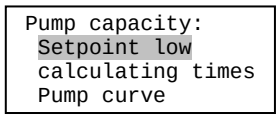
7.1.2.3.3 Pump capacity

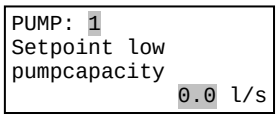


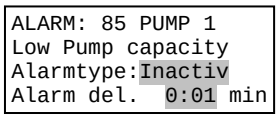


Options for the pump capacity.

7.1.2.3.3.1 Low pump capacity

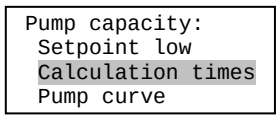


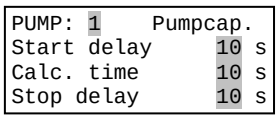




The pump capacity alarm is used to show clogging and wear of the pump.

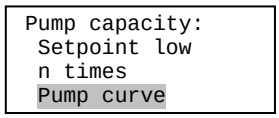
7.1.2.3.3.2 Calculation times

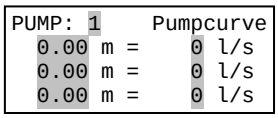




If calculation times are set to 0 no automatic update of the pump capacity will be made

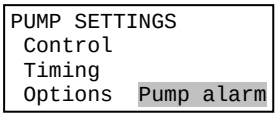
7.1.2.3.3.3 Pump curve

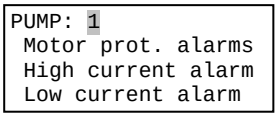




Compensates flow for changes in pump capacity. This function demands that the setting of the head of the pumps is made.
(See menu pumppit)

7.1.2.4 Pump settings / pump alarm





Most of the pump alarms are collected in this menu. These settings can also be made in ”ALARM / Settings”

7.1.2.4.1 Alarm motor protector

```
PUMP: 1
 Motor prot. alarms
 High current alarm
 Low current alarm
```

```
PUMP: 1
  Motor protection
  Auto reset fail
  High temperature
```

7.1.2.4.1.1 Fallen motor protector

```
PUMP: 1
  Motor protection
  Auto reset fail
  High temperature
```

```
ALARM: 83 PUMP 1
Fallen motorprot.
Alarmtype:B-Alarm
Alarm del.  0:05 min
```

7.1.2.4.1.2 Reset failure

```
PUMP: 1
  Motor protection
  Auto reset fail
  High temperature
```

```
ALARM: 92 PUMP 1
Failure motorprot.
Alarmtype:B-Alarm
Alarm del.  0:05 min
```

This alarm is only given when automatic resetting is used and the resetting of the protector fails

7.1.2.4.1.3 High temperature

```
PUMP: 1
  Motor protection
  Auto reset fail
  High temperature
```

```
ALARM: 84 PUMP 1
Fallen tempprot.
Alarmtype:B-Alarm
Alarm del.  0:05 min
```

7.1.2.4.2 Alarm high motor current

```
PUMP: 1
 Motor prot. alarms
 High current alarm
 Low current alarm
```

```
ALARM: 81 PUMP 1
High motorcurrent
Alarmtype:Inactiv
Alarm del.  0:01 min
```

```
ALARM: 81 PUMP 1
High motorcurrent
High current 20.00 A
Hysteresis    0.10 A
```

7.1.2.4.3 Alarm low motor current

```
PUMP: 1
 Motor prot. alarms
 High current alarm
 Low current alarm
```

```
ALARM: 82 PUMP 1
Low motorcurrent
Alarmtype:Inactiv
Alarm del.  0:01 min
```

```
ALARM: 82 PUMP 1
Low motorcurrent
Low current   2.00 A
Hysteresis    0.10 A
```

7.1.3 Pump valve

```
Pump status
Pump settings
Pump valve
Alarm blocking
```

```
VALVE PUMP   1
Pumptime open   10 s
Pumptime close  60 s
Endcontact    Alarms
```

Pump time open controls the time the pump must be running before the valve starts to open.

7.1.3.1 End contacts

```
VALVE PUMP   1
Pumptime open   10 s
Pumptime close  60 s
Endcontact    Alarms
```

```
VALVE PUMP   1
Max.times
Reopen
Block. at alarm
```

This is the menu for end contacts

7.1.3.1.1 Max. times

```
VALVE PUMP   1
Max.times
Reopen
Block. at alarm
```

```
VALVE PUMP   1
Max times
Opening  :  60 sec.
Closing  :  60 sec.
```

```
VALVE PUMP   1
Close retry on error
after  0:00 minutes
 ( 0 = No retries )
```

This is used to set timers for open/close valve, if they overrun they can be set to try again and raise alarms.

7.1.3.1.2 Reopen

```
VALVE PUMP   1
Max.times
Reopen
Block. at alarm
```

```
VALVE PUMP   1
Reopen        10 sec
at lost endcontact
 ( 0 = No reopen )
```

This function is used for hydraulic / pneumatic valves that due to leaking pressure can loose the end contact during the operation.

7.1.3.1.3 Pump blocking at valve error alarm

```
VALVE PUMP   1
Max.times
Reopen
Block. at alarm
```

```
ALARM: 91 PUMP 1
Pump block. valve
Alarmtype:Inactiv
Alarm del.  0:01 min
```

This function triggers an alarm if an alarm from the pump valve is detected. If this function is active, the pump operation will be blocked, if an alarm from the valve is detected, until this alarm is acknowledged.

7.1.3.2 Alarm valve error

```
VALVE PUMP   1
Pumptime open   10 s
Pumptime close  60 s
Endcontact    Alarms
```

```
ALARM: 88 PUMP 1
Err.opening valve
Alarmtype:Inactiv
Alarm del.  0:01 min
```

Error opening valve will be given if the end position is not detected within the max. time.

```
ALARM: 89 PUMP 1
Err closing valve
Alarmtype:Inactiv
Alarm del.  0:01 min
```

Error closing valve will be given if the end position is not detected within the min. time

```
ALARM: 90 PUMP 1
Error valve
Alarmtype:Inactiv
Alarm del.  0:01 min
```

A valve error will be given if both end contacts are active at the same time

7.1.4 Alarm blocking of pumps

```
Pump status
Pump settings
Pump valve
Alarm blocking
```

```
PUMP: 1   hold when
unacknowl. alarms
 Alarm Conditions
 Alarm
```

7.1.4.1 Alarm conditions for blocking

```
PUMP: 1   hold when
unacknowl. alarms
 Alarm Conditions
 Alarm
```

```
PUMP: 1   Blocked on
unack. alarm no.
 81:           NO
High motorcurrent
```

Possible blocking conditions:
High motor current, low motor current, fallen motor protector, fallen temp. protector, low pump capacity, and No running confirmation. The pump operation is blocked until the blocking alarm is acknowledged.

7.1.4.2 Alarm type pump alarm blocked

```
PUMP: 1   hold when
unacknowl. alarms
 Alarm Conditions
 Alarm
```

```
ALARM: 93 PUMP 1
Pump alarm blocked
Alarmtype:Inactiv
Alarm del.  0:01 min
```

A separate alarm can be set to indicate that a pump is alarm blocked. Acknowledgement of this alarm will acknowledge all alarms that block the pump.

7.2 Pumppit

Function key for program group ”PUMPPIT”

```
PUMPPIT:
Status
Settings
Pumppit valve
```

In certain cases this name is pump group instead of pump pit (for ex. pressure sensors in booster stations). The connection is the same as for ex. pump group 1 as for connection to the pump pit 1.

7.2.1 Status

```
PUMPPIT:
Status
Settings
Pumppit valve
```

```
PUMPPIT:
Status
 Pumped volume
 Multiple pumprun
```

In this menu are the status viewed for a pump pit. The status are for each pump pit: Pumped Volume and how many times and how long there have been two or more pumps running at the same time. The status can be viewed 7 days back in time and the total amount.

7.2.1.1 Pumped volume

```
PUMPPIT:
Status
 Pumped volume
 Multiple pumprun
```

```
PUMPPIT: 1
TOTAL
Pumped volume
             15.0 m3
```

```
PUMPPIT: 1
Today
Pumped volume
             13.0 m3
```

```
PUMPPIT: 1
Day 7
Pumped volume
              0.0 m3
```

7.2.1.2 Multiple pumps running

Run times and number of occasions when 2 or more pumps have been running at the same time.

```
PUMPPIT: 1
Status
 Pumped volume
 Multiple pumprun
```

```
Multi pump run PP:1
TOTAL
Time:      0:00 h:mm
Count:        0
```

```
Multi pump run PP:1
Today
Time:      0:00 h:mm
Count:        0
```

```
Multi pump run PP:1
Day 7
Time:      0:00 h:mm
Count:        0
```

7.2.2 Settings

```
PUMPPIT:
Status
Settings
Pumppit valve
```

```
PUMPPIT: 1
Timers
Station flow
Options
```

In the settings menu are the pump pits options and timers gathered.

7.2.2.1 Times

```
PUMPPIT: 1
Timers
Station flow
Options
```

```
PUMPPIT: 1  Timers:
 Start-stop delay
 Runtime alternator
```

There are three timers that can be set for each pump pit, two for start and stop-delays and one run timer for alternating pumps.

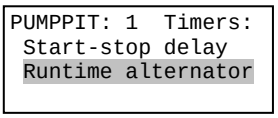
7.2.2.1.1 Start-stop delays

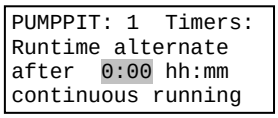
```
PUMPPIT: 1  Timers:
 Start-stop delay
 Runtime alternator
```

```
PUMPPIT: 1  Timers:
Mintime between
Pumpstarts :   5 sec
Pumpstop   :   0 sec
```

These timers are set to prevent simultaneous start or stop between pumps in automatic control mode. **NOTE!** The function that blocks the pumps is not affected by these times.

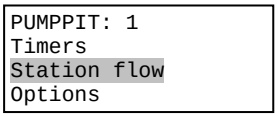
7.2.2.1.2 Running time alternation

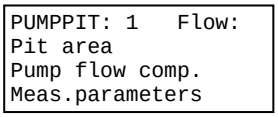




Gives the possibility to alternate between pumps when running pumps. This alternate function is based on how long a pump has been running, instead of the alternation start function in the pump menu. An alternation is made when the pump has been running continuously for a fixed time.

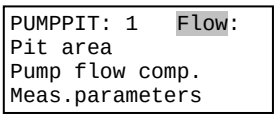
7.2.2.2 Station flow

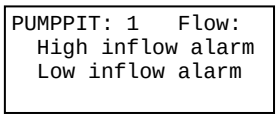




In the menu for the station flow are all parameters for the flow in the pit entered.

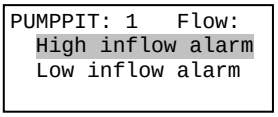
7.2.2.2.1 Flow: Alarm set-points

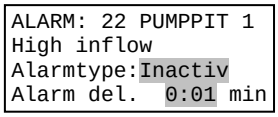


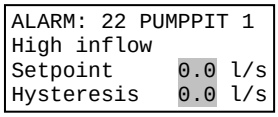


In the submenu Flow are the alarms for the inflow entered. A set point can be entered for High inflow and for Low inflow.

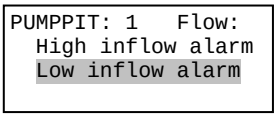
7.2.2.2.1.1 Alarm high inflow

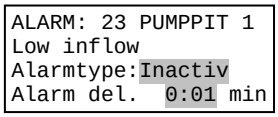


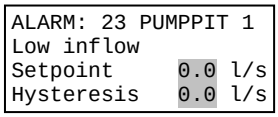




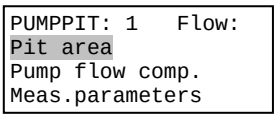
7.2.2.2.1.2 Alarm low inflow

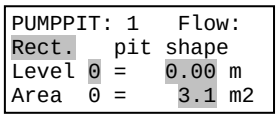






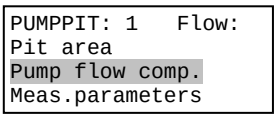
7.2.2.2.2 Pit area

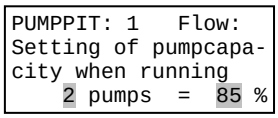




In the submenu pit area are the properties for the pit entered, see chapter 6.3.1.The shape can be rectangular or conical shape. Set new level and area for each level where the pit changes shape.

7.2.2.2.3 Pump flow compensation





In the submenu Pump flow compensation can adjustments of the pump capacity can be set for the increased pressure when several pumps are running. Set a percentage of the pump capacity on each sets of pumps running, 2,3 up to 16 pumps.

7.2.2.2.4 Measuring parameters for flow calculation

```
PUMPPIT: 1   Flow:
Pit area
Pump flow comp.
Meas.parameters
```

```
PUMPPIT: 1   Flow:
Emptying / Filling
Meas. interval
Pump Capacity
```

In the submenu Measuring parameters for flow calculation are the properties for the flow entered. If the pit is Emptying/filling a pit, measuring interval and properties of the pit for the calculation of the capacity of the pump

7.2.2.2.4.1 Emptying / Filling

```
PUMPPIT: 1   Flow:
Emptying / Filling
Meas. interval
Pump Capacity
```

```
PUMPPIT: 1   Flow:
Pumps EMPTYING
pit when pumping
```

Controls if the measuring of the flow is in- or outgoing. In a normal sewage-pumping pit the pumps empty the pit, in a water tower the pumps fill the reservoir.

7.2.2.2.4.2 Measuring intervals

```
PUMPPIT: 1   Flow:
Emptying / Filling
Meas. interval
Pump Capacity
```

```
PUMPPIT: 1   Flow:
Time between flow
calculation = 10 sec
  ( 0 = OFF )
```

The interval between calculations of the volume change in the pit. Longer time gives better accuracy at low flows and large pit areas.

7.2.2.2.4.3 Pump capacity – min. level / head of pumps

```
PUMPPIT: 1   Flow:
Emptying / Filling
Meas. interval
Pump Capacity
```

```
PUMPPIT: 1   Flow:
Option pumpcap.:
Min lev. pumpcap.
Head of pumps
```

```
PUMPPIT: 1   Flow:
Min level in the pit
for calc. of pump-
capacity =   0.00 m
```

See chapter 6.3.2.
If the pit level drops below a pre-set value the calculation is stopped.

```
PUMPPIT: 1   Flow:
Option pumpcap.:
Min lev. pumpcap.
Head of pumps
```

```
PUMPPIT: 1   Flow:
Head of pumps for
compensation with
pumpcurve     0.00 m
```

```
PUMPPIT: 1   Flow:
Pump outlet related
to level in
pumppit 1
```

Head of pumps must be set if pump curves are used.
Pump outlet should relate to the pit where pumps are placed.

7.2.2.3 Options

```
PUMPPIT: 1
Timers
Station flow
Options
```

```
PUMPPIT: 1  Options:
 High level float
 Overflow
 Level settings
```

In the submenu Options are the alarmlevels for the pit entered also the overflow level and Backup control options.

7.2.2.3.1 High level float

```
PUMPPIT: 1  Options:
 High level float
 Overflow
 Level settings
```

```
ALARM: 20 PUMPPIT 1
High float
Alarmtype:A-Alarm
Alarm del.  0:10 min
```

```
PUMPPIT: 1  Options:
 High level float
  Back-up start
  Alarm sensor Err.
```

A high level float can be used for backup control and trigger an alarm.

7.2.2.3.1.1 Back-up start

```
PUMPPIT: 1  Options:
 High level float
  Back-up start
  Alarm sensor Err.
```

```
ALARM: 19 PUMPPIT 1
Hi float ctrl.
Alarmtype:Inactiv
Alarm del.  0:01 min
```

```
ALARM: 19 PUMPPIT 1
Hi float ctrl.
Backup start:  0 sec
Pump  1 Back-up OFF
```

Gives the possibility to control pumps of free choice via a high level float if level sensor is damaged.

7.2.2.3.1.2 Alarm sensor error

```
PUMPPIT: 1  Options:
 High level float
  Back-up start
  Alarm sensor Err.
```

```
ALARM: 25 PUMPPIT 1
Sensor error
Alarmtype:Inactiv
Alarm del.  0:01 min
```

```
PUMPPIT: 1  Options:
 High level float
Alarm at      0.00 m
Max deviation 0.00 m
```

The switch level for the high level float can be compared with the value from the level sensor. If not equal an error alarm can be set

7.2.2.3.2 Overflow

```
PUMPPIT: 1  Options:
 High level float
 Overflow
 Level settings
```

```
ALARM: 21 PUMPPIT 1
Overflow
Alarmtype:A-Alarm
Alarm del.  0:10 min
```

```
PUMPPIT: 1  Options:
Overfl.lev   0.000 m
(If overflow float
 is not connected )
```

The overflow alarm must be set active to be able to register an overflow. To avoid registering disturbances, in example when waves occur, a delay of the alarm can be set. This delay will be active also when the level in the pit drops and the overflow stops. If no high level sensor is installed, can an overflow level be set. If an overflow sensor is installed this overflow level value is ignored.

7.2.2.3.3 Level settings

```
PUMPPIT: 1  Options:
 High level float
 Overflow
 Level settings
```

```
PUMPPIT: 1  Levels:
  High level alarm
  Low level alarm
  Relative level
```

In the Level settings, the alarms for low/high levels are entered and also the relative level of pit above the sea-level.

7.2.2.3.4 High level alarm

```
PUMPPIT: 1  Levels:
  High level alarm
  Low level alarm
  Relative level
```

```
ALARM: 17 PUMPPIT 1
High level
Alarmtype:B-Alarm
Alarm del.  0:10 min
```

```
ALARM: 17 PUMPPIT 1
High level
High level    5.00 m
Hysteresis    0.05 m
```

7.2.2.3.5 Low level alarm

```
PUMPPIT: 1  Levels:
  High level alarm
  Low level alarm
  Relative level
```

```
ALARM: 18 PUMPPIT 1
Low level
Alarmtype:Inactiv
Alarm del.  0:01 min
```

```
ALARM: 18 PUMPPIT 1
Low level
Low level     0.50 m
Hysteresis    0.05 m
```

7.2.2.3.6 Relative level , meters above sea level

```
PUMPPIT: 1  Levels:
  High level alarm
  Low level alarm
  Relative level
```

```
PUMPPIT: 1  Levels:
Relative level at
sensor 0-point
            0.00 m
```

Here the reference level is set to show standardised levels.

7.2.3 Pumppit valve

```
PUMPPIT:
Status
Settings
Pumppit valve
```

```
VALVE PUMPPIT  1
Pumptime open   10 s
Pumptime close  60 s
Endcontact    Alarms
```

The pumppit valve opens when any pump in the pit starts and closes when the last running pump shall stop. Otherwise the same function as pump valve.

7.2.3.1 End contacts

```
VALVE PUMPPIT  1
Pumptime open   10 s
Pumptime close  60 s
Endcontact    Alarms
```

```
VALVE PUMPPIT  1
Max.times
Reopen
Block. at alarm
```

7.2.3.1.1 Max. times

```
VALVE PUMPPIT  1
Max.times
Reopen
Block. at alarm
```

```
VALVE PUMPPIT  1
Max times
Opening  :  60 sec.
Closing  :  60 sec.
```

```
VALVE PUMPPIT  1
Close retry on error
after  0:00 minutes
 ( 0 = No retries )
```

7.2.3.1.2 Reopen

```
VALVE PUMPPIT  1
Max.times
Reopen
Block. at alarm
```

```
VALVE PUMPPIT  1
Reopen        10 sec
at lost endcontact
 ( 0 = No reopen )
```

This function is used for hydraulic / pneumatic valves that can loose the end contact due to loss of pressure during operation.

7.2.3.1.3 Pump blocking at alarm

```
VALVE PUMPPIT  1
Max.times
Reopen
Block. at alarm
```

```
ALARM: 30 PUMPPIT 1
Pump block. valve
Alarmtype:Inactiv
Alarm del.  0:01 min
```

If this alarm is active the pump is blocked until the alarm for the error end contact is acknowledged.

7.2.3.2 Alarm valve error

```
VALVE PUMPPIT  1
Pumptime open   10 s
Pumptime close  60 s
Endcontact    Alarms
```

```
ALARM: 27 PUMPPIT 1
Error opening valve
Alarmtype:Inactiv
Alarm del.  0:01 min
```

Opening error is shown if end contact is not detected within
max. time

```
ALARM: 28 PUMPPIT 1
Error closing valve
Alarmtype:Inactiv
Alarm del.  0:01 min
```

Closing error is shown if end contact is not detected within max. time.

```
ALARM: 29 PUMPPIT 1
Valve error
Alarmtype:Inactiv
Alarm del.  0:01 min
```

Valve error is given if both end contacts are active together

7.3 Alarm Show /Program

9
ALARM

Function key for program group ”ALARM”

```
ALARM:
Status
Configure
Set alarms
```

The alarm menu is split into 3 sub menus:

Status
In this submenu the alarms are acknowledged and selected.

Settings
In this submenu there are different possibilities to set alarm types and alarm delays for all alarms. Set-point values for the different alarms are however set in the actual program group(for ex. high level in pumppit is set in menu group pumppit).

For every digital in- and outputs separate alarm can be set independently of the IO function. Many IO functions have except from this alarm own alarms that are automatically coupled. An input for ex. fallen motor protector can therefore have 2 alarms if alarm motor protector is set under pump key and further alarm for the digital input if the input is activated to trigger an alarm. Therefore the independent IO alarms should only be used where the input is not connected to a IO function which has equivalent alarm, which can generate two alarms instead of only one

Set alarms
This submenu gives an overview over the used alarms. In this menu only set alarms can be changed.

7.3.1 Status

```
ALARM:
Status
Configure
Set alarms
```

```
VIEW CRITERIA
Not ackn.alarms
Active alarms
All alarms
```

In the status menu the alarms are acknowledged and the status of the alarms are viewed.

7.3.1.1 Selection alarm status

```
VIEW CRITERIA
Not ackn.alarms
Active alarms
All alarms
```

```
VIEW CRITERIA =
A, B, or C Alarm
(Change, press Enter
when in alarm list)
```

In this menu is there a choice for filtering the list depending on alarm types. This menu is also available via the ”ENTER” key when showing alarms in the other status menus.
The selection criteria for all alarm types is (A, B, or. C alarm) and is the default setting when entering the status menu.

7.3.1.2 Not acknowledged alarms

```
VIEW CRITERIA
Not ackn.alarms
Active alarms
All alarms
```

```
BALARM 100 PUMP 2
Fallen tempprot.
On   990201 11.50:45
ALARM ACTIVE
```

In the list of Not acknowledged alarms are alarms viewed by stepping with the arrow keys.

RESET ALARM
FUNCTION

```
BALARM 100 PUMP 2
Fallen tempprot.
Ack.  Local
     990205 14.56:12
```

Pressing the RESET ALARM/ FUNCTION key when the alarm is showing in the panel does acknowledgement of an alarm.
The actual time for the acknowledgement is shown.

→

```
VIEW CRITERIA
Not ackn.alarms
NO NON ACKNOWLEDGED
A, B, or C Alarm
```

Next alarm is shown by pressing the arrow keys.

This message is shown, when all alarms are acknowledged.

7.3.1.3 Active alarms

```
VIEW CRITERIA
Not ackn.alarms
Active alarms
All alarms
```

```
BALARM 100 PUMP 2
Fallen tempprot.
On   990201 11.50:45
ALARM ACTIVE
```

Under active alarms both acknowledged and unacknowledged alarms are shown. The key RESET ALARMS / FUNCTION" acknowledges or shows when acknowledgement was done.

7.3.1.4 All alarms

```
VIEW CRITERIA
Not ackn.alarms
Active alarms
All alarms
```

```
BALARM 100 PUMP 2
Fallen tempprot.
On   990201 11.50:45
Off  990205 15.00:14
```

Under All alarms is the whole alarm list shown. Shows which time an alarm has gone active, inactive and when the acknowledgement was done.

7.3.2 Settings

```
ALARM:
Status
Configure
Set alarms
```

```
SETTINGS:
Alarms: In groups
Alarms:Number order
Ackn. access
```

Under the settings menu can new alarms be set. There are two ways to view the alarms either in their alarm group or number. An access code for alarm acknowledgement can be set.

7.3.2.1 Alarms in groups

```
SETTINGS:
Alarms: In groups
Alarms:Number order
Ackn. access
```

```
ALARM GROUPS:
System    Pumppit  1
Pump  1   Flow/Pulse
com.      IO module
```

The alarms are split into 6 main groups
Last in this manual are all alarms listed.

7.3.2.1.1 System

The system alarms have numbers 1-9 and are as follows.
Person alarm
Ext. Person alarm
UC in local mode
Modem error
Telephone error
Configuration error *(Given for a part of the most common errors in setting)*

7.3.2.1.2 Pump pit

The pumppit alarms have alarm no. 17-80 for pumppit 1 to 4. Following alarms for each pumppit.
High level
Low level
Back-up start
High float
Overflow
High inflow
Low inflow
Sensor error
Pumps DI blocked
Error open valve
Error close valve
Valve error
Pumps blocked by valve error

7.3.2.1.3 Pump

The pump alarms have alarm no. 81-336 for pump 1 to 16. Following alarms available for each pump.

High motor current
Low motor current
Fallen motor protector
Fallen temp. protector
Low pump capacity
No running confirmation
Pump blocked
Error open valve
Error close valve
Valve error
Pump blocked by valve error
Error motor protector
Pump alarm blocked

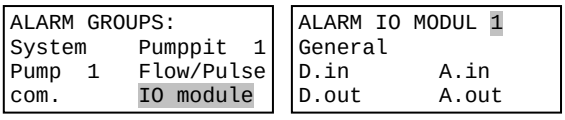
7.3.2.1.4 Flow/Pulse

High alarms for flows have alarm no. 337-352
Alarm number 337-340 for overflow 1-4,
Alarm number 341-344 for flow meter 1-4,
Alarm number 345-352 for pulse channels 1-8.

7.3.2.1.5 Communication

Alarms that can occur when the PCx is acting as a Comli/Modbus master, is always communication error for the master channel (slave does not answer), and error when calling for each master channel.

7.3.2.1.6 IO-module



The alarm group IO module is split into 5 sub groups for IO signals and power supply.

7.3.2.1.6.1 General

Following general alarms are available for each IO module.

Power failure	*(Alarm when module switches over to battery back-up)*
Low voltage	*(Voltage level is below the set alarm level for a IO-module F116)*
IO module missing	*(Cable or hardware error)*
AI-board missing	*(hardware error)*
Sensor error	*(Alarm for that a mA signal is below 3 mA for 4-20 mA signals)*

7.3.2.1.6.2 Digital inputs(D.in)

Each digital input (1-16) can generate an alarm when the input goes active.
NOTE! Possibility for double alarms as described in chapter 6.3 settings.

7.3.2.1.6.3 Analogue inputs(A.in)

High and low alarms can be activated for each analogue input (1-4).
Note that for ex. the level alarm for pumppit has separate alarm numbers for high and low level alarm.
NOTE! Possibility for double alarms as described in chapter 6.3 settings.

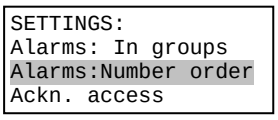
7.3.2.1.6.4 Digital outputs (D.out)

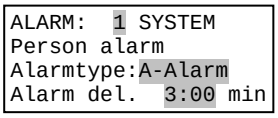
Each digital output(1-8) can generate an alarm when the output goes active.

7.3.2.1.6.5 Analogue outputs (A.out)

High and low level alarm can be set for each analogue output.

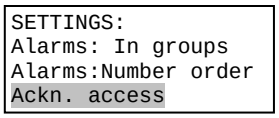
7.3.2.2 Alarm number order

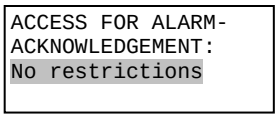




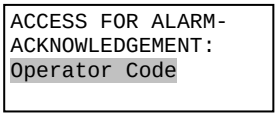
Includes all alarms. Input an alarm number or step with the arrow keys. See alarm list page 131.

7.3.2.3 Access for alarm acknowledgement

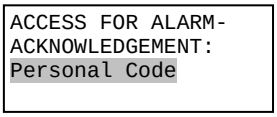


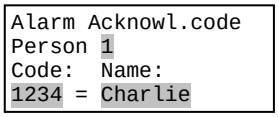


This function can be used to set an Access level to acknowledge alarms, where only authorised personnel is allowed to acknowledge alarms, also personal access codes can be set.



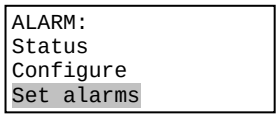
This is selected if Operator/system access level is needed to acknoledge alarms.

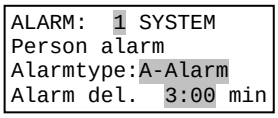




With a personal code it will be known who reseted an alarm through that code. Up to 9 diffrent codes can be set.

7.3.3 Set alarms





This menu filters all alarms that have been set and gives a good overview of all alarms that are in use and the possibility to change alarm type and delay.

7.4 Digital in

4
DIGITAL
IN

Function key for program group ”DIGITAL IN”

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
 BLOCKED
Status: 0 ( OPEN )
```

When the marker is set in the first row the actual status for the output is shown.The number after the IO-module (in brackets)shows the total number of connected IO-modules on the CAN-bus.

1st row
Shows which IO-module (1-8) and what digital input(1-16) that is going to be shown/programmed. The arrow keys are used to step between the IO.modules and with the ENTER key jump to the inputs, which also is stepped with the arrow keys. When the marker is on this row and pressing the key ”FUNCTION” the input function is shown on row 3. This can be used to show the basic function that is connected this input.

2 nd row
If the signal is normally open or closed.

3 rd row
The function text which is shown/ programmed.

4 th row in show position
Shows the status of the input.

4 th row in programming position
Via the arrow keys the following choices are available: **SAVE**, **SETTINGS**, **TEXT** and **IO-SIGNAL**. Under function IO-SIGNAL is set if the function is controlled via a digital input (Connection block) or via an internal IO-bit number.
During programming of digital input nothing happens to previous made settings until the new configuration is saved. See chapter 7.4.3 about common settings on page 84.

7.4.1 Normally CLOSED/OPEN

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
 BLOCKED
Status: 0 ( OPEN )
```

Setting for the function in normal position.
Many alarm relays are often in normally closed position to give alarm at power failure. This setting is only valid if the input signal is through a connection block.

```
IO-modul:2(1) Din: 1
MODUL MISSING
 BLOCKED
Status: 0
```

If IO module is not connected this will show in the text window.

If the input is connected to an internal IO number the text will show ” IO-bit”, see further in this chapter about common settings – IO signal.

7.4.2 Input types

Following input types are available

Type no.	Function	Connected to
0	Closed	
1	High level float pumppit	Pumppit 1-4
2	Overflow pumppit	Pumppit 1-4
3	Start confirmation pump	Pump 1-16
4	Motor protector pump	Pump 1-16
5	Temp. protector pump	Pump 1-16
6	Block pumps	Pump 1-16
7	Block pumppit	Pumppit 1-4
8	End position valve open	Pump 1-16 and Pumppit 1-4
9	End position valve closed	Pump 1-16 and Pumppit 1-4
10	Pulse input (Rain, Flow, Energy)	Pulse channel 1-8
11	Alarm inputs of free choice.	
12	Person alarm (Visiting alarm and local display)	
13	Ext. Person alarm.	
14	Start float.	Pump 1-16 and Pumppit 1-4
15	Stop float.	Pump 1-16 and Pumppit 1-4
16	Block PID controller	PID regulator 1-2
17	Block output	Output of free choice(IO-no 0-63)
18	Activate output	Output of free choice(IO-no 0-63)
19	Shift motor Max (End position)	Shift motor 1-4
20	Shift motor Min (End position)	Shift motor 1-4
21	Block Shift motor	Shift motor 1-4
22	Force Shift motor	Shift motor 1-4
23	Block pump start	Pump 1-16 and Pumppit 1-4
24	Block derivata control	Pumppit 1-4
25	Power failure IO-module	IO-module 1-8
26	Alarm Acknowledge	
27	Manual start of pump	Pump 1-16

7.4.2.1 Closed

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
 BLOCKED
SAVE
```

Output unused.

7.4.2.2 High level float pumppit

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
HIGHFLOAT PUMPPIT
PUMPPIT: 1
```

Set a pumppit no. to which the float belongs.
Other relevant settings are made in program group ”PUMPPIT”.

