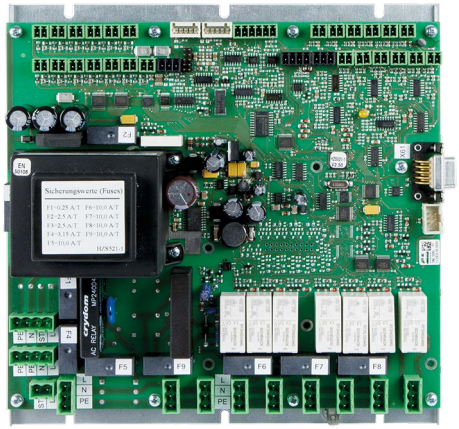
Boiler Module Power Board
HZS 521-1



This heating system has a modular construction. The HZS 521-1 function module is a mod-ule used for the boiler.

It communicates with the CPU module and executes the commands sent. The HZS is a simple component that is used to control automated processes in a heating system.

All interfaces and connections for controlling the heating boiler are located on the control board. They are customized to the requirements of the oven.

Power Supply

	Supply voltage	230 V AC +/-10 % (Input voltage for power transformer on the power board, input voltage for STB, Phase for phase angle, relay and Triac output)
	Power supply frequency	50-60 Hz
	Current consumption Supply voltage (230 V AC)	Total current consumption 200 mA + current consumption of the connected loads (Starting with HW 2.80: max. 16 A)
		Power supply transformer Supply for the power board and CPU electronics Supply for Heater Lambda sensor: 200 mA
		The power supply is switched of STB, L-STB Loads connected over fuse F4 (3,15 AT): X11 Primary fan: maximum 690 W/ maximum 3 A Loads connected over fuse F5 (10 AT): X14 Screw: maximum 690 W/ maximum 3 A
		Loads connected over fuse F6 (10 AT): X9 Turbine: maximum 2300 W/ maximum 10 A Loads connected over fuse F7 (10 AT): X8 Ignition: maximum 2300 W/ maximum 10 A Loads connected over fuse F8 (10 AT): X5 Heat exchange cleaner: maximum 690 W/maximum 3 A X6 Grate open: maximum 690 W/maximum 3 A X7 Grate closed: maximum 690 W/maximum 3 A
		The power supply not switched over STB, L Loads connected over fuse F9 (10 AT): X10 boiler circuit return flow pump: maximum 2300 W/ maximum 10 A

+24 V Supply Specifications

	Minimum current available for external users (CPU for the heating control, internal expansion modules...)	minimum 400 mA at +24 V DC
	Applicable connectors	X61

Performance Data

	Processor	AT90CAN32
	Controller frequency	6.0 MHz
	Command execution time	circa 2 µs
	Interfaces	1x CAN
	Internal program memory	32-kbytes (Flash)
	Internal data and/or program buffering (internal EEPROM)	1 kByte (Flash) no battery buffering required
	External data memory	no
	Signal generator	no
	Real-time clock	no

Terminal Requirements

	Connection technology (starting with HW 2.70) **Connector terminals are not included in delivery!**	The following spring terminals are required: 1x 2-pin FKC 2.5 HC/ 2-ST-5.08 Phoenix Contact spring terminal connector RM 5.08 11x 3-pin FKC 2.5/ 3-ST-5.08 Phoenix Contact spring terminal connector RM 5.08 1x 4-pin FKC 2.5/ 4-ST-5.08 Phoenix Contact spring terminal connector RM 5.08 1x 4-pin FKC 2.5 HC/ 4-ST-5.08 Phoenix Contact spring terminal RM 5.08 25x 2-pin FK-MCP 1.5/ 2-ST-3.5 Phoenix Contact spring terminal connector RM 3.5 2x 3-pin FK-MCP 1.5/ 3-ST-3.5 Phoenix Contact spring terminal connector RM 3.5 (option) 1x 4-pin FK-MCP 1.5/ 4-ST-3.5 Phoenix Contact spring terminal connector RM 3.5 1x 6-pin FK-MCP 1.5/ 6-ST-3.5 Phoenix Contact spring terminal connector RM 3.5 2x 5-pin 733-105 Wago connector plug with Clamp technology RM 2.5

Digital Input Specifications DI1-13

	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	13	
	Connector	13x 2-pin, RM 3.5	
	Application	DI1: Worm gear temperature X44 DI2: Grate sensor X45 DI3: Valve sensor 1 X46 DI4: external contact X47 DI5: Worm gear X48 DI6: Reserve X49 DI7: Reserve X50	DI8: Reserve X51 DI9: Reserve X52 DI10: Reserve X53 DI11: Reserve X54 DI12: Reserve X55 DI13: Reserve X56

