

# Instruction Manual

## Busch PLC 2.0 and Busch LCD for Retrofit Kit



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- 1 Monochrome display 8 lines 21 characters
- 2 LED Power:
  - a. Off: no initialized pump
  - b. On: initialized pump and mode « Local » selected
  - c. Flashing: initialized pump and mode « Remote » selected
- 3 LED DP Run:
  - a. Off: the module(s) DP is/are switched off
  - b. On: le(s) module(s) DP is/are switched on
  - c. Flashing: the module(s) DP is/are in switch-off phase
- 4 LED MB Run:
  - a. Off: the module MB is switched off
  - b. On: the module MB is switched on
- 5 LED Purge:
  - a. Off: the purge cycle is not activated
  - b. On: the purge cycle is activated
  - c. Flashing: the cycle « Antilock » is activated
- 6 LED Warning:
  - a. Off: no warning present
  - b. On: at least one warning present
  - c. Flashing: the « warm-Up » cycle is in progress
- 7 LED Alarm:
  - a. Off: no alarm present
  - b. On: at least one alarm is present
- 8 OK button:
  - a. Pressing briefly (1s) : stops the buzzer
  - b. Pressing briefly (1s) : selects a field to be modified
  - c. Pressing briefly (1s) : validates a field modification
  - d. Pressing longer (5s) : clears warnings and alarms
- 9 Button Right arrow:
  - a. Upward scrolling of menus
  - b. Shifts the cursor towards the right, pointing to the character to be modified
- 10 Left arrow button:
  - a. Downward scrolling of menus
  - b. Shifts the cursor towards the left, pointing to the character to be modified
- 11 Down arrow button:
  - a. Upward scrolling of sub menus
  - b. Decrease of the character highlighted by the cursor
  - c. Scrolling in an unrolling field
- 12 Up arrow button:
  - a. Downward scrolling of sub menus
  - b. Increase of the character highlighted by the cursor
  - c. Scrolls in an unrolling field
- 13 Stop Button:
  - a. Pressing briefly (1s) : activation of cycle « Purge » or cycle « Antilock »
  - b. Pressing longer (5s) : stops the pump
- 14 Start Button:
  - a. Pressing briefly (1s): starting up the pump in mode « Local »
  - b. Pressing longer (5s) : stops the cycle « Warm-Up »
- 15 RJ45 connection socket.

## ◆ Special functions:

### Setting the display contrast

- Press the Left arrow button
- Press rapidly the Up arrow button while pressing the Left arrow button
- Press several times the Up arrow button or Down arrow button in order to increase or decrease the contrast
- Release the Left arrow button

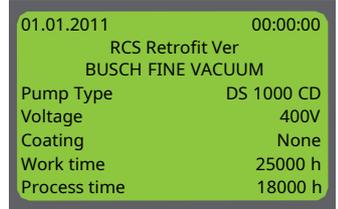
**NOTE :** disconnecting and reconnecting the handpad will restore the original contrast setting

### Testing the LEDs

- Disconnect the handpad
- Reconnect the handpad
- The version and date of firmware and the address will be displayed
- The LEDs and the buzzer are activated for 2 seconds

### Standby display

- After 10 minutes of inactivity, the handpad's display switches into « Standby » mode.
- Press any button to deactivate the « Standby » mode.



01.01.2011	00:00:00
RCS Retrofit Ver	
BUSCH FINE VACUUM	
Pump Type	DS 1000 CD
Voltage	400V
Coating	None
Work time	25000 h
Process time	18000 h

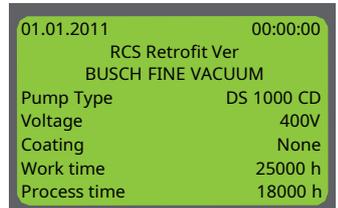


TIU Version 2.4	
01/01/2011	
Address :	1

## ◆ Description of menus:

### Entry page

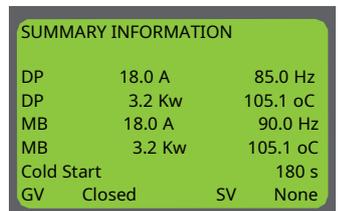
- Line 1 : Date and hour
- Line 4 : Type, number and version of the pump
- Line 5 : Power supply voltage
- Line 6 : DP module coating
- Line 6 : Work time corresponding to the pump's total operating time
- Line 7 : Process time corresponding to the operating time of the pump at maximum frequency of rotation.



01.01.2011	00:00:00
RCS Retrofit Ver	
BUSCH FINE VACUUM	
Pump Type	DS 1000 CD
Voltage	400V
Coating	None
Work time	25000 h
Process time	18000 h

### Summary page

- Line 3 : Electric current in Amperes absorbed by the motor of module DP1 and frequency of rotation of the motor in Hertz.
- Line 4 : Power consumed by the motor of module DP1 in Kilowatts and temperature of module DP1 in degrees centigrade.
- Line 5 : Electric current in Amperes absorbed by the motor of module MB and frequency of rotation of the motor in Hertz.
- Line 6 : Power consumed by the motor of module MB in Kilowatts and temperature of module MB in degree centigrade.
- Line 7 : Countdown of the duration for the warming up cycle.
- Line 8 : Status of the valve « Gate Valve » and status of the valve « Soft Valve ».



SUMMARY INFORMATION		
DP	18.0 A	85.0 Hz
DP	3.2 Kw	105.1 oC
MB	18.0 A	90.0 Hz
MB	3.2 Kw	105.1 oC
Cold Start	180 s	
GV	Closed	SV None

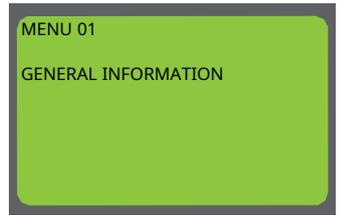
**NOTE :** the values for frequency, rotational speed and power can only be displayed when the motor is controlled by a frequency inverter.

## ◆ Menus

The buttons « Right arrow » and « Left arrow » allow to select one of the 10 menus described below:

### **MENU 01 GENERAL INFORMATION**

- Gives access to different information concerning the operation of the pump.



### **MENU 02 PROCESS SETTINGS**

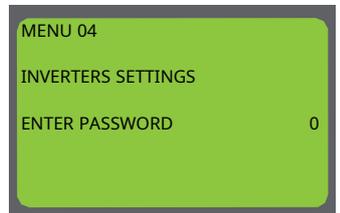
- Gives access to, and allows the modification of, the process parameters without the use of a password.

### **MENU 03 PARAMETERS SETTINGS**

- Gives access to, and allows the modification of, the adjustment parameters of the pump using a password.

### **MENU 04 INVERTERS SETTINGS**

- Gives access to, and allows the modification of, the adjustment parameters for the frequency inverters. (if available) using a password.



### **MENU 05 COMMUNICATION**

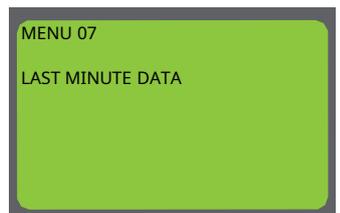
- Gives access to, and allows the modification of, the communication parameters without the use of a password.

### **MENU 06 LAST EVENTS**

- Gives access to the last 100 registered events.

### **MENU 07 LAST MINUTE DATA**

- Gives access to certain data registered every second for the last minute.



### **MENU 08 TOOL INTERFACE**

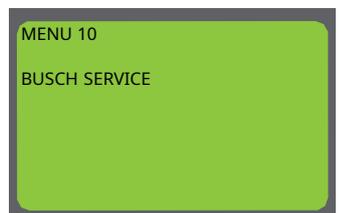
- Gives access to, and allows the modification of, the configuration parameters of every input and output of the tool interface without the use of a password.

### **MENU 09 HELP AND DIAGNOSIS**

- Gives access to information making the pump's diagnosis easier.

### **MENU 10 BUSCH SERVICE**

- Gives access to, and allows the modification of, some functions normally reserved for Busch Service using a password.



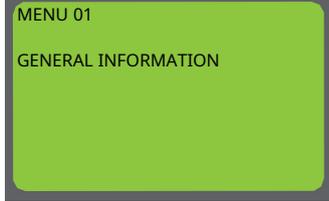
## ◆ Description of MENU 01 GENERAL INFORMATION.

The buttons «Up arrow » and «Down arrow» allow to navigate in the sub menus described below.

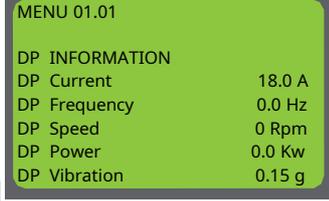
### MENU 01.01 DP INFORMATION

- Line 4 : Electric current (measured in Amperes) absorbed by the motor of module DP.
- Line 5 : Frequency of rotation of the motor in Hertz.
- Line 6 : Rotation speed of the motor in Revolutions per minute.
- Line 7 : Power consumed by the motor in Kilowatts.
- Line 8 : Vibration level in acceleration units g.

**NOTE:** the values for frequency, rotational speed and power can only be displayed when the motor is controlled by a frequency inverter.



MENU 01  
GENERAL INFORMATION



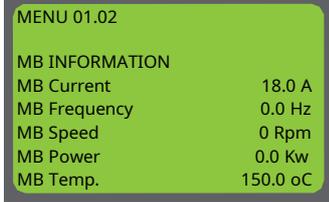
MENU 01.01  
DP INFORMATION  
DP Current 18.0 A  
DP Frequency 0.0 Hz  
DP Speed 0 Rpm  
DP Power 0.0 Kw  
DP Vibration 0.15 g

### MENU 01.02 MB INFORMATION

- Line 4 : Electric current (measured in Amperes) absorbed by the motor of module MB.
- Line 5 : Frequency of rotation of the motor in Hertz.
- Line 6 : Rotation speed of the motor in Revolutions per minute.
- Line 7 : Power consumed by the motor in Kilowatts.
- Line 8 : Temperature of module MB in degrees centigrade.

**NOTE:** the values for frequency, rotational speed and power can only be displayed when the motor is controlled by a frequency inverter.

**NOTE:** the temperature value of module MB can only be displayed if the module is equipped with a PT100 type- temperature sensor.

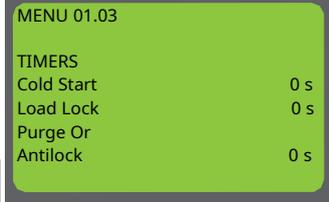


MENU 01.02  
MB INFORMATION  
MB Current 18.0 A  
MB Frequency 0.0 Hz  
MB Speed 0 Rpm  
MB Power 0.0 Kw  
MB Temp. 150.0 oC

### MENU 01.03 TIMERS

- Line 4 : Deduction of the duration for the « Warming » up cycle
- Line 5 : Deduction of the duration for the « Load Lock » cycle.
- Line 7 : Deduction of the duration for the « Purge » or « Antilock » cycles.

**NOTE:** for more information, refer to the chapters dealing with the cycles mentioned above.

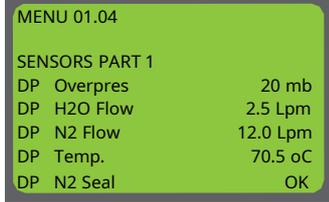


MENU 01.03  
TIMERS  
Cold Start 0 s  
Load Lock 0 s  
Purge Or  
Antilock 0 s

### MENU 01.04 SENSORS PART 1

- Line 4 : Overpressure at the outlet of module DP1 in Millibars.
- Line 5 : Cooling water flow of module DP in liters per minute.
- Line 6 : Sealing gas or/and dilution gas flow of module DP in liters per minute.
- Line 7 : Temperature of module DP in degrees centigrade.
- Line 8 : Status of the monitoring device for the sealing gas flow.

**NOTE:** the values regarding overpressure at the outlet, water flow and gas flow can only be displayed if the flow-meters are of the analog type.



MENU 01.04  
SENSORS PART 1  
DP Overpres 20 mb  
DP H2O Flow 2.5 Lpm  
DP N2 Flow 12.0 Lpm  
DP Temp. 70.5 oC  
DP N2 Seal OK

## MENU 01.05 SENSORS PART 2

- Line 4 : Status of the trip switch/motor breaker or of the thermal protection for the motor of module DP.
- Line 5 : Status of the temperature sensor monitoring the motor of module DP.
- Line 6 : Status of the monitoring device for the cooling liquid flow of module DP.
- Line 7 : Status of the cooling liquid temperature sensor monitoring module DP.
- Line 8 : Status of the monitoring device for the cooling water flow of module DP.

MENU 01.05		
SENSORS PART 2		
DP	Motor Break.	OK
DP	Motor Temp.	KO
DP	Glycol Flow	OK
DP	Glycol Temp.	KO
DP	H2O Flow	NONE

**NOTE:** If the security device is not installed on the pump, the relevant information on the display will say «None». If it is installed, the information OK or KO will be displayed, according to the status of the -device. (activated or not activated)

## MENU 01.06 SENSORS PART 3

- Line 4 : Status of the oil temperature A-side sensor monitoring the module DP.
- Line 5 : Status of the oil temperature (or B-side) sensor monitoring the module DP.
- Line 6 : Status of the oil level A-side sensor of module DP.
- Line 7 : Status of the oil level B-side sensor of module DP.
- Line 8 : Status of the monitoring device for the rotational direction of the electrical power supply phases.

MENU 01.06		
SENSORS PART 3		
DP	Oil Temp A	OK
DP	Oil Temp	KO
DP	Oil Level A	OK
DP	Oil Level B	KO
	Phase Rotation	NONE

**NOTE :** If the security device is not installed on the pump, the relevant information on the display will say «None». If it is installed, the information OK or KO will be displayed, according to the status of the device. (activated or not activated)

## MENU 01.07 SENSORS PART 4

- Line 4 : Status of the monitoring device for the cooling water flow of motor DP.
- Line 5 : Status of the monitoring device for the pressure of the expansion vessel of module DP.
- Line 6 : Status of the pressure switch monitoring the overpressure at the outlet of module DP.
- Line 7 : Status of the monitoring device for the sealing gas or/and dilution gas flow.
- Line 8 : Status of the pressure switch monitoring the sealing gas pressure.

MENU 01.07		
SENSORS PART 4		
DP	Motor H2O	OK
DP	Vessel Pres.	KO
DP	Overpres.	OK
	N2 Flow	KO
	N2 Pressure	NONE

**NOTE :** If the security device is not installed on the pump, the relevant information on the display will say «None». If it is installed, the information OK or KO will be displayed, according to the status of the device. (activated or not activated)

## MENU 01.08 SENSORS PART 5

- Line 3 : Status of the trip switch/motor breaker or of the thermal protection for the motor of module MB.
- Line 4 : Status of the temperature sensor monitoring the motor of module MB.
- Line 5 : Status of the oil temperature sensor monitoring the module MB.
- Line 6 : Status of the pressure switch monitoring the pressure at the inlet of the pump.
- Line 7 : Status of the monitoring device for the cooling water flow of module MB.
- Line 8 : Status of the temperature sensor monitoring the braking resistance of MB.

MENU 01.08	
SENSORS PART 5	
MB Motor Break.	OK
MB Motor Temp.	OK
MB Oil Temp.	KO
MB Inlet Pres.	OK
MB H2O Flow	KO
MB B.R Temp.	NONE

**NOTE :** If security device is not installed on the pump, the relevant information on the display will say « None ». If it is installed, the information OK or KO will be displayed, according to the status of the device. (activated or not activated)

## MENU 01.09 SENSORS PART 6

- Line 4 : Status of the valve « Gate Valve ».
- Line 5 : Status of the valve « Soft Valve ».
- Line 6 : Status of the external heater.
- Line 7 : Temperature of exhaust gas in degrees centigrade.
- Line 8 : Temperature of heater jacket in degrees centigrade.

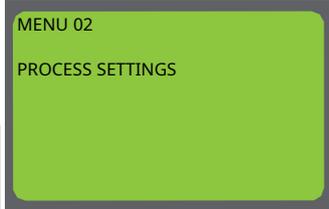
MENU 01.09	
SENSORS PART 6	
Gate Valve	OK
Soft Valve	KO
Extern Heater	OK
Exhaust Temp	0.0 °C
Heat Jacket	0.0 °C

**NOTE :** If security device is not installed on the pump, the relevant information on the display will say «None». If it is installed, the information OK or KO will be displayed, according to the status of the device. (activated or not activated)

**NOTE:** the temperature value of exhaust temp and heat jacket can only be displayed if the system is equipped with a temperature sensor and a device.

## ◆ Description of MENU 02 PROCESS SETTINGS

The buttons « Down arrow » and « Up arrow » allow to navigate in the sub menus described below.



MENU 02  
PROCESS SETTINGS

**NOTE:** modification of a parameter.

- Press the OK button as many times as necessary to select the parameter to be modified.
- Press the buttons « Left arrow » and « Right arrow » as many times as necessary to select number to be modified.
- Press the button « Down arrow » and « Up arrow » as many times as necessary to modify the value of the parameter.
- Press the OK button to save the modification of the parameter.

### MENU 02.01 LOAD LOCK

- Line 4: Selection of the mode.
- Line 6: Threshold of current in Ampere.
- Line 7: Duration of the mode in Seconds.
- Line 8: Selection of the mode for module DP.



MENU 02.01  
LOADLOCK  
LL Mode Auto  
DP Current Level 10.0 A  
Time Before 20 s  
DP Idle Disable

#### Description of the operation:

- LL Mode = Off
  - The mode « Load Lock » is de-activated, the module DP and the module MB, when present, operate constantly at their maximum frequency of rotation.

**NOTE :** the parameters « DP (or MB) Current Level », « Time Before » and « DP Idle » are idle.

- LL Mode = Auto
  - The mode Load Lock is activated and de-activated according to the current load taken in by the module DP (or MB). The current threshold is adjustable using the parameters « DP/MB Current Level ». When the current level exceeds the threshold, the modules DP and MB accelerate to their maximum frequency of rotation. When the current level drops below the threshold, a time delay which is adjustable in its duration using the parameter « Time Before », will start. As soon as the time delay's duration has elapsed, the modules DP and MB slow down to their minimum frequency of rotation.