7.4.2.3 Overflow pumppit

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
OVERFLOW PP:
PUMPPIT: 1
```

Set a pumppit no. to which the overflow sensor belongs.
Other relevant settings are made in program group ”PUMPPIT”.

7.4.2.4 Start confirmation pump

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
STARTCONF. PUMP
PUMP No: 1
```

Set the number for a pump that the start confirmation is for.
Other relevant settings are made in program group ”PUMP”.
Start confirmation must be set to the digital input to get a correct running indication for a pump.

7.4.2.5 Motor protector pump

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
MOTOR PROT. PUMP
PUMP No: 1
```

Set a pump number that the motor protector is for.
Other relevant settings are made in program group ”PUMP”.

7.4.2.6 Temperature protector pump

```
IO-modul:1(1) Din: 1
NORMALLY CLOSED
TEMP.PROT PUMP
PUMP No: 1
```

Set a pump number for temp. protector.
Other relevant settings are made in program group ”PUMP”.
NOTE! Most built-in temperature protectors have an opening function when failure. If that is the case Normally closed should be entered also, see figure.

7.4.2.7 Block pump

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
BLOCK PUMP
PUMP No: 1
```

Used for ex. HAND-0-AUTO switch, leakage guards a.s.o. Sets the pump to be blocked. Other settings are made in program group ”PUMP”. This function does not close the setpoint for the pump, which means that the pump will start again if the stop level wasn’t reached before the pump was blocked. All time delays except F.705 are ignored.

7.4.2.8 Block pumppit

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
BLOCK PUMPPIT
PUMPPIT: 1
```

Blocks all the pumps that are connected to a specific pit.
Set a pumppit no. to be blocked. Other relevant settings are made in program group ”PUMPPIT”. This function closes the set-point values for all the pumps, to allow a restart with set time delays. Pumps that were running will not start when the blocking has stopped.

7.4.2.9 Valve open

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
VALVE OPEN
PUMP No.  1
```

For end contact detection of pump valve open.
Other relevant settings are made in program group ”PUMP” or “PUMPPIT” depending on where the valve belongs.

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
VALVE OPEN
PUMPPIT   1
```

Connect to pumppit if several pumps use the valve.

7.4.2.10 Valve closed

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
VALVE CLOSED
PUMP No.  1
```

For end contact detection of pump valve is closed.
Other relevant settings are made in program group ”PUMP” or “PUMPPIT” depending on where the valve belongs.

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
VALVE CLOSED
PUMPPIT   1
```

Connect to pumppit if several pumps use valve

7.4.2.11 Pulse input

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
PULSE INPUT
PULSE CHANNEL:1(1-8)
```

The maximum amount of pulse inputs is 8 in the system.
The Max pulse freq. is 100 Hz with Min pulse time of 5 mSec.

Enter a pulse channel 1-8.

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
PULSE INPUT 1
SETTINGS
```

```
IO-modul:1(1) Din: 1
Flow (l/s)
PULSE INPUT 1
1 pulse = 0.000 l
```

Following flow types can be selected:
Flow (l/s), Flow (m3/h), Energy (kW), Rain (l/s*ha), Own type (unit./s), Own type (unit/h)

```
IO-modul:1(1) Din: 1
User type (units/s)
Pulse unit    l
Flow unit     l/s
```

For user typed unit a menu of own units is added.

```
IO-modul:1(1) Din: 1
Flow (l/s)
PULSE INPUT 1
1 l   =   0.0 pulses
```

Scaling can be a volume units/pulse or a pulses/volume unit

7.4.2.12 Alarm input

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
ALARM INPUT
ALARM
```

```
ALARM:385 DIN 1:1
ALARM INPUT
Alarmtype:Inactiv
Alarm del.  0:01 min
```

An alarm input uses the general IO alarms for digital inputs.

7.4.2.13 Person alarm

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
PERSON ALARM
Local mode? NO
```

The alarm number 1 is the person alarm and is connected through a DI. The person alarm is normally connected to a light switch in a station. When the input is activated, a timer starts that generates a person alarm when it is overrun. The timer is set to zero every time a key on the PCx is pressed also each time the light switch is turned on.
To the person alarm a digital output can be connected that will signal when the timer needs to be reseted. The local mode can be selected for one or all communication ports. This means that all remote control is blocked from these ports (All Comli/Modbus writing to PCx is blocked in local mode). A LED in the front of the PCx shows local mode. Personal alarm is always transmitted even if all other alarm calls are blocked when visiting. Alarm type and times for the person alarm are set in program group “ ALARM “.

7.4.2.14 Ext. Person alarm

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
EXT. PERSON ALARM
SAVE
```

Has the Alarm number 2.
Ext. person alarm is used to connect already existing equipment for visiting alarm. This alarm is transmitted even if all other alarm calls are blocked when visiting.

Alarm type and times for person alarm are set in program group " ALARM "

7.4.2.15 Start float

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
START FLOAT
PUMP No.  1
```

Connected to pump or pumppit.
Can be used separately or in combination with level set-point for a pump.
Stop float or a level set-point for stopping the pump has priority before the start float. Start and stop float can influence the status before the alternation function, which means that another pump that is started with alternation function can be affected by this function and be started even if it has not been set to start on this float.

7.4.2.16 Stop float

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
STOP FLOAT
PUMP No.  1
```

Connected to pump or pumppit.
Can be used separately or in combination with level set-points.
Stop float ha priority before start float and start set-points.
Start and stop float can influence the status before alternation, which means that another pump that is alternated can be affected.

7.4.2.17 Block PID controller

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
BLOCK PID REG.
PID REGULATOR: 1
```

Block a selected PID controller.

7.4.2.18 Block output

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
HOLD OUTPUT
IO-modul:1   Dout: 1
```

Blocks a selected output directly, independent of other automatics that are connected to the output.

7.4.2.19 Activate output

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
FORCE OUTPUT
IO-modul:1   Dout: 1
```

Activate a selected output directly, independent of other automatics which are connected to the output. Only the input type Block output has priority over this function.

7.4.2.20 Shift motor max

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
SHIFT MOTOR MAX
SHIFT MOTOR: 1
```

End contact detection for a shift motor 1 - 4 in max position.
Gives possibility to detect deviations of the actual value if the max value is known.

7.4.2.21 Shift motor min

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
SHIFT MOTOR MIN
SHIFT MOTOR: 1
```

End contact detection for shift motor 1 - 4 min position
Gives possibility to detect deviations of the actual value if the min value is known.

7.4.2.22 Block shift motor

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
HOLD SHIFT MOTOR
SHIFT MOTOR: 1
```

Used for HAND-0-AUTO switch for shift motors

7.4.2.23 Force shift motor

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
FORCE SHIFT MOTOR
SHIFT MOTOR: 1
```

Forces the shift motor to a preset setpoint in F.720

7.4.2.24 Block pump start

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
BLOCK P. START
PUMP No. 1
```

Connect to pump or pumppit.
Blocks the start command to pumps in off position.
Pumps that are running are not affected.

7.4.2.25 Block derivata control

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
BLOCK. DERIVATA PP
PUMPPIT: 1
```

Blocks derivata control of pumps (see F.708).
Choose pump pit.

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
BLOCK. DERIVATA PP 1
SETTINGS
```

```
IO-modul:1(1) Din: 1
Block level derivata
control (F.708) for
Start and stop
```

Select partial or full blocking.

```
IO-modul:1(1) Din: 1
Block level derivata
control (F.708) for
Start only
```

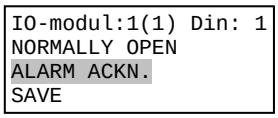
```
IO-modul:1(1) Din: 1
Block level derivata
control (F.708) for
Stop only
```

7.4.2.26 Power failure IO-module

```
IO-modul:1(1) Din: 1
NORMALLY OPEN
POWER FAIL IO-MOD.
IO-modul:1
```

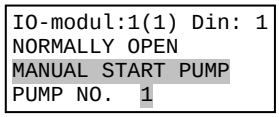
Sets an alarm when a electric power loss happens for a specific IO-module

7.4.2.27 Alarm acknowledge



To acknowledge alarms on an extern button. All alarms will be acknowledged.

7.4.2.28 Manual start of pump



Will start a pump on an input. The pump will stop if a stop level is reached. If the level is below the stop setpoint, the pump will only be run when the input is active

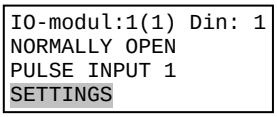
7.4.3 Common settings for digital inputs

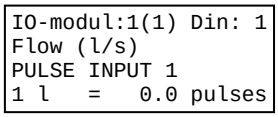
On row 4 there are the alternatives SAVE, SETTINGS, TEXT, IO-SIGNAL, and in some cases ALARM. These can be selected by pressing the arrow keys and then enter

7.4.3.1 Save

If there are no further settings to be made for the input, save is shown on the last row. If settings have been changed a question is shown which must be confirmed with YES and <ENTER> for the new settings to be accepted.
The question ”SAVE CHANGES” is shown if the CANCEL key is used to go backwards after changes have been made.

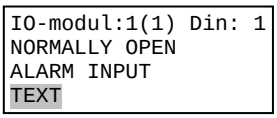
7.4.3.2 Settings

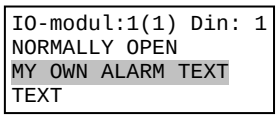




If further settings are available for the input SETTINGS is shown for these input types.

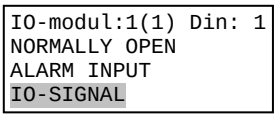
7.4.3.3 Own text for inputs

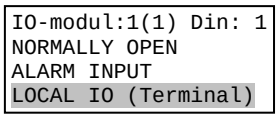


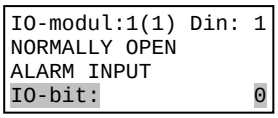


Own user text can be used for all types of inputs. The standard text is shown again when the input type is changed. If the text have been changed the real function behind the own typed text is shown when the “FUNCTION” key is be pressed, for ex. The own text is “ ERROR FAN” and when the funcion key is pressed it will show “ ALARM INPUT”.

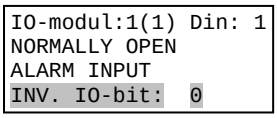
7.4.3.4 IO-signal



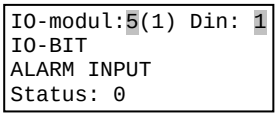




Input signals can be connected to internal I/O numbers instead of normal terminals, to allow more complex function in the PCx..
When IO number is selected the input is totally independent of the input terminal. It is recommended to use IO-bit primarily on not connected IO-modules



INV. IO-bit inverts status from selected IO number, meaning IO status 0 gives DI status 1 and vice versa.



In the main menu the digital inputs are indicated as *IO-bit* or *INV. IO-bit* on row 2.

The choice normally open / closed is not available for IO-bit.

7.5 Digital out

5
DIGITAL
OUT

Function key for program group ”DIGITAL OUT”

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
 BLOCKED
Status: 0 ( OPEN )
```

If the marker is on row 1 the actual status for the output is shown.
The number after the IO-module (In brackets) shows the number of connected IO-modules. IO-modul 1 is PCx and 2-8 is PCxp with the CAN ID 2-8

1 st row
The seleceted IO-module (1-8) and Digital output (1-8) that is to be shown/programmed.
The arrow keys are used to step between the modules and with enter key jump to the outputs, which also are stepped with the arrow keys. If the marker is on row 1 and the ”FUNCTION” key is pressed the function type will be shown on row 3.

2 nd row
If the output is normally open or closed.

3 rd row
Shows/ programmes the function of the output or a free programmable text that describes the function.

4 th row in show position
her the status of the input is shown.

4:e row in programming mode
Via the arrow keys following selections are available: **SAVE**, **SETTINGS**, **and TEXT**.
During programming of a digital output the earlier settings are not influenced until the new settings are saved.

7.5.1 Normally CLOSED/OPEN

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
 BLOCKED
Status: 0 ( OPEN )
```

Setting for normal position.
An alarm output is often normally closed to register an alarm when the power failures.

```
IO-modul:2(1)Dout: 1
MODUL MISSING
 BLOCKED
Status: 0 ( OPEN )
```

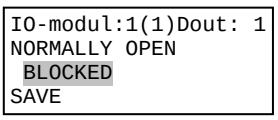
If IO module is not connected this text is shown.

7.5.2 Output types

Following output types are available

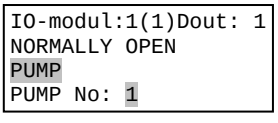
Type no.	Function	Connected to
0	Closed	
1	Pump	Pump 1-16
2	Valve control	Pump 1-16 and Pumppit 1-4
3	Open valve	Pump 1-16 and Pumppit 1-4
4	Close valve	Pump 1-16 and Pumppit 1-4
5	Start confirmation pumppit	Pumppit 1-4
6	Not acknowledged alarm	A,B,C alarm
7	Selective alarm outputs	1-6 alarm numbers of free choice
8	remote controlled output	
9	Signal person alarm	
10	Alarm active	A,B,C alarm
11	Alarm pulse (at new alarm)	A,B,C alarm
12	Reset motor protector	Pump 1-16 and Pumppit 1-4
13	Reverse pump	Pump 1-16
14	Spray pit	Pump 1-16 and Pumppit 1-4
15	IO-bit.	IO no 0-4095
16	Logic IO	1-5 IO no. Of free choice
17	Pre-set volume flow meter	Overflow 1-4, and flow meter 1-4
18	Pre-set number of pulses	Pulse channel 1-8
19	Pre-set pit flow	Pumppit 1-4
20	Timer	Free floating or timer 1-9.
21	Setpoint	Analogue value of free choice.
22	Variable speed controlled pump	Pump 1-16
23	Shift motor increase	Shift motor 1-4
24	Shift motor decrease	Shift motor 1-4
25	Compare register data	2 data registers of free choice
26	Setpoint window	Analogue value of free choice.
27	Modem power	COM 1-2

7.5.2.1 Closed



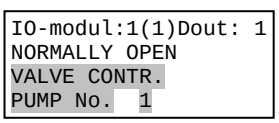
When not an output is used.

7.5.2.2 Pump



Sets the output to control a pump. Options are 1-16.
Other settings for the pump are in program group ”PUMP”

7.5.2.3 Valve control



For pump valves with a single control mechanism. The output is active when the valve is open and inactive when closed.
Connected to PUMP or PUMPPIT
Other settings in program group ”PUMP” or ”PUMPPIT”

7.5.2.4 Open valve

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
OPEN VALVE
PUMP No.  1
```

The output sends open pulses until the end contact is reached or when the max time for opening the valve expires.
Connected to PUMP or PUMPPIT
Other settings in program group ”PUMP” or ”PUMPPIT”

7.5.2.5 Close valve

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
OPEN VALVE
PUMP No.  1
```

The output sends closing pulses until the end contact is reached or when the max time for closing the valve expires.
Connected to a PUMP or PUMPPIT
Other settings in program group ”PUMP” or ”PUMPPIT”

7.5.2.6 Running indication pumppit

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
RUN.IND PUMPPIT
PUMPPIT:1
```

The output is active if any pump in the pit is running.

7.5.2.7 Not acknowledged alarm

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
ALARM UNACK.
    A - Alarm
```

The output is active if any unacknowledged alarm exists for a alarm type. Alarm types are A, B and C alarm, or a combination of these types.

7.5.2.8 Selective alarm output

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
SELECTIVE ALARM OUTP
SETTINGS
```

```
IO-modul:1(1)Dout: 1
  0   0  Alarm no.
  0   0  conditions:
  0   0  OR
```

Used for combined alarm for 1 to 6 alarm numbers of free choice, or for “OR” and “AND” alarms. If for ex. 2 alarm numbers with low priority are active at the same time, alarm with higher priority can be set if both alarms are active simultaneously.
Not used alarm numbers are set to 0. Conditions can be ”OR” and ”AND”. If ”OR” is set the output will be active if any of the alarm numbers is active. If ”AND” is set all set alarm numbers must be active for the output to be activated.

7.5.2.9 Remote controlled output

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
REM.CONTR OUTPUT
On time   0:00 mm:ss
```

For direct manoeuvre from supervision system or other Comli/Modbus masters. This output is controlled by writing to the IO number (IO 0-7 = D.out 1-8) of the output. If an ON time is set (max 99 min 59 sec) the output will deactivate after the set time. Every new writing sets timer to 0. If ON time is 0, no automatic reset.

7.5.2.10 Signal person alarm

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
SIGNAL PERSON. ALARM
SETTINGS
```

Is activated when the timer has expired and the alarm delay is activated. Connected to audio signal or similar as reminder to 0 set timer.

7.5.2.11 Alarm active

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
ALARM ACTIVE
    A - Alarm
```

This output is active if alarms are active for selected alarm types.
Alarm types are A, B and C alarm, or a combination of these types.

7.5.2.12 Alarm pulse

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
ALARM PULSE
    A - Alarm
```

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
A ALARM PULSE
On time   0:00 mm:ss
```

Gives a pulse every time a new alarm occurs for selected alarm type(s). Alarm types are A, B and C alarm, or a combination of these types. Pulse time from 1 sec. to 99 min 59 sec Used for existing alarm calling systems.

7.5.2.13 Reset motor protector

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
RESET M-PROT.
PUMP No.  1
```

```
IO-modul:1(1)Dout: 1
Delay        30 sec
Pulse time    1 sec
No of retries 1
```

For autoresetting a motor protector.
If resetting is done for all protectors at the same time, PUMPPIT is set instead of PUMP NO. The reset sequence starts in this case if any of the motor protectors in the pumppit is set.

The delay time must be long enough for the protector to cool down before resetting.
Pulse time tells how long the output shall be active when resetting the protector. When max number of retries is exceeded the resetting is stopped and an alarm ”Error motor protector ” is given. The condition for a successful reset attempt is when the running time of the pump exceeds the set **Delay time.** When the alarm for Error motor protector is restored is the counter for retries set to 0.

7.5.2.14 Reverse pump

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
REVERSE PUMP
PUMP No: 1
```

```
IO-modul:1(1)Dout: 1
Delay          5 sec
Reverse time   1 sec
Pump relay OFF
```

For automatic or remote reversing of pump.
The conditions for automatic control of the reversing are set in program group ”PUMP”.

Delay time is the shortest time the pump must be stopped before a reversing sequence starts if the pump is running.
Reverse time is how long time the output should be active.
Pump relay is set to OFF if the manoeuvre of the pump is made from the reversing contact. If the reversing contact only changes the phase sequence the **Pump relay** is set to ON for pump manoeuvre via the normal pump output.

7.5.2.15 Spray

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
SPRAY
PUMP No.  1
```

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
10 STOP  betw. spray
On time   1:00 mm:ss
```

For automatic cleaning of pumppit after pre-set no. of stops or starts of pumps.
The number can be on starts and stops in the PUMPPIT or on separate PUMP NO.
Select if the pre-set number shall be on pump STOP or START. This controls if spraying shall start at low STOP level or at high START level. Up to 99 starts/stops between sprayings can be set. Spraying time can be up to 99 min and 59 sec.

7.5.2.16 IO-bit

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
IO-BIT
SETTINGS
```

Used to connect a IO number free of choice to an output either as a pulse when the IO goes active, or with start and stop delay.

```
IO-modul:1(1)Dout: 1
D.OUT 1:2
PUMP 2
IO-bit:     1
```

When the IO number is the actual function for the IO number, it is shown on row 2 and 3. The IO-number can be changed with the arrow keys.

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
IO-BIT
SETTINGS
```

```
IO-modul:1(1)Dout: 1
On delay    0:00 m:s
Pulse time  0:00 m:s
Alarm hold: OFF
```

```
ALARM:417 DOUT 1:1
IO-BIT
Alarmtype:Inactiv
Alarm del.  0:01 min
```

```
IO-modul:1(1)Dout: 1
On delay    0:00 m:s
Off delay   0:00 m:s
Alarm hold: OFF
```

ON DELAY can be set up to 999:59 mm:ss.
If the selected IO number is inactive before the time delay is OFF no contact function will be given.
Pulse time or **Off delay** is set according to wanted function, max 999:59 mm:ss.
Contact function will be given with set pulse time even if the IO-number goes inactive earlier.
Alarm blocking can be set to OFF or ON and gives possibility to block the output if it has been active longer time than set alarm delay. To release the blocking, the alarm for the output has to be acknowledged.

7.5.2.17 Logic IO

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
LOGIC IO
SETTINGS
```

```
IO-modul:1(1)Dout: 1
Condition OR  IO-ON
Signal 1
IO    1 NORMAL
```

```
IO-modul:1(1)Dout: 1
DOUT 1:2
PUMP 2
IO-number:   1
```

For logic conditions on 1 to 5 IO numbers free of choice.
Following conditions can be set: ”OR ON”, ”AND ON”, ”OR OFF”, ”AND OFF”.
To see help texts for the function of the IO numbers the FUNCTION key can be pressed when the marker is on the field for the IO-number. Can be changed with arrow keys.

SELECT IO number for signal 1-5, and NORMAL (1=True) or INVERTED (0=True) for the signal.
For not used signals the IO number should be set to –1 to indicate this.

7.5.2.18 Pre-set value flow meters

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
FLOW PULSE FL.M.
Flow:1 Ov.flow 1
```

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
On time      1 sec
   0.0 m3 / pulse
```

Give a pulse when pre-set volume is reached.
Used for external counters and control of samplers.

Select wanted flow signal, flow 1-4=Overflow for Pumppit1-4, flow 5-8=Flow meter 1-4.
Pulse time from 0.5 – 99 sec.
Pre-set flow volume from 0.1 – 6553.5 m3 / pulse.

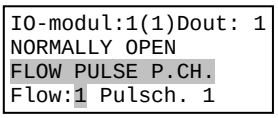
7.5.2.19 Pre-set pulse volume

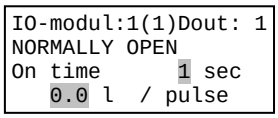
```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
FLOW PULSE P.CH.
Flow:1 Pulsch. 1
```

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
On time      1 sec
   0.0 l  / pulse
```

Gives a pulse when pre-set volume is reached.
Used for external counters and control of samplers.
Select wanted flow signal, pulse channel 1-8.
Pulse time from 0.5 – 99 sec.
Pre-set flow volume from 0.1 – 6553.5 pulse units / pulse.

7.5.2.20 Pre-set pit flow

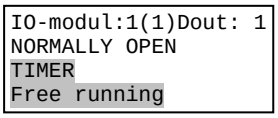


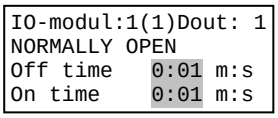


Gives a pulse when pre-set volume is reached
Used for external counters and control of samplers

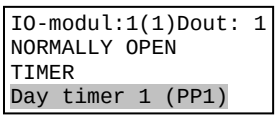
Select the wanted flow signal, pumppit 1-4.
Pulse time from 0.5 – 99 sec.
Pre-set flow volume from. 0.1 – 6553.5 m3 / pulse

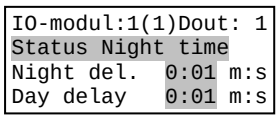
7.5.2.21 Timer



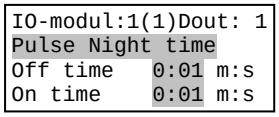


Timer can be free running or connected to a set value in F.110.
Max pause or pulse time is 999 min. 59 sec.



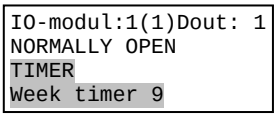


Timer 1-8 controls normal time - night time
The output can indicate actual time with delay up to 999:59 mm:ss. Alternatively a pulse can be generated at specific time.



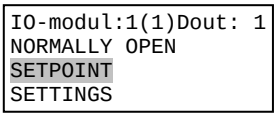
Pulse *Night time*, *Normal time* or *Night +Normal time can be set*.

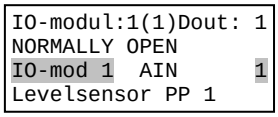
Off (pause) time sets On delay up to 999:59 mm:ss
On (pulse) time set the time for contact closure max 999:59 mm:ss



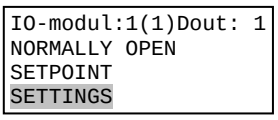
Timer 9 is a week timer with separate settings for each day.
With this timer the output follows the actual status.

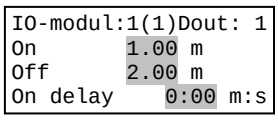
7.5.2.22 Setpoint





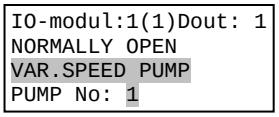
The setpoint value can be coupled to any analogue input choice.

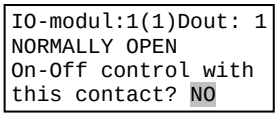




On and Off set-point are set separately
On delay can be set up to 99:59 mm:ss

7.5.2.23 Variable speed controlled pump

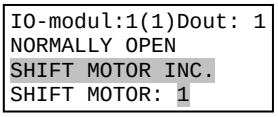




All pumps, which are to be speed controlled with the built-in speed control logic in the PCx, must have this output type.

If “control with this contact” is set to ”YES” the normal contact is always Off when the pump is speed controlled. If ”NO” is set the contact is used to connect the pump to the frequency converter and the manoeuvre of the pump is done via the normal pump contact. See chap. 6.5 page.27.
In program group ”PUMP” the pump must be VARIABLE SPEED if this output type should work.

7.5.2.24 Shift motor increase



Contact output for control of shift motors.
Select shift motor 1 – 4.
All other settings made in F.720.

7.5.2.25 Shift motor decrease

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
SHIFT MOTOR DEC.
SHIFT MOTOR: 1
```

Contact output for control of shift motors
Select shift motor 1 – 4.
All other settings made in F.720.

7.5.2.26 Compare register data

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
COMPARE REGISTERDATA
SETTINGS
```

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
COMPARE REGISTERDATA
R.    1 <  R.    2
```

Compares content in 2 Data registers.
If conditions are fulfilled the output goes active.
Possible conditions are ”<”, ”<=”, ”=”, ”>=”and ”>”.
The register numbers can be 0 – 65535.

See separate Comli/Modbus register manual for description of data register.
At double registers the higher register number is set .
For comparison with own set-points F.808 can be used for writing to free Data registers.

7.5.2.27 Setpoint window

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
SETPOINT WINDOW
SETTINGS
```

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
IO-mod 1  AIN      1
Levelsensor PP 1
```

The setpoint window can be coupled to any analogue input.

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
SETPOINT WINDOW
SETTINGS
```

```
IO-modul:1(1)Dout: 1
Max      2.00 m
Min      1.00 m
On delay    0:00 m:s
```

Output is active when signal is between Max and Min setting. If Max is set lower than Min, the output function is inverted (output active for signals outside window).

On delay can be set up to 99:59 mm:ss

7.5.2.28 Modem Power

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
MODEM POWER
COM: 1
```

Power to modem on either COM1 or COM2. The PCx has a built in function that can reset a modem that has been jammed or working correctly.

7.5.3 Common setting for digital outputs

On row 4 are alternatives for SETTINGS, SAVE and TEXT.
These can be selected via arrow keys.

7.5.3.1 Settings

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
 BLOCKED
SETTINGS
```

```
IO-modul:1(1)Dout: 1
No further config
possible in this
menu
```

Shows other settings for selected type.
If no further settings this picture is shown.

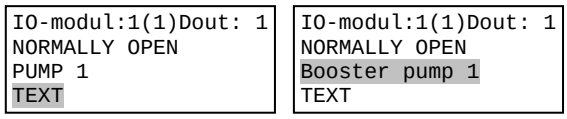
7.5.3.2 Save

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
 BLOCKED
SAVE
```

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
 BLOCKED
SAVE CHANGES   YES
```

When the settings are ready SAVE will show on the lowest row. If settings have been changed the SAVE CHANGES show and must be confirmed with YES and <ENTER> before the new values are valid. The question ”SAVE CHANGES” even show if you try to go backward with the CANCEL key after changes have been made.

7.5.3.3 Own text for outputs



Own text can be used for all types of outputs. The standard text reappears when the output type is changed.
To check the function behind own text, the ”FUNCTION” key can be pressed when the marker is on row 1.

7.6 Analogue in

1
ANALOGUE
IN

Function key for program group ”ANALOGUE IN”

```
IO-module:1(1) Ain:1
mA input
Levelsensor PP 1
Value:   4.02 m
```

When the marker is on the first row the actual status for the input is shown. The number behind the IO-module (in brackets) shows number of connected IO-modules. IO-module 1 is PCx and 2-8 is PCxp with the CAN ID 2-8

1st row
Here is shown which IO-module (1-8) and what analogue input(1-46) is going to be shown/programmed.
The arrow keys are used to step between the inputs.
When the marker is on this row, pressing the key ”FUNCTION” can show the input function on row 3. This is used to show the basic function that is behind own texts.

2nd row
shows which board type (type of input signal) at connected to the input..

For inputs with missing analogue input board the text below is shown.

```
IO-module:2(1) Ain:1
No input
 Blocked
Value:      0
```

If the input is connected to an internal Data register the following is shown.

```
IO-module:2(1) Ain:1
Data  register
 Blocked
Value:      0
```

See chapter about common settings – IO signal.

3rd row
Here is shown /programmed which signal type or. Free text that describes the desired function.

4 th row in show position
Shows the status of the input.

4 th row in programming position
Through the arrow keys are the following choices available: **SAVE**, **SETTINGS**, **TEXT** and **IO-SIGNAL**.
Under function IO-SIGNAL is set if the function is controlled via an analogue input board (Connection block) or via an internal data register number.
During programming of analogue input nothing happens to previous made settings until the new configuration is saved.

7.6.1 Input types

Following analogue input types are available

Type no.	Function	Connected to
0	Closed	
1	Current transformer	Pump 1-16
2	Free choice	
3	Level sensor	Pumppit 1-4
4	Channel flow	Flow meter 1-4
5	Overflow	Pumppit 1-4
6	Flow	Flow meter 1-4
7	Outgoing pressure	Pump group 1-4
8	Pressure suction side	Pump group 1-4

7.6.1.1 Closed

```
IO-module:1(1) Ain:1
mA input
 Blocked
Value:      0
```

Unused input.

7.6.1.2 Current transformer

Used as running indication and for alarm at high or low currents,

```
IO-module:1(1) Ain:1
mA input
Currenttransf.
PUMP  1
```

```
IO-module:1(1) Ain:1
mA input
Currenttransf.
Unit:A      SETTINGS
```

```
IO-module:1(1) Ain:1
Currenttransf.
Sensor      Scaling
Filter      Alarm
```

Set a pump number for the current transformer.

7.6.1.2.1 Sensor

```
IO-module:1(1) Ain:1
Currenttransf.
Sensor      Scaling
Filter      Alarm
```

```
IO-module:1(1) Ain:1
Currenttransf.
0/4 - 20 mA
Change
```

Only 0 and 4-20 mA inputs is available

7.6.1.2.2 Scaling

```
IO-module:1(1) Ain:1
Currenttransf.
Sensor      Scaling
Filter      Alarm
```

```
IO-module:1(1) Ain:1
Start value:    0.0 %
 0 mA=    0.00 A
20 mA=   20.00 A
```

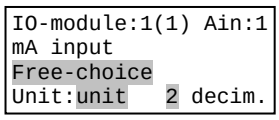
Select 0 or. 4 mA with arrow keys for transformer with current output (0-20 / 4-20 mA).

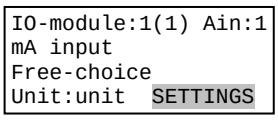
Start value is used as an input the first 20 sec. after power on.

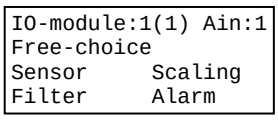
Scaling is set to get the nominal value for the current transformer for ex. 20 A for a 20 mA signal. This is valid when the motor cable passes once through the transformer. If the cable goes twice through the transformer, the measuring range is divided by 2.

7.6.1.3 Free choice

Used for external measuring value where logging , alarms and set-points are needed.

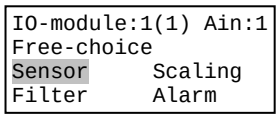


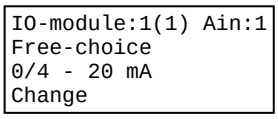




Set a wanted unit and no. of decimals for display.
See common settings about free text.

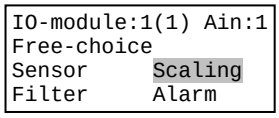
7.6.1.3.1 Sensor

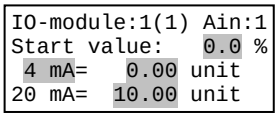




For free type of signal with normal mA signal from an external sensor.

