"AIR CONTROL 1"

1. General:



The control unit consists of the following functional blocks:

- a) **Microprocessor logic** (with **EEPROM** memory for data back-up) for all control, monitoring and display functions;
- b) **Keyboard** with 6 keys for switching the compressor on and off, and for entering recommended and limit settings;
- c) Customised **LCD display** for showing the current actual and recommended parameters and the operating status, plus faults/warnings;
- d) Analogue processing of network pressure, compressor temperature and oil temperature;
- e) **Digital inputs/outputs** for selecting a compressor;

2. Hardware description:

2.1) Micro-processor logic:

16-bit microcontroller with Watchdog,
Power failure detection (mains failure > 30 ms),
128 kbyte Flash EPROM,
256 byte EEPROM (for data backup),
32 kbytes RAM.

2.2) Keyboard:

Ruggedized touchpad keyboard, 6 keys (*Option:* up to 10 keys), customised finish.

2.3) Display:

LCD with display area approx. 55 mm* 45 mm:

- 7-segment A => 3-digit, 7-segment display;
- 7-segment $B \Rightarrow 1\frac{1}{2}$ -digit, 7-segment display;
- 7-segment C => 5-digit, 7-segment display;
- Symbols used for units: °C, °F, °K, bar, psi and MPa;
- Symbols also for: fault, warning, motor, solenoid valve, heating, fan, remote operation, restart, automatic (modes);

- 2 LEDs (green and red).

2.4) Analogue inputs:

Galvanically isolated;

Sensor voltage 18V DC;

 1×4 -20mA input (equivalent to 0-16 bar/200 ohms load), 10-bit resolution;

2 inputs for KTY temperature sensor (measuring current 1mA), 10-bit resolution.

2.5) Digital inputs:

Galvanically isolated; Sensor voltages 12V DC and 24V DC; 6 × 24V DC, 10mA standard digital inputs; 2 ×12V DC PTC temperature sensors;

can also be used at your discretion as standard digital inputs;

2.6) Digital outputs:

6 × relay outputs, contacts with common connections, 250V AC, 6A, including 2 × varistor outputs for connecting solenoid valves, Rating of the common connection: 250V AC 6A
1 relay output, changeover switch, 250V AC, 6A;

2.7) Networking (Option)

RS232 or RS485 interface

2.8) Power supplies, terminals, casing

Power supplies: 10V AC (8VA), max pre-circuit-breaker T 1.0 A 18V AC (8VA), max pre-circuit-breaker T 0.5 A ± 10%, 50/60 Hz each;

Phoenix plug-in screw terminals (MSTBVA type for relay outputs, Mini-Combicon type for remaining connections); Compact casing with front panel 240 mm*120 mm, casing depth 42 mm, Fixing to the instrument panel by means of four × 3 mm tapped bolts.

2.9 Wiring:

Pin 1	Earthing point for electronics	
Pin 2	0V (10V AC)	
Pin 3	10V (10V AC)	
Pin 4	0V (18V AC)	
Pin 5	18V (18V AC)	
Pin 6	Common terminal for pins 7-12	
Pin 7	Relay output 1, mains protection	(A01.0)
Pin 8	Relay output 2, star protection	(A01.1)
Pin 9	Relay output 3, delta protection	(A01.2)
Pin 10	Relay output 4, solenoid valve (with varistor)	(A01.3)
Pin 11	Relay output 5, supplementary heating/fan	(A01.4)
Pin 12	Relay output 7, condensation valve (with varistor)	(A01.6)
Pin 13	Relay 6, contact (normally closed)/busbar fault	(A01.5)
Pin 14	Relay 6, common	
Pin 15	Relay 6, contact	

CAUT	ION!	If an RS232 or RS485 module is which adjoin pin 35 on the rear of	plugged in, the board!	nen the 2 <i>dip</i>	switches
P ^{III} TU		and butput 1	,	output mou	u10
nin 40		+ analog output 1)		ule
nin 39		- analog output 1)	internal ana	100
Pin 38		GNDx)	Connection	for
Pin 37		+ analog output 2)	Option.	
Pin 36		- analog output 2)		
pin 40		18V AC)		
pin 39		18V AC)	MK200 mo	dules
Pin 38		GNDx)	Connection	for
Pin 37		Signal A)	Option:	
Pin 36		Signal B)		
1 11 00)		
Pin 35		RS485/RS232 power supply)		
Pin 34		RS485/RS232 TXD)	1110011000	
Pin 33		RS485/RS232 RXD)	Interface	
Pin 32		RS485/RS232 earth)	Option:	
Pin 31		24V DC sensor voltage			
Pin 30		12V DC (PTC) sensor voltage			
Pin 29	(PTC)	Digital input 1, Fault: Motor tem	perature		(E02.0)
Pin 28		Digital input 2, Fault: Current ov	verload		(E02.1)
		Warning: temp.re	estriction / hea	ating	
Pin 27		Digital input 3, Fault: Excess pre-	essure or		(E02.2)
Pin 26		Digital input 4, Fault: Direction	of rotation		(E02.3)
		or "Heating active" (VARIO-Co	mp.) (E02.4)	1	
Pin 25		Digital input 5, Fault: Pressure d	ifference, oil s	separator	
Pin 24		Digital input 6. Fault: EMERGE	NCY SHUTD	OWN	(E02.5)
1 111 25		or: GLW-OK			(102.0)
Pin 23		Digital input 7 REMOTE On/O	ff	20au/110 10au	(E02.7) (E02.6)
Din 22		Digital input & GLW (= basalog	d salaation): I	and/No lond	(E02 7)
Pin 21		4-20mA input, 18V DC sensor v	oltage		()
Pin 20		4-20mA input signal (network p	ressure)		(AE00)
Pin 19		KTY-2, signal (oil / dew point te	emperature)		(AE01)
Pin 18		KTY-1, signal (compressor temp	perature)		(AE02)
Pin 17		Analogue inputs, earth		(AE00 –	AE02)
Pin 16		Shielding connection			

