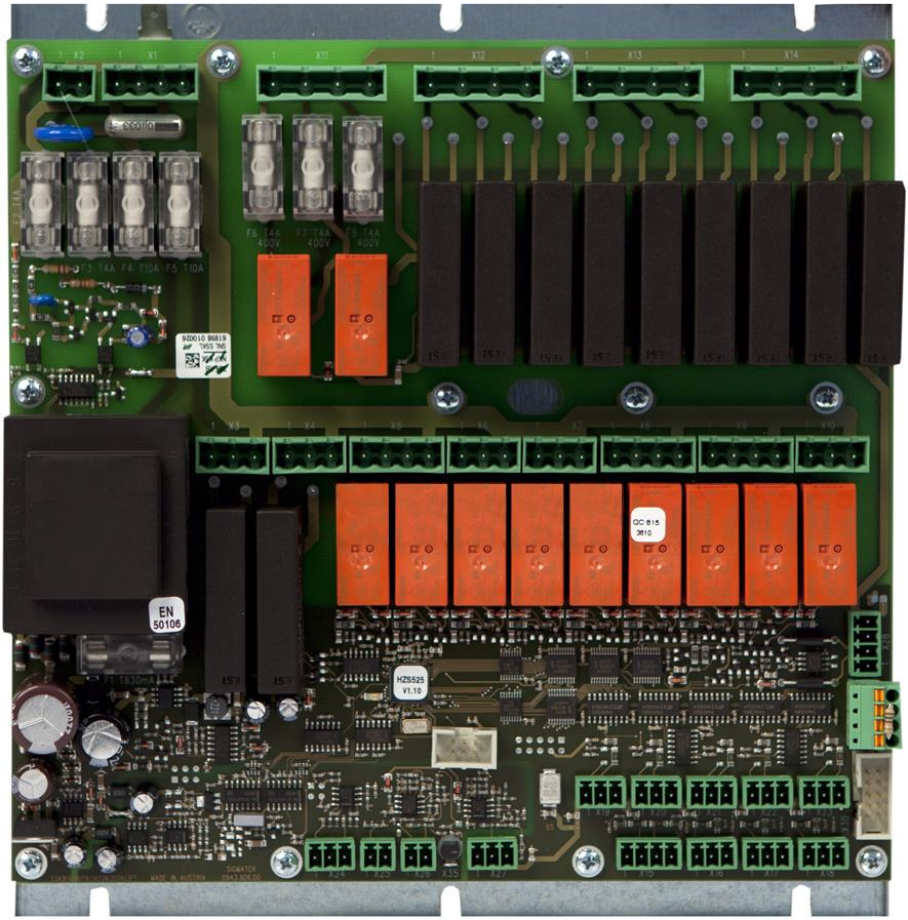
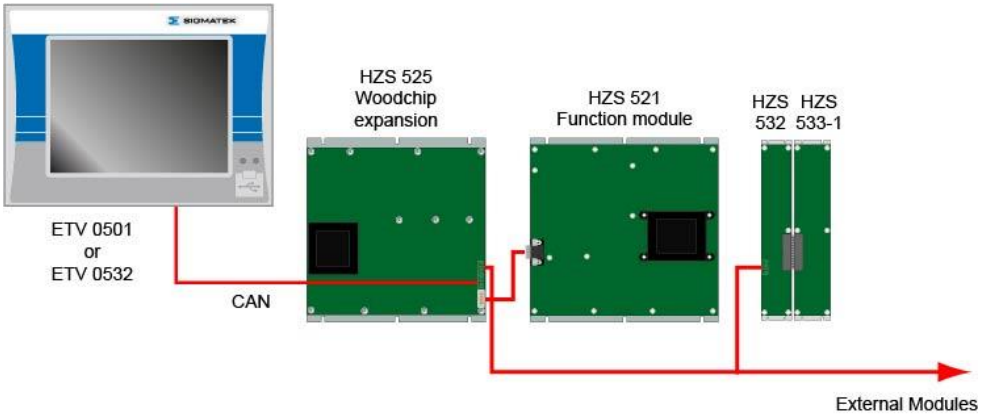
WOODCHIP EXPANSION HZS 525



System Description

The HZS 525 woodchip expansion board is used to control a woodchip heater in a modular heating system. Communication with the CPU is established over CAN bus.

The HZS 525 forms the CAN bus neutral point for connecting the HZS 521 function module and HZS 532 expansion controller.



The woodchip expansion module is supplied with 230 V AC and thereby generates the internal +24 V supply voltage. The +24 V supply for the CPU (e.g. ETV 0501) and the expansion controller is provided by the HZS 524.

The function module is mechanically mounted on a mounting plate.

Configuration

- **Function module voltage supply:**
  - 400 V AC supply (50 Hz – 60 Hz, L1/L2/L3/N/PE, 4-pin)
  - 230 V AC supply (50 Hz – 60 Hz, L/LSTB/N/PE, 4-pin)
  - 230 V AC connection Emergency Stop (LSTB/LNA, 2-pin)
  - 230 V / 18 V / 12 VA transformer with 630 mA secondary fuse → int. +24 V supply

- **230 V AC relay outputs supplied over STB and Emergency Stop with 10 AT fuse:**
  - Heating ignition blower / fan (230 V AC / 10 A / 4-pin
  - Reserve 1/2 (230 V AC / 10 A / 4-pin)
  - Mains controller (230 V AC / 3 A / 2-pin)

- **230 V AC relay outputs without STB supply, and Emergency Stop with 10 AT fuse:**
  - Return flow mixer OPEN/CLOSED (230 V AC / 3 A / 4-pin)
  - Heat exchange drive (230 VAC / 10 A / 3-pin)
  - Burner grate drive (230 V AC / 10 A / 3-pin)

- **Triac output 230 V AC (phase angle control) with supply over STB and Emergency Stop with 4 AT fuse:**
  - Induction fan (230 V AC / 3 A / 3-pin)
  - Secondary fan (230 V AC / 3 A / 3-pin)

- **400 V AC Triac outputs (zero-cross switching) with phase inverter relay for changing direction, disconnectable over mains contact with 4 AT fuse / 400 V:**
  - Fuel extraction (400 V AC / 3~ / 1 A / 4-pin)
  - Stoker (400 V AC / 3~ / 1 A / 4-pin)
  - Ash removal (400 V AC / 3~ / 1 A / 4-pin)
  - All 3 motor phases are operated over Triac outputs!
  - The phase inverter relay crosses 2 phases to reverse the direction of the motor!
  - The external mains (3 x normally open, 400 V AC) must shut down all 3 phases of the 400 V supply!

- **Digital inputs 230 V AC:**
  - STB (230 V AC / 100 ms / 1 mA / 4-pin)
  - Emergency Stop (230 V AC / 100 ms / 1 mA / 2-pin)

- **+24 V DC digital inputs:**
  - End position sensor heat exchange (+24 V / 5 ms / 5 mA / 3-pin)
  - End position sensor burner grate (+24 V / 5 ms / 5 mA / 3-pin)
  - End switch fire damper (+24 V / 5 ms / 5 mA / 3-pin)
  - Fill level fuel extraction NO/NC (+24 V / 5 ms / 5 mA / 4-pin)

- **Digital input frequency measurement +24 V DC:**
  - Speed measurement, fuel extraction (+24 V / 0.1 ms / 5 mA / 0 – 1 kHz / 3-pin)
  - Speed measurement stoker (+24 V / 0.1 ms / 5 mA / 0 – 1 kHz / 3-pin)
  - Speed measurement, ash removal (+24 V / 0.1 ms / 5 mA / 0 – 1 kHz / 3-pin)
  - Speed measurement, induction fan (+24 V / 0.1 ms / 5 mA / 0 – 1 kHz / 3-pin)
  - Speed measurement, Reserve (+24 V / 0.1 ms / 5 mA / 0 – 1 kHz / 3-pin)

- **Analog inputs: (description/ sensors/ range/Resolution/ accuracy/ connector pin)**
  - Firebed potentiometer / potentiometer / 0-5 kOhm / 5 Ohm / ±25 Ohm / 3-pin
  - Vacuum actuator/ pressure sensor / 0-10 V / 2.5 mV / ±100 mV / 3-pin
  - Burner shuttle/ PT1000 / 0 to +250 °C / 0.5 °C / ±1.0 °C / 2-pin
  - Combustion chamber temperature (optional) / NiCr-Ni Type K / 0 to +1200 °C / 1 °C / ±5 °C / 2-pin
  - Thermal couple compensation directly on the circuit board (optional) / KTY10-62 / - / - / - / -