**NOTE :** If the parameter « DP Idle » is configured to « Disable », the module DP runs constantly at maximum frequency of rotation.

- LL Mode = External
  - The Load Lock mode is activated and de-activated depending on the digital input status « Remote Process On » which is available on the tool interface. When the input changes to status 1, the modules DP and MB accelerate to their maximum frequency of rotation. When the input changes to status 0, the modules DP and MB slow down to their minimum frequency of rotation.

**NOTE :** When the parameter « DP Idle » is configured to « Disable », the module DP runs constantly at the maximum frequency of rotation. The parameters « DP (or MB) Current Level » and « Time Before » are idle.

Refer to chapter « Description of MENU 08 TOOL INTERFACE » for the configuration of the input « Remote Process On ».

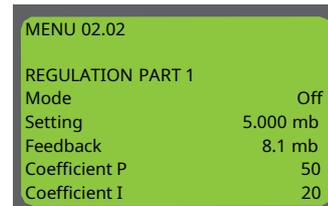
## CAUTION

The mode « Load Lock » will not work when:

- The warming up cycle has not finished.
- The mode maintenance is activated.
- The module MB is not controlled by a frequency inverter.

## MENU 02.02 REGULATION PART 1

- Line 4: Selection of mode.
- Line 5: Pressure value in Millibars.
- Line 6: Display of measured pressure in Millibars.
- Line 7: Regulating coefficient P.
- Line 8: Regulating coefficient I.



MENU 02.02	
REGULATION PART 1	
Mode	Off
Setting	5,000 mb
Feedback	8.1 mb
Coefficient P	50
Coefficient I	20

### Description of the operation:

- Mode = Off
  - The regulation is de-activated.
- Mode = Analog
  - The frequency of rotation of module DP or module MB, when present, is proportional to the current intensity applied to the analog input 4-20 mA AI8 (pin 33 of Toolinterface connector).

**NOTE :** If the module MB is not present, the frequency value of rotation of the module DP will be given by the formula  $I_{ma} = 16(F - F_{max}) / (F_{max} - F_{min}) + 20$  with F = the frequency of rotation required in Hz, Fmax being the maximum frequency of rotation in Hz as defined by the parameter « DP Full Frequency » and Fmin being the minimum frequency of rotation in Hz as defined by the parameter

#### «DP Idle Frequency».

When the module MB is present, the frequency value of rotation of the module MB will be given by the formula  $I_{ma} = 16(F - F_{max}) / (F_{max} - F_{min}) + 20$  with F = the frequency of rotation required in Hz, Fmax being the maximum frequency of rotation in Hz as defined by the parameter « MB Full Frequency » and Fmin being the minimum frequency of rotation in Hz as defined by the parameter

#### «MB Idle Frequency».

Refer to chapter « Description of MENU 04 INVERTERS SETTINGS » in order to determine the values of parameters « DP(MB) Full Frequency » and « DP(MB) Idle Frequency ».

The parameters « Setting », « Coefficient P » and « Coefficient I » are idle.

- Mode = Pressure
  - The frequency of rotation of module DP or module MB, when present, is regulated according to the pressure value which is adjustable by the parameter « Setting », according to the pressure measured in the chamber with the help of a pressure sensor connected to the analog input 4-20mA AI8 (pin 33 of Tool interface connector) and the regulating parameters « Coefficient P » and « Coefficient I ».

**NOTE :** Refer to paragraph « MENU 02.02 REGULATION PART 2 » in order to calibrate the measurement of the pressure sensor used.



## CAUTION

- The mode « Regulation » will not work when:
- The warming up cycle has not finished.
  - The mode « Maintenance » is activated.
  - The mode « Load Lock » is activated.
  - The module DP (or MB) is not monitored by a frequency inverter.

## MENU 02.03 REGULATION PART 2

- Line 5: Pressure in Millibars measured by the regulating sensor when providing a current of 4 mA.
- Line 7: Pressure in Millibars measured by the regulating sensor when providing a current of 20 mA.

MENU 02.03	
REGULATION PART 2	
Sensor Pressure for 4 mA	1.000 mb
Sensor pressure for 20 mA	10.1 mb

**NOTE:** Connect the pressure sensor's signal to the analog input 4-20mA AI8 (pin 4 of PID connector).

Use a sensor which is adequate with the pressure value that is to be adjusted.

## MENU 02.04 N2 IDLE MODE

- Line 4: Validation of mode.
- Line 6: Delay in Seconds between the start signal of « Process » phase and the opening of the dilution gas valve.
- Line 8: Delay in Seconds between the end signal of « Process » phase and the closure of the dilution gas valve.

MENU 02.04	
N2 IDLE MODE	
Enable	Yes
Delay from Idle to process	0 s
DP from Process to Idle	0 s

### Description of the operation:

- Enable = Off
  - The mode « N2 Idle Mode » is de-activated and the dilution gas valve is constantly open.
- Enable = Auto
  - The mode « N2 Idle Mode » is activated.
  - When the pump is in « Idle » mode (modules DP and/or MB at minimum frequency of rotation), the dilution gas valve is closed.
  - When the start signal of « Process » phase is detected, the modules DP and MB begin to accelerate and the time delay, which is adjustable in its duration using the parameter « Delay from Idle to Process », will start.
  - As soon as the duration of the time delay has elapsed, the dilution gas valve opens.
  - When the end signal of « Process » phase is detected, the modules DP and MB begin to slow down and the time delay, which is adjustable in its duration using the parameter « Delay from Process to Idle » will start.
  - As soon as the duration of the time delay has elapsed, the dilution gas valve closes.

- Enable = Extern
  - The N2 sol valve's control is carried out by means of the digital input « N2 Valve On » available on the tool interface.
  - The passage of 0 to 1 in the digital input « N2 Valve On » open the valve whereas the passage of 1 to 0 of the digital input « N2 Valve On » triggers the valve to close.

**NOTE :** Refer to chapter « Description of MENU 08 TOOL INTERFACE » for the configuration of the input « N2 Valve On ».

### CAUTION

The mode « N2 Idle Mode » will not work when:

- The warming up cycle has not finished.
- The mode « Maintenance » is activated.
- The mode « Load Lock » is de-activated.
- The gas dilution valve is not installed.

## MENU 02.05 INVERTERS IDLE MODE

- Line 4: Validation of mode.
- Line 6: Delay in Seconds between the start signal of « Process » phase and the acceleration of modules DP and MB.
- Line 8: Delay in Seconds between the end signal of « Process » phase and the slowing down of modules DP and MB.

MENU 02.05	
INVERTERS IDLE MODE	
Enable	Yes
Delay from Idle to process	0 s
DP from Process to Idle	0 s

### Description of the operation :

- Enable = No
  - The mode « Inverters Idle Mode » is de-activated.
- Enable = Yes
  - The mode « Inverters Idle Mode » is activated.

When the start signal of « Process » phase is detected, the time delay, which is adjustable in its duration using the parameter « Delay from Idle to Process », will start. As soon as the time delay's duration has elapsed, the modules DP and MB begin to accelerate.

When the end signal of « Process » phase is detected, the time delay, which is adjustable in its duration using the parameter « Delay from Process to Idle », will start.

As soon as the time delay's duration has elapsed, the modules DP and MB begin to slow down.

### CAUTION

The mode « Inverters Idle Mode » will not work when:

- The warming up cycle has not finished.
- The mode « Maintenance » is activated.
- The mode « Load Lock » is de-activated.

## MENU 02.06 GATE-SOFT VALVES

- Line 4: Configuration of the « Gate valve ».
- Line 5: Configuration of the « Soft valve ».
- Line 6: Duration in Seconds of the « Soft valve » opening.
- Line 7: Delay in Seconds of monitoring the opening of « Gate valve » and « Soft valve ».



MENU 02.06	
GATE-SOFT VALVES	
GV	Yes-Wired
SV	None
SV Open Time	30 s
Warning Time	5 s

### Description of the operation:

- GV = None (respectively SV = None)
  - The « Gate valve » (respectively the « Soft Valve ») is not installed or is installed but not controlled by the pump.
- GV = Yes-Wired (respectively SV = Yes-Wired)
  - The « Gate valve » (respectively the « Soft Valve ») is installed and completely controlled by the pump.  
The digital output « Open Gate Valve » (respectively « Open Soft Valve ») available on the tool interface, allows to open and close the valve. The digital input « Gate Valve Open » (respectively « Soft Valve Open ») available on the tool interface, allows to know the open or closed status of the valve.
- GV = Yes-Not Wired (respectively SV = Yes-Not Wired)
  - The « Gate valve » (respectively the « Soft Valve ») is installed and partially controlled by the pump. The digital output « Open Gate Valve » (respectively « Open Soft Valve ») available on the tool interface allows to open and close the valve. There is no digital input « Gate Valve Open » (respectively « Soft Valve Open ») available on the tool interface that allows to know the open or closed status of the valve.

### Configuration examples:

- GV = Yes-Wired, SV = Yes-Wired (« Gate Valve » and « Soft Valve » are completely controlled by the pump.  
When the start signal of « Process » phase is detected, the « Soft Valve » opens and the time delay, which is adjustable in its duration using the parameter « SV Open Time », will start.  
As soon as the time delay's duration has elapsed, the « Soft Valve » closes and the « Gate Valve » opens.  
When the end signal of « Process » phase is detected, the « Gate Valve » closes.  
At the same time, a time delay, which is adjustable in its duration using the parameter « Warning Time » will start as soon as the « Gate Valve » (respectively the « Soft Valve ») opens.  
If, as soon as the time delay's duration has elapsed, the open status of the « Gate valve » (respectively the « Soft Valve ») has not been registered on the digital input « Gate Valve Open » (respectively « Soft Valve Open ») on the tool interface, the warning « Gate valve Time-out » (respectively « Soft Valve Time-out ») is displayed on the handpad.

- GV = Yes-Not Wired, SV = None (« Gate Valve » is partially controlled by the pump and « Soft Valve » is not installed).

When the start signal of « Process » phase is detected, the « Gate Valve » opens. When the end signal of « Process » phase is detected, the « Gate Valve » closes. The parameters « SV Open Time » and « Warning Time » are idle.

**NOTE :** It is possible to communicate to the « Tool » the status of the « Gate Valve » (respectively the « Soft valve ») by using the digital output « Gate Valve Open » (respectively « Soft Valve Open ») available on the tool interface. Refer to chapter « Description of MENU 08 TOOL INTERFACE » for the input configurations for « Gate Valve Open », « Soft Valve Open » and output configurations for « Open Gate valve », « Open Soft Valve », « Gate Valve Open », « Soft Valve open ».

## CAUTION

The « Gate Valve » (respectively the « Soft Valve ») is closed when:

- a. The warming up cycle has not finished.
- b. The mode « Purge » is activated.
- c. The mode « Antilock » is activated.
- d. The pump is in « Idle Mode ».

## MENU 02.07 ANTILOCK MODE

- Line 4: Validation of mode.
- Line 5: Duration of the pump's stop time in Seconds.
- Line 6: Duration of the pump's rotation time in Seconds.
- Line 7: Temperature of end of mode in degrees centigrade.

MENU 02.07	
ANTILOCK MODE	
Enable	Yes
Stop Time	600 s
Start Time	30 s
Temp. Level	50 oC

### Description of the operation:

- Enable = No
  - The « Antilock » mode is de-activated.
- Enable = Yes
  - The « Antilock » mode is activated.

Use of this mode prevents sticking of the screws to the cylinder when the pump is cooling down.

When the pump is operated in mode « Local » a brief pressing of the « Stop » button starts the cycle, displayed by the flashing of the LED « Purge ».

When present, the module MB is stopped, the LED « MB run » goes out, the LED « DP run » remains on.

The module DP is alternatively stopped for the adjustable duration of parameter « Stop Time » and started for the adjustable duration of parameter « Start Time » until the temperature of module DP is inferior to the temperature given by the parameter « Temp. Level ».

The pump is then completely stopped, the LEDs « DP run » and « Purge » go out.

- NOTE :**
- a. When present, the dilution gas valve is open when the pump rotates.
  - b. In mode « Remote 1 », the passage of 1 to 0 in the digital input « Remote Start Pump », available on the tool interface, triggers the start of the mode « Antilock ».
  - c. In mode « Remote 2 », the passage of 1 to 0 in the digital input « Remote Stop Pump », available on the tool interface, triggers the start of the mode « Antilock ».
  - d. Refer to chapter « Description of MENU 05 COMMUNICATION » for the selection and the description of mode « Remote 1 » or mode « Remote 2 ».
  - e. Refer to chapter « Description of MENU 08 TOOL INTERFACE » for the configuration of the inputs « Remote Start Pump » and « Remote Stop Pump ».

## MENU 02.08 OPTIONS PART 1

- Line 4: Validation of the presence of the external heater.
- Line 5: Cancellation of the operation of the buzzer.
- Line 6: Cancellation of the purge cycle.
- Line 7: Cancellation of the dilution gas alarm.
- Line 8: Validation of WZ 2000 module for DS 3010 .

MENU 02.08	
OPTIONS PART 1	
External Heater	No
Buzzer Disable	No
Purge Disable	No
N2 Alarm Disable	No
WZ 2000 Apply	No

### Description of the operation:

- External Heater = No
  - The start of the external heater is not monitored by the pump.
- External Heater = Yes
  - The start of the external heater is monitored by the pump. If the external heater's "started" status has not been registered in the digital input « External Heater On » on the tool interface while the pump is in operation, the warning « External Heater Time-out » is displayed on the handpad.

**NOTE :** Refer to chapter « Description of MENU 08 TOOL INTERFACE » for the configuration of the input « External Heater On ».

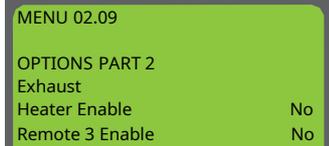
- Buzzer Disable = No
  - The operation of the buzzer in case of an alarm or a warning is activated.
- Buzzer Disable = Yes
  - The operation of the buzzer in case of an alarm or a warning is de-activated.
- Purge Disable = No
  - The activation of the purge cycle is authorized.
- Purge Disable = Yes
  - The activation of the purge cycle is not authorized.
- N2 Alarm Disable = No
  - The flow level of the dilution gas is monitored.
- N2 Alarm Disable = Yes
  - The flow level of the dilution gas is not monitored.
- WZ 2000 Apply = No
  - Apply WZ 2001 parameter for DS 3010
- WZ 2000 Apply = Yes
  - Apply WZ 2000 parameter for DS 3010

## MENU 02.09 OPTIONS PART 2

- Line 5: Validation of the presence of the heater at the outlet.
- Line 6: Validation of « Remote 3 » operation.

### Description of the operation:

- Exhaust Heater Enable = No
  - The start of the outlet heater is not controlled by the pump.
- External Heater = Yes
  - The start of the outlet heater is controlled by pump and started as soon as the pump is started-up.
- Remote 3 Enable = No
  - Use of mode « Remote 3 » is not authorized.
- Remote 3 Enable = Yes
  - Use of mode « Remote 3 » is authorized.



MENU 02.09	
OPTIONS PART 2	
Exhaust	
Heater Enable	No
Remote 3 Enable	No

**NOTE :** Refer to chapter « Description of MENU 05 COMMUNICATION » for the selection and description of mode « Remote 3 ».

## MENU 02.10 OPTIONS PART 3

- Line 4: Validation of reset integration power consumption value.
- Line 5: Validation of reset integration N2 consumption value.

### Description of the operation:

- Int . power Reset = Off
  - Deactivation of reset function.
- Int . power Reset = Start
  - Activation of reset function.
- Int . N2 Reset = Off
  - Deactivation of reset function.
- Int . N2 Reset = Start
  - Activation of reset function.



MENU 02.10	
OPTIONS PART 3	
Int . Power Reset	Off
Int . N2 Reset	Off

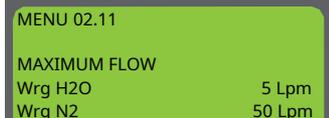
**NOTE :** Refer to chapter « Summary3 page » for the selection and the description of « Int . Power » and « Int . N2 ».

## MENU 02.11 MAXIMUM FLOW

- Line 4: Maximum cooling water flow.
- Line 5: Maximum barrier and dilution gas flow.

### Description of the operation:

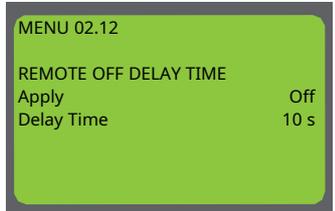
- When the cooling water flow (respectively the barrier and dilution gas flow) exceeds the adjustable value using the parameter « Wrg H2O » (respectively « Wrg N2 »), the warning « H2O Flow Too High » (respectively N2 Flow Too High ») is displayed on the handpad.



MENU 02.11	
MAXIMUM FLOW	
Wrg H2O	5 Lpm
Wrg N2	50 Lpm

## MENU 02.12 REMOTE OFF DELAY TIME

- Line 4: Validation of mode.
- Line 5: Duration of the mode in Seconds.



MENU 02.12	
REMOTE OFF DELAY TIME	
Apply	Off
Delay Time	10 s

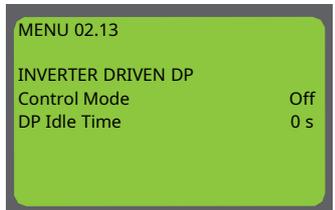
### Description of the operation:

- Apply = Off
  - The mode « REMOTE OFF DELAY TIME » is deactivate.
  - The MB's control is carried out by means of the digital input « Remote MB On » available on the tool interface.
  - The passage of 0 to 1 in the digital input « Remote MB On » starts the MB, whereas the passage of 1 to 0 of the digital input « Remote MB On » triggers the pumps to stop.
- Apply = Yes
  - The mode « REMOTE OFF DELAY TIME » is activate.
  - The MB's control is carried out by means of the digital input « Remote MB On » available on the tool interface.
  - The passage of 0 to 1 in the digital input « Remote MB On » starts the MB as soon as the time delay's duration has elapsed, whereas the passage of 1 to 0 of the digital input « Remote MB On » triggers the pumps to stop.

