AIRLEADER *Professional* Compressor-Management

Operation manual for AIRLEADER 2, 4, 8

from program version V-10

WF STEUERUNGSTECHNIK GMBH

WF STEUERUNGSTECHNIK GMBH, Zeppelinstr. 7-9, D 75446 WIERNSHEIM, Tel. + 49 7044 911100, Fax + 497044 5717

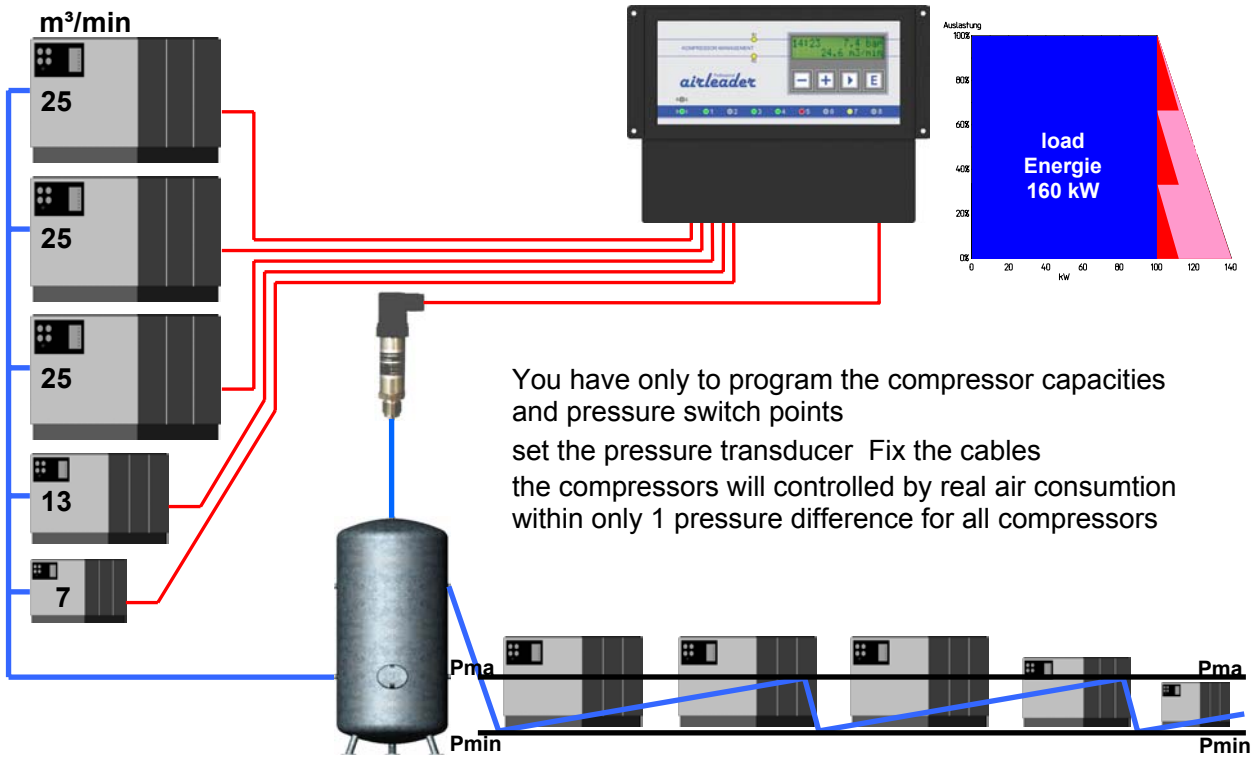
SUMMARIES

To change the language of Display text please activate the programming bridge

Press + and − simultaneous, change language with + and − Than press E button.

Instead of equal large compressors
devide the last compressor in the capacity

to save each quantity of idle running energy



You have only to program the compressor capacities and pressure switch points

set the pressure transducer Fix the cables

the compressors will controlled by real air consumtion within only 1 pressure difference for all compressors

FUNKTIONAL DESCRIPTION

AIRLEADER combines compressors of different sizes

to an optimum unit which automatically adapts to the production based on the current compressed air consumption. It is made sure that it is always the most efficient compressor combination which generates the compressed air necessary for production, independent of the manufacturer and the performance. The system pressure remains within the smallest limits. It is seen that the costs are kept as low as possible. The compressor performances and a common pressure difference are programmed in for all the compressors. Based on this information, AIRLEADER permanently calculates the current compressed air consumption and the volume of the compressed air system. The self-learning 8-fold calculation depth makes it possible to adapt the compressors to the changes in consumption in a dynamic way.

Automatic compressor change as per compressed air consumption

If all the compressors are on the same rank, they are working fully automatically and based on consumption. The priority of the compressors is adapted to the production process in real time and with a useful hysterisis calculation. It is always the compressor combination with the lowest cycle rates which is running and thus with the lowest idle times. Big compressors are only running when needed. The smaller compressors are running under load instead of idling with the big compressors. The compressors auto-regulate the motor start limitations.

The status of the compressors is constantly monitored.

If a running compressor displays a malfunction within the pressure range or is switched off for service, its performance is taken over by other compressors. If several compressors are needed to do this, addition is made time-delayed. Load and total running times are stored for the individual compressors. The operating hours are deleted, if required.

The following information is permanently shown on the display:

- Compressed air consumption in m³/min
- current system pressure in bar
- Pressure dew point in °C (at the click of a button

Compressor status is displayed with the three-colour LEDs:

green	Compressor conveys
yellow	Compressor is idling
red	Compressor displays a malfunction
red blinking	Compressor is switched off
LED off	Compressor is ready for use

Connecting of compressors

is effected using the relay cards supplied with potential free change-over contact. Each compressor informs of its status such as motor running, malfunction and readiness for use via contacts.

Standart hardware scope of supply

AIRLEADER	in metallized housing for wall mounting
Relay card	for every compressor (top hat rail mounting in compressor control cabinet)
Transmitter	fort he current pressure detection with analog output of 4-20 mA
RS-485	seriall interface for PC and Master-Slave connection

COMPRESSOR CONNECTION

A relay circuit board for compressor connection

for every compressor is contained in the scope of supply for installing in the electrical compressor housing. The relay switches the compressor on load or in idle running. Three digital inputs supervise the condition of the compressor attached at the relay card. The relay circuit board will bee installed at the top hat rail mounting.

Output function

The relay with change contact is attached in serial to the pressure switch of the compressor. The pressure switch of the compressor becomes safety pressure switch function automatically and takes over the function to the control the compressor if AIRLEADER is not in function or the pressure transducer cable has broken. Maximum load of relay contact 8 amps at 230 VAC. The relay contacts are attached to the connection provided by the compressor manufacturer for an external pressure switch at compressors with an electronic control and pressure transducer. The compressors regulate the idle running time and engine start demarcations by themselves.

