

Data Sheet

1. General information

Elektronikon Mk5s main controller

Printed Matter Number	: 2946 1788 00
Applicable to	: Mk5s controlled units
Preliminary Operations	: -
Safety Instructions	: General
Persons Required	: 1
Special Tools	: -
Consumables	: -

2. Document overview

This document describes the following:

1.	General information	1
2.	Document overview	1
3.	Safety first.....	3
4.	Environmental conditions.....	4
5.	Mounting and installation	4
5.1.	Mechanical mounting.....	4
5.2.	Electrical installation.....	7
5.2.1	Supply requirements	7
5.2.2	Earth terminations	7
5.2.3	FCC user information	8
6.	Maintenance during service	8
6.1.	Front panel	8
7.	Technical Data	9
7.1.	CPU-Core	9
7.2.	Real Time Clock	9
7.3.	LCD-Display	9
7.4.	Digital Outputs 10A.....	10
7.5.	Digital Inputs.....	10
7.6.	Analog Inputs.....	11
7.6.1	Pt1000.....	11
7.6.2	Pressure.....	11
7.7.	Ethernet.....	12
7.8.	CAN-Bus (internal CAN).....	12

7.9.	CAN-Bus (LAN)	12
7.10.	RS-485	13
7.11.	IO-bus.....	13
7.12.	General.....	14
8.	Pin assignment	15
8.1.	Pin Assignment CAN1 & CAN2 –Bus	15
8.2.	Pin Assignment RS485.....	15
8.3.	Pin Remote IO	16
8.4.	Pin Assignment power supply, analog en digital inputs	16
8.5.	Pin Assignment analog en digital inputs	17
8.6.	Pin Assignment Digital Output.....	17
8.7.	Pin Assignment Digital Output.....	18

3. Safety first

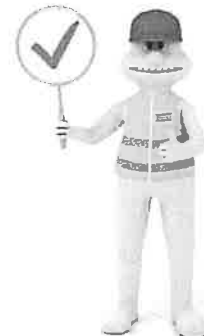
SAFETY = THINK BEFORE YOU ACT



1. STOP
EVALUATE RISKS



3. THINK
SEEK PROPER SOLUTION



2. ACT
CARRY OUT SOLUTION



PERSONAL PROTECTION KEEPS YOU SAFE



LOCK OUT / TAG OUT
TAKE AWAY THE RISKS

4. Document Information and History

Edition	Date	Description	Author
00	03/12/2013	First Edition	CTS
01	13/09/2017	update	Wouter Cattoor

5. Environmental conditions

The controller is designed to work in following conditions:

- Minimum operating temperature: -10°C
- Maximum operating temperature: +60°C
- Maximum humidity: 90% RH, 95%RH no condensation
- Maximum altitude of 2000 m (if altitude is higher than 2000m a temperature derating of 5%/1000m is required)

The controller should be mounted in an IP54 enclosure which guarantees a pollution degree 2. (only non-conductive pollution, occasionally temporary condensation may be expected)



The controller shall be protected against direct sunlight. Direct sunlight may affect the visual appearance of the controller.

