User manual

CLC 200 En

Flygt

ITT Industries
Engineered for life

ITT Flygt AB
Box 2058
S-291 02 Kristianstad
Sweden

Tel +46 44 20 59 00

2005-12-09

Part.no 40_501291

This document may change without any further notice.

Contents

1 Introduction

This manual is general for the global standard family. Note that some paragraphs are specific for special programs. These paragraphs have a “program note” after the headline or within the text. The pictures are only examples and most of them are on a FMC200.

FMC is ITT Flygt’s remote terminal unit (RTU) for the control and supervision of wastewater pumping stations equipped with one or more pumps. The RTU incorporates a powerful 32-bit processor, data memory, program memory, alarm panel, display and level transmitter. The RTU can be equipped with modems and a separate battery backup supply as options.

The RTU is equipped with parameter-controlled functions for pump control, alarm functions, operating statistics, performance monitoring and communications with the central system and/or Paging system.

1.1 Channels

The control parameters and the alarms are shown on a display on the front panel. The pushbuttons on the panel are used to select different channels and to enter or change parameter values.

The channels are grouped according to function. The first channel in each group serves also as a group header.

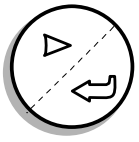
There are three levels of channels:

- User channels for reading the operating data. These channels are always visible.
- Parameter channels for entering or changing the parameter values.
- Service channels for the basic settings carried out by the service personnel.

The pushbuttons are used to change from one channel to the next or from one group to another. See 1.2 "Viewing a channel".

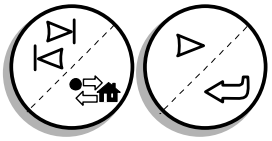
A = Pump status LED
B = Start signal LED
C = Display
D = Push buttons
E = Power in LED

1.2 Viewing a channel

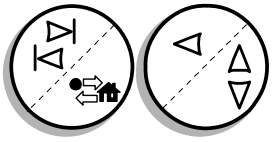


To advance one channel at a time, press and release the Right arrow /Enter button repeatedly until the desired channel is displayed.

Use the Left arrow/Up-Down button in similar manner to scroll backwards.



Press this two buttons to step forward to next channel group.



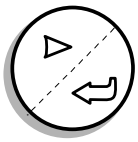
Press this two buttons to step backwards in the channel group.

Press and release the Step group/Shift button to change from the ALARM LOG channel (“Home”) to the latest shown channel.

1.3 Changing a parameter

Channels are a central concept in the RTU. The channel values can be read out or altered. Every RTU in the FMC family is provided with a display consisting of two lines of 16 characters each.

The RTU may be set to either the Read or Write mode. Read is used to obtain a readout of the values in the various channels. To alter a value, select the Write mode.

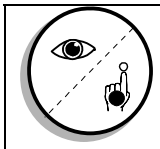
Button	Read mode	Write mode
 **Read/write**	Used to enter the write mode. LED is extinguished in Read mode.	Used to abort changes and enter read mode. LED is turned on in Write mode.
 **Left arrow / Increase or decrease**	Used to step backward to the previous channel in the list or together with the Shift button to step to the previous channel group.	Used to increase the selected value or together with the Shift button to decrease the selected value.
 **Right arrow / Enter**	Used to step forward to the next channel in the list or together with the Shift button to step to the next channel group.	Used to step to the right in the display window and to save specified values or with the Shift button to step to the left.
 **Shift**	Used in combination with Right arrow or Left arrow button to scroll through channel groups or alone to jump to the first channel in the list.	Used in combination with Enter button to return to previously entered values or, in combination with Increase/decrease button to specify lower value than that shown in display window.

Messages in the display:

Value stored	The value has been recorded.
Low value	The value is below the permissible range. Enter a higher value.
High value	The value is above the permissible range. Enter a lower value.

See 16 "Appendix C - List of channels" for information on valid values for the corresponding channel.

The FMC will revert automatically to Read mode.

	Press the Read/Write button to exit the channel without saving the value.

1.4 Alarm panel

This part describes the standard function of the alarm panel. In some special programs the use of the alarm panel may be different. For detailed information about the LED's see 15.1 "Alarm panel LED's".

The RTU is equipped with an alarm panel that indicates the most common alarms by means of LED's

Symbols	Description
	Overflow alarm.
	Power failure.
	High level sensor or float.
	Low level sensor or float.
	External pump alarms: Programs GSP2xx: Tripped motor protection. Programs GSP4xx: Tripped motor protection, water in oil, high temperature or pump switched off. Programs GSP2xx US: Tripped motor protection, high/low current, pump switched off or operation error.
[Picture Black pump]	Programs GSP4xx US: Tripped motor protection, water in oil, high temperature, pump switched off or operation error.
	Water in oil.
	High temperature.
	Internal pump alarms: Programs GSPxxx: High/low current, high/low capacity, operation error, service and max starts. Programs CLCxxx: Operation error and service.
[Picture Pump with Q]	Programs GSPxxx US: High/low capacity.

Symbols	Description
	Pump switched off.
	Pump blocked or remote.

The appropriate LED will start to flash when an alarm is activated and will continue to flash until the alarm has been acknowledged with the acknowledgement button. If the alarm remains active i.e. if the cause is still present when the alarm is acknowledged, the LED will display a steady beam. If the alarm becomes passive before it is acknowledged, the LED will continue to flash until acknowledgement is performed.

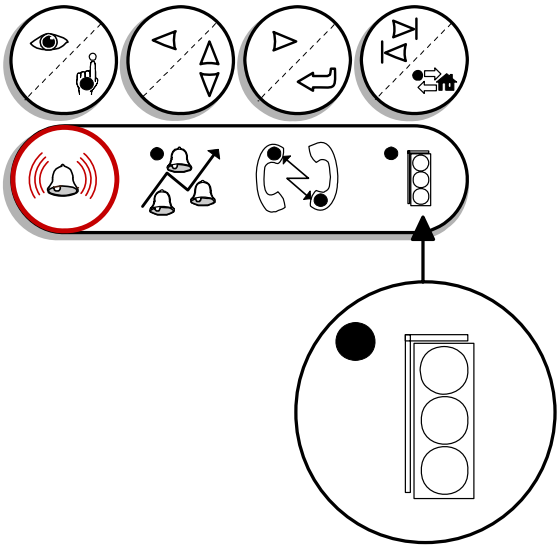
	The alarm panel indications are acknowledged by pressing the Alarm acknowledgement button located at the extreme left of the lower row of buttons under the display.

Acknowledgement with the button affects only the indication on the alarm panel, not the alarm in the alarm log or alarm buffer.

2 Starting the RTU

First connect the RTU as described in the general installation instructions supplied with the unit. See 19 "Appendix F - Connection" for a description of the signals. Complete the connection procedure by switching on the unit.

An LED on the front panel indicates the operational status of the unit. When the RTU is switched on, the LED will display a steady red light while the unit starts up. If set points have not been entered in the unit, the LED will start to flash. To start the RTU, certain settings must be made using the buttons on the front panel. The LED will display a steady green light when the unit is operating.



Steady red light	RTU has been switched on or cold-started. Unit has not been programmed and set points have not been entered.
Flashing red light	Program is running but RTU has not received set points.
Steady green light	Set points have been entered and RTU is in service.

Operational status LED on front panel.

2.1 Personal safety

!

N.B.
Care must be taken to ensure that personnel cannot come in contact with live cabling or terminal blocks in the course of connection or service work. Maximum caution must be exercised when working on the digital outputs.

2.2 Configuring the RTU

The RTU requires certain parameters and set points to operate. Most of these can also be entered from the central system.

Although the RTU is supplied with a number of default settings, some of the channels must be complemented or altered (see 16 "Appendix C - List of channels" for a complete list), beginning with the settings of a number of channels in the first channel group. Do not skip the last point (Time and date), it is the most important.

- **Display channel.** This is the first channel to change. Select "Service" to show all channels. See 3.1.2 "Selecting visibility level" for more information.
- **Language.** Select preferred language to use in the FMC. See 3.1.3 "Selecting language" for more information.
- **Show functions.** This function shows/hides functions in the FMC channels. Step through this set-point and select functions to use. Set all positions to "1" to show all channels. See 3.1.4 "Selecting used functions" for more information.
- **Inverse inputs.** Select the digital inputs connected to the FMC that is "inverted" / active low. See 3.2.2 "Inverting inputs" for more information.
- **Select connected signals.** Select signals connected to the FMC inputs and outputs. N.B! These set-points are sensitive. Be careful to select the correct input and output or connected equipment may start unpredictable. See 3.2.3 "Selecting input functions" and 3.2.4 "Selecting output functions" for more information.

Communication setup. The following part is needed only if the station uses any type of communication, either to a central system or paging system.

- **Station number.** The station number must be unique to each RTU, and is used by the central system to identify the unit. The number may vary from 1 to 899. See 3.3.2 "Station number".
- **Fixed line ID.** This parameter is only needed if the communication use fixed line. See 3.3.3 "Fixed ID number".
- **Communication mode.** The communication settings are central to get the FMC to communicate. Select the modem/method used to communicate with this station. Only change the setting for the serial channel used. See 3.3.4 "Communication selections".
- **DTE speed.** Select the communication speed to the modem or other equipment. See 3.3.5 "DTE speed selection".
- **Protocol.** Select protocol used. AquaCom, Comli, Modbus or CCom. Use AquaCom to the central system, AquaView. See 3.3.6 "Protocol selection"
- Other parameters for communication that may be required to be changed include various delays used in special communications like radio or GSM.

Starting up the pumps. To get the pump control up and running, follow this part. This set-up a rough control of the pumps.

- **Level sensor.** Select the range used by the level sensor. This is the only value needed, if a normal level sensor is used, to use the sensor. To get an accurate flow and pump control other set-points are needed. See 5.1.1 "Level transmitter adjustment" for information on this.

- Start, stop and level regulator parameters. Select start and stop level for the pumps. Also enter control parameters for the PI regulator. See 7 "Pump control" for information on this.

Apart from these parameters, it is possible to enter set-points for alarm distribution, monitoring of pump currents, energy measurement, precipitation measurement, pump operation, capacity measurement and much more depending on used FMC program. These functions and their parameters are described in the following chapter. All these settings can also be entered from the central system.

- **Date and time.** Enter time and date to start the RTU when all of the settings have been entered. See next section.

2.3 Setting the time and date and commissioning the RTU control.

If the RTU is cold started it will not control and monitor the station. The operating status led will be red and blinking and the channel showing date and time will only show question marks. *The date and time must be entered* to enable the RTU control and monitoring system to start after a cold start. This channel is found as the second channel, in the first channel group. Edit the time and date and remember to save the value, even if the original time and date is right. The operating status LED will change to green and display a steady light when this is done.

3 System functions

3.1 General

3.1.1 Selecting channels

The first channel in the channel list is a special select channel that is used to jump to other channels. To get the channel number, see 16 "Appendix C - List of channels".

```
SELECT CHANNEL
  0 - (1-100)
```

The first channel.

Enter the channel number and you will jump directly to the selected channel. To jump back to this channel press the Shift button on the terminal. Pressing the Shift button several times will jump back and forth between the selected channel and this channel.

3.1.2 Selecting visibility level

In the third channel you select if you want to see all channels or only the harmless read only channels. There are three levels of visibility.

```
Display channel
User
```

Showing only user channels.

The first is the user level and it is default. It will show only the result channels and some harmless channels.

```
Display channel
Parameter
```

Showing parameter channels.

The second is the parameter level. It will show all channels that you need to control the station including the user channels.

The third level is the service level.

```
Display channel
Service
```

Showing service channels.

The service selection will return back to either parameter or user mode five minutes after the last use of the display.

3.1.3 Selecting language

It is possible to change the shown language in the FMC. This setting will also change the language used for alarm texts sent to the paging system.

```
Language
English
```

The language channel set to English.

3.1.4 Selecting used functions

This function shows and hides different channels in the application part of the FMC program. Here it is possible to hide channel functions that are not used in the current installation.

The channel is a binary channel showing the enabled functions.

```
Show functions
111111111100000
```

The channel to select showed functions.

Set the bit to zero to hide the channels for a special function.

!

N.B.
The functions will still work in the background. Remember to turn of a function before hiding the channels.

Available options depend on the program used.

Options		**See**
Person.+burglary	Personnel alarm and burglary alarm channels.	4.3 and 4.4
General analog	General analogue input channels.	5.2
Adv. pump contr.	Advanced pump control channels.	7.4
Vol. pulse	Volume pulse channels.	8.1
ACS550 cleaning	ACS550 cleaning channels.	7.6
Overflow	Overflow calculation channels.	8.2
Service larm	Service alarm channels.	4.6
Blocking in+out	Remote blocking, in and out, channels.	9
Counter	Counter channels.	10
Test alarm	Test alarm channels.	4.5
Timers	Timer channels.	11
Pump 2 Pump 4	Pump 2, or 4, channels. This will make the FMC channels look like a one pump or three pump station.	

3.1.5 Program information

3.1.5.1 System information

The system ID tells version number of the system program inside the FMC. Use this information to identify the program if you contact ITT Flygt service.

```
System:  3.51.00
ProgID:    12345
```

System and program identity channel.

3.1.5.2 Project number

The project number is used as information to identify the station and program when you contact ITT Flygt service. Do not change the number.

3.1.6 Program mode function

The program mode function is used when maintaining the FMC. It is possible to restart the FMC, start remote service and load/save set-points.

3.1.6.1 Run mode

```
Program mode
Normal run
```

Run mode changeable from AquaView.

It is possible change the run mode by sending the set-points from AquaView. This is sometimes very useful but it opens a security risk. To prevent the change of this channel set the run mode to Normal locked. This will prevent the possibility to cold start the FMC from remote but also prevent the possibility to use remote service. Other remote functions from AquaView are not affected by this channel.

```
Program mode
Normal locked
```

Run mode not changeable from AquaView.

It is still possible to activate remote service and cold/warm start the FMC if the channel is changed locally on the FMC.

3.1.6.2 Restarting the FMC

The program mode channel is used if a situation occurs in which the RTU must be cold or warm started. The command will not be done immediately when the channel is saved. It is possible to repent the command by changing the channel again.

```
Program mode
Warm start
```

Warm starting the FMC.

Restarting will take 1 to 5 minutes depending on the program.

```
Program mode
Cold start
```

Cold starting the FMC.

! Remember that the set-points will be lost and must be re-entered following a cold start.

3.1.6.3 Remote service

If the RTU is called, it is possible to service the FMC from remote. This includes loading a new program over the telephone line.

```
Program mode
Remote load COM3
```

Remote load on COM3.

Select the COM port to be used in the program mode channel. A PCMCIA modem is connected to the COM3 port. An external modem is usually connected on COM1.

The FMC will not control the station during remote service. Remote service takes about 5 to 10 minutes and the only way to force the FMC to start-up is to do a power down/up.

! The RTU may need to be started as described under Starting the RTU when the new software has been downloaded.

3.1.6.4 Save/load set-points

It is possible to save and load set-points to a file in the FMC. Use this function to protect the set-points from being destroyed in a cold start. Once you saved the set-points they will be used to start-up the FMC in a cold start. The cold-start will as normal loose alarm, trend and report data, but in this case not control parameters and the FMC will continue to control the station.

Set-points will be saved automatically at midnight if changed.

Another way of using this function is if you experiment with set-points and you want to be able to return to the original set-points. It is also possible to use this option if you want to copy set-points from one FMC to another but only, and this is important, only if the to programs are identical. The two programs have to have the same program ID.

```
Program mode
Save setpoints
```

To save the set-points.

Remember that when loading the set-points the program will assume the same logical state as when they where saved. If the save was done after a cold start then this command will be equal to a cold start and all set-points will be lost.

```
Program mode
Load setpoints
```

Loading set-points.

! The load set-points do not work if the program is changed in service. If the program is changed the command may destroy the set-points or even crash the program. Use it carefully.

3.1.6.5 Save default set-points

It is possible to change the default values used by the FMC at a cold start-up. This may be used to create a regional variant of the set-points to make the installation easier.

```
Program mode
Save defaults
```

To save the default values.

To create a regional file first set-up the FMC with desired values. Next select the command and the FMC will create a file "ABackup.IMG". This will contain all set-point values. Download the file to your PC and use this file in the installation of future FMCs.

!! It is extremely important that the file is installed in the exact same program with the same program ID otherwise the FMC may crash.

3.1.7 Default channel

It is possible to select a channel to show when the FMC is not used. Most common use is to show the current level but any channel may be selected.

```
Default channel
 50
```

Default channel to show set to channel number 50.

To find out the channel number first locate the channel you want to show and then press the Shift button. The Shift button will jump to the first channel that will show the channel number. Enter this number into the Default channel.

3.1.8 Password

Two password channels are included in the FMC to prevent unauthorised personnel from altering settings in the FMC. The function is activated by entering the appropriate four-digit code in the New password channel. When an operator wishes to alter a setting in any channel using the buttons on the front panel, the code must first be entered before the data can be changed.

```
Enter password
   0
```

This is the password channel that appears if the password is activated.

To turn off the password function, enter 0000 as a new password.

Remember that unauthorised personnel must also be prevented from changing settings from the central system to ensure full protection against unauthorised alterations.

3.2 Physical setup

The programs use flexible inputs and output digital signals witch allow the user to select input polarity and function for most of the signals.

These settings are required to get the FMC to work with external equipment.

3.2.1 Viewing inputs

It is possible to view the status of the digital inputs connected to the FMC.

```
Status inputs
0100100000000000
```

Inputs 2 and 5 activated.

Switch the channel input to write mode to get a description of the individual inputs. Many of them may however be general inputs.

3.2.2 Inverting inputs

Closing contacts normally activates the digital input signals. The signal function can be inverted in the channel if input is to be activated by breaking contacts.

```
Inverse inputs
0000100010000000
```

This is the invert inputs channel with two inputs inverted.

The inversion of input signals is only possible on inputs directly connected to the FMC. Inputs connected to Siox units are not possible to invert. In this case use an intermediate relay.

3.2.3 Selecting input functions

Some inputs in the program are selectable. The possible options on an individual input depend on position and program. See 19 "Appendix F - Connection" for more information about your program.

The input functions and a short description of the function are included in the table below. See individual function descriptions for more information.

Available options depend on the program used.

Input function	Description	See
Not used	The input is not used. Connected signal will be ignored.	
Spare alarm	A spare alarm is created on the input. The alarm code depends on connected input.	
Px Off switch	Pump turned off. This will stop the pump and prevent the program from starting it.	

Input function	Description	See
High float	High level float. This function gives an alarm and may also start the pumps.	7.3.4
Low float	Low level float. This function stops the pumps and gives an alarm.	-"-
Overflow sensor	Overflow sensor input. This will start the overflow calculation. It is possible to use the level sensor to trigger the overflow but with lower accuracy. To do this make sure the overflow input is not used.	8.2
Power fail	Power fail sensor. This will stop the pumps.	4.2
Intruder sensor	Intruder sensor or witch. This input will cause the intruder alarm.	4.4
Personnel onsite	Personnel on site input. This will activate the personnel on site protection function.	4.3
Intruder + personnel.	Personnel on site combined with intruder sensor. It is possible to combine these two inputs to save one input.	4.3 and 4.4
Counter pulse	General pulse counter. May be connected to a rain sensor.	10
Timer x	General timer input. Used to create various timer functions together with an output.	11

3.2.4 Selecting output functions

Some outputs in the program are selectable. The possible options on an individual output depend on position and program. See 19 "Appendix F - Connection" for more information.

The output functions and a short description of the function are included in the table below. See individual function descriptions for more information.

Available options depend on the program used.

Output function	Description	See
Not used	The output is not used. Connected signal will be low.	
High level	Activated by a high level alarm.	5.1.3
Extrem high lev.	Activated by an extremely high level alarm.	-"-
Low level	Activated by a low level alarm.	-"-
Extrem low lev.	Activated by an extremely low level alarm.	-"-
Generic analog x	The output is controlled by the generic analogue signal.	5.2.4
Remote blocked	The output is activated when the FMC gets remote blocked by another FMC.	9.2.2

Output function	Description	See
Alarm pulse	One pulse on every new alarm.	3.5.3
Alarm status	Shows the status of alarms. Low - no alarms, pulse - active not acknowledged alarms, high - active alarms.	-"-
Alarm active	Shows if there are any active alarms.	-"-
Timer x out	Activated by the Timer functions.	11
Watchdog	The output is high when the program has set-points and runs properly.	
Remote x	The output is controlled by the user from status.	
Buzzer	The output is used by intruder alarm and personnel functions. The buzzer is activated to inform the user when the alarms is turn on/off and when working time has expired.	4.3 and 4.4
Siren	Intruder alarm or personnel alarm. Connect to a siren.	-"-
Buzzer+siren	Buzzer and siren combined.	-"-
Volume pulse	One pulse for each amount of outflow/inflow/overflow volume.	8.1

3.3 Communication setup

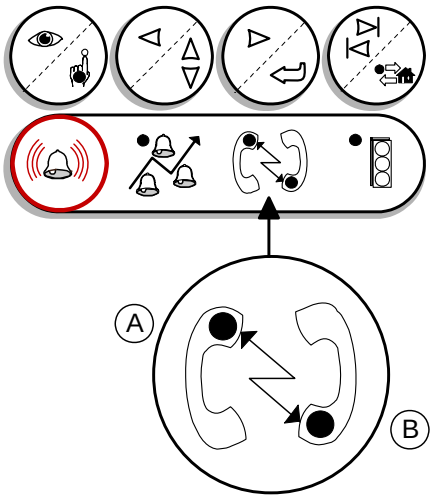
The FMC can communicate with the central station and paging systems in several different ways. Select communication function depending on connected equipment and decried function.

The programs are equipped with a very flexible communication set-up. It is possible to connect various modems and use several protocols.

These settings are only required if the FMC should communicate. A stand alone FMC do not require any changes in this section.

3.3.1 Communication indicating LED's

Two LED's, indicating the communication status, are mounted on the front panel. These are located in the symbols representing two telephone handsets underneath the buttons.



A = LED flashes when receiving data
B = LED flashes when RTU is transmitting data.

Communication indicating lamps.

3.3.2 Station number

To enable the central system to contact the station and get the status data for the picture you have to enter the correct station number. This number has to be the same as in the central system.

```
Station number
 50
```

This is the station number channel.

Valid station numbers range from 1 to 899.

3.3.3 Fixed ID number

To connect the FMC on a fixed line the Fixed line ID need to be entered otherwise the communication will not work. This number needs to be the same in the AquaView system.

```
ID number fixed
 0 (fixed)
```

The fixed line ID.

3.3.4 Communication selections

In the communication channels the following selections are available.

Serial channel	**Alternative**	**Function and description**	**DTE speed**
COM1	Not used	No equipment on COM1.	
	TD22 V22	External TD-22 working in V.22 mode.	1200-4800

Serial channel	Alternative	Function and description	DTE speed
	TD22 V.22bisLAPM	External TD-22 working in V.22bis mode with compression and error correction.	1200-4800
	TD22 V23 dial.	External TD-22 working in V.23 mode.	1200
	(TD22 V23 fix.)	Not recommended*. External TD-22 working in V.23 fixed mode.	1200
	TD33 V.90	External TD-33 working in V.34 mode.	4800-38400
	TD33 V.90 X1	External TD-33 working in V.34 mode. No busy tone detection.	4800-38400
	TD33 V.90 LAPM	External TD-33 working in V.34 mode with compression and error correction.	4800-57600
	RS232 half dup.	RS232 half duplex.	300-57600
	RS232 full dup.	RS232 full duplex.	300-57600
	Siox RS232	External Siox driver K32.	Only 4800 or 19200
	Alarm printer	Alarm printer. ASCII protocol.	1200-57600
	User def. 0	User configuration 0 defined in modem. (AT Z)	300-57600
	User def. multid	User configuration 0 defined in modem working in multi-drop mode for V.23. (AT Z)	300-57600
	Factory set. 0	Modem factory configuration 0. (AT &F)	300-57600
	User def. 1	User configuration 1 defined in modem. (AT Z1)	300-57600
	Factory set. 1	Modem factory configuration 1. (AT &F1)	300-57600
COM3	Not used	No equipment on COM3.	
	TDK5660 V.90	Internal TDK 5660 working as V.34.	1200-9600 Default 9600
	TDK5660 V.22	Internal TDK 5660 working as V.22.	1200
	TDK2814 V.34	Internal TDK 2814 working as V.34.	1200-9600 Default 9600

Serial channel	Alternative	Function and description	DTE speed
	TDK2814 V.22	Internal TDK 2814 working as V.22 with line speed = DTE speed.	1200
	3COM V.90	Internal 3COM.	1200-9600
	User def. 0	User configuration 0 defined in modem. (AT Z)	300-57600
	Factory set. 0	Modem factory configuration 0. (AT &F)	300-57600
	User def. 1	User configuration 1 defined in modem. (AT Z1)	300-57600
	Factory set. 1	Modem factory configuration 1. (AT &F1)	300-57600
COM4	Not used	No equipment on COM1.	
	RS232 half dup.	RS232 half duplex.	300-57600
	RS232 full dup.	RS232 full duplex.	300-57600
	Siox RS232	External Siox driver K32.	Only 4800 or 19200
	Alarm printer	Alarm printer. ASCII protocol.	1200-57600
	User def. 0	User configuration 0 defined in modem. (AT Z)	300-57600
	User def. multid	User configuration 0 defined in modem working in multi-drop mode for V.23. (AT Z)	300-57600
	Factory set. 0	Modem factory configuration 0. (AT &F)	300-57600
	User def. 1	User configuration 1 defined in modem. (AT Z1)	300-57600
	Factory set. 1	Modem factory configuration 1. (AT &F1)	300-57600

3.3.4.1 PC-card modem TDK 2814

Use one of these settings if the FMC is supplied with the TDK 2814 modem installed. There is a cable connected to the modem with a modular contact

connected. Connect it to the telephone line. An FMC series 86 or 89 delivered before May 1999 use this older modem.

