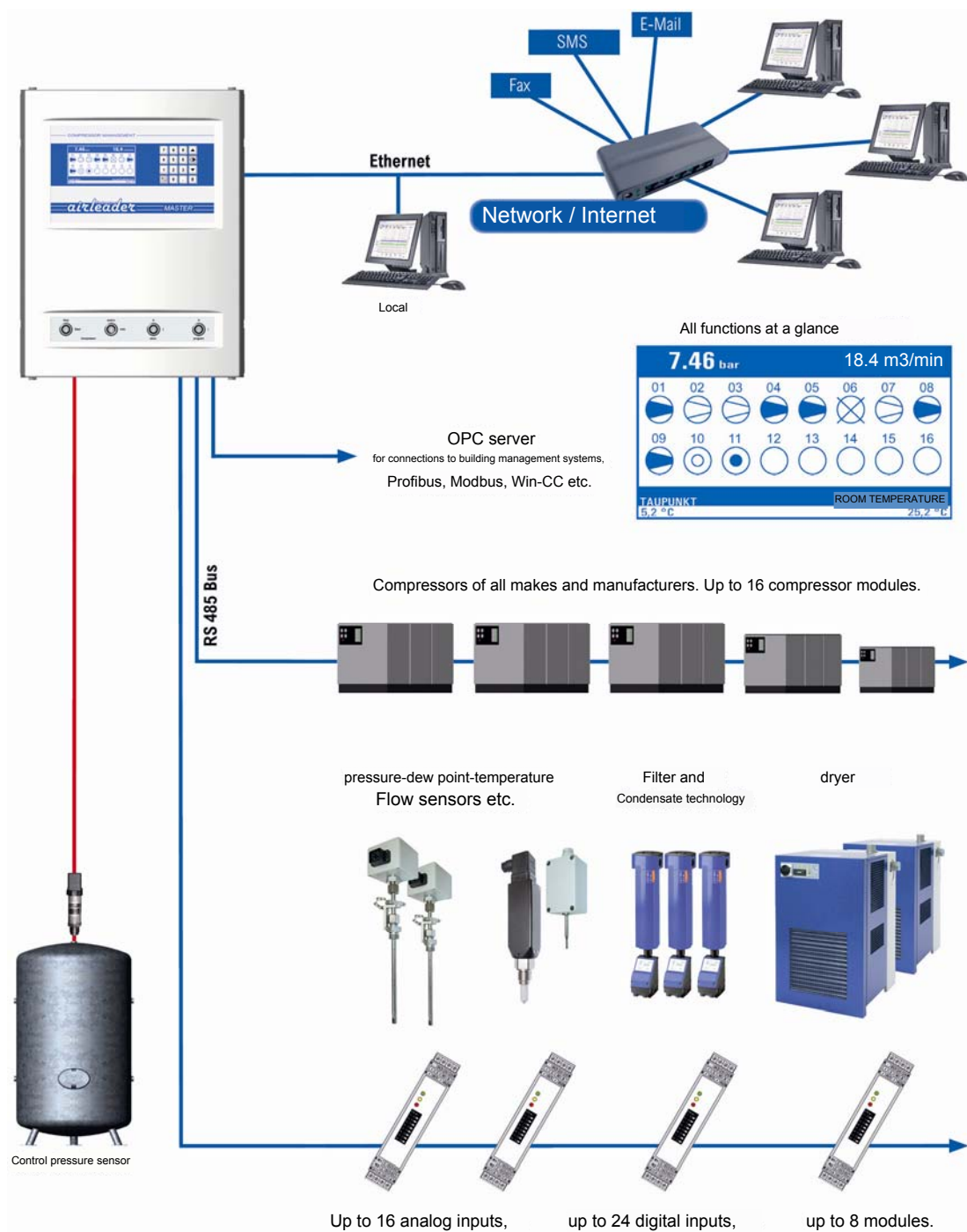


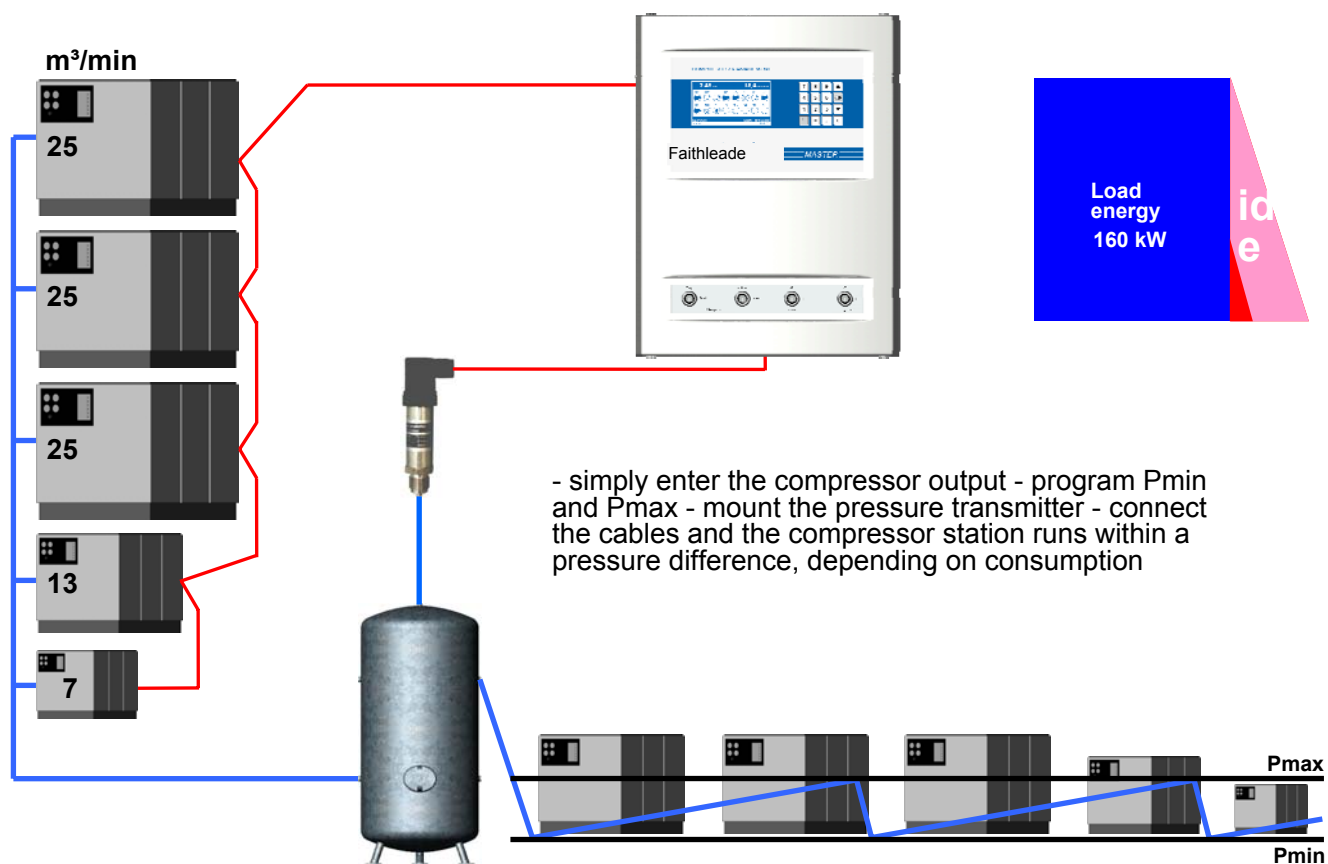
OPERATING INSTRUCTIONS for AIRLEADER compressor management



WF STEUERUNGSTECHNIK GMBH

AIRLEADER gets the most out of every compressor combination

This can save a lot of idle energy



Press button for program version and serial number



CONTENTS

PART 1 AIRLEADER Master MODULE

- Page 1 Contents
- Page 2 Functional description
- Page 3 Display and button function

SPEED-CONTROLLED COMPRESSOR

- Page 4 Control and design of regulated compressors
- Page 5 Configuration of control range max and control buffer
- Page 6 Minimum volume flow and remote actual pressure
- Page 7 Station with 2 frequency-controlled compressors

PROGRAMMING OF COMPRESSOR CONTROL

- Page 8 Programming the load / idle compressor
- Page 9 Programming the controlled compressors
- Page 10 Programming the pressure profiles and rankings
- Page 11 Programming the analog inputs on the control unit
- Page 12 Programming the analog inputs of the connection modules with address 17-24
- Page 13 Digital inputs and analog output of the connection module addresses 17-24

REAL-TIME TIMER

- Page 14 Programming real-time timer
- Page 15 Programming notes of the real-time timer

STATUS DATA and COMMISSIONING

- Page 16 Status data and status of the connection modules
- Page 17 Displays at the push of a button
- Page 18 Programming the IP address and network settings
- Page 19 Commissioning and jumpers

PART 2 Dimensions, configuration and connection diagrams

- Page 22 Housing operation
- Page 23 Master module dimension drawing
- Page 24 Terminal connection designation
- Page 25 Connection diagram
- Page 26 RS-485 connection diagram
- Page 27 Connection module configuration and dimensions
- Page 28 Digital and analog inputs on the connection module
- Page 29 Compressor connection load/idle
- Page 30 Compressor connection with remote/local circuit
- Page 31 Analog inputs on the connection module
- Page 32 Analogue output on the connection module
- Page 33 Digital inputs and outputs on the master module
- Page 34 Analogue inputs and outputs on the master module

PART 3: Optional metal control cabinet

- Page 36 AIRLEADER Master module in the control cabinet
- Page 37 Supply voltage, key switch and RS485 connections
- Page 38 Analogue input and output connections
- Page 39 Digital output connections
- Page 40 Digital input connections
- Page 41 Device list
- Page 42 Device arrangement

PART 4: Connection modules type 4700 (gray)

- Page 43 Connection module configuration
- Page 44 Connection module dimension drawing
- Page 45 RS-485 connection diagram

FUNCTIONAL DESCRIPTION

AIRLEADER combines compressors of different sizes

into a unit that automatically adjusts to production based on current compressed air consumption. It is ensured that only the most efficient compressor combination always produces the compressed air required for production, regardless of manufacturer and performance. The system pressure remains within the lowest limits. Care is taken to ensure that the costs incurred remain as low as possible. The compressor performance and a common pressure difference for all compressors are programmed. With this information, AIRLEADER constantly calculates the current compressed air consumption and the compressed air network volume. The self-learning 8-fold calculation depth dynamically adapts the compressors to the compressed air consumption. Automatic compressor change according to compressed air consumption:

If all compressors are on the same level, they work completely automatically and depending on consumption. The sequence of the compressors is adapted to the production process in real time using sensible hysteresis calculations. Only the compressor combination with the lowest switching frequencies and therefore the lowest idle times always runs. Large compressors only run when they are needed. Instead of the large compressors idling, the smaller compressors run under load. The maximum permissible number of motor starts/h is specified by the compressor's internal control. The compressors are constantly checked for their status.

If a running compressor within the pressure band malfunctions or is switched off for maintenance, its performance is replaced. If several compressors are required, the connection is staggered. Load and total running times are saved for each individual compressor. The operating times can be deleted if necessary. (e.g. when changing the compressor configuration) The compressors are controlled

via the connection modules that are installed on the top-hat rail in the compressor's control cabinet. The connection to the MASTER control is established via the industrial RS-485 bus. The operating voltage of 24 volts AC/DC can be connected to the compressor's power supply. (if this matches and is sufficiently dimensioned. 200mA is required) Error messages

If a compressor malfunctions, this is shown symbolically on the display. The performance of the compressor reported as faulty is replaced by the compressor combination that is closest to the compressed air consumption. The collective fault message for the compressors is activated on the AIRLEADER master module for signal output. Fault messages from the accessory modules are activated via the "collective fault message for accessories" output. Compressor motor running

If these inputs are connected, AIRLEADER receives the message "Compressor motor ON or OFF". (symbolic indication on the display). The total operating hours are also saved in addition to the load hours. The operating hours can be viewed on the display. The running time compensation ensures consistent operating hours with the same compressor output.

Compressor ready for operation

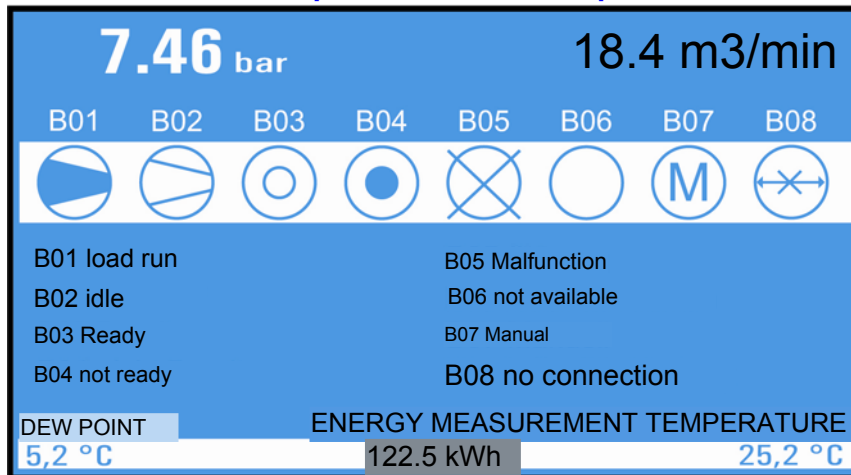
These inputs must be connected so that the AIRLEADER compressor management recognizes the readiness of the compressors. If these inputs are not connected, the compressor is not ready and cannot be selected. A fault message is not activated.

The fault messages are not switched on

and a compressor malfunctions, this compressor output cannot be replaced correctly. This can lead to a brief drop in pressure. The display shows the compressed air consumption too high by the value of the faulty compressor. It is therefore advisable to wire the fault message inputs so that the compressed air consumption is always displayed correctly and the power is replaced correctly immediately.

DISPLAY DISPLAY and BUTTON FUNCTION

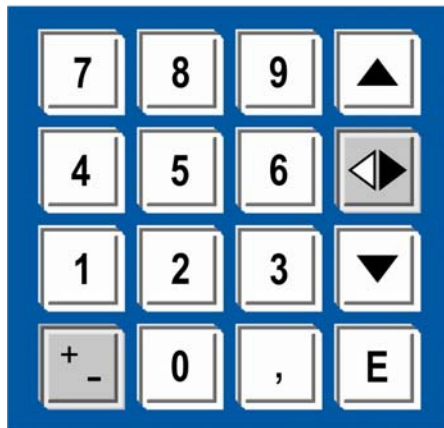
Pressure compressed air consumption



Analog input: AE2 AE3 AE4 on the master module

Press the key to display the meaning of the characters (legend).

