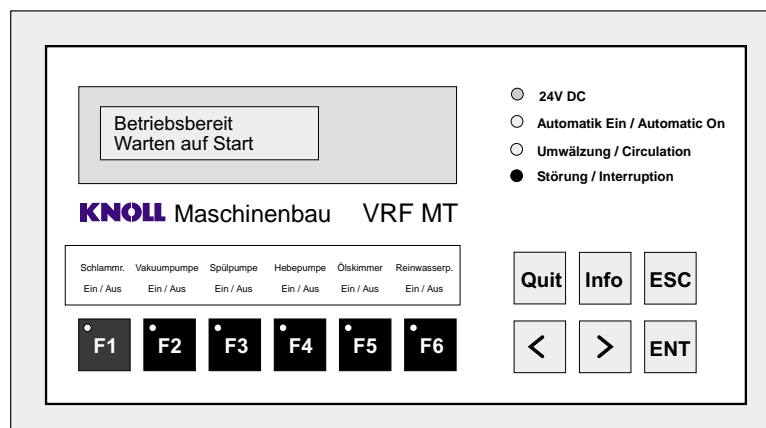


Operating Instructions

User's Terminal Type VRF MT

(up to version 4.1)



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- Working hours of vacuum pump	(w-hours vacuum p.)	
- Working hours of reverse flow rinsing pump	(w-hours reverse flow r.p.)	
- Working hours of lifting pump	(w-hours lifting pump)	
- Working hours of oil skimmer	(w-hours oil skimmer)	
- Working hours of pure water pump	(w-hours pw pump)	
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1 Description of Product and Functions

Field of application

Control of Knoll Rotating Vacuum Filter Type VRF

Structure and method of functioning

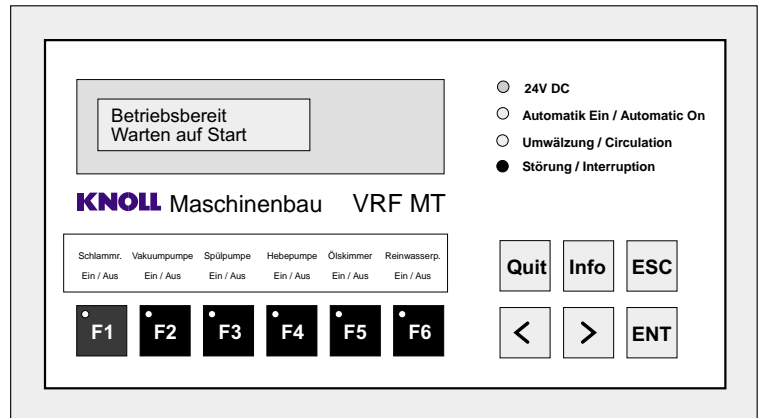
- Automatic control of filtering facility
- Tool setting mode by means of operational keys
- Clear text display for all operational modes
- Limitation of parameter settings (depression / time values)
- Analog depression measurement with display of actual values
- Door assembly (IP54)