- **CAN bus interface:**
  - Incoming CAN bus from the CPU, e.g. ETV 0501 (Phoenix 4-pin incl. +24 V DC)
  - Outgoing CAN bus for the HZS 521 (blade terminal, 10-pin, incl. +24 VDC)
  - Outgoing CAN bus for the HZS 532 expansion controller (4-pin Phoenix, incl. +24 V DC)
  - With a baud rate of 100 kbits/s, the minimum start topology can be ignored.
  - The CAN bus termination must be mounted in the end module of the CAN bus structure

Technical Data

Controller performance data

Controller	AT90CAN32
Controller frequency	16.0 MHz
Command execution time	Circa 70 ns
Interfaces	1 x CAN
Internal program memory	32 kbytes (Flash)
Internal data and/or program buffering (internal EEPROM)	1 kbyte (Flash) No battery buffering required

Power supply

Supply voltage 230 V	230 V AC ±10 % (transformers in function module)	
Supply frequency	50 - 60 Hz	
Current consumption electronics	Typically 45 mA	Maximum 90 mA
Current consumption of electronics and connected loads	Maximum 12 A	
Fuses	T630 mA transformer fuse (secondary) T10 A relay output 230 V AC with supply over STB and Emergency Stop T10 A relay output 230 V AC without supply over STB and Emergency Stop 2 x T4 A Triac output 230 V AC with supply over STB and Emergency Stop	

Supply voltage 400 V	3 x 230 V AC ±10 %
Supply frequency	50 - 60 Hz
Current consumption of electronics and connected loads	Maximum 4 A / Phase
Fuses	3 x T4 A Triac outputs 400 V AC

+24 V supply specifications

Minimum current available for external sensors and initiators	Minimum 200 mA at +24 V DC
Applicable connectors	X15, X16, X17, X18, X19, X20, X21, X22, X23, X27

Terminal requirements

Connection technology	**Connector terminals are not included in delivery!** The following sprint terminals are required: 2 x FK-MCP1.5/2-ST-3.5 Phoenix Contact spring terminal connector 10 x FK-MCP1.5/3-ST-3.5 Phoenix Contact spring terminal connector 3 x FK-MCP1.5/4-ST-3.5 Phoenix Contact spring contact connector 1 x FKC2.5/2-ST-5.08 Phoenix Contact Spring terminal connector 5 x FKC2.5/3-ST-5.08 Phoenix Contact spring terminal connector 4 x FKC.5/4-ST-5.08 Phoenix Contact spring terminal connector 4 x GFKC2.5/4-ST-7.62 Phoenix Contact spring terminal connector

230 V AC digital output specifications

Number of relays	9
Relay types	Normally open
Relays	RT 314024
Switching range	16.8 – 30 V DC
Switching current	Typically 16.7 mA at +24 V
Switching time	<10 ms
Switching power	See data sheet: Tyco Schrack RT1 series
Fuse	2 x T10 A
Connection technology	1 x 2-pin Phoenix RM5.08 mm 2 x 3-pin Phoenix RM5.08 mm 3 x 4-pin Phoenix RM5.08 mm

400 V AC phase inverter relay specifications

Number of relays	2
Relay types	Changeover contact
Relays	RT 314024
Switching range	16.8 – 30 V DC
Switching current	Typically 16.7 mA at +24 V
Switching time	<10 ms
Switching power	See data sheet: Tyco Schrack RT1 series
Fuse	2 x T4 A / 400 V
Connection technology	-

Technical data RT314024 relay

Tyco Electronics — General Purpose Relays — SCHRACK

Power PCB Relay RT1

1 pole 12 / 16 A, 1 CO or 1 NO contact
DC or AC coil
Sensitive coil 400 mW
5 kV / 10 mm coil contact, reinforced insulation
Ambient temperature 85°C (DC coil)
WG version: Product in accordance to IEC60335-1
RoHS compliant (Directive 2002/95/EC) as per product date code 0413


F0144-B

Applications
Boiler control, timers, garage door control, POS automation, interface modules

Approvals

REG.-Nr. 6106, E214025, 14385, C0786, 98.4118.01,
Technical data of approved types on request

Contact data

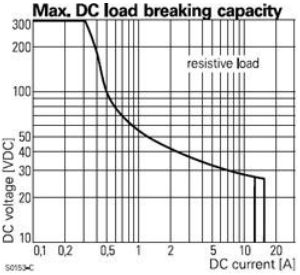
Contact configuration	1 CO or 1 NO contact	
Contact set	single contact	
Type of interruption	micro disconnection	
Rated current	12 A	16 A
Rated voltage / max.switching voltage AC	250/400 VAC	
Limiting continuous current		UL: 20 A
Maximum breaking capacity AC	3000 VA	4000 VA
Limiting making capacity, max 4 s, df 10%	25 A	30 A
Contact material	AgNi 90/10, AgNi 90/10 gold plated	
Mechanical endurance DC coil	> 30 x 10^6 cycles	
AC coil	> 10 x 10^6 cycles	
Rated frequency of operation with / without load	6 / 1200 min^{-1}	

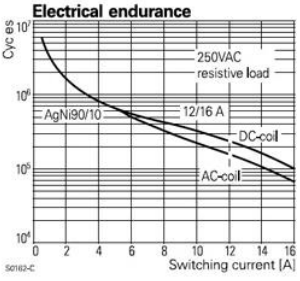
Contact ratings

Type	Load	Cycles
RT314	16 A, 250 VAC, NO contact, 85°C, DF 10%, UL508	$50x10^3$
RT314	16 A, 250 VAC, NC contact, 70°C, 30min^{-1}	$53x10^3$
RT314	20 A, 250 VAC, NO contact, 85°C, UL508	$6x10^3$
RT314	1000 W incandescent lamp, 250 VAC	$1.2x10^3$
RT314	10 A, 250 VAC, cosφ=0.6, CO contact, 70°C	$200x10^3$
RT314	5 A / 2 A, 250 VAC, cosφ=1, motor, NO contact, 10min^{-1}, 70°C	$1.1x10^6$
RT314	0.26 A / 0.01 A, 230 VAC, cosφ=0.38, valve, NO contact, 25min^{-1}	$7.6x10^6$
RT314	Pilot duty A300 (NO contact), B300 (CO/NC contact), UL508	
RT314	1hp @ 240 VAC, 1/2hp @ 120 VAC, NO contact, UL508	
RT314	AC15, 6 A, 250 VAC, NO and NC contact, 85°C, EN60947-5-1	
RT314	DC13, 2 A / 24 VDC, 0.2 A / 250 VDC, NO and NC contact, 85°C, EN60947-5-1	

Coil data

Rated coil voltage range DC coil	5...110 VDC
AC coil	24...230 VAC
Coil power DC coil	typ 400 mW
AC coil	typ 0.75 VA
Operative range	2
Coil insulation system according UL1446	class F





Specifications for the 400 V AC digital Triac outputs (zero-cross switching)

Number of relays	9
Relays	Celduc SKA20440
Switching range	3 – 30 V
Switching current	Typically 3 mA at +5 V
Switching time	<= 10 ms
Switching power	400 V / 5.0 A at 0 °C / ambient temperature 400 V / 4.0 A at 30 °C / ambient temperature 400 V / 2.6 A at 60 °C / ambient temperature Details can be found in the SKA20440 data sheet
Zero-point switching	Yes
Protective circuit	Yes (Varistor on output)
Fuse	3 x T4 A / 400 V
Connection technology	3 x 4-pin Phoenix RM7.62 mm

Specification for the 230 V AC digital triac outputs (phase angle control)

Number of relays	2
Relays	Celduc SKA20421
Switching range	3 – 30 V
Switching current	Typically 3 mA at +5 V
Switching time	<= 0.1 ms
Switching power	230 V / 5.0 A at 0 °C / ambient temperature 230 V / 4.0 A at 30 °C / ambient temperature 230 V / 2.6 A at 60 °C / ambient temperature Details can be found in the SKA20421 data sheet
Zero-point switching	no
Protective circuit	Yes (Varistor on output)
Fuse	2 x T4 A
Connection technology	2 x 3-pin Phoenix RM5.08 mm