7.6.1.3.2 Scaling

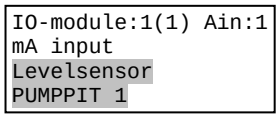


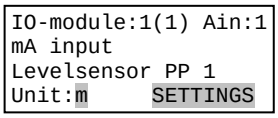


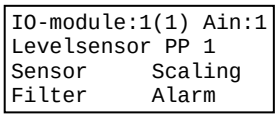
Select 0 or. 4 mA with arrow keys (0-20 / 4-20 mA).
Scaling is normally set to the nominal measuring range for the sensor.
Start value is used as input the first 20 sec. after the power up.

7.6.1.4 Level sensor

Used for level sensor, which is connected to pumppit with associated control functions.

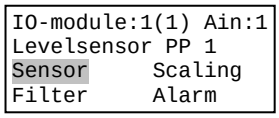


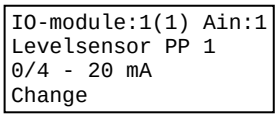




Set to pumppit to control or general for level indication only. Unit can be in meter or cm.

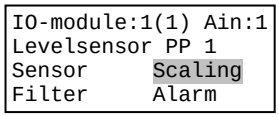
7.6.1.4.1 Sensor

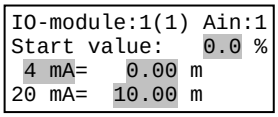




The level sensor is often a 4-20 mA signal.

7.6.1.4.2 Scaling

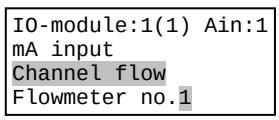


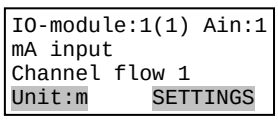


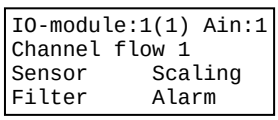
Chose 0 or 4 mA with arrow keys (0-20 / 4-20 mA).
Scaling is normally set to the nominal measuring range for the sensor. Start value is used as input the first 20 sec. after power on.

7.6.1.5 Channel flow

Connection of level sensor for flow metering in open channels and weirs







Select flow meter 1-4
As Channel flow is based on in a channel or weir the unit can be set as meter or mm.

7.6.1.5.1 Sensor

```
IO-module:1(1) Ain:1
Channel flow 1
Sensor      Scaling
Filter      Alarm
```

```
IO-module:1(1) Ain:1
Channel flow 1
0/4 - 20 mA
Sensor OK
```

The level sensor is mostly a 2 wire submersible sensor.

7.6.1.5.2 Scaling

```
IO-module:1(1) Ain:1
Channel flow 1
Sensor      Scaling
Filter      Alarm
```

```
IO-module:1(1) Ain:1
Start value:    0.0 %
 4 mA=   0.000 m
20 mA=   1.000 m
```

Start value is used as input the first 20 sec. after power on. Chose 0 or 4 mA with arrow keys (0-20 / 4-20 mA). Scaling is normally set to the nominal measuring range for the sensor. If the 0 point of the sensor is the weir edge, the 0 point is adjusted so that 0.000 m is exactly at the weir edge. Is the sensor mounted for ex. 0.1 m below the edge the scaling must be adjusted for this.
Note! The difference between 0/4 mA and 20 mA must be the total measuring span of the sensor.

7.6.1.6 Overflow

The overflow can be measured with a separate level sensor, if the overflow is in such a way that the normal sensor can't be used. If overflow switch is connected the measurement starts when the switch goes active or a set overflow level is reached if overflow switch isn't connected. See overflow page 48.

```
IO-module:1(1) Ain:1
mA input
Overflow
PUMPPIT 1
```

```
IO-module:1(1) Ain:1
mA input
Overflow
Unit:m      SETTINGS
```

```
IO-module:1(1) Ain:1
Overflow
Sensor      Scaling
Filter      Alarm
```

Chose pumppit 1-4 and a level unit, in meter or mm.

7.6.1.6.1 Sensor

```
IO-module:1(1) Ain:1
Overflow
Sensor      Scaling
Filter      Alarm
```

```
IO-module:1(1) Ain:1
Overflow
0/4 - 20 mA
Sensor OK
```

Level sensor is often a 2 wire submersible sensor.

7.6.1.6.2 Scaling

```
IO-module:1(1) Ain:1
Overflow
Sensor      Scaling
Filter      Alarm
```

```
IO-module:1(1) Ain:1
Start value:    0.0 %
 4 mA=   0.000 m
20 mA=   1.000 m
```

Chose 0 or 4 mA with arrow keys(0-20 / 4-20 mA). Scaling is normally set to the nominal measuring range for the sensor. See also chapter 7.2.2.3.2. Start value is used in the first 20 sec. after power on.

7.6.1.7 Flow

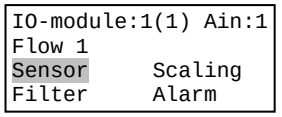
```
IO-module:1(1) Ain:1
mA input
Flow
Flowmeter no.1
```

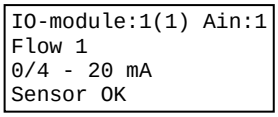
```
IO-module:1(1) Ain:1
mA input
Flow 1
Unit:l/s    SETTINGS
```

```
IO-module:1(1) Ain:1
Flow 1
Sensor      Scaling
Filter      Alarm
```

For external flow sensors where accumulation, logging, alarm limits and set-point are needed. Select flow meter 1-4. These are the same as for channel flow, which means that external flow sensors must have an own number. Unit can be in l/s or m3/h.

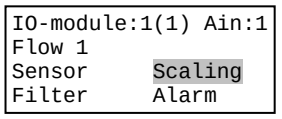
7.6.1.7.1 Sensors

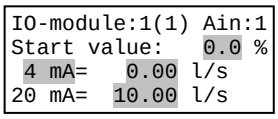




Sensor is most times a 0/4-20 mA signal from an external Flow sensor.

7.6.1.7.2 Scaling

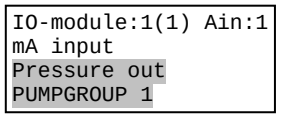


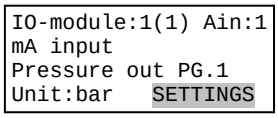


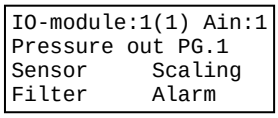
Chose 0 or 4 mA with arrow keys(0-20 / 4-20 mA)..
Scaling is normally set to the nominal measuring range for the sensor.
Start value is used as input the first 20 sec. after power on.

7.6.1.8 Outgoing pressure

Used for booster stations where the pressure sensor is connected to the pumppit associated control functions.

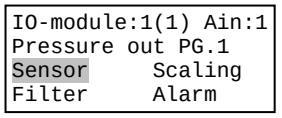


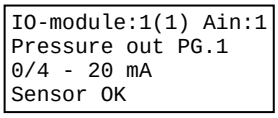




Chose general or pump group 1-4. Connecting to pump group is the same as connection to pumppit.

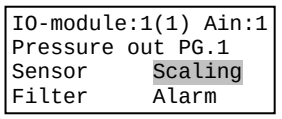
7.6.1.8.1 Sensor

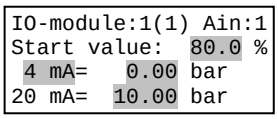




Sensor is normally a 0/4-20 mA signal from external pressure sensor.

7.6.1.8.2 Scaling

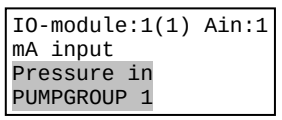


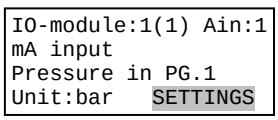


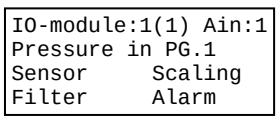
Scaling is normally set to the nominal measuring range for the sensor..
Start value is used as input the first 20 sec. after power on.

7.6.1.9 Pressure suction side

This type is used for speed controlled pumps to limit the outgoing pressure if suction pressure is low.

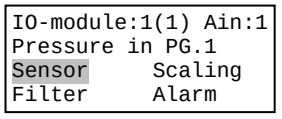


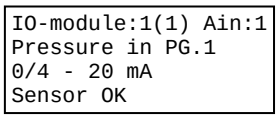




Chose general or Pump group 1-4.
Connection to pump group is the same as connection to pumppit.

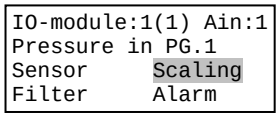
7.6.1.9.1 Sensor

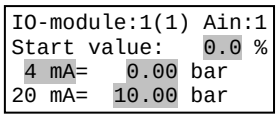




Sensor is normally a 0/4-20 mA signal from external pressure sensor.

7.6.1.9.2 Scaling



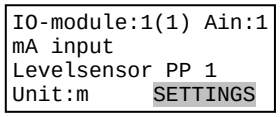


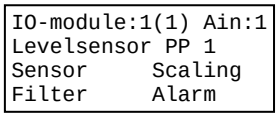
Chose 0 or 4 mA with arrow keys(0-20 / 4-20 mA). Scaling is normally set to the nominal measuring range for the sensor.
Start value is used as input the first 20 sec. after power on.

7.6.2 Common settings for analogue inputs

On row 4 there are settings for TEXT, UNIT, IO-SIGNAL and SAVE.
Use arrow keys to step around.

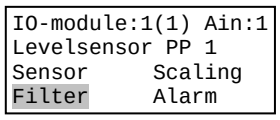
7.6.2.1 Settings

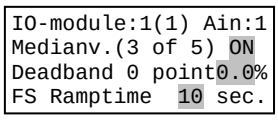




Sensors and scaling are shown for each sensor types.

7.6.2.1.1 Filter





To achieve a stable measuring signal the are 3 different filters available for the analogue signals to be shown.

Median value:

If this filter is set to ON, the new value is a median of the actual value together with the last 4 values. The values with the highest deviation are not used and the 3 remaining values are made to a new average measuring value. The calculation is made 2 times a second, that is why the value is delayed.

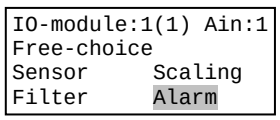
Dead band 0 point:

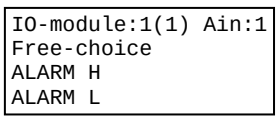
Some sensors can be unstable around its 0 point as for ex. current transformers which easily are affected by nearby motor cables. To achieve a stable 0 point a dead zone of up to 9.9 % of the scaled range can be set. If the signal is lower than the dead zone the measuring value is set to 0.

FS Ramp time:

The ramp time is a derivative limit of the input signal to limit the level of occasional disturbances. The FS ramp time is the time it takes for the input to move across the whole set of the scaled range. This is adjustable between 1 and 99 sec.

7.6.2.1.2 Alarm

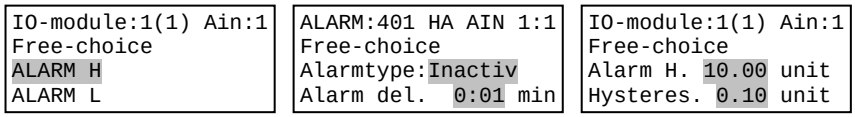




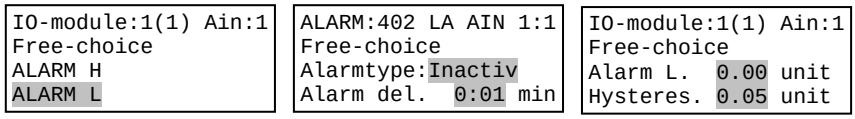
For each analogue input signal, a high and low alarm can be set.

NOTE! Pump pits and pumps have separate alarms for level and motor currents, which makes it possible to set up twice as many alarms as wanted. The alarms should ONLY be set on the program groups only. In example if you set up an higl level alarm on the analogue input sensor connected to pump pit 1and an alarm for high level pump pit1 under the pump pit key group, you will receive two alarms for the same reason.

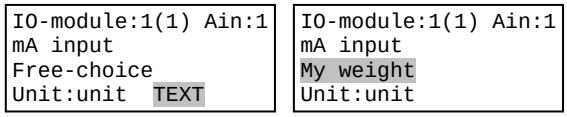
7.6.2.1.2.1 High alarm



7.6.2.1.2.2 Low alarm

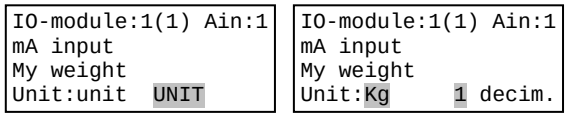


7.6.2.2 Own texts on inputs



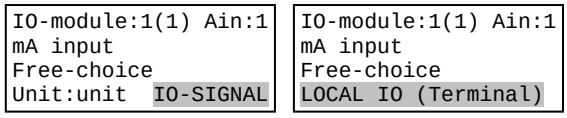
Own texts can be set for all types of inputs. The standard text will show when the input type is changed. To check to function behind own text the FUNCTION key can be pressed when the marker is on row 1.

7.6.2.3 Own unit on inputs

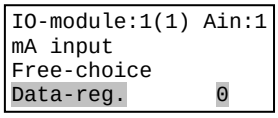


The unit can be changed for every input. Input types with forward connection should use preset units, for ex. level sensor for channel flow can not have decimetres as unit. The decimals in the display should normally be set to 3-4 digits accuracy for scaled range.

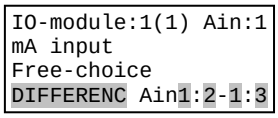
7.6.2.4 IO-signal



The input signal can be selected from a Data register number or as a differential signal of 2 other inputs. Standard setting is a local signal from an input board.

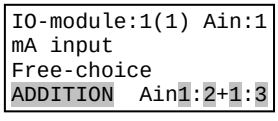


If Data reg. is set the signal is not connected to the physical input. Therefore use this function primarily for inputs on IO-modules that are not connected to the system. Can be used for ex. Com. signals.



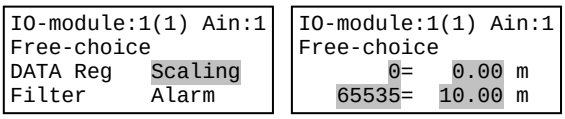
Even at differential measurement the signal is not connected to the physical input. Use this function primarily on not connected IO-modules

Differential measurement can for ex. be used for grid control.
A new differential signal is made from the 2 set inputs. The difference is calculated from the scaled value, which the 2 input signals can have different measuring ranges.



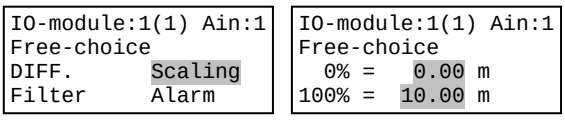
Even at addition the signal is not connected to the physical input. Use this function primarily on not connected IO-modules. Addition can for example be used for the summation of 2 flows

7.6.2.4.1 Scaling data



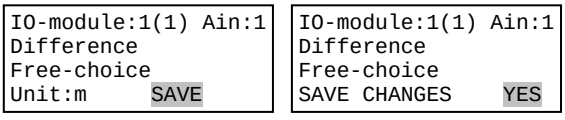
The register values are set for wanted measuring range.

7.6.2.4.2 Scaling differential measurement and addition



Wanted measuring range is set in engineer units. This measuring range is used for reading integer data (0-65535) with Comli/Modbus.

7.6.2.5 Save



When setting is done, SAVE can be selected. If changes have been made they must be confirmed with YES and <ENTER> to activate the changes. Question for ”SAVE CHANGES” will appear even with the CANCEL key if any changes have been made.

7.7 Analogue out

2
ANALOGU
E
OUT

Functions key for program group ”ANALOGUE OUT”

```
IO-modul:1(1) Aout:1

Outsignal:  6.464 mA
Scale
```

When the marker is on row 1 the actual output signal is shown.
The number behind the IO-module(in brackets) shows the number of IO-modules connected. The IO-module 1 is the PCx and 2-8 is PCxp with the CAN ID 2-8

1st row
Here is set which I/O module (1-8) and Analogue output (1-2) is to be shown/programmed.

2nd row
Shows which signal is connected to the output.

3rd row
Shows the actual value of the mA signal

4th row
Through the arrow keys are the following choices available: **SCALING, SAVE and ALARM**.

7.7.1 Signal choice

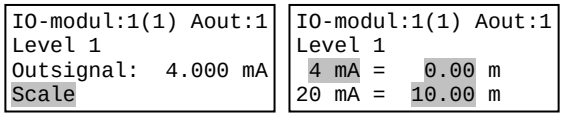
Following signals are available for connection to the output signal.

Signal	**Index area**	
Level pumppit	1-4	
Inflow pumppit	1-4	
Outflow pumppit	1-4	
Overflow pumppit	1-4	
Flow meter	1-4	
Overflow level pumppit	1-4	
Level flow meter	1-4	
Pulse channel	1-8	
IO-module 1 Analogue in	1-4	Analogue input signal according to actual settings
IO-module 2 Analogue in	1-4	
IO-module 3 Analogue in	1-4	
IO-module 4 Analogue in	1-4	
IO-module 5 Analogue in	1-4	
IO-module 6 Analogue in	1-4	
IO-module 7 Analogue in	1-4	
IO-module 8 Analogue in	1-4	
Data register	0-12287	
PID controller	1-2	
Speed PID	1-2	
Pressure	1-4	
Suction pressure	1-4	
Volume pumppit	1-4	

```
IO-modul:1(1) Aout:1

LEVEL    PP.        1
```

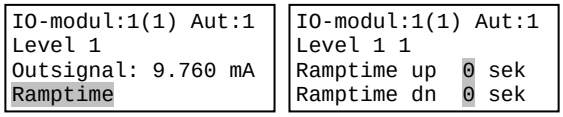
Wanted signal is selected via the arrow keys

7.7.2 Scaling



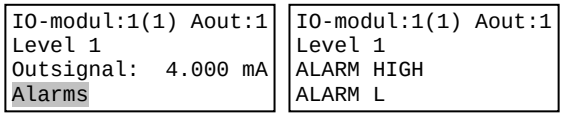
Select 0 or 4 mA with arrow keys and set wanted range for output signal.

7.7.3 Ramptime



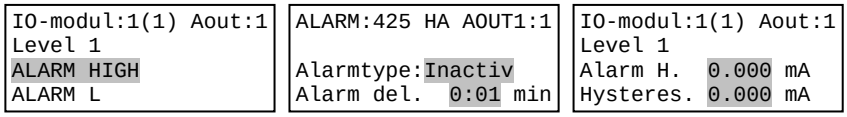
For each output can a separate ramp time be set. The time can be between 0-99 seconds

7.7.4 Alarm



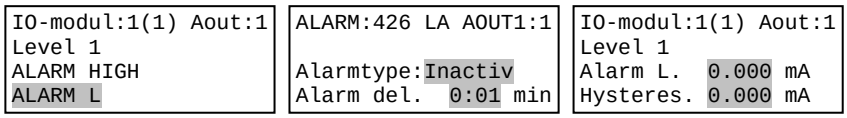
For each output signal high and low alarm can be set.

7.7.4.1 High alarm



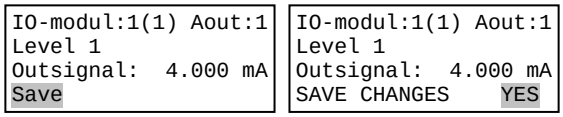
Set alarm type, delay and alarm limits.

7.7.4.2 Low alarm



Set alarm type, delay and alarm limit

7.7.5 Save



If settings have been change these must be saved before they are valid.

7.8 Flow/pulse

3
FLOW/
PULSE

Function key for program group ”FLOW/PULSE”

```
Accumulated flow
Ovfl. status
Actual values
Channel flow config
```

In this program group all data for flow meters and pulse volumes are shown. Here the weir and channel types for open channel flow meters are set.

All accumulated values are available as total accumulated and as totals for 7 days + today value. Today’s value is updated to midnight and is than mowed to yesterday and 0- set.

```
PUMPPIT: 1
TOTAL
Pumped volume
              0.0 m3
```

```
PUMPPIT: 1
Today
Pumped volume
              0.0 m3
```

```
PUMPPIT: 1
Day 1
Pumped volume
              0.0 m3
```

```
PUMPPIT: 1
Day 2
Pumped volume
              0.0 m3
```

```
PUMPPIT: 1
Day 3
Pumped volume
              0.0 m3
```

```
PUMPPIT: 1
Day 4
Pumped volume
              0.0 m3
```

```
PUMPPIT: 1
Day 5
Pumped volume
              0.0 m3
```

```
PUMPPIT: 1
Day 6
Pumped volume
              0.0 m3
```

```
PUMPPIT: 1
Day 7
Pumped volume
              0.0 m3
```

The different values are selected via the arrow keys on the marked fields.

7.8.1 Accumulated volume

```
Accumulated flow
Ovfl. status
Actual values
Channel flow config
```

```
Accumulated flow:
  A:IN flow
  D:IN Pulse flow
  Pumped flow
```

Accumulated volume is split into 3 sub groups.

```
Accumulated flow:
  A:IN flow
  D:IN Pulse flow
  Pumped flow
```

```
1 Ov.flow 1
TOTAL
Accumulated flow
              0.0 m3
```

A:IN flow shows the overflow value for pumppit 1-4 And analogue flow meter 1-4.

```
Accumulated flow:
  A:IN flow
  D:IN Pulse flow
  Pumped flow
```

```
1 ENERGY
TOTAL
Accumulated flow
       89034.3 kWh
```

D:IN pulse flow shows the accumulated values for pulse channels 1-8. Actual set text for the digital inputs is used as name.

```
Accumulated flow:
  A:IN flow
  D:IN Pulse flow
  Pumped flow
```

```
PUMPPIT: 1
TOTAL
Pumped volume
              0.0 m3
```

Pumped volume is selected for pumppit 1-4.

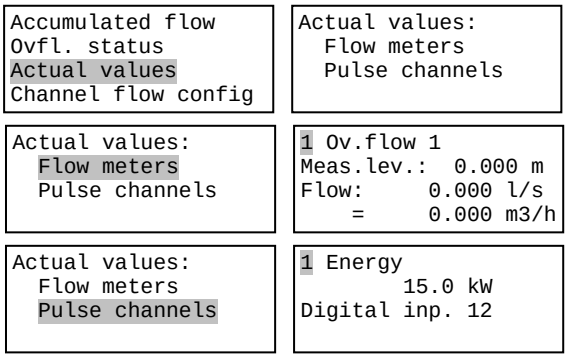
7.8.2 Overflow status

```
Accumulated flow
Ovfl. status
Actual values
Channel flow config
```

```
PP 1 Overflow status
TOTAL
Ovfl.time     0:00 h
No.:             0
```

The overflow status shows the overflow time and number of overflows in pump pit 1-4

7.8.3 Actual values



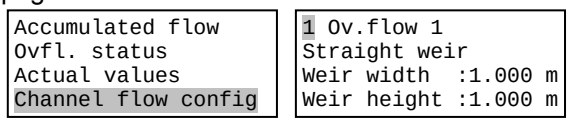
The actual values show the actual analogue measuring values and are split into 2 sub groups.

Flow meter shows actual flow + measuring level for open channel flow meters or external flow meters.

Pulse times for pulse channel 1-8 are recalculated to actual intensity values to show actual flows. ”Fluctuating ” values can occur when the pulse times are very long.

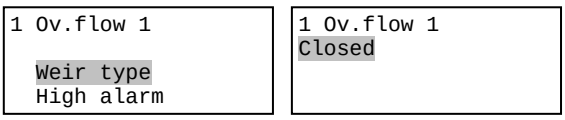
7.8.4 Configuration channel flow

For channel flow certain rules must be considered for lay out and mounting, see flow information on page 17



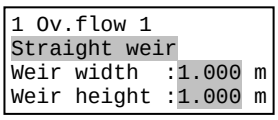
configuration of weir type for channel flow can be set for overflow pumppit 1-4 and flow meter 1-4. When entering the actual weir type is shown

7.8.4.1 Weir type

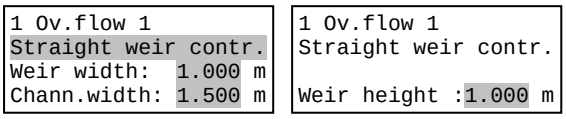


Not used flow meters are set to *Closed.*

7.8.4.1.1 Straight weir without and with contraction

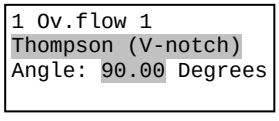


For straight weir without contraction the weir width and weir height shall be set.
See page 17



With side contraction even the channel width shall be set.

7.8.4.1.2 Thompson (V-weir)



For V-notch (Thompson) weir the angle must be set.
See page 18.

7.8.4.1.3 Parshall flumes

```
1 Ov.flow 1
Parshall 1 inch
```

Parshall flumes are selected for pre-defined standard sizes.
No other parameters are needed
Following standard sizes are pre-defined: 1, 2, 3, 6, 9, 12, 18, 24 and 36 inch (12 inch =1 foot).

```
1 Ov.flow 1
Parshall 36 inch
```

For other sizes actual exponent and constant must be set.
See page 19

7.8.4.1.4 Venturi channels

```
1 Ov.flow 1
Venturi channel
Restriction: 0.500 m
ChannelWidth:0.800 m
```

For Venturi channels the channel width and restriction width are set.

7.8.4.1.5 Known exponent and constant

```
1 Ov.flow 1
Free exp. and const.
Exponent :  1.5000
Constant :  2.9530
```

For most of the channel types the equation has a constant multiplied with measuring height with exponent.
These values can be set for most type of measuring weirs.

7.8.4.1.6 Known points on a flow curve

```
1 Ov.flow 1
Known values
```

```
1 Ov.flow 1
Level  1: 0.1000 m
   ->     3.0000 l/s
  <->    10.8000 m³h
```

I only the flow curve for the weir or flow channel is available known points for level and corresponding flow can be set and up to 16 points can be set. At least 2 points + 0 level are required.

New values are set with rising level. Setting 0 as level after the last point is set finishes the table. Flow can be set as l/s or m3/h. When the configuration is saved the table values are analysed if the formula with exponent and constant can be used. If the table values follow the standard equation the channel type is changes to known exponent and constant. If the table is not accepted the channel type is set to *closed.*

7.8.4.1.7 Venturi channel according to ISO 1438

```
1 Ov.flow 1
Venturi (ISO)
Restriction: 0.500 m
ChannelWidth:0.800 m
```

```
1 Ov.flow 1
Venturi (ISO)

Restr.length:1.000 m
```

For Venturi according to ISO even the restriction length shall be set, not only the channel and restriction width.

7.8.4.1.8 Dual exponent and constant

```
1 Ov.flow 1
Dual exp. and const.
Exponent :  1.5000
Constant :  2.9530
```

```
1 Ov.flow 1
Dual exp. and const.
Exponent 2: 1.5000
Constant 2: 2.9530
```

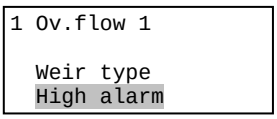
Used in Europe for some complex curves.
$Q = k_1 * h^{exp1} + k_2 * h^{exp2}$

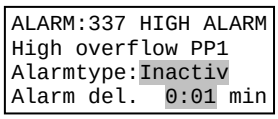
7.8.4.1.9 Save

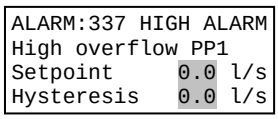
```
1 Ov.flow 1
Known values (l/s)

SAVE CHANGES?   YES
```

To activate changes the new configuration must be saved.
This question shows on exit from configuration menu if changes have been made. Answering **NO** restores previous settings.

7.8.4.2 High alarm

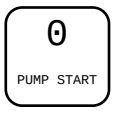




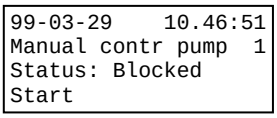


For each flow meter a high flow alarm can be set.

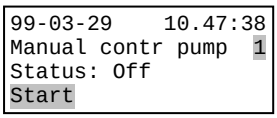
7.9 Manually controlled pump



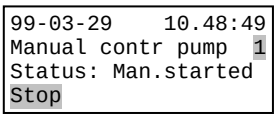
Function key for program group ”PUMP START”



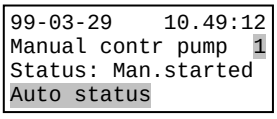
In this program group there is a possibility to see actual pump status and manually start and stop pumps.
Blocked pumps cannot be manually started.



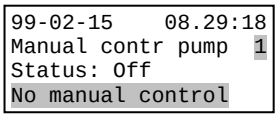
Hand manoeuvre can only be made if the pumps are between the start and stop levels, as the usual operation level always has priority over this function. This is to prevent that the station is left on manual control.
NOTE! This is not valid if the manoeuvre is made by external HAND-0-AUTO switch.



Hand manoeuvred pumps are not alternated and is put back on full automatic when the stop/start set-point levels are reached.

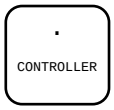


There is a possibility to reset the pump control to full automatic manually.



The manual control is disabled for pumps that belong to speed control groups.

7.10 PID Controller



Function key for program group ”CONTROLLER”
See section 6.6 side 28.

```
PID: 1 DISABLED
Runmenue
Program menu
CONTROLLER CLOSED
```

In this program group are the Status and all settings for the 2 PID controllers in the PCx viewed and programmed
Not used PID controller must be set to CLOSED

7.10.1 Running menu

```
PID: 1 ENABLED
Runmenue
Program menu
CONTROLLER RUNNING
```

```
PID: 1   AUTO   LSP
ACTUAL     0.98 m
SETP.      1.30 m
OUTSIGNAL    0.0 %
```

In the running menu the conditions for the output signal and set-point value are shown also the actual status of ACTUAL VALUE, SET-POINT VALUE and OUTPUT SIGNAL is shown.

7.10.1.1 Output signal auto / manual

```
PID: 1   AUTO   LSP
ACTUAL     0.98 m
SETP.      1.30 m
OUTSIGNAL    0.0 %
```

This field shows the running condition for the output signal. In position *AUTO* the output signal is controlled by the controller. In position *MAN* the output is controlled manually from the panel unit. Own values can be set for the output signal to increase –decrease the signal via the arrow keys.

7.10.1.2 Selection of set-point value

```
PID: 1   AUTO   LSP
ACTUAL     0.98 m
SETP.      1.30 m
OUTSIGNAL    0.0 %
```

In this field the source for the set-point value is set. In position *LSP* (Local Set Point) the set-point value is controlled from this menu.
External set-point can be used, *RSP* (Remote Set Point) for value from analogue input, alternatively *CSP* (Computer Set Point) for remote set-point.
If external set-point is not configured the field for *LSP* can not be changed.

7.10.2 Programming menu

```
PID: 1 ENABLED
Runmenue
Program menu
CONTROLLER RUNNING
```

```
PID: 1
PID Pararmeters
Act.value Setp.value
Outsignal
```

In the programming menu the basic PID parameters are set, and options for actual value set-point value and output signal.

7.10.2.1 PID Parameters

```
PID: 1
PID Pararmeters
Act.value Setp.value
Outsignal
```

```
PID: 1  PID PARAM.
P.Ampl      1.000
I.Time       30 sek
D.Time        0 sek
```

```
PID: 1  PID PARAM.
Contr.direction DIR
Outsignal at zero-
deviation =    0.0 %
```

```
PID: 1  PID PARAM.
Samplingtime
controller  1.0 sek
```

P. amplification gives the amplification factor for the deviation signal in the controller.
I. time gives the integration time and controls the damping time of the controller.
D. time gives the derivative time, which calculates the speed of change of the actual value (derivative).
See page 28 for description of the parameters for the PID controller.
Control direction *DIR or REV* controls the polarity of the output signal of the controller. *DIR* gives increasing output signal for set-point value < actual value, *REV* gives increased output signal if actual value < set-point value.
The output signal at 0 deviation gives the possibility to set a basic offset on the output signal and is normally only used when the I and D parameters are not used.
The Sampling time is how often the output signal is updated.

7.10.2.2 Actual value

```
PID: 1
PID Pararmeters
Act.value Setp.value
Outsignal
```

```
PID: 1    ACT.VALUE
A.IN Actvalue  1:1
  0% =   0.00 m
100% =  10.00 m
```

The actual value is connected to an input signal. The range of the input signal of the controller is scaled in technical units.