Input function

The 24 VDC signal from AIRLEADER is attached by the potential-free contacts in the compressor to the registration of the compressor condition

Compressor fault report

If a compressor goes on fault shows the compressors LED red. On fault of reported compressor the performance gets the compressed air consumption the most favorable compressors combination replaces through this one. The fault report for the compressors is activated at the AIRLEADER an common fault signal.

Compressor motor running.

If these inputs get connected, AIRLEADER receives the motor running time. The compressors LED then shines yellow. The total hours are also stored as the load hours. The advertisement of the hours can be retrieved over the display. The running time compensation provides equally running times of compressors with same capacity.

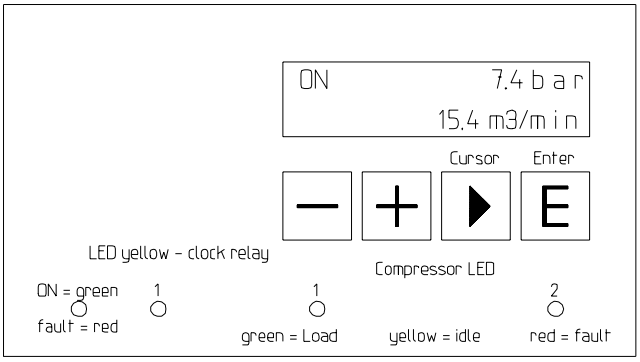
Compressor ready input

These input must be connected so that compressor management AIRLEADER recognizes the readiness of the compressors. If these input don't get connected, flashes the LED red and the compressor cannot be in operation. A fault signal isn't activated.

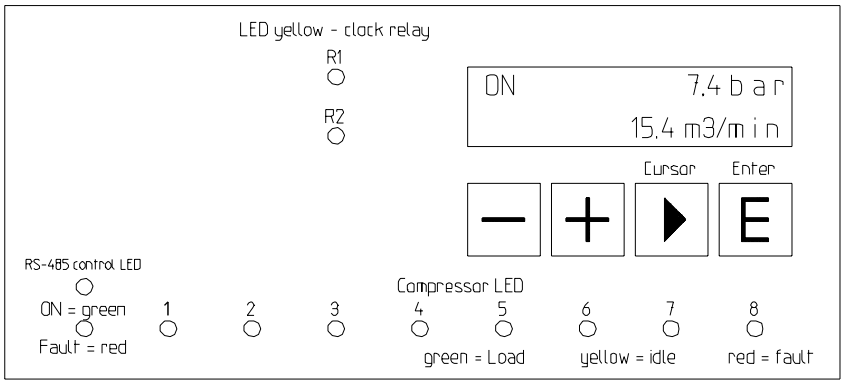
If the fault input is not connected

and one of the compressors stops due to a malfunction, the display will show a wrong compressed air consumption (too high = by the value of the faulty compressor). For this reason it is advisable to connect the malfunction signal inputs, so that the compressed air consumption is always shown correctly and the capacity is also corrected and immediately after reaching the P min.

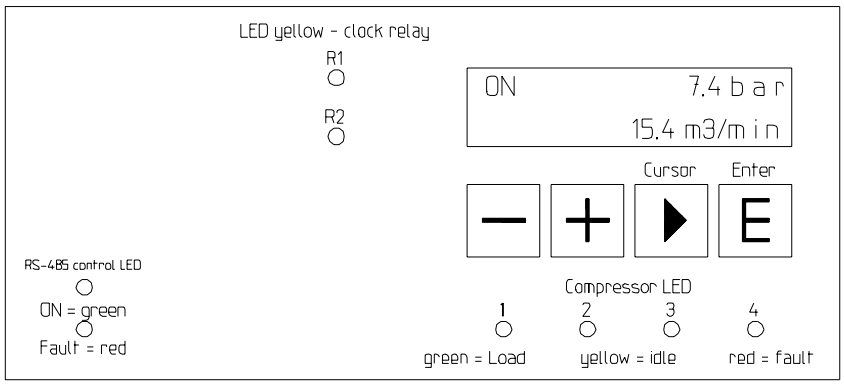
DISPLAY and KEY CONTROL



AIRLEADER 2



AIRLEADER 4



AIRLEADER 8

Key	Function
−	Decrease numeric value
+	Increase numeric value
▶	Next confirm display
E	ENTER confirm data
▶ + E	Return to the basic display

RANK profiles and EQUAL hour running

Examble: the following compressors have to be controlled

Channel	Compr. Capacity	Additinal functions	Spezial functions
1	20 m³/min	with heat recovery	shall be priority before 2,3,4,5
2	18 m³/min	-	-
3	18 m³/min	it's 20 years olt	stand by compressor
4	13 m³/min	-	-
5	10 m³/min	-	-
6	10 m³/min	with heat recovery	shall be priority before 2,3,4,5

Got with E and ▶ to program menu **compressor priority**.

Display shows:

c	o	m	p					1	2	3	4	5	6	7	8
r	a	n	k					1	1	1	1	1	1	1	1

adjust with + and −. To the next with ▶

Confirm with E. **1 = means highest priority; 8 = means lowest priority.**

For the examble above the programming has to be done as following:

c	o	m	p					1	2	3	4	5	6	7	8
r	a	n	k					1	2	3	2	2	1	1	1

ATTENTION!!

Compressors with the same priority are controlled by air consumtion.

Compressors with different priority are controlled priority dependent

Right configuration:

compressor 1 + 6:	Controlled by air consumtion at priority 1
compressor 2 + 4 + 5:	Controlled by air consumtion at priority 2 after priority 1
compressor 3:	Only operating if absolutly necessary

Compressor equal running times

For compressors with the same capacity you can program a changing time for the same running hours if these compressors are in the same priority stage. Every compressor capacity group can be programmed with a different change time. The change takes place under consideration of the engine running times. If a compressor has achieved the programmed interval time in the same capacity group it will be change to the compressor with the lowest time, without pressure drop.

Display shows:

c	o	m	p	r	e	s	s	o	r	s		w	i	t	h
			1	8									5		h

adjust with + and − To the next with E.

Display show:

c	o	m	p	r	e	s	s	o	r	s		w	i	t	h
			1	0									5		h

adjust with + and − To the next with E.

Below an hour the changing time appears within minutes = min.
Possible attitude 1-59 minutes, then 1-99 hours.
If the time in a capacity group is programmed to 0 the compressor don't change.
This function can be used for compressors with 2 steps.