Technical data solid state relay SKA204xx

Caractéristiques d'entrée (20°C) / *Input characteristics (20°C)*

Types / *Models*			DC INPUT			
Modèles / *References*		SKA104xx	SKA204xx	SKA114xx	SKA214xx	
Paramètre / *Parameter*	Symbol			Avec/with LED	Avec/with LED	Unit
Plage de tension de commande (Uc) / *Input voltage range (Uc)*	Uc	2,5-10	4-30(*)	3-10	7-30	VDC
Tension maximum de commande / *Maximum control voltage*	Uc max	10	30(*)	10	30	VDC
Tension minimum de commande / *Minimum control voltage*	Uc min	2,5	4(*)	3	7	VDC
Courant de fonctionnement/*Operating current*	Ic	3	3(*)	5	6	mADC
Courant maximum de commande / *Maximum control current*	Ic max	30	30	40	40	mADC
Tension de relachement/*Release voltage*	Uc off	0,8	0,8	0,8	0,8	VDC
Résistance interne / *Input internal resistor*	Rc	330	1000	220	750	Ω

(*) 3-30VDC & 2mA for random relays

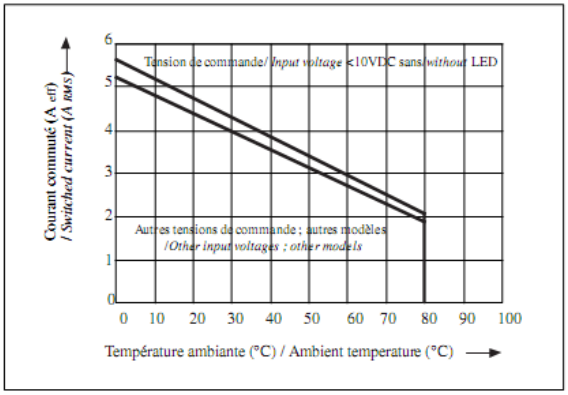
Caractéristiques générales / *General characteristics*

Paramètre / *Parameter*			Unit
Température de stockage / *Storage temperature*		-40 à/*to* +150	°C
Température de fonctionnement /*Operating temperature*		-40 à/*to* +80	°C
Tension d'isolement entrée-sortie / *Input-output isolation voltage*		4000	VRMS
Capacité entrée-sortie/ *Input-output capacity*		3	pF
Poids/ *Weight*		20	g

Caractéristiques de sortie (à 20°C) / *Output characteristics (20°C)*

Types / *Models*	AC OUPUT				
Modèles / *References*	SKA..420	SKA..421	SKA..440	SKA..441	
Paramètre / *Parameter*					Unit
Types / *Models*	Synchrone *Zero Cross*	Asynchrone *Random*	Synchrone *Zero Cross*	Asynchrone *Random*	
Tension nominale / *Nominal voltage*	230	230	400	400	VRMS
Plage tension de fonctionnement / *Operating range*	12 à/*to* 275	12 à/*to* 275	12 à/*to* 460	12 à/*to* 460	VRMS
Tension crête (écrêteur de surtension) /*Peak voltage (clamping voltage)*	600 (450)	600 (450)	900 (720)	900 (720)	VPEAK
Niveau de synchonisation / *Synchronizing level*	± 12	-	± 12	-	V
Courant nominal (voir les caractéristiques thermiques) / *Nominal current (see thermal curves)*	4	4	4	4	ARMS
Courant de surcharge accidentel admissible maximum (10ms) : / *Maximum accidental overload current (10ms) : ITSM*	100	100	100	100	APEAK
Chute tension directe (In) / *On state voltage drop (IN)*	1,6	1,6	1,6	1,6	VPEAK
Courant de fuite état bloqué (@Un/50Hz) / *Off state leakage current (@Un/50Hz)*	0,3	0,3	0,3	0,3	mARMS
Courant de charge minimum / *Minimum load current*	5	5	5	5	mARMS
Courant de maintien / *Holding current*	50	50	100	100	mA
Temps de fermeture (50Hz) / *Turn on time (50Hz)*	10	0,1	10	0,1	ms
Temps d'ouverture (50Hz) / *Turn off time (50Hz)*	10	10	10	10	ms
Fréquence d'utilisation / *Operating frequency*	10 à/*to* 440	10 à/*to* 440	10 à/*to* 440	10 à/*to* 440	Hz
dv/dt état bloqué / *Off state dv/dt*	500	500	500	500	V/µs
I²t(<10ms)	50	50	50	50	A^2s
di/dt non répétitif / *No repetitive di/dt*	20	20	20	20	A/µs
Homologation / *Approval*	UL-VDE				

Fig.2 Caractéristiques thermiques / *thermal curves :*



230 V AC digital output Emergency Stop and STB specifications

Number	2
Input delay	100 ms
Connection technology	1 x 2-pin Phoenix RM5.08 mm 1 x 4-pin Phoenix RM5.08 mm

+24 V DC digital input specifications

Input voltage	Typically +24 V	Maximum +30 V
Signal level	low: <+8 V	High: >+14 V
Switching threshold	Typically +11 V	
Input current	5 mA at +24 V	
Input delay	Typically 5 ms	
Number	5	
Connection technology	3 x 3-pin Phoenix RM3.5 mm 1 x 4-pin Phoenix RM3.5 mm	

+24 V DC digital frequency measurement input specifications

Number	1
Input signal	+24 V
Input frequency	Maximum 1 kHz
Signal evaluation	1X
Counter analysis	8-bit
Input current	5 mA at +24 V
Input delay	0.1 ms
Number	5
Connection technology	5 x 3-pin Phoenix RM3.5 mm

0 - 5 kOhm analog input specifications

Number of channels	1
Measurement range	0 to 5 kOhms
Measurement value	0 to 5000
Resolution	1 Ohm
Measurement precision	±25 Ohms
Input resistance	100 kOhm
Short circuit and open sensor detection	Sensor break detection only
Connection technology	1 x 3-pin Phoenix RM3.5 mm

0 - 10 V analog input specifications

Number of channels	1
Measurement range	0 to 10 V
Measurement value	0 to 10000
Resolution	1 mV
Measurement precision	±50 mV
Input resistance	100 kOhms
Short circuit and open sensor detection	Sensor break detection only
Connection technology	1 x 3-pin Phoenix RM3.5 mm

PT 1000 analog input specifications

Number of channels	1
Sensor Type	PT1000
Measurement range	0 to +250 °C
Sensor range	1000.0 - 1941.0 Ohm
Measurement value	0 to 2500
Resolution	0.1 °C
Measurement precision	±1.0 °C
Typical current measurement	1.0 mA
Input resistance	8.2 kOhm
Short circuit and open sensor detection	yes
Connection technology	1 x 2-pin Phoenix RM3.5 mm

NiCr-Ni (Type K, optional) analog input specifications

Number of channels	1
Sensor Type	NiCr-Ni (type K thermo element)
Measurement range	0 to +1200 °C
Sensor range	0 - 48.838 mV
Measurement value	0 to 12000
Resolution	0.1 °C
Measurement precision	±5 °C
Input resistance	41.2 kOhm
Short circuit and open sensor detection	Sensor break detection only
Connection technology	1 x 2-pin Phoenix RM 3.5 mm

KTY10-62 (thermal couple compensation, optional) analog input specifications

Number of channels	1
Sensor Type	KTY10-62 (ohmic temperature sensor)
Measurement range	-50 – +100 °C
Sensor range	1035.9 - 3399.9 Ohm
Measurement value	-500 to 1000
Resolution	0.1 °C
Measurement precision	±1.0 °C
Typical current measurement	0.8 mA
Input resistance	10 kOhm
Connection technology	Internal

Mechanics

Mechanical dimensions	220 mm x 210 mm x 50 mm (L x W x H, the maximum height is based on the height of the transformer)