Technical Data

Parameters limit values

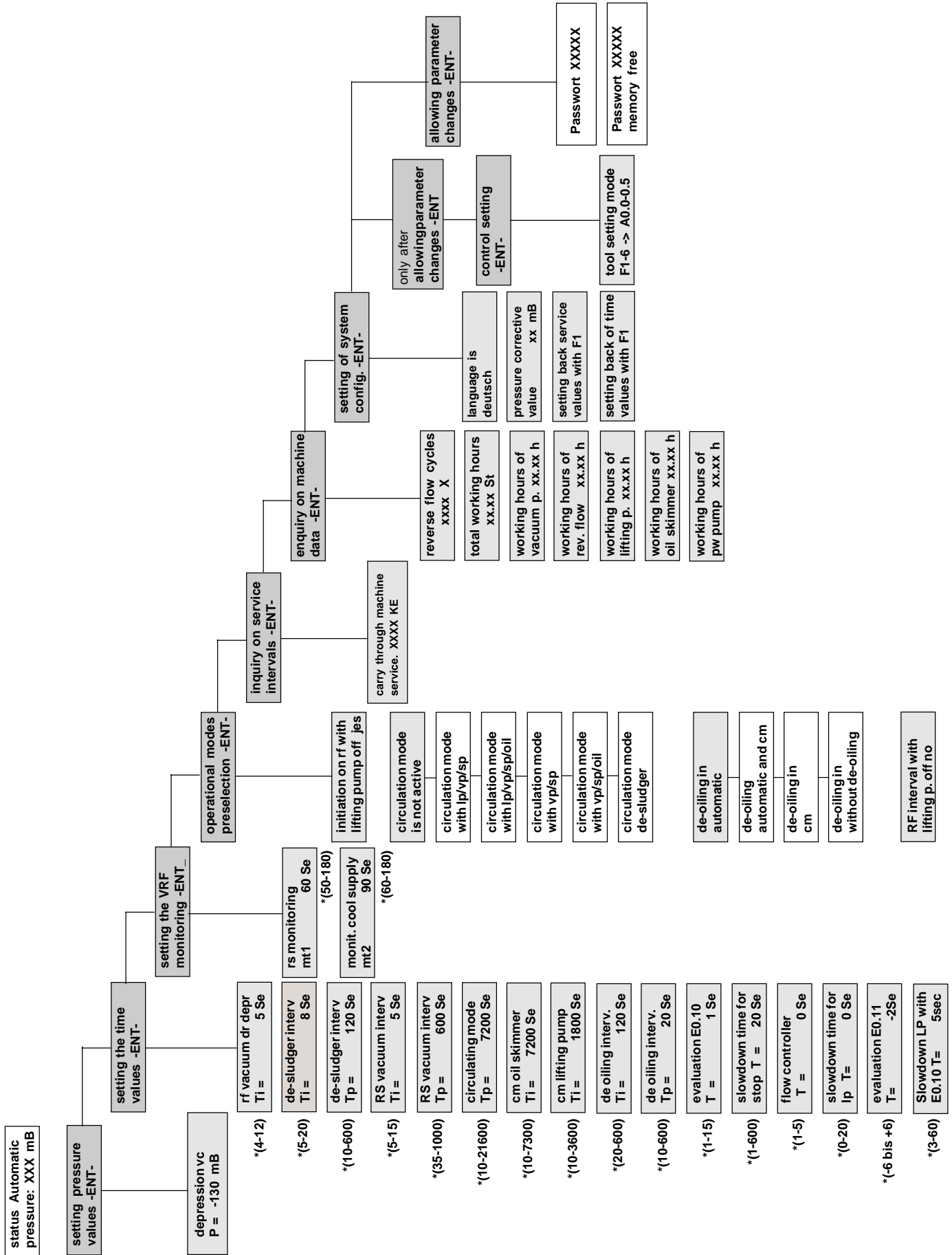
working temperature	0° - 50°
supply voltage for logic	22 - 30 volt
supply voltage for relays	19 - 30 volt
current consumption	approx. 200 mA
inputs 0 level	0 .. 6 volt
inputs 1 level	10 .. 30 volt
input resistance	approx. 3kohm
issues (make contact)	30V / 1 A (min. 10 mA)
issues (change-over contact)	30V / 2 A (min. 10 mA)
inputs analog (voltage)	0 .. 10 volt
input resistance analog (voltage)	approx. 6.5 kohm
inputs analog (current)	0 .. 20 mA
input resistance analog (current)	250 ohm
EEPROM	1 million write cycles
10 years data storage	
plug	Weidmüller 3.5mm 90° (4,6,16,18 poles)
front film	polyester (suited for industrial uses)
cleaning of front film	water with detergent or spirit
system of protection	front side IP 54
safety of operation (EMV)	test according to IEC 801 degree of sharpness 3