6. Mounting and installation

6.1. Mechanical mounting

1. Use a mounting plate of suitable stiffness, with following excisions:

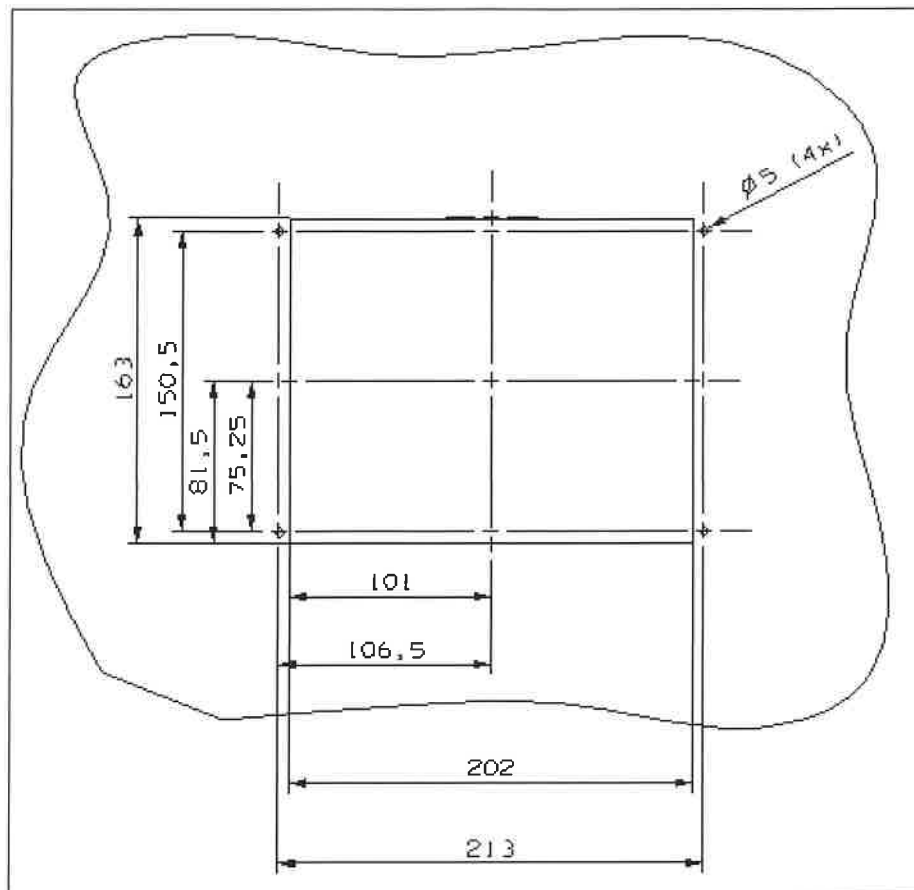


Figure 1: Excisions of the panel where the controller is designed to mount in.

2. Mount the controller vertically and upright.
3. Mount the seal in a correct manner, to guarantee the IP54 dust and water tightness.
4. Fix the controller with 4 screws (M4), tighten with a torque of 3Nm. Max.

The screws should be of suitable length conform Figure 2.

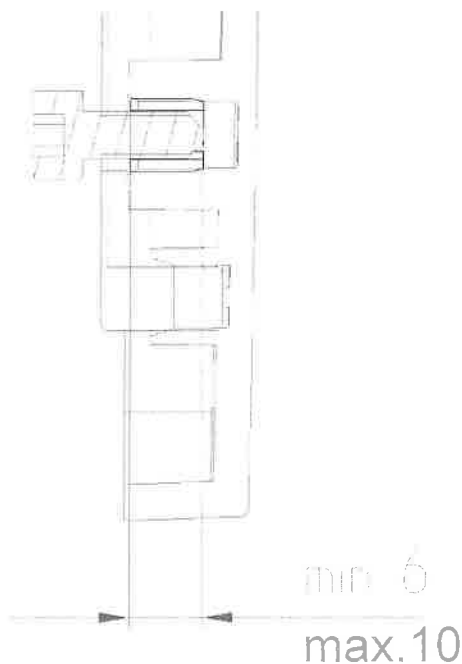


Figure 2: Screw length for mounting the controller in the panel.

5. Make sure that the control box in which the controller is mounted contains following label:



This enclosure contains electrical equipment

It may only be opened by key or special tool.

6. Make sure that the ventilation openings are free, with sufficient free area around the module to have ventilation, in order not reach the max operating temperature (see § 4)

6.2. Electrical installation

5.2.1 Supply requirements

- The device has **no** fuse in the 24VAC power supply line. A fuse **2A slow** has to be provided **externally**.
- The power supply conductor shall have a disconnecting device.
- The secondary circuits and earthing of the supplying transfo should be separated from the primary circuit by at least reinforced insulation.
- The supply voltage is 24V +40%, -30%, frequency of 50/60Hz, 16VA. A supply drop-out of maximum 40ms is permitted.

5.2.2 Earth terminations



Do not operate the machine with grounding wire disconnected!

Bonding between conduit connections is not automatic and must be provided as part of the installation!

1. Make a low resistance connection between the earth terminal of the controller and the chassis of the enclosure. This connection is a function earth connection, with a maximum wire length of 20cm.
2. Connect cables and shielding to the grounding termination with M4 eye-terminals or use FASTON type receptacle 6,3-1,5mm, as recommended. Otherwise, the connection shall be such that a low resistance connection shall be guaranteed.
3. Make sure that the screw to connect to the grounding connection terminals is an M4 screw, with a length suitable for connection and conform Figure 3.