7.10.2.3 Set-point value

```
PID: 1
PID Pararmeters
Act.value Setp.value
Outsignal
```

Here are all the basic settings for the set-point value.

```
PID: 1    SETPOINT
Extern setp val. NO
Setpoint type    CSP
Start setp.       -
```

External set-point value is set to YES if analogue input (*RemoteSetPoint*) or remote set-point (*ComputerSetPoint*) is used.
At start up there is a possibility to control the set-point to *INT*, *EXT* or – as used latest.

```
PID: 1    SETPOINT
Setpointlimit   NO
Max setpoint  10.00
Min setpoint   0.00
```

The setpoint can be limited to a selected range.

```
PID: 1    SETPOINT
A.IN Ext.setp. 1:4
Start-up setp.  NO
Startsetp.     1.00
```

External set-point value can be connected to an analogue input.
For internal set-point value, a start-up set-point can be set to YES to activate a pre-set set-point at start up. If NO is set the latest used set-point is used.

```
PID: 1    SETPOINT
Setpoint tracking
(YES/NO)       NO
```

If set-point tracking is set to YES the external set-point is copied to the internal when external set-point is active. This is to avoid set-point changes when switching from external to internal set-point.

7.10.2.4 Output signal

```
PID: 1
PID Pararmeters
Act.value Setp.value
Outsignal
```

```
PID: 1    OUTSIGNAL
Start    (A/M)  -
Startsignal?    NO
Startvalue    0.0 %
```

The output signal at start up is set to ”– ”to use the latest used settings or ”*AUTO*” or. *”MAN”*
For manual position the start up value can be selected.

```
PID: 1    OUTSIGNAL
Outsignallim.?  NO
Max outsign. 100.0 %
Min outsign.   0.0 %
```

If needed the output signal can be limited to a certain range.

```
PID: 1    OUTSIGNAL
Outsign.block?  NO
Block. in MAN?  NO
D.IN Block.   1:0
```

Possibility to block the output signal via digital input.

```
PID: 1    OUTSIGNAL
Actual or blockvalue
when blocking   BLV
Blockvalue    0.0 %
```

When blocking the output signal, the options can be held at actual value or set to pre-set output signal(block value).

7.11 Configuration of main menu

The main menu is configured via <ENTER> key when the main menu is active.

```
MAIN MENU  3 values
           Value 2 =
INFLOW   PP.
SYSTEM PROG
```

In this program group are the setting for the values that are to be shown in the main menu of the display unit.

7.11.1 Signal list

Following signal can be shown in the main menu

Signal	Index	Unit
Level pumppit	1-4	0.01 meter
Inflow pumppit	1-4	0.1 l/s or m3/h
Outflow pumppit	1-4	0.1 l/s or m3/h
Overflow pumppit	1-4	0.1 l/s or m3/h
Flow meter	1-4	0.1 l/s or m3/h
Overflow level pumppit	1-4	0.001 m
Level flow meter	1-4	0.001 m
Pulse channel	1-8	0.1 unit according to actual configuration
IO-module 1	1-4	Analogue input 1-4 according to actual configuration
IO-module 2	1-4	
IO-module 3	1-4	
IO-module 4	1-4	
IO-module 5	1-4	
IO-module 6	1-4	
IO-module 7	1-4	
IO-module 8	1-4	
Data register	0-12287	Note technical units are not shown for a Data register.
PID controller	1-2	0.01 % Actual output signal.
Speed PID	1-2	0.01 % Actual speed to frequency converter.
Pressure	1-4	0.01 bar Pressure sensor for pumppit 1-4
Suction pressure	1-4	0.01 bar suction pressure sensor for pumppit 1-4
Volume pumppit	1-4	0.001 m3

7.11.2 Display alternatives

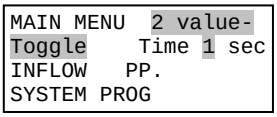
7.11.2.1 Fixed values

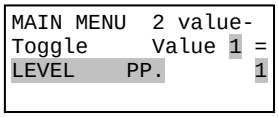
```
MAIN MENU  3 values
           Value 2 =
INFLOW   PP.       1
```

Display can be selected for date and time + 3 values, or 4 values with 1 value / row.
For each value (row) a signal is selected via the arrow keys to allow setting of (pumppit no a.s.o.).

The signal text shown in this type of main menu can be max 9 characters and is copied, if possible, from the associated inputs if the description is max 9 characters. Otherwise the standard texts are used. To have a signal description with longer texts, the option toggle values should be selected.

7.11.2.2 Toggled values



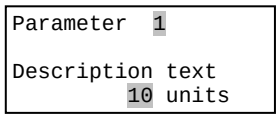


Toggled values can be from 2 up to 10 different values. Time shows how long each value is displayed.

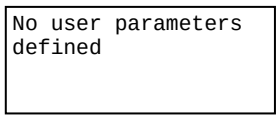
This type of main menu shows the signal description on one row (max 20 characters) and measuring values on one row.
If possible the signal text is copied from associated input to get more information about the signal.
In the toggled main menu the values can be reached via the arrow keys to get information faster if many values are toggled.

7.12 Parameters specific for user

Function key for group ”PARAMETERS”



In this group can user specific parameters be shown or modified.
Max. 24 parameters can be assigned for this key by function code 6, F6.
Operator access is required to modify parameters.

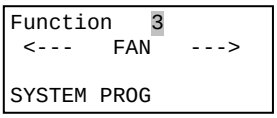


If there are no parameters defined, this text will show up for 3 seconds.

8 Function codes

8.1 Overview

Function key for program group "FUNCTION"



A function number can be set directly, or stepped with the arrow keys to get an overview of available functions.

8.1.1 Index for function codes in main groups

8.1.1.1 Time functions

8.1.1.2 User interface

8.1.1.3 Zero setting functions

8.1.1.4 History functions

8.1.1.5 Speed control

8.1.1.6 Settling pit

8.1.1.7 Pump related functions

8.1.1.8 Communication, modem and alarm calls

8.1.1.9 Standard configurations

8.1.1.10 Basic information and test, hard ware

These functions are normally not used by the user, mainly used for factory settings and troubleshooting.

8.1.1.11 Other

8.2 Description of all function codes.

8.2.1 Function 2, Time since last boot

```
Function   2 BREAK
TIME SINCE BOOT
           49567 sec
BOOT CNT =     9
```

Information about restarts and running time since last boot.
Used for trouble shooting

```
Function   2 0 SET
TIME SINCE BOOT
           49603 sec
BOOT CNT =     9
```

Possibility to 0 set counter

8.2.2 Function 3, Back ground timing

```
Function   3 SET 0.
BACKGROUND TIMING
Momentan = 0.040 sec
Max      = 0.048 sec
```

Shows CPU load for the control program, 0.100 sec = 100%.
Actual value can sometimes be up to 1.000 sec but should generally be less than 0.090 sec
Max gives the max actual value since last 0 setting.

8.2.3 Function 6, User specific parameters

```
Function   6 Par.  1
OFF       Reg.     0
Paramter description
Unit Unit      Dec. 0
```

```
Function   6 Par.  1
Factor     1
Min          0 Unit
Max     100000 Unit
```

Up to 24 parameters can be set-up for access by direct key function ”PARAMETERS”. Each parameter is set to ”OFF”, ”READ”, ”SET” or “TIME” for selected data register. For data in double registers the higher register number should be used. Text description can be max. 20 characters and unit max. 6 characters.
If “TIME” is selected, no of decimals is automatically set for 2 decimals and data in seconds will read out as mmm:ss
For decimal adjustment or data conversion a factor can be set (ex. factor 60 displays data in seconds as whole minutes, or hhh:mm if “TIME” is set).
Max and Min value must be set. Both display and adjustment range is limited to selected span.

8.2.4 Function 100, Date and time

```
Function 100   SET
DATE         TIME
99-02-06     13.28:01
yy-mm-dd     hh.mm:ss
```

Sets the clock in PCx.

8.2.5 Function 110, Timer

Day / Night timer which are available for digital output type TIMER.

```
Function 110 Timer 1
PUMPPIT 1  DAY/NIGHT
Day time   00:00 h:m
Night time 00:00 h:m
```

```
Function 110 Timer 1
PUMPPIT 1  WEEKDAYS
Day time   00:00 h:m
Night time 00:00 h:m
```

```
Function 110 Timer 1
PUMPPIT 1  Monday
Day time   00:00 h:m
Night time 00:00 h:m
```

Timer 1-4 controls normal/night time for pumppit 1-4. Chose between day or week timer. With day timer the switching is made at the same time all days. With week timer the time is set separately for each day.

```
Function 110 Timer 5
GENERAL
Day time   00:00 h:m
Night time 00:00 h:m
```

Timer 5-8 are general day timers for normal/night time and are used to control events repeated 1 time every day.

```
Function 110 Timer 9
WEEKDAYS   Monday
On time    00:00 h:m
Off time   00:00 h:m
```

Timer 9 is a general week timer with separate settings for each day.

8.2.6 Function 112, Sequence control by week timer

With function 112 up to 64 events be programmed over a week on up to 8 IO-channels.

Each event is programmed with week day Monday-Sunday and time as hh:mm, and connected to IO channel 1-8, with new IO-status (0/1),

For each event an analogue value (0-65535) can be set. This value is put in a Data register for the IO-channel. These values can then be used further for control or status indications.

There are no separate in/out-put types for these events, which only are available IO-bits (976-983 = channel 1-8) for digital status, and register (86-93 = channel 1-8) for analogue status.
This to be able to combine the normal functions with IO-bits to get desired control function.

```
Function 112
Sequence control
week timer
SYSTEM PROG
```

```
Event:  1  Disabled
Monday     00:00
New status OFF
New value      0
```

```
Event:  1  Channel 1
Monday     00:00
New status OFF
New value      0
```

Each switching (1-64) is connected to selected IO-channel.
The setting is done with week and time and can be don freely. To allow an easy control it is recommended that the switching is made sequential.
New IO status (OFF / ON) can be set for each switching.
New value can be set 0-65535 for status indication or used for other data control.

8.2.7 Function 116, Status and alarms for supply voltage of IO-modules

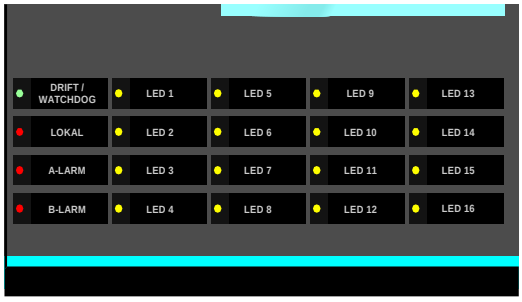
```
Function 116   MOD 1
Supply:     25.6 VDC
Setpoint    10.5 VDC
```

Shows the level of the input voltage for a specific IO-module. An alarm can be trigged on a user specified voltage level.

8.2.8 Function 120, LED set-up

```
Function 120
Config. LED  1
Digital output
IO mod 1 D.out 1
```

Setting of yellow LED on the panel unit. For each LED following signal choices are available, *Digital output, Digital input, Alarm status, IO-bit, and Blocked*



8.2.9 Function 124, Empty alarm list and digital history

```
Function 124
Empty ALARM LIST and
Digital history
BREAK
```

This function erases all 512 events in the digital history.
Toggle to 0- SET and press <ENTER> to execute.

8.2.10 Function 125, Zero set pump status

```
Function 125
ZERO - SET
PUMP STATUS
BREAK
```

This function sets start and running time counters for all pumps to zero.
Toggle to START 0-SETTING and press <ENTER> to execute.

8.2.11 Function 126, Zero set flow status

```
Function 126
ZERO - SET
FLOW STATUS
BREAK
```

This function sets all accumulated volumes for flow meter 1-4.to zero
Toggle to START 0-SETTING and then press <ENTER> to execute.

8.2.12 Function 127, Zero set pump pit status

```
Function 127
ZERO - SET
PUMPPIT STATUS
BREAK
```

This function sets all accumulated overflows and multiple running times to zero. Toggle to START 0-SETTING and press <ENTER> to execute.

8.2.13 Function 128, Zero set pulse status

```
Function 128
ZERO - SET
PULSE VOLUME STATUS
BREAK
```

This function sets all accumulated pulse volumes for pulse channel 1-8 to zero.
Toggle to START 0-SETTING and press <ENTER> to execute.

8.2.14 Function 400, Settings for analogue history

```
Function 400
Setup
Analogue logger
SYSTEM PROG
```

```
Function 400  Ch.  0
Log every   5:00 min
Average value
Level 1
```

```
Function 400  Ch.  0
Log every   5:00 min
Average value
Options
```

```
Function 400  Ch.  0
16-bits (2-Kompl.)
LEVEL    PP.       1
```

```
Function 400  Ch.  0
Log every   5:00 min
Actual value
SAVE CHANGES ?  YES
```

For each signal that is going to be logged, the options interval between log values and log type must be set. The type can be chosen, *Closed , Actual value, Average value, Min value* or *Max value.*
Logging can be with 16 or 32 bit resolution.
16 bit log can be 2-complement (negative values allowed) or 0-65535 positive values only (negative value saved as 0).

New settings must be confirmed with YES and then <ENTER> before they become valid.

8.2.15 Function 401, Data start register for expanded history

```
Function 401  Ch.  0
Data  startregister
for expanded 24 hour
log data:     0
```

```
Function 401  Ch.  0
Expand data for
Today
```

To be able to read compressed historic data directly, it must be expand to the register. A start register for each log channels must be set. 0 or 16384 – 32767. See page 32.

For each channel select the day which the expanded data comes from.

8.2.16 Function 405, Setting of time stamp for digital IO history

```
Function 405
Setup time stamps
on digital IO events
SYSTEM PROG
```

```
Function 405 IO-Log
Dig. in    Dig.out
Pump events
All IO numbers
```

```
Function 405 IO 256
DIN 1:1
ALARM INPUT
TIME STAMP DISABLED
```

```
Function 405 IO 256
DIN 1:1
ALARM INPUT
TIME STAMP ENABLED
```

Time stamping of digital signals is activated separately for each IO-number. IO numbers are grouped for *Digital in, Digital out, Pump events* or *All IO numbers*.

Toggle between TIME STAMP, DISABLED or ENABLE and confirm with <ENTER>.

8.2.17 Function 410, Show analogue historic files

```
Function 410
Show Analogue
history files
SYSTEM PROG
```

```
Function 410  990206
Channel  0  Block  1
12:55        1.54 m
Level 1
```

All saved analogue data in the PCx can be shown locally with F.410. The log channels can be switched with the arrow keys, the name of the actual signal is shown on row 4.
For the chosen channel the stored log blocks can be changed via the arrow keys, the log date for the block is shown on the first row. The time is set via the keyboard or with the arrow keys. If the time is changed with the arrow keys and the time passes mid night also the new block number is updated to a new date.

8.2.18 Function 415, Show digital IO and alarm history

```
Function 415
Show digital IO and
alarm history
SYSTEM PROG
```

```
Function 415 IO 1123
990206 14.18:49
ALARM 100 ON
Fallen tempprot.
```

Digital story is shown with IO-number, time stamp and IO-text for each stored event. The latest event is shown and earlier events by stepping backwards with the arrow key left, or arrow key right for the oldest saved event.

8.2.19 Function 600, Ramp times for speed controlled pump

```
Function 600
Timeramp for PID
speed controlled
SYSTEM PROG
```

```
P.speed Timeramp PG1
Increasing      5 sec
Decreasing      5 sec
Power on      120 sec
```

Time ramps are set separately for increasing or decreasing speed. The start-up ramp is only valid for configuration for booster station with slow filling of the pipe after operation interruption. See 6.5

8.2.20 Function 610, Override with set-points

```
Function 610   PG:1
Over ride with
setpoints OFF (PID)
(Pressure Boost)
```

```
Function 610   PG:1
Minimum speed for
speed reg. pump: 5 %
```

This setting controls the type of speed control.
See section 6.5

```
Function 610   PG:1
Over ride with
setpoints ON (PID)
(Pumppit)
```

```
Function 610   PG:1
Minimum speed  5 %
locked  speed 90 %
After delay:1:00 min
```

```
Function 610   PG:1
Start    2.00 m
Stop     1.00 m
```

```
Function 610   PG:1
Over ride with
setpoints ON P-BAND
(Pumppit)
```

```
Function 610   PG:1
Minimum speed  5 %
locked  speed 90 %
After delay:1:00 min
```

```
Function 610   PG:1
Start    2.00 m
Stop     1.00 m
```

```
Function 610   PG:1
Min cap.    1.50 m
Max cap.    3.00 m
```

Set-point *OFF (PID)* is used for booster stations, *ON (PID)* for pump pit where the level is to be kept constant, and *ON P -BAND* where the pit is used to even out the flow for ex. the last pumping pit before the treatment plant.

8.2.21 Function 620, Alternation of frequency controlled pump

```
Function 620   PG:1
Alternate speed pump
Monday      3:00 h:m
( 0:00 = INACTIVE )
```

Alternation of pumps that are speed controlled can be set from 0-7 times a week. Separate time can be set for each day. When no alternation is wanted on a day the time is set to 0:00
See section 6.5

8.2.22 Function 630, Manual alternating of frequency controlled pump

```
Function 630   PG:1
Current speed reg.
pump = P 1
```

A selected pump can manually be set to be active speed regulated pump, possible speed regulated pumps can be shown via the arrow keys. During change over the sequence is shown on row 4.
See even section 6.5

8.2.23 Function 640, Max difference pressure side – suction side

```
Function 640   PG:1
Max difference
In - Out pressure
            0.00 bar
```

This function is in use when a booster station is controlled with a pressure sensor connected on the suction side. Lowering the set-point value to the PID controller makes the limitation. See section 6.5

8.2.24 Function 650, Pump blocking at low suction pressure

```
Function 650   PG:1
Pumphold on low
in pressure at
            0.00 bar
```

This function is used in booster stations where a pressure sensor is connected on the suction side. If the suction pressure goes below a set value all pumps can be blocked. See section 6.5

8.2.25 Function 660, Limit PID signal at pump change

```
Function 660   PG:1
Limit PID during
pump switch? NO
```

Without any limitations of the PID regulator, the regulator adjusts the signal toward a set-point value even during a switching sequence of the pumps. This will give the fastest settling time for stations with large flow variations, but can give oscillation with more pump manoeuvres as consequence. This option can limit that but with slower response time as drawback. See also section 6.5

8.2.26 Function 700, Sedimentation pits

```
Function 700
Sedimentation pit
Configuration
Setpoints
```

Control of pre settling in sedimentation pits.
This function will block pumps in sedimentation pits during pre-set time, to allow for pre-settling after for an ex. heavy rainfall. When the level rises more than the pre-set values the blocking timer is restarted.

```
Function 700
Sedimentation pit
Configuration
Setpoints
```

```
Function 700
Sedimentation pit
Pumppit 1
Hold time 30:00 h;mm
```

Select a sedimentation pit and set settling time.

```
Function 700
Sedimentation pit
Configuration
Setpoints
```

```
Setpoint 0 pumps
 10 cm /  1 min.
 15 cm /  3 min.
 20 cm /  6 min.
```

Set-points for rising level for restart of blocking timer is set separately for 0 , 1 and 2 pumps in operation. 3 different set-points can be set for each case of operation.

8.2.27 Function 701, Status sedimentation pit

```
Function 701
Sedimentation Status
Timer done
Timer      0:02 h;mm
```

On row 3 the actual pump status is shown and on row 4 the status of the timer is shown. The timer shows how long time the pumps have been blocked and must reach the set time in F.700 before a pump is started, this is indicated on row 3 ”Timer done”.

8.2.28 Function 702, Auto alternation when pump failure

```
Function 702 PP: 1
Auto alternate on
pumpfailure: ON
```

This function is applicable on most cases where pump alternation is used. When pump alternation is activated, auto alternation at pump failure should be set to *ON.*

8.2.29 Function 703, Pump alternate option

```
Function 703 PP: 1
Pump alternate
Each pump stop
```

This setting controls if the pumps should alternate on every pump stop or only when last pump stops (all pumps in pit off).
Chose *Each pump stop* or *Last pump stop.*

8.2.30 Function 705, Min. time between every change of the relays.

```
Function 705 PP 1-4
Min time between
every change of
pump relais    2 sec
```

```
IO-modul:1(1)Dout: 1
NORMALLY OPEN
REM.CONTR OUTPUT
On time   0:00 mm:ss
```

The purpose is to protect electrical cabinets and interlocking posts from the high load that a simultaneous start of several pumps can cause. The pump status is unchanged during a set time after a pump operation.

8.2.31 Function 706, Flag blocked pump as hand stopped

```
Function 706
Flag blocked pump
as hand stopped
Pump  1 NO
```

A blocked pump normally returns to auto as soon as the reason of the blocking is fixed. This can sometimes give unwanted pump starts.
When a blocked pump is flagged as hand stopped, the pump will not restart before all other pumps in the pit have stopped and/or actual level is over start level for the pump.

8.2.32 Function 707, Check run of pump

```
Function 707    P. 1
Checkrun pump after
 10 h in off state.
Run time:  1:00 min.
```

This function gives the possibility to make a test run of a pump that has not been used for a certain time (1-999 h).
The time for the operation is max 99:59 mm:ss.

```
Function 707    P. 1
Separate pump valve
manouver:  0:00 min.
( 0 = follows pump )
```

Pump valve can be checked separately (pump is off during this check) if valve time is entered. The time set should be the max time for opening and closing the valve including the start and open delays. Open command is active until endpoint detection or valve timeout is received, there after a close sequence is started. The pump is blocked until the closing sequence is finished.The check run is allowed if the levels are between these values (**NOTE!** can be allowed below the normal stop level). No check run will take place for blocked pumps.

```
Function 707    P. 1
Pumprun allowed if
level <    0.00 m or
level >    1.00 m
```

8.2.33 Function 708, Pump control on level derivate

```
Function 708 PP: 1
Level derivata pump-
Start:  5 cm/  1 min
Stopp:- 5 cm/  1 min
```

This function gives the possibility to start and stop pumps before a level set point depending on the derivate of the level in pit exceeds set point value. Set-points for level derivate is between 1-99 cm/ 1-99 minutes. 0-setting this value will disable this function.

```
Function 708 PP: 1
Start condition
valid when
 0-15 pumps running
```

Validity for derivate control can be limited for a preset range of pumps running.

```
Function 708 PP: 1
Stop condition
valid when
 1-16 pumps running
```

Setting of valid pump range is done separately for start and stop.

Set-points are checked once every minute towards an average value of the level in the pit.
The function allows only 1 pump manoeuvre / minute. If the derivata is still high 1 minute after a previous started pump, the next pump in pit is started a.s.o. Individual start/stop delays for the pumps are ignored. But Common min. delays between pumpstart / pumpstop in pit are still valid.
The start sequence for pumps is 1 and the 2 up to 16, depending on how many pumps that is connected to a pump pit. The stop sequence of the pumps is in reverse order, 16-1. This function is only intended for pump pits where pumps are emptying the pit.

8.2.34 Function 710, Max no. of pumps running simultaneously

```
Function 710 PP: 1
Max. no of pumps
running together:  0
( 0=No limitation )
```

Set the max. amount of pumps operating simultaneously. Separate setting for each pump pit can be made.
Normally combined with auto alternation at pump failure ON in F.702

8.2.35 Function 711, Max no. of pumps running simultaneously in 2 pumppits

```
Function 711 Max. no
of pumps PP:1 and 2
running together:  0
( 0=No limitation )
```

Limits the number of pumps in 2 pump pits that are operating simultaneously at the same time. Set which 2 pump pits should have the limit, and the highest number of pumps running at the same time.

8.2.36 Function 720, Shift motor

```
Function 720
Shifting motor 1
Status
Configuration
```

PCx can control 4 Shift motors.
The status menu is the actual and the set-point value shown, and the possibility to set the set-point value.

```
Function 720
Shifting motor 1
Status
Configuration
```

```
Function 720
Setpoint   Deadband
Feedback   Pulsetime
Endpoints
```

The configuration menu have are all related settings available.

```
Function 720
Setpoint   Deadband
Feedback   Pulsetime
Endpoints
```

```
Function 720 DISABLE
SHIFTMOTOR DISABLED
```

The set-point can be connected to an analogue input or be set manually

```
Function 720 A:IN
Setpoint    1.54 m
IO-Modul:1 AI:1
Levelsensor PP 1
```

For analogue input the IO-Module and AI no. is set.

```
Function 720 MANUAL
Setpoint    2.00 m
```

The manual set-point is set directly in technical units, which are copied from the analogue input of the actual value.

```
Function 720 REMOTE
Setpoint    2.00 m
```

Even a remote set-point can be set manually. Otherwise set via Data 11611+11612 for shift motor 1, 11635+11636 for shift motor 2, 10153+10154 for shift motor 3 and 10174+10175 for shift motor 4.

```
Function 720
Setpoint   Deadband
Feedback   Pulsetime
Endpoints
```

```
Function 720
Feedback    1.54 m
IO-Modul:1 AI:2
Shift motor position
```

The actual value is connected to an analogue input to send back the signal of the position of shift motor. The position of the end contact can be set to allow for deviation check of the actual value. Deviation status is on IO 872-874 for shift motor 1, 888-890 for shift motor 2, 832-844 for shift motor 3 and 848-860 for shift motor 4. For alarms these IO can be connected to digital in/outputs for free alarm texts.

```
Function 720
Setpoint   Deadband
Feedback   Pulsetime
Endpoints
```

```
Function 720 Endpt.
MIN:        1.00 m
MAX:        3.00 m
Hysteres    0.10 m
```

```
Function 720
Setpoint   Deadband
Feedback   Pulsetime
Endpoints
```

```
Function 720


Deadband +- 0.10 m
```

If the deviation of actual value and set-point value is less than the set dead zone no change will be made.

```
Function 720
Setpoint   Deadband
Feedback   Pulsetime
Endpoints
```

```
Function 720
Increase-Decrease
Max on time   10 sec
Pause time    10 sec
```

Pulse and use time for outputs are set to fit the shift motor.

```
Function 720
Shifting motor 1
Status
Configuration
```

```
Shifting motor 1
MANUAL
Setpoint    2.00 m
Feedback    1.54 m
```

In the status menu the set-point value and the actual value are shown. The different sources for the set-point can be toggled for manual control of the set-point value.

8.2.37 Function 800, Communication parameters

```
Function 800
Com port 1:
 2400 baud NO PARITY
Handshake    OFF
```

To get the serial communications to work properly, the settings for the units that are communicating with each other must be equal. Parity and handshake are normally not used when modem is used. Handshake must be ON for certain multi drop modems that request carrier wave.

COM1 is the RS232/485 port on the PCx
COM2 is the RS232/485 port on the PCxp-unit, with CAN ID 2.
COM3 is the RS232/485 port on the PCxp-unit, with CAN ID 3.
COM4 is the RS232/485 port on the PCxp-unit, with CAN ID 4.
COM5 is the RS232/485 port on the PCxp-unit, with CAN ID 5.
COM6 is the RS232/485 port on the PCxp-unit, with CAN ID 6.
COM7 is the RS232/485 port on the PCxp-unit, with CAN ID 7.
COM8 is the RS232/485 port on the PCxp-unit, with CAN ID 8.

8.2.38 Function 801, Com. Port transfer (Com echo)

```
Function 801
Com echo (Multidrop)
Com1 -> Com2 OFF
Com2 -> Com1 OFF
```

To enable communication with several substations from one modem connection there is a possibility to activate a communication transfer (echo) between the two serial ports. **NOTE** that the com echo can only be used between COM1 and COM2 and the ports must use the same protocol.

The communication echo is activated separately for each Com. port, and shall normally be the same for both ports. Possible alternatives:
OFF, Com 1: and Com 2: work independently.
ON, all incoming data are transferred out on the other port. Gives shortest delay.
DATA, all telegrams that concern other slave units are transferred. Necessary if a unit shall be communication master to other slave units at the same time.
NOTE! All slave units must have their own unique Comli or Modbus identity (see F.802).

8.2.39 Function 802, Protocol (Comli/Modbus) parameters

```
Function 802
Com port 1: COMLI
Identity:    1
Time out: 2 seconds
```

This function is used to set protocol parameters of a selected com-port.
First line: Selected com-port and protocol that is used for the com-port.
Second Line: With the Comli or Modbus protocol up to 255 slave units at the same time can be connected to the same communication line. This demands that each unit has its own unique slave address. Separate identity can be set for different com-ports. When a modem is connected to the system it is normally identity 1.
Third Line: Time out is how long the PCx waits for a telegram to be completed. Timeout for a slave (PCx) shall be shorter than for the master (supervision system) to allow retransmissions due to communication disturbances to work correctly. For a connection with fixed cable generally 3 sec time out for the master and 2 sec for a slave is used. When a radio modem with routing over several nods or a bad and noisy telephone line where the modem uses a built-in error correction may the time has to be increased.

8.2.40 Function 804, Comli/Modbus cross reference

```
Function 804
Comli Crossreferens:
Crossreferens:
Com 1: Closed
```

With F.805 and F.806 a cross reference table can be set-up to the data flow in Comli/Modbus to the supervision system. These can be activated separately for each communication port. See separate Comli/Modbus register manual.

8.2.41 Function 805, Cross reference table for data register

```
Function 805   Data-
register    0 ->    0
Factor      0 (0=def)
Pos. numbers 0-65535
```

For Comli telegram type 0 and 2 the register 0-254 can be set for data for free register 0-12287. Possibility for certain rescaling of data, for ex. running times in seconds can be rescaled to minutes with the factor 60. The scale factor can be between 0-32767. With the factor 0 no rescaling is done.

Certain supervision systems only handle positive values when using the Comli protocol. Settings can be selected for *2-compl. +/-32767 or pure integers 0-65535*.If positive numbers are used will 0 be returned for negative values.

8.2.42 Function 806, Cross reference table for IO-bits

```
Function 806
IO-bit number:    0
coupled to
internal IO:      0
```

For Comli telegrams if type 0, 2, 3 and 4 the IO numbers 0-510 can be set for connecting IO number 0-4095 to those bits

8.2.43 Function 807, Scaling data register with calculated integer data

```
Function 807 Scale
Data register:  5
    0 =     0 l/s
65535 =   100 l/s
```

In data register 5-36 is there a possibility to read the calculated value as integers 0-65535. As these calculated values don't demand any min and max scaling, there is a possibility here to scale the range for these values. See Comli/Modbus register manual for data register specification.

8.2.44 Function 808, Free data registers

```
Function 808
Free data registers
1960
data:               0
```

Data register 1960-2047 are free to be used for any data.
This function gives the possibility to read / set data in these registers.

8.2.45 Function 809, Error counters on COM ports

```
Function 809
Status Com port 1
Telegram OK        30
>Rx buf. full       0
```

These function is showing different telegram info and errors counters on the a selected COM port. The counters have a reset function. The following error counters are available for Checksum, Message, parity, Framing, Overrun, RX buffer full and a break counter.

8.2.46 Function 810, Hayes init. before calling

```
Function 810  Com 1:
EXECUTE Hayes init
when calling
h0e0v1q0
```

Certain modems can demand an extra Hayes initiation to work as wanted. This initiation is sent before each call from PCx. New initiation of max 20 digits can be tested with the *EXECUTE* command. Start AT is not needed.

8.2.47 Function 811, Hayes init after disconnection

```
Function 811  Com 1:
EXECUTE Hayes reset
after disconnecting
q0&w
```

This function gives the possibility to change the characteristics of the modem in listening position. This initiation is sent after each time the PCx is disconnected. New initiation of max 20 digits can be tested with the *EXECUTE* command. Start AT must not be set.

8.2.48 Function 812, No. of call signals before modem answer

```
Function 812  Com 1
Modem answers after
  1 callsignals
MODEM OK
```

Controls no. of call signals before the modem answers. 0 = auto answer closed. When the number of call signals is changed the new value will be sent to the modem. Status on row 4 shows if modem has accepted the new value.

8.2.49 Function 813, Modem initiation

```
Function 813  Com 1
Modem init
START
```

Function for initiate a modem. At initiation the 12V power supply to the modem is cut for 4 seconds, if it is connected to a digital output. The RTS signal goes low during the same time. The power is set to On and after a 10 sec. delay the default initiation is sent and than PIN code, if GSM modem is used. Thereafter the number of call signals (F.812), and finally the Hayes reset (F.811) command. Information about the activity and the result are shown on row 4 during initiation. If alarm call is set (F.815) this function runs automatically every 3:rd hour after the latest Comli/Modbus communication with the substation have been made. (Some modems have the ability to freeze unprovoked).

8.2.50 Function 814, No. of alarm call attempts

```
Function 814
Abort alarm dialling
after  20 retries
```

Highest number of attempts of calling an alarm out. The calling is stopped when the pre-set number of attempts is reached. Every new alarm set the attempt counter to 0 and the PCx is trying again.