REAL TIME CLOCK

The clock relay allows to control the following functions time dependent:

1. switching compressors ON/OFF
2. 3 profiles of pressure
3. 3 priority stage profiles
4. 2 outputs of 24 VDC for change relay's to switch ON/OFF additional equipment (dryer, valves)

The dates for 2.pressure or priority profile mut be configurated in the main menu

Attention:

The programming of the Clock relay is a little more complex than the programming steps used up to now, please make notes of all settings you want to program the clock relay by using the following spread sheet.

Unchanged settings have to be confirmed by pressing 

The clock relay will be activated by cable bridge CLOCK.

Key  **means = YES -- Key**  **means = NO**

At maximum 16 switching times can be set.

Examble:

SP	Day of week							Time	LS	PP	RP	R1	R2
01	**M**	**D**	**M**	**D**	**F**	s	s	06:00	EIN	1	1	EIN	AUS
02	**M**	**D**	**M**	**D**	**F**	s	s	22:00	EIN	2	2	AUS	EIN
03	**M**	**D**	**M**	**D**	**F**	**S**	s	00:00	AUS			AUS	AUS

SELECTED DAYS of the week are marked with CAPITAL LETTERS

Monday to Friday from 6:00 to 22:00

Mangement-System ON with pressure profile No. 1 – rank profile No. 1 and output R1 ON. (to switch an dryer)

From 22:00 to 24:00

Pressure is lowered (pressure profile No 2) and set to rank profile to No 2. Also a smaller refrigeration dryer is switched on output No 2 with an relay

At 00:00

The compressed air equipment is switches OFF by the clock relay.

CLOCK Display shows:

1. day – hour – minute programming

S	T	0	1											
M	T	M	T	F	s	s				0	6	:	0	0

2. programming the funktions

S	T	0	1				P	P	-	1		R	P	-	1
L	S	-	O	N			R	1	-	1		R	1	-	0

3. to the next switch point

p	r	o	g	r	a	m		m	o	r	e			
s	w	i	t	c	h		t	i	m	e	s		?	N

ajust with  and  .Confirm with 

By remove the switching bridge CLOCK

is the clock function The compressors management is switching the compressors now over the data of the 1st pressure rank profile that is programmed in the basic menu

Respect: within the clock menu you are always in programming mode !!

PROGRAMMING-NOTES

Compressor capacities

No.	1	2	3	4	5	6	7	8
m³/min								

Pressure profile = PP

No.	P min	P max	P Alarm
1	Bar	bar	bar
2	Bar	bar	bar
3	Bar	bar	bar

Compressor rank profiles = RP

Compr.	1	2	3	4	5	6	7	8
1.RP								
2.RP								
3.RP								

Clock relay switching times and functions

SP	Day of the week							Time	LS	PP	RP	R1	R2
1	M	D	M	D	F	S	S						
2	M	D	M	D	F	S	S						
3	M	D	M	D	F	S	S						
4	M	D	M	D	F	S	S						
5	M	D	M	D	F	S	S						
6	M	D	M	D	F	S	S						
7	M	D	M	D	F	S	S						
8	M	D	M	D	F	S	S						
9	M	D	M	D	F	S	S						
10	M	D	M	D	F	S	S						
11	M	D	M	D	F	S	S						
12	M	D	M	D	F	S	S						
13	M	D	M	D	F	S	S						
14	M	D	M	D	F	S	S						
15	M	D	M	D	F	S	S						
16	M	D	M	D	F	S	S						

SP=switching point LS=Management Leadsystem switching output = R1 switching output = R2

VARIOUS SPEED COMPRESSOR

The various speed regulated compressor is integrated actively

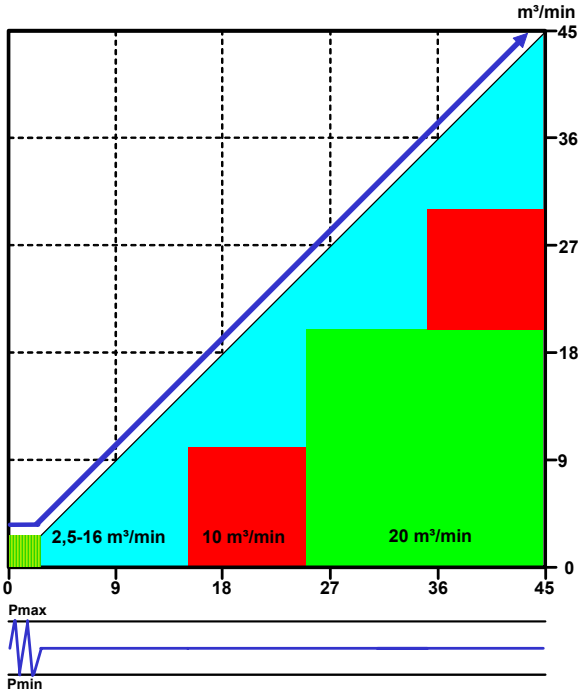
He sends the information about his motor speed over its analog outputs to AIRLEADER. This parameter must be programmed to the minimal and maximum capacity delivered compressed air. The analog output various speed regulated compressor interpreted for 4-20 mA. The analog signal of Compressors with an analog output of 0-10 VDC must be changed from 0-10 VDC with a receiving multicoupler to 4-20 mA.

The right combination of compressor capacities

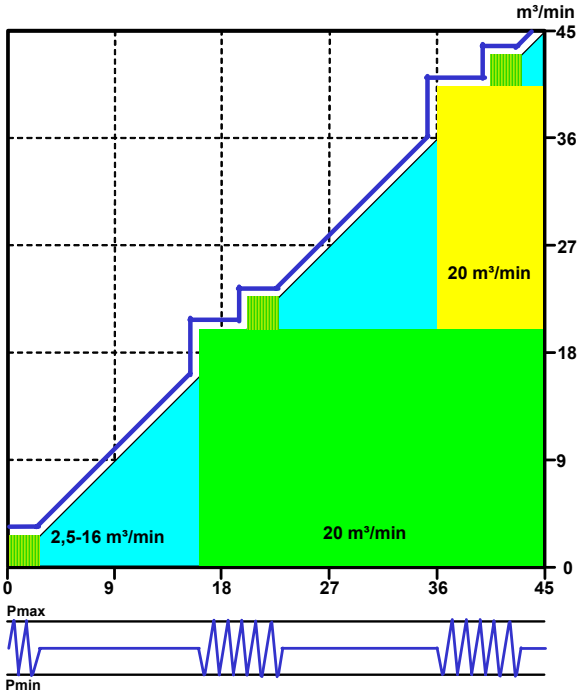
together with speed regulated and normal compressors with a firm performance is decisive for good results in regulation. Is the various speed regulated compressor the smallest in combination with only bigger compressors there are only small section regulated by the various speed compressor. Big mechanical hurdle cannot be regulated directly.