**NOTE :** a. This function only works when passage of 0 to 1 in the digital input « Remote MB On Enable».  
b. Refer to chapter « Description of MENU 08 TOOL INTERFACE » for the configuration of the input « Remote MB On » and « Remote MB On « Enable ».

## MENU 02.13 INVERTER DRIVEN DP (Optional)

- Line 4: Selection of the mode.
- Line 5: Duration of the mode in Seconds.



MENU 02.13	
INVERTER DRIVEN DP	
Control Mode	Off
DP Idle Time	0 s

### Description of the operation:

- Control Mode = Off
  - The mode « INVERTER DRIVEN DP » is deactivated.
  - The module DP, when DP inverter present, operate constantly at maximum frequency of rotation.
- Control Mode = Auto
  - Case 1 = Load lock in menu 02.01 is Auto.
  - The mode « INVERTER DRIVEN DP » is activated and deactivated according to the current load taken in by the module DP(or MB).
  - The current threshold is adjustable using the parameters « DP/MB Current Level in menu 02.01 ».
  - When the current level exceeds the threshold, the module MB accelerate to maximum frequency of rotation.
  - When the current level drops below the threshold, a time delay which is adjustable in its duration using the parameter « Time Before in menu 02.01 », will start.
  - As soon as the time delay's duration has elapsed, the modules DP and MB slow down to their minimum frequency of rotation.

When the modules DP and MB start to slow down frequency of rotation, a time delay which is adjustable in its duration using the parameter « DP Idle Time in menu 02.13 », will start. As soon as the time delay's duration has elapsed, the module DP accelerate to maximum frequency of rotation.

- Case 2 = Load lock in menu 02.01 is Extern.

The « INVERTER DRIVEN DP » mode is activated and deactivated depending on the digital input status « Remote Process On » which is available on the tool interface. When the input changes to status 1, the module MB accelerate to maximum frequency of rotation.

When the input changes to status 0, the modules DP and MB slow down to their minimum frequency of rotation.

When the modules DP and MB start to slow down frequency of rotation, a time delay which is adjustable in its duration using the parameter « DP Idle Time in menu « 02.13 », will start.

As soon as the time delay's duration has elapsed, the module DP accelerate to maximum frequency of rotation.

- Control Mode = External

- Case 1 = Load lock in menu 02.01 is Auto.

The « INVERTER DRIVEN DP » mode is activated and deactivated depending on the digital input status « Remote Process On » which is available on the tool interface. When the input changes to status 1, the module DP accelerate to maximum frequency of rotation.

When the input changes to status 0, the module DP slow down to minimum frequency of rotation.

The module MB is controlled by according to the current load taken in by the module DP(or MB).

The current threshold is adjustable using the parameters « DP/MB Current Level in menu 02.01 ».

When the current level exceeds the threshold, the module MB accelerate to maximum frequency of rotation.

When the current level drops below the threshold, a time delay which is adjustable in its duration using the parameter « Time Before in menu 02.01 », will start. As soon as the time delay's duration has elapsed, the module MB slow down to their minimum frequency of rotation.

- Case 2 = Load lock in menu 02.01 is Extern.

The « INVERTER DRIVEN DP » mode is activated and deactivated depending on the digital input status « Remote Process On » which is available on the tool interface. When the input changes to status 1, the modules DP and MB accelerate to their maximum frequency of rotation.

When the input changes to status 0, the modules DP and MB slow down to their minimum frequency of rotation.

**NOTE :** a. This function only works when apply option code in menu 03.01.

b. Only control DP frequency of rotation.

c. Refer to chapter « Description of MENU 08 TOOL INTERFACE » for the configuration of the input « Remote Process On ».



## CAUTION

The mode « INVERTER DRIVEN DP » will not work when:

- a. The warming up cycle has not finished.
- b. The mode maintenance is activated. (except external mode in menu 02.13)
- c. The module DP is not controlled by a frequency inverter.

## MENU 02.14 BUSCH HEATING JACKET (Optional)

- Line 4 : Validation of the « BUSCH HEATING JACKET ».
- Line 5 : Operating temperature of heating jacket.
- Line 6 : Low limit level for heating jacket temperature.
- Line 7 : High limit level for heating jacket temperature.
- Line 8 : the maximum authorized duration in Seconds for Low warning

MENU 02.14	
BUSCH HEATING JACKET	
	Disable
Set Value	200.0 °C
Low Warn	190.0 °C
High Warn	210.0 °C
Delay Time	50 s

### Description of the operation:

- Mode = Disable
  - The mode « BUSCH HEATING JACKET » is deactivated.
- Mode = Enable
  - The mode « BUSCH HEATING JACKET » is activated. The temperature of heating jacket is controlled by set value. When the temperature of heating jacket lower than the level defined by the parameter « Low warn », the time delay, which is adjustable in its duration using the parameter « Delay time », is started. The alarm « Heat Jacket Too Low » is displayed on the handpad, when the time delay's duration has elapsed. When the temperature of heating jacket exceeds the level defined by the parameter « High warn », the time delay of 100sec is started. The alarm « Heat Jacket Too High » is displayed on the handpad, when the time delay's duration has elapsed.

**NOTE :** Refer to paragraph « Description ALARMS/WARNINGS » for more information on the alarm operation.

- a. This function only works when apply option code in menu 03.01.
- b. Need to install devices.

## MENU 02.15 AUTO RESTART FUNCTION (Optional)

- Line 4: Validation of the « AUTO RESTART FUNCTION ».
- Line 5: Duration of the « AUTO RESTART FUNCTION » mode for activation in minutes.

### Description of the operation:

- Mode : Disable
  - The « AUTO RESTART FUNCTION » is deactivated.
- Mode : Enable
  - The « AUTO RESTART FUNCTION » is activated.

MENU 02.15	
AUTO RESTART FUNCTION	
	Disable
Waiting Time	3 min

When the pump power is cut off due to a power failure without normal stopping during pump operation, the pump automatically operates when power is restored within the parameter « Waiting Time ».

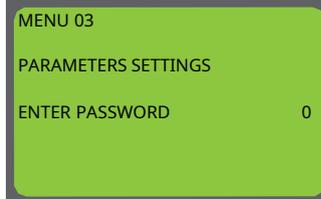
**NOTE :** This function only works when apply option code in menu 03.01

## ◆ Description of MENU 03 PARAMETERS SETTINGS

Access to the sub menus described below is subject to prior entry of a password.

**NOTE :** entry of password.

- Press the OK button to select the password to be entered.
- Press the buttons « Left arrow » and « Right arrow » as many times as necessary to select, where applicable, the character to be modified.
- Press the buttons « Down arrow » and « Up arrow » as many times as necessary to modify the value of the password.
- Press the OK button to save the entry of the password.
- Press the button « Down arrow » to enter the first sub menu. When the password is incorrect this last operation is not possible.



The buttons « Down arrow » and « Up arrow » allow to navigate in the sub menus described below.

**NOTE :** modification of a parameter.

- Press the OK button as many times as necessary to select the parameter to be modified.
- Press the buttons « Left arrow » and « Right arrow » as many times as necessary to select, where applicable, the character to be modified.
- Press the buttons « Down arrow » and « Up arrow » as many times as necessary to modify the value of the parameter.
- Press the OK button to save the parameter's modification.

### MENU 03.01 PUMP SELECTION

- Line 4: Selection of type, number and version of the pump.
- Line 5: Selection of power supply voltage.
- Line 6: Selection of tantal coating of module.
- Line 7: Selection of options.
- Line 8: Validation of initialization of the default values.



Select the parameters « Init Values » = « Init » when all parameters concerning the definition of the pump are established.

When the selected pump does not exist in the library, the parameter « Init Values » switches to the value « No Valid » and the LED « Power » goes out.

When the selected pump exists in the library, the parameter « Init Values » switches to the value « Done », the LED « Power » goes on and all parameters are automatically initialized in their default value, including the process parameters and the parameters relating to the frequency inverters.

**NOTE :** The pump's initialization is not possible when the pump has not stopped. If the values of certain parameters must be different from the default values, they must be modified manually. Use the file « Definition of options » to inform on parameter « Option Code »

### MENU 03.02 TIMERS

- Line 4: Duration of purge cycle in Seconds.
- Line 5: Duration of « Cold Start » cycle in Seconds.
- Line 6: Duration of starting time delay for module MB in Seconds.
- Line 7: Duration of stop time delay for module DP in Seconds.
- Line 8: Duration of monitoring delay for the pressure switch at the inlet of module MB in Seconds.



## Description of the operation:

- Purge Time: when the pump is operating in « Local » mode, briefly pressing the « Stop » button starts the cycle, signaled by the LED « Purge » which will light.
- The pump is kept rotating until the time delay, which is adjustable in its duration using the parameter « Purge Time », has elapsed.
- The pump is then completely stopped, the LEDs « DP run », « MB run » and « Purge » go out.

**NOTE :** a. Activation of the purge cycle is not authorized when the cycle « Antilock » is selected.

Refer to paragraph « MENU 02.07 ANTILOCK » for modification.

b. Activation of the purge cycle is not authorized when the parameter « Purge Disable » = 1.

Refer to paragraph « MENU 02.08 OPTIONS PART 1 » on how to modify this parameter.

c. When present, the dilution gas valve is open when the pump rotates.

d. When the purge cycle is under way, briefly pressing the « Start » button will cancel the cycle.

e. The purge cycle is not possible if the starting and stopping of the pump is carried out in « Remote » mode.

- Cold Start: the cycle « Cold Start » is used to warm up the pump when the temperature of module DP is lower than 75 °C.
- During operation in mode « Local », briefly pressing the « Start » button will start the cycle, displayed by the flashing of the LED « Warning ».
- The cycle continues until the time delay, which is adjustable in its duration using the parameter « Cold Start », has elapsed or until the temperature of module DP has reached 75 °C.
- The pump is then ready for production and the LED « Warning » goes out.

**NOTE :** a. Depending on the type of pump, a longer pressing of the « Start » button will allow to shorten the cycle « Cold Start », irrespective of the temperature of module DP.

b. Depending on the type of pump, an incompressible fixed time delay can be imposed during the « Cold Start » cycle.

- MB On Delay: when the pumps starts, module DP is triggered into rotation and the time delay, which is adjustable in its duration using the parameter « MB On Delay », is started.  
As soon as the time delay's duration has elapsed, the module MB is triggered into rotation.
- MB Off Delay: when the pump stops, the LED « DP run » flashes, the module MB is stopped and the time delay, which is adjustable in its duration using the parameter « MB Off Delay », is started.  
As soon as the time delay's duration has elapsed, the module DP is stopped and the LED « DP run » goes out.

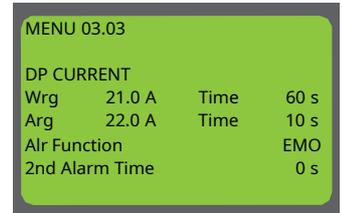
**NOTE :** When the pump is not equipped with a module DP, the time delay is reduced to 2 seconds.

- MB Inlet Pres.: when the pump starts, the module DP is triggered into rotation and the time delay, which is adjustable in its duration using the parameter « MB Inlet Pres.», is started.  
As soon as the time delay's duration has elapsed, the status of the digital input « MB Inlet Pressure » is checked: if the pressure at the inlet of module MB is too high, the alarm « MB Inlet Pressure Too High » is displayed on the handpad.

**NOTE :** When the pump is not equipped with a module MB, or when the module MB is controlled by a frequency inverter, the parameter « MB-Inlet Pres. » is idle, because there is no pressure switch at the inlet to control the pressure of module MB.

## MENU 03.03 DP CURRENT

- Line 4: First control level in Amperes for current absorbed by the motor of module DP and maximum duration authorized in Seconds.
- Line 5: Second control level in Amperes for current absorbed by the motor of module DP and maximum duration authorized in Seconds.
- Line 6: Operation to be executed in case of an alarm.
- Line 7: maximum duration authorized in Seconds for DP module.



MENU 03.03			
DP CURRENT			
Wrg	21.0 A	Time	60 s
Arg	22.0 A	Time	10 s
Alr Function			EMO
2nd Alarm Time			0 s

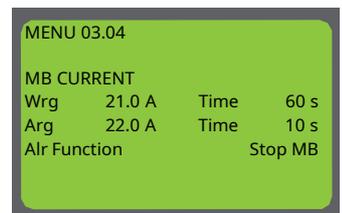
### Description of the operation:

- **Management of the first control level:** when the current absorbed by the motor of module DP exceeds the level defined by parameter « Wrg », the time delay, which is adjustable in its duration using the parameter « Time », is started. The warning « DP Current Too High » is displayed on the handpad when the time delay's duration has elapsed.
- **Management of the second control level:** when the current absorbed by the motor of module DP exceeds the level defined by parameter « Alr », the time delay, which is adjustable in its duration using the parameter « Time », is started. The alarm « DP Current Too High » is displayed on the handpad when the time delay's duration has elapsed.
- **Operation of the alarm by default:** EMO
- **Management of the first control level:** when the current absorbed by the motor of module DP exceeds the level defined by parameter « Wrg » and the Wrg time delay's duration has elapsed, the time delay, which is adjustable in its duration using the parameter « 2nd Alarm Time », is started. The alarm « DP Overload Too long » is displayed on the handpad when time delay's duration has elapsed.  
(Only apply BC 0600 F)

**NOTE :** Refer to paragraph « Description ALARMS/WARNINGS » for more information on the alarm operation.

## MENU 03.04 MB CURRENT

- Line 4 : First control level in Amperes for current absorbed by the motor of module MB and maximum authorized duration in Seconds.
- Line 5 : Second control level in Amperes for current absorbed by the motor of module MB and maximum authorized duration in Seconds.
- Line 6: Operation to be executed in case of an alarm.



MENU 03.04			
MB CURRENT			
Wrg	21.0 A	Time	60 s
Arg	22.0 A	Time	10 s
Alr Function			Stop MB

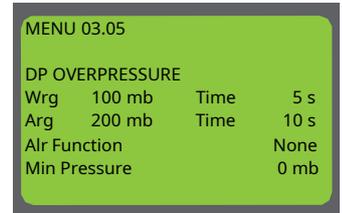
### Description of the operation:

- Management of the first control level: when the current absorbed by the motor of module MB exceeds the level defined by the parameter « Wrg », the time delay, which is adjustable in its duration using the parameter « Time », is started.  
The warning « MB Current Too High » is displayed on the handpad when the time delay's duration has elapsed.
- Management of the second control level: when the current absorbed by the motor of module MB exceeds the level defined by the parameter « Alr », the time delay, which is adjustable in its duration using the parameter « Time », is started. The alarm « MB Current Too High » is displayed on the handpad when the time delay's duration has elapsed. Operation of the alarm by default: Stop MB

**NOTE :** Refer to paragraph « Description ALARMS/WARNINGS » for more information on the alarm operation.

## MENU 03.05 DP OVERPRESSURE

- Line 4 : First control level for overpressure measured at the pump's outlet in Millibars and maximum authorized duration in Seconds.
- Line 5 : Second control level for overpressure measured at the pump's outlet in Millibars and maximum authorized duration in Seconds.
- Line 6 : Operation to be executed in case of an alarm.
- Line 7 : Minimum DP overpressure valve (used for sensor failure detection).
- Line 8 : Select type of installed sensor.



MENU 03.05			
DP OVERPRESSURE			
Wrg	100 mb	Time	5 s
Arg	200 mb	Time	10 s
Alr Function			None
Min Pressure			0 mb

### Description of the operation:

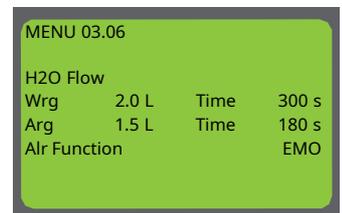
- Management of the first control level: if the overpressure measured at the pump's outlet exceeds the level defined by the parameter « Wrg », the time delay, which is adjustable in its duration using the parameter « Time », is started. The warning « DP Overpressure Too High » is displayed on the handpad when the time delay's duration has elapsed.
- Management of the second control level: if the overpressure measured at the pump's outlet exceeds the level defined by the parameter « Alr », the time delay, which is adjustable in its duration using the parameter « Time », is started. The alarm « DP Overpressure Too High » is displayed on the handpad when the time delay's duration has elapsed.
- Operation of the alarm by default: None

**NOTE :** a. Refer to paragraph « Description ALARMS/WARNINGS » for more information on the alarm operation.

b. If the sensor used to measure the overpressure is not analog, the parameters « Wrg » and « Alr » are idle.

## MENU 03.06 H2O Flow

- Line 4 : First control level for the pump cooling water flow in Liters per Minute and maximum authorized duration in Seconds.
- Line 5 : Second control level for pump cooling water flow in Liters per Minute and maximum authorized duration in Seconds.
- Line 6 : Operation to be executed in case of an alarm.



MENU 03.06			
H2O Flow			
Wrg	2.0 L	Time	300 s
Arg	1.5 L	Time	180 s
Alr Function			EMO

### Description of the operation:

- Management of the first control level: if the pump's cooling water flow is lower than the level defined by the parameter « Wrg », the time delay, which is adjustable in its duration using the parameter « Time », is started. The warning « H2O Flow Too Low » is displayed on the handpad when the time delay's duration has elapsed.
- Management of the second control level: if the pump's cooling water flow is lower than the level defined by the parameter « Alr », the time delay, which is adjustable in its duration using the parameter « Time », is started. The alarm « H2O Flow Too Low » is displayed on the handpad when the time delay's duration has elapsed.
- Operation of the alarm by default: EMO

**NOTE :** a. Refer to paragraph « Description ALARMS/WARNINGS » for more information on the alarm operation.

b. If the sensor used to measure the cooling water flow is not analog, the parameters « Wrg » and « Alr » are idle.

