Flowmetering

System Controller

KMA4000 / PLU4000

Operating instructions

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Notes

- **Before connecting and operating the unit, the operating instructions supplied with the unit must generally be strictly observed.**

- **The unit must only be connected, operated and used in accordance with the regulations concerning its purpose of use, applicable legal regulations, generally acknowledged technical rules as well as the industrial safety regulations and accident prevention instructions.**

- **All electric connections must be connected in strict compliance with the notes on installation contained in the operating instructions. Only then can perfect operation of the measuring system and the required reliability be guaranteed.**

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1 GENERAL

1.1 Area of application

The System Controller serves as an interface between the automation system and KMA4000 or the actuator-/ sensor module PLU4000.

KMA 4000	all versions
PLU 4000	application 0.55 configured A-E from 16.3 (Update by service is possible)

1.2 Specific features

- Kind of software can be recognised automatically (if KMA 4000 or PLU 4000 is connected).
- Monitoring of communication between KMA4000 / System Controller. Further indication in case of failure.
- Output of 4 process values via galvanic isolated analogue outputs (0-10V)
- Choose of measuring range via selector switch
- Monitoring of internal faults in KMA4000 und indication via LEDs and isolated outputs.
- Setting of measuring time and temperatures via selector switch.
- output of frequency via +5V TTL resp. open collector output Imax 8mA static, 18mA pulse
- Dividing of frequency output via 2^n steps n=0 – 7
- Controlling of the system via ignition-/fuel on
- flushing
- outlet pump separately switchable

1.3 Copyright

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1.4 Scope of supply

Pos.	name	pcs	notes
1	19“ electronic unit 3HE	1	
2	wire	1	
3	operating manual	1	

1.5 Technical data

- Power supply 110-230V/50-60Hz 60VA, fuse 2x2A MT
- Ambient temperature +10 – 40°C
- The communication to KMA4000 takes place via the serial RS232 interface. Taken are RxD, TxD and GnD. The standard baud rate is 9600 Baud, 8N1. The AK-commands can be find in chapter „AK-commands". In chapter „program operations" are the operations of the program described.
- Density will be read out via AK und and given out by 16Bit value (analogue galvanic isolated short-circuit proof BNC-plug -X21). 0V=0,700 g/ccm , 10V=0,900g/ccm.
- Temperature of PLU121 will be read out via AK und and given out by 16Bit value (analogue galvanic isolated short-circuit proof BNC-plug –X22). 0V=0°C , 10V=100°C
- The current consumption (temperature compensated) will be read out via AK und and given out (analogue galvanic isolated short-circuit proof BNC-plug -X24). 0V=0l/h , 10V=Qmax (75 l/h) in determination of meter selector switch
- The current gravimetric consumption (temperature compensated) will be read out via AK und and given out (analogue galvanic isolated short-circuit proof BNC-plug –X23). 0V=0kg/h – 10V=75kg/h in determination of meter selector switch (e.g.75l/hr)
- The 4 analogue outputs are toleranced with +/- 0,004% from adjusted maximal value.
- The measuring time will be adjusted via two BCD-decode switches. Minimum 1 second, max. 99 seconds.
- The temperature defaults for outlet- and inlet temperature circuit will be preset via each with 2 BCD-decode switches. Range: 0-99°C
- The switch „outlet pump ON" determines, if the KMA4000 will run with or without outlet pump.
- The pushbutton „quit warning" resets a accumulated warning as confirmation. If, after acknowledgement still a „warning fault" is applied (yellow LED), this one will be set again. Parallel to this, a potential-free Input (Optocoupler) is available, to quit via the automation system. (+24V fault quit at X1.5)
- A potential-free change-over contact for warning signal 1A/24V and visualisation via a yellow LED (visible from outside) NO-contact in warning status closed, in case of fault open (–X1.7).
- A potential-free change-over contact for fault indication 1A/24V and visualisation via a red LED (visible from outside) NO-contact in error status closed, in case of fault open (–X1.6).
- A potential-free change-over contact for ready-to-operate 1A/24V and visualisation via a green LED. This will be set after effectual initialisation of KMA 4000. Relais shows ready-to-operate.(–X2.8)
- LED to display data-flow COM-interface