For functions of the analog inputs, see page 11

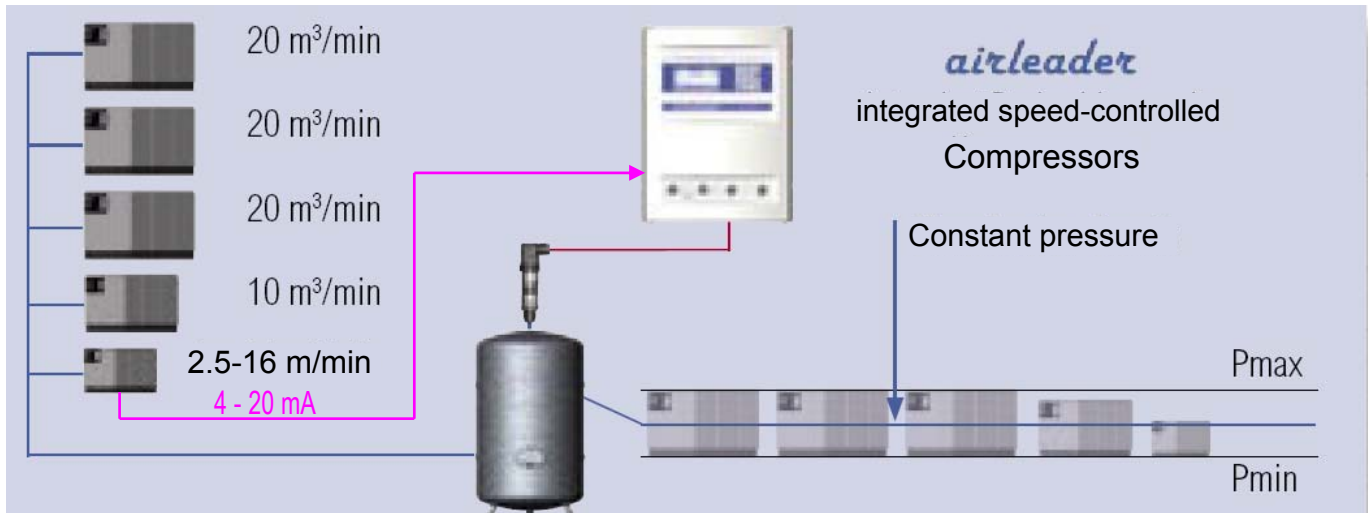


Button function E	
	ENTER - opens the basic menu
▲	Cursor higher
▼	Cursor lower
◀▶	Cursor to the right
+/- and ◀▶	press at the same time = cursor to the left
E and ◀▶	Back to the basic image
4	View status of compressors
7	Show status of the sensor modules
1 and ▲	more display contrast
1 and ▼	less display contrast
1	Yes
0	No

Control and design of regulated compressors

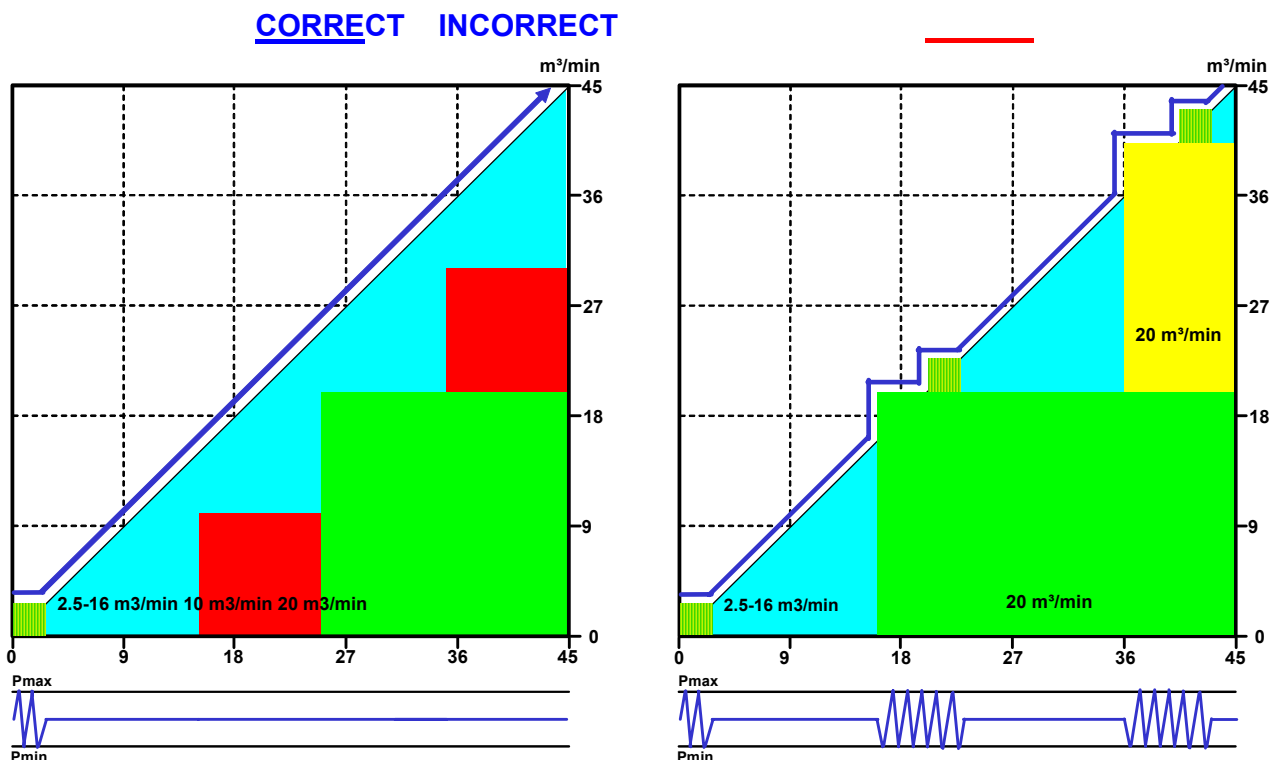
The speed-controlled compressor is actively integrated

The speed-controlled compressor sends information about its motor speed to AIRLEADER via its analog output. This is parameterized according to the minimum and maximum delivery quantity. The analog input for the speed-controlled compressor is designed for 4-20 mA. Different signals such as 6.2 mA - 18.7 mA can also be programmed. If a compressor has a voltage output, e.g. 0-10 VDC, this signal must be converted to 4-20 mA using an isolation amplifier. The control pressure of the regulated compressor must be programmed midway between the AIRLEADER switching points.



The correct gradation of compressor performance

is crucial for continuous control between the speed-controlled compressor in conjunction with normal compressors with fixed output. If the speed of the smallest compressor in a compressed air station is regulated in combination with only larger outputs, compressed air can only be generated continuously in some areas. This mechanical hurdle cannot be adjusted continuously. EXAMPLE for the correct interpretation of the services:



Configuration of control range max and control buffer

Example with a controlled compressor, - Control range from 2.5 - 16 m³/min - A freely definable control limit

ensures continuous switching on and replacement of compressors within the programmed pressure band. The control limits are defined with the control range max and the control buffer. If the control range max is set lower than the maximum delivery quantity of the compressor, the control range max and control buffer are activated. "Control range max" setting

The control range max is set, for example, to 15 m³/min. If the compressed air consumption now goes higher than 15 m³/min, a time-flexible trend calculation monitors the compressed air consumption and switches on another compressor within the pressure band set on the AIRLEADER (10 m³/min as example). If the speed-controlled compressor, together with the 10 m³/min compressor, then reaches the maximum control range again at 25 m³/min consumption, the 10 m³/min compressor is continuously replaced by the 20 m³/min compressor. The 10 m³/min compressor switches on when the controlled compressor reaches the maximum control range at 35 m³/min consumption together with the 20 m³/min compressor. "Control buffer" setting

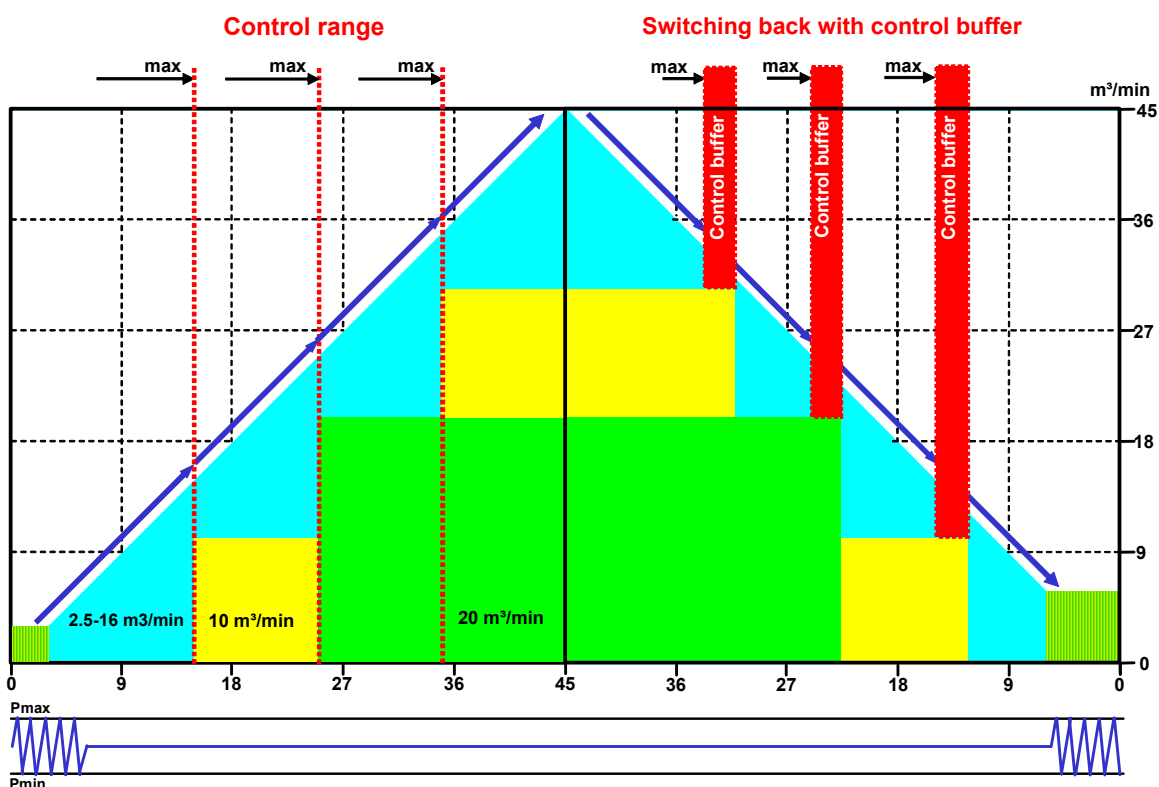
The control buffer is set, for example, to 1.5 m³/min. As air demand falls, the variable-speed compressor drops below its maximum control range of 15 m³/min while the two fixed-speed compressors deliver 10 + 20 m³/min. The control buffer delays switching off the 10 m³/min compressor by the configured 1.5 m³/min margin. Once the buffer threshold is crossed, a trend calculation with a variable time window switches off the 10 m³/min compressor within the Airleader pressure band. The variable-speed compressor then increases its delivery to approximately 13.5 m³/min.

Correct control-buffer setting:
 $15.0 - 1.5 - 2.5 = 11.0 \text{ m}^3/\text{min}$ (check total)

Incorrect control-buffer setting:
 $15.0 - 3.5 - 2.5 = 9.0 \text{ m}^3/\text{min}$ (check total)

In both examples, maximum control range = 15.0 m³/min and minimum control range = 2.5 m³/min.

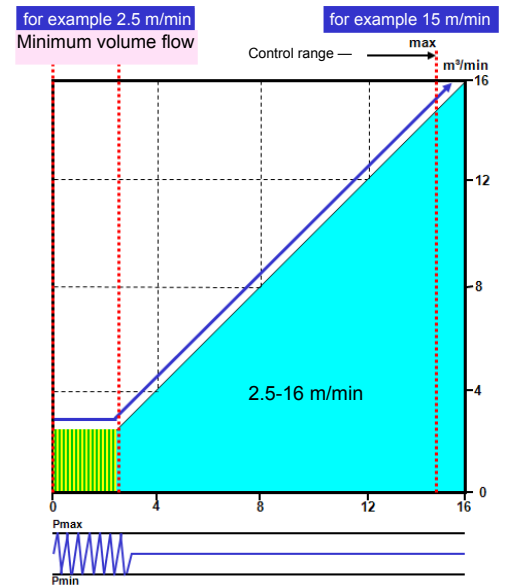
If the check total is less than the fixed-speed compressor capacity, the maximum control-range limit remains active, but the control buffer does not. The buffer is also inactive unless the maximum control-range setting is below the compressor's maximum delivery rate.



Minimum volume flow and remote actual pressure

“Minimum volume flow” setting

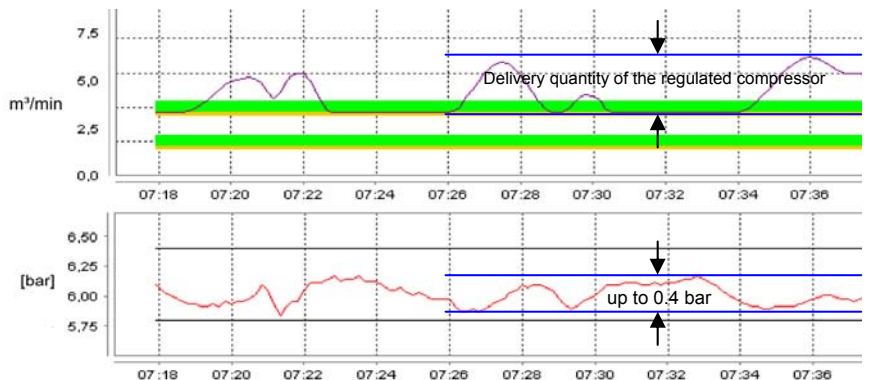
By setting the minimum volume flow in the speed-controlled compressor menu, it can be determined whether a normal compressor should run in load/idle mode below the compressor's minimum delivery volume. Setting the minimum volume flow of 0 m³/min causes: The speed-controlled compressor runs in start/stop mode as long as the compressed air consumption is between 0 and 2.5 m³/min. Setting the minimum volume flow of 2.5 m³/min causes: Below approx. 2.5 m³/min, a normal compressor runs in load/idle mode. The downshift occurs when consumption decreases with a downshift hysteresis. This operating mode is only more economical if a small compressor with, for example, 2.5-4 m³/min is also installed in the compressed air station.



Remote actual pressure feed through analog output on the connection module

Pressure differences through dryers and filters

This means that there can be a difference of up to 0.4 bar between the pressure transmitter of the regulated compressor and the higher-level control system. Precise control within the lowest pressure limits is therefore not possible. The pressure difference at the higher-level control must be set expanded by this pressure value. This creates a pressure difference of 0.7 bar. (more than in a station without a regulated compressor)



With the remote actual pressure value control

It is guaranteed that the regulated compressor can be operated together with the higher-level control within a narrow pressure limit. The current actual pressure from AIRLEADER is output via 4-20 mA at the analog output of the connection module. If the compressor has a different pressure transmitter range, the output can be adjusted accordingly. Example: AIRLEADER 0-16 bar = 4-20 mA compressor 1-20 bar = 4-20 mA or compressor -1-15 bar = 4-20 mA An offset value setting for remote actual pressure

can be programmed via the menu of the controlled compressor to adapt the pressure setpoint of the controlled compressor to the pressure difference. This is particularly important if more than 1 controlled compressor is installed in the compressed air network and the analog values of the individual compressors do not match.

Station with 2 frequency controlled compressors

In a station with 2 regulated compressors

The pressure sensors of the controlled compressors must be in the same place as the pressure transmitter of the AIRLEADER, because pressure differences between the compressed air dryer and filter can strongly influence the control behavior between them. The configuration is described on page 4. "Control range max" setting and control buffer

Example 1: with two regulated compressors of the same size

Compressor type	m ³ /min	Control range	Control range max	Control buffer	Vol. Str. Min		
1 FU - regulated	5-30	28 m ³ /min	5 m ³ /min	0			
2 FU - regulated	5-30	28 m ³ /min	5 m ³ /min	0			
3 Load / Idle	15	- - -					
4 Load / Idle	25	- - -					

Example 2: with two differently sized regulated compressors

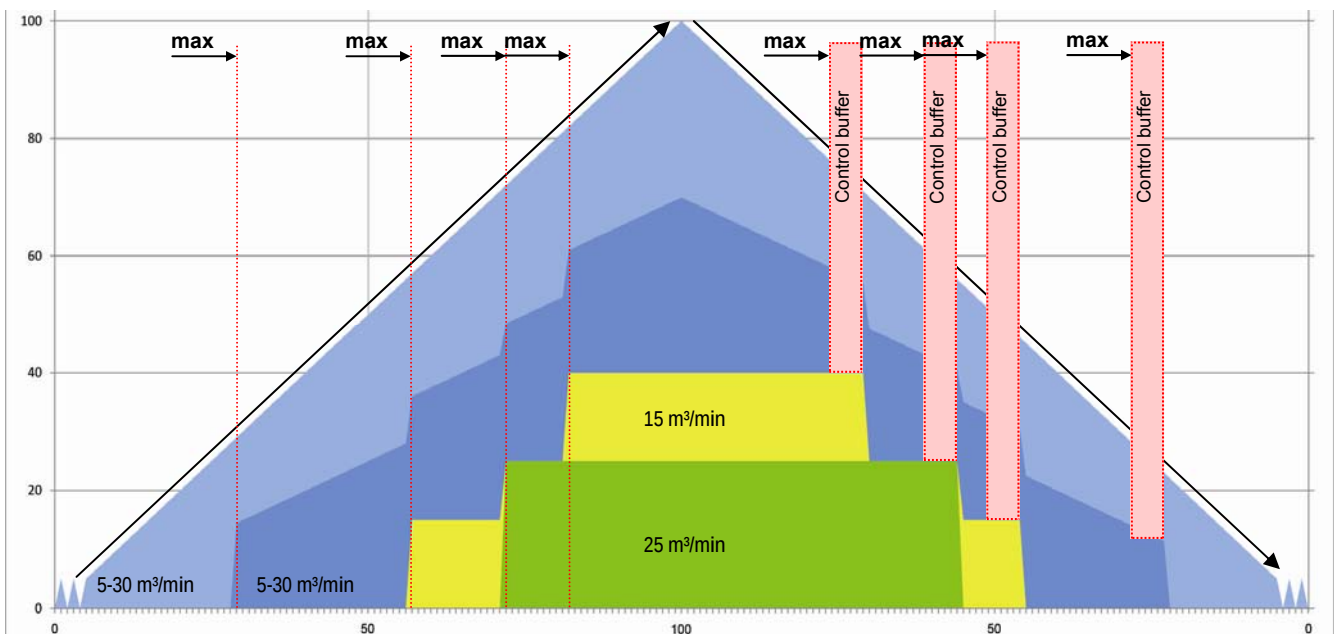
Compressor type	m ³ /min	Control range	Control range max	Control buffer	Vol. Str. Min		
1 FU - regulated	1.5-10	9 m ³ /min	1.5 m ³ /min	0			
2 FU - regulated	5-20	18 m ³ /min	4 m ³ /min	0			
3 Load / Idle	15	- - -					
4 Load / Idle	25	- - -					

In example 2

- When the max control range is reached, compressor 1 switches to compressor 2 - When compressor 2 reaches the max control range, compressor 1 is switched on - When both compressors reach their max control range with a total of 27 m³/min, a load/idle compressor is started - The control decides, depending on consumption, whether one of the controlled compressors can be switched off The max control range

ensures that controlled compressors always run in the specifically correct range. If a controlled compressor delivers more than the maximum set in the control range, a time-flexible trend calculation is started, which switches on another compressor to match the current compressed air consumption. If the compressed air requirement decreases again within the trend calculation, no compressor is switched on. In this way, the entire control range is available.