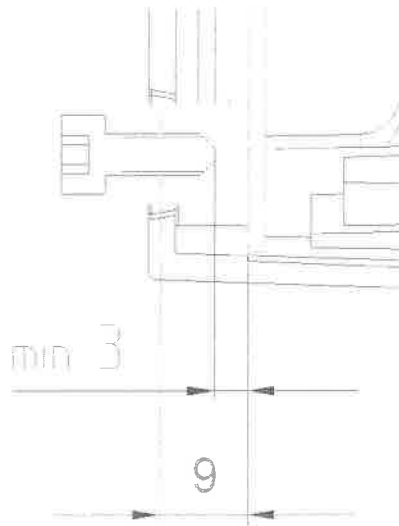


Figure 3: screw length for mounting shielding, PE's, ... to the earth terminal connection.

5.2.3 FCC user information

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC rules.

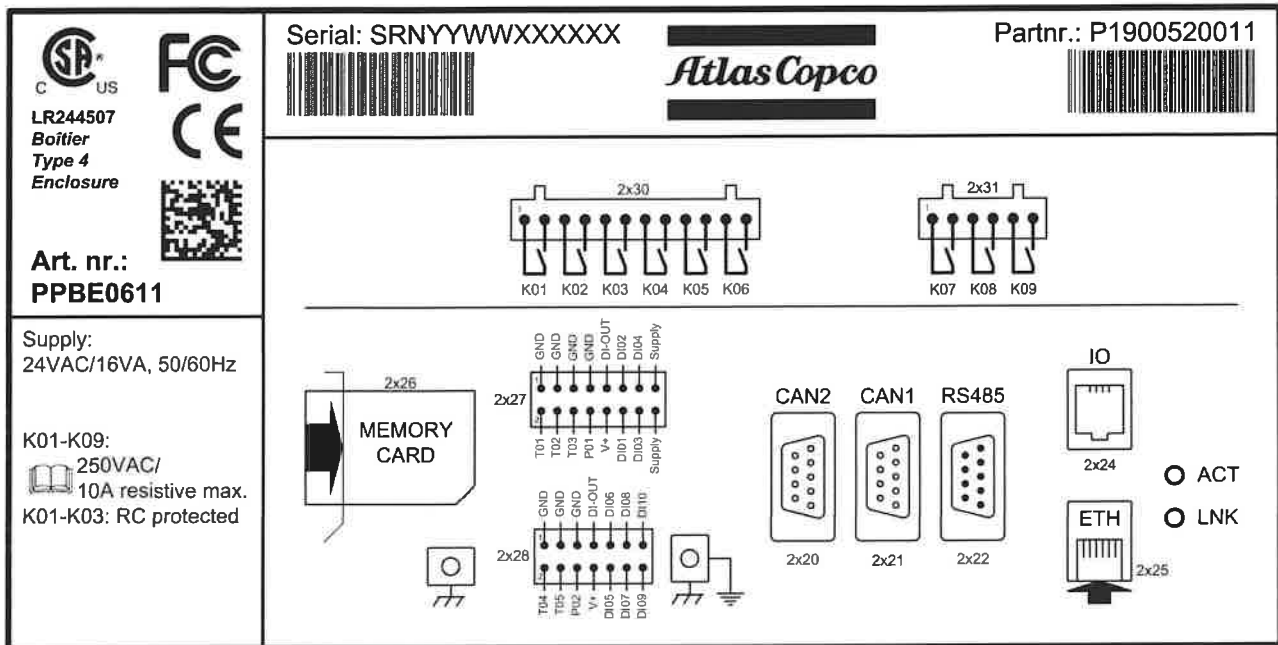


Figure 4: overview of connections to be made

7. Maintenance during service

7.1. Front panel

The front panel can be cleaned with a wet soft cloth and mild soap only.



The front part of the controller is scratch sensitive. Other products are not allowed and may damage the surface!

8. Technical Data

8.1. CPU-Core

Parameter	Value
CPU	Analog Devices BF536
CPU-Bus configuration	16 Bit
Internal RAM	100 kByte
Flash EPROM	16 MByte
SDRAM	16 MByte
Backup RAM Functionality	5 kByte

8.2. Real Time Clock

Parameter	Value
Type	ST Thomson 41T00SM6
Counter	seconds, minutes, hours, day, months, years, century
Leap Year handling	automatic
Summertime handling	by software
Tolerance $T_{amb}=25^{\circ}\text{C}$	typ. ± 100 ppm
Aging first year	typ. ± 10 ppm
Tolerance $T_{amb}=-10^{\circ}\text{C} \dots 70^{\circ}\text{C}$	typ. ± 100 ppm
Life Time Battery: $T_{amb}=25^{\circ}\text{C}$ only RTC supplied compressor always power off	min. 10 years