must be set to OFF beforehand.

ALUP-LC Buchsen/Klemmenanordnung (Ansicht Rückseite)



3. Software description:

3.1) Key assignment:

If a key is assigned to multiple use, then the next position is selected each time the key is pressed.

- : Editing recommended/limit settings/codes • •
- ENTER : Taking the edited value into the current variable;
- INFO : Display/editing of:

	7-segment B	7-segme	nt C Parameters	S		
	[1]	[##.#]	Lower pressure threshold	(3.5-15.0 bar)		
	[2]	[##.#]	Upper pressure threshold	(3.5-15.0 bar)		
	[3]	[##.#]	Safety pressure	(display only)		
	[4]	[##.#]	Minimal pressure / GLW	(3.5-15.0 bar)		
	[5]	[05.0]	Min compressor temperature	(display only)		
	[6]	[110]	Max. compressor temperature	(display only)		
	[7]	[#####]	Total runtime			
	[8]	[#####]	Runtime on load			
	[9]	[#####]	Remaining air filter time	(display only)		
	[10]	[#####]	Remaining time oil/oil filter	(display only)		
	[11]	[#####]	Remaining oil separator time	(display only)		
	[12]	[#####]	Remaining lubrication time	(display only)		
	[13]	[#####]	Remaining compressor time	(display only)		
	[14]	[#####]	Remaining dryer time	(display only)		
			[only VARIO compressor!]			
0	(1) If comp	ressor ON:				
	Switch o	ff compress	sor;			
	(2) After a fault has occurred:					
	Clearing the fault report (= RESET key)					
	(3) Key pressed longer than 3 seconds:					
	Enter the	code (only	v possible if system OFF);			
<red led=""></red>	: flashes for warning/service message, steady light for fault;					
I	: Switch on	compresso	or;			

<green LED> : Operating display (lights if the compressor is switched on/ flashes if this is to be calculated each time the compressor starts up.

You can only change settings which you call up via the "INFO" key if the **CODE 0011** is entered beforehand. Without this code, these values can only be displayed.

3.2) Other input parameters:

3.2.1) Mode:	(refer also to: Item. 3.5.2)		
Enter code 0002 =>	7-segment A 7-segment B 7-segment C	002 1 #	1 = Mode
		0 = A $1 = L$ $2 = C$	UTOMATIC OAD/NO LOAD PTIONAL AUTOMATIC

The following 2 parameters then appear only if OPTIONAL AUTOMATIC mode has been activated.

ENTER =>	7-segment A 7-segment B 7-segment C	002 2 #.#	2 = max. Pressure drop Range: 0 - 9.9 bar
	/-segment C		Kange: 0 - 9.9 bar

max. pressure drop after selecting No Load

ENTER =>	7-segment A	002	
	7-segment B	3 ##	$3 = \max$. cycles
	7-segment C	пп	Range: 1 - 55

maximum permissible cycles, compressor motor

- If AUTOMATIC mode is selected, then this is displayed using the **Automatic** symbol.
- If OPTIONAL AUTOMATIC mode is selected, then this is <u>also</u> marked by means of a decimal point <u>before</u> the temperature setting.

3.2.2) Automatic restart after a power cut: (refer also to: item **3.5.10**)

enter code 0003 =>	7-segment A	003
	7-segment B	#
	7-segment C	

0 = Restart OFF 1 = Restart ON

If restart has been activated, this is shown using the **Restart** symbol.

3.2.3) Block/release supplementary heating, select fan - standard compressor

Enter co	de 0005 => 7-segme 7-segme 7-segme	ent A ent B ent C	00)5 #	1 = Mode
Mode:	0 = no supplementary heating (1 = supplementary heating (no 2 = with fan (no heating!)	no fan!) fan!)		\ > Se / hea	equence - refer to ading 3.5.7

If the supplementary heating is defective ($\underline{0}$ or $\underline{2}$), then the second KTY sensor (oil temperature) is no longer monitored for a line defect.