Digital Input Specifications DI16

	Number	1
	Connector	without internal circuit
	Application	DI16: STB cutoff active (230 V AC)

Digital Input Specifications DI17

	Input signal	open collector (up to HW-Version 1.1), +24 V (starting from HW-Version 2.0)
	Input frequency	maximum 600 Hz
	Signal analysis	1X
	Counter resolution	8-bit
	Input current	3 mA at +24 V
	Input delay	typically 20 µs
	Number	1
	Connector	3-pin, RM 3.5
	Application	DI17: Speed feedback primary fan X57

Digital Output Specifications DA2, DA4: Relay Outputs – 230 V AC/10 V

	Number	2
	Relay type	normally open
	Relays	RT314024 WG
	Switching range	16.8-30 V DC
	Switching current	typically 11 mA at + 24 V
	Switching time	circa 10 ms
	Switching power	see data sheet: Tyco Schrack RT1 series
	Fuse	10 AT
	Connector	2x 3-pin, RM 5.08
	Application	- DA2: Heat exchange cleaner X5 (switched by STB) - DA4: Grate closed X7(switched by STB)

Digital Output Specifications DA5-7: Relay Outputs – 230 V AC/10 V

	Number	3
	Relay type	normally open
	Relays	RT314024 WG
	Switching range	16.8-30 V DC
	Switching current	typically 11 mA at + 24 V
	Switching time	circa 10 ms
	Switching power	see data sheet: Tyco Schrack RT1 series
	Fuse	10 AT
	Connector	3x 3-pin, RM 5.08
	Application	- DA5: Ignition X8 (switched by STB) - DA6: Turbine X9 (switched by STB) - DA7: Return flow pump X10 (not switched by STB)

Digital Output Specifications DA1: 230 V AC/3 A potential-free contact

	Number	1
	Relay type	changeover contacts, potential-free
	Relays	RT314024 WG
	Switching range	16.8-30 V DC
	Switching current	typically 11 mA at + 24 V
	Switching time	circa 10 ms
	Switching power	see data sheet: Tyco Schrack RT1 series
	Fuse	-
	Connector	1x 3-pin, RM 5.08
	Application	DA1: Error X4

Digital Output Specifications DA3: Relay Outputs – 230 V AC/10 V

	Number	1
	Relay type	normally open
	Relays	RT31L024 WG
	Switching range	16.8-30 V DC
	Switching current	typically 11 mA at + 24 V
	Switching time	circa 10 ms

Switching power	see data sheet: Tyco Schrack RT1 series
Max. output current	10 A output
Max. inrush current	80 A for 20 ms 30 A for 4 s
Fuse	10 AT
Connector	1x 3-pin, RM 5.08
Application	X6

Digital Triac Output Specifications (zero-point switching, not clocked)

Number of relays	1
Relays	Crydom MP240D4
Switching range	3-32 V
Switching current	typically 2.6 mA at +5 V
Switching time	< 10 ms
Switching power	230 V/4.0 A at 0 °C ambient temperature 230 V/4.0 A at 35 °C ambient temperature 230 V/2.0 A at 80 °C ambient temperature details can be found in the MP240D4 data sheet
Zero-point switching	yes
Protective circuit	yes (RC network and Varistor on output)
Fuse	10 AT
Connector	1x 3-pin, RM 5.08
Application	DA20: Worm gear X14 (switched by STB)

Digital Triac Output Specifications (Phase Angle Control), X11

Number of Triac outputs	1
Operation mode	phase angle control angle of ignition 0-155° value setting 0-255 (0-100 %) phase shift through load > -27° ... < 72°
Solid state relay	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/2.0 A at 80 °C ambient temperature Details can be found in the SKA20421 data sheet
Zero-point switching	no
Protective circuit	yes (Varistor on output)
Fuse	3.15 AT
Connector	1x 3-pin, RM 5.08
Application	Primary fan X11 (switched by STB)

Digital Relay Output Lambda Sensor Specifications

Number of relays	1
Relay Types	normally open
Relays	NY-24W-K
Switching range	16.8-30 V DC
Switching current	typically 11 mA at + 24 V
Switching time	< 10 ms
Switching power	see data sheet: NY-24W-K
Fuse	2.5 AT
Connector	1x 4-pin Phoenix RM3.5 mm

Digital Output Specifications DA22: PWR Sensor ON

Number	1
Connector	without internal circuit
Application	DA22: Supply power sensor on (Lambda and CO sensors)