8.3. LCD-Display

Parameter	Value
Type	3.5" QVGA
LCD-Controller	BF536 internal
Technology	TFT
Backlight	LED
Backlight Lifetime	10k hours @ 25°C (brightness 50%)
Character Set	customer specific
Foil Material	PolyCarbonate
LED	4 (Gr,Y,R,Blue)
Keys	8

8.4. Digital Outputs 10A

Parameter	Value
Number of Outputs	9
Identifications	K01-K03 (RC protected) K04-K09
Type	relay (voltage free contacts)
Rated Voltage AC	250V
Rated Current	10 A
Peak Current	20 A
Switching Voltage AC	max. 400V
Switching Power	max. 2500VA
Pick-Up Time	typ. 15ms
Drop-Out Time	typ. 20ms
Switching Frequency (max. load)	max. 30 / minute
Contact Life (max. load)	8×10^4 2.5×10^5 cycles
Mechanical Life (no load)	typ. 1×10^7 cycles

NOTE: Maximum DC load: 30V DC - 10A resistive Minimum current: 5mA

8.5. Digital Inputs

Parameter	Value
Number	10
Identification	DI01-DI10 DI-OUT (24VDC supply)
Input Voltage Low	-3..... 5.0V DC
High	15.....26.0V DC
Input Current Low	0....15mA
High	5....15mA
Isolated	no
Impedance	4800 Ohm
Supply by Controller	24.0V +/- 10%DC
Supply Current	max. 100 mA (dissipation for all DI together)
Supply Protection	short circuit protected to ground

8.6. Analog Inputs

7.6.1 Pt1000

Parameter	Value
Number	5
Identification	T01-T05 (return terminal: GND)
Temperature Range	-50°C.....+300°C
Resolution	<0.2°C
Error	+/- 1°C (0-100°C range) +/- 2°C (full range) (2% accuracy under extreme EMC stress)
Current	typ. 2mA
Protection	short circuit protected to ground
Resolution A/D Converter	12 Bit
Sensor Type	2 wire
Isolated	No

7.6.2 Pressure

Parameter	Value
Number	2
Identification	P01 (5V supply: V+ ; GND)
Input Voltage	0.2....4.8V
Resolution	12 Bit
Error	max. +/- 6LSB
Input Resistance	typ. 100kΩ
Supply Current (each sensor)	max. 5mA
Supply for Pressure Sensor Vref	5V +/-5%
Reference for A/D- Converter	Supply for Sensor
Supply for Pressure Sensor	short circuit protected to ground
Sensor Type	2 wire single ended
Isolated	No

8.7. Ethernet

Parameter	Value
Controller	Integrated in CPU
Specification	IEEE 802.3
Baudrate	10/100 Mbit
Isolated	yes
Connector Type	RJ45

8.8. CAN-Bus (internal CAN)

Parameter	Value
Controller	Integrated in CPU
Type	Full CAN / BASIC CAN
Number of nodes	max.32
Specification	V2.0 Part B
Physical Layer	ISO11898
Baudrate	Programmable (max. 1 Mbaud)
Common Mode Rejection	-2.....+7V
Isolated	no
Connector Type	Sub-D 9 pole male

8.9. CAN-Bus (LAN)

Parameter	Value
Controller	MCP2515
Type	Full CAN / BASIC CAN
Number of nodes	max.32
Specification	V2.0 Part B
Physical Layer	ISO11898
Baudrate	Programmable (max.125 kbaud)
Common Mode Rejection	-2.....+7V
Isolated	no
Connector Type	Sub-D 9 pole male

8.10. RS-485

Parameter	Value
Controller	MCP2515
Type	Full CAN / BASIC CAN
Number of nodes	max.32
Specification	V2.0 Part B
Physical Layer	ISO11898
Baudrate	Programmable (max.125 kbaud)
Common Mode Rejection	-2.....+7V
Isolated	no

8.11. IO-bus

Parameter	Value
Controller	integrated in CPU
Type	RS-485 (proprietary)
Number of nodes	max.10
Configuration	half duplex
Baudrate	200 kbaud
Differential Output Voltage	min. 1.5V
Differential Input Voltage	min. 200mV
Common Mode Voltage	-7.....+12V
Receiver Input Impedance	12k Ω
Cable length	max. 4m (unterminated)
Isolated	no
Connector Type	RJ11