2 Control Elements



Key	Activity in the	Function
ESC	main menu submenu	back to status display in the main menu leaving of the submenus
ENT	main menu submenu	branch out into the respective submenu switch to next submenu (displayed value = stored value)
>	main menu submenu	switch to next item in the main menu increase displayed value (by continual pressing, a quick increase, such as +100, can be obtained)
<	main menu submenu	switch to previous item in the main menu lower displayed value (by continual pressing, a quick lowering, such as -100, can be obtained)
Info	main and submenu	display of version and date programme. (display for approx. 4 seconds.) display of pressure corrective value (K:) e.g. Knoll VRF V X.X (number of software version) date=software status K: 0 = pressure corrective value
Quit	main menu submenu	cancel potential errors cancel potential errors
F1	main menu submenu	no function. resetting of times or service values respectively.
F1..6	main menu submenu	no function. in the submenu "Tool setting mode" direct setting of the issues A0.0 to A0.5. F1 and F2 are used for password input (F1,F2,F1,F2,ENT)
simult. Quit,Info & ESC	always	pressed simultaneously, they lead to a control resetting (comparable to switching off the logic voltage)
simult. F1/F2/F5/F6	always	direct jump to menu language selection
Quit, Info & ESC --> F1,F2,F3 simult	always	Keys pressed in sequence shown opposite, causes the selection of setting mode, even with an active error message. (Acknowledgement, info and ESC pressed simultaneously results in a restart of the control; if F1, F2, F3, are pressed simultaneously during the restart, the control jumps into setting mode.

2.1 Menustruktur



* = possible setting range

3 Short Description of the Main Menu

Menu item	Short description	see page
setting the press.values -ENT-	determining the depression which initiates the reverse flow cycle	9
setting the time values -ENT-	12 submenus permit the setting of the interval for each function	10
setting the VRF monitoring -ENT-	monitoring the reverse flow and supply flow cycles, comparing them with a desired value and signalling deviations	11
operating modes preselection -ENT-	setting different operating modes for circulating mode, automatic de-oiling and reverse flow	12
inquiry on service intervals -ENT-	inquiry on when the next service should be carried through	13
inquiry on machine data -ENT-	display of working hours or cycles of different components respectively/ set	14
setting of syst. config. -ENT-	resetting of service values, factory settings, choice of vernacular, display of pressure corrective value	15
control setting -ENT-	all functions taken up by operational keys (F1 to F6) can be retrieved by key operation	16
allowing param. changes -ENT-	input of password in order to allow for changes in setting	17
flow controller T = 0 Sec	If a flow control is installed in the unit, it can be controlled from the terminal	21



The menu mode of the VRF MT control is arranged in such a way that it always jumps to the programme item which has been chosen immediately before. The advantage is that, if additional corrections of the setting become necessary, the user will have no trouble finding the menu item which has been changed before.

Each time the **ENT** key in the submenu is pressed, the control jumps to the next programme item. The last item is again followed by the first. Settings are carried through by means of the keys < or >. All display indications are saved automatically.

4 Initial Operation

Apply a voltage of 24V DC (+20% / -10%, residual ripple < 10%)

- control light 24V DC is on
- the display has the following text:

**ready for operation
waiting to start**

signal start (input E0.7 = 1-signal)

- display has the following text:

**status automatic
pressure: xxx mB**



The displayed pressure value must be between -16mB and +16mB. If this is not the case, adjust the signals for the pressure sensor (see chapter 14)

The light-emitting diodes of the operational keys for the different functions are on; the facility is in operation.

If E0.7 (signal EIN) is now deactivated and the circulating mode is active, the display has the following text:

**status circul.
pressure: xxx mB**

The circulating mode can only be activated with an integrated lifting tank.



By pressing the keys F1, F2, F5, F6 simultaneously, the programme branches out directly to the language menu. The desired language can be chosen by means of the keys < >.

Main menu

**status automatic
pressure: XXX mB**

**setting pressure
values -ENT-**

**setting the
time values -ENT-**

**setting the VRF
monitoring -ENT-**

**operational modes
preselection -ENT-**

**inquiry on service
intervals -ENT-**

**inquiry on machine
data -ENT-**

**setting of
system config. -ENT-**

**control setting
-ENT-**

**allowing parameter
changes -ENT-**

5 Setting the Pressure Values

Purpose

Determination of the depression value which initiates the reverse flow process

If the red control light error / interruption is not flashing, first allow for parameter changes (see chapter 13), then continue as described below.