## MENU 03.07 N2 Flow

- Line 4 : First control level for the pump's dilution gas flow in Liters per Minute and maximum authorized duration in Seconds.
- Line 5 : Second control level for the pump's dilution gas flow in Liters per Minute and maximum authorized duration in Seconds.
- Line 6 : Operation to be executed in case of an alarm.
- Line 7 : Select type of installed sensor.

MENU 03.07			
N2 Flow			
Wrg	5.0 L	Time	30 s
Arg	2.5 L	Time	60 s
Alr Function			None
Range N2			2 – 200 L

### Description of the operation:

- Management of the first control level: if the pump's dilution gas flow is lower than the level defined by the parameter « Wrg », the time delay, which is adjustable in its duration using the parameter « Time », is started. The warning « N2 Flow Too Low » is displayed on the handpad when the time delay's duration has elapsed.
- Management of the second control level: if the pump's dilution gas flow is lower than the level defined by the parameter « Alr », the time delay, which is adjustable in its duration using the parameter « Time », is started. The alarm «N2 Flow Too Low » is displayed on the handpad when the time delay's duration has elapsed.
- Operation of the alarm by default: None
- Default sensor type: According installed sensor type.

- NOTE :**
- Refer to paragraph « Description ALARMS/WARNINGS » for more information on the alarm operation.
  - If the parameter « N2 Alarm Disable = Yes », the dilution gas flow is not monitored. See paragraph « MENU 02.08 OPTIONS PART 1 » on how to modify this parameter.
  - If the function « N2 IDLE MODE » is used, the dilution gas flow is not monitored in « Idle » mode. See paragraph «MENU 02.04 N2 IDLE- MODE » to modify this function.
  - If the sensor used to measure the dilution gas flow is not analog, the parameters « Wrg » and « Alr » are idle.

## MENU 03.08 DP TEMPERATURE

- Line 4 : First control level for the temperature of module DP in degrees centigrade and the maximum authorized duration in Seconds.
- Line 5 : Second control level for the temperature of module DP in degrees centigrade and the maximum authorized duration in Seconds.
- Line 6 : Operation to be executed in case of an alarm.
- Line 7 : Select type of installed sensor.

MENU 03.08			
DP TEMPERATURE			
Wrg	110 oC	Time	180 s
Arg	130 oC	Time	180 s
Alr Function			EMO
Range PT100			0 – 200 oC

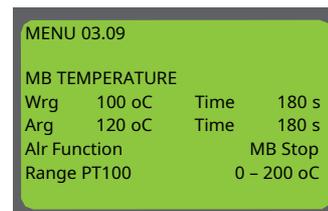
### Description of the operation:

- Management of the first control level: if the temperature of module DP exceeds the level defined by the parameter « Wrg », the time delay, which is adjustable in its duration using the parameter « Time », is started. The warning « DP Temperature Too High » is displayed on the handpad when the time delay's duration has elapsed.
- Management of the second control level: if the temperature of module DP exceeds the level defined by the parameter « Alr », the time delay, which is adjustable in its duration using the parameter « Time », is started. The alarm « DP Temperature Too High » is displayed on the hand- pad when the time delay's duration has elapsed.
- Operation of the alarm by default: EMO
- Default sensor type: 0 – 200 °C

**NOTE :** Refer to paragraph « Description ALARMS/WARNINGS » for more information on the alarm operation.

## MENU 03.09 MB TEMPERATURE

- Line 4 : First control level for the temperature of module MB in degrees centigrade and the maximum authorized duration in Seconds.
- Line 5 : Second control level for the temperature of module MB in degrees centigrade and the maximum authorized duration in Seconds.
- Line 6 : Operation to be executed in case of an alarm.
- Line 7 : Select type of installed sensor.



MENU 03.09			
MB TEMPERATURE			
Wrg	100 oC	Time	180 s
Arg	120 oC	Time	180 s
Alr Function			MB Stop
Range	PT100		0 - 200 oC

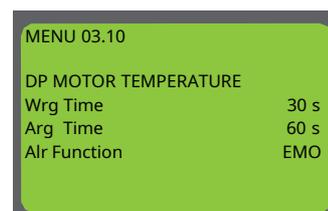
### Description of the operation:

- Management of the first control level: if the temperature of module MB exceeds the level defined by the parameter « Wrg », the time delay, which is adjustable in its duration using the parameter « Time », is started. The warning « MB Temperature Too High » is displayed on the handpad when the time delay's duration has elapsed.
- Management of the second control level: if the temperature of module MB exceeds the level defined by the parameter « Alr », the time delay, which is adjustable in its duration using the parameter « Time », is started. The alarm « MB Temperature Too High » is displayed on the hand- pad when the time delay's duration has elapsed.
- Operation of the alarm by default: Stop MB
- Default sensor type: 0 - 200 °C

**NOTE :** a. Refer to paragraph « Description ALARMS/WARNINGS » for more information on the alarm operation.  
b. If the sensor used to measure the temperature of module MB is not installed, the parameters « Wrg », « Alr », « Time » and « Alr Function » are idle.

## MENU 03.10 DP MOTOR TEMPERATURE

- Line 4 : Maximum authorized duration in Seconds of the first control level for the temperature of the motor of module DP.
- Line 5 : Maximum authorized duration in Seconds of the second control level for the temperature of the motor of module DP.
- Line 6 : Operation to be executed in case of an alarm.



MENU 03.10	
DP MOTOR TEMPERATURE	
Wrg Time	30 s
Arg Time	60 s
Alr Function	EMO

### Description of the operation:

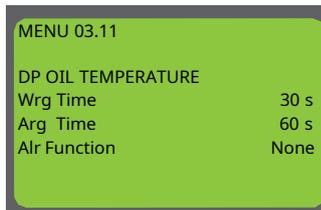
- Management of the first control level: if the temperature of the motor of module DP is too high, the time delay, which is adjustable in its duration using the parameter « Wrg Time », is started. The warning « DP Motor Temperature Too High » is displayed on the handpad when the time delay's duration has elapsed.
- Management of the second control level: if the temperature of the motor of module DP is too high, the time delay, which is adjustable in its duration using the parameter « Alr Time », is started. The alarm « DP Motor Temperature Too High » is displayed on the handpad when the time delay's duration has elapsed.
- Operation of the alarm by default: EMO

**NOTE :** a. Refer to paragraph « Description ALARMS/WARNINGS » for more information on the alarm operation.

b. If the sensor used to measure the temperature of the motor of module DP is not installed, the parameters « Wrg Time », « Alr Time» and « Alr Function » are idle.

## MENU 03.11 DP OIL TEMPERATURE

- Line 4 : Maximum authorized duration in Seconds of the first control level for the oil temperature of module DP.
- Line 5 : Maximum authorized duration in Seconds of the second control level for the oil temperature of module DP.
- Line 6 : Operation to be executed in case of an alarm.



MENU 03.11	
DP OIL TEMPERATURE	
Wrg Time	30 s
Arg Time	60 s
Alr Function	None

### Description of the operation:

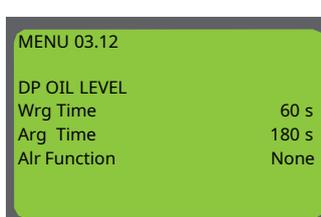
- Management of the first control level: if the oil temperature of module DP is too high, the time delay, which is adjustable in its duration using the parameter « Wrg Time », is started. The warning « DP Oil Temperature Too High » is displayed on the handpad when the time delay's duration has elapsed.
- Management of the second control level: if the oil temperature of module DP is too high, the time delay, which is adjustable in its duration using the parameter « Alr Time », is started. The alarm « DP Oil Temperature Too High » is displayed on the handpad when the time delay's duration has elapsed.
- Operation of the alarm by default: None

**NOTE :** a. Refer to paragraph « Description ALARMS/WARNINGS » for more information on the alarm operation.

b. If the sensor used to measure the oil temperature of module DP is not installed, the parameters « Wrg Time », « Alr Time» and « Alr Function » are idle.

## MENU 03.12 DP OIL LEVEL

- Line 4 : Maximum authorized duration in Seconds of the first control level for oil level of module DP.
- Line 5: Maximum authorized duration in Seconds of the second control level for oil level of module DP.
- Line 6 : Operation to be executed in case of an alarm.



MENU 03.12	
DP OIL LEVEL	
Wrg Time	60 s
Arg Time	180 s
Alr Function	None

### Description of the operation:

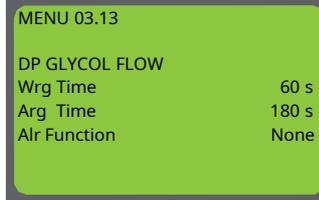
- Management of the first control level: if the oil level of module DP is too low, the time delay, which is adjustable in its duration using the parameter « Wrg Time », is started. The warning « DP Oil Level Too Low » is displayed on the handpad when the time delay's duration has elapsed.
- Management of the second control level: if the oil level of module DP is too low, the time delay, which is adjustable in its duration using the parameter « Alr Time », is started. The alarm « DP Oil Level Too Low » is displayed on the handpad when the time delay's duration has elapsed.
- Operation of the alarm by default: None

**NOTE :** a. Refer to paragraph « Description ALARMS/WARNINGS » for more information on the alarm operation.

b. If the sensor used to measure the oil level of module DP is not installed, the parameters «Wrg Time», «Alr Time» & «Alr Function» are idle.

## MENU 03.13 DP GLYCOL FLOW

- Line 4 : Maximum authorized duration in Seconds of the first control level for the pump's cooling liquid flow.
- Line 5 : Maximum authorized duration in Seconds of second control level for the pump's cooling liquid flow.
- Line 6 : Operation to be executed in case of an alarm.



MENU 03.13	
DP GLYCOL FLOW	
Wrg Time	60 s
Arg Time	180 s
Alr Function	None

### Description of the operation:

- Management of the first control level: if the pump's cooling liquid flow is too low, the time delay, which is adjustable in its duration using the parameter « Wrg Time », is started. The warning « DP Glycol Flow Too Low » is displayed on the handpad when the time delay's duration has elapsed.
- Management of the second control level: if the pump's cooling liquid flow is too low, the time delay, which is adjustable in its duration using the parameter « Alr Time », is started. The alarm « DP Glycol Flow Too Low » is displayed on the handpad when the time delay's duration has elapsed.
- Operation of the alarm by default: None

**NOTE :** a. Refer to paragraph « Description ALARMS/WARNINGS » for more information on the alarm operation.

b. If the sensor used to measure the pump's cooling liquid flow is not installed, the parameters « Wrg Time », « Alr Time» and « Alr Function » are idle.

## MENU 03.14 DP GLYCOL TEMPERATURE

- Line 4 : Maximum authorized duration in Seconds of the first control level for the pump's cooling liquid temperature.
- Line 5 : Maximum authorized duration in Seconds of the second control level for the pump's cooling liquid temperature.
- Line 6 : Operation to be executed in case of an alarm.



MENU 03.14	
DP GLYCOL TEMPERATURE	
Wrg Time	60 s
Arg Time	180 s
Alr Function	None

### Description of the operation:

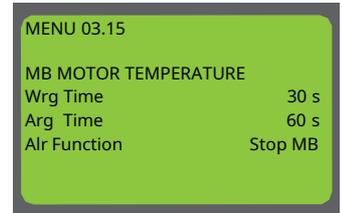
- Management of the first control level: if the pump's cooling liquid temperature is too high, the time delay, which is adjustable in its duration using the parameter « Wrg Time », is started. The warning « DP Glycol Temperature Too High » is displayed on the handpad when the time delay's duration has elapsed.
- Management of the second control level: if the pump's cooling liquid temperature is too high, the time delay, which is adjustable in its duration using the parameter « Alr Time », is started. The alarm « DP Glycol Temperature Too High » is displayed on the handpad when the time delay's duration has elapsed.
- Operation of the alarm by default: None

**NOTE :** a. See paragraph « Description ALARMS/WARNINGS » for more information on the alarm operation.

b. If the sensor used to measure the pump's cooling liquid temperature is not installed, the parameters « Wrg Time », « Alr Time» and « Alr Function » are idle.

## MENU 03.15 MB MOTOR TEMPERATURE

- Line 4 : Maximum authorized duration in Seconds of the first control level for the temperature of the motor of module MB.
- Line 5 : Maximum authorized duration in Seconds of the second control level for the temperature of the motor of module MB.
- Line 6 : Operation to be executed in case of an alarm.



MENU 03.15	
MB MOTOR TEMPERATURE	
Wrg Time	30 s
Arg Time	60 s
Alr Function	Stop MB

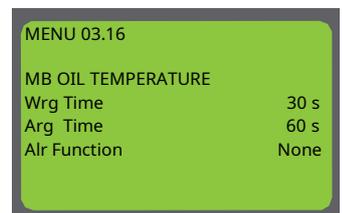
### Description of the operation:

- Management of the first control level: if the temperature of the motor of module MB is too high, the time delay, which is adjustable in its duration using the parameter « Wrg Time », is started. The warning « MB Motor Temperature Too High » is displayed on the handpad when the time delay's duration has elapsed.
- Management of the second control level: if the temperature of the motor of module MB is too high, the time delay, which is adjustable in its duration using the parameter « Alr Time », is started. The alarm « MB Motor Temperature Too High » is displayed on the handpad when the time delay's duration has elapsed.
- Operation of the alarm by default: Stop MB

**NOTE :** a. See paragraph « Description ALARMS/WARNINGS » for more information on the alarm operation.  
b. If the sensor used to measure the temperature of the motor of module MB is not installed, the parameters « Wrg Time », « Alr Time » and « Alr Function » are idle.

## MENU 03.16 MB OIL TEMPERATURE

- Line 4 : Maximum authorized duration in Seconds of the first control level for the oil temperature of module MB.
- Line 5 : Maximum authorized duration in Seconds of the second control level for the oil temperature of module MB.
- Line 6 : Operation to be executed in case of an alarm.



MENU 03.16	
MB OIL TEMPERATURE	
Wrg Time	30 s
Arg Time	60 s
Alr Function	None

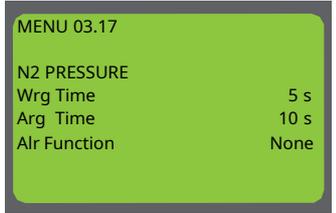
### Description of the operation:

- Management of the first control level: if the oil temperature of module MB is too high, the time delay, which is adjustable in its duration using the parameter « Wrg Time », is started. The warning « MB Oil Temperature Too High » is displayed on the handpad when the time delay's duration has elapsed.
- Management of the second control level: if the oil temperature of module MB is too high, the time delay, which is adjustable in its duration using the parameter « Alr Time », is started. The alarm « MB Oil Temperature Too High » is displayed on the handpad when the time delay's duration has elapsed.
- Operation of the alarm by default: None

**NOTE :** a. See paragraph « Description ALARMS/WARNINGS » for more information on the alarm operation.  
b. If the sensor used to measure the oil temperature of module MB is not installed, the parameters « Wrg Time », « Alr Time » and « Alr Function » are idle.

## MENU 03.17 N2 PRESSURE

- Line 4 : Maximum authorized duration in Seconds of the first control level for the barrier gas pressure in the pump.
- Line 5 : Maximum authorized duration in Seconds of the second control level for the barrier gas pressure in the pump.
- Line 6 : Operation to be executed in case of an alarm.



MENU 03.17			
N2 PRESSURE			
Wrg Time			5 s
Arg Time			10 s
Alr Function			None

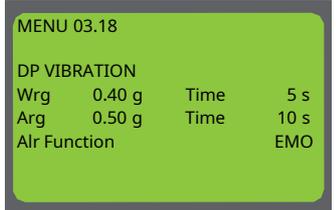
### Description of the operation:

- Management of the first control level: if the barrier gas pressure in the pump is too low, the time delay, which is adjustable in its duration using the parameter « Wrg Time », is started. The warning « N2 Pressure Too Low » is displayed on the handpad when the time delay's duration has elapsed.
- Management of the second control level: if the barrier gas pressure in the pump is too low, the time delay, which is adjustable in its duration using the parameter « Alr Time », is started. The alarm « N2 Pressure Too Low » is displayed on the handpad when the time delay's duration has elapsed.
- Operation of the alarm by default : None

**NOTE :** a. Refer to paragraph « Description ALARMS/WARNINGS » for more information on the alarm operation.  
b. If the sensor used to measure the barrier gas pressure in the pump is not installed, the parameters « Wrg Time », « Alr Time » and « Alr Function » are idle.

## MENU 03.18 DP VIBRATION

- Line 4 : First control level for vibrations of module DP in acceleration units and maximum authorized duration in Seconds.
- Line 5 : Second control level for vibrations of module DP in acceleration units and maximum authorized duration in Seconds.
- Line 6 : Operation to be executed in case of an alarm.



MENU 03.18			
DP VIBRATION			
Wrg	0.40 g	Time	5 s
Arg	0.50 g	Time	10 s
Alr Function			EMO

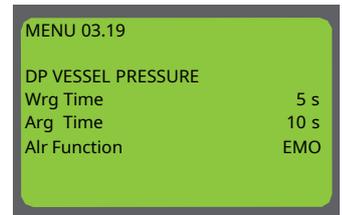
### Description of the operation:

- Management of the first control level: if the vibration level of module DP exceeds the level defined by the parameter « Wrg », the time delay, which can be adjusted in its duration using the parameter « Time », is started. The warning « DP Vibration Too High » is displayed on the handpad when the time delay's duration has elapsed.
- Procedure of the second control level: if the vibration level of module DP exceeds the level defined by the parameter « Alr », the time delay, which can be adjusted in its duration using the parameter « Time », is started. The warning « DP Vibration Too High » is displayed on the handpad when the time delay's duration has elapsed.
- Operation of the automatic alarm : EMO

**NOTE :** Refer to paragraph « Description ALARMS/WARNINGS » for more information on the alarm operation.

## MENU 03.19 DP VESSEL PRESSURE

- Line 4 : First control level for the pressure in the expansion vessel of DP module and maximum authorized duration in Seconds.
- Line 5 : Second control level for the pressure in the expansion vessel of DP module and maximum authorized duration in Seconds.
- Line 6 : Operation to be executed in case of an alarm.