Example of the right interpretation of the performances:

RIGHT combination



WRONG combination



The freely definable regulation limits

switches smaller compressor direct ON or OFF direct in the pressure band. The regulation limits are defined with **regulation range xax** and **regulation buffer**. The regulation limits are then active if at least a compressor is smaller than the difference between the minmum capacity and regulation range max minus buffer (in m³/min) of the regulated compressor. If settting the regulation range max on e.g. 15m³/min, then the consumption trend is watched over a short time to start the next compressor. The regulation range of VS compressor is enlarged.
If setting regulation buffer on e.g. 2 m³/min, and the air consumption is lower than 13 m³/min,then the consumption trend is watched over a short time to switch OFF an small compressor.

With the freely definable minimal capacity

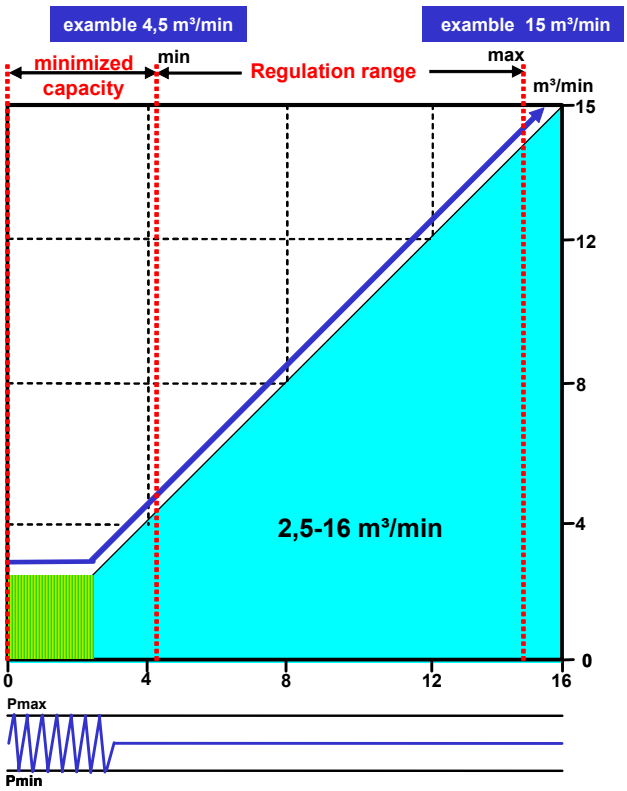
of the various speed compressor you can determine whether the compressed air production can be produced below this point with an normal load/unload compressor. The range will be from 0 m³/min up to the 50% of the capacity from the speed regulated compressor.
If this is point is setted to 0 m³/min the VSD compressor is responsibly also for the lower area in the start/stop mode.

Respect: installation of pressure transducer with 2 regulated compressors

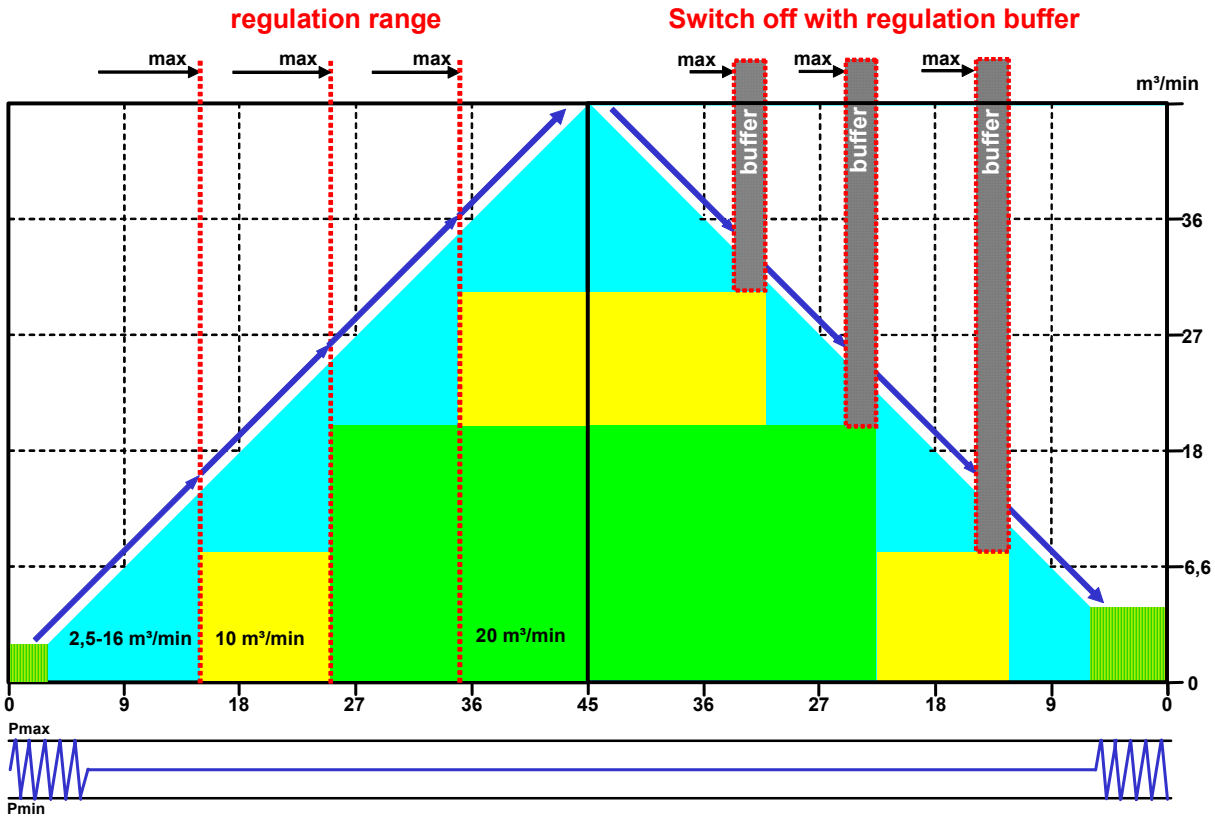
As an option is availably a control program for 2 regulated compressors. The pressure transducer of AIRLEADER and the both VSD compressors must be installed at the same location !!!

DEFINITION of REGULATION RANGE

Definition REGULATION RANGE



Switches compressors ON / OFF if they are smaller than the regulation range



COMMISSIONING and SWITCHING FUNCTIONS

Assembling relay cards in the compressor control cubicle in accordance with electrical plan and manufacturer's indications

The pressure switches of the compressors now become „safety pressure switches“.