In this case, the first KTY sensor (compressor temperature) is used to select the relay output for the supplementary heating.

If the value **2** (i.e. with fan) has been set here as the parameter, then you can still edit the following settings:

ENTER => 7-segment A 005 2 7-segment B 2 = Lower threshold temperature. ## 7-segment C (Fan ON if compressor temperature $\geq \#\#^{\circ}C$) ENTER => 7-segment A 005 3 3 =Upper threshold temperature. 7-segment B ## 7-segment C

(Fan OFF if compressor temperature $\leq \#\#^{\circ}C$)

3.2.4) Oil heating (VARIO compressor only)

Enter code 0005 =>	7-segment A	005 1	
	7-segment B	#	I = With oil heating
	7-segment C		0 = Without oil heating

a) Without oil heating

If the temperature is within the range "+1 °C ... +5 °C", then the message "Warning Temperature too low" (symbol " Δ 4") will be displayed. The compressor can nevertheless start. If the temperature is below "+1 °C", the compressor cannot be started (green LED and "°C" symbol flash).

b) With oil heating

If the external oil heating is activated (K1.25+31 = open) then the compressor cannot start (green LED and temperature display flash e.g. "-5 °C").

If external oil heating has been active for more than 10 minutes, then the compressor can be restarted.

If external oil heating is controlled, then the decimal point to the right of the temperature display will be shown (e.g. 25.°C).

3.2.5) Local operation or remote control or GLW OK message:

Enter code 0008 =>	7-segment 7-segment 7-segment	A B C	008 1 #	
	0 = Local operation	ON/	OFF only via	the keyboard
	1 = Remote control	ON, OFF	if pins 23+31 and Local ke 5, if pins 23+3 or via the 0	= closed [side] eyed (from V 1.61); 1 = open, key;
	2 = GLW OK	GLV GLV	W OK, if pins W fault if pins	23+31 = closed; 23+31 = open;

If remote control has been selected and the system is keyed (from V 1.61), then this is indicated by the **Remote** symbol flashing. If the system has been switched off using the **0** key, then the Remote symbol in the LCD goes off again. (from V 1.61)

3.2.6) Supplementary heating: Upper threshold temperature – standard compressor

Enter code 0015 => 7-segment A
7-segment B
7-segment C
015

Range: 5-80°C

This temperature is used only to switch the supplementary heating on or off when the compressor is in operation. (refer also to heading **3.5.7**)

3.2.7) GLW mode (system works as GLW slave):

Enter code 0018 =>	7-segment A	018
	7-segment B	1 #
	7-segment C	

0 = not GLW mode, i.e. Load/No load via local pressure sensor

1 = GLW mode,	Under load if pins $22+31 = closed$
	No Load if pins $22+31 = $ open

<u>N.B.:</u>

If input e02.6 has been defined as message [GLW OK] using code 0008 and this signal is absent (e02.6 = 0), then GLW mode is switched off automatically and reprocessed with the local pressure sensor. (until e02.6 = 1 again)

If GLW mode has been activated, then this is also shown in the LCD by means of the <u>static</u> **Remote symbol**

In GLW mode, the local pressure sensor is used only for monitoring the safety pressure (P_ALLOWED).

From Version 1.40 and above:

If GLW mode is activated, the Load/No Load demand from the GLW master is also made via the RS485 interface. In this case, the relevant digital input signals are ignored as long as the selection is made via the interface. If the data exchange via the interface is interrupted for more than 2 seconds, then the control unit switches back to selection via the digital inputs.

From Version 1.90 and above:

If GLW mode is activated, and the pressure falls under "minimal pressure", the GLW mode is switched off automatically and reprocessed with the local pressure sensor. Warning [7] ("minimal pressure") is displayed. This warning has to be cleared with the 0-key to switch back to the GLW mode again.

3.2.8) Fault memory:

a) Display fault memory:

Enter code 0030 ...

7-segment.A =>	E##	Item: 01 – 20
7-segment B =>	##	Fault/warning number
7-segment C =>	#####	Total runtime when
-		the fault/warning occurred

If the symbol [warning triangle] is included, then this entry is a warning/service.

If the symbol [tool] is included, then this entry is a fault.

If the relevant item is unassigned, then the following display appears:

7-segment.A =>	E##
7-segment B =>	
7-segment C =>	

Use the arrow keys to scroll through the 20 items in the fault memory. Item 1 always contains the most recent fault.

Individual items in the fault memory are stored in the EEPROM memory, and are therefore still available after a power cut.

b) Clear fault memory:

Enter code 0130 ... The fault memory is cleared.