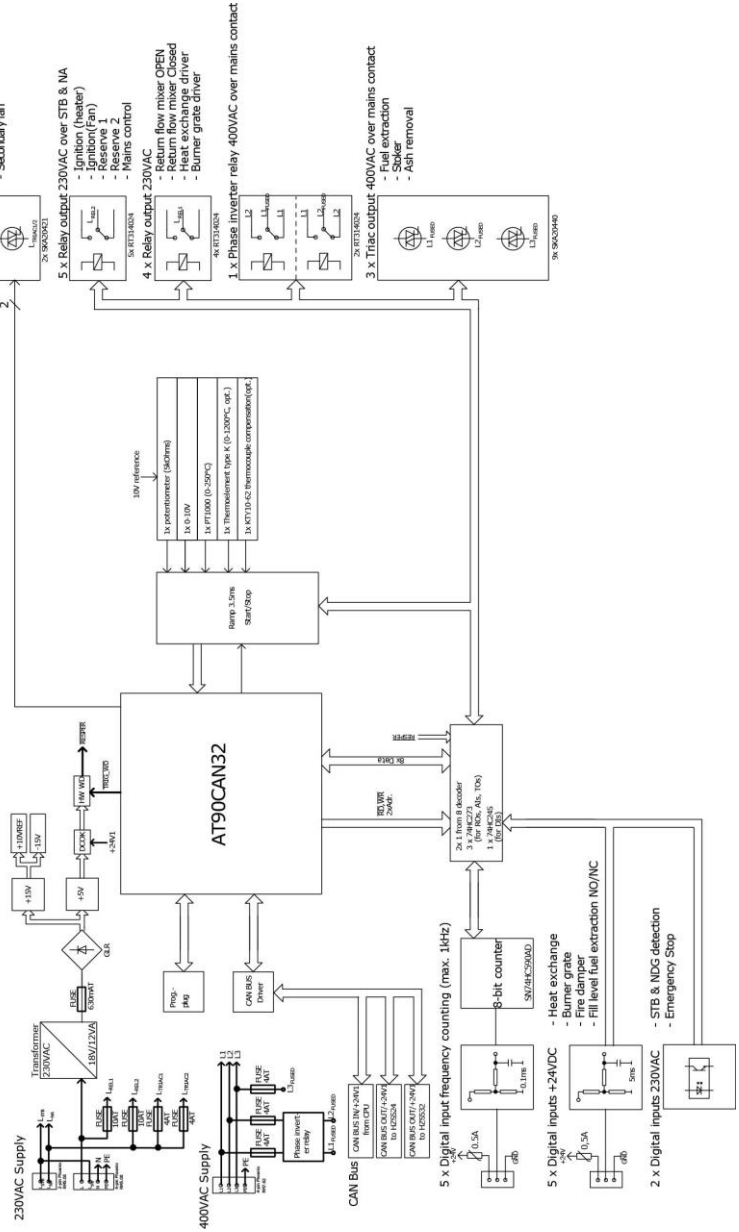
Miscellaneous

Article number	05-895-525
HW version	1.x

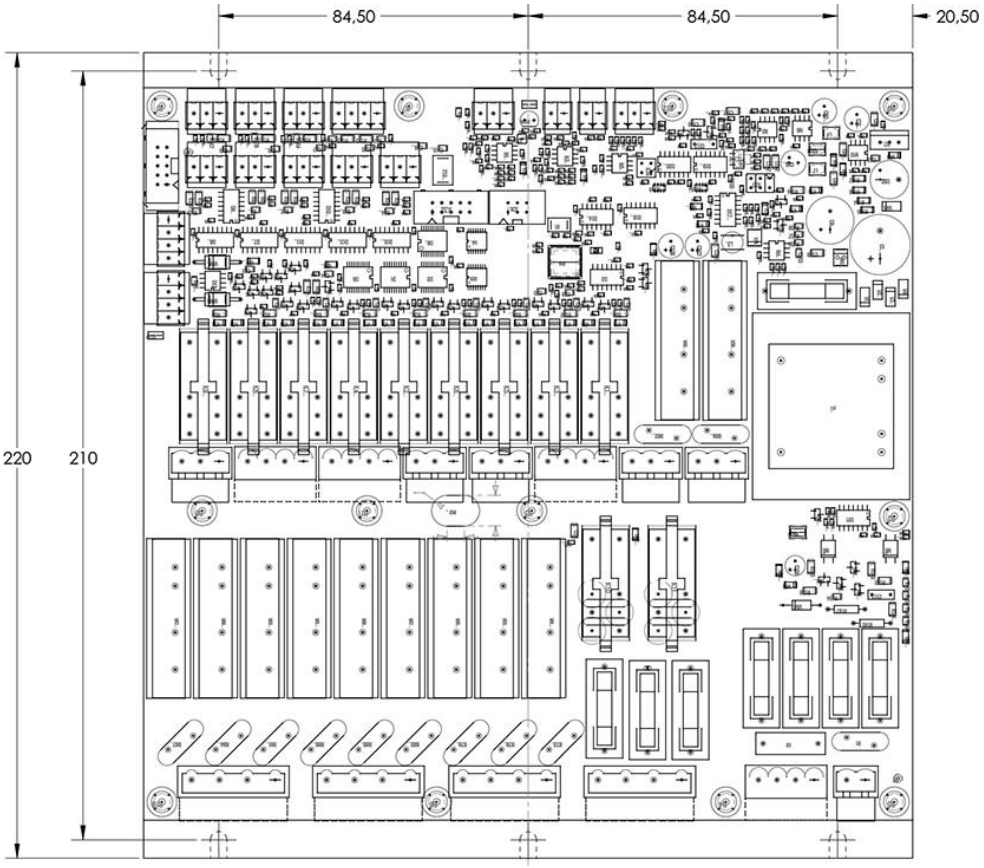
Environmental conditions

Storage temperature	-20 – +70 °C	
Operating temperature	0 – +60 °C	
Humidity	10 - 90 %, non-condensing	
EMC stability	in accordance with EN 61000-6-2 (industrial area)	
EMC - noise generation	according to EN 61000-6-3 (living area)	
Shock resistance	EN 60068-2-27	150 m/s²

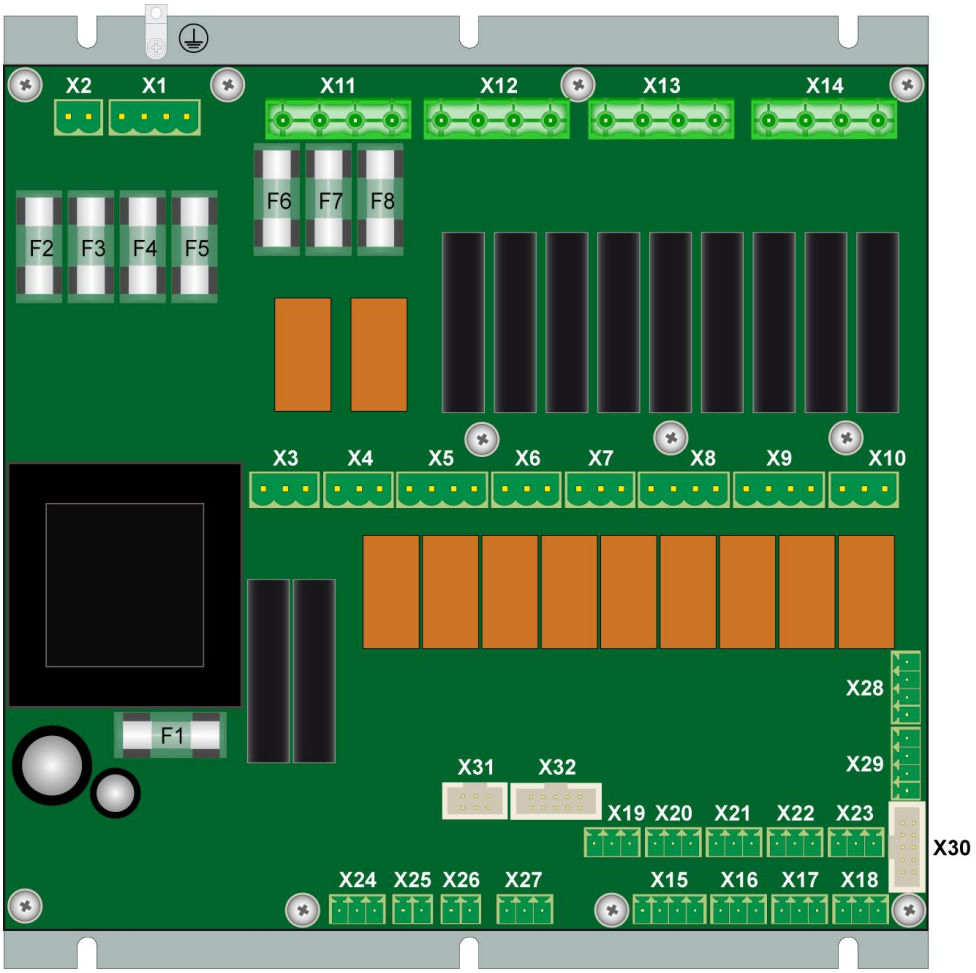
Block Diagram



Mechanical Dimensions



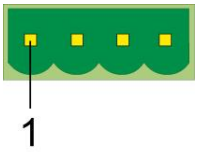
Connector Layout



230 V AC supply connector pin layout

X1 – 230 V AC power supply/STB

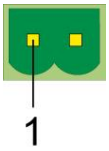
4-pin Phoenix connector RM5.08



Pin	Signal	Function
1	L	Phase
2	L-STB	Phase switched over STB
3	N	Neutral
4	PE	Earth wire