EXAMBLE:

Pressure setting of AIRLEADER	**=**	**6,0 - 7,0 bar**
Settin of compressor pressure switches	**=**	**6,5 - 7,5 bar**

In case of absence of current, the contact's of the relay card are closed. The compressors are controlled by their installed pressure switches

Check the pressure coneection of the pressure tranducer

ATTENTION:

It is absolutely necessary to install the tranducer at a calm part of the compressed air line.
As an optimum we recommend a seperate 1/2" line leading from the receiver to the tranducer.

Switching ON delay time iss et to 30 sec by manufactorer.

Connect cable bridge **START** with an cable or a switch and AIRLEADER will start your compressed air station.
From now on your compressors are energy saving controlled and depending on your real consumption of compressed air.

Programming the various capacity of the various speed compressor

it is absolutely necessarily, to programm the minimal and maximum capacity of the regulated compressor (according to the manufacturer's indications) together with the mA values appropriately correctly.

Examble: minimum capacity = 2,5m³/min = 6,2mA measured
maximum capacity = 16,0m³/min = 17,2mA measured

please see the programming instructions

12. Switching functional description

Switching bridge: START
With this switching bridge the compressors will be switched ON / OFF.
Bridge activated = The compressors will be controlled by AIRLEADER
Bridge deactivated = The compressors turn OFF

Switching bridge: PROG
IIf this is activated, all programm parts can be programmed.
To programming the compressor capacities the switching bridge **START** may not be activated.

Switching bridge: CLOCK:

If this bridge is activated, the CLOCK will be activated.
If this bridge is deactivated the compressors management is switching the compressors now over the data of the 1st pressure rank profile that is programmed in the basic menu.

Switching bridge 2. Prof:
If a 2nd pressure profil, or a 2nd Priority (rank) profile was programmed, the respective function can be activated over this bridge

PROGRAMMING-MENU und Interface RS 485

Programming order

1. Compressor capacities

2. Pressure switching points

3. Compressor priority stages

4. Equal running hours

5. Compressor running times

6. Clock relay

adjust with  and  .Confirm with  .

Compressor Management „OFF“:
all data can be programmed.

Compressor Management „ON“ :
all system data expect **„Compressor capacities“** can be programmed

End of programming:
Disconnect cable bridge **„PROG“**. After this all values can be indicated but not changed.

PROGRAMMING MANUAL : See last 3 Pages

Interface RS 485

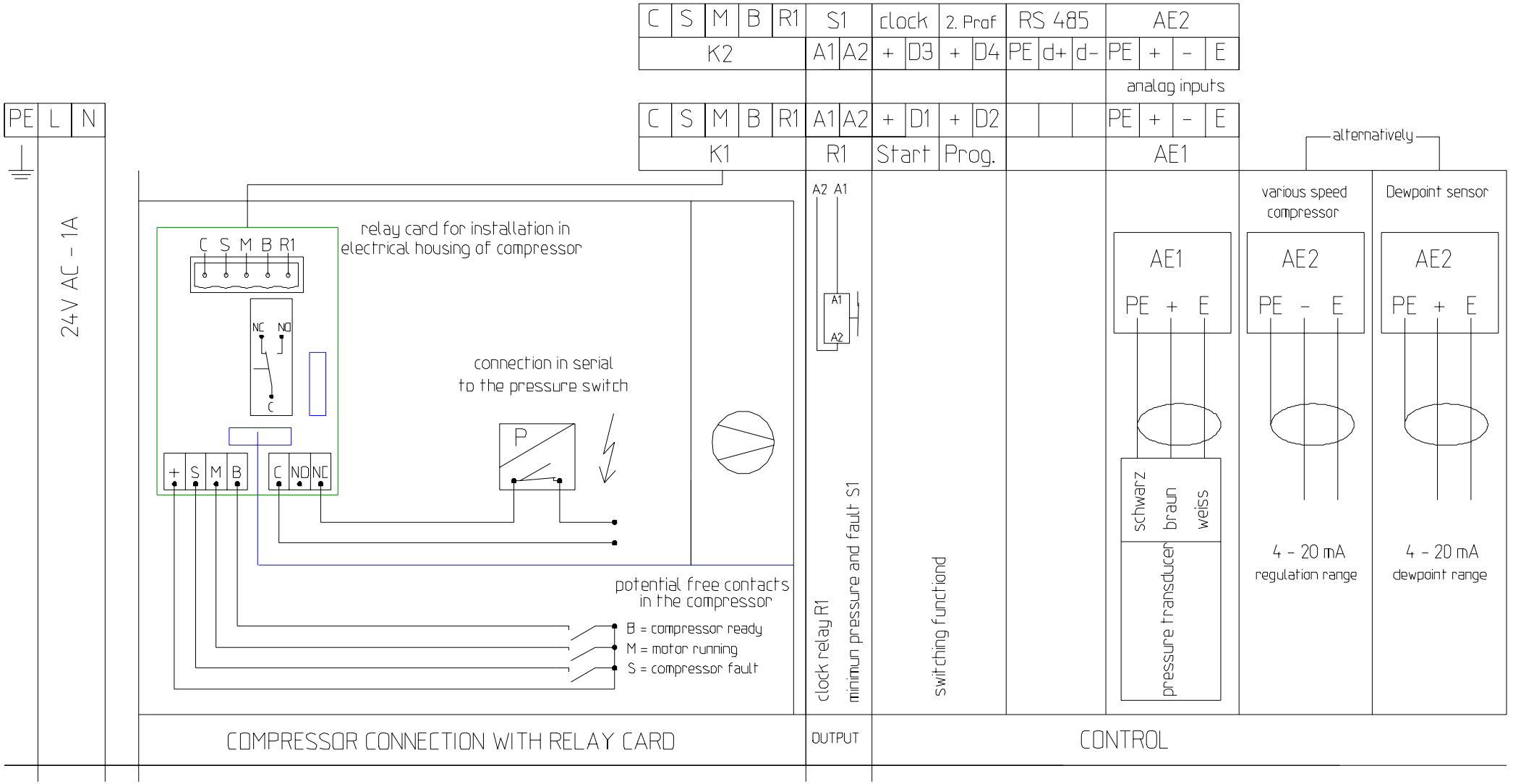
The compressor management system has an interface RS 485 for comunication with other AIRLEADERs and personal computers.

Maximum cable length is 1200 meter. The cable must be shieldet and pair twisted.

The connection to an personal computer please use special interface cards for RS 485 or an industrial interface from RS 485 to RS 232.