3.2.9) Editing the recommended settings for the service intervals:

a) Dryer:		(VARIO compressor only)
Enter code 0040 =>	7-segment A 7-segment B 7-segment C	040 1 ######
b) Air filter:		
Enter code 0041 =>	7-segment A 7-segment B 7-segment C	041 1 ######
c) Oil/oil filter:		
Enter code 0042 =>	7-segment A 7-segment B 7-segment C	042 1 ######
d) Oil separator:		
Enter code 0043 =>	7-segment A 7-segment B 7-segment C	043 1 ######
e) Motor lubrication:		
Enter code 0044 =>	7-segment A 7-segment B 7-segment.C	044 1 ######
f) Compressor:		
Enter code 0045 =>	7-segment A 7-segment B 7-segment C	045 1 ######

Use the arrow keys in increments of 500 to select the relevant recommended value, and then accept with the ENTER key (range: 0-20,000 hours).

If you accept a recommended setting with the ENTER key, then the relevant interval (remaining time) is also started afresh with the recommended setting.

3.2.10) No Load, Shutdown time, Star/delta delay (run-up):



Set the relevant recommended setting with the arrow keys, and then press the ENTER key to accept.

3.2.11) Set system type and pressure range:

Enter code 0060 =>	7-segment A	060	
	7-segment B	1	
	7-segment C	#####	
	System type:	SCK xxxxx (o "vAR" _ VAH "vAR-t" / Con	or Combi) RIO- npressor

Regardless of the system type selected here, the following parameters: Run-up time, maximum number of cycles (ABO), No load time and the servicing intervals are preset with the backing table values.

ENTER =>	7-segment A	060
	7-segment B	2
	7-segment C	##.#

Pressure range: 7.0 - 15.0 bar

The upper pressure threshold is preset to the value chosen here and the lower pressure threshold is preset to "upper pressure threshold - 2 bar".

The pressure range set here is also used as the upper limit when editing the lower and upper pressure threshold settings (refer to: Item 3.1/INFO key).

ENTER =>	7-segment A	060
	7-segment B	3
	7-segment C	####

Max. air flow: $0 - 9999 \text{ m}^3/\text{h}$

The maximal air flow of the compressor is set here.

3.2.12) Set pulse/pause times for the condensation valve:



CAUTION! The condensation valve is then selected only if the value 2 is set as the mode (with fan) in the "Supplementary heating" menu (refer also to: Item 3.2.3). The condensation valve is then always selected (pulse/pause control) if the compressor is running (standard compressor) or if the compressor is in load operation (VARIO compressor).

3.2.13) Activate/deactivate analogue output for frequency converter:



Use an additional analogue output module (internal or external module) to preset the recommended value for a frequency converter (signal from 4 to 20 mA).

<u>CAUTION!</u> The following settings are only relevant if this analogue output module is available and the frequency converter [FU] control is activated!

ENTER => 7-segment A
7-segment B
7-segment C
$$2$$

##.# Speed lowering from:

This presets the pressure from which the maximum recommended setting for the FU is limited. (Range: 5.0 to 13.0 bar//default setting: 5.0 bar)

ENTER =>
$$7$$
-segment A 075
7-segment B $\# . \#$ Speed lowering to:

This presets the pressure from which the maximum recommended setting for the FU is no longer limited. (Range: 5.0 to 13.0 bar//default setting: 13.0 bar)

ENTER =>	7-segment A	075	
	7-segment B	4 #	
	7-segment C	#	Speed lowering to:

This presets the current at which the maximum recommended setting is lowered furthest. (Range: 3 to 8 mA//default setting: 5mA)

ENTER =>	7-segment A	075	
	7-segment B	5 ###	
	7-segment C		Percentage recommended value:

This presets the recommended value within the current governed pressure range. (Range: 0 to 100% //default setting: 50%)

 Example:
 0% => recommended value = lower pressure threshold;

 50% => recommended value = (lower pressure threshold + upper pressure threshold)/2;

 100% => recommended value = upper pressure threshold;

ENTER =>	7-segment A	075	
	7-segment B	6 ###	
	7-segment C	###	Control factor

This sets the control factor (P proportion of the controller). (Range: 1 to 999//default setting: 100)

ENTER =>	7-segment A	075	
	7-segment B	7 ####	
	7-segment C		Adjustment time:

The adjustment time is set here (I proportion of the controller at $0 \Rightarrow$ no I proportion). (Range: 0 to 9999 seconds//default setting: 0 seconds).

ENTER =>	7-segment A	075	
	7-segment B	8 ###	
	7-segment C		Min.control limit:

The minimal control limit of a frequency-converter is set here. This value has to be set to the according parameter in the frequency-converter (Range: 0 to 100 %).



When the dryer is controlled, this is indicated by means of symbol $\underline{\mathbb{M}}$

The dew point temperature can be displayed, when the key \blacktriangle is pressed in the main screen (the symbol "T2" is additionally displayed => 2. temperature).