X2 - 230 V AC Emergency Stop

2-pin Phoenix connector RM5.08

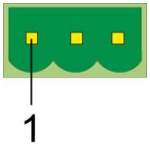


Pin	Signal	Function
1	L-STB	Phase switched over STB
2	L-NA	Phase switched over Emergency Stop

230 V AC Triac output connector pin assignment

X3 – 230 V AC-Triac output induction fan

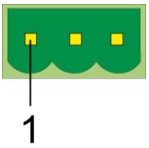
3-pin Phoenix connector RM5.08



Pin	Signal	Function
1	$L_{induction\ fan}$	TO1: induction fan
2	N	Neutral
3	PE	Earth wire

X4 – 230 V AC Triac output secondary fan

3-pin Phoenix connector RM5.08

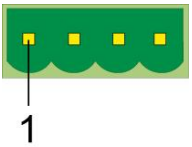


Pin	Signal	Function
1	$L_{secondary\ fan}$	TO2 Secondary fan
2	N	Neutral
3	PE	Earth wire

230 V AC relay output connector pin assignment

X5 – 230 V AC relay output return flow mixer

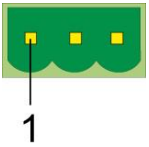
4-pin Phoenix connector RM5.08



Pin	Signal	Function
1	$L_{return\ flow\ mixer\ OPREN}$	RO1 return flow mixer OPEN
2	$L_{return\ flow\ mixer\ CLOSED}$	RO2 return flow mixer CLOSED
3	N	Neutral
4	PE	Earth wire

X6 – 230 V AC relay output heat exchange driver

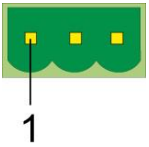
3-pin Phoenix connector RM5.08



Pin	Signal	Function
1	$L_{heat\ exchange}$	RO3 Heat exchange driver
2	N	Neutral
3	PE	Earth wire

X7 – 230 V AC relay output burner grate driver

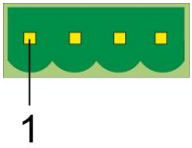
3-pin Phoenix connector RM5.08



Pin	Signal	Function
1	$L_{heat\ exchange}$	RO4 Burner grate driver
2	N	Neutral
3	PE	Earth wire

X8 – 230 V AC ignition, blower heating/fan

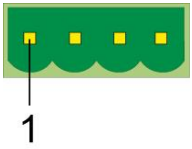
4-pin Phoenix connector RM5.08



Pin	Signal	Function
1	$L_{ignition\ blower\ heating}$	RO5 Ignition blower, heating
2	$L_{ignition\ blow\ fan}$	RO6 Ignition blower, fan
3	N	Neutral
4	PE	Earth wire

X9 – 230 V AC relay output reserve 1/2

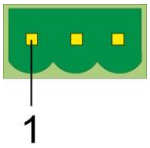
4-pin Phoenix connector RM5.08



Pin	Signal	Function
1	$L_{Reserve\ 1}$	RO7: Reserve 1
2	$L_{Reserve\ 2}$	RO8: Reserve 2
3	N	Neutral
4	PE	Earth wire

X10 – 230 V AC relay output, mains control

3-pin Phoenix connector RM5.08

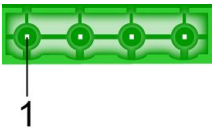


Pin	Signal	Function
1	$L_{mains\ control}$	RO9 Mains control
2	N	Neutral
3	PE	Earth wire

400 V AC supply connector pin layout

X11 – 400 V AC power line

4-pin Phoenix RM7.62

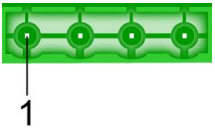


Pin	Signal	Function
1	L1	Phase 1
2	L2	Phase 2
3	L3	Phase 3
4	PE	Earth wire

400 V AC connector layout of Triac outputs

X12 – 400 V AC Triac output, fuel extraction

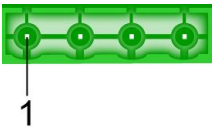
4-pin Phoenix RM7.62



Pin	Signal	Function
1	L1fuel extraction	TO3 Fuel extraction (L1)
2	L2fuel extraction	TO4 Fuel extraction (L2)
3	L3fuel extraction	TO5 Fuel extraction (L3)
4	PE	Earth wire

X13 – 400 V AC Triac output, stoker

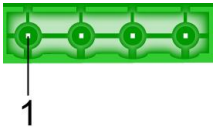
4-pin Phoenix RM7.62



Pin	Signal	Function
1	L1stoker	TO6 Stoker (L1)
2	L2Stoker	TO7 Stoker (L2)
3	L3Stoker	TO8 Stoker (L3)
4	PE	Earth wire

X14 – 400 V AC-Triac output, ash removal

4-pin Phoenix RM7.62

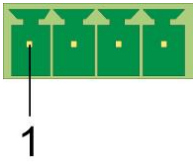


Pin	Signal	Function
1	$L1_{ash\ removal}$	TO9: ash removal (L1)
2	$L2_{ash\ removal}$	TO10: ash removal (L2)
3	$L3_{ash\ removal}$	TO11: ash removal (L3)
4	PE	Earth wire

+24 V DC digital input connector layout

X15 – +24 V DC digital input, fuel extraction fill level NO/NC

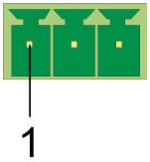
4-pin Phoenix RM3.5 connector



Pin	Signal	Function
1	+24 V2	+24 V DC
2	DI1	DI1 NC fuel extraction fill level
3	DI2	DI2 NO fuel extraction fill level
4	GND	GND

X16 – +24 V DC digital input, heat exchange end position

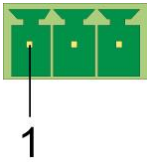
3-pin Phoenix RM3.5 connector



Pin	Signal	Function
1	+24 V2	+24 V DC
2	DI3	DI3 Heat exchange end position sensor
3	GND	GND

X17 – +24 V DC digital input, burner grate end position

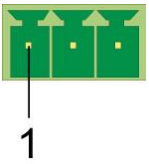
3-pin Phoenix RM3.5 connector



Pin	Signal	Function
1	+24 V2	+24 V DC
2	DI4	DI4 Burner grate end position
3	GND	GND

X18 – +24 V DC digital input, fire damper end position

3-pin Phoenix RM3.5 connector

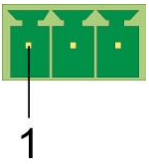


Pin	Signal	Function
1	+24 V2	+24 V DC
2	DI5	DI5 fire damper end position
3	GND	GND

+24 V DC connector layout for counter inputs

X19 – +24 V DC counter input, fuel extraction rotation speed

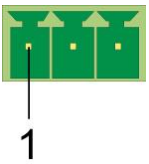
3-pin Phoenix RM3.5 connector



Pin	Signal	Function
1	+24 V2	+24 V DC
2	DI6	DI6 Fuel extraction rotation speed
3	GND	GND