8.2.51 Function 815, Alarm dialling

```
Function 815
Alarm no.1 to Com 1:
CLOSED
Tel:
```

For each alarm number that are set, the Comport connected to the modem must be set.
See 6.11.6 page 34 for information about different alarm telephone numbers.

```
Function 815
Alarm no.1 to Com 1:
GSM/BEEPER (UCP)
Tel:0740930000
```

```
Function 815
Alarm no.1 to Com 1:
Max no of messages
in 1 call =  2
```

Alarm to GSM telephone with SMS text support. Up to 4 different GSM telephones can be pages. See F.820 and F.821.

```
Function 815
Call C-system on
A Alarm on
Timeout  2:00 min.
```

Select which alarms shall generate a call function to the supervision system Time out is the longest time for the supervision system to ackn. The call by writing to reg. 333.
LC-TRANSLATOR works the same way as the supervision system except that the Comli/Modbus identity is reported as text directly after connection ex.”PCx ID=01”, A delay between the connect
command and the ID string can be set.

```
Funktion 815
Alarm no.1 på Com 1:
Time from CONNECT to
ID string    0 sec
```

```
Function 815
Alarm no.1 to Com 1:
MINICALL TEXT
Tel:086300814
```

Telephone number to Minicall is set for wanted baud rate (only for Sweden). See. F 822 and F.823. Up to 4 minicall pagers can be set.

```
Function 815
Alarm no.1 to Com 1:
SMS GSM MODEM (PDU)
Tel:4670123456
```

```
Funktion 815
Short Message
Service Center no.
+46705008999
```

If GSM modem is connected to the PCx, alarms can be sent directly to the GSM telephone with SMS messages. Each GSM operator has his own SMSC no. to be set here.

The GSM number is set in international format with country code without leading 0 in the in the area code.

8.2.52 Function 816, Pause time between alarm calls

```
Function 816
Pause time between
alarmcalls
 5:00 minutes
```

If the alarm call fails, PCx waits this time before a new attempt is made.

8.2.53 Function 817, Alarm acknowledgement to stop alarm calls.

```
Function 817
Alarmacknow. to
stop calls
No acknowledge
```

Setting for acknowledgement type to approve the alarm call.
If acknowledgement is missing new attempts will be made up to set max. number in F.814. See page 36 for different types of acknowledgement that can be used.

No acknowledge The calling is stopped when the receiver has answered.
Call signal. Acknowledgement is done by calling back.
Write to reg. 333 Is selected automatically if the first alarm number is a supervision system.
All Data com. Communication with a PC or supervision system acknowledges the alarm.

8.2.54 Function 818, Remote acknowledgement of alarm

```
Function 818
Dist. acknow. all
alarms when writing
to reg. 333   NO
```

If the alarm call is to supervision system there is a possibility here to acknowledge the local alarm list by alarm call acknowledge from the supervision system.

8.2.55 Function 819, Station identity

```
Function 819
Station no:    1
and name
Riverside
```

Station no. 0-9999 are in data register 584 and identifies the station when calling to a supervision system. A name in clear text can be set for the identity when sending alarms to pagers.

8.2.56 Function 820, GSM sender information for UCP protocol

```
Function 820
GSM (UCP-protocol)
Send no. 123456
Password
```

Most operators for SMS messages to GSM telephones support the UCP protocol.This setting differs between the operators.

8.2.57 Function 821, GSM receiver for UCP protocol

```
Function 821
GSM (UCP-protocol)
Receiver   1 TEXT
Number 070123456
```

```
Function 821
GSM (UCP-protocol)
Text to send:
Only station ID
```

```
Function 821
GSM (UCP-protocol)
Text to send:
Alarm specification
```

Up to 4 different GSM telephones can be paged.
For SMS messages *TEXT* shall be selected, other types are for future use.

See page. 37.
For each receiver this must be set if only station ID, or if all alarms shall be shown in clear text.

8.2.58 Function 822, Minicall sender information for the THS protocol(Sweden only)

```
Function 822
MINICALL (THS) modem
Send subscr. 900000
Password   LOSEN
```

```
Function 822 Modem
Max  2400  baud
Extra hayes init:
```

To send a minicall message a subscription with Telia is needed to receive a subscriber number and a password. Separate max. baud rate can be set for minicall messages depending on the telephone number in F.815. See page 35. Minicall alarm is always sent with 7 data bits and even parity. Possibility for extra hayes initiation of modem.

8.2.59 Function 823, Minicall receiver for THS protocol (Sweden only)

```
Function 823 M.CALL
Receiver   1 TEXT
Number 0746123456
Ack. code   0
```

```
Function 823 M.CALL
Receiver   1 TEXT
Text to send:
Only station ID
```

```
Function 823 M.CALL
Receiver   1 TEXT
Text to send:
Alarm specification
```

Up to 4 different minicall pagers can be set. Minicall messages can be sent as *TEXT*, *NUMERIC* or *TONE.* Receiver numbers shall be set with area cod, totally 10 digits.

For each receiver can be set if only station ID or all alarms shall be shown in clear text.

8.2.60 Function 824, Block alarm calls when visiting

```
Function 824
Alarm dial only on
personal alarm when
visiting? NO
```

If the person alarm input is activated in the station there is a possibility to block alarm calls when visiting. If new alarms are not acknowledged these will give alarm calls when this block is lifted. This function can be used as alternative to F.828 when the communication is called through telephone line.

8.2.61 Function 825, First number for person alarm

```
Function 825
First dialno.(F.815)
for personal alarm 1
(Alarm no. 1 and 2)
```

For person alarm (alarm number 1 and 2) the first alarm call can be set to any of the alarm services which is set in F.815

8.2.62 Function 826, GSM modem PIN and PUK code

```
Function 826  Com 1:
GSM modem
PIN code 1234
PUK code 12345678
```

The GSM modem needs a SIM card with associated PIN code to activate the modem. The PUK code is normally not needed but will be needed to set a new PIN code if it is not valid. Separate codes can be set for each Comport. Run modem initiation F.813 to execute and verify changes.

8.2.63 Function 827, GSM modem signal strength

```
Function 827  Com 1:
Siemens
M1
Signal 99
```

This function shows the signal strength 0-31 or 99 if information is missing. See command AT+CSQ in modem manual. A value less than 11 indicates insufficient signal strength. The modem must be initiated with F.813 for correct function. Modem manufacturer and type are shown for information.

8.2.64 Function 828, Block new alarms when visiting

```
Function 828
Only personal alarms
are active when
visiting? NO
```

If the personal alarm input is activated in the station is there a possibility to disable new alarms during the visit. All new alarms except the personal alarms (alarm no. 1 and 2) are disabled during the visit. This function is an alternative to F.824 when communication is on a fixed line.

8.2.65 Function 829, Alarm blocking on power fail

```
Funktion 829
Larmblockering
Vid nätfel     JA
VISA ALLA LARM
```

```
Funktion 829
Larmblockering
Vid nätfel     JA
VISA UPPSATTA LARM
```

```
LARM:  2 SYSTEM
Yttre personlarm
Vid nätfel är larm
AKTIVT
```

When power fail alarm is active may other alarms also be trigged by that power loss. This function can block alarms in such a case. To limit the alarm handling to few alarms. On the unit it is possible to step between alarms and select those that shall be active during a power loss. There is a filter function that can show only set alarms. The options for an alarm are either Active or blocked during a power loss. The default is that only power loss alarm and personal alarm is active during a power failure.

8.2.66 Function 830, Communication master configuration

```
Function 830
COMLI MASTER BASIC
CONFIGURATION
SYSTEM PROG
```

```
COMLI MASTER CH. 1
Disabled
COM 1   Comli ID   1
Interval    0:00 m:s
```

```
COMLI MASTER CH. 1
Fix line
COM 1   Comli ID   1
Interval    1:00 m:s
```

```
COMLI MASTER CH. 1
Phone:123456
COM 1   Comli ID   1
Interval    0:00 m:s
```

Up to 8 master channels can be set.
For each type are set type of line (fixed or phone), communications port, Protocol ID for connected slave, and interval timer for how often communication with the slave shall be done. If the interval is set to 0 the timer is shut off. The communication can also be trigged by IO-events, see F.832.
NOTE ! Only ONE master on a fixed line.

For telephone modem the phone number to the slave must be set. See page 30.

8.2.67 Function 831, Comli master messages

```
Function 831
COMLI MASTER  IO
AND REGISTER CONFIG.
SYSTEM PROG
```

```
COMLI MASTER MSG   1
Digital IO         0
Read from
Master ch.1 IO 0
```

```
COMLI MASTER MSG   1
Register std.      0
Read from
Master ch.1 R. 0
```

```
COMLI MASTER MSG   1
Crossref. reg.     0
Write to
Master ch.1 R. 0
```

```
COMLI MASTER MSG   1
Ext. register      0
Read from
Master ch.1 R. 0
```

Up to 127 Comli messages can be set.
For each message the data/telegram type must be set. Specify local IO/Register number for data. Specify if data is to be *read from* or be *written to* the slave.
Connect the message to the master channel in F.830.
Specify IO/Register number in the Comli slave.
Standard register means telegram type 0 and 2. Register 0-3071. Eventual cross reference is ignored.
Cross ref. reg. Uses cross reference in F.805. Otherwise the same as standard register. *Ext. register* uses telegram type < and = for register 0-65535.

8.2.68 Function 832, IO-trig setup of communication master

```
Function 832
Setup Com. master
IO - trig
SYSTEM PROG
```

```
Function 832 IO TRIG
Dig. in    Dig.out
Pump events
All IO numbers
```

```
Function 832 IO 256
DIN 1:1
P.1 NOT IN AUTO
COM.TRIG DISABLED
```

The com. master can be activated on changes in status of single IO-numbers. Each single IO-number can be set to activate the com. master.

IO numbers are grouped as digital in, digital out, pump events and all IO numbers.
For each IO number *COM.TRIG DISABLED* or *COM.TRIG ENABLED* can be selected.

8.2.69 Function 833, Modbus master messages

```
Function 831
MODBUS MASTER  IO
AND REGISTER CONFIG.
SYSTEM PROG
```

```
MODB. MASTER MSG   1
COIL IO            0
Read from
Master ch.1 IO 0
```

Up to 127 Modbus messages can be set.
For each message the data/telegram type must be set, COIL IO, Input IO, Hold. Reg., Input reg.

```
COMLI MASTER MSG   1
Input IO           0
Read from
Master ch.1 R. 0
```

Specify local IO/Register number for data.

Specify if data is to be *read from* or be *written to* the slave. Note that INPUT IO and INPUT register is only read only.

```
COMLI MASTER MSG   1
Holding reg.       0
Write to
Master ch.1 R. 0
```

Specify IO/Register number in the Modbus slave.

```
COMLI MASTER MSG   1
Input register     0
Read from
Master ch.1 R. 0
```

Connect the message to the master channel in F.830.

8.2.70 Function 840, IO controlled register data

```
Function 840
IO controlled Comli
data.   Function  1
ENABLED
```

```
Function 840
IO    0 -> reg. 1960
0 = Value          10
1 = Value          11
```

This function gives the possibility to manipulate data depending on IO status. Up to 16 different IO can be configured.
IO-number free of choice is connected to a selected data register. Data is set for IO status 0 and 1. Data can be selected as a numeric value or be collected from another data register

```
Function 840
IO    0 -> reg. 1960
0 = Register       10
1 = Register       11
```

NOTE! There are no restrictions for the choice of data register. This means that a wrong configuration can demolish other parameters and can cause disturbances in the system. Therefore **USE THIS FUNCTION WITH OUTMOST CARE**.

8.2.71 Function 850, Power save mode

To lower the energy consumption of the unit is there two functions to do this. Especially useful are these when the units is backup powered with batteries.

```
Funktion 850
Energibesparing:
LED indikering av
NEJ
```

The first function turns the LED indications off, if a operator panel is connected it takes a little time. The LED indication will be lighten when pressing a Key on the operator panel and then after a little while turns them off again.

NOTE! When this function is in use there is NO indication on the unit that it is on.

```
Funktion 850
Energibesparing:
CPU i idle
NEJ
```

The second function sets the processor in a low energy mode.

8.2.72 Function 872, Standard configuration speed controlled pumppit with 2 pumps

```
Function 872
2 PUMP SPEED
CONTROLLED PUMPPIT
BREAK
```

Basic configuration for a pumppit with 2 pumps and 1 frequency converter.
See section 6.5 page 24 about speed control.

Following standard configurations are available.

PID WITH M.CURRENT	For constant level with PID controller.
PID W.O. M.CURRENT	
P-BAND WITH M.CURRENT	For flow equalisation within a level interval.
P-BAND W.O. M.CURRENT	

Function 872 (2-pump configuration for speed control in pumppit):
PID without motor currents.

executes function 899 (basic initiation).
Digital output:

1. NO Pump 1
2. NO Pump 2
4. NO Signal 0-set personal alarm 30 min. delay
5. NO Pump 1 Speed controlled pump
6. NO Pump 2 Speed controlled pump
8. NC Combined alarm output A+B - alarm

ON/OFF of speed controlled pump is done with D.OUT 1 and 2.
If this is wanted from D.OUT 5 and 6 this can be reset to these outputs.

Digital input:

1. NC Block Pump 1 (not auto)
2. NC Block Pump 2 (not auto)
5. NO Fallen motor protector Pump 1
6. NO Fallen motor protector Pump 2
9. NC Fallen temp. protector Pump 1
10. NC Fallen temp. protector Pump 2
16. NO Person alarm - Local mode

Analogue input:

1. Level sensor PP.1 4-20 mA = 0-10 meter.

Analogue output:

1. Speed signal to frequency converter 4-20 mA = 0-100.00 %

LED:

1. Auto position P 1.
2. Start confirmation P 1.
3. Motor protector P 1.
4. Temp. protector P 1.
5. Auto position P 2.
6. Start confirmation P 2.
7. Motor protector P 2.
8. Temp. protector P 2.

16. Signal person alarm timer

Alternation fixed pumps:

Pump 1:	alternation ON.
Pump 2:	alternation ON..

PID 1:	Set-point	1.30 m
	P.Ampl.	5.000
	I.time	30 sec.
	D.time	0 sec.
	Control action:	DIR

F.600: Ramp times:

Start up:	5 sec.
Increasing speed:	5 sec.
Decreasing speed:	5 sec.

F.610:	Control via start start/stop with set-points:	ON
	Start level:	1.50 m
	Stop level:	0.70 m
Set-point value for low speed		
	for switching over to locked speed:	25 %
	Locked speed:	75 %
	Time delay before locking:	300 sec. (5 min.)
F.620	Time for alternation of speed controlled pump:	Each Monday 03:00
F.660	Limit speed when changing pump:	OFF
F.702	Auto alternation if pump failure:	ON

Log channel:		Signal:	Log mode:	Interval (sec):
0.	Level PP.1	Average	300	

Alarm no.:		Alarm type:	Alarm delay (sec):
1	Person alarm	A	180
9	Configuration error	B	60
83	Fallen m. protector P1	B	5
84	Fallen temp. protector P1	B	5
99	Fallen m. protector P2	B	5
100	Fallen temp. protector P2	B	5
369	Power fail. IO-module 1	B	60
370	Low voltage 12V	B	60
371	IO-module 1 missing	A	120
372	AI Board 1 missing	A	60

For choice with motor currents add.

Analogue input:

2.	Current transf. Pump 1	0-20 Ampere
3.	Current transf. Pump 2	0-20 Ampere

Alarm no:		Alarm type:	Alarm delay (sec):	Set-point
81	High motor curr. P1	B	15	20.0 A
86	No start conf. P1	B	15	2.0 A
97	High motor curr.P2	B	15	20.0 A
102	No start conf. P2	B	15	2.0 A
373	AI board 2 missing	B	60	
374	AI board 3 missing	B	60	

8.2.73 Function 873, Standard configuration speed controlled pumppit with 3 pumps

```
Function 873
3 PUMP SPEED
CONTROLLED PUMPPIT
BREAK
```

Basic configuration for a pumppit with 3 pumps and 1 frequency converter. See section 6.5 page 24 about speed control and configuration appendix last in this manual.

Following standard configurations are available.
PID WITH M.CURRENT For constant level with PID controller.
PID W.O. M.CURRENT
P-BAND WITH M.CURRENT For flow equalisation within set level interval.
P-BAND W.O. M.CURRENT

Function 873 (3-pump configuration for speed control in pumppit):
PID without motor currents.

executes function 899 (basic initiation).
Digital output:

1. NO Pump 1
2. NO Pump 2
3. NO Pump 3
4. NO Signal 0-set personal alarm 30 min. delay
5. NO Pump 1 Speed controlled pump
6. NO Pump 2 Speed controlled pump
7. NO Pump 3 Speed controlled pump
8. NC Combined alarm output A+B - alarm

ON/OFF of speed controlled pump is done with D.OUT 1,2 and 3.
If this is wanted from D.OUT 5,6 and 7 this can be reset to these outputs.

Digital input:

1. NC Block Pump 1 (not auto)
2. NC Block Pump 2 (not auto)
3. NC Block Pump 32 (not auto)
5. NO Fallen motor protector Pump 1
6. NO Fallen motor protector Pump 2
7. NO Fallen motor protector Pump 3
9. NC Fallen temp. protector Pump 1
10. NC Fallen temp. protector Pump 2
11. NC Fallen temp. protector Pump 3
16. NO Person alarm - Local mode

Analogue input:

1. Level sensor PP.1 4-20 mA = 0-10 meter.

Analogue output:

1. Speed signal to frequency converter 4-20 mA = 0-100.00 %

LED:

1. Auto position P 1.
2. Start confirmation P 1.
3. Motor protector P 1.
4. Temp. protector P 1.
5. Auto position P 2.
6. Start confirmation P 2.
7. Motor protector P 2.
8. Temp. protector P 2.
9. Auto position P 3.
10. Start confirmation P 3.
11. Motor protector P 3.
12. Temp. protector P 3.
16. Signal person alarm timer

Alternation fixed pumps:

	Pump 1:	alternation ON.
	Pump 2:	alternation ON..
	Pump 3:	alternation ON.

.

PID 1:	Set-point	1.30 m
	P.Ampl.	5.000
	I.time	30 sec.
	D.time	0 sec.
	Control action:	DIR

F.600: Ramp times:

	Start up:	5 sec.
	Increasing speed:	5 sec.
	Decreasing speed:	5 sec.

F.610: Control via start start/stop with set-points: ON

	Start level:	1.50 m
	Stop level:	0.70 m

Set-point value for low speed

	for switching over to locked speed:	25 %
	Locked speed:	75 %
	Time delay before locking:	300 sec. (5 min.)

F.620 Time for alternation of speed controlled pump: Each Monday 03:00

F.660 Limit speed when changing pump: OFF

F.702 Auto alternation when pump failure: ON

Log channel:		Signal:	Log mode:	Interval (sec):
0.	Level PP.1	Average	300	

Alarm no.:		Alarm type:	Alarm delay (sec):
1	Person alarm	A	180
9	Configuration error	B	60
83	Fallen m. protector P1	B	5
84	Fallen temp. protector P1	B	5
99	Fallen m. protector P2	B	5
100	Fallen temp. protector P2	B	5
115	Fallen m. protector P3	B	5
116	Fallen temp. protector P3	B	5
369	Power fail. IO-module 1	B	60
370	Low voltage	B	60
371	IO-module 1 missing	A	120
372	AI Board 1 missing	A	60

For choice with motor currents add.

Analogue input:

2.	Current transf. Pump 1	0-20 Ampere
3.	Current transf. Pump 2	0-20 Ampere
4.	Current transf. Pump 3	0-20 Ampere

Alarm no:		Alarm type:	Alarm delay (sec):	Set-point
81	High motor curr. P1	B	15	20.0 A
86	No start conf. P1	B	15	2.0 A
97	High motor curr.P2	B	15	20.0 A
102	No start conf. P2	B	15	2.0 A
113	High motor curr.P3	B	15	20.0 A
118	No start conf. P3	B	15	2.0 A
373	AI board 2 missing	B	60	
374	AI board 3 missing	B	60	
375	AI board 4 missing	B	60	

8.2.74 Function 882, Standard configuration pressure boost with 2 pumps

```
Function 882
2 PUMP PRESSURE
BOOST CONFIGURATION
BREAK
```

Basic configuration for Booster station with 2 pumps and 1 frequency converter.
See section 6.5 page 24 about speed control and configuration appendix in the end of this manual.

Following standard configurations are available.
WITH MOTOR CURRENTS For constant pressure with PID controller.
WITHOUT MOTOR CURRENT
WITH INPUT PRESSURE For pressure limitation at low suction pressure (without motor currents).
Function 882 (2-pump configuration for booster station with speed controlled pump):
Without Motor currents

Executes function 899 (basic initiation).
Digital output:

1. NO Pump 1
2. NO Pump 2
4. NO Signal 0-set personal alarm 30 min. delay
5. NO Pump 1 Speed controlled pump
6. NO Pump 2 Speed controlled pump
8. NC Combined alarm output A+B - alarm

ON/OFF of speed controlled pump is done with D.OUT 1 and 2.
If this is wanted from D.OUT 5 and 6 this can be reset to these outputs
Digital input:

1. NC Block Pump 1 (not auto)
2. NC Block Pump 1 (not auto)
5. NO Fallen motor protector Pump 1
6. NO Fallen motor protector Pump 2
9. NC Fallen temp. protector Pump 1
10. NC Fallen temp. protector Pump 2
16. NO Person alarm - Local mode

Analogue input:

1. Pressure sensor PP.1 4-20 mA = 0-10 bar.

Analogue output:

1. Speed signal to frequency converter 4-20 mA = 0-100.00 %

LED:

1. Auto position P 1.
2. Start confirmation P 1.
3. Motor protector P 1.
4. Temp. protector P 1.
5. Auto position P 2.
6. Start confirmation P 2.
7. Motor protector P 2.
8. Temp. protector P 2.
16. Signal person alarm timer

PID 1:	Set-point	6 bar
	P.Ampl.	2.000
	I.time	30 sec.
	D.time	0 sec.
	Control action:	REV

F.600: Ramp times:

	Start up:	120 sec.
	Increasing speed:	5 sec.
	Decreasing speed:	5 sec.

F.610: Control via start start/stop with set-points : ON
Set-point for min. speed of speed controlled pump: 5 %
F.620 Times for alternation of speed contr. pump: Each Monday 03:00
F.660 Limit speed when changing pump : ON
F.702 Auto alternation when pump failure ON

Alarm no:		Alarm type:	Alarm delay (sec):	Set-point
1	Person alarm	A	180	
9	Configuration error	B	60	
83	Fallen m. protector P1	B	5	
84	Fallen temp. protector P1	B	5	
99	Fallen m. protector P2	B	5	
100	Fallen temp. protector P2	B	5	
369	Power fail. IO-module 1	B	60	
370	Low voltage 12V	B	60	
371	IO-module 1 missing	A	120	
372	AI Board 1 missing	A	60	
401	High alarm AI 1:1	B	60	10 bar
402	Low alarm AI 1:1	B	60	1 bar

Log channel:		Signal:	Log mode:	Interval (sec):
0.	Pressure out PP1	Average	300	

For choice with motor currents add.
Analogue input:

2.	Current transf. Pump 1	0-20 Ampere
3.	Current transf. Pump 2	0-20 Ampere

Alarm no:		Alarm type:	Alarm delay (sec):	Set-point
81	High motor curr. P1	B	15	20.0 A
86	No start conf P1	B	15	2.0 A
97	High motor curr. P2	B	15	20.0 A
102	No start conf P2	B	15	2.0 A
373	AI board 2 missing	B	60	
374	AI board 3 missing	B	60	

With suction pressure sensor add.

Digital input:
13. NO No start conf. Pump 1
14. NO No start conf Pump 2

Analogue input:
2. Suction pressure sensor PP.1 4-20 mA = 0-10 bar.

Alarm no:		Alarm type:	Alarm delay (sec):
86	No start conf P1	B	15
102	No start conf P2	B	15
373	AI board 2 missing	B	60

Log channel:	Signal:	Log mode:	Interval (sec):
1.	Suction pressure PP.1	Average	300

8.2.75 Function 883, Standard configuration pressure boost with 3 pumps

```
Function 883
3 PUMP PRESSURE
BOOST CONFIGURATION
BREAK
```

Basic configuration for a Booster station with 3 pumps and 1 frequency converter .
See section 6.5 page 24 about speed control and configuration appendix in the end of this manual.

Following standard configurations are available.
WITH MOTOR CURRENTS For constant pressure with PID controller
WITHOUT MOTOR CURRENT
WITH INPUT PRESSURE For pressure limitation at low suction pressure (without motor currents).
Function 883 (3-pump configuration for booster station with speed controlled pump):
Without Motor currents

Execute function 899 (basic initiation).
Digital output:

1. NO Pump 1
2. NO Pump 2
3. NO Pump 3
4. NO Signal 0-set personal alarm 30 min. delay
5. NO Pump 1 Speed controlled pump
6. NO Pump 2 Speed controlled pump
7. NO Pump 3 Speed controlled pump
8. NC Combined alarm output A+B - alarm

ON/OFF of speed controlled pump is done with D.OUT 1 and 2.
If this is wanted from D.OUT 5,6 and 7 this can be reset to these outputs

Digital input:

1. NC Block Pump 1 (not auto)
2. NC Block Pump 2 (not auto)
3. NC Block Pump 3 (not auto)
5. NO Fallen motor protector Pump 1
6. NO Fallen motor protector Pump 2
7. NO Fallen motor protector Pump 3
9. NC Fallen temp.protector Pump 1
10. NC Fallen temp.protector Pump 2
11. NC Fallen temp.protector Pump 3
16. NO Person alarm - Local mode

Analogue input:

1. Pressure sensor PP.1 4-20 mA = 0-10 bar.

Analogue output:

2. Speed signal to frequency converter 4-20 mA = 0-100.00 %

LED:

1. Auto position P 1.
2. Start confirmation P 1.
3. Motor protector P 1.
4. Temp.protector P 1.
5. Auto position P 2.
6. Start confirmation P 2.
7. Motor protector P 2.
8. Temp.protector P 2.
9. Auto position P 3.
10. Start confirmation P 3.
11. Motor protector P 3.
12. Temp.protector P 3.
16. Signal person alarm timer

Alternation fixed pumps:

	Pump 1:	alternation ON.
	Pump 2:	alternation ON.
	Pump 3:	alternation ON.

PID 1:	Set-point	6 bar
	P.Ampl.	2.000
	I.time	180 sec.
	D.time	0 sec.
	Control action:	REV

F.600: Ramp times:

	Start up:	120 sec.
	Increasing speed:	5 sec.
	Decreasing speed:	5 sec.

F.610: Control via start start/stop with set-points :	ON
Set-point for min. speed of speed controlled pump:	5 %
F.620 Times for alternation of speed contr. pump:	Each Monday 03:00
F.660 Limit speed when changing pump :	ON
F.702 Auto alternation when pump failure	ON

Alarm no:		Alarm type:	Alarm delay (sec):	Set-point
1	Person alarm	A	180	
9	Configuration error	B	60	
83	Fallen m.protector P1	B	5	
84	Fallen temp.protector P1	B	5	
99	Fallen m.protector P2	B	5	
100	Fallen temp.protector P2	B	5	
115	Fallen m.protector P3	B	5	
116	Fallen temp.protector P3	B	5	
369	Power fail. IO-module 1	B	60	
370	Low voltage 12V	B	60	
371	IO-module 1 missing	A	120	
372	AI Board 1 missing	A	60	
401	High alarm AI 1:1	B	60	10 bar
402	Low alarm AI 1:1	B	60	1 bar

Display shows:

Time
Speed
Control signal PID
Outgoing pressure

Log channel:		Signal:	Log mode:	Interval (sec):
0.	Pressure out PP1	Average	300	

For choice with motor currents add.

Analogue input:

2.	Current transf. Pump 1	0-20 Ampere
3.	Current transf. Pump 2	0-20 Ampere
4.	Current transf. Pump 3	0-20 Ampere

Alarm no:		Alarm type:	Alarm delay (sec):	Set-point
81	High motor curr. P1	B	15	20.0 A
86	No start conf P1	B	15	2.0 A
97	High motor curr. P2	B	15	20.0 A
102	No start conf P2	B	15	2.0 A
113	High motor curr P3	B	15	20.0 A
118	No start conf P3	B	15	2.0 A
373	AI board 2 missing	B	60	
374	AI board 3 missing	B	60	
375	AI board 4 missing	B	60	

With suction pressure sensor add.

Digital input:

13. NO No start conf. Pump 1
14. NO No start conf Pump 2
15. NO No start conf Pump 3

Analogue input:

2. Suction pressure sensor PP.1 4-20 mA = 0-10 bar.

Alarm no:		Alarm type:	Alarm delay (sec):
86	No start conf P1	B	15
102	No start conf P2	B	15
118	No start conf P3	B	15
373	AI board 2 missing	B	60

Row 3 shows suction pressure.

Log channel:	Signal:	Log mode:	Interval (sec):
1.	Suction pressure PP.1	Average	300

8.2.76 Function 888, Standard 2 pump configuration according to UCP/UCC standard

```
Function 888
OLD UCP/UCC 2 PUMP
CONFIGURATION
BREAK
```

Basic configuration for pump control of 2 pumps.
See page 10 about pump control and configuration appendix in the end of the manual

Following standard configurations are available.
WITH MOTOR CURRENTS
WITHOUT MOTOR CURRENT

Function 888 (2-pump config UCP-UCC standard):

Execute function 899 (basic initiation).
Digital output:
:

1. NO Combined alarm output A-alarm
2. NO Combined output alarm B-alarm
3. NO Pump 1
4. NO Pump 2
5. NO Motor protector reset Pump 1
6. NO Motor protector reset Pump 2
8. NO Signal 0-set personal alarm 30 min. delay

Digital output:

1. NC Block Pump 1 (not auto)
2. NC Block Pump 2 (not auto)
3. NO Fallen motor protector Pump 1
4. NO Fallen motor protector Pump 2
5. NC Fallen temp. Protector Pump 1
6. NC Fallen temp. Protector Pump 2
7. NO High float PP.1
8. NO Overflow float PP.1
9. NO Person alarm - Local mode

Analogue input :

1. Level sensor PP.1 4-20 mA = 0-10 meter.

With motor currents

2. Current transformer Pump 1 0-20 Ampere
3. Current transformer Pump 2 0-20 Ampere
9. Indication DIN 9 person alarm input
10. Indication D.OUT 8 Signal person alarm timer
13. Overflow PP.1
14. High float PP.1

Pump 1: Start 1.5 m, Stop 0.7 m, alternation ON.
Pump 2: Start 1.6 m, Stop 0.8 m, alternation ON.

Analogue history: 16 bit 2-complement (UCP compatible)

Log channel:	Signal:	Log mode:	Interval (sec)::	
0.	Level PP.1	Average	300	
1.	Inflow PG.1	Average	300	
2.	Outflow PG.1	Average	00	
3.	Overflow level PP.1	Average	300	
4.	Overflow PP.1	Average	300	(Over flow type must be set)

Alarm no:		Alarm type:	Alarm delay (sec):	
1	Personal alarm	A	180	
9	Configuration error	B	60	
20	High float PP.1	A	10	
21	Overflow PP.1	A	10	
83	Fallen m.protector P1	B	5	
84	Fallen temp.protector P1	B	5	
92	Error m.protector P1	B	5	
99	Fallen m.protector P2	B	5	
100	Fallen temp.protector P2	B	5	
108	Error m.protector P2	B	5	
369	Power fail. IO-module 1	B	60	
370	Low voltage 12V	B	60	
371	IO-module 1 missing	A	120	
372	AI Board 1 missing	A	60	
With motor currents				
81	High motor current P1	B	15	20.0 A
86	No start conf. P1	B	15	2.2 A
97	High motor current P2	B	15	20.0 A
102	No start conf P2	B	15	2.2 A
373	AI Board 2 missing	B	60	
374	AI Board 3 missing	B	60	

8.2.77 Function 890, Simple 2- pump configuration

```
Function 890
BASIC 2 PUMP
CONFIGURATION
BREAK
```

Basic configuration for control of 2 pumps with motor currents.
This configuration is the base for all other types in the F.89x series.
See section 6.1 page 10 about pump control.

Function 890 (Simple 2-pump configuration):

executes function 899 (basic initiation).
Digital output:
1. NO Pump 1
2. NO Pump 2
4. NO Signal 0-set personal alarm 30 min. delay
8. NC Combined alarm output A+B - alarm

Digital input:
5. NO Fallen m. protector Pump 1
6. NO Fallen m. protector Pump 2
13. NO High float PP.1
14. NO Overflow float PP.1
16. NO Personal alarm - Local mode

Analogue input:
1. Level sensor PP.1 4-20 mA = 0-10 meter.

LED:
1. Operation P 1 (D.OUT 1:1)
5. Operation P 2 (D.OUT 1:2)
13. Overflow PP.1
14. High float PP.1
16. Signal person alarm timer.

Pump 1: Start 1.5 m, Stop 0.7 m, alternation ON.
Pump 2: Start 1.6 m, Stop 0.8 m, alternation ON.