- A digital input (optocoupler 24V) system on. Testcell-sided +24V switched via –X2.2 (ignition on). Impressing the voltage, the inlet- (outlet) pump will be switched on and will the KMA4000 initialise. The LED "measuring ready" switches on. After put off +24V the inlet pump will be switched off again.
- A digital input (optocoupler 24V) purge. Testcell-sided +24V switched via –X2.9 (flush). Impressing the voltage the order „purging on" will be sent. At loss of voltage „purging off". There is no feedback intended, if the purging valve has operated !
- With a DUO-Led the status for operation of the Remote-Box will be announced. Stand-by: green. Fault: red.
- Push-button „transfer Parameter" which transfers during the measuring process new parameters in KMA4000 or PLU4000. It compares which parameters have changed and those will transferred via AK.
- A active watch dog switch to generate a automatic reset.

Technical description

The system controller will be connected via the serial interface –X10 with the KMA4000 –X5 or at KL14 of PLU4000 module. The frequency input –X30 will be connected with KMA4000 – X30. Through the test bed control the required feedback (fault/warning) and control input (ignition on etc.) will be switched. A self- and lamp test will be carry on by the remote box after switch on. After this it tries to get connection via the serial interface to KMA4000. In case of success , the system controller indicates „stand-by". There are two different operation modes:

1. The KMA4000 and System Controller are on, but there is no signal „ignition/fuel on". The System Controller controls the communication and the incoming faults and sets the warning- resp. fault-LED according to the appeared faults. The output–X1.6 will **not** set in that mode, because of not disturbing the boot up of the test cell computer. The analogue values will be given out actualised every second.
2. The system controller will set via–X1.3 „ignition on" in measuring mode and starts up the inlet pump. The system controller controls the communication and the incoming faults. It sets according the faults warning - resp. fault-LEDs. In this mode the output –X1.6 will be set according the faults.

1.7 LCD Display

- LCD-Display for showing the process values with 4 x 40 characters and lighting of background. By pushing the button „DISPLAY SCROLL" the different masks with actual values can called up. Push button and hold pushed , until a new mask is shown up, then release button.

```
*                                        PIERBURG INSTRUMENTS                                    *
*                                            SYSTEM CONTROLLER                                   *
*                                                                                                *
*                                            VERSION 2.0                                         *
```

Mask 1 appears, when the device is switched on

```
*                                        PIERBURG INSTRUMENTS                                    *
*                                                                                                *
*                                            LED-TEST-RUN UP                                     *
*                                                                                                *
```

Mask 2 will be shown on display during the LED test for approx. 5

```
*                                                                                                *
*                                        ---SERVICE-MODE----                                     *
*                                        RS232 PC CONTROLLING                                    *
*                    SYSTEM              CONTROLLR-MODE: STANDBY                                 *
```

Mask 3 appears, when switching over to service mode. During service mode no analogue values will be displayed.

| | | |

- Measuring time set PLU 121

Command „EFEC K2 2 XX.X „
The value which is adjusted in the operating element Measuring time, will be carried over , for example: set 3 seconds measuring time „EFEC K2 2 3.0"

- Inlet pump ON/OFF

Command „EHRQ K2 7 1.0" Inlet pump On
Command „EHRQ K2 8 1.0" Inlet pump Off

- Outlet pump ON/OFF

Command „EHRQ K2 9 1.0" Outlet pump On
Command „EHRQ K2 10 1.0" Outlet pump Off

- Flushing ON/OFF

Command „EHRQ K2 11 1.0" flushing valve On
Command „EHRQ K2 12 1.0" flushing valve Off

- Set inlet temperature

Command „EHRQ K2 1 X.XXXX" Attention ! The inlet temperature is standardised on 1 , means 20°C=0.20

- inlet temperature regulator On in automatic mode

Command „SCPA K2 1"

- Set outlet temperature

Command „EHRQ K2 4 X.XXXX" Attention! The outlet temperature is standardised on 1 , means 20°C=0.20

- outlet temperature regulator On in automatic mode

Command „SCPA K2 2"

- Monitoring of measuring values

Command „AEDN K2 27 11 40"

Example: Reply-string „AEDN 0 K2 OK 27 11 40 **51.8000** 32768 0.0000 0.0000 ...