Control range downshift with control buffer



PROGRAMMING of the load/idle compressors

7.05 bar 37.2 m3/min

COMPRESSOR CONTROL PROGRAMMING

PROGRAMMING ANALOG-DIGITAL INPUTS

STATUS DATA

TIMER

LANGUAGE - LANGUAGE

DEW POINT 1.3 °C TEMPERATURE 18.7 °C

7.05 bar 37.2 m3/min

COMPRESSOR CONTROL PROGRAMMING

COMPRESSOR MODULES

PRESSURE SWITCH POINTS

COMPRESSOR RANKS

COMPRESSOR CHANGE TIMES

CONTROL PARAMETERS

DEW POINT 1.3 °C TEMPERATURE 18.7 °C

7.05 bar 37.2 m3/min

COMPRESSOR PERFORMANCE

K	No	V S	
O	01	N	20,0 m3/min
M	02	N	20,0 m3/min
P	03	N	18,0 m3/min
R	04	N	18,0 m3/min
E	05	N	12,5 m3/min
S	06	N	12,5 m3/min
S	07	N	0,0 m3/min
O	08	N	0,0 m3/min

DEW POINT 1.3 °C TEMPERATURE 18.7 °C

7.05 bar 37.2 m3/min

COMPRESSOR MODULE 02 PROGRAMMING

AE1: CURRENT MEASUREMENT N
ENERGY MEASUREMENT J

I min : 4,0 mA 0,0
I max : 20,0 mA 200,0

AE2: TEMPERATURE MEASUREMENT N
UNIVERSAL SENSOR N

DEW POINT 1.3 °C TEMPERATURE 18.7 °C

Programming of compressor performance
Pressing the “E” key takes you to the basic menu. All data is programmed via the “Compressor control programming” menu. It is saved by pressing the “E” (ENTER) key. The compressor outputs are entered in the “Compressor Module” submenu in m3/min (delivery quantity). Analog inputs for compressors

Pressing the ENTER key for the compressor output opens the configuration of the analog inputs for compressors Analog input AE 1

is configured for connecting current transformers for ampere measurement or for energy measurement (kW) analog input AE 2

is configured for the connection of temperature sensors Or a free sensor type can be connected as a universal sensor

PROGRAMMING of the controlled compressors

7.05 bar		37.2 m3/min	
K	N r	V S	COMPRESSOR PERFORMANCE
O	01	N	20,0 m3/min
M	02	N	20,0 m3/min
P	03	N	18,0 m3/min
R	04	N	18,0 m3/min
E	05	N	12,5 m3/min
S	06	N	12,5 m3/min
S	07	J	2,5 ... 16,0 m3/min
O	08	J	2,5 ... 16,0 m3/min
R			
DEW POINT		TEMPERATURE	
1.3 °C		18.7 °C	

Speed-controlled compressor: Under the VS (variable speed) column you can set whether it is a load/idle or a speed-controlled compressor. If it is a controlled compressor, the value must be set to "J" (yes) using the "1" button. The minimum and maximum performance (in m3/min) of the regulated compressor is programmed one after the other. By pressing the "E" (ENTER) key you get to the configuration of the regulated compressor. The minimum and maximum

7.05 bar		37.2 m3/min	
COMPRESSOR MODULE		07	PROGRAMMING
A E 1 : REGULATED COMPRESSOR			
I min		6.2 mA	2,5 m3/min
I max		18,5 mA	16,0 m3/min
Control range		max	15,0 m3/min
Control buffer			2,0 m3/min
Volume flow		I n i n	0,0 m3/min
A E 2 : TEMPERATURE MEASUREMENT N			
CURRENT MEASUREMENT N			
ENERGY MEASUREMENT N			
DEW POINT		TEMPERATURE	
1.3 °C		18.7 °C	

The delivery rate of the speed-controlled compressor (according to the manufacturer's information) must be correctly programmed together with the mA values of the analog output. Example:

Minimum delivery rate 2.5m3/min = 6.2mA measured Maximum delivery rate 16.0m3/min = 18.5mA measured Control range and control buffer Vol.Str. min setting see page 4+5 Analog input AE2: Can be programmed for the following functions:

- Temperature measurement
- Current measurement
- Energy measurement Analog output on the connection module

7.05 bar		37.2 m3/min	
COMPRESSOR MODULE		07	PROGRAMMING
A E 1 : REGULATED COMPRESSOR			
I min		6.2 mA	2,5 m3/min
I max		18,5 mA	16,0 m3/min
Control range		max	15,0 m3/min
Control buffer			2,0 m3/min
Volume flow		m i n	0,0 m3/min
A E 2 : TEMPERATURE MEASUREMENT J			
T min		-60,0 °C	T max 00,0 °C
Amine - 10.0		°C	A max 10,0 °C
DEW POINT		TEMPERATURE	
1.3 °C		18.7 °C	

The actual pressure value signal from the AIRLEADER is present. (see page 6) as long as the average output is set to No (N). If the average value output is used, a second connection module (address 17-24) must be installed for the pressure actual value signal. Average value output of the pressure signal

7 . 0 5 bar		3 7 . 2 m3/min	
COMPRESSOR MODULE 07 PROGRAMMING			
PARAMETER ANALOG OUTPUT		A O :	
I m i n :	4 , 0 mA	=	0 , 0 0 bar
I m a x :	2 0 , 0 mA	=	1 6 , 0 0 bar
AVERAGE OUTPUT		N	
O F F S E T		0 1 , 0 bar	
DEW POINT		TEMPERATURE	
1 . 3 ° C		1 8 . 7 ° C	

If this is set to Yes (J), the average value of the pressure band set on the AIRLEADER is available at the analog output. Example: Pmin 6.0 bar, Pmax 7.0 bar mean = 6.5 bar

Programming - pressure profiles and rankings

PRESSURE PROFILES Up to 4 different pressure profiles can be predefined in the “Pressure switching points” submenu. These can be selected from outside either via the real-time timer or via the digital inputs. **RANKINGS** are programmed in the “Compressor rankings” submenu. Example: The following compressors are to be controlled

- Compressor 1 with 20.0 m3/min
- Compressor 2 with 20.0 m3/min
- Compressor 3 with 18.0 m3/min
- Compressor 4 with 18.0 m3/min
- Compressor 5 with 12.5 m3/min
- Compressor 6 with 12.5 m3/min

Special requirement

- Heat recovery is connected to compressor 1+6
- Compressor 3 should be reserve

Recommended programming

- Compressor 1+6 receive rank 1
- Compressor 2+4+5 receive rank 2
- Compressor 3 receives rank 3. The compressors are controlled within a ranking depending on consumption. If the performance of one ranking is not sufficient, the compressors from the next lower ranking are switched on depending on consumption. Compressor change times In the “Compressors - Change times” submenu, compressors with the same performance receive an automatic change time that can be freely entered. Setting the control parameters: only after consulting the manufacturer.

7 . 0 5 bar 3 7 . 2 m3/min

D R U C K P U N K T	DP	P min	P max	P-Alert
0 1		6 . 0 0	6 . 5 0	5 . 5 0 bar
0 2		5 . 0 0	5 . 5 0	4 . 4 0 bar
0 3		4 . 0 0	4 . 5 0	3 . 3 0 bar
0 4		3 . 0 0	3 . 5 0	2 . 2 0 bar

DEW POINT 1 . 3 ° C TEMPERATURE 1 8 . 7 ° C

7 . 0 5 bar 3 7 . 2 m3/min

R A N K F O L G E	NO	K O M P R E S S O R								rank
		0 1	0 2	0 3	0 4	0 5	0 6	0 7	0 8	
0 1		1	2	3	2	2	1	1	1	rank
0 2		1	1	1	1	1	1	1	1	rank
0 3		1	1	1	1	1	1	1	1	rank
0 4		1	1	1	1	1	1	1	1	rank

DEW POINT 1 . 3 ° C TEMPERATURE 1 8 . 7 ° C

7 . 0 5 bar 3 7 . 2 m3/min

COMPRESSOR CHANGE TIMES

COMPRESSORS	m3 / min	Hours	Wed n
mit	2 0 . 0	0 4	0 0
with	1 8 . 0	0 4	0 0
with	1 2 , 5	0 2	0 0
mit	1 6 , 0	0 4	0 0

DEW POINT 1 . 3 ° C TEMPERATURE 1 8 . 7 ° C

7 . 0 5 bar 3 7 . 2 m3/min

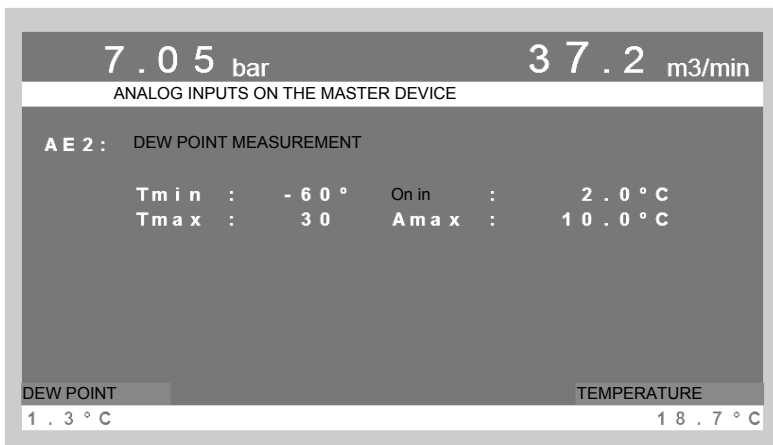
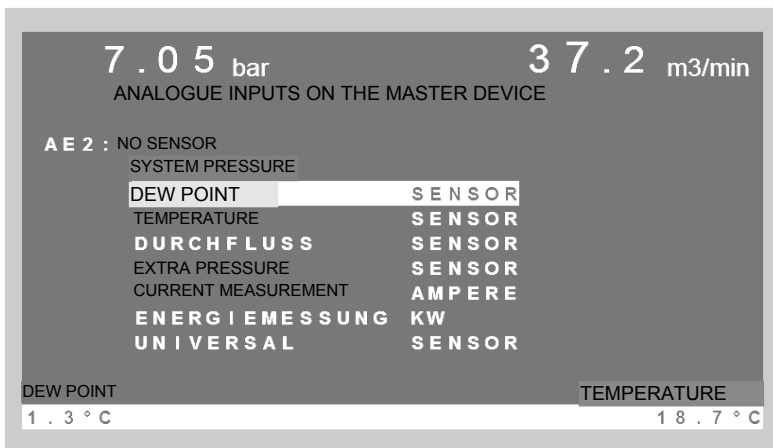
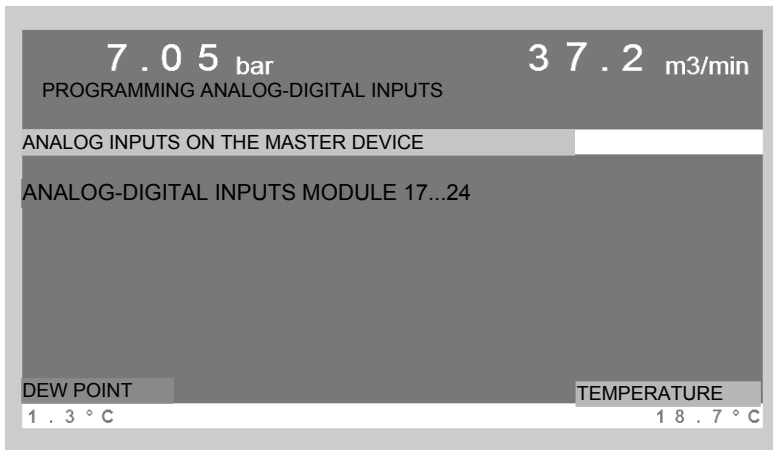
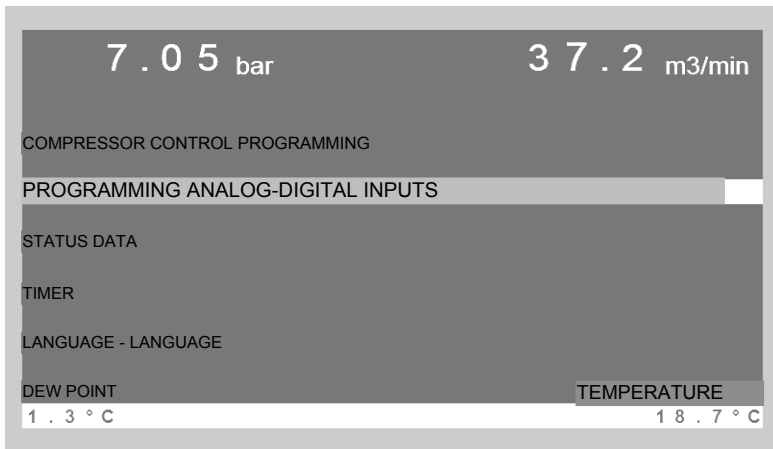
CONTROL PARAMETERS