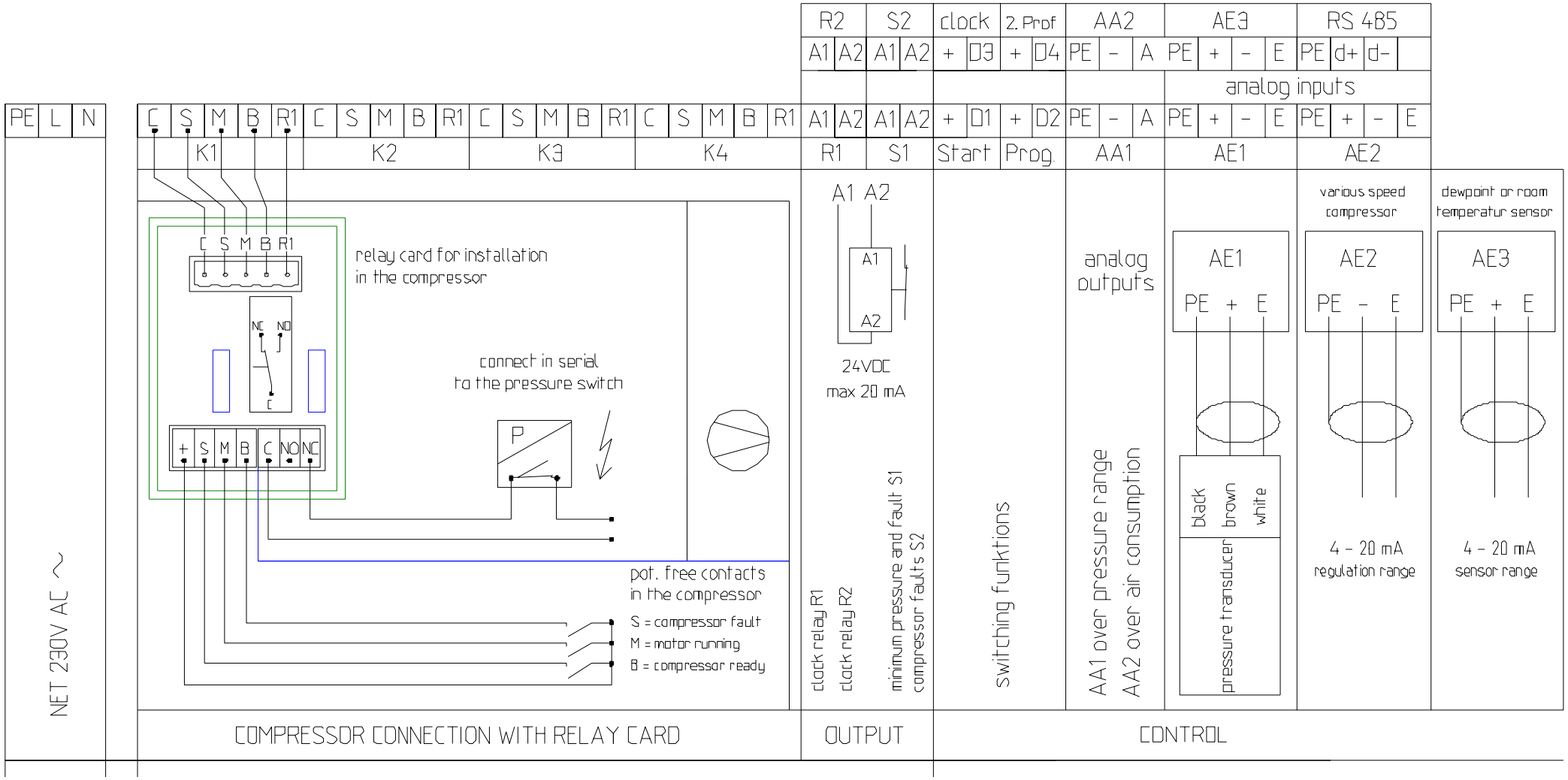
As an option you can have an PC-Programm under WINDOWS to show the air consumption, pressure compressor running times with diagramms. An energy spread sheet is integreated.

CONNECTION and TERMINAL PLAN for AIRLEADER 2 *Professional*



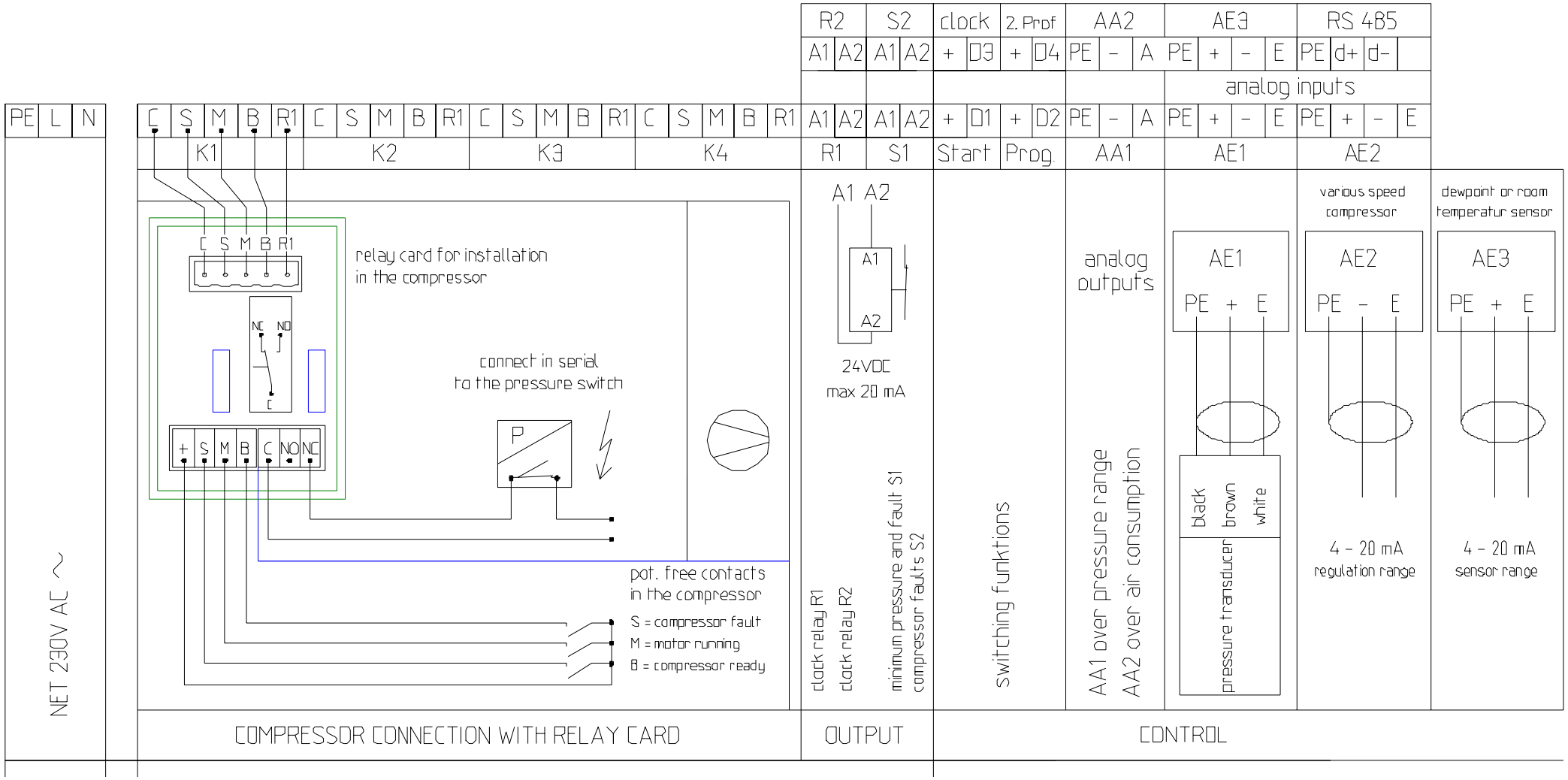
Use only flexible and shieldet cable with diameter of 0,25 - 0,5 mm²