X20 – +24 V DC counter input, stoker rotation speed

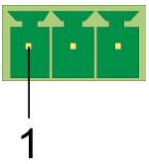
3-pin Phoenix RM3.5 connector



Pin	Signal	Function
1	+24 V2	+24 V DC
2	DI7	DI7 Stoker rotation speed
3	GND	GND

X21 – +24 V DC digital input, ash removal rotation speed

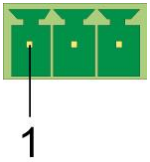
3-pin Phoenix RM3.5 connector



Pin	Signal	Function
1	+24 V2	+24 V DC
2	DI8	DI8 Ash removal rotation speed
3	GND	GND

X22 – +24 V DC digital input, induction fan speed

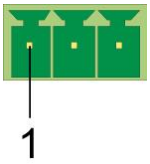
3-pin Phoenix RM3.5 connector



Pin	Signal	Function
1	+24 V2	+24 V DC
2	D9	DI9 Induction fan speed
3	GND	GND

X23 – +24 V DC digital input, reserve rotation speed

3-pin Phoenix RM3.5 connector

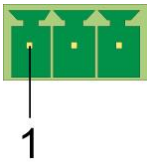


Pin	Signal	Function
1	+24 V2	+24 V DC
2	D10	DI10 Reserve rotation speed
3	GND	GND

Connector Layout of Analog Inputs

X24 – analog input firebed potentiometer

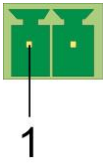
3-pin Phoenix RM3.5 connector



Pin	Signal	Function
1	POTI_VCC	POTI_VCC
2	AI1	AI1 Firebed potentiometer
3	POTI_GND	POTI_GND

X25 – analog input burner shuttle

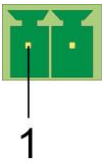
2-pin Phoenix RM3.5 connector



Pin	Signal	Function
1	AI2	AI2 Burner shuttle
2	AGND	AGND

X26 – analog input, combustion chamber temperature (optional)

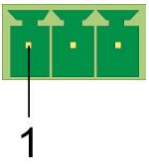
2-pin Phoenix RM3.5 connector



Pin	Signal	Function
1	AGND	AGND
2	AI3	AI3 Combustion chamber temperature

X27 – analog input, vacuum actuator

3-pin Phoenix RM3.5 connector

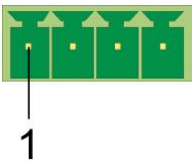


Pin	Signal	Function
1	+24 V2	+24 V DC
2	AI4	AI4 Vacuum actuator
3	GND	GND

CAN bus connector layout

X28 – CAN bus IN (from CPU)

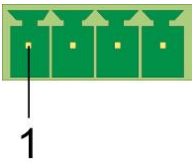
4-pin Phoenix connector RM5.08



Pin	Signal	Function
1	+24 V3	+24 V DC
2	CAN_A	CAN_A
3	CAN_B	CAN_B
4	GND	GND

X29 – CAN bus OUT (to HZS 532)

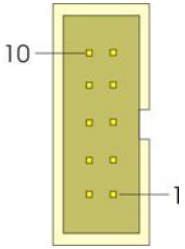
4-pin Phoenix connector RM5.08



Pin	Signal	Function
1	+24 V3	+24 V DC
2	CAN_A	CAN_A
3	CAN_B	CAN_B
4	GND	GND

X30 – CAN bus OUT (to HZS 524)

10-pin blade terminal RM2.54

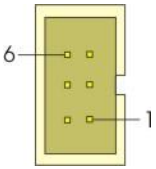


Pin	Signal	Function
1	CAN_A	CAN_A
2	CAN_B	CAN_B
3	GND	GND
4	GND	GND
5	+24 V3	+24 V DC
6	+24 V3	+24 V DC
7	+24 V3	+24 V DC
8	N.c.	N.c.
9	GND	GND
10	GND	GND

Pin layout for programming connectors

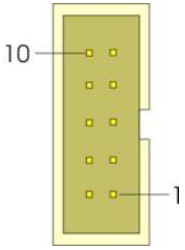
X31 – Programming connector strip for controller

6-pin blade terminal RM 2.54



X32 – JTAG interface for controller (not placed)

10-pin connector RM2.54

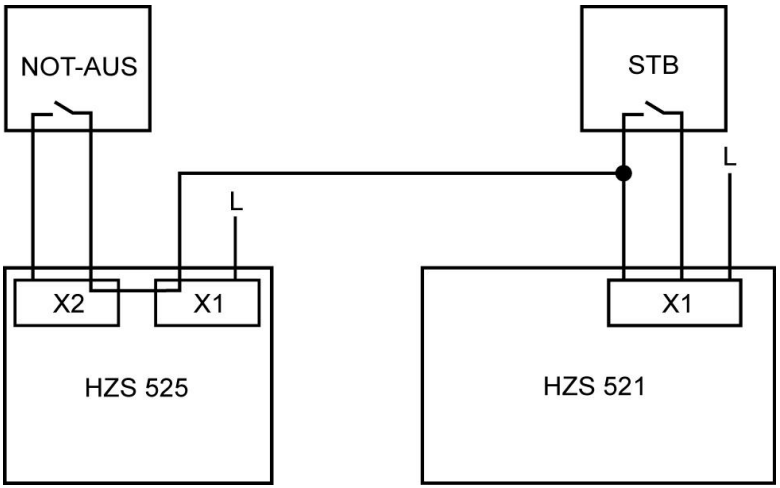


STB and Emergency Stop switch (temperature safety limiter)

The STB and Emergency Stop switch must be wired externally!

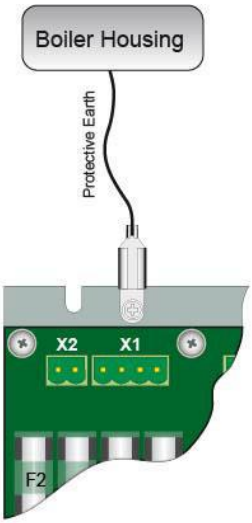
Activates the STB and Emergency Stop switch; the following 230 V AC outputs in the function module are then no longer powered:

- 230 - V AC relay output: Ignition blower heater/fan, X8
- 230 - V AC relay output: Reserve 1/2, X9
- 230 - V AC relay output: Mains control for 400 V AC, X10
- Phase angle control Induction fan, X3
- Phase angle control Secondary fan, X4



Earth connection

The earth contact on the mounting plate must be electrically connected to the boiler.



Wiring Guidelines

The signals recorded by the analog inputs are very small in comparison to the digital signals. To ensure error-free operation, a careful wiring method must be followed:

- The lines connected to the source of the analog signals must be as short as possible and parallel wiring to digital signal lines must be avoided.
- The signal lines must be shielded.
- 230 V AC lines (power circuit and relay outputs etc.) must not be wired parallel to analog and digital input lines.

Wiring guidelines for digital inputs

The input filters used, which suppress noise signals, allow operation in harsh environmental conditions. In addition, a careful wiring method is recommended to ensure error-free function.

The following guidelines should be observed:

- Avoid parallel connections between input lines and load bearing or AC circuits.
- Correct wiring to mass

General information on the relay outputs

All relay coils are powered by the internal +24 V DC supply. The cross sectional area of the relay outputs must be large enough for the maximum continuous current at 230 V AC for each connected load as used in the specifications for the relay outputs. It is important to note that at high currents, thermal loads affect the wiring and with continuous over loading can lead to a break down! Hi voltages can current leakage or arcing between different potentials!

To ensure error-free operation, a careful wiring method must be followed.

- Avoid parallel wiring between input lines and load-bearing circuits.

Wiring guidelines for the analog input

The signals recorded by the analog modules are very small in comparison to the digital signals. To ensure error-free operation, a careful wiring method must be followed.

- The connection lines to the source of the analog signals must be as short as possible and parallel wiring to digital signal lines or AC circuits must be avoided.
- The signal lines should be 2-pin shielded or twisted pair wires.

Measuring temperature with thermo elements

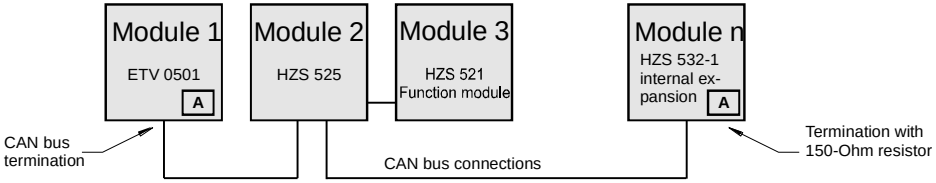
Temperature measurement using thermocouples is based on the temperature-dependent voltage, which is generated through the combination of two conductors from different metals (alloys); this is called the Seebeck effect.