DELAY TIME	Min	Sec
STARTUP	0 0	3 0
BELOW		2 0
ABOVE		2 0

SAFETY ZONE	bar
BELOW	0 , 2
ABOVE	0 , 2

DEW POINT 1 . 3 ° C TEMPERATURE 1 8 . 7 ° C

Analog inputs on the control unit



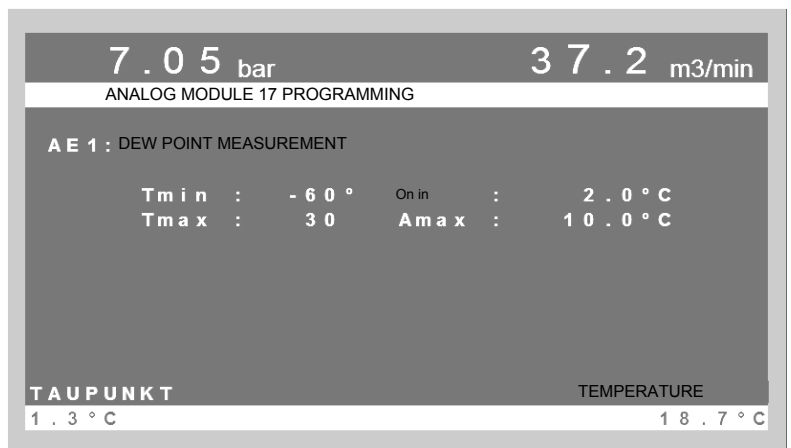
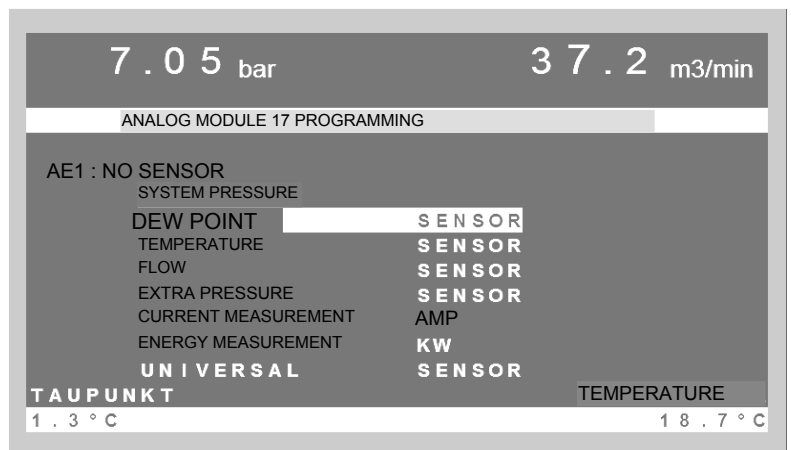
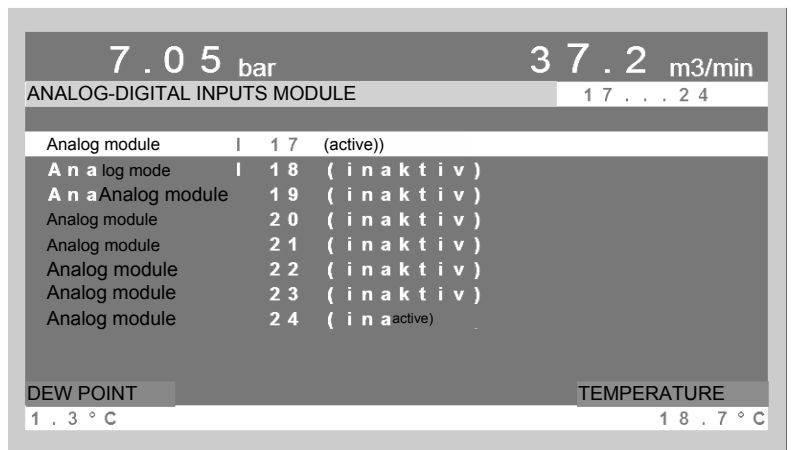
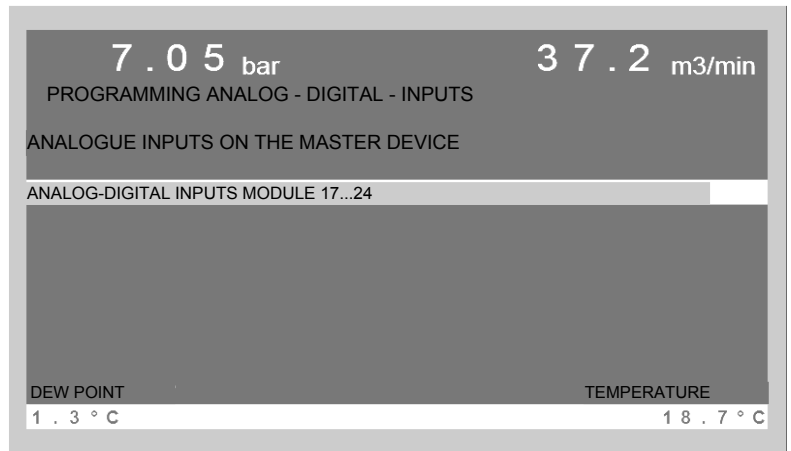
ANALOG inputs on the master device
There are 4 analog inputs on the master device as standard. Analog input "AE1" is assigned for control pressure. (Default) The pressure transmitter for the control pressure is included in the scope of delivery of the AIRLEADER Master module. No other sensor should be connected. The control pressure is shown in the top left of the display AE2, AE3, and AE4 can be freely assigned for the following sensors:

- System pressure
 - Pressure dew point
 - Temperature
 - Flow
 - Extra pressure
 - Current measurement
- The parameterization of the analog inputs are programmed according to the sensor values • 4 mA lower value (e.g. Tmin) • 20 mA upper value (e.g. Tmax) • Energy measurement Each analog input has a digital output for fault reporting. If the specified limits are exceeded or fallen below, a fault message is displayed at the digital output. The measured values of these sensors are permanently shown in the footer of the display. The window for the alarm specification is freely programmable within the sensor values.

Analog inputs on the connection module (17-24)

ANALOG and DIGITAL inputs on the connection modules. Up to 8 connection modules for external analog sensors and external digital messages can be connected. These modules are numbered 17-24. This address can be set with DIP switches on the modules. Inputs and outputs of the connection module:

- 2 analog inputs for sensors with 4-20 mA signal
 - 3 digital inputs for connecting fault and running messages from accessories in the compressed air station or at a more remote location.
 - 1 analog output 4-20 mA across the pressure range of the connected pressure transmitter.
 - 2 digital outputs (changeover contacts, 230 V AC / 2 A) for fault message output of the sensors connected to this module. Possible sensors for the analog inputs:
 - System pressure
 - Pressure dew point
 - Temperature
 - Extra pressure
 - Flow
 - Current measurement
 - Energy measurement
- The 8 connection modules provide up to 24 digital messages and up to 16 analog inputs for sensors



Digital input and analog output on the connection module

7.05 bar 37.2 m3/min

ANALOG MODULE 17 PROGRAMMING

AE2 : NO SENSOR

SYSTEM PRESSURE	
DEW POINT	SENSOR
TEMPERATURE	SENSOR
FLOW	SENSOR
EXTRA PRESSURE	SENSOR
S CURRENT MEASUREMENT	AMP
ENERGY MEASUREMENT	KW
UNIVERSAL	SENSOR

DEW POINT 1.3 °C TEMPERATURE 18.7 °C

7.05 bar 37.2 m3/min

ANALOG MODULE 17 PROGRAMMING

AE2 : FLOW MEASUREMENT

Fmax : 50.0 m3/min

DEW POINT 1.3 °C TEMPERATURE 18.7 °C

7.05 bar 37.2 m3/min

ANALOG MODULE 17 PROGRAMMING

DIGITAL INPUTS	FAULT	OPERATION
S	<	N
M	e.	J
B	g	N

DEW POINT 1.3 °C TEMPERATURE 18.7 °C

7.05 bar 37.2 m3/min

ANALOG MODULE 17 PROGRAMMING

PARAMETER ANALOG OUTPUT AO

Imin : 0.0 mA = 0.00 bar

Imax : 20.0 mA = 16.00 bar

AVERAGE OUTPUT N

OFFSET = 0.00 bar

DEW POINT 1.3 °C TEMPERATURE 18.7 °C

Flow sensor configuration

If a flow sensor is connected to an analog input, the value Fmax applies to the maximum possible measurable flow at 20 mA. The measured variable of a flow sensor for compressed air is the measured compressed air speed in the compressed air line. The manufacturer states this in meters/second. At the maximum compressed air speed, e.g. 185 m/sec, 20 mA is present at the analog output of the flow sensor. With a pipe diameter of 100mm, this is approx. 73 m3/min flow at the digital inputs of the connection module

Fault messages from refrigeration dryers, filters, condensate drains, oil-water separators, booster compressors, etc. can be connected. For this purpose, the inputs S-M-B are defined as faults (J). In the event of a fault, a fault message is then output to digital output 6 of the master module. An alarm message is generated in the web server visualization. If these inputs are to be used as an operating message, the relevant channel must be programmed with (J) under "Operation". Analog output on the connection module

The actual pressure value signal from the AIRLEADER is present as long as the average value output is set to No (N). (see page 6) If the average value output is used, a second connection module (address 17-24) must be installed for the pressure actual value signal. Average value output of the pressure signal

When set to Yes (J), the analogue output provides the midpoint of the Airleader pressure band.

REAL-TIME TIMER PROGRAMMING

7.05 bar 37.2 m3/min

COMPRESSOR CONTROL PROGRAMMING

PROGRAMMING ANALOG-DIGITAL INPUTS

STATUS DATA

TIMER

LANGUAGE - LANGUAGE

DEW POINT 1.3 °C TEMPERATURE 18.7 °C

7.05 bar 37.2 m3/min

TIMER

SET DATE AND TIME

SWITCHPOINT PROGRAMMING

DEW POINT 1.3 °C TEMPERATURE 18.7 °C

7.05 bar 37.2 m3/min

DATE AND SET TIME

weekday : Mo

day : 13

Month : 03

Year : 2007

Hour : 12

Minute : 40

second : 13

DEW POINT 1.3 °C TEMPERATURE 18.7 °C

7.05 bar 37.2 m3/min

TIMER - PROGRAMMING

S P	WEEKDAY	TIME	ON OFF	D P	R F	R 1	R 2
01	MDMDFss	06:00	A	1	1	1	0
02	MDMDFss	22:00	A	2	2	0	1
03	mdmdfss	00:00	OUT OF	1	1	0	0
04	mdmdfss	00:00	OUT OF	1	1	0	0
05	mdmdfss	00:00	OUT OF	1	1	0	0
06	mdmdfss	00:00	OUT OF	1	1	0	0
07	mdmdfss	00:00	OUT OF	1	1	0	0
08	mdmdfss	00:00	OUT OF	1	1	0	0

DEW POINT 1.3 °C TEMPERATURE 18.7 °C

The following functions can be controlled time-dependently with the timer:

- Switch compressors ON/OFF
 - 4 pressure profiles for time-dependent pressure adjustment
 - 4 ranking sequences for time-dependent ranking changeover
 - 2 digital outputs for time-dependent control of contact relays with potential-free changeover contact for additional devices (dryers, valves, etc.)
- The specifications for the 2nd, 3rd and 4th pressure profiles and ranks must be previously configured in the basic menu. Note all the settings that are to be programmed with the timer on the table before programming so that incorrect programming does not occur.
- "CLOCK" jumper** The timer is generally only activated via the "CLOCK" jumper. Up to 16 switching points can be programmed in the timer menu. Example: 1. Monday to Friday from 6:00 a.m. to 10:00 p.m.
- Control system ON
 - Pressure profile 1
 - Rank level 1
 - Digital output R1 ON
- e.g. for refrigeration dryers. 2. Monday to Friday from 10 p.m. to midnight
- the pressure is reduced
 - pressure profile 2 and rank level 2 are activated.
- At the same time, digital output R2 switches to a smaller refrigeration dryer. 3. At 00:00 a.m.
- the entire compressed air station is switched off. CAPITAL LETTERS have days of the week that are to be switched. Removing the "CLOCK" jumper deactivates the timer. The compressor management now switches the compressors using the data of the 1st pressure profile and the 1st ranking programmed in the basic menu

Timer programming notes

Compressor assignment

No. 1	2	3	4	5	6	7	8										
Name																	
No. 9	10	11	12	13	14	15	16										
Name																	

Pressure profiles = DP

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

Compressor rankings = RF

compr. 1	2	3	4	5	6	7	8										
1.RF																	
2.RF																	
3.RF																	
4.RF																	

Timer switching points

SP	weekday	time	LS	DP	RF	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																	

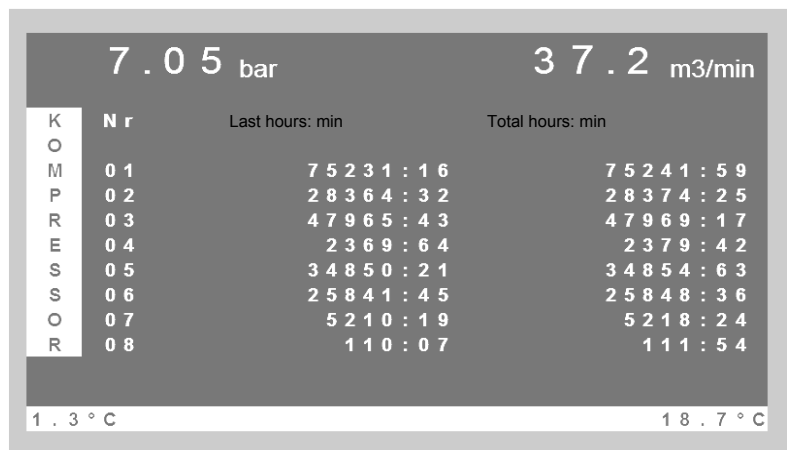
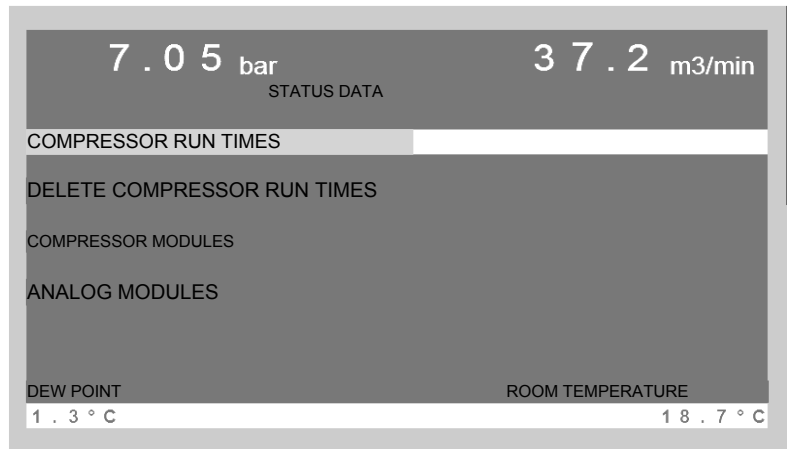
SP=Switching point LS=Control system RF=Priority contact=R1 Contact=R2

Status data and condition of the connection modules

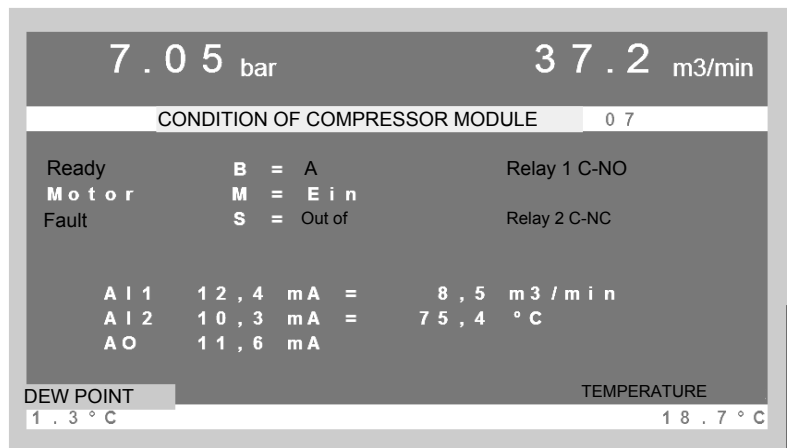
Status data The following status data can be queried in this menu:

- Compressor running times
- Delete compressor running times
- State of the compressor module
- State of the analog-digital modules

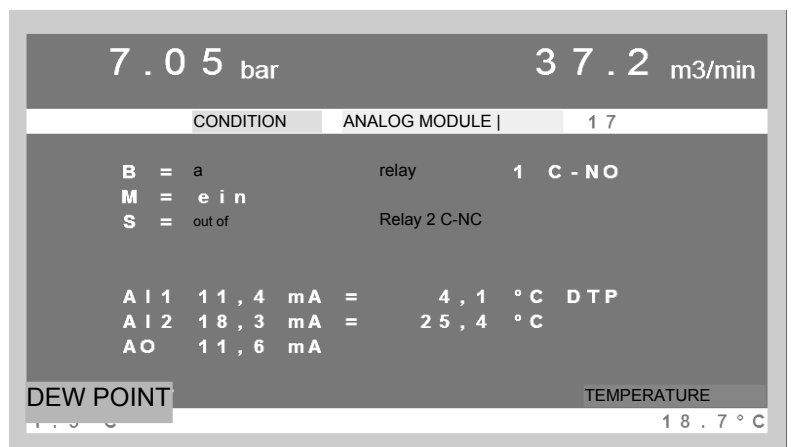
The running times of the compressors such as load and total hours are saved from the time the AIRLEADER control is commissioned. Deleting running times is possible under the Compressor running times menu. If you want to delete the compressor running times, use the "1" key to set the value to "J" (Yes) and confirm this with Enter



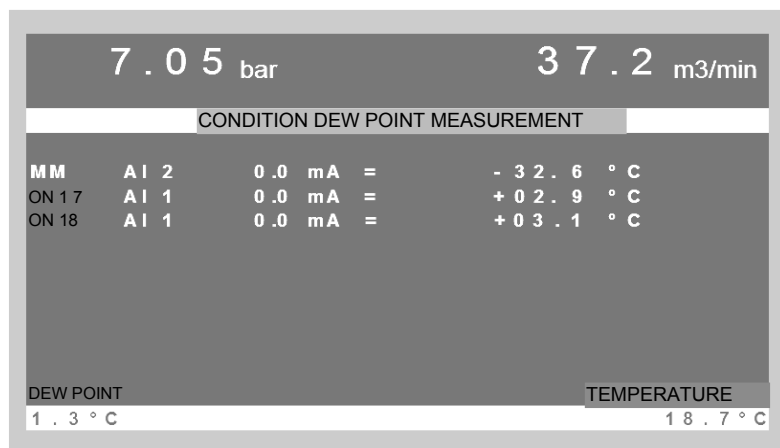
State of the compressor modules (1-16) The state of the digital and analogue inputs and outputs is clearly displayed using this menu item. Or press the key