CONNECTION and TERMINAL PLAN for AIRLEADER 4 *Professional*



Use only flexible and shieldet cable with diameter of 0,25 - 0,5 mm²

CONNECTION and TERMINAL PLAN for AIRLEADER 8 *Professional*



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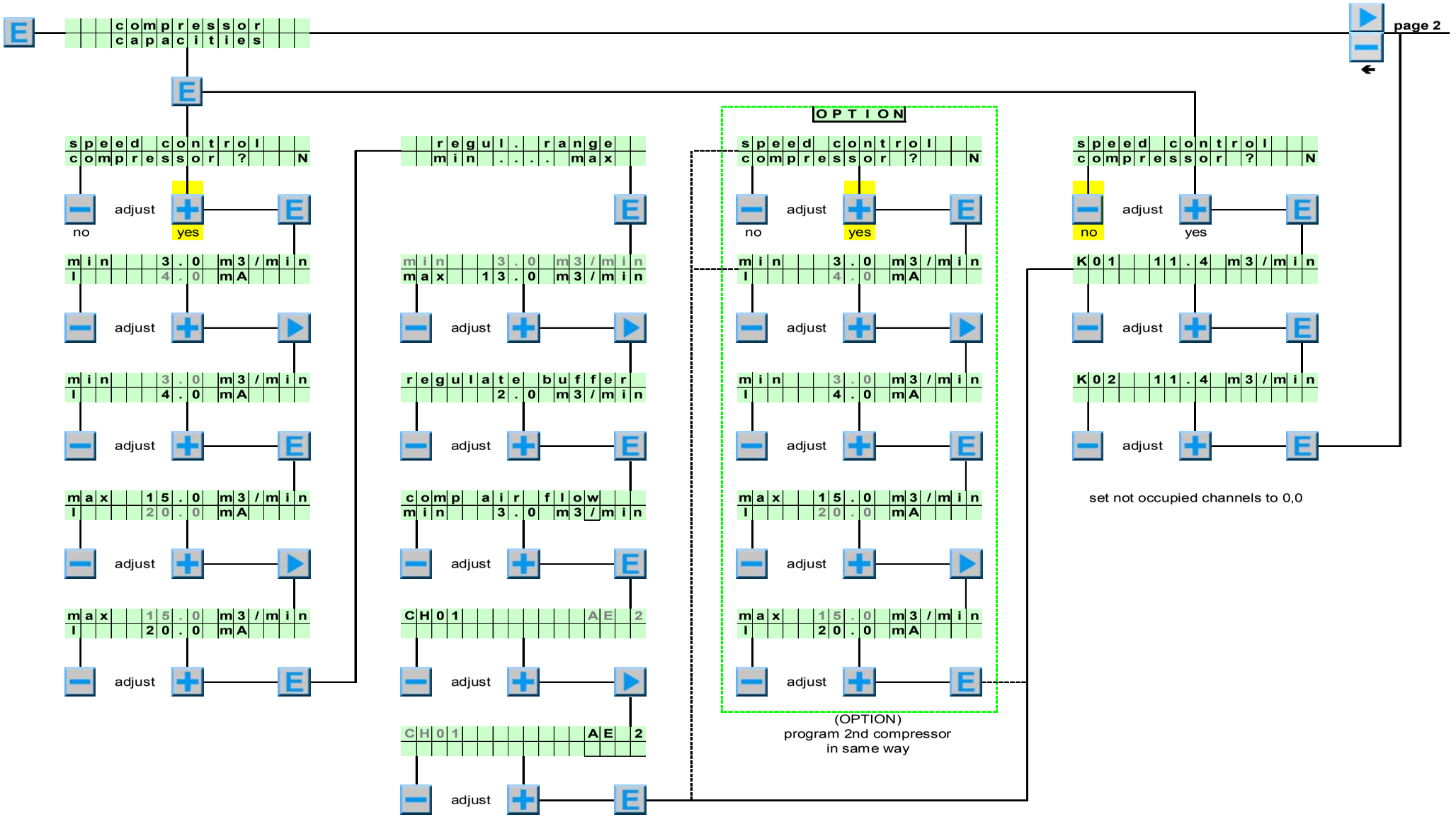
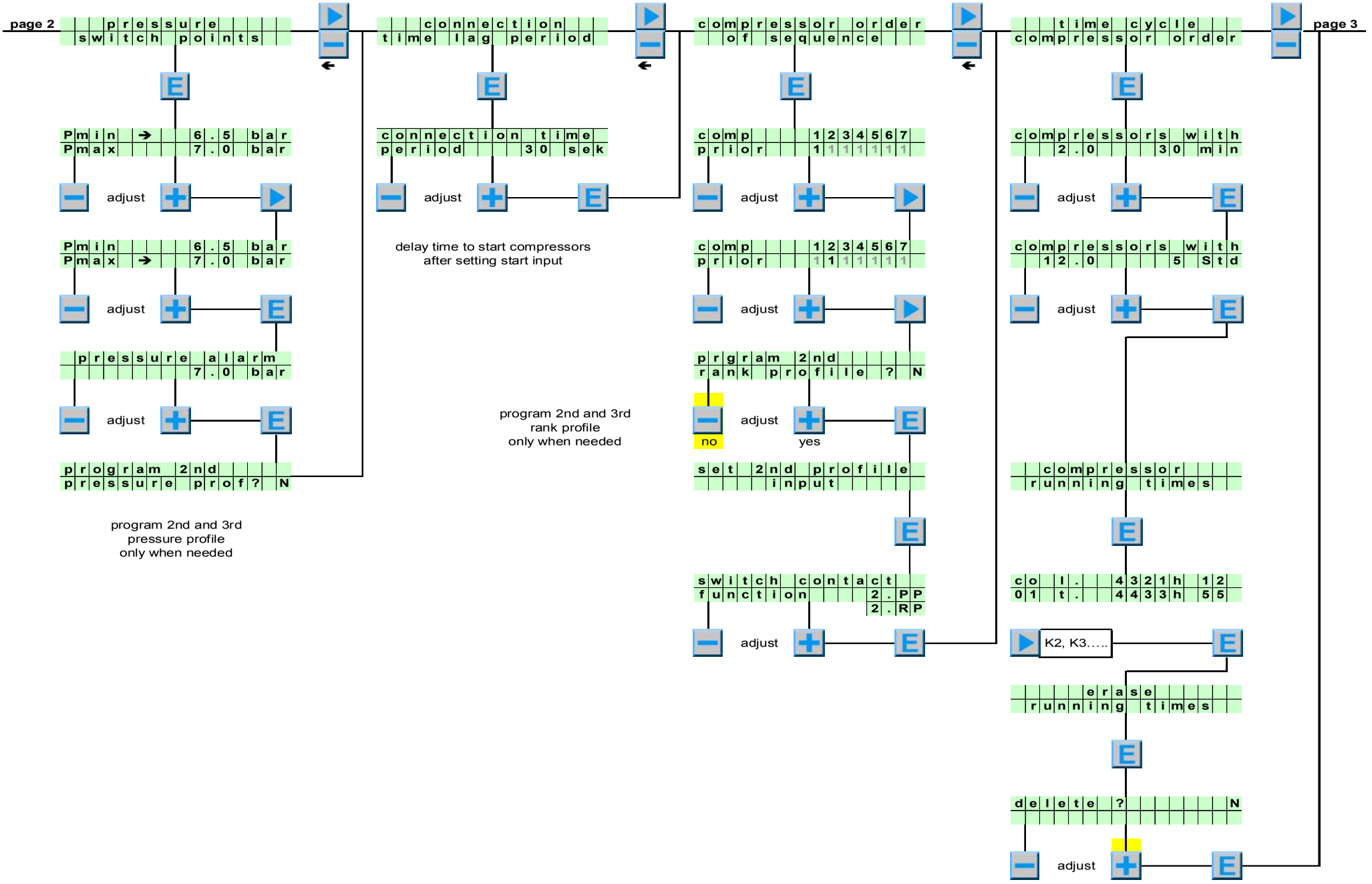
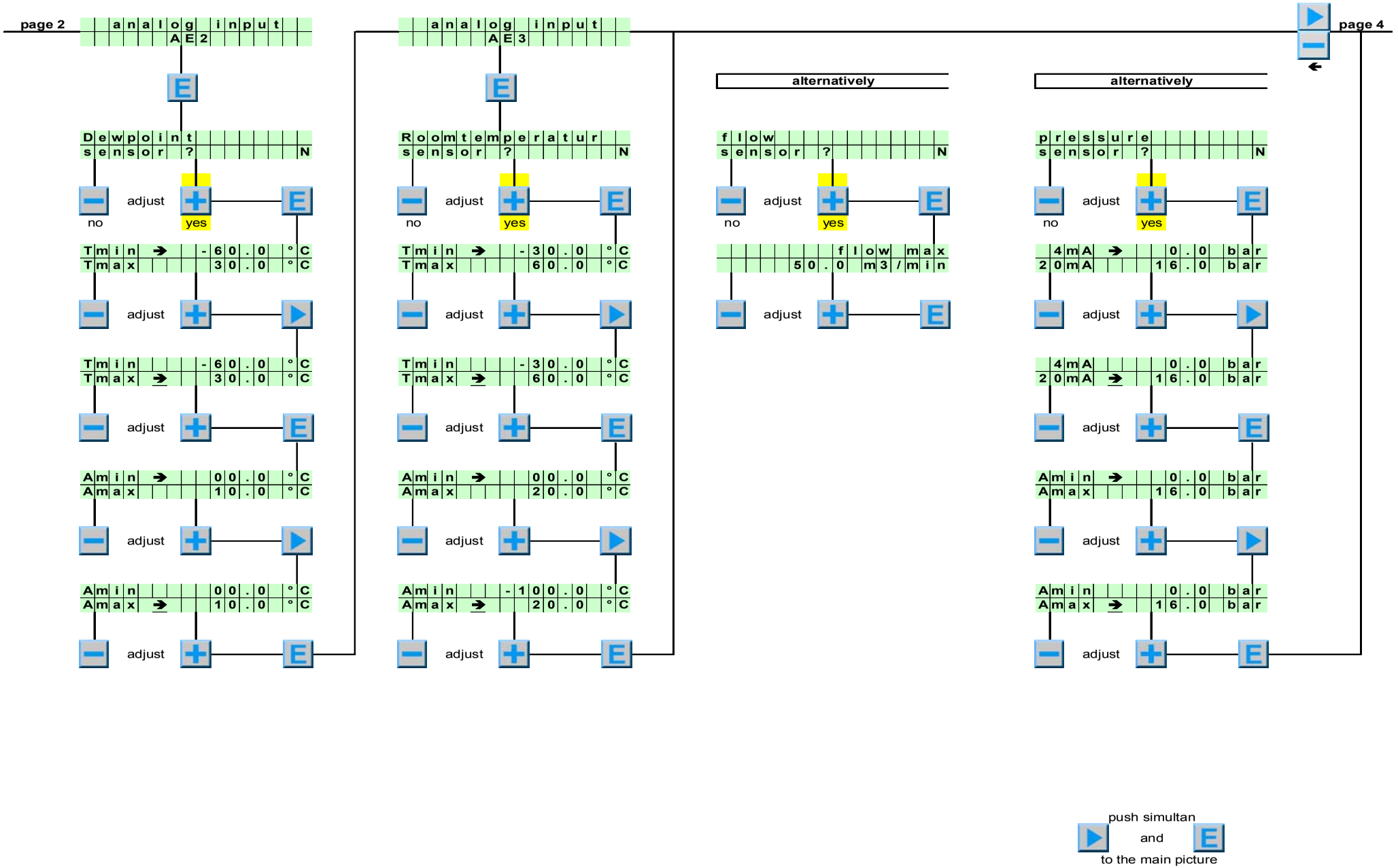
Programming manual page 1



Programming manual page 2



Programming manual page 3 (ANALOG INPUTS)



Programming manual page 4