This voltage exists therefore not only at the measurement point (where it is desired) but also at the coupling between the thermo element conductors and the copper connection (connector clamp). Thermo voltage at location is undesired, however, it is unavoidable. This means that a thermo element always measures a relative temperature (temperature difference between the sensor tips and the coupling).

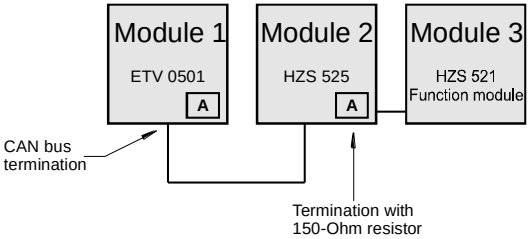
An exact measurement is therefore only possible if the voltage corresponding to temperature of the coupling is measured and added the voltage at the measurement point. There is no room temperature compensation

CAN Bus Termination

In a CAN bus system, both end modules must be terminated. This is necessary to avoid transmission errors caused by reflections in the line.



If the HZS 532-1 internal expansion is an end module, the termination must be made on the HZS 532-1 (connector plug incl. terminating resistor removed from X29 of the HZS 525 function module).



A = termination resistor

If the woodchip HZS 525 with the HZS 521 function module is an end module, the termination must be made on the HZS 525-M (connector plug X29 incl. terminating resistor).

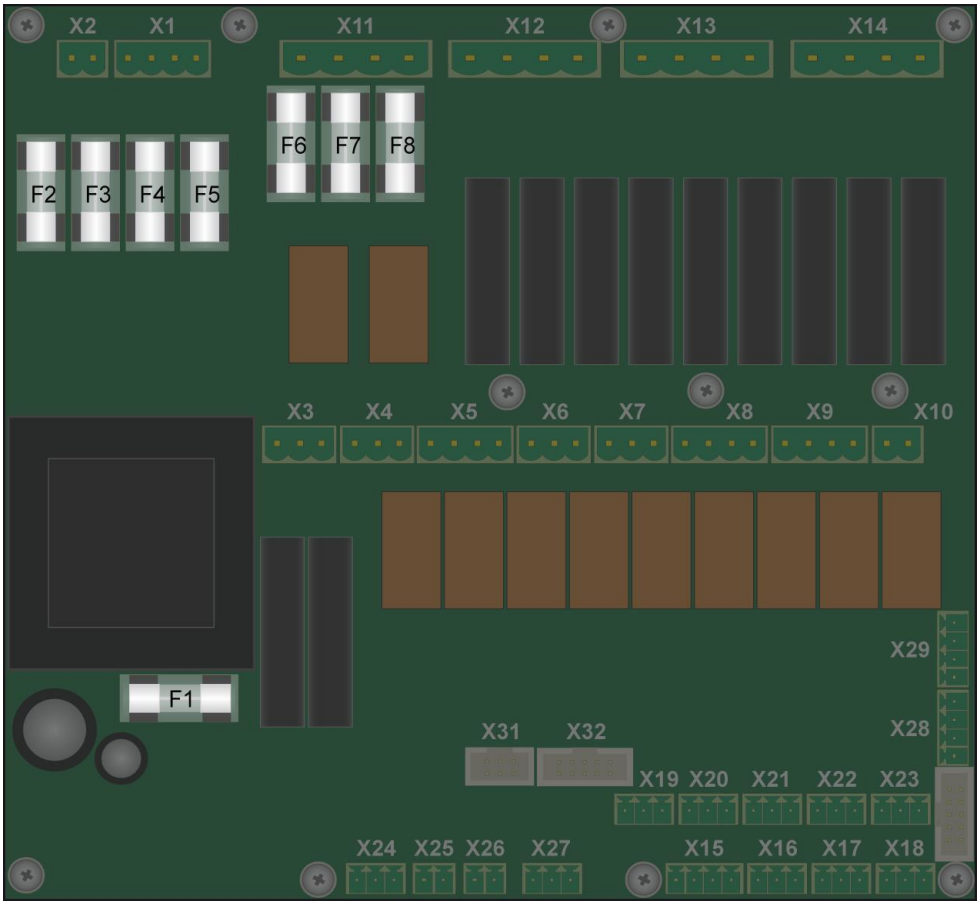
The CAN termination has a 150-Ohm terminating resistor between CAN A and CAN B.

Fuses

The fuses may only be exchanged by qualified personnel after the 230 V AC power supply has be disconnected! Current safety regulations and rules must be observed!

The power supply for the electronics as well as all 230 V AC circuits is protected by micro fuses.

When changing the fuses, please observe the following overview with the assignment of the fuses on the power board:



Fuse	Value	Assignment
F1	T630 mA	230 V AC fuse: internal electronics (secondary side of transformer)
F2	T4 A	230 V AC fuse over STB and Emergency Stop: phase angle 1 - induction fan
F3	T4 A	230 V AC fuse over STB and Emergency Stop: phase angle 2 - induction fan
F4	T10 A	230 V AC fuse: return flow mixer / heat exchange driver / burner grate driver
F5	T10 A	230 V AC fuse over STB and Emergency Stop: ignition blower/ reserve / mains controller
F6	T4 A	400 V AC fuse: Phase L1
F7	T4 A	400 V AC fuse: Phase L2
F8	T4 A	400 V AC fuse: Phase L3

PTC Fuse

Additionally protected with self-resetting PTC fuses:

Fuse	Value	Label	Assignment		
F10	0.5 A	+24 V 2	+24 V output for digital inputs:		
			DI1, DI2	X15	Fuel extraction fill level
			DI3	X16	end position sensor, heat exchange
			DI4	X17	end position, burner grate
			DI5	X18	end position, fire damper
			DI6	X23	rotation speed, reserve
			DI7	X22	rotation speed, induction fan
			DI8	X21	rotation speed, ash removal
			DI9	X20	rotation speed, stoker
			DI10	X19	rotation speed, fuel extraction
			AI4	X27	analog input 0-10 V

These PTC fuses are maintenance free and can only be changed by SIGMATEK !

The PTC fuse remains high ohmic as long as current is applied. The PTC fuse provides continuous protection until the error is corrected or the current is removed. During the self-reset, the PTC fuse resistance quickly returns to its output value

AT90CAN32 Port Assignment

PORT	I/O	Signal	Description of functions
PA0	I/O	D1	Data line D0
PA1	I/O	D1	Data line D1
PA2	I/O	D2	Data line D2
PA3	I/O	D3	Data line D3
PA4	I/O	D4	Data line D4
PA5	I/O	D5	Data line D5
PA6	I/O	D6	Data line D6
PA7	I/O	D7	Data line D7
PB0	Output	\START_RAMPE	\Start for AI ramp
PB1	Output	SCK	Controller programming: Clock
PB2	I/O	PB1	Test point 1 (X101)
PB3	I/O	PB2	Test point 2 (X102)
PB4	I/O	PB3	Test point 3 (X103)
PB5	I/O	PB4	Test point 4 (X104)
PB6	I/O	PB5	Test point 5 (X105)
PB7	Output	LED	Status display
PC0	Output	A08	Address line A08
PC1	Output	A09	Address line A09
PC2	Output	A10	Address line A10
PC3	Output	A11	Address line A11
PC4	I/O	N.C.	Not connected
PC5	I/O	N.C.	Not connected
PC6	I/O	N.C.	Not connected
PC7	I/O	N.C.	Not connected
PD0	input	Start	Start signal for AI
PD1	input	AI	AI input
PD2	input	STOP	Stop signal for AI
PD3	input	ZEROCR	Zero cross (null point crossover detection)
PD4	I/O	N.C.	Not connected
PD5	Output	\CANTX	CAN: Transmit data
PD6	input	\CANRX	CAN: Receive data
PD7	I/O	N.C.	Not connected
PE0	input	PDI	Controller programming: Serial Data input
PE1	Output	PDO	Controller programming: Serial Data Output
PE2	Output	\TRIG_WD	Hardware Watchdog trigger
PE3	Output	PAS1	Phase angle 1 - induction fan
PE4	Output	PAS2	Phase angle 2 - secondary fan
PE5	I/O	N.C.	Not connected
PE6	I/O	N.C.	Not connected
PE7	I/O	N.C.	Not connected
PF0	I/O	N.C.	Not connected
PF1	I/O	N.C.	Not connected
PF2	I/O	N.C.	Not connected
PF3	I/O	N.C.	Not connected
PF4	input	TCK	JTAG Test Clock
PF5	input	TMS	JTAG Test Mode Select Input
PF6	Output	TDO	JTAG Test Data Output
PF7	input	TDI	JTAG Test Data Input