MENU 03.19	
DP VESSEL PRESSURE	
Wrg Time	5 s
Arg Time	10 s
Alr Function	EMO

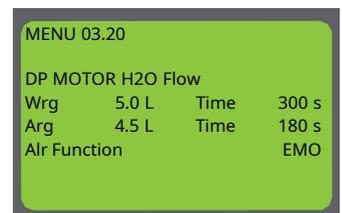
### Description of the operation:

- Management of the first control level: if the pressure in the expansion vessel of module DP is too high, the time delay, which is adjustable in its duration using the parameter « Wrg Time », is started. The warning « DP vessel pressure too high » is displayed on the handpad when the time delay's duration has elapsed.
- Management of the second control level: if the pressure in the expansion vessel of module DP is too high, the time delay, which is adjustable in its duration using the parameter « Alr Time », is started. The warning « DP vessel pressure too high » is displayed on the handpad when the time delay's duration has elapsed.
- Operation of the automatic alarm: EMO

**NOTE :** a. Refer to paragraph « Description ALARMS/WARNINGS » for more information on the alarm operation  
b. If the expansion vessel of the module DP is not installed, the parameters « Wrg Time », « Alr Time » and « Alr Function » are idle.

## MENU 03.20 DP MOTOR H2O Flow

- Line 4 : First control level for the DP motor's cooling water flow in Liters per Minute and maximum authorized duration in Seconds.
- Line 5 : Second control level for the DP motor's cooling water flow in Liters per Minute and maximum authorized duration in Seconds.
- Line 6 : Operation to be executed in case of an alarm.



MENU 03.20	
DP MOTOR H2O Flow	
Wrg	5,0 L Time 300 s
Arg	4,5 L Time 180 s
Alr Function	EMO

### Description of the operation:

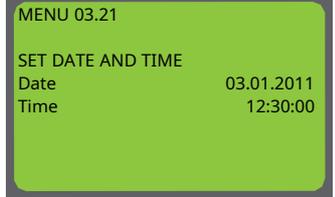
- Management of the first control level: if the DP motor's cooling water flow is lower than the level defined by the parameter « Wrg », the time delay, which is adjustable in its duration using the parameter « Time », is started.
- The warning « DP MOTOR H2O Too Low » is displayed on the handpad when the time delay's duration has elapsed.
- Management of the second control level: if the DP motor's cooling water flow is lower than the level defined by the parameter « Alr », the time delay, which is adjustable in its duration using the parameter « Time », is started.
- The alarm « DP MOTOR H2O Too Low » is displayed on the handpad when the time delay's duration has elapsed.
- Operation of the alarm by default: EMO

**NOTE :** a. Refer to paragraph « Description ALARMS/WARNINGS » for more information on the alarm operation.  
b. If the sensor used to measure the cooling water flow is not analog, the parameters « Wrg » and « Alr » are idle.

## MENU 03.21 SET DATE AND TIME

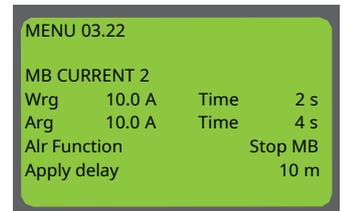
- Line 4: Selection of date.
- Line 5: Selection of time.

**NOTE :** The modification of date and time is not registered when the pump is rotating.



## MENU 03.22 MB CURRENT 2 (Optional)

- Line 4 : First control level in Amperes for current absorbed by the motor of module MB and maximum authorized duration in Seconds.
- Line 5 : Second control level in Amperes for current absorbed by the motor of module MB and maximum authorized duration in Seconds.
- Line 6 : Operation to be executed in case of an alarm.
- Line 7 : Delay time for applying the function.



### Description of the operation:

- Management of the first control level: when the current absorbed by the motor of module MB exceeds the level defined by the parameter « Wrg », the time delay, which is adjustable in its duration using the parameter « Time », is started.
- The warning « E-MB Current Too High » is displayed on the handpad when the time delay's duration has elapsed.
- Management of the second control level: when the current absorbed by the motor of module MB exceeds the level defined by the parameter « Alr », the time delay, which is adjustable in its duration using the parameter « Time », is started.
- The alarm « E-MB Current Too High » is displayed on the handpad when the time delay's duration has elapsed.
- Operation of the alarm by default: Stop MB
- The alarm function is applied, when « Apply delay » "s duration has elapsed.

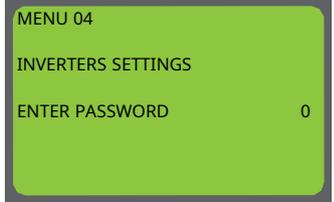
**NOTE :** a. Refer to paragraph « Description ALARMS/WARNINGS » for more information on the alarm operation.  
b. Only allow that the page is displayed, when use a option code in menu 3.1 page.

## ◆ Description of MENU 04 INVERTERS SETTINGS

Access to the sub menus described below is subject to prior entry of a password.

**NOTE :** entry of password.

- Press the OK button to select the password to be entered.
- Press the buttons « Left arrow » and « Right arrow » as many times as necessary to select, where applicable, the character to be modified.
- Press the buttons « Down arrow » and « Up arrow » as many times as necessary to modify the value of the password.
- Press the OK button to save the entry of the password.
- Press the button « Down arrow » to enter the first sub menu. If the password is incorrect, this last operation is not possible.



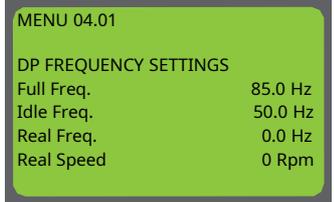
The buttons « Down arrow » and « Up arrow » allow to navigate in the sub menus described below.

**NOTE :** modification of a parameter.

- Press the OK button as many times as necessary to select the parameter to be modified.
- Press the buttons « Left arrow » and « Right arrow » as many times as necessary to select, where applicable, the character to be modified.
- Press the buttons « Down arrow » and « Up arrow » as many times as necessary to modify the value of the parameter.
- Press the OK button to save the parameter's modification.

### MENU 04.01 DP FREQUENCY SETTINGS

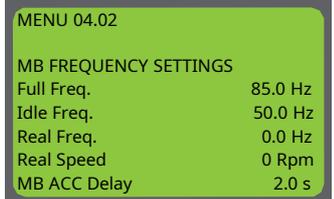
- Line 4 : Selection of the maximum frequency of rotation of module DP in Hertz.
- Line 5 : Selection of the minimum frequency of rotation of module DP in Hertz.
- Line 6 : Display of the current frequency of rotation in Hertz.
- Line 7 : Display of the current rotational speed in Revolutions per Minute.



**NOTE :** the values of frequency, rotational speed can only be displayed when the motor of module DP is controlled by a frequency inverter.

### MENU 04.02 MB FREQUENCY SETTINGS

- Line 4 : Selection of the maximum frequency of rotation of module MB in Hertz.
- Line 5 : Selection of the minimum frequency of rotation of module MB in Hertz.
- Line 6 : Display of the current frequency of rotation in Hertz.
- Line 7 : Display of the current rotational speed in Revolutions per Minute.
- Line 8 : MB acceleration delay time setting. Acceleration delay can reduce power consumption



**NOTE :** the values of frequency, rotational speed can only be displayed when the motor of module MB is controlled by a frequency inverter.

## MENU 04.03 MULTI STEP FUNCTION

- Line 4: Validation of mode.
- Line 5: Selection of the step 1 frequency of rotation of module MB in Hertz.
- Line 6: Duration time of the MB's step 1 frequency.
- Line 7: Selection of the step 2 frequency of rotation of module MB in Hertz.
- Line 8: Duration time of the MB's step 2 frequency.

MENU 04.03	
MULTI STEP FUNCTION	
Function	Off
Step 1	30.0 Hz
Step 1 Dwell	2.0 s
Step 2	50.0 Hz
Step 2 Dwell	3.0 s

**NOTE :** Multi step function is to avoid damage of pump from overload.

## MENU 04.04 DC VOLTAGE MONITORING

- Line 4: Display of the current DC voltage of a frequency inverter for DP.
- Line 8: Display of the current DC voltage of a frequency inverter for MB.

MENU 04.05	
DC VOLTAGE MONITORING	
DP DC Link	0 VDC
MB DC Link	0 VDC

**NOTE :** the values of DC voltage can only be displayed when the motor of module DP is controlled by a frequency inverter.

## ◆ Description of MENU 05 COMMUNICATION

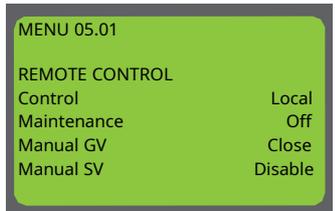
The buttons « Down arrow » and « Up arrow » allow to navigate in the sub menus described below.

**NOTE :** modification of a parameter.

- Press the OK button as many times as necessary to select the parameter to be modified.
- Press the buttons « Left arrow » and « Right arrow » as many times as necessary to select, where applicable, the character to be modified.
- Press the buttons « Down arrow » and « Up arrow » as many times as necessary to modify the value of the parameter.
- Press the OK button to save the parameter's modification.

### MENU 05.01 REMOTE CONTROL

- Line 4: Selection of the control mode.
- Line 5: Selection of the maintenance mode.
- Line 6 : Manual control for opening and closing of the « Gate Valve ».
- Line 7 : Manual control for opening and closing of the « Soft Valve ».



MENU 05.01	
REMOTE CONTROL	
Control	Local
Maintenance	Off
Manual GV	Close
Manual SV	Disable

#### Description of the operation:

- Control = Local
  - The pump's control is carried out with the help of the buttons « Start », « Stop » and « OK » in the following way :
    - Pressing briefly the « Start » button starts the pump in the mode « Cold Start », in the mode « Idle » or in the mode « Process » according to the temperature of module DP and the configuration of the pump's operating mode.
    - Pressing the « Start » button for longer interrupts the cycle « Cold Start » under some reserves.
    - Pressing briefly the « Stop » button starts the cycle « Purge » or the cycle « Antilock ».  
See paragraph «MENU 02.07 ANTILOCK MODE» and paragraph « MENU 03.02 TIMERS » for more information on the cycles « Purge » or « Antilock ».
    - Pressing the « Stop » button for longer stops the pump.
    - Pressing briefly the button « OK » stops the buzzer where applicable.
    - Pressing the button « OK » for longer clears the warnings and the alarms where applicable.
- Control = Network
  - The pump's control is carried out by means of commands transmitted through the intermediate network the pump is connected to.
- Control = Remote 1
  - The pump's control is carried out by means of the digital input « Remote Start Pump » available on the tool interface. The passage of 0 to 1 in the digital input « Remote Start Pump » starts the pump whereas the passage of 1 to 0 of the digital input « Remote Start Pump » triggers the pumps to stop.

**NOTE :** a. If the mode « Antilock » is selected, the passage of 1 to 0 in the digital input « Remote Start Pump » triggers the activation of the mode « Antilock ». See paragraph « MENU 02.07 ANTILOCK MODE » for more information on the cycle « Antilock ».

b. Refer to chapter « Description of MENU 08 TOOL INTERFACE » for the configuration of the input « Remote Start-Pump ».

- Control = Remote 2
  - The pump's control is carried out by means of the digital inputs « Remote Start Pump » and « Remote Stop Pump » available on the tool interface. The passage of 0 to 1 in the digital input « Remote Start Pump » starts the pump whereas the passage of 1 to 0 in the digital input « Remote-Stop Pump » triggers the pump to stop.

**NOTE :** a. If the « Antilock » is selected, the passage of 1 to 0 in the digital input « Remote Stop Pump » triggers the activation of the mode « Antilock ». See paragraph « MENU 02.07 ANTILOCK MODE » for more information on the cycle « Antilock ».

b. Refer to chapter « Description of MENU 08 TOOL INTERFACE » for the configuration of the input « Remote Start - Pump » and the input « Remote Stop Pump ».

- Control = Remote 3
  - The pump's control is carried out by means of the digital inputs « Remote DP Full Speed » and « Remote MB Full Speed » available on the tool interface. The pump starts as soon as the mode « Remote 3 » is selected. The passage of 0 to 1 in the digital input « DP Full Speed » triggers the acceleration of module DP up to its maximum frequency of rotation. The passage of 0 to 1 in the digital input « MB Full Speed » triggers the acceleration of module MB up to its maximum frequency of rotation.
  - The passage of 1 to 0 in the digital input « MB Full Speed » triggers the slowdown of module MB to its minimum frequency of rotation.
  - The passage of 1 to 0 in the digital input « DP Full Speed » triggers the slowdown of module DP to its minimum frequency of rotation.

**NOTE :** a. The mode « Remote 3 » can only be used when the parameter « Remote 3 Enable » = « Yes ».

See paragraph « MENU 02.09 OPTION PART 2 » on how to modify this parameter.

b. Select the mode « Local » and use the « Stop » button to stop the pump or to activate the cycle « Purge » or the cycle « Antilock ».

c. Refer to chapter « Description of MENU 08 TOOL INTERFACE » for the configuration of the input « DP Full Speed » and the input « MB Full Speed ».



## CAUTION

When the control mode is « Local », this means that:

- The buttons « Start » and « Stop » are idle.
- Pressing briefly the « OK » button stops the buzzer where applicable.
- Pressing the « OK » button for longer clears the warnings and the alarms, where applicable, only when the pump has stopped.
- The cycle « Purge » is not possible.

- Maintenance = Off
  - The mode « Maintenance » is de-activated.
- Maintenance = On
  - The mode « Maintenance » is activated in mode « Local ».
- Maintenance = Remote
  - The mode « Maintenance » is activated by the passage of 0 to 1 in the digital input « Remote - Maintenance », available on the tool interface.

**NOTE :** Refer to chapter « Description of MENU 08 TOOL INTERFACE » for configuration of the input « Remote Maintenance ».

 **CAUTION**

The mode « Maintenance » is used to empty the chambers after a period of maintenance.  
 The frequency of rotation of module MB is reduced so as to reduce stress on the mechanical components and to reduce noise in the room where the pump is installed.

- Manual GV (SV) = Disable
  - The opening or closing mode for the « Gate Valve » (respectively the « Soft Valve » is de-activated.
- Manual GV (SV) = Open
  - The opening mode for the « Gate Valve » (respectively the « Soft Valve » is activated.
- Manual GV (SV) = Close
  - The closing mode for the « Gate Valve » (respectively the « Soft Valve » is activated.

**Menu 05.02 SET IP ADDRESS**

- Line 4 : Selection of the IP address
- Line 5 : Selection of the sub mask.
- Line 6 : Selection of the router address.

```
MENU 05.02
SET IP ADDRESS
Addr.    129.   1.   8.  25
Subm.    255. 255.  0.   0
Gate.     0.   0.   0.   0
```

 **CAUTION**

When several pumps are connected to one single net, they must all have a different address.

**Menu 05.03 SET MODBUS RTU**

- Line 5 : Selection of the RS485 Configuration.
- Line 7 : Selection of the RS232 Configuration.
- Line 8 : Selection of the Modbus RTU address.
- The pump provides 4 kinds of « Com set»
  - 19200,N,8,2 (default)
  - 19200,N,8,1
  - 9600,N,8,2
  - 9600,N,8,1

```
MENU 05.03
SET MODBUS RTU
RS485 Configuration      19200,N,8,2
RS232 Configuration      19200,N,8,2
Com set                   19200,N,8,2
Modbus Address           0
```

 **CAUTION**

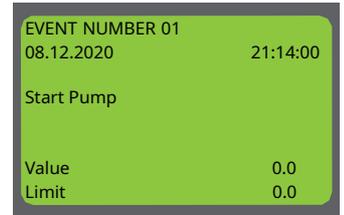
When several pumps are connected to one single net, they must all have a different address.

- Pin configuration for customer network.

	Pin no.	Description
RS485	1	D+
	4	D-
	9	SGND
	Pin no.	Description
RS232	2	RXD
	3	TXD
	5	GND

## ◆ Description of MENU 06 LAST EVENTS

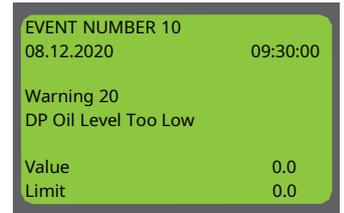
- Line 1: Event number between 1 and 100.
- Line 2 : Date and time the event occurred.
- Line 4 : Warning or alarm number when applicable.
- Line 5 : Description of the event.
- Line 7 : Value read on the sensor at the time of the event where applicable.
- Line 8 : Authorized limit value where applicable.



EVENT NUMBER 01	
08.12.2020	21:14:00
Start Pump	
Value	0.0
Limit	0.0

Use the buttons « Down arrow » and « Up arrow » to scroll all events.

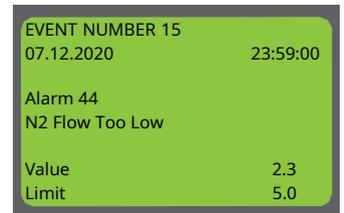
The last 100 events are stored in chronological order, number 1 being the most recent event.



EVENT NUMBER 10	
08.12.2020	09:30:00
Warning 20	
DP Oil Level Too Low	
Value	0.0
Limit	0.0

- List of events that can be stored :

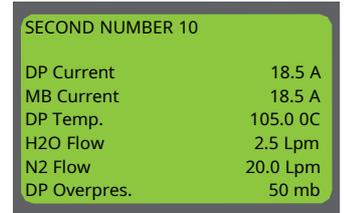
- « Start Pump » : date and time when the pump has been started.
- « Stop Pump » : date and time when the pump has been stopped.
- « Purge Pump » : date and time when the cycle « Purge » has been activated.
- « Antilock Pump » : date and time when the cycle « Antilock » has been activated.
- « Reset Pump » : date and time when the warnings and alarms have been cleared.
- « Power Loss » : date and time there was a power cut whilst the pump had been operating.
- « Power Off » : date and time there was a power cut whilst the pump had been stopped.
- « Power On » : date and time power to the pump was switched on.
- The alarms : date and time when an alarm has been displayed with the value read on the sensor and the authorized limit, where applicable.
- The warnings : date and time when a warning has been displayed with the value read on the sensor and the authorized limit, where applicable.