If the keys \blacktriangle and ENTER are pressed simultaneously, then the dryer can be switched on and off manually. If the dryer has been switched off in this way, the $\underbrace{\$}$ symbol flashes.

3.2.15) Setup system-defaults:

Enter code 0088 => All programmable parameters are set to their default values.

(<u>N.B.:</u> all changes made bevore are cleared !)

3.2.16) Convert pressure indicator unit:

Enter code 0090 =>	7-segment A	090	
	7-segment B	1 #	
	7-segment C	#	

- 0 = Pressure display in [bar]
- 1 = Pressure display in [MPa]
- 2 = Pressure display in [psi]

3.2.17) Convert temperature display unit:

Enter code $0095 \Rightarrow$

7-segment A 7-segment B 7-segment C 0 = Temperature display in [°C]

1 = Temperature display in [°F]

2 = Temperature display in [°K]

3.2.18) Pressure measurement correction setting:

Enter code 0105 =>

1	105
T	##.#
	##.#

095

#

Now use the arrow keys to enter a setting of -0.5 to +0.5.

This setting changes the gradient of the pressure curve, in order to use the pressure sensors to compensate for minor variations.

[current pressure setting = measured value * P_MAX/(P_MAX - PRESSURE CORRECTION)]

Examples: $P_MAX = 10.0$ bar

a) PRESSURE CORRECTION = +0.3	 $P = P_{measured} * 10.0/(10.0 - (+0.3))$
	$= P_{measured} * 1.03$
b) PRESSURE CORRECTION = -0.3	 $P = P$ _measured * 10.0/(10.0 - (-0.3))
	$= P_{measured} * 0.97$

3.2.19) Set system address:

Enter code 9950 =>
$$7-se_{950}$$

7-segment B $1 = Address$
7-segment C $\#$

00 = The RS485 connection (e.g. viewing) is switched off

- 01..16 = The system is (e.g. from the PC) contacted via the relevant address.
- <u>N.B.:</u> You must ensure that a separate address is set for each system connected. The relevant interface module (RS485) must also be available in the control unit.

ENTER => 7-segment A
$$7$$
-segment B 2 4 2 = Mode 7-segment C 2

0 = Data can be read from the control unit via the interface, and the settings in the control unit can also be changed.

1 =Only data from the control unit can be read via the interface.

ENTER => 7-segment A 7-segment B 7-segment C 0 = 4800 bauds (default setting) 1 = 9600 bauds 2 = 19200 bauds

<u>N.B.:</u> You must ensure that the same bit rate (transfer speed) is set for each connected system!

3.2.20) Digital input/output test:

Enter code 9980 =>	7-segment A 7-segment B 7-segment C	980 1 #	1 = Input 1 $0 = Off/1 = On$
ENTER =>	7-segment A 7-segment B 7-segment C	980 2 #	2 = Input 2 $0 = Off/1 = On$
::			
ENTER =>	7-segment A 7-segment B 7-segment C	980 8 #	8 = Input 8 0 = Off/1 = On
ENTER =>	7-segment A 7-segment B 7-segment C	980 9 #	9 = Output 1 0 = Off/1 = Switch on
ENTER =>	7-segment A 7-segment B 7-segment C	980 15 #	15 = Output 7 0 = Off/1 = Switch on

With the output signals, use the arrow keys to switch the relevant output ON-(\checkmark key) or OFF (\checkmark key).

Press the ENTER key to switch to the next stage on each occasion (in this situation, the outputs are always switched off initially).

You return to the default display after the final stage.

CAUTION! If individual outputs are activated in test mode, then the compressor motor may start up.

3.3) Depiction on the LCD of the operating/display unit:



Тор:	- Tool = Fault;
	- 7-segment display (" 7-segment.A ");
	- Symbols for MPa, psi, bar;
Centre:	- 7-segment display ("7-segment B");
	- Symbols for warning/servicing, motor, solenoid
	valve, heating, fan;
Bottom:	- 7-segment display (" 7-segment C ");
	- Symbols for °C, °F, K, hours, minutes, seconds;
	- Symbols for restart, automatic, remote control;

3.3.1) Default display:

7-segment A:	- current network pre	ssure	"10.2 bar"	
7-segment B:	 no display (no fault number of the activ number of the activ 	/warning); e fault (if tool e warning/serv	on); icing message (if wa	arning triangle on);
7-segment C:	 a) no fault/warning: b) if fault/warning: Use the ▲ arrow karrow karrow	current compr fault/warning ey to bring up t in the default di ey to bring up t	essor temperature g text (abbreviation, he current temperatu splay (oil or dew poi he running shutdowr	" 058 • <i>C</i> " 5 characters) are int temperature). n or tracking time

3.3.2) Input code:

In the default display, press the 0 key for approx. 3 seconds ...

7-segment A:	cod
7-segment B:	####
7-segment C:	

Now use the arrow keys to enter the relevant code.

Press the ENTER key to accept the code or the 0 key to reject the input.