Analogue history: 16 bit 2-complement (UCP compatible)

Log channel:	Signal:	Log mode:	Interval (sec):	
0.	Level PP.1	Average	300	
1.	Inflow PP.1	Average	300	
2.	Outflow PP.1	Average	300	
3.	Overflow level PP.1	Average	300	
4.	Overflow PP.1	Average	300	(Overflow type must be set)

Alarm no:		Alarm type:	Alarm delay (sec):	Set-point
1	Person alarm	A	180	
6	High CPU temp.	B	60	
7	Low voltage 3V	B	60	
8	3V battery missing	B	60	
9	Configuration error	B	60	
17	High level PP.1	A	10	5.00 meter
20	High float PP.1	A	10	
21	Overflow PP.1	A	10	
83	Fallen m.protector P1	B	5	
99	Fallen m.protector P 2	B	5	
369	Power fail. IO-module 1	B	60	
370	Low voltage 12V	B	60	
371	IO-module 1 missing	A	120	
372	AI Board 1 missing	A	60	

8.2.78 Function 892, Standard 2-pump configuration

```
Function 892
STANDARD 2 PUMP
CONFIGURATION
BREAK
```

Standard configuration for pump control with 2 pumps.
See section 6.1 page 10 about pump control and configuration appendix in the end of the manual.

Following standard configurations are available .
WITH MOTOR CURRENTS
WITHOUT MOTOR CURRENT
Function 892 (2-pump configuration):

Executes function 899 (basic initiation).
Digital output:

1. NO Pump 1
2. NO Pump 2
4. NO Signal 0-set personal alarm 30 min. delay
5. NO Motor protector reset Pump 1
6. NO Motor protector reset Pump 2
8. NC Combined alarm out A+B - alarm

Digital inputs:

1. NC Block Pump 1 (not auto)
2. NC Block Pump 2 (not auto)
5. NO Fallen motor protector Pump 1
6. NO Fallen motor protector Pump 2
9. NC Fallen temp. Protector Pump 1
10. NC Fallen temp. Protector Pump 2
13. NO High float PP.1
14. NO Overflow float PP.1
16. NO Person alarm - Local mode

Analogue input :

1. Level sensor PP.1 4-20 mA = 0-10 meter.

With motor currents

2. Current transformer Pump 1 0-20 Ampere
3. Current transformer Pump 2 0-20 Ampere

LED:

1. Auto position P 1.
2. Start confirmation P 1.
3. Motor protector P 1.
4. Temp.protector P 1.
5. Auto position P 2.
6. Start confirmation P 2.
7. Motor protector P 2.
8. Temp.protector P 2.
13. Overflow PP.1
14. High float PP.1
16. Signal person alarm timer

Pump 1: Start 1.5 m, Stop 0.7 m, alternation ON.
Pump 2: Start 1.6 m, Stop 0.8 m, alternation ON.
Analogue history: 16 bit 2-complement (UCP compatible)

Log channel:	Signal:	Log mode:	Interval (sec):	
0.	Level PP.1	Average	300	
1.	Inflow PG.1	Average	300	
2.	Outflow PG.1	Average	00	
3.	Overflow level PP.1	Average	300	
4.	Overflow PP.1	Average	300	(Over flow type must be set)

Alarm no:		Alarm type:	Alarm delay (sec):	
1	Personal alarm	A	180	
9	Configuration error	B	60	
17	High level PP.1	B	10	5.00 meter
20	High float PP.1	A	10	
21	Overflow PP.1	A	10	
83	Fallen m.protector P1	B	5	
84	Fallen temp.protector P1	B	5	
92	Error m.protector P1	B	5	
99	Fallen m.protector P2	B	5	
100	Fallen temp.protector P2	B	5	
108	Error m.protector P2	B	5	
369	Power fail. IO-module 1	B	60	
370	Low voltage 12V	B	60	
371	IO-module 1 missing	A	120	
372	AI Board 1 missing	A	60	
With motor currents				
81	High motor current P1	B	15	20.0 A
86	No start conf P1	B	15	2.0 A
97	High motor current P2	B	15	20.0 A
102	No start conf P2	B	15	2.0 A
373	AI Board 2 missing	B	60	
374	AI Board 3 missing	B	60	

8.2.79 Function 893, Standard 3-pump configuration

```
Function 893
STANDARD 3 PUMP
CONFIGURATION
BREAK
```

Basic configuration for control of 3 pumps with motor currents.
See section 6.1 page 10 about pump control and configuration appendix in the end of the manual.

Following standard configurations are available.
WITH MOTOR CURRENTS
WITHOUT MOTOR CURRENT

Function 893 (Standard 3-pump configuration):
executes function 899 (basic initiation) and 890.
Digital output:

1. NO Pump 1
2. NO Pump 2
3. NO Pump 3
4. NO Signal 0-set personal alarm 30 min. delay
5. NO Motor protector reset Pump 1
6. NO Motor protector reset Pump 2
7. NO Motor protector reset Pump 3
8. NC Combined alarm output A+B - alarm

Digital input:

1. NC Block Pump 1 (not auto)
2. NC Block Pump 2 (not auto)
3. NC Block Pump 3 (not auto)
5. NO Fallen motor protector Pump 1
6. NO Fallen motor protector Pump 2
7. NO Fallen motor protector Pump 3
9. NC Fallen temp. Protector Pump 1
10. NC Fallen temp. Protector Pump 2
11. NC Fallen temp. Protector Pump 3
13. NO High float PP.1
14. NO Overflow float PP.1
16. NO Person alarm – Local mode

Analogue input :

1. Level sensor PP.1 4-20 mA = 0-10 meter.

With motor currents

2. Current transformer Pump 1 0-20 Ampere
3. Current transformer Pump 2 0-20 Ampere
4. Current transformer Pump 3 0-20 Ampere

LED:

1. Auto position P 1.
2. Start confirmation P 1.
3. Motor protector P 1.
4. Temp.protector P 1.
5. Auto position P 2.
6. Start confirmation P 2.
7. Motor protector P 2.
8. Temp.protector P 2.
9. Auto position .P 3.
10. Start confirmation P 3.
11. Motor protector P 3.
12. Temp.protector P 3.
13. Overflow PP.1
14. High float PP.1
16. Signal person alarm timer

Pump 1: Start 1.5 m, Stop0.7 m, alternation ON.
Pump 2: Start 1.6 m, Stop 0.8 m, alternation ON.
Pump 3: Start 1.7 m, Stop 0.9 m, alternation ON

Analogue history: 16 bit 2-ckomplement (UCP compatible)

Log channel:	Signal:	Log mode:	Interval (sec):	
0.	Level PP.1	Average	300	
1.	Inflow PP.1	Average	300	
2.	Outflow PP.1	Average	300	
3.	Overflow level PP.1	Average	300	
4.	Overflow PP.1	Average	300	(Overflow type must be set)

Alarm no:		Alarm type:	Alarm delay (sec):	Set-point
1	Person alarm	A	180	
9	Configuration error	B	60	
17	High level PP.1	B	10	5.00 meter
20	High float PP.1	A	10	
21	Overflow PP.1	A	10	
83	Fallen m.protector P1	B	5	
84	Fallen temp.protector P	B	5	
92	Error motor protector P1	B	5	
99	Fallen m.protector P2	B	5	
100	Fallen temp.protector P2	B	5	
108	Error motor protector P2	B	5	
115	Fallen m.protector P3	B	5	
116	Fallen temp.protector P3	B	5	
124	Error motor protector P3	B	5	
369	Power fail. IO-module 1	B	60	
370	Low voltage 12V	B	60	
371	IO-module 1 missing	A	120	
372	AI Board 1 missing	A	60	
with motor currents				
81	High motor curr. P1	B	15	20.0 A
86	No start conf P1	B	15	2.0 A
97	High motor curr. P2	B	15	20.0 A
102	No start conf P2	B	15	2.0 A
113	High motor curr. P3	B	15	20.0 A
118	No start conf P3	B	15	2.0 A
373	AI board 2 missing	B	60	
374	AI board 3 missing	B	60	
375	AI board 4 missing	B	60	

8.2.80 Function 894, Standard 4-pump configuration

```
Function 894
STANDARD 4 PUMP
CONFIGURATION
BREAK
```

Standard for pump control with 4 pumps.
See section 6.1 page 10 about pump control.

Following standard configurations are available.
WITH MOTOR CURRENTS
WITHOUT MOTOR CURRENT
Function 894 (4-pump configuration):
executes function 899 (basic initiation) and 890.

Digital output:

1. NO Pump 1
2. NO Pump 2
3. NO Pump 3
4. NO Pump 4
5. NO Motor protector reset Pump 1
6. NO Motor protector reset Pump 2
7. NO Motor protector reset Pump 3
8. NO Motor protector reset Pump 4

2:7. NO Signal 0-set personal alarm 30 min. delay
2:8. NC Combined alarm output A+B - alarm

Digital input:

1. NC Block Pump 1 (not auto)
2. NC Block Pump 1 (not auto)
3. NC Block Pump 1 (not auto)
4. NC Block Pump 1 (not auto)
5. NO Fallen motor protector Pump 1
6. NO Fallen motor protector Pump 2
7. NO Fallen motor protector Pump 3
8. NO Fallen motor protector Pump 4
9. NC Fallen temp. Protector Pump 1
10. NC Fallen temp. Protector Pump 2
11. NC Fallen temp. Protector Pump 3
12. NC Fallen temp. Protector Pump 4
13. NO High float PP.1
14. NO Overflow float PP.1
16. NO Person alarm - Local mode

Analogue input :

1. Level sensor PP.1 4-20 mA = 0-10 meter.

With motor currents

2. Current transformer Pump 1 0-20 Ampere
5. Current transformer Pump 2 0-20 Ampere
4. Current transformer Pump 3 0-20 Ampere

2:1. Current transformer Pump 4 0-20 Ampere

LED:

1. Auto position P 1.
2. Start confirmation P 1.
3. Motor protector P 1.
4. Temp.protector P 1.
5. Auto position P 2.
6. Start confirmation P 2.
7. Motor protector P 2.
8. Temp.protector P 2.
9. Auto position .P 3.
10. Start confirmation P 3.
11. Motor protector P 3.
12. Temp.protector P 3.
13. Auto position P 4.
14. Start confirmation P 4.
15. Motor protector P 4.
16. Temp.protector P 4.

Pump 1: Start 1.5 m, Stop 0.7 m, alternation ON.
Pump 2: Start 1.6 m, Stop 0.8 m, alternation ON.
Pump 3: Start 1.7 m, Stop 0.9 m, alternation ON.
Pump 4: Start 1.8 m, Stop 1.0 m, alternation ON.

Analogue history: 16 bit 2-complement (UCP compatible)

Log channel:	Signal:	Log mode:	Interval (sec)	
0.	Level PP.1	Average	300	
1.	Inflow PP.1	Average	300	
2.	Outflow PP.1	Average	300	
3.	Overflow level PP.1	Average	300	
4.	Overflow PP.1	Average	300	(Overflow type must be set)

Alarm no:		Alarm type:	Alarm delay (sec):	Set-point
1	Person alarm	A	180	
9	Configuration error	B	60	
17	High level PP.1	B	10	5.00 meter
20	High float PP.1	A	10	
21	Overflow PP.1	A	10	
83	Fallen m.protector P1	B	5	
84	Fallen temp.protector P1	B	5	
92	Error motor protector P1	B	5	
99	Fallen m.protector P2	B	5	
100	Fallen temp.protector P2	B	5	
108	Error motor protector P2	B	5	
115	Fallen temp.protector P3	B	5	
116	Fallen temp.protector P3	B	5	
124	Error motor protector P3	B	5	
131	Fallen m.protector P4	B	5	
132	Fallen temp.protector P4	B	5	
140	Error motor protector P4	B	5	
369	Power fail. IO-module 1	B	60	
370	Low voltage 12V	B	60	
371	IO-module 1 missing	A	120	
372	AI Board 1 missing	A	60	
433	Power fail. IO-module 2	B	60	
434	Low power 12V mod.2	B	60	
435	IO-module 2 missing	A	120	

with motor currents

81	High motor curr P1	B	15	20.0 A
86	No start conf P1	B	15	2.0 A
97	High motor curr P2	B	15	20.0 A
102	No start conf P2	B	15	2.0 A
113	High motor curr P3	B	15	20.0 A
118	No start conf P3	B	15	2.0 A
129	High motor curr P4	B	15	20.0 A
134	No start conf P4	B	15	2.0 A
373	AI Board 1 missing	B	60	
374	AI Board 2 missing	B	60	
375	AI Board 3 missing	B	60	
436	AI Board 2:1 missing	B	60	

8.2.81 Function 899, Delivery initiation

```
Function 899
FACTORY INITIATION
BREAK
```

Must be run after resetting memory with F.988.
Sets default settings for the unit.
If the customer orders no configuration this is the standard configuration at delivery.

For complete erasing of earlier configurations F.988 must be run before starting the configuration:

Operator access:	1
System access:	2
All D.in:	Closed
All D.out:	Closed
All A.out:	Closed
A.in 1:	Level sensor PP 1
Other A.in:	Closed
Comport 1-8:	9600,N,8,1 No handshake Comli ID 1
Pumppit parameters PUMPPIT 1-4:	
Min time between pump starts:	10 sec
Pit Area:	3.1 m2 on all points
Level points:	0, 1, 2, 3, 4, 5, 6, 7, 8, 9 meter
Outflow comp at 2-16 pumps:	95% at 2 pumps, 90% at 3 pumps a.s.o.
Pumps EMPTYING pit.	
Calc. interval inflow:	10 sec.
Min level for pumpcap. calc.	0 m.
Scaling for Flow reg. 5-12:	0-100 l/s
All pumps blocked.	
Control levels:	P1 Start=1.20, Stop=0.70 + 10 cm for each
pump	
ON - OFF delay:	1 sec for all pumps
Calc. timer pump capacity:	10 sec for all parameters.
Pump curve:	0 for all parameters.

8.2.82 Function 900, Program version

```
Function 900
Program version 1.04
Standard
English
```

This function shows the program version used in the PCx

8.2.83 Function 901, Upgrade information

```
Function 901
Free upgrade up to
V. 1.99   Act.key:F8
VIEW
```

Information about upgrade key

8.2.84 Function 902, Serial numbers

```
Function 902
Serial no    1234567
PCB:   45202199 B- 1
Mf. date: 2002-11-29
```

Information about Serial number for PCB and PCx

8.2.85 Function 910, basic calibration of the analogue input

This calibration is normally done in the factory and **should not** be made by the customer.

```
Function 910
Basic calibration of
analogue inputs
SYSTEM PROG
```

```
Function 910 Ain 1:1
mA input
0/4 - 20 mA
CALIBRATE
```

```
Function 910 Ain 1:1
AD-Value:   8229
PRESS ENTER TO SET
0 mA
```

Calibration is done by connecting calibrated signals to the inputs, for these the raw data is read and stored in a memory chip.

8.2.86 Function 911, Calibration of analogue output

This calibration is made in the factory and **should not** be made by the customer.

```
Function 911
Calibrate Anal. out
Io-mod:1  Aout:1
Outsignal:  4.000 mA
```

```
Function 911
Aout:1:1 read values
Value 1 =  4.000 mA
Value 2 = 20.000 mA
```

Calibration is done by reading values from the analogue output.
From these values a scaling factor is calculated and stored in a memory chip on the IO-module.

8.2.87 Function 913, Baud rate CAN-bus

```
Function 913
BAUDRATE CAN-BUS
         250000  b/s
```

This setting is made in the factory and **should not** be made by customer.
The data speed for exchange of I/O data between the panel unit and the IO-modules is set to 250 Kbit/s as default value on the PCx and should normally not be changed.

8.2.88 Function 914, CAN-bus status

```
Function 914
Status CAN bus
 TX COUNT          12
>RX COUNT           1
```

This function shows the status of the CAN-bus and is used for troubleshooting. Status counters can be set to 0

8.2.89 Function 916, Test of serial ports

```
Function 916
SELFTEST OF
SERIALPORT No: 1
BAUDRATE  19200
```

```
Function 916
TXD = TEST UART1
RXD =
RX timeout .....
```

Function for loop back test of serial ports.
TXD and RXD as well as RTS and CTS must be bridged for a selftest.

8.2.90 Function 923, Test of digital IO

```
Function 923
SELFTEST OF DI/DO
MODUL NO : 1
```

This function is used for a loop back test in a test jig at the factory.

8.2.91 Function 950, Access codes

```
Function 950 CHANGE
Access codes
```

```
Function 950 CHANGE
Access codes
Operator code =   1
System code =     2
```

This function can change the codes for the access of operator and system level.
The range is 0 – 9999.

8.2.92 Function 988, 0- setting of memory

```
Function 988
0-SET RAM MEMORY
START 0-SETTING
Saved configur. ?
```

This function 0- sets the entire memory in the PCx.
After 0-setting the PCx restarts and the F.899 must be run for basic initiation.
Used to totally erase earlier configurations.

9 IO- and alarm numbers

9.1 IO numbers

9.1.1 Digital outputs:

Digital Output	DO1	DO2	DO3	DO4	DO5	DO6	DO7	DO8
IO-module 1	0	1	2	3	4	5	6	7
IO-module 2	8	9	10	11	12	13	14	15
IO-module 3	16	17	18	19	20	21	22	23
IO-module 4	24	25	26	27	28	29	30	31
IO-module 5	32	33	34	35	36	37	38	39
IO-module 6	40	41	42	43	44	45	46	47
IO-module 7	48	49	50	51	52	53	54	55
IO-module 8	56	57	58	59	60	61	62	63

9.1.2 Pump status (P1-P16):

Pump	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16
Pump running indication	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
Pump Relay	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
Pump blocked	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
Pump reversing	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
Fallen M-protection	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143
Pump hand started	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159
Pump hand stopped	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
Fallen temp. protector	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191
Status setpoint	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207
Pump valve status	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223
End position valve closed	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239
End position valve open	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255
Start float	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911
Stop float	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927
Alarm blockad	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943
Actual speed cont. pump	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959

9.1.3 Digital inputs:

Digital input	DI1	DI2	DI3	DI4	DI5	DI6	DI7	DI8	DI9	DI10	DI11	DI12	DI13	DI14	DI15	DI16
IO-modul 1	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271
IO-modul 2	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287
IO-modul 3	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303
IO-modul 4	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319
IO-modul 5	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335
IO-modul 6	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351
IO-modul 7	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367
IO-modul 8	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383

9.1.4 Pump pit valves:

	PP.1	PP.2	PP.3	PP.4
Valve status:	384	385	386	387
End position closed:	392	393	394	395
End position open:	400	401	402	403

9.1.5 One or more pumps in the pit are blocked trough alarm:

Pump(s) alarm blocked	408	409	410	411

9.1.6 Pump pit status:

	PP.1	**PP.2**	**PP.3**	**PP.4**
Sensor error	432	440	448	456
Pump pit blocked	433	441	449	457
Error opening valve	434	442	450	458
Error closing valve	435	443	451	459
Valve error	436	444	452	460
P.P. blocked by valve	437	445	453	461
Not used	438	446	454	462
Not used	439	447	455	463
High level	464	472	480	488
Low level	465	473	481	489
Back-up start	466	474	482	490
High level float	467	475	483	491
Overflow	468	476	484	492
High inflow	469	477	485	493
Low inflow	470	478	486	494
Not used	471	479	487	495

9.1.7 Comb alarm status:

	IO-bit	**Octal**	**Hexadecimal**
Not ackn. A-Alarm	496	760	1F0
Not ackn B-Alarm	497	761	1F1
Not ackn. C-Alarm	498	762	1F2
Active A-Alarm	504	770	1F8
Active B-Alarm	505	771	1F9
Active C-Alarm	506	772	1FA
Ackn Alarm call	511	777	1FF

Same as ackn to reg.333
0=PCx disconnects line,
1=System disconnects line.

9.1.8 Free user area:

Can be used freely for ex. remote communication or own programming flags.
IO-bit
512-799

9.1.9 Check run (F.707):

Pump	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16
Pump, Check if running	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815
Pump valve, Check run.	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831

9.1.10 Shift motor:

Shift motor	**1**	**2**	**3**	**4**
End position MIN	864	880	832	848
End position MAX	865	881	833	849
Blocked	866	882	834	850
Remote position	867	883	835	851
Decrease signal	868	884	836	852
Increase signal	869	885	837	853
DI forced position	870	886	838	854
Error actual value min	872	888	840	856
Error actual value max	873	889	841	857
Error dual end position	874	890	842	858
No A.IN actual value	875	891	843	859
No A.IN set point	876	892	844	860

9.1.11 User IO:

Reserved as user IO	960-967

9.1.12 Status sequential week timer:

Status sequence channel 1-8	976-983

9.1.13 System info:

	IO-bit
Ackn. Personal alarm	992
Outer personal alarm ON	993
Local mode	994
Modem error	995
Telephone error	996
Configuration Error	1000

9.1.14 Alarm status:

	IO-bit
Alarm 1=IO 1024 and so on	1024-2047

Alarm status indicates 1 if alarm is active and 0 when alarm is off, independent of alarm type (A, B or C-Alarm). Alarm numbers that are set to ”Inactive” always show 0.
For the whole list of alarms check the chapter 9.2.

9.1.15 Latched alarm status:

Alarm 1=IO 2048 and so on	2048-3071

Latched alarm status is set to 1 when an alarm goes active and are updated after a Comli/Modbus readout of actual alarm status. This is made to prevent loosing alarms that have gone inactive before a call is finished. For the whole list of alarms check the chapter 9.2.

9.1.16 Acknowledged alarms:

Alarm 1=IO 3072 and so on 3072-4095

Status for acknowledged alarms are set to 0 each time a new alarm occurs and gives the possibility for a central system to acknowledge each alarm individually.
The acknowledgement works the same way as local acknowledgement on PCx and is made by writing a 1 to actual alarm bit. For the whole list of alarms check the chapter 9.2.

9.1.17 Blocked alarms at Power failure

The IO-bits that controls if an Alarm should be blocked when the Power Fail. Alarm is active are 7168-8047. For the whole list of alarms check the chapter 9.2.
1 = Blocked at Power Fail. Alarm
0 = Not Blocked.

9.1.18 Time stamp of IO-event

Time stamp for change of IO 0-1023. IO 4096 controls time stamp of IO 0 and so on
IO-bit
4096-5119

9.1.19 Trig of Com. master communication

Communication trig when changed status on IO 0-1023 (0=OFF 1=ON). IO 5120 controls trig on IO 0 and so on
IO-bit
5120-6143

9.1.20 Pump blocking at not ackn. Pump error alarms.

IO number for config. of blocking conditions. 0=No blocking 1=Block until alarm is ackn.

Alarm conditions:	**Pump1**	**Pump2**	**Pump3**	**...**	**Pump16**
High motor current	6144	6152	6160	**...**	6264
Low motor current	6145	6153	6161	**...**	6265
Fallen motor protector	6146	6154	6162	**...**	6266
Fallen temp. protector	6147	6155	6163	**...**	6267
Low pump capacity	6148	6156	6164	**...**	6268
Running indication missing	6149	6157	6165	**...**	6269
Not used	6150	6158	6166	**...**	6270
Not used	6151	6159	6167	**...**	6271

9.1.21 Setting of new IO status for sequential events.

	IO-bit	Octal	Hexadecimal
Sequential event 1-64	6272-6335	14200-14277	1880-18BF

9.2 Alarm numbers

Alarm nr	Alarm group:	Alarm text:	IO-Number	Latch IO	Ackno.IO	Blocked
Alarm 1:	SYSTEM	Person Alarm	1024	2048	3072	7168
Alarm 2:	SYSTEM	Ext. Person Alarm	1025	2049	3073	7169
Alarm 3:	SYSTEM	UC in local mode	1026	2050	3074	7170
Alarm 4:	SYSTEM	Modem error	1027	2051	3075	7171
Alarm 5:	SYSTEM	Phone error	1028	2052	3076	7172
Alarm 6:	SYSTEM	Not used	1029	2053	3077	7173
Alarm 7:	SYSTEM	Not used	1030	2054	3078	7174
Alarm 8:	SYSTEM	Not used	1031	2055	3079	7175
Alarm 9:	SYSTEM	Configuration error	1032	2056	3080	7176
Alarm 10:	SYSTEM	Not used	1033	2057	3081	7177
Alarm 11:	SYSTEM	Not used	1034	2058	3082	7178
Alarm 12:	SYSTEM	Not used	1035	2059	3083	7179
Alarm 13:	SYSTEM	Not used	1036	2060	3084	7180
Alarm 14:	SYSTEM	Not used	1037	2061	3085	7181
Alarm 15:	SYSTEM	Not used	1038	2062	3086	7182
Alarm 16:	SYSTEM	Not used	1039	2063	3087	7183
Alarm 17:	PUMPPIT 1	High level	1040	2064	3088	7184
Alarm 18:	PUMPPIT 1	Low level	1041	2065	3089	7185
Alarm 19:	PUMPPIT 1	Back-up start	1042	2066	3090	7186
Alarm 20:	PUMPPIT 1	High level float	1043	2067	3091	7187
Alarm 21:	PUMPPIT 1	Overflow	1044	2068	3092	7188
Alarm 22:	PUMPPIT 1	High inflow	1045	2069	3093	7189
Alarm 23:	PUMPPIT 1	Low inflow	1046	2070	3094	7190
Alarm 24:	PUMPPIT 1	Not used	1047	2071	3095	7191
Alarm 25:	PUMPPIT 1	Sensor error	1048	2072	3096	7192
Alarm 26:	PUMPPIT 1	Pumps DIN blocked	1049	2073	3097	7193
Alarm 27:	PUMPPIT 1	Error opening valve	1050	2074	3098	7194
Alarm 28:	PUMPPIT 1	Error closing valve	1051	2075	3099	7195
Alarm 29:	PUMPPIT 1	Valve error	1052	2076	3100	7196
Alarm 30:	PUMPPIT 1	Pump block valve	1053	2077	3101	7197
Alarm 31:	PUMPPIT 1	Not used	1054	2078	3102	7198
Alarm 32:	PUMPPIT 1	Not used	1055	2079	3103	7199
Alarm 33:	PUMPPIT 2	High level	1056	2080	3104	7200
Alarm 34:	PUMPPIT 2	Low level	1057	2081	3105	7201
Alarm 35:	PUMPPIT 2	Back-up start	1058	2082	3106	7202
Alarm 36:	PUMPPIT 2	High level float	1059	2083	3107	7203
Alarm 37:	PUMPPIT 2	Overflow	1060	2084	3108	7204
Alarm 38:	PUMPPIT 2	High inflow	1061	2085	3109	7205
Alarm 39:	PUMPPIT 2	Low inflow	1062	2086	3110	7206
Alarm 40:	PUMPPIT 2	Not used	1063	2087	3111	7207
Alarm 41:	PUMPPIT 2	Sensor error	1064	2088	3112	7208
Alarm 42:	PUMPPIT 2	Pumps DIN blocked	1065	2089	3113	7209
Alarm 43:	PUMPPIT 2	Error opening valve	1066	2090	3114	7210
Alarm 44:	PUMPPIT 2	Error closing valve	1067	2091	3115	7211
Alarm 45:	PUMPPIT 2	Valve error	1068	2092	3116	7212
Alarm 46:	PUMPPIT 2	Pump block valve	1069	2093	3117	7213
Alarm 47:	PUMPPIT 2	Not used	1070	2094	3118	7214
Alarm 48:	PUMPPIT 2	Not used	1071	2095	3119	7215
Alarm 49:	PUMPPIT 3	High level	1072	2096	3120	7216
Alarm 50:	PUMPPIT 3	Low level	1073	2097	3121	7217
Alarm 51:	PUMPPIT 3	Back-up start	1074	2098	3122	7218
Alarm 52:	PUMPPIT 3	High level float	1075	2099	3123	7219
Alarm 53:	PUMPPIT 3	Overflow	1076	2100	3124	7220
Alarm 54:	PUMPPIT 3	High inflow	1077	2101	3125	7221
Alarm 55:	PUMPPIT 3	Low inflow	1078	2102	3126	7222
Alarm 56:	PUMPPIT 3	Not used	1079	2103	3127	7223
Alarm 57:	PUMPPIT 3	Sensor error	1080	2104	3128	7224
Alarm 58:	PUMPPIT 3	Pumps DIN blocked	1081	2105	3129	7225
Alarm 59:	PUMPPIT 3	Error opening valve	1082	2106	3130	7226
Alarm 60:	PUMPPIT 3	Error closing valve	1083	2107	3131	7227
Alarm 61:	PUMPPIT 3	Valve error	1084	2108	3132	7228
Alarm 62:	PUMPPIT 3	Pump block valve	1085	2109	3133	7229
Alarm 63:	PUMPPIT 3	Not used	1086	2110	3134	7230
Alarm 64:	PUMPPIT 3	Not used	1087	2111	3135	7231

Alarm nr	Alarm group:	Alarm text:	IO-Number	Latch IO	Ackno.IO	Blocked
Alarm 65:	PUMPPIT 4	High level	1088	2112	3136	7232
Alarm 66:	PUMPPIT 4	Low level	1089	2113	3137	7233
Alarm 67:	PUMPPIT 4	Back-up start	1090	2114	3138	7234
Alarm 68:	PUMPPIT 4	High level float	1091	2115	3139	7235
Alarm 69:	PUMPPIT 4	Overflow	1092	2116	3140	7236
Alarm 70:	PUMPPIT 4	High inflow	1093	2117	3141	7237
Alarm 71:	PUMPPIT 4	Low inflow	1094	2118	3142	7238
Alarm 72:	PUMPPIT 4	Not used	1095	2119	3143	7239
Alarm 73:	PUMPPIT 4	Sensor error	1096	2120	3144	7240
Alarm 74:	PUMPPIT 4	Pumps DIN blocked	1097	2121	3145	7241
Alarm 75:	PUMPPIT 4	Error opening valve	1098	2122	3146	7242
Alarm 76:	PUMPPIT 4	Error closing valve	1099	2123	3147	7243
Alarm 77:	PUMPPIT 4	Valve error	1100	2124	3148	7244
Alarm 78:	PUMPPIT 4	Pump block valve	1101	2125	3149	7245
Alarm 79:	PUMPPIT 4	Not used	1102	2126	3150	7246
Alarm 80:	PUMPPIT 4	Not used	1103	2127	3151	7247
Alarm 81:	PUMP 1	High motorcurrent	1104	2128	3152	7248
Alarm 82:	PUMP 1	Low motorcurrent	1105	2129	3153	7249
Alarm 83:	PUMP 1	Fallen motorprot.	1106	2130	3154	7250
Alarm 84:	PUMP 1	Fallen temp. prot.	1107	2131	3155	7251
Alarm 85:	PUMP 1	Low pump capacity	1108	2132	3156	7252
Alarm 86:	PUMP 1	No run. ind.	1109	2133	3157	7253
Alarm 87:	PUMP 1	Pump ext. blocked.	1110	2134	3158	7254
Alarm 88:	PUMP 1	Error opening valve	1111	2135	3159	7255
Alarm 89:	PUMP 1	Error closing valve	1112	2136	3160	7256
Alarm 90:	PUMP 1	Valve error	1113	2137	3161	7257
Alarm 91:	PUMP 1	Pump block valve	1114	2138	3162	7258
Alarm 92:	PUMP 1	Error motorprot.	1115	2139	3163	7259
Alarm 93:	PUMP 1	Not used	1116	2140	3164	7260
Alarm 94:	PUMP 1	Not used	1117	2141	3165	7261
Alarm 95:	PUMP 1	Not used	1118	2142	3166	7262
Alarm 96:	PUMP 1	Not used	1119	2143	3167	7263
Alarm 97:	PUMP 2	High motorcurrent	1120	2144	3168	7264
Alarm 98:	PUMP 2	Low motorcurrent	1121	2145	3169	7265
Alarm 99:	PUMP 2	Fallen motorprot.	1122	2146	3170	7266
Alarm 100:	PUMP 2	Fallen temp. prot.	1123	2147	3171	7267
Alarm 101:	PUMP 2	Low pump capacity	1124	2148	3172	7268
Alarm 102:	PUMP 2	No run. ind.	1125	2149	3173	7269
Alarm 103:	PUMP 2	Pump ext. blocked.	1126	2150	3174	7270
Alarm 104:	PUMP 2	Error opening valve	1127	2151	3175	7271
Alarm 105:	PUMP 2	Error closing valve	1128	2152	3176	7272
Alarm 106:	PUMP 2	Valve error	1129	2153	3177	7273
Alarm 107:	PUMP 2	Pump block valve	1130	2154	3178	7274
Alarm 108:	PUMP 2	Error motorprot.	1131	2155	3179	7275
Alarm 109:	PUMP 2	Not used	1132	2156	3180	7276
Alarm 110:	PUMP 2	Not used	1133	2157	3181	7277
Alarm 111:	PUMP 2	Not used	1134	2158	3182	7278
Alarm 112:	PUMP 2	Not used	1135	2159	3183	7279
Alarm 113:	PUMP 3	High motorcurrent	1136	2160	3184	7280
Alarm 114:	PUMP 3	Low motorcurrent	1137	2161	3185	7281
Alarm 115:	PUMP 3	Fallen motorprot.	1138	2162	3186	7282
Alarm 116:	PUMP 3	Fallen temp. prot.	1139	2163	3187	7283
Alarm 117:	PUMP 3	Low pump capacity	1140	2164	3188	7284
Alarm 118:	PUMP 3	No run. ind.	1141	2165	3189	7285
Alarm 119:	PUMP 3	Pump ext. blocked.	1142	2166	3190	7286
Alarm 120:	PUMP 3	Error opening valve	1143	2167	3191	7287
Alarm 121:	PUMP 3	Error closing valve	1144	2168	3192	7288
Alarm 122:	PUMP 3	Valve error	1145	2169	3193	7289
Alarm 123:	PUMP 3	Pump block valve	1146	2170	3194	7290
Alarm 124:	PUMP 3	Error motorprot.	1147	2171	3195	7291
Alarm 125:	PUMP 3	Not used	1148	2172	3196	7292
Alarm 126:	PUMP 3	Not used	1149	2173	3197	7293
Alarm 127:	PUMP 3	Not used	1150	2174	3198	7294
Alarm 128:	PUMP 3	Not used	1151	2175	3199	7295