8.12. General

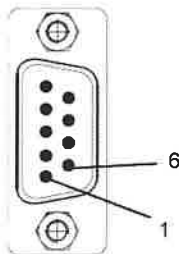
Parameter	Value
Supply Voltage	24VAC +40%/-30% 50/60Hz
Type of Protection	IP54 front IP21 back
Temperature Range	
Operating	-10°C.....+60°C
Storage	-30°C.....+70°C
Permissible Humidity	Relative humidity 95% no condensation
Noise emission	EN 55022 class B: 1998 EN 50081-2: 1993
Noise immunity	EN 50082-2: 1995 EN 61000-6-2: 1999
Weight	950g
Dimension	240x190x80 mm
Housing	PCABS-V0
Mounting	cabinet door

9. Pin assignment

9.1. Pin Assignment CAN1 & CAN2 –Bus

Sub-D 9 pole male

2X20 & 2X21

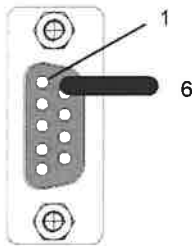


Pin	Function
1	Reserved
2	CAN_LOW
3	CAN_GND
4	Reserved
5	Reserved
6	CAN_GND
7	CAN_HIGH
8	Reserved
9	Reserved

9.2. Pin Assignment RS485

Sub-D 9 pole female

2X22

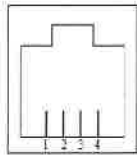


Pin	Function
1	GND
2	Reserved
3	TxD/RxD+
4	Reserved
5	Reserved
6	Reserved
7	Reserved
8	TxD/RxD-
9	Reserved

9.3. Pin Remote IO

RJ11

2X24



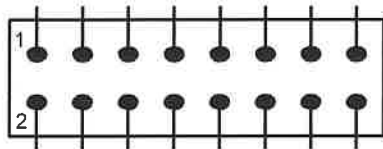
Pin	Function
1	GND
2	TxD/RxD+
3	TxD/RxD-
4	REM ID line

9.4. Pin Assignment power supply, analog en digital inputs

Male connector, straight, 16-way,
pitch 3.5mm.

Model: Wago 713-116

2X27

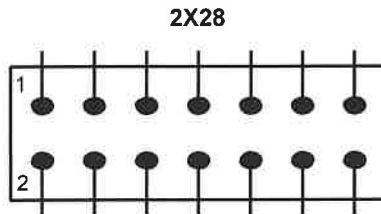


Pin	Function
1	GND
2	Temperature Input 01
3	GND
4	Temperature Input 02
5	GND
6	Temperature Input 03
7	GND
8	Pressure Input 01
9	Digital Input Supply
10	V+ 5V Supply for Pressure Sensor
11	Digital Input 02
12	Digital Input 01
13	Digital Input 04
14	Digital Input 03
15	24VAC Supply
16	24VAC Supply

9.5. Pin Assignment analog en digital inputs

Male connector, straight, 14-way,
pitch 3.5mm.

Model: Wago 713-114

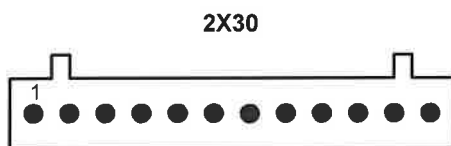


Pin	Function
1	GND
2	Temperature Input 04
3	GND
4	Temperature Input 05
5	GND
6	Pressure Input 02
7	Digital Input Supply
8	V+ 5V Supply for Pressure Sensor
9	Digital Input 06
10	Digital Input 05
11	Digital Input 08
12	Digital Input 07
13	Digital Input 10
14	Digital Input 09

9.6. Pin Assignment Digital Output

Male connector, straight, 12-way,
pitch 5mm.

Model: Wago 721-142/001-000

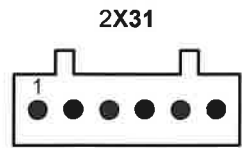


Pin	Function
1	K01 Relay Output brake contact
2	K01 Relay Output transfer contact
3	K02 Relay Output brake contact
4	K02 Relay Output transfer contact
5	K03 Relay Output brake contact
6	K03 Relay Output transfer contact
7	K04 Relay Output brake contact
8	K04 Relay Output transfer contact
9	K05 Relay Output brake contact
10	K05 Relay Output transfer contact
11	K06 Relay Output brake contact
12	K06 Relay Output transfer contact

9.7. Pin Assignment Digital Output

Male connector, straight, 6-way,
pitch 5mm.

Model: Wago 721-136/001-000



Pin	Function
1	K07 Relay Output brake contact
2	K07 Relay Output transfer contact
3	K08 Relay Output brake contact
4	K08 Relay Output transfer contact
5	K09 Relay Output brake contact
6	K09 Relay Output transfer contact