Parameter 1 (bold) sampling time 51.8 seconds

Used will be Parameter:

2 : mirrors the condition of pumps, valves and temperature regulator in bit-coded kind. Values are observed and if it differs from the debit, it will be displayed via warning resp. fault.
10: value of density will be displayed analogue via –X21 each second.
12: temperature PLU121 will be displayed analogue via –X22 each second.
31: current volumetric (temperature compensated) consumption (not averaged) will be displayed analogue via –X24 each second.
37: current mass flow (not averaged) will be displayed analogue via –X23.

1.9 Error handling

With every reply-string, the condition of the of the error counter will be output. It will be checked if the error counter is >0 ; in that case it starts up the error inquiry.
Reply-string „AEDN **0** K2 OK 4000.2563 27 11 .... „.

It starts up a loop, which reads out n-counts through the loop in depend of the error counter. In the response telegram it will give back the error task and the error number. E.g. „AEDN K2 1 40.4456 19.0000 3.0000" Inlet pressure limit error.
After this it deletes the error counter to zero. In depend of the error it shows a warning/error.

Program run

General:	
output „fault"	- X1.6
output „warning"	- X1.7
output „meas. Ready/stand-by"	- X2.8
input „flush"	- X2.9
input „quit warning "	- X1.5
input „ignition On"	- X2.2
input „fault"	- X1.3
LED „stand-by"	LED1 red/green/off
LED „measuring ready"	LED2 green/off
LED „warning"	LED3 yellow/off
LED „fault"	LED4 red/off
LED „communication"	LED5 red/green/off

condition	function
KMA4000 supply off Controller supply off	no function
KMA4000 supply off Controller supply on	Initialisation Controller (Lamb test) -X1.6 no fault, -X1.7 fault, -X2.8 fault LED1 red, LED2 off, LED3 yellow, LED4 red, LED5 red tried to build up the connection to KMA4000 each second.

KMA4000 supply on Controller supply on	System controller can build up communication to KMA4000 (AK-command sets measuring time) -> -X1.6 no fault, -X1.7 no fault, -X1.8 fault, LED1 green, LED2 off, LED3 off, LED4 off, LED5 green
	communication is build up, but no „OK" in reply-string -> -X1.6 no fault, -X1.7 fault, -X2.8 fault, LED1 green flashing, LED2 off, LED3 yellow, LED4 red flashing, LED 5 green flashing
	System Controller can not build up communication to KMA4000 ->-X1.6 no fault, -X1.7 fault, -X2.8 fault, LED1 red flashing, LED2 off, LED3 yellow, LED4 red flashing, LED5 red (After switch-on the supply, wait approx. 10 seconds until the KMA4000 is initialised)
communication build-up	communication build-up ,but no „OK" in reply-string -> -X1.6 no fault, -X1.7 fault, -X2.8 fault, LED1 green flashing, LED2 off, LED3 yellow, LED4 red flashing, LED 5 green flashing
	error memory= zero -> -X1.6 no fault, -X1.7 no fault, -X2.8 fault, LED1 green, LED2 off, LED3 off, LED4 off, LED5 green
	error memory > zero -> -X1.6 no fault, -X1.7 fault, -X2.8 fault, LED1 green flashing, LED2 off, LED3 yellow, LED4 off, LED5 green
communication build-up command „ignition on"	error memory = zero -> write all set parameter (meas. time, inlet-/outlet temperature) in KMA4000 switch on the inlet pump, switch on (if necessary) the outlet pump. Switch temperature regulator in automatic mode. In case of successful initialisation (regulator on, pump(s) on)