State of analogue-digital module (17-24) The analogue-digital module reports faults and running messages from dryers, filters, etc. Sensors with analogue outputs can be connected to monitor e.g. dew point, temperature, etc. The state of the digital and analogue inputs and outputs is displayed. Or press button



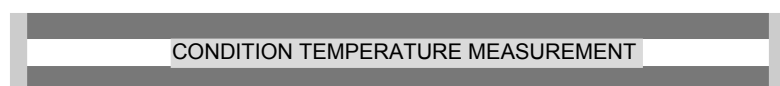
Display functions at the touch of a button



Display function

The values of the connected and programmed analog sensors can be displayed for a specific purpose using various buttons. Condition of the dew point sensors

press at the same time MM = master module AM = connection module



press at the same time



press at the same time



press at the same time



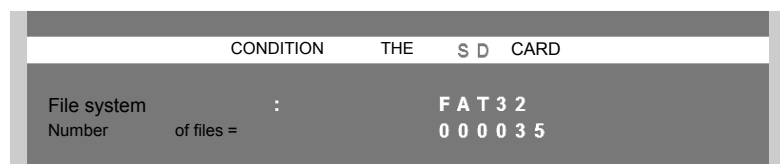
press at the same time



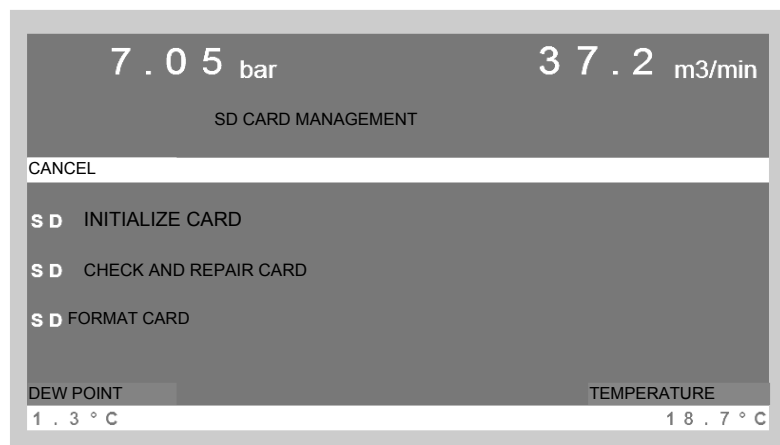
press at the same time



press at the same time



press



press at the same time

IP address and network settings

7.05 bar 37.2 m3/min

CODE EINGEBEN

000000

TAUPUNKT 1.3 °C RAUMTEMPERATUR 18.7 °C

7.05 bar 37.2 m3/min

WERKSINSTELLUNGENPROGRAMMIN

IP - Adresse = 192.168.0.100

Subnetzmaske = 255.255.255.255

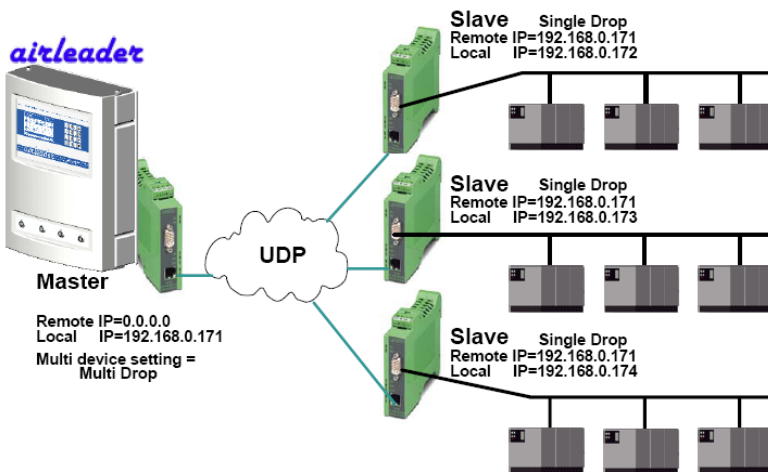
Standardgateway = 192.168.0.1

TAUPUNKT 1.3 °C RAUMTEMPERATUR 18.7 °C

DANGER:

Before starting up the web server, check the date on the AIRLEADER control and set it to the current time Step 1 Activate the programming bridge Step 2 press simultaneously IP address - program ENTER CODE confirm the code "000000" with the "E" (Enter) key IP address program the following parameters:

- IP address
- Subnet mask
- Default gateway



Communication via Ethernet

between AIRLEADER and the connection modules via Ethernet. The connection between AIRLEADER and the connection modules for the compressors and other components can be made via Ethernet using the COM server. The AIRLEADER RS-485 interface is connected to a COM server. The COM server receives an IP address that fits into the IP address range. Additional COM servers can be connected to the Ethernet with their own IP address. Program waiting time for slave response

7.05 bar 37.2 m3/min

PROGRAMMING FACTORY SETTINGS

Waiting time for response slave: 200 ms

DEW POINT 1.3 °C TEMPERATURE 18.7 °C

At the same time press ENTER CODE, enter "11111" and confirm with the "E" button. Program the waiting time "200 ms". If necessary, this can also be changed from 150-250 ms

COMMISSIONING and SWITCHING BRIDGES

Install and connect the connection modules in the compressor control cabinet according to the terminal plan and manufacturer's instructions. The pressure switches of the compressors are now "safety pressure switches" Setting example:

Pressure setting AIRLEADER = 6.0 - 7.0 bar

Compressor pressure switch = 6.5 - 7.5 bar

If the AIRLEADER compressor control system is de-energized, the contacts are closed. The compressors are controlled by their own pressure switch. Check the pressure connection on the pressure transmitter Attention: it is absolutely necessary to install the pressure transmitter on a calm pressure line. However, it is best to install a separate 1/2" pressure line from the pressure vessel to the pressure transmitter. The "switch-on delay time" is programmed at the factory with 30 seconds. If you now close the "START" bridge with a cable or switch, AIRLEADER starts your compressed air station. From now on, your compressors will be controlled "consumption-dependent and energy-saving".

Entering the delivery data of the speed-controlled compressor

It is absolutely necessary to correctly program the minimum and maximum delivery volume of the speed-controlled compressor (according to the manufacturer's instructions) together with the mA values. See page 6 Example: minimum delivery rate = 2.5m³/min = 6.2mA measured maximum delivery rate = 16.0m³/min = 17.2mA measured Programming see programming instructions

12. Jumpers Functional description Jumper: START This jumper is used to switch the compressors ON/OFF. Bridge activated = the compressors are controlled via AIRLEADER Bridge deactivated = the compressors switch "OFF" or go to idle and then OFF Jumper manual If this bridge is activated, the relays on the connection modules fall into the idle state. Compressors running under load are taken over immediately. The remaining compressors that are not yet running are switched to the compressor's own circuit with a time delay. Jumper clock: If this bridge is connected, the timer is activated. If the clock bridge is deactivated, it is controlled according to the basic profiles. Jumper: PROG If the programming bridge is activated, all program parts can be programmed. To program the compressor performance, the START jumper must not be activated.

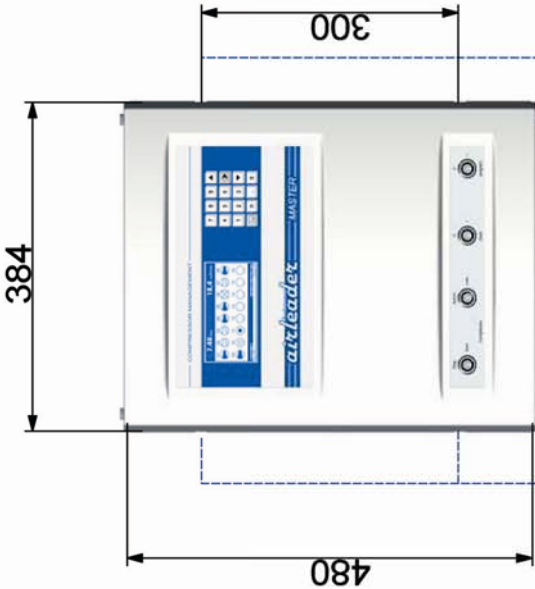
PART 2	Dimensions, configuration and connection diagrams
Page 22	Housing operation
Page 23	Master module dimension drawing
Page 24	Terminal connection designation
Page 25	Connection diagram
Page 26	RS-485 connection diagram
Page 27	Connection module configuration
Page 28	Digital and analog inputs on the connection module
Page 29	Compressor connection load/idle
Page 30	Compressor connection with remote/local switching
Page 31	Analog inputs on the connection module
Page 32	Analog outputs on the connection module
Page 33	Digital in and outputs on the master module
Page 34	Analog inputs and outputs on the master module

														22		von	
														Housing operation			
														Designation			
														Name			
														Date		22.09.2006	
														drawn			
														geändert			
														changed			

														22		von	
														Housing operation			
														Designation			
														Name			
														Date		22.09.2006	
														drawn			
														geändert			
														changed			



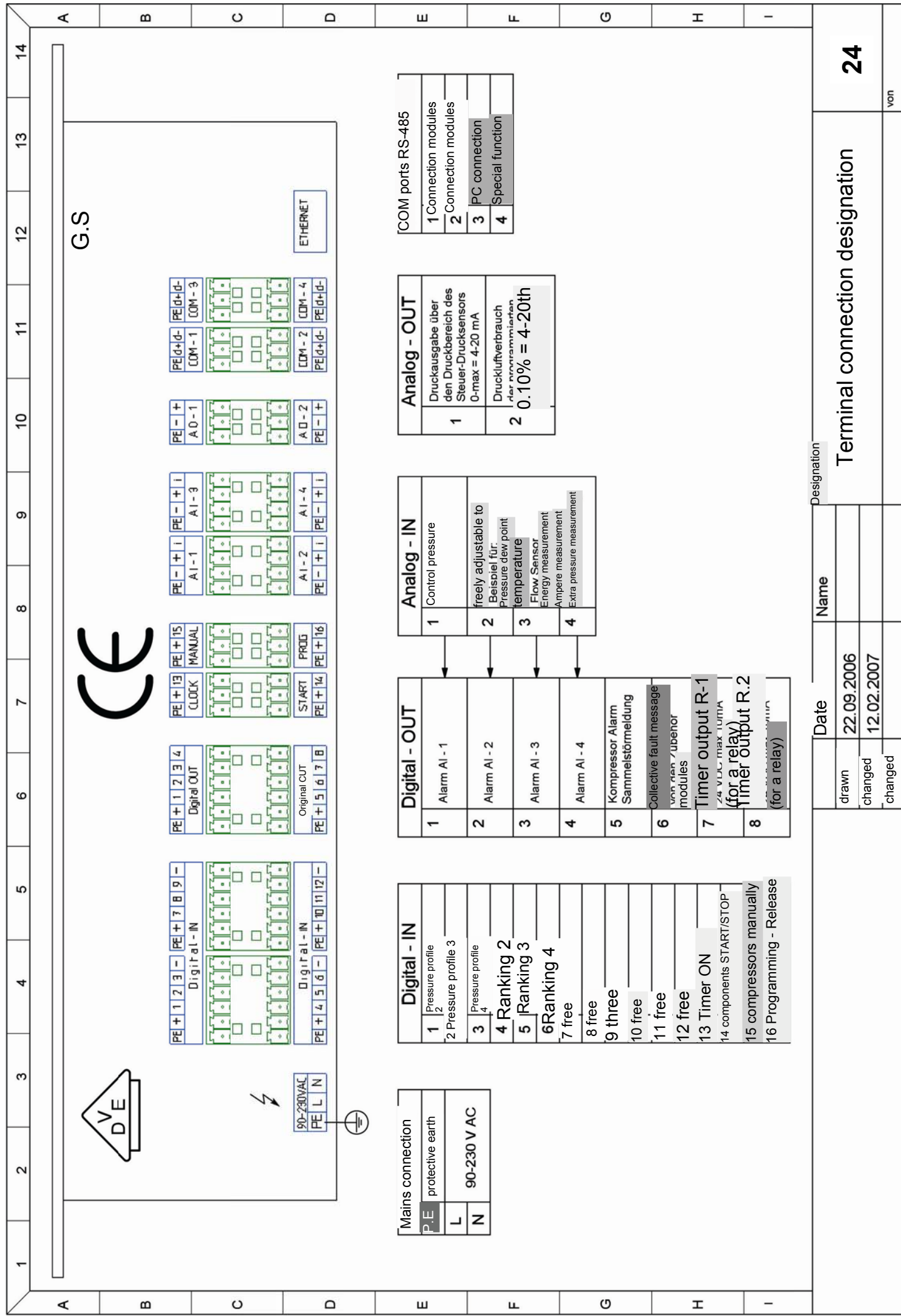
To open the front of the housing
to the left, the knurled screws
unscrew on the right side