EVENT NUMBER 15	
07.12.2020	23:59:00
Alarm 44	
N2 Flow Too Low	
Value	2.3
Limit	5.0

## ◆ Description of MENU 07 LAST MINUTE DATA

- Line 1 : Number of the Second between 0 and 59.
- Line 3 : Current in Amperes absorbed by the motor of module DP.
- Line 4 : Current in Ampere absorbed by the motor of module MB.
- Line 5 : Temperature of module DP in Degrees centigrade.
- Line 6 : Cooling water flow in Litres per Minute.
- Line 7 : Barrier or/and dilution gas flow in Litres per Minute.
- Line 8 : Overpressure at the outlet of module DP in Millibars.



SECOND NUMBER 10	
DP Current	18.5 A
MB Current	18.5 A
DP Temp.	105.0 0C
H2O Flow	2.5 Lpm
N2 Flow	20.0 Lpm
DP Overpres.	50 mb

Use the buttons « Down arrow » and « Up arrow » to scroll all values stored every second of the previous minute, the number 0 being the last second.

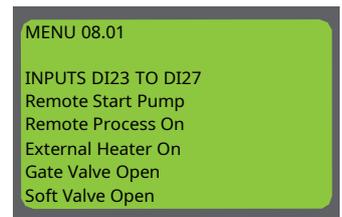
Storing the values begins as soon as the pump has started and continues until the start of the switch-off phase.

## ◆ Description of MENU 08 TOOL INTERFACE

The buttons « Down arrow » and « Up arrow » allow to navigate in the sub menus described below.

### MENU 08.01 INPUTS DI23 TO DI27

- Line 4 : Configuration of the digital input DI23.
- Line 5 : Configuration of the digital input DI24.
- Line 6 : Configuration of the digital input DI25.
- Line 7 : Configuration of the digital input DI26.
- Line 8 : Configuration of the digital input DI27.



The tool interface provides the user with 5 digital inputs which can be configured.

- List and description of the potential operations for each digital input of the tool interface:
  - « Remote Start Pump » : Input used to start and stop the pump in mode « Remote 1 » or to start the pump in mode « Remote 2 ».  
See paragraph « MENU 05.01 REMOTE CONTROL » for more information on the mode « Remote 1 » and the mode « Remote 2 ».
  - « Remote Stop Pump » : Input used to stop the pump in mode « Remote 2 ».  
See paragraph « MENU 05.01 REMOTE CONTROL » for more information on the mode « Remote 2 ».
  - « Remote Process On » : Input used to change from mode « Idle » to mode « Process » and vice versa in mode « Load Lock » by using an external signal.  
See paragraph « MENU 02.01 LOAD LOCK » for more information on the mode « Load Lock ».
  - « Remote DP Full Speed » : Input used to accelerate and slow down module DP in mode « Remote 3 ».  
See paragraph « MENU 05.01 REMOTE CONTROL » for more information on the mode « Remote 3 ».
  - « Remote MB Full Speed » : Input used to accelerate and slow down module MB in mode « Remote 3 ».  
See paragraph « MENU 05.01 REMOTE CONTROL » for more information on the mode « Remote 3 ».
  - « Remote Maintenance » : Input used to select the mode « Maintenance » by using an external signal.  
See paragraph « MENU 05.01 REMOTE CONTROL » for more information on the mode « Maintenance ».
  - « Gate Valve Open » : Input used to check that the « Gate Valve » is open.  
See paragraph « MENU 02.06 GATE-SOFT VALVES » for more information on the mode « Maintenance ».
  - « Soft Valve Open » : Input used to check that the « Soft Valve » is open. See paragraph « MENU 02.06 GATE-SOFT VALVES » for more information on mode « Maintenance ».
  - « External Heater On » : Input used to check that the external heating is switched on.  
See paragraph « MENU 02.08 OPTION PART 1 » for more information on the mode « Maintenance ».
  - « N2 Valve On » : Input used to open and close the « N2 Sol Valve » in the mode « Extern ».  
See paragraph « MENU 02.04 N2 IDLE MODE » for more information on the mode « Extern ».

- « Remote MB On » : Input used to start and stop the MB by using external signal, during input « Remote MB On Enable » by using external signal.
- « Remote MB On Enable » : Input used to enable « Remote MB On » by using external signal.
- Default configuration for the digital inputs of the tool interface:

Inputs	Pin No	Type of signal
DI23	37+38	Remote Start Pump
DI24	41+42	Remote Process ON
DI25	48	External Heater ON
DI26	49	Gate Valve Open
DI27	50	Soft Valve Open

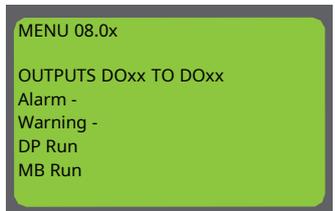
## MENU 08.02 OUTPUTS DO01 TO DO04

## MENU 08.03 OUTPUTS DO05 TO DO08

## MENU 08.04 OUTPUTS DO09 TO DO12

## MENU 08.05 OUTPUTS DO13 TO DO16

- Line 4: Configuration of the digital output DO01 (or DO05 or DO09 or DO13).
- Line 5: Configuration of the digital output DO02 (or DO06 or DO10 or DO14).
- Line 6: Configuration of the digital output DO03 (or DO07 or DO11 or DO15).
- Line 7: Configuration of the digital output DO04 (or DO08 or DO12 or DO16).



The tool interface provides the user with 16 digital outputs which can be configured.

- List and description of the potential functions for each digital output of the tool interface:
  - « Alarm + » : Status of the output to 1 if an alarm is present, otherwise to 0.
  - « Alarm - » : Status of the output to 0 if an alarm is present, otherwise to 1.
  - « Warning + » : Status of the output to 1 if a warning is present, otherwise to 0.
  - « Warning - » : Status of the output to 0 if a warning is present, otherwise to 1.
  - « DP Run » : Status of the output to 1 if the module DP is rotating, otherwise to 0.
  - « MB Run » : Status of the output to 1 if the module MB is rotating, otherwise to 0.
  - « DP Full Speed » : Status of the output to 1 is the module DP runs with maximum frequency, otherwise to 0.
  - « MB Full Speed » : Status of the output to 1 if the module MB runs with maximum frequency, otherwise to 0.
  - « Pump Ready » : Status of the output to 1 if the pump is ready to start production, otherwise to 0.
  - « Idle Mode » : Status of the output to 1 if the pump is in mode « Idle », otherwise to 0.
  - « Inverters Ready » : Status of the output to 1 if the single inverter is, or the inverters are, ready, otherwise to 0.
  - « Open Gate Valve » : Status of the output to 1 to open the « Gate Valve », otherwise to 0.
  - « Open Soft Valve » : Status of the output to 1 to open the « Soft Valve », otherwise to 0.
  - « Gate Valve Status » : Status of the output to 1 if the « Gate Valve » is open, otherwise to 0.
  - « Soft Valve Status » : Status of the output to 1 if the « Soft Valve » is open, otherwise to 0.

- « EMO Status + » : Status of the output to 1 if EMO Status is normality, otherwise to 0.
- « EMO Status - » : Status of the output to 0 if EMO Status is normality, otherwise to 1.
- « AGV Open + » : Status of the output to 1 if AGV Open is normality, otherwise to 0.
- « AGV Open - » : Status of the output to 0 if AGV Open is normality, otherwise to 1.
- « Alr DP Overcurrent + » : Status of the output to 1 if the alarm « DP Current Too High » is present, otherwise to 0.
- « Alr DP Overcurrent - » : Status of the output is 0 if the alarm « DP Current Too High » is present, otherwise to 1.
- « Alr DP Overpress + » : Status of the output to 1 if the alarm « DP Overpressure Too High » is present, otherwise to 0.
- « Alr DP Overpress - » : Status of the output to 0 if the alarm « DP Overpressure Too High » is present, otherwise to 1.
- « Alr DP Overtemp. + » : Status of the output to 1 if the alarm « DP Temperature Too High » is present, otherwise to 0.
- « Alr DP Overtemp. - » : Status of the output to 0 if the alarm « DP Temperature Too High » is present, otherwise to 1.
- « Alr DP Vibration + » : Status of the output to 1 if the alarm « DP Vibration Too High » is present, otherwise to 0.
- « Alr DP Vibration - » : Status of the output to 0 if the alarm « DP Vibration Too High » is present, otherwise to 1.
- « Alr MB Overcurrent + » : Status of the output to 1 if the alarm « MB Current Too High » is present, otherwise to 0.
- « Alr MB Overcurrent - » : Status of the output to 0 if the alarm « MB Current Too High » is present, otherwise to 1.
- « Alr MB Overtemp. + » : Status of the output to 1 if the alarm « MB Temperature Too High » is present, otherwise to 0.
- « Alr MB Overtemp. - » : Status of the output to 0 if the alarm « MB Temperature Too High » is present, otherwise to 1.
- « Alr H2O Flow Low + » : Status of the output to 1 if the alarm « H2O Flow Too Low » is present, otherwise to 0.
- « Alr H2O Flow Low - » : Status of the output to 0 if the alarm « H2O Flow Too Low » is present, otherwise to 1.
- « Alr N2 Flow Low + » : Status of the output to 1 if the alarm « N2 Flow Too Low » is present, otherwise to 0.
- « Alr N2 Flow Low - » : Status of the output to 0 if the alarm « N2 Flow Too Low » is present, otherwise to 1.
- « Alr N2 Pres. Low + » : Status of the output to 1 if the alarm « N2 Pressure Too Low » is present, otherwise to 0.
- « Alr N2 Pres. Low - » : Status of the output to 0 if the alarm « N2 Pressure Too Low » is present, otherwise to 1.
- « Wrg DP Overcurrent + » : Status of the output to 1 if the warning « DP Current Too High » is present, otherwise to 0.

- « Wrg DP Overcurrent - » : Status of the output to 0 if the warning « DP Current Too High » is present, otherwise to 1.
- « Wrg DP Overpress + » : Status of the output to 1 if the warning « DP Overpressure Too High » is present, otherwise to 0.
- « Wrg DP Overpress - » : Status of the output to 0 if the warning « DP Overpressure Too High » is present, otherwise to 1.
- « Wrg DP Overtemp. + » : Status of the output to 1 if the warning « DP Temperature Too High » is present, otherwise to 0.
- « Wrg DP Overtemp. - » : Status of the output to 0 if the warning « DP Temperature Too High » is present, otherwise to 1.
- « Wrg DP Vibration + » : Status of the output to 1 if the warning « DP Vibration Too High » is present, otherwise to 0.
- « Wrg DP Vibration - » : Status of the output to 0 if the warning « DP Vibration Too High » is present, otherwise to 1.
- « Wrg MB Overcurrent + » : Status of the output to 1 if the warning « MB Current Too High » is present, otherwise to 0.
- « Wrg MB Overcurrent - » : Status of the output to 0 if the warning « MB Current Too High » is present, otherwise to 1.
- « Wrg MB Overtemp. + » : Status of the output to 1 if the warning « MB Temperature Too High » is present, otherwise to 0.
- « Wrg MB Overtemp. - » : Status of the output to 0 if the warning « MB Temperature Too High » is present, otherwise to 1.
- « Wrg H2O Flow Low + » : Status of the output to 1 if the warning « H2O Flow Too Low » is present, otherwise to 0.
- « Wrg H2O Flow Low - » : Status of the output to 0 if the warning « H2O Flow Too Low » is present, otherwise to 1.
- « Wrg N2 Flow Low + » : Status of the output to 1 if the warning « N2 Flow Too Low » is present, otherwise to 0.
- « Wrg N2 Flow Low - » : Status of the output to 0 if the warning « N2 Flow Too Low » is present, otherwise to 1.
- « Wrg N2 Pres. Low + » : Status of the output to 1 if the warning « N2 Pressure Too Low » is present, otherwise to 0.
- « Wrg N2 Pres. Low - » : Status of the output to 0 if the warning « N2 Pressure Too Low » is present, otherwise to 1.
- « DP Full Speed Reached + » : Status of the output to 1 if the module DP frequency reach to maximum frequency, otherwise to 0.
- « DP Full Speed Reached - » : Status of the output to 0 if the module DP frequency reach to maximum frequency, otherwise to 1.
- « MB Full Speed Reached + » : Status of the output to 1 if the module MB frequency reach to maximum frequency, otherwise to 0.
- « MB Full Speed Reached - » : Status of the output to 0 if the module MB frequency reach to maximum frequency, otherwise to 1.

- « Remote 1 Status + » : Status of the output to 1 if the pump control mode is « Remote 1 », otherwise to 0.

- « Remote 1 Status - » : Status of the output to 0 if the pump control mode is « Remote 1 », otherwise to 1.

- Default configuration for the digital outputs of the tool interface:

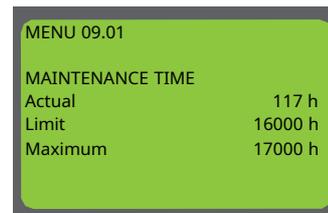
Outputs	Pin No	Type of signal
DO01	1+2	Alarm -
DO02	3+4	Warning -
DO03	5+6	DP Run
DO04	7+8	MB Run
DO05	9+10	Pump ready
DO06	11+12	Alr DP Overcurrent +
DO07	13+14	Alr MB Overcurrent +
DO08	15+16	Alr DP OverPres. +
DO09	17+18	Alr H2O Flow Low +
DO10	19+20	Alr N2 Flow Low +
DO11	21+22	Alr DP Overtemp. +
DO12	23+24	Wrg DP Overcurrent +
DO13	25+26	Wrg MB Overcurrent +
DO14	27+28	Wrg DP Overpres. +
DO15	29+30	Open Gate Valve
DO16	31+32	Open Soft Valve

## ◆ Description of MENU 09 HELP AND DIAGNOSIS

The buttons « Down arrow » and « Up arrow » allow to navigate in the sub menus described below.

### MENU 09.01 MAINTENANCE TIME

- Line 4 : Value of the maintenance counter.
- Line 5 : Limit value of the maintenance counter.
- Line 6 : Maximum value of the maintenance counter.



MENU 09.01	
MAINTENANCE TIME	
Actual	117 h
Limit	16000 h
Maximum	17000 h

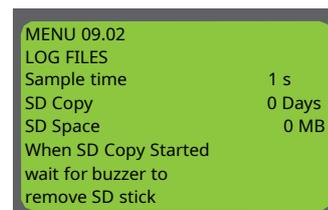
#### Description of the operation:

- When the value of the maintenance counter exceeds the limit value of the counter, the warning « Maintenance Time » is displayed on the handpad and the buzzer is switched on. Pressing briefly the button « OK » will stop the buzzer. Pressing the « OK » button for longer will allow to clear the warning.
- If the pump stays in operation and maintenance was not carried out, this warning will again be displayed every 100 hours until the counter has reached the maximum value. From that moment onwards, it will not be possible to stop the buzzer and clear the warning.

**NOTE :** a. When the warning « Maintenance Time » is displayed, the pump is not stopped, even if the maximum value of the counter has been exceeded.  
b. Resetting the counter to zero can only be carried out by Busch service personnel during the next preventative maintenance.

### MENU 09.02 LOG FILES

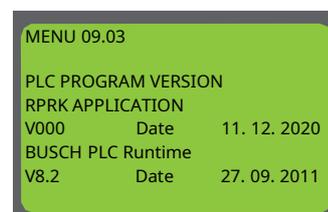
- Line 3 : Sample times for memorizing data.
- Line 4 : Amount of daily files to be copied onto SD.
- Line 5 : Available storage capacity of inserted SD.



MENU 09.02	
LOG FILES	
Sample time	1 s
SD Copy	0 Days
SD Space	0 MB
When SD Copy Started	
wait for buzzer to	
remove SD stick	

### MENU 09.03 PLC PROGRAM VERSION

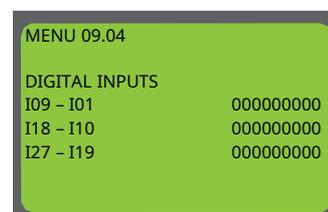
- Line 4 : PLC program name.
- Line 5 : PLC program version and date.
- Line 6 : PLC runtime name.
- Line 7 : PLC runtime version and date.



MENU 09.03	
PLC PROGRAM VERSION	
RPRK APPLICATION	
V000	Date 11. 12. 2020
BUSCH PLC Runtime	
V8.2	Date 27. 09. 2011

### MENU 09.04 DIGITAL INPUTS

- Line 4 : Status of the digital inputs I01 to I09, the status of the digital input I01 being the value on the right.
- Line 5 : Status of the digital inputs I10 to I18, the status of the digital input I10 being the value on the right.
- Line 6 : Status of the digital inputs I19 to I27, the status of the digital input I19 being the value on the right.



MENU 09.04	
DIGITAL INPUTS	
I09 - I01	000000000
I18 - I10	000000000
I27 - I19	000000000

Refer to the pump's electrical wiring diagrams to find out about the function of the digital inputs.

## MENU 09.05 DIGITAL OUTPUTS

- Line 4 : Status of the outputs Q01 to Q08, the status of the output Q01 being the value on the right.
- Line 5 : Status of the outputs Q09 to Q16, the status of the output Q09 being the value on the right.
- Line 6 : Status of the outputs Q17 to Q24, the status of the output Q17 being the value on the right.
- Line 7: Status of the outputs Q25.

MENU 09.05	
DIGITAL OUTPUTS	
Q08 – Q01	00000000
Q16 – Q09	00000000
Q24 – Q17	00000000
Q25	0

## MENU 09.06 ANALOG INPUTS

- Line 4 : Value of the analog inputs AI01 and AI02 in mA.
- Line 5 : Value of the analog inputs AI03 and AI04 in mA.
- Line 6 : Value of the analog inputs AI05 and AI06 in mA.
- Line 7 : Value of the analog inputs AI07 and AI08 in mA.