	-X1.6 no fault, -X1.7 no fault, -X2.8 no fault, LED1 green, LED2 green, LED3 off, LED4 off, LED5 green error memory > zero -> error memory will be read out and according of error number set too from –X1.6, LED3 yellow and/or –X1.7, LED4 red responds. communication build-up but no „OK" in reply string -> -X1.6 no fault, -X1.7 fault, -X2.8 fault, LED1 green flashing, LED2 off, LED3 yellow, LED4 red flashing, LED 5 green flashing
KMA4000 successful in meas. mode	error memory = zero -> request of measuring values every seconds and output via analogue outputs. -X1.6 no fault, -X1.7 no fault, -X2.8 no fault, LED1 green, LED2 green, LED3 off, LED4 off, LED5 green error memory > zero -> -X1.6 no fault, -X1.7 fault, -X2.8 fault, LED1 green flashing, LED2 off, LED3 yellow, LED4 off, LED5 green. error memory will be read out and according the error number set of –X1.6, LED3 yellow and/or –X1.7, LED4 red warning and/or fault responds. communication build up but no „OK" in reply-string -> -X1.6 no fault, -X1.7 fault, -X2.8 fault, LED1 green flashing, LED2 off, LED3 yellow, LED4 red flashing, LED 5 green flashing
New parameter transmit	After pushing of the button „Parameter transmission" those will transmit. During the transmission the analogue output values will be frozen.
command „ignition on" off	If the level at the input will reset –X2.2, the inlet pump can switched off via AK. All other functions will automatically switched off .

	(output and LED , see „communication build up"
quit warning	If the button „ quit warning " or the input –X1.5 set, the output –X1.7 to no fault and LED3 switched off. After this, the module goes back to the previous mode.
flushing	When setting input to –X2.9 the AK-Command „flush on" will be transmit, -X2.8 fault und LED2 flashing. If the input–X4 will be reset „flush off" will be transmit. The module goes back to previous mode.
Watchdog Reset	After Watchdog reset the –X1.6 and –X1.7 will set automatically on fault. This means a over taking of the former operation condition is not possible.
Interruption of communication	If the communication will be interrupted during the measuring mode (i.e. switch over to service computer) the fault only will optical signalised via LED 4.. The fault output will **not** set. If you run in standard mode and the communication will be interrupt, the error output will be activated.

2 INSTALLATION

2.1 Danger warning

ATTENTION

When assembling, please take care, that of venting and place not close to hot envoronment.
Note: Shield only be connected to one side, or to both sides uncoupled one side by capacity.

2.2 Installation

19" rack

2.3 Operating

The SYSYTEM CONTROLLER is wired according the application. After switch on of the SYSTEM CONTROLLER and successful build up of communication, the device is ready for operating. In ready-operation mode following values can be set up: Meas. time, set point temperature, outlet temperature and outlet pump ON/OFF. With the signal "ignition on" these values will be transferred to KMA 4000. During the measuring mode these parameters also can be changed. Those will send by pushing the button "transfer parameter" to KMA4000. Changing the type of flow meter takes effect after pushing "send parameters. The status "outlet pump" will transferred directly.By pushing the button "quit" faults and warnings will be resetted. Note that the choice of flow meter type is according to the max. value of the analogue volumetric and gravimetric output.
Following errors will result in warnings:

- Gas bubbles
- Over current inlet-/outlet pump
- Control of limit inlet-/outlet temperature
- 100% max. flow oversized longer than 30 sec.
- Motor frequency converter

Following errors will result in faults:

- Limit violation inlet pressure
- Frequency converter switches off inlet-/ outlet pump automatically

3 SEARCHING FOR FAULTS

- No function (lamp test, etc.):
  - check power supply
  - check fuses
  - switch-on defect