- press **ENT** key
- press keys **<** or **>** repeatedly until the following message appears:

setting of pressure values -ENT-
- press **ENT** key
the following message appears:

**depression vc
P = -XXX mB**
- press keys **<** or **>** repeatedly until the desired depression is indicated (possible setting: -120mB to -300mB)
- back to the main menu: press the **ESC key 2x**



The factory setting for the depression is -130 mB. The measurement is on differential pressure, i.e., if the pressure sensor shows +63 mB with balanced pressure ratios in- and outside of the drum, a reverse flow would only take place at -193 mB. (-130 mB and +63 mB)

Main menu

status automatic pressure: XXX mB

setting pressure values -ENT-

setting the time values -ENT-

setting the VRF monitoring -ENT-

operational modes preselection -ENT-

inquiry on service intervals -ENT-

inquiry on machine data -ENT-

setting of system config. -ENT-

control setting -ENT-

allowing for parameter changes -ENT-

6 Setting of Time Values

Purpose

Setting of individual interval time values such as dead times and working times. This allows for an ideal adaptation of the facility to different working conditions.



Modifications of time settings should only be carried through by staff familiar with the facility's method of functioning. In order to return to the factory's basic setting, see the menu **Setting of system config.** (chapter 11). For the meaning of abbreviations, see chapter 16.

If the red control light error / interruption is not flashing, first allow for parameter changes (see chapter 13), then continue as described below.

- press **ENT** key
 - press keys **<** or **>** repeatedly until the following message appears:
- setting of
time values -ENT-**
- press **ENT** key the following message appears:
- rf vacuum dr
depr. ti = 5 sec.**
- If you want to change the setting, press the **keys < or >** repeatedly; in order to reach the next menu item, press **the ENT** key.



When the **ENT key is pressed**, the control jumps to the next programme item. The last programme item is again followed by the first. Settings are carried out by means of the keys **< or >**.

- Back to the main menu: press the **ESC key 2x.**

* = time characteristics which can be reset by means of F1 (see chapter 11)

Main menu

status automatic
pressure: XXX mB

setting the pressure
values -ENT-

setting the
time values -ENT-

* rf vacuum dr depr
ti = 5 sec.

setting the VRF
monitoring -ENT-

* de-sludger interv
ti = 8 sec.

operational modes
preselection -ENT-

* de-sludger interv
tp = 120 sec.

inquiry on serv.
intervals -ENT-

* rf vacuum interv
ti = 8 sec.

inquiry on
machine data -ENT-

* rf vacuum interv
tp = 600 sec.

setting of system
config. -ENT-

* circulating mode
tp = 7200 sec.

control
setting -ENT-

* cm oil skimmer
ti = 7200 sec.

allowing parameter
changes -ENT-

* cm lifting pump
ti = 1800 sec.

de-oiling interv.
ti = 120 sec.

de-oiling interv.
tp = 20 sec.

evaluation E0.10
t = 1 sec.

slowdown time for
stop t = 1 sec.

flow control
t = 0 sec.

slowdown time lp
t = 0 sec.

evaluation E0.11
t = -2 sec.

7 Setting the VRF Monitoring

Purpose

Setting of individual time values for monitoring the facility, i.e., if the reverse flow rinsing pump or the float switch in the VRF are switched on more than five times within the set time period, an error message is given and the facility turned off.



Modifications of time settings should only be carried through by staff familiar with the facility's method of functioning. In order to return to the factory's basic settings, see the menu Setting system config. (chapter 11). For the meaning of abbreviations, see chapter 16.

If the red control light error / interruption is not flashing, first allow for parameter changes (see chapter 13), then continue as described below.

- press **ENT** key
- press keys **<** or **>** repeatedly until the following message appears:

setting VRF monitoring -ENT-

- press **ENT** key the following message appears:

rf monitoring mt1 = 60 sec.

- If you want to change the setting, press the **keys <** or **>** repeatedly; in order to reach the next menu item, press **the ENT** key.



When the **ENT key is pressed**, the control jumps to the next programme item. The last programme item is again followed by the first. Settings are carried out by means of the keys **<** or **>**.

- Back to the main menu: press the **ESC key 2x**.

Main menu

status automatic
pressure: XXX mB

setting the pressure values -ENT-

setting the time values -ENT-

setting the VRF monitoring -ENT-

rf monitoring mt1 60 sec.

operational modes preselection -ENT-

monit. cool. supply mt2 90 sec.

inquiry on serv. intervals -ENT-

inquiry on machine data -ENT-

setting of system config. -ENT-

control setting -ENT-

allowing parameter changes -ENT-

8 Preselection of Operational Modes

Purpose

Setting of individual operational modes such as circulating mode On/Off, de-oiling in automatic and circulating mode, initiation of reverse flow process with lifting pump OFF. If a facility is to be operated in the circulating mode, a lifting tank must be integrated.