PG0	Output	\WR	Release for AI, RO or TO
PG1	Output	\RD	Release for DI
PG2	I/O	N.C.	Not connected
PG3	I/O	N.C.	Not connected
PG4	I/O	N.C.	Not connected

Addressing

Address 16-Bit	Access	Function	Description
$00xx	RD	\CS_R0	Read digital inputs DI01-05, DI_STB and DI_NA
$01xx	RD	\CS_R_C1	Read digital counter input DI6
$02xx	RD	\CS_R_C2	Read digital counter input DI7
$03xx	RD	\CS_R_C3	Read digital counter input DI8
$04xx	RD	\CS_R_C4	Read digital counter input DI9
$05xx	RD	\CS_R_C5	Read digital counter input DI10
$00xx	WR	\CS_W0	Write digital outputs RO01-08
$01xx	WR	\CS_W1	Write digital outputs RO09-10 and TO03-0
$02xx	WR	\CS_W2	Write digital outputs RO09-10 and TO03-0

I/O Ports

Port/Bit	I/O	Signal	Descriptions of functions: Read digital inputs DI01-08
IN-PORT0-0	input	DI03	Digital Input 3: Heat exchange end position sensor, active = log.1
IN-PORT0-1	input	DI04	Digital Input 4. Burner grate end position sensor, active = log.1
IN-PORT0-2	input	DI05	Digital Input 5 Fire damper end position sensor, active = log.1
IN-PORT0-3	input	DI01	Digital Input 1: Fuel extraction NC fill level, active = log.1
IN-PORT0-4	input	DI02	Digital Input 2: Fuel extraction NO fill level, active = log.1
IN-PORT0-5	input	GND	GND
IN-PORT0-6	input	DI_STB	Digital input STB : STB detection, active = log.1
IN-PORT0-7	input	DI_NA	Digital input NA: Emergency Stop detection, active = log.1

Port/Bit	I/O	Signal	Descriptions of functions: Digital outputs RO01-08
OUT-PORT0-0	Output	RO01	Relay output 01: Return flow mixer OPEN, log: Select
OUT-PORT0-1	Output	RO02	Relay output 02: Return flow mixer CLOSED, log: Select
OUT-PORT0-2	Output	RO03	Relay output 03: heat exchange, log1: Select
OUT-PORT0-3	Output	RO04	Relay output 04: burner grate, log1: Select
OUT-PORT0-4	Output	RO05	Relay output 05: ignition blower heating, log1: Select
OUT-PORT0-5	Output	RO06	Relay output 06: ignition blower fan, log1: Select
OUT-PORT0-6	Output	RO07	Relay output 07: - reserve 1, log1: select
OUT-PORT0-7	Output	RO08	Relay output 08: - reserve 2, log1: select

Port/Bit	I/O	Signal	Descriptions of functions: Digital outputs RO09-12 and TRIAC 1-3
OUT-PORT1-0	Output	RO09	Relay output 09: mains contact, log1: Select
OUT-PORT1-1	Output	RO10	Relay output 10: 400V AC phase inverter L1 & L2, log1: Select
OUT-PORT1-2	Output	TO03	Triac output 03: 400V AC fuel extraction, log1: Select
OUT-PORT1-3	Output	TO04	Triac output 04: 400V AC stoker, log1: Select
OUT-PORT1-4	Output	TO05	Triac output 05: 400V AC ash removal, log1: Select
OUT-PORT1-5	Output	N.C.	Not connected
OUT-PORT1-6	Output	N.C.	Not connected
OUT-PORT1-7	Output	N.C.	Not connected

Port/Bit	I/O	Signal	Descriptions of functions: Digital outputs SEL_AI1-8
OUT-PORT2-0	Output	SEL_AI1	Digital output 1: Output select firebed potentiometer, log1: Select
OUT-PORT2-1	Output	SEL_AI2	Digital output 2: Output select burner shuttle, log1: Select
OUT-PORT2-2	Output	SEL_AI3	Digital output 3: Output select combustion chamber temperature, log1: Select
OUT-PORT2-3	Output	SEL_AI4	Digital output 4: Output select vacuum actuator, log1: Select
OUT-PORT2-4	Output	SEL_AI5	Digital output 5: Temperature compensation select output, log1: select
OUT-PORT2-5	Output	N.C.	Not connected
OUT-PORT2-6	Output	N.C.	Not connected
OUT-PORT2-7	Output	N.C.	Not connected

525 Module Identification: Atmel AVR AT90CAN32 (Internal FLASH)

(Labels are based on the C-DIAS Labels and are managed under C-DIAS)

Address	DATA	Description
		Organization of data in bytes
00	$xx	Checksum from CDIAS header (addresses 1 to 5) = 5 bytes
01	123	Identification
02	230	Module group 230 = Biomass heating control
03	25	Variant HZS 525 = Function module 5
04	5	Number of channels HZS 525 = function module 5
05	$10	Hardware Version $XY ($10=HW 1.0, $32=HW 3.2)

Checksum formula:

- See CDIAS hardware identification

HZS 525 Calibration Data: Atmel AVR AT90CAN32 (internal FLASH)

Address	DATA	Description
		Organization of data in Words
$40	$xxxx	Header checksum (2 words) + length of reference data (70 words) = 72 words
$42	12345	Identification
$44	26	Length of the reference data in Words
$46	25	Variant 25 = HZS 525 = function module 5 woodchip expansion
$48	10003	Vref [mV] for converting AI to absolute voltage Not supported since measurement is only possible from 0.6 to 3.3 V! e.g. for 0 to 48 mV 0 to 48 mV, offset and gain from the amplifier are also required!
$4A	0	Vref [d] = Ramp Stop value at the time of calibration for the reference voltage compensation (drift of C) at 0 to 48 mV and 0 to 10 V, etc. Not supported, since by the standardization of AI to Ramping value = Stop at 10000, a reference voltage correction already occurs.
$4C	6346	Ramp start voltage [mV] /Vref [mV] * 10000 = the ratio Start/Vref for the resistance measurement
$50	32986	Ramp stop voltage [mV] /Vref [mV] * 10000 = the ratio Start/Vref for the resistance measurement
$54	0	reserved
$56	0	reserved
$58	0	reserved
$5A	0	reserved
$5C	0	reserved
$5E	0	reserved
$60	Mul	AI1 potentiometer 0 - 5 k Offset
$62	10000	AI1 Multiplier
$64	Div	AI1 Divisor
$66	Mul	AI2 series resistance - PT1000 0°C - +250°C (1000 Ω (- 1941 Ω)
$68	10000	AI2 Multiplier
$6A	Div	AI2 Divisor
$6C	8200	AI3 Offset – NiCr-Ni Type K 0 °C - +1200 °C (0 mV – 48.828 mV)

$6E	1	AI3 Multiplier
$70	1	AI3 Divisor
$72	-1186	AI4 0 - 10 V Offset
$74	10000	AI4 Multiplier
$76	16443	AI4 Divisor
$78	9992	AI5 series resistor – KTY10-62 –50 °C – +100 °C (1308.9 Ω – 3400 Ω)
$7A	1	AI5 Multiplier
$7C	1	AI5 Divisor

Calculating the analog input values for AI (0 V to+10 V)

Example: AI (0 V to +10 V)

Offset -1186 d
Gain Multiplier 10000 d (resolution fix)
Gain Divisor 16443 d

Standardized VALUE = (read analog input values + Offset)*Gain multiplier /Gain divisor

Example: (Display)
Value for 0 V: [1186 + (-1186)] x 10000 / 16443 = 00000
Value for +10 V: [17629 + (-1186)] x 10000 / 16443 = 10000