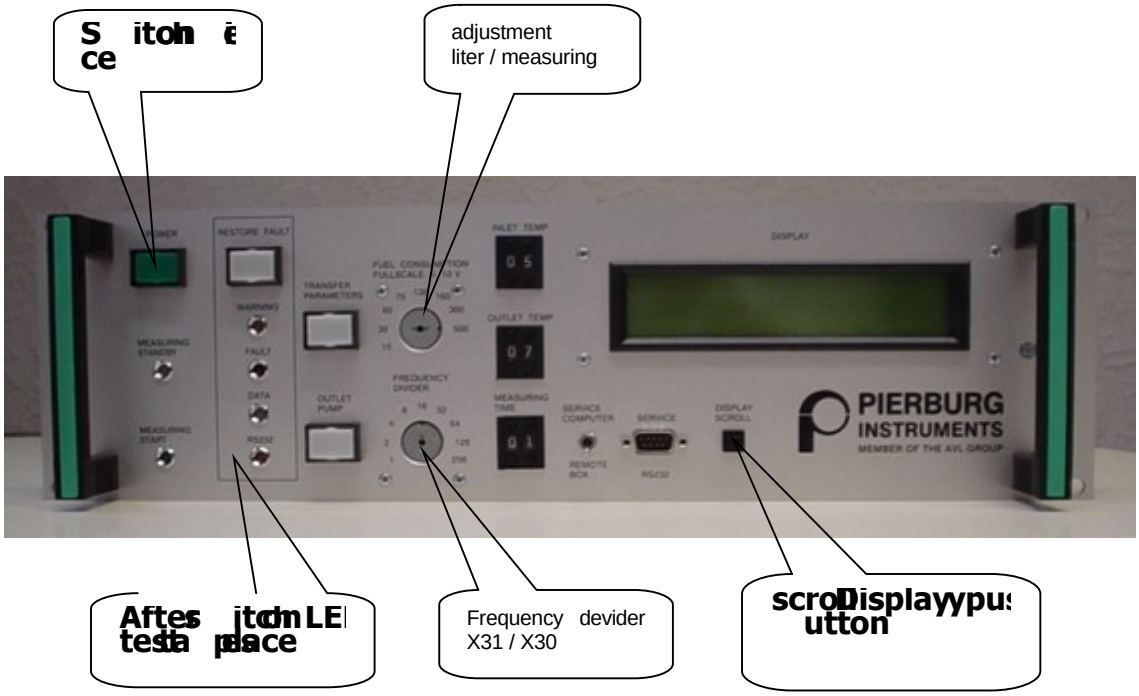
- No build-up of communication:
  - KMA4000 not switched on
  - cable between KMA4000 - Remote Box defect/lost/not connected

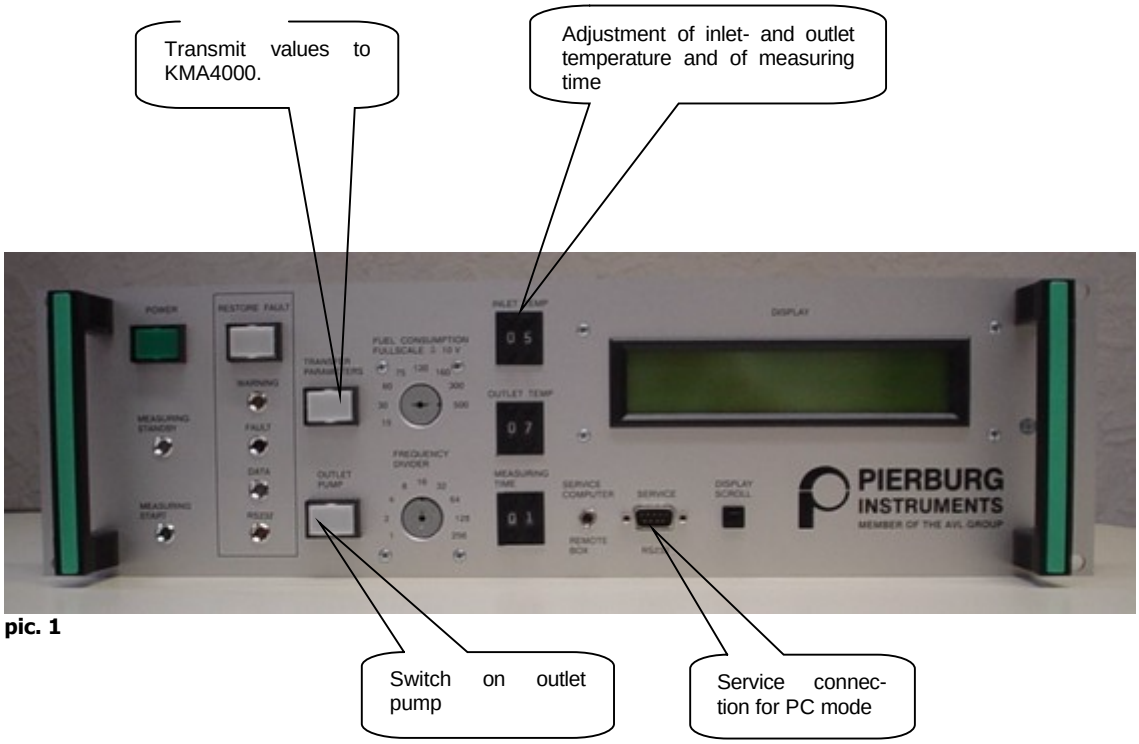
- permanent warning signal:
  -announced faults check with service computer