If the red control light error / interruption is not flashing, first allow for parameter changes (see chapter 13), then continue as described below.

- press **ENT** key
- press keys **<** or **>** repeatedly until the following message appears:

operat. modes
preselect. -ENT-

- press **ENT** key the following message appears:

initiation rf with
lift. pump off yes

- If you want to change the setting, press the **keys < or >** repeatedly; in order to reach the next menu item, press **the ENT** key.



When the **ENT key is pressed**, the control jumps to the next programme item. The last programme item is again followed by the first. Settings are carried out by means of the keys **<** or **>**.

- Back to the main menu: press the **ESC key 2x**.



The preselection "de-oiling in autom. and cm" depends on the preselection "circulating mode" of the pumps

Main menu

status automatic
pressure: XXX mB

setting the pressure
values -ENT-

setting the
time values -ENT-

setting the VRF
monitoring -ENT-

operational modes
preselection -ENT-

initiation of rf with
lifting pump off yes

inquiry on serv.
intervals -ENT-

circulating mode
is not active

inquiry on
machine data -ENT-

circulating mode
with lp/vp/sp

setting of system
config. -ENT-

circulating mode
with lp/vp/sp/oil

control
setting -ENT-

circulating mode
with vp/sp

allowing parameter
changes -ENT-

circulating mode
with vp/sp/oil

circulating mode
de - sludger

de-oiling in
automatic

de-oiling in
autom. and cm

de-oiling in
cm

de-oiling in
without de-oiling

RF interval with
lifting p. off no

9 Inquiry on Service Intervals

Purpose

inquiry on when a service inspection of the facility should be carried through



The facility service date is calculated counting backwards beginning with 15000 tu. When 0 tu are reached, the system gives off a signal which must be acknowledged. The acknowledgement of the signal increases the number of tu by +100.

One tu is equivalent to 10 - 30 minutes, depending on the strain on the facility.

- press **ENT** key
- press keys **<** or **>** repeatedly until the following message appears:

**inquiry on serv.
intervals -ENT-**
- press **ENT** key
the following message appears:

**carry through
machine service
XXXX tu**
- Back to the main menu: press the **ESC key 2x**.

The setting back to 15000 tu is carried out in the menu "Setting of system config." (see chapter 11).

Main menu

**status automatic
pressure: XXX mB**

**setting the pressure
values -ENT-**

**setting the
time values -ENT-**

**setting the VRF
monitoring -ENT-**

**operational modes
preselection -ENT-**

**inquiry on serv.
intervals -ENT-**

**inquiry on
machine data -ENT-**

**setting of system
config. -ENT-**

**control
setting -ENT-**

**allowing parameter
changes -ENT-**

10 Inquiry on Machine Data

Purpose

Inquiry on the working hours of the facility and of individual subassemblies, pumps, etc.

- press **ENT** key
- press keys **<** or **>** repeatedly until the following message appears: inquiry on machine data -ENT-
- press **ENT** key message appears: reverse flow cycles
xxxx X
- If you want to reach the next menu item, press the **ENT** key.



When the **ENT** key is pressed, the control jumps to the next programme item. The last item is again followed by the first.

- Back to the main menu: press the **ESC** key 2x.

Main menu

status automatic
pressure: XXX mB

setting the pressure
values-ENT-

setting the
time values -ENT-

setting the VRF
monitoring -ENT-

operational modes
preselection -ENT-

inquiry on serv.
intervals -ENT-

inquiry on
machine data -ENT-

reverse flow cycles
xxxx X

setting of system
config.-ENT-

total working hours
xx.xx h

control
setting -ENT-

working hours of
vacuum p. xx.xx h

allowing parameter
changes-ENT-

working hours of
rev. flow xx.xx h

working hours of
lift. pump xx.xx h

working hours of oil
skimmer xx.xx h

working hours of
pw pump xx.xx h

11 Setting of System Configuration

Purpose

Determination of vernacular for messages, setting of pressure corrective values, resetting of service values and factory settings

If the red control light error / interruption is not flashing, first allow for parameter changes (see chapter 13), then continue as described below.