Alarm nr	Alarm group:	Alarm text:	IO-Number	Latch IO	Ackno.IO	Blocked
Alarm 129:	PUMP 4	High motorcurrent	1152	2176	3200	7296
Alarm 130:	PUMP 4	Low motorcurrent	1153	2177	3201	7297
Alarm 131:	PUMP 4	Fallen motorprot.	1154	2178	3202	7298
Alarm 132:	PUMP 4	Fallen temp. prot.	1155	2179	3203	7299
Alarm 133:	PUMP 4	Low pump capacity	1156	2180	3204	7300
Alarm 134:	PUMP 4	No run. ind.	1157	2181	3205	7301
Alarm 135:	PUMP 4	Pump ext. blocked.	1158	2182	3206	7302
Alarm 136:	PUMP 4	Error opening valve	1159	2183	3207	7303
Alarm 137:	PUMP 4	Error closing valve	1160	2184	3208	7304
Alarm 138:	PUMP 4	Valve error	1161	2185	3209	7305
Alarm 139:	PUMP 4	Pump block valve	1162	2186	3210	7306
Alarm 140:	PUMP 4	Error motorprot.	1163	2187	3211	7307
Alarm 141:	PUMP 4	Not used	1164	2188	3212	7308
Alarm 142:	PUMP 4	Not used	1165	2189	3213	7309
Alarm 143:	PUMP 4	Not used	1166	2190	3214	7310
Alarm 144:	PUMP 4	Not used	1167	2191	3215	7311
Alarm 145:	PUMP 5	High motorcurrent	1168	2192	3216	7312
Alarm 146:	PUMP 5	Low motorcurrent	1169	2193	3217	7313
Alarm 147:	PUMP 5	Fallen motorprot.	1170	2194	3218	7314
Alarm 148:	PUMP 5	Fallen temp. prot.	1171	2195	3219	7315
Alarm 149:	PUMP 5	Low pump capacity	1172	2196	3220	7316
Alarm 150:	PUMP 5	No run. ind.	1173	2197	3221	7317
Alarm 151:	PUMP 5	Pump ext. blocked.	1174	2198	3222	7318
Alarm 152:	PUMP 5	Error opening valve	1175	2199	3223	7319
Alarm 153:	PUMP 5	Error closing valve	1176	2200	3224	7320
Alarm 154:	PUMP 5	Valve error	1177	2201	3225	7321
Alarm 155:	PUMP 5	Pump block valve	1178	2202	3226	7322
Alarm 156:	PUMP 5	Error motorprot.	1179	2203	3227	7323
Alarm 157:	PUMP 5	Not used	1180	2204	3228	7324
Alarm 158:	PUMP 5	Not used	1181	2205	3229	7325
Alarm 159:	PUMP 5	Not used	1182	2206	3230	7326
Alarm 160:	PUMP 5	Not used	1183	2207	3231	7327
Alarm 161:	PUMP 6	High motorcurrent	1184	2208	3232	7328
Alarm 162:	PUMP 6	Low motorcurrent	1185	2209	3233	7329
Alarm 163:	PUMP 6	Fallen motorprot.	1186	2210	3234	7330
Alarm 164:	PUMP 6	Fallen temp. prot.	1187	2211	3235	7331
Alarm 165:	PUMP 6	Low pump capacity	1188	2212	3236	7332
Alarm 166:	PUMP 6	No run. ind.	1189	2213	3237	7333
Alarm 167:	PUMP 6	Pump ext. blocked.	1190	2214	3238	7334
Alarm 168:	PUMP 6	Error opening valve	1191	2215	3239	7335
Alarm 169:	PUMP 6	Error closing valve	1192	2216	3240	7336
Alarm 170:	PUMP 6	Valve error	1193	2217	3241	7337
Alarm 171:	PUMP 6	Pump block valve	1194	2218	3242	7338
Alarm 172:	PUMP 6	Error motorprot.	1195	2219	3243	7339
Alarm 173:	PUMP 6	Not used	1196	2220	3244	7340
Alarm 174:	PUMP 6	Not used	1197	2221	3245	7341
Alarm 175:	PUMP 6	Not used	1198	2222	3246	7342
Alarm 176:	PUMP 6	Not used	1199	2223	3247	7343
Alarm 177:	PUMP 7	High motorcurrent	1200	2224	3248	7344
Alarm 178:	PUMP 7	Low motorcurrent	1201	2225	3249	7345
Alarm 179:	PUMP 7	Fallen motorprot.	1202	2226	3250	7346
Alarm 180:	PUMP 7	Fallen temp. prot.	1203	2227	3251	7347
Alarm 181:	PUMP 7	Low pump capacity	1204	2228	3252	7348
Alarm 182:	PUMP 7	No run. ind.	1205	2229	3253	7349
Alarm 183:	PUMP 7	Pump ext. blocked.	1206	2230	3254	7350
Alarm 184:	PUMP 7	Error opening valve	1207	2231	3255	7351
Alarm 185:	PUMP 7	Error closing valve	1208	2232	3256	7352
Alarm 186:	PUMP 7	Valve error	1209	2233	3257	7353
Alarm 187:	PUMP 7	Pump block valve	1210	2234	3258	7354
Alarm 188:	PUMP 7	Error motorprot.	1211	2235	3259	7355
Alarm 189:	PUMP 7	Not used	1212	2236	3260	7356
Alarm 190:	PUMP 7	Not used	1213	2237	3261	7357
Alarm 191:	PUMP 7	Not used	1214	2238	3262	7358
Alarm 192:	PUMP 7	Not used	1215	2239	3263	7359

Alarm nr	Alarm group:	Alarm text:	IO-Number	Latch IO	Ackno.IO	Blocked
Alarm 193:	PUMP 8	High motorcurrent	1216	2240	3264	7360
Alarm 194:	PUMP 8	Low motorcurrent	1217	2241	3265	7361
Alarm 195:	PUMP 8	Fallen motorprot.	1218	2242	3266	7362
Alarm 196:	PUMP 8	Fallen temp. prot.	1219	2243	3267	7363
Alarm 197:	PUMP 8	Low pump capacity	1220	2244	3268	7364
Alarm 198:	PUMP 8	No run. ind.	1221	2245	3269	7365
Alarm 199:	PUMP 8	Pump ext. blocked.	1222	2246	3270	7366
Alarm 200:	PUMP 8	Error opening valve	1223	2247	3271	7367
Alarm 201:	PUMP 8	Error closing valve	1224	2248	3272	7368
Alarm 202:	PUMP 8	Valve error	1225	2249	3273	7369
Alarm 203:	PUMP 8	Pump block valve	1226	2250	3274	7370
Alarm 204:	PUMP 8	Error motorprot.	1227	2251	3275	7371
Alarm 205:	PUMP 8	Not used	1228	2252	3276	7372
Alarm 206:	PUMP 8	Not used	1229	2253	3277	7373
Alarm 207:	PUMP 8	Not used	1230	2254	3278	7374
Alarm 208:	PUMP 8	Not used	1231	2255	3279	7375
Alarm 209:	PUMP 9	High motorcurrent	1232	2256	3280	7376
Alarm 210:	PUMP 9	Low motorcurrent	1233	2257	3281	7377
Alarm 211:	PUMP 9	Fallen motorprot.	1234	2258	3282	7378
Alarm 212:	PUMP 9	Fallen temp. prot.	1235	2259	3283	7379
Alarm 213:	PUMP 9	Low pump capacity	1236	2260	3284	7380
Alarm 214:	PUMP 9	No run. ind.	1237	2261	3285	7381
Alarm 215:	PUMP 9	Pump ext. blocked.	1238	2262	3286	7382
Alarm 216:	PUMP 9	Error opening valve	1239	2263	3287	7383
Alarm 217:	PUMP 9	Error closing valve	1240	2264	3288	7384
Alarm 218:	PUMP 9	Valve error	1241	2265	3289	7385
Alarm 219:	PUMP 9	Pump block valve	1242	2266	3290	7386
Alarm 220:	PUMP 9	Error motorprot.	1243	2267	3291	7387
Alarm 221:	PUMP 9	Not used	1244	2268	3292	7388
Alarm 222:	PUMP 9	Not used	1245	2269	3293	7389
Alarm 223:	PUMP 9	Not used	1246	2270	3294	7390
Alarm 224:	PUMP 9	Not used	1247	2271	3295	7391
Alarm 225:	PUMP 10	High motorcurrent	1248	2272	3296	7392
Alarm 226:	PUMP 10	Low motorcurrent	1249	2273	3297	7393
Alarm 227:	PUMP 10	Fallen motorprot.	1250	2274	3298	7394
Alarm 228:	PUMP 10	Fallen temp. prot.	1251	2275	3299	7395
Alarm 229:	PUMP 10	Low pump capacity	1252	2276	3300	7396
Alarm 230:	PUMP 10	No run. ind.	1253	2277	3301	7397
Alarm 231:	PUMP 10	Pump ext. blocked.	1254	2278	3302	7398
Alarm 232:	PUMP 10	Error opening valve	1255	2279	3303	7399
Alarm 233:	PUMP 10	Error closing valve	1256	2280	3304	7400
Alarm 234:	PUMP 10	Valve error	1257	2281	3305	7401
Alarm 235:	PUMP 10	Pump block valve	1258	2282	3306	7402
Alarm 236:	PUMP 10	Error motorprot.	1259	2283	3307	7403
Alarm 237:	PUMP 10	Not used	1260	2284	3308	7404
Alarm 238:	PUMP 10	Not used	1261	2285	3309	7405
Alarm 239:	PUMP 10	Not used	1262	2286	3310	7406
Alarm 240:	PUMP 10	Not used	1263	2287	3311	7407
Alarm 241:	PUMP 11	High motorcurrent	1264	2288	3312	7408
Alarm 242:	PUMP 11	Low motorcurrent	1265	2289	3313	7409
Alarm 243:	PUMP 11	Fallen motorprot.	1266	2290	3314	7410
Alarm 244:	PUMP 11	Fallen temp. prot.	1267	2291	3315	7411
Alarm 245:	PUMP 11	Low pump capacity	1268	2292	3316	7412
Alarm 246:	PUMP 11	No run. ind.	1269	2293	3317	7413
Alarm 247:	PUMP 11	Pump ext. blocked.	1270	2294	3318	7414
Alarm 248:	PUMP 11	Error opening valve	1271	2295	3319	7415
Alarm 249:	PUMP 11	Error closing valve	1272	2296	3320	7416
Alarm 250:	PUMP 11	Valve error	1273	2297	3321	7417
Alarm 251:	PUMP 11	Pump block valve	1274	2298	3322	7418
Alarm 252:	PUMP 11	Error motorprot.	1275	2299	3323	7419
Alarm 253:	PUMP 11	Not used	1276	2300	3324	7420
Alarm 254:	PUMP 11	Not used	1277	2301	3325	7421
Alarm 255:	PUMP 11	Not used	1278	2302	3326	7422
Alarm 256:	PUMP 11	Not used	1279	2303	3327	7423

Alarm nr	Alarm group:	Alarm text:	IO-Number	Latch IO	Ackno.IO	Blocked
Alarm 257:	PUMP 12	High motorcurrent	1280	2304	3328	7424
Alarm 258:	PUMP 12	Low motorcurrent	1281	2305	3329	7425
Alarm 259:	PUMP 12	Fallen motorprot.	1282	2306	3330	7426
Alarm 260:	PUMP 12	Fallen temp. prot.	1283	2307	3331	7427
Alarm 261:	PUMP 12	Low pump capacity	1284	2308	3332	7428
Alarm 262:	PUMP 12	No run. ind.	1285	2309	3333	7429
Alarm 263:	PUMP 12	Pump ext. blocked.	1286	2310	3334	7430
Alarm 264:	PUMP 12	Error opening valve	1287	2311	3335	7431
Alarm 265:	PUMP 12	Error closing valve	1288	2312	3336	7432
Alarm 266:	PUMP 12	Valve error	1289	2313	3337	7433
Alarm 267:	PUMP 12	Pump block valve	1290	2314	3338	7434
Alarm 268:	PUMP 12	Error motorprot.	1291	2315	3339	7435
Alarm 269:	PUMP 12	Not used	1292	2316	3340	7436
Alarm 270:	PUMP 12	Not used	1293	2317	3341	7437
Alarm 271:	PUMP 12	Not used	1294	2318	3342	7438
Alarm 272:	PUMP 12	Not used	1295	2319	3343	7439
Alarm 273:	PUMP 13	High motorcurrent	1296	2320	3344	7440
Alarm 274:	PUMP 13	Low motorcurrent	1297	2321	3345	7441
Alarm 275:	PUMP 13	Fallen motorprot.	1298	2322	3346	7442
Alarm 276:	PUMP 13	Fallen temp. prot.	1299	2323	3347	7443
Alarm 277:	PUMP 13	Low pump capacity	1300	2324	3348	7444
Alarm 278:	PUMP 13	No run. ind.	1301	2325	3349	7445
Alarm 279:	PUMP 13	Pump ext. blocked.	1302	2326	3350	7446
Alarm 280:	PUMP 13	Error opening valve	1303	2327	3351	7447
Alarm 281:	PUMP 13	Error closing valve	1304	2328	3352	7448
Alarm 282:	PUMP 13	Valve error	1305	2329	3353	7449
Alarm 283:	PUMP 13	Pump block valve	1306	2330	3354	7450
Alarm 284:	PUMP 13	Error motorprot.	1307	2331	3355	7451
Alarm 285:	PUMP 13	Not used	1308	2332	3356	7452
Alarm 286:	PUMP 13	Not used	1309	2333	3357	7453
Alarm 287:	PUMP 13	Not used	1310	2334	3358	7454
Alarm 288:	PUMP 13	Not used	1311	2335	3359	7455
Alarm 289:	PUMP 14	High motorcurrent	1312	2336	3360	7456
Alarm 290:	PUMP 14	Low motorcurrent	1313	2337	3361	7457
Alarm 291:	PUMP 14	Fallen motorprot.	1314	2338	3362	7458
Alarm 292:	PUMP 14	Fallen temp. prot.	1315	2339	3363	7459
Alarm 293:	PUMP 14	Low pump capacity	1316	2340	3364	7460
Alarm 294:	PUMP 14	No run. ind.	1317	2341	3365	7461
Alarm 295:	PUMP 14	Pump ext. blocked.	1318	2342	3366	7462
Alarm 296:	PUMP 14	Error opening valve	1319	2343	3367	7463
Alarm 297:	PUMP 14	Error closing valve	1320	2344	3368	7464
Alarm 298:	PUMP 14	Valve error	1321	2345	3369	7465
Alarm 299:	PUMP 14	Pump block valve	1322	2346	3370	7466
Alarm 300:	PUMP 14	Error motorprot.	1323	2347	3371	7467
Alarm 301:	PUMP 14	Not used	1324	2348	3372	7468
Alarm 302:	PUMP 14	Not used	1325	2349	3373	7469
Alarm 303:	PUMP 14	Not used	1326	2350	3374	7470
Alarm 304:	PUMP 14	Not used	1327	2351	3375	7471
Alarm 305:	PUMP 15	High motorcurrent	1328	2352	3376	7472
Alarm 306:	PUMP 15	Low motorcurrent	1329	2353	3377	7473
Alarm 307:	PUMP 15	Fallen motorprot.	1330	2354	3378	7474
Alarm 308:	PUMP 15	Fallen temp. prot.	1331	2355	3379	7475
Alarm 309:	PUMP 15	Low pump capacity	1332	2356	3380	7476
Alarm 310:	PUMP 15	No run. ind.	1333	2357	3381	7477
Alarm 311:	PUMP 15	Pump ext. blocked.	1334	2358	3382	7478
Alarm 312:	PUMP 15	Error opening valve	1335	2359	3383	7479
Alarm 313:	PUMP 15	Error closing valve	1336	2360	3384	7480
Alarm 314:	PUMP 15	Valve error	1337	2361	3385	7481
Alarm 315:	PUMP 15	Pump block valve	1338	2362	3386	7482
Alarm 316:	PUMP 15	Error motorprot.	1339	2363	3387	7483
Alarm 317:	PUMP 15	Not used	1340	2364	3388	7484
Alarm 318:	PUMP 15	Not used	1341	2365	3389	7485
Alarm 319:	PUMP 15	Not used	1342	2366	3390	7486
Alarm 320:	PUMP 15	Not used	1343	2367	3391	7487

Alarm nr	Alarm group:	Alarm text:	IO-Number	Latch IO	Ackno.IO	Blocked
Alarm 321:	PUMP 16	High motorcurrent	1344	2368	3392	7488
Alarm 322:	PUMP 16	Low motorcurrent	1345	2369	3393	7489
Alarm 323:	PUMP 16	Fallen motorprot.	1346	2370	3394	7490
Alarm 324:	PUMP 16	Fallen temp. prot.	1347	2371	3395	7491
Alarm 325:	PUMP 16	Low pump capacity	1348	2372	3396	7492
Alarm 326:	PUMP 16	No run. ind.	1349	2373	3397	7493
Alarm 327:	PUMP 16	Pump ext. blocked.	1350	2374	3398	7494
Alarm 328:	PUMP 16	Error opening valve	1351	2375	3399	7495
Alarm 329:	PUMP 16	Error closing valve	1352	2376	3400	7496
Alarm 330:	PUMP 16	Valve error	1353	2377	3401	7497
Alarm 331:	PUMP 16	Pump block valve	1354	2378	3402	7498
Alarm 332:	PUMP 16	Error motorprot.	1355	2379	3403	7499
Alarm 333:	PUMP 16	Not used	1356	2380	3404	7500
Alarm 334:	PUMP 16	Not used	1357	2381	3405	7501
Alarm 335:	PUMP 16	Not used	1358	2382	3406	7502
Alarm 336:	PUMP 16	Not used	1359	2383	3407	7503
Alarm 337:	HIGH ALARM	High Overflow PP1	1360	2384	3408	7504
Alarm 338:	HIGH ALARM	High Overflow PP2	1361	2385	3409	7505
Alarm 339:	HIGH ALARM	High Overflow PP3	1362	2386	3410	7506
Alarm 340:	HIGH ALARM	High Overflow PP4	1363	2387	3411	7507
Alarm 341:	HIGH ALARM	High Flow FM1	1364	2388	3412	7508
Alarm 342:	HIGH ALARM	High Flow FM2	1365	2389	3413	7509
Alarm 343:	HIGH ALARM	High Flow FM3	1366	2390	3414	7510
Alarm 344:	HIGH ALARM	High Flow FM4	1367	2391	3415	7511
Alarm 345:	HIGH ALARM	HIGH ALARM Puls.ch..1	1368	2392	3416	7512
Alarm 346:	HIGH ALARM	HIGH ALARM Puls.ch..2	1369	2393	3417	7513
Alarm 347:	HIGH ALARM	HIGH ALARM Puls.ch..3	1370	2394	3418	7514
Alarm 348:	HIGH ALARM	HIGH ALARM Puls.ch..4	1371	2395	3419	7515
Alarm 349:	HIGH ALARM	HIGH ALARM Puls.ch..5	1372	2396	3420	7516
Alarm 350:	HIGH ALARM	HIGH ALARM Puls.ch..6	1373	2397	3421	7517
Alarm 351:	HIGH ALARM	HIGH ALARM Puls.ch..7	1374	2398	3422	7518
Alarm 352:	HIGH ALARM	HIGH ALARM Puls.ch..8	1375	2399	3423	7519
Alarm 353:	REM. COM.	Com. err Master ch.1	1376	2400	3424	7520
Alarm 354:	REM. COM.	Err. when calling1	1377	2401	3425	7521
Alarm 355:	REM. COM.	Com. err Master ch.2	1378	2402	3426	7522
Alarm 356:	REM. COM.	Err. when calling2	1379	2403	3427	7523
Alarm 357:	REM. COM.	Com. err Master ch.3	1380	2404	3428	7524
Alarm 358:	REM. COM.	Err. when calling3	1381	2405	3429	7525
Alarm 359:	REM. COM.	Com. err Master ch.4	1382	2406	3430	7526
Alarm 360:	REM. COM.	Err. when calling4	1383	2407	3431	7527
Alarm 361:	REM. COM.	Com. err Master ch.5	1384	2408	3432	7528
Alarm 362:	REM. COM.	Err. when calling5	1385	2409	3433	7529
Alarm 363:	REM. COM.	Com. err Master ch.6	1386	2410	3434	7530
Alarm 364:	REM. COM.	Err. when calling6	1387	2411	3435	7531
Alarm 365:	REM. COM.	Com. err Master ch.7	1388	2412	3436	7532
Alarm 366:	REM. COM.	Err. when calling7	1389	2413	3437	7533
Alarm 367:	REM. COM.	Com. err Master ch.8	1390	2414	3438	7534
Alarm 368:	REM. COM.	Err. when calling8	1391	2415	3439	7535
Alarm 369:	IO MODUL 1	Power failure	1392	2416	3440	7536
Alarm 370:	IO MODUL 1	Low voltage 12V	1393	2417	3441	7537
Alarm 371:	IO MODUL 1	IO module missing	1394	2418	3442	7538
Alarm 372:	IO MODUL 1	AI board 1 missing	1395	2419	3443	7539
Alarm 373:	IO MODUL 1	AI board 2 missing	1396	2420	3444	7540
Alarm 374:	IO MODUL 1	AI board 3 missing	1397	2421	3445	7541
Alarm 375:	IO MODUL 1	AI board 4 missing	1398	2422	3446	7542
Alarm 376:	IO MODUL 1	Not used	1399	2423	3447	7543
Alarm 377:	IO MODUL 1	Not used	1400	2424	3448	7544
Alarm 378:	IO MODUL 1	Not used	1401	2425	3449	7545
Alarm 379:	IO MODUL 1	Not used	1402	2426	3450	7546
Alarm 380:	IO MODUL 1	Not used	1403	2427	3451	7547
Alarm 381:	IO MODUL 1	Not used	1404	2428	3452	7548
Alarm 382:	IO MODUL 1	Not used	1405	2429	3453	7549
Alarm 383:	IO MODUL 1	Not used	1406	2430	3454	7550
Alarm 384:	IO MODUL 1	Not used	1407	2431	3455	7551

Alarm nr	Alarm group:	Alarm text:	IO-Number	Latch IO	Ackno.IO	Blocked
Alarm 385:	DIN 1:1	Actual DI text	1408	2432	3456	7552
Alarm 386:	DIN 1:2	Actual DI text	1409	2433	3457	7553
Alarm 387:	DIN 1:3	Actual DI text	1410	2434	3458	7554
Alarm 388:	DIN 1:4	Actual DI text	1411	2435	3459	7555
Alarm 389:	DIN 1:5	Actual DI text	1412	2436	3460	7556
Alarm 390:	DIN 1:6	Actual DI text	1413	2437	3461	7557
Alarm 391:	DIN 1:7	Actual DI text	1414	2438	3462	7558
Alarm 392:	DIN 1:8	Actual DI text	1415	2439	3463	7559
Alarm 393:	DIN 1:9	Actual DI text	1416	2440	3464	7560
Alarm 394:	DIN 1:10	Actual DI text	1417	2441	3465	7561
Alarm 395:	DIN 1:11	Actual DI text	1418	2442	3466	7562
Alarm 396:	DIN 1:12	Actual DI text	1419	2443	3467	7563
Alarm 397:	DIN 1:13	Actual DI text	1420	2444	3468	7564
Alarm 398:	DIN 1:14	Actual DI text	1421	2445	3469	7565
Alarm 399:	DIN 1:15	Actual DI text	1422	2446	3470	7566
Alarm 400:	DIN 1:16	Actual DI text	1423	2447	3471	7567
Alarm 401:	HA AIN 1:1	Actual AI text	1424	2448	3472	7568
Alarm 402:	LA AIN 1:1	Actual AI text	1425	2449	3473	7569
Alarm 403:	HA AIN 1:2	Actual AI text	1426	2450	3474	7570
Alarm 404:	LA AIN 1:2	Actual AI text	1427	2451	3475	7571
Alarm 405:	HA AIN 1:3	Actual AI text	1428	2452	3476	7572
Alarm 406:	LA AIN 1:3	Actual AI text	1429	2453	3477	7573
Alarm 407:	HA AIN 1:4	Actual AI text	1430	2454	3478	7574
Alarm 408:	LA AIN 1:4	Actual AI text	1431	2455	3479	7575
Alarm 409:	SPARE	Not used	1432	2456	3480	7576
Alarm 410:	SPARE	Not used	1433	2457	3481	7577
Alarm 411:	SPARE	Not used	1434	2458	3482	7578
Alarm 412:	SPARE	Not used	1435	2459	3483	7579
Alarm 413:	SPARE	Not used	1436	2460	3484	7580
Alarm 414:	SPARE	Not used	1437	2461	3485	7581
Alarm 415:	SPARE	Not used	1438	2462	3486	7582
Alarm 416:	SPARE	Not used	1439	2463	3487	7583
Alarm 417:	DO 1:1	Actual DO text	1440	2464	3488	7584
Alarm 418:	DO 1:2	Actual DO text	1441	2465	3489	7585
Alarm 419:	DO 1:3	Actual DO text	1442	2466	3490	7586
Alarm 420:	DO 1:4	Actual DO text	1443	2467	3491	7587
Alarm 421:	DO 1:5	Actual DO text	1444	2468	3492	7588
Alarm 422:	DO 1:6	Actual DO text	1445	2469	3493	7589
Alarm 423:	DO 1:7	Actual DO text	1446	2470	3494	7590
Alarm 424:	DO 1:8	Actual DO text	1447	2471	3495	7591
Alarm 425:	HA AO 1:1	Actual signal text	1448	2472	3496	7592
Alarm 426:	LA AO 1:1	Actual signal text	1449	2473	3497	7593
Alarm 427:	HA AO 1:2	Actual signal text	1450	2474	3498	7594
Alarm 428:	LA AO 1:2	Actual signal text	1451	2475	3499	7595
Alarm 429:	SPARE	Not used	1452	2476	3500	7596
Alarm 430:	SPARE	Not used	1453	2477	3501	7597
Alarm 431:	SPARE	Not used	1454	2478	3502	7598
Alarm 432:	SPARE	Not used	1455	2479	3503	7599
Alarm 433:	IO MODUL 2	Power failure	1456	2480	3504	7600
Alarm 434:	IO MODUL 2	Low voltage 12V	1457	2481	3505	7601
Alarm 435:	IO MODUL 2	IO module missing	1458	2482	3506	7602
Alarm 436:	IO MODUL 2	AI board 1 missing	1459	2483	3507	7603
Alarm 437:	IO MODUL 2	AI board 2 missing	1460	2484	3508	7604
Alarm 438:	IO MODUL 2	AI board 3 missing	1461	2485	3509	7605
Alarm 439:	IO MODUL 2	AI board 4 missing	1462	2486	3510	7606
Alarm 440:	IO MODUL 2	Not used	1463	2487	3511	7607
Alarm 441:	IO MODUL 2	Not used	1464	2488	3512	7608
Alarm 442:	IO MODUL 2	Not used	1465	2489	3513	7609
Alarm 443:	IO MODUL 2	Not used	1466	2490	3514	7610
Alarm 444:	IO MODUL 2	Not used	1467	2491	3515	7611
Alarm 445:	IO MODUL 2	Not used	1468	2492	3516	7612
Alarm 446:	IO MODUL 2	Not used	1469	2493	3517	7613
Alarm 447:	IO MODUL 2	Not used	1470	2494	3518	7614
Alarm 448:	IO MODUL 2	Not used	1471	2495	3519	7615

Alarm nr	Alarm group:	Alarm text:	IO-Number	Latch IO	Ackno.IO	Blocked
Alarm 449:	DIN 2:1	Actual DI text	1472	2496	3520	7616
Alarm 450:	DIN 2:2	Actual DI text	1473	2497	3521	7617
Alarm 451:	DIN 2:3	Actual DI text	1474	2498	3522	7618
Alarm 452:	DIN 2:4	Actual DI text	1475	2499	3523	7619
Alarm 453:	DIN 2:5	Actual DI text	1476	2500	3524	7620
Alarm 454:	DIN 2:6	Actual DI text	1477	2501	3525	7621
Alarm 455:	DIN 2:7	Actual DI text	1478	2502	3526	7622
Alarm 456:	DIN 2:8	Actual DI text	1479	2503	3527	7623
Alarm 457:	DIN 2:9	Actual DI text	1480	2504	3528	7624
Alarm 458:	DIN 2:10	Actual DI text	1481	2505	3529	7625
Alarm 459:	DIN 2:11	Actual DI text	1482	2506	3530	7626
Alarm 460:	DIN 2:12	Actual DI text	1483	2507	3531	7627
Alarm 461:	DIN 2:13	Actual DI text	1484	2508	3532	7628
Alarm 462:	DIN 2:14	Actual DI text	1485	2509	3533	7629
Alarm 463:	DIN 2:15	Actual DI text	1486	2510	3534	7630
Alarm 464:	DIN 2:16	Actual DI text	1487	2511	3535	7631
Alarm 465:	HA AIN 2:1	Actual AI text	1488	2512	3536	7632
Alarm 466:	LA AIN 2:1	Actual AI text	1489	2513	3537	7633
Alarm 467:	HA AIN 2:2	Actual AI text	1490	2514	3538	7634
Alarm 468:	LA AIN 2:2	Actual AI text	1491	2515	3539	7635
Alarm 469:	HA AIN 2:3	Actual AI text	1492	2516	3540	7636
Alarm 470:	LA AIN 2:3	Actual AI text	1493	2517	3541	7637
Alarm 471:	HA AIN 2:4	Actual AI text	1494	2518	3542	7638
Alarm 472:	LA AIN 2:4	Actual AI text	1495	2519	3543	7639
Alarm 473:	SPARE	Not used	1496	2520	3544	7640
Alarm 474:	SPARE	Not used	1497	2521	3545	7641
Alarm 475:	SPARE	Not used	1498	2522	3546	7642
Alarm 476:	SPARE	Not used	1499	2523	3547	7643
Alarm 477:	SPARE	Not used	1500	2524	3548	7644
Alarm 478:	SPARE	Not used	1501	2525	3549	7645
Alarm 479:	SPARE	Not used	1502	2526	3550	7646
Alarm 480:	SPARE	Not used	1503	2527	3551	7647
Alarm 481:	DO 2:1	Actual DO text	1504	2528	3552	7648
Alarm 482:	DO 2:2	Actual DO text	1505	2529	3553	7649
Alarm 483:	DO 2:3	Actual DO text	1506	2530	3554	7650
Alarm 484:	DO 2:4	Actual DO text	1507	2531	3555	7651
Alarm 485:	DO 2:5	Actual DO text	1508	2532	3556	7652
Alarm 486:	DO 2:6	Actual DO text	1509	2533	3557	7653
Alarm 487:	DO 2:7	Actual DO text	1510	2534	3558	7654
Alarm 488:	DO 2:8	Actual DO text	1511	2535	3559	7655
Alarm 489:	HA AO 2:1	Actual signal text	1512	2536	3560	7656
Alarm 490:	LA AO 2:1	Actual signal text	1513	2537	3561	7657
Alarm 491:	HA AO 2:2	Actual signal text	1514	2538	3562	7658
Alarm 492:	LA AO 2:2	Actual signal text	1515	2539	3563	7659
Alarm 493:	SPARE	Not used	1516	2540	3564	7660
Alarm 494:	SPARE	Not used	1517	2541	3565	7661
Alarm 495:	SPARE	Not used	1518	2542	3566	7662
Alarm 496:	SPARE	Not used	1519	2543	3567	7663
Alarm 497:	IO MODUL 3	Power failure	1520	2544	3568	7664
Alarm 498:	IO MODUL 3	Low voltage 12V	1521	2545	3569	7665
Alarm 499:	IO MODUL 3	IO module missing	1522	2546	3570	7666
Alarm 500:	IO MODUL 3	AI board 1 missing	1523	2547	3571	7667
Alarm 501:	IO MODUL 3	AI board 2 missing	1524	2548	3572	7668
Alarm 502:	IO MODUL 3	AI board 3 missing	1525	2549	3573	7669
Alarm 503:	IO MODUL 3	AI board 4 missing	1526	2550	3574	7670
Alarm 504:	IO MODUL 3	Not used	1527	2551	3575	7671
Alarm 505:	IO MODUL 3	Not used	1528	2552	3576	7672
Alarm 506:	IO MODUL 3	Not used	1529	2553	3577	7673
Alarm 507:	IO MODUL 3	Not used	1530	2554	3578	7674
Alarm 508:	IO MODUL 3	Not used	1531	2555	3579	7675
Alarm 509:	IO MODUL 3	Not used	1532	2556	3580	7676
Alarm 510:	IO MODUL 3	Not used	1533	2557	3581	7677
Alarm 511:	IO MODUL 3	Not used	1534	2558	3582	7678
Alarm 512:	IO MODUL 3	Not used	1535	2559	3583	7679