3.4) Processing faults/warnings:

3.4.1) Fault:

The Tool symbol flashes and the relevant number is shown flashing in the "7-segment B" field.

7-segm. B	7-segm.C			
[1]	[Por]	"Incorrect setting"	(Change re	commended pressure settings)
[2]	[EPROm]	"EEPROM?"	(Change all	l settings)
[3]	[Lo AC]	"Low voltage"	(only if det	ection is activated/refer to: item 3.6)
[4]	[no AC]	"Power cut"		(only if Automatic Restart is not set)
[5]	[DEFEC]	"Incorrect compens. sett	ing"	(Check for repairs/compensation)
[6]	[EmERG]	"EMERGENCY OFF ke	yed"	(Contact open = fault)
[7]	[rotot]	"Direction of rotation"		(Contact open = fault)
[8]	[mott]	"Motor temperature"		(PTC)
[9]	[hiCur]	"Current overload"		(Contact open = fault)
[10]	[hi P]	"Excess pressure"		(Contact open = fault)
[11]	[diF P]	"Oil separator pressure d	ifference"	(Contact open = fault)
[12]	[SE t]	"Compressor temperatur		(Compressor temperature sensor
		[sensor] lead defective'	1	monitoring)
[13]	[SE t2]	"Oil temp. [sensor] lead	defective."	(Oil temperature sensor monitoring)
[14]	[SE P]	"Pressure [sensor] lead d	lefective"	(Monitoring: pressure sensor)
[15]	[hi t]	"Compress. temperature	too high"	(Temperature > max. compr.temp.)
[16]	[hi P]	"Network pressure too h	igh"	(Pressure > safety pressure)

If any of these faults appears, then it leads to the compressor switching off. The red LED stays on until the fault has been cleared. The fault can only be cleared with the **0** key if its cause has been rectified in the interim.

3.4.2) Warning/Servicing:

The Warning Triangle symbol flashes and the relevant number is shown flashing in the ''7-segment B'' field!

7-segm.B	7-segm.C		
[2]	[hi t]	"Compr. temperature up"	$(\text{Temp.} > \text{max.compr.temp.} - 5^{\circ}\text{C})$
[3]	[hi P]	"Network pressure up"	(pressure $>$ safety pressure - 0.3 bar)
[4]	[Cold]	"Temp.too low"	VARIO: $+1^{\circ}C \leq \text{comp.temp.} \leq +5^{\circ}C$
		-	Standard: Comp.temp./oil temp. < +1°C
[7]	[min P]	"minimal pressure"	GLW mode is activated and
			pressure < "minimal pressor";
[8]	[oilHE]	"Oillevel / Heating"	"Heating" is activated, and no signal on
			input ,,e02.2";
[10]	[]	"Maintenance dryer":	(Residual maint. time < 100 hours VARIO)
[11]	[m Air]	"Air filter servicing"	(Time to service < 100 hours)
[12]	[moilF]	"Oil/oil filter servicing"	(Time to service < 100 hours)
[13]	[m SEP]	"Oil separator servicing"(Time to se	ervice < 100 hours)
[14]	[m mot]	"Lubrication servicing"	(Time to service < 100 hours)
[15]	[m Com]	"Compressor servicing"	(Time to service < 100 hours)
[16]	[modul]	"I/O module warning"	The ext. MK200-4AO I/O module is
		-	registering a fault, or the module is not

responding (although it is activated) !

The compressor is not switched off if a warning or servicing message is displayed.

The red light flashes until the reason for the warning is eliminated or until the relevant servicing interval has been cleared. Normally, a fault/warning is indicated immediately.

However, if the user has pressed the INFO key, to enter recommended or limit settings, then the fault is displayed only when the user has switched back to the default display.

3.5) Information on the program:

3.5.1) Modes:

- a) the compressor is switched off:
 - the green LED is off
 - the Motor and Solenoid Valve symbols are off (LCD)
- b) the compressor is switched on, but the current pressure is still above the lower threshold (run- up guard).
 - the green LED is flashing
 - the Motor and Solenoid Valve symbols are off
- c) The compressor has been switched on, but the compressor temperature (or oil temperature if used "with heating" is still below +1°C (standard comp. or between +1°C and +5°C for VARIO compr.).
 - the green LED is flashing
 - the Motor and Solenoid Valve symbols are off
 - the temperature unit symbol is flashing (LCD: $^{\circ}C/^{\circ}F/K$)
- *d)* The compressor is in operation, but the load valve is switched off, i.e. the compressor is not compressing (run-up phase or no load).
 - the green LED is on
 - the Motor symbol is on
 - the Load Valve symbol is off

If the compressor is in Automatic or Optional Automatic mode and the no load clock is running , then the decimal point to the left of the pressure display flashes.