- press **ENT** key
- press keys **<** or **>** repeatedly

until the following message appears:

setting of system config. -ENT-

- press **ENT** key the following message appears:

language is German

- If you want to change the setting, press the **keys < or >** repeatedly; in order to reach the next menu item, press **the ENT** key.



When the **ENT key is pressed**, the control jumps to the next programme item. The last programme item is again followed by the first. Settings are carried out by means of the keys **< or >**.

- Back to the main menu: press the **ESC key 2x**.

For the choice of language, see chapter 17.



The menu "reset time characteristics by means of F1" refers not only to those time characteristics which are immediately connected with the RVF unit

Main menu

status automatic
pressure: XXX mB

setting the pressure
values -ENT-

setting the
time values -ENT-

setting the VRF
monitoring -ENT-

operational modes
preselection -ENT-

inquiry on serv.
intervals -ENT-

inquiry on
machine data -ENT-

setting of system
config. -ENT-

control
setting -ENT-

allowing parameter
changes -ENT-

language is German

pressure corrective
value xx mB

setting back service
values with F1

setting back of time
values with F1

12 Control Setting



This menu appears only if the menu "Allowing for parameter changes" (chapter 13) has been selected **in advance** and the password entered, or if the red control light error / interruption is flashing.

Purpose

Manually switching on all subassemblies controlled by operational keys (F1 to F6), such as pumps, by pressing the respective operational key.

(The name of the subassembly is indicated on top of the corresponding operational key.)



- **When pumps are controlled manually, there is danger of the facility overflowing; therefore observe all containers or switch on the pumps for short time periods only.**

- press **ENT** key
- press keys **<** or **>** repeatedly

until the following message appears:

control setting
press **ENT** key

- press **ENT** key
- message appears:

tool setting mode
F1-6 -> A0.0-0.5

- Back to the main menu: press the **ESC** key

Main menu

status automatic
pressure: XXX mB

setting the pressure
values -ENT-

setting the
time values -ENT-

setting the VRF
monitoring -ENT-

operational modes
preselection -ENT-

inquiry on serv.
intervals -ENT-

inquiry on
machine data -ENT-

setting of system
config. -ENT-

control
setting -ENT-

allowing parameter
changes -ENT-

13 Allowing for Parameter Changes

Purpose

Modifications of the control setting may only be carried through after entering a password. Entering a password is always necessary if the red control light "error / interruption" **is not flashing**.

- press **ENT** key
- press keys **<** or **>** repeatedly
until the following message appears: **allowing parameter changes -ENT-**
- press **ENT** key
message appears: **password _ _ _ _**
- enter password: (F1, F2, F1, F2)
- press **ENT** key
message appears: **password XXXXX
memory clear**
- press **ENT** key



The flashing of the red control light error/ interruption indicates that the memory has been cleared for modifications. If no modification is carried out within 900 seconds, the modification mode and the red control light are switched off automatically.

Main menu

- status automatic pressure: XXX mB**
- setting the pressure values -ENT-**
- setting the time values -ENT-**
- setting the VRF monitoring -ENT-**
- operational modes preselection -ENT-**
- inquiry on serv. intervals -ENT-**
- inquiry on machine data -ENT-**
- setting of system config. -ENT-**
- control setting -ENT-**
- allowing parameter changes -ENT-**

14 Pressure Sensor Signal Adjustment

Purpose

Adjusting the facility's vacuum actual value to the vacuum display. **This is only necessary if the pressure display does not show a value between -16 mB and 16 mB with the vacuum pump switched off!**

If a pressure adjustment is necessary, proceed as described below.



- The adjustment work described here may require opening of the control cabinet. The control cabinet may only be opened by skilled electricians.

Procedure:

- Operate the facility for at least 1 minute
- Switch off the facility's power section. If necessary, do this by switching off the fuse in the control cabinet. (The vacuum pump may not be in operation.)
- Give the signal for starting (E0.7) to the control. Read the value for pressure/depression from the display. **Pressure: xxx mB** (note down the displayed value)

If the red control light error / interruption is not flashing, first allow for parameter changes (see chapter 13), then continue as described below.