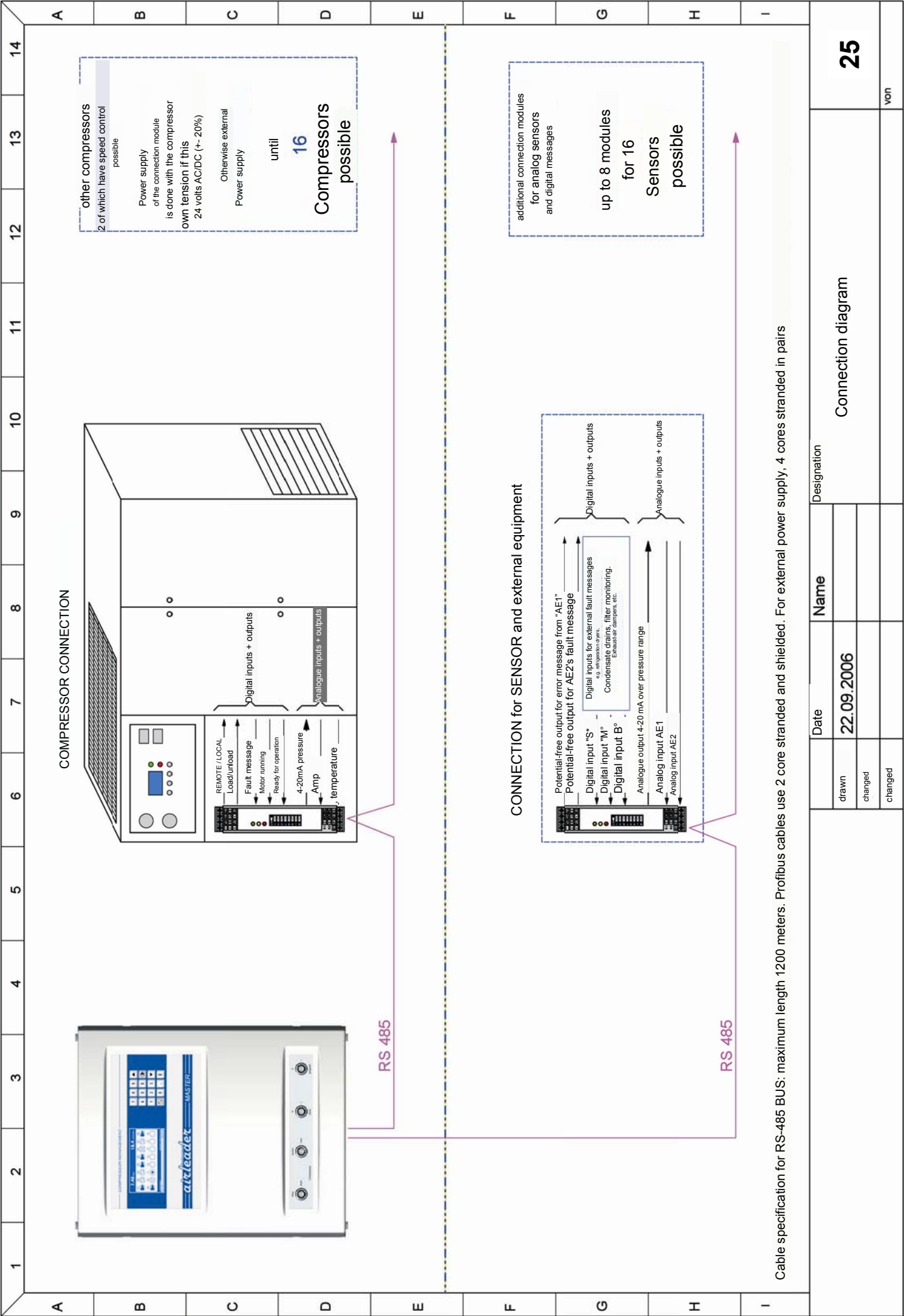


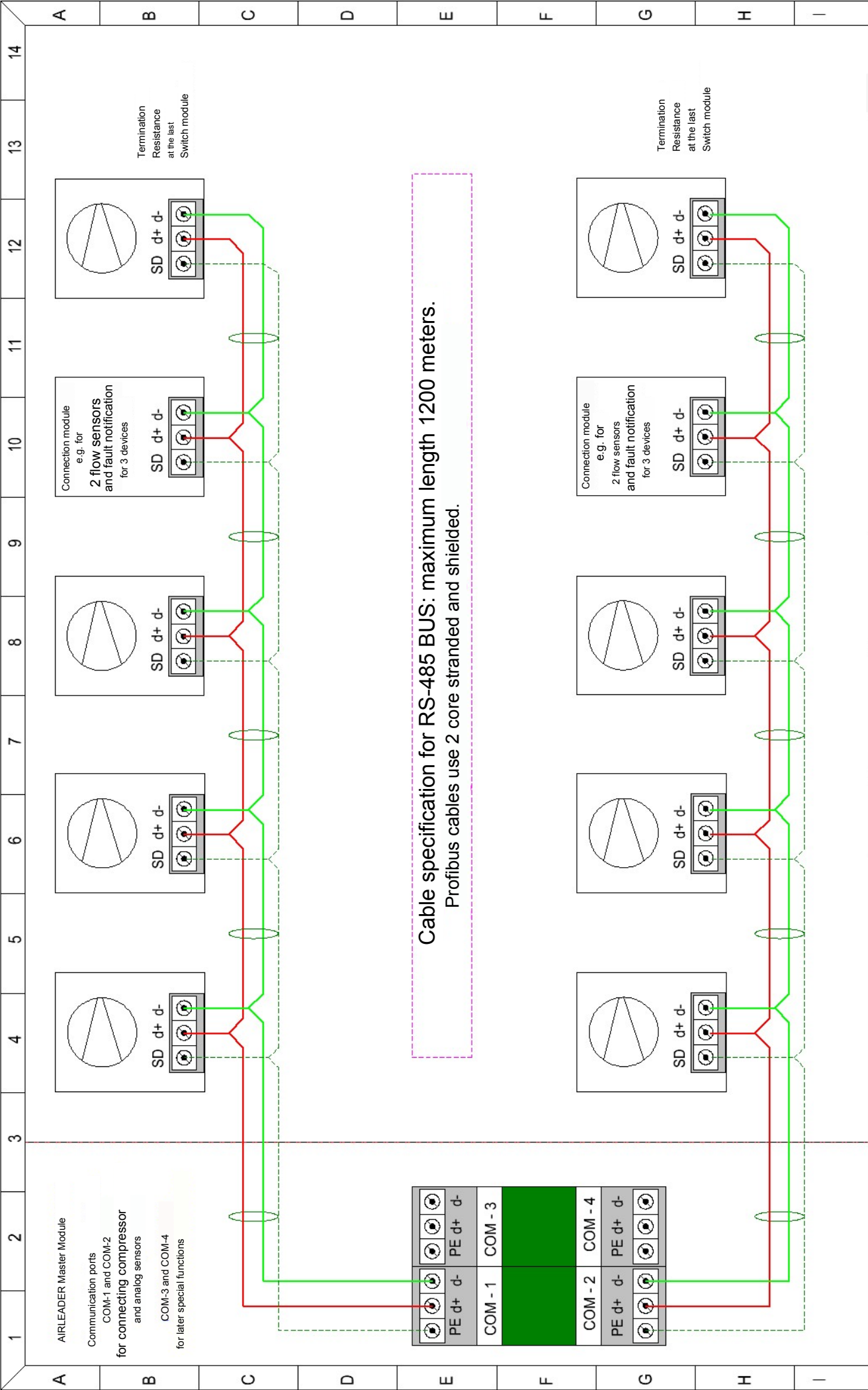
Wall mounting holes
Screws and washers
use

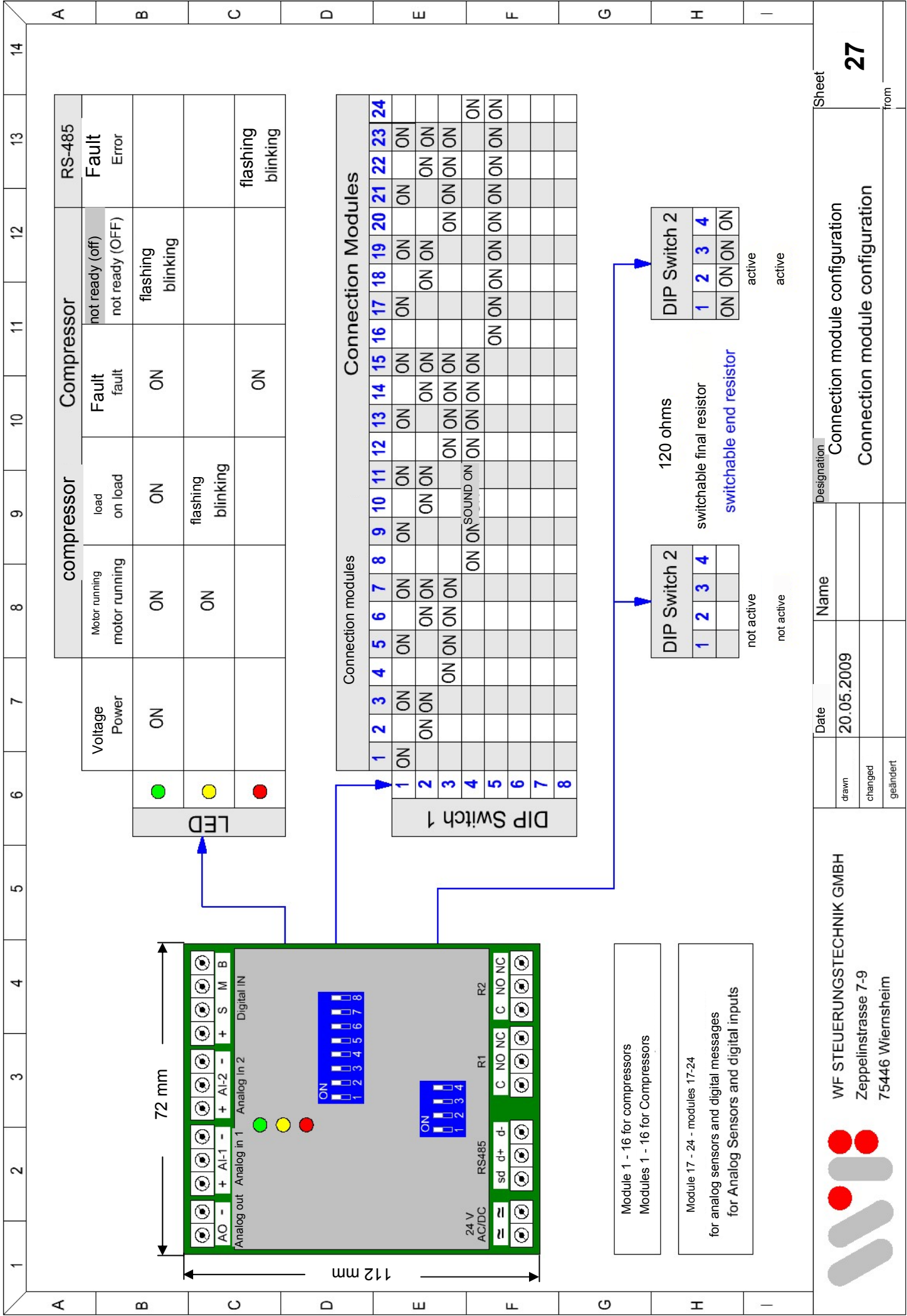


To open the front of the housing
to the right the knurled screws
unscrew on the left side

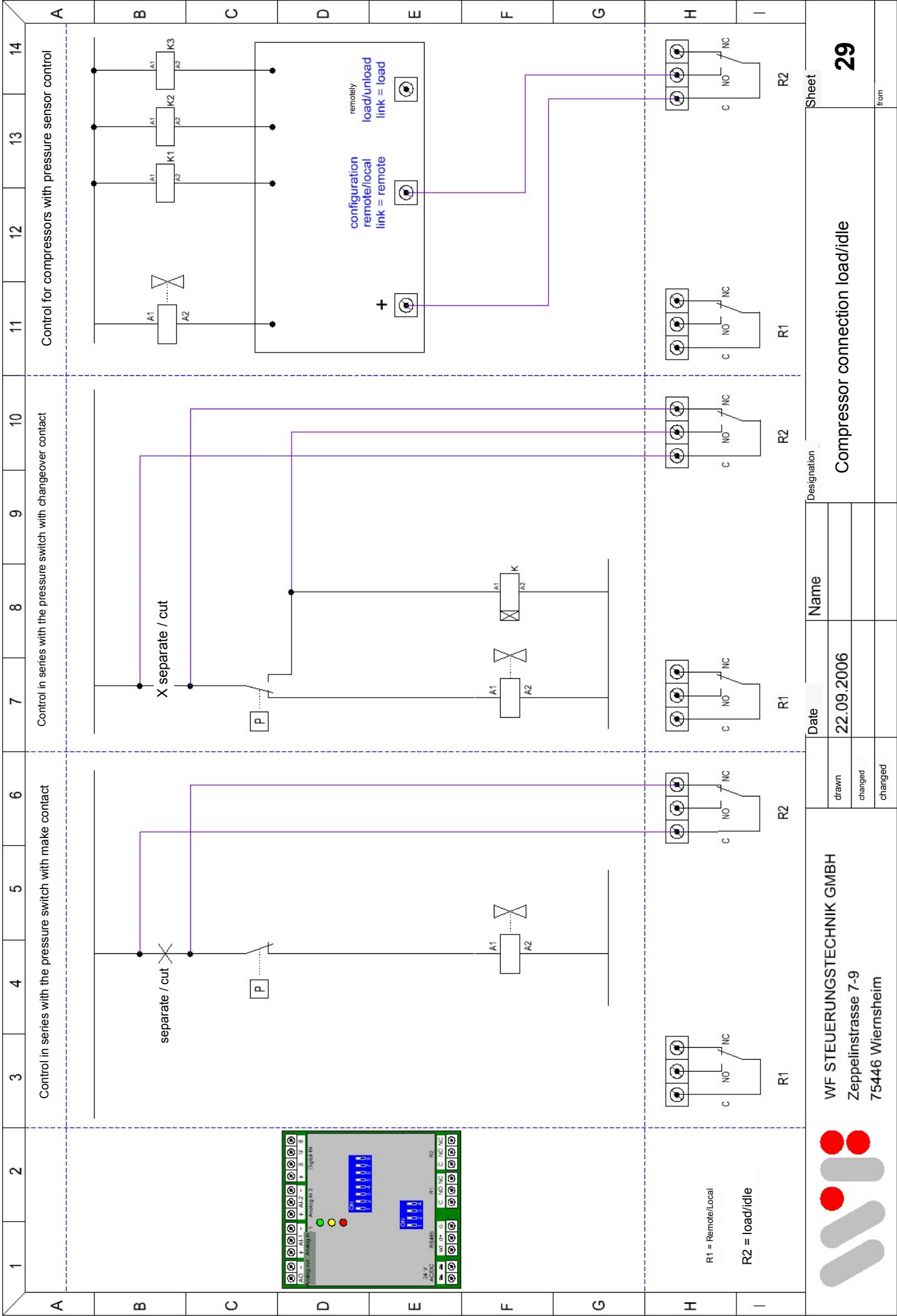


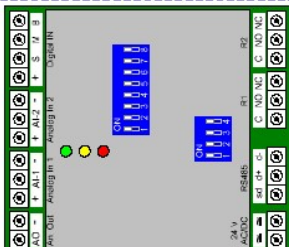
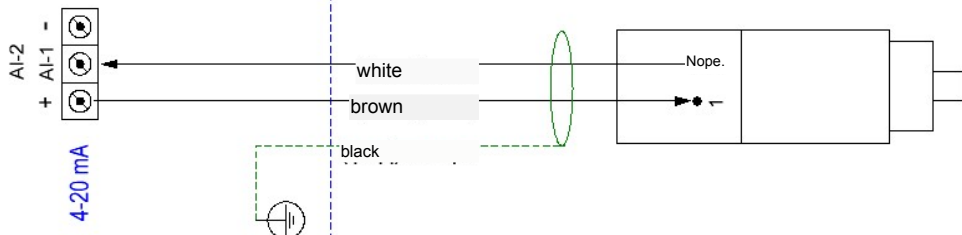
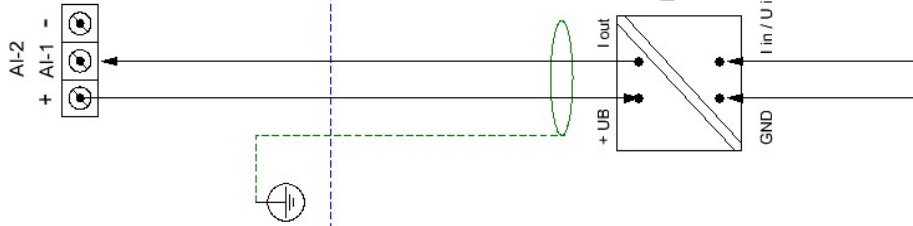
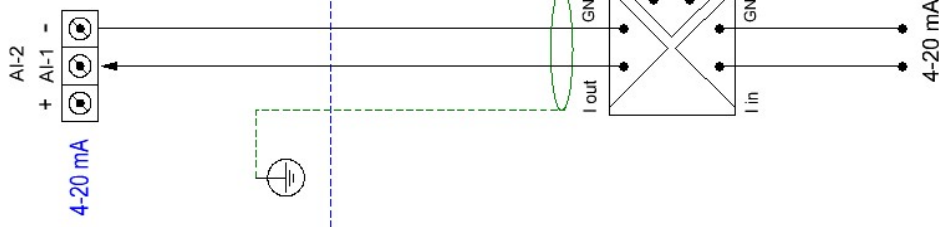