- e) The compressor is in operation and the load valve is switched on, i.e. the compressor is compressing. (Under load)
 - the green LED is on
 - the Motor symbol is on
 - the Load Valve symbol is on

3.5.2) Modes:

(refer also to: item 3.2.1)

a) AUTOMATIC mode:

After reaching the upper pressure threshold, the system moves to NO LOAD for the duration of the tracking time (see: 3.2.10).

To show that the no load cycle is active, the decimal point on the left <u>before</u> the pressure display flashes. After the no load time has elapsed, the motor switches off.

After switching off, the green LED => Standby flashes for a new start-up.

As soon as the pressure is again less than the lower pressure threshold, the system restarts.

b) LOAD/NO LOAD mode:

The compressor alternates between Load and No Load modes, i.e. it tracks with no time restriction.

c) OPTIONAL AUTOMATIC mode: (refer also to: Item 3.2.1)

The decimal point to the left <u>before</u> the temperature display, as well as the Automatic symbol, are selected as the coding for OPTIONAL AUTOMATIC MODE.

Whenever the system alternates between Load and No Load modes then, after 10 and 40 seconds respectively, the network pressure is memorised.

If the pressure drop thus calculates is above the threshold (ABO PRESSURE DIFFERENCE), then the system remains in No Load mode for the "long" tracking time (Item 3.2.10./NO LOAD CYCLE) and, if not, then switches off after a "short" tracking time (45 seconds). To show that the no load cycle is active, the decimal point on the left <u>before</u> the pressure display flashes.

Each time the compressor motor starts up, an internal counter (number of switches) is incremented by 1. As soon as this counter reaches the preset maximum number of cycles (MAX. CYCLES), the motor no longer switches off after the tracking time has elapsed, but remains in No Load mode until the counter is again below the relevant threshold [MAX. CYCLES]. After one complete cycle ($t_{SP} = 3600$ seconds/max. cycles) the counter is decremented by 1again.

3.5.3) Switch on process:

If the current network pressure is above the set pressure threshold when the compressor is switched on, then the green LED flashes (= standby). Only if the network pressure falls below the threshold does the compressor start and the operating display (green LED) come on permanently.

If the compressor temperature (or oil temperature if used "with heating") when switching on is below $+1^{\circ}$ C (or between 1 and 5°C for VARIO compressor), then the temperature unit (°C/°F/°K) flashes, as does the green LED.

Additionally, warning "4" is displayed.

If the temperature then rises to at least +1°C, then the compressor starts up. (refer to item 3.5.7)

3.5.4) Switch-off process:

If the compressor is switched off using the **0 key** (or using Remote OFF), then it switches first into No Load mode. The decimal point <u>before</u> the pressure indicator in the display flashes. Use the \checkmark arrow key to display the remaining time to switch off. The shutdown time is used as the time here (see item 3.2.10). Only after this time has elapsed does the system switch off completely.

3.5.5) Shutdown time:

(see: item 3.5.10 / automatic restart)

3.5.6) Safety pressure:

("P_ALLOWED")

The safety pressure is that set in Pressure Range + 0.8 bar. (For Pressure Range, refer to: Item 3.2.18)

Example: Pressure Range = $10 \text{ bar} \implies "P_allowed" = 10.8 \text{ bar}$

If the pressure exceeds the "P_allowed – 0.3 bar", then a warning is registered. If the pressure exceeds the "P_allowed" threshold, then the compressor is switched off and a fault message is displayed.

3.5.7) Supplementary heating/fan function: [refer also to: **3.2.3**]

(standard compressors)

a) "No heating" and "no fan"

If the <u>compressor temperature</u> falls below the threshold [min. compressor temperature], the Supplementary Heating output is switched on.

As soon as the <u>compressor temperature</u> rises above the threshold [minimum compression temperature $+ 2^{\circ}$ C], the output is switched off once more.

b) "Heating"/compressor is OFF/master switch is ON

If the <u>oil temperature</u> falls below the threshold [minimum compression temperature], then the Supplementary Heating output is switched on.

As soon as the <u>oil temperature</u> rises above the threshold [minimum compression temperature $+ 2^{\circ}$ C], the output is switched off again.

c) "Heating"/compressor is ON

If the <u>oil temperature</u> is below the - 3°C switch-off temperature threshold (refer to item 3.2.8), then the Supplementary Heating output is switched on. As soon as the heating switch-off temperature threshold has been reached, or if the compressor is switched off, then the output switches off again.

If the function "Heating" is activated and there is no signal on input "E02.2" then warning [8] ("Oillevel / Heating) is displayed.

d) With fan

If the compressor is keyed and the compressor temperature rises above the Fan ON threshold, then the output for the fan is switched on.

If the compressor temperature falls below the Fan OFF threshold, then the output for the fan is switched off again

At the With fan setting, a condensation valve is also selected via the 7th relay output (for this, refer also to: Item 3.2.12).

In general, the compressor can only be started when the <u>compressor temperature (or oil</u> <u>temperature when used "with heating"</u> has reached at least the threshold of $+1^{\circ}C$.