MENU 09.06			
ANALOG INPUTS in mA			
AI01	0.00	AI02	0.00
AI03	0.00	AI04	0.00
AI05	0.00	AI06	0.00
AI07	0.00	AI08	0.00

## MENU 09.06a ANALOG INPUTS

- Line 4 : Value of the analog inputs AI09 and AI10 in mA.
- Line 5 : Value of the analog inputs AI11 and AI12 in mA.

MENU 09.06a			
ANALOG INPUTS in mA			
AI09	0.00	AI10	0.00
AI11	0.00	AI12	0.00

## MENU 09.07 ANALOG OUTPUTS

- Line 4 : Value of the analog outputs AO01 and AO02 in mA.
- Line 6 : Configuration of the analog output AO01.
- Line 8 : Configuration of the analog output AO02.

MENU 09.07			
ANALOG OUTPUTS in mA			
AO01	4.00	AO02	4.00
AO01 Configuration			
DP Current			
AO02 Configuration			
MB Current			

The 2 analog outputs which can be configured are made available to the user inside the pump's terminal box (pins 14 and 15 of the module interface with 50 terminals).

- List and description of possible signals for the 2 analog outputs:
  - « DP Current » : Current graphics of module DP with scale 0-100 A = 4-20 mA.
  - « DP Overpressure » : Overpressure graphics of module DP with scale 0-500 mb = 4-20 mA.
  - « DP Temperature » : Temperature graphics of module DP with scale 0-200 °C = 4-20 mA.
  - « DP Vibration » : Graphics of the vibration level of module DP with the scale 0-1 g = 4-20 mA.
  - « DP1 Current » : Current graphics of module DP1 with scale 0-100 A = 4-20 mA.
  - « DP1 Overpressure » : Overpressure graphics of module DP1 with scale 0-500 mb = 4-20 mA.
  - « DP1 Temperature » : Temperature graphics of module DP1 with scale 0-200 °C = 4-20 mA.
  - « DP1 Vibration » : Graphics of the vibration level of module DP1 with the scale 0-1 g = 4-20 mA
  - « DP2 Current » : Current graphics of module DP2 with scale 0-100 A = 4-20 mA.
  - « DP2 Overpressure » : Overpressure graphics of module DP2 with scale 0-500 mb = 4-20 mA.
  - « DP2 Temperature » : Temperature graphics of module DP2 with scale 0-200 °C = 4-20 mA.
  - « DP2 Vibration » : Graphics of the vibration level of module DP2 with the scale 0-1 g = 4-20 mA.
  - « MB Current » : Current graphics of module MB with scale 0-100 A = 4-20 mA.

- « MB Temperature » : Temperature graphics of module MB with scale 0-150 °C = 4-20 mA.
- « H2O Flow » : Cooling water flow graphics with scale 0-50 Lpm = 4-20 mA.
- « N2 Flow » : Dilution gas flow graphics with scale 0-200 Lpm = 4-20 mA.
- « DP Frequency » : DP Frequency graphics with scale Fmin – Fmax Hz = 4-20 mA.

## MENU 09.08 DATA INVERTER

- Line 4 : Last error code of the inverter of module DP and module MB.
- Line 5 : Second to last error code of the inverter of module DP and module MB.
- Line 6 : Temperature of the power transmitters of the DP and MB module's inverters.

MENU 09.08		
DATA INVERTER	DP	MB
Last Error	0	0
Last Error -1	0	0
IGBT in oC	0	0

### Description of the operation:

- « Last Error » and « Last Error -1 »: Refer to the inverter's operating instructions to find out what the error code means.

## MENU 09.09 EXTERNAL DIGITAL INPUTS/OUTPUTS

- Line 4 : Status of the inputs I01 to I08, the status of the input I01 being the value on the right.
- Line 5 : Status of the inputs I09 to I16, the status of the input I09 being the value on the right.
- Line 6 : Status of the outputs Q01 to Q08, the status of the output Q01 being the value on the right.

MENU 09.09	
EXT DI/DO	
I08 – I01	00000000
I16 – I09	00000000
O08 – O01	00000000

Refer to the pump's electrical wiring diagrams to find out about the function of the digital inputs/outputs.

## MENU 09.10 EXTERNAL ANALOG INPUTS

- Line 4 : Value of the analog inputs AI01 and AI02 in mA.
- Line 5 : Value of the analog inputs AI03 and AI04 in mA.
- Line 6 : Value of the analog inputs AI05 and AI06 in mA.
- Line 7 : Value of the analog inputs AI07 and AI08 in mA.

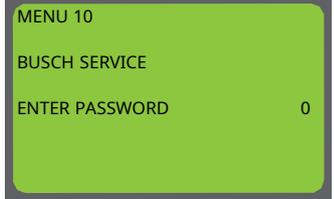
MENU 09.10			
EXTERNAL ANALOG INPUTS in mA			
AI01	0.00	AI02	0.00
AI03	0.00	AI04	0.00
AI05	0.00	AI06	0.00
AI07	0.00	AI08	0.00

## ◆ Description of MENU 10 BUSCH SERVICE

Access to the sub menus described below is subject to the prior entry of a password.

**NOTE :** entry of password.

- Press the OK button to select the password to be entered.
- Press the buttons « Left arrow » and « Right arrow » as many times as necessary to select, where applicable, the character to be modified.
- Press the buttons « Down arrow » and « Up arrow » as many times as necessary to modify the value of the password.
- Press the OK button to save the entry of the password.
- Press the button « Down arrow » to enter the first sub menu. When the password is incorrect, this last operation is not possible.

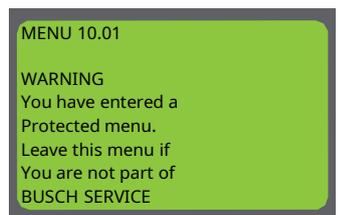


The buttons « Down arrow » and « Up arrow » allow to navigate in the sub menus described below.

### MENU 10.01 WARNING

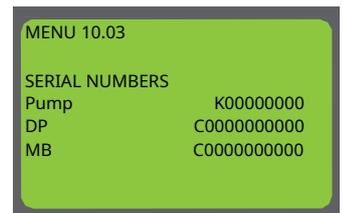
### MENU 10.02 WARNING

Warning message for people not authorized to use these functions.



### MENU 10.03 SERIAL NUMBERS

- Line 4 : Serial number of the pump.
- Line 5 : Serial number of module DP.
- Line 6 : Serial number of module MB.
- The serial numbers are divided up in three parts Cxxyzzzzzz:
  - C = Chevenez. K = Korea.
  - xxyy = year and calender week number.
  - zzzzzz = sequential number of the pump or of module in the given week.



### CAUTION

Do not forget to update these serial numbers if one of the pump's components has been changed.

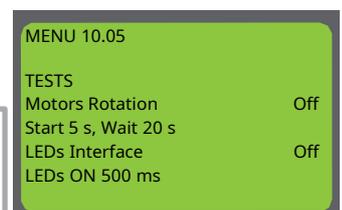
### MENU 10.04 RESET FEATURES

- Line 4 : Resetting the work counter to zero.
- Line 5 : Resetting the process counter to zero.
- Line 6 : Resetting the events list to zero.
- Line 7 : Resetting the maintenance counter to zero.



### MENU 10.05 TESTS

- Line 4 : Starts the direction of rotation test for the motors.
- Line 6 : Starts the test for the LEDs of the tool interface.



### CAUTION

These tests are only possible when the pump has been stopped

## MENU 10.06 KFVA S/W UPGRADE

- Line 4 : The name of Name.cod file stored by SD
- Line 6 : The upgrade function from cod file stored by SD



### CAUTION

The file transfer function onto a SD is only possible if the pump has been stopped.

MENU 10.06	
RPRK S/W UPGRADE	
Name	None
Upgrade	No
Wait for buzzer then	
Turn off and turn on	
Device power supply	

## MENU 10.07 BUSCH PLC PERFORMANCE

- Line 3 : Average cycle time of the programmable controller.
- Line 4 : Maximum cycle time for the programmable controller.

MENU 10.07	
COUNTERS	
PLC Average	12 ms
PLC Maximum	12 ms
DP Current Peak	0

## MENU 10.08 COMMUNICATION RESET FUNCTION

The signal function that clear to communication error periodically caused by noise and other communication.

- Line 6 : A cycle time that to clear communication error (Min : 1s, Max : 30days)
- Line 7 : Select whether to enable function.
- Line 8 : Input the predetermined value and practice the function.

MENU 10.08			
COMMUNICATION RESET FUNCTION			
Cycle Time			
0 Day	0 h	0 m	0s
Activate			Off

## MENU 10.09 PHASE ROTATION ALARM-OFF FUNCTION

The prepared alarm-off function that error caused by a sudden voltage drop or other reasons during pump operating in spite of error by phase check before pump ran.

- Line 6 : The delay time to act Alarm-Off Function after pump ran (Min : 1m, Max : 60m)
- Line 7 : Select whether to enable function.
- Line 8 : Input the predetermined value and practice the function.

MENU 10.09	
PHASE ROTATION SENSOR DEACTIVATE FUNCTION	
After	10 m
Activate	Yes
Initialization	Done

## Description « ALARMS/WARNINGS »

When an alarm or a warning occurs, a description is displayed on the handpad.

The buzzer is also activated and the LED « Alarm » or the LED « Warning » is switched on.

- Line 1 : Alarm or warning number.
- Line 3 : Description of the alarm or warning.
- Line 5 : Value read on the counter at the moment the event occurred, where applicable.
- Line 6 : Authorized limit value, where applicable.

Alarm Number 21	
DP Current too High	
Value	25.0 A
Limit	24.0 A
Press Down for Next	

**NOTE :** action in case of an alarm or warning.

- Press the OK button briefly in order to stop the buzzer.
- Press the « Down arrow » button in order to visualize the following alarm or the following warning.
- When the last alarm or the last warning has been displayed, press the OK button in order to go back to the entry page or press the « Down arrow» button to display the description of the first alarm or the first warning again.
- Press the OK button for longer in order to clear the alarms and the warnings.

Last Alarm or Warning	
Press Ok to Exit	
Press Down for Next	

# Alarms and warnings

List and description of the possible alarms and warnings. Refer to the pump's wiring diagram to check how to interpret the information given below.

No.	Description	Causes	Solution
<b>GENERAL</b>			
1	LED « Power » of the PLC is off	<ul style="list-style-type: none"> <li>- The PLC has no current</li> <li>- The PLC is faulty</li> </ul>	<ul style="list-style-type: none"> <li>- Check the electrical supply</li> <li>- Replace the PLC</li> </ul>
2	LED « Run » of the PLC does not flash	<ul style="list-style-type: none"> <li>-The program has not been loaded</li> <li>-The program has stopped</li> </ul>	<ul style="list-style-type: none"> <li>- Load the program</li> <li>- Switch off, then switch on the pump</li> </ul>
3	LED « Power » of the handpad is off	<ul style="list-style-type: none"> <li>- The handpad has no electricity</li> <li>- The handpad is defective/faulty</li> <li>- The handpad's address is incorrect</li> <li>- Initialization of the pump type has not been carried out</li> </ul>	<ul style="list-style-type: none"> <li>- Check the connections of the handpad</li> <li>- Replace the handpad</li> <li>- Check the address of the handpad</li> <li>- Initialize the pump</li> </ul>
4	No text on the handpad display	<ul style="list-style-type: none"> <li>- The handpad has no current</li> <li>- The handpad is faulty</li> <li>- The contrast is incorrectly adjusted</li> </ul>	<ul style="list-style-type: none"> <li>- Check the handpad connection</li> <li>- Replace the handpad</li> <li>- Adjust the contrast</li> </ul>
5	The buttons of the handpad are inactive	<ul style="list-style-type: none"> <li>- Communication with the PLC is interrupted</li> <li>- The handpad is faulty</li> </ul>	<ul style="list-style-type: none"> <li>- Disconnect and reconnect the handpad</li> <li>- Replace the handpad</li> </ul>
6	Date and time are incorrect	<ul style="list-style-type: none"> <li>- Date and time have not been set up</li> <li>- The PLC battery is defective</li> </ul>	<ul style="list-style-type: none"> <li>- Set up date and time</li> <li>- Replace the PLC battery</li> </ul>
<b>ALARMS</b>			
Alr 1	EMO Activated	<ul style="list-style-type: none"> <li>- The button EMERGENCY STOP is pushed in.</li> <li>- The digital input indicating the status of the button is 0</li> </ul>	<ul style="list-style-type: none"> <li>- Release the button</li> <li>- Check the wiring and the operation of the security relay</li> </ul>
Alr 2	Inverter Not Ready	<ul style="list-style-type: none"> <li>- One inverter or one of the frequency inverters is defective</li> <li>- The parameter setting of one or all of the frequency inverters is incorrect</li> <li>- The digital input indicating the status of the frequency inverter is 0</li> </ul>	<ul style="list-style-type: none"> <li>- Replace the frequency inverter</li> <li>- Check the parameter setting</li> <li>- Check the wiring and the operation of the motor</li> </ul>

# Alarms and warnings

List and description of the possible alarms and warnings. Refer to the pump's wiring diagram to check how to interpret the information given below.

Alr 3	Wrong Phases Rotat.	<ul style="list-style-type: none"> <li>- The wiring of the power supply cables is incorrect</li> <li>- The power supply voltage is too low</li> <li>- The adjustment of the monitoring device for the electrical power supply phases is incorrect</li> <li>- The digital input indicating the status of the monitoring device is 0</li> </ul>	<ul style="list-style-type: none"> <li>- Check the wiring of the phases</li> <li>- Check the value of the power supply</li> <li>- Check adjustment of the monitoring device</li> <li>- Check the wiring and the operation of the monitoring device</li> </ul>
Alr 4	Spare		
Alr 5	DP Motor Breaker Off	<ul style="list-style-type: none"> <li>- The breaker protecting the motor or the frequency inverter is switched off</li> <li>- A short circuit has been detected</li> <li>- The digital input indicating the status of the breaker is 0</li> </ul>	<ul style="list-style-type: none"> <li>- Switch on the breaker</li> <li>- Measure the electrical resistance</li> <li>- Check the wiring and the operation of the breaker</li> </ul>
Alr 6	MB Motor Breaker Off	- See Alr 5	- See Alr 5
Alr 7	Spare		
Alr 8	MB Inlet Pressure Too High	<ul style="list-style-type: none"> <li>- The module's inlet pressure is too high</li> <li>- The digital input indicating the status of monitoring device is 0</li> </ul>	<ul style="list-style-type: none"> <li>- Check the operation of the module and the inlet pressure</li> <li>- Check the wiring and the operation of the monitoring device</li> </ul>
Alr 9	Spare		
Alr 10	Spare		
Alr 11	DP Inverter Not Ready	<ul style="list-style-type: none"> <li>- The frequency inverter is defective</li> <li>- The parameter setting for the frequency inverter is incorrect</li> <li>- The status value for the frequency inverter read through the Modbus net is incorrect</li> </ul>	<ul style="list-style-type: none"> <li>- Replace the frequency inverter</li> <li>- Check the parameter setting</li> <li>- Check the wiring and the operation of the motor</li> </ul>
Alr 12	Spare		
Alr 13	Spare		
Alr 14	MB Inverter Not Ready	-See Alr 11	-See Alr 11

# Alarms and warnings

List and description of the possible alarms and warnings. Refer to the pump's wiring diagram to check how to interpret the information given below.

Alr 15	Spare		
Alr 16	Spare		
Alr 17	Spare		
Alr 18	Spare		
Alr 19	Spare		
Alr 20	Spare		
Alr 21	DP Current Too High	- The current absorbed by the motor or the frequency inverter exceeds the limit authorized in the pump's parameters (MENU 3)	<ul style="list-style-type: none"> <li>- Check the operation of the motor or/and the frequency inverter</li> <li>- Check the value of the parameter limit</li> <li>- Check the wiring and the operation of the measuring device</li> </ul>
Alr 22	DP Overpressure Too High	- The overpressure measured at the pump's outlet exceeds the limit authorized in the pump's parameters (MENU 3)	<ul style="list-style-type: none"> <li>- Check the operation of the outlet</li> <li>- Check the value of the parameter limit</li> <li>- Check the wiring and the operation of the measuring device</li> </ul>
Alr 23	DP Temperature Too High	- The temperature measured in module exceeds the limit authorized in the pump's parameters (MENU 3)	<ul style="list-style-type: none"> <li>- Check the operation of the cooling system</li> <li>- Check the value of the parameter limit</li> <li>- Check the wiring and the operation of the measuring device</li> </ul>
Alr 24	DP Vibration Too High	- The vibration level measured in the module exceeds the limit authorized in the pump's parameters (MENU 3)	<ul style="list-style-type: none"> <li>- Check the operation of the module</li> <li>- Check the value of the parameter's limit</li> <li>- Check the wiring and the operation of the measuring device</li> </ul>
Alr 25	Spare		
Alr 26	Spare		
Alr 27	Spare		
Alr 28	Spare		
Alr 29	Spare		

# Alarms and warnings

List and description of the possible alarms and warnings. Refer to the pump's wiring diagram to check how to interpret the information given below.

Alr 30	Spare		
Alr 31	Spare		
Alr 32	Spare		
Alr 33	MB Current Too High	-See Alr 21	-See Alr 21
Alr 34	MB Temperature Too High	-See Alr 23	-See Alr 23
Alr 35	DP Motor Temperature Too High	-See Alr 10	-See Alr 10
Alr 36	MB Motor Temperature Too High	-See Alr 10	-See Alr 10
Alr 37	DP Oil Temperature B High	-See Alr 16	-See Alr 16
Alr 38	MB Oil Tem Too High	-See Alr 16	-See Alr 16
Alr 39	DP Oil Level B Low	-See Alr 15	-See Alr 15
Alr 40	DP Glycol Flow Too Low	-See Alr 4	-See Alr 4
Alr 41	DP Glycol Temperature Too High	-See Alr 7	-See Alr 7
Alr 42	DP H2O Flow Too Low	-See Alr 17	-See Alr 17
Alr 43	DP N2 Flow Too Low	-See Alr 18	-See Alr 18
Alr 44	N2 Pressure Too Low	- The dilution gas pressure is too low - The digital input indicating the status of the monitoring device is 0	- Check the operation of the gas system - Check the wiring and the operation of the measuring device
Alr 45	DP Vessel Pressure Too High	-The pressure in the expansion vessel is too high -The digital input indicating the status of the monitoring device is 0	- Check the operation of the expansion vessel Check the wiring and the operation of the measuring device
Alr 46	MB H2O Too Low	-See Alr 17	-See Alr 17
Alr 47	DP Oil Temperature A High	-See Alr 16	-See Alr 16
Alr 48			
Alr 49			

# Alarms and warnings

List and description of the possible alarms and warnings. Refer to the pump's wiring diagram to check how to interpret the information given below.