3.3.4.2 PC-card modem TDK 5660

Use one of these settings if the FMC is supplied with the TDK 5660 V.90 modem.

```
Communic. COM3
TDK5660 V.34
```

Communication selected to TDK5660 on COM3.

An FMC series 86 or 89 delivered after May 1999 use this newer modem.

3.3.4.3 Modem TD-22

Use one of these settings if the FMC is delivered with the Westermo TD-22 modem. Select V.23 when the modem shall communicate with CCC0502/0503 modems. Select V.23 fixed when the modem shall communicate with CCD0502/0503 or other TD-22 modems on a fixed line. V.22 should be used to communicate with other Hayes modems.

* Using TD-22 in V.23 mode is not recommended. The modem is initialized by the FMC and this fixed mode cause the possibility to initialize the modem again to be lost. If the modem loose power the communication is lost. It is therefore highly recommended to connect the TD-22 modem to the same power supply as the FMC if this communication mode is used. This will cause the modem to be initialized safely. A better method is to set the TD-22 modem to V.23 mode using the DIP switches inside the modem and use RS232 half duplex as communication mode.

3.3.4.4 Modem TD-33

Use one of these settings if the FMC is supplied with the TD-33 modem.

```
Communic. COM1
TD33 V.90 X1
```

Communication selected to TD-33 using option X1.

The option TD33 X1 is used when the modem has problems to detect the telephone system dial tone.

3.3.4.5 Modem TD-23

Use the option for RS232 half duplex if the modem TD-23 is used. Set speed to 1200 bit/s.

3.3.4.6 RS232 full duplex

Use this option for point to point communication on a fixed line cable together with Mtc-Com or AquaView. A null modem or a special null modem cable should be used in this communication.

This option is also used for modems emulating a RS232 line using control signals. This is the preferred option for using modem TD-22 in V.23 fixed mode.

3.3.4.7 RS232 half duplex

Use this option for multi-drop communication using TD-22 or TD-23 on a fixed line cable together with Mtc-Com or AquaView.

3.3.4.8 Radio modem Elpro 405

To use the Elpro 405 radio modem the modem itself needs to be configured before installing it with the FMC. See separate documentation.

Use option RS232 full duplex if the modem is used in polled mode.

3.3.4.9 User defined modems

It is possible to connect other modems to the FMC. In this case the modem needs to be configured using a PC before installation. The configuration should be saved in the internal memory area 0 inside the modem using the command "AT E0 V0 &W0". The modem will then later on be initiated with the command "AT Z" to recall the saved configuration. See separate documentation for specific modems.

```
Communic. COM4
User def. multid
```

Communication selected to a user defined multi-drop modem on COM4.

It is possible to run the user defined modem in either multi-drop mode or point-to-point mode. Multi-drop mode is used for fixed line modems.

3.3.4.10 Alarm printer

The alarm printer is connected to COM1 usually with 1200 bps. Use 8 bits 1 stop bit and no parity in the printer. Used character table is "MS-DOS 850".

3.3.4.11 Other information on modems and connections

The line speed depends on the initiation string, line quality and DTE speed. Changing the DTE speed will not always change the line speed.

All modems besides PC card modems are connected to COM1. See the modem documentation for cabling specifications.

When the communication mode is changed then the FMC will automatically restart after a few seconds.

3.3.5 DTE speed selection

Select the DTE speed for the used channels. The DTE speed is the speed on the serial channel connected to the FMC.

```
Speed COM1
 9600 bit/s
```

DTE speed on COM1 selected to 9600.

If a modem is used this is the speed between the modem and the FMC. This is not the same as the line speed between the two modems.

! It is highly recommended that the DTE speed is equal or higher compared to the line speed.

3.3.6 Protocol selection

Select protocol to use on the serial channels.

```
Protocol on COM1
AquaCom
```

COM1 selected to use AquaCom.

Supported options are:

Menu option	Comment
None	No protocol used. Use this if Siox or alarm printer is selected.
AquaCom	AquaCom dialled or AquaCom fixed. Dialled or fixed mode is selected automatically depending on connected modem.
Modbus	Modbus fixed.
Comli	Comli dialled or Comli fixed.
CCom	CCom fixed.
Other	Other option. This will make the channel change to enter a protocol code. See protocol code below.

! It is not possible to select two dialled serial channels working with the AquaCom protocol at the same time.

Code	Protocol	Comment
0	None	Selecting this code will switch the channel back to a menu.
1	Alarm printer	Alarm printer connected. It is not necessary to select this option if alarm printer is selected as communication mode.
2	Service	It is possible to service the FMC using other serial channels than COM2 using this option.
3	AquaCom slave	Same as menu option.
4	Modbus slave	Same as menu option.
5	Comli slave	Same as menu option.
8	Siox	Siox connected. It is not necessary to select this option if Siox is selected as communication mode.
13	CCom slave	Same as menu option.
6,7,9,10,		Do not use these. Used for master communication and others.

Code	Protocol	Comment
11,12,14		
15-		Future use. May be used with newer FMC system versions. See FMC system technical messages.

3.3.7 Communication time-outs and delays

Avoid changing these values unless absolutely necessary. The communication may be unstable or cease to work if any of these values is set to a faulty value.

3.3.7.1 RTS delay

This is the time required by the modem to stabilise the signal before it starts to transmit data. In certain cases, the RTS delay must be changed to permit communications to work satisfactorily.

```
RTS delay COM1
 200 ms
```

This shows RTS delay set to 200 ms on COM1.

The RTS delay is also used in dialled up communication as a general delay between telegrams. In dialled communication it rarely need to be used and is set to 0 ms.

! Operation may be put at risk if this value is too high. A suitable value is between 100 and 300 ms.

3.3.7.2 Time-out telegram

This setting controls how long the program will wait for an answer. A timeout may occur if a long time elapses before a response is received from the central system or another remote terminal unit. The response time in the channel can be increased to prevent this; however, it is recommended that this value (8 seconds) should not be changed unless absolutely necessary.

3.3.7.3 Time-out character

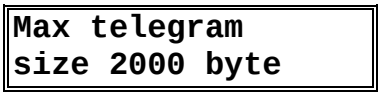
This setting controls how long the program waits for a new character. In some applications where messages are sent in packages it can be gaps. This concern particularly radio communication where you can get time-outs. To avoid them increase the value in this channel.

3.3.7.4 Delay before sending OK

This is the time the program waits from starting a modem communication until sending the first OK message. In special situations where radio modems are used it may be necessary to increase this value if the communication line is not ready directly.

3.3.8 Max telegram size

It is sometimes necessary to reduce the size of the telegrams sent between the FMC and the CS, especially if radios are used. It is possible to set the size of some of the telegrams using this function.



Telegram size set to default value.

3.3.9 Trend sample

3.3.9.1 Sample time

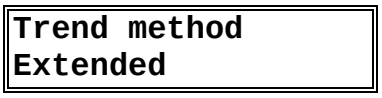
The FMC continuously sample trend data's like levels, flows and currents. The sample rate of this data may be changed in one minute intervals between 1 and 30 minutes. The default sample rate is 5 minutes.

Sample rate set to one minute.

If the sample rate is changed to one minute the same change has to be done in the set-up of this station in AquaView. A zero in this channel will work as the default value, five minutes.

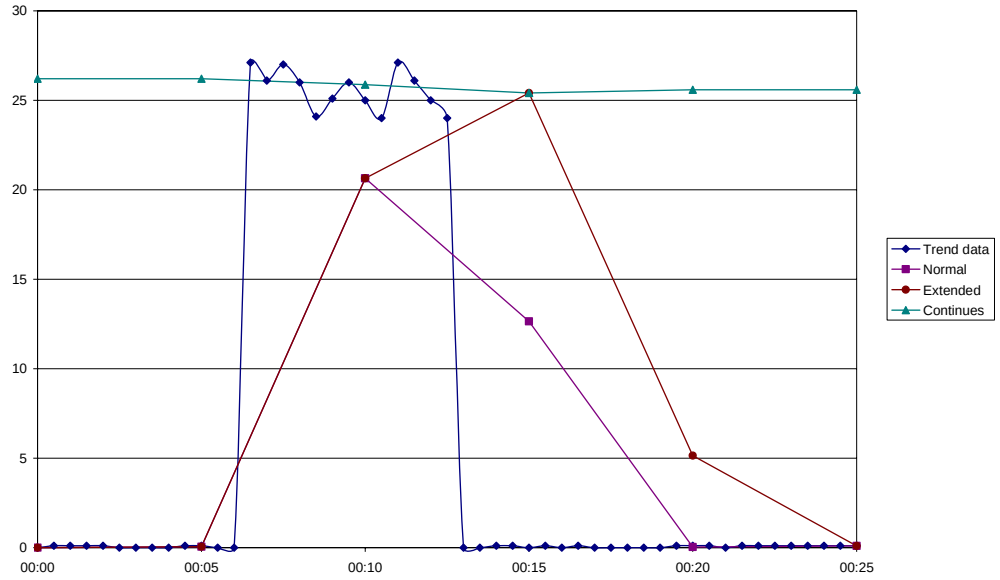
3.3.9.2 Sample method

The way trend is sampled in the FMC may be affected. In some station with rapid pump-cycles even changing the trend sample rate to one minute may be to long. In this case it is possible to extend the sampled trend in two ways.



Extending the trend.

This function changes the sampling of trend values that is dependent of pump operation. Affected trends are: Pump currents, pump flow, energy effect and specific energy.



Resulting trend curves in AquaView.

Normal	Trend is sampled 10 times during the selected time. The average is calculated and shown in the resulting trend.
Extended	The trend is sampled during the pump operation. The average value is used to extend the stored trend. The resulting trend will be guaranteed to show at least one sample with the true maximum value.
Continues	The trend is sampled during the pump operation. The average is used to store trend during non pump operation resulting in a continuous trend curve.

3.3.10 Remote control break delay

The pumps can be remote-controlled from the central system. The option of starting and stopping the pumps manually is available on the status picture. When remote control is selected, the RTU pump control function is inoperable. When a pump is started remotely, pump control returns to auto mode when the picture is closed. The remote control break delay prevents the FMC from setting the pump in auto mode after a closed picture. It is then possible to control the pumps remotely without the need of an open status picture.

```
Remote break
   0 min
```

The remote break delay default value.

A pump that is started with a remote command will always stop at the normal stop level or low level float. It will also stop on any pump failure. The pump will then return to automatic mode.

A pump that is stopped with remote command will stay stopped until the status picture is closed and the remote break delay is elapsed. The pump will then return to automatic mode and start as normal.

! Care is always required when operating the pumps manually from the central system.

See 18 "Appendix E - Central system" for information on all objects to be controlled remotely.

3.3.11 Response delay incoming call

This is the delay from the first ring signal to answer from the FMC.

! Only set this time if the telephone line is also connected to a normal telephone. Using this value in loot of stations will increase the data collection time in the CS.

3.4 General alarm information

The RTU may generate an alarm in different situations as part of pump station monitoring. The alarm may be due, for example, to the absence of an operating response, but may also be activated by internal monitoring functions. See 17 "Appendix D - List of alarms" for a list of the alarms in the RTU.

3.4.1 Active/passive alarm types

Two alarms are generated in most alarm situations, one when the condition is fulfilled i.e. when the alarm is activated, and the other when the alarm is passivated. In a few alarm situations, the alarm is generated only when the condition is fulfilled. One example of this second type is the "Warm start" alarm.

3.4.2 Alarm priorities

An RTU alarm can be assigned one of four different priorities, A, B, C or D. In some special cases the alarm may also have priority E and H. In most cases, these are used as described below. The Alarm distribution channel described below determines the alarms that are to be transmitted.

Priority	**Shown in the FMC alarm log**	**Sent by FMC to central system or paging**	**Sent by central system to paging**	**Comment**
A	Yes	Yes *	Yes	Is assigned to the most important alarms.
B	Yes	Yes *	No	Is assigned to those alarms which, although not as important, must be reported continuously to the alarm recipient.
C	Yes	No *	No	Usually assigned to those alarms that are only to be recorded locally in the RTU.
D	Yes	Yes *	Yes	Works as A alarms with the difference that they are transmitted to the pager

Priority	Shown in the FMC alarm log	Sent by FMC to central system or paging	Sent by central system to paging	Comment
				only on work hours.
E	Yes	No	No	Is used by the RTU when the Local alarm mode has been selected. This priority is not selectable for individual alarms.
F	No	No	No	Used to hide alarms from showing up in the FMC. Usually used by programmers of the FMC but may be used locally on the FMC.
H	No	No	No	Is assigned to alarms working as events. This events is not transmitted automatically, they are instead collected as data.

* The actual priorities transmitted to the central system or paging may be changed. See 3.6.3 "Alarm distribution, selecting alarms for transmission".

See 17 "Appendix D - List of alarms" regarding alarm priorities following a cold start.

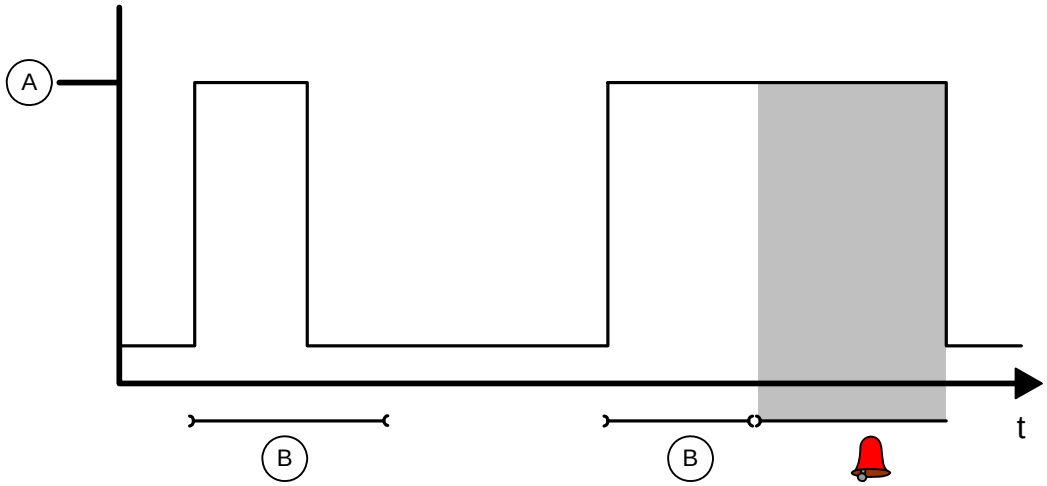
It is possible to change the alarm priority and alarm code locally on the FMC. See 3.6.6 "Changing alarm code and priority".

3.4.3 Alarm activation

Most alarms are in service directly when the RTU is commissioned. The monitoring of analogue values requires alarm limits to be entered for them. The various alarm limits and their respective functions are described in other parts of this document.

3.4.4 Alarm delay

Each alarm can be delayed for a period during which the alarm condition shall be fulfilled before the alarm is generated. A delay is used to ‘filter out’ disturbances of a temporary nature in the system. No general rule can be given regarding a suitable delay since the setting will be dependent on the plant configuration. However, approx. 10 seconds is a normal setting.



A = Alarm condition present B = Alarm delay

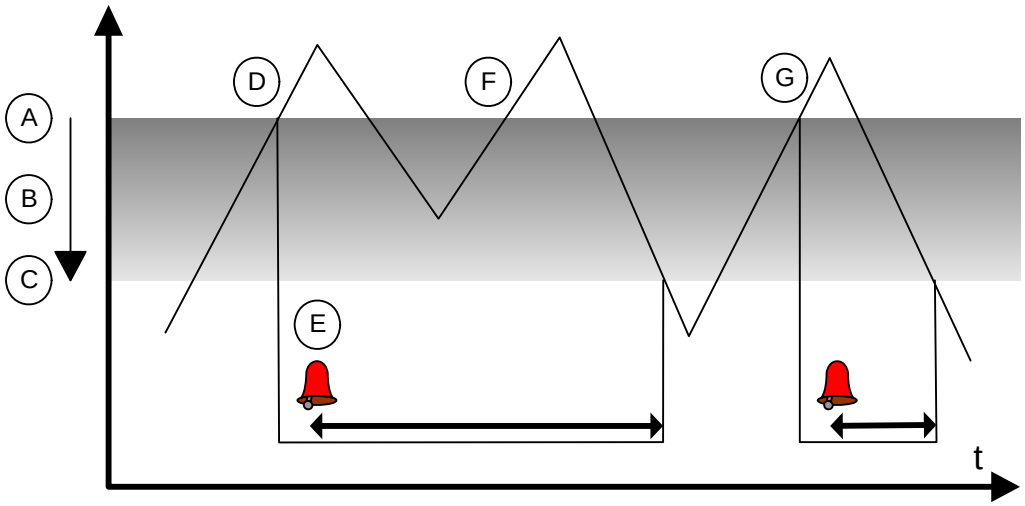
Typical alarm delay

In the above example, an alarm is not generated on the first occasion since the alarm condition is not present for long enough. However an alarm is generated in the second case since the alarm condition is still present when the delay period expires.

ITT Flygt RTU's can be set with different delays for general alarms, high level alarm, low level alarm as well as power failure alarms. If a central system is installed, alarm delays can also be set by means of the central system set point function.

3.4.5 Alarm hysteresis

Alarm hysteresis is another method of filtering out undesired, superfluous alarms. Hysteresis, which is applied to analogue alarm limits, specifies the amount by which the measured value must change for an alarm to be deactivated.



Example of high level alarm with hysteresis and alarm delay.

In the above example, the High level (A) alarm is subject to a limit. The shaded area (B) shows the hysteresis range. If an alarm occurs, the level must fall below the lower hysteresis limit (C) before it can be repeated. The alarm condition is

fulfilled at (D), although the alarm itself is generated a little later (E) since it is normally subject to a delay. The alarm remains active while the level remains in the shaded, hysteresis area. Thus, a new alarm is not generated at (F), even though the level has again risen above the high level limit, since it has not fallen below the lower hysteresis limit in the interim. However, at (G), the alarm condition is again fulfilled and an alarm is generated after the specified delay.

Hysteresis operates in similar manner for a Low level alarm. In this case, the level must exceed the upper hysteresis limit before the alarm can be repeated.

The alarm hysteresis is set via channels in the appropriate group channel and can also be set from a central system.

3.5 Local alarm functions

This chapter describes how alarms are used on the FMC locally.

3.5.1 Alarm logging

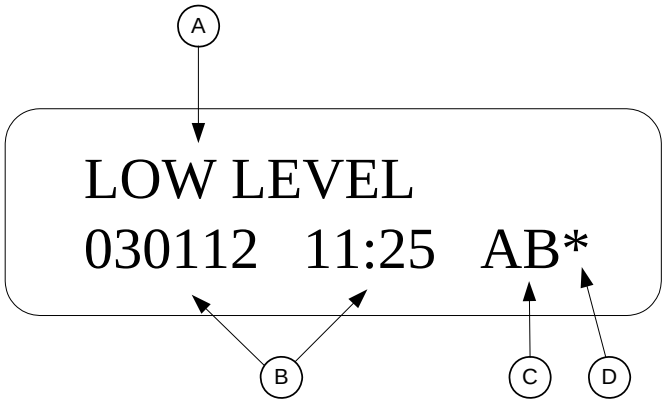
An alarm generated when the alarm condition is fulfilled is recorded in the alarm log, which accommodates minimum 100 alarms. If a greater number of alarms are generated, the earliest alarm will be overwritten.

The alarm log channel.

To view the alarm log:

1. Select the Alarm log channel in the ALARM LOG channel group.
2. The number of alarms stored in the alarm log will be displayed in the display window.
3. To view and scroll through the alarms, press the Read/Write button so that the LED lights and the RTU enter the print mode. Press Read/Write again to return to the Read mode.
4. The most recent alarm will be displayed.
5. To view earlier alarms: Press the Left arrow button. When the earliest alarm has been scrolled up, the text Alarm end and the alarm in question will be displayed.
6. To return to a more recent alarm, press the Right arrow button. As in the case of the earliest alarm, a message will be displayed when the last recorded alarm has been reached.
7. To return to the Alarm log channel, press the Read/Write button until the LED lights and the RTU returns to the print mode. Press Read/Write again to return to the Read mode.

The alarm text is recorded in the alarm log together with the following information:



A = Alarm text
B = Date and time of alarm
C = Type and priority of alarm
D = Alarm transmitted to central or alarm system

Alarm displayed on RTU.

The alarm text consists of a maximum of 16 characters. In the letter combination stating the type and priority, the first letter, A, indicates that the alarm is an activation alarm i.e. that generated when the alarm condition is fulfilled. The corresponding passivation alarm, i.e. that generated when the condition is no longer fulfilled, is not stored in the alarm log. The second letter indicates the priority (A, B, C or E) assigned to the alarm (see 3.4.2 "Alarm priorities" for explanation). The last character, *, indicates that the alarm has been transferred to the central or alarm system. Further information regarding this is contained in the section 17 "Appendix D - List of alarms".

3.5.1.1 Deleting all alarms in alarm log

Proceed as follows to delete all of the alarms in the alarm log:

1. Select the Write mode with the Read/Write button. The LED will light.
2. Select the figure ‘2’ with the Increase/decrease button and press Enter.
3. The display will indicate that the alarm log is empty.

Deleting alarms in the alarm log will not delete the alarm in the central system. Alarms are sent to the central system independent of the alarms in the alarm log.

There is no need to delete alarms to make space for new alarms. If the alarm buffer becomes full, the oldest alarm will be overwritten. The only reason to delete alarms is to make it easier to find new alarms.

3.5.1.2 Deleting one alarm in alarm log

Alarms can also be deleted individually using the Shift button.

1. Scroll to the alarm to be cancelled.
2. Press the Shift button.
3. The alarm will be deleted and removed from the log.

3.5.1.3 General alarm

The lowermost LED on the alarm panel is used as a general alarm LED. This means that it will begin to flash as soon as a new alarm has been recorded in the alarm log. Always scroll through the alarm log to check for new alarms when this LED flashes. When the alarm log is checked, the LED is extinguished if the alarm has been acknowledged from the alarm panel.

3.5.1.4 Testing alarm panel LED's

The FMC incorporates a function for testing the integrity of all of the LED's on the alarm panel. Press and hold the alarm acknowledgement button until the LED's begin to flash. The LED's will revert to normal operation when the button is released.

3.5.2 Printing out alarms from RTU

A printer can be connected directly to the unit and alarms printed out as they are generated. Note that this does not include alarms received before the printer is connected.

The printer, which must be of the serial type, is connected to COM1or COM4. Select communication mode Alarm printer in the communications channels. See 3.3.4 "Communication selections".

3.5.3 Alarm output signal

The alarms in the FMC may be indicated with an output. There are tree variants on the output with slightly different functions.

Output option	**Function**
Alarm pulse	One pulse on every new alarm. A short pulse on the output is generated on every new active flank on A, B or D alarms. The length of the pulse may be set in a channel.
Alarm status	Shows the status of alarms. The alarm output will work the same way as an alarm LED. Low - no alarms, pulse - active not acknowledged alarms, high - active alarms. Alarms are acknowledged on the FMC panel.
Alarm active	Shows if there are any active alarms. The output will be high as long as there is an A, B or D alarm active.

Only A, B or D alarms are used with the output. If an alarm is set to C it will not affect the output.

Alarms with only an active flank and no passive flank like Warm start will not affect the output.

3.6 Remote alarm setup

3.6.1 Alarms to central system

Alarms are transmitted to the central system via a dedicated or dial-up connection. Alarms to be transmitted are stored in a buffer. If the buffer becomes full, the earliest alarm will be overwritten by the most recent but this will only happen if the connection to the central system is lost for several days.

A dial-up RTU can also be configured to call a pager directly. The selection to send to the pager is made in the telephone number by entering the special character "&" in the first position. See 3.6.4 "Telephone numbers to CS/Pager".

3.6.1.1 RTU with dedicated connection to central system (CS)

If an RTU is connected to the central system by a dedicated connection, the CS will transmit alarm queries to the RTU. Any alarms in the buffer will then be transmitted.