Alarm nr	Alarm group:	Alarm text:	IO-Number	Latch IO	Ackno.IO	Blocked
Alarm 513:	DIN 3:1	Actual DI text	1536	2560	3584	7680
Alarm 514:	DIN 3:2	Actual DI text	1537	2561	3585	7681
Alarm 515:	DIN 3:3	Actual DI text	1538	2562	3586	7682
Alarm 516:	DIN 3:4	Actual DI text	1539	2563	3587	7683
Alarm 517:	DIN 3:5	Actual DI text	1540	2564	3588	7684
Alarm 518:	DIN 3:6	Actual DI text	1541	2565	3589	7685
Alarm 519:	DIN 3:7	Actual DI text	1542	2566	3590	7686
Alarm 520:	DIN 3:8	Actual DI text	1543	2567	3591	7687
Alarm 521:	DIN 3:9	Actual DI text	1544	2568	3592	7688
Alarm 522:	DIN 3:10	Actual DI text	1545	2569	3593	7689
Alarm 523:	DIN 3:11	Actual DI text	1546	2570	3594	7690
Alarm 524:	DIN 3:12	Actual DI text	1547	2571	3595	7691
Alarm 525:	DIN 3:13	Actual DI text	1548	2572	3596	7692
Alarm 526:	DIN 3:14	Actual DI text	1549	2573	3597	7693
Alarm 527:	DIN 3:15	Actual DI text	1550	2574	3598	7694
Alarm 528:	DIN 3:16	Actual DI text	1551	2575	3599	7695
Alarm 529:	HA AIN 3:1	Actual AI text	1552	2576	3600	7696
Alarm 530:	LA AIN 3:1	Actual AI text	1553	2577	3601	7697
Alarm 531:	HA AIN 3:2	Actual AI text	1554	2578	3602	7698
Alarm 532:	LA AIN 3:2	Actual AI text	1555	2579	3603	7699
Alarm 533:	HA AIN 3:3	Actual AI text	1556	2580	3604	7700
Alarm 534:	LA AIN 3:3	Actual AI text	1557	2581	3605	7701
Alarm 535:	HA AIN 3:4	Actual AI text	1558	2582	3606	7702
Alarm 536:	LA AIN 3:4	Actual AI text	1559	2583	3607	7703
Alarm 537:	SPARE	Not used	1560	2584	3608	7704
Alarm 538:	SPARE	Not used	1561	2585	3609	7705
Alarm 539:	SPARE	Not used	1562	2586	3610	7706
Alarm 540:	SPARE	Not used	1563	2587	3611	7707
Alarm 541:	SPARE	Not used	1564	2588	3612	7708
Alarm 542:	SPARE	Not used	1565	2589	3613	7709
Alarm 543:	SPARE	Not used	1566	2590	3614	7710
Alarm 544:	SPARE	Not used	1567	2591	3615	7711
Alarm 545:	DO 3:1	Actual DO text	1568	2592	3616	7712
Alarm 546:	DO 3:2	Actual DO text	1569	2593	3617	7713
Alarm 547:	DO 3:3	Actual DO text	1570	2594	3618	7714
Alarm 548:	DO 3:4	Actual DO text	1571	2595	3619	7715
Alarm 549:	DO 3:5	Actual DO text	1572	2596	3620	7716
Alarm 550:	DO 3:6	Actual DO text	1573	2597	3621	7717
Alarm 551:	DO 3:7	Actual DO text	1574	2598	3622	7718
Alarm 552:	DO 3:8	Actual DO text	1575	2599	3623	7719
Alarm 553:	HA AO 3:1	Actual signal text	1576	2600	3624	7720
Alarm 554:	LA AO 3:1	Actual signal text	1577	2601	3625	7721
Alarm 555:	HA AO 3:2	Actual signal text	1578	2602	3626	7722
Alarm 556:	LA AO 3:2	Actual signal text	1579	2603	3627	7723
Alarm 557:	SPARE	Not used	1580	2604	3628	7724
Alarm 558:	SPARE	Not used	1581	2605	3629	7725
Alarm 559:	SPARE	Not used	1582	2606	3630	7726
Alarm 560:	SPARE	Not used	1583	2607	3631	7727
Alarm 561:	IO MODUL 4	Power failure	1584	2608	3632	7728
Alarm 562:	IO MODUL 4	Low voltage 12V	1585	2609	3633	7729
Alarm 563:	IO MODUL 4	IO module missing	1586	2610	3634	7730
Alarm 564:	IO MODUL 4	AI board 1 missing	1587	2611	3635	7731
Alarm 565:	IO MODUL 4	AI board 2 missing	1588	2612	3636	7732
Alarm 566:	IO MODUL 4	AI board 3 missing	1589	2613	3637	7733
Alarm 567:	IO MODUL 4	AI board 4 missing	1590	2614	3638	7734
Alarm 568:	IO MODUL 4	Not used	1591	2615	3639	7735
Alarm 569:	IO MODUL 4	Not used	1592	2616	3640	7736
Alarm 570:	IO MODUL 4	Not used	1593	2617	3641	7737
Alarm 571:	IO MODUL 4	Not used	1594	2618	3642	7738
Alarm 572:	IO MODUL 4	Not used	1595	2619	3643	7739
Alarm 573:	IO MODUL 4	Not used	1596	2620	3644	7740
Alarm 574:	IO MODUL 4	Not used	1597	2621	3645	7741
Alarm 575:	IO MODUL 4	Not used	1598	2622	3646	7742
Alarm 576:	IO MODUL 4	Not used	1599	2623	3647	7743

Alarm nr	Alarm group:	Alarm text:	IO-Number	Latch IO	Ackno.IO	Blocked
Alarm 577:	DIN 4:1	Actual DI text	1600	2624	3648	7744
Alarm 578:	DIN 4:2	Actual DI text	1601	2625	3649	7745
Alarm 579:	DIN 4:3	Actual DI text	1602	2626	3650	7746
Alarm 580:	DIN 4:4	Actual DI text	1603	2627	3651	7747
Alarm 581:	DIN 4:5	Actual DI text	1604	2628	3652	7748
Alarm 582:	DIN 4:6	Actual DI text	1605	2629	3653	7749
Alarm 583:	DIN 4:7	Actual DI text	1606	2630	3654	7750
Alarm 584:	DIN 4:8	Actual DI text	1607	2631	3655	7751
Alarm 585:	DIN 4:9	Actual DI text	1608	2632	3656	7752
Alarm 586:	DIN 4:10	Actual DI text	1609	2633	3657	7753
Alarm 587:	DIN 4:11	Actual DI text	1610	2634	3658	7754
Alarm 588:	DIN 4:12	Actual DI text	1611	2635	3659	7755
Alarm 589:	DIN 4:13	Actual DI text	1612	2636	3660	7756
Alarm 590:	DIN 4:14	Actual DI text	1613	2637	3661	7757
Alarm 591:	DIN 4:15	Actual DI text	1614	2638	3662	7758
Alarm 592:	DIN 4:16	Actual DI text	1615	2639	3663	7759
Alarm 593:	HA AIN 4:1	Actual AI text	1616	2640	3664	7760
Alarm 594:	LA AIN 4:1	Actual AI text	1617	2641	3665	7761
Alarm 595:	HA AIN 4:2	Actual AI text	1618	2642	3666	7762
Alarm 596:	LA AIN 4:2	Actual AI text	1619	2643	3667	7763
Alarm 597:	HA AIN 4:3	Actual AI text	1620	2644	3668	7764
Alarm 598:	LA AIN 4:3	Actual AI text	1621	2645	3669	7765
Alarm 599:	HA AIN 4:4	Actual AI text	1622	2646	3670	7766
Alarm 600:	LA AIN 4:4	Actual AI text	1623	2647	3671	7767
Alarm 601:	SPARE	Not used	1624	2648	3672	7768
Alarm 602:	SPARE	Not used	1625	2649	3673	7769
Alarm 603:	SPARE	Not used	1626	2650	3674	7770
Alarm 604:	SPARE	Not used	1627	2651	3675	7771
Alarm 605:	SPARE	Not used	1628	2652	3676	7772
Alarm 606:	SPARE	Not used	1629	2653	3677	7773
Alarm 607:	SPARE	Not used	1630	2654	3678	7774
Alarm 608:	SPARE	Not used	1631	2655	3679	7775
Alarm 609:	DO 4:1	Actual DO text	1632	2656	3680	7776
Alarm 610:	DO 4:2	Actual DO text	1633	2657	3681	7777
Alarm 611:	DO 4:3	Actual DO text	1634	2658	3682	7778
Alarm 612:	DO 4:4	Actual DO text	1635	2659	3683	7779
Alarm 613:	DO 4:5	Actual DO text	1636	2660	3684	7780
Alarm 614:	DO 4:6	Actual DO text	1637	2661	3685	7781
Alarm 615:	DO 4:7	Actual DO text	1638	2662	3686	7782
Alarm 616:	DO 4:8	Actual DO text	1639	2663	3687	7783
Alarm 617:	HA AO 4:1	Actual signal text	1640	2664	3688	7784
Alarm 618:	LA AO 4:1	Actual signal text	1641	2665	3689	7785
Alarm 619:	HA AO 4:2	Actual signal text	1642	2666	3690	7786
Alarm 620:	LA AO 4:2	Actual signal text	1643	2667	3691	7787
Alarm 621:	SPARE	Not used	1644	2668	3692	7788
Alarm 622:	SPARE	Not used	1645	2669	3693	7789
Alarm 623:	SPARE	Not used	1646	2670	3694	7790
Alarm 624:	SPARE	Not used	1647	2671	3695	7791
Alarm 625:	IO MODUL 5	Power failure	1648	2672	3696	7792
Alarm 626:	IO MODUL 5	Low voltage 12V	1649	2673	3697	7793
Alarm 627:	IO MODUL 5	IO module missing	1650	2674	3698	7794
Alarm 628:	IO MODUL 5	AI board 1 missing	1651	2675	3699	7795
Alarm 629:	IO MODUL 5	AI board 2 missing	1652	2676	3700	7796
Alarm 630:	IO MODUL 5	AI board 3 missing	1653	2677	3701	7797
Alarm 631:	IO MODUL 5	AI board 4 missing	1654	2678	3702	7798
Alarm 632:	IO MODUL 5	Not used	1655	2679	3703	7799
Alarm 633:	IO MODUL 5	Not used	1656	2680	3704	7800
Alarm 634:	IO MODUL 5	Not used	1657	2681	3705	7801
Alarm 635:	IO MODUL 5	Not used	1658	2682	3706	7802
Alarm 636:	IO MODUL 5	Not used	1659	2683	3707	7803
Alarm 637:	IO MODUL 5	Not used	1660	2684	3708	7804
Alarm 638:	IO MODUL 5	Not used	1661	2685	3709	7805
Alarm 639:	IO MODUL 5	Not used	1662	2686	3710	7806
Alarm 640:	IO MODUL 5	Not used	1663	2687	3711	7807

Alarm nr	Alarm group:	Alarm text:	IO-Number	Latch IO	Ackno.IO	Blocked
Alarm 641:	DIN 5:1	Actual DI text	1664	2688	3712	7808
Alarm 642:	DIN 5:2	Actual DI text	1665	2689	3713	7809
Alarm 643:	DIN 5:3	Actual DI text	1666	2690	3714	7810
Alarm 644:	DIN 5:4	Actual DI text	1667	2691	3715	7811
Alarm 645:	DIN 5:5	Actual DI text	1668	2692	3716	7812
Alarm 646:	DIN 5:6	Actual DI text	1669	2693	3717	7813
Alarm 647:	DIN 5:7	Actual DI text	1670	2694	3718	7814
Alarm 648:	DIN 5:8	Actual DI text	1671	2695	3719	7815
Alarm 649:	DIN 5:9	Actual DI text	1672	2696	3720	7816
Alarm 650:	DIN 5:10	Actual DI text	1673	2697	3721	7817
Alarm 651:	DIN 5:11	Actual DI text	1674	2698	3722	7818
Alarm 652:	DIN 5:12	Actual DI text	1675	2699	3723	7819
Alarm 653:	DIN 5:13	Actual DI text	1676	2700	3724	7820
Alarm 654:	DIN 5:14	Actual DI text	1677	2701	3725	7821
Alarm 655:	DIN 5:15	Actual DI text	1678	2702	3726	7822
Alarm 656:	DIN 5:16	Actual DI text	1679	2703	3727	7823
Alarm 657:	HA AIN 5:1	Actual AI text	1680	2704	3728	7824
Alarm 658:	LA AIN 5:1	Actual AI text	1681	2705	3729	7825
Alarm 659:	HA AIN 5:2	Actual AI text	1682	2706	3730	7826
Alarm 660:	LA AIN 5:2	Actual AI text	1683	2707	3731	7827
Alarm 661:	HA AIN 5:3	Actual AI text	1684	2708	3732	7828
Alarm 662:	LA AIN 5:3	Actual AI text	1685	2709	3733	7829
Alarm 663:	HA AIN 5:4	Actual AI text	1686	2710	3734	7830
Alarm 664:	LA AIN 5:4	Actual AI text	1687	2711	3735	7831
Alarm 665:	SPARE	Not used	1688	2712	3736	7832
Alarm 666:	SPARE	Not used	1689	2713	3737	7833
Alarm 667:	SPARE	Not used	1690	2714	3738	7834
Alarm 668:	SPARE	Not used	1691	2715	3739	7835
Alarm 669:	SPARE	Not used	1692	2716	3740	7836
Alarm 670:	SPARE	Not used	1693	2717	3741	7837
Alarm 671:	SPARE	Not used	1694	2718	3742	7838
Alarm 672:	SPARE	Not used	1695	2719	3743	7839
Alarm 673:	DO 5:1	Actual DO text	1696	2720	3744	7840
Alarm 674:	DO 5:2	Actual DO text	1697	2721	3745	7841
Alarm 675:	DO 5:3	Actual DO text	1698	2722	3746	7842
Alarm 676:	DO 5:4	Actual DO text	1699	2723	3747	7843
Alarm 677:	DO 5:5	Actual DO text	1700	2724	3748	7844
Alarm 678:	DO 5:6	Actual DO text	1701	2725	3749	7845
Alarm 679:	DO 5:7	Actual DO text	1702	2726	3750	7846
Alarm 680:	DO 5:8	Actual DO text	1703	2727	3751	7847
Alarm 681:	HA AO 5:1	Actual signal text	1704	2728	3752	7848
Alarm 682:	LA AO 5:1	Actual signal text	1705	2729	3753	7849
Alarm 683:	HA AO 5:2	Actual signal text	1706	2730	3754	7850
Alarm 684:	LA AO 5:2	Actual signal text	1707	2731	3755	7851
Alarm 685:	SPARE	Not used	1708	2732	3756	7852
Alarm 686:	SPARE	Not used	1709	2733	3757	7853
Alarm 687:	SPARE	Not used	1710	2734	3758	7854
Alarm 688:	SPARE	Not used	1711	2735	3759	7855
Alarm 689:	IO MODUL 6	Power failure	1712	2736	3760	7856
Alarm 690:	IO MODUL 6	Low voltage 12V	1713	2737	3761	7857
Alarm 691:	IO MODUL 6	IO module missing	1714	2738	3762	7858
Alarm 692:	IO MODUL 6	AI board 1 missing	1715	2739	3763	7859
Alarm 693:	IO MODUL 6	AI board 2 missing	1716	2740	3764	7860
Alarm 694:	IO MODUL 6	AI board 3 missing	1717	2741	3765	7861
Alarm 695:	IO MODUL 6	AI board 4 missing	1718	2742	3766	7862
Alarm 696:	IO MODUL 6	Not used	1719	2743	3767	7863
Alarm 697:	IO MODUL 6	Not used	1720	2744	3768	7864
Alarm 698:	IO MODUL 6	Not used	1721	2745	3769	7865
Alarm 699:	IO MODUL 6	Not used	1722	2746	3770	7866
Alarm 700:	IO MODUL 6	Not used	1723	2747	3771	7867
Alarm 701:	IO MODUL 6	Not used	1724	2748	3772	7868
Alarm 702:	IO MODUL 6	Not used	1725	2749	3773	7869
Alarm 703:	IO MODUL 6	Not used	1726	2750	3774	7870
Alarm 704:	IO MODUL 6	Not used	1727	2751	3775	7871

Alarm nr	Alarm group:	Alarm text:	IO-Number	Latch IO	Ackno.IO	Blocked
Alarm 705:	DIN 6:1	Actual DI text	1728	2752	3776	7872
Alarm 706:	DIN 6:2	Actual DI text	1729	2753	3777	7873
Alarm 707:	DIN 6:3	Actual DI text	1730	2754	3778	7874
Alarm 708:	DIN 6:4	Actual DI text	1731	2755	3779	7875
Alarm 709:	DIN 6:5	Actual DI text	1732	2756	3780	7876
Alarm 710:	DIN 6:6	Actual DI text	1733	2757	3781	7877
Alarm 711:	DIN 6:7	Actual DI text	1734	2758	3782	7878
Alarm 712:	DIN 6:8	Actual DI text	1735	2759	3783	7879
Alarm 713:	DIN 6:9	Actual DI text	1736	2760	3784	7880
Alarm 714:	DIN 6:10	Actual DI text	1737	2761	3785	7881
Alarm 715:	DIN 6:11	Actual DI text	1738	2762	3786	7882
Alarm 716:	DIN 6:12	Actual DI text	1739	2763	3787	7883
Alarm 717:	DIN 6:13	Actual DI text	1740	2764	3788	7884
Alarm 718:	DIN 6:14	Actual DI text	1741	2765	3789	7885
Alarm 719:	DIN 6:15	Actual DI text	1742	2766	3790	7886
Alarm 720:	DIN 6:16	Actual DI text	1743	2767	3791	7887
Alarm 721:	HA AIN 6:1	Actual AI text	1744	2768	3792	7888
Alarm 722:	LA AIN 6:1	Actual AI text	1745	2769	3793	7889
Alarm 723:	HA AIN 6:2	Actual AI text	1746	2770	3794	7890
Alarm 724:	LA AIN 6:2	Actual AI text	1747	2771	3795	7891
Alarm 725:	HA AIN 6:3	Actual AI text	1748	2772	3796	7892
Alarm 726:	LA AIN 6:3	Actual AI text	1749	2773	3797	7893
Alarm 727:	HA AIN 6:4	Actual AI text	1750	2774	3798	7894
Alarm 728:	LA AIN 6:4	Actual AI text	1751	2775	3799	7895
Alarm 729:	SPARE	Not used	1752	2776	3800	7896
Alarm 730:	SPARE	Not used	1753	2777	3801	7897
Alarm 731:	SPARE	Not used	1754	2778	3802	7898
Alarm 732:	SPARE	Not used	1755	2779	3803	7899
Alarm 733:	SPARE	Not used	1756	2780	3804	7900
Alarm 734:	SPARE	Not used	1757	2781	3805	7901
Alarm 735:	SPARE	Not used	1758	2782	3806	7902
Alarm 736:	SPARE	Not used	1759	2783	3807	7903
Alarm 737:	DO 6:1	Actual DO text	1760	2784	3808	7904
Alarm 738:	DO 6:2	Actual DO text	1761	2785	3809	7905
Alarm 739:	DO 6:3	Actual DO text	1762	2786	3810	7906
Alarm 740:	DO 6:4	Actual DO text	1763	2787	3811	7907
Alarm 741:	DO 6:5	Actual DO text	1764	2788	3812	7908
Alarm 742:	DO 6:6	Actual DO text	1765	2789	3813	7909
Alarm 743:	DO 6:7	Actual DO text	1766	2790	3814	7910
Alarm 744:	DO 6:8	Actual DO text	1767	2791	3815	7911
Alarm 745:	HA AO 6:1	Actual signal text	1768	2792	3816	7912
Alarm 746:	LA AO 6:1	Actual signal text	1769	2793	3817	7913
Alarm 747:	HA AO 6:2	Actual signal text	1770	2794	3818	7914
Alarm 748:	LA AO 6:2	Actual signal text	1771	2795	3819	7915
Alarm 749:	SPARE	Not used	1772	2796	3820	7916
Alarm 750:	SPARE	Not used	1773	2797	3821	7917
Alarm 751:	SPARE	Not used	1774	2798	3822	7918
Alarm 752:	SPARE	Not used	1775	2799	3823	7919
Alarm 753:	IO MODUL 7	Power failure	1776	2800	3824	7920
Alarm 754:	IO MODUL 7	Low voltage 12V	1777	2801	3825	7921
Alarm 755:	IO MODUL 7	IO module missing	1778	2802	3826	7922
Alarm 756:	IO MODUL 7	AI board 1 missing	1779	2803	3827	7923
Alarm 757:	IO MODUL 7	AI board 2 missing	1780	2804	3828	7924
Alarm 758:	IO MODUL 7	AI board 3 missing	1781	2805	3829	7925
Alarm 759:	IO MODUL 7	AI board 4 missing	1782	2806	3830	7926
Alarm 760:	IO MODUL 7	Not used	1783	2807	3831	7927
Alarm 761:	IO MODUL 7	Not used	1784	2808	3832	7928
Alarm 762:	IO MODUL 7	Not used	1785	2809	3833	7929
Alarm 763:	IO MODUL 7	Not used	1786	2810	3834	7930
Alarm 764:	IO MODUL 7	Not used	1787	2811	3835	7931
Alarm 765:	IO MODUL 7	Not used	1788	2812	3836	7932
Alarm 766:	IO MODUL 7	Not used	1789	2813	3837	7933
Alarm 767:	IO MODUL 7	Not used	1790	2814	3838	7934
Alarm 768:	IO MODUL 7	Not used	1791	2815	3839	7935

Alarm nr	Alarm group:	Alarm text:	IO-Number	Latch IO	Ackno.IO	Blocked
Alarm 769:	DIN 7:1	Actual DI text	1792	2816	3840	7936
Alarm 770:	DIN 7:2	Actual DI text	1793	2817	3841	7937
Alarm 771:	DIN 7:3	Actual DI text	1794	2818	3842	7938
Alarm 772:	DIN 7:4	Actual DI text	1795	2819	3843	7939
Alarm 773:	DIN 7:5	Actual DI text	1796	2820	3844	7940
Alarm 774:	DIN 7:6	Actual DI text	1797	2821	3845	7941
Alarm 775:	DIN 7:7	Actual DI text	1798	2822	3846	7942
Alarm 776:	DIN 7:8	Actual DI text	1799	2823	3847	7943
Alarm 777:	DIN 7:9	Actual DI text	1800	2824	3848	7944
Alarm 778:	DIN 7:10	Actual DI text	1801	2825	3849	7945
Alarm 779:	DIN 7:11	Actual DI text	1802	2826	3850	7946
Alarm 780:	DIN 7:12	Actual DI text	1803	2827	3851	7947
Alarm 781:	DIN 7:13	Actual DI text	1804	2828	3852	7948
Alarm 782:	DIN 7:14	Actual DI text	1805	2829	3853	7949
Alarm 783:	DIN 7:15	Actual DI text	1806	2830	3854	7950
Alarm 784:	DIN 7:16	Actual DI text	1807	2831	3855	7951
Alarm 785:	HA AIN 7:1	Actual AI text	1808	2832	3856	7952
Alarm 786:	LA AIN 7:1	Actual AI text	1809	2833	3857	7953
Alarm 787:	HA AIN 7:2	Actual AI text	1810	2834	3858	7954
Alarm 788:	LA AIN 7:2	Actual AI text	1811	2835	3859	7955
Alarm 789:	HA AIN 7:3	Actual AI text	1812	2836	3860	7956
Alarm 790:	LA AIN 7:3	Actual AI text	1813	2837	3861	7957
Alarm 791:	HA AIN 7:4	Actual AI text	1814	2838	3862	7958
Alarm 792:	LA AIN 7:4	Actual AI text	1815	2839	3863	7959
Alarm 793:	SPARE	Not used	1816	2840	3864	7960
Alarm 794:	SPARE	Not used	1817	2841	3865	7961
Alarm 795:	SPARE	Not used	1818	2842	3866	7962
Alarm 796:	SPARE	Not used	1819	2843	3867	7963
Alarm 797:	SPARE	Not used	1820	2844	3868	7964
Alarm 798:	SPARE	Not used	1821	2845	3869	7965
Alarm 799:	SPARE	Not used	1822	2846	3870	7966
Alarm 800:	SPARE	Not used	1823	2847	3871	7967
Alarm 801:	DO 7:1	Actual DO text	1824	2848	3872	7968
Alarm 802:	DO 7:2	Actual DO text	1825	2849	3873	7969
Alarm 803:	DO 7:3	Actual DO text	1826	2850	3874	7970
Alarm 804:	DO 7:4	Actual DO text	1827	2851	3875	7971
Alarm 805:	DO 7:5	Actual DO text	1828	2852	3876	7972
Alarm 806:	DO 7:6	Actual DO text	1829	2853	3877	7973
Alarm 807:	DO 7:7	Actual DO text	1830	2854	3878	7974
Alarm 808:	DO 7:8	Actual DO text	1831	2855	3879	7975
Alarm 809:	HA AO 7:1	Actual signal text	1832	2856	3880	7976
Alarm 810:	LA AO 7:1	Actual signal text	1833	2857	3881	7977
Alarm 811:	HA AO 7:2	Actual signal text	1834	2858	3882	7978
Alarm 812:	LA AO 7:2	Actual signal text	1835	2859	3883	7979
Alarm 813:	SPARE	Not used	1836	2860	3884	7980
Alarm 814:	SPARE	Not used	1837	2861	3885	7981
Alarm 815:	SPARE	Not used	1838	2862	3886	7982
Alarm 816:	SPARE	Not used	1839	2863	3887	7983
Alarm 817:	IO MODUL 8	Power failure	1840	2864	3888	7984
Alarm 818:	IO MODUL 8	Low voltage 12V	1841	2865	3889	7985
Alarm 819:	IO MODUL 8	IO module missing	1842	2866	3890	7986
Alarm 820:	IO MODUL 8	AI board 1 missing	1843	2867	3891	7987
Alarm 821:	IO MODUL 8	AI board 2 missing	1844	2868	3892	7988
Alarm 822:	IO MODUL 8	AI board 3 missing	1845	2869	3893	7989
Alarm 823:	IO MODUL 8	AI board 4 missing	1846	2870	3894	7990
Alarm 824:	IO MODUL 8	Not used	1847	2871	3895	7991
Alarm 825:	IO MODUL 8	Not used	1848	2872	3896	7992
Alarm 826:	IO MODUL 8	Not used	1849	2873	3897	7993
Alarm 827:	IO MODUL 8	Not used	1850	2874	3898	7994
Alarm 828:	IO MODUL 8	Not used	1851	2875	3899	7995
Alarm 829:	IO MODUL 8	Not used	1852	2876	3900	7996
Alarm 830:	IO MODUL 8	Not used	1853	2877	3901	7997
Alarm 831:	IO MODUL 8	Not used	1854	2878	3902	7998
Alarm 832:	IO MODUL 8	Not used	1855	2879	3903	7999

Alarm nr	Alarm group:	Alarm text:	IO-Number	Latch IO	Ackno.IO	Blocked
Alarm 833:	DIN 8:1	Actual DI text	1856	2880	3904	8000
Alarm 834:	DIN 8:2	Actual DI text	1857	2881	3905	8001
Alarm 835:	DIN 8:3	Actual DI text	1858	2882	3906	8002
Alarm 836:	DIN 8:4	Actual DI text	1859	2883	3907	8003
Alarm 837:	DIN 8:5	Actual DI text	1860	2884	3908	8004
Alarm 838:	DIN 8:6	Actual DI text	1861	2885	3909	8005
Alarm 839:	DIN 8:7	Actual DI text	1862	2886	3910	8006
Alarm 840:	DIN 8:8	Actual DI text	1863	2887	3911	8007
Alarm 841:	DIN 8:9	Actual DI text	1864	2888	3912	8008
Alarm 842:	DIN 8:10	Actual DI text	1865	2889	3913	8009
Alarm 843:	DIN 8:11	Actual DI text	1866	2890	3914	8010
Alarm 844:	DIN 8:12	Actual DI text	1867	2891	3915	8011
Alarm 845:	DIN 8:13	Actual DI text	1868	2892	3916	8012
Alarm 846:	DIN 8:14	Actual DI text	1869	2893	3917	8013
Alarm 847:	DIN 8:15	Actual DI text	1870	2894	3918	8014
Alarm 848:	DIN 8:16	Actual DI text	1871	2895	3919	8015
Alarm 849:	HA AIN 8:1	Actual AI text	1872	2896	3920	8016
Alarm 850:	LA AIN 8:1	Actual AI text	1873	2897	3921	8017
Alarm 851:	HA AIN 8:2	Actual AI text	1874	2898	3922	8018
Alarm 852:	LA AIN 8:2	Actual AI text	1875	2899	3923	8019
Alarm 853:	HA AIN 8:3	Actual AI text	1876	2900	3924	8020
Alarm 854:	LA AIN 8:3	Actual AI text	1877	2901	3925	8021
Alarm 855:	HA AIN 8:4	Actual AI text	1878	2902	3926	8022
Alarm 856:	LA AIN 8:4	Actual AI text	1879	2903	3927	8023
Alarm 857:	SPARE	Not used	1880	2904	3928	8024
Alarm 858:	SPARE	Not used	1881	2905	3929	8025
Alarm 859:	SPARE	Not used	1882	2906	3930	8026
Alarm 860:	SPARE	Not used	1883	2907	3931	8027
Alarm 861:	SPARE	Not used	1884	2908	3932	8028
Alarm 862:	SPARE	Not used	1885	2909	3933	8029
Alarm 863:	SPARE	Not used	1886	2910	3934	8030
Alarm 864:	SPARE	Not used	1887	2911	3935	8031
Alarm 865:	DO 8:1	Actual DO text	1888	2912	3936	8032
Alarm 866:	DO 8:2	Actual DO text	1889	2913	3937	8033
Alarm 867:	DO 8:3	Actual DO text	1890	2914	3938	8034
Alarm 868:	DO 8:4	Actual DO text	1891	2915	3939	8035
Alarm 869:	DO 8:5	Actual DO text	1892	2916	3940	8036
Alarm 870:	DO 8:6	Actual DO text	1893	2917	3941	8037
Alarm 871:	DO 8:7	Actual DO text	1894	2918	3942	8038
Alarm 872:	DO 8:8	Actual DO text	1895	2919	3943	8039
Alarm 873:	HA AO 8:1	Actual signal text	1896	2920	3944	8040
Alarm 874:	LA AO 8:1	Actual signal text	1897	2921	3945	8041
Alarm 875:	HA AO 8:2	Actual signal text	1898	2922	3946	8042
Alarm 876:	LA AO 8:2	Actual signal text	1899	2923	3947	8043
Alarm 877:	SPARE	Not used	1900	2924	3948	8044
Alarm 878:	SPARE	Not used	1901	2925	3949	8045
Alarm 879:	SPARE	Not used	1902	2926	3950	8046
Alarm 880:	SPARE	Not used	1903	2927	3951	8047

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