- press **ENT** key
- press keys **<** or **>** repeatedly

until the following

setting of system config. -ENT-

- press **ENT 2x** the following message appears:

pressure corrective valueXX mB

- If you want to change the setting, press the keys **<** or **>** repeatedly until the sum of the pressure value you have noted down before and the one which is set now equals 0, e.g.: noted pressure value is **-47 mB**, pressure value set now is **47 mB**; the sum equals 0 mB.
- Back to the main menu: press the **ESC key 2x**. The pressure display in the main menu should now be within the range described above: pressure 0 mB

Main menu

status automatic
pressure: XXX mB

setting the pressure values -ENT-

setting the time values -ENT-

setting the VRF monitoring -ENT-

operational modes preselection -ENT-

inquiry on serv. intervals -ENT-

inquiry on machine data -ENT-

setting of system config. -ENT-

language is German

control setting -ENT-

pressure corrective value xx mB

allowing parameter changes -ENT-

setting back service values with F1

setting back of time values with F1

15 Elimination of Errors

Failure Indications

In the case of failure, two types of errors are being distinguished:

1. Errors which lead to the immediate stopping of the machine. This concerns e.g. the protective motor switch and the monitoring times mt1 and mt2.
2. Other errors block certain openings, while the machine continues operating. Some of these are "used oil barrel full" and "lifting tank flooding".

The errors are indicated by the system via the disturbance light (A0.10) and the disturbance relays (A0.14 for "used oil barrel full", A0.15 others).

All indicated messages must first be cancelled by the operator and then acknowledged at the control desk by means of the **Quit** key.

Error designation	Possible causes	Remedy
protective motor switch EO.xx has been activated	drive motor overloaded, too many chips present, cycle time of de-sludger is too long flow rate of the pumps too high (reduce delivery side)	check the protective motor switch E0.xx, acknowledge the error shorten the de-sludger interval (tp) (see chapter 6)
operating material is flooding the lp tank	lifting pump is defective running wheel of the lifting pump is defective lifting pump is too small suction line of lifting pump is clogged lifting pump throttled down too far	replace the lifting pump clean the lifting pump replace the running wheel open the throttling of the lifting pump
operating material coolant drum missing	see above "operating material is flooding"	see above "operating material is flooding"
system error error mt2	within the set time period mt2, a lack of coolant was registered five times the coolant supply is subject to large fluctuations lifting pump is defective	check the lifting pump electrically and mechanically if no errors in the pump can be detected, mt2 can be shortened (see chapter 7) E0.11 delayed evaluation if necessary
operating material coolant lack in pw tank	coolant level is too low pw pump is too big	fill in new coolant
Error E.015	---	eliminating malfunction

Error designation	Possible cause	Remedy
system error mt1	within the set time period mt1, reverse flowing was registered 5 times the tissue of the vacuum drum is clogged or conglutinated	remove vacuum drum, clean with high-pressure blower or by suction
system error transducer error	the pressure sensor is defective the leads of the pressure sensor are defective	replace
system error EEPROM error	-----	when this message has appeared several times, exchange the control
system error service values	Check the following components: - Check vacuum drum for damage (see chapter 12). - Check float switches for contamination.	Service values for reset: The values for the Quit key are increased by 100 KE (approx. 8 hours) Menü: Set system configuration Submenü: Reset the service values by means of the F1 key (see chapter14).
fuse breaks down	faulty connection	if necessary, inform the customer service
after switching on, the following message appears: system error 18V and/or INT and/or ADC and/or EEPR	voltage too low	if the error has appeared several times, inform the customer service Check mains / line voltage. Check power pack.