If the supplementary heating or fan output is switched on, then this is shown in the LC display using the corresponding symbol.

3.5.8) Servicing intervals:

(Actual values, refer to: 3.1/recommended values refer to: 3.2.9)

a) Servicing requirement

The relevant intervals are enumerated below.

As soon as any of these intervals is less than 100 hours, the relevant message appears and the red light flashes (=> Servicing).

To clear this message, first enter the **code 0021** and then press the **0** key. This resets the relevant interval to the recommended setting once more.

b) 1. Servicing for Oil/Oil Filter:

After the first service, the recommended value for the Oil/Oil Filter servicing interval is changed automatically from 500 hours to 2000 hours.

3.5.9) Sequence on Automatic Restart

If automatic restart after a power cut has been programmed, then the time which has been preset in the *"Shutdown time"* (refer to item 3.2.6) will run after power has been restored. The Restart symbol flashes while this time runs.

If the system was in operation before the power cut, then it will restart after this time has elapsed, but will otherwise remain in STOP mode.

If Restart is activated, the *Power Cut* fault will **not** be reported after power has been restored.

3.6) Codes used in the program:

<i>0002</i> => Selection:	AUTOMATIC, LOAD/NO LOAD, OPTIONAL AUTOMATIC mode (+ supplementary settings for OPTIONAL AUTOMATIC mode)
0003 => Selection:	automatic restart (Y/N) + time
0005 => Selection:	no supplementary heating/supplementary heating or with fan (standard comp) or set parameter for oil heating (VARIO comp)
<i>0008</i> => Selection:	Local operation or remote control
<i>0011</i> => Release:	Release editing of recommended/limit settings which are called up via the INFO key
0015 => Selection:	Editing the switch-off temperature for supplementary heating
0018 => Selection:	GLW mode $(0/1)$ [1 => System is GLW slave]
<i>0021</i> => Call-up:	Release COMPRESSOR SERVICING clearance You then quit with the 0 key!)
<i>0030</i> => Call up:	Show fault memory
<i>0040</i> => Call up:	Editing the dryer servicing interval (VARIO comp)
0041 => Call up: 0042 => Call up: 0043 => Call up: 0044 => Call up: 0045 => Call up:	Editing the Air Filter servicing interval Editing the Oil/Oil Filter servicing interval Editing the Oil separator servicing interval Editing the Motor Lubrication servicing interval Editing the Compressor servicing interval
<i>0051 =></i> Call up:	Edit No Load, Shutdown time, Star/Delta switching delay (run-up time)
0060 => Call-up: 0062 => Call-up: 0069 => Call-up:	Select system and pressure range (refer to: Item 3.2.11). Only select the pressure range (e.g. following a software update) Only select the max. air flow (e.g. following a software update)
<i>0065</i> => Call-up:	Edit condensation valve pulse/pause times; (see: Item 03.02.12).
<i>0075</i> => Call-up:	Set the parameters for selecting a frequency converter; (see: Item 3.2.13)

<i>0080</i> => Call-up:	Set the parameters for controlling the dryer; (see: Item 3.2.14 // VARIO compressor only!)
<i>0088</i> => Call-up:	System data default settings (variable parameters):
<i>0090</i> => Call-up:	Convert pressure indicator unit
<i>0095</i> => Call-up:	Convert temperature indicator unit
<i>0105</i> => Call-up:	Define pressure measurement correction factor
<i>0130</i> => Call-up:	Erase fault memory
<i>9900</i> => Release:	Initializing (then press the 0 key!)
	- Set runtime/load time to 0;
	- Servicing intervals => recommended values;
	- Erase fault memory;
	N.B.: (Only designed for 1 start-up)
<i>9919</i> => Release:	Edit operating/load hours
	Next, call up the relevant settings using the INFO key
9929 => Freigabe:	Edit operating/load hours
	The operating/load hours can be edited in steps of 1000 hrs.
<i>9950</i> => Call-up	Set system address, interface mode, and baud speed [PC link]
9970 => Call-up	Set the behavior when power is restored after a "Low Voltage" warning
<i>9980</i> => Call-up	Test of inputs/outputs
<i>9999 =></i> Call-up:	Show current program version

3.7) Fault in the control unit programming memory

After switching the mains on, if an error in the programming memory (Flash EPROM) has been detected, then the following message appears subsequently in the temperature display:

"noAPP",

"FLASH" => In this case, the program must be reloaded into the control unit.

3.8) Transferring a new program to the control unit;

- a) Switch off the power supply to the control unit;
- b) Press the **Info** and **0** keys *simultaneously*, and at the same time reconnect the power supply to the control unit.
- c) FLASH now appears in the display
- d) The relevant program (hexadecimal file) can now be transferred to the control unit
- e) After the program has been transferred successfully to the control unit, the power supply must be switched off briefly and then switched on again.