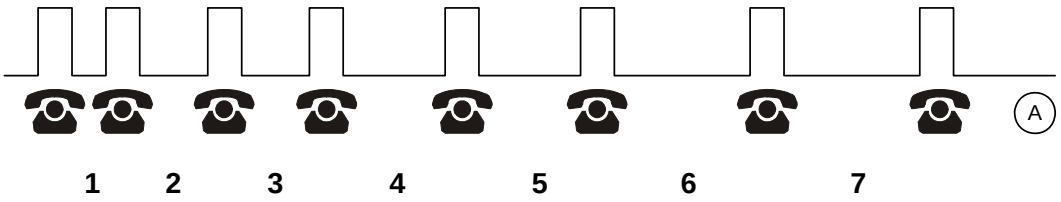
3.6.1.2 RTU with dial-up connection

In the case of a dial-up connection, the RTU will dial to the CS or pager as soon as an alarm is created. For this purpose, the alarm receiver's telephone number must be entered in the Telno:1 MTC/Page channel in the major channel group, which contains two telephone number channels.

3.6.1.3 How the RTU dials out alarms

The RTU contains two channels for telephone numbers. In the event of an alarm, the RTU rings the first number stored in the first channel. This number may go to the CS or pager. If this is unsuccessful, the unit will make further attempts to call the same number, with a pause between each attempt. The number of attempts is controlled by two channels Number of calls CS and Number of calls pager.

When the RTU rings and the call fail, the first pause will be 1 minute long. Thereafter, the pause duration will increase by one minute on each occasion.



A = Pause

RTU alarm dial-out sequence.

If the RTU fails to transmit the alarm to the telephone number in the first channel, further attempts will be made to call the number in the next channel. If this is also unsuccessful, dialling will be blocked (A). The blocking time is set in the Pager cycle channel.

After the blocking the RTU will recommence the sequence from the beginning i.e. making new attempts to call the number in each channel. The RTU will continue to attempt to report the alarm until it succeeds.

The CS will automatically acknowledge if the alarm is successfully transmitted to the CS the alarm.

If the alarm is transmitted to a pager then the RTU will wait for acknowledge from the user. The time the RTU will wait is set in the Pager acknowledge time channel.

If the user fails to acknowledge the alarm the RTU will try the next telephone number in the sequence.

3.6.2 Alarm status, changing alarm mode

An alarm can be transmitted to the central or alarm system, or simply recorded in the RTU. The appropriate setting is made in the Transmit alarm channel in the main channel group.

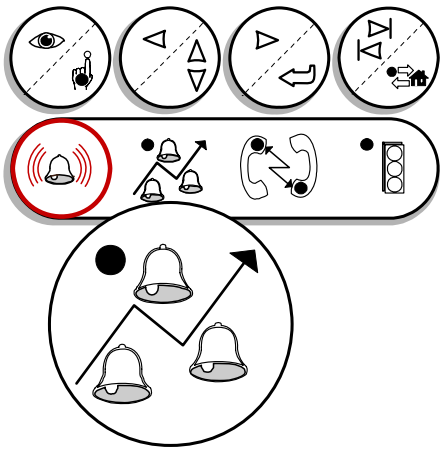
```
Transmit alarm
Local today
```

Alarm is only recorded locally in RTU.

Local permanent	Alarms are only recorded in the RTU. All alarms (*) get priority E and will not be transmitted to the central system.
Remote	Alarms are transmitted to the central system. The particular alarms that are transmitted will depend on the setting in the Alarm distribution channel.
Clear	May be used to prohibit alarms, which have not yet been transmitted to the central system, from being sent.
Local today	Same as "Local permanent". The selection will return to remote at midnight.

Select the Local alarm mode to avoid false alarms, for example when carrying out service work in the pump station.

The Cold start and Personnel alarms are transmitted to the central or alarm system on every occasion, regardless of the alarm mode selected.



Alarm mode indicating lamp.

The front panel is provided with an indicating lamp showing the alarm mode.

LED state	**Meaning**
Steady light	Remote mode, alarms will be transmitted.
Flashes	Alarms waiting to be transmitted.
Extinguished	Local mode, alarms will not be transmitted.

3.6.3 Alarm distribution, selecting alarms for transmission

Select the priorities to be transmitted to the central/pager in the Alarm distribution channel. The default setting is to transmit A and B alarms, as well as P alarms, which represent passive alarm. Enter '1' in the positions corresponding to the transmission priorities.

```
Alarmdistrib.
1101 (ABCP)
```

Alarm distribution for transmission of A and B priority alarms, as well as passive alarms.

See 3.4.2 "Alarm priorities" for more information.

3.6.4 Telephone numbers to CS/Pager

A telephone number may contain up to 16 characters, including the type of dialling and "pause" characters.

The following characters are used to enter the telephone number correctly:

Character	Explanation
&	Used in Paging systems numbers. The '&' character must always be first in the string if this telephone number is a paging number. Otherwise the system assumes that the alarm should be transmitted to a Mtc-Com or AquaView.
T	The RTU transmits digits using tones in what is known as DTMF tone dialling, which is the most common mode. The DTMF tone dialling character must be first in the string when calling the central system but in second position in paging numbers. If the paging system uses a telephone number to the paging central and this is a paging number then do NOT use this character.
P	The RTU transmits digits by sending mechanical pulses. This should be used only if DTMF tone dialling does not work due to older types of telephone exchanges. The pulse dialling character must be first in the string when calling the central system but in second position in paging numbers. If the paging system uses a telephone number to the paging central and this is a paging number then do NOT use this character.
,	The RTU pauses for 2 seconds, e.g. to dial 0 for an outside line. A pause can be inserted at any point in the telephone number. Several pauses may also be inserted in succession. If the paging system uses a telephone number to the paging central and this is a paging number then do NOT use this character.

A telephone number to an MTC-COM may be of the following form:

```
Telno:1 MTC/Page
T123456
```

Telephone number 123456 entered.

This means that the RTU will ring the number 123456 in the event of an alarm. The character 'T' at the start indicates tone dialling.

The number T0,234567 means that the MTC-COM first dials a zero, then pauses for 2 seconds before continuing with 234567.

The telephone numbers can also be entered in the channels using the set point adjustment function in the central system.

3.6.5 Number of calls to CS

The numbers of attempts to call central system are controlled by the channel:

```
Number of calls
CS  5
```

Number of calls to central system.

This is the number of calls the FMC will try to make to the same number before switching to the next number.

3.6.6 Changing alarm code and priority

It is possible to change the alarm priority and alarm code locally on the FMC. This is normally done by sending the "Alarm code filter" from AquaView. Three channels are used for this function. You enter the alarm code of the channel you want to change in the first channel and then you set the priority and code in the following two channels.

Example on how to change the spare alarm on input 6 to another code.

First select the alarm code to change.

```
Select alarm
code   86
```

Go to the next channel.

And change the priority to another code.

```
Alarm priority
A
```

Go to the next channel.

And change to another alarm code.

```
New alarm code
  45
```

The input 6 will now send an A alarm with code 45 "Low pH".

If this alarm is sent to directly from FMC to pager the text will be the old text "Alarm digital input 6". It is however possible to change also the text but this must be done by updating the FMC with a special text file (FMC.CFG) using a PC.

3.7 Paging setup

3.7.1 Text paging system and SMS message

The RTU can handle alarm distribution directly to a paging system or to a GSM telephone. The first sign in the channel Telno: CS/PAGE must be “&”, otherwise the program will handle the phone call as if calling to a CS.

3.7.1.1 Numerical paging

The message that is sent to a numerical pager consists of numerical code like “12580501”. It starts with the station number, three digits "125". The next four digits are the alarm code "8050", and the last digit is the priority of the alarm "1". The only setting needed is the telephone number to the pager in the channel "Telno. 1 CS/PAGE" starting with a “&”.

3.7.1.2 Alphanumerical paging

When using alphanumerical paging, the message on the pager consists of alarm text and station name. The following settings are needed:

The telephone number to the pager in the channel Telno: CS/PAGE starting with a "&". Neither a "T" nor a comma should be used.
The telephone number to the paging central. This is the telephone number that is dialled by the modem when an alarm should be transmitted. Information is given on the subscriber agreement and in that company's documentation. No "&" should be entered in this channel.
The name of the station should be entered in the channel Station name. If no name is entered, the station number will be sent to the pager.
If used, enter the password in the channel Password.

3.7.1.3 SMS

When using SMS, the message on the GSM telephone consists of alarm text and station name. The following settings are needed:

The telephone number to the GSM telephone in the channel Telno: CS/PAGE starting with a "&". Neither a "T" nor a comma should be used.
The telephone number to the paging central. This is the telephone number that is dialled by the modem when an alarm should be transmitted. Information is given on the subscriber agreement and in that company's documentation. No "&" should be entered in this channel.
The name of the station should be entered in the channel Station name. If no name is entered, the station number will be sent to the pager.
If used, enter the password in the channel Password.
If used (SMS for Germany), an identification code should be entered in the channel Identity code.

3.7.2 Number of calls to pager

The numbers of attempts to call the pager central are controlled by the channel:

```
Number of calls
pager  5
```

Number of calls to paging central.

This is the number of calls the FMC will try to make to the same number before switching to the next number.

3.7.3 Pager acknowledge time

If the alarm is transmitted to a pager then the RTU will wait for acknowledge from the user. The time the RTU will wait is set in the Pager acknowledge time channel.

```
Pager Ack Time
  10 min
```

The Pager acknowledge channel.

If the user fails to acknowledge the alarm the RTU will try the next telephone number in the sequence.

If you do not want to acknowledge any alarms then set this time to zero. The FMC will then send the alarm and then automatically acknowledge the alarm. Only use this if the paging system has a two way communication to the pager like in SMS.

3.7.4 Wait time pager cycle

If the RTU fails to transmit the alarm to the telephone number in the first channel, further attempts will be made to call the number in the next channel. If this is also unsuccessful, dialling will be blocked. The blocking time is set in the Pager cycle channel.

```
Wait time pager
cycle:  180 min
```

After the blocking the RTU will restart he sequence from the beginning i.e. making new attempts to call the number in each channel. The RTU will continue to attempt to report the alarm until it succeeds.

3.7.5 Selecting paging system

The RTU can also dial out an alarm directly to a paging system. The correct values must be entered in the parameter channels including Telephone number to PAD, Pager number and more depending on the selected paging system.

The FMC software may handle several paging systems. Countries normally have only one or two paging systems. The systems to use in different countries are listed below. Since this function is heavily dependent on the paging system supplier it might not be completely up to date.

Number	**Paging name**	**Parameters used. See following headlines.**	**Countries**
0	None		
3	MiniCall numeric		Sweden
4	Semadigit		Holland
7	Numerik N/DK	Wt	Norway, Denmark, Sweden
9	Minicall text	Tx, Pw, Id, Pad, Stn	Sweden
10	Semascript	Pad	Holland
11	TAP text	Id, Pad, Stn	England, France, Canada
12	Cityruf DE	Wt	Germany
13	SMS Europ.	Pw, Id, Pad, Stn	Sweden
14	SMS UCP	Pad, Stn	Sweden, Norway, Denmark, Holland, Germany, Austria
16	SemaDigit B	Wt	Belgium
17	SemaDigit NL	Wt	Holland
18	TAP D1 SMS	Pad, Stn	Germany

Number	Paging name	Parameters used. See following headlines.	Countries
19	GSM-SMS	Pad, Stn	Almost all countries
20	Numeric A		Austria
21	SMS-SFR F	Pad, Stn	France
22	SMS-Itineris F	Pad, Stn	France
23	TAP F	Id, Pad, Stn	France
24	SMS-Bouygues	Pad, Stn	France
	Other		

See the next chapter and also 16 "Appendix C - List of channels" for information about the parameters.

To select the paging system you select the name in the Paging system channel.

```
Paging system
SMS UCP
```

Selecting SMS UCP Paging.

Since the paging systems change all the time the internal system software of the FMC might be updated with newer paging systems. If this happen you can select the option "Other" in the paging channel.

```
Paging system
Other
```

Selecting another paging system.

This will immediately change the channel to enable entering the paging code instead.

```
Paging system
code  0
```

Selecting paging system by code.

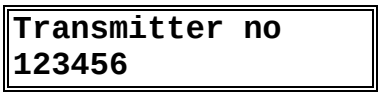
Now you are able to select any paging system supported by the newer system software. This number will be larger than the last number in the table above. Selecting number zero will change back the channel to the normal menu channel.

In the set points from AquaView you always have to select the paging number code. The menu channel is not available there.

3.7.6 Paging system parameters

Information on some of the channels is given on the subscriber agreement and in that company’s documentation.

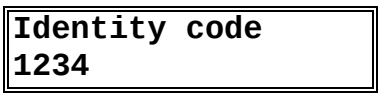
3.7.6.1 Tx = Paging transmitter number



Paging transmitter number

The transmitter number is normally only six characters. It is currently only used in "Minicall text" in Sweden.

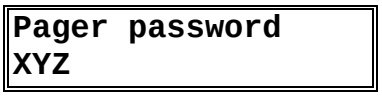
3.7.6.2 Id = Paging identity code



Paging identity code

The identity code may be any text or number.

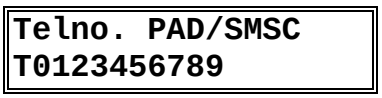
3.7.6.3 Pw = Paging password



Paging password

The password may also be any text or number.

3.7.6.4 Pad = Paging number to PAD/SMSC

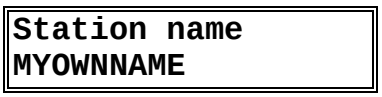


Paging number to PAD/SMSC

The telephone number to the paging central follow the same rules as the normal telephone numbers with the exception that you can not use the "&" character.

3.7.6.5 Stn = Station name

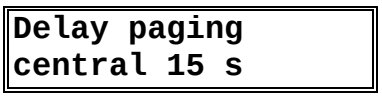
The Station name is entered as specified in the central system.



Station name

Try to select a name as close as the one in the CS to avoid confusion. Only capital letters and numbers are allowed.

3.7.6.6 Wt = Delay paging central



Wait time, delay paging central

The paging delay wait time is used in primitive text paging systems to wait out the voice so the message will be accepted. Some systems do not accept sending the message immediately. This might also be used in other ways in some paging systems.

4 Special alarms and alarm delays

4.1 Analogue and digital alarm delays

Most of the alarms are either delayed by the analogue alarm delay or the digital alarm delay. Set the delays depending on the situation at your station. A general guide is to set both the digital delay and the analogue delay to 10 s but this may need to be changed.

```
Digital delay
  10 s
```

Digital alarm delay set to 10 s

4.2 Power failure delay

A special delay is used for power failure.

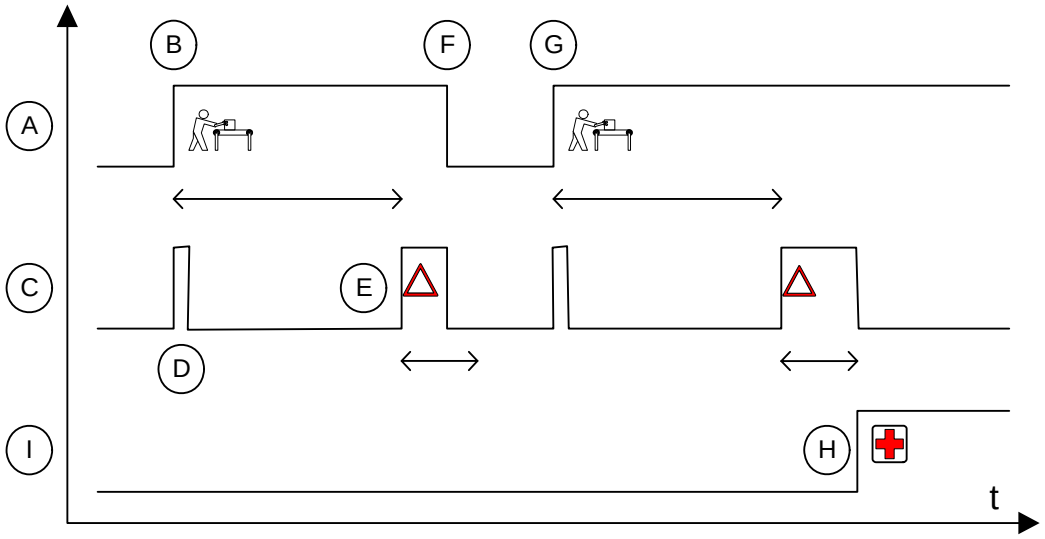
```
Power fail
delay   10 s
```

Power failure alarm delay.

The power failure will stop the pumps immediately. The alarm will however be delayed by the time in the channel. The pumps will start when the power failure signal goes low and after a short start delay.

4.3 Personnel alarm

The personnel alarm is one of the most important alarm functions. The alarm is used when work of any kind is being carried out in the pumping station.



Personnel alarm.

A switch (A) connected to the personnel alarm input, usually the station lighting switch, is operated when work begins (B) in the station, starting a countdown of the specified working period. The output buzzer (C) is activated shortly (D) when the period starts and then when the period has elapsed (E). Some type of warning signal should be connected to this output. The switch should be opened (F) when the warning is received and then closed again to begin a new working period (G). Failure to acknowledge the buzzer signal will start the output siren (I) and send an alarm to the central system (H).

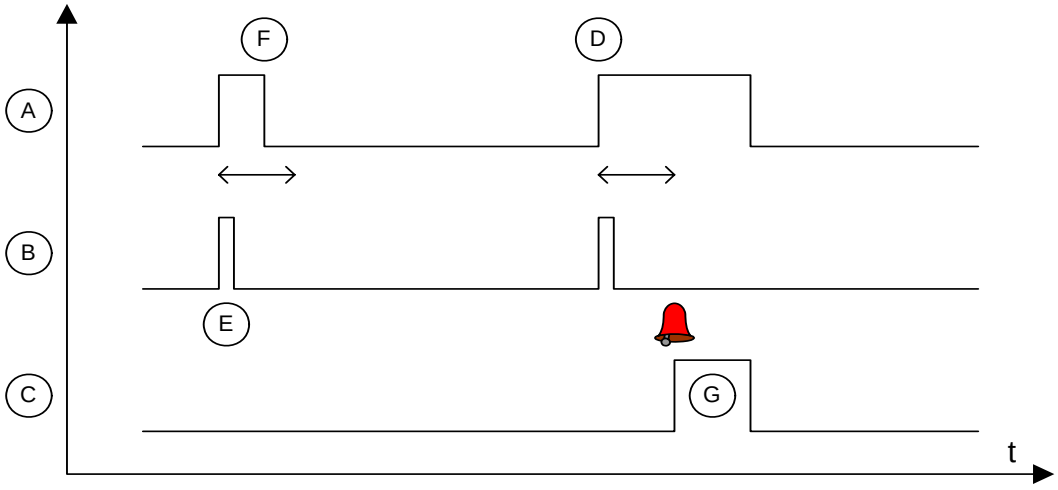
The working and warning periods are set in the Max. work time and Warning time channels, and can also be set from the central system. If the periods are changed while the switch is closed, the new settings will not apply until the switch has been opened.

The personnel alarm is dialled out to the central system or paging in all cases, regardless of the alarm mode selected.

4.4 Intruder alarm

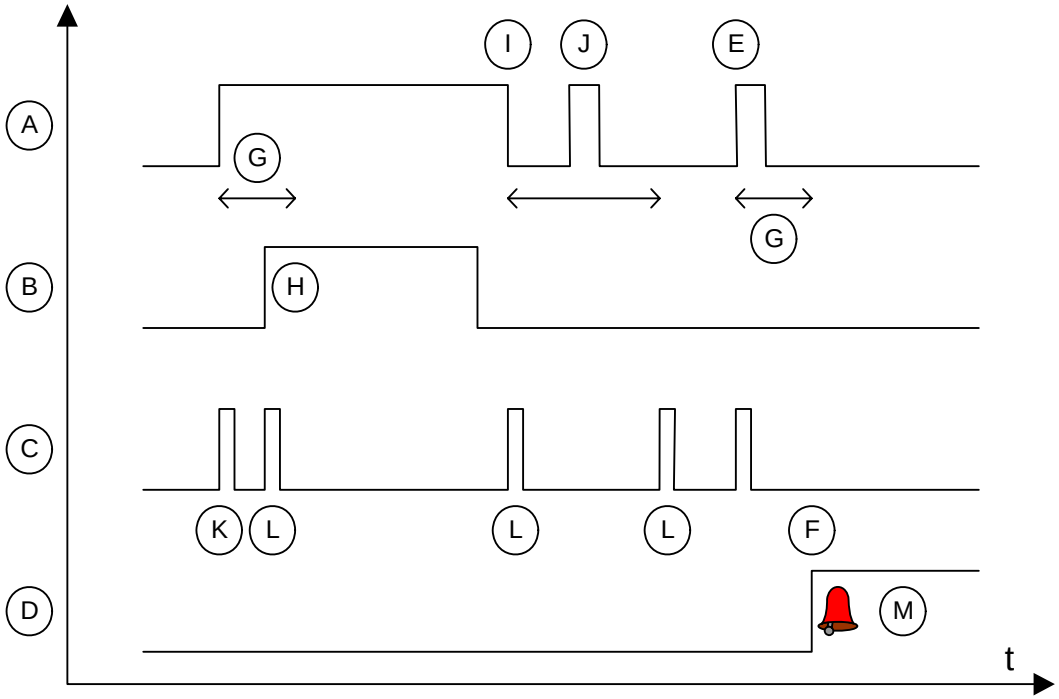
The intruder alarm simply sends an alarm if the input intruder sensor is activated and the alarm is not stopped in some way.

There are two basic ways to use the intruder alarm.



Intruder alarm using only intruder sensor.

The simple way is to use only use the intruder sensor (A) and not use the FMC password. The use of a buzzer output (B) and siren output (C) are optional. If the intruder sensor is high and stay high (D), for the period in the intruder delay channel, the alarm will be created. The intruder alarm is simply stopped by a low signal on intruder sensor (F). The output buzzer signal will be activated for a short beep (E) to indicate that the sensor is activated. When the alarm is created the siren output will be permanently high (G) until the alarm disappears. This solution is suitable when external intruder alarm systems are used.



Intruder alarm using intruder sensor and FMC password.

The other way to use the intruder alarm is to use both intruder sensor input (A) and FMC password (B). The use of the buzzer (C) and siren (D) outputs are optional. If the intruder sensor gets high (E) the alarm (F) will be created after the intruder delay (G). In this case it a low signal on the intruder alarm will not stop the alarm. Enter the password (H) in the FMC to stop the alarm. The FMC will show the password channel automatically. The alarm is deactivated as long as the sensor input is active or as long as the FMC display is active. The intruder alarm is activated again two minutes after the sensor input is low (I) and the display of the FMC is off. Sensor input will be ignored during this period (J). The output signal will be activated for a short beep when the sensor is activated (K) and also when the alarm is turned off by entering the password (L). When the alarm is created the siren output will be permanently high (M) until the alarm is deactivated by entering the password in the FMC.

It is possible to connect intruder sensor and personnel on site signals to the same input. It is also possible to connect buzzer and siren outputs to the same output. See 3.2.3 "Selecting input functions".

4.5 Test alarm

To verify that the alarm distribution is working properly, it is possible to configure the RTU to call out a test alarm. The test alarm has B-priority as default, and is transmitted in the same way as an ordinary alarm according to the settings regarding the alarm distribution.

You set the number of days between every alarm and the time you want the alarm to be transmitted.

```
Testalarm every
 2 days
```

```
Testalarm time
13:00 h:m
```

These settings will send an alarm every other day at 13:00.

4.6 Pump service alarm

The RTU can be programmed with a service alarm, which is activated after the pumps have been in service for a number of hours. The length of the service interval is entered in the Service interval pumps channel in the SERVICE INTERVAL channel group. A service alarm will be generated if the pumps are in service for an extended period.

The Time after service channels show how long the pumps have been in service since the last service. The service interval can be set from the central system.