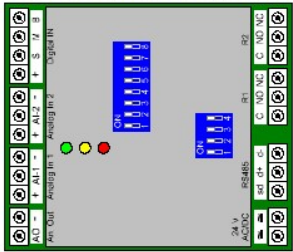
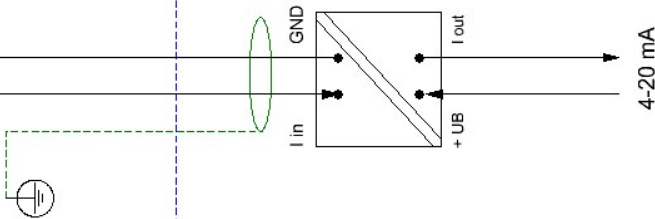
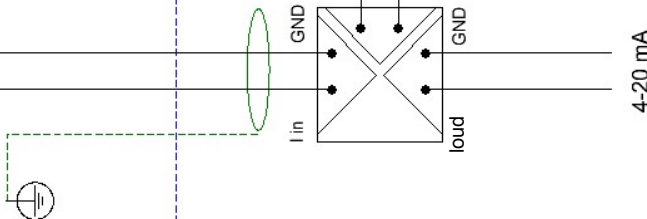
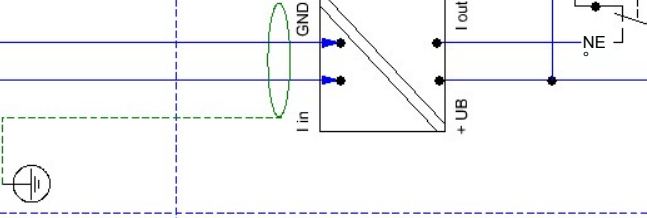
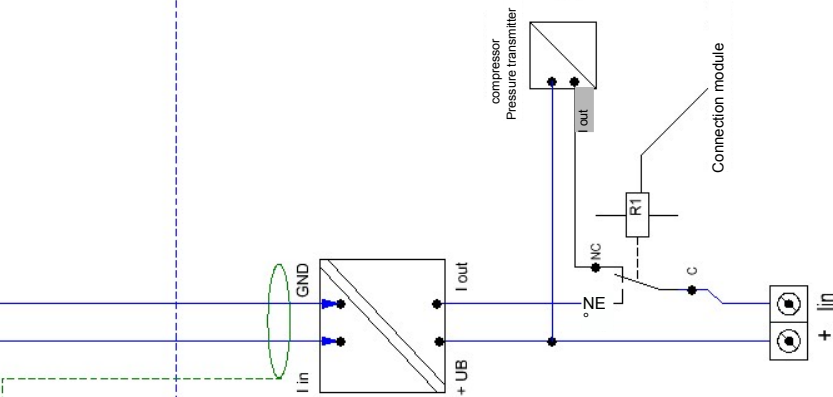
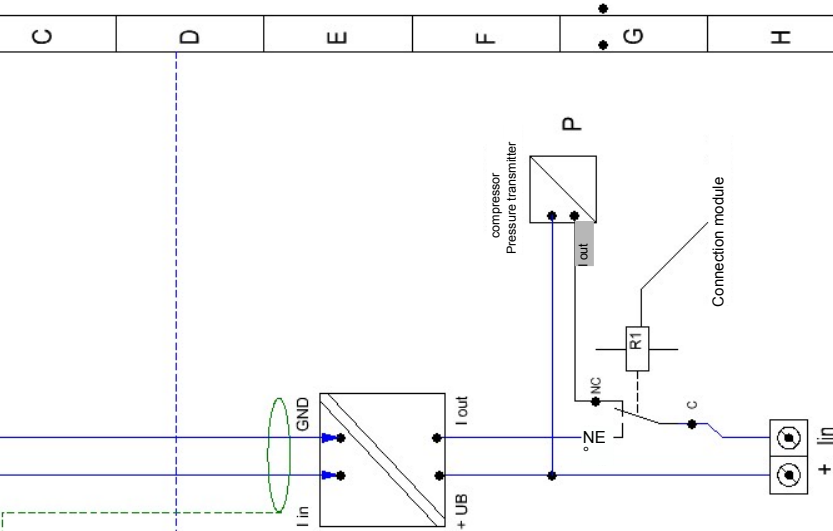
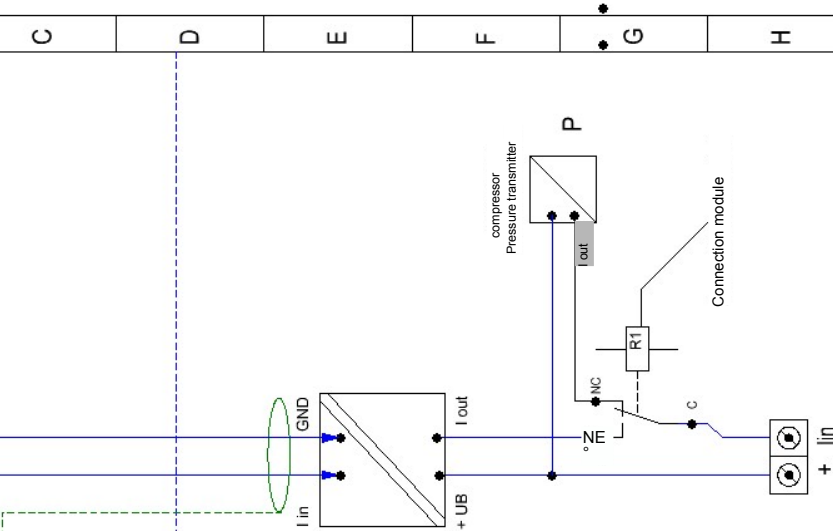


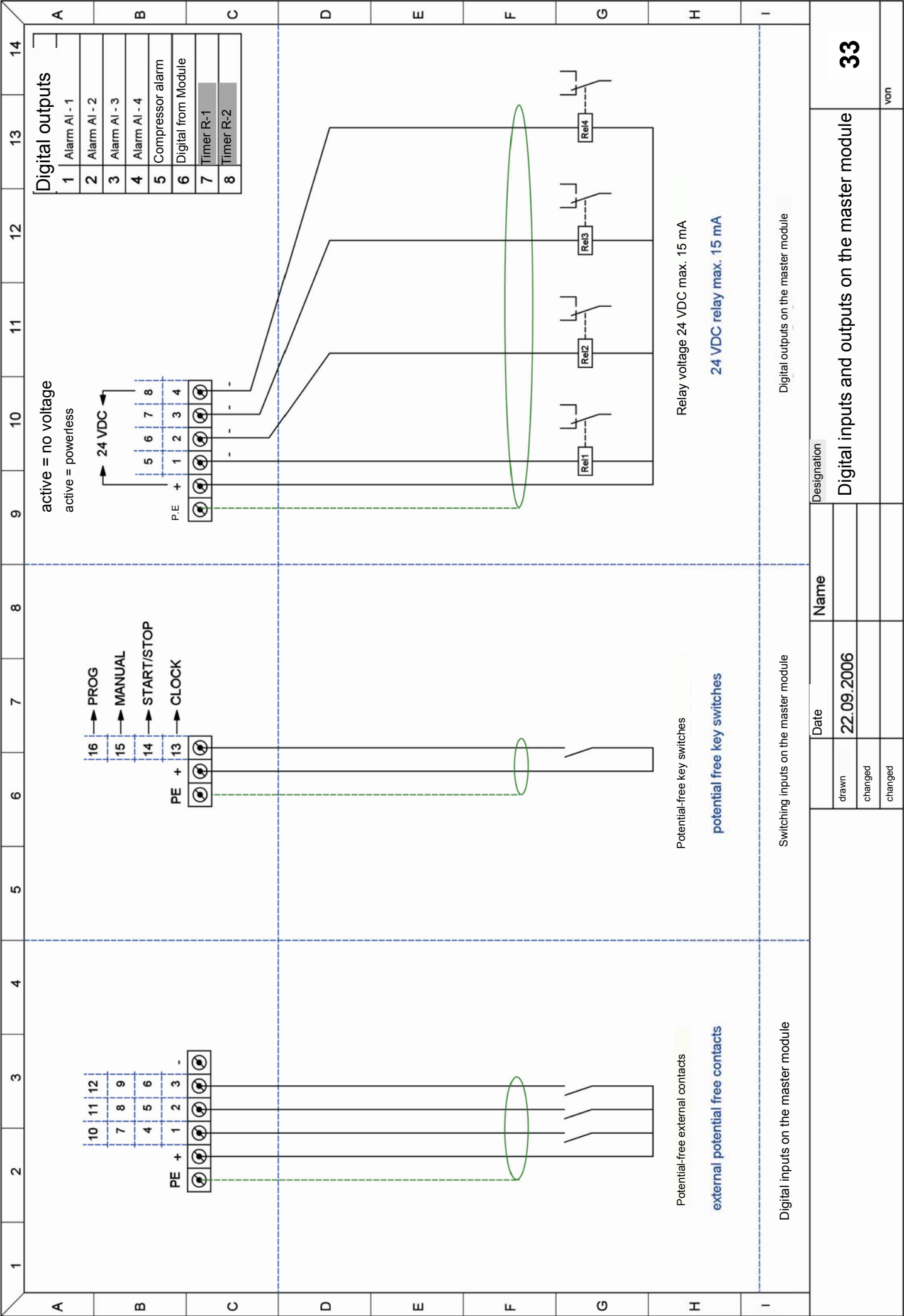


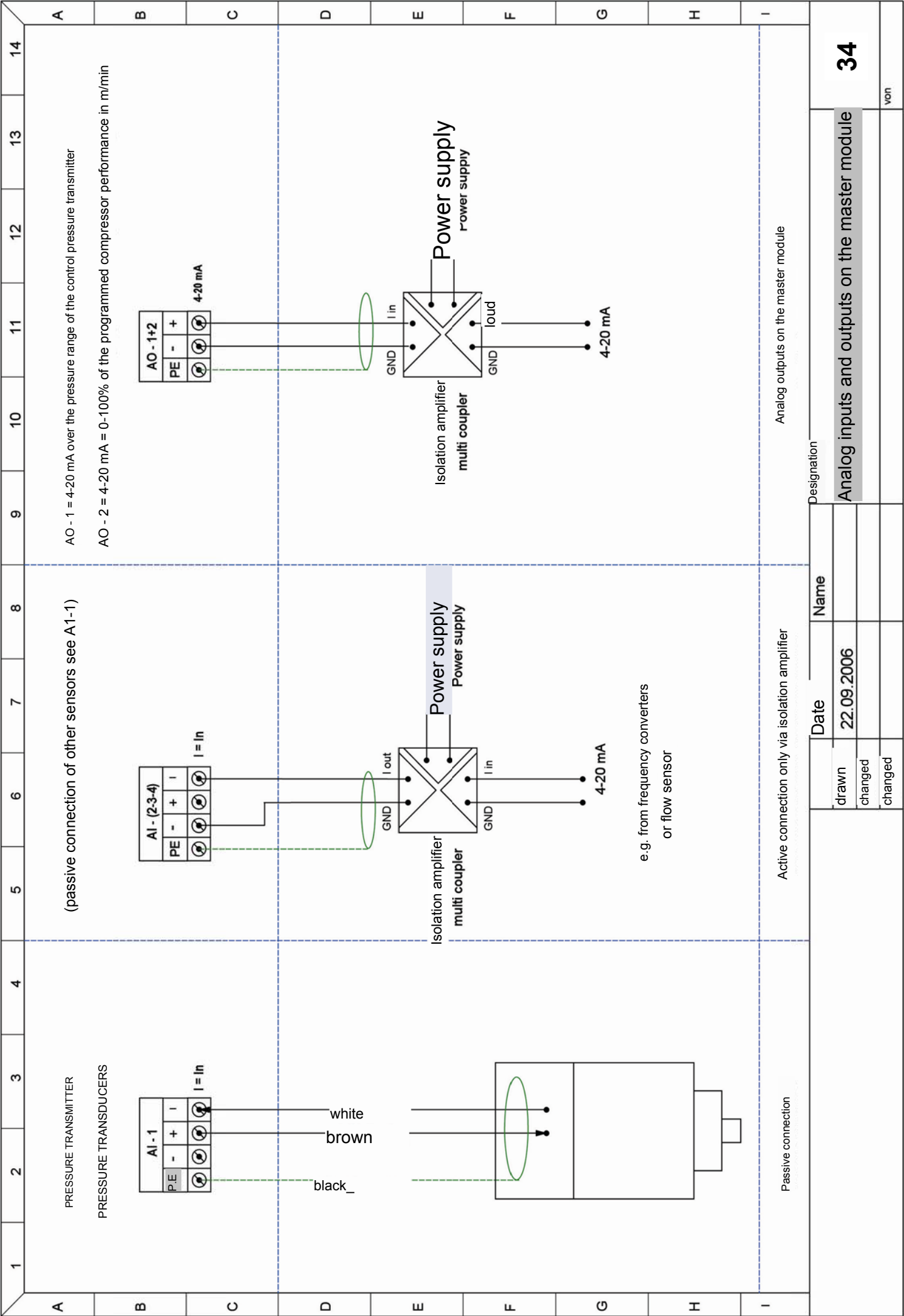
1		2		3		4		5		6		7		8		9		10		11		12		13		14	
A		S = fault / fault M = motor running B = Ready for operation / ready																									
B																											
C																											
D																											
E																											
F																											
G																											
H																											
I																											
Digital inputs on the connection module												Analog inputs on the connection module												Analog input on the connection module			
<																											



		1	2	3	4	5	6	7	8	9	10	11	12	13	14
A	Active connection only via isolation amplifier														
B	Passive connection														
C	Passive connection														
D	Passive connection														
E	Passive connection														
F	Passive connection														
G	Passive connection														
H	Passive connection														
I	Passive connection														
															
															
															
															
e.g. from frequency converter or flow sensor Isolation amplifier MCR-FL-C-UI-UI-B-DCI-24/230															
Connection via isolation amplifier with passive output Isolation amplifier MCR-CLP-UI-1-4															
PRESSURE TRANSMITTER PRESSURE TRANSDUCERS															
Connection module															
WF STEUERUNGSTECHNIK GMBH Zeppelinstrasse 7-9 75446 Wiernsheim															
Date 22.09.2006															
Name															
Designation															
Analogue inputs on the connection module															
Sheet 31															

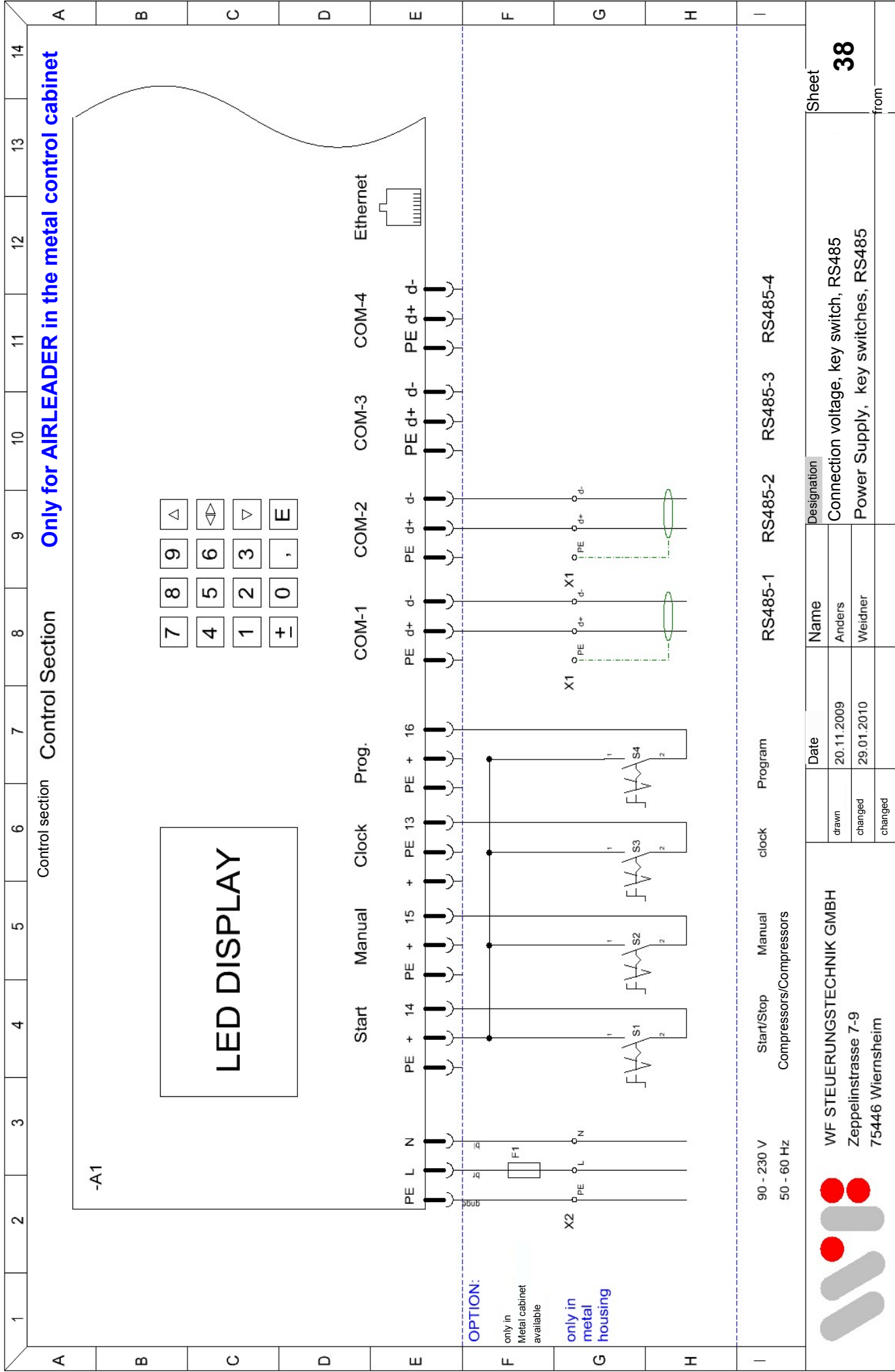
1	2	3	4	5	6	7	8	9	10	11	12	13	14
A	Active output												
	4-20 mA over the pressure range of the control pressure transmitter												
B													
C													
D													
E													
F													
G													
H													
I	Connection module Pressure transmitter input on the compressor 4-20 mA via isolation amplifier MCR-CLP-UI-1-4												
		WF STEUERUNGSTECHNIK GMBH				drawn	Date	Name	Designation		Sheet		
		Zeppelinstrasse 7-9				changed	22.09.2006		Analogue output on the connection module		32		
		75446 Wiernsheim				changed					from		