- permanent fault signal:
  - inlet pressure out of limits
  - flow range permanent >110%
  - converter pump switched off

4 RELEASE

fig. 1	Front operating
fig. 2	Back side / plug assignment
fig. 3	Front plate drawing
fig. 4	declaration of conformity


adjustment
liter / measuring
Frequency devider
X31 / X30
PIERBURG
INSTRUMENTS
MEMBER OF THE AVL GROUP


Transmit values to KMA4000.
Adjustment of inlet- and outlet temperature and of measuring time
Switch on outlet pump
Service connection for PC mode
PIERBURG
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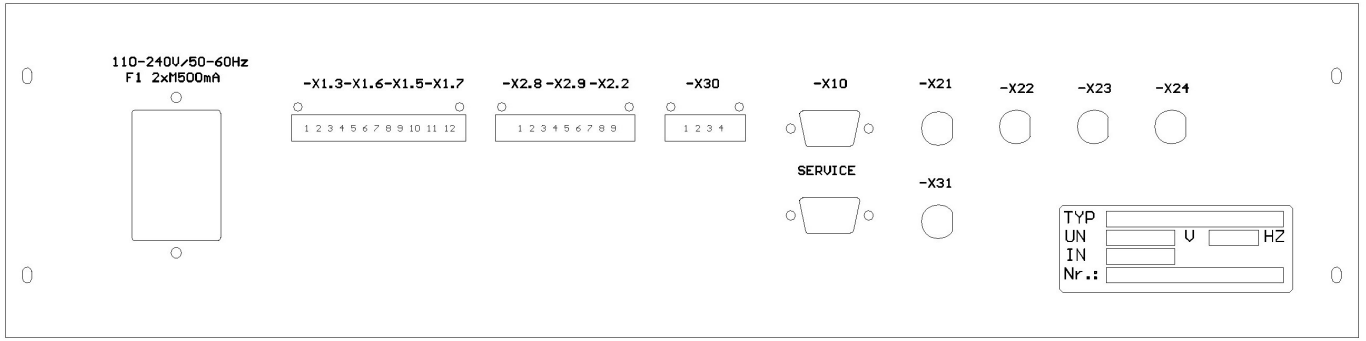
pic. 1

pic. 2



X1.3 / 1 = Störung
X1.3 / 2 = Störung
X1.3 / 3 = Störung PE

X1.6 / 4 = Störung
X1.6 / 5 = Störung
X1.6 / 6 = Störung PE

X1.5 / 7 = Quittung Extern +24V
X1.5 / 8 = Quittung Extern GND
X1.5 / 9 = Quittung Extern PE