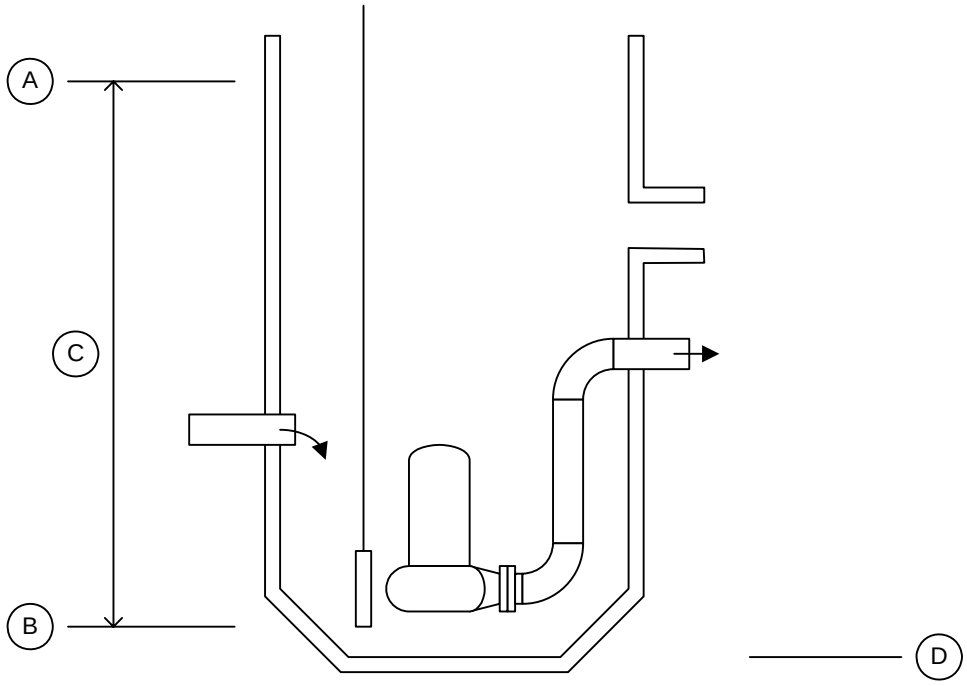
The Time after service channels must be reset on completion of service. Change from the Read to the Write mode in the channel and select Delete value? Yes. The value in the channel will then be zeroed.

5 Analogue sensors

5.1 Level sensor

5.1.1 Level transmitter adjustment

Adjustment of the level transmitter is extremely simple.



The range is specified in the max level (A) and min level (B) channels in the LEVEL group channel. The range of the sensor (C) is max level minus min level. Min level is often set to zero but to get an accurate level and inflow measurement the min level should be set to the distance from the bottom (D) of the sump to the level sensor. In this case also adjust the max level to ensure that the range is accurate.

!

If the pump sump walls are inclined in the normal pumping range it is important to enter the true value for minimum and maximum level to get a correct value on the inflow and capacity calculation.

Max level normally corresponds to the maximum sensor value 20 mA. Min level corresponds to the value 4 mA. It is possible to change the maximum and minimum sensor values 20 and 4 mA if odd level sensors need to be connected. These values are changed if calibration is done.

5.1.2 Level alarms

Low, very low, high and very high level alarm limits are required to enable the level alarms to be monitored. These limits are entered in the High level alarm and Low level alarm channels in the LEVEL channel group. The alarm can also be

provided with hysteresis in the Hyst. level alarm channel to avoid unnecessary alarms.

These alarms use individual alarm delays. The high level alarms are delayed use one delay and the low level alarms use one.

See 3.4.5 "Alarm hysteresis" for a description of the concept of hysteresis.

5.1.3 High and low level alarm outputs

The high level alarms and low level alarms activate digital output signals. The output goes high when the alarm is activated and low when the alarm goes passive.

The outputs are intended to be used to control external equipment. The outputs may also be connected to external alarm systems. See 19 "Appendix F - Connection" for more information.

5.1.4 Level calibration

Level calibration of the transmitter is not required. However, proceed as follows if the need for calibration should arise for any reason:

1. Select the Level (calibrate) channel in the same channel group.
2. Change to the Write mode.
3. Enter the max. level for the transmitter calibration range in the Specify max. level: channel and press Enter to save.
4. Enter the min. level for the transmitter calibration range in the Specify min. level: channel and press Enter to save.
5. When the Transmitter in air. Press <Enter> channel is displayed, lift the transmitter out of the water and press Enter.
6. When the Transmitter in water. Press <Enter> channel is displayed, immerse the transmitter in the water and press Enter.
7. Enter the actual level of the transmitter below the water surface in the Specify actual level: channel and press Enter to save.
8. The message Calibration complete will be displayed.

5.2 General analogue

Many of the programs have the possibility to connect a general analogue signal. This could be used for example to measure different flows, pH, current, temperature or pressure. It is possible to use the input to replace internal calculations for overflow.

5.2.1 Input options

The Maximum value and Minimum value channels must be adjusted to ensure that the transmitter reads the correct value.

It is possible to select different options on this analogue. The options are:

Channel option	Comment
General	The analogue is used as a general input. No unit will be used when the value is presented. The volume calculation will be turned off.
Flow	The analogue is used to measure a flow. The volume of the flow will be calculated.
Overflow	The analogue is used to measure the station overflow. This will replace the overflow calculation by the program using the level and overflow sensors. If the overflow sensor is used this will be used to start the overflow monitoring. If the overflow sensor is not used the overflow will start when the flow is larger than 1 l/s. This requires the analogue to be trimmed to be accurate on 4 mA or else it may register false overflow alarms.
PH	The analogue is used to measure pH.
Temperature	The analogue is used to measure temperature in Celsius.
Pressure	The analogue is used to measure pressure in bar.

5.2.2 Volume calculation

If a flow meter is connected and option Flow selected then the program will calculate the volume on this flow. The flow is integrated, and the total volume is showed in the channel total flow.

5.2.3 Alarms

Low and high alarm limits are required to enable the value to be monitored. These limits are entered in the High alarm and Low alarm channels. The alarm can also be provided with hysteresis in the Alarm Hyster. channel to avoid unnecessary alarms. See 3.4.5 "Alarm hysteresis" for a description of the concept of hysteresis.

5.2.4 Level control output

An object may be controlled by the analogue signal. Enter values in the Start value analogue and Stop value analogue to activate the digital output. This output may be used for example to control an external object or to block the pumps.

The output is active either by high level or low level. The function depends on the order of the start and stop levels. If the start level is higher than the stop level then the output will be activated when the analogue is higher than the start level and it will be de-activated when the analogue is lower than the stop level. If the start level is lower that the stop level the output will be reversed. The output will in this case be activated when the analogue signal is lower than the start level and deactivated when the analogue is higher than the stop level.

6 Operational data

The RTU continuously monitors, measures and stores pumping station data. See 18 "Appendix E - Central system" for the trend measurements and report values, which are recorded in the RTU and which, can be collected in the central system.

The values recorded in the RTU can be read in the appropriate channels. The values are recorded simultaneously in daily and continues basis and presented as todays, yesterdays or continues data. Daily recording means that the saved values are zeroed every midnight. Continuous recording means that each value is saved continuously until it is zeroed manually. Yesterday values are the full day value for the previous day.

It is possible to change mode anytime without loosing any data. All three types of values are recorded and saved continuously.

6.1 Selecting report mode

Selects the manner in which recorded values are to be displayed in the channel. The reporting mode cannot be selected from the central system. Change the setting in the channel:

```
OPERATIONAL DATA
Today's
```

Report mode channel.

6.2 Restarting counters

It is possible to empty the counters for all local continues data. Today's and yesterdays values are not possible to change.

To change any report value first change to continues data.

```
OPERATIONAL DATA
Continuous
```

Report mode in continuous.

Then select the channel with the data to change, select the Write mode and change the value.

6.3 Runtimes and start data

Running times and number of starts are calculated on all pumps.

```
P1 no. of starts
  23 day
```

Daily value for pump 1 number of starts.

```
P1 runtime
 2:10 h:m y-day
```

Yesterday runtime for pump 1.

The program also calculates running time and starts for two simultaneously running pumps. The number of starts in this data is the number of times a second pump starts.

```
Two pump starts
  12 day
```

Daily number of starts for two pumps.

```
Two pump runtime
##### h total
```

Total run time for two pumps.

6.4 VFD frequency and pump torque

The pump frequency and torque are shown individually for each pump.

Pump frequency is shows the control signal sent to the VFD and .pump torque shows the value the VFD calculates.

```
Output freq. P1
42.3 Hz
```

Output frequency for P1 to VFD.

```
Torque P1
  75.3 %
```

Torque for P1 from VFD.

6.5 Cleaning sequences

Cleaning sequences preformed by the VFDs are counted.

```
Num. clean P1
   3 yesterday
```

Cleanings made on P1 yesterday.

7 Pump control

The pump control function determines the manner in which the pumps operate, including starting and stopping, as well as the sequence of operation.

The pump control channels are grouped in the Start and stop levels, Pump control, Advanced pump control and Pump sump cleaning channel group.

7.1 Start and stop level

There is only one start and one stop level.

To control pumps set both the start and the stop level.

The basic function is that the pumps will start and stop around the start level. The last pump running will stop at the stop level.

```
Start level
  1.30 m
```

Start level for pumps.

```
Stop level
  0.40 m
```

Stop level for last running pump.

7.2 Pumping range

Keeping the same level creates a risk of fouling build-up in the sump. This may be prevented by specifying a pumping range. The pump control will slowly change the level within this pumping range several times during a day.

```
Pumping range
  0.30 m
```

Pumping range.

The pumps will be working in the range starting at the start level and up to start level plus pumping range. The fist stating pump will always start at the start level.

Function is turned off by selecting zero range.

7.3 Pump control

7.3.1 Regulation of constant level

The control program is designed to keep a steady level in the pump station. This is done using a PI regulator that reacts on differences between the selected working level an current level. The control logic starts and stops pumps depending on the output of the regulator. If the regulator needs to lower the level and only one pump is running at maximum speed then next pump will start.

```
Amplification
02.00
```

Regulator amplification value.

Set the P value of the regulator. A higher value makes the regulator react faster but with a risk of causing oscillation of level. A lower value makes the regulator react slower but with a risk of high and low levels in the pump station.

```
Integration time
0120 s
```

Regulator integration time.

Set the I value of the regulator. A higher value makes the regulator not so eager on keeping the level and this will use the pump sump more as a buffer, also with a risk on getting high and low levels. A low value will make the regulator more eager on keeping the set point level.

7.3.2 Switching delay

The switching delay is used when the pump control program need to start or stop one pump to keep the regulated level. The delay starts counting when pumps run at maximum or minimum speed.

```
Delay seq. steps
 120 s
```

Delay for starting or stopping next pump.

Do not set this value to low. This may cause pumps to start and stop too quickly.

7.3.3 Min frequency

The min frequency is the lowest speed used to run the pumps. This is an important set point. A to low value may cause high pumping costs and also increase the risk of clogging pump.

```
Min frequency
35.0 Hz
```

Minimum frequency with default value.

If the value is to low then the pump will never pump down to the stop level. This will also cause two pumps to run to long and not switch over to one pump.

A to high value may cause the control toggle between running one pump and two pumps. It will also make the control stop and start one pump unnecessary often when the flow is low.

7.3.4 Backup control

When the level activates the high level float, a backup function intervenes to start a pump. When the level switch signal disappears, a timer function is initiated to ensure that the pumps continue to run for at least the specified time. This time is specified in the high level run time channel.

```
High level run
time   10 s
```

The high level run time channel.

When the timer runs out the pumps will ether continue to run or stop depending on the level signal. The main purpose of the function is to secure the pumping even if the level sensor fails to work. The most common fail on the sensor will make the level show zero. This will stop the pumps when the high level runtime timer runs out. If the level sensor works as normal the pumps will continue to run and stop at the normal stop level.

The pumps are not started if the time is set to zero. In this case only the alarm is created.

The number of pumps that start will depend on the setting in the maximum running pumps channel. It is possible to select exactly witch pumps to start at the high level float. See 7.4.4 "Special control options" for possibilities on how to customize pump operation.

```
Low level block-
time #### s
```

Low level block time channel.

When the low level float is activated a similar function exists to protect the pumps to run if the level sensor fails. The pumps are blocked as long as the low level is active and continued to be blocked the time in the low level block time.

7.3.5 Response error delay

The response error delay controls the time it takes to switch to another pump if the response signal should fail to appear. At the same time the response alarm is created. The switching of pumps only occurs within alternating pumps. If the pump is not alternating the program will only create the alarm and try to run the pump without the response signal. The program will prefer pumps without response error when it starts alternating pumps but it will try to start them if more pumps need to be started. The alarm will disappear (be passive) when the response signal appears the next time. To manually disable the alarm start the pump by hand, the response signal must of course appear.

The delay is also used to remove the over current alarm that may otherwise be trigged when the pump starts.

7.4 Advanced pump control

7.4.1 Action, starting control sequences locally

It is possible to start some automatic pump control sequences locally on the FMC display. The alternatives are to activate the VFD cleaning sequence on a pump. These functions are the same as the corresponding remote command.

```
Action
Select action
```

The select action channel.

The channel return to "Select action" after starting any of the commands.

See **7.6** "**VFD cleaning sequence**" for information on this function.

7.4.2 Boost run time

It is possible to run pumps at full speed a short time at pump start.

```
Boost speed time
  20 s
```

Boost time set to 20 seconds.

The pumps run at full speed also after a cleaning sequence.

7.4.3 Maximum running pumps

It is possible to reduce the number of simultaneously running pumps. Use this function if the hydraulic or electric system can not handle all running pumps. Reducing the number of pumps with this function has no effect on witch pump is running, it only effects how many.

```
Max running
pumps #
```

The channel for maximum running pumps.

Example: For a two pump station entering '1' eliminate the simultaneous running of both pumps.

Almost the same effect is achieved if one or more start level values are set to zero when the alternation is active. All stop levels are however always required on active pumps. The difference between using the maximum running pumps function and removing starting levels is what will happen when the level rise to the high level float. When using maximum running pumps then only the allowed amount of pumps will start. Pumps with no start level will start on the high level float.

7.4.4 Special control options

It is possible to set special options to control the pumps. All these options are normally set to off and they rarely need to be changed.

Option	**Default function.** **Off**	**Special function.** **On**
Disconnected	Pump work as normal.	Pump is disconnected and the control of the pump is turned of completely.
No backup run	Pump start on backup run (High level float).	Pump does not start on backup run.

Option	Default function. Off	Special function. On
No long run blk.	Pump is stopped if running to long time.	Pump is not stopped if running to long time.
Not tele blocked	Pump is blocked when FMC is remote blocked.	Pump is not blocked when the FMC is remote blocked.
No cleaning	VFD is allowed to run cleaning sequence.	VFD is not allowed to run cleaning sequence.

7.4.4.1 Disconnect

Use this option if the pump needs to be removed from the pumping sequence temporary.

7.4.4.2 No backup run

This option will disable the pump from backup run. Backup run normally start all pumps or as many as allowed by maximum running pumps set-point. If the station uses different sized pumps smaller pumps may start when the backup run is activated. Remove these pumps with this option if necessary.

See 7.3.4 "Backup control" for more information.

7.4.4.3 No long run block

The function long runtime block is common for all pumps. If some of the pumps are not suited for this function these pumps may be removed from the block by this option.

See 7.5.1 "Maximum pump time" for more information.

7.4.4.4 Not tele blocked

The pumps stopped if the station receives a remote blocking command. If this is not the desired behaviour set this bit to let the pump continue to run.

See 9.2.2 "Blocking actions" for more information.

7.4.4.5 No cleaning

The VFD detects high torque conditions and initiated a cleaning sequence. If cleaning sequences is not desired on this pump then set this option to on.

See **7.6** "**VFD cleaning sequence**" more information.

7.5 Sump cleaning

7.5.1 Maximum pump time

To prevent a pump from running continuously for a long time, it is possible to enter a time in the channel Maximum pump time. The pump that has exceeded the

limit will be stopped. When the time between starts has elapsed, and the level rises above a start level, the next pump according to the starting sequence will start. This will prevent clogging building up that lowers the capacity of the pump.

This function works with all pumps. If one or more of the pumps is not suitable for this the pump may be removed from the function by changing an option in the special control channel for this pump. See 7.4.4 "Special control options" for details about configuration options.

7.6 VFD cleaning sequence

The Flygt ACS550 is set up to detect clogging conditions. The VFD will signal to the FMC when a clogging condition occurs and ask for allowance to run the cleaning sequence. The FMC then starts the cleaning sequence and waits for it finish.

An event "Cleaning Px" is created to make it possible to track VFD cleanings.

The cleaning sequence is done by repeatedly run the pump forward and backward several times. The exact way is determined by the parameters in the VFD.

7.6.1 Time scheduled cleaning

The FMC may start the VFD cleaning sequence by it self. Select a time interval to run a cleaning sequence.

```
Clean rep. time
#### min
```

Cleaning repeat time.

Time is counted from pump start.

Set the value to zero to turn off the function.

7.6.2 Cleaning alarms

To protect the pump from to many cleaning sequences the FMC counts repeated cleanings made by the VFD. First an alarm is created and if the cleanings continue the FMC will eventually block the VFD cleanings.

```
Alarm clean seq.
##
```

Number of cleanings to create the first alarm.

Select number of repeated cleanings in this channel to create the first alarm.

Set this value to zero to turn of the alarm.

```
Max clean in seq
##
```

Number of repeated cleanings to block.

Select the number of repeated cleanings required to block the VFD cleaning sequence. Another alarm is created when the cleaning sequence is blocked.

To remove the blocking condition press the acknowledge button. See next section.

Set this value to zero to turn of the blocking function.

7.6.3 Unblocking cleaning sequence

The VFD cleaning sequence is protected to run forever. When the cleaning sequence has been blocked you have to unblock this condition by pressing the acknowledge button or sending an unblocking remote command.

	The blocking of the cleaning sequence is removed by pressing the acknowledge button.

8 Flow calculations

The flow calculations are carried out independent of the pump control. It is not necessary to control the pumps to use the flow calculations. The flow calculations only use the level sensor, and optionally other analogue signals, look if the pumps are running using the response signals and then calculate flows and volumes.

8.1 Volume pulse

It is possible to control external equipments like a water sampler or a chemical feeder based on different flows in the station. A digital output is used to start the equipment using a 3 second pulse. The pulse is created when the amount of water has passed.

```
Volume pulse
#####.# m3/pulse
```

Amount of water to make a pulse.

Select the water flow to use to create the pulse.

```
Volume pulse src
################
```

Channel to select pulse source.

The following options are possible.

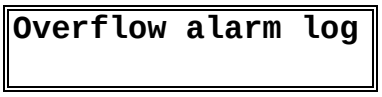
Overflow	The pulse is created using the overflow. An extra pulse is created when the overflow starts.
Generic ana flow	The pulse is created using the generic analogue.

8.2 Overflow

The monitoring and recording of overflow conditions is an important element of pump station monitoring. The overflow flow, overflow time, number of overflows and overflow quantity are recorded in the RTU. An overflow alarm is generated and recorded in its own Overflow alarm log when overflow occurs. All channels which process overflow monitoring and recording are located in the OVERFLOW… channel group.

8.2.1 Overflow alarm log

In addition to the ordinary alarm log, overflow alarms are stored in a special log for overflow alarms only. The overflow alarm log is located in the FLOWS... group channel



Overflow alarm log channel

Activation and passivation are both shown in the overflow alarm log.

To view the overflow alarm log:

1. Select the Overflow alarm log channel.
2. To view and scroll through the alarms, press the Read/print button so that the LED lights and the RTU enter the print mode. Press Read/print again to return to the Read mode.
3. The most recent alarm will be displayed.
4. To view earlier alarms: Press the Left arrow button. When the earliest alarm has been scrolled up, the text Alarm end and the alarm in question will be displayed.
5. To return to a more recent alarm, press the Right arrow button. As in the case of the earliest alarm, a message will be displayed when the last recorded alarm has been reached.
6. To return to the Overflow alarm log channel, press the Read/print button until the LED lights and the RTU returns to the print mode. Press Read/print again to return to the Read mode.

Alarms cannot be deleted from the overflow alarm log.

8.2.2 Setting of overflow monitoring

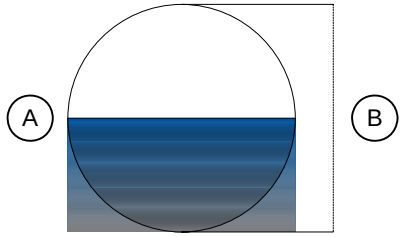
A conventional level switch or an overflow transmitter can be used to record overflow. If a switch is chosen, the RTU will record the overflow period and the number of overflows. There is a delay of 15 sec before the calculation starts to prevent faulty values. A transmitter should be installed if the overflow flow is also to be recorded since this device will provide more accurate values than a level switch.

When selecting a transmitter, it is important to specify a type, which has a very high accuracy and is insensitive to changes in atmospheric pressure, fouling, floating sludge and foaming. The transmitter must also be completely submersible.

To enable the RTU to calculate the overflow quantity, the height of the overflow range must be entered and the overflow curve defined. This is done by specifying the flow, which will occur at different overflow levels. Instead of entering the values for the different overflow segments this can be done by the program in order to ease your calculations in the case of rectangular or V-notch weir.

The type of weir that is used are entered in the Weir select channel, rectangular for rectangular weir, V-notch for the V-notch shaped weir and manual if the values are to be entered manually.

The overflow range is the height of the overflow outlet in the pump sump. The overflow level, which varies between 0 and the top of the overflow range, is the level in the overflow outlet under overflow conditions.



A = Overflow level
B = Overflow range

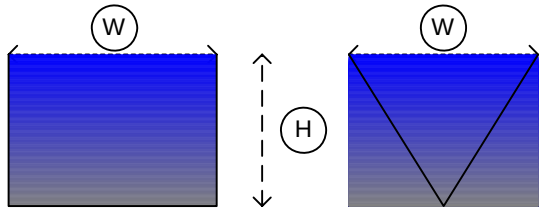
Overflow level and overflow range.

First enter the overflow range. This is entered in the Overflow range channel in the OVERFLOW… channel group.

8.2.3 Using a weir to specify overflow segments

If the Rectangular or V-notch are selected, the width of the weir have to be entered in the Weir width channel, and the discharge coefficient associated with the current weir have to be entered in the channel Discharge coeff.

The discharge coefficient is a value in the range of 0.00-1.00 that describes certain properties of the weir such as the shape of the edge, the dimensions of the channel and of the approach and more. The typical value for rectangular weir is Dc ≈ 0.62, and for V-notch weir Dc ≈ 0.58, but it may differ. The manufacturer of the weir should provide this coefficient. What is described in words above is also explained by the following figure except for the Dc.

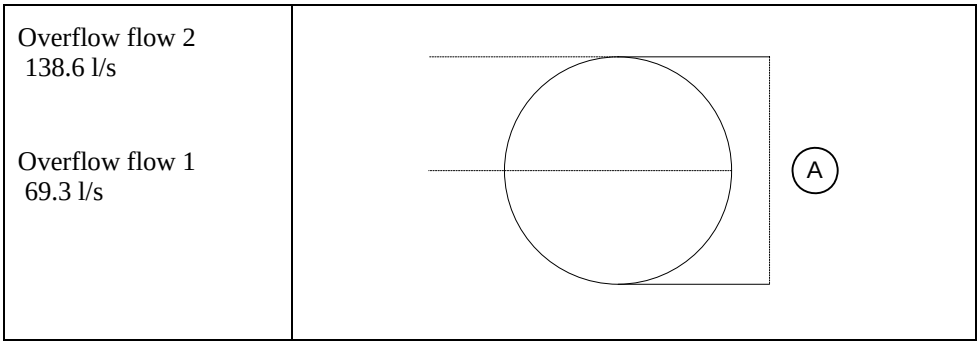


W = Weir width.
H = Overflow range.
Left = Rectangular, right = V-notch.

8.2.4 Setting the overflow segments manually

The overflow curve parameters are then entered. Up to 20 overflow levels can be specified. Although the RTU can calculate the curve for only two levels, it will be more accurate if the values for several levels are entered.

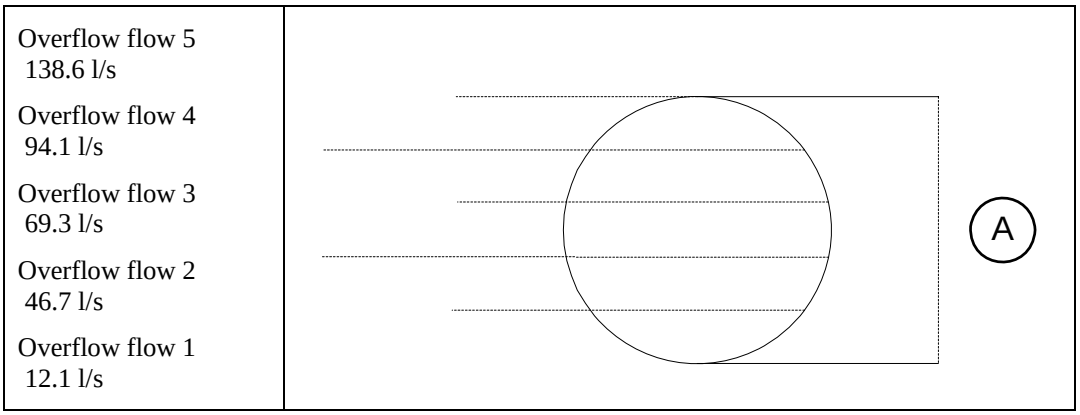
Distribute the chosen levels evenly over the overflow range. If the flow is only specified at two overflow levels, the levels midway in the overflow range and the max. level should be chosen.



A = Overflow range

Flow curve defined by two levels.