PART 3:	OPTION only included with AIRLEADER in the metal control cabinet
Page 36	AIRLEADER Master Module in the control cabinet
Page 37	Connection voltage, key switch, RS-485
Page 38	Connection analog inputs and outputs
Page 39	Connection digital outputs
Page 40	Connection digital inputs
Page 41	Device list
Page 42	Device arrangement

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
A	Sheet Sheet		designation Designation											
B	34		Control section	control section										
	35		Control section	control section										
	36		Control section	control section										
C	37		Control section	control section										
	38		Device list	Parts List										
D	39		Device arrangement	Arrangement Diagram										
E														
F														
G														
H														
I														
WF STEUERUNGSTECHNIK GMBH Zeppelinstrasse 7-9 75446 Wiernsheim Sheet 37 von														

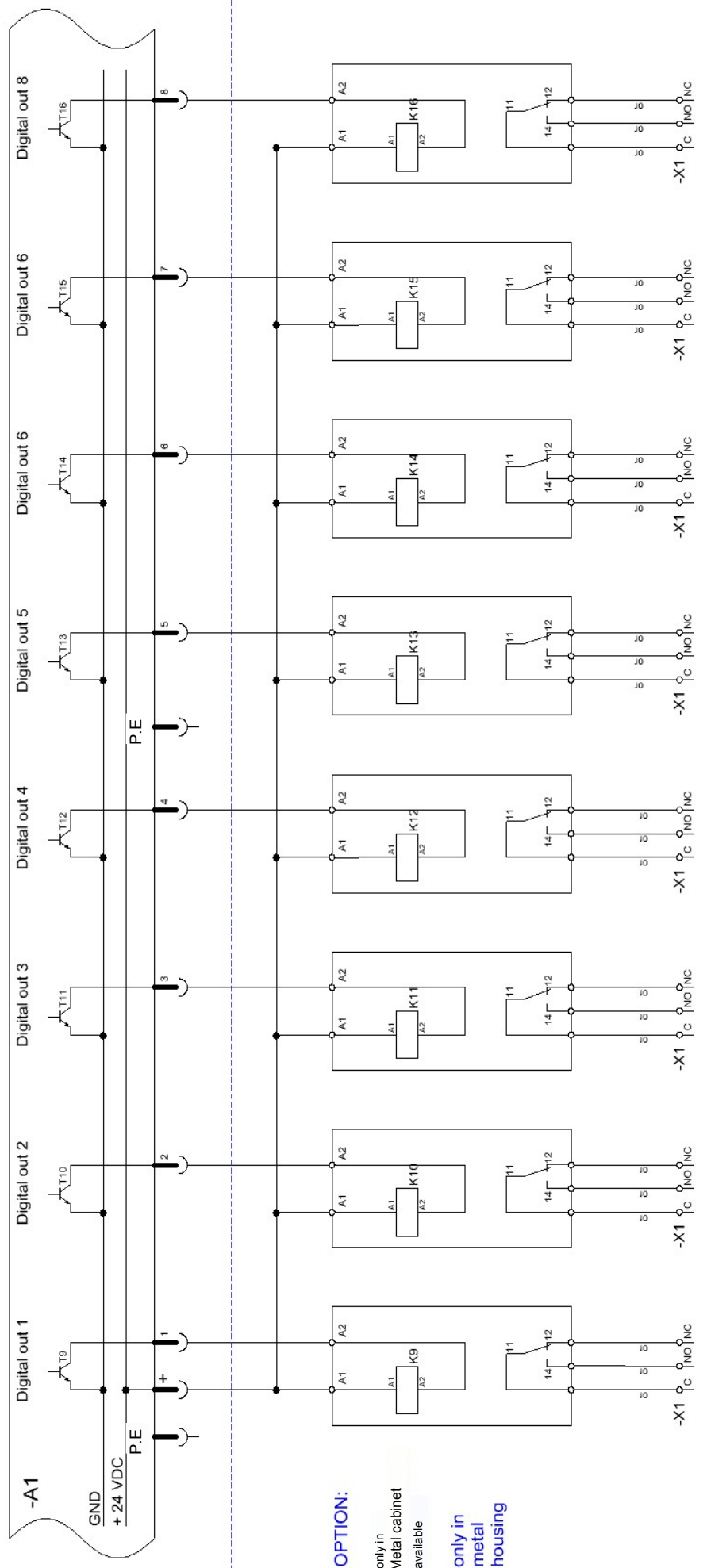




 WF STEUERUNGSTECHNIK GMBH Zeppelinstrasse 7-9 75446 Wiernsheim					Designation	Sheet
		drawn	20.11.2009	Anders	Analogue INs and OUTPUTS Connection analog inputs/outputs	39 from
		changed	29.01.2010	Weidner		
		geändert				

Only for AIRLEADER in the metal control cabinet

Control section



OPTION:
only in
Metal cabinet
available

only in
metal
housing

Digital outputs
digital outputs

Function	Digital out 1	Digital out 2	Digital out 3	Digital out 4	Compressor malfunction	Malfunction modules 17-24	Timer output 1	Timer output 2
Function	digital. outp. 1	digital. outp. 2	digital. outp. 3	digital. outp. 4	Compressor fault	fault modules 17-24	clock output 1	clock output 2



WF STEUERUNGSTECHNIK GMBH
Zepelinstrasse 7-9
75446 Wiernsheim

Designation
Connection of digital outputs
Connection digital outputs

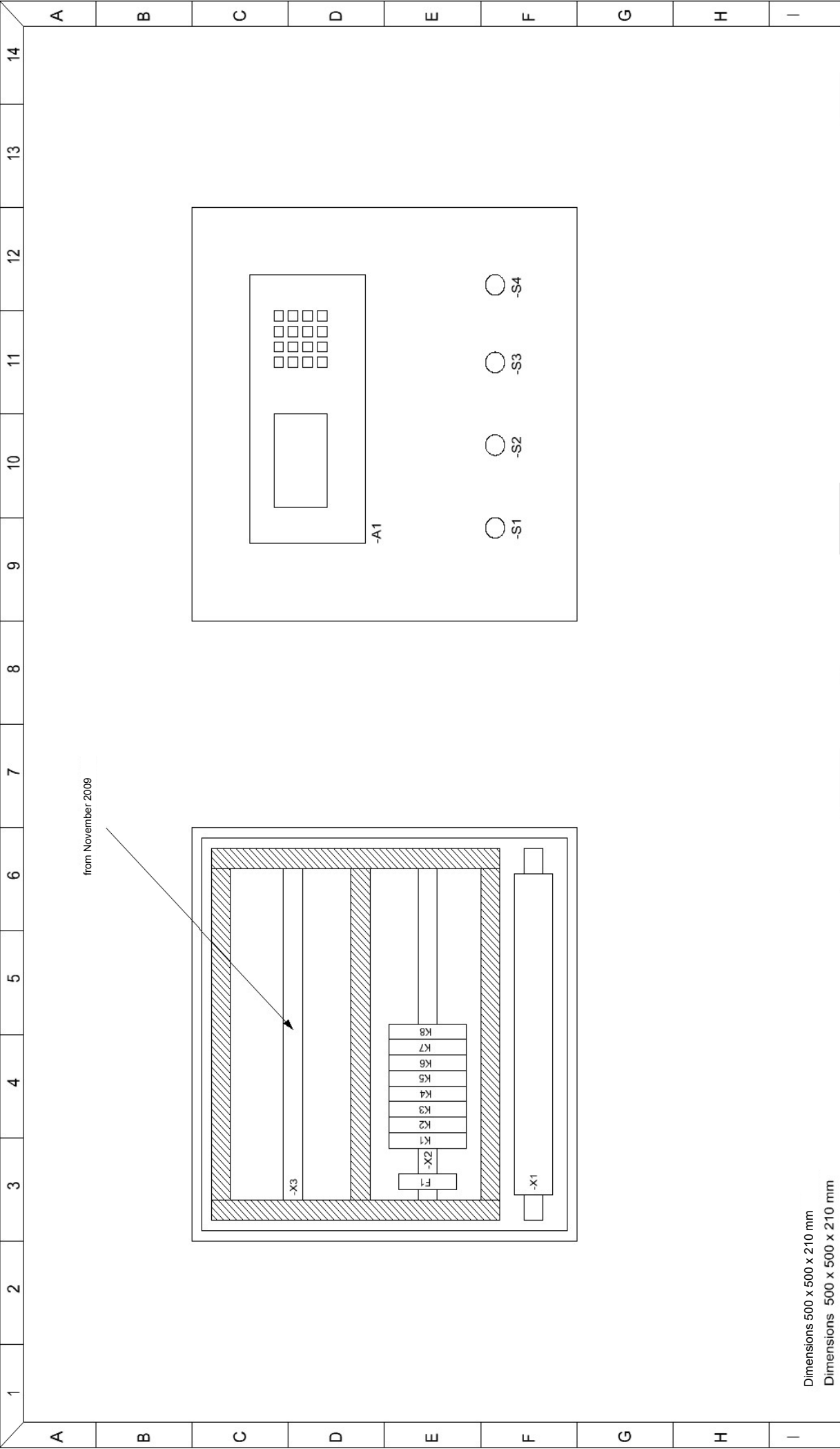
Name	Date
Anders	20.11.2009
Weidner	29.01.2010

Sheet

from

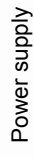
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
A	Control section														
B	-A1 Digital - in														
C															
D	OPTION: only in Metal cabinet available only in metal housing														
E															
F															
G															
H															
I	function	Digital inputs													
	Function	Digital inputs													
		WF STEUERUNGSTECHNIK GMBH Zeppelinstrasse 7-9 75446 Wiernsheim				Date		Name		Designation		Sheet			
		drawn				20.11.2009		Anders		Connection of digital inputs		41			
		changed				29.01.2010		Weidner		Connection digital outputs		from			
		changed													

1		2		3		4		5		6		7		8		9		10		11		12		13		14	
A		Designation Designation		Device Device		Make Make								Device type Type		Technical data Technical data		Ident No. Ident No.		A							
		-A1		Control electronics		WF Steuerungstechnik								AIRLEADER Master Module				2401-MS									
B		-S1		Key switch		Moeller								M22 WRS		closer		216887									
		-S2		Key switch		Moeller								M22 WRS		closer		216887									
		-S3		Key switch		Moeller								M22 WRS		closer		216887									
C		-S4		Key switch		Moeller								M22 WRS		closer		216887									
		-F1		Fuse circuit breaker										Si clamp M4/8 SF		1 A		1SNA115657R2500									
D		-K1 - K8		Coupling relay		Phoenix								PLC-RSC-24UC/2		24 V AC/DC		2966184									
		-X1		Auxiliary relay		Entelec								DR4/6.1				1SNA110491R1700									
		-X1		Terminal block		Entelec								DR4/6P				1SNA160496R2600									
E		-X2		Terminal PE		Entelec								D4/6 NLP		PE - L - N		1SNA110440R0700									
				Three-tier clamp																							
				Terminal																							
F																											
G																											
H																											
I																											
		1																									



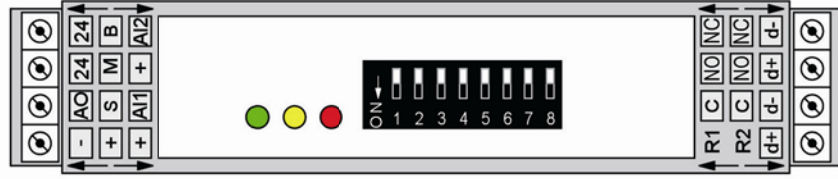
 WF STEUERUNGSTECHNIK GMBH Zeppelinstrasse 7-9 75446 Wiernsheim					Designation	Sheet
	drawn	20.11.2009	Anders		Device arrangement	43
	changed	29.01.2010	Weidner		Arrangement Diagram	
	changed					

PART 4:	Connection modules type 4700 (gray)
Page 43	Connection module configuration
Page 44	Connection module dimension drawing
Page 45	RS-485 connection diagram



Power supply

24 V AC/DC (+/- 20%)

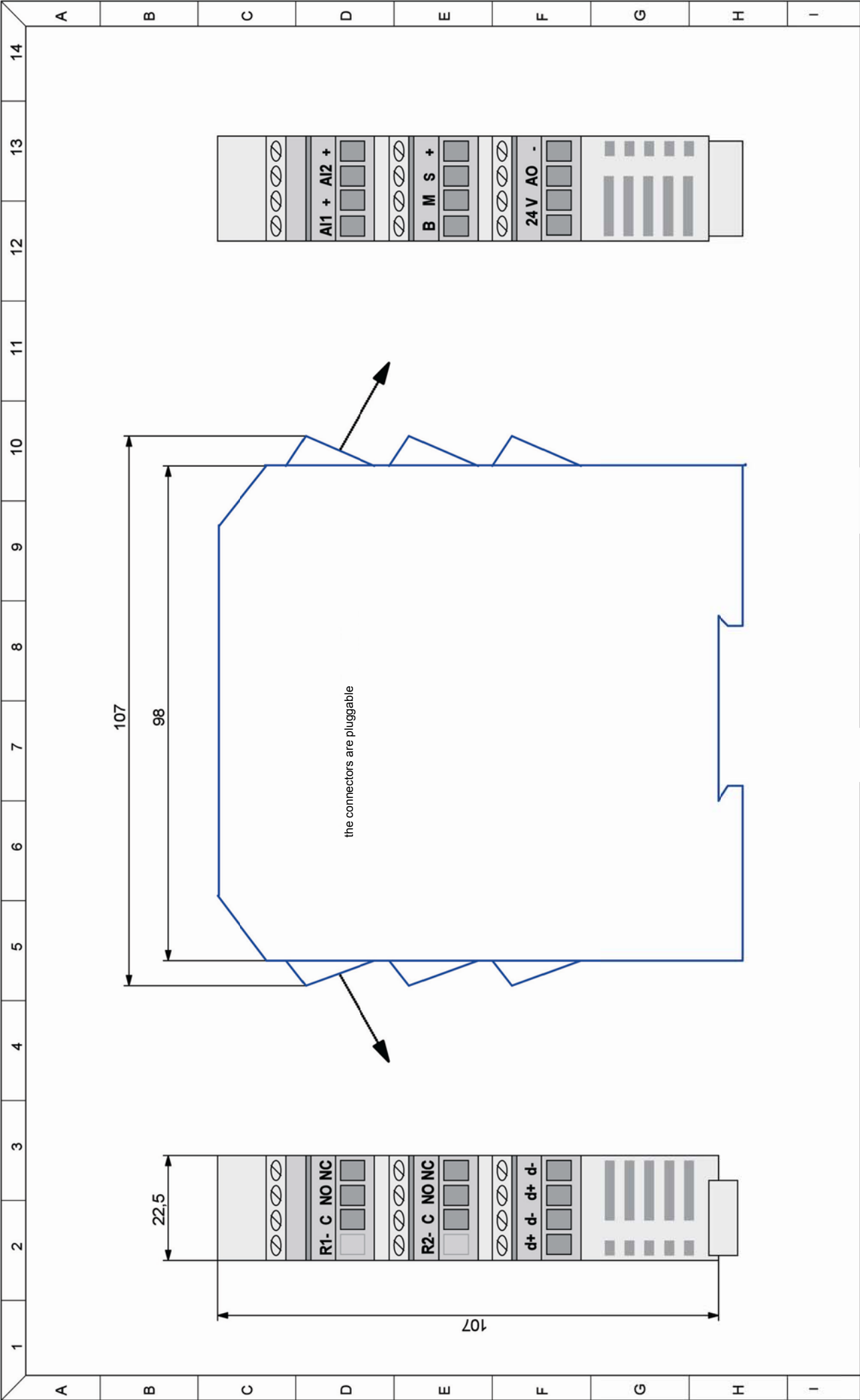


LED		Power	Motor running	load on load	Fault	RS-485 Error communication	compressor not ready
		ON	ON	ON	ON	ON	flashing blinking
			ON	flashing blinking			
					ON	flashing blinking	

[illegible]

Connection modules 1 - 16 connection module 1 - 16	only for compressors only for compressors
Connection modules 17 - 24 connection modules 17 - 24	für Analog Sensoren und externe Störmeldungen for analog sensors and external fault inputs

		Date	Name	Designation	47
	drawn	22.09.2006		Connection module configuration	
	changed				
	changed				
				von	



					Designation	Connection module dimension drawing	48
	drawn	22.09.2006					
	geändert	08.06.2007					
							von