Alr 50	Spare		
Alr 51	Spare		
Alr 52	Spare		
Alr 53	Spare		
Alr 54	Spare		
Alr 55	Spare		
Alr 56	Spare		
Alr 57	Spare		
Alr 58	Spare		
Alr 59	DP Current Too Low	- The current absorbed by the motor or the frequency inverter is 0	- Check the operation of the motor or/and the frequency inverter - Check the wiring and the operation of the measuring device
Alr 60	Spare		
Alr 61	Spare		
Alr 62	Spare		
Alr 63	DP Inverter Stall	-The motor's rotation speed is under 8Hz	-Check the frequency inverter -Check the wiring and the operation of the monitoring device -Check the module and motor -Check the pump operation condition
Alr 64	Spare		
Alr 65	Spare		
Alr 66	MB Inverter Stall	-See Alr 63	-See Alr 63
Alr 67	Spare		
Alr 68	Spare		
Alr 69	Spare		

# Alarms and warnings

List and description of the possible alarms and warnings. Refer to the pump's wiring diagram to check how to interpret the information given below.

Alr 70	Spare		
Alr 71	Spare		
Alr 72	Spare		
Alr 73	Spare		
Alr 74	Spare		
Alr 75	Spare		
Alr 76	Spare		
Alr 77	Spare		
Alr 78	Spare		
Alr 79	Spare		
Alr 80	Spare		
Alr 81	Spare		
Alr 82	Spare		
Alr 83	Spare		
Alr 84	DP Overload Too long	- The current absorbed by the motor or the frequency inverter exceeds the warning limit and 2nd alarm time authorized in the pump's parameters (MENU 3)	- Check the operation of the motor or/and the frequency inverter - Check the value of the parameter limit - Check the wiring and the operation of the measuring device
Alr 85	E-MB Current Too High	- The current absorbed by the motor or the frequency inverter exceeds the limit authorized in the pump's parameters (MENU 3.22)	- Check the operation of the motor or/and the frequency inverter - Check the value of the parameter limit - Check the wiring and the operation of the measuring device
Alr 86	DP Motor H2O Too Low	-See Alr 17	-See Alr 17

# Alarms and warnings

List and description of the possible alarms and warnings. Refer to the pump's wiring diagram to check how to interpret the information given below.

AVERTISSEMENTS			
Wrg 1	DP Current Too High	- The current absorbed by the motor or the frequency inverter exceeds the limit authorized in the pumps parameters (MENU 3)	- Check the operation of the motor or/and the frequency inverter - Check the value of the parameter limit - Check the wiring and the operation of the measuring device
Wrg 2	DP Overpressure Too High	- The overpressure measured at the pumps outlet exceeds the limit authorized in the pumps parameters (MENU 3)	- Check the operation of the outlet - Check the value of the parameter limit - Check the wiring and the operation of the measuring device
Wrg 3	DP Temperature Too High	- The temperature measured in the module exceeds the limit authorized in the pumps parameters (MENU 3)	- Check the operation of the cooling system - Check the value of the parameter limit - Check the wiring and the operation of the measuring device
Wrg 4	DP Vibration Too High	- The vibration level measured in the module exceeds the limit authorized in the pumps parameters (MENU 3)	- Check the operation of the module - Check the value of the parameters limit - Check the wiring and the operation of the measuring device
Wrg 5	Spare		
Wrg 6	Spare		
Wrg 7	Spare		
Wrg 8	Spare		
Wrg 9	Spare		
Wrg 10	Spare		

# Alarms and warnings

List and description of the possible alarms and warnings. Refer to the pump's wiring diagram to check how to interpret the information given below.

Wrg 11	Spare		
Wrg 12	Spare	-See Wrg 4	-See Wrg 4
Wrg 13	MB Current Too High	-See Wrg 1	-See Wrg 1
Wrg 14	MB Temperature Too High	-See Wrg 3	-See Wrg 3
Wrg 15	DP Motor Temperature Too High	<ul style="list-style-type: none"> <li>- The motor temperature is too high</li> <li>- The digital input indicating the status of the monitoring device is 0</li> </ul>	<ul style="list-style-type: none"> <li>- Check the operation of the motor and the cooling system</li> <li>- Check the wiring and the operation of the monitoring device</li> </ul>
Wrg 16	MB Motor Temperature Too High	-See Wrg 15	-See Wrg 15
Wrg 17	DP Oil Temperature B. High	<ul style="list-style-type: none"> <li>- The motor temperature is too high</li> <li>- The digital input indicating the status of the monitoring device is 0</li> </ul>	<ul style="list-style-type: none"> <li>- Check the operation of the motor and the cooling system</li> <li>- Check the wiring and the operation of the monitoring device</li> </ul>
Wrg 18	MB Oil Temperature Too High	-See Wrg 17	-See Wrg 17
Wrg 19	DP Oil Level B Low	<ul style="list-style-type: none"> <li>- The module's oil level is too low</li> <li>- The digital input indicating the status of the monitoring device is 0</li> </ul>	<ul style="list-style-type: none"> <li>- Check the oil level</li> <li>- Check the wiring and the operation of the monitoring device</li> </ul>
Wrg 20	DP Glycol Flow Too Low	<ul style="list-style-type: none"> <li>- The module's cooling liquid flow is too low</li> <li>- The digital input indicating the status of the monitoring device is 0</li> </ul>	<ul style="list-style-type: none"> <li>- Check the cooling liquid's quantity and flow</li> <li>- Check the wiring and the operation of the monitoring device</li> </ul>
Wrg 21	DP Glycol Temperature Too High	<ul style="list-style-type: none"> <li>- The module's cooling liquid temperature is too high</li> <li>- The digital input indicating the status of the monitoring device is 0</li> </ul>	<ul style="list-style-type: none"> <li>- Check the operation of the cooling system</li> <li>- Check the wiring and the operation of the monitoring device</li> </ul>

# Alarms and warnings

List and description of the possible alarms and warnings. Refer to the pump's wiring diagram to check how to interpret the information given below.

Wrg 22	DP H2O Flow Too Low	<ul style="list-style-type: none"> <li>- The measured cooling water flow is inferior to the limit authorized in the pump's parameters (MENU 3)</li> <li>- The digital input indicating the status of the monitoring device is 0</li> </ul>	<ul style="list-style-type: none"> <li>- Check the operation of the cooling system</li> <li>- Check the value of the parameter limit</li> <li>- Check the wiring and the operation of the measuring device</li> </ul>
Wrg 23	DP N2 Flow Too Low	<ul style="list-style-type: none"> <li>- The measured dilution gas flow is inferior to the limit authorized in the pump's parameters (MENU 3)</li> <li>- The digital input indicating the status of the monitoring device is 0</li> </ul>	<ul style="list-style-type: none"> <li>- Check the operation of the gas system</li> <li>- Check the value of the parameter limit</li> <li>- Check the wiring and the operation of the measuring device</li> </ul>
Wrg 24	N2 Pressure Too Low	<ul style="list-style-type: none"> <li>- The dilution gas pressure is too low</li> <li>- The digital input indicating the status of the monitoring device is 0</li> </ul>	<ul style="list-style-type: none"> <li>- Check the operation of the gas system</li> <li>- Check the wiring and the operation of the measuring device</li> </ul>
Wrg 25	DP Vessel Pressure Too High	<ul style="list-style-type: none"> <li>- The pressure in the expansion vessel is too high</li> <li>- The digital input indicating the status of the monitoring device is 0</li> </ul>	<ul style="list-style-type: none"> <li>- Check the operation of the expansion vessel</li> <li>- Check the wiring and the operation of the measuring device</li> </ul>
Wrg 26	Gate Valve Time-Out	<ul style="list-style-type: none"> <li>- The valve's opening time exceeds the maximum time limit authorized in the pump's parameters (MENU 2)</li> <li>- The digital input indicating the status of the valve is 0</li> </ul>	<ul style="list-style-type: none"> <li>- Check the operation of the valve</li> <li>- Check the configuration of the valve</li> <li>- Check the value of the parameter limit</li> <li>- Check the wiring</li> </ul>
Wrg 27	Soft Valve Time-Out	<ul style="list-style-type: none"> <li>- The valve's opening time exceeds the maximum time limit authorized in the pump's parameters (MENU 2)</li> <li>- The digital input indicating the status of the valve is 0</li> </ul>	<ul style="list-style-type: none"> <li>- Check the operation of the valve</li> <li>- Check the configuration of the valve</li> <li>- Check the value of the parameter limit</li> <li>- Check the wiring</li> </ul>
Wrg 28	External Heater Time-Out	<ul style="list-style-type: none"> <li>- The external heating is not switched on</li> <li>- The digital input indicating the status of the heating is 0</li> </ul>	<ul style="list-style-type: none"> <li>- Check the configuration of the external heating</li> <li>- Switch on the external heating</li> <li>- Check the wiring and the operation of the external heating</li> </ul>
Wrg 29	DP Oil Temperature A. High	-See Wrg 17	-See Wrg 17

# Alarms and warnings

List and description of the possible alarms and warnings. Refer to the pump's wiring diagram to check how to interpret the information given below.

Wrg 30	Spare		
Wrg 31	Spare		
Wrg 32	Spare		
Wrg 33	DP Overpressure Too Low	- The overpressure measured at the pump's outlet too low and puts the operation of the sensor in doubt	- Check the wiring and the operation of the sensor
Wrg 34	Spare		
Wrg 35	Spare		
Wrg 36	Spare		
Wrg 37	DP Temperature Too Low	- The temperature measured on the module is too low and puts the operation of the sensor in doubt	- Check the wiring and the operation of the sensor
Wrg 38	Spare		
Wrg 39	Spare		
Wrg 40	Spare		
Wrg 41	MB Temperature Too Low	-See Wrg 37	-See Wrg 37
Wrg 42	Spare		
Wrg 43	Spare		
Wrg 44	Spare		

# Alarms and warnings

List and description of the possible alarms and warnings. Refer to the pump's wiring diagram to check how to interpret the information given below.

Wrg 45	DP H2O Flow Too High	- The measured cooling water flow exceeds the limit required in the pump's « Process » parameters (MENU 2) leading to excessive consumption	- Reduce the cooling water flow - Check the value of the parameter limit
Wrg 46	DP N2 Flow Too High	- The measured dilution gas flow exceeds the limit required in the pump's « Process » parameters (MENU 2) leading to excessive consumption	- Reduce the dilution gas flow - Check the value of the parameter limit
Wrg 47	Spare		
Wrg 48	Maintenance Time	- The maintenance counter exceeds the maximum authorized value	- Carry out preventative maintenance of the pump
Wrg 49	Spare		
Wrg 50	Spare		
Wrg 51	Spare		
Wrg 52	Spare		
Wrg 53	Spare		
Wrg 54	Spare		
Wrg 55	Spare		
Wrg 56	Spare		
Wrg 57	Spare		
Wrg 58	Spare		
Wrg 59	Spare		

# Alarms and warnings

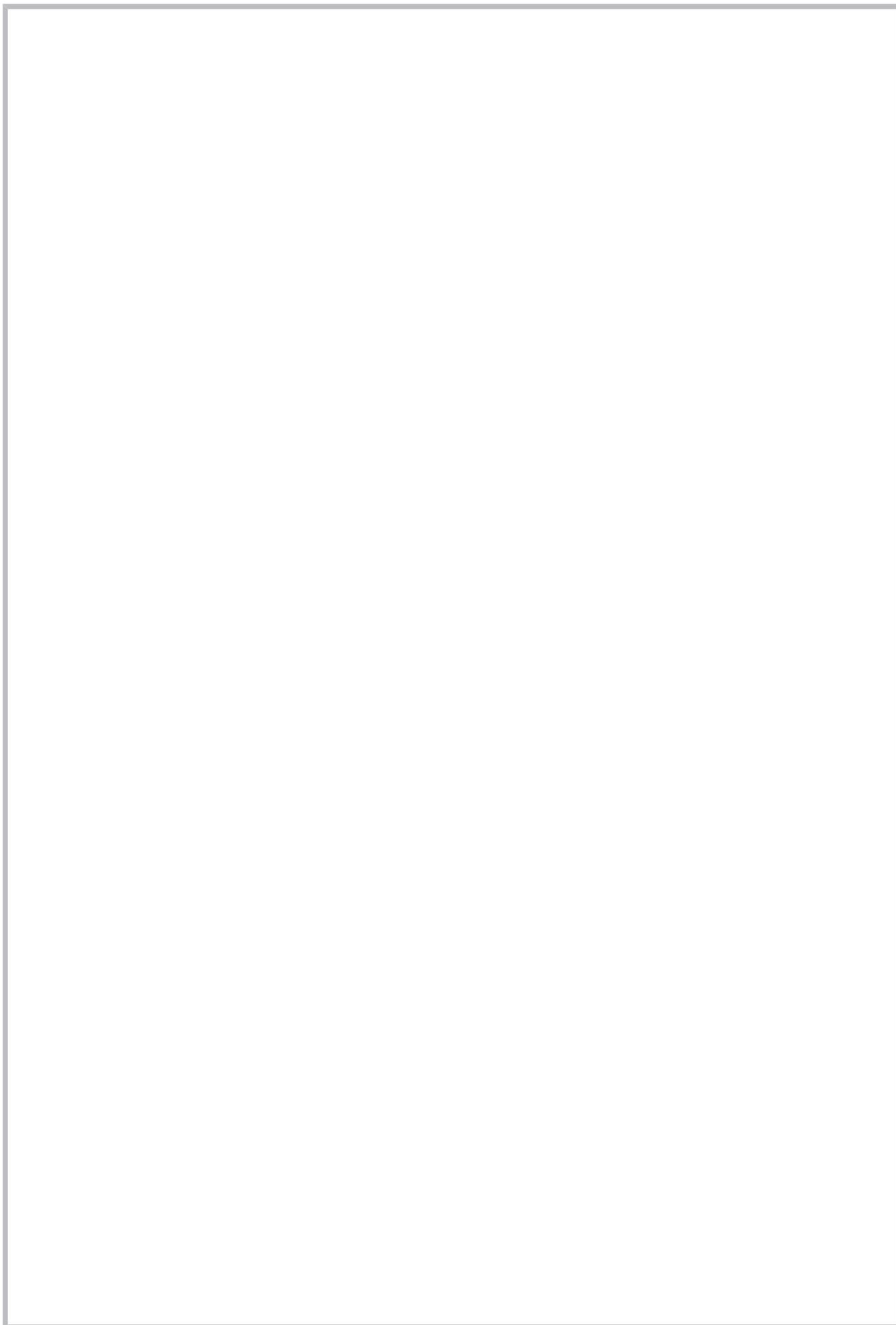
List and description of the possible alarms and warnings. Refer to the pump's wiring diagram to check how to interpret the information given below.

Wrg 60	DP Oil Level A Low	-See Wrg 19	-See Wrg 19
Wrg 61	Spare		
Wrg 62	Spare		
Wrg 63	Integration Power value max	- The integration power value counter exceeds the maximum authorized value(9999 GWh)	- Initialize the value in menu 02.10
Wrg 64	Integration N2 value max	- The integration N2 value counter exceeds the maximum authorized value(4200000000 L)	- Initialize the value in menu 02.10
Wrg 65	MB BR Temperature High	- The braking resistance's temperature is too high - The digital input indicating the status of the monitoring device is 0	- Check the cooling system for braking resistance - Check the wiring and the operation of the monitoring device - Check frequency inverter deceleration speed
Wrg 66	Spare		
Wrg 67	Spare		
Wrg 68	Spare		
Wrg 69	Spare		
Wrg 70	Spare		
Wrg 71	Spare		
Wrg 72	Spare		
Wrg 73	Spare		

# Alarms and warnings

List and description of the possible alarms and warnings. Refer to the pump's wiring diagram to check how to interpret the information given below.

Wrg 74	Spare		
Wrg 75	Spare		
Wrg 76	Spare		
Wrg 77	Spare		
Wrg 78	Spare		
Wrg 79	Spare		
Wrg 80	Spare		
Wrg 81	Spare		
Wrg 82	Spare		
Wrg 83	Spare		
Wrg 84	Heat Jacket Too Low	- The temperature measured in the heat jacket is inferior to the limit authorized in the menu 02.14	- Check the operation of the system - Check the value of the parameter limit - Check the wiring and the operation of the measuring device
Wrg 85	Heat Jacket Too High	- The temperature measured in the heat jacket exceeds the limit authorized in the menu 02.14	- Check the operation of the system - Check the value of the parameter limit - Check the wiring and the operation of the measuring device
Wrg 86	E-MB Current Too High	-The current absorbed by the motor or the frequency inverter exceeds the limit authorized in the pumps parameters (MENU 3.22)	- Check the operation of the motor or/and the frequency inverter - Check the value of the parameter limit - Check the wiring and the operation of the measuring device
Wrg 87	DP Motor H2O Too Low	-See Wrg 22	-See Wrg 22
Wrg 88	DP Motor H2O Too High	-See Wrg 45	-See Wrg 45
Wrg 89	MB Speed Too High	- For BC 0600 F - MB is spinning under heavy load.	- Check Operation condition - MB is stopping under heavy load.
Wrg 90	SD memory lack	- The storage capacity of SD is lower then 80mb.	- Check SD status - Change another SD - Delete the files stored in SD

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