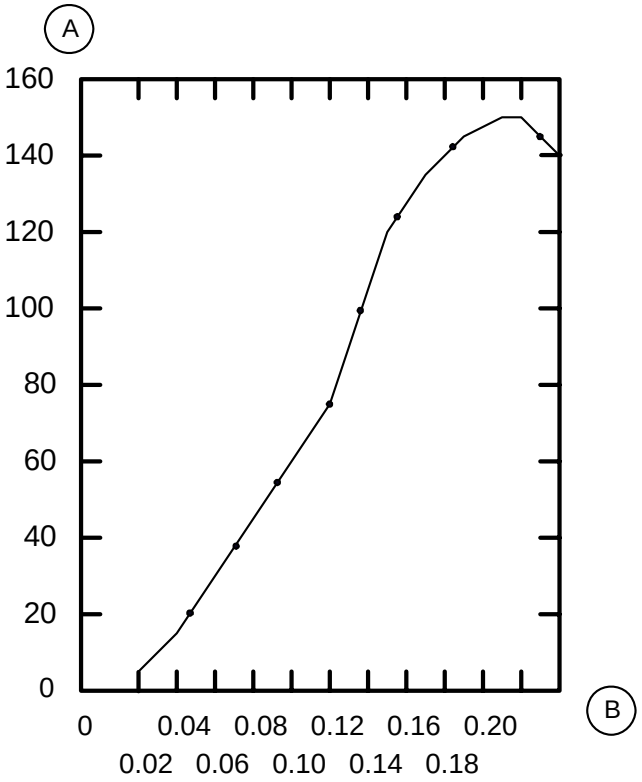
In the example below, the flow is specified at 5 different levels.



A = Overflow range

Flow curve defined at five levels.

Finally, the figure below shows a typical overflow curve calculated on the basis of ten entered values.



A = Overflow flow l/s
B = Level, m

Typical overflow curve.

The overflow curve will not be correct if the overflow flow is obstructed or if there is not a free fall to the receiver.

The overflow range and flow can be set from the central system.

9 Blocking

The blocking functions in the FMC are used mainly to prevent overflows in unsuitable stations. When the flows from several stations converge and the station there is not dimensioned to handle the total flow this function may be used to improve the situation. It is also used to avoid overflows in especially sensitive receivers.

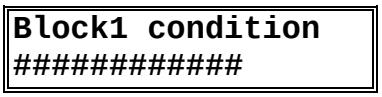
The blocking functions work in principle by sending messages between the FMC's to stop one or more of the stations from pumping. The messages may be sent by telephone calls or by fixed line. The condition that is used to generate and send the blocking message is highly configurable. The action carried out may be to stop one or more pumps or to set an output signal that does something else. The flexibility of the function makes it possible to use it in other ways than blocking.

9.1 Sending blocking commands

9.1.1 Blocking conditions

The blocking conditions are the rules the FMC use to decide when to send a blocking command, either dialled or fixed. There are two independent sets of conditions and it is possible to select witch stations to send the blocking command to on each set.

The conditions inputs that are used to generate a blocking of another RTU is given in the channel Block condition. One or more conditions can be chosen.



Blocking conditions

Two block condition channels exist. The channel has the options below:

Channel option	**Blocking condition**
Px failed	Blocking is activated if the pump is failed. Pump has a leak alarm, trip alarm, high temperature alarm or blocked by a low current alarm.
Px switched off	Blocking is activated when the pump is switched of manually.
Block levels	Blocking levels used. Blocking is activated when the sump level reaches the blocking level.
High level	Blocking is activated when the sump level reach the high level alarm limit.
Extrem high lev.	Blocking is activated when the sump level reach the extra high level alarm limit.
High level input	Blocking is activated when the sump level reach the high level float.

Channel option	Blocking condition
Overflow input	Blocking is activated when the sump level reach the overflow level float/sensor.
Power fail input	Blocking is activated when power fail is detected.
Block input	Blocking is activated when a special digital input is activated.
Gen ana level	General analogue levels used. Blocking is activated when the general analogue reach the start level.

In the channel Block logic it is possible to select if all conditions or only one condition need to be active to start the blocking. Select "or" if only one condition is needed. Select "and" if all conditions are needed.

```
Block 1 logic
########
```

Select "and" or "or".

Two channels with block logic exist.

9.1.2 Selecting stations to block in dialled blocking

These channels are only used in dialled communication. Select the stations to send blocking commands to by entering the telephone numbers to the stations in the telephone channels.

```
Telephone #1
12345678
```

Telephone number one of six.

Select telephone number to use by the two blocking conditions by setting the channel:

```
Block1 tele# use
000101
```

Telephone numbers 1 and 3 used by blocking command 1.

Two channels that select telephone numbers exist.

9.1.3 Blocking using level sensor

If blocking levels are selected as condition also set the level to start and stop the blocking using the level sensor.

```
Blocking level
@##.## m
```

Send blocking command on this level.

```
Unblocking level
@##.## m
```

Send unblocking command on this level.

9.1.4 Delaying the block messages

The blocking messages are delayed before sent by two channels, block delay and deblock delay. If for example a level float is used as condition the delays are needed to avoid too many telephone calls.

Block delay
s

Delay for sending a block command.

Deblock delay
s

Delay for sending a unblock command.

9.2 Receiving a blocking command

9.2.1 Blocking status

In normal state, the channel Block status displays the text Not Blocked. If the RTU has been blocked by another RTU the text will be changed to Blocked. When the RTU has been deblocked the text Not blocked is shown again.

Blocked status
Blocked

Station blocked.

To reset the blocking, change the value to "not blocked". This channel can also be used to block the station. This can be used for example to test the blocking functions.

9.2.2 Blocking actions

It is possible to choose activity when an RTU has received a blocking command from another RTU. The pumps are normally blocked when a remote block command is received. To disable blocking of a pump, set the "Not tele blocked" option in the special control channel for the pump. See 7.4.4 "Special control options" on how to do this.

The blocked output is activated by default. The output has to be selected on most programs. See 3.2.4 "Selecting output functions".

9.2.3 Blocking data

Blocking time and events are displayed in two channels. This data are also sent to report.

9.2.4 Selecting stations to block in fixed line blocking

These channels are only used in fixed line communication. Select the station to receive blocking commands from by entering the station fixed line ID. The ID to enter is found in the channel "ID fixed line" in the sending station.

```
Blocked by ID
@#
```

ID number of station blocking this station.

Also select if block 1 condition or block 2 condition in the sending station should block this station.

```
Blocked by func
01
```

Blocking function 1 selected to block this station.

Blocking commands in fixed line communication is using the AquaCom telegram TIO. In this telegram there are possibilities to get values from other RTU:s connected to another fixed line network. See the Mtc-Com manual on how to use this function.

9.3 Blocking safety

If the transmission fails, the FMC attempts to reach the other FMC as long as the blocking conditions are fulfilled. To increase safety two channels are used. The first in the sending/blocking FMC is a repeat of the blocking command. The second in the receiving/blocked FMC is a timeout of the blocked command. Both or none of the channels has to be used.

```
Repeat block.
#### min
```

Channel to repeat the blocking command.

Set this channel and the FMC will send repeated blocking commands with this interval. Do not set this channel shorter than the time it takes to dial all blocked stations.

```
Timeout block.
#### min
```

Channel to remove the blocking command.

The timeout of the blocking will unblock (remove the blocking command) from the station. If the communication for some reason fails the FMC will resume normal pumping after this time. When the blocking command is repeated the time out will restart. The time out has to be longer than the repeat block time in the blocking FMC.

10 Counter

A pulse with duration exceeding 10 ms can be connected to the RTU to count pulses. This could be used for example to measure precipitation (see 19 "Appendix F - Connection" for information on the terminal block to which the pulse must be connected). Commence by entering the value per pulse in the Counter scale channel. See the supplier’s documentation for information regarding this value.

When the amount per pulse value has been entered, the quantity will be recorded in the RTU. The recorded value will be displayed in the Counter channel, which is the first channel in the group channel of the same name. The form in which the value is reported (daily or continuous) will depend on how the RTU is configured. See the beginning of this chapter for instructions on how to select the reporting mode and how to delete recorded values.

An alarm limit can also be entered in the Max value 5 min or in the Max value 24h channel. The limit should be stated in quantity for a 5-minute or a 24-hour period. The COUNTER group channel contains channels for entering settings and reading out recorded values. All settings can be sent from the central system.

11 Function timers

The program is equipped with two timer functions. Each timer function is controlled by one digital input and control one digital output. The two timer functions are equal.

There is one channel for each timer function to select operation for the timer. There are six functions to select and there are also two channels for each timer to select time delays.

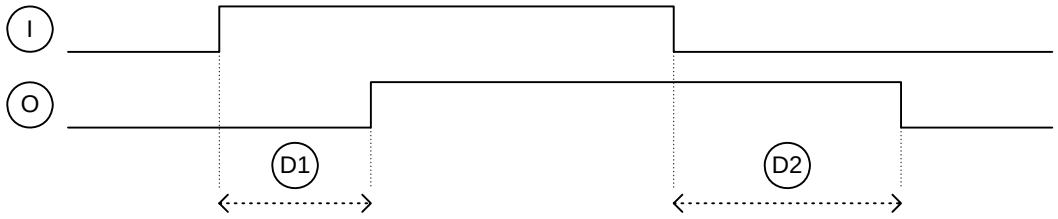
I = Timer input signal.

O = Timer output signal.

D1 = Pulse delay.

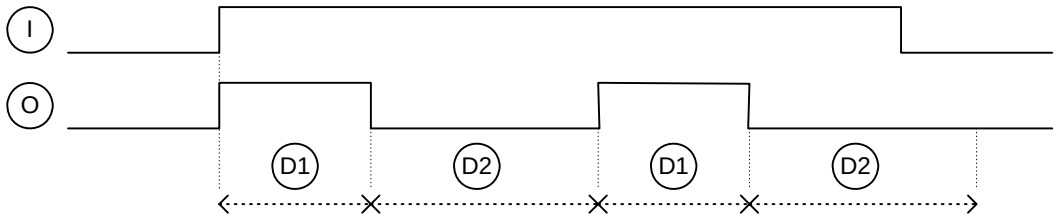
D2 = Pause delay.

Option: On/off delay



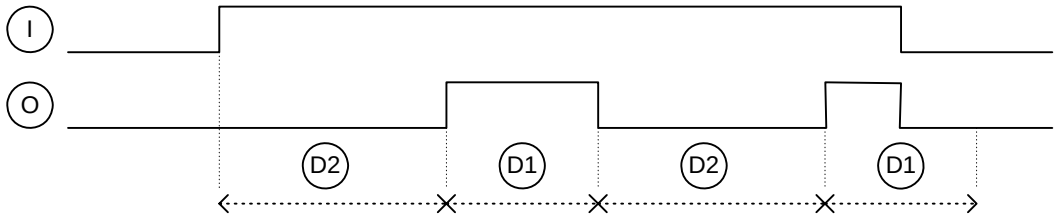
This option will delay the input to the output signal.

Option: Pulses



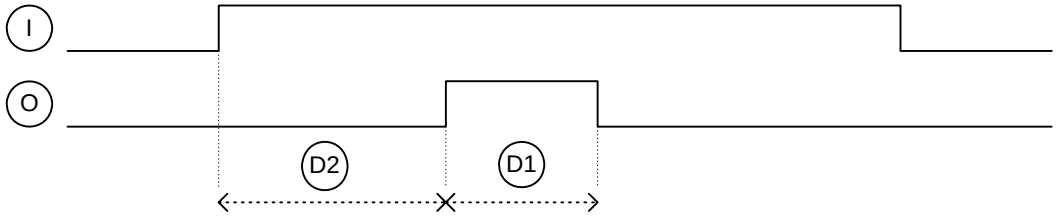
This option will create pulses on the output as long as the input is active.

Option: Pulses delayed



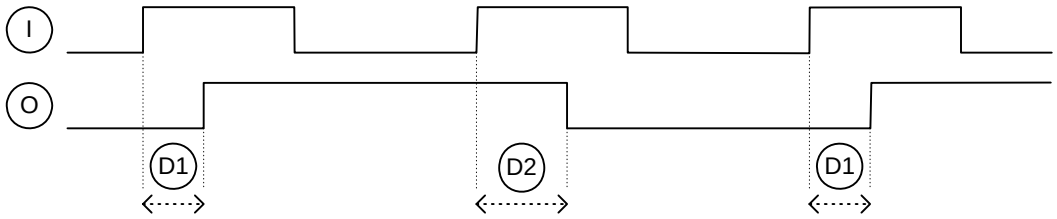
This option will also create pulses on the output but start with the delay.

Option: 1 pulse



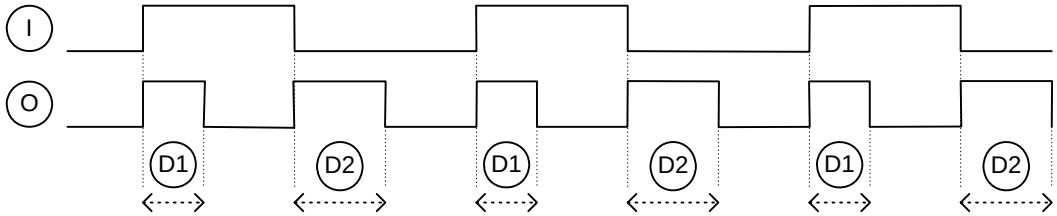
This option will create one single output pulse.

Option: Halve pulse



This option will create pulses on the output with half the frequency as the input.

Option: Double pulse



This option will create pulses on the output with double frequency as the input.

12 Safety

12.1 Personal safety

! N.B.
Care must be taken to ensure that personnel cannot come in contact with live cabling or terminal blocks in the course of connection or service work. Maximum caution must be exercised when working on the digital outputs.

12.2 Password function

Two password channels are included in the first channel group to prevent unauthorised personnel from altering settings in the RTU. The function is activated by entering the appropriate four-digit code in the New password channel. When an operator wishes to alter a setting in any channel using the buttons on the front panel, the code must first be entered before the data can be changed.

Remember that unauthorised personnel must also be prevented from changing settings from the central system to ensure full protection against unauthorised alterations.

See 3.1.8 "Password" for a description of this function.

12.3 Personnel alarm

The purpose of the personnel alarm function is to increase personnel safety when working in the pumping station. Always activate this alarm when connecting the RTU. See 4.3 "Personnel alarm" for a description of this function.

13 Service and maintenance

!

N.B.
Care must be taken to ensure that personnel cannot come in contact with live cabling or terminal blocks in the course of connection or service work. Maximum caution must be exercised when working on the digital outputs.

13.1 Battery life

An external uninterruptedly power source (UPS) can be connected to the RTU. This means that the RTU will continue to record data in the event of a power failure. The duration of the power available under these conditions will depend on the type of battery. The life of a battery normally ranges from two to five years (see battery manufacturer's specifications).

13.2 Replacement of components

Contact ITT Flygt, Technical Support, if hardware components need to be replaced. Check the following details:

- Type of hardware. The designation can be found at the lower right-hand corner of the front panel.
- Hardware serial number located at the extreme left of the unit above the terminal blocks.
- The program name found in the first or second channel.
- The project number found in the Project number channel. This is also found in the set points.
- In the case of software, information regarding the system version and program identity number is required. This will be found in the System information channel. Identity number is also found in the status picture.

13.3 Service in pumping station

A number of recommendations must be followed when carrying out service in the pumping station, for example when removing pumps for maintenance. Start by resetting the alarm mode from remote to Local, to avoid the possible transmission of false alarms to the alarm or central system. Personnel alarms will be rung out regardless of which alarm mode is selected (see under Alarms in the chapter headed Changing alarm mode. The Remote mode should be reselected on completion of service work.

In the case of a dial-up workstation with a spare telephone, an answering delay can be entered in the RTU to allow time for answering the phone. The delay is entered in the Response delay dialled channel.

Changes in settings, for example in pump control, which will apply only during the actual maintenance work, can be carried out most easily using the buttons on the RTU front panel. This makes it easy to restore all of the settings by re-entering the set points from the central system when work has been completed.

When altering settings temporarily in the RTU in the absence of a central system, the original values should be noted to ensure that they can easily be restored.

14 Appendix A - Fault tracing

!

N.B.
Care must be taken to ensure that personnel cannot come in contact with live cabling or terminal blocks in the course of connection or service work. Maximum caution must be exercised when working on the digital outputs.

In the event of problems with the RTU, start by checking the points in this chapter. If this does not provide a solution, contact ITT Flygt, Technical Support. Ensure that the information listed below is available. The channels referred to here are located in the major channel group.

In the case of software, information regarding the system and program identity is required. This will be found in the System: 3.07.00 ProgID:. channel (the system version may vary).

```
System:  3.07.00
ProgID:     7036
```

Type of connection (see Communication channel)
RTU telephone number (in the case of dial-up RTU type)
Hardware product designation and serial number

A = Product designation
B = Serial number

Product designation and serial number.

Type, version and revision number of central system

14.1 Common problem

The following are some of the most common problems dealt with by Technical Support.

? **Central system is receiving no data**

First determine if the problem is in the central system or in the RTU. Check if data is being received from other RTUs. If so, the problem is probably in the RTU. Otherwise, see the central system documentation.

See Checking communication below if the problem appears to be with the RTU.

? **Only one pump starts regardless of the level in the sump**

First check if any of the pump alarms is active, in which case the pump is blocked.

Next, check the pump control setting.

Is a starting level value missing?
Check that the stopping level values are correct.
Check that the Max. number of pumps running channel is set to ‘1’.
If the pump control parameters are correct, check the connection of the unit as described in the general installation instructions and Appendix - Connection.

? **Pump does not start although starting delay has long elapsed**

Check that the random starting range is not too big.

Check the connection of the unit as described in the general installation instructions and Appendix - Connection.

?

Pump currents are not recorded

Check the pump current settings. See under Pump currents in the chapter headed Monitoring and measurement.

Check that the pump operating responses are connected correctly. The currents are recorded only when pump is running.

? **No level signal from transmitter**

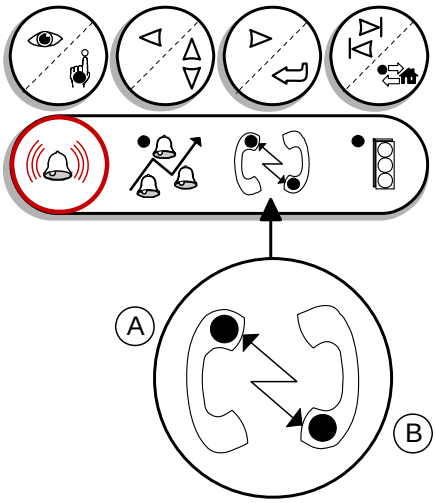
Start by checking that level transmitter settings have been entered. See under Setting of transmitter in the chapter headed Starting the RTU.

Check that the transmitter is correctly installed, then carry out test measurement.

14.1.1 Checking communication

Start by checking the modem connections. Check that the cables are connected securely. Remember to check the supply voltage to an external modem.

Check the communication LED’s on the front panel. These should flash when the unit is transmitting and receiving data.



A = LED flashes when receiving data
B = LED flashes when RTU is transmitting data.

Communication LED's.

Modem with dedicated connection between RTU and central system:

Check the modem LED's to determine if the modem is transmitting and receiving data. See the modem manual for details.

Modem with dial-up connection between RTU and central system:

First check the telephone connection. Connect a telephone in parallel with the RTU. Test the connection by calling another number.

Next, call the RTU from an ordinary telephone to see if the RTU answers.

14.1.2 Checking level transmitter signal

Check for a voltage of at least 8 V d.c. across the terminals.

Lift the transmitter out of the water and check that it is delivering a 4 mA current signal. Check that the signal changes when the transmitter is again immersed in the water.

Note that transmitter does not require to be calibrated; only the Max. level and Min. level settings require to be set.

14.1.3 Testing digital inputs

To test a digital input, activate a signal, such as a motor protection. Check that the DI status in the DI status channel in the major channel group is changed and that the LED lights.

14.1.4 Testing annunciator panel

To test that all LED's on the annunciator panel are working, press and hold the alarm acknowledgement button until the LED's begin to flash. The LED's will return to normal operation when the button is released.

14.1.5 Checking supply voltage

Check the power supply unit connections. Measure the supply voltage at the terminal block.

15 Appendix B - Front panel LED’s

15.1 Alarm panel LED's

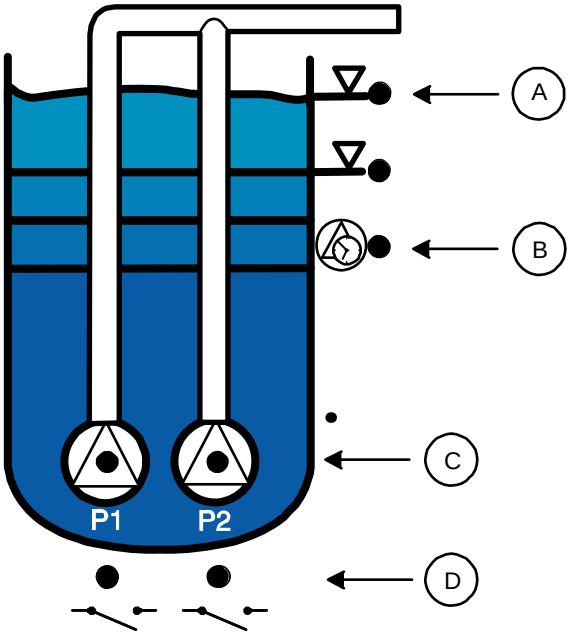
LED’s displays the alarms on the annunciation panel as follows:

Alarm LED

Number	Description
1	Overflow.
2	Power failure.
3	High level sensor or float.
4	Low level sensor or float.
5	P1 tripped.
6	P2 tripped.
7	Blocked cleaning sequence for Pump 1.
8	Blocked cleaning sequence for Pump 2.
11	Internal failue P1. Service or no response.
12	Internal failue P2. Service or no response.
13	P1 switched off.
14	P2 switched off.
15	This station is remote blocked or station is controlled by remote command from status.
16	New alarms in alarm log.

15.2 Operation LED’s

The following LED’s indicates pump operation:



A = Indicate when the start level is reached for respective pump
B = Capacity measurement in progress
C = Pump running
D = Pump start output active

Operating indications.

16 Appendix C - List of channels

The list is composed as follows: The left-hand column, Display, shows the appearance of the display in the particular channel. The # character indicates those positions which may/should indicate values. The next column shows the text displayed in the set point setting in the central system, and the range and options which the channel may afford.

Menus

SELECT CHANNEL

No	Menu Name	Specification	Description
0	SELECT CHANNEL ### (0-xxx)	**Writable**	Start channel in which channels can be selected.

CLC 200 1.00

No	Menu Name	Specification	Description
1	CLC 200 1.00 20##-##-## ##:##	**Writable**	Shows program name and date/time. Date and time must be set in a cold started system before it activates the controlling.
2	Display channel ################	**Writable** **Alternative** 0 = User 1 = Parameter 2 = Service	Selection of showed channels. User - Show only result channels. Parameter - Show all application set-up channels. Service - Show all channels including system channels.
3	¤ Language ################	**Writable** **Alternative** 0 = English 1 = Svenska **Central System Text** Language	Select language to show and use in the display for this RTU. 0=English, 1=Svenska.
4	Show functions ##############	**Writable** **Alternative** 1 = Person.+burglary 2 = - 3 = General analog 4 = Adv. pump contr. 5 = Flush+vol. pulse 6 = ACS550 cleaning 7 = Overflow 8 = Service larm 9 = Blocking in+out 10 = - 11 = Counter 12 = Test alarm 13 = Timers 14 = Pump 2 **Central System Text** Show functions	Select the functions that shall be visible in the display.
5	System: Progid:	**Read only**	Identifies the RTU program unique ID. Quote this information together with the program name in channel 1 when you are calling ITT Flygt support regarding software questions.
6	Project number ######.##	**Writable** **Interval** 0.00 To 999999.99 **Central System Text** Project number	Enter the ITT Flygt project number. For example 97M123A will be 97123.01.
7	Program mode ################	**Writable** **Alternative** 0 = Normal run 1 = Warm start 2 = Cold start	Selections: 0 = Normal run. 1 = Warm start (no data loss). 2 = Cold start (remove data). 3 = Remote COM3 (remote service through modem). 4 = Remote COM1. 5 = Remote COM4. 6 = Save setpoints (to file). 7 =

		3 = Remote load COM3 4 = Remote load COM1 5 = Remote load COM4 6 = Save setpoints 7 = Load setpoints 8 = Save defaults 9 = Normal locked **Central System Text** Program mode	Load setpoints (from file).
8	Default channel ###	**Writable**	Select default channel number. This channel is selected when no button is tuched in 5 minutes. The display background light is turned of at the same time.
9	Enter password ####	**Writable**	Used to logging in to a RTU with activated password. If a new password is selected it protects all channels.
10	New password ####	**Writable**	Sets a new password. To change the password you need to enter the current password first. Password is disabled by entering a zero.