16 Meaning of Abbreviations

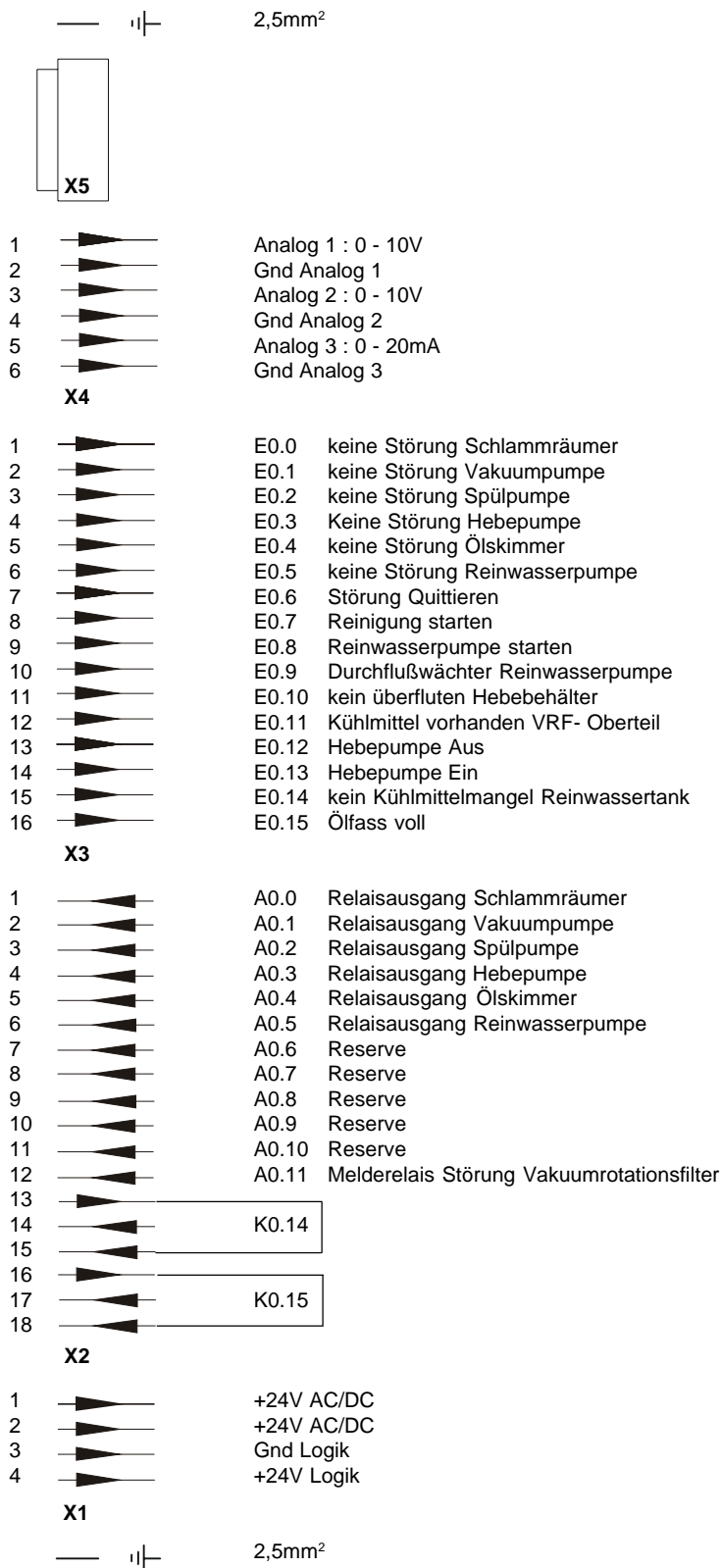
Abbreviation:

autom.	= automatic
lifting p.	= lifting pump
lp	= lifting pump
interv.	= interval
tu	= time unit 10-30 min. = 1tu (depending on the strain)
mB	= millibar
oil	= oil skimmer
rf	= reverse flow
reverse flow ...	= reverse flow rinsing pump
pw pump	= pure water pump
pwp	= pure water pump
de-sludg.	= de-sludger
sec.	= seconds
sp	= slush pump
h	= hours
ti	= timer impulse (turn-on time)
tp	= timer pause (dead time)
mt	= monitoring time
mt1	= timer reverse flow monitoring
mt2	= timer supply monitoring
superv.	= supervision
depr.	= depression
cm	= circulating mode
vacuum p.	= vacuum pump
vacuum dr.	= vacuum drum
vc	= vacuum chamber
vp	= vacuum pump

Flow controller

If requested by the customer, a system can be equipped with a flow controller. If the set rate of flow is fallen below (e.g. hose assembly or tool clogged), an error message is issued. In that case, the flow controller must be set according to the specifications of the tool and machine tool manufacturers.

17 Steckerbelegung



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