X1.7 / 10 = Warnung +24V
X1.7 / 11 = Warnung GND
X1.7 / 12 = Warnung PE

X2.8 / 1 = Betriebsbereit +24V
X2.8 / 2 = Betriebsbereit GND
X2.8 / 3 = Betriebsbereit PE

X2.9 / 4 = Spülen +24V
X2.9 / 5 = Spülen GND
X2.9 / 6 = Spülen PE

X2.2 / 7 = Zündung Ein +24V
X2.2 / 8 = Zündung Ein GND
X2.2 / 9 = Zündung Ein PE

X10 / 2 = KMA4000 / RXD
X10 / 3 = KMA4000 / TXD
X10 / 5 = Seriell GND

X30 / 1 = RS422A
X30 / 2 = RS422B
X30 / 3 = GND
X30 / 4 = PE

X31 / 1 = Frequenzausgang
X31 / 2 = Frequenz GND

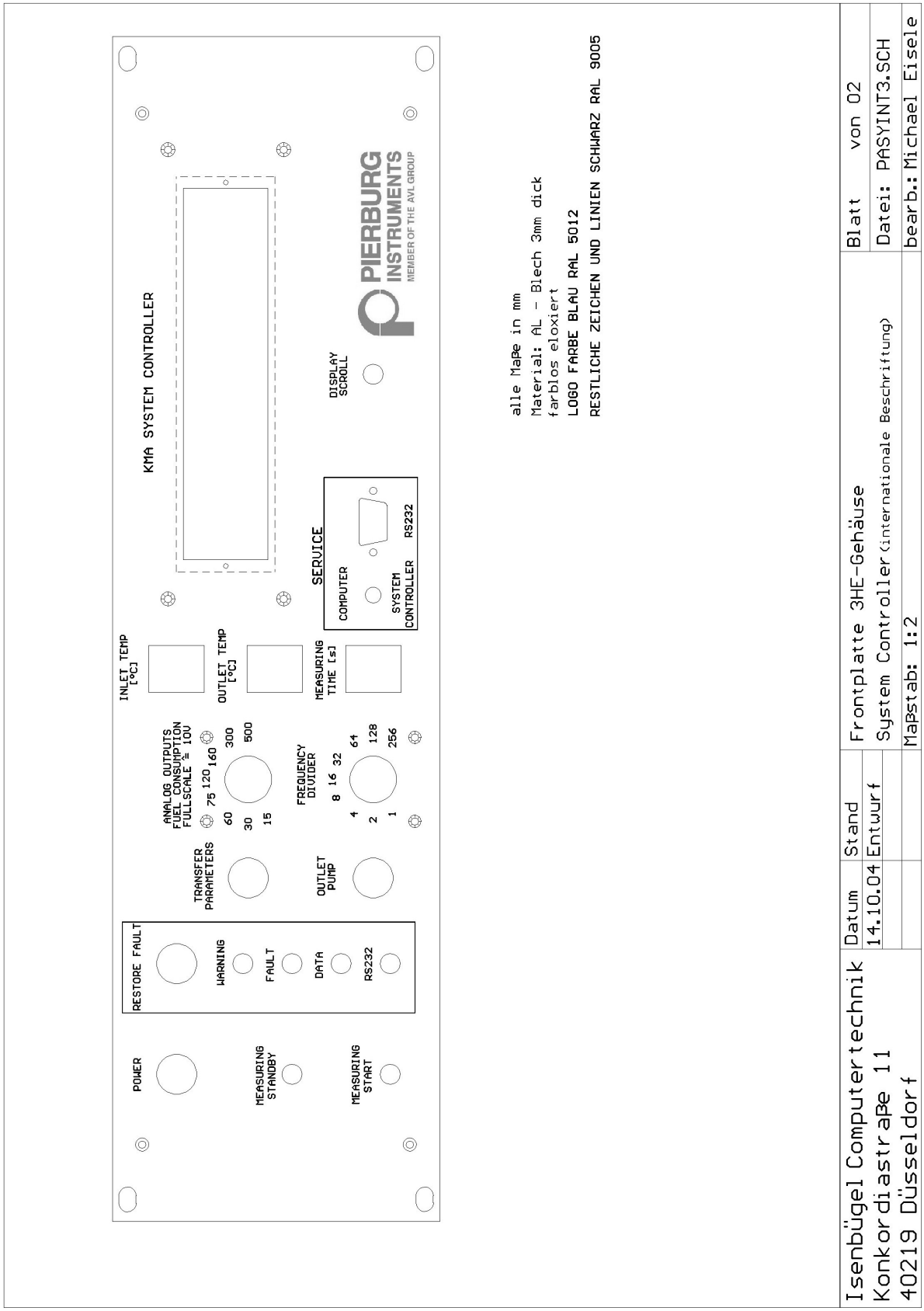
X21 / 1 = Dichte
X21 / 2 = Dichte GND

X22 / 1 = Temperatur PLU121
X22 / 2 = Temperatur PLU121 GND

X23 / 1 = grav. Verbrauch
X23 / 2 = grav. Verbrauch GND

X24 / 1 = volum. Verbrauch
X24 / 2 = volum. Verbrauch GND

Isenbügel Computertechnik Konkordiastraße 11 40219 Düsseldorf	Datum 16.09.04	Stand Serie	Anschlußplan SYSTEM CONTROLER Vers. Display	Blatt 01 von 01 Datei: REMOTE.SCH
			Maßstab: 1:2	bearb.: Michael Eisele


KMA SYSTEM CONTROLLER
PIERBURG INSTRUMENTS
MEMBER OF THE AVL GROUP
DISPLAY SCROLL
SERVICE
COMPUTER
SYSTEM CONTROLLER RS232
INLET TEMP [°C]
OUTLET TEMP [°C]
MEASURING TIME [s]
ANALOG OUTPUTS FUEL CONSUMPTION FULLSCALE ≙ 10U
75 120 160 60 300 500 30 15
FREQUENCY DIVIDER
8 16 32 4 64 128 2 256 1
TRANSFER PARAMETERS
OUTLET PUMP
RESTORE FAULT