PHYSICAL SETUP

No	Menu Name	Specification	Description
11	PHYSICAL SETUP ...	**Read only**	Setup of digital and analogue signals.
12	Status inputs ################	**Writable** **Alternative** 1 = Di 01 2 = Di 02 3 = Di 03 4 = Di 04 5 = Di 05 6 = Di 06 7 = Di 07 8 = Di 08 9 = Di 09 10 = Di 10 11 = Di 11 12 = Di 12 13 = Di 13 14 = Di 14 15 = Di 15 16 = Di 16	System channel. This channel shows the status of the digital inputs. '0' = Input not active, '1' = input active. Change to write mode to see the function is of each input.
13	Inverse inputs ################	**Writable** **Alternative** 1 = Di 01 2 = Di 02 3 = Di 03 4 = Di 04 5 = Di 05 6 = Di 06 7 = Di 07 8 = Di 08 9 = Di 09 10 = Di 10 11 = Di 11 12 = Di 12 13 = Di 13 14 = Di 14 15 = Di 15 16 = Di 16 **Central System Text** Inverse inputs 1-16 (0=NO, 1=NC)	System channel. Select which digital input signals to invert. '0' = NO, normal open contact and '1' = NC, normal closed contact, inverted.
14	Function inp. 09 ################	**Writable** **Alternative** 0 = Not used 1 = Overflow sensor 2 = Spare alarm 3 = Intruder sensor 4 = Personnel onsite 5 = Intr.sens+pers. 6 = Block remote **Central System Text**	Function on input signal 09. Select function: 0=Not used, 1=Overflow sensor, 2=Spare alarm, 3=Intruder sensor, 4=Personnel onsite, 5=Intr.sens+pers., 6=Block remote.

		Function on input 09	
15	Function inp. 10 ################	**Writable** **Alternative** 0 = Not used 1 = Power fail 2 = Spare alarm 3 = Intruder sensor 4 = Personnel onsite 5 = Intr.sens+pers. 6 = Block remote **Central System Text** Function on input 10	Function on input signal 10. Select function: 0=Not used, 1=Power fail, 2=Spare alarm, 3=Intruder sensor, 4=Personnel onsite, 5=Intr.sens+pers., 6=Block remote.
16	Function inp. 11 ################	**Writable** **Alternative** 0 = Not used 1 = High float 2 = Spare alarm 3 = Intruder sensor 4 = Personnel onsite 5 = Intr.sens+pers. 6 = Block remote **Central System Text** Function on input 11	Function on input signal 11. Select function: 0=Not used, 1=High float, 2=Spare alarm, 3=Intruder sensor, 4=Personnel onsite, 5=Intr.sens+pers., 6=Block remote.
17	Function inp. 12 ################	**Writable** **Alternative** 0 = Not used 1 = Low float 2 = Spare alarm 3 = Intruder sensor 4 = Personnel onsite 5 = Intr.sens+pers. 6 = Block remote **Central System Text** Function on input 12	Function on input signal 12. Select function: 0=Not used, 1=Low float, 2=Spare alarm, 3=Intruder sensor, 4=Personnel onsite, 5=Intr.sens+pers., 6=Block remote.
18	Function inp. 13 ################	**Writable** **Alternative** 0 = Not used 1 = P1 Off switch 2 = Spare alarm 3 = Intruder sensor 4 = Personnel onsite 5 = Intr.sens+pers. 6 = Block remote 7 = Counter pulse 8 = Timer 1 9 = Timer 2 **Central System Text** Function on input 13	Function on input signal 13. Select function: 0=Not used, 1=P1 Off switch, 2=Spare alarm, 3=Intruder sensor, 4=Personnel onsite, 5=Intr.sens+pers., 6=Block remote, 7=Counter pulse, 8=Timer 1, 9=Timer 2.
19	Function inp. 14 ################	**Writable** **Alternative** 0 = Not used 1 = P2 Off switch 2 = Spare alarm 3 = Intruder sensor	Function on input signal 14. Select function: 0=Not used, 1=P2 Off switch, 2=Spare alarm, 3=Intruder sensor, 4=Personnel onsite, 5=Intr.sens+pers., 6=Block remote, 7=Counter pulse, 8=Timer 1, 9=Timer 2.

		4 = Personnel onsite 5 = Intr.sens+pers. 6 = Block remote 7 = Counter pulse 8 = Timer 1 9 = Timer 2 **Central System Text** Function on input 14	
20	Function inp. 15 ################	**Writable** **Alternative** 0 = Not used 1 = Counter pulse 2 = Spare alarm 3 = Intruder sensor 4 = Personnel onsite 5 = Intr.sens+pers. 6 = Block remote 7 = Counter pulse 8 = Timer 1 9 = Timer 2 **Central System Text** Function on input 15	Function on input signal 15. Select function: 0=Not used, 1=Counter pulse, 2=Spare alarm, 3=Intruder sensor, 4=Personnel onsite, 5=Intr.sens+pers., 6=Block remote, 7=Counter pulse, 8=Timer 1, 9=Timer 2.
21	Function inp. 16 ################	**Writable** **Alternative** 0 = Not used 1 = Personnel onsite 2 = Spare alarm 3 = Intruder sensor 4 = Personnel onsite 5 = Intr.sens+pers. 6 = Block remote 7 = Counter pulse 8 = Timer 1 9 = Timer 2 **Central System Text** Function on input 16	Function on input signal 16. Select function: 0=Not used, 1=Personnel onsite, 2=Spare alarm, 3=Intruder sensor, 4=Personnel onsite, 5=Intr.sens+pers., 6=Block remote, 7=Counter pulse, 8=Timer 1, 9=Timer 2.
22	Function out. 05 ################	**Writable** **Alternative** 0 = Not used 1 = High level 2 = Extrem high lev. 3 = Generic analog 4 4 = Remote blocked 5 = Alarm pulse 6 = Alarm status 7 = Alarm active 8 = Timer 1 out 9 = Watchdog 10 = Remote 1 11 = Buzzer 12 = Siren 13 = Buzzer+siren 14 = Volume pulse **Central System Text** Function on output 05	Function on output signal 05. Select function: 0=Not used, 1=High level, 2=Extrem high lev., 3=Generic analog 4, 4=Remote blocked, 5=Alarm pulse, 6=Alarm status, 7=Alarm active, 8=Timer 1 out, 9=Watchdog, 10=Remote 1, 11=Buzzer, 12=Siren, 13=Buzzer+siren, 14=Volume pulse.

23	Function out. 06 ################	**Writable** **Alternative** 0 = Not used 1 = Low level 2 = Extrem low lev. 3 = Generic analog 4 4 = Remote blocked 5 = Alarm pulse 6 = Alarm status 7 = Alarm active 8 = Timer 2 out 9 = Watchdog 10 = Remote 2 11 = Buzzer 12 = Siren 13 = Buzzer+siren 14 = Volume pulse **Central System Text** Function on output 06	Function on output signal 06. Select function: 0=Not used, 1=Low level, 2=Extrem low lev., 3=Generic analog 4, 4=Remote blocked, 5=Alarm pulse, 6=Alarm status, 7=Alarm active, 8=Timer 2 out, 9=Watchdog, 10=Remote 2, 11=Buzzer, 12=Siren, 13=Buzzer+siren, 14=Volume pulse.
24	Function out. 07 ################	**Writable** **Alternative** 0 = Not used 1 = High level 2 = Extrem high lev. 3 = Generic analog 4 4 = Remote blocked 5 = Alarm pulse 6 = Alarm status 7 = Alarm active 8 = Timer 1 out 9 = Watchdog 10 = Remote 1 11 = Buzzer 12 = Siren 13 = Buzzer+siren 14 = Volume pulse **Central System Text** Function on output 07	Function on output signal 07. Select function: 0=Not used, 1=High level, 2=Extrem high lev., 3=Generic analog 4, 4=Remote blocked, 5=Alarm pulse, 6=Alarm status, 7=Alarm active, 8=Timer 1 out, 9=Watchdog, 10=Remote 1, 11=Buzzer, 12=Siren, 13=Buzzer+siren, 14=Volume pulse.
25	Function out. 08 ################	**Writable** **Alternative** 0 = Not used 1 = Low level 2 = Extrem low lev. 3 = Generic analog 4 4 = Remote blocked 5 = Alarm pulse 6 = Alarm status 7 = Alarm active 8 = Timer 2 out 9 = Watchdog 10 = Remote 2 11 = Buzzer 12 = Siren 13 = Buzzer+siren 14 = Volume pulse **Central System Text**	Function on output signal 08. Select function: 0=Not used, 1=Low level, 2=Extrem low lev., 3=Generic analog 4, 4=Remote blocked, 5=Alarm pulse, 6=Alarm status, 7=Alarm active, 8=Timer 2 out, 9=Watchdog, 10=Remote 2, 11=Buzzer, 12=Siren, 13=Buzzer+siren, 14=Volume pulse.

		Function on output 08	

COMMUNICATION

No	Menu Name	Specification	Description
26	COMMUNICATION SETUP ...	**Read only**	Setup of communication.
27	Station number ###	**Writable** **Interval** 1 To 899	The station number identifies the RTU. The station number is 999 in a cold started RTU.
28	ID number fixed ## (fixed)	**Writable** **Interval** 0 To 50	Enter the ID number used to identify the station in fixed line communication.
29	Communic. COM1 ################	**Writable** **Alternative** 0 = Not used 1 = TD22 V.22 2 = TD22 V.22bisLAPM 3 = TD22 V.23 dial. 4 = (TD22 V.23 fix.) 5 = TD33 V.90 6 = TD33 V.90 X1 7 = TD33 V.90 LAPM 8 = RS232 half dup. 9 = RS232 full dup. 10 = Elpro 405 dial. 11 = Siox RS232 12 = Alarm printer 13 = User def. 0 14 = User def. 0 HDX 15 = Factory set. 0 16 = User def. 1 17 = Factory set. 1	Select communication function on serial channel 1.
30	Speed COM1 ###00 bit/s	**Writable** **Alternative** 0 = 3 1 = 6 2 = 12 3 = 24 4 = 48 5 = 96 6 = 192 7 = 384 8 = 576	Select communication speed (DTE) on serial channel 1.
222 (31)	Protocol on COM1 ################	**Indirect** **Writable** **Alternative** 0 = None 1 = AquaCom 2 = Modbus 3 = Comli 4 = CCom 5 = Other	Selection of protocol on COM1.

223 (31)	Protocol on COM1 code ##	**Indirect** **Writable** **Interval** 0 To 99	Selection of protocol code for COM1. 3=AquaCom, 4=Modbus, 5=Comli, 13=CCom.
32	RTS delay COM1 #### ms	**Writable** **Interval** 0 To 2000 **Central System Text** General and RTS delay COM1 (ms)	The time the modem needs to stabilise the signal before it begins to send data. Recommended value is 100-300 ms for fixed line and 0 ms for dialled line.
33	Communic. COM3 ################	**Writable** **Alternative** 0 = Not used 1 = TDK5660 V.90 2 = TDK5660 V.22 3 = TDK2814 V.34 4 = TDK2814 V.22 5 = 3COM V.90 6 = User def. 0 7 = Factory set. 0 8 = User def. 1 9 = Factory set. 1	Select communication function on serial channel 3.
34	Speed COM3 ###00 bit/s	**Writable** **Alternative** 0 = 3 1 = 6 2 = 12 3 = 24 4 = 48 5 = 96 6 = 192 7 = 384 8 = 576	Select communication speed (DTE) on serial channel 3.
224 (35)	Protocol on COM3 ################	**Indirect** **Writable** **Alternative** 0 = None 1 = AquaCom 2 = Modbus 3 = Comli 4 = CCom 5 = Other	Selection of protocol on COM3.
225 (35)	Protocol on COM3 code ##	**Indirect** **Writable** **Interval** 0 To 99	Selection of protocol code for COM3. 3=AquaCom, 4=Modbus, 5=Comli, 13=CCom.
36	RTS delay COM3 #### ms	**Writable** **Interval** 0 To 2000 **Central System Text** General and RTS delay COM3 (ms)	The time the modem needs to stabilise the signal before it begins to send data. Recommended value is 100-300 ms for fixed line and 0 ms for dialled line.

37	Communic. COM4 ################	**Writable** **Alternative** 0 = Not used 1 = RS232 half dup. 2 = RS232 full dup. 3 = Elpro 405 dial. 4 = Siox RS232 5 = Alarm printer 6 = User def. 0 7 = User def. 0 HDX 8 = Factory set. 0 9 = User def. 1 10 = Factory set. 1	Select communication function on serial channel 4.
38	Speed COM4 ###00 bit/s	**Writable** **Alternative** 0 = 3 1 = 6 2 = 12 3 = 24 4 = 48 5 = 96 6 = 192 7 = 384 8 = 576	Select communication speed (DTE) on serial channel 4.
226 (39)	Protocol on COM4 ################	**Indirect** **Writable** **Alternative** 0 = None 1 = AquaCom 2 = Modbus 3 = Comli 4 = CCom 5 = Other	Selection of protocol on COM4.
227 (39)	Protocol on COM4 code ##	**Indirect** **Writable** **Interval** 0 To 99	Selection of protocol code for COM4. 3=AquaCom, 4=Modbus, 5=Comli, 13=CCom.
40	RTS delay COM4 #### ms	**Writable** **Interval** 0 To 2000 **Central System Text** General and RTS delay COM4 (ms)	The time the modem needs to stabilise the signal before it begins to send data. Recommended value is 100-300 ms for fixed line and 0 ms for dialled line.
41	Time-out teleg. ## s	**Writable** **Interval** 0 To 30 **Central System Text** Time-out telegram (s)	This setting controls how long the program will wait for an answer. When it takes long time to receive an answer from an RTU the program will timeout. To avoid this you may increase this value. Only change the default value 8 s if it is absolutely necessary.
42	Time-out char #### ms	**Writable** **Interval**	This setting controls how long the program wait for a new character in a telegram.

		0 To 9999 **Central System Text** Time-out character (ms)	
43	Send OK delay ##### ms	**Writable** **Interval** 0 To 15000 **Central System Text** Delay before sending OK (ms)	The time the program wait from starting a modem communication until sending the first OK message.
44	Max telegram size #### byte	**Writable** **Interval** 0 To 9999 **Central System Text** Max telegram size (byte)	The maximum telegram size that is used in AquaCom. Longer telegrams is splitted up in smaler ones.
45	Trend sample time ## min	**Writable** **Interval** 0 To 60 **Central System Text** Trend sample time (min)	Trend sample time. A zero will give 5 minutes.
46	Trend method ################	**Writable** **Alternative** 0 = Normal 1 = Extended 2 = Continuous **Central System Text** Trend sample method	Sample method for trend. 0=Normal, 1=Extended, 2=Continuous
47	Remote break #### min	**Writable** **Interval** 0 To 1440 **Central System Text** Remote ctrl break delay (min)	A pump can be switched on or off via the central system 'installation status'. After leaving the status picture the pump will keep this mode during the time set in this channel.
48	Response delay dialled ## s	**Writable** **Interval** 0 To 30 **Central System Text** Response delay incoming call (s)	Enter the delay time before answering incoming calls.

ALARM LOG:

No	Menu Name	Specification	Description
49	ALARM LOG: ### Acknowledge:#(2)	**Writable**	Shows locally unacknowledged alarms. There is room for about 400 alarms in the RTU.
50	Transmit alarm ################	**Writable** **Alternative** 0 = Local permanent 1 = Remote 2 = Clear 3 = Local today **Central System Text** Alarm status (0=Local, 1=Remote)	Select whether an alarm should be sent to CS/pager. 'Clear' will remove all alarm that is waiting to be sent. Alarm created when the state is in 'Local' or 'Local today' will not be sent to CS with the exeption of 'Personal' and 'Cold start' alarms that is sent anyway. 'Local today' will return to remote at midnight.
51	Alarmdistrib. #### (ABCP)	**Writable** **Alternative** 1 = A--- Alarm 2 = -B-- Alarm 3 = --C- Alarm 4 = ---P Passive **Central System Text** Alarm distribution (ABCP)	Select the alarms priorities to send to CS/pager. A '1' means that this alarm with this priority should be sent. A '0' that it should not be sent. Default setup is '1101'. A=A Alarm up flank. B=B Alarm up flank, C=C Alarm up flank, P=all alarm down flank.
52	Telno. 1 CS/PAGE ################	**Writable** **Central System Text** Telephone number 1 CS/Pager	First telephone number to CS or paging system. Use a '&' as the first character for numbers to paging systems.
53	Telno. 2 CS/PAGE ################	**Writable** **Central System Text** Telephone number 2 CS/Pager	Second telephone number to CS or paging system. Use a '&' as the first character for numbers to paging systems.
54	Number of calls to CS ##	**Writable** **Interval** 0 To 99 **Central System Text** Number of calls to CS	Alarming to CS. Number of calls the RTU makes when the CS is not responding.
55	New alarm pulse length ### s	**Writable** **Interval** 0 To 999 **Central System Text** Pulse length on new alarm (s)	Enter the pulse length of the alarm output at a new alarm. This may be used to control an acoustic alarm.
56	Select alarm code ####	**Writable** **Interval** 0 To 8999	Select alarm code to show and change.
57	Alarm priority #	**Writable** **Alternative** 0 = - 1 = A 2 = B 3 = C 4 = D	Select new alarm priority for the alarm selected in the previous channel.

		5 = F 6 = H	
58	New alarm code ####	**Writable** **Interval** 0 To 9499	Select new alarm code for selected alarm.

PAGING SETUP

No	Menu Name	Specification	Description
59	PAGING SETUP ...	**Read only**	Setup for paging.
60	Station name ################	**Writable** **Central System Text** Station name	Station name. This name is transmitted to some paging systems. If the name is missing the station number will be transmitted.
61	Number of calls to pager ##	**Writable** **Interval** 0 To 99 **Central System Text** Number of calls to pager	Alarming to pager. Number of calls the RTU makes when the service personnel is not responding.
62	Pager ack. time #### min	**Writable** **Interval** 0 To 9999 **Central System Text** Pager acknowledge time (min)	This is the time the user has to accnowledge an alarm that is sent to a pager. If no accnowledge is received the alarm will be sent again. If the time is set to zero no accnowledge is neaded. In this case the unit only calls one time.
63	Wait time pager cycle #### min	**Writable** **Interval** 0 To 9999 **Central System Text** Wait time pager cycle (min)	Waiting time after a unsuccessful batch of alarm calls.
220 (64)	Paging system ################	**Indirect** **Writable** **Alternative** 0 = None 1 = Minicall numeric 2 = Semadigit 3 = Numerik N/DK 4 = Minicall text 5 = Semascript 6 = TAP text 7 = Cityruf DE 8 = SMS Europ. 9 = SMS UCP 10 = SemaDigit B 11 = SemaDigit NL 12 = TAP D1 SMS 13 = GSM-SMS 14 = Numeric A 15 = SMS-SFR F 16 = SMS-Itineris F 17 = TAP F 18 = SMS-Bouygues 19 = Other	Selection of paging system.
221 (64)	Paging system code ##	**Indirect** **Writable** **Interval**	Selection of paging system. 0=None, 3=Minicall numeric, 4=Semadigit, 5=BellBoy, 7=Numerik N/DK, 9=Minicall

		0 To 99 **Central System Text** Paging system selection code	text, 10=Semascript, 11=TAP text, 12=Cityruf DE, 13=SMS Europ., 14=SMS UCP, 16=SemaDigit B, 17=SemaDigit NL, 18=TAP D1 SMS, 19=GSM-SMS M20, 20=Numeric A, 21=SMS-SFR F, 22=SMS-Itineris F, 23=TAP F, 24=SMS-Bouygues.
65	Telno. PAD/SMSC ################	**Writable** **Central System Text** Paging number to PAD/SMSC	Phone number to the paging central. This number must be used if larms is to be sent to SMS.
66	Delay paging central ## s	**Writable** **Interval** 0 To 99 **Central System Text** Delay paging central (s)	Delay between dialling and transmitting of the paging message. Only used in some paging systems.
67	Transmitter no ################	**Writable** **Central System Text** Paging transmitter number	Transmit number for paging system. Only used in some paging systems.
68	Identity code ################	**Writable** **Central System Text** Paging identity code	Identification code for paging system. Only used in some paging systems.
69	Paging password ################	**Writable** **Central System Text** Paging password	Password for paging system. Only used in some paging systems.

ALARM DELAYS

No	Menu Name	Specification	Description
70	ALARM DELAYS ...	**Read only**	Setup for alarm delays.
71	Digital delay #### s	**Writable** **Interval** 0 To 9999 **Central System Text** Digital alarm delay (s)	Common alarm delay for digital alarms.
72	Analog delay #### s	**Writable** **Interval** 0 To 9999 **Central System Text** Analogue alarm delay (s)	Common alarm delay for analogue alarms.
73	Power fail delay #### s	**Writable** **Interval** 0 To 9999 **Central System Text** Power fail alarm delay (s)	Alarm delay for power fail alarm.
74	Worktim pers.al. ### min	**Writable** **Interval** 0 To 999 **Central System Text** Worktime before personnel alarm (min)	Enter the time that the work will last. After this time the output buzzer will start.
75	Pers. warning #### s	**Writable** **Interval** 0 To 9999 **Central System Text** Personnel alarm warning time (s)	The delay before the alarm is sent after the warning buzzer started.
76	Burglary delay #### s	**Writable** **Interval** 0 To 9999 **Central System Text** Burglary alarm delay (s)	Delay before the intruder alarm is sent to CS.

LEVEL

No	Menu Name	Specification	Description
77	LEVEL @##.## m	**Read only**	Shows the level of the water in the sump.
78	High level @##.## m	**Writable** **Interval** -100.00 To 100.00 **Central System Text** High level (m)	Alarm limit for high level. The alarm will be generated when the sump level reach up to this value. Set the alarm level to zero to disable the alarm.
79	Extrem high lev. @##.## m	**Writable** **Interval** -100.00 To 100.00 **Central System Text** Extremely high level (m)	Alarm limit for extremely high level. The alarm will be generated when the sump level reach up to this value. Set the alarm level to zero to disable the alarm.
80	High level alarm delay ##### s	**Writable** **Interval** 0 To 99999 **Central System Text** High level alarm delay (s)	Alarm delay for high level and extremely high level alarms.
81	Low level @##.## m	**Writable** **Interval** -100.00 To 100.00 **Central System Text** Low level (m)	Alarm limit for low level. The alarm will be generated when the sump level goes down below this value. Set the alarm level to zero to disable the alarm.
82	Extrem low lev. @##.## m	**Writable** **Interval** -100.00 To 100.00 **Central System Text** Extremely low level (m)	Alarm limit for extremely low level. The alarm will be generated when the sump level goes down below this value. Set the alarm level to zero to disable the alarm.
83	Low level alarm delay #### s	**Writable** **Interval** 0 To 9999 **Central System Text** Low level alarm delay (s)	Alarm delay for low level and extremely low level alarms.
84	Level alarm hyst ##.## m	**Writable** **Interval** 0.00 To 10.00 **Central System Text** Level alarm hysteresis (m)	Hysteresis for all level alarms.
85	Calibrate level @##.## m	**Writable**	Calibration of the level sensor.
86	Maximum level @##.## m	**Writable** **Interval** -100.00 To 100.00 **Central System Text**	Maximum value for level sensor. Enter the level measured when the signal is equal to maximum signal (normally 20 mA). The value is normally equal to sensor range plus the next channel value. Changed by level

		Maximum level (m)	calibration.
87	Minimum level @##.## m	**Writable** **Interval** -100.00 To 100.00 **Central System Text** Minimum level (m)	Minimum value for level sensor. Enter the level measured when the signal is equal to minimum signal (normally 4 mA). The value is normally equal to the distance from the sump bottom to the sensor. Changed by level calibration.
88	Max sensor sign. ##.### mA	**Writable** **Interval** 0.000 To 30.000 **Central System Text** Maximum sensor signal (mA)	Maximum sensor signal. Normally 20 mA. Changed by level calibration.
89	Min sensor sign. ##.### mA	**Writable** **Interval** 0.000 To 30.000 **Central System Text** Minimum sensor signal (mA)	Minimum sensor signal. Normally 4 mA. Changed by level calibration.

GENERAL ANALOG 4

No	Menu Name	Specification	Description
90	GENERAL ANALOG 4 @####.## @####.## l/s @####.## A ##.## pH @###.## C @###.## bar	**Read only**	Shows the general analogue 4 input.
234 (91)	Volume GA4 Not used	**Indirect** **Read only**	Shown when the volume in general analog 4 is not used.
235 (91)	Volume GA4 #####.# m3 day #####.# m3 y-day	**Indirect** **Read only**	Volume general analog 4.
236 (91)	Volume GA4 ########.# m3	**Indirect** **Writable**	Volume for general analog 4. Enter a value manually and the counter will continue on this value.
92	High value GA4 @####.##	**Writable** **Interval** -9999.99 To 9999.99 **Central System Text** High alarm general analog 4	Alarm limit för high value general analogue 4. Set the alarm level to zero to disable the alarm.
93	Low value GA4 @####.##	**Writable** **Interval** -9999.99 To 9999.99 **Central System Text** Low alarm general analog 4	Alarm limit för low value general analogue 4. Set the alarm level to zero to disable the alarm.
94	Alarm hyst. GA4 ####.##	**Writable** **Interval** 0.00 To 9999.99 **Central System Text** Alarm hysteresis general analog 4	Hysteresis for general analogue 4 alarms.
95	Use of GA4 ################	**Writable** **Alternative** 0 = General 1 = Flow 2 = Pumpflow 3 = Inflow 4 = Overflow 5 = Current 6 = PH 7 = Temperature 8 = Pressure **Central System Text** Use of general analog 4	Select view of general analogue 4. 0=General, 1=Flow, 2=Pumpflow, 3=Inflow, 4=Overflow, 5=Current, 6=PH, 7=Temperature, 8=Pressure
96	Max value GA4	**Writable**	Maximum value for general analogue 4.