Analog Input Specifications AI1, X38: Lambda Sensor Interface

Lambda sensor type	LSM 11 Robert Bosch GmbH No. 0 258 104 002 001
Heating supply	14 V AC - switched by the controller
Heating current	at 13 V AC, approximately 1.4 A
Max. Measurement range analog voltage of the Lambda sensor	-100 ... +100 mV
Input resistance analog input	> 1 MΩ
Current load of the lambda sensor	< 1 µA
Control range with an exhaust gas temperature = 220 °C	1,00-2,00 Lambda value λ 1,85-10,24 % oxygen +68 mV ... +3,5 mV Lambda sensor output voltage
Number	1
Connector	1x 4-pin, RM 3.5

Analog Input Specifications AI2, X39: CO Sensor Interface

CO-Sensor Type	SGAS220 Steinel Solutions AG
Heater voltage	< 10 V DC (regulated through the reference temperature, switched by the controller)
Heating current	up to 100 mA (at activation approximately 300 mA)
Measurement range	0-500 ppm 500-40 kΩ
Number	1
Connector	1x 6-pin, RM 3.5

AI3 and AI20, X60 and X59 Analog Input Secifications: Air Volume Sensor

Power supply	+24 V
Output current	maximum 500 mA
Analog output	5 V
Measurement range	0-2.5 V
Number	2
Connector	1x 5-pin, RM 2.5

Analog Input Specifications AI4-6 and AI8-10: KTY81-110 (-25 ... +100 °C)

Number of channels	6
Sensor Type	KTY81-110 (Ohmic temperature sensor)
Measurement range	-25 ... +100 °C
Sensor range	653-1696 Ω
Measurement value	-250 ... +1000
Resolution	0.2 °C
Typical current measurement	0.9 mA
Input resistance	4,7 KΩ
Connector	1x 2-pin, RM 3.5
Application	AI4: Boiler temperature X28 AI5: Return flow temperature X29 AI6: Ambient temperature X30 AI8: Reserve X32 AI9: Reserve X33 AI10: Reserve X34

Analog Input Specifications AI7: PT1000 (0-250 °C)

Number of channels	1
Sensor Type	PT1000
Measurement range	0-250 °C
Sensor range	1000-1941 Ω
Measurement value	0-2500
Resolution	0.4 °C
Typical current measurement	0.7 mA
Input resistance	5,6 KΩ
Connector	1x 2-pin, RM 3.5
Application	AI7: Exhaust temperature X31

Analog Input Specifications AI11: KTY10-62 (-25 ... +100 °C)

Number of channels	1
Sensor Type	KTY10-62 (ohmic temperature sensor)
Measurement range	-25 ... +100 °C
Sensor range	1308.9-3399.9 Ω
Measurement value	-250 ... +1000
Resolution	0.4 °C
Typical current measurement	0.8 mA
Input resistance	10 kΩ
Connector	1x 2-pin, RM 3.5
Application	AI11: X35: thermal coupling compensation (option) The KTY sensor is located on the control

Analog Input Specifications AI12: NiCr-Ni (0-600 °C)

Number of channels	1
Sensor Type	NiCr-Ni (TYPE K thermo element)
Measurement range	0-600 °C
Sensor range	0-24.905 mV
Measurement value	0-6000
Resolution	0.4 °C
Input resistance	10 kΩ
Connector	1x 2-pin, RM 3.5
Application	AI12: Reserve X36

Analog Input Specifications AI13: NiCr-Ni (0-1200 °C)

Number of channels	1
Sensor Type	NiCr-Ni (TYPE K thermo element)
Measurement range	0-1200 °C
Sensor range	0-48.828 mV
Measurement value	0-12000
Resolution	0.4 °C
Input resistance	24 kΩ
Connector	1x 2-pin, RM 3.5
Application	AI13: Reserve X37

Analog Input Specifications AI21: 0-10 V

Number of channels	1
Measurement range	0-10 V
Measurement value	0-10000
Resolution	20 mV
Input resistance	100 KΩ
Connector	1x 3-pin, RM 3.5
Application	AI21: External controller X42

Analog Input Specifications AI22: 0-3 V

Number of channels	1
Measurement range	0-3 V
Measurement value	0-3000
Resolution	20 mV
Input resistance	150 KΩ
Connector	1x 2-pin, RM 3.5
Application	AI22: Reserve X27

Analog Output Specifications AO1: 0-10 V

Number of channels	1
Output range	0-10 V
Output value	0-10000
Resolution	20 mV
Output current	maximum 10 mA
Connector	1x 2-pin, RM 3.5
Application	AO1: Secondary fan, X43

Article Number and Miscellaneous

Article number	05-895-521-1

Environmental Conditions

Storage temperature	-20 ... +70 °C	
Operating temperature	0 ... +60 °C	
Humidity	0-95 %, non-condensing	
EMC stability	according to EN 61000-6-2:2001	
Shock resistance	EN 60068-2-27	150 m/s²