WARNING
FAULT
DATA
RS232
POWER
MEASURING STANDBY
MEASURING START
alle Maße in mm
Material: AL - Blech 3mm dick
farblos eloxiert
LOGO FARBE BLAU RAL 5012
RESTLICHE ZEICHEN UND LINIEN SCHWARZ RAL 9005
Isenbügel Computertechnik
Konkordiastraße 11
40219 Düsseldorf
Datum 14.10.04
Stand Entwurf
Frontplatte 3HE-Gehäuse
System Controller (internationale Beschriftung)
Maßstab: 1:2
Blatt von 02
Datei: PASYINT3.SCH
bearb.: Michael Eisele

pic. 3

ISENBÜGEL COMPUTERTECHNIK
INDUSTRIELLE ELEKTRONIK HARD- UND SOFTWARE

Werner Isenbügel - Konkordiastr. 11 - 40219 Düsseldorf

EU-Konformitätserklärung

Wir erklären, daß das nachfolgend bezeichnete Gerät hinsichtlich Sicherheit und Personenschutz die einschlägigen Richtlinien für EMV sowie Niederspannung erfüllt.

Bezeichnung	:	SYSTEM CONTROLLER
Typ	:	001
Übereinstimmung mit EU-Richtlinien	:	EU-Richtlinie EMV 89/336/EWG Ausgabe 92/31/EWG EU-Richtlinie Niederspannung 73/23/EWG
Angewandte harmonisierte Normen	:	EN 61000-6-4 :2001 EN 55011 : 1998+A1 EN 55011 : 1999+A2 :2002 EN 61000-6-2 : 2001

Bei Zweckentfremdung oder einer mit uns nicht abgestimmten Änderung des Gerätes verliert diese Erklärung ihre Gültigkeit .

ISENBÜGEL COMPUTERTECHNIK

Uwe Isenbügel

Düsseldorf 1. November 2004

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pic. 4