	@####.##	**Interval** -9999.99 To 9999.99 **Central System Text** Maximum value general analog 4	Enter the value measued by the sensor when the signal is 20 mA.
97	Min value GA4 @####.##	**Writable** **Interval** -9999.99 To 9999.99 **Central System Text** Minimum value general analog 4	Minimum value for general analogue 4. Enter the value measued by the sensor when the signal is 0 or 4 mA.
98	Signal type GA4 #######	**Writable** **Alternative** 0 = 0-20 mA 1 = 4-20 mA **Central System Text** Signal type general ana. (0=0, 1=4-20mA)	Type of sensor for general analogue 4. Choose between 0=0-20 mA, 1=4-20 mA.
99	Start value GA4 @####.##	**Writable** **Interval** -9999.99 To 9999.99 **Central System Text** Start value general analog 4	Enter a start value. When general analogue 4 reach this value an output is activated. This output remains active until the stop value is reached.
100	Stop value GA4 @####.##	**Writable** **Interval** -9999.99 To 9999.99 **Central System Text** Stop value general analog 4	Enter a stop value. When general analogue 4 reach the start value an output is activated. This output remains active until the stop value is reached.

OPERATIONAL DATA

No	Menu Name	Specification	Description
101	OPERATIONAL DATA ################	**Writable** **Alternative** 0 = Today's 1 = Yesterday's 2 = Continuous	Selects if channels with report data should show today's, yesterday's or continuos values. Today's and yesterday's values can not be changed. Continues values may be changed. This channel may be changed without influence on stored values.
237 (102)	P1 no. of starts #### day #### yesterday	**Indirect** **Read only**	Starts of pump 1.
238 (102)	P1 no. of starts ####### total	**Indirect** **Writable** **Interval** 0 To 9999999	Starts of pump 1. Enter a value manually and the counter will continue on this value.
239 (103)	P1 runtime ##:## h:m day ##:## h:m y-day	**Indirect** **Read only**	Runtime pump 1.
240 (103)	P1 runtime ##### h total	**Indirect** **Writable** **Interval** 0 To 99999	Runtime pump 1. Enter a value manually and the counter will continue on this value.
241 (104)	P2 no. of starts #### day #### yesterday	**Indirect** **Read only**	Starts of pump 2.
242 (104)	P2 no. of starts ####### total	**Indirect** **Writable** **Interval** 0 To 9999999	Starts of pump 2. Enter a value manually and the counter will continue on this value.
243 (105)	P2 runtime ##:## h:m day ##:## h:m y-day	**Indirect** **Read only**	Runtime pump 2.
244 (105)	P2 runtime ##### h total	**Indirect** **Writable** **Interval** 0 To 99999	Runtime pump 2. Enter a value manually and the counter will continue on this value.
245 (106)	Two pump starts #### day #### yesterday	**Indirect** **Read only**	Starts two pumps running at the same time.
246 (106)	Two pump starts ####### total	**Indirect** **Writable** **Interval** 0 To 9999999	Starts two pumps running at the same time. Enter a value manually and the counter will continue on this value.
247	Two pump runtime	**Indirect**	Runtime two pumps running at the same

(107)	##:## h:m day ##:## h:m y-day	**Read only**	time.
248 (107)	Two pump runtime ##### h total	**Indirect** **Writable** **Interval** 0 To 99999	Runtime two pumps running at the same time. Enter a value manually and the counter will continue on this value.
108	Output freq. P1 ##.# Hz	**Read only**	Shows output frequency for P1.
109	Output freq. P2 ##.# Hz	**Read only**	Shows output frequency for P2.
110	Torque P1 @###.# %	**Read only**	Shows torque on pump 1.
111	Torque P2 @###.# %	**Read only**	Shows torque on pump 2.
263 (112)	Num. clean P1 #### day #### yesterday	**Indirect** **Read only**	Number of cleaning events on P1.
264 (112)	Num. clean P1 ##### total	**Indirect** **Writable** **Interval** 0 To 99999	Number of cleaning events on P1. Enter a value manually and the counter will continue on this value.
265 (113)	Num. clean P2 #### day #### yesterday	**Indirect** **Read only**	Number of cleaning events on P2.
266 (113)	Num. clean P2 ##### total	**Indirect** **Writable** **Interval** 0 To 99999	Number of cleaning events on P2. Enter a value manually and the counter will continue on this value.

START AND STOP

No	Menu Name	Specification	Description
114	START AND STOP LEVELS ...	**Read only**	Start and stop levels of the pumps.
115	Regulation level @##.## m	**Writable** **Interval** -100.00 To 100.00 **Central System Text** Regulation level (m)	Regulated level. The contol keeps this level and start as many pump as needed.
116	Pumping range #.## m	**Writable** **Interval** 0.00 To 10.00 **Central System Text** Pumping range (m)	The setpoint level is variated within this range to avoid buildups on the sump wals.
117	Stop level @##.## m	**Writable** **Interval** -100.00 To 100.00 **Central System Text** Stop level (m)	Stop level. The contol stopps the last pump at this level. Other pumps are stopped at the regulation level.

PUMP CONTROL

No	Menu Name	Specification	Description
118	PUMP CONTROL ...	**Read only**	Control of pumps.
119	Amplification ##.##	**Writable** **Interval** 0.00 To 99.99 **Central System Text** Amplification	Amplification for PI reguator controlling level.
120	Integration time #### s	**Writable** **Interval** 0 To 9999 **Central System Text** Integration time (s)	Integration time for PI reguator controlling level.
121	Delay seq. steps #### s	**Writable** **Interval** 0 To 9999 **Central System Text** Delay between sequence steps (s)	Delay to start or stop a pump when the regulator runns at max or min speed.
122	Min frequency ##.# Hz	**Writable** **Interval** 0.0 To 50.0 **Central System Text** Minimum frequency (Hz)	Minimum pump run frequency. ITT Flygt recommend to use >= 35 Hz.
123	High level run time #### s	**Writable** **Interval** 0 To 9999 **Central System Text** High level float minimum run time (s)	Runtime on high level float. When the high level float is activated the available pumps will start and continue to run at least this time after return of the float. A zero of will prevent the pump to start and only make an alarm.
124	Low level block-time #### s	**Writable** **Interval** 0 To 9999 **Central System Text** Low level float minimum block time (s)	Blocktime on low level float. When the low level float is activated all pumps will stop and continue to be stopped this time after return of the float. Also a zero will stop the pumps.
125	Al. pump do not start #### s	**Writable** **Interval** 3 To 9999 **Central System Text** Alarm pump does not start after (s)	Alarm delay for pump responce. When there is no running signal within this time an operation alarm will be generated. Alternating pumps will switch on this alarm.

ADVANCED PUMP

No	Menu Name	Specification	Description
126	ADVANCED PUMP CONTROL ...	**Read only**	Advanced control of pumps.
127	Action ################	**Writable** **Alternative** 0 = Select action 1 = Clean P1 2 = Clean P2	Select remote action. Options: 0=Select action, 1=Clean P1, 2=Clean P2.
128	Boost speed time ### s	**Writable** **Interval** 0 To 999 **Central System Text** Boost speed at start (s)	Boost VFD ouput at start. This time the VFD runns at max speed at start.
129	Max running pumps #	**Writable** **Interval** 0 To 4 **Central System Text** Max running pumps	Max running pumps. Used to limit the number of pumps running at the same time.
130	Special cont. P1 #####	**Writable** **Alternative** 1 = Disconnected 2 = No backup run 3 = No long run blk. 4 = Not tele blocked 5 = No cleaning **Central System Text** Special control P1	Special control of pump 1. Options: 1=Disconnected, 2=No backup run, 3=No long run blk., 4=Not tele blocked, 5=No cleaning
131	Special cont. P2 #####	**Writable** **Alternative** 1 = Disconnected 2 = No backup run 3 = No long run blk. 4 = Not tele blocked 5 = No cleaning **Central System Text** Special control P2	Special control of pump 2. Options: 1=Disconnected, 2=No backup run, 3=No long run blk., 4=Not tele blocked, 5=No cleaning

SUMP CLEANING

No	Menu Name	Specification	Description
132	SUMP CLEANING ...	**Read only**	Cleaning of pump sump.
133	Max. pump time #### min	**Writable** **Interval** 0 To 9999 **Central System Text** Maximum pump time (min)	Maximum continues runtime of the pumps. When the pump has run this time it is stopped temporarly. This prevents garbage from building up on the impeller lowering the performance.
134	Clean rep. time #### min	**Writable** **Interval** 0 To 9999 **Central System Text** Cleaning repeat time (min)	Time controlled cleaning with VFD. The cleaning sequence is repeated with this intervall. Time is counted from pump start.
135	Alarm clean seq. ##	**Writable** **Interval** 0 To 99 **Central System Text** Warn on X cleanings in seqence	Alarm limit for continues cleaning sequences.
136	Max clean in seq ##	**Writable** **Interval** 0 To 99 **Central System Text** Max cleanings in seqence	Maximum continues cleaning sequences. This will block the cleaning serquence if it is run this number of times without pause.

VOLUME PULSE

No	Menu Name	Specification	Description
137	VOLUME PULSE ...	**Read only**	Flow pulse function.
138	Volume pulse #####.# m3/pulse	**Writable** **Interval** 0.0 To 99999.9 **Central System Text** Volume output pulse (m3/pulse)	Flow pulses. Enter the volume that is needed to create a pulse. This can be used for sample taking.
139	Volume pulse src ################	**Writable** **Alternative** 0 = Overflow 1 = Generic ana flow **Central System Text** Volume output pulse source	Select source for flow pulse. 0=Overflow, 1=Generic ana flow. This channel selects the type of flow to use to create pulses. If overflow is selected the program will make an extra pulse when the overflow starts.

OVERFLOW

No	Menu Name	Specification	Description
140	OVERFLOW #####.# l/s	**Read only**	Show calculated overflow.
253 (141)	Overflow volume #####.# m3 day #####.# m3 y-day	**Indirect** **Read only**	Overflow volume.
254 (141)	Overflow volume ######## m3 tot	**Indirect** **Writable** **Interval** 0 To 100000000	Overflow volume. Enter a value manually and the counter will continue on this value.
249 (142)	Overflow time ##:## h:m day ##:## h:m y-day	**Indirect** **Read only**	Overflow time.
250 (142)	Overflow time ##### h total	**Indirect** **Writable** **Interval** 0 To 99999	Overflow time. Enter a value manually and the counter will continue on this value.
251 (143)	Num. overflow #### day #### yesterday	**Indirect** **Read only**	Number of overflows.
252 (143)	Num. overflow ##### total	**Indirect** **Writable** **Interval** 0 To 99999	Number of overflows. Enter a value manually and the counter will continue on this value.
144	Num. gross over-flows #####	**Writable** **Interval** 0 To 99999	Number of gross overflows. If the time span between two overflows is smaller than 24 hour this second overflow belongs to the first one.
145	Overflow alarm log	**Writable**	Overflow alarm log. Shows all overflow alarms. Press read/write twice to view the alarms.

OVERFLOW

No	Menu Name	Specification	Description
146	OVERFLOW DEFINITION ...	**Read only**	Overflow calculation.
147	Overflow level @##.## m	**Writable** **Interval** -100.00 To 100.00 **Central System Text** Overflow level (m)	The level where overflow occures. Set this level manually if no overflow sensor is used.
148	Discharge coeff. #.##	**Writable** **Interval** 0.00 To 1.00 **Central System Text** Discharge coeff.(0.00-1.00)	Enter the overflow coefficient for the overflow weir. This value is used only to automatically calculate the overflow table. This value will often be named as cd.
149	Overflow range #.### m	**Writable** **Interval** 0.000 To 99.999 **Central System Text** Overflow range (m)	Enter the height of the overflow weir. This height shoud correspond to the maximum flow in the overflow table.
150	Weir width ##.### m	**Writable** **Interval** 0.000 To 99.999 **Central System Text** Overflow weir width (m)	Enter the width of the overflow weir. This value is used only to automatically calculate the overflow table.
151	Weir select ################	**Writable** **Alternative** 0 = Manual 1 = Rectangular 2 = V-notch **Central System Text** Weir select (0=Man, 1=Rect, 2=V-Notch)	Overflow table method. 0=Manual, 1=Rectangular, 2=V-notch. Select calculation method for overflow table. Select 'Manual' to define the overflow segment manually. Select 'Rectangular' or ' V-Notch' and the unit will calculate the overflow segments.
152	Overflow segment 01: #####.# l/s	**Writable** **Interval** 0.0 To 99999.9 **Central System Text** Overflow segment 01 (l/s)	The flow over the overflow weir when the level is in this segment. (see overflow description).
153	Overflow segment 02: #####.# l/s	**Writable** **Interval** 0.0 To 99999.9 **Central System Text** Overflow segment 02 (l/s)	The flow over the overflow weir when the level is in this segment. (see overflow description).
154	Overflow segment 03: #####.# l/s	**Writable** **Interval** 0.0 To 99999.9 **Central System Text** Overflow segment 03 (l/s)	The flow over the overflow weir when the level is in this segment. (see overflow description).

155	Overflow segment 04: #####.# l/s	**Writable** **Interval** 0.0 To 99999.9 **Central System Text** Overflow segment 04 (l/s)	The flow over the overflow weir when the level is in this segment. (see overflow description).
156	Overflow segment 05: #####.# l/s	**Writable** **Interval** 0.0 To 99999.9 **Central System Text** Overflow segment 05 (l/s)	The flow over the overflow weir when the level is in this segment. (see overflow description).
157	Overflow segment 06: #####.# l/s	**Writable** **Interval** 0.0 To 99999.9 **Central System Text** Overflow segment 06 (l/s)	The flow over the overflow weir when the level is in this segment. (see overflow description).
158	Overflow segment 07: #####.# l/s	**Writable** **Interval** 0.0 To 99999.9 **Central System Text** Overflow segment 07 (l/s)	The flow over the overflow weir when the level is in this segment. (see overflow description).
159	Overflow segment 08: #####.# l/s	**Writable** **Interval** 0.0 To 99999.9 **Central System Text** Overflow segment 08 (l/s)	The flow over the overflow weir when the level is in this segment. (see overflow description).
160	Overflow segment 09: #####.# l/s	**Writable** **Interval** 0.0 To 99999.9 **Central System Text** Overflow segment 09 (l/s)	The flow over the overflow weir when the level is in this segment. (see overflow description).
161	Overflow segment 10: #####.# l/s	**Writable** **Interval** 0.0 To 99999.9 **Central System Text** Overflow segment 10 (l/s)	The flow over the overflow weir when the level is in this segment. (see overflow description).
162	Overflow segment 11: #####.# l/s	**Writable** **Interval** 0.0 To 99999.9 **Central System Text** Overflow segment 11 (l/s)	The flow over the overflow weir when the level is in this segment. (see overflow description).
163	Overflow segment 12: #####.# l/s	**Writable** **Interval** 0.0 To 99999.9 **Central System Text** Overflow segment 12 (l/s)	The flow over the overflow weir when the level is in this segment. (see overflow description).
164	Overflow segment 13: #####.# l/s	**Writable** **Interval** 0.0 To 99999.9 **Central System Text**	The flow over the overflow weir when the level is in this segment. (see overflow description).

		Overflow segment 13 (l/s)	
165	Overflow segment 14: #####.# l/s	**Writable** **Interval** 0.0 To 99999.9 **Central System Text** Overflow segment 14 (l/s)	The flow over the overflow weir when the level is in this segment. (see overflow description).
166	Overflow segment 15: #####.# l/s	**Writable** **Interval** 0.0 To 99999.9 **Central System Text** Overflow segment 15 (l/s)	The flow over the overflow weir when the level is in this segment. (see overflow description).
167	Overflow segment 16: #####.# l/s	**Writable** **Interval** 0.0 To 99999.9 **Central System Text** Overflow segment 16 (l/s)	The flow over the overflow weir when the level is in this segment. (see overflow description).
168	Overflow segment 17: #####.# l/s	**Writable** **Interval** 0.0 To 99999.9 **Central System Text** Overflow segment 17 (l/s)	The flow over the overflow weir when the level is in this segment. (see overflow description).
169	Overflow segment 18: #####.# l/s	**Writable** **Interval** 0.0 To 99999.9 **Central System Text** Overflow segment 18 (l/s)	The flow over the overflow weir when the level is in this segment. (see overflow description).
170	Overflow segment 19: #####.# l/s	**Writable** **Interval** 0.0 To 99999.9 **Central System Text** Overflow segment 19 (l/s)	The flow over the overflow weir when the level is in this segment. (see overflow description).
171	Overflow segment 20: #####.# l/s	**Writable** **Interval** 0.0 To 99999.9 **Central System Text** Overflow segment 20 (l/s)	The flow over the overflow weir when the level is in this segment. (see overflow description).

SERVICE

No	Menu Name	Specification	Description
172	SERVICE ...	**Read only**	Service-alarms.
173	Service interval P1 ##### h	**Writable** **Interval** 0 To 99999 **Central System Text** Service interval P1 (h)	Service inteval time. When the pump has run this time a service alarm is sent.
174	P1 time after service ##### h	**Writable**	This is the time since the last pump service on pump 1. Reset this channel after service.
175	Service interval P2 ##### h	**Writable** **Interval** 0 To 99999 **Central System Text** Service interval P2 (h)	Service inteval time. When the pump has run this time a service alarm is sent.
176	P2 time after service ##### h	**Writable**	This is the time since the last pump service on pump 2. Reset this channel after service.

RECEIVE BLOCKING

No	Menu Name	Specification	Description
177	RECEIVE BLOCKING ...	**Read only**	Receive blocking.
178	Blocked status ################	**Writable** **Alternative** 0 = Not blocked 1 = Blocked	Shows the block status. The status changes when the FMC receives remote blocking or unblocking commands. To override the remote command change the status in this channel.
255 (179)	Num. of blocks #### day #### yesterday	**Indirect** **Read only**	Number of blockings.
256 (179)	Num. of blocks ##### total	**Indirect** **Writable** **Interval** 0 To 99999	Number of blockings. Enter a value manually and the counter will continue on this value.
257 (180)	Blocked time ##:## h:m day ##:## h:m y-day	**Indirect** **Read only**	Blocked time.
258 (180)	Blocked time ##### h total	**Indirect** **Writable** **Interval** 0 To 99999	Blocked time. Enter a value manually and the counter will continue on this value.
181	Timeout block. #### min	**Writable** **Interval** 0 To 9999 **Central System Text** Timeout blocking (min)	The blocked station will be unblocked after this time. This is a saftey function to unblock the station if a unblocking command fail to come. Use the repeat blocking function in the sending FMC and set it to five minutes less than this value.
182	Blocked by ID @#	**Writable** **Interval** -1 To 9 **Central System Text** Fixed blocked by ID	Fixed line ID of remote station that blocks this station. Used only in fixed communication.
183	Blocked by func ##	**Writable** **Alternative** 1 = Blocked by fnc 2 2 = Blocked by fnc 1 **Central System Text** Fixed blocked by function (21)	Block logic function in the remote station that is used to block this station. Used only in fixed communication. Options: 1=Blocked by fnc 2, 2=Blocked by fnc 1

SEND BLOCKING

No	Menu Name	Specification	Description
184	SEND BLOCKING ...	**Read only**	Send blocking.
185	Block delay #### s	**Writable** **Interval** 0 To 9999 **Central System Text** Block delay (s)	Enter the time to wait before the unit actually sends a blocking telegram when the blocking conditions are active.
186	Deblock delay #### s	**Writable** **Interval** 0 To 9999 **Central System Text** Deblock delay (s)	Enter the time to wait before the unit is actually sending deblocking when the blocking conditions is passive.
187	Repeat block. #### min	**Writable** **Interval** 0 To 9999 **Central System Text** Repeat blocking (min)	Repeating time for blocking command. A new blocking command is sent out after this time. Use the timeout blocking function in the receiving station and set it to five minutes more than this value.
188	Telephone #1 ################	**Writable** **Central System Text** Telephone #1	Blocking telephone number. Enter the telephone number of the unit you want to block.
189	Telephone #2 ################	**Writable** **Central System Text** Telephone #2	Blocking telephone number. Enter the telephone number of the unit you want to block.
190	Telephone #3 ################	**Writable** **Central System Text** Telephone #3	Blocking telephone number. Enter the telephone number of the unit you want to block.
191	Telephone #4 ################	**Writable** **Central System Text** Telephone #4	Blocking telephone number. Enter the telephone number of the unit you want to block.
192	Telephone #5 ################	**Writable** **Central System Text** Telephone #5	Blocking telephone number. Enter the telephone number of the unit you want to block.
193	Telephone #6 ################	**Writable** **Central System Text** Telephone #6	Blocking telephone number. Enter the telephone number of the unit you want to block.
194	Block1 condition ############	**Writable** **Alternative** 1 = P1 failed 2 = P2 failed 3 = P1 switched off 4 = P2 switched off 5 = Block levels 6 = High level	Blocking logic set 1. Select the conditions that is required to send a blocking command. Options: 1=P1 failed, 2=P2 failed, 3=P1 switched off, 4=P2 switched off, 5=Block levels, 6=High level, 7=Extrem high lev., 8=High level float, 9=Overflow input, 10=Power fail input,

		7 = Extrem high lev. 8 = High level float 9 = Overflow input 10 = Power fail input 11 = Block input 12 = Gen ana level **Central System Text** Block 1 condition	11=Block input, 12=Gen ana level
195	Block1 tele# use ######	**Writable** **Alternative** 1 = Use number 6 2 = Use number 5 3 = Use number 4 4 = Use number 3 5 = Use number 2 6 = Use number 1 **Central System Text** Use tele# for block 1 (654321)	Blocking logic set 1. Select the telephone numbers to use for this blocking condition. Options: 1=Use number 6, 2=Use number 5, 3=Use number 4, 4=Use number 3, 5=Use number 2, 6=Use number 1
196	Block 1 logic ########	**Writable** **Alternative** 0 = Or 1 = And **Central System Text** Block 1 logic (0=Or, 1=And)	Blocking logic set 1. Select block logic for this function. 0=Or, 1=And. Select if one (or) or all (and) of the conditions are required to send block commands to other stations.
197	Block2 condition ############	**Writable** **Alternative** 1 = P1 failed 2 = P2 failed 3 = P1 switched off 4 = P2 switched off 5 = Block levels 6 = High level 7 = Extrem high lev. 8 = High level float 9 = Overflow input 10 = Power fail input 11 = Block input 12 = Gen ana level **Central System Text** Block 2 condition	Blocking logic set 2. Select the conditions that is required to send a blocking command. Options: 1=P1 failed, 2=P2 failed, 3=P1 switched off, 4=P2 switched off, 5=Block levels, 6=High level, 7=Extrem high lev., 8=High level float, 9=Overflow input, 10=Power fail input, 11=Block input, 12=Gen ana level
198	Block2 tele# use ######	**Writable** **Alternative** 1 = Use number 6 2 = Use number 5 3 = Use number 4 4 = Use number 3 5 = Use number 2 6 = Use number 1 **Central System Text** Use tele# for block 2 (654321)	Blocking logic set 2. Select the telephone numbers to use for this blocking condition. Options: 1=Use number 6, 2=Use number 5, 3=Use number 4, 4=Use number 3, 5=Use number 2, 6=Use number 1
199	Block 2 logic ########	**Writable** **Alternative** 0 = Or 1 = And	Blocking logic set 2. Select block logic for this function. 0=Or, 1=And. Select if one (or) or all (and) of the conditions are required to send block

		Central System Text Block 2 logic (0=Or, 1=And)	commands to other stations.
200	Blocking level 1 @##.## m	**Writable** **Interval** 0.00 To 100.00 **Central System Text** Blocking level 1 (m)	Blocking level 1. Other stations are blocked at this level.
201	Unblock level 1 @##.## m	**Writable** **Interval** 0.00 To 100.00 **Central System Text** Un-blockering level 1 (m)	Deblocking level 1. Other stations are unblocked at this level.

COUNTER

No	Menu Name	Specification	Description
202	COUNTER ...	**Read only**	General counter.
203	Counter #####.# x/5min #####.# mm/5min #####.# l/s	**Read only**	Shows counter intensity in units/time.
259 (204)	Counter #######.# day #######.# y-day #######.# mm day #######.# mm y-d #######.# m3 day #######.# m3 y-d	**Indirect** **Read only**	Counter value.
260 (204)	Counter #######.# total #######.# mm #######.# m3	**Indirect** **Writable** **Interval** 0.0 To 9999999.9	Counted value. Enter a value manually and the counter will continue on this value.
261 (205)	Counter runtime ##:## h:m day ##:## h:m y-day	**Indirect** **Read only**	Counter time.
262 (205)	Counter runtime ##### h total	**Indirect** **Writable** **Interval** 0 To 99999	Counter time. Enter a value manually and the counter will continue on this value.
206	Max value 5 min ########.#	**Writable** **Interval** 0.0 To 99999999.9 **Central System Text** Maximum value per 5 min	Enter the value by which a high alarm counter will be generated. This will be measured on 5 min base.
207	Max value 24 h ########.#	**Writable** **Interval** 0.0 To 99999999.9 **Central System Text** Maximum value per 24 hour	Enter the value by which a high alarm counter will be generated. This will be measured on 24 h base.
208	Use of counter ################	**Writable** **Alternative** 0 = General 1 = Rain 2 = Flow **Central System Text** Use of counter	Select use of counter. This selection changes the shown unit in the channels. 0=General, 1=Rain, 2=Flow.
209	Counter scale ###.### x/pulse ###.### mm/pulse	**Writable** **Interval** 0.000 To 999.999	Enter here the counter scale for counter input.

	###.### m3/pulse	**Central System Text** Counter scale (x/pulse)	

TEST ALARM

No	Menu Name	Specification	Description
210	TEST ALARM ...	**Read only**	Test alarm function.
211	Testalarm every ## days	**Writable** **Interval** 0 To 99 **Central System Text** Test alarm (every xx days)	Enter how often the FMC has to report himself with a testalarm. A zero in this channel turns off this function.
212	Testalarm time ##:## h:m	**Writable** **Interval** 00:00 To 23:59 **Central System Text** Test alarm time (h:m)	Enter the time of day the unit will send the test alarm.

FUNCTION TIMERS

No	Menu Name	Specification	Description
213	FUNCTION TIMERS ...	**Read only**	Function timers.
214	Function timer 1 ################	**Writable** **Alternative** 0 = No function 1 = On/off delay 2 = Pulses 3 = Pulses delayed 4 = One pulse 5 = Halve pulses 6 = Double pulses **Central System Text** Timer 1 function	Select function for timer 1. Options: 0=No function, 1=On/off delay, 2=Pulses, 3=Pulses delayed, 4=One pulse, 5=Halve pulses, 6=Double pulses.
215	T1 pulse time ##### s	**Writable** **Interval** 0 To 99999 **Central System Text** Timer 1 pulse time (s)	Enter the on/pulse time or active flank delay.
216	T1 pause time ##### s	**Writable** **Interval** 0 To 99999 **Central System Text** Timer 1 pause time (s)	Enter the off/pause time or the passive flank delay.
217	Function timer 2 ################	**Writable** **Alternative** 0 = No function 1 = On/off delay 2 = Pulses 3 = Pulses delayed 4 = One pulse 5 = Halve pulses 6 = Double pulses **Central System Text** Timer 2 function	Select function for timer 2. Options: 0=No function, 1=On/off delay, 2=Pulses, 3=Pulses delayed, 4=One pulse, 5=Halve pulses, 6=Double pulses.
218	T2 pulse time ##### s	**Writable** **Interval** 0 To 99999 **Central System Text** Timer 2 pulse time (s)	Enter the on/pulse time or active flank delay.
219	T2 pause time ##### s	**Writable** **Interval** 0 To 99999 **Central System Text** Timer 2 pause time (s)	Enter the off/pause time or the passive flank delay.

17 Appendix D - List of alarms

The following is a list of the alarms which can be generated and transmitted, together with the associated alarm codes and alarm texts, as well as an explanation of the alarm sources.

Only the alarm code is transmitted in the case of an alarm to a paging system that can only receive numbers. The list can be used to obtain an explanation of the alarm codes transmitted and received.

The priority shown is that assigned to the alarm after a cold start.**Alarms**

Alarm Code	Default priority	Delay	Local text	Central System Text	Description
1	B	60	High level	High level	High level in the pump sump. Alarm from the analog level input.
2	B	60	Low level	Low level	Low level in the pump sump. Alarm from the analog level input.
3	A	300	Mains error	Mains error	It has been a external net failure. The pumps are blocked.
4	A	10	High level float	High level float	High level float. Alarm from digital input.
5	A	60	Pers. alarm	Personal alarm	Personal alarm warning time has run out without reset. Personnel in danger !
6	A	0	Intruder	Intruder	Burglary alarm reset time has run out before turned off.
11	B	10	Tripped motor P1	Tripped motor protector P1	Pump 1 has a triggered motor. The pump is blocked by this alarm.
12	B	10	Tripped motor P2	Tripped motor protector P2	Pump 2 has a triggered motor. The pump is blocked by this alarm.
28	B		RTU no answer	Substation does not answer	There is no communication with the RTU. This alarm is not created in the RTU, it is created in CS when it fails to contact the RTU.
30	B		No response P1	No response P1	The RTU has not received a response signal from pump 1. The pump has probably failed to start.
31	B		No response P2	No response P2	The RTU has not received a response signal from pump 2. The pump has probably failed to start.
34	A	10	Overflow	Overflow	Overflowing. The station is now overflowing.

40	B	10	Low level float	Low level float	Low level float. Alarm from digital input.
51	B	60	Very high level	Extremely high level	Extremely high level in the sump. Alarm from the analog level input.
52	B	60	Very low level	Extremely low level	Extremely low level in the sump. Alarm from the analog level input.
72	B		High rainfall	High rainfall	The RTU has calculated a rainfall higher than the high alarm limit.
89	B	10	Alarm input 09	Alarm digital input 09	Spare alarm input 09.
90	B	10	Alarm input 10	Alarm digital input 10	Spare alarm input 10.
91	B	10	Alarm input 11	Alarm digital input 11	Spare alarm input 11.
92	B	10	Alarm input 12	Alarm digital input 12	Spare alarm input 12.
93	B	10	Alarm input 13	Alarm digital input 13	Spare alarm input 13.
94	B	10	Alarm input 14	Alarm digital input 14	Spare alarm input 14.
95	B	10	Alarm input 15	Alarm digital input 15	Spare alarm input 15.
96	B	10	Alarm input 16	Alarm digital input 16	Spare alarm input 16.
8001	C		No teleline	No telephone line	The RTU has failed to detect a dial tone. The alarm is made passive the next time the RTU detects a dial tone.
8002	C		No resp. paging	No response from Paging system	No answer from paging system central.
8004	B		Serv. no resp.	Service personnel no response	Printed out if on-call personnel do not answer.
8005	B		Serv. busy	Service personnel busy	Printed out if on-call personnel telephone is engaged.
8019	B		Missing param.	Missing parameters	The RTU is cold started and has no set points. Some automatic control does not work.
8033	C		Invalid tel.no.	Incorrect tel.no	One of the telephone numbers has invalid characters. Check all

					telephone numbers and correct.
8035	C		Bad param. dist.	Bad parameters for alarm distribution	Incorrect parameters in paging set points. Check and retransmit.
8050	B		Setpoint changed	Setpoint changed	At least one channel have been changed on the local display. The alarm revertes when new set points are sent to the RTU.
8083	B		Station blocked	Station blocked	This FMC has received a blocking command from another FMC.
8089	C		Unknown p-system	Unknown paging system	The selected paging system does not exist. The selected code is wrong or the system program needs to be updated to a newer version.
8090	A		Cold start	Cold start	The RTU is cold started. The RTU needs new set points. Most automatic control do not work.
8111	C		Telegram long	Telegram too long	The telegram received where to long. This may happen when there are communication problems.
8114	B		Warm start	Warm start	The RTU is warm started. The reason is either power failure or manual restart.
8117	C		Modem error	Modem error	The RTU has detected an error in the modem. If this alarm follows every warm start there is a failure in the modem.
8123	C		Error Hayes com.	Error in Hayes command	The modem responds with an error code on initiation. This may be due to an error in the modem or if you select the wrong modem.
8142	C		File error	File error	The RTU has detected a write or read error on the internal disk.
8156	H		Call failed CS	Unsuccessful call to CS	Recorded as an event. The RTU has failed to dial to CS.
8157	H		Call ok CS	Call ok to CS	Recorded as an event. The RTU has succeeded to dial to CS.
8190	B		Fail ana.sig. Px	Contradicting analogue signals, Px	Both high and low float has been activated at the same time. Check the floats.
8191	B		Fail dig.sig. Px	Contradicting digital signals, Px	Both start and stop level are active at the same time. Check setpoints for pumps.

8193	B		Fail signals Px	Contradicting signals on pumps	High float and stop level or low float and start level are active at the same time. Check floats and setpoints.
8194	B		Calib. complete	Calibration complete	Calibration of level sensor has been done.
8199	C		Serial restarted	Serial task restarted	For some reason one of the serial channels (with or without modem) was halted and hence reinitiated by the system software.
8200	C		P-Checksum error	Paging - Checksum error	Check sum error on transmitting a pager message.
8201	C		P-Format error	Paging - Format error	Format error on transmitting a pager message.
8202	C		P-Error pager no	Paging - Error in pager number	The number to the paging central is wrong on sending a paging message.
8203	C		P-Error TX no	Paging - Error in transmitter number	Not a valid transmission number on sending a paging message.
8204	C		P-Wrong password	Paging - Wrong password	Password not valid on sending a paging message.
8205	C		P-ID code error	Paging - ID code error	Authorisation code not valid on sending a paging message.
8209	C		P-Serv. blocked	Paging - Service blocked	Paging service blocked on sending a paging message.
8210	C		P-Timeout	Paging - Timeout	Timeout on sending a paging message.
8211	C		P-Busy/other err	Paging - Busy/other error	Paging central [number] engaged.
8212	C		P-Call failed	Paging - Call failed	SMS call failed. There are some communication problem with the SMS central.
8213	B		Low 12V Supply	Low 12V internal supply	The internal 12 V power supply is low. May due to a fault in the internal power transformer.
8214	B		Low 24V Supply	Low 24V external supply	The external 24 V power supply is low. May due to a discharged battery or bad external power.
8215	B		Low int. battery	Low internal battery	The internal battery has low power. This may due to an old battery or that the FMC has been dead (no supply) for a long time. This is detected only at power-up.

8488	H		P1 cleaning	P1 running cleaning sequence	Event. Running cleaning cycle on pump 1.
8489	H		P2 cleaning	P2 running cleaning sequence	Event. Running cleaning cycle on pump 2.
8492	B		Many clean P1	Many cleaning cycles on P1	The ACS550 has run many clecning cycles on pump 1.
8493	B		Many clean P2	Many cleaning cycles on P2	The ACS550 has run many clecning cycles on pump 2.
8496	A		Clean block P1	Cleaning blocked P1. Reset !	The ACS550 cleaning cycle is blocked because it has tried to many times. A manual reset and maybe an inspection of pump 1 is needed.
8497	A		Clean block P2	Cleaning blocked P2. Reset !	The ACS550 cleaning cycle is blocked because it has tried to many times. A manual reset and maybe an inspection of pump 2 is needed.
8508	B		Service P1	Service P1	P1 has run the set setvice time. The pump needs service.
8509	B		Service P2	Service P2	P2 has run the set setvice time. The pump needs service.
8536	H		Intruder al. off	Intruder alarm decativated	The intruder alarm is disconnected.
8538	A	300	I/O-mod not resp	I/O module(s) not responding	Communication problems with Siox units. Communication errors or not responding units may be the reason.
8539	B	300	Wrong I/O module	Wrong type of I/O module	Communication problems with Siox units. Wrong unit type.
8540	A	10	Pic comm error	Pic communication error	Error on communication between top and bottom card in the RTU.
8541	B	120	Ana.sig < 4 mA	Analogue signal < 4 mA	One of the 4-20 mA analogue inputs receives a signal < 3.5 mA.
8542	B		Disk error/low	Disk error/low disk space	Low internal disk space or disk write/read error.
8543	B	120	Ana.sig > 20 mA	Analogue signal > 20 mA	One of the analogue inputs receives a signal > 20.5 mA.
8602	A		High level+pfail	High level+pumpfailure	There is a high level in the sump and at least one pump is on fail.

8603	B		Blocking	Blocking other stations	The blocking function is activated. This FMC is sending blocking commands to other FMC's.
8606	B	10	P1 switched off	P1 switched off	The Auto-Manual-Off switch set to off. Pump 1 is stopped.
8607	B	10	P2 switched off	P2 switched off	The Auto-Manual-Off switch set to off. Pump 2 is stopped.
8615	A		Failure 2 pumps	Failure on two pumps	There are two failed pumps.
8630	B		Testcall !	Testcall !	The test alarm are sent to check that the station is alive. It is sent every n:th day at the time in the setpoint.
8634	B	10	High analogue 4	High analogue 4	High alarm value general analogue 4.
8635	B	10	Low analogue 4	Low analogue 4	Low alarm value general analogue 4.
8650	B		High counter 24h	High alarm counter 24 h	The counter has reached the maximum value per 24 hours.
8651	B		High count. 5min	High alarm counter 5 min	The counter has reached the maximum value per 5 minutes.

18 Appendix E - Central system

18.1 Periodic reporting

RTU stores the following operating data for the 30 previous days. The daily report is fetched automatically from the central system once per day. This function can be disconnected from the system.

The following information is summarized in the periodic report:

Report

Text1	Text2	Text3	Description
Starts	P1		Number of starts pump 1.
Run time	P1	h	Running time pump 1.
Starts	P2		Number of starts pump 2.
Run time	P2	h	Running time pump 2.
Starts	two pumps		Number of starts with two pumps.
Runtime	two pumps	h	Running time with two pumps.
Runtime	P1 total	h	Running time pump 1 total. This is the continuously sum since start-up.
Runtime	P2 total	h	Running time pump 2 total. This is the continuously sum since start-up.
Number of	overflows		Number of overflow events.
Number of	gross	overflows	Number of gross overflow events.
Overflow	time	h	Overflow time.
Overflow	volume	m3	Overflow volume.
Volume	analogue 4	m3	General analogue 4 volume.
Blocked	events		Number of times this station has been blocked from another FMC.
Blocked	time	h	The time this station has been blocked from another FMC.
Counter	value		Counter.
Runtime	counter	h	Running time counter input.
Cleaning	P1		Number of cleaning events on P1.
Cleaning	P2		Number of cleaning events on P2.

18.2 Historical trend

Measurements are stored in RTU at intervals of five minutes as default and are fetched from the central system one or more times every day. The information can then be displayed in graphical form. This function can be disconnected from the system.

The following figures can be presented in the form of a trend graph:

Trend

Text1	Text2	Text3	Description
Level		m	Level in station.
Value	analogue 4		General analogue 4.
Overflow		l/s	Overflow.
Counter		value/5min	Counter value per 5 minute.
Counter	24 h	sum	Counter sum over 24 hours.
Torque	P1	%	Torque on pump 1.
Torque	P2	%	Torque on pump 2.
Output	freq. P1	Hz	Output frequency to VFD for pump 1.
Output	freq. P2	Hz	Output frequency to VFD for pump 2.

18.3 Remote control

The pumps can be operated by remote control as required. In this case, the units are not controlled by level, but in response to commands from the workstation. Only when the connection is switched out does pump control revert automatically to RTU.

Remote Control

Object	Description
ALARMS	Acknowledge paging alarms. If alarms is sent from the FMC directly to the pager then it is possible to acknowledge the alarms here.
BLOCK	Control of blocking for this station.

RO1	Control of output 1.
RO2	Control of output 2.
VFD1	Control of VFD 1.
VFD2	Control of VFD 2.
AUTO	Return control to automatic. Releases all remote control commands.

19 Appendix F - Connection

!

N.B.
Care must be taken to ensure that personnel cannot come in contact with live cabling or terminal blocks in the course of connection or service work. Maximum caution must be exercised when working on the digital outputs.

The following is a description of the terminal blocks in the RTU (see wiring diagram at rear of section).

Before connecting external electrical equipment, such as relays, coils etc., to outputs or inputs, check carefully that the electrical specifications comply with those of the FMC. If this is not the case, install the necessary protective equipment to avoid the occurrence of operating disturbances.

Digital input signals

1 - Std digital in - FMC digital in

Signal No	Terminal No	Description
01:01	3 - 4	Input. Response P1. Must be connected.
01:02	5 - 6	Input. Response P2. Must be connected.
01:03	7 - 8	Input. Tripped motor protector P1. Stops the pump.
01:04	9 - 10	Input. Cleaning request from ACS550. P1.
01:05	11 - 12	Input. Cleaning active on ACS550. P1.
01:06	13 - 14	Input. Tripped motor protector P2. Stops the pump.
01:07	15 - 16	Input. Cleaning request from ACS550. P2.
01:08	17 - 18	Input. Cleaning active on ACS550. P2.
01:09	19 - 20	Multi input 09. 0=Not used, 1=Overflow sensor, 2=Spare alarm, 3=Intruder sensor, 4=Personnel onsite, 5=Intr.sens+pers., 6=Block remote.
01:10	21 - 22	Multi input 10. 0=Not used, 1=Power fail, 2=Spare alarm, 3=Intruder sensor, 4=Personnel onsite, 5=Intr.sens+pers., 6=Block remote.
01:11	23 - 24	Multi input 11. 0=Not used, 1=High float, 2=Spare alarm, 3=Intruder sensor, 4=Personnel onsite, 5=Intr.sens+pers., 6=Block remote.
01:12	25 - 26	Multi input 12. 0=Not used, 1=Low float, 2=Spare alarm, 3=Intruder sensor, 4=Personnel onsite, 5=Intr.sens+pers., 6=Block remote.
01:13	27 - 28	Multi input 13. 0=Not used, 1=P1 Off switch, 2=Spare alarm, 3=Intruder sensor, 4=Personnel onsite, 5=Intr.sens+pers., 6=Block remote, 7=Counter

		pulse, 8=Timer 1, 9=Timer 2.
01:14	29 - 30	Multi input 14. 0=Not used, 1=P2 Off switch, 2=Spare alarm, 3=Intruder sensor, 4=Personnel onsite, 5=Intr.sens+pers., 6=Block remote, 7=Counter pulse, 8=Timer 1, 9=Timer 2.
01:15	31 - 32	Multi input 15. 0=Not used, 1=Counter pulse, 2=Spare alarm, 3=Intruder sensor, 4=Personnel onsite, 5=Intr.sens+pers., 6=Block remote, 7=Counter pulse, 8=Timer 1, 9=Timer 2.
01:16	33 - 34	Multi input 16. 0=Not used, 1=Personnel onsite, 2=Spare alarm, 3=Intruder sensor, 4=Personnel onsite, 5=Intr.sens+pers., 6=Block remote, 7=Counter pulse, 8=Timer 1, 9=Timer 2.

Digital output signals

2 - Std digital out - FMC digital out

Signal No	Terminal No	Description
02:01	53 - 54	Output. Run P1.
02:02	55 - 56	Output. Run P2.
02:03	57 - 58	Output. Execute cleaning on ACS550. P1.
02:04	59 - 60	Output. Execute cleaning on ACS550. P2.
02:05	61 - 62	Multi output signal 05. 0=Not used, 1=High level, 2=Extrem high lev., 3=Generic analog 4, 4=Remote blocked, 5=Alarm pulse, 6=Alarm status, 7=Alarm active, 8=Timer 1 out, 9=Watchdog, 10=Remote 1, 11=Buzzer, 12=Siren, 13=Buzzer+siren, 14=Volume pulse.
02:06	63 - 64	Multi output signal 06. 0=Not used, 1=Low level, 2=Extrem low lev., 3=Generic analog 4, 4=Remote blocked, 5=Alarm pulse, 6=Alarm status, 7=Alarm active, 8=Timer 2 out, 9=Watchdog, 10=Remote 2, 11=Buzzer, 12=Siren, 13=Buzzer+siren, 14=Volume pulse.
02:07	65 - 66	Multi output signal 07. 0=Not used, 1=High level, 2=Extrem high lev., 3=Generic analog 4, 4=Remote blocked, 5=Alarm pulse, 6=Alarm status, 7=Alarm active, 8=Timer 1 out, 9=Watchdog, 10=Remote 1, 11=Buzzer, 12=Siren, 13=Buzzer+siren, 14=Volume pulse.
02:08	67 - 68	Multi output signal 08. 0=Not used, 1=Low level, 2=Extrem low lev., 3=Generic analog 4, 4=Remote blocked, 5=Alarm pulse, 6=Alarm status, 7=Alarm active, 8=Timer 2 out, 9=Watchdog, 10=Remote 2, 11=Buzzer, 12=Siren, 13=Buzzer+siren, 14=Volume pulse.

Analogue input signals

3 - Std analogue in - FMC analogue in

Signal No	Terminal No	Description
03:01	41 - 42	Pump sump 1 level. Level signal for pump control and flow calculations.
03:02	43 - 44	Torque P1.
03:03	45 - 46	Torque P2.
03:04	47 - 48	Unscaled general analog 4.

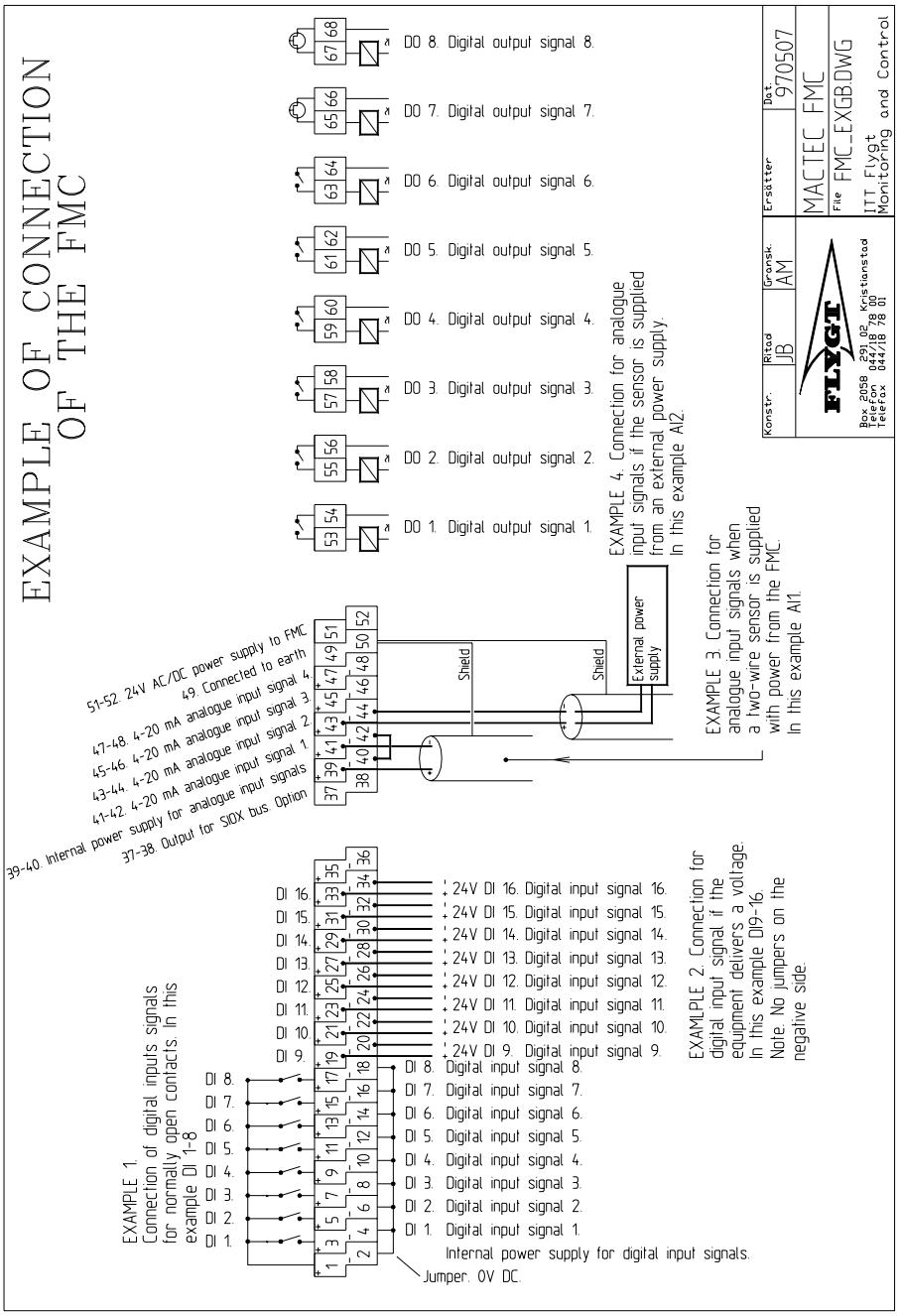
4 - RIO R02 - Address: 1 VFD Outputs

Signal No	Terminal No	Description

Analogue output signals

4 - RIO R02 - Address: 1 VFD Outputs

Signal No	Terminal No	Description
04:01		VFD speed for pump 1.
04:02		VFD speed for